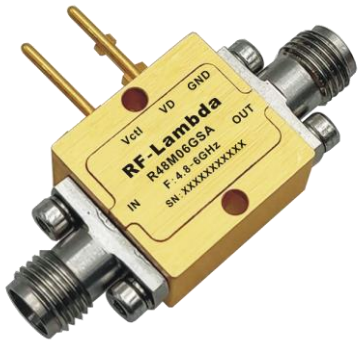
Low Noise Amplifier with Bypass 4.8GHz-6GHz



Product Description

R48M06GSA is a low noise amplifier with a frequency range of 4.8 to 6GHz.

The power output of this amplifier is 25dBm typical. The typical gain is 15dB with a flatness of ±0.5dB.

The working temperature of this product is between - 40℃ and + 85℃.

Features

- Low Noise Amplifier
- Gain 15dB Typical
- Output Saturation Power 25dBm Typical
- Supply Voltage +3VDC/+5VDC
- 50 Ohm Matched Input/Output
- Low Noise Figure +1.5dB Typical
- Gain Flatness ±0.5/dB

Typical Applications

- Wireless Infrastructure
- Military and Aerospace Applications
- Test Instrumentation
- Radar Systems
- 5G Wireless Communications
- Microwave Radio Systems
- TR Modules
- Research and Development
- Cellular Base Stations

Electrical Specifications (T_A=+25ºC)

Parameter		VD = +3V						VD = +5V						
		LNA Mode			Bypass Mode			LNA Mode			Bypass Mode			
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range			4.8 - 6.0						4.8 - 6.0					GHz
Gain		10	13		-3.2	-2.6		13	15		-3	-2.6		dB
Gain Flatness			±0.5						±0.5					dB
Gain Variation Over Temperature (-40℃~+85℃)			0.026			0.002			0.026			0.002		dB / °C
Noise Figure			1.8	2.1		/			1.6	2.0		/		dB
Input Return Loss			-20	-8		-14			-18	-6		-12		dB
Output Return Loss			-12	-5		-15			-14	-5		-14		dB
Output 1dB Compression Point (P1dB)		7	9			24		11	13			24		dBm
Saturated Output Power (Psat)			9.5			25			13.5			25		dBm
Output Third Order Intercept (OIP3)			21			29			25			29		dBm
Supply Current			20			0.01			48			0.01		mA
Reverse Isolation			-30			/			-32			/		dB
Switching Speed	LNA Mode to Bypass Mode			40					20					ns
	Bypass Mode to LNA Mode					50						60		ns
Weight						0.015 Max								lbs.
Impedance						50								Ohms
Input / Output Connectors						SMA-Female (Input) – SMA-Female (Output)								
Package						Epoxy Sealed (Standard)								
						Hermetically Sealed (Optional)								

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Absolute Maximum Ratings

Parameter	Rating
Operating Voltage	+6VDC
*RF Input Power (RFIN) (VD = +5.0 Vdc)	+15dBm (LNA Mode) +30dBm (Bypass Mode)

Bias Up Procedure

1. Connect Ground Pin
2. Connect input and output
3. Connect +3V/+5V biasing

Bias Down Procedure

1. Turn off +3V/+5V biasing
2. Remove RF connection
3. Remove Ground

Environmental Specifications and Test Standards

Parameter	Description
Operational Temperature	-40ºC to +85ºC (Case Temperature)
Storage Temperature	-50ºC to +105ºC
Thermal Shock	-40ºC → +85ºC (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85ºC for 72 Hours
Shock	1. Weight >20g, 50g half sine wave for 11ms, Speed variation 3.44m/s 2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s 3. Total 18 times (6 directions, 3 repetitions per direction).
Altitude	Standard: 30,000 Ft (Epoxy Sealed Controlled Environment) Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)
Hermetically Sealed (Optional)	MIL-STD-883 (For Hermetically Sealed Units)

*Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.
**For vibration testing details please see additional information section.

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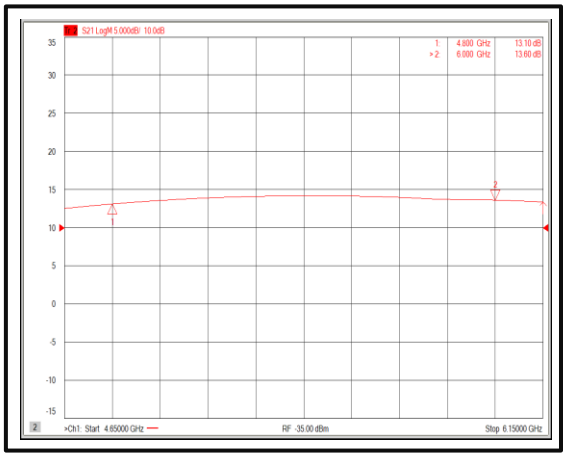
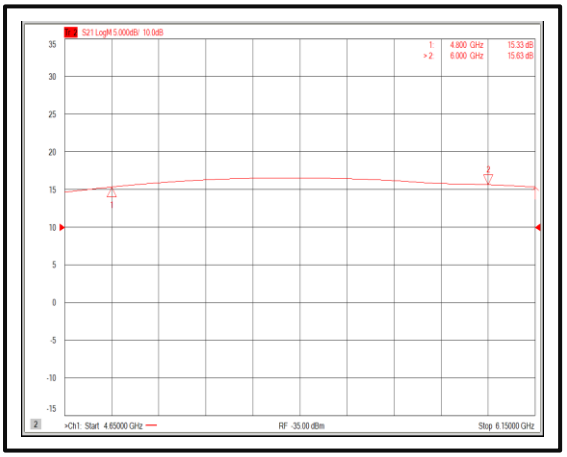
Typical Performance Plots

LNA Broadband

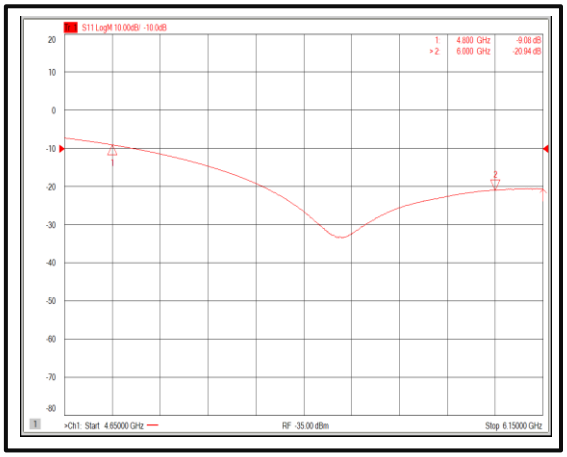
Gain@+25℃ (Vdd=3V)



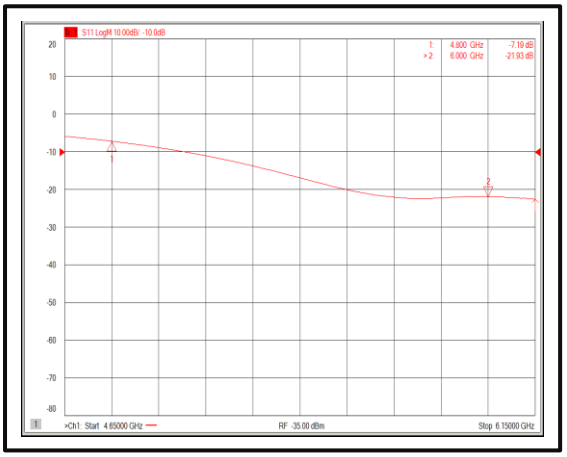
Gain@+25℃ (Vdd=5V)



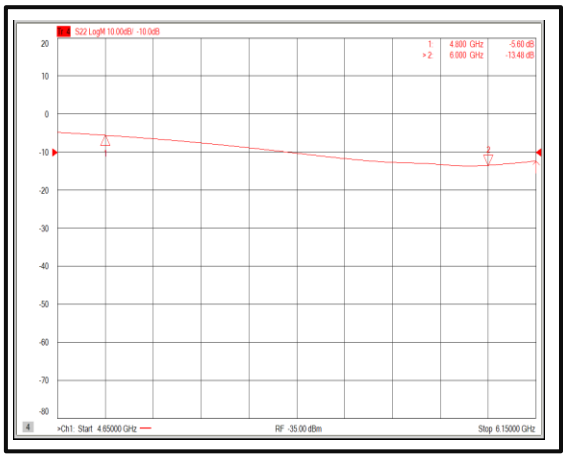
Input Return Loss @+25℃ (Vdd=3V)



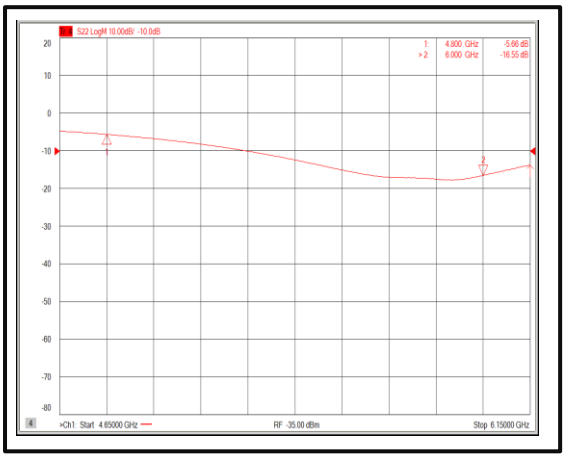
Input Return Loss @+25℃ (Vdd=5V)



Output Return Loss @+25℃ (Vdd=3V)

