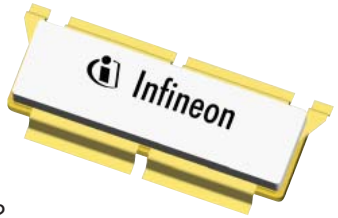
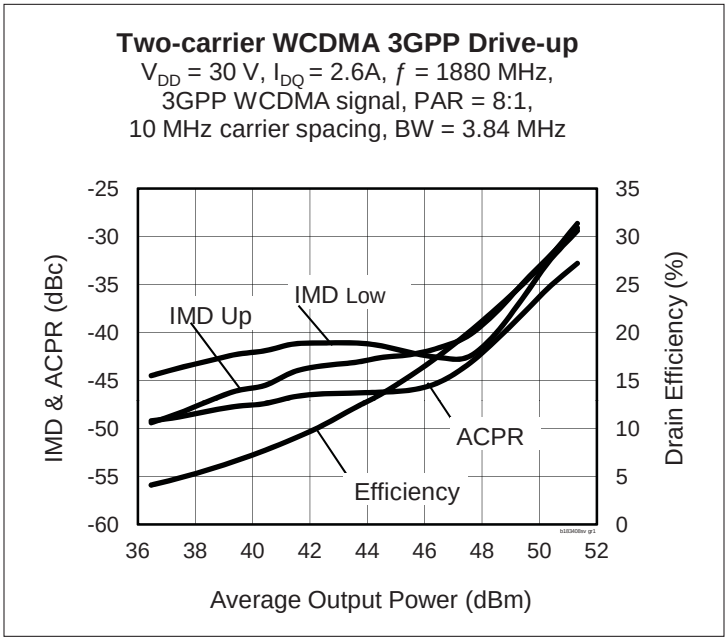
High Power RF LDMOS Field Effect Transistor
340 W, 30 V, 1805 – 1880 MHz

Description

The PTFB183408SV is a 340-watt LDMOS FET 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 and thermally-enhanced package with earless flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTFB183408SV
Package H-37275G-6/2



Features

- Broadband internal input and output matching
- Wide video bandwidth
- Typical single-carrier WCDMA performance, 1880 MHz, 30 V
  - Output power = 125 W
  - Efficiency = 31%
  - Gain = 17 dB
  - PAR = 5.5 dB @ 0.01% CCDF probability
  - ACPR @ 5 MHz = –37 dBc
- Increased negative gate-source voltage range for improved performance in Doherty amplifiers
- Capable of handling 10:1 VSWR @ 30 V, 300 W (CW) output power
- Integrated ESD protection
- Excellent thermal stability
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Measurements (device with straight leads, combined outputs—tested in Infineon test fixture)
V_{DD} = 30 V, I_{DQ} = 2.65 A, P_{OUT} = 80 W average, f = 1880 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16	17	—	dB
Drain Efficiency	η_D	24	25.5	—	%
Intermodulation Distortion	IMD	—	–35	–34	dBc

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics (cont.)

Single-carrier WCDMA Specifications (not subject to production test – verified by design / characterization in Infineon test fixture)

V_{DD} = 30 V, I_{DQ} = 2.6 A, IQ clipping, channel bandwidth = 3.84 MHz, Input signal PAR = 7.5 dB @ 0.01% CCDF probability

Characteristic	Conditions	Symbol	1805 MHz (Typ)	1842 MHz (Typ)	1880 MHz (Typ)	Unit
Gain	P_{OUT} (AVG) = 49 dBm	G_{ps}	17.1	17.3	17.5	dB
	P_{OUT} (AVG) = 51 dBm		17.0	17.15	17.4	
Drain Efficiency	P_{OUT} (AVG) = 49 dBm	η_D	25	24.5	24	%
	P_{OUT} (AVG) = 51 dBm		31	30	30	
Output PAR at 0.01%	P_{OUT} (AVG) = 49 dBm	dB	6.5	6.5	6.5	dB
	P_{OUT} (AVG) = 51 dBm		5.5	5.5	5.5	
Adjacent Channel Power Ratio	P_{OUT} (AVG) = 49 dBm	ACPR	–43	–42.5	–41	dBc
	P_{OUT} (AVG) = 51 dBm		–36	–35	–34	

Two-tone Specifications (not subject to production test – verified by design / characterization in Infineon test fixture)
V_{DD} = 30 V, I_{DQ} = 2.6 A, P_{OUT} = 310 W PEP, f = 1880 MHz, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	17.5	—	dB
Drain Efficiency	η_D	—	35	—	%
Intermodulation Distortion	IMD	—	30	—	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	$R_{DS(on)}$	—	0.05	—	Ω
Operating Gate Voltage	V_{DS} = 30 V, I_{DQ} = 2.6 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

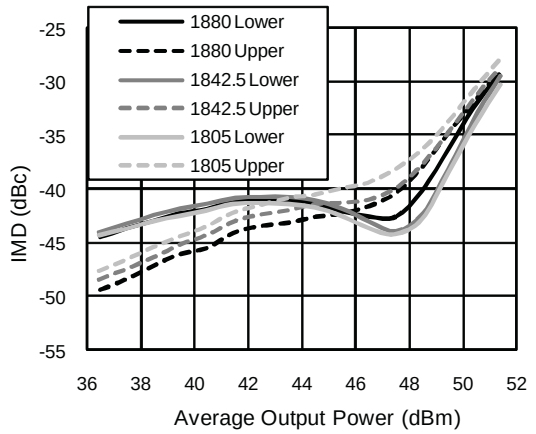
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 340 W CW)	$R_{\theta JC}$	0.2	°C/W

