Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

MAGX-002731-180L0x

GaN on SiC HEMT Pulsed Power Transistor
180 W Peak, 2700 to 3100 MHz, 300 μs Pulse, 10% Duty Rev. V6

Features

- GaN Depletion Mode HEMT Microwave Transistor
- Common Source Configuration
- Broadband Class AB Operation
- Thermally Enhanced Cu/Mo/Cu Package
- RoHS Compliant
- +50 V Typical Operation
- MTTF of 600 Years (T_J < 200ºC)
- EAR99 Export Classification

Applications

- Civilian and Military Pulsed Radar

Description

The MAGX-002731-180L00 and MAGX-002731-180L0S are gold metalized matched Gallium Nitride (GaN) on Silicon Carbide RF power transistors optimized for civilian and military radar pulsed applications between 2700 - 3100 MHz.

Using state of the art wafer fabrication processes, these high performance transistors provide high gain, efficiency, bandwidth, ruggedness over a wide bandwidth for today's demanding application needs.

The MAGX-002731-180L00 and MAGX-002731-180L0S are constructed using thermally enhanced Cu/Mo/Cu flanged ceramic packages which provide excellent thermal performance. High breakdown voltages allow for reliable and stable operation in extreme mismatched load conditions unparalleled with older semiconductor technologies.

MAGX-002731-180L00

MAGX-002731-180L0S

Ordering Information[1]

Part Number	Package
MAGX-002731-180L00	Standard Flange
MAGX-002731-180L0S	Earless Flange
MAGX-S32731-180L00	2700 – 3100 MHz Evaluation Board

1. When ordering the evaluation board, please indicate on sales order notes if it will be used for:
   A. Standard Flange devices
   B. Earless Flange devices

Electrical Specifications[2]: 2700 - 3100 MHz, T_A = 25°C

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
RF Functional Tests: V_{DD} = 50 V, I_{DQ} = 500 mA, 300 µs Pulse, 10% Duty Cycle						
Output Power	P_{IN} = 14 Wpk	P_{OUT}	180	215	-	Wpk
Gain	P_{IN} = 14 Wpk	G_P	11.1	11.8	-	dB
Drain Efficiency	P_{IN} = 14 Wpk	η_D	43	51	-	%
Load Mismatch Stability	P_{IN} = 14 Wpk	VSWR-S	-	5:1	-	-
Load Mismatch Tolerance	P_{IN} = 14 Wpk	VSWR-T	-	10:1	-	-

2. Typical RF performance measured in an RF evaluation board.

Electrical Characteristics: T_A = 25°C

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
DC Characteristics						
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 175 V	I_{DS}	-	-	12	mA
Gate Threshold Voltage	V_{DS} = 5 V, I_D = 30 mA	$V_{GS\ (TH)}$	-5	-3	-2	V
Forward Transconductance	V_{DS} = 5 V, I_D = 3.5 mA	G_M	5	-	-	S
Dynamic Characteristics						
Input Capacitance	N/A - Input Internally Matched	C_{ISS}	N/A	N/A	N/A	pF
Output Capacitance	V_{DS} = 50 V, V_{GS} = -8 V, F = 1 MHz	C_{OSS}	-	26.1	30.3	pF
Reverse Transfer Capacitance	V_{DS} = 50 V, V_{GS} = -8 V, F = 1 MHz	C_{RSS}	-	2.3	4.7	pF

Absolute Maximum Ratings[3,4,5]

