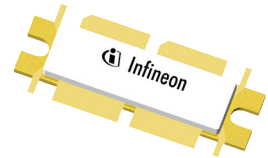


High Power RF LDMOS Field Effect Transistors 340 W, 1805 – 1880 MHz

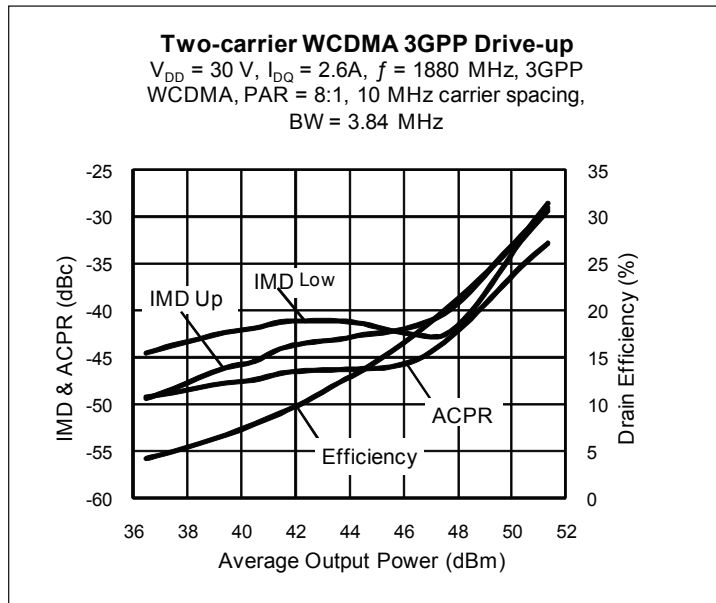
Description

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)

$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $P_{OUT} = 80\text{ W}$ average, $f_1 = 1870\text{ MHz}$, $f_2 = 1880\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	16	17	—	dB
Drain Efficiency	η_D	24	25.5	—	%
Intermodulation Distortion	IMD	—	-35	-32	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.)

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

$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, 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	$P_{OUT} \text{ (AVG)} = 49\text{ dBm}$	G_{ps}	17.1	17.3	17.5
	$P_{OUT} \text{ (AVG)} = 51\text{ dBm}$		17.0	17.15	17.4
Drain Efficiency	$P_{OUT} \text{ (AVG)} = 49\text{ dBm}$	η_D	25	24.5	24
	$P_{OUT} \text{ (AVG)} = 51\text{ dBm}$		31	30	30
Output PAR at 0.01%	$P_{OUT} \text{ (AVG)} = 49\text{ dBm}$	dB	6.5	6.5	6.5
	$P_{OUT} \text{ (AVG)} = 51\text{ dBm}$		5.5	5.5	5.5
Adjacent Channel Power Ratio	$P_{OUT} \text{ (AVG)} = 49\text{ dBm}$	ACPR	-43	-42.5	-41
	$P_{OUT} \text{ (AVG)} = 51\text{ dBm}$		-36	-35	-34

Two-tone Specifications (not subject to production test – verified by design / characterization in Infineon test fixture)

$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $P_{OUT} = 310\text{ W PEP}$, $f = 1880\text{ MHz}$, 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	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	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	$V_{DS} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$	V_{GS}	2.3	2.8	3.3	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

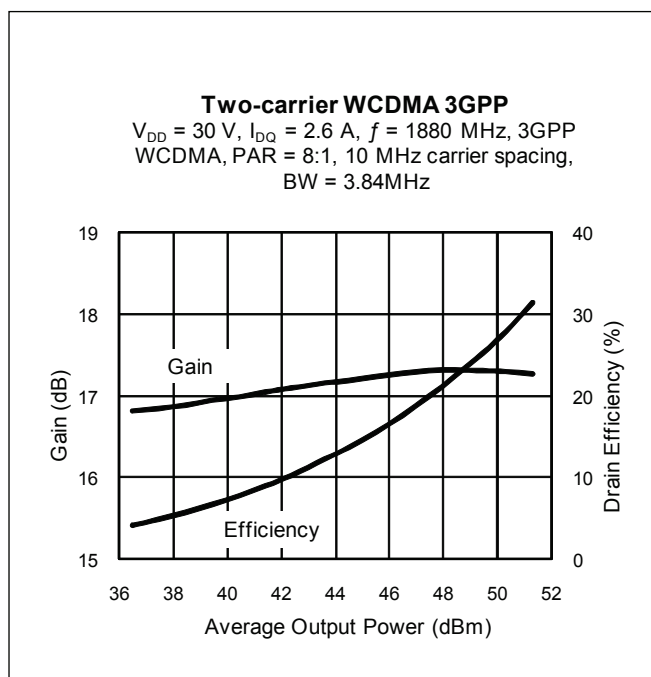
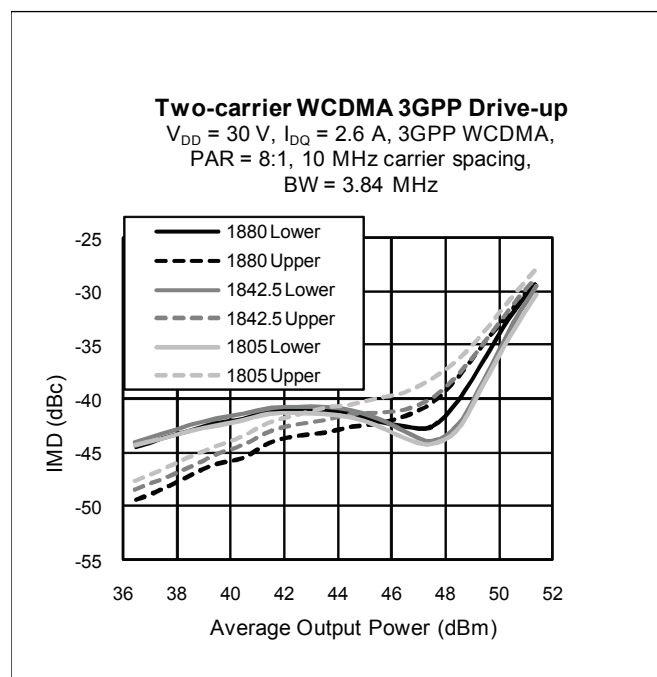
Maximum Ratings

