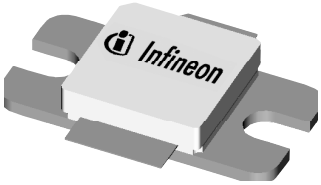
green Product

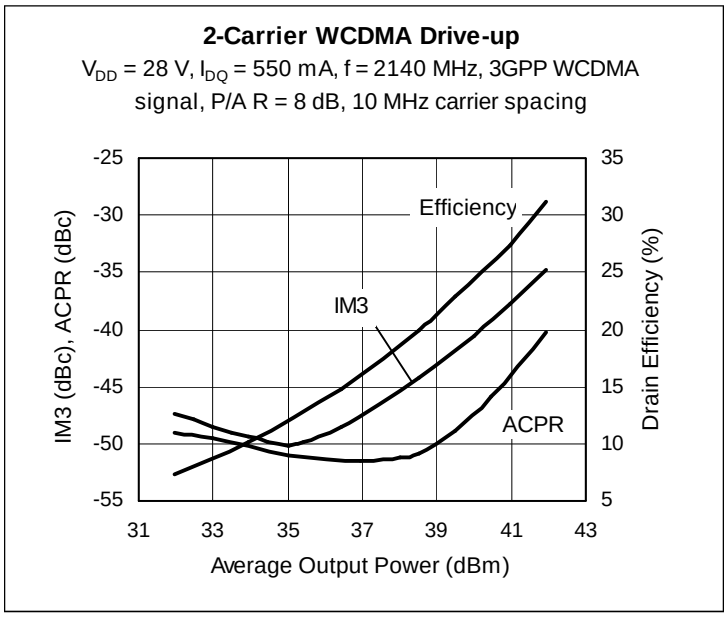
Thermally-Enhanced High Power RF LDMOS FET 60 W, 2110 – 2170 MHz

Description

The PTFA210601E is a thermally-enhanced, 60-watt, internally matched *GOLDMOS*® FET intended for WCDMA applications. It is characaterized for single- and two-carrier WCDMA operation from 2110 to 2170 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.



PTFA210601E
Package H-30265-2



Features

- Thermally-enhanced package, Pb-free and RoHS-compliant
- Broadband internal matching
- Typical two-carrier WCDMA performance at 2140 MHz, 28 V
  - Average output power = 12 W
  - Linear Gain = 16 dB
  - Efficiency = 27.0%
  - Intermodulation distortion = –38 dBc
  - Adjacent channel power = –44 dBc
- Typical CW performance, 2170 MHz, 28 V
  - Output power at P–1dB = 68 W
  - Efficiency = 58.5%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 60 W (CW) output power

RF Characteristics

WCDMA Measurements (tested in Infineon test fixture)

V_{DD} = 28 V, I_{DQ} = 550 mA, P_{OUT} = 12 W average
f_1 = 2135 MHz, f_2 = 2145 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	15.0	16.0	—	dB
Drain Efficiency	η_D	26.0	27.0	—	%
Intermodulation Distortion	IMD	—	–38	–37	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 (not subject to production test—verified by design/characterization in Infineon test fixture)
V_{DD} = 28 V, I_{DQ} = 550 mA, P_{OUT} = 60 W PEP, f = 2140 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	16	—	dB
Drain Efficiency	η_D	—	42	—	%
Intermodulation Distortion	IMD	—	–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	$R_{DS(on)}$	—	0.15	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 550 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, 60 W CW)	$R_{\theta JC}$	0.89	°C/W

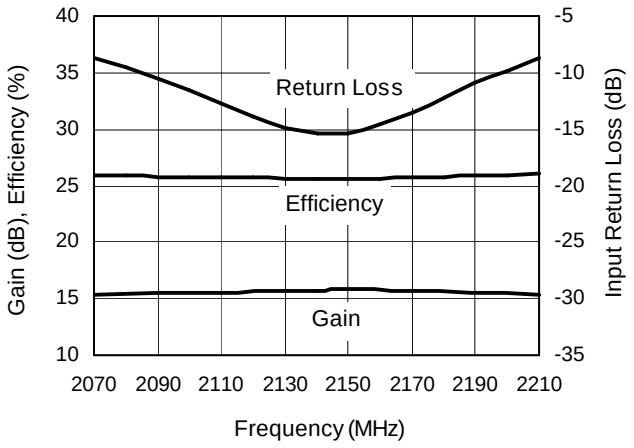
Ordering Information

Type and Version	Package Outline	Package Description	Marking
PTFA210601E V1	H-30265-2	Thermally-enhanced slotted flange, single-ended	PTFA210601E

