

# GTVA220701FA

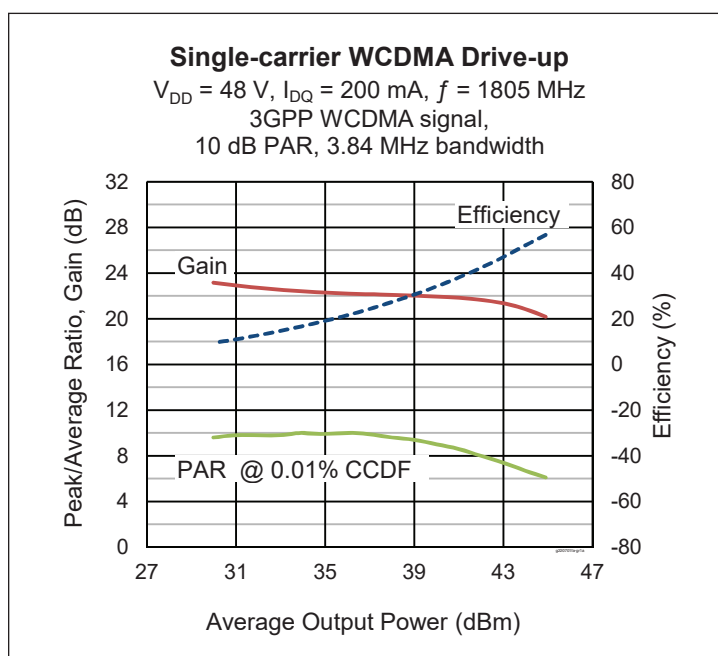
## Thermally-Enhanced High Power RF GaN on SiC HEMT 70 W, 50 V, 1805 – 2170 MHz

### Description

The GTVA220701FA is a 70-watt ( $P_{3dB}$ ) GaN on SiC high electron mobility transistor (HEMT) for use in multi-standard cellular power amplifier applications. It features input matching, high efficiency, and a thermally-enhanced package with earless flange.



GTVA220701FA  
Package H-37265J-2



### Features

- GaN on SiC HEMT technology
- Input matched
- Typical CW performance, 1880 MHz, 48 V
  - Output power at  $P_{3dB} = 45\text{ W}$
  - Efficiency = 60.7%
  - Gain = 21.6 dB
- Human Body Model, Class 1A (per ANSI/ESDA/ JEDEC JS-001)
- Capable of handling 10:1 VSWR @ 48 V, 40 W (CW) output power
- RoHS-compliant

### RF Characteristics

#### Single-carrier LTE Specifications (tested in Wolfspeed test fixture)

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 200\text{ mA}$ ,  $P_{OUT} = 6.3\text{ W avg}$ ,  $f = 2170\text{ MHz}$ , 3GPP signal, 3.84 channel bandwidth, peak/average = 10.6 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	$G_{ps}$	20.75	22	—	dB
Drain Efficiency	$\eta_D$	24.5	27	—	%
Adjacent Channel Power Ratio	ACPR	—	-36.5	-33	dBc

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

## DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	$V_{GS} = -8\text{ V}$ , $I_D = 7.2\text{ mA}$	$V_{(BR)DSS}$	150	—	—	V
Drain-source Leakage Current	$V_{GS} = 8\text{ V}$ , $V_{DS} = 10\text{ V}$	$I_{DSS}$	—	—	5	mA
Gate Threshold Voltage	$V_{DS} = 10\text{ V}$ , $I_D = 7.2\text{ mA}$	$V_{GS(th)}$	-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	$V_{DS} = 48\text{ V}$ , $I_D = 0.2\text{ A}$	$V_{GS(Q)}$	—	-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	$I_G$	20	mA
Drain Current	$I_D$	13.5	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.

