PTFA241301E
PTFA241301F

green Product

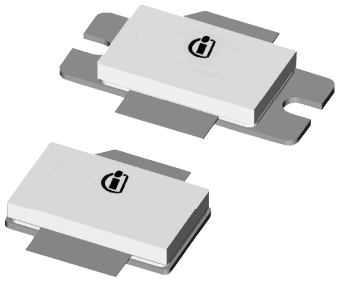
Thermally-Enhanced High Power RF LDMOS FETs
130 W, 2420 – 2480 MHz

Description

The PTFA241301E and PTFA241301F are thermally-enhanced 130-watt, internally matched *GOLDMOS*® FETs intended for ultra-linear applications. They are characterized for CDMA, CDMA2000, Super3G (3GPP TSG RAN), and WiMAX operation from 2420 to 2480 MHz. Full gold metallization ensures excellent device lifetime and reliability.

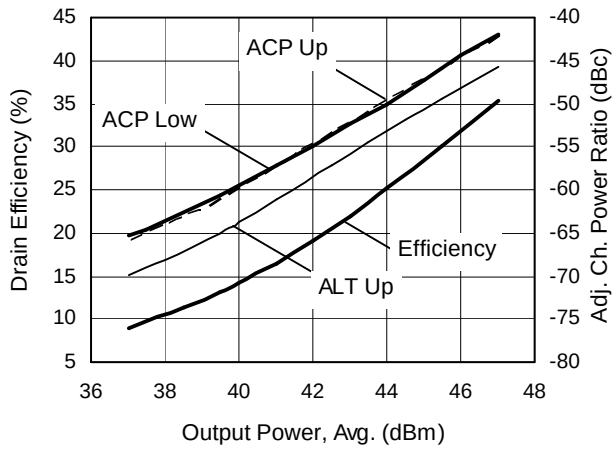
PTFA241301E
Package H-30260-2

PTFA241301F
Package H-31260-2



Three-carrier CDMA2000 Performance

V_{DD} = 28 V, I_{DQ} = 1150 mA, f = 2450 MHz



Features

- Thermally-enhanced packaging, Pb-free and RoHS-compliant
- Broadband internal matching
- Typical CDMA2000 performance at 2450 MHz
  - Average output power = 25 W
  - Linear Gain = 14 dB
  - Efficiency = 25%
- Typical CW performance, 2420 MHz, 28 V
  - Output power at P–1dB = 140 W
  - Efficiency = 50%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 130 W (CW) output power

RF Characteristics

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

V_{DD} = 28 V, I_{DQ} = 1150 mA, P_{OUT} = 25 W average, f = 2450 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	14	—	dB
Drain Efficiency	η_D	—	25	—	%
Adjacent Channel Power Ratio	ACPR	—	–50	—	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} = 1150 mA, P_{OUT} = 130 W PEP, f = 2420 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	13.0	14	—	dB
Drain Efficiency	η_D	36	38	—	%
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	$R_{DS(on)}$	—	0.07	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 1150 mA	V_{GS}	2	2.4	3	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	438	W
Above 25°C derate by		2.5	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 130 W CW)	$R_{\theta JC}$	0.40	°C/W

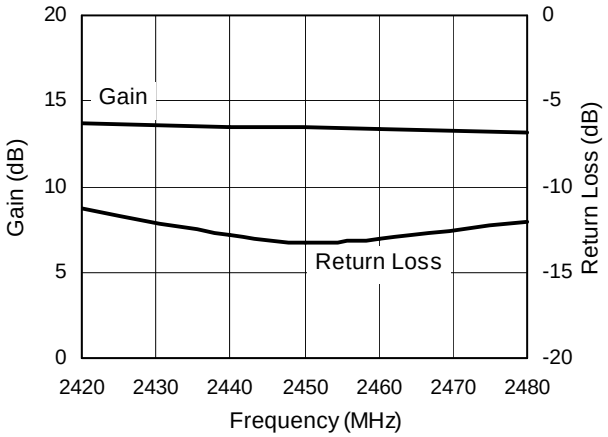
Ordering Information

Type	Package Outline	Package Description	Marking
PTFA241301E	H-30260-2	Thermally-enhanced slotted flange, single-ended	PTFA241301E
PTFA241301F	H-31260-2	Thermally-enhanced earless flange, single-ended	PTFA241301F

Typical Performance (data taken in a production test fixture)

