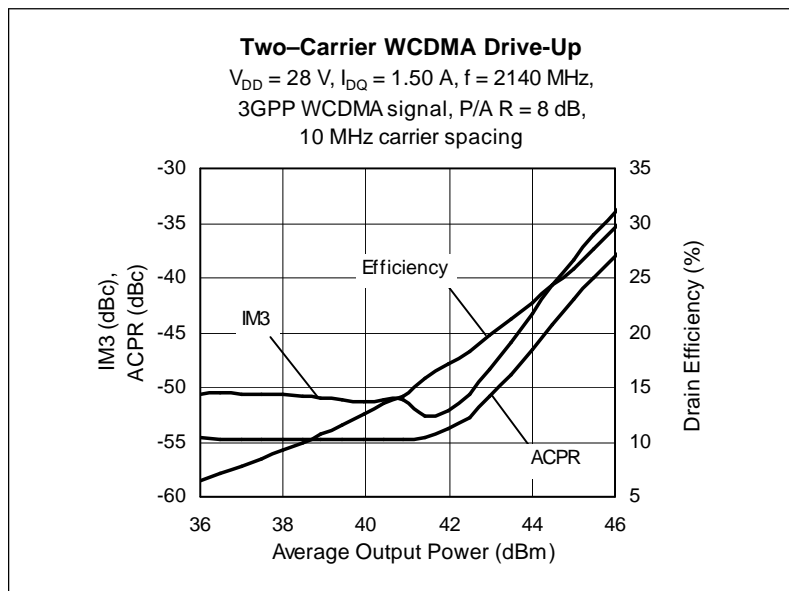


# LDMOS RF Power Field Effect Transistor 130 W, 2110–2170 MHz

## Description

The PTF211301 is a 130-W, internally matched *GOLDMOS* FET intended for WCDMA applications. It is characterized for single- and two-carrier WCDMA operation from 2110 to 2170 MHz. Full gold metallization ensures excellent device lifetime and reliability.



## Features

- Broadband internal matching
- Typical two-carrier WCDMA performance at 2140 MHz
  - Average output power = 28 W
  - Linear Gain = 13.5 dB
  - Efficiency = 25%
  - Intermodulation distortion = -37 dBc
  - Adjacent channel power = -42 dBc
- Typical CW performance, 2170 MHz, 28 V
  - Output power at P-1dB = 148 W
  - Efficiency = 50%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability, low HCl drift
- Capable of handling 10:1 VSWR @ 28 V, 130 W (CW) output power



PTF211301A  
Package 20260

## 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)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1.5\text{ A}$ ,  $P_{OUT} = 28\text{ W}$  average

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

Characteristic	Symbol	Min	Typ	Max	Units
Intermodulation Distortion	IMD	—	-37	—	dBc
Gain	$G_{ps}$	—	13.5	—	dB
Drain Efficiency	$\eta_D$	—	25	—	%

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1.5\text{ A}$ ,  $P_{OUT} = 120\text{ W PEP}$ ,  $f = 2170\text{ MHz}$ , tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	$G_{ps}$	12	13.5	—	dB
Drain Efficiency	$\eta_D$	34	37	—	%
Intermodulation Distortion	IMD	—	-30	-28	dBc

