

Thermally-Enhanced High Power RF LDMOS FETs

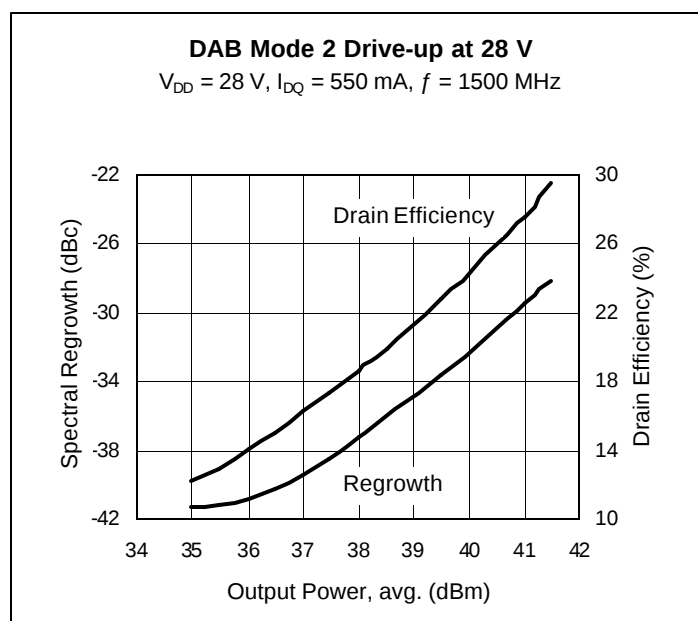
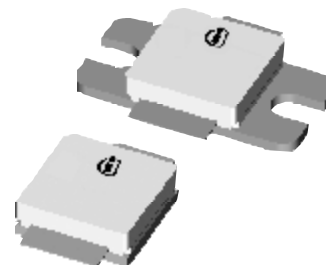
45 W, 1450 – 1550 MHz

Description

The PTF140451E and PTF140451F are 45-watt, *GOLDMOS*® FETs intended for DAB applications. These devices are characterized for Digital Audio Broadcast operation in the 1450 to 1550 MHz band. Thermally-enhanced packages provide the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTF140451E
Package 30265

PTF140451F
Package 31265



Features

- Thermally-enhanced packages
- Broadband internal matching
- Typical DAB Mode 2 performance at 1500 MHz, 28 V
 - Average output power = 12.5 W
 - Efficiency = 27.5%
 - Spectral regrowth = -30 dBc
 - $\Delta 975\text{ kHz } f_C$
- Typical DAB Mode 2 performance at 1500 MHz, 32 V
 - Average output power = 15.5 W
 - Efficiency = 27%
 - Spectral regrowth = -30 dBc
 - $\Delta 975\text{ kHz } f_C$
- Typical CW performance, 1500 MHz, 28 V
 - Output power = 60 W
 - Linear gain = 18 dB
 - Efficiency = 54% at P-1dB
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR at 28 V, 45 W (CW) output power
- Pb-free and RoHS compliant

RF Characteristics

DAB Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $P_{OUT} = 12.5\text{ W}_{AVG}$, $f = 1500\text{ MHz}$, DAB Mode 2, $\Delta 975\text{ kHz } f_C$

Characteristic	Symbol	Min	Typ	Max	Unit
Spectral Regrowth	RGTH	—	-30	—	dBc
Gain	G_{ps}	—	18	—	dB
Drain Efficiency	η_D	—	27.5	—	%

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)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$, $P_{OUT} = 45\text{ W}_{PEP}$, $f = 1500\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	17	18	—	dB
Drain Efficiency	η_D	35	36.5	—	%
Intermodulation Distortion	IMD	—	−32	−30	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = 10\text{ }\mu\text{A}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.02	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 550\text{ mA}$	V_{GS}	2.5	3.3	4.0	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

