

Thermally-Enhanced High Power RF LDMOS FETs 55 W, 869 – 960 MHz

Description

The PTFA080551E and PTFA080551F are 55-watt LDMOS FETs designed for EDGE and CDMA power amplifier applications in the 869 to 960 MHz band. Features include input 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.

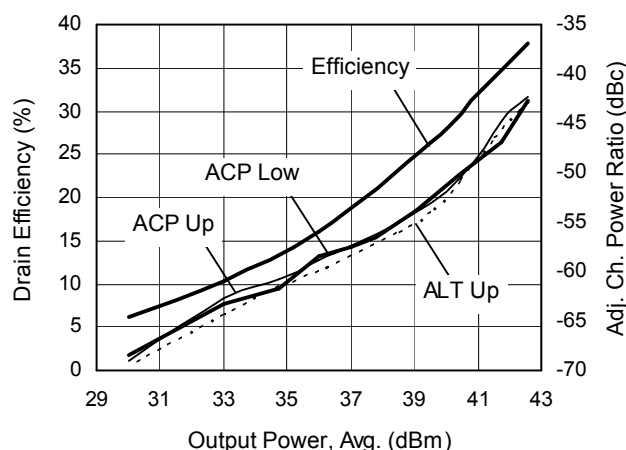
PTFA080551E
Package H-36265-2

PTFA080551F
Package H-37265-2



Three-carrier CDMA2000 Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 960\text{ MHz}$



Features

- Broadband internal matching
- Typical EDGE performance
 - Average output power = 26 W
 - Gain = 18 dB
 - Efficiency = 44%
- Typical CW performance
 - Output power at P-1dB = 75 W
 - Gain = 17 dB
 - Efficiency = 67%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 55 W (CW) output power
- Pb-free and RoHS compliant

RF Characteristics

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT} = 26\text{ W AVG}$, $f = 959.8\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Error Vector Magnitude	EVM (RMS)	—	2.5	—	%
Modulation Spectrum @ 400 kHz	ACPR	—	-60	—	dBc
Modulation Spectrum @ 600 kHz	ACPR	—	-75	—	dBc
Gain	G_{ps}	—	18	—	dB
Drain Efficiency	η_D	—	44	—	%

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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 600\text{ mA}$, $P_{OUT} = 55\text{ W PEP}$, $f = 960\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	18	18.5	—	dB
Drain Efficiency	η_D	46.5	48	—	%
Intermodulation Distortion	IMD	—	−31	−29	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
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.15	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$	V_{GS}	2.0	2.3	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	219	W
Above 25 $^{\circ}\text{C}$ derate by		1.25	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$)	$R_{\theta JC}$	0.8	$^{\circ}\text{C/W}$

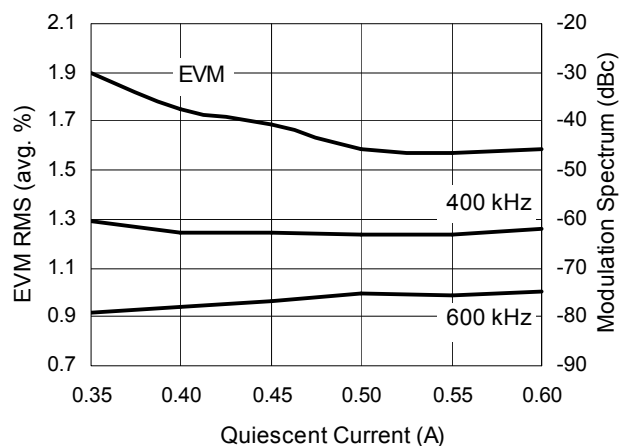
Ordering Information

Type and Version	Order Code	Package Description	Shipping
PTFA080551E V4 R0	PTFA080551EV4R0XTMA1	H-36265-2, bolt-down	Tape & Reel, 50 pcs
PTFA080551E V4 R250	PTFA080551EV4R250XTMA1	H-36265-2, bolt-down	Tape & Reel, 250 pcs
PTFA080551F V4 R0	PTFA080551FV4R0XTMA1	H-37265-2, earless flange	Tape & Reel, 50 pcs
PTFA080551F V4 R250	PTFA080551FV4R250XTMA1	H-37265-2, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

