

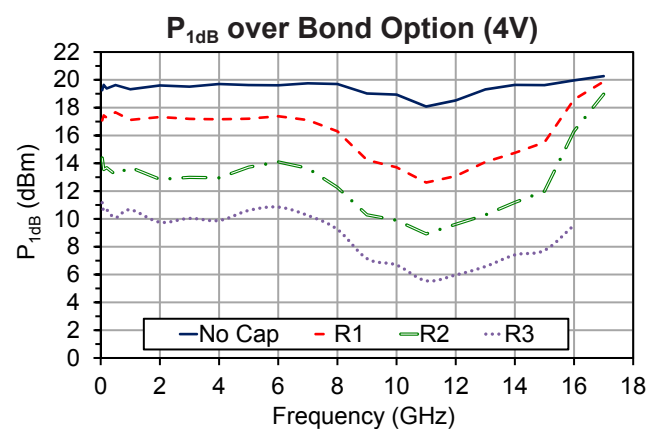
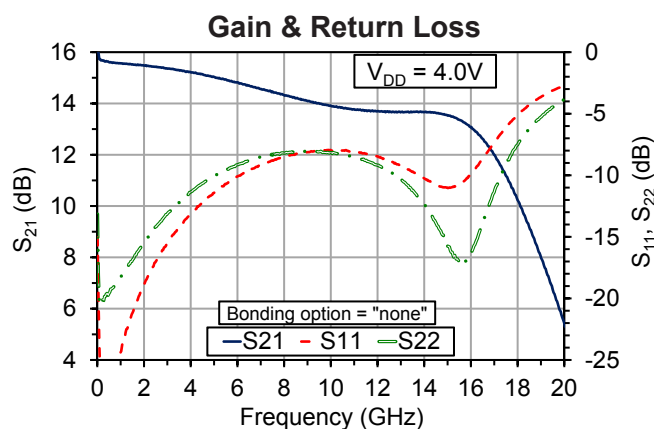
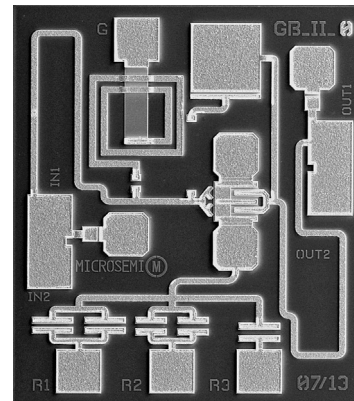
# DC-16GHz, Power-Selectable Wideband Amplifier

## Features

- Power-selectable from 7 to 19dBm  $P_{1dB}$  and 16-21dBm  $P_{3dB}$  by choosing bond option
- Gain of 13-16dB and 29dBm OIP3 at the highest power option
- Gain varies <1.4dB from -40°C to +85°C
- Self-biased with single positive supply
- Input and Output matched to 50Ω
- 0.76mm x 0.66mm x 0.1mm die size

## Applications

- Instrumentation
- Electronic warfare
- Microwave communications
- Radar



**RF Specifications (CW, Typical Device, RF Probe):**  $T_A = 25^\circ C$ ,  $V_{DD} = 4V^1$

Bond Option	ID	Gain	$P_{1dB}$	OIP3
None	80	14.5	19	29
R1 to Ground	45	12.5	15	25
R2 to Ground	32	11.5	12	22
R3 to Ground	24	10.5	8	18

<sup>1</sup> Device is intended for small-signal applications only

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

Parameter	Value	Units
Drain Voltage ( $V_D$ )	+4.5	V
Input Power ( $P_{IN}$ )	+19	dBm
Operating Channel Temperature	175 <sup>2</sup>	°C
Operating Ambient Temperature ( $T_A$ )	-55 to +85	°C
Storage Temperature	-65 to 150	°C
Thermal Resistasnce, Channel to Die Backside	175	°C/W



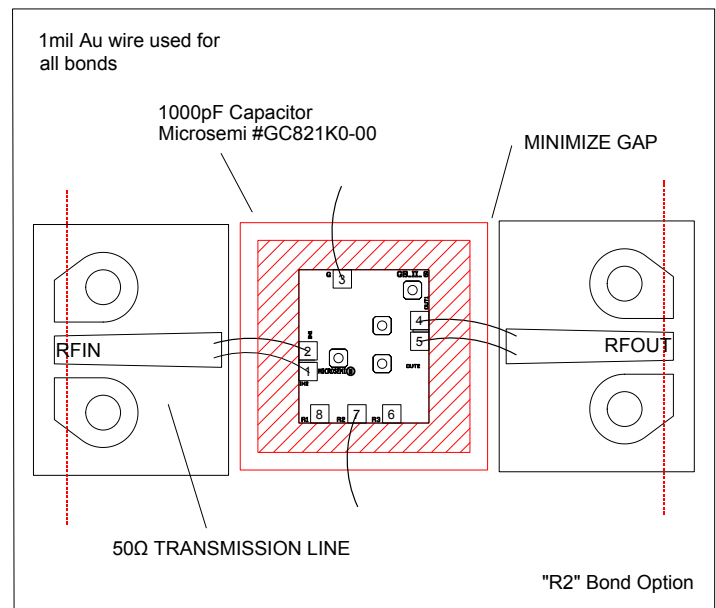
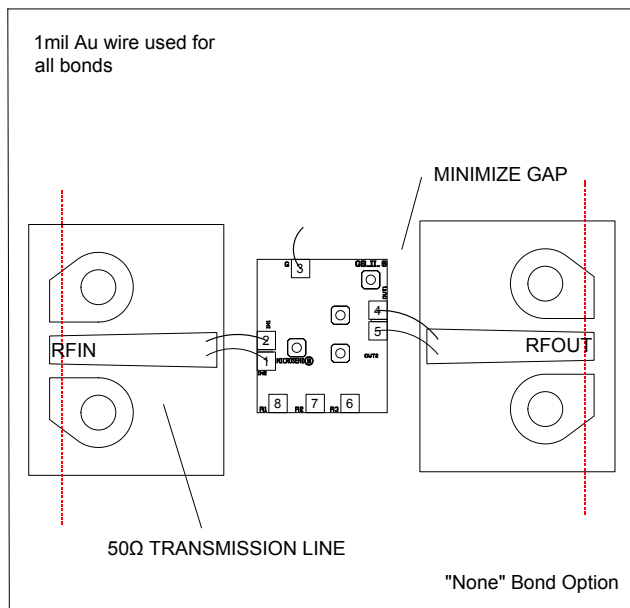
Caution, ESD Sensitive Device

