LDMOS Transistor, 75 W, 50 V
DC - 1 GHz

MAPL-100405-060C
Rev. V1

Features

- Saturated Power: 75 W
- Drain Efficiency: 70%
- Small Signal Gain: 20 dB
- Lead-Free Air Cavity Ceramic Package
- RoHS* Compliant

440206

Applications

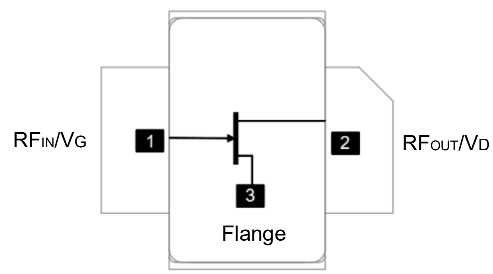
- UHF Radar
- Public Safety Radio
- ISM
- General Amplification

Description

The MAPL-100405-060C is an LDMOS Transistor suitable for use in power amplifier applications in the DC to 1 GHz frequency band. Features include high gain and a thermally-enhanced package. Manufactured with MACOM's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

Offered in a thermally-enhanced flange package, the MAPL-100405-060C provides superior performance under CW operation allowing customers to improve SWaP-C benchmarks in their next generation systems.

Functional Schematic



Typical RF Performance:

- Pulse width of 15msec and 25% duty, P_{IN} = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, T_C = 25°C

Frequency (GHz)	Output Power (dBm)	Gain (dB)	η_D (%)
0.420	48.1	23.1	60.2
0.435	48.5	23.5	70.3
0.450	48.0	23.0	61.7

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
MAPL-100405-060C00	Bulk
MAPL-100405-060SB1	Sample Board

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

RF Electrical Specifications[1]:
Freq. = 435 MHz, CW, P_{IN} = 25 dBm, T_A = +25C, V_{DS} = 50 V, I_{DQ} = 100 mA

Parameter	Units	Min.	Typ.	Max.
Output Power	W	70.0	73.5	—
Drain Efficiency	%	68.0	69.7	—
Power Gain	dB	23.4	23.7	—

1. Final testing and screening for all transistor sales is performed using the MAPL-100405-060SB1 at 435 MHz.

Absolute Maximum Ratings[2,3]

Parameter	Absolute Maximum
Drain-Source Voltage	105 V
Gate Voltage	-6 +12 V
Operating Voltage	0 to + 55 V
Mounting Temperature	245°C
Junction Temperature[4]	+225°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-65C to +150°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. Junction Temperature (T_J) = T_C + Ɵjc * (V * I)
   Typical thermal resistance (Ɵjc) = 1.63 °C/W for CW.
   a) For T_C = +25°C,
      T_J = 106°C @ P_{DISS}= 50 W
   b) For T_C = +85°C,
      T_J = 166°C @ P_{DISS}= 50 W

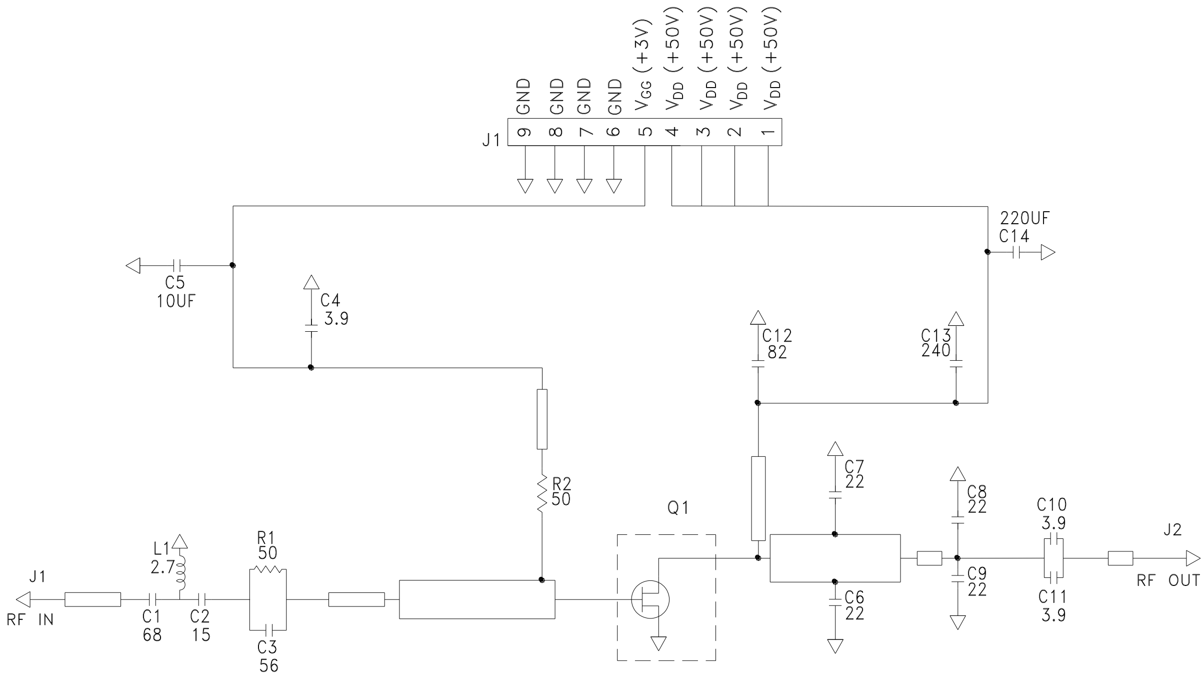
Handling Procedures

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, 420 - 450 MHz



Description

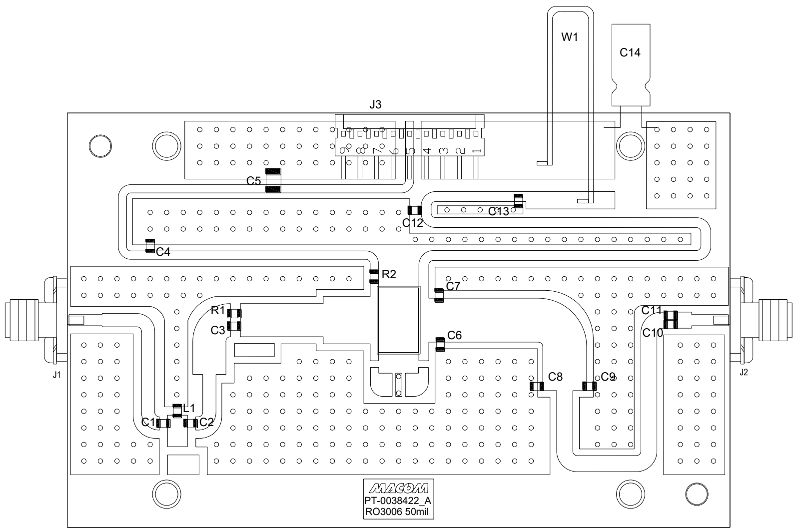
Parts measured on evaluation board (50-mil thick RO3006). Matching is provided using a combination of lumped elements and transmission lines as shown in the simplified schematic above. Recommended tuning solution component placement, transmission lines, and details are shown on the next page.

