

# GTVA123501FA

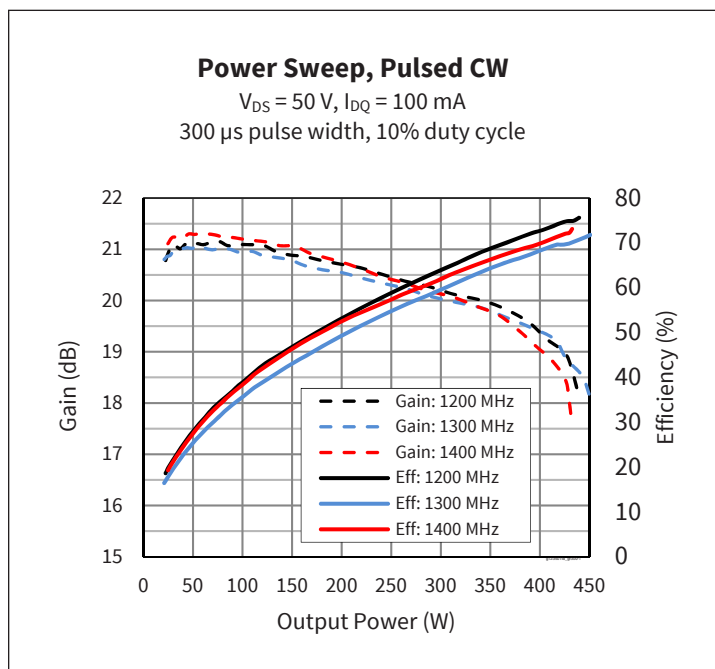
## Thermally-Enhanced High Power RF GaN on SiC HEMT 350 W, 50 V, DC - 1.4 GHz

### 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  $\mu\text{s}$ , 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)

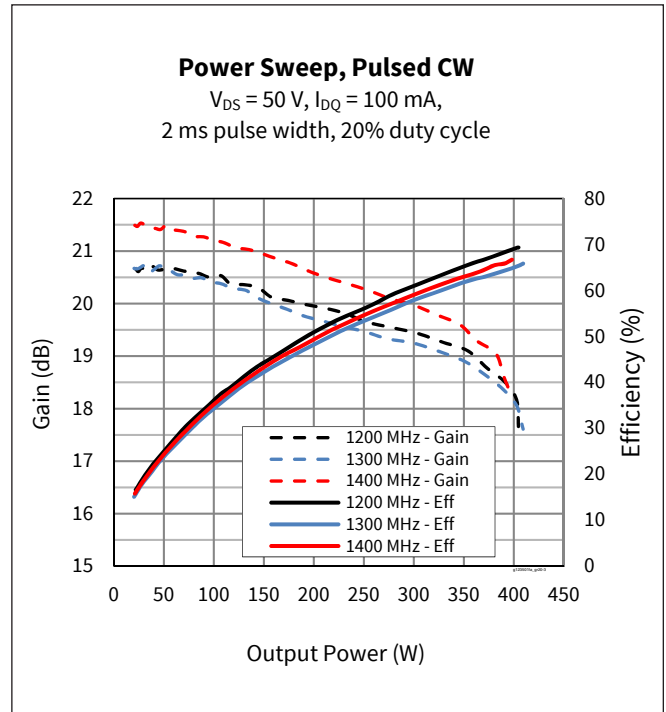
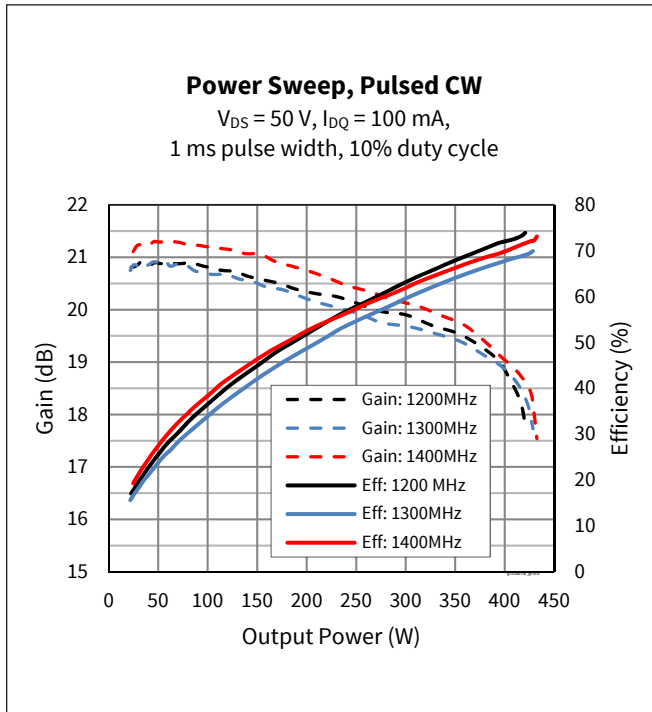
$V_{DD} = 50\text{ V}$ ,  $I_{DQ} = 100\text{ mA}$ ,  $P_{OUT} = 350\text{ W}$ ,  $f = 1300\text{ MHz}$ , pulse width = 300  $\mu\text{s}$ , 10% duty cycle

