

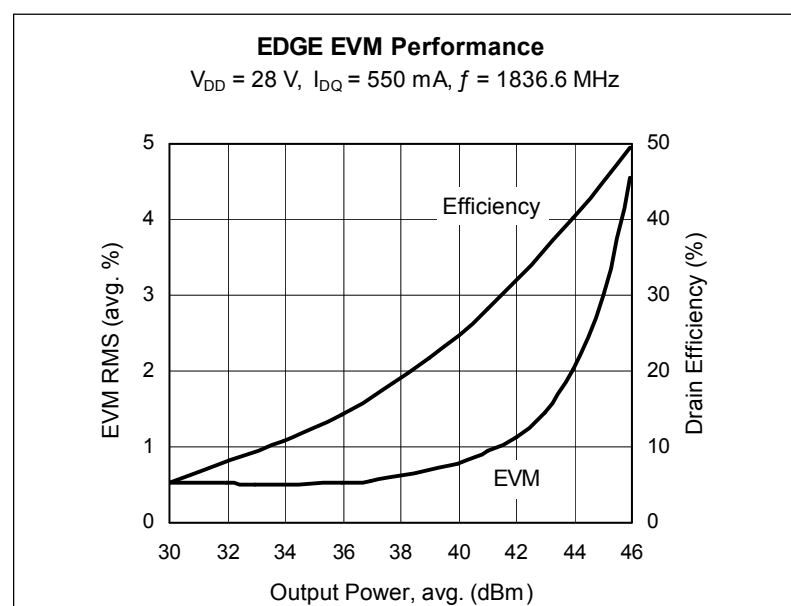
Thermally-Enhanced High Power RF LDMOS FETs 70 W, 1805 – 1880 MHz

Description

The PTFA180701E and PTFA180701F are 70-watt LDMOS FETs designed for GSM and GSM EDGE power amplifier applications in the 1805 MHz to 1880 MHz band. 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.

PTFA180701E
Package H-36265-2

PTFA180701F
Package H-37265-2



Features

- Thermally-enhanced packages, Pb-free and RoHS-compliant
- Broadband internal matching
- Typical EDGE performance
 - Average output power = 44 dBm
 - Gain = 16.5 dB
 - Efficiency = 40.5%
 - EVM = 2.0%
- Typical CW performance
 - Output power at P-1dB = 72 W
 - Gain = 15.5 dB
 - Efficiency = 59%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 70 W (CW) output power

RF Characteristics

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $P_{OUT} = 44\text{ dBm}$, $f = 1836.6\text{ MHz}$

Characteristic		Symbol	Min	Typ	Max	Unit
Error Vector Magnitude		EVM RMS	—	2.0	—	%
Modulation Spectrum	@ 400 kHz	ACPR	—	-62	—	dBc
	@ 600 kHz	ACPR	—	-76	—	dBc
Gain		G_{ps}	—	16.5	—	dB
Drain Efficiency		η_D	—	40.5	—	%

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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $P_{OUT} = 60\text{ W PEP}$, $f = 1840\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	15.5	16.5	—	dB
Drain Efficiency	η_D	44	45	—	%
Intermodulation Distortion	IMD	—	−30	−29	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	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.125	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_D = 550\text{ mA}$	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	201	W
		1.15	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 70 W CW)	$R_{\theta JC}$	0.87	$^{\circ}\text{C/W}$

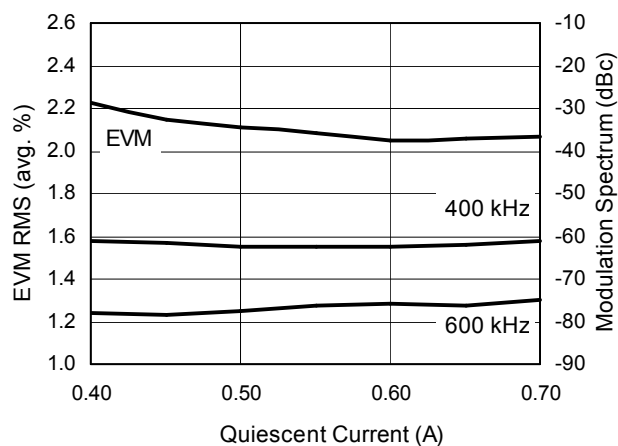
Ordering Information

Type and Version	Package Type	Package Description	Marking
PTFA180701E V4	H-36265-2	Thermally-enhanced slotted flange, single-ended	PTFA180701E
PTFA180701E V4	H-37265-2	Thermally-enhanced earless flange, single-ended	PTFA180701F

