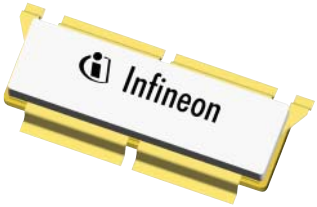
Thermally-Enhanced High Power RF LDMOS FET
320 W, 28 V, 2110 – 2170 MHz

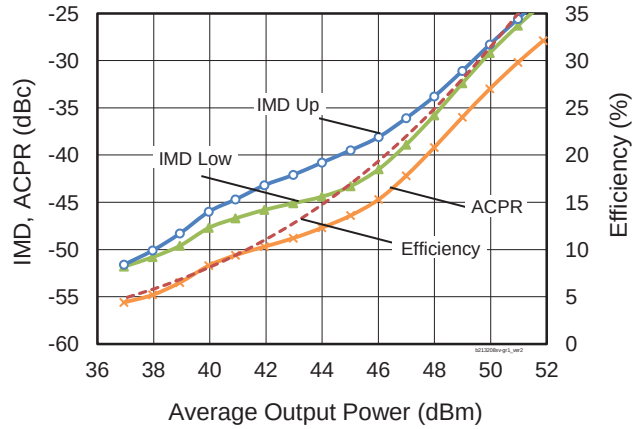
Description

The PTFB213208SV is a 320-watt LDMOS FET 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 package with earless flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTFB213208SV
Package H-37275G-6/2
(formed leads)

Two-carrier WCDMA 3GPP Drive-up
V_{DD} = 28 V, I_{DQ} = 2.65 A, f = 2170 MHz,
3GPP WCDMA signal, PAR = 8 dB,
10 MHz carrier spacing, BW = 3.84 MHz



Features

- Broadband internal matching
- Wide video bandwidth
- Typical pulsed CW performance, 2140 MHz, 28 V (combined outputs)
  - Output power @ P_{1dB} = 343 W
  - Efficiency = 54%
  - Gain = 16.5 dB
- Typical single-carrier WCDMA performance, 2140 MHz, 28 V
  - Output power = 50 dBm avg
  - Gain = 17 dB
  - Efficiency = 32%
- Capable of handling 10:1 VSWR @ 28 V, 320 W (CW) output power
- Integrated ESD protection
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Specifications (device with straight leads, tested in Infineon test fixture)
V_{DD} = 28 V, I_{DQ} = 2.6 A, P_{OUT} = 85 W average, f = 2170 MHz
3GPP WCDMA signal, 3.84 MHz channel bandwidth, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	Gps	15.75	17	—	dB
Drain Efficiency	η_D	29	32	—	%
Adjacent Channel Power Ratio	ACPR	—	–35	–29.5	dBc

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics (both sides)

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
	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} = 28 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	225	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 200 W CW)	$R_{\theta JC}$	0.20	°C/W

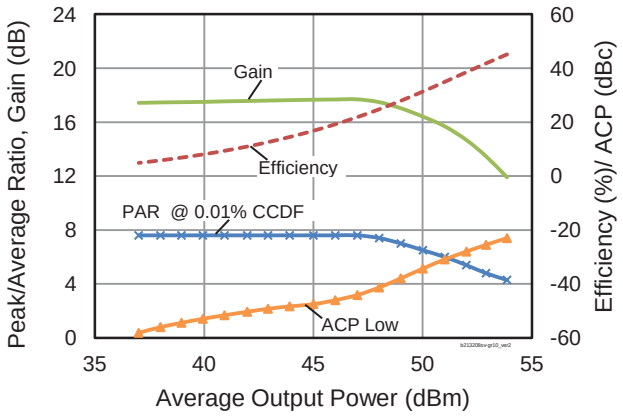
Ordering Information

Type and Version	Order Code	Package Description	Shipping
PTFB213208SV V2 R250	PTFB213208SVV2R250XTMA1	H-37275G-6/2, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

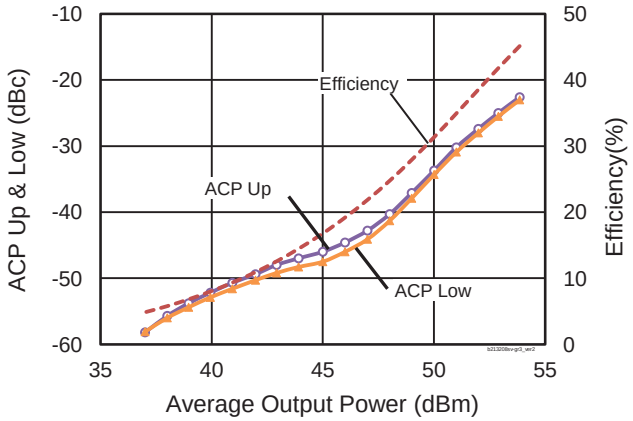
Single-carrier WCDMA 3GPP Drive-up

V_{DD} = 28V, I_{DQ} = 2.7 A, f = 2170 MHz
3GPP WCDMA signal,
PAR = 7.5 dB, 3.84 MHz BW