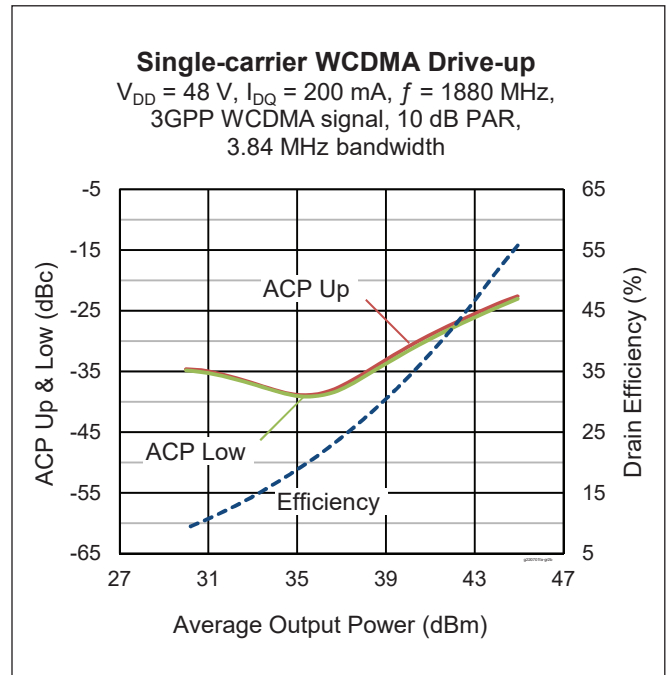
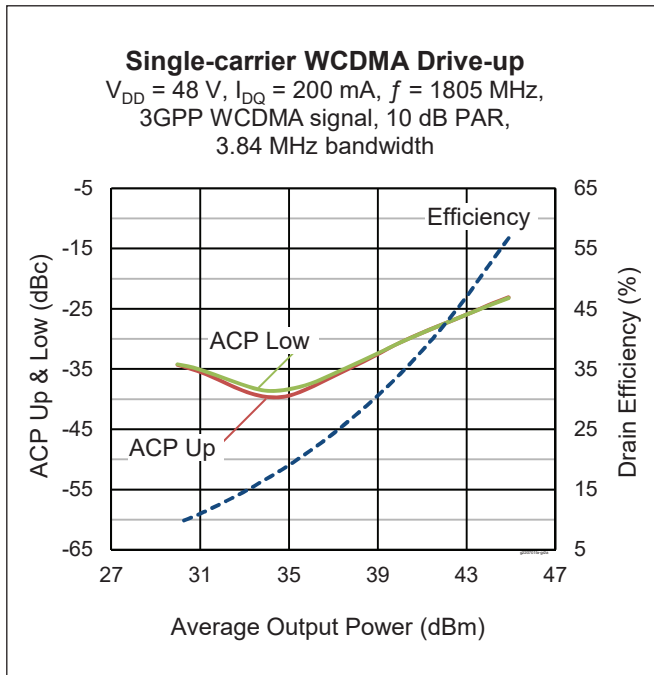
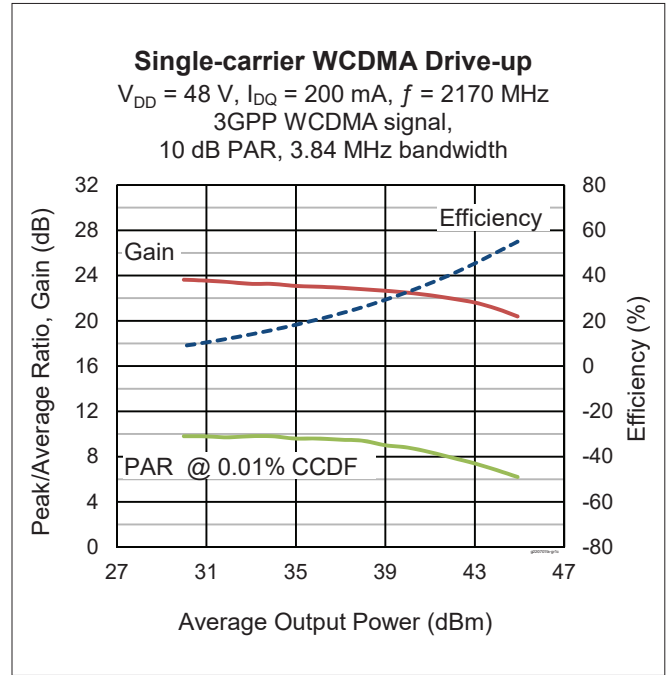
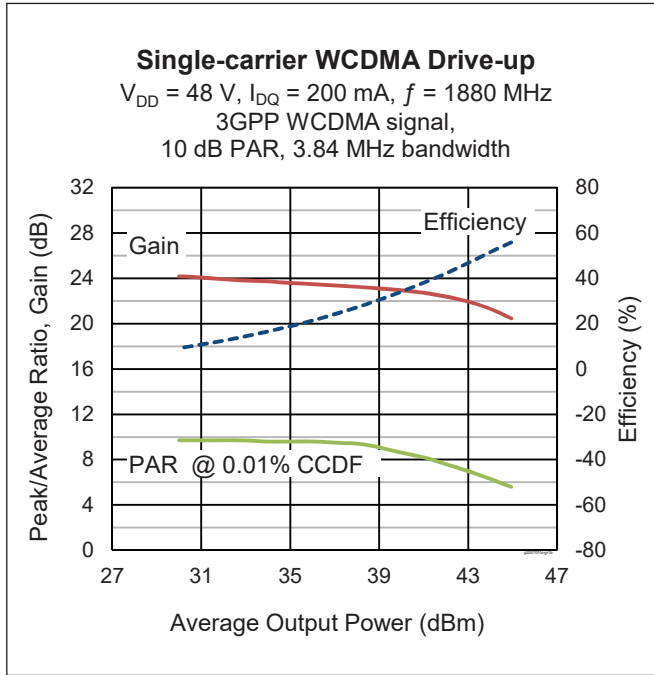
## Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance ( $T_{CASE} = 70\text{ °C}$ , 55 W (CW), $V_{DD} = 48\text{ V}$ , 2170 MHz)	$R_{\theta JC}$	2.36	°C/W