Ordering Information

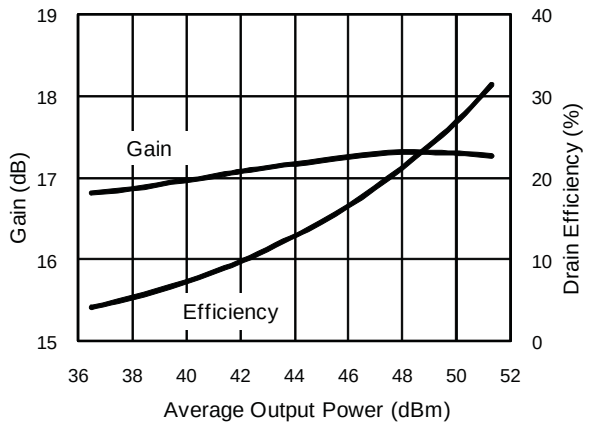
Type and Version	Order Code	Package Description	Shipping
PTFB183408SV V2 R250	PTFB183408SVV2R250XTMA1	H-37275G-6/2, ceramic open-cavity, formed leads	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

Two-carrier WCDMA 3GPP Drive-up
V_{DD} = 30 V, I_{DQ} = 2.6 A, 3GPP WCDMA, PAR = 8:1, 10 MHz carrier spacing, BW = 3.84 MHz



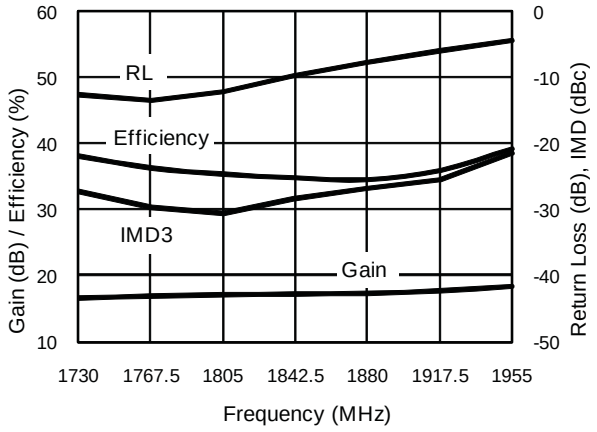
Two-carrier WCDMA 3GPP
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1880 MHz, 3GPP WCDMA, PAR = 8:1, 10 MHz carrier spacing, BW = 3.84MHz



Typical Performance (cont.)

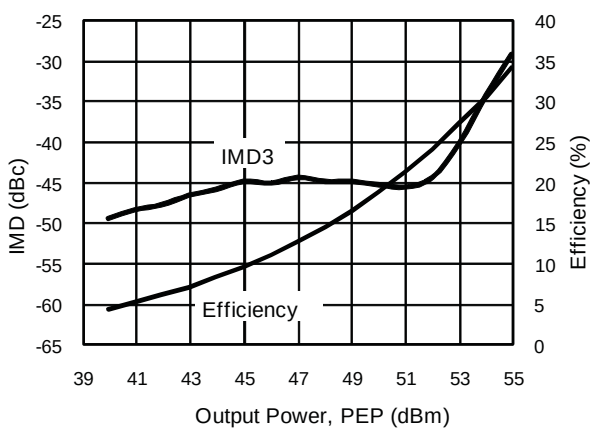
Two-tone Broadband
Gain, Efficiency & Return Loss
vs. Frequency

V_{DD} = 30 V, I_{DQ} = 2.6 A, P_{OUT} = 170 W



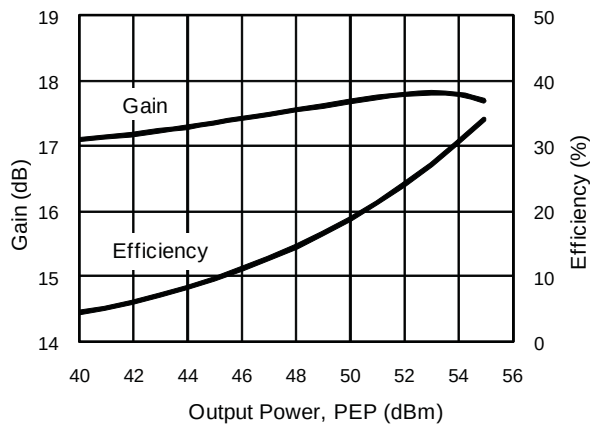
Two-tone Drive-up

V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1880 MHz, f_2 = 1879 MHz



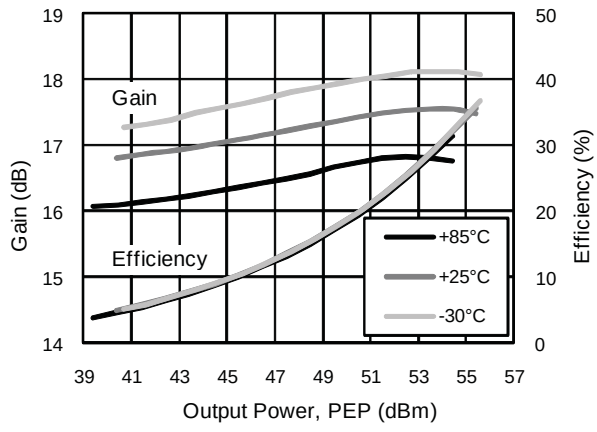
Two-tone Drive-up

V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1880 MHz, f_2 = 1879 MHz



Two-tone Drive-up (over temp)

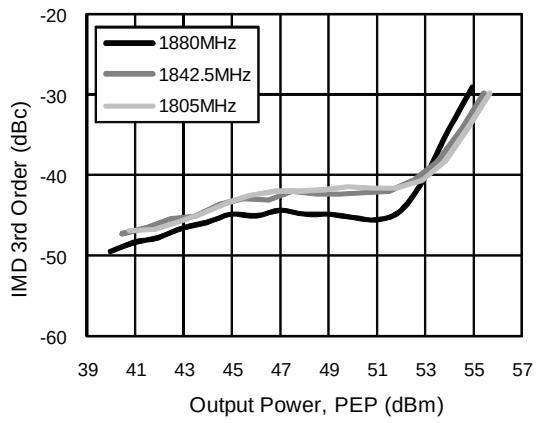
(P_{OUT}-max 3rd order IMD @ -30dBc)
V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1842.5 MHz, f_2 = 1841.5 MHz



Typical Performance (cont.)

