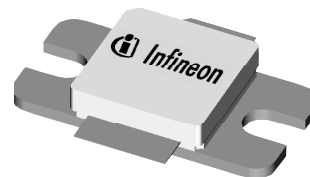


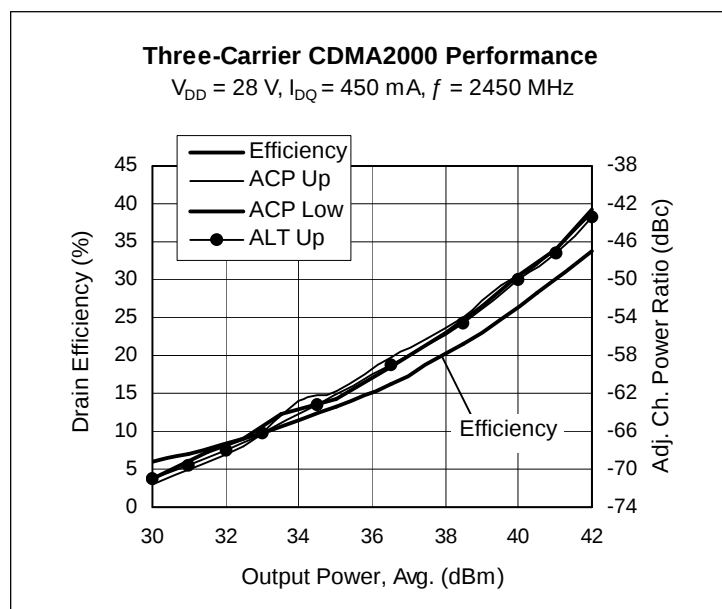
Thermally-Enhanced High Power RF LDMOS FET 45 W, 2420 – 2480 MHz

Description

The PTFA240451E is a thermally-enhanced, 45-watt, internally-matched **GOLDMOS®** FET intended for CDMA2000 and WiMAX applications from 2420 to 2480 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.



PTFA240451E
Package H-30265-2



Features

- Thermally-enhanced, lead-free and RoHS-compliant packaging
- Broadband internal matching
- Typical two-carrier CDMA performance at 2450 MHz, 28 V
 - Average output power = 10 W
 - Linear Gain = 14 dB
 - Efficiency = 27%
 - Adjacent channel power = -45 dBc
- Typical CW performance, 2450 MHz, 28 V
 - Output power at P-1dB = 50 W
 - Efficiency = 54%
- 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

RF Characteristics

3-Carrier CDMA2000 Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT} = 14\text{ W}$ average, $f = 2450\text{ MHz}$, channel bandwidth = 3.75 MHz; ACPR measured in 30 kHz bandwidth at $f_C \pm 2.135\text{ MHz}$ offset

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	14	—	dB
Drain Efficiency	η_D	—	31	—	%
Adjacent Channel Power Ratio	ACPR	—	-45	—	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 (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT} = 45\text{ W PEP}$, $f = 2480\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	13.5	14	—	dB
Drain Efficiency	η_D	39	40	—	%
Intermodulation Distortion	IMD	—	−30	−28	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	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.17	—	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

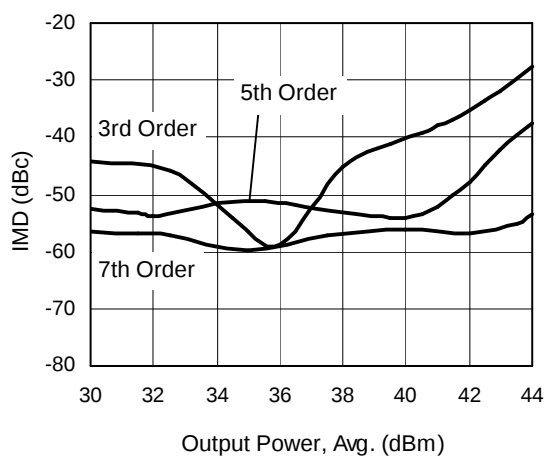
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	−0.5 to +12	V
Junction Temperature	T_J	200	$^{\circ}\text{C}$
Total Device Dissipation Above 25 $^{\circ}\text{C}$ derate by	P_D	196	W
		1.12	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 45 W CW)	$R_{\theta JC}$	0.89	$^{\circ}\text{C/W}$

