DPO70000SX
Series Oscilloscopes

Technical Reference

077-1043-01

Tektronix

DPO70000SX
Series Oscilloscopes

Technical Reference

Warning

The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

Supports Product Firmware V7.0 and above.

www.tektronix.com
077-1043-01

Tektronix

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- In North America, call 1-800-833-9200.
- Worldwide, visit *www.tektronix.com* to find contacts in your area.

Table of Contents

Contacting Tektronix 0
Important safety information iii
General safety summary iii
Terms in the manual vi
Terms on the product vi
Symbols on the product vi

Specifications

Vertical system analog channels 1
Horizontal and acquisition system 15
Trigger specifications 18
Input-output port specifications 25
Data storage specifications 27
Power source specification 28
Mechanical specifications 28
Environmental specifications 29

Performance verification

Performance verification 31
Conventions 32
Brief procedures 34
Self tests 34
Functional tests 35
Verify all analog input channels 36
Verify the time base 38
Verify the A (Main) and B (Delayed) trigger systems 40
Verify the file system 41
Performance tests 42
Prerequisites 43
Equipment required 43
Test record 48
Signal acquisition system checks 86
Check DC voltage measurement accuracy, ATI channel 87
Check DC voltage measurement accuracy, TekConnect channels 90
Check DC gain accuracy, ATI channel 97
Check DC gain accuracy, TekConnect channels 100

Check offset accuracy, ATI channel 125
Check offset accuracy, TekConnect channels 128
Check analog bandwidth, ATI channel 132
Check channel bandwidth, TekConnect channels 135
Check Input Resistance, ATI channel 140
Check input resistance, TekConnect channels 141
Time base system checks 143
Check timebase and delay time accuracy and reference 143
Check delta time measurement accuracy 147
Trigger system checks 152
Check time qualified trigger accuracy 152
Check sensitivity edge trigger DC coupled 156
Output signal checks 163
Check fast edge output 163
Sine wave generator leveling procedure 168
Method 1 168
Method 2 170

Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

To avoid fire or personal injury

Use proper power cord. Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.

Ground the product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect. The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Connect and disconnect properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source. Use only insulated voltage probes, test leads, and adapters supplied with the product, or indicated by Tektronix to be suitable for the product.

Observe all terminal ratings. To avoid fire or shock hazard, observe all rating and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not exceed the Measurement Category (CAT) rating and voltage or current rating of the lowest rated individual component of a product, probe, or accessory. Use caution when using 1:1 test leads because the probe tip voltage is directly transmitted to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Provide proper ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment. Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product. This product is provided with handles for lifting and carrying.

WARNING. *The product is heavy. To reduce the risk of personal injury or damage to the device get help when lifting or carrying the product.*

Use only the Tektronix rackmount hardware specified for this product.

Probes and test leads

Before connecting probes or test leads, connect the power cord from the power connector to a properly grounded power outlet.

Keep fingers behind the finger guards on the probes.

Remove all probes, test leads and accessories that are not in use.

Use only correct Measurement Category (CAT), voltage, temperature, altitude, and amperage rated probes, test leads, and adapters for any measurement.

Terms in the manual

These terms may appear in this manual:

WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the product

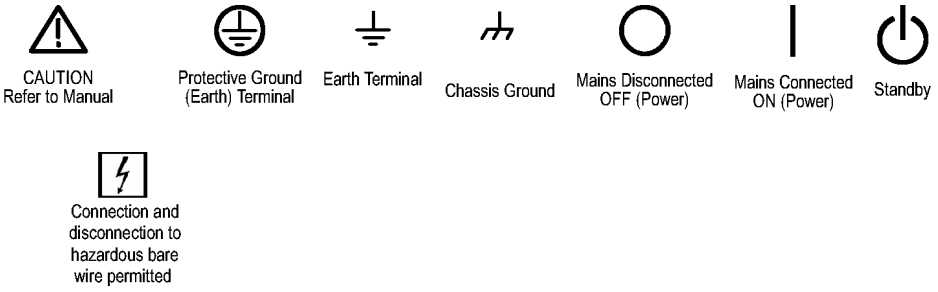
These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

Symbols on the product

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbols may appear on the product:



Specifications

This chapter contains specifications for the instrument. All specifications are guaranteed unless noted as "typical." Typical specifications are provided for your convenience but are not guaranteed. Specifications that are marked with the ✓ symbol are checked in Performance Verification.

All specifications apply to all models unless noted otherwise. To meet specifications, the following conditions must first be met:

- The instrument must have been calibrated in an ambient temperature range between 18 °C and 28 °C.
- The instrument must be powered from a source that meets the specifications.
- The instrument must have been operating continuously for twenty minutes within the specified operating temperature range. (60 minutes continuous operation required if the ambient relative humidity is greater than 60%.)
- You must perform the Signal Path Compensation (SPC) operation described in the user manual and the online help. If the operating temperature changes by more than 5 °C, you must perform the SPC operation again.

Vertical system analog channels

Number of channels	≥50 GHz models: 2+1, <50 GHz models: Four channels, all identical
Input connector	
TekConnect channels:	TekConnect. Power supply compatible with VPI.
ATI channel:	Male 1.85 mm coax.
Input coupling	
TekConnect channels:	Two modes: DC, 50 ohms to a programmable termination voltage; Ground. The termination can be connected to a DC voltage: ≤ 1.2 V_{FS} settings: -3.5 V to 3.5 V, > 1.2 V_{FS} settings: 0.0 V
ATI channel:	DC, 50 Ω.
✓ **Input resistance**	
≤1.2 V_{FS} settings	50 Ω ±3% at 18 to 28 ºC (64 to 82 ºF) 50 Ω ±4% over 5 to 45 ºC (45 to 113 ºF)
>1.2 V_{FS} settings	50 Ω ±4.4% over 5 to 45 ºC (45 to 113 ºF)

Maximum input voltage	
TekConnect channels:	≤1.2 V_{FS} settings:
	±1.5 V relative to the termination bias (30 mA maximum)
	±5 V absolute maximum input
	>1.2 V_{FS} settings:
	±8 V. Limited by maximum Vterm current and the attenuator power rating at maximum temperature.
ATI channel:	±0.75 V_{pk}
Aux channel:	±5.0 V_{pk}
Input termination voltage (VTerm) range, TekConnect channels	
≤1.2 V_{FS} settings:	-3.5 V to +3.5 V
>1.2 V_{FS} settings:	0 V
Input VSWR	Measured with a TekConnect TCA-292D adaptor and a network analyzer.
≤1.2 V_{FS} settings:	0 – 17 GHz: 1.4:1
	17 – 20 GHz: 1.6:1
	20 – 33 GHz: 2.0:1
>1.2 V_{FS} settings:	0 – 17 GHz: 1.4:1
	17 – 33 GHz: 2.0:1
ATI channel:	0-20GHz: 1.7:1
	>20-33 GHz: 2.0:1
	> 33-70 GHz: 3.0:1
Number of digitized bits	8 bits
Digitizer nonlinearity (typical)	< 1.0 DL (digitization level), differential; < 1 DL integral, independently based
Sensitivity range	
TekConnect channels	62.5 mV_{FS} to 6 V_{FS}
ATI channel	100 mV_{FS} to 300 mV_{FS}.
DC gain accuracy	± 2%
DC voltage measurement accuracy, Sample, Average, and Hi-Res modes	Net offset = offset - (position × volts/division).

Full scale setting	DC measurement accuracy
62.5 mV_{FS} – 1.2 V_{FS} [1]	±[2% | vertical value - net offset | + 0.4% | net offset | + 0.2% | net offset – Vterm setting | +2.5 mV + 0.014 FS]
1.21 V_{FS} – 6 V_{FS}	±[2% | vertical value - net offset | + 0.4% | net offset | + 12.5 mV + 0.014 FS]
Delta volts reading	
62.5 mV_{FS} – 6 V_{FS}	±[2% | vertical value – net offset | + 0.008 FS]

Position range

± 5 divisions

Offset range

TekConnect channels

Full Scale voltage range	Offset range
62.5 mV_{FS} – 1.2 V_{FS}	±3.4 V
>1.2 V_{FS} – 6 V_{FS}	±6 V

ATI channel

Full Scale voltage range	Offset range
100 mV_{FS} – 300 mV_{FS}	±300 mV - (10 div × Volts/div)

Offset accuracy

Net offset = offset - (position × volts/division).

Full scale voltage range	Offset accuracy
62.5 mV_{FS} to 1.2 V_{FS} (TekConnect channels)	±(0.4% | net offset | + 0.2% | net offset – Vterm setting | + 2.5 mV + 1% FS)
>1.2 V_{FS} to 6 V_{FS} (TekConnect channels)	±(0.6% | net offset | + 13.4 mV + 1% FS)
100 mV_{FS} to 300 mV_{FS} (ATI channel)	±(0.35% | net offset | + 2 mV + 1% FS)

Analog bandwidth

Bandwidth with a TCA292D adapter on TekConnect channels or directly into ATI channel.

Ambient temperature 18ºC to 28ºC assumed for all guaranteed bandwidth specifications.

Enhanced bandwidth is guaranteed at the following full scale (FS) stepped gain settings:

TekConnect channels: 62.5 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, and 5 V.

ATI channel: All settings from 100 mV through 300 mV.

[1] For ATI channels, the full scale settings range is 100 mV_{FS} to 300 mV_{FS}.

Instrument	Channel	BW settings	Bandwidth [2]	Sample rate
DPO77002SX	ATI, 1 Ch	70 GHz BWE	>67 GHz 70 GHz typical	200 GS [3]
DPO77002SX DPO73304SX	TekConnect, 2 Ch	No BWE	>33 GHz	All
DPO77002SX DPO73304SX	TekConnect, 2 Ch	33 GHz BWE	>33 GHz	100 GS/s
DPO77002SX DPO73304SX	TekConnect, 2 Ch TekConnect, 4 Ch	23 GHz BWE	>23 GHz	50 GS/s
DPO75902SX	ATI, 1 Ch	59 GHz BWE	>59 GHz	200 GS
DPO75902SX DPO75002SX	ATI, 1 Ch	50 GHz BWE	>50 GHz	200 GS
DPO75902SX	TekConnect	No BWE	>33 GHz	All
DPO75002SX	TekConnect	No BWE	>25 GHz	All
DPO75002SX	TekConnect	25 GHz BWE	>25 GHz	100 GS/s
DPO75002SX	TekConnect	23 GHz BWE	>23 GHz	50 GS/s
DPO72304SX	TekConnect	No BWE	>23 GHz	50 GS/s, 100 GS/s
DPO72304SX	TekConnect	23 GHz BWE	>23 GHz	50 GS/s, 100 GS/s

TekConnect channel

Typical temperature derating			
Frequency	**TC, (dB/°C)**	**5 °C**	**45 °C**
DC - 5 GHz	0.005 dB/°C	0.07	-0.09
10 GHz	0.010 dB/°C	0.13	-0.17
15 GHz	0.025 dB/°C	0.33	-0.43
20 GHz	0.045 dB/°C	0.59	-0.77
23 GHz	0.10 dB/°C	1.30	-1.70
25 GHz	0.10 dB/°C	1.30	-1.70
30 GHz	0.115 dB/°C	1.50	-1.96
33 GHz	0.160 dB/°C	2.08	-2.72

ATI channel

Typical temperature derating			
Frequency	**TC, (dB/°C)**		
DC - 10 GHz	0.002 dB/°C		
15 GHz	0.005 dB/°C		
20 GHz	0.01 dB/°C		
30 GHz	0.05 dB/°C		
40 GHz	0.07 dB/°C		
50 GHz	0.05 dB/°C		

[2] To determine the amount of performance derating above the temperature limit, use the Typical Temperature Variation table.

[3] 200 GS/s is the only sample rate available on the ATI channel.

Typical temperature derating			
Frequency	**TC, (dB/°C)**		
60 GHz	0.05 dB/°C		
67 GHz	0.05 dB/°C		

Frequency response tolerance

All modes, BWE on, 18 ºC to 28 ºC (typical)

To determine the amount of performance derating above the temperature limit, use the Typical Temperature Variation table

TekConnect channel:

Step settings TekConnect channels: 77.5 mV_{FS}, 151 mV_{FS}, 302 mV_{FS}, 605 mV_{FS}, 1210 mV_{FS}., 1620 $mV_{FS,}$ 3240 mV_{FS}

±0.5 dB from DC to 50% of nominal BW

±1.5 dB from 50% to 80% of nominal BW

All other gain settings:

±1.0 dB from DC to 50% of nominal BW

±2.0 dB from 50% to 80% of nominal BW

ATI channel:

All volts/div settings

±0.5 dB from DC to 20 GHz

±0.75 dB from >20 GHz to 30 GHz

±1.25 dB from >30 GHz to 68.5 GHz

±2 dB from >68.5 GHz to 69.5 GHz

+2 / -3 dB at 70 GHz

TekConnect channel

Typical temperature derating			
Frequency	**TC, (dB/°C)**	**5 °C**	**45 °C**
DC - 5 GHz	0.005 dB/°C	0.07	-0.09
10 GHz	0.010 dB/°C	0.13	-0.17
15 GHz	0.025 dB/°C	0.33	-0.43
20 GHz	0.045 dB/°C	0.59	-0.77
23 GHz	0.10 dB/°C	1.30	-1.70
25 GHz	0.10 dB/°C	1.30	-1.70
30 GHz	0.115 dB/°C	1.50	-1.96
33 GHz	0.160 dB/°C	2.08	-2.72

ATI channel

Typical temperature derating			
Frequency	**TC, (dB/°C)**		
DC - 5 GHz	0.005 dB/°C		
DC - 10 GHz	0.002 dB/°C		
15 GHz	0.005 dB/°C		
20 GHz	0.01 dB/°C		
30 GHz	0.05 dB/°C		
40 GHz	0.07 dB/°C		
50 GHz	0.05 dB/°C		
60 GHz	0.05 dB/°C		

Calculated rise time

Calculated risetimes for specified instrument bandwidths

Instrument bandwidth	BWE On		BWE Off	
	10% - 90%	20% - 80%	10% - 90%	20% - 80%
70 GHz	5.6 ps	4.3 ps	n/a	n/a
50 GHz	7.8 ps	6 ps	n/a	n/a
33 GHz	13 ps	9 ps	21 ps	14 ps
25 GHz	16 ps	12 ps	22 ps	15 ps
23 GHZ	17 ps	13 ps	24 ps	16 ps

Step response settling time (typical)

The time by which the step response enters and stays below the indicated % error. Step transition occurs at the 50% amplitude point of the step leading edge.

BWE off

Instrument	Gain setting (FS)	Settling Error	
		Amount	Time
DPO77002SX TekConnect channels	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<6% <5.5% <3%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms
DPO75902SX TekConnect channels	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<6% <5.5% <3%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms
DPO75002SX TekConnect channels	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<6% <5.5% <3%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms
DPO73304SX	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<6% <5.5% <3%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms
DPO72304SX	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<6% <5% <3%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms

BWE on (fastest BWE setting)

BWE on (fastest BWE setting) Instrument Gain setting (FS) Settling

Instrument	Gain setting (FS)	Settling Error	
		Amount	Time
DPO77002SX, DPO75902SX, DPO75002SX ATI channel	100 mV, 200 mV, 300 mV	<3.5% <2.5% <1.5%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms
DPO77002SX, DPO75902SX, DPO75002SX TekConnect channels	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<3.5% <2.5% <1.5%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms
DPO73304SX, DPO72304SX	62.5 mV, 100 mV, 200 mV, 500 mV, 1.0 V, 1.2 V, 1.4 V, 2 V, 4 V	<3.5% <2.5% <1.5%	150 ps – 400 ps 400 ps – 3 ns 3 ns – 1 ms

Effective bits, typical.

The following charts give the typical effective bits for a 225 mV p-p sine-wave input sampled at 250 mV_{FS} and maximum sample rate.

	DPO77002SX	DPO75902SX	DPO75002SX
Input Frequency	200 GS/s 70 GHz	200 GS/s 59 GHz	200 GS/s 50 GHz
10 MHz	5.0 bits	5.13 bits	5.22 bits
0.92 GHz	5.0 bits	5.13 bits	5.21 bits
1.92 GHz	5.0 bits	5.13 bits	5.21 bits
2.92 GHz	5.0 bits	5.14 bits	5.21 bits
3.92 GHz	5.0 bits	5.13 bits	5.21 bits
4.92 GHz	4.9 bits	5.02 bits	5.10 bits
5.92 GHz	4.9 bits	5.03 bits	5.10 bits
6.92 GHz	4.9 bits	5.02 bits	5.09 bits
7.92 GHz	4.9 bits	5.02 bits	5.08 bits
8.92 GHz	4.9 bits	5.02 bits	5.09 bits
9.92 GHz	4.9 bits	5.03 bits	5.10 bits
10.92 GHz	4.9 bits	5.03 bits	5.10 bits
11.92 GHz	4.9 bits	5.07 bits	5.14 bits
12.92 GHz	4.9 bits	5.06 bits	5.18 bits
13.92 GHz	4.9 bits	5.08 bits	5.20 bits
14.92 GHz	4.9 bits	5.11 bits	5.22 bits
15.92 GHz	4.8 bits	4.98 bits	5.11 bits
16.92 GHz	4.8 bits	4.88 bits	5.05 bits
17.92 GHz	4.7 bits	4.75 bits	4.90 bits
18.92 GHz	4.7 bits	4.76 bits	4.92 bits
19.92 GHz	4.7 bits	4.80 bits	4.93 bits
20.92 GHz	4.7 bits	4.81 bits	4.93 bits
21.92 GHz	4.6 bits	4.76 bits	4.85 bits
22.92 GHz	4.6 bits	4.81 bits	4.89 bits
23.92 GHz	4.8 bits	4.87 bits	4.94 bits
24.92 GHz	4.7 bits	4.83 bits	4.89 bits
25.92 GHz	4.7 bits	4.84 bits	4.92 bits
26.92 GHz	4.6 bits	4.86 bits	4.93 bits
27.92 GHz	4.6 bits	4.82 bits	4.90 bits
28.92 GHz	4.6 bits	4.85 bits	4.94 bits
29.92 GHz	4.6 bits	4.85 bits	4.95 bits
30.92 GHz	4.6 bits	4.74 bits	4.90 bits
31.92 GHz	4.5 bits	4.70 bits	4.80 bits
32.92 GHz	4.5 bits	4.58 bits	4.74 bits
33.92 GHz	4.5 bits	4.67 bits	4.76 bits
35.92 GHz	4.5 bits	4.60 bits	4.67 bits

	DPO77002SX	DPO75902SX	DPO75002SX
37.92 GHz	4.3 bits	4.41 bits	4.47 bits
39.92 GHz	4.3 bits	4.57 bits	4.65 bits
41.92 GHz	4.4 bits	4.49 bits	4.62 bits
43.92 GHz	4.6 bits	4.71 bits	4.87 bits
45.92 GHz	4.4 bits	4.54 bits	4.71 bits
47.92 GHz	4.4 bits	4.53 bits	4.64 bits
49.92 GHz	4.4 bits	4.60 bits	4.68 bits
51.92 GHz	4.5 bits	4.72 bits	
53.92 GHz	4.6 bits	4.63 bits	
55.92 GHz	4.5 bits	4.57 bits	
57.92 GHz	4.5 bits	4.43 bits	
59.92 GHz	4.8 bits	4.90 bits	
61.92 GHz	4.8 bits		
63.92 GHz	4.9 bits		
65.92 GHz	4.9 bits		
67.92 GHz	4.9 bits		
69.92 GHz	4.7 bits		

BWE on, Enhanced MIMO filter, full bandwidth

	DPO70002SX, DPO75902SX, DPO75002SX, DPO73304SX TekConnect channels		DPO72304SX	
Input frequency	100 GS/s, 33 GHz	50 GS/s, 23 GHz	100 GS/s, 23 GHz	50 GS/s, 23 GHz
10 MHz	5.4 bits	5.4 bits	5.9 bits	5.3 bits
1 GHz	5.2 bits	5.3 bits	5.8 bits	5.2 bits
2 GHz	5.2 bits	5.2 bits	5.7 bits	5.2 bits
3 GHz	5.1 bits	5.1 bits	5.6 bits	5.1 bits
4 GHz	5.1 bits	5.2 bits	5.6 bits	5.2 bits
5 GHz	5.2 bits	5.1 bits	5.6 bits	5.1 bits
6 GHz	5.0 bits	5.1 bits	5.6 bits	5.0 bits
7 GHz	5.0 bits	5.1 bits	5.5 bits	5.1 bits
8 GHz	5.1 bits	5.1 bits	5.6 bits	5.1 bits
9 GHz	5.1 bits	5.0 bits	5.6 bits	5.0 bits
10 GHz	5.2 bits	5.1 bits	5.5 bits	5.0 bits
11 GHz	5.1 bits	4.9 bits	5.4 bits	4.9 bits
12 GHz	5.2 bits	5.0 bits	5.5 bits	5.0 bits
13 GHz	5.1 bits	4.9 bits	5.4 bits	4.9 bits
14 GHz	5.1 bits	4.9 bits	5.3 bits	4.8 bits
15 GHz	4.9 bits	4.8 bits	5.1 bits	4.8 bits

	DPO70002SX, DPO75902SX, DPO75002SX, DPO73304SX TekConnect channels		DPO72304SX	
16 GHz	4.8 bits	4.8 bits	5.2 bits	4.7 bits
17 GHz	4.9 bits	4.8 bits	5.2 bits	4.7 bits
18 GHz	4.9 bits	4.8 bits	5.3 bits	4.8 bits
19 GHz	4.8 bits	4.8 bits	5.2 bits	4.7 bits
20 GHz	4.7 bits	4.6 bits	5.1 bits	4.7 bits
21 GHz	4.8 bits	4.8 bits	5.3 bits	4.8 bits
22 GHz	4.8 bits	4.9 bits	5.3 bits	4.8 bits
23 GHz	4.9 bits		5.2 bits	
24 GHz	5.0 bits			
25 GHz	4.8 bits			
26 GHz	4.9 bits			
27 GHz	4.8 bits			
28 GHz	4.7 bits			
29 GHz	4.9 bits			
30 GHz	4.9 bits			
31 GHz	4.8 bits			
32 GHz	4.8 bits			
33 GHz	4.8 bits			

BWE on, full bandwidth

Nine division sine wave input at the indicated frequency, sampled at 500 mV_{FS} vertical sensitivity and maximum sample rate

	DPO73304SX, DPO77002SX, DPO75902SX, DPO75002SX TekConnect channels		**DPO72304SX**	
Input frequency	100 GS/s, 33 GHz	50 GS/s, 23 GHz	100 GS/s, 23 GHz	50 GS/s, 23 GHz
10 MHz	5.4 bits	5.2 bits	6.0 bits	5.2 bits
1 GHz	4.9 bits	5.0 bits	5.5 bits	5.0 bits
2 GHz	4.9 bits	5.0 bits	5.3 bits	5.0 bits
3 GHz	5.0 bits	4.9 bits	5.4 bits	4.9 bits
4 GHz	4.5 bits	4.8 bits	4.8 bits	4.5 bits
5 GHz	4.7 bits	4.7 bits	5.3 bits	4.7 bits
6 GHz	4.8 bits	4.7 bits	5.2 bits	4.7 bits
7 GHz	4.9 bits	4.8 bits	5.3 bits	4.8 bits
8 GHz	5.0 bits	4.8 bits	5.4 bits	4.8 bits
9 GHz	5.0 bits	4.7 bits	5.3 bits	4.7 bits
10 GHz	5.0 bits	4.7 bits	5.4 bits	4.7 bits
11 GHz	5.0 bits	4.7 bits	5.2 bits	4.7 bits
12 GHz	5.1 bits	4.7 bits	5.3 bits	4.7 bits
13 GHz	4.7 bits	4.7 bits	5.2 bits	4.7 bits
14 GHz	5.0 bits	4.8 bits	5.2 bits	4.8 bits
15 GHz	4.8 bits	4.6 bits	5.1 bits	4.6 bits
16 GHz	4.6 bits	4.6 bits	5.2 bits	4.6 bits
17 GHz	4.8 bits	4.6 bits	5.1 bits	4.6 bits
18 GHz	4.7 bits	4.6 bits	5.1 bits	4.6 bits
19 GHz	4.5 bits	4.6 bits	5.0 bits	4.6 bits
20 GHz	4.4 bits	4.5 bits	5.0 bits	4.6 bits
21 GHz	4.4 bits	4.6 bits	5.1 bits	4.6 bits
22 GHz	4.6 bits	4.6 bits	5.1 bits	4.6 bits
23 GHz	4.6 bits		5.1 bits	
24 GHz	4.7 bits			
25 GHz	4.7 bits			
26 GHz	4.6 bits			
27 GHz	4.6 bits			
28 GHz	4.6 bits			
29 GHz	4.6 bits			
30 GHz	4.6 bits			
31 GHz	4.5 bits			
32 GHz	4.5 bits			
33 GHz	4.5 bits			

Full analog bandwidth

	DPO73304SX, DPO77002SX, DPO75902SX, DPO75002SX TekConnect channels		DPO72304SX	
Input frequency	100 GS/s	50 GS/s	100 GS/s	50 GS/s
10 MHz	5.2 bits	5.2 bits	5.4 bits	5.2 bits
1 GHz	4.8 bits	4.8 bits	5.0 bits	5.0 bits
2 GHz	4.9 bits	4.9 bits	5.1 bits	5.0 bits
3 GHz	4.8 bits	4.8 bits	5.1 bits	4.9 bits
4 GHz	4.7 bits	4.7 bits	4.7 bits	4.7 bits
5 GHz	4.7 bits	4.7 bits	4.8 bits	4.7 bits
6 GHz	4.7 bits	4.7 bits	4.8 bits	4.7 bits
7 GHz	4.7 bits	4.7 bits	4.9 bits	4.7 bits
8 GHz	4.6 bits	4.6 bits	4.9 bits	4.8 bits
9 GHz	4.6 bits	4.7 bits	4.9 bits	4.7 bits
10 GHz	4.7 bits	4.7 bits	4.9 bits	4.7 bits
11 GHz	4.7 bits	4.7 bits	4.9 bits	4.7 bits
12 GHz	4.7 bits	4.7 bits	4.9 bits	4.7 bits
13 GHz	4.5 bits	4.5 bits	4.8 bits	4.5 bits
14 GHz	4.7 bits	4.7 bits	4.9 bits	4.7 bits
15 GHz	4.6 bits	4.6 bits	4.7 bits	4.6 bits
16 GHz	4.4 bits	4.5 bits	4.7 bits	4.5 bits
17 GHz	4.4 bits	4.5 bits	4.7 bits	4.5 bits
18 GHz	4.4 bits	4.5 bits	4.6 bits	4.5 bits
19 GHz	4.1 bits	4.2 bits	4.5 bits	4.5 bits
20 GHz	4.2 bits	4.3 bits	4.5 bits	4.5 bits
21 GHz	4.5 bits	4.5 bits	4.6 bits	4.5 bits
22 GHz	4.4 bits	4.5 bits	4.8 bits	4.5 bits
23 GHz	4.4 bits	4.5 bits	4.8 bits	4.3 bits
24 GHz	4.5 bits	4.4 bits		
25 GHz	4.4 bits	4.5 bits		
26GHz	4.3 bits	4.4 bits		
27 GHz	4.3 bits	4.1 bits		
28 GHz	4.1 bits	4.1 bits		
29 GHz	3.8 bits	4.2 bits		
30 GHz	4.2 bits	4.2 bits		
31 GHz	4.2 bits	4.4 bits		
32 GHz	4.1 bits	4.1 bits		
33 GHz	4.2 bits	4.3 bits		

Noise (typical)

Gain setting, full scale, BWE off	DPO77002SX, DPO75902SX, DPO75002SX, DPO73304SX TekConnect channels	DPO72304SX
62.5 mV	0.88 mV	0.79 mV
100 mV	0.96 mV	0.86 mV
200 mV	1.53 mV	1.41 mV
500 mV	4.19 mV	3.14 mV
1 V	8.30 mV	6.10 mV
2.0 V	18.84 mV	14.19 mV
3.0 V	24.64 mV	19.09 mV
4.0 V	37.91 mV	26.01 mV
5.0 V	43.36 mV	31.84 mV
6.0 V	47.93 mV	36.97 mV

Gain setting, full scale, BWE on	DPO77002SX, DPO75902SX, DPO75002SX, DPO73304SX TekConnect channels		DPO72304SX	
	100 GS/s	50 GS/s	100 GS/s	50 GS/s
62.5 mV	0.84 mV	0.84 mV	0.75 mV	0.72 mV
100 mV	0.93 mV	0.93 mV	0.78 mV	0.82 mV
150 mV	1.31 mV	1.29 mV	1.08 mV	1.19 mV
200 mV	1.52 mV	1.60 mV	1.14 mV	1.43 mV
200 mV	2.49 mV	2.52 mV	2.10 mV	2.29 mV
400 mV	2.92 mV	3.12 mV	2.58 mV	2.29 mV
500 mV	3.55 mV	3.80 mV	2.65 mV	3.38 mV
600 mV	4.86 mV	4.86 mV	4.14 mV	4.42 mV
700 mV	5.25 mV	5.39 mV	4.64 mV	4.96 mV
800 mV	5.76 mV	6.08 mV	5.08 mV	5.52 mV
900 mV	6.30 mV	6.66 mV	5.63 mV	6.13 mV
1 V	6.80 mV	7.30 mV	5.09 mV	6.54 mV
1.1 V	8.69 mV	9.02 mV	7.79 mV	8.20 mV
1.2 V	9.12 mV	9.60 mV	8.28 mV	8.72 mV
2.0 V	15.40 mV	14.5 mV	11.66 mV	14.65 mV
3.0 V	19.91 mV	19.82 mV	15.31 mV	20.51 mV
4.0 V	28.83 mV	27.85 mV	21.61 mV	27.84 mV
5.0 V	34.32 mV	32.80 mV	25.69 mV	34.07 mV
6.0 V	39.82 mV	38.96 mV	29.65 mV	39.18 mV

Gain setting, full scale, ATI channel	DPO77002SX DPO75902SX, DPO75002SX
100 mV	1.19 mV
200 mV	1.76 mV
250 mV	2.10 mV
300 mV	2.49 mV

Channel-to-channel crosstalk (channel isolation), typical

Input frequency range (up to the rated bandwidth). Assumes two channels with the same scale and bandwidth settings. The limits apply up to the bandwidth of the particular instrument.

ATI models		
Specified channels	**Instrument frequency range**	**Isolation**
ATI channels (isolation between any two [or more] ATI channels in separate units), requires UltraSync	DC to 70 GHz	70 dB
TekConnect channels in an ATI unit (isolation between channels 1 and 3)	DC to 33 GHz	60 dB
TekConnect channels to ATI channel (isolation between channels 1 and 3 to channel 2)	DC to 4 GHz	55 dB
	>4 GHz to 10 GHz	45 dB
	>10 GHz to 20 GHz	35 dB
	>20 GHz to 30 GHz	30 dB
	>30 GHz to 33 GHz	27 dB
ATI channel to TekConnect (non-ATI) channels (isolation between channel 2 and channels 1 or 3)	DC to 3 GHz	55 dB
	>3 GHz to 12 GHz	40 dB
	>12 GHz to 33 GHz	30 dB
	>33 to 70 GHz	60 dB

TekConnect models (non-ATI)		
Specified channels	**Instrument frequency range**	**Isolation**
Isolation between channels 1 or 2 and channels 3 or 4	DC to 33 GHz	60 dB
Isolation between channels 1 and 2, or channels 3 and 4	DC to 2 GHz	60 dB
	>2 to 10 GHz	42 dB
	>10 to 20 GHz	35 dB
	>20 to 33 GHz	30 dB

Measurement category

The measuring terminals on this product are not rated for connection to mains or Measurement Category II, III or IV circuits.

TekConnect interface

The instrument TekConnect channels support the TekConnect interface.

Horizontal and acquisition system

Delay between channels, full bandwidth, equivalent time, BWE off, without deskew (typical)

≤ 1 ps between any two channels at any gain setting at 25 °C ±5 °C.

Derate linearly to ≤3 ps at 5 °C and 45 °C

Delay between channels, BWE (typical)

≤ 500 fs between any two channels within the same box at any gain setting at 25 °C ±5 °C prior to any user adjustment. Manual adjustment available with 10 fs minimum resolution. Derate linearly to ≤ 1.5 ps at 5 °C and 45 °C.

Real-time sample rate range

Channels	Sample rate, maximum
	(Standard)
TekConnect channels	Up to 100 GS/s
ATI channels	200 GS/s only

Equivalent-time sample rate or interpolated waveform rate range

Equivalent-time acquisition can be enabled or disabled. When disabled, waveforms are interpolated at the fastest time base settings.

Up to 5 TS/s (waveform interval down to 0.2 ps) in E.T. and 0.2 ps resolution in trigger placement.

Maximum record length, sample mode

The maximum record length depends on the installed record length options. Maximum record length is less in serial trigger mode, hi-res mode, or when using the FIR filter.

500,000,000 points (all channels), 1 G samples on 1–2 channels at 50 GS/s and 100 GS/s sample rates or greater (interpolated or equivalent time)

Maximum record length, HiRes mode

Half the record length of sample mode

Record length limits

Operation	4 X 50 GS/s Acquisition	2 x 100 GS/s Acquisition	1 x 200 GS/s Acquisition
Display acquired waveform	500 Msamples	1 Gsamples	1 Gsamples
Waveform data CURVE? output any PI	500 Msamples	1 Gsamples	1 Gsamples
Math1 = Ch1 - Ch3	250 Msamples	250 Msamples	250 Msamples
Arbfilt (Ch1, "filter")			
FFTmag(Ch1)			
Reference Waveforms (Rn)	1 Gsamples	1 Gsamples	1 Gsamples

Seconds division range

Fastest sweep speed is 10 ps per division

Internal time-base reference frequency

10 MHz

Electronically adjustable over about ±10 ppm.

Time base accuracy

$\pm 0.8 \times 10^{-6}$ $\pm 0.3 \times 10^{-6}$ aging/year after first year when operated within 23°C ±5°C after 30 minute warm-up.

Typical: ±0.1 x 10^{-6} initial accuracy after adjustment.

Timing jitter (aperture uncertainty), (typical)

Measured at the maximum sample rate.

External Reference Low with ~0 dBm input drive at 10 MHz

TekConnect:

<100 fs rms for record durations less than 10 µs

<120 fs rms for record durations less than 100 µs

<140 fs rms for record durations less than 10 ms

<300 fs rms for record durations less than 10 s

ATI:

<65 fs rms for record durations less than 10 µs

External Reference Hi with ~0 dBm input drive at 10 MHz

TekConnect:

<100 fs rms for record durations less than 2 µs

<500 fs rms for record durations less than 10 s

ATI:

<65 fs rms for record durations less than 10 µs

For external reference in high (tracking) mode, the input reference must be low noise and the edge slew rate must exceed 1.5 V/ns to achieve the typical jitter results.

Internal Reference

TekConnect:

<100 fs rms for record durations less than 10 µs

<120 fs rms for record durations less than 100 µs

<140 fs rms for record durations less than 5 ms

ATI:

<65 fs rms for record durations less than 10 µs

For internal reference, specification assumes no signal attached to the external reference input.

Jitter noise floor (typical)

Applies to time periods as long as 10.0 ns. Typical jitter noise floor is measured at the maximum, BWE enabled bandwidth:

DPO77002SX	<250 fs
DPO75902SX	<250 fs
DPO75002SX	<250 fs
DPO73304SX	<250 fs
DPO72304SX	<250 fs

Calculate the jitter noise floor (JNF) for a given instrument setting using the following formula:

N_{typ} = typical input-referred noise spec (volts rms)

F_N = 1.3 for instrument bandwidth ≤9 GHz; 1.5 for instrument bandwidth ≥10 GHz

SR = slew rate around the measurement

$F_I = (1.7 \times 10^{-2})/\text{sqrt}(2) = 1.2 \times 10^{-2}$

t_r = rise time of the measurement edge

t_j = timebase jitter or aperture uncertainty

TBA = timebase accuracy (2 ppm)

$$JNF_{RMS} = \sqrt{(N_{typ} \times F_N)^2 \times \left(\frac{1}{SR}\right)^2 + F_I^2 \times t_r^2 + t_j^2}\text{seconds}_{RMS}$$

The interpolated sample rate of the waveform must be at least 25 times the bandwidth of the signal being measured.

Acquisition update rate (typical)

DPO models 300,000 waveforms per second maximum

Delta time measurement accuracy

The formula to calculate the maximum delta-time measurement accuracy (DTAmax) for a given instrument setting and input signal is given below (assumes insignificant signal content above Nyquist and insignificant error due to aliasing, overdrive recovery and overdrive interpolation):

N_{typ} = typical input-referred noise spec (volts rms)

F_N = 1.3 for instrument bandwidth ≤9 GHz; 1.5 for instrument bandwidth ≥10 GHz

SR_1 = slew rate around 1st point in measurement (1st edge)

SR_2 = slew rate around 2nd point in measurement (2nd edge)

TBA = timebase accuracy (2 ppm)

F_I = 1.2 × 10–2

t_{r1} = rise time of first edge

t_{r2} = rise time of second edge

t_j = sample jitter/aperture uncertainty (about 250 fs for time durations less than 10 µs)

$t_{reading}$ = delta-time measurement (seconds)

Peak-peak based on statistical accumulation of 500 waveforms.

$$DTA_{MAX_{pk-pk}} = 10 \times \sqrt{(N_{typ} \times F_N)^2\left[\left(\frac{1}{SR_1}\right)^2 + \left(\frac{1}{SR_2}\right)^2\right] + F_I^2 \times \left(t_{r1}^2 + t_{r2}^2\right) + (2 \times t_j)^2} + TBA \times t_{reading}\text{seconds}_{pk-pk}$$

RMS is guaranteed regardless of data-gathering duration.

$$DTA_{MAX_{RMS}} = \sqrt{(N_{typ} \times F_N)^2\left[\left(\frac{1}{SR_1}\right)^2 + \left(\frac{1}{SR_2}\right)^2\right] + F_I^2 \times \left(t_{r1}^2 + t_{r2}^2\right) + (2 \times t_j)^2} + TBA \times t_{reading}\ \text{seconds}_{RMS}$$

The term under the square-root sign is the stability and is due to time interval error (TIE). The errors due to this term occur throughout a single-shot measurement. The second term is due to both the absolute center-frequency accuracy and the center-frequency stability of the timebase and varies between multiple single-shot measurements over the observation interval (the amount of time from the first single-shot measurement to the final single-shot measurement). The observation interval may not exceed 1 year.

Trigger specifications

Trigger jitter DC coupled A edge (typical)

10 fs using enhanced trigger placement.

1 ps rms for low frequency, fast rise time signal, A edge, holdoff time = 30 µs

Edge trigger sensitivity DC coupled (typical)

All sources, positive or negative edge.