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	19.4	20	21.5	dB
Drain Efficiency	$\eta_D$	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  $\mu\text{sec}$  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 [ $\Omega$ ]	Zl [ $\Omega$ ]	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  $\mu\text{sec}$  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 [ $\Omega$ ]	Zl [ $\Omega$ ]	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  $\mu\text{sec}$  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 [ $\Omega$ ]	Zl [ $\Omega$ ]	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  $\mu\text{s}$  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

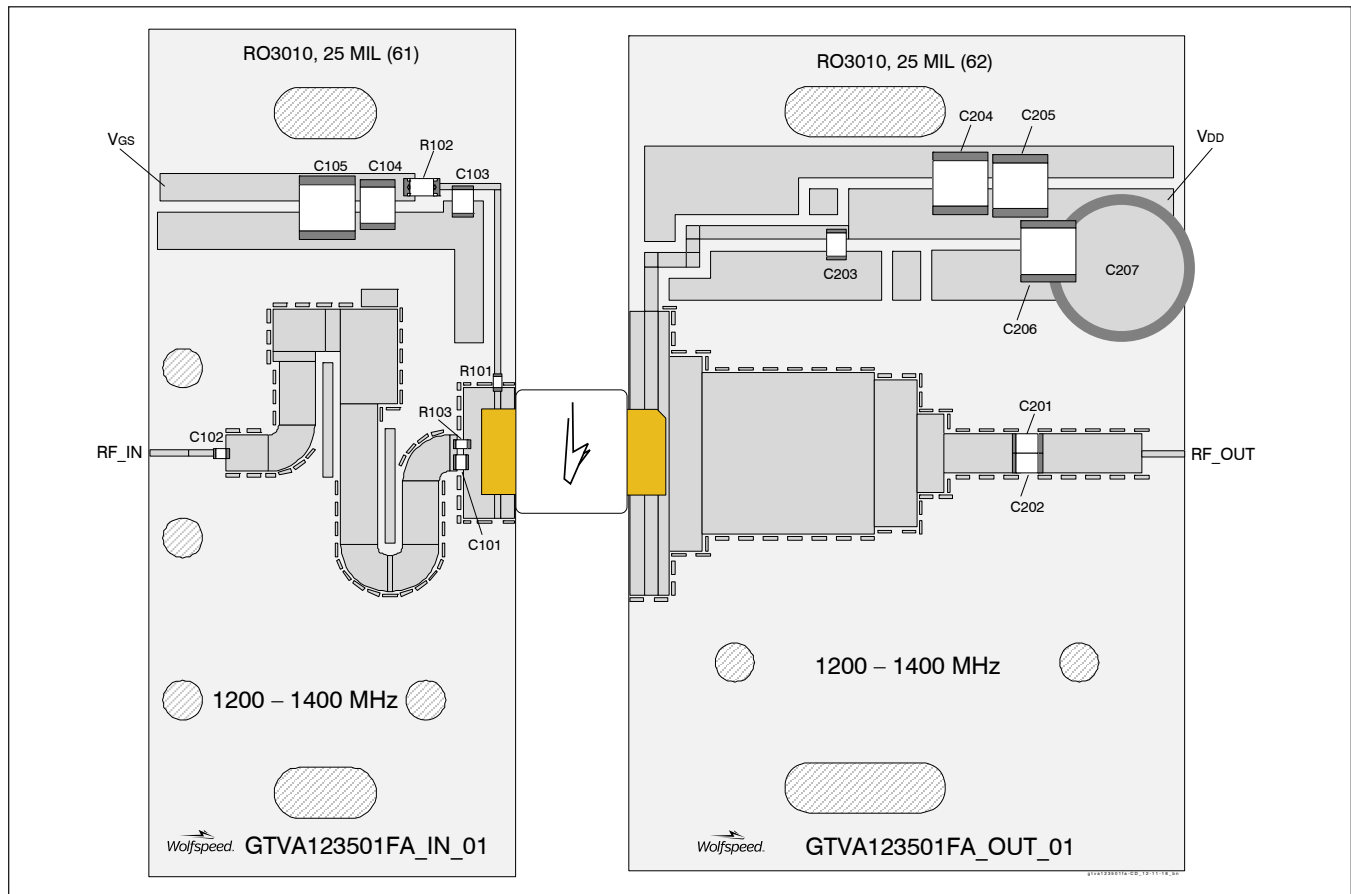
Order Code	Frequency	Description
LTN/GTVA123501FA-V1	DC - 1.4 GHz	Class AB, Rogers 3010, 0.64 mm [0.025"] thick, 2 oz. copper, $\epsilon_r = 10.2$

**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>



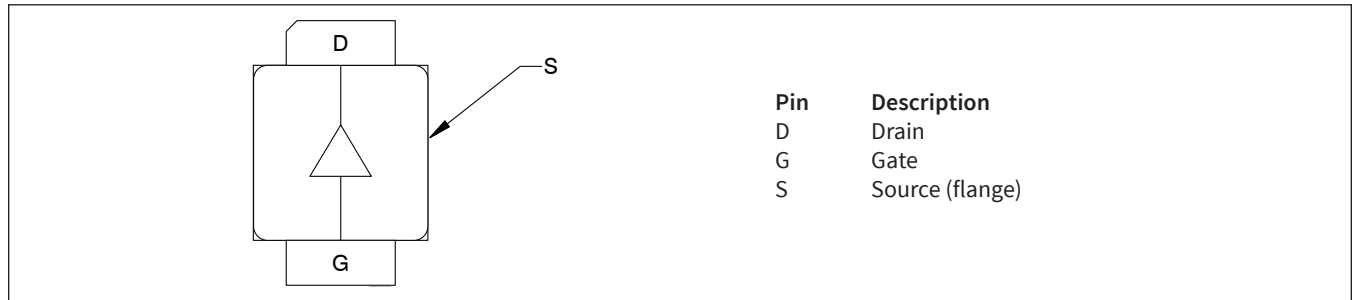
Assembly diagram (not to scale)

**Reference Circuit** (cont.)

**Components Information**

Component	Description	Manufacturer	P/N
<b>Input</b>			
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
<b>Output</b>			
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

