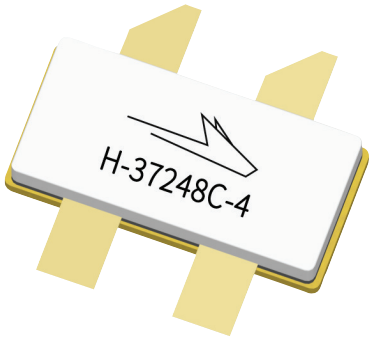
GTRA262802FC

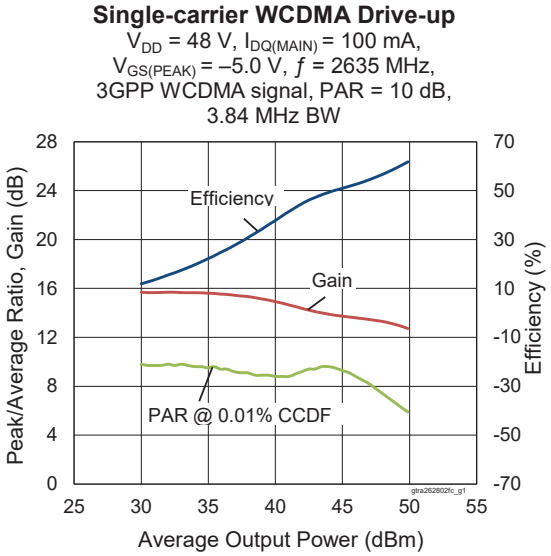
Thermally-Enhanced High Power RF GaN on SiC HEMT
250 W, 48 V, 2490 – 2690 MHz



Package Types: H-37248C-4
PN: GTRA262802FC

Description

The GTRA262802FC is a 250-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.



Features

- GaN on SiC HEMT technology
- Input matched
- Typical pulsed CW performance, 2605 MHz, 48 V, combined outputs, 16 µs pulse width, 10% duty cycle
  - Output power at P_{3dB} = 250 W
  - Efficiency = 62%
  - Gain = 14.4 dB
- Capable of handling 10:1 VSWR @48 V, 38 W (CW) output power
- Human Body Model Class 1A (per ANSI/ESDA/JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed Doherty production test fixture)
V_{DD} = 48 V, I_{DQ} = 100 mA, $V_{GS(PEAK)}$ = $V_{GS\ @}$ I_{DQ} = 200 mA – 2.05 V, P_{OUT} = 38 W avg, ƒ = 2635 MHz, 3GPP signal, 3.84 MHz channel bandwidth, 10 dB peak/average @ 0.01% CCDF

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Gain	G_{ps}	13.5	14	—	dB
Drain Efficiency	η_D	49	54	—	%
Adjacent Channel Power Ratio	ACPR	—	–28	–24.5	dBc

Note:
All published data at T_{CASE} = 25°C unless otherwise indicated
ESD: Electrostatic discharge sensitive device—observe handling precautions!

RoHS compliant

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DC Characteristics

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Conditions
Drain-source Breakdown Voltage (main)	$V_{BR(DSS)}$	150	—	—	V	V_{GS} = -8 V, I_D = 10 mA
Drain-source Breakdown Voltage (peak)						
Drain-source Leakage Current	I_{DSS}	—	—	5	mA	V_{GS} = -8 V, V_{DS} = 10 V
Gate Threshold Voltage (main)	$V_{GS(th)}$	–3.5	–3.0	–2.5	V	V_{DS} = 10 V, I_D = 10.8 mA
Gate Threshold Voltage (peak)						V_{DS} = 10 V, I_D = 20 mA

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating Voltage	V_{DD}	0	—	50	V	
Gate Quiescent Voltage	$V_{GS(Q)}$	—	–3.0	—		V_{DS} =48 V, I_D = 100 mA

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	125	V
Gate-source Voltage	V_{GS}	–10 to +2	
Operating Voltage	V_{DD}	55	
Gate Current (main)	I_G	10.8	mA
Gate Current (peak)		20	
Drain Current (main)	I_D	4.0	A
Drain Current (peak)		7.5	
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	