Trigger Source	Sensitivity
A-Event trigger	≤ 5%FS from DC to 50 MHz ≤ 7.5%FS at 5 GHz ≤ 10%FS at 10 GHz ≤ 15%FS at 15 GHz ≤ 35%FS at 20 GHz ≤ 50%FS at 25 GHz
B-Event trigger	≤ 5%FS from DC to 50 MHz ≤ 7.5%FS at 5 GHz ≤ 10%FS at 10 GHz ≤ 15%FS at 15 GHz ≤ 35%FS at 20GHz ≤ 50%FS at 25 GHz
Auxiliary input	100 mV_{pp} from DC to 1 GHz 175 mV_{pp} at 4 GHz 225 mV_{pp} at 8 GHz 450 mV_{pp} at 10 GHz 800 mV_{pp} at 11 GHz

Trigger sensitivity TPC (typical)

The minimum signal levels required for stable triggering of a waveform when the hardware is incapable of doing so (excessive frequency, small input).

Trigger Source	Sensitivity
A Event trigger, Ch1 – Ch4	20%×FS from DC to instrument bandwidth
B Event trigger, Ch1 – Ch4	20%×FS from DC to instrument bandwidth

Edge trigger sensitivity, non-DC-coupled modes (typical)

All sources, positive or negative edge, for vertical scale settings ≥10 mV/div and ≤1 V/div

Trigger Coupling	Sensitivity
NOISE REJ	15%FS from DC to 50 MHz 22.5% at 5 GHz 30%FS at 10 GHz 45%FS at 15 GHz 100%FS at 20 GHz
AC	Same as DC-coupled limits for frequencies > 100 Hz, attenuates signals <100 Hz
HF REJ	Same as DC-coupled limits for frequencies < 20 kHz, attenuates signals > 20 kHz
LF REJ	Same as DC-coupled limits for frequencies > 200 kHz, attenuates signals < 200 kHz
RF	Minimum hysteresis / High sensitivity
	A TRIG TekConnect 2.5% FS from DC to 50 MHz 2.5% FS at 5 GHz 2.5% FS at 10 GHz 5% FS at 15 GHz 7.5% FS at 20 GHz 12.5% FS at 25 GHz
	B TRIG TekConnect 2.5% FS from DC to 50 MHz 2.5% FS at 5 GHz 2.5% FS at 10 GHz 5% FS at 15 GHz 7.5% FS at 20 GHz 20% FS at 25 GHz
	A TRIG ATI 2.5% FS from DC to 50 MHz 2.5% FS at 5 GHz 2.5% FS at 10 GHz 5% FS at 15 GHz 10% FS at 20 GHz 22.5% FS at 25 GHz
	B TRIG ATI 2.5% FS from DC to 50 MHz 2.5% FS at 5 GHz 2.5% FS at 10 GHz 5% FS at 15 GHz 10% FS at 20 GHz 22.5% FS at 25 GHz

Trigger level or threshold range

Trigger Source	Range
Ch1, 2, 3, or 4	Full scale
Auxiliary input	±3.65 V
Line	0 V, Not settable

Trigger level or threshold accuracy (typical)

Edge trigger, DC coupled

Trigger Source	Accuracy
Channel 1, 2, 3, or 4	± [(2% | trigger level - net offset |) + (3.5% FS) + offset accuracy]
Auxiliary	Not specified

Trigger position error (typical)

Edge trigger, DC coupling, for a 5 division peak to peak 1 GHz sine wave signal.

Acquisition mode	Trigger Position Error
Sample, Average	± (1 waveform sample interval + 50 ps)
Peak Detect, Envelope	± (2 waveform sample intervals + 50 ps)

Time range for time-qualified triggers

Setup/Hold Violation		
	Setup time Hold time Setup + hold time	-100 ns to +100 ns -1 ns to +100 ns 500 ps minimum
Time qualified pattern		300 ps to 1 s
Timeout		40 ps to 1 s
Time qualified window, outside >t		40 ps to 1 s
All other types		40 ps to 1 s

Time-qualified trigger timer accuracy

For glitch, width, time qualified runt, transition, or window and timeout triggering (40 ps to 1.0 ns typical):

Time range	Accuracy
40 ps to ≤50 ns	±(3% of setting + 15 ps)
50 ns to ≤500 ns	±(1.5% of setting + 100 ns)
500 ns to 1 s	±(150 ppm x setting + 500 ps)

Setup/hold violation and time qualified pattern (40 ps to 1.0 ns typical):

300 ps to 1.01 µs	±(5% of setting + 200 ps)
1.02 µs to 1 s	±(TB [1] accuracy + 20 ns)

[1] TB Accuracy is the Time Base Accuracy expressed as a percentage of setting

Advanced trigger sensitivity (typical)	15% x FS from DC to 10 GHz (pattern and state trigger DC to 1 GHz), not violating the minimum timing requirements for each type (for vertical settings from 6.5 mV/div to 600 mV/div at the TekConnect connector)

Advanced trigger types minimum timing requirements (typical)

Minimum duration of the pattern includes delay mismatch between channels.

Trigger		Minimum pulse width	Minimum rearm time	Setup time	Hold time
Width		40 ps	50 ps for time < 5 ns, 75 ps above 5 ns.	n/a	n/a
Logic-Qualified Width		40 ps	50 ps for time < 5 ns, 75 ps above 5 ns.	0 ps	100 ps
Glitch		40 ps	50 ps for time < 5 ns, 75 ps above 5 ns.	n/a	n/a
Logic-Qualified Glitch		40 ps	50 ps for time < 5 ns, 75 ps above 5 ns.	15 ps	85 ps
Timeout		n/a	50 ps for time < 5 ns, 75 ps above 5 ns.	n/a	n/a
Logic-Qualified Timeout [2]		n/a	50 ps for time < 5 ns, 75 ps above 5 ns.	10 ps	90 ps
Window [3]	Enters	50 ps Inside window	75 ps rearm outside window	n/a	n/a
		0 ps transition through window			
	Exits	50 ps Outside window	75 ps rearm inside window		
Time-Qualified Window	Inside > t	50 ps Inside window	75 ps rearm outside window	55 ps	145 ps
		0 ps transition through window			
	Outside > t	50 ps Outside window	75 ps rearm inside window		

[2] Hold Time for logic qualified Timeout is measured from the expiration of the timer that causes the trigger.

[3] Window trigger for A trigger implemented with both triple masters basically performing edge trigger with the outputs or'ed together so it could have much better specs for minimum pulse width and rearm time (40ps/40ps) than the Time Qualified Window trigger which uses the actual window trigger circuitry and time qualifiers in the Tek46. However the B trigger also may have to use the window trigger circuitry if triple master not available so we've used the reduced specs for all window trigger modes. If you adjust the trigger levels you can get more performance out of window trigger.

Trigger	Minimum pulse width	Minimum rearm time	Setup time	Hold time
Logic Qualified Window	50 ps Inside window	75 ps rearm outside window	70 ps	30 ps
	0 ps transition through window			
	50 ps Outside window	75 ps rearm inside window		
Runt	40 ps	50 ps	n/a	n/a
Time Qualified Runt	40 ps	50 ps for time < 5 ns, 75 ps above 5 ns.	n/a	n/a
Logic-Qualified Runt	40 ps	50 ps	15 ps	85 ps
Transition [4]	0 ps. Triggers with equal threshold settings	50 ps for time < 5 ns, 75 ps above 5 ns.	n/a	n/a
Logic-Qualified Transition	0 ps. Triggers with equal threshold settings	50 ps for time < 5 ns, 75 ps above 5 ns.	0 ps	100 ps
Pattern	150 ps	200 ps	N.A.	N.A.
Time qualified pattern	150 ps	300 ps	N.A.	N.A.
State	1.7 GHz [5]	N.A.	25 ps	100 ps

Setup and hold times refer to the amount of time before and after a triggering "event" that the qualifying signal must be true. In some cases (like Glitch) the "event" is the trailing edge of the glitch.

Setup/hold violation	Clock active [6]	Clock inactive
(Hold times ≥ 0)	Hold time setting + 550 ps	500 ps
(Hold times < 0)	Hold time setting + 1.6 ns	500 ps

[4] Rearm time for transition trigger is time below lower threshold and time above upper threshold. Neither rearm time may be violated.

[5] Maximum frequency for clock signal in state trigger type

[6] Clock Active time refers to the minimum time from active to inactive edge. Clock Inactive refers to the minimum time from inactive to active clock edge. Active edge is the edge that does the clocking, inactive edge is the other edge. For example, for positive edge clock, clock active time refers to the positive pulse width and clock inactive refers to the negative pulse width.

Envelope trigger (typical)

Minimum frequency	Maximum frequency
500 MHz	20 GHz
Minimum Burst Time	Minimum Gap
< 20 ns	< 20 ns
500 MHz - 10 GHz	40% x FS
15 GHz	80% x FS
20 GHz	100% x FS

B trigger after events minimum timing requirements (typical)

Minimum pulse width	Maximum counting frequency	Minimum time between channels
40 ps	3.5 GHz	1 ns

B trigger after events, event counter range

1 to 2,000,000,000

B trigger after time, time delay range

3.2 ns to 3 Ms

Variable A-Event trigger holdoff range

250 ns to 12 s + random holdoff

Lowest frequency for successful set level to 50% (typical)

50 Hz

Low speed serial trigger

Number of bits 128 bits

Baud rate limits (typical) 10 Mbaud

Input-output port specifications

Auxiliary trigger input characteristics and range	50 Ω, ±5 V (DC plus peak AC)
Auxiliary output logic polarity and functionality	Default output is A trigger low true (a negative edge when the A trigger event occurs). You can also program the output to A trigger high true, and B trigger low or high true.
Auxiliary output logic levels	**V_{out} high**: ≥2.5 V into 1 MΩ load, ≥1.0 V into 50 Ω load to ground **V_{out} low (true)**: ≤0.7 V into 1 MΩ load ≤0.25 V into 50 Ω load to ground
Fast Edge output step amplitude and offset	1200 mV differential into a 100 Ω load with a -300 mV common mode.
Fast Edge output step frequency	1 kHz ± 20%
Fast Edge output step rise time (typical)	30 ps directly into an input channel. To deskew a probe, use a 50 Ω terminator in series with the deskew fixture to minimize HF aberrations.
Fast Edge output step aberrations (typical)	≤ ± 1% after the first 500 ns following the square wave transition. To deskew a probe, use a 50 Ω terminator in series with the deskew fixture to minimize HF aberrations.
Fast Edge output skew between differential outputs.	<0.8 ps skew between Positive and Negative Fast Edge Outputs.
Jitter of internal Fast Edge trigger (typical)	2 ps rms
External reference input frequency	10 MHz, 100 MHz, 12.5 GHz The instrument scans for either 10 MHz or 100 MHz. 12.5 GHz supported on separate SMA input.
External reference input frequency variation tolerance (typical)	Low (stable) jitter mode: ± 20 ppm High (tracking) mode: ± 1% Run SPC whenever the external reference is more than 0.1% (1000 ppm) different from the nominal reference frequency or the reference at which SPC was last run.
External reference input sensitivity (typical)	≥ 200 mV_{p-p} (-10.0 dBm)
External reference input voltage, maximum	2.8 V_{p-p} (+13 dBm)
External reference input impedance (typical)	R_{in} = 50 Ω
12.5 GHz Clock In	1.3 V_{p-p} (6 dBm)

B, C, D 12.5 GHz Clock Out (UltraSync)	1.3 V_{p-p} (6 dBm)
Timebase reference output frequency	10 MHz and 12.5 GHz outputs
Internal reference output voltage (typical)	
10 MHz Vout pk-pk	> 800 mV peak-peak into 50 Ω
	> 1.6 V peak-peak into 1 MΩ (internally AC coupled).
Input and output ports	
DVI-D Video port	A female Digital Visual Interface (DVI-D) compatible port
VGA port	A female Video Graphics Array (VGA) compatible port
DisplayPort	Two connectors (primary, secondary) provide digital display interfaces
PCIe	PCIe ports to configure multi-instrument systems
Trigger	UltraSync trigger bus
Keyboard and Mouse ports	PS-2 compatible, instrument must be powered down to make connection
LAN ports	Two RJ-45 connectors (LAN1, LAN2), support 10BASE-T, 100BASE-TX, and Gigabit Ethernet
External audio ports	External audio jacks for microphone input and line output
USB ports	Four front panel USB 2.0 connectors
	Four rear panel USB 3.0/USB 2.0 connectors
	One rear panel USB device connector
USB 3.0 Device Port	5 GBit/sec Rx and Tx (USB Super Speed native)
	480 Mbit/sec (High Speed compatible)
	12 Mbit/sec (Full Speed compatible)
PCIe Device Port	PCI Express x4 Gen 2
	5 Gbits/s per lane, 4 lanes Rx, 4 lanes Tx per port
	20 Gbits/s upstream, 20 Gbits/s downstream per port
	40 Gbits/s aggregate per port
UltraSync	
Input/Output ports	UltraSync Trigger, Data, Clock Input, and Clock Output Ports
Maximum number of UltraSync connected Instruments	4 synchronized Instruments 3 extensions per master
Cable length	1 Meter or 2 Meters
Number of clock outputs	3 SMA clock output ports to extensions (ports B,C,D)
Number of clock inputs	1 SMA clock input port from master (port A)
Number of data ports	3 bidirectional PCIe Express data communication ports (ports B,C,D). Port D is referred to as Port A when the instrument is operating as an extension and Port D when the instrument is operating as the master. iPASS Mini-SAS x4 Connector.

Data port bandwidth	PCI Express x4 Gen2. 20 Gbits/s upstream, 20 Gbits/s downstream per port. 5 Gbits/s per lane, 4 lanes Rx, 4 lanes Tx per port. 40 Gbits/s aggregate per port.
Number of trigger connection ports	3 bidirectional acquisition control and trigger synchronization ports (ports B,C,D). Port D is referred to as Port A when the instrument is operating as an extension and Port D when the instrument is operating as the master.
Crosstalk (channel isolation)	Channel isolation between any 2 channels in an Ultrasync configuration that do not reside within the same chassis.

Input frequency range (stay within BW of instrument)	Isolation
0-70 GHz	70 dB

Data storage specifications

Nonvolatile memory retention time (typical)	>20 years
Solid state drive	Waveforms and setups are stored on the solid state drive. Solid state drive is a ≥900 GB solid state drive (removable).

Power source specification

Power consumption

<980 W, single instrument, maximum

≤780 W, single unit (typical)

Source voltage and frequency

100 V to 240 V_{RMS}, 50/60 Hz

115 V ±10%, 400 Hz

CAT II

Mechanical specifications

Weight

DPO70000SX models: 19 kg (42 lbs) oscilloscope only

Dimensions

DPO70000SX models

157 mm (6.0 in) height
452 mm (17.8 in) width
553 mm (21.8 in) depth

DPO70000SX models, Rackmount configuration

177 mm (7.0 in) height
440 mm (19.75 in) width
523 mm (20.6 in) depth (from rack mounting ear to back of instrument)

Cooling

Required clearances

Fan-forced air circulation with no air filter	
Top	0 mm (0 in)
Bottom	6.35 mm (0.25 in) minimum or 0 mm (0 in) when standing on feet, flip stands down
Left side	76 mm (3 in)
Right side	76 mm (3 in)
Rear	0 mm (0 in) on rear feet

Construction material: Chassis parts are constructed of aluminum alloy, front panel is constructed of plastic laminate, circuit boards are constructed of glass laminate

Environmental specifications

Temperature

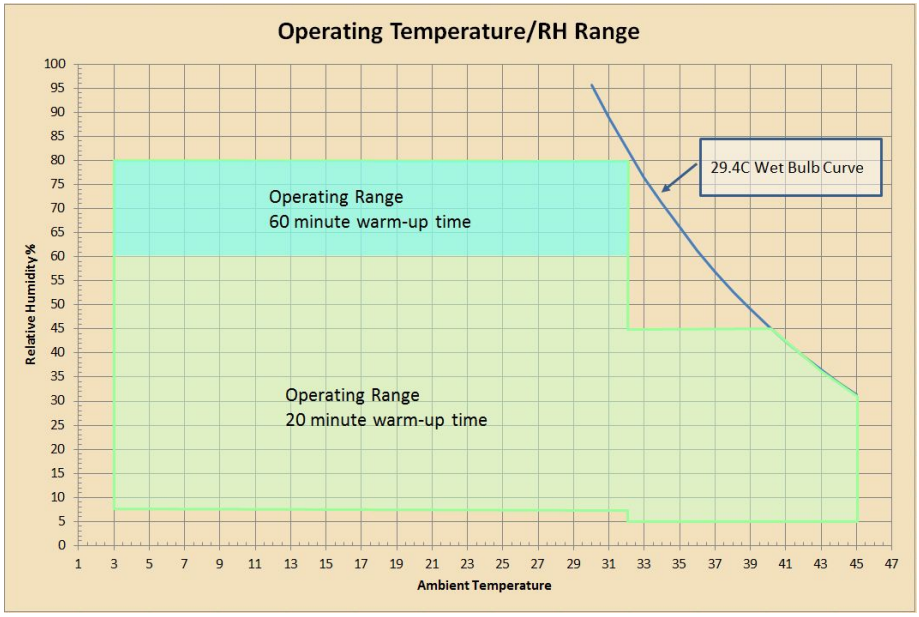
Operating	+5 °C to +45 °C (41 °F to +113 °F), with 11 °C per hour maximum gradient, noncondensing, derated 1 °C per 300 meters (984.25 feet) above 1500 meters (4921.25 feet) altitude
Nonoperating	-20 °C to +60 °C (-4 °F to +140 °F), with 20 °C/hour maximum gradient

Humidity

Operating

8% to 80% relative humidity at up to +32 °C (+90 °F)

5% to 45% relative humidity above +32 °C (+90 °F) up to +45 °C (+113 °F), noncondensing, and is limited by a maximum wet-bulb temperature of +29.4 °C (+85 °F) (derates relative humidity to 32% at +45 °C (+113 °F)



Nonoperating

5% to 95% relative humidity at up to +30 °C (+86 °F),

5% to 45% relative humidity above +30 °C (+86 °F), up to +60 °C (+140 °F), noncondensing, and is limited by a maximum wet-bulb temperature of +29.4 °C (+85 °F) (derates relative humidity to 11% at +60 °C (+140 °F))

Altitude

Operating	Up to 3,000 meters (9,843 feet), derate maximum operating temperature by 1 °C per 300 meters (984.25 feet) above 1500 meters (4921.25 feet) altitude
Nonoperating	Up to 12,000 meters (39,370 feet)

Performance verification

Performance verification

Two types of Performance Verification procedures can be performed on these products: *Brief Procedures* and *Performance Tests*. You may not need to perform all of these procedures, depending on what you want to accomplish.

If you are not familiar with operating this instrument, read the instrument user manual or explore the online help.

- To rapidly confirm that the instrument functions and was adjusted properly, perform only the brief procedures under *Self Tests*.

  Advantages. These procedures are quick to do, require no external equipment or signal sources, and perform extensive functional and accuracy testing to provide high confidence that the instrument will perform properly. They can be used as a quick check before making a series of important measurements.

- To further check functionality, first do the *Self Tests* just mentioned; then do the brief procedures under *Functional Tests*.

  Advantages. These procedures require minimal additional time to perform, require no additional equipment other than cables and adapters, and these procedures more completely test the internal hardware of the instrument. They can be used to quickly determine if the instrument is suitable for putting into service, such as when it is first received.

- If more extensive confirmation of performance is desired, perform the *Performance Tests* after performing the *Functional* and *SelfTests* mentioned above. *Performance tests* on page 42

  Advantages. These procedures add direct checking of the warranted specifications that are marked with the ✓ symbol. These procedures require specific test equipment. *Equipment required* on page 43

Conventions

Throughout these procedures the following conventions apply:

- Each test procedure uses the following general format:
  - Title of Test
  - Equipment Required
  - Prerequisites
  - Procedure
- Each procedure consists of as many steps, substeps, and subparts as required to do the test. Steps, substeps, and subparts are sequenced as follows:

1. First Step

a. First Substep

- First Subpart
- Second Subpart

b. Second Substep

2. Second Step

- In steps and substeps, the lead-in statement in italics instructs you what to do, while the instructions that follow tell you how to do it, as in the example step below:

  Initialize the instrument: Pull down the File menu, select Recall Default Setup.

STOP. The **STOP** notation at the left is accompanied by information you must read to do the procedure properly.

- The term "toolbar" refers to a row of buttons at the top of the display. The term "menu bar" refers to a row of menus at the top of the display. You can switch between toolbar and menu bar operating modes by using the menu at the top right of the toolbar or menu bar. (See *Figure 1: Toolbar and menu bar* on page 33.)
- Item numbers in the equipment required lists refer to the equipment. (See *Equipment required* on page 43.)

Figure 1: Toolbar and menu bar

- The procedures assume you have connected a mouse to the instrument so you can click on the screen controls. If you have not connected a mouse, you can use the touch screen to operate the screen controls.

Brief procedures

The *Self Tests* use internal routines to confirm basic functionality and proper adjustment. No test equipment is required to do these test procedures.

The *Functional Tests* utilize the probe-compensation output at the front panel as a test-signal source for further verifying that the instrument functions properly. A BNC cable and an adaptor or a probe, depending on your instrument model are required to do these test procedures.

Self tests

This procedure uses internal routines to verify that the instrument functions and was adjusted properly. No test equipment or hookups are required.

Equipment required	Prerequisites
None	Power on the instrument and allow a 20 minute warm-up before doing this procedure.

1. *Verify that internal diagnostics pass:* Do the following substeps to verify passing of internal diagnostics.

   a. *Display the System diagnostics menu:*

      If the instrument is in toolbar mode, put the instrument into menu bar mode.

      Pull down the **Utilities** menu and select **Instrument Diagnostics. . .** . This displays the diagnostics control window.

   b. *Run the System Diagnostics:*

      - First disconnect any input signals from all channels.
      - Click the **Run** button in the diagnostics control window.

   c. *Wait:* The internal diagnostics do an exhaustive verification of proper instrument function. This verification may take several minutes. When the verification is finished, the resulting status will appear in the diagnostics control window.

   d. *Verify that no failures are found and reported on-screen.* All tests should pass.

   e. *Run the signal-path compensation routine:*

      Pull down the **Utilities** menu and select **Instrument Calibration. . .** . This displays the instrument calibration control window.

      If required because the instrument is in service mode, select the **Signal Path** button under Calibration Area.

      Click the **Run SPC** button to start the routine.

f. *Wait:* Signal-path compensation may take five to fifteen minutes to run.

g. *Confirm signal-path compensation returns passed status:* Verify that the word **Pass** appears in the instrument calibration control window.

2. *Return to regular service:* Click the **X** (close) button to exit the instrument calibration control window.

Functional tests

The purpose of these procedures is to confirm that the instrument functions properly. The only equipment required is a BNC or SMA cable and an adapter or the instrument probe. If you need to store settings during these procedures, access the local C: drive and store them in the TekScope > Setups directory.

STOP. These procedures verify functions; that is, they verify that the instrument features operate. They do not verify that they operate within limits.

Therefore, when the instructions in the functional tests that follow call for you to verify that a signal appears on-screen "that is about five divisions in amplitude" or "has a period of about six horizontal divisions," etc., do NOT interpret the quantities given as limits. Operation within limits is checked in Performance Tests. (See *Performance tests* on page 42.)

STOP. DO NOT make changes to the front-panel settings that are not called out in the procedures. Each verification procedure will require you to set the instrument to certain default settings before verifying functions. If you make changes to these settings, other than those called out in the procedure, you may obtain invalid results. In this case, just redo the procedure from step 1.

When you are instructed to press a front-panel or screen button, the button may already be selected (its label will be highlighted). If this is the case, it is not necessary to press the button.

Verify all analog input channels

Equipment required	Prerequisites
One SMA cable (item 20) One adapter (item 19) One termination (item 4) one attenuator (item 3)	None

1. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.
2. *Hook up the signal source:* Connect the equipment as shown in the following figure to the channel input you want to test (beginning with Ch 1). Terminate the unused Fast Edge output.

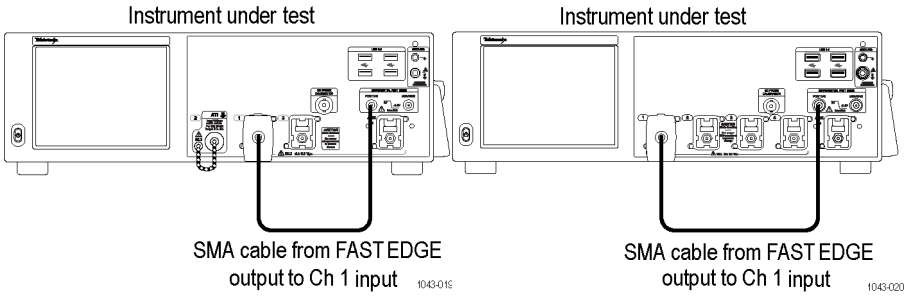


Figure 2: Universal test hookup for functional tests - Ch 1 shown

3. *Turn off all channels:*

   Pull down the **Vertical** menu, select Vertical Setup. Select each Channel tab and verify that the **Display** is off.

4. *Select the channel to test:* Press the Display button for the channel you are currently testing. The channel display comes on.
5. *Set up the instrument:*

   NOTE. *If the AutoSet Undo window appears, click the X.*

   - Pull down the **Horiz/Acq** menu, select Autoset. This sets the horizontal and vertical scale and vertical offset for a usable display and sets the trigger source to the channel you are testing.
   - Pull down the **Vertical** menu, select Vertical Setup. Confirm that the Ch1 Offset is about **-300 mV**.

6. *Verify that the channel is operational:* Confirm that the following statements are true.

   - Verify that the vertical scale readout and the waveform amplitude for the channel under test. (See *Table 3: Vertical settings* on page 37.)

Table 3: Vertical settings

Setting	Without probe	ATI input with attenuator
Scale	100 mV	30 mV
Waveform amplitude	about 4.5 to 6.5 divisions	about 6 divisions

- The vertical **Position** control (for the channel you are testing) moves the signal up and down the screen.
- Increasing the vertical **Scale** (for the channel you are testing) decreases the amplitude of the waveform on-screen, decreasing the scale increases the amplitude, and returning the scale to the original scale setting returns the original amplitude for that scale setting. (See *Table 3: Vertical settings* on page 37.)

7. *Verify that the channel acquires in all acquisition modes:* Pull down the **Horiz/Acq** menu to select **Horizontal/Acquisition Setup. . .** . Click the **Acquisition** tab in the control window that displays. Click each of the acquisition modes and confirm that the following statements are true.
   - Sample mode displays an actively acquiring waveform on-screen. (Note that there is a small amount of noise present on the square wave).
   - Peak Detect mode displays an actively acquiring waveform on-screen with the noise present in Sample mode "peak detected".
   - Hi Res mode displays an actively acquiring waveform on-screen with the noise that was present in Sample mode reduced.
   - Average mode displays an actively acquiring waveform on-screen with the noise reduced.
   - Envelope mode displays an actively acquiring waveform on-screen with the noise displayed.

   NOTE. *Default setup enables enhanced triggering. Enhanced triggering can cause a slower acquisition rate that can be noticed in waveform database mode. As waveform database mode acquires 100,000 samples, the display intensity will increase, be cleared, and then the process will start over. When enhanced triggering is turned off, and with the specified settings and input signal, the display reaches full intensity right away.*

   - Waveform Database mode displays an actively acquiring waveform on-screen with the noise displayed.
8. *Test all channels:* Repeat steps 2 through 7 until all TekConnect input channels are verified.
9. If your instrument has an ATI input, repeat steps 2 through 7 with the Fast Edge signal connected to the ATI input channel through an attenuator.
10. *Remove the test hookup:* Disconnect the equipment from the instrument.

Verify the time base

Equipment required	Prerequisites
One SMA cable (item 20) One adapter (item 19) One termination (item 4)	None

1. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.
2. *Hook up the signal source:* Connect the fast edge output to the Ch 1 input as shown in the following figure. Terminate the unused Fast Edge output.

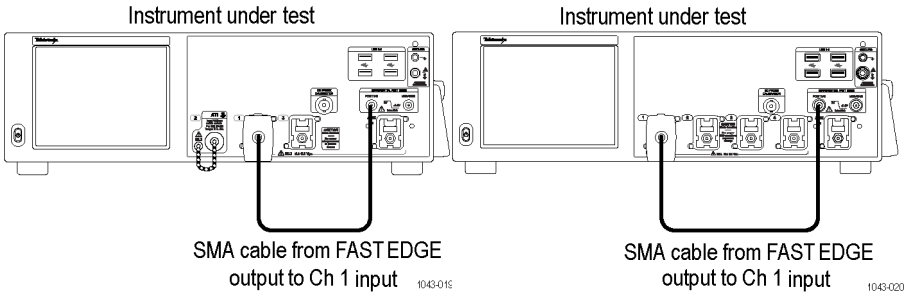


Figure 3: Setup for time base test

3. *Set up the instrument:*Pull down the **Horiz/Acq** menu, select Autoset.
4. Set the **Vertical Scale** to **100 mV**/div.
5. *Set the time base:* Set the horizontal **Scale** to **200 µs/div**. The time-base readout is displayed at the bottom of the graticule.
6. *Verify that the time base operates:* Confirm the following statements.
   - One period of the square-wave signal is about five horizontal divisions on-screen for the 200 µs/div horizontal scale setting.
   - Decreasing the horizontal **Scale** expands the waveform on-screen (more horizontal divisions per waveform period), increasing the scale contracts it, and returning the horizontal scale to 200 µs/div returns the period to about five divisions.
   - Changing the horizontal **Position** positions the signal left and right on-screen.

7. *Verify horizontal delay:*

   a. *Center a rising edge on screen:*

      - Set the horizontal **Position** so that the rising edge where the waveform is triggered is lined up with the center horizontal graticule.
      - Change the horizontal **Scale** to **20 µs/div**. The rising edge of the waveform should remain near the center graticule and the falling edge should be off screen.

   b. *Turn on and set horizontal delay:*

      - Pull down the **Horiz/Acq** menu to select **Horizontal/Acquisition Setup. . .** .
      - Click the **Horizontal** tab in the control window that displays.
      - Click the **Delay Mode** button to turn delay on.
      - Double click the **Horiz Delay** control in the control window to display the pop-up keypad. Click the keypad buttons to set the horizontal delay to **1 ms** and then click the **ENTER** key.

   c. *Verify the waveform:* Verify that a rising edge of the waveform is within a few divisions of center screen.

   d. *Adjust the horizontal delay:* Change the horizontal delay setting. Verify that the rising edge shifts horizontally.

   e. *Verify the delay toggle function:*

      - Adjust the delay setting to center the rising edge horizontally on the screen.
      - Change the horizontal **Scale** to **40 ns/div**. The rising edge of the waveform should remain near the center graticule.
      - Readjust the delay setting to position the rising edge 2 divisions to the right of the center graticule line.
      - Click the **Delay Mode** button several times to toggle delay off and on and back off again. Verify that the display switches quickly between two different points in time (the rising edge shifts horizontally on the display).

8. *Remove the test hookup:* Disconnect the test hookup from the instrument.

Verify the A (Main) and B (Delayed) trigger systems

Equipment required	Prerequisites
One SMA cable (item 20) One adapter (item 19) One termination (item 4)	None

1. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.
2. *Hook up the signal source:* Connect the probe fast edge output to the Ch 1 input as shown in the following figure. Terminate the unused Fast Edge output.

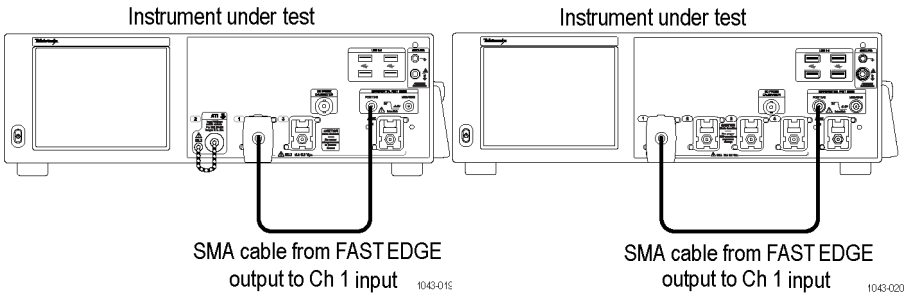


Figure 4: Setup for trigger test

3. *Set up the instrument:* Pull down the **Horiz/Acq** menu, select Autoset.
4. Set the **Vertical Scale** to **120 mV**/div.
5. *Verify that the main trigger system operates:* Confirm that the following statements are true.
   - Pull down the **Trig** menu, select A Event (Main) Trigger Setup.
   - The trigger level readout for the A (main) trigger system changes with the trigger-**Level** control.
   - The trigger-**Level** control can trigger and untrigger the square-wave signal as you level setting. (Leave the signal untriggered).
   - Pushing the **Set to 50%** button sets the trigger level to the 50% amplitude point of the signal and triggers the signal that you just left untriggered. (Leave the signal triggered.)
6. *Verify that the delayed trigger system operates:*
   a. *Set up the delayed trigger:*

   Pull down the **Trig** menu and select **A – B Trigger Sequence. . .** . This displays the A →B Sequence tab of the trigger setup control window.

   Click the **Trig After Time** button under A Then B.

   Click the **B Trig Level** control in the control window.

Select the Options tab and then set the trigger mode to **Norm**.

b. *Confirm that the following statements are true*:

- The trigger-level readout for the B trigger system changes as you adjust the B trigger level.
- As you adjust the trigger level, the square-wave signal can become triggered and untriggered. (Leave the signal triggered.)

c. *Verify the delayed trigger counter:*

- Double click the **Trigger Delay** control to pop up a numeric keypad for that control.
- Click the keypad to enter a trigger delay time of **1 second** (click 1 and None) and then click **Enter**.
- If you have the optional front panel, verify that the trigger **Ready** indicator on the front panel flashes about once every second as the waveform is updated on-screen.
- If you do not have the optional front panel, verify that the number of acquisitions increases about once every second as the waveform is updated on-screen.

7. *Remove the test hookup:* Disconnect the test hookup from the instrument.

Verify the file system

Equipment required	Prerequisites
One SMA cable (item 20) One adapter (item 19) One termination (item 4)	None

1. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

2. *Hook up the signal source:* Connect the fast edge output to the Ch 1 input as shown in the following figure. Terminate the unused Fast Edge output.

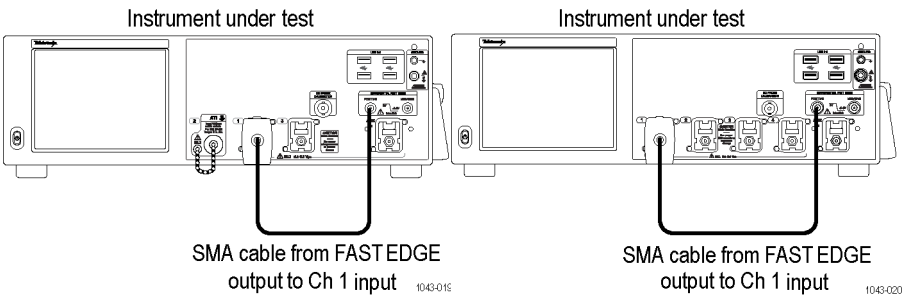


Figure 5: Setup for the file system test

3. *Set up the instrument:* Pull down the **Horiz/Acq** menu, select Autoset.

4. Set the **Vertical Scale** to **120 mV**/div.
5. *Set the time base:* Set the horizontal **Scale** to **1 ms/div**. The time-base readout is displayed at the bottom of the graticule.
6. *Save the settings:*
   a. Pull down the **File** menu to select **Save As. . . >Setup. . .** . This displays the instrument Save As control window.
   b. Note the default location and file name and then click the **Save** button to save the setup to the default file name and location.
7. *Change the settings again:* Set the horizontal **SCALE** to **200µs/div**.
8. *Verify the file system works:*
   a. Pull down the **File** menu to select **Recall**. This displays the instrument Recall control window.
   b. Click **Recall What > Setup**.
   c. Locate and then double click the setup file that you previously stored.
   d. Verify that the instrument retrieved the saved setup. Do this by noticing the horizontal **SCALE** is again 1 ms and the waveform shows ten cycles just as it did when you saved the setup.
9. *Remove the test hookup:* Disconnect the test hookup from the instrument.

Performance tests

This section contains a collection of manual procedures for checking that the instrument performs as warranted.

The procedures are arranged in logical groupings: *Signal Acquisition System Checks*, *Time Base System Checks*, *Triggering System Checks*, and *Output Ports Checks*. They check all the characteristics that are designated as checked in *Specifications.* (The characteristics that are checked appear with a ✓ in *Specifications*).

STOP. These procedures extend the confidence level provided by the basic procedures. The basic procedures should be done first, then these procedures performed if desired.

CAUTION.

Using settings not asked for by these procedures could damage the instrument. These procedures operate the instrument near its maximum limits. Using settings similar to, but not the settings called for by the procedures, could damage the input circuitry of the instrument. See the Maximum input voltage specification for the maximum nondestructive input voltage level.

Prerequisites

The tests in this section comprise an extensive, valid confirmation of performance and functionality when the following requirements are met:

- The cabinet must be installed on the instrument.
- You must have performed and passed the procedures under *Self Tests*, and those under *Functional Tests.* (See *Functional tests* on page 35.)
- A signal-path compensation must have been done within the recommended calibration interval and at a temperature within ±5 ºC (±9 ºF) of the present operating temperature. (If at the time you did the prerequisite *Self Tests,* the temperature was within the limits just stated, consider this prerequisite met). A signal-path compensation must have been done at an ambient humidity within 25% of the current ambient humidity and after having been at that humidity for at least 4 hours.
- The instrument must have been last adjusted at an ambient temperature between +18 ºC (+64 ºF) and +28 ºC (+82 ºF), must have been operating for a warm-up period of at least 20 minutes (60 minutes for the DPO70000SX instruments if the humidity is >60%), and must be operating at an ambient temperature as listed in the specifications. (See *Environmental specifications* on page 29.) (The warm-up requirement is usually met in the course of meeting the Self Tests and Functional Tests prerequisites listed above).
- Support sensor, probe, and adapter setups to avoid stress or torque when connected to the device under test (DUT).

Equipment required

The performance verification procedures use external, traceable signal sources to directly check warranted characteristics. The following table lists the required equipment.

