PTFB183404E
PTFB183404F

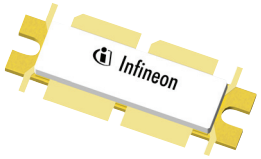
green Product

High Power RF LDMOS Field Effect Transistors
340 W, 1805 – 1880 MHz

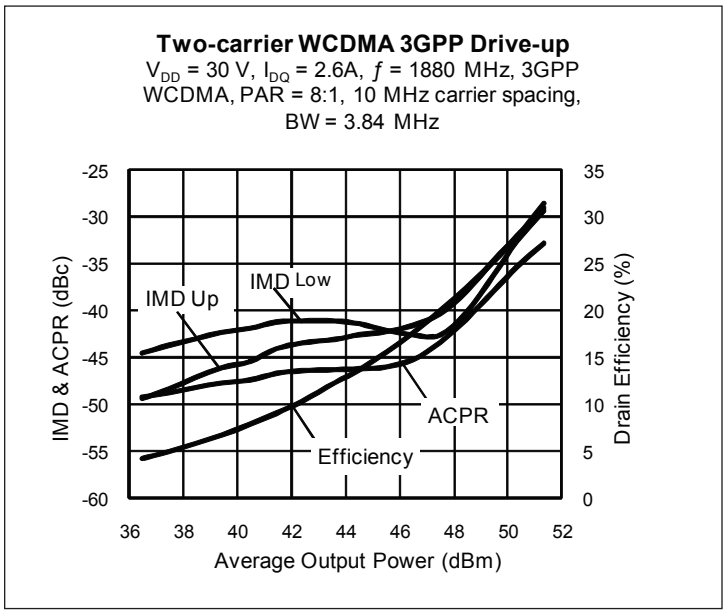
Description

The PTFB183404E and PTFB183404F are 340-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 and thermally-enhanced package with slotted and earless flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFB183404E
Package H-36275-8



PTFB183404F
Package H-37275-6/2



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, 340 W (CW) output power
- Integrated ESD protection
- Excellent thermal stability
- Pb-free and RoHS compliant

RF Characteristics

Two-carrier WCDMA Measurements (tested in Infineon test fixture)
V_{DD} = 30 V, I_{DQ} = 2.6 A, P_{OUT} = 80 W average, f_1 = 1870 MHz, f_2 = 1880 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16	17	—	dB
Drain Efficiency	ηD	24	25.5	—	%
Intermodulation Distortion	IMD	—	–35	–32	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 Performance (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)
Gain	P_{OUT} (AVG) = 49 dBm	G_{ps}	17.1	17.3	17.5
	P_{OUT} (AVG) = 51 dBm		17.0	17.15	17.4
Drain Efficiency	P_{OUT} (AVG) = 49 dBm	ηD	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
	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
	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	ηD	—	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

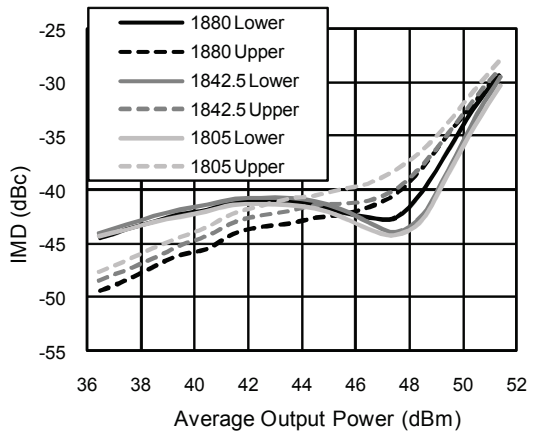
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 340 W CW)	$R_{\theta JC}$	0.2	°C/W

Ordering Information

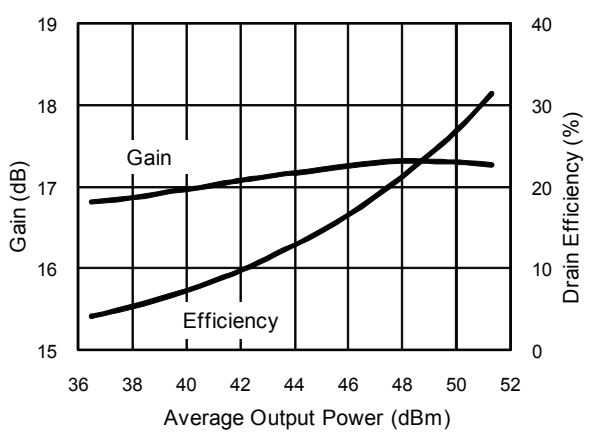
Type and Version	Order Code	Package Description	Shipping
PTFB183404E V1 R0	PTFB183404EV1R0XTMA1	Slotted push-pull	Tape & Reel, 50pcs
PTFB183404E V1 R250	PTFB183404EV1R250XTMA1	Slotted push-pull	Tape & Reel, 250pcs
PTFB183404F V2 R0	PTFB183404FV2R0XTMA1	Earless push-pull	Tape & Reel, 50pcs
PTFB183404F V2 R250	PTFB183404FV2R250XTMA1	Earless push-pull	Tape & Reel, 250pcs

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

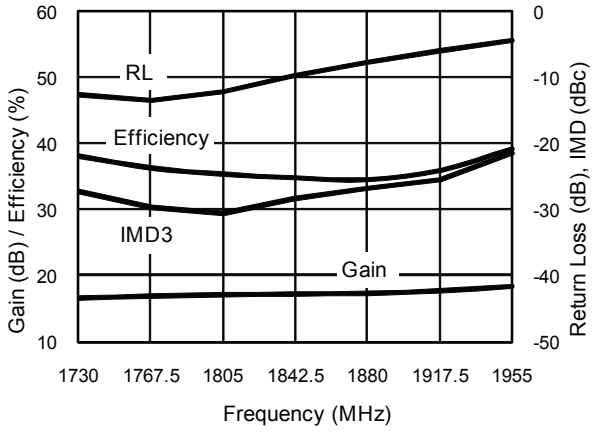


Two-carrier WCDMA 3GPP
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1880 MHz, 3GPP WCDMA, PAR = 8:1, 10 MHz carrier spacing, BW = 3.84MHz

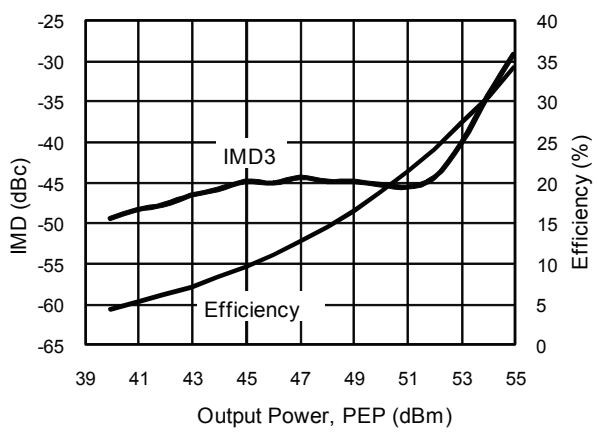


Typical Performance (cont.)

