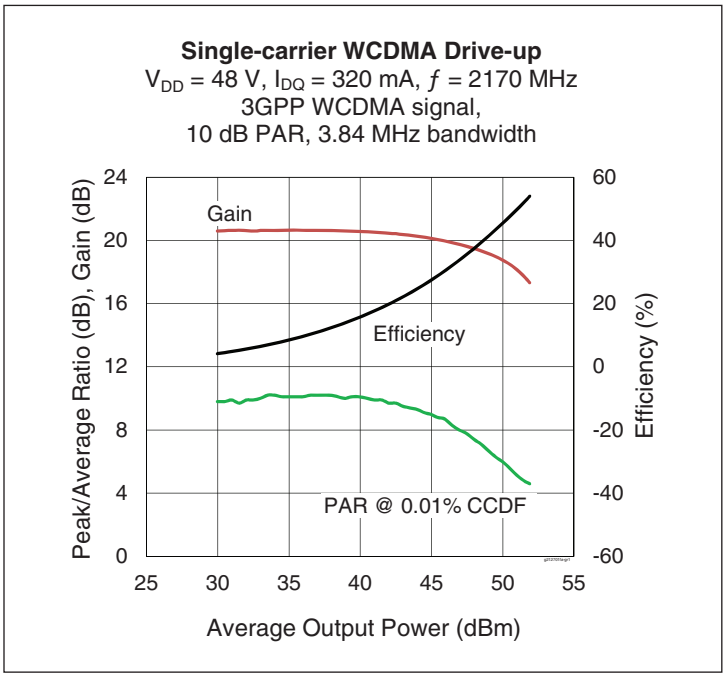
GTVA212701FA

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

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.

GTVA212701FA
Package H-87265J-2



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 at 0.01% probablity on CCDF	OPAR	6.4	7.0	—	dB

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

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

Recommended Operating Conditions

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

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	125	V
Operating Voltage	V_{DD}	55	V
Gate-source Voltage	V_{GS}	–10 to +2	V
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	°C

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

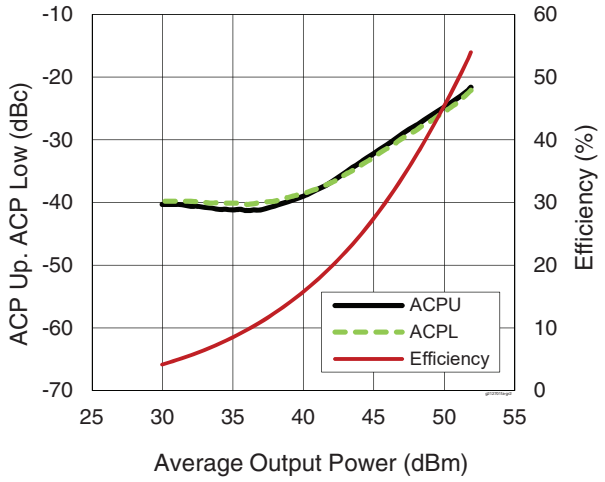
Characteristic	Symbol	Value	Unit
Thermal Resistance	$R_{\theta JC}$	1.1	°C/W

Ordering Information

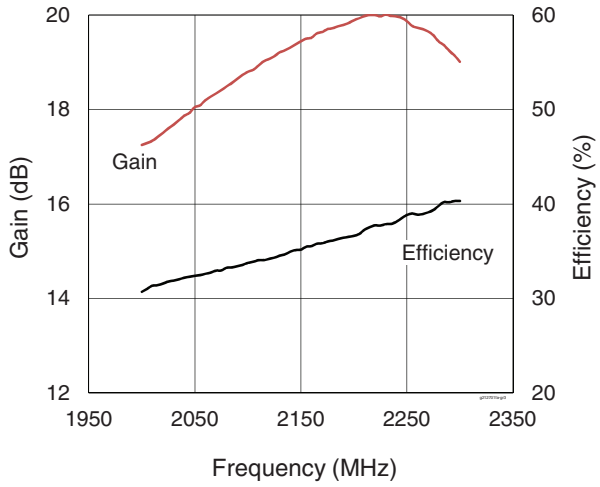
Type and Version	Order Code	Package and Description	Shipping
GTVA212701FA V2 R0	GTVA212701FA-V2-R0	H-87265J-2, single-ended, earless flange	Tape & Reel, 50 pcs
GTVA212701FA V2 R2	GTVA212701FA-V2-R2	H-87265J-2, single-ended, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in Wolfspeed production test fixture)

