

Thermally-Enhanced High Power RF LDMOS FETs

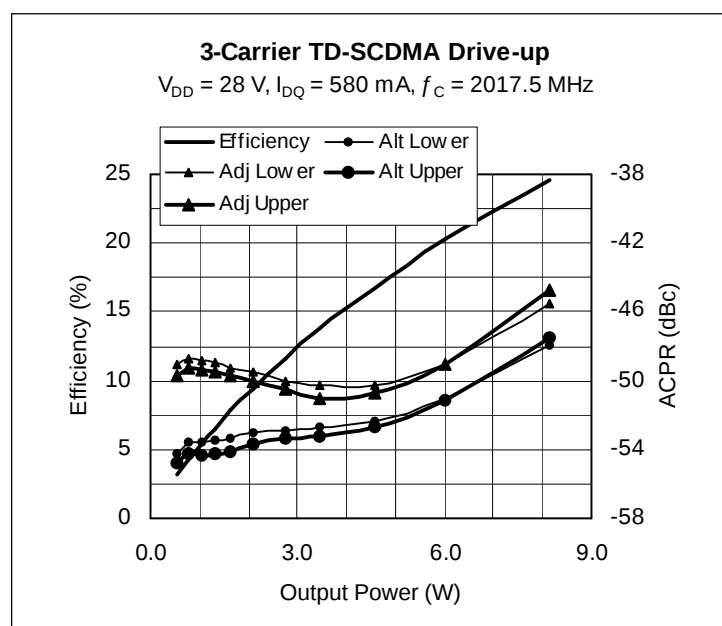
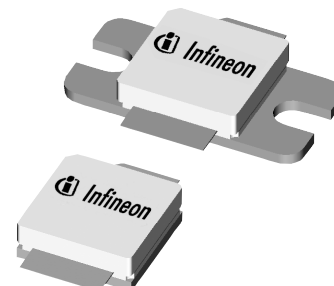
45 W, 2010 – 2025 MHz and 2110 – 2170 MHz

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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{OUT} = 11.5\text{ W AVG}$

$f_1 = 2140\text{ MHz}$, $f_2 = 2150\text{ MHz}$, 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 $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics (cont.)

Two-tone Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{OUT} = 45\text{ W PEP}$, $f = 2170\text{ MHz}$, 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	$V_{GS} = 0\text{ V}$, $I_D = 10\text{ }\mu\text{A}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.2	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$	V_{GS}	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	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	$^{\circ}\text{C}$
Total Device Dissipation	P_D	175	W
Above 25 $^{\circ}\text{C}$ derate by		1.0	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 45 W CW)	$R_{\theta JC}$	1.0	$^{\circ}\text{C/W}$

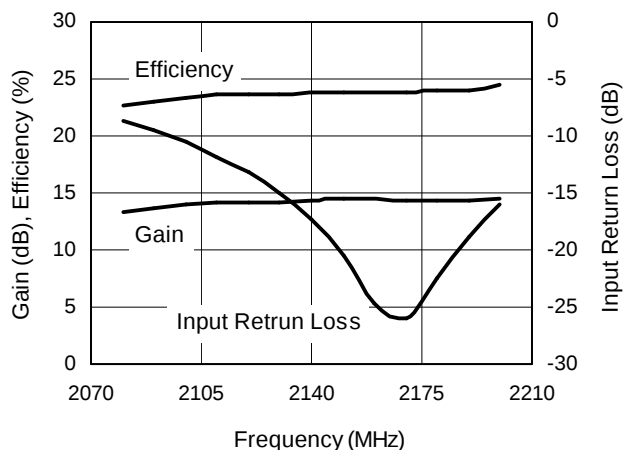
Ordering Information

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)

