

Thermally-Enhanced High Power RF LDMOS FETs 180 W, 2110 – 2170 MHz

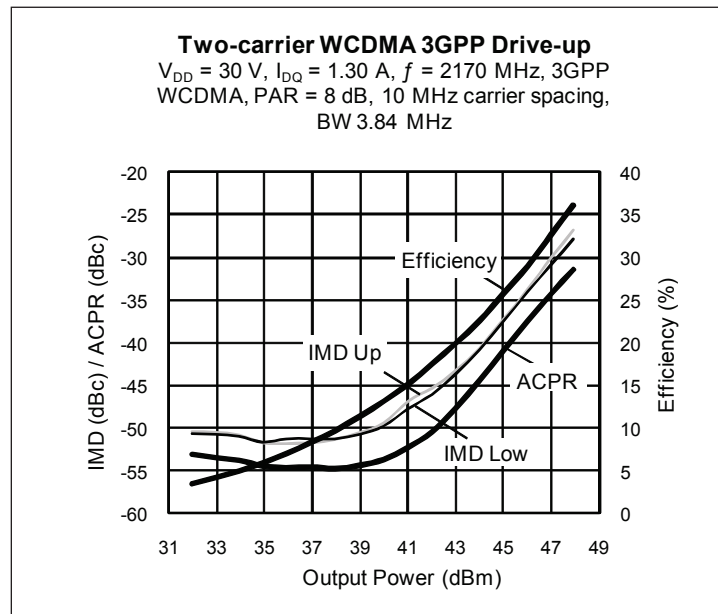
Description

The PTFB211803EL and PTFB211803FL are 180-watt LDMOS FETs intended for use in multi-standard cellular power amplifier applications in the 2110 to 2170 MHz frequency band. Features include input and output matching, high gain and thermally-enhanced packages with slotted or earless flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFB211803EL
H-33288-6



PTFB211803FL
H-34288-4/2



Features

- Broadband internal matching
- Typical two-carrier WCDMA performance at 2170 MHz, 30 V
 - Average output power = 40 W
 - Linear Gain = 17.5 dB
 - Efficiency = 29.7%
 - Intermodulation distortion = -34 dBc
 - Adjacent channel power = -37 dBc
- Typical CW performance, 2170 MHz, 30 V
 - Output power at P_{1dB} = 180 W
 - Efficiency = 55%
- Increased negative gate-source voltage range for improved performance in Doherty amplifiers
- Integrated ESD protection.
- Capable of handling 10:1 VSWR @ 30 V, 180 W (CW) output power
- Pb-free and RoHS compliant

RF Characteristics

Two-carrier WCDMA Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)
 $V_{DD} = 30\text{ V}$, $I_{DQ} = 1.3\text{ A}$, $P_{OUT} = 40\text{ W}$ average, $f_1 = 2135\text{ MHz}$, $f_2 = 2145\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	17.5	—	dB
Drain Efficiency	η_D	—	29.5	—	%
Adjacent Channel Power Ratio	ACPR	—	-38	—	dBc

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-carrier WCDMA Measurements (tested in Infineon test fixture)

$V_{DD} = 30\text{ V}$, $I_{DQ} = 1.3\text{ A}$, $P_{OUT} = 38\text{ W}$ average, $f_1 = 2165\text{ MHz}$, $f_2 = 2170\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 7.5 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16	17	—	dB
Drain Efficiency	η_D	28	29.5	—	%
Intermodulation Distortion	IMD	—	-32.5	-31.5	dBc

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
Drain Leakage Current	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.05	—	Ω
Operating Gate Voltage	$V_{DS} = 30\text{ V}$, $I_{DQ} = 1.3\text{ A}$	V_{GS}	2.3	3.0	3.3	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