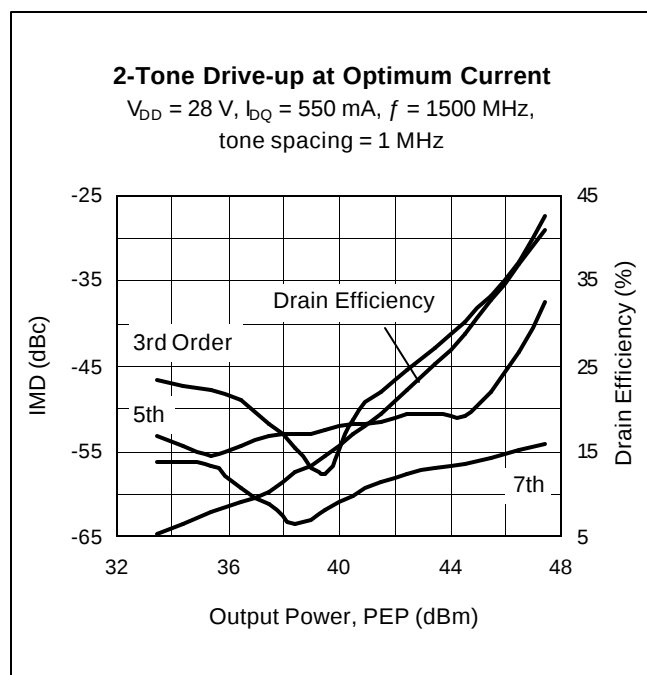
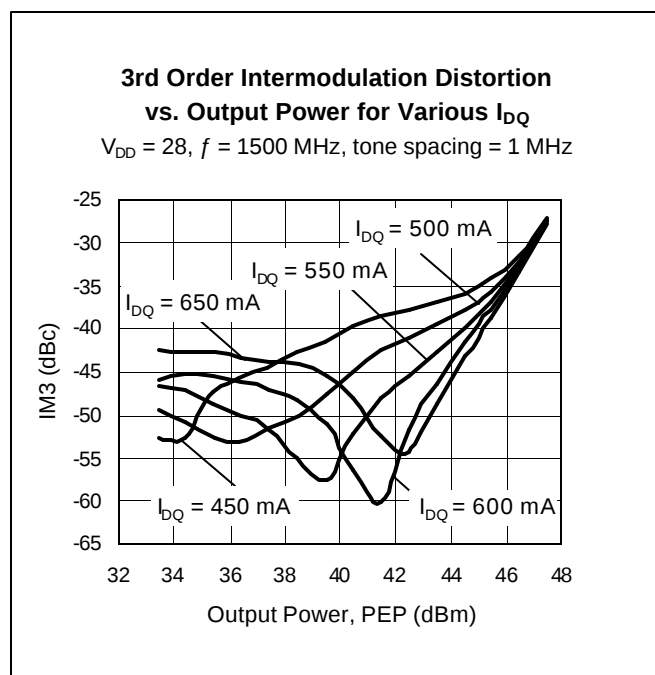
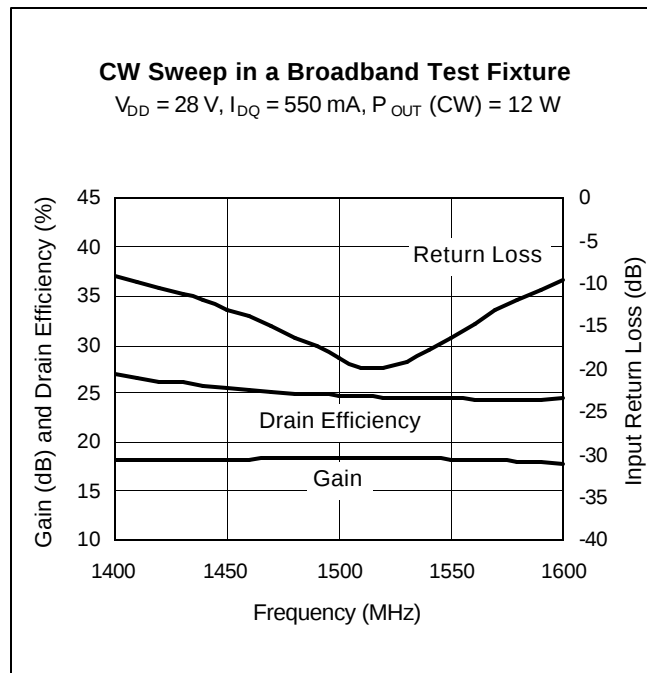
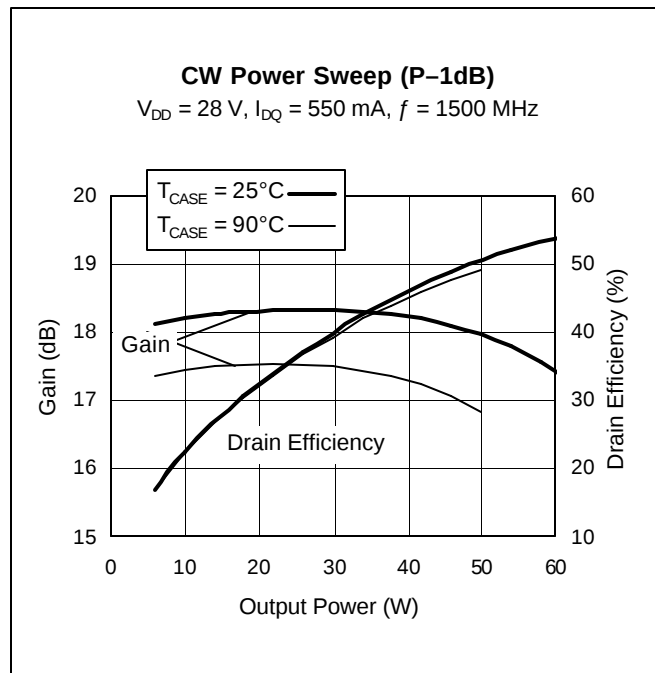
Maximum Ratings

