



CITCRYO4-12B

Cryogenic HEMT Low Noise Amplifier

KEY FEATURES

- Very low noise, average 4K, over 4 to 12 GHz
- Operates with wide range of DC supply voltage
- Provides usable gain and noise at DC power as low as 4 mW
- Input/Output return loss is <-10 dB

PERFORMANCE FEATURES

- RF Freq 4 to 12 GHz
- Gain 35 dB $\pm$ 2 dB
- Average noise temperature 4 Kelvin
- Average noise Figure 0.07 dB

APPLICATIONS

- ✓ Radio astronomy arrays
- ✓ Satellite and Space Communication
- ✓ Research & development
- ✓ Quantum computing



Description

CMT's new enhanced cryogenic low noise amplifier, the CITCRYO4-12B, has been designed to meet the requirements for quantum applications.

A SUBSTANTIAL ADVANCEMENT

- The CITCRYO4-12B can achieve a noise temperature of 4 K through a 4 to 8 GHz frequency band.
- Its lowest noise temperature measured is 2.5K with a gain of 35 dB at 4 GHz. This is a substantial advancement from the original CMT's CITCRYO4-12A.
- In its standard configuration, it comes with female SMA connectors on the RF-input and output and a 4-pin 2 mm pitch header for the DC. The amplifier requires three (3) separate DC-voltages. The amplifier is also

LOW POWER CONSUMPTION

- The amplifier can achieve a very low power consumption as low as 4 mW with a noise temperature of less than 6 K from 4 to 6 GHz.
- Its input return loss is less than 10 dB throughout this frequency band.

