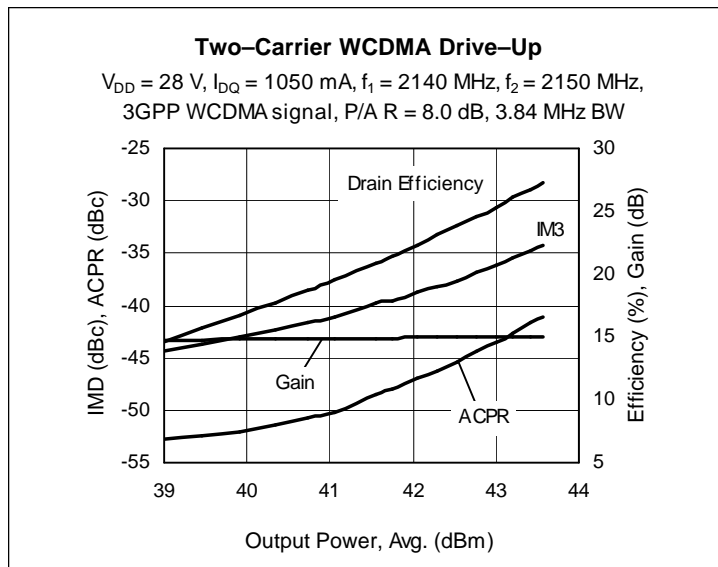


# LDMOS RF Power Field Effect Transistor 90 W, 2110–2170 MHz

## Description

The PTF210901 is an internally matched 90 W GOLDMOS FET intended for WCDMA applications from 2110 to 2170 MHz. Full gold metallization ensures excellent device lifetime and reliability.



## Features

- Internal matching for wideband performance
- Typical two-carrier 3GPP WCDMA performance
  - Average output power = 19 W at -37 dBc
  - Efficiency = 25%
- Typical CW performance
  - Output power at P-1dB = 105 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 at 28 V, 90 W (CW) output power



PTF210901E  
Package 30248

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

## RF Performance 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)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1050\text{ mA}$ ,  $P_{OUT} = 19\text{ W AVG}$   
 $f_1 = 2140\text{ MHz}$ ,  $f_2 = 2150\text{ MHz}$ , 3GPP signal, channel bandwidth 3.84 MHz, 8.0 dB peak/average @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Units
Intermodulation Distortion	IMD	—	-37	—	dBc
Gain	$G_{ps}$	—	15	—	dB
Drain Efficiency	$\eta_D$	—	25	—	%

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 1050\text{ mA}$ ,  $P_{OUT} = 90\text{ W PEP}$ ,  $f = 2170\text{ MHz}$ , tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	$G_{ps}$	13.5	15	—	dB
Drain Efficiency	$\eta_D$	36	38	—	%
Intermodulation Distortion	IMD	—	-30	-28	dBc

