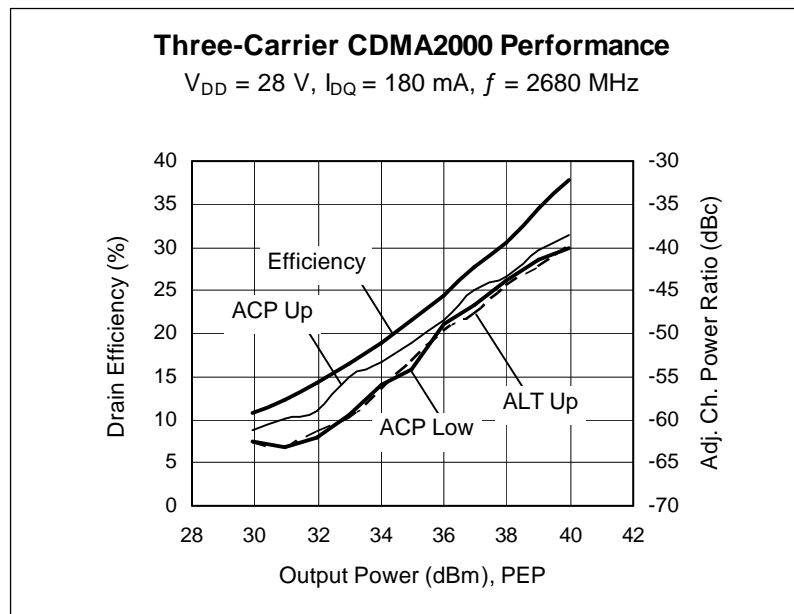


## Thermally-Enhanced High Power RF LDMOS FET 10 W, 2400 – 2700 MHz

### Description

The PTF240101S is a 10-watt, internally-matched *GOLDMOS*® FET device intended for CDMA2000 and WiMAX applications in the 2.4 to 2.7 GHz band. Full gold metallization ensures excellent device lifetime and reliability.

PTF240101S  
Package H-32259-2



### Features

- Pb-free and RoHS-compliant
- Typical CDMA2000 performance
  - Average output power = 2.0 W
  - Gain = 16 dB
  - Efficiency = 18%
  - ACPR = -55 dBc
- Typical CW performance
  - Output power at P-1dB = 15 W
  - Efficiency = 45%
- Integrated ESD protection: Human Body Model Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 10 W (CW) output power

### RF Characteristics, CDMA2000 Operation

**CDMA2000 Measurements** (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 180\text{ mA}$ ,  $P_{OUT} = 2\text{ W}$ ,  $f = 2680\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Adjacent Channel Power Ratio	ACPR	—	-55	—	dBc
Gain	$G_{ps}$	—	16	—	dB

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 180\text{ mA}$ ,  $P_{OUT} = 10\text{ W PEP}$ ,  $f = 2680\text{ MHz}$ , tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	15.5	16	—	dB
Intermodulation Distortion	IMD	—	-31	-28	dBc

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) (cont.)

 $V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 160\text{ mA}$ ,  $f = 2680\text{ MHz}$ , tone spacing = 7 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	14	15	—	dB
Efficiency at 1 W avg.	$\eta_D$	9	10	—	%
Intermodulation Distortion at 1 W avg.	IMD	—	-42	-40	dBc
Compression at 10 W avg.	$P_{comp}$	—	0.3	1.0	dB
Input Return Loss at 2.4 GHz	IRL	-10	-12	—	dB

**DC Characteristics**

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$ , $I_{DS} = 10\text{ }\mu\text{A}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	1.0	$\mu\text{A}$
On-State Resistance	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ A}$	$R_{DS(on)}$	—	0.83	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 28\text{ V}$ , $I_{DQ} = 180\text{ mA}$	$V_{GS}$	2.5	3.2	4.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	—	—	1.0	$\mu\text{A}$