Typical Performance (data taken in a production test fixture)

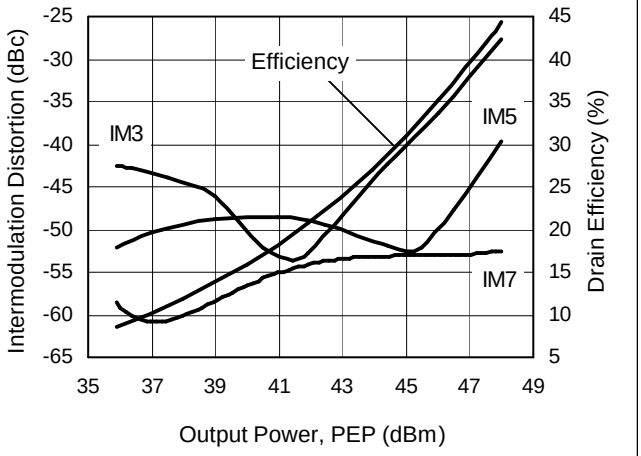
Broadband Performance

V_{DD} = 28 V, I_{DQ} = 550 mA, P_{OUT} = 41 dBm



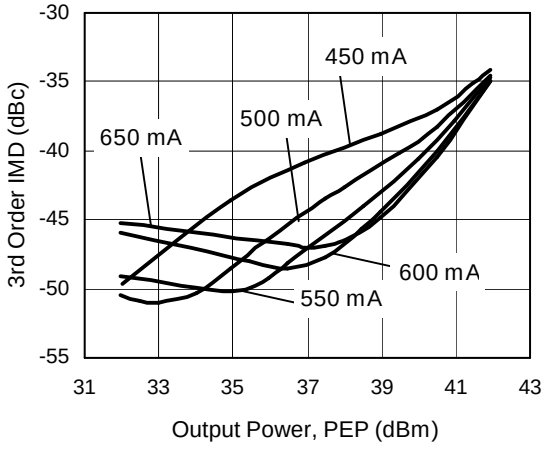
2-Tone Drive-up

V_{DD} = 28 V, I_{DQ} = 550 mA,
f = 2140 MHz, tone spacing = 1 MHz



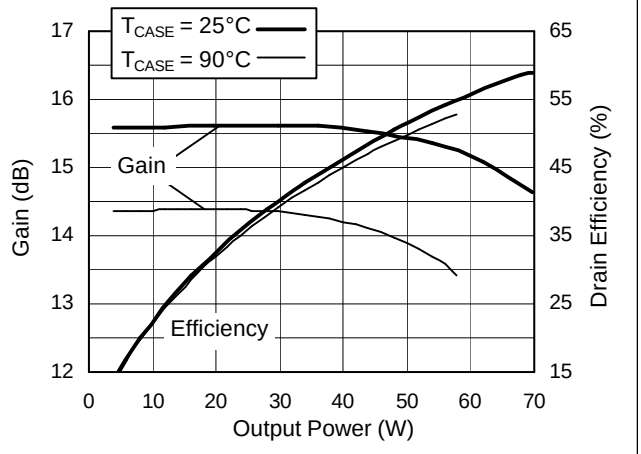
Two-carrier WCDMA at Selected Biases

V_{DD} = 28 V, f = 1960 MHz, 3GPP WCDMA signal,
P/AR = 8 dB, 10 MHz carrier spacing, series show I_{DQ}



Power Sweep, CW Conditions

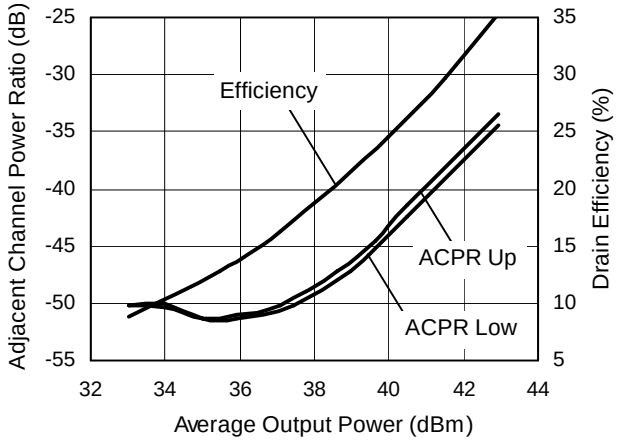
V_{DD} = 28 V, I_{DQ} = 550 mA, f = 2170 MHz



Typical Performance (cont.)