1. Attenuator, 10X (two required)

Minimum requirements	Example	Purpose
Ratio: 10X; impedance 50 Ω; connectors: female input, male output	BNC ≤ 2 GHz Tektronix part number 011-0059-03 SMA ≤ 18 GHz Tektronix part number 015-1003-00	Signal attenuation, bandwidth, trigger sensitivity

2. Attenuator, 5X

Ratio: 5X; impedance 50 Ω; connectors: female input, male output	BNC ≤ 2 GHz Tektronix part number 011-0060-02 SMA ≤ 18 GHz Tektronix part number 015-1002-01	Signal attenuation, bandwidth, trigger sensitivity

3. Attenuator, 10 dB

2.92MM female to 2.92MM male, 50 Ω, 10 dB, 2 Watts	2.92MM ≤ 40 GHz Tektronix part number 011-0221-00	Signal attenuation

4. Termination, 50 Ω

Impedance 50 Ω; connector: male SMA	Tektronix part number 015-1022-01 (18 GHz)	Signal termination for channel delay test, trigger sensitivity

5. Cable, Precision 50 Ω Coaxial (three required)

50 Ω, 36 in, male-to-male BNC connectors	Tektronix part number 012-0482-00	Signal interconnection, Trigger out, time qualified trigger, timebase delay time, bandwidth, input resistance, delta time, generator leveling

6. Connector, Dual-Banana (two required)

Female BNC-to-dual banana	Tektronix part number 103-0090-00	Various accuracy tests, input resistance

7. Generator, DC Calibration

Instrument bandwidth ≤20 GHz:Variable amplitude to ±7 V; accuracy to 0.1%	Fluke 9500B [1]	Checking DC offset, gain, measurement accuracy, probe compensation out, and maximum input voltage
Instrument bandwidth >20 GHz:Variable amplitude to ±7 V; accuracy to 0.1%	Keithly 2400	

8. Timer-counter

10 MHz and 100 MHz, 1 s gate	Advantest R5360	Checking long-term sample rate and delay time accuracy

9. Generator, Sine-Wave

TekConnect channels:50 MHz to at least the instrument bandwidth. Variable amplitude from 60 mV to 2.0 V_{p-p} into 50 Ω. Frequency error <2.0%	Anritsu MG3690C RF/ Microwave Signal Generator	Checking analog bandwidth, trigger sensitivity, sample-rate, external clock, trigger sensitivity, time qualified trigger, and delay-time accuracy
ATI channel: 100 MHz to at least the instrument bandwidth. Variable amplitude from 60 mV to 2.0 V_{p-p} into 50 Ω. Frequency error <2.0%	Anritsu MG3697C RF/ Microwave Signal Generator	

[1] Fluke 9500B/1100, 9500B/3200, or 9500B/2200 and an output head (9510 or 9530) appropriate for the bandwidth of the instrument being tested.

10. Meter, Level and Power Sensor

TekConnect channels, frequency range: 50 MHz to the instrument bandwidth. Amplitude range: 6 mV_{p-p} to 2 V_{p-p}	Rohde & Schwarz NRVS and NRV-Z15 (40 GHz)	Checking analog bandwidth and trigger sensitivity
ATI channel, frequency range: 100 MHz to the instrument bandwidth. Amplitude range: 6 mV_{p-p} to 2 V_{p-p}	Rhode & Schwartz NRP2 and NRP-Z57 (67 GHz)	

11. Splitter, Power

Instrument bandwidth ≤3 GHz: Frequency range: DC to 18 GHz. Tracking: <2.0%	Agilent part number 11667A	Checking analog bandwidth and trigger sensitivity
Instrument bandwidth >3 GHz: Frequency range: DC to 40 GHz. Tracking: <2.0%	Anritsu K241C (40 GHz)	

12. Splitter, Power

Instrument bandwidth ≤3 GHz: Frequency range: DC to 18 GHz. Tracking: <2.0%	Agilent part number 11667A	Checking analog bandwidth and trigger sensitivity
Instrument bandwidth >3 GHz: Frequency range: DC to 40 GHz. Tracking: <2.0%	Anritsu K241C (40 GHz)	

13. Cable

2.92 mm male-to-female	Gore PhaseFlex cable EL0CQ0CP0360 (40 GHz)	Checking analog bandwidth

14. Adapter

K male-to-male DC to 40 GHz	Anritsu K220B	Checking analog bandwidth

15. Adapter (four required)

Male N-to-female BNC	Tektronix part number 103-0045-00	Checking analog bandwidth

16. Adapter (three required)

SMA female-to-female	Tektronix part number 015-1012-00 (18 GHz)	Checking trigger sensitivity

17. Adapter (three required)

SMA male-to-female BNC	Tektronix part number 015-1018-00	Checking the delay between channels, delta time

18. Adapter

BNC to Minigrabber	Tektronix part number 013-0342-xx	Checking fast edge output

19. Adapter (four required)

SMA male-to-BNC female	TCA-BNC or TCA-292mm and, if required, SMA male-to-BNC female adapter (Tektronix part number 015-0554-00 (4 GHz) or 015-1018-00)	Signal interconnection, measurement accuracy, delay time, time qualified trigger, trigger sensitivity, DC gain, offset, bandwidth, input resistance, fast edge out
	TCA-292D	

20. Cable, Coaxial (three required)

50 Ω, 20 in, male-to-male SMA connectors	Tektronix part number 174-1427-00	Checking delta time measurement accuracy, fast edge out, trigger sensitivity

21. Adapter

SMA "T", male to 2 SMA female	Tektronix part number 015-1016-00 (18 GHz)	Checking delta time measurement accuracy

22. Adapter

SMA female to BNC male	Tektronix part number 015-0572-00 (4 GHz)	Used to test delta time measurement accuracy and trigger sensitivity

23. Termination

Short circuit, SMA connector, female	Tektronix part number 015-1021-00 (18 GHz)	Checking delta time measurement accuracy

24. Attenuator, 2X

Ratio: 2X; impedance 50 Ω; connectors: female BNC input, male BNC output	Tektronix part number 011-0069-02 (2 GHz)	Checking delta time measurement accuracy, pulse trigger accuracy, time qualified trigger, trigger sensitivity, and channel isolation

25. Digital Multimeter

Ohms: <60 Ohms	Keithley 2700	Checking input impedance

26. Adapter

BNC “T”, male to 2 females	Tektronix part number 103-0030-xx	Checking DC gain and offset accuracy

27. Attenuator 2X

Ratio: 2X; impedance 50 Ω; connectors: female input, male output	BNC ≤ 2 GHz Tektronix part number 011-0069-xx	Checking output signals

28. Connector saver

Connector saver; ATI; 1.85 mm	Tektronix part number 103-0474-xx	ATI connector protection

29. Torque wrench

Torque wrench	Tektronix part number 067-2362-xx	Making connections

30. Backing wrench

Backing wrench; ATI connector saver	Tektronix part number 103-1942-xx	Making connections

31. Adapter

40 GHz, 1.85 mm female to 2.92 mm female	Tektronix part number 103-0483-xx	Making connections
18 GHz, 1.85 mm female to SMA female	Tektronix part number 103-0484-xx	

32. Cable, coaxial

1.85 mm male to 1.85 mm female	Gore 0F0CA0CB036.0	Checking bandwidth

Test record

Photocopy the test record tables and use them to record the performance test results for your instrument.

Table 4: Test information

Item	Recorded value
Instrument Serial Number	
Technician	
Certificate Number	
Date of Calibration	
Temperature	
RH %	

DC voltage measurement accuracy (averaged), ATI channel				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 10 mV Vert scale setting, 0 Div position setting				
0 V offset, +30 mV input	25.5 mV	_____	_____	34.5 mV
0 V offset, -30 mV input	-34.5 mV	_____	_____	-25.5 mV
-0.2 V offset, -170 mV input	-175.7 mV	_____	_____	-164.3 mV
+0.2 V offset, 170 mV input	+164.3 mV	_____	_____	+175.7 mV
+0.2 V offset, 230 mV input	224.3 V	_____	_____	235.7 mV
-0.2 V offset, -230 mV input	-235.7 mV	_____	_____	-224.3 V
Ch2 20 mV Vert scale setting, 0 Div position setting				
0 V offset, 60 mV input	53.5 mV	_____	_____	66.5 mV
0 V offset, -60 mV input	66.5 mV	_____	_____	-53.5 mV
-0.1 V offset, -40 mV input	-47.1 mV	_____	_____	-32.9 mV
+0.1 V offset, 40 mV input	+32.9 mV	_____	_____	+47.1 mV
+0.1 V offset, 160 mV input	152.9 mV	_____	_____	167.1 mV
-0.1 V offset, -160 mV input	-167.1 mV	_____	_____	-152.9 mV
Ch2 30 mV Vert scale setting, 0 Div position setting				
0 V offset, 90 mV input	81.5 mV	_____	_____	98.5 mV
0 V offset, -90 mV input	-98.5 mV	_____	_____	-81.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 6.25 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4012 V	_____	_____	3.4363 V
+2.4 V offset	2.4032 V	_____	_____	2.4343 V
+1.5 V termination				
+2.5 V offset	2.49345 V	_____	_____	2.52456 V
+1.5 V offset	1.49945 V	_____	_____	1.51856 V
+0.5 V offset	501.45 mV	_____	_____	516.56 mV
0 V termination				
0 V offset, 18.75 mV input	15.0 mV	_____	_____	22.5 mV
0 V offset, -18.75 mV input	-22.5 mV	_____	_____	-15.0 mV
-1 V offset	-1.00056 V	_____	_____	-981.45 mV
+1 V offset	999.45 mV	_____	_____	1.01856 V
-3.5 V termination				
-3.4 V offset	-3.4363 V	_____	_____	-3.4012 V
-2.4 V offset	-2.4343 V	_____	_____	-2.4032 V
-1.5 V termination				
-2.5 V offset	-2.52456 V	_____	_____	-2.49345 V
-1.5 V offset	-1.51856 V	_____	_____	-1.49945 V
-0.5 V offset	-516.56 mV	_____	_____	-501.45 mV
Ch1 10 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4117 V	_____	_____	3.4483 V
+2.4 V offset	2.4137 V	_____	_____	2.4463 V
+1.5 V termination				
+2.5 V offset	2.4988 V	_____	_____	2.5312 V
+1.5 V offset	1.5195 V	_____	_____	1.5405 V
+0.5 V offset	521.5 mV	_____	_____	538.5 mV
0 V termination				
0 V offset, 30 mV input	25.5 mV	_____	_____	34.5 mV
0 V offset, -30 mV input	-34.5 mV	_____	_____	-25.5 mV
-1 V offset	-980.5 mV	_____	_____	-959.5 mV
+1 V offset	1.0195 V	_____	_____	1.0405 V
-3.5 V termination				
-3.4 V offset	-3.4117 V	_____	_____	-3.4483 V
-2.4 V offset	-2.4137 V	_____	_____	-2.4463 V
-1.5 V termination				
-2.5 V offset	-2.5312 V	_____	_____	-2.4988 V
-1.5 V offset	-1.5405 V	_____	_____	-1.5195 V
-0.5 V offset	-538.5 mV	_____	_____	-521.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 20 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4397 V	_____	_____	3.4803 V
+2.4 V offset	2.4417 V	_____	_____	2.4783 V
+1.5 V termination				
+2.5 V offset	2.5415 V	_____	_____	2.5785 V
+1.5 V offset	1.5475 V	_____	_____	1.5725 V
+0.5 V offset	549.5 mV	_____	_____	570.5 mV
0 V termination				
0 V offset, 60 mV input	53.5 mV	_____	_____	66.5 mV
0 V offset, -60 mV input	-66.5 mV	_____	_____	-53.5 mV
-1 V offset	-952.5 mV	_____	_____	-927.5 mV
+1 V offset	1.0475 V	_____	_____	1.0725 V
-3.5 V termination				
-3.4 V offset	-3.4803 V	_____	_____	-3.4397 V
-2.4 V offset	-2.47831 V	_____	_____	-2.4417 V
-1.5 V termination				
-2.5 V offset	-2.5785 V	_____	_____	-2.5415 V
-1.5 V offset	-1.5725 V	_____	_____	-1.5475 V
-0.5 V offset	-570.5 mV	_____	_____	-549.5 mV
Ch1 50 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.5237 V	_____	_____	3.5763 V
+2.4 V offset	2.5257 V	_____	_____	2.5743 V
+1.5 V termination				
+2.5 V offset	2.6255 V	_____	_____	2.6745 V
+1.5 V offset	1.6315 V	_____	_____	1.6685 V
+0.5 V offset	633.5 mV	_____	_____	666.5 mV
0 V termination				
0 V offset, 150 mV input	137.5 mV	_____	_____	162.5 mV
0 V offset, -150 mV input	-162.5 mV	_____	_____	-137.5 mV
-1 V offset	-868.5 mV	_____	_____	-831.5 mV
+1 V offset	1.1315 V	_____	_____	1.1685 V
-3.5 V termination				
-3.4 V offset	-3.5763 V	_____	_____	-3.5237 V
-2.4 V offset	-2.5743 V	_____	_____	-2.5257 V
-1.5 V termination				
-2.5 V offset	-2.6745 V	_____	_____	-2.6255 V
-1.5 V offset	-1.6685 V	_____	_____	-1.6315 V
-0.5 V offset	-666.5 mV	_____	_____	-633.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 100 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.6637 V	_____	_____	3.7363 V
+2.4 V offset	2.6657 V	_____	_____	2.7343 V
+1.5 V termination				
+2.5 V offset	2.7655 V	_____	_____	2.8345 V
+1.5 V offset	1.7715 V	_____	_____	1.8285 V
+0.5 V offset	773.5 mV	_____	_____	826.5 mV
0 V termination				
0 V offset, 300 mV input	277.5 mV	_____	_____	322.5 mV
0 V offset, -300 mV input	-322.5 mV	_____	_____	-277.5 mV
-1 V offset	-728.5 mV	_____	_____	-671.5 mV
+1 V offset	1.2715 V	_____	_____	1.3285 V
-3.5 V termination				
-3.4 V offset	-3.7363 V	_____	_____	-3.6637 V
-2.4 V offset	-2.7343 V	_____	_____	-2.6657 V
-1.5 V termination				
-2.5 V offset	-2.8345 V	_____	_____	-2.7655 V
-1.5 V offset	-1.8285 V	_____	_____	-1.7715 V
-0.5 V offset	-826.5 mV	_____	_____	-773.5 mV
Ch1 120 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.7197 V	_____	_____	3.8003 V
+2.4 V offset	2.7217 V	_____	_____	2.7983 V
+1.5 V termination				
+2.5 V offset	2.8215 V	_____	_____	2.8985 V
+1.5 V offset	1.8275 V	_____	_____	1.8925 V
+0.5 V offset	829.5 mV	_____	_____	890.5 mV
0 V termination				
0 V offset, 360 mV input	333.5 mV	_____	_____	386.5 mV
0 V offset, -360 mV input	-386.5 mV	_____	_____	-333.5 mV
-1 V offset	-672.5 mV	_____	_____	-607.5 mV
+1 V offset	1.3275 V	_____	_____	1.3925 V
-3.5 V termination				
-3.4 V offset	-3.8003 V	_____	_____	-3.7197 V
-2.4 V offset	-2.7983 V	_____	_____	-2.7217 V
-1.5 V termination				
-2.5 V offset	-2.8985 V	_____	_____	-2.8215 V
-1.5 V offset	-1.8925 V	_____	_____	-1.8275 V
-0.5 V offset	-890.5 mV	_____	_____	-829.5 mV
Ch1 140 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	-624.5 mV	_____	_____	-535.5 mV
0 V offset	379.5 mV	_____	_____	460.5 mV
+1 V offset	1.3755 V	_____	_____	1.4645 V

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 200 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	-456.5 mV	_____	_____	-343.5 mV
0 V offset	547.5 mV	_____	_____	652.5 mV
+1 V offset	1.5435 V	_____	_____	1.6565 V
Ch1 400 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	103.5 mV	_____	_____	296.5 mV
0 V offset	1.1075 V	_____	_____	1.2925 V
+1 V offset	2.1035 V	_____	_____	2.2965 V
Ch2 6.25 mV Vert scale setting, 0 Div position setting				
(non-ATI channel)				
+3.5 V termination				
+3.4 V offset	3.4012 V	_____	_____	3.4363 V
+2.4 V offset	2.4032 V	_____	_____	2.4343 V
+1.5 V termination				
+2.5 V offset	2.49345 V	_____	_____	2.52456 V
+1.5 V offset	1.49945 V	_____	_____	1.51856 V
+0.5 V offset	501.45 mV	_____	_____	516.56 mV
0 V termination				
0 V offset, 18.75 mV input	15.0 mV	_____	_____	22.5 mV
0 V offset, -18.75 mV input	-22.5 mV	_____	_____	-15.0 mV
-1 V offset	-1.00056 V	_____	_____	-981.45 mV
+1 V offset	999.45 mV	_____	_____	1.01856 V
-3.5 V termination				
-3.4 V offset	-3.4363 V	_____	_____	-3.4012 V
-2.4 V offset	-2.4343 V	_____	_____	-2.4032 V
-1.5 V termination				
-2.5 V offset	-2.52456 V	_____	_____	-2.49345 V
-1.5 V offset	-1.51856 V	_____	_____	-1.49945 V
-0.5 V offset	-516.56 mV	_____	_____	-501.45 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 10 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
+3.5 V termination				
+3.4 V offset	3.4117 V	_____	_____	3.4483 V
+2.4 V offset	2.4137 V	_____	_____	2.4463 V
+1.5 V termination				
+2.5 V offset	2.4988 V	_____	_____	2.5312 V
+1.5 V offset	1.5195 V	_____	_____	1.5405 V
+0.5 V offset	521.5 mV	_____	_____	538.5 mV
0 V termination				
0 V offset, 30 mV input	25.5 mV	_____	_____	34.5 mV
0 V offset, -30 mV input	-34.5 mV	_____	_____	-25.5 mV
-1 V offset	-980.5 mV	_____	_____	-959.5 mV
+1 V offset	1.0195 V	_____	_____	1.0405 V
-3.5 V termination				
-3.4 V offset	-3.4117 V	_____	_____	-3.4483 V
-2.4 V offset	-2.4137 V	_____	_____	-2.4463 V
-1.5 V termination				
-2.5 V offset	-2.5312 V	_____	_____	-2.4988 V
-1.5 V offset	-1.5405 V	_____	_____	-1.5195 V
-0.5 V offset	-538.5 mV	_____	_____	-521.5 mV
Ch2 20 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
+3.5 V termination				
+3.4 V offset	3.4397 V	_____	_____	3.4803 V
+2.4 V offset	2.4417 V	_____	_____	2.4783 V
+1.5 V termination				
+2.5 V offset	2.5415 V	_____	_____	2.5785 V
+1.5 V offset	1.5475 V	_____	_____	1.5725 V
+0.5 V offset	549.5 mV	_____	_____	570.5 mV
0 V termination				
0 V offset, 60 mV input	53.5 mV	_____	_____	66.5 mV
0 V offset, -60 mV input	-66.5 mV	_____	_____	-53.5 mV
-1 V offset	-952.5 mV	_____	_____	-927.5 mV
+1 V offset	1.0475 V	_____	_____	1.0725 V
-3.5 V termination				
-3.4 V offset	-3.4803 V	_____	_____	-3.4397 V
-2.4 V offset	-2.47831 V	_____	_____	-2.4417 V
-1.5 V termination				
-2.5 V offset	-2.5785 V	_____	_____	-2.5415 V
-1.5 V offset	-1.5725 V	_____	_____	-1.5475 V
-0.5 V offset	-570.5 mV	_____	_____	-549.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 50 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
+3.5 V termination				
+3.4 V offset	3.5237 V	_____	_____	3.5763 V
+2.4 V offset	2.5257 V	_____	_____	2.5743 V
+1.5 V termination				
+2.5 V offset	2.6255 V	_____	_____	2.6745 V
+1.5 V offset	1.6315 V	_____	_____	1.6685 V
+0.5 V offset	633.5 mV	_____	_____	666.5 mV
0 V termination				
0 V offset, 150 mV input	137.5 mV	_____	_____	162.5 mV
0 V offset, -150 mV input	-162.5 mV	_____	_____	-137.5 mV
-1 V offset	-868.5 mV	_____	_____	-831.5 mV
+1 V offset	1.1315 V	_____	_____	1.1685 V
-3.5 V termination				
-3.4 V offset	-3.5763 V	_____	_____	-3.5237 V
-2.4 V offset	-2.5743 V	_____	_____	-2.5257 V
-1.5 V termination				
-2.5 V offset	-2.6745 V	_____	_____	-2.6255 V
-1.5 V offset	-1.6685 V	_____	_____	-1.6315 V
-0.5 V offset	-666.5 mV	_____	_____	-633.5 mV
Ch2 100 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
+3.5 V termination				
+3.4 V offset	3.6637 V	_____	_____	3.7363 V
+2.4 V offset	2.6657 V	_____	_____	2.7343 V
+1.5 V termination				
+2.5 V offset	2.7655 V	_____	_____	2.8345 V
+1.5 V offset	1.7715 V	_____	_____	1.8285 V
+0.5 V offset	773.5 mV	_____	_____	826.5 mV
0 V termination				
0 V offset, 300 mV input	277.5 mV	_____	_____	322.5 mV
0 V offset, -300 mV input	-322.5 mV	_____	_____	-277.5 mV
-1 V offset	-728.5 mV	_____	_____	-671.5 mV
+1 V offset	1.2715 V	_____	_____	1.3285 V
-3.5 V termination				
-3.4 V offset	-3.7363 V	_____	_____	-3.6637 V
-2.4 V offset	-2.7343 V	_____	_____	-2.6657 V
-1.5 V termination				
-2.5 V offset	-2.8345 V	_____	_____	-2.7655 V
-1.5 V offset	-1.8285 V	_____	_____	-1.7715 V
-0.5 V offset	-826.5 mV	_____	_____	-773.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 120 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
+3.5 V termination				
+3.4 V offset	3.7197 V	_____	_____	3.8003 V
+2.4 V offset	2.7217 V	_____	_____	2.7983 V
+1.5 V termination				
+2.5 V offset	2.8215 V	_____	_____	2.8985 V
+1.5 V offset	1.8275 V	_____	_____	1.8925 V
+0.5 V offset	829.5 mV	_____	_____	890.5 mV
0 V termination				
0 V offset, 360 mV input	333.5 mV	_____	_____	386.5 mV
0 V offset, -360 mV input	-386.5 mV	_____	_____	-333.5 mV
-1 V offset	-672.5 mV	_____	_____	-607.5 mV
+1 V offset	1.3275 V	_____	_____	1.3925 V
-3.5 V termination				
-3.4 V offset	-3.8003 V	_____	_____	-3.7197 V
-2.4 V offset	-2.7983 V	_____	_____	-2.7217 V
-1.5 V termination				
-2.5 V offset	-2.8985 V	_____	_____	-2.8215 V
-1.5 V offset	-1.8925 V	_____	_____	-1.8275 V
-0.5 V offset	-890.5 mV	_____	_____	-829.5 mV
Ch2 140 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
0 V termination				
–1 V offset	-624.5 mV	_____	_____	-535.5 mV
0 V offset	379.5 mV	_____	_____	460.5 mV
+1 V offset	1.3755 V	_____	_____	1.4645 V
Ch2 200 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
0 V termination				
–1 V offset	-456.5 mV	_____	_____	-343.5 mV
0 V offset	547.5 mV	_____	_____	652.5 mV
+1 V offset	1.5435 V	_____	_____	1.6565 V
Ch2 400 mV Vert scale setting, 0 Div position setting (non-ATI channel)				
0 V termination				
–1 V offset	103.5 mV	_____	_____	296.5 mV
0 V offset	1.1075 V	_____	_____	1.2925 V
+1 V offset	2.1035 V	_____	_____	2.2965 V

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 6.25 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4012 V	_____	_____	3.4363 V
+2.4 V offset	2.4032 V	_____	_____	2.4343 V
+1.5 V termination				
+2.5 V offset	2.49345 V	_____	_____	2.52456 V
+1.5 V offset	1.49945 V	_____	_____	1.51856 V
+0.5 V offset	501.45 mV	_____	_____	516.56 mV
0 V termination				
0 V offset, 18.75 mV input	15.0 mV	_____	_____	22.5 mV
0 V offset, -18.75 mV input	-22.5 mV	_____	_____	-15.0 mV
-1 V offset	-1.00056 V	_____	_____	-981.45 mV
+1 V offset	999.45 mV	_____	_____	1.01856 V
-3.5 V termination				
-3.4 V offset	-3.4363 V	_____	_____	-3.4012 V
-2.4 V offset	-2.4343 V	_____	_____	-2.4032 V
-1.5 V termination				
-2.5 V offset	-2.52456 V	_____	_____	-2.49345 V
-1.5 V offset	-1.51856 V	_____	_____	-1.49945 V
-0.5 V offset	-516.56 mV	_____	_____	-501.45 mV
Ch3 10 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4117 V	_____	_____	3.4483 V
+2.4 V offset	2.4137 V	_____	_____	2.4463 V
+1.5 V termination				
+2.5 V offset	2.4988 V	_____	_____	2.5312 V
+1.5 V offset	1.5195 V	_____	_____	1.5405 V
+0.5 V offset	521.5 mV	_____	_____	538.5 mV
0 V termination				
0 V offset, 30 mV input	25.5 mV	_____	_____	34.5 mV
0 V offset, -30 mV input	-34.5 mV	_____	_____	-25.5 mV
-1 V offset	-980.5 mV	_____	_____	-959.5 mV
+1 V offset	1.0195 V	_____	_____	1.0405 V
-3.5 V termination				
-3.4 V offset	-3.4117 V	_____	_____	-3.4483 V
-2.4 V offset	-2.4137 V	_____	_____	-2.4463 V
-1.5 V termination				
-2.5 V offset	-2.5312 V	_____	_____	-2.4988 V
-1.5 V offset	-1.5405 V	_____	_____	-1.5195 V
-0.5 V offset	-538.5 mV	_____	_____	-521.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 20 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4397 V	_____	_____	3.4803 V
+2.4 V offset	2.4417 V	_____	_____	2.4783 V
+1.5 V termination				
+2.5 V offset	2.5415 V	_____	_____	2.5785 V
+1.5 V offset	1.5475 V	_____	_____	1.5725 V
+0.5 V offset	549.5 mV	_____	_____	570.5 mV
0 V termination				
0 V offset, 60 mV input	53.5 mV	_____	_____	66.5 mV
0 V offset, -60 mV input	-66.5 mV	_____	_____	-53.5 mV
-1 V offset	-952.5 mV	_____	_____	-927.5 mV
+1 V offset	1.0475 V	_____	_____	1.0725 V
-3.5 V termination				
-3.4 V offset	-3.4803 V	_____	_____	-3.4397 V
-2.4 V offset	-2.47831 V	_____	_____	-2.4417 V
-1.5 V termination				
-2.5 V offset	-2.5785 V	_____	_____	-2.5415 V
-1.5 V offset	-1.5725 V	_____	_____	-1.5475 V
-0.5 V offset	-570.5 mV	_____	_____	-549.5 mV
Ch3 50 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.5237 V	_____	_____	3.5763 V
+2.4 V offset	2.5257 V	_____	_____	2.5743 V
+1.5 V termination				
+2.5 V offset	2.6255 V	_____	_____	2.6745 V
+1.5 V offset	1.6315 V	_____	_____	1.6685 V
+0.5 V offset	633.5 mV	_____	_____	666.5 mV
0 V termination				
0 V offset, 150 mV input	137.5 mV	_____	_____	162.5 mV
0 V offset, -150 mV input	162.5 mV	_____	_____	137.5 mV
-1 V offset	-868.5 mV	_____	_____	-831.5 mV
+1 V offset	1.1315 V	_____	_____	1.1685 V
-3.5 V termination				
-3.4 V offset	-3.5763 V	_____	_____	-3.5237 V
-2.4 V offset	-2.5743 V	_____	_____	-2.5257 V
-1.5 V termination				
-2.5 V offset	-2.6745 V	_____	_____	-2.6255 V
-1.5 V offset	-1.6685 V	_____	_____	-1.6315 V
-0.5 V offset	-666.5 mV	_____	_____	-633.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 100 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.6637 V	_____	_____	3.7363 V
+2.4 V offset	2.6657 V	_____	_____	2.7343 V
+1.5 V termination				
+2.5 V offset	2.7655 V	_____	_____	2.8345 V
+1.5 V offset	1.7715 V	_____	_____	1.8285 V
+0.5 V offset	773.5 mV	_____	_____	826.5 mV
0 V termination				
0 V offset, 300 mV input	277.5 mV	_____	_____	322.5 mV
0 V offset, -300 mV input	-322.5 mV	_____	_____	-277.5 mV
-1 V offset	-728.5 mV	_____	_____	-671.5 mV
+1 V offset	1.2715 V	_____	_____	1.3285 V
-3.5 V termination				
-3.4 V offset	-3.7363 V	_____	_____	-3.6637 V
-2.4 V offset	-2.7343 V	_____	_____	-2.6657 V
-1.5 V termination				
-2.5 V offset	-2.8345 V	_____	_____	-2.7655 V
-1.5 V offset	-1.8285 V	_____	_____	-1.7715 V
-0.5 V offset	-826.5 mV	_____	_____	-773.5 mV
Ch3 120 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.7197 V	_____	_____	3.8003 V
+2.4 V offset	2.7217 V	_____	_____	2.7983 V
+1.5 V termination				
+2.5 V offset	2.8215 V	_____	_____	2.8985 V
+1.5 V offset	1.8275 V	_____	_____	1.8925 V
+0.5 V offset	829.5 mV	_____	_____	890.5 mV
0 V termination				
0 V offset, 360 mV input	333.5 mV	_____	_____	386.5 mV
0 V offset, -360 mV input	-386.5 mV	_____	_____	-333.5 mV
-1 V offset	-672.5 mV	_____	_____	-607.5 mV
+1 V offset	1.3275 V	_____	_____	1.3925 V
-3.5 V termination				
-3.4 V offset	-3.8003 V	_____	_____	-3.7197 V
-2.4 V offset	-2.7983 V	_____	_____	-2.7217 V
-1.5 V termination				
-2.5 V offset	-2.8985 V	_____	_____	-2.8215 V
-1.5 V offset	-1.8925 V	_____	_____	-1.8275 V
-0.5 V offset	-890.5 mV	_____	_____	-829.5 mV
Ch3 140 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	-624.5 mV	_____	_____	-535.5 mV
0 V offset	379.5 mV	_____	_____	460.5 mV
+1 V offset	1.3755 V	_____	_____	1.4645 V

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 200 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	-456.5 mV	_____	_____	-343.5 mV
0 V offset	547.5 mV	_____	_____	652.5 mV
+1 V offset	1.5435 V	_____	_____	1.6565 V
Ch3 400 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	103.5 mV	_____	_____	296.5 mV
0 V offset	1.1075 V	_____	_____	1.2925 V
+1 V offset	2.1035 V	_____	_____	2.2965 V
Ch4 6.25 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4012 V	_____	_____	3.4363 V
+2.4 V offset	2.4032 V	_____	_____	2.4343 V
+1.5 V termination				
+2.5 V offset	2.49345 V	_____	_____	2.52456 V
+1.5 V offset	1.49945 V	_____	_____	1.51856 V
+0.5 V offset	501.45 mV	_____	_____	516.56 mV
0 V termination				
0 V offset, 18.75 mV input	15.0 mV	_____	_____	22.5 mV
0 V offset, -18.75 mV input	-22.5 mV	_____	_____	-15.0 mV
-1 V offset	-1.00056 V	_____	_____	-981.45 mV
+1 V offset	999.45 mV	_____	_____	1.01856 V
-3.5 V termination				
-3.4 V offset	-3.4363 V	_____	_____	-3.4012 V
-2.4 V offset	-2.4343 V	_____	_____	-2.4032 V
-1.5 V termination				
-2.5 V offset	-2.52456 V	_____	_____	-2.49345 V
-1.5 V offset	-1.51856 V	_____	_____	-1.49945 V
-0.5 V offset	-516.56 mV	_____	_____	-501.45 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 10 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4117 V	_____	_____	3.4483 V
+2.4 V offset	2.4137 V	_____	_____	2.4463 V
+1.5 V termination				
+2.5 V offset	2.4988 V	_____	_____	2.5312 V
+1.5 V offset	1.5195 V	_____	_____	1.5405 V
+0.5 V offset	521.5 mV	_____	_____	538.5 mV
0 V termination				
0 V offset, 30 mV input	25.5 mV	_____	_____	34.5 mV
0 V offset, -30 mV input	-34.5 mV	_____	_____	-25.5 mV
-1 V offset	-980.5 mV	_____	_____	-959.5 mV
+1 V offset	1.0195 V	_____	_____	1.0405 V
-3.5 V termination				
-3.4 V offset	-3.4117 V	_____	_____	-3.4483 V
-2.4 V offset	-2.4137 V	_____	_____	-2.4463 V
-1.5 V termination				
-2.5 V offset	-2.5312 V	_____	_____	-2.4988 V
-1.5 V offset	-1.5405 V	_____	_____	-1.5195 V
-0.5 V offset	-538.5 mV	_____	_____	-521.5 mV
Ch4 20 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.4397 V	_____	_____	3.4803 V
+2.4 V offset	2.4417 V	_____	_____	2.4783 V
+1.5 V termination				
+2.5 V offset	2.5415 V	_____	_____	2.5785 V
+1.5 V offset	1.5475 V	_____	_____	1.5725 V
+0.5 V offset	549.5 mV	_____	_____	570.5 mV
0 V termination				
0 V offset, 60 mV input	53.5 mV	_____	_____	66.5 mV
0 V offset, -60 mV input	-66.5 mV	_____	_____	-53.5 mV
-1 V offset	-952.5 mV	_____	_____	-927.5 mV
+1 V offset	1.0475 V	_____	_____	1.0725 V
-3.5 V termination				
-3.4 V offset	-3.4803 V	_____	_____	-3.4397 V
-2.4 V offset	-2.47831 V	_____	_____	-2.4417 V
-1.5 V termination				
-2.5 V offset	-2.5785 V	_____	_____	-2.5415 V
-1.5 V offset	-1.5725 V	_____	_____	-1.5475 V
-0.5 V offset	-570.5 mV	_____	_____	-549.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 50 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.5237 V	_____	_____	3.5763 V
+2.4 V offset	2.5257 V	_____	_____	2.5743 V
+1.5 V termination				
+2.5 V offset	2.6255 V	_____	_____	2.6745 V
+1.5 V offset	1.6315 V	_____	_____	1.6685 V
+0.5 V offset	633.5 mV	_____	_____	666.5 mV
0 V termination				
0 V offset, 150 mV input	137.5 mV	_____	_____	162.5 mV
0 V offset, -150 mV input	-162.5 mV	_____	_____	-137.5 mV
-1 V offset	-868.5 mV	_____	_____	-831.5 mV
+1 V offset	1.1315 V	_____	_____	1.1685 V
-3.5 V termination				
-3.4 V offset	-3.5763 V	_____	_____	-3.5237 V
-2.4 V offset	-2.5743 V	_____	_____	-2.5257 V
-1.5 V termination				
-2.5 V offset	-2.6745 V	_____	_____	-2.6255 V
-1.5 V offset	-1.6685 V	_____	_____	-1.6315 V
-0.5 V offset	-666.5 mV	_____	_____	-633.5 mV
Ch4 100 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.6637 V	_____	_____	3.7363 V
+2.4 V offset	2.6657 V	_____	_____	2.7343 V
+1.5 V termination				
+2.5 V offset	2.7655 V	_____	_____	2.8345 V
+1.5 V offset	1.7715 V	_____	_____	1.8285 V
+0.5 V offset	773.5 mV	_____	_____	826.5 mV
0 V termination				
0 V offset, 300 mV input	277.5 mV	_____	_____	322.5 mV
0 V offset, -300 mV input	-322.5 mV	_____	_____	-277.5 mV
-1 V offset	-728.5 mV	_____	_____	-671.5 mV
+1 V offset	1.2715 V	_____	_____	1.3285 V
-3.5 V termination				
-3.4 V offset	-3.7363 V	_____	_____	-3.6637 V
-2.4 V offset	-2.7343 V	_____	_____	-2.6657 V
-1.5 V termination				
-2.5 V offset	-2.8345 V	_____	_____	-2.7655 V
-1.5 V offset	-1.8285 V	_____	_____	-1.7715 V
-0.5 V offset	-826.5 mV	_____	_____	-773.5 mV

DC voltage measurement accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 120 mV Vert scale setting, 0 Div position setting				
+3.5 V termination				
+3.4 V offset	3.7197 V	_____	_____	3.8003 V
+2.4 V offset	2.7217 V	_____	_____	2.7983 V
+1.5 V termination				
+2.5 V offset	2.8215 V	_____	_____	2.8985 V
+1.5 V offset	1.8275 V	_____	_____	1.8925 V
+0.5 V offset	829.5 mV	_____	_____	890.5 mV
0 V termination				
0 V offset, 360 mV input	333.5 mV	_____	_____	386.5 mV
0 V offset, -360 mV input	-386.5 mV	_____	_____	-333.5 mV
-1 V offset	-672.5 mV	_____	_____	-607.5 mV
+1 V offset	1.3275 V	_____	_____	1.3925 V
-3.5 V termination				
-3.4 V offset	-3.8003 V	_____	_____	-3.7197 V
-2.4 V offset	-2.7983 V	_____	_____	-2.7217 V
-1.5 V termination				
-2.5 V offset	-2.8985 V	_____	_____	-2.8215 V
-1.5 V offset	-1.8925 V	_____	_____	-1.8275 V
-0.5 V offset	-890.5 mV	_____	_____	-829.5 mV
Ch4 140 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	-624.5 mV	_____	_____	-535.5 mV
0 V offset	379.5 mV	_____	_____	460.5 mV
+1 V offset	1.3755 V	_____	_____	1.4645 V
Ch4 200 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	-456.5 mV	_____	_____	-343.5 mV
0 V offset	547.5 mV	_____	_____	652.5 mV
+1 V offset	1.5435 V	_____	_____	1.6565 V
Ch4 400 mV Vert scale setting, 0 Div position setting				
0 V termination				
–1 V offset	103.5 mV	_____	_____	296.5 mV
0 V offset	1.1075 V	_____	_____	1.2925 V
+1 V offset	2.1035 V	_____	_____	2.2965 V

