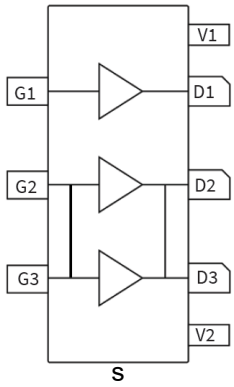
Thermally Enhanced GaN Amplifier 48 V, 610 W 1805 - 1880 MHz

WGC18630
Rev. V1

Features

- Optimized for Cellular Base Station Applications
- GaN on SiC HEMT Technology
- 48 V Operation
- Pulsed CW Performance: 1842 MHz, 48 V, 40 µs Pulse Width, 10% Duty Cycle, Combined Outputs
- Output Power @ P4dB = 610 W
- Efficiency @ P4dB = 73%
- 100 % RF Tested
- RoHS* Compliant



Description

The WGC18630 is a 610 W (P4dB) GaN on SiC HEMT amplifier designed for 5G base station application and optimized for 1805 - 1880 MHz modulated signal operation. It features high efficiency, and a thermally enhanced package with earless flange.

Typical RF Characteristics

WCDMA 3GPP TM1 64 DPCH 10 dB PAR @ 0.01% CCDF, V_{DS} = 48 V, I_{DQCAR} = 720 mA, V_{GSPK} = -5 V, T_C = 25°C, P_{OUT} = 49.3 dBm

Frequency (MHz)	G_p (dB)	ηD	Output PAR (dB)	ACPR (dBc)
1805	16.7	58.7	8.8	-31.6
1842	16.7	58.4	8.7	-31.9
1880	16.5	57.9	8.6	-31.8

Pin Configuration[1]

Pin #	Function
G1	Gate Main
G2	Gate Peak 1
G3	Gate Peak 2
D1	Drain Main
D2	Drain Peak 1
D3	Drain Peak 2
V1, V2	Drain Video Decoupling, No DC Bias
S	Source (flange)

1. Exposed metallization on the back side of the package.

Ordering Information

Part Number	Package
WGC18630V1A-RA	50 piece reel
WGC18630V1A-R2	250 piece reel
LTAWGC18630-E1	Doherty Sample Board

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

RF Electrical Specifications:
T_C = 25°C, V_{DS} = 48 V, I_{DQCAR} = 720 mA, V_{GSPK} = -5 V
Note: Performance in MACOM Doherty Evaluation Test Fixture, 50 Ω system.

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Power Gain	WCDMA[2], 1842 MHz, P_{OUT} = 49.3 dBm	dB	—	16.7	—
Drain Efficiency	WCDMA[2], 1842 MHz, Pout = 49.3dBm	%	—	58	—
Output CCDF @ 0.01%	WCDMA[2], 1842 MHz, Pout = 49.3dBm	dB	—	8.7	—
Adjacent Channel Power	WCDMA[2], 1842 MHz, Pout = 49.3dBm	dBc	—	-32	—
Input Return Loss	WCDMA[2], 1842 MHz, Pout = 49.3dBm	dB	—	-14	—
Ruggedness: Output Mismatch	All phase angles	VSWR = 10:1, No Device Damage			

RF Electrical Specifications:
T_A = 25°C, V_{DS} = 48 V, I_{DQCAR} = 360 mA, V_{GSPK} = V_{GS} @ I_{DQPK} = 720 mA - 1.6 V
Note: Performance in MACOM Doherty Production Test Fixture, 50 Ω system.

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Power Gain	WCDMA[2], 1880 MHz, P_{OUT} = 49.3 dBm	dB	14.0	16.5	—
Drain Efficiency	WCDMA[2], 1880 MHz, P_{OUT} = 49.3 dBm	%	44.0	52.5	—
Output CCDF @ 0.01%	WCDMA[2], 1880 MHz, P_{OUT} = 49.3 dBm	dB	6.8	8.0	—
Adjacent Channel Power	WCDMA[2], 1880 MHz, P_{OUT} = 49.3 dBm	dBc	—	-32.0	-25.0
Input Return Loss	WCDMA[2], 1880 MHz, P_{OUT} = 49.3 dBm	dB	—	-12	—

DC Electrical Characteristics T_c = 25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Carrier Amplifier					
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 10 V	mA	—	—	5.7
Gate-Source Leakage Current - Mid Voltage	V_{GS} = -8 V, V_{DS} = 50 V	mA	-8.5	—	—
Gate-Source Leakage Current - High Voltage	V_{GS} = -8 V, V_{DS} = 150 V	mA	-11.2	—	—
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 36 mA	V	-3.8	-3.1	-2.3
Peaking Amplifier					
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 10 V	mA	—	—	11.4
Gate-Source Leakage Current - Mid Voltage	V_{GS} = -8 V, V_{DS} = 50 V	mA	-16.9	—	—
Gate-Source Leakage Current - High Voltage	V_{GS} = -8 V, V_{DS} = 150 V	mA	-22.3	—	—
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 72 mA	V	-3.8	-3.1	-2.3