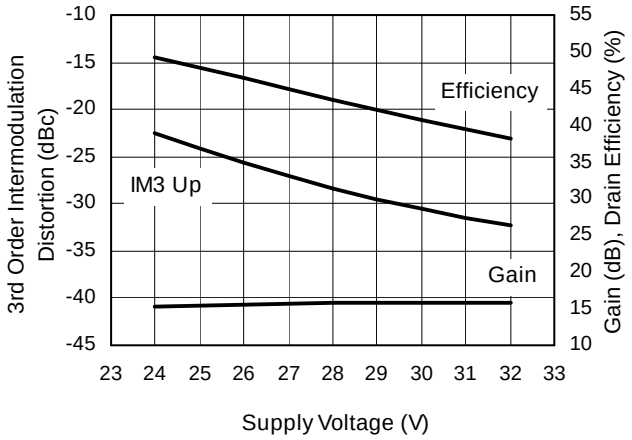
Single-carrier WCDMA Drive-up

V_{DD} = 28 V, I_{DQ} = 550 mA, f = 2140 MHz,
3GPP WCDMA signal, TM1 w/16 DPCH, 67% clipping,
P/A R = 8.5 dB, 3.84 MHz BW



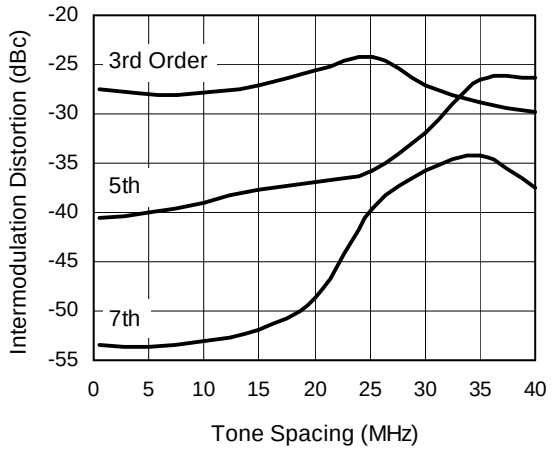
IM3, Drain Efficiency and Gain vs. Supply Voltage

I_{DQ} = 550 mA, f = 2140 MHz, P_{OUT} (PEP) = 47.8 dBm,
tone spacing = 1 MHz



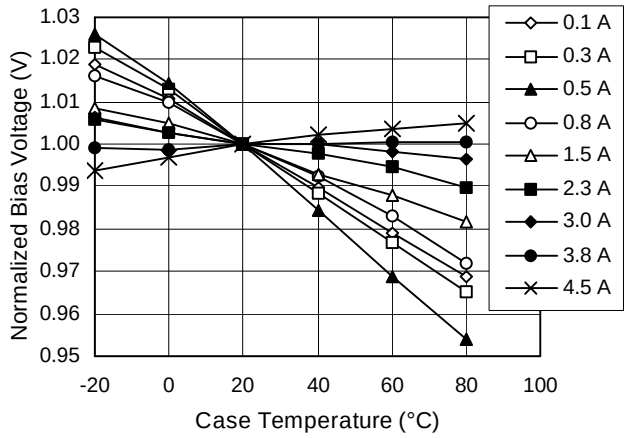
Intermodulation Distortion Products vs. Tone Spacing