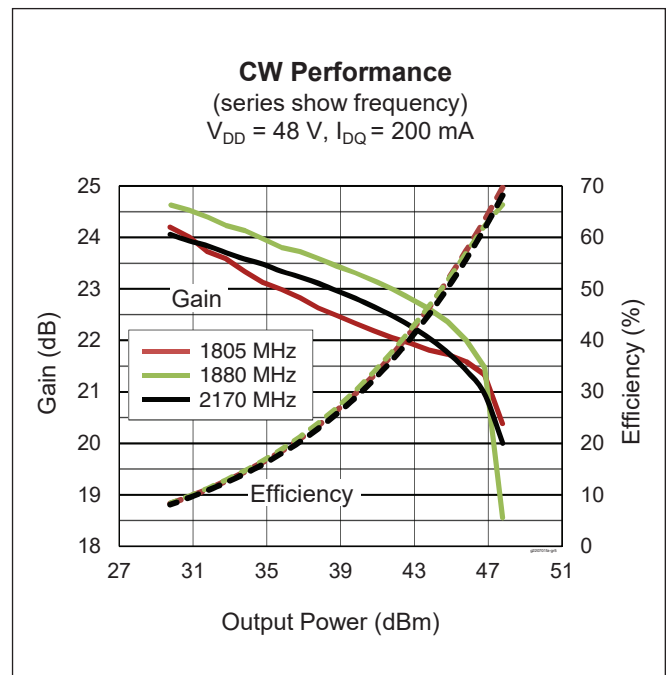
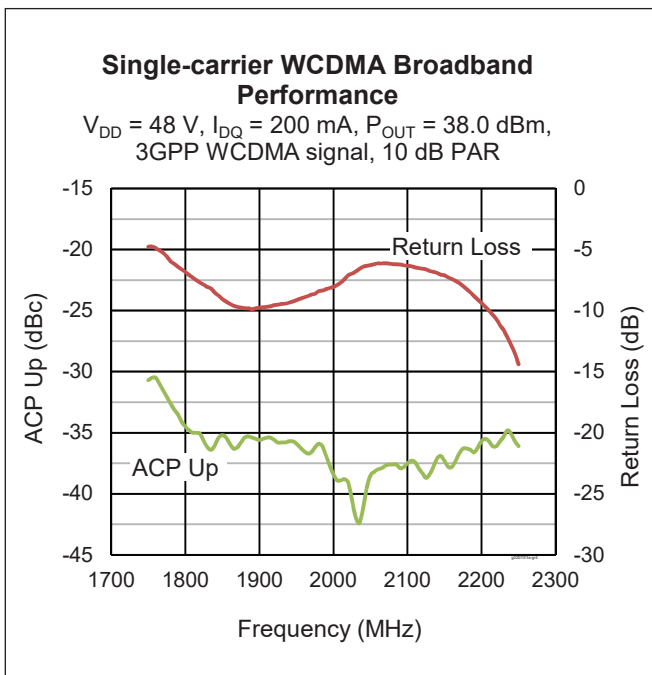
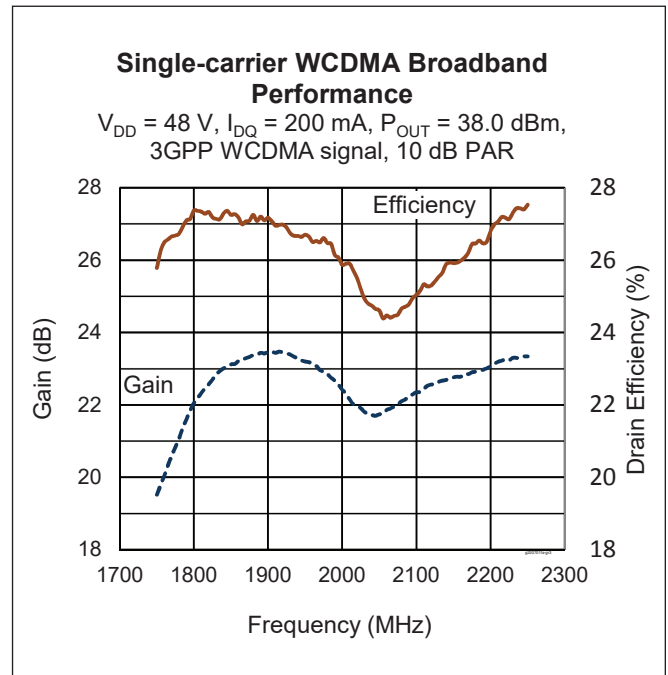
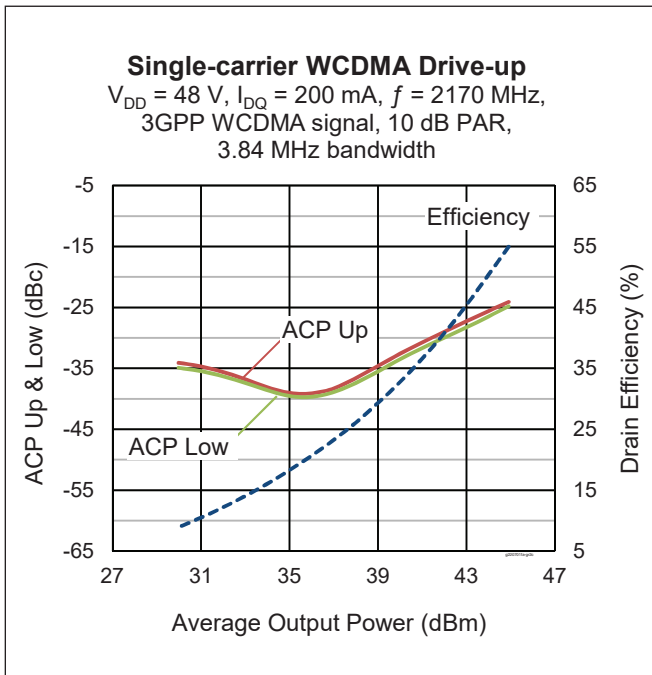
## Ordering Information