Biasing Sequence

Bias ON
1. Ensure RF is turned off
2. Apply nominal drain voltage
3. Bias gate to desired quiescent drain current
4. Apply RF

Bias OFF
1. Turn RF off
2. Turn-off drain voltage
3. Turn-off gate voltage

Evaluation Test Fixture and Recommended Tuning Solution, 420 - 450 MHz



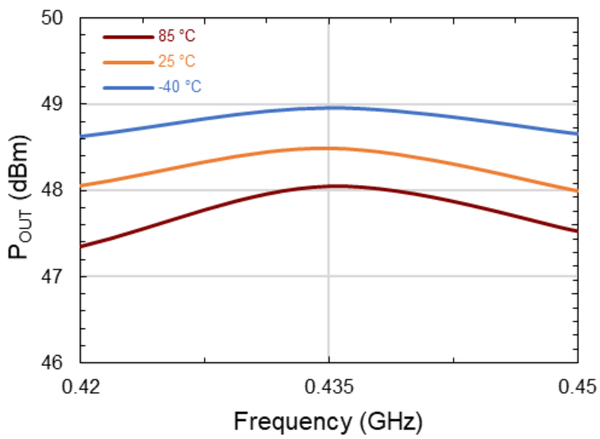
Assembly Parts List

Reference Designator	Description	Qty.
C1	CAP, 68 pF, +/-0.1pF, 250V, 0805, ATC600F	1
C2	CAP, 15 pF, +/-0.1pF, 250V, 0805, ATC600F	1
C3	CAP, 56 pF +/- 5%, 250V, 0805, ATC 600F	1
C4, C10, C11	CAP, 3.9 pF, +/-0.1pF, 250V, 0805, ATC600F	3
C5	10uF 1210in T10% 125C 100V	1
C6, C7, C8, C9	CAP, 22 pF +/- 5%, 250V, 0805, ATC 600F	4
C12	CAP, 82 pF +/- 5%, 250V, 0805, ATC 600F	1
C13	CAP, 240 pF +/- 5%, 250V, 0805, ATC 600F	1
C14	CAP, 220uF, 100V, Electrolytic	1
L1	2.7nH 0603	1
R1, R2	RES, 50 OHM, 0805	1
W1	18 +/- 2AWG 4.25" Wire	1
J1,J2	CONN, SMA, PANEL MOUNT JACK, FLANGE, 4-HOLE, BLUNT POST	2
J3	HEADER RT>PLZ .1CEN LK 9POS	1
—	PCB, RO3006, Er = 6.15, h = 50 mil	1
Q1	MAPL-100405-060C	1

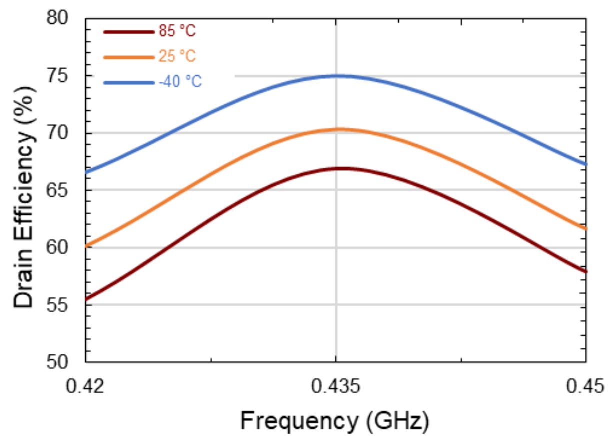
Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

Pulsed 15 msec/25%,Pin = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, Frequency = 435 MHz (Unless Otherwise Noted)
For Engineering Evaluation Only – This data does not Modify MACOM's Datasheet Limits.

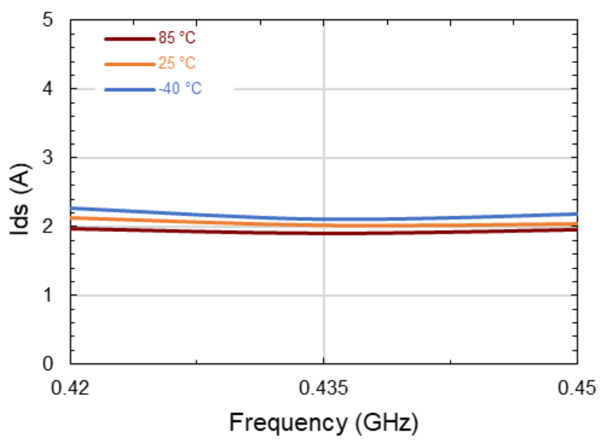
Output Power vs. Temperature and Frequency



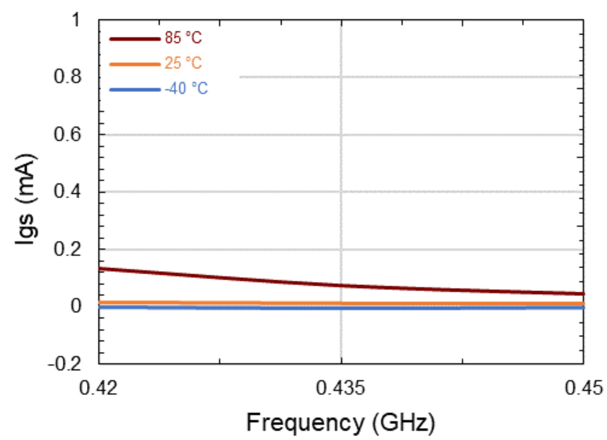
Drain Efficiency vs. Temperature and Frequency



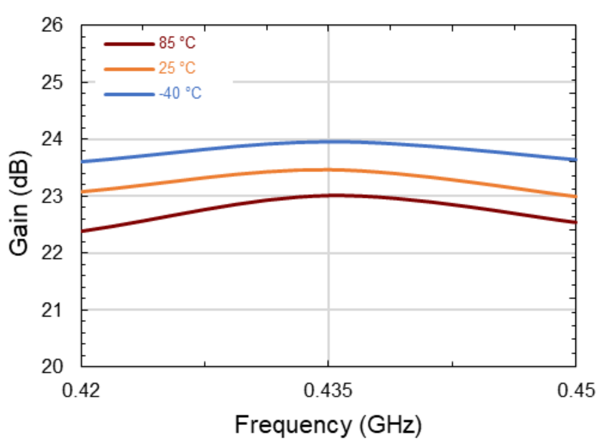
Drain Current vs. Temperature and Frequency