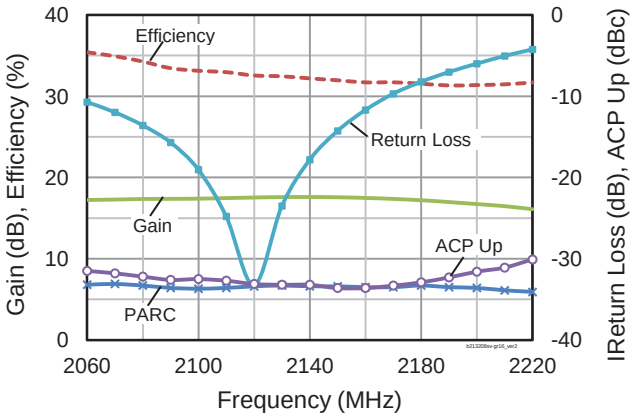
Single-carrier WCDMA 3GPP Drive-up

V_{DD} = 28 V, I_{DQ} = 2.7 A, f = 2170 MHz,
3GPP WCDMA signal, PAR = 7.5 dB,
BW = 3.84 MHz



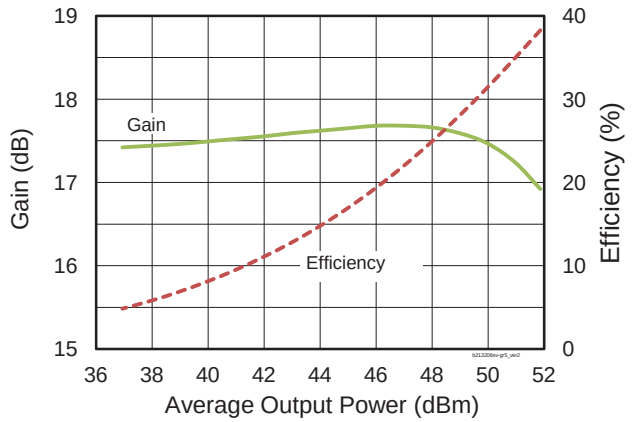
Single-carrier WCDMA 3GPP Broadband

V_{DD} = 28 V, I_{DQ} = 2.7 A, P_{OUT} = 100 W



Two-carrier WCDMA 3GPP Drive-up

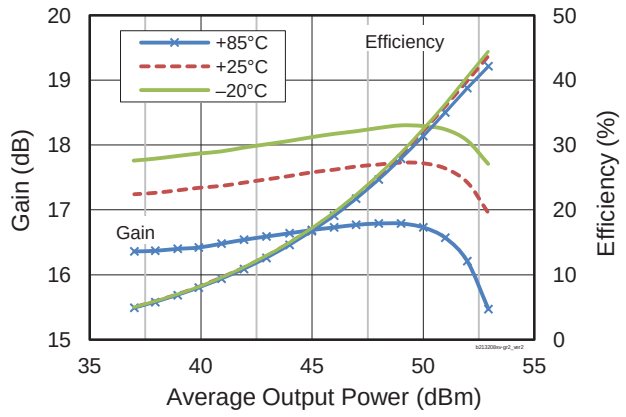
V_{DD} = 28 V, I_{DQ} = 2.65 A, f = 2170 MHz,
3GPP WCDMA signal, PAR = 8 dB,
10 MHz carrier spacing, BW = 3.84 MHz



Typical Performance (cont.)

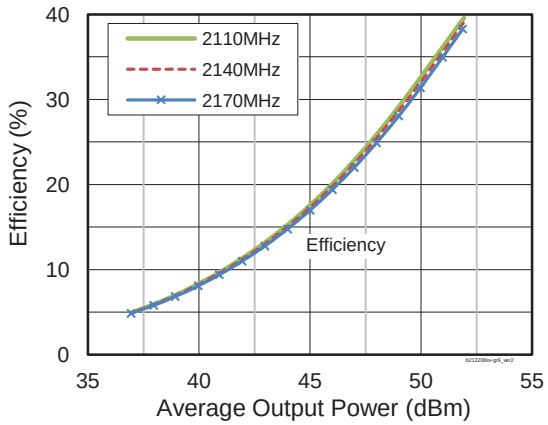
Two-tone Drive-up (over temperature)

V_{DD} = 28 V, I_{DQ} = 2.7 A,
f_1 = 2139.5 MHz, f_2 = 2140.5 MHz



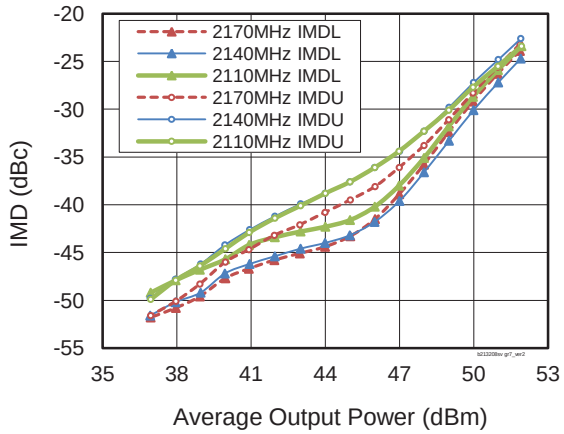
Two-carrier WCDMA 3GPP Drive-up

V_{DD} = 28 V, I_{DQ} = 2.7 A,
f = 2110, 2140, 2170 MHz,
3GPP WCDMA signal, PAR = 8 dB,
10 MHz carrier spacing, BW = 3.84 MHz