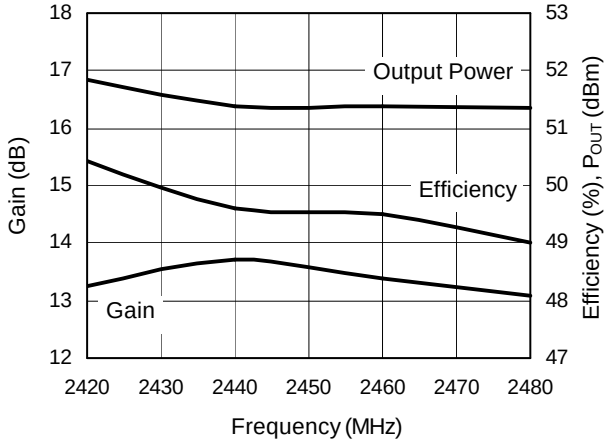
Linear Broadband Performance

V_{DD} = 28 V, I_{DQ} = 1150 mA, P_{OUT}, Avg. = 45.5 dBm



Broadband CW Performance (at P–1dB)

V_{DD} = 28 V, I_{DQ} = 1150 mA

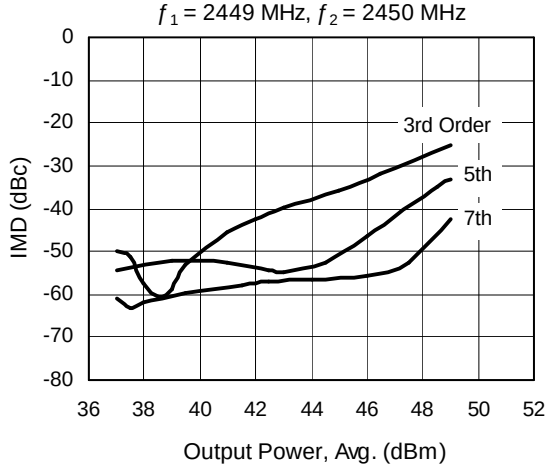


Intermodulation Distortion vs. Output Power

(as measured in a broadband circuit)

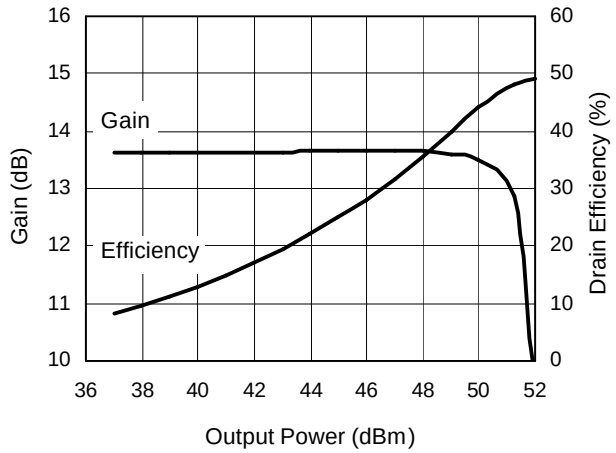
V_{DD} = 28 V, I_{DQ} = 1150 mA,

f_1 = 2449 MHz, f_2 = 2450 MHz



Gain & Efficiency vs. Output Power

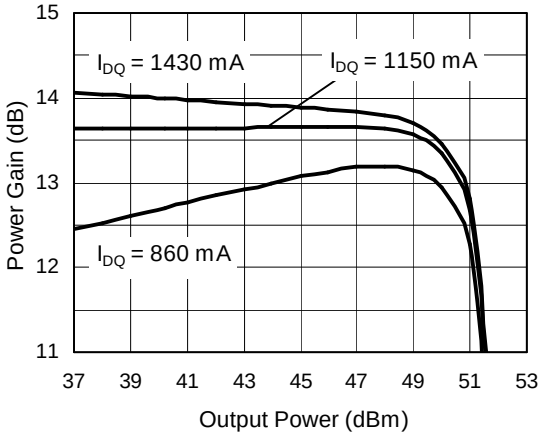
V_{DD} = 28 V, I_{DQ} = 1150 mA, f = 2450 MHz



Typical Performance (cont.)

