

Low Noise Amplifier 3.5 - 8.0 GHz

Rev. V1

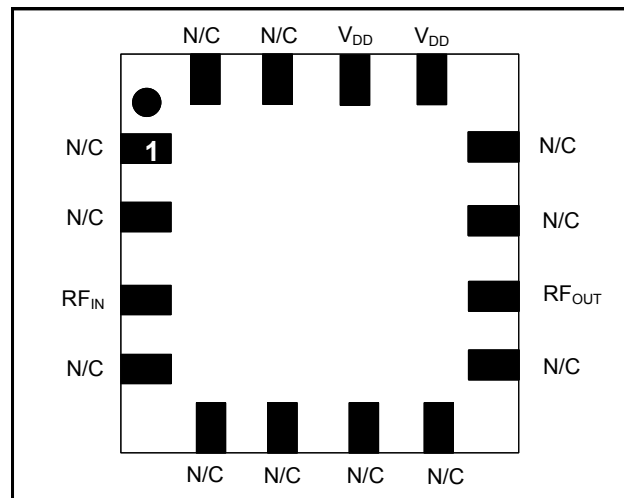
Features

- 12 dB Gain
- 2 dB Noise Figure
- Single Power Supply
- 3-5 V, 40 mA Self Bias
- Lead-Free 3mm PQFN-16LD Package
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

The XL1007-QT is a 3.5 to 8.0 GHz low noise amplifier in a lead free 3 mm PQFN-16LD plastic surface mount package. The device is a self-biased, single supply design with 12 dB gain and 2 dB noise figure. This MMIC uses an optical pHEMT process.

Functional Schematic



Ordering Information ^{1,2}

Part Number	Package
XL1007-QT-0G0T	3000 piece reel
XL1007-QT-EV3	Sample Test Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Pin Configuration ³

Pin No.	Pin Name	Description
1	N/C	No Connection
2	N/C	No Connection
3	RF _{IN}	RF Input
4	N/C	No Connection
5	N/C	No Connection
6	N/C	No Connection
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection
10	RF _{OUT}	RF Output
11	N/C	No Connection
12	N/C	No Connection
13	V _{DD}	Bias Voltage
14	V _{DD}	Bias Voltage
15	N/C	No Connection
16	N/C	No Connection

3. The exposed pad centered on the package bottom must be connected to RF and DC ground.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $V_{DD} = 5\text{ V}$, $Z_0 = 75\ \Omega$

Parameter	Units	Min.	Typ.	Max.
Gain 4 GHz 8 GHz	dB	12.0 6.5	15.0 10.0	—
Input Return Loss 4 GHz 8 GHz	dB	—	-6 -10	—
Output Return Loss 4 GHz 8 GHz	dB	—	-8 -10	—
Noise Figure 4 GHz 8 GHz	dB	—	1.7 2.4	2.6 3.8
Current	mA	—	44	70

Typical Parameters

Parameter	Units	4 GHz	5 GHz	6 GHz	7 GHz	8 GHz
Gain	dB	15.0	15.0	13.5	11.5	10.0
Noise Figure	dB	1.7	1.6	1.7	2.0	2.4
Output P1dB	dBm	13.0	14.0	14.5	14.0	13.0
Output IP3 (Pout = OP1dB - 10, 10 MHz Spacing)	dBm	25.0	28.0	29.0	29.0	28.5
Current	mA	11.0	44.0	44.0	44.0	44.0

Absolute Maximum Ratings^{4,5}

Parameter	Absolute Maximum
Supply Voltage	+6 Volts
Input Power	+10 dBm
Junction Temperature	175°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +125°C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
 5. M/A-COM does not recommend sustained operation near these survivability limits.