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	175	W
Above 25 $^{\circ}\text{C}$ derate by		1.0	W/ $^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$)	$R_{\theta JC}$	1.0	$^{\circ}\text{C/W}$

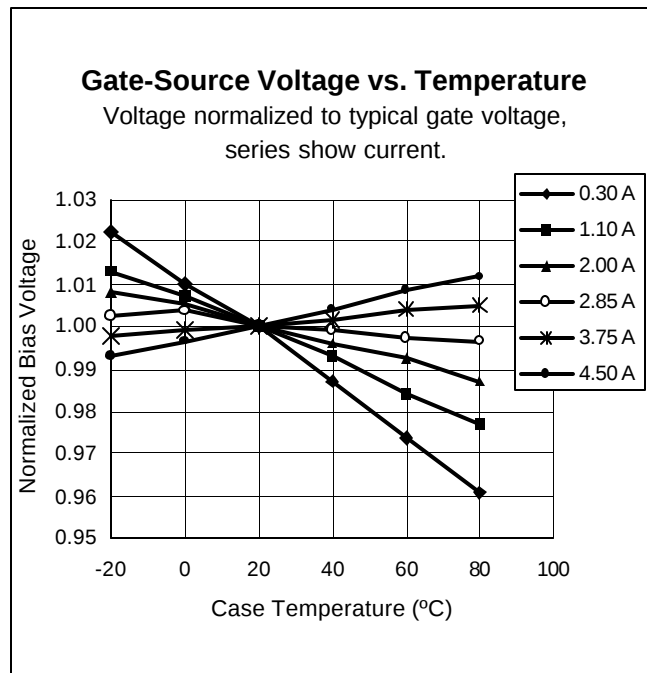
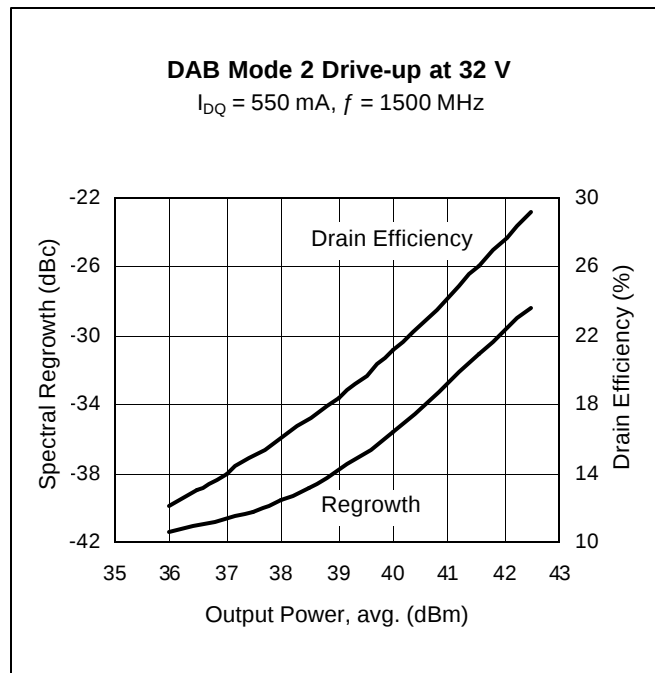
Ordering Information

