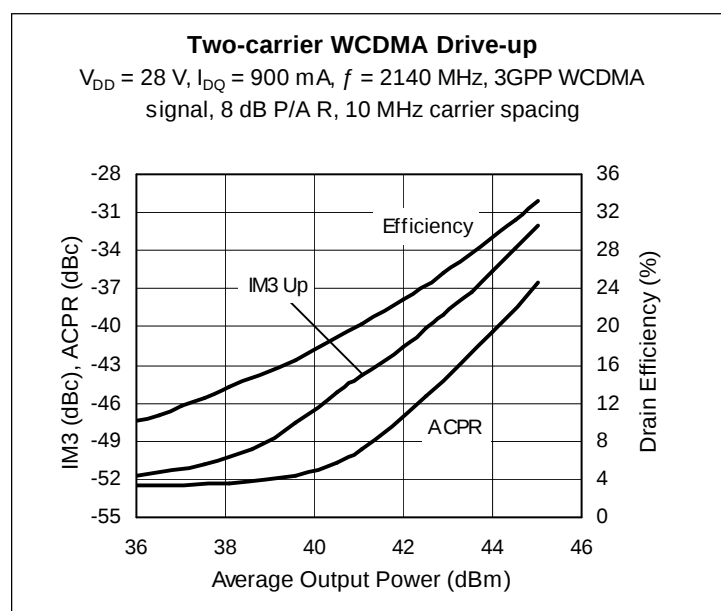


Thermally-Enhanced High Power RF LDMOS FET 100 W, 2110 – 2170 MHz

Description

The PTFA211001E is a thermally-enhanced, 100-watt, internally-matched **GOLDMOS®** FET intended for WCDMA applications. It is characterized for single- and two-carrier WCDMA operation from 2110 to 2170 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTFA211001E
Package H-30248-2



Features

- Thermally-enhanced package, Pb-free and RoHS-compliant
- Broadband internal matching
- Typical two-carrier WCDMA performance at 2140 MHz, 28 V
 - Average output power = 23 W
 - Linear Gain = 16 dB
 - Efficiency = 28.5%
 - Intermodulation distortion = -37 dBc
 - Adjacent channel power = -41 dBc
- Typical CW performance, 2170 MHz, 28 V
 - Output power at P-1dB = 125 W
 - Efficiency = 57%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 100 W (CW) output power

RF Characteristics

WCDMA Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT} = 23\text{ W}$ average

$f_1 = 2135\text{ MHz}$, $f_2 = 2145\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	15	16	—	dB
Drain Efficiency	η_D	27	28.5	—	%
Intermodulation Distortion	IMD	—	-37	-36	dBc

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

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	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.08	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$	V_{GS}	2.0	2.5	3.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

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	417	W
Above 25 $^{\circ}\text{C}$ derate by		2.38	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 100 W CW)	$R_{\theta JC}$	0.42	$^{\circ}\text{C/W}$

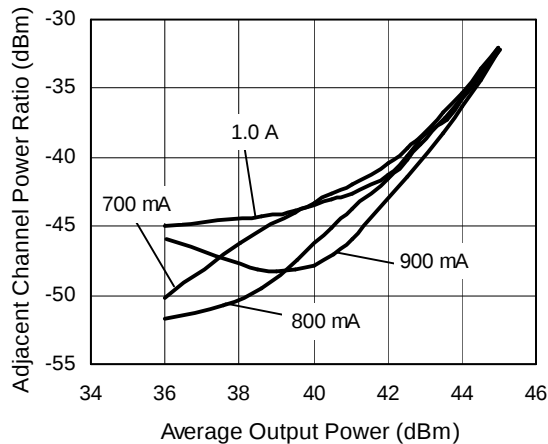
Ordering Information

Type and Version	Package Outline	Package Description	Marking
PTFA211001E V1	H-30248-2	Thermally-enhanced slotted flange, single-ended	PTFA211001E