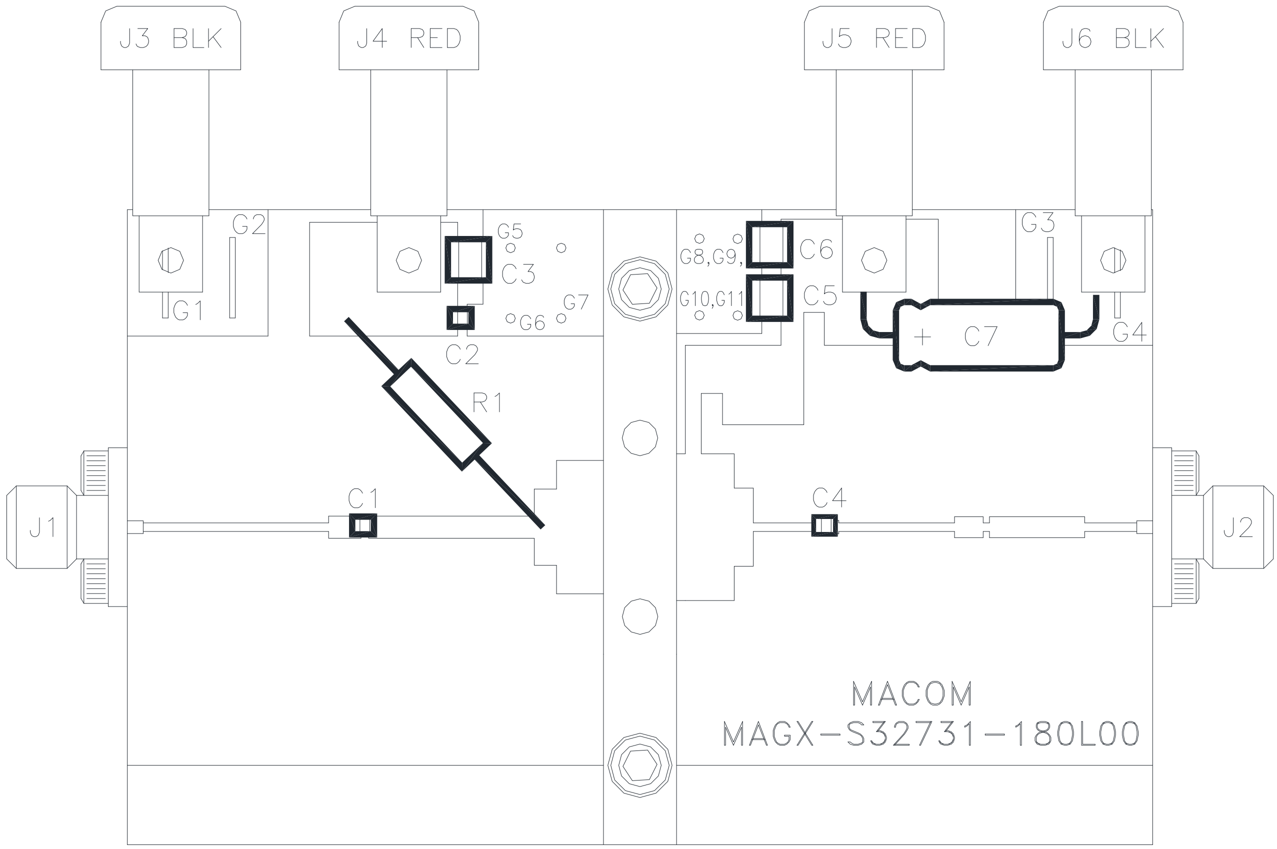
Parameter	Absolute Maximum
Drain Supply Voltage (V_{DD})	+65 V
Gate Supply Voltage (V_{GG})	-8 V to 0 V
Drain Supply Current (I_D)	10 A
Input Power[6] (P_{IN})	P_{IN} (nominal) + 3 dB
Operating Junction Temperature[7]	250ºC
Peak Pulsed Power Dissipation @ 85°C	192 W
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
ESD Min. - Charged Device Model (CDM)	350 V
ESD Min. - Human Body Model (HBM)	550 V
Maximum Solder Temperature	260°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.
5. For saturated performance it is recommended that the sum of (3 * V_{DD} + | V_{GG} |) < 175 V.
6. Input Power Limit is +3 dB over nominal drive required to achieve P_{OUT} = 180 W.
7. Operating junction temperature is measured with infrared (IR) microscope. Junction temperature directly affects a device's MTTF and should be kept as low as possible to maximize lifetime.
   - MTTF = 5.3 x 10^6 hours (T_J < 200°C)
   - MTTF = 6.8 x 10^4 hours (T_J < 250°C)

Thermal Characteristics

Parameter	Test Conditions	Symbol	Typical	Units
Thermal Resistance	T_C = 85ºC, V_{DD} = 50 V, I_{DQ} = 500 mA Pulse Width = 500 μs, Duty Cycle = 10%	Θ_{JC}	0.6	°C/W