Gate Current vs. Temperature and Frequency



Large Signal Gain vs. Temperature and Frequency



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

Pulsed 15 msec/25%,Pin = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, Frequency = 435 MHz (Unless Otherwise Noted)
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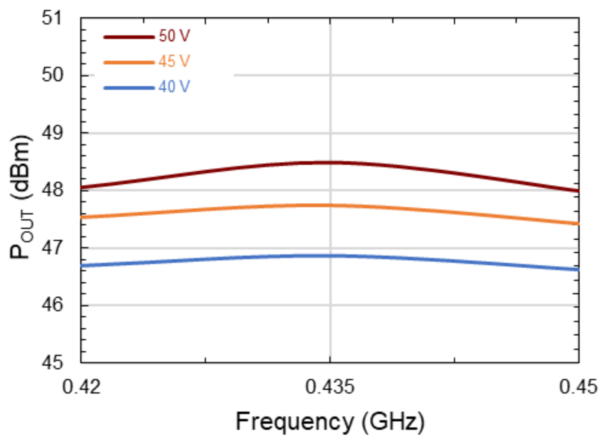
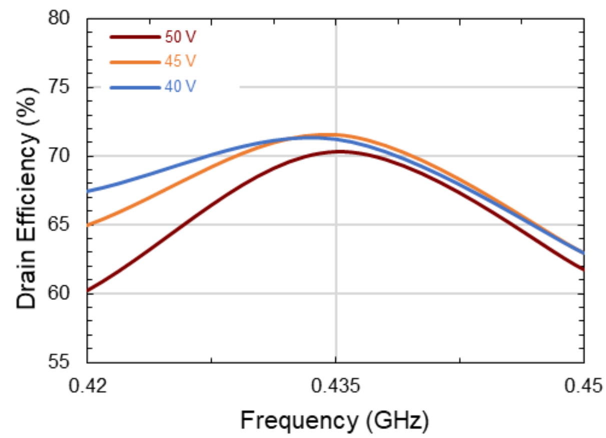
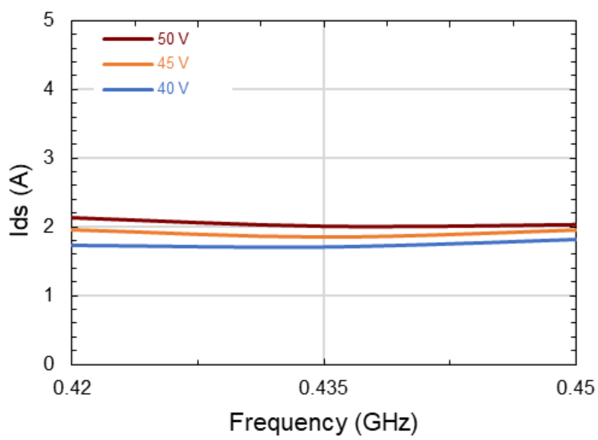
Output Power vs. V_{DS} and Frequency



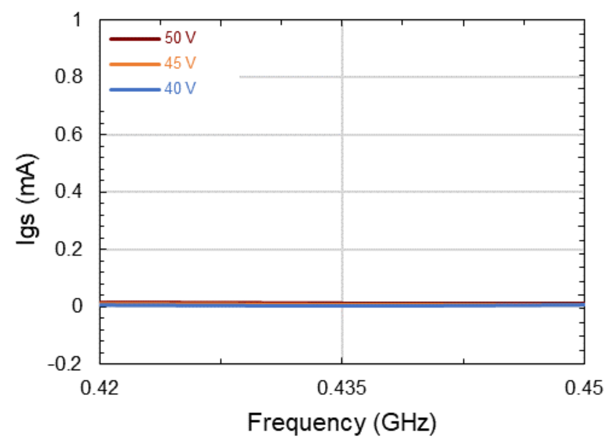
Drain Efficiency vs. V_{DS} and Frequency



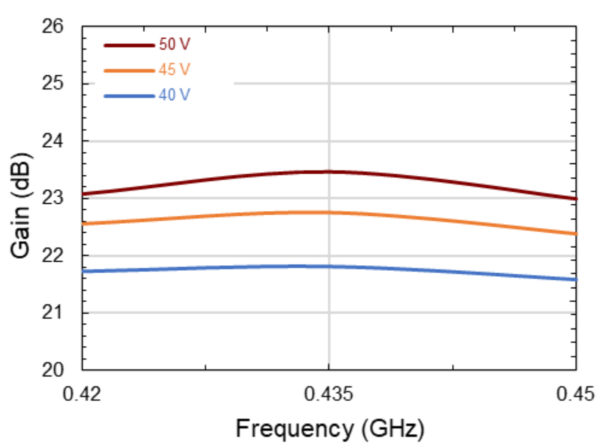
Drain Current vs. V_{DS} and Frequency



Gate Current vs. V_{DS} and Frequency



Large Signal Gain vs. V_{DS} and Frequency



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

Pulsed 15 msec/25%,Pin = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, Frequency = 435 MHz (Unless Otherwise Noted)
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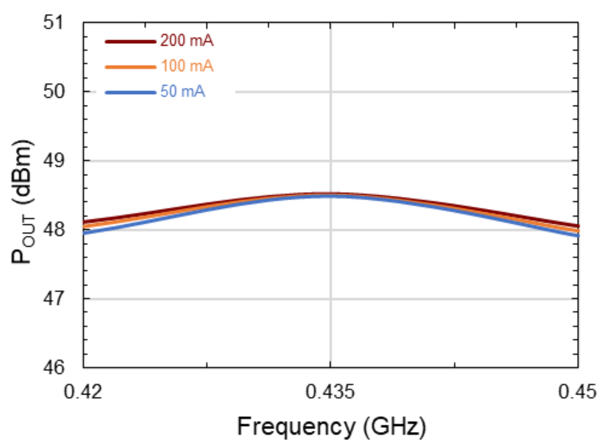
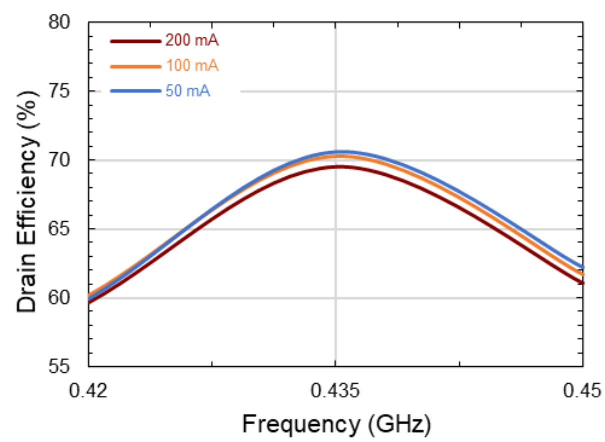
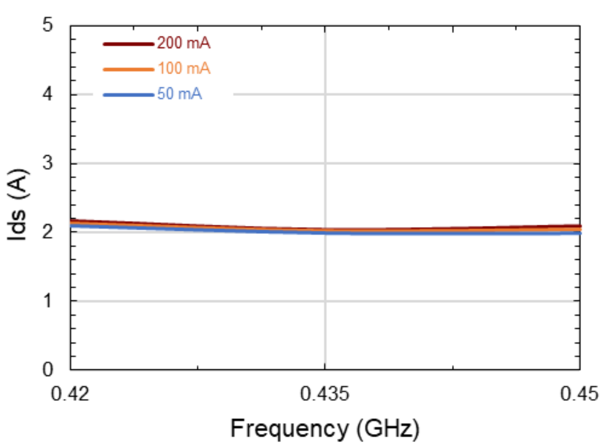
Output Power vs. I_{DQ} and Frequency



