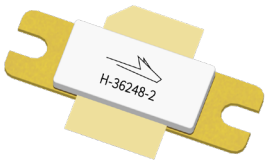
GTVA355001EC/FC

Thermally-Enhanced High Power RF GaN on SiC HEMT
500 W, 50 V, 2900 – 3500 MHz

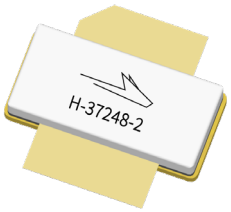
Description

The GTVA355001EC and GTVA355001FC are 500-watt GaN on SiC high electron mobility transistors (HEMTs) for use in the 2900 to 3500 MHz frequecy band. They feature input and output matching, high efficiency, and a thermally-enhanced packages.

GTVA355001EC
Package H-36248-2



GTVA355001FC
Package H-37248-2



Features

- GaN on SiC HEMT technology
- Broadband internal input and output matching
- Typical pulsed CW performance (class AB), 3500 MHz, 50 V, 300 µs pulse width, 10% duty cycle
  - Output power at P_{3dB} = 500 W
  - Drain efficiency = 65%
  - Gain = 13 dB
- Pb-free and RoHS compliant

Target RF Characteristics

Pulsed CW Specifications (tested in Wolfspeed class AB test fixture)
V_{DD} = 50 V, I_{DQ} = 200 mA, P_{OUT} = 500 W, f = 3500 MHz, pulse width = 300 µs, duty cycle = 10%

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	13	—	dB
Drain Efficiency	η_D	—	65	—	%

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 = 65 mA	$V_{(BR)DSS}$	125	—	—	V
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 65 mA	$V_{GS(th)}$	—	–3.0	—	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 V, I_D = 200 mA	$V_{GS(Q)}$	—	–3	—	V

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	150	V
Gate-source Voltage	V_{GS}	–10 to +2	V
Gate Current	I_G	60	mA
Drain Current	I_D	20	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

[1] T_{CASE} = 85°C, P_{DISS} = 300 W, 300 µs pulse width, 20% duty cycle

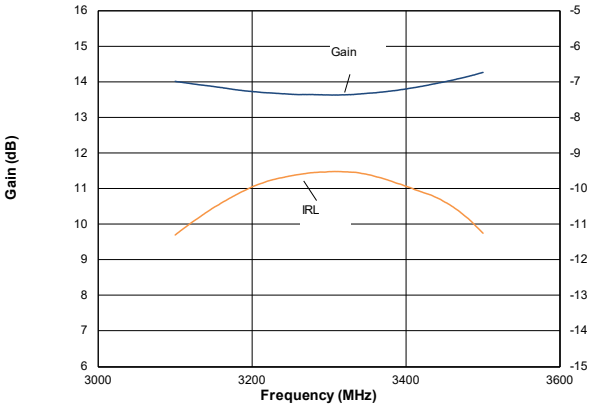
[2] T_{CASE} = 85°C, P_{DISS} = 300 W, 500 µs pulse width, 20% duty cycle

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction to Case[1]	$R_{\theta JC}$	0.44	°C/W
Thermal Resistance, Junction to Case[2]	$R_{\theta JC}$	0.48	°C/W

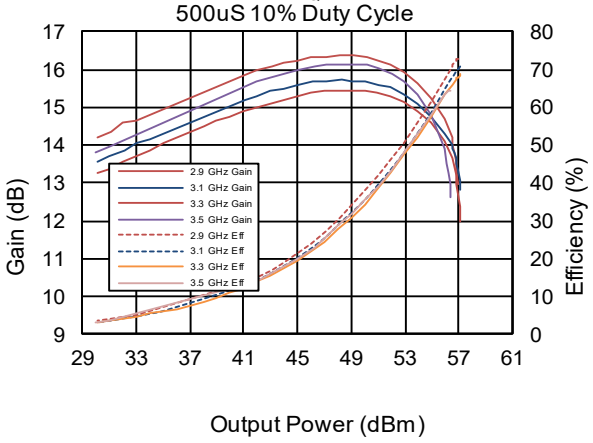
Ordering Information

Type and Version	Order Code	Package	Shipping
GTVA355001EC V1 R0	TBD	H-36248-2	Tape & Reel, 50 pcs
GTVA355001EC V1 R2	TBD	H-36248-2	Tape & Reel, 250 pcs
GTVA355001FC V1 R0	TBD	H-37248-2	Tape & Reel, 50 pcs
GTVA355001FC V1 R2	TBD	H-37248-2	Tape & Reel, 250 pcs

