

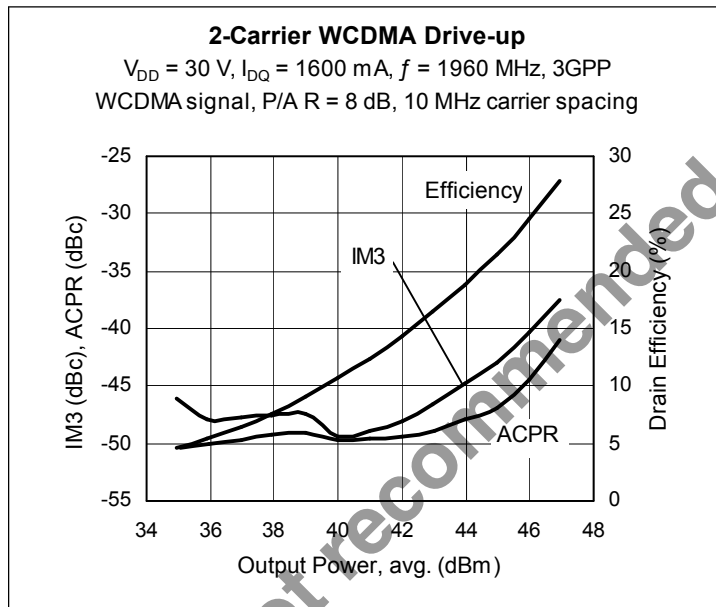
Thermally-Enhanced High Power RF LDMOS FETs 200 W, 1930 – 1990 MHz

Description

The PTFA192001E and PTFA192001F are 200-watt LDMOS FETs intended for single- and two-carrier WCDMA and CDMA applications from 1930 to 1990 MHz. Features include input and output matching, and thermally-enhanced packages with slotted or earless flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFA192001E
 Package H-36260-2

PTFA192001F
 Package H-37260-2



Features

- Pb-free, RoHS-compliant and thermally-enhanced packages
- Broadband internal matching
- Typical two-carrier WCDMA performance at 1990 MHz, 30 V
 - Average output power = 47.0 dBm
 - Linear Gain = 15.9 dB
 - Efficiency = 27%
 - Intermodulation distortion = -36 dBc
 - Adjacent channel power = -41 dBc
- Typical single-carrier WCDMA performance at 1960 MHz, 30 V, 3GPP signal, P/AR = 7.5 dB
 - Average output power = 48.5 dBm
 - Linear Gain = 15.9 dB
 - Efficiency = 34%
 - Intermodulation distortion = -37 dBc
 - Adjacent channel power = -40 dBc
- Typical CW performance, 1960 MHz, 30 V
 - Output power at P-1dB = 240 W
 - Efficiency = 57%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 5:1 VSWR @ 30 V, 200 W (CW) output power

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics

WCDMA Measurements (tested in Infineon test fixture)

 $V_{DD} = 30\text{ V}$, $I_{DQ} = 1.8\text{ A}$, $P_{OUT} = 50\text{ W}$ average

 $f_1 = 1985\text{ MHz}$, $f_2 = 1995\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	15.3	15.9	—	dB
Drain Efficiency	η_D	26.5	27	—	%
Intermodulation Distortion	IMD	—	-36	-34	dBc

Two-tone Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

 $V_{DD} = 30\text{ V}$, $I_{DQ} = 1.6\text{ A}$, $P_{OUT} = 200\text{ W PEP}$, $f = 1960\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	15.9	—	dB
Drain Efficiency	η_D	—	41	—	%
Intermodulation Distortion	IMD	—	-30	—	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
Drain Leakage Current	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.05	—	Ω
Operating Gate Voltage	$V_{DS} = 30\text{ V}$, $I_{DQ} = 1.8\text{ A}$	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

