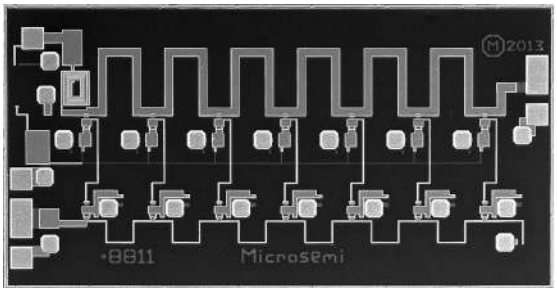
2-22GHz, 13dB Gain Low-Noise Wideband Distributed Amplifier

Features

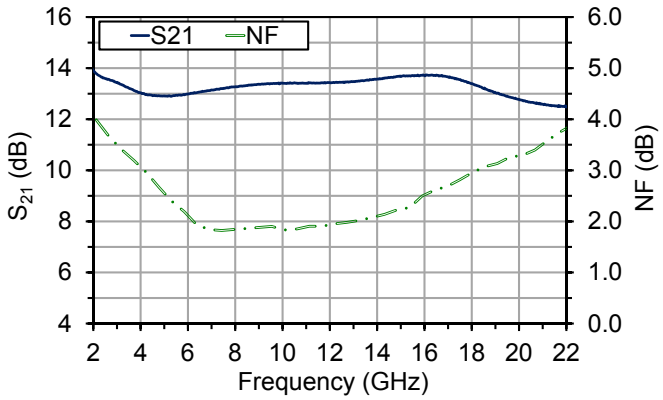
- >15dBm P_{1dB} with 1.8dB NF and 13dB gain at 10GHz
- Gain flatness ~ +/-0.75dB
- <2dB NF from 6-12GHz
- Single supply voltage of +5V @ 50mA
- Input and Output matched to 50Ω
- 1.5mm x 2.82mm x 0.1mm die size



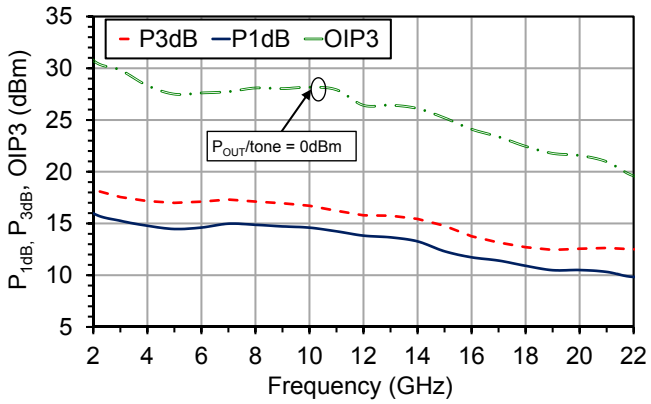
Applications

- Instrumentation
- Electronic warfare
- Microwave communications
- Radar

Gain & NF



Power & OIP3



Typical Performance (CW, Typical Device, RF Probe): T_A = 25°C, V_{DD} = 5V

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[1]	°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

