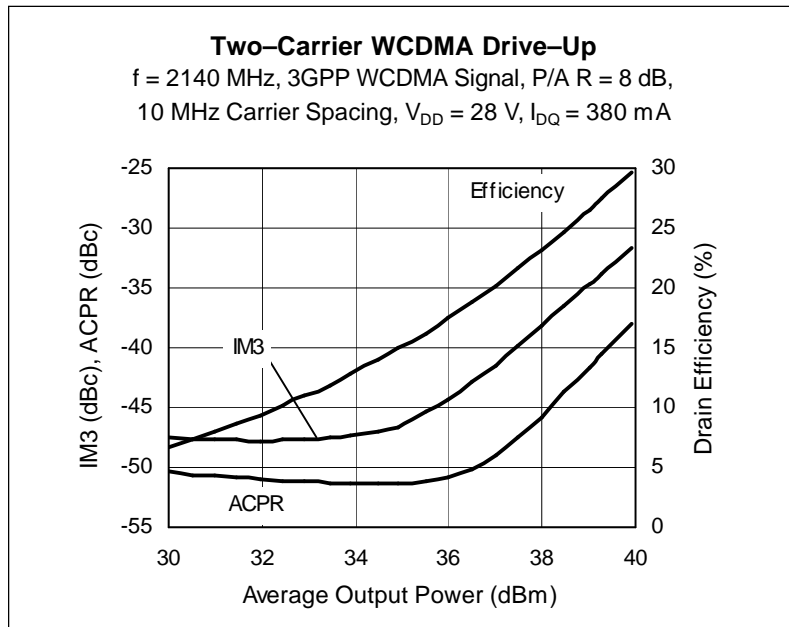


## LDMOS RF Power Field Effect Transistor 30 W, 2110–2170 MHz

### 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.

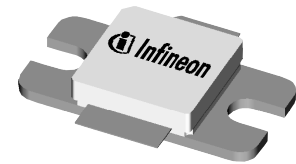


### Features

- 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!

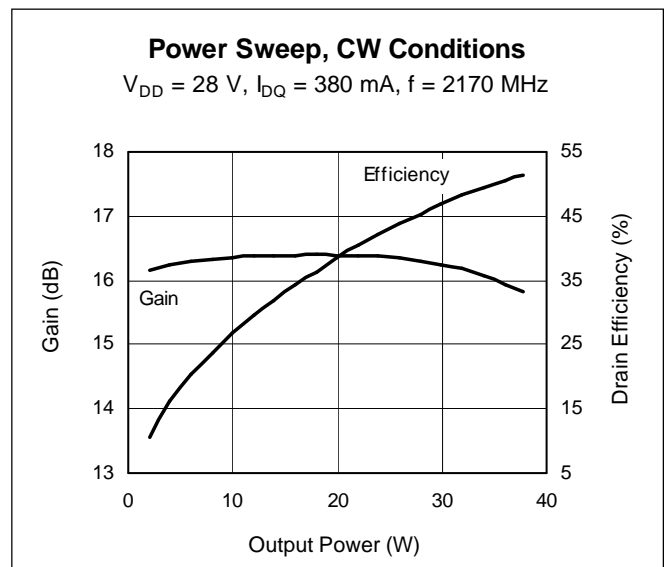
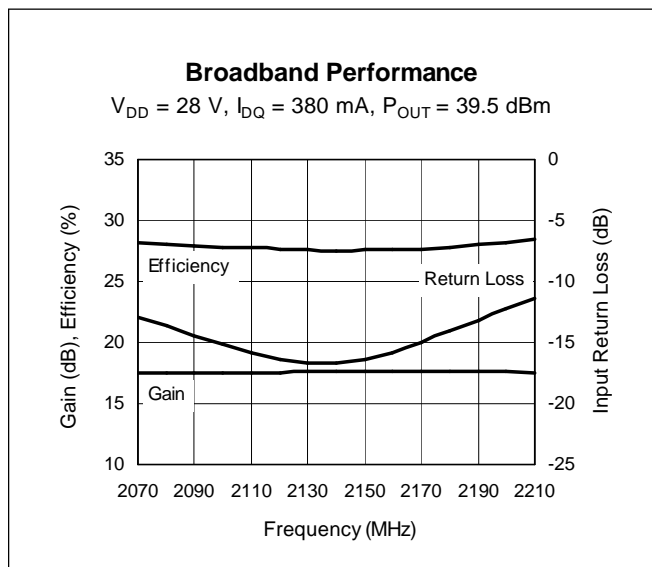
**DC Characteristics** at  $T_{CASE} = 25^{\circ}C$  unless otherwise indicated