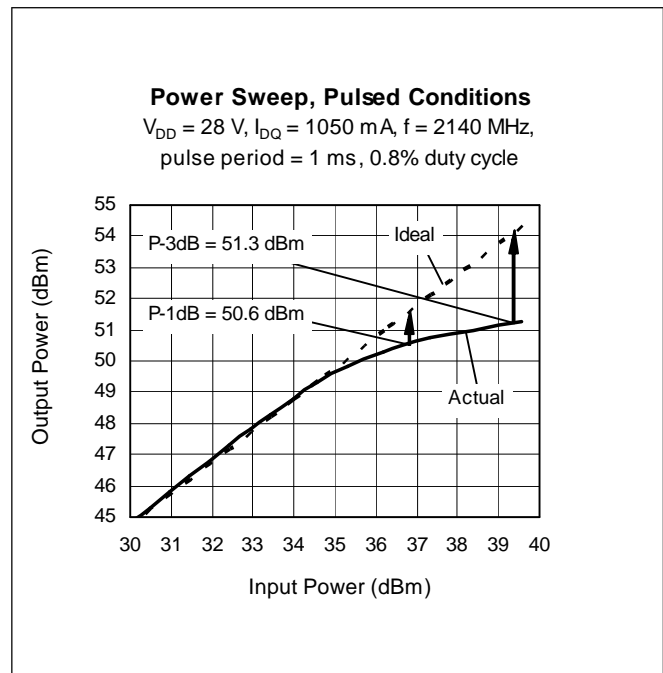
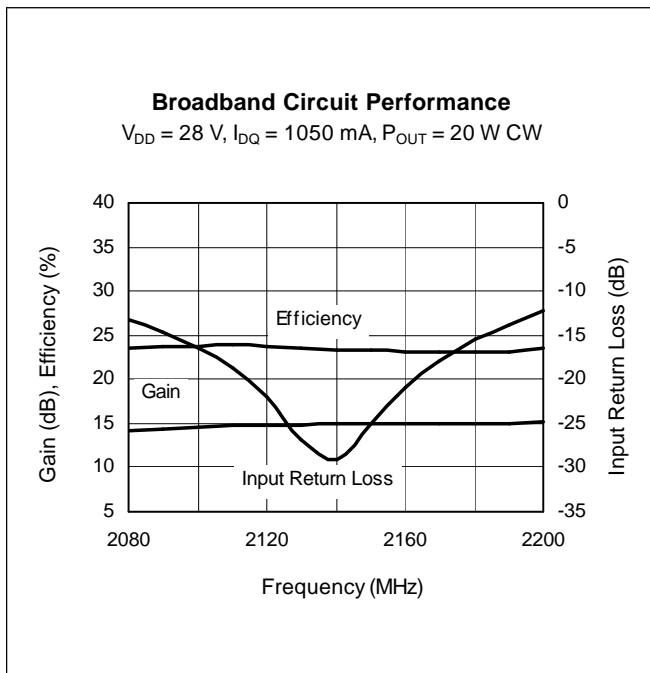
**Electrical Characteristics** at  $T_{CASE} = 25^{\circ}C$  unless otherwise indicated

Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain–Source Breakdown Voltage	$V_{GS} = 0 V, I_D = 10 \mu A$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28 V, V_{GS} = 0 V$	$I_{DSS}$	—	—	1.0	$\mu A$
On–State Resistance	$V_{GS} = 10 V, V_{DS} = 0.1 V$	$R_{DS(on)}$	—	0.1	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28 V, I_{DQ} = 1050 mA$	$V_{GS}$	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10 V, V_{DS} = 0 V$	$I_{GSS}$	—	0.01	1.0	$\mu A$

