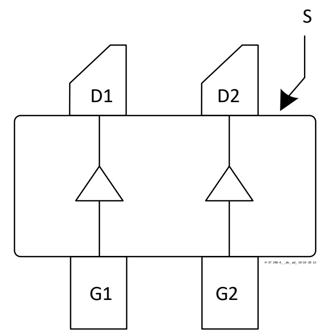
Features

- GaN on SiC HEMT Technology
- Pulsed CW Performance: 2690 MHz, 48 V, 10 μs Pulse Width, 10% Duty Cycle, Combined Outputs
- Output Power @ P_{4dB} = 480 W
- Efficiency @ P_{4dB} = 66%
- RoHS* Compliant

Description

The GTRB264902FC-V1 is a 480 W (P_{4dB}) 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 package with earless flange.

Functional Schematic



Pin Configuration[2]

Pin #	Function
D1	Drain Device 1 (Main)
D2	Drain Device 2 (Peak)
G1	Gate Device 1 (Main)
G2	Gate Device 2 (Peak)
S	Source (flange)

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

Typical RF Performance[1]

V_{DD} = 48 V, I_{DQ} = 500 mA, $V_{GS(Peak)}$ = - 5.5 V
P_{OUT} = 47.5 dBm (56 W), T_A = +25°C,
Channel Bandwidth = 3.84 MHz,
Peak/Average = 10 dB @ 0.01% CCDF

Frequency (MHz)	Gain (dB)	Efficiency (%)	OPAR (dB)	ACPR (dBc)
2620	14.9	55.0	8.7	- 27.6
2655	14.8	56.0	8.6	- 28.4
2690	14.5	55.0	8.6	- 29.3

1. Measurements taken with the device soldered in an application test circuit.

Ordering Information

Part Number	Package
GTRB264902FCV1-R2	250 piece reel
LTAGTRB264902FC-E1	Sample Board

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

Single-Carrier WCDMA Specifications[3]**:** V_{DD} = 48 V, I_{DQ} = 500 mA, P_{OUT} = 57.5 W avg, $V_{GS(PEAK)}$ = (V_{GS} at $I_{DQ(PEAK)}$ = 500 mA) - 2.45 V, T_A = 25°C, *f* = 2690 MHz, 3GPP signal, 3.84 MHz channel bandwidth, Peak/Average = 10 dB @ 0.01% CCDF

Parameter	Units	Min.	Typ.	Max.
Gain	dB	13.3	14.5	—-
Drain Efficiency	%	51	55	—
Adjacent Channel Power Ratio (ACPR)	dBc	—	- 25	- 22
Output PAR @ 0.01% CCDF	dB	7.0	8.0	—

3. Measurements taken in MACOM Production Test Fixture

DC Characteristics

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Drain-Source Breakdown Voltage	V_{GS} = -8 V, I_D = 10 mA Main, Peak	V	150	—	—
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 10 V Main Peak	mA	—	—	4.4 6.3
Gate-Source Leakage Current	V_{GS} = -8 V, V_{DD} = 50 V Main Peak	mA	—	—	- 6.9 - 9.9
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 25 mA, Main V_{DS} = 10 V, I_D = 36 mA, Peak	V	-3.8	-3.0	-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 = 500 mA	V	-3.5	-2.8	-2.0

Absolute Maximum Ratings[4,5,6]

Parameter	Absolute Maximum
Drain Source Voltage	125 V
Gate Source Voltage	-10 V to +2 V
Operating Voltage	55 V
Gate Current Main Peak	 25 mA 36 mA
Drain Current Main Peak	 9.5 A 13.5 A
Junction Temperature	+275°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 ($R_{\theta JC}$) Main Peak	T_C = +85°C, 101 W DC T_C = +85°C, 143 W DC	°C/W	—	1.4 1.0	—

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.

Load Pull Performance: Pulsed CW Signal: 160 µs, 10% Duty Cycle

Main Side:

Frequency (MHz)	Z_{SOURCE} (Ω)	Maximum Output Power				
		V_{DS} = 48 V, I_{DQ} = 300 mA, T_C = 25°C, P3dB, Class AB				
		Z_{LOAD} (Ω)	Gain (dB)	P_{OUT} (dBm)	P_{OUT} (W)	η_D (%)
2620	6.26–j11.70	4.26-j8.96	16.4	54.4	278.0	67.2
2655	8.62-j12.33	4.25-j8.45	16.7	54.4	273.5	71.5
2690	8.63-j10.89	3.51-j9.34	16.2	54.4	273.0	64.1

