

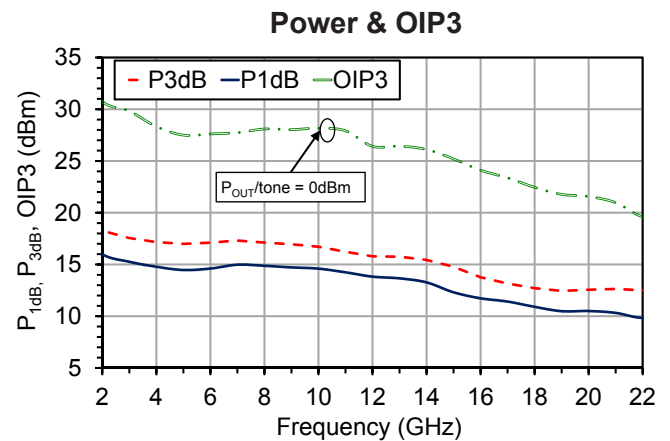
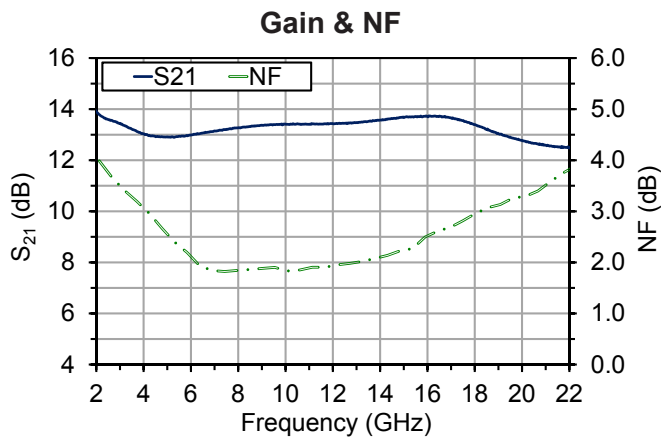
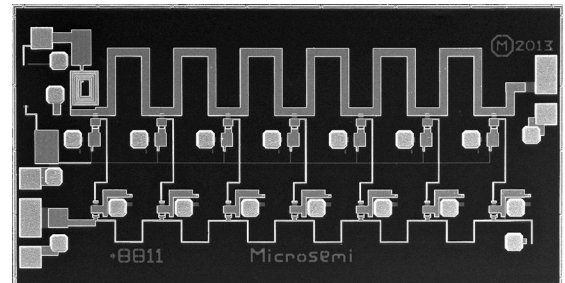
## 2-22GHz, 13dB Gain Low-Noise Wideband Distributed Amplifier

### Features

- >15dBm  $P_{1dB}$  with 1.8dB NF and 13dB gain at 10GHz
- Gain flatness  $\sim \pm 0.75$ dB
- <2dB NF from 6-12GHz
- Single supply voltage of +5V @ 50mA
- Input and Output matched to 50 $\Omega$
- 1.5mm x 2.82mm x 0.1mm die size

### Applications

- Instrumentation
- Electronic warfare
- Microwave communications
- Radar



**Typical Performance (CW, Typical Device, RF Probe):**  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 5\text{V}$

Parameter	Min	Typ	Max	Units
Frequency	2	-	22	GHz
Small Signal Gain	12.5	-	14.0	dB
Noise Figure	1.8	2.5	4.0	dB
Output Power, $P_{1dB}$	10	13	16	dBm
Output Power, $P_{3dB}$	12	15	18	dBm
Output IP3	19	26	31	dBm
Drain Current		50		mA

**Table 1: Absolute Maximum Ratings, Not Simultaneous**

Parameter	Rating	Units
Drain Voltage ( $V_D$ )	+8	V
Input Power ( $P_{IN}$ )	24	dBm
Channel Temperature ( $T_C$ )	150 <sup>1</sup>	°C
Operating Ambient Temperature ( $T_A$ )	-55 to +85	°C
Storage Temperature	-65 to +150	°C
Thermal Resistance, Channel to Die Backside	40	°C/W

