

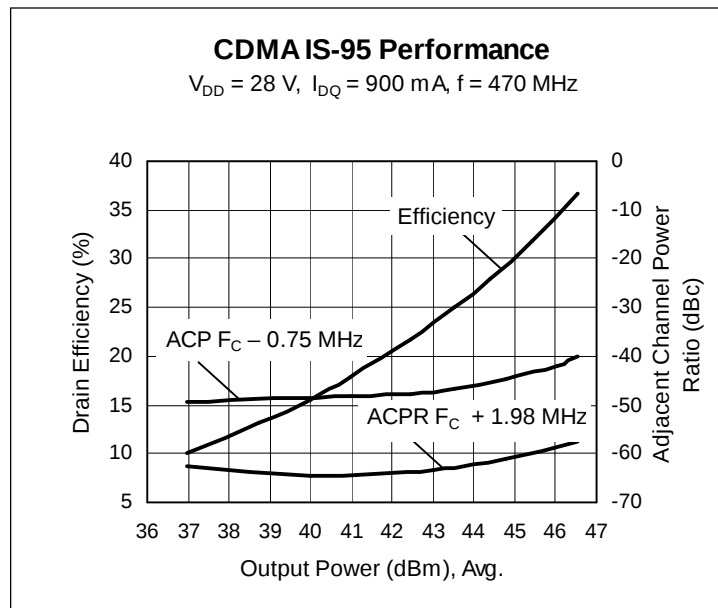
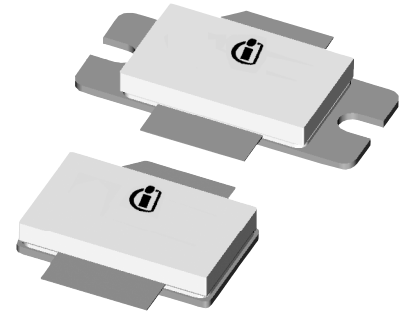
Thermally-Enhanced High Power RF LDMOS FETs 150 W, 450 – 500 MHz

Description

The PTF041501E and PTF041501F are thermally-enhanced, 150-watt, internally-matched GOLDMOS FETs intended for ultra-linear CDMA applications. They are characterized for CDMA and CDMA2000 operation from 450 to 470 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTF041501E
Package 30260

PTF041501F
Package 31260



Features

- Thermally-enhanced packages
- Broadband internal matching
- Typical CDMA performance at 470 MHz, 28 V
 - Average output power = 32 W
 - Linear Gain = 21 dB
 - Efficiency = 31%
- Typical CW performance, 470 MHz, 28 V
 - Output power at P-1dB = 165 W
 - Efficiency = 61%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 5:1 VSWR @ 28 V, 150 W (CW) output power

RF Characteristics

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

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT} = 60\text{ W}$ average, $f = 470\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	21	—	dB
Drain Efficiency	η_D	—	42	—	%
Adjacent Channel Power Ratio	ACPR	—	-45	—	dB

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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT} = 150\text{ W PEP}$, $f = 470\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	20.0	21	—	dB
Drain Efficiency	η_D	45	46	—	%
Intermodulation Distortion	IMD	—	−30	−29	dBc

DC Characteristics at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ }\mu\text{A}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.07	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$	V_{GS}	2	2.9	4	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	P_D	625	W
Above 25°C derate by		3.57	W/ $^\circ\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^\circ\text{C}$
Thermal Resistance ($T_{CASE} = 70^\circ\text{C}$, 150 W CW)	$R_{\theta JC}$	0.28	$^\circ\text{C/W}$

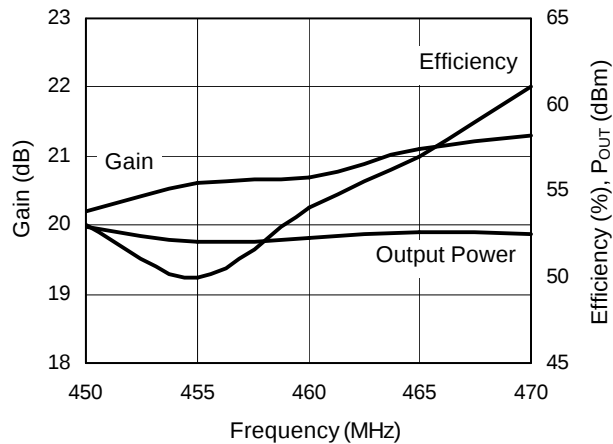
Ordering Information

Type	Package Outline	Package Description	Marking
PTF041501E	30260	Thermally-enhanced slotted flange, single-ended	PTF041501E
PTF041501F	31260	Thermally-enhanced earless flange, single-ended	PTF041501F

