GaN on SiC Transistor, 300 W, 65 V
DC - 2 GHz

MACOM PURE CARBIDE

MAPC-A3030-AB
Rev. V2

Features

- Saturated Power: 300 W
- Drain Efficiency: 71%
- Lead-Free Air Cavity Ceramic Package
- RoHS* Compliant

Applications

- Avionics - TACAN, DME, IFF
- Military Radio
- L-band Radar
- Electronic Warfare
- ISM
- General Amplification

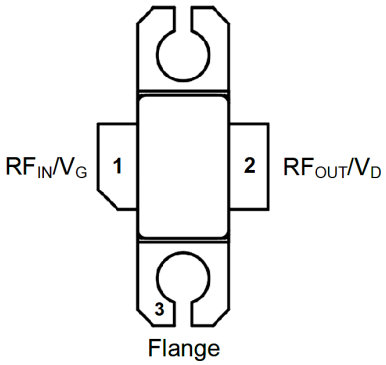
Description

The MAPC-A3030-AB is a 300 W packaged, unmatched transistor which supports both defense and commercial related applications.

Offered in a thermally-enhanced flange package, the MAPC-A3030-AB provides superior performance under CW operation allowing customers to improve SWaP-C benchmarks in their next generation systems.

AC-360B-2

Functional Schematic



Typical RF Performance:

- Measured CW, P_{IN} = 34 dBm, V_{DS} = 65 V, I_{DQ} = 1000 mA, T_C = 25°C

Frequency (GHz)	Output Power (dBm)	Gain (dB)	η_D
0.85	54.9	20.9	74.0
0.95	55.0	21.0	71.6
1.05	54.9	20.9	73.4

Pin Configuration

Pin #	Pin Name	Function
1	RF$_{IN}$ / V$_G$	RF Input / Gate
2	RF$_{OUT}$ / V$_D$	RF Output / Drain
3	Flange[1]	Ground / Source

1. The flange on the package bottom must be connected to RF, DC and thermal ground.

Ordering Information

Part Number	MOQ Increment
MAPC-A3030-AB000	Bulk Quantity: Bolt-down
MAPC-A3030-ABSB1	Sample Board: Bolt-down

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

RF Electrical Characteristics:
Freq. = 0.95 GHz, CW, T_C = +25°C, V_{DS} = 65 V, I_{DQ} = 1000 mA

Note: Performance in MACOM Evaluation Test Fixture, 50 Ω system

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Output Power	P_{IN} = 34 dBm	P_{OUT}	—	55.0	—	dBm
Drain Efficiency	P_{IN} = 34 dBm	η	—	71.6	—	%
Output Mismatch Stress	CW, All Phase Angles, T_C = -40°C, P_{IN} = 14 - 34 dBm	Ψ	VSWR = 2:1, No Damage, No Spurs Found			

RF Electrical Specifications:
Freq. = 0.9 GHz, Pulsed 10% DC, 100 µs PW, T_C = +25°C, V_{DS} = 65 V, I_{DQ} = 1000 mA

Note: Performance in MACOM Production Test Fixture, 50 Ω system

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Units
Output Power	P_{IN} = 34 dBm	P_{OUT}	54.3	55.0	—	dBm
Drain Efficiency	P_{IN} = 34 dBm	η	69	76	—	%
Low Power Gain	P_{IN} = 10 dBm	G_{SS}	22.8	24.4	—	dB

Note: Final testing and screening for all transistor sales is performed using the MAPC-A3030-AB-AMP at 0.9 GHz.

Absolute Maximum Ratings[2,3]

Parameter	Absolute Maximum
Drain Source Voltage	195 V
Gate Voltage	-10 V, +2 V
Drain Current	38.9 A
Gate Current	42 mA
Junction Temperature[3,4,5]	+225°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Mounting Temperature	+245°C

2. Exceeding any one or combination of these limits may cause permanent damage to this device.
3. MACOM does not recommend sustained operation near these survivability limits.
4. Operating at nominal conditions with $T_J \leq$ +225 °C will ensure MTTF > 1 x 10^6 hours.
5. Junction Temperature (T_J) = T_C + Θjc * (V * I)
   Typical thermal resistance (Θjc) = 0.95 °C/W for CW.
   a) For T_C = +25°C,
   T_J = 145 °C @ P_{DISS} = 126 W
   b) For T_C = +85°C,
   T_J = 213 °C @ P_{DISS} = 135 W

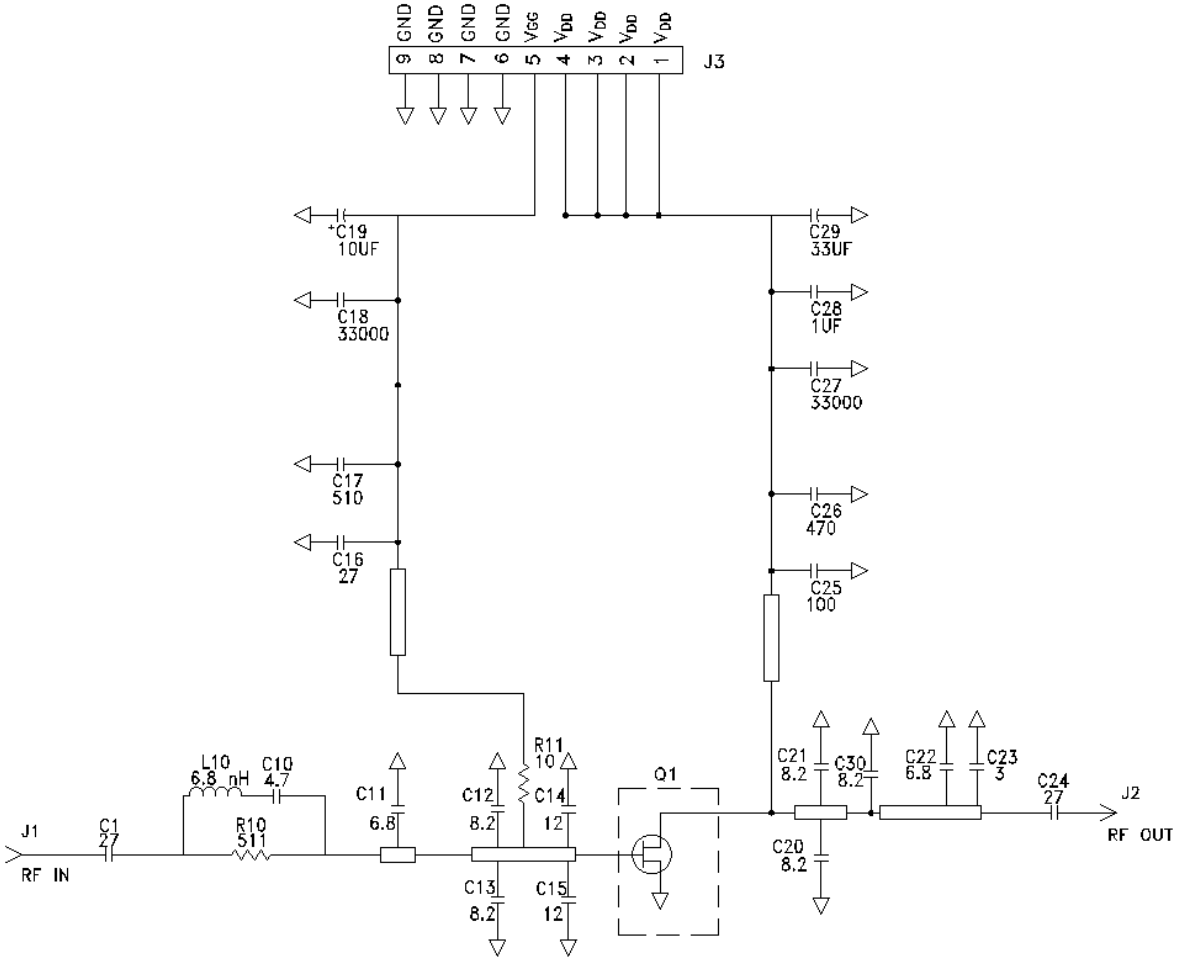
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Evaluation Test Fixture and Recommended Tuning Solution, 0.85 - 1.05 GHz



