PTF210451E
PTF210451F

green Product

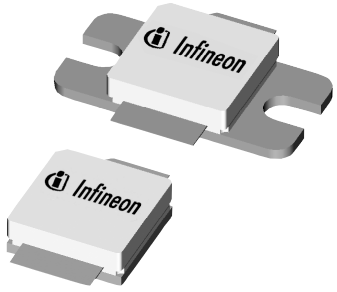
Thermally-Enhanced High Power RF LDMOS FETs
45 W, 2010 – 2025 MHz and 2110 – 2170 MHz

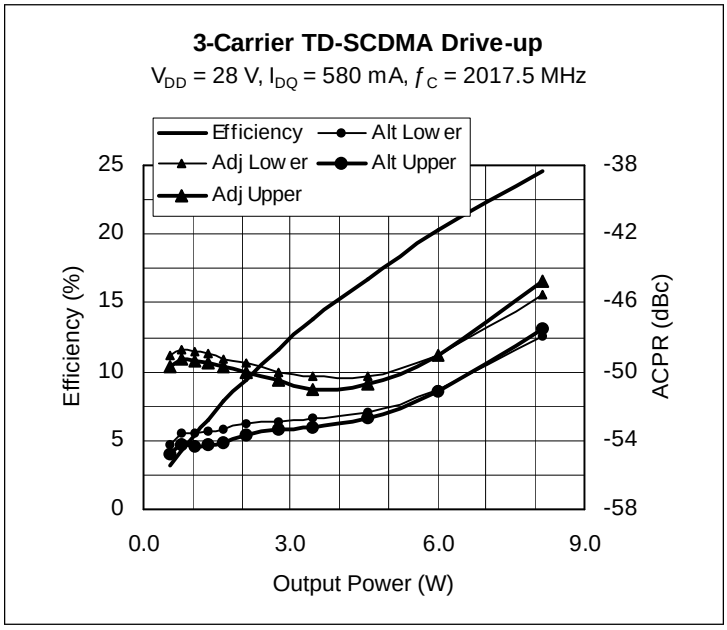
Description

The PTF210451E and PTF210451F are 45-watt internally-matched *GOLDMOS*® FETs intended for TD-SCDMA applications from 2010 to 2025 MHz, and WCDMA applications from 2110 to 2170 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTF210451E
Package H-30265-2

PTF210451F
Package H-31265-2





Features

- Thermally-enhanced packages, Pb-free and RoHS-compliant
- Internal matching for wideband performance
- Typical three-carrier TD-SCDMA performance
  - Average output power = 3 W
  - Gain = 14 dB
  - Efficiency = 12.5%
  - ACPR = –50 dBc
- Typical CW performance
  - Output power at P–1dB = 50 W
  - Linear gain = 14 dB
  - Efficiency = 53%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI Drift
- Capable of handling 10:1 VSWR @ 28 V, 45 W (CW) output power

RF Characteristics

WCDMA Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)
V_{DD} = 28 V, I_{DQ} = 500 mA, P_{OUT} = 11.5 W AVG
f_1 = 2140 MHz, f_2 = 2150 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Intermodulation Distortion	IMD	—	–37	—	dBc
Gain	G_{ps}	—	14	—	dB
Drain Efficiency	η_D	—	27	—	%

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics (cont.)

Two-tone Measurements (tested in Infineon test fixture)

V_{DD} = 28 V, I_{DQ} = 500 mA, P_{OUT} = 45 W PEP, f = 2170 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	13	14	—	dB
Drain Efficiency	η_D	35	38	—	%
Intermodulation Distortion	IMD	—	–32	–30	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 10 µA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.2	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 500 mA	V_{GS}	2.5	3.2	4.0	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–0.5 to +12	V
Junction Temperature	T_J	200	°C
Total Device Dissipation	P_D	175	W
Above 25°C derate by		1.0	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 45 W CW)	$R_{\theta JC}$	1.0	°C/W

