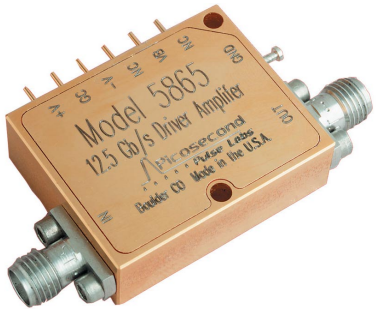
MODEL 5865

12.5 GB/S MODULATOR DRIVER

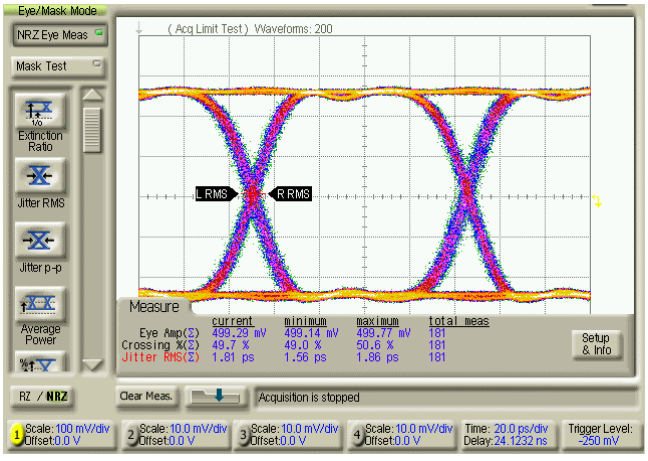
- **Lithium Niobate modulator driver (8 V_{amp} output)**
- **High gain with low power dissipation (2.3 watts at 8 V_{amp})**
- **Temperature compensated design for output stability**
- **Includes EOM bias network, crossing point control & adjustable output voltage**



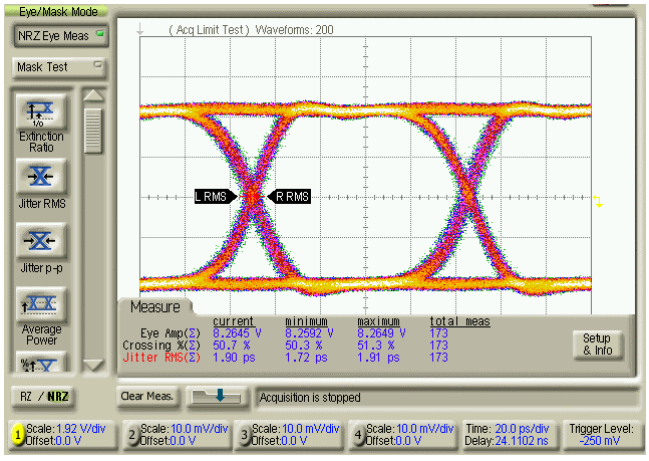
The Picosecond Pulse Labs Model 5865 is a modulator driver intended for use driving Lithium Niobate modulators at data rates up to 12.5 Gb/s. Driven by only 500 mV of input signal, this driver produces excellent, wide-open eye patterns with 8 V of amplitude.

The 5865 includes internal temperature compensation for excellent output stability over temperature, and exhibits both high output and low power dissipation. It also incorporates internal sequencing circuitry, making it insensitive to power supply application sequence.

Typical 10.66 Gb/s Eye Measurements



Input Test Signal [1]



Output Response [2]

[1] Input test signal generated by Agilent Pattern Generator model 70843B.
[2] Output response measured using Agilent oscilloscope model 86100A with model 83484A 50 GHz plug-in module.