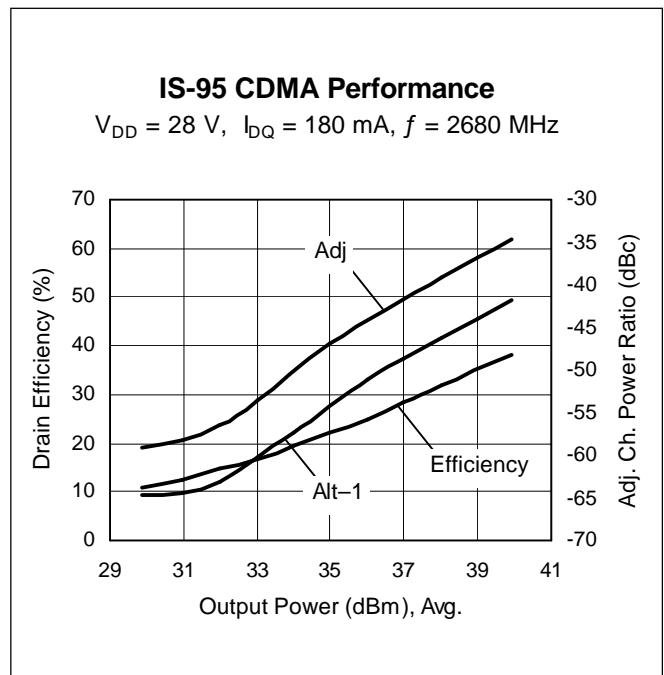
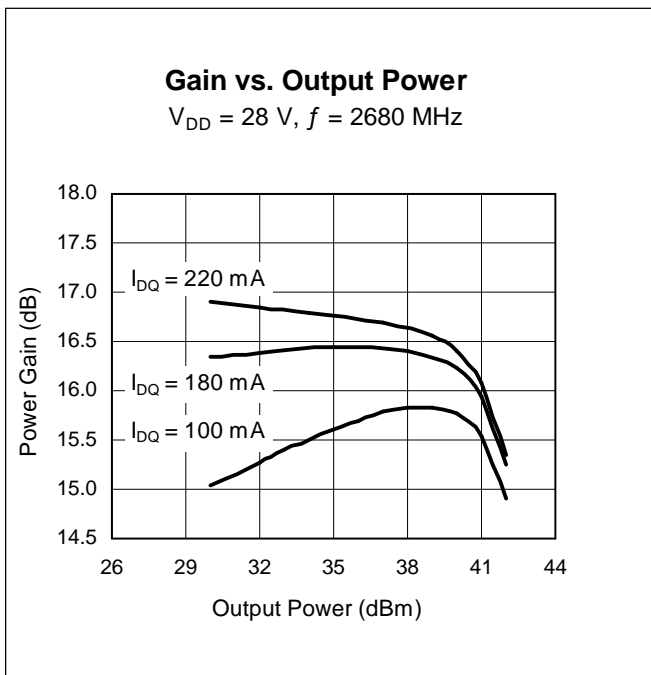
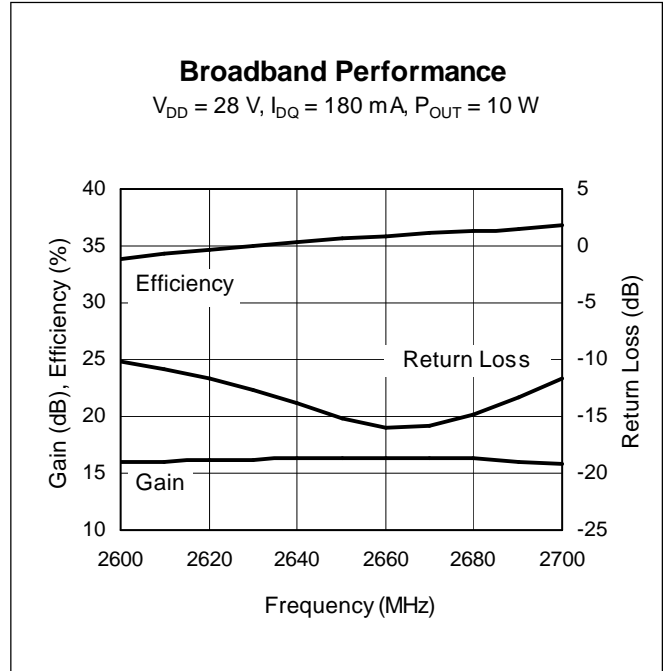
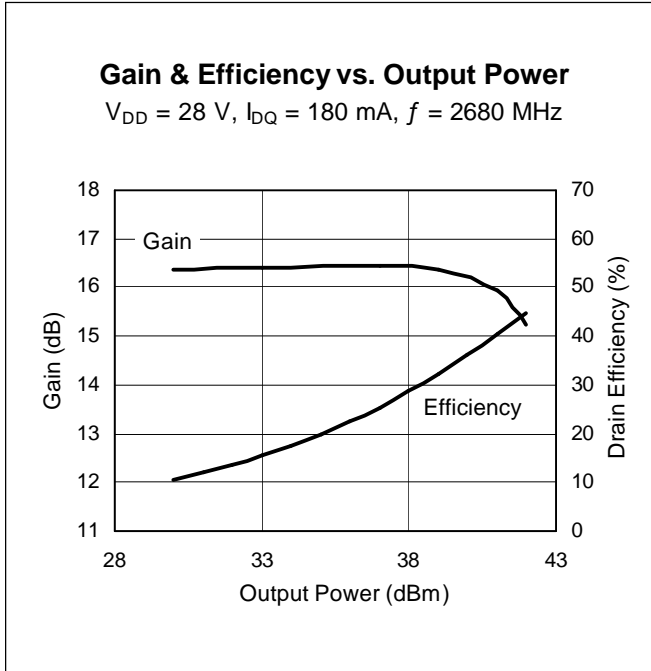
**Maximum Ratings**

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	$^{\circ}\text{C}$
Total Device Dissipation	$P_D$	58	W
Above 25 $^{\circ}\text{C}$ derate by		0.333	W/ $^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ( $T_{CASE} = 70^{\circ}\text{C}$ , 10 W CW)	$R_{\theta JC}$	3.0	$^{\circ}\text{C}/\text{W}$

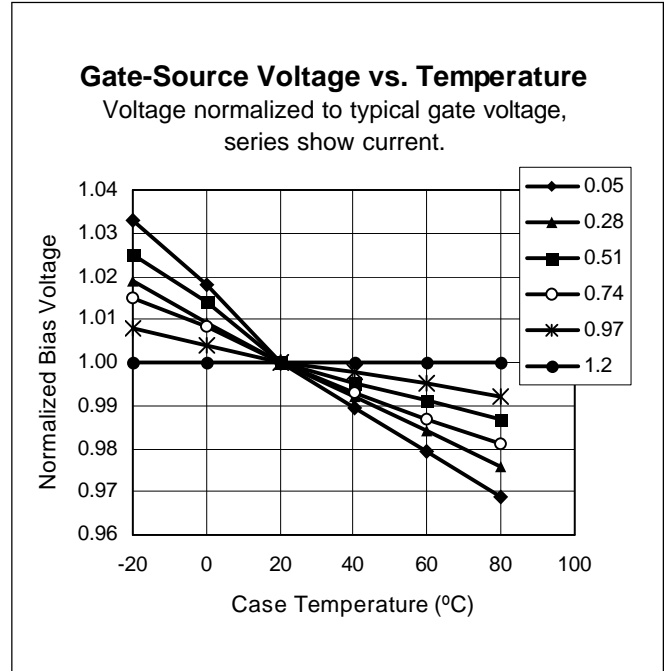
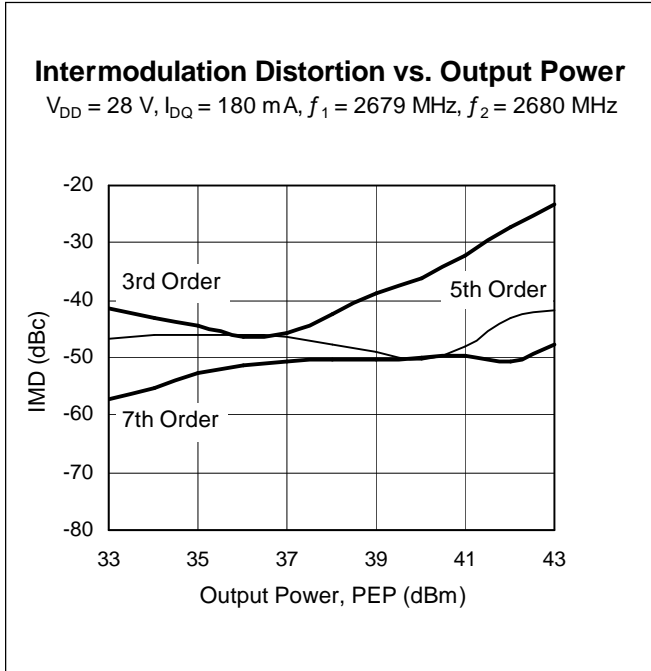
**Ordering Information**