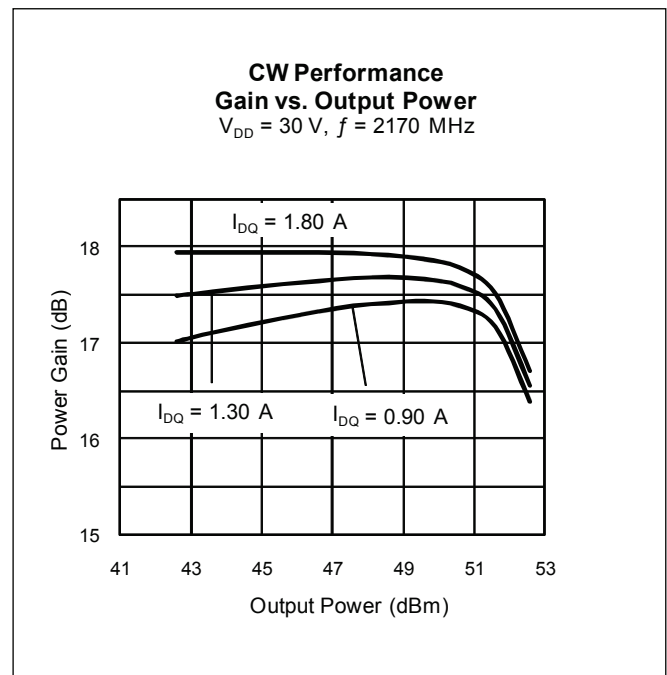
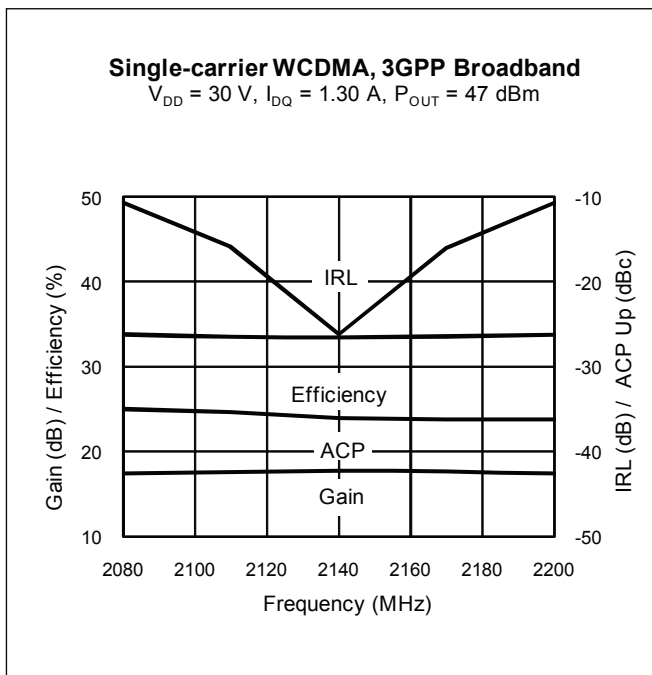
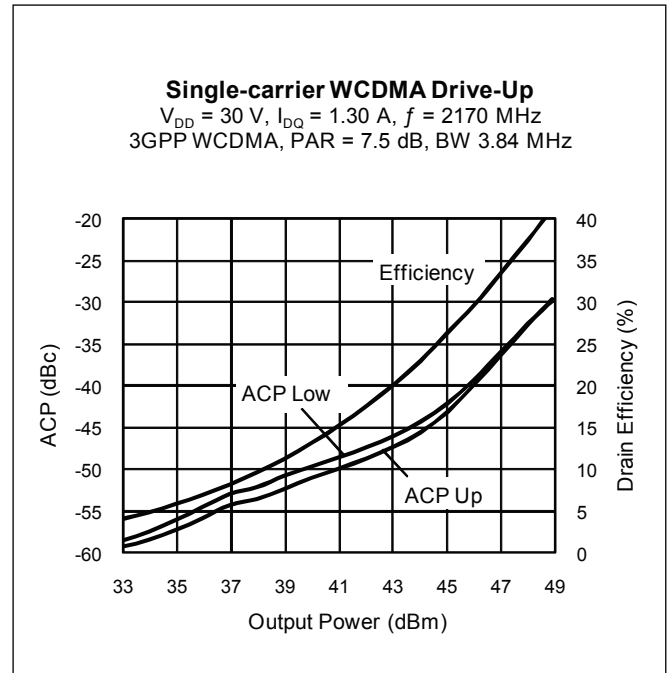
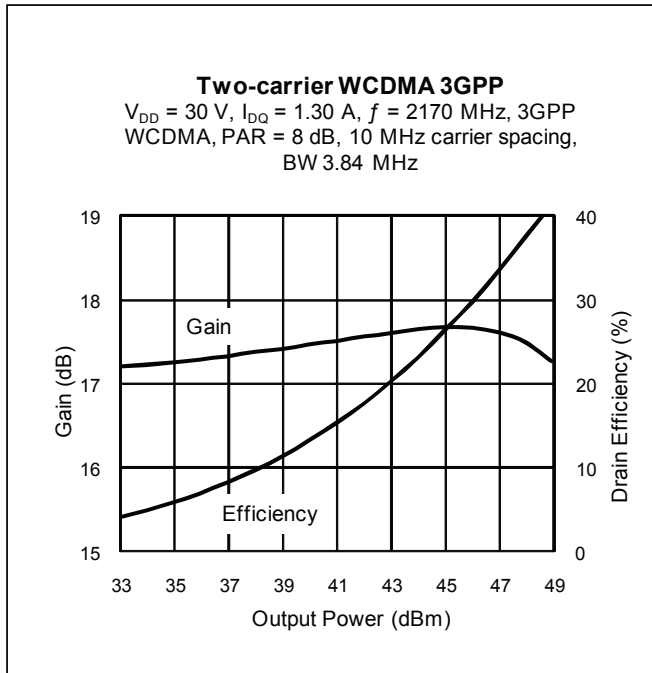
Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	-6 to +10	V
Junction Temperature	T_J	200	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 180 W CW)	$R_{\theta JC}$	0.3	$^{\circ}\text{C/W}$