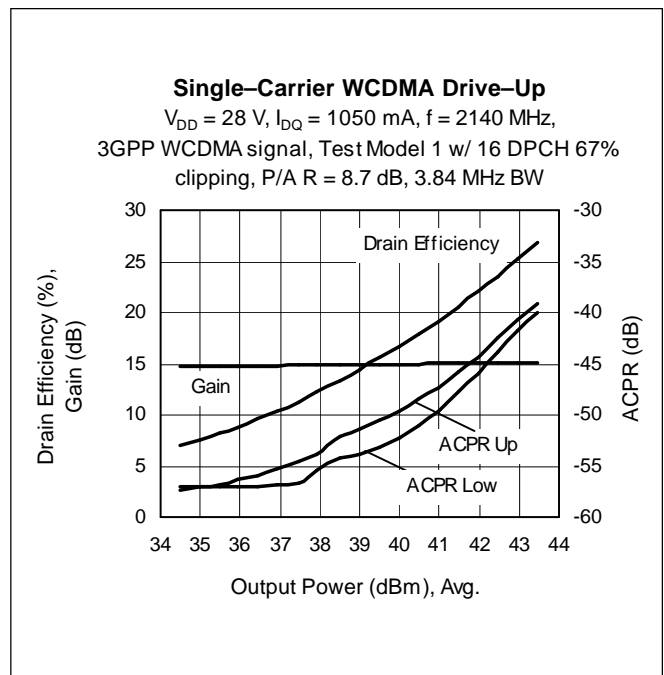
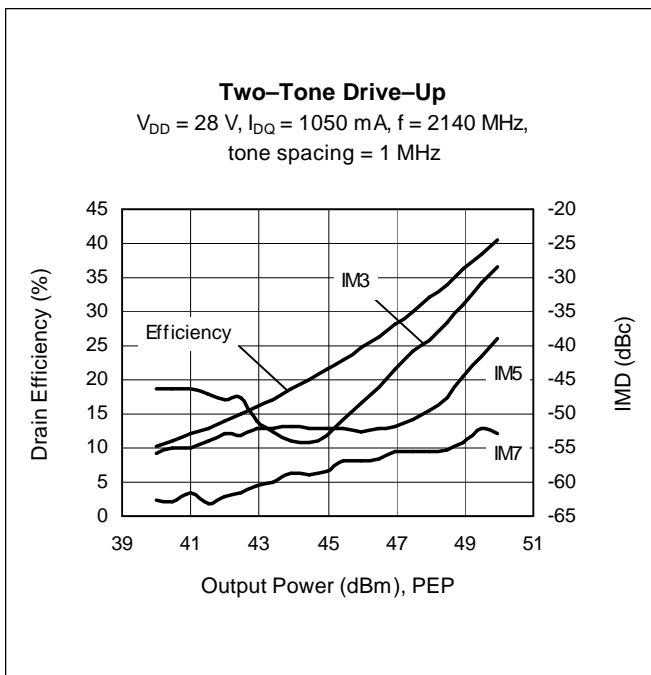
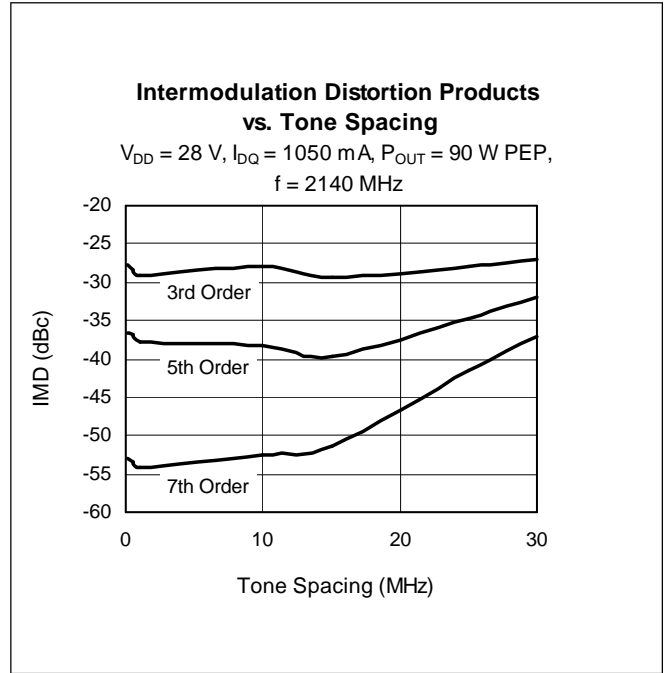
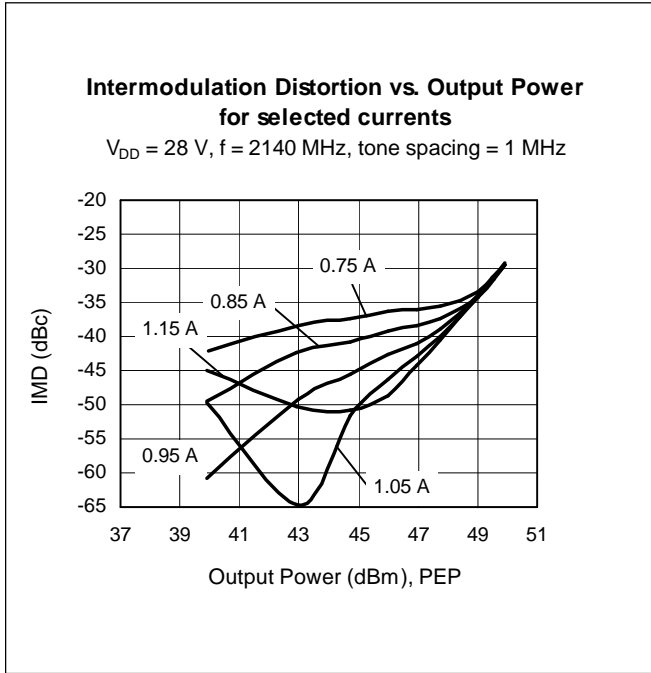
**Maximum Ratings**