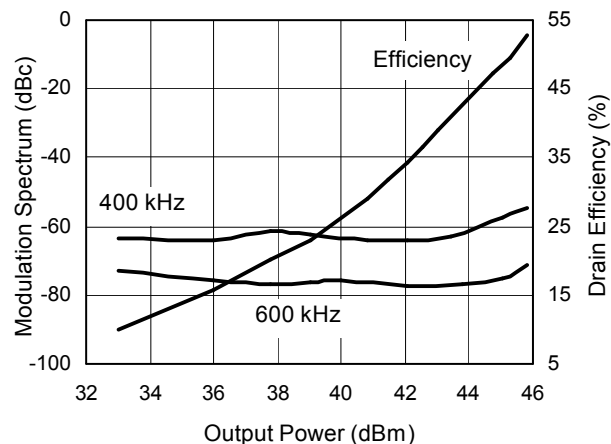
Edge EVM and Modulation Spectrum vs. Quiescent Current

$V_{DD} = 28\text{ V}$, $f = 959.8\text{ MHz}$, $P_{OUT} = 22\text{ W}$



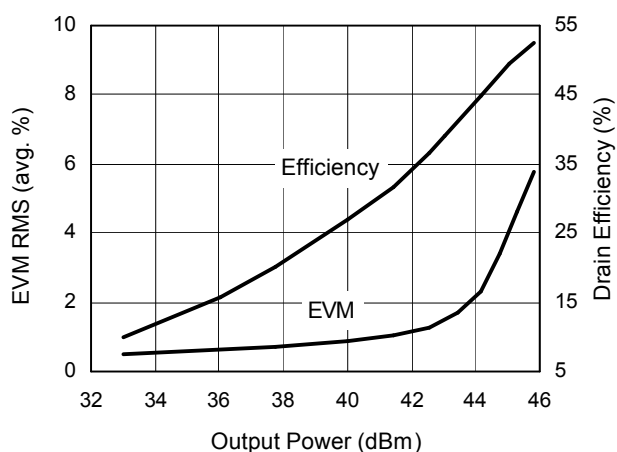
EDGE Modulation Spectrum Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 959.8\text{ MHz}$



EDGE EVM Performance

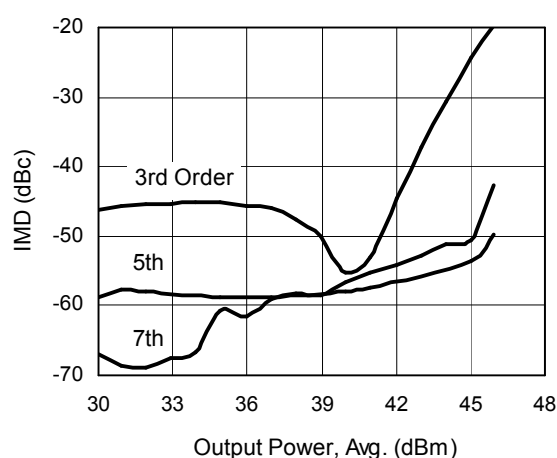
$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 959.8\text{ MHz}$



Intermodulation Distortion vs. Output Power

(as measured in a broadband circuit)

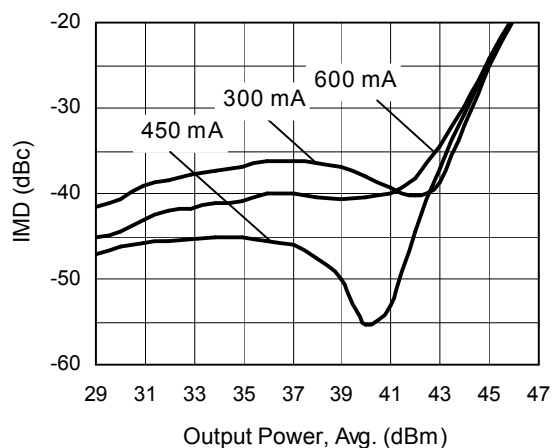
$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f_1 = 959\text{ MHz}$, $f_2 = 960\text{ MHz}$



Typical Performance (cont.)