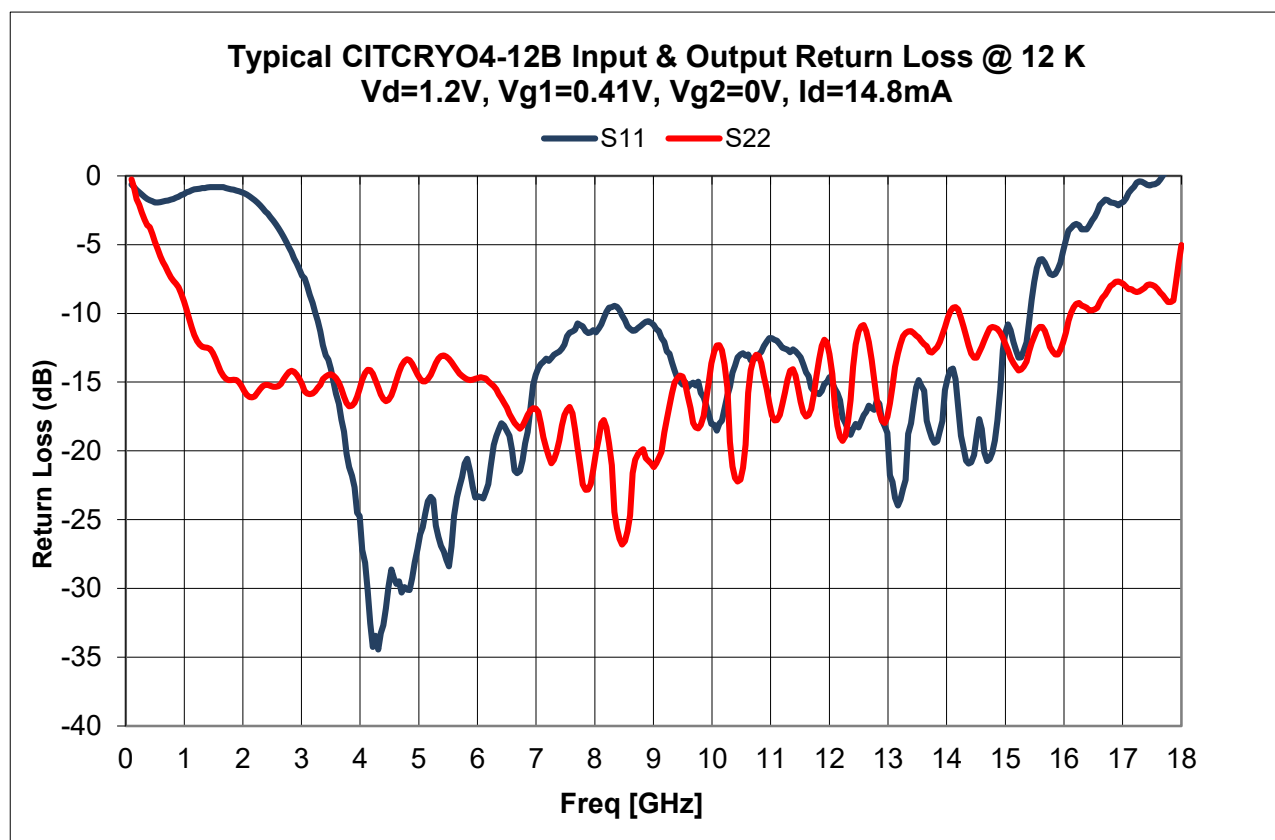
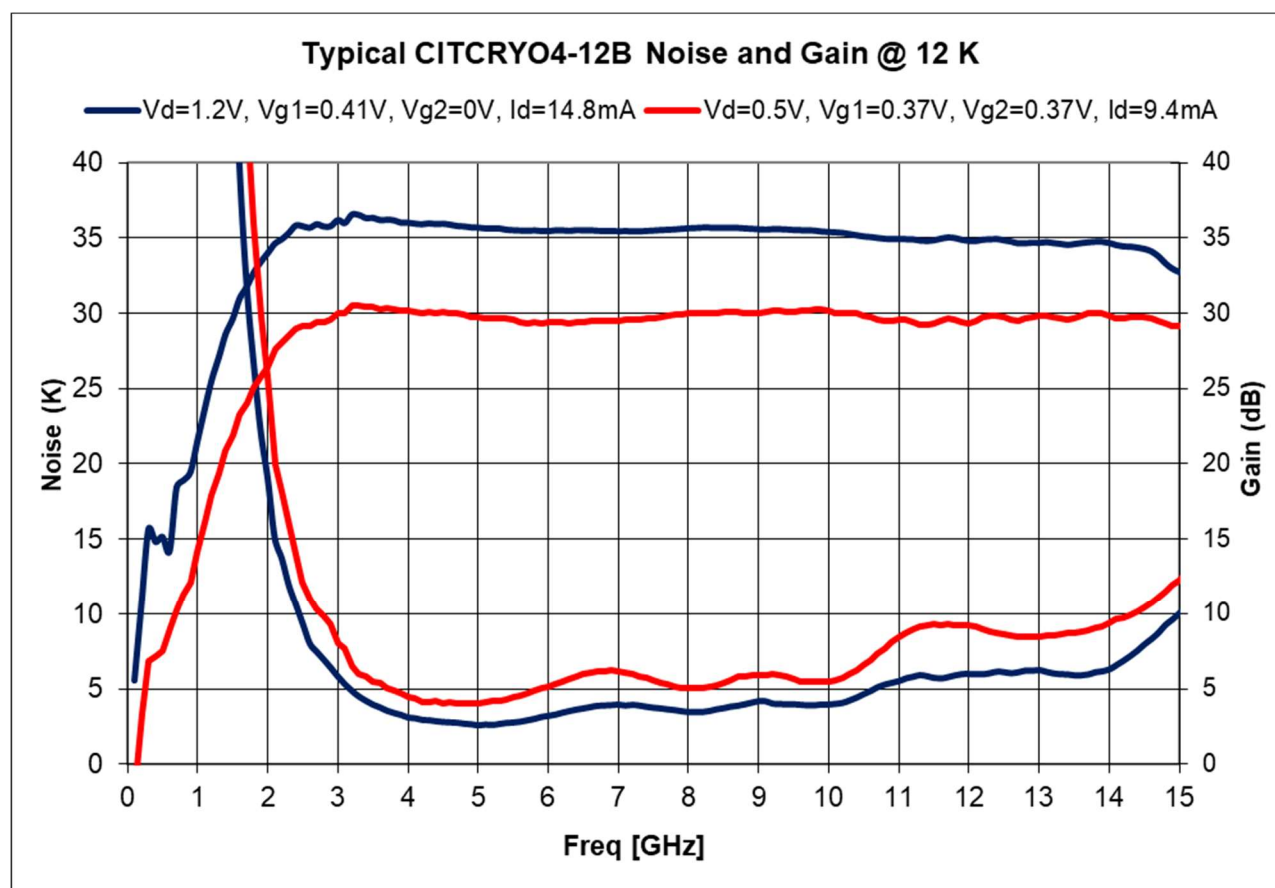
Electrical Specifications @ 12 K

