

Thermally-Enhanced High Power RF LDMOS FETs 150 W, 420 – 500 MHz

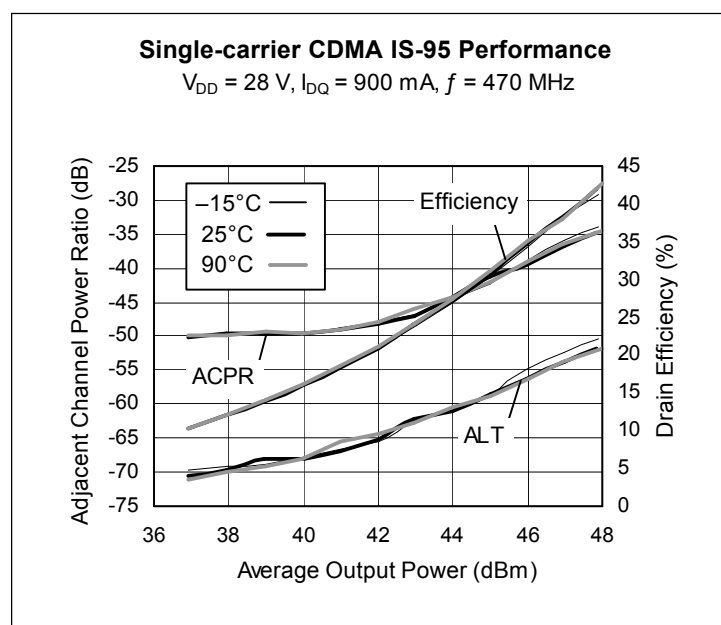
Description

The PTFA041501E and PTFA041501F are 150-watt LDMOS FETs designed for ultra-linear CDMA power amplifier applications. They are available in thermally-enhanced ceramic open-cavity packages. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFA041501E
Package H-36248-2



PTFA041501F
Package H-37248-2



Features

- Broadband internal matching
- Typical CDMA performance at 470 MHz, 28 V
 - Average output power = 60 W
 - Linear Gain = 21 dB
 - Efficiency = 41%
- Typical CW performance, 470 MHz, 28 V
 - Output power at P-1dB = 175 W
 - Efficiency = 62%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 150 W (CW) output power
- Pb-free and RoHS-compliant

RF Characteristics

Single-carrier CDMA IS-95 Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT} = 60\text{ W}$ average, $f = 470\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	21	—	dB
Drain Efficiency	η_D	—	41	—	%
Adjacent Channel Power Ratio	ACPR	—	-33	—	dB

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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT} = 150\text{ W PEP}$, $f = 470\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	20.0	21.0	—	dB
Drain Efficiency	η_D	45.0	46.5	—	%
Intermodulation Distortion	IMD	—	-29	-28	dBc

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	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.07	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$	V_{GS}	2	2.48	3	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