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	$P_D$	389 2.22	W W/ $^{\circ}C$
Storage Temperature Range	$T_{STG}$	-40 to +150	$^{\circ}C$
Thermal Resistance ( $T_{CASE} = 70^{\circ}C, 90 W CW$ )	$R_{\theta JC}$	0.45	$^{\circ}C/W$

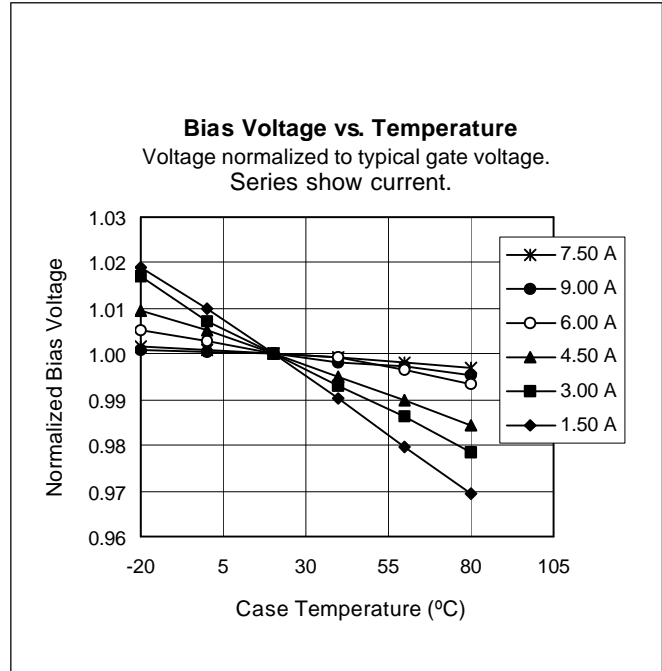
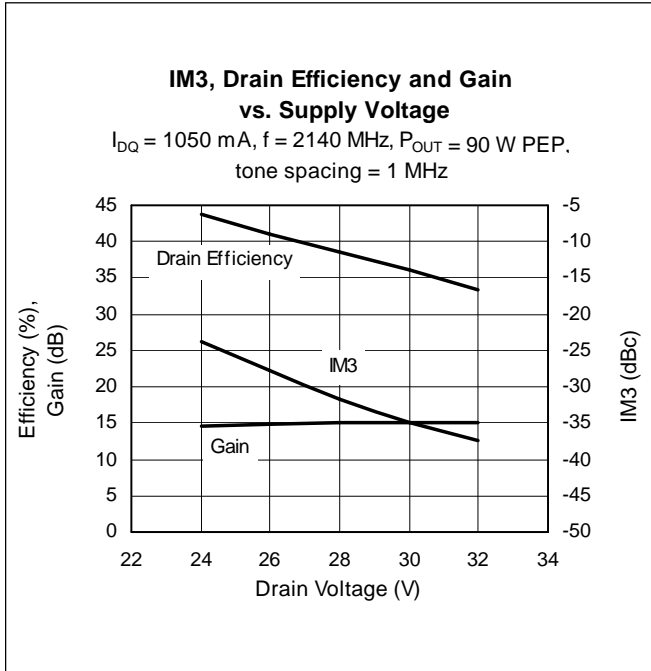
**Typical Performance** in broadband test fixture



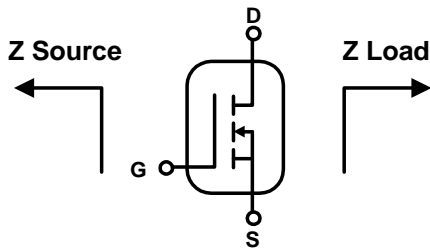
Typical Performance (cont.)



