

**Tektronix DPO
Demo 1 Board
Instruction Manual**

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Tektronix

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DPO Demo 1 Board

The Tektronix DPO Demo 1 board provides signals you can use to demonstrate features of Tektronix oscilloscopes.

Connections Plug a USB cable between your computer and the Demo 1 board. When you apply power to the demo board, a green LED on the board turns on.

Signals

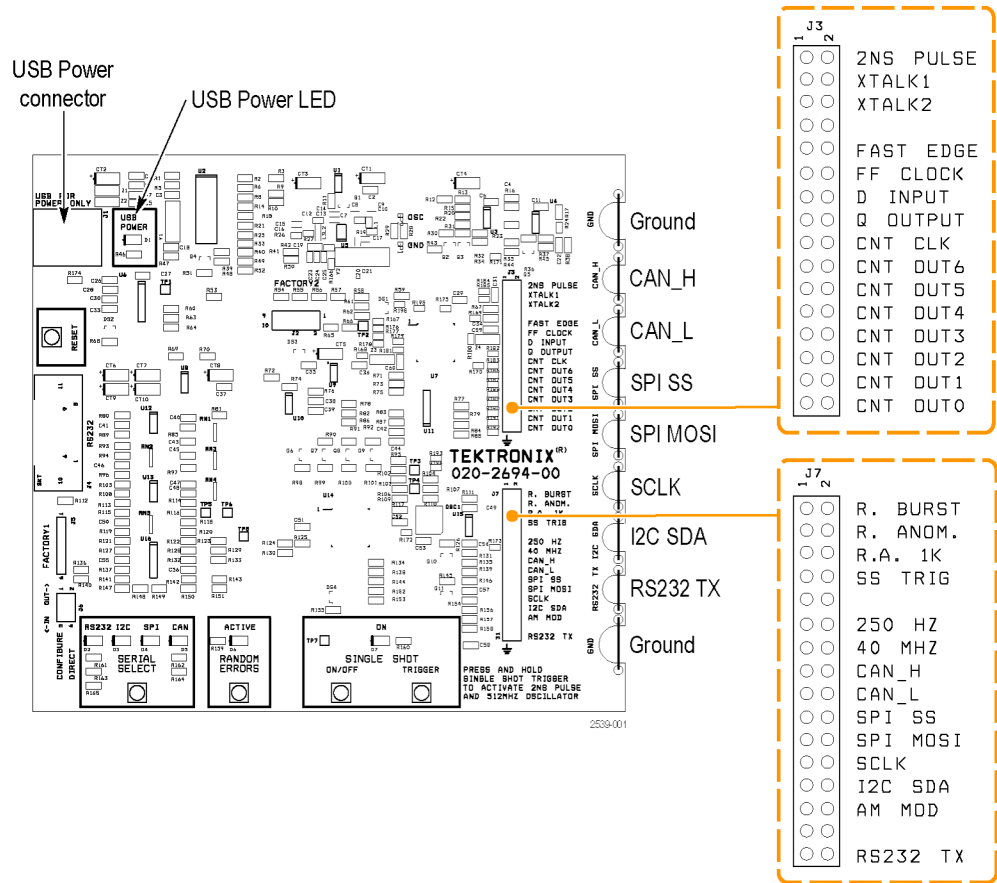


Figure 1: USB Power connector and LED, connection points, and signal names

I²C Bus Board label. I2C SDA, SCLK

Description. This is the I²C (Inter-IC Communication) bus signal between the uC and a serial EEPROM.

There are several different types of data packets.

The clock signal is 100 kHz, and 0 to 5 volts.

You need to select the I²C bus standard on the demo board to activate the bus. (See page 5, *Select a Serial Standard and Interpret the LED.*)

SPI Bus **Board label.** SCLK, SPI SS, SPI MOSI

Description. These are SPI (Serial Peripheral Interface) serial bus signals.

The SPI bus works as follows:

- SCLK rising edge latch
- Active Low SS
- Active High MOSI

Packets occur intermittently, as close together as about 400 µsec.

The clock signal is 625 kHz, and 0 to 5 volts.