5865 Electrical Specifications

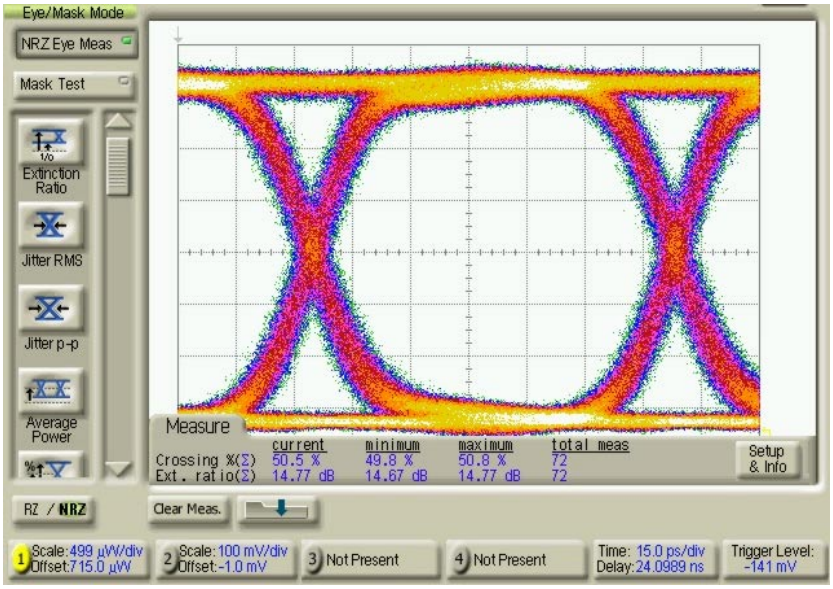
PARAMETER	SYMBOL	UNITS	MIN	TYPICAL	MAX	COMMENTS
Polarity						Non-inverting
Output Eye Voltage with V_{gc} = 0 V	V_{OUT}	V_{amp}	7.5	8.0		V_{in} = 0.5 V_{amp}, 12.5 Gb/s PRBS
Output Eye Voltage with V_{gc} = -15 V	V_{OUT}	V_{amp}		1.0	2.0	V_{in} = 0.5 V_{amp}
Deconvolved Rise / Fall Time [1]	$t_{r,f}$	ps		14 / 23	20 / 28	10% to 90%, V_{in} = 0.5 V_{amp}, 12.5 Gb/s PRBS
Additive Jitter [1] RMS Peak-to-Peak		 ps ps_{pp}		 0.7 4	 1.5 8	V_{in} = 0.5 V_{amp}, 12.5 Gb/s PRBS, measured at crossing point
Output Eye Voltage Variation Over Operating Temperature Range	ΔV_{OUT}	%		± 3	± 5	V_{gc} = 0 V, V_{in} = 0.5 V_{amp}, T_{CASE} = –5 to 75C, 12.5 GHz PRBS
Crossing Point Adjust		%	±15	±20		±5 V input at V_{cp}, V_{in} = 0.5 V_{amp}
Crossing Point Variation Over Operating Temperature Range		%		±1.0	±2.0	0.5 V_{amp} Input, 12.5 Gb/s PRBS, T_{CASE} = –5 to 75°C, V_{gc} constant
Overshoot / Undershoot		%		5		12.5 Gb/s PRBS
Input Return Loss 50 MHz < f < 5 GHz 5 GHz ≤ f < 12 GHz	S_{11}	dB		 -15 -12	 -12 -10	
Output return loss	S_{22}	dB		-14	-12	50 MHz < f < 12 GHz
Noise Figure	NF	dB		5.75	6.5	f = 1 GHz

[1] Deconvolution is done by root sum of squares. Input rise/fall times were 27 ps. Input jitter was 2.3 ps RMS / 9.8 ps pk-pk.

5865 Operating Specifications

PARAMETER	SYMBOL	UNITS	MIN	TYPICAL	MAX	COMMENTS
Maximum allowed Input		V_{amp}			1.5	Damage threshold for input
DC Voltage Supply (pos)	$+V_{DC}$	V_{DC}	8	8	8.25	275 mA typical with V_{OUT} = 8 V_{amp}
DC Voltage Supply (neg)	$-V_{DC}$	V_{DC}	-5.25	-5	-4.75	20 mA typical
Power Dissipation	P_{diss}	W		2.3	2.6	V_{OUT} = 8 V_{amp}, V_{gc} may be utilized to lower the output level and lower the power dissipated
Output Voltage Bias	V_{bias}	V_{DC}	-17		+33	2.5 kΩ resistor (DC current ≤ 3.5 mA),
Operating Temperature	T_{CASE}	°C	-5		75	Case Temperature
Storage Temperature	T_{CASE}	°C	-40		125	Case Temperature