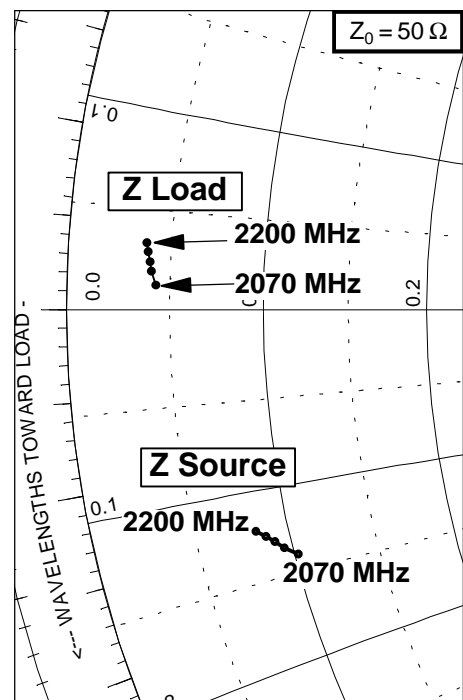
Typical Performance (cont.)



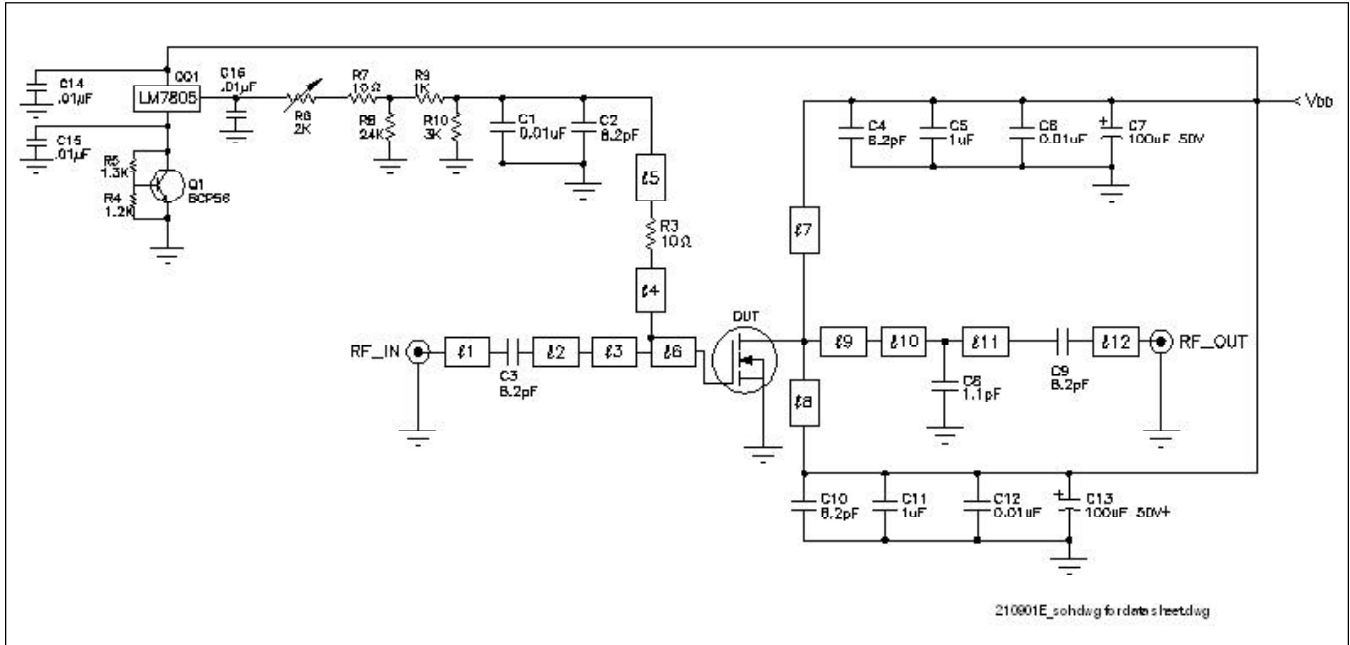
Broadband Circuit Impedance Data



Frequency MHz	Z Source $\Omega$		Z Load $\Omega$	
	R	jX	R	jX
2070	5.11	-7.00	2.14	0.62