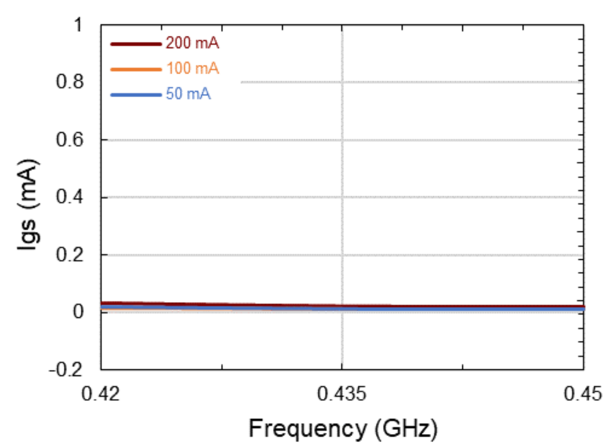
Drain Efficiency vs. I_{DQ} and Frequency



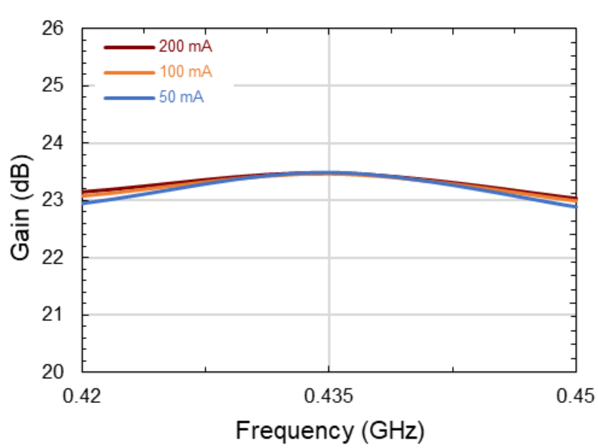
Drain Current vs. I_{DQ} and Frequency



Gate Current vs. I_{DQ} and Frequency



Large Signal Gain vs. I_{DQ} and Frequency



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

Pulsed 15 msec/25%,Pin = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, Frequency = 435 MHz (Unless Otherwise Noted)
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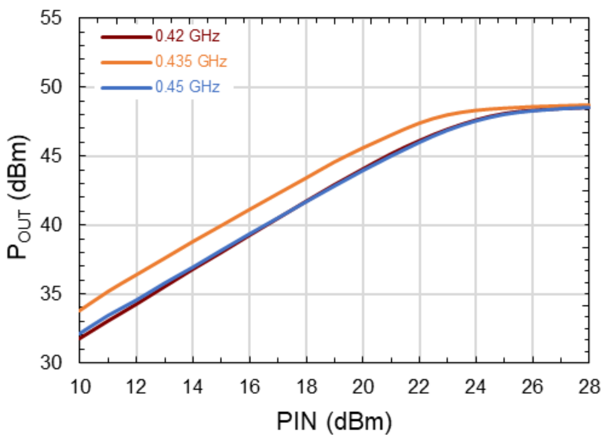
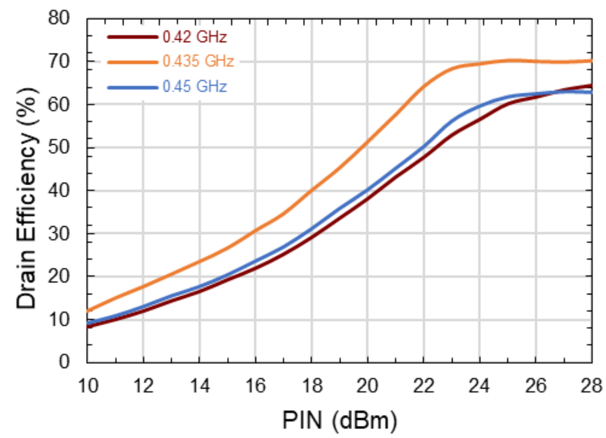
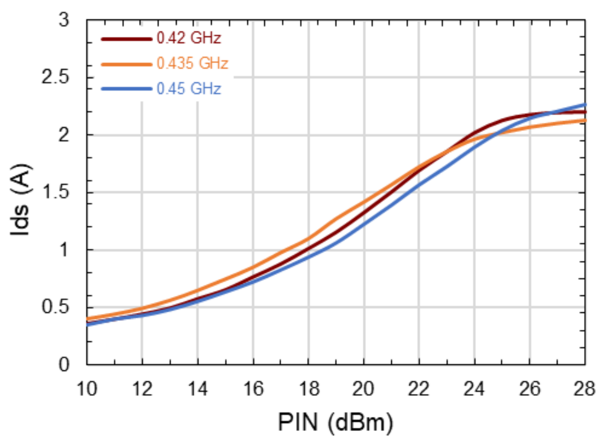
Output Power vs. Frequency and P_{IN}



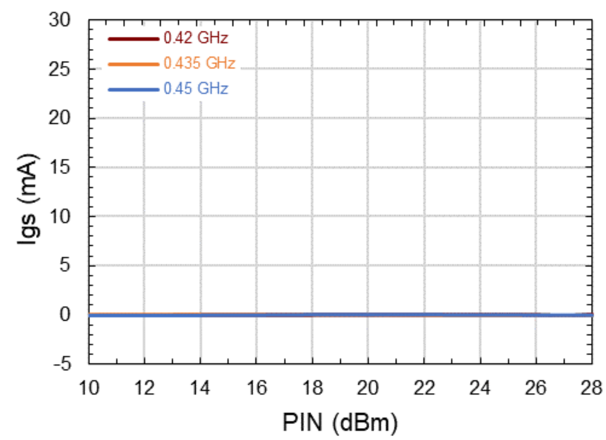
Drain Efficiency vs. Frequency and P_{IN}



