

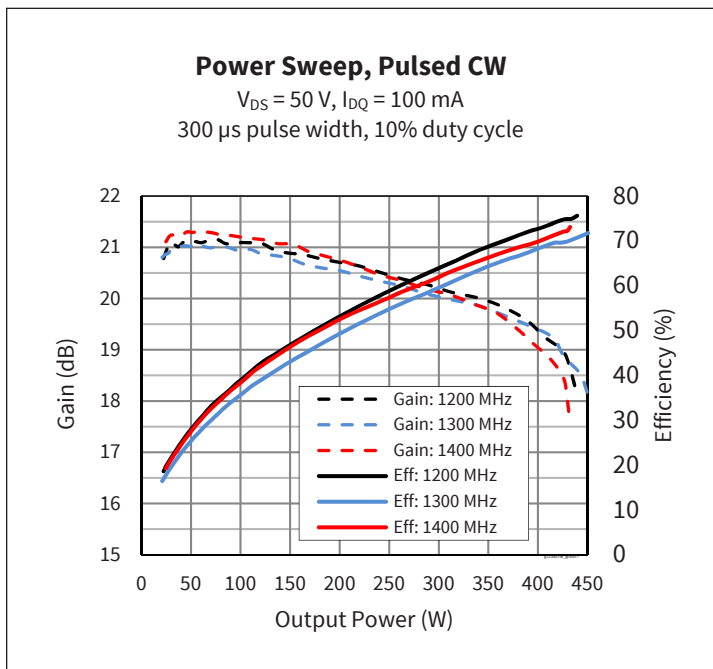
GTVA123501FA

Thermally-Enhanced High Power RF GaN on SiC HEMT 350 W, 50 V, DC - 1.4 GHz

Description

The GTVA123501FA is a 350-watt GaN on SiC high electron mobility transistor (HEMT) for use in the DC - 1.4 GHz frequency band. It features input matching, high efficiency, and a thermally-enhanced surface-mount package with earless flange.

GTVA123501FA
Package H-37265J-2



Features

- GaN on SiC HEMT technology
- Input matched
- Typical pulsed CW performance: pulse width = 300 μs , duty cycle = 10%, DC - 1.4 Hz, $V_{DS} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$
 - Output power = 350 W min @ P_{3dB}
 - Drain Efficiency = 70 %
 - Gain = 18 dB
- Human Body Model Class 1B (per ANSI/ESDA/JEDEC JS-001)
- Capable of handling 10:1 VSWR (all phase angles) at $V_{DS} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $f = 1300\text{ MHz}$, $P_{OUT} = 350\text{ W}$ peak
- Pb-free and RoHS compliant

RF Characteristics

Pulsed RF Performance (tested in Wolfspeed test fixture)

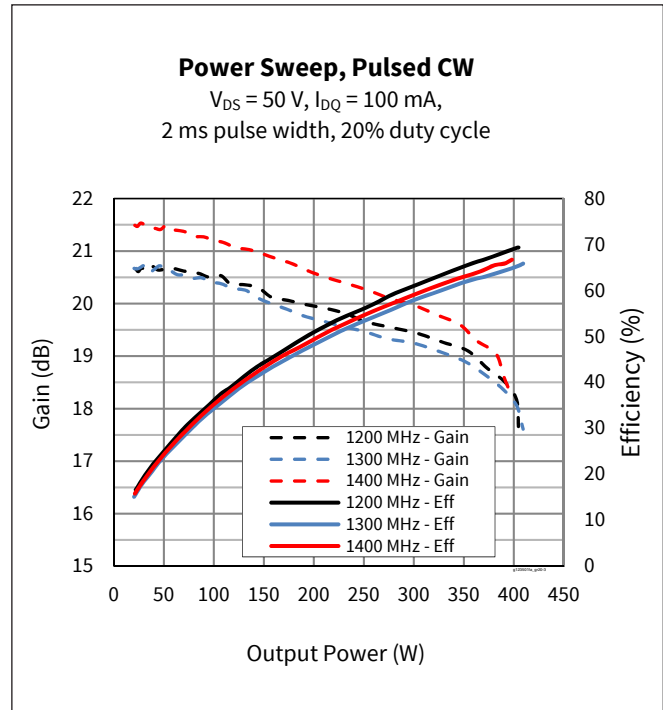
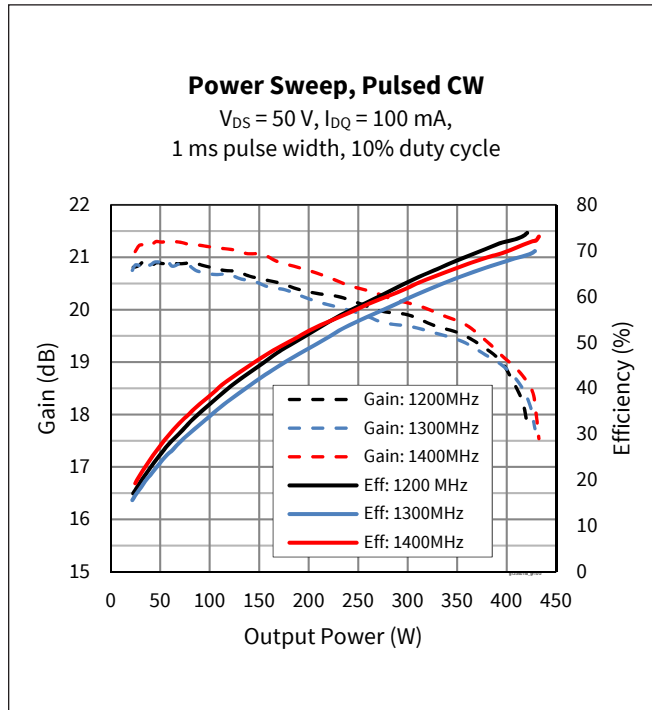
$V_{DD} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, $P_{OUT} = 350\text{ W}$, $f = 1300\text{ MHz}$, pulse width = 300 μs , 10% duty cycle

