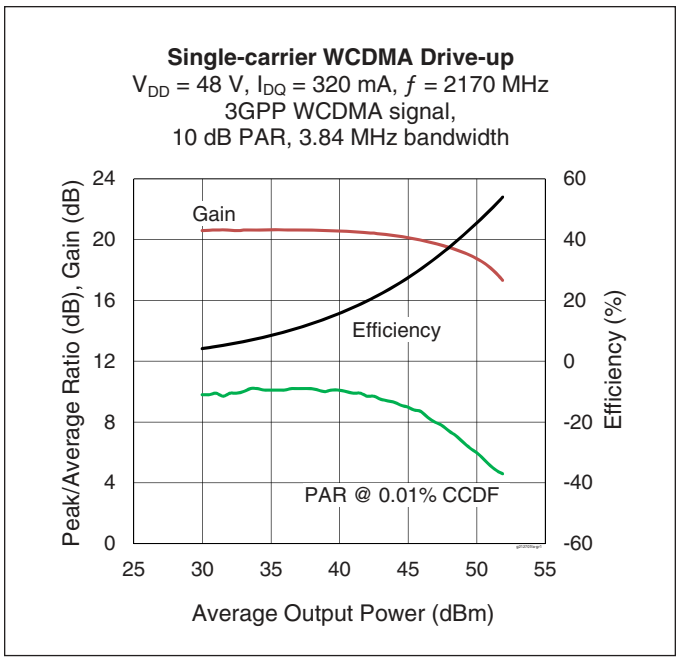
GTVA212701FA

Thermally-Enhanced High Power RF GaN on SiC HEMT
270 W, 48 V, 2110 – 2200 MHz

Package Types: H-87265J-2

Description

The GTVA212701FA is a 270-watt GaN on SiC high electron mobility transistor (HEMT) for use in the 2110 to 2200 MHz frequecy band. It features input matching, high efficiency, and a thermally-enhanced earless package.



Features

- GaN on SiC HEMT technology
- Input matched
- Typical pulsed CW performance (class AB), 2180 MHz, 48 V, 10 µs pulse width, 10% duty cycle
  - Output power P_{3dB} = 300 W
  - Drain efficiency = 68.5%
  - Gain = 17.5 dB
- Human Body Model Class 1B (per ANSI/ESDA/JEDEC JS-001)
- Capable of handling 10:1 VSWR @ 48 V, 56.2 W (WCDMA) output power
- Low thermal resistance
- Pb-free and RoHS-compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed test fixture)
V_{DD} = 48 V, I_{DQ} = 320 mA, 56.2 W average output power, ƒ = 2180 MHz. 3GPP WCDMA signal: 3.84 MHz channel bandwidth, 10 dB PAR at 0.01% CCDF.

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Gain	G_{ps}	18	19	—	dB
Drain Efficiency	η_D	35	38	—	%
Adjacent Channel Power Ratio	ACPR	—	–29	–26	dBc
Output PAR @ 0.01% CCDF	OPAR	6.4	7.0	—	dB

Note:
All published data at T_{CASE} = 25°C unless otherwise indicated
ESD: Electrostatic discharge sensitive device—observe handling precautions!

RoHS compliant

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DC Characteristics

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Conditions
Drain-source Breakdown Voltage	$V_{BR(DSS)}$	150	—	—	V	V_{GS} = -8 V, I_D = 10 mA
Drain-source Leakage Current	I_{DSS}	—	—	4.5	mA	V_{GS} = -8 V, V_{DS} = 10 V
Gate Threshold Voltage	$V_{DSX(th)}$	–3.8	–3.0	–2.3	V	V_{DS} = 10 V, I_D = 32 mA

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Drain Operating Voltage	V_{DD}	0	—	50	V	
Gate Quiescent Voltage	$V_{GS(Q)}$	–3.4	–3.0	-2.5		V_{DS} = 48 V, I_D = 320 mA

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	125	V
Operating Voltage	V_{DD}	55	
Gate-Source Voltage	V_{GS}	–10 to +2	
Gate Current	I_G	32	mA
Drain Current	I_D	12	A
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	

Operation above the maximum values listed here may cause permanent damage. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the component. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. For reliable continuous operation, the device should be operated within the operating voltage range (V_{DD}) specified above.