Typical Performance (data taken in a production test fixture)

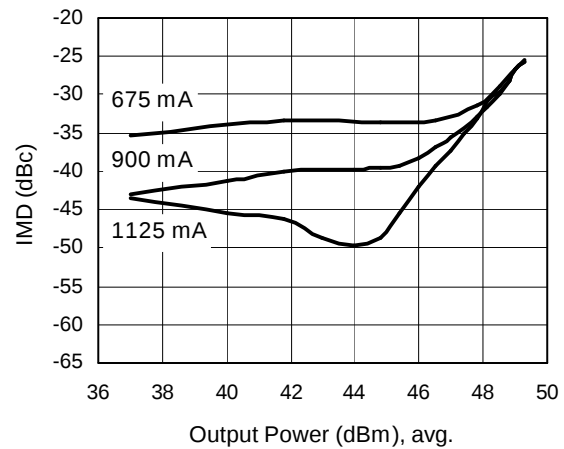
P_{OUT} , Gain & Efficiency (at P-1dB) vs. Frequency

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$



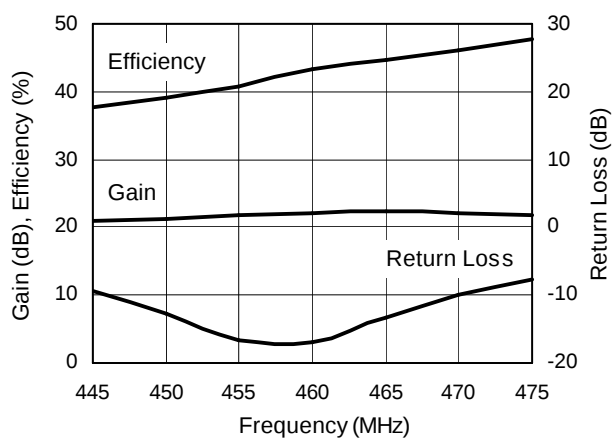
IM3 vs. Output Power at Selected Biases

$V_{DD} = 28\text{ V}$, $f_1 = 469\text{ MHz}$, $f_2 = 470\text{ MHz}$



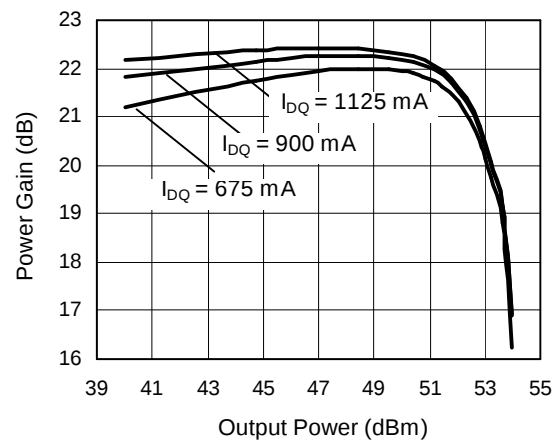
Broadband Circuit Performance

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $P_{OUT\text{ avg.}} = 48.75\text{ dBm}$



Power Sweep

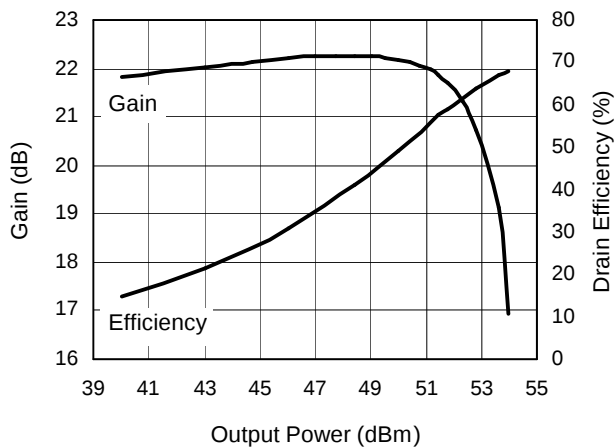
$V_{DD} = 28\text{ V}$, $f = 470\text{ MHz}$



Typical Performance (cont.)

