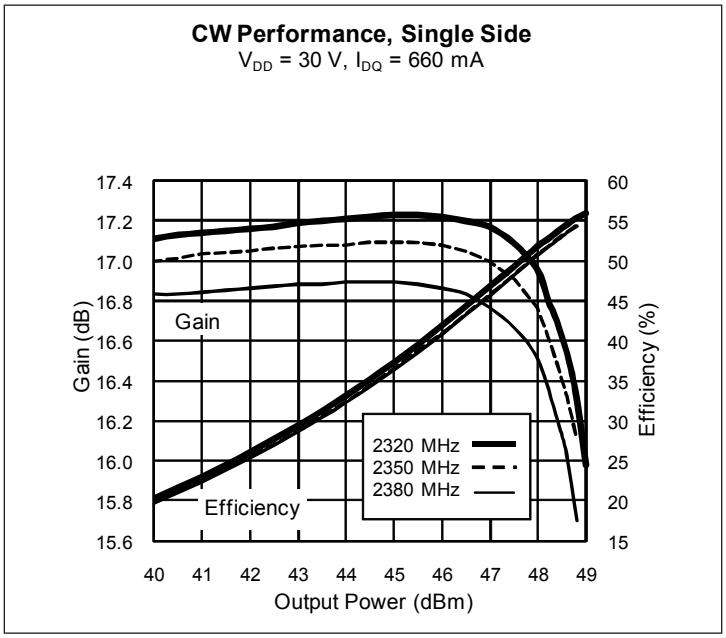
green Product

High Power RF LDMOS Field Effect Transistor
140 W, 2300 – 2400 MHz

Description

The PTFB241402F integrates two LDMOS FETs into one open-cavity ceramic package. It is designed for cellular amplifier applications in the 2300 to 2400 MHz frequency band. Manufactured with Infineon's advanced LDMOS process, this device offers excellent thermal performance and superior reliability.

PTFB241402F
Package H-37248-4



Features

- Broadband internal matching
- Typical CW performance, single side
  - Output power (1dB compression) = 70 W
  - Efficiency = 55%
- Increased negative gate-source voltage range for improved performance in Doherty amplifiers
- Integrated ESD protection
- Excellent thermal stability
- Capable of handling 10:1 VSWR @ 30 V, 70 W (CW) output power
- Pb-free and RoHS compliant

RF Characteristics

Two-tone Measurements (tested in Infineon test fixture, combined outputs)
V_{DD} = 30 V, I_{DQ} = 1200 mA, P_{OUT} = 110 W PEP, f = 2370 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16.5	17	—	dB
Drain Efficiency	ηD	34.5	37	—	%
Intermodulation Distortion	IMD	—	–32	–30	dBc

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics (single side)

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} = 30 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	μA
Drain Leakage Current	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	$R_{DS(on)}$	—	0.3	—	Ω
Operating Gate Voltage	V_{DS} = 30 V, I_{DQ} = 660 mA	V_{GS}	2.3	2.8	3.3	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	μA

Maximum Ratings

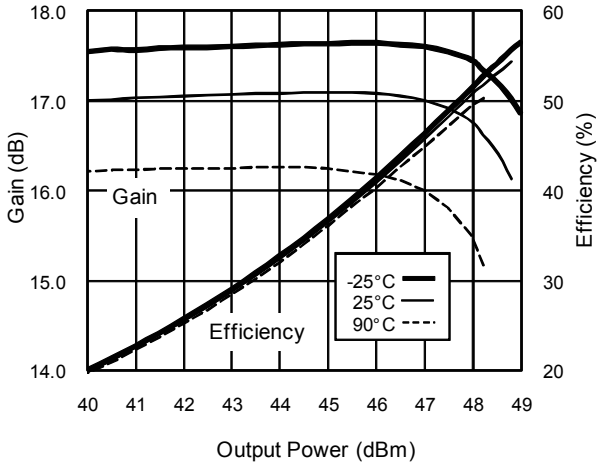
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 140 W CW)	$R_{\theta JC}$	0.38	°C/W

Ordering Information

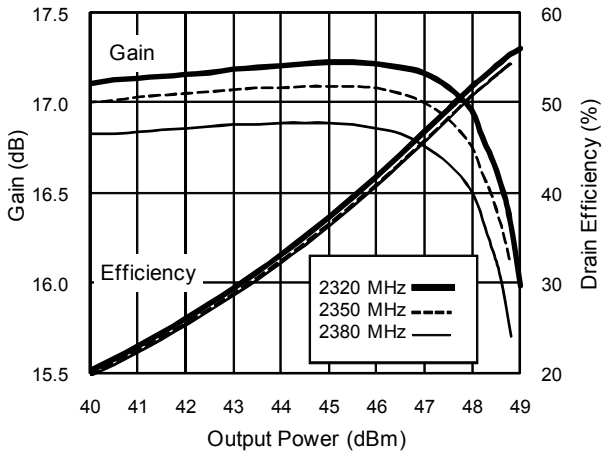
Type and Version	Package Outline	Package Description	Shipping
PTFB241402F V1	H-37248-4	Thermally-enhanced earless flange	Tray
PTFB241402F V1 R250	H-37248-4	Thermally-enhanced earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