Typical Performance (measurements taken in production test fixture)

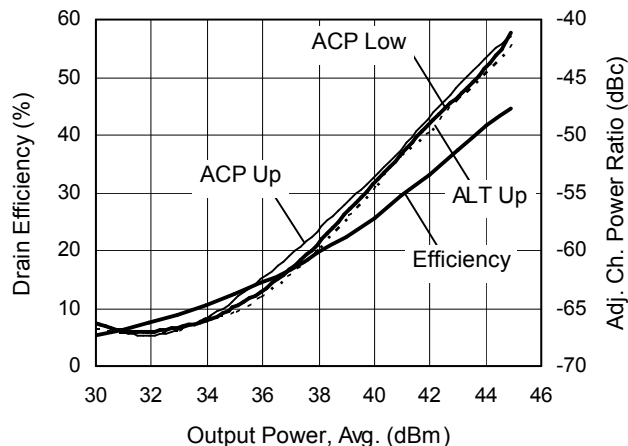
Edge EVM and Modulation Spectrum vs. Quiescent Current

$V_{DD} = 28\text{ V}$, $f = 1836.6\text{ MHz}$, $P_{OUT} = 44\text{ dBm}$



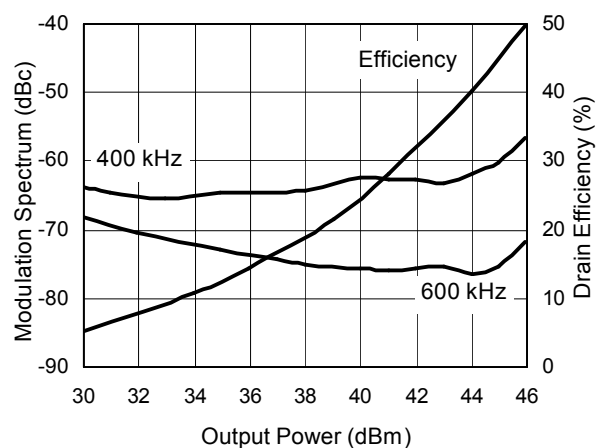
Three-Carrier CDMA2000 Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $f = 1840\text{ MHz}$



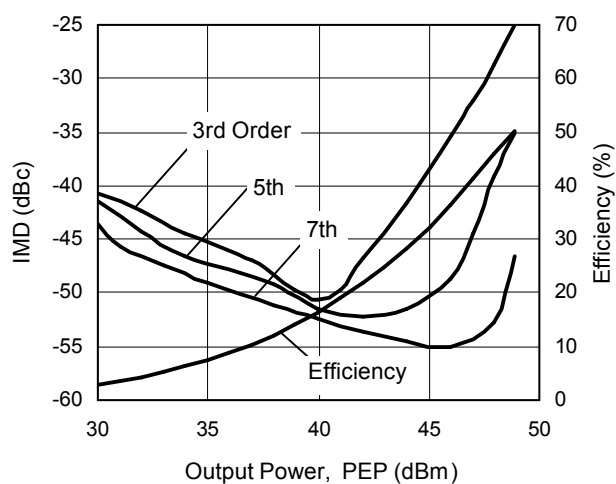
EDGE Modulation Spectrum Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $f = 1836.6\text{ MHz}$



Intermodulation Distortion vs. Output Power

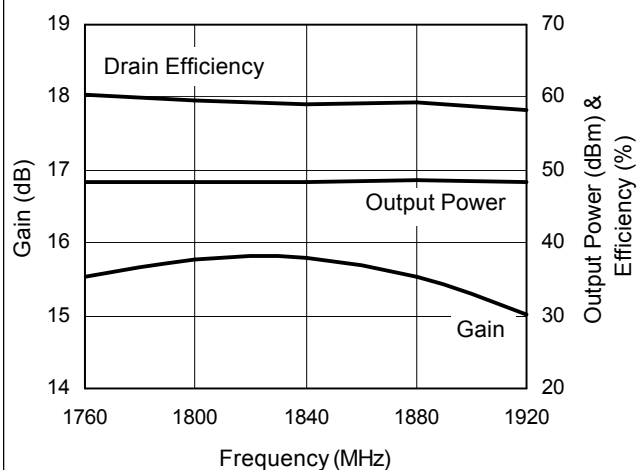
$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $f = 1840\text{ MHz}$,
tone spacing = 1 MHz



Typical Performance (cont.)