2110	4.78	-6.74	2.03	0.97
2140	4.57	-6.50	1.99	1.21
2170	4.35	-6.30	1.92	1.45
2200	4.12	-6.11	1.88	1.67



Test Circuit



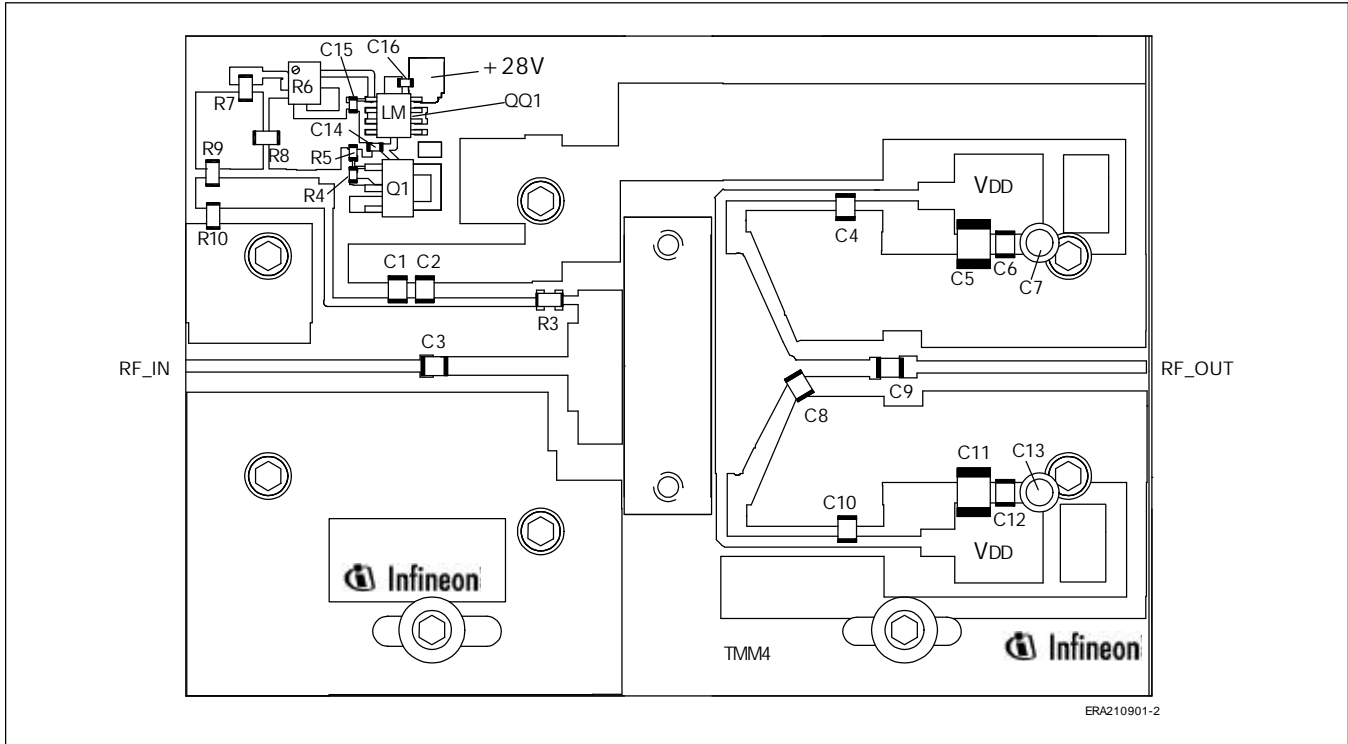
Reference Circuit Schematic for  $f = 2140$  MHz

