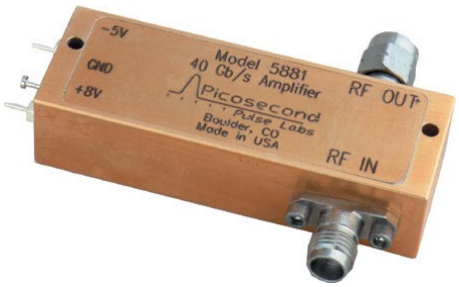
# MODEL 5881

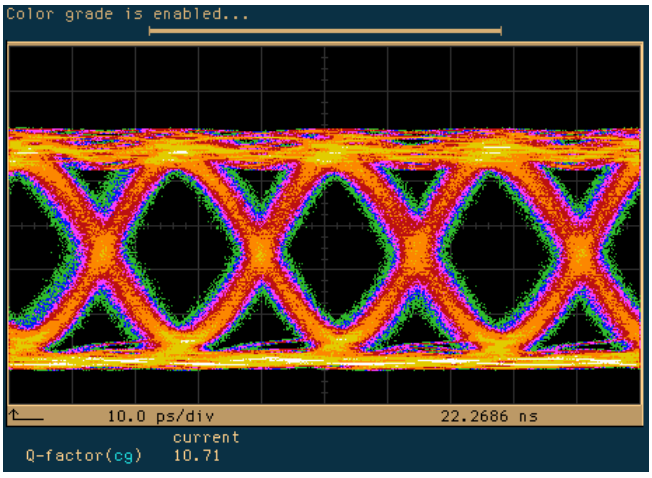
## 40 GB/S BROADBAND AMPLIFIER

- **Electro-Absorption Modulator driver or optical receiver amplifier**
- **20 kHz - 43 GHz bandwidth**
- **8 ps risetime**
- **2.7 $V_{amp}$ eye amplitude**
- **8.5 dB gain**

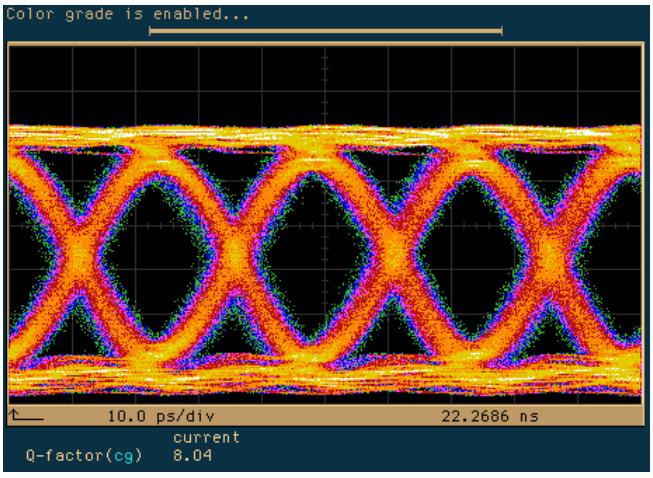



The 5881 is extremely broadband, covering over 6 decades from 20 kHz to 43 GHz. It also demonstrates a very clean time domain response, resulting in high quality 40 Gb/s eye diagrams. The 5881 includes internal reverse voltage protection, power supply regulation, and sequencing circuitry, making it insensitive to power supply voltage variation and application sequence.

## Typical 40 Gb/s Eye Measurements




**Input Test Signal** [1]
Eye amplitude 0.5 V




**Output Response** [1]
Eye amplitude 1.3 V

[1] Measured on 50 GHz Agilent 54750 oscilloscope.