Type	Package Outline	Package Description	Marking
PTF240101S	H-32259-2	Thermally-enhanced, surface mount	PTF240101S

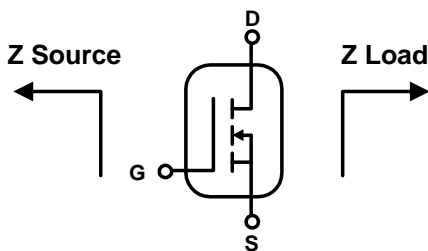
**Typical Performance, CDMA2000 Operation** (measurements taken in broadband test fixture)



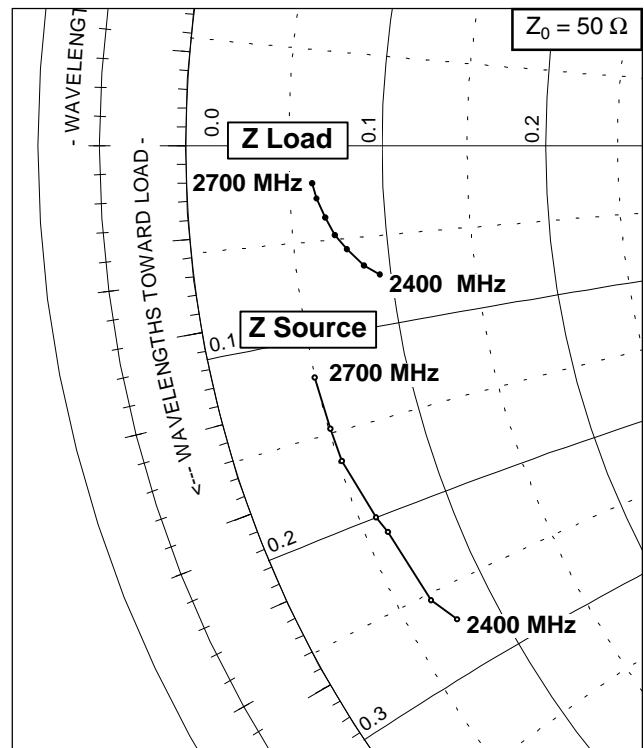
Typical Performance (cont.)



