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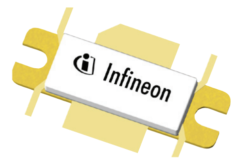
Thermally-Enhanced High Power RF LDMOS FETs
240 W, 1805 – 1880 MHz

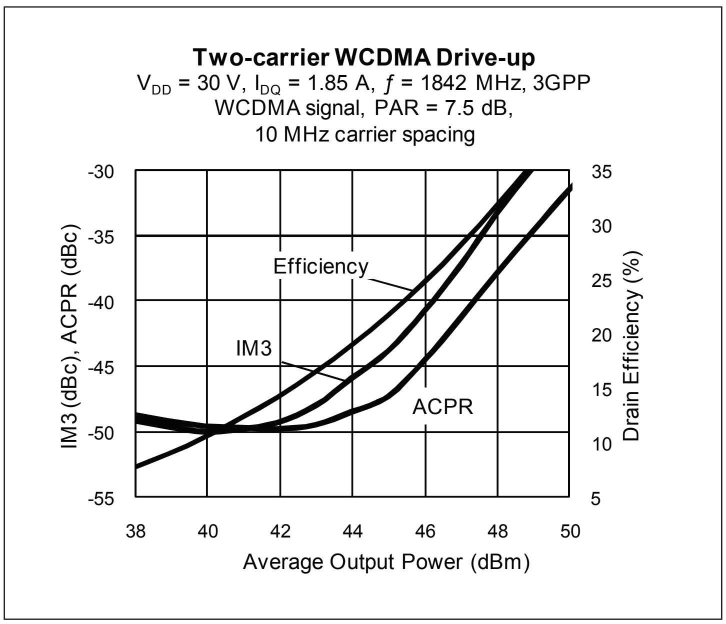
Description

The PTFB182503EL and PTFB182503FL are 240-watt LDMOS FETs intended for use in multi-standard cellular power amplifier applications in the 1805 to 1880 MHz frequency band. Features include input and output matching, high gain, wide signal bandwidth and reduced memory effects for improved DPD correctability. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFB182503EL
H-33288-6



PTFB182503FL
H-34288-4/2



Features

- Broadband internal input and output matching
- Enhanced for use in DPD error correction systems
- Typical two-carrier WCDMA performance, 1880 MHz, 30 V
  - Average output power = 50 W
  - Linear gain = 19 dB
  - Drain efficiency = 28 %
  - Intermodulation distortion = –35 dBc
- Typical CW performance, 1880 MHz, 30 V
  - Output power at P_{1dB} = 240 W
  - Efficiency = 55%
- Increased negative gate-source voltage range for improved performance in Doherty peaking amplifiers
- Integrated ESD protection. Human Body Model, Class 2 (minimum)
- Capable of handling 10:1 VSWR @ 30 V, 240 W (CW) output power
- Pb-free, RoHS compliant

RF Characteristics

Two-carrier WCDMA Specifications (tested in Infineon test fixture)
V_{DD} = 30 V, I_{DQ} = 1.85 A, P_{OUT} = 50 W average
f_1 = 1840 MHz, f_2 = 1845 MHz, 3GPP signal, channel bandwidth = 3.84 MHz , peak/average = 7.5 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	18	19	—	dB
Drain Efficiency	ηD	27	28	—	%
Intermodulation Distortion	IMD	—	–35	–31	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 Specifications (not subject to production test—verified by design/characterization in Infineon test fixture)
V_{DD} = 30 V, I_{DQ} = 1.85 A, P_{OUT} = 220 W PEP, f = 1840 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	18	—	dB
Drain Efficiency	ηD	—	40	—	%
Intermodulation Distortion	IMD	—	–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
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	$R_{DS(on)}$	—	0.03	—	Ω
Operating Gate Voltage	V_{DS} = 30 V, I_{DQ} = 1.85 A	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