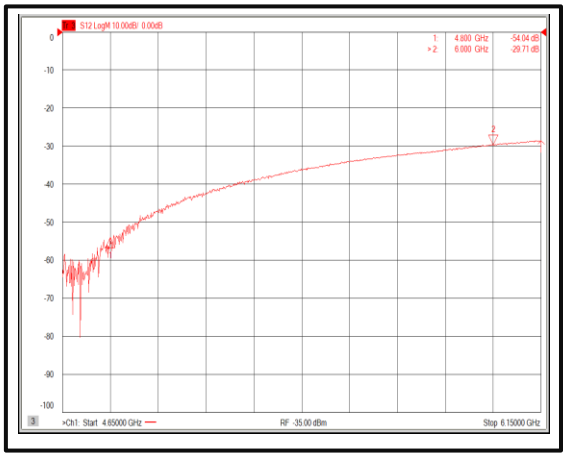


Output Return Loss @+25℃ (Vdd=5V)

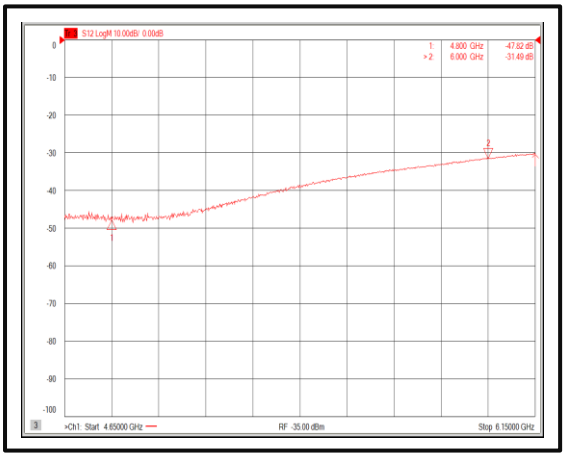


Typical Performance Plots

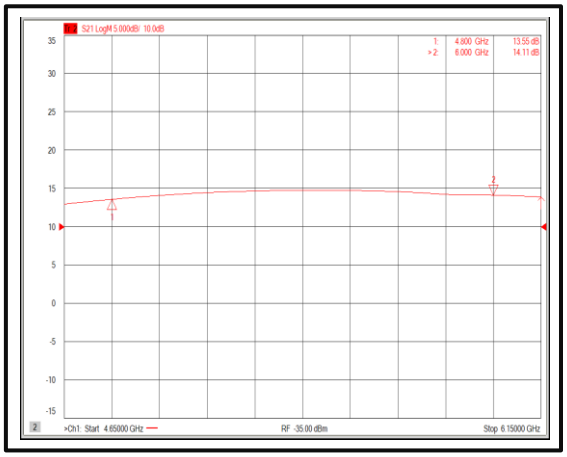
Isolation@+25℃ (Vdd=3V)



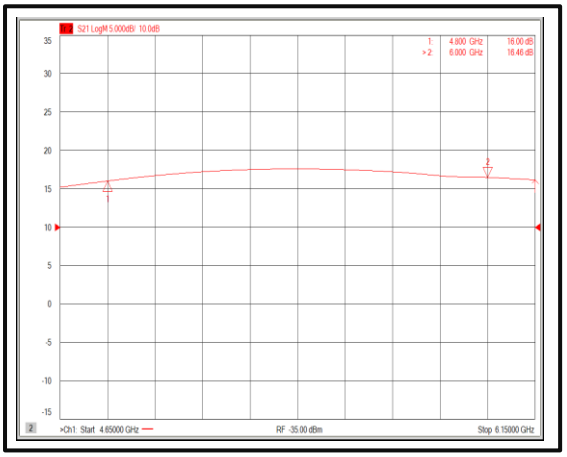
Isolation@+25℃ (Vdd=5V)



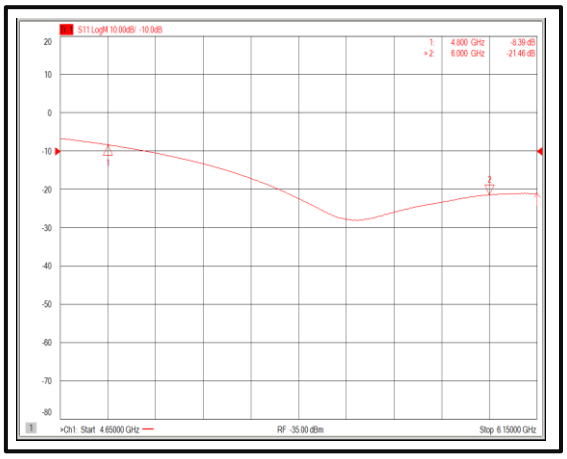
Gain@-40℃ (Vdd=3V)



Gain@-40℃ (Vdd=5V)



Input Return Loss @-40℃ (Vdd=3V)



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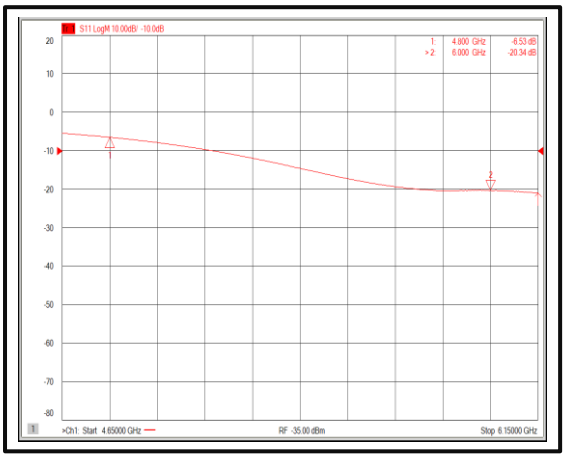
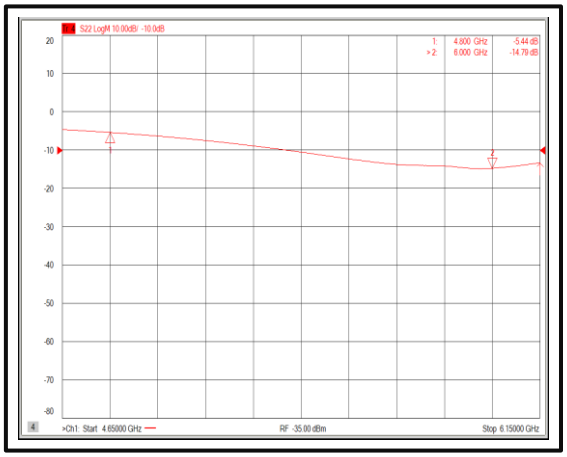


Typical Performance Plots

Output Return Loss @-40℃ (Vdd=3V)



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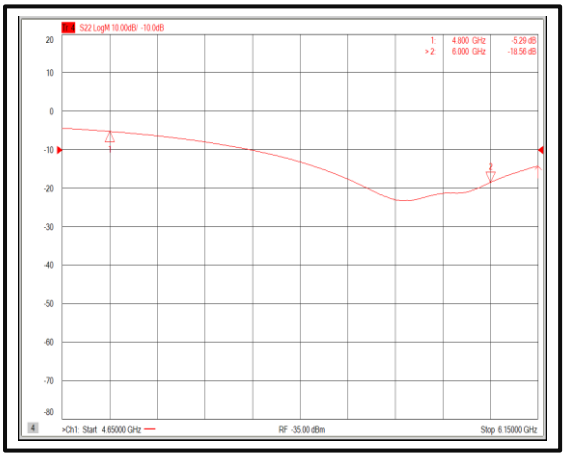
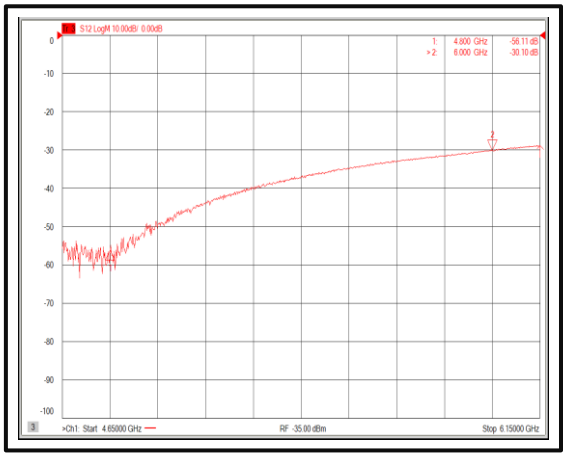


Isolation@-40℃ (Vdd=3V)



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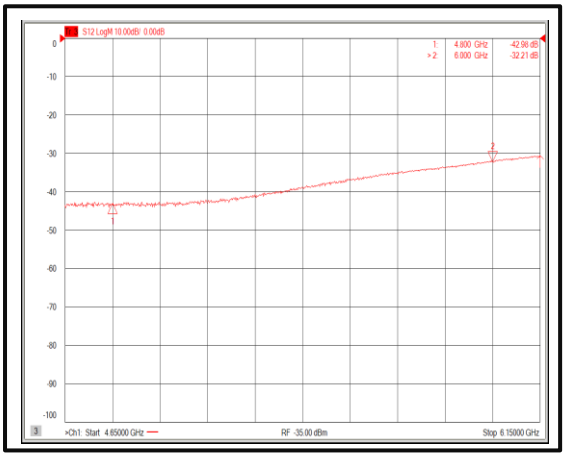
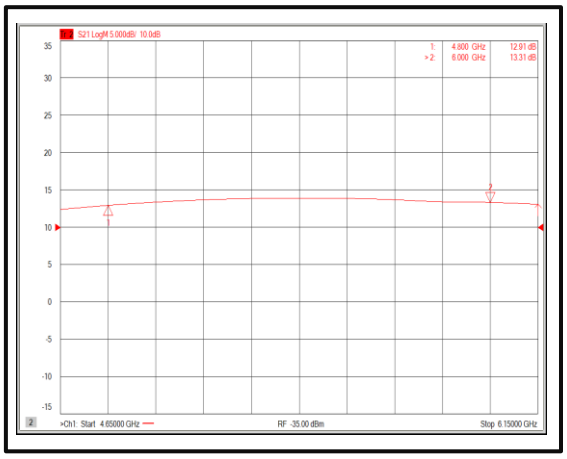
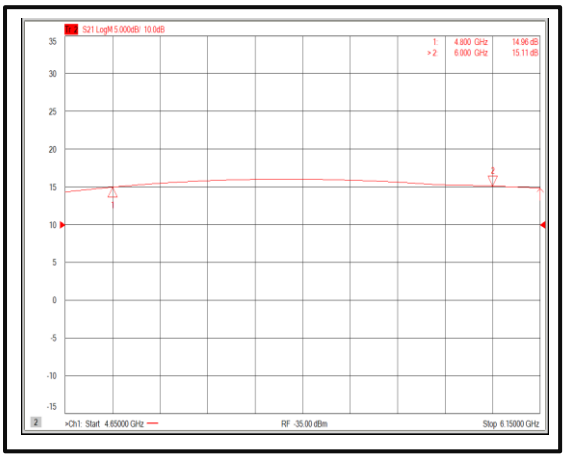