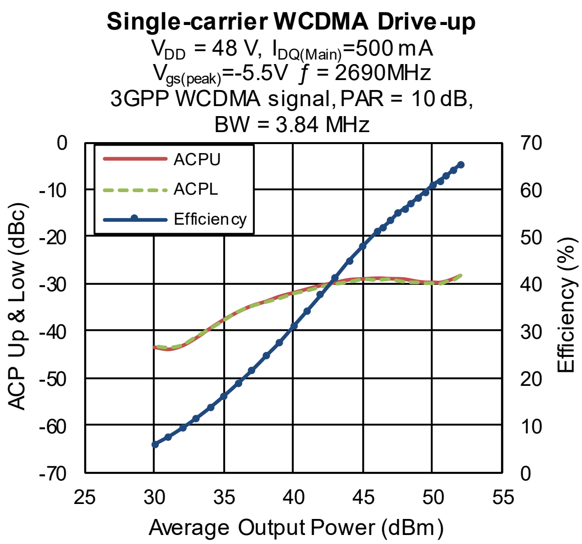
Frequency (MHz)	Z_{SOURCE} (Ω)	Maximum Drain Efficiency				
		V_{DS} = 48 V, I_{DQ} = 250 mA, T_C = 25°C, P3dB, Class AB				
		Z_{LOAD} (Ω)	Gain (dB)	P_{OUT} (dBm)	P_{OUT} (W)	η_D (%)
2620	6.26–j11.70	4.63+j4.24	18.3	52.1	163.3	80.7
2655	8.62-j12.33	4.12+j4.04	18.3	51.5	142.6	80.4
2690	8.63-j10.89	3.29+j5.26	18.2	52.2	166.3	78.4

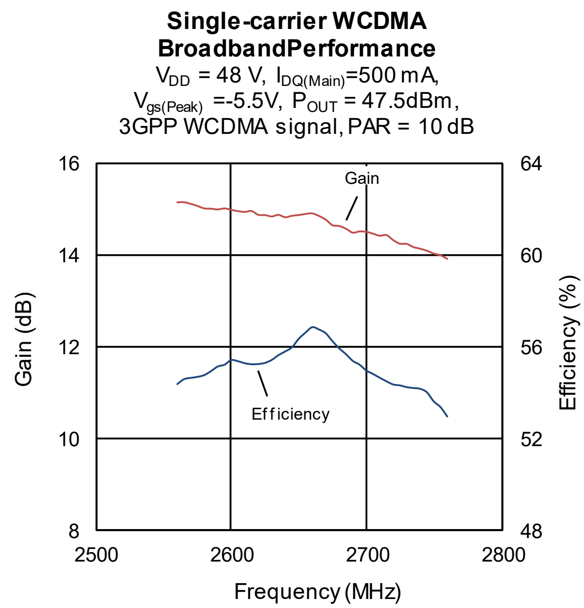
Peak Side:

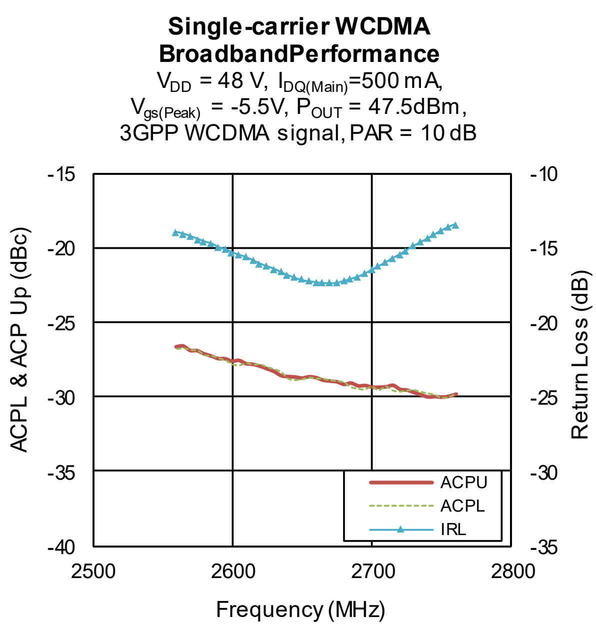
Frequency (MHz)	Z_{SOURCE} (Ω)	Maximum Output Power				
		V_{DS} = 48 V, $V_{GS(PEAK)}$ = -5 V, T_C = 25°C, P3dB, Class C				
		Z_{LOAD} (Ω)	Gain (dB)	P_{3dB} (dBm)	P_{3dB} (W)	η_D (%)
2620	1.69-j9.79	2.95-j7.49	12.3	55.3	338.8	60.5
2655	1.68-j9.3	2.76-j6.98	12.6	55.3	339.6	62.5
2690	2.15-j9.85	3.55-j6.98	12.8	55.3	336.5	68.8

