

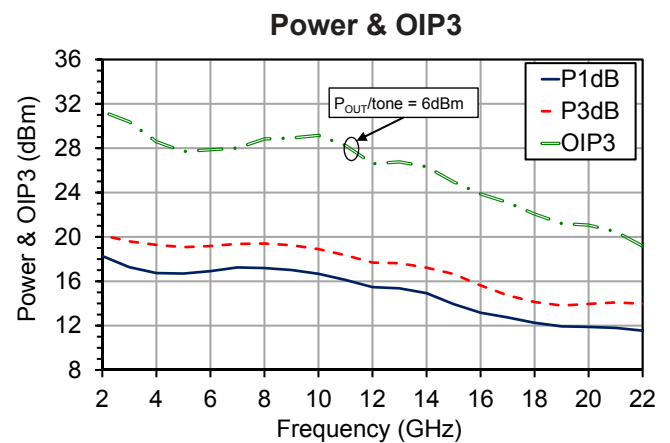
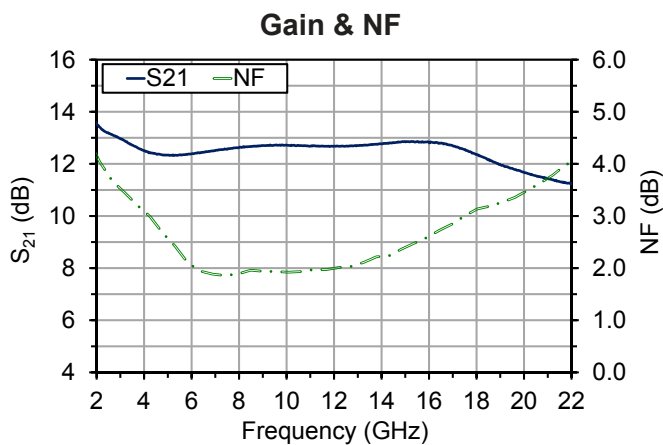
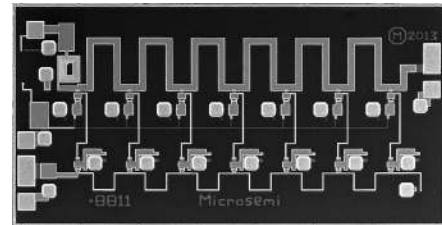
## 2-20GHz, 12.5dB Gain Low-Noise Wideband Distributed Amplifier

### Features

- >16.5dBm  $P_{1dB}$  with 1.9dB NF and 12.5dB gain at 10GHz
- <2dB NF from 6-12GHz
- Single supply voltage of +8V @ 50mA
- Input and Output matched to 50Ω
- 1.5mm x 2.82mm x 0.1mm die size

### Applications

- Instrumentation
- Electronic warfare
- Microwave communications
- Radar



**Typical Performance (CW, Typical Device, RF Probe):**  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 8\text{V}$

Parameter	Min	Typ	Max	Units
Frequency	2	-	22	GHz
Small Signal Gain	11.3	-	13.5	dB
Noise Figure	1.9	2.5	4.0	dB
Output Power, $P_{1dB}$	12	14	18	dBm
Output Power, $P_{3dB}$	14	18	20	dBm
Output IP3	19	26	31	dBm
Drain Current		50		mA

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

Parameter	Rating	Units
Drain Voltage ( $V_D$ )	+9	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