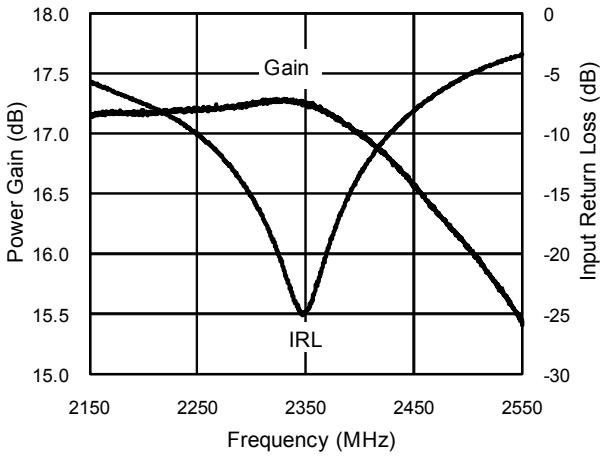
CW Performance, Single Side
V_{DD} = 30 V, I_{DQ} = 660 mA



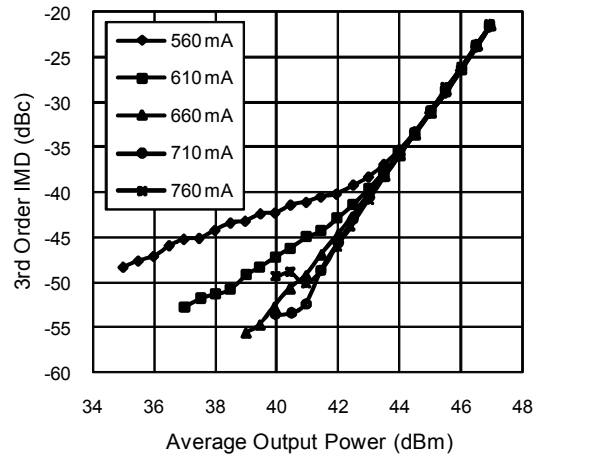
CW Sweep at P_{1dB}, Single Side
V_{DD} = 30 V, I_{DQ} = 660 mA



Small Signal CW Gain & Input Return Loss, Single Side
V_{DD} = 30 V, I_{DQ} = 660 mA



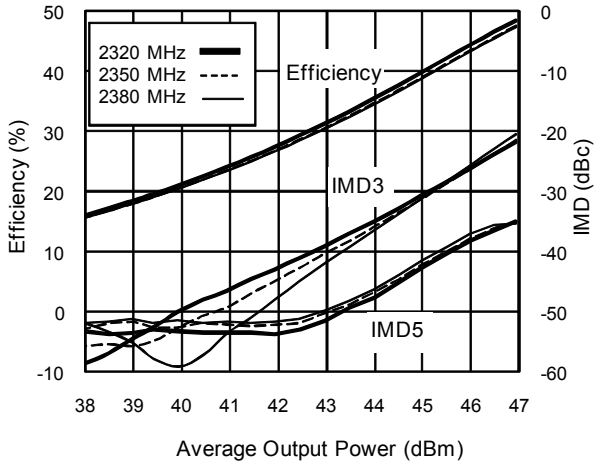
Two-tone Performance at Various I_{DQ}, Single Side
f = 2350 MHz, V_{DD} = 30 V, I_{DQ} = Varying



Typical Performance (cont.)

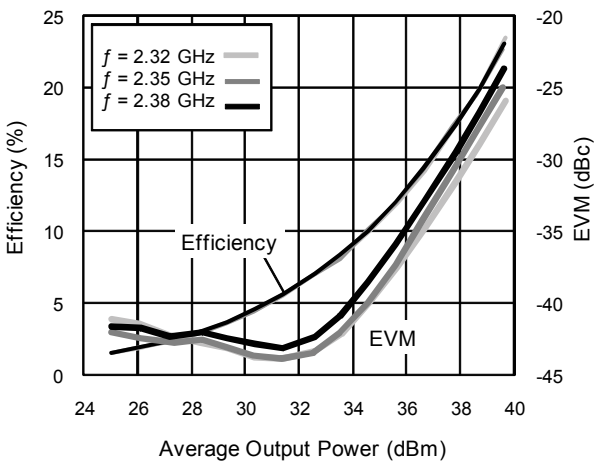
Two-tone Performance at Selected Frequencies, Single Side