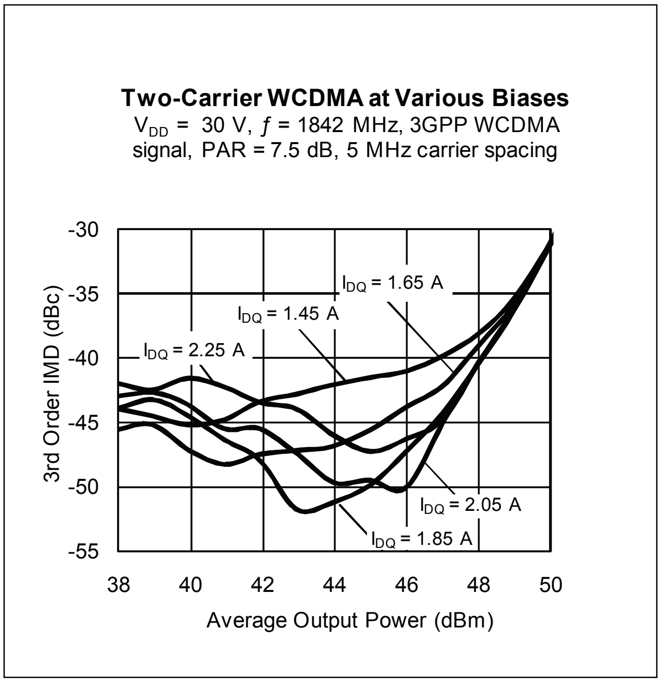
Maximum Ratings

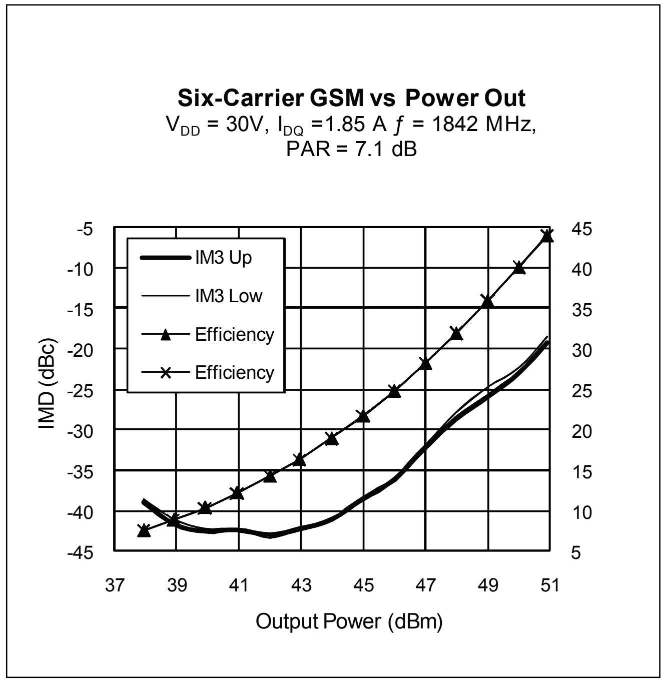
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Operating Voltage	V_{DD}	24 to 30	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 50 W WCDMA)	$R_{\theta JC}$	0.262	°C/W

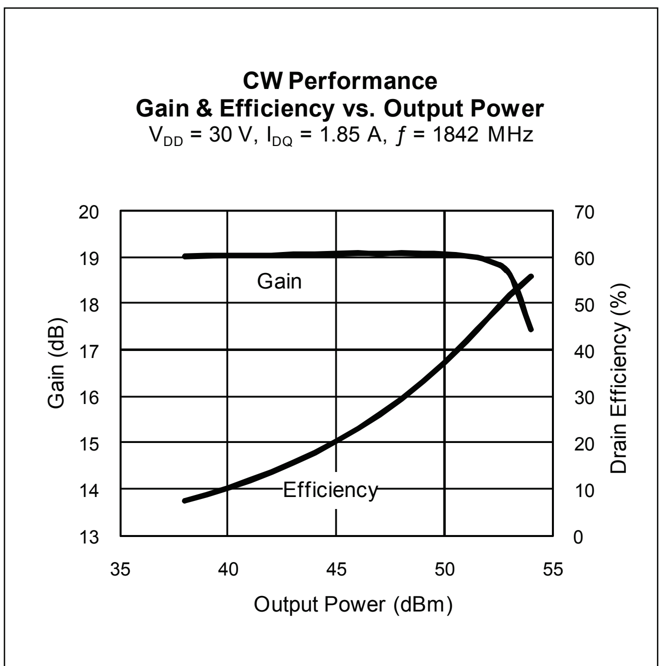
Ordering Information

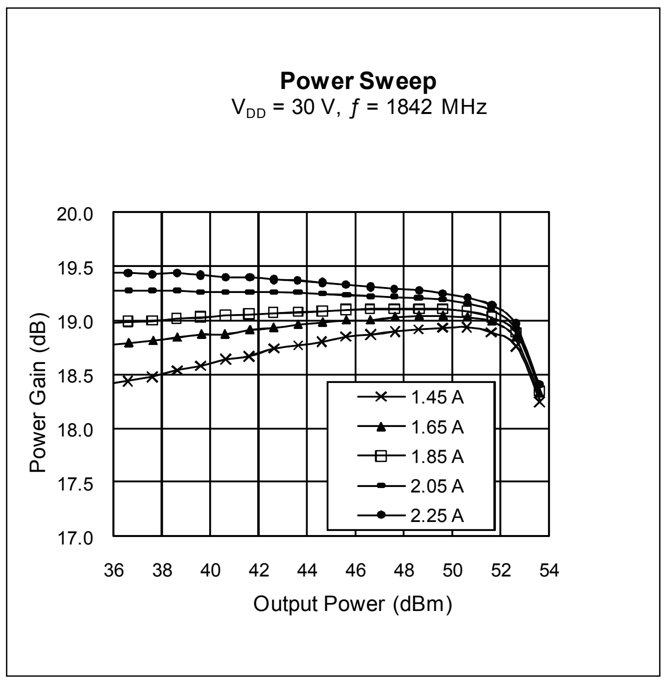
Type and Version	Order Code	Package Description	Shipping
PTFB182503EL V1 R0	PTFB182503ELV1R0XTMA1	H-33288-6, slotted flange	Tape & Reel, 50 pcs
PTFB182503EL V1 R250	PTFB182503ELV1R250XTMA1	H-33288-6, slotted flange	Tape & Reel, 250 pcs
PTFB182503FL V2 R0	PTFB182503FLV2R0XTMA1	H-34288-4/2, earless flange	Tape & Reel, 50 pcs
PTFB182503FL V2 R250	PTFB182503FLV2R250XTMA1	H-34288-4/2, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

