

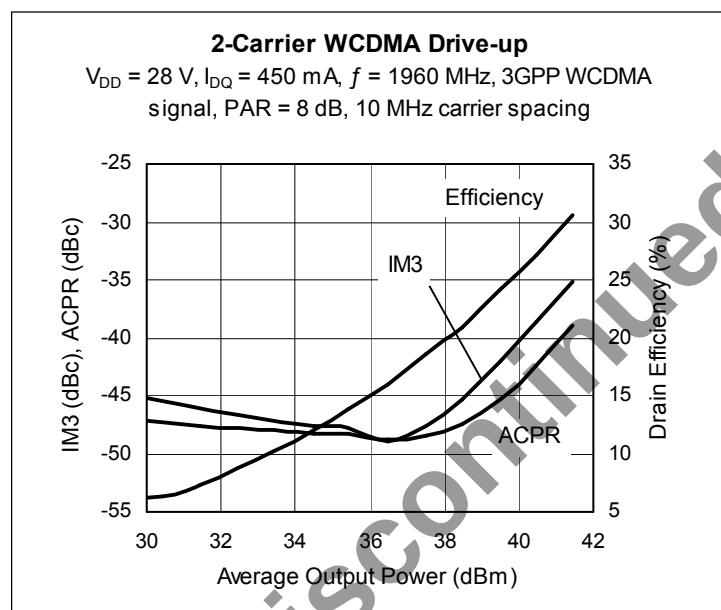
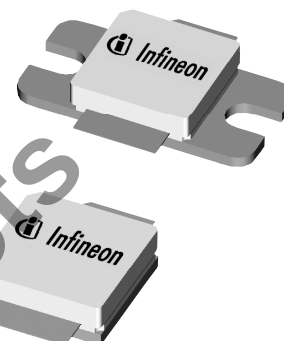
Thermally-Enhanced High Power RF LDMOS FETs 45 W, 1930 – 1990 MHz

Description

The PTFA190451E and PTFA190451F are thermally-enhanced, 45-watt, internally matched LDMOS FETs designed for WCDMA, TD-SCDMA and other cellular standards in the 1930 to 1990 MHz frequency band. These devices are available in thermally-enhanced packages with eared or earless flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFA190451E
Package H-36265-2

PTFA190451F
Package H-37265-2



Features

- Broadband internal matching
- Typical two-carrier WCDMA performance at 1960 MHz, 28 V
 - Average output power = 11 W
 - Linear gain = 17.5 dB
 - Efficiency = 28.0%
 - Intermodulation distortion = -39 dBc
 - Adjacent channel power = -42 dBc
- Typical CW performance, 1960 MHz, 28 V
 - Output power at P-1dB = 60 W
 - Efficiency = 60%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 45 W (CW) output power
- Pb-free and RoHS compliant

RF Characteristics

WCDMA Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT} = 11\text{ W}$ average

$f_1 = 1955\text{ MHz}$, $f_2 = 1965\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16.5	17.5	—	dB
Drain Efficiency	η_D	27	28	—	%
Intermodulation Distortion	IMD	—	-39	-37	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 (not subject to production test—verified by design/characterization in Infineon test fixture)
 $V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT} = 45\text{ W PEP}$, $f = 1990\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	17.5	—	dB
Drain Efficiency	η_D	—	38	—	%
Intermodulation Distortion	IMD	—	-31	—	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.91	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$	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 Above 25 $^{\circ}\text{C}$ derate by	P_D	211	W
		1.21	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 45 W CW)	$R_{\theta JC}$	0.83	$^{\circ}\text{C/W}$

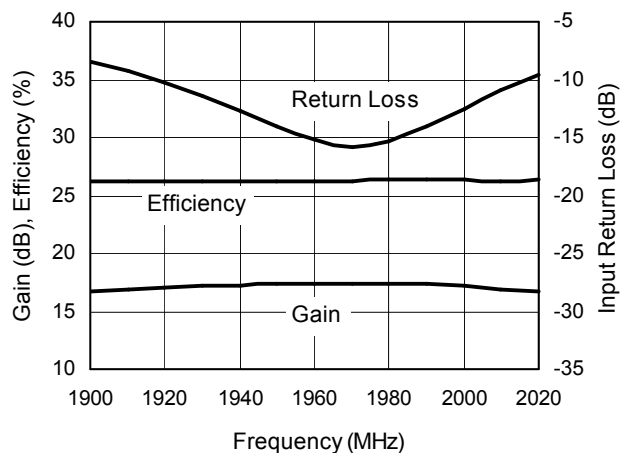
Ordering Information

Type and Version	Package Outline	Package Description	Shipping	Marking
PTFA190451E V4	H-36265-2	Thermally-enhanced slotted flanges, single-ended	Tray	PTFA190451E
PTFA190451F V4	H-37265-2	Thermally-enhanced earless flange, single-ended	Tray	PTFA190451F