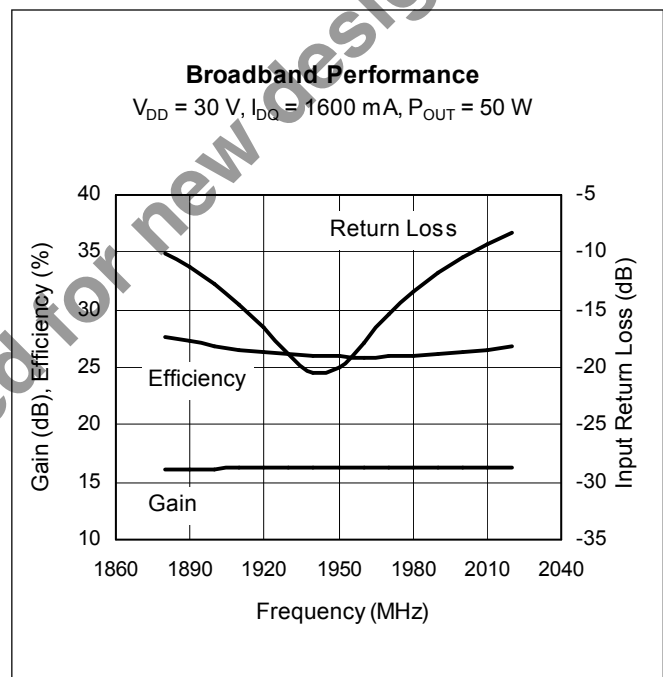
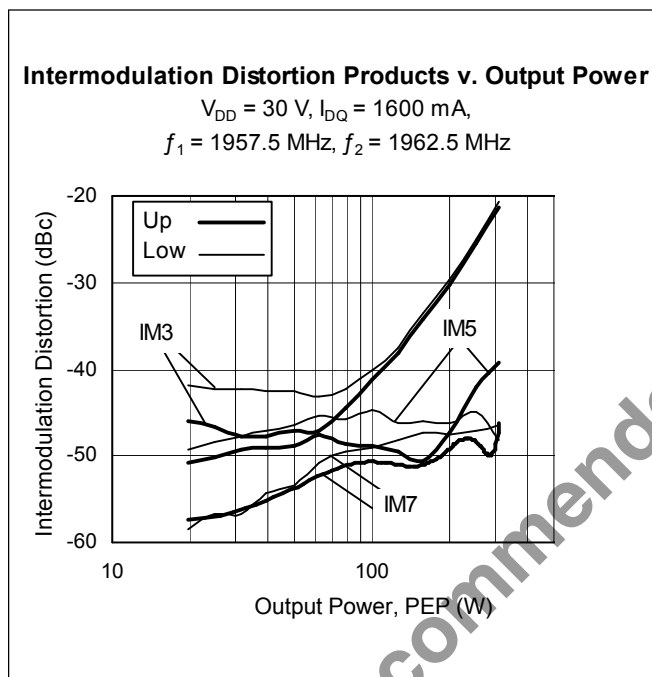
Maximum Ratings

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	625	W
Above 25 $^{\circ}\text{C}$ derate by		3.57	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 200 W CW)	$R_{\theta JC}$	0.28	$^{\circ}\text{C}/\text{W}$