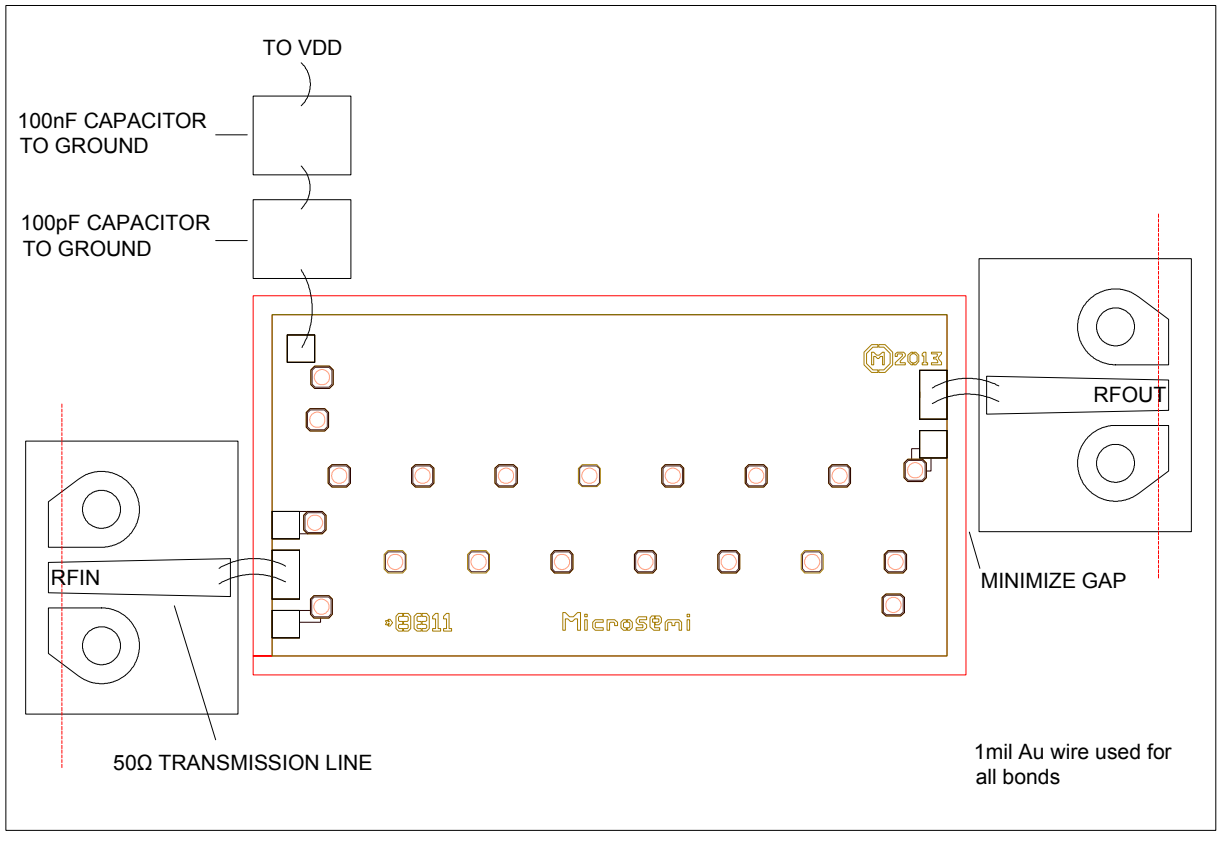
[1] MTTF > 10^8 hours at T_C = 150°C

Caution, ESD Sensitive Device

Table 2: Specifications (CW, 100% Test): T_A = 25°C, V_{DD} = 5V, I_{DD} = 65mA

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[2]

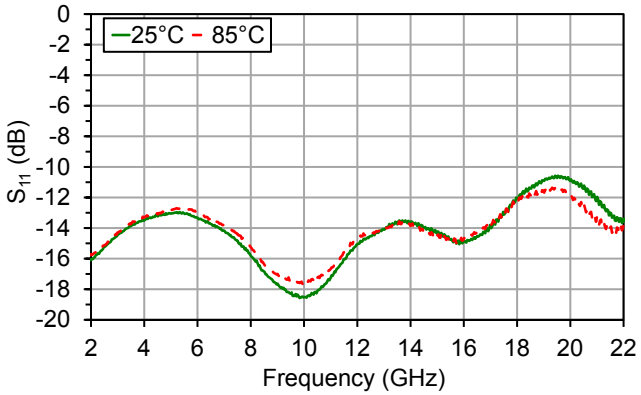


[2] Reference planes are the same for S-parameter files downloadable on www.microsemi.com/mmics