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

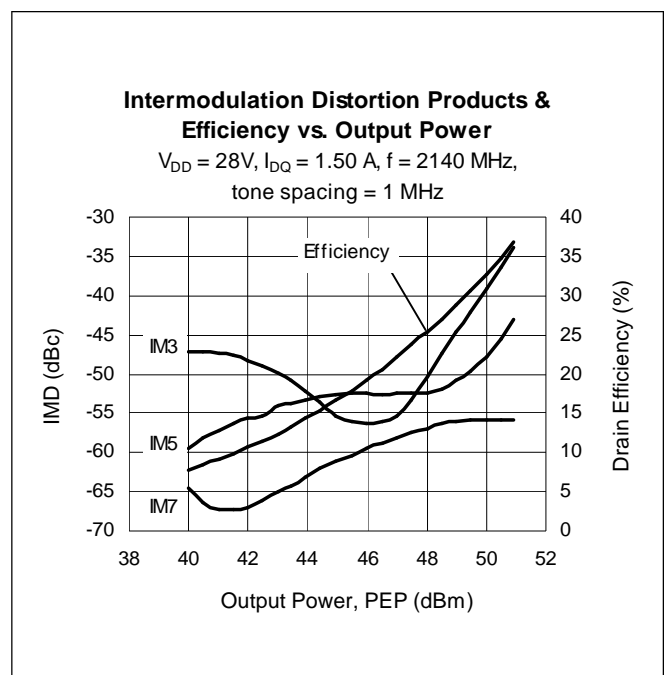
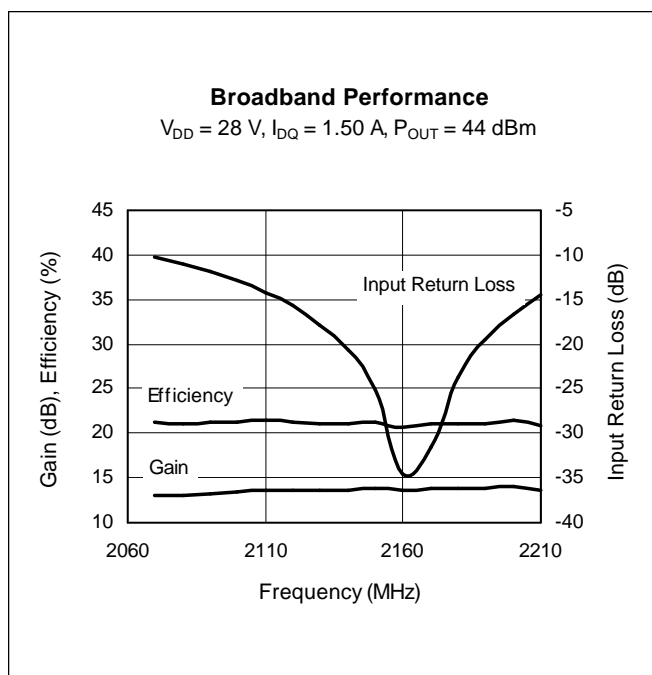
**DC Characteristics** at  $T_{CASE} = 25^{\circ}C$  unless otherwise indicated

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	$V_{GS} = 10 V, V_{DS} = 0.1 V$	$R_{DS(on)}$	—	0.07	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28 V, I_{DQ} = 1.5 A$	$V_{GS}$	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10 V, V_{DS} = 0 V$	$I_{GSS}$	—	—	1.0	$\mu A$

