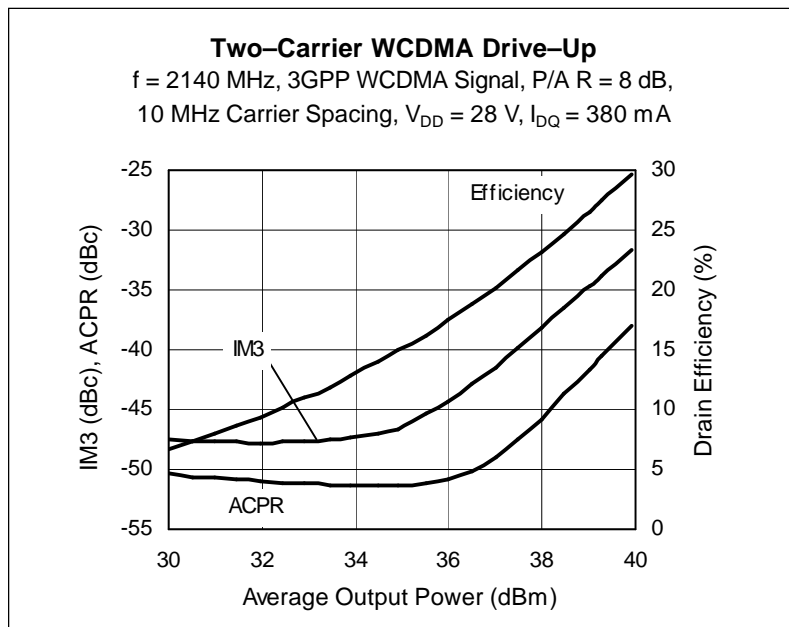


## LDMOS RF Power Field Effect Transistor 30 W, 2110–2170 MHz

### Description

The PTF210301 is a 30 W, internally matched *GOLDMOS* FET intended for WCDMA applications from 2110 to 2170 MHz. Full gold metallization ensures excellent device lifetime and reliability.

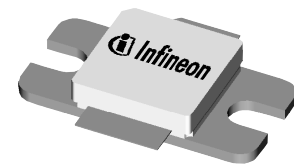


### Features

- Broadband internal matching
- Typical two-carrier WCDMA performance
  - Average output power = 7.0 W
  - Gain = 16 dB
  - Efficiency = 25%
  - IM3 = -37 dBc
- Typical CW performance
  - Output power at P-1dB = 36 W
  - Gain = 15 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, 30 W (CW) output power

PTF210301A  
Package 20265

PTF210301E  
Package 30265



### RF Characteristics at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

#### WCDMA Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28$  V,  $I_{DQ} = 380$  mA,  $P_{OUT} = 36.5$  dBm

$f_1 = 2140$  MHz,  $f_2 = 2150$  MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Units
Intermodulation Distortion	IMD	—	-44	—	dBc
Gain	$G_{ps}$	—	16	—	dB
Drain Efficiency	$\eta_D$	—	20	—	%

#### Two-Tone Measurements (tested in Infineon test fixture)

$V_{DD} = 28$  V,  $I_{DQ} = 380$  mA,  $P_{OUT} = 9$  W PEP,  $f = 2170$  MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	$G_{ps}$	14.5	16	—	dB
Drain Efficiency	$\eta_D$	15	18	—	%
Intermodulation Distortion	IMD	—	-47	-42	dBc