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	°C
Storage Temperature Range	T_{STG}	-40 to +150	°C
Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 340 W CW)	$R_{\theta JC}$	0.2	°C/W

Ordering Information

Type and Version	Package Outline	Package Description	Shipping
PTFB183404E V1	H-36275-8	Ceramic open-cavity, slotted push-pull	Tray
PTFB183404E V1 R250	H-36275-8	Ceramic open-cavity, slotted push-pull	Tape & Reel, 250 pcs
PTFB183404F V2	H-37275-6/2	Ceramic open-cavity, earless push-pull	Tray
PTFB183404F V2 R250	H-37275-6/2	Ceramic open-cavity, earless push-pull	Tape & Reel, 250 pcs

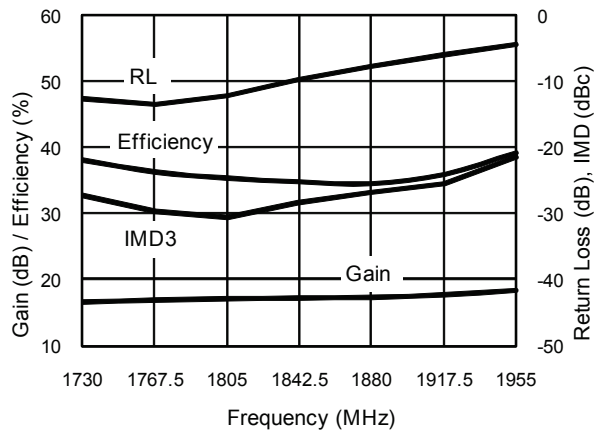
Typical Performance (data taken in a production test fixture)



Typical Performance (cont.)

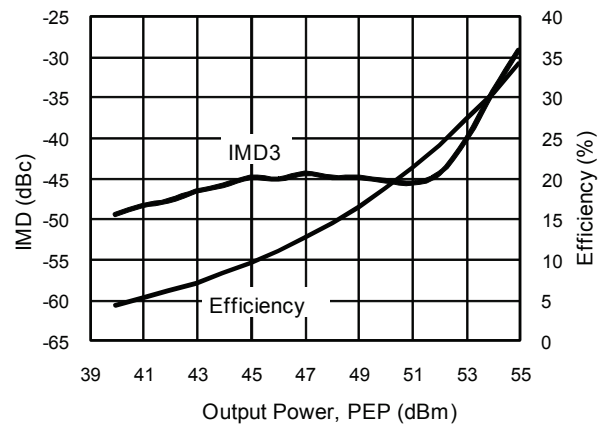
**Two-tone Broadband
Gain, Efficiency & Return Loss
vs. Frequency**

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



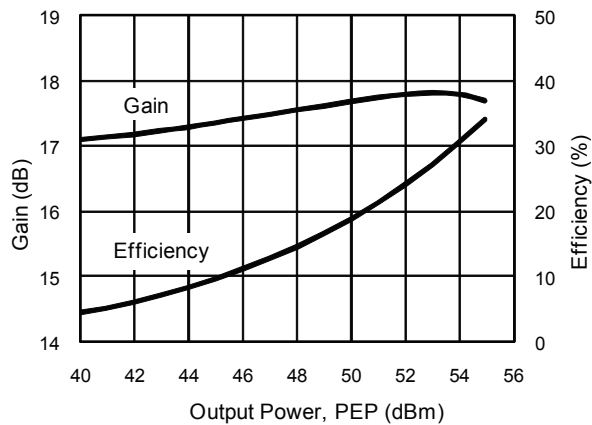
Two-tone Drive-up

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



Two-tone Drive-up

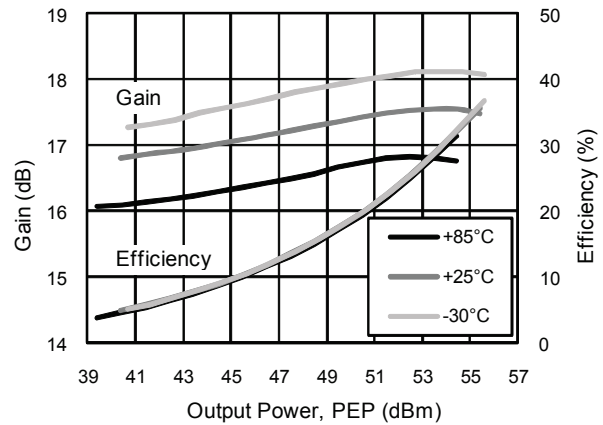
$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$,
 $f_1 = 1880\text{ MHz}$, $f_2 = 1879\text{ MHz}$



Two-tone Drive-up (over temp)

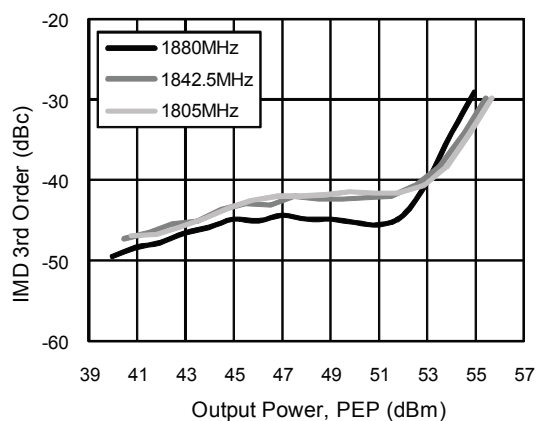
($P_{OUT-max}$ 3rd order IMD @ -30dBc)