Ordering Information

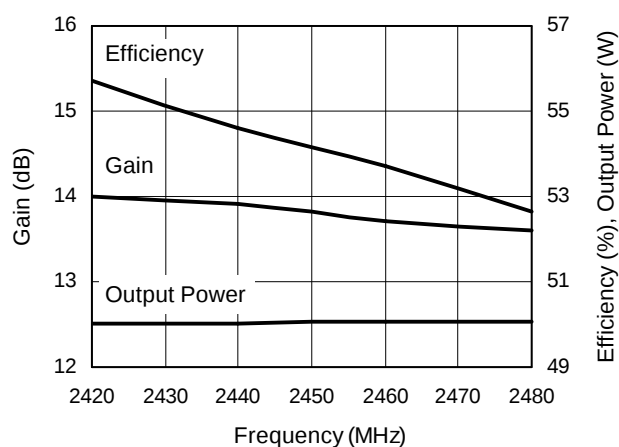
Type and Version	Package Outline	Package Description	Marking
PTFA240451E V1	H-30265-2	Thermally-enhanced slotted flange, single-ended	PTFA240451E

Typical Performance (data taken in a production test fixture)

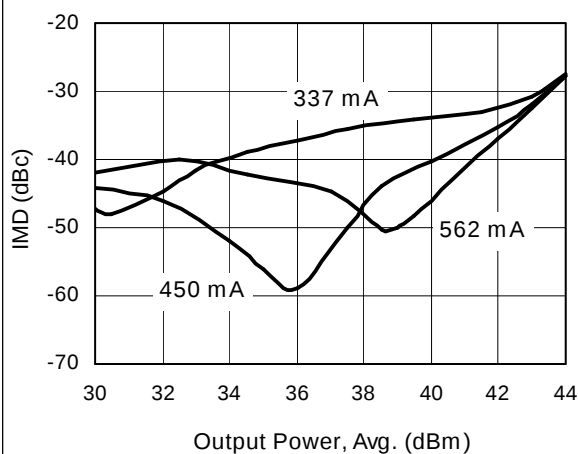
Intermodulation Distortion vs. Output Power (as measured in a broadband circuit)

 $V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f_1 = 2449\text{ MHz}$, $f_2 = 2450\text{ MHz}$


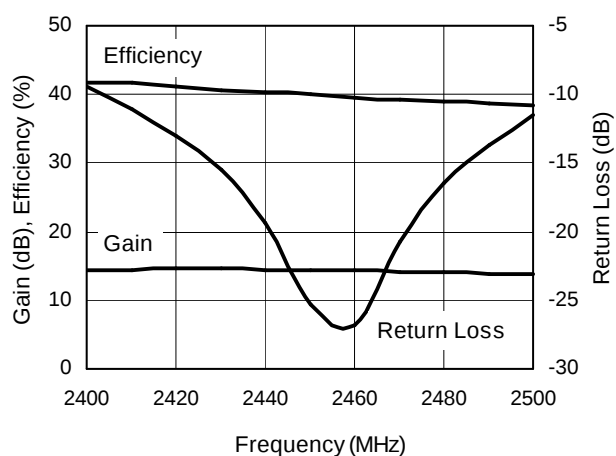
Typical P_{OUT} , Gain & Efficiency (at P-1dB) vs. Frequency