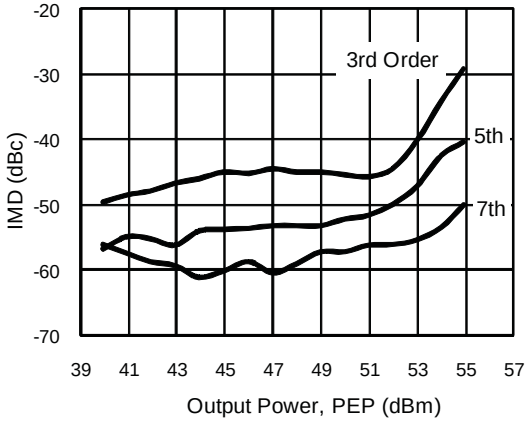
Two-tone Drive-up at Selected Frequencies

V_{DD} = 30 V, I_{DQ} = 2.6 A, tone spacing = 1 MHz



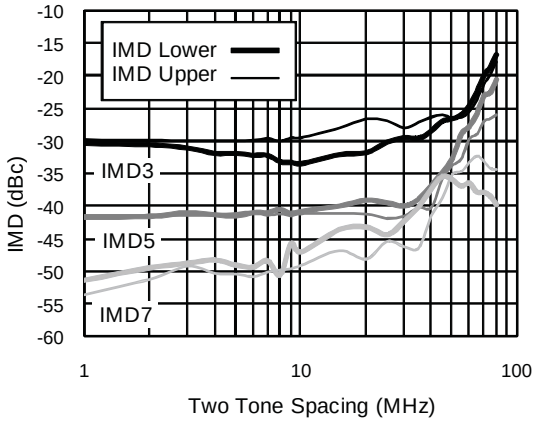
Intermodulation Distortion vs. Output Power

V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1880 MHz, f_2 = 1879 MHz



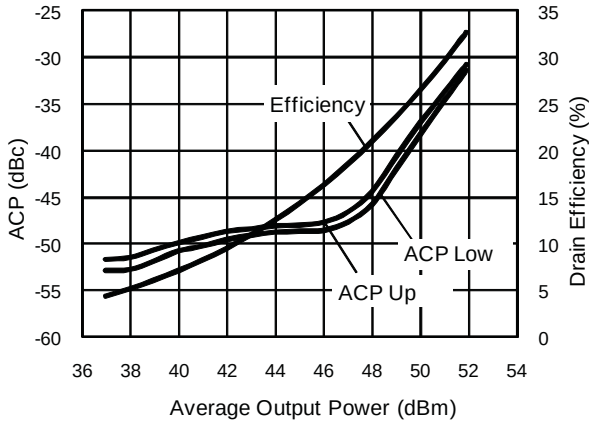
Intermodulation Distortion vs. Tone Spacing

f = 1842.5 MHz, P_{OUT} = 330 W (PEP),
V_{DD} = 30 V, I_{DQ} = 2.6 A



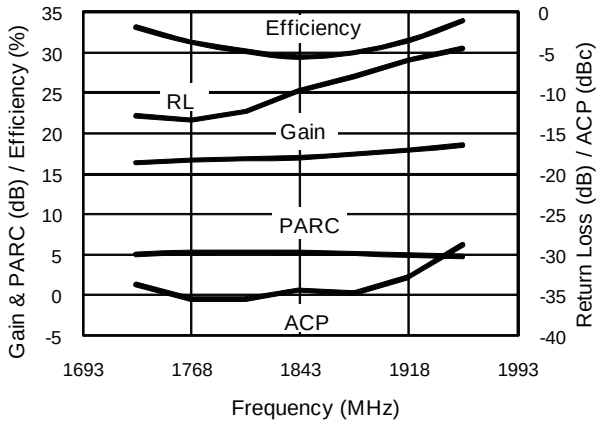
Single-carrier Drive-up, 1880 MHz

V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1880 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz

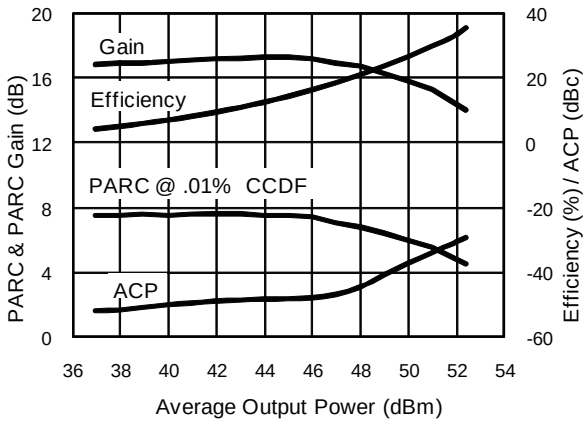


Typical Performance (cont.)

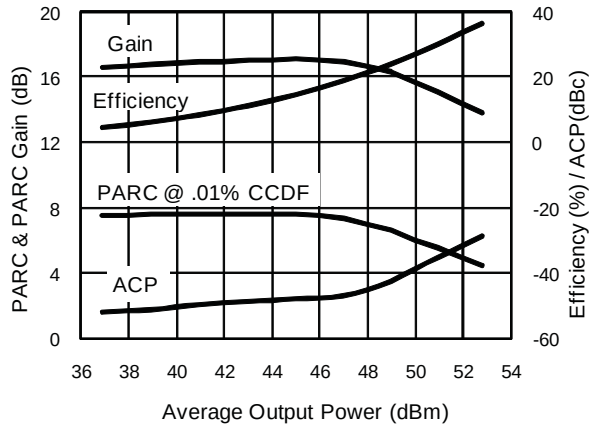
Single-carrier Broadband Performance
V_{DD} = 30 V, I_{DQ} = 2.6 A, P_{OUT} = 125 W