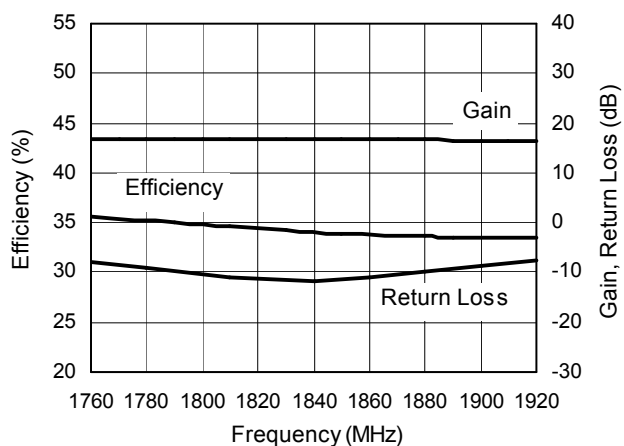
Broadband Test Fixture Performance (P-1dB)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$



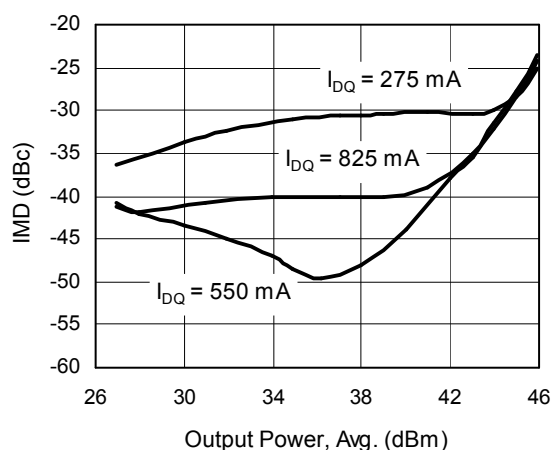
CW Broadband Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $P_{OUT} = 43\text{ dBm}$



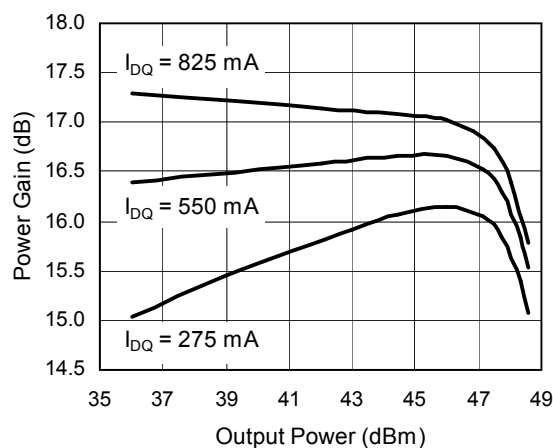
IM3 vs. Output Power at Selected Biases

$V_{DD} = 28\text{ V}$, $f_1 = 1849\text{ MHz}$, $f_2 = 1840\text{ MHz}$



Power Sweep

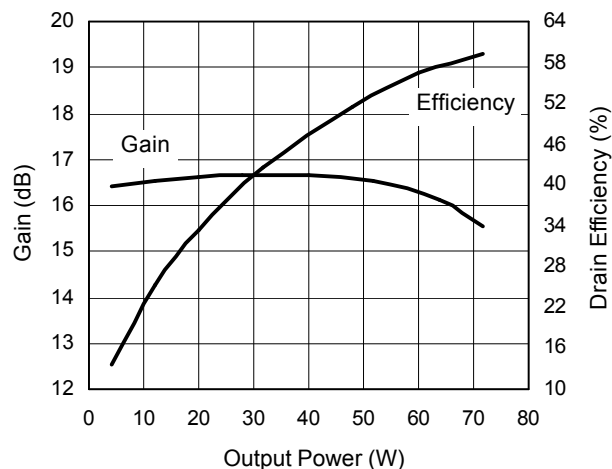
$V_{DD} = 28\text{ V}$, $f = 1880\text{ MHz}$



Typical Performance (cont.)