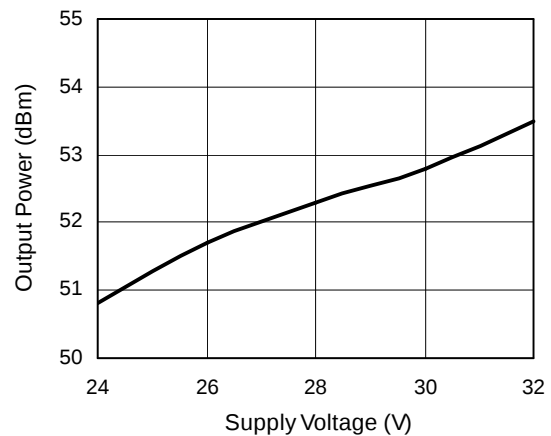
Gain & Efficiency vs. Output Power

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $f = 470\text{ MHz}$



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

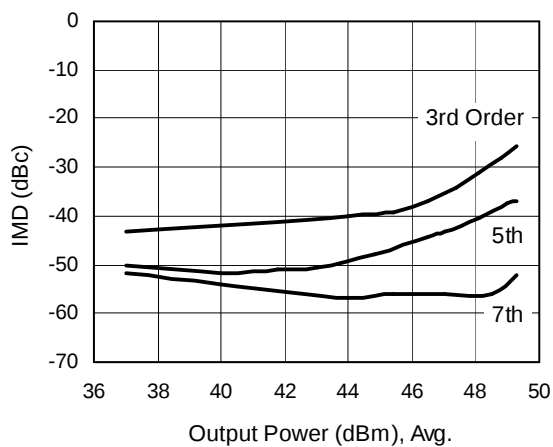
$I_{DQ} = 900\text{ mA}$, $f = 470\text{ MHz}$



Intermodulation Distortion vs. P_{OUT}

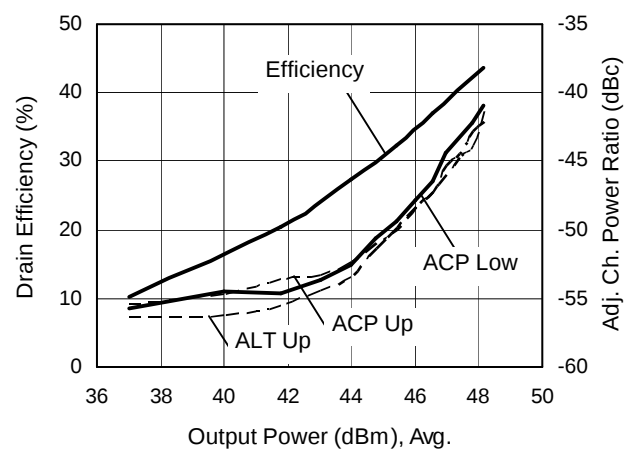
(in a broadband circuit)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $f_1 = 469\text{ MHz}$, $f_2 = 470\text{ MHz}$

