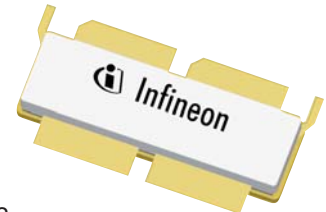


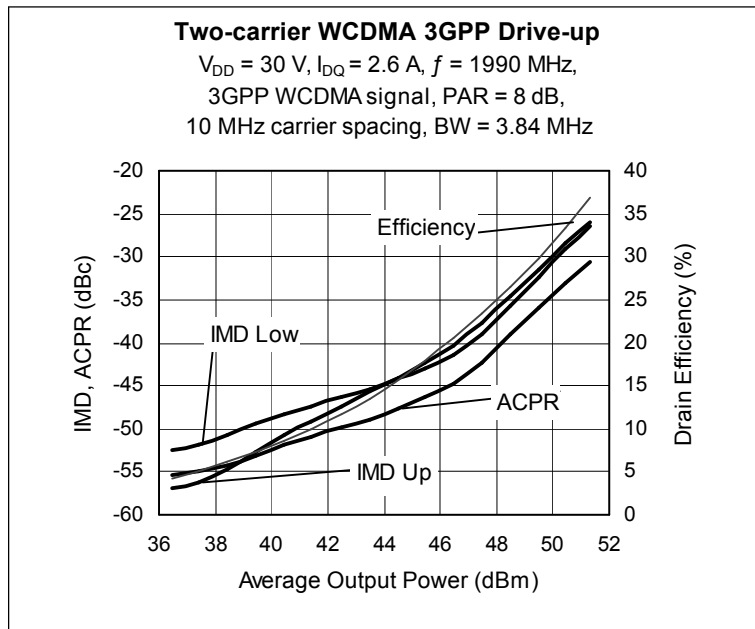
Thermally-Enhanced High Power RF LDMOS FETs 340 W, 30 V, 1930 – 1990 MHz

Description

The PTFB193404F is a 340-watt LDMOS FET intended for use in multi-standard cellular power amplifier applications in the 1930 to 1990 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.



PTFB193404F
Package H-37275-6/2



Features

- Broadband internal matching
- Wide video bandwidth
- Typical single-carrier WCDMA performance, 1990 MHz, 30 V
 - Output power = 125 W
 - Efficiency = 31%
 - Gain = 17 dB
 - PAR = 5.5 dB @ 0.01% CCDF
 - ACPR @ 5 MHz = -35 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, $f = 1990\text{ MHz}$, 5 MHz spacing, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 7.5 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	17.5	19	—	dB
Drain Efficiency	η_D	28.5	30	—	%
Adjacent Channel Power Ratio	ACPR	—	-31	-29	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 Characteristics (not subject to production test—verified by design/characterization in Infineon test fixture)
 $V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $P_{OUT} = 80\text{ W}$ average, $f_1 = 1980\text{ MHz}$, $f_2 = 1990\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 7.5 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	18	—	dB
Drain Efficiency	η_D	—	29	—	%
Intermodulation Distortion	IMD	—	-33	—	dBc

Two-tone Characteristics (not subject to production test—verified by design/characterization in Infineon test fixture)
 $V_{DD} = 30\text{ V}$, $I_{DQ} = 2.6\text{ A}$, $P_{OUT} = 265\text{ W}$ PEP, $f = 1990\text{ MHz}$, tone spacing = 1 MHz

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	19	—	dB
Drain Efficiency	η_D	—	36	—	%
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
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	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

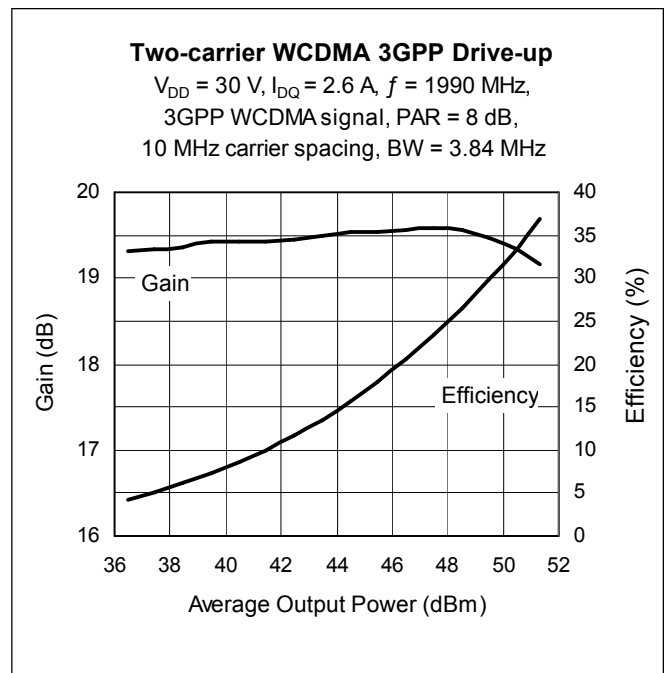
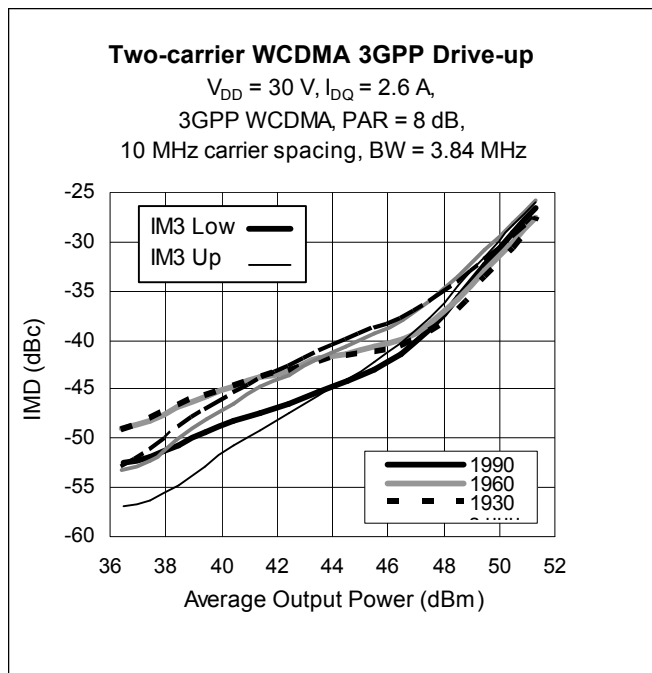
Maximum Ratings