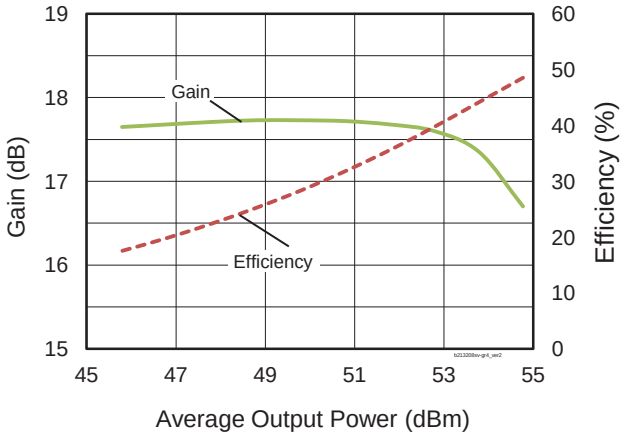
Two-carrier WCDMA 3GPP Drive-up

V_{DD} = 30 V, I_{DQ} = 2.65 A,
3GPP WCDMA, PAR = 8 dB,
10 MHz carrier spacing, BW = 3.84 MHz



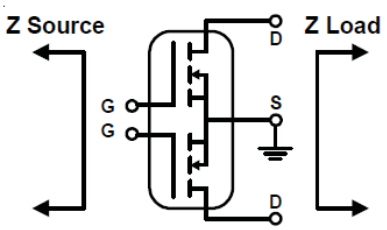
CW Drive-up

V_{DD} = 28 V, I_{DQ} = 2.7 A, f = 2170 MHz



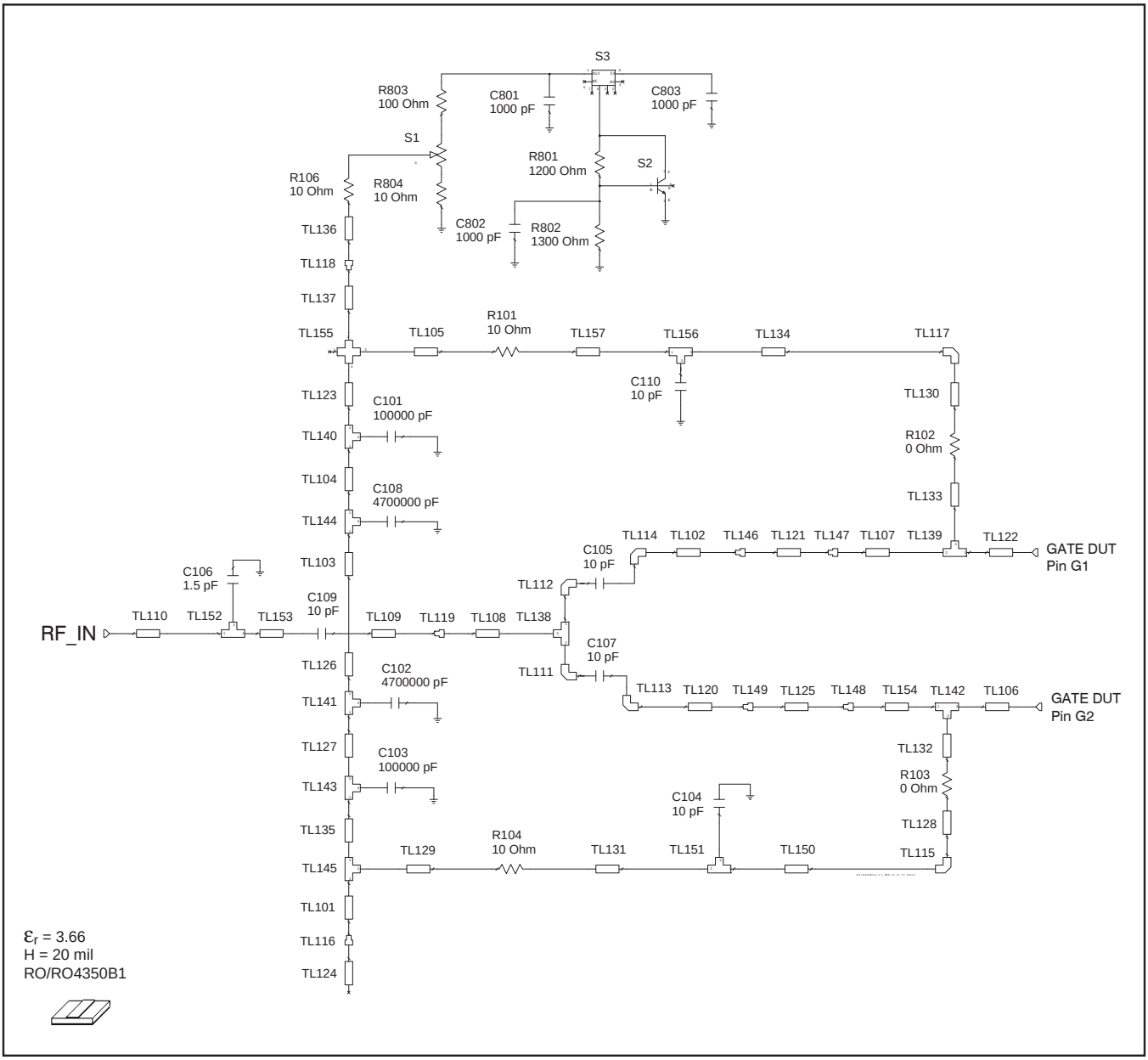
Broadband Circuit Impedance

Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
2080	2.84	–5.14	0.97	–2.70
2090	2.82	–5.14	0.95	–2.69
2100	2.79	–5.15	0.93	–2.67
