Thermally Enhanced GaN Amplifier
400 W, 48 V, 2620 - 2690 MHz

MACOM PURE CARBIDE™

WGC26420
Rev. V1

Features

- GaN on SiC HEMT Technology
- Pulsed CW Performance: 2655 MHz, 48 V, 40 µs Pulse Width, 10% Duty Cycle, Combined Outputs
- Output Power @ P4dB = 400 W
- Efficiency @ P4dB = 65%
- RoHS* Compliant

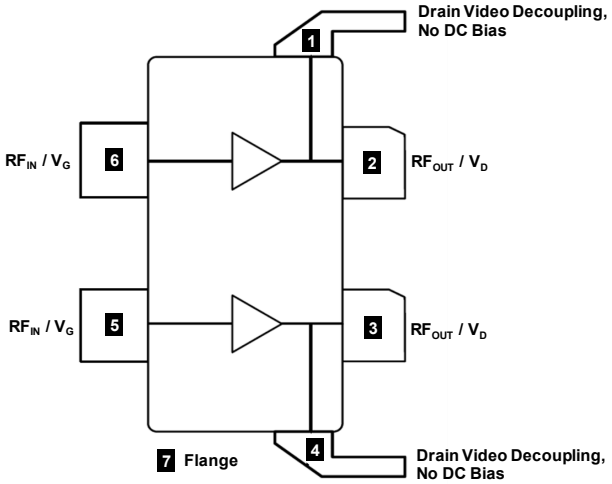
Applications

- Cellular Power

Description

The WGC26420 is a 400 W (P4dB) GaN on Silicon Carbide HEMT amplifier designed for use in multi-standard cellular power amplifier applications. It features optimized operation from 2620 - 2690 MHz and a thermally-enhanced over-molded plastic package.

Functional Schematic



Typical RF Performance[1]

WCDMA 3GPP TM1 64 DPCH 10dB PAR @ 0.01% CCDF, V_{DS} = 48 V, I_{DQCAR} = 280 mA, V_{GSPK} = - 5.0 V, P_{OUT} = 47.3 dBm (54 W), T_A = +25°C.

Frequency (MHz)	Gain (dB)	Efficiency (%)	OPAR (dB)	ACPR (dBc)
2620	16.6	53.6	9.5	-27.6
2655	16.5	53.6	9.4	-29.0
2690	16.3	52.9	9.4	-30.0

1. Measurements taken in MACOM Doherty Evaluation Test Fixture with device soldered to the heatsink, 50 Ω system.

Pin Configuration[2]

Pin #	Function
6	Carrier RF$_{IN}$ / V$_G$
5	Peak RF$_{IN}$ / V$_G$
2	Carrier RF$_{OUT}$ / V$_D$
3	Peak RF$_{OUT}$ / V$_D$
1, 4	Drain Video Decoupling. No DC Bias
7	Flange

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

Ordering Information

Part Number	Package
WGC26420V1A-R2	250 piece reel
LTAWGC26420-E1	Sample Board

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

RF Electrical Specifications:

V_{DS} = 48 V, I_{DQCAR} = 280 mA, V_{GSPK} = - 5.0 V, T_A = +25°C.
Note: Performance in MACOM Doherty Evaluation Test Fixture with device soldered to the heatsink, 50 Ω system.

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Power Gain	WCDMA[3], 2655 MHz, P_{OUT} = 47.3 dBm	Gp	—	16.5	—	dB
Drain Efficiency	WCDMA[3], 2655 MHz, P_{OUT} = 47.3 dBm	η	—	53.6	—	%
Output CCDF @ 0.01%	WCDMA[3], 2655 MHz, P_{OUT} = 47.3 dBm	PAR	—	9.4	—	dB
Adjacent Channel Power	WCDMA[3], 2655 MHz, P_{OUT} = 47.3 dBm	ACP	—	- 29.0	—	dBc
Input Return Loss	WCDMA[3], 2655 MHz, P_{OUT} = 47.3 dBm	IRL	—	- 19	—	dB
Ruggedness: Output Mismatch	All phase angles	ψ	VSWR = 10:1, No Device Damage			

RF Electrical Specifications:

V_{DS} = 48 V, I_{DQCAR} = 280 mA, V_{GSPK} = V_{GS} at I_{DQPK} = 560 mA - 1.2 V, T_A = +25°C
Note: Performance in MACOM Doherty Production Test Fixture, 50 Ω system.