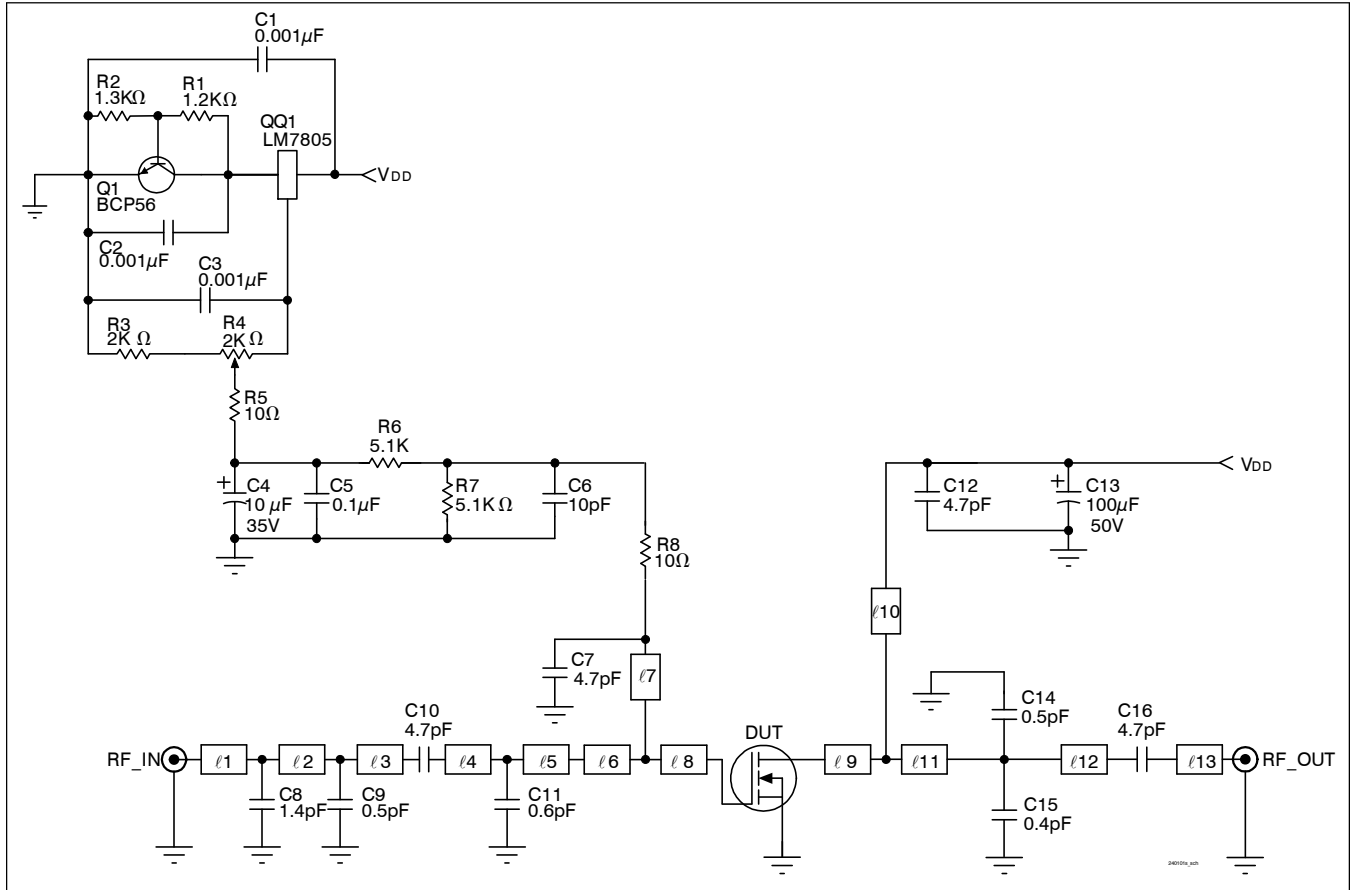
Broadband Circuit Impedance Data



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
2400	3.8	-13.5	4.7	-3.6
2450	3.4	-12.7	4.3	-3.3
2500	3.1	-10.5	4.0	-2.8
2550	3.3	-10.0	3.6	-2.4
2600	2.6	-8.3	3.4	-1.9
2650	2.9	-7.4	3.2	-1.4
2700	2.5	-6.0	3.1	-1.0



CDMA2000 Reference Circuit



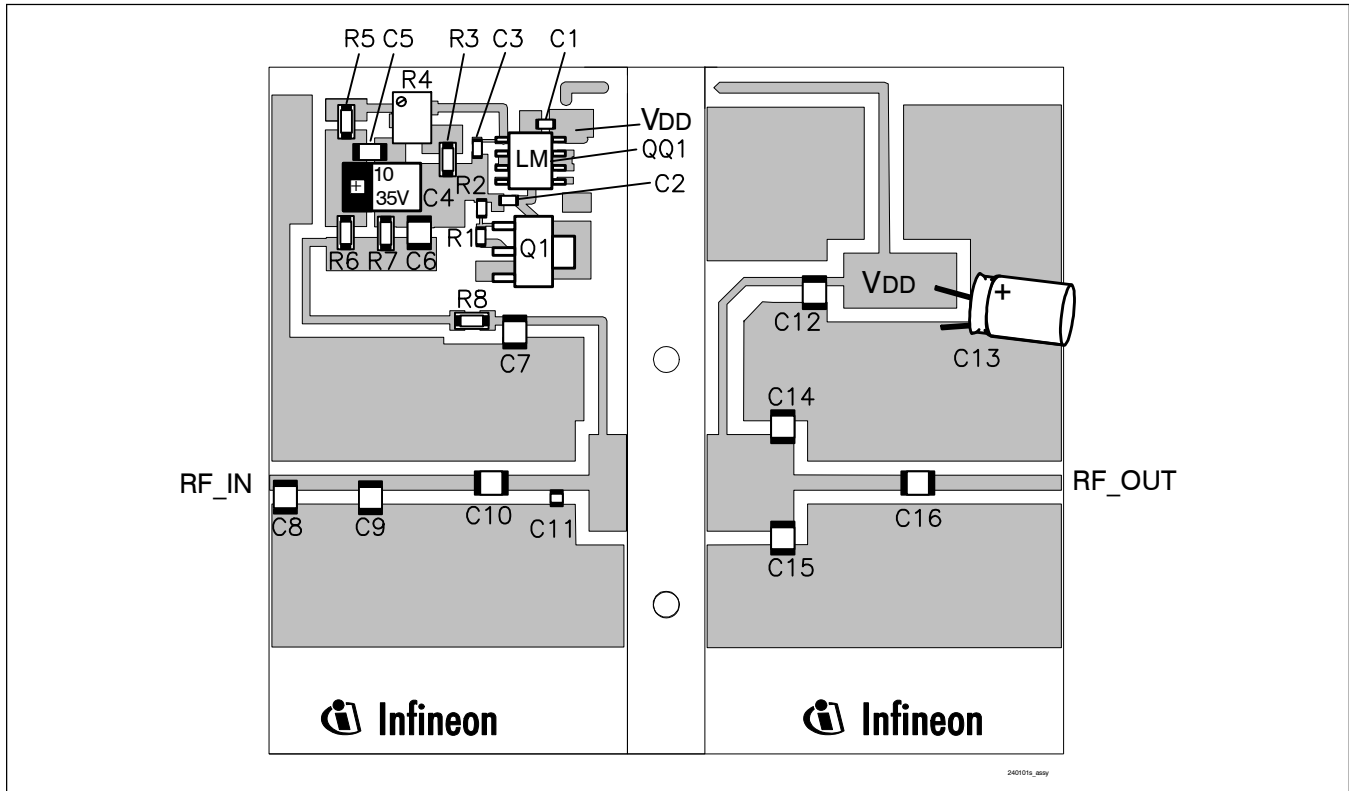
Reference Circuit Schematic for  $f = 2650 \text{ MHz}$

Circuit Assembly Information

DUT	PTF240101S	LDMOS Transistor
Circuit Board	0.76 mm [0.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4, 2 oz. Copper