V_{DD} = 30 V, I_{DQ} = 660 mA, 1 MHz Spacing

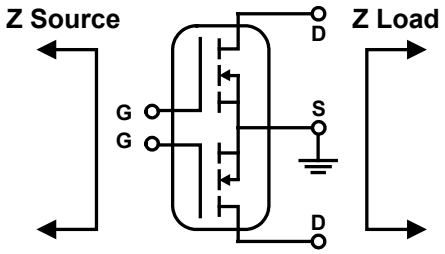


Wimax Performance, Single Side

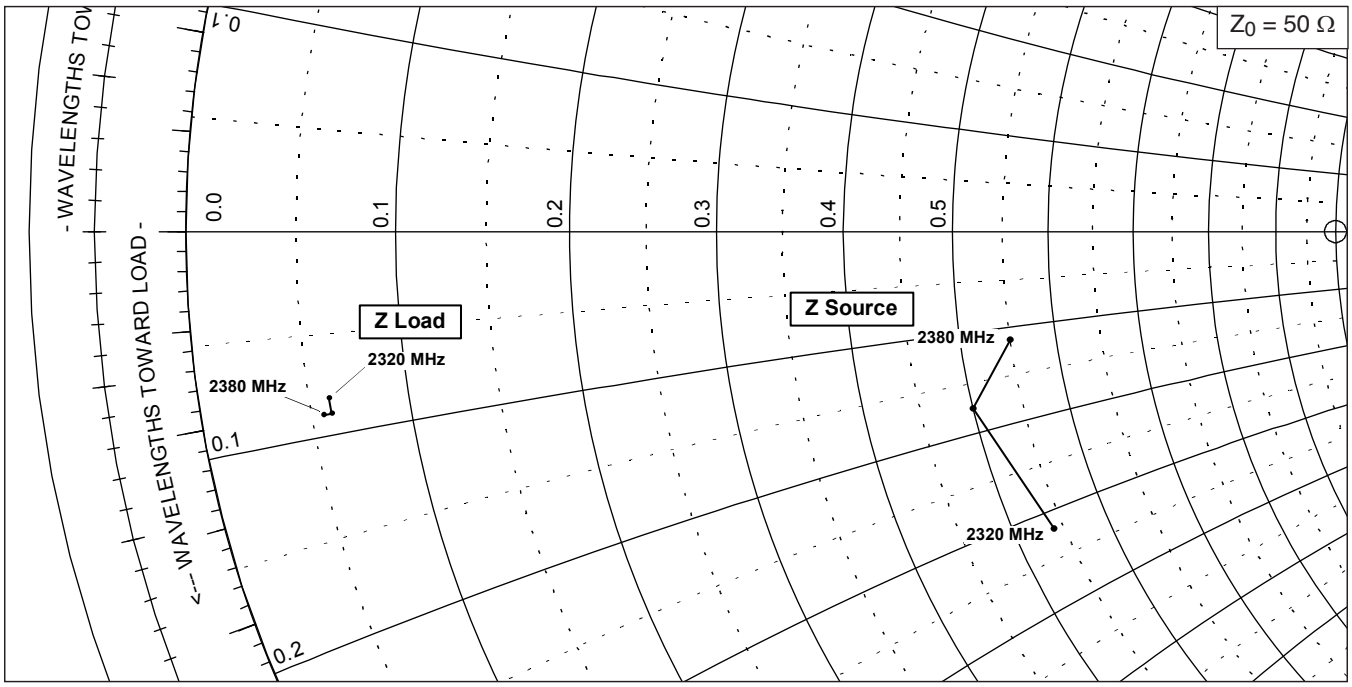
V_{DD} = 30 V, I_{DQ} = 680 mA, modulation = 64 QAM2/3, channel bandwidth = 1.75 MHz, sample rate = 2 MHz