Description

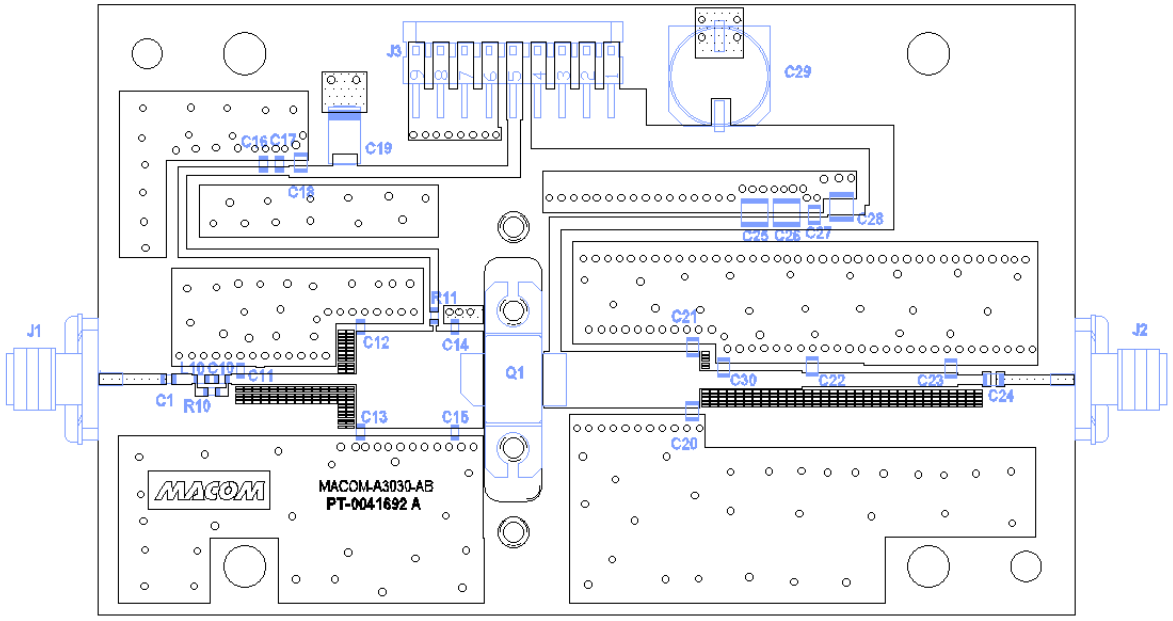
Parts measured on evaluation board (20-mil thick Rogers 6035HTC). Matching is provided using a combination of lumped elements and transmission lines as shown in the simplified schematic above. Recommended tuning solution component placement, transmission lines, and details are shown on the next page.

Biasing Sequence

Bias ON
1. Ensure RF is turned off
2. Apply pinch-off voltage of -5 V to the gate
3. Apply nominal drain voltage
4. Bias gate to desired quiescent drain current
5. Apply RF

Bias OFF
1. Turn RF off
2. Apply pinch-off voltage of -5 V to the gate
3. Turn-off drain voltage
4. Turn-off gate voltage