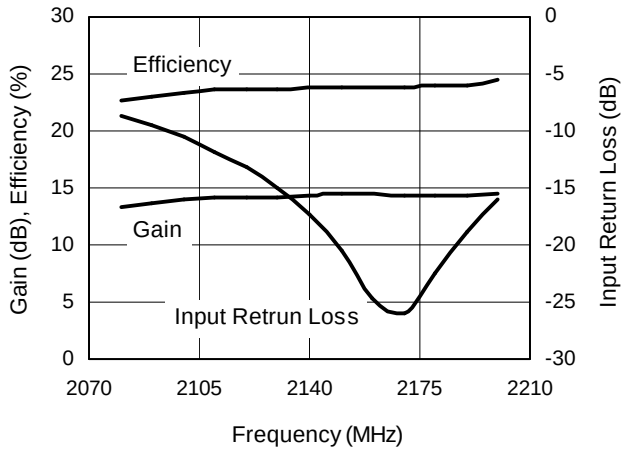
Ordering Information

Type and Version	Package Outline	Package Description	Marking
PTF210451E V1	H-30265-2	Thermally-enhanced slotted flange, single-ended	PTF210451E
PTF210451F V1	H-31265-2	Thermally-enhanced earless flange, single-ended	PTF210451F

Typical Performance (data taken in production test fixture)

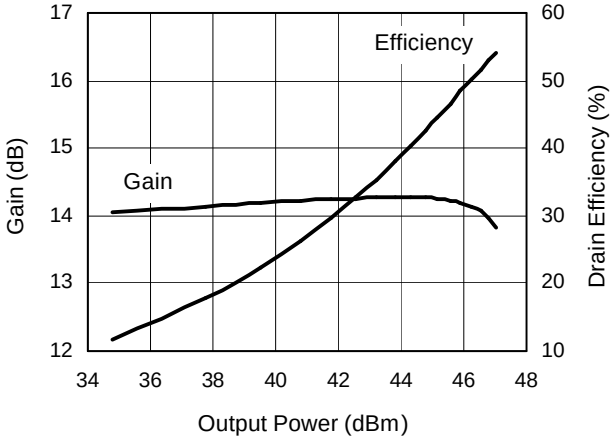
Broadband Performance

V_{DD} = 28 V, I_{DQ} = 500 mA, P_{OUT} = 40 dBm



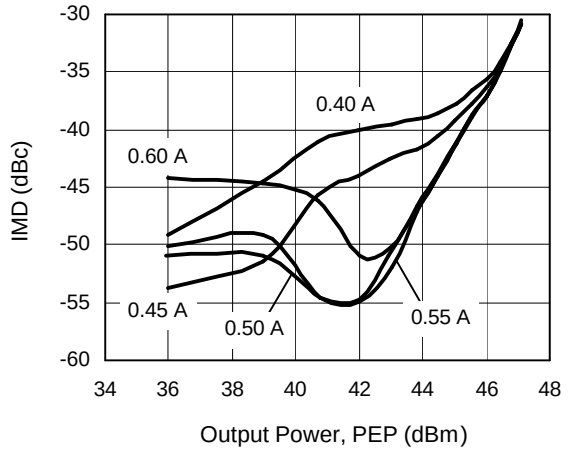
Power Sweep, CW Conditions

V_{DD} = 28 V, I_{DQ} = 500 mA, f = 2170 MHz



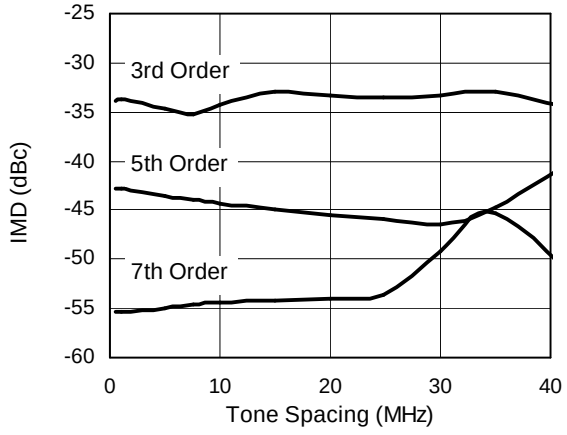
Intermodulation Distortion vs. Output Power for selected currents