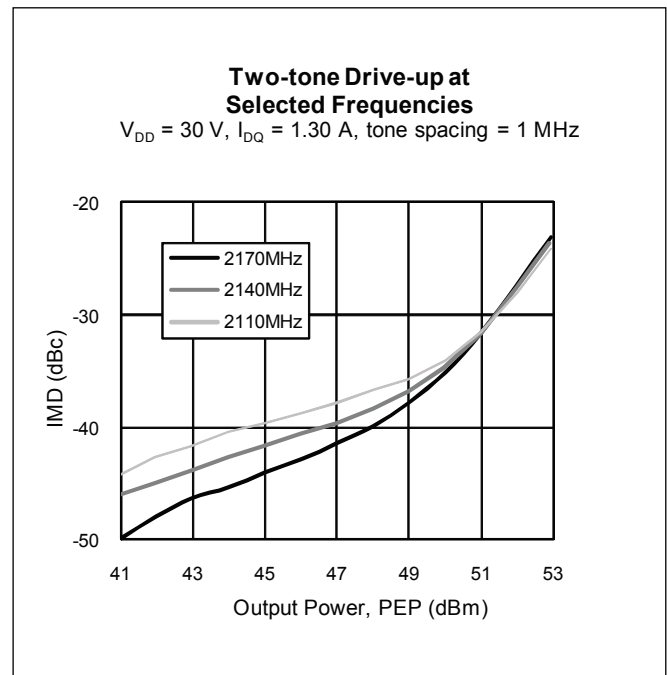
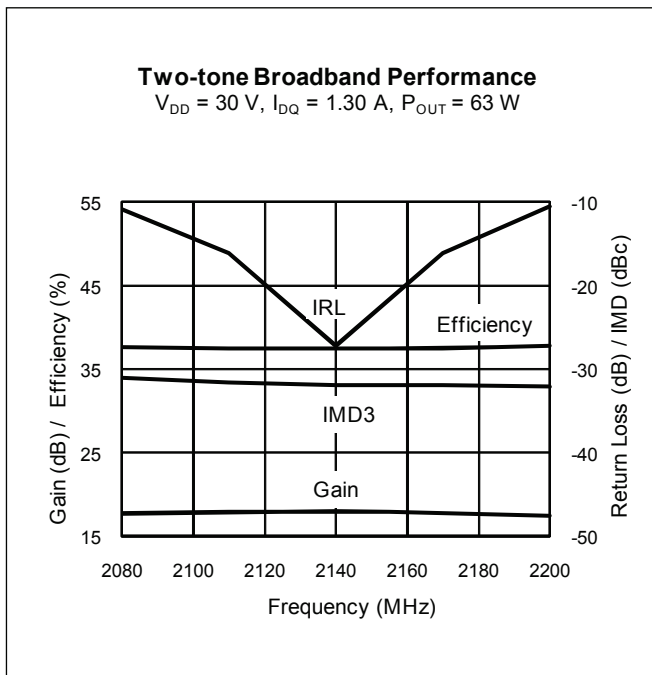
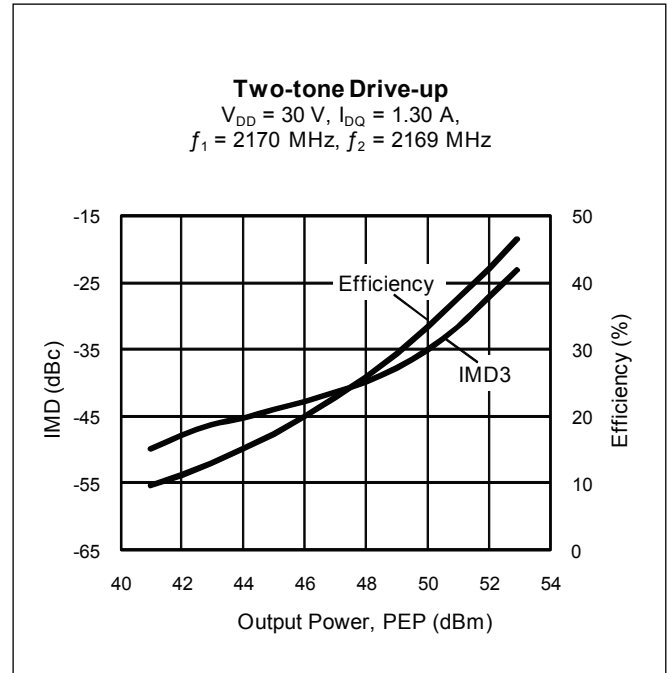
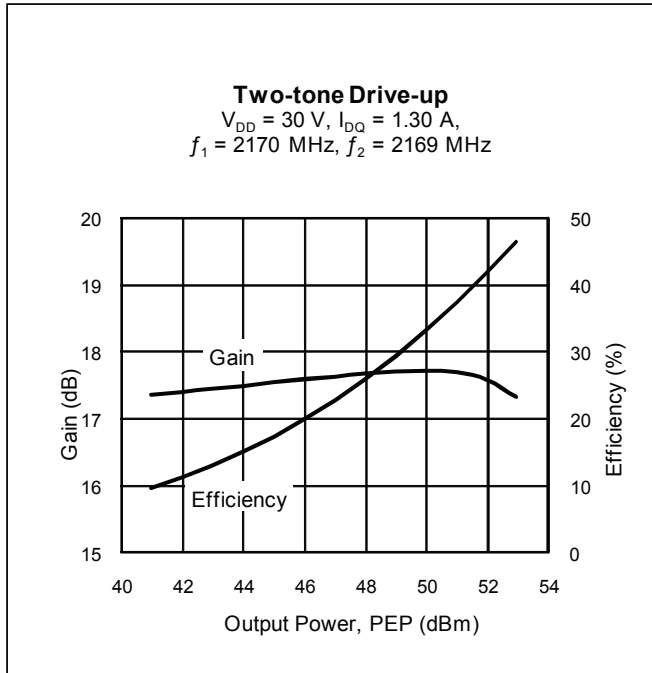
Ordering Information

Type and Version	Package Type	Package Description	Shipping
PTFB211803EL V1	H-33288-6	Slotted flange, single-ended	Tray
PTFB211803EL V1 R250	H-33288-6	Slotted flange, single-ended	Tape & Reel, 250 pcs
PTFB211803FL V2	H-34288-4/2	Earless flange, single-ended	Tray
PTFB211803FL V2 R250	H-34288-4/2	Earless flange, single-ended	Tape & Reel, 250 pcs

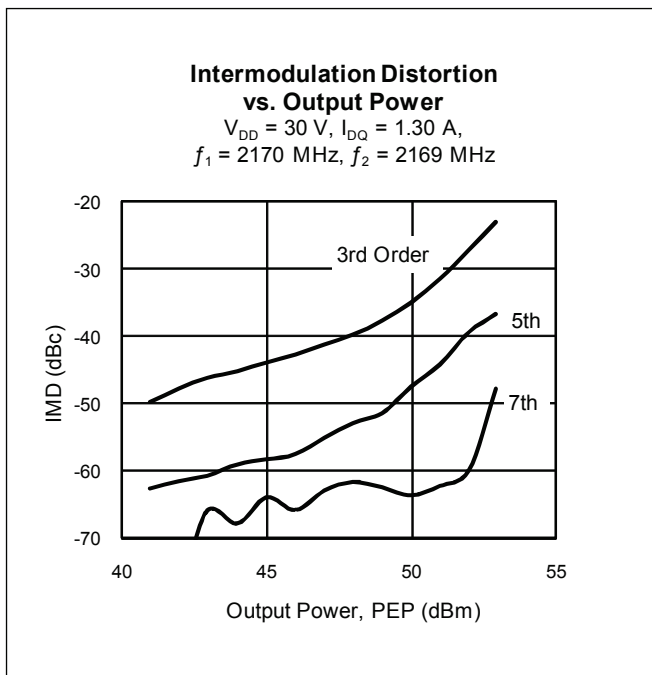
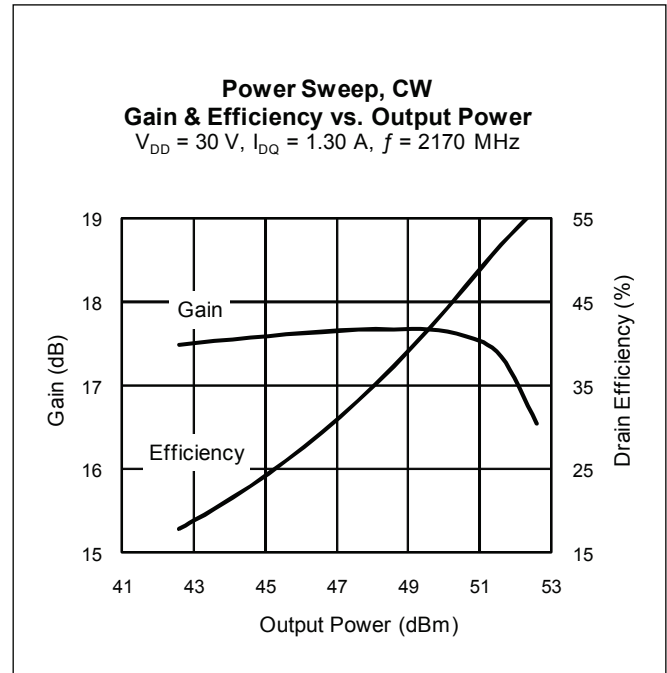
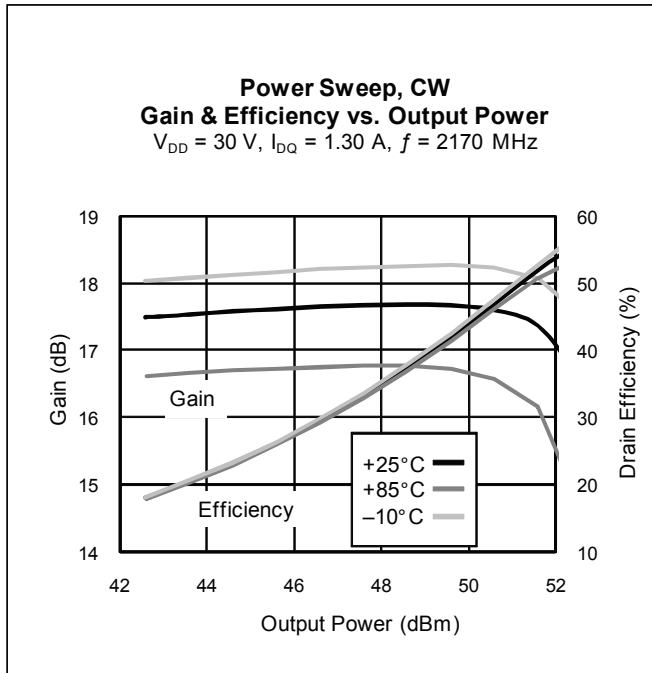
Typical Performance (data taken in a production test fixture)