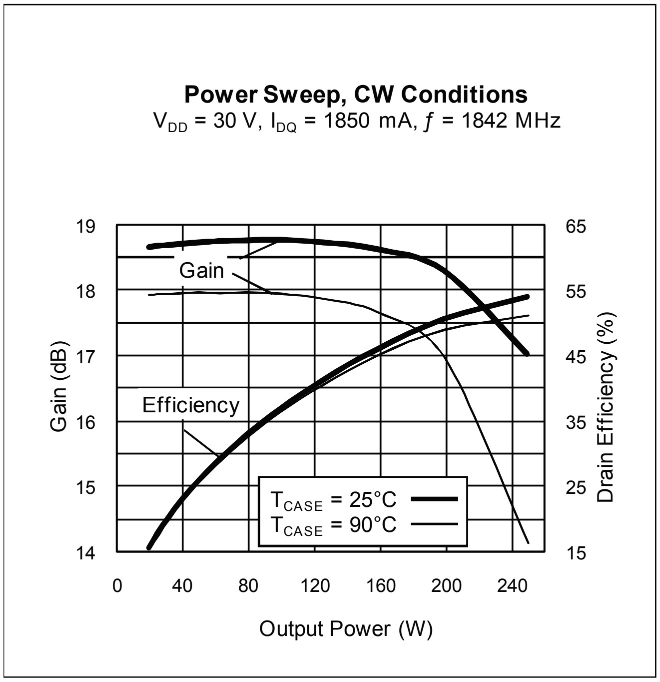


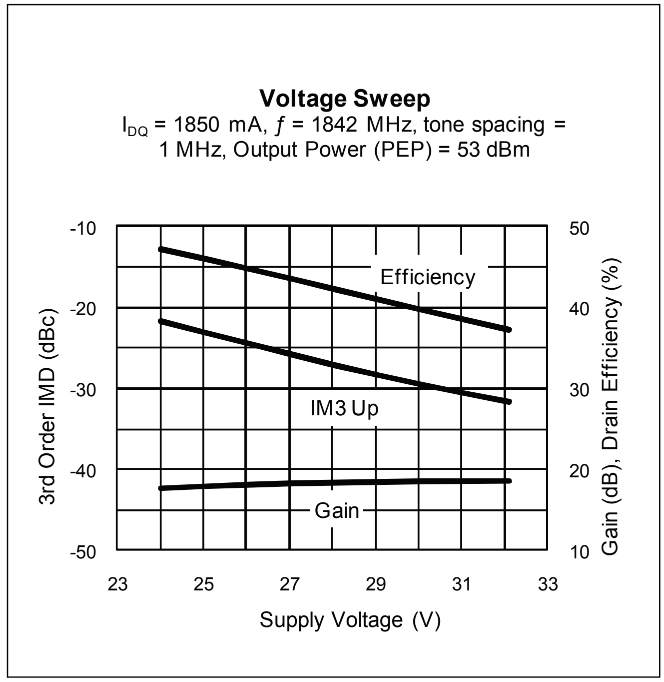




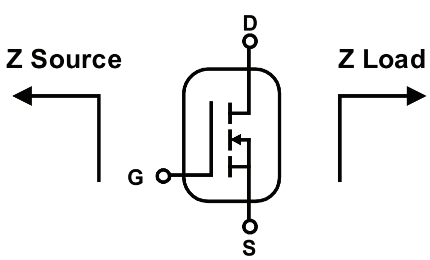


Typical Performance (cont.)