Handling Procedures

Please observe the following precautions to avoid damage:

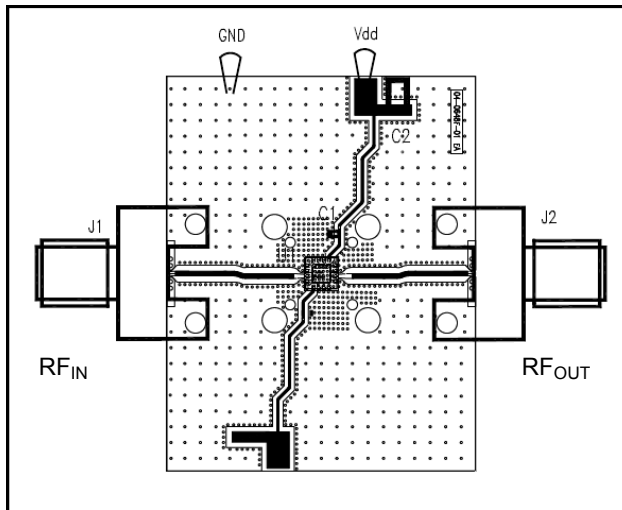
Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

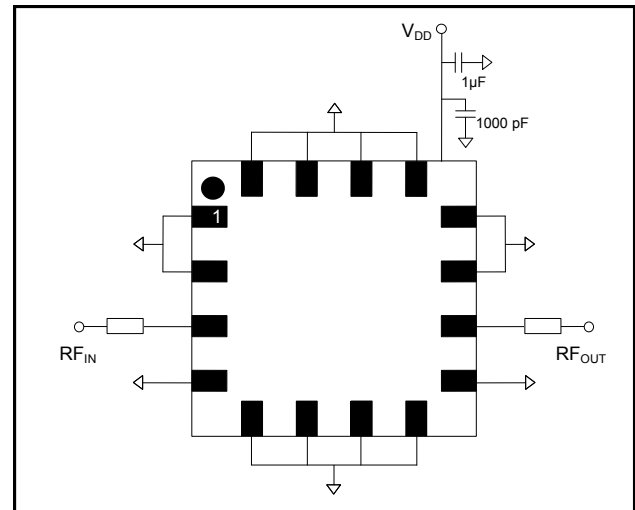
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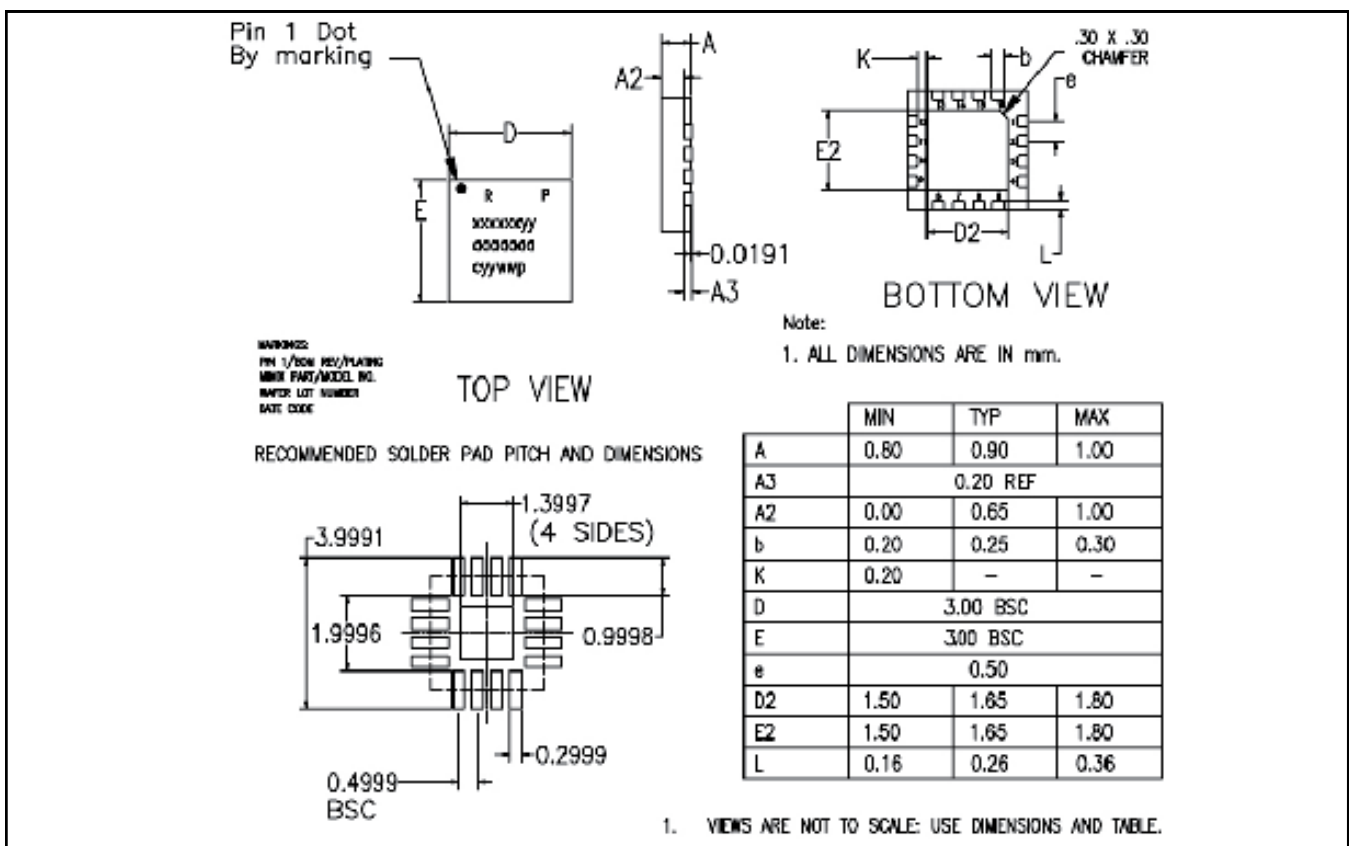
Evaluation Board Layout