Description	Typical	Minimum	Maximum
RF Frequency		4 GHz	12 GHz
Gain	35 dB	35 dB $\pm$ 2 dB	
Noise Temperature	4 K		
IRL (-20log S ₁₁)		< -10 dB	
ORL (-20log S ₂₂)		< -10 dB	
Drain Voltage	1.2 V	0.6 V	1.5 V

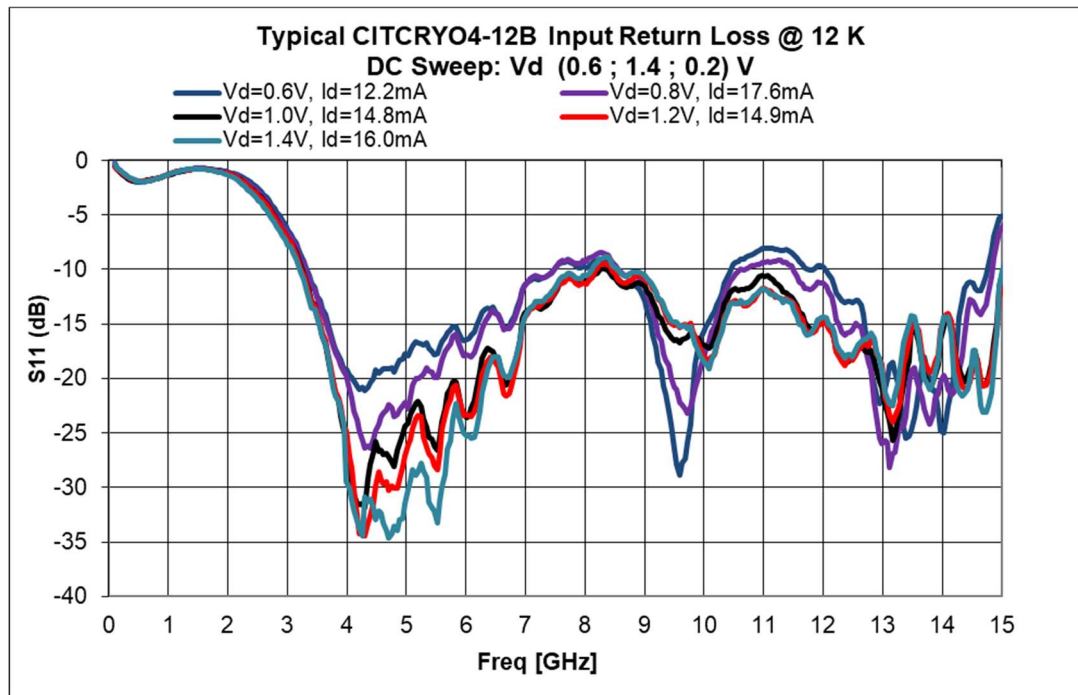
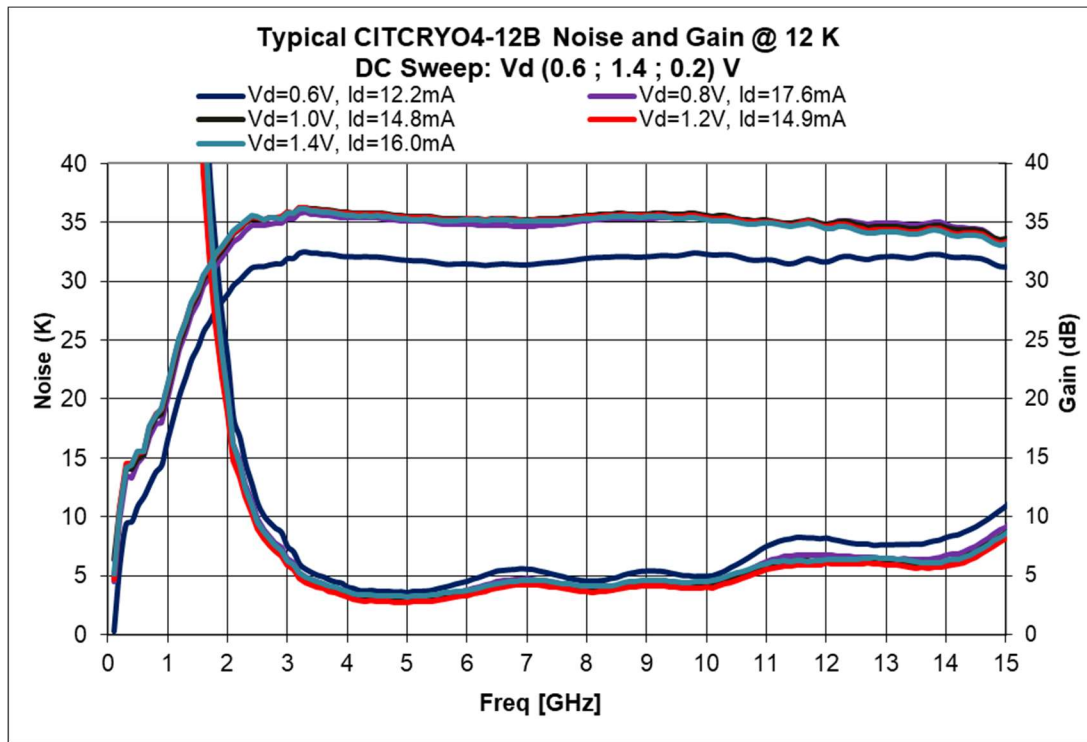
Electrical Specifications @ 300 K