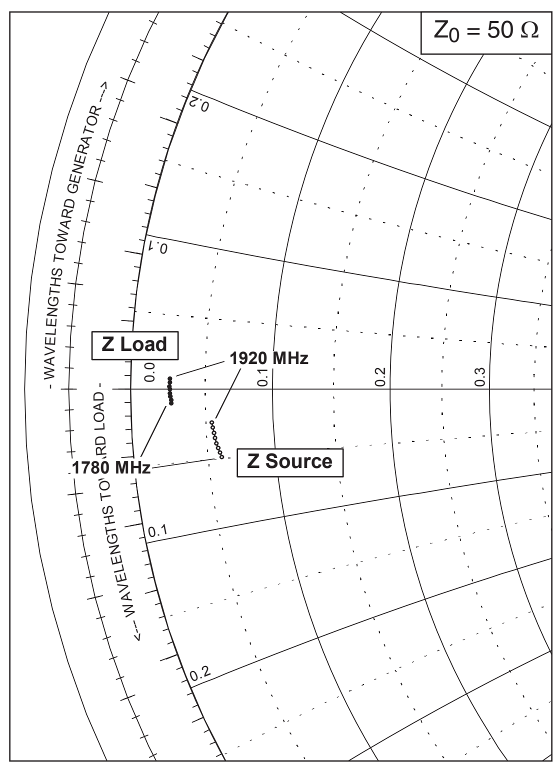




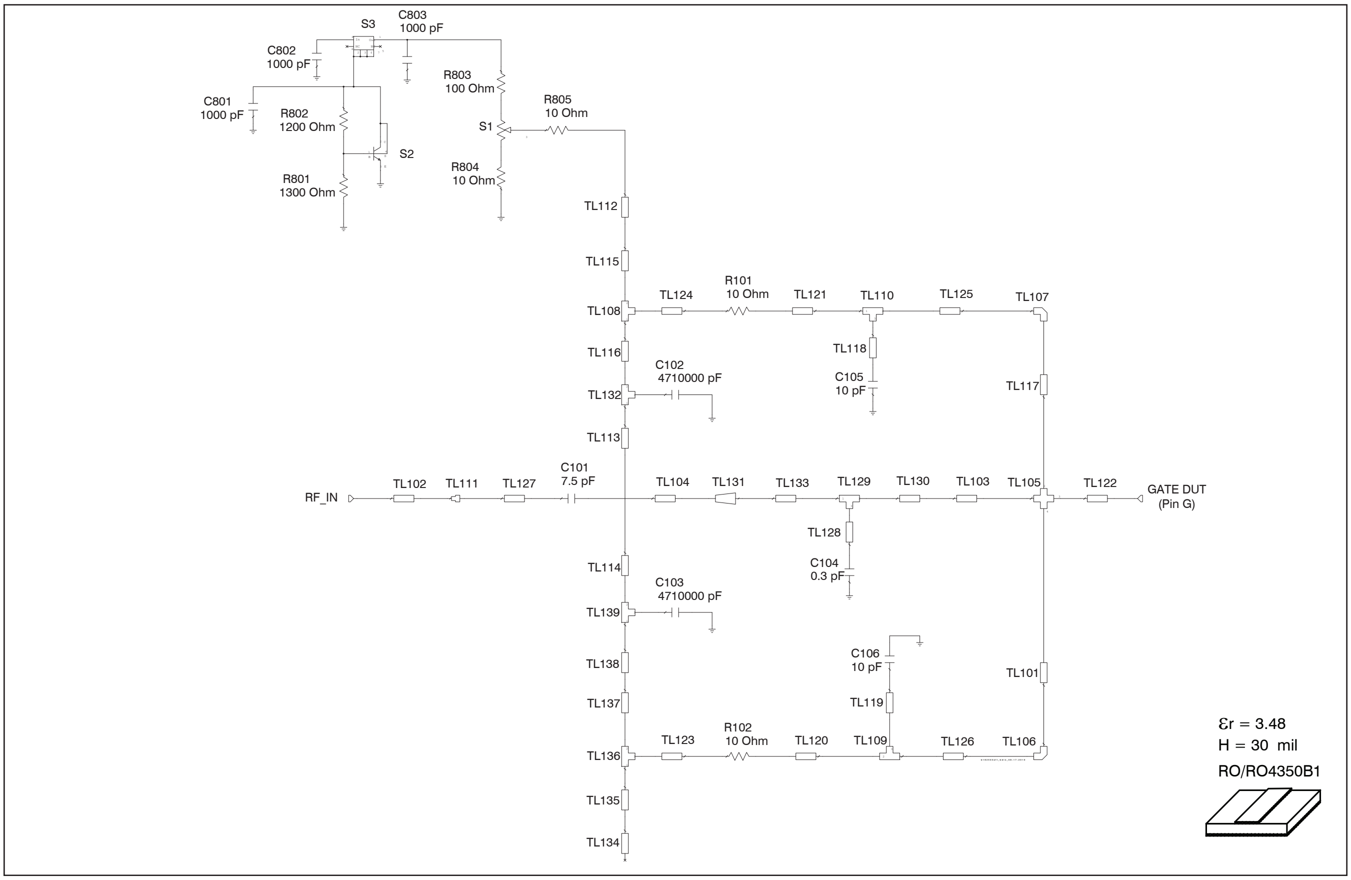
Broadband Circuit Impedance



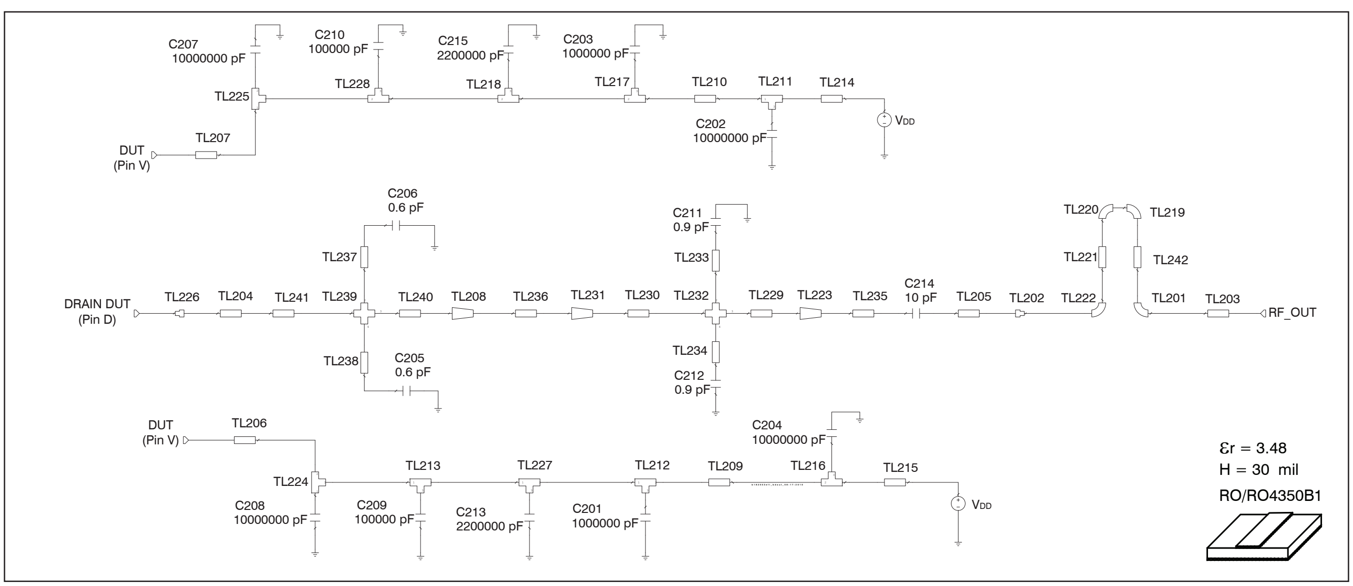
Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1780	2.99	–2.48	1.33	–0.49
1800	2.95	–2.30	1.33	–0.38
1820	2.89	–2.13	1.31	–0.27
1840	2.84	–1.96	1.29	–0.16
1860	2.80	–1.76	1.29	–0.02
1880	2.78	–1.58	1.28	0.10
1900	2.74	–1.39	1.29	0.23
1920	2.72	–1.21	1.29	0.36



Reference Circuit



Reference circuit input schematic for ƒ = 1880 MHz



Reference circuit output schematic for ƒ = 1880 MHz

Reference Circuit (cont.)

Description	
DUT	PTFB182503EL or PTFB182503FL
PCB	0.76 mm [.030"] thick, εr = 3.48, Rogers 4350, 1 oz. copper

Electrical Characteristics at 1880 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101, TL117	0.022 λ, 78.27 Ω	W = 0.762, L = 2.159	W = 30, L = 85
TL102	0.035 λ, 51.58 Ω	W = 1.651, L = 3.358	W = 65, L = 132
TL103	0.050 λ, 9.67 Ω	W = 13.970, L = 4.445	W = 550, L = 175
TL104	0.031 λ, 51.58 Ω	W = 1.651, L = 3.018	W = 65, L = 119
TL105		W1 = 13.970, W2 = 0.762, W3 = 13.970, W4 = 0.762	W1 = 550, W2 = 30, W3 = 550 W4 = 30
TL106, TL107		W = 0.762	W = 30
TL108, TL136	0.010 λ, 68.02 Ω	W1 = 1.016, W2 = 1.016, W3 = 1.016	W1 = 40, W2 = 40, W3 = 40