$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$,
 $f_1 = 1842.5\text{ MHz}$, $f_2 = 1841.5\text{ MHz}$



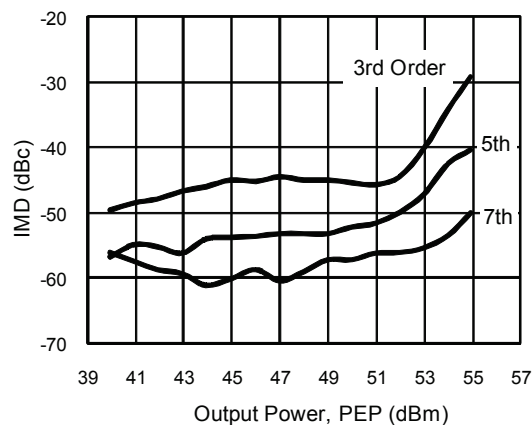
Typical Performance (cont.)

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

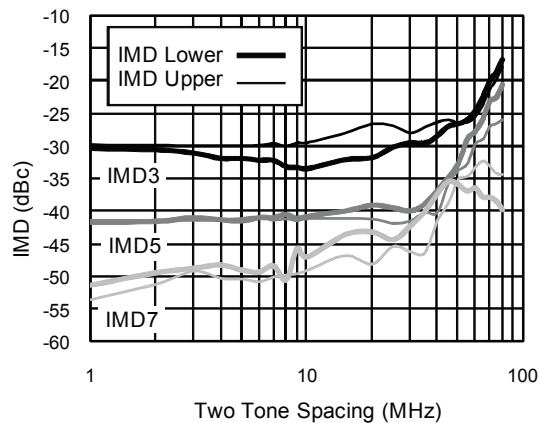


Intermodulation Distortion vs. Output Power

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

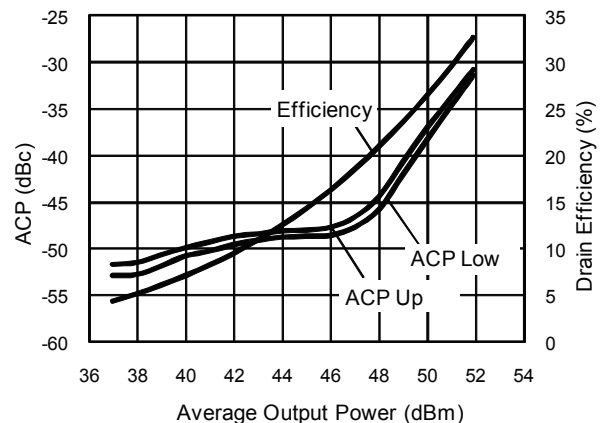


Intermodulation Distortion vs. Tone Spacing
 $f = 1842.5\text{ MHz}$, $P_{OUT} = 330\text{ W (PEP)}$,
 $V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$



Single-carrier Drive-up, 1880 MHz

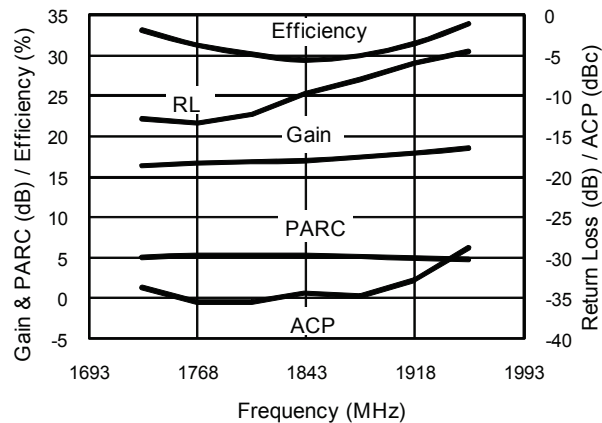
$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $f = 1880\text{ MHz}$,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



Typical Performance (cont.)