Typical Performance (data taken in a production test fixture)

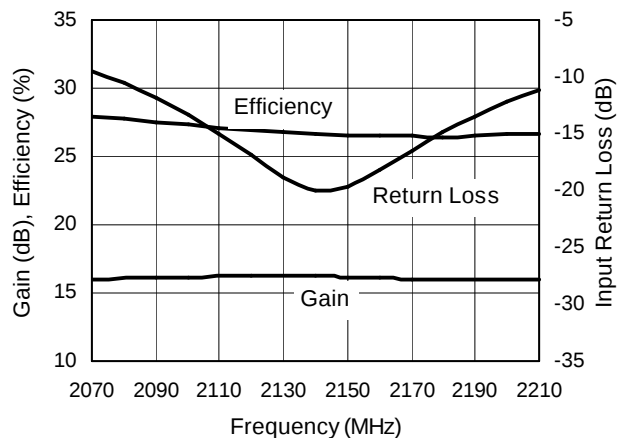
Two-carrier WCDMA at Various Biases

$V_{DD} = 28\text{ V}$, $f = 2140\text{ MHz}$, 3GPP WCDMA signal,
P/AR = 8 dB, 10 MHz carrier spacing, series show I_{DQ}



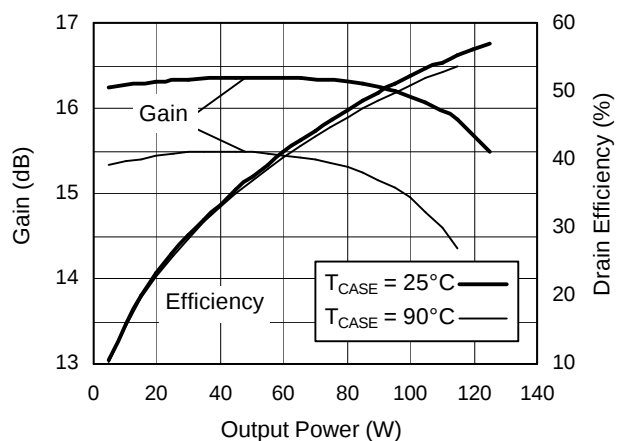
Broadband Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT} = 44.0\text{ dBm}$



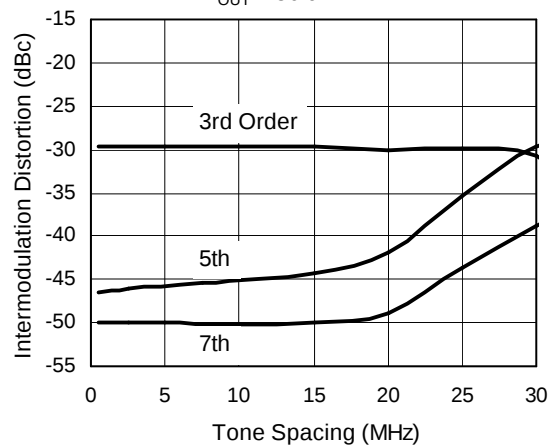
Power Sweep, CW Conditions

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $f = 2170\text{ MHz}$



Intermodulation Distortion Products vs. Tone Spacing

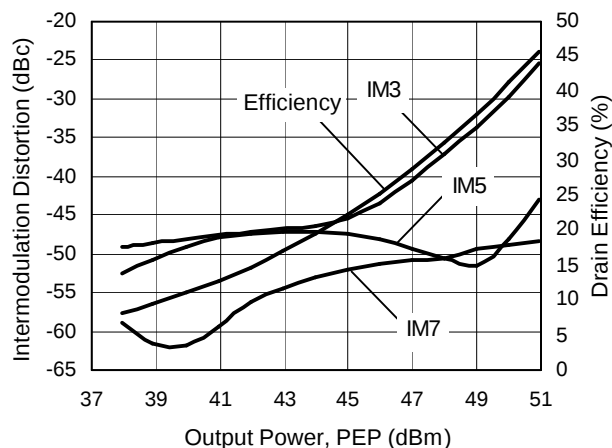
$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $f = 2140\text{ MHz}$,
 $P_{OUT} = 50\text{ dBm PEP}$



Typical Performance (cont.)