<sup>2</sup> MTTF ~ 10<sup>7</sup> hours at  $T_{channel} = 175^\circ\text{C}$ . Device is intended for small-signal applications only  
 Note: Bare die is non-hermetic; recommend to use in an environmentally sealed package.

**Table 2: Specifications (CW, 100% Test):  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 4\text{V}$** 

Parameter	Min	Typ	Max	Units
$I_{DD}$ , bond option = "none"	45	80	115	mA

### RF Probe Measurement Set-Up With Reference Planes<sup>3</sup>



To use the "none" bonding option, attach the die directly to the baseplate.

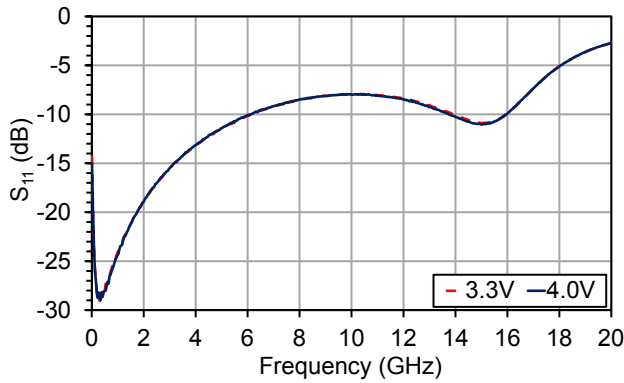
To use the "R1", "R2" or "R3" bonding options, mount the die on top of a capacitor to float the source and bond the appropriate pad to ground.

<sup>3</sup> Reference planes are the same for S-parameter files downloadable on [www.microsemi.com/mmics](http://www.microsemi.com/mmics)

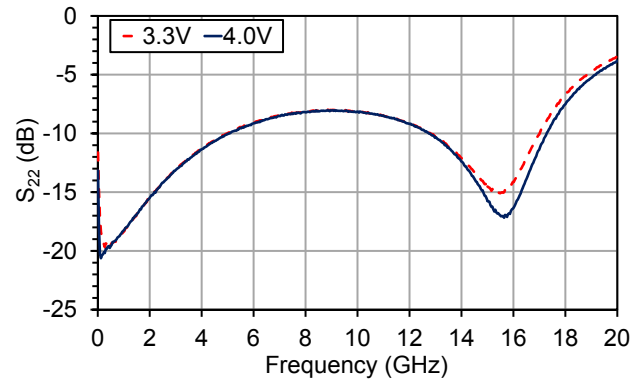
## Typical Performance, RF Probe

$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , bond option = "none" unless otherwise noted

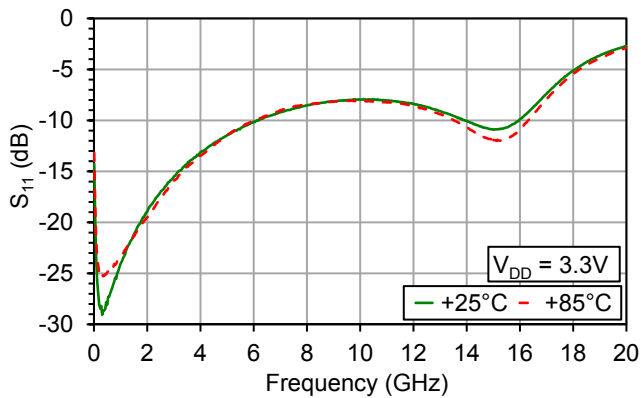
**$S_{11}$  Over  $V_{DD}$**



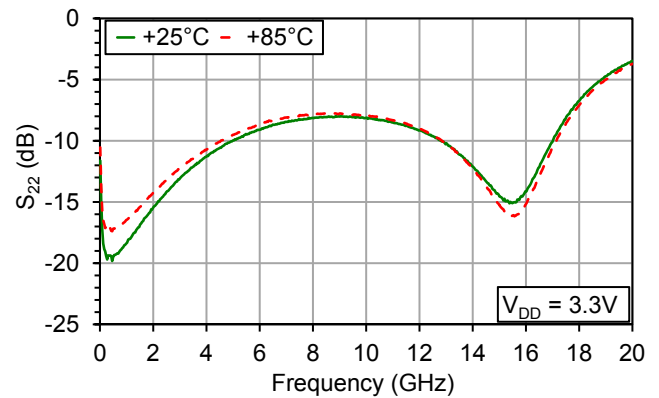
**$S_{22}$  Over  $V_{DD}$**



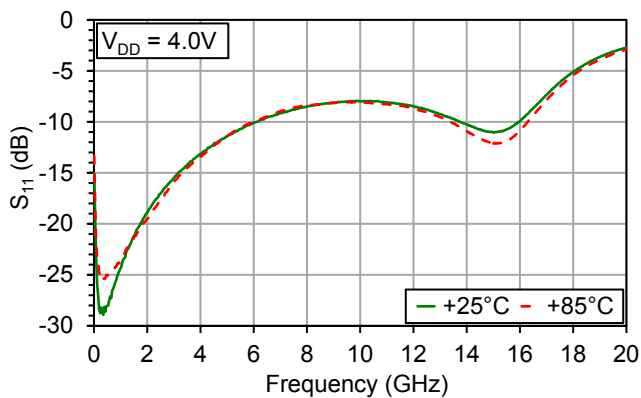
**$S_{11}$  Over Temperature,  $V_{DD} = 3.3V$**