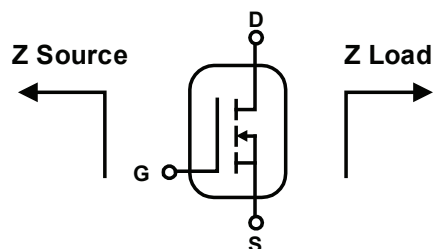
Typical Performance (cont.)



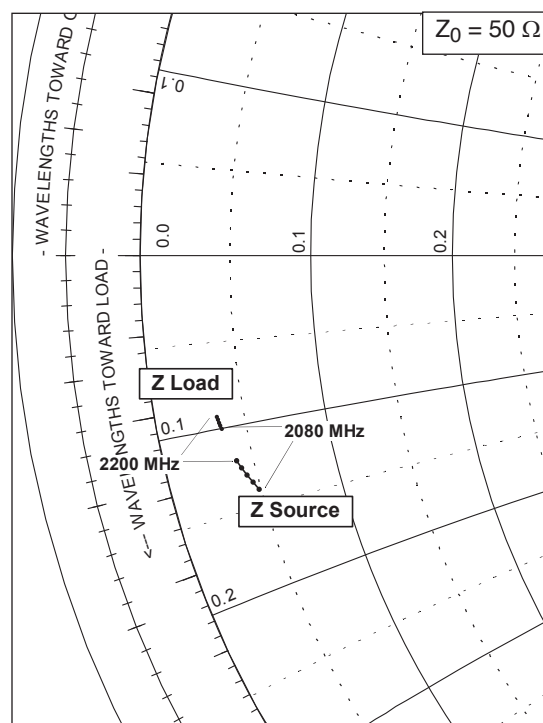
Typical Performance (cont.)