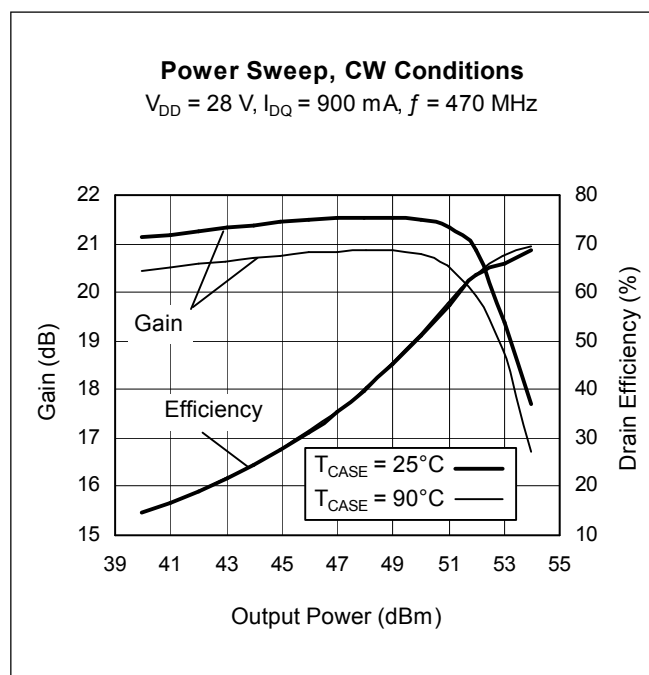
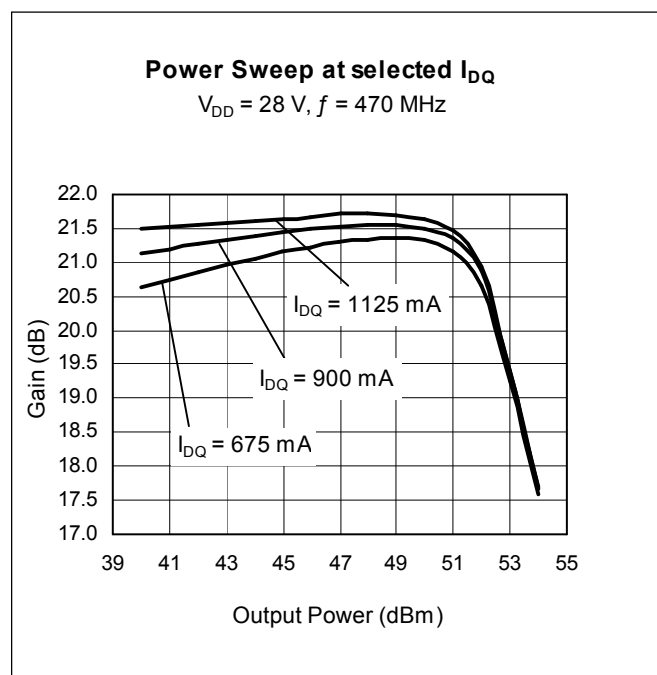
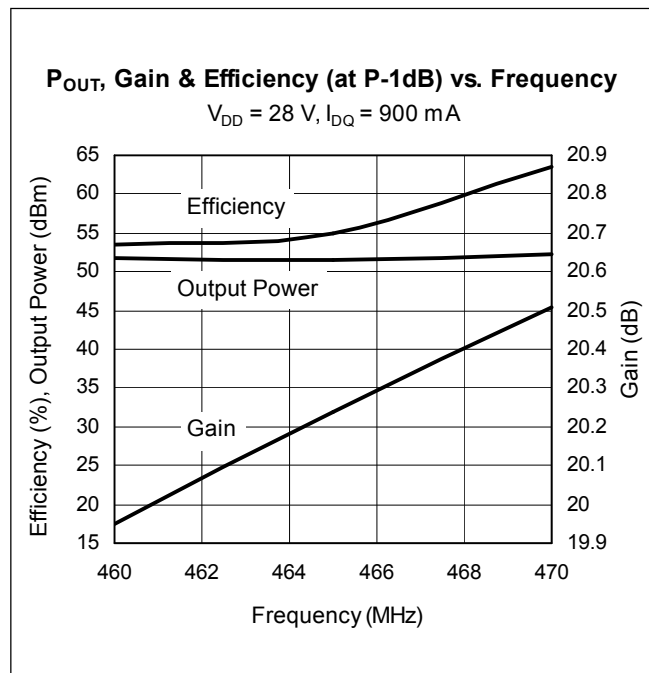
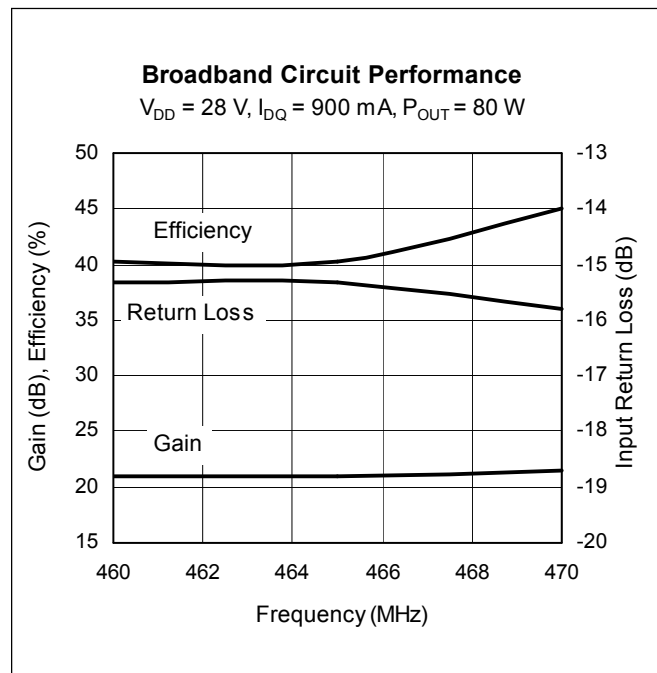
Maximum Ratings