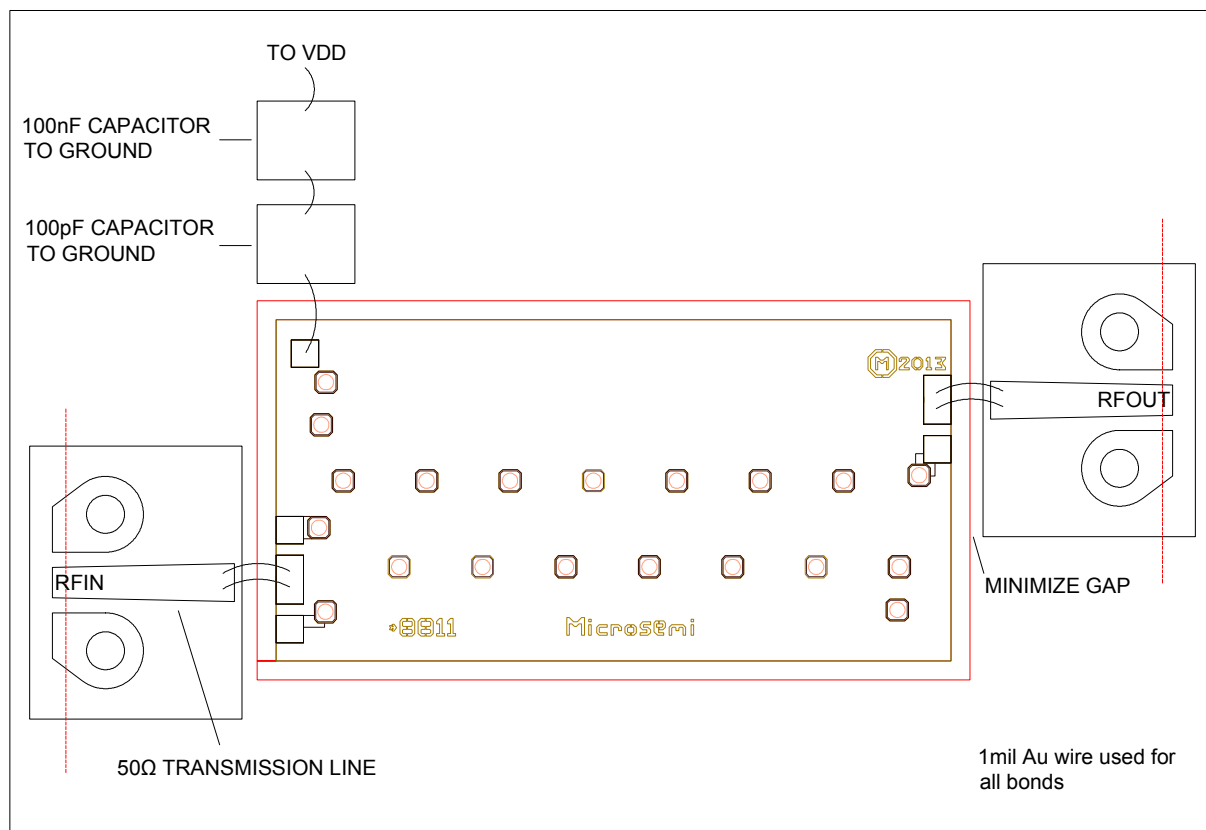
<sup>1</sup> MTTF > 10<sup>8</sup> hours at  $T_C = 150^\circ\text{C}$ 


Caution, ESD Sensitive Device

**Table 2: Specifications (CW, 100% Test):  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 5\text{V}$ ,  $I_{DD} = 65\text{mA}$** 

Parameter	Frequency	Min	Max	Units
$I_{DD}$	-	-	90	mA
Small Signal Gain	20GHz	11.0	-	dB
Output Power, $P_{1dB}$	20GHz	8.5	-	dBm

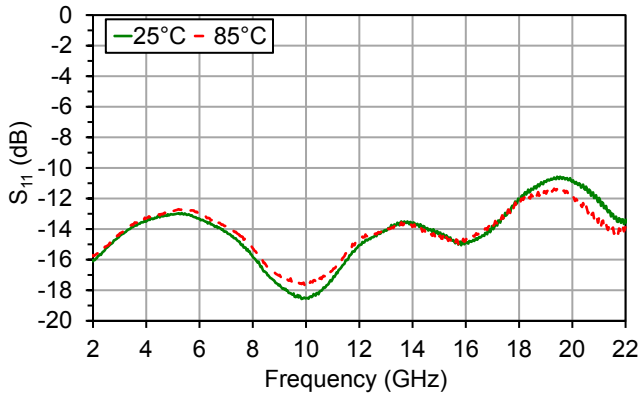
## RF Probe Measurement Set-Up With Reference Planes<sup>2</sup>


<sup>2</sup> Reference planes are the same for S-parameter files downloadable on [www.microsemi.com/mmics](http://www.microsemi.com/mmics)