Broadband Circuit Impedance

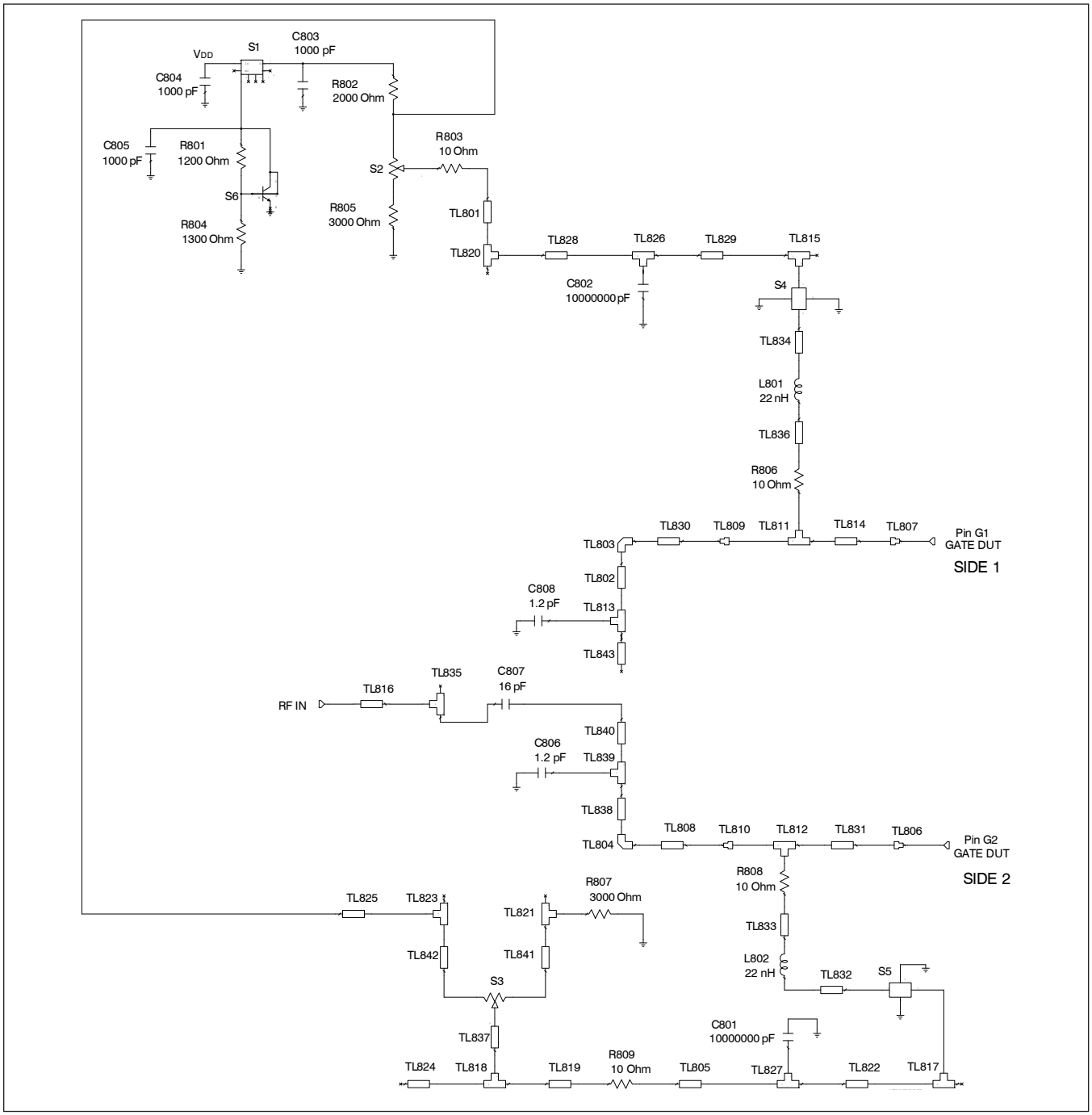


Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
2320	27.0	–16.0	3.0	–4.1
2350	25.0	–8.8	3.0	–4.5
2380	27.5	–5.7	2.8	–4.5



