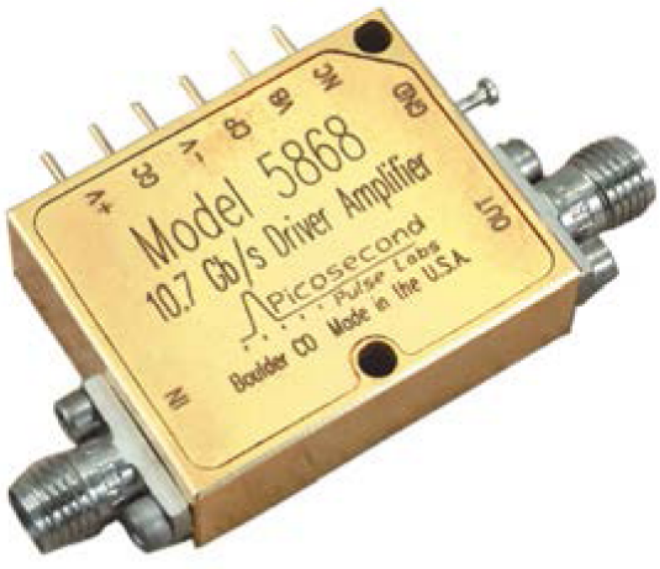
10.7 Gb/s Driver Amplifier

PSPL5868 Datasheet

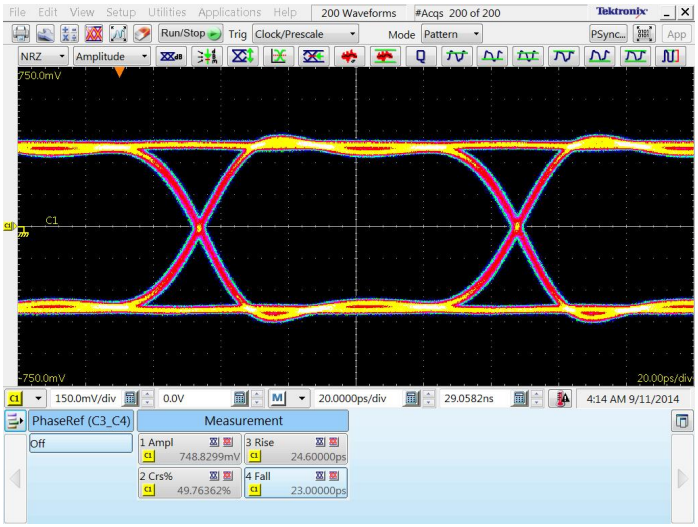


The Model PSPL5868 driver amplifier is intended for use as a modulator driver or as a linear amplifier. This device includes internal temperature compensation for excellent output stability over temperature, and exhibits both high output and low power dissipation. It also incorporates internal sequencing circuitry, making it insensitive to power supply application sequence.

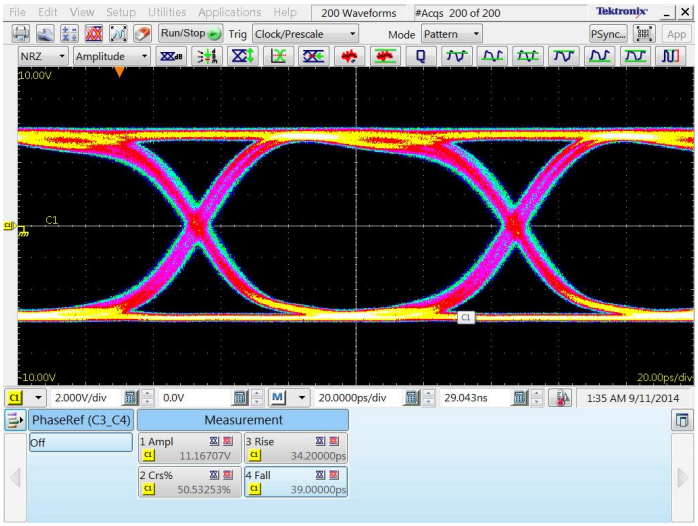
Key performance specifications

- 11 V output amplitude 10.7 Gb/s Modulator Driver
- Linear amplifier with 28 dB gain
- 30 kHz to 11.8 GHz bandwidth
- Temperature compensated design for output stability
- Includes bias network, crossing point control & adjustable output voltage