Broadband Circuit Impedance

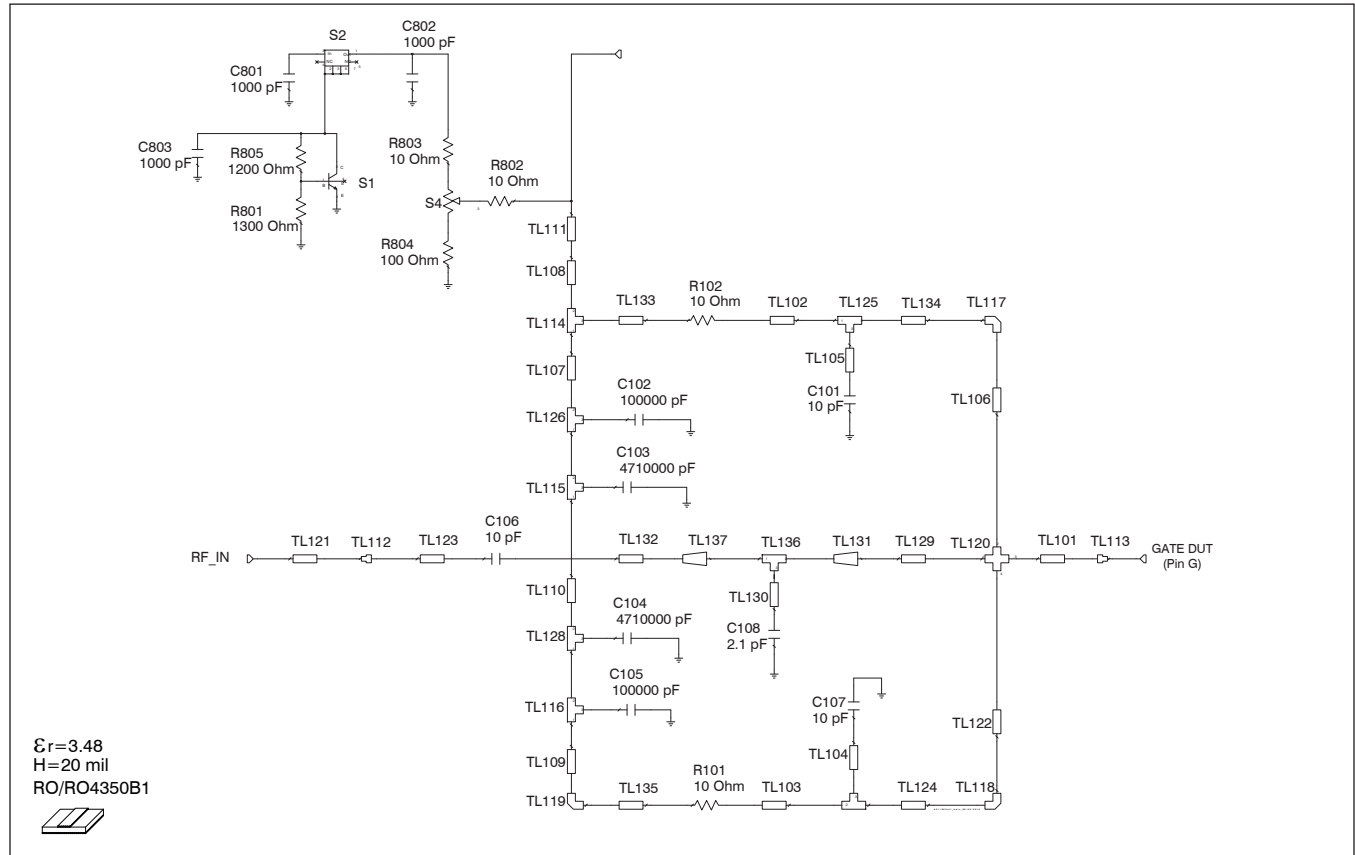


Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
2200	2.02	-6.03	1.70	-4.67
2170	2.12	-6.26	1.72	-4.76
2140	2.23	-6.50	1.73	-4.85
2110	2.34	-6.75	1.75	-4.95
2080	2.47	-7.01	1.77	-5.05

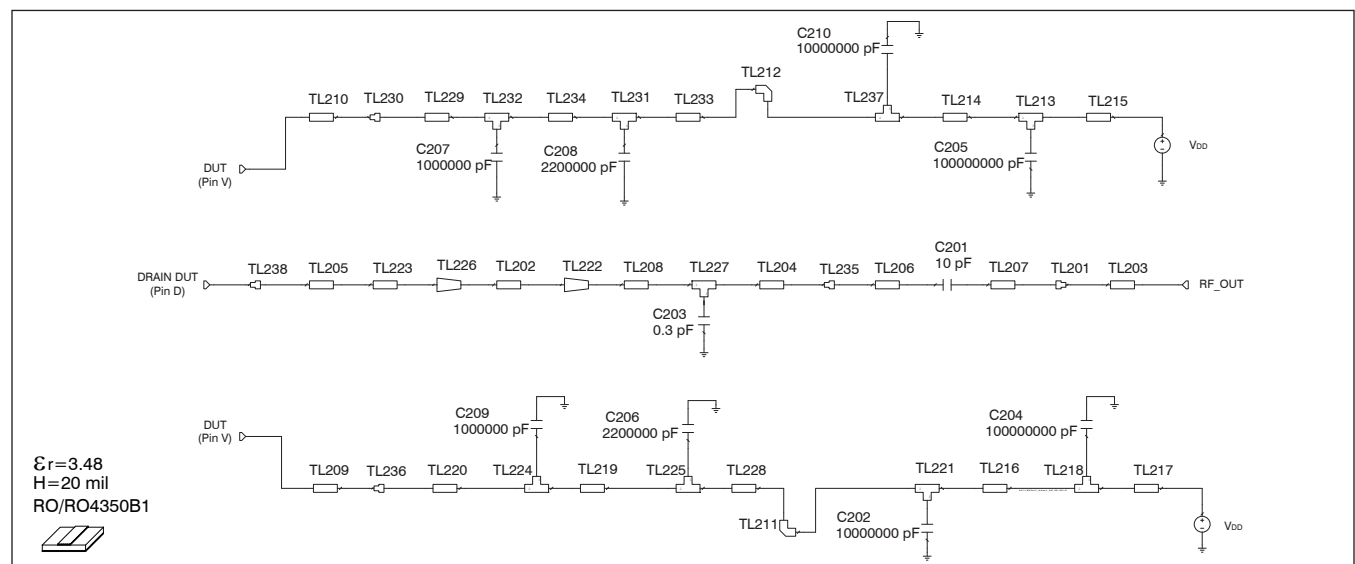


See next page for reference circuit information

Reference Circuit



Reference circuit input schematic for $f = 2170$ MHz



Reference circuit output schematic for $f = 2170$ MHz

Reference Circuit (cont.)

Description

DUT	PTFB211803EL or PTFB211803FL
PCB	0.508 mm [.020"] thick, $\epsilon_r = 3.66$, Rogers 4350, 1 oz. copper