Microstrip	Electrical Characteristics at 2650 MHz	Dimensions: L x W (mm)	Dimensions: L x W (in.)
$\ell 1$	0.043 $\lambda$ , 50.0 $\Omega$	2.67 x 1.35	0.105 x 0.053
$\ell 2$	0.119 $\lambda$ , 50.0 $\Omega$	7.37 x 1.35	0.290 x 0.053
$\ell 3$	0.173 $\lambda$ , 50.0 $\Omega$	10.67 x 1.35	0.420 x 0.053
$\ell 4$	0.114 $\lambda$ , 50.0 $\Omega$	7.06 x 1.35	0.278 x 0.053
$\ell 5$	0.030 $\lambda$ , 50.0 $\Omega$	1.83 x 1.35	0.072 x 0.053
$\ell 6$	0.019 $\lambda$ , 13.3 $\Omega$	1.09 x 8.81	0.043 x 0.347
$\ell 7$	0.278 $\lambda$ , 75.0 $\Omega$	17.60 x 0.69	0.693 x 0.027
$\ell 8$	0.038 $\lambda$ , 13.3 $\Omega$	2.18 x 8.81	0.086 x 0.347
$\ell 9$	0.027 $\lambda$ , 13.3 $\Omega$	1.52 x 8.81	0.060 x 0.347
$\ell 10$	0.327 $\lambda$ , 75.0 $\Omega$	20.73 x 0.69	0.816 x 0.027
$\ell 11$	0.086 $\lambda$ , 13.3 $\Omega$	4.83 x 8.81	0.190 x 0.347
$\ell 12$	0.177 $\lambda$ , 50.0 $\Omega$	10.92 x 1.35	0.430 x 0.053
$\ell 13$	0.217 $\lambda$ , 50.0 $\Omega$	13.41 x 1.35	0.528 x 0.053

CDMA2000 Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)\*

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 $\mu$ F	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 $\mu$ F, 35 V	Digi-Key	PCS6106TR-ND
C5	Capacitor, 0.1 $\mu$ F	Digi-Key	PCC104BCT-ND
C6	Ceramic capacitor, 10 pF	ATC	100B 100
C7, C10, C12, C16	Ceramic capacitor, 4.7 pF	ATC	100B 4R7
C8	Ceramic capacitor, 1.4 pF	ATC	100B 1R4
C9, C14	Ceramic capacitor, 0.5 pF	ATC	100B 0R5
C11	Ceramic capacitor, 0.6 pF	ATC	100A 0R6
C13	Tantalum capacitor, 100 $\mu$ F, 50 V	Digi-Key	P5571-ND
C15	Ceramic capacitor, 0.4 pF	ATC	100B 0R4
Q1	Transistor	Infineon	BCP56
QQ1	Voltage Regulator	National Semiconductor	LM7805
R1	Chip resistor, 1.2 k-ohms	Digi-Key	P1.2KGCT-ND
R2	Chip resistor, 1.3 k-ohms	Digi-Key	P1.3KGCT-ND
R3	Chip resistor, 2 k-ohms	Digi-Key	P2KECT-ND
R4	Potentiometer, 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R8	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor, 5.1 k-ohms	Digi-Key	P5.1KECT-ND

\*Gerber files for this circuit are available upon request.

## RF Characteristics, WiMAX Operation

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 160\text{ mA}$ ,  $P_{OUT} = 1\text{ W}$ ,  $f = 2400\text{ MHz}$ , 3.5 MHz bandwidth, 4 MHz sampling rate, 64 QAM 2/3

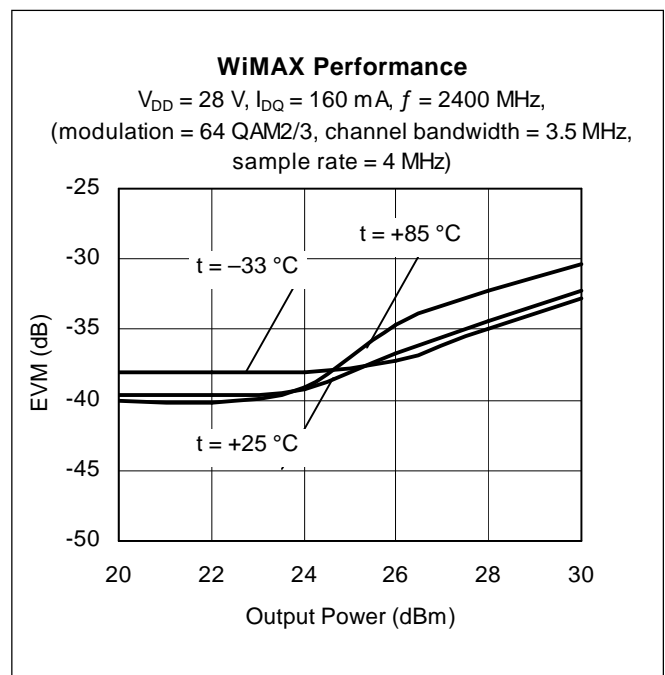
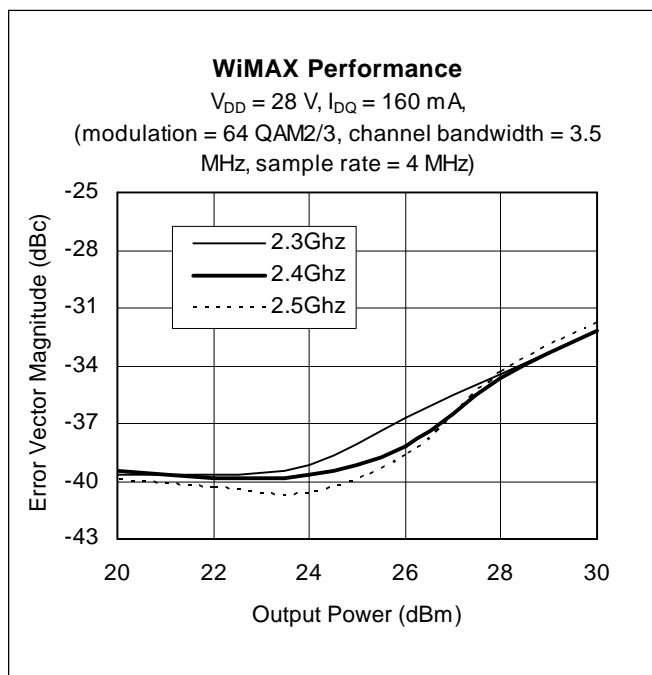
Characteristic	Symbol	Min	Typ	Max	Unit
Error Vector Magnitude	EVM	—	-41	—	dBc
Gain	$G_{ps}$	—	15.5	—	dB