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

Characteristics	Symbol	Value	Unit	Conditions
Thermal Resistance (main)	$R_{\theta JC}$	1.71	°C/W	T_{CASE} = 70 °C, 38 W CW

Ordering Information

Type and Version	Order Code	Package Description	Shipping
GTRA262802FC V2 R0	GTRA262802FC-V2-R0	H-37248C-4	Tape & Reel, 50 pcs
GTRA262802FC V2 R2	GTRA262802FC-V2-R2	H-37248C-4	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

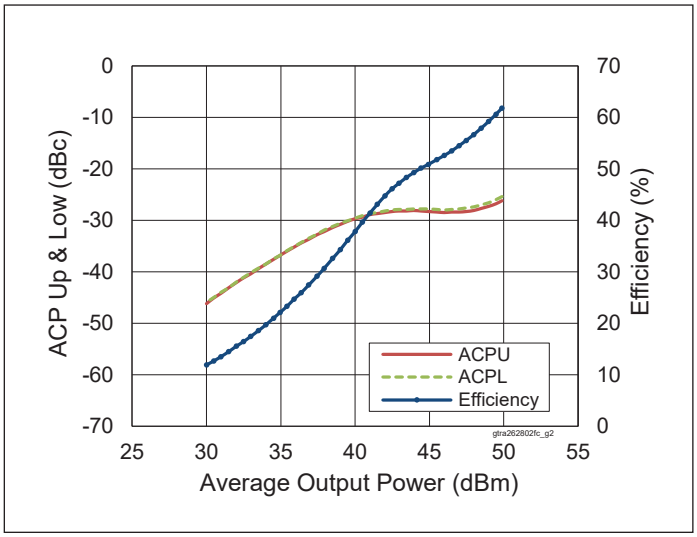


Figure 1. Single-carrier WCDMA Drive-up

V_{DD} = 48 V, $I_{DQ(MAIN)}$ = 100 mA,
$V_{GS(PEAK)}$ = –5.0 V, f = 2635 MHz,
3GPP WCDMA signal, PAR = 10 dB,
3.84 MHz BW

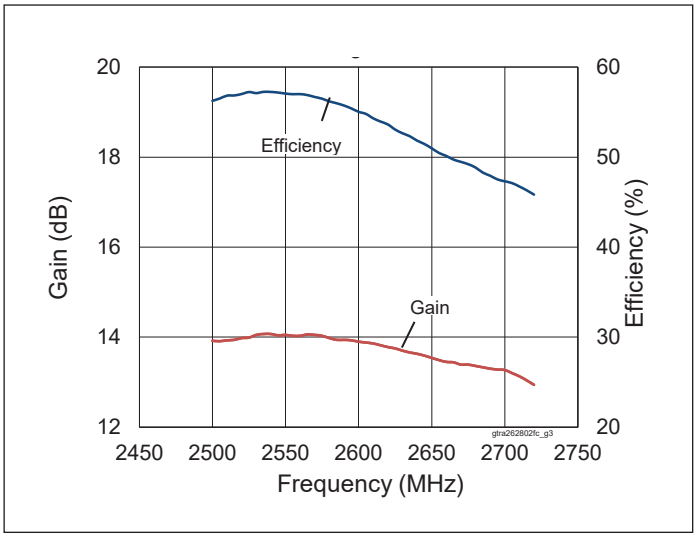


Figure 2. Single-carrier WCDMA Broadband Performance

V_{DD} = 48 V, $I_{DQ(MAIN)}$ = 100 mA,
$V_{GS(PEAK)}$ = –5.0 V, P_{OUT} = 45.8 dBm,
3GPP WCDMA signal, PAR = 10 dB

Typical Performance (cont.)