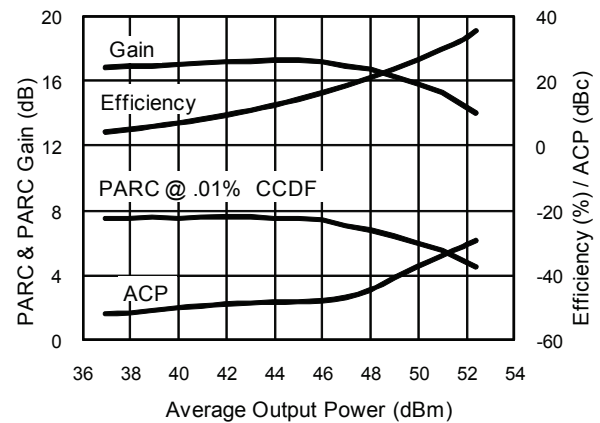
Single-carrier Broadband Performance

$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $P_{OUT} = 125\text{ W}$



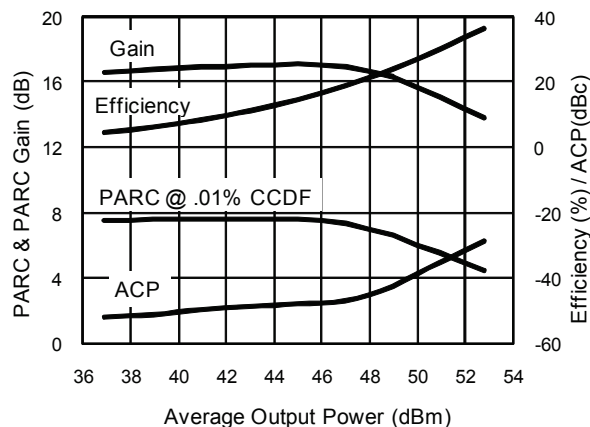
Single-carrier Drive-up, 1880 MHz

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



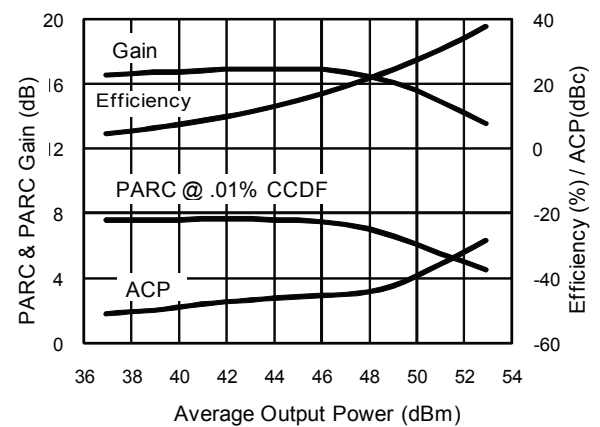
Single-carrier Drive-up, 1842 MHz

$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $f = 1842\text{ MHz}$,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz

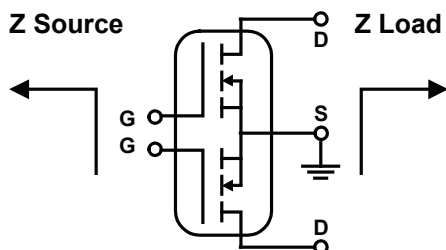


Single-carrier Drive-up, 1805 MHz

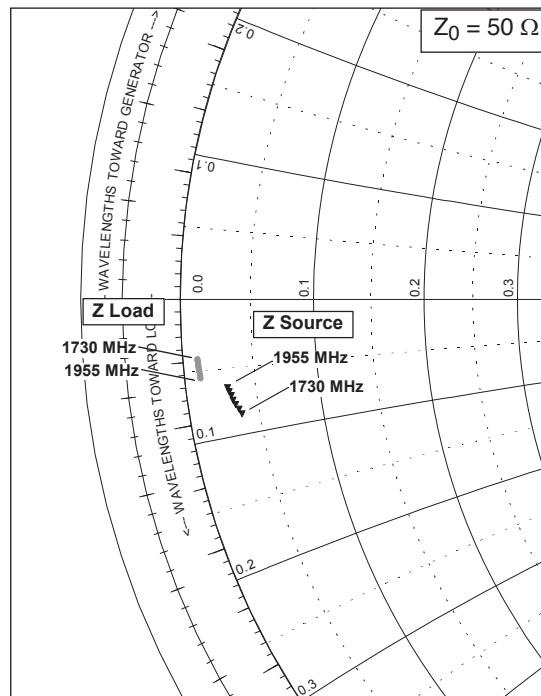
$V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $f = 1805\text{ MHz}$,
3GPP WCDMA signal, PAR = 7.5:1,
BW = 3.84 MHz



Broadband Circuit Impedance (combined leads)