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	$^{\circ}C/W$

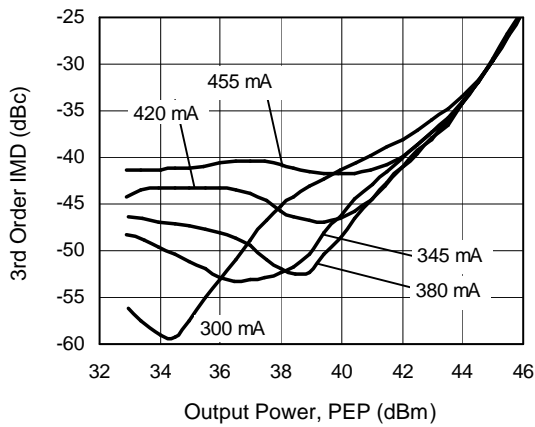
**Typical Performance** (data taken in a production test fixture)



Typical Performance (cont.)

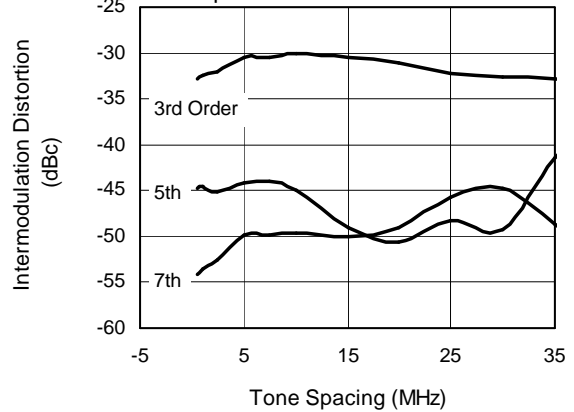
**Intermodulation Distortion vs. Output Power**

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



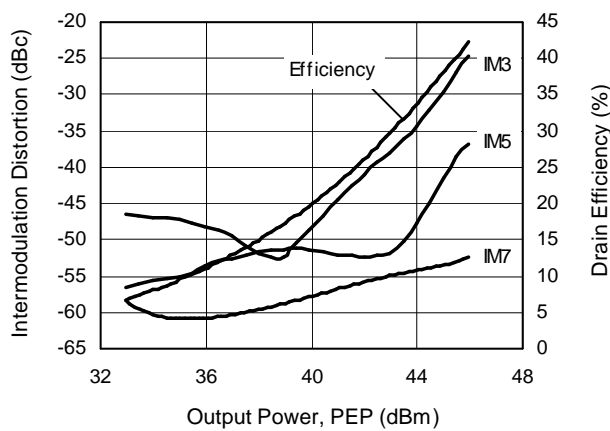
**Intermodulation Distortion Products vs. Tone Spacing**

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



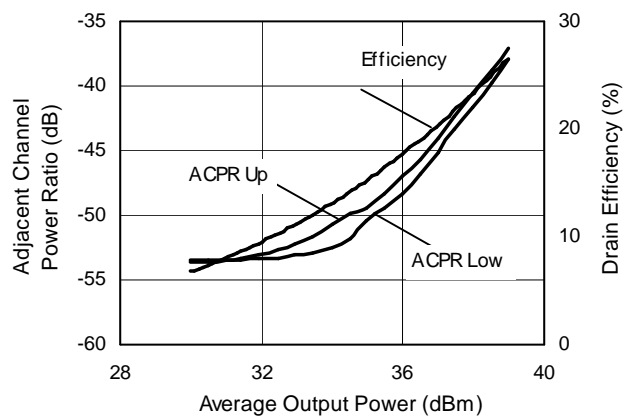
**Two-Tone Drive-Up at Optimum  $I_{DQ}$**