Gain@+85℃ (Vdd=3V)



Gain@+85℃ (Vdd=5V)



Typical Performance Plots

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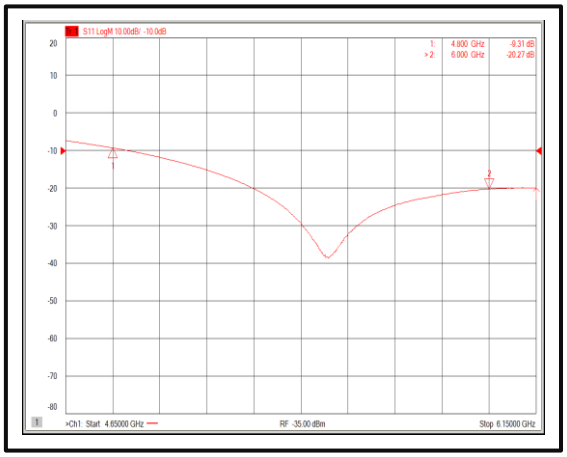
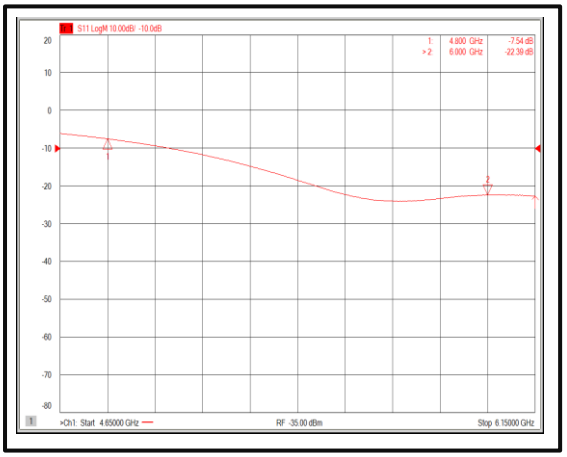


Input Return Loss @+85℃ (Vdd=5V)



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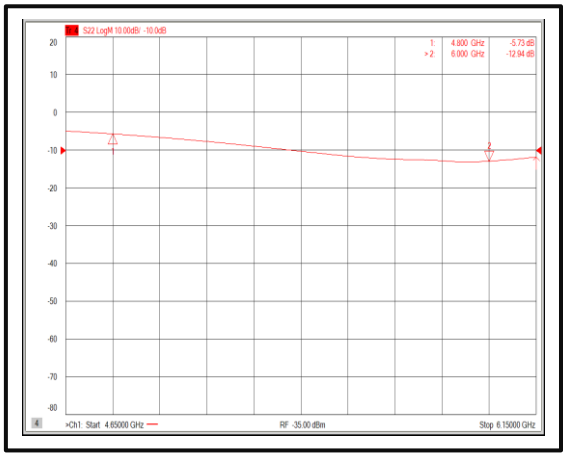

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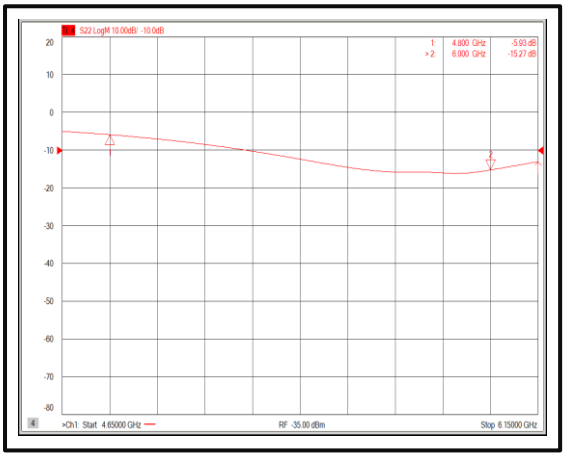

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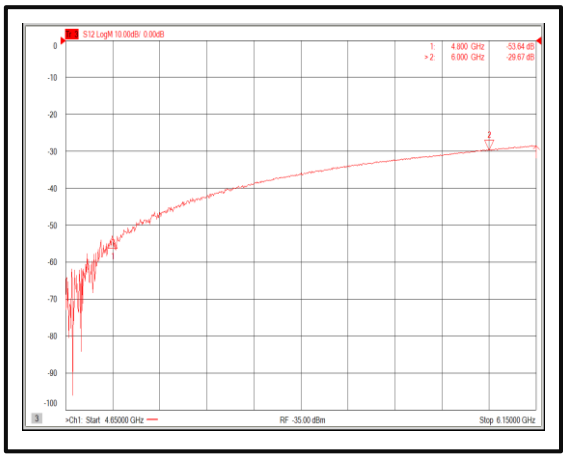

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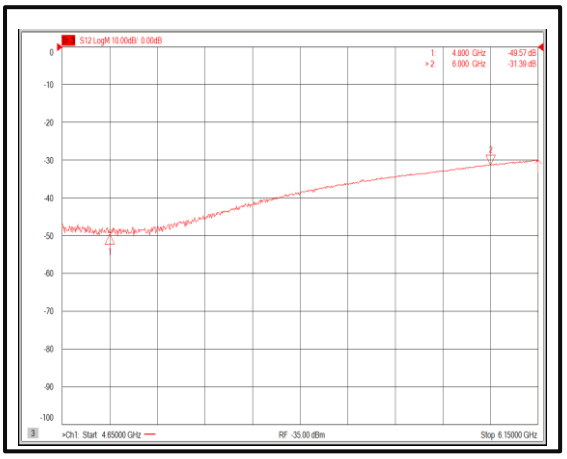
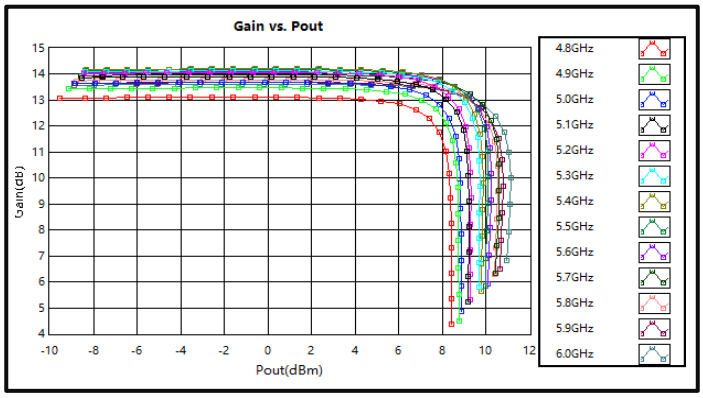
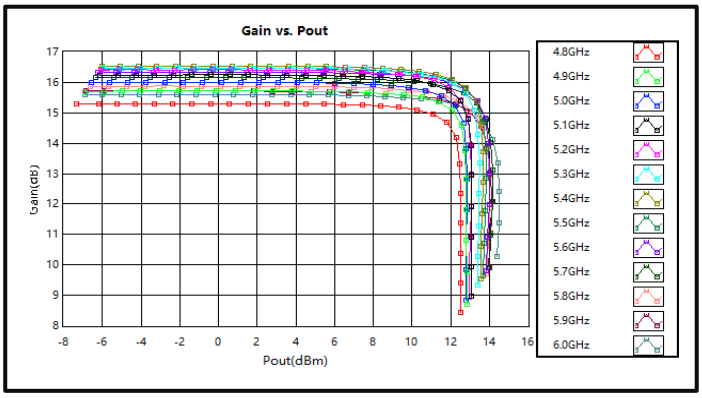


Typical Performance Plots

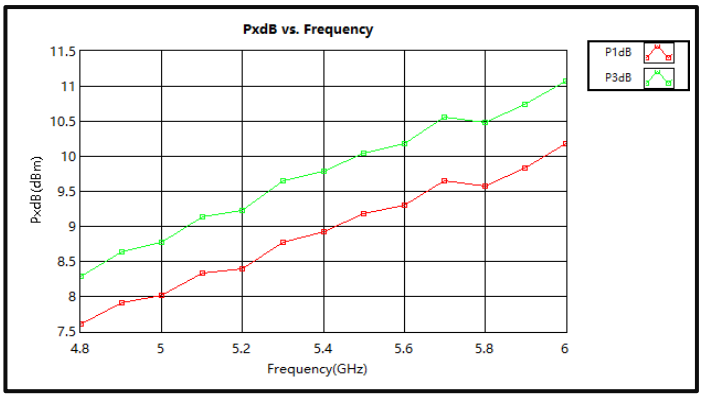
Gain vs. Output Power (Vdd=3V)



Gain vs. Output Power (Vdd=5V)



P1dB & P3dB vs. Frequency (Vdd=3V)