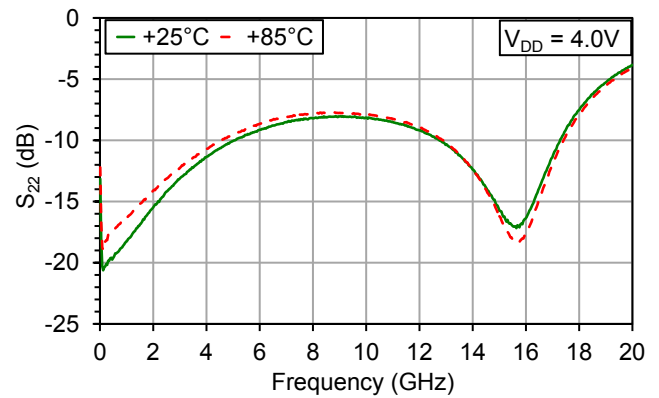
**$S_{22}$  Over Temperature,  $V_{DD} = 3.3V$**



**$S_{11}$  Over Temperature,  $V_{DD} = 4.0V$**



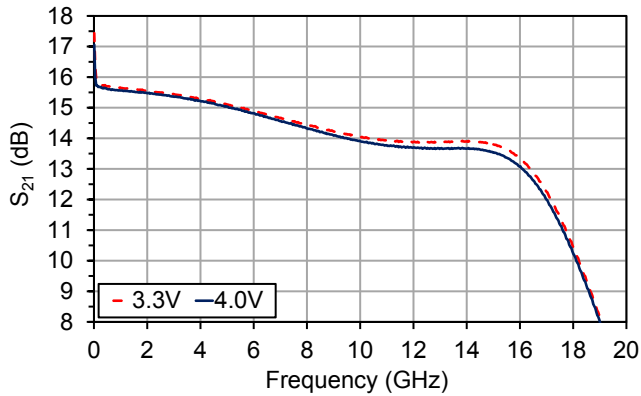
**$S_{22}$  Over Temperature,  $V_{DD} = 4.0V$**



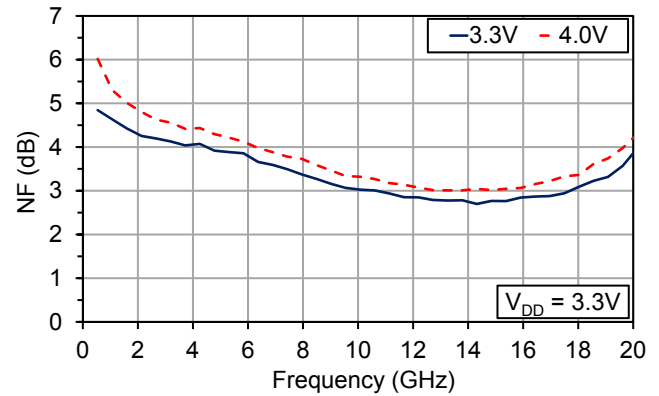
## Typical Performance, RF Probe

$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , bond option = "none" unless otherwise noted

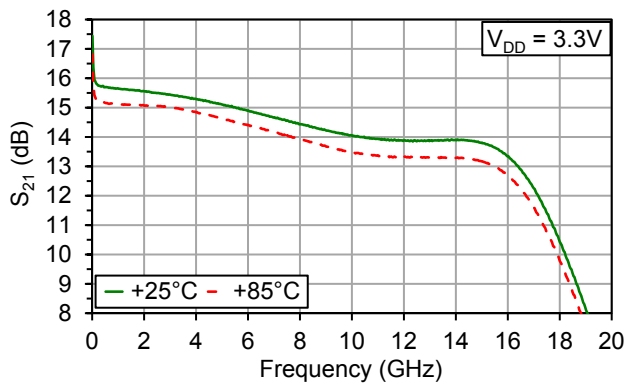
### $S_{21}$ Over $V_{DD}$



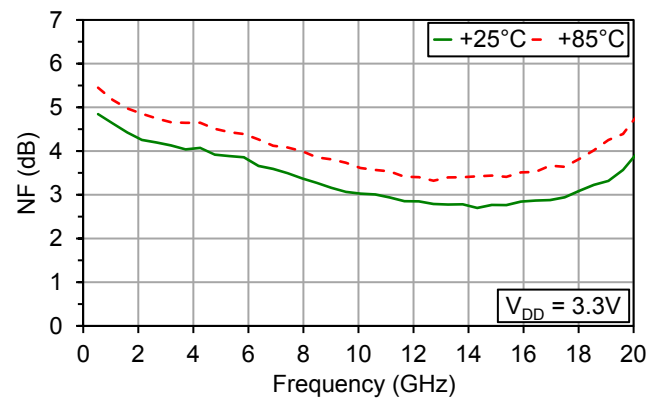
### NF Over $V_{DD}$



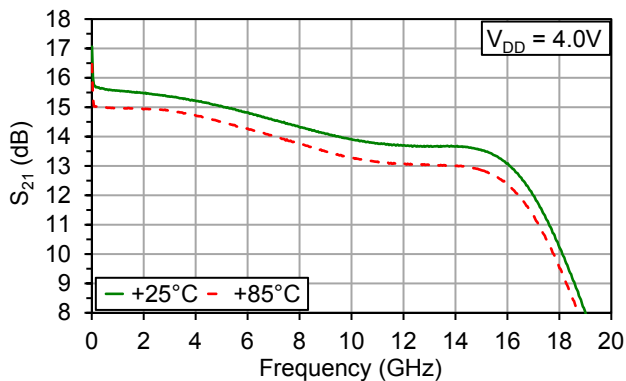
### $S_{21}$ Over Temperature, $V_{DD} = 3.3V$