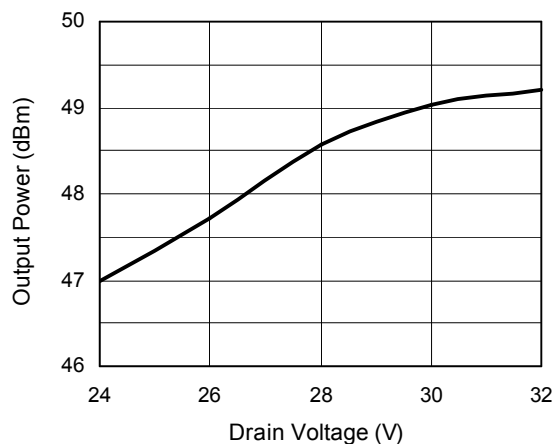
Gain & Efficiency vs. Output Power

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $f = 1880\text{ MHz}$



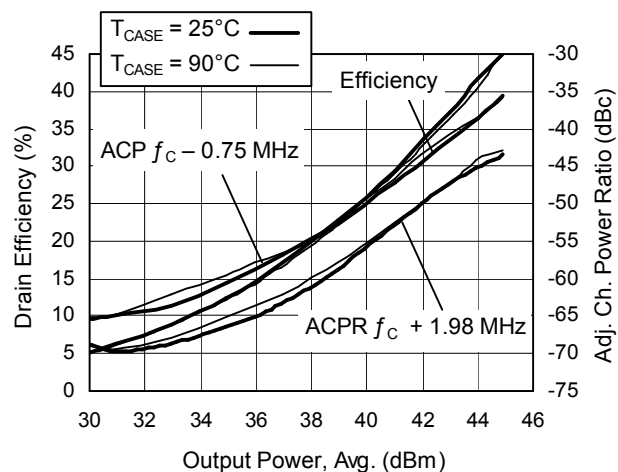
Output Power (P-1dB) vs. Drain Voltage

$I_{DQ} = 550\text{ mA}$, $f = 1880\text{ MHz}$



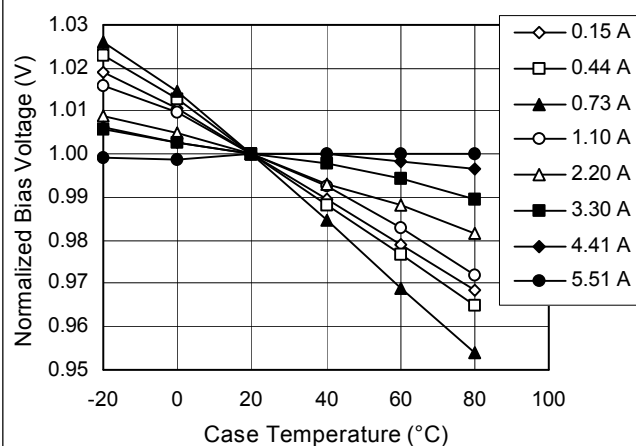
IS-95 CDMA Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $f = 1840\text{ MHz}$

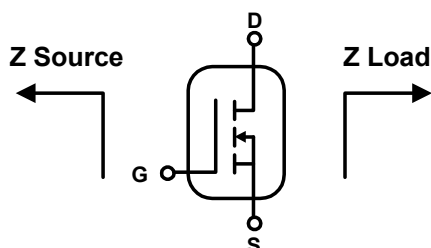


Bias Voltage vs. Temperature

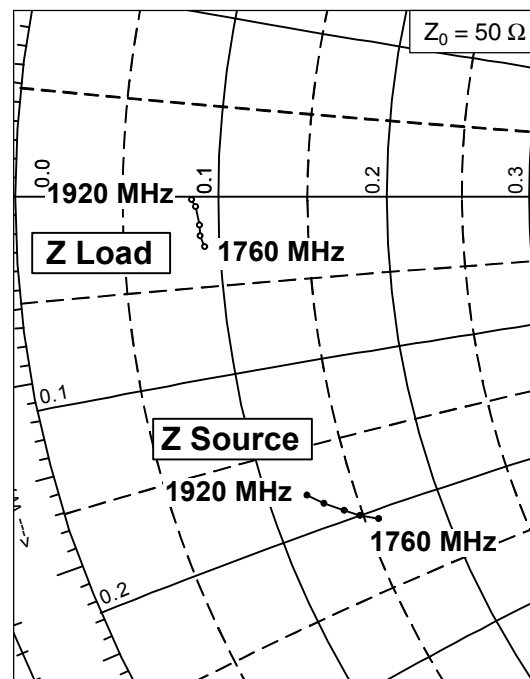
Voltage normalized to typical gate voltage,
series show current