Evaluation Test Fixture and Recommended Tuning Solution, 0.85 - 1.05 GHz



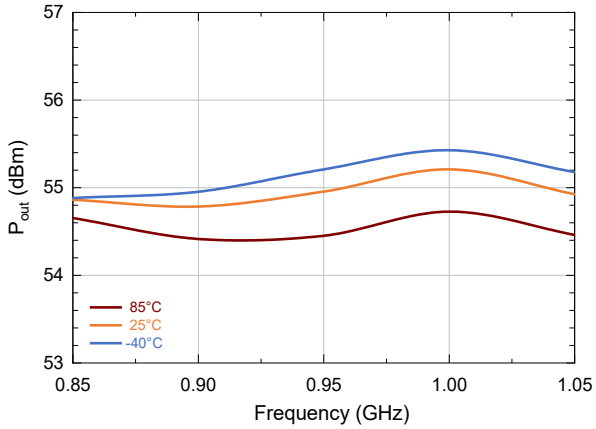
Assembly Parts List

Reference Designator	Value	Tolerance	Manufacturer	Part Number
C1, C16	27 pF	+/- 5 %	Kyocera / AVX	600S270JW250XT
C10	4.7 pF	+/- 0.1 pF	Kyocera / AVX	600S4R7BW250XT
C11	6.8 pF	+/- 0.25 pF	Kyocera / AVX	600S6R8CW250XT
C12, C13	8.2 pF	+/- 0.25 pF	Kyocera / AVX	600S8R2CW250XT
C14, C15	12 pF	+/- 5 %	Kyocera / AVX	600S120JW250XT
C17	510 pF	+/- 5 %	Murata	GRM1885C2A511JA1D
C18, C27	33000 pF	+/- 10 %	Murata	GRM21BR72A333KA01L
C19	10 µF	+/- 10 %	KEMET	T496C106K016ATE2K0
C20, C21, C30	8.2 pF	+/- 0.25 pF	Kyocera / AVX	600F8P2CT250XT
C22	6.8 pF	+/- 0.25 pF	Kyocera / AVX	600F6P8CT250XT
C23	3.0 pF	+/- 0.1 pF	Kyocera / AVX	600F3R0BT250XT
C24	27 pF	+/- 5 %	Kyocera / AVX	600F270JT250XT
C25	100 pF	+/- 5 %	Kyocera / AVX	800B100JT200XT
C26	470 pF	+/- 5 %	Kyocera / AVX	800B471JT200XT
C28	1.0 µF	+/- 10 %	Murata	GRM32ER72A105KA01L
C29	33 µF	+/- 20 %	Panasonic	ECE-V2AA330P
R10	511 Ω	+/- 1 %	KOA Speer	RK73H1JTT5110F
R11	10 Ω	+/- 1 %	KOA Speer	RK73H1JT10R0F
L10	6.8 nH	+/- 5 %	Murata	LQG18HN6N8J00D
J1, J2	-	-	Amphenol	132150
J3	-	-	TE Connectivity	640457-9
PCB	Rogers 6035HTC, 20 mil			
Q1	MACOM GaN Power Amplifier			MAPC-A3030-AB

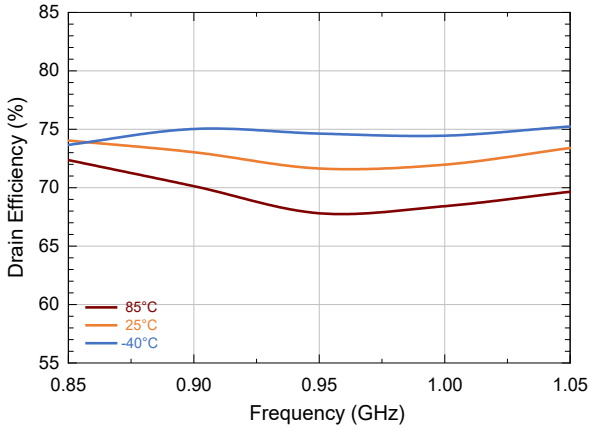
Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, P_{IN} = 34 dBm, V_{DS} = 65 V, I_{DQ} = 1000 mA
For Engineering Evaluation Only – This data does not Modify MACOM's Datasheet Limits.

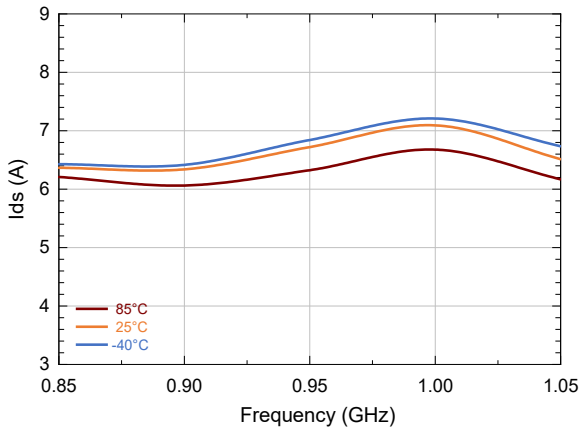
Output Power vs. Temperature and Frequency



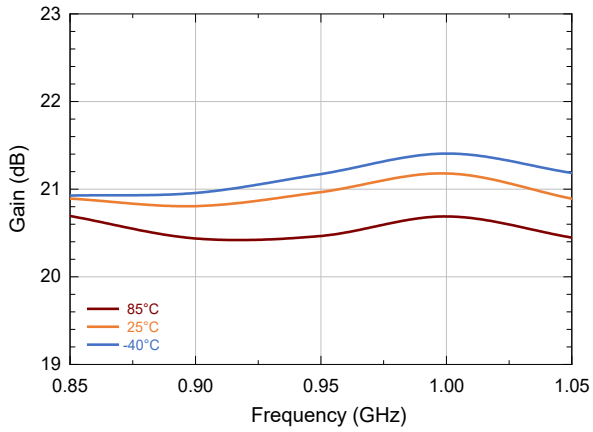
Drain Efficiency vs. Temperature and Frequency



Drain Current vs. Temperature and Frequency



Large Signal Gain vs. Temperature and Frequency



Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, P_{IN} = 34 dBm, T_C = 25 ºC, I_{DQ} = 1000 mA
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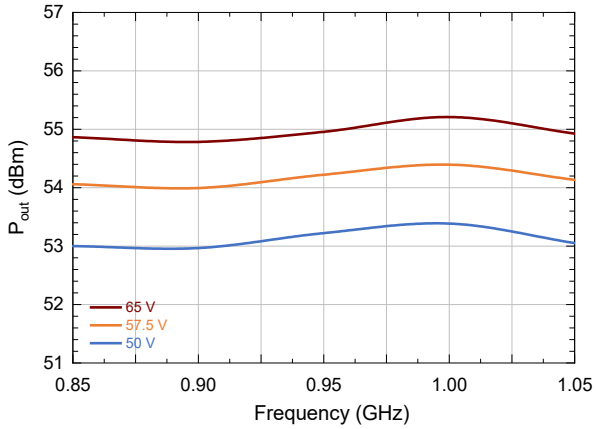
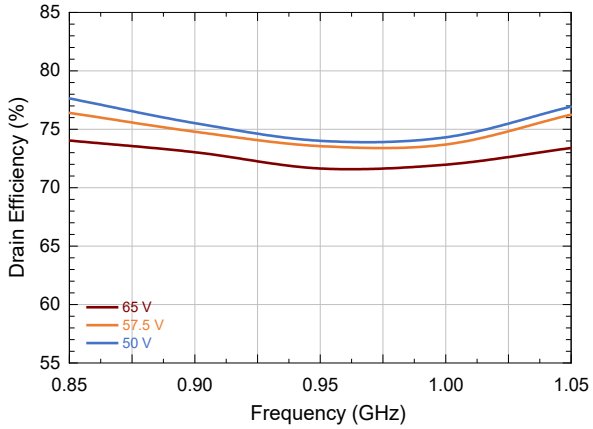
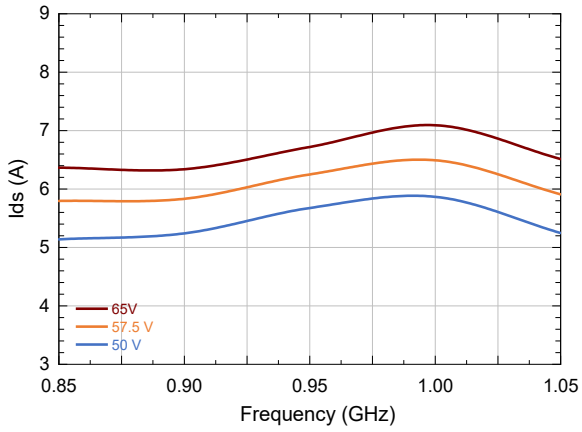
Output Power vs. V_{DS} and Frequency