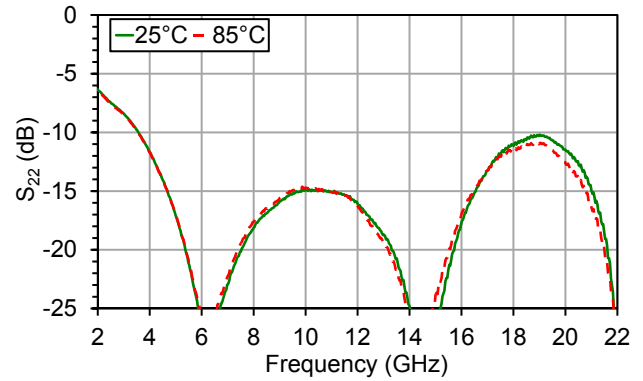
## Typical Performance, RF Probe

$V_{DD} = 5V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

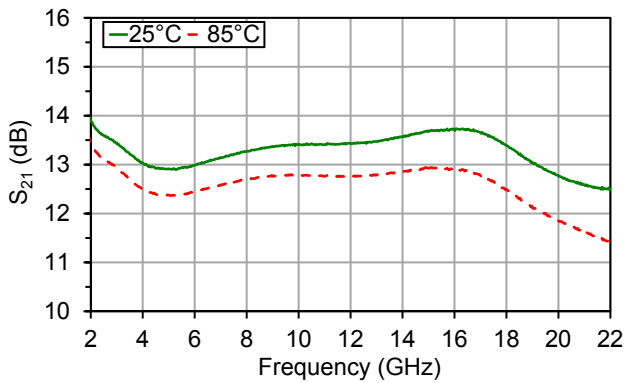
### $S_{11}$ Over Temperature



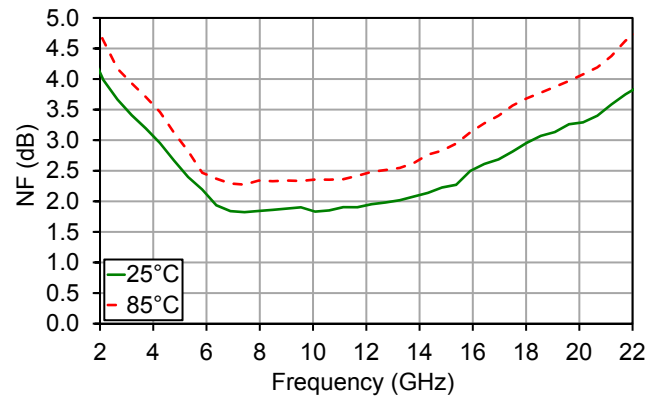
### $S_{22}$ Over Temperature



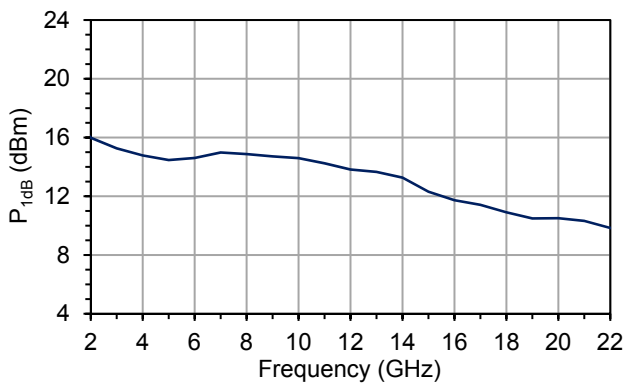