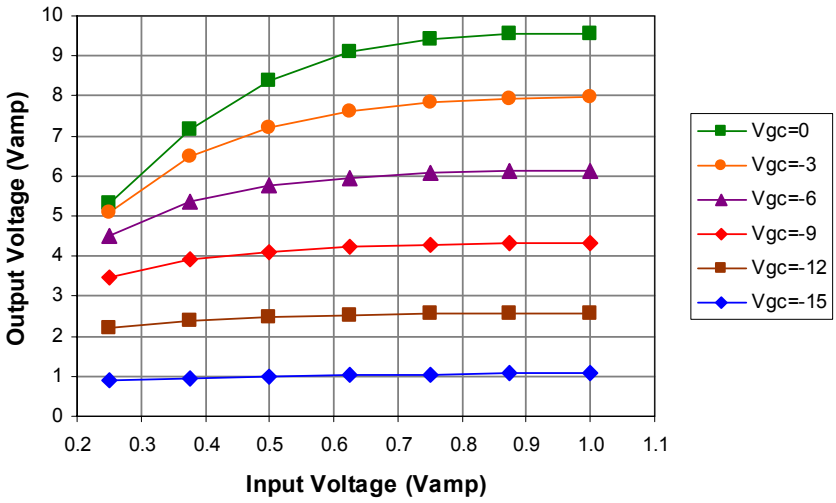
Static sensitive device, limited 30 day warranty.



Typical Measured 10.66 Gb/s Optical Eye

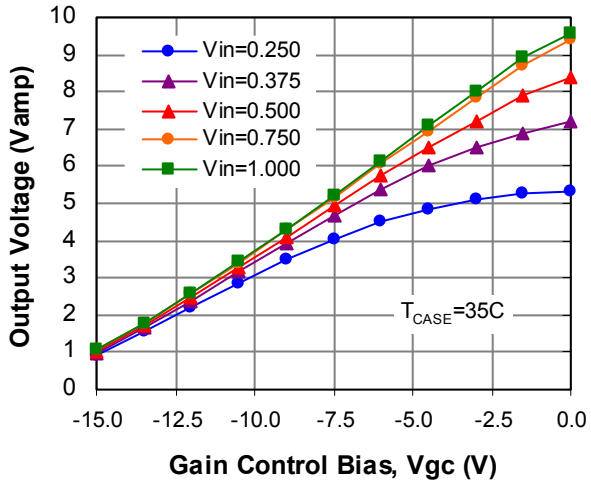
(PSPL model 5865 driver, modulator controller, and OTI 12.5Gb/s $LiNbO_3$ modulator)

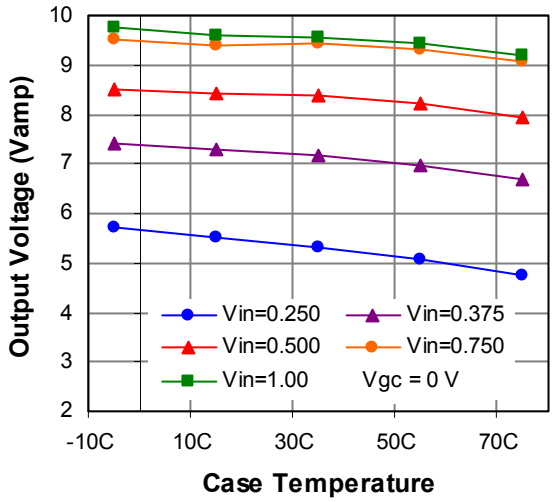
Input test signal generated by Advantest Pattern Generator model D3186. Output response measured using Agilent oscilloscope model 86100A with model 86109A optical plug-in module.