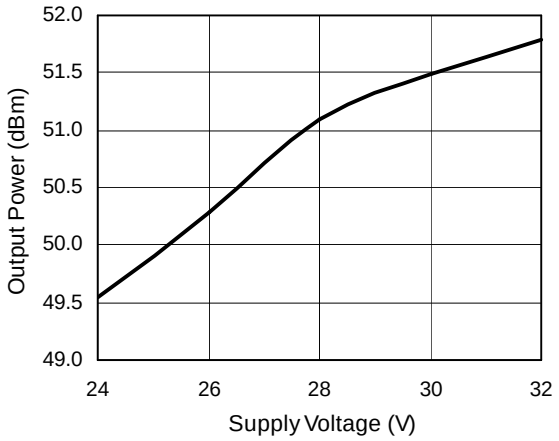
Power Sweep

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



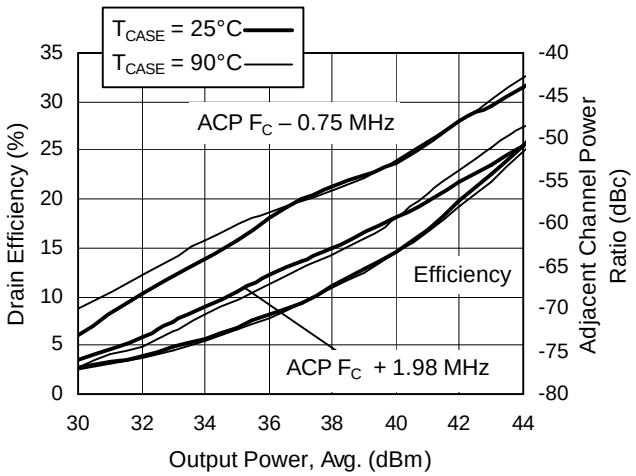
Output Power (at 1 dB compression) vs. Supply Voltage

I_{DQ} = 1150 mA, f = 2450 MHz



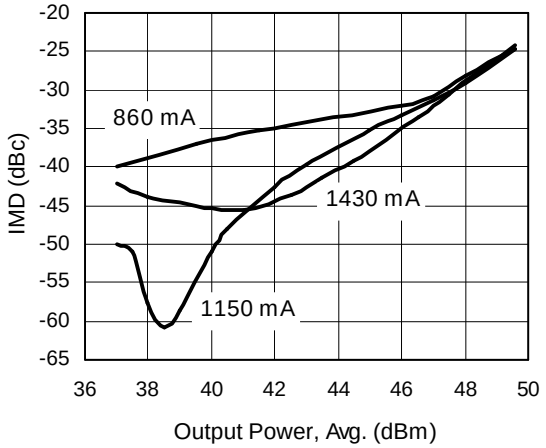
IS-95 CDMA Performance

V_{DD} = 28 V, I_{DQ} = 1150 mA, f = 2450 MHz



IM3 vs. Output Power at Selected Biases

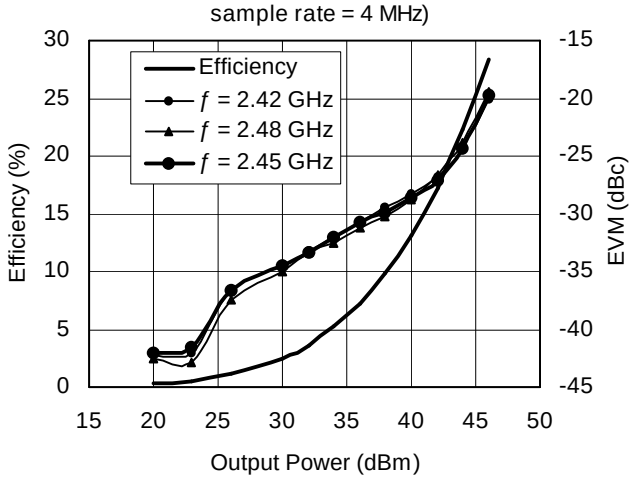
V_{DD} = 28 V, f_1 = 2449, f_2 = 2450 MHz



Typical Performance (cont.)

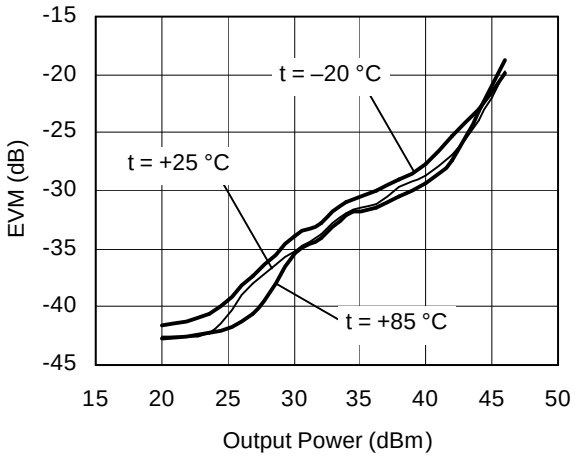
WiMAX Performance

V_{DD} = 28 V, I_{DQ} = 1.2 A,
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)



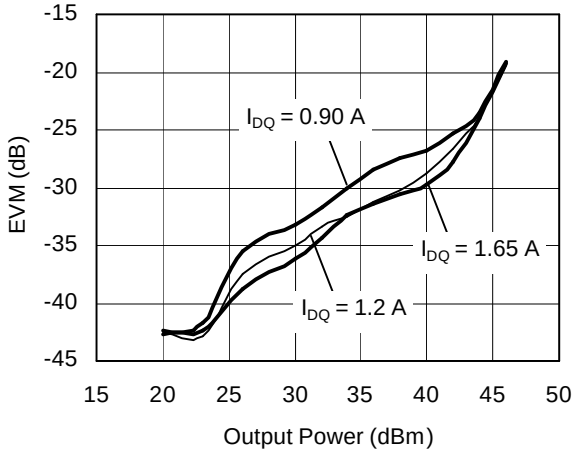
WiMAX Performance

V_{DD} = 28 V, I_{DQ} = 1.2 A, f = 2480 MHz,
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)