V_{DD} = 28 V, f = 2140 MHz, tone spacing = 1 MHz



Intermodulation Distortion Products vs. Tone Spacing

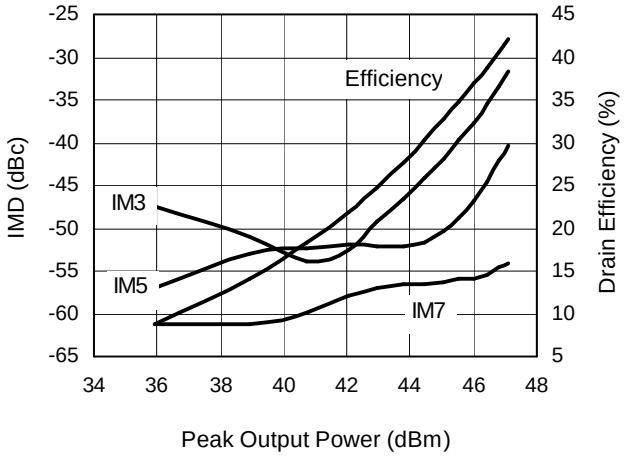
V_{DD} = 28 V, I_{DQ} = 500 mA, f = 2140 MHz,
P_{OUT} = 45 W PEP



Typical Performance (cont.)

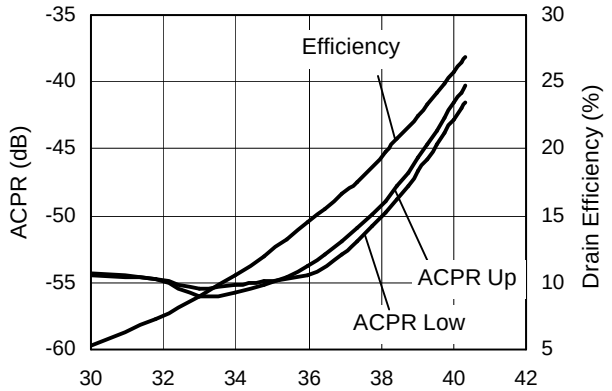
Two-tone Drive-Up

V_{DD} = 28 V, I_{DQ} = 500 mA, f = 2140 MHz, tone spacing = 1 MHz



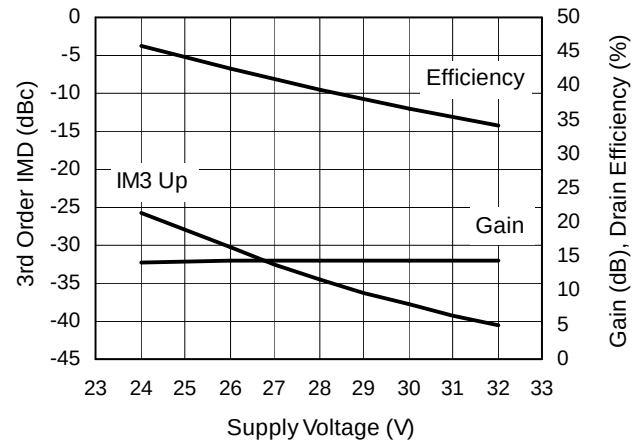
Single-carrier WCDMA Drive-Up

V_{DD} = 28 V, I_{DQ} = 500 mA, f = 2140 MHz, 3GPP WCDMA signal, Test Model 1 w/16 DPCH, 67% clipping, P/A R = 8.7 dB, 3.84 MHz BW



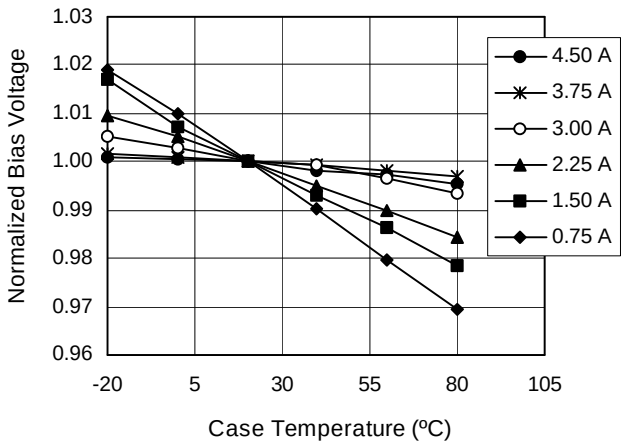
IM3, Gain & Drain Efficiency vs. Supply Voltage