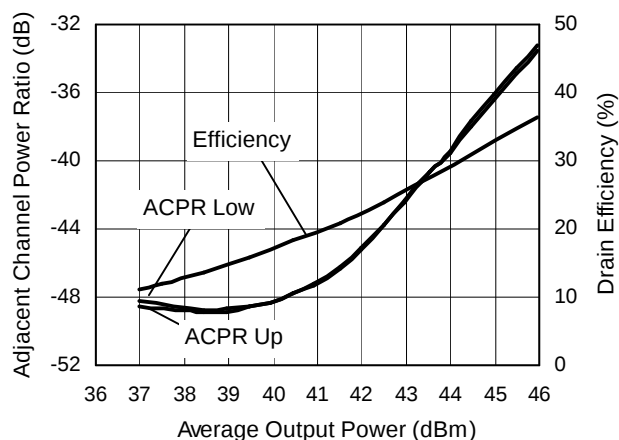
2-Tone Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$,
 $f = 2140\text{ MHz}$, tone spacing = 1 MHz



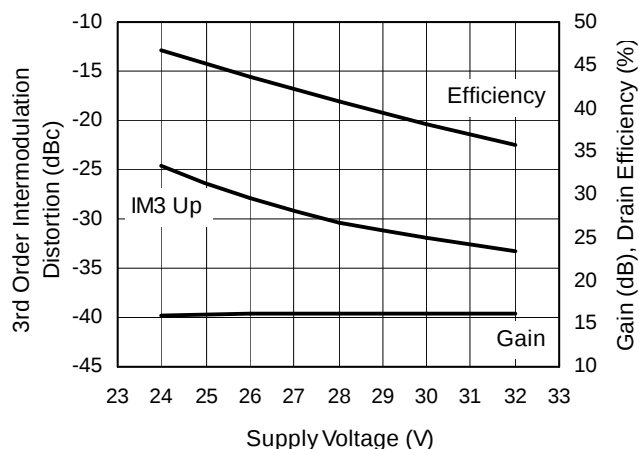
Single-carrier WCDMA Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $f = 2140\text{ MHz}$,
 3GPP WCDMA signal, TM1 w/16 DPCH, 67% clipping,
 P/A R = 8.5 dB, 3.84 MHz BW



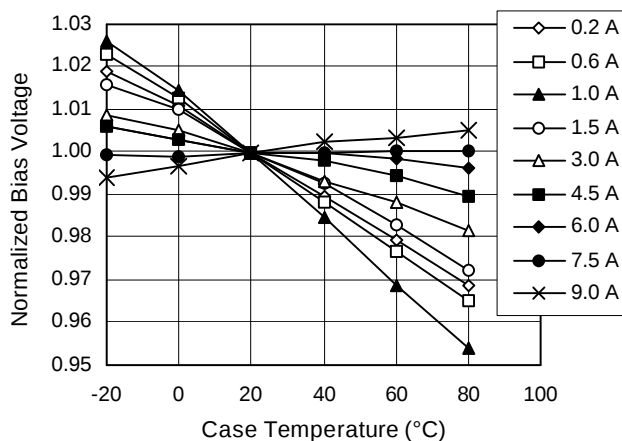
IM3, Drain Efficiency and Gain vs. Supply Voltage

$I_{DQ} = 900\text{ mA}$, $f = 2140\text{ MHz}$, tone spacing = 1 MHz,
 Output Power (PEP) = 50 dBm