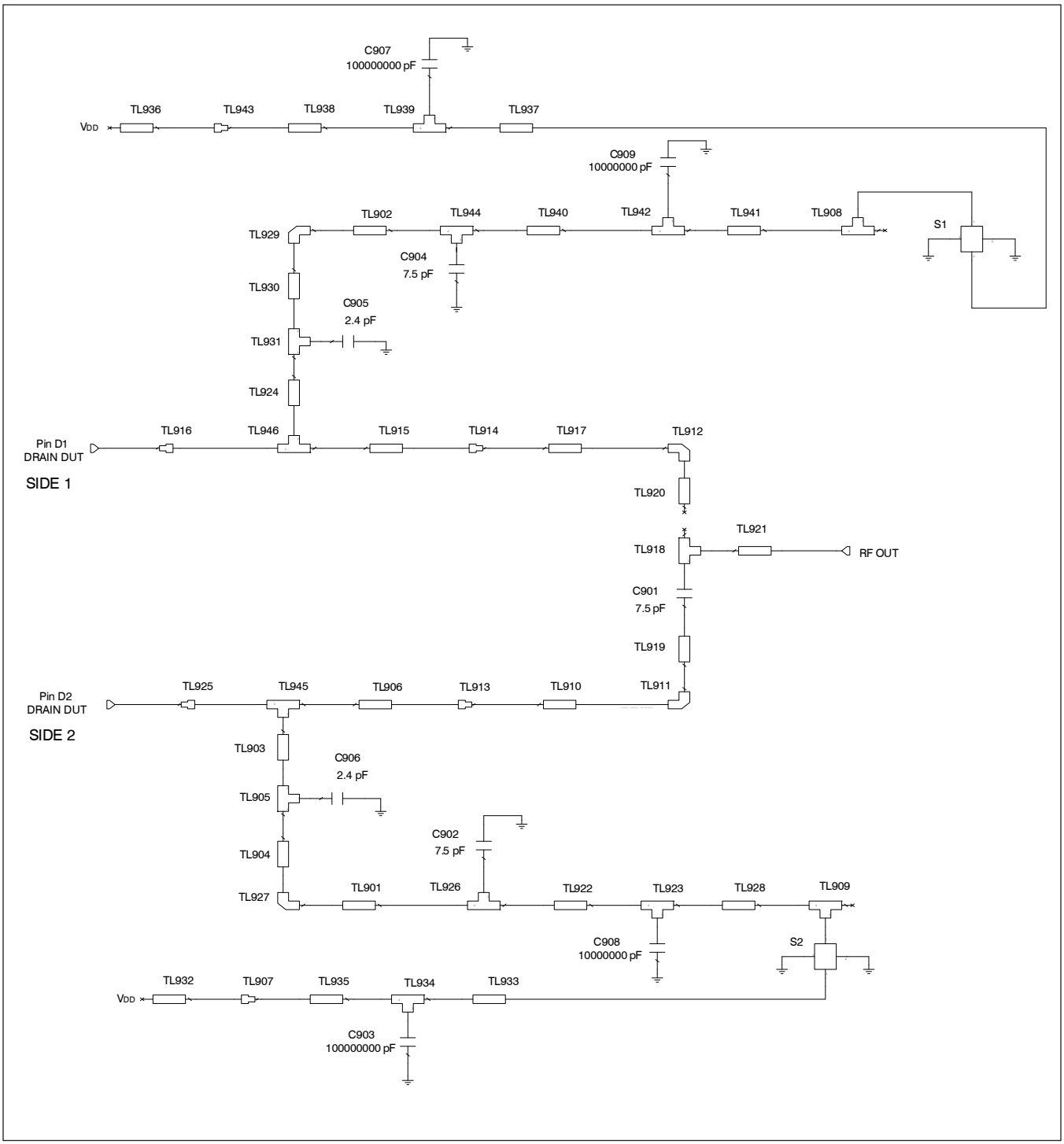
Reference Circuit

This reference circuit is designed to test only one side at a time. This block diagram shows the configuration for testing Side 2. To test Side 1, move capacitors C807 and C901 to close the circuit to Side 1.



Reference circuit input schematic for ƒ = 2380 MHz

Reference Circuit (cont.)



Reference circuit output schematic for ƒ = 2380 MHz

Reference Circuit (cont.)

Description	
DUT	PTFB241402F
PCB	0.508 mm [.020"] thick, εr = 3.66, Rogers 4350, 1 oz. copper

Electrical Characteristics at 2380 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL801	0.114 λ, 35.71 Ω	W = 1.905, L = 8.479	W = 75, L = 334
TL802, TL838	0.005 λ, 51.98 Ω	W = 1.087, L = 0.356	W = 43, L = 14
TL803, TL804		W = 1.087	W = 43
TL805	0.063 λ, 35.71 Ω	W = 1.905, L = 4.674	W = 75, L = 184
TL806, Tl807		W1 = 3.810, W2 = 5.842	W1 = 150, W2 = 230
TL808	0.094 λ, 51.98 Ω	W = 1.087, L = 7.163	W = 43, L = 282
TL809		W1 = 1.087, W2 = 1.087	W1 = 43, W2 = 43
TL810		W1 = 1.087, W2 = 5.842	W1 = 43, W2 = 230
TL811, TL812	0.011 λ, 14.61 Ω	W1 = 5.842, W2 = 5.842, W3 = 0.762	W1 = 230, W2 = 230, W3 = 30
TL813, TL839	0.018 λ, 51.98 Ω	W1 = 1.087, W2 = 1.087, W3 = 1.397	W1 = 43, W2 = 43, W3 = 55
TL814	0.066 λ, 14.61 Ω	W = 5.842, L = 4.699	W = 230, L = 185
TL815, TL817, TL818, TL820, TL821, TL823	0.026 λ, 35.71 Ω	W1 = 1.905, W2 = 1.905, W3 = 1.905	W1 = 75, W2 = 75, W3 = 75
TL816	0.146 λ, 51.98 Ω	W = 1.087, L = 11.118	W = 43, L = 438
TL819	0.068 λ, 35.71 Ω	W = 1.905, L = 5.080	W = 75, L = 200
TL822, TL829	0.029 λ, 35.71 Ω	W = 1.905, L = 2.184	W = 75, L = 86
TL824, TL837	0.033 λ, 35.71 Ω	W = 1.905, L = 2.477	W = 75, L = 98
TL825	0.010 λ, 35.71 Ω	W = 1.905, L = 0.711	W = 75, L = 28
TL826, TL827	0.010 λ, 35.71 Ω	W1 = 1.905, W2 = 1.905, W3 = 0.762	W1 = 75, W2 = 75, W3 = 30
TL828	0.146 λ, 35.71 Ω	W = 1.905, L = 10.897	W = 75, L = 429
TL830	0.094 λ, 51.98 Ω	W = 1.087, L = 7.163	W = 43, L = 282
TL831	0.066 λ, 14.61 Ω	W = 5.842, L = 4.699	W = 230, L = 185
TL832, TL834	0.027 λ, 35.71 Ω	W = 1.905, L = 2.032	W = 75, L = 80
TL833	0.036 λ, 35.71 Ω	W = 1.905, L = 2.705	W = 75, L = 107
TL835	0.014 λ, 44.26 Ω	W1 = 1.397, W2 = 1.397, W3 = 1.087	W1 = 55, W2 = 55, W3 = 43
TL836	0.032 λ, 35.71 Ω	W = 1.905, L = 2.408	W = 75, L = 95
TL840, TL843	0.010 λ, 51.98 Ω	W = 1.087, L = 0.762	W = 43, L = 30
TL841, TL842	0.026 λ, 35.71 Ω	W = 1.905, L = 1.905	W = 75, L = 75

table continued on page 9

Reference Circuit (cont.)