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	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 150 W CW)	$R_{\theta JC}$	0.42	$^{\circ}\text{C/W}$

Ordering Information

Type and Version	Package Type	Package Description	Shipping
PTFA041501E V4	H-36248-2	Thermally-enhanced slotted flange, single-ended	Tray
PTFA041501E V4 R250	H-36248-2	Thermally-enhanced slotted flange, single-ended	Tape & Reel, 250 pcs
PTFA041501F V4	H-37248-2	Thermally-enhanced earless flange, single-ended	Tray
PTFA041501F V4 R250	H-37248-2	Thermally-enhanced earless flange, single-ended	Tape & Reel, 250 pcs

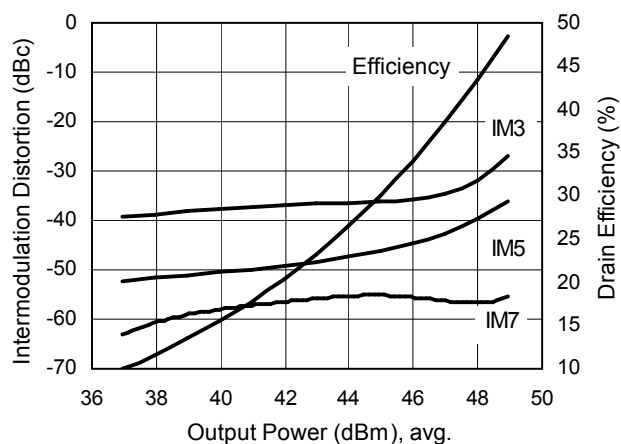
Typical Performance (data taken in a production test fixture)



Typical Performance (cont.)

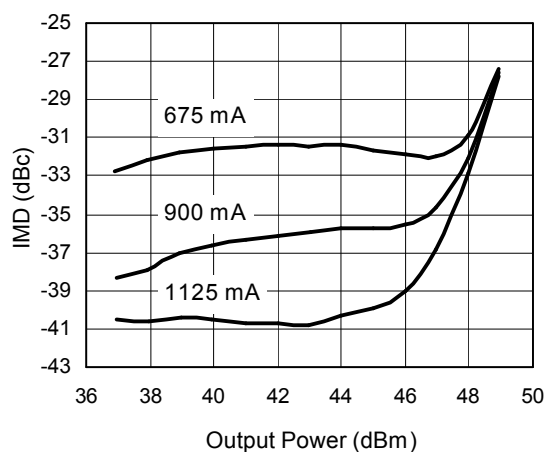
Intermodulation Distortion vs. Output Power

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$,
 $f_1 = 469\text{ MHz}$, $f_2 = 470\text{ MHz}$