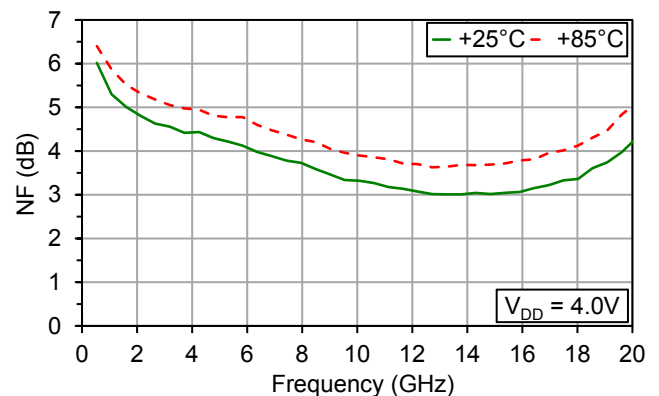
### NF Over Temperature, $V_{DD} = 3.3V$



### $S_{21}$ Over Temperature, $V_{DD} = 4.0V$



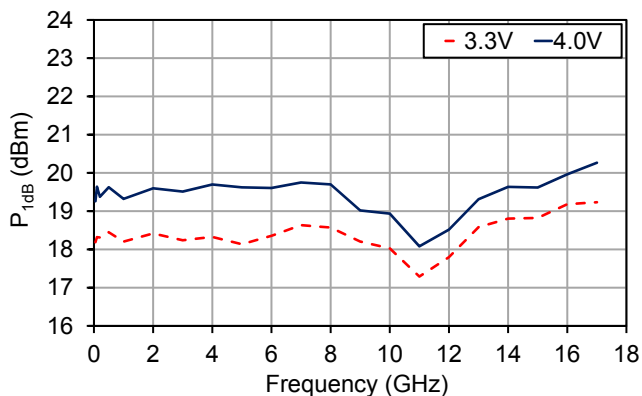
### NF Over Temperature, $V_{DD} = 4.0V$



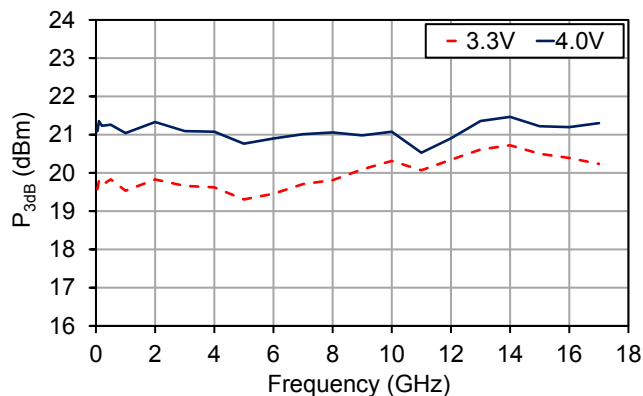
## Typical Performance, RF Probe

$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , bond option = "none" unless otherwise noted