Test Fixture Assembly



Parts List

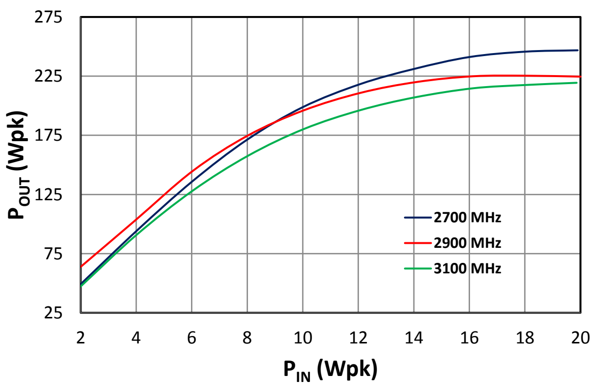
Part	Description
C1, C2, C4	Capacitor, 12 pF, 250 V, 5%, ATC800A
C3, C5	Capacitor, 0.1 µF, 100 V, 10%, X7R, 0805, TDK
C6	Capacitor, 1.0 µF, 100 V, 5%, 1206, Murata
C7	Capacitor, 22 µF, 100 V, 20%, Panasonic
R1	Resistor, 12 ohm, 1/4 W, 1%, Axial, Vishay Dale
J1, J2	SMA Connector
J3, J6	Female Banana Jack, Black
J4, J5	Female Banana Jack, Red
PCB	MACOM (Rogers RT6010.5LM, 0.25” thick, Er = 10.5)

Applications Section

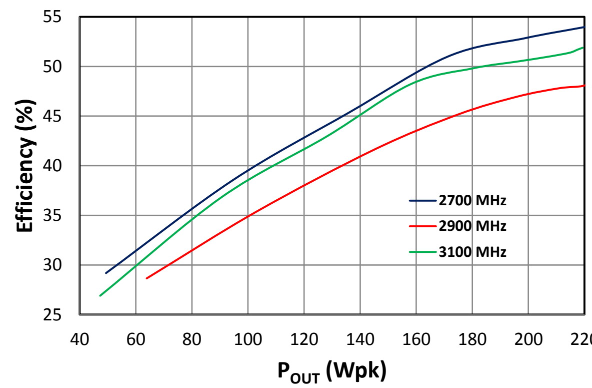
Typical Large-Signal Performance Curves

2700 - 3100 MHz, 300 µs Pulse, 10% Duty Cycle, V_{DD} = 50 V, I_{DQ} = 500 mA, P_{IN} = 14 Wpk, T_A = 25°C

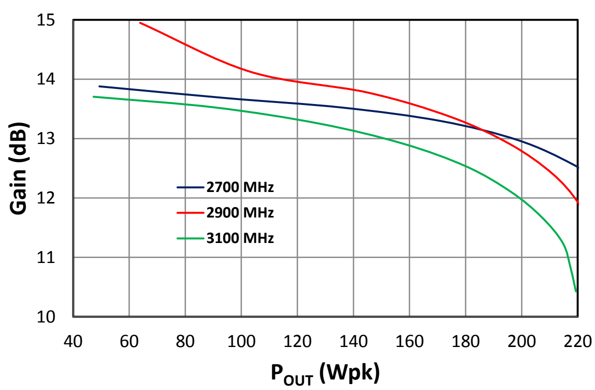
Output Power vs. Input Power



Drain Efficiency vs. Output Power



Gain vs. Output Power

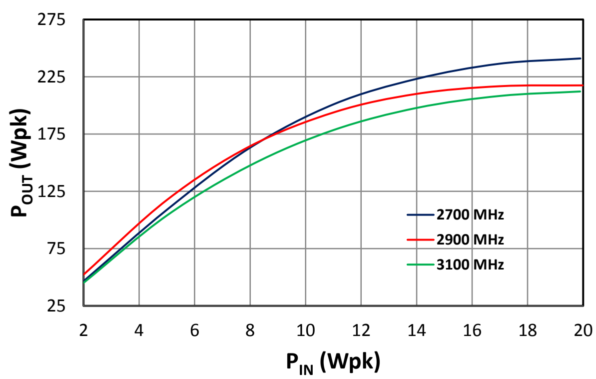


Applications Section

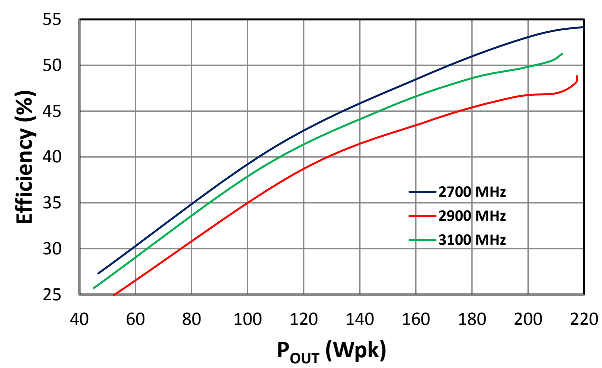
Typical Large-Signal Performance Curves

2700 - 3100 MHz, 500 μs Pulse, 10% Duty Cycle, V_{DD} = 50 V, I_{DQ} = 500 mA, P_{IN} = 14 Wpk, T_A = 25°C