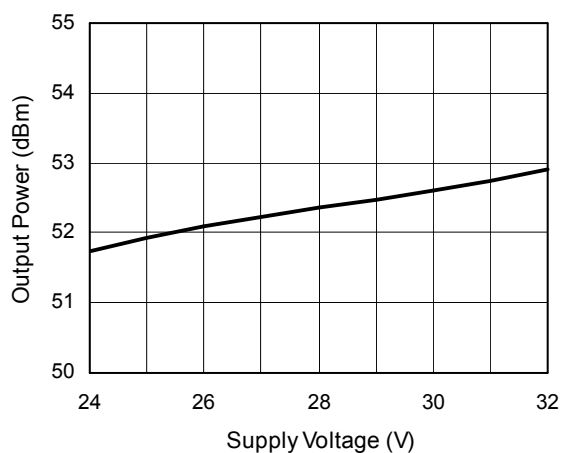
IM3 vs. Output Power at Selected Biases

$V_{DD} = 28\text{ V}$, $f_1 = 469\text{ MHz}$, $f_2 = 470\text{ MHz}$



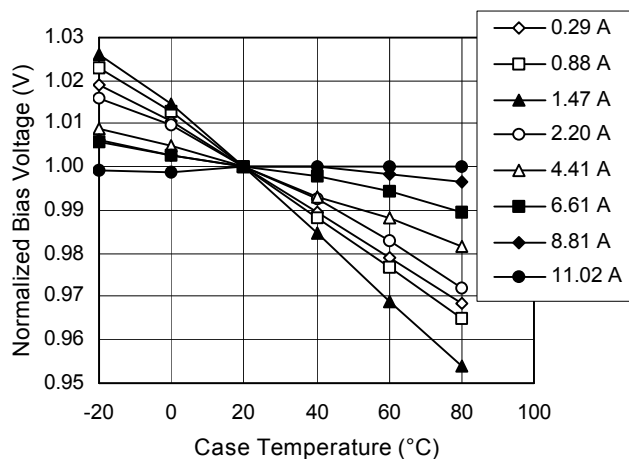
Output Power (at 1 dB compression) vs. Supply Voltage

$I_{DQ} = 900\text{ mA}$, $f = 470\text{ MHz}$

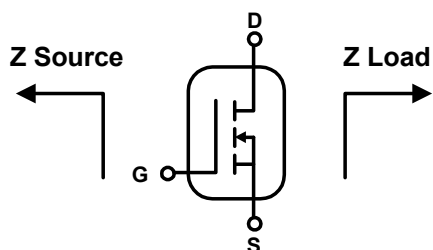


Bias Voltage vs. Temperature

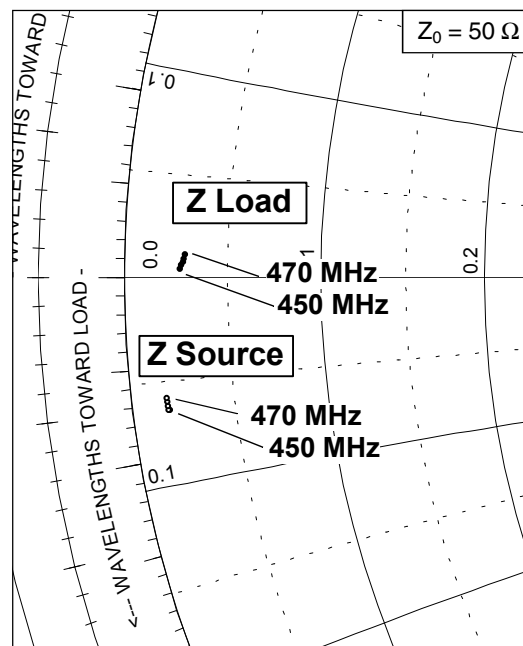
Voltage normalized to typical gate voltage,
series show current