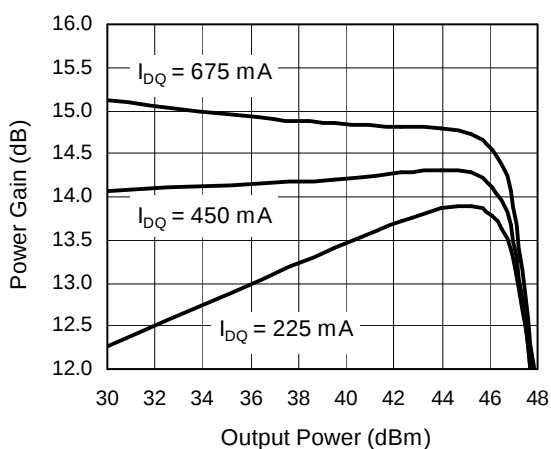
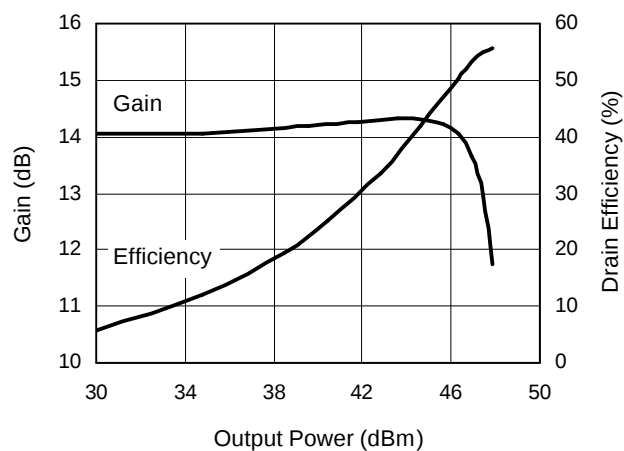
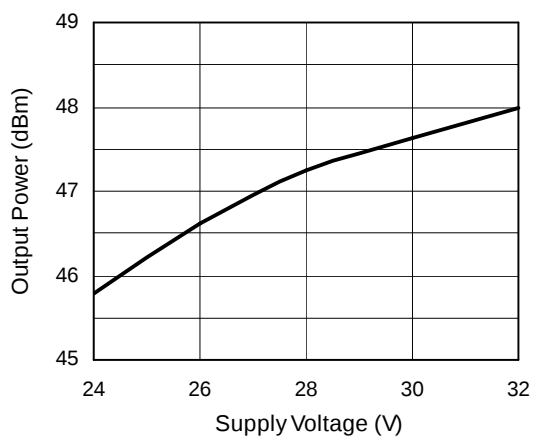
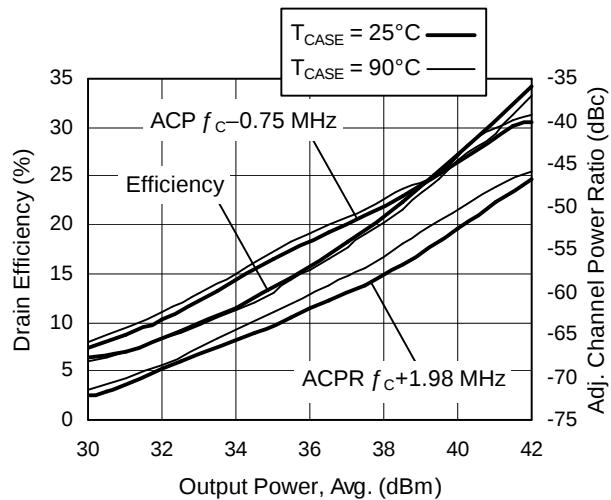
 $V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$