DC gain accuracy (averaged), ATI channel				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 10 mV Vert scale setting,				
0 Div position setting, 0 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +0.2 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -0.2 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
Ch2 20 mV Vert scale setting,				
0 Div position setting, 0 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +0.1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -0.1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
Ch2 30 mV Vert scale setting,				
0 Div position setting, 0 V offset	+ 176.4 mV	_____	_____	+ 183.6 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 6.25 mV Vert scale setting				
0 V termination				
0 Div position setting, 0 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1 V offset	37.24 mV	_____	_____	38.76 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +0.5 V offset	37.24 mV	_____	_____	38.76 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +2.4 V offset	37.24 mV	_____	_____	38.76 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -2.4 V offset	37.24 mV	_____	_____	38.76 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -0.5 V offset	37.24 mV	_____	_____	38.76 mV
Ch1 10 mV Vert scale setting,				
0 V termination				
0 Div position setting, 0 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 20 mV Vert scale setting,				
0 V termination				
0 Div position setting, 0 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
Ch1 50 mV Vert scale setting,				
0 V termination				
0 Div position setting, 0 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1 V offset	+ 294 mV	_____	_____	+ 306 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +0.5 V offset	+ 294 mV	_____	_____	+ 306 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -0.5 V offset	+ 294 mV	_____	_____	+ 306 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 100 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -1 V offset	+ 588 mV	_____	_____	+ 612 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
Ch1 120 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -1 V offset	705.6 mV	_____	_____	734.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +0.5 V offset	705.6 mV	_____	_____	734.4 mV
+3.4 V termination				
–5 Div position setting, +3.4 V offset	705.6 mV	_____	_____	734.4 mV
—5Div position setting, +2.4 V offset	705.6 mV	_____	_____	734.4 mV
-3.4 V termination				
5 Div position setting, -3.4 V offset	705.6 mV	_____	_____	734.4 mV
5Div position setting, -2.4 V offset	705.6 mV	_____	_____	734.4 mV
-1.5 V termination				
5 Div position setting, -1.5 V offset	705.6 mV	_____	_____	734.4 mV
5 Div position setting, -0.5 V offset	705.6 mV	_____	_____	734.4 mV
Ch1 140 mV Vert scale setting, 0 V termination				
0 Div position setting, -1 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, 0 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, +1 V offset	823.2 mV	_____	_____	856.8 mV
Ch1 200 mV Vert scale setting, 0 V termination				
0 Div position setting, -0.9 V offset	1176 mV	_____	_____	1224 mV
0 Div position setting, 0 V offset	1176 mV	_____	_____	1224 mV
0 Div position setting, +0.9 V offset	1176 mV	_____	_____	1224 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 400 mV Vert scale setting,				
0 V termination				
0 Div position setting, -0.3 V offset	2352 mV	_____	_____	2448 mV
0 Div position setting, 0 V offset	2352 mV	_____	_____	2448 mV
0 Div position setting, +0.3 V offset	2352 mV	_____	_____	2448 mV
Ch2 6.25 mV Vert scale setting (non-ATI channel)				
0 V termination				
0 Div position setting, 0 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1 V offset	37.24 mV	_____	_____	38.76 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +0.5 V offset	37.24 mV	_____	_____	38.76 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +2.4 V offset	37.24 mV	_____	_____	38.76 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -2.4 V offset	37.24 mV	_____	_____	38.76 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -0.5 V offset	37.24 mV	_____	_____	38.76 mV
Ch2 10 mV Vert scale setting (non-ATI channel),				
0 V termination				
0 Div position setting, 0 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 20 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, 0 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
Ch2 50 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, 0 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1 V offset	+ 294 mV	_____	_____	+ 306 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +0.5 V offset	+ 294 mV	_____	_____	+ 306 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -0.5 V offset	+ 294 mV	_____	_____	+ 306 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 100 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, 0 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -1 V offset	+ 588 mV	_____	_____	+ 612 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
Ch2 120 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, 0 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -1 V offset	705.6 mV	_____	_____	734.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +0.5 V offset	705.6 mV	_____	_____	734.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +2.4 V offset	705.6 mV	_____	_____	734.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -2.4 V offset	705.6 mV	_____	_____	734.4 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -0.5 V offset	705.6 mV	_____	_____	734.4 mV
Ch2 140 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, -1 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, 0 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, +1 V offset	823.2 mV	_____	_____	856.8 mV
Ch2 200 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, -0.9 V offset	1176 mV	_____	_____	1224 mV
0 Div position setting, 0 V offset	1176 mV	_____	_____	1224 mV
0 Div position setting, +0.9 V offset	1176 mV	_____	_____	1224 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 400 mV Vert scale setting (non-ATI channel), 0 V termination				
0 Div position setting, -0.3 V offset	2352 mV	_____	_____	2448 mV
0 Div position setting, 0 V offset	2352 mV	_____	_____	2448 mV
0 Div position setting, +0.3 V offset	2352 mV	_____	_____	2448 mV
Ch3 6.25 mV Vert scale setting 0 V termination				
0 Div position setting, 0 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1 V offset	37.24 mV	_____	_____	38.76 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +0.5 V offset	37.24 mV	_____	_____	38.76 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +2.4 V offset	37.24 mV	_____	_____	38.76 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -2.4 V offset	37.24 mV	_____	_____	38.76 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -0.5 V offset	37.24 mV	_____	_____	38.76 mV
Ch3 10 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 20 mV Vert scale setting,				
0 V termination				
0 Div position setting, 0 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
Ch3 50 mV Vert scale setting,				
0 V termination				
0 Div position setting, 0 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1 V offset	+ 294 mV	_____	_____	+ 306 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +0.5 V offset	+ 294 mV	_____	_____	+ 306 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -0.5 V offset	+ 294 mV	_____	_____	+ 306 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 100 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -1 V offset	+ 588 mV	_____	_____	+ 612 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
Ch3 120 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -1 V offset	705.6 mV	_____	_____	734.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +0.5 V offset	705.6 mV	_____	_____	734.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +2.4 V offset	705.6 mV	_____	_____	734.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -2.4 V offset	705.6 mV	_____	_____	734.4 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -0.5 V offset	705.6 mV	_____	_____	734.4 mV
Ch3 140 mV Vert scale setting, 0 V termination				
0 Div position setting, -1 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, 0 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, +1 V offset	823.2 mV	_____	_____	856.8 mV
Ch3 200 mV Vert scale setting, 0 V termination				
0 Div position setting, -0.9 V offset	1176 mV	_____	_____	1224 mV
0 Div position setting, 0 V offset	1176 mV	_____	_____	1224 mV
0 Div position setting, +0.9 V offset	1176 mV	_____	_____	1224 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 400 mV Vert scale setting,				
0 V termination				
0 Div position setting, -0.3 V offset	2352 mV	_____	_____	2448 mV
0 Div position setting, 0 V offset	2352 mV	_____	_____	2448 mV
0 Div position setting, +0.3 V offset	2352 mV	_____	_____	2448 mV
Ch4 6.25 mV Vert scale setting				
0 V termination				
0 Div position setting, 0 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1 V offset	37.24 mV	_____	_____	38.76 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +0.5 V offset	37.24 mV	_____	_____	38.76 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, +2.4 V offset	37.24 mV	_____	_____	38.76 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -2.4 V offset	37.24 mV	_____	_____	38.76 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -1.5 V offset	37.24 mV	_____	_____	38.76 mV
0 Div position setting, -0.5 V offset	37.24 mV	_____	_____	38.76 mV
Ch4 10 mV Vert scale setting,				
0 V termination				
0 Div position setting, 0 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, +2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -2.4 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -1.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV
0 Div position setting, -0.5 V offset	+ 58.8 mV	_____	_____	+ 61.2 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 20 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, +2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -2.4 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -1.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
0 Div position setting, -0.5 V offset	+ 117.6 mV	_____	_____	+ 122.4 mV
Ch4 50 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1 V offset	+ 294 mV	_____	_____	+ 306 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +0.5 V offset	+ 294 mV	_____	_____	+ 306 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, +2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -2.4 V offset	+ 294 mV	_____	_____	+ 306 mV
-1.5 V termination				
0 Div position setting, -2.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -1.5 V offset	+ 294 mV	_____	_____	+ 306 mV
0 Div position setting, -0.5 V offset	+ 294 mV	_____	_____	+ 306 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 100 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -1 V offset	+ 588 mV	_____	_____	+ 612 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, +2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -2.4 V offset	+ 588 mV	_____	_____	+ 612 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	+ 588 mV	_____	_____	+ 612 mV
0 Div position setting, -0.5 V offset	+ 588 mV	_____	_____	+ 612 mV
Ch4 120 mV Vert scale setting, 0 V termination				
0 Div position setting, 0 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -1 V offset	705.6 mV	_____	_____	734.4 mV
+1.5 V termination				
0 Div position setting, +2.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +0.5 V offset	705.6 mV	_____	_____	734.4 mV
+3.4 V termination				
0 Div position setting, +3.4 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, +2.4 V offset	705.6 mV	_____	_____	734.4 mV
-3.4 V termination				
0 Div position setting, -3.4 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -2.4 V offset	705.6 mV	_____	_____	734.4 mV
-1.5 V termination				
0 Div position setting, -1.5 V offset	705.6 mV	_____	_____	734.4 mV
0 Div position setting, -0.5 V offset	705.6 mV	_____	_____	734.4 mV
Ch4 140 mV Vert scale setting, 0 V termination				
0 Div position setting, -1 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, 0 V offset	823.2 mV	_____	_____	856.8 mV
0 Div position setting, +1 V offset	823.2 mV	_____	_____	856.8 mV

DC gain accuracy (averaged), TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 200 mV Vert scale setting, 0 V termination 0 Div position setting, -0.9 V offset 0 Div position setting, 0 V offset 0 Div position setting, +0.9 V offset	 1176 mV 1176 mV 1176 mV	 _____ _____ _____	 _____ _____ _____	 1224 mV 1224 mV 1224 mV
Ch4 400 mV Vert scale setting, 0 V termination 0 Div position setting, -0.3 V offset 0 Div position setting, 0 V offset 0 Div position setting, +0.3 V offset	 2352 mV 2352 mV 2352 mV	 _____ _____ _____	 _____ _____ _____	 2448 mV 2448 mV 2448 mV

Offset accuracy, ATI channel				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 10 mV Vert scale, 0 Div position setting, 0 V offset +0.2 V offset -0.2 V offset	 –3.5 mV +0.2354 V -0.2446 V	 _____ _____ _____	 _____ _____ _____	 +3.5 mV +0.2446 V -0.2354 V
Ch2 20 mV Vert scale, 0 Div position setting, 0 V offset +0.1 V offset -0.1 V offset	 –4.5 mV +0.1750 V –0.1851 V	 _____ _____ _____	 _____ _____ _____	 +4.5 mV +0.1851 V –0.1750 V
Ch2 30 mV Vert scale, 0 Div position setting, 0 V offset	 –5.5 mV	 _____	 _____	 +5.5 mV

Offset accuracy, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 6.25 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.13 mV +3.3831 V –3.4169 V	 _____ _____ _____	 _____ _____ _____	 +3.125 mV +3.4169 V –3.3831 V
Ch1 10 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.5 mV +3.3827 V –3.4173 V	 _____ _____ _____	 _____ _____ _____	 +3.5 mV +3.4173 V –3.3827 V
Ch1 20 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –4.5 mV +3.3817 V –3.4183 V	 _____ _____ _____	 _____ _____ _____	 +4.5 mV +3.4183 V –3.3817 V
Ch1 50 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –7.5 mV +3.3787 V –3.4213 V	 _____ _____ _____	 _____ _____ _____	 +7.5 mV +3.4213 V –3.3787 V

Offset accuracy, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 100 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –12.5 mV +3.3737 V –3.4263 V	 _____ _____ _____	 _____ _____ _____	 +12.5 mV +3.4263 V –3.3737 V
Ch1 120 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –14.5 mV +3.3717 V –3.4283 V	 _____ _____ _____	 _____ _____ _____	 +14.5 mV +3.4283 V –3.3717 V
Ch1 140 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0525 V –16.5 mV +5.9475 V	 _____ _____ _____	 _____ _____ _____	 –5.9475 V +16.5 mV +6.0525 V
Ch1 200 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0585 V –22.5 mV +5.9415 V	 _____ _____ _____	 _____ _____ _____	 –5.9415 V +22.5 mV +6.0585 V
Ch1 400 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0785 mV –42.5 mV +5.9215 V	 _____ _____ _____	 _____ _____ _____	 –5.9215 mV +42.5 mV +6.0785 V
Ch2 6.25 mV Vert scale, 0 Div position setting (non-ATI channel), 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.13 mV +3.3831 V –3.4169 V	 _____ _____ _____	 _____ _____ _____	 +3.125 mV +3.4169 V –3.3831 V
Ch2 10 mV Vert scale, 0 Div position setting (non-ATI channel), 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.5 mV +3.3827 V –3.4173 V	 _____ _____ _____	 _____ _____ _____	 +3.5 mV +3.4173 V –3.3827 V
Ch2 20 mV Vert scale, 0 Div position setting (non-ATI channel), 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –4.5 mV +3.3817 V –3.4183 V	 _____ _____ _____	 _____ _____ _____	 +4.5 mV +3.4183 V –3.3817 V
Ch2 50 mV Vert scale, 0 Div position setting (non-ATI channel), 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –7.5 mV +3.3787 V –3.4213 V	 _____ _____ _____	 _____ _____ _____	 +7.5 mV +3.4213 V –3.3787 V
Ch2 100 mV Vert scale, 0 Div position setting (non-ATI channel), 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –12.5 mV +3.3737 V –3.4263 V	 _____ _____ _____	 _____ _____ _____	 +12.5 mV +3.4263 V –3.3737 V

Offset accuracy, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 120 mV Vert scale, 0 Div position setting (non-ATI channel), 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –14.5 mV +3.3717 V –3.4283 V	 _____ _____ _____	 _____ _____ _____	 +14.5 mV +3.4283 V –3.3717 V
Ch2 140 mV Vert scale, 0 Div position setting (non-ATI channel), -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0525 V –16.5 mV +5.9475 V	 _____ _____ _____	 _____ _____ _____	 +5.9475 V +16.5 mV +6.0525 V V
Ch2 200 mV Vert scale, 0 Div position setting (non-ATI channel), -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0585 V –22.5 mV +5.9414 V	 _____ _____ _____	 _____ _____ _____	 –5.9415 V +22.5 mV +6.0585 V
Ch2 400 mV Vert scale, 0 Div position setting (non-ATI channel), -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0785 mV –42.5 mV +5.9215 V	 _____ _____ _____	 _____ _____ _____	 –5.9215 V +42.5 mV +6.0785 mV
Ch3 6.25 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.13 mV +3.3831 V –3.4169 V	 _____ _____ _____	 _____ _____ _____	 +3.125 mV +3.4169 V –3.3831 V
Ch3 10 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.5 mV +3.3827 V –3.4173 V	 _____ _____ _____	 _____ _____ _____	 +3.5 mV +3.4173 V –3.3827 V
Ch3 20 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –4.5 mV +3.3817 V –3.4183 V	 _____ _____ _____	 _____ _____ _____	 +4.5 mV +3.4183 V –3.3817 V
Ch3 50 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –7.5 mV +3.3787 V –3.4213 V	 _____ _____ _____	 _____ _____ _____	 +7.5 mV +3.4213 V –3.3787 V
Ch3 100 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –12.5 mV +3.3737 V –3.4263 V	 _____ _____ _____	 _____ _____ _____	 +12.5 mV +3.4263 V –3.3737 V
Ch3 120 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –14.5 mV +3.3717 V –3.4283 V	 _____ _____ _____	 _____ _____ _____	 +14.5 mV +3.4283 V –3.3717 V

Offset accuracy, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch3 140 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0525 V –16.5 mV +5.9475 V	 _____ _____ _____	 _____ _____ _____	 –5.9475 V +16.5 mV +6.0525 V
Ch3 200 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0585 V –22.5 mV +5.9415 V	 _____ _____ _____	 _____ _____ _____	 –5.9415 V +22.5 mV +6.0585 V
Ch3 400 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0785 V –42.5 mV +5.9215 V	 _____ _____ _____	 _____ _____ _____	 –5.9215 V +42.5 mV +6.0785 V
Ch4 6.25 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.13 mV +3.3831 V –3.4169 V	 _____ _____ _____	 _____ _____ _____	 +3.125 mV +3.4169 V –3.3831 V
Ch4 10 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –3.5 mV +3.3827 V –3.4173 V	 _____ _____ _____	 _____ _____ _____	 +3.5 mV +3.4173 V –3.3827 V
Ch4 20 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –4.5 mV +3.3817 V –3.4183 V	 _____ _____ _____	 _____ _____ _____	 +4.5 mV +3.4183 V –3.3817 V
Ch4 50 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –7.5 mV +3.3787 V –3.4213 V	 _____ _____ _____	 _____ _____ _____	 +7.5 mV +3.4213 V –3.3787 V
Ch4 100 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –12.5 mV +3.3737 V –3.4263 V	 _____ _____ _____	 _____ _____ _____	 +12.5 mV +3.4263 V –3.3737 V
Ch4 120 mV Vert scale, 0 Div position setting, 0 V offset, 0 V termination +3.4 V offset, +3.5 V termination -3.4 V offset, -3.5 V termination	 –14.5 mV +3.3717 V –3.4283 V	 _____ _____ _____	 _____ _____ _____	 +14.5 mV +3.4283 V –3.3717 V
Ch4 140 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0525 V –16.5 mV +5.9475 V	 _____ _____ _____	 _____ _____ _____	 –5.9475 V +16.5 mV +6.0525 V

Offset accuracy, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch4 200 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0585 V –22.5 mV +5.9415 V	 _____ _____ _____	 _____ _____ _____	 –5.9415 V +22.5 mV +6.0585 V
Ch4 400 mV Vert scale, 0 Div position setting, -6 V offset, 0 V termination 0 V offset, 0 V termination +6 V offset, 0 V termination	 –6.0785 V –42.5 mV +5.9215 V	 _____ _____ _____	 _____ _____ _____	 –5.9215 V +42.5 mV +6.0785 V

Channel bandwidth, ATI channel				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch2 10 mV 20 mV 30 mV	 24.7 mV 49.5 mV 74.2 mV	 _____ _____ _____	 _____ _____ _____	 N/A N/A N/A

Channel bandwidth, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1				
6.25 mV	15.5 mV	_____	_____	N/A
10 mV	24.7 mV	_____	_____	N/A
20 mV	50 mV	_____	_____	N/A
50 mV	124 mV	_____	_____	N/A
100 mV	248 mV	_____	_____	N/A
120 mV	297 mV	_____	_____	N/A
140 mV	346 mV	_____	_____	N/A
200 mV	495 mV	_____	_____	N/A
400 mV	990 mV	_____	_____	N/A
Ch2 (non-ATI instruments only)				
6.25 mV	15.5 mV	_____	_____	N/A
10 mV	24.7 mV	_____	_____	N/A
20 mV	50 mV	_____	_____	N/A
50 mV	124 mV	_____	_____	N/A
100 mV	248 mV	_____	_____	N/A
120 mV	297 mV	_____	_____	N/A
140 mV	346 mV	_____	_____	N/A
200 mV	495 mV	_____	_____	N/A
400 mV	990 mV	_____	_____	N/A
Ch3				
6.25 mV	15.5 mV	_____	_____	N/A
10 mV	24.7 mV	_____	_____	N/A
20 mV	50 mV	_____	_____	N/A
50 mV	124 mV	_____	_____	N/A
100 mV	248 mV	_____	_____	N/A
120 mV	297 mV	_____	_____	N/A
140 mV	346 mV	_____	_____	N/A
200 mV	495 mV	_____	_____	N/A
400 mV	990 mV	_____	_____	N/A
Ch4				
6.25 mV	15.5 mV	_____	_____	N/A
10 mV	24.7 mV	_____	_____	N/A
20 mV	50 mV	_____	_____	N/A
50 mV	124 mV	_____	_____	N/A
100 mV	248 mV	_____	_____	N/A
120 mV	297 mV	_____	_____	N/A
140 mV	346 mV	_____	_____	N/A
200 mV	495 mV	_____	_____	N/A
400 mV	990 mV	_____	_____	N/A

Input resistance, ATI channel				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Input resistance				
Ch2 10 mV/div	48.5 Ω	_____	_____	51.5 Ω
Ch2 20 mV/div	48.5 Ω	_____	_____	51.5 Ω
Ch2 30 mV/div	48.5 Ω	_____	_____	51.5 Ω

Input resistance, TekConnect channels				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Input resistance,				
Ch1 6.25 mV/div	48.5 Ω	_____	_____	51.5 Ω
Ch2 6.25 mV/div (non ATI instruments only)	48.5 Ω	_____	_____	51.5 Ω
Ch3 6.25 mV/div	48.5 Ω	_____	_____	51.5 Ω
Ch4 6.25 mV/div	48.5 Ω	_____	_____	51.5 Ω
Ch1 140 mV/div	47.8 Ω	_____	_____	52.2 Ω
Ch2 140 mV/div	47.8 Ω	_____	_____	52.2 Ω
Ch3 140 mV/div	47.8 Ω	_____	_____	52.2 Ω
Ch4 140 mV/div	47.8 Ω	_____	_____	52.2 Ω

Time base system				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Time base, delay time, and internal reference accuracy 10 MHz	Pass/Fail	_____ _____	_____ _____	Pass/Fail
External reference 10 MHz	Pass/Fail	_____	_____	Pass/Fail
Delta time measurement				
DPO77002SX, Ch2, BWE on				
10 mV, rms 10 mV, pk-pk 30 mV, rms 30 mV, pk-pk	N/A N/A N/A N/A	_____ _____ _____ _____	_____ _____ _____ _____	0.560 ps 5.60 ps 0.400 ps 4.00 ps
DPO77002SX, Ch1, BWE on				
6.25 mV, rms 6.25 mV, pk-pk 50 mV, rms 50 mV, pk-pk 100 mV, rms 100 mV, pk-pk	N/A N/A N/A N/A N/A N/A	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	0.560 ps 5.60 ps 0.400 ps 4.00 ps 0.400 ps 4.00 ps
DPO77002SX, Ch3, BWE on				
6.25 mV, rms 6.25 mV, pk-pk 50 mV, rms 50 mV, pk-pk 100 mV, rms 100 mV, pk-pk	N/A N/A N/A N/A N/A N/A	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	0.560 ps 5.60 ps 0.400 ps 4.00 ps 0.400 ps 4.00 ps
DPO75902SX, Ch2, BWE on				
10 mV, rms 10 mV, pk-pk 30 mV, rms 30 mV, pk-pk	N/A N/A N/A N/A	_____ _____ _____ _____	_____ _____ _____ _____	0.560 ps 5.60 ps 0.400 ps 4.00 ps
DPO75902SX, Ch1, BWE on				
6.25 mV, rms 6.25 mV, pk-pk 50 mV, rms 50 mV, pk-pk 100 mV, rms 100 mV, pk-pk	N/A N/A N/A N/A N/A N/A	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	0.560 ps 5.60 ps 0.400 ps 4.00 ps 0.400 ps 4.00 ps
DPO75902SX, Ch3, BWE on				
6.25 mV, rms 6.25 mV, pk-pk 50 mV, rms 50 mV, pk-pk 100 mV, rms 100 mV, pk-pk	N/A N/A N/A N/A N/A N/A	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____	0.560 ps 5.60 ps 0.400 ps 4.00 ps 0.400 ps 4.00 ps
DPO75002SX, Ch2, BWE on				

Time base system				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
10 mV, rms	N/A	_____	_____	0.560 ps
10 mV, pk-pk	N/A	_____	_____	5.60 ps
30 mV, rms	N/A	_____	_____	0.400 ps
30 mV, pk-pk	N/A	_____	_____	4.00 ps
DPO75002SX, Ch1, BWE on				
6.25 mV, rms	N/A	_____	_____	0.560 ps
6.25 mV, pk-pk	N/A	_____	_____	5.60 ps
50 mV, rms	N/A	_____	_____	0.400 ps
50 mV, pk-pk	N/A	_____	_____	4.00 ps
100 mV, rms	N/A	_____	_____	0.400 ps
100 mV, pk-pk	N/A	_____	_____	4.00 ps
DPO75002SX, Ch3, BWE on				
6.25 mV, rms	N/A	_____	_____	0.560 ps
6.25 mV, pk-pk	N/A	_____	_____	5.60 ps
50 mV, rms	N/A	_____	_____	0.400 ps
50 mV, pk-pk	N/A	_____	_____	4.00 ps
100 mV, rms	N/A	_____	_____	0.400 ps
100 mV, pk-pk	N/A	_____	_____	4.00 ps
DPO73304SX, Ch1, BWE on				
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO73304SX, Ch2, BWE on				
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO73304SX, Ch3, BWE on				
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.4500 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO73304SX, Ch4, BWE on				

Time base system				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO72304SX, Ch1, BWE on				
10 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
6.25 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO72304SX, Ch2, BWE on				
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO72304SX, Ch3, BWE on				
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps
DPO72304SX, Ch4, BWE on				
6.25 mV, rms	N/A	_____	_____	0.600 ps
6.25 mV, pk-pk	N/A	_____	_____	6.00 ps
50 mV, rms	N/A	_____	_____	0.450 ps
50 mV, pk-pk	N/A	_____	_____	4.50 ps
100 mV, rms	N/A	_____	_____	0.450 ps
100 mV, pk-pk	N/A	_____	_____	4.50 ps

Trigger system accuracy				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Time accuracy for time qualified triggers				
time range < 1 ms				
Lower Limit	4.835 ns	_____	_____	5.165 ns
Upper Limit	4.835 ns	_____	_____	5.165 ns
time range ≥ 1 µs				
Lower Limit	1.47 µs	_____	_____	2.53 µs
Upper Limit	1.47 µs	_____	_____	2.53 µs
Ch1 trigger sensitivity, 50 MHz	Pass/Fail	_____	_____	Pass/Fail

Trigger system accuracy				
Instrument performance test	**Minimum**	**Incoming**	**Outgoing**	**Maximum**
Ch1 delayed trigger sensitivity, 50 MHz	Pass/Fail	_____	_____	Pass/Fail
AUX trigger input sensitivity, 50 MHz	Pass/Fail	_____	_____	Pass/Fail
Ch1 trigger sensitivity				
5 GHz 10 GHz 15 GHz 20 GHz 25 GHz	Pass/Fail Pass/Fail Pass/Fail Pass/Fail Pass/Fail	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____	Pass/Fail Pass/Fail Pass/Fail Pass/Fail Pass/Fail
Ch1 B trigger sensitivity				
5 GHz 10 GHz 15 GHz 20 GHz 25 GHz	Pass/Fail Pass/Fail Pass/Fail Pass/Fail Pass/Fail	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____	Pass/Fail Pass/Fail Pass/Fail Pass/Fail Pass/Fail
Ch1 AUX trigger input				
11 GHz	Pass/Fail	_____	_____	Pass/Fail
Fast Edge output signal Voltage (difference)				
Positive	450 mV	_____	_____	650 mV
Negative	450 mV	_____	_____	650 mV

Signal acquisition system checks

These procedures check those characteristics that relate to the signal-acquisition system and are listed as checked under *Warranted Characteristics* in *Specifications*. See *Equipment required* on page 43 for test equipment specifications.

Check DC voltage measurement accuracy, ATI channel

Equipment Required	Prerequisites
One DC calibration generator (Item 7) Two Dual-Banana Connectors, (Item 6) Two cables, BNC, (Item 5) One BNC T, (Item 26) One 1.85 mm female to SMA female adapter (Item 31) One SMA male-to-BNC female adapter (Item 17)	The instrument must meet the prerequisites. (See *Prerequisites* on page 43.)

WARNING. *The generator is capable of outputting dangerous voltages. Be sure to set the DC calibration generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during the performance of this procedure.*

1. *Install the test hookup and preset the instrument controls:*
   a. *Hook up the test-signal source:*
      - Set the output of a DC calibration generator to off or 0 volts.
      - Connect the output of a DC calibration generator. (See *Figure 6: DC voltage accuracy test hookup* on page 87.)
   b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.
   c. *Modify the default settings:*
      - From the button bar, select **Horiz/Acq** and select the **Acquisition** tab.
      - Set the Horizontal Scale to **1 ms/div**.
      - Set the Record Length to **5000**.
      - Set the Acquisition Mode to **Hi Res**.
      - Set the Trigger Source to **Line**.

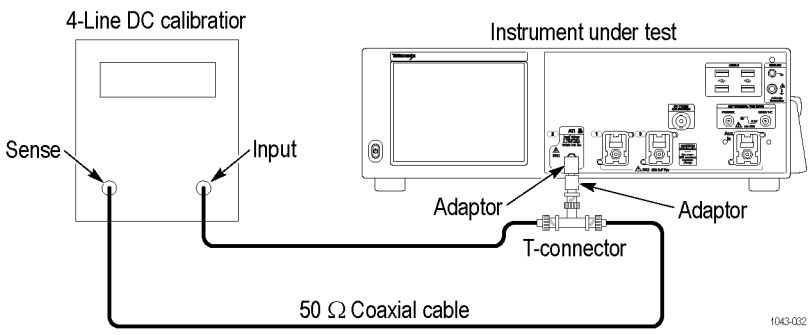


Figure 6: DC voltage accuracy test hookup

2. *Confirm input channels are within limits for DC accuracy at maximum offset, position, and termination voltage:* Do the following substeps.

   a. *Select the ATI channel:*

      - Set the generator output to 0 V.
      - From the button bar, select **Vertical** and then **Vertical Setup**.
      - Select the tab that corresponds to the channel you are to confirm. Click the Display Off button.

   b. *Turn on the measurement Mean for the channel:*

      - From the button bar, select **Measure** and select the **Ampl** tab, **More**, and then select **Mean** to measure the mean of the current channel.
      - Press the **X** (Close) button.

      NOTE. *If any of the voltages supplied by your generator are not calibrated, verify those generator voltages using a digital multimeter, item 25.*

   c. *Set the vertical scale:* Set the vertical **Scale** to one of the settings listed in the following table that is not yet checked, starting with the first setting listed.

Table 5: DC voltage measurement accuracy

Scale setting	Offset setting [2]	Generator setting	Accuracy limits
10 mV	0 V	30 mV	25.5 mV to 34.5 mV
	0 V	-30 mV	-34.5 mV to -25.5 mV
	–0.2 V	-170 mV	-175.7 mV to -164.3 mV
	+0.2 V	+170 mV	+164.3 mV to +175.7 mV
	+0.2 V	0.23 V	224.3 mV to 235.7 mV
	-0.2 V	-0.23 V	-235.7 mV to -224.3 mV
20 mV	0 V	60 mV	53.5 mV to 66.5 mV
	0 V	-60 mV	-66.5 mV to -53.5 mV
	–0.1 V	-40 mV	-47.1 mV to -32.9 mV
	+0.1 V	+40 mV	+32.9+47.1 mV to +47.1 mV
	+0.1 V	160 mV	152.9 mV to 167.1 mV
	-0.1 V	-160 mV	-167.1 mV to -152.9 mV
30 mV	0 V	90 mV	81.5 mV to 98.5 mV
	0 V	-90 mV	-98.5 mV to -81.5 mV

[2] Set as precisely as the instrument's offset resolution permits.

d. *Display the test signal:*

- Display the **Vertical Setup** menu.
- Use the keypad to set the Offset vertical setting as listed in the table for the current vertical scale setting. The baseline level may move off screen.
- Set the generator to the level and polarity indicated in the table for the vertical scale and offset settings you have made.

e. *Measure the test signal:* Press the **X** (close) button. Read the measurement results at the measurement statistics **Mean** measurement readout. See the following figure.

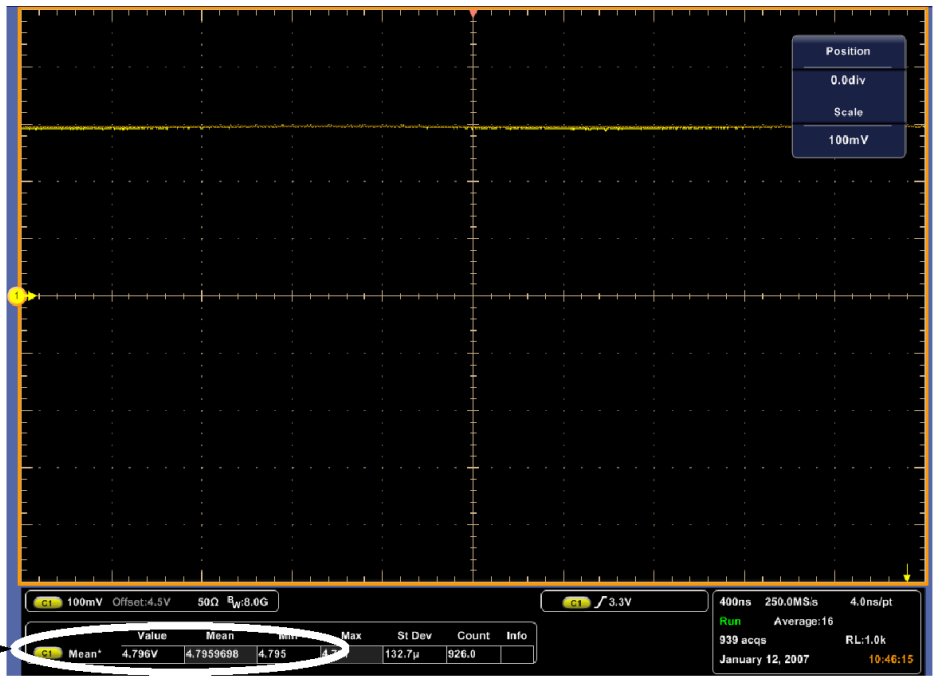


Figure 7: Measurement of DC accuracy

f. *Check against limits:*

- CHECK that the readout for the measurement **Mean** readout on screen is within the limits listed for the current vertical scale and termination/offset/generator settings. Enter the value on test record.
- Repeat substeps 2.c through 2.f until all vertical scale settings are checked for the channel under test. (See *Table 6: DC voltage measurement accuracy* on page 92.)

3. *Disconnect the hookup:*

a. *Set the generator output to 0 V.*

b. Disconnect the equipment from the generator output and the input connector of the channel last tested.

Check DC voltage measurement accuracy, TekConnect channels

Equipment Required	Prerequisites
One DC calibration generator, (Item 7) Two Dual-Banana Connectors, (Item 6) Two cables, (Item 5) One BNC T adapter, (Item 26) One SMA male-to-BNC female adapter, (Item 19)	The instrument must meet the prerequisites. (See *Prerequisites* on page 43.)

WARNING. *The generator is capable of outputting dangerous voltages. Be sure to set the DC calibration generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during the performance of this procedure.*

1. *Install the test hookup and preset the instrument controls:*

   a. *Hook up the test-signal source:*

      - Set the output of a DC calibration generator to off or 0 volts.
      - Connect the output of a DC calibration generator. (See *Figure 8: DC voltage accuracy test hookup* on page 91.)

   b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

   c. *Modify the default settings:*

      - From the button bar, select **Horiz/Acq** and select the **Acquisition** tab.
      - Set the Horizontal Scale to **1 ms/div**.
      - Set the Record Length to **5000**.
      - Set the Acquisition Mode to **Hi Res**.
      - Set the Trigger Source to **Line**.

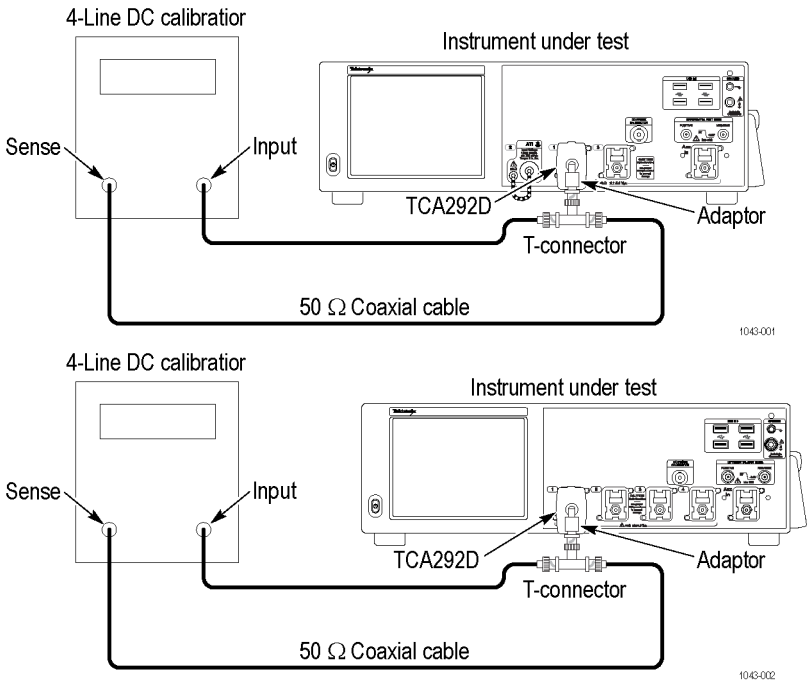


Figure 8: DC voltage accuracy test hookup

2. *Confirm input channels are within limits for DC accuracy at maximum offset, position, and termination voltage:* Do the following substeps - test Ch 1 first, *skipping substep* 2.a of this step *since Ch 1 is already selected from step* 1.

   a. *Select an unchecked channel:*

      - From the button bar, select **Measure** and then **Clear All** to remove the previous measurement.
      - From the button bar, select **Vertical** and then **Vertical Setup** Click the Display On button of the channel just confirmed to remove the channel from the display.
      - Select the tab that corresponds to the channel you are to confirm. Click the Display Off button.
      - Set the generator output to 0 V.
      - Move the test hookup to the channel you selected.

   b. *Turn on the measurement Mean for the channel:*

      - From the button bar, select **Measure** and select the **Ampl** tab, **More**, and then select **Mean** to measure the mean of the current channel.
      - Press the **X** (Close) button.

      NOTE. *If any of the voltages supplied by your generator are not calibrated, verify those generator voltages using a digital multimeter, item 25.*

   c. *Set the vertical scale:* Set the vertical **Scale** to one of the settings listed in the following table that is not yet checked, starting with the first setting listed.

Table 6: DC voltage measurement accuracy

Scale setting	Termination setting	Offset setting [3]	Generator setting	Accuracy limits
6.25 mV	+3.5 V	+3.4 V	3.419 V	3.4012 V to 3.4363 V
	+3.5 V	+2.4 V	2.419 V	2.4032 V to 2.4343 V
	+1.5 V	+2.5 V	2.509 V	2.49345 V to 2.52456 V
	-1.5 V	-1.5 V	-1.509 V	-1.51856 V to -1.49945 V
	+1.5 V	+0.5 V	509 mV	501.45 mV to 516.56 mV
	0 V	0 V	18.75 mV	15.0 mV to 22.5 mV
	0 V	0 V	-18.75 mV	-22.5 mV to -15.0 mV
	0 V	–1.0 V	-981 mV	-991 mV to -971.5 mV
	0 V	+1.0 V	1.019 V	1.009 mV to 1.0285 V
	-3.5 V	-3.4 V	-3.419 V	-3.4363 V to -3.4012 V

[3] Set as precisely as the instrument's offset resolution permits.