Evaluation Board Schematic



Lead-Free 3 mm 16-Lead PQFN[†]



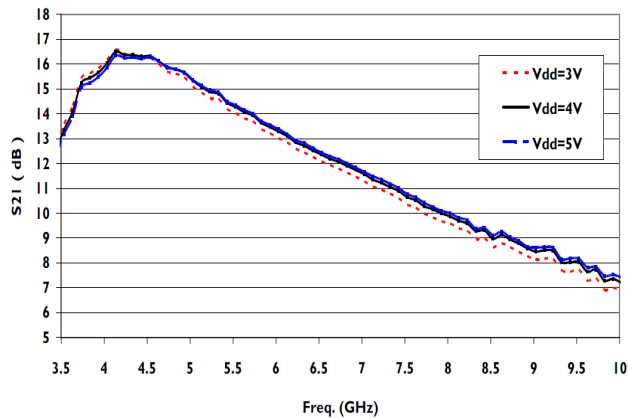
† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin plating over copper

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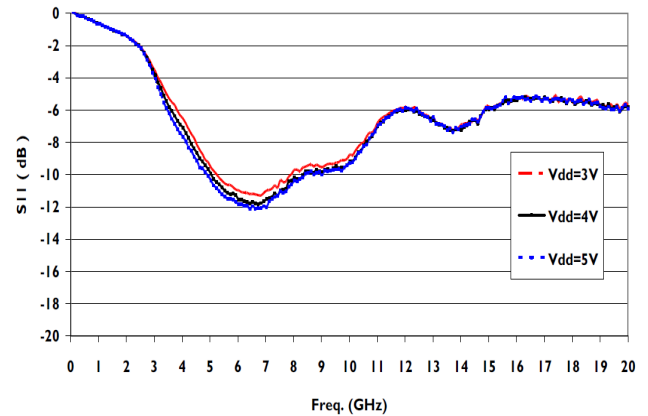
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Typical Performance Curves:

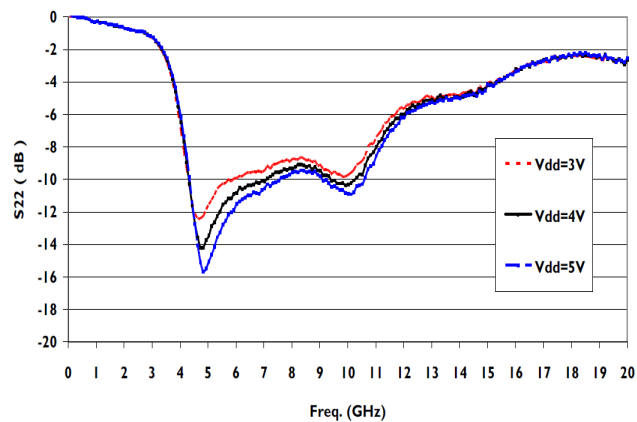
Gain vs. Voltage



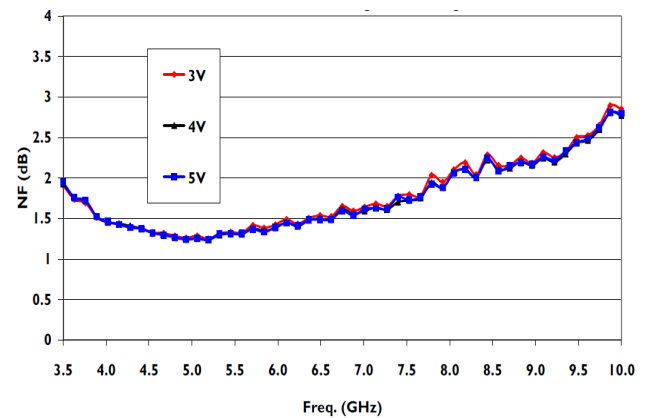
Input Return Loss vs. Voltage



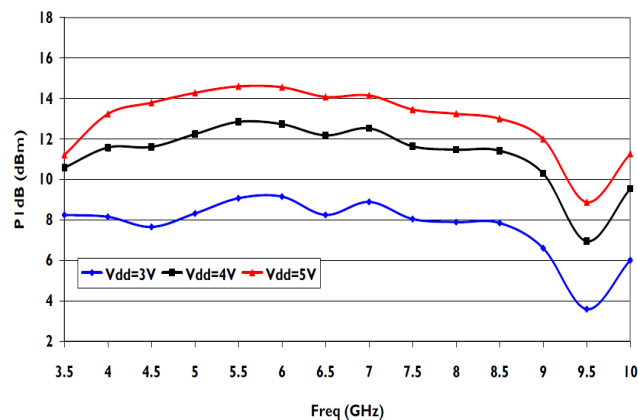
Output Return Loss vs. Voltage



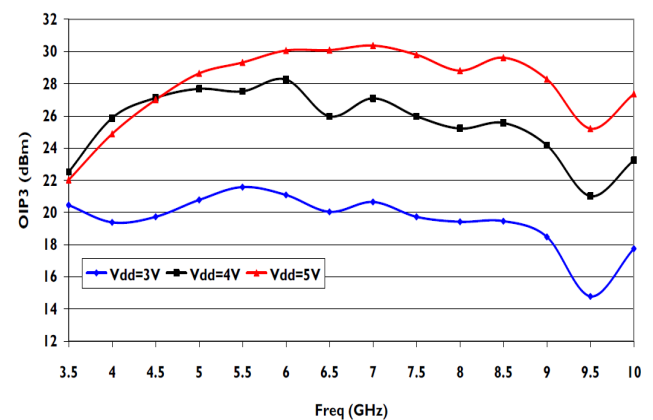
Noise Figure vs. Voltage



P1dB vs. Voltage



Output IP3 vs. Voltage

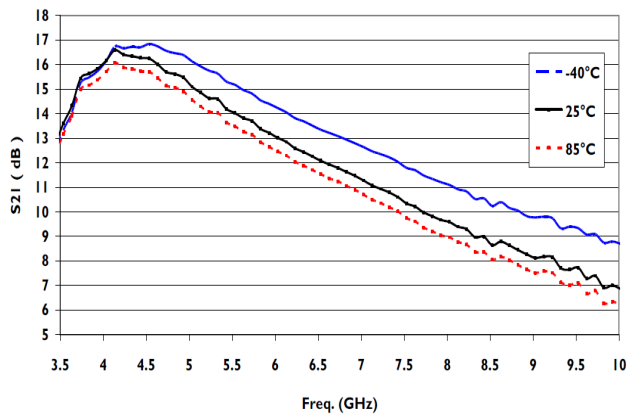


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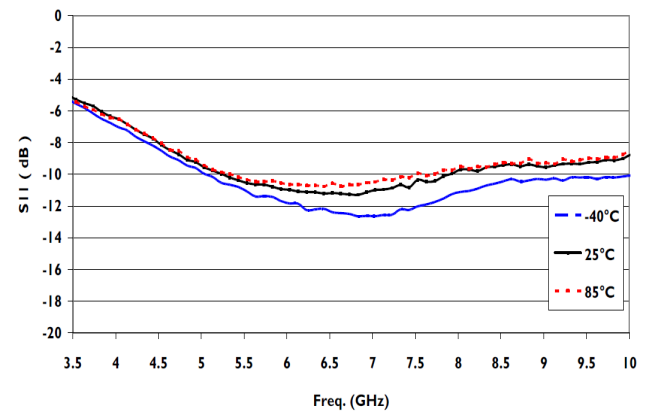
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Typical Performance Curves: $V_{DD} = 3\text{ V}$