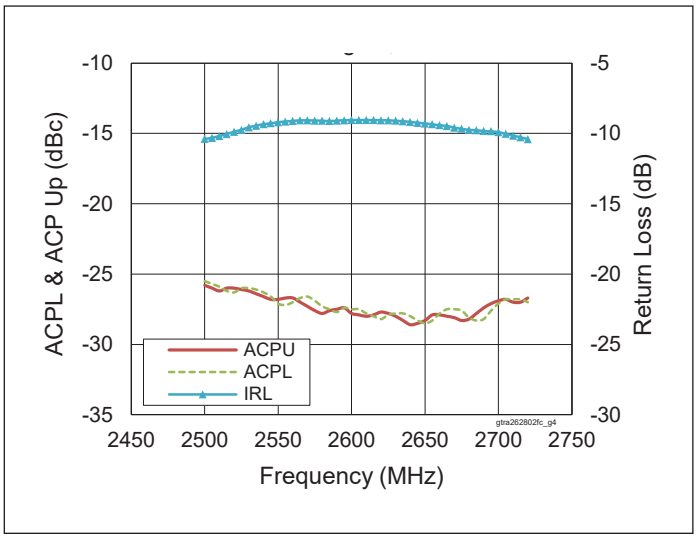


Figure 3. Single-carrier WCDMA Broadband Performance

V_{DD} = 48 V, $I_{DQ(MAIN)}$ = 100 mA,
$V_{GS(PEAK)}$ = -5.0 V, P_{OUT} = 45.8 dBm,
3GPP WCDMA signal, PAR = 10 dB