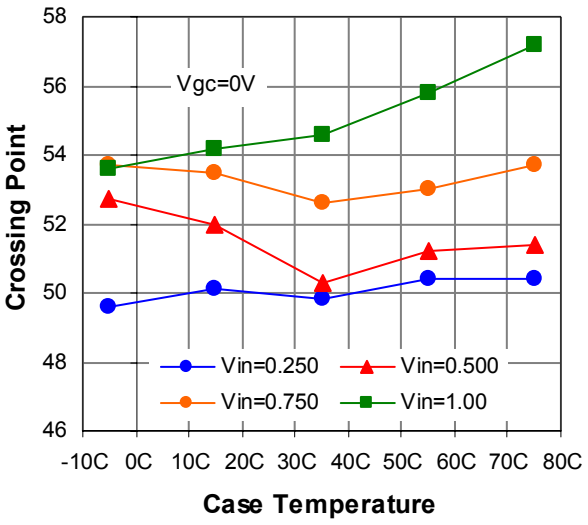


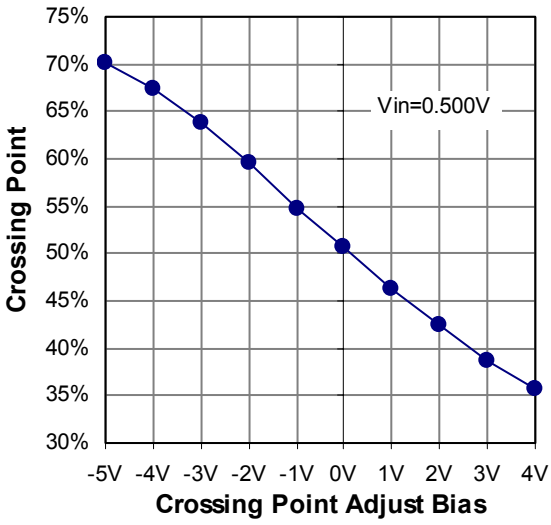
Typical Output Voltage versus Input Voltage

(Gain Control Bias = Vgc, T_{CASE} = 35C)