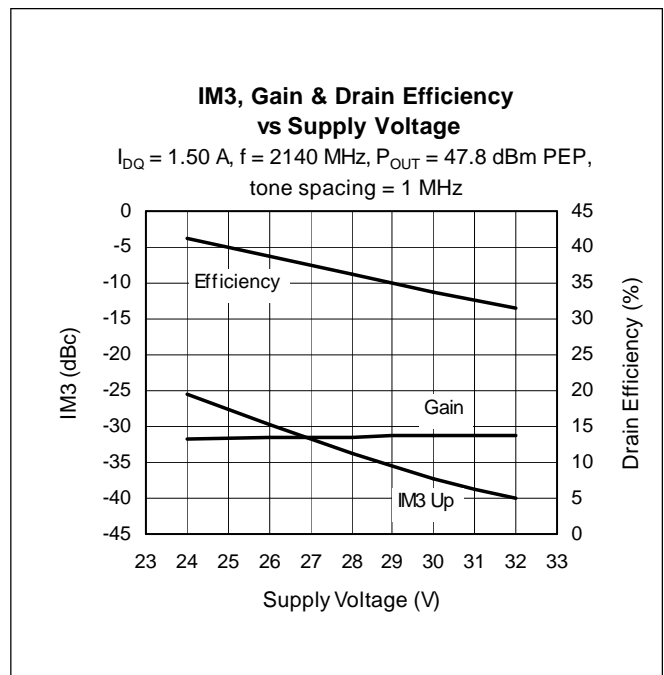
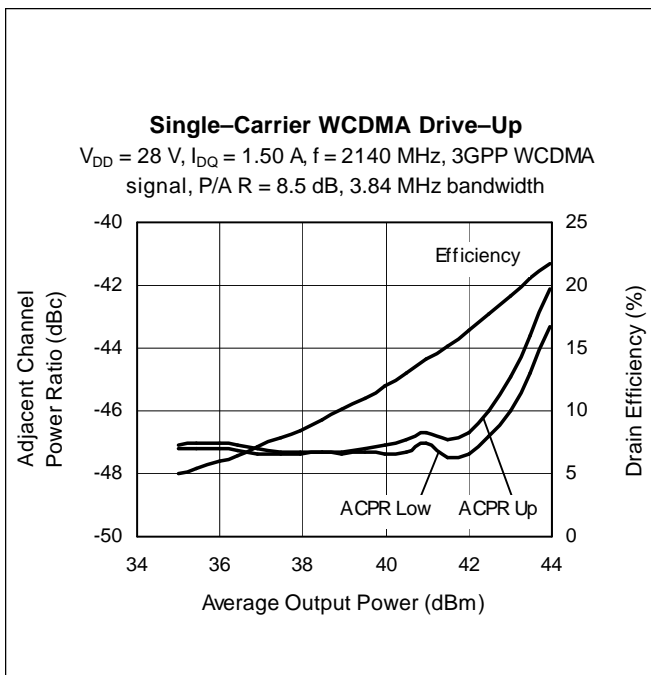
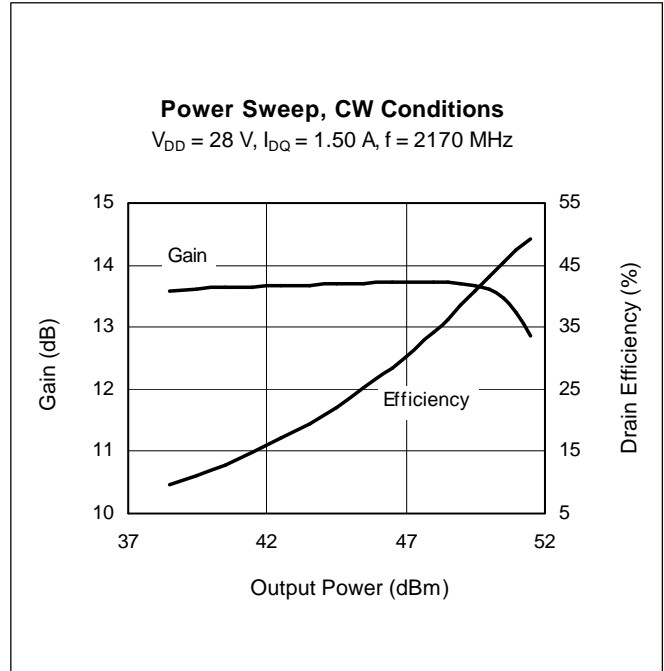
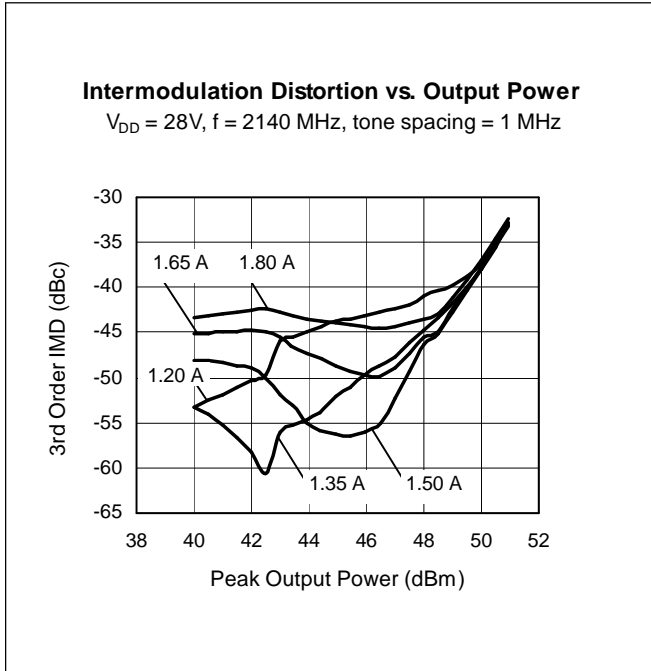
**Maximum Ratings**