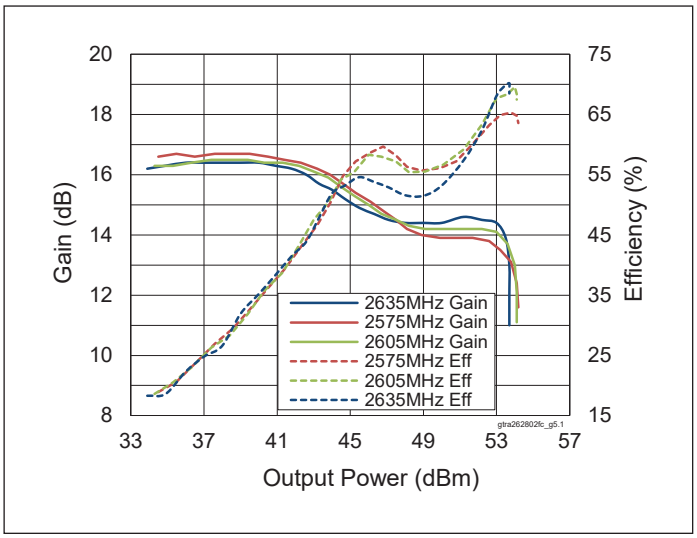


Figure 4. Pulse CW Performance

V_{DD} = 48 V, $I_{DQ(MAIN)}$ = 100 mA,
$V_{GS(PEAK)}$ = -5.0 V

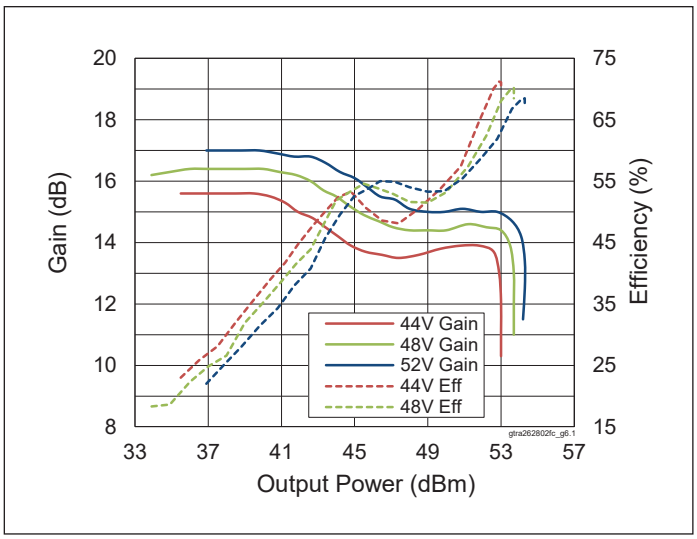


Figure 5. Pulse CW Performance at various V_{DD}

$I_{DQ(MAIN)}$ = 100 mA, $V_{GS(PEAK)}$ = –5 V,
f = 2635 MHz

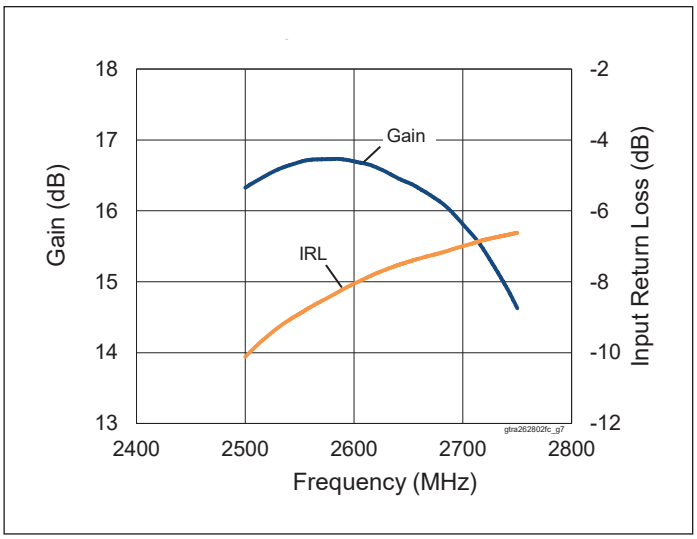


Figure 6. CW Performance Small Signal Gain & Input Return Loss

V_{DD} = 48 V, $I_{DQ(MAIN)}$ = 100 mA,
V_{GSPEAK} = –5.0 V

Load Pull Performance

Main Side Load Pull Performance – Pulsed CW signal: 16 µs, 10% duty cycle, 48 V, I_{DQ} = 100 mA, Class AB

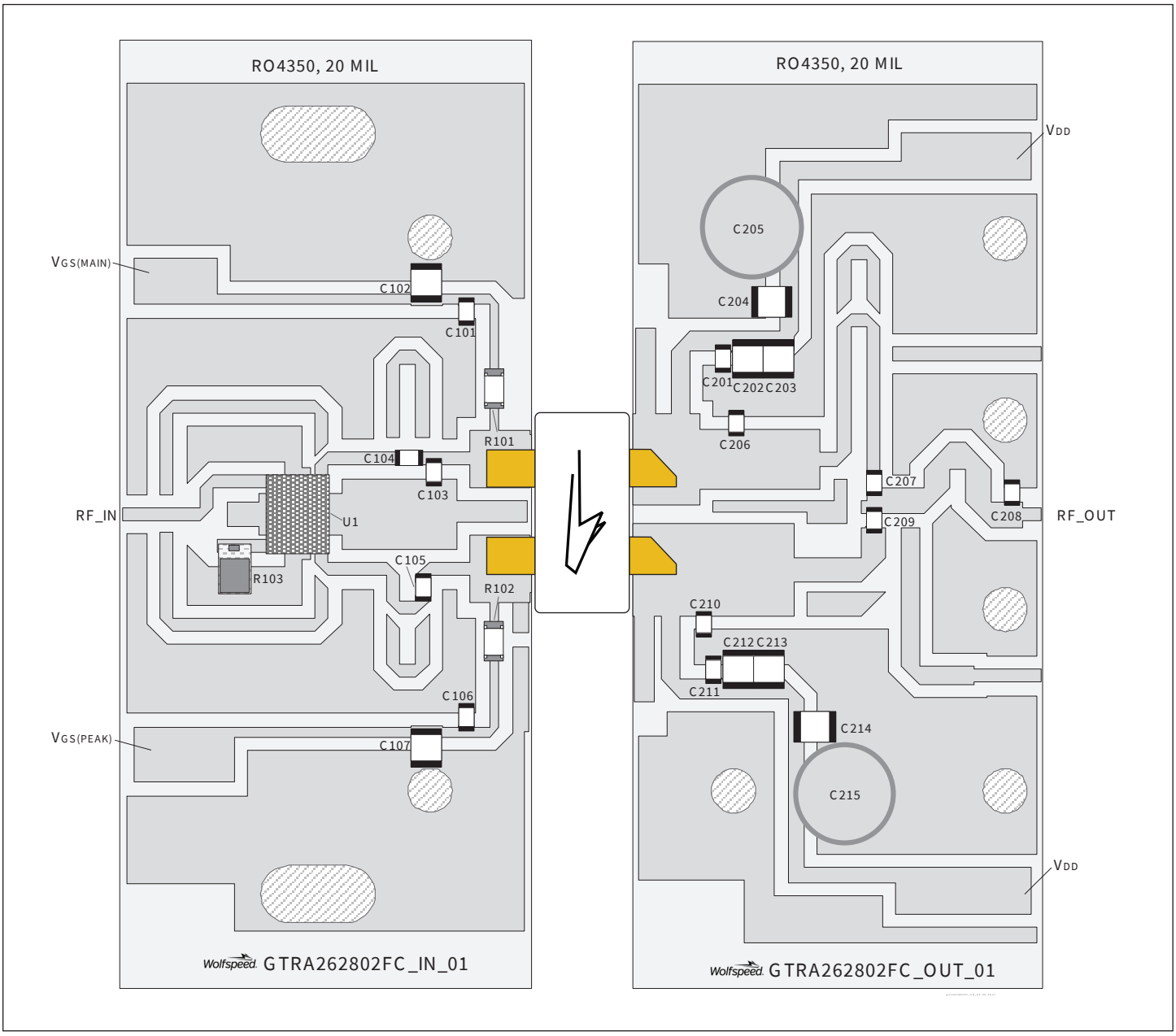
		P_{3dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	ηD [%]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	ηD [%]
2550	24.62-j26.07	6.32-j4.58	16.28	51.00	125.89	64.9	4.21-j0.93	18.05	49.13	81.75	77.8
2620	27.89-j15.25	7.12-j4.87	16.15	50.91	123.31	66.4	4.75-j1.63	17.64	49.67	92.60	77.2
2690	37.33-j8.37	7.07-j5.42	15.71	50.81	120.50	64.8	4.46-j1.56	17.52	49.04	80.09	76.5