Broadband Circuit Impedance

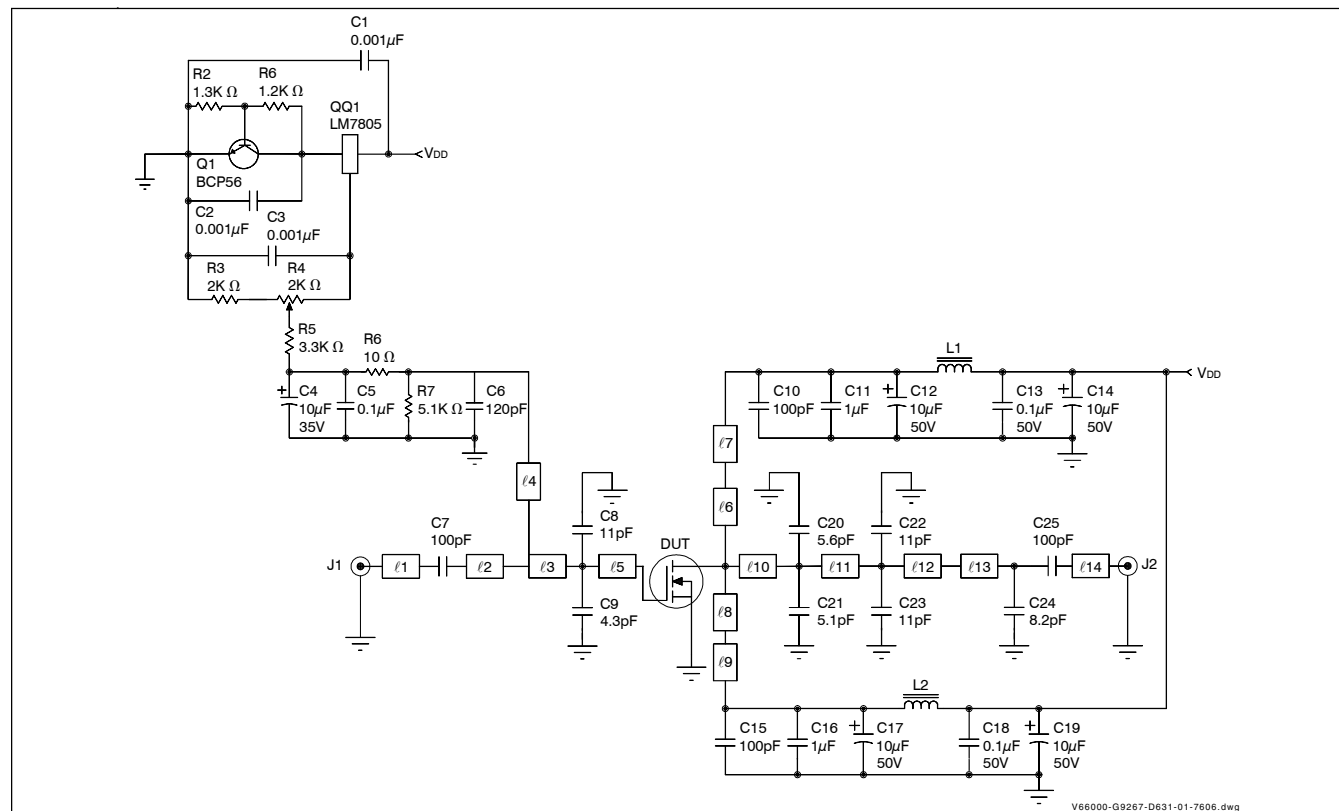


Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
450	0.88	-3.20	1.33	0.22
455	0.84	-3.20	1.35	0.31
460	0.84	-3.10	1.40	0.38
465	0.84	-3.00	1.41	0.47
470	0.83	-2.90	1.44	0.57



See next page for circuit information

Reference Circuit



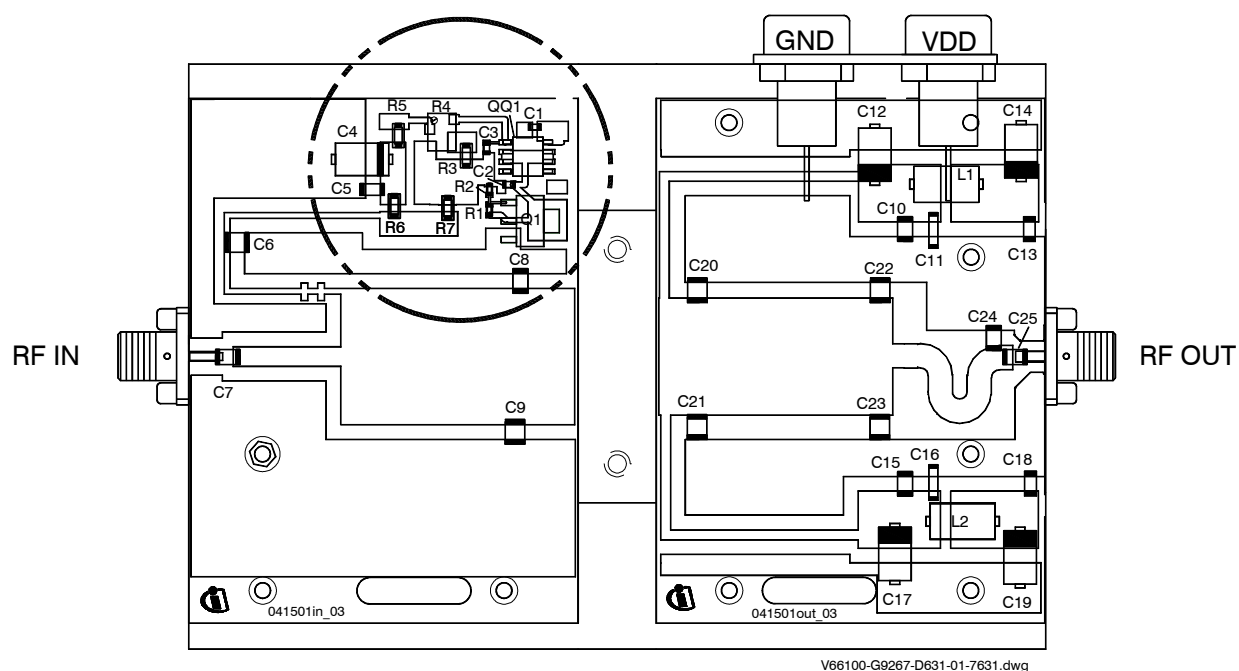
Reference circuit schematic for $f = 460$ MHz

