

Features

- GaN on SiC HEMT Technology
- Designed for Digital Predistortion Error Correction Systems
- 7W Peak Output Power
- High Terminal Impedances for Broadband Performance
- 100% DC and RF Tested
- RoHS* Compliant

Applications

- Point-to-Point
- Infrastructure

Description

The MAPC-C38007-AD is a GaN on Silicon Carbide HEMT designed for base station applications. The circuit is optimized for modulated signal operation within the 3400 - 3800 MHz frequency band. This product is housed in a 4.0 x 4.5 mm DFN package.

Typical RF Performance:

$V_{DS} = 48\text{ V}$, $I_{DQ} = 16\text{ mA}$

$P_{OUT} = 26\text{ dBm}$, $T_A = 25^\circ\text{C}$

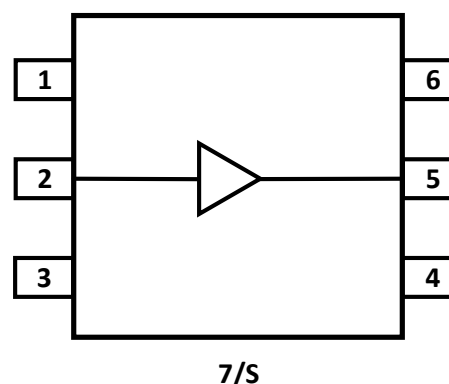
Note: Performance in MACOM Class AB Application Fixture. Single Carrier- W-CDMA Channel Bandwidth 3.84 MHz, PAR 10 dB @ 0.01% CCDF.

Frequency (MHz)	Gain (dB)	Efficiency (%)	Output PAR (dB)	ACPR (dBc)
3400	18.0	15.5	9.6	-41.0
3600	18.8	16.0	9.6	-41.0
3800	18.2	15.0	9.6	-41.0



4.0 x 4.5 mm DFN

Functional Schematic



Pin Configuration

Pin #	Pin Name	Function
1,3,4,6	N/C	No Connection
2	RF _{IN} / V _G	RF Input / Gate
5	RF _{OUT} / V _D	RF Output / Drain
7/S	Pad ²	Ground / Source

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

Ordering Information

Part Number	Package
MAPC-C38007-ADTR1	3000 Piece Reel ¹
MAPC-C38007-ADSB1	Sample Board

1. See application note AN-0004525 for Tape & Reel information.

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

RF Electrical Characterization:

$T_A = 25^\circ\text{C}$, $V_{DS} = 48\text{ V}$, $I_{DQ} = 16\text{ mA}$

Note: Performance in MACOM Class AB Application Fixture.

Single Carrier- W-CDMA Channel Bandwidth 3.84 MHz, PAR 10 dB @ 0.01% CCDF.

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Power Gain	3600 MHz, $P_{OUT} = 26\text{ dBm}$	Gp	—	18.5	—	dB
Drain Efficiency	3600 MHz, $P_{OUT} = 26\text{ dBm}$	η	—	16.0	—	%
Output CCDF @ 0.01%	3600 MHz, $P_{OUT} = 26\text{ dBm}$	PAR	—	9.6	—	dB
Adjacent Channel Power	3600 MHz, $P_{OUT} = 26\text{ dBm}$	ACP	—	-41.0	—	dBc
Input Return Loss	3600 MHz, $P_{OUT} = 26\text{ dBm}$	IRL	—	-8	—	dB
Gain Flatness	3600 MHz, $P_{OUT} = 26\text{ dBm}$	G_F	—	0.8	—	dB
Gain Variation (-40°C to +105°C)	3600 MHz, $P_{OUT} = 26\text{ dBm}$	ΔG	—	0.02	—	dB/°C
Power Variation (-40°C to +105°C)	3600 MHz, Pulsed 10% DC	ΔP_{3dB}	—	0.004	—	dB/°C
Ruggedness: Output Mismatch	All phase angles	Ψ	VSWR=10:1, No Device Damage			

RF Electrical Test Specifications:

$T_A = 25^\circ\text{C}$, $V_{DS} = 48\text{ V}$, $I_{DQ} = 16\text{ mA}$

Note: Performance in MACOM Class AB Production Test Fixture.