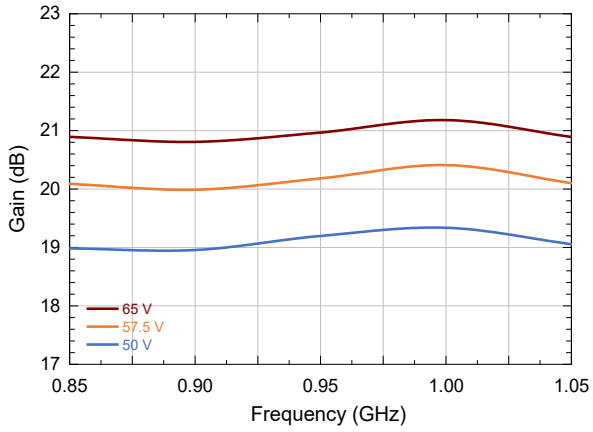
Drain Efficiency vs. V_{DS} and Frequency



Drain Current vs. V_{DS} and Frequency



Large Signal Gain vs. V_{DS} and Frequency



Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, P_{IN} = 34 dBm, V_{DS} = 65 V, T_C = 25 ºC
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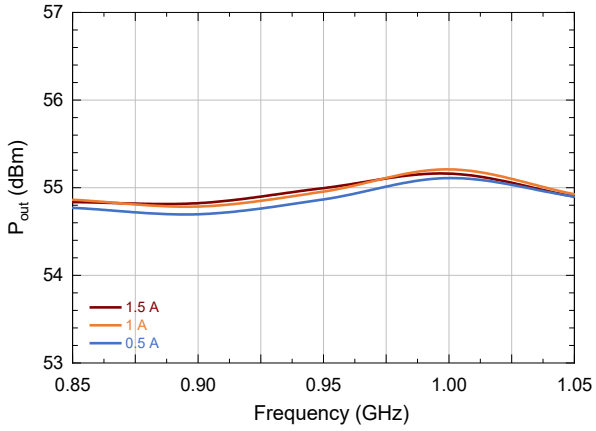
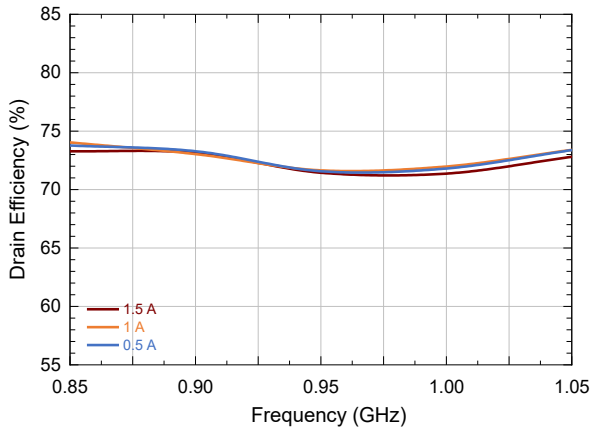
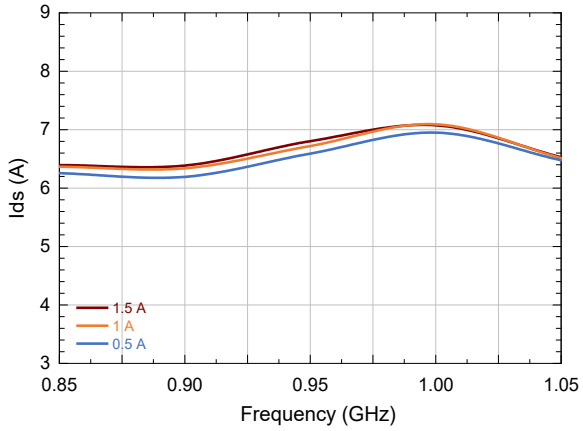
Output Power vs. I_{DQ} and Frequency



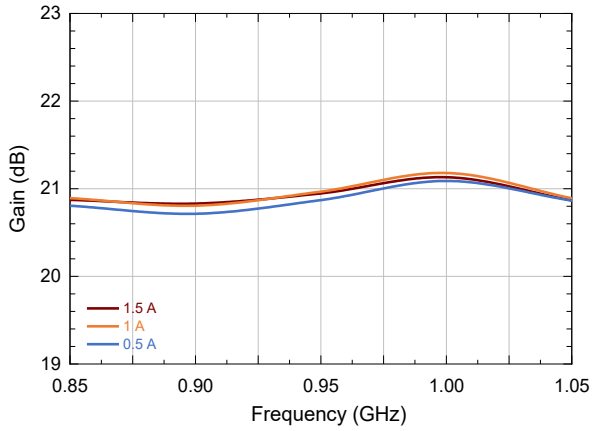
Drain Efficiency vs. I_{DQ} and Frequency