Electrical Characteristics at 2380 MHz

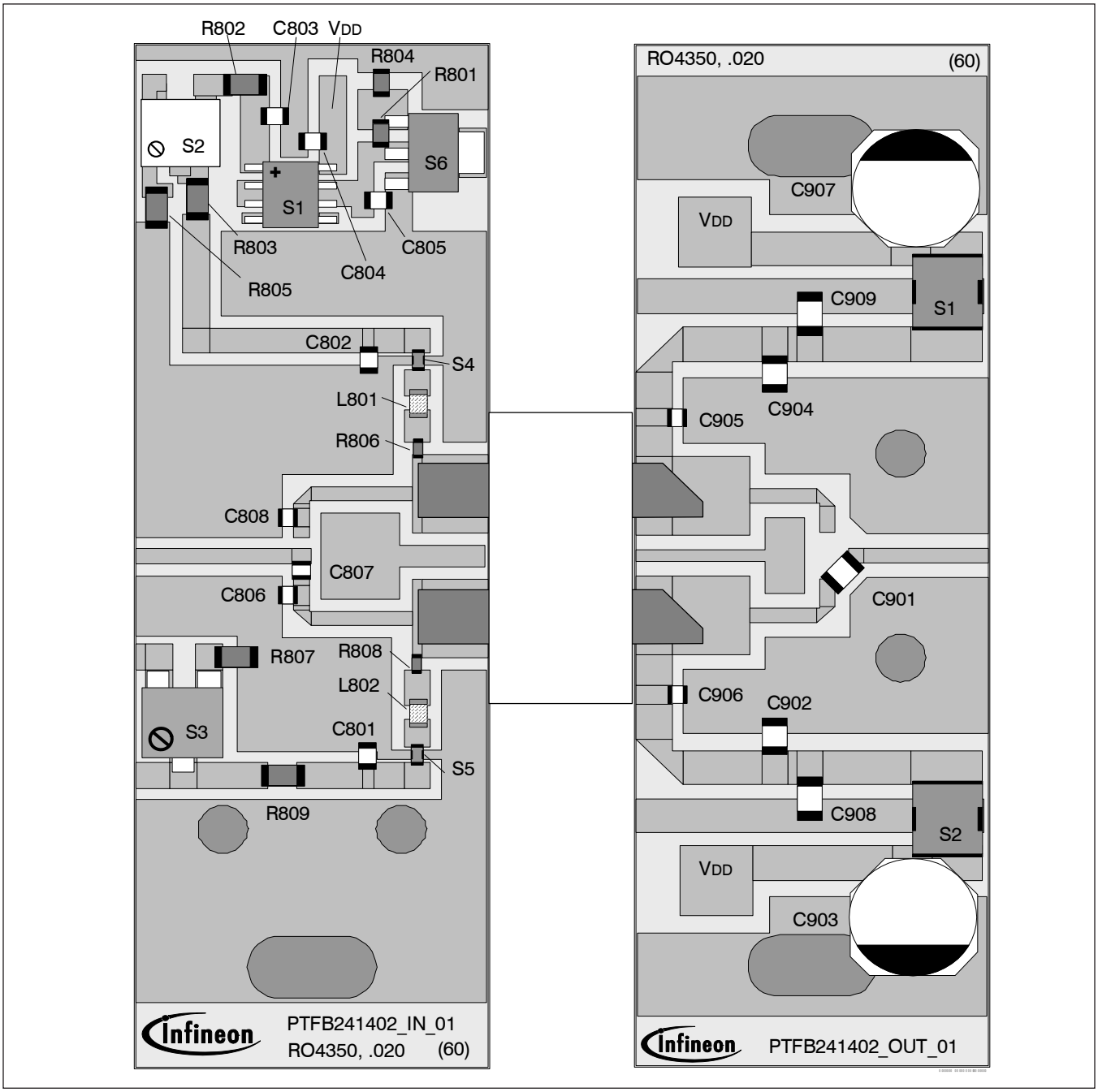
Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Output			
TL901, TL902	0.077 λ, 28.85 Ω	W = 2.540, L = 5.690	W = 100, L = 24
TL903	0.031 λ, 28.85 Ω	W = 2.540, L = 2.286	W = 100, L = 90
TL904	0.036 λ, 28.85 Ω	W = 2.540, L = 2.667	W = 100, L = 105
TL905, TL931	0.019 λ, 28.85 Ω	W1 = 2.540, W2 = 2.540, W3 = 1.397	W1 = 100, W2 = 100, W3 = 55
TL906	0.078 λ, 14.61 Ω	W = 5.842, L = 5.588	W = 230, L = 220
TL907		W1 = 0.003, W2 = 0.003, Offset = 0.001	W1 = 3, W2 = 102, Offset = 50
TL908, TL909	0.069 λ, 28.85 Ω	W1 = 2.540, W2 = 2.540, W3 = 5.080	W1 = 100, W2 = 100, W3 = 200
TL910	0.063 λ, 51.98 Ω	W = 1.087, L = 4.826	W = 43, L = 190
TL911, TL912		W = 1.087	W = 43
TL913, TL914		W1 = 1.087, W2 = 5.842	W1 = 43, W2 = 230
TL915	0.078 λ, 14.61 Ω	W = 5.842, L = 5.588	W = 230, L = 220
TL916, TL925		W1 = 3.810, W2 = 5.842	W1 = 150, W2 = 230
TL917	0.063 λ, 51.98 Ω	W = 1.087, L = 4.826	W = 43, L = 190
TL918	0.014 λ, 51.98 Ω	W1 = 1.087, W2 = 1.087, W3 = 1.087	W1 = 43, W2 = 43, W3 = 43
TL919, TL920	0.027 λ, 51.98 Ω	W = 1.087, L = 2.032	W = 43, L = 80
TL921	0.117 λ, 51.98 Ω	W = 1.087, L = 8.890	W = 43, L = 350
TL922, TL940	0.009 λ, 28.85 Ω	W = 2.540, L = 0.655	W = 100, L = 26
TL923, TL926, TL942 TL944	0.025 λ, 28.85 Ω	W1 = 2.540, W2 = 2.540, W3 = 1.829	W1 = 100, W2 = 100, W3 = 72
TL924	0.031 λ, 28.85 Ω	W = 2.540, L = 2.286	W = 100, L = 90
TL927, TL929		W = 2.540	W = 100
TL928, TL941	0.086 λ, 28.85 Ω	W = 2.540, L = 6.363	W = 100, L = 251
TL930	0.036 λ, 28.85 Ω	W = 2.540, L = 2.667	W = 100, L = 105
TL932, TL936	0.073 λ, 16.19 Ω	W = 5.182, L = 5.207	W = 204, L = 205
TL933, TL937	0.050 λ, 28.85 Ω	W = 2.540, L = 3.670	W = 100, L = 145
TL934, TL939	0.038 λ, 28.85 Ω	W1 = 2.540, W2 = 2.540, W3 = 2.794	W1 = 100, W2 = 100, W3 = 110
TL935, TL938	0.136 λ, 28.85 Ω	W = 2.540, L = 10.020	W = 100, L = 395
TL943		W1 = 0.003, W2 = 0.003, Offset = –0.001	W1 = 3, W2 = 102, Offset = –50
TL945, TL946	0.036 λ, 14.61 Ω	W1 = 5.842, W2 = 5.842, W3 = 2.540	W1 = 230, W2 = 230, W3 = 100