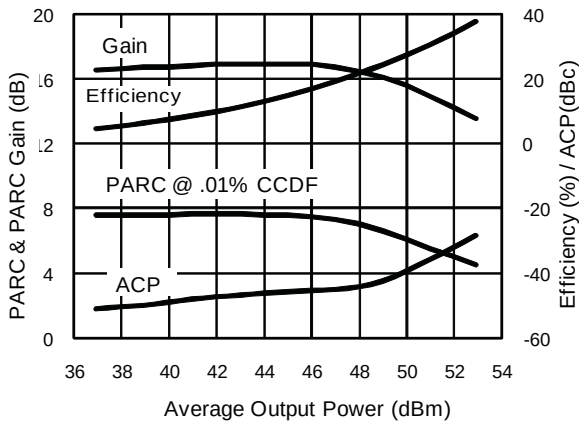
Single-carrier Drive-up, 1880 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1880 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



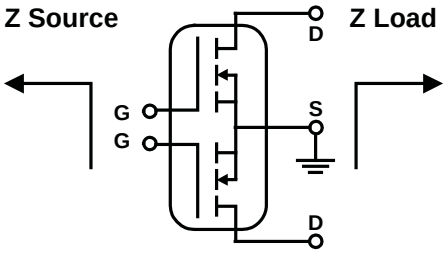
Single-carrier Drive-up, 1842 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1842 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



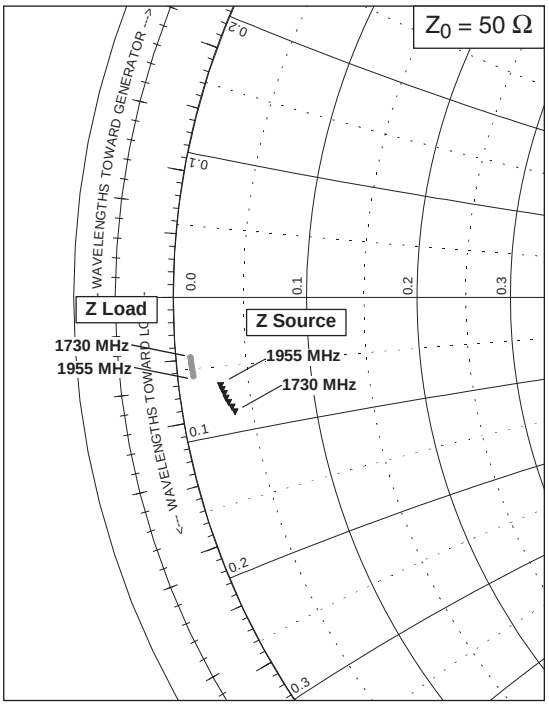
Single-carrier Drive-up, 1805 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1805 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



Broadband Circuit Impedance (combined leads)

