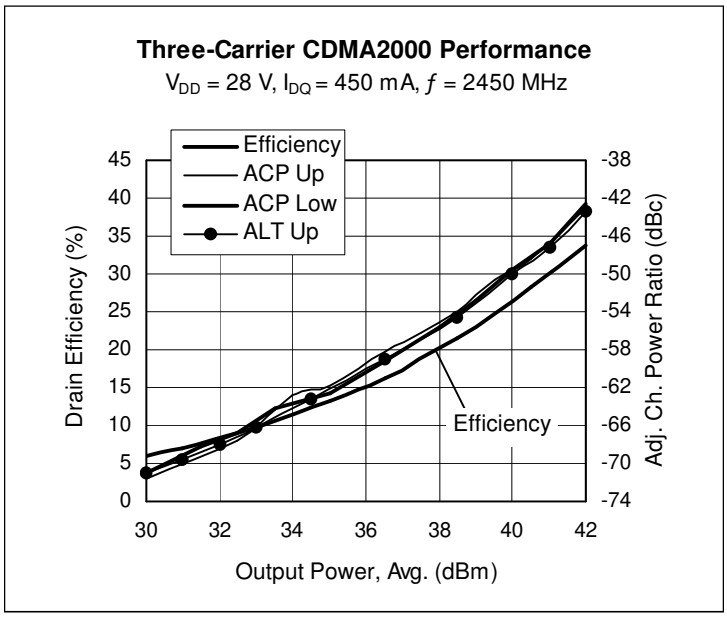
Thermally-Enhanced High Power RF LDMOS FET
45 W, 2420 – 2480 MHz

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 V, I_{DQ} = 450 mA, P_{OUT} = 14 W average, f = 2450 MHz, channel bandwidth = 3.75 MHz; ACPR measured in 30 kHz bandwidth at f_C ± 2.135 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°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 V, I_{DQ} = 450 mA, P_{OUT} = 45 W PEP, f = 2480 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 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
	V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10.0	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.17	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 450 mA	V_{GS}	2.0	2.5	3.0	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA

Maximum Ratings

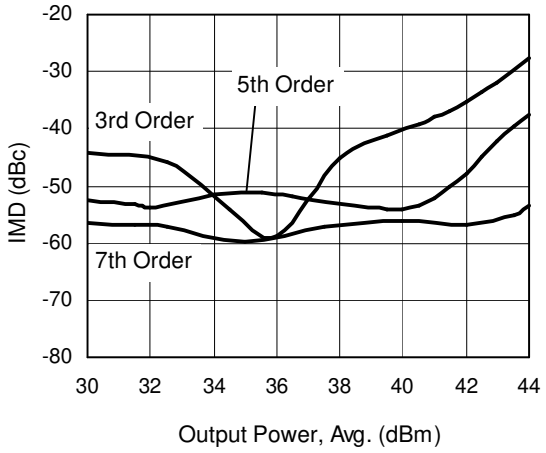
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–0.5 to +12	V
Junction Temperature	T_J	200	°C
Total Device Dissipation	P_D	196	W
Above 25°C derate by		1.12	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 45 W CW)	$R_{\theta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

Ordering Information

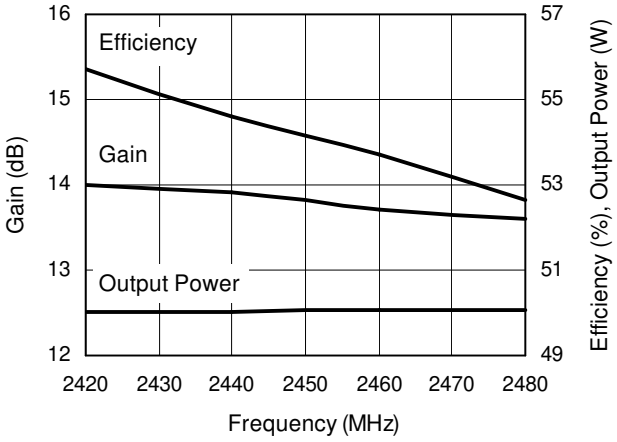
Type and Version	Package Outline	Package Description	Marking
PTFA240451E V1	H-30265-2	Thermally-enhanced slotted flange, single-ended	PTFA240451E