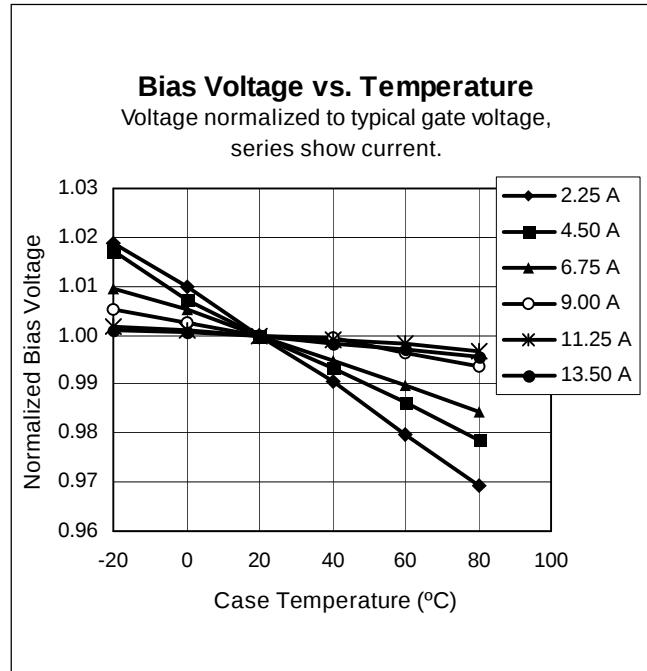


Three-carrier CDMA 2000 Performance

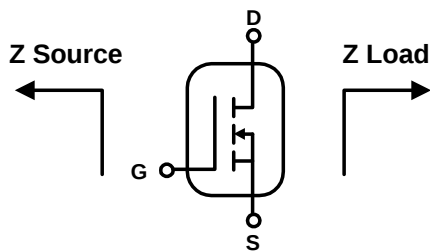
$V_{DD} = 28\text{ V}$, $I_{DQ} = 900\text{ mA}$, $f = 470\text{ MHz}$



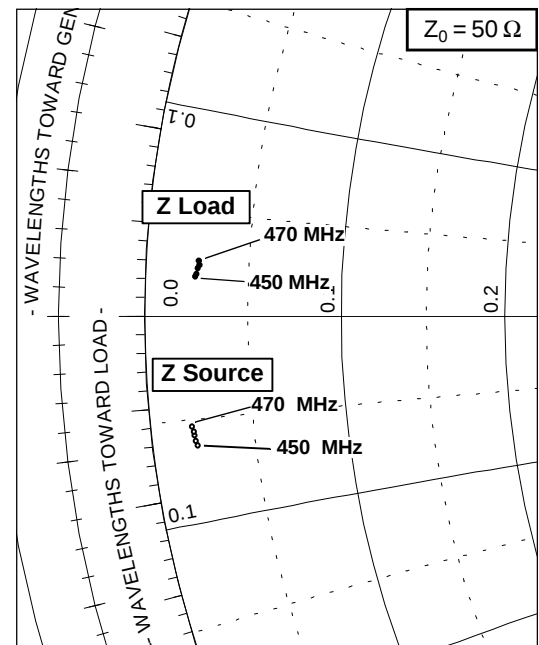
Typical Performance (cont.)