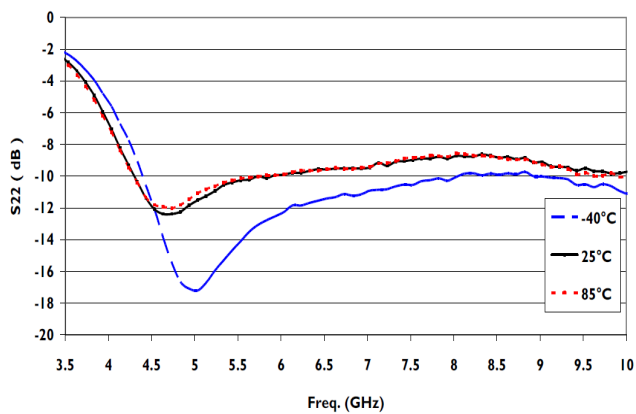
Gain



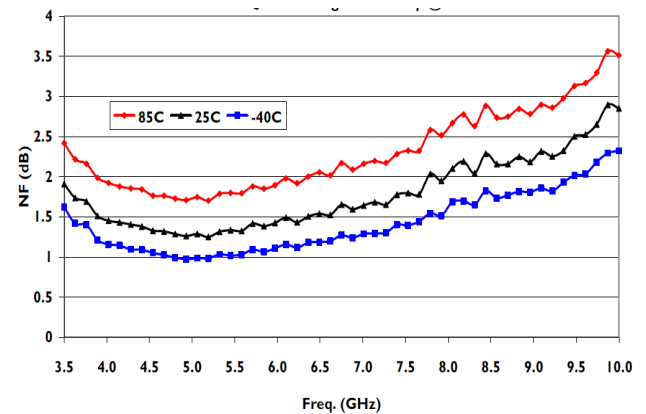
Input Return Loss



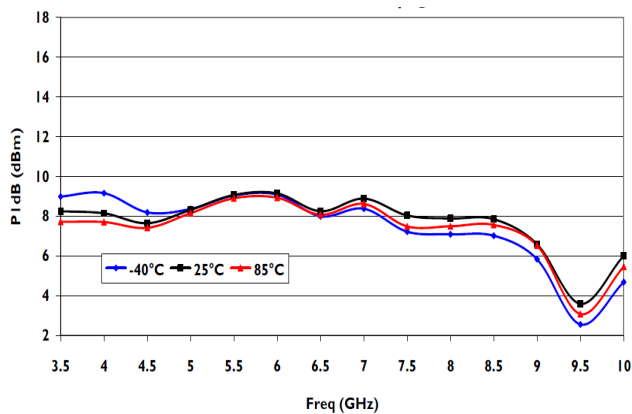
Output Return Loss



Noise Figure

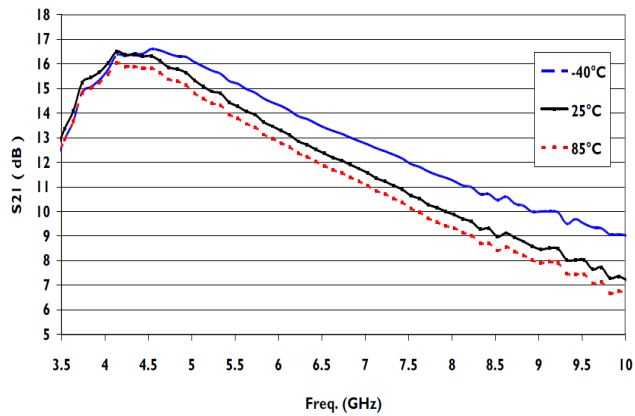


P1dB

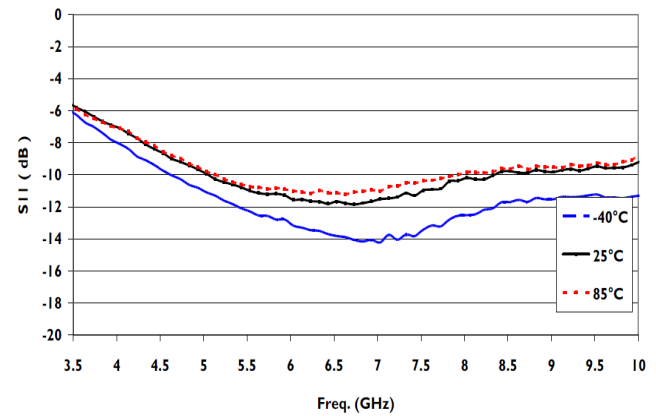