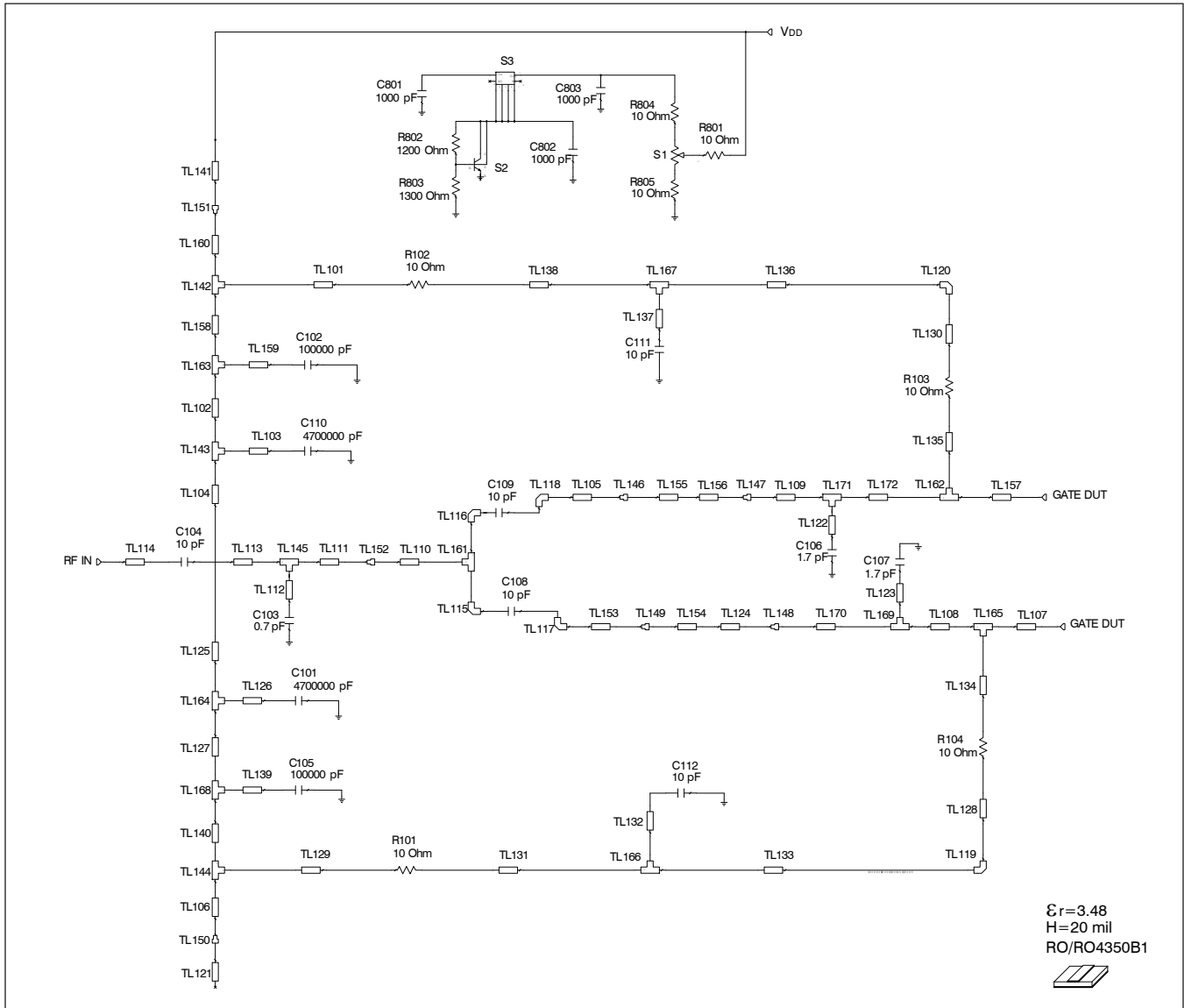


Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1730	1.86	-4.25	0.55	-2.78
1768	1.77	-4.06	0.54	-2.66
1805	1.68	-3.88	0.53	-2.54
1843	1.61	-3.70	0.52	-2.43
1880	1.56	-3.53	0.51	-2.32
1918	1.51	-3.37	0.51	-2.21
1955	1.47	-3.22	0.5	-2.11



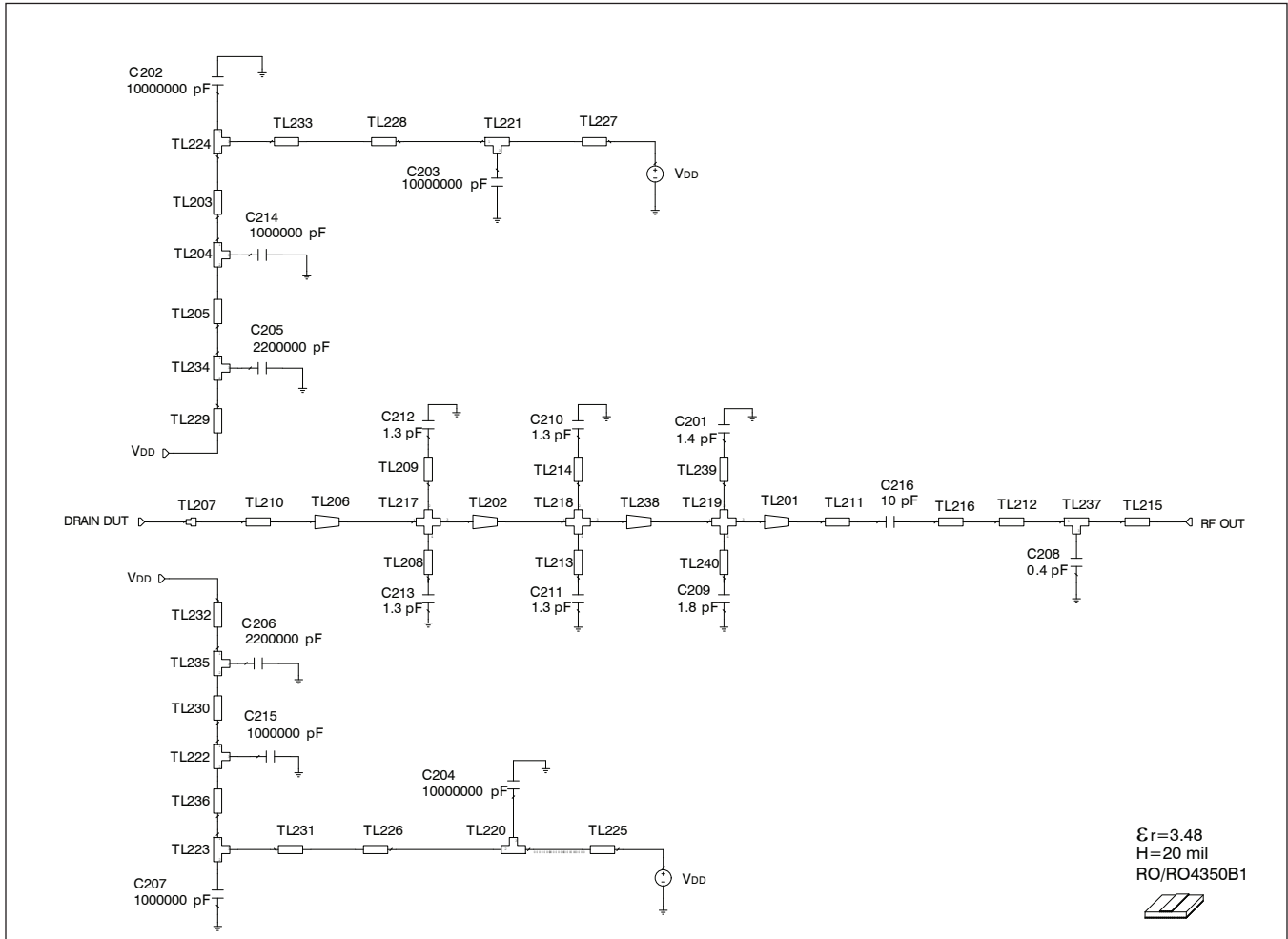
See next page for reference circuit information

Reference Circuit



Reference circuit input schematic for $f = 1880$ MHz

Reference Circuit (cont.)



Reference circuit output schematic for $f = 1880$ MHz

Reference Circuit (cont.)