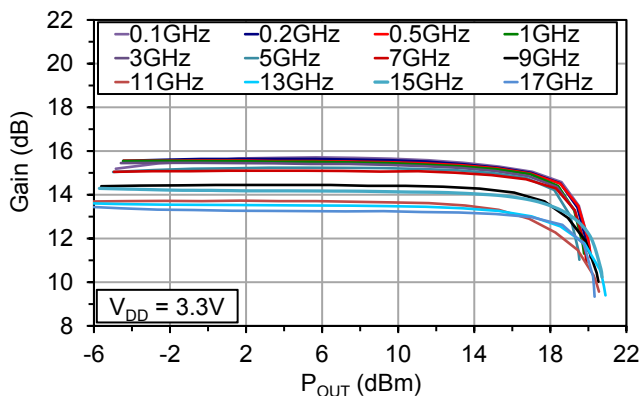
### $P_{1dB}$ Over $V_{DD}$



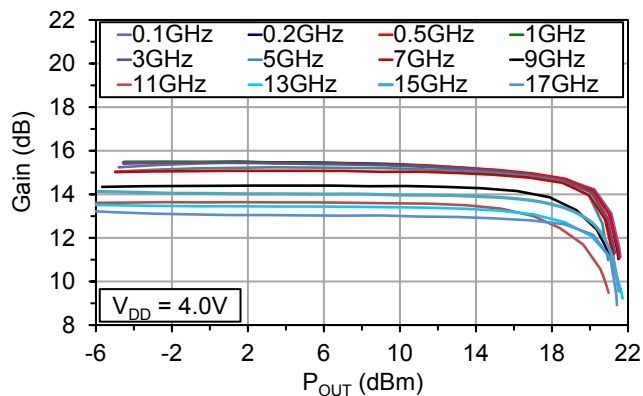
### $P_{3dB}$ Over $V_{DD}$



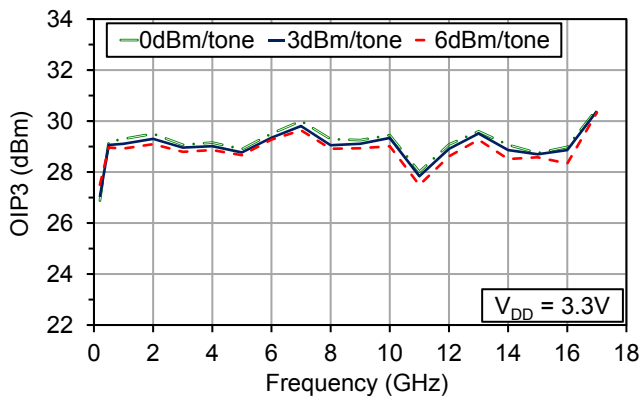
### Power Sweep



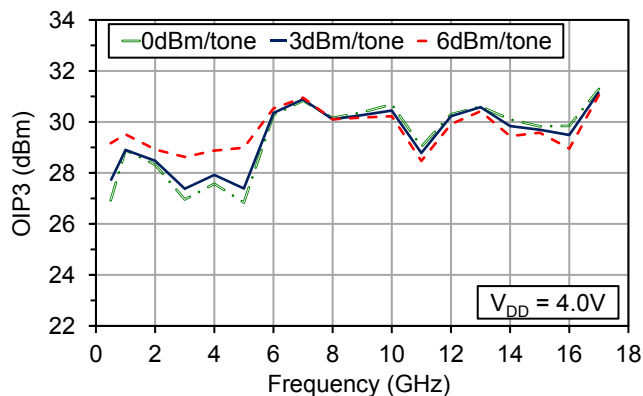
### Power Sweep



### OIP3 Over $P_{OUT}$

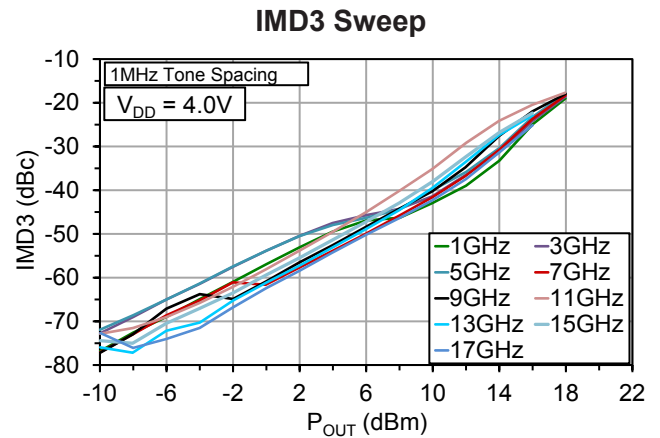
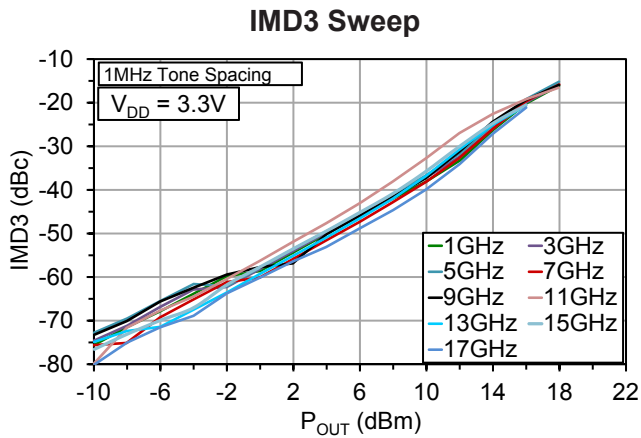


### OIP3 Over $P_{OUT}$



## Typical Performance, RF Probe

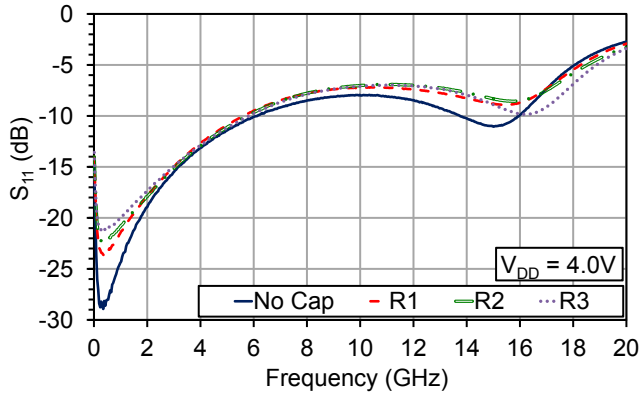
$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , bond option = "none" unless otherwise noted



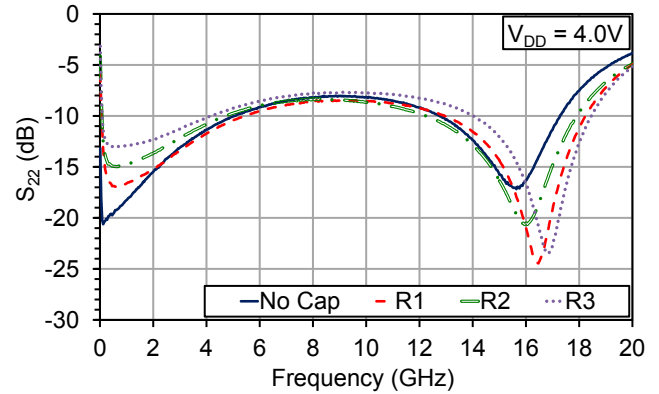
## Typical Performance, RF Probe

$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , performance over bond option