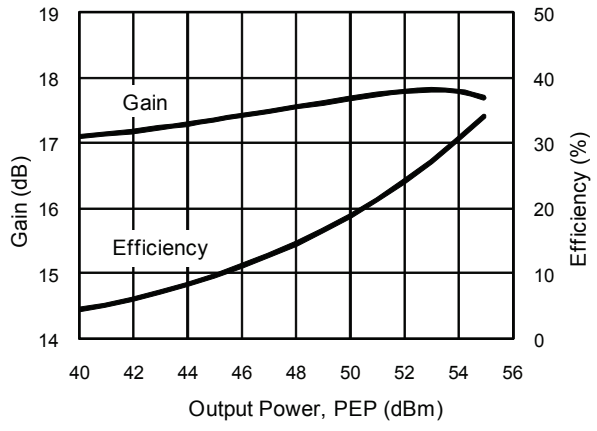
Two-tone Broadband
Gain, Efficiency & Return Loss
vs. Frequency
V_{DD} = 30 V, I_{DQ} = 2.6 A, P_{OUT} = 170 W



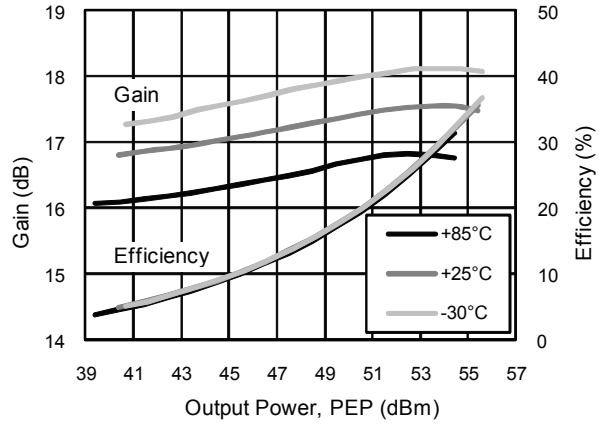
Two-tone Drive-up
V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1880 MHz, f_2 = 1879 MHz



Two-tone Drive-up
V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1880 MHz, f_2 = 1879 MHz

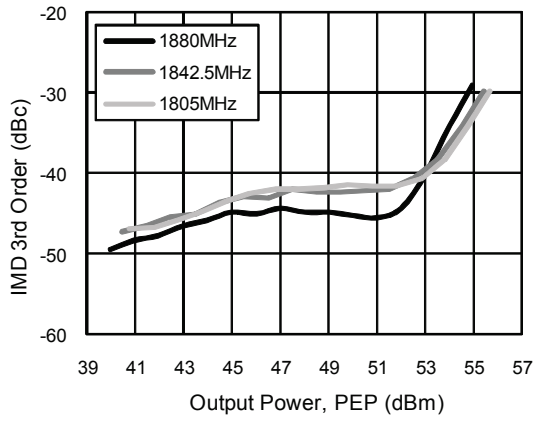


Two-tone Drive-up (over temp)
(P_{OUT}-max 3rd order IMD @ -30dBc)
V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1842.5 MHz, f_2 = 1841.5 MHz

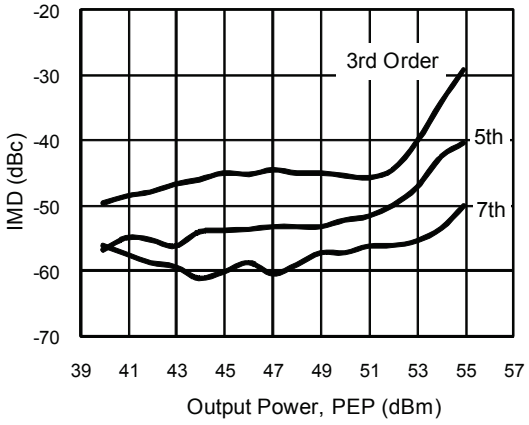


Typical Performance (cont.)

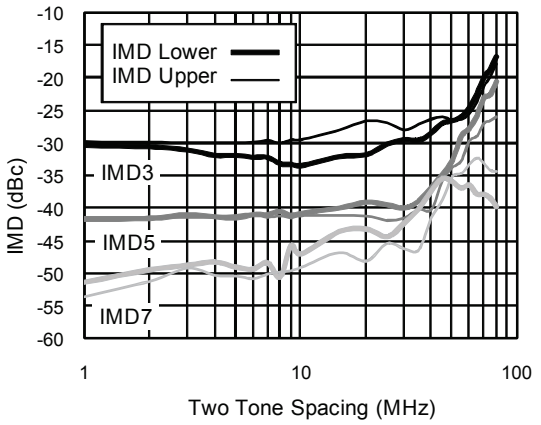
Two-tone Drive-up at Selected Frequencies
V_{DD} = 30 V, I_{DQ} = 2.6 A, tone spacing = 1 MHz



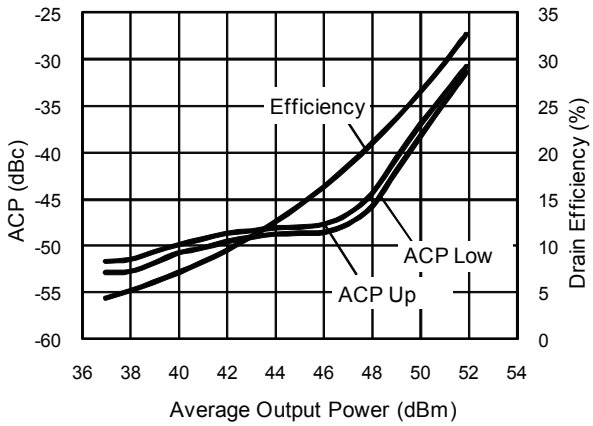
Intermodulation Distortion vs. Output Power
V_{DD} = 30 V, I_{DQ} = 2.6 A,
f_1 = 1880 MHz, f_2 = 1879 MHz