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Power Gain	WCDMA[3], 2690 MHz, P_{OUT} = 47.3 dBm	Gp	13.5	15.5	—	dB
Drain Efficiency	WCDMA[3], 2690 MHz, P_{OUT} = 47.3 dBm	η	42.0	49.0	—	%
Output CCDF @ 0.01%	WCDMA[3], 2690 MHz, P_{OUT} = 47.3 dBm	PAR	8.2	9.2	—	dB
Adjacent Channel Power	WCDMA[3], 2690 MHz, P_{OUT} = 47.3 dBm	ACP	—	- 30.0	- 26.0	dBc

3. WCDMA 3GPP TM1 64 DPCH 10dB PAR @ 0.01% CCDF.

DC Electrical Characteristics: T_A = 25°C

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Carrier Amplifier						
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 10 V	I_{DLK}	—	—	4.4	mA
Gate-Source Leakage Current - Mid Voltage	V_{GS} = -8 V, V_{DS} = 50 V	I_{GLKM}	- 6.6	—	—	mA
Gate-Source Leakage Current - High Voltage	V_{GS} = -8 V, V_{DS} = 150 V	I_{GLKH}	- 2.0	—	—	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 28 mA	V_T	- 3.8	- 3.1	- 2.3	V
Peaking Amplifier						
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 10 V	I_{DLK}	—	—	8.8	mA
Gate-Source Leakage Current - Mid Voltage	V_{GS} = -8 V, V_{DS} = 50 V	I_{GLKM}	- 13.1	—	—	mA
Gate-Source Leakage Current - High Voltage	V_{GS} = -8 V, V_{DS} = 150 V	I_{GLKH}	- 4.0	—	—	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 56 mA	V_T	- 3.8	- 3.1	- 2.3	V

Recommended Operating Voltages

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Drain Operating Voltage	—	V	—	—	50
Gate Quiescent Voltage	V_{DS} = 48 V, I_D = 280 mA	V	- 3.6	- 2.9	- 2.1

Absolute Maximum Ratings[4,5,6]

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	28 mA
Gate Current (Peaking), I_G	56 mA
Drain Current (Carrier), I_D	12 A
Drain Current (Peaking), I_D	24 A
Junction Temperature	+225°C
Storage Temperature	-65°C to +150°C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. MACOM does not recommend sustained operation near these survivability limits.
6. Product's qualification were performed @ +225°C. Operation @ T_J (+275°C) reduces median time to failure.

Thermal Characteristics

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Thermal Resistance ($R_{\theta JC}$) Carrier Peak	T_C = +85°C 123 W DC 157 W DC	°C/W	—	 1.2 0.7	—