IM3 vs. Output Power for Selected Biases

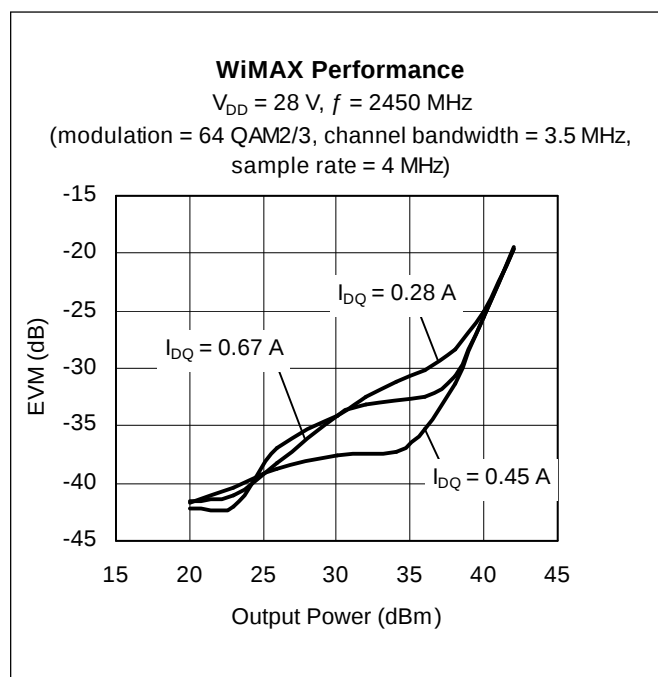
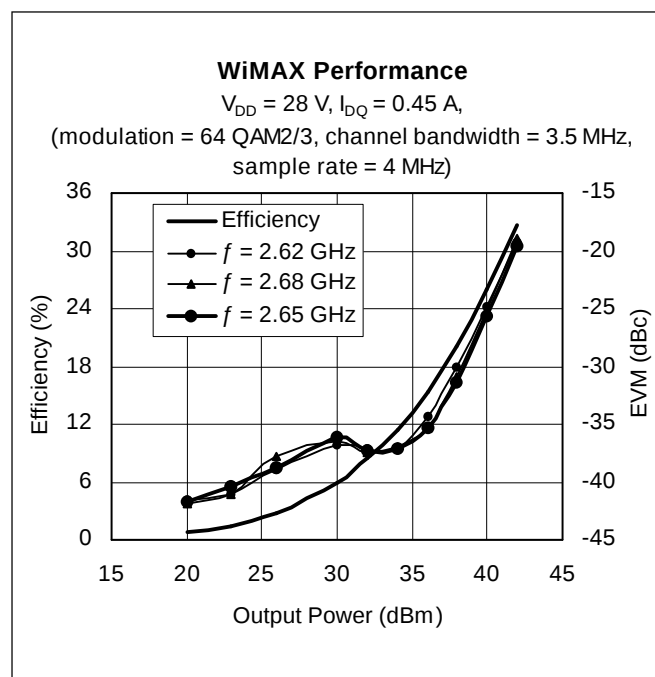
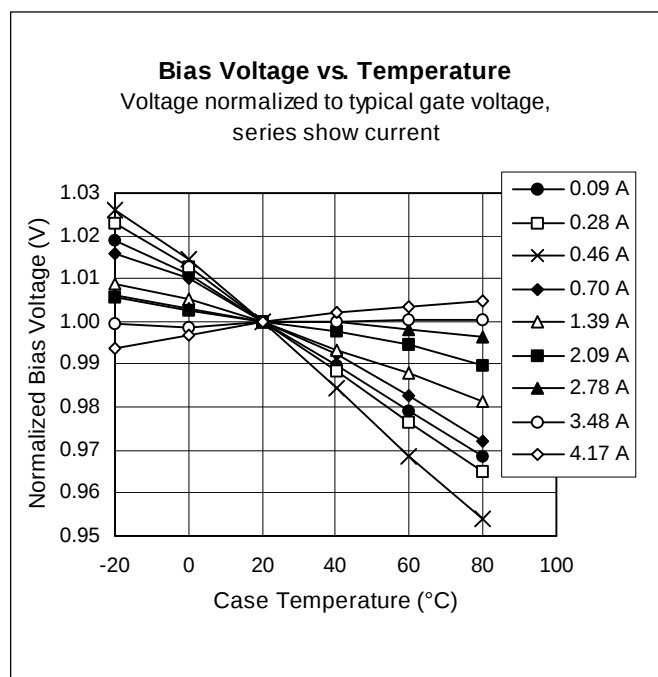
 $V_{DD} = 28\text{ V}$, $f_1 = 2449\text{ MHz}$, $f_2 = 2450\text{ MHz}$


2-Tone Broadband Performance

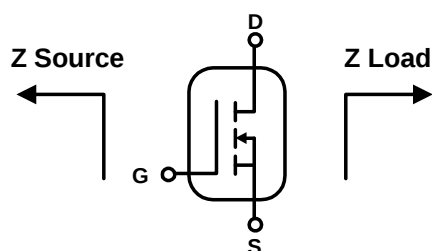
 $V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $P_{OUT\text{ Avg.}} = 43.52\text{ dBm}$


Typical Performance (cont.)
Power Sweep
 $V_{DD} = 28\text{ V}$, $f = 2450\text{ MHz}$

Gain & Efficiency vs. Output Power
 $V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 2450\text{ MHz}$