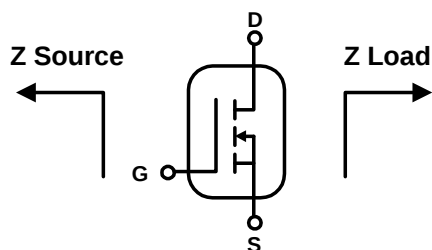


Bias Voltage vs. Temperature

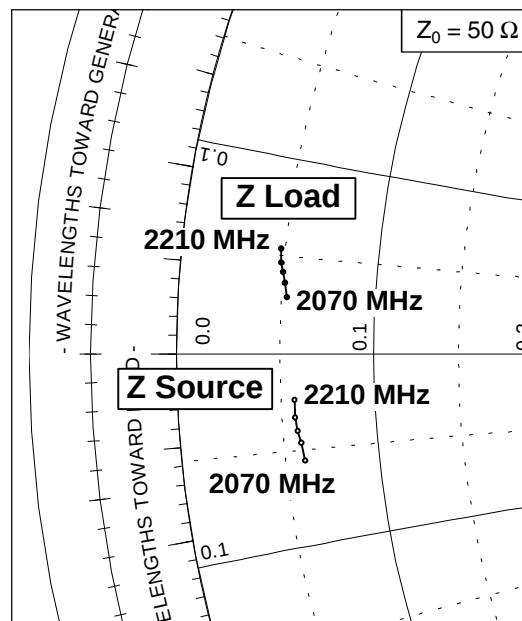
Voltage normalized to typical gate voltage,
 series show current



