

### MACOM PURE CARBIDE

WSDC2640-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

### Description

The WSDC2640 GaN on SiC HEMT amplifier 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 70 W (48.5 dBm) in a 6.5 x 7.0 mm DFN package.

### **Typical RF Performance**

WCDMA 3GPP TM1 64 DPCH 9.9 dB PAR @ 0.01% CCDF, V<sub>DS</sub> = 46 V, I<sub>DQCAR</sub> = 40 mA, V<sub>GSPK</sub> = -5.2 V, T<sub>A</sub> = 25°C, P<sub>OUT</sub> = 39.5 dBm.

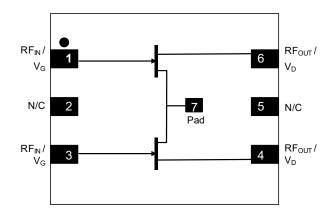
Frequency (GHz)	G <sub>P</sub> (dB)	η <sub>D</sub> (%)	OPAR (dB)	ACPR (dBc)
2.496	16.7	56	8.5	-27
2.593	17.0	57	8.5	-29
2.690	16.5	58	8.4	-28

## **Ordering Information**

Part Number	Package
WSDC2640-V1-R3K	3000 Piece Reel
FXA-WSDC2640V1-1	Sample Board (tuned for 2.3-2.4 GHz)
FXA-WSDC2640V1-2	Sample Board (tuned for 2.496-2.690 GHz)



### **Functional Schematic**



### Pin Configuration

Pin#	Pin Name	Function
1	RF <sub>IN</sub> / V <sub>G</sub>	RF Input / Gate (Carrier)
2,5	N/C	No Connection
6	RF <sub>OUT</sub> / V <sub>D</sub>	RF Output / Drain (Carrier)
3	RF <sub>IN</sub> / V <sub>G</sub>	RF Input / Gate (Peaking)
4	RF <sub>OUT</sub> / V <sub>D</sub>	RF Output / Drain (Peaking)
7	Pad <sup>1</sup>	Ground / Source

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

<sup>\*</sup> Restrictions on Hazardous Substances, compliant to current RoHS EU directive.



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RF Electrical Characteristics:  $T_A$  = 25°C,  $V_{DS}$  = 46 V,  $I_{DQCAR}$  = 40 mA,  $V_{GSPK}$  = -5.2 V Note: Performance in MACOM Evaluation Test Fixture, 50  $\Omega$  system.

Parameter	Test Conditions	Units	Min.	Тур.	Max.
Small Signal Gain	Pulsed <sup>2</sup> , 2.6 GHz	dB	-	18.8	-
Saturation Output Power	Pulsed <sup>2</sup> , 2.6 GHz	dBm	-	48.5	-
Drain Efficiency at Saturation	Pulsed <sup>2</sup> , 2.6 GHz	%	-	64	-
Power Gain	WCDMA <sup>3</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dB	-	16.8	-
Drain Efficiency	WCDMA <sup>3</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	%	-	57	-
Output CCDF @ 0.01%	WCDMA <sup>3</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dB	-	8.5	-
Adjacent Channel Power	WCDMA <sup>3</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dBc	-	-28	-
Input Return Loss	WCDMA <sup>3</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dB	-	-20	-
Ruggedness: Output Mismatch	All Phase Angles	VSWR = 4:1, No Device Damage		amage	

## RF Electrical Characteristics: $T_A$ = 25°C, $V_{DS}$ = 48 V, $I_{DQCAR}$ = 40 mA, $V_{GSPK}$ = -4.8 V Note: Performance in MACOM Doherty Production Test Fixture, 50 $\Omega$ system.

Parameter	Test Conditions	Units	Min.	Тур.	Max.
Power Gain	LTE <sup>4</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dB	12	13	-
Drain Efficiency	LTE <sup>4</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	%	45	50	-
Output CCDF @ 0.01%	LTE <sup>4</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dB	5.5	6.5	-
Adjacent Channel Power Ratio	LTE <sup>4</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dBc	-	-23	-19
Input Return Loss	LTE <sup>4</sup> , 2.6 GHz, P <sub>OUT</sub> = 39.5 dBm	dB	-	-15	-7

<sup>2.</sup> Pulse details: 20 µs pulse width, 0.2 ms period, 10% Duty Cycle

<sup>3.</sup> Modulated Signal: 3.84 MHz, WCMDA 3GPP TM1 64 DPCH, 9.9 dB PAR @ 0.01% CCDF

<sup>4.</sup> LTE Signal: 20 MHz, 8 dB PAR @ 0.01% CCDF



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DC Electrical Characteristics:  $T_A = 25$ °C