Typical Performance (data taken in a production test fixture)

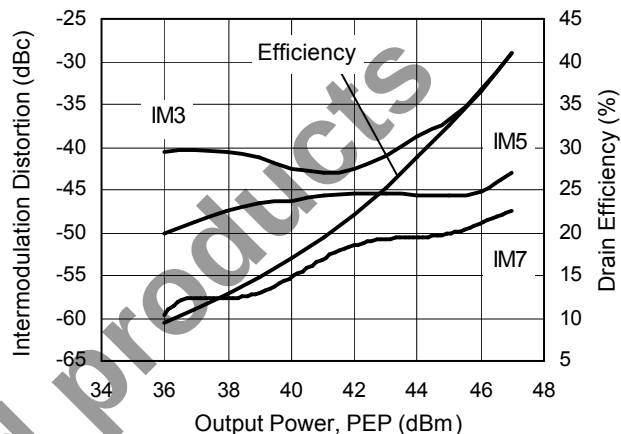
Broadband Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT} = 12\text{ W}$



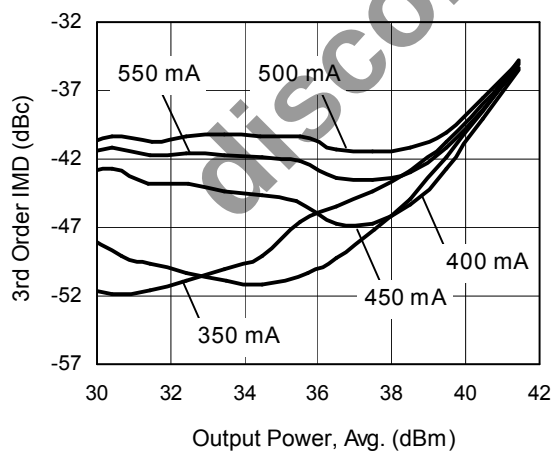
2-Tone Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$,
 $f = 1960\text{ MHz}$, tone spacing = 1 MHz



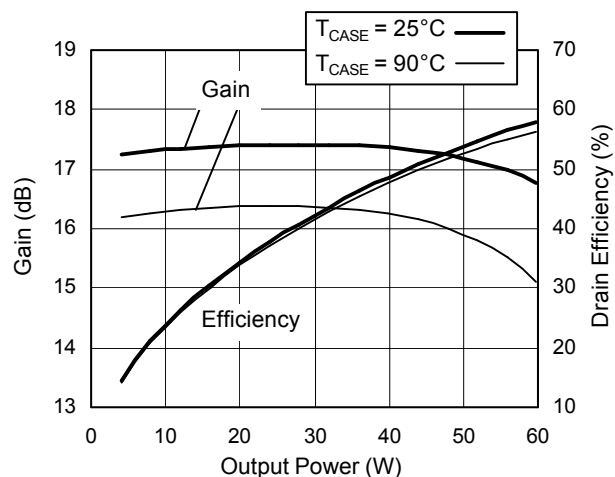
Two-carrier WCDMA at Various Biases

$V_{DD} = 28\text{ V}$, $f = 1960\text{ MHz}$, 3GPP WCDMA signal,
PAR = 8 dB, 10 MHz carrier spacing, series show I_{DQ}



Power Sweep, CW Conditions

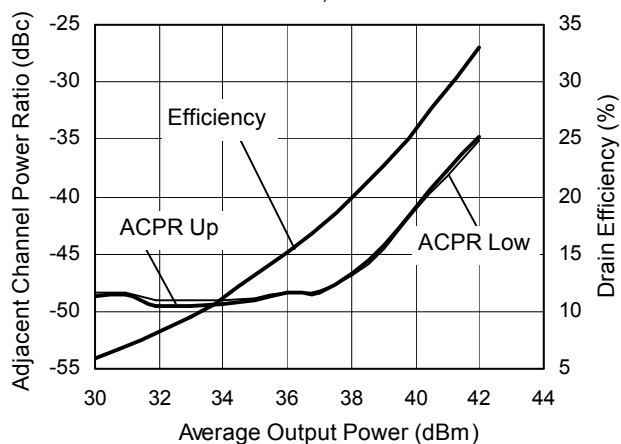
$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 1990\text{ MHz}$



Typical Performance (cont.)