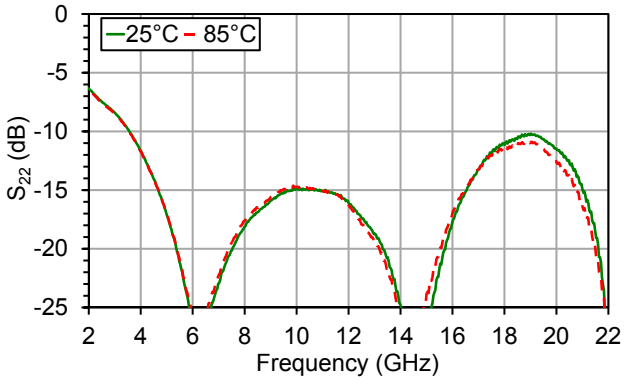
Typical Performance, RF Probe

V_{DD} = 5V, I_{DD} = 50mA, T_A = 25°C unless otherwise noted

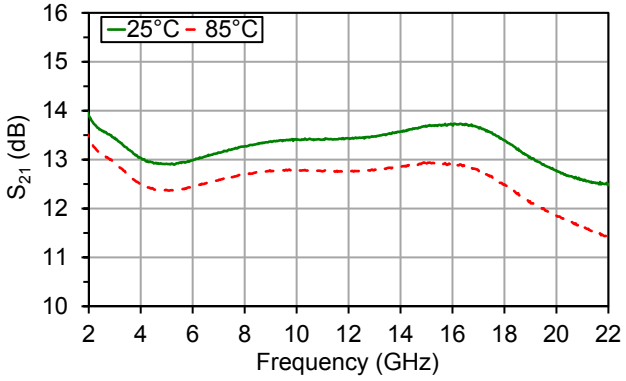
S_{11} Over Temperature



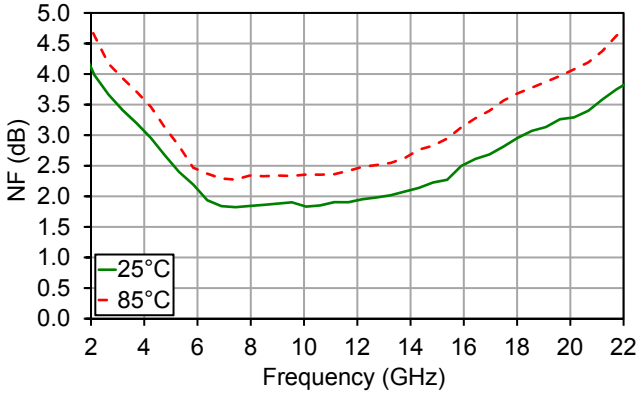
S_{22} Over Temperature



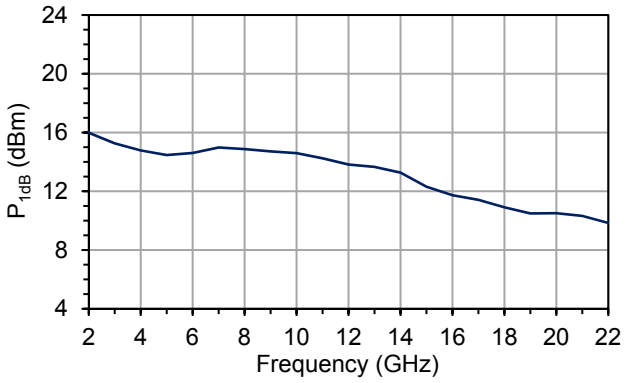
S_{21} Over Temperature