Ordering Information

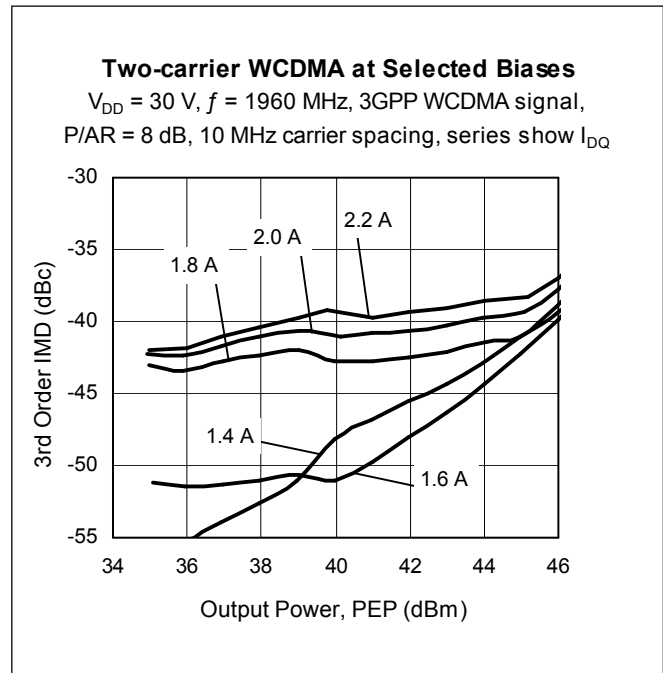
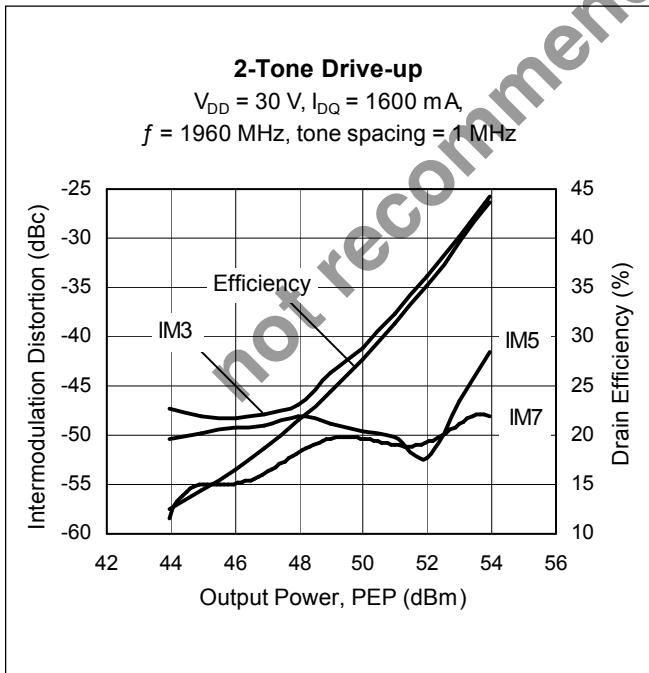
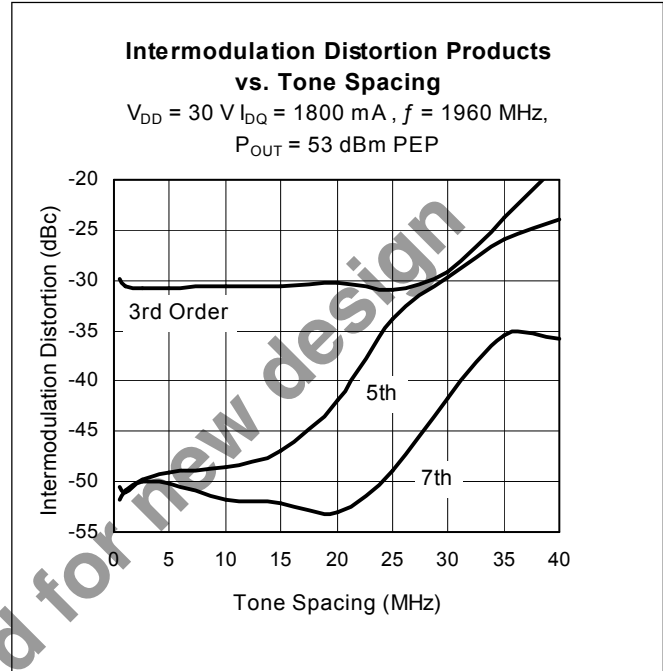
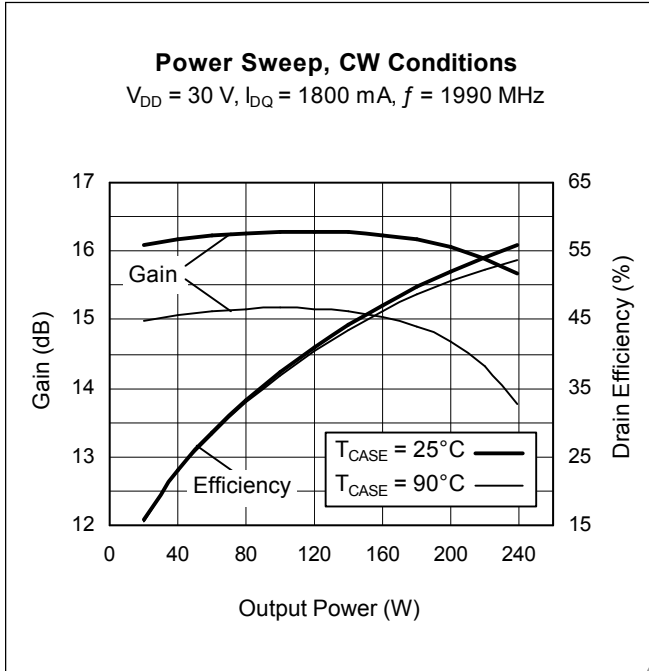
Type and Version	Package Type	Package Description	Marking
PTFA192001E V4	H-36260-2	Thermally-enhanced slotted flange, single-ended	PTFA192001E
PTFA192001F V4	H-37260-2	Thermally-enhanced earless flange, single-ended	PTFA192001F

Typical Performance (data taken in a production test fixture)