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

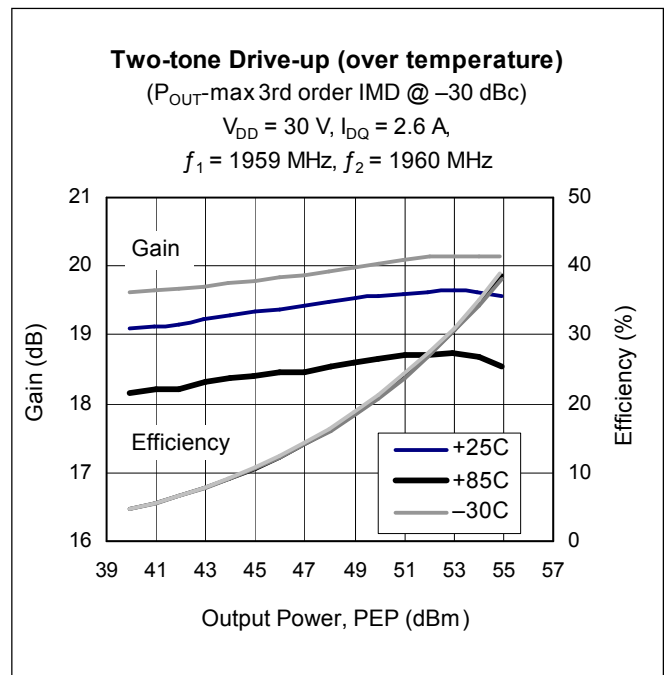
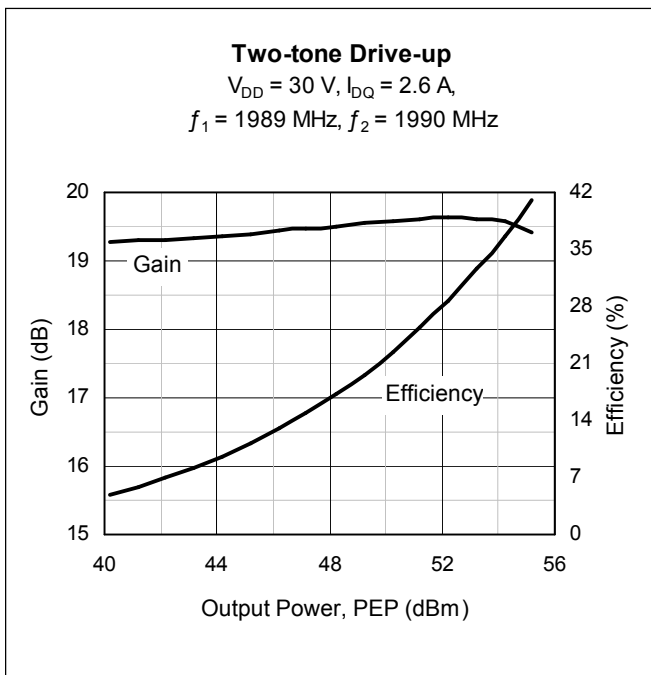
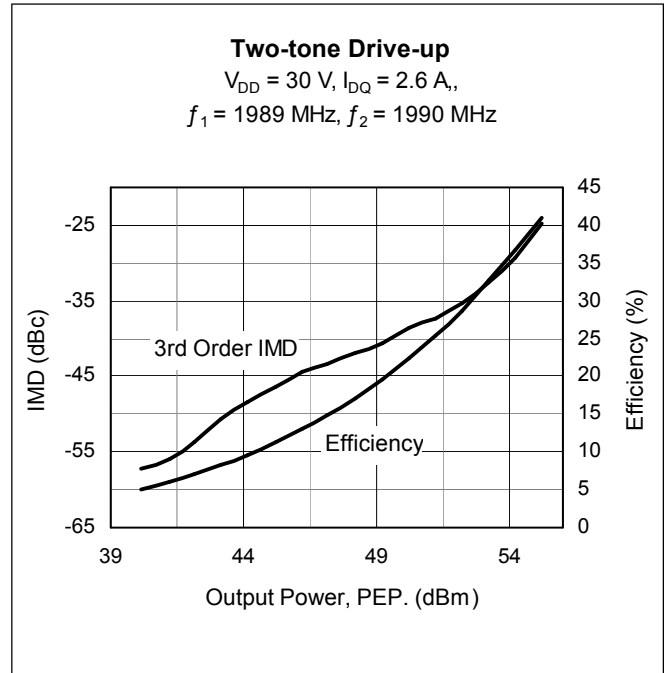
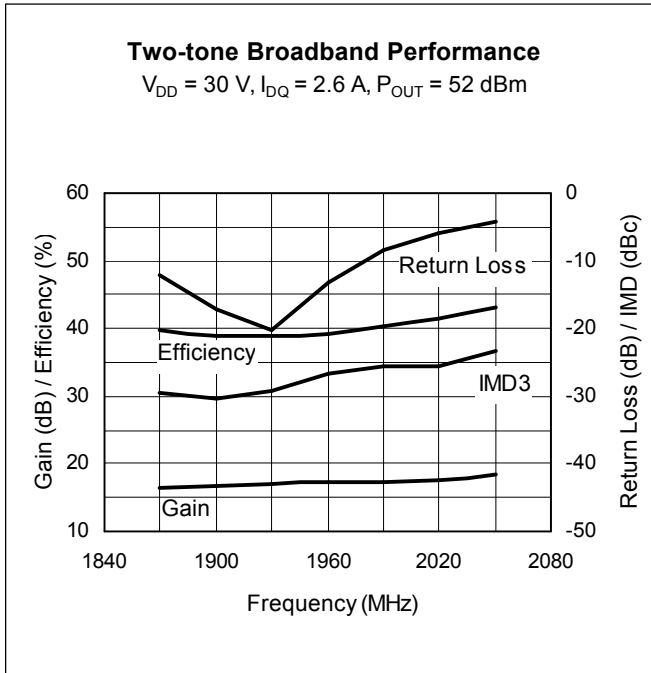
Ordering Information