Typical Performance (data taken in a production test fixture)

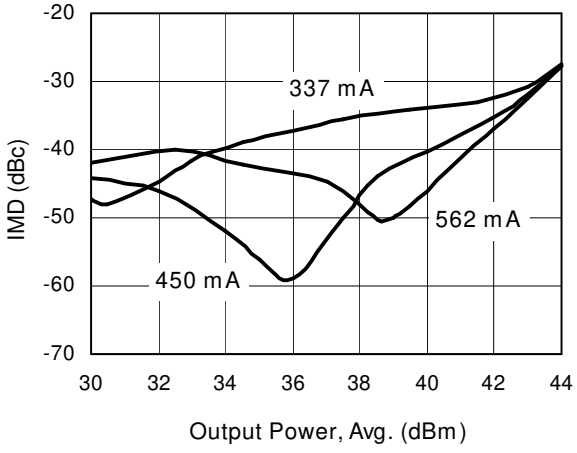
Intermodulation Distortion vs. Output Power
(as measured in a broadband circuit)
V_{DD} = 28 V, I_{DQ} = 450 mA, f_1 = 2449 MHz, f_2 = 2450 MHz



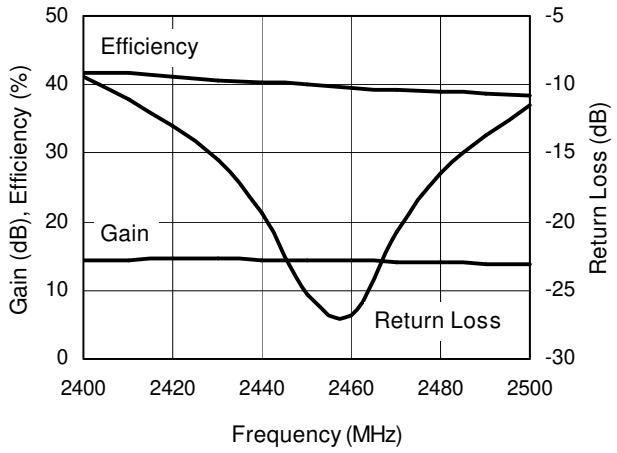
Typical P_{OUT}, Gain & Efficiency (at P-1dB) vs. Frequency
V_{DD} = 28 V, I_{DQ} = 450 mA



IM3 vs. Output Power for Selected Biases
V_{DD} = 28 V, f_1 = 2449 MHz, f_2 = 2450 MHz



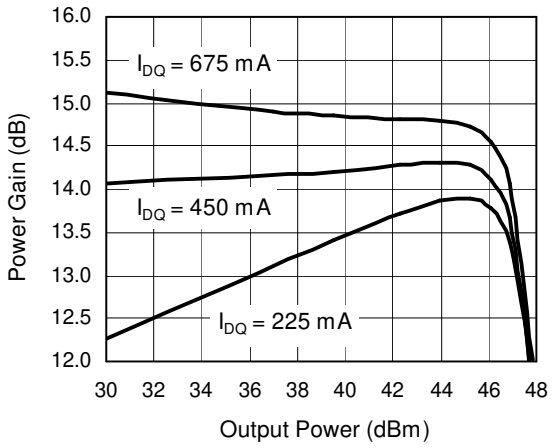
2-Tone Broadband Performance
V_{DD} = 28 V, I_{DQ} = 450 mA, P_{OUT} Avg. = 43.52 dBm



Typical Performance (cont.)