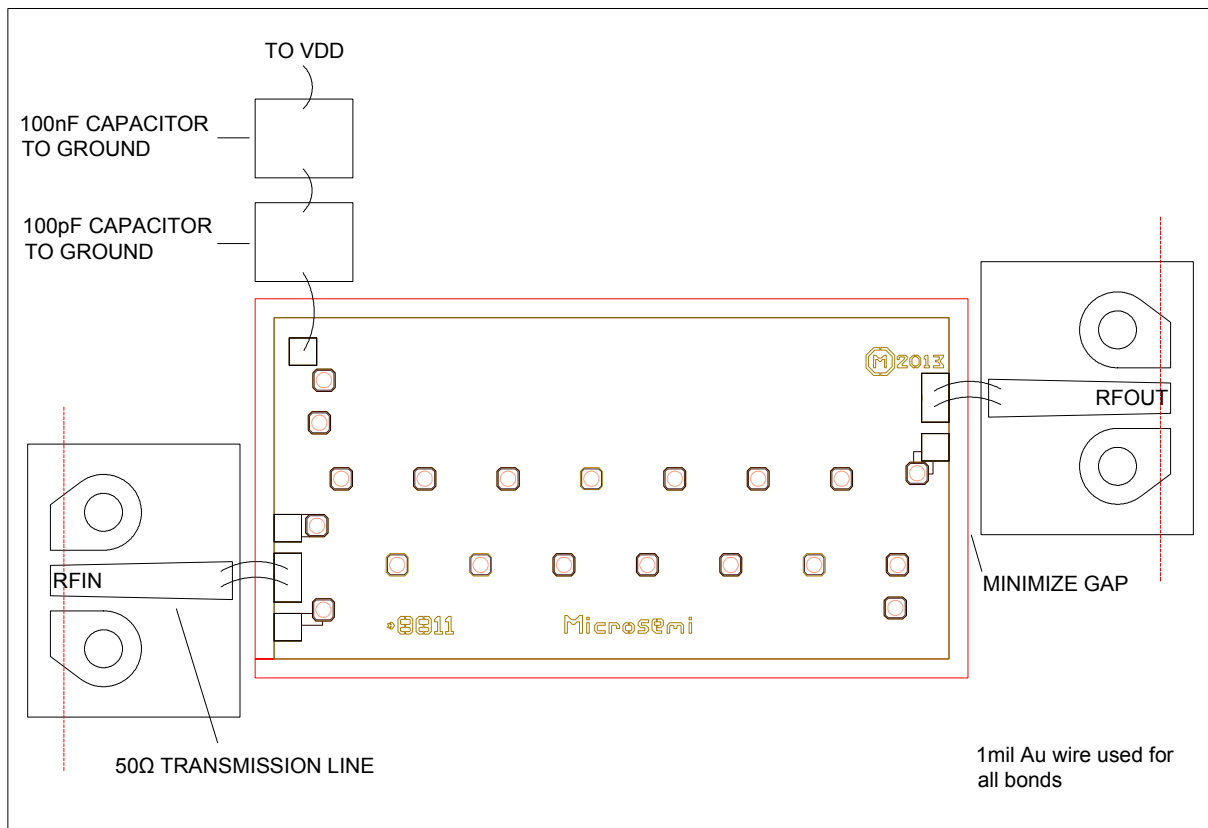
Caution, ESD Sensitive Device

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

**Table 2: Specifications (CW, 100% Test):  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 8\text{V}$**

Parameter		Min	Max	Units
$I_{DD}$	-	-	105	mA
Small Signal Gain	20GHz	9.5	-	dB
Output Power, $P_{1dB}$	20GHz	9.0	-	dBm

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

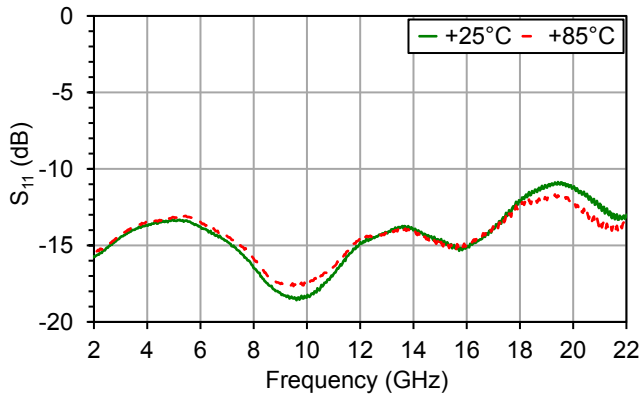


<sup>2</sup> Reference planes are the same for S-parameter files downloadable on [www.microsemi.com/mmics](http://www.microsemi.com/mmics)