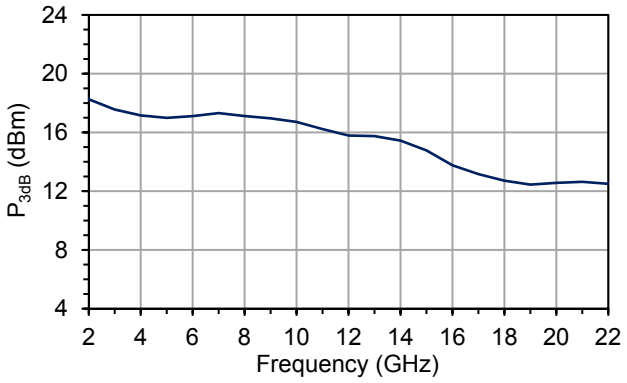
NF Over Temperature



P_{1dB} Over Frequency



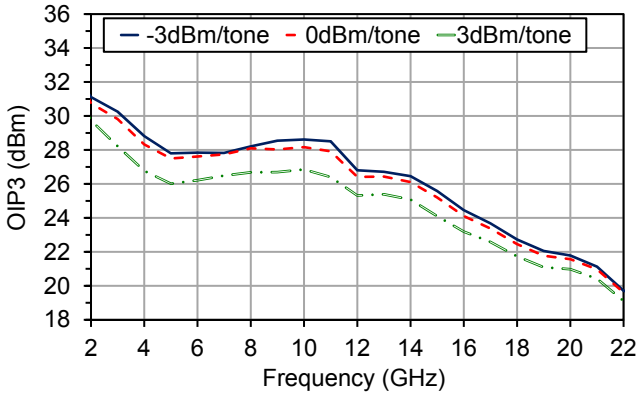
P_{3dB} Over Frequency



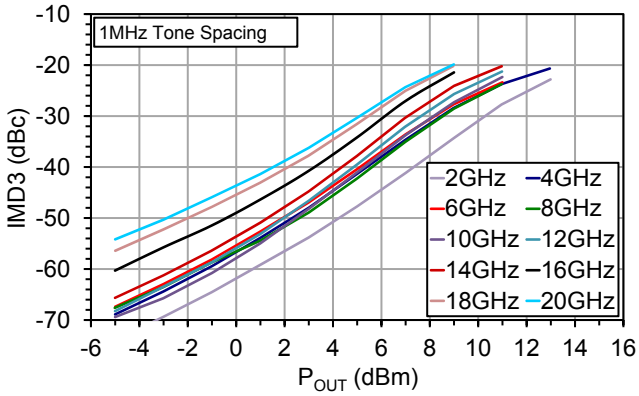
Typical Performance, RF Probe

V_{DD} = 5V, I_{DD} = 50mA, T_A = 25°C unless otherwise noted

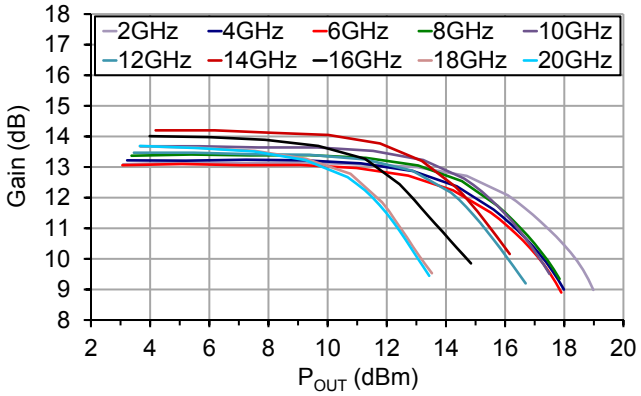
