

1.5 Watt K-Band VSAT Power Amplifier

13.75 - 14.5 GHz

V1P.0

MAAPSS0065

MAAPSS0065

Features

- High Linear Gain: 32 dB Typ.
- High Saturated Output Power: +32 dBm Typ.
- High Power Added Efficiency: 25% Typ.
- 50 Ω Input / Output Broadband Matched
- Integrated Output Power Detector

Description

M/A-COM's MAAPSS0065 is a four stage MMIC power amplifier in a bolt down ceramic package, allowing easy assembly. The MAAPSS0065 employs a fully matched chip with internally decoupled gate and drain bias networks. The MAAPSS0065 is designed to operate from a constant current drain supply or a constant voltage gate supply. By varying the bias conditions, the saturated output power performance of this device may be tailored for various applications.

The MAAPSS0065 is ideally suited for use as an output stage or a driver amplifier in VSAT systems. The MAAPSS0065 includes internal supply line bypassing in the package, minimizing the number of external components required. M/A-COM's MAAPSS0065 is fabricated using a mature 0.5 micron MBE based GaAs MESFET process. The process features full passivation for increased performance and reliability. This product is 100% RF tested to ensure compliance to performance specifications.

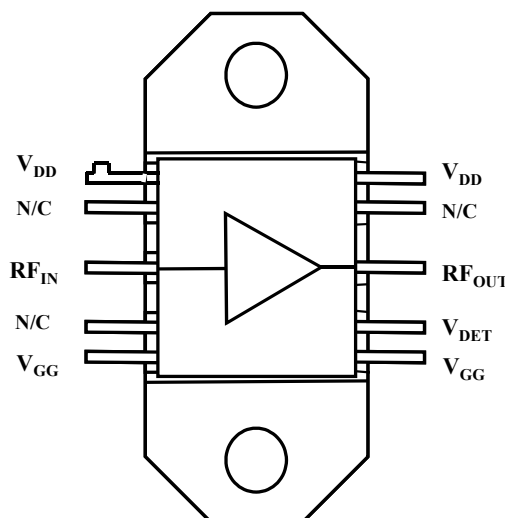
Absolute Maximum Ratings^{1,2}

Parameter	Absolute Maximum
Input Power	+13 dBm
Operating Voltages	$V_{DD} = +10$ volts; $V_{GG} = -3$ volts; $V_{DD} - V_{GG} = 12$ volts
I_{ds}	1000 mA
Channel Temperature	+150 °C
Operating Temperature	-40 °C to +80 °C
Storage Temperature	-65 °C to +150 °C

1. Exceeding any one or a combination of these limits may cause permanent damage.

2. Adequate heat sinking and grounding required on flange base.

Functional Schematic



Pin Configuration

PIN No.	PIN Name	Description
1	V_{DD}	Drain Supply
2	N/C	No Connect
3	RF_{IN}	RF Input
4	N/C	No Connect
5	V_{GG}	Gate Supply
6	V_{GG}	Gate Supply
7	V_{DET}	Output Power Detector
8	RF_{OUT}	RF Output
9	N/C	No Connect
10	V_{DD}	Drain Supply
Flange	GND	RF & DC Ground

Ordering Information

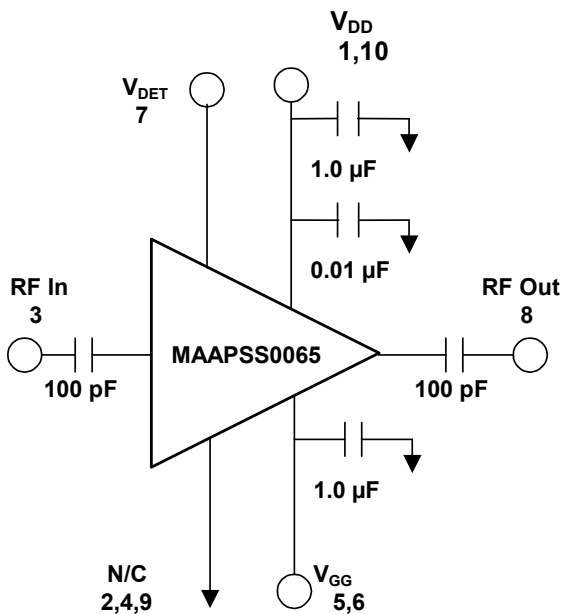
Part Number	Package
MAAPSS0065	CR-15 Ceramic Bolt Down Package