Type	Package Outline	Package Description	Marking
PTF140451E	30265	Thermally-enhanced slotted flange, single-ended	PTF140451E
PTF140451F	31265	Thermally-enhanced earless flange, single-ended	PTF140451F

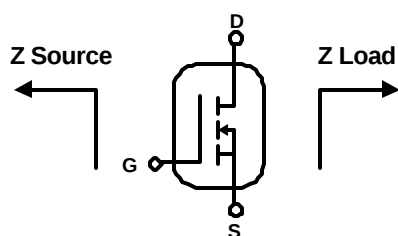
Typical Performance



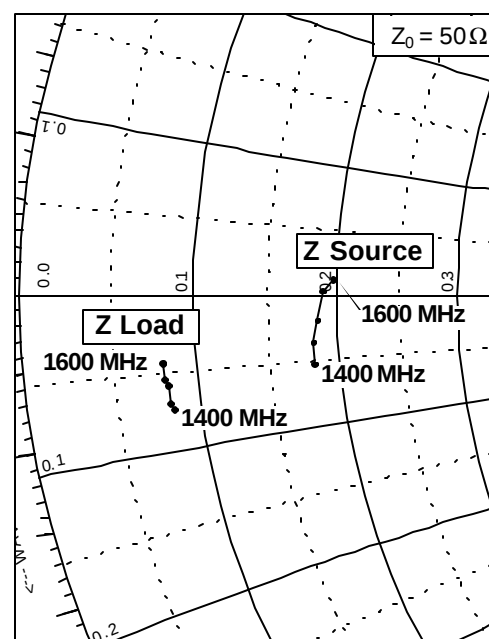
Typical Performance (cont.)