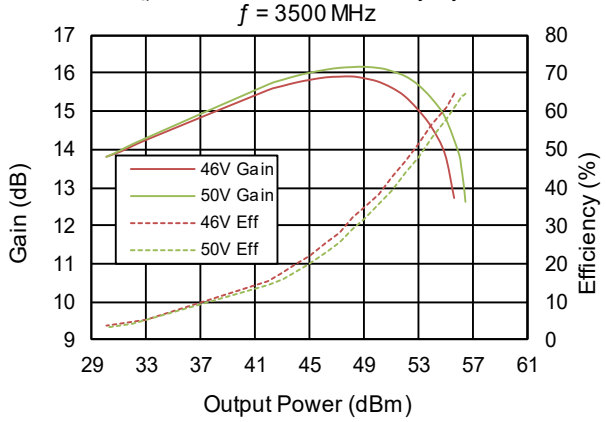
CW Performance Small Signal Gain & Input Return Loss
V_{DD} = 50 V, I_{DQ}= 200 mA,



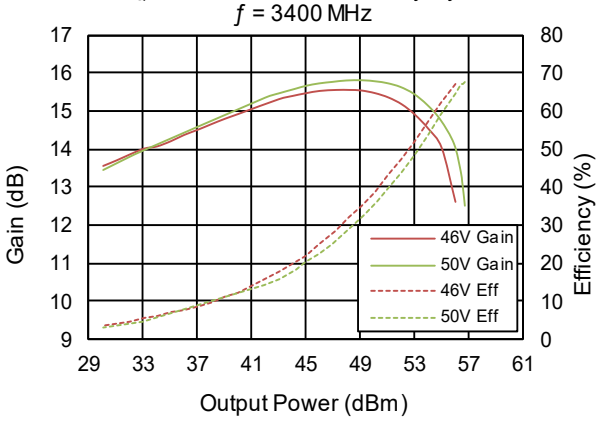
PulsedCW Performance
V_{DD} = 50 V, I_{DQ}= 200 mA,
500uS 10% Duty Cycle



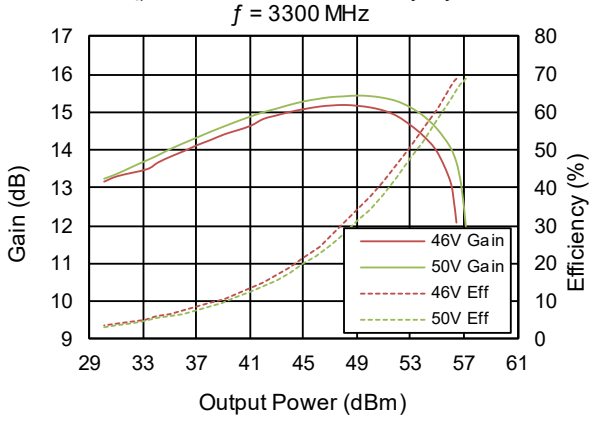
PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 3500 MHz



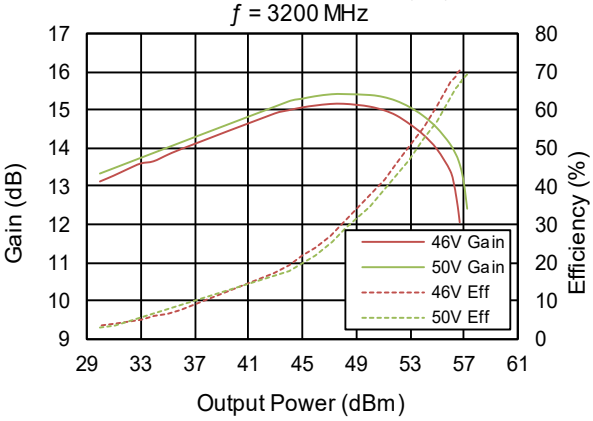
PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 3400 MHz