### $S_{21}$ Over Temperature



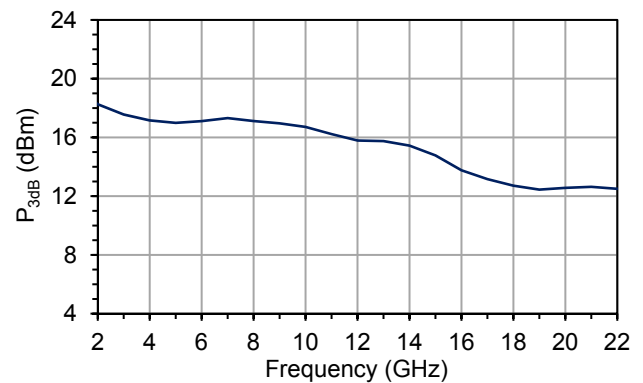
### NF Over Temperature



### $P_{1dB}$ Over Frequency



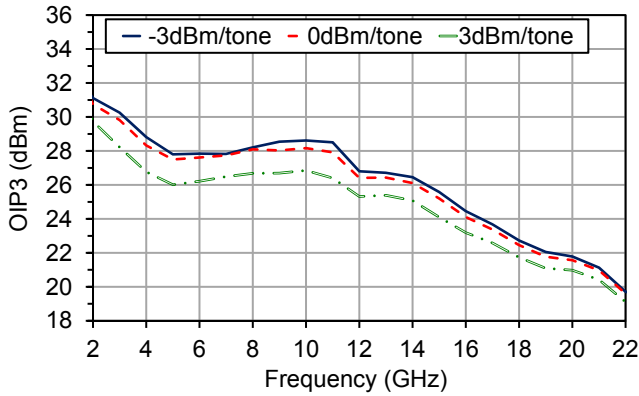
### $P_{3dB}$ Over Frequency



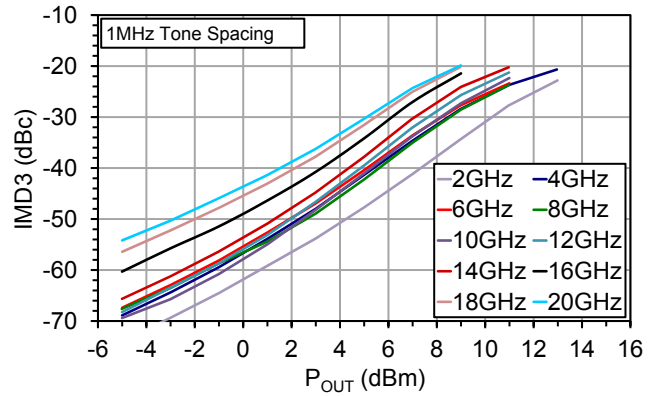
## Typical Performance, RF Probe

$V_{DD} = 5V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