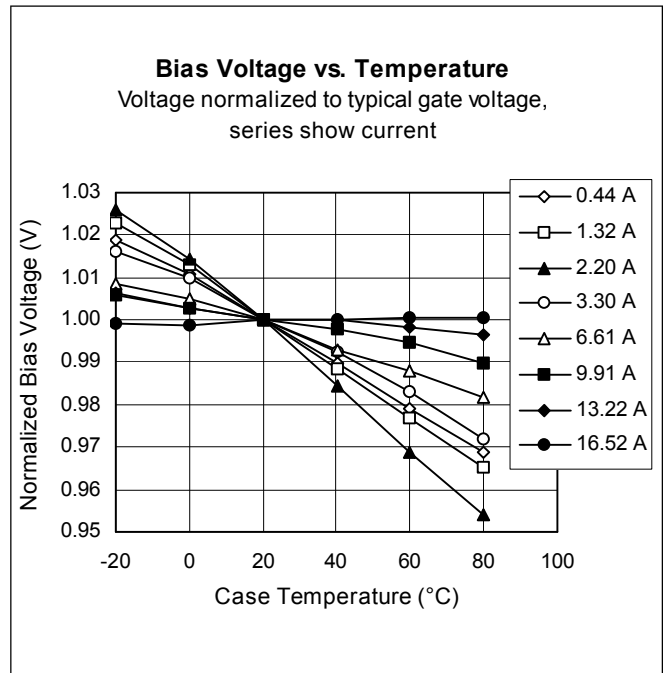
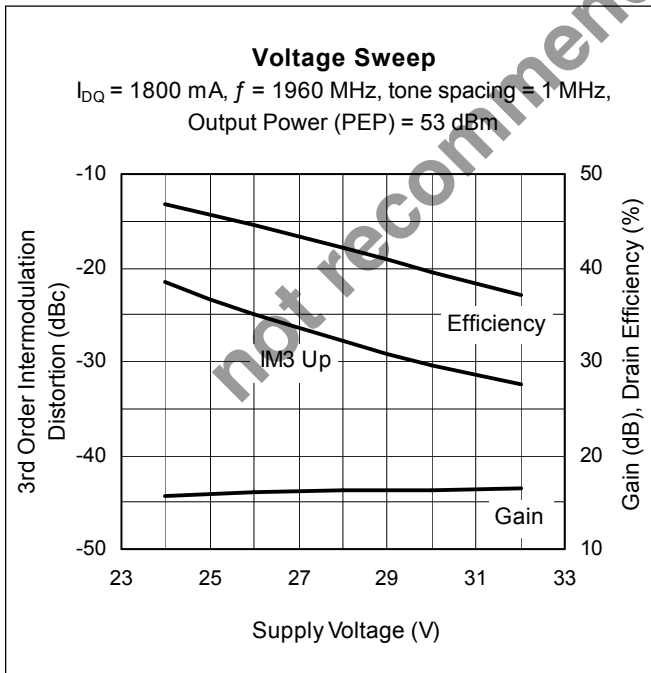
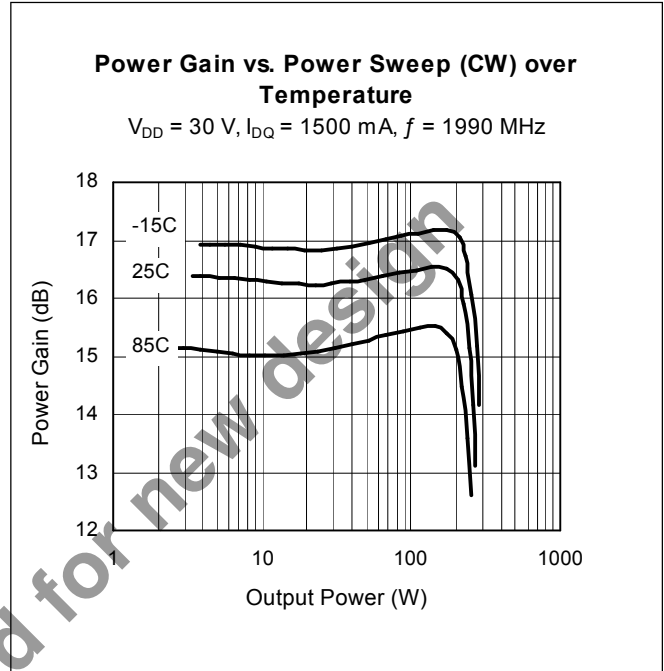
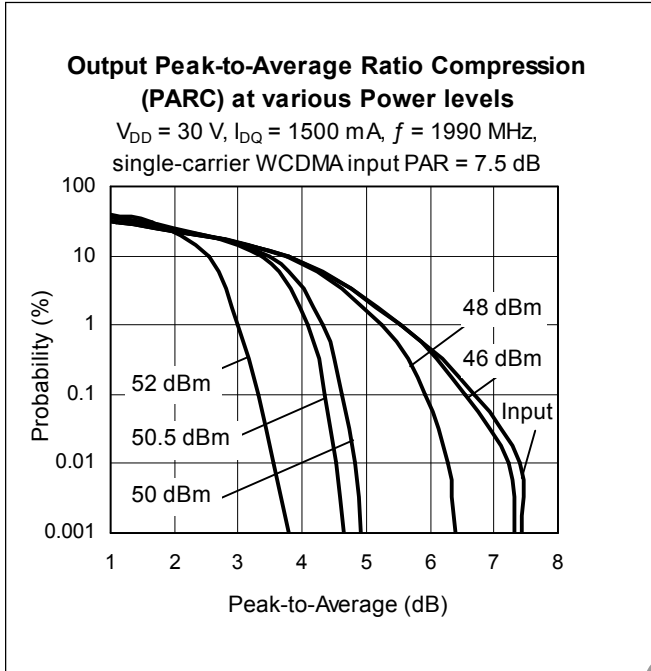