I_{DQ} = 500 mA, f = 2140 MHz, P_{OUT} = 44.75 dBm (PEP), tone spacing = 1 MHz

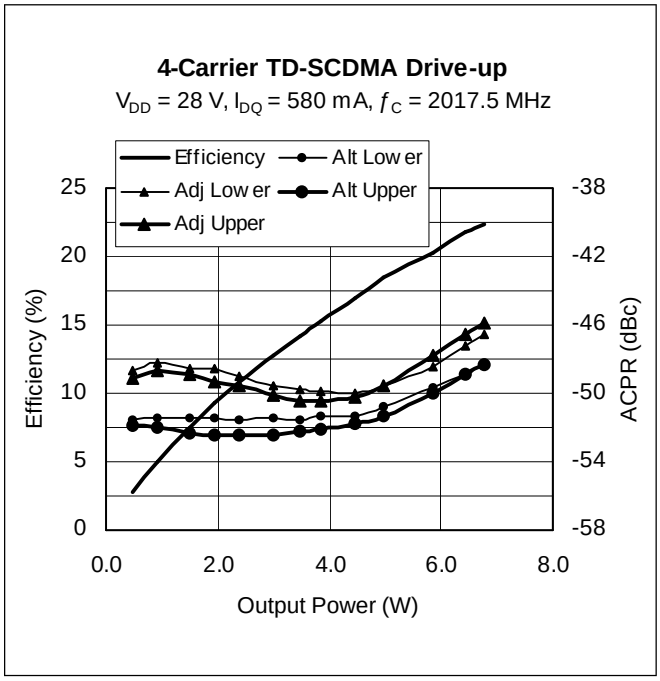


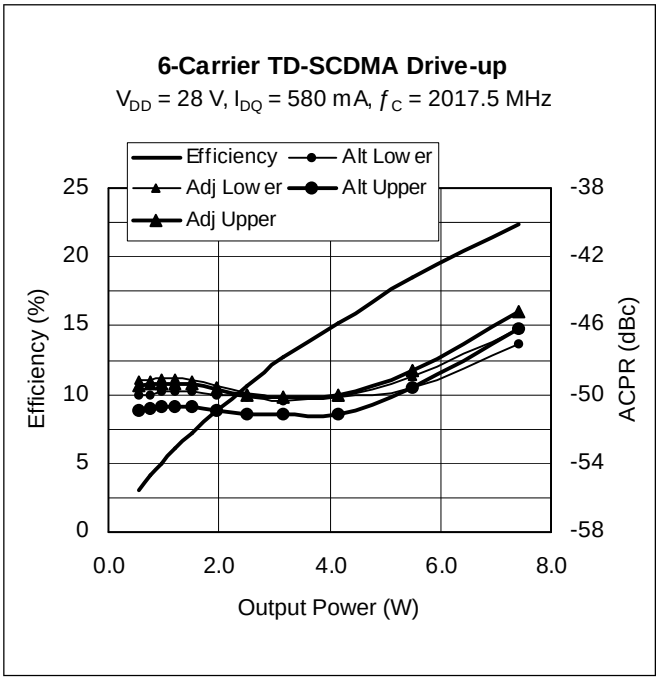
Bias Voltage vs. Case Temperature

Voltage normalized to typical gate voltage. Series show current.

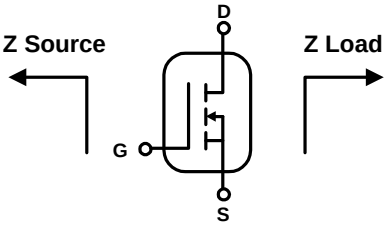


Typical Performance (cont.)