Description

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

Electrical Characteristics at 1880 MHz

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101, TL129	0.017λ , 54.17 Ω	W = 1.016, L = 1.651	W = 40, L = 65
TL102	0.002λ , 63.89 Ω	W = 0.762, L = 0.203	W = 30, L = 8
TL103, TL139	0.000λ , 41.75 Ω	W = 1.524, L = 0.025	W = 60, L = 1
TL104	0.208λ , 63.89 Ω	W = 0.762, L = 20.297	W = 30, L = 799
TL105	0.008λ , 28.85 Ω	W = 2.540, L = 0.762	W = 100, L = 30
TL106	0.005λ , 63.89 Ω	W = 0.762, L = 0.508	W = 30, L = 20
TL107, TL157	0.061λ , 8.03 Ω	W = 11.430, L = 5.359	W = 450, L = 211
TL108, TL172	0.004λ , 8.03 Ω	W = 11.430, L = 0.338	W = 450, L = 13
TL109, TL170	0.002λ , 8.03 Ω	W = 11.430, L = 0.196	W = 450, L = 8
TL110	0.022λ , 32.60 Ω	W = 2.159, L = 2.032	W = 85, L = 80
TL111	0.028λ , 49.69 Ω	W = 1.168, L = 2.710	W = 46, L = 107
TL112	0.000λ , 63.89 Ω	W = 0.762, L = 0.025	W = 30, L = 1
TL113	0.016λ , 49.69 Ω	W = 1.168, L = 1.549	W = 46, L = 61
TL114	0.029λ , 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	0.013λ , 34.08 Ω	W = 2.032, L = 1.270	W = 80, L = 50
TL122, TL123	0.000λ , 63.89 Ω	W = 0.762, L = 0.000	W = 30, L = 0
TL124, TL156	0.014λ , 17.20 Ω	W = 4.826, L = 1.270	W = 190, L = 50
TL125	0.013λ , 63.89 Ω	W = 0.762, L = 1.270	W = 30, L = 50
TL126, TL139, TL159	0.000λ , 41.75 Ω	W = 1.524, L = 0.025	W = 60, L = 1
TL127	0.002λ , 63.89 Ω	W = 0.762, L = 0.203	W = 30, L = 8
TL128, TL130	0.013λ , 54.17 Ω	W = 1.016, L = 1.262	W = 40, L = 50
TL131, TL138	0.014λ , 54.17 Ω	W = 1.016, L = 1.397	W = 40, L = 55
TL132, TL137	0.000λ , 34.08 Ω	W = 2.032, L = 0.025	W = 80, L = 1
TL133, TL136	0.079λ , 54.17 Ω	W = 1.016, L = 7.620	W = 40, L = 300
TL134, TL135	0.008λ , 54.17 Ω	W = 1.016, L = 0.762	W = 40, L = 30
TL140	0.015λ , 63.89 Ω	W = 0.762, L = 1.422	W = 30, L = 56
TL142, TL144	0.010λ , 63.89 Ω	W1 = 0.762, W2 = 0.762, W3 = 1.016	W1 = 30, W2 = 30, W3 = 40
TL143, TL168	0.016λ , 63.89 Ω	W1 = 0.762, W2 = 0.762, W3 = 1.524	W1 = 30, W2 = 30, W3 = 60
TL145	0.008λ , 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)	0.011λ , 12.30Ω / 34.72Ω	$W1 = 7.112$, $W2 = 1.981$, $L = 1.016$	$W1 = 280$, $W2 = 78$, $L = 40$
TL202 (taper)	0.009λ , 5.88Ω / 7.95Ω	$W1 = 16.002$, $W2 = 11.557$, $L = 0.762$	$W1 = 630$, $W2 = 455$, $L = 30$
TL203	0.019λ , 20.93Ω	$W = 3.810$, $L = 1.778$	$W = 150$, $L = 70$
TL204	0.019λ , 20.93Ω	$W1 = 3.810$, $W2 = 3.810$, $W3 = 1.778$	$W1 = 150$, $W2 = 150$, $W3 = 70$
TL205, TL230	0.003λ , 20.93Ω	$W = 3.810$, $L = 0.254$	$W = 150$, $L = 10$
TL206 (taper)	0.023λ , 3.67Ω / 5.88Ω	$W1 = 26.365$, $W2 = 16.002$, $L = 2.032$	$W1 = 1038$, $W2 = 630$, $L = 80$
TL207		$W1 = 25.400$, $W2 = 26.365$	$W1 = 1000$, $W2 = 1038$
TL208, TL209	0.000λ , 144.35Ω	$W = 0.025$, $L = 0.025$	$W = 1$, $L = 1$
TL210	0.055λ , 3.67Ω	$W = 26.365$, $L = 4.801$	$W = 1038$, $L = 189$
TL211	0.044λ , 34.72Ω	$W = 1.981$, $L = 4.115$	$W = 78$, $L = 162$
TL212	0.005λ , 47.12Ω	$W = 1.270$, $L = 0.432$	$W = 50$, $L = 17$
TL213, TL214, TL239, TL240	0.000λ , 144.35Ω	$W = 0.025$, $L = 0.025$	$W = 1$, $L = 1$
TL215	0.066λ , 47.12Ω	$W = 1.270$, $L = 6.299$	$W = 50$, $L = 248$
TL216	0.014λ , 28.85Ω	$W = 2.540$, $L = 1.270$	$W = 100$, $L = 50$
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	0.042λ , 20.93Ω	$W1 = 3.810$, $W2 = 3.810$, $W3 = 3.810$	$W1 = 150$, $W2 = 150$, $W3 = 150$
TL222	0.019λ , 20.93Ω	$W1 = 3.810$, $W2 = 3.810$, $W3 = 1.778$	$W1 = 150$, $W2 = 150$, $W3 = 70$
TL225, TL227	0.023λ , 20.93Ω	$W = 3.810$, $L = 2.078$	$W = 150$, $L = 82$
TL226, TL228	0.066λ , 20.93Ω	$W = 3.810$, $L = 6.020$	$W = 150$, $L = 237$
TL229, TL232	0.028λ , 20.93Ω	$W = 3.810$, $L = 2.540$	$W = 150$, $L = 100$
TL231, TL233	0.097λ , 20.93Ω	$W = 3.810$, $L = 8.915$	$W = 150$, $L = 351$
TL234, TL235	0.019λ , 20.93Ω	$W1 = 3.810$, $W2 = 3.810$, $W3 = 1.778$	$W1 = 150$, $W2 = 150$, $W3 = 70$,
TL236	0.019λ , 20.93Ω	$W = 3.810$, $L = 1.778$	$W = 150$, $L = 70$
TL237	0.021λ , 47.12Ω	$W1 = 1.270$, $W2 = 1.270$, $W3 = 2.032$	$W1 = 50$, $W2 = 50$, $W3 = 80$
TL238 (taper)	0.009λ , 7.95Ω / 12.30Ω	$W1 = 11.557$, $W2 = 7.112$, $L = 0.787$	$W1 = 455$, $W2 = 280$, $L = 31$

