GaN on SiC Transistor
6 W, 48 V, 5.0 GHz

MACOM PURE CARBIDE

WSGPC01-V1
Rev. V1

Features

- Optimized for Cellular Base Station Applications
- Designed for Digital Predistortion Error Correction Systems
- High Terminal Impedances for Broadband Performance
- 48 V Capable Operation
- 100% RF Tested
- RoHS* Compliant

4.0 x 4.5 mm DFN

Description

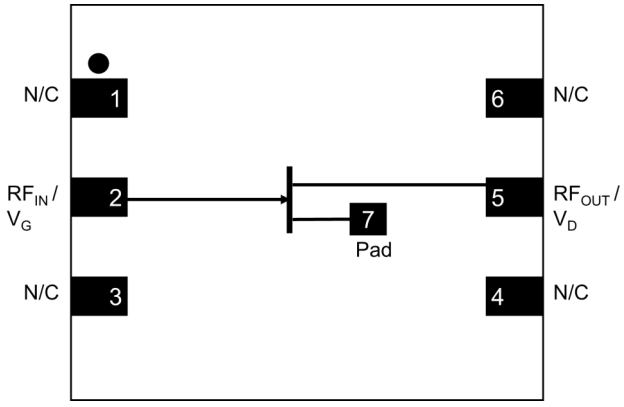
The WSGPC01 GaN on SiC HEMT designed for base station applications and optimized for 2.496 - 2.690 GHz modulated signal operation. This device supports pulsed and linear operation with peak output power levels to 6 W (37.8 dBm) in an 4.0 x 4.5 mm DFN package.

Typical RF Performance

- WCDMA 3GPP TM1 64 DPCH 9.9 dB PAR @ 0.01% CCDF, V_{DS} = 46 V, I_{DQ} = 10 mA, T_A = 25°C, P_{OUT} = 23 dBm.

Frequency (GHz)	G_P (dB)	η_D (%)	OPAR (dB)	ACPR (dBc)
2.496	18	13	9.7	-41
2.690	17	12	9.7	-41

Functional Schematic



Pin Configuration

Pin #	Function
1,3,4,6[1]	No Connection[1]
2	RF Input / Gate
5	RF Output / Drain
7	Ground / Source

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

Ordering Information

Part Number	Package
WSGPC01-V1-R3K	3000 Piece Reel
FXA-WSGPC01V1-1	Driver Sample Board (tuned for 2.496-2.690GHz)

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

RF Electrical Characteristics: T_A = 25°C, V_{DS} = 46 V, I_{DQ} = 10 mA
Note: Performance in MACOM Single-ended Class-AB Evaluation Test Fixture, 50 Ω system.

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Small Signal Gain	Pulsed[2], 2.6 GHz	-	18.5	-	dB
Saturation Output Power	Pulsed[2], 2.6 GHz	-	38	-	dBm
Drain Efficiency at Saturation	Pulsed[2], 2.6 GHz	-	50	-	%
Power Gain	WCDMA[3], 2.6 GHz, P_{OUT} = 23 dBm	-	18	-	dB
Drain Efficiency	WCDMA[3], 2.6 GHz, P_{OUT} = 23 dBm	-	12.5	-	%
Output CCDF @ 0.01%	WCDMA[3], 2.6 GHz, P_{OUT} = 23 dBm	-	9.7	-	dB
Adjacent Channel Power	WCDMA[3], 2.6 GHz, P_{OUT} = 23 dBm	-	-41	-	dBc
Input Return Loss	WCDMA[3], 2.6 GHz, P_{OUT} = 23 dBm	-	-6	-	dB
Ruggedness: Output Mismatch	All Phase Angles	VSWR = 5:1, No Device Damage			

RF Electrical Characteristics: T_A = 25°C, V_{DS} = 48 V, I_{DQ} = 10 mA
Note: Performance in MACOM Single-ended Class-AB Production Test Fixture, 50 Ω system.

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Power Gain	LTE[4], 2.6 GHz, P_{OUT} = 23 dBm	16	17.5	-	dB
Drain Efficiency	LTE[4], 2.6 GHz, P_{OUT} = 23 dBm	12.5	15	-	%
Output CCDF @ 0.01%	LTE[4], 2.6 GHz, P_{OUT} = 23 dBm	6	6.5	-	dB
Adjacent Channel Power Ratio	LTE[4], 2.6 GHz, P_{OUT} = 23 dBm	-	-37	-33	dBc
Input Return Loss	LTE[4], 2.6 GHz, P_{OUT} = 23 dBm	-	-15	-7	dB

2. Pulse details: 20 µs pulse width, 0.2 ms period, 10% Duty Cycle
3. Modulated Signal: 3.84 MHz, WCMDA 3GPP TM1 64 DPCH, 9.9 dB PAR @ 0.01% CCDF
4. LTE Signal: 20 MHz, 8 dB PAR @ 0.01% CCDF