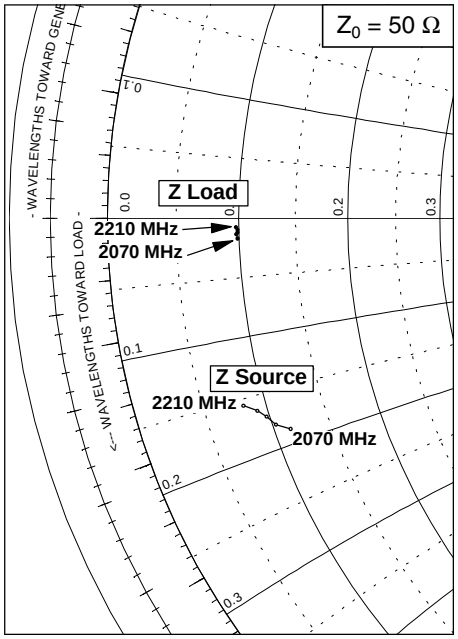




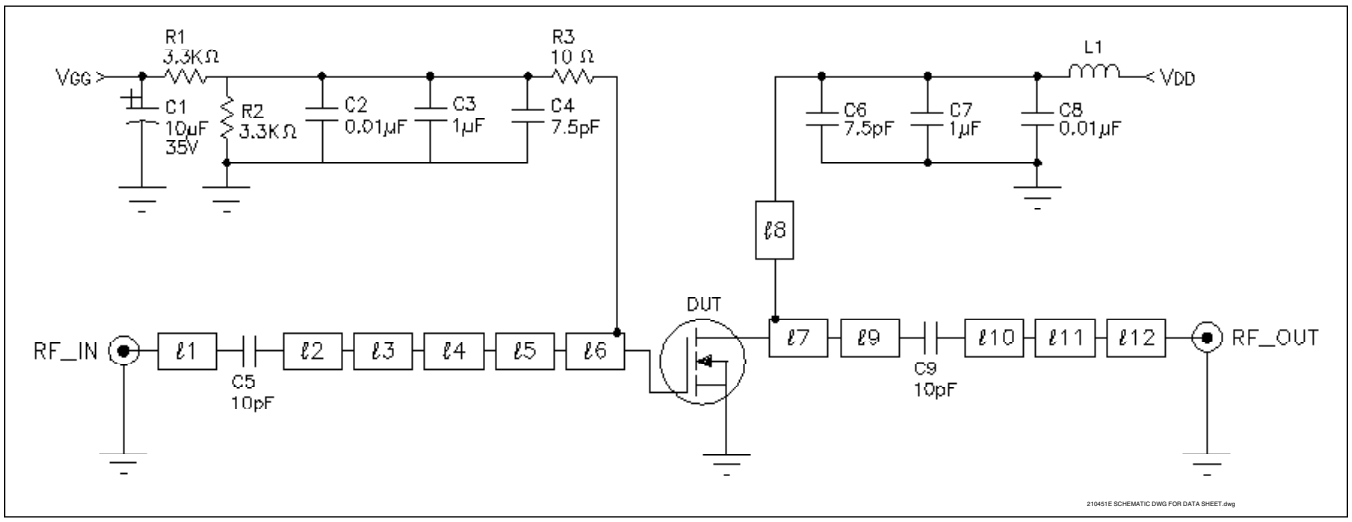
Broadband Circuit Impedance Data



Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
2070	5.72	–9.36	4.94	–0.87
2110	5.17	–8.97	4.90	–0.69
2140	4.88	–8.52	4.96	–0.60
2170	4.59	–8.16	4.96	–0.49
2210	4.08	–7.79	4.88	–0.39