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

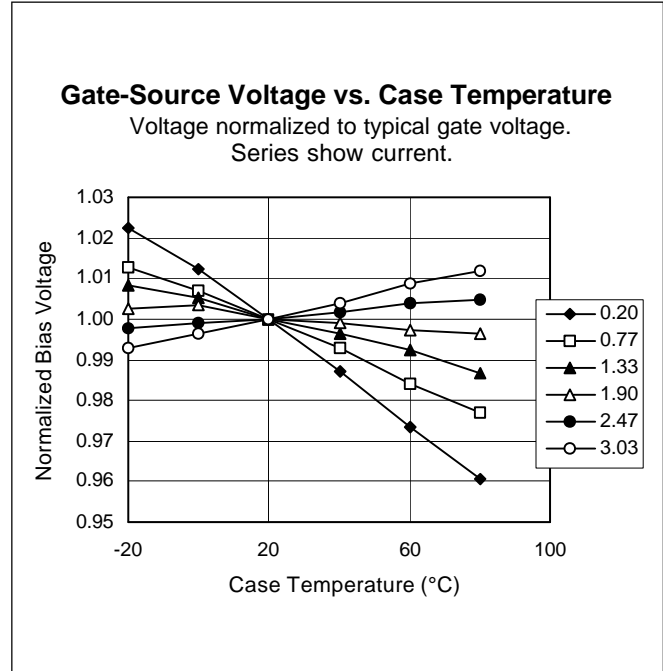
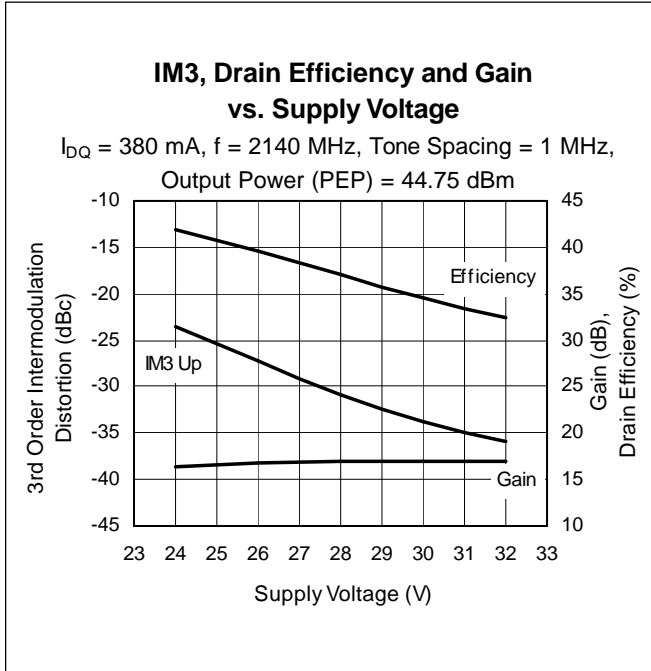


**Single-Carrier WCDMA Drive-Up**

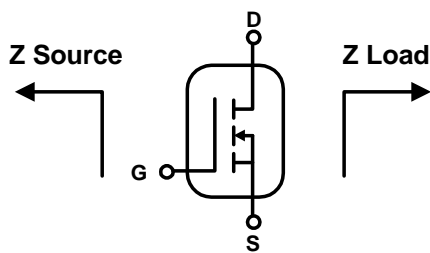
$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 380\text{ mA}$ ,  $f = 2140\text{ MHz}$ ,  
3GPP WCDMA signal, TM1 w/16 DPCH, 67%  
Clipping, P/A R = 8.7 dB, 3.84 MHz BW