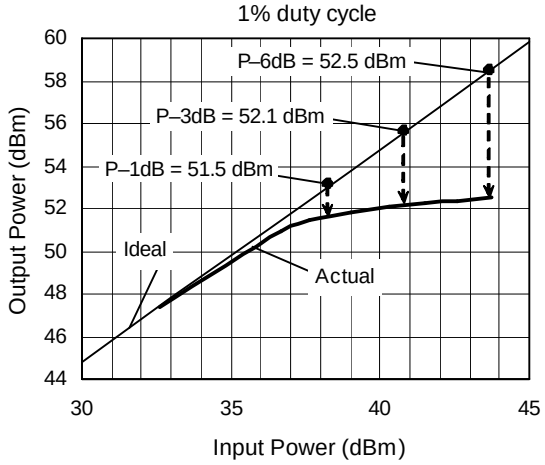
WiMAX Performance

V_{DD} = 28 V, f = 2480 MHz
(modulation = 64 QAM2/3, channel bandwidth = 3.5 MHz,
sample rate = 4 MHz)

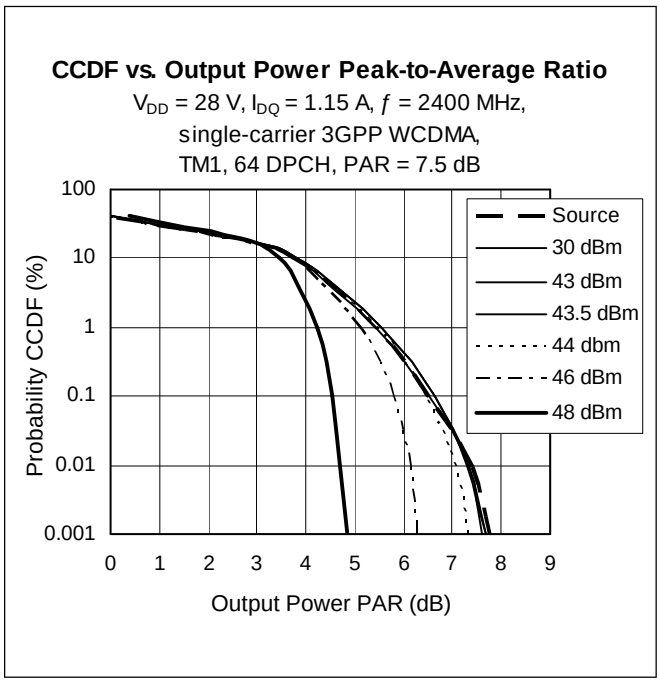


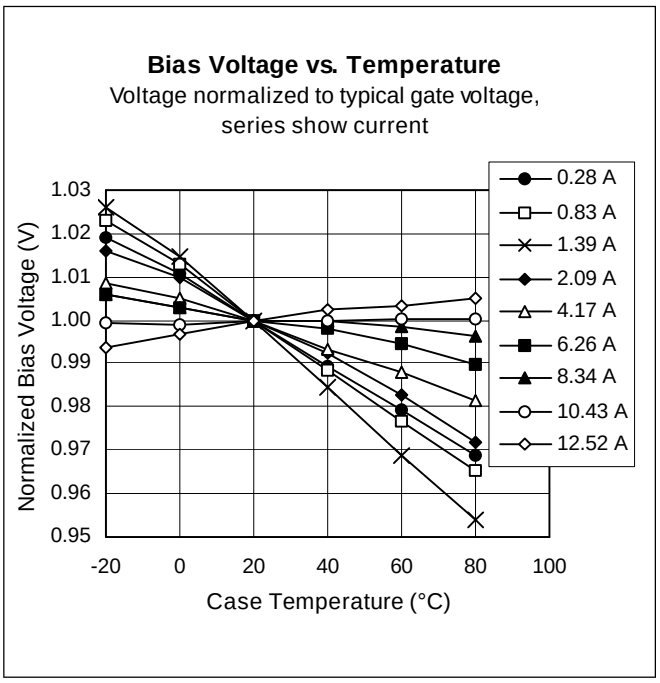
Power Sweep, under Pulsed Conditions

V_{DD} = 28 V, I_{DQ} = 1.15 A, f = 2420 MHz,
pulse period = 800 µs, pulse width = 80 µs,
1% duty cycle