Description	Typical	Minimum	Maximum
RF Frequency		4 GHz	12 GHz
Gain	35 dB	35 dB $\pm$ 2 dB	
Noise Temperature	50 K		
IRL (-20log S ₁₁)		< -10 dB	
ORL (-20log S ₂₂)		< -10 dB	
DC Voltage	1.8 V	1.0 V	2.0 V

Typical Test Results – Optimum DC Bias @ 12 K



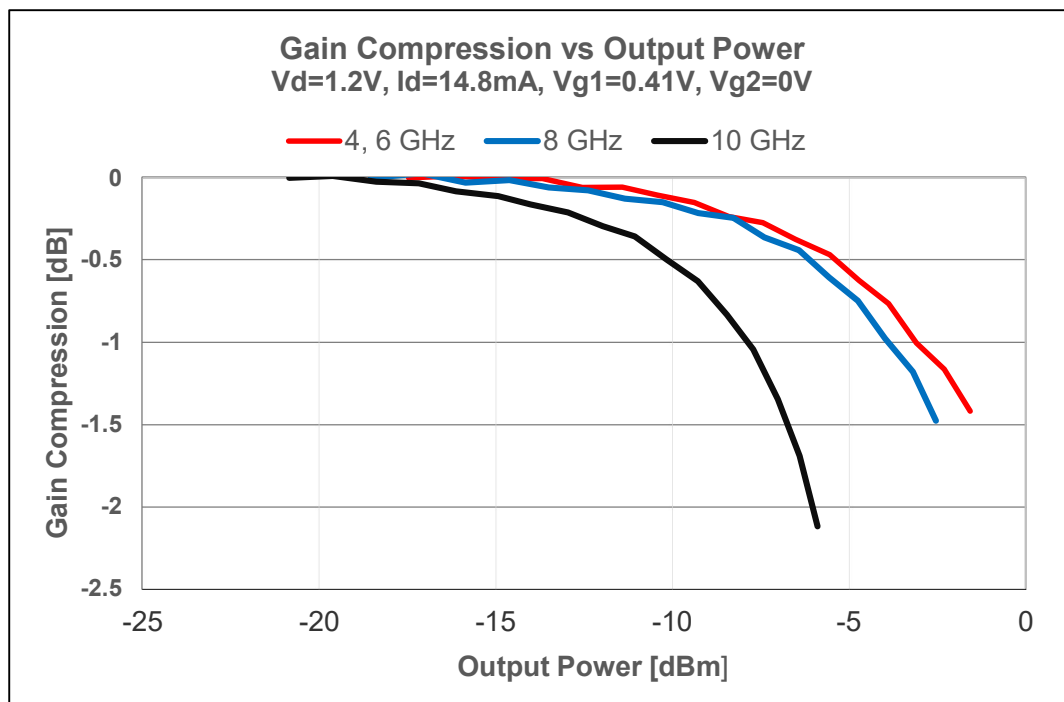
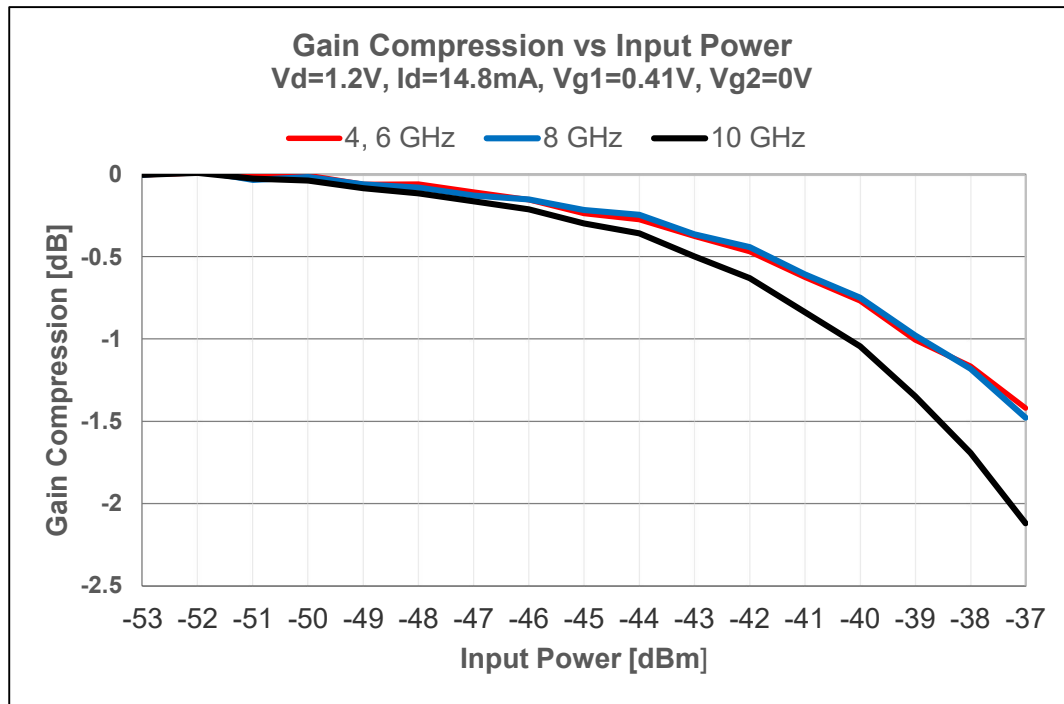
Typical Test Results – DC Bias Sweep @ 12 K