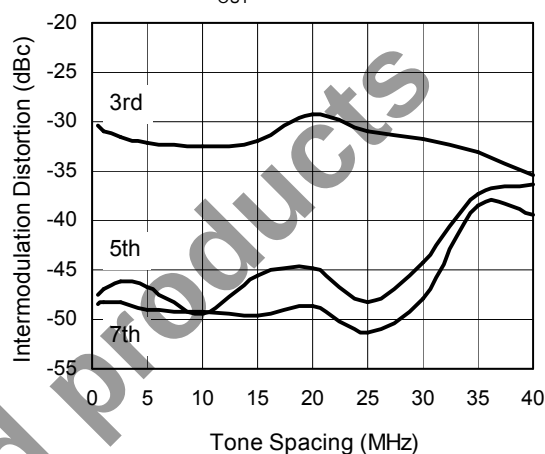
Single-carrier WCDMA Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 1960\text{ MHz}$,
3GPP WCDMA signal, TM1 w/16 DPCH, 67% clipping,
P/A R = 8.5 dB, 3.84 MHz BW



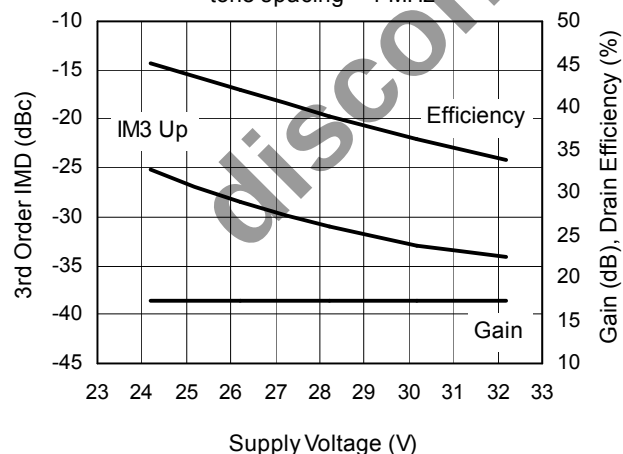
Intermodulation Distortion Products vs. Tone Spacing

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 1960\text{ MHz}$,
 $P_{OUT} = 46.5\text{ dBm PEP}$



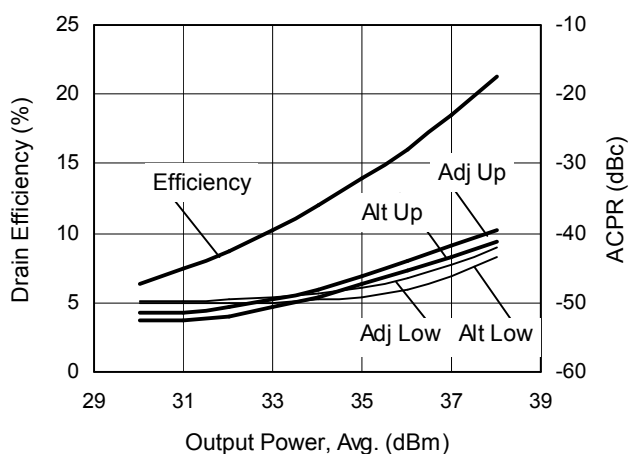
IM3, Drain Efficiency and Gain vs. Supply Voltage

$I_{DQ} = 450\text{ mA}$, $f = 1960\text{ MHz}$, $P_{OUT} (\text{PEP}) = 46.5\text{ dBm}$,
tone spacing = 1 MHz