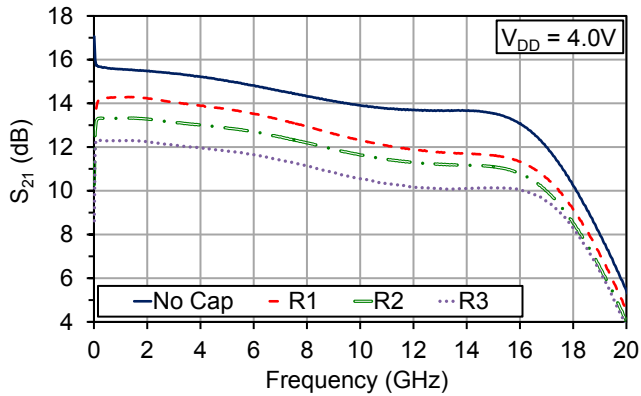
**$S_{11}$  Over Bonding Option**



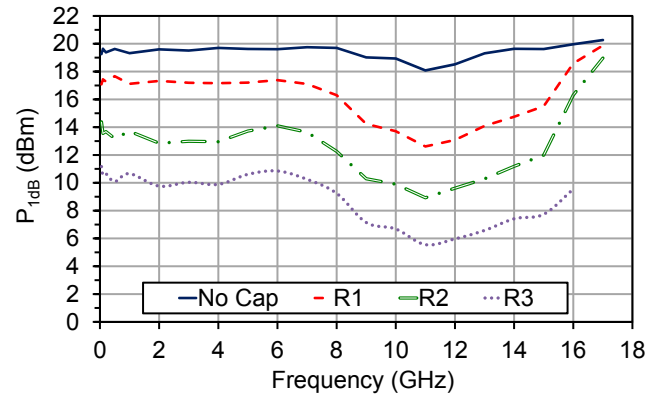
**$S_{22}$  Over Bonding Option**



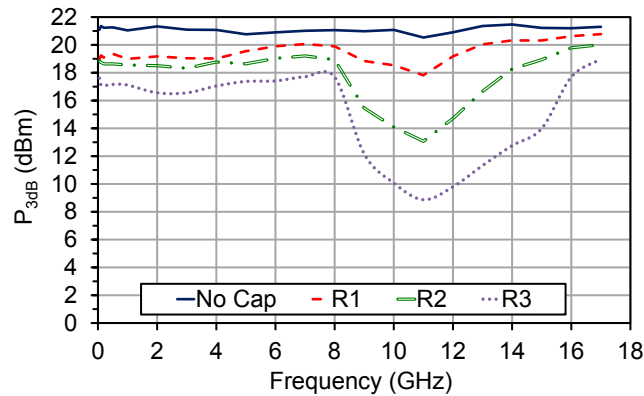
**$S_{21}$  Over Bonding Option**



**$P_{1dB}$  Over Bonding Option**

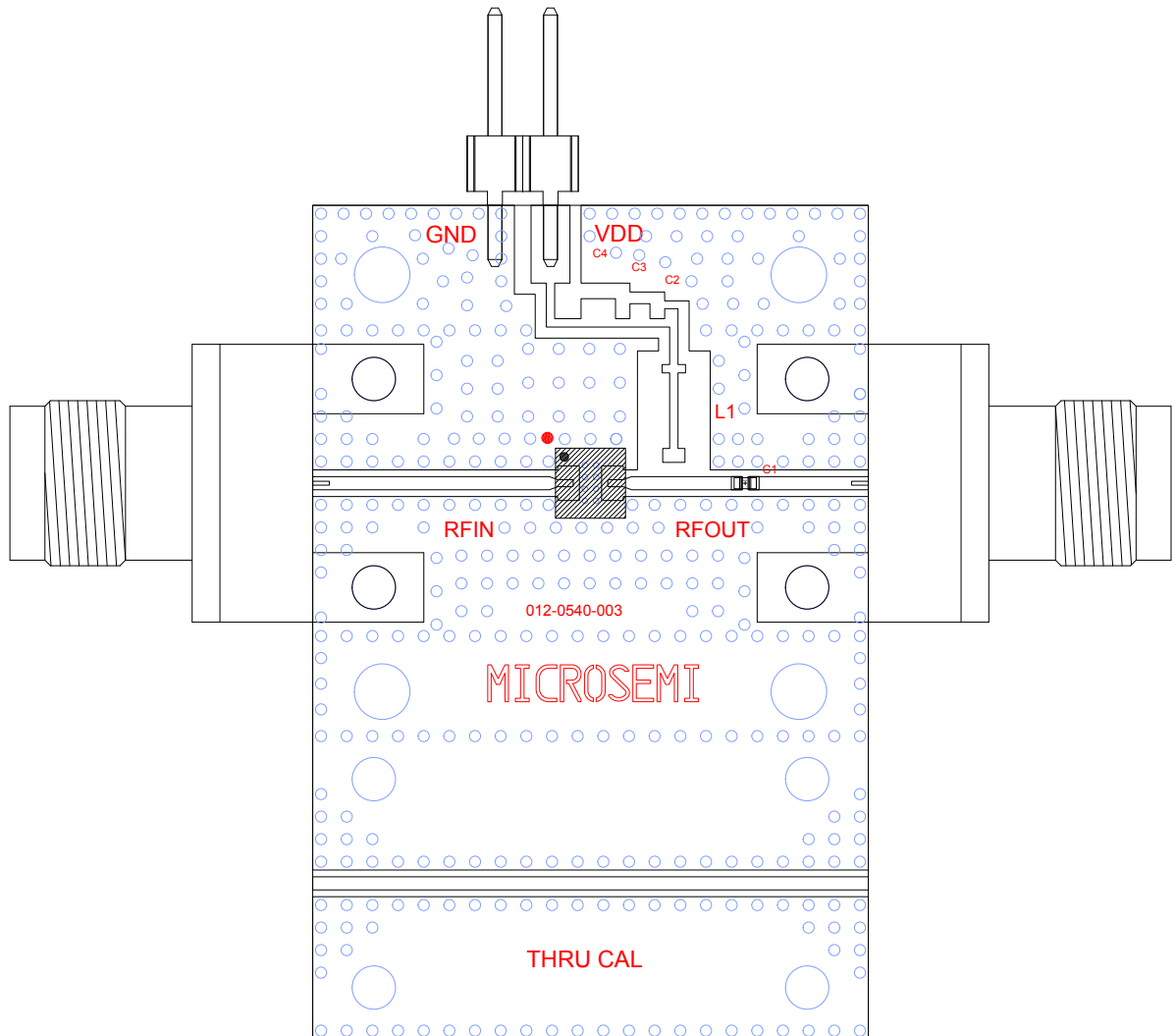


**$P_{3dB}$  Over Bonding Option**



## Connectorized Test Fixture

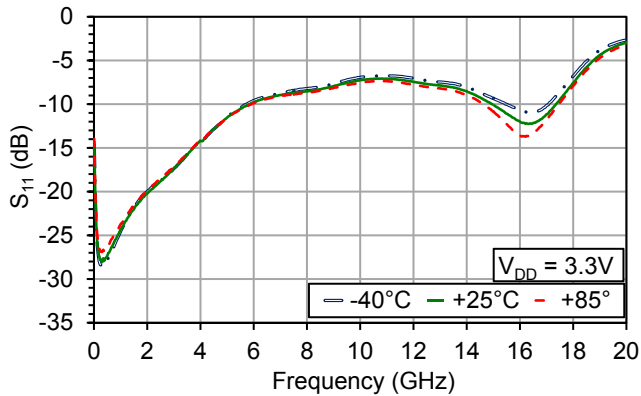
With SMK 2.92mm Connectors



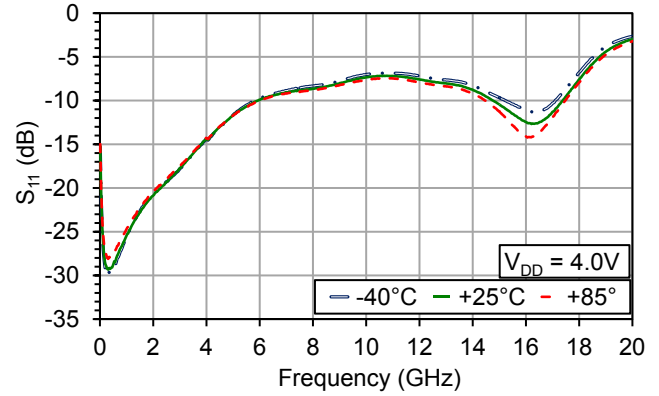
## Typical Performance, Connectorized Test Fixture

$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , bond option = "none" unless otherwise noted