2110	2.77	–5.15	0.92	–2.65
2120	2.74	–5.16	0.90	–2.64
2130	2.71	–5.16	0.88	–2.62
2140	2.67	–5.17	0.86	–2.60
2150	2.64	–5.18	0.85	–2.58
2160	2.60	–5.18	0.83	–2.56
2170	2.57	–5.19	0.81	–2.54
2180	2.53	–5.19	0.79	–2.53
2190	2.48	–5.19	0.78	–2.51
2200	2.44	–5.19	0.76	–2.48



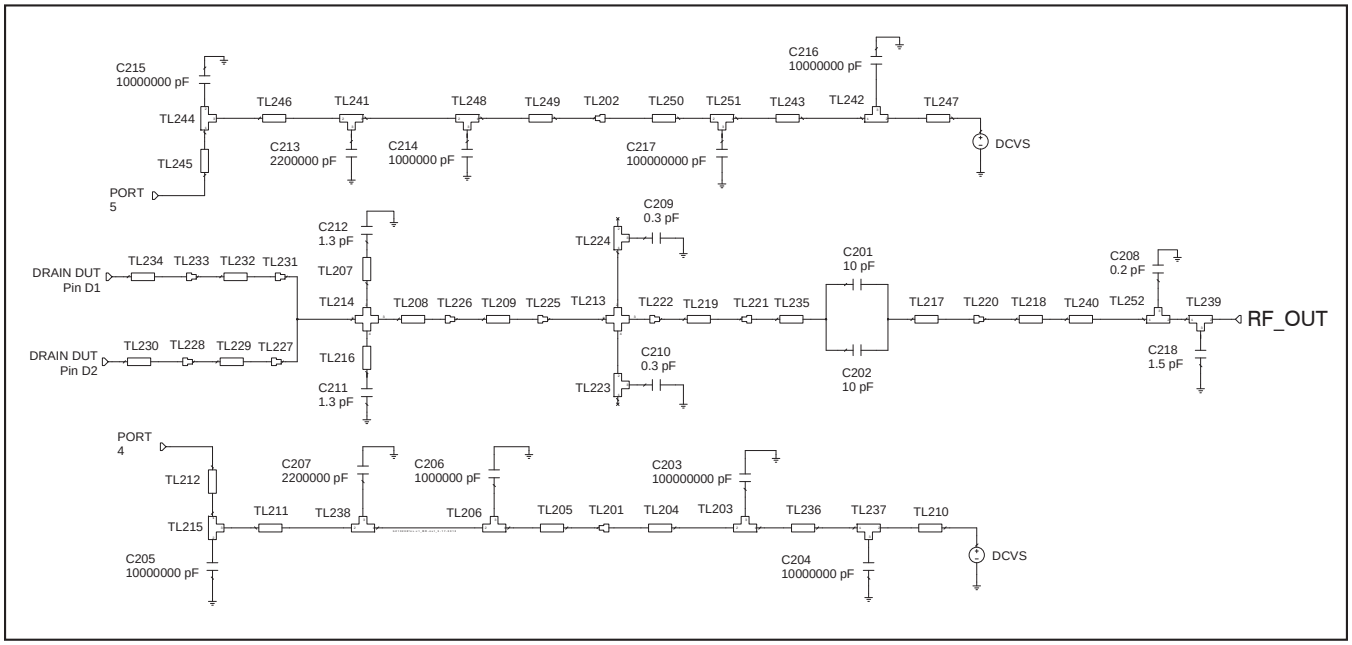
See next page for reference circuit information

Reference Circuit



Reference circuit input schematic for ƒ = 2170 MHz

Reference Circuit (cont.)