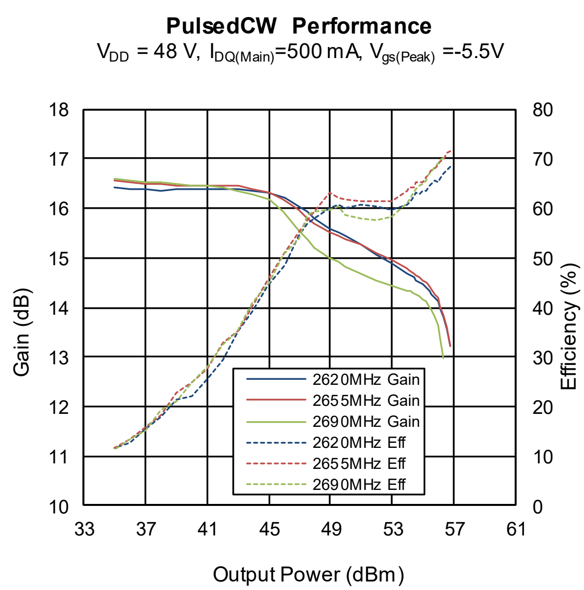
Frequency (MHz)	Z_{SOURCE} (Ω)	Maximum Drain Efficiency				
		V_{DS} = 48 V, $V_{GS(PEAK)}$ = -5 V, T_C = 25°C, P3dB, Class C				
		Z_{LOAD} (Ω)	Gain (dB)	P_{3dB} (dBm)	P_{3dB} (W)	η_D (%)
2620	1.69-j9.79	3.47+j3.83	13.9	53.8	242.1	79.0
2655	1.68-j9.3	2.67+j3.60	13.7	53.0	200.5	78.2
2690	2.15-j9.85	3.64+j4.10	13.4	53.7	236.1	79.9

