PTFA041501GL
PTFA041501HL

green Product

Thermally-Enhanced High Power RF LDMOS FETs
150 W, 420 – 500 MHz

Description

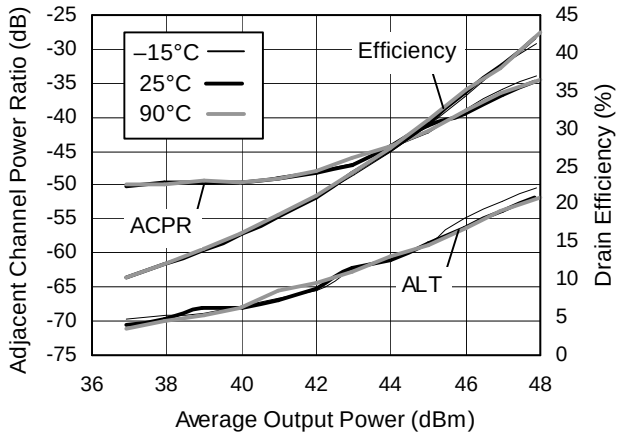
The PTFA041501GL and PTFA041501HL are 150-watt LDMOS FETs designed for ultra-linear CDMA power amplifier applications. They are available in thermally-enhanced plastic open-cavity packages with copper flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFA041501GL
Package PG-63248-2

PTFA041501HL
Package PG-64248-2

Single-carrier CDMA IS-95 Performance

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



Features

- Thermally-enhanced plastic open-cavity (EPOC™) packages with copper flanges, Pb-free and RoHS compliant
- Broadband internal matching
- Typical CDMA performance at 470 MHz, 28 V
  - Average output power = 60 W
  - Linear Gain = 21 dB
  - Efficiency = 41%
- Typical CW performance, 470 MHz, 28 V
  - Output power at P–1dB = 175 W
  - Efficiency = 62%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 150 W (CW) output power

RF Characteristics

Single-carrier CDMA IS-95 Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

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

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	21	—	dB
Drain Efficiency	η_D	—	41	—	%
Adjacent Channel Power Ratio	ACPR	—	–33	—	dB

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} = 900 mA, P_{OUT} = 150 W PEP, f = 470 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	20.0	21.0	—	dB
Drain Efficiency	η_D	45.0	46.5	—	%
Intermodulation Distortion	IMD	—	–29	–28	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 10 µA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	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} = 900 mA	V_{GS}	2	2.48	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	625	W
Above 25°C derate by		3.57	W/°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 150 W CW, soldered)	$R_{\theta JC}$	0.28	°C/W

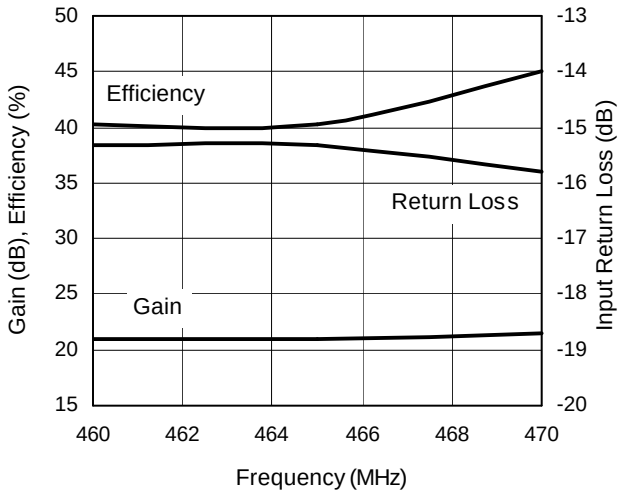
Ordering Information

Type and Version	Package Outline	Package Description	Shipping	Marking
PTFA041501GL V1	PG-63248-2	Thermally-enhanced slotted flange, single-ended	Tray	PTFA041501GL
PTFA041501HL V1	PG-64248-2	Thermally-enhanced slotted flange, single-ended	Tray	PTFA041501HL