Peak Side Load Pull Performance – Pulsed CW signal: 16 µs, 10% duty cycle, 48 V, I_{DQ} = 200 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]	ηD [%]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	ηD [%]
2550	7.71-j18.49	4.94-j4.23	15.03	53.81	240.38	64.0	2.92-j1.60	16.74	52.20	165.84	73.7
2620	11.70-j15.12	4.83-j4.21	15.31	53.31	214.29	61.0	2.98-j1.60	16.84	51.97	157.29	71.7
2690	14.78-j11.61	4.83-j4.33	15.18	53.45	221.31	60.8	3.13-j1.73	16.72	52.14	163.64	71.6

See next page for Reference Circuit

Reference Circuit, 2575 – 2635 MHz



Reference circuit assembly diagram (not to scale)

Reference Circuit Assembly

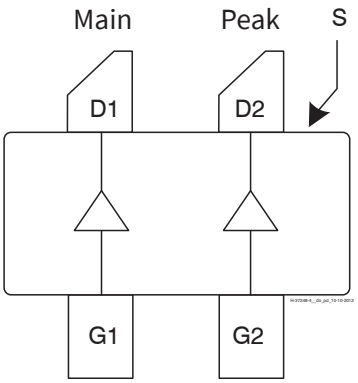
DUT	GTRA262802FC-V2
Test Fixture Part No.	LTA/GTRA262802FC-V2
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66, f = 2575 – 2635 MHz

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

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C104, C105, C106	Capacitor, 10 pF	ATC	ATC600F100JT250XT
C102, C107	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C103	Capacitor, 0.5 pF	ATC	ATC600F0R5BT250XT
R101, R102	Resistor, 20 ohms	Panasonic Electronic Components	ERJ-8GEYJ200V
R103	Resistor, 50 ohms	Richardson	C8A50Z4A
U1	Hybrid coupler	Anaren	X3C26P1-03S
Output			
C201, C207, C209, C211	Capacitor, 10 pF	ATC	ATC600F100JT250XT
C202, C203, C204, C212, C213, C214	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C205, C215	Capacitor, 470 µF	Cornell Dubilier Electronics (CDE)	SEK471M050ST
C206	Capacitor, 0.8 pF	ATC	ATC600F0R8BT250XT
C208	Capacitor, 0.2 pF	ATC	ATC600F0R2BT250XT
C210	Capacitor, 0.5 pF	ATC	ATC600F0R5BT250XT

Pinout Diagram (top view)



Pin	Description
D1	Drain Device 1 (Main)
D2	Drain Device 2 (Peak)
G1	Gate Device 1 (Main)
G2	Gate Device 2 (Peak)
S	Source (flange)