Broadband Circuit Impedance

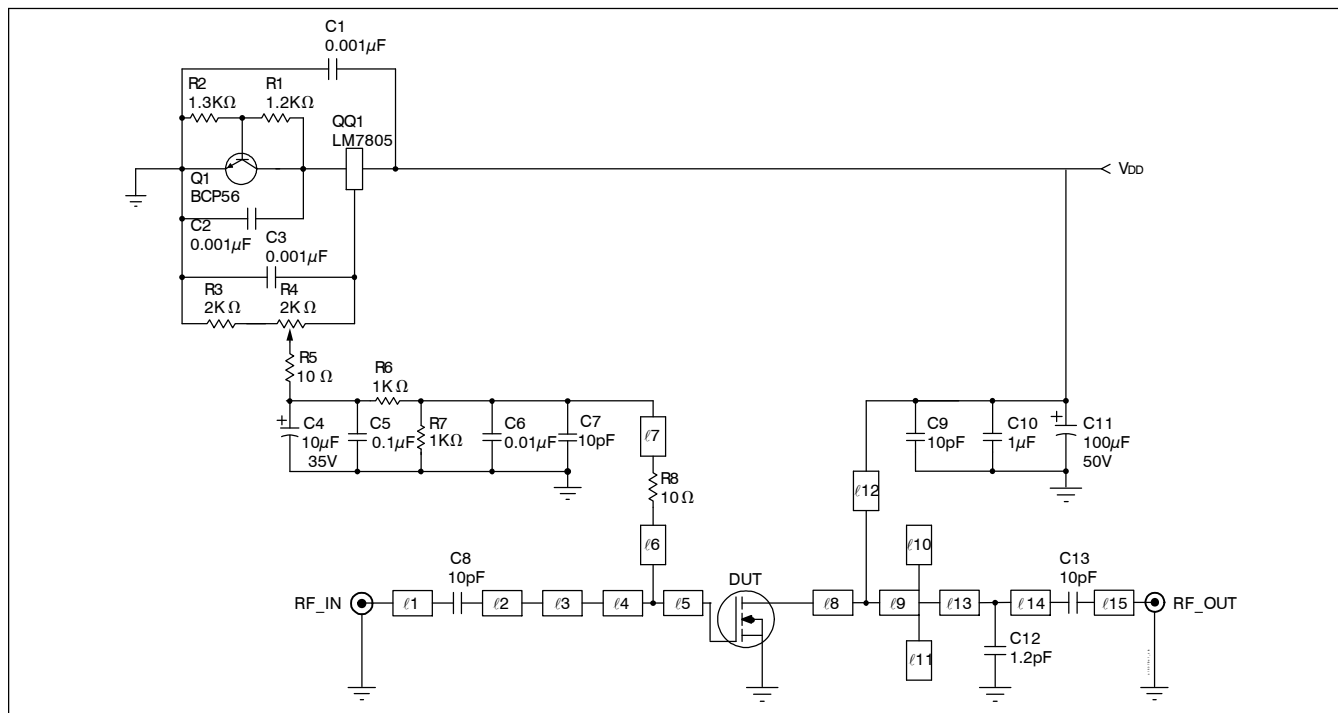


Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
1760	7.9	-10.3	4.6	-1.4
1800	7.4	-10.0	4.5	-1.1
1840	7.0	-9.7	4.5	-0.8
1880	6.5	-9.3	4.4	-0.3
1920	6.1	-8.9	4.3	-0.1