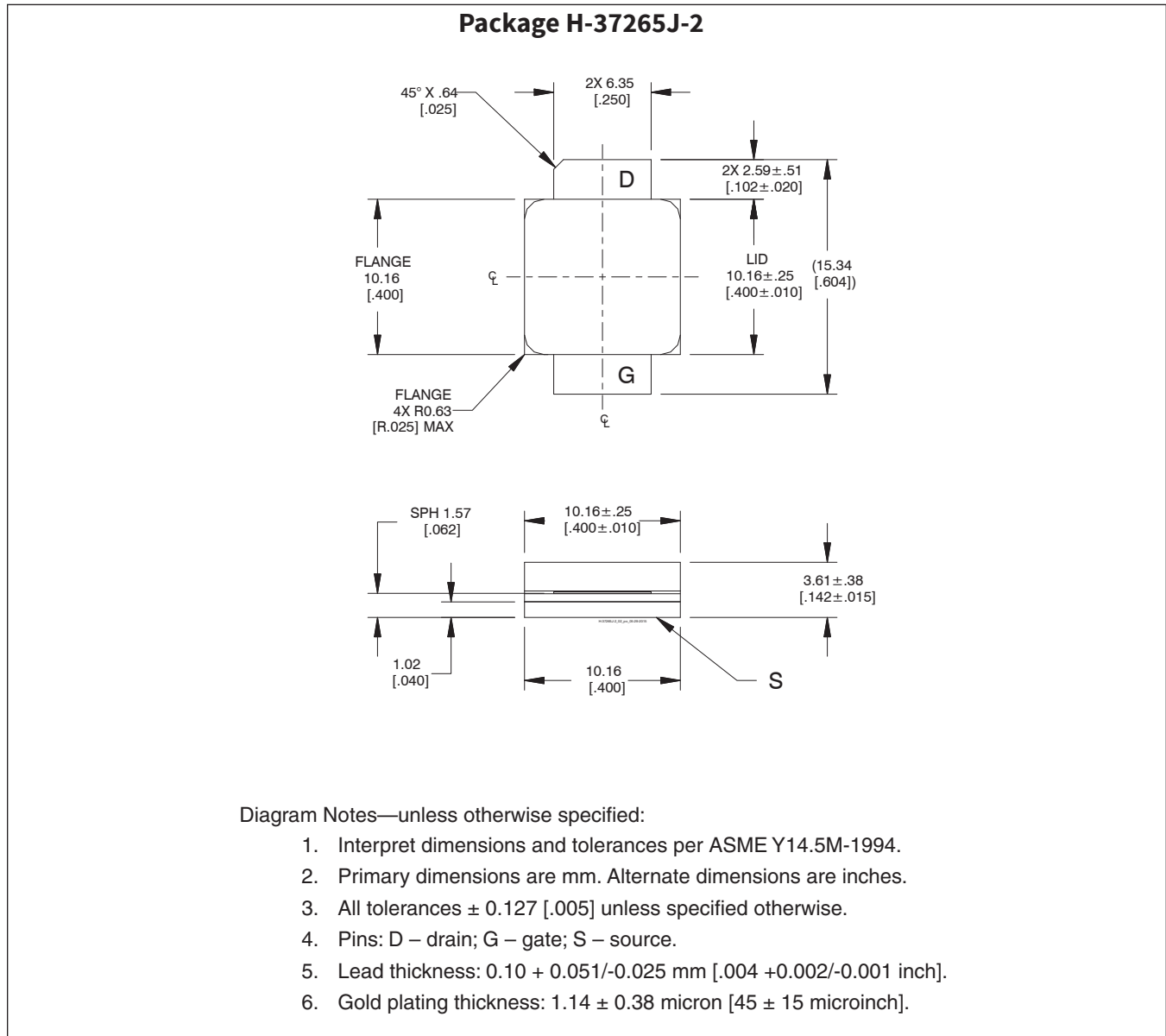
**Pinout Diagram** (top view)



Lead connections for GTVA123501FA

**See next page for package mechanical specifications**

**Package Outline Specifications**



## 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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