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

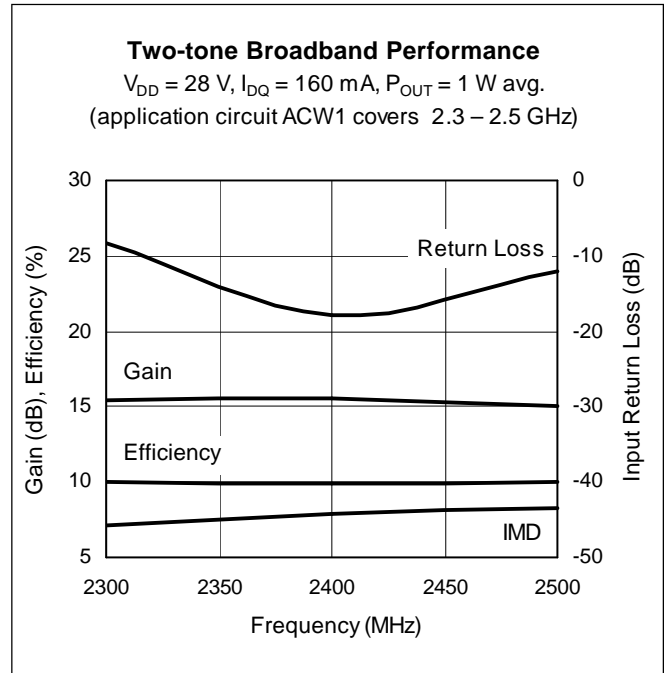
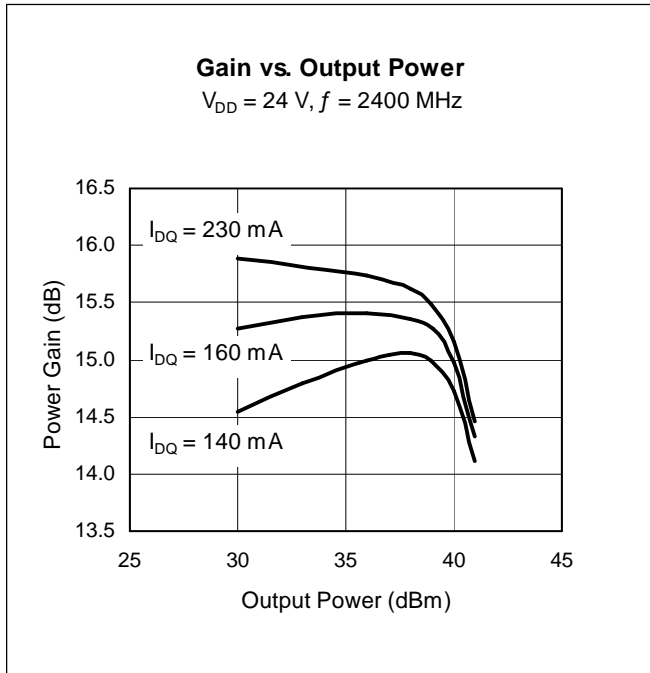
$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 160\text{ mA}$ ,  $P_{OUT} = 1\text{ W avg.}$ ,  $f = 2300, 2400, 2500\text{ MHz}$ , tone spacing = 7 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	14.0	15.5	—	dB
Intermodulation Distortion	IMD	—	-43	-40	dBc
Drain Efficiency	$\eta_D$	9	10	—	%
Input Return Loss at 2.4 GHz	IRL	—	-14	-10	dB

## Typical WiMAX Performance (measurements taken in broadband test fixture)



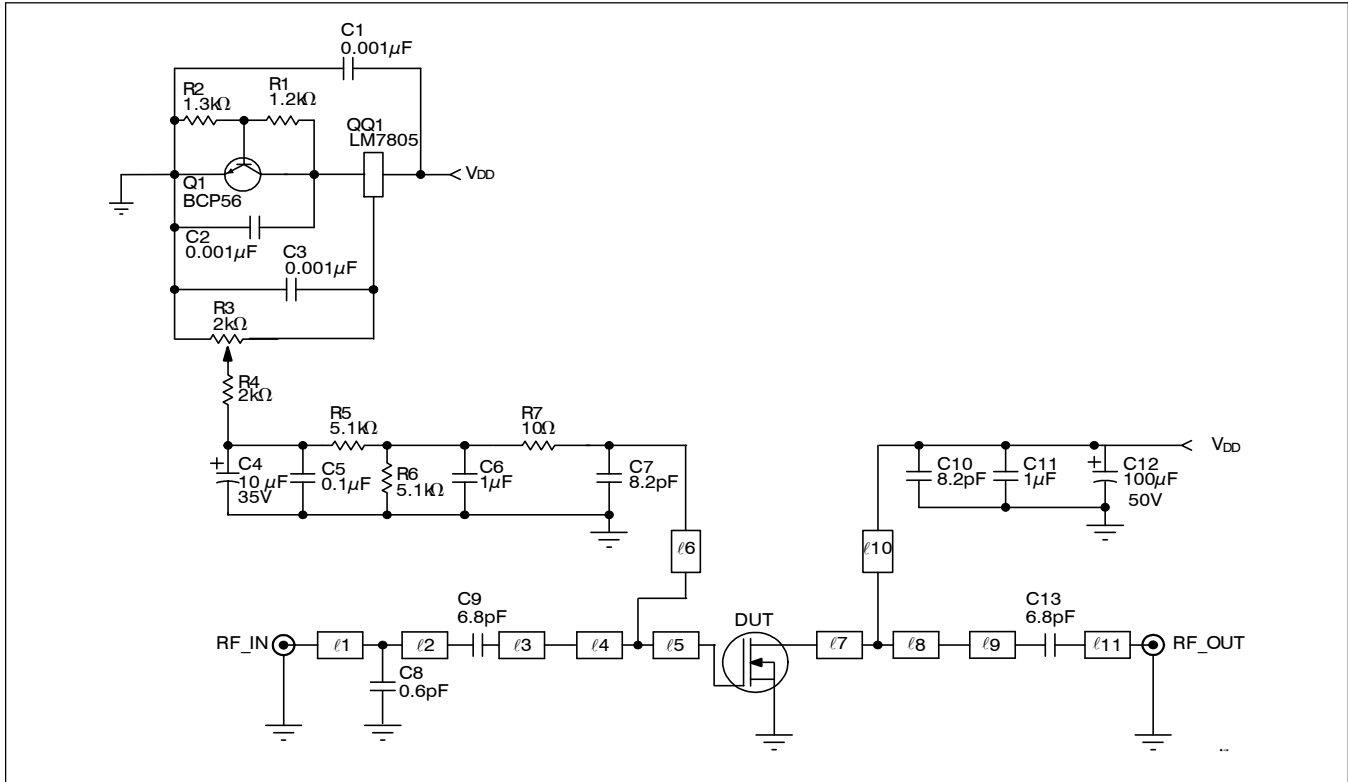
**Typical WiMAX Performance** (cont.)