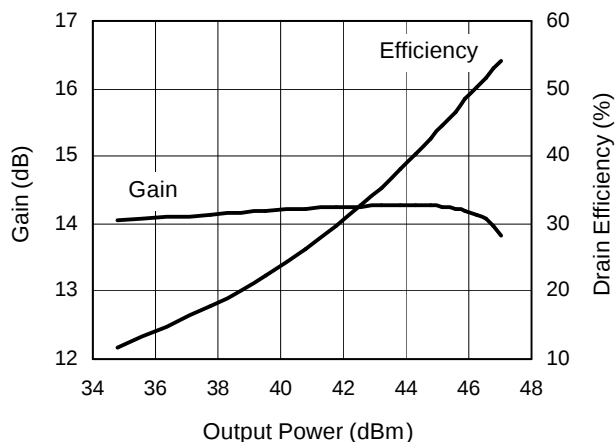
Broadband Performance

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



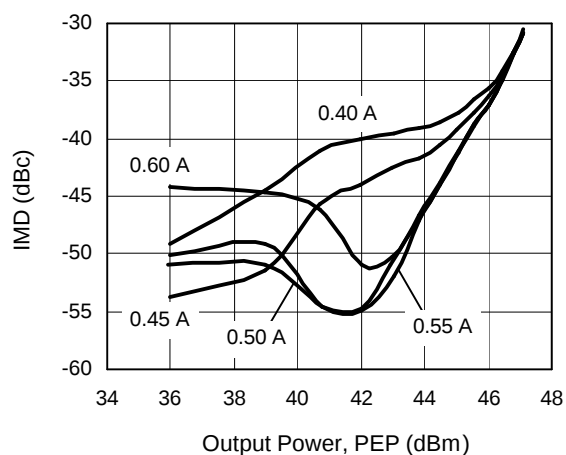
Power Sweep, CW Conditions

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



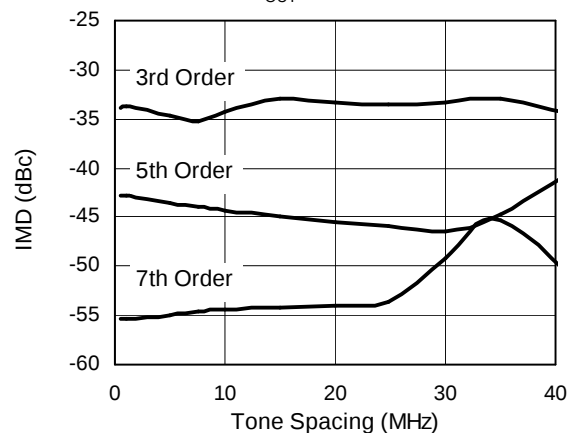
Intermodulation Distortion vs. Output Power for selected currents

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



Intermodulation Distortion Products vs. Tone Spacing

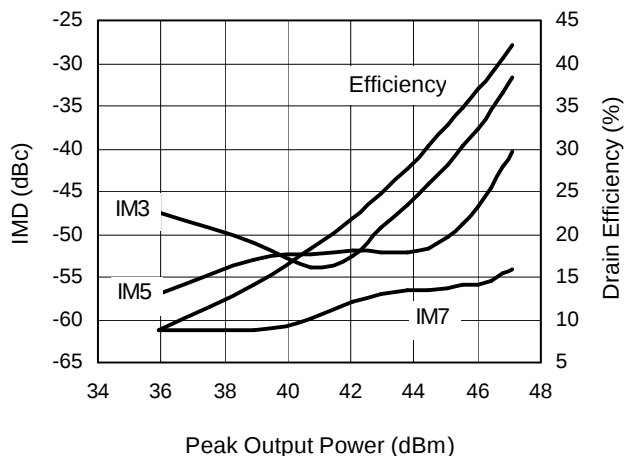
$V_{DD} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$, $f = 2140\text{ MHz}$,
 $P_{OUT} = 45\text{ W PEP}$



Typical Performance (cont.)