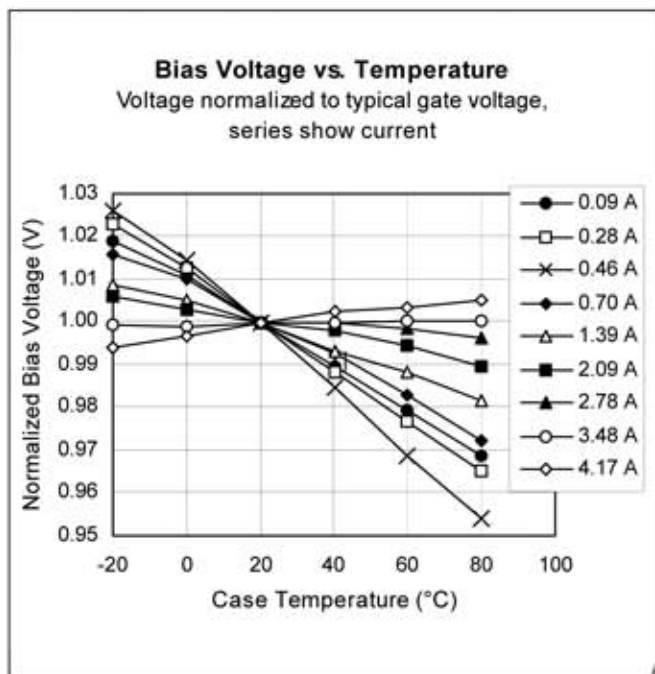
6-Carrier TD-SCDMA Performance

$V_{DC} = 28\text{ V}$, $I_{DQ} = 380\text{ mA}$, $f_o = 2017.5\text{ MHz}$

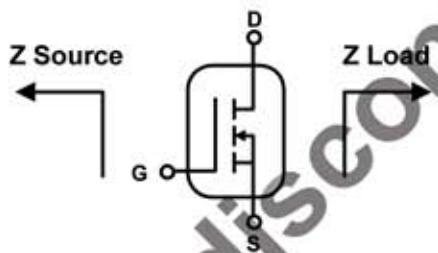


*See Infineon distributor for future availability.

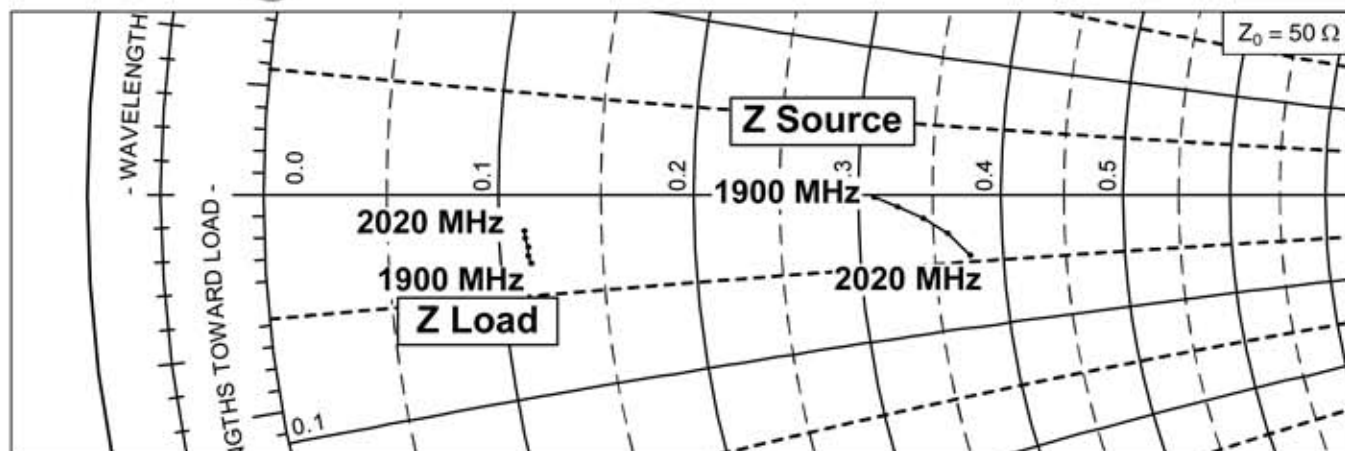
Typical Performance (cont.)