Output Power (at 1 dB Compression) vs. Supply Voltage
 $I_{DQ} = 450\text{ mA}$, $f = 2450\text{ MHz}$

IS-95 CDMA Performance
 $V_{DD} = 28\text{ V}$, $I_{DQ} = 450\text{ mA}$, $f = 2450\text{ MHz}$


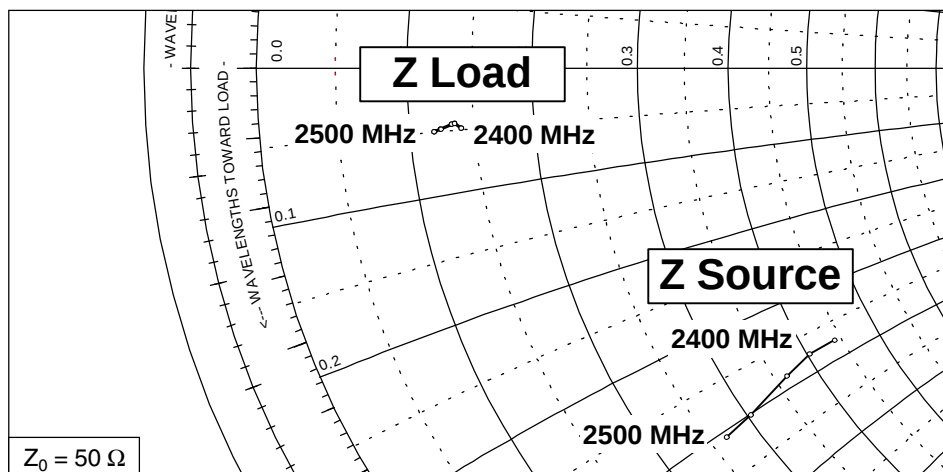
Typical Performance (cont.)