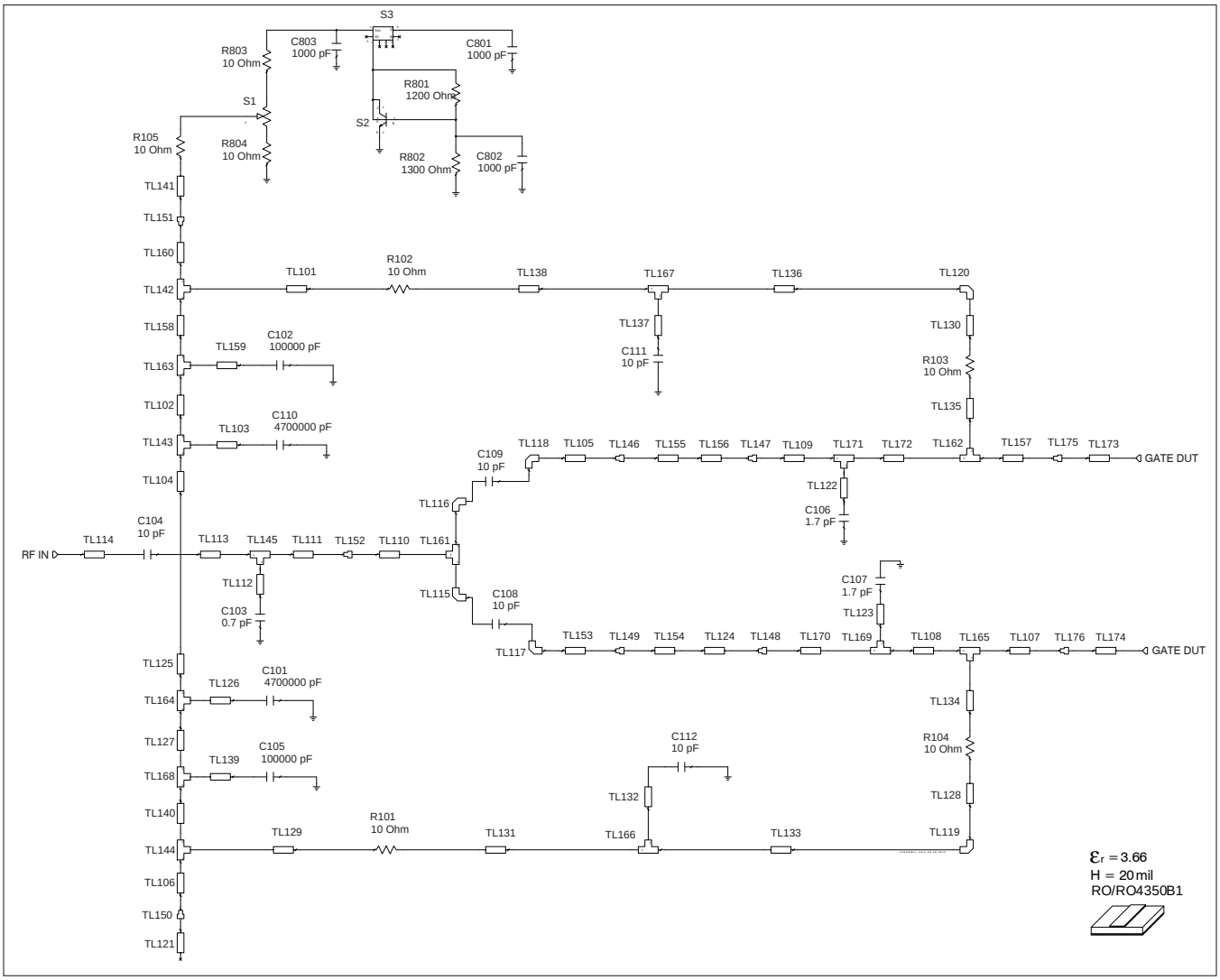


Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1730	1.86	–4.25	0.55	–2.78
1768	1.77	–4.06	0.54	–2.66
1805	1.68	–3.88	0.53	–7.54
1843	1.61	–3.70	0.52	–2.43
1880	1.56	–3.53	0.51	–2.32
1918	1.51	–3.37	0.51	–2.21
1955	1.47	–3.22	0.5	–2.11



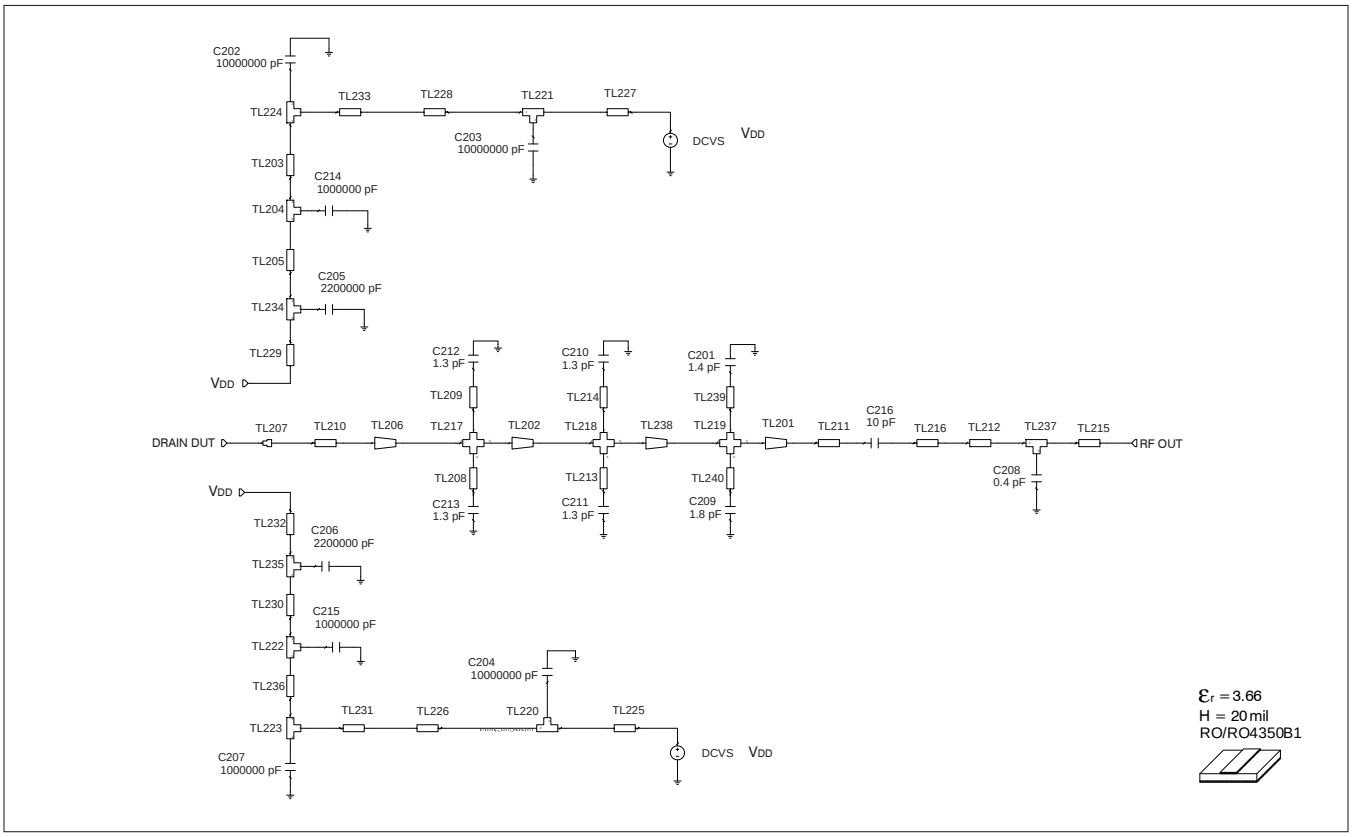
See next page for reference circuit information

Reference Circuit



Reference circuit input schematic for ƒ = 1880 MHz

Reference Circuit (cont.)



Reference circuit output schematic for ƒ = 1880 MHz

Reference Circuit (cont.)

Reference Circuit Assembly

DUT	PTFB183408SV
Test Fixture Part No.	LTN/PTFB183408SV
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, ε_r = 3.66