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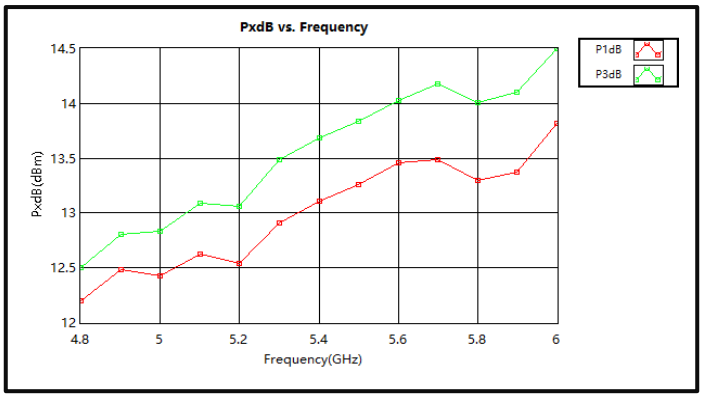
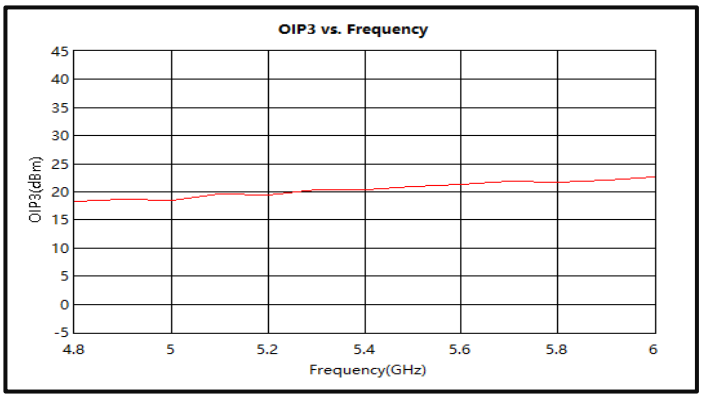


Output Third Order Intercept (OIP3) (Vdd=3V)



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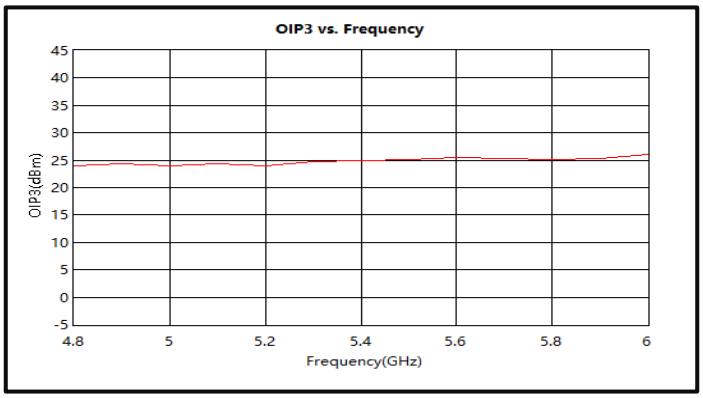
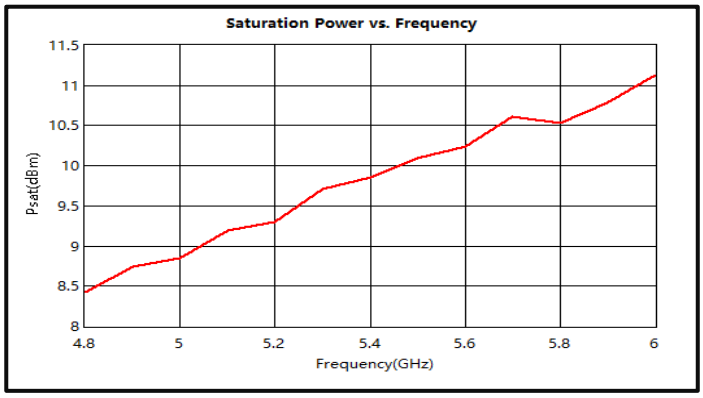
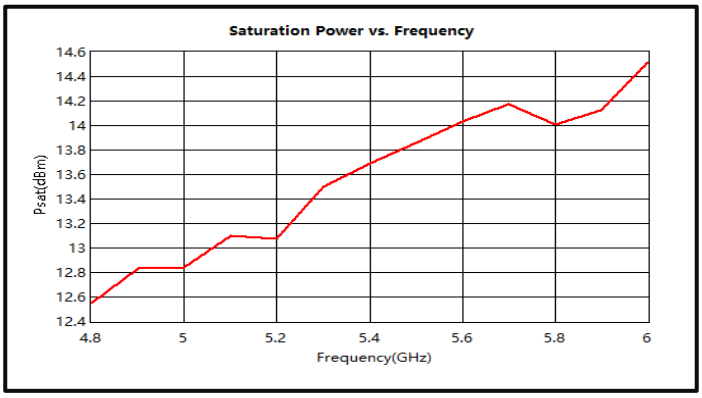


Typical Performance Plots

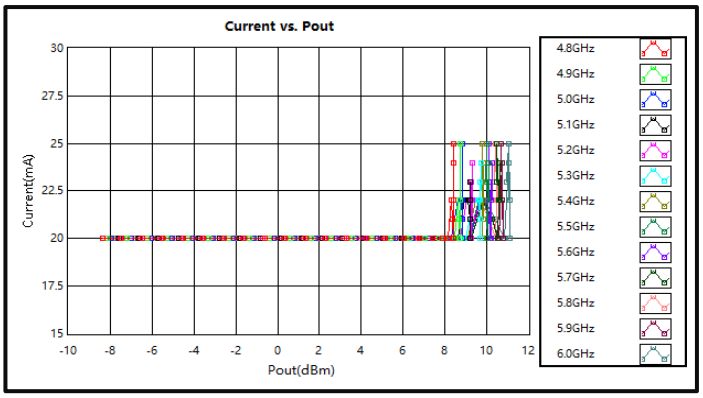
Saturation Power vs. Frequency (Vdd=3V)



Saturation Power vs. Frequency (Vdd=5V)



Current vs. Pout (Vdd=3V)



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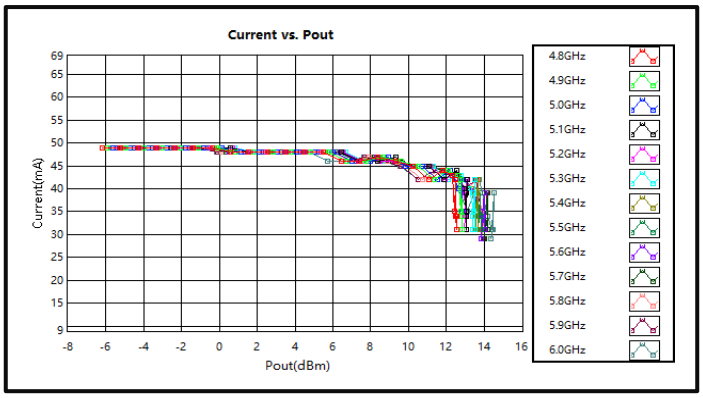
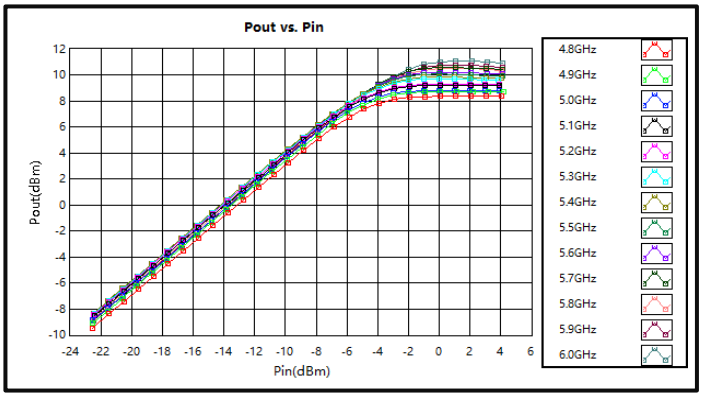
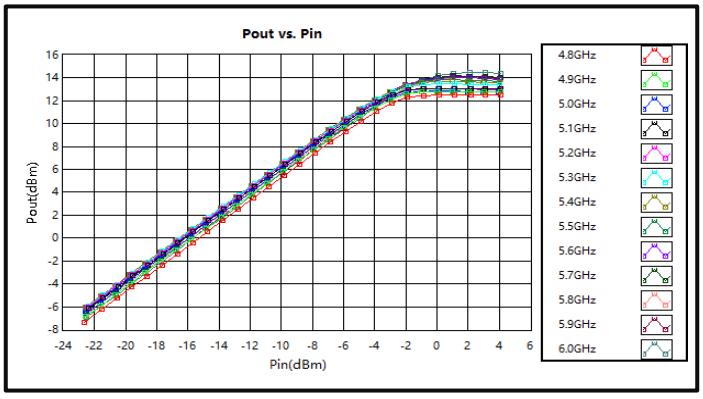


Pout vs. Pin (Vdd=3V)

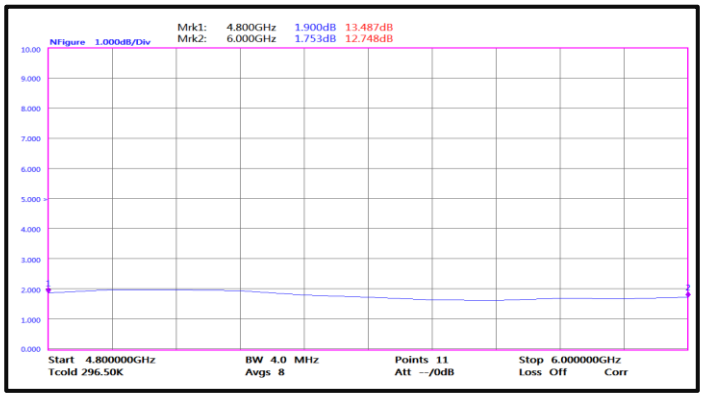


Pout vs. Pin (Vdd=5V)