Type and Version	Package Outline	Package Description	Shipping
PTFB193404F V1	H-37275-6/2	Ceramic open-cavity, earless push-pull	Tray
PTFB193404F V1 R250	H-37275-6/2	Ceramic open-cavity, earless push-pull	Tape & reel, 250 pcs

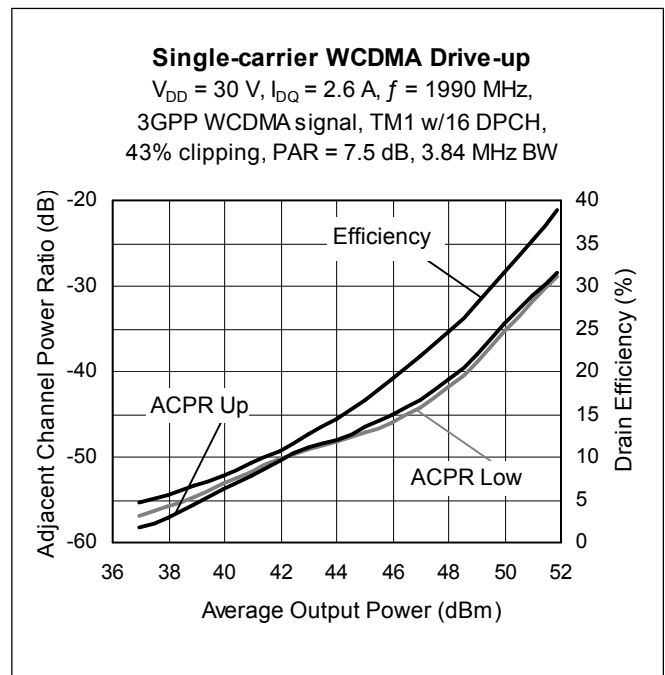
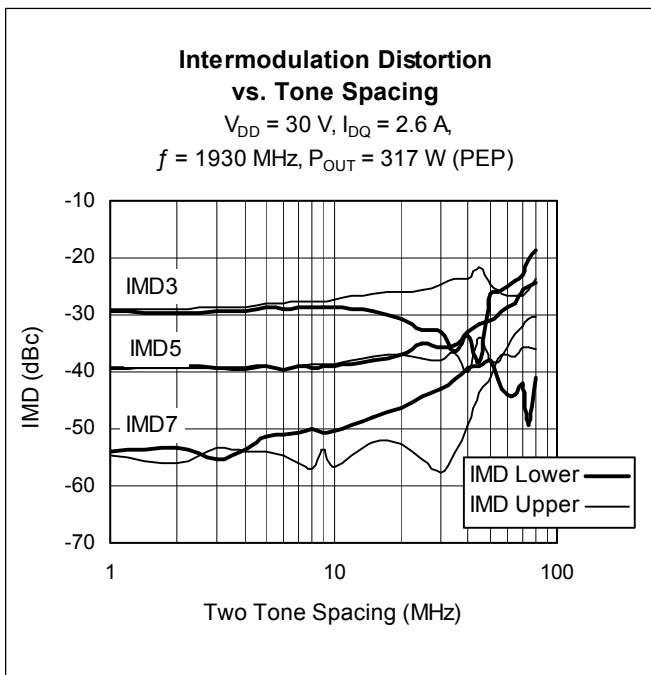
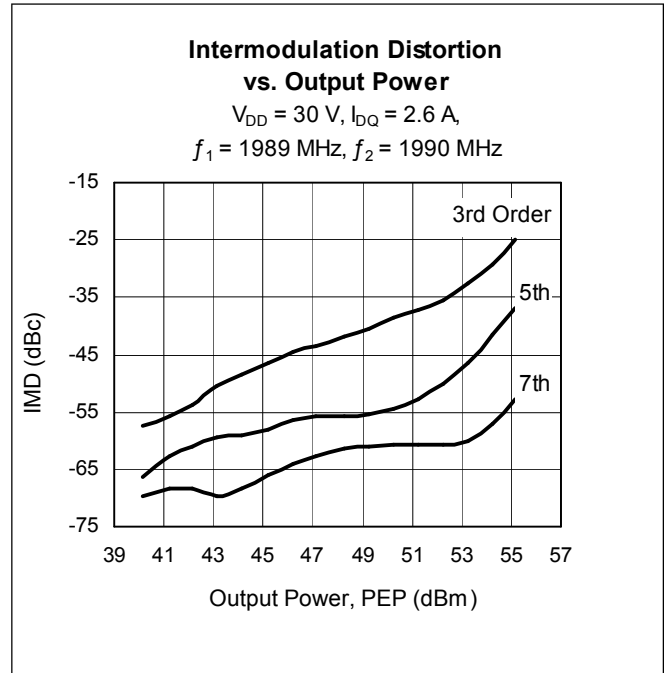
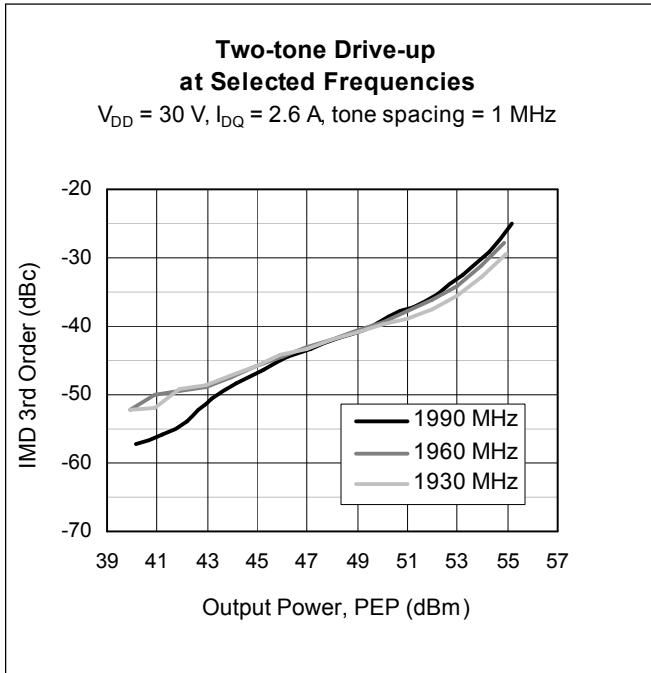
Typical Performance (data taken in production test fixture)