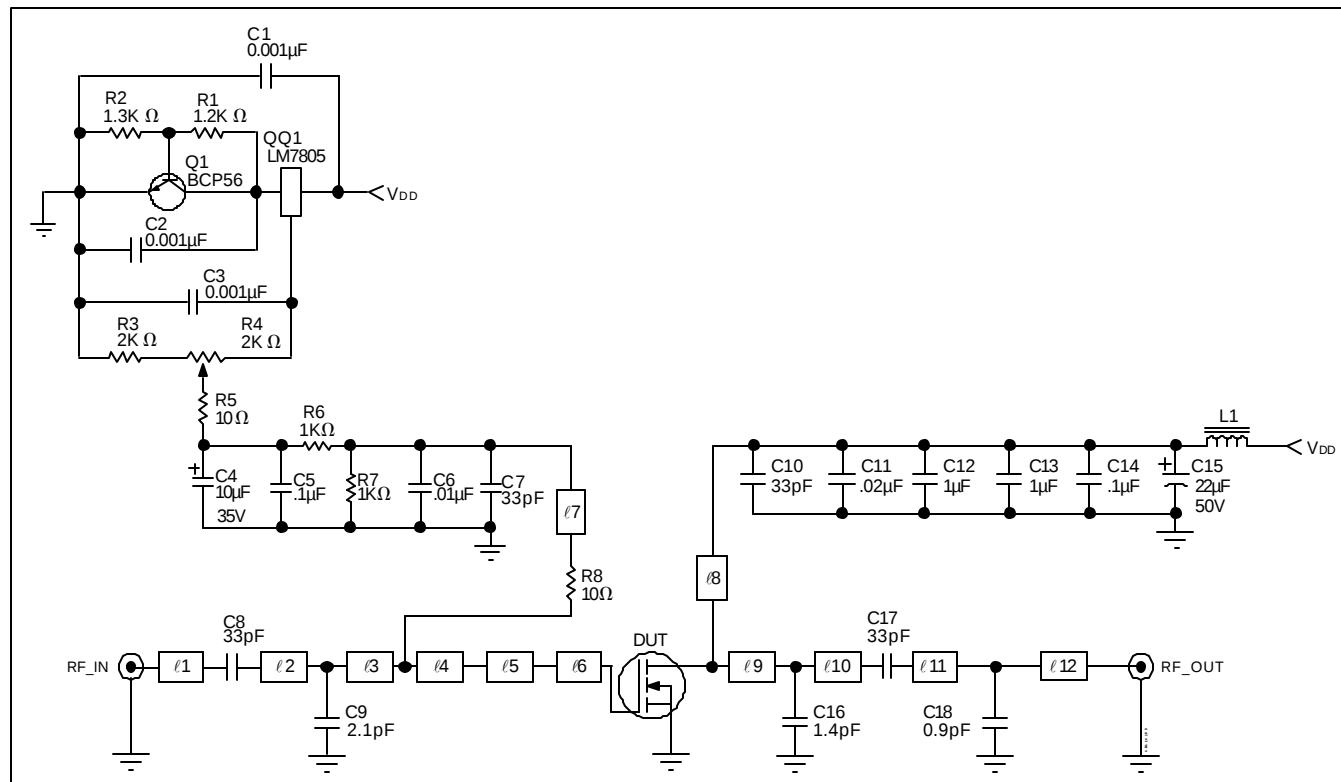
Broadband Circuit Impedance



Frequency MHz	Z Source W		Z Load W	
	R	jX	R	jX
1400	9.1	-2.65	4.20	-3.70
1450	9.1	-1.81	4.10	-3.50
1500	9.3	-0.98	4.10	-2.90
1550	9.5	0.15	4.00	-2.70
1600	9.9	0.60	4.00	-2.20



Reference Circuit



Reference circuit schematic for 1500 MHz

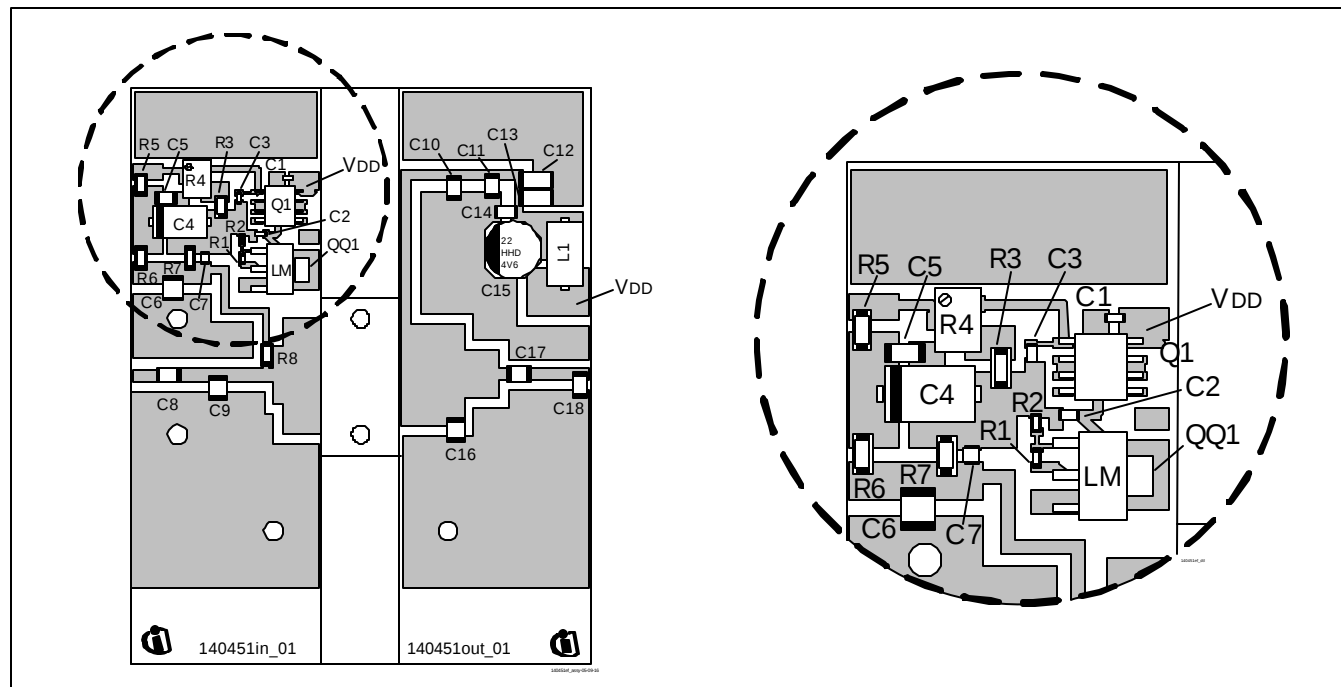
Circuit Assembly Information

DUT	PTF140451E or PTF140451F	LDMOS Transistor
PCB	0.76 mm [0.030"] thick, $\epsilon_r = 4.5$	TMM4 2 oz. copper, both sides