Reference circuit output schematic for ƒ = 2170 MHz

Reference Circuit Assembly

DUT	PTFB213208SV
Reference Circuit Part No.	LTN/PTFB213208SV
PCB	Rogers RO4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66
Find Gerber files for this reference fixture on the Infineon Web site at **http://www.infineon.com/rfpower**	

Electrical Characteristics at 2170 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101	0.006 λ, 62.65 Ω	W = 0.76, L = 0.51	W = 30, L = 30
TL102	0.010 λ, 28.26 Ω	W = 2.54, L = 0.76	W = 100, L = 100
TL103	0.171 λ, 62.65 Ω	W = 0.76, L = 14.2	W = 30, L = 30
TL104	0.010 λ, 62.65 Ω	W = 0.76, L = 0.81	W = 30, L = 30
TL105	0.020 λ, 53.11 Ω	W = 1.02, L = 1.65	W = 40, L = 40
TL106	0.072 λ, 7.13 Ω	W = 12.7, L = 5.36	W = 500, L = 500
TL107	0.017 λ, 7.13 Ω	W = 12.7, L = 1.3	W = 500, L = 500
TL108	0.026 λ, 31.94 Ω	W = 2.16, L = 2.03	W = 85, L = 85
TL109	0.061 λ, 48.71 Ω	W = 1.17, L = 5.02	W = 46, L = 46
TL110	0.006 λ, 48.71 Ω	W = 1.17, L = 0.51	W = 46, L = 46
TL120	0.010 λ, 28.26 Ω	W = 2.54, L = 0.76	W = 100, L = 100
TL121	0.023 λ, 16.69 Ω	W = 4.88, L = 1.78	W = 192, L = 192
TL122	0.072 λ, 7.13 Ω	W = 12.7, L = 5.36	W = 500, L = 500

(table cont. next page)

Reference Circuit (cont.)

Electrical Characteristics at 2170 MHz (Input cont.)

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
TL123	0.043 λ, 62.65 Ω	W = 0.76, L = 3.56	W = 30, L = 30
TL124, TL136	0.016 λ, 33.39 Ω	W = 2.03, L = 1.27	W = 80, L = 80
TL125	0.023 λ, 16.69 Ω	W = 4.88, L = 1.78	W = 192, L = 192
TL126	0.031 λ, 62.65 Ω	W = 0.76, L = 2.54	W = 30, L = 30
TL127	0.011 λ, 62.65 Ω	W = 0.76, L = 0.89	W = 30, L = 30
TL128, TL130	0.006 λ, 53.11 Ω	W = 1.02, L = 0.51	W = 40, L = 40
TL129	0.019 λ, 53.11 Ω	W = 1.02, L = 1.53	W = 40, L = 40
TL131, TL157	0.017 λ, 53.11 Ω	W = 1.02, L = 1.42	W = 40, L = 40
TL132, TL133	0.009 λ, 53.11 Ω	W = 1.02, L = 0.76	W = 40, L = 40
TL134	0.100 λ, 53.11 Ω	W = 1.02, L = 8.2	W = 40, L = 40
TL135	0.045 λ, 62.65 Ω	W = 0.76, L = 3.71	W = 30, L = 30
TL137	0.003 λ, 62.65 Ω	W = 0.76, L = 0.28	W = 30, L = 30
TL138	0.027 λ, 28.26 Ω	W1 = 2.54, W2 = 2.54, W3 = 2.16	W1 = 100, W2 = 100, W3 = 85
TL139, TL142	0.014 λ, 7.13 Ω	W1 = 12.7, W2 = 12.7, W3 = 1.02	W1 = 500, W2 = 500, W3 = 40
TL140, TL141, TL143, TL144	0.015 λ, 62.65 Ω	W1 = 0.76, W2 = 0.76, W3 = 1.27	W1 = 30, W2 = 30, W3 = 50
TL145	0.012 λ, 62.65 Ω	W1 = 0.76, W2 = 0.76, W3 = 1.02	W1 = 30, W2 = 30, W3 = 40
TL150	0.102 λ, 53.11 Ω	W = 1.02, L = 8.36	W = 40, L = 40
TL151, TL156	0.015 λ, 53.11 Ω	W1 = 1.02, W2 = 1.02, W3 = 1.27	W1 = 40, W2 = 40, W3 = 50
TL152	0.016 λ, 48.71 Ω	W1 = 1.17, W2 = 1.17, W3 = 1.27	W1 = 46, W2 = 46, W3 = 50
TL153	0.012 λ, 48.71 Ω	W = 1.17, L = 0.97	W = 46, L = 46
TL154	0.017 λ, 7.13 Ω	W = 12.7, L = 1.3	W = 500, L = 500
TL155	0.009 λ, 46.18 Ω	W1 = 1.27, W2 = 0.76, W3 = 1.27W4	W1 = 50, W2 = 50, W3 = 50, W4 = 30
Output			
TL203	0.027 λ, 11.33 Ω	W1 = 7.62, W2 = 7.62, W3 = 2.03	W1 = 300, W2 = 300, W3 = 80
TL204	0.029 λ, 11.33 Ω	W = 7.62, L = 2.18	W = 300, L = 300
TL205	0.091 λ, 20.5 Ω	W = 3.81, L = 7.11	W = 150, L = 150
TL206	0.029 λ, 20.5 Ω	W1 = 3.81, W2 = 3.81, W3 = 2.29	W1 = 150, W2 = 150, W3 = 90
TL207, TL216	0.000 λ, 141.78 Ω	W = 0.03, L = 0.03	W = 1, L = 1
TL208	0.009 λ, 4.2 Ω	W = 22.35, L = 0.65	W = 880, L = 880
TL209	0.021 λ, 7.75 Ω	W = 11.61, L = 1.6	W = 457, L = 457
TL210	0.013 λ, 11.33 Ω	W = 7.62, L = 1.02	W = 300, L = 300
TL211	0.017 λ, 20.5 Ω	W = 3.81, L = 1.3	W = 150, L = 150
TL212	0.100 λ, 20.5 Ω	W = 3.81, L = 7.8	W = 150, L = 150
TL213	0.003 λ, 10.21 Ω	W1 = 8.56, W2 = 0.25, W3 = 8.56W4	W1 = 337, W2 = 337, W3 = 337, W4 = 10
TL214	0.021 λ, 4.2 Ω	W1 = 22.35, W2 = 1.52, W3 = 22.35W4	W1 = 880, W2 = 880, W3 = 880, W4 = 60
TL215	0.049 λ, 20.5 Ω	W1 = 3.81, W2 = 3.81, W3 = 3.81	W1 = 150, W2 = 150, W3 = 150
TL217	0.016 λ, 20.5 Ω	W = 3.81, L = 1.27	W = 150, L = 150
TL218	0.034 λ, 46.18 Ω	W = 1.27, L = 2.74	W = 50, L = 50
TL219	0.036 λ, 34.02 Ω	W = 1.98, L = 2.84	W = 78, L = 78