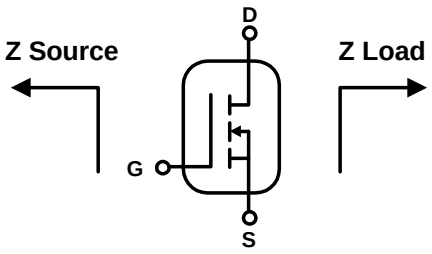


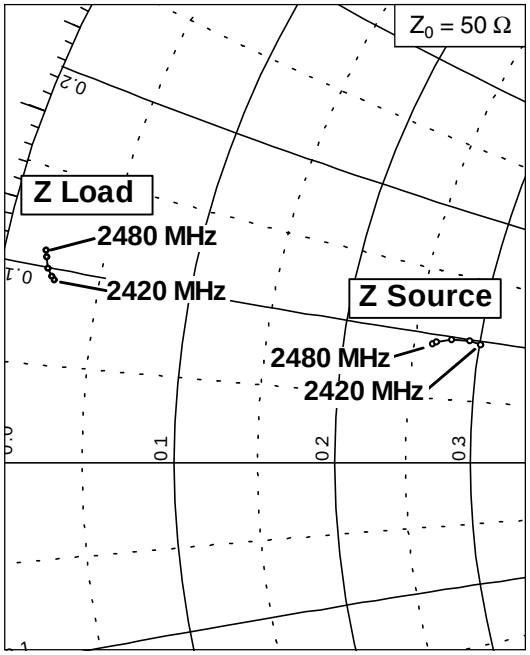
Typical Performance (cont.)





Broadband Circuit Impedance

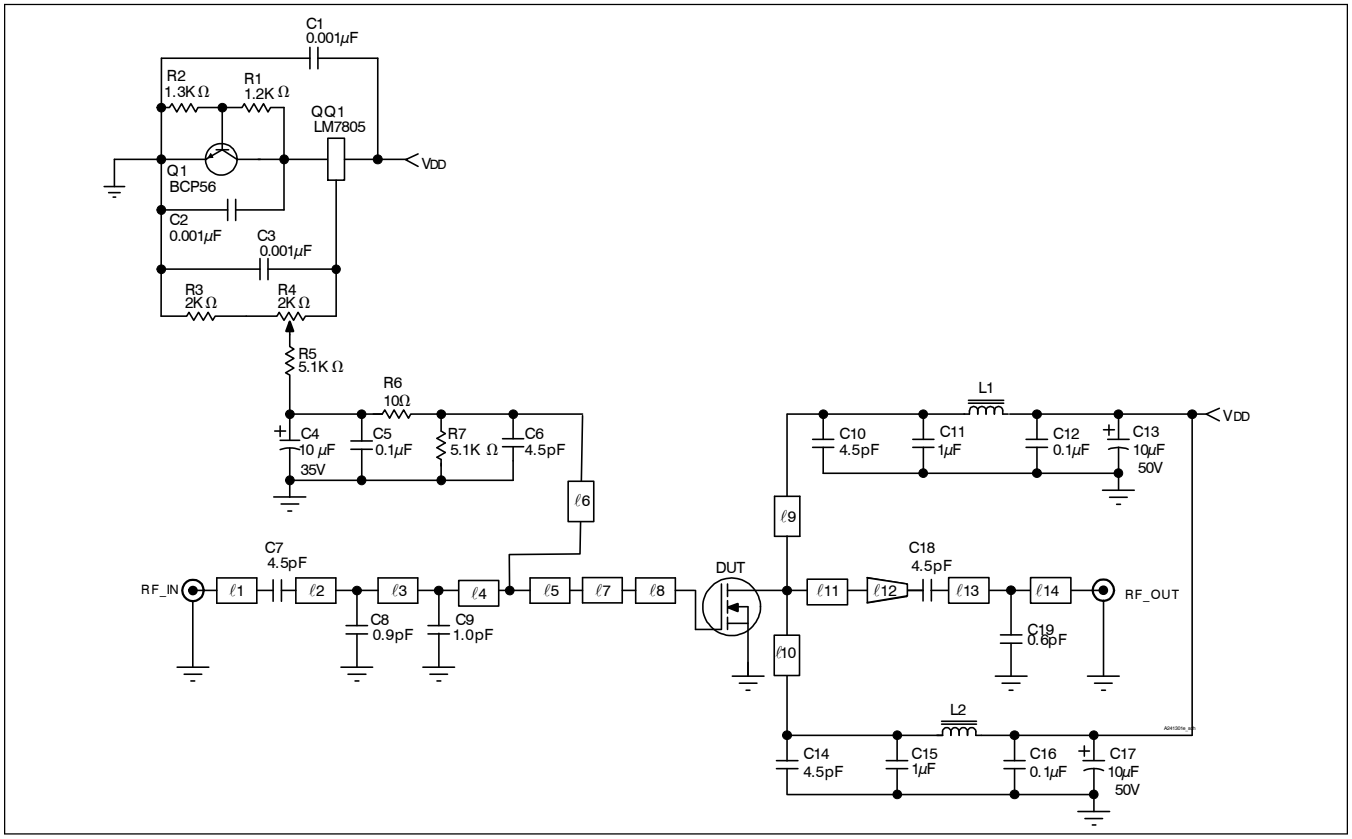




Frequency	Z Source W		Z Load W	
MHz	R	jX	R	jX
2420	13.20	4.69	1.35	4.73
2430	13.30	4.75	1.28	4.80
2450	13.85	4.94	1.14	4.99
2470	14.59	5.00	1.06	5.27
2480	15.01	4.91	1.01	5.43