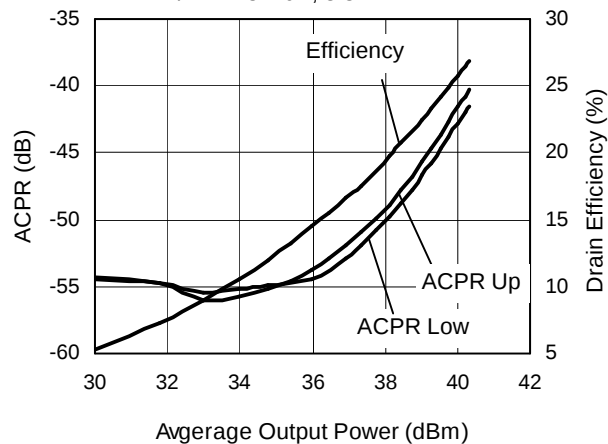
Two-tone Drive-Up

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



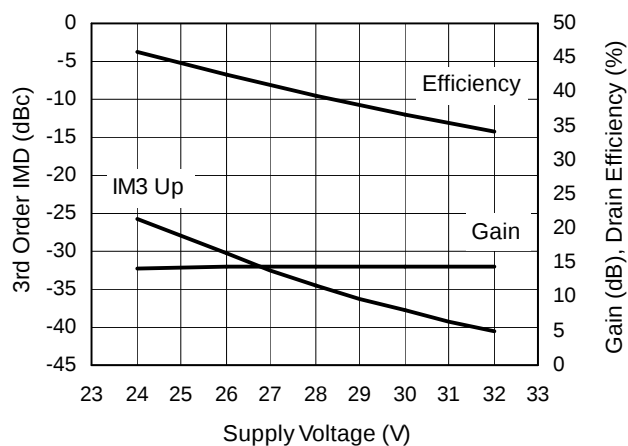
Single-carrier WCDMA Drive-Up

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



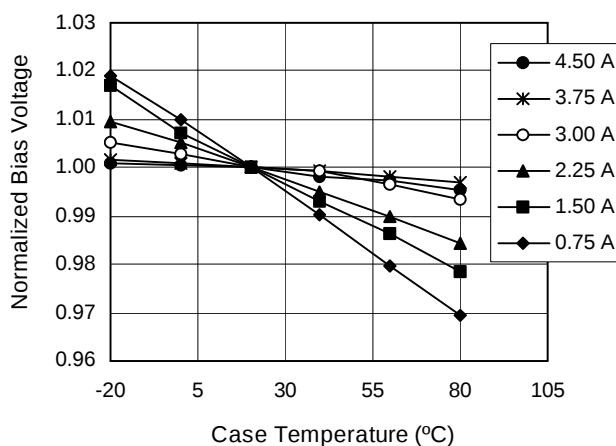
IM3, Gain & Drain Efficiency vs. Supply Voltage

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

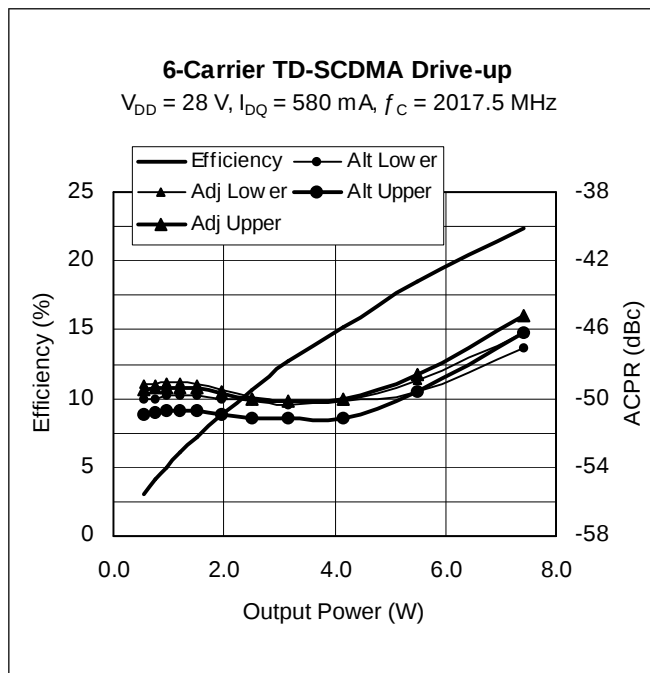
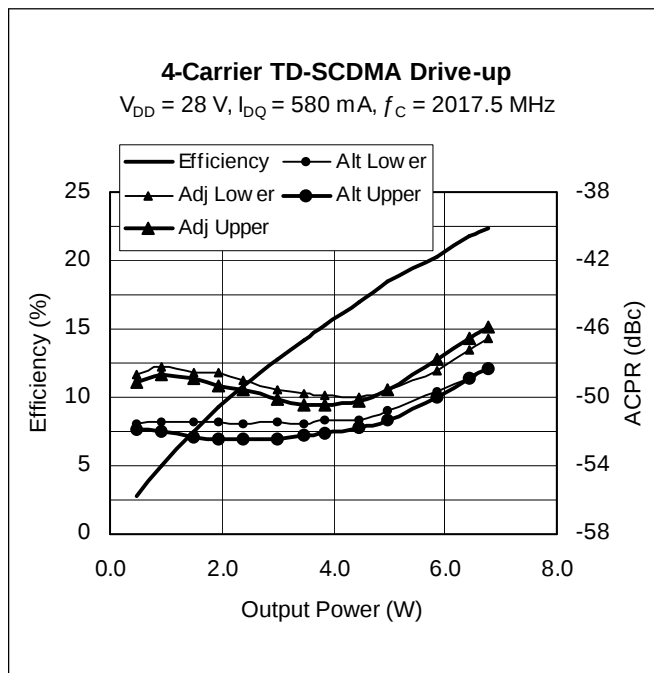