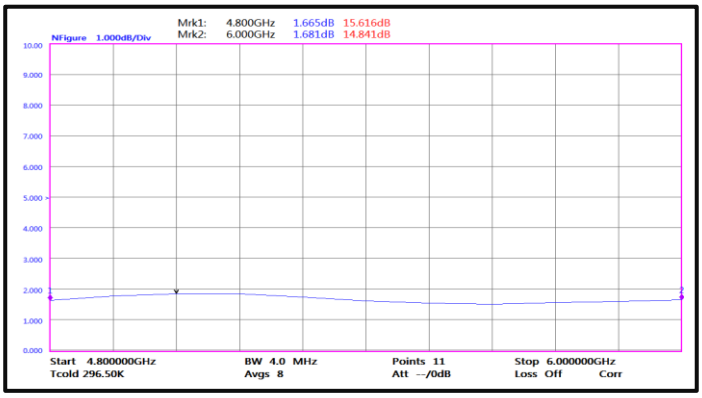


Typical Performance Plots

Noise Figure (Vdd=3V)



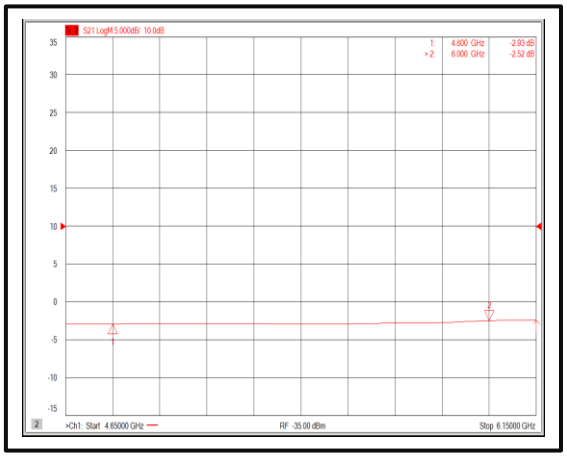
Noise Figure (Vdd=5V)



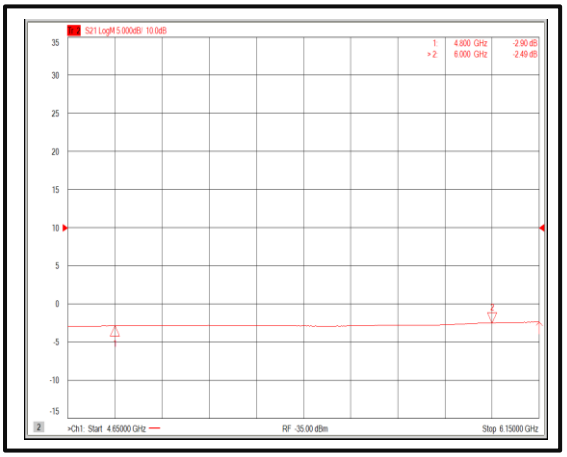
Typical Performance Plots

Bypass Mode

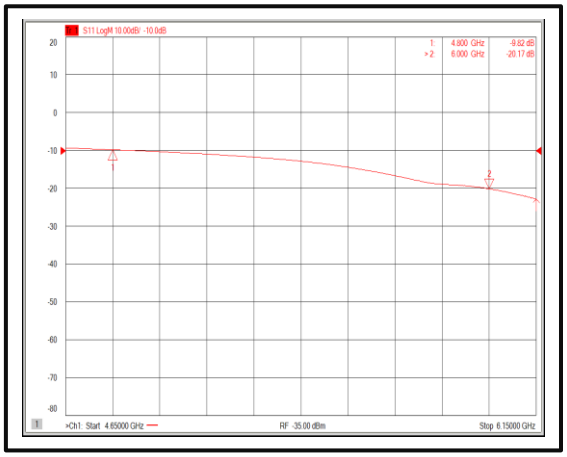
Gain@+25℃ (Vdd=3V)



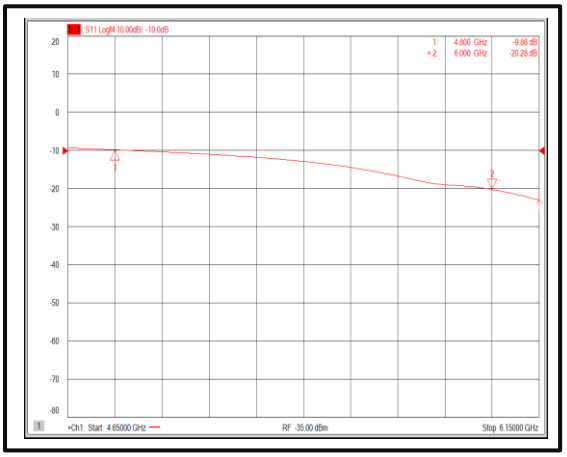
Gain@+25℃ (Vdd=5V)



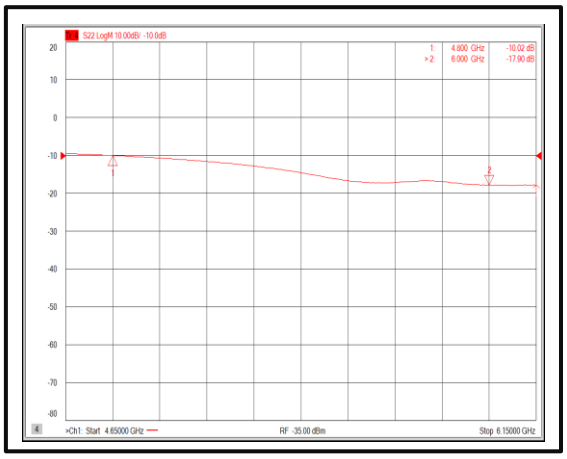
Input Return Loss @+25℃ (Vdd=3V)



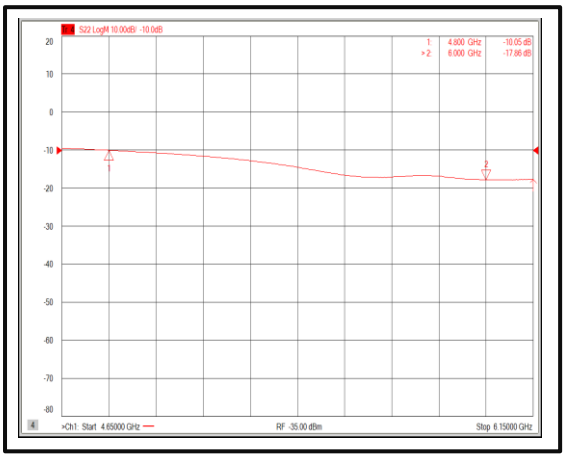
Input Return Loss @+25℃ (Vdd=5V)



Output Return Loss @+25℃ (Vdd=3V)

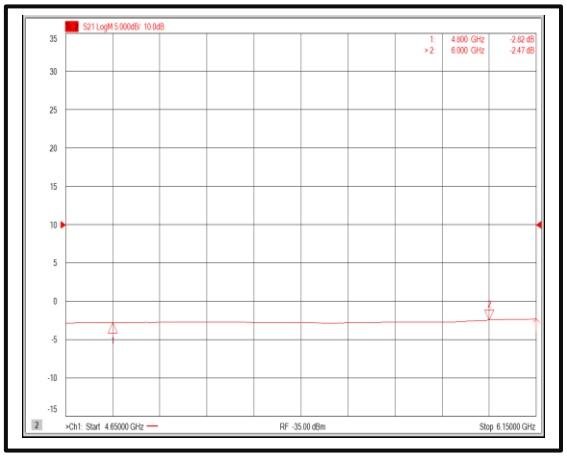


Output Return Loss @+25℃ (Vdd=5V)

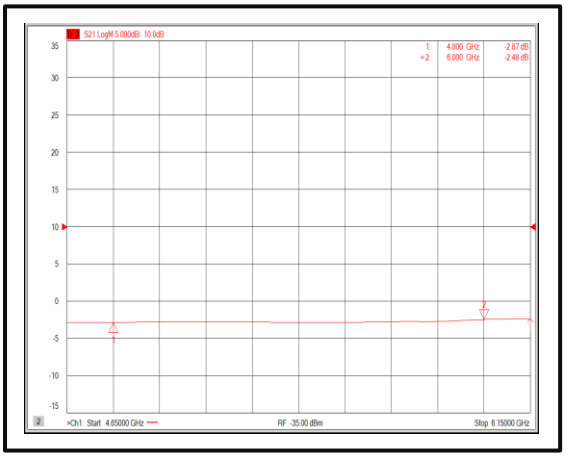


Typical Performance Plots

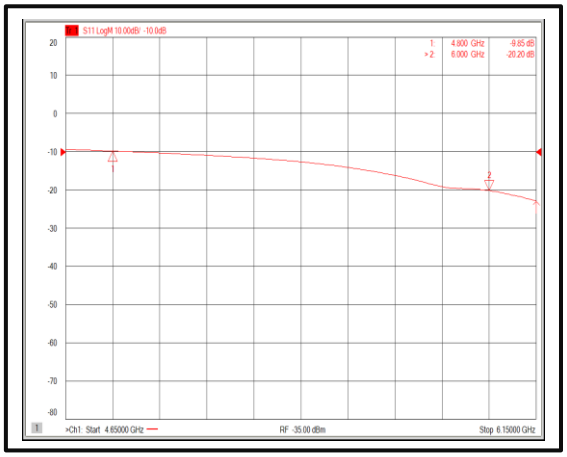
Gain@-40℃ (Vdd=3V)