**ESD:** Electrostatic discharge sensitive device — observe handling precautions!

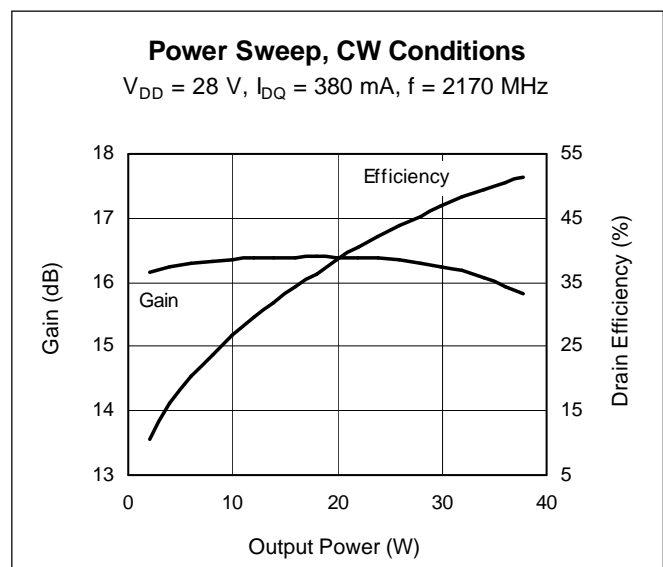
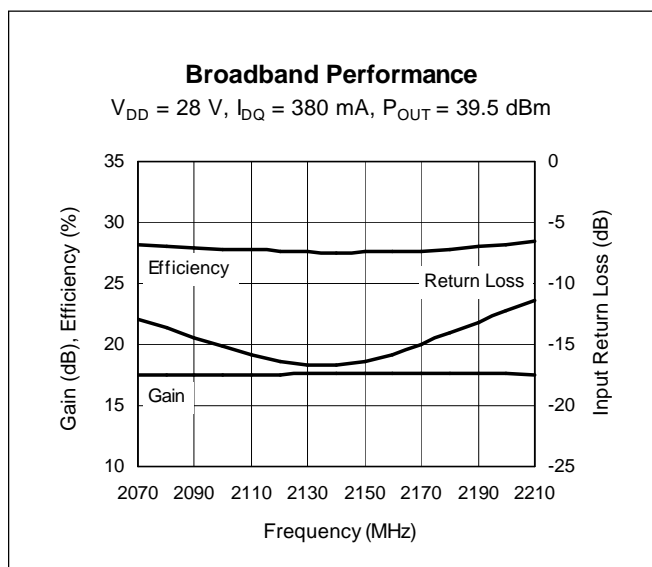
**DC Characteristics** at  $T_{CASE} = 25^{\circ}C$  unless otherwise indicated

Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain–Source Breakdown Voltage	$V_{GS} = 0 V, I_{DS} = 10 \mu A$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28 V, V_{GS} = 0 V$	$I_{DSS}$	—	—	1.0	$\mu A$
On–State Resistance	$V_{GS} = 10 V, V_{DS} = 0.1 V$	$R_{DS(on)}$	—	0.26	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28 V, I_{DQ} = 380 mA$	$V_{GS}$	2.5	3.2	4	V
Gate Leakage Current	$V_{GS} = 10 V, V_{DS} = 0 V$	$I_{GSS}$	—	—	1.0	$\mu A$

**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	$^{\circ}C$
Total Device Dissipation Above 25 $^{\circ}C$ derate by	PTF210301A $P_D$	116 0.67	W W/ $^{\circ}C$
Total Device Dissipation Above 25 $^{\circ}C$ derate by	PTF210301E $P_D$	145 0.83	W W/ $^{\circ}C$
Storage Temperature Range	$T_{STG}$	-40 to +150	$^{\circ}C$
Thermal Resistance ( $T_{CASE} = 70^{\circ}C, 30 W CW$ )	PTF210301A $R_{\theta JC}$	1.5	$^{\circ}C/W$
	PTF210301E $R_{\theta JC}$	1.2	$^{\circ}C/W$

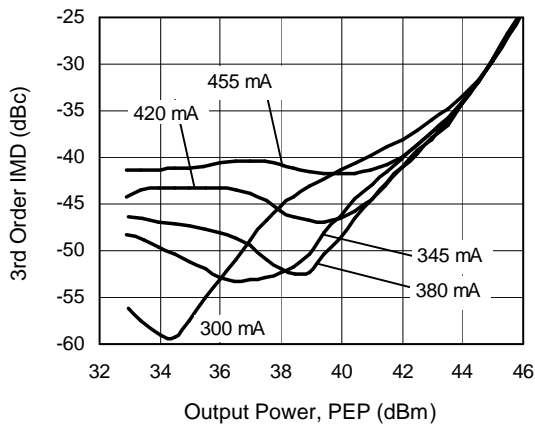
**Typical Performance** (data taken in a production test fixture)



Typical Performance (cont.)