Bias Voltage vs. Case Temperature

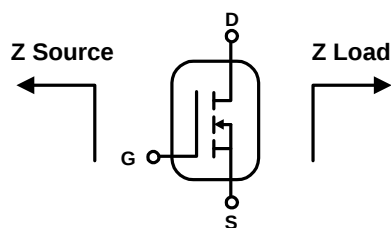
Voltage normalized to typical gate voltage.
Series show current.



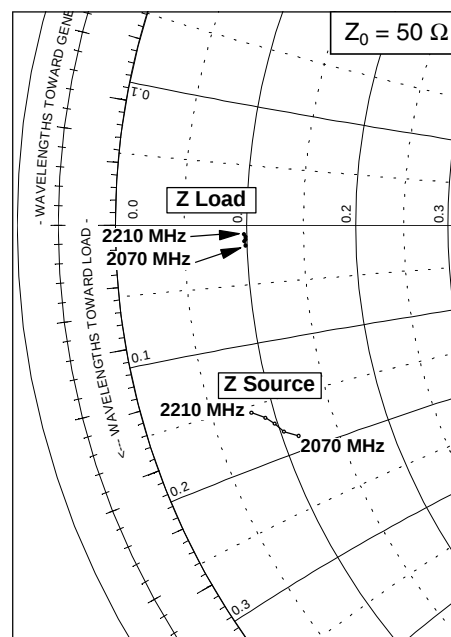
Typical Performance (cont.)



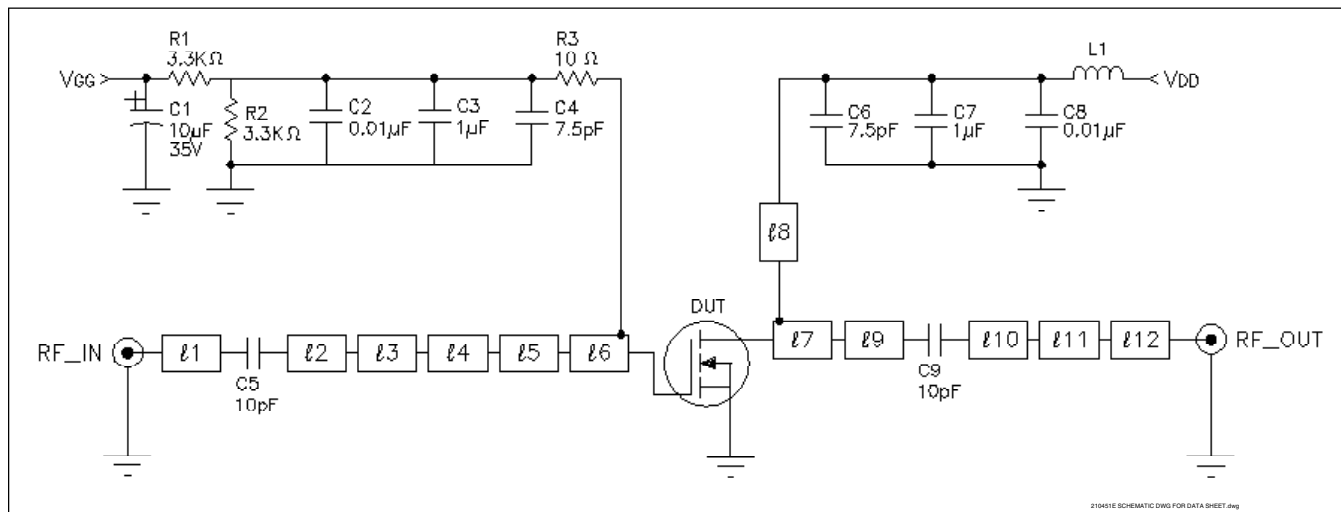
Broadband Circuit Impedance Data



Frequency MHz	Z Source W		Z Load W	
	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