Reference Circuit (cont.)

Circuit Assembly Information

Test Fixture Part No.	LTN/PTFB241402F

Find Gerber files for this test fixture on the Infineon Web site at *http://www.infineon.com/rfpower*



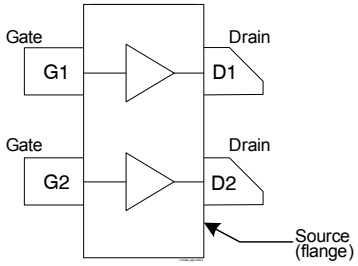
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Suggested Manufacturer	P/N
Input			
C801, C802	Capacitor, 10 µF	Digi-Key	490-3905-6-ND
C803, C804, C805	Capacitor, 1000 pF	Digi-Key	PCC1772CT-ND
C806, C808	Chip capacitor, 1.2 pF	ATC	ATC100A1R2BW150XB
C807	Chip capacitor, 16 pF	ATC	ATC100A160FW150XB
L801, L802	Inductor, 22 nH	Digi-Key	TKS2349CT-ND
R801	Resistor, 1200 Ω	Digi-Key	P1.2KGCT-ND
R802	Resistor, 2000 Ω	Digi-Key	P2.0KECT-ND
R803, R809	Resistor, 10 Ω	Digi-Key	P10ECT-ND
R804	Resistor, 1300 Ω	Digi-Key	P1.3KGCT-ND
R805, R807	Resistor, 3000 Ω	Digi-Key	P3.0KECT-ND
R806, R808	Resistor, 10 Ω	Digi-Key	P10GCT-ND
S1	Voltage Regulator	National Semiconductor	LM7805
S2, S3	Potentiometer, 2k Ω	Digi-Key	3224W-202ECT-ND
S4, S5	EMI filter, 2 - 4 A, 0.1 - 2.2 µF	Murata	NFM18P
S6	Transistor	Infineon Technologies	BCP56
Output			
C901, C902, C904	Chip capacitor, 7.5 pF	ATC	ATC100B7R5BW500XB
C903, C907	Capacitor, 100 µF	Digi-Key	PCE3718CT-ND
C905, C906	Chip capacitor, 2.4 pF	ATC	ATC100A2R4BW150XB
C908, C909	Capacitor, 10 µF	Digi-Key	490-1891-2-ND
S1, S2	EMI filter, 6 A, 1.5 µF	Murata	NFM55P