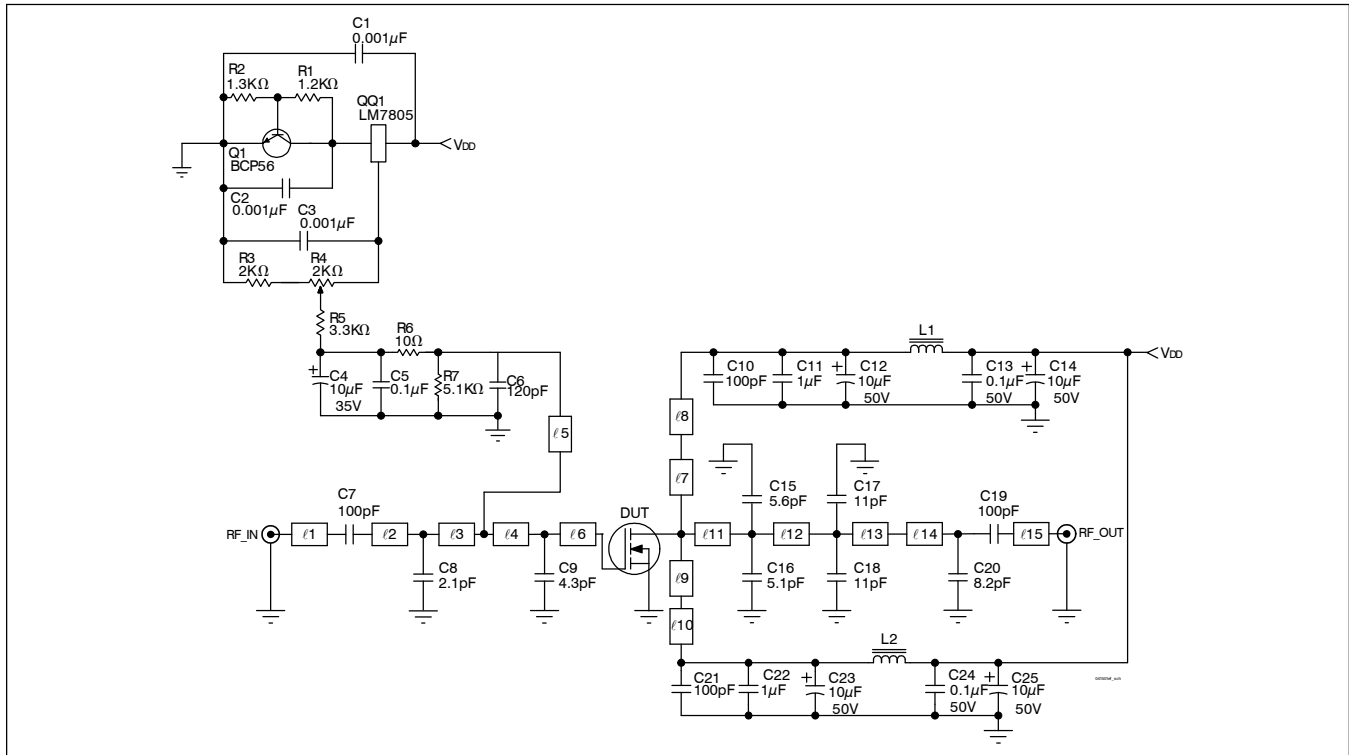
Broadband Circuit Impedance



Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
450	1.07	-3.15	1.18	0.96
455	1.03	-3.04	1.21	1.03
460	1.02	-2.89	1.24	1.17
465	1.01	-2.80	1.28	1.25
470	0.99	-2.67	1.26	1.36



Reference Circuit



Reference Circuit Schematic for $f = 460 \text{ MHz}$

Circuit Assembly Information

DUT	PTF041501E or PTF041501F	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, $\epsilon_r = 4.5$	Rogers TMM10	2 oz. copper