Circuit Assembly Information

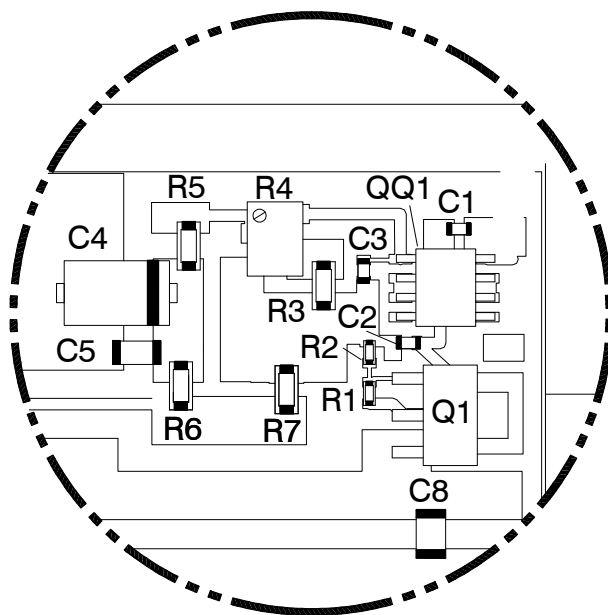
DUT	PTFA041501E or PTFA041501F	LDMOS Transistor		
PCB	LTN/PTFA041501EF	0.76 mm [.030"] thick, $\epsilon_r = 9.2$	Rogers TMM10	2 oz. copper

Microstrip	Electrical Characteristics at 460 MHz	Dimensions L x W (mm)	Dimensions L x W (in.)
$\ell 1$	0.016λ , 50.69 Ω	4.32 x 0.71	0.170 x 0.028
$\ell 2$	0.058λ , 24.34 Ω	14.22 x 2.54	0.560 x 0.100
$\ell 3$	0.097λ , 4.85 Ω	21.59 x 17.78	0.850 x 0.700
$\ell 4$	0.081λ , 50.69 Ω	21.59 x 0.71	0.850 x 0.280
$\ell 5$	0.040λ , 4.85 Ω	8.89 x 17.78	0.350 x 0.700
$\ell 6$	0.158λ , 37.73 Ω	40.64 x 1.27	1.600 x 0.050
$\ell 7$	0.030λ , 10.94 Ω	5.59 x 7.11	0.220 x 0.280
$\ell 8$	0.158λ , 37.73 Ω	40.64 x 1.27	1.600 x 0.050
$\ell 9$	0.030λ , 10.94 Ω	5.59 x 7.11	0.220 x 0.280
$\ell 10$	0.025λ , 5.58 Ω	5.59 x 15.24	0.220 x 0.600
$\ell 11$	0.105λ , 5.58 Ω	23.62 x 15.24	0.930 x 0.600
$\ell 12$	0.006λ , 5.58 Ω	1.27 x 15.24	0.050 x 0.600
$\ell 13$	0.104λ , 21.37 Ω	25.4 x 3.05	1.000 x 0.120
$\ell 14$	0.014λ , 50.69 Ω	3.81 x 0.71	0.150 x 0.028

Reference Circuit (cont.)