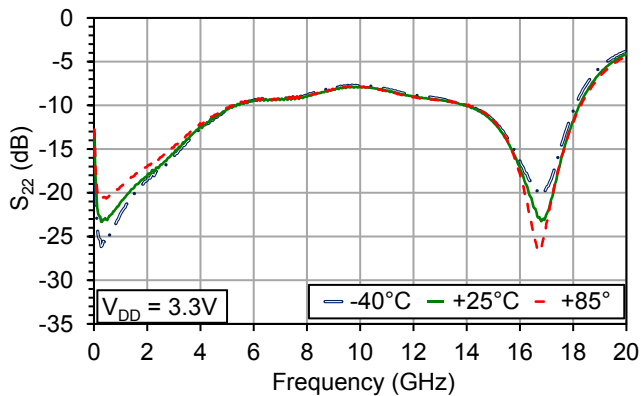
### $S_{11}$ Over Temperature



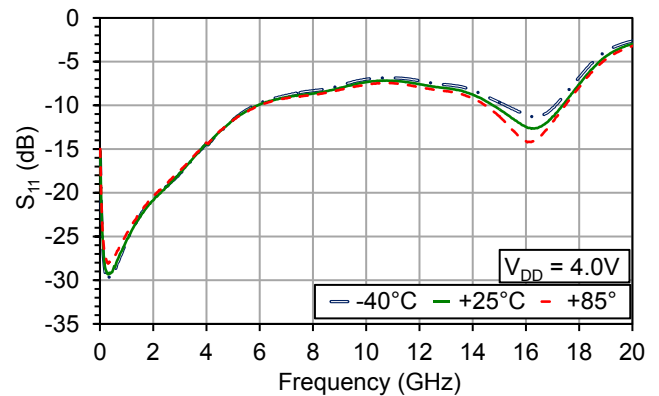
### $S_{11}$ Over Temperature



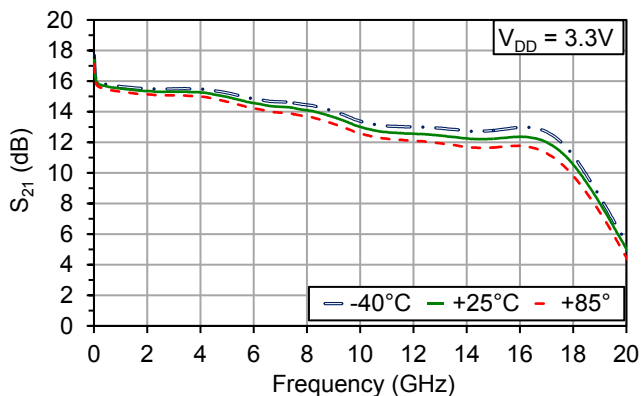
### $S_{22}$ Over Temperature



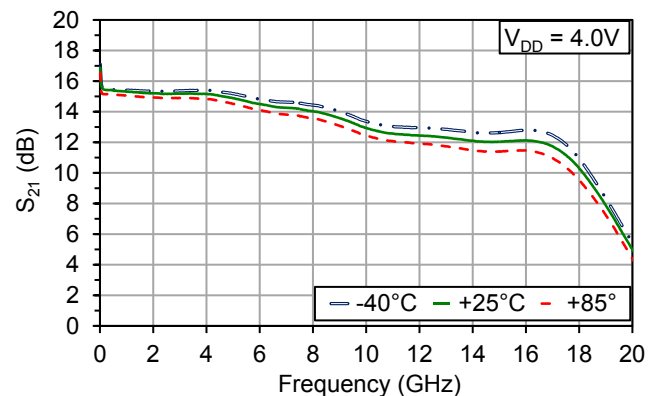
### $S_{22}$ Over Temperature



### $S_{21}$ Over Temperature



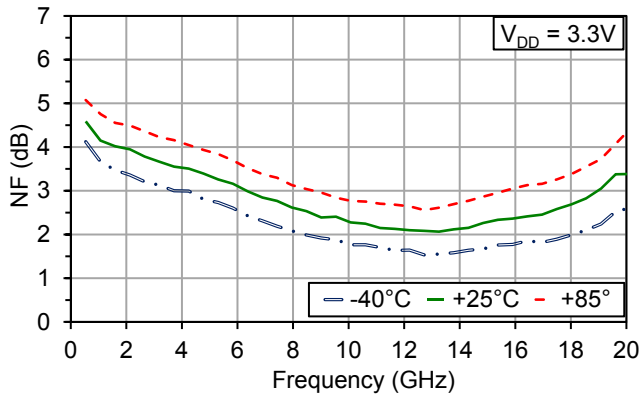
### $S_{21}$ Over Temperature



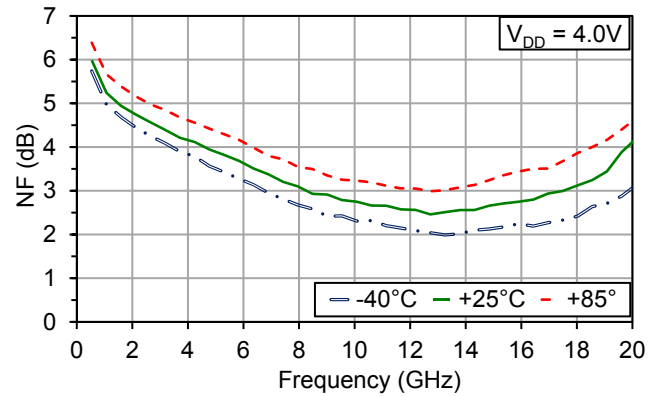
## Typical Performance, Connectorized Test Fixture

$V_{DD} = 4V$ ,  $I_{DD} = 80mA$ ,  $T_A = 25^\circ C$ , bond option = "none" unless otherwise noted

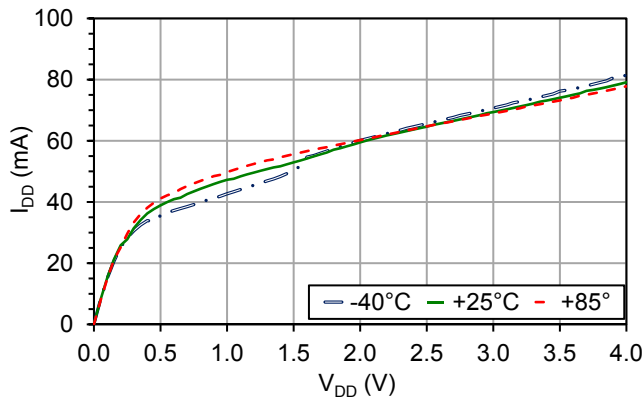