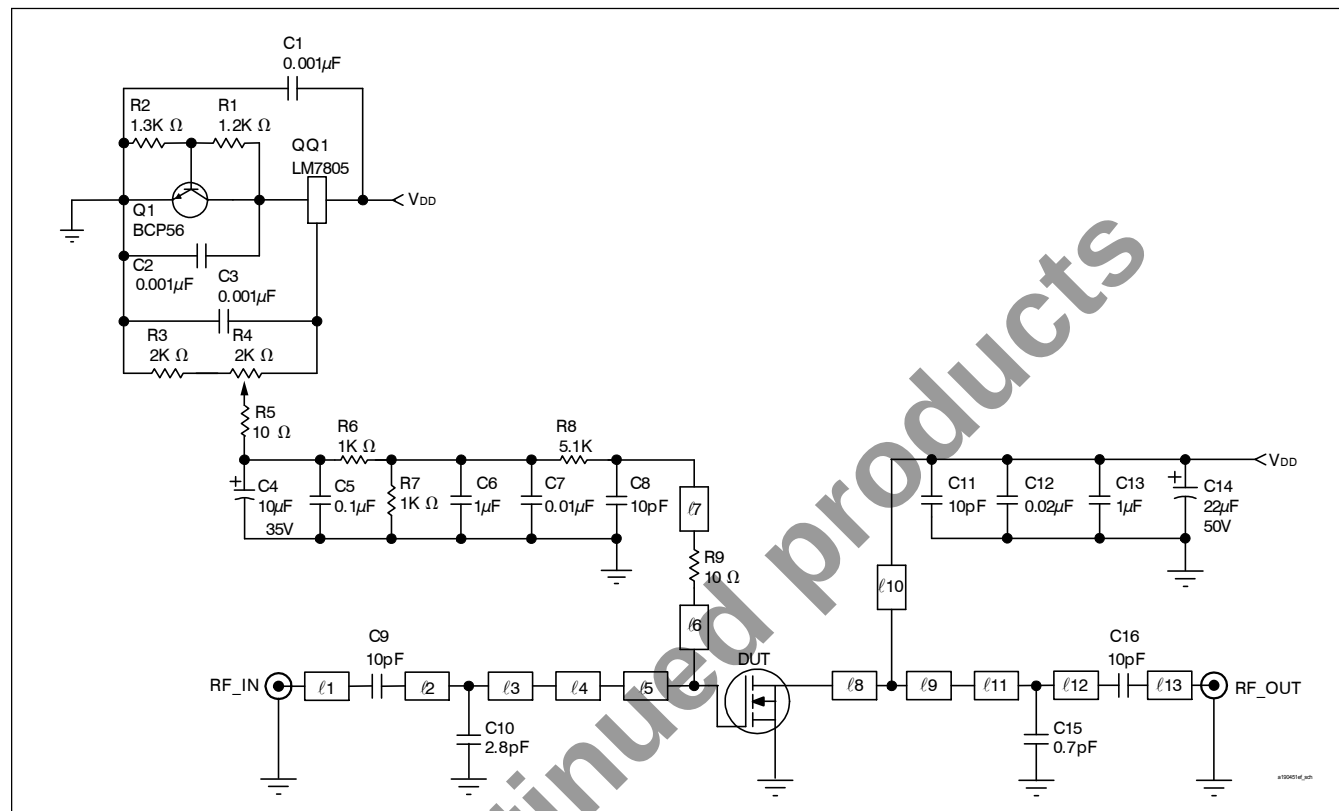
Broadband Circuit Impedance



Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1900	15.51	-0.094	5.73	-1.71
1930	16.30	-0.444	5.68	-1.52
1960	17.19	-0.881	5.69	-1.31
1990	18.02	-1.437	5.63	-1.08
2020	18.79	-2.315	5.61	-0.91