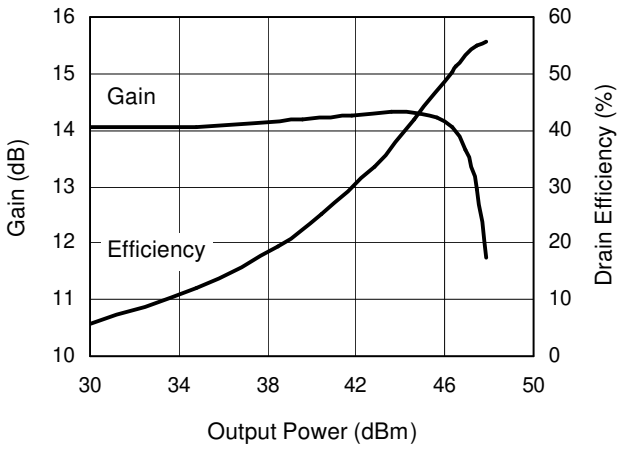
Power Sweep

V_{DD} = 28 V, f = 2450 MHz



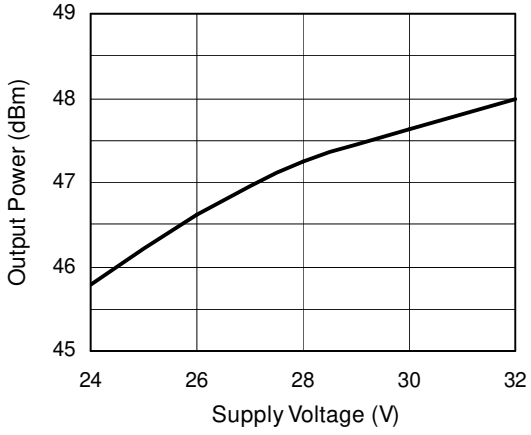
Gain & Efficiency vs. Output Power

V_{DD} = 28 V, I_{DQ} = 450 mA, f = 2450 MHz



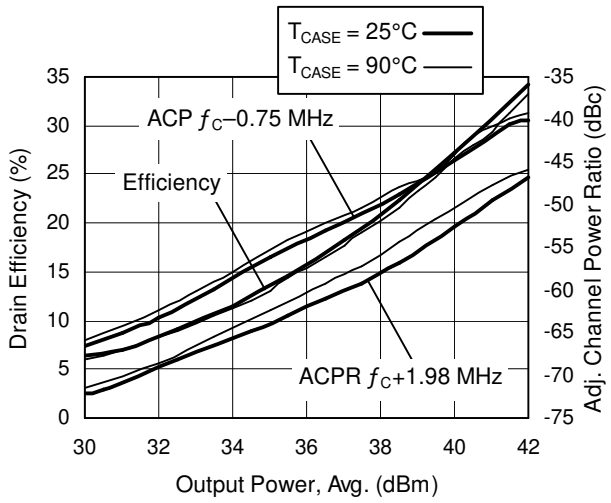
Output Power (at 1 dB Compression) vs. Supply Voltage