Single Carrier- LTE Channel Bandwidth 20 MHz, PAR 8dB @ 0.01% CCDF.

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Power Gain	3800 MHz, $P_{OUT} = 26\text{ dBm}$	Gp	15.3	16.4	—	dB
Drain Efficiency	3800 MHz, $P_{OUT} = 26\text{ dBm}$	η	18	19.3	—	%
Output CCDF @ 0.01%	3800 MHz, $P_{OUT} = 26\text{ dBm}$	PAR	8.1	8.3	—	dB
Adjacent Channel Power	3800 MHz, $P_{OUT} = 26\text{ dBm}$	ACP	—	-34.6	-33.8	dBc

DC Electrical Characteristics $T_A = 25^\circ\text{C}$

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Drain-Source Leakage Current	$V_{GS} = -8\text{ V}, V_{DS} = 150\text{ V}$	I_{DLK}	-	-	0.1	mA
Gate-Source Leakage Current	$V_{GS} = -8\text{ V}, V_{DS} = 150\text{ V}$	I_{GLK}	-0.06	-	-	mA
Gate Threshold Voltage	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	V_T	-3.8	-2.8	-2.1	V
Gate Quiescent Voltage	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	V_{GSQ}	-3.6	-3.2	-2.1	V
On Resistance	$V_{DS} = 0.1\text{ V}, V_{GS} = 0\text{ V}, I_D = 0.1\text{ mA}$	R_{ON}	-	3.65	-	Ω

Recommended Operating Voltages

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Drain Operating Voltage	—	V	—	—	50
Gate Quiescent Voltage	$V_{DS} = 48\text{ V}, I_D = 16\text{ mA}$	V	-3.8	-2.8	-2.1

Moisture Sensitivity Level

Level	Test Standard	Package Temperature	Unit
3	IPC/JEDEC J-STD-020	260	C

Absolute Maximum Ratings^{3,4,5,6,7}

Parameter	Absolute Maximum
Drain Source Voltage, V_{DS}	125 V
Gate Source Voltage, V_{GS}	-10 to 3 V
Gate Current, I_G	4.9 mA
Storage Temperature Range	-65°C to +150°C
Case Operating Temperature Range	-40°C to +125°C
Channel Operating Temperature Range, T_{CH}	-40°C to +225°C
Absolute Maximum Channel Temperature	+250°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation above maximum operating conditions.
5. Operating at drain source voltage $V_{DS} < 55V$ will ensure $MTTF > 1 \times 10^6$ hours.
6. Operating at nominal conditions with $T_{CH} \leq 220^\circ C$ will ensure $MTTF > 1 \times 10^6$ hours.
7. MTTF may be estimated by the expression $MTTF \text{ (hours)} = A e^{[B + C/(T+273)]}$ where T is the channel temperature in degrees Celsius.,
 $A = 1.34$, $B = -31.81$, and $C = 22,397$.

Thermal Characteristics⁸

Parameter	Test Conditions	Symbol	Typical	Units
Thermal Resistance using Finite Element Analysis	$V_{DS} = 48 V$ $T_C = 125^\circ C$, $T_{CH} = 225^\circ C$	$R_{\theta}(FEA)$	15.6	°C/W
Thermal Resistance using Infrared Measurement of Die Surface Temperature	$V_{DS} = 48 V$ $T_C = 125^\circ C$, $T_{SURFACE} = 200^\circ C$	$R_{\theta}(IR)$	12.5	°C/W

8. Case temperature measured using thermocouple embedded in heat-sink. Contact local applications support team for more details on this measurement.