Typical 10.7 Gb/s eye measurements

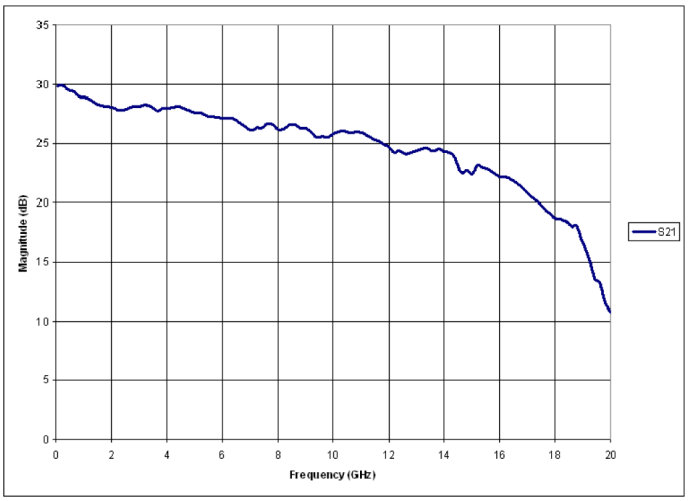


Input from Tektronix PPG1601, PRBS = 2^{23}–1, 750 mV

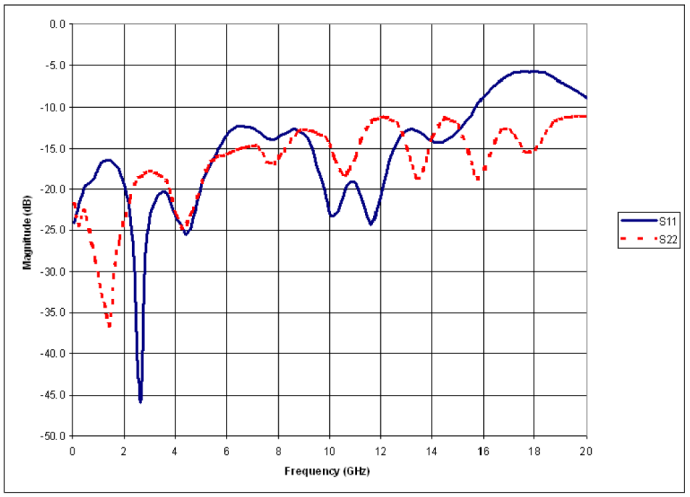


Output amplitude, 11 V

Typical performance

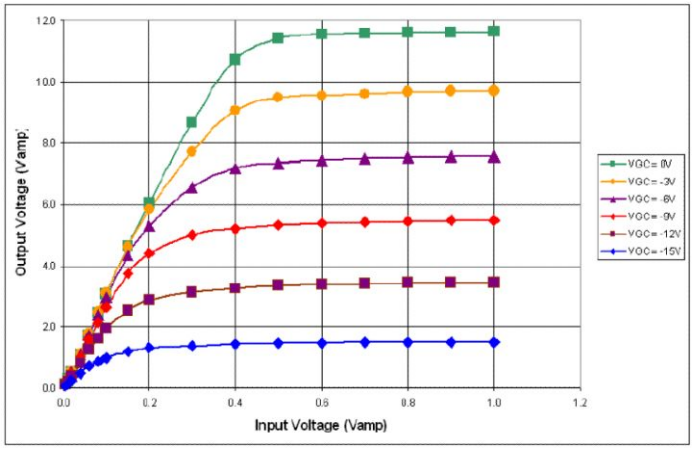


Typical small signal S_{21} (measured at –20 dBm input power)

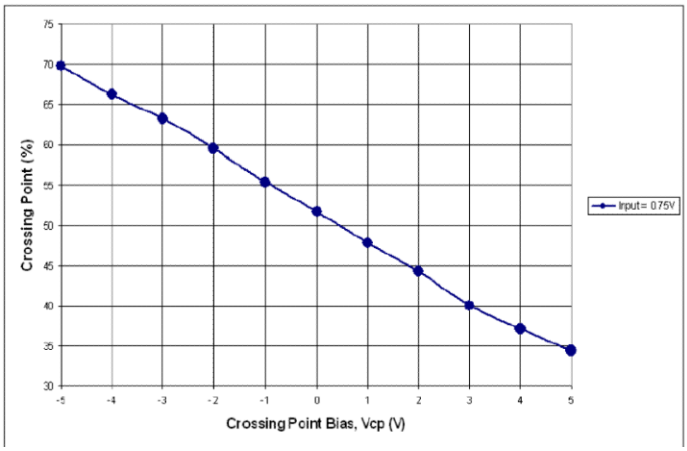


Typical small signal S_{11} and $_{22}$ (measured at –20 dBm input power)