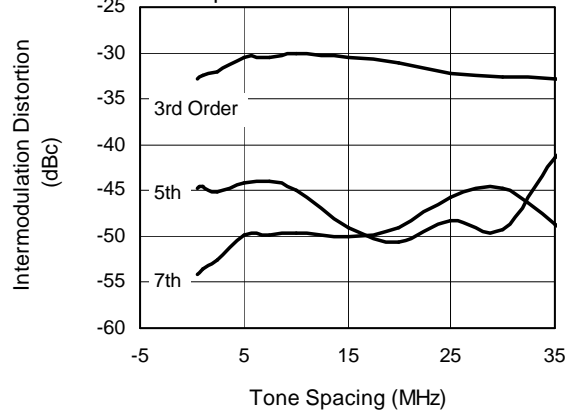
**Intermodulation Distortion vs. Output Power**

$V_{DD} = 28\text{ V}$ ,  $f = 2140\text{ MHz}$ , Tone Spacing = 1 MHz



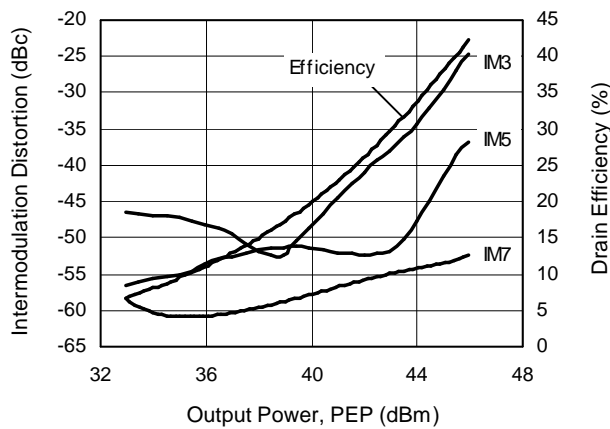
**Intermodulation Distortion Products vs. Tone Spacing**

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 380\text{ mA}$ ,  $f = 2140\text{ MHz}$ ,  
Output Power = 44.75 dBm PEP



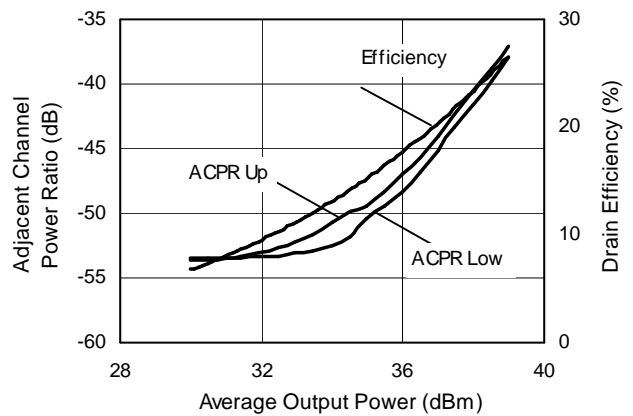
**Two-Tone Drive-Up at Optimum  $I_{DQ}$**

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 380\text{ mA}$ ,  
 $f = 2140\text{ MHz}$ , Tone Spacing = 1 MHz

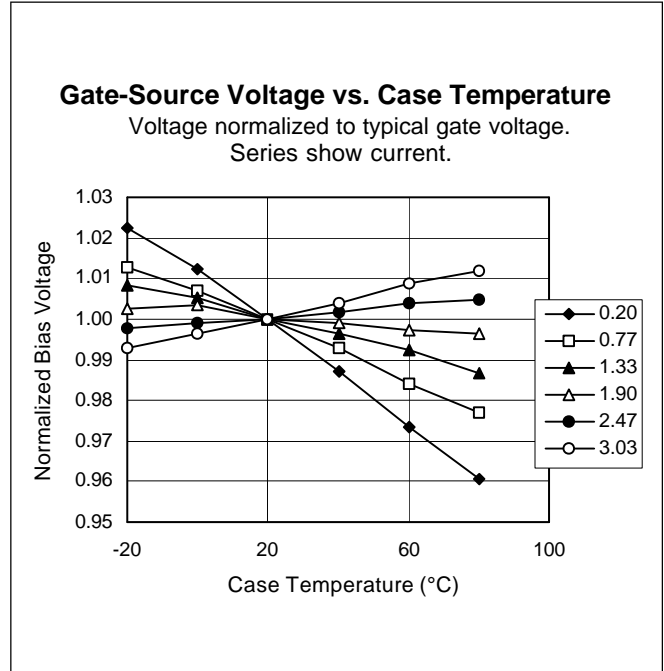
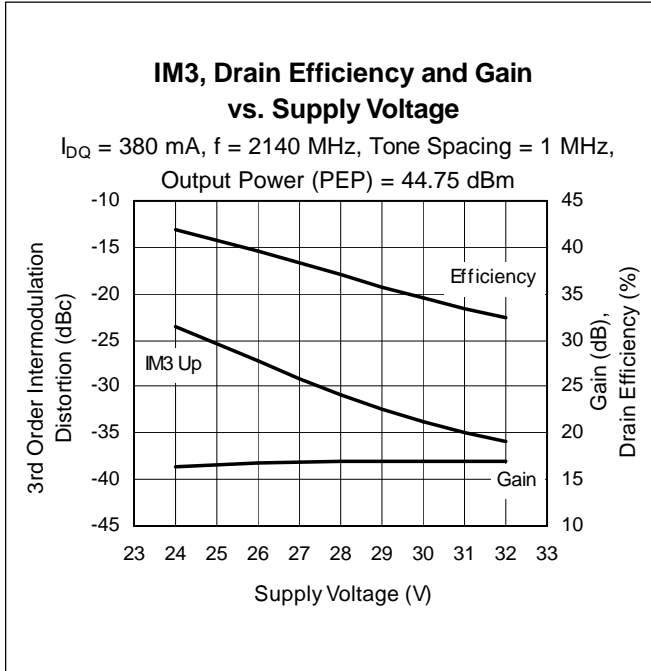