Electrical Characteristics at 2170 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101	0.053λ , 6.67Ω	$W = 13.970$, $L = 4.064$	$W = 550$, $L = 160$
TL102, TL103	0.019λ , 54.17Ω	$W = 1.016$, $L = 1.575$	$W = 40$, $L = 62$
TL104, TL105	0.000λ , 36.77Ω	$W = 1.829$, $L = 0.025$	$W = 72$, $L = 1$
TL106, TL122	0.026λ , 54.17Ω	$W = 1.016$, $L = 2.159$	$W = 40$, $L = 85$
TL107	0.021λ , 54.17Ω	$W = 1.016$, $L = 1.727$	$W = 40$, $L = 68$
TL108	0.018λ , 54.17Ω	$W = 1.016$, $L = 1.524$	$W = 40$, $L = 60$
TL109	0.029λ , 54.17Ω	$W = 1.016$, $L = 2.451$	$W = 40$, $L = 97$
TL110	0.092λ , 63.89Ω	$W = 0.762$, $L = 7.831$	$W = 30$, $L = 308$
TL111	0.031λ , 34.72Ω	$W = 1.981$, $L = 2.540$	$W = 78$, $L = 100$
TL112		$W1 = 1.270$, $W2 = 2.286$	$W1 = 50$, $W2 = 90$
TL113		$W1 = 17.780$, $W2 = 12.700$	$W1 = 700$, $W2 = 500$
TL114	0.012λ , 54.17Ω	$W1 = 1.016$, $W2 = 1.270$, $W3 = 1.016$	$W1 = 40$, $W2 = 50$, $W3 = 40$
TL115, TL116, TL126, TL128	0.019λ , 63.89Ω	$W1 = 0.762$, $W2 = 0.762$, $W3 = 1.600$	$W1 = 30$, $W2 = 30$, $W3 = 63$
TL117, TL118, TL119		$W = 1.016$	$W = 40$
TL120		$W1 = 13.970$, $W2 = 1.016$, $W3 = 13.970$ $W4 = 1.016$	$W1 = 550$, $W2 = 40$, $W3 = 550$ $W4 = 40$
TL121	0.032λ , 47.12Ω	$W = 1.270$, $L = 2.692$	$W = 50$, $L = 106$
TL123	0.016λ , 31.24Ω	$W = 2.286$, $L = 1.270$	$W = 90$, $L = 50$
TL124, TL134	0.095λ , 54.17Ω	$W = 1.016$, $L = 8.001$	$W = 40$, $L = 315$
TL125, TL127	0.022λ , 54.17Ω	$W1 = 1.016$, $W2 = 1.016$, $W3 = 1.829$	$W1 = 40$, $W2 = 40$, $W3 = 72$
TL129	0.005λ , 6.67Ω	$W = 13.970$, $L = 0.356$	$W = 550$, $L = 14$
TL130	0.000λ , 144.35Ω	$W = 0.025$, $L = 0.025$	$W = 1$, $L = 1$
TL131 (taper)	0.008λ , $6.67 \Omega / 7.64 \Omega$	$W1 = 13.970$, $W2 = 12.065$, $L = 0.584$	$W1 = 550$, $W2 = 475$, $L = 23$
TL132	0.134λ , 47.12	$W = 1.270$, $L = 11.151$	$W = 50$, $L = 439$
TL133	0.012λ , 54.17	$W = 1.016$, $L = 1.016$	$W = 40$, $L = 40$
TL135	0.012λ , 54.17	$W = 1.016$, $L = 1.021$	$W = 40$, $L = 40$
TL136	0.000λ , 7.64	$W1 = 12.065$, $W2 = 12.065$, $W3 = 0.025$	$W1 = 475$, $W2 = 475$, $W3 = 1$
TL137 (taper)	0.032λ , $7.64 \Omega / 47.12 \Omega$	$W1 = 12.065$, $W2 = 1.270$, $L = 2.464$	$W1 = 475$, $W2 = 50$, $L = 97$

table continued on page 9

Reference Circuit (cont.)

Electrical Characteristics at 2170 MHz

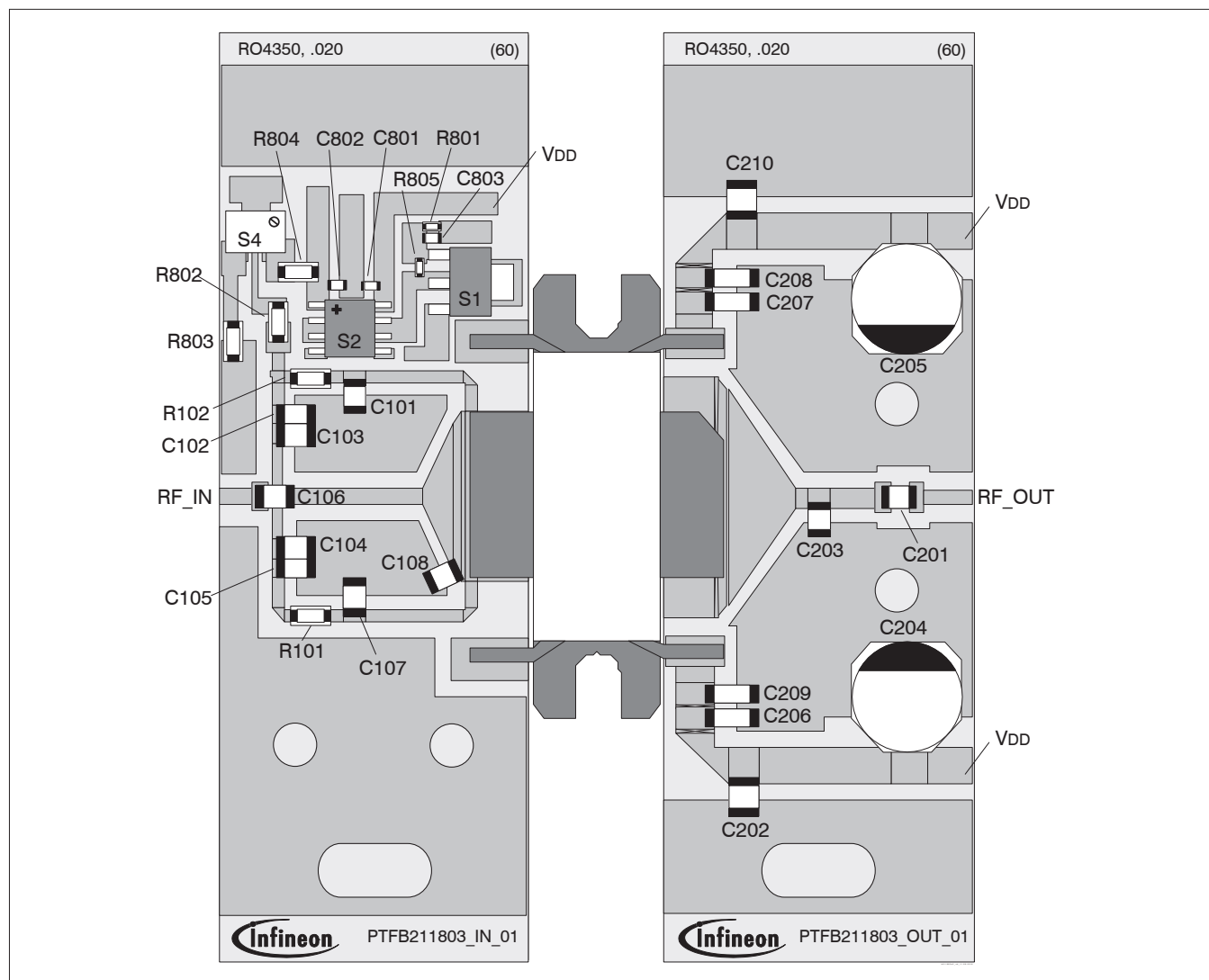
Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Output			
TL201		W1 = 1.270, W2 = 2.540	W1 = 50, W2 = 100
TL202	0.001 λ , 5.33 Ω	W = 17.780, L = 0.076	W = 700, L = 3
TL203	0.047 λ , 47.12 Ω	W = 1.270, L = 3.912	W = 50, L = 154
TL204	0.044 λ , 39.51 Ω	W = 1.651, L = 3.581	W = 65, L = 141
TL205	0.054 λ , 4.84 Ω	W = 19.685, L = 4.064	W = 775, L = 160
TL206, TL207	0.016 λ , 28.85 Ω	W = 2.540, L = 1.270	W = 100, L = 50
TL208	0.012 λ , 39.51 Ω	W = 1.651, L = 1.016	W = 65, L = 40
TL209	0.032 λ , 16.90 Ω	W = 4.928, L = 2.540	W = 194, L = 100
TL210	0.032 λ , 17.05 Ω	W = 4.877, L = 2.540	W = 192, L = 100
TL211, TL212		W = 3.048	W = 120
TL213, TL218	0.038 λ , 25.04 Ω	W1 = 3.048, W2 = 3.048, W3 = 3.048	W1 = 120, W2 = 120, W3 = 120
TL214, TL216	0.135 λ , 25.04 Ω	W = 3.048, L = 10.820	W = 120, L = 426
TL215, TL217	0.046 λ , 25.04 Ω	W = 3.048, L = 3.683	W = 120, L = 145
TL219, TL228, TL233, TL234	0.003 λ , 25.04 Ω	W = 3.048, L = 0.254	W = 120, L = 10
TL220, TL229	0.016 λ , 25.04 Ω	W = 3.048, L = 1.270	W = 120, L = 50
TL221, TL237	0.031 λ , 25.04 Ω	W1 = 3.048, W2 = 3.048, W3 = 2.489	W1 = 120, W2 = 120, W3 = 98
TL222 (taper)	0.074 λ , 5.33 Ω / 39.51 Ω	W1 = 17.780, W2 = 1.651, L = 5.588	W1 = 700, W2 = 65, L = 220
TL223	0.003 λ , 4.84 Ω	W = 19.685, L = 0.254	W = 775, L = 10
TL224, TL225, TL231, TL232	0.022 λ , 25.04 Ω	W1 = 3.048, W2 = 3.048, W3 = 1.778	W1 = 120, W2 = 120, W3 = 70
TL226 (taper)	0.010 λ , 4.84 Ω / 5.33 Ω	W1 = 19.685, W2 = 17.780, L = 0.762	W1 = 775, W2 = 700, L = 30
TL227	0.022 λ , 39.51 Ω	W1 = 1.651, W2 = 1.651, W3 = 1.829	W1 = 65, W2 = 65, W3 = 72
TL230, TL236		W1 = 4.928, W2 = 3.048,	W1 = 194, W2 = 120
TL235		W1 = 1.651, W2 = 2.540	W1 = 65, W2 = 100
TL238		W1 = 12.700, W2 = 17.780	W1 = 500, W2 = 700