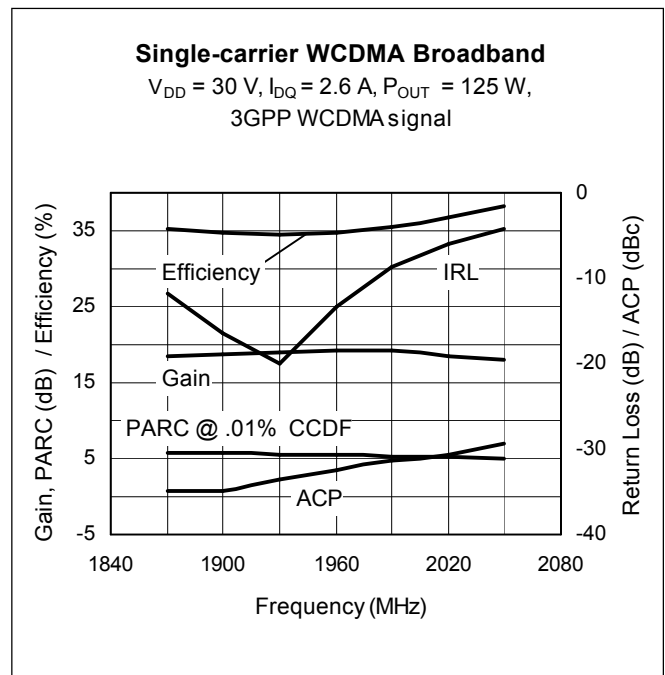
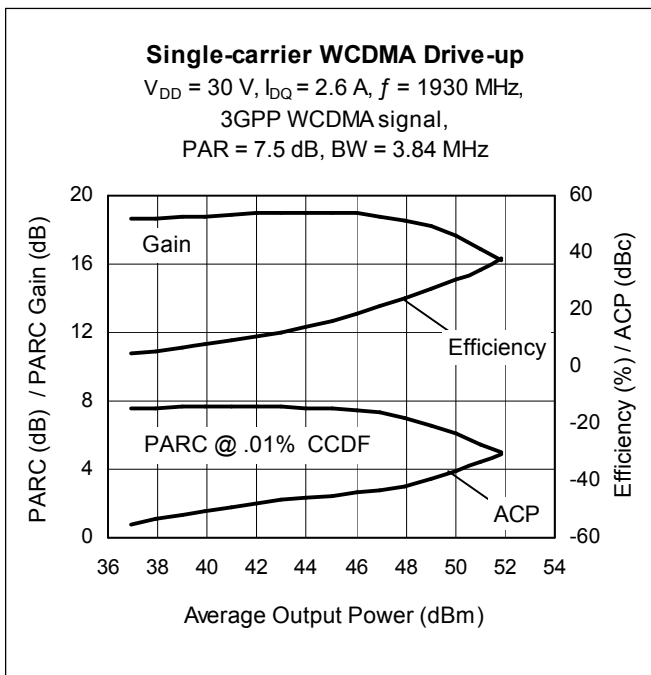
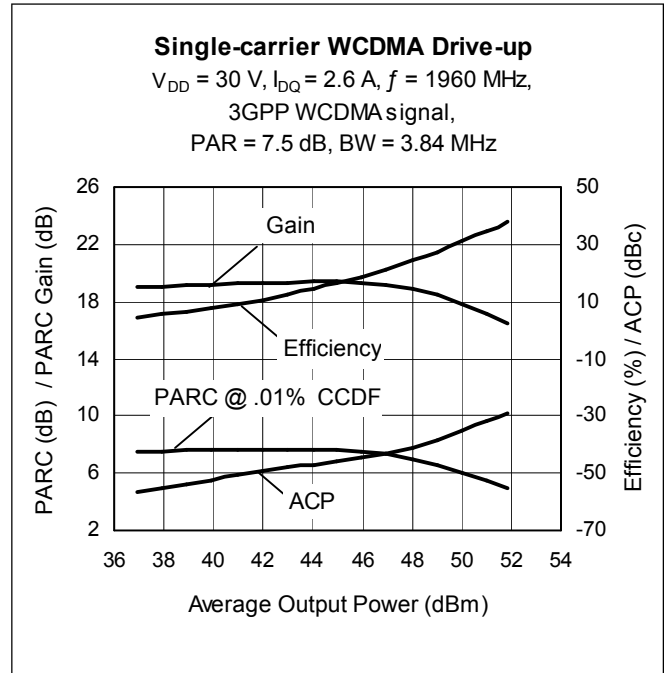
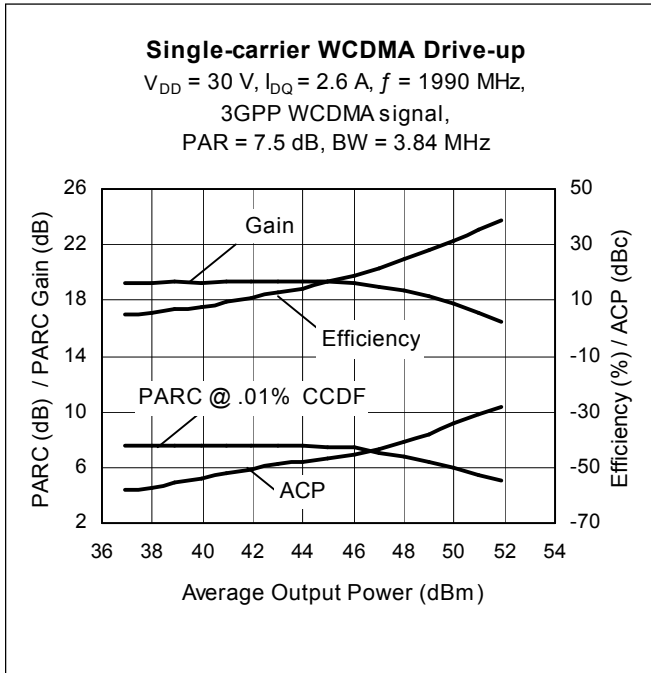
Typical Performance (cont.)



Typical Performance (cont.)

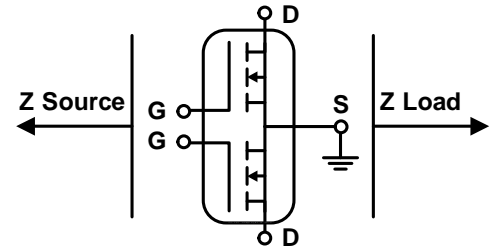


Typical Performance (cont.)