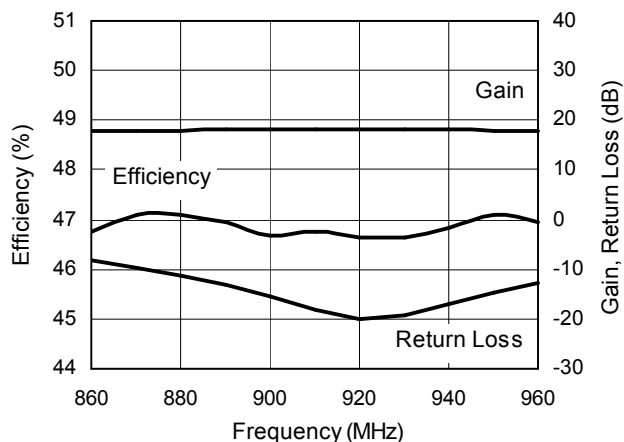
IM3 vs. Output Power at Selected Biases

$V_{DD} = 28\text{ V}$, $f_1 = 959$, $f_2 = 960\text{ MHz}$



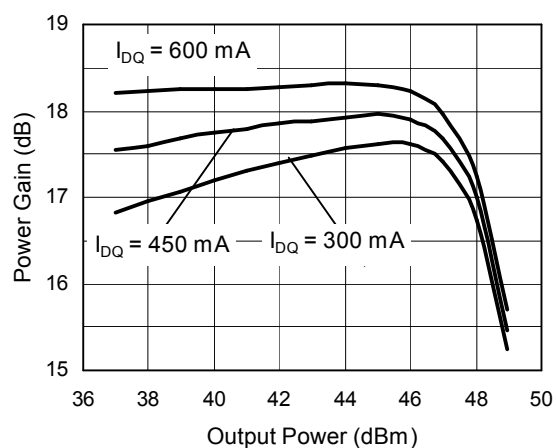
Linear Broadband Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 600\text{ mA}$, $P_{OUT\text{ Avg}} = 44.39\text{ dBm}$



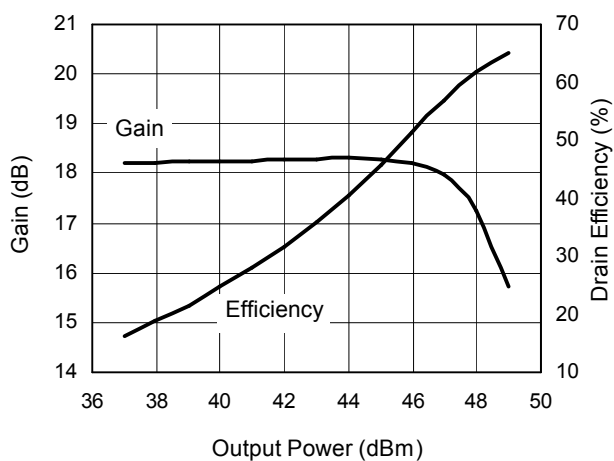
Power Sweep

$V_{DD} = 28\text{ V}$, $f = 960\text{ MHz}$



Gain & Efficiency vs. Output Power

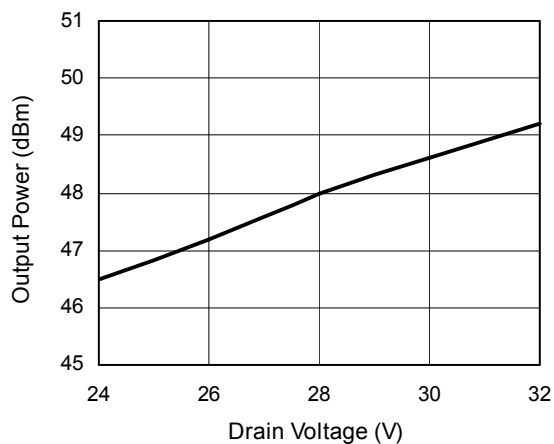
$V_{DD} = 28\text{ V}$, $I_{DQ} = 600\text{ mA}$, $f = 960\text{ MHz}$



Typical Performance (cont.)