Typical Performance Curves: Data taken in evaluation board

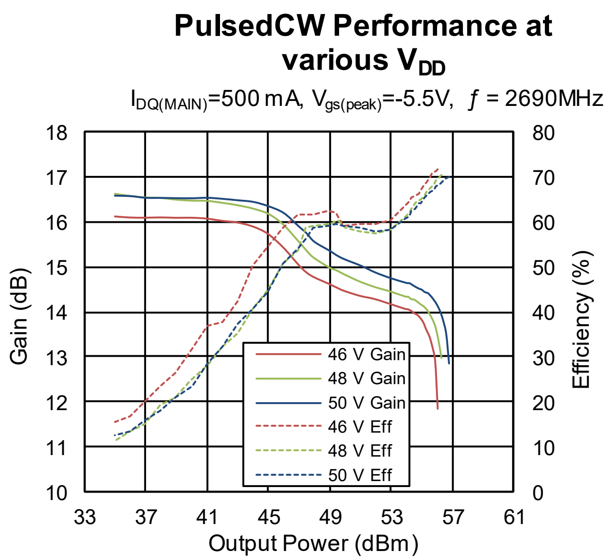


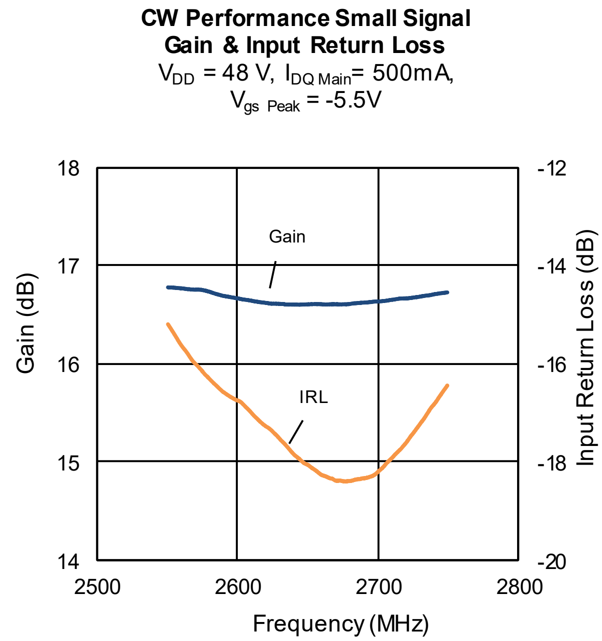




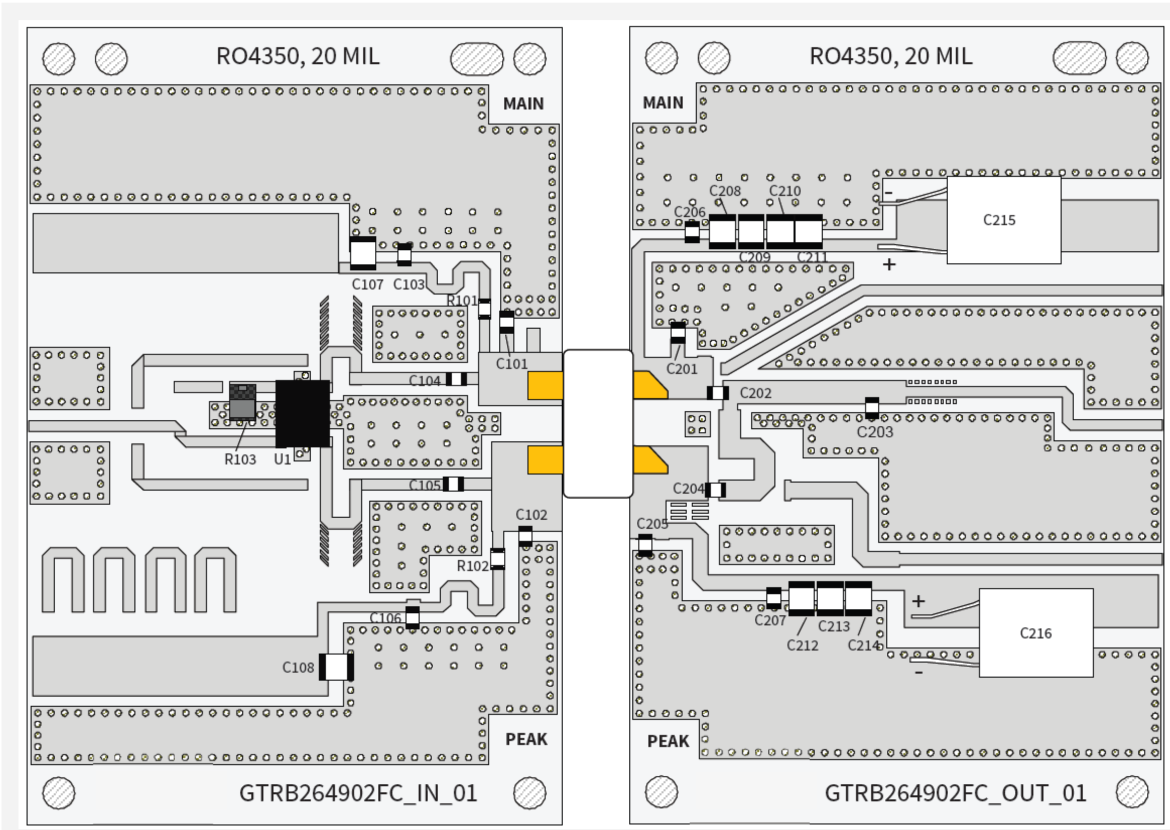


Typical Performance Curves: Data taken in evaluation board





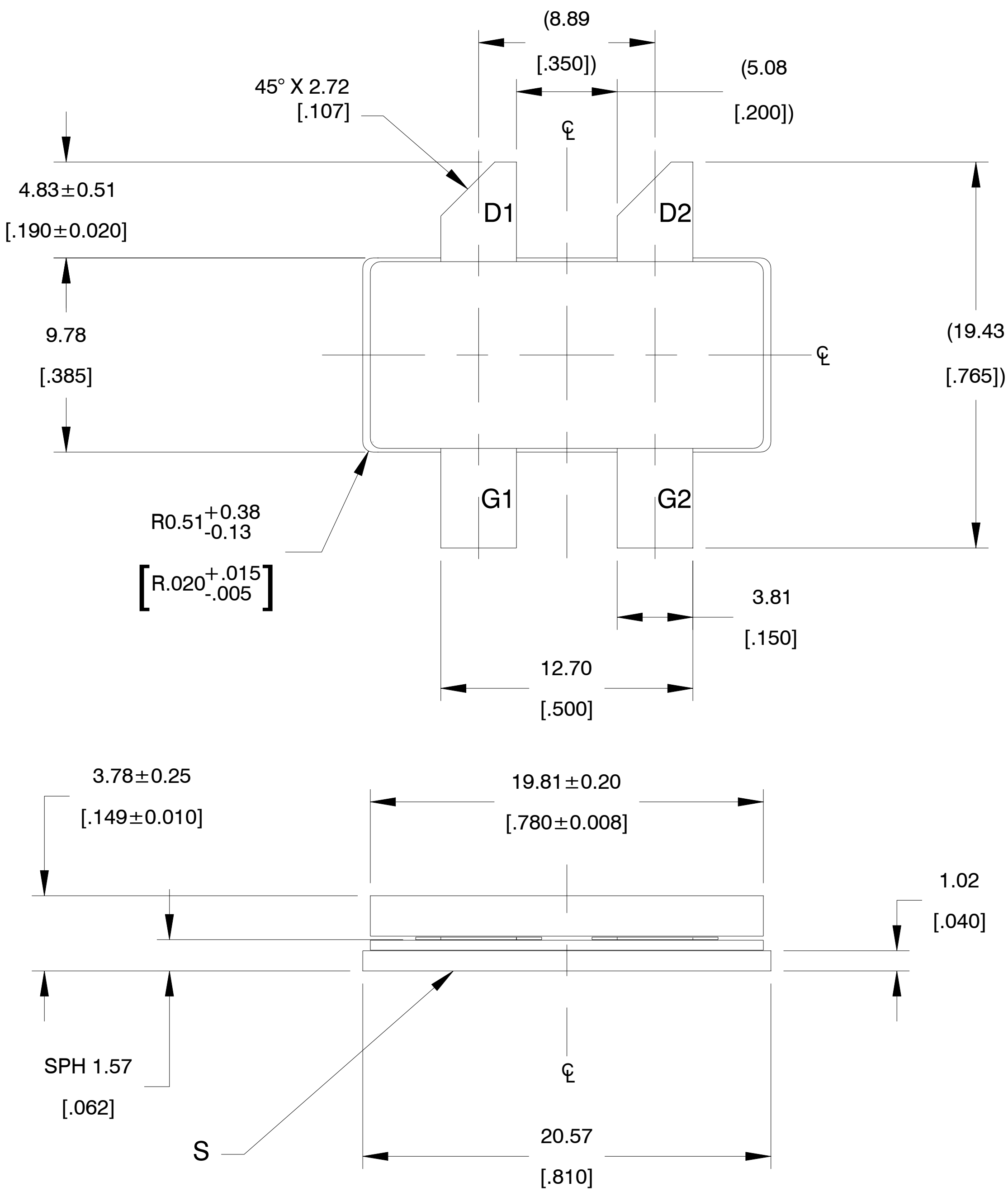
Evaluation Board: 2620 - 2690 MHz



Parts List for Evaluation Board: 2620 - 2690 MHz

Component	Description	Manufacturer	Manufacturer P/N
Input			
C101	Capacitor, 0.7 pF	ATC	ATC600F0R7250XT
C102	Capacitor, 0.8 µF	ATC	ATC600F0R8250XT
C103, C104, C105, C106	Capacitor, 10 pF	ATC	ATC600F100JT250XT
C107, C108	Capacitor, 10 µF, 50V	Taiyo Yuden	UMK325C7106MM-T
R101, R102	Resistor, 10 ohms	Yaego	RC0805JR-0710RP
R103	Resistor, 50 ohms	Anaren	C8A50Z4B
U1	Hybrid Coupler	Aneren	X3C26P1-03S
Output			
C201	Capacitor, 0.3 pF	ATC	ATC600F0R3BT250XT
C202	Capacitor, 1.8 pF	ATC	ATC600F1R8BT250XT
C203	Capacitor, 0.3 pF	ATC	ATC600F0R3BT250XT
C204	Capacitor, 3.9 pF	ATC	ATC600F3R9BT250XT
C205	Capacitor, 1.2 pF	ATC	ATC600F1R2BT250XT
C206, C207	Capacitor, 10 pF	ATC	ATC600F100JT250XT
C208, C209,C210,C211, C212, C213, C214	Capacitor, 10 µF, 100V	Murata	GRM32EC72A106KE05L
C215, C216	Capacitor, 470 µF, 100 V	Panasonic	ECA-2AHG47B

Lead-Free Outline Drawing H-37248C-4



Interpret dimensions and tolerances per ASME Y14.5M-1994
Primary dimensions are mm; alternate dimensions are inches
All tolerances ± 0.127 [0.005]
Lead thickness: 0.13 ± 0.05 mm [0.005 ± 0.002 inch]
Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]