Typical Performance (data taken in a production)

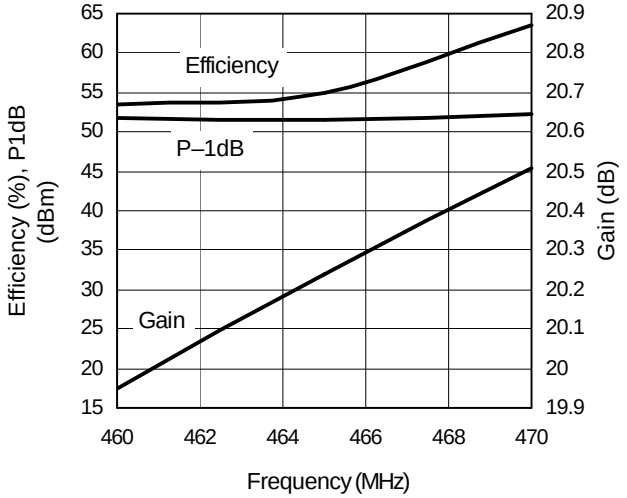
Broadband Circuit Performance

V_{DD} = 28 V, I_{DQ} = 900 mA, P1dB



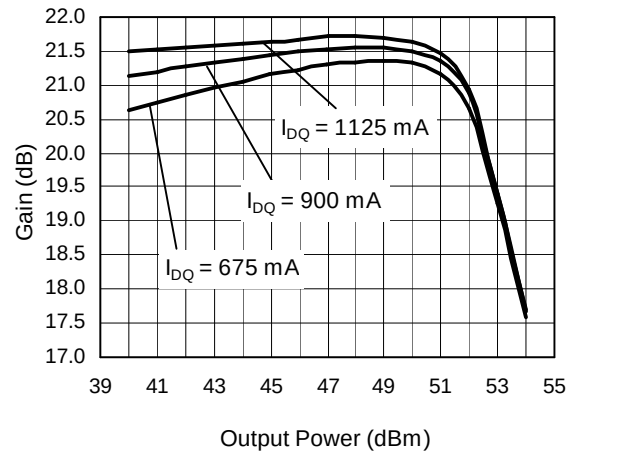
P_{OUT}, Gain & Efficiency (at P-1dB) vs. Frequency

V_{DD} = 28 V, I_{DQ} = 900 mA, P–1dB



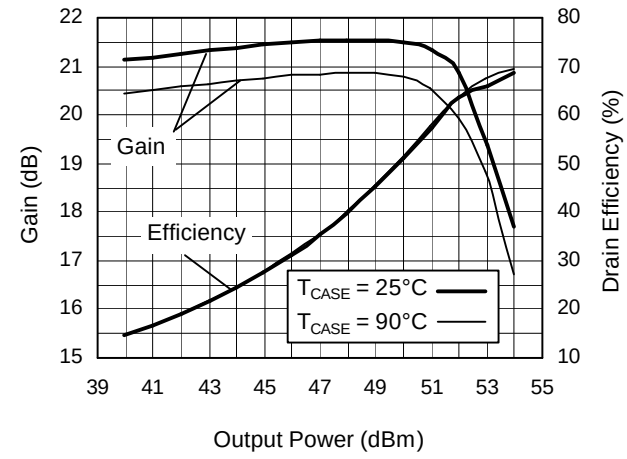
Power Sweep at selected I_{DQ}

V_{DD} = 28 V, f = 470 MHz



Power Sweep, CW Conditions

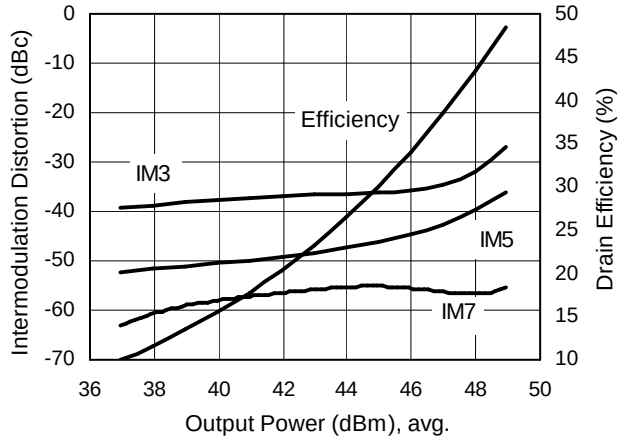
V_{DD} = 28 V, I_{DQ} = 900 mA, f = 470 MHz



Typical Performance (cont.)