**Single-Carrier WCDMA Drive-Up**

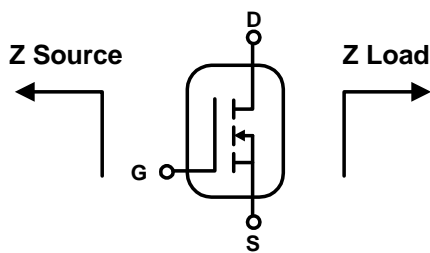
$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 380\text{ mA}$ ,  $f = 2140\text{ MHz}$ ,  
3GPP WCDMA signal, TM1 w/16 DPCH, 67%  
Clipping, P/A R = 8.7 dB, 3.84 MHz BW



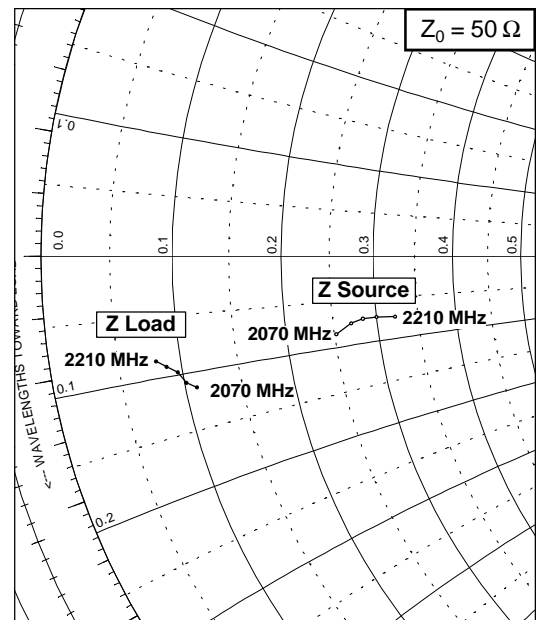
Typical Performance (cont.)