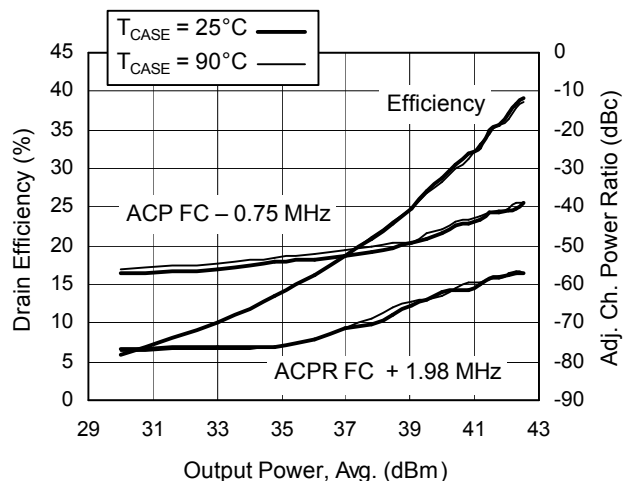
Output Power (P-1dB) vs. Drain Voltage

$I_{DQ} = 600 \text{ mA}$, $f = 960 \text{ MHz}$



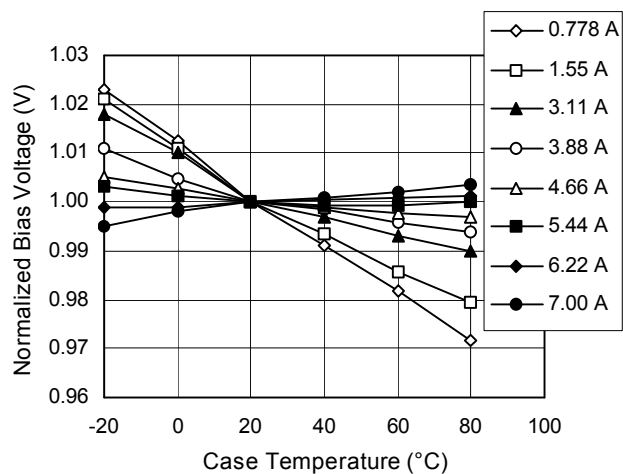
IS-95 CDMA Performance

$V_{DD} = 28 \text{ V}$, $I_{DQ} = 450 \text{ mA}$, $f = 960 \text{ MHz}$

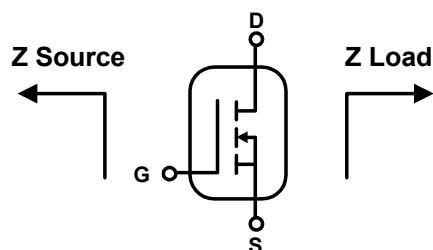


Bias Voltage vs. Temperature