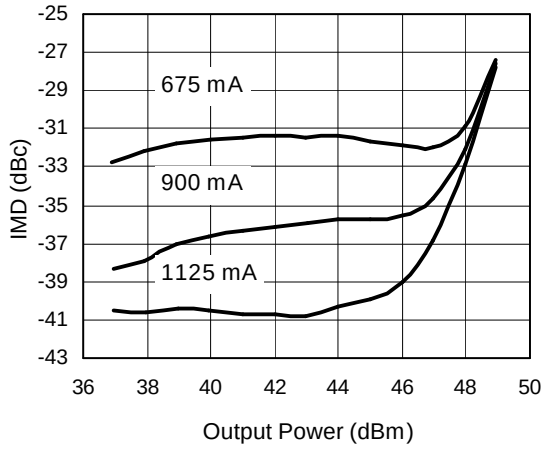
Intermodulation Distortion vs. Pout

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



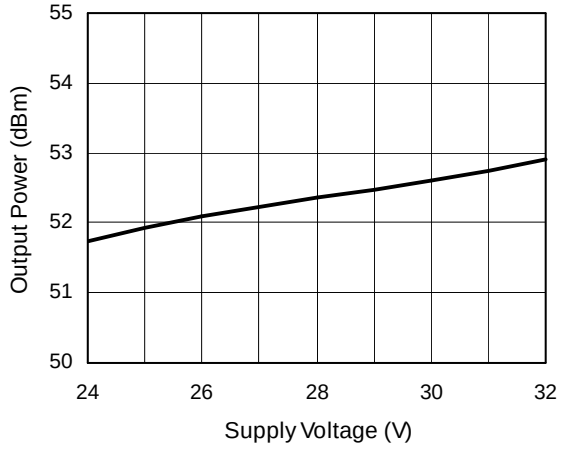
IM3 vs. Output Power at Selected Biases

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



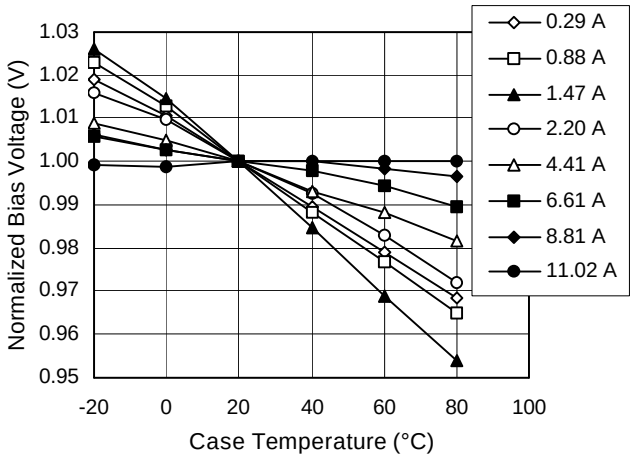
Output Power (at 1 dB Compression) vs. Supply Voltage