Intermodulation Distortion vs. Tone Spacing
f = 1842.5 MHz, P_{OUT} = 330 W (PEP),
V_{DD} = 30 V, I_{DQ} = 2.6 A

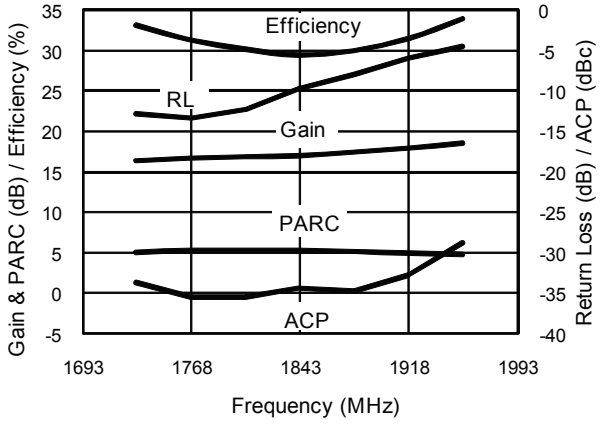


Single-carrier Drive-up, 1880 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1880 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz

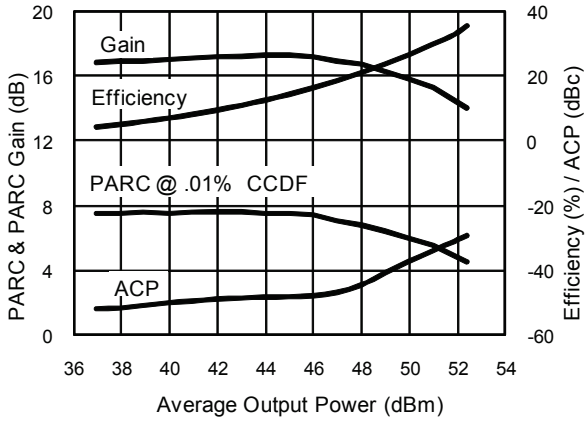


Typical Performance (cont.)

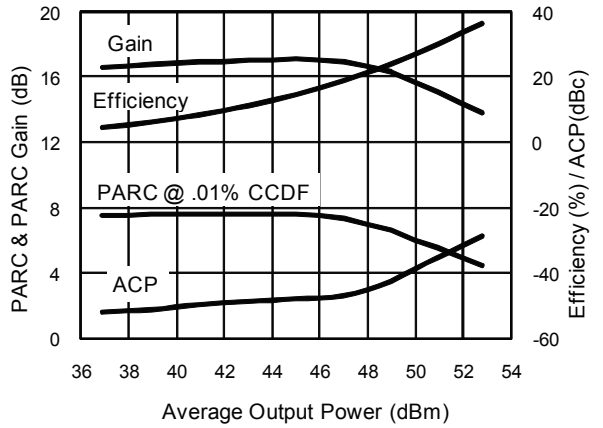
Single-carrier Broadband Performance
V_{DD} = 30 V, I_{DQ} = 2.6 A, P_{OUT} = 125 W



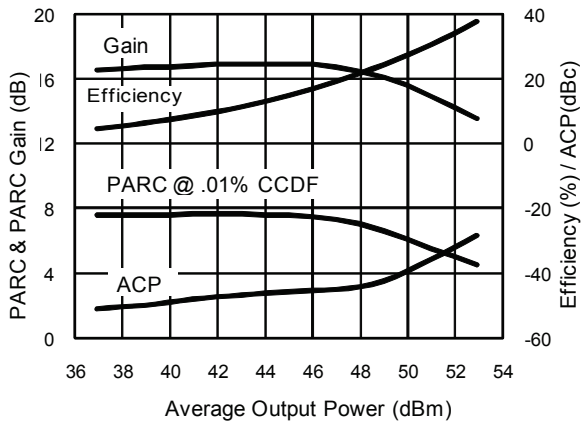
Single-carrier Drive-up, 1880 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1880 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



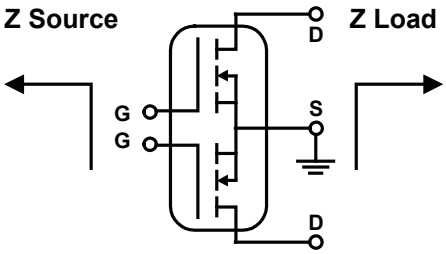
Single-carrier Drive-up, 1842 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1842 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



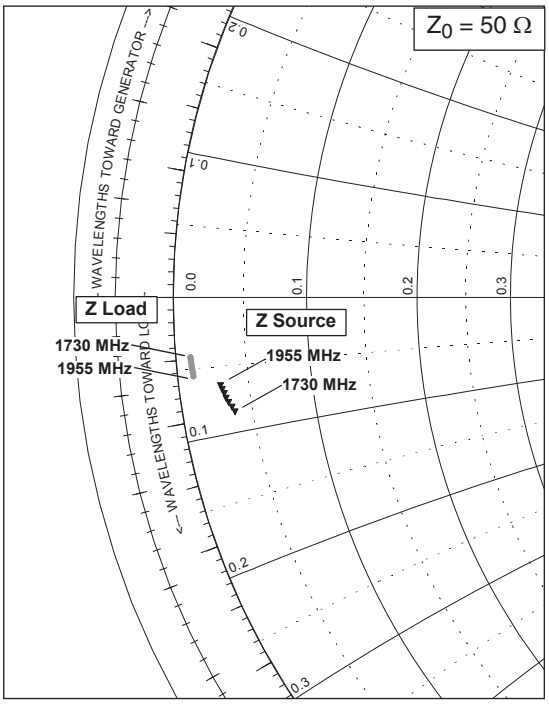
Single-carrier Drive-up, 1805 MHz
V_{DD} = 30 V, I_{DQ} = 2.6 A, f = 1805 MHz,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



Broadband Circuit Impedance (combined leads)