Voltage normalized to typical gate voltage,
series show current



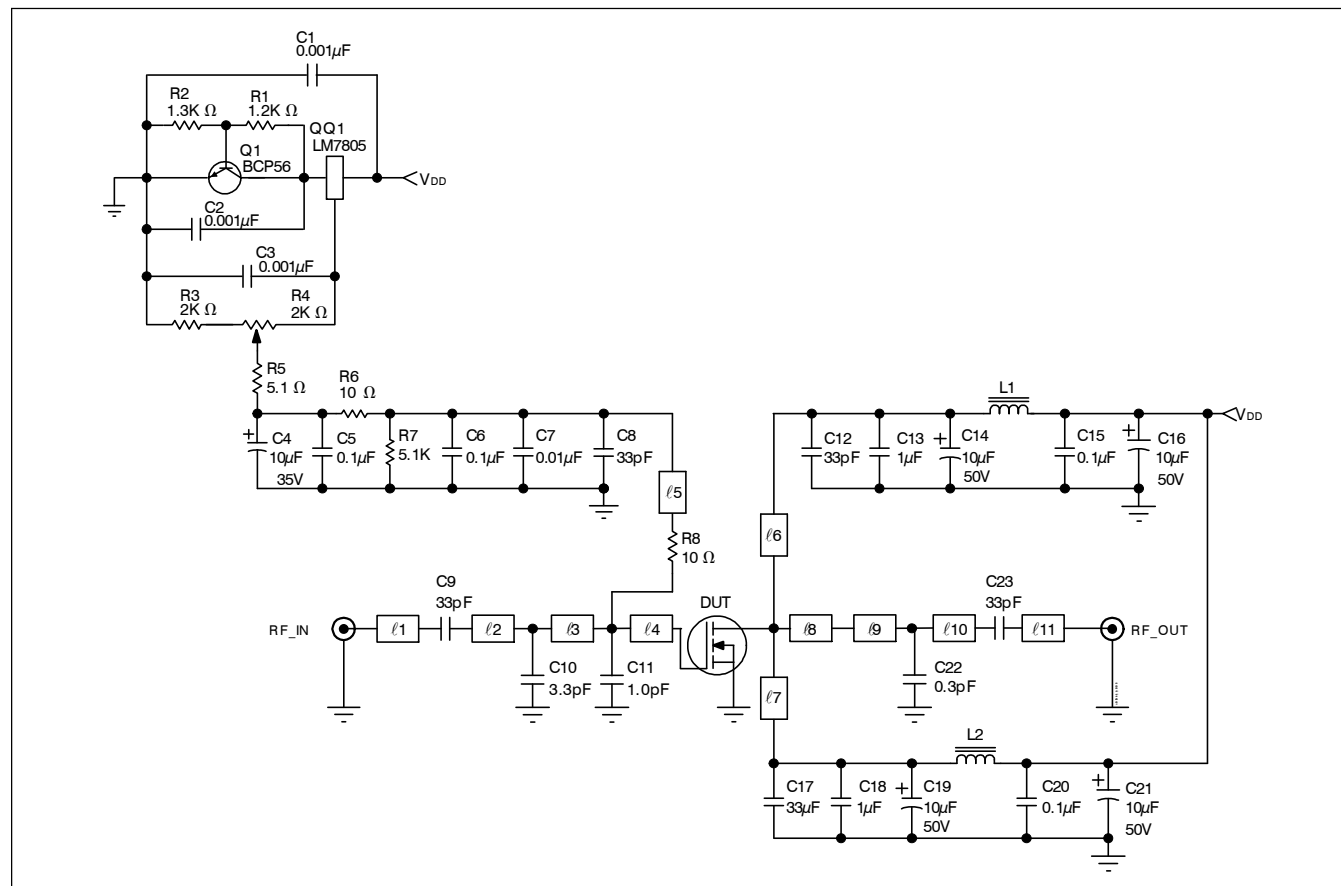
Broadband Circuit Impedance



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
869	8.91	-10.93	7.42	-1.63
880	3.72	-8.28	4.65	-1.74
894	5.93	-5.43	4.61	0.16
920	4.87	-7.16	4.88	-0.59
960	6.05	-5.57	4.89	0.86