OIP3 Over Frequency



IMD Sweep Over Frequency

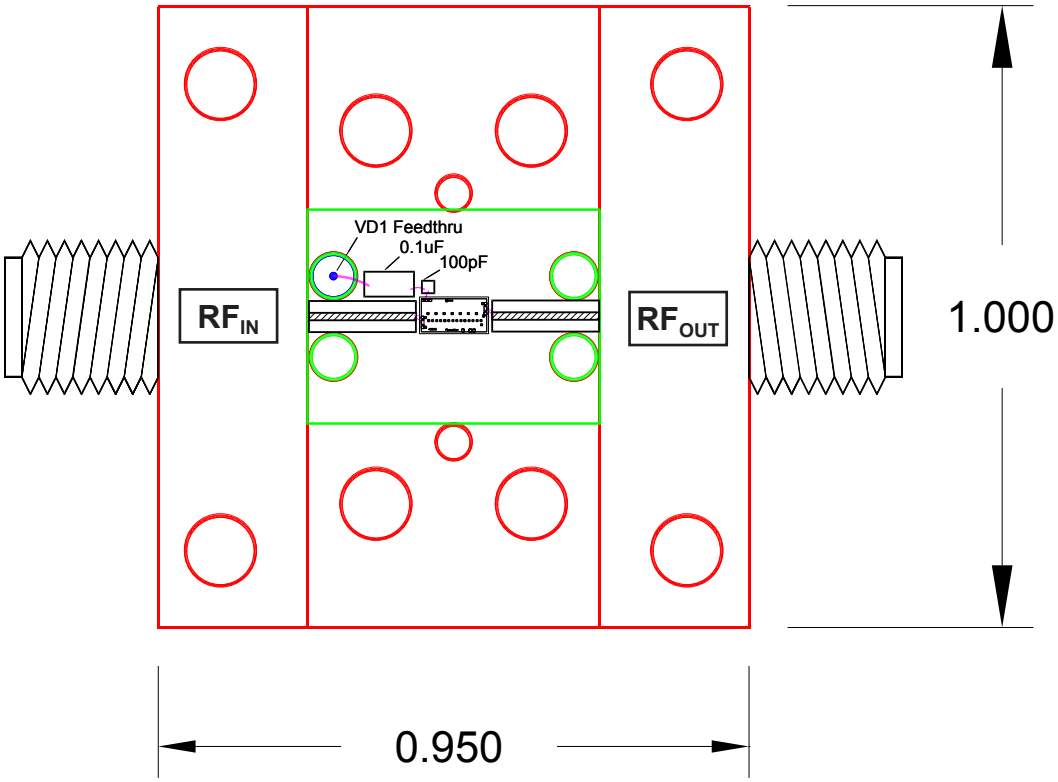


Power Sweep Over Frequency



Connectorized Test Fixture

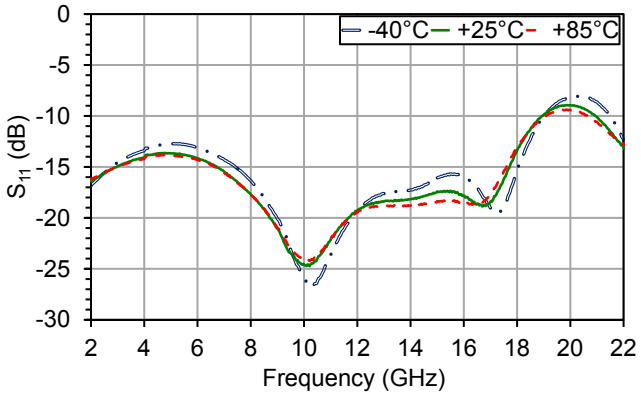
With SMK 2.92mm Connectors



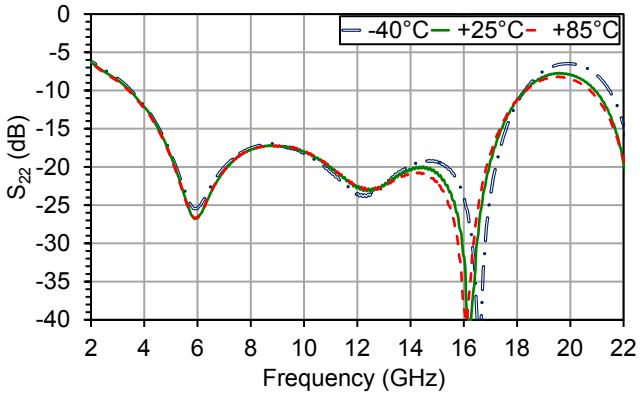
Typical Performance, Connectorized Test Fixture