not recommended for new design

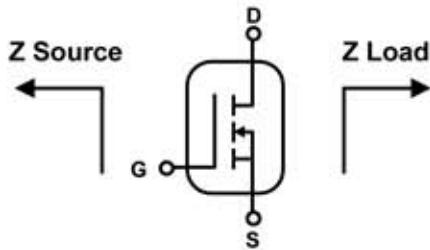
Typical Performance (cont.)



Typical Performance (cont.)



Broadband Circuit Impedance



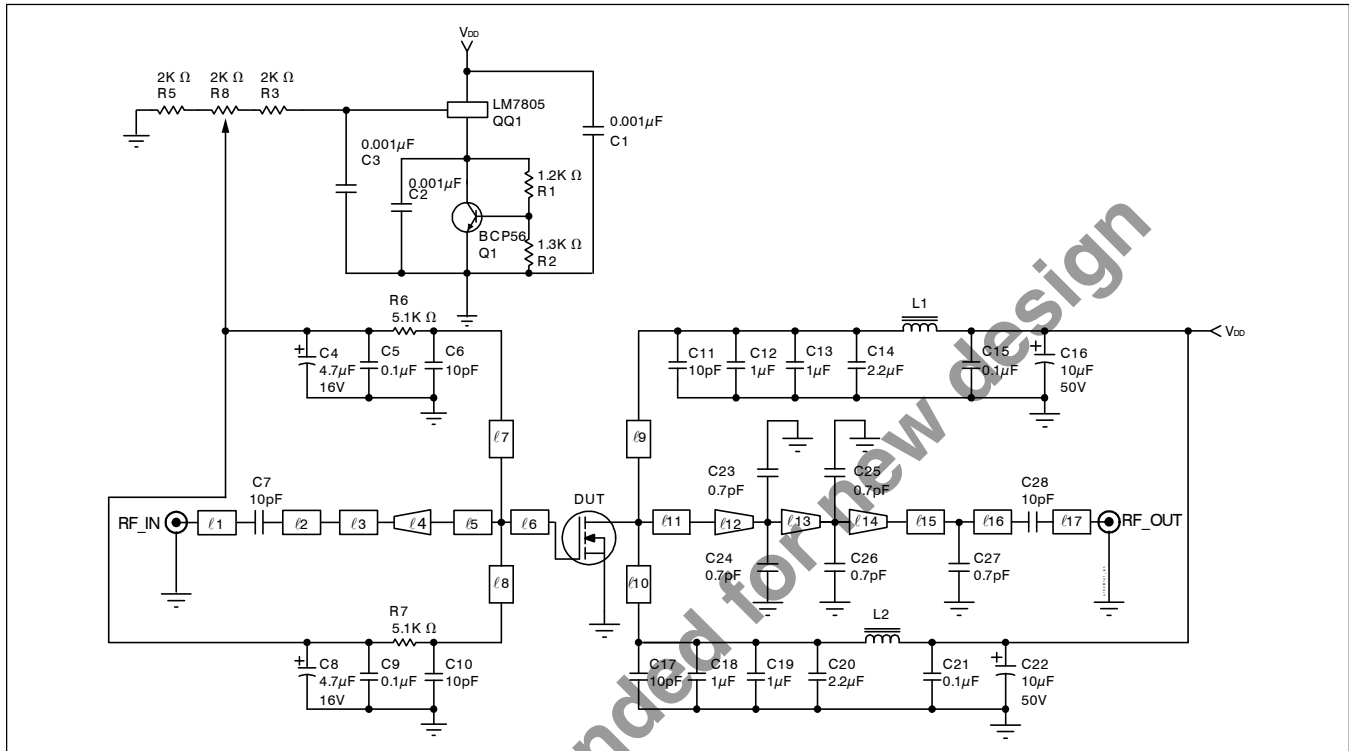
Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1900	8.033	-8.054	0.943	2.60
1930	7.611	-7.612	0.932	2.87
1960	7.230	-7.197	0.886	3.15
1990	6.839	-6.839	0.863	3.44
2020	6.541	-6.496	0.829	3.71