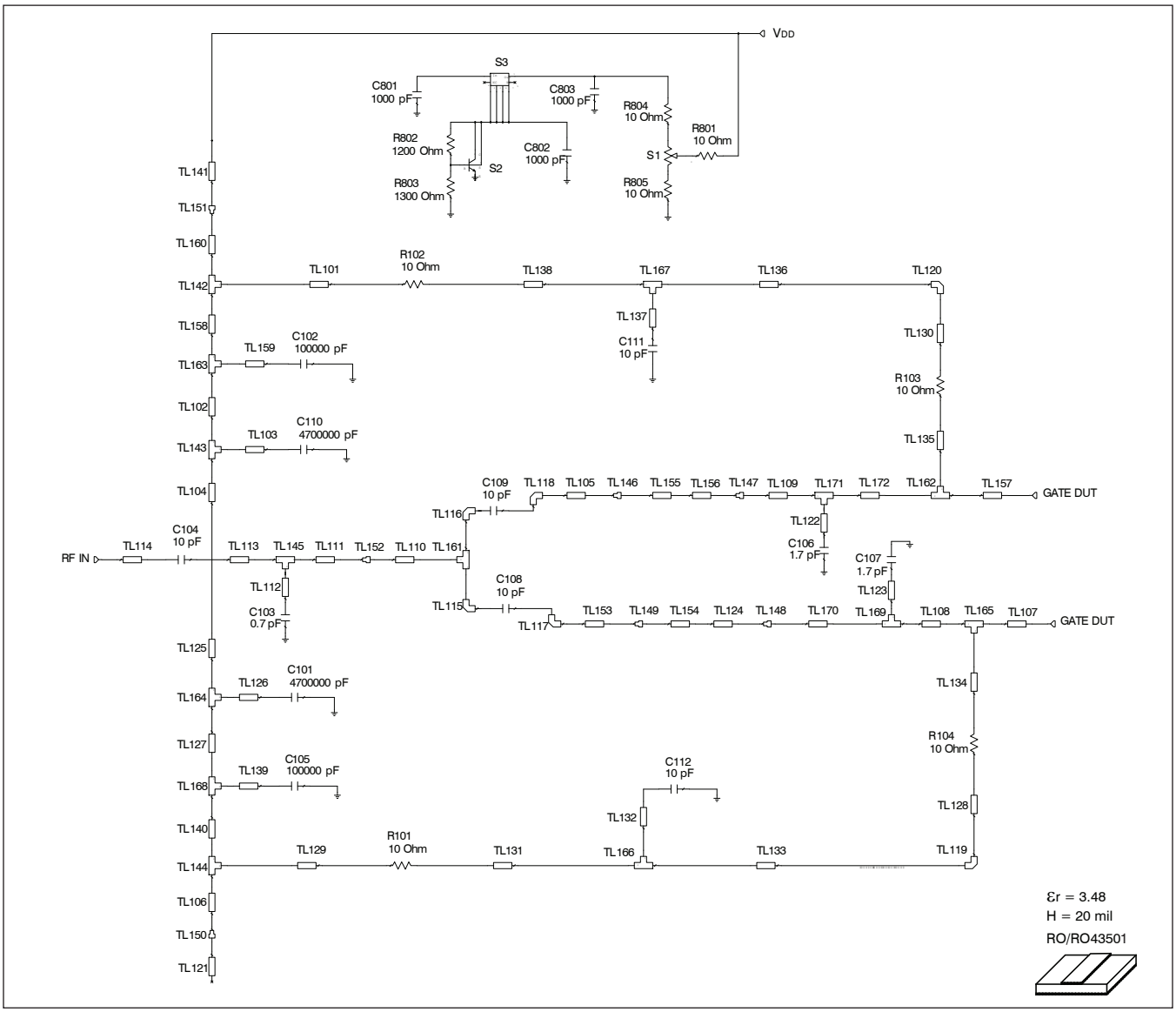


Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1730	1.86	–4.25	0.55	–2.78
1768	1.77	–4.06	0.54	–2.66
1805	1.68	–3.88	0.53	–7.54
1843	1.61	–3.70	0.52	–2.43
1880	1.56	–3.53	0.51	–2.32
1918	1.51	–3.37	0.51	–2.21
1955	1.47	–3.22	0.5	–2.11



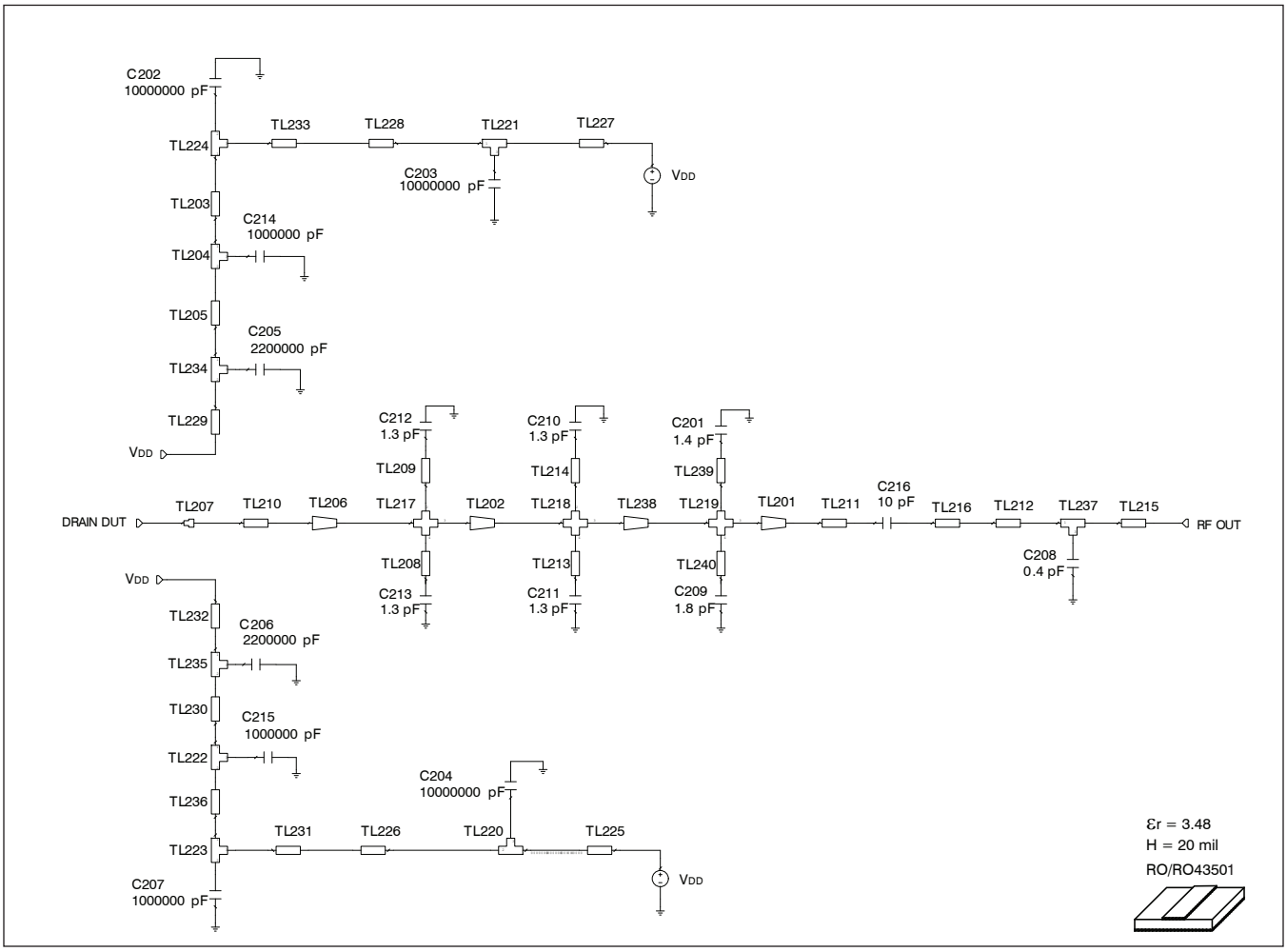
See next page for reference circuit information