I_{DQ} = 450 mA, f = 2450 MHz



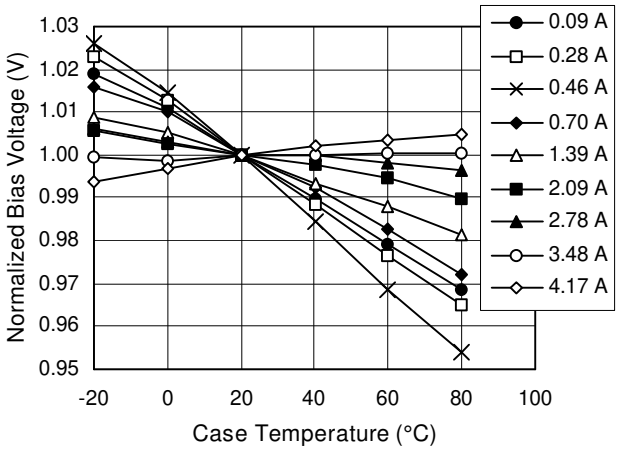
IS-95 CDMA Performance

V_{DD} = 28 V, I_{DQ} = 450 mA, f = 2450 MHz

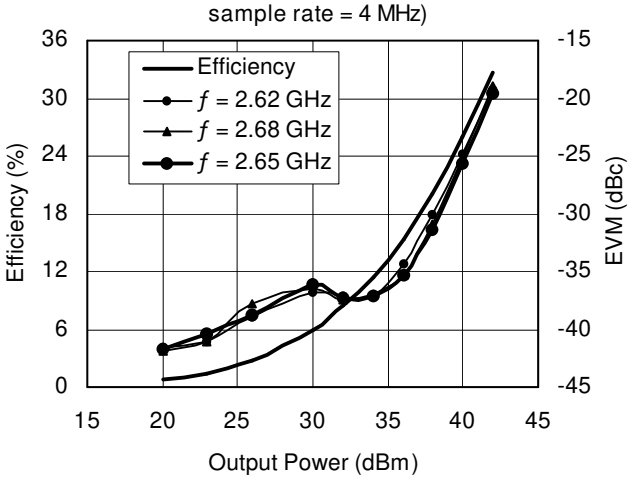


Typical Performance (cont.)

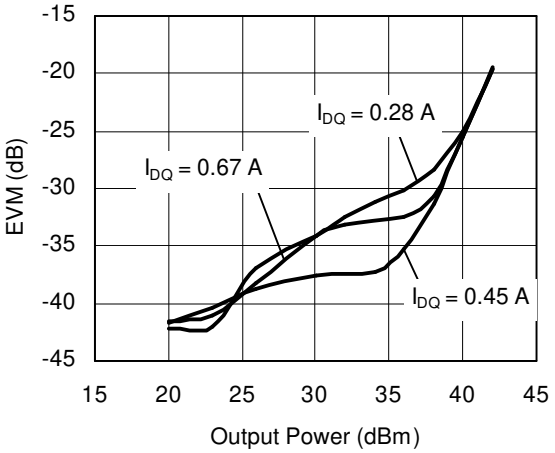
Bias Voltage vs. Temperature
Voltage normalized to typical gate voltage,
series show current



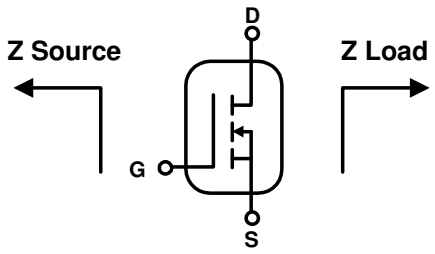
WiMAX Performance
V_{DD} = 28 V, I_{DQ} = 0.45 A,
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)



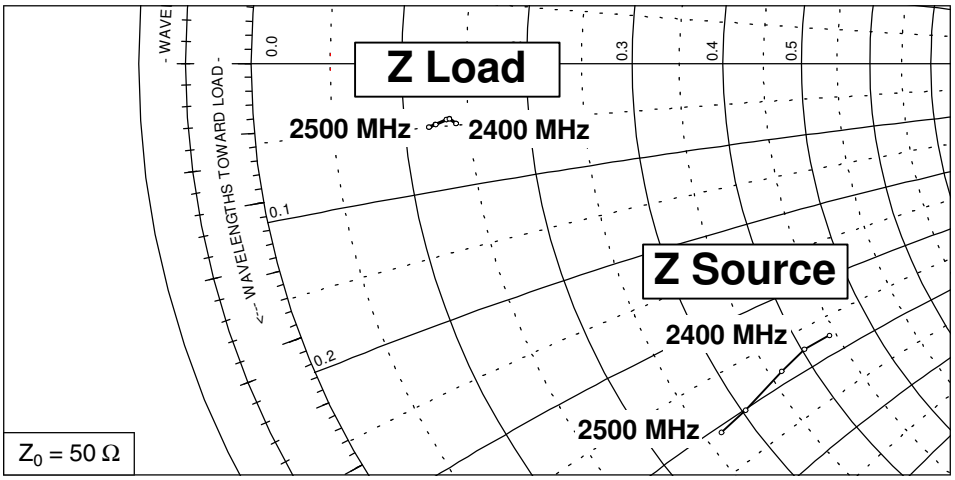
WiMAX Performance
V_{DD} = 28 V, f = 2450 MHz
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)