Circuit Information

DUT	PTF210901E	LDMOS Transistor	
PCB	0.76 mm [0.030"] thick, $\epsilon_r = 4.5$	2 oz. copper	TMM4

Microstrip	Value at 2140 MHz	Dimensions: L x W (mm.)	Dimensions: L x W (in.)
$l_1$	$0.375 \lambda$ , $50 \Omega$	28.45 x 1.40	1.120 x 0.055
$l_2$	$0.199 \lambda$ , $39.2 \Omega$	14.83 x 2.06	0.584 x 0.081
$l_3$	$0.015 \lambda$ , $11.5 \Omega$	1.07 x 10.06	0.042 x 0.396
$l_4$	$0.037 \lambda$ , $60.4 \Omega$	2.90 x 0.97	0.114 x 0.038
$l_5$	$0.195 \lambda$ , $60.4 \Omega$	15.11 x 0.97	0.595 x 0.038
$l_6$	$0.073 \lambda$ , $7.5 \Omega$	4.98 x 17.73	0.196 x 0.698
$l_7, l_8$	$0.199 \lambda$ , $55.4 \Omega$	15.32 x 1.14	0.603 x 0.045
$l_9$	$0.049 \lambda$ , $4.98 \Omega$	3.30 x 25.17	0.130 x 0.991
$l_{10}$	$0.089 \lambda$ , $4.98 \Omega$	5.99 x 25.17	0.236 x 0.991
$l_{11}$	$0.151 \lambda$ , $41.9 \Omega$	11.30 x 1.85	0.445 x 0.073
$l_{12}$	$0.381 \lambda$ , $50 \Omega$	29.13 x 1.40	1.147 x 0.055