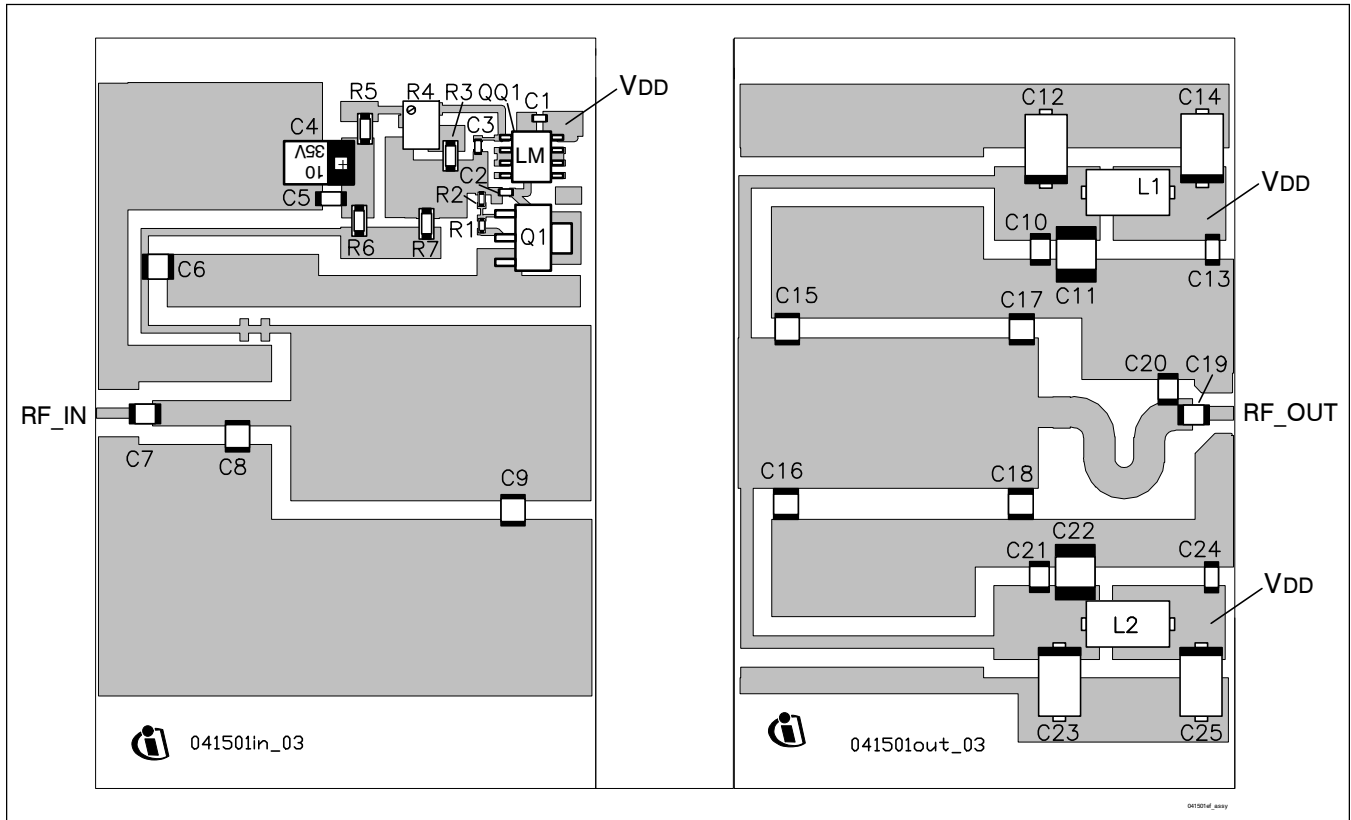
Microstrip	Electrical Characteristics at 460 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
ℓ_1	0.016 λ , 50.0 Ω	4.32 x 0.71	0.170 x 0.028
ℓ_2	0.033 λ , 24.0 Ω	8.13 x 2.54	0.320 x 0.100
ℓ_3	0.025 λ , 24.0 Ω	6.10 x 2.54	0.240 x 0.100
ℓ_4	0.097 λ , 4.8 Ω	21.59 x 17.78	0.850 x 0.700
ℓ_5	0.081 λ , 50.0 Ω	21.59 x 0.71	0.850 x 0.028
ℓ_6	0.040 λ , 4.8 Ω	8.89 x 17.78	0.350 x 0.700
ℓ_7	0.158 λ , 38.0 Ω	40.64 x 1.27	1.600 x 0.050
ℓ_8	0.030 λ , 10.9 Ω	5.59 x 7.11	0.220 x 0.280
ℓ_9	0.158 λ , 38.0 Ω	40.64 x 1.27	1.600 x 0.050
ℓ_{10}	0.030 λ , 10.9 Ω	5.59 x 7.11	0.220 x 0.280
ℓ_{11}	0.025 λ , 5.6 Ω	5.59 x 15.24	0.220 x 0.600
ℓ_{12}	0.105 λ , 5.6 Ω	23.62 x 15.24	0.930 x 0.600
ℓ_{13}	0.006 λ , 5.6 Ω	1.27 x 15.24	0.050 x 0.600
ℓ_{14}	0.104 λ , 21.3 Ω	25.40 x 3.05	1.000 x 0.120
ℓ_{15}	0.014 λ , 50.0 Ω	3.81 x 0.71	0.150 x 0.028

¹ Electrical characteristics are rounded.

Reference Circuit (cont.)

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, C13, C24	Capacitor, 0.1 μ F	Digi-Key	P4525-ND
C6	Ceramic capacitor, 120 pF	ATC	100B 121
C7, C10, C19, C21	Ceramic capacitor, 100 pF	ATC	100B 101
C8	Ceramic capacitor, 2.1 pF	ATC	100B 2R1
C9	Ceramic capacitor, 4.3 pF	ATC	100B 4R3
C11, C22	Capacitor, 1.0 μ F	ATC	920C105
C12, C14, C23, C25	Capacitor, 10 μ F, 50 V	Gerrette Electronics	TPS106K050R0400
C15	Ceramic capacitor, 5.6 pF	ATC	100B 5R6
C16	Ceramic capacitor, 5.1 pF	ATC	100B 5R1
C17, C18	Ceramic capacitor, 11 pF	ATC	100B 110
C20	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
L1, L2	Ferrite, 6 mm	Ferroxcube	53/3/4.6-452
Q1	Transistor	Infineon	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	P2.0KECT-ND
R4	Potentiometer, 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5	Chip resistor, 3.3 k-ohms	Digi-Key	P3.3KECT-ND
R6	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R7	Chip resistor, 5.1 k-ohms	Digi-Key	P5.1KECT-ND