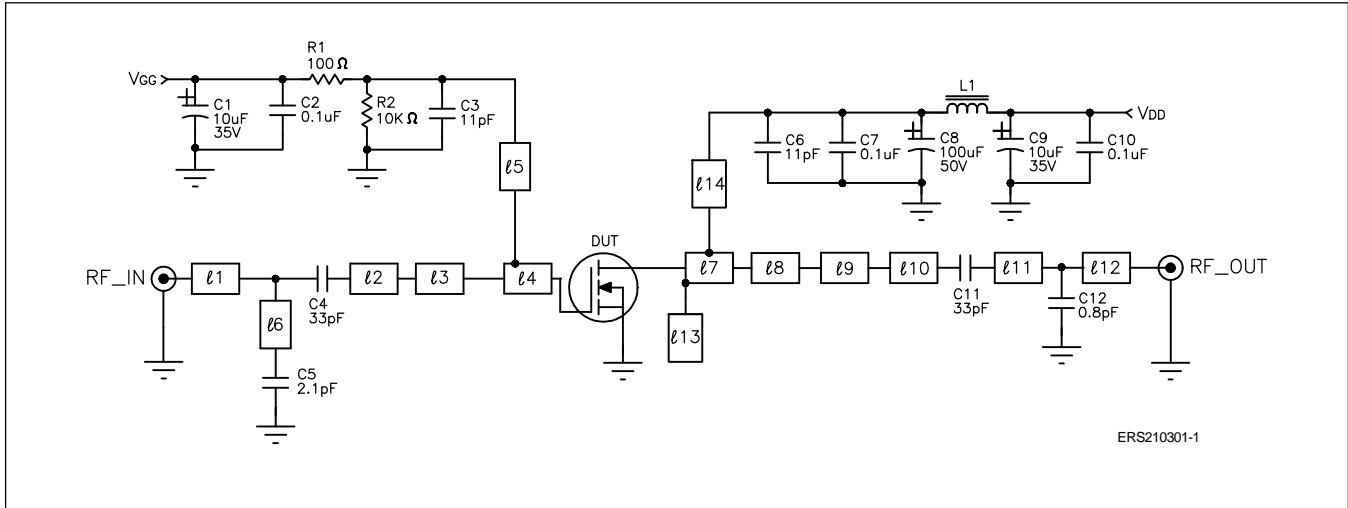
Broadband Circuit Impedance Data



Frequency MHz	Z Source $\Omega$		Z Load $\Omega$	
	R	jX	R	jX
2070	12.6	-4.3	5.5	-5.7
2110	13.5	-3.8	5.1	-5.4
2140	14.2	-3.6	4.8	-4.9
2170	15.0	-3.6	4.4	-4.6
2210	16.1	-3.7	4.0	-4.3



Test Circuit



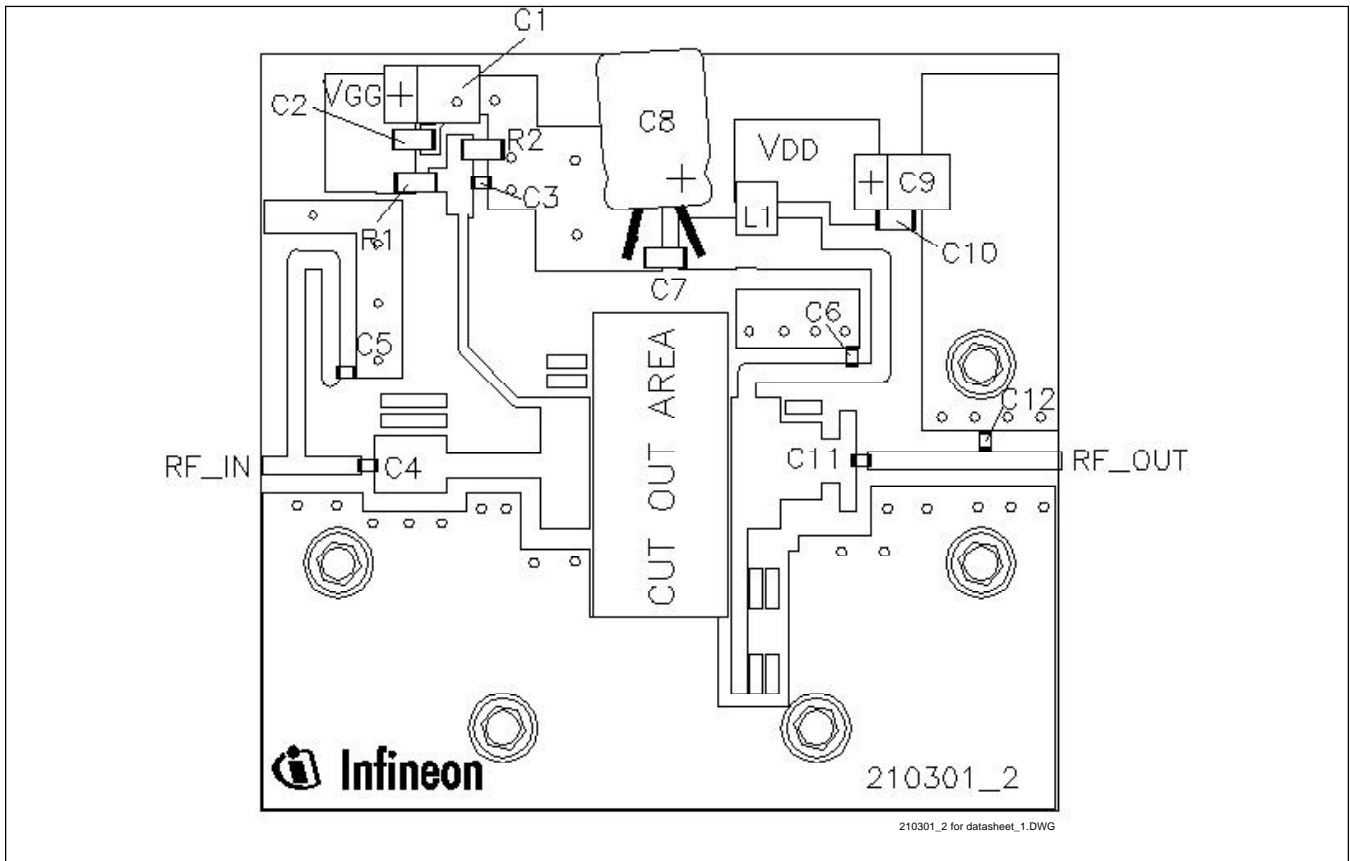
Test Circuit Schematic for  $f = 2170$  MHz