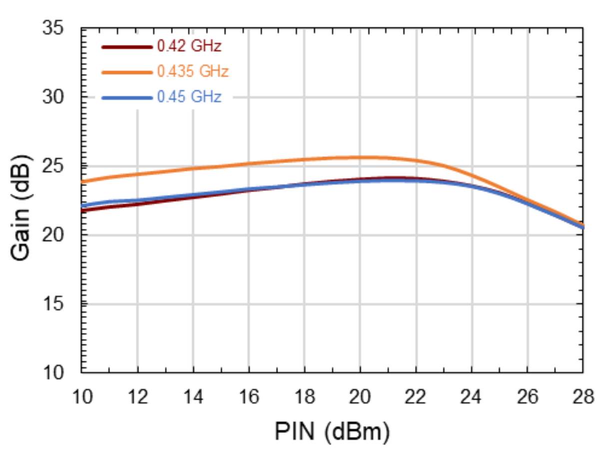
Drain Current vs. Frequency and P_{IN}



Gate Current vs. Frequency and P_{IN}



Large Signal Gain vs. Frequency and P_{IN}



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

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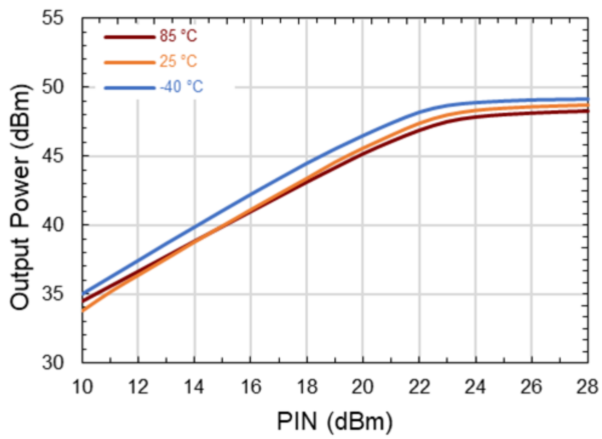
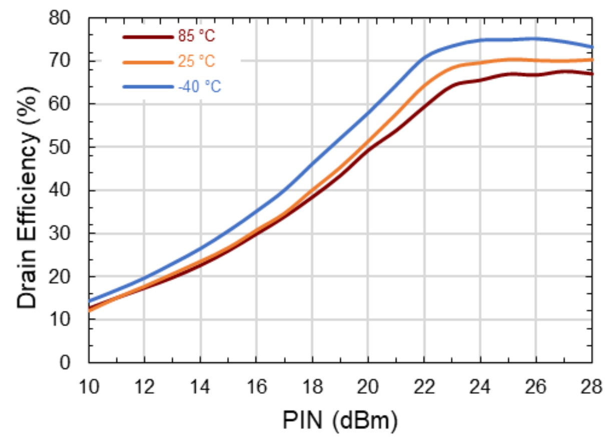
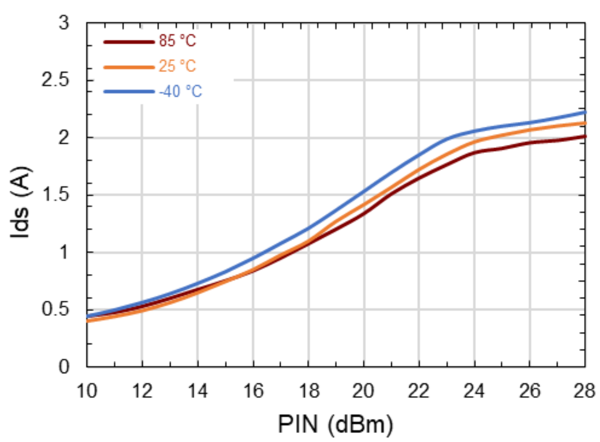
Output Power vs. Temperature and P_{IN}



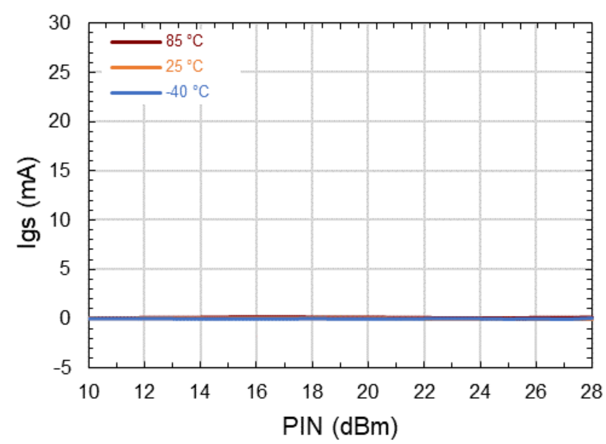
Drain Efficiency vs. Temperature and P_{IN}



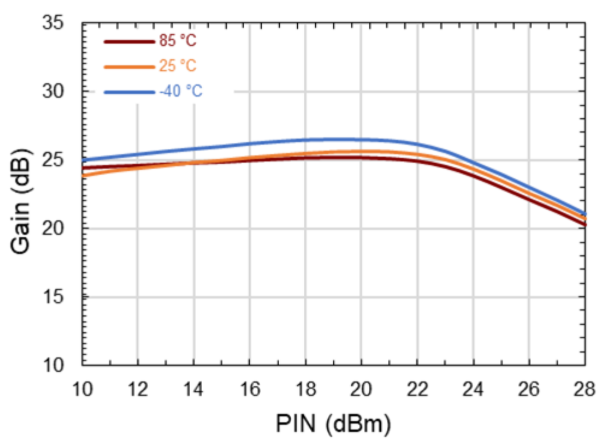
Drain Current vs. Temperature and P_{IN}