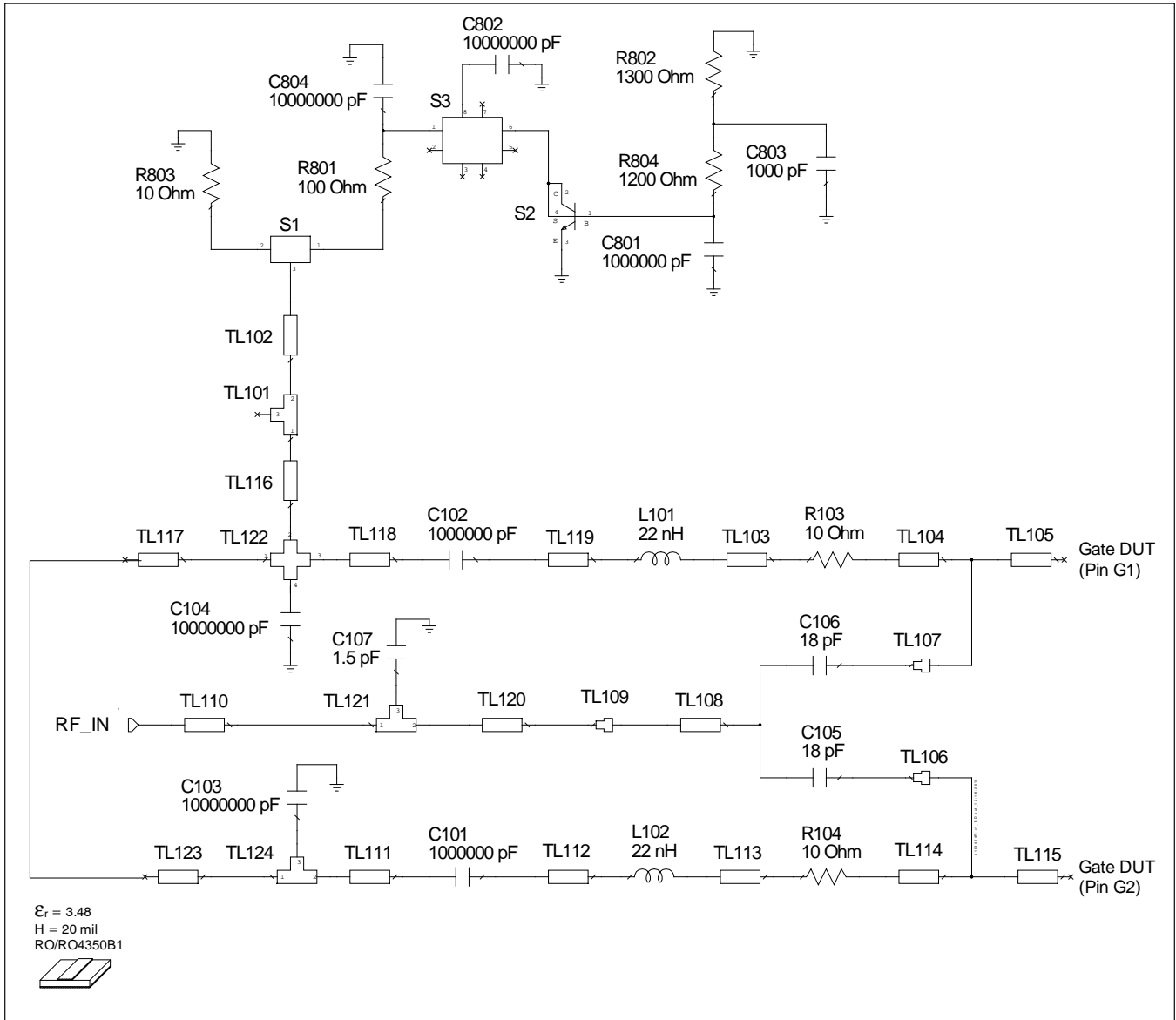
Broadband Circuit Impedance (measurements taken on full part, both sides)

Frequency	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1900	1.21	-3.60	0.73	-2.08
1930	1.21	-3.53	0.72	-2.01
1960	1.20	-3.47	0.72	-1.94
1990	1.20	-3.41	0.72	-1.87
2020	1.19	-3.35	0.72	-1.81