See next page for circuit information

not recommended for new designs

Reference Circuit



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

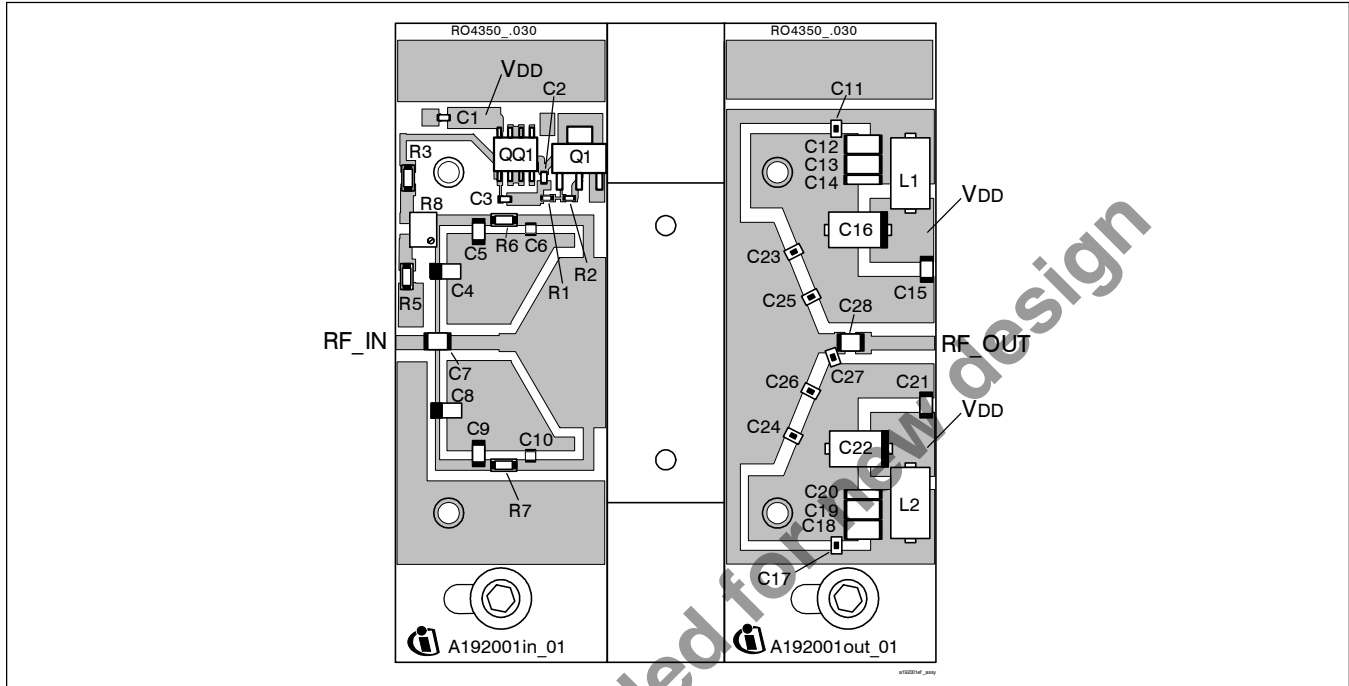
Circuit Assembly Information

DUT	PTFA192001E or PTFA192001F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 3.48$	Rogers RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 1960 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l_1	0.038λ , 50.0Ω	3.51 x 1.70	0.138 x 0.067
l_2	0.071λ , 50.0Ω	6.60 x 1.70	0.260 x 0.067
l_3	0.022λ , 43.0Ω	2.01 x 2.16	0.079 x 0.085
l_4 (taper)	0.060λ , $43.0 \Omega / 6.9 \Omega$	5.28 x 2.16 / 20.32	0.208 x 0.085 / 0.800
l_5	0.040λ , 6.9Ω	3.33 x 20.32	0.131 x 0.800
l_6	0.026λ , 6.9Ω	2.21 x 20.32	0.087 x 0.800
l_7, l_8	0.123λ , 60.0Ω	11.48 x 1.24	0.452 x 0.049
l_9, l_{10}	0.258λ , 50.9Ω	23.88 x 1.65	0.940 x 0.065
l_{11}	0.067λ , 5.0Ω	5.59 x 28.91	0.220 x 1.138
l_{12} (taper)	0.017λ , $5.0 \Omega / 7.2 \Omega$	1.42 x 28.91 / 19.51	0.056 x 1.138 / 0.768
l_{13} (taper)	0.024λ , $7.2 \Omega / 12.3 \Omega$	2.08 x 19.51 / 10.67	0.082 x 0.768 / 0.420
l_{14} (taper)	0.019λ , $12.3 \Omega / 41 \Omega$	1.78 x 10.67 / 2.29	0.070 x 0.420 / 0.090
l_{15}	0.009λ , 41.0Ω	0.79 x 2.29	0.031 x 0.090
l_{16}	0.021λ , 41.0Ω	1.85 x 2.29	0.073 x 0.090
l_{17}	0.096λ , 50.0Ω	8.99 x 1.70	0.354 x 0.067

¹Electrical characteristics are rounded.