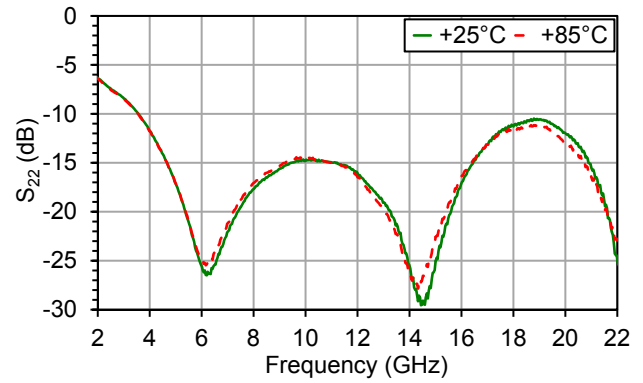
## Typical Performance, RF Probe

$V_{DD} = 8V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

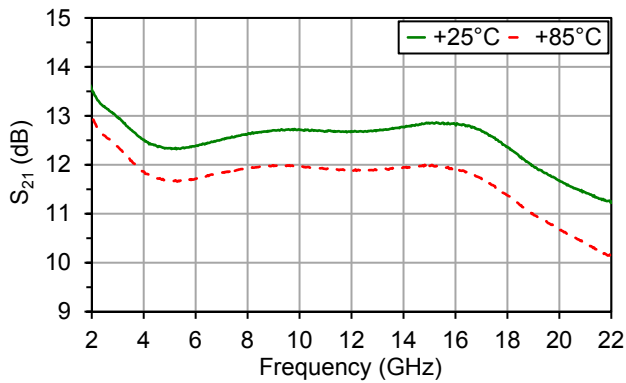
### $S_{11}$ Over Temperature



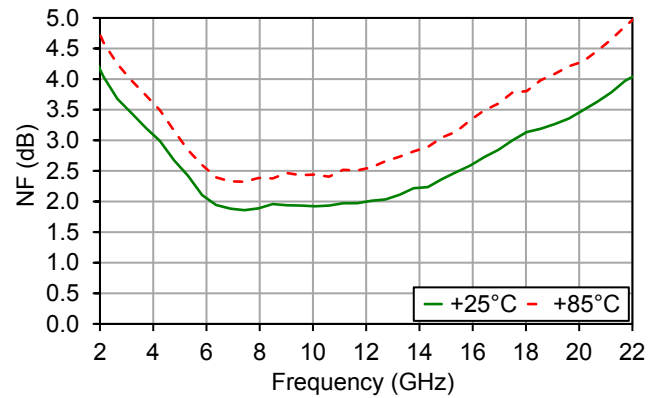
### $S_{22}$ Over Temperature



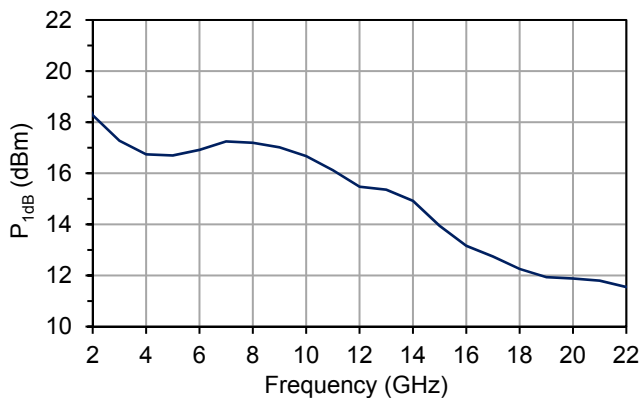