You need to select the SPI bus standard on the demo board to activate the bus. (See page 5, *Select a Serial Standard and Interpret the LED.*)

CAN Bus **Board label.** CAN_H, CAN_L

Description. These are CAN (Controller Area Network) serial bus signals.

The bit rate of the data packet is about 20 kbps.

You need to select the CAN bus standard on the demo board to activate the bus. (See page 5, *Select a Serial Standard and Interpret the LED.*)

RS-232 Bus **Board label.** RS232 TX

Description. This is the RS-232 bus transmit signal (TX).

The decoded data packets display an ASCII string. Set the instrument to trigger on the letter Q (hex value 51) and the instrument displays the word Quickstart.

There are no matching receive or data flow control signals.

The baud rate is 9600. The data format is 1 start bit, and 8 data bits with no parity.

You need to select the RS232 bus standard on the demo board to activate the bus. (See page 5, *Select a Serial Standard and Interpret the LED.*)

2 ns Pulse	Board label. 2NS PULSE
	Description. This signal is a 2 ns to 3 ns, 1.5 V pulse at a 3.3 ms repetition rate. Use this signal to demonstrate the minimum pulse width capture specification of an instrument's acquisition system.
	Push and hold the SINGLE SHOT TRIGGER button to activate the 2NS PULSE signal and the 512 MHz oscillator.
Crosstalk	Board label. XTALK1, XTALK2
	Description. These are two signals with significant crosstalk between them.
Fast Edge	Board label. FAST EDGE
	Description. This is a 78 kHz capacitively coupled square wave signal with a 3 ns rise and fall time.
FF Clock	Board label. FF CLK
	Description. This is the 20 MHz clock input signal to a fairly fast flip-flop.
FF Data Input	Board label. D INPUT
	Description. This is an approximate 1.1 MHz data input signal to a fairly fast flip-flop that is asynchronous to the clock input.
FF Q Output	Board label. Q OUTPUT
	Description. This is the Q output signal of the fairly fast flip-flop. This signal shows metastable behavior infrequently.
Counter Clock	Board label. CNT CLK
	Description. This is the 10 MHz clock signal for the 7-bit Counter Output signals.
Counter Output Bits	Board label. CNT OUT0: CNT OUT6
	Description. These are the 7-bits of the binary counter. The LSB is CNT OUT0 at 5 MHz, that is, half of the counter input clock.

Random Burst **Board label.** R. BURST

Description. This signal produces a burst of logic pulses every 1.1 ms. The burst pulses vary in width from 100 ns to 500 ns.

Random Anomaly **Board label.** R. ANOM

Description. There are two frequently occurring anomalies in this pulse train.

There is a half-height runt pulse that occurs infrequently within a burst. Use a Runt trigger to isolate the signal.

There is an approximately 25 ns (narrow) pulse that occurs infrequently within a burst. Use a Pulse Width trigger to isolate the signal.

The pulse train is a repeating group of four pulses: 100 ns, 200 ns, 100 ns, and 100 ns wide. The group repeats at a 1.6 μ s rate.

**1k Resistance in Series
With the Random Anomaly**

Board label. R.A. 1K

Description. This is the same Random Anomaly signal with a 1k resistor between the driver and the pin. Use to demonstrate probe loading effects on the ability to find runts and narrow pulses.

Single Shot Trigger **Board label.** SS TRIG

Description. Push and hold the **SINGLE SHOT TRIGGER** button to initiate the 2NS PULSE signal and the 512 MHz oscillator.

250 Hz **Board label.** 250 HZ

Description. This is a 250 Hz to 300 Hz, 5 volt, square wave signal.

40 MHz **Board label.** 40 MHZ

Description. This is a 40 MHz, 5 volt, square wave signal.

Amplitude Modulation **Board label.** AM MOD

Description. This is an 11.5 kHz carrier amplitude signal modulated by a 500 Hz sine wave signal.

The AM MOD signal is centered around ground. Set the oscilloscope trigger level to the top or bottom of the waveform to stabilize the waveform on the display.