V66100-G9267-D631-01-7631.dwg

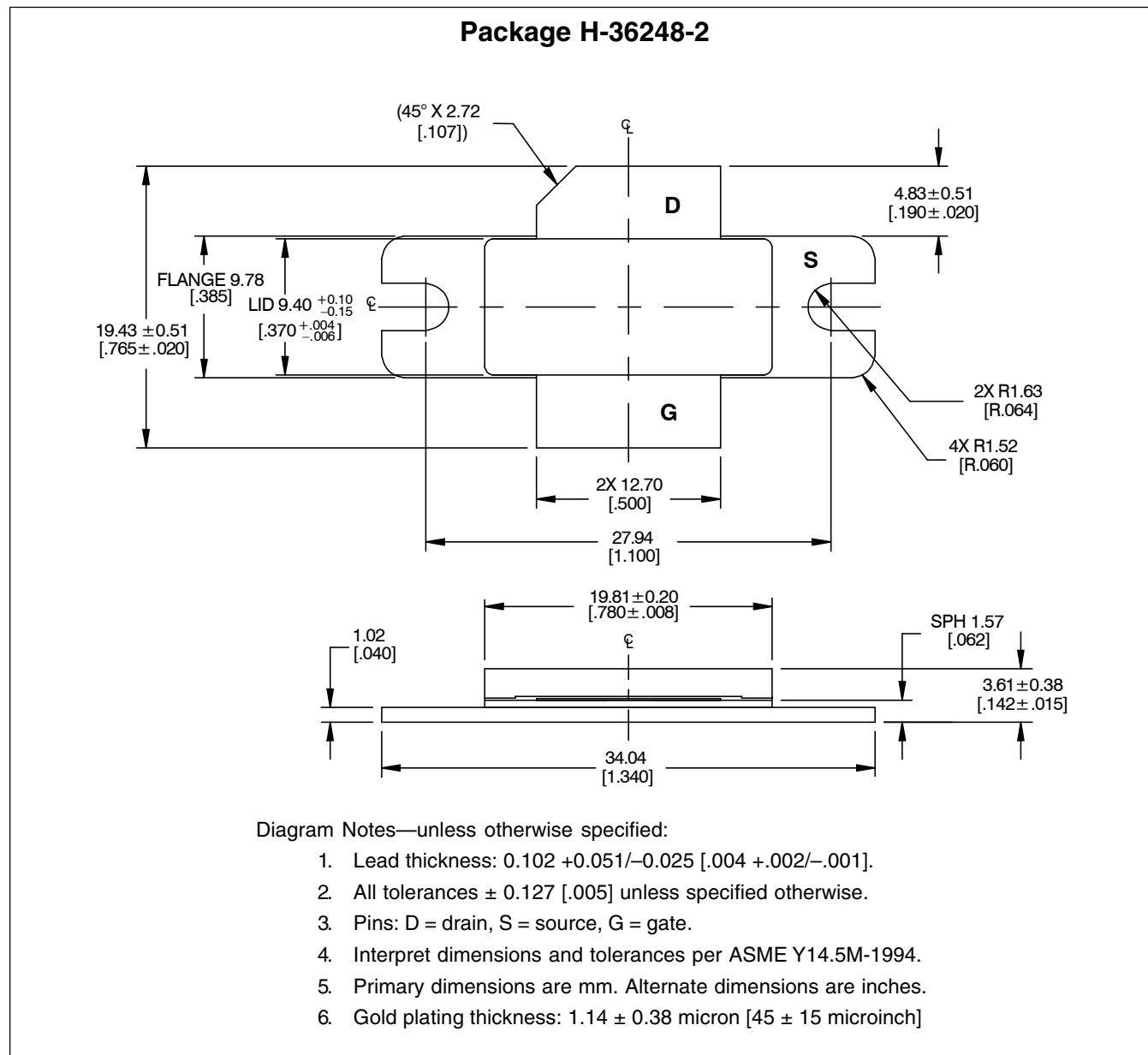


Reference circuit assembly diagram (not to scale). Gerber files for this circuit available on request.