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

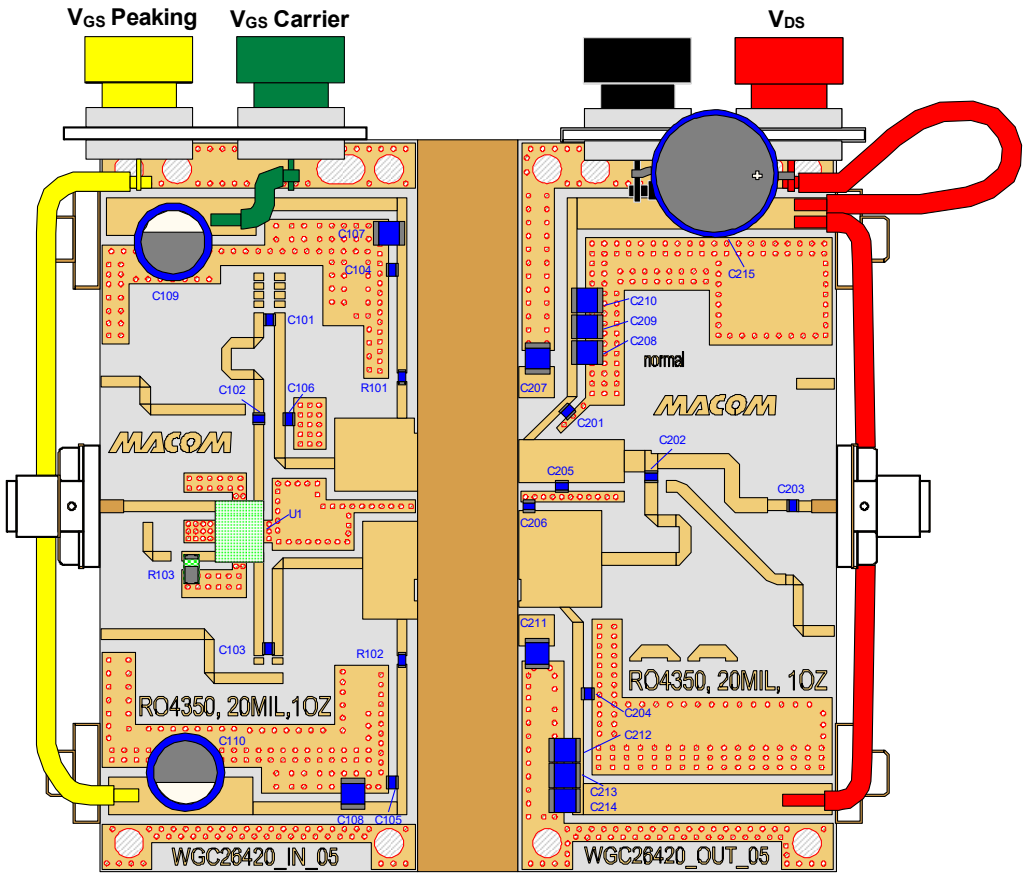
Handling Procedures

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.

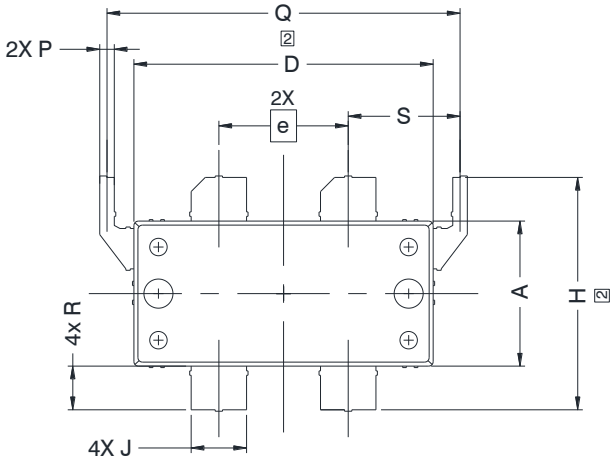
Evaluation Board: 2620 - 2690 MHz



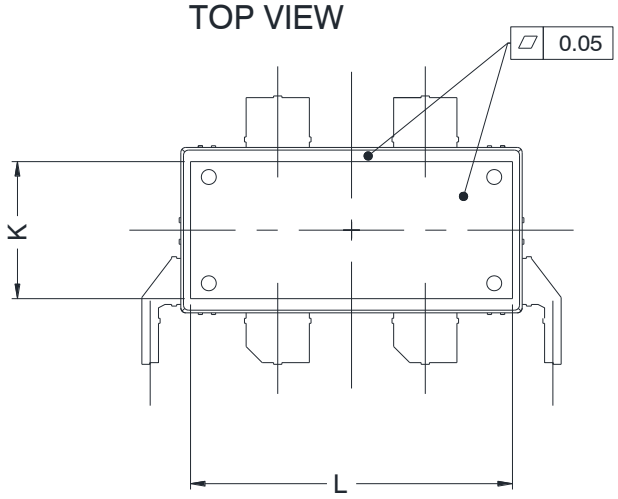
Parts List for Evaluation Board: 2620 - 2690 MHz