Drain Current vs. I_{DQ} and Frequency



Large Signal Gain vs. I_{DQ} and Frequency



Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, T_C = 25 °C, V_{DS} = 65 V, I_{DQ} = 1000 mA
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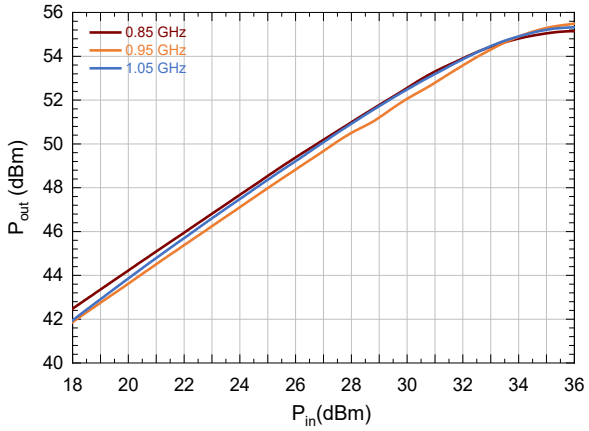
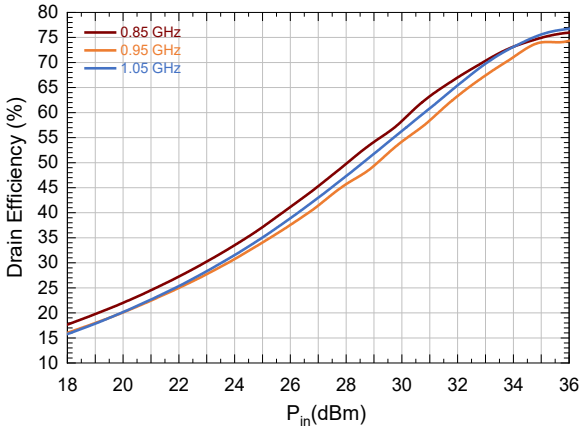
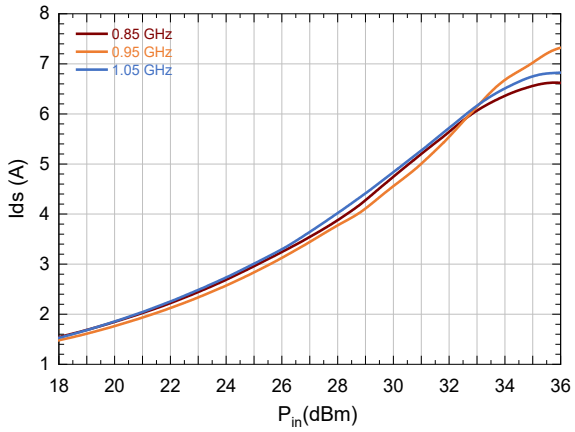
Output Power vs. Frequency and P_{IN}



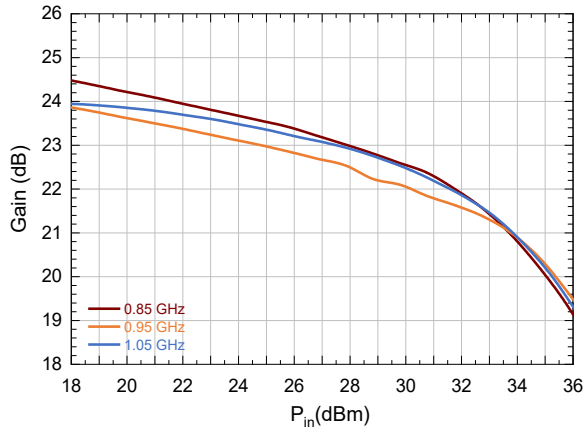
Drain Efficiency vs. Frequency and P_{IN}



Drain Current vs. Frequency and P_{IN}



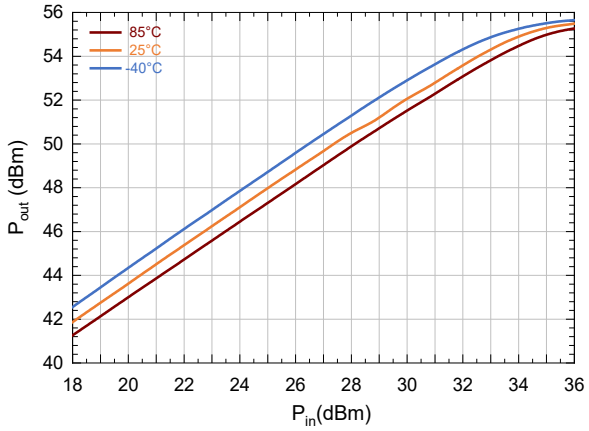
Large Signal Gain vs. Frequency and P_{IN}



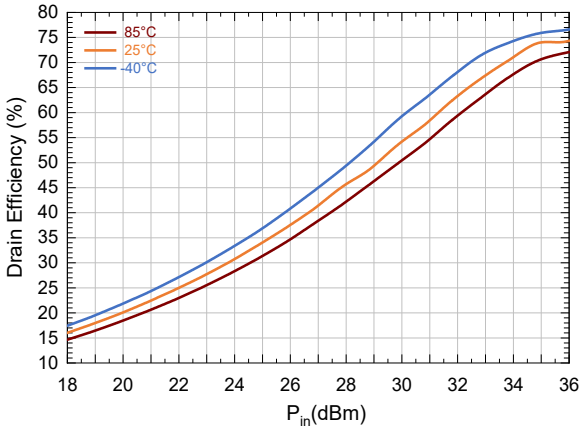
Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, Frequency = 0.95 GHz, V_{DS} = 65 V, I_{DQ} = 1000 mA
For Engineering Evaluation Only – This data does not Modify MACOM's Datasheet Limits.

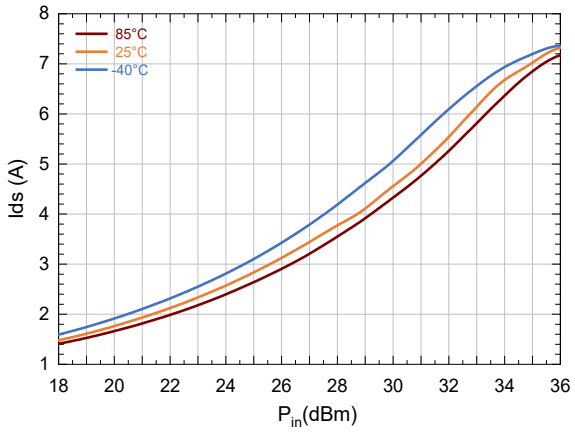
Output Power vs. Temperature and P_{IN}



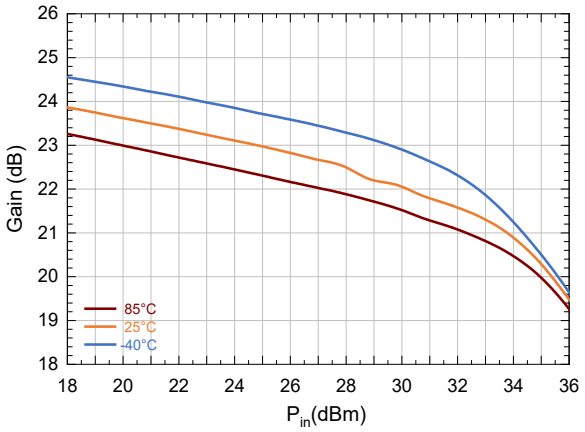
Drain Efficiency vs. Temperature and P_{IN}