Gate Current vs. Temperature and P_{IN}



Large Signal Gain vs. Temperature and P_{IN}



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

Pulsed 15 msec/25%,Pin = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, Frequency = 435 MHz (Unless Otherwise Noted)
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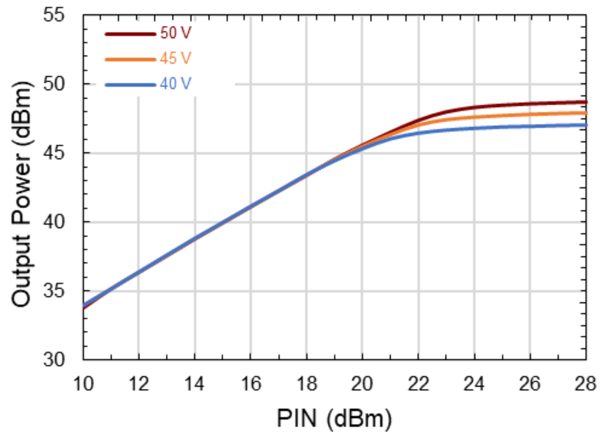
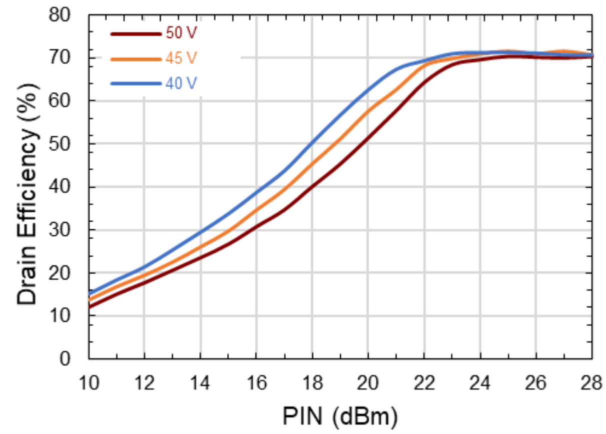
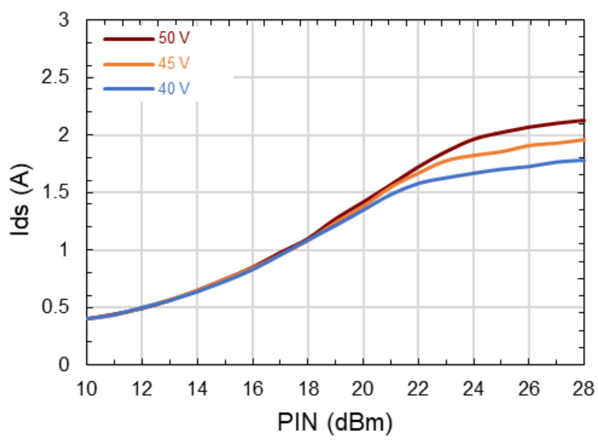
Output Power vs. V_{DS} and P_{IN}



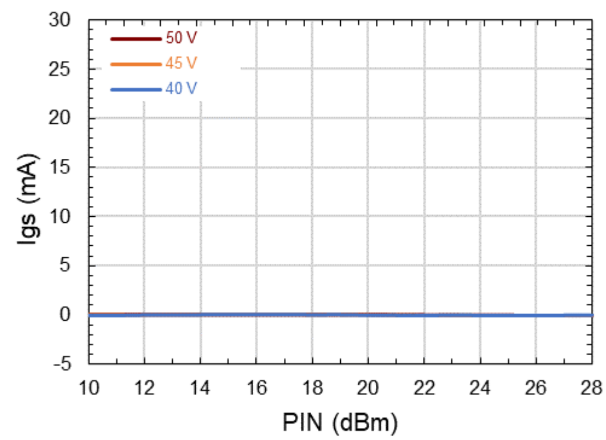
Drain Efficiency vs. V_{DS} and P_{IN}



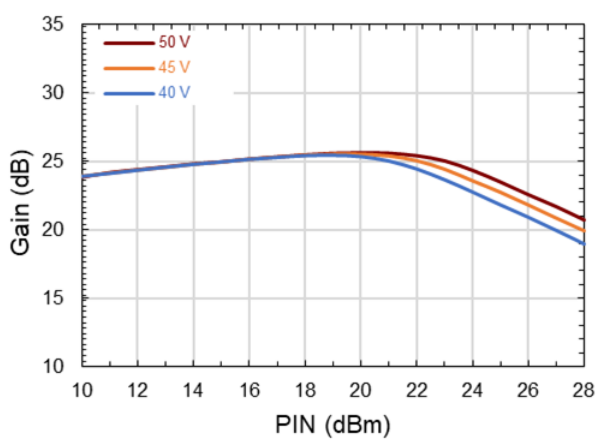
Drain Current vs. V_{DS} and P_{IN}



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



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



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

Pulsed 15 msec/25%,Pin = 25 dBm, V_{DS} = 50 V, I_{DQ} = 100 mA, Frequency = 435 MHz (Unless Otherwise Noted)
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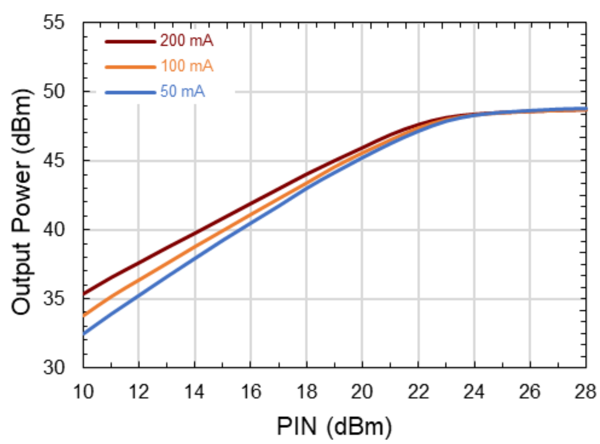
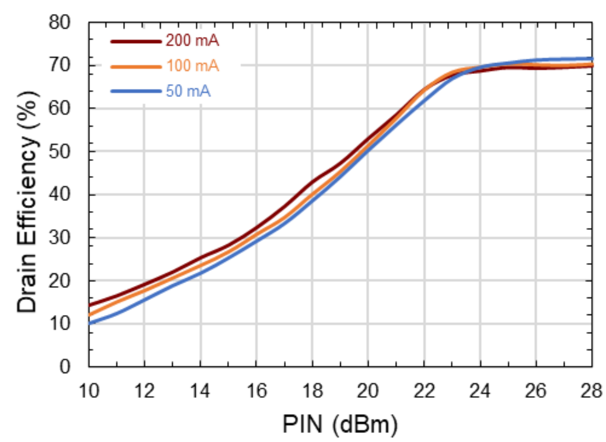
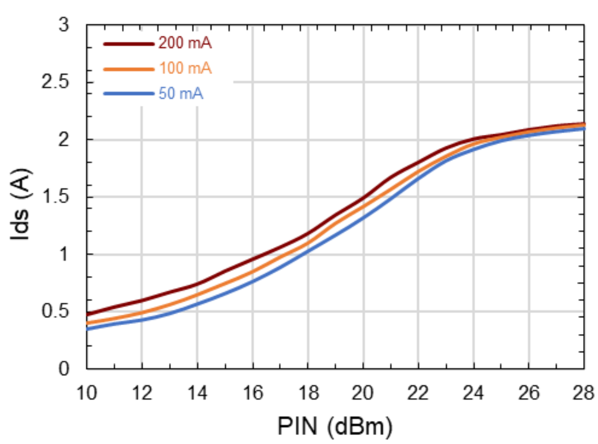
Output Power vs. I_{DQ} and P_{IN}