**Test Circuit** (cont.)



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

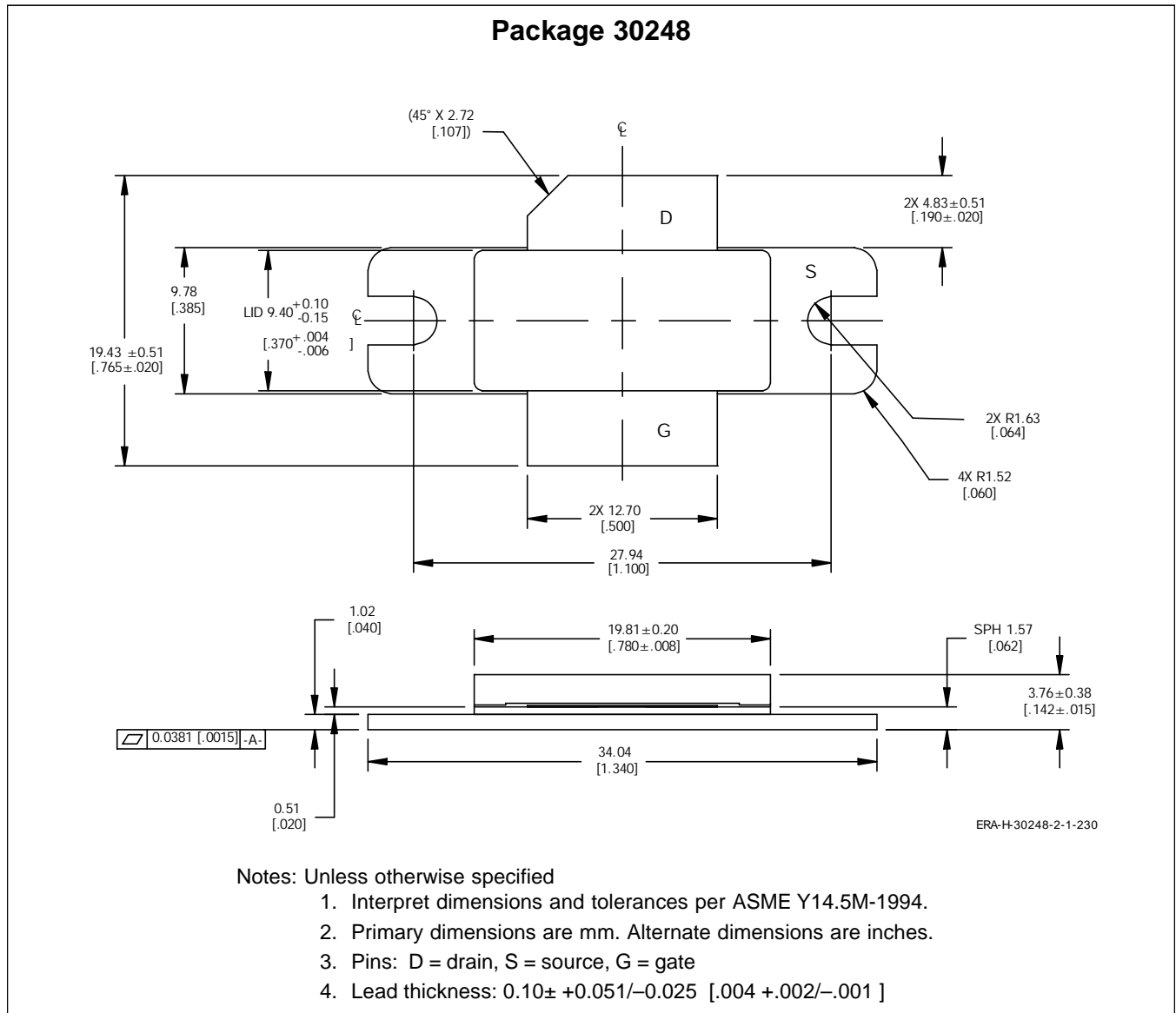
Component	Description	Manufacturer	P/N or Comment
C1, C6, C12	Capacitor, 0.01 $\mu$ F	Digi-Key	PCC1772CT-ND
C2, C3, C4, C9, C10	Capacitor, 8.2 pF	ATC	100B 8R2
C5, C11	Capacitor, 1 $\mu$ F, ceramic, 50 V	ATC	920DC105KW100
C7, C13	Capacitor, 100 $\mu$ F, 50 V, electrolytic	Digi-Key	P5182-ND
C8	Capacitor, 1.1 pF	ATC	100B OR6
C14, C15, C16	Capacitor, 0.01 $\mu$ F	Digi-Key	PCC1772CT-ND
QQ1	Voltage regulator	Digi-Key	LM 7805
Q1	Transistor	Infineon	BCP56
R1, R2	Resistor, 12K ohm, 1/4 W, 1206	Digi-Key	P12KECT-ND
R3	Resistor, 10 ohm, 1/4 W, 1206	Digi-Key	P10ECT-ND
R4	Resistor, 1.2K ohm, 1/10 W, 0603	Digi-Key	P1.2KGCT-ND
R5	Resistor, 1.3K ohm, 1/10 W, 0603	Digi-Key	P1.3KGCT-ND
R6	Resistor, variable 2K ohm, 4 W	Digi-Key	3224 W-202ETR-ND
R7	Resistor, 10 ohm, 1/4 W, 1206	Digi-Key	P10ECT-ND
R8	Resistor, 24K ohm, 1/4 W, 1206	Digi-Key	P24KECT-ND
R9	Resistor, 1K ohm, 1/4 W, 1206	Digi-Key	P1.0KECT-ND
R10	Resistor, 3K ohm, 1/4 W, 1206	Digi-Key	P3.0KECT-ND

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

### Ordering Information

Type	Package Outline	Package Description	Marking
PTF210901E	30248	Thermally enhanced, with flange	PTF210901E

### Package Outline Specifications



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

**PTF210901**

**Revision History:**           **2004-01-16**

Previous Version:           2003-12-22, Data Sheet

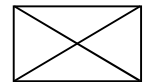
Page	Subjects (major changes since last revision)
5	Circuit schematic adjusted

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[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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