### $S_{21}$ Over Temperature



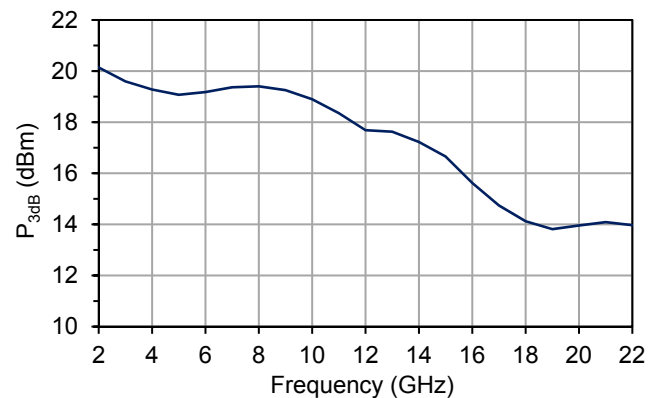
### NF Over Temperature



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



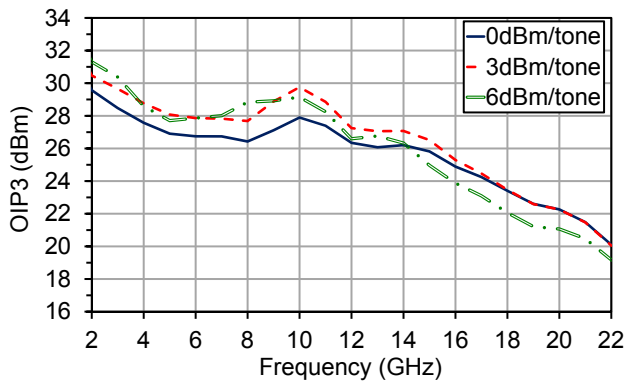
### $P_{3dB}$ Over Frequency



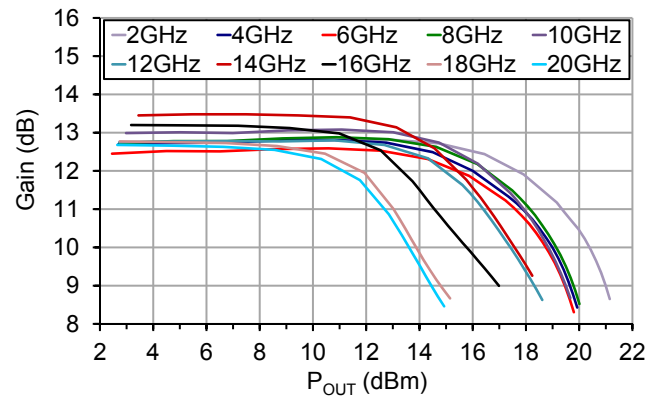
## Typical Performance, RF Probe

$V_{DD} = 8V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