See next page for circuit information

Reference Circuit



Reference circuit schematic diagram for $f = 960 \text{ MHz}$

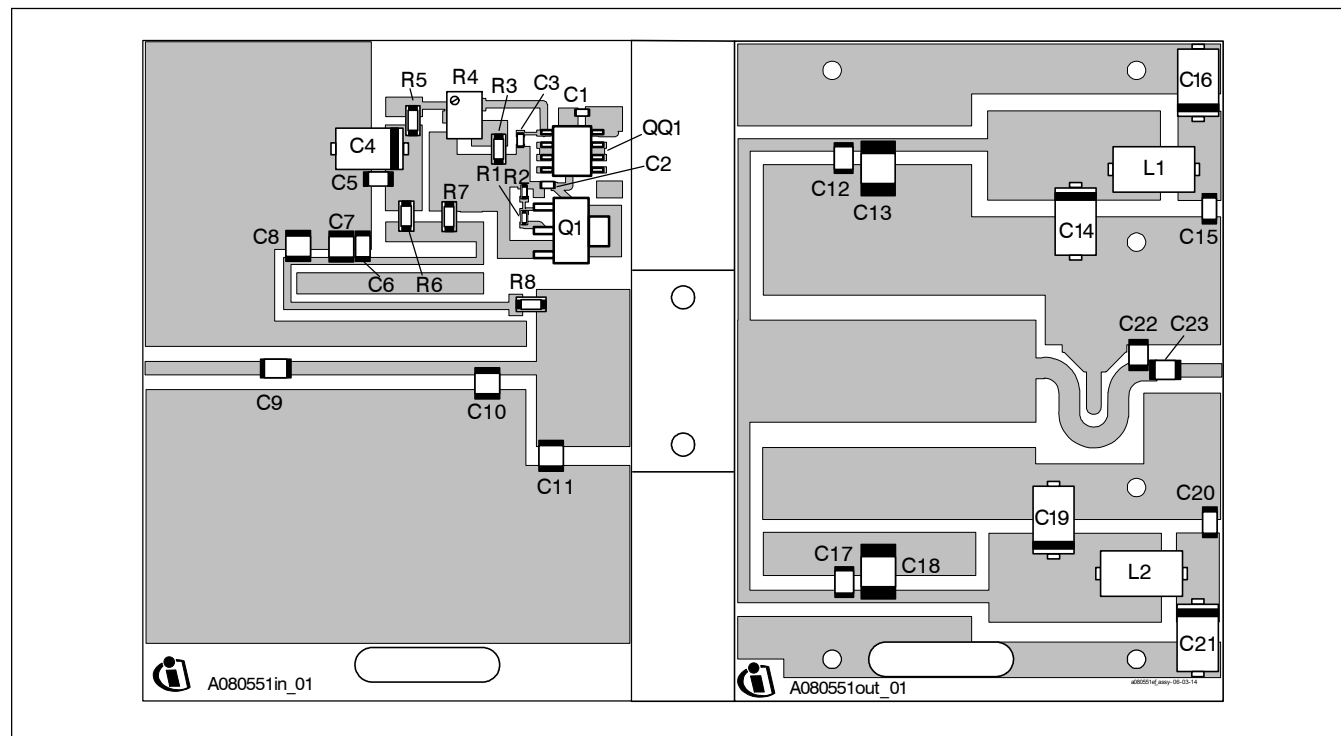
Circuit Assembly Information

DUT	PTFA080551E or PTFA080551F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 960 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l_1	0.070 λ , 50.0 Ω	12.19 x 1.37	0.480 x 0.054
l_2	0.122 λ , 50.0 Ω	20.93 x 1.37	0.824 x 0.054
l_3	0.031 λ , 50.0 Ω	5.31 x 1.37	0.209 x 0.054
l_4	0.063 λ , 7.5 Ω	9.58 x 16.21	0.377 x 0.638
l_5	0.162 λ , 67.0 Ω	28.45 x 0.79	1.120 x 0.031
l_6, l_7	0.150 λ , 55.0 Ω	25.65 x 1.17	1.010 x 0.046
l_8	0.198 λ , 11.1 Ω	30.73 x 10.46	1.210 x 0.412
l_9	0.145 λ , 38.0 Ω	24.21 x 2.16	0.953 x 0.085
l_{10}	0.009 λ , 38.0 Ω	1.52 x 2.16	0.060 x 0.085
l_{11}	0.026 λ , 50.0 Ω	4.50 x 1.37	0.177 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	399-1655-2-ND
C5, C6, C15, C20	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C8, C9, C12, C17, C23	Ceramic capacitor, 33 pF	ATC	100B 330
C7	Capacitor, 0.01 μ F	ATC	200B 103
C10	Ceramic capacitor, 3.3 pF	ATC	100B 3R3
C11	Ceramic capacitor, 1.0 pF	ATC	100B 1R0
C13, C18	Capacitor, 1.0 μ F	ATC	920C105
C14, C16, C19, C21	Tantalum capacitor, 10 μ F, 50 V	Garrett Electronics	TPSE106K050R0400
C22	Ceramic capacitor, 0.3 pF	ATC	100B 0R3
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	Chip Resistor 2 k-ohms	Digi-Key	P2KECT-ND
R4	Potentiometer 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R7	Chip Resistor 5.1 k-ohms	Digi-Key	P5.1KECT-ND
R6, R8	Chip Resistor 10 ohms	Digi-Key	P10ECT-ND