TL109, TL110, TL132, TL139	0.010 λ, 78.27 Ω	W1 = 0.762, W2 = 0.762, W3 = 1.016	W1 = 30, W2 = 30, W3 = 40
TL111		W1 = 1.651, W2 = 2.032	W1 = 65, W2 = 80
TL112, TL134	0.014 λ, 38.82 Ω	W = 2.540, L = 1.321	W = 100, L = 52
TL113	0.020 λ, 78.27 Ω	W = 0.762, L = 2.007	W = 30, L = 79
TL114	0.099 λ, 92.53 Ω	W = 0.508, L = 9.957	W = 20, L = 392
TL115	0.016 λ, 68.02 Ω	W = 1.016, L = 1.524	W = 40, L = 60
TL116, TL137	0.017 λ, 78.27 Ω	W = 0.762, L = 1.727	W = 30, L = 68
TL118, TL119	0.001 λ, 68.02 Ω	W = 1.016, L = 0.127	W = 40, L = 5
TL120, TL121	0.013 λ, 78.27 Ω	W = 0.762, L = 1.270	W = 30, L = 50
TL122	0.022 λ, 9.67 Ω	W = 13.970, L = 1.981	W = 550, L = 78
TL123, TL124	0.007 λ, 68.02 Ω	W = 1.016, L = 0.686	W = 40, L = 27
TL125, TL126	0.118 λ, 78.27 Ω	W = 0.762, L = 11.684	W = 30, L = 460
TL127	0.008 λ, 45.17 Ω	W = 2.032, L = 0.762	W = 80, L = 30
TL128	0.000 λ, 45.17 Ω	W = 2.032, L = 0.025	W = 80, L = 1
TL129	0.023 λ, 9.67 Ω	W1 = 13.970, W2 = 13.970, W3 = 2.032	W1 = 550, W2 = 550, W3 = 80
TL130	0.000 λ, 9.67 Ω	W = 13.970, L = 0.025	W = 550, L = 1
TL131 (taper)	0.028 λ, 9.67 Ω / 51.58 Ω	W1 = 13.970, W2 = 1.651, L = 2.515	W1 = 550, W2 = 65, L = 99
TL133	0.050 λ, 9.67 Ω	W = 13.970, L = 4.470	W = 550, L = 176
TL135	0.015 λ, 68.02 Ω	W = 1.016, L = 1.514	W = 40, L = 60
TL138	0.010 λ, 78.27 Ω	W = 0.762, L = 0.991	W = 30, L = 39