(table cont. next page)

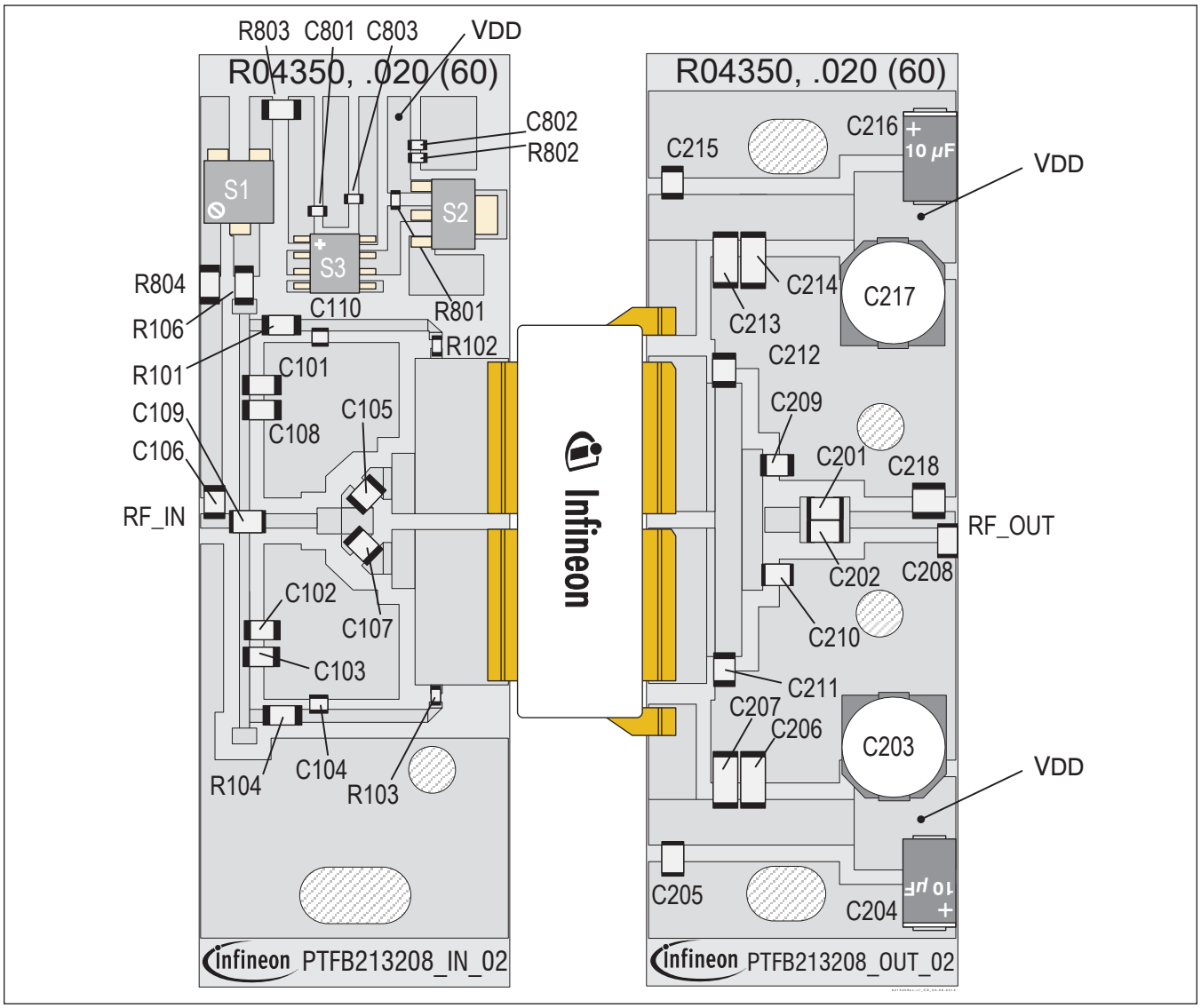
Reference Circuit (cont.)