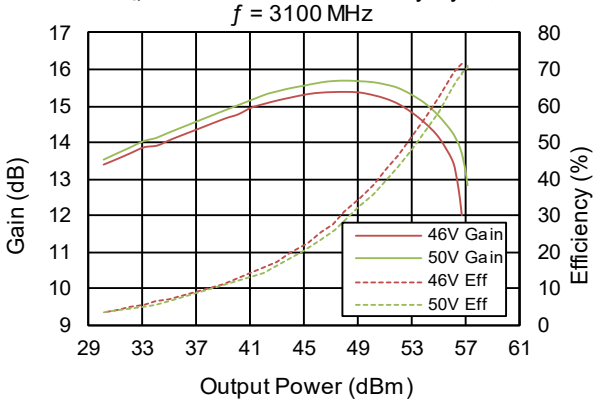
PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 3300 MHz



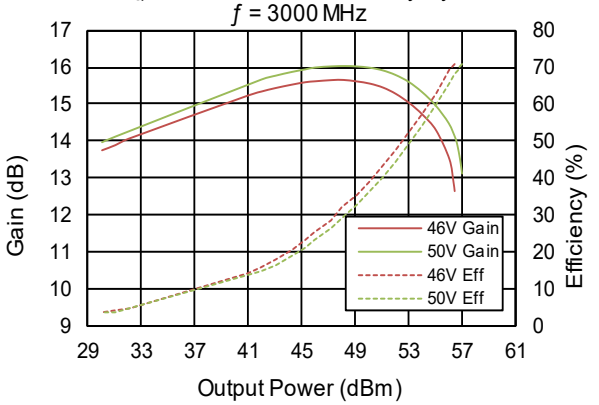
PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 3200 MHz



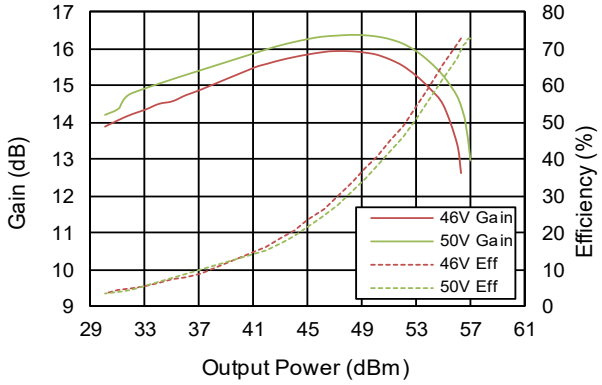
PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 3100 MHz



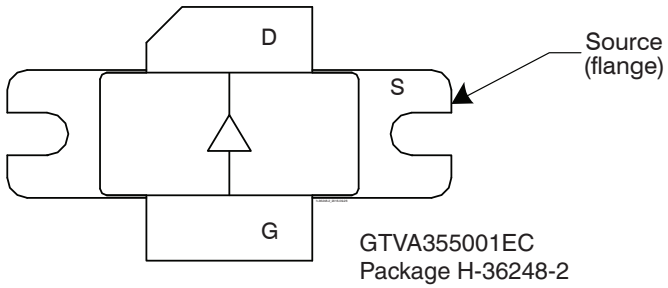
PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 3000 MHz



PulsedCW Performance at various V_{DD}
I_{DQ}= 200 mA, 500uS 10% Duty Cycle,
f = 2900 MHz

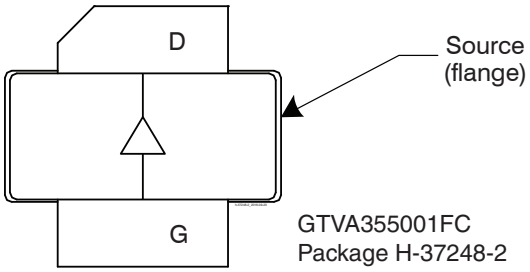


Pinout Diagram (top view)



GTVA355001EC
Package H-36248-2

Pin	Description
D	Drain
G	Gate
S	Source (flange)



GTVA355001FC
Package H-37248-2

Pin	Description
D	Drain
G	Gate
S	Source (flange)