Thermal Characteristics (T_{CASE} = 70°c, 56.2 W (CW), 48 V, I_{DQ} = 320 mA, 2170 MHz)

Characteristic	Symbol	Value	Unit
Thermal Resistance	$R_{\theta JC}$	1.1	°C/W

Ordering Information

Type and Version	Order Code	Package	Shipping
GTVA212701FA V2 R0	GTVA212701FA-V2-R0	H-87265J-2, single-ended, earless flange	Tape & Reel, 50 pcs
GTVA212701FA V2 R2	GTVA212701FA-V2-R2	H-87265J-2, single-ended, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in Wolfspeed production test fixture)

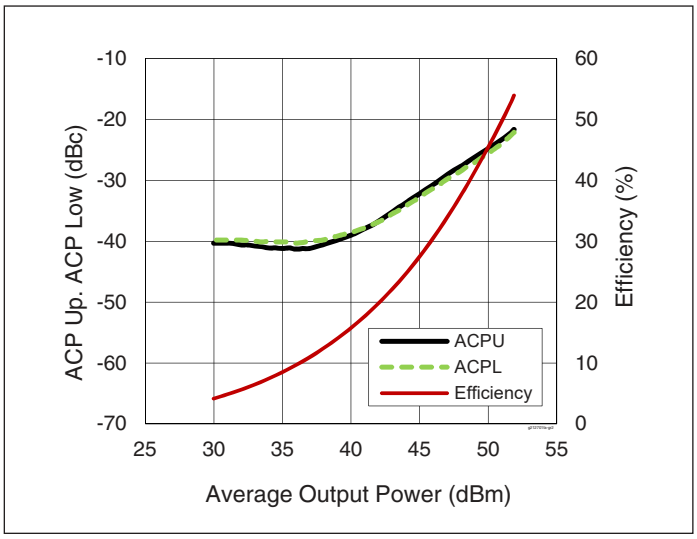


Figure 1. Single-carrier WCDMA Drive-up

V_{DD} = 48 V, I_{DQ} = 320 mA, f = 2170 MHz
3GPP WCDMA signal, 10 dB PAR,
3.84 MHz bandwidth