Electrical Characteristics at 2170 MHz (output cont.)

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
TL223, TL224	0.018 λ, 100.15 Ω	W1 = 0.25, W2 = 0.25, W3 = 1.52	W1 = 10, W2 = 10, W3 = 60
TL229, TL232	0.009 λ, 8.46 Ω	W = 10.54, L = 0.65	W = 415, L = 415
TL230, TL234	0.064 λ, 7.13 Ω	W = 12.7, L = 4.8	W = 500, L = 500
TL235	0.016 λ, 20.5 Ω	W = 3.81, L = 1.27	W = 150, L = 150
TL236, TL243	0.012 λ, 11.33 Ω	W = 7.62, L = 0.94	W = 300, L = 300
TL237, TL251, TL242	0.027 λ, 11.33 Ω	W1 = 7.62, W2 = 7.62, W3 = 2.03	W1 = 300, W2 = 300, W3 = 80
TL238, TL241, TL248	0.029 λ, 20.5 Ω	W1 = 3.81, W2 = 3.81, W3 = 2.29	W1 = 150, W2 = 150, W3 = 90
TL239	0.019 λ, 46.18 Ω	W1 = 1.27, W2 = 1.27, W3 = 1.52	W1 = 50, W2 = 50, W3 = 60
TL240	0.036 λ, 46.18 Ω	W = 1.27, L = 2.97	W = 50, L = 50
TL244	0.049 λ, 20.5 Ω	W1 = 3.81, W2 = 3.81, W3 = 3.81	W1 = 150, W2 = 150, W3 = 150
TL245	0.100 λ, 20.5 Ω	W = 3.81, L = 7.8	W = 150, L = 150
TL246	0.017 λ, 20.5 Ω	W = 3.81, L = 1.3	W = 150, L = 150
TL247	0.013 λ, 11.33 Ω	W = 7.62, L = 1.02	W = 300, L = 300
TL249	0.091 λ, 20.5 Ω	W = 3.81, L = 7.11	W = 150, L = 150
TL250	0.029 λ, 11.33 Ω	W = 7.62, L = 2.18	W = 300, L = 300
TL252	0.019 λ, 46.18 Ω	W1 = 1.27, W2 = 1.27, W3 = 1.52	W1 = 50, W2 = 50, W3 = 60, = 0

See next page for assembly information

Reference Circuit (cont.)



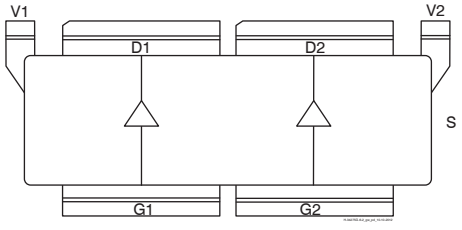
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C103	Chip capacitor, 1 µF	Panasonic Electronic Components	ECJ-3VB1H104K
C102, C108	Chip capacitor, 4.7 µF	Panasonic Electronic Components	ECS-T1CY475R
C104, C110	Chip capacitor, 10 pF	ATC	ATC100A100JW150XB
C105, C107, C109	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB
C106	Chip capacitor, 1.50 pF	ATC	ATC100B1R5CW500XB
C801, C802, C803	Chip capacitor, 1,000 pF	Panasonic Electronic Components	ECJ-1VB1H102
R101	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
R102, R103	Resistor, 0.00 Ω	Panasonic Electronic Components	ERJ-3GEY0R00V
R104, R106, R804	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
R801	Resistor, 1,200 Ω	Panasonic Electronic Components	ERJ-3GEYJ122V
R802	Resistor, 1,300 Ω	Panasonic Electronic Components	ERJ-3GEYJ132V
R803	Resistor, 100 Ω	Panasonic Electronic Components	ERJ-8GEYJ101V
S1	Potentiometer, 2k Ω	Bourns Inc	3224W-1-202E
S2	Transistor	Infineon Technologies	BCP56
S3	Voltage Regulator	Texas Instruments	LM7805
Output			
C201, C202	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB
C203, C217	Capacitor, 100 µF	Panasonic Electronic Components	EEE-FP1V101AP
C204, C216	Capacitor, 10 µF	AVX Corporation	TPSE106K050R0400
C205, C215	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C206, C214	Chip capacitor, 1 µF	TDK Corporation	C4532X7R2A105M230KA
C207, C213	Chip capacitor, 2.2 µF	TDK Corporation	C4532X7R1H225M160KA
C208	Chip capacitor, 0.20 pF	ATC	ATC100B0R2BW500XB
C209, C210	Chip capacitor, 0.30 pF	ATC	ATC100B0R3CW500XB
C211, C212	Chip capacitor, 1.30 pF	ATC	ATC100B1R3CW500XB
C218	Chip capacitor, 1.50 pF	ATC	ATC100B1R5CW500XB