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	19.4	20	21.5	dB
Drain Efficiency	η_D	70	74	—	%

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

Typical Performance (data taken in a Wolfspeed production test fixture)



Load Pull Performance

Pulsed CW signal: 16 μsec pulse width, 10% duty cycle, $V_{DS} = 50\text{ V}$, $I_{DQ} = 300\text{ mA}$, compression level = P_{3dB}

Class AB		Max Output Power				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]
1200	1.91 - j4.59	2.64 - j0.41	18.9	56.85	484	68.2
1300	4.57 - j4.77	2.60 - j1.02	18.4	56.59	456	65.8
1400	4.70 + j1.32	1.98 - j0.34	18.6	56.41	438	66.5

Pulsed CW signal: 16 μsec pulse width, 10% duty cycle, $V_{DS} = 50\text{ V}$, $I_{DQ} = 300\text{ mA}$, compression level = P_{3dB}

Class AB		Max Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]
1200	1.91 - j4.59	3.55 - j0.13	19.2	56.42	439	72.3
1300	4.57 - j4.77	3.35 + j0.10	19.1	56.05	403	71.0
1400	4.70 + j1.32	1.83 - j0.04	19.0	56.20	417	68.0

Pulsed CW signal: 16 μsec pulse width, 10% duty cycle, $V_{DS} = 50\text{ V}$, $I_{DQ} = 300\text{ mA}$, compression level = P_{3dB}

Class AB		Z Optimal				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]
1200	1.91 - j4.59	4.54 + j0.53	19.3	55.63	366	72.2
1300	4.57 - j4.77	3.80 + j0.25	19.2	55.64	366	73.8
1400	4.70 + j1.32	2.69 + j0.19	18.8	55.75	376	72.2

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	$V_{GS} = -8\text{ V}$, $I_D = 10\text{ mA}$	$V_{(BR)DSS}$	150	—	—	V
Drain-source Leakage Current	$V_{GS} = -8\text{ V}$, $V_{DS} = 10\text{ V}$	I_{DSS}	—	—	5.8	mA
Gate Threshold Voltage	$V_{DS} = 10\text{ V}$, $I_D = 42\text{ mA}$	$V_{GS(th)}$	-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	$V_{DS} = 50\text{ V}$, $I_D = 100\text{ mA}$	$V_{GS(Q)}$	—	-2.8	—	V

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	125	V
Gate-source Voltage	V_{GS}	-10 to +2	V
Gate Current	I_G	42	mA
Drain Current	I_D	15	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

$T_{CASE} = 70\text{ °C}$, $P_{DISS} = 300\text{ W peak}$, $V_{DS} = 50\text{ V}$, $I_{DQ} = 100\text{ mA}$, 1300 MHz, 300 μs pulse width, 10% duty cycle

Parameter	Symbol	Value	Unit
Thermal Resistance, junction to case	$R_{\theta JC}$	0.17	°C/W

Ordering Information

Type and Version	Order Code	Package	Shipping
GTVA123501FA V1 R0	GTVA123501FA-V1-R0	H-37265J-2, single-ended, earless flange	Tape & Reel, 50 pcs
GTVA123501FA V1 R2	GTVA123501FA-V1-R2	H-37265J-2, single-ended, earless flange	Tape & Reel, 250 pcs