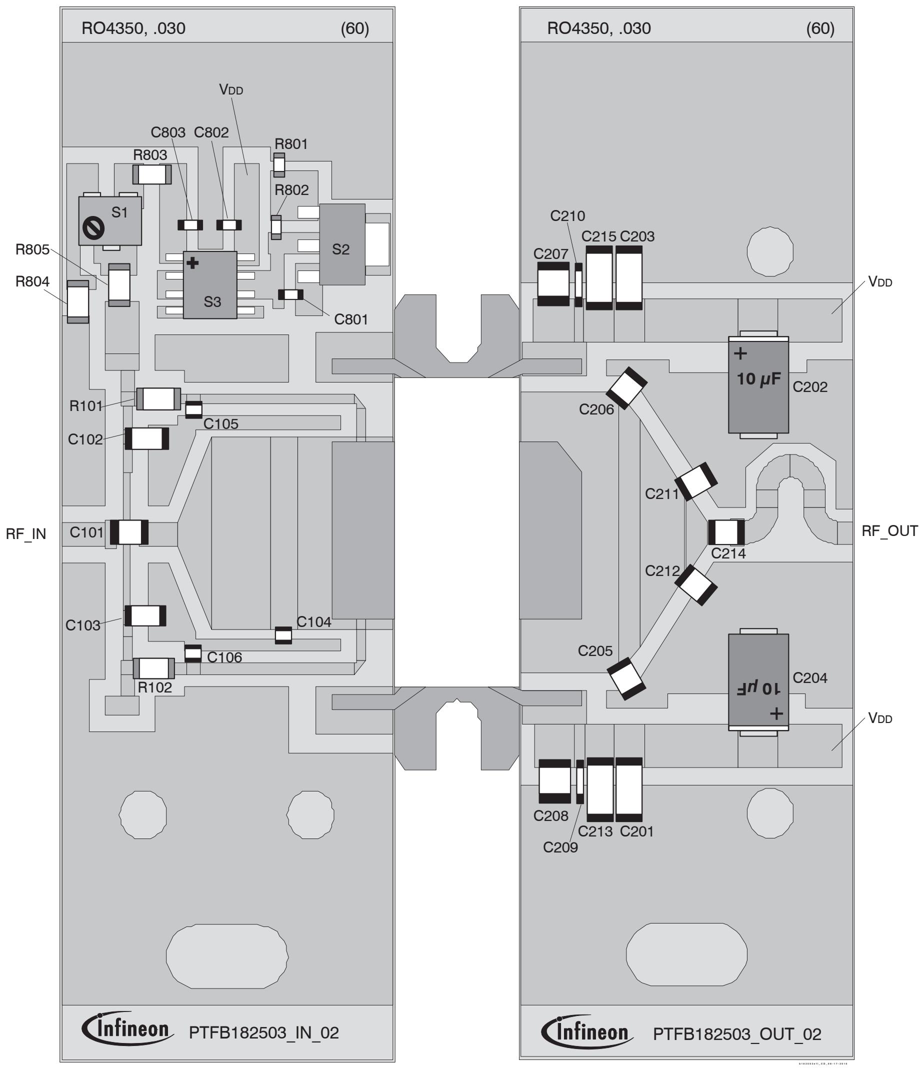
table continued on page 7

Reference Circuit (cont.)

Electrical Characteristics at 1880 MHz			
Transmission Line	**Electrical Characteristics**	**Dimensions: mm**	**Dimensions: mils**
Output			
TL201, TL219, TL220, TL222		W = 0.002, ANG = 90.000, R = 0.002	W = 2, ANG = 3543307, R = 70
TL202		W1 = 1.651, W2 = 2.032	W1 = 65, W2 = 80
TL203	0.012 λ, 51.58 Ω	W = 1.651, L = 1.118	W = 65, L = 44
TL204	0.084 λ, 6.86 Ω	W = 20.320, L = 7.366	W = 800, L = 290
TL205	0.011 λ, 45.17 Ω	W = 2.032, L = 1.016	W = 80, L = 40
TL206	0.028 λ, 23.60 Ω	W = 4.928, L = 2.540	W = 194, L = 100
TL207	0.028 λ, 23.79 Ω	W = 4.877, L = 2.540	W = 192, L = 100
TL208 (taper)	0.018 λ, 6.86 Ω / 8.31 Ω	W1 = 20.320, W2 = 16.510, L = 1.575	W1 = 800, W2 = 650, L = 62
TL209, TL210	0.076 λ, 34.08 Ω	W = 3.048, L = 7.112	W = 120, L = 280
TL211, TL216, TL224, TL225	0.032 λ, 34.08 Ω	W1 = 3.048, W2 = 3.048, W3 = 3.048	W1 = 120, W2 = 120, W3 = 120
TL212, TL228, TL217, TL218, TL227	0.024 λ, 34.08 Ω	W1 = 3.048, W2 = 3.048, W3 = 2.286	W1 = 120, W2 = 120, W3 = 90
TL213	0.008 λ, 34.08 Ω	W1 = 3.048, W2 = 3.048, W3 = 0.762	W1 = 120, W2 = 120, W3 = 30
TL214, TL215	0.051 λ, 34.08 Ω	W = 3.048, L = 4.826	W = 120, L = 190
TL221, TL242	0.013 λ, 51.58 Ω	W = 1.651, L = 1.270	W = 65, L = 50
TL223 (taper)	0.018 λ, 19.45 Ω / 51.58 Ω	W1 = 6.248, W2 = 1.651, L = 1.651	W1 = 246, W2 = 65, L = 65
TL226		W1 = 12.700, W2 = 17.780	W1 = 500, W2 = 700
TL229, TL230	0.000 λ, 19.45 Ω	W = 6.248, L = 0.025	W = 246, L = 1
TL231 (taper)	0.038 λ, 8.31 Ω / 19.45 Ω	W1 = 16.510, W2 = 6.248, L = 3.378	W1 = 650, W2 = 246, L = 133
TL232		W1 = 6.248, W2 = 0.025 , W3 = 6.248, W4 = 0.025	W1 = 246, W2 = 1, W3 = 246, W4 = 1
TL233, TL234, TL237, TL238	0.000 λ, 146.88 Ω	W = 0.025, L = 0.025	W = 1, L = 1
TL235	0.005 λ, 51.58 Ω	W = 1.651, L = 0.508	W = 65, L = 20
TL236 TL239	0.000 λ, 8.31 Ω	W = 16.510, L = 0.025 W1 = 20.320, W2 = 0.025, W3 = 20.320 W4 = 0.025	W = 650, L = 1 W1 = 800, W2 = 1, W3 = 800, W4 = 1
TL240, TL241	0.000 λ, 6.86 Ω	W = 20.320, L = 0.025	W = 800, L = 1