V_{DD} = 28 V, I_{DQ} = 550 mA, f = 2140 MHz,
P_{OUT} = 47.8 dBm PEP

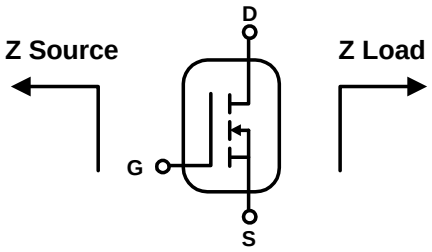


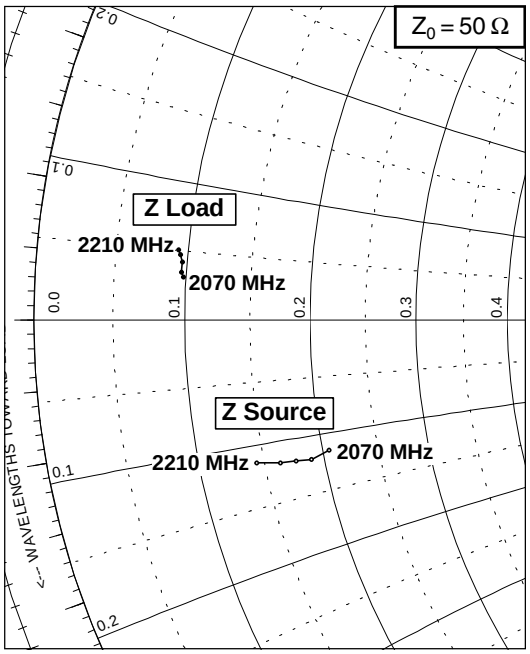
Bias Voltage vs. Temperature

Voltage normalized to typical gate voltage,
series show current



Broadband Circuit Impedance

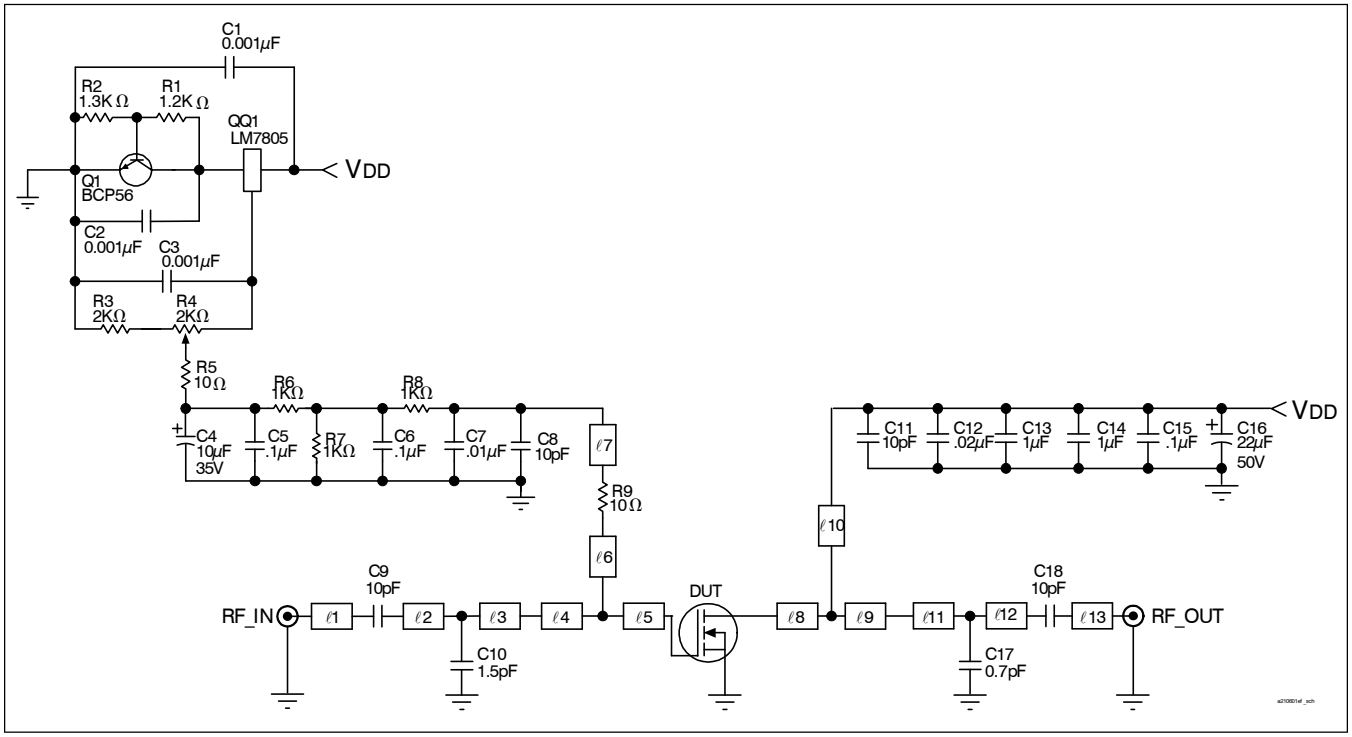




Frequency	Z Source W		Z Load W	
MHz	R	jX	R	jX
2070	10.29	–5.79	4.91	1.57
2110	9.46	–6.02	4.83	1.75
2140	8.79	–5.95	4.85	2.12
2170	8.14	–5.91	4.76	2.38
2210	7.19	–5.72	4.66	2.55