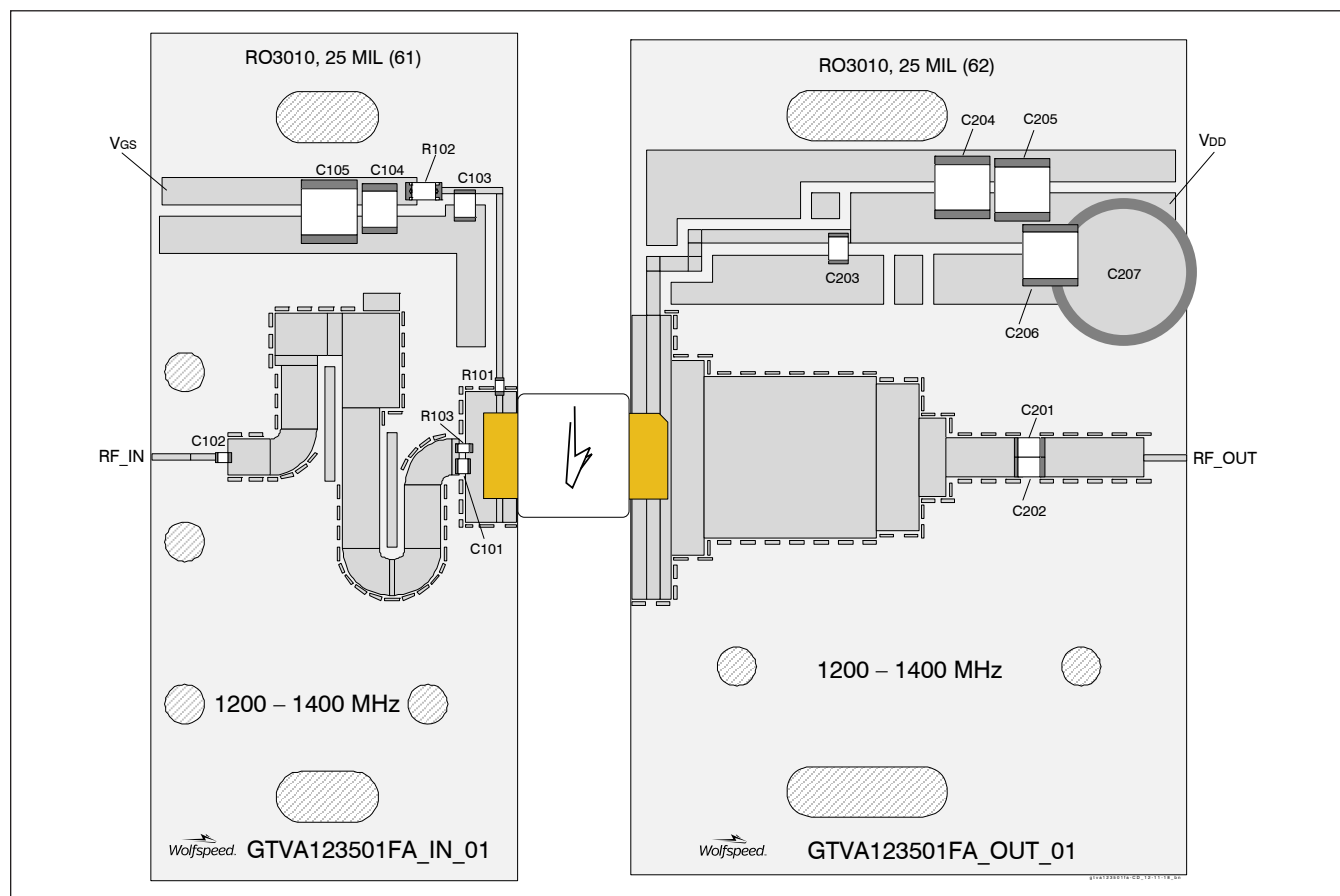
Evaluation Board

Order Code	Frequency	Description
LTN/GTVA123501FA-V1	DC - 1.4 GHz	Class AB, Rogers 3010, 0.64 mm [0.025"] thick, 2 oz. copper, $\epsilon_r = 10.2$

Reference Circuit, DC - 1.4 GHz**Reference Circuit Assembly**

DUT	GTVA123501FA V1
Test Fixture Part No.	LTN/GTVA123501FA-V1
PCB	Rogers 3010, 0.64 mm [0.025"] thick, 2 oz. copper, $\epsilon_r = 10.2$

Find Gerber files for this test fixture on the Wolfspeed Web site at <http://www.wolfspeed.com/RF>