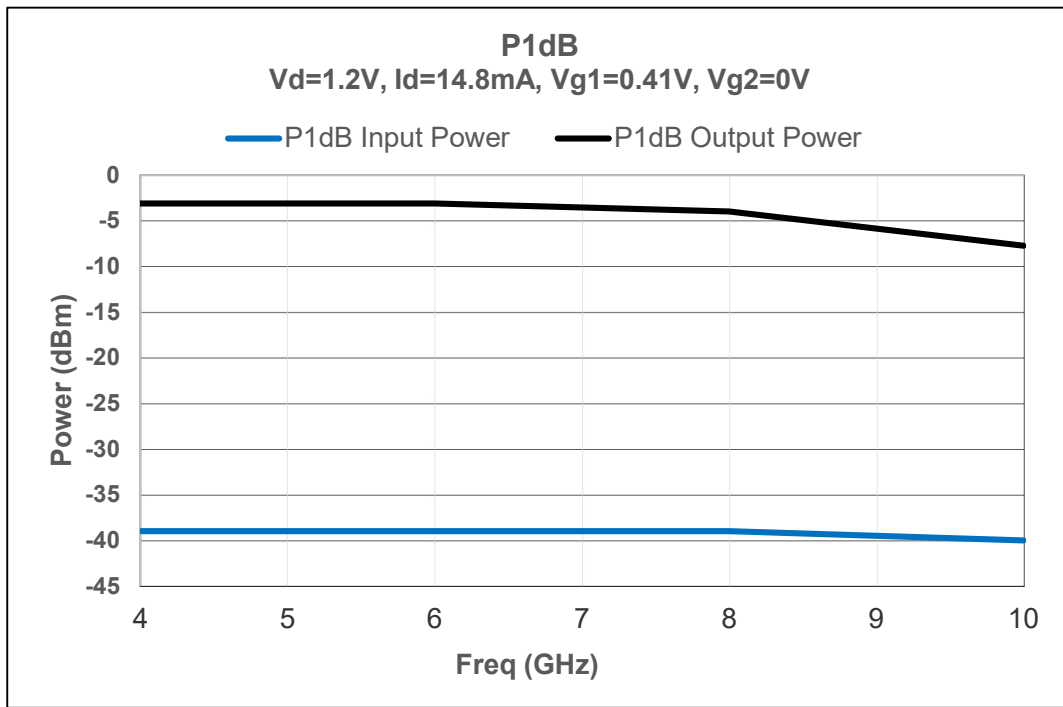


Vd (V)	Vg1 (V)	Vg2 (V)	Id (mA)
0.6	0.37	0.47	12.2
0.8	0.45	0.54	17.6
1.0	0.51	0.23	14.8
1.2	0.41	0.00	14.9
1.4	0.54	-0.14	16.0