Component	Description	Manufacturer	Manufacturer P/N
WGC26420_IN_05	PCB, 0.020" THK, RO4350, 1 OZ. COPPER, Er = 3.66	MANUFACTURED	REV_IN_05
C101, C102, C103, C104, c105	Capacitor, 10 pF	ATC	ATC800A100JT250X
C106	Capacitor, 1.0 pF	ATC	ATC800A1R0CT250X
C107, C108	Capacitor, 100 µF, 100 V	Murata	GRM32EC72A106KE05L
C109, C110	Capacitor, 100 µF, 35 V	Panasonic	PCE5016CT-ND
R101, R102	Resistor, 5.6 Ω	Panasonic	ERJ-3GEYJ5R6V
R103	Resistor, 50 Ω	Anaren	C8A50Z4
U1	Hybrid Coupler, 2.3-2.7 GHz	Anaren	X3C21P1-04S
WGC26420_OUT_05	PCB, 0.020" THK, RO4350, 1 OZ. COPPER, Er = 3.66	MANUFACTURED	REV_OUT_05
C201, C202, C203, C204	Capacitor, 10 pF	ATC	ATC800A100JT250X
C205	Capacitor, 0.4 pF	ATC	ATC800A0R4CT250X
C206	Capacitor, 1.0 pF	ATC	ATC800A1R0CT250X
C207, C208, C209, C210, C211, C212, C213, C214	Capacitor, 100 µF, 100 V	Murata	GRM32EC72A106KE05L
C215	Capacitor, 100 µF, 100 V	Panasonic	ECA-2AHG221

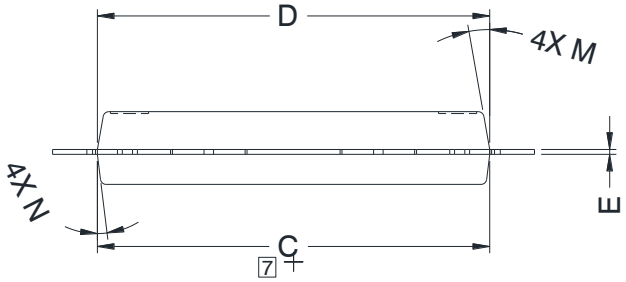
Package Outline Drawing PG-HB3SOF-6-1



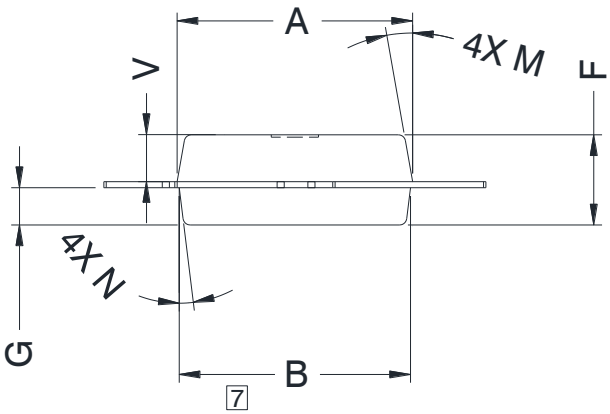
TOP VIEW



BOTTOM VIEW



FRONT VIEW



RIGHT SIDE VIEW

DIM	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	.390	.392	.394	9.91	9.96	10.01
B	.383	.385	.387	9.73	9.78	9.83
C	.808	.810	.812	20.52	20.57	20.62
D	.808	.810	.812	20.52	20.57	20.62
E	.007	.010	.013	0.17	0.25	0.33
F	.148	.150	.152	3.76	3.81	3.86
G	.060	.062	.064	1.52	1.57	1.62
H	.624	.628	.632	15.86	15.96	16.06
J	.148	.150	.152	3.76	3.81	3.86
K	-	.325	-	-	8.25	-
L	-	.764	-	-	19.40	-
M	-	10°±1°	-	-	10°±1°	-
N	-	7°±1°	-	-	7°±1°	-
P	.037	.039	.041	0.95	1.00	1.05
e	-	.350	-	-	8.89	-
Q	.953	.955	.957	24.22	24.27	24.32
R	.116	.118	.120	2.95	3.00	3.05
S	.301	.303	.305	7.64	7.69	7.74
V	.076	.078	.080	1.94	1.99	2.04

Remarks:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994
2. Mold/Dam Bar/Metal protrusion of 0.30mm max per side not included.
3. Metal protrusions are connected to source and shall not exceed 0.10mm max.
4. Fillets and radii:- Unless otherwise noted all radii are 0.30mm max.
5. Molded package Ra 1.2-1.6um.
6. All metal surfaces are tin plated, except area of cut.
7. Does not include Mold/Dam Bar and Metal protrusion.