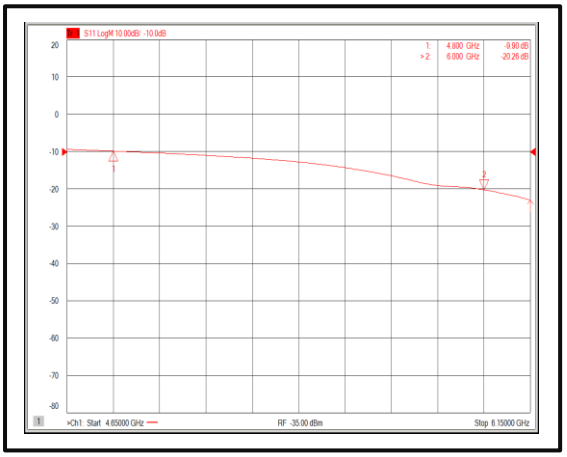
Gain@-40℃ (Vdd=5V)



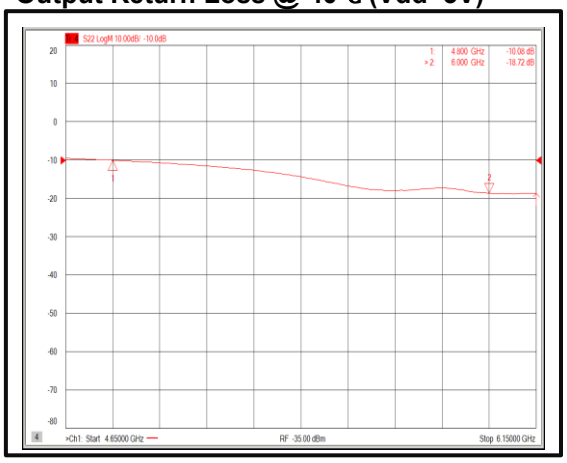
Input Return Loss @-40℃ (Vdd=3V)



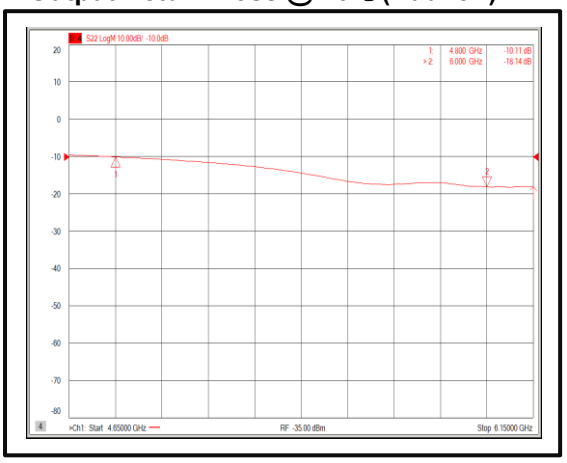
Input Return Loss @-40℃ (Vdd=5V)



Output Return Loss @-40℃ (Vdd=3V)

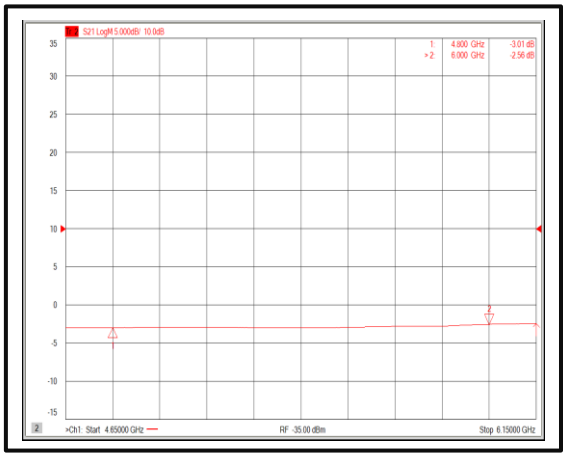


Output Return Loss @-40℃ (Vdd=5V)

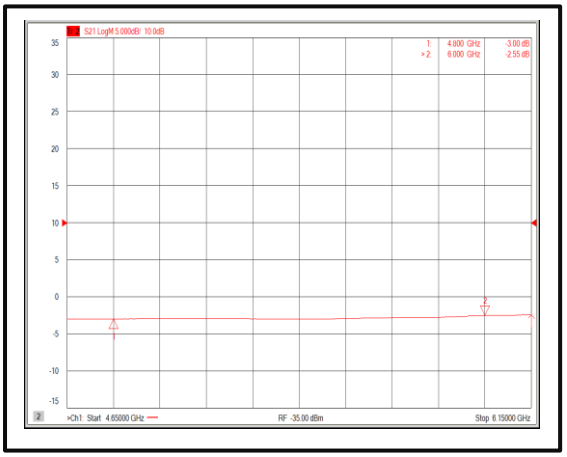


Typical Performance Plots

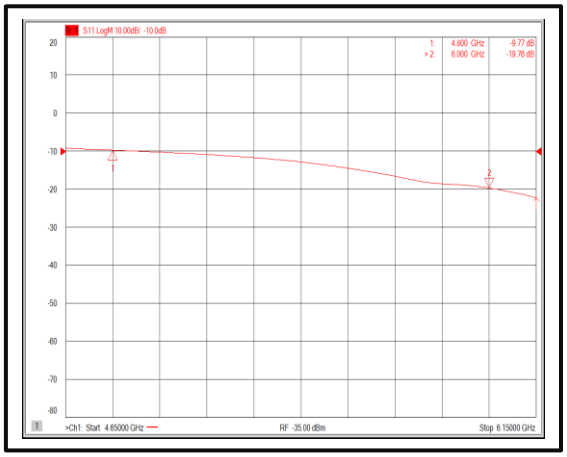
Gain@+85℃ (Vdd=3V)



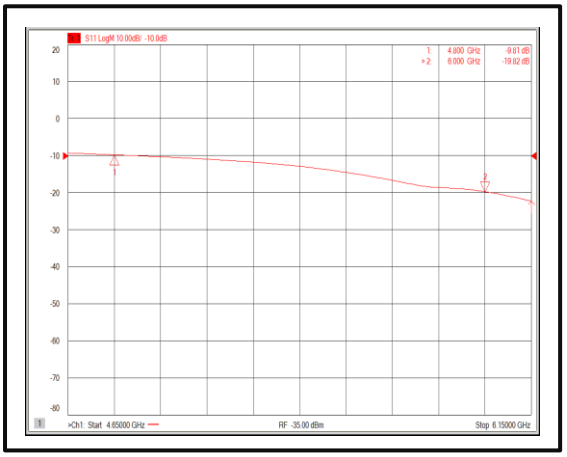
Gain@+85℃ (Vdd=5V)



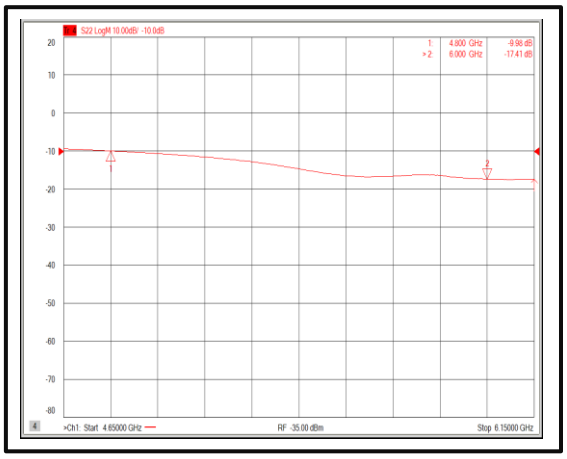
Input Return Loss @+85℃ (Vdd=3V)



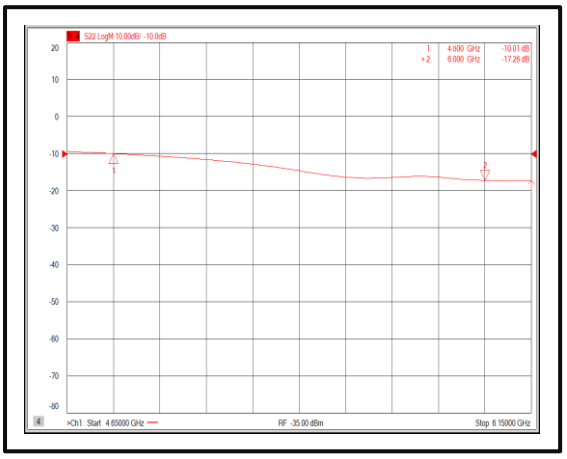
Input Return Loss @+85℃ (Vdd=5V)



Output Return Loss @+85℃ (Vdd=3V)

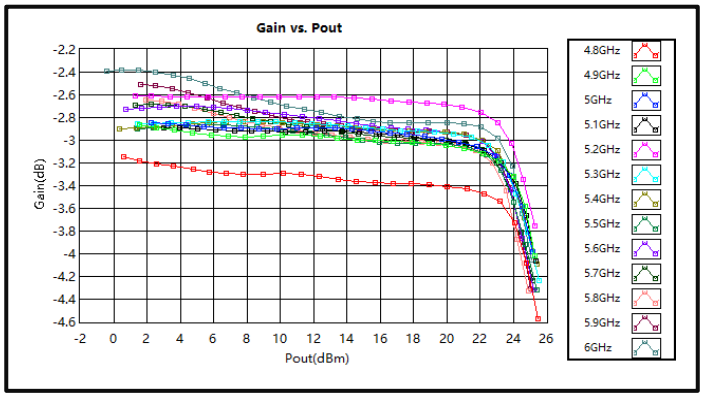


Output Return Loss @+85℃ (Vdd=5V)