Broadband Circuit Impedance

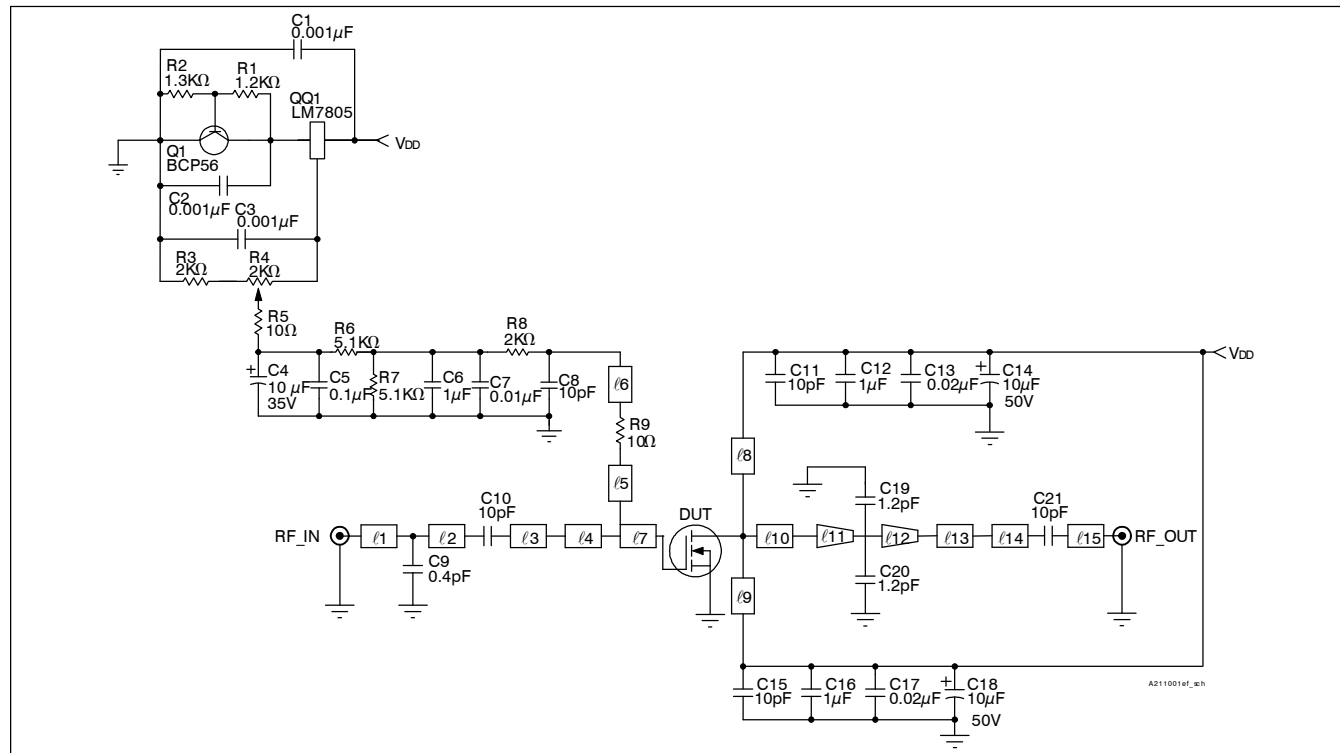


Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
2070	3.02	-2.80	2.64	1.47
2110	2.96	-2.32	2.57	1.84
2140	2.89	-2.01	2.51	2.10
2170	2.84	-1.66	2.44	2.34
2210	2.85	-1.20	2.40	2.70