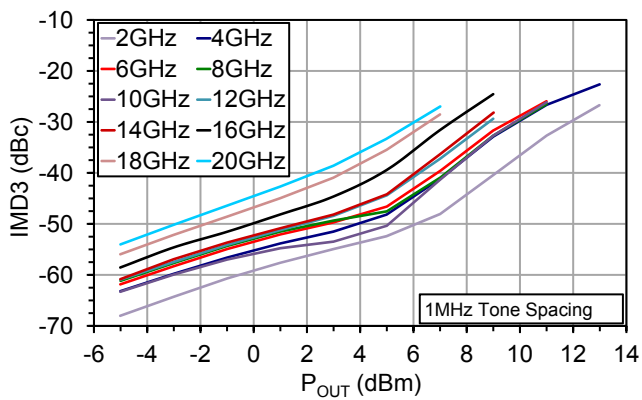
**OIP3 Over  $P_{OUT}$**



**Power Sweep**

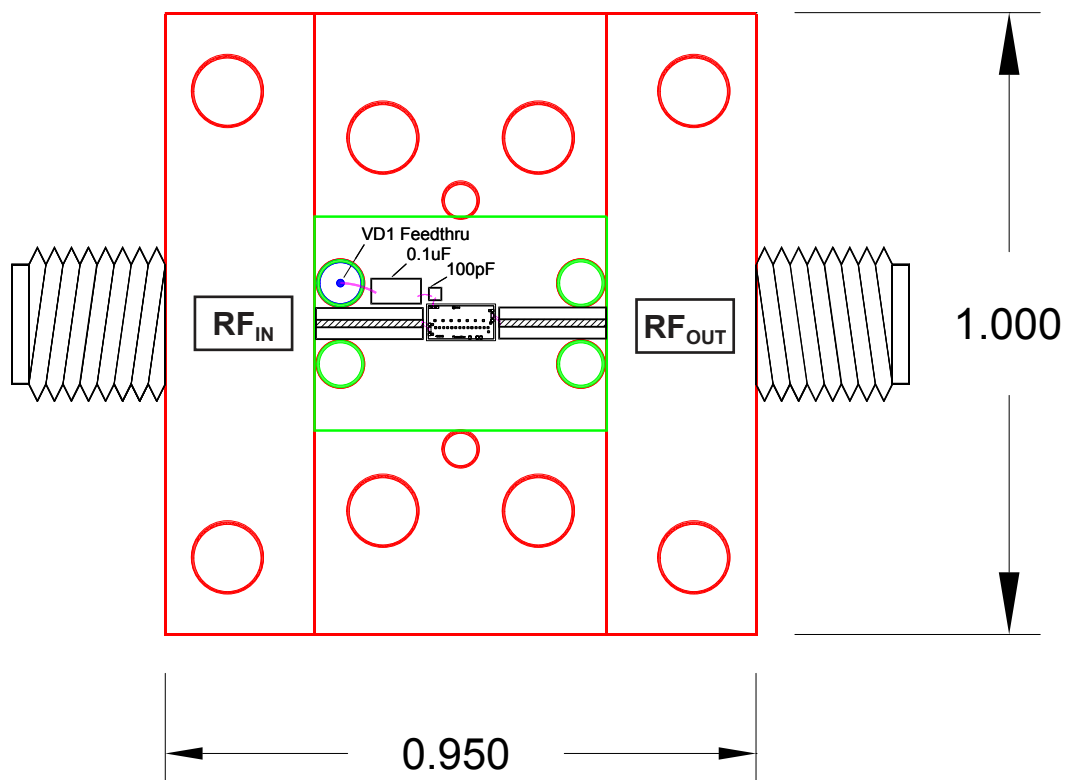


**IMD3 Sweep**



## Connectorized Test Fixture

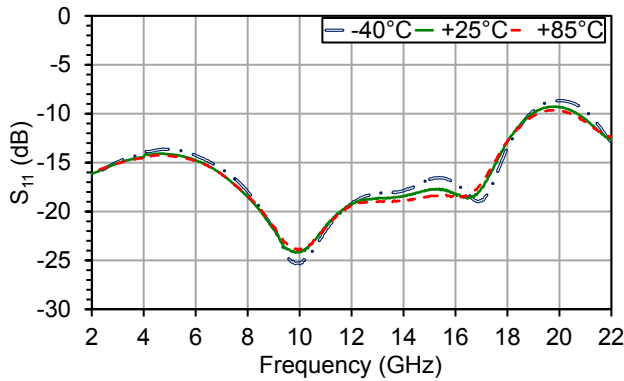
With SMK 2.92mm Connectors



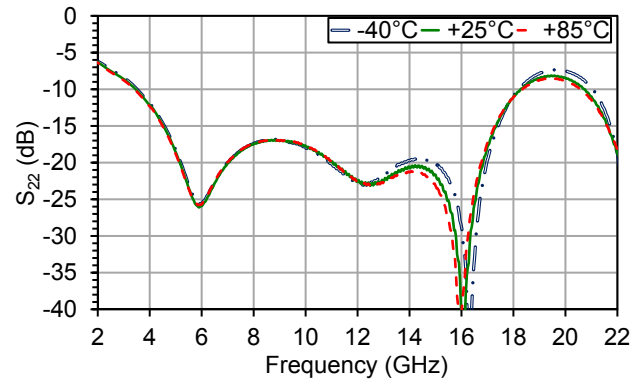
## Typical Performance, Connectorized Test Fixture