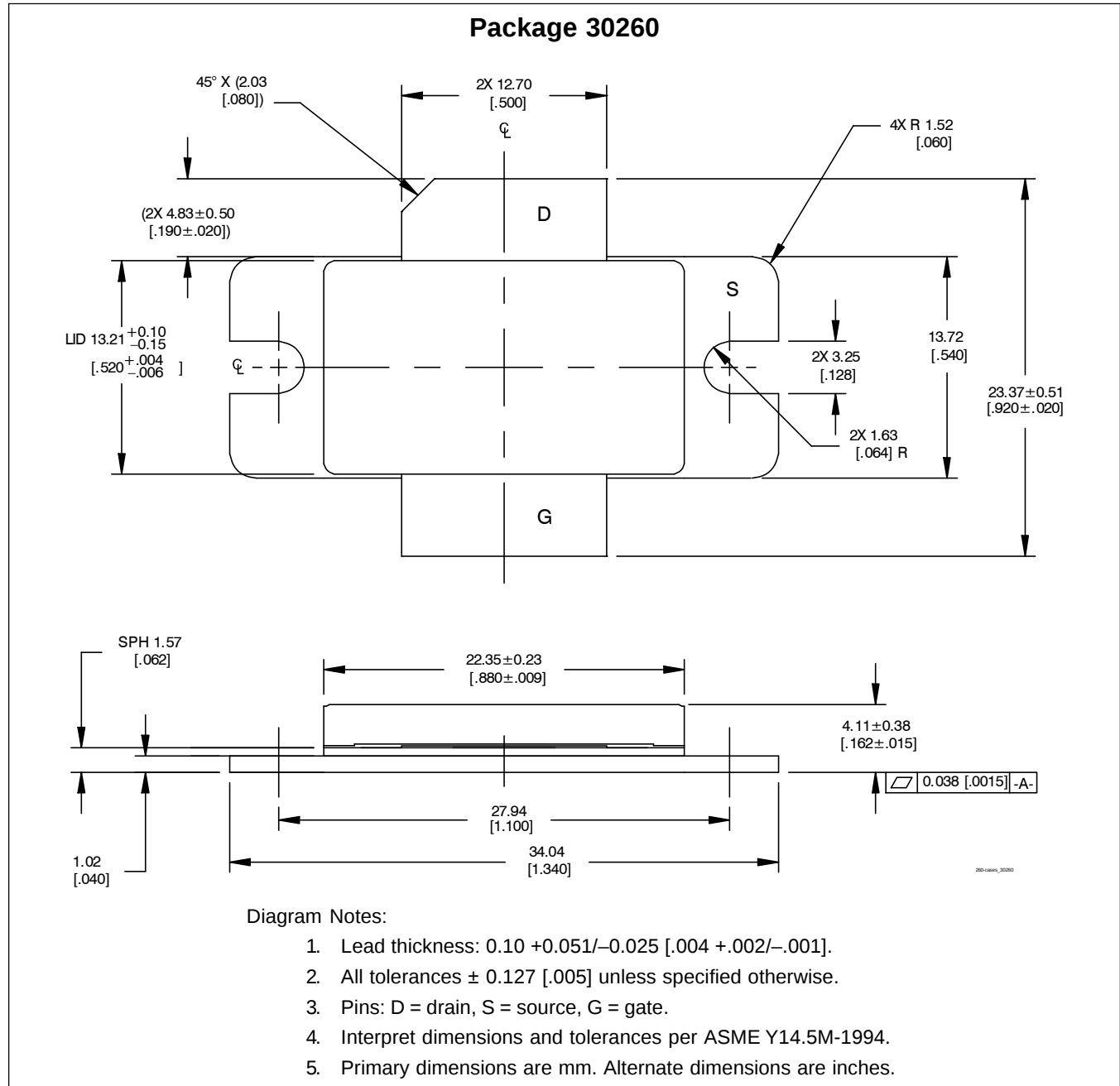
Reference Circuit (cont.)