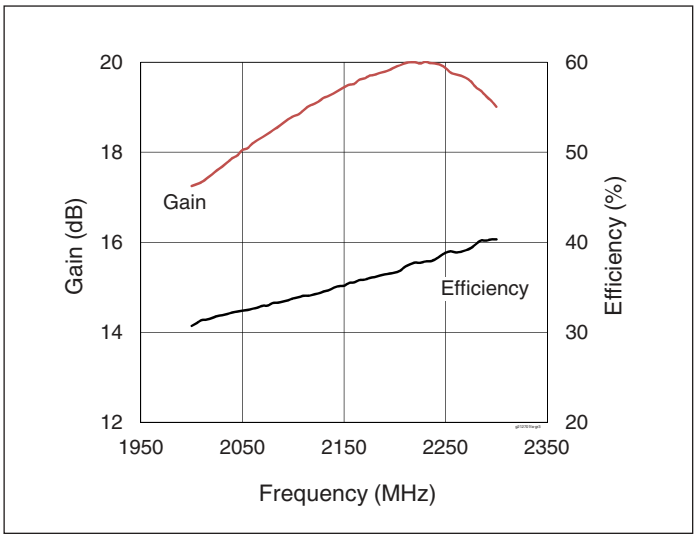


Figure 2. Single-carrier WCDMA Broadband

V_{DD} = 48 V, I_{DQ} = 320 mA,
P_{OUT} = 47.5 dBm
3GPP WCDMA signal, 10 dB PAR

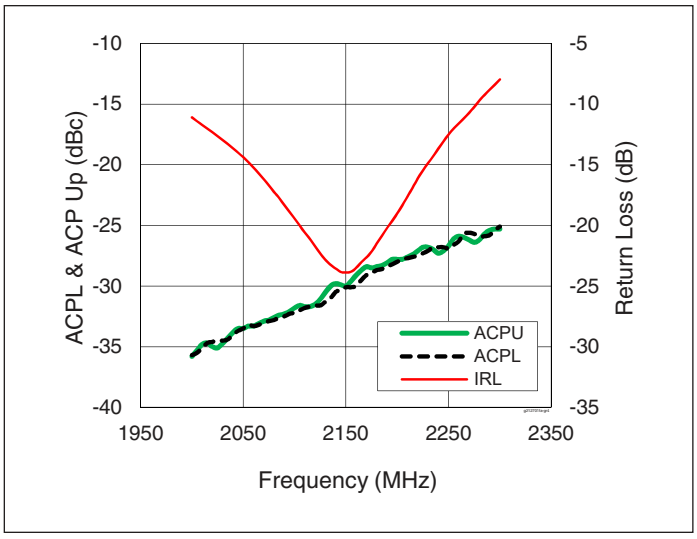


Figure 3. Single-carrier WCDMA Broadband

V_{DD} = 48 V, I_{DQ} = 320 mA,
P_{OUT} = 47.5 dBm
3GPP WCDMA signal, 10 dB PAR

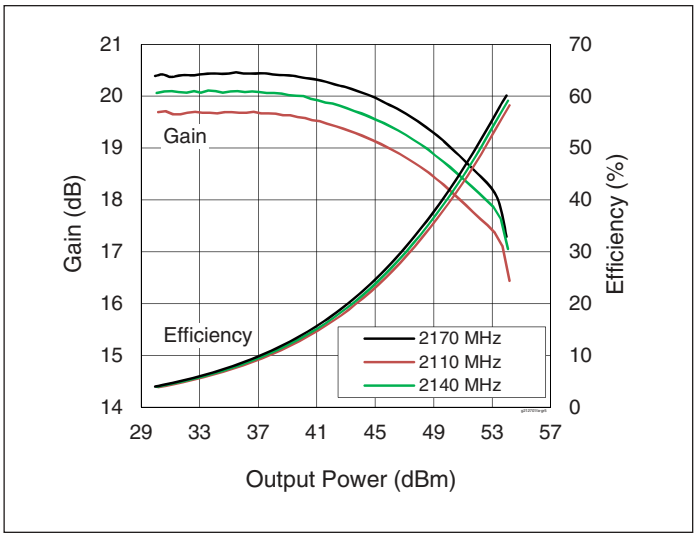


Figure 4. CW Performance Across Frequency

V_{DD} = 48 V, I_{DQ} = 320 mA

Typical Performance (cont.)