Parameter	Test Conditions	Min.	Тур.	Max.	Units
	Carrier Amplifier				
Drain-Source Leakage Current	V <sub>GS</sub> = -8 V, V <sub>DS</sub> = 150 V	-	-	1.62	mA
Gate-Source Leakage Current	V <sub>GS</sub> = -8 V, V <sub>DS</sub> = 150 V	-1.25	-	-	mA
Gate Threshold Voltage	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 3.7 mA	-3.8	-2.8	-2.1	V
Gate Quiescent Voltage	V <sub>DS</sub> = 48 V, I <sub>D</sub> = 40 mA	-3.6	-2.4	-2.1	V
	Peaking Amplifier				
Drain-Source Leakage Current	V <sub>GS</sub> = -8 V, V <sub>DS</sub> = 150 V	-	-	2.70	mA
Gate-Source Leakage Current	V <sub>GS</sub> = -8 V, V <sub>DS</sub> = 150 V	-2.09	-	-	mA
Gate Threshold Voltage	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 6.1 mA	-3.8	-2.8	-2.1	V
Gate Quiescent Voltage	V <sub>DS</sub> = 48 V, I <sub>D</sub> = 60 mA	-3.6	-2.4	-2.1	V

## **Recommended Operating Voltages**

Parameter	Test Conditions	Min.	Тур.	Max.	Units
Drain Operating Voltage	_	0	-	50	V
Carrier Amplifier					
Gate Quiescent Voltage	V <sub>DS</sub> = 48 V, I <sub>D</sub> = 40 mA	-3.6	-2.4	-2.1	V



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### **Absolute Maximum Ratings**<sup>5,6</sup>

Parameter	Absolute Maximum
Drain Source Voltage, V <sub>DS</sub>	150 V
Gate Source Voltage, V <sub>GS</sub>	-10 V to +2 V
Operating Voltage	55 V
Gate Current (Carrier), I <sub>G</sub>	3.7 mA
Drain Current (Carrier), I <sub>D</sub>	1.2 A
Gate Current (Peaking), I <sub>G</sub>	6.1 mA
Drain Current (Peaking), I <sub>D</sub>	2.1 A
Junction Temperature	+225°C
Channel Operating Temperature	-40°C to +225°C
Storage Temperature	-65°C to +150°C

<sup>5.</sup> Exceeding any one or combination of these limits may cause permanent damage to this device.

### **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**

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		
Charge Device Model (per JS-002)	C2B		

<sup>6.</sup> MACOM does not recommend sustained operation near these survivability limits.

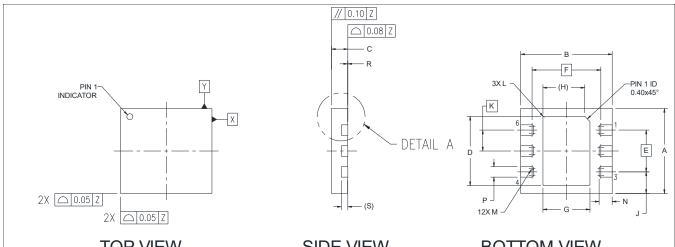


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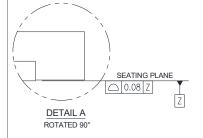
### Lead-Free 7.0 x 6.5 mm 6-Lead Package Dimensions<sup>†</sup>





SIDE VIEW

**BOTTOM VIEW** 



	INCHES			MILLIMETERS		
DIM	MIN	TYP	MAX	MIN	TYP	MAX
Α	0.254	0.256	0.258	6.45	6.5	6.55
В	0.274	0.276	0.278	6.95	7	7.05
С	0.045	0.049	0.053	1.15	1.25	1.35
D	0.205	0.209	0.213	5.21	5.31	5.41
Е	-	0.126	-	-	3.2	-
F	-	0.207	-	-	5.26	-
G	0.138	0.142	0.146	3.5	3.6	3.7
Н	-	0.126	-	-	3.2	-
J	0.063	0.065	0.067	1.6	1.65	1.7
K	-	0.063	-	-	1.6	-
L	-	0.004	0.008	-	0.1	0.2
М	-	0.005	0.016	-	0.13	0.4
N	0.035	0.039	0.043	0.9	1	1.1
Р	0.03	0.031	0.033	0.75	0.8	0.85
R	0	0.001	0.002	0	0.02	0.05
S	-	0.02	-	-	0.5	-

<sup>†</sup> Interpret dimensions and tolerances per ASME Y14.5M-1994.

<sup>&</sup>lt;sup>†</sup> Meets JEDEC moisture sensitivity level (MSL) 3 requirements.



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