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

Electrical Characteristics at 1880 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101, TL129	0.017 λ, 53.11 Ω	W = 1.02, L = 1.65	W = 40, L = 65
TL102, TL127	0.002 λ, 62.65 Ω	W = 0.76, L = 0.20	W = 30, L = 8
TL103, TL139, TL126, TL159	0 λ, 40.91 Ω	W = 1.52, L = 0.03	W = 60, L = 1
TL104	0.212 λ, 62.65 Ω	W = 0.76, L = 20.20	W = 30, L = 799
TL105, TL153	0.008 λ, 28.26 Ω	W = 2.54, L = 0.76	W = 100, L = 30
TL106	0.005 λ, 62.65 Ω	W = 0.76, L = 0.51	W = 30, L = 20
TL107, TL157	0.018 λ, 7.86 Ω	W = 11.43, L = 5.36	W = 450, L = 211
TL108, TL172	0.004 λ, 7.86 Ω	W = 11.43, L = 0.34	W = 450, L = 13
TL109, TL170	0.002 λ, 7.86 Ω	W = 11.43, L = 0.20	W = 450, L = 8
TL110	0.022 λ, 31.94 Ω	W = 2.16, L = 2.03	W = 85, L = 80
TL111	0.029 λ, 48.71 Ω	W = 1.17, L = 2.71	W = 46, L = 107
TL112	0 λ, 62.65 Ω	W = 0.76, L = 0.03	W = 30, L = 1
TL113	0.016 λ, 48.71 Ω	W = 1.17, L = 1.55	W = 46, L = 61
TL114	0.029 λ, 48.71 Ω	W = 1.17, L = 2.743	W = 46, L = 108
TL121, TL141	0.014 λ, 33.39 Ω	W = 2.03, L = 1.27	W = 80, L = 50
TL122, TL123	0 λ, 62.65 Ω	W = 0.76, L = 0.00	W = 30, L = 0
TL124, TL156	0.014 λ, 16.84 Ω	W = 4.83, L = 1.27	W = 190, L = 50
TL125	0.013 λ, 62.65 Ω	W = 0.76, L = 1.27	W = 30, L = 50
TL128, TL130	0.013 λ, 53.11 Ω	W = 1.02, L = 1.26	W = 40, L = 50
TL131, TL138	0.015 λ, 53.11 Ω	W = 1.02, L = 1.40	W = 40, L = 55
TL132, TL137	0 λ, 33.39 Ω	W = 2.03, L = 0.03	W = 80, L = 1
TL133, TL136	0.080 λ, 53.11 Ω	W = 1.02, L = 7.62	W = 40, L = 300
TL134, TL135	0.008 λ, 53.11 Ω	W = 1.02, L = 0.76	W = 40, L = 30
TL140, TL158	0.015 λ, 62.65 Ω	W = 0.76, L = 1.42	W = 30, L = 56
TL142, TL144	0.011 λ, 62.65 Ω	W1 = 0.76, W2 = 0.76, W3 = 1.02	W1 = 30, W2 = 30, W3 = 40
TL143, TL168, TL163, TL164	0.016 λ, 62.65 Ω	W1 = 0.76, W2 = 0.76, W3 = 1.52	W1 = 30, W2 = 30, W3 = 60
TL145	0.008 λ, 48.71 Ω	W1 = 1.17, W2 = 1.17, W3 = 0.76	W1 = 46, W2 = 46, W3 = 30
TL154, TL155	0.006 λ, 16.84 Ω	W = 4.83, L = 0.51	W = 190, L = 20
TL160	0.004 λ, 62.65 Ω	W = 0.76, L = 0.40	W = 30, L = 16

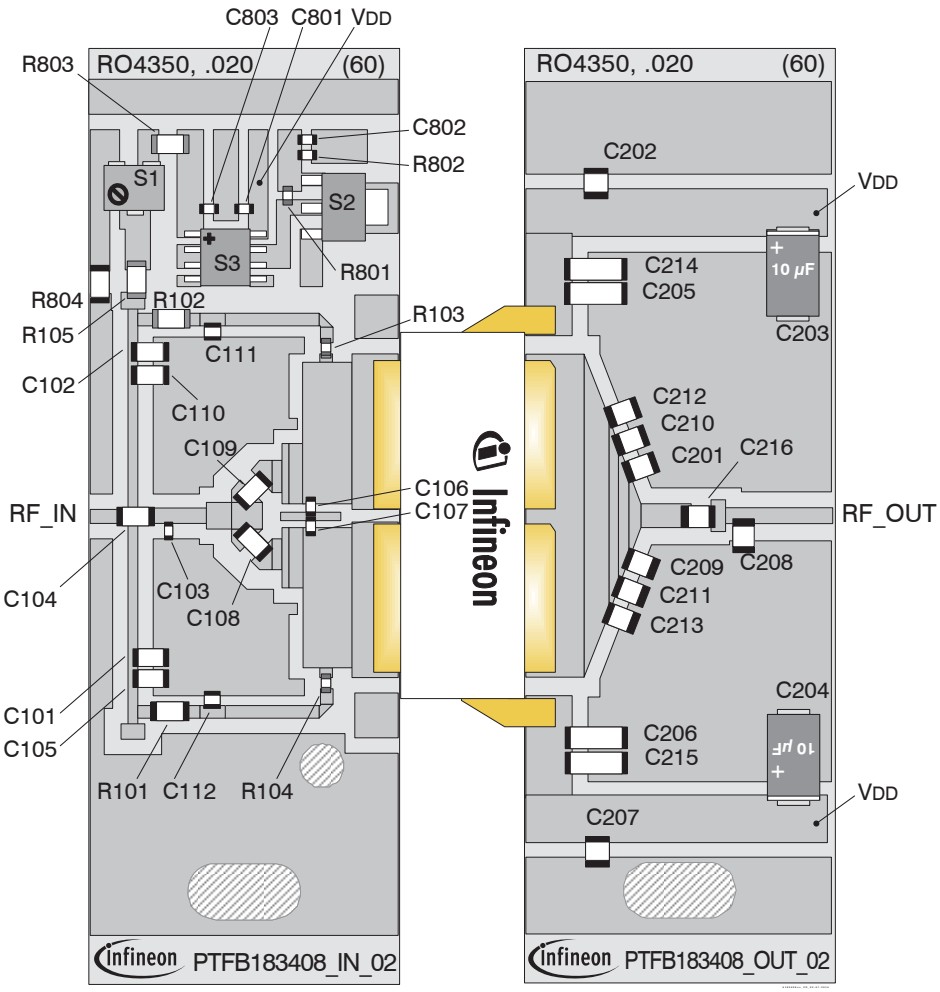
table continued on page 11

Reference Circuit (cont.)