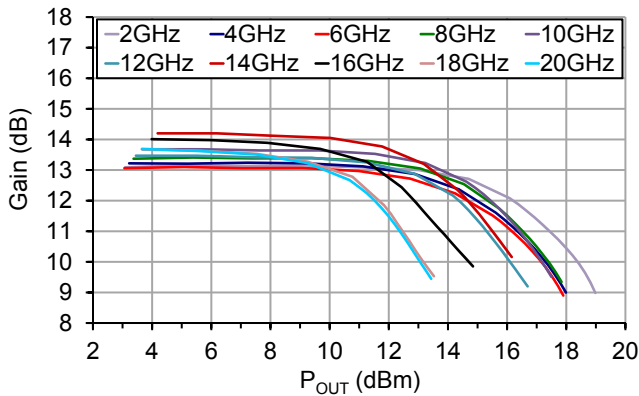
### OIP3 Over Frequency



### IMD Sweep Over Frequency

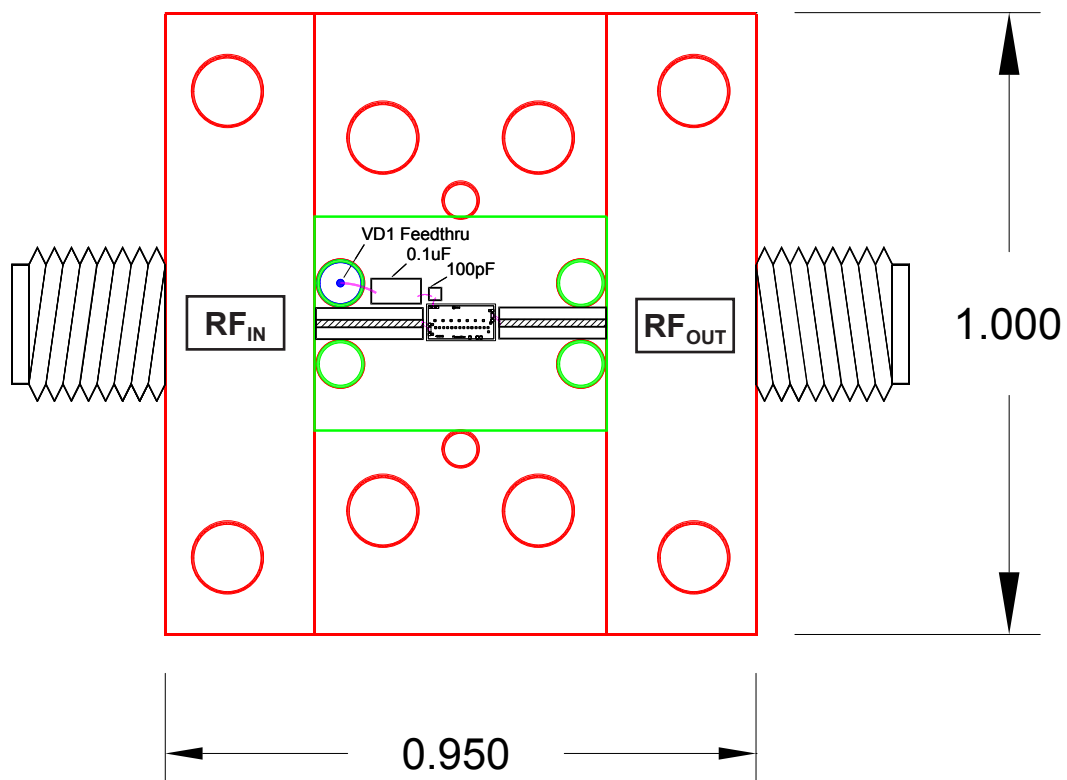


### Power Sweep Over Frequency



## Connectorized Test Fixture

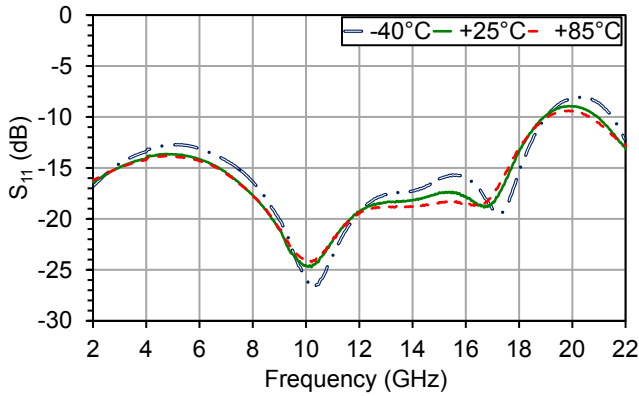
With SMK 2.92mm Connectors



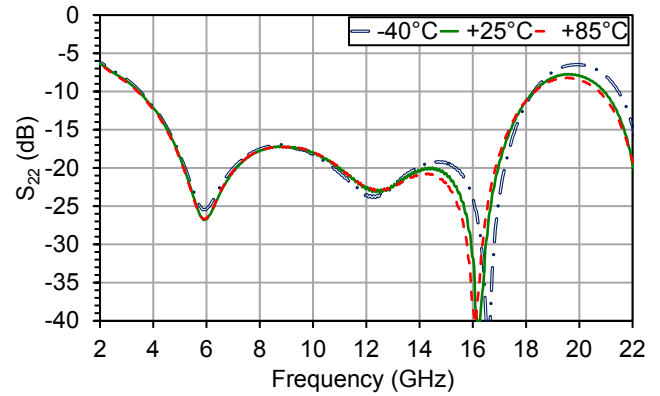
## Typical Performance, Connectorized Test Fixture