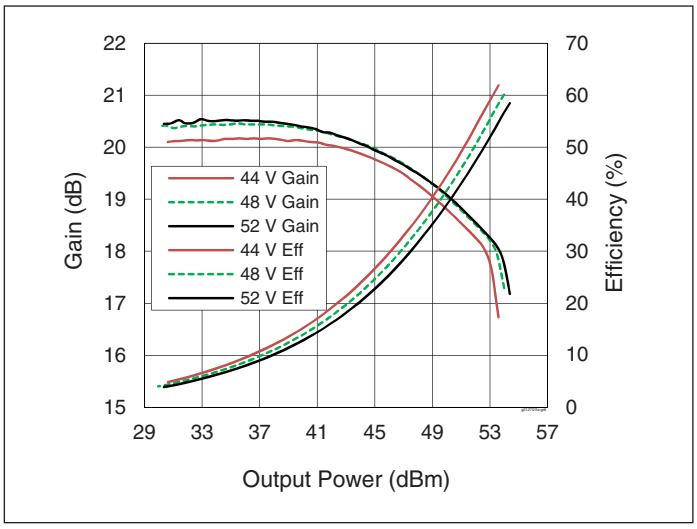


Figure 5. CW Performance at Various V_{DD}

I_{DQ} = 320 mA, f = 2170 MHz

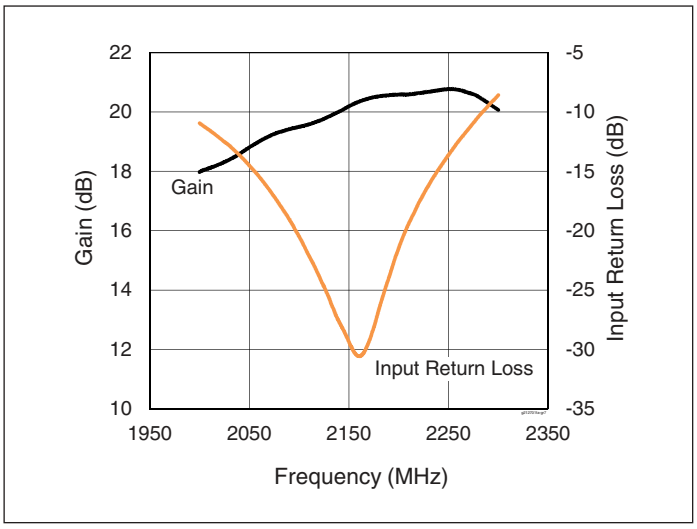


Figure 6. CW Small Signal Performance

V_{DD} = 48 V, I_{DQ} = 320 mA

Load Pull

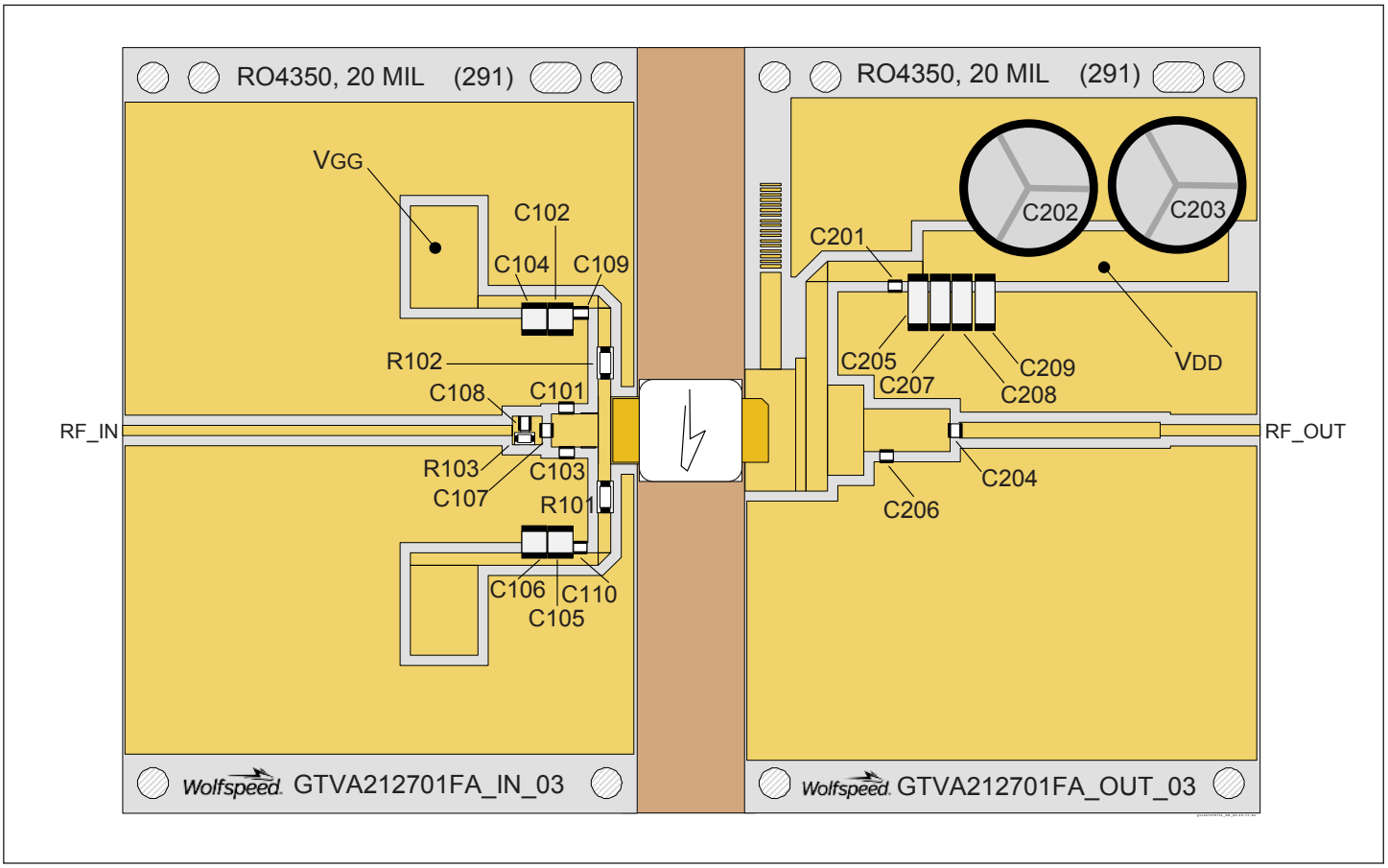
Pulsed CW signal: – 10 µsec, 10% duty cycle; V_{DD} = 48 V, I_{DQ} = 300 mA

Class AB		P_{3dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	η_D [%]
2110	6.38 – j6.61	3.01 – j3.1	17.28	55.72	373.2	67.5	3.01 – j1.41	18.57	54.74	297.6	73.9
2170	4.78 – j4.24	3.01 – j3.1	17.37	55.71	372.3	68.8	3.13 – j1.84	18.55	54.78	300.7	73.2
2200	4.09 – j4.3	3.01 – j3.1	16.97	55.80	380.2	65.6	3.08 – j1.97	18.6	54.88	307.6	74.7

Evaluation Board, 2110 to 2200 MHz

Evaluation Board Part Number	LTN/GTVA212701FA-V2
PCB Information	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, ε_r = 3.66

Find Gerber files for this reference circuit on the Wolfspeed Web site at www.wolfspeed.com/RF



Reference circuit assembly diagram (not to scale)