See next page for circuit information

Reference Circuit



Reference circuit schematic for f = 2140 MHz

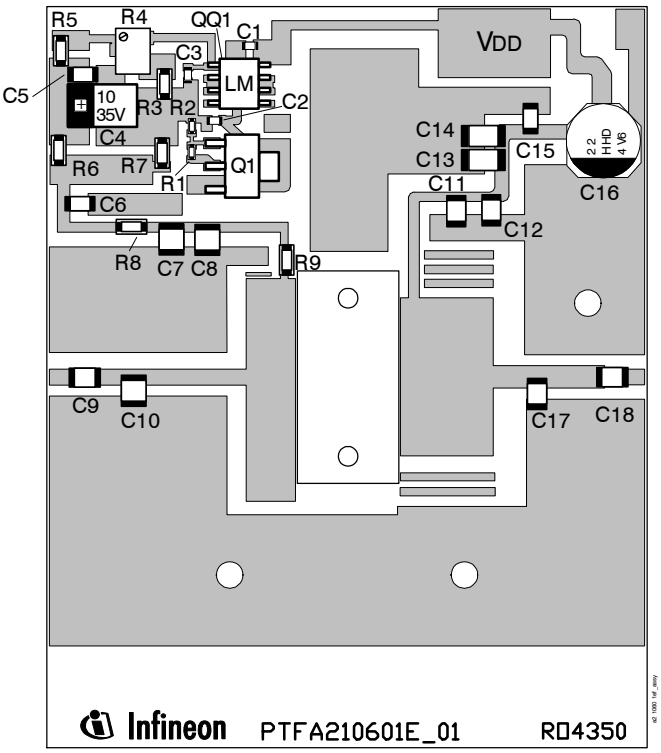
Circuit Assembly Information

DUT	PTFA210601E	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, ε_r = 3.48	Rogers 4350	1 oz. copper

Microstrip	Electrical Characteristics at 2140 MHz[1]	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.030 λ, 50.0 Ω	2.54 x 1.52	0.100 x 0.060
ℓ2	0.038 λ, 50.0 Ω	3.15 x 1.52	0.124 x 0.060
ℓ3	0.146 λ, 50.0 Ω	12.32 x 1.52	0.485 x 0.060
ℓ4	0.049 λ, 6.2 Ω	3.81 x 22.78	0.150 x 0.897
ℓ5	0.016 λ, 6.2 Ω	1.17 x 22.78	0.046 x 0.897
ℓ6	0.009 λ, 80.0 Ω	0.74 x 0.69	0.029 x 0.027
ℓ7	0.112 λ, 80.0 Ω	9.78 x 0.69	0.385 x 0.027
ℓ8	0.018 λ, 8.5 Ω	1.35 x 16.26	0.053 x 0.640
ℓ9	0.105 λ, 8.5 Ω	8.08 x 16.26	0.318 x 0.640
ℓ10	0.173 λ, 67.0 Ω	14.83 x 1.02	0.584 x 0.040
ℓ11	0.051 λ, 41.0 Ω	4.11 x 2.29	0.162 x 0.090
ℓ12	0.077 λ, 41.0 Ω	6.35 x 2.29	0.250 x 0.090
ℓ13	0.032 λ, 50.0 Ω	2.79 x 1.52	0.110 x 0.060

[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, C15	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C7	Capacitor, 0.01 µF	ATC	100B 103
C8, C9, C11, C18	Ceramic capacitor, 10 pF	ATC	100B 100
C10	Ceramic capacitor, 1.5 pF	ATC	100B 1R5
C12	Capacitor, 0.02 µF	ATC	200B 203
C13, C14	Capacitor, 1.0 µF	Digi-Key	445-1411-1-ND
C16	Electrolytic capacitor, 22 µF, 50 V	Digi-Key	PCE3374CT-ND
C17	Ceramic capacitor, 0.7 pF	ATC	100B 0R7
Q1	Transistor	Infineon Technologies	BCP56
QQ1	Voltage regulator	National Semiconductor	LM7805
R1	Chip resistor, 1.2k ohms	Digi-Key	P1.2KGCT-ND
R2	Chip resistor, 1.3k ohms	Digi-Key	P1.3KGCT-ND
R3	Chip resistor, 2k ohms	Digi-Key	P2KECT-ND
R4	Potentiometer, 2k ohms	Digi-Key	3224W-202ETR-ND
R5, R9	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R6, R7, R8	Chip resistor, 1k ohms	Digi-Key	P1KECT-ND