See next page for circuit information

Reference Circuit



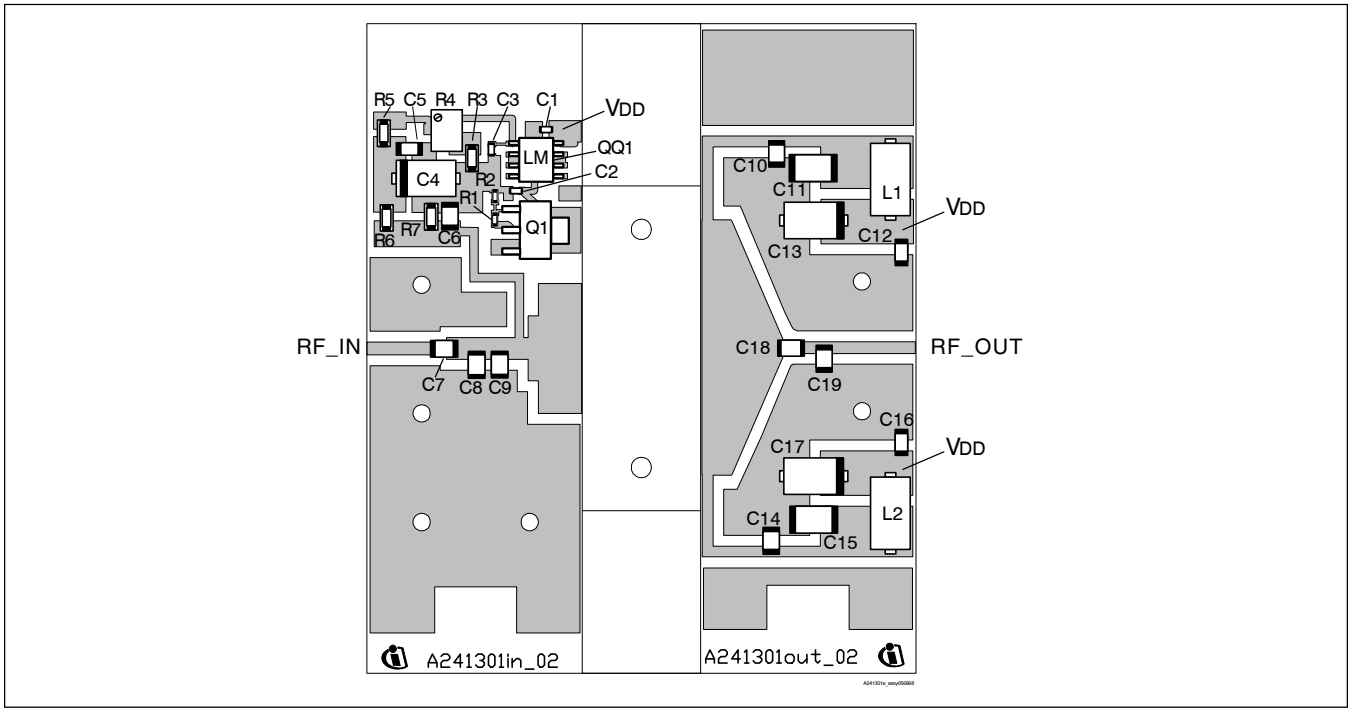
Reference circuit schematic for ƒ = 2420 MHz

Circuit Assembly Information			
DUT	PTFA241301E or PTFA241301F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, ε_r = 4.5	Rogers TMM4	2 oz. copper

Microstrip	Electrical Characteristics at 2420 MHz[1]	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ1	0.112 λ, 50.0 Ω	7.52 x 1.37	0.296 x 0.054
ℓ2	0.039 λ, 34.0 Ω	2.54 x 2.54	0.100 x 0.100
ℓ3	0.045 λ, 34.0 Ω	2.92 x 2.54	0.115 x 0.100
ℓ4	0.044 λ, 34.0 Ω	2.87 x 2.54	0.113 x 0.100
ℓ5	0.017 λ, 34.0 Ω	1.09 x 2.54	0.043 x 0.100
ℓ6	0.307 λ, 60.0 Ω	21.01 x 0.97	0.827 x 0.038
ℓ7	0.019 λ, 14.7 Ω	1.17 x 7.62	0.046 x 0.300
ℓ8	0.083 λ, 8.0 Ω	5.03 x 15.24	0.198 x 0.600
ℓ9, ℓ10	0.237 λ, 50.0 Ω	16.00 x 1.27	0.630 x 0.050
ℓ11	0.057 λ, 4.3 Ω	3.43 x 29.85	0.135 x 1.175
ℓ12 (taper)	0.098 λ, 4.3 Ω / 50.0 Ω	5.99 x 29.85 / 1.37	0.236 x 1.175 / 0.054
ℓ13	0.034 λ, 50.0 Ω	2.29 x 1.37	0.090 x 0.054
ℓ14	0.164 λ, 50.0 Ω	11.13 x 1.37	0.438 x 0.054