$V_{DD} = 5V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

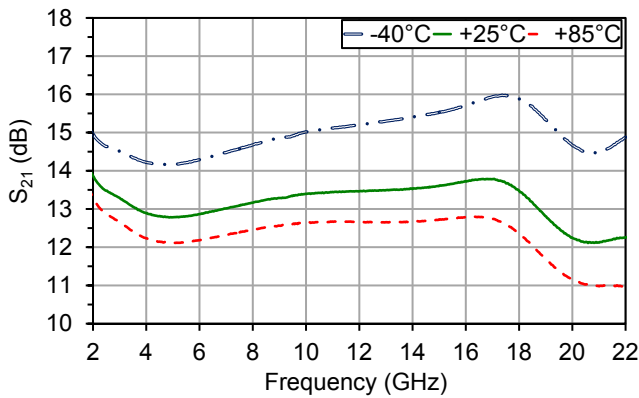
### $S_{11}$ Over Temperature



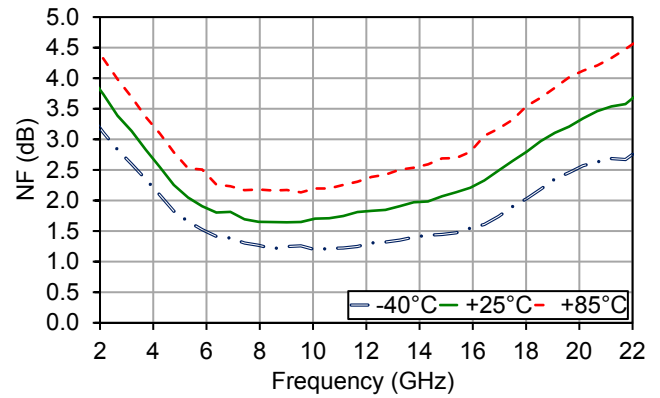
### $S_{22}$ Over Temperature



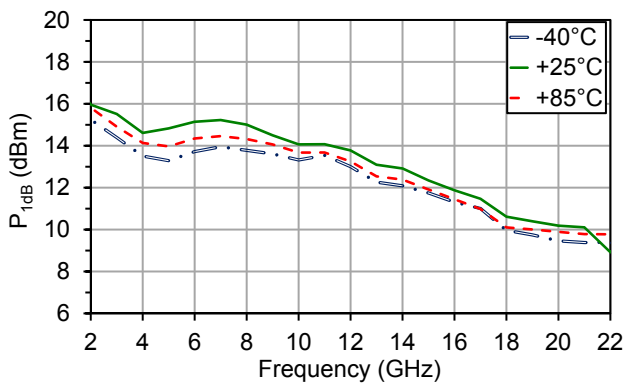
### $S_{21}$ Over Temperature



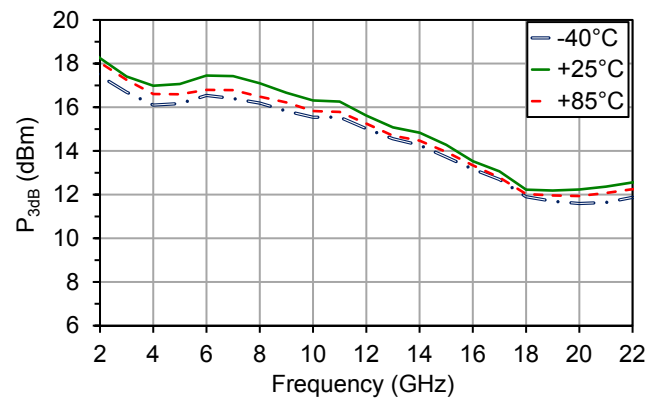
### NF Over Temperature



### $P_{1dB}$ Over Frequency



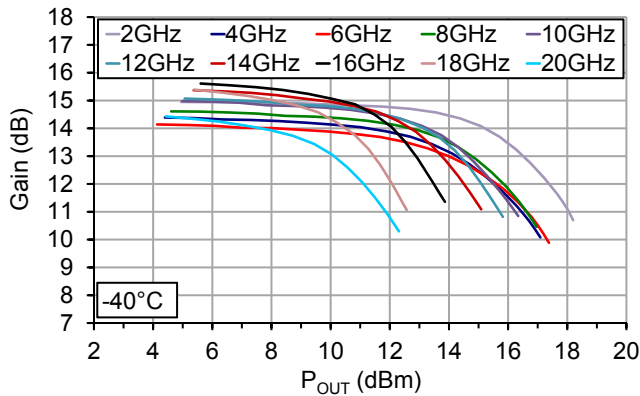
### $P_{3dB}$ Over Frequency



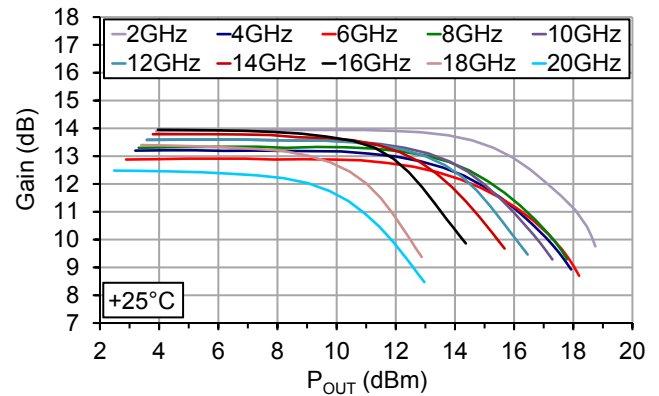
# Typical Performance, Connectorized Test Fixture