Broadband Circuit Impedance

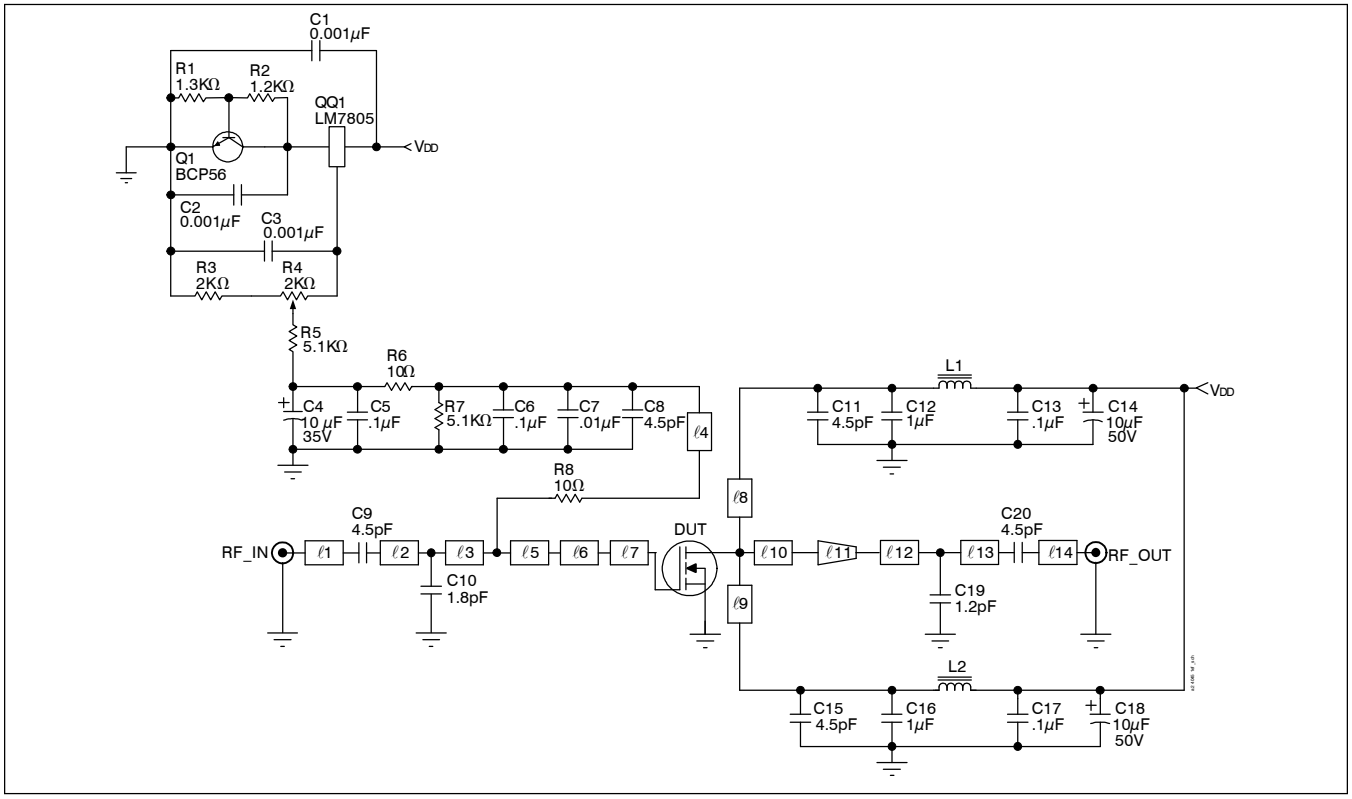


Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
2400	22.12	–18.74	6.98	–2.35
2420	20.27	–18.71	6.73	–2.14
2450	18.30	–19.18	6.61	–2.17
2480	15.24	–19.95	6.17	–2.32
2500	13.45	–20.19	5.92	–2.41