Pinout Diagram



Lead connections for PTFB241402F

Package Outline Specifications

Package H-37248-4

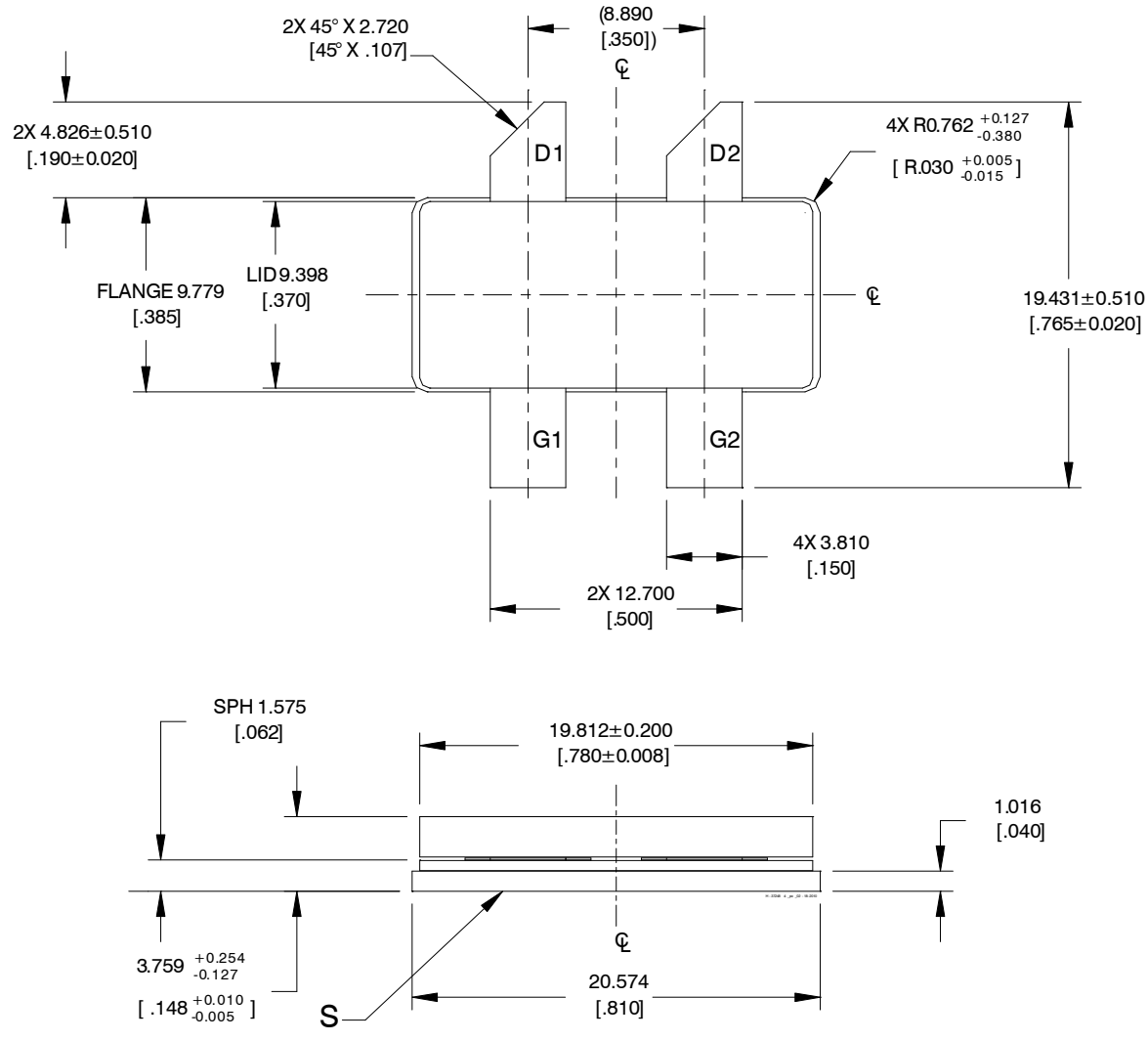


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [.005] unless specified otherwise.
4. Pins: D1, D2 = drains; S = source; G1, G2 = gates.
5. Lead thickness: 0.102 +0.076/–0.025 [0.004+0.003/–0.001].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch] max.

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

Revision History:	2011-04-04	Data Sheet
Previous Version:	2010-04-19, Data Sheet	

Page	Subjects (major changes since last revision)
1	Updated ESD protection feature
3	Removed CW performance at selected drain voltages graph

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Any information within this document that you feel is wrong, unclear or missing at all?
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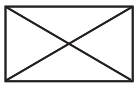

Edition 2011-04-04

Published by
Infineon Technologies AG
81726 Munich, Germany

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