Reference Circuit* (not to scale)

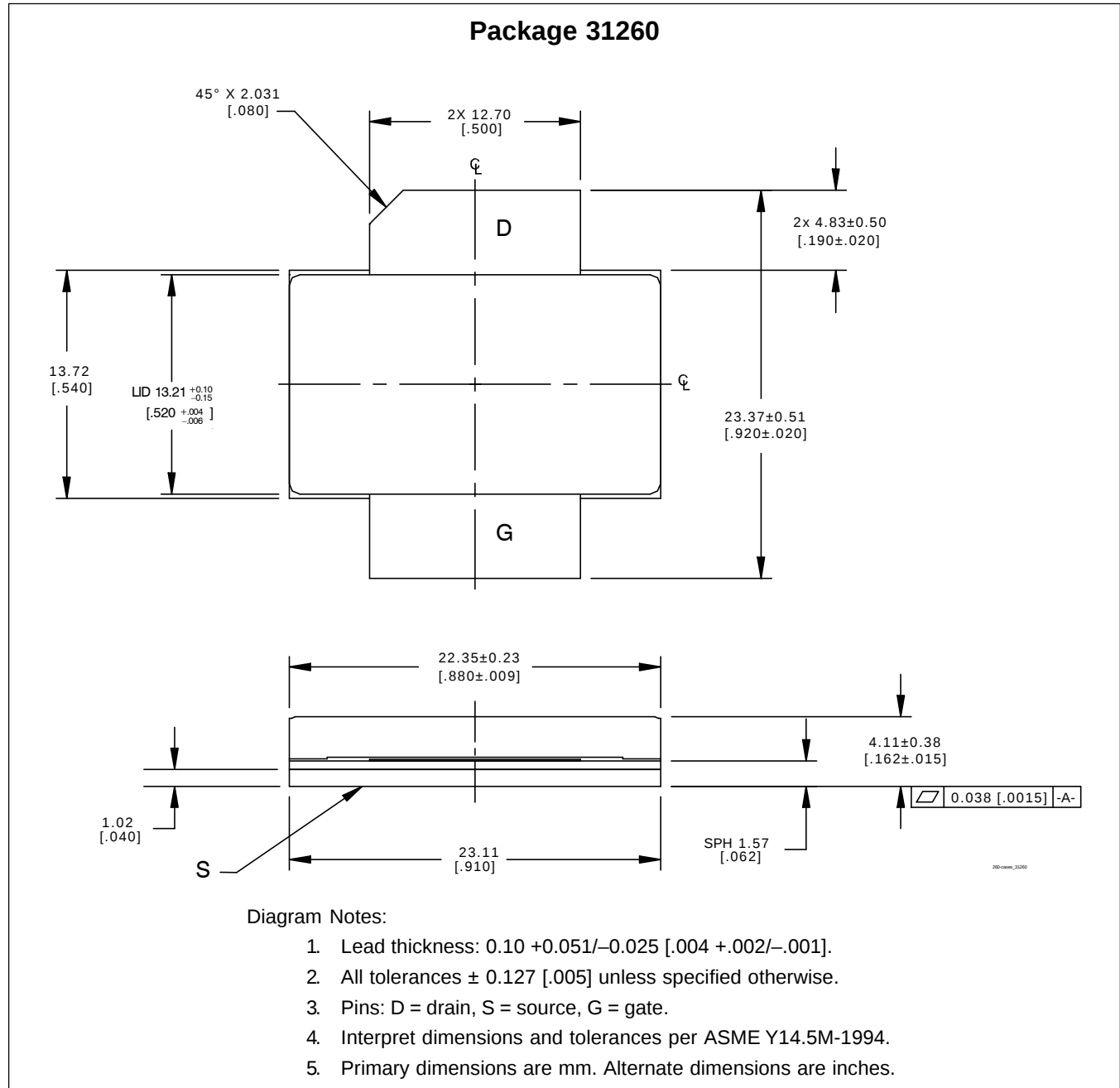
*Gerber Files for this circuit available on request

Package Outline Specifications



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

Package Outline Specifications (cont.)



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Revision History: 2005-04-15

Data Sheet

Previous Version: 2004-11-12, Preliminary Data Sheet

Page	Subjects (major changes since last revision)
	Add impedance and circuit information

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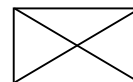
Please send your proposal (including a reference to this document) to:

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