Reference Circuit (cont.)

Circuit Assembly Information	
Test Fixture Part No.	LTN/PTFB182503EF
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.)

Component	Description	Suggested Manufacturer	P/N
Input			
C101	Chip capacitor, 7.5 pF	ATC	ATC100B7R5BW500XB
C102, C103	Chip capacitor, 4.71 µF	ATC	493-2372-2-ND
C104	Chip capacitor, 0.3 pF	ATC	ATC100A0R3BW150XB
C105, C106	Chip capacitor, 10 pF	ATC	ATC100A100FW150XB
C801, C802, C803	Capacitor, 1000 pF	Digi-Key	PCC1772CT-ND
R101, R102, R804, R805	Resistor, 10 Ω	Digi-Key	P10ECT-ND
R801	Resistor, 1300 Ω	Digi-Key	P1.3KGCT-ND
R802	Resistor, 1200 Ω	Digi-Key	P1.2KGCT-ND
R803	Resistor, 100 Ω	Digi-Key	P100ECT-ND
S1	Potentiometer, 2k Ω	Digi-Key	3224W-202ECT-ND
S2	Transistor	Digi-Key	BCP5616TA-ND
S3	Voltage Regulator	Digi-Key	LM78L05ACM-ND

Output			
C201, C203	Chip capacitor, 0.1 µF	Digi-Key	445-1411-2-ND
C202, C204	Capacitor, 10 µF	Garrett Electronics	281M5002106K
C205, C206	Chip capacitor, 0.6 pF	ATC	ATC100B0R6BW500XB
C207, C208	Chip capacitor, 10 µF	Digi-Key	587-1818-2-ND
C209, C210	Chip capacitor, 0.1 µF	Digi-Key	399-1267-2-ND
C211, C212	Chip capacitor, 0.9 pF	ATC	ATC100B0R9BW500XB
C213, C215	Chip capacitor, 2.2 µF	Digi-Key	445-1447-2-ND
C214	Chip capacitor, 10 pF	ATC	ATC100B100FW500XB