Test Circuit



Test circuit schematic for 2170 MHz

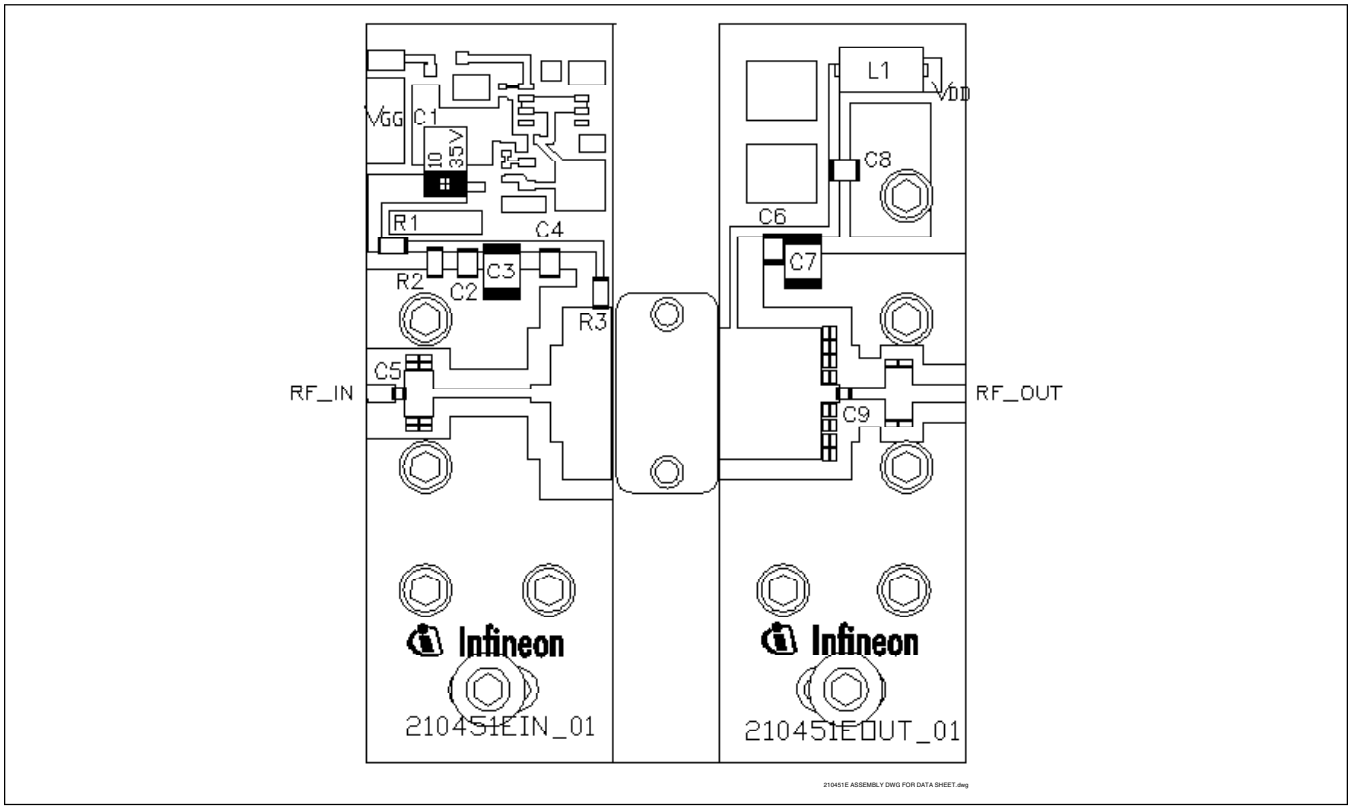
Circuit Assembly Information

DUT	PTF210451E or PTF210451F	LDMOS Transistor	
Circuit Board	0.79 mm [.031"] thick, ε_r = 4.5	Rogers TMM4, 2 oz. copper	

Microstrip	Electrical Characteristics at 2170 MHz[1]	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.047 λ, 45 Ω	3.48 x 1.78	0.137 x 0.070
ℓ2	0.040 λ, 23 Ω	2.87 x 4.57	0.113 x 0.180
ℓ3	0.132 λ, 66 Ω	10.08 x 0.89	0.397 x 0.035
ℓ4	0.028 λ, 45 Ω	2.08 x 1.78	0.082 x 0.070
ℓ5	0.018 λ, 12 Ω	1.27 x 10.06	0.050 x 0.396
ℓ6	0.074 λ, 7 Ω	4.98 x 17.68	0.196 x 0.696
ℓ7	0.152 λ, 9 Ω	10.34 x 13.56	0.407 x 0.534
ℓ8	0.257 λ, 68 Ω	19.76 x 0.84	0.778 x 0.033
ℓ9	0.027 λ, 44 Ω	1.98 x 1.83	0.078 x 0.072
ℓ10	0.056 λ, 56 Ω	4.22 x 1.22	0.166 x 0.048
ℓ11	0.036 λ, 19 Ω	2.57 x 5.74	0.101 x 0.226
ℓ12	0.076 λ, 44 Ω	5.64 x 1.80	0.222 x 0.071

[1]Electrical Characteristics are rounded.

Test Circuit (cont.)