Type and Version	Order Code	Package	Shipping
GTVA220701FA V1 R0	GTVA220701FA-V1-R0	H-37265J-2, earless flange	Tape & Reel, 50 pcs
GTVA220701FA V1 R2	GTVA220701FA-V1-R2	H-37265J-2, earless flange	Tape & Reel, 250 pcs

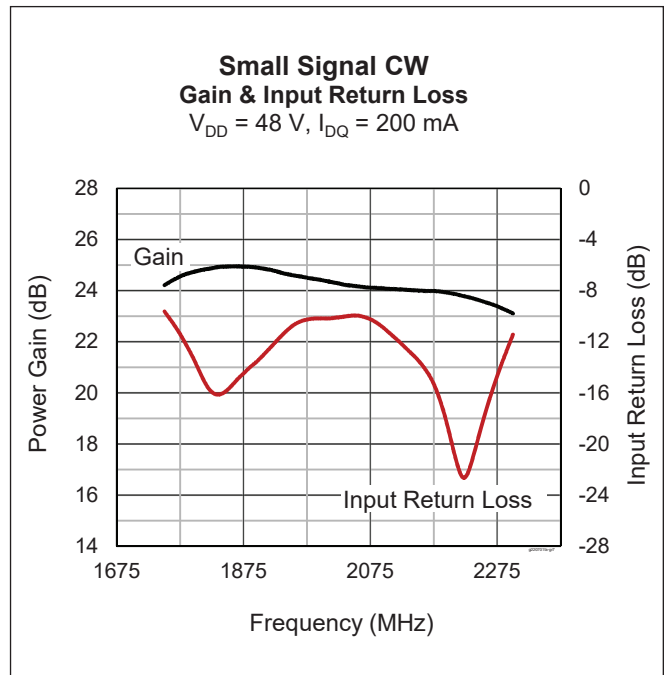
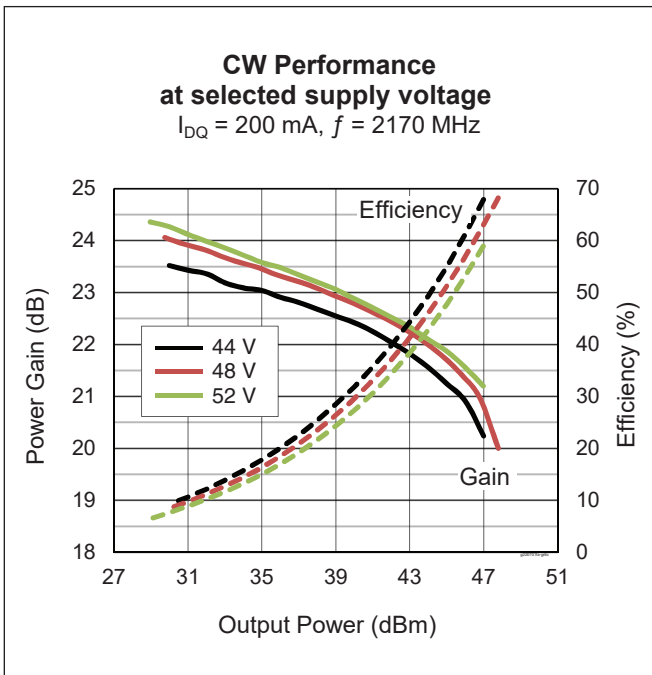
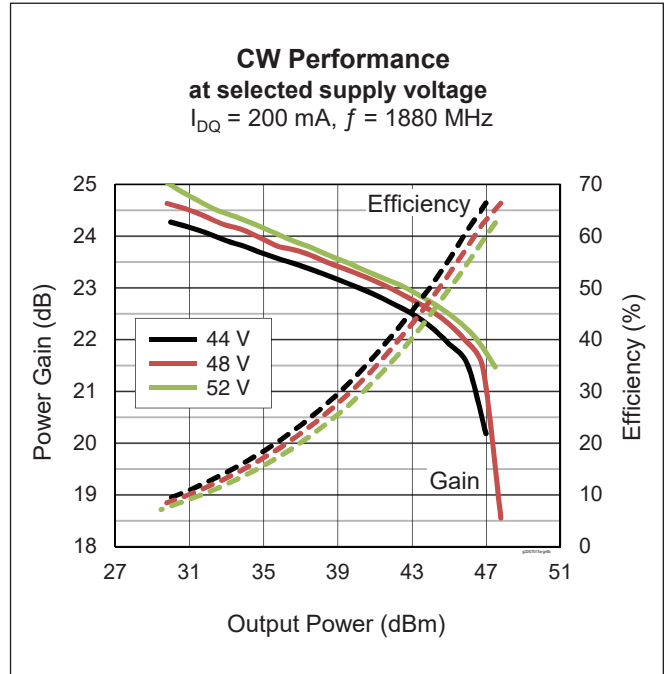
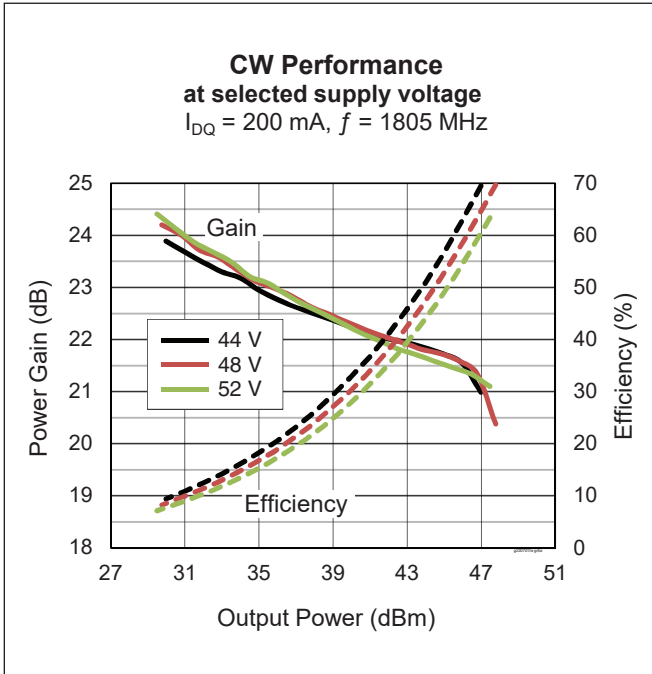
**Typical Performance** (data taken in an Wolfspeed production test fixture)