## 5881 Electrical Specifications

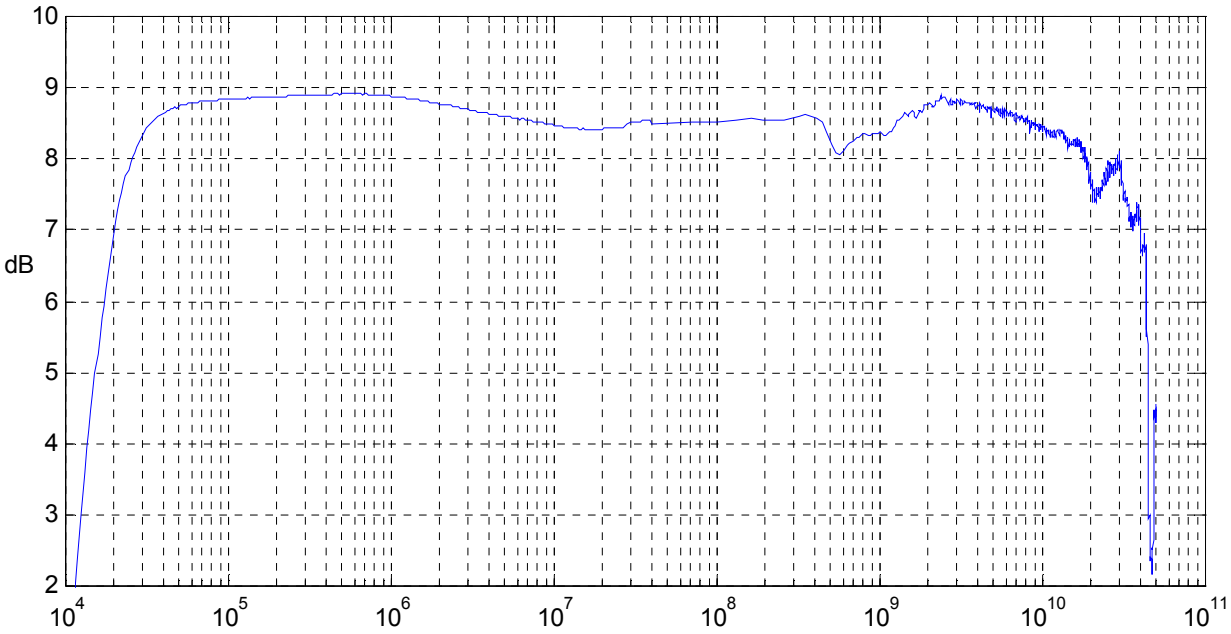
| PARAMETER | SYMBOL | UNITS | MIN | TYPICAL | MAX | COMMENTS |
|---|---|---|---|---|---|---|
| Polarity | | | | | | Inverting<br>AC coupled input and output |
| High Frequency $f_{-3dB}$ | $f_{HIGH}$ | GHz | 35 | 43 | | |
| Low Frequency $f_{-3dB}$ | $f_{LOW}$ | kHz | | 20 | 35 | |
| Output Eye Voltage | $V_{OUT}$ | $V_{amp}$ | 2.4 | 2.7 | | $V_{in}$ = 1.5 $V_{amp}$, 12.5 Gb/s PRBS |
| Gain | | dB | 7.5 | 8.5 | | Measured at 100 MHz |
| Gain Ripple | | dB | | ±0.75 | ±1.5 | 50 MHz < f < 35 GHz |
| Output Power at 1 dB Gain Compression | $P_{1dB}$ | dBm | | 12<br>11 | | f < 25 GHz<br>25 GHz < f < 40 GHz |
| Noise Figure | NF | dB | | 5 | | Measured at 1.5 GHz |
| Group Delay Variation | | ps | | ±10 | ±15 | 3 GHz < f < 35 GHz, 0.8 GHz aperture |
| Deconvolved Rise Time | $t_r$ | ps | | 8 | | 10% to 90%, root-sum-of-squares extraction, 15 ps system rise time |
| Overshoot / Undershoot | | % | | ±6 | | 500 ps window, 15 ps system rise time |
| Input Return Loss<br>50 MHz < f < 10 GHz<br>10 GHz ≤ f < 30 GHz | $S_{11}$ | dB | | <br>-20<br>-10 | <br>-15<br>-8 | |
| Output Return Loss<br>50 MHz < f < 10 GHz<br>10 GHz ≤ f < 30 GHz | $S_{22}$ | dB | | <br>-13<br>-10 | <br>-10<br>-8 | |