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	$P_D$	350	W
Above $25^{\circ}C$ derate by		2.0	$W/^{\circ}C$
Storage Temperature Range	$T_{STG}$	-40 to +150	$^{\circ}C$
Thermal Resistance ( $T_{CASE} = 70^{\circ}C, 130 W CW$ )	$R_{\theta JC}$	0.50	$^{\circ}C/W$

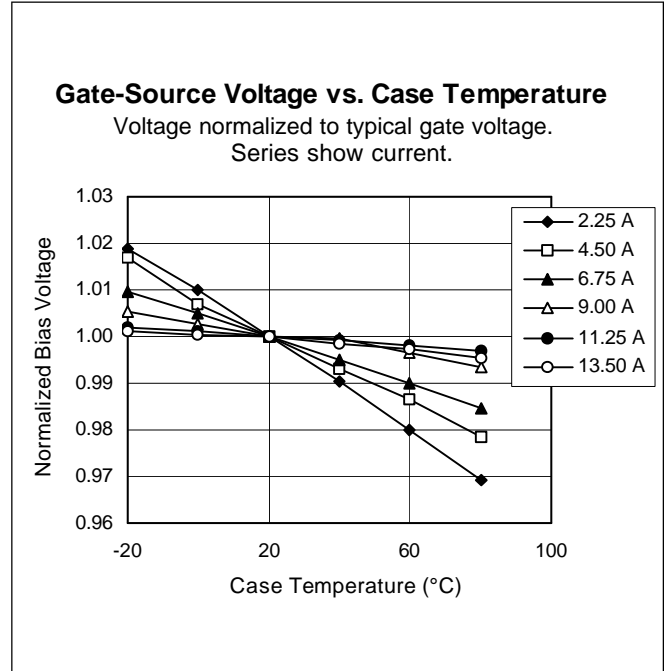
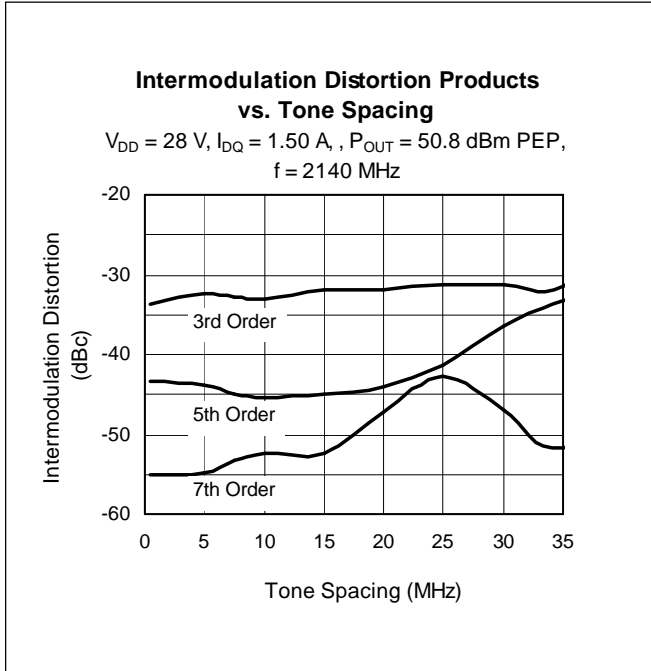
**Typical Performance** (data taken in a production test fixture)



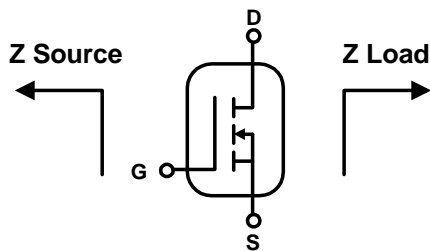
Typical Performance (cont.)