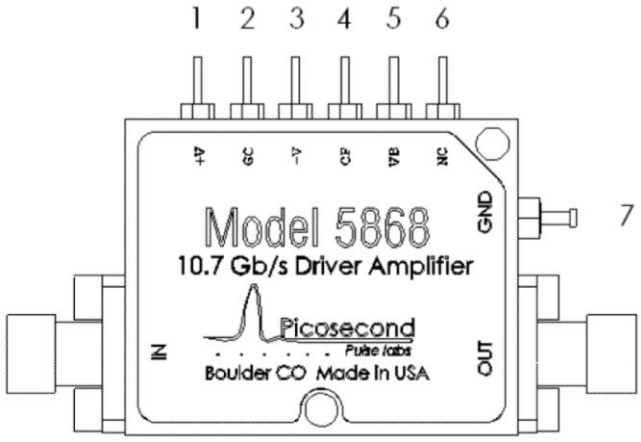
Typical performance plots



Output voltage vs. Input voltage (Gain control bias = V_{gc}, T_{CASE} = 35 °C



Crossing point vs. V_{cp}



Pin Descriptions

Pin #	Pin Lable	Description
	IN	SMA, signal input, $V_{amp} \leq$ 1.5 V (damage threshold)
1	+V	Positive DC voltage supply, 8.25 V [1] [2]
2	GC	V_{gc}Variable output control, -15 V ≤ V_{gc} ≤ 0 V [3]
3	-V	Negative DC voltage supply, -5.25 V ≤ V ≤ -4.75 V [2]
4	CP	Crossing point adjust, -5 V ≤ V_{cp} ≤ 5 V [4]
5	VB	DC Voltage bias, -17 ≤ VB ≤ +33 [5]
6	NC	No connection / Not used
7	GND	Ground connection
	OUT	SMA, signal output

Instructions

The PSPL5868 10.7 Gb/s modulator driver can 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 shown in the following drawing and table. **Warning:** To prevent damage, provide a ground connection at pin 7 before applying voltage to the PSPL5868.

1 At 8.25 V, approximately 3 W is dissipated.

2 No power sequencing is necessary. Voltages may be applied in any order after ground is applied.

3 Output Control: With VGC at 0 V, or left floating (disconnected), the driver will provide maximum gain and maximum output voltage. The user can decrease VGC 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).

4 The crossing point may vary until unit achieves thermal equilibrium. VCP > 0 V will lower the output crossing point and increase power dissipation. Care must be taken to ensure that the positive supply current does not exceed 400 mA.

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 2.5 kΩ resistor.

Specifications

Parameter	Symbol	Units	Minimum	Typical	Maximum	Comments
Impedance	Z	ohms		50		
Upper 3 dB freq.	$f_{c,h}$	GHz		11.8		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		28.5		Measured at 2 GHz
Max Power Out (-1 dB gain comp)	$P_{1\ dB}$	dBm		24.4		Measured at 2 GHz
Output Eye Voltage with V_{GC} = 0 V	V_{OUT}	V_{amp}	10.5	11		V_{in} = 0.75 V_{amp}, 10.7 Gb/s PRBS
Output Eye Voltage with V_{GC} = -15 V	V_{OUT}	V_{amp}		1.5	2.5	V_{in} = 0.75 V_{amp}, 10.7 Gb/s PRBS
Return Loss, Input and Output	S_{11}, S_{22}	dB		-16 -11		50 MHz < f < 5 GHz 5 GHz ≤ f < 12 GHz
Rise Time	t_r	ps		31		10-90%, V_{in} = 0.75 V_{amp}, 10.7 Gb/s PRBS
Fall Time	t_f	ps		36		
Additive Jitter RMS Peak-to-Peak		 ps ps_{pp}		 1.5 8		 V_{in} = 0.75 V_{amp}, 10.7 Gb/s PRBS, measured at crossing point
Overshoot		%		5		10.7 Gb/s PRBS
Undershoot		%		5		10.7 Gb/s PRBS
Eff. Input RMS Noise Voltage		µV rms		152		
Noise Figure	NF	dB		5.75		f = 1 GHz
Output Eye Voltage Variation	Δ V_{OUT}	%		±5		V_{gc} = 0 V, V_{in} = 0.75 V_{amp}, T_{CASE} = -5 to 75 °C
Crossing Point Adjust		%	±12	-13.5 / +17.5		±5 V input at V_{cp}, V_{in} = 0.5 V_{amp}
Crossing Point Variation		%		±5		V_{in} = 0.75 V_{amp}, 10.7 Gb/s PRBS, T_{CASE} = -5 to 75 °C
Polarity	Non-Inverting					
Coupling	AC, input and output					
RF Connectors	SMA jacks (f)					
DC Connector	Solder pins					
Voltage Supply (+)	$+V_{DC}$	V	8	8.25	8.5	
Voltage Supply (-)	$-V_{DC}$	V	-5.25	-5	-4.75	
Supply Current (+)	$+I_{DC}$	mA		325		V_{out} = 11 V_{amp} [6]
Supply Current (-)	$-I_{DC}$	mA		20		
Power Dissipation	P_{diss}	W		3	3.3	V_{out} = 11 V_{amp} [7]
Max Allowed Input		V_{amp}			1.5	Input damage threshold
Output Voltage Bias	V_{bias}	V_{DC}	-17	0	33	No connection required [8]
Gain Control Bias	V_{gc}	V_{DC}	-15	0	0	No connection required
Crossing Point Bias	V_{cp}	V_{DC}	-5	0	5	No connection required
Operating Temp	T_{CASE}	°C	-5		75	Case temperature