Bias Sequencing

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 to the gate
3. Turn-off drain voltage
4. Turn-off gate voltage

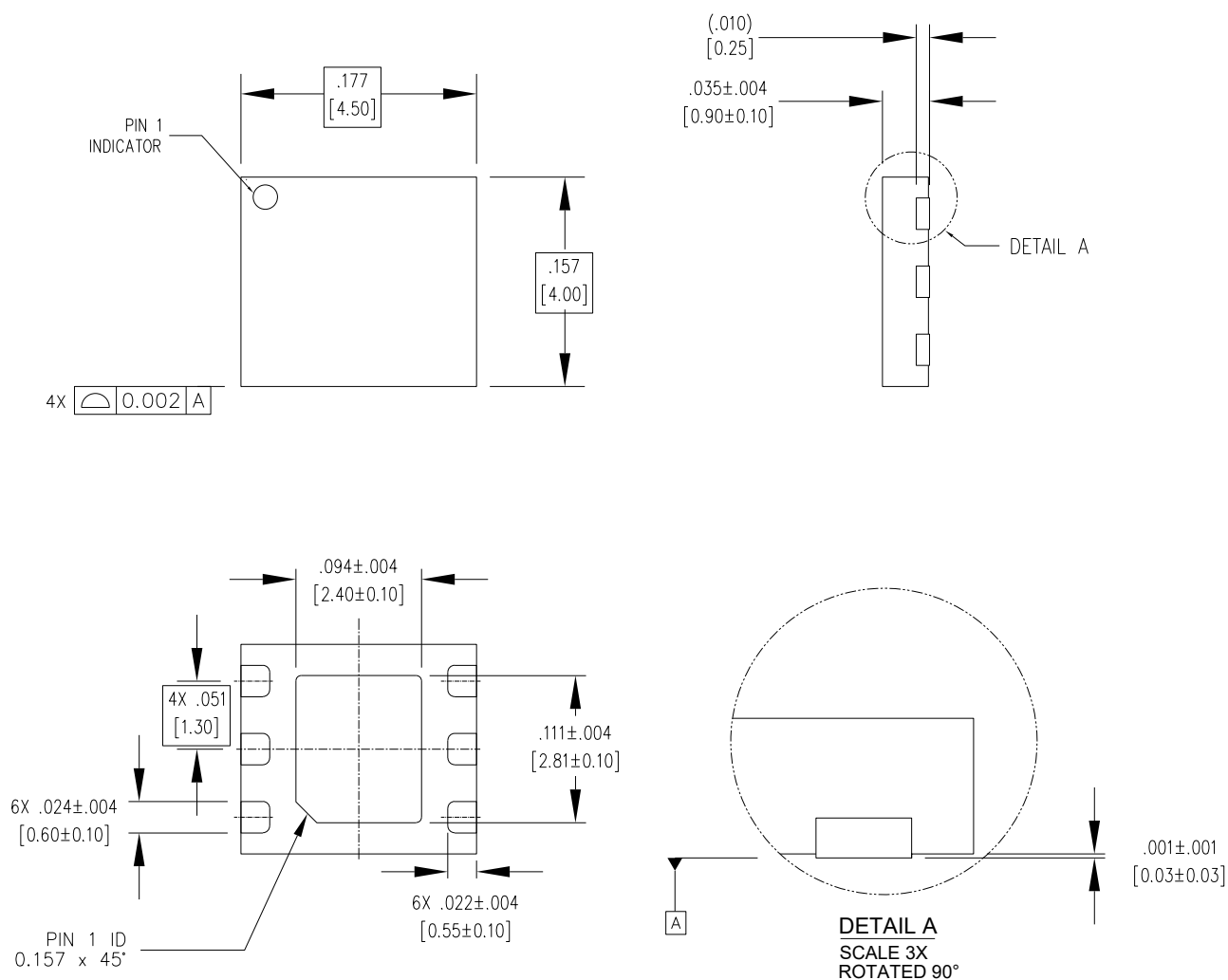
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Nitride Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1B and CDM Class C0b devices.

Lead-Free 4.0 x 4.5 mm 6L Package Dimensions



NOTES:

1. ALL DIMENSIONS SHOWN AS in[mm]. CONTROLLING DIMENSIONS ARE IN in.
CONVERTED mm DIMENSIONS ARE NOT NECESSARILY EXACT.
2. EXPOSED LEADS 100% Sn MATTE.

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