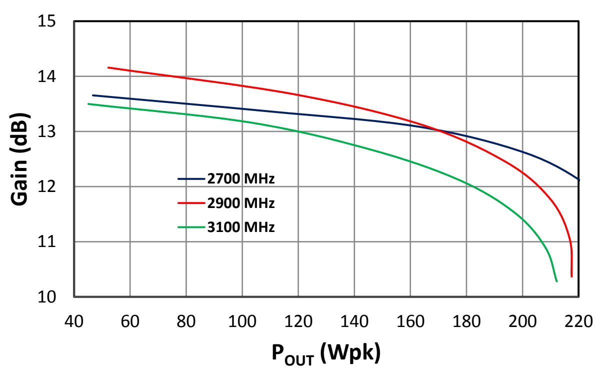
Output Power vs. Input Power



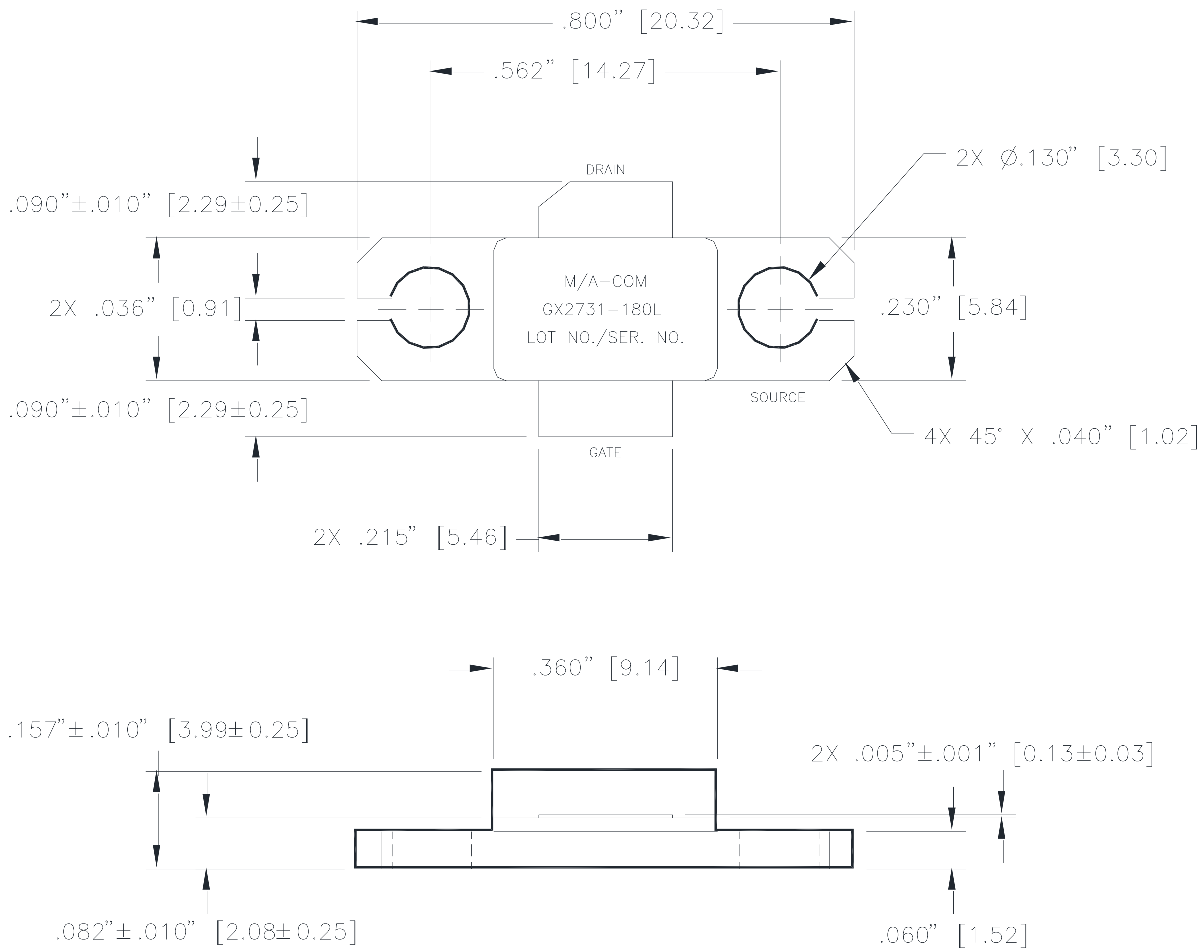
Drain Efficiency vs. Output Power



Gain vs. Output Power



Outline Drawing (Flanged)