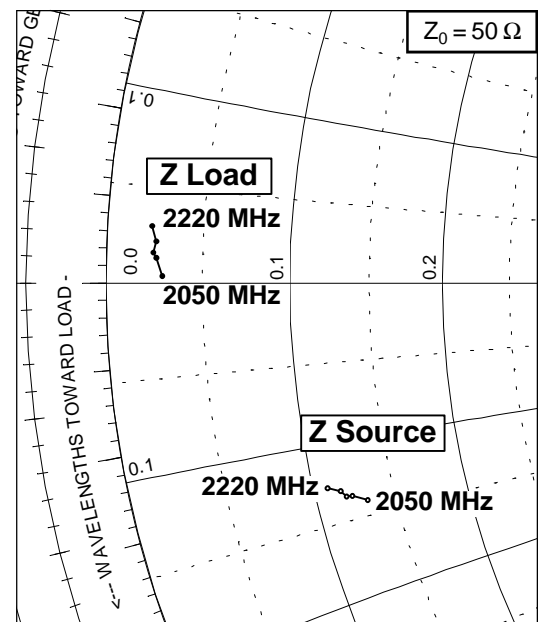
Typical Performance (cont.)



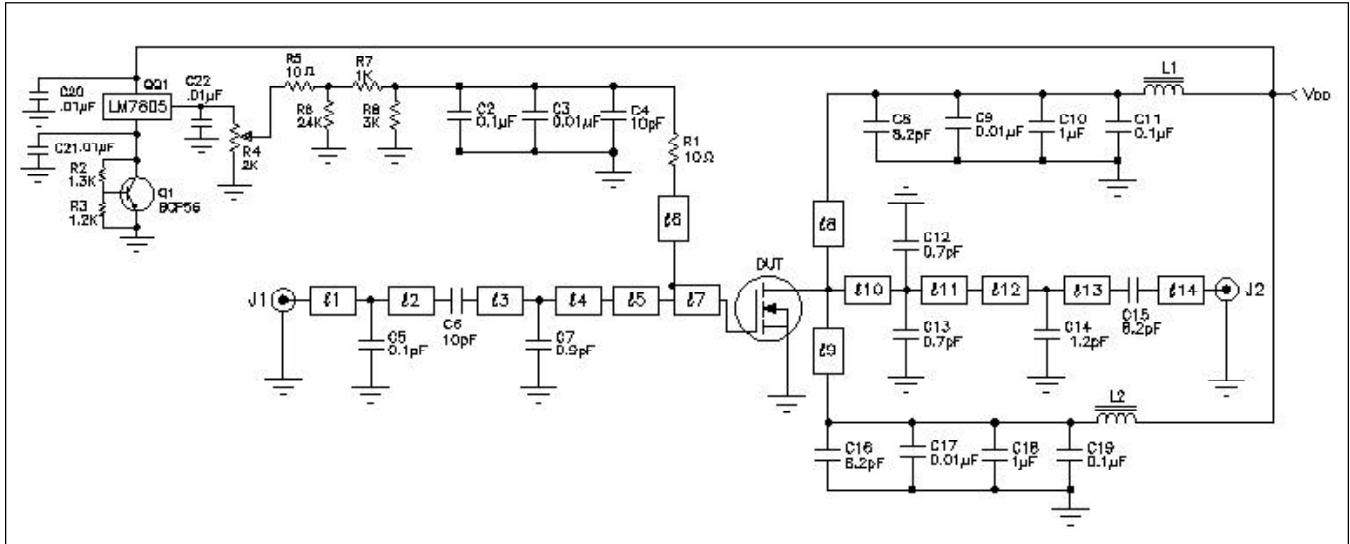
Broadband Circuit Impedance



Frequency MHz	Z Source $\Omega$		Z Load $\Omega$	
	R	jX	R	jX
2050	6.58	-7.02	1.43	0.19
2110	6.14	-6.76	1.27	0.66
2140	5.96	-6.75	1.19	0.80
2170	5.82	-6.54	1.25	1.09
2220	5.45	-6.36	1.12	1.49