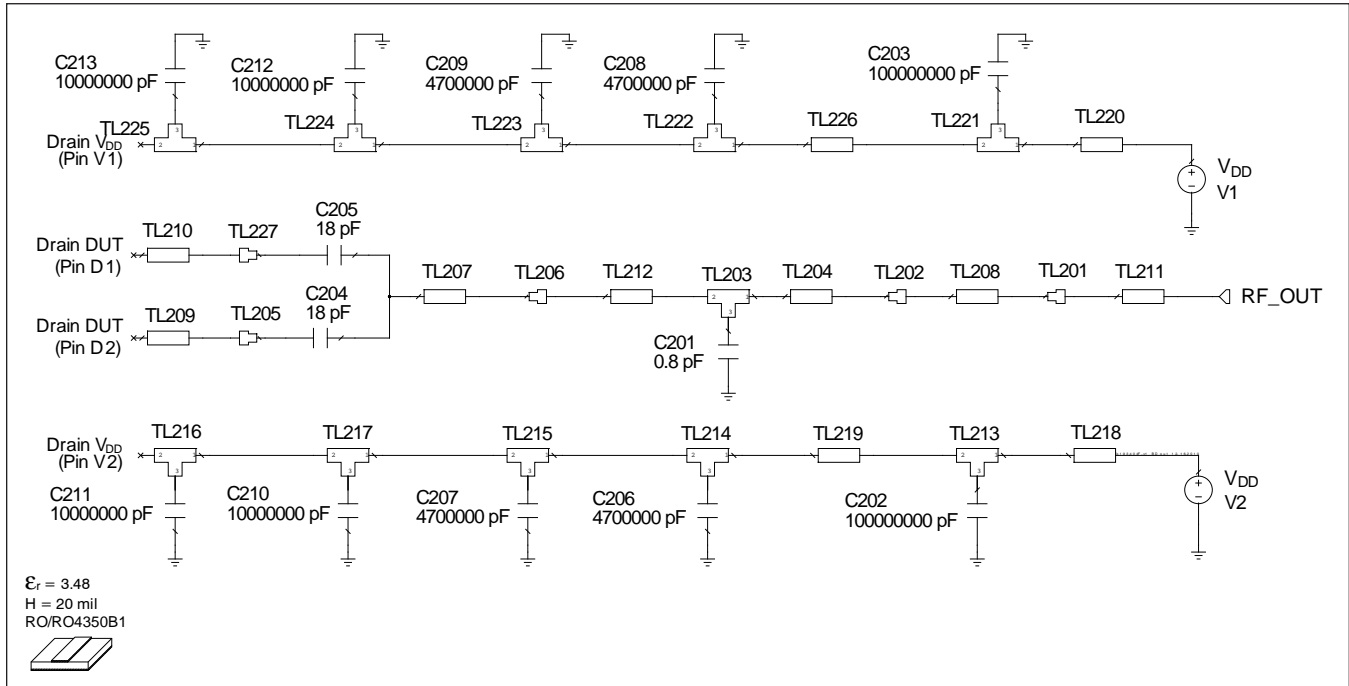


See next page for circuit information

Reference Circuit



Reference circuit input schematic for $f = 1990 \text{ MHz}$

Reference Circuit (cont.)

Reference circuit output schematic for $f = 1990$ MHz
Reference Circuit Assembly

DUT	PTFB193404F
Test Fixture Part No.	LTN/PTFB193404EF
PCB	Rogers RO4350, 0.508 mm [0.020"] thick, 1 oz. copper, $\epsilon_r = 3.48$ copper
Find Gerber files for this test fixture on the Infineon Web site at http://www.infineon.com/rfpower	

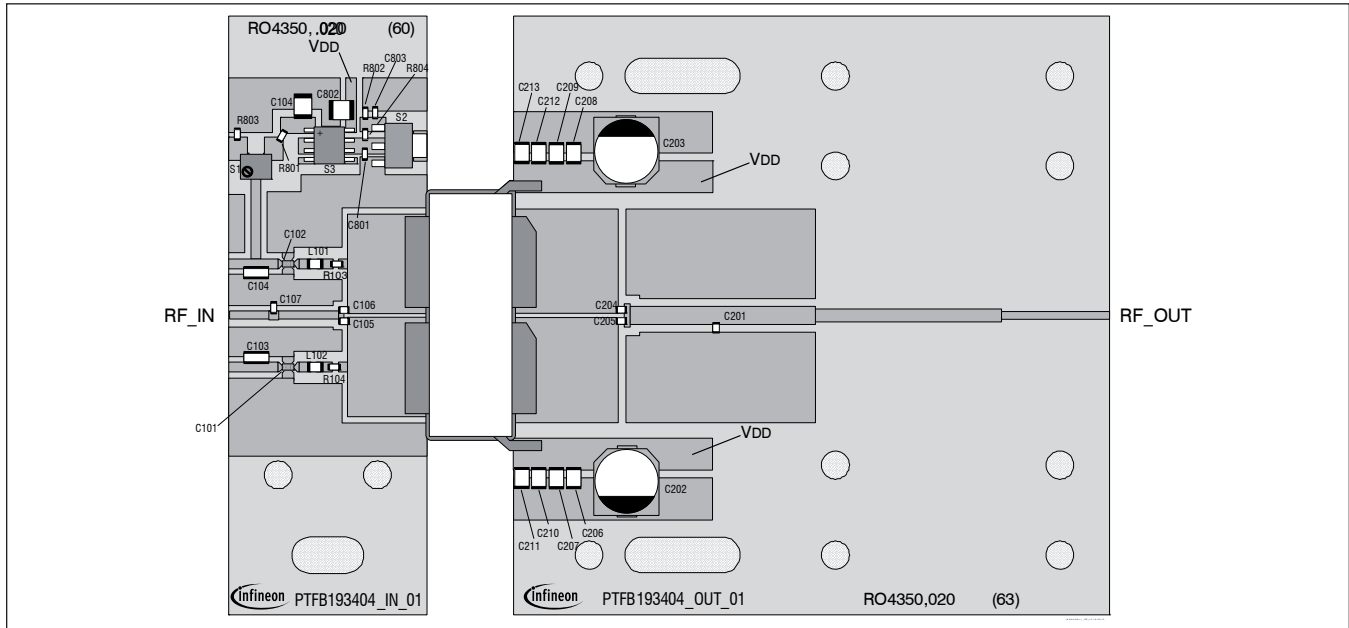
Transmission Line	Electrical Characteristics	Dimensions: W, L (mm)	Dimensions: W, L (mils)
TL101	0.017λ , 47.12 Ω	W1 = 1.270, W2 = 1.270, W3 = 1.524	W1 = 50, W2 = 50, W3 = 60