Broadband Circuit Impedance

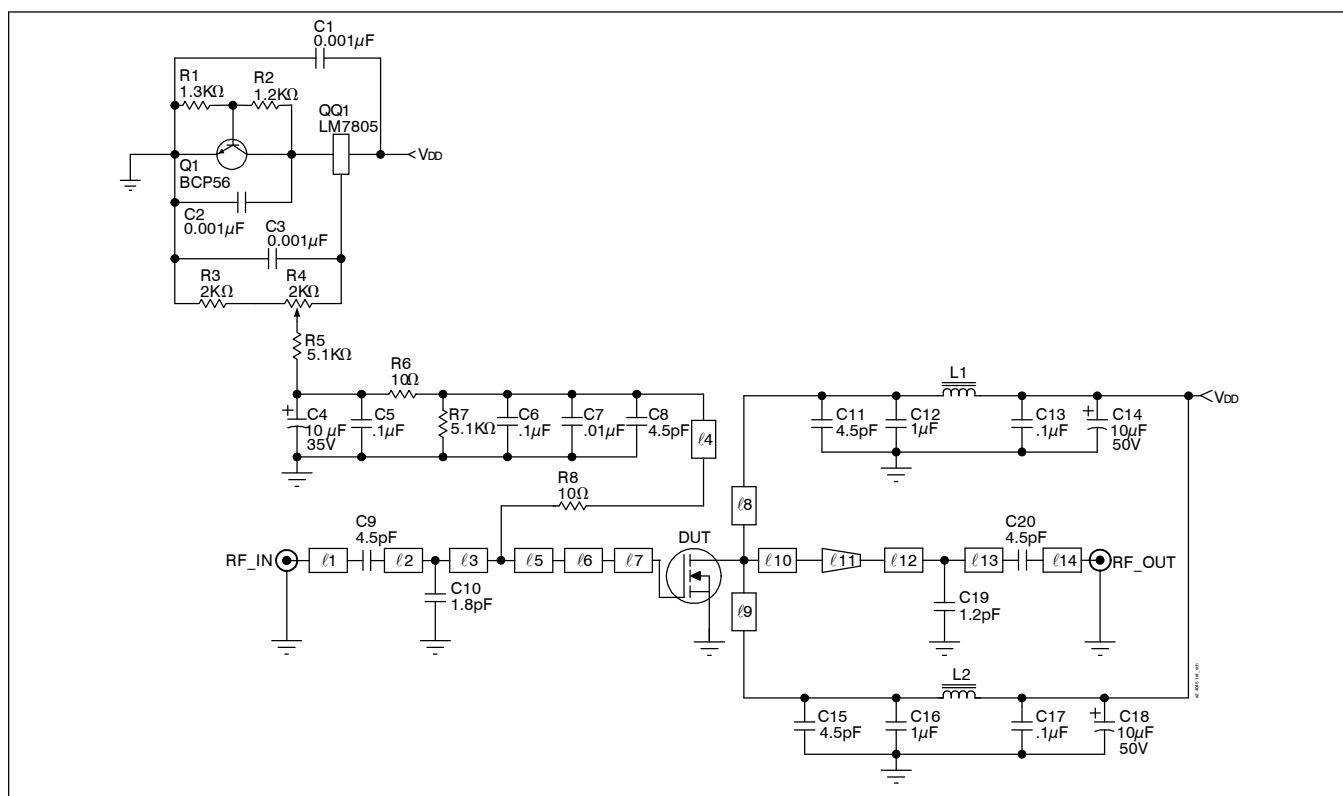


Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
2400	22.12	-18.74	6.98	-2.35
2420	20.27	-18.71	6.73	-2.14
2450	18.30	-19.18	6.61	-2.17
2480	15.24	-19.95	6.17	-2.32
2500	13.45	-20.19	5.92	-2.41