Test Circuit



Reference Circuit Schematic for  $f = 2140$  MHz

Circuit Assembly Information

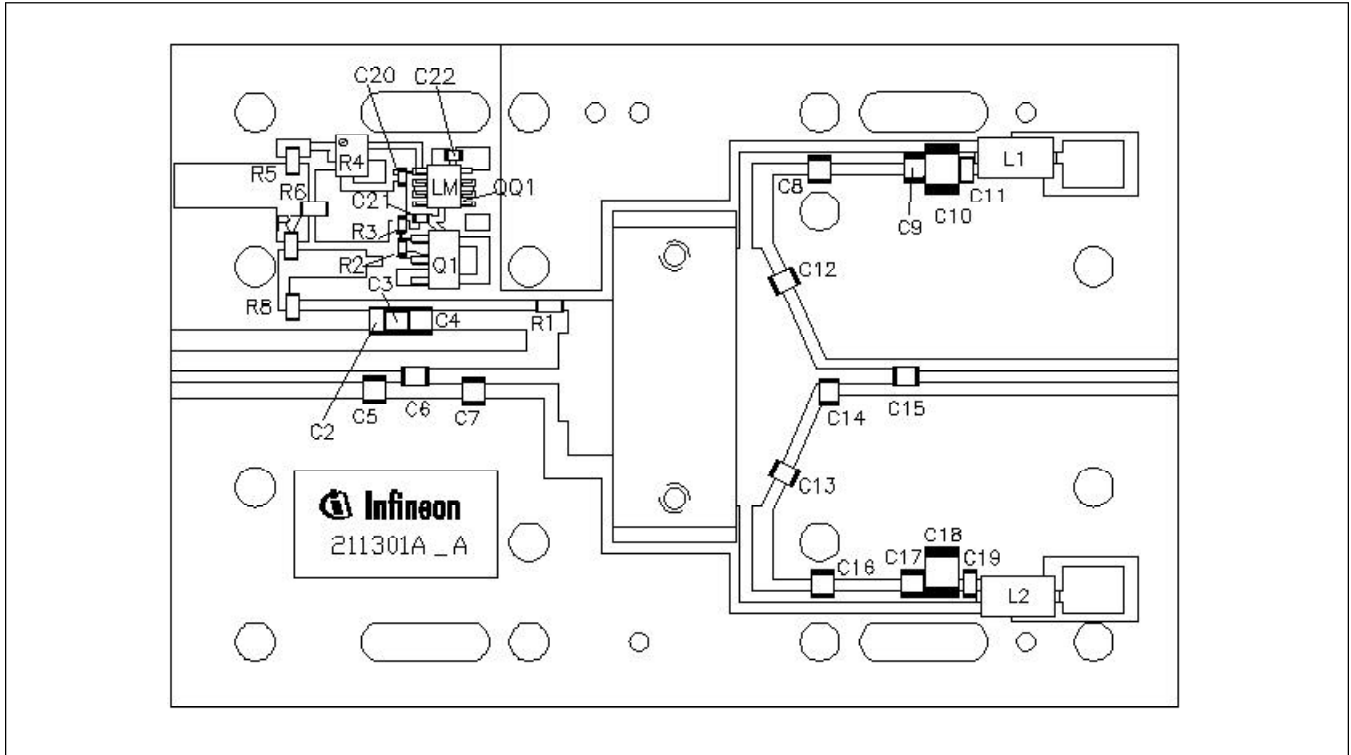
DUT	PTF211301	LDMOS Transistor	
PCB	0.76 mm. [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2140 MHz	Dimensions: W x L (mm.)	Dimensions: W x L (in.)
$l_1$	$0.308 \lambda$ , $54 \Omega$	23.24 x 1.30	0.915 x 0.051
$l_2$	$0.059 \lambda$ , $54 \Omega$	4.45 x 1.30	0.175 x 0.051
$l_3$	$0.154 \lambda$ , $45 \Omega$	11.43 x 1.78	0.450 x 0.070
$l_4$	$0.132 \lambda$ , $45 \Omega$	9.83 x 1.78	0.387 x 0.070
$l_5$	$0.061 \lambda$ , $13 \Omega$	4.22 x 10.08	0.166 x 0.397
$l_6$	$0.012 \lambda$ , $53 \Omega$	0.89 x 1.32	0.035 x 0.052
$l_7$	$0.074 \lambda$ , $7 \Omega$	5.00 x 17.73	0.197 x 0.698
$l_8$	$0.409 \lambda$ , $55 \Omega$	30.99 x 1.22	1.220 x 0.048
$l_9$	$0.409 \lambda$ , $55 \Omega$	30.99 x 1.22	1.220 x 0.048
$l_{10}$	$0.029 \lambda$ , $4 \Omega$	1.93 x 29.72	0.076 x 1.170
$l_{11}$	$0.016 \lambda$ , $5 \Omega$	1.52 x 25.10	0.060 x 0.988
$l_{12}$	$0.067 \lambda$ , $13 \Omega$	1.91 x 12.90	0.075 x 0.508
$l_{13}$	$0.125 \lambda$ , $43 \Omega$	9.32 x 1.85	0.367 x 0.073
$l_{14}$	$0.411 \lambda$ , $54 \Omega$	30.99 x 1.30	1.220 x 0.051