Reference Circuit



Reference circuit input schematic for ƒ = 1880 MHz

Reference Circuit (cont.)



Reference circuit output schematic for ƒ = 1880 MHz

Reference Circuit (cont.)

Description	
DUT	PTFB183404E or PTFB183404F
PCB	0.508 mm [.020"] thick, εr = 3.48, Rogers 4350, 1 oz. copper

Electrical Characteristics at 1880 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101, TL129	0.017 λ, 54.17 Ω	W = 1.016, L = 1.651	W = 40, L = 65
TL102	0.002 λ, 63.89 Ω	W = 0.762, L = 0.203	W = 30, L = 8
TL103, TL139	0.000 λ, 41.75 Ω	W = 1.524, L = 0.025	W = 60, L = 1
TL104	0.208 λ, 63.89 Ω	W = 0.762, L = 20.297	W = 30, L = 799
TL105	0.008 λ, 28.85 Ω	W = 2.540, L = 0.762	W = 100, L = 30
TL106	0.005 λ, 63.89 Ω	W = 0.762, L = 0.508	W = 30, L = 20
TL107, TL157	0.061 λ, 8.03 Ω	W = 11.430, L = 5.359	W = 450, L = 211
TL108, TL172	0.004 λ, 8.03 Ω	W = 11.430, L = 0.338	W = 450, L = 13
TL109, TL170	0.002 λ, 8.03 Ω	W = 11.430, L = 0.196	W = 450, L = 8
TL110	0.022 λ, 32.60 Ω	W = 2.159, L = 2.032	W = 85, L = 80
TL111	0.028 λ, 49.69 Ω	W = 1.168, L = 2.710	W = 46, L = 107
TL112	0.000 λ, 63.89 Ω	W = 0.762, L = 0.025	W = 30, L = 1
TL113	0.016 λ, 49.69 Ω	W = 1.168, L = 1.549	W = 46, L = 61
TL114	0.029 λ, 49.69 Ω	W = 1.168, L = 2.743	W = 46, L = 108
TL115, TL116, TL117, TL118		W = 2.540	W = 100
TL119, TL120		W = 1.016	W = 40
TL121, TL141	0.013 λ, 34.08 Ω	W = 2.032, L = 1.270	W = 80, L = 50
TL122, TL123	0.000 λ, 63.89 Ω	W = 0.762, L = 0.000	W = 30, L = 0
TL124, TL156	0.014 λ, 17.20 Ω	W = 4.826, L = 1.270	W = 190, L = 50
TL125	0.013 λ, 63.89 Ω	W = 0.762, L = 1.270	W = 30, L = 50
TL126, TL139, TL159	0.000 λ, 41.75 Ω	W = 1.524, L = 0.025	W = 60, L = 1
TL127	0.002 λ, 63.89 Ω	W = 0.762, L = 0.203	W = 30, L = 8
TL128, TL130	0.013 λ, 54.17 Ω	W = 1.016, L = 1.262	W = 40, L = 50
TL131, TL138	0.014 λ, 54.17 Ω	W = 1.016, L = 1.397	W = 40, L = 55
TL132, TL137	0.000 λ, 34.08 Ω	W = 2.032, L = 0.025	W = 80, L = 1
TL133, TL136	0.079 λ, 54.17 Ω	W = 1.016, L = 7.620	W = 40, L = 300
TL134, TL135	0.008 λ, 54.17 Ω	W = 1.016, L = 0.762	W = 40, L = 30
TL140	0.015 λ, 63.89 Ω	W = 0.762, L = 1.422	W = 30, L = 56
TL142, TL144	0.010 λ, 63.89 Ω	W1 = 0.762, W2 = 0.762, W3 = 1.016	W1 = 30, W2 = 30, W3 = 40
TL143, TL168	0.016 λ, 63.89 Ω	W1 = 0.762, W2 = 0.762, W3 = 1.524	W1 = 30, W2 = 30, W3 = 60
TL145	0.008 λ, 49.69 Ω	W1 = 1.168, W2 = 1.168, W3 = 0.762	W1 = 46, W2 = 46, W3 = 30
TL146		W1 = 0.003, W2 = 0.005, Offset = 0.000	W1 = 3, W2 = 190, Offset = 10
TL147		W1 = 0.005, W2 = 0.011, Offset = 0.003	W1 = 5, W2 = 450, Offset = 130

table continued on page 11

Reference Circuit (cont.)

Electrical Characteristics at 1880 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL148		W1 = 0.005, W2 = 0.011, Offset = –0.003	W1 = 5, W2 = 450, Offset = –130
TL149		W1 = 0.003, W2 = 0.005, Offset = 0.000	W1 = 3, W2 = 190, Offset = –10
TL150		W1 = 2.032, W2 = 0.762	W1 = 80, W2 = 30
TL151		W1 = 2.540, W2 = 0.762	W1 = 100, W2 = 30
TL152		W1 = 1.168, W2 = 2.159	W1 = 46, W2 = 85
TL153	0.008 λ, 28.85 Ω	W = 2.540, L = 0.762	W = 100, L = 30
TL154, TL155	0.006 λ, 17.20 Ω	W = 4.826, L = 0.508	W = 190, L = 20
TL158	0.015 λ, 63.89 Ω	W = 0.762, L = 1.422	W = 30, L = 56
TL160	0.004 λ, 63.89 Ω	W = 0.762, L = 0.404	W = 30, L = 16
TL161	0.023 λ, 28.85 Ω	W1 = 2.540, W2 = 2.540, W3 = 2.159	W1 = 100, W2 = 100, W3 = 85
TL162, TL165	0.011 λ, 8.03 Ω	W1 = 11.430, W2 = 11.430, W3 = 1.016	W1 = 450, W2 = 450, W3 = 40
TL163, TL164	0.016 λ, 63.89 Ω	W1 = 0.762, W2 = 0.762, W3 = 1.524	W1 = 30, W2 = 30, W3 = 60
TL166, TL167	0.021 λ, 54.17 Ω	W1 = 1.016, W2 = 1.016, W3 = 2.032	W1 = 40, W2 = 40, W3 = 80
TL169, TL171	0.009 λ, 8.03 Ω	W1 = 11.430, W2 = 11.430, W3 = 0.762	W1 = 450, W2 = 450, W3 = 30

See next page for more reference circuit information

Reference Circuit (cont.)