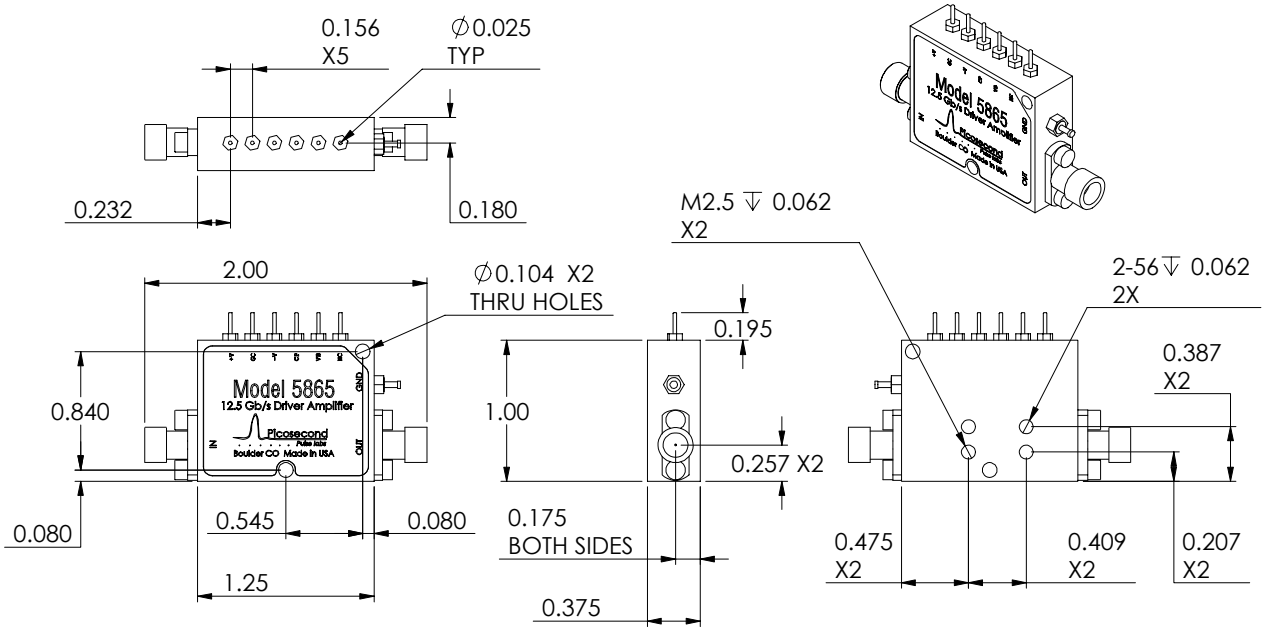






Detailed test setup information available upon request.

5865 Mechanical Dimensions (in inches unless otherwise stated)



Ordering Information

Part #: 5865-107

where 107 denotes connector configuration of RF input SMA jack, RF output SMA jack, solder pins. Other connector configurations (SMA plug, etc…) may be available upon request.

Contact Information

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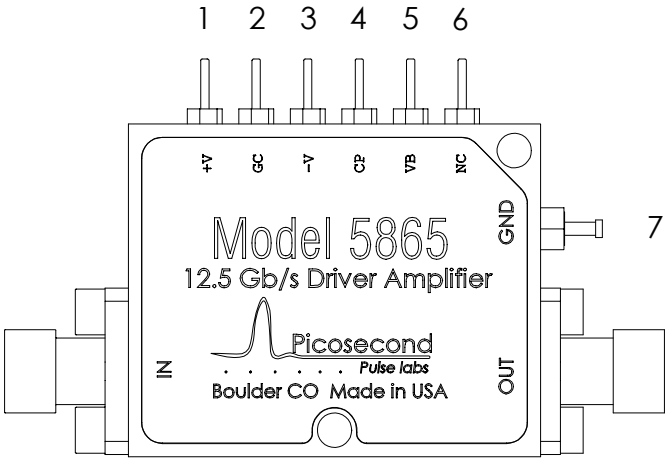
Instructions for Use

The Picosecond Pulse Labs 5865 12.5 Gb/s modulator driver may be operated using only three of the available 7 pins. The DC pins required for operation are 1, 3, and 7. The RF connectors and DC pins are diagramed and defined below.



Pin Descriptions

Pin #	Pin Label	Description
	IN	SMA, signal input, $V_{amp} \leq 1.5$ V (damage threshold)
1	+V	Positive DC voltage supply, 8 V (see Note 1 and Note 2)
2	GC	V_{gc}, Variable output control, -15 V $\leq V_{gc} \leq$ 0 V (see Note 3)
3	-V	Negative DC voltage supply, -5.25 V $\leq$ V $\leq$ -4.75 V (see Note 2)
4	CP	Crossing point adjust, -5 V $\leq V_{cp} \leq$ 5 V (see Note 4)
5	VB	DC Voltage bias, -17 $\leq$ VB $\leq$ +33 (see Note 5)
6	NC	No connection / Not used
7	GND	Ground connection
	OUT	SMA, signal output

Warning: The 5865 requires a ground connection at pin #7 prior to voltage application to prevent damage.

NOTES:

Note 1: At 8V, approximately 2.3W is dissipated.
Note 2: No power sequencing is necessary. Voltages may be applied in any order **after** ground is applied.
Note 3: Output Control: With V_{gc} at 0V, or left floating (disconnected), the driver will provide maximum gain and maximum output voltage. The user may decrease V_{gc} to decrease the RF signal gain when the driver is operating in the linear regime, or to reduce the output voltage level when the driver is operated in saturation (this will also reduce the power dissipated).
Note 4: The crossing point may vary until unit achieves thermal equilibrium.
Note 5: Voltage Bias: The VB pin allows the user to apply a *low current* (less than 3.5 mA) DC offset to the Signal Output for biasing electro-optic modulators through a 2 kΩ resistor.