DC Electrical Characteristics: T_A = 25°C

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Drain-Source Leakage Current	V_{GS} = - 8 V, V_{DS} = 150 V	-	-	0.28	mA
Gate-Source Leakage Current	V_{GS} = - 8 V, V_{DS} = 150 V	-0.30	-	-	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 0.88 mA	-3.8	-2.8	-2.1	V

Recommended Operating Voltages

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Drain Operating Voltage	—	0	-	50	V
Gate Quiescent Voltage	V_{DS} = 48 V, I_D = 10 mA	-3.6	-2.4	-2.1	V

Absolute Maximum Ratings[5,6]

Parameter	Absolute Maximum
Drain Source Voltage, V_{DS}	150 V
Gate Source Voltage, V_{GS}	-10 V to +2 V
Operating Voltage	55 V
Gate Current I_G	0.88 mA
Drain Current, I_D	0.30 A
Junction Temperature	+225°C
Channel Operating Temperature	-40°C to +225°C
Storage Temperature	-65°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. MACOM does not recommend sustained operation near these survivability limits.

Bias Sequencing

Bias ON

1. Ensure RF is turned off
2. Apply pinch-off voltage of -5V 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:

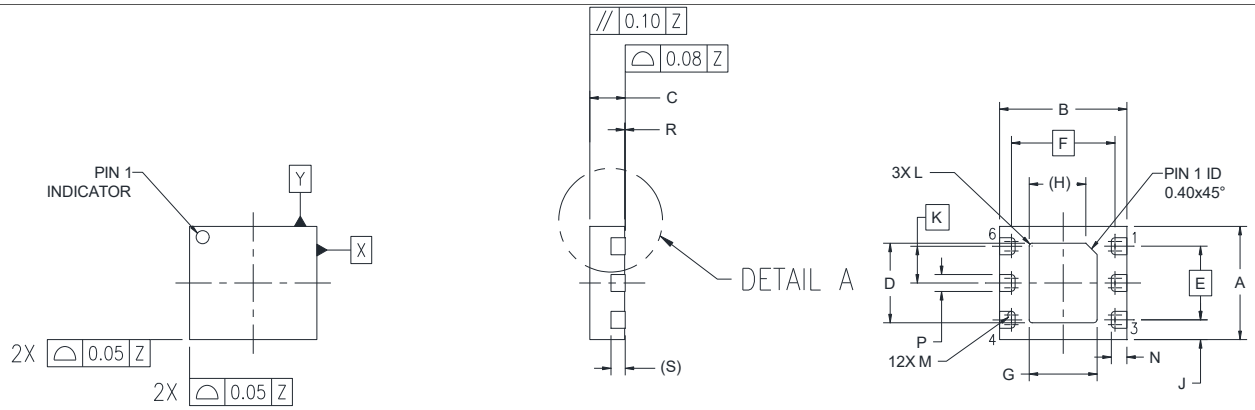
Static Sensitivity

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.

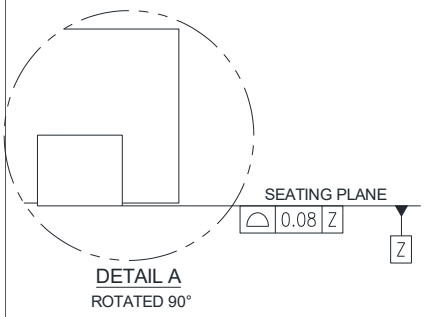
ESD Characteristics

Test Methodology	Test Conditions
Human Body Model (per JS-001)	1A
Charge Device Model (per JS-002)	C1

Lead-Free 4.0 x 4.5 mm 6-Lead Package Dimensions†



TOP VIEW SIDE VIEW BOTTOM VIEW



DIM	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.156	0.157	0.159	3.95	4	4.05
B	0.175	0.177	0.179	4.45	4.5	4.55
C	0.045	0.049	0.053	1.15	1.25	1.35
D	0.107	0.111	0.115	2.71	2.81	2.91
E	-	0.102	-	-	2.6	-
F	-	0.144	-	-	3.66	-
G	0.091	0.094	0.098	2.3	2.4	2.5
H	-	0.079	-	-	2	-
J	0.026	0.028	0.03	0.65	0.7	0.75
K	-	0.051	-	-	1.3	-
L	-	0.004	0.008	-	0.1	0.2
M	-	0.005	0.016	-	0.13	0.4
N	0.018	0.022	0.026	0.45	0.55	0.65
P	0.022	0.024	0.026	0.55	0.6	0.65
R	0	0.001	0.002	0	0.02	0.05
S	-	0.02	-	-	0.5	-

† Interpret dimensions and tolerances per ASME Y14.5M-1994.

† Meets JEDEC moisture sensitivity level (MSL) 3 requirements.