Assembly diagram (not to scale)

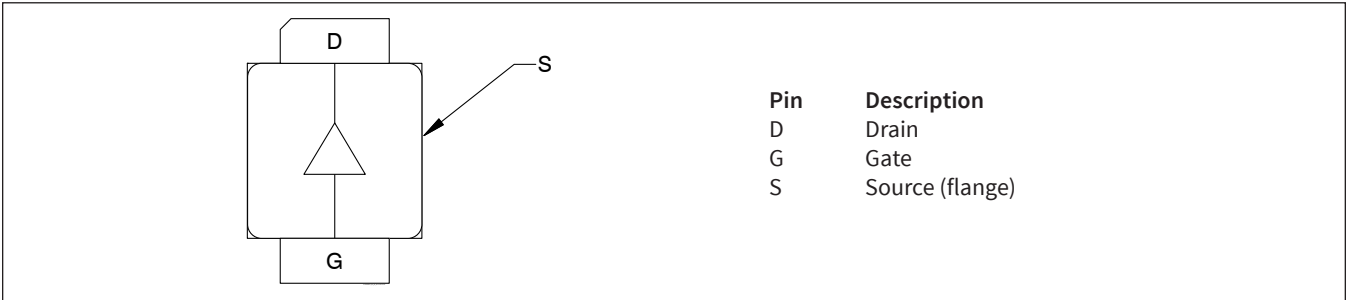


Reference Circuit (cont.)

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C102	Capacitor, 56 pF	ATC	ATC100A560JW150XB
C103	Capacitor, 56 pF	ATC	ATC100B560JW500XB
C104	Capacitor, 1 μF	TDK Corporation	C4532X7R2A105M230KA
C105	Capacitor, 10 μF	TDK Corporation	C5750X5R1H106K230KA
R101, R103	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-3GEYJ100V
R102	Resistor, 5.6 ohms	Panasonic Electronic Components	ERJ-8RQJ5R6V
Output			
C201, C202	Capacitor, 24 pF	ATC	ATC100B240JW500XB
C203	Capacitor, 56 pF	ATC	ATC100B560JW500XB
C204, C205, C206	Capacitor, 10 μF	TDK Corporation	C5750X5R1H106K230KA
C207	Capacitor, 100 μF	Cornell Dubilier Electronics (CDE)	SK101M100ST

Pinout Diagram (top view)



Lead connections for GTVA123501FA

See next page for package mechanical specifications

Package Outline Specifications

Package H-37265J-2

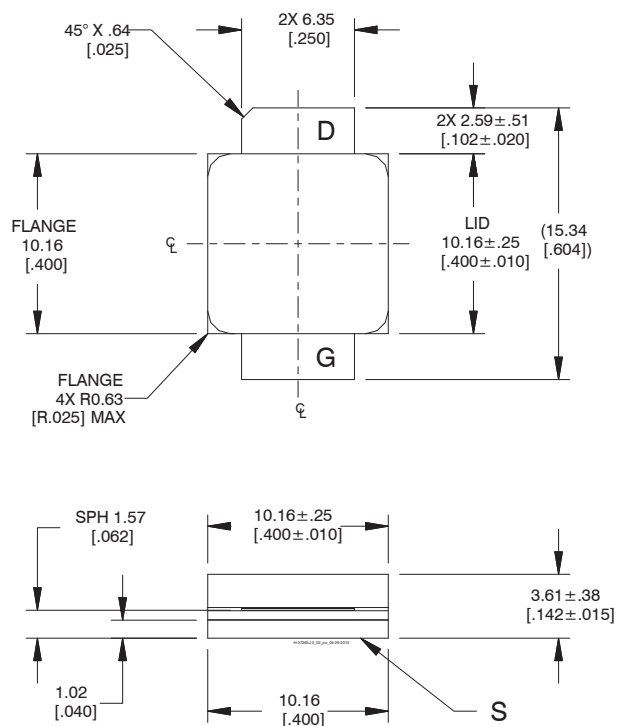


Diagram Notes—unless otherwise specified:

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] unless specified otherwise.
4. Pins: D – drain; G – gate; S – source.
5. Lead thickness: $0.10 + 0.051/-0.025$ mm [.004 +0.002/-0.001 inch].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

Revision History

Revision	Date	Data Sheet	Page	Subjects (major changes at each revision)
01	2016-05-23	Advance	All	Proposed specifications for new product development
02	2018-05-08	Advance	All	Converted to Wolfspeed Data Sheet, updated DC and thermal characteristics
03	2019-01-07	Production	All	Information for production-released device, including firm specifications, operating conditions and performance, and reference circuit specifications.

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Notes

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