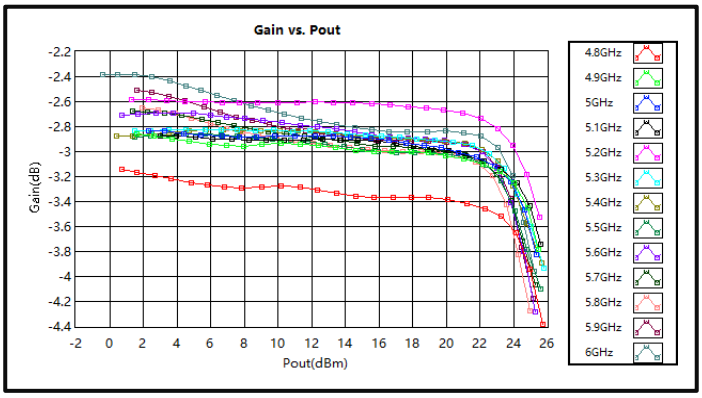


Typical Performance Plots

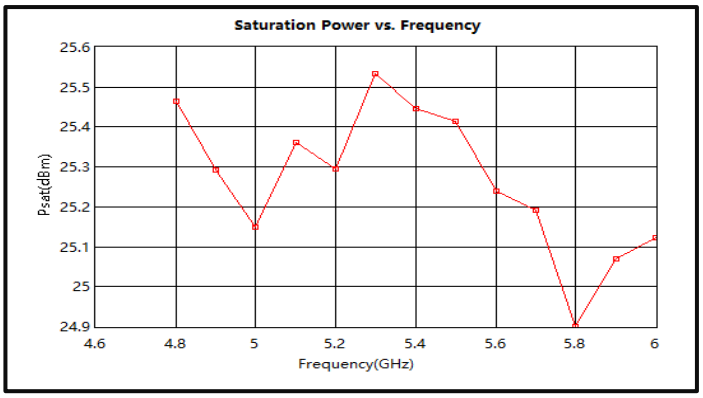
Gain vs. Output Power (Vdd=3V)



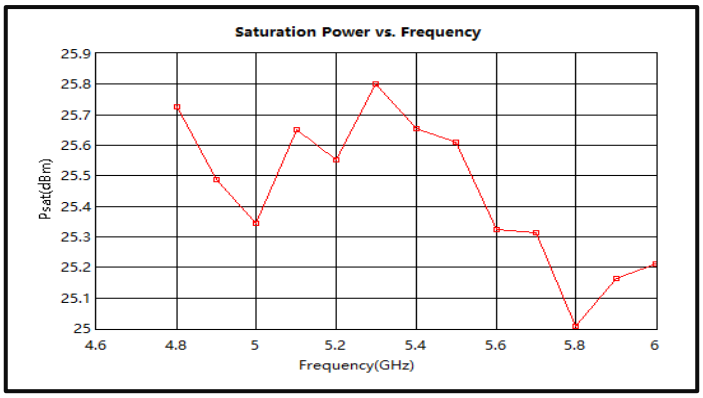
Gain vs. Output Power (Vdd=5V)



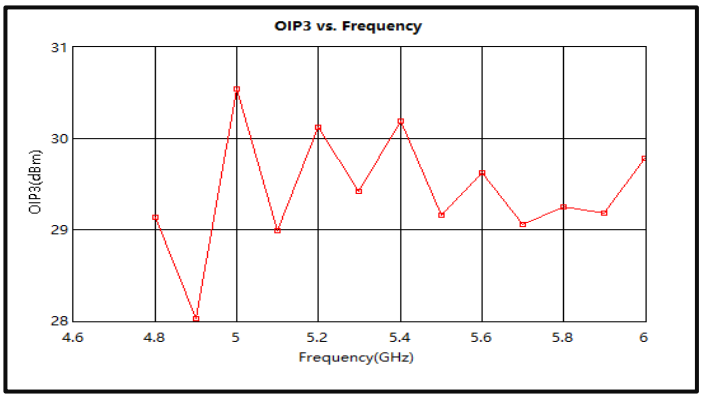
Saturation Power vs. Frequency (Vdd=3V)



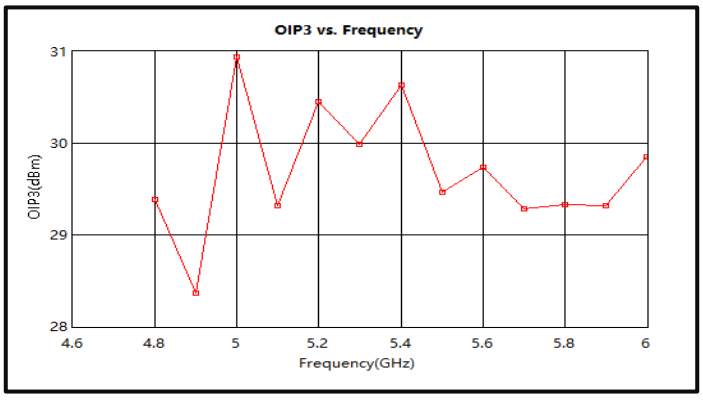
Saturation Power vs. Frequency (Vdd=5V)



Output Third Order Intercept (OIP3) (Vdd=3V)

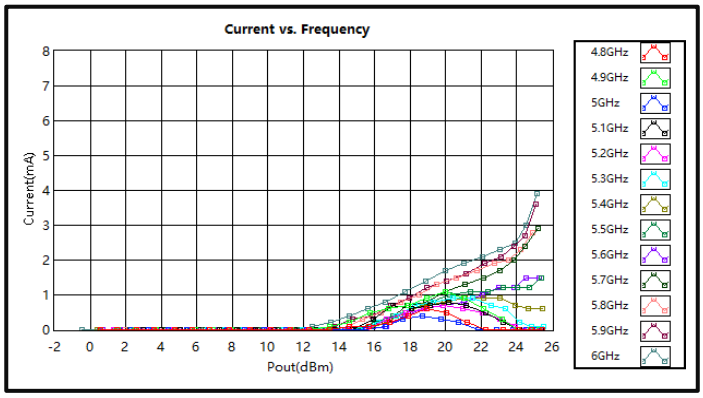


Output Third Order Intercept (OIP3) (Vdd=5V)

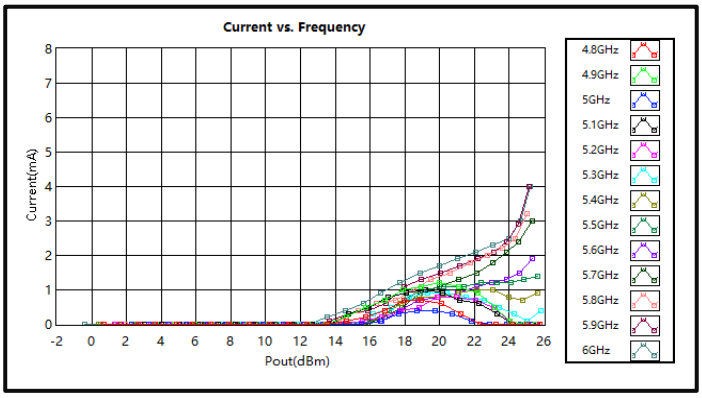


Typical Performance Plots

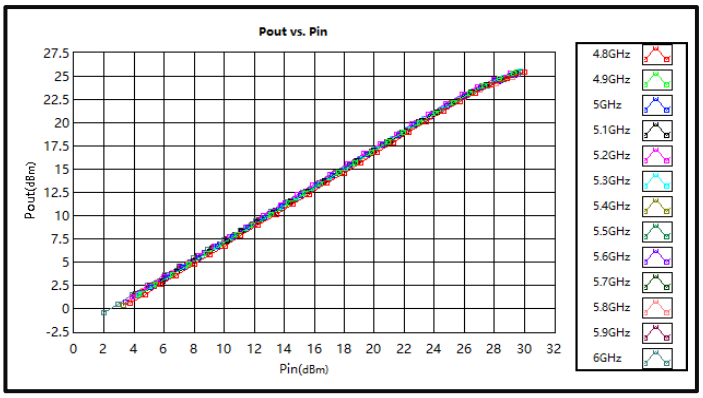
Current vs. Pout (Vdd=3V)



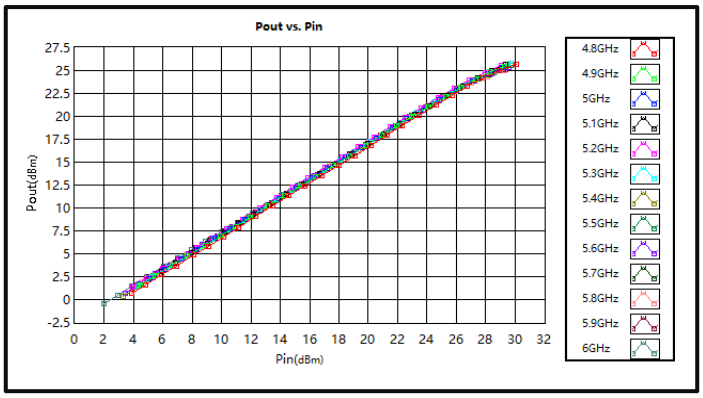
Current vs. Pout (Vdd=5V)



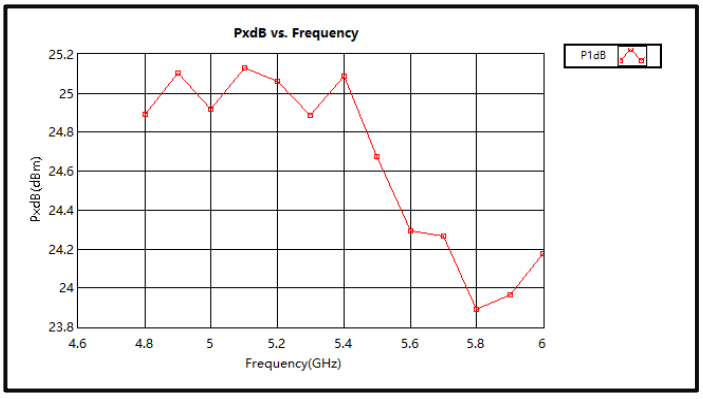
Pout vs. Pin (Vdd=3V)



Pout vs. Pin (Vdd=5V)