Drain Current vs. Temperature and P_{IN}



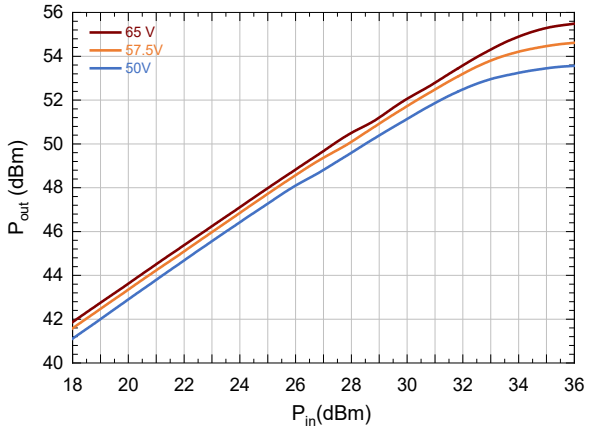
Large Signal Gain vs. Temperature and P_{IN}



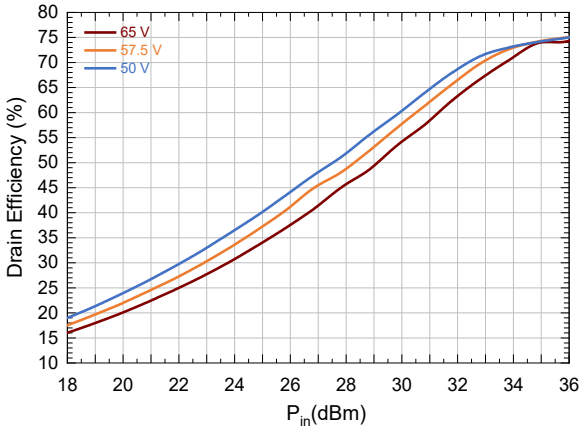
Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, Frequency = 0.95 GHz, T_C = 25 °C, I_{DQ} = 1000 mA
For Engineering Evaluation Only – This data does not Modify MACOM's Datasheet Limits.

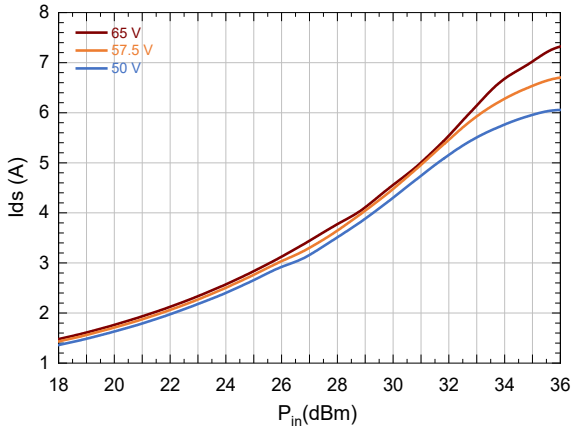
Output Power vs. V_{DS} and P_{IN}



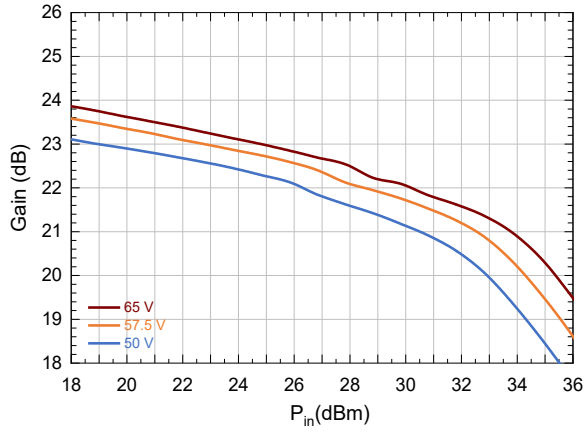
Drain Efficiency vs. V_{DS} and P_{IN}



Drain Current vs. V_{DS} and P_{IN}



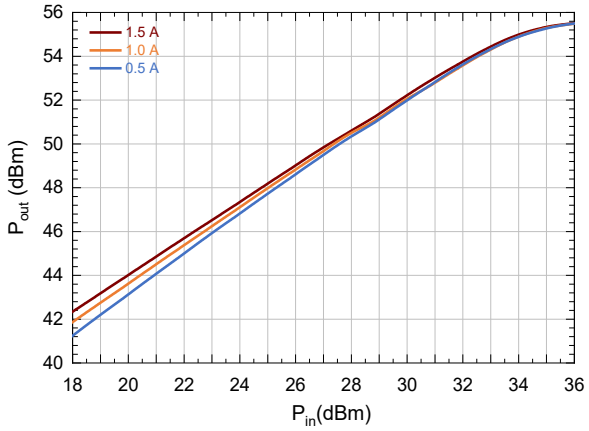
Large Signal Gain vs. V_{DS} and P_{IN}



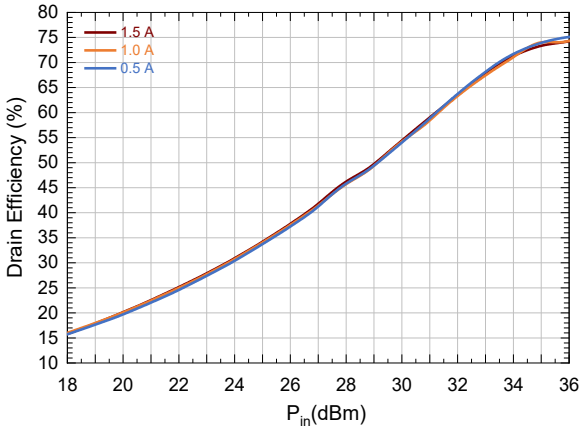
Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture

CW, Frequency = 0.95 GHz, T_C = 25 °C, V_{DS} = 65 V
For Engineering Evaluation Only – This data does not Modify MACOM's Datasheet Limits.