Unless otherwise noted, tolerances are inches ±.005" [millimeters ±0.13mm]

Bias Sequencing

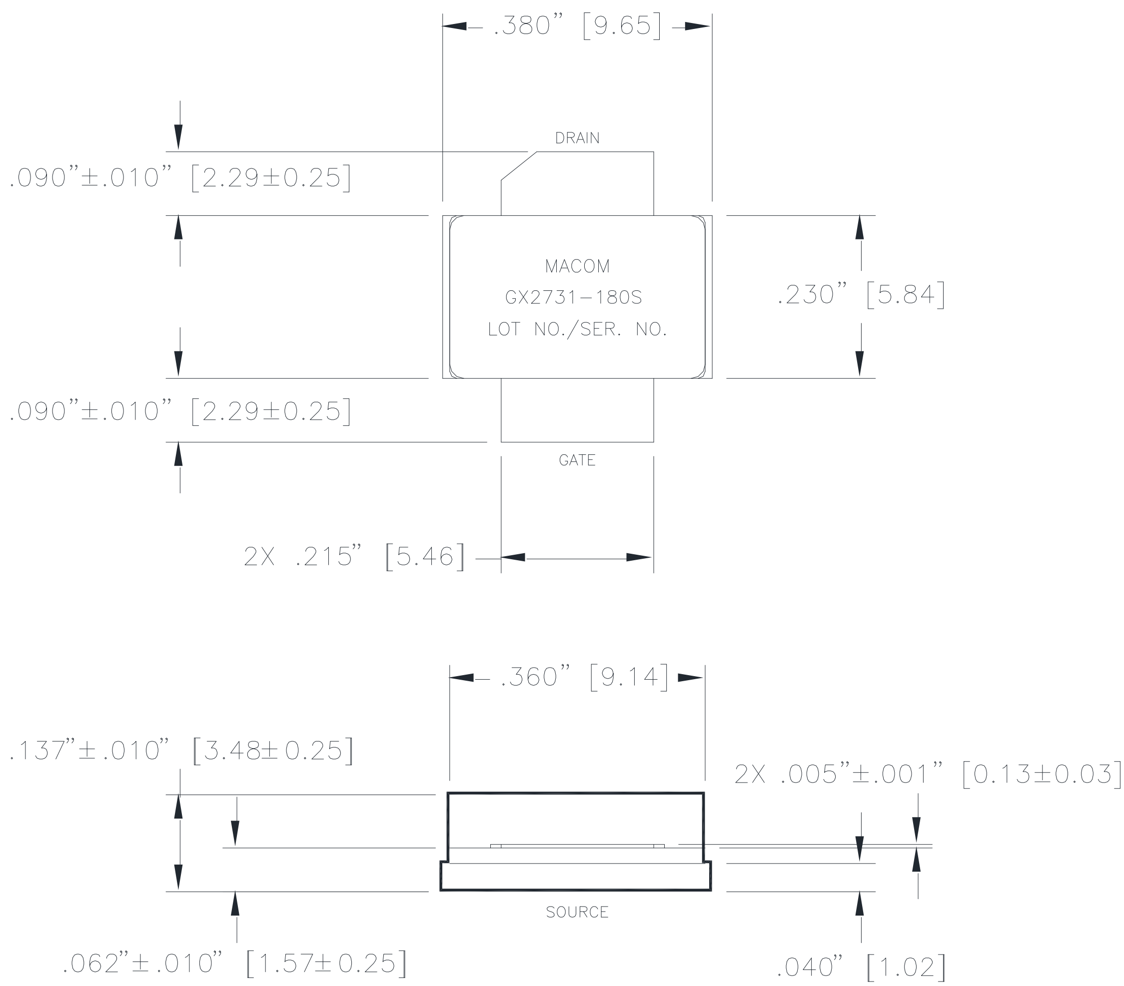
TURNING THE DEVICE ON

1. Set V_{GS} to the pinch-off (V_P), typically -5 V.
2. Turn on V_{DS} to nominal voltage (50 V).
3. Increase V_{GS} until the I_{DS} current is reached .
4. Apply RF power to desired level.

TURNING THE DEVICE OFF

1. Turn the RF power off.
2. Decrease V_{GS} down to V_P.
3. Decrease V_{DS} down to 0 V.
4. Turn off V_{GS}.

Outline Drawing (Flangeless)



Unless otherwise noted, tolerances are inches ±.005" [millimeters ±0.13mm]