Specifications valid at case temperature of 23C

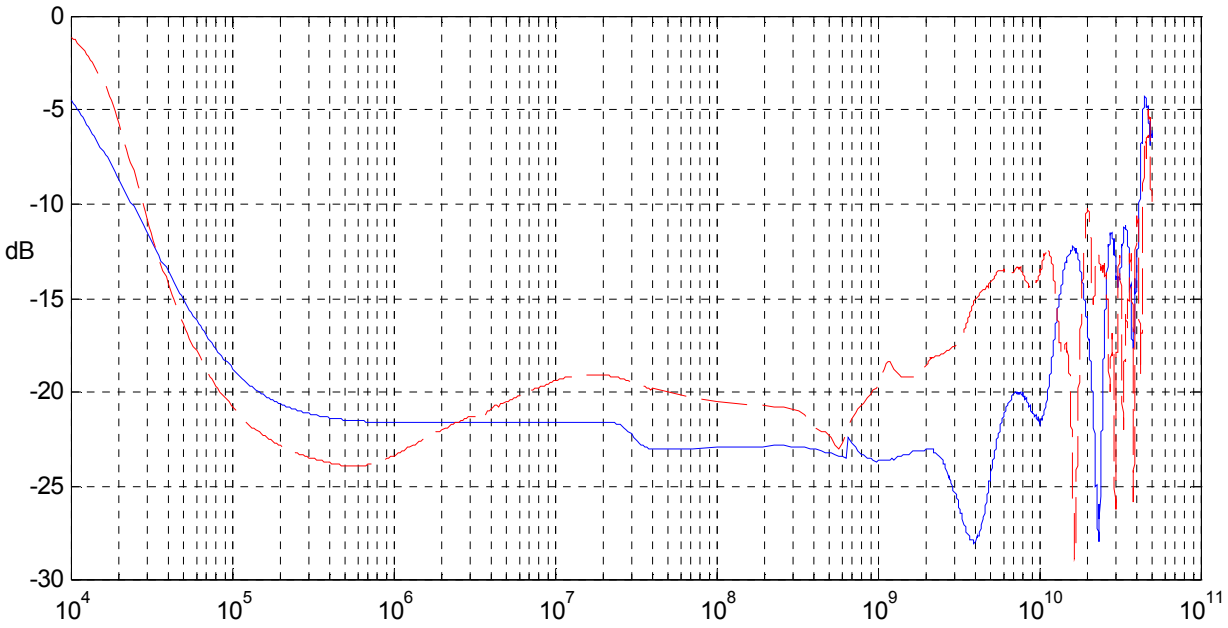
## 5881 Operating Specifications

| PARAMETER | SYMBOL | UNITS | MIN | TYPICAL | MAX | COMMENTS |
|---|---|---|---|---|---|---|
| Maximum Allowed Input Power | | dBm | | | 16 | Damage threshold |
| DC Voltage Supply (pos) | $+V_{DC}$ | $V_{DC}$ | 7 | 8 | 9 | 80 mA typical |
| DC Voltage Supply (neg) | $-V_{DC}$ | $V_{DC}$ | -5.5 | -5 | -4.5 | 15 mA typical |
| DC Voltage Applied to RF Input or Output | | $V_{DC}$ | -4 | | +8 | Damage threshold |
| Operating Temperature | $T_{CASE}$ | °C | 0 | | 70 | Case temperature |

Static sensitive device, limited 30 day warranty.