**NF Over Temperature**



**NF Over Temperature**

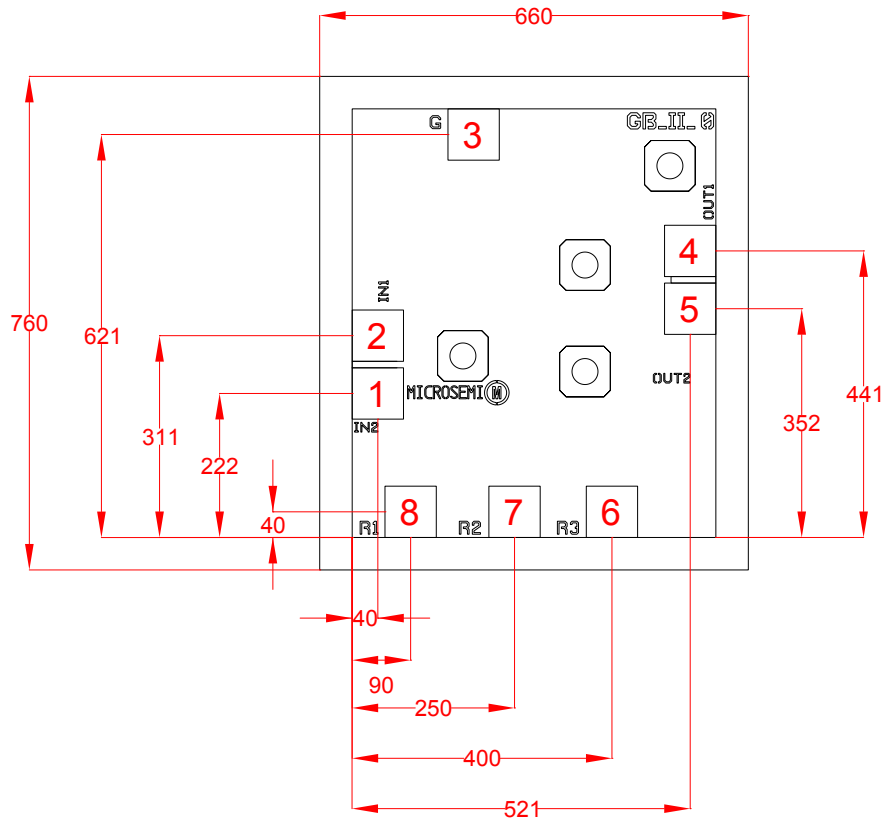


**DC,  $I_{DD}$**



### 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)). See Page 2 for example bonding configurations.



**Table 3: Pad Descriptions**

Pad #	Description	Pad Dimensions ( $\mu\text{m}$ )
1, 2	$\text{RF}_{\text{IN}}$ , DC coupled	75 x 75
3	Ground	75 x 75
4, 5	$\text{RF}_{\text{OUT}}$ , coupled	75 x 75
6	R3 bond option	75 x 75
7	R2 bond option	75 x 75
8	R1 bond option	75 x 75
Die Backside	Refer to bonding option on page 2	-

### Biasing

MMA016AA is a self-biased device with a single positive supply. Apply  $V_{\text{DD}}$   $\text{RF}_{\text{OUT}}$ .

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