**Gerber Files for this circuit available on request*

Package Outline Specifications

Package H-30265-2

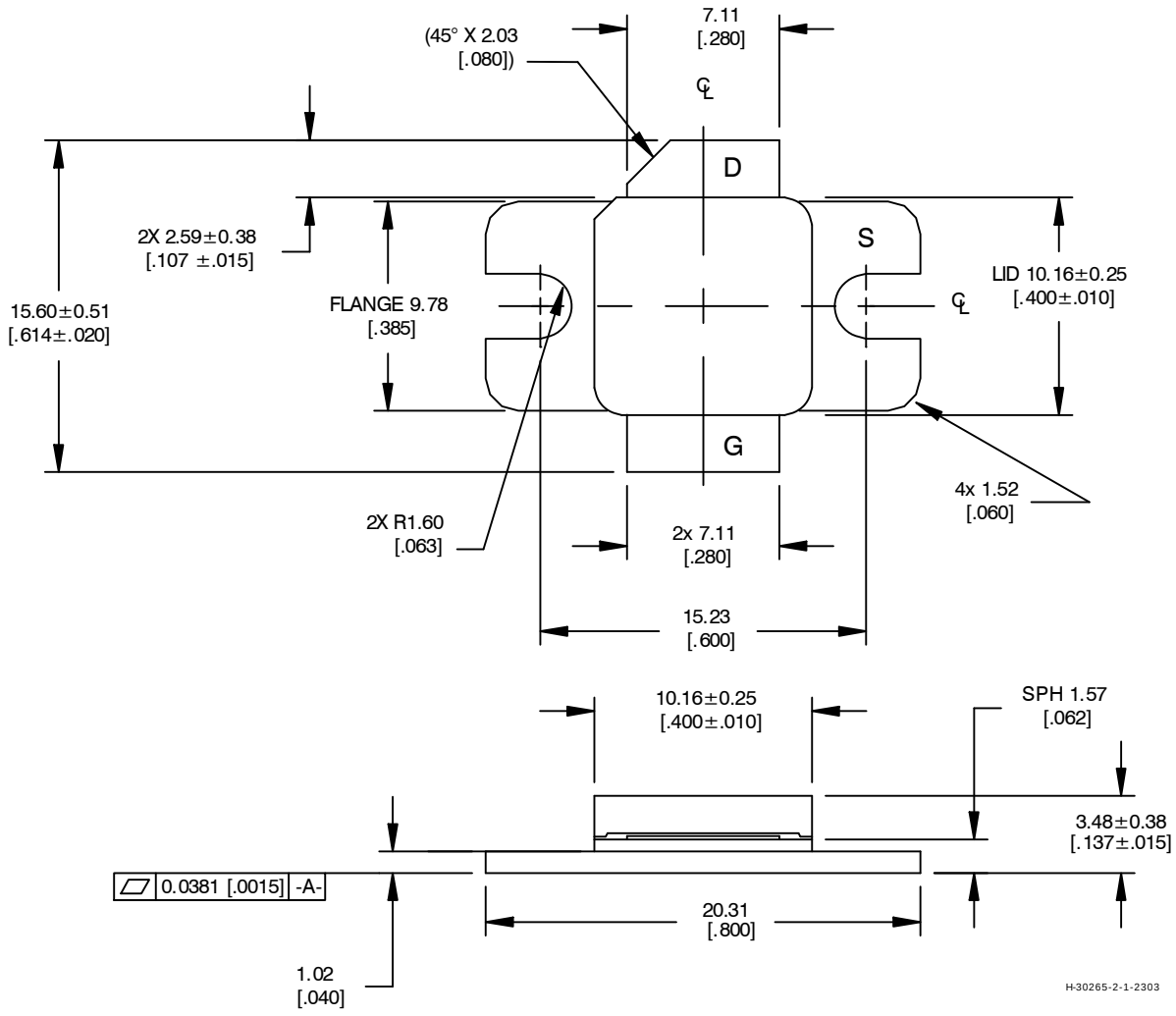


Diagram Notes—unless otherwise specified:

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 micron ± 0.38 micron [45 microinch ± 15 microinch] (min).

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

PTFA210601E

Revision History:	**2008-03-04**	Data Sheet
Previous Version:	2007-03-02, Data Sheet	

Page	**Subjects (major changes since last revision)**
All	Remove references to alternate products.

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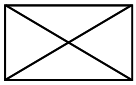

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