Typical Performance Curves: $V_{DD} = 4\text{ V}$

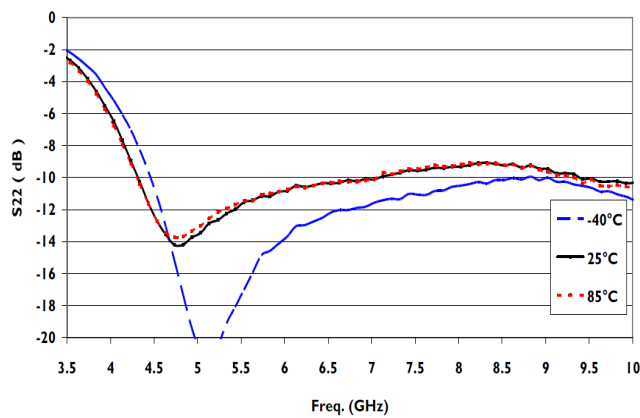
Gain



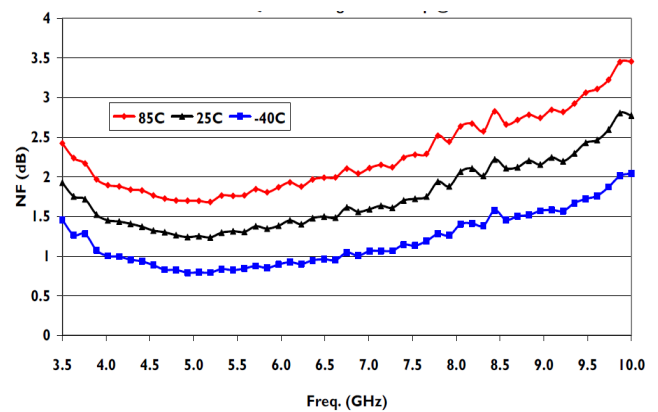
Input Return Loss



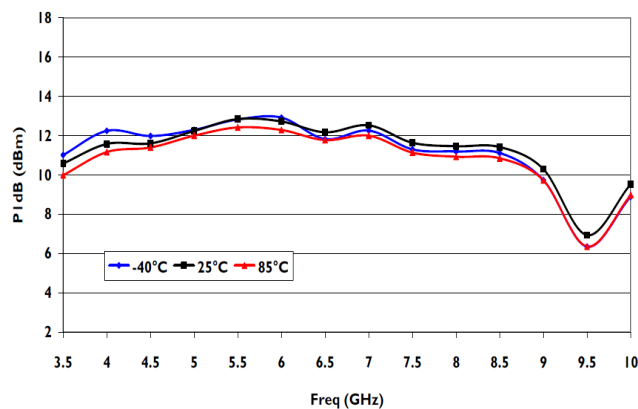
Output Return Loss



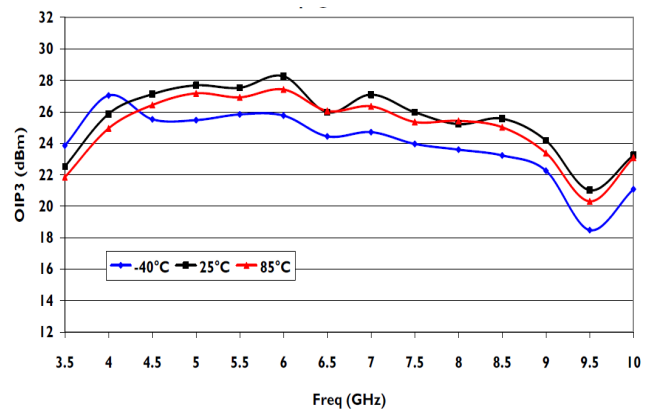
Noise Figure



P1dB