Typical Test Results – Gain Compression, P1dB

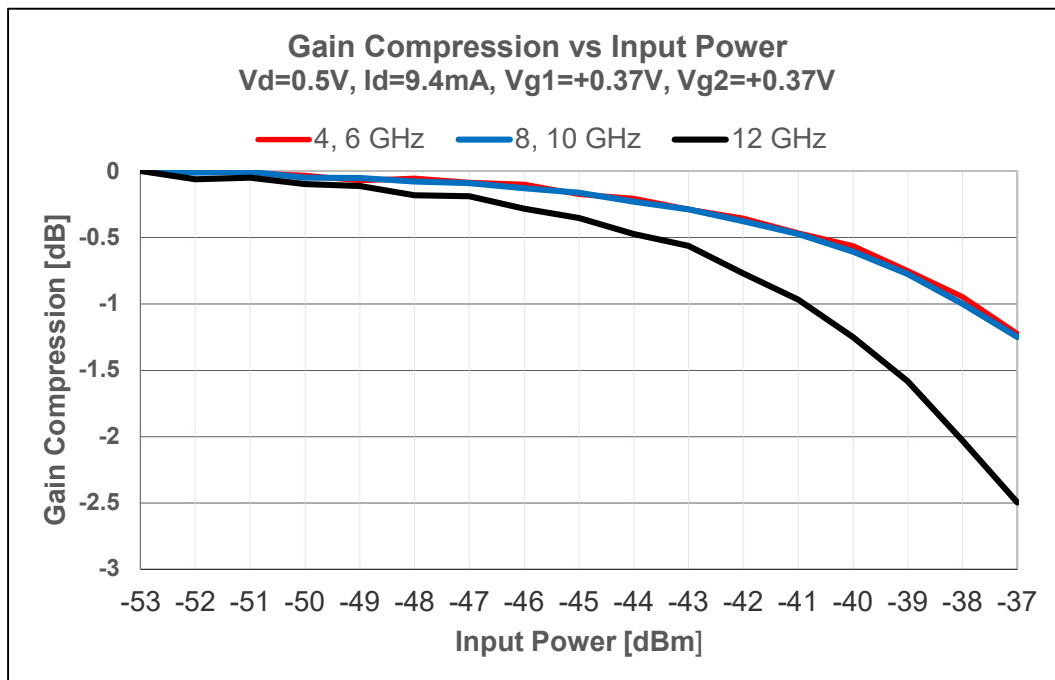