Reference Circuit (cont.)

Circuit Assembly Information

Test Fixture Part No. LTN/PTFB211803EF

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



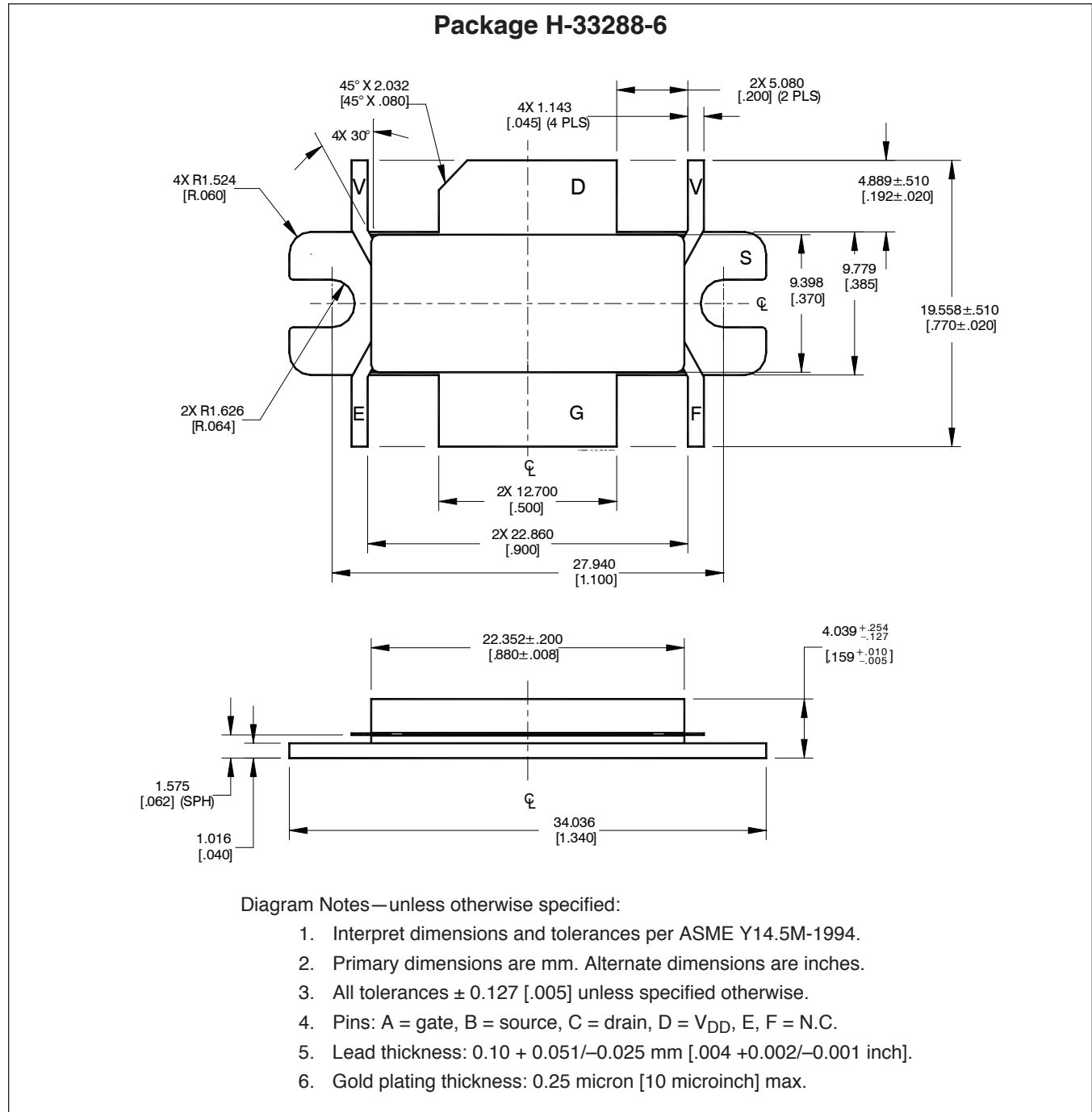
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Suggested Manufacturer	P/N
Input			
C101, C106, C107	Chip capacitor, 10 pF	ATC	ATC100B100JW500XJ
C102, C105	Chip capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C103, C104	Chip capacitor, 4.71 μ F	Digi-Key	493-2372-2-ND
C108	Chip capacitor, 2.1 pF	ATC	ATC100B2R1BW500XB
C801, C802, C803	Capacitor, 1000 pF	Digi-Key	PCC1772CT-ND
R101, R102, R802, R803	Resistor, 10 Ω	Digi-Key	P10ECT-ND
R801	Resistor, 1300 Ω	Digi-Key	P1.3KGCT-ND
R804	Resistor, 100 Ω	Digi-Key	P100ECT-ND
R805	Resistor, 1200 Ω	Digi-Key	P1.2KGCT-ND
S1	Transistor	Digi-Key	BCP56-ND
S2	Voltage Regulator	Digi-Key	LM78L05ACM-ND
S4	Potentiometer, 2k Ω	Digi-Key	3224W-202ECT-ND
Output			
C201	Chip capacitor, 10 pF	ATC	ATC100B100JW500XJ
C202, C210	Capacitor, 10 μ F	Digi-Key	587-1818-2-ND
C203	Chip capacitor, 0.3 pF	ATC	ATC100B0R3BW500XB
C204, C205	Capacitor, 100 μ F	Digi-Key	PCE4442TR-ND
C206, C208	Chip capacitor, 2.2 μ F	Digi-Key	445-1447-2-ND
C207, C209	Chip capacitor, 1 μ F	Digi-Key	445-1411-2-ND