V_{DD} = 5V, I_{DD} = 50mA, T_A = 25°C unless otherwise noted

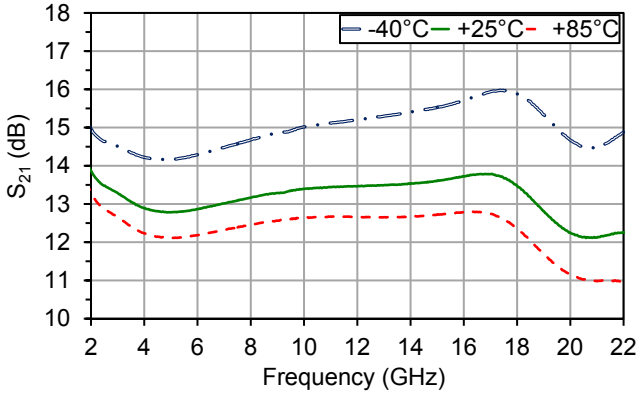
S_{11} Over Temperature



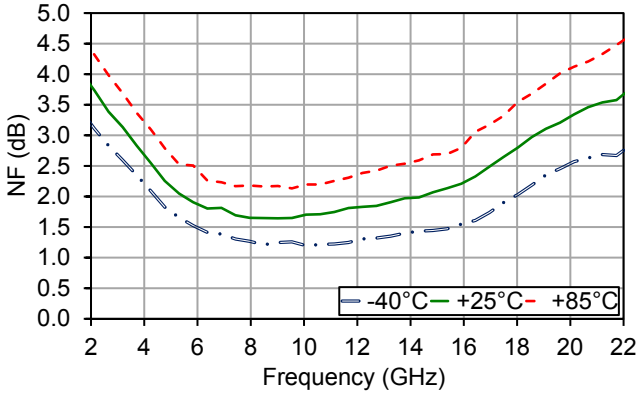
S_{22} Over Temperature



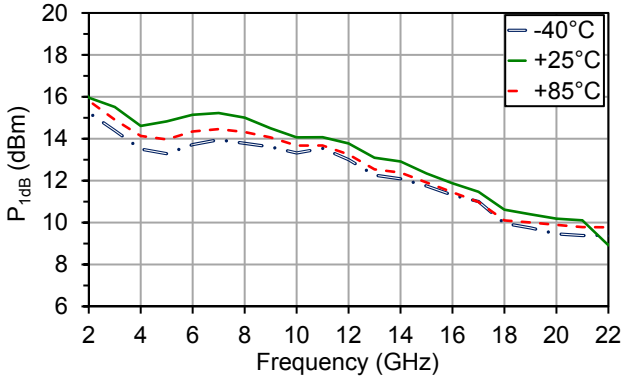
S_{21} Over Temperature



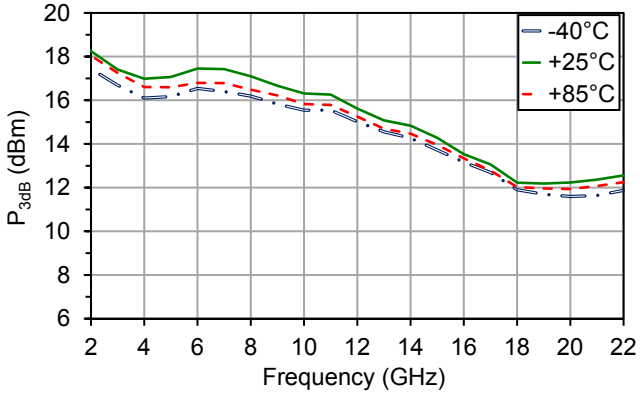
NF Over Temperature



P_{1dB} Over Frequency



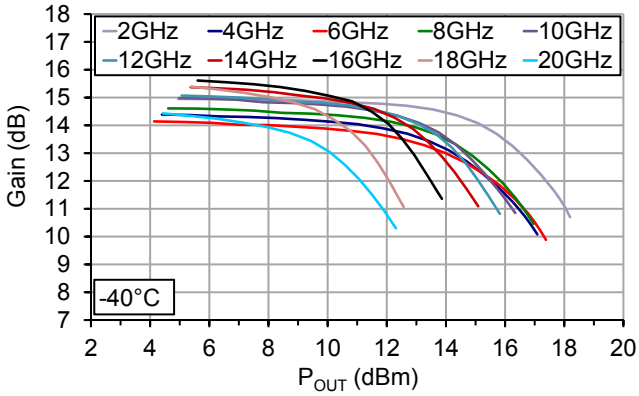
P_{3dB} Over Frequency



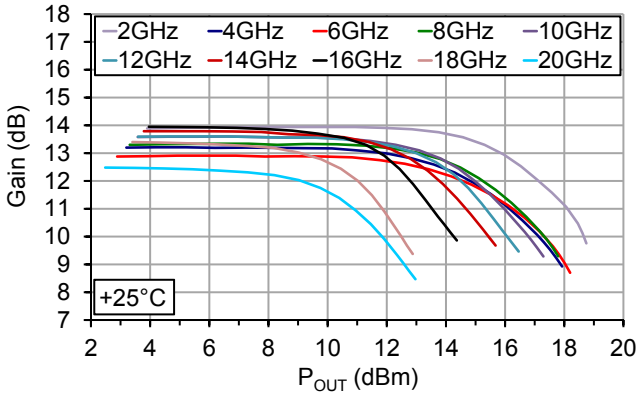
Typical Performance, Connectorized Test Fixture