See next page for circuit information

Reference Circuit



Reference circuit schematic for 1840 MHz

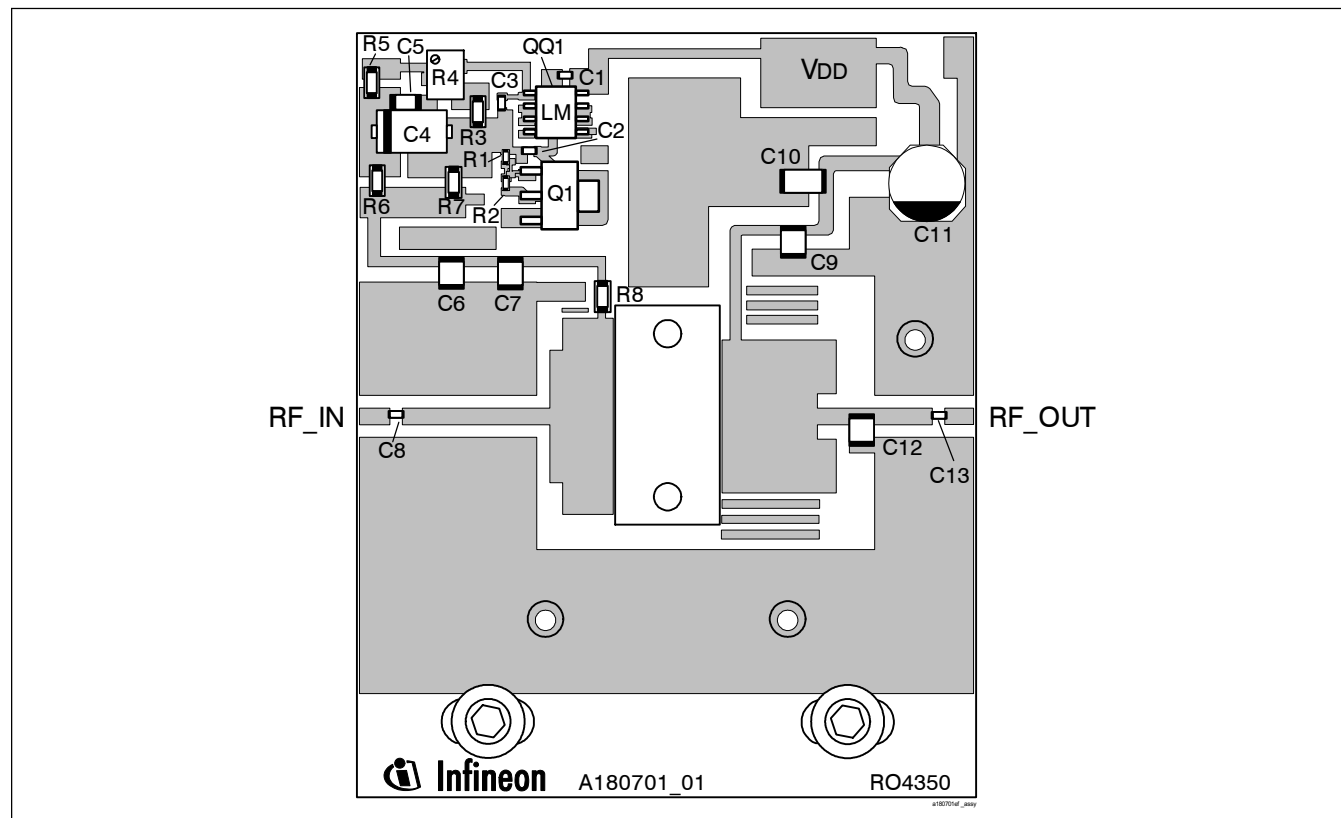
Circuit Assembly Information

DUT	PTFA180701E or PTFA180701F	LDMOS Transistor	
PCB	0.76 mm [.030"], $\epsilon_r = 3.48$	Rogers, RO4350	1 oz. copper

Microstrip	Electrical Characteristics at 1840 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
$\ell 1$	0.034 λ , 50.0	3.33 x 1.70	0.131 x 0.067
$\ell 2$	0.149 λ , 50.0	14.68 x 1.70	0.578 x 0.067
$\ell 3$	0.014 λ , 10.2	1.27 x 13.28	0.050 x 0.523
$\ell 4$	0.044 λ , 7.1	3.86 x 19.61	0.152 x 0.772
$\ell 5$	0.014 λ , 7.1	1.27 x 19.61	0.050 x 0.772
$\ell 6$	0.012 λ , 78.0	1.22 x 0.74	0.048 x 0.029
$\ell 7$	0.115 λ , 65.0	11.51 x 1.07	0.453 x 0.042
$\ell 8$	0.016 λ , 8.9	1.37 x 15.34	0.054 x 0.604
$\ell 9$	0.090 λ , 8.9	8.13 x 15.34	0.320 x 0.604
$\ell 10, \ell 11$	0.020 λ , 21.8	1.91 x 5.36	0.075 x 0.211
$\ell 12$	0.162 λ , 64.0	16.18 x 1.12	0.637 x 0.044
$\ell 13$	0.042 λ , 50.0	4.11 x 1.70	0.162 x 0.067
$\ell 14$	0.074 λ , 50.0	7.29 x 1.70	0.287 x 0.067
$\ell 15$	0.032 λ , 50.0	3.12 x 1.70	0.123 x 0.067

¹Electrical characteristics are rounded

Reference Circuit (cont.)