Components Information

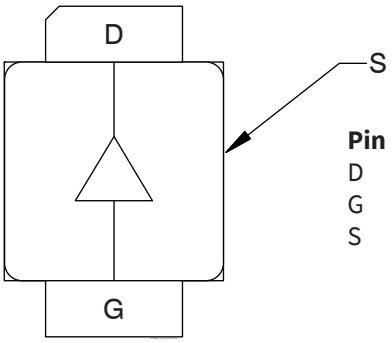
Component	Description	Manufacturer	P/N
In			
C101	Capacitor, 2 pF	ATC	ATC800A2R0BT250XT
C102, C104, C105, C106	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C103	Capacitor, 0.2 pF	ATC	ATC800A0R2BT250XT
C107	Capacitor, 15 pF	ATC	ATC800A150GT250XT
C108	Capacitor, 12 pF	ATC	ATC800A120JT250XT
C109, C110	Capacitor, 24 pF	ATC	ATC800A240JT250XT
R101, R102	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ100V
R103	Resistor, 10 ohms	Yageo	RC0805JR-0710RL
Out			
C201	Capacitor, 1.5 pF	ATC	ATC600S1R5CT250XT
C202, C210	Capacitor, 0.5 pF	ATC	ATC600S0R5CT250XT
C203	Capacitor, 1.0 pF	ATC	ATC600S1R0CT250XT
C204	Capacitor, 6.8 pF	ATC	ATC800A6R8CT250XT

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

Pinout Diagram (top view)



Pin	Description
D	Drain
G	Gate
S	Source (flange)

Package Outline Specifications – Package H-87265J-2

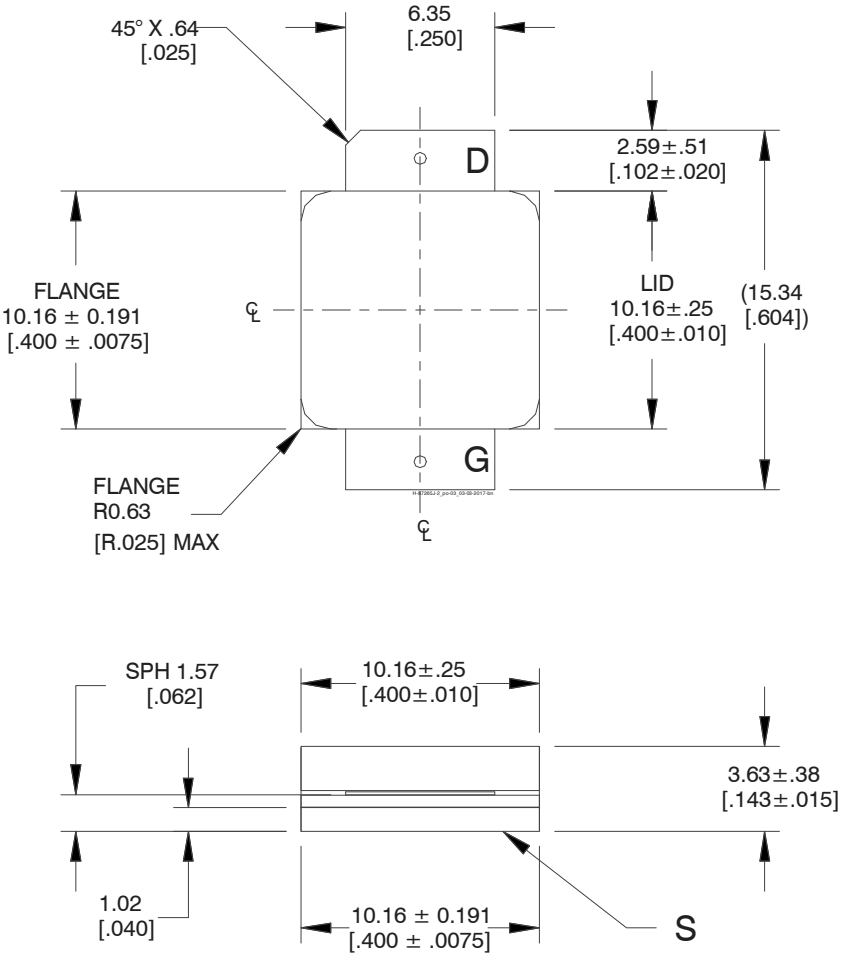


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994
2. Primary dimensions are mm; alternate dimensions are inches
3. All tolerances ± 0.127 [.005]
4. Pins: D – drain; G – gate; S – source
5. Lead thickness: 0.13 ± 0.05 mm [.005 ± .002 inch]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

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