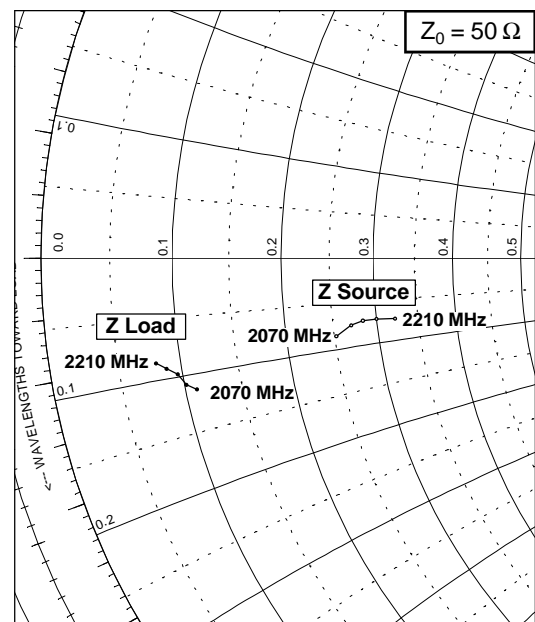
Typical Performance (cont.)



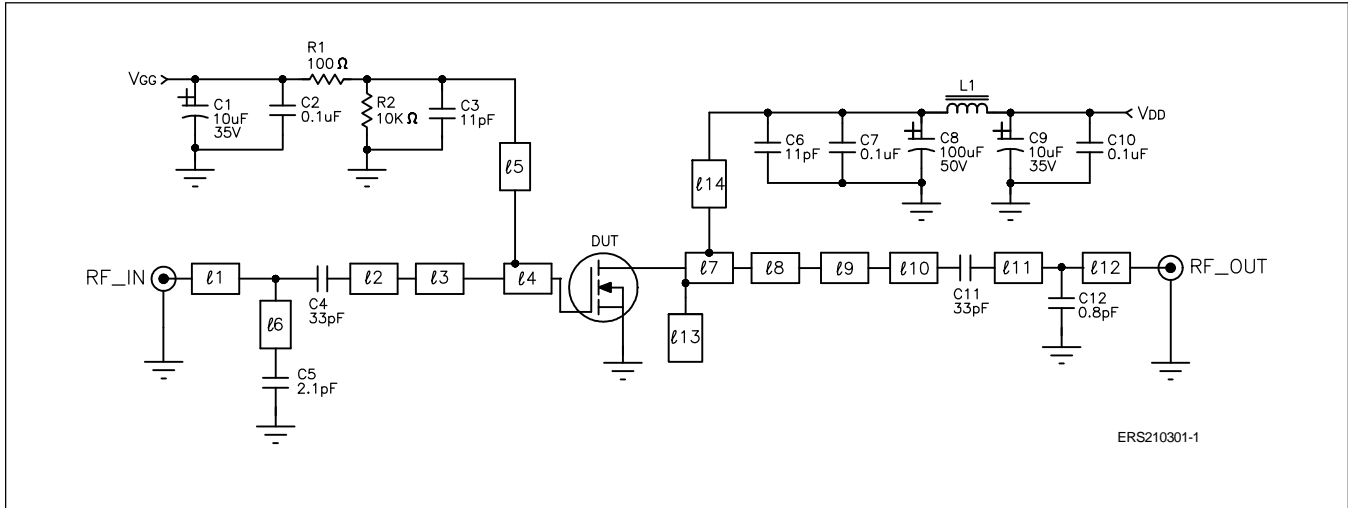
Broadband Circuit Impedance Data