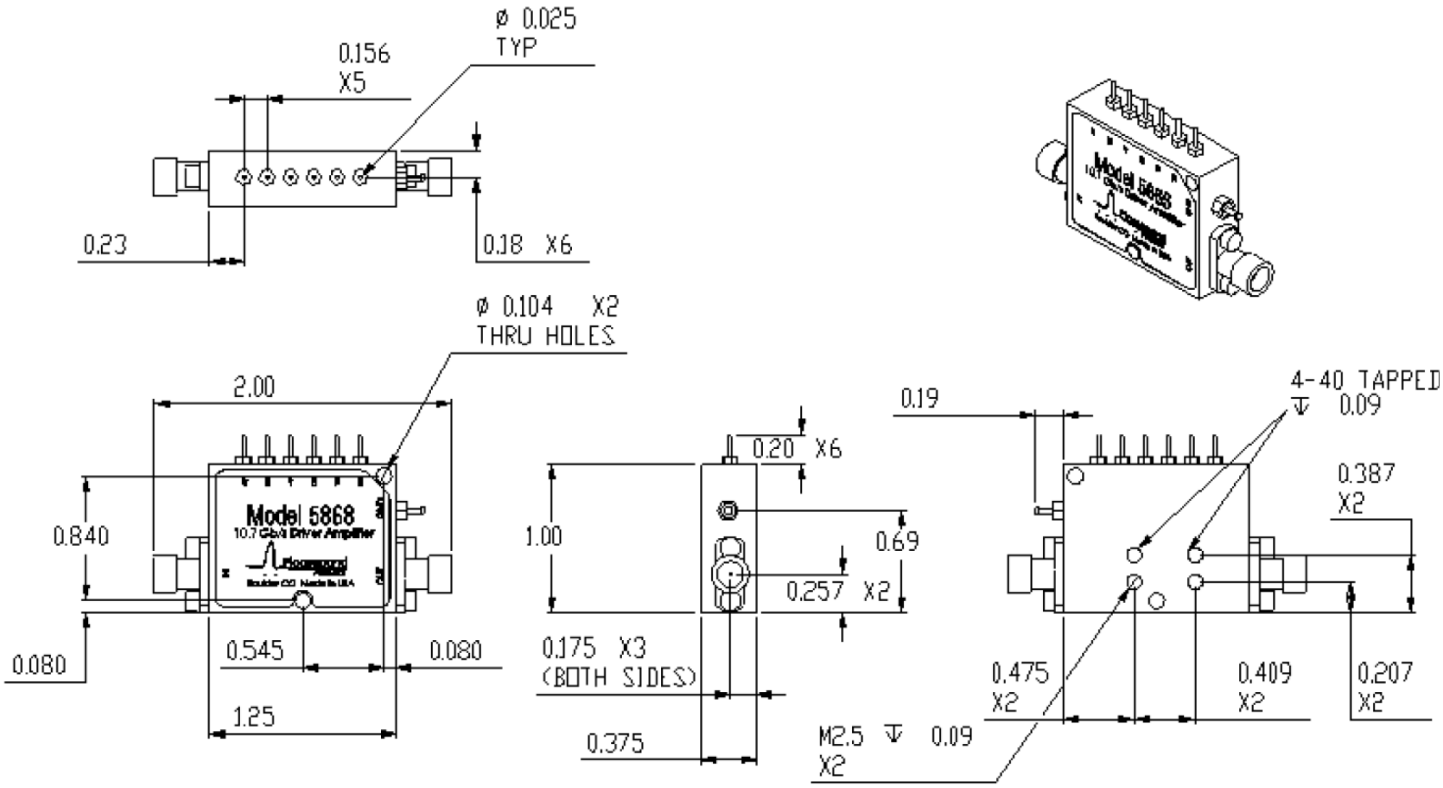
6 The PSPL5868 can be damaged by excessive heat that is produced when driving low duty cycle positive pulses. To ensure the amplifier will not be damaged by overheating, it is recommended the positive supply voltage has its current limit set to 400 mA.

7 V_{gc} can be used to lower the output level and power dissipated. V_{cp} > 0 V will lower the crossing point and increase the power dissipated.

8 A 2.5 kΩ resistor is connected to the output from the V_{bias} pin for adding a low current (≤ 3.5 mA) DC bias.

Parameter	Symbol	Units	Minimum	Typical	Maximum	Comments
Storage Temp	T_{stor}	°C	-40		125	
Warranty	One year					

Mechanical dimensions



Ordering information

Models

PSPL5868	DRIVER AMPLIFIER, 10.7 Gb/s

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