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Electrical Specifications: $V_{DD} = 8.0\text{ V}$, $I_{DS} = 750\text{ mA}$, $T_A = 25^\circ\text{C}$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Linear Gain	$P_{in} = -20\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dB		32	
Input Return Loss	$P_{in} = -20\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dB		-13	
Output Return Loss	$P_{in} = -20\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dB		-9	
Output Power	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dBm		32	
Output Power vs. Frequency	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dB		± 0.3	
Output Power vs. Temperature	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $P_{in} = +3\text{ dBm}$	dB		± 0.5	
Drain Bias Current	$P_{in} = +3\text{ dBm}$	mA		750	
Gate Bias Voltage	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	V		-1.0	
Gate Bias Current	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	mA		10	
Thermal Resistance (θ_{JC})	25°C Heat Sink	$^\circ\text{C/W}$		8.0	
Second Harmonic	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dBc		-35	
Third Harmonic	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	dBc		-45	
Detector Voltage	$P_{in} = +3\text{ dBm}$, $I_{ds} = 750\text{ mA Typ.}$	V		2.4	

Application Schematic ^{3,4}

3. External DC blocking capacitors required on the RF ports.
 4. For optimum IP3 performance, V_{DD} bypass capacitors should be placed within 0.5 inches of the V_{DD} leads.

Handling Procedures

Please observe the following precautions to avoid damage to the MAAPSS0065:

Static Sensitivity

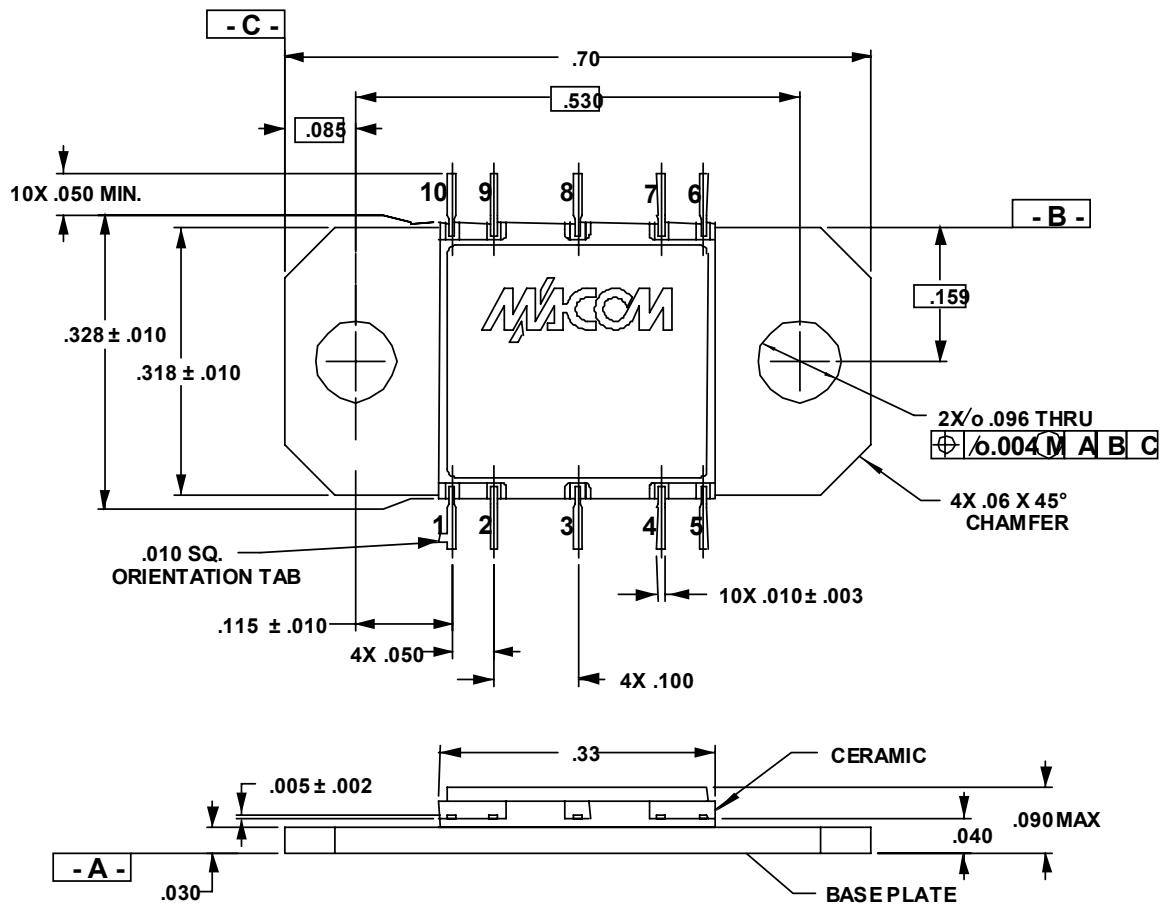
Gallium arsenide integrated circuits are ESD sensitive and can be damaged by static electricity. Use proper ESD precautions when handling these devices.