See next page for circuit information

Reference Circuit



Reference circuit schematic for $f = 2480$ MHz

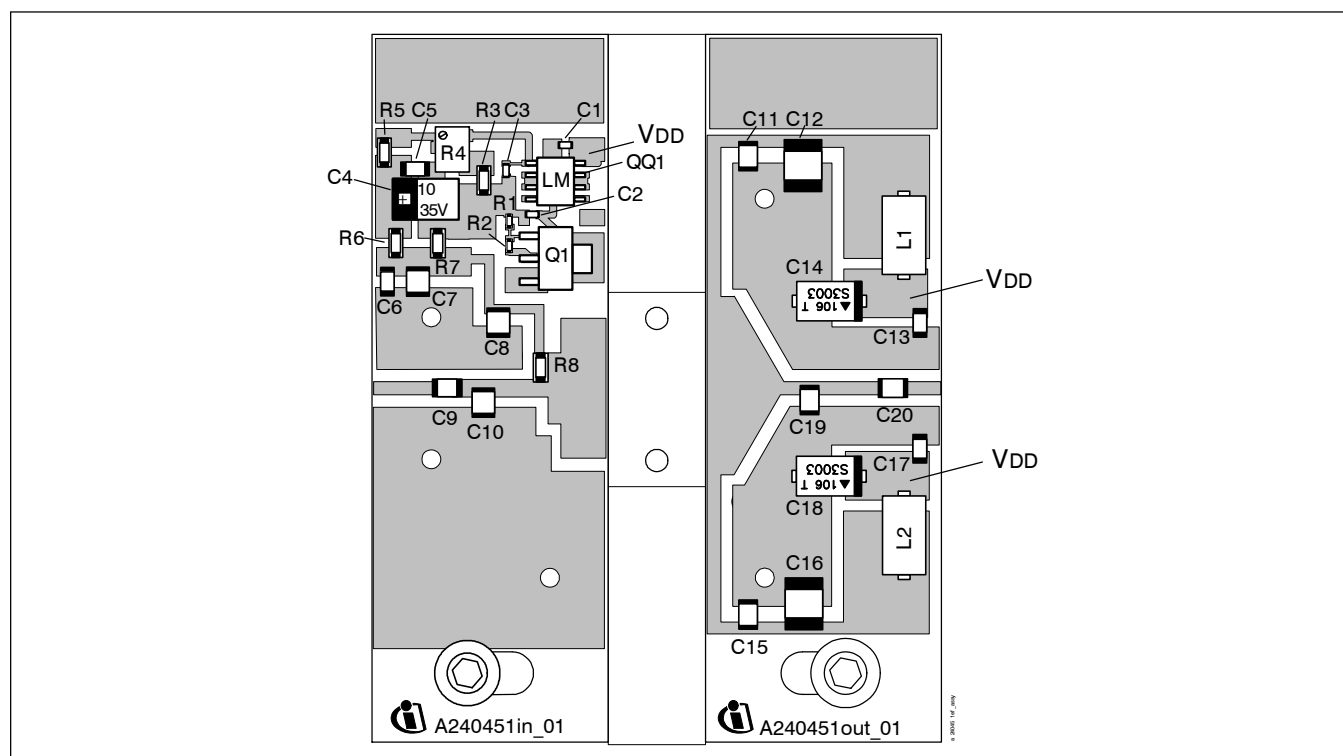
Circuit Assembly Information

DUT	PTFA240451E	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2480 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ_1	0.102λ , 50.0 Ω	6.68 x 1.40	0.263 x 0.055
ℓ_2	0.050λ , 44.0 Ω	3.12 x 1.78	0.123 x 0.070
ℓ_3	0.094λ , 44.0 Ω	6.10 x 1.78	0.240 x 0.070
ℓ_4	0.148λ , 64.0 Ω	9.86 x 0.89	0.388 x 0.035
ℓ_5	0.016λ , 44.0 Ω	1.04 x 1.78	0.041 x 0.070
ℓ_6	0.021λ , 14.7 Ω	1.35 x 7.62	0.053 x 0.300
ℓ_7	0.080λ , 8.2 Ω	4.78 x 14.86	0.188 x 0.585
ℓ_8, ℓ_9	0.295λ , 50.0 Ω	19.30 x 1.40	0.760 x 0.055
ℓ_{10}	0.049λ , 6.5 Ω	2.84 x 19.05	0.112 x 0.750
ℓ_{11} (taper)	0.079λ , 6.5 Ω / 50.0 Ω	5.16 x 19.05 / 1.40	0.203 x 0.750 / 0.055
ℓ_{12}	0.045λ , 50.0 Ω	2.95 x 1.40	0.116 x 0.055
ℓ_{13}	0.117λ , 50.0 Ω	7.62 x 1.40	0.300 x 0.055
ℓ_{14}	0.058λ , 50.0 Ω	3.81 x 1.40	0.150 x 0.055

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	PCS6106TR-ND
C5, C6, C13, C17	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C7	Ceramic capacitor, 0.01 μ F	ATC	200B 103
C8, C9, C11, C15, C20	Ceramic capacitor, 4.5 pF	ATC	100B 4R5
C10	Ceramic capacitor, 1.8 pF	ATC	100B 1R8
C12, C16	Capacitor, 1 μ F	ATC	920C105KW
C14, C18	Tantalum capacitor, 10 μ F, 50 V	Garrett Electronics	TPSE106K050R0400
C19	Ceramic capacitor, 1.2 pF	ATC	100B 1R2
L1, L2	Ferrite	Philips	BDS46/3.8.8-452
Q1	Transistor	Infineon	BCP56
QQ1	Voltage regulator	National Semiconductor	LM7805
R1	Chip resistor, 1.3 k-ohms	Digi-Key	P1.3KGCT-ND
R2	Chip resistor, 1.2 k-ohms	Digi-Key	P1.2KGCT-ND
R3	Chip resistor, 2 k-ohms	Digi-Key	P2.0KECT-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

Package H-30265-2



1. Lead thickness: $0.10 +0.051/-0.025$ [$0.004 +.002/-0.001$].
2. All tolerances ± 0.127 [0.005] unless specified otherwise.
3. Pins: D = drain, S = source, G = gate.
4. Interpret dimensions and tolerances per ASME Y14.5M-1994.
5. Primary dimensions are mm. Alternate dimensions are inches.
6. Gold plating thickness:
S - flange: 2.54 micron [100 microinch] (min)
D, G - leads: 1.14 ± 0.38 micron [45 ± 15 microinch]

Rev. 04, 2008-03-04

PTFA240451E

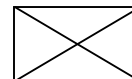
Revision History:	2008-03-04	Data Sheet
Previous Version:	2006-07-17, Data Sheet	
Page	Subjects (major changes since last revision)	
All	Remove references to alternate products.	

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