

12.5 Gb/s Driver Amplifier LABware Module PSPL8001 Datasheet



The PSPL8001 12.5 Gb/s Driver Amplifier LABware Module is designed for bench-top lab use. This LABware module can simply be plugged in with a line cord (either 110 V or 220 V) and the driver amplifier is ready for use. The PSPL8001 is ideal for driving Lithium Niobate optical modulators using NRZ signals for test and characterization experiments. The PSPL8001 can also be used as a linear amplifier with 26 dB gain and 12 GHz bandwidth for inputs less than ±150 mV (300 mV_{p-p} with 50% duty cycle).

Key performance specifications

- LABware bench-top instrument
- 12.5 Gb/s Driver Amplifer
- 7.5 Vpp output amplitude
- Linear amplifier with 26 dB gain
- 30 kHz to 12 GHz bandwidth
- Integrated power supplies, amplitude, and crossing-point controls

Typical performance



Output Eye Amplitude vs. Input Amplitude Setting



10.0 Gb/s NRZ signal, 2^{23} -1 PRBS, Crossing Point (XP) = 5.0 Black line shows 26 dB gain for comparison



Output Eye Amplitude vs. Amplitude Setting



10.0 Gb/s NRZ signal, 2²³-1 PRBS Input Eye Amplitude = 654 mV, Crossing Point (XP) = 5.0

Output Eye Crossing Point vs. Crossing Point (XP) Setting



10.0 Gb/s NRZ signal, 2^{23} -1 PRBS, Amplitude (A) = 10.0, Input Eye Amplitude = 654 mV



Output Voltage Range vs. Crossing Point (XP) Control

10 ns pulse with 0.1% duty cycle, Amplitude (A) = 10.0

The Amplitude (A) control has very little effect on the output voltage under small signal conditions. Generally, it should be set to 10.0 when the PSPL8001 is used as a linear amplifier. The Crossing Point (XP) control sets the bias point of the amplifier. It should be set to 5.0. Both the Amplitude (A) and Crossing Point (XP) controls have locking levers. Be sure that the locks are released before rotating the knobs.

The Crossing Point (XP) control provides an adjustment for the crossing point of NRZ signals. By shifting the bias point, it can also compensate for NRZ signals that do not have a Mark Ratio of 1:2, RZ signals, or signals with low or high duty cycles.

The PSPL8001 is AC-coupled at the Input and Output, and the average value of the output signal (the DC component) must be at 0 V. Most NRZ data streams are conditioned to have a 50% duty cycle when averaged over a long period, about a microsecond. Those signals make full use of the positive and negative halves of the amplifier's operating range.

The average amplitude of low duty cycle signals can be virtually at the baseline. These signals use only one half of the PSPL8001 operating range, and the maximum output amplitude may be 4 V instead of 8 V. The Crossing Point (XP) control can shift the amplifier's operating point and increase the output amplitude up to 6 V in some cases.

It is recommended that the PSPL8001 be driven with a negative polarity signal when the duty cycle is very low. Narrow positive pulses can generate excessive heat within the PSPL8001 and damage the amplifier. Similarly, large duty signals should be positive.

Typical 10.66 Gb/s eye measurements



Input from Tektronix PPG1601, PRBS=223-1, 500 mv





Caution: The PSPL8001 contains a static sensitive amplifier. To avoid damage from static electricity, always short the terminals of a device before connecting it to the input or output of the PSPL8001. Even coax cables must be shorted before making the connection.

Specifications

Small signal (linear) conditions

Parameter	Symbol	Units	Minimum	Typical	Maximum	Comments
Upper 3 dB freq.	f _{c,h}	GHz		12		Relative to gain at 2 GHz
Lower 3 dB freq.	f _{c,l}	kHz		30		Relative to gain at 2 GHz
Small signal gain	S ₂₁	dB		26.5		Measured at 2 GHz
Max Power Out (-1 dB gain comp)	P _{1dB}	dBm		23.5 20.5		Measured at 2 GHz Square wave Sine wave
Return Loss, Input and Output	S ₁₁ , S ₂₂	dB		-14 -11	-12 -9	50 MHz < f < 5 GHz 5 GHz ≤ f < 12 GHz
Noise Figure	NF	dB		5.75	6.5	f = 1 GHz

Large signal conditions

Parameter	Symbol	Units	Minimum	Typical	Maximum	Comments
Impedance	Z	ohms		50		
Output Eye Voltage with Amplitude (A) control = 10.0	V _{OUT}	V _{amp}	7.0	7.5		V _{in} = 0.5 V _{amp} , 12.5 Gb/s PRBS
Output Eye Voltage with Amplitude (A) control = 0.0	V _{OUT}	V _{amp}		3.2	4.0	V _{in} = 0.5 V _{amp} , 12.5 Gb/s PRBS
Rise Time	t _r	ps		22	28	20-80%, V _{in} = 0.5 V _{amp} , 12.5 Gb/s PRBS
Fall Time	t _f	ps		24	30	
Additive Jitter RMS Peak-to-Peak		ps ps _{pp}		0.7 4	2.0 8	V _{in} = 0.5 V _{amp} , 12.5 Gb/s PRBS, meas. at crossing point
Crossing Point (XP) Adjust, Amplitude (A) control = 10.0		%	±10	±15		V _{in} = 0.5 V _{amp}
Overshoot		%		5		12.5 Gb/s PRBS
Undershoot		%		5		12.5 Gb/s PRBS
Polarity	Non-Inverting					
Coupling	AC, input and output					
RF Connectors	SMA jacks (f)					

Operating specifications

Parameter	Comments			
Max Allowed Input	1.5 Max V _{amp} (damage threshold for input)			
AC Power	100, 117, 200, or 230 VAC, 50/60 Hz, 15VA (60 Hz)			
Environment Operating Storage	(Indoors, 80% relative humidity) 20 to 30 °C 0 to 50 °C			
Safety Certifications	Conforms to EN-061010-1 (CE mark), UL-1244 and IEC-348. Safety class I. For lab use by qualified personnel.			
Dimensions	9.6 x 7.5 x 1.7 in. (244 x 190 x 33 mm)			
Weight	3.3 lbs. (1.5 kg)			
Accessories	USA power cord			
Warranty	One Year			

Ordering information

Models

PSPL8001

DRIVER AMPLIFIER, 12.5G b/s, LABware

Datasheet

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28 Aug 2015 1PW-30543-1

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