Lead connections for GTRA262802FC V2

Package Outline Specifications – Package H-37248C-4

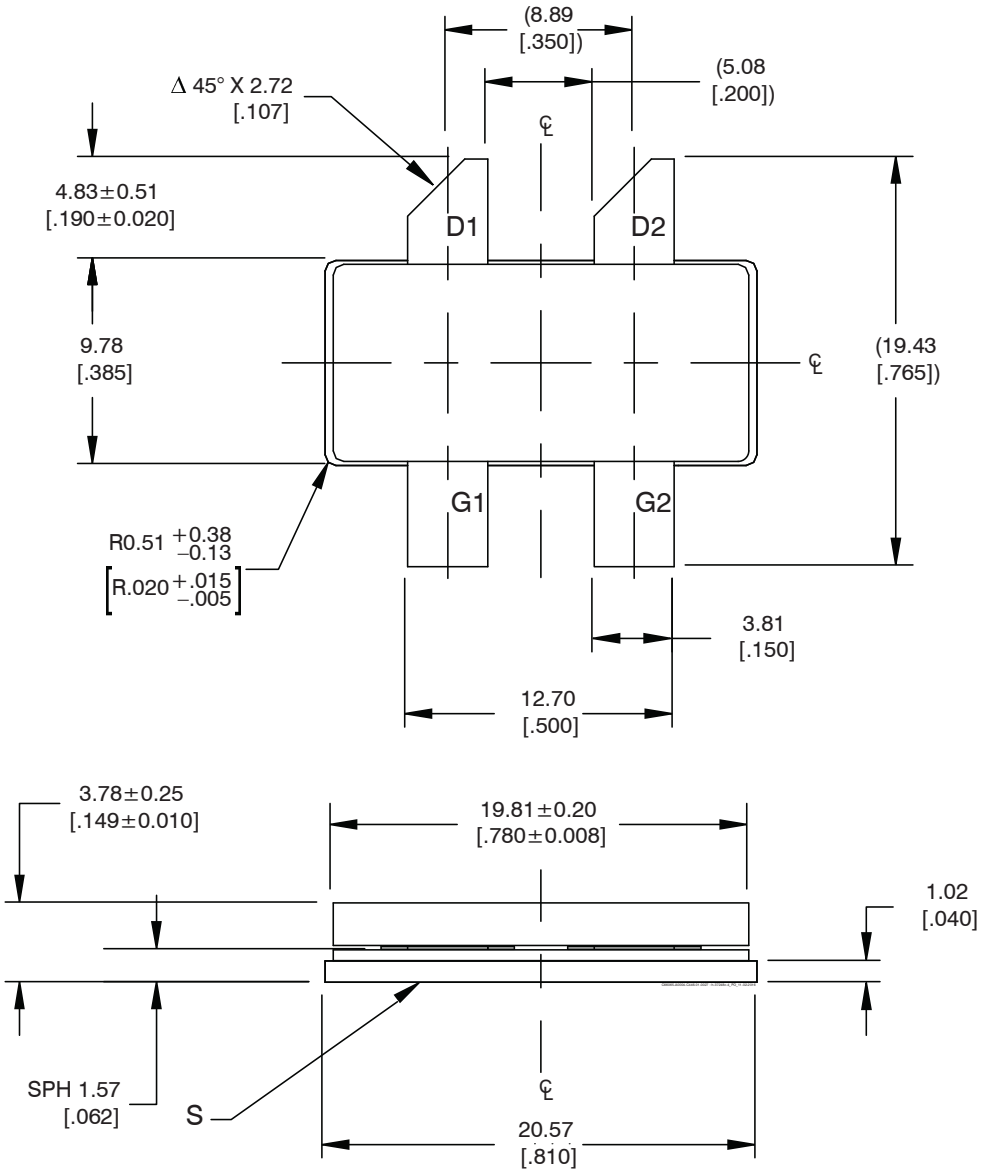


Diagram Notes—unless otherwise specified:

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: D1, D2 – drain, G1, G2 – gate, S – source (flange)
5. Lead thickness: 0.13 ± 0.05 [0.005 ± 0.002]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

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