Output IP3, $P_{\text{OUT}}/\text{Tone} = P_{1\text{dB}} - 10\text{ dB}$

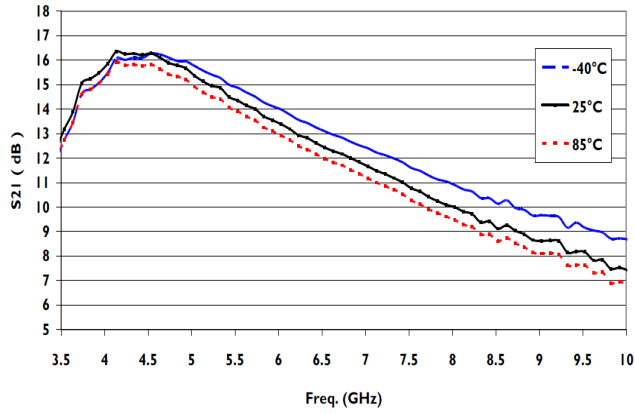


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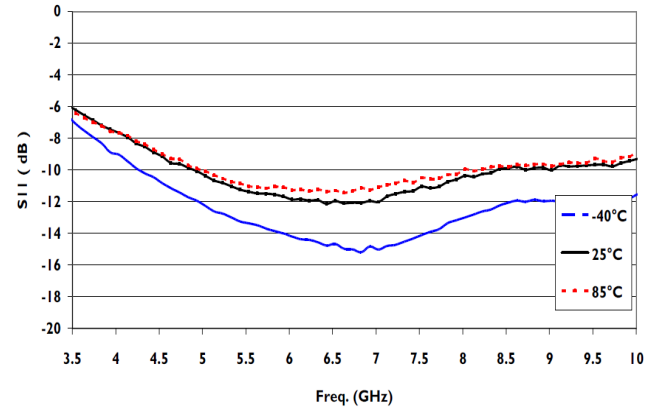
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Typical Performance Curves: $V_{DD} = 5\text{ V}$