$V_d=1.2V$, $T_c=12K$

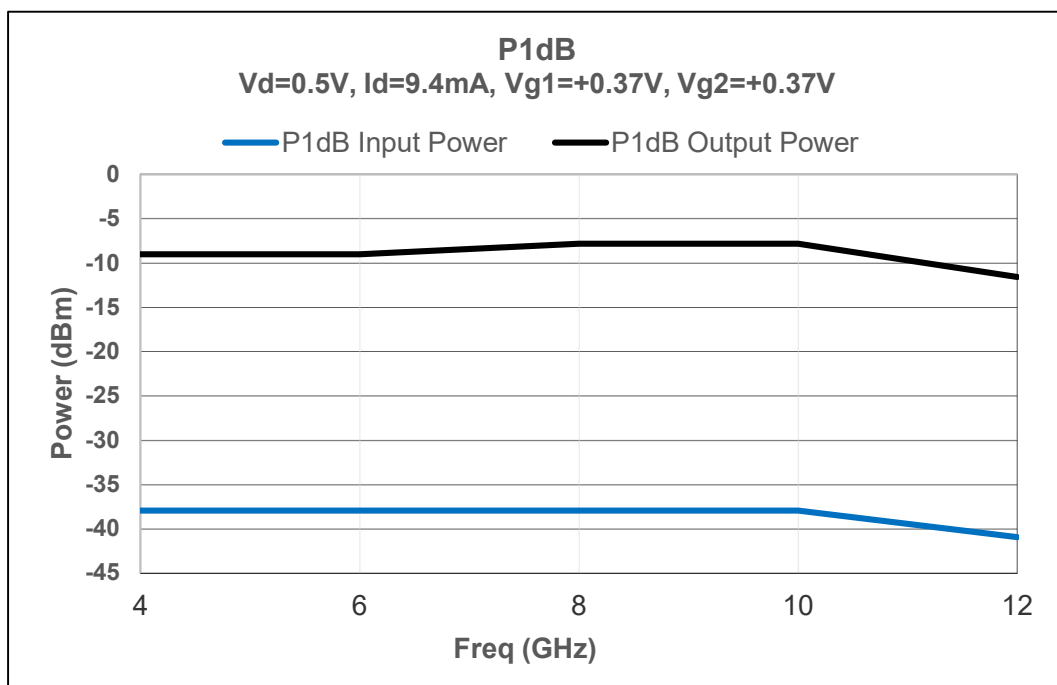
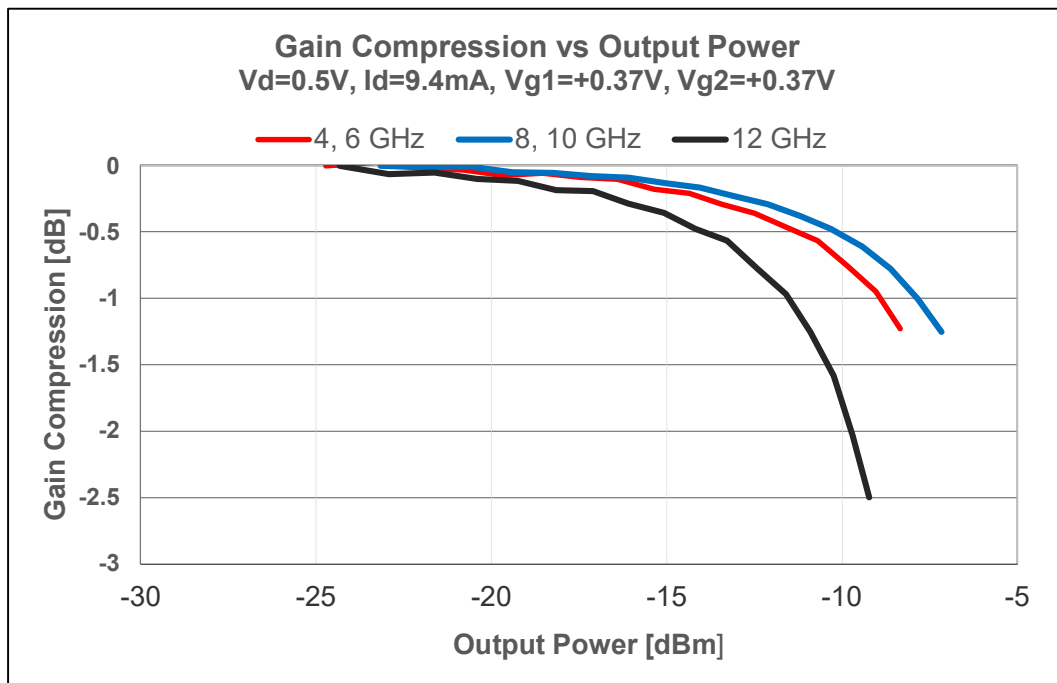