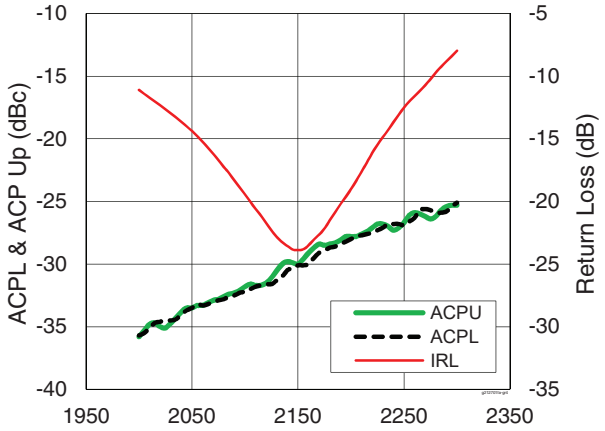
Single-carrier WCDMA Drive-up
V_{DD} = 48 V, I_{DQ} = 320 mA, f = 2170 MHz
3GPP WCDMA signal, 10 dB PAR,
3.84 MHz bandwidth



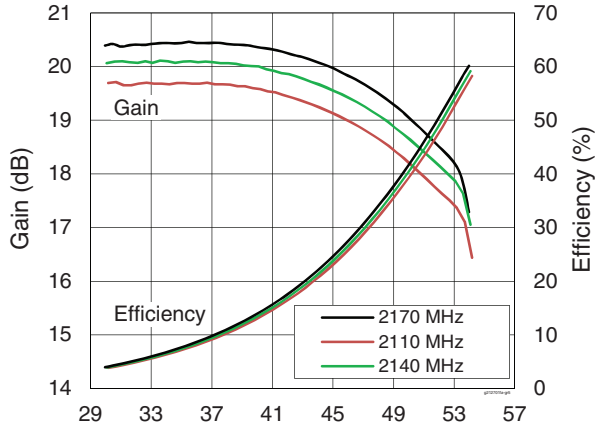
Single-carrier WCDMA Broadband
V_{DD} = 48 V, I_{DQ} = 320 mA,
P_{OUT} = 47.5 dBm
3GPP WCDMA signal, 10 dB PAR



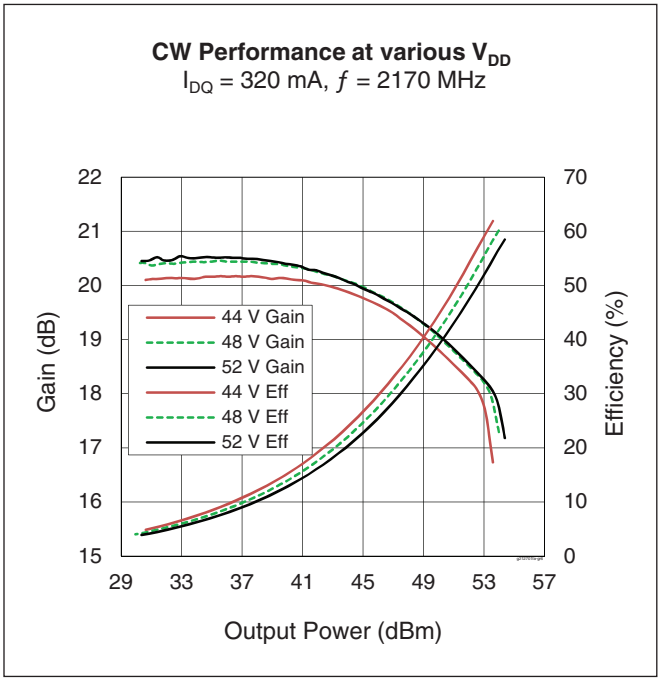
Single-carrier WCDMA Broadband
V_{DD} = 48 V, I_{DQ} = 320 mA,
P_{OUT} = 47.5 dBm
3GPP WCDMA signal, 10 dB PAR