Recommended Operating Voltages

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Drain Operating Voltage	—	V	0	—	50
Gate Quiescent Voltage	V_{DS} = 48 V, I_D = 360 mA	V	-3.8	-3.0	-2.3

Absolute Maximum Ratings[3,4,5]

Parameter	Absolute Maximum
Drain Source Voltage, V_{DS}	125 V
Gate Source Voltage, V_{GS}	-10 V to +2 V
Operating Voltage, V_{DS}	55 V
Gate Current (Carrier), I_G	36 mA
Gate Current (Peaking), I_G	72 mA
Drain Current (Carrier), I_D	12.2 A
Drain Current (Peaking), I_D	24.4 A
Junction Temperature	+225°C
Storage Temperature	-65°C to +150°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. Product's qualification were performed @ +225°C. Operation @ T_J (+275°C) reduces median time to failure.

Thermal Characteristics

Parameter	Test Conditions	Typical
Thermal Resistance ($R_{\theta JC}$) Carrier Peaking	V_{DS} = 48 V, T_C = +85°C, 123 W DC 157 W DC	 1.1°C/W 0.6°C/W

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

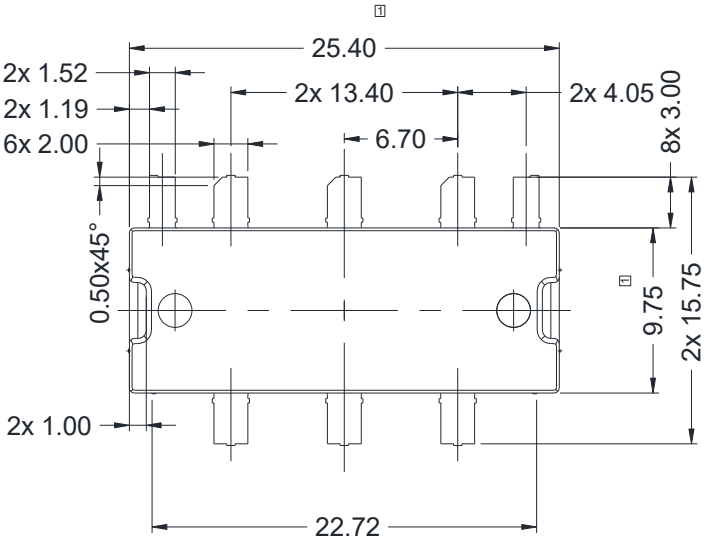
Handling Procedures

Please observe the following precautions to avoid damage:

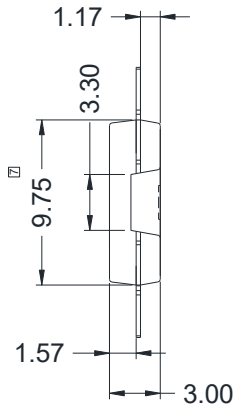
Static Sensitivity

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 HBM Class 1B and CDM Class C3 devices.

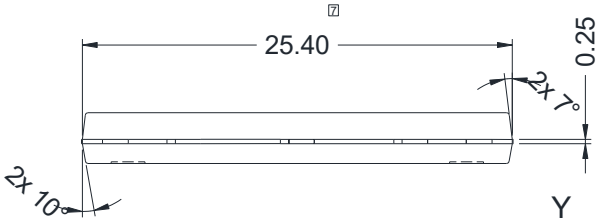
Lead-Free PG-HBSOF-8 Package Dimensions



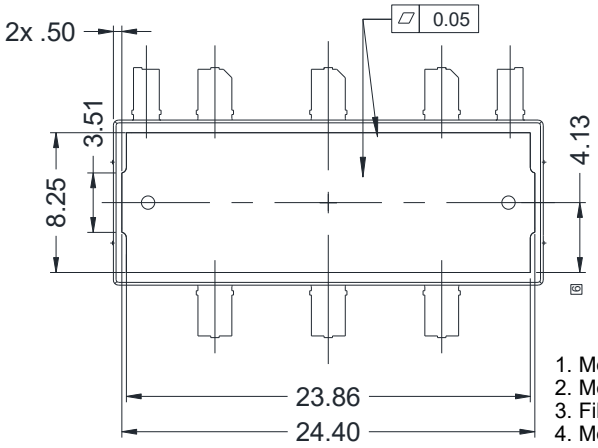
TOP VIEW



END VIEW



SIDE VIEW



BOTTOM VIEW

1. Mold/dam bar/metal protrusion of 0.30 mm max per side not included.
2. Metal protrusions connected to source and shall not exceed 0.10 mm max.
3. Fillets and radii: Unless otherwise noted all radii are 0.3 mm max.
4. Molded package Ra 1.2-1.6 µm.
5. All metal surfaces tin pre-plated, except area of cut.
6. Exposed metal surface tin plated, may not be covered by mold compound.
7. Does not include mold/dam bar/metal protrusion.
8. Interpret dimensions and tolerances per ISO 8015.
9. Dimensions are in mm.
10. All tolerances are ± 0.1 mm unless specified otherwise.