Circuit Assembly Information

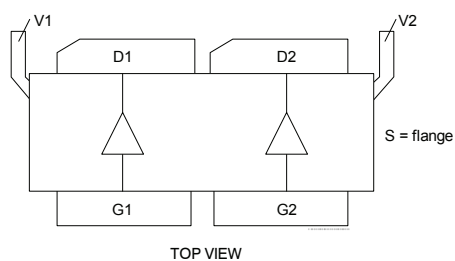
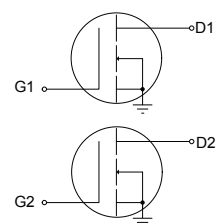
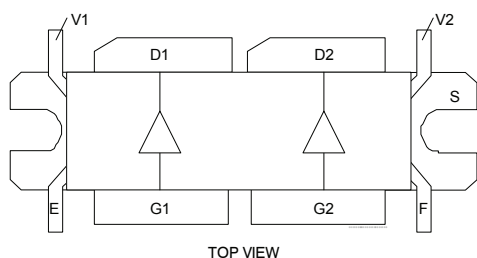
Find Gerber files for this test fixture on the Infineon Web site at <http://www.infineon.com/rfpower>



Reference Circuit (cont.)

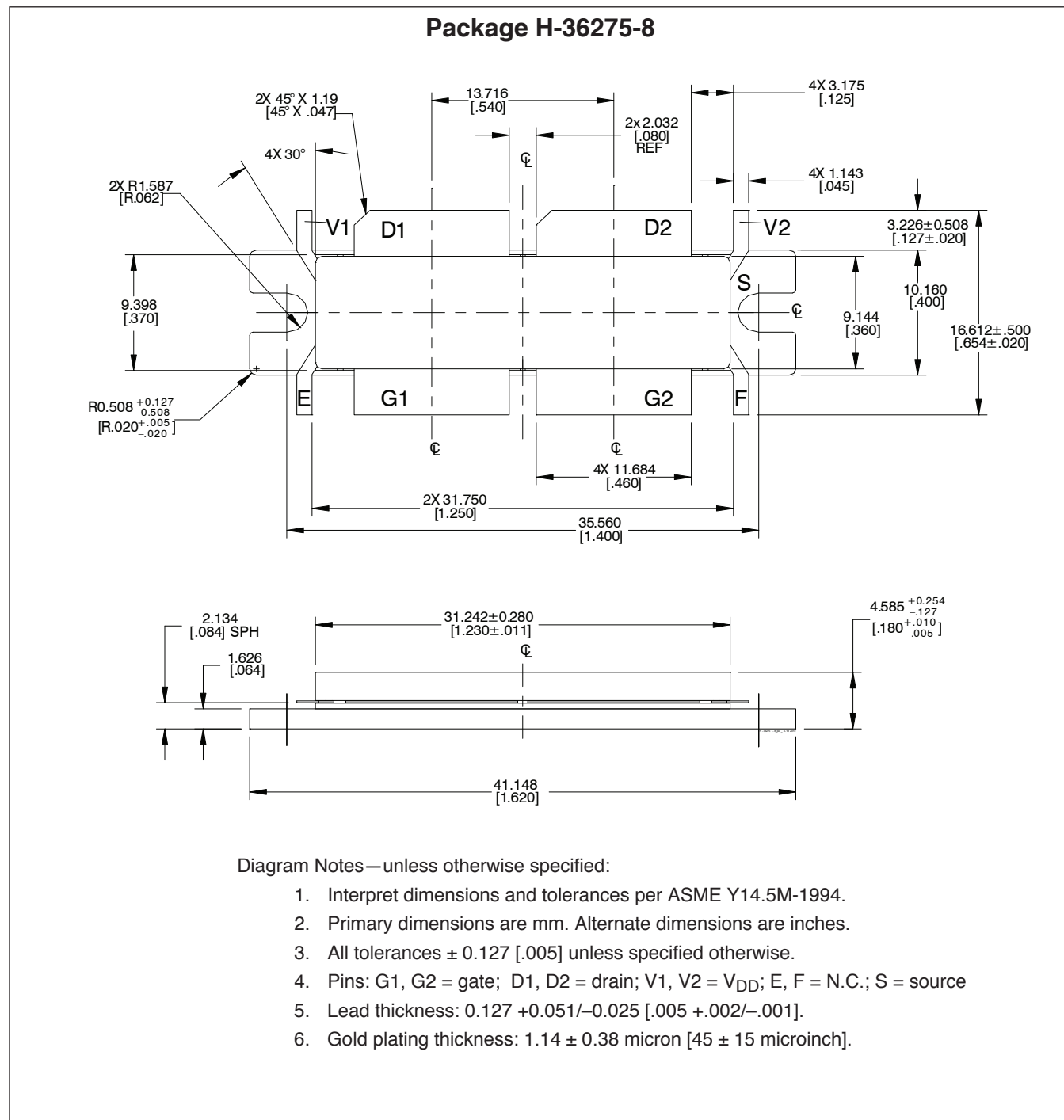
Component	Description	Suggested Manufacturer	P/N
Input			
C101, C110	Chip capacitor, 4.7 μ F	Digi-Key	PCS3475CT-ND
C102, C105	Chip capacitor, 0.1 μ F	Digi-Key	PCC104BCT-ND
C103	Chip capacitor, 0.7 pF	ATC	ATC100B0R7BW500XB
C104, C108, C109	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB
C106, C107	Chip capacitor, 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 μ F	Digi-Key	587-1818-2-ND
C203, C204	Tantalum capacitor, 10 μ F	Digi-Key	TPSE106K050R0400
C205, C206	Chip capacitor, 2.2 μ F	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 μ F	Digi-Key	445-1411-2-ND
C216	Chip capacitor, 10 pF	ATC	ATC100B100JW500XB