TL102	0.039λ , 47.12 Ω	W = 1.270, L = 3.553	W = 50, L = 140
TL103	0.023λ , 47.12 Ω	W = 1.270, L = 2.055	W = 50, L = 81
TL104	0.013λ , 47.12 Ω	W = 1.270, L = 1.168	W = 50, L = 46
TL105	0.122λ , 7.29 Ω	W = 12.700, L = 10.160	W = 500, L = 400
TL106		W1 = 0.010, W2 = 1.168, Offset = 5.893	W1 = 10, W2 = 46, Offset = 232
TL107		W1 = 0.010, W2 = 1.168, Offset = -5.893	W1 = 10, W2 = 46, Offset = -232
TL108	0.007λ , 34.08 Ω	W = 2.032, L = 0.635	W = 80, L = 25
TL109	0.012λ , 34.08 Ω	W1 = 2.032, W2 = 1.034	W1 = 80, W2 = 41
TL110	0.055λ , 53.60 Ω	W = 1.034, L = 5.029	W = 41, L = 198
TL111	0.023λ , 47.12 Ω	W = 1.270, L = 2.111	W = 50, L = 83
TL112	0.017λ , 47.12 Ω	W = 1.270, L = 1.524	W = 50, L = 60
TL113	0.023λ , 47.12 Ω	W = 1.270, L = 2.055	W = 50, L = 81