V_{DD} = 5V, I_{DD} = 50mA, T_A = 25°C unless otherwise noted

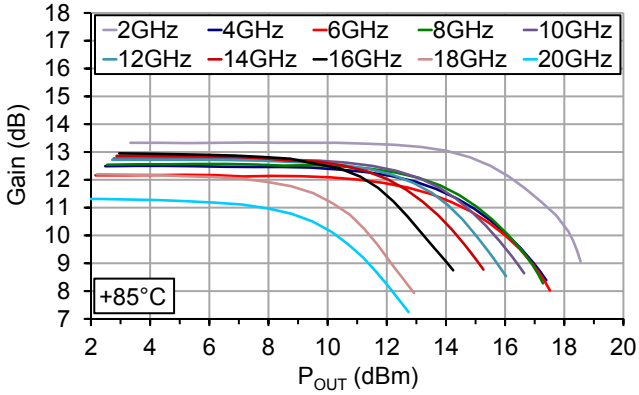
Power Sweep, -40°C



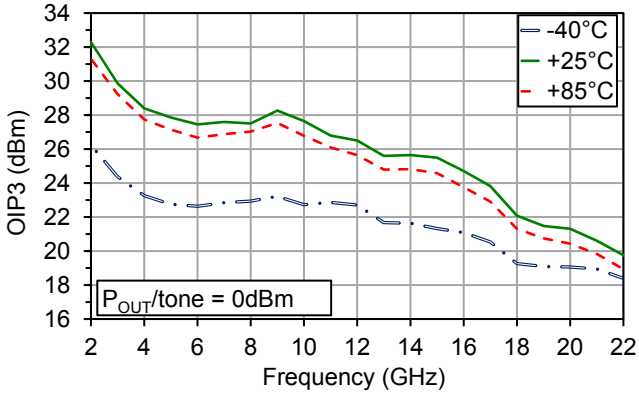
Power Sweep, +25°C



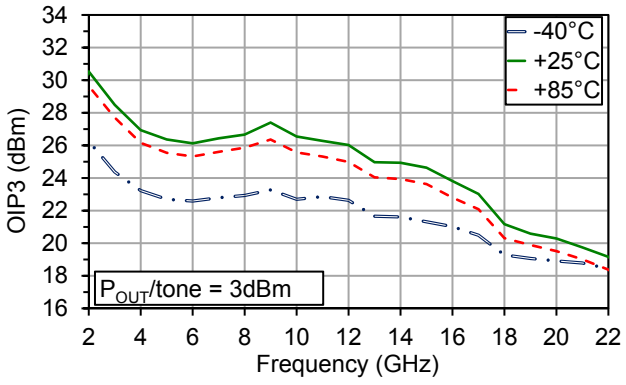
Power Sweep, +85°C



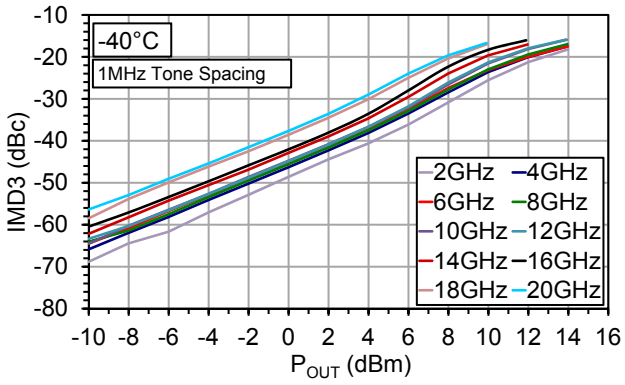
OIP3, P_{OUT}/tone = 0dBm



OIP3, P_{OUT}/tone = 3dBm



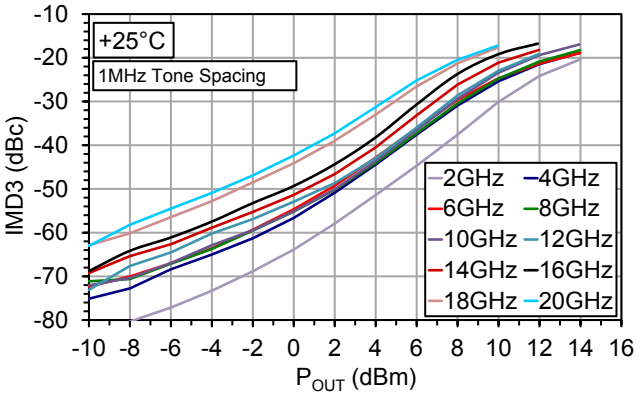
IMD3 Sweep, -40°C



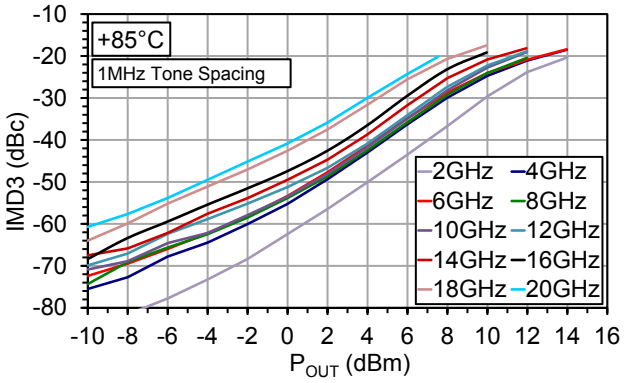
Typical Performance, Connectorized Test Fixture