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



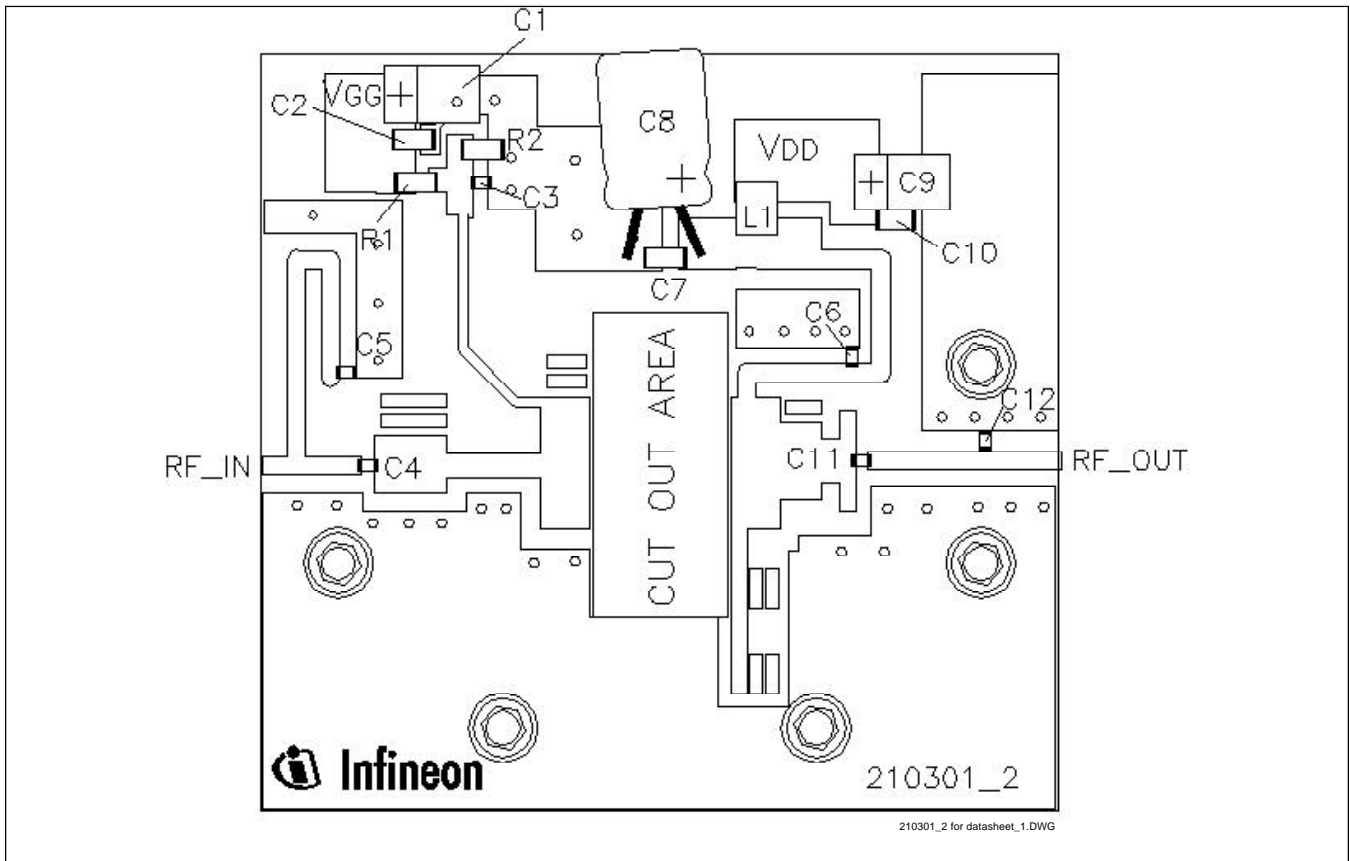
Test Circuit Schematic for  $f = 2170$  MHz