Scale setting	Termination setting	Offset setting [3]	Generator setting	Accuracy limits
	-3.5 V	-2.4 V	-2.419 V	-2.4343 V to -2.4032 V
	-1.5 V	-2.5 V	-2.509 V	-2.52456 V to -2.49345 V
	+1.5 V	+1.5 V	1.509 V	1.49945 V to 1.51856
	-1.5 V	-0.5 V	-509 mV	-516.56 mV to -501.45 mV
10 mV	+3.5 V	+3.4 V	3.43 V	3.4117 V to 3.4483 V
	+3.5 V	+2.4 V	2.43 V	2.4137 V to 2.4463 V
	+1.5 V	+2.5 V	2.515 V	2.4988 V to 2.5312 V
	+1.5 V	+1.5 V	1.53 V	1.5195 V to 1.5405 V
	+1.5 V	+0.5 V	530 mV	521.5 mV to 538.5 mV
	0 V	0 V	30 mV	25.5 mV to 34.5 mV
	0 V	0 V	-30 mV	-34.5 mV to -25.5 mV
	0 V	–1.0 V	-970 mV	-980.5 mV to -959.5 mV
	0 V	+1.0 V	1.03 V	1.0195 V to 1.0405 V
	-3.5 V	-3.4 V	-3.43 V	-3.4117 V to -3.4483 V
	-3.5 V	-2.4 V	-2.43V	-2.4137 V to -2.4463 V
	-1.5 V	-2.5 V	-2.515 V	-2.5312 V to -2.4988 V
	-1.5 V	-1.5 V	-1.53 V	-1.5405 V to -1.5195 V
	-1.5 V	-0.5 V	-530 mV	-538.5 mV to -521.5 mV
20 mV	+3.5 V	+3.4 V	3.46 V	3.4397 V to 3.4803 V
	+3.5 V	+2.4 V	2.46 V	2.4417 V to 2.4783 V
	+1.5 V	+2.5 V	2.56 V	2.5415 V to 2.5785 V
	+1.5 V	+1.5 V	1.56 V	1.5475 V to 1.5725 V
	+1.5 V	+0.5 V	560 mV	549.5 mV to 570.5 mV
	0 V	0 V	60 mV	53.5 mV to 66.5 mV
	0 V	0 V	-60 mV	-66.5 mV to -53.5 mV
	0 V	–1.0 V	-940 mV	-952.5 mV to -927.5 mV
	0 V	+1.0 V	1.06 V	1.0475 V to 1.0725 V
	-3.5 V	-3.4 V	-3.46 V	-3.4803 V to -3.4397 V
	-3.5 V	-2.4 V	-2.46 V	-2.4783 V to -2.4417 V
	-1.5 V	-2.5 V	-2.56 V	-2.5785 V to -2.5415 V
	-1.5 V	-1.5 V	-1.56 V	-1.5725 V to -1.5475 V
	-1.5 V	-0.5 V	-560 mV	-570.5 mV to -549.5 mV
50 mV	+3.5 V	+3.4 V	3.55 V	3.5237 V to 3.5763 V
	+3.5 V	+2.4 V	2.55 V	2.5257 V to 2.5743 V
	+1.5 V	+2.5 V	2.65 V	2.6255 V to 2.6745 V
	+1.5 V	+1.5 V	1.65 V	1.6315 V to 1.6685 V
	+1.5 V	+0.5 V	650 mV	633.5 mV to 666.5 mV

[3] Set as precisely as the instrument's offset resolution permits.

Scale setting	Termination setting	Offset setting [3]	Generator setting	Accuracy limits
	0 V	0 V	150 mV	137.5 mV to 162.5 mV
	0 V	0 V	-150 mV	-162.5 mV to -137.5 mV
	0 V	–1.0 V	-850 mV	-868.5 mV to -831.5 mV
	0 V	+1.0 V	1.15 V	1.1315 V to 1.1685 V
	-3.5 V	-3.4 V	-3.55 V	-3.5763 V to -3.5237 V
	-3.5 V	-2.4 V	-2.55 V	-2.5743 V to -2.5257 V
	-1.5 V	-2.5 V	-2.65 V	-2.6745 V to -2.6255 V
	-1.5 V	-1.5 V	-1.65 V	-1.6685 V to -1.6315 V
	-1.5 V	-0.5 V	-650 mV	-666.5 mV to -633.5 mV
100 mV	+3.5 V	+3.4 V	3.7 V	3.6637 V to 3.7363 V
	+3.5 V	+2.4 V	2.7 V	2.6657 V to 2.7343 V
	+1.5 V	+2.5 V	2.8 V	2.7655 V to 2.8345 V
	+1.5 V	+1.5 V	1.8 V	1.7715 V to 1.8285 V
	+1.5 V	+0.5 V	800 mV	773.5 mV to 826.5 mV
	0 V	0 V	300 mV	277.5 mV to 322.5 mV
	0 V	0 V	-300 mV	-322.5 mV to -277.5 mV
	0 V	–1.0 V	-700 mV	-728.5 mV to -671.5 mV
	0 V	+1.0 V	1.3 V	1.2715 V to 1.3285 V
	-3.5 V	-3.4 V	-3.7 V	-3.7363 V to -3.6637 V
	-3.5 V	-2.4 V	-2.7 V	-2.7343 V to -2.6657 V
	-1.5 V	-2.5 V	-2.8 V	-2.8345 V to -2.7655 V
	-1.5 V	-1.5 V	-1.8 V	-1.8285 V to -1.7715 V
	-1.5 V	-0.5 V	-800 mV	-826.5 mV to -773.5 mV
120 mV	+3.5 V	+3.4 V	3.76 V	3.7197 V to 3.8003 V
	+3.5 V	+2.4 V	2.76 V	2.7217 V to 2.7983 V
	+1.5 V	+2.5 V	2.86 V	2.8215 V to 2.8985 V
	+1.5 V	+1.5 V	1.86 V	1.8275 V to 1.8925 V
	+1.5 V	+0.5 V	860 mV	829.5 mV to 890.5 mV
	0 V	0 V	360 mV	333.5 mV to 386.5 mV
	0 V	0 V	-360 mV	-386.5 mV to -333.5 mV
	0 V	–1.0 V	-640 mV	-672.5 mV to -607.5 mV
	0 V	+1.0 V	1.36 V	1.3275 V to 1.3925 V
	-3.5 V	-3.4 V	-3.76 V	-3.8003 V to -3.7197 V
	-3.5 V	-2.4 V	-2.76 V	-2.7983 V to -2.7217 V
	-1.5 V	-2.5 V	-2.86 V	-2.8985 V to -2.8215 V
	-1.5 V	-1.5 V	-1.86 V	-1.8925 V to -1.8275 V
	-1.5 V	-0.5 V	-860 mV	-890.5 mV to -829.5 mV

[3] Set as precisely as the instrument's offset resolution permits.

Scale setting	Termination setting	Offset setting [3]	Generator setting	Accuracy limits
140 mV	0 V	–1.0 V	-580 mV	-624.5 mV to -535.5 mV
	0 V	0 V	420 mV	379.5 mV to 460.5 mV
	0 V	+1.0 V	1.42 V	1.3755 V to 1.4645 V
200 mV	0 V	–1.0 V	-400 mV	-456.5 mV to -343.5 mV
	0 V	0 V	600 mV	547.5 mV to 652.5 mV
	0 V	+1.0 V	1.60 V	1.5435 V to 1.6565 V
400 mV	0 V	–1.0 V	200 mV	103.5 mV to 296.5 mV
	0 V	0 V	1.20 V	1.1075 V to 1.2925 V
	0 V	+1.0 V	2.20 V	2.1035 V to 2.2965 V

d. *Display the test signal:*

- Display the **Vertical Setup** menu.
- Use the keypad to set the Termination Voltage and Offset vertical settings as listed in the table for the current vertical scale setting. The baseline level may move off screen.
- Set the generator to the level and polarity indicated in the table for the vertical scale, termination voltage, and offset settings you have made.

[3] Set as precisely as the instrument's offset resolution permits.

e. *Measure the test signal:* Press the **X** (close) button. Read the measurement results at the measurement statistics **Mean** measurement readout. See the following figure.

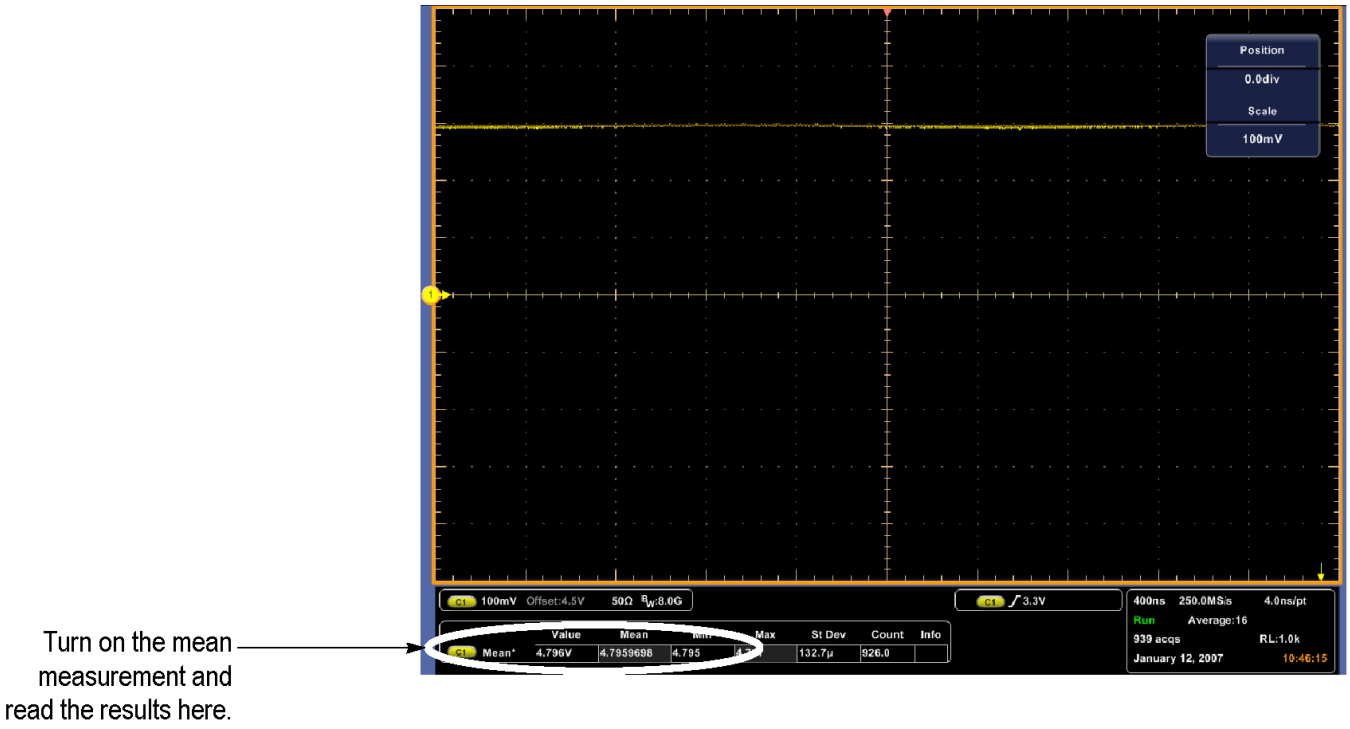


Figure 9: Measurement of DC accuracy

f. *Check against limits:*

- CHECK that the readout for the measurement **Mean** readout on screen is within the limits listed for the current vertical scale and termination/offset/generator settings. Enter the value on test record.
- Repeat substeps 2.c through 2.f until all vertical scale settings are checked for the channel under test. (See *Table 6: DC voltage measurement accuracy* on page 92.)

g. *Test all channels:* Repeat substeps 2.a through 2.f for all TekConnect channels.

3. *Disconnect the hookup:*

a. *Set the generator output to 0 V.*

b. Disconnect the equipment from the generator output and the input connector of the channel last tested.

Check DC gain accuracy, ATI channel

Equipment required	Prerequisites
One DC calibration generator, (Item 7) Two dual-banana connectors, (Item 6) Two cables, (Item 5) One BNC "T", male to 2 females, (Item 26) One SMA male-to-female BNC adapter, (Item 17) On adapter, SMA female-to-female 1.85, (Item 31)	The instrument must meet the prerequisites. (See *Prerequisites* on page 43.)

WARNING. *The generator is capable of outputting dangerous voltages. To avoid injury, be sure to set the DC calibration generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during this procedure.*

CAUTION. *The generator is capable of outputting voltages that exceed the maximum input voltage of the instrument. To avoid damaging the instrument, be sure to set the DC calibration generator to off or 0 volts before connecting or disconnecting the test hookup during this procedure.*

1. *Install the test hookup and preset the instrument controls:*
   a. *Hook up the test-signal source:*
      - Set the output of a DC calibration generator to off or 0 volts. Set the DC impedance of the generator to 50 Ω.
      - Connect the generator to **Ch 2** through an adapter. Refer to the following figure.

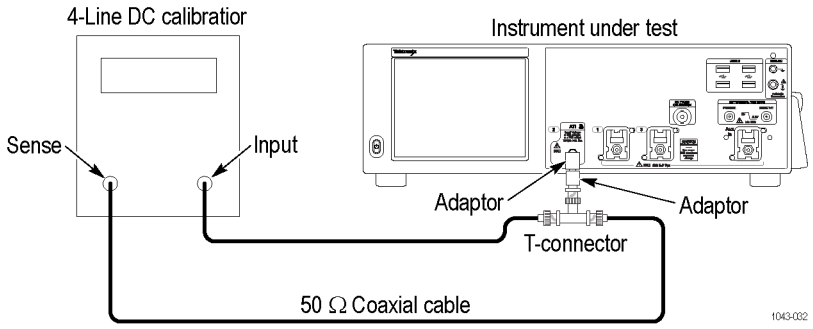


Figure 10: DC gain accuracy test hookup

   b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.
   c. *Modify the default settings:*
      - From the button bar, select **Horiz/Acq** and select the **Acquisition** tab.
      - Set the Horizontal Scale to **1 ms/div**.

- Set the Record Length to **5000**.
- Set the Acquisition Mode to **Hi Res**.
- Set the Trigger Source to **Line**.

2. *Confirm input channels are within limits for DC gain accuracy*.

a. *Select channel 2:*

- *Set the generator output to 0 V*.
- Select channel 2.

b. *Turn on the measurement Mean for the channel:*

- From the tool bar, select **Measure** and select the **Ampl** tab, **More**, and then select **Mean** to measure the mean of the channel.
- Press the **X** (Close) button.

c. *Set the vertical scale:* Set the vertical **Scale** to one of the settings in the following table that is not yet checked, starting with the first setting.

Table 7: Gain accuracy

Ch	Scale setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch2	10 mV	0	0 V	30 mV			+58.8 mV to +61.2 mV
				-30 mV			
		0	+0.2 V	170 mV			+58.8 mV to +61.2 mV
				230 mV			
		0	-0.2 V	-230 mV			+58.8 mV to +61.2 mV
				-170 mV			
Ch2	20 mV	0	0 V	60 mV			+117.6 mV to +122.4 mV
				-60 mV			
		0	+0.1 V	40 mV			+117.6 mV to +122.4 mV
				160 mV			
		0	-0.1 V	-160 mV			+117.6 mV to +122.4 mV
				-40 mV			
Ch2	30 mV	0	0 V	90 mV			+176.4 mV to +183.6 mV
				-90 mV			

d. *Display the test signal:*

- Display the **Vertical Setup** menu.
- Use the keypad to set the Position and Offset vertical settings as listed in the table for the current vertical scale setting. The baseline level may move off screen.
- Set the generator so that its Sense value and polarity matches the generator setting in the table for the vertical scale, position, and offset settings you have made. The DC test level should appear at about 3 division on screen. Using the Vertical Position, move the test level to 3 divisions above the center screen.

NOTE. *It's important to use the Sense reading of the generator instead of the Output level when adjusting the generator to the specified voltage setting.*

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e. *Measure the test signal:* Press the **Close** button.

- Read the measurement results at the measurement statistics **Mean** measurement readout. Refer to the following figure.
- Record the Mean in the Measurement Mean column. (See *Table 7: Gain accuracy* on page 98.)

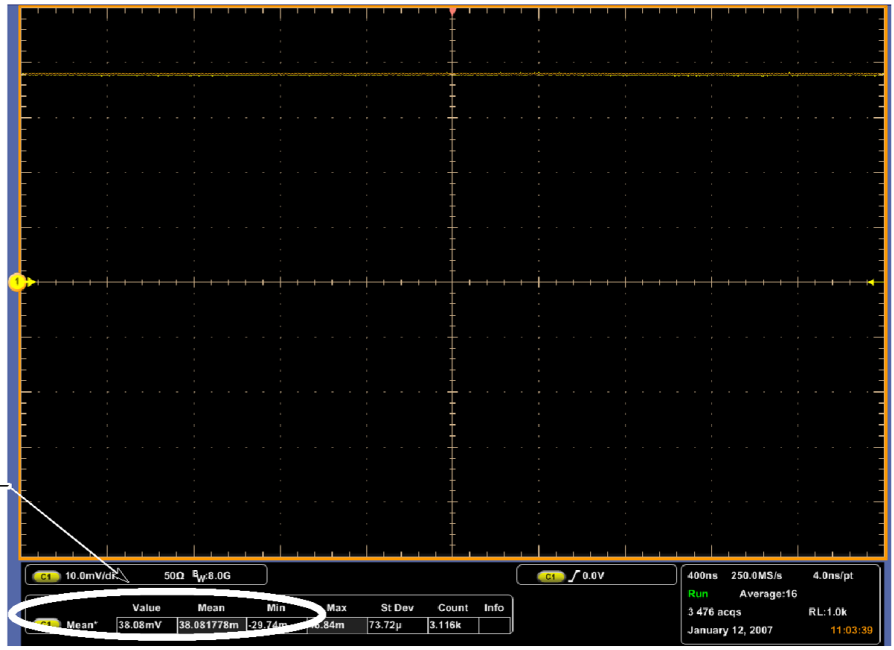

Figure 11: Measurement of DC gain accuracy

f. *Measure second mean:*

- Set the generator to the second level and polarity indicated in the table for the vertical scale, position, and offset settings you have made.
- Repeat substep 2.e using the current vertical scale, position, offset, and new generator setting for the second mean.

g. *Check against limits:*

- Subtract the second measurement mean from the first measurement mean for the current vertical scale, termination voltage, position, and offset.
- Record the difference of the two mean measurements in the Difference of Measurement Means column of the table. (See *Table 7: Gain accuracy* on page 98.)
- CHECK that the Difference of Measurement Mean is within the limits listed for the current vertical scale/position/offset/generator settings. Enter measurement mean difference value on test record.

h. Repeat substeps 2.d through 2.g, using the next position, offset and generator settings listed in the table for the current vertical scale.

i. Repeat substeps 2.c through 2.h until all vertical scale settings, listed in the table are checked. (See *DC Gain Accuracy*.)

3. *Disconnect the hookup:*

a. *Set the generator output to 0 V.*

b. Disconnect the generator output from the channel last tested.

Check DC gain accuracy, TekConnect channels

Equipment required	Prerequisites
One DC calibration generator (Item 7) Two, dual-banana connectors, (Item 6) Two cables, (Item 5) One SMA male-to-female BNC adapter (Item 19) One BNC "T", male to 2 females (Item 26)	The instrument must meet the prerequisites. (See *Prerequisites* on page 43.)

WARNING. *The generator is capable of outputting dangerous voltages. To avoid injury, be sure to set the DC calibration generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during this procedure.*

1. *Install the test hookup and preset the instrument controls:*

a. *Hook up the test-signal source:*

- Set the output of a DC calibration generator to off or 0 volts. Set the DC impedance of the generator to 50 Ω.
- Connect the generator to **Ch 1** through an adapter. Refer to the following figure.

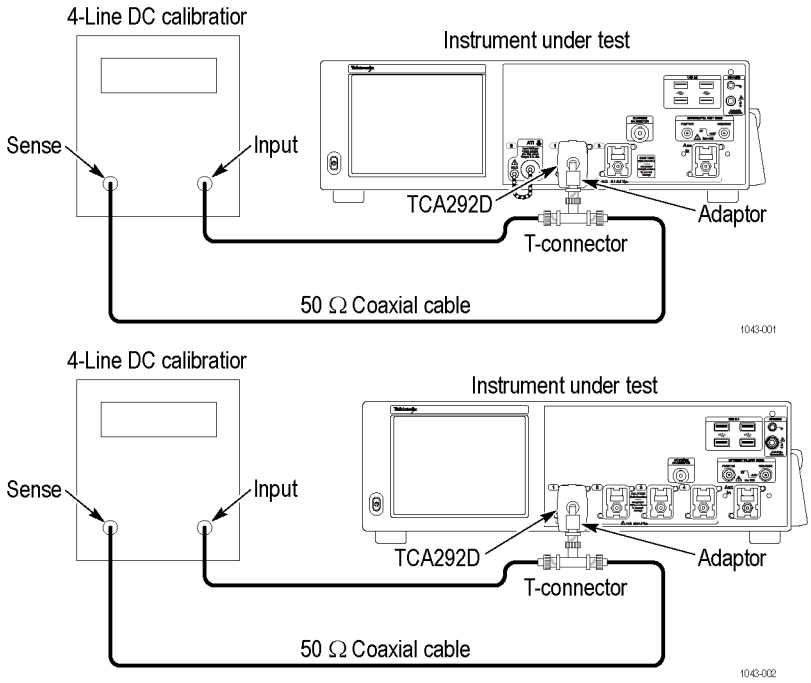

Figure 12: DC gain accuracy test hookup

b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

c. *Modify the default settings:*

- From the button bar, select **Horiz/Acq** and select the **Acquisition** tab.
- Set the Horizontal Scale to **1 ms/div**.
- Set the Record Length to **5000**.
- Set the Acquisition Mode to **Hi Res**.
- Set the Trigger Source to **Line**.

2. *Confirm input channels are within limits for DC gain accuracy*. Do the following substeps - test Ch 1 first, *skipping substep* 2.a of this step *since Ch 1 is already selected from step* 1.

a. *Select an unchecked channel:*

- From the tool bar, select **Measure** and then **Clear All** to remove the previous measurement.
- Press the Display button of the channel just confirmed to remove the channel from the display.

- Press the Channel tab and the Display button that corresponds to the channel you are to confirm. On instruments with an ATI channel, do not check Channel 2.
- *Set the generator output to 0 V.*
- Move the test hookup to the channel you selected.

b. *Turn on the measurement Mean for the channel:*

- From the tool bar, select **Measure** and select the **Ampl** tab, **More**, and then select **Mean** to measure the mean of the current channel.
- Press the **X** (Close) button.

c. *Set the vertical scale:* Set the vertical **Scale** to one of the settings in the following table that is not yet checked, starting with the first setting.

Table 8: Gain accuracy

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch1	6.25 mV	0 V	0	0 V	19 mV			+37.24 mV to +38.76 mV
					-19 mV			
			0	+1 V	1.019 V			+37.24 mV to +38.76 mV
					981 mV			
			0	-1 V	-981 mV			+37.24 mV to +38.76 mV
					-1.019 V			
		1.5 V	0	2.5 V	2.519 V			+37.24 mV to +38.76 mV
					2.481 V			
			0	1.5 V	1.519 V			+37.24 mV to +38.76 mV
					1.481 V			
			0	0.5 V	519 mV			+37.24 mV to +38.76 mV
					481 mV			
		3.4 V	0	3.4 V	3.419 V			+37.24 mV to +38.76 mV
					3.381 V			
			0	2.4 V	2.419 V			+37.24 mV to +38.76 mV
					2.381 V			
		-3.4 V	0	-3.4 V	-3.381 V			+37.24 mV to +38.76 mV
					-3.419 V			
			0	-2.4 V	-2.381 V			+37.24 mV to +38.76 mV
					-2.419 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-1.5 V	0	-2.5 V	-2.481 V			+37.24 mV to +38.76 mV
					-2.519 V			
			0	-1.5 V	-1.481 V			+37.24 mV to +38.76 mV
					-1.519 V			
			0	-0.5 V	-481 mV			+37.24 mV to +38.76 mV
					-519 mV			
Ch1	10 mV	0 V	0	0 V	30 mV			+58.8 mV to +61.2 mV
					-30 mV			
			0	+1 V	1.03 V			+58.8 mV to +61.2 mV
					970 mV			
			0	-1 V	-970 mV			+58.8 mV to +61.2 mV
					-1.03 V			
		1.5 V	0	2.5 V	2.53 V			+58.8 mV to +61.2 mV
					2.47 V			
			0	1.5 V	1.53 V			+58.8 mV to +61.2 mV
					1.47 V			
			0	0.5 V	530 mV			+58.8 mV to +61.2 mV
					470 mV			
		3.4 V	0	3.4 V	3.43 V			+58.8 mV to +61.2 mV
					3.37 V			
			0	2.4 V	2.43 V			+58.8 mV to +61.2 mV
					2.37 V			
		-3.4 V	0	-3.4 V	-3.37 V			+58.8 mV to +61.2 mV
					-3.43 V			
			0	-2.4 V	-2.37 V			+58.8 mV to +61.2 mV
					-2.43 V			
		-1.5 V	0	-2.5 V	-2.47 V			+58.8 mV to +61.2 mV
					-2.53 V			
			0	-1.5 V	-1.47 V			+58.8 mV to +61.2 mV
					-1.53 V			
			0	-0.5 V	-470 mV			+58.8 mV to +61.2 mV
					-530 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch1	20 mV	0 V	0	0 V	60 mV			+117.6 mV to +122.4 mV
					-60 mV			
			0	+1 V	1.06 V			+117.6 mV to +122.4 mV
					940 mV			
			0	-1 V	-940 mV			+117.6 mV to +122.4 mV
					-1.06 V			
		1.5 V	0	2.5 V	2.56 V			+117.6 mV to +122.4 mV
					2.44 V			
			0	1.5 V	1.56 V			+117.6 mV to +122.4 mV
					1.44 V			
			0	0.5 V	560 mV			+117.6 mV to +122.4 mV
					440 mV			
		3.4 V	0	3.4 V	3.46 V			+117.6 mV to +122.4 mV
					3.34 V			
			0	2.4 V	2.46 V			+117.6 mV to +122.4 mV
					2.34 V			
		-3.4 V	0	-3.4 V	-3.34 V			+117.6 mV to +122.4 mV
					-3.46 V			
			0	-2.4 V	-2.34 V			+117.6 mV to +122.4 mV
					-2.46 V			
		-1.5 V	0	-2.5 V	-2.44 V			+117.6 mV to +122.4 mV
					-2.56 V			
			0	-1.5 V	-1.44 V			+117.6 mV to +122.4 mV
					-1.56 V			
			0	-0.5 V	-440 mV			+117.6 mV to +122.4 mV
					-560 mV			
Ch1	50 mV	0 V	0	0 V	150 mV			+294 mV to +306 mV
					-150 mV			
			0	+1 V	1.15 V			+294 mV to +306 mV
					850 mV			
			0	-1 V	-850 mV			+294 mV to +306 mV
					-1.15 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		1.5 V	0	2.5 V	2.65 V			+294 mV to +306 mV
					2.35 V			
			0	1.5 V	1.65 V			+294 mV to +306 mV
					1.35 V			
			0	0.5 V	650 mV			+294 mV to +306 mV
					350 mV			
		3.4 V	0	3.4 V	3.55 V			+294 mV to +306 mV
					3.25 V			
			0	2.4 V	2.55 V			+294 mV to +306 mV
					2.25 V			
		-3.4 V	0	-3.4 V	-3.25 V			+294 mV to +306 mV
					-3.55 V			
			0	-2.4 V	-2.25 V			+294 mV to +306 mV
					-2.55 V			
		-1.5 V	0	-2.5 V	-2.35 V			+294 mV to +306 mV
					-2.65 V			
			0	-1.5 V	-1.35 V			+294 mV to +306 mV
					-1.65 V			
			0	-0.5 V	-350 mV			+294 mV to +306 mV
					-650 mV			
Ch1	100 mV	0 V	0	0 V	300 mV			+588 mV to +612 mV
					-300 mV			
			0	+1 V	1.3 V			+588 mV to +612 mV
					700 mV			
			0	-1 V	-700 mV			+588 mV to +612 mV
					-1.3 V			
		1.5 V	0	2.5 V	2.8 V			+588 mV to +612 mV
					2.2 V			
			0	1.5 V	1.8 V			+588 mV to +612 mV
					1.2 V			
			0	0.5 V	800 mV			+588 mV to +612 mV
					200 mV			
		3.4 V	0	3.4 V	3.70 V			+588 mV to +612 mV
					3.10 V			
			0	2.4 V	2.70 V			+588 mV to +612 mV
					2.10 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-3.4 V	0	-3.4 V	-3.10 V			+588 mV to +612 mV
					-3.70 V			
			0	-2.4 V	-2.10 V			+588 mV to +612 mV
					-2.70 V			
		-1.5 V	0	-1.5 V	-1.20 V			+588 mV to +612 mV
					-1.80 V			
			0	-0.5 V	- 200 mV			+588 mV to +612 mV
					-800 mV			
Ch1	120 mV	0 V	0	0 V	360 mV			+705.6 mV to +734.4 mV
					-360 mV			
			0	+1 V	1.36 V			+705.6 mV to +734.4 mV
					640 mV			
			0	-1 V	-640 mV			+705.6 mV to +734.4 mV
					-1.36 V			
		1.5 V	0	2.5 V	2.86 V			+705.6 mV to +734.4 mV
					2.14 V			
			0	1.5 V	1.86 V			+705.6 mV to +734.4 mV
					1.14 V			
			0	0.5 V	860 mV			+705.6 mV to +734.4 mV
					140 mV			
		3.4 V	0	3.4 V	3.76 V			+705.6 mV to +734.4 mV
					3.04 V			
			0	2.4 V	2.76 V			+705.6 mV to +734.4 mV
					2.04 V			
		-3.4 V	0	-3.4 V	-3.04 V			+705.6 mV to +734.4 mV
					-3.76 V			
			0	-2.4 V	-2.04 V			+705.6 mV to +734.4 mV
					-2.76 V			
		-1.5 V	0	-1.5 V	-1.14 V			+705.6 mV to +734.4 mV
					-1.86 V			
			0	-0.5 V	-140 mV			+705.6 mV to +734.4 mV
					-860 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch1	140 mV	0 V	0	–1 V	–580 mV			+823.2 mV to +856.8 mV
					–1.42 V			
			0	0 V	420 mV			+823.2 mV to +856.8 mV
					–420 mV			
			0	+1 V	1.42 V			+823.2 mV to +856.8 mV
					580 mV			
Ch1	200 mV	0 V	0	–0.9 V	–300 mV			+1.176 V to +1.224 V
					–1.50 V			
			0	0 V	600 mV			+1.176 V to +1.224 V
					–600 mV			
			0	+0.9 V	1.50 V			+1.176 V to +1.224 V
					300 mV			
Ch1	400 mV	0 V	0	–0.3 V	900 mV			+2.352 V to +2.448 V
					–1.50 V			
			0	0 V	1.20 V			+2.352 V to +2.448 V
					–1.20 V			
			0	+0.3 V	1.50 V			+2.352 V to +2.448 V
					–900 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch2 (non-ATI)	6.25 mV	0 V	0	0 V	19 mV			+37.24 mV to +38.76 mV
					-19 mV			
			0	+1 V	1.019 V			+37.24 mV to +38.76 mV
					981 mV			
			0	-1 V	-981 mV			+37.24 mV to +38.76 mV
					-1.019 V			
		1.5 V	0	2.5 V	2.519 V			+37.24 mV to +38.76 mV
					2.481 V			
			0	1.5 V	1.519 V			+37.24 mV to +38.76 mV
					1.481 V			
			0	0.5 V	519 mV			+37.24 mV to +38.76 mV
					481 mV			
		3.4 V	0	3.4 V	3.419 V			+37.24 mV to +38.76 mV
					3.381 V			
			0	2.4 V	2.419 V			+37.24 mV to +38.76 mV
					2.381 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-3.4 V	0	-3.4 V	-3.381 V			+37.24 mV to +38.76 mV
					-3.419 V			
			0	-2.4 V	-2.381 V			+37.24 mV to +38.76 mV
					-2.419 V			
		-1.5 V	0	-2.5 V	-2.481 V			+37.24 mV to +38.76 mV
					-2.519 V			
			0	-1.5 V	-1.481 V			+37.24 mV to +38.76 mV
					-1.519 V			
			0	-0.5 V	-481 mV			+37.24 mV to +38.76 mV
					-519 mV			
Ch2 (non-ATI)	10 mV	0 V	0	0 V	30 mV			+58.8 mV to +61.2 mV
					-30 mV			
			0	+1 V	1.03 V			+58.8 mV to +61.2 mV
					970 mV			
			0	-1 V	-970 mV			+58.8 mV to +61.2 mV
					-1.03 V			
		1.5 V	0	2.5 V	2.53 V			+58.8 mV to +61.2 mV
					2.47 V			
			0	1.5 V	1.53 V			+58.8 mV to +61.2 mV
					1.47 V			
			0	0.5 V	530 mV			+58.8 mV to +61.2 mV
					470 mV			
		3.4 V	0	3.4 V	3.43 V			+58.8 mV to +61.2 mV
					3.37 V			
			0	2.4 V	2.43 V			+58.8 mV to +61.2 mV
					2.37 V			
		-3.4 V	0	-3.4 V	-3.37 V			+58.8 mV to +61.2 mV
					-3.43 V			
			0	-2.4 V	-2.37 V			+58.8 mV to +61.2 mV
					-2.43 V			
		-1.5 V	0	-2.5 V	-2.47 V			+58.8 mV to +61.2 mV
					-2.53 V			
			0	-1.5 V	-1.47 V			+58.8 mV to +61.2 mV
					-1.53 V			
			0	-0.5 V	-470 mV			+58.8 mV to +61.2 mV
					-530 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch2 (non-ATI)	20 mV	0 V	0	0 V	60 mV			+117.6 mV to +122.4 mV
					-60 mV			
			0	+1 V	1.06 V			+117.6 mV to +122.4 mV
					940 mV			
			0	-1 V	-940 mV			+117.6 mV to +122.4 mV
					-1.06 V			
		1.5 V	0	2.5 V	2.56 V			+117.6 mV to +122.4 mV
					2.44 V			
			0	1.5 V	1.56 V			+117.6 mV to +122.4 mV
					1.44 V			
			0	0.5 V	560 mV			+117.6 mV to +122.4 mV
					440 mV			
		3.4 V	0	3.4 V	3.46 V			+117.6 mV to +122.4 mV
					3.34 V			
			0	2.4 V	2.46 V			+117.6 mV to +122.4 mV
					2.34 V			
		-3.4 V	0	-3.4 V	-3.34 V			+117.6 mV to +122.4 mV
					-3.46 V			
			0	-2.4 V	-2.34 V			+117.6 mV to +122.4 mV
					-2.46 V			
		-1.5 V	0	-2.5 V	-2.44 V			+117.6 mV to +122.4 mV
					-2.56 V			
			0	-1.5 V	-1.44 V			+117.6 mV to +122.4 mV
					-1.56 V			
			0	-0.5 V	-440 mV			+117.6 mV to +122.4 mV
					-560 mV			
Ch2 (non-ATI)	50 mV	0 V	0	0 V	150 mV			+294 mV to +306 mV
					-150 mV			
			0	+1 V	1.15 V			+294 mV to +306 mV
					850 mV			
			0	-1 V	-850 mV			+294 mV to +306 mV
					-1.15 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		1.5 V	0	2.5 V	2.65 V			+294 mV to +306 mV
					2.35 V			
			0	1.5 V	1.65 V			+294 mV to +306 mV
					1.35 V			
			0	0.5 V	650 mV			+294 mV to +306 mV
					350 mV			
		3.4 V	0	3.4 V	3.55 V			+294 mV to +306 mV
					3.25 V			
			0	2.4 V	2.55 V			+294 mV to +306 mV
					2.25 V			
		-3.4 V	0	-3.4 V	-3.25 V			+294 mV to +306 mV
					-3.55 V			
			0	-2.4 V	-2.25 V			+294 mV to +306 mV
					-2.55 V			
		-1.5 V	0	-2.5 V	-2.35 V			+294 mV to +306 mV
					-2.65 V			
			0	-1.5 V	-1.35 V			+294 mV to +306 mV
					-1.65 V			
			0	-0.5 V	-350 mV			+294 mV to +306 mV
					-650 mV			
Ch2 (non-ATI)	100 mV	0 V	0	0 V	300 mV			+588 mV to +612 mV
					-300 mV			
			0	+1 V	1.3 V			+588 mV to +612 mV
					700 mV			
			0	-1 V	-700 mV			+588 mV to +612 mV
					-1.3 V			
		1.5 V	0	2.5 V	2.8 V			+588 mV to +612 mV
					2.2 V			
			0	1.5 V	1.8 V			+588 mV to +612 mV
					1.2 V			
			0	0.5 V	800 mV			+588 mV to +612 mV
					200 mV			
		3.4 V	0	3.4 V	3.70 V			+588 mV to +612 mV
					3.10 V			
			0	2.4 V	2.70 V			+588 mV to +612 mV
					2.10 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-3.4 V	0	-3.4 V	-3.10 V			+588 mV to +612 mV
					-3.70 V			
			0	-2.4 V	-2.10 V			+588 mV to +612 mV
					-2.70 V			
		-1.5 V	0	-1.5 V	-1.20 V			+588 mV to +612 mV
					-1.80 V			
			0	-0.5 V	- 200 mV			+588 mV to +612 mV
					-800 mV			
Ch2 (non-ATI)	120 mV	0 V	0	0 V	360 mV			+705.6 mV to +734.4 mV
					-360 mV			
			0	+1 V	1.36 V			+705.6 mV to +734.4 mV
					640 mV			
			0	-1 V	-640 mV			+705.6 mV to +734.4 mV
					-1.36 V			
		1.5 V	0	2.5 V	2.86 V			+705.6 mV to +734.4 mV
					2.14 V			
			0	1.5 V	1.86 V			+705.6 mV to +734.4 mV
					1.14 V			
			0	0.5 V	860 mV			+705.6 mV to +734.4 mV
					140 mV			
		3.4 V	0	3.4 V	3.76 V			+705.6 mV to +734.4 mV
					3.04 V			
			0	2.4 V	2.76 V			+705.6 mV to +734.4 mV
					2.04 V			
		-3.4 V	0	-3.4 V	-3.04 V			+705.6 mV to +734.4 mV
					-3.76 V			
			0	-2.4 V	-2.04 V			+705.6 mV to +734.4 mV
					-2.76 V			
		-1.5 V	0	-1.5 V	-1.14 V			+705.6 mV to +734.4 mV
					-1.86 V			
			0	-0.5 V	-140 mV			+705.6 mV to +734.4 mV
					-860 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch2 (non-ATI)	140 mV	0 V	0	–1 V	–580 mV			+823.2 mV to +856.8 mV
					–1.42 V			
			0	0 V	420 mV			+823.2 mV to +856.8 mV
					–420 mV			
			0	+1 V	1.42 V			+823.2 mV to +856.8 mV
					580 V			
Ch2 (non-ATI)	200 mV	0 V	0	–0.9 V	–300 mV			+1.176 V to +1.224 V
					–1.50 V			
			0	0 V	600 mV			+1.176 V to +1.224 V
					–600 mV			
			0	+0.9 V	1.50 V			+1.176 V to +1.224 V
					300 mV			
Ch2 (non-ATI)	400 mV	0 V	0	–0.3 V	900 mV			+2.352 mV to +2.448 mV
					–1.50 V			
			0	0 V	1.20 V			+2.352 mV to +2.448 mV
					–1.20 V			
			0	+0.3 V	1.50 V			+2.352 mV to +2.448 mV
					–900 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch3	6.25 mV	0 V	0	0 V	19 mV			+37.24 mV to +38.76 mV
					-19 mV			
			0	+1 V	1.019 V			+37.24 mV to +38.76 mV
					981 mV			
			0	-1 V	-981 mV			+37.24 mV to +38.76 mV
					-1.019 V			
		1.5 V	0	2.5 V	2.519 V			+37.24 mV to +38.76 mV
					2.481 V			
			0	1.5 V	1.519 V			+37.24 mV to +38.76 mV
					1.481 V			
			0	0.5 V	519 mV			+37.24 mV to +38.76 mV
					481 mV			
		3.4 V	0	3.4 V	3.419 V			+37.24 mV to +38.76 mV
					3.381 V			
			0	2.4 V	2.419 V			+37.24 mV to +38.76 mV
					2.381 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-3.4 V	0	-3.4 V	-3.381 V			+37.24 mV to +38.76 mV
					-3.419 V			
			0	-2.4 V	-2.381 V			+37.24 mV to +38.76 mV
					-2.419 V			
		-1.5 V	0	-2.5 V	-2.481 V			+37.24 mV to +38.76 mV
					-2.519 V			
			0	-1.5 V	-1.481 V			+37.24 mV to +38.76 mV
					-1.519 V			
			0	-0.5 V	-481 mV			+37.24 mV to +38.76 mV
					-519 mV			
Ch3	10 mV	0 V	0	0 V	30 mV			+58.8 mV to +61.2 mV
					-30 mV			
			0	+1 V	1.03 V			+58.8 mV to +61.2 mV
					970 mV			
			0	-1 V	-970 mV			+58.8 mV to +61.2 mV
					-1.03 V			
		1.5 V	0	2.5 V	2.53 V			+58.8 mV to +61.2 mV
					2.47 V			
			0	1.5 V	1.53 V			+58.8 mV to +61.2 mV
					1.47 V			
			0	0.5 V	530 mV			+58.8 mV to +61.2 mV
					470 mV			
		3.4 V	0	3.4 V	3.43 V			+58.8 mV to +61.2 mV
					3.37 V			
			0	2.4 V	2.43 V			+58.8 mV to +61.2 mV
					2.37 V			
		-3.4 V	0	-3.4 V	-3.37 V			+58.8 mV to +61.2 mV
					-3.43 V			
			0	-2.4 V	-2.37 V			+58.8 mV to +61.2 mV
					-2.43 V			
		-1.5 V	0	-2.5 V	-2.47 V			+58.8 mV to +61.2 mV
					-2.53 V			
			0	-1.5 V	-1.47 V			+58.8 mV to +61.2 mV
					-1.53 V			
			0	-0.5 V	-470 mV			+58.8 mV to +61.2 mV
					-530 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch3	20 mV	0 V	0	0 V	60 mV			+117.6 mV to +122.4 mV
					-60 mV			
			0	+1 V	1.06 V			+117.6 mV to +122.4 mV
					940 mV			
			0	-1 V	-940 mV			+117.6 mV to +122.4 mV
					-1.06 V			
		1.5 V	0	2.5 V	2.56 V			+117.6 mV to +122.4 mV
					2.44 V			
			0	1.5 V	1.56 V			+117.6 mV to +122.4 mV
					1.44 V			
			0	0.5 V	560 mV			+117.6 mV to +122.4 mV
					440 mV			
		3.4 V	0	3.4 V	3.46 V			+117.6 mV to +122.4 mV
					3.34 V			
			0	2.4 V	2.46 V			+117.6 mV to +122.4 mV
					2.34 V			
		-3.4 V	0	-3.4 V	-3.34 V			+117.6 mV to +122.4 mV
					-3.46 V			
			0	-2.4 V	-2.34 V			+117.6 mV to +122.4 mV
					-2.46 V			
		-1.5 V	0	-2.5 V	-2.44 V			+117.6 mV to +122.4 mV
					-2.56 V			
			0	-1.5 V	-1.44 V			+117.6 mV to +122.4 mV
					-1.56 V			
			0	-0.5 V	-440 mV			+117.6 mV to +122.4 mV
					-560 mV			
Ch3	50 mV	0 V	0	0 V	150 mV			+294 mV to +306 mV
					-150 mV			
			0	+1 V	1.15 V			+294 mV to +306 mV
					850 mV			
			0	-1 V	-850 mV			+294 mV to +306 mV
					-1.15 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		1.5 V	0	2.5 V	2.65 V			+294 mV to +306 mV
					2.35 V			
			0	1.5 V	1.65 V			+294 mV to +306 mV
					1.35 V			
			0	0.5 V	650 mV			+294 mV to +306 mV
					350 mV			
		3.4 V	0	3.4 V	3.55 V			+294 mV to +306 mV
					3.25 V			
			0	2.4 V	2.55 V			+294 mV to +306 mV
					2.25 V			
		-3.4 V	0	-3.4 V	-3.25 V			+294 mV to +306 mV
					-3.55 V			
			0	-2.4 V	-2.25 V			+294 mV to +306 mV
					-2.55 V			
		-1.5 V	0	-2.5 V	-2.35 V			+294 mV to +306 mV
					-2.65 V			
			0	-1.5 V	-1.35 V			+294 mV to +306 mV
					-1.65 V			
			0	-0.5 V	-350 mV			+294 mV to +306 mV
					-650 mV			
Ch3	100 mV	0 V	0	0 V	300 mV			+588 mV to +612 mV
					-300 mV			
			0	+1 V	1.3 V			+588 mV to +612 mV
					700 mV			
			0	-1 V	-700 mV			+588 mV to +612 mV
					-1.3 V			
		1.5 V	0	2.5 V	2.8 V			+588 mV to +612 mV
					2.2 V			
			0	1.5 V	1.8 V			+588 mV to +612 mV
					1.2 V			
			0	0.5 V	800 mV			+588 mV to +612 mV
					200 mV			
		3.4 V	0	3.4 V	3.70 V			+588 mV to +612 mV
					3.10 V			
			0	2.4 V	2.70 V			+588 mV to +612 mV
					2.10 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-3.4 V	0	-3.4 V	-3.10 V			+588 mV to +612 mV
					-3.70 V			
			0	-2.4 V	-2.10 V			+588 mV to +612 mV
					-2.70 V			
		-1.5 V	0	-1.5 V	-1.20 V			+588 mV to +612 mV
					-1.80 V			
			0	-0.5 V	- 200 mV			+588 mV to +612 mV
					-800 mV			
Ch3	120 mV	0 V	0	0 V	360 mV			+705.6 mV to +734.4 mV
					-360 mV			
			0	+1 V	1.36 V			+705.6 mV to +734.4 mV
					640 mV			
			0	-1 V	-640 mV			+705.6 mV to +734.4 mV
					-1.36 V			
		1.5 V	0	2.5 V	2.86 V			+705.6 mV to +734.4 mV
					2.14 V			
			0	1.5 V	1.86 V			+705.6 mV to +734.4 mV
					1.14 V			
			0	0.5 V	860 mV			+705.6 mV to +734.4 mV
					140 mV			
		3.4 V	0	3.4 V	3.76 V			+705.6 mV to +734.4 mV
					3.04 V			
			0	2.4 V	2.76 V			+705.6 mV to +734.4 mV
					2.04 V			
		-3.4 V	0	-3.4 V	-3.04 V			+705.6 mV to +734.4 mV
					-3.76 V			
			0	-2.4 V	-2.04 V			+705.6 mV to +734.4 mV
					-2.76 V			
		-1.5 V	0	-1.5 V	-1.14 V			+705.6 mV to +734.4 mV
					-1.86 V			
			0	-0.5 V	-140 mV			+705.6 mV to +734.4 mV
					-860 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch3	140 mV	0 V	0	–1 V	–580 mV			+8.232 mV to +8.568 mV
					–1.42 V			
			0	0 V	420 mV			+8.232 mV to +8.568 mV
					–420 mV			
			0	+1 V	1.42 V			+8.232 mV to +8.568 mV
					580 mV			
Ch3	200 mV	0 V	0	–0.9 V	–300 mV			+1.176 mV to +1.224 mV
					–1.50 V			
			0	0 V	600 mV			+1.176 mV to +1.224 mV
					–600 mV			
			0	+0.9 V	1.50 V			+1.176 mV to +1.224 mV
					300 mV			
Ch3	400 mV	0 V	0	–0.3 V	900 mV			+2.352 mV to +2.448 mV
					–1.50 V			
			0	0 V	1.20 V			+2.352 mV to +2.448 mV
					–1.20 V			
			0	+0.3 V	1.50 V			+2.352 mV to +2.448 mV
					–900 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch4	6.25 mV	0 V	0	0 V	19 mV			+37.24 mV to +38.76 mV Ch4
					-19 mV			
			0	+1 V	1.019 V			+37.24 mV to +38.76 mV
					981 mV			
			0	-1 V	-981 mV			+37.24 mV to +38.76 mV
					-1.019 V			
		1.5 V	0	2.5 V	2.519 V			+37.24 mV to +38.76 mV
					2.481 V			
			0	1.5 V	1.519 V			+37.24 mV to +38.76 mV
					1.481 V			
			0	0.5 V	519 mV			+37.24 mV to +38.76 mV
					481 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		3.4 V	0	3.4 V	3.419 V			+37.24 mV to +38.76 mV
					3.381 V			
			0	2.4 V	2.419 V			+37.24 mV to +38.76 mV
					2.381 V			
		-3.4 V	0	-3.4 V	-3.381 V			+37.24 mV to +38.76 mV
					-3.419 V			
			0	-2.4 V	-2.381 V			+37.24 mV to +38.76 mV
					-2.419 V			
		-1.5 V	0	-2.5 V	-2.481 V			+37.24 mV to +38.76 mV
					-2.519 V			
			0	-1.5 V	-1.481 V			+37.24 mV to +38.76 mV
					-1.519 V			
			0	-0.5 V	-481 mV			+37.24 mV to +38.76 mV
					-519 mV			
Ch4	10 mV	0 V	0	0 V	30 mV			+58.8 mV to +61.2 mV
					-30 mV			
			0	+1 V	1.03 V			+58.8 mV to +61.2 mV
					970 mV			
			0	-1 V	-970 mV			+58.8 mV to +61.2 mV
					-1.03 V			
		1.5 V	0	2.5 V	2.53 V			+58.8 mV to +61.2 mV
					2.47 V			
			0	1.5 V	1.53 V			+58.8 mV to +61.2 mV
					1.47 V			
			0	0.5 V	530 mV			+58.8 mV to +61.2 mV
					470 mV			
		3.4 V	0	3.4 V	3.43 V			+58.8 mV to +61.2 mV
					3.37 V			
			0	2.4 V	2.43 V			+58.8 mV to +61.2 mV
					2.37 V			
		-3.4 V	0	-3.4 V	-3.37 V			+58.8 mV to +61.2 mV
					-3.43 V			
			0	-2.4 V	-2.37 V			+58.8 mV to +61.2 mV
					-2.43 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-1.5 V	0	-2.5 V	-2.47 V			+58.8 mV to +61.2 mV
					-2.53 V			
			0	-1.5 V	-1.47 V			+58.8 mV to +61.2 mV
					-1.53 V			
			0	-0.5 V	-470 mV			+58.8 mV to +61.2 mV
					-530 mV			
Ch4	20 mV	0 V	0	0 V	60 mV			+117.6 mV to +122.4 mV
					-60 mV			
			0	+1 V	1.06 V			+117.6 mV to +122.4 mV
					940 mV			
			0	-1 V	-940 mV			+117.6 mV to +122.4 mV
					-1.06 V			
		1.5 V	0	2.5 V	2.56 V			+117.6 mV to +122.4 mV
					2.44 V			
			0	1.5 V	1.56 V			+117.6 mV to +122.4 mV
					1.44 V			
			0	0.5 V	560 mV			+117.6 mV to +122.4 mV
					440 mV			
		3.4 V	0	3.4 V	3.46 V			+117.6 mV to +122.4 mV
					3.34 V			
			0	2.4 V	2.46 V			+117.6 mV to +122.4 mV
					2.34 V			
		-3.4 V	0	-3.4 V	-3.34 V			+117.6 mV to +122.4 mV
					-3.46 V			
			0	-2.4 V	-2.34 V			+117.6 mV to +122.4 mV
					-2.46 V			
		-1.5 V	0	-2.5 V	-2.44 V			+117.6 mV to +122.4 mV
					-2.56 V			
			0	-1.5 V	-1.44 V			+117.6 mV to +122.4 mV
					-1.56 V			
			0	-0.5 V	-440 mV			+117.6 mV to +122.4 mV
					-560 mV			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
Ch4	50 mV	0 V	0	0 V	150 mV			+294 mV to +306 mV
					-150 mV			
			0	+1 V	1.15 V			+294 mV to +306 mV
					850 mV			
			0	-1 V	-850 mV			+294 mV to +306 mV
					-1.15 V			
		1.5 V	0	2.5 V	2.65 V			+294 mV to +306 mV
					2.35 V			
			0	1.5 V	1.65 V			+294 mV to +306 mV
					1.35 V			
			0	0.5 V	650 mV			+294 mV to +306 mV
					350 mV			
		3.4 V	0	3.4 V	3.55 V			+294 mV to +306 mV
					3.25 V			
			0	2.4 V	2.55 V			+294 mV to +306 mV
					2.25 V			
		-3.4 V	0	-3.4 V	-3.25 V			+294 mV to +306 mV
					-3.55 V			
			0	-2.4 V	-2.25 V			+294 mV to +306 mV
					-2.55 V			
		-1.5 V	0	-2.5 V	-2.35 V			+294 mV to +306 mV
					-2.65 V			
			0	-1.5 V	-1.35 V			+294 mV to +306 mV
					-1.65 V			
			0	-0.5 V	-350 mV			+294 mV to +306 mV
					-650 mV			
Ch4	100 mV	0 V	0	0 V	300 mV			+588 mV to +612 mV
					-300 mV			
			0	+1 V	1.3 V			+588 mV to +612 mV
					700 mV			
			0	-1 V	-700 mV			+588 mV to +612 mV
					-1.3 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		1.5 V	0	2.5 V	2.8 V			+588 mV to +612 mV
					2.2 V			
			0	1.5 V	1.8 V			+588 mV to +612 mV
					1.2 V			
			0	0.5 V	800 mV			+588 mV to +612 mV
					200 mV			
		3.4 V	0	3.4 V	3.70 V			+588 mV to +612 mV
					3.10 V			
			0	2.4 V	2.70 V			+588 mV to +612 mV
					2.10 V			
		-3.4 V	0	-3.4 V	-3.10 V			+588 mV to +612 mV
					-3.70 V			
			0	-2.4 V	-2.10 V			+588 mV to +612 mV
					-2.70 V			
		-1.5 V	0	-1.5 V	-1.20 V			+588 mV to +612 mV
					-1.80 V			
			0	-0.5 V	- 200 mV			+588 mV to +612 mV
					-800 mV			
Ch4	120 mV	0 V	0	0 V	360 mV			+705.6 mV to +734.4 mV
					-360 mV			
			0	+1 V	1.36 V			+705.6 mV to +734.4 mV
					640 mV			
			0	-1 V	-640 mV			+705.6 mV to +734.4 mV
					-1.36 V			
		1.5 V	0	2.5 V	2.86 V			+705.6 mV to +734.4 mV
					2.14 V			
			0	1.5 V	1.86 V			+705.6 mV to +734.4 mV
					1.14 V			
			0	0.5 V	860 mV			+705.6 mV to +734.4 mV
					140 mV			
		3.4 V	0	3.4 V	3.76 V			+705.6 mV to +734.4 mV
					3.04 V			
			0	2.4 V	2.76 V			+705.6 mV to +734.4 mV
					2.04 V			