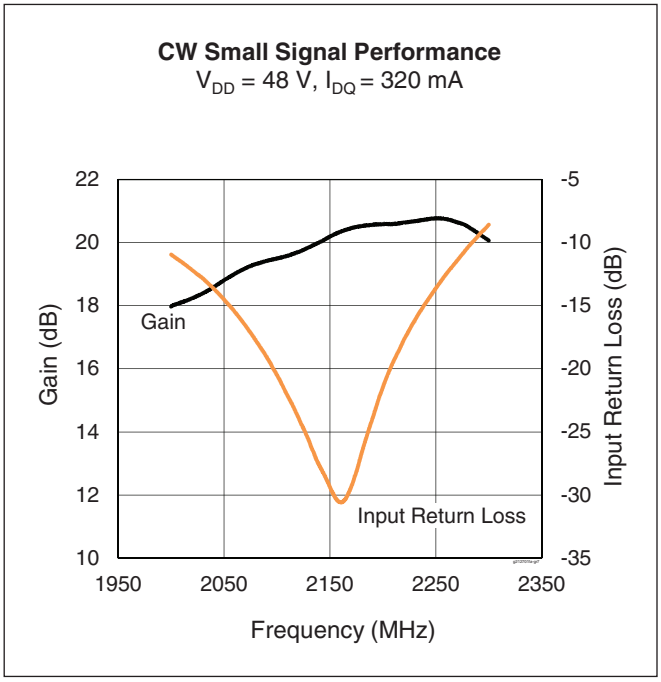


CW Performance Across Frequency
V_{DD} = 48 V, I_{DQ} = 320 mA



Typical Performance (cont.)





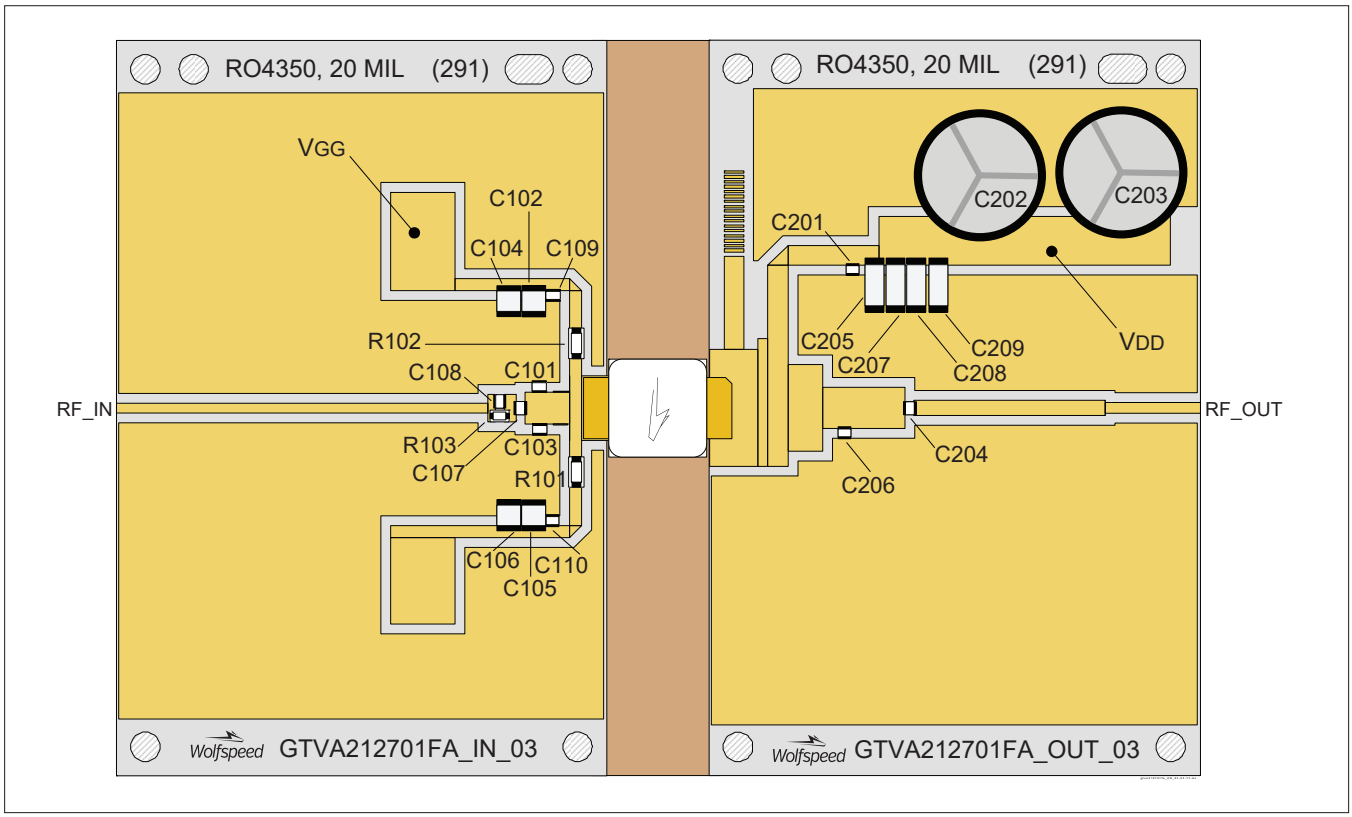
Load Pull

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

Reference Circuit tuned for 2110 to 2200 MHz

DUT	GTVA212701FA V2
Reference Circuit Part No.	LTN/GTVA212701FA-V2
PCB	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 **http://www.wolfspeed.com/RF**	