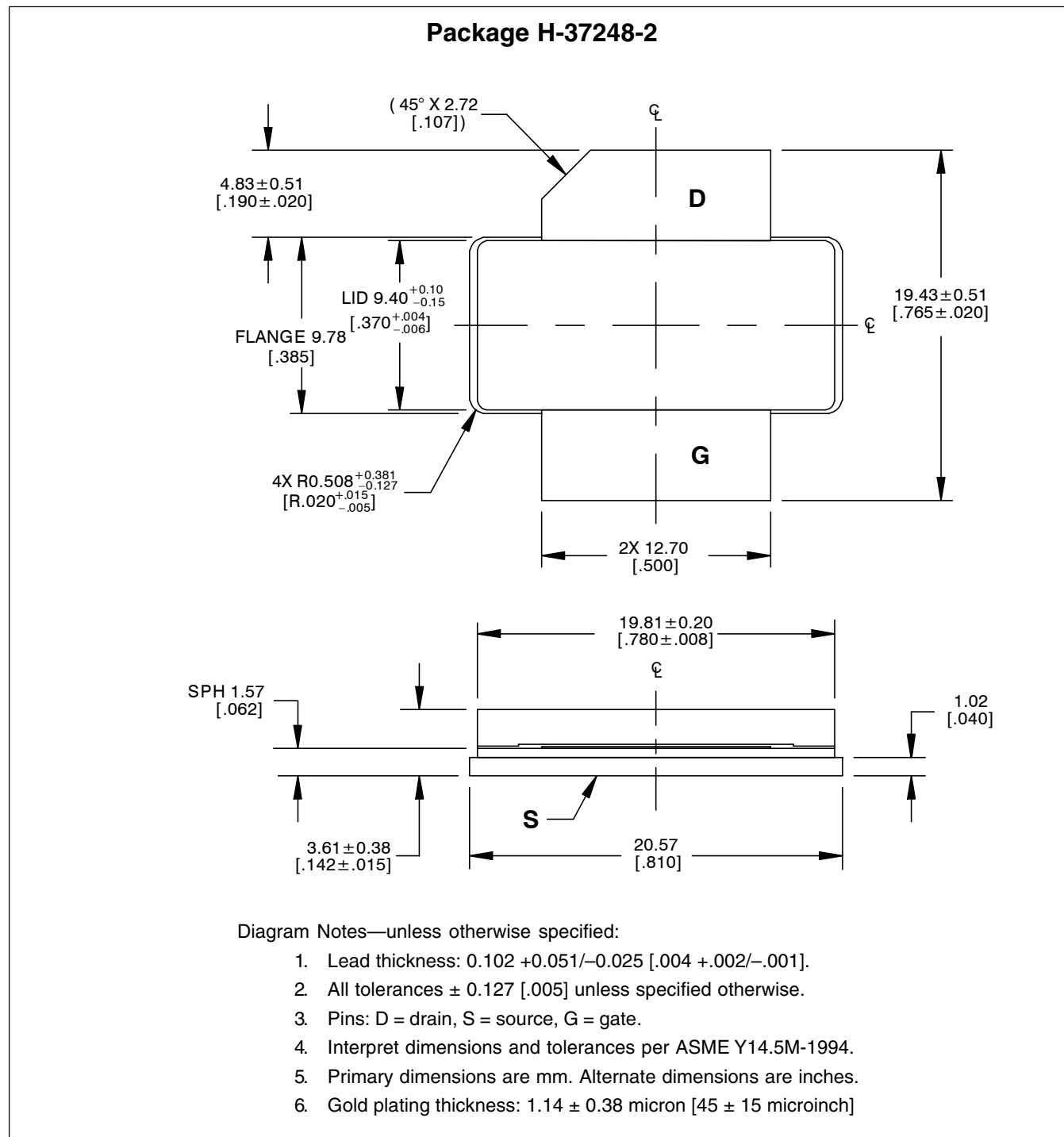
Reference Circuit (cont.)

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, C13, C18	Capacitor, 0.1 μ F	Digi-Key	P4525-ND
C6	Ceramic capacitor, 120 pF	ATC	100B 121
C7, C10, C15, C25	Ceramic capacitor, 100 pF	ATC	100B 101
C8, C22, C23	Ceramic capacitor, 11 pF	ATC	100B 110
C9	Ceramic capacitor, 4.3 pF	ATC	100B 4R3
C11, C16	Capacitor, 1.0 μ F	ATC	920C105
C12, C14, C17, C19	Capacitor, 10 μ F, 50 V	Garrett Electronics	TPS106K050R0400
C20	Ceramic capacitor, 5.6 pF	ATC	100B 5R6
C21	Ceramic capacitor, 5.1 pF	ATC	100B 5R1
C24	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
L1, L2	Ferrite, 6 mm	Ferroxcube	53/3/4.6-452
Q1	Transistor	Infineon Technologies	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	Chip resistor, 2k ohms	Digi-Key	P2.0KECT-ND
R4	Potentiometer, 2k ohms	Digi-Key	3224W-202ETR-ND
R5	Chip resistor, 3.3k ohms	Digi-Key	P3.3KECT-ND
R6	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R7	Chip resistor, 5.1k ohms	Digi-Key	P5.1KECT-ND

Package Outline Specifications



Package Outline Specifications (cont.)



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

Revision History: 2010-01-20

Data Sheet

Previous Version: none

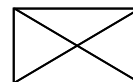
Page	Subjects (major changes since last revision)
6, 9, 10	Minor cosmetic changes only

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