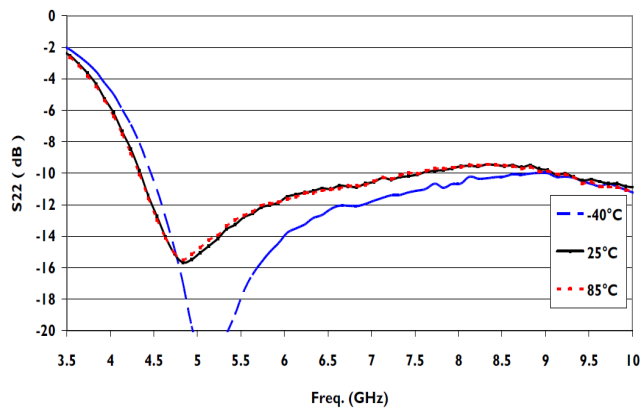
Gain



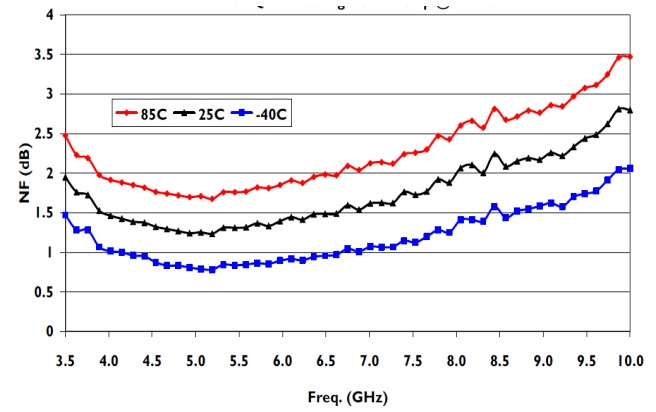
Input Return Loss



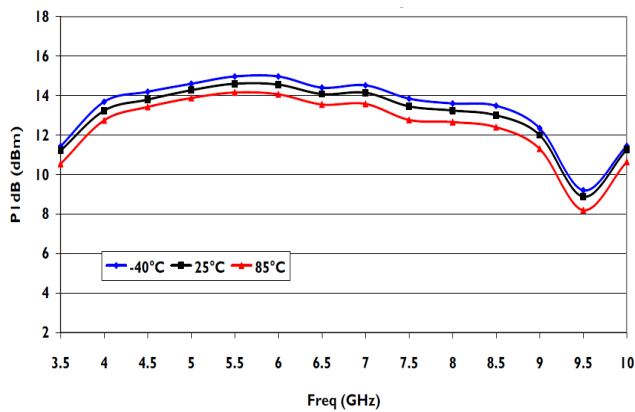
Output Return Loss



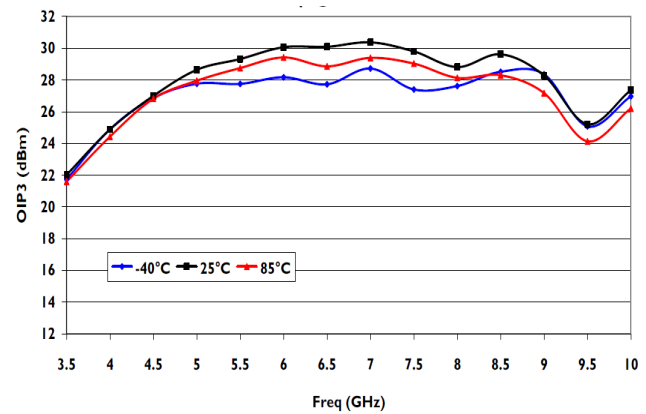
Noise Figure



P1dB



Output IP3, $P_{OUT}/\text{Tone} = P_{1\text{dB}} - 10\text{ dB}$



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