V_{DD} = 5V, I_{DD} = 50mA, T_A = 25°C unless otherwise noted

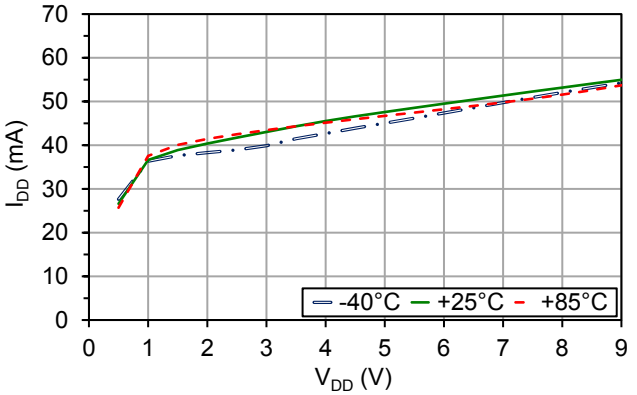
IMD3 Sweep, +25°C



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).

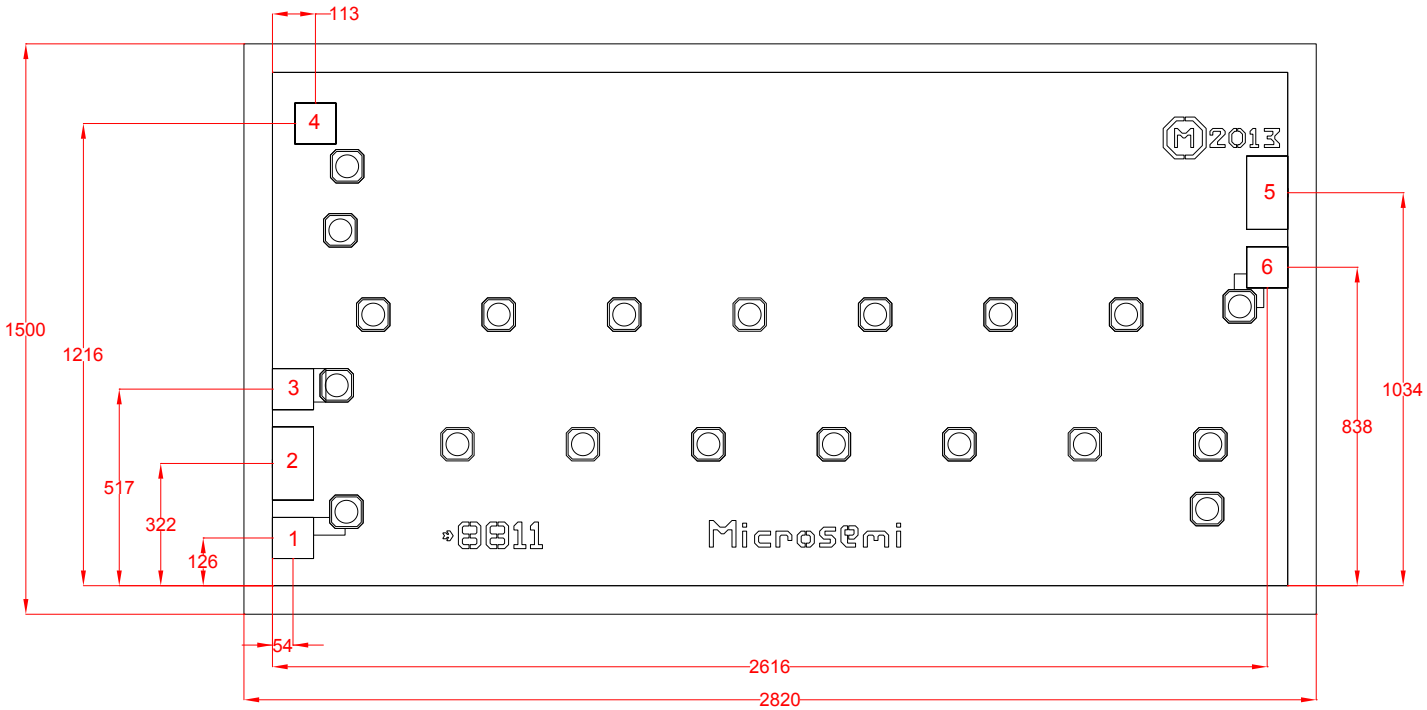


Table 3: Pad Descriptions

Pad #	Descrtiption	Pad Dimensions (µm)
1, 3, 6	Ground	100 x 100
2	RF_{IN}, Pad is AC Coupled	100 x 190
5	RF_{OUT}, Pad is AC Coupled	100 x 190
4	V_{DD}	100 x 100

Biasing

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

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