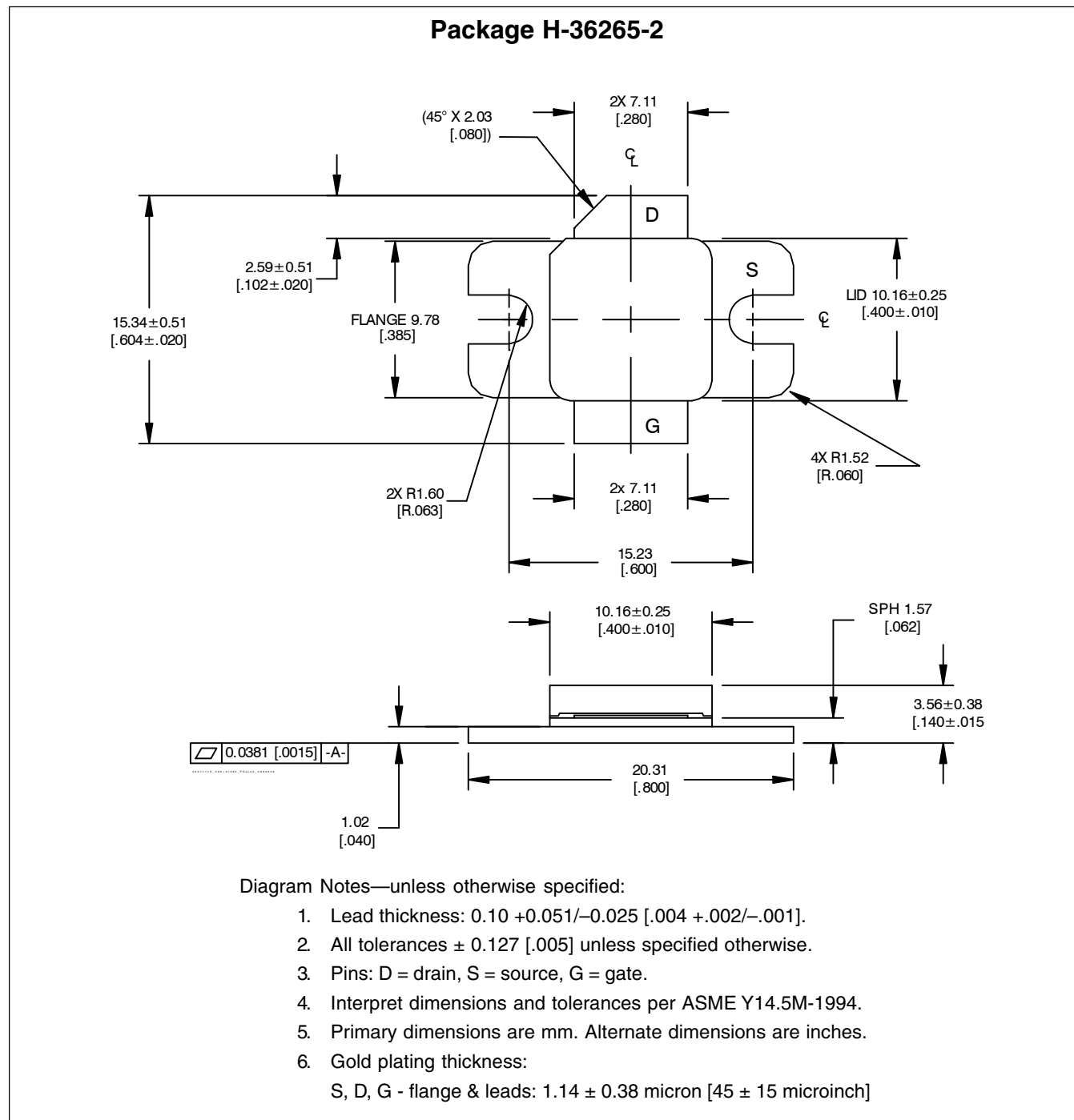


Reference circuit assembly diagram* (not to scale)

Component	Description	Suggested Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.001 μ F	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 μ F, 35 V	Digi-Key	399-1655-2-ND
C5	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6	Capacitor, 0.01 μ F	ATC	200B 103
C7, C9	Ceramic capacitor, 10 pF	ATC	100B 100
C8, C13	Ceramic capacitor, 10 pF	ATC	100A 100
C10	Ceramic capacitor, 1 μ F	Digi-Key	445-1411-1-ND
C11	Electrolytic capacitor, 100 μ F, 50 V	Digi-Key	PCE3718CT-ND
C12	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	Chip resistor 2 k-ohms	Digi-Key	P2KECT-ND
R4	Potentiometer 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R8	Chip resistor 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor 1 k-ohms	Digi-Key	P1KECT-ND