Electrical Characteristics at 1880 MHz

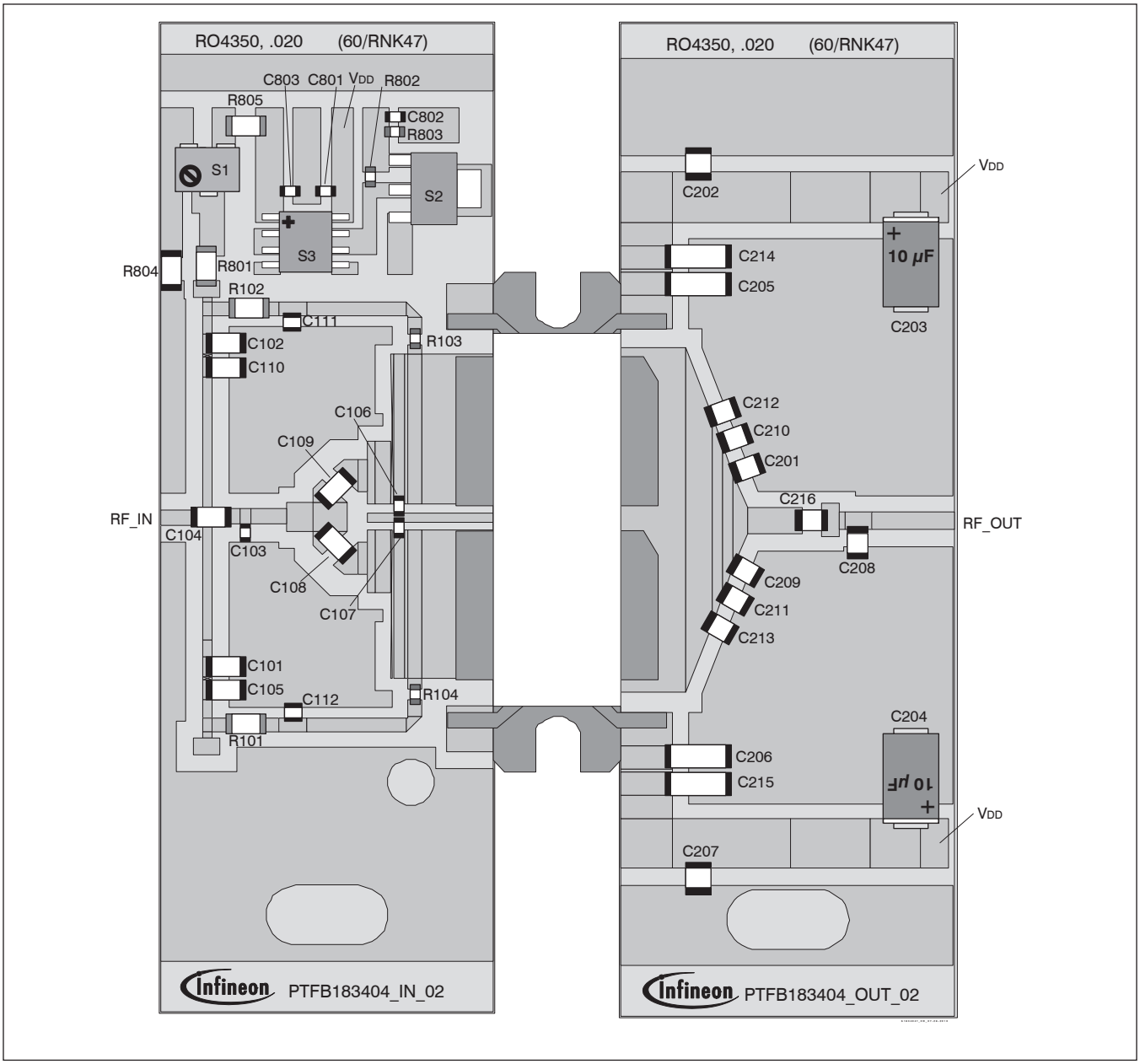
Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Output			
TL201 (taper)	0.011 λ, 12.30 Ω / 34.72 Ω	W1 = 7.112, W2 = 1.981, L = 1.016	W1 = 280, W2 = 78, L = 40
TL202 (taper)	0.009 λ, 5.88 Ω / 7.95 Ω	W1 = 16.002, W2 = 11.557, L = 0.762	W1 = 630, W2 = 455, L = 30
TL203	0.019 λ, 20.93 Ω	W = 3.810, L = 1.778	W = 150, L = 70
TL204	0.019 λ, 20.93 Ω	W1 = 3.810, W2 = 3.810, W3 = 1.778	W1 = 150, W2 = 150, W3 = 70
TL205, TL230	0.003 λ, 20.93 Ω	W = 3.810, L = 0.254	W = 150, L = 10
TL206 (taper)	0.023 λ, 3.67 Ω / 5.88 Ω	W1 = 26.365, W2 = 16.002, L = 2.032	W1 = 1038, W2 = 630, L = 80
TL207		W1 = 25.400, W2 = 26.365	W1 = 1000, W2 = 1038
TL208, TL209	0.000 λ, 144.35 Ω	W = 0.025, L = 0.025	W = 1, L = 1
TL210	0.055 λ, 3.67 Ω	W = 26.365, L = 4.801	W = 1038, L = 189
TL211	0.044 λ, 34.72 Ω	W = 1.981, L = 4.115	W = 78, L = 162
TL212	0.005 λ, 47.12 Ω	W = 1.270, L = 0.432	W = 50, L = 17
TL213, TL214, TL239, TL240	0.000 λ, 144.35 Ω	W = 0.025, L = 0.025	W = 1, L = 1
TL215	0.066 λ, 47.12 Ω	W = 1.270, L = 6.299	W = 50, L = 248
TL216	0.014 λ, 28.85 Ω	W = 2.540, L = 1.270	W = 100, L = 50
TL217		W1 = 16.002, W2 = 0.025, W3 = 16.002 W4 = 0.025	W1 = 630, W2 = 1, W3 = 630, W4 = 1
TL218		W1 = 11.557, W2 = 0.025, W3 = 11.557 W4 = 0.025	W1 = 455, W2 = 1, W3 = 455, W4 = 1
TL219		W1 = 7.112, W2 = 0.025, W3 = 7.112 W4 = 0.025	W1 = 280, W2 = 1, W3 = 280 W4 = 1
TL220, TL221, TL223, TL224	0.042 λ, 20.93 Ω	W1 = 3.810, W2 = 3.810, W3 = 3.810	W1 = 150, W2 = 150, W3 = 150
TL222	0.019 λ, 20.93 Ω	W1 = 3.810, W2 = 3.810, W3 = 1.778	W1 = 150, W2 = 150, W3 = 70
TL225, TL227	0.023 λ, 20.93 Ω	W = 3.810, L = 2.078	W = 150, L = 82
TL226, TL228	0.066 λ, 20.93 Ω	W = 3.810, L = 6.020	W = 150, L = 237
TL229, TL232	0.028 λ, 20.93 Ω	W = 3.810, L = 2.540	W = 150, L = 100
TL231, TL233	0.097 λ, 20.93 Ω	W = 3.810, L = 8.915	W = 150, L = 351
TL234, TL235	0.019 λ, 20.93 Ω	W1 = 3.810, W2 = 3.810, W3 = 1.778	W1 = 150, W2 = 150, W3 = 70,
TL236	0.019 λ, 20.93 Ω	W = 3.810, L = 1.778	W = 150, L = 70
TL237	0.021 λ, 47.12 Ω	W1 = 1.270, W2 = 1.270, W3 = 2.032	W1 = 50, W2 = 50, W3 = 80
TL238 (taper)	0.009 λ, 7.95 Ω / 12.30 Ω	W1 = 11.557, W2 = 7.112, L = 0.787	W1 = 455, W2 = 280, L = 31