I_{DQ} = 900 mA, f = 470 MHz

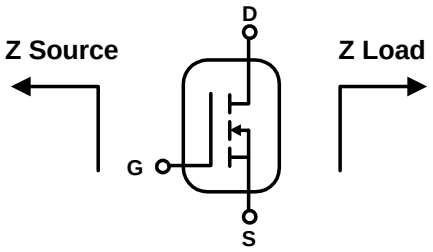


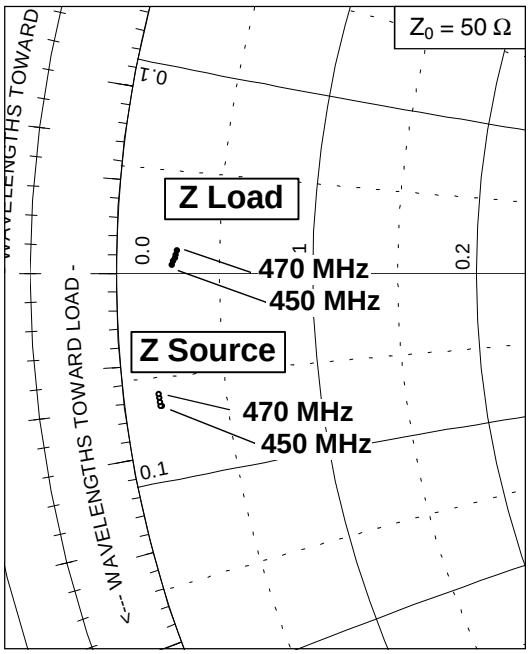
Bias Voltage vs. Temperature

Voltage normalized to typical gate voltage,
series show current



Broadband Circuit Impedance

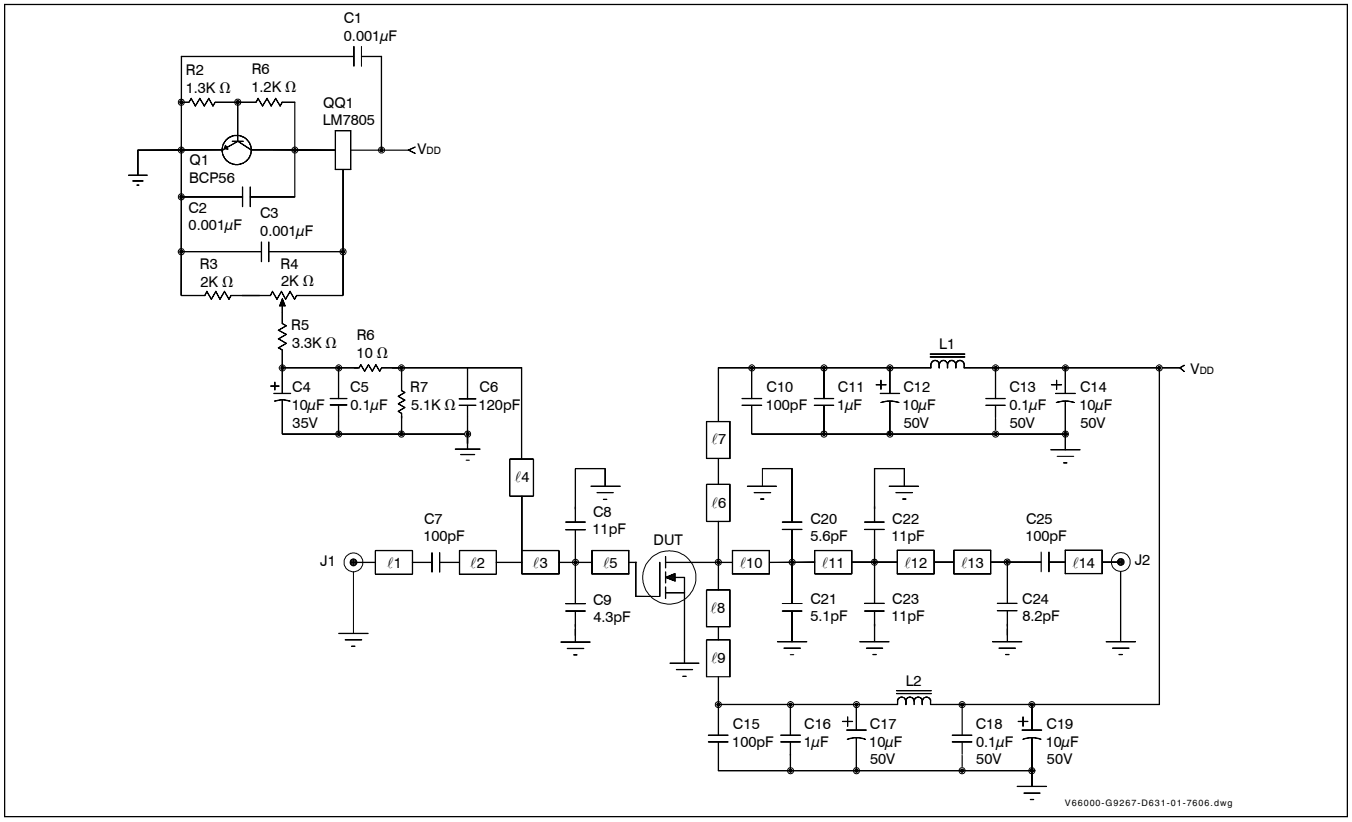




Frequency	Z Source W		Z Load W	
MHz	R	jX	R	jX
450	0.88	–3.20	1.33	0.22
455	0.84	–3.20	1.35	0.31
460	0.84	–3.10	1.40	0.38
465	0.84	–3.00	1.41	0.47
470	0.83	–2.90	1.44	0.57