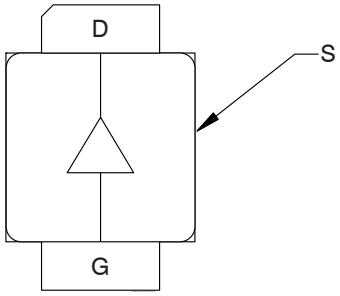
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Manufacturer	P/N
Input			
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
Output			
C201, C204	Capacitor, 24 pF	ATC	ATC800A240JT250XT
C202, C203	Capacitor, 220 µF	Panasonic Electronic Components	ECA-2AHG221
C205, C207, C208, C209	Capacitor, 10 µF	TDK Corporation	C5750X7S2A106M230KB
C206	Capacitor, 0.6 pF	ATC	ATC800A0R6BT250XT

Pinout Diagram (top view)



Pin	Description
D	Drain
G	Gate
S	Source (flange)

Package Outline Specifications

Package H-87265J-2

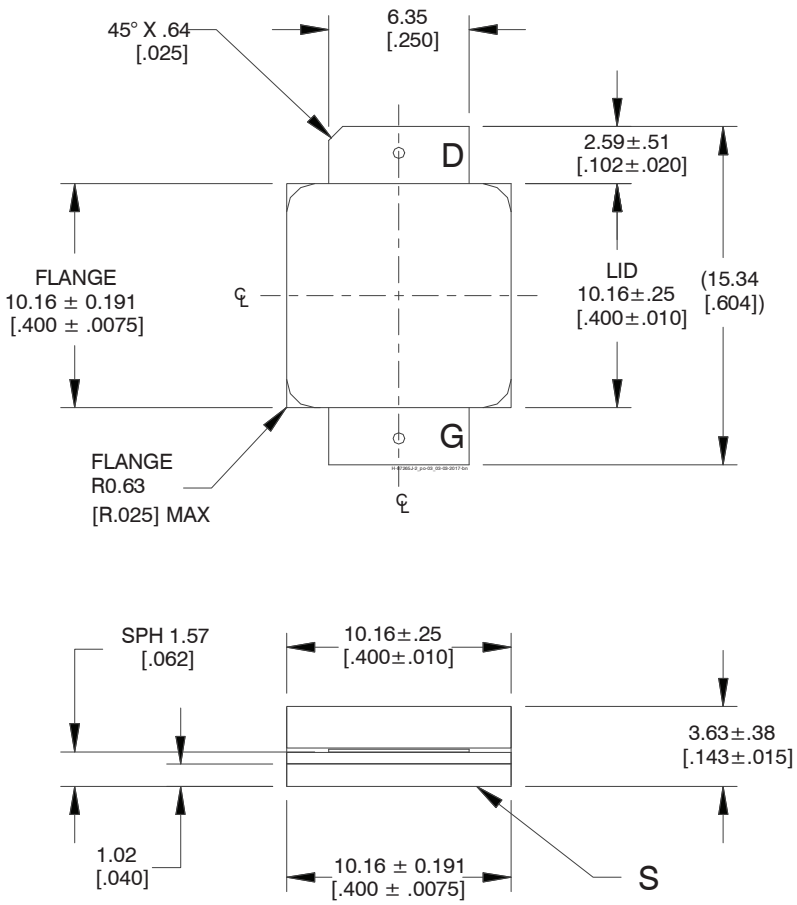


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994
2. Primary dimensions are mm; alternate dimensions are inches
3. All tolerances ± 0.127 [0.005]
4. Pins: D – drain, G – gate, S – source (flange)
5. Lead thickness: 0.13 ± 0.05 mm [0.005 ± 0.002]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

Revision History

01	2017-01-24	Advance	All	Proposed specification for new product development
02	2017-07-07	Production	All	Data Sheet now represents production-released product specifications, including reference circuit and performance information
03	2018-03-28	Production	1 2 7, 8	Change frequency of testing from 2170 MHz to 2180 MHz. Typo in table heading Typos: Package Outline diagram notes, email information.
04	2018-07-05	Production	All	Revised to V2. Converted to Wolfspeed data sheet.
04.1	2019-01-28	Production	2	Added gate quiescent voltage and operating voltage

For more information, please contact:

4600 Silicon Drive
Durham, North Carolina, USA 27703
www.wolfspeed.com/RF

Sales Contact
RFSales@wolfspeed.com

RF Product Marketing Contact
RFMarketing@wolfspeed.com
919.407.7816

Notes

Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. “Typical” parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer’s technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.