Reference Circuit (cont.)

Circuit Assembly Information

Test Fixture Part No.	LTN/PTFB183404EF

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

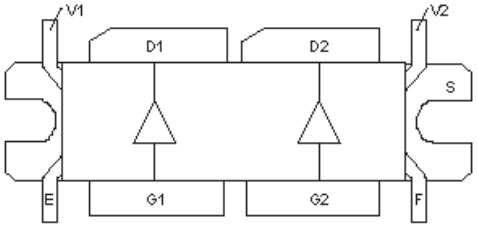


Reference circuit assembly diagram (not to scale)

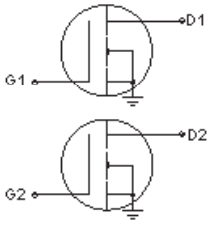
Reference Circuit (cont.)

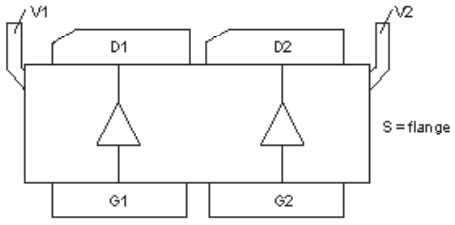
Component	Description	Suggested Manufacturer	P/N
Input			
C101, C110	Chip capacitor, 4.7 µF	Digi-Key	PCS3475CT-ND
C102, C105	Chip capacitor, 0.1 µF	Digi-Key	PCC104BCT-ND
C103	Chip capacitor, 0.7 pF	ATC	ATC100B0R7BW500XB
C104, C108, C109	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB
C106, C107	Chip capacitor, 1.7 pF	ATC	ATC100A1R7BW150XB
C111, C112	Chip capacitor, 10 pF	ATC	ATC100A100JW500XB
C801, C802, C803	Chip capacitor, 1000 pF	Digi-Key	PCC1772CT-ND
R101, R102, R801, R804, R805	Resistor, 10 Ω	Digi-Key	P10ECT-ND
R103, R104	Resistor, 10 Ω	Digi-Key	P10GCT-ND
R802	Resistor, 1200 Ω	Digi-Key	P1.2KGCT-ND
R803	Resistor, 1300 Ω	Digi-Key	P1.3KGCT-ND
S1	Potentiometer, 2k Ω	Digi-Key	3224W-202ECT-ND
S2	Transistor	Digi-Key	BCP5616TA-ND
S3	Voltage Regulator	Digi-Key	LM7805
Output			
C201	Chip capacitor, 1.4 pF	ATC	ATC100B1R4BW500XB
C202, C207	Chip capacitor, 10 µF	Digi-Key	587-1818-2-ND
C203, C204	Tantalum capacitor, 10 µF	Digi-Key	TPSE106K050R0400
C205, C206	Chip capacitor, 2.2 µF	Digi-Key	445-1447-2-ND
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	Digi-Key	445-1411-2-ND
C216	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB

Pinout Diagram



TOP VIEW





TOP VIEW

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
E	N.C.
F	N.C.
S	Source (flange)