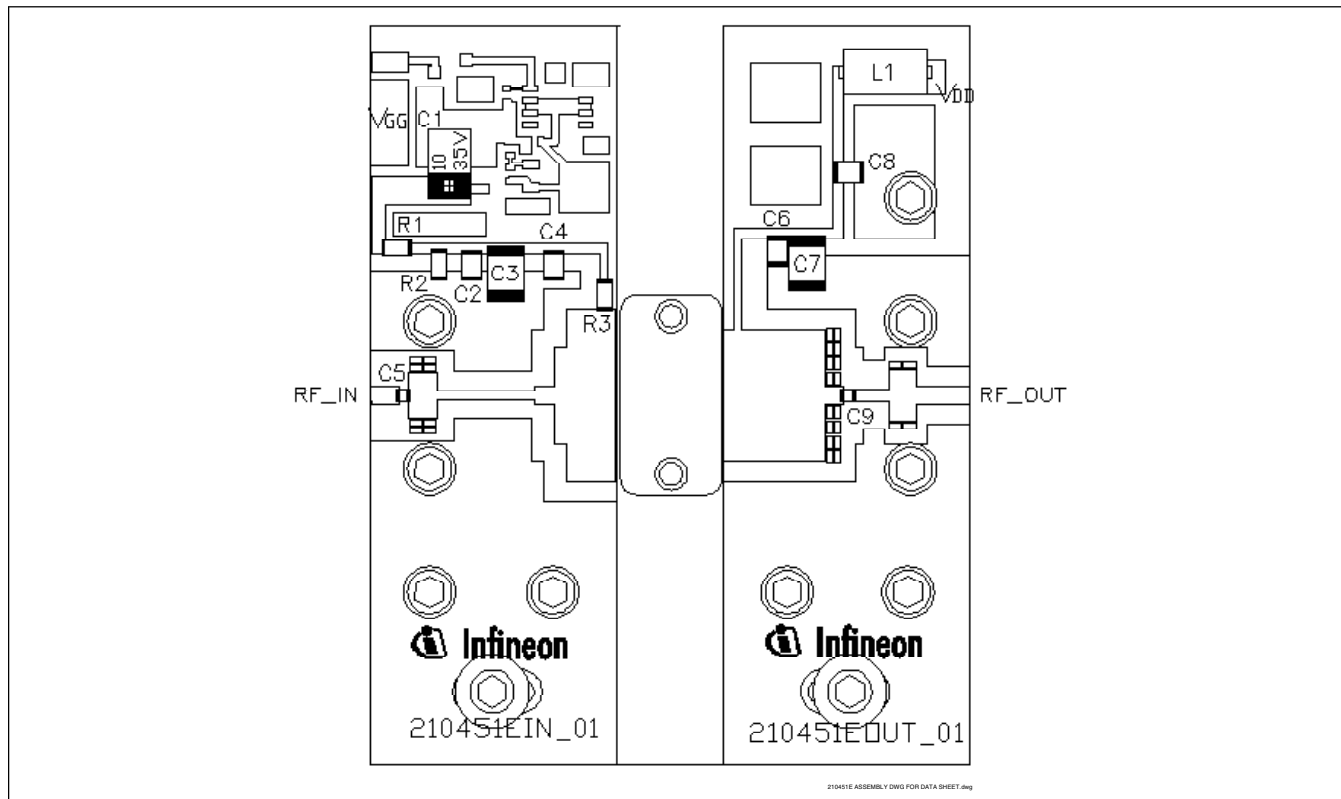
Circuit Assembly Information

DUT	PTF210451E or PTF210451F	LDMOS Transistor	
Circuit Board	0.79 mm [.031"] thick, $\epsilon_r = 4.5$	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

¹Electrical Characteristics are rounded.

Test Circuit (cont.)