**Test Circuit** (cont.)

Component	Description	Manufacturer	P/N or Comment
C1	Capacitor, 10 $\mu$ F, 35 V, Tant TE series	Digi-Key	PCS6106TR-ND, SMD
C2, C11, C19	Capacitor, 0.1 $\mu$ F	Digi-Key	PCC104BCT
C3, C9, C17	Capacitor, 0.01 $\mu$ F	ATC	X08J103AFB
C4, C6	Capacitor, 10 pF	ATC	100 B 100
C5	Capacitor, 0.1 pF	ATC	100 B 0R1
C7	Capacitor, 0.9 pF	ATC	100 B 0R9
C8, C15, C16	Capacitor, 8.2 pF	ATC	100 B 8R2
C10, C18	Capacitor, 1 $\mu$ F	ATC	X24L105BVC
C12, C13	Capacitor, 0.7 pF	ATC	100 B 0R7
C14	Capacitor, 1.2 pF	ATC	100 B 1R2
C20, C21, C22	Capacitor, 0.01 $\mu$ F	Digi-Key	PCC1772CT-ND
J1, J2	Connector, SMA, Female, Panel Mount		
L1, L2	Ferrite		
QQ1	Voltage regulator	Digi-Key	LM7805
Q1	Transistor	Infineon	BCP56
R1	Resistor, 10 $\Omega$ , 1/4 W	Digi-Key	P10ECT-ND
R2	Resistor, 1.3 k $\Omega$ , 1/10 W, 0603	Digi-Key	P1.3KGCT-ND
R3	Resistor, 1.2 k $\Omega$ , 1/10 W, 0603	Digi-Key	P1.2KGCT-ND
R4	Potentiometer, 2 k $\Omega$ , 4 W	Digi-Key	3224W-202ETR-ND
R5	Resistor, 10 k $\Omega$ , 1/4 W, 1206	Digi-Key	P10KECT-ND
R6	Resistor, 24 k $\Omega$ , 1/4 W, 1206	Digi-Key	P24KECT-ND
R7	Resistor, 1 k $\Omega$ , 1/4 W, 1206	Digi-Key	P1.0KECT-ND
R8	Resistor, 3 k $\Omega$ , 1/4 W, 1206	Digi-Key	P3.0KECT-ND