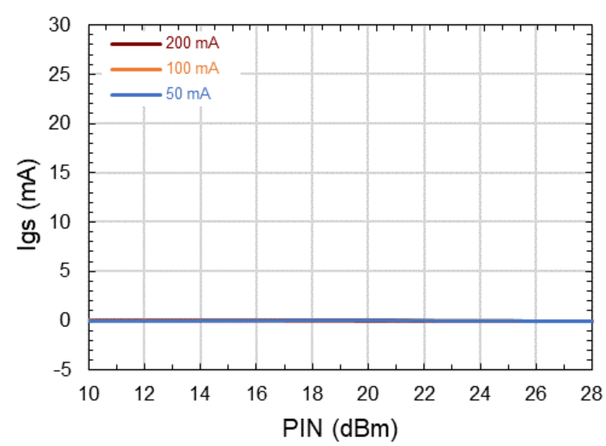
Drain Efficiency vs. I_{DQ} and P_{IN}



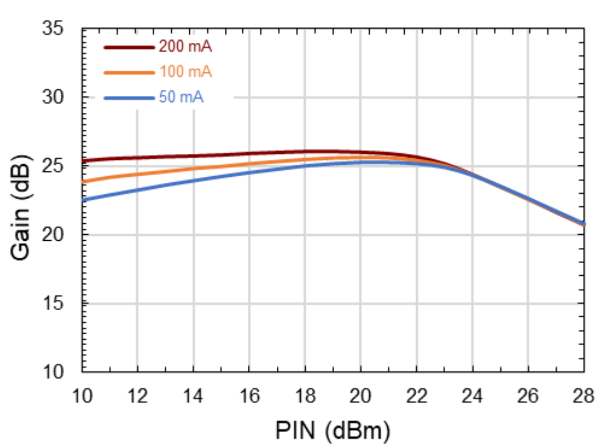
Drain Current vs. I_{DQ} and P_{IN}



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



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



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

CW, V_{DS} = 50V, I_{DQ} = 100 mA, Pin=-20dBm
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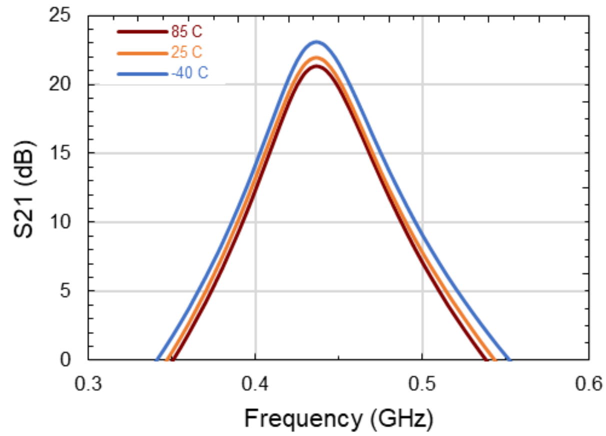
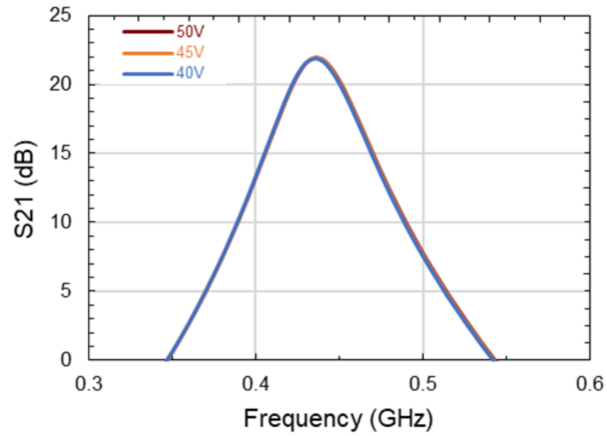
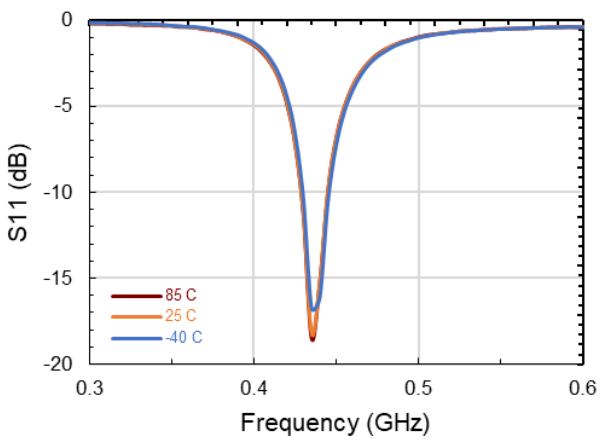
S21 vs Frequency and Temperature