$V_{DD} = 8V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

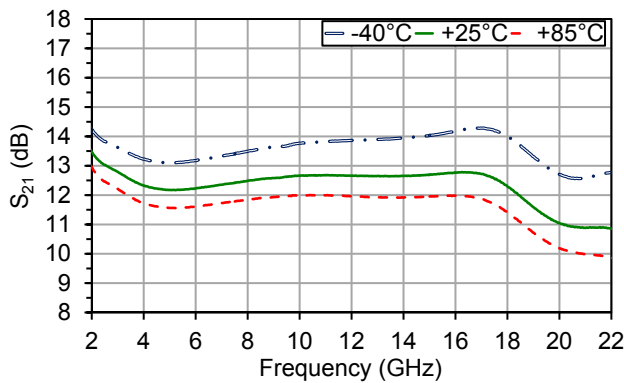
### $S_{11}$ Over Temperature



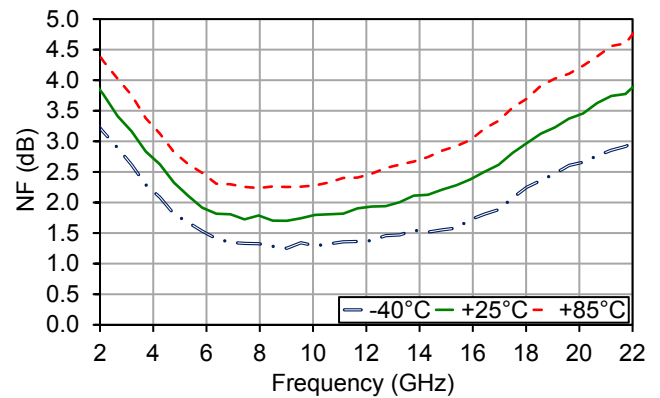
### $S_{22}$ Over Temperature



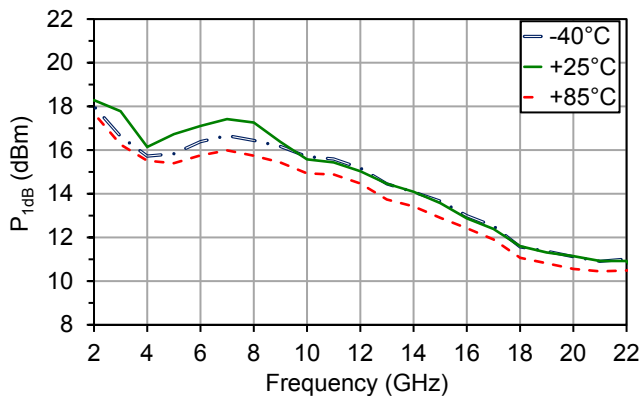
### $S_{21}$ Over Temperature



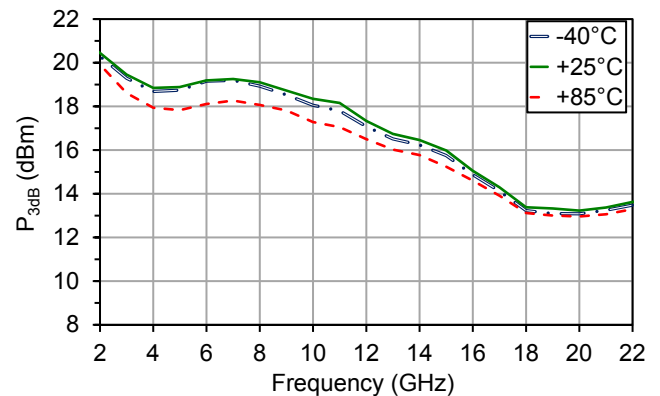
### NF Over Temperature



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



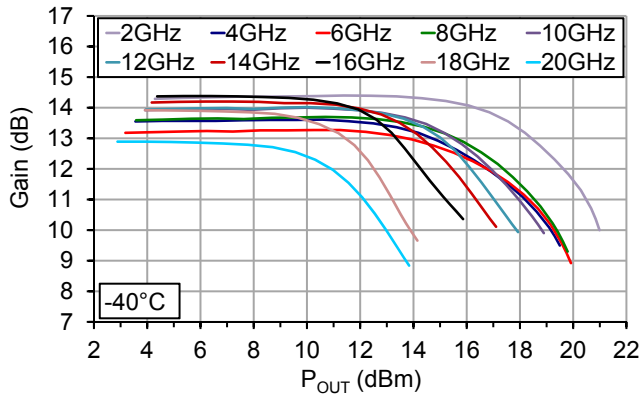
### $P_{3dB}$ Over Temperature



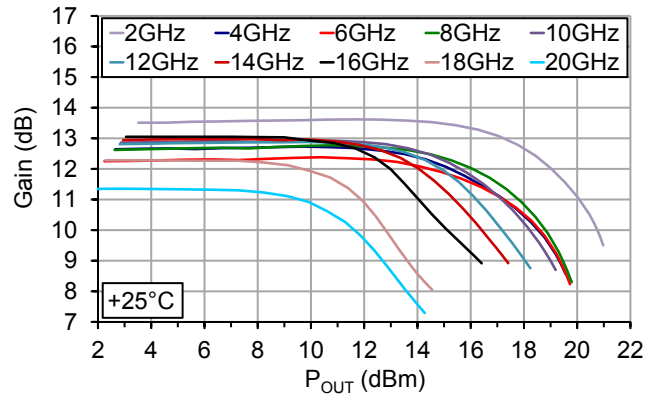
# Typical Performance, Connectorized Test Fixture