DUT	PTF210301	LDMOS Transistor	
PCB	0.76 mm. [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2170 MHz	Dimensions: W x L (mm.)	Dimensions: W x L (in.)
l1	0.102 $\lambda$ , 50 $\Omega$	7.62 x 1.42	0.300 x 0.056
l2	0.078 $\lambda$ , 22.8 $\Omega$	5.51 x 4.45	0.217 x 0.175
l3	0.098 $\lambda$ , 42.8 $\Omega$	7.24 x 1.83	0.285 x 0.072
l4	0.053 $\lambda$ , 11.6 $\Omega$	3.61 x 10.03	0.142 x 0.395
l5	0.136 $\lambda$ , 74 $\Omega$	10.16 x 0.66	0.400 x 0.026
l6	0.373 $\lambda$ , 54.5 $\Omega$	27.94 x 1.19	1.100 x 0.047
l7	0.054 $\lambda$ , 11.6 $\Omega$	3.68 x 10.03	0.145 x 0.395
l8	0.047 $\lambda$ , 18.2 $\Omega$	3.30 x 5.84	0.130 x 0.230
l9	0.019 $\lambda$ , 28.5 $\Omega$	1.37 x 3.30	0.054 x 0.130
l10	0.019 $\lambda$ , 14.3 $\Omega$	1.32 x 7.87	0.052 x 0.310
l11	0.110 $\lambda$ , 50 $\Omega$	8.26 x 1.42	0.325 x 0.056
l12	0.087 $\lambda$ , 50 $\Omega$	6.48 x 1.42	0.255 x 0.056
l13	0.152 $\lambda$ , 52.7 $\Omega$	11.43 x 1.27	0.450 x 0.050
l14	0.340 $\lambda$ , 50 $\Omega$	25.40 x 1.42	1.000 x 0.056

**Test Circuit** (cont.)

Component	Description	Manufacturer	P/N or Comment
C1, C9	10 $\mu$ F, 35 V Capacitor	Digi-Key	PC56106
C2, C7, C10	Capacitor, 0.1 $\mu$ F, 50 V	Digi-Key	PCC103BCT-ND
C3, C6	Capacitor, 11 pF	ATC	100A 110
C4, C11	Capacitor, 33 pF	ATC	100A 330
C5	Capacitor, 2.1 pF	ATC	100A 2R1
C8	Capacitor, 100 $\mu$ F, 50 V	Digi-Key	P5182-ND
C12	Capacitor, 0.8 pF	ATC	100A 0R8
L1	Ferrite, 6 mm	Philips	53/3/4.6-452
R1, R2	Chip Resistor, 100 $\Omega$ , 1/8 W 1206	Digi-Key	101ECT-ND