Package Outline Specifications

Package H-33288-6

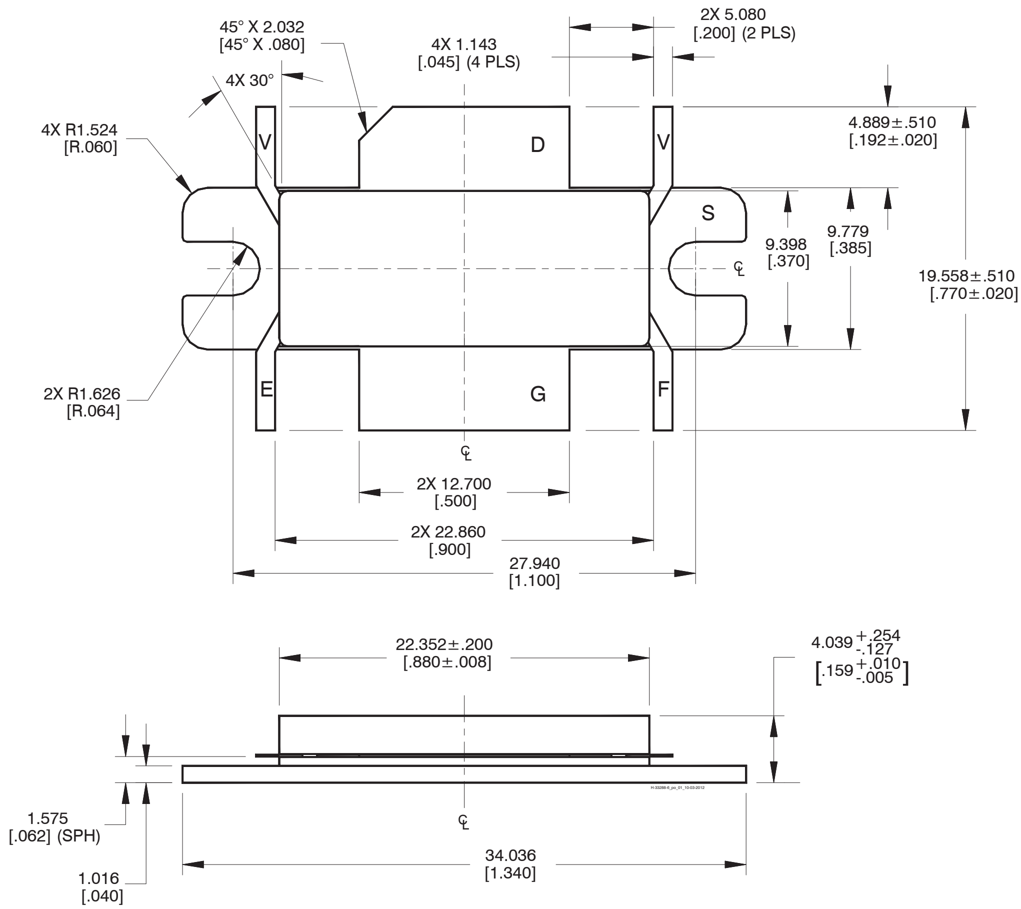


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ±0.127 [0.005] unless specified otherwise.
4. Pins: D – drain; G – gate; S – source; V – V_{DD}; E, F – N.C.
5. Lead thickness: 0.10 + 0.051/–0.025 mm [0.004 + 0.002/–0.001 inch].
6. Gold plating thickness: 0.25 micron [10 microinch] max.

Package Outline Specifications (cont.)

Package H-34288-4/2

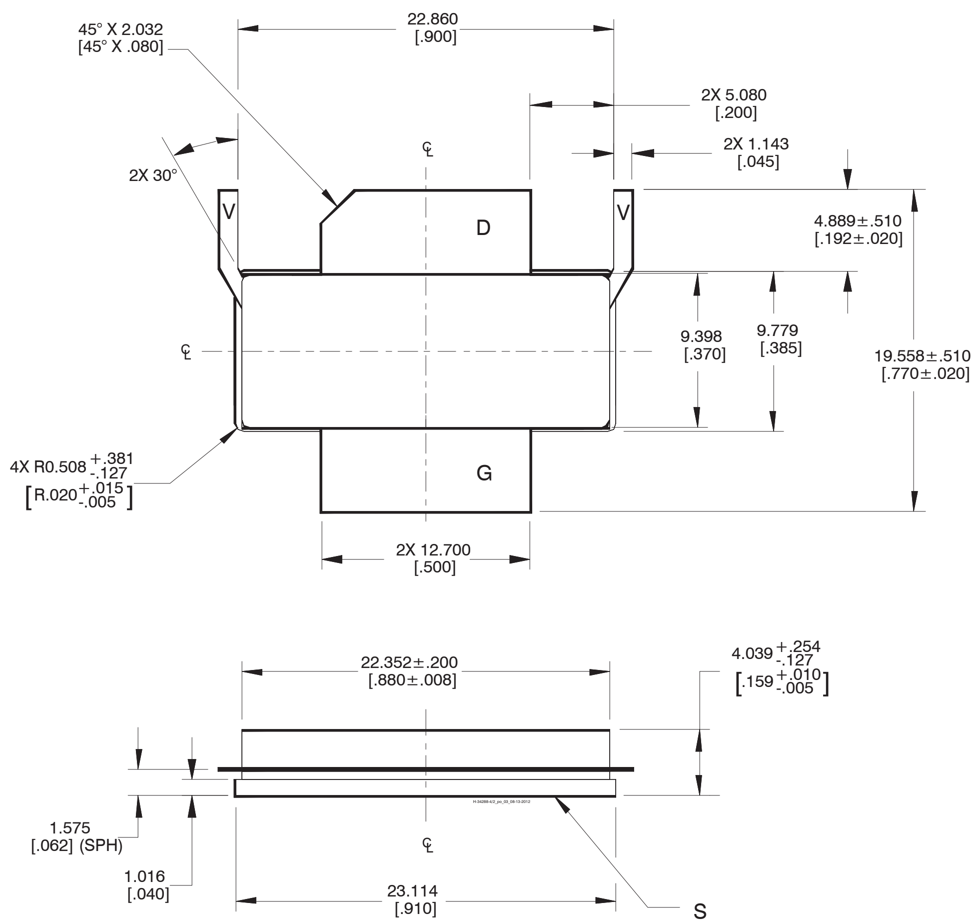


Diagram Notes—unless otherwise specified:

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6. Gold plating thickness: 0.25 micron [10 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: 2016-06-10 Data Sheet

Previous Version: 2013-08-06, Data Sheet

Page	Subjects (major changes since last revision)
2	Updated ordering code to R0

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Edition 2016-06-10

Published by
Infineon Technologies AG
81726 Munich, Germany

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