Ch	Scale setting	Termination setting	Position setting (Divs)	Offset setting	Generator setting	Measurement mean	Difference of measurement means	Accuracy limits
		-3.4 V	0	-3.4 V	-3.04 V			+705.6 mV to +734.4 mV
					-3.76 V			
			0	-2.4 V	-2.04 V			+705.6 mV to +734.4 mV
					-2.76 V			
		-1.5 V	0	-1.5 V	-1.14 V			+705.6 mV to +734.4 mV
					-1.86 V			
			0	-0.5 V	-140 mV			+705.6 mV to +734.4 mV
					-860 mV			
Ch4	140 mV	0 V	0	–1 V	–580 mV			+823.2 mV to +856.8 mV
					–1.42 V			
			0	0 V	420 V			+823.2 mV to +856.8 mV
					–420 mV			
			0	+1 V	1.42 V			+823.2 mV to +856.8 mV
					580 mV			
Ch4	200 mV	0 V	0	–0.9 V	–300 mV			+1.176 V to +1.224 V
					–1.50 V			
			0	0 V	600 mV			+1.176 V to +1.224 V
					–600 mV			
			0	+0.9 V	1.50 mV			+1.176 V to +1.224 V
					300 V			
Ch4	400 mV	0 V	0	–0.3 V	900 mV			+2.352 mV to +2.448 mV
					–1.50 V			
			0	0 V	1.20 V			+2.352 mV to +2.448 mV
					–1.20 V			
			0	+0.3 V	1.50 V			+2.352 mV to +2.448 mV
					–900 mV			

d. *Display the test signal:*

- Display the **Vertical Setup** menu.
- Use the keypad to set the Termination Voltage, Position, and Offset vertical settings as listed in the table for the current vertical scale setting. The baseline level may move off screen.
- Set the generator so that its Sense value and polarity matches the generator setting in the table for the vertical scale, position, offset, and termination settings you have made. The DC test level should appear at about 3 division on screen. Using the Vertical **Position**, move the test level to 3 divisions above the center screen.

NOTE. *It's important to use the Sense reading of the generator instead of the Output level when adjusting the generator to the specified voltage setting.*

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e. *Measure the test signal:* Press the **Close** button.

- Read the measurement results at the measurement statistics **Mean** measurement readout. Refer to the following figure.
- Record the Mean in the Measurement Mean column. (See *Table 8: Gain accuracy* on page 102.)

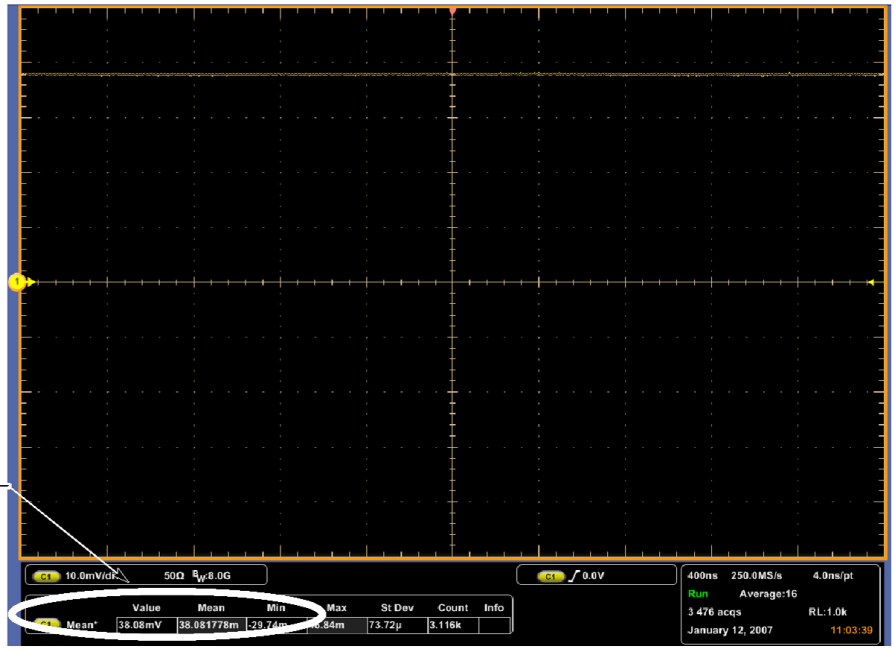


Figure 13: Measurement of DC gain accuracy

f. *Measure second mean:*

- Set the generator to the second level and polarity indicated in the table for the vertical scale, termination voltage, position, and offset settings you have made.
- Repeat substep 2.e using the current vertical scale, termination voltage, position, offset, and new generator setting for the second mean.

g. *Check against limits:*

- Subtract the second measurement mean from the first measurement mean for the current vertical scale, termination voltage, position, and offset.
- Record the difference of the two mean measurements in the Difference of Measurement Means column of the table. (See *Table 8: Gain accuracy* on page 102.)
- CHECK that the Difference of Measurement Mean is within the limits listed for the current vertical scale/termination/position/offset/ generator settings. Enter measurement mean difference value on the test record.

h. Repeat substeps 2.d through 2.g, using the next position, offset and generator settings listed in the table for the current vertical scale.

i. Repeat substeps 2.c through 2.h until all vertical scale settings, listed in the table, are checked for the channel under test. (See *Table 8: Gain accuracy* on page 102.)

j. *Test all channels:* Repeat substeps 2.a through 2.i for all TekConnect channels.

3. *Disconnect the hookup:*

a. *Set the generator output to 0 V.*

b. Disconnect the generator output from the channel last tested.

Check offset accuracy, ATI channel

Equipment Required	Prerequisites
One DC calibration generator, (Item 7) Two dual-banana connectors, (Item 6) Two cables, (Item 5) One SMA male-to-female BNC adapter, (Item 17) One BNC "T" adapter, (Item 26)	The instrument must meet the prerequisites. (See *Prerequisites* on page 43.)

WARNING. *The generator is capable of outputting dangerous voltages. To avoid injury, be sure to set the DC calibration generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during this procedure.*

1. *Install the test hookup and preset the instrument controls:*

   a. *Hook up the test-signal source:*

      - Set the output of a DC calibration generator to off or 0 volts. Set the DC impedance of the generator to 50 Ω.
      - Connect the output of a DC calibration generator to **Ch 2** through an adapter. Refer to the following figure.

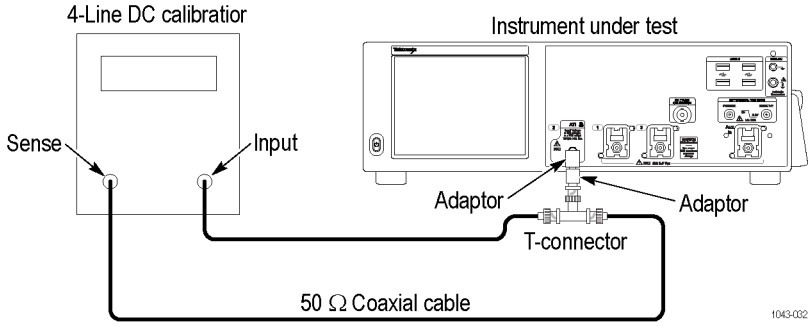


Figure 14: Offset accuracy test hookup

   b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

   c. *Modify the default settings:*

      - Set the Horizontal Scale to **1 ms/div**.
      - Set the Record Length to **5000**.
      - Set the Acquisition Mode to **Hi Res**.
      - Set the Trigger Source to **Line**.

2. *Confirm input channel is within limits for offset accuracy.*

   a. ■ *Set the generator output to 0 V.*

      ■ Select the tab that corresponds to the channel you are to confirm and then its **Display Off** button to display the channel.

   b. *Turn on the measurement Mean for the channel:*

      ■ From the tool bar, select **Measure** and select the **Ampl** tab, **More**, and then select **Mean** to measure the mean of the current channel.

      ■ Press the **X** (Close) button.

   c. *Set the vertical scale:* Set the vertical **Scale** to one of the settings in the following table that is not yet checked.

Table 9: Offset accuracy

Scale setting	Position setting (Divs)	Offset setting [4]	Generator setting	Accuracy limits
10 mV	0	0 V	0 V	–3.5 mV to +3.5 mV
		+0.2 V	+0.24 V	+0.2354 V to +0.2446 V
		-0.2 V	-0.24 V	–0.2446 V to –0.2354 V
20 mV	0	0 V	0 V	–4.5 mV to +4.5 mV
		+0.1 V	+0.18 V	+0.1750 V to +0.1851 V
		-0.1 V	-0.18 V	–0.1851 V to –0.1750 V
30 mV	0	0 V	0 V	–5.5 mV to +5.5 mV

   d. *Display the test signal:*

      ■ Display the **Vertical Setup** menu.

      ■ Use the keypad to set the Position, and Offset vertical settings as listed in the table for the current vertical scale setting. The baseline level may move off screen.

      ■ Set the generator so that its Sense value and polarity matches the generator setting in the table for the vertical scale, position, and offset settings you have made.

NOTE. *It's important to use the Sense reading of the generator instead of the Output level when adjusting the generator to the specified voltage setting.*

[4] Set as precisely as the instrument's offset resolution permits.

e. *Measure the test signal:* Press **Close**. Read the measurement results at the **Mean** measurement readout. Refer to the following figure.

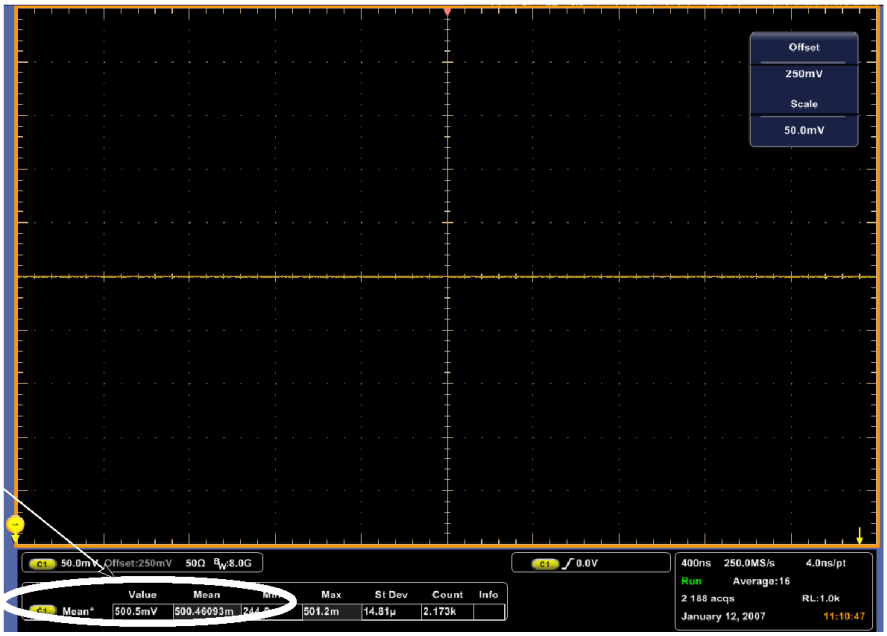


Figure 15: Measurement of offset accuracy

f. *Check against limits:*

- CHECK that the readout for the measurement **Mean** readout on screen is within the limits listed for the current vertical scale and position/offset/generator settings. Enter the value on the test record.
- Repeat substep 2.d, using the offset and generator settings as is listed in the table.
- CHECK that the **Mean** measurement readout on screen is within the limits listed for the current vertical scale setting and position/offset/ generator settings. Enter the value on the test record.
- Repeat substep 2.d, using the negative-polarity offset and generator settings as is listed in the table.
- CHECK that the **Mean** measurement readout on screen is within the limits listed for the current vertical scale setting and position/offset/ generator settings. Enter the value on the test record.
- Repeat substeps 2.c through 2.f until all vertical scale settings, are checked. (See *Table 9: Offset accuracy* on page 126.)

3. *Disconnect the hookup:*

a. Set the generator output to 0 V.

b. Disconnect the generator from the channel.

Check offset accuracy, TekConnect channels

Equipment Required	Prerequisites
One DC calibration generator (Item 7) Two dual-banana connectors, (Item 6) Two cables, (Item 5) One BNC "T" adapter (Item 26) One SMA male-to-female BNC adapter (Item 19)	The instrument must meet the prerequisites. (See *Prerequisites* on page 43.)

WARNING. *The generator is capable of outputting dangerous voltages. To avoid injury, be sure to set the DC calibration generator to off or 0 volts before connecting, disconnecting, and/or moving the test hookup during this procedure.*

1. *Install the test hookup and preset the instrument controls:*

   a. *Hook up the test-signal source:*

   - Set the output of a DC calibration generator to off or 0 volts. Set the DC impedance of the generator to 50 Ω.
   - Connect the output of a DC calibration generator to **Ch 1** through an adapter. Refer to the following figure.

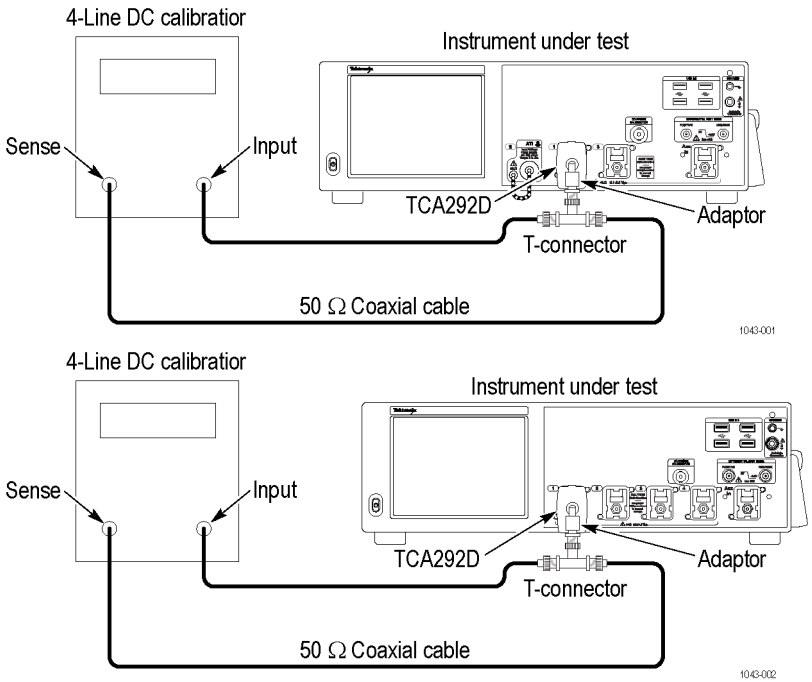


Figure 16: Offset accuracy test hookup

b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

c. *Modify the default settings:*

- Set the Horizontal Scale to **1 ms/div**.
- Set the Record Length to **5000**.
- Set the Acquisition Mode to **Hi Res**.
- Set the Trigger Source to **Line**.

2. *Confirm input channels are within limits for offset accuracy*. Do the following substeps - test Ch 1 first, *skipping substep* 2.a *since Ch 1 is already selected from step* 1.

a. *Select an unchecked channel:*

- From the tool bar, select **Measure** and then **Clear All** to remove the previous measurement.
- From the tool bar, select **Vertical** and then **Display On** button of the channel just confirmed to remove the channel from the display.
- Select the tab that corresponds to the channel you are to confirm and then its **Display Off** button to display the channel.
- *Set the generator output to 0 V.*
- Move the test hookup to the channel you selected.

b. *Turn on the measurement Mean for the channel:*

- From the tool bar, select **Measure** and select the **Ampl** tab, **More**, and then select **Mean** to measure the mean of the current channel.
- Press the **X** (Close) button.

c. *Set the vertical scale:* Set the vertical **Scale** to one of the settings in the following table that is not yet checked.

Table 10: Offset accuracy

Scale setting	Position setting (Divs)	Termination setting	Offset setting [5]	Generator setting	Accuracy limits
6.25 mV	0	0 V	0 V	0 V	–3.13 mV to +3.25 mV
		+3.5 V	+3.4 V	+3.4 V	+3.3831 V to +3.4169 V
		-3.5 V	-3.4 V	-3.4 V	–3.4169 V to –3.3831 V
10 mV	0	0 V	0 V	0 V	–3.5 mV to +3.5 mV
		+3.5 V	+3.4 V	+3.4 V	+3.3827 V to +3.4173 V
		-3.5 V	-3.4 V	-3.4 V	–3.4173 V to –3.3827 V

[5] Set as precisely as the instrument's offset resolution permits.

Scale setting	Position setting (Divs)	Termination setting	Offset setting [5]	Generator setting	Accuracy limits
20 mV	0	0 V	0 V	0 V	–4.5 mV to +4.5 mV
		+3.5 V	+3.4 V	+3.4 V	+3.3817 V to +3.4183 V
		-3.5 V	-3.4 V	-3.4 V	–3.4183 V to –3.3817 V
50 mV	0	0 V	0 V	0 V	–7.5 mV to +7.5 mV
		+3.5 V	+3.4 V	+3.4 V	+3.3787 V to +3.4213 V
		-3.5 V	-3.4 V	-3.4 V	–3.4213 V to –3.3787 V
100 mV	0	0 V	0 V	0 V	–12.5 mV to +12.5 mV
		+3.5 V	+3.4 V	+3.4 V	+3.3737 V to +3.4263 V
		-3.5 V	-3.4 V	-3.4 V	–3.4263 V to –3.3737 V
120 mV	0	0 V	0 V	0 V	–14.5 mV to +14.5 mV
		+3.5 V	+3.4 V	+3.4 V	+3.3717 V to +3.4283 V
		-3.5 V	-3.4 V	-3.4 V	–3.4283 V to –3.3717 V
140 mV	0	0 V	–6 V	–6 V	–6.0525 V to +5.9475 V
		0 V	0 V	0 V	–16.5 mV to +16.5 mV
		0 V	+6 V	+6 V	–5.9475 V to +6.0525 V
200 mV	0	0 V	–6 V	–6 V	–6.0585 V to –5.9415 V
		0 V	0 V	0 V	–22.5 V to +22.5 V
		0 V	+6 V	+6 V	+5.9415 V to +6.0585 V
400 mV	0	0 V	–6 V	–6 V	–6.0785 V to –5.9215 V
		0 V	0 V	0 V	–42.5 mV to +42.5 mV
		0 V	+6 V	+6 V	+5.9215 mV to +6.0785 mV

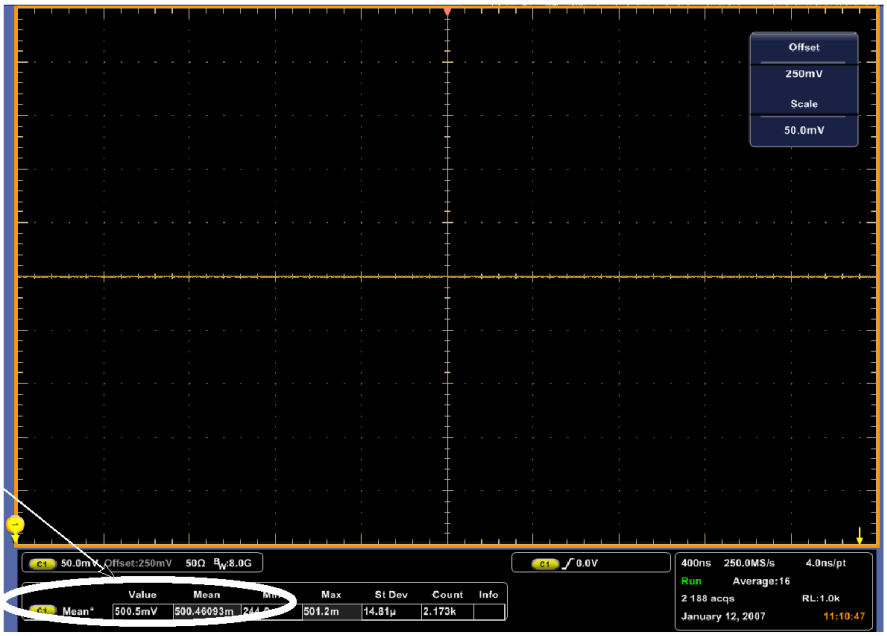
d. *Display the test signal:*

- Display the **Vertical Setup** menu.
- Use the keypad to set the Termination Voltage, Position, and Offset vertical settings as listed in the table for the current vertical scale setting. The baseline level may move off screen.
- Set the generator so that its Sense value and polarity matches the generator setting in the table for the vertical scale, termination voltage, position, and offset settings you have made.

NOTE. *It's important to use the Sense reading of the generator instead of the Output level when adjusting the generator to the specified voltage setting.*

[5] Set as precisely as the instrument's offset resolution permits.

e. *Measure the test signal:* Press **Close**. Read the measurement results at the **Mean** measurement readout. Refer to the following figure.



Turn on the measurement called mean and read the results here.

Figure 17: Measurement of offset accuracy

f. *Check against limits:*

- CHECK that the readout for the measurement **Mean** readout on screen is within the limits listed for the current vertical scale and position/offset/generator settings. Enter the value on the test record.
- Repeat substep 2.d, using the offset and generator settings as is listed in the table.
- CHECK that the **Mean** measurement readout on screen is within the limits listed for the current vertical scale setting and position/offset/termination/generator settings. Enter the value on the test record.
- Repeat substep 2.d, using the negative-polarity offset and generator settings as is listed in the table.
- CHECK that the **Mean** measurement readout on screen is within the limits listed for the current vertical scale setting and position/offset/termination/generator settings. Enter the value on the test record.
- Repeat substeps 2.c through 2.f until all vertical scale settings, are checked for the channel under test. (See *Table 10: Offset accuracy* on page 129.)

g. *Test all channels:* Repeat substeps 2.a through 2.f for all TekConnect channels.

3. *Disconnect the hookup:*

a. Set the generator output to 0 V.

b. Disconnect the generator from the channel last tested.

Check analog bandwidth, ATI channel

Equipment Required	Prerequisites
One sine wave generator (Item 9) One level meter and power sensor (Item 10) One cable, (Item 32)	(See *Prerequisites* on page 43.)

1. *Install the test hookup and preset the instrument controls:*

   a. *Initialize the instrument:*

      - Pull down the **File** menu, select Recall Default Setup.

   b. *Hook up the test-signal source:* Connect the sine wave output of the sine wave generator to **Ch 2**. Set the output of the generator to a reference frequency of 100 MHz. (See *Figure 18: Channel bandwidth test hookup* on page 132.)