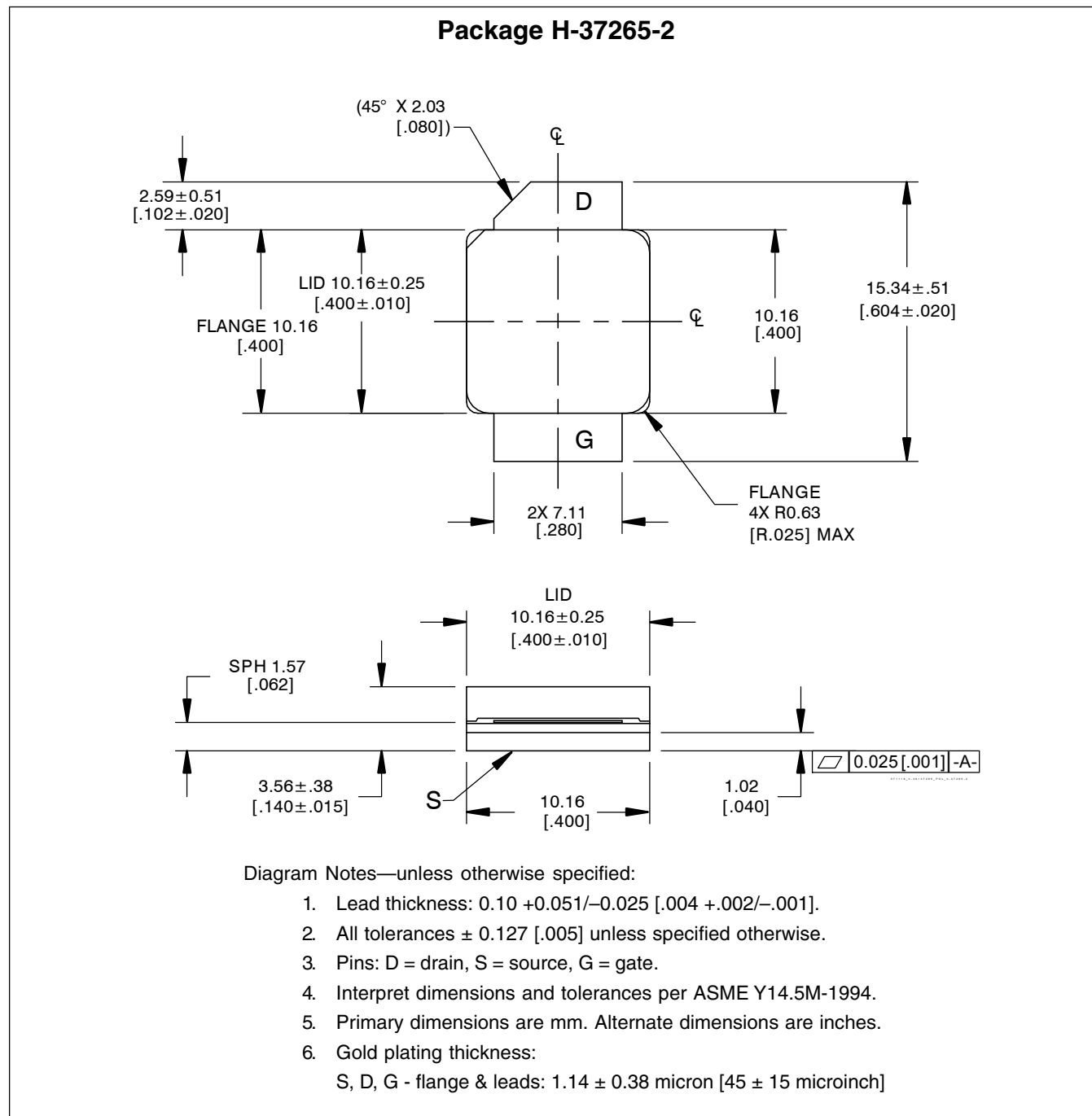
*Gerber files for this circuit available on request.

Package Outline Specifications



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Package Outline Specifications (cont.)



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Revision History: 2009-02-20

Data Sheet

Previous Version: 2006-08-10, Data Sheet

Page	Subjects (major changes since last revision)
1, 3, 9, 10	Update to product V4, with new package technologies. Update package outline diagrams.
8	Fixed typing error

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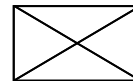
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