Reference Circuit



Reference circuit schematic for $f = 1960 \text{ MHz}$

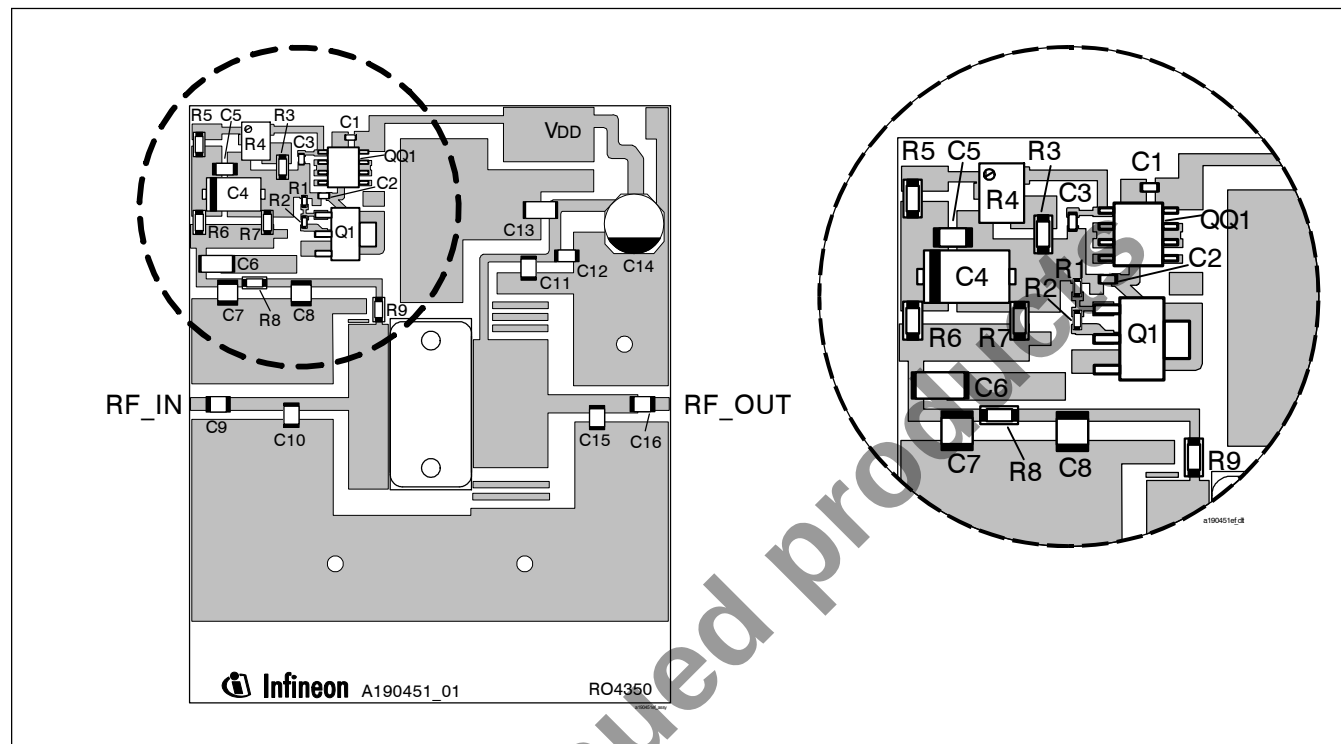
Circuit Assembly Information

DUT	PTFA190451E or PTFA190451F	LDMOS Transistor	
PCB	0.76 mm [0.030"] thick, $\epsilon_r = 3.48$	Rogers 4350	1 oz. copper

Microstrip	Electrical Characteristics at 1960 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l_1	0.031 λ , 50.0 Ω	2.79 x 1.57	0.110 x 0.062
l_2	0.089 λ , 50.0 Ω	8.26 x 1.57	0.325 x 0.062
l_3	0.076 λ , 50.0 Ω	7.04 x 1.57	0.277 x 0.062
l_4	0.045 λ , 6.7 Ω	3.84 x 21.08	0.151 x 0.830
l_5	0.014 λ , 6.7 Ω	1.14 x 21.08	0.045 x 0.830
l_6	0.007 λ , 77.0 Ω	0.64 x 0.76	0.025 x 0.030
l_7	0.123 λ , 72.0 Ω	11.66 x 0.89	0.459 x 0.035
l_8	0.016 λ , 8.5 Ω	1.30 x 16.21	0.051 x 0.638
l_9	0.096 λ , 8.5 Ω	8.13 x 16.21	0.320 x 0.638
l_{10}	0.171 λ , 67.0 Ω	16.13 x 1.04	0.635 x 0.041
l_{11}	0.053 λ , 41.0 Ω	4.80 x 2.31	0.189 x 0.091
l_{12}	0.063 λ , 41.0 Ω	5.72 x 2.31	0.225 x 0.091
l_{13}	0.030 λ , 54.0 Ω	2.79 x 1.52	0.110 x 0.060

¹Electrical characteristics are rounded.

Reference Circuit (cont.)