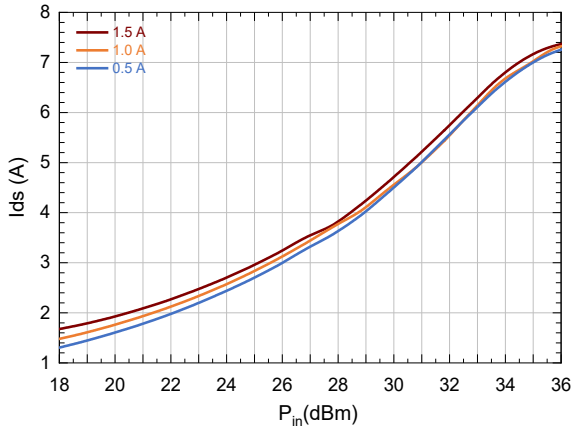
Output Power vs. I_{DQ} and P_{IN}



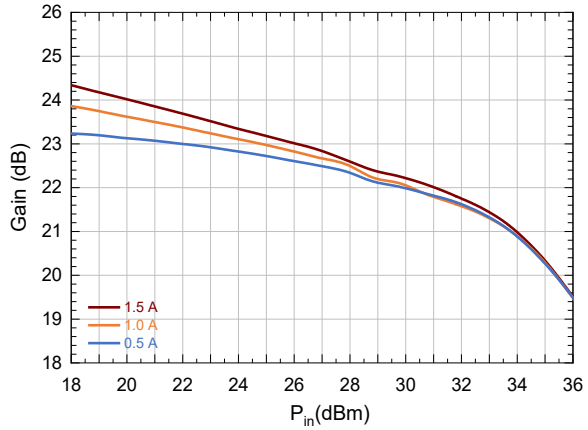
Drain Efficiency vs. I_{DQ} and P_{IN}



Drain Current vs. I_{DQ} and P_{IN}



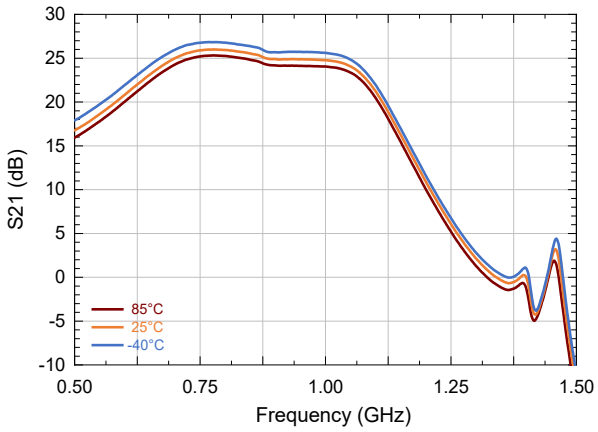
Large Signal Gain vs. I_{DQ} and P_{IN}



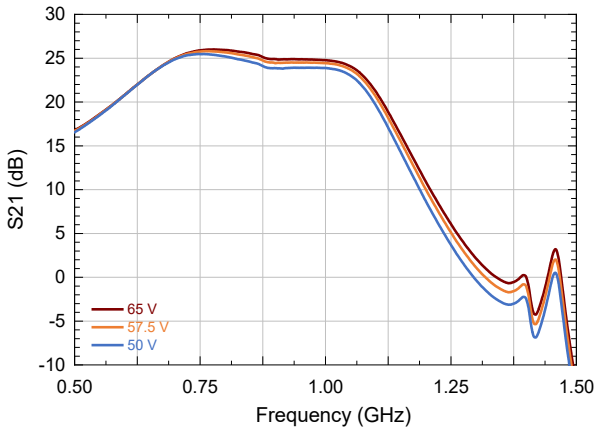
Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture:

CW, V_{DS} = 65 V, I_{DQ} = 1000 mA, P_{IN} = -20 dBm (Unless Otherwise Noted)
For Engineering Evaluation Only—This data does not Modify MACOM's Datasheet Limits.