See next page for circuit information

Reference Circuit



Reference circuit schematic for $f = 2140$ MHz

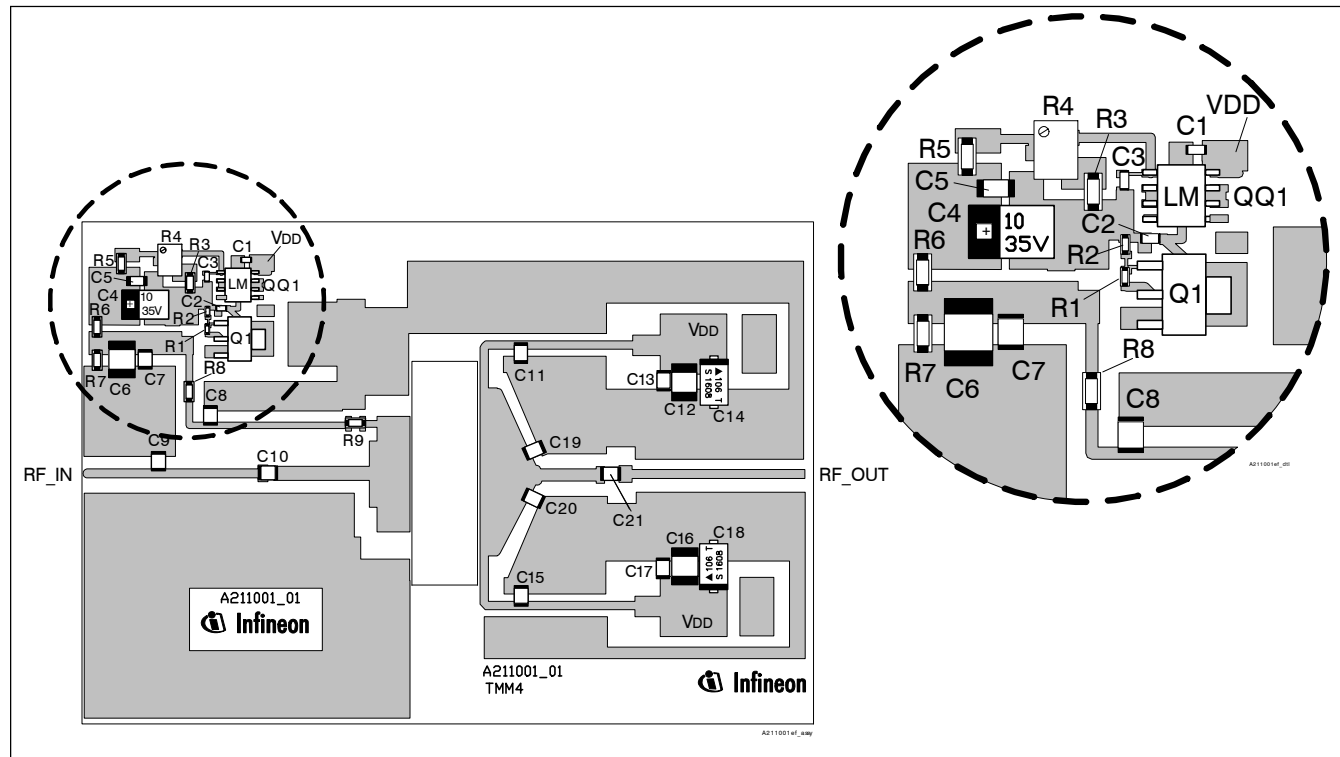
Circuit Assembly Information

DUT	PTFA211001E	LDMOS Transistor	
PCB	0.76 mm [0.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2140 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l_1	0.130 λ , 52.0 Ω	9.96 x 1.30	0.392 x 0.051
l_2	0.235 λ , 52.0 Ω	18.01 x 1.30	0.709 x 0.051
l_3	0.191 λ , 39.0 Ω	14.30 x 2.08	0.563 x 0.082
l_4	0.018 λ , 11.5 Ω	1.22 x 10.03	0.048 x 0.395
l_5	0.024 λ , 64.0 Ω	1.88 x 0.89	0.074 x 0.035
l_6	0.261 λ , 64.0 Ω	20.32 x 0.89	0.800 x 0.035
l_7	0.073 λ , 7.0 Ω	4.98 x 17.68	0.196 x 0.696
l_8, l_9	0.170 λ , 55.0 Ω	13.08 x 1.17	0.515 x 0.046
l_{10}	0.043 λ , 5.0 Ω	2.95 x 25.40	0.116 x 1.000
l_{11} (taper)	0.059 λ , 5.0 Ω / 17.4 Ω	4.01 x 25.40 / 6.17	0.158 x 1.000 / 0.243
l_{12} (taper)	0.033 λ , 17.4 Ω / 42.0 Ω	2.36 x 6.17 / 1.83	0.093 x 0.243 / 0.072
l_{13}	0.124 λ , 42.0 Ω	9.30 x 1.83	0.366 x 0.072
l_{14}	0.381 λ , 50.0 Ω	29.11 x 1.37	1.146 x 0.054

¹Electrical characteristics are rounded.

Reference Circuit (cont.)