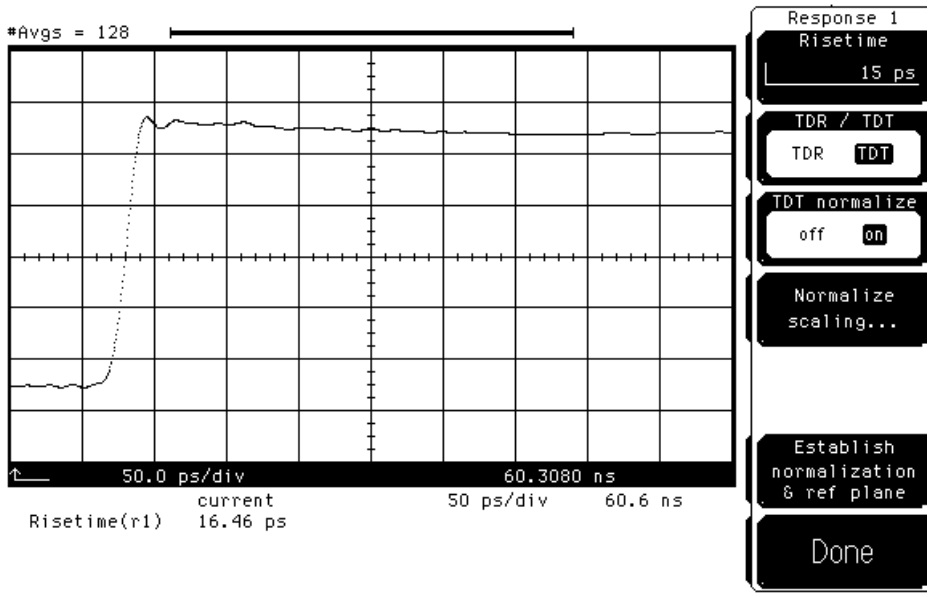



**Typical S21 from 10 kHz to 50 GHz**




**Typical Return Loss from 10 kHz to 50 GHz**

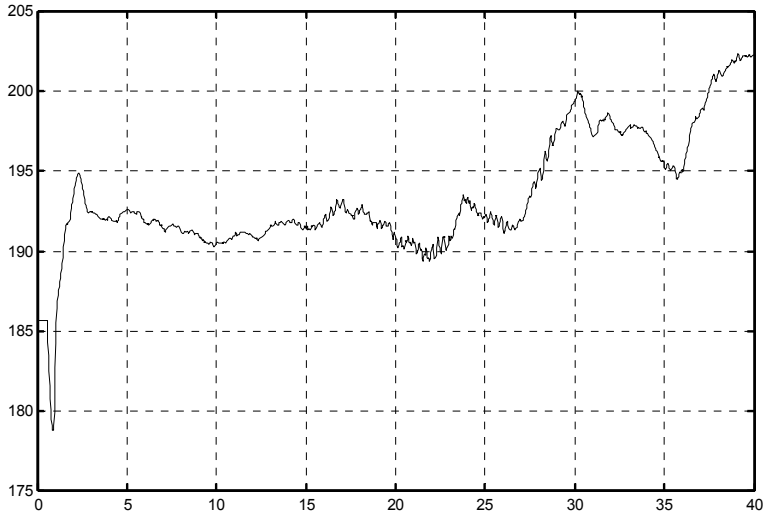
S11 is the solid blue trace, S22 is the dashed red trace.




## Typical Step Response

Input signal is 15 ps risetime.
Measured using a PSPL 4015C pulse generator and Agilent 54750 50 GHz oscilloscope.

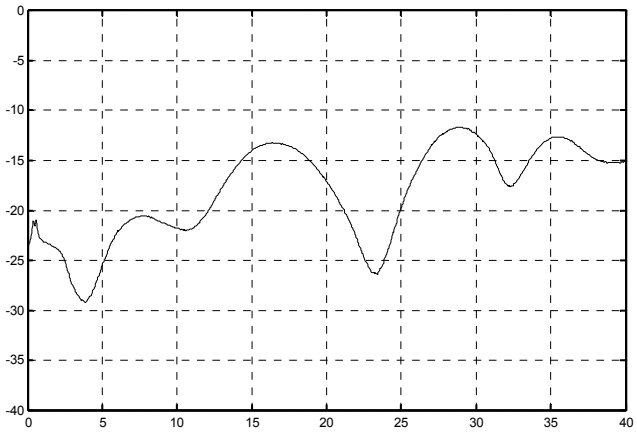
$$t_{r(amplifier)} = \sqrt{[t_{r(system)}]^2 - [t_{r(generator)}]^2}$$



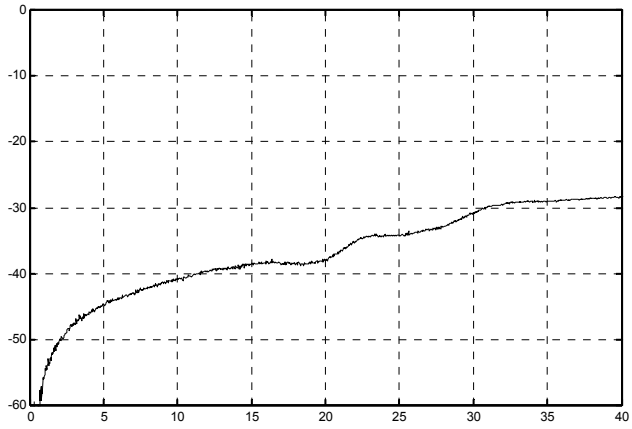

## Typical Group Delay

5 ps/div, 5 GHz/div, 0.8 GHz aperture.

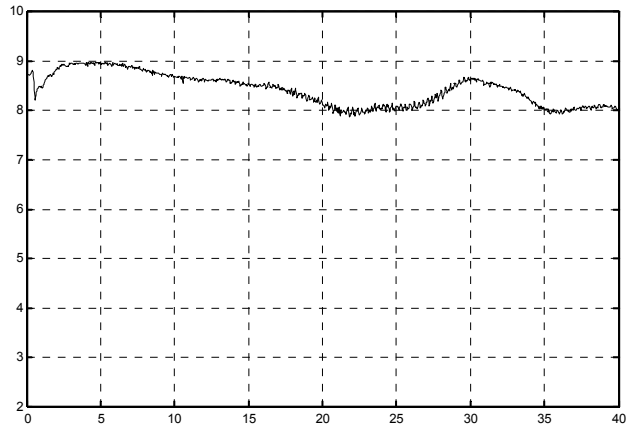
## Typical 40 MHz - 40 GHz Frequency Response