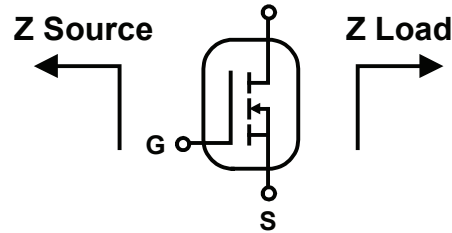
Typical Performance (cont.)



Typical Performance (cont.)



**Broadband Circuit Impedance** (combined leads)

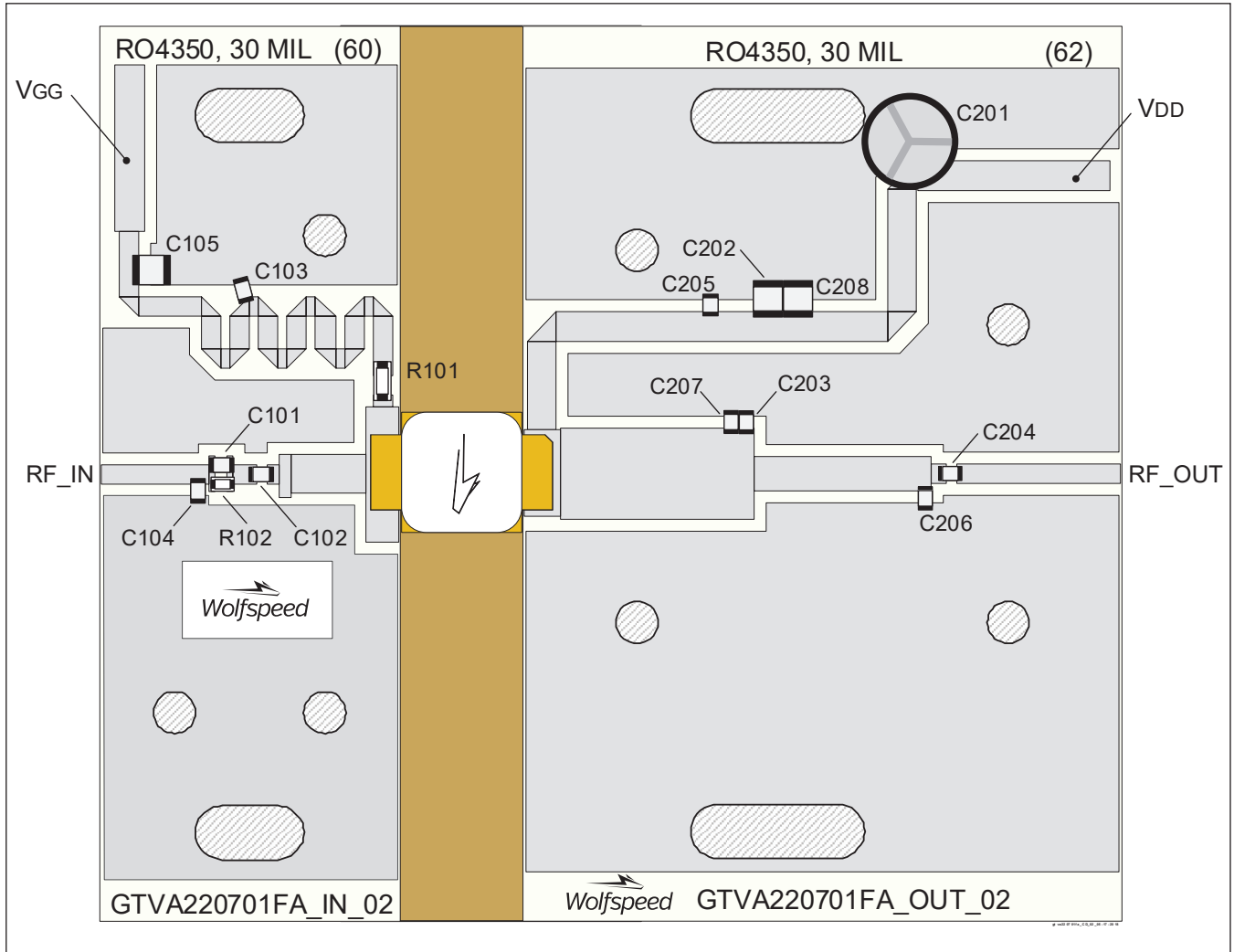


Freq [MHz]	Z Source $\Omega$		Z Load $\Omega$	
	R	jX	R	jX
1805	1.95	-5.67	12.02	5.87
1840	2.01	-6.27	11.94	3.94
1880	2.43	-7.17	11.33	3.15
2100	9.95	-9.38	10.39	0.02
2140	11.40	-8.40	10.31	-0.75
2170	11.61	-9.07	10.50	-2.23

**Reference Circuit, tuned for 1805 MHz to 2170 MHz**

DUT	GTVA220701FA V1
Test Fixture Part No.	LTN/GTVA220701FA V1
PCB	Rogers 4350, 0.762 mm [.030"] thick, 2 oz. copper, $\epsilon_r = 3.66$
Find Gerber files for this test fixture on the Wolfspeed Web site at <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a>	