Pinout Diagram (top view)



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

Lead connections for PTFB213208SV

Package Outline Specifications

Package H-37275G-6/2 (formed leads)

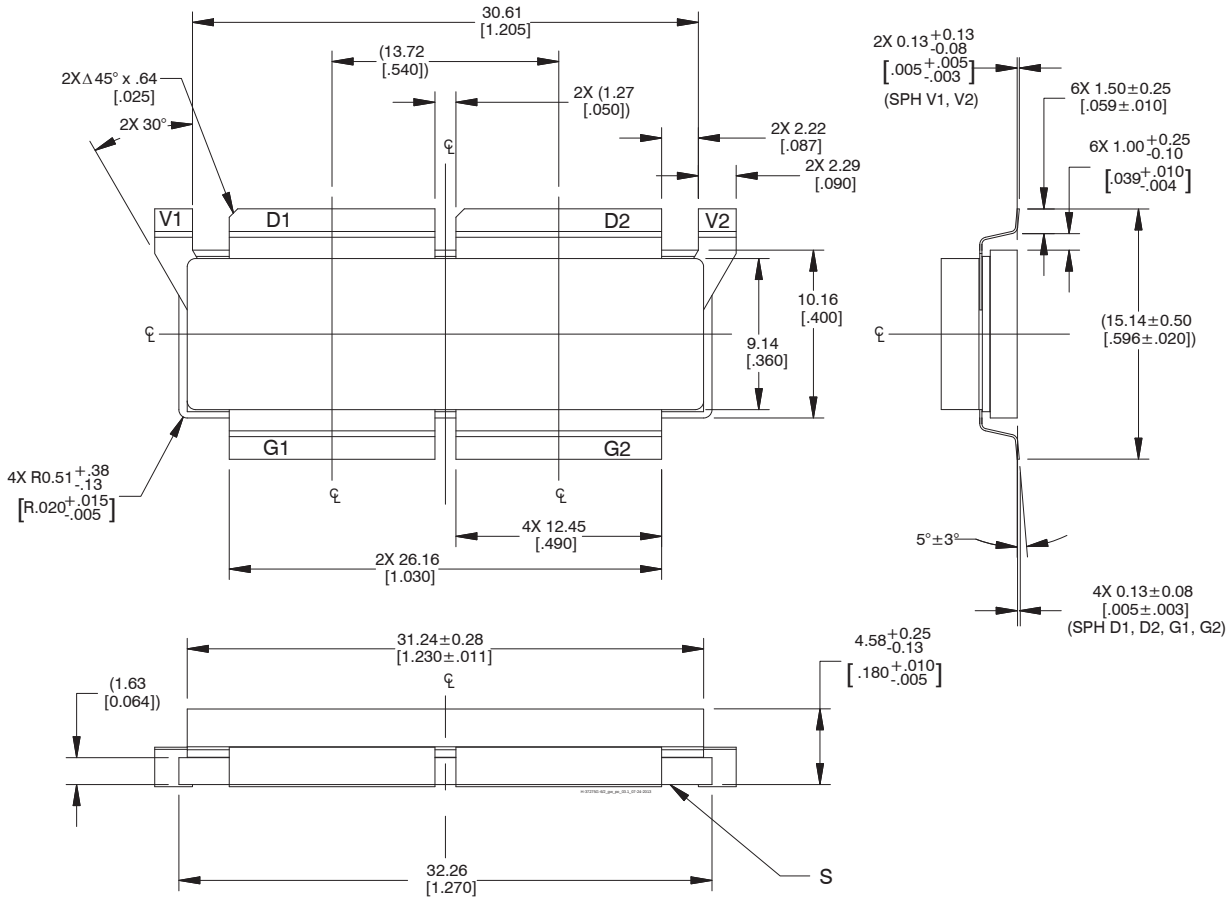


Diagram Notes—unless otherwise specified:

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].
4. Pins: D1, D2 – drain, G1, G2 – gate, S – source, V1, V2 – V_{DD}.
5. Lead thickness: 0.13 +0.051/–0.025 [.005 +.002/–.001].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

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

Revision History

Revision	Date	Data Sheet	Page	Subjects (major changes compared to previous revision)
01	2012-02-07	Advance	All	Data Sheet reflects advance specification for product development
02	2013-05-17	Production	All	Data Sheet reflects released product specification Product released: Specifications updated; circuit and other information added
03	2014-03-06	Production	All 1 2 4 7 (10), 11 12	New package changes product to Version 2. Clarifiy graph and table labels. Specify output power for thermal resistance specification, update ordering table & pinout diagram. Misc. corrections and relabeling of three graphs. Ɛr corrected to 3.66. Add manufacturer name to components table. New package: diagram and information.
04	2014-08-20	Production	12	Correct lead measurements in diagram and notes

We Listen to Your Comments

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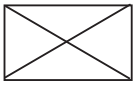

Edition 2014-08-20

Published by
Infineon Technologies AG
85579 Neubiberg, Germany

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