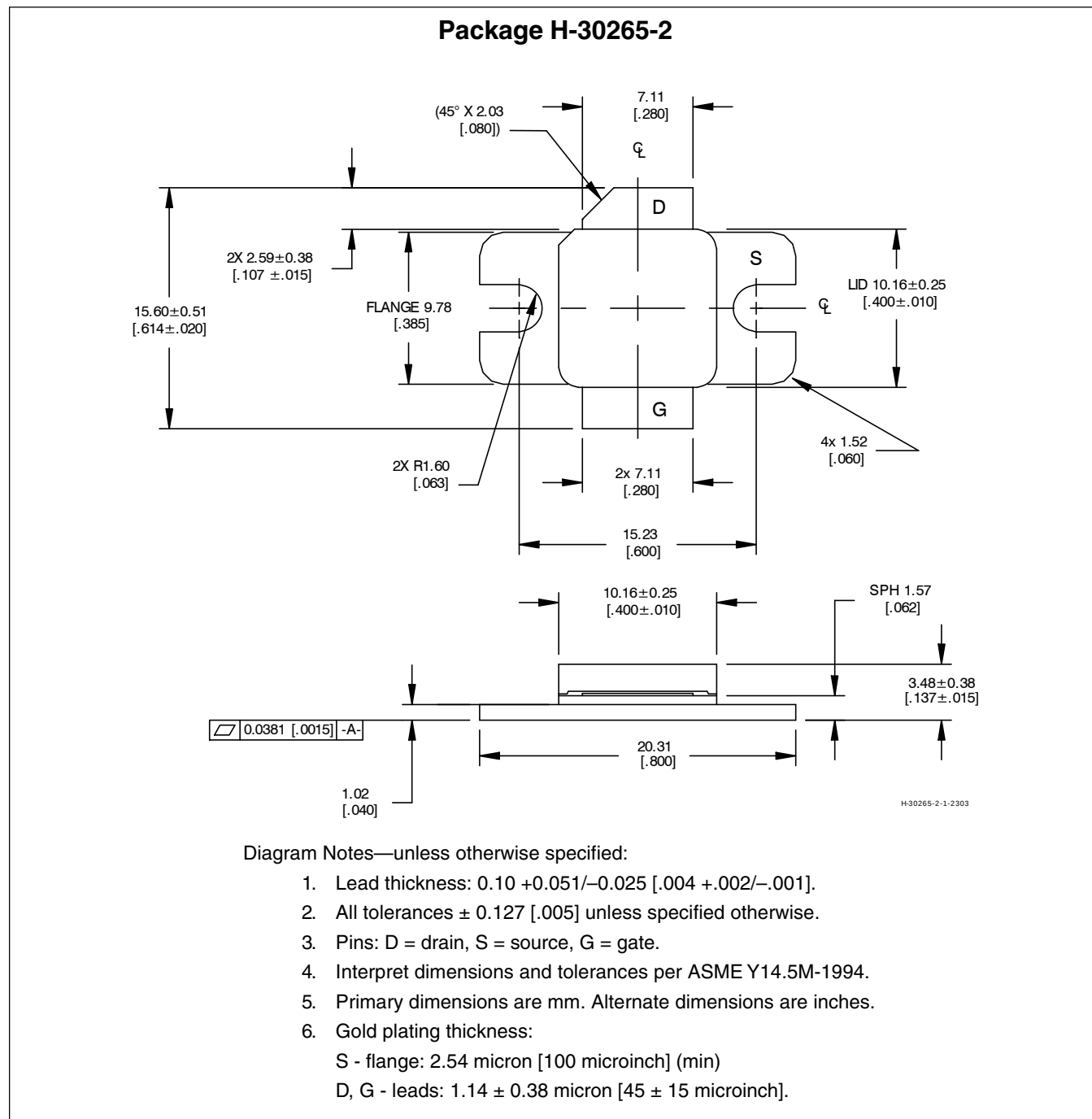


Test circuit assembly diagram* (not to scale)

Component	Description	Suggested Manufacturer	P/N or Comment
C1	Capacitor, 10 μ F, 35 V, Tant TE series	Digi-Key	PCS6106TR-ND, SMD
C2, C8	Capacitor, 0.01 μ F	ATC	X08J103AFB ATC 200B103MW
C3, C7	Capacitor, 1 μ F	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