$V_{DD} = 5V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

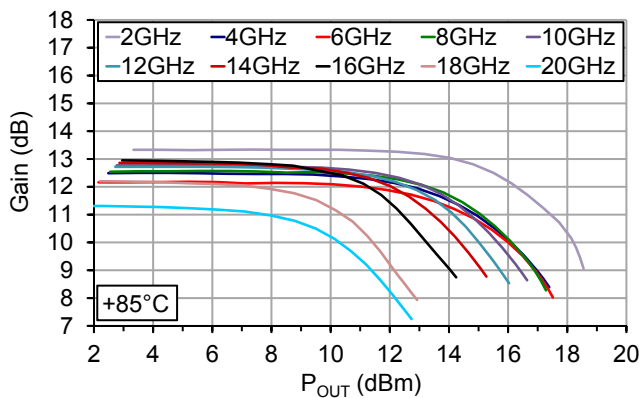
**Power Sweep,  $-40^\circ C$**



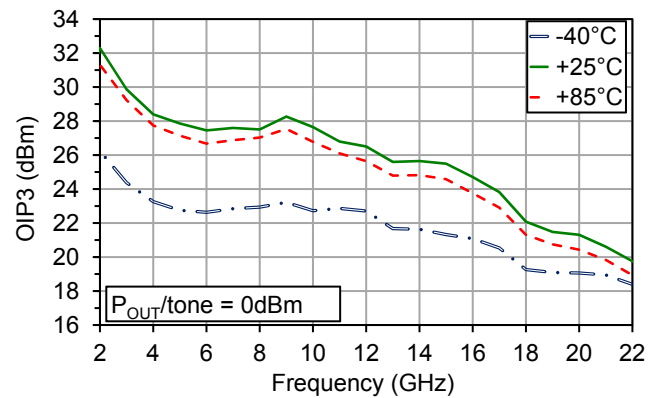
**Power Sweep,  $+25^\circ C$**



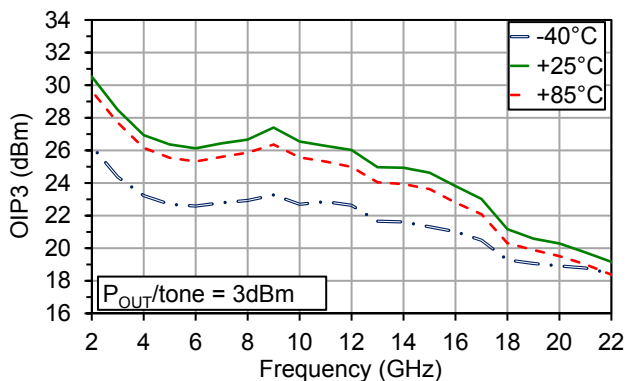
**Power Sweep,  $+85^\circ C$**



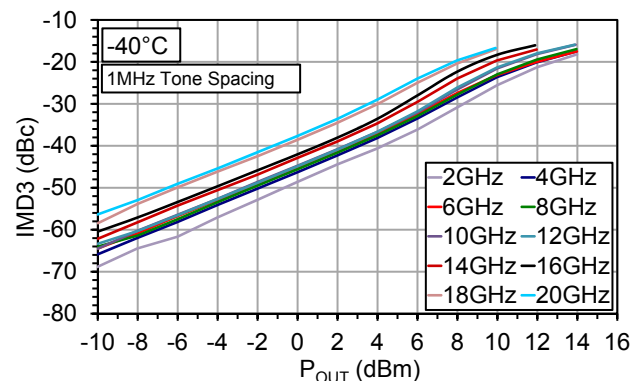
**OIP3,  $P_{OUT}/tone = 0dBm$**



**OIP3,  $P_{OUT}/tone = 3dBm$**



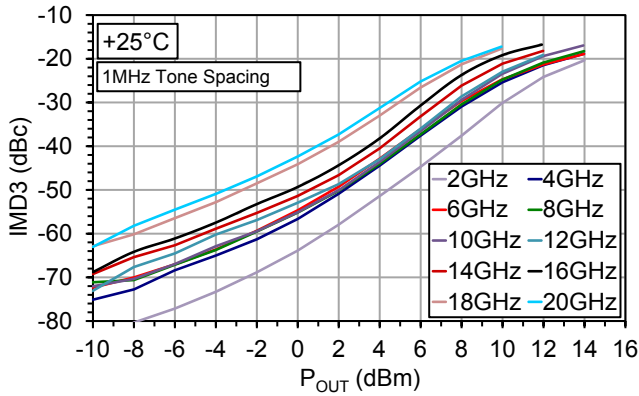
**IMD3 Sweep,  $-40^\circ C$**



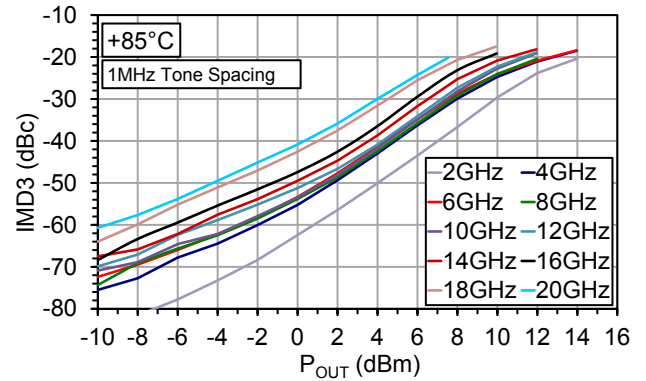
## Typical Performance, Connectorized Test Fixture