See next page for circuit information

Reference Circuit



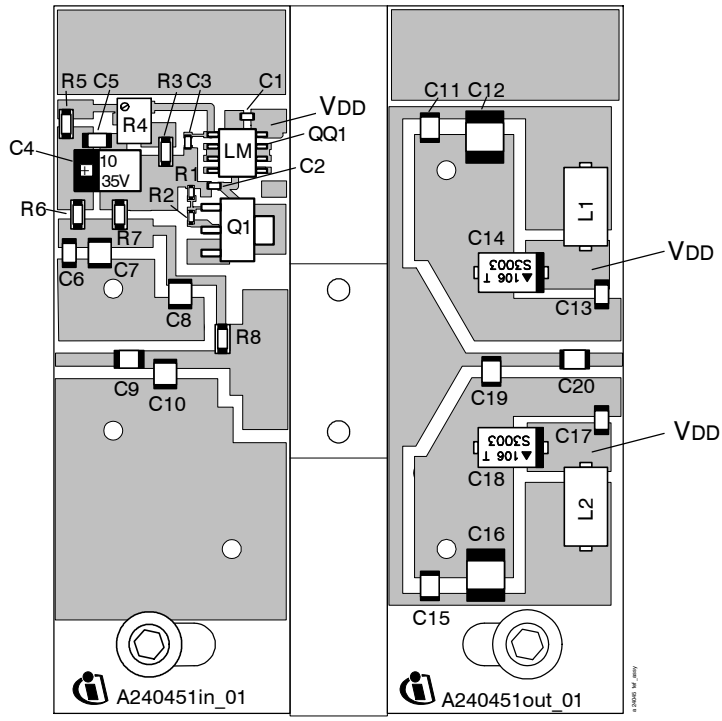
Reference circuit schematic for ƒ = 2480 MHz

Circuit Assembly Information			
DUT	PTFA240451E	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, ε_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.)
ℓ1	0.102 λ, 50.0 Ω	6.68 x 1.40	0.263 x 0.055
ℓ2	0.050 λ, 44.0 Ω	3.12 x 1.78	0.123 x 0.070
ℓ3	0.094 λ, 44.0 Ω	6.10 x 1.78	0.240 x 0.070
ℓ4	0.148 λ, 64.0 Ω	9.86 x 0.89	0.388 x 0.035
ℓ5	0.016 λ, 44.0 Ω	1.04 x 1.78	0.041 x 0.070
ℓ6	0.021 λ, 14.7 Ω	1.35 x 7.62	0.053 x 0.300
ℓ7	0.080 λ, 8.2 Ω	4.78 x 14.86	0.188 x 0.585
ℓ8, ℓ9	0.295 λ, 50.0 Ω	19.30 x 1.40	0.760 x 0.055
ℓ10	0.049 λ, 6.5 Ω	2.84 x 19.05	0.112 x 0.750
ℓ11 (taper)	0.079 λ, 6.5 Ω / 50.0 Ω	5.16 x 19.05 / 1.40	0.203 x 0.750 / 0.055
ℓ12	0.045 λ, 50.0 Ω	2.95 x 1.40	0.116 x 0.055
ℓ13	0.117 λ, 50.0 Ω	7.62 x 1.40	0.300 x 0.055
ℓ14	0.058 λ, 50.0 Ω	3.81 x 1.40	0.150 x 0.055

[1]Electrical 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 µF	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 µF, 35 V	Digi-Key	PCS6106TR-ND
C5, C6, C13, C17	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C7	Ceramic capacitor, 0.01 µF	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 µF	ATC	920C105KW
C14, C18	Tantalum capacitor, 10 µF, 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 Outline Specifications