See next page for circuit information

Reference Circuit

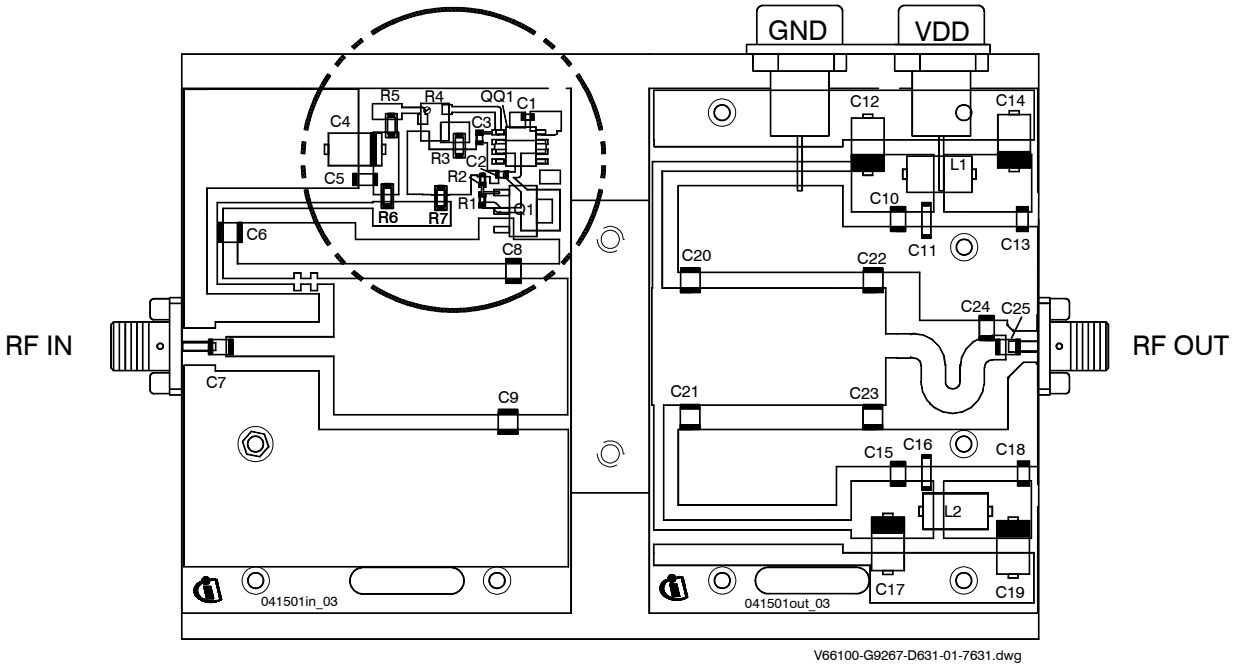


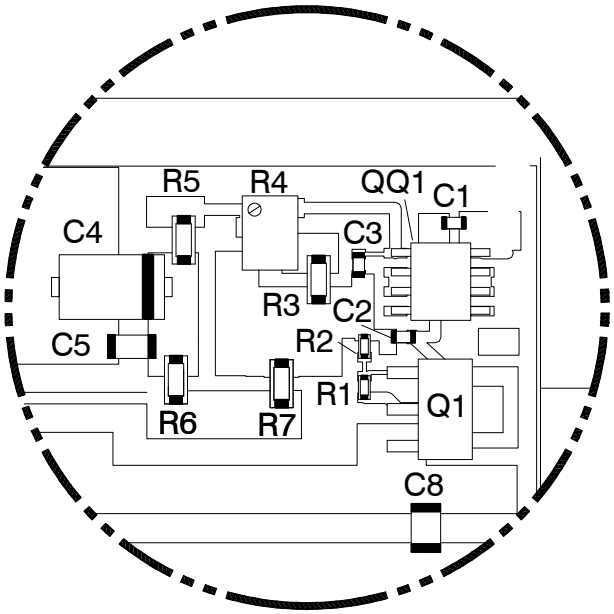
Reference circuit schematic for ƒ = 460 MHz

Circuit Assembly Information			
DUT	PTFA041501GL or PTFA041501HL	LDMOS Transistor	
PCB	0.76 mm [.030"] thick, ε_r = 9.2	Rogers TMM10	2 oz. copper

Microstrip	Electrical Characteristics at 460 MHz	Dimensions L x W (mm)	Dimensions L x W (in.)
ℓ 1	0.016 λ, 50.69 Ω	4.32 x 0.71	0.170 x 0.028
ℓ 2	0.058 λ, 24.34 Ω	14.22 x 2.54	0.560 x 0.100
ℓ 3	0.097 λ, 4.85 Ω	21.59 x 17.78	0.850 x 0.700
ℓ 4	0.081 λ, 50.69 Ω	21.59 x 0.71	0.850 x 0.280
ℓ 5	0.040 λ, 4.85 Ω	8.89 x 17.78	0.350 x 0.700
ℓ 6	0.158 λ, 37.73 Ω	40.64 x 1.27	1.600 x 0.050
ℓ 7	0.030 λ, 10.94 Ω	5.59 x 7.11	0.220 x 0.280
ℓ 8	0.158 λ, 37.73 Ω	40.64 x 1.27	1.600 x 0.050
ℓ 9	0.030 λ, 10.94 Ω	5.59 x 7.11	0.220 x 0.280
ℓ 10	0.025 λ, 5.58 Ω	5.59 x 15.24	0.220 x 0.600
ℓ 11	0.105 λ, 5.58 Ω	23.62 x 15.24	0.930 x 0.600
ℓ 12	0.006 λ, 5.58 Ω	1.27 x 15.24	0.050 x 0.600
ℓ 13	0.104 λ, 21.37 Ω	25.4 x 3.05	1.000 x 0.120
ℓ 14	0.014 λ, 50.69 Ω	3.81 x 0.71	0.150 x 0.028

Reference Circuit (cont.)





Reference circuit assembly diagram (not to scale). Gerber files for this circuit available on request.

Reference Circuit (cont.)