Operating the MAAPSS0065

The MAAPSS0065 is static sensitive. Please handle with care. To operate the device, follow these steps.

1. Apply -2.0 Volts to V_{GG} .
2. Ramp V_{DD} to +8V.
3. Adjust V_{GG} to set typical drain current .
4. Apply RF.
5. Power down sequence in reverse. Turn gate voltage off last.

CR-15



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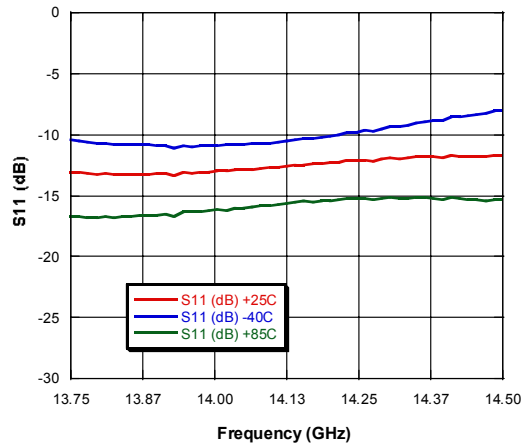
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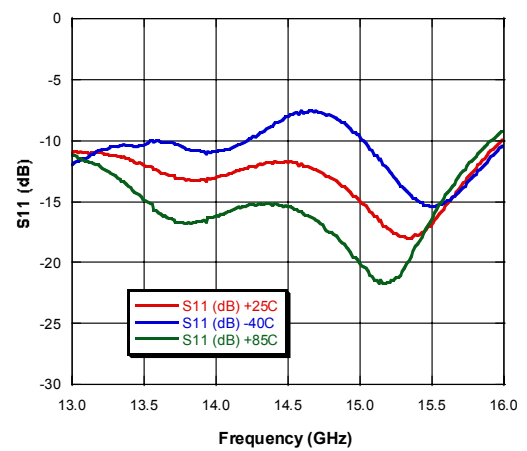
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Typical Performance Curves