Reference Circuit (cont.)

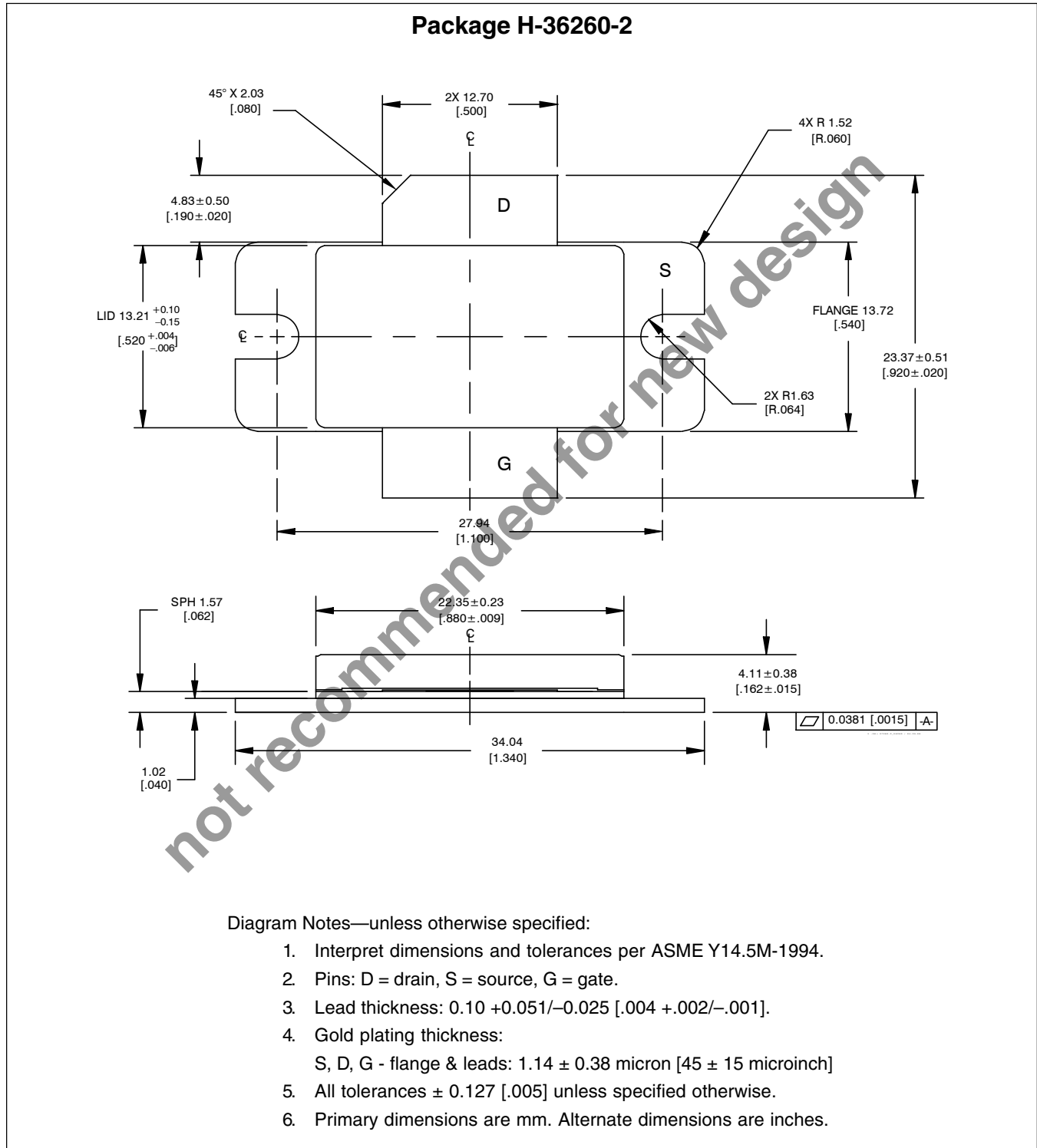


Reference circuit assembly diagram* (not to scale)

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 μ F	Digi-Key	PCC1772CT-ND
C4, C8	Capacitor, 4.7 μ F, 16 V	Digi-Key	PCS3475CT-ND
C5, C9, C15, C21	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6, C10	Ceramic capacitor, 10 pF	ATC	100A 100
C7, C28	Ceramic capacitor, 10 pF	ATC	100B 100
C11, C17	Capacitor, 10 pF	AVX	08051J100GBTTR
C12, C13, C18, C19	Ceramic capacitor, 1 μ F	Digi-Key	445-1411-1-ND
C14, C20	Capacitor, 2.2 μ F	Digi-Key	445-1447-2-ND
C16, C22	Tantalum capacitor, 10 μ F, 50 V	Garrett Electronics	TPSE106K050R0400
C23, C24, C25, C26, C27	Capacitor, 0.7 pF	AVX	08051J0R7BBTTR
L1, L2	Ferrite, 8.9 mm	Elna Magnetics	BDS 4.6/3/8.9-4S2
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, R5	Chip resistor 2 k-ohms	Digi-Key	P2KECT-ND
R6, R7	Chip resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND
R8	Potentiometer 2 k-ohms	Digi-Key	3224W-202ETR-ND