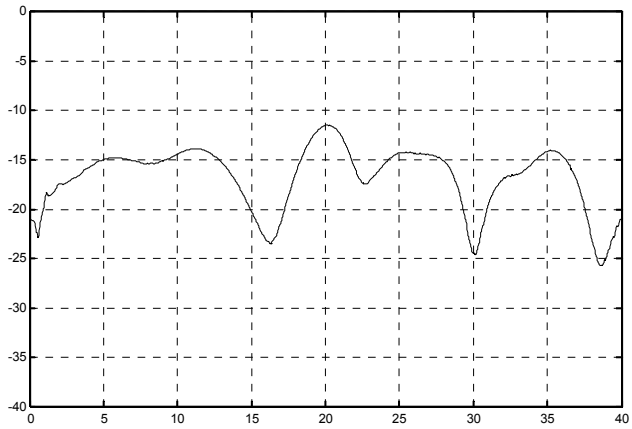

**S11**
5 dB/div, 5 GHz/div




**S12**
10 dB/div, 5 GHz/div



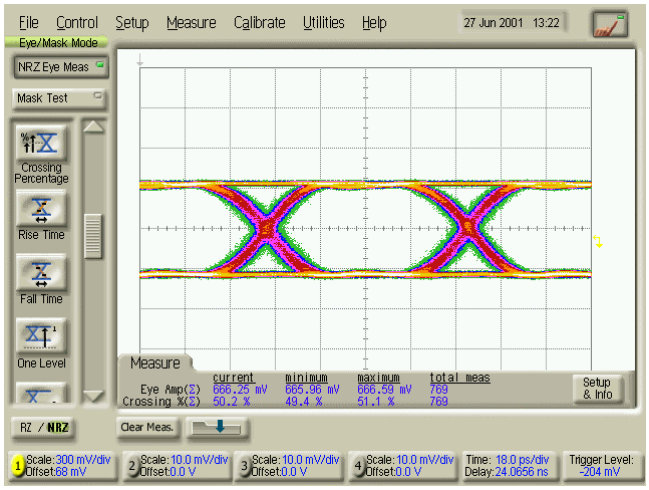

**S21**
1 dB/div, 5 GHz/div




**S22**
5 dB/div, 5 GHz/div

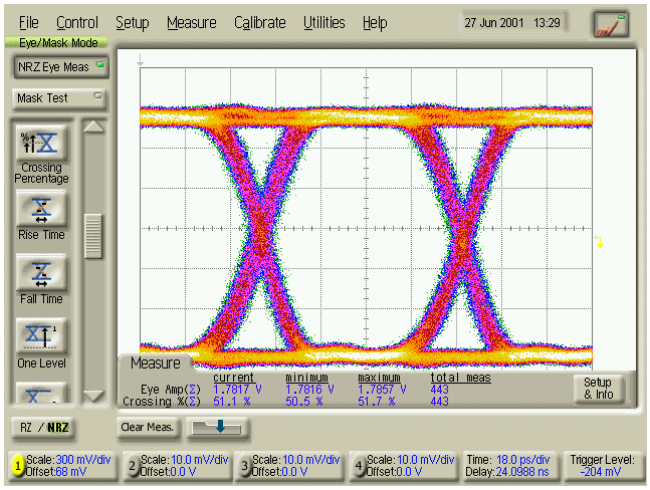
## 12.5 Gb/s Measurements

Measurements made on 50 GHz Agilent 86100A.



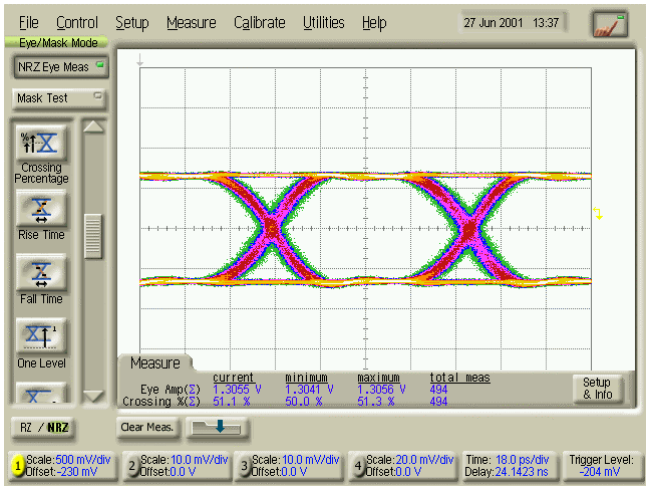

### 0.67 V Input Test Signal

Input signal is NRZ, $2^{31}$-1.
Eye amplitude 0.67 V, 50% crossing point.