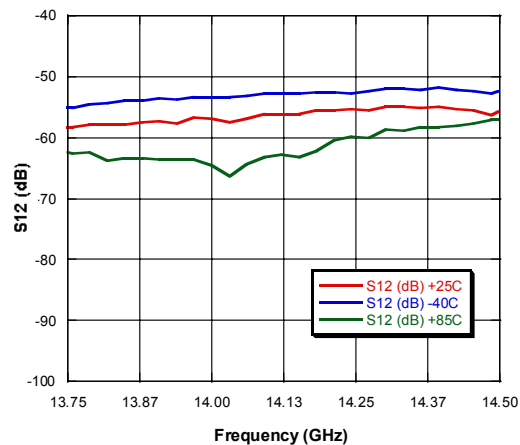
S11 over Temperature



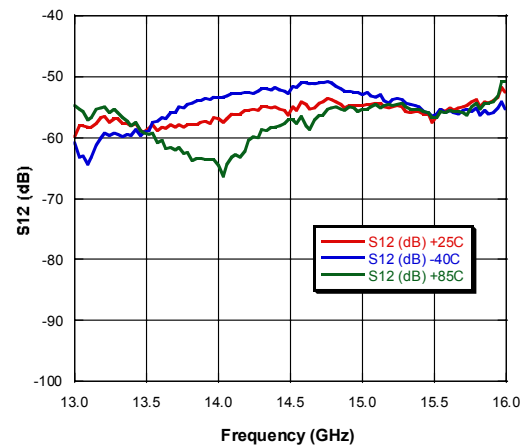
S11 Broadband over Temperature



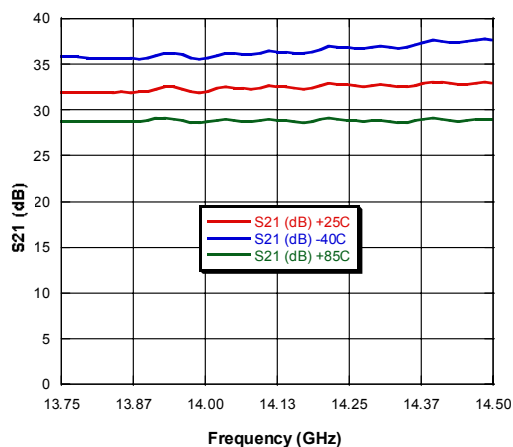
S12 over Temperature



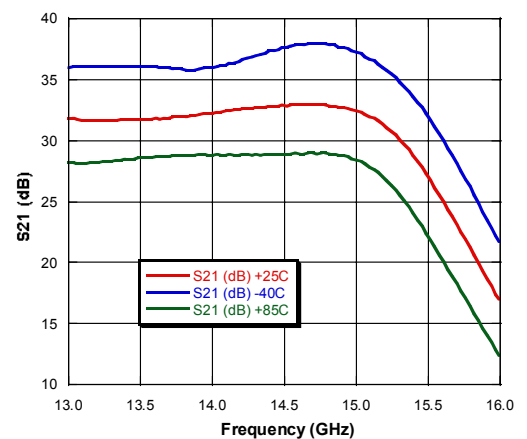
S12 Broadband over Temperature



S21 over Temperature



S21 Broadband over Temperature



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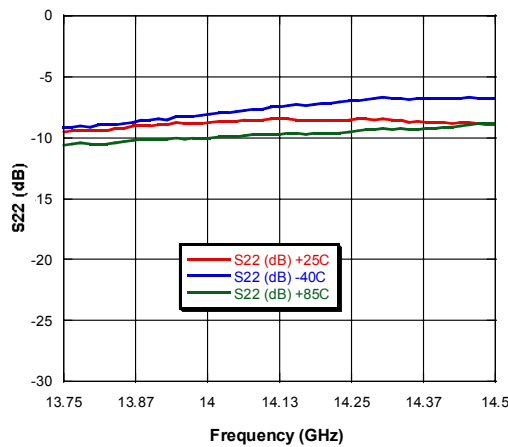
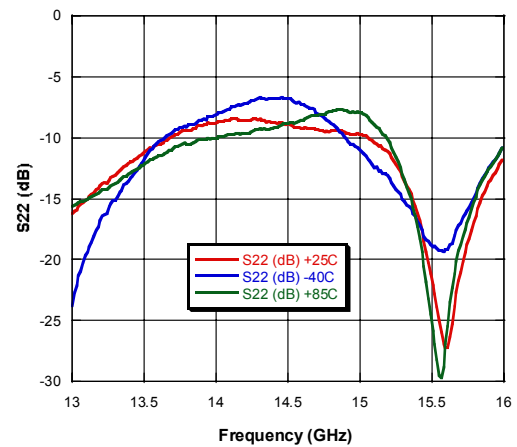
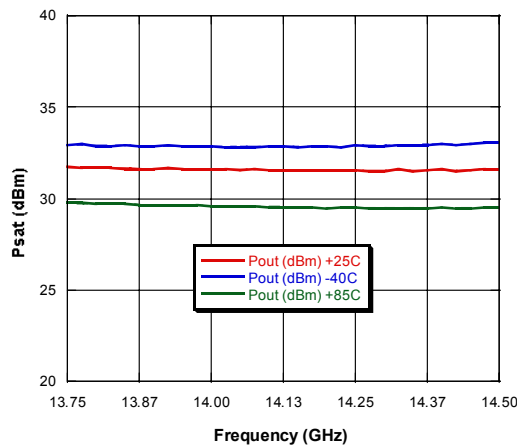
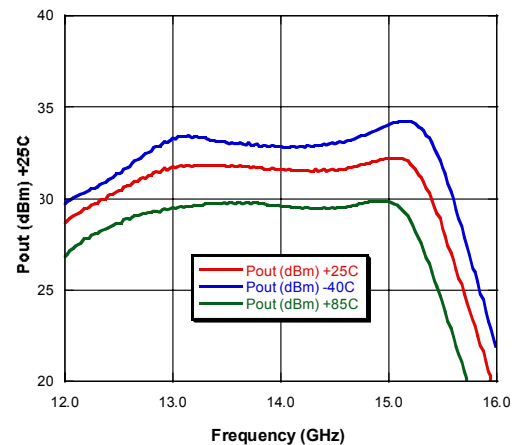
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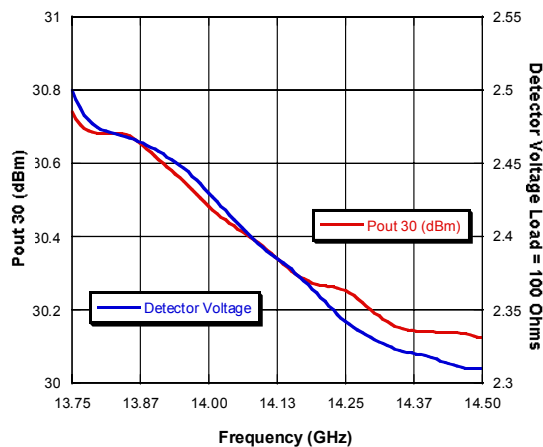