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



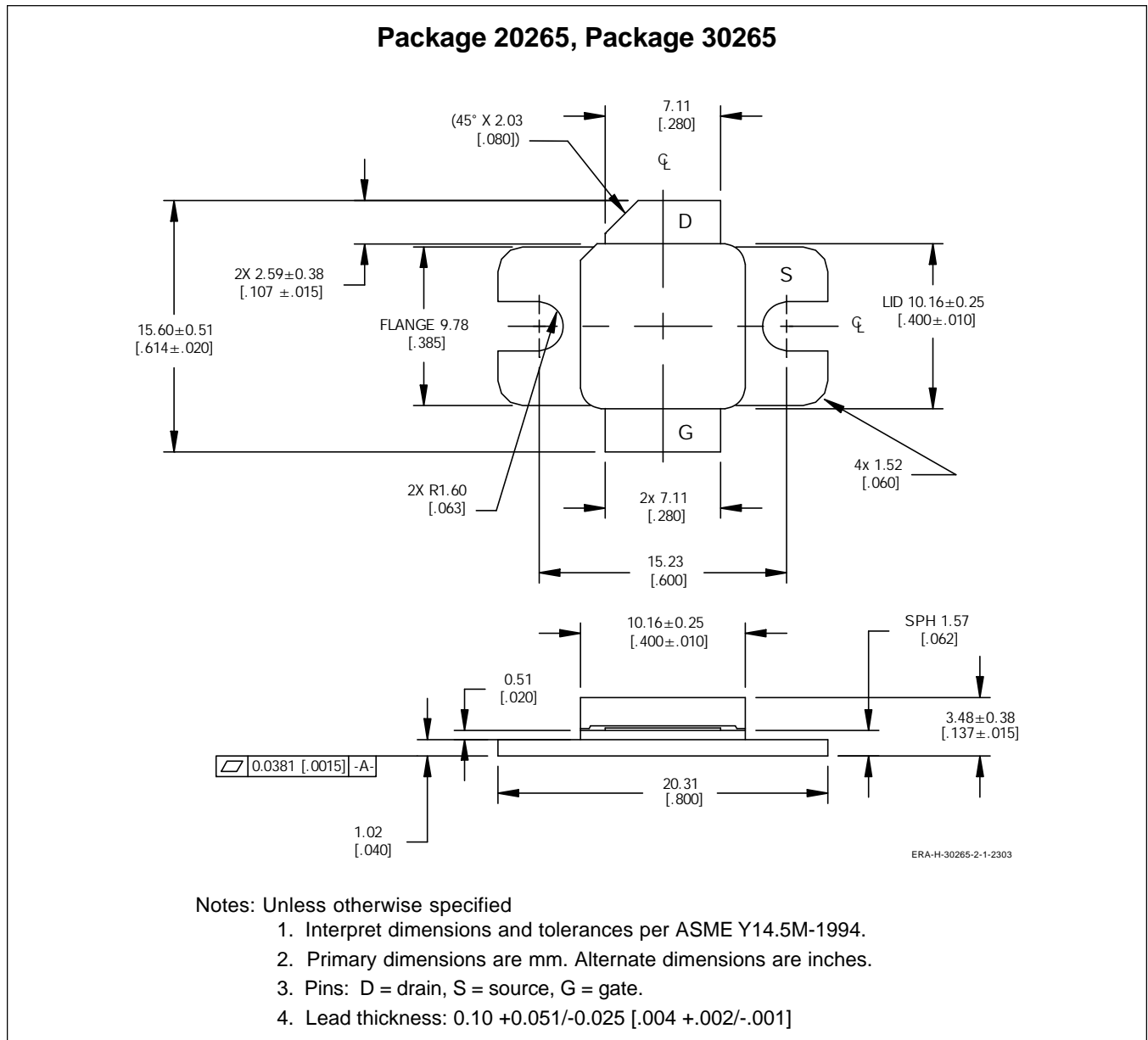
Reference Circuit<sup>1</sup> (not to scale)

<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>

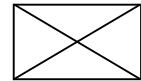
<b>Revision History:</b>	<b>2003-12-22</b>	Data Sheet
Previous Version:	2003-11-06, Data Sheet	
Page	Subjects (major changes since last revision)	
	Combine PTF210301E and PTF210301A onto this Data Sheet.	
7	Update Package Outline	

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