See next page for WiMAX circuit information



### WiMAX Reference Circuit



WiMAX reference circuit schematic  $f = 2500 \text{ MHz}$

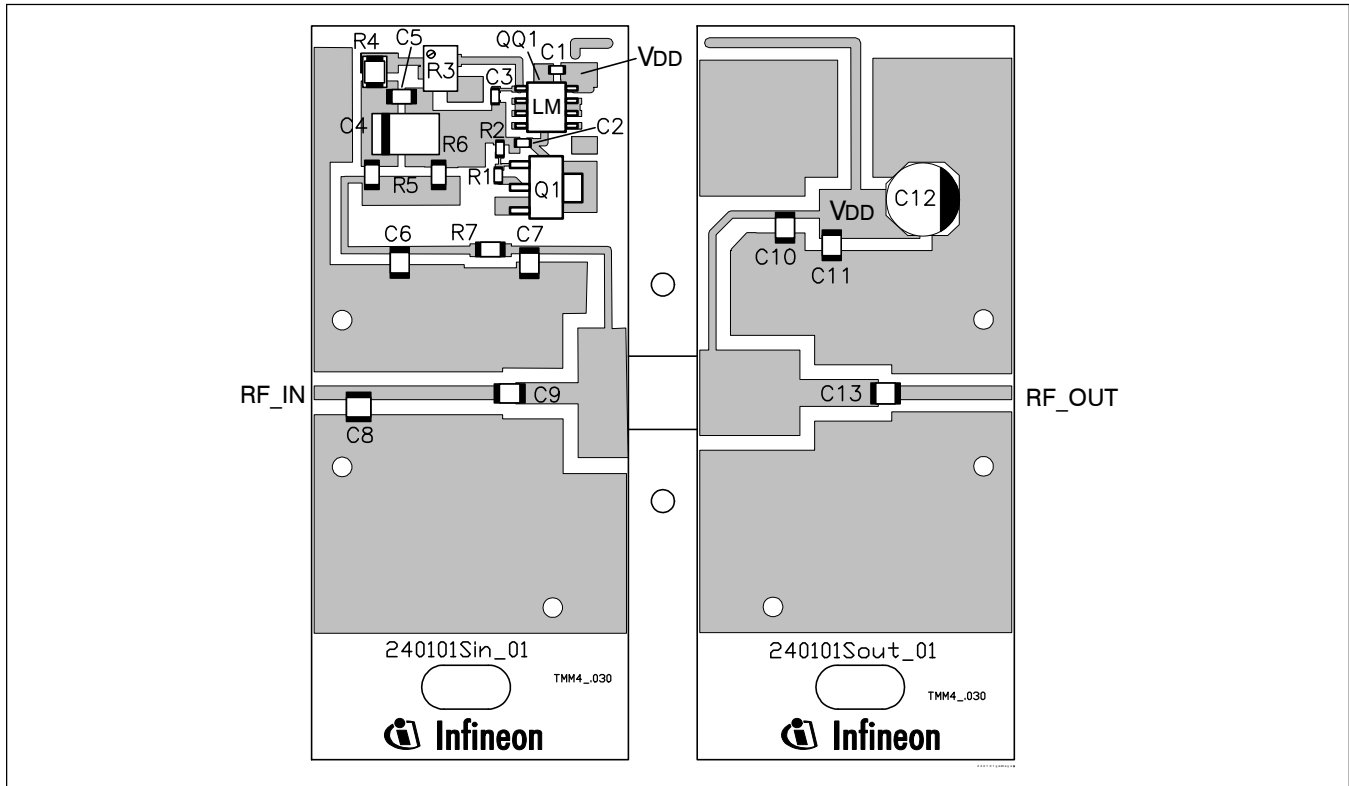
#### Circuit Assembly Information

DUT	PTF240101S	LDMOS Transistor	
Circuit Board	0.76 mm [0.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4, 2 oz. Copper	

Microstrip	Electrical Characteristics at 2500 MHz <sup>1</sup>	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l1	0.036 $\lambda$ , 50.0 $\Omega$	5.28 x 1.37	0.208 x 0.054
l2	0.081 $\lambda$ , 50.0 $\Omega$	13.69 x 1.37	0.539 x 0.054
l3	0.105 $\lambda$ , 38.0 $\Omega$	6.71 x 2.16	0.264 x 0.085
l4	0.051 $\lambda$ , 8.8 $\Omega$	3.00 x 13.64	0.118 x 0.537
l5	0.035 $\lambda$ , 8.8 $\Omega$	2.03 x 13.64	0.080 x 0.537
l6	0.278 $\lambda$ , 75.0 $\Omega$	17.60 x 0.69	0.693 x 0.027
l7	0.025 $\lambda$ , 12.9 $\Omega$	1.50 x 8.89	0.059 x 0.350
l8	0.147 $\lambda$ , 12.9 $\Omega$	8.71 x 8.89	0.343 x 0.350
l9	0.323 $\lambda$ , 68.0 $\Omega$	21.59 x 0.76	0.850 x 0.030
l10	0.133 $\lambda$ , 33.0 $\Omega$	8.38 x 2.74	0.330 x 0.108
l11	0.183 $\lambda$ , 50.0 $\Omega$	11.91 x 1.37	0.469 x 0.054

<sup>1</sup> Electrical Characteristics are rounded

WiMAX Reference Circuit (cont.)