GTVA355001FC Application Circuit Bill of Materials

Component	Description	Manufacturer	P/N
Input			
C101, C105, C106	Capicacitor, 10 pF	ATC	ATC600F100JT250X
C102	Capacitor, 1000000 pF, 100V, 1 µF	Digi-Key	490-14464-1-ND
C103	Capacitor, 10000000 pF, 25V, 10 µF	Digi-Key	490-7202-1-ND
C104	Capacitor, 1.1 pF	ATC	ATC600F1R1CT250X
R101	Resistor, 5.6 ohms	Digi-Key	P5.6PCT-ND
R102	Resistor, 30 ohms	Digi-Key	P30GCT-ND
Output			
C201, C203, C204	Capacitor, 10 pF	ATC	ATC600F100JT250X
C202, C205	Capacitor, 1000000 pF, 1 µF	Digi-Key	445-1411-2-ND
C206	Capacitor, 6800000000 pF, 6800 µF	Digi-Key	493-14771-ND

Package Outline Specifications

Package H-36248-2

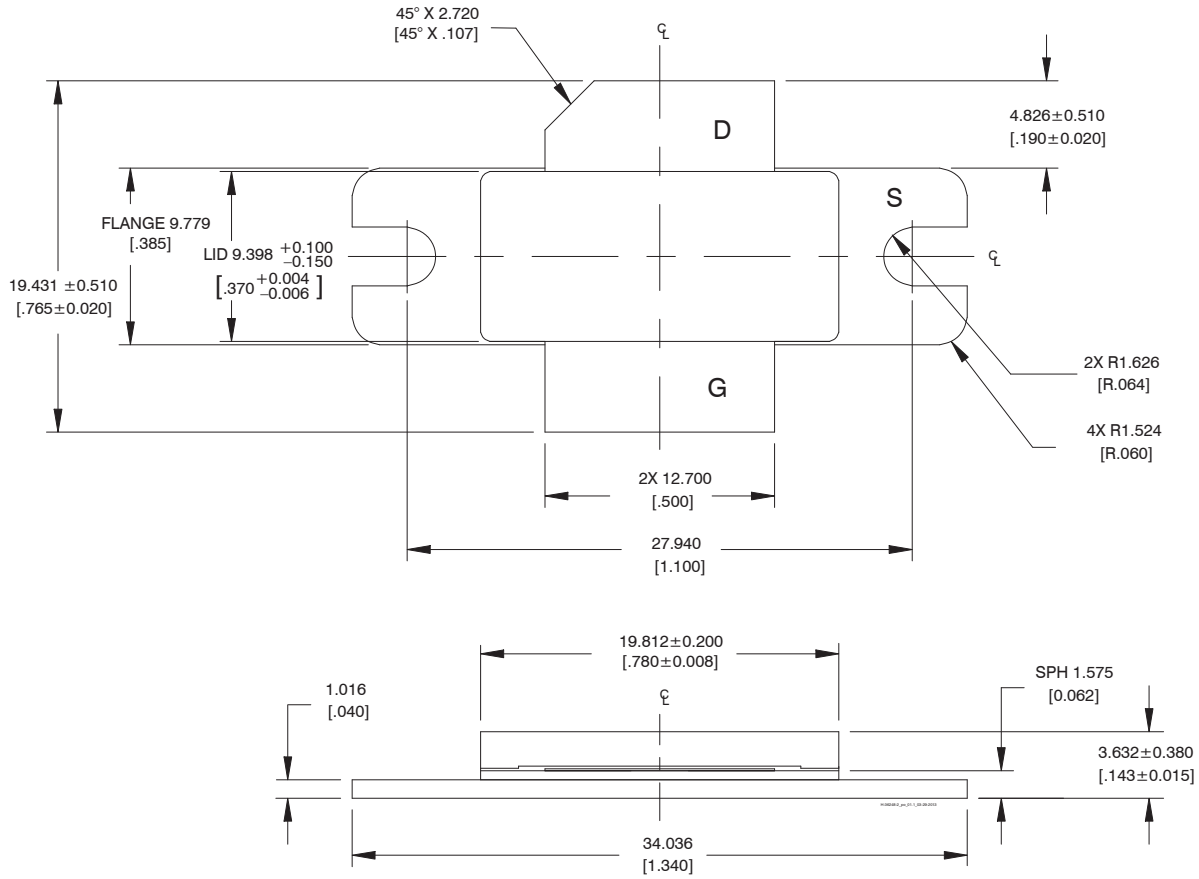


Diagram Notes—unless otherwise specified:

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
5. Lead thickness: 0.10 +0.051/–0.025 mm [0.004 +0.002/–0.001 inch]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

Package Outline Specifications (cont.)