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, C13, C18	Capacitor, 0.1 µF	Digi-Key	P4525-ND
C6	Ceramic capacitor, 120 pF	ATC	100B 121
C7, C10, C15, C25	Ceramic capacitor, 100 pF	ATC	100B 101
C8, C22, C23	Ceramic capacitor, 11 pF	ATC	100B 110
C9	Ceramic capacitor, 4.3 pF	ATC	100B 4R3
C11, C16	Capacitor, 1.0 µF	ATC	920C105
C12, C14, C17, C19	Capacitor, 10 µF, 50 V	Garrett Electronics	TPS106K050R0400
C20	Ceramic capacitor, 5.6 pF	ATC	100B 5R6
C21	Ceramic capacitor, 5.1 pF	ATC	100B 5R1
C24	Ceramic capacitor, 8.2 pF	ATC	100B 8R2
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, 1.2k ohms	Digi-Key	P1.2KGCT-ND
R2	Chip resistor, 1.3k ohms	Digi-Key	P1.3KGCT-ND
R3	Chip resistor, 2k ohms	Digi-Key	P2.0KECT-ND
R4	Potentiometer, 2k ohms	Digi-Key	3224W-202ETR-ND
R5	Chip resistor, 3.3k ohms	Digi-Key	P3.3KECT-ND
R6	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R7	Chip resistor, 5.1k ohms	Digi-Key	P5.1KECT-ND

Package Outline Specifications

Package PG-63248-2

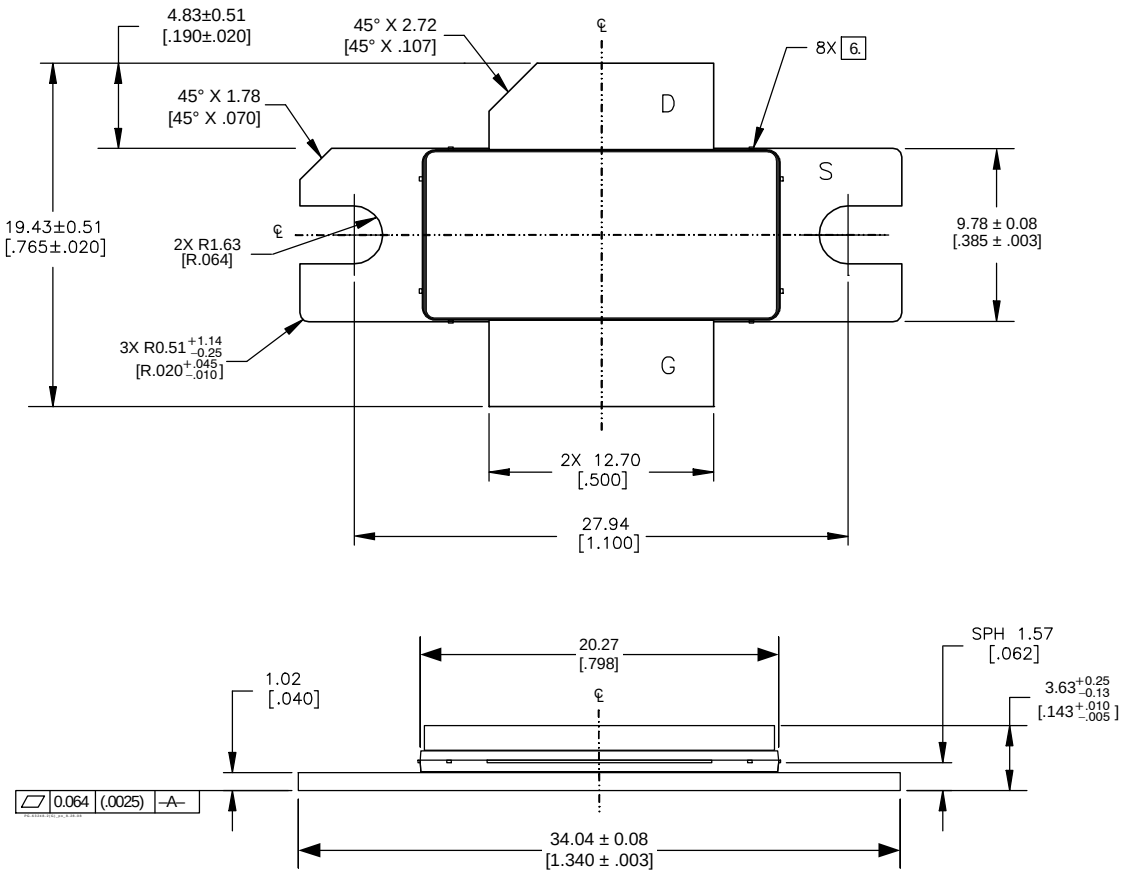


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. Pins: D = drain, S = source, G = gate.
4. Lead thickness: 0.10 + 0.051/–0.025 mm [.004 +0.002/–0.001 inch].
5. Gold plating thickness: < 0.254 micron [< 10 microinch]
6. Tabs may protrude 0.13 [.005] max from body.
7. All tolerances ± 0.25 [.01] / ± 0.127 [.005] unless specified otherwise.