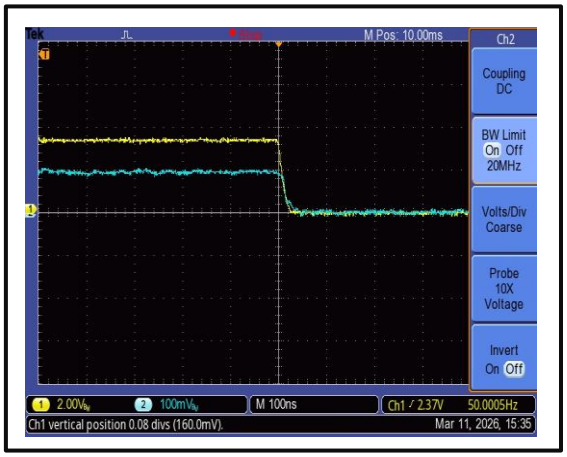


P1dB vs. Frequency (Vdd=3V)

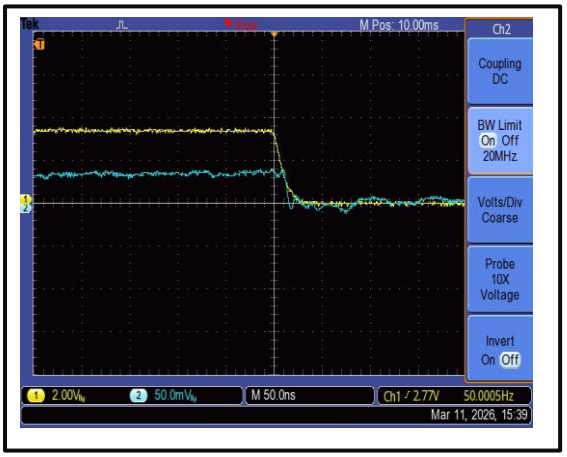


Typical Performance Plots

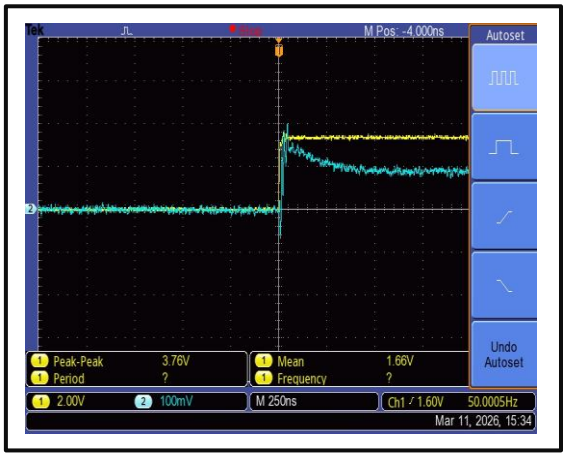
Speed (Vdd=3V)



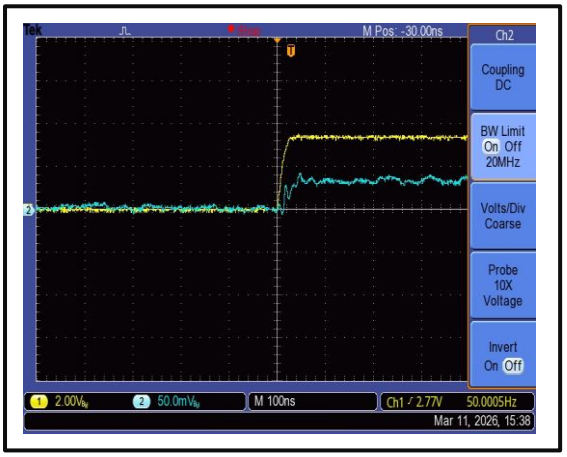
Speed (Vdd=5V)



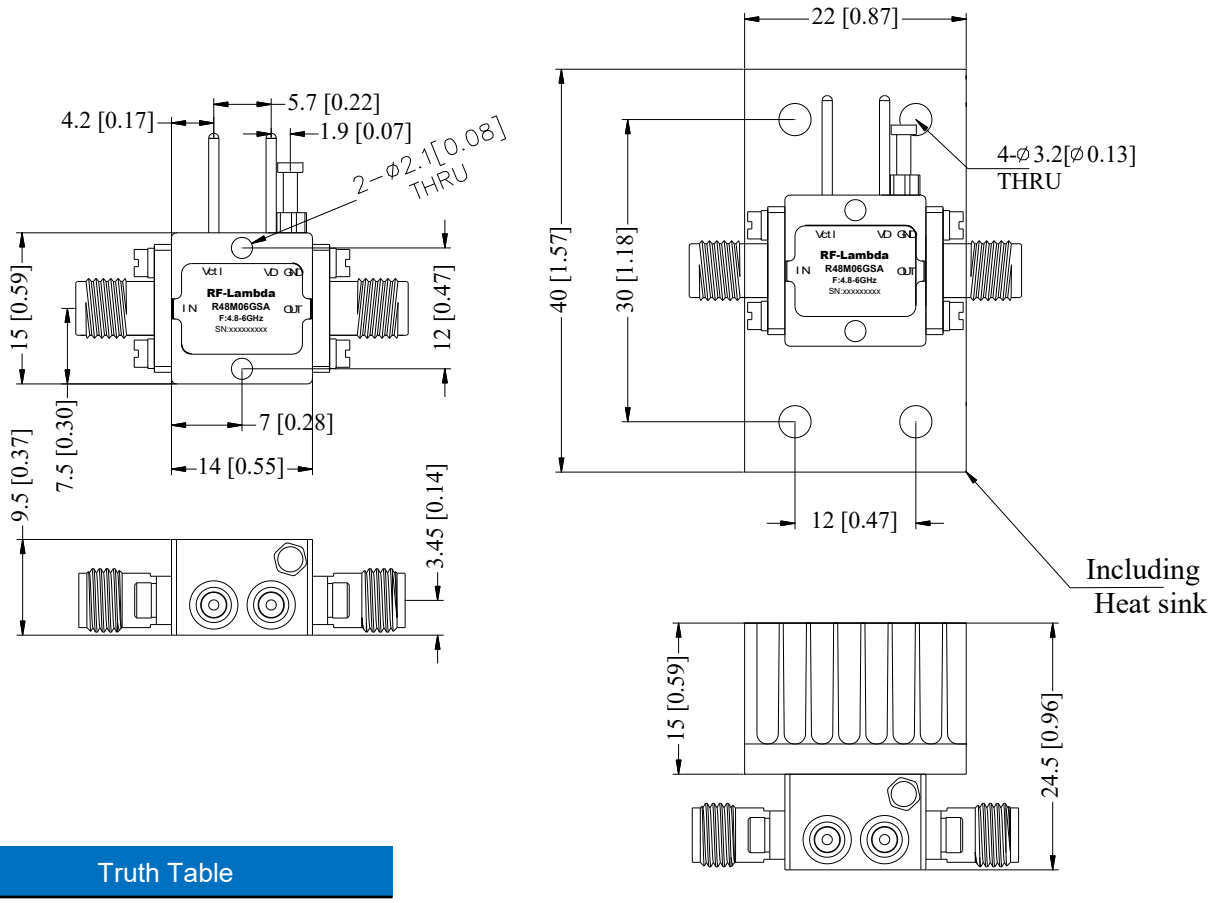
Speed (Vdd=3V)



Speed (Vdd=5V)



Outline Drawing



Truth Table	
LNA Mode	Vctl= VD
Bypass Mode	Vctl= 0V

Notes:
1. Package Material: Aluminum
2. Finish: Gold Plated
3. All dimensions are in millimeters [inches].
4. Housing Tolerances ±0.1 [0.004] unless otherwise specified.
5. Heat sink required during operation (sold separately). Matching heatsink is listed on our website. If customer would like to use their own cooling method, please make sure the amplifier will operate under the specs that listed in page 2 of this datasheet.

Additional Information

Documentation	Webpage
ESD Policy	https://rflambda.com/pdf/rflambda_esd_control.pdf
Heatsink Lookup Specifications	https://rflambda.com/search_heatsink.jsp
Connector Torque Specifications	https://www.rflambda.com/pdf/Torque_Specifications.pdf
Random Vibration Test Standard	https://www.rflambda.com/pdf/rflambda_random_vibration_MIL-STD-202G.pdf

Ordering Information

Part Number	Modification	Description
R48M06GSA	Standard	4.8GHz-6GHz Low Noise Amplifier

Amplifier Use

Ensure that the amplifier input and output ports are safely terminated into a proper 50 ohm load before turning on the power. Never operate the amplifier without a load. A proper 50 ohm load is defined as a load with impedance less than 1.9:1 or return loss larger than 10dB relative to 50 Ohm within the specified operating band width.

Power Supply Requirements
Power supply must be able to provide adequate current for the amplifier. Power supply should be able to provide 1.5 times the typical current or 1.2 times the maximum current (whichever is greater).

In most cases, RF - Lambda amplifiers will withstand severe mismatches without damage. However, operation with poor loads is discouraged. If prolonged operation with poor or unknown loads is expected, an external device such as an isolator or circulator should be used to protect the amplifier.

Ensure that the power is off when connecting or disconnecting the input or output of the amp.

Prevent overdriving the amplifier. Do not exceed the recommended input power level.

Adequate heat-sinking required for RF amplifier modules. Please inquire.

Amplifiers do not contain Thermal protection, Reverse DC polarity or Over voltage protection with the exception of a few models. Please inquire.

Proper electrostatic discharge (ESD) precautions are recommended to avoid performance degradation or loss of functionality.

What is not covered with warranty?

Each RF - Lambda amplifier will go through power and temperature stress testing.
Since the die, ICs or MMICs are fragile, these are not covered by warranty. Any damage to these will NOT be free to repair.

Important Notice

The information contained herein is believed to be reliable. RF-Lambda makes no warranties regarding the information contained herein. RF-Lambda assumes no responsibility or liability whatsoever for any of the information contained herein. RF-Lambda assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for RF-Lambda products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.
RF-Lambda products are not warranted or authorized for use as critical components in medical, life-saving, or life sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

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