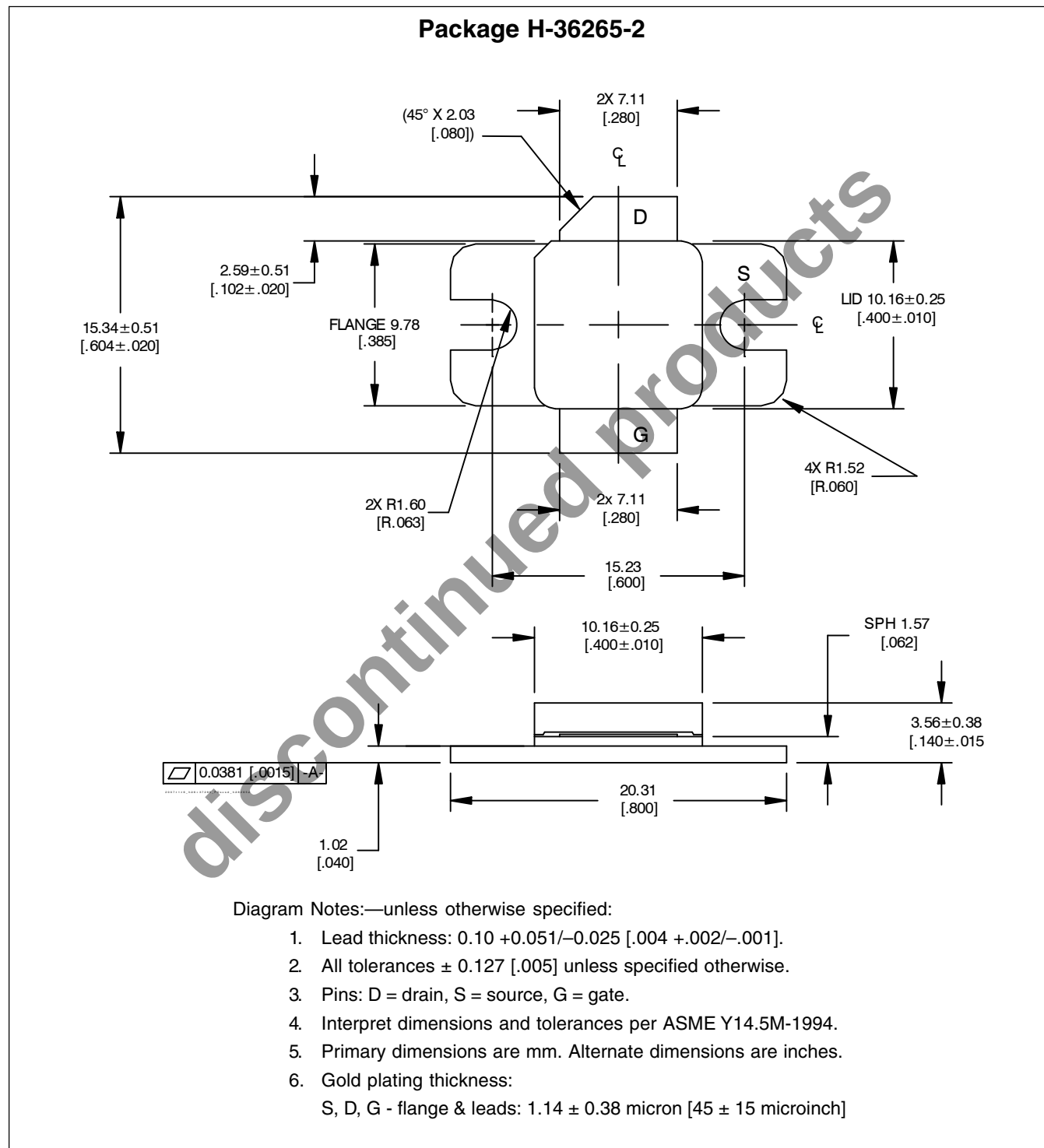


Reference circuit assembly diagram* (not to scale)

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	399-1655-2-ND
C5	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6, C13	Ceramic capacitor, 1 μ F	Digi-Key	445-1411-1-ND
C7	Capacitor, 0.01 μ F	ATC	200B 103
C8, C9, C11, C16	Ceramic capacitor, 10 pF	ATC	100B 100
C10	Ceramic capacitor, 2.8 pF	ATC	100B 2R8
C12	Capacitor, 0.02 μ F	ATC	200B 203
C14	Capacitor, 22 μ F, 50 V	Digi-Key	PCE3374CT-ND
C15	Ceramic capacitor, 0.7 pF	ATC	100B 0R7
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	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 1 k-ohms	Digi-Key	P1KECT-ND
R8	Chip Resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND

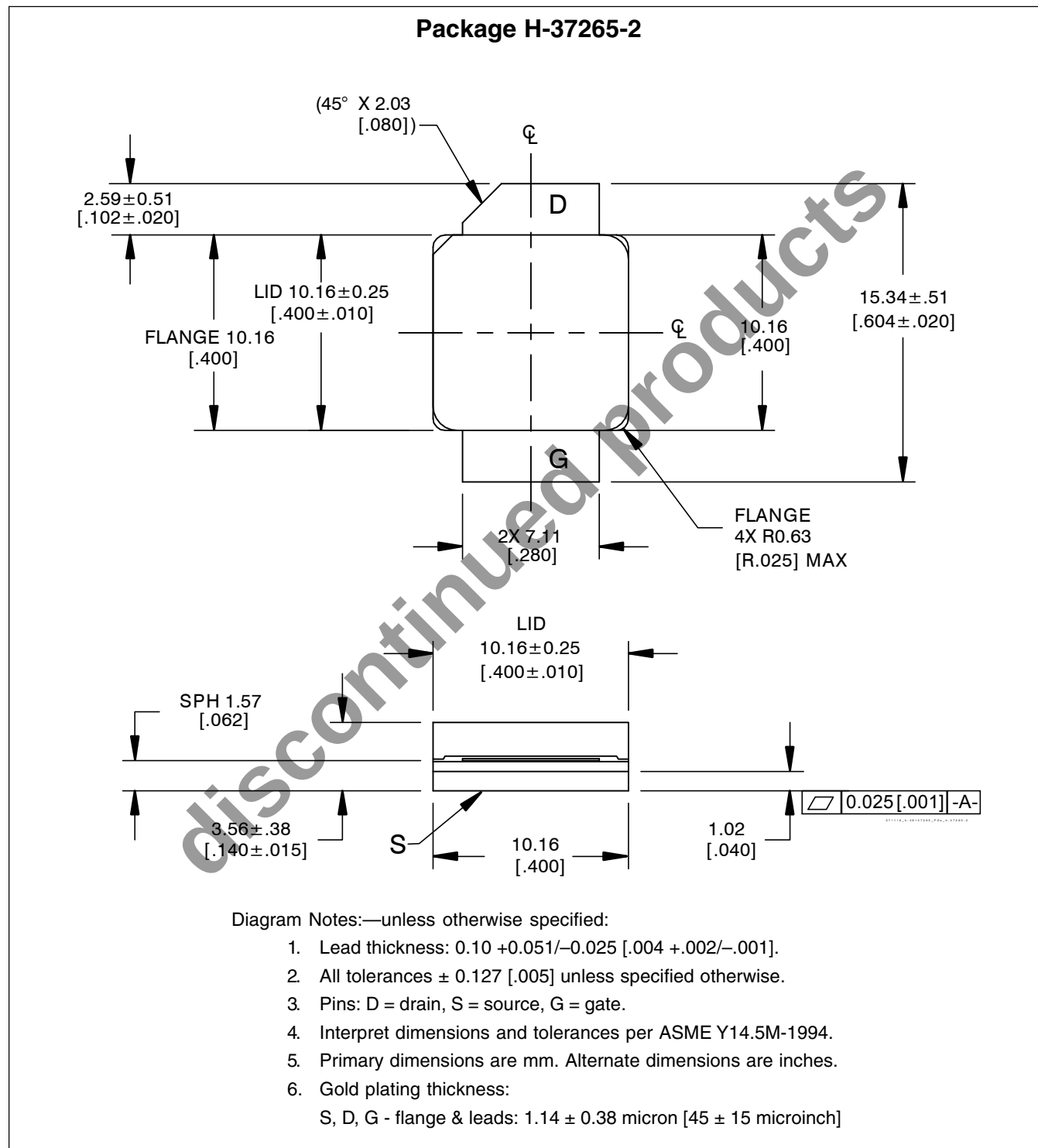
*Gerber Files for this circuit available on request

Package Outline Specifications



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

Package Outline Specifications (cont.)



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Revision History: 2015-01-12

Data Sheet

Previous Version: 2009-02-20, PTFA 190451E/F V1, Data Sheet

Page	Subjects (major changes since last revision)
All	Product Discontinued. Please see PD notes : PD_215_14.

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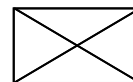
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