Package H-37248-2

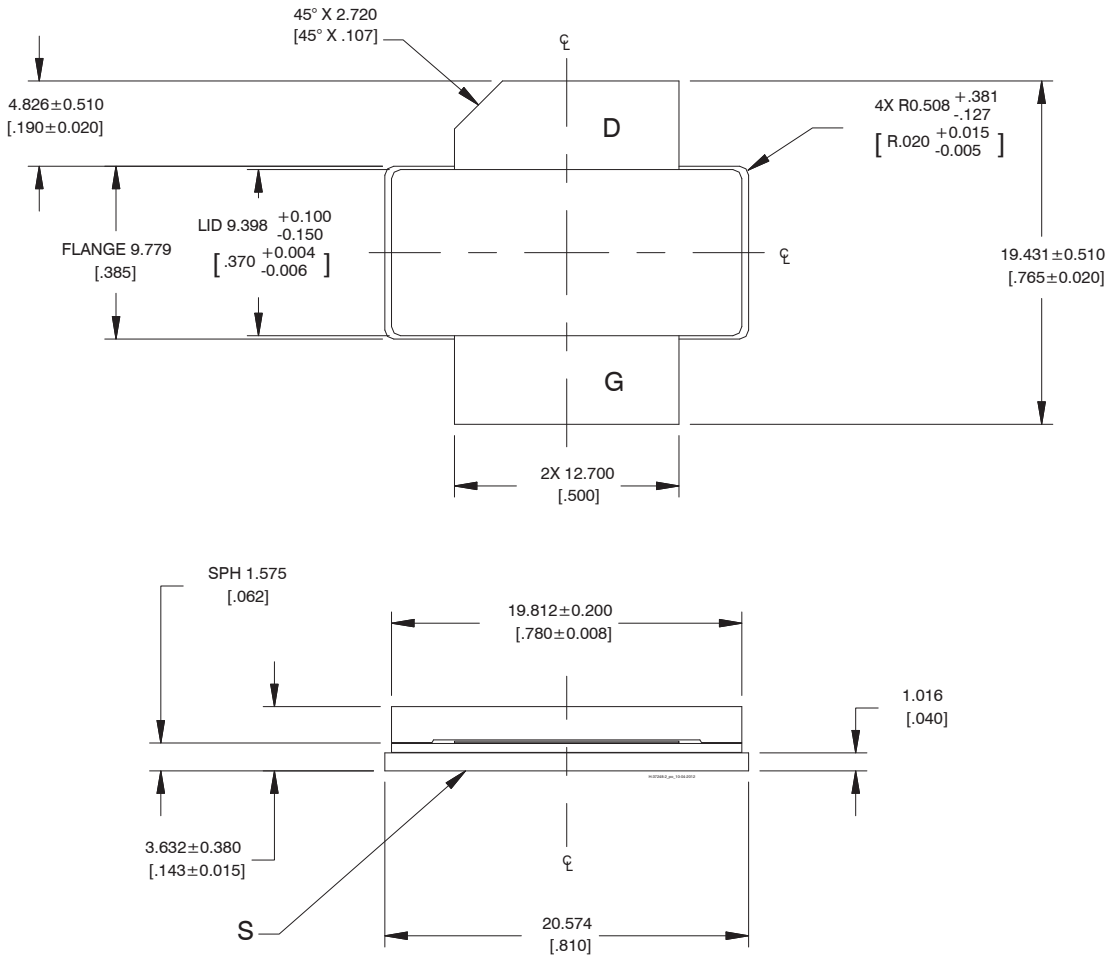


Diagram Notes—unless otherwise specified:

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
5. Lead thickness: 0.10 +0.051/–0.025 mm [0.004 +0.002/–0.001 inch]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