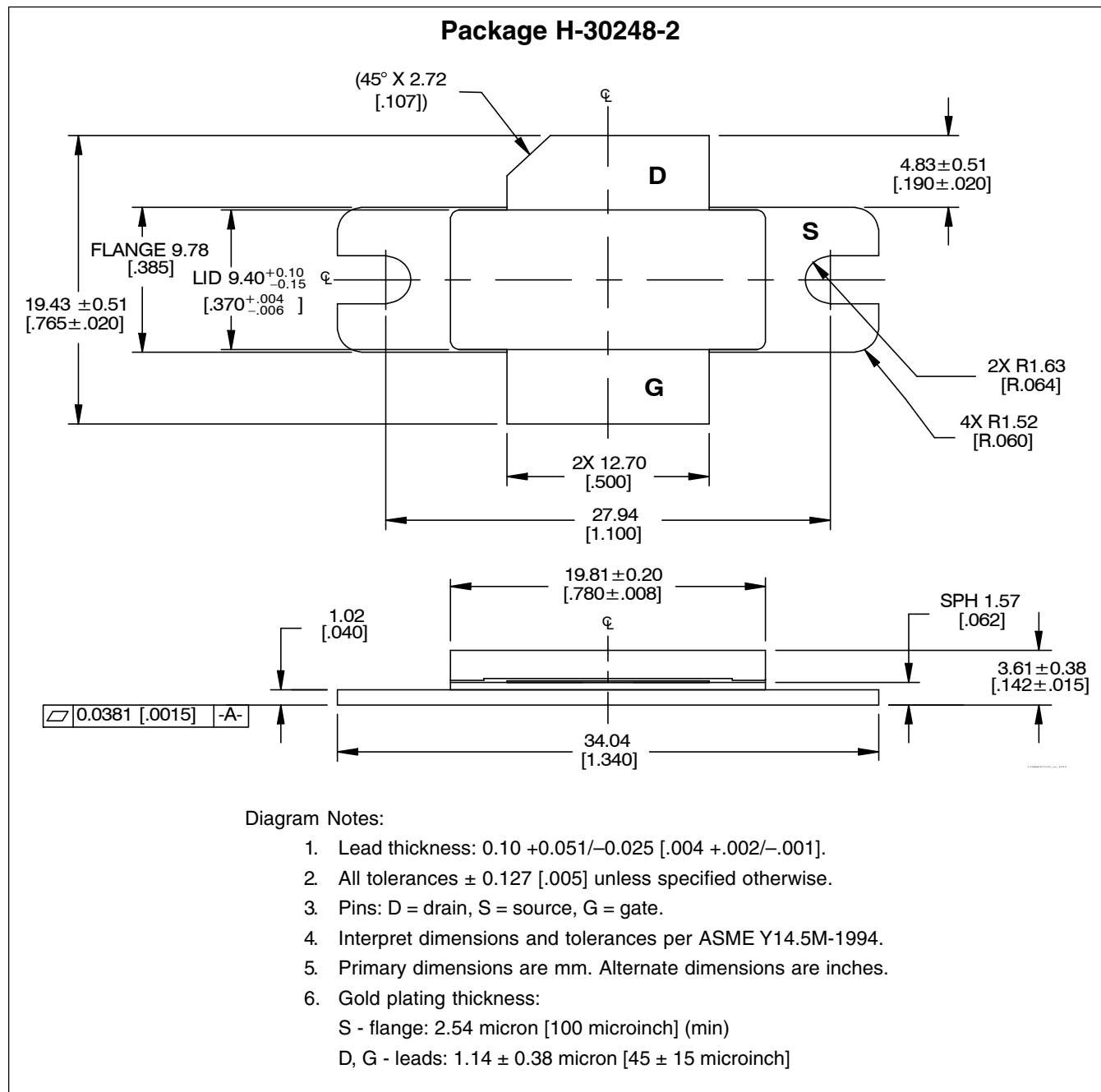


Reference circuit assembly diagram* (not to scale)

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 μ F	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 μ F, 35 V	Digi-Key	PCS6106TR-ND
C5	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6, C12, C16	Capacitor, 1 μ F	ATC	920C105
C7	Capacitor, 0.01 μ F	Digi-Key	200B 103
C8, C10, C11, C15, C21	Ceramic capacitor, 10 pF	ATC	100B 100
C9	Ceramic capacitor, 0.4 pF	ATC	100B 0R4
C13, C17	Capacitor, 0.02 μ F	Digi-Key	200B203
C14, C18	Tantalum capacitor, 10 μ F, 50 V	Gerrette Electronics	TPS106K050R0400
C19, C20	Ceramic capacitor, 1.2 pF	ATC	100B 1R2
Q1	Transistor	Infineon Technologies	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, R8	Chip resistor 2 k-ohms	Digi-Key	P2KECT-ND
R4	Potentiometer, 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R9	Chip resistor 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND

¹Gerber Files for this circuit available on our Web site: www.infineon.com/rfpower

Package Outline Specifications



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

Revision History: 2008-03-04

Data Sheet

Previous Version: 2005-02-04, Data Sheet

Page	Subjects (major changes since last revision)
All	Remove references to alternate products.

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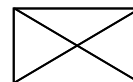
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