Package Outline Specifications



Package Outline Specifications (cont.)

Package H-34288-4/2

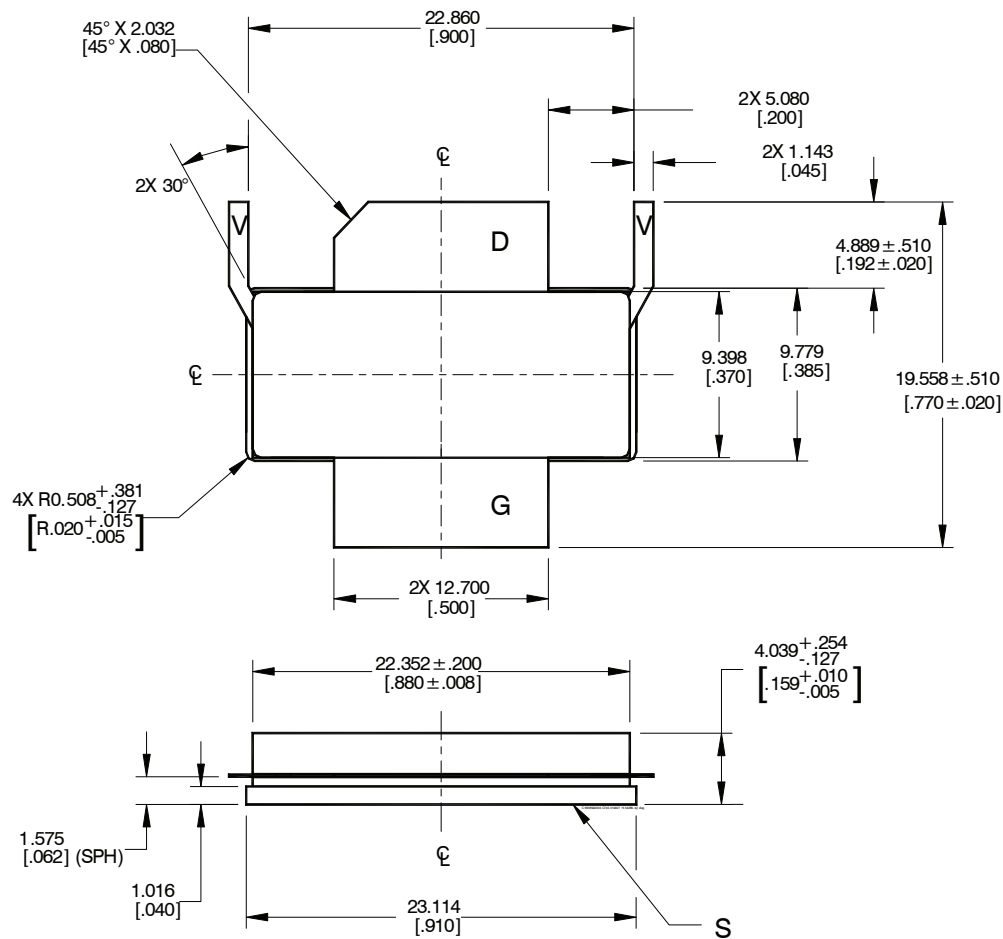


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [0.005] unless specified otherwise.
4. Pins: D = drain; S = source; G = gate; V = V_{DD} .
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.

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

Revision History: 2010-11-10

Data Sheet

Previous Version: 2010-08-25, Data Sheet

Page	Subjects (major changes since last revision)
1, 2, 12	Changed eared flange package type

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[PTFA211801F V5](#) [PTFA211801F V5 R250](#)