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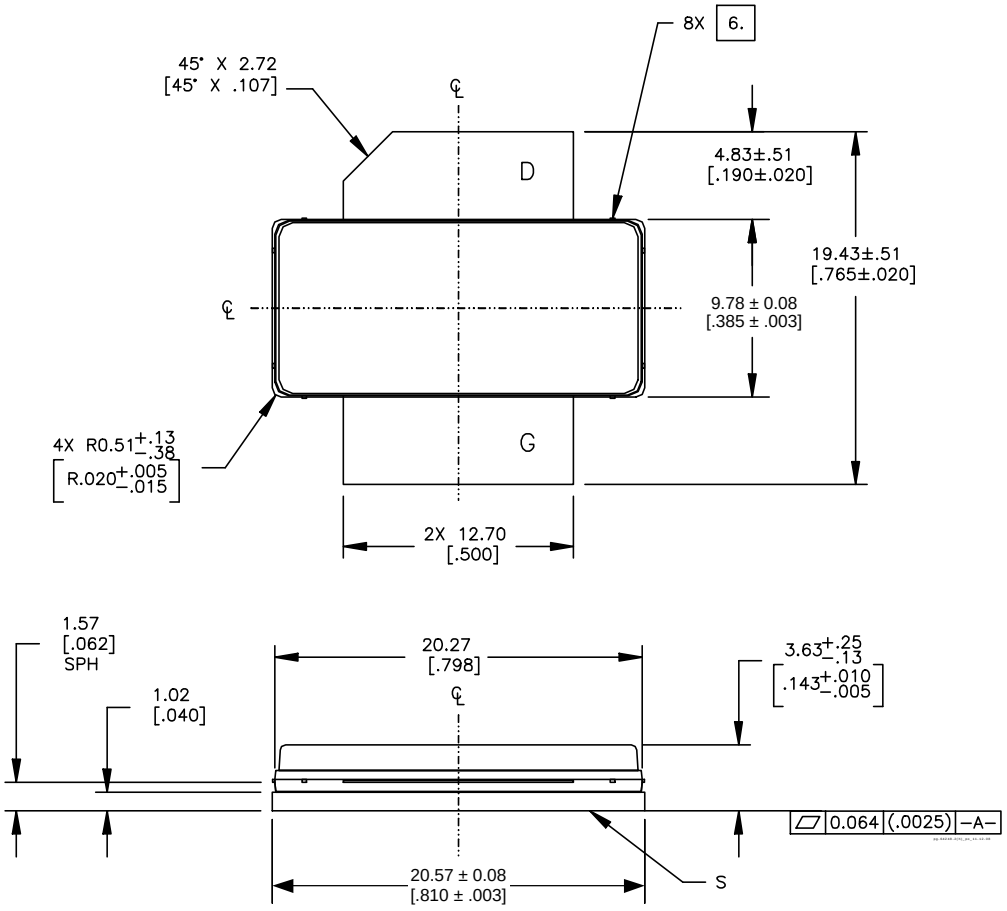
Package Outline Specifications (cont.)

Package PG-64248-2



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Revision History:	2008-11-21	Data Sheet
Previous Version:	2008-09-09, Preliminary Data Sheet	

Page	Subjects (major changes since last revision)
all	Remove Preliminary designation.
1 – 4	Finalize specifications.
5 – 7	Add circuit and impedance information.

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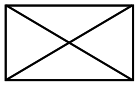

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