Microstrip	Electrical Characteristics at 1500 MHz ¹	Dimensions: L x W (mm)	Dimensions: L x W (in.)
l_1	0.035 λ , 50.0 Ω	3.81 x 1.47	0.150 x 0.058
l_2	0.043 λ , 41.0 Ω	4.60 x 1.93	0.181 x 0.076
l_3	0.064 λ , 41.0 Ω	6.91 x 1.93	0.272 x 0.076
l_4	0.010 λ , 41.0 Ω	1.04 x 1.93	0.041 x 0.076
l_5	0.012 λ , 14.7 Ω	1.19 x 7.62	0.047 x 0.300
l_6	0.050 λ , 8.0 Ω	4.90 x 15.24	0.193 x 0.600
l_7	0.150 λ , 60.0 Ω	16.69 x 0.97	0.657 x 0.038
l_8	0.246 λ , 54.0 Ω	26.85 x 1.24	1.057 x 0.049
l_9	0.087 λ , 9.0 Ω	8.48 x 13.46	0.334 x 0.530
l_{10}	0.045 λ , 17.0 Ω	4.57 x 6.25	0.180 x 0.246
l_{11}	0.083 λ , 50.0 Ω	9.02 x 1.52	0.355 x 0.060
l_{12}	0.0113 λ , 50.0 Ω	1.22 x 1.52	0.048 x 0.060

¹Electrical 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 μ F	Digi-Key	PCC1772CT-ND
C4	Tantalum capacitor, 10 μ F, 35 V	Digi-Key	366-1655-2-ND
C5, C14	Capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C6	Capacitor, 0.01 μ F	ATC	200B 103
C7	Capacitor, 33 pF	ATC	100A 330
C8, C10, C17	Ceramic capacitor, 33 pF	ATC	100B 330
C9	Ceramic capacitor, 2.1 pF	ATC	100B 2R1
C11	Capacitor, 0.02 μ F	ATC	200B 203
C12, C13	Ceramic capacitor, 1.0 μ F	Digi-Key	445-1411-1-ND
C15	Electrolytic capacitor, 22 μ F, 50 V	Digi-Key	PCE3374CT-ND
C16	Ceramic capacitor, 1.4 pF	ATC	100B 1R4
C18	Ceramic capacitor, 0.9 pF	ATC	100B 0R9
L1	Ferrite, 8.9 mm	Elna Magnetics	BDS 4.6/3/8.9-4S2
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	P2KECT-ND
R4	Potentiometer, 2 k-ohms	Digi-Key	3224W-202ETR-ND
R5, R8	Chip resistor, 10 ohms	Digi-Key	P10ECT-ND
R6, R7	Chip resistor, 1 k-ohms	Digi-Key	P1KECT-ND

*Gerber files for this circuit are available on request.

Package 30265

The drawing shows two views of a package:

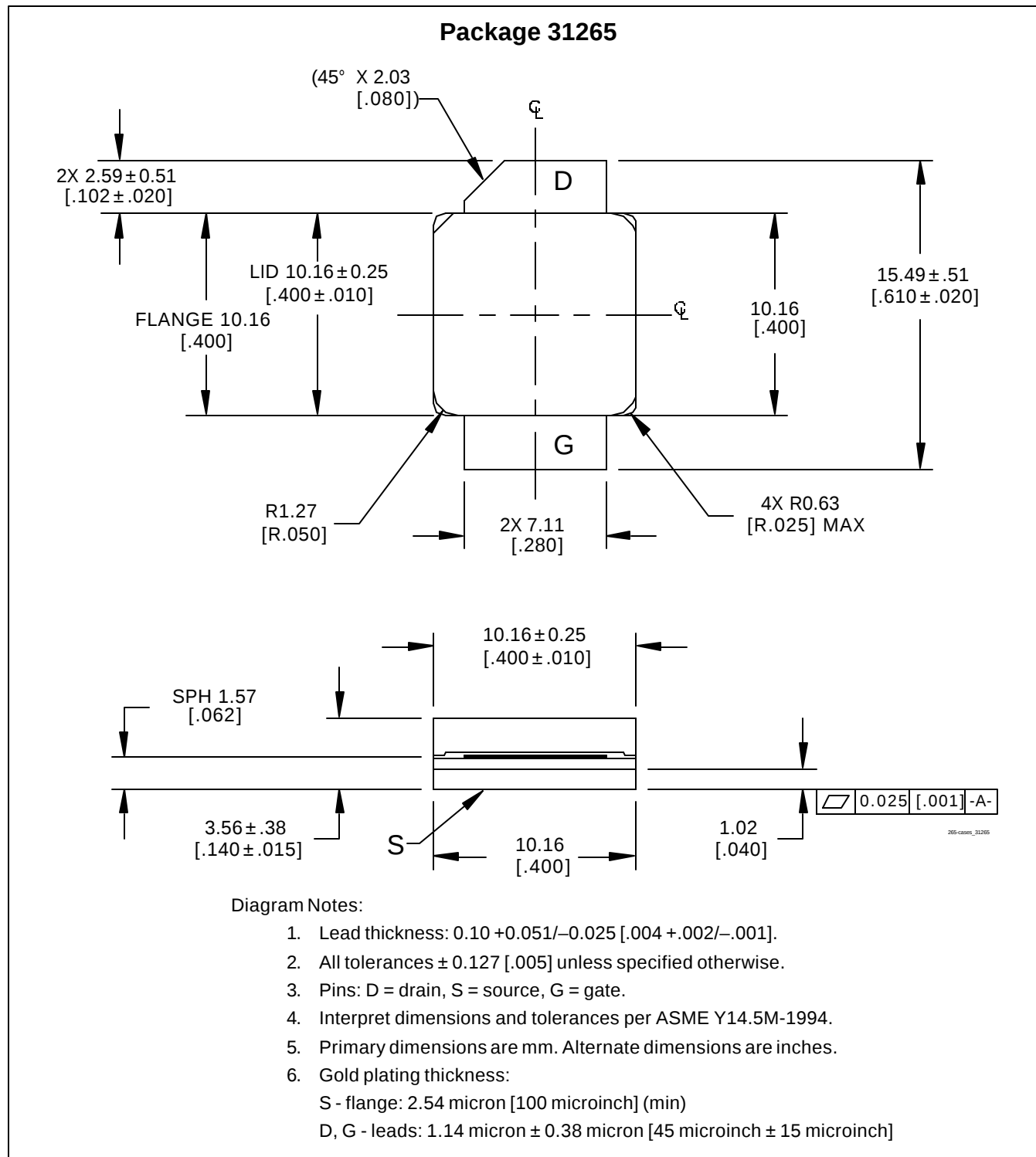
- Top View:** Shows a central square pad with rounded corners. Dimensions include:
 - Overall width: $15.23 \pm .000$ [mm]
 - Lead thickness: $0.10 \pm 0.051 / -0.025$ [mm] (Note 1)
 - Lead pitch: $7.11 \pm .280$ [mm]
 - Flange width: $9.78 \pm .385$ [mm]
 - Gate width: 15.60 ± 0.51 [mm]
 - Source/Drain pads: $10.16 \pm 0.25 \pm .400$ [mm]
 - SPH (Solder Pad Height): $1.57 \pm .062$ [mm]
 - Gold plating thickness: $0.0381 \pm .0015$ [mm] (-A-)
- Side View:** Shows the profile of the package, highlighting the lead thickness and the SPH dimension.

Diagram Notes:

- Lead thickness: $0.10 + 0.051 / -0.025$ [mm].
- All tolerances ± 0.127 [mm] unless specified otherwise.
- Pins: D = drain, S = source, G = gate.
- Interpret dimensions and tolerances per ASME Y14.5M-1994.
- Primary dimensions are mm. Alternate dimensions are inches.
- Gold plating thickness:
 - S - flange: 2.54 micron [100 microinch] (min)
 - D, G - leads: $1.14 \text{ micron} \pm 0.38 \text{ micron}$ [45 microinch ± 15 microinch]

Data Sheet

Package Outline Specifications (cont.)



Find the latest and most complete information about products and packaging at the Infineon Internet page
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Revision History:	2005-11-01	Data Sheet
Previous Version:	2005-09-07, Preliminary Data Sheet	

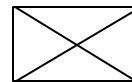
Page	Subjects (major changes since last revision)
All	Add graphs and circuit information. Remove Preliminary designation.

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highpowerRF@infineon.com

To request other information, contact us at:
+1 877 465 3667 (1-877-GOLDMOS) USA
or +1 408 776 0600 International



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