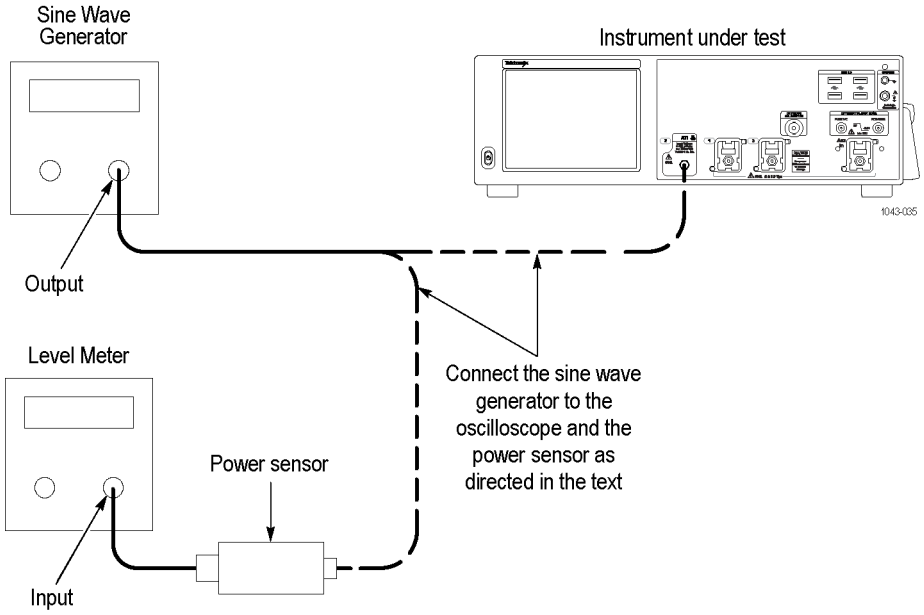


Figure 18: Channel bandwidth test hookup

   c. *Modify the default settings:*

      - Select **Vertical**, select **Vertical Setup**.
      - Press Display Off to turn off Chan 1.
      - Select the Chan 2 tab.
      - Press Display Off to turn on Chan 2.
      - Check **Force Constant Sample Rate** (Digital filters ensured).
      - From the Bandwidth drop-down list, select the maximum bandwidth for your instrument.

- From the button bar, select **Horiz/Acq** and select the **Horizontal** tab. Set the Sample Rate to **200 GS/s**.
- Set the horizontal **Scale** to **40 ns**.

2. *Confirm the input channels are within limits for bandwidth:*

Table 11: Channel bandwidth

Vertical scale	Reference amplitude (3.5 div)	Horizontal scale	Test frequency			-3 dB limits
			DPO77002SX	DPO75902SX	DPO75002SX	
10 mV	35 mV	1 ns	67 GHz	59 GHz	50 GHz	≥24.7 mV
20 mV	70 mV	1 ns	67 GHz	59 GHz	50 GHz	≥49.5 mV
30 mV	105 mV	1 ns	67 GHz	59 GHz	50 GHz	≥74.2 mV

a. *Set the trigger source:* Set the trigger Source to **Line**.

b. *Set the vertical scale:*

For the channel you are testing, set the vertical **Scale** to the setting listed in the tables (starting with the lowest setting). See the preceding Channel bandwidth table that applies to your instrument.

c. *Set the trigger coupling:* From the button bar, select **Trigger** and select Coupling **DC**.

d. *Display the test signal:* Do the following subparts to first display the reference signal and then the test signal.

- From the button bar, click **Cursors**. Select Cursor Type **H Bars**.
- From the button bar select **Measure**; then select the **Time** tab.
- Select the **Freq** button to measure the frequency of the current channel.
- Select the **Ampl** tab. Select the **Amplitude** button.
- From the Annotation drop-down list, select **None**.
- Select the **Statistics** button, then select the **Mean** button.
- Click the **X** (Close) button.
- Set the generator output so the Ch 2 Amplitude mean readout equals the reference amplitude. See the preceding Channel Bandwidth table that applies to your oscilloscope model. This corresponds to the vertical scale set in substep 2.d.
- Remove the cable from the CH 2 input and connect it to the power sensor.
- Record the reading on the power meter.

e. *Measure the test signal:*

- Set the frequency of the generator, to the test frequency in the tables that corresponds to the vertical scale set in substep 2.d.
- Set the horizontal **Scale** to the horizontal scale setting in the tables that corresponds to the vertical scale set in substep 2.d.
- Adjust the output of the generator until the reading on the power meter is equal to the reading recorded on the power meter in step 2.f. If required by your level meter, input the correction factor for the new frequency.
- Remove the cable from the power sensor and connect it to the Ch 2 input.
- Adjust Cursor 1 to the top of the waveform and Cursor 2 to the bottom of the waveform. Read the absolute value of the result at the ΔV readout.
- Read the results at the Ch 2 Amplitude mean readout, which will automatically measure the amplitude of the test signal. (See *Figure 19: Measurement of analog bandwidth* on page 134.)

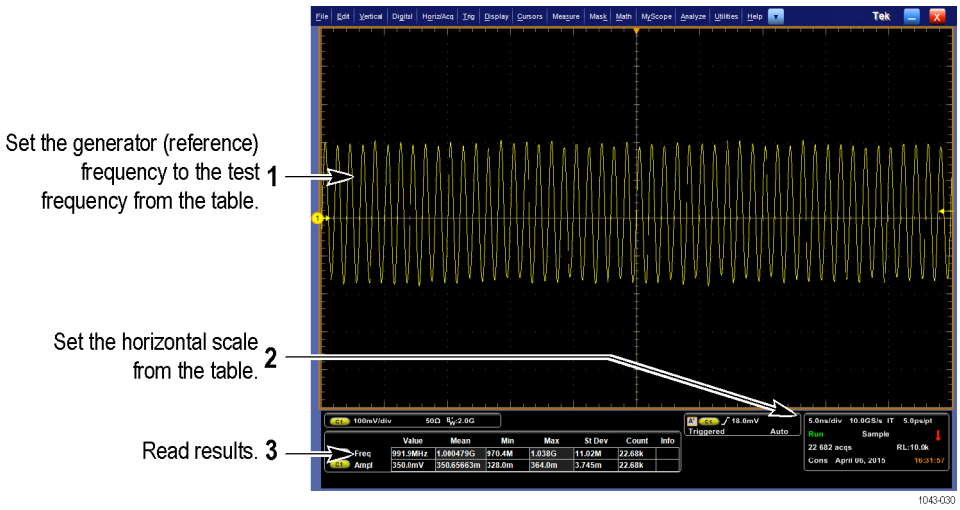


Figure 19: Measurement of analog bandwidth

f. *Check against limits:*

- CHECK that the measured amplitude is within the limits for the current vertical scale setting in the table.
- Enter the voltage on the test record.
- When finished checking, set the horizontal **Scale** back to the 20 ns.

g. *Check remaining vertical scale settings against limits:*

- Check the remaining vertical scale settings for the channel under test by repeating substeps 2.a through 2.g for each of the remaining scale settings for the channel under test.
- When doing substep 2.d, skip the subparts that turn on the Chx Amplitude mean measurement.

3. *Disconnect the hookup:* Disconnect the test hook up from the input connector of the channel last tested.

Check channel bandwidth, TekConnect channels

Equipment Required	Prerequisites
One sine wave generator (Item 9) One level meter and power sensor (Item 10) One power splitter (Item 12) 50 Ω precision cable 2.92 mm male-to-female (Item 13) One K male-to-male adapter (Item 14) SMA male-to-BNC female adapter (Item 19)	(See *Prerequisites* on page 43.)

1. *Install the test hookup and preset the instrument controls:*

a. *Initialize the instrument:*

- Pull down the **File** menu, select **Recall Default Setup**.

b. *Modify the default settings:*

- Select **Vertical**, select **Vertical Setup**.
- From the Bandwidth drop-down list, select the maximum bandwidth for your instrument.
- From the button bar, select **Horiz/Acq** and select the **Horizontal** tab. Select Constant Sample Rate mode. Set the Sample Rate to **250 GS/s** or **200 GS/s**, depending on instrument setup.
- Set the horizontal **Scale** to **40 ns**.
- From the button bar, select **Horiz/Acq** and select the **Acquisition** tab. Set the acquisition mode as follows: Select **Sample**.
- Set the sampling mode as follows: Select the **Interpolate IT** button.

- From the button bar, Select **Measure**. Select Setups **Ref Levs**; then select the **Histogram Mode** button.
- If your instrument has enhanced bandwidth, from the toolbar, select **Vertical** and check **Force Constant Sample Rate** (Digital filters ensured). Select **Apply to All Channels**.

c. *Hook up the test-signal source:* Connect the sine wave output of the sine wave generator to **Ch 1** through a power splitter. Connect the power sensor of the power meter to the power splitter. Set the output of the generator to a reference frequency of 50 MHz. (See *Figure 20: Channel bandwidth test hookup* on page 136.)

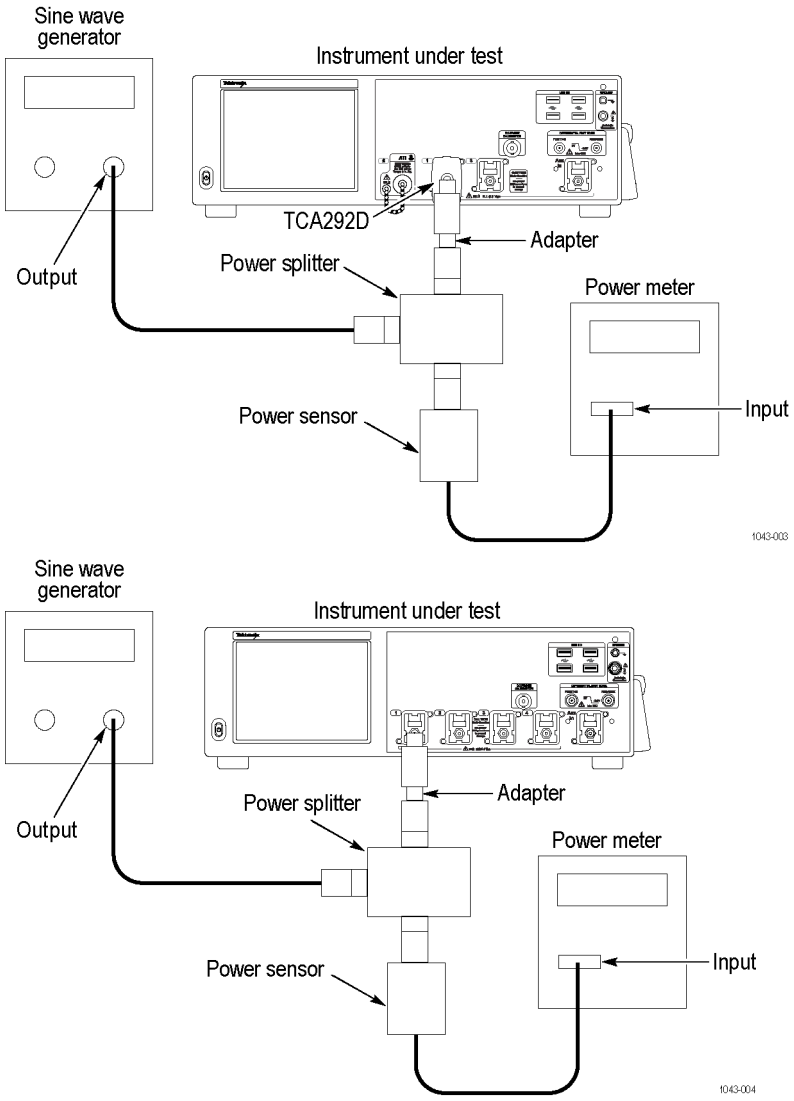


Figure 20: Channel bandwidth test hookup

2. *Confirm the input channels are within limits for bandwidth:* Do the following substeps - test Ch 1 first, *skipping substeps* 2.a*and* 2.b*since Ch 1 is already set up for testing from step* 1.

   a. *Select an unchecked channel:*

      - DPO72304SX and DPO73304SX: Click **Cursors** to remove cursors from the display.
      - From the button bar, select **Measure** and then **Clear All** to remove the previous measurement.
      - From the button bar select Vertical and then **Vertical Setup**. Click the Display **On** button of the channel just confirmed to remove the channel from the display.
      - Select the tab that corresponds to the channel you are to confirm, and then click Display **OFF**.
      - Move the test setup to the channel you selected.

   Table 12: Channel bandwidth

Vertical scale	Reference amplitude (3.5 div)	Horizontal scale	Test frequency			-3 dB limits
			DPO77002SX DPO73304SX	DPO75902SX DPO75002SX	DPO72304SX	
6.25 mV	21.9 mV	1 ns	33 GHz	33 GHz	23 GHz	≥15.5 mV
10 mV	35 mV	1 ns	33 GHz	33 GHz	23 GHz	≥24.7 mV
20 mV	70 mV	1 ns	33 GHz	33 GHz	23 GHz	≥50 mV
50 mV	175 mV	1 ns	33 GHz	33 GHz	23 GHz	≥124 mV
100 mV	350 mV	1 ns	33 GHz	33 GHz	23 GHz	≥248 mV
120 mV	420 mV	1 ns	33 GHz	33 GHz	23 GHz	≥297 mV
140 mV	490 mV	1 ns	33 GHz	33 GHz	23 GHz	≥346 mV
200 mV	700 mV [6]	1 ns	33 GHz	33 GHz	23 GHz	≥495 mV
400 mV	1400 mV [7]	1 ns	33 GHz	33 GHz	23 GHz	≥990 mV

   b. *Set the trigger source:* Set the trigger Source to **Line**.

   c. *Set the vertical scale:*

      For the channel you are testing, set the vertical **Scale** to the setting listed in the tables (starting with the lowest setting). See the preceding Channel bandwidth table that applies to your instrument.

   d. *Set the trigger coupling:* From the button bar, select **Trigger** and select Coupling **DC**.

[6] If your generator cannot output the required amplitude, determine its maximum output at the Test frequency, and use this for the reference amplitude. The -3 dB limit can be calculated as: 0.707 × reference amplitude.

[7] If your generator cannot output the required amplitude, determine its maximum output at the Test frequency, and use this for the reference amplitude. The -3 dB limit can be calculated as: 0.707 × reference amplitude.

e. *Display the test signal:* Do the following subparts to first display the reference signal and then the test signal.

- From the button bar, click **Cursors**. Select Cursor Type **H Bars**.
- From the button bar select **Measure**; then select the **Time** tab.
- Select the **Freq** button to measure the frequency of the current channel.
- Select the **Ampl** tab. Select the **Amplitude** button.
- From the Annotation drop-down list, select **None**.
- Select the **Statistics** button, then select the **Mean** button.
- Click the **X** (Close) button.
- Set the generator output so the Chx Amplitude mean readout equals the reference amplitude. See the preceding Channel Bandwidth table that applies to your oscilloscope model. This corresponds to the vertical scale set in substep 2.c.
- Record the reading on the power meter.
- Set the trigger as follows: Click the **Trigger** button. Click the **Set to 50%** button as necessary to trigger a stable display. At full bandwidth, you may also want to make small, manual adjustments to the trigger level.

NOTE. *If you are using Line trigger, the test signal is not shown as a stable display.*

---

f. *Measure the test signal:*

- Set the frequency of the generator to the test frequency in the tables that corresponds to the vertical scale set in substep 2.c.
- Set the frequency of the generator, as shown on screen, to the test frequency in the tables that corresponds to the vertical scale set in substep 2.c.
- Set the horizontal **Scale** to the horizontal scale setting in the tables that corresponds to the vertical scale set in substep 2.c. Click **SET to 50%** as necessary to trigger the signal.
- Adjust the output of the generator until the reading on the power meter is equal to the reading recorded on the power meter in step 2.e.
- Adjust Cursor 1 to the top of the waveform and Cursor 2 to the bottom of the waveform. Read the absolute value of the result at the ΔV readout.
- Read the results at the Chx Amplitude mean readout, which will automatically measure the amplitude of the test signal. (See *Figure 21: Measurement of analog bandwidth* on page 139.)

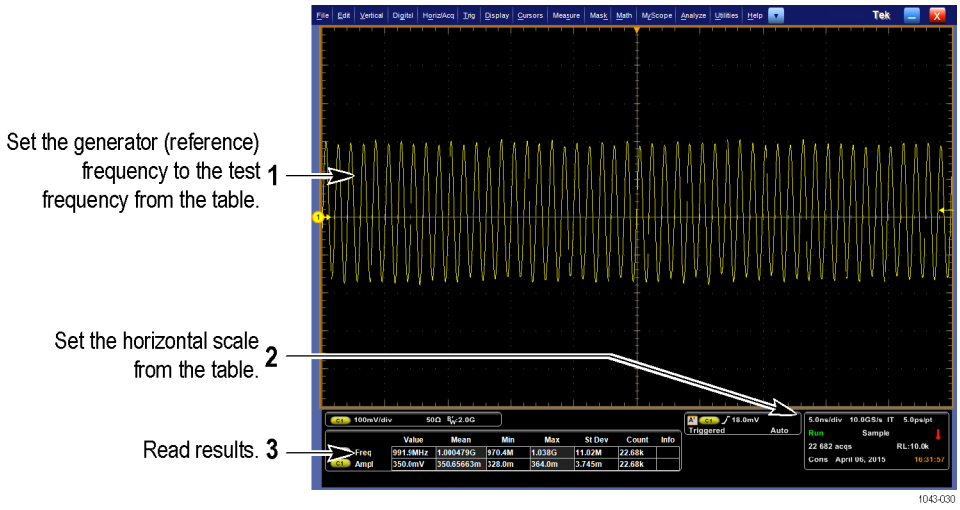


Figure 21: Measurement of analog bandwidth

g. *Check against limits:*

- CHECK that the measured amplitude is within the limits for the current vertical scale setting in the table.
- Enter the voltage on the test record.
- When finished checking, set the horizontal **Scale** back to the 20 ns.

h. *Check remaining vertical scale settings against limits:*

- Check the remaining vertical scale settings for the channel under test by repeating substeps 2.a through 2.g for each of the remaining scale settings for the channel under test.
- When doing substep 2.e, skip the subparts that turn on the Chx Amplitude mean measurement until you check a new channel.
- When selecting a new channel and before doing substep 2.d, click the **Clear All** button to remove the previous channel measurements.

i. *Test all channels:* Repeat substeps 2.a through 2.h for all TekConnect channels.

3. *Disconnect the hookup:* Disconnect the test hook up from the input connector of the channel last tested.

Check Input Resistance, ATI channel

Equipment Required	Prerequisites
One Digital Multimeter, (Item 25) One Dual-Banana Connector, (Item 6) One precision 50 Ω coaxial cable, (Item 5) One SMA male-to-female BNC adapter, (Item 17) One 1.85 mm to SMA female adapter, (Item 31) One SMA female-to-female adapter, (Item 16) One SMA female short circuit adapter, (Item 23)	(See *Prerequisites* on page 43.)

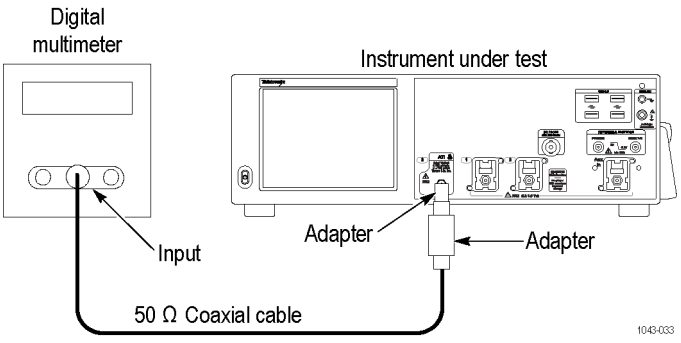


Figure 22: Input resistance test hookup

1. *Install the test hookup and preset the instrument controls:*

a. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

b. Short the cable from the multimeter by connecting a shorting adapter and SMA-to-SMA adapter to the BNC-to-SMA adapter.

c. Read and record the resistance of the multimeter leads.

d. *Hook up the test-signal source*: Connect, through a 50 Ω precision coaxial cable, the input of the multimeter to **Ch 2** through adapters. (See *Figure 22: Input resistance test hookup* on page 140.)

e. Set the Vertical **Scale** to **10.0 mV** per division

2. *Check input impedance against limits:*

   a. *Measure the impedance:* Read and record the measured impedance.

   b. Remove the dual banana connector from the digital multimeter (DMM), turn it 180 degrees and reinsert it in the DMM input.

   c. *Measure the impedance:* Read and record the measured impedance.

   d. Add the two measurements and divide the result by 2.

   e. Subtract the resistance of the multimeter leads from the average that you calculated.

   f. Enter the result on the test record.

   g. Check - The measurement is within the limits specified in the test record.

3. Set the Vertical **Scale** to **20 mV** per division and repeat step 2.

4. Set the Vertical **Scale** to **30 mV** per division and repeat step 2.

5. *Disconnect the hookup:* Disconnect the equipment from the instrument.

Check input resistance, TekConnect channels

Equipment Required	Prerequisites
One Digital Multimeter (Item 25) One Dual-Banana Connector, (Item 6) One precision 50 Ω coaxial cable (Item 5) Adapter One SMA male-to-female BNC adapter (Item 19) One SMA female-to-female adapter (Item 16) One SMA male short circuit adapter (Item 23)	(See *Prerequisites* on page 43.)

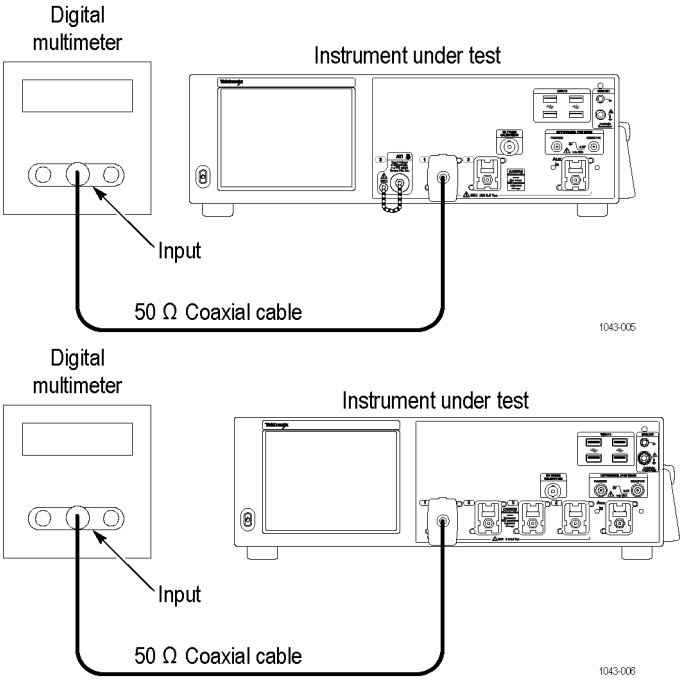


Figure 23: Input resistance test hookup

1. *Install the test hookup and preset the instrument controls:*

   a. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

   b. Short the cable from the multimeter by connecting a shorting adapter and SMA-to-SMA adapter to the BNC-to-SMA adapter.

   c. Read and record the resistance of the multimeter leads.

   d. *Hook up the test-signal source*: Connect, through a 50 Ω precision coaxial cable, the input of the multimeter to **Ch 1** through adapters. (See *Figure 23: Input resistance test hookup* on page 142.)

   e. Set the Vertical **Scale** to **6.25 mV** per division

2. *Check input impedance against limits:*

   a. *Measure the impedance:* Read and record the measured impedance.

   b. Remove the dual banana connector from the digital multimeter (DMM), turn it 180 degrees and reinsert it in the DMM input.

   c. *Measure the impedance:* Read and record the measured impedance.

   d. Add the two measurements and divide the result by 2.

   e. Subtract the resistance of the multimeter leads from the average that you calculated.

   f. Enter the result on the test record.

   g. Check - The measurement is within the limits specified in the test record.

3. Set the Vertical **Scale** to **140 mV** per division and repeat step 2.
4. *Repeat steps* 2 *through* 3 *for the remaining TekConnect input channels:*
   a. Move the test setup to an unchecked TekConnect channel.
   b. Set the Vertical **Scale** of the channel to **6.25 mV** per division.
   c. Repeat steps 2 through 3.
5. *Disconnect the hookup:* Disconnect the equipment from the instrument.

Time base system checks

These procedures check those characteristics that relate to the time base system and are listed as checked under *Warranted Characteristics* in *Specifications.*

Check timebase and delay time accuracy and reference

Equipment Required	Prerequisites
One timer-counter (Item 8) One 50 Ω, precision coaxial cable (Item 5) One SMA male-to-female BNC adapter (Item 19) One sine wave generator (Item 9)	(See *Prerequisites* on page 43.)

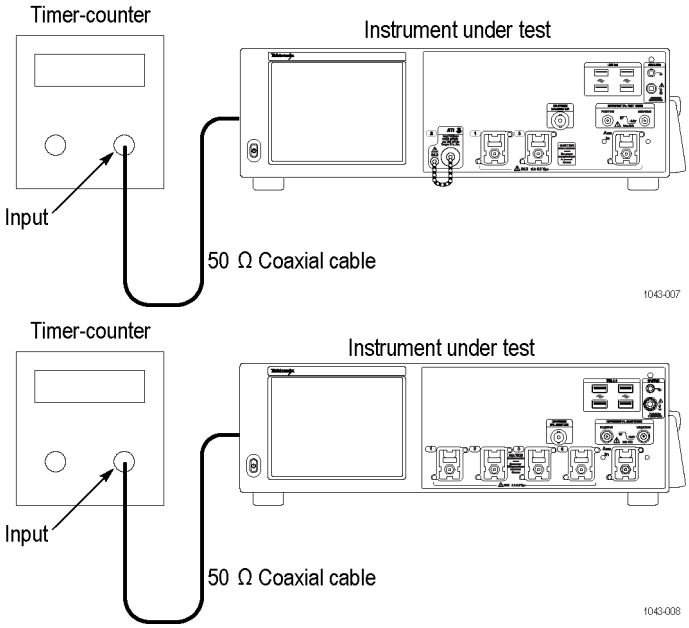


Figure 24: Timebase and delay time initial test hookup

1. *Install the test hookup and preset the instrument controls:*
   a. *Hook up the test-signal source*: Connect the input of the timer-counter to **Ref Clock Out** . (See *Figure 24: Timebase and delay time initial test hookup* on page 144.)
      - Set the timer-counter gate to 1 s.
      - Set the timer-counter to count the 10 MHz reference output.
   b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.
2. *Confirm the time base is within limits for accuracies:*
   a. *Check Time base, delay time accuracies, and reference output frequency:*
      - CHECK that the count on the timer-counter is within limits.
      - Enter the count in the table.

Time since initial/ last adjustment	Minimum	Measured count	Maximum
0	9999.999 kHz		10000.001 kHz
1 year	9999.991 kHz		10000.009 kHz
2 years	9999.988 kHz		10000.012 kHz
3 years	9999.985 kHz		10000.015 kHz

      - Compare the measured count to the value for the time since the last time base adjustment.
      - If the count is within the limits, enter Pass in the test record. If the count is not within limits, enter Fail in the test record.

3. *Disconnect the hookup:* Disconnect the equipment from the instrument.

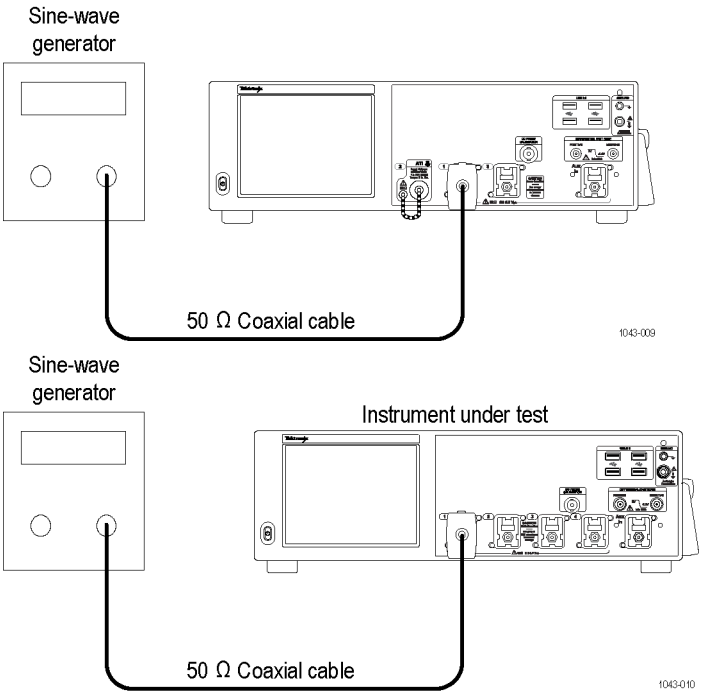


Figure 25: Timebase and delay time second test hookup

4. *Install the test hookup and preset the instrument controls:*

   a. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

   b. *Hook up the test-signal source*: Connect the output of the sine wave generator to the **CH1** input. (See *Figure 25: Timebase and delay time second test hookup* on page 145.)

   - From the button bar, select **Measure** and select the **Ampl** tab.
   - Click the **Pk-Pk** button.
   - Click the **X** (Close) button.
   - Set the Vertical **Scale** to 50 mV.
   - Set the generator for a 10.0 MHz sine wave.
   - Set the generator to output a 4 division signal. Adjust the output until the Pk-Pk readout displays 200 mV.

   c. *Set the instrument controls:*

   - Move the cable from the **CH1** input to the rear-panel **Ext Ref In** input (See *Figure 26: Timebase and delay time final test hookup* on page 146.)
   - From menu mode, select **Utilities** and select **External Signals**.
   - Click the **External** button to select the external reference.

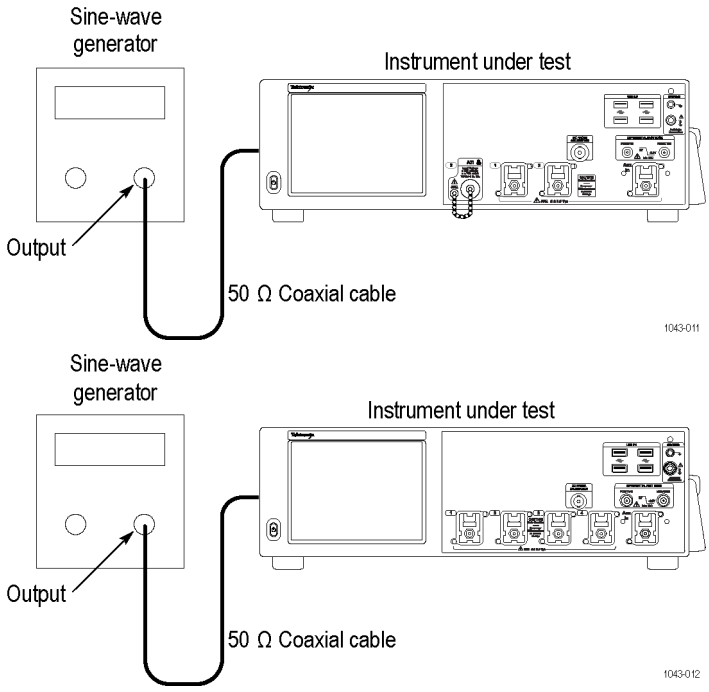


Figure 26: Timebase and delay time final test hookup

5. *Confirm external reference:*
   a. *Perform a signal path compensation:*
      - Select **Utilities** and then select **Instrument Calibration**.
      - Select **Run SPC** (**Calibrate** on some instruments) and wait for the signal path compensation to finish.
   b. *Check the completion status:* Enter the pass/fail status in the test record. If the Status is Fail, refer the instrument to qualified service personnel.
6. *Disconnect the hookup:*
   a. Disconnect all test equipment from the instrument.
   b. *Set the instrument controls:*
      - From menu mode, select **Utilities** and select **External Signals**.
      - Click the **Internal** button to select the internal reference.
   c. *Perform a signal path compensation:*
      - Select **Utilities** and then select **Instrument Calibration**.
      - Select **Run SPC** (**Calibrate** on some instruments) and wait for the signal path compensation to finish.

Check delta time measurement accuracy

Equipment Required	Prerequisites
One 50 Ω, precision coaxial cable (Item 5) One sine-wave generator (Item 9) One adapter (Item 19)	(See *Prerequisites* on page 43.)

This procedure checks the Delta Time Measurement Accuracy as listed in *Specifications*.

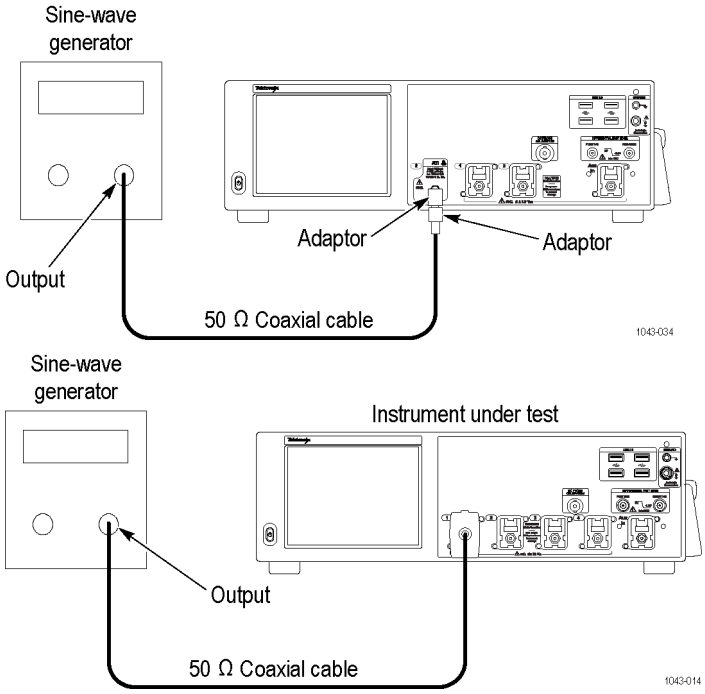


Figure 27: Delta time accuracy test hookup

1. *Install the test hookup and preset the instrument controls:*

   a. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

   b. *Hook up the sine-wave generator:*

   - When testomg an ATI channel: Connect the sine-wave output of the sine-wave generator through a **50 Ω** precision coaxial cable to **Ch 2** through an adapter and connector saver.
   - When testing a TekConnect channel: Connect the sine-wave output of the sine-wave generator through a **50 Ω** precision coaxial cable to **Ch 1** through an adapter.
   - Power on the generator.
   - Set the sine-wave generator to output a sine wave of the frequency shown in the table. (See *Table 13: Delta time measurement settings* on page 149.)
   - Set the generator output for 60 mV. (This amplitude will be adjusted later to get an 8-division pulse on screen.)
   - Set the Vertical Scale to the Volts/Div shown in the table.
   - Set the Trigger Source to the input channel you are using.

c. *Modify the initialized control settings:*

- Readjust the Trigger **Level** so the trigger level is at 50% of the rising edge of the sine wave.
- From the button bar, select the **Horiz/Acq** button. Select the **Manual** button to turn on Manual Mode.
- Select the **Acquisition** tab. Press the **IT** button to turn on Interpolate Time Only.
- From the button bar, select the **Vertical** button.
- Select **Digital Filters (DSP) Enabled**.
- Set the vertical scale, generator frequency, record length, and sample rate as indicated in the following table for the instrument under test.

Table 13: Delta time measurement settings

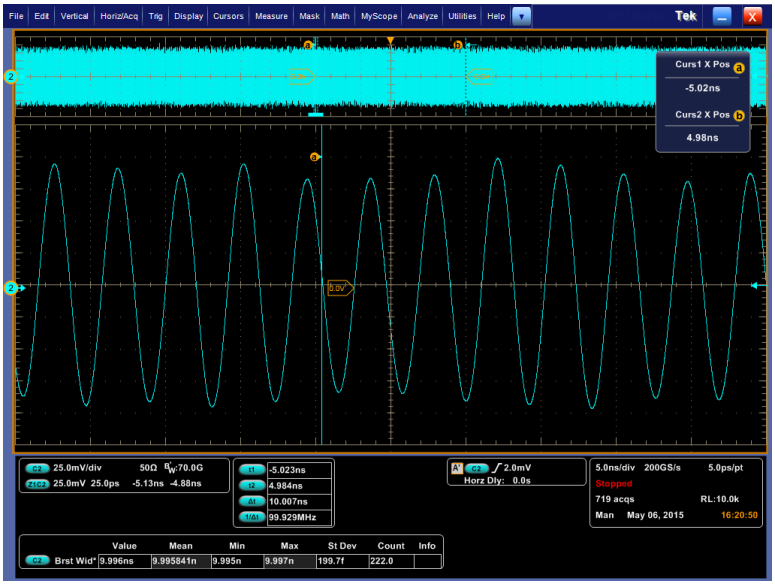
Instrument	Volts/div	Sine wave generator frequency	Record length	Sample rate (IT mode)	Burst width	Delta time rms accuracy limit	Delta time pk-pk accuracy limit
BWE on							
DPO77002SX (ATI input)	10 mV	43.37 GHz	10000	200 GS/s	10 ns	0.560 ps	5.60 ps
	30 mV	43.47 GHz	10000	200 GS/s	10 ns	0.400 ps	4.00 ps
DPO77002SX (TekConnect inputs)	6.25 mV	19.49 GHz	10000	100 GS/s	10 ns	0.560 ps	5.60 ps
	50 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
	100 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
DPO75902SX (ATI input)	10 mV	36.56 GHz	10000	200 GS/s	10 ns	0.560 ps	5.60 ps
	30 mV	36.56 GHz	10000	200 GS/s	10 ns	0.400 ps	4.00 ps
DPO75902SX (TekConnect inputs)	6.25 mV	19.49 GHz	10000	100 GS/s	10 ns	0.560 ps	5.60 ps
	50 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
	100 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
DPO75002SX (ATI input)	10 mV	31.05 GHz	10000	200 GS/s	10 ns	0.560 ps	5.60 ps
	30 mV	31.05 GHz	10000	200 GS/s	10 ns	0.400 ps	4.00 ps
DPO75002SX (TekConnect inputs)	6.25 mV	19.49 GHz	10000	100 GS/s	10 ns	0.560 ps	5.60 ps
	50 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
	100 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
DPO73304SX, 33 GHz	6.25 mV	19.49 GHz	10000	100 GS/s	10 ns	0.560 ps	5.60 ps
	50 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
	100 mV	19.49 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
DPO72304SX, 23 GHz	6.25 mV	14.28 GHz	10000	100 GS/s	10 ns	0.560 ps	5.60 ps
	50 mV	14.28 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps
	100 mV	14.28 GHz	10000	100 GS/s	10 ns	0.400 ps	4.00 ps

d. Adjust the generator output as necessary to obtain **8 divisions** of displayed waveform.

e. *Set up for statistics measurements:*

- From the button bar, select **Measure** and then select the **More** tab to show the More Measurements menu.
- Click the **Burst Width** button.
- Select Setups **Gating** and then select **Cursor**.
- Click **Setup**.
- Select Setups **Statistics** and then select **All**. Set the Weight n= to **1000**. Click **Reset** to reset the statistics.
- Click **Setup**.
- Select Setups **Ref Levs** and then select **Absolute**.
- Click **MidRef**. Using the keypad, set the mid reference level to **0 V**. Click the **X** (Close) button.
- Click one of the cursors to assign the multipurpose readouts to the cursors.
- Click the Cursor readout and set the Cursor 1 x position to –5.0 ns, and set the Cursor 2 x position to +5 ns.
- Pull down the **Vertical** menu, select Zoom Setup.
- Click **Zoom** to toggle Zoom on.
- Set the Horizontal Zoom position to 45% (100 GS/s) or 40% (200 GS/s), and set the Zoom factor to 20.
- Click a cursor to assign the multipurpose readouts to the Cursors.