[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	366-1655-2-ND
C5, C12, C16	Capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C6, C7, C10, C14, C18	Ceramic capacitor 4.5 pF	ATC	100B 4R5
C8	Ceramic capacitor 0.9 pF	ATC	100B 0R9
C9	Ceramic capacitor 1 pF	ATC	100B 1R0
C11, C15	Ceramic capacitor 1 µF	Digi-Key	19528-ND
C13, C17	Capacitor, 10 µF, 50 V	Garrett Electronics	TPS106K050R0400
C19	Ceramic capacitor 0.6 pF	ATC	100B 0R6
L1, L2	Ferrite, 6 mm	Ferroxcube	53/3/4.6-452
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	P22KECT-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	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND

**Gerber Files for this circuit available on request*

Package Outline Specifications

Package H-30260-2

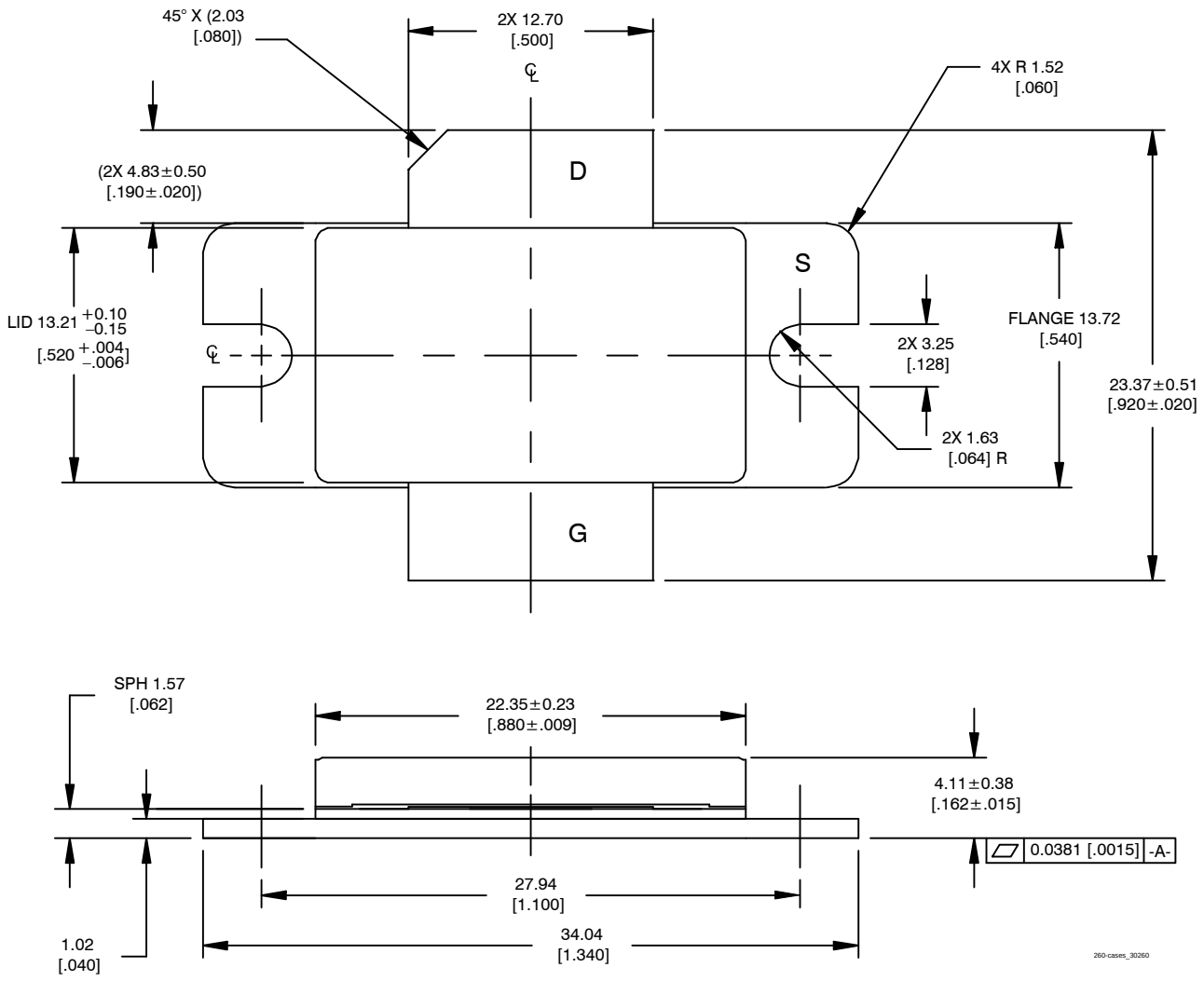


Diagram Notes—unless otherwise specified:

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]

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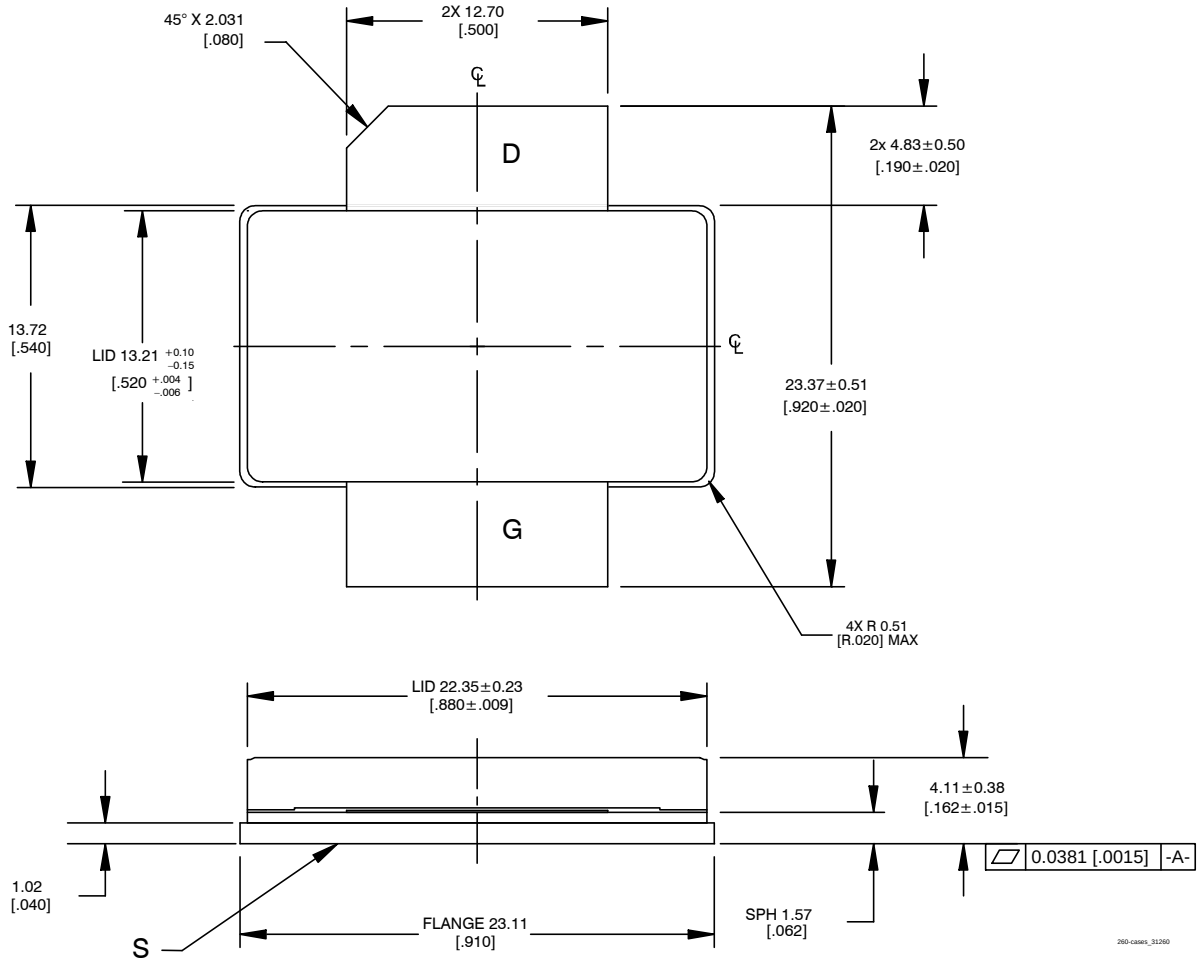
Package Outline Specifications (cont.)

Package H-31260-2



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Revision History:	**2007-05-11**	Data Sheet
Previous Version:	2006-06-29, Data Sheet	

Page	Subjects (major changes since last revision)
5, 6	Add two graphs.
9	Update package outline diagram for Package H-30260-2.

Notes:

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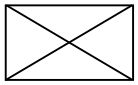

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