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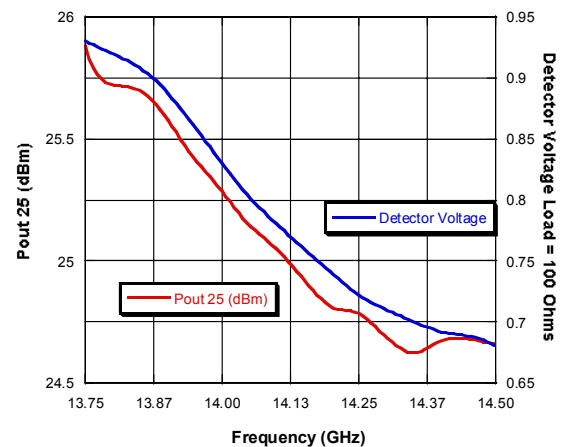
Typical Performance Curves (continued)

S₂₂ over TemperatureS₂₂ Broadband over TemperatureP_{SAT} over TemperatureP_{SAT} Broadband over Temperature

Detector Voltage at 30 dBm out



Detector Voltage at 25 dBm out



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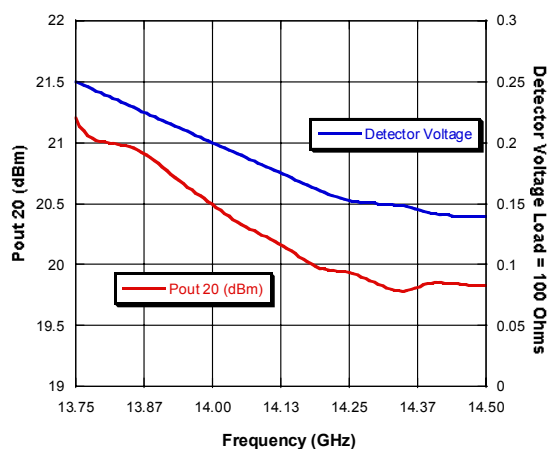
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Typical Performance Curves (continued)

V1P.0

Detector Voltage at 20 dBm out



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