Operating the DPO Demo 1 Board

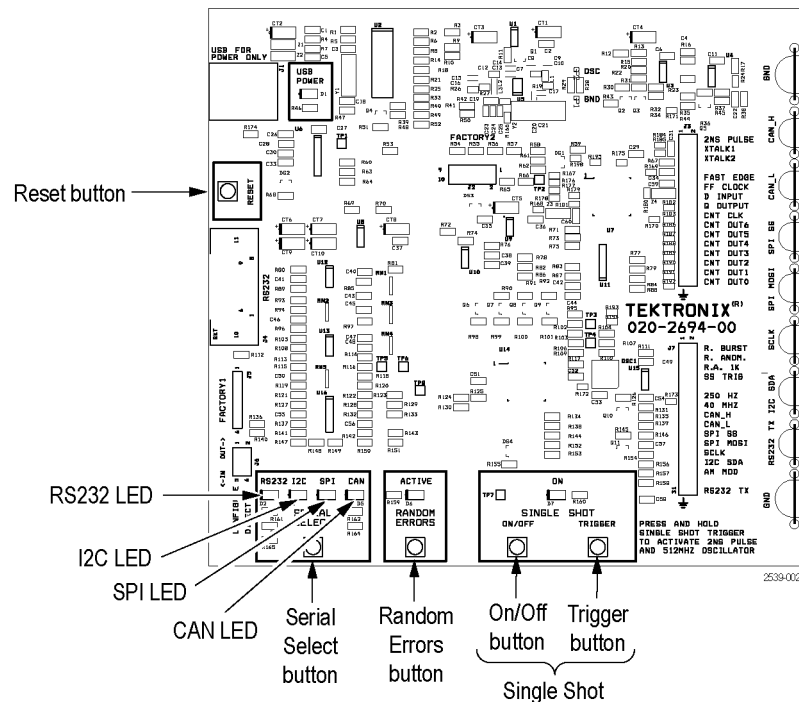


Figure 2: DPO Demo 1 board control buttons and LEDs

Select a Serial Standard and Interpret the LED. Push the **SERIAL SELECT** button at the bottom of the DPO Demo 1 board. Each time you push the button, the demo board activates a different serial standard: RS-232, I²C, SPI, and CAN. Notice that the I²C and SPI signals share the same SCLK connection point on the right side of the board for their clock signals.

Create Random Errors (RS-232 Only). Select the RS-232 serial standard and push the **RANDOM ERRORS** button at the bottom of the demo board. This automatically generates random error signals. The glitch frequency is random within a 2.5 ms to 15 ms range. The glitch duration varies randomly between around 500 ns to 50 μ s.

Push the button again to stop the demo board from generating random errors.

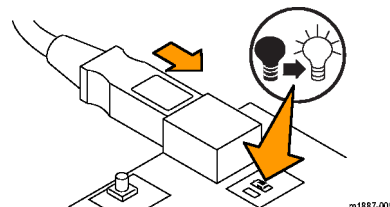
Select Between Single Shot Serial Streams and a Continuous Stream. Push the **SINGLE SHOT ON/OFF** button.

Activate the 2 ns Pulse and the 512 MHz Oscillator. Push and hold the **SINGLE SHOT TRIGGER** button.

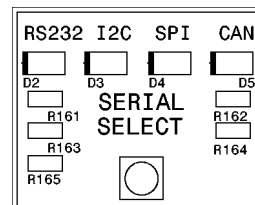
Troubleshooting the Board

If your DPO Demo 1 board does not appear to work, perform the following checks:

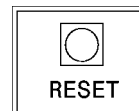
1. Check the power.
If the demo board is receiving power, the power indicator will be lit. If the Power LED is not lit, try gently pushing in the power cable on the USB Power port.



2. Check the settings.
Look at the serial select indicator lights and decide if they are set as you want them to be set.



3. Reset the demo board. Push the **RESET** button on the demo board.



If the demo board is still not acting properly, the following is a “master” reset procedure that you can try.

1. Push and continue to hold down the On/Off switch in the board’s Single Shot Box.
2. Push and release the Reset switch.
3. In the Serial Select Box, all four LEDs (RS232, I2C, SPI, and CAN) should now turn on.
4. When all four LEDs (RS232, I2C, SPI, and CAN) in the Serial Select Box go out, release the On/Off switch.
5. A moment later, all four LEDs (RS232, I2C, SPI, and CAN) should flash several times. Then, only the I2C LED will be lit.