$V_{DD} = 5V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

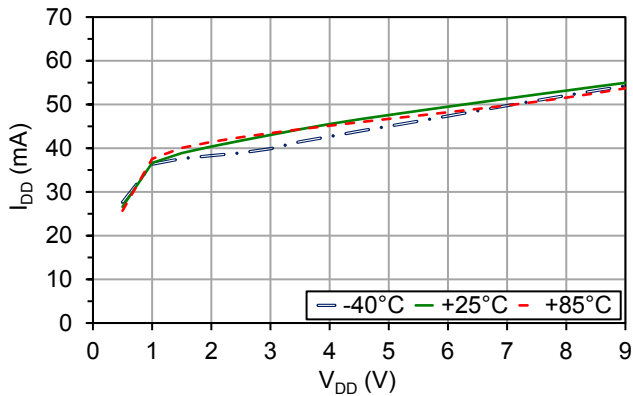
**IMD3 Sweep, +25°C**



**IMD3 Sweep, +85°C**



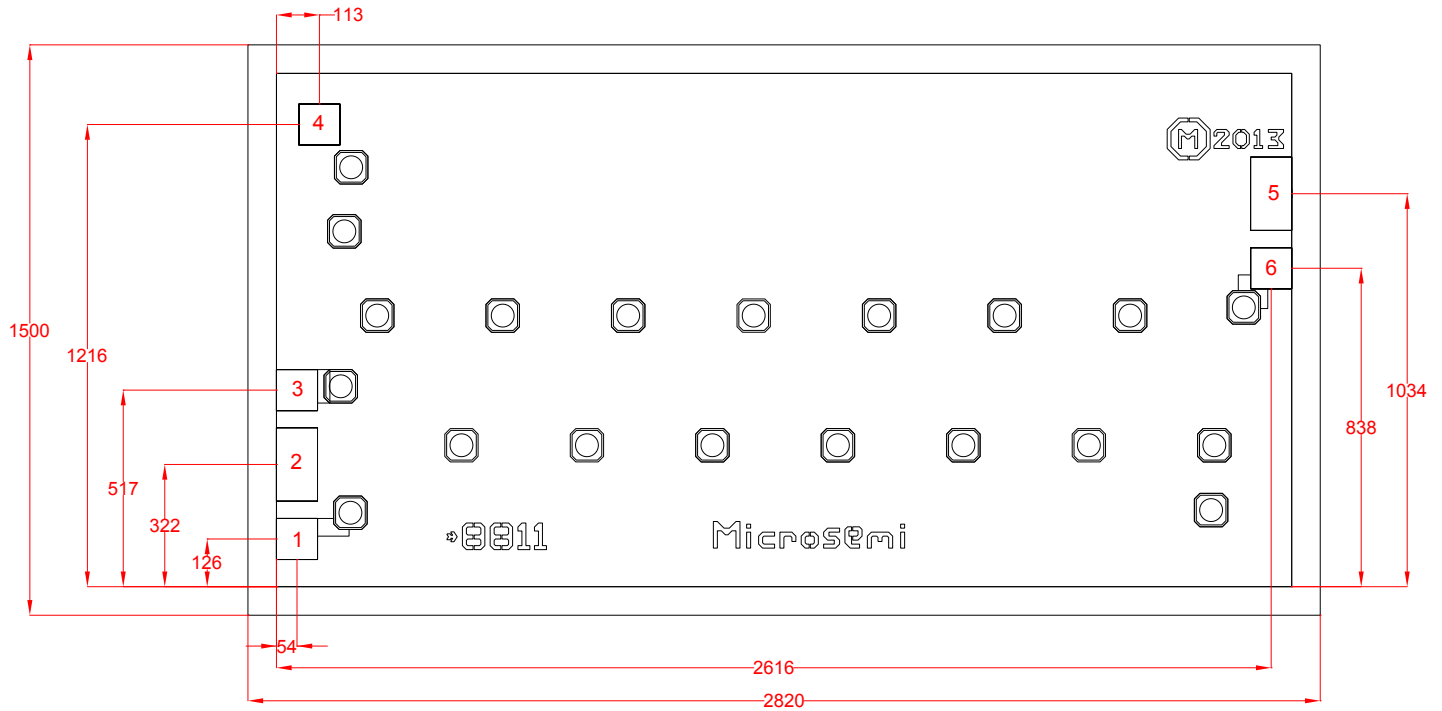
**DC**





**Chip layout showing pad locations.**

All dimensions are in microns. Die thickness is 100 microns. Backside metal is gold, bond pad metal is gold. Refer to Die Handling Application Note MM-APP-0001 (visit [www.microsemi.com/mmics](http://www.microsemi.com/mmics)).


**Table 3: Pad Descriptions**

Pad #	Description	Pad Dimensions ( $\mu\text{m}$ )
1, 3, 6	Ground	100 x 100
2	RF <sub>IN</sub> , Pad is AC Coupled	100 x 190
5	RF <sub>OUT</sub> , Pad is AC Coupled	100 x 190
4	V <sub>DD</sub>	100 x 100

**Biasing**

MMA003AA is a self-biased device with single positive supply. Apply V<sub>DD</sub> to pad 4.

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