Test circuit assembly diagram (not to scale)*

Component	Description	Suggested Manufacturer	P/N or Comment
C1	Capacitor, 10 µF, 35 V, Tant TE series	Digi-Key	PCS6106TR-ND, SMD
C2, C8	Capacitor, 0.01 µF	ATC	X08J103AFB ATC 200B103MW
C3, C7	Capacitor, 1 µF	ATC	X24L105BVC
C4, C6	Capacitor, 7.5 pF	ATC	100B 7R5
C5, C9	Capacitor, 10 pF	ATC	100A 100
L1	Ferrite Bead	Elne Magnetic	#BDS31314.6-452
R1, R2	Resistor, 3.3K ohm, 1/4 W	Digi-Key	P3.3K ECT-ND
R3	Resistor, 10 ohm, 1/4 W	Digi-Key	P10 ECT-ND

**Gerber files for this circuit available on request*

Package Outline Specifications

Package H-30265-2

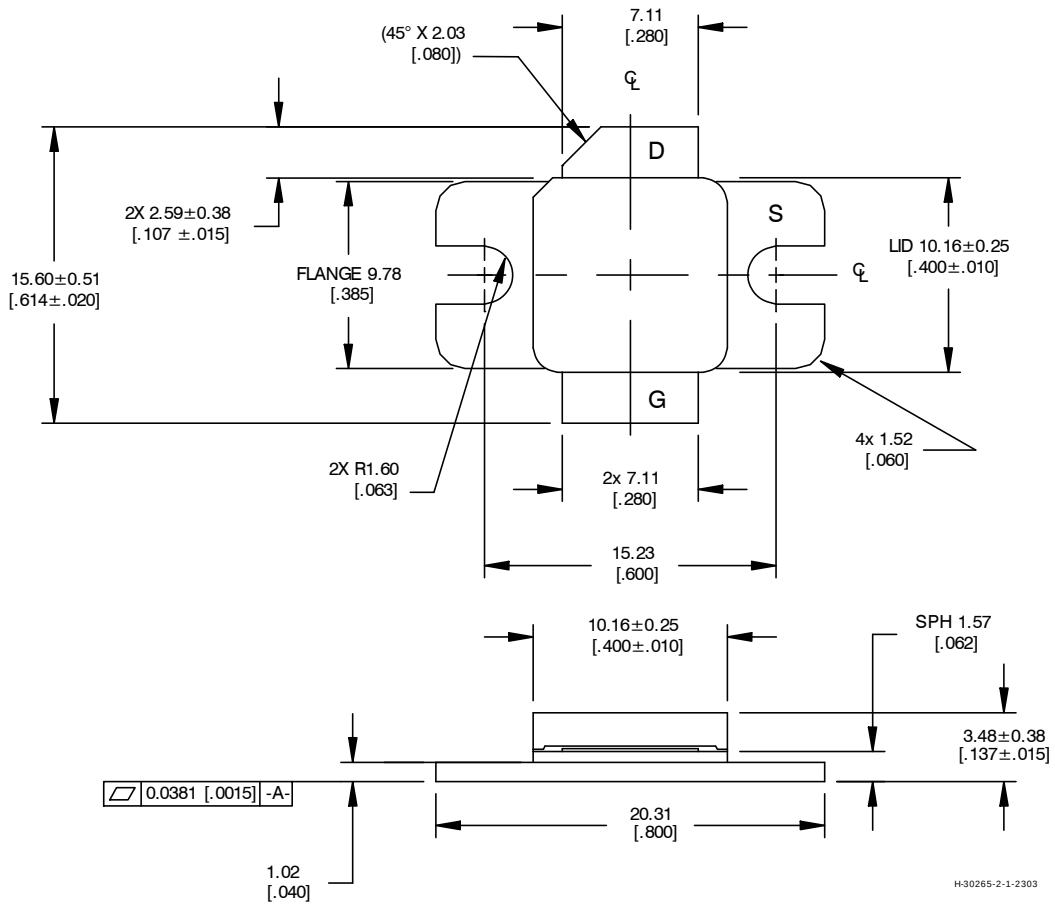


Diagram Notes—unless otherwise specified:

1. Lead thickness: 0.10 +0.051/–0.025 [.004 +.002/–.001].
2. All tolerances ± 0.127 [.005] unless specified otherwise.
3. Pins: D = drain, S = source, G = gate.
4. Interpret dimensions and tolerances per ASME Y14.5M-1994.
5. Primary dimensions are mm. Alternate dimensions are inches.
6. Gold plating thickness:
   S - flange: 2.54 micron [100 microinch] (min)
   D, G - leads: 1.14 ± 0.38 micron [45 ± 15 microinch].