$V_{DD} = 8V, I_{DD} = 50mA, T_A = 25^\circ C$  unless otherwise noted

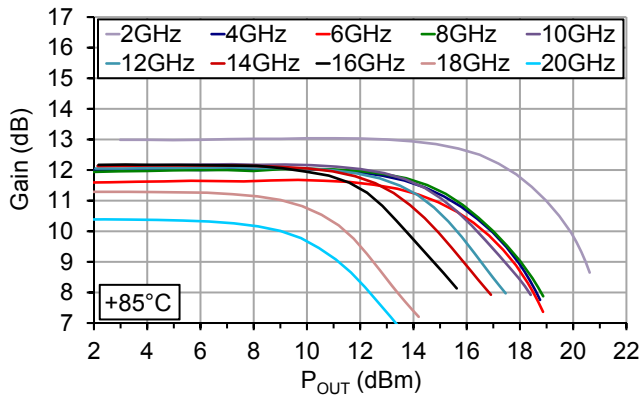
**Power Sweep, -40°C**



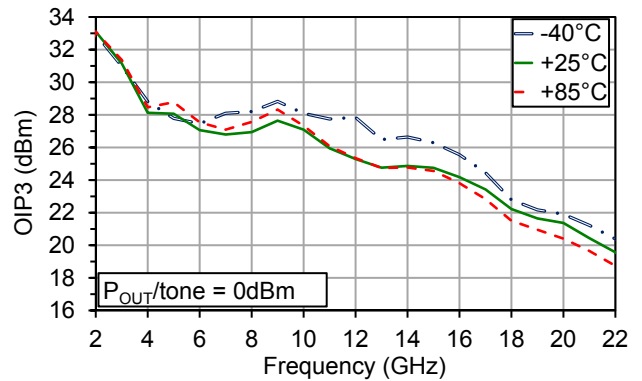
**Power Sweep, +25°C**



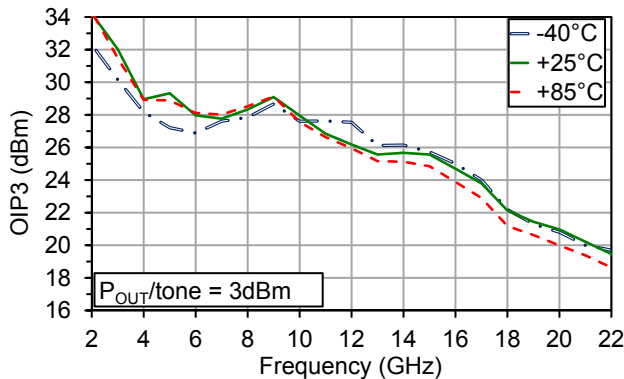
**Power Sweep, +85°C**



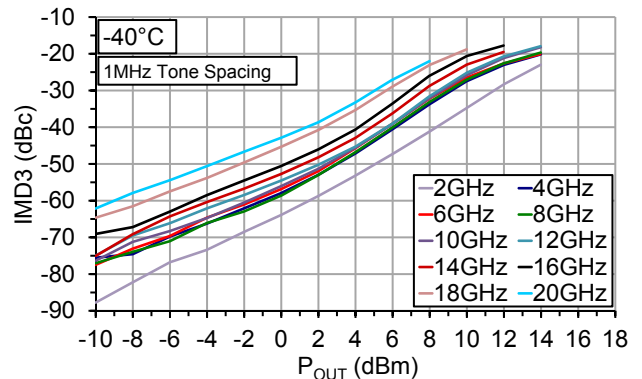
**OIP3, 0dBm/tone**



**OIP3, 3dBm/tone**



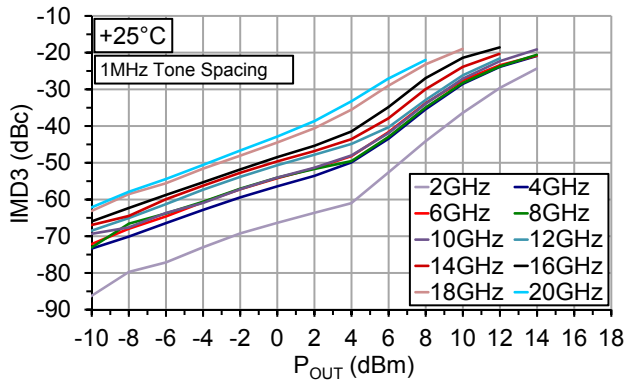
**IMD3 Sweep, -40°C**



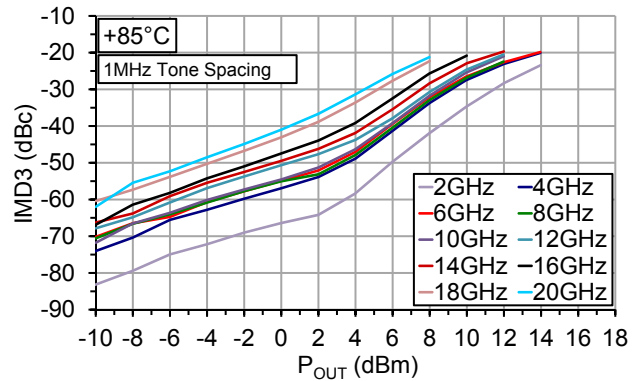
## Typical Performance, Connectorized Test Fixture