Pinout Diagram

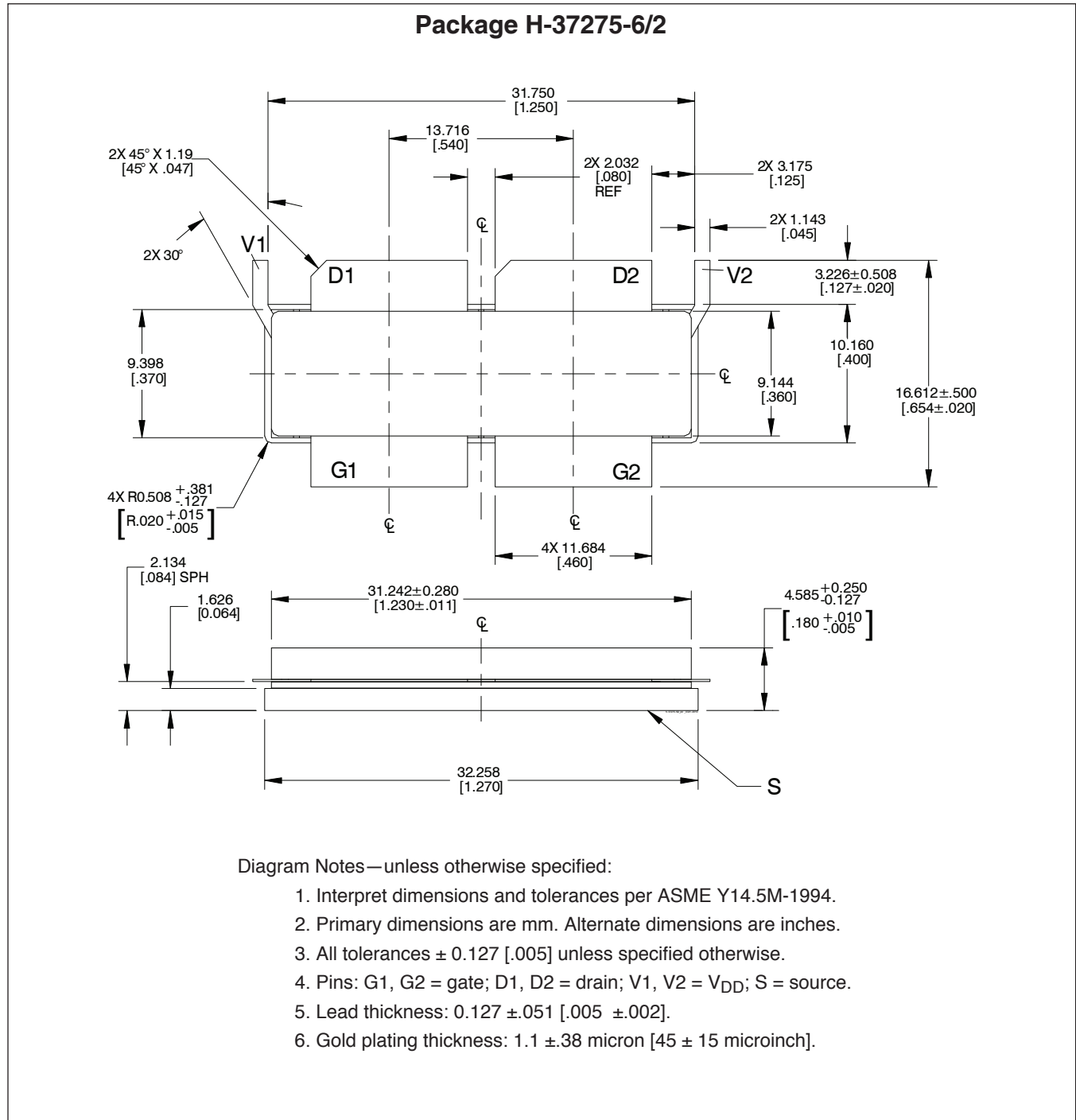


Pin	Description
V1	V _{DD} Device 1
V2	V _{DD} Device 2
G1	Gate Device 1
G2	Gate Device 2
D1	Drain Device 1
D2	Drain Device 2
E	N.C.
F	N.C.
S	Source (flange)

Package Outline Specifications



Package Outline Specifications (cont.)



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

Revision History: 2010-11-17

Data Sheet

Previous Version: 2010-07-23, Data Sheet

Page	Subjects (major changes since last revision)
All	Merge the data sheet to include E and F versions.

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Edition 2010-11-17

Published by

Infineon Technologies AG

81726 Munich, Germany

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