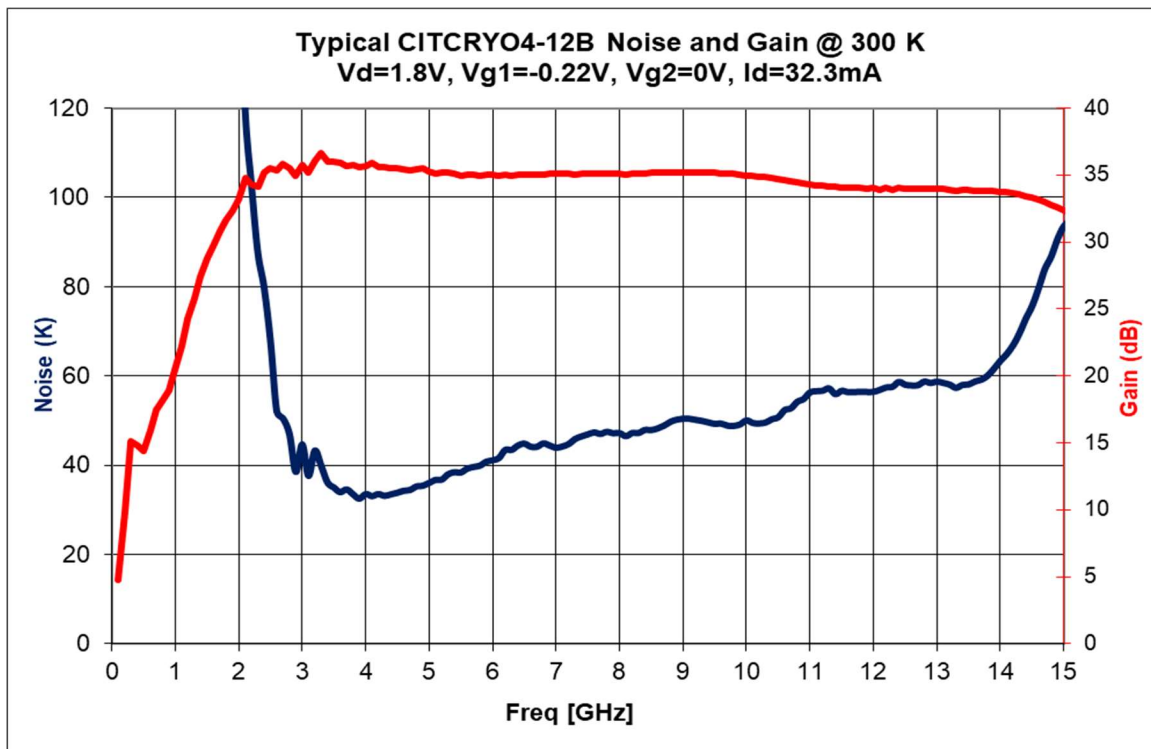
Typical Test Results – Gain Compression, P1dB

Vd=0.5V, Tc=12K

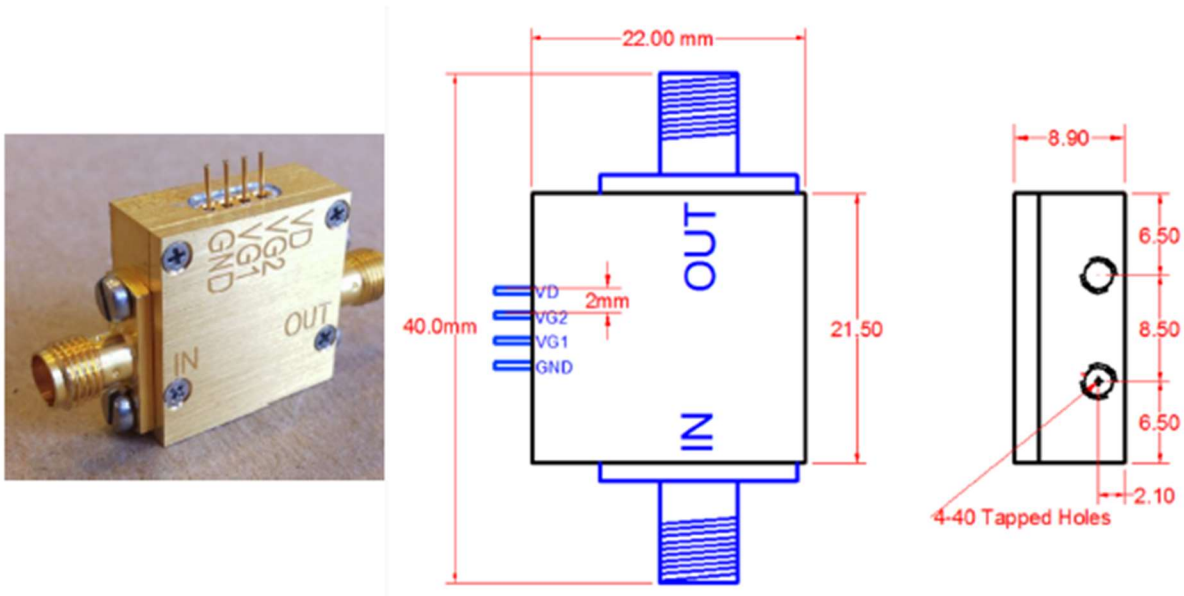




Typical Test Results – Optimum DC Bias @ 300 K



CAD Housing Drawing



*Dimensions are in mm

Product Care and Maintenance

- Use care to not bend (and break) the DC bias pin when tightening the output SMA connector.
- The amplifier should not be connected to the power supply when connecting the input connector.
- Set the power of Port 1 in your VNA to be less than -45 dB when testing the amplifier. Otherwise, the amplifier may saturate, and the data obtained will be incorrect.
- Do not attempt to open the amplifier.
- Electrostatic discharge may damage the amplifier

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