$V_{DD} = 8V$ ,  $I_{DD} = 50mA$ ,  $T_A = 25^\circ C$  unless otherwise noted

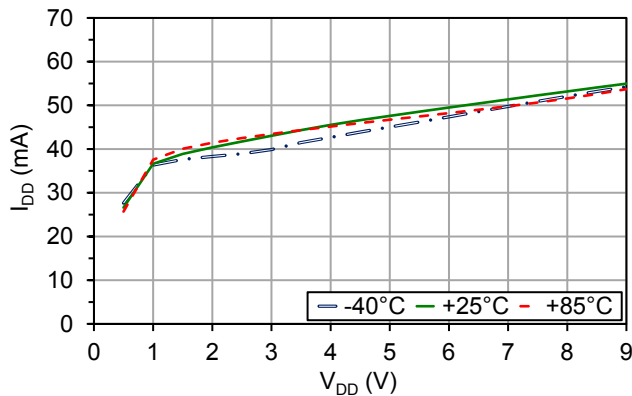
**IMD3 Sweep, +25°C, 1MHz Tone Spacing**



**IMD3 Sweep, +85°C, 1MHz Tone Spacing**



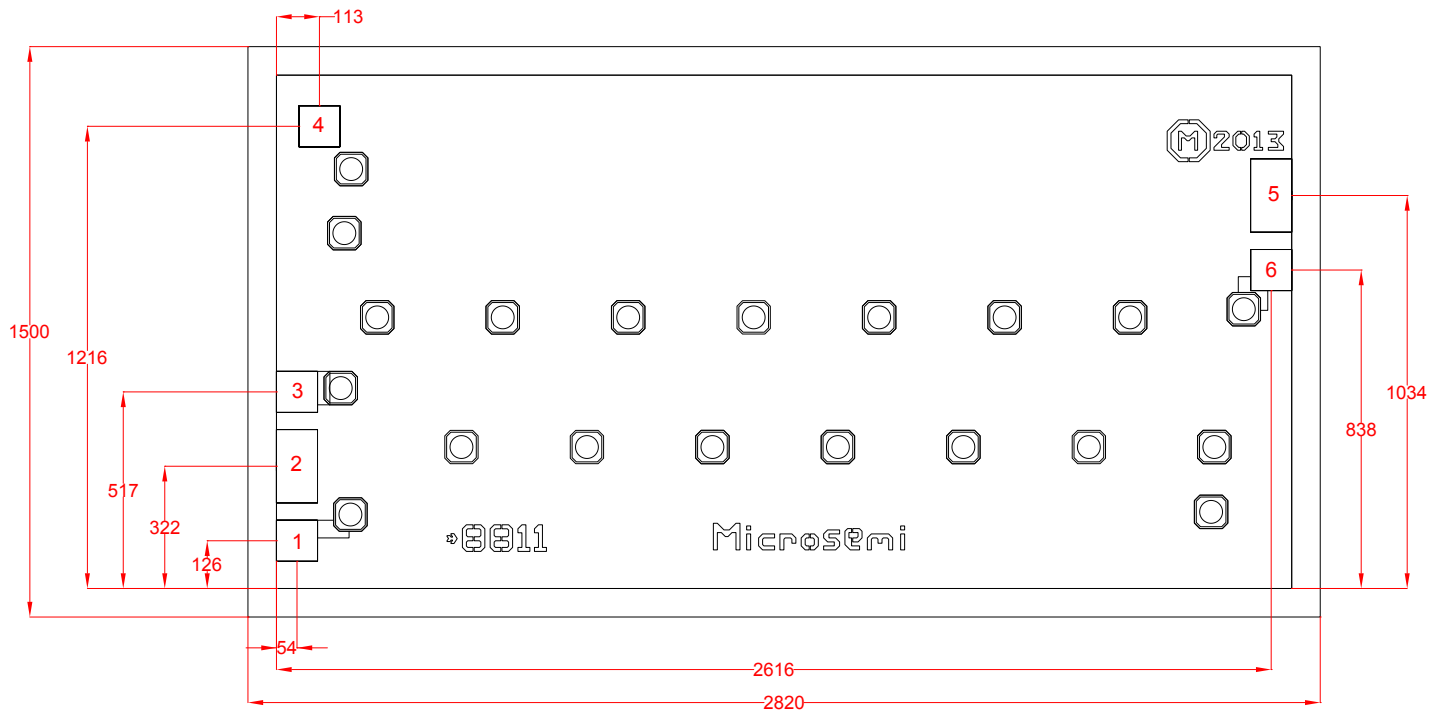
**DC**





**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	$\text{RF}_{\text{IN}}$ , AC Coupled	100 x 190
5	$\text{RF}_{\text{OUT}}$ , AC Coupled	100 x 190
4	$V_{\text{DD}}$	100 x 100

**Biasing**

MMA003AA is a self-biased device with single positive supply. Apply  $V_{\text{DD}}$  to pad 4.

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