*Gerber Files for this circuit available on request

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Package Outline Specifications

Package H-36265-2

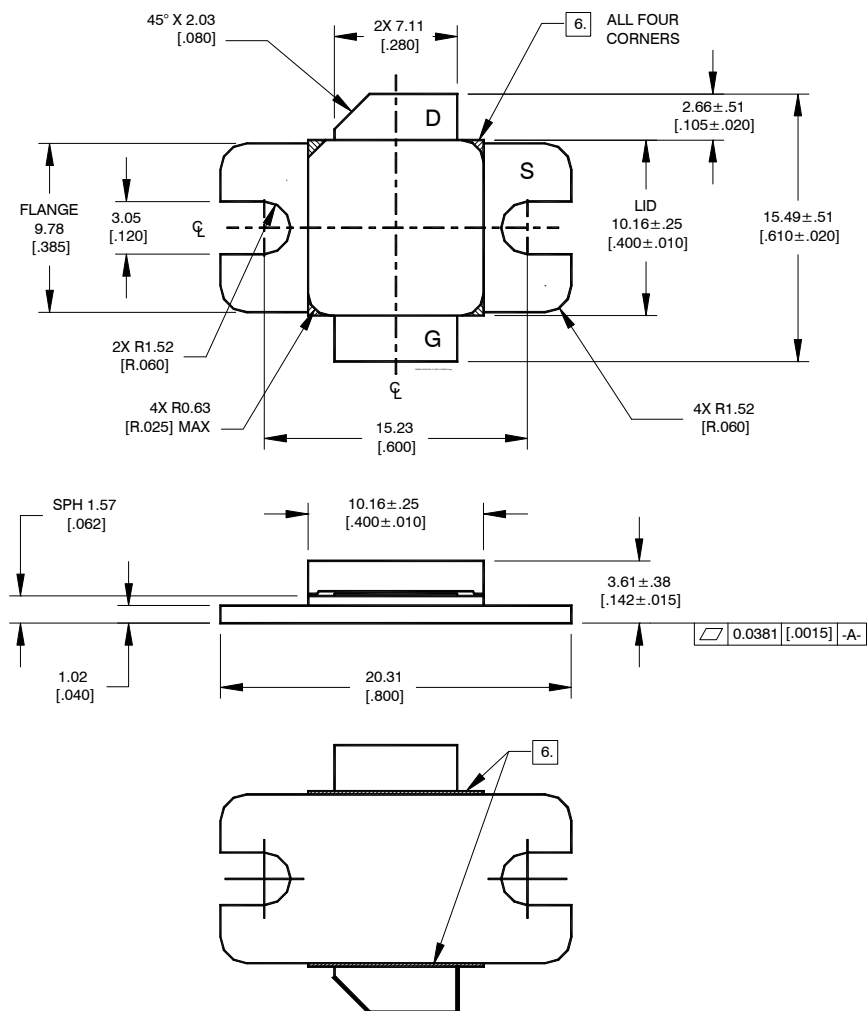
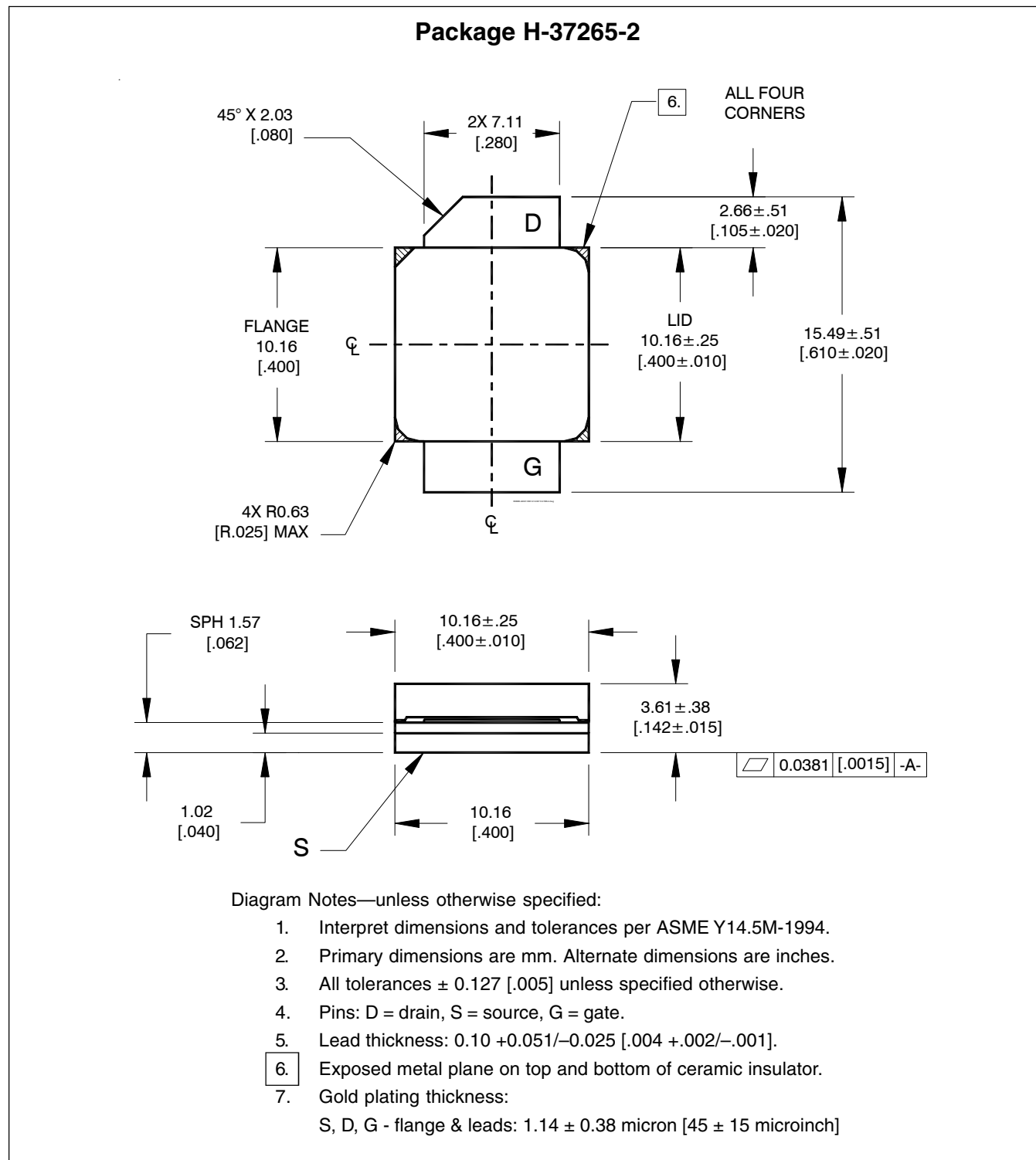


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [.005] unless specified otherwise.
4. Pins: D = drain, S = source, G = gate.
5. Lead thickness: $0.10 +0.051/-0.025$ [.004 +.002/-0.001].
6. Exposed metal plane on top and bottom of ceramic insulator.
7. Gold plating thickness:
S, D, G - flange & leads: 1.14 ± 0.38 micron [45 ± 15 microinch]

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Package Outline Specifications (cont.)



Revision History: 2016-06-16

Data Sheet

Previous Version: 2009-03-31, Data Sheet

Page	Subjects (major changes since last revision)
2	Update ordering information

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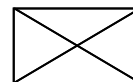
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