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

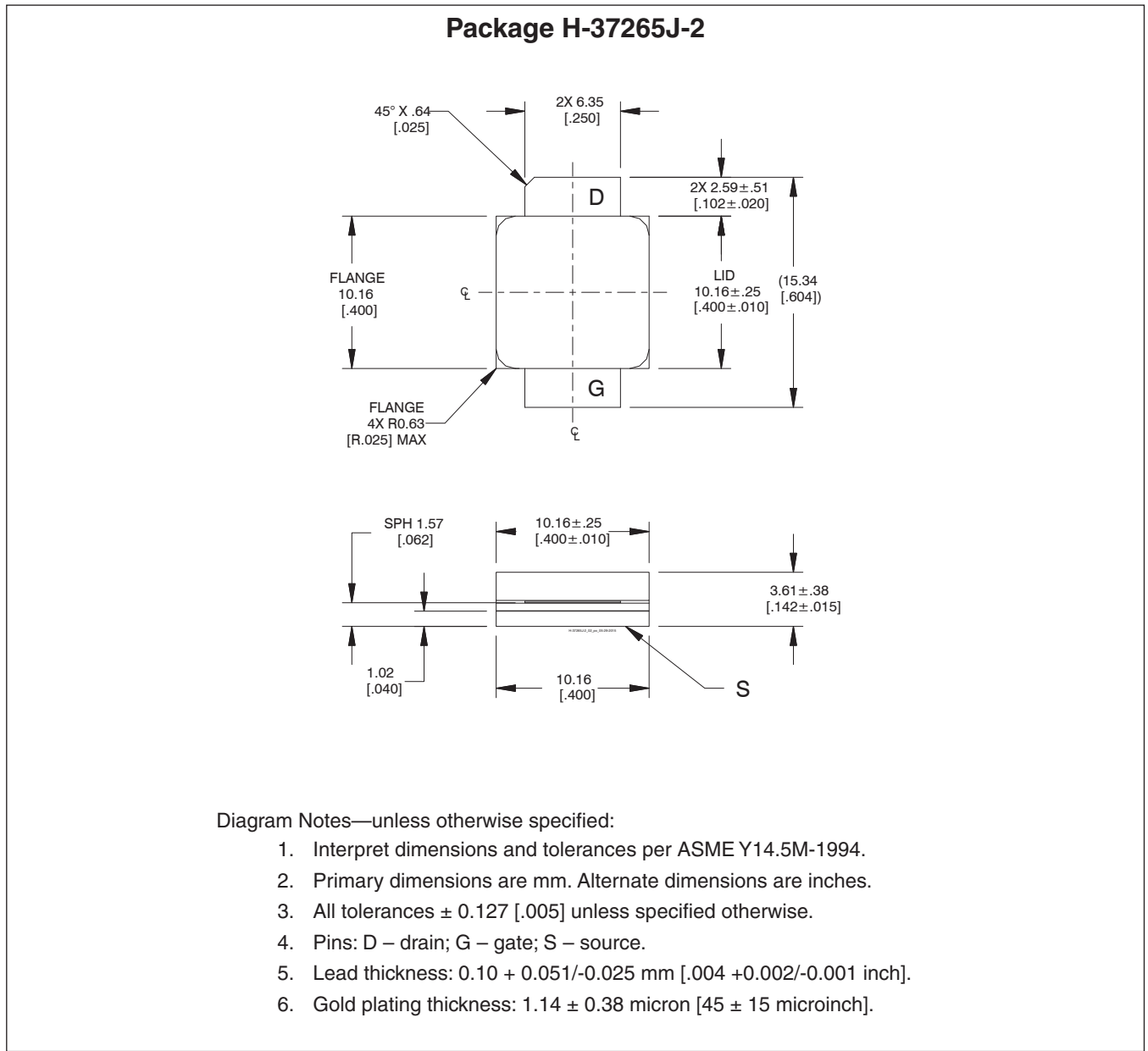
**Reference Circuit** (cont.)**Components Information**

Component	Description	Manufacturer	P/N
<b>In</b>			
C101	Capacitor, 2.4 pF	ATC	ATC600F2R4JT250XT
C102, C103	Capacitor, 20 pF	ATC	ATC600F200JT250XT
C104	Capacitor, 1 pF	ATC	ATC600F1R0JT250XT
C105	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
R101	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ100V
R102	Resistor, 330 ohms	Panasonic Electronic Components	ERJ-3GEYJ331V
<b>Out</b>			
C201	Capacitor, 47 $\mu$ F	Cornell Dubilier Electronics (CDE)	SEK470M100ST
C202, C208	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
C203	Capacitor, 1 pF	ATC	ATC600F1R0JT250XT
C204, C205	Capacitor, 20 pF	ATC	ATC600F200JT250XT
C206	Capacitor, 0.7 pF	ATC	ATC600F0R7JT250XT
C207	Capacitor, 0.3 pF	ATC	ATC600F0R3JT250XT

**Package Outline Specifications, next page**



Package Outline Specifications



## Revision History

Revision	Date	Data Sheet	Page	Subjects (major changes at each revision)
01	2015-08-18	Advance	all	Data Sheet reflects advance specification for product development
02	2016-04-01	Production	all	Product released to production. Add firm specifications, performance information, and reference circuit information,
03	2017-04-06	Production	1 2	Remove "Integrated ESD protection" from Features Restructure tables for clarity.
04	2018-05-17	Production	All	Converted to Wolfspeed Data Sheet

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## Notes

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