- Set the Cursor 1 x position near the trough of the waveform so that ref level annotation is consistently indicating the same edge after the trigger point.



- Set the Zoom position to 55% (100 GS/s) or 60% (200 GS/s).
- Click a cursor. Set the Cursor 2 x position so that ref level annotation consistently indicates the same falling edge and the cursor Δt is close to 10 ns.

f. *Read the measurement:*

- Select **Horiz/Acq > Run/Stop**.
- Select **Edit > Clear Data**. Allow approximately 1000 acquisitions to accumulate, then press **Run/Stop**.
- Read the Std Dev statistic measurement.
- Enter the time on the test record.
- The standard deviation (St Dev) measurement must be less than or equal to the rms Delta-time accuracy limit for your instrument. (See *Table 13: Delta time measurement settings* on page 149.)
- Read the Max and Min statistic measurements.
- Subtract the Max and Min statistic measurements.
- Enter the time on the test record.
- The absolute value of the difference of the Max and Min measurements must be less than or equal to the pk-pk Delta-time accuracy limit for your instrument and bandwidth setting. (See *Table 13: Delta time measurement settings* on page 149.)
- Press the **Run/Stop** button.

g. *Repeat for all other Volts/div settings in the table for your instrument:*

- Set the vertical scale, generator frequency, record length, and sample rate as indicated in the table.
- Repeat step 1.f.

h. *Repeat for all channels of your instrument:*

- Connect the sine-wave output of the sine-wave generator through a **50 Ω** precision coaxial cable to the next unchecked TekConnect channel through an adapter.
- Set the sine-wave generator to output a sine wave of the frequency shown in the table. (See *Table 13: Delta time measurement settings* on page 149.)
- Set the generator output for 60 mV. (This amplitude will be adjusted later to get an 8-division pulse on screen.)
- Set the Vertical Scale to the Volts/Div shown in the table.
- Set the Trigger Source to the input channel you are using.
- Repeat substeps 1.c through 1.h until all channels have been checked.

2. *Disconnect all test equipment from the instrument.*

Trigger system checks

These procedures check those characteristics that relate to the trigger system and are listed as checked in *Specifications.*

Check time qualified trigger accuracy

Equipment Required	Prerequisites
One sine wave generator (Item 9) One 2X attenuator (Item 24) One 50 Ω, precision coaxial cable (Item 5) One SMA male-to-female BNC adapter (Item 19)	(See *Prerequisites* on page 43.)

1. *Install the test hookup and preset the instrument controls:*

a. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

b. *Modify the default setup:*

- Set the horizontal **Scale** to 2 ns.

c. *Hook up the test-signal source:* Connect the output of the sine wave generator to Ch 1 as shown in the following figure.

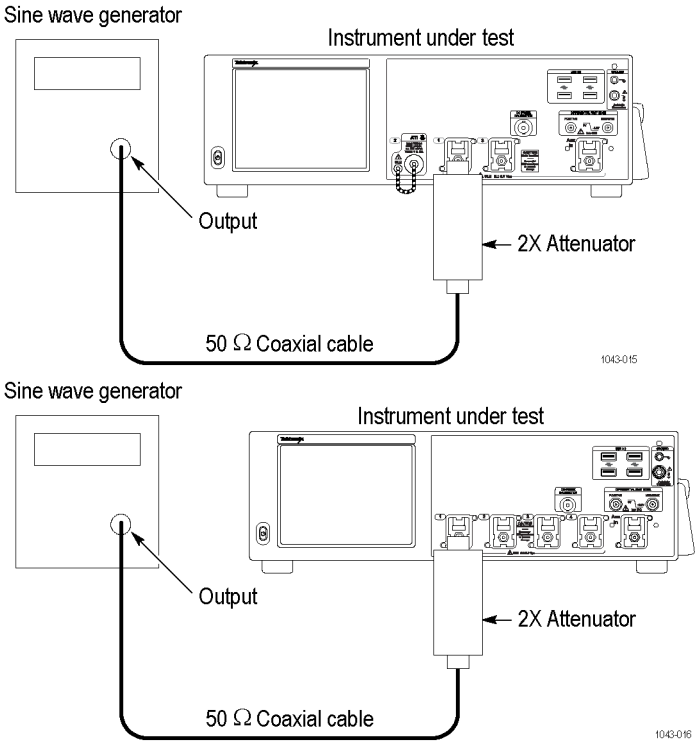


Figure 28: Time qualified trigger test hookup

d. *Set the trigger mode:* Select Trig > Mode. Set the Trigger **Mode** to **Normal**.

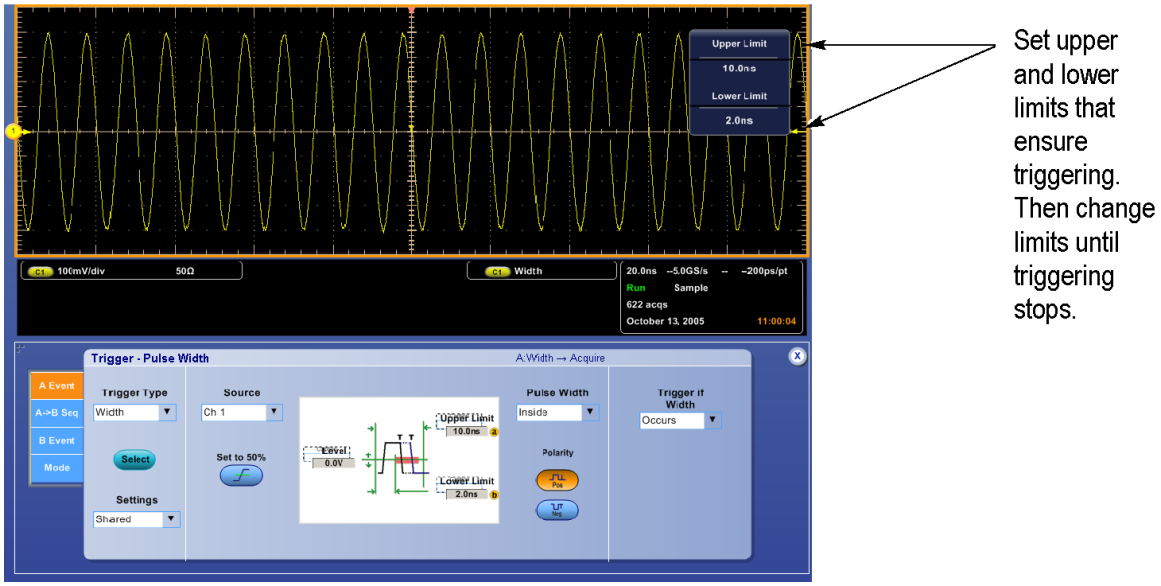


Figure 29: Measurement of time accuracy for pulse and glitch triggering

2. *Confirm the trigger system is within time-accuracy limits for time qualified trigger accuracy (time range<1 µs)*:

   a. *Set upper and lower limits that ensure triggering at 100 MHz:* (See *Figure 29: Measurement of time accuracy for pulse and glitch triggering* on page 153.)

      - Select **Trig > A Event (Main) Trigger Setup** and then select the **A Event** tab; then pull down on Trigger Type and select **Width** triggering.
      - Pull down Pulse Width and select **Inside** limits.
      - Click **Upper Limit**. Use the keypad to set the upper limit to 10 ns.
      - Click **Lower Limit**. Use the keypad to set the lower limit to 2 ns.

   b. *Display the test signal:*

      - Set the Horizontal **Scale** to 20 ns.
      - Set the output of the sine wave generator for a 100 MHz, five-division sine wave on screen. Set the Vertical **Scale** to 20 mV (the waveform will overdrive the display).
      - Press **SET to 50%**.

   c. *Check against limits:* Do the following subparts in the order listed.

      - While doing the following subparts, monitor the display (it will stop acquiring) to determine when triggering is lost.
      - If using the optional front panel, press the multipurpose knobs until Fine is on.
      - Use the multipurpose knob or the keypad to *increase* the **Lower Limit** readout until triggering is lost.
      - CHECK that the **Lower Limit** readout, after the instrument stops triggering, is within the following limits:

Model	Limit
DPO models	4.835 ns to 5.165 ns

      - Enter the time on the test record.
      - Use the keypad to return the **Lower Limit** to 2 ns and reestablish triggering.
      - Click **Upper Limit**; then use the multipurpose knob or keypad to slowly *decrease* the **Upper Limit** readout until triggering stops.
      - CHECK that the **Upper Limit** readout, after the instrument loses triggering, is within the following limits:

Model	Limit
DPO models	4.835 ns to 5.165 ns, inclusive

      - Enter the time on the test record.

3. *Confirm the trigger system is within time-accuracy limits for pulse-glitch or pulse-width triggering (time range≥1 µs):*

   a. *Set upper and lower limits that ensure triggering at 250 kHz:*

      - Click **Upper Limit**. Use the keypad to set the upper limit to 4 µs.
      - Click **Lower Limit**. Use the keypad to set the lower limit to 500 ns.

   b. *Display the test signal:*

      - Set the Horizontal **Scale** to 4 µs.
      - Set the Vertical **Scale** to 100 mV.
      - Set the output of the sine wave generator for a 250 kHz, five-division sine wave on screen. Set the Vertical **Scale** to 20 mV (the waveform will overdrive the display).
      - Press **SET to 50%**.

   c. *Check against limits:* Do the following subparts in the order listed.

      - If using the optional front panel, press the multipurpose knobs until Fine is on.
      - Use the multipurpose knob or keypad to *increase* the **Lower Limit** readout until triggering is lost.
      - CHECK that the **Lower Limit** readout, after the instrument stops triggering, is within the following limits:

Model	Limit
DPO models	1.47 µs to 2.53 µs, inclusive

      - Enter the time on the test record.
      - Use the keypad to return the **Lower Limit** to 500 ns and reestablish triggering.
      - Click **Upper Limit**; then use the multipurpose knob or keypad to slowly *decrease* the **Upper Limit** readout until triggering stops.
      - CHECK that the **Upper Limit** readout, after the instrument loses triggering, is within the following limits:

Model	Limit
DPO models	1.47 µs to 2.53 µs, inclusive

      - Enter the time on the test record.

4. *Disconnect the hookup:* Disconnect the equipment from the instrument.

Check sensitivity edge trigger DC coupled

Equipment required	Prerequisites
One leveled sine wave generator (Item 9) Three precision 50 Ω coaxial cables (Item 20) Two SMA female to BNC male adapters (Item 22) Three SMA female-to-female adapters (Item 16) One 10X attenuator (Item 1) One power splitter (Item 12) Male N-to-BNC adapter (Item 15) One SMA adapter (Item 19) One 5X attenuator (Item 2) One 2X attenuator (Item 24)	(See *Prerequisites* on page 43.)

NOTE. *The sine wave generator output amplitude must be leveled to within 0.35 dB of the reference frequency (10 MHz) through the trigger frequency being tested. Refer to the Sine Wave Generator Leveling Procedure if your sine wave generator does not have automatic output amplitude leveling. (See Sine wave generator leveling procedure on page 168.)*

NOTE. *This procedure checks a typical, not warranted, specification.*

1. *Install the test hookup and preset the instrument controls:*

   a. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

   b. *Modify the initialized front-panel control settings:*

      - Set the Horizontal **Scale** to 20 ns.
      - Set the Trigger **Mode** to **Normal**.
      - From the button bar, select **Horiz/Acq** and then select the **Acquisition** tab.
      - Select **Average** and set the number of averages to **16**.
      - Click the **Equivalent ET** button.

   c. *Hook up the test-signal source:*

      - Connect the signal output of the generator to a power splitter. Connect one output of the power splitter to **Ch 1** as shown in the following figure. Connect the other output of the power splitter to the **Aux Input** as in the following figure.

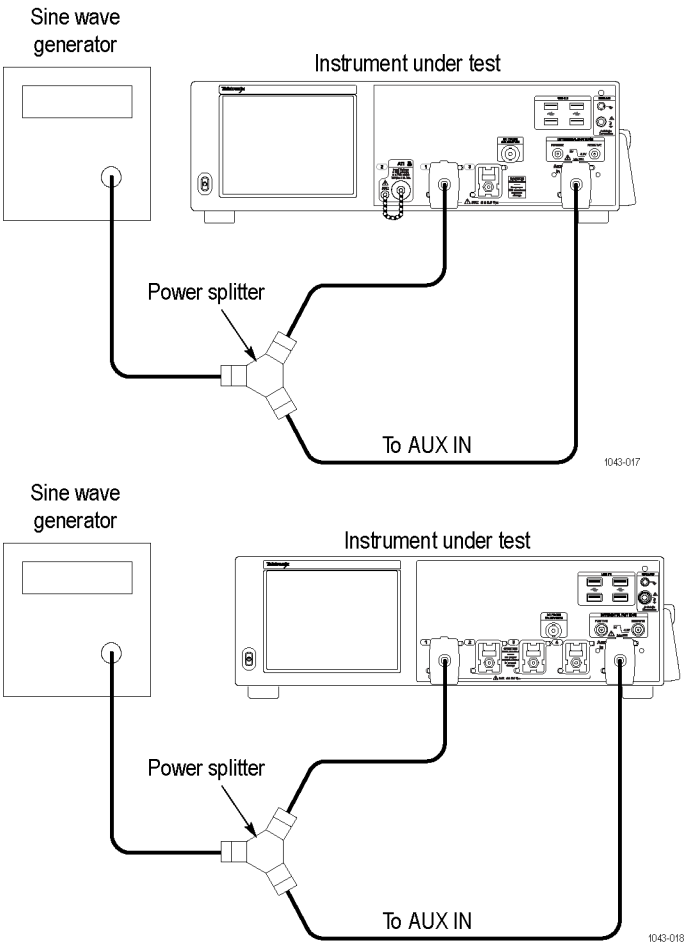


Figure 30: Sensitivity, edge trigger, DC coupled test hookup

2. *Confirm the trigger system is within sensitivity limits (50 MHz):*

a. *Display the test signal:*

- Set the generator frequency to 50 MHz.
- From the button bar, select **Measure**.
- Select Setup **Ref Levs**; then click the **Min-Max** button.
- Click the **Setup** button and select the **Ampl** tab; then click the **Amplitude** button.
- Click the X (close) button.
- Select Trig > A Event (Main) Trigger Setup.
- Press **Set to 50%**.
- Set the generator amplitude on screen as follows:

Model	Divisions
DPO models	5 divisions

- Now fine adjust the generator output until the **Ch 1 Amplitude** readout indicates the amplitude is as follows (Readout may fluctuate):

Model	Amplitude
DPO models	500 mV

- Disconnect the 50 Ω precision coaxial cable at **Ch 1** and reconnect it to **Ch 1** through a 10X attenuator.

b. *Check the A trigger system for stable triggering at limits:*

- Read the following definition: A stable trigger is one that is consistent; that is, one that results in a uniform, regular display triggered on the selected slope (positive or negative). This display should *not* have its trigger point switching between opposite slopes, nor should it roll across the screen. At horizontal scale settings of 2 ms/division and faster, if using the optional front panel, **Trig'd** will remain constantly lighted. It will flash for slower settings.
- Select the positive trigger slope.
- Adjust the Trigger **Level** so that there is a stable trigger. CHECK that the trigger is stable for the test waveform on the positive slope.
- Select the negative trigger slope. Adjust the Trigger **Level** so that there is a stable trigger.
- CHECK that the trigger is stable for the test waveform on the negative slope.
- Enter pass or fail in the test record.
- Leave the trigger system triggered on the positive slope of the waveform before continuing to the next step.

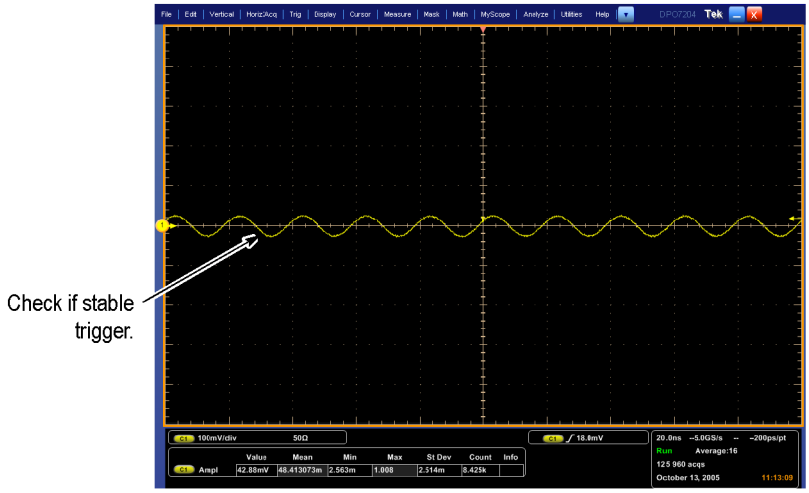


Figure 31: Measurement of trigger sensitivity - 50 MHz results shown

c. *Check B trigger system for stable triggering at limits:* Do the following subparts in the order listed.

- From the button bar select **Trig**, select the **A Event** tab, and set the **Source** to Line.

- Select the **A->B Seq** tab, and click the A then B **Trig After Time** button.
- Select the **B Event** tab, and click the **Set To 50%** button.
- CHECK that a stable trigger is obtained for the test waveform for both the positive and negative slopes of the waveform. (See *Figure 31: Measurement of trigger sensitivity - 50 MHz results shown* on page 159.)
- Enter pass or fail in the test record.
- Leave the Delayed trigger system triggered on the positive slope of the waveform before continuing to the next step. Also, return to the A trigger: select the **A->B Seq** tab and click the A->B Sequence **A Only** button. Then select the **A Event** tab.
- Select the **A Event** tab, and set the **Source** to CH1.
- Press the X (Close button).

3. *Confirm the AUX Trigger input (at 50 MHz):*

   a. *Display the test signal:*

   - Remove the 10X attenuator and reconnect the cable to **Ch 1**.
   - Set the signal amplitude as follows: **2.5 divisions**
   - Now fine adjust the generator output until the **Ch 1 Amplitude** readout indicates the amplitude is as follows (readout may fluctuate): **100 mV**

   b. *Check the AUX trigger source for stable triggering at limits:* Do the following in the order listed.

   - Use the definition for stable trigger from step 2.b.
   - Set the Trigger **Source** to **Aux** (Ext).
   - Press **Push-Set 50%**.
   - CHECK that a stable trigger is obtained for the test waveform on both the positive and negative slopes. Set the Trigger **Slope** to the negative trigger slope. Adjust the Trigger **Level** to stabilize the trigger if required.
   - Enter pass or fail in the test record.
   - Leave the trigger system triggered on the positive slope of the waveform before proceeding to the next check.
   - Set the Trigger **Source** to **Ch 1**.

4. *Confirm that the A trigger system is within sensitivity limits (full bandwidth):*

   a. *Set the Horizontal Scale:* Set the Horizontal **Scale** to 200 ps.

   b. *Display the test signal:*

   - Set the generator frequency to full bandwidth as follows:

Model	Generator frequency
DPO models	25 GHz

- Set the generator amplitude on screen as follows:

Model	Amplitude
DPO models	5 divisions

- Now fine adjust the generator output until the **Ch 1 Amplitude** readout indicates the amplitude is as follows (readout may fluctuate):

Model	Amplitude
DPO models	500 mV

- Check that a stable trigger is obtained.

c. Repeat step 2, substeps 2.b and 2.c for the full bandwidth selected.

Table 14: Trigger settings

Generator amplitude	Generator frequency		Horizontal scale
	A trigger	B trigger	
75 mV	5 GHz	5 GHz	200 ns
100 mV	10 GHz	10 GHz	200 ps
150 mV	15 GHz	15 GHz	200 ps
350 mV	20 GHz	20 GHz	100 ps
500 mV	25 GHz	25 GHz	100 ps

d. *Display the test signal:*

- Set the generator frequency to 10 MHz. Set the Horizontal SCALE as indicated in the table. (See *Table 14: Trigger settings* on page 161.)
- Fine adjust the generator output until the **Ch 1 Amplitude** readout indicates the amplitude listed in the table for a frequency not yet checked. (See *Table 14: Trigger settings* on page 161.)
- Set the generator frequency to the frequency in the table that corresponds to the amplitude just set. Set the Horizontal **SCALE** as indicated in the table. (See *Table 14: Trigger settings* on page 161.)
- CHECK that a stable trigger is obtained.
- Read the following definition: A stable trigger is one where the **Trig'd** LED will remain constantly lighted.
- Select the positive trigger slope.
- Adjust the Trigger Level so that there is a stable trigger. CHECK that the trigger is stable.
- Select the negative trigger slope. Adjust the Trigger Level so that there is a stable trigger.

- CHECK that the trigger is stable.
- Enter pass or fail in the test record.
- Leave the trigger system triggered on the positive slope of the waveform before continuing to the next step.
- From the button bar select **Trig**, select the **A Event** tab, and set the **Source** to Line.
- From the button bar select **Trig**, select the **A->B Seq** tab, and click the A then B **Trig After Time** button.
- Select the **B Event** tab, and click the **Set To 50%** button.
- CHECK that a stable trigger is obtained for the test waveform for both the positive and negative slopes of the waveform. Adjust the Trigger Level to stabilize the A trigger. Click **Level** and use the keypad or the multipurpose knob/Fine button to stabilize the B trigger. Click one of the Slope buttons to switch between trigger slopes. (See *Figure 31: Measurement of trigger sensitivity - 50 MHz results shown* on page 159.)
- Enter pass or fail in the test record.
- Leave the B trigger system triggered on the positive slope of the waveform before continuing to the next step. Also, return to the A trigger: select the **A->B Seq** tab and click the A->B Sequence **A Only** button. Then select the **A Event** tab.
- From the button bar select **Trig**, select the **A Event** tab, and set the **Source** to CH1.
- Press the X (Close button).

e. Repeat step 4.d until each frequency in the table is checked. (See *Table 14: Trigger settings* on page 161.)

f. *Display the test signal (Aux trigger at bandwidth):*

- Set the Horizontal Scale to 1 ns.
- Reconnect the cable to **Ch 1**.
- Set the generator frequency to full bandwidth as follows:

Model	Generator frequency
DPO models	11 GHz

- Set the generator amplitude on screen as follows:

Model	Amplitude
DPO models	8 divisions

- Now fine adjust the generator output until the **Ch 1 Amplitude** readout indicates the amplitude is as follows (readout may fluctuate):

Model	Amplitude
DPO models	800 mV

g. Repeat step 3.b only, for the full bandwidth selected.

NOTE. *You just checked the trigger sensitivity. If desired, you may repeat steps 1 through step 4.e for the other channels (Ch 2 [TekConnect only], Ch 3, and Ch 4).*

5. *Disconnect the hookup:* Disconnect the equipment from Aux In and the channel last tested.

Output signal checks

The procedure that follows checks those characteristics of the output signals that are listed as checked under *Warranted Characteristics* in *Specifications.*

Check fast edge output

Equipment required	Prerequisites
One BNC to Minigrabber adapter (item 18) One precision 50 Ω coaxial cable (Item 20) One SMA termination, (Item 4) One DC calibration generator (Item 7) One adapter (Item 19)	(See *Prerequisites* on page 43.) Also, the instrument must have passed *Check Timebase and Delay Time Accuracy and Reference.* (See *Check timebase and delay time accuracy and reference* on page 143.)

1. *Install the test hookup and preset the instrument controls:*

a. *Hook up test-signal:* Refer to the following figure. Terminate the unused Fast Edge signal.

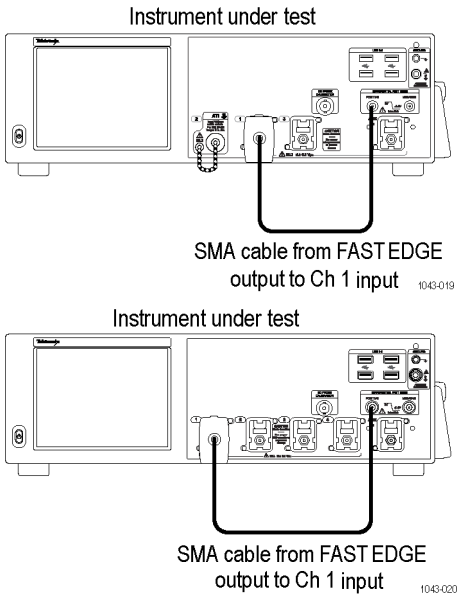


Figure 32: Fast edge output initial test hookup

b. *Initialize the instrument:* Pull down the **File** menu, select Recall Default Setup.

c. *Modify the initialized front-panel control settings:*

- Set the **Vertical Scale** to **120 mV**/div.
- Set the Horizontal **Scale** to 200 µs.
- Select the Trig > A Event (Main) Trigger Setup menu. Press **Set to 50%**.
- Center the display on screen.
- From the button bar, select **Horiz/Acq** and select the **Acquisition** tab.
- Click **Average** and set the number of averages to **128**.

2. *Confirm the fast edge signal:*

Figure 33: Measurement of fast edge frequency

a. *Save the fast edge signal in reference memory:*

- From the menu bar, select **File**; **Save As . . .**, **Waveform**, and then **Ref 1**.
- Click the **Save** button to save the Fast Edge signal in reference 1.
- Disconnect the signal from **Ch 1** and the Fast Edge connector.
- Select **File**; **Recall . . .**, **Waveform**, and then select the file name.
- Click the **Recall** button to recall the probe compensation signal to the display.

b. *Hook up the DC standard source:*

- Set the output of a DC calibration generator to off or 0 volts.
- Connect the output of a DC calibration generator to **Ch 1**. Refer to the following figure.

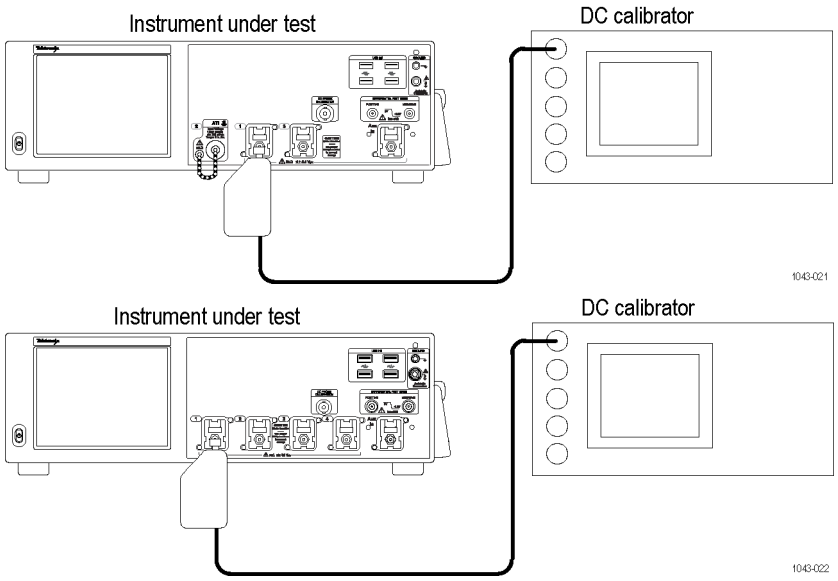


Figure 34: Fast edge output second test hookup

c. *Measure amplitude of the fast edge signal:*

- From the button bar, select **Horiz/Acq** and select the **Acquisition** tab.
- Click **Average** and set the number of averages to **16** using the keypad or the multipurpose knob.
- Adjust the output of the DC calibration generator until it precisely overlaps the top (upper) level of the stored fast edge signal.
- Record the setting of the DC generator.
- Adjust the output of the DC calibration generator until it precisely overlaps the base (lower) level of the stored fast edge signal.
- Record the setting of the DC generator.

d. Press the **X** (close) button to remove the menus from the display. (See *Figure 35: Measurement of fast edge amplitude* on page 167.)

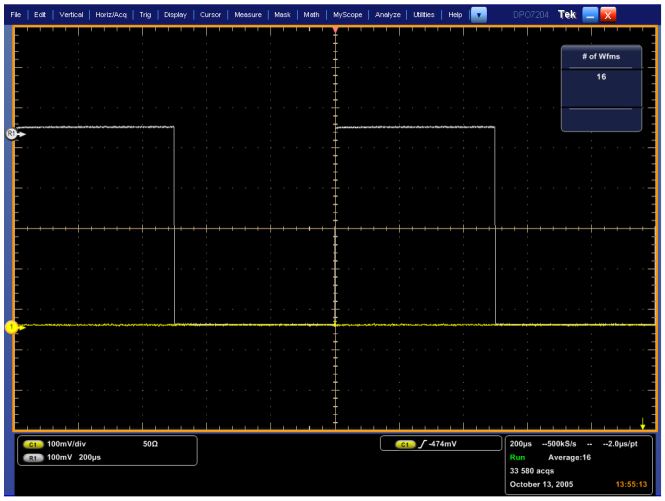


Figure 35: Measurement of fast edge amplitude

e. *Check against limits:*

- Subtract the value just obtained (base level) from that obtained previously (top level).
- CHECK that the difference obtained is within limits as follows:

Model	Limits
DPO models	450 mV to 650 mV

- Enter voltage difference on test record.

3. *Disconnect the hookup:* Disconnect the calibrator from the **Ch 1** input.

4. *Check the negative output.* Repeat steps 1 through 3 using the Differential Fast Edge **NEGATIVE** output.

Sine wave generator leveling procedure

Some procedures in this manual require a sine wave generator to produce the necessary test signals. If you do not have a leveled sine wave generator, use one of the following methods to level the output amplitude of your sine wave generator.

Method 1

Equipment required	Prerequisites
Sine wave generator (Item 9) Meter, power and sensor (Item 10) Power splitter (Item 12) 50 Ω precision cable 2.92 mm male-to-female (Item 13) One K male-to-male adapter (Item 14)	(See *Prerequisites* on page 43.)

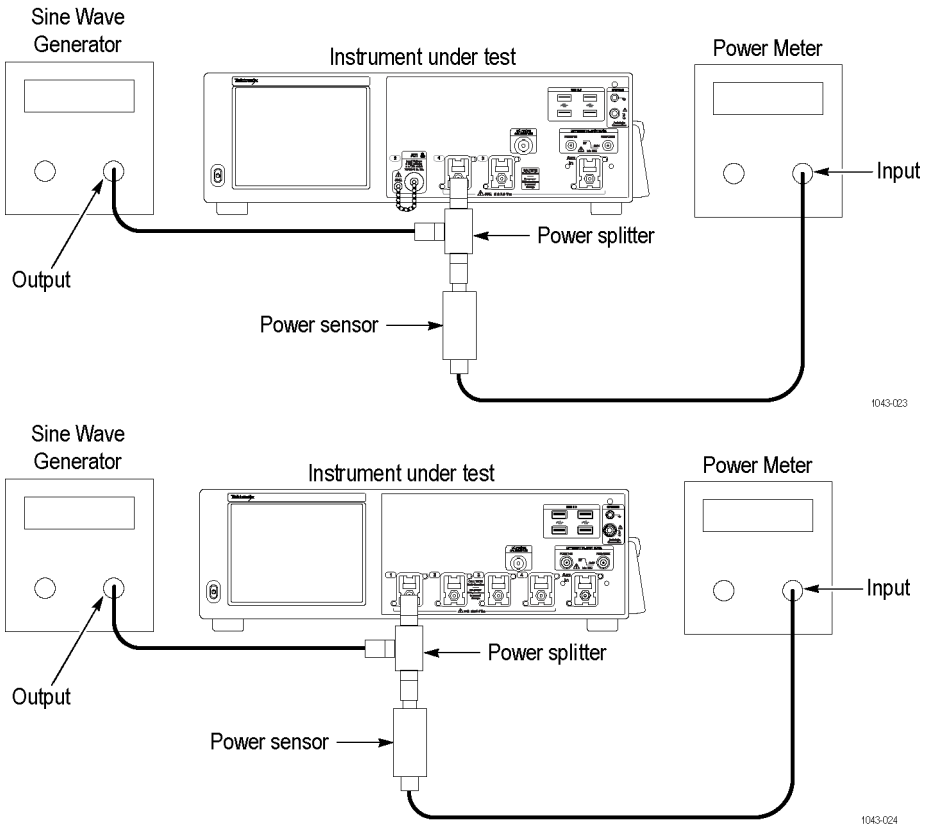


Figure 36: Sine wave generator leveling equipment setup

1. *Install the test hookup:* Connect the equipment as shown in the above figure.
2. *Set the Generator:*
   - Set the sine wave generator to a reference frequency of 10 MHz.
   - Adjust the sine wave generator amplitude to the required number of divisions as measured by the instrument.

3. *Record the reference level:* Note the reading on the level meter.
4. *Set the generator to the new frequency and reference level:*
   - Change the sine wave generator to the desired new frequency.
   - Input the correction factor and/or the new frequency into the level meter.
   - Adjust the sine wave generator amplitude until the level meter again reads the value noted in step 3. The signal amplitude is now correctly set for the new frequency.

Method 2

Equipment required	Prerequisites
Sine wave generator (Item 9) Level meter and power sensor (Item 10) Two male N to female BNC adapters (Item 15) Two precision coaxial cables (Item 5) One or two SMA male-to-female BNC adapters (Item 19)	(See *Prerequisites* on page 43.)

1. *Install the test hookup:* Connect the equipment as shown in the figure below (start with the sine wave generator connected to the instrument). (See *Figure 37: Equipment setup for maximum amplitude* on page 171.)

2. *Set the Generator:*
   - Set the sine wave generator to a reference frequency of 10 MHz.
   - Adjust the sine wave generator amplitude to the required number of divisions as measured by the instrument.

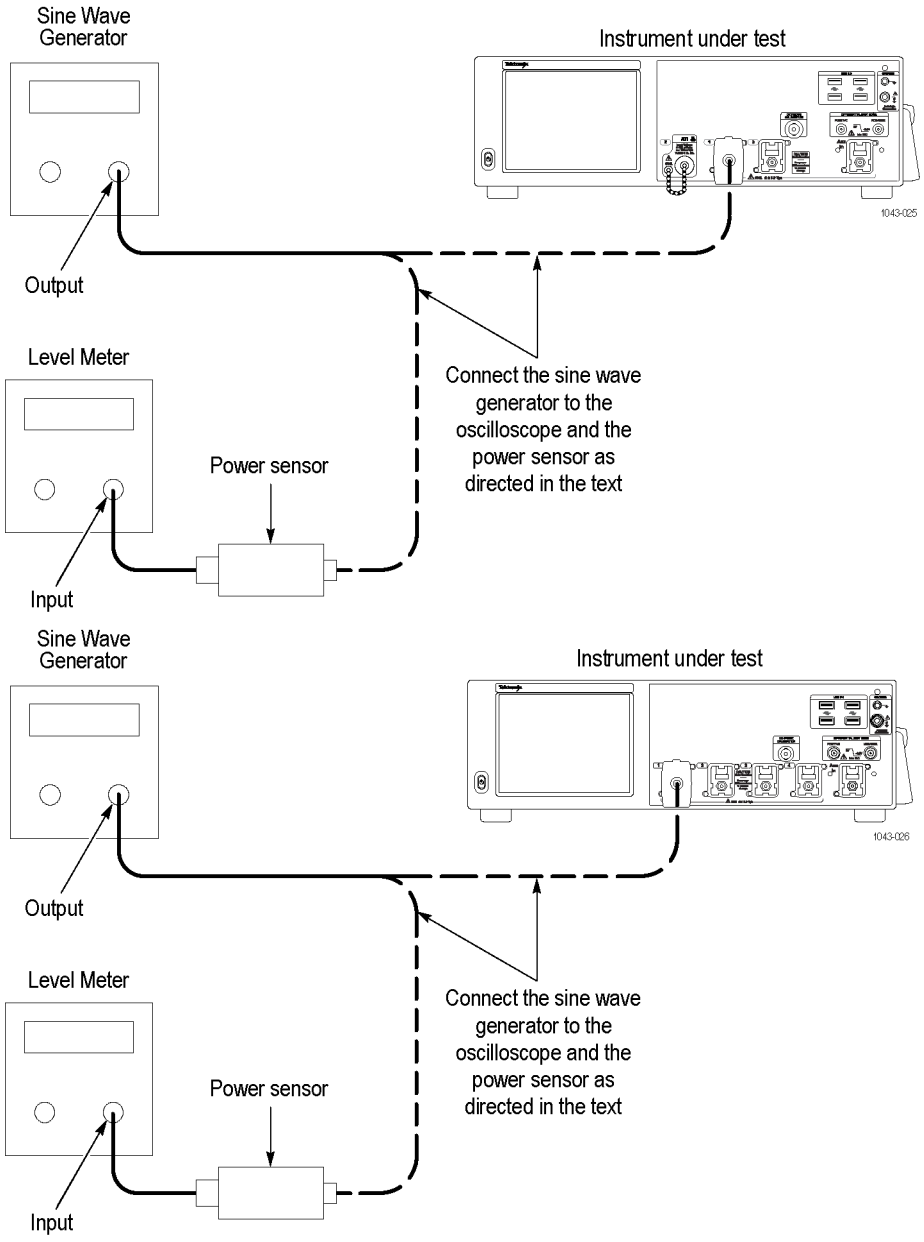


Figure 37: Equipment setup for maximum amplitude

3. *Record the reference level:*
   - Disconnect the sine wave generator from the instrument.
   - Connect the sine wave generator to the power sensor.
   - Note the level meter reading.
4. *Set the generator to the new frequency and reference level:*
   - Change the sine wave generator to the desired new frequency.
   - Input the correction factor and/or the new frequency into the level meter.
   - Adjust the sine wave generator amplitude until the level meter again reads the value noted in step 3. The signal amplitude is now correctly set for the new frequency.
   - Disconnect the sine wave generator from the power sensor.
   - Connect the sine wave generator to the instrument.

Index

C

Check input resistance, 140
Check input resistance ≥4 GHz models, 142
Conventions
  performance verification, 32

E

Equipment List
  for performance verification, 43

F

Functional tests, 35

P

Performance Verification
  brief procedures, 34
  equipment required, 43
  functional tests, 34, 35
  general instructions, 31
  partial vs. complete, 31
  prerequisites, 43
  purpose and extent of, 31
  self tests, 34
  signal acquisition system, 86
  sine wave generator leveling, 168
  test record, 48
  time base system, 143
  trigger system, 152
  warranted characteristics, 42

S

Sine wave generator leveling, 168
Specifications
  data storage, 27
  input and output ports, 25
  mechanical, 28
  power source, 28
  serial triggers, 24
  trigger system, 18
  vertical system, 1

W

Warranted characteristics, 42