Electrical Characteristics at 1880 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input (cont.)			
TL161	0.024 λ, 28.26 Ω	W1 = 2.54, W2 = 2.54, W3 = 2.16	W1 = 100, W2 = 100, W3 = 85
TL162, TL165	0.012 λ, 7.86 Ω	W1 = 11.43, W2 = 11.43, W3 = 1.026	W1 = 450, W2 = 450, W3 = 40
TL166, TL167	0.021 λ, 53.11 Ω	W1 = 1.03, W2 = 1.02, W3 = 2.03	W1 = 40, W2 = 40, W3 = 80
TL169, TL171	0.009 λ, 7.86 Ω	W1 = 11.43, W2 = 11.43, W3 = 0.76	W1 = 450, W2 = 450, W3 = 30
TL173, TL174	0.044 λ, 7.13 Ω	W = 12.70, L = 3.79	W = 500, L = 149
Output			
TL201 (taper)	0.012 λ, 12.04 Ω / 34.02 Ω	W1 = 7.11, W2 = 1.98, L = 1.02	W1 = 280, W2 = 78, L = 40
TL202 (taper)	0.009 λ, 5.75 Ω / 7.78 Ω	W1 = 16.00, W2 = 11.56, L = 0.76	W1 = 630, W2 = 455, L = 30
TL203	0.020 λ, 20.50 Ω	W = 3.81, L = 1.78	W = 150, L = 70
TL204	0.020 λ, 20.50 Ω	W1 = 3.81, W2 = 3.81, W3 = 1.78	W1 = 150, W2 = 150, W3 = 70
TL205	0.003 λ, 20.50 Ω	W = 3.81, L = 0.25	W = 150, L = 10
TL206 (taper)	0.024 λ, 3.59 Ω / 12.04 Ω	W1 = 26.37 W2 = 16.00, L = 2.03	W1 = 1038, W2 = 630, L = 80
TL208, TL209, TL213, TL214, TL239, TL240	0.000 λ, 141.78 Ω	W = 0.03, L = 0.03	W = 1, L = 1
TL210	0.057 λ, 3.59 Ω	W = 26.37, L = 4.80	W = 1038, L = 189
TL211	0.045 λ, 34.02 Ω	W = 1.98, L = 4.12	W = 78, L = 162
TL212	0.005 λ, 46.18 Ω	W = 1.27, L = 0.43	W = 50, L = 17
TL215	0.067 λ, 46.18 Ω	W = 1.27, L = 6.03	W = 50, L = 248
TL216	0.014 λ, 28.26 Ω	W = 2.54, L = 1.27	W = 100, L = 50
TL217	0.000 λ, 5.75 Ω	W1 = 16.00, W2 = 0.03, W3 = 16.00, W4 = 0.03	W1 = 630, W2 = 1, W3 = 630, W4 = 1
TL218	0.000 λ, 7.78 Ω	W1 = 11.56, W2 = 0. 03, W3 = 11.56, W4 = 0.03	W1 = 455, W2 = 1, W3 = 455, W4 = 1
TL219	0.000 λ, 12.04 Ω	W1 = 7.11, W2 = 0. 03, W3 = 7.11, W4 = 0.025	W1 = 280, W2 = 1, W3 = 280, W4 = 1
TL220, TL221, TL223, TL224	0.042 λ, 20.50 Ω	W1 = 3.81, W2 = 3.81, W3 = 3.81	W1 = 150, W2 = 150, W3 = 150
TL222	0.020 λ, 20.50 Ω	W1 = 3.81, W2 = 3.81, W3 = 1.78	W1 = 150, W2 = 150, W3 = 70
TL225, TL227	0.023 λ, 20.50 Ω	W = 3.81, L = 2.08	W = 150, L = 82
TL226, TL228	0.067 λ, 20.50 Ω	W = 3.81, L = 6.02	W = 150, L = 237
TL229, TL232	0.028 λ, 20.50 Ω	W = 3.81, L = 2.54	W = 150, L = 100
TL230	0.003 λ, 20.50 Ω	W = 3.81, L = 0.25	W = 150, L = 10
TL231, TL233	0.099 λ, 20.50 Ω	W = 3.81, L = 8.92	W = 150, L = 351
TL234, TL235	0.020 λ, 20.50 Ω	W1 = 3.81, W2 = 3.81, W3 = 1.78	W1 = 150, W2 = 150, W3 = 70
TL236	0.020 λ, 20.50 Ω	W = 3.81, L = 1.78	W = 150, L = 70
TL237	0.022 λ, 46.18 Ω	W1 = 1.27, W2 = 1.27, W3 = 2.03	W1 = 50, W2 = 50, W3 = 80
TL238 (taper)	0.009 λ, 7.78 Ω / 12.04 Ω	W1 = 11.56, W2 = 7.112, L = 0.79	W1 = 455, W2 = 280, L = 31

Reference Circuit (cont.)



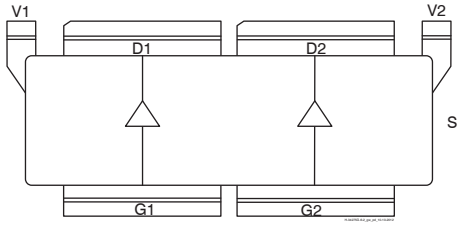
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Suggested Manufacturer	P/N
Input			
C101, C110	Chip capacitor, 4.7 µF	Panasonic Electronic Components	ECS-T1CY475R
C102, C105	Chip capacitor, 0.1 µF	Panasonic Electronic Components	ECJ-3VB1H104K
C103	Chip capacitor, 0.7 pF	ATC	ATC100B0R7BW500XB
C104, C108, C109	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB
C106, C107	Chip capacitor, 1.7 pF	ATC	ATC100A1R7BW150XB
C111, C112	Chip capacitor, 10 pF	ATC	ATC100A100JW500XB
C801, C802, C803	Chip capacitor, 1000 pF	Panasonic Electronic Components	ECJ-1VB1H102K
R101, R102, R105, R803, R804	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
R103, R104	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-3GEYJ100V
R801	Resistor, 1200 Ω	Panasonic Electronic Components	ERJ-3GEYJ122V
R802	Resistor, 1300 Ω	Panasonic Electronic Components	ERJ-3GEYJ132V
S1	Potentiometer, 2k Ω	Bourns Inc	3224W-1-202E
S2	Transistor	Infineon Technologies	BCP56
S3	Voltage Regulator	Texas Instruments	LM7805
Output			
C201	Chip capacitor, 1.4 pF	ATC	ATC100B1R4BW500XB
C202, C207	Chip capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C203, C204	Tantalum capacitor, 10 µF	AVX Corporation	TPSE106K050R0400
C205, C206	Chip capacitor, 2.2 µF	TDK Corporation	C4532X7R1H225M160KA
C208	Chip capacitor, 0.4 pF	ATC	ATC100B0R4BW500XB
C209	Chip capacitor, 1.8 pF	ATC	ATC100B1R8BW500XB
C210, C211, C212, C213	Chip capacitor, 1.3 pF	ATC	ATC100B1R3BW500XB
C214, C215	Chip capacitor, 1 µF	TDK Corporation	C4532X7R2A105M230KA
C216	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB

Pinout Diagram



Pin	Description
V1	V_{DD} Device 1
V2	V_{DD} Device 2
G1	Gate Device 1
G2	Gate Device 2
D1	Drain Device 1
D2	Drain Device 2
S	Source (flange)

Package Outline Specifications

Package H-37275G-6/2 with Formed Leads

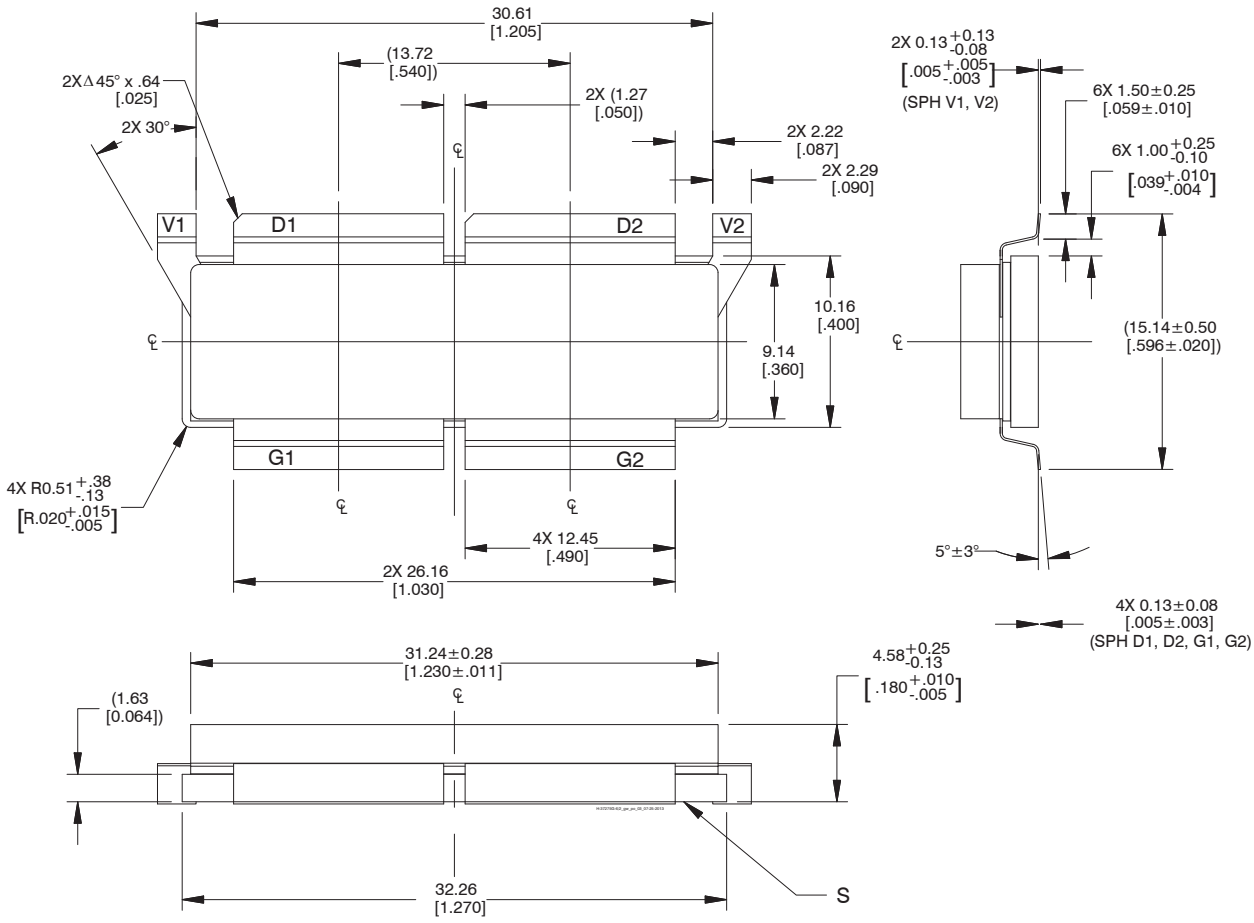


Diagram Notes—unless otherwise specified:

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. D1, D2 – drains; G1, G2 – gates; S – source; V1, V2 – V_{DD}.
5. Lead thickness: 0.10 + 0.076/–0.025 mm [0.004+0.003/–0.001 inch].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

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http://www.infineon.com/rfpower

Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2012-03-23	Advance	All	Data Sheet reflects advance specification for product development
02	2012-06-28	Production	All	Data Sheet reflects released product specification
03	2014-03-07	Production	All 1 3 12 13	Updated V1 to V2, updated package & package related drawings throughout added statement "device with straight leads" into single-carrier WCDMA measurement table updated ordering table updated reference design circuit - corrected mislabels of R102, C102, C110 Removed R805, corrected R801, R802, R803 in component table. updated pinout diagram to show gullwing version

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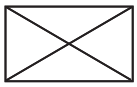

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