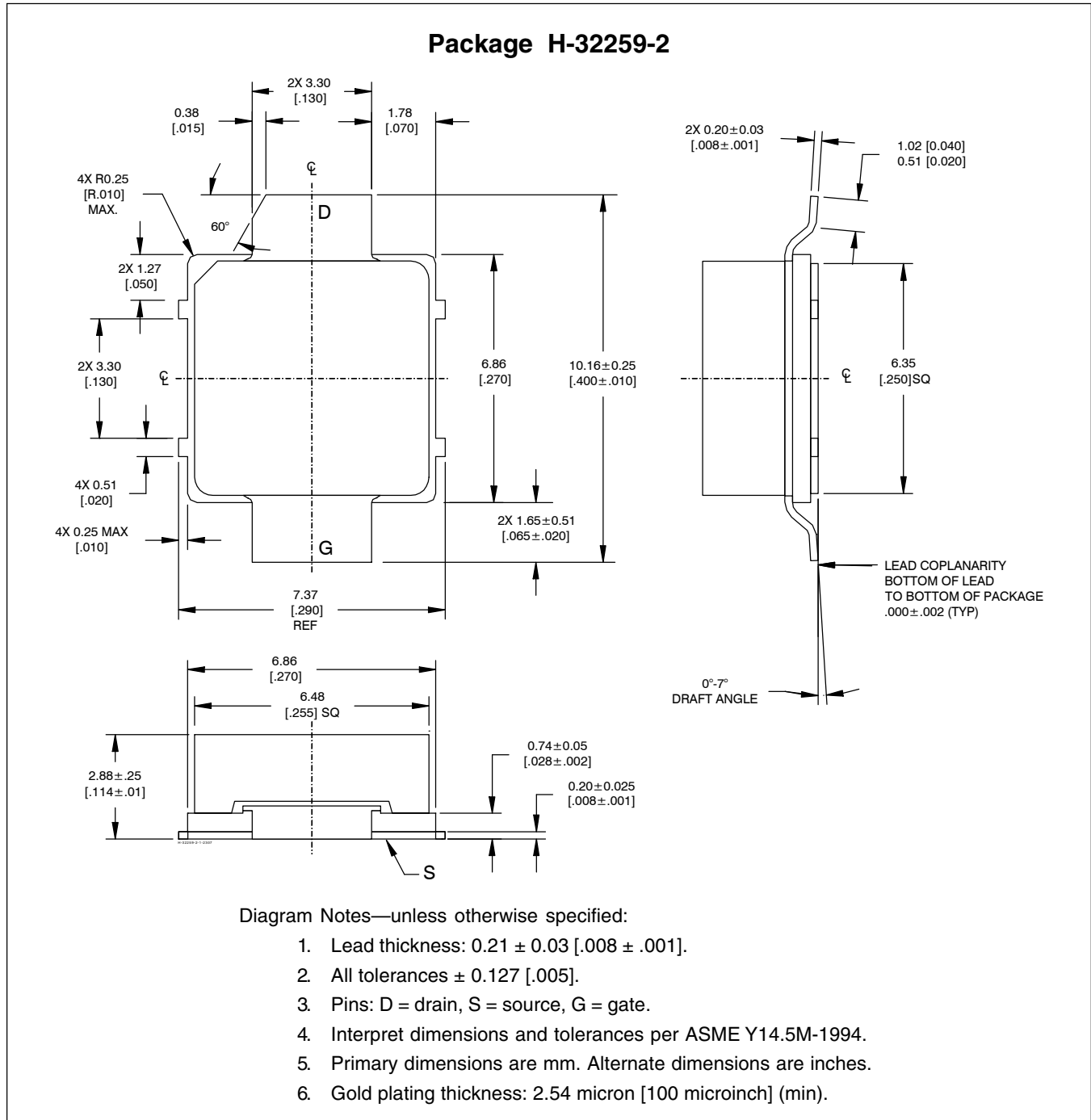


Reference circuit assembly diagram (not to scale)\*

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 $\mu$ F	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 $\mu$ F, 35 V	Digi-Key	PCS6106TR-ND
C5	Capacitor, 0.1 $\mu$ F	Digi-Key	PCC104BCT-ND
C6, C11	Ceramic capacitor, 0.01 $\mu$ F	Digi-Key	PCC103BCT-ND
C7, C10	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
C8	Ceramic capacitor, 0.6 pF	ATC	100B 0R6
C9, C13	Ceramic capacitor, 6.8 pF	ATC	100B 6R8
C12	Tantalum capacitor, 100 $\mu$ F, 50 V	Digi-Key	P5571-ND
C15	Ceramic capacitor, 0.4 pF	ATC	100B 0R4
Q1	Transistor	Infineon	BCP56
QQ1	Voltage Regulator	National Semiconductor	LM7805
R1	Chip resistor, 1.2k ohms	Digi-Key	P1.2KGCT-ND
R2	Chip resistor, 1.3k ohms	Digi-Key	P1.3KGCT-ND
R3	Potentiometer, 2k ohms	Digi-Key	3224W-202ETR-ND
R4	Chip resistor, 2k ohms	Digi-Key	P2KECT-ND
R5, R6	Chip resistor, 5.1k ohms	Digi-Key	P5.1KECT-ND
R7	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND

\*Gerber files for this circuit are available upon request.

Package Outline Specifications



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

**PTF240101S**

**Confidential, Limited Internal Distribution**

**Revision History: 2007-04-12**

Data Sheet

Previous Version: 2006-12-15, Data Sheet

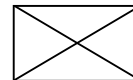
Page	Subjects (major changes since last revision)
9, 10	Update and correct circuit diagrams and information

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