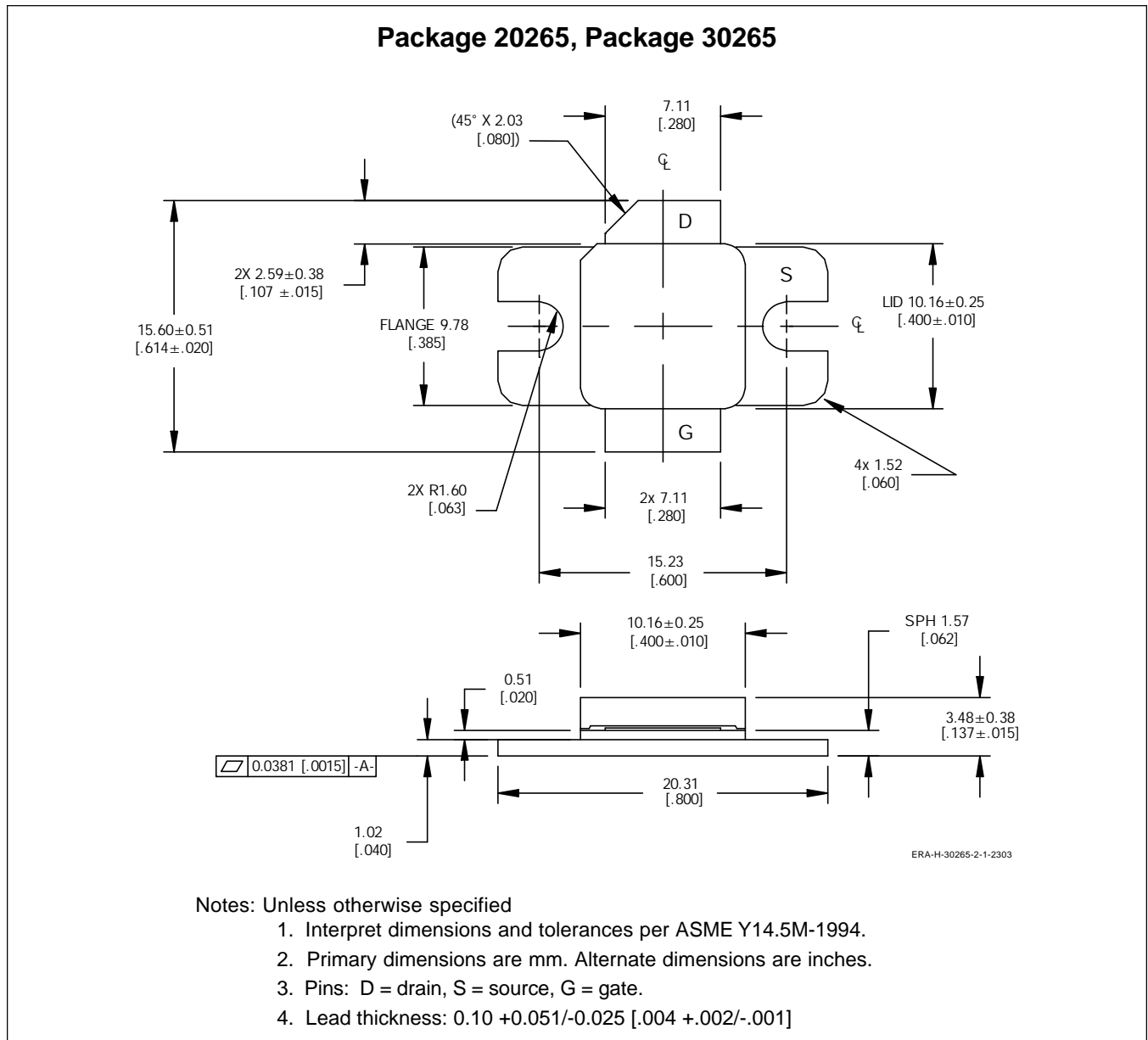
Reference Circuit<sup>1</sup> (not to scale)

<sup>1</sup> Gerber Files for this circuit available on request

### Ordering Information

Type	Package Outline	Package Description	Marking
PTF210301A	20265	Standard ceramic, flange	PTF210301A
PTF210301E	30265	Thermally enhanced, flange	PTF210301E

### Package Outline Specifications



Find the latest and most complete information about products and packaging at the Infineon Internet page <http://www.infineon.com/products>

<b>Revision History:</b>	<b>2003-12-22</b>	Data Sheet
Previous Version:	2003-11-06, Data Sheet	
Page	Subjects (major changes since last revision)	
	Combine PTF210301E and PTF210301A onto this Data Sheet.	
7	Update Package Outline	

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Any information within this document that you feel is wrong, unclear or missing at all?

Your feedback will help us to continuously improve the quality of this document.

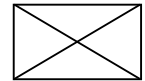
Please send your proposal (including a reference to this document) to:

[highpowerRF@infineon.com](mailto:highpowerRF@infineon.com)

To request other information, contact us at:

+1 877 465 3667 (1-877-GOLDMOS) USA

or +1 408 776 0600 International



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