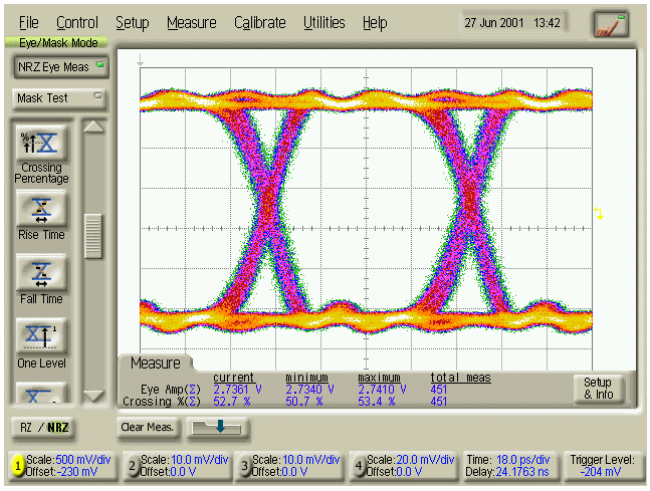

### Output Response to 0.67 V

Amplifier in linear range.
Eye amplitude 1.8 V, 51% crossing point.




### 1.3 V Input Test Signal

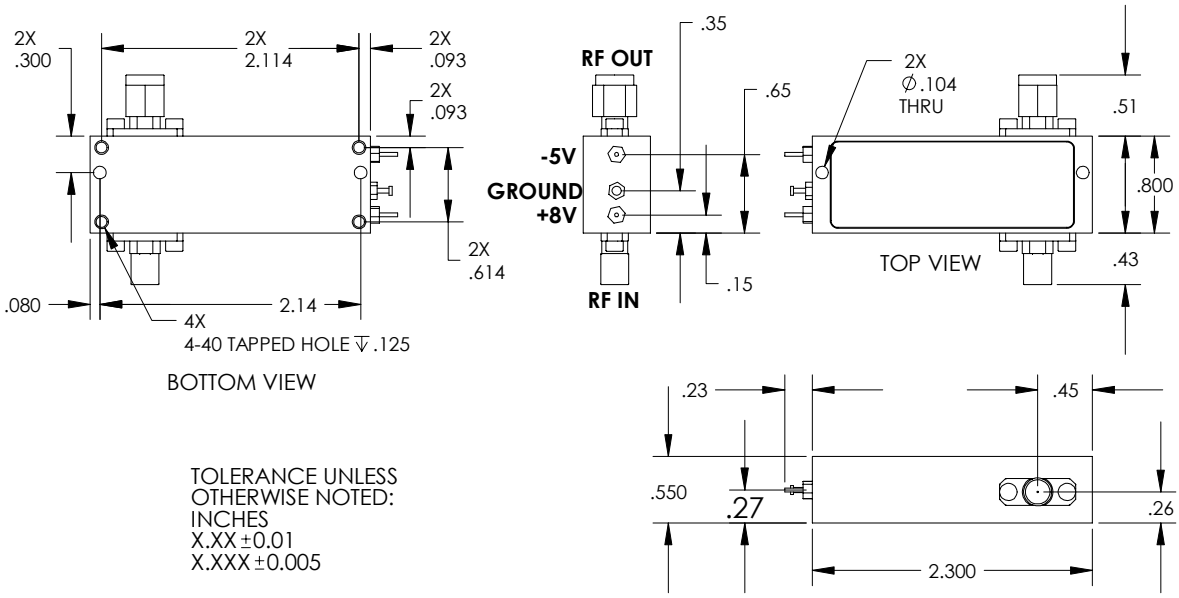
Input signal is NRZ, $2^{31}$-1.
Eye amplitude 1.3 V, 51% crossing point.




### Output Response to 1.3 V

Amplifier in compression (~2dB).
Eye amplitude 2.7 V, 53% crossing point.

## Model 5881 Dimensions




## Ordering Information

Part #: 5881-206

Where 206 denotes connector configuration of RF input 2.4 mm jack, RF output 2.4 mm plug, solder pin DC connections. Other connector configurations (2.4 mm or 2.92 mm) are available upon request.

## Contact Information

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