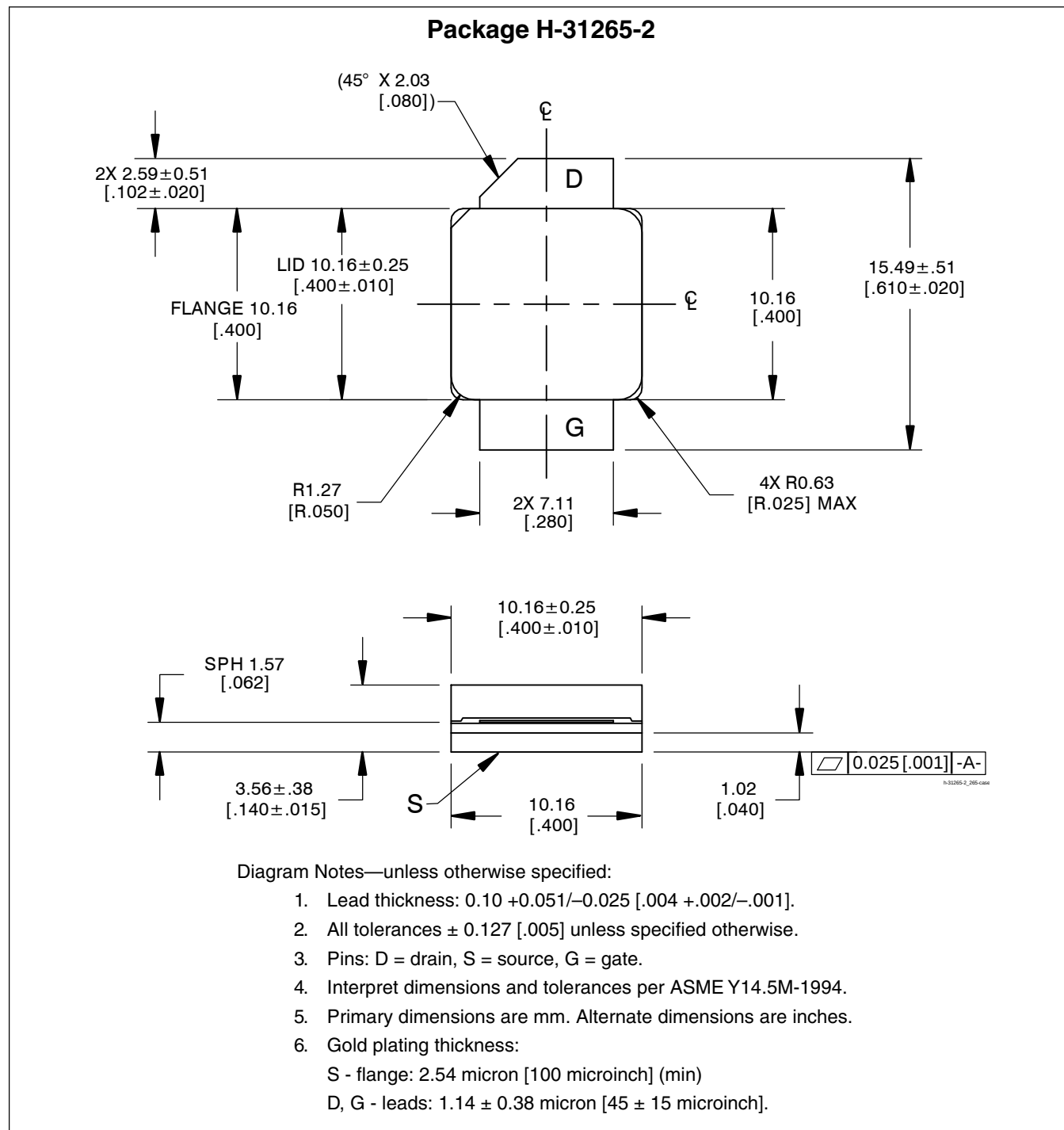
*Gerber files for this circuit available on request

Package Outline Specifications



Find the latest and most complete information about products and packaging at the Infineon Internet page
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Package Outline Specifications (cont.)



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PTF210451EF**Confidential, Limited Internal Distribution****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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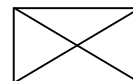
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