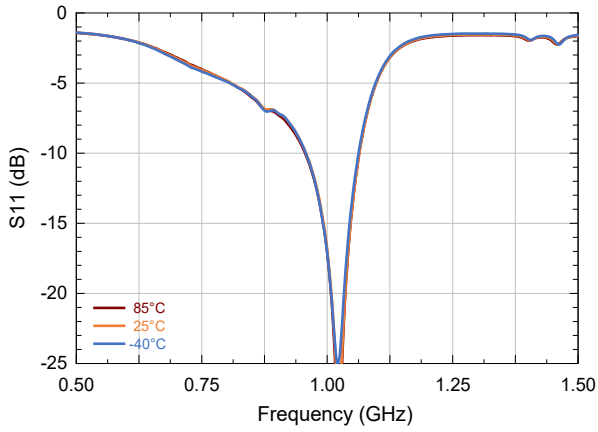
S21 vs Frequency and Temperature



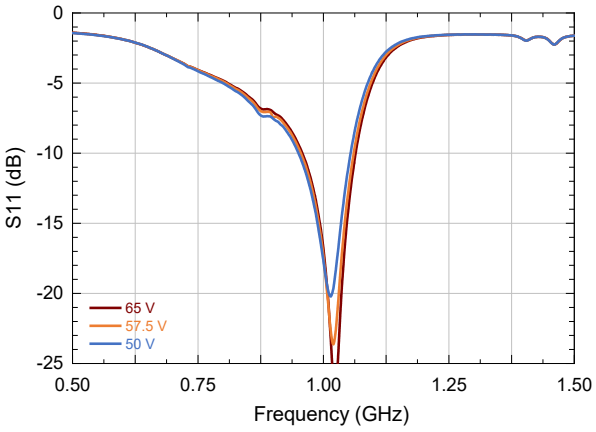
S21 vs Frequency and V_{DS}



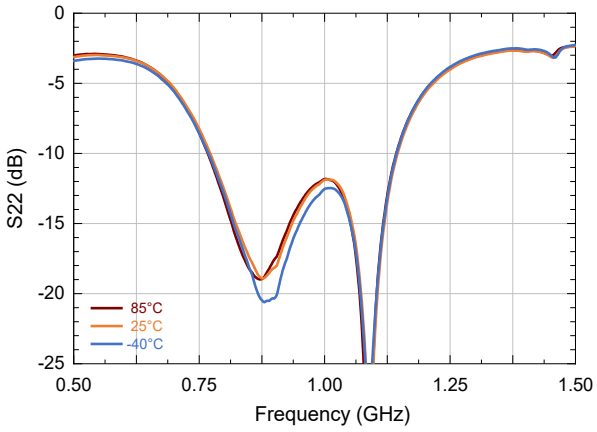
S11 vs Frequency and Temperature



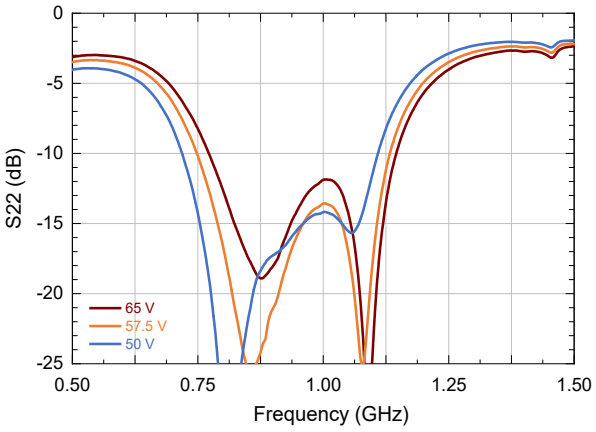
S11 vs Frequency and V_{DS}



S22 vs Frequency and Temperature



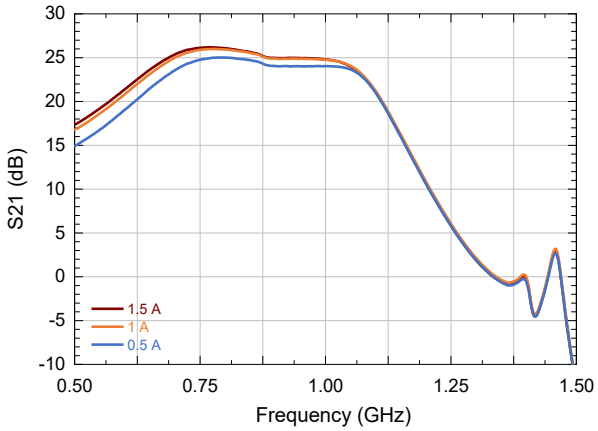
S22 vs Frequency and V_{DS}



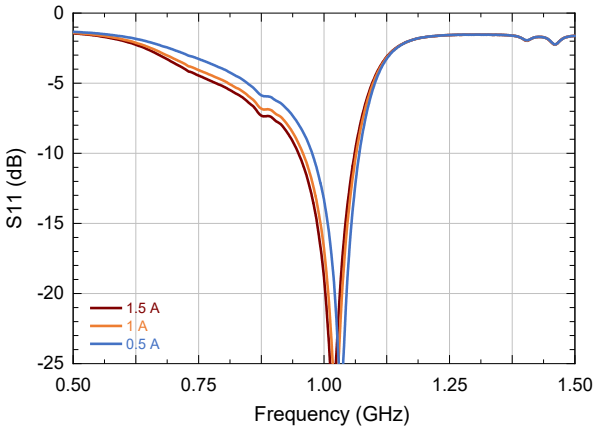
Typical Performance Curves as Measured in the 0.85 - 1.05 GHz Evaluation Test Fixture:

CW, V_{DS} = 65 V, I_{DQ} = 1000 mA, P_{IN} = -20 dBm (Unless Otherwise Noted)
For Engineering Evaluation Only—This data does not Modify MACOM's Datasheet Limits.

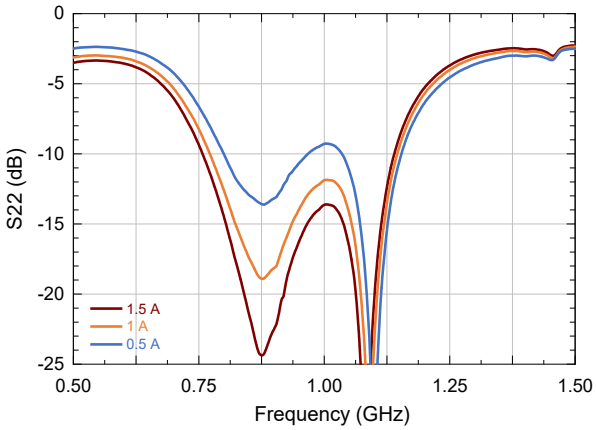
S21 vs Frequency and I_{DQ}



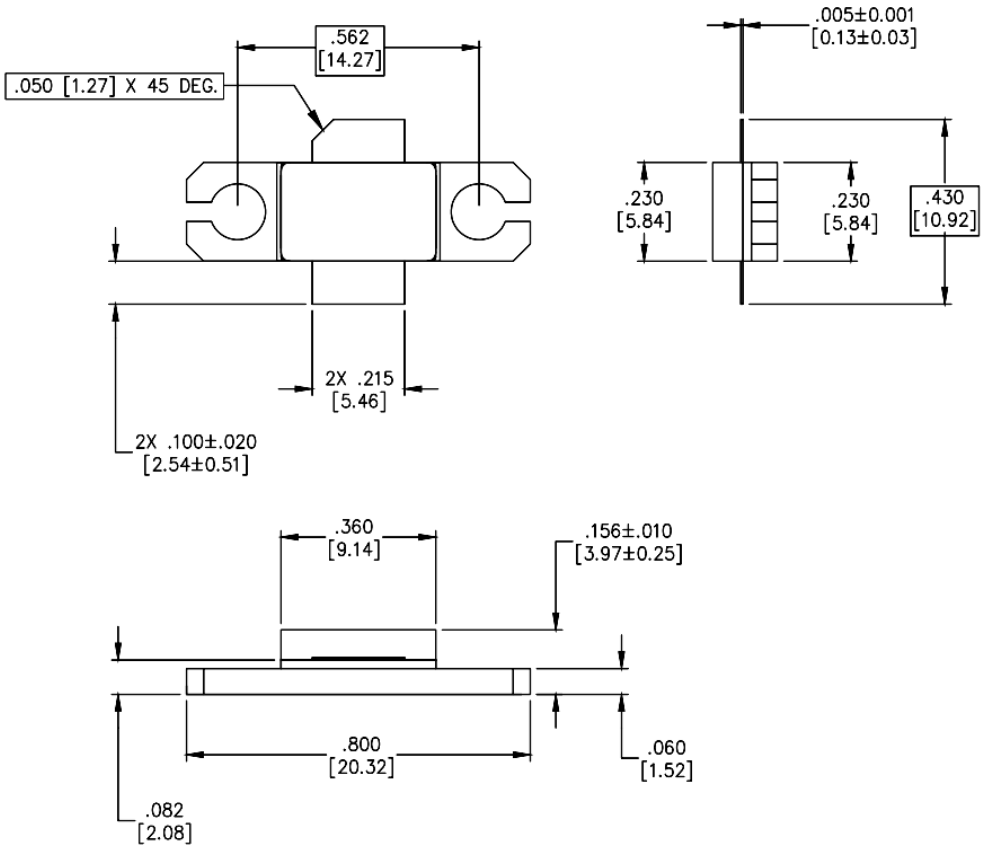
S11 vs Frequency and I_{DQ}



S22 vs Frequency and I_{DQ}



Lead-free AC-360B-2 Package Dimensions



NOTES:

1. ALL DIMENSIONS SHOWN AS in[mm]. CONTROLLING DIMENSIONS ARE IN in AND CONVERTED mm DIMENSIONS ARE NOT NECESSARILY EXACT.
2. ALL TOLERANCES ARE ±.005 [0.13] UNLESS OTHERWISE NOTED
3. LEAD FINISH: AU
   FLANGE FINISH: AU
4. LID SEAL EPOXY MAY FLOW OUT A MAXIMUM OF .020 [0.51] FROM EDGE OF LID
5. LID MAY BE MIS-ALIGNED UP TO .010 [0.25] FROM PACKAGE IN ANY DIRECTION