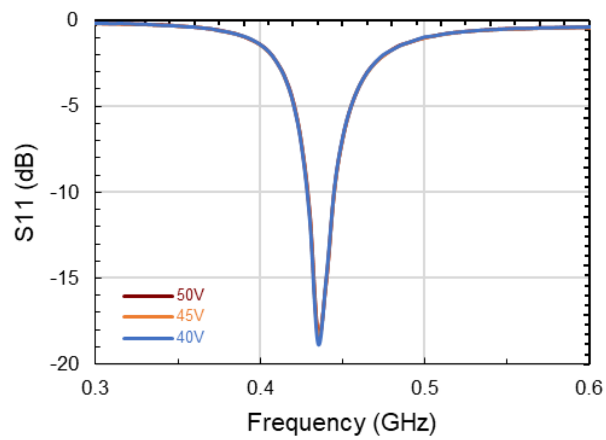
S21 vs Frequency and V_{DS}



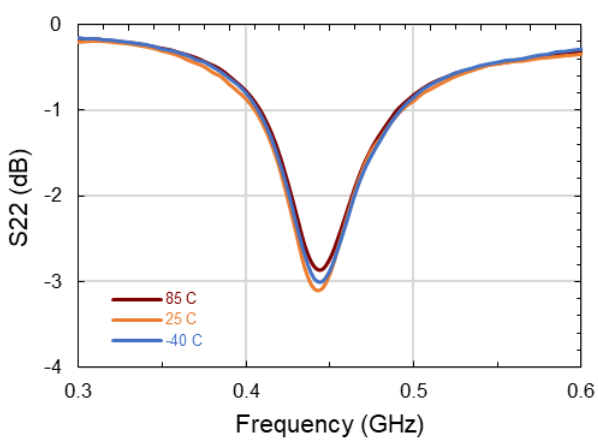
S11 vs Frequency and Temperature



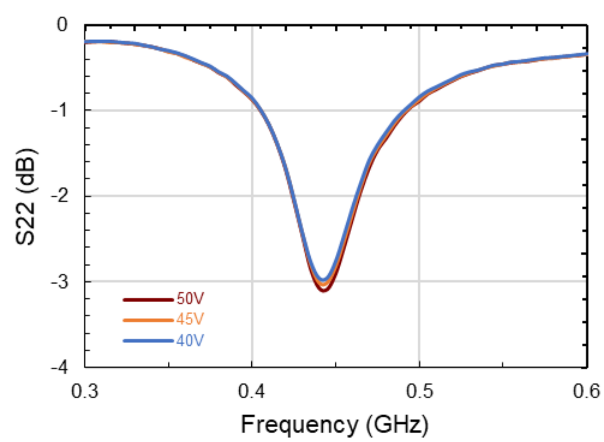
S11 vs Frequency and V_{DS}



S22 vs Frequency and Temperature



S22 vs Frequency and V_{DS}



Typical Performance Curves as Measured in the 420 – 450 MHz Evaluation Test Fixture

CW, V_{DS} = 50V, I_{DQ} = 100 mA, Pin=-20dBm
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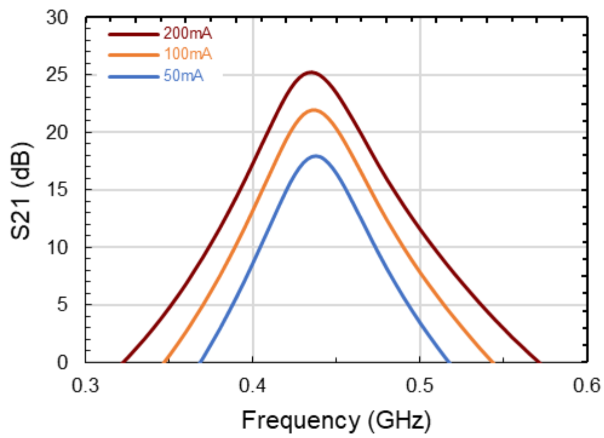
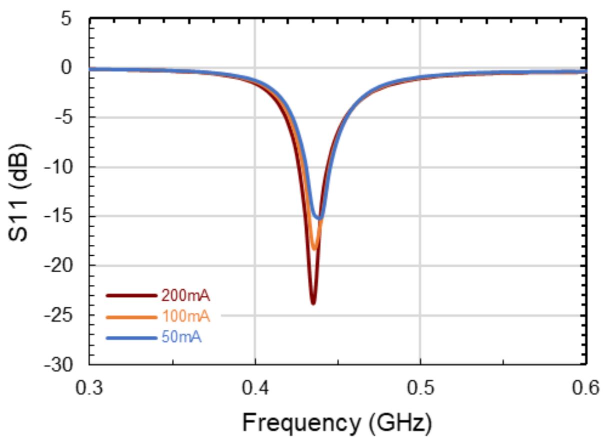
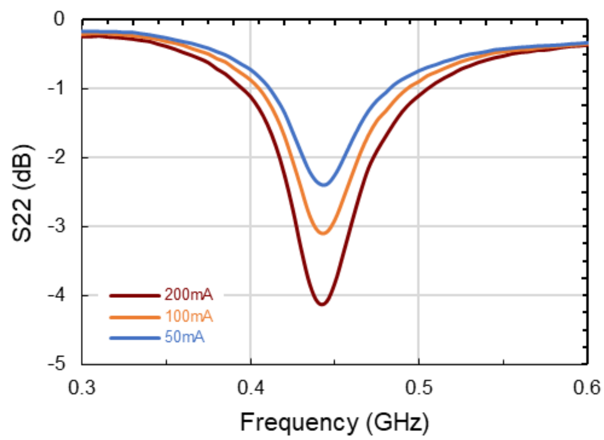
S21 vs Frequency and I_{DQ}



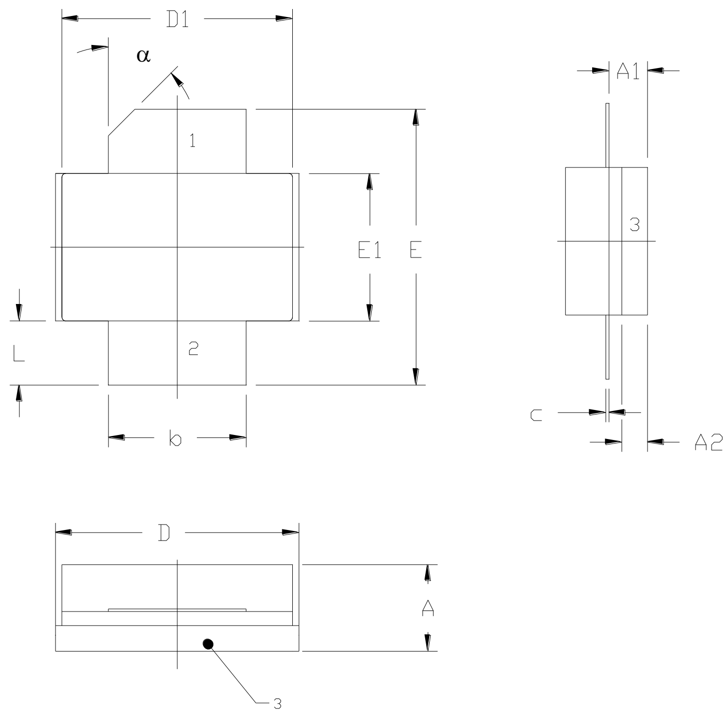
S11 vs Frequency and I_{DQ}



S22 vs Frequency and I_{DQ}



Lead-free 440206 Package Dimensions



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M - 1994.
2. CONTROLLING DIMENSION: INCH.
3. ADHESIVE FROM LID MAY EXTEND A MAXIMUM OF 0.020" BEYOND EDGE OF LID.
4. LID MAY BE MISALIGNED TO THE BODY OF PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.

	INCHES		MILLIMETERS		NOTES
DIM	MIN	MAX	MIN	MAX	
A	0.125	0.145	3.18	3.68	
A1	0.057	0.067	1.45	1.70	
A2	0.035	0.045	0.89	1.14	
b	0.210	0.220	5.33	5.59	2x
c	0.004	0.006	0.10	0.15	2x
D	0.375	0.385	9.53	9.78	
D1	0.355	0.365	9.02	9.27	
E	0.400	0.460	10.16	11.68	
E1	0.225	0.235	5.72	5.97	
L	0.085	0.115	2.16	2.92	2x
α	45° REF		45° REF		

PIN 1. DRAIN
2. GATE
3. SOURCE