Package H-30265-2

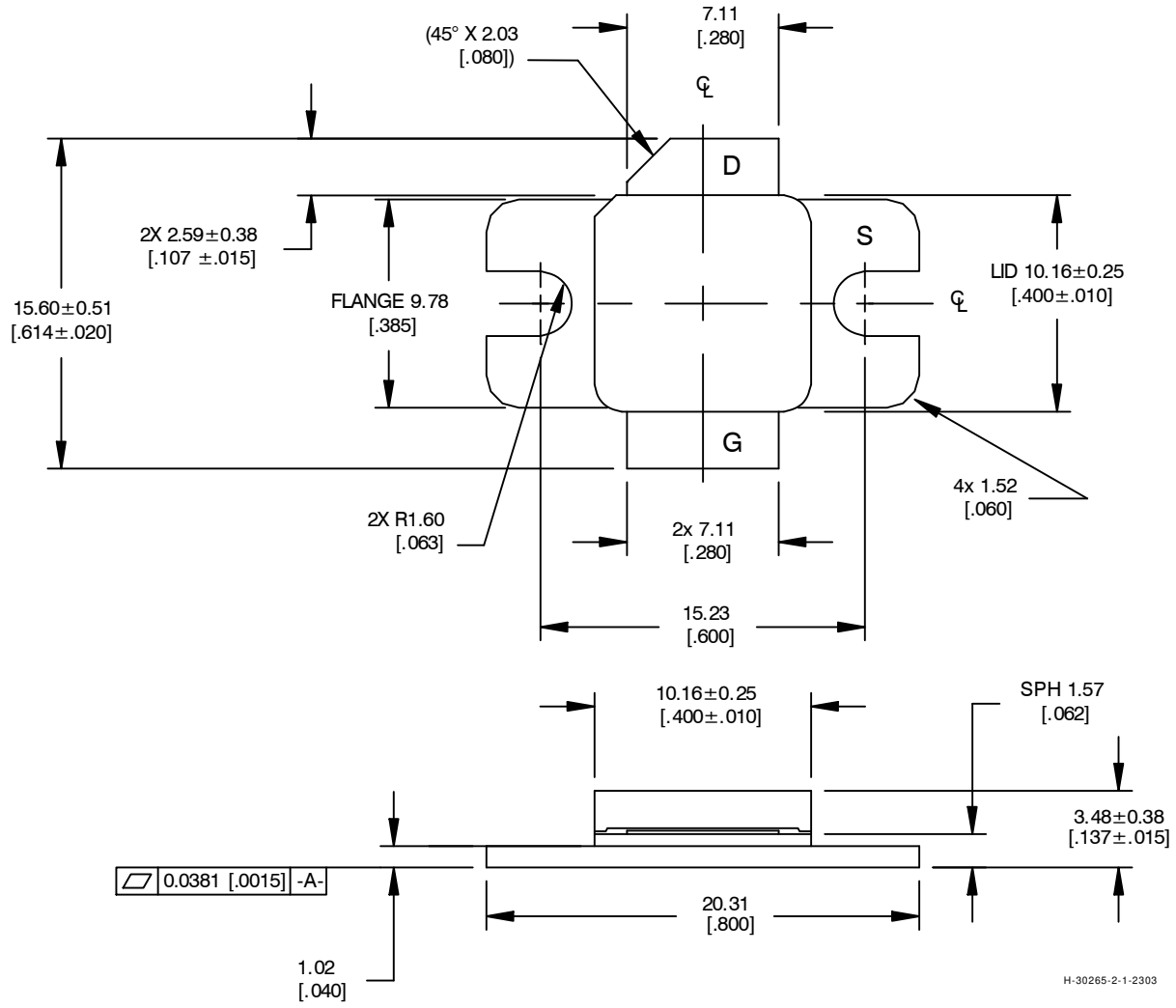


Diagram Notes:

1. Lead thickness: 0.10 +0.051/–0.025 [.004 +.002/–.001].
2. All tolerances ± 0.127 [.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]

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

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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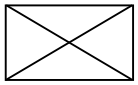

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