**Test Circuit** (cont.)

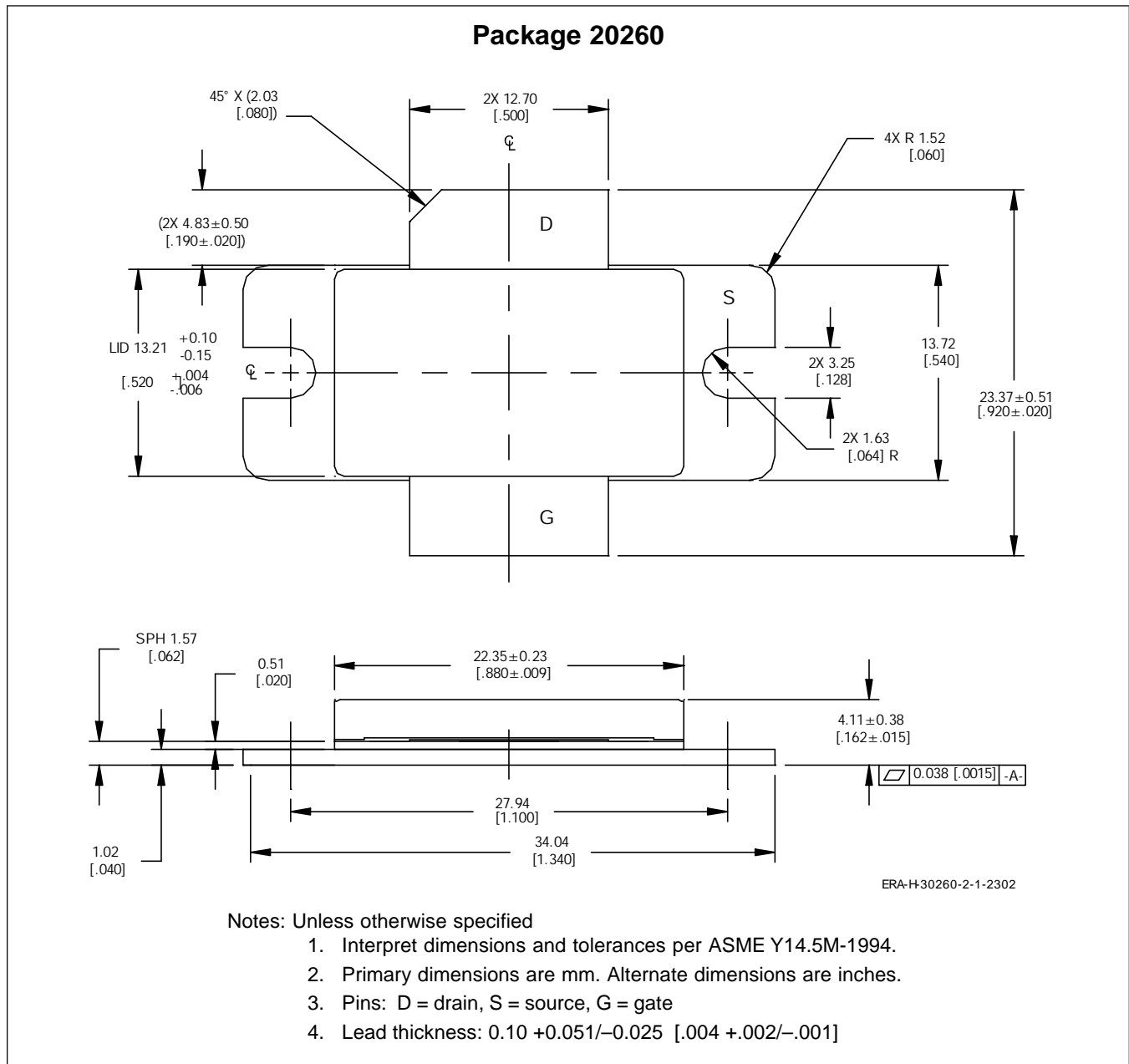


Reference Circuit<sup>1</sup> (not to scale)

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

### Package Outline Specifications

Type	Package Outline	Package Description	Marking
PTF211301A	20260	Standard Ceramic, flange	PTF211301A



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>2004-01-02</b>	<b>Data Sheet</b>
Previous Version:	2003-11-24, Preliminary Data Sheet	
Page	Subjects (major changes since last revision)	
	Preliminary status removed.	

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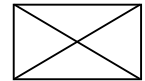
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