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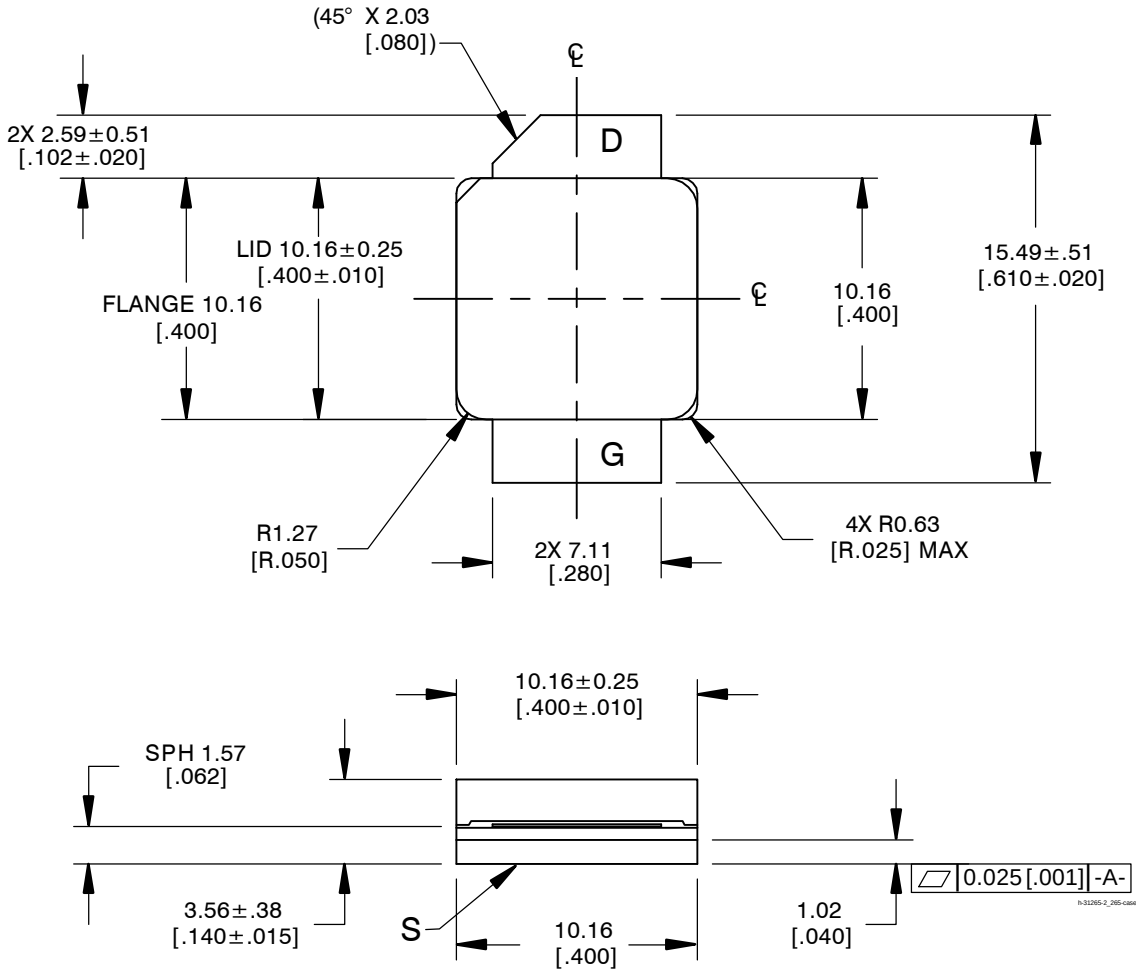
Package Outline Specifications (cont.)

Package H-31265-2



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PTF210451EF
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Revision History:	2008-02-13	Data Sheet
Previous Version:	2006-09-05, Data Sheet	

Page	Subjects (major changes since last revision)
all	Show PTF210451F as released.

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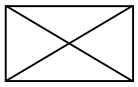

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