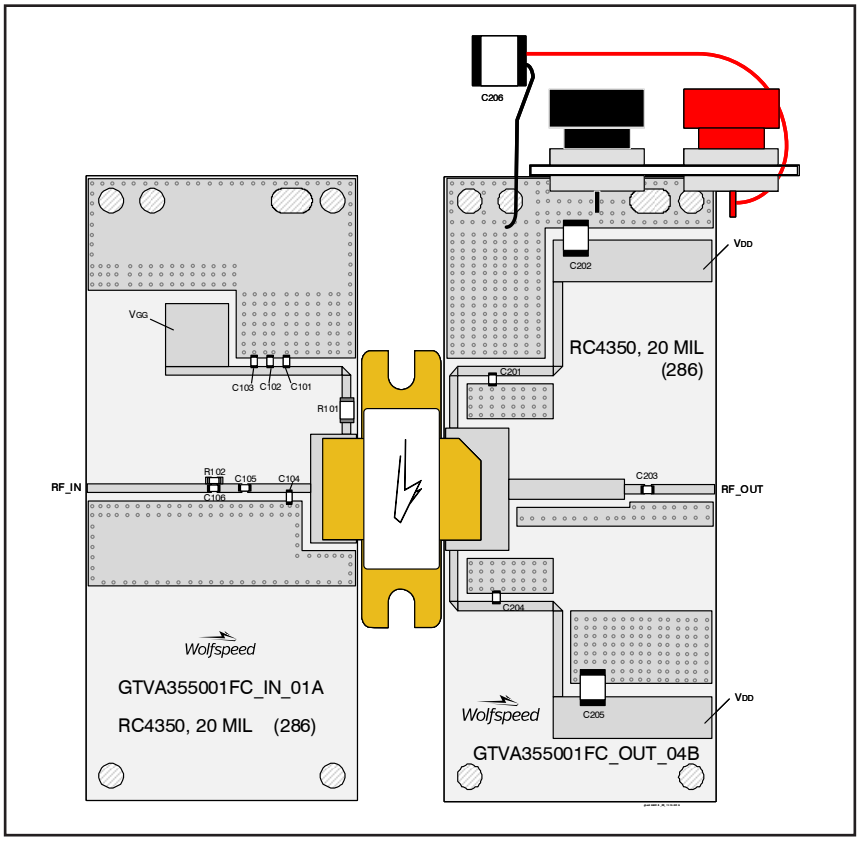
Load Pull Performance

Single Side Load Pull Performance - 10 µs, 10% duty cycle, class AB, V_{DD} = 50 V, 300 mA

		DUT P3dB									
		Max Eff					Max Power				
Freq	Zsource	ZL	Gain P3	Drain Eff P3	P3dB	P3dB	ZL	Gain P3	Drain Eff P3	P3dB	P3dB
MHz	ohm	ohm	dB	%	dBm	W	ohm	dB	%	dBm	W
2900	2.4-j5.9	3.87-j2.67	14.17	73.53	56.92	492.04	1.75-j3.26	12.93	65.49	58.84	765.6
3100	4.09-j6.09	3.22-j2.28	14.14	71.84	57.08	510.51	1.7-j3.59	12.76	61.55	58.67	736.21
3300	6.37-j3.9	2.65-j2.07	14.28	70.72	56.86	485.29	1.73-j3.74	13.04	62.27	58.75	749.89
3500	4.86-j1.36	2.48-j2.48	14.43	68.72	56.88	487.53	1.78-j4.0	13.2	60.67	58.56	717.79

GTVA355001FC Application Circuit Drawing

DUT	GTVA355001EC/FC
Test Fixture Part No.	LNT/GTVA355001EC V1, LTN/GTVA355001FC V1
PCB	Rogers 4350, 0.508 mm [0.20"] thick, 2 oz. copper, ε_r = 3.66
Find Gerber files for this text fixture on the Wolfspeed Web site at **www.wolfspeed.com/RF**	



Reference circuit assembly diagtam (not to scale)

Revision History

Revision	Date	Data Sheet	Page	Subjects (major changes at each revision)
0.1	2018-05-17	Advance	all	Data Sheet reflects afvance specification for product development
0.2	2019-11-07	Advance	all	Edits to existing Data Sheet

For more information, please contact:

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

Sales Contact
RFSales@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.