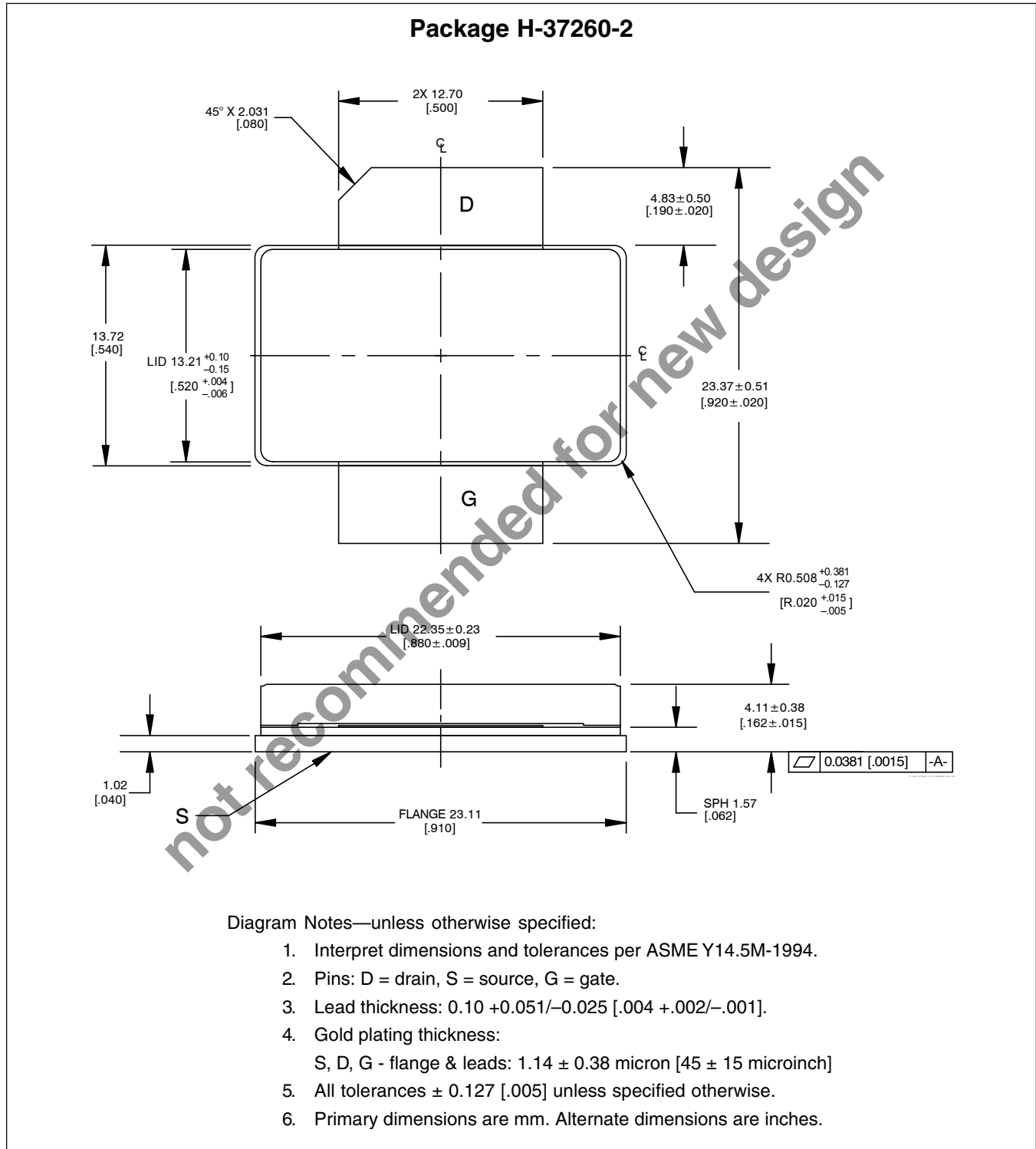
*Gerber files for this circuit available on request

Package Outline Specifications



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Package Outline Specifications (cont.)



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Revision History: 2015-03-04

Data Sheet

Previous Version: 2009-04-01, Data Sheet

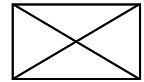
Page	Subjects (major changes since last revision)
All	Not recommended for new design

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