Package Outline Specifications

Package H-36275-8

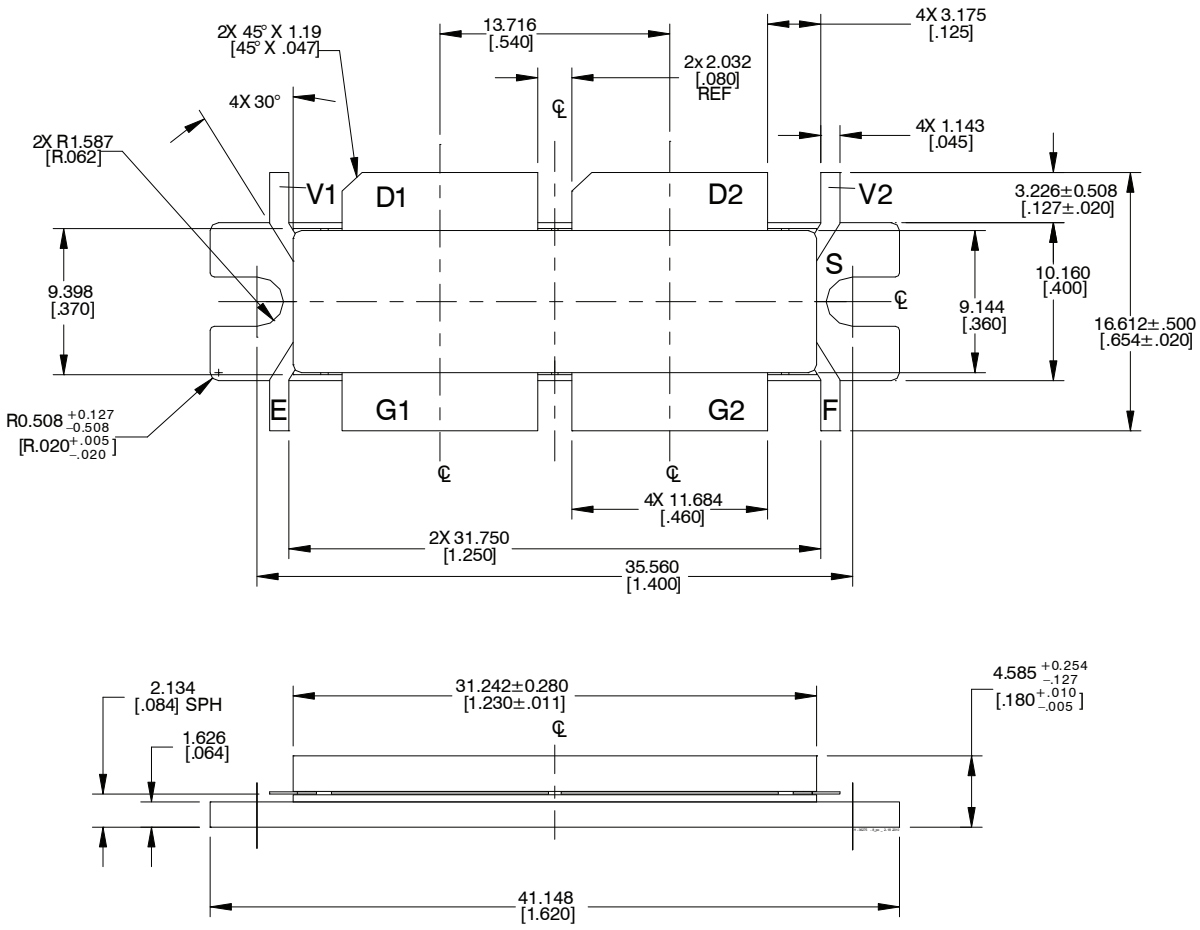


Diagram Notes—unless otherwise specified:

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: G1, G2 = gate; D1, D2 = drain; V1, V2 = V_{DD}; E, F = N.C.; S = source
5. Lead thickness: 0.127 +0.051/–0.025 [.005 +.002/–.001].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

Package Outline Specifications (cont.)

Package H-37275-6/2

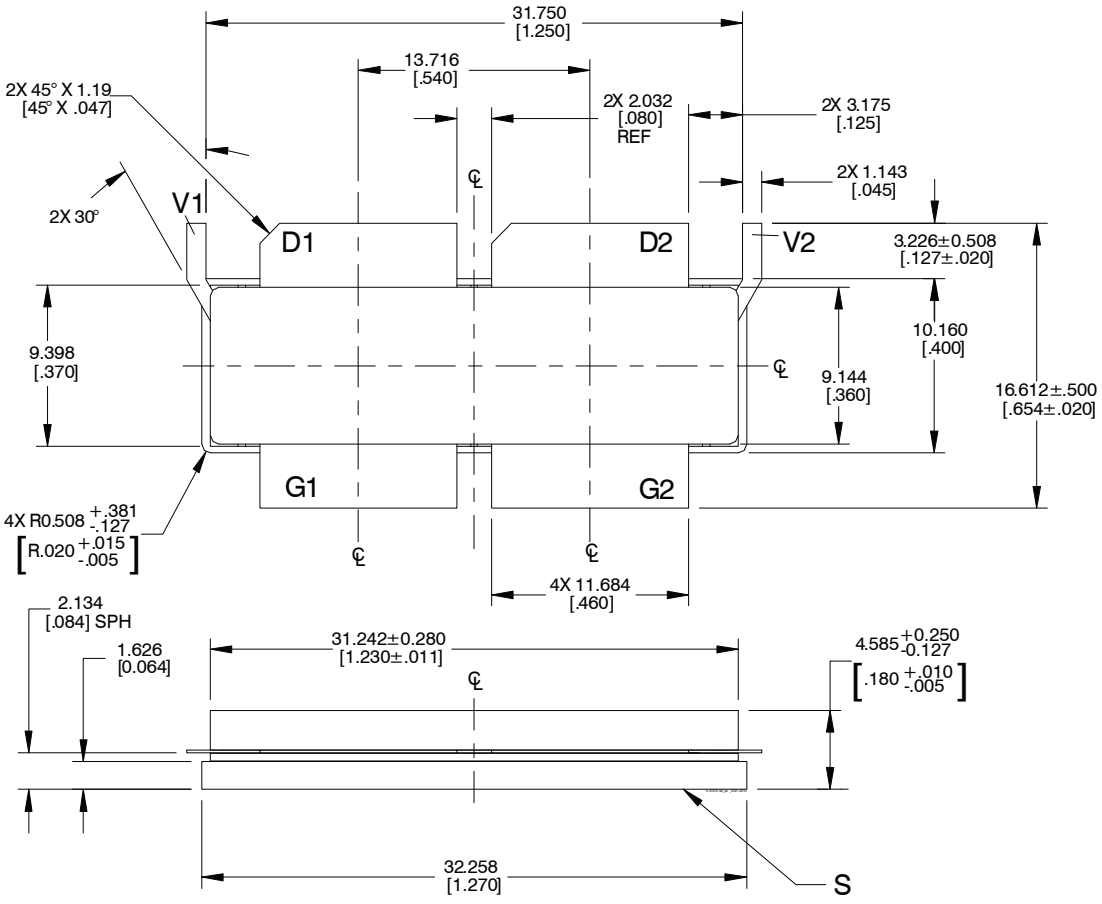


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
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4. Pins: G1, G2 = gate; D1, D2 = drain; V1, V2 = V_{DD}; S = source.
5. Lead thickness: 0.127 ±.051 [.005 ±.002].
6. Gold plating thickness: 1.1 ±.38 micron [45 ± 15 microinch].

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Revision History:	2016-06-10	Data Sheet
Previous Version:	2010-11-17, Data Sheet	

Page	Subjects (major changes since last revision)
3	Added ordering code

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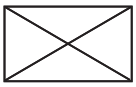

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