table continued on page 9

Reference Circuit (cont.)

Transmission Line	Electrical Characteristics	Dimensions: W, L (mm)	Dimensions: W, L (mils)
Input (cont.)			
TL114	0.013 λ , 47.12 Ω	W = 1.270, L = 1.168	W = 50, L = 46
TL115	0.122 λ , 7.29 Ω	W = 12.700, L = 10.160	W = 500, L = 400
TL116	0.068 λ , 47.12 Ω	W = 1.270, L = 6.170	W = 50, L = 243
TL117	0.032 λ , 47.12 Ω	W = 1.270, L = 2.875	W = 50, L = 113
TL118	0.024 λ , 47.12 Ω	W = 1.270, L = 2.131	W = 50, L = 84
TL119	0.017 λ , 47.12 Ω	W = 1.270, L = 1.524	W = 50, L = 60
TL120	0.084 λ , 53.60 Ω	W = 1.034, L = 7.671	W = 41, L = 302
TL121	0.014 λ , 53.60 Ω	W1 = 1.034, W2 = 1.034, W3 = 1.27	W1 = 41, W2 = 41, W3 = 50
TL122	0.014 λ , 47.12 Ω	W1 = 1.270, W2 = 1.270, W3 = 1.270, W4 = 1.270	W1 = 50, W2 = 50, W3 = 50, W4 = 50
TL123	0.032 λ , 47.12 Ω	W = 1.270, L = 2.896	W = 50, L = 114
TL124	0.014 λ , 47.12 Ω	W1 = 1.270, W2 = 1.270, W3 = 1.27	W1 = 50, W2 = 50, W3 = 50
Output			
TL201		W1 = 1.577, W2 = 1.046	W1 = 62, W2 = 41
TL202		W1 = 2.263, W2 = 1.577	W1 = 89, W2 = 62
TL203	0.009 λ , 31.48 Ω	W1 = 2.263, W2 = 2.263, W3 = 0.762	W1 = 89, W2 = 89, W3 = 30
TL204	0.139 λ , 31.48 Ω	W = 2.263, L = 12.299	W = 89, L = 484
TL205		W1 = 0.001, W2 = 13.335, Offset = -6.223	W1 = 1, W2 = 525, Offset = -245
TL206		W1 = 3.048, W2 = 2.263	W1 = 120, W2 = 89
TL207	0.009 λ , 25.04 Ω	W = 3.048, L = 0.762	W = 120, L = 30
TL208	0.266 λ , 40.78 Ω	W = 1.577, L = 23.889	W = 62, L = 941
TL209	0.160 λ , 6.97 Ω	W = 13.335, L = 13.335	W = 525, L = 525
TL210	0.160 λ , 6.97 Ω	W = 13.335, L = 13.335	W = 525, L = 525
TL211	0.151 λ , 53.21 Ω	W = 1.046, L = 13.774	W = 41, L = 542
TL212	0.120 λ , 31.48 Ω	W = 2.263, L = 10.617	W = 89, L = 418
TL213	0.024 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.032	W1 = 160, W2 = 160, W3 = 80
TL214	0.026 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.286	W1 = 160, W2 = 160, W3 = 90
TL215	0.026 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.286	W1 = 160, W2 = 160, W3 = 90
TL216	0.024 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.032	W1 = 160, W2 = 160, W3 = 80
TL217	0.026 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.286	W1 = 160, W2 = 160, W3 = 90
TL218	0.116 λ , 19.85 Ω	W = 4.064, L = 10.008	W = 160, L = 394
TL219	0.052 λ , 19.85 Ω	W = 4.064, L = 4.470	W = 160, L = 176
TL220	0.116 λ , 19.85 Ω	W = 4.064, L = 10.008	W = 160, L = 394
TL221	0.024 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.032	W1 = 160, W2 = 160, W3 = 80
TL222	0.026 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.286	W1 = 160, W2 = 160, W3 = 90
TL223	0.026 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.286	W1 = 160, W2 = 160, W3 = 90
TL224	0.026 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.286	W1 = 160, W2 = 160, W3 = 90
TL225	0.024 λ , 19.85 Ω	W1 = 4.064, W2 = 4.064, W3 = 2.032	W1 = 160, W2 = 160, W3 = 80
TL226	0.052 λ , 19.85 Ω	W = 4.064, L = 4.470	W = 160, L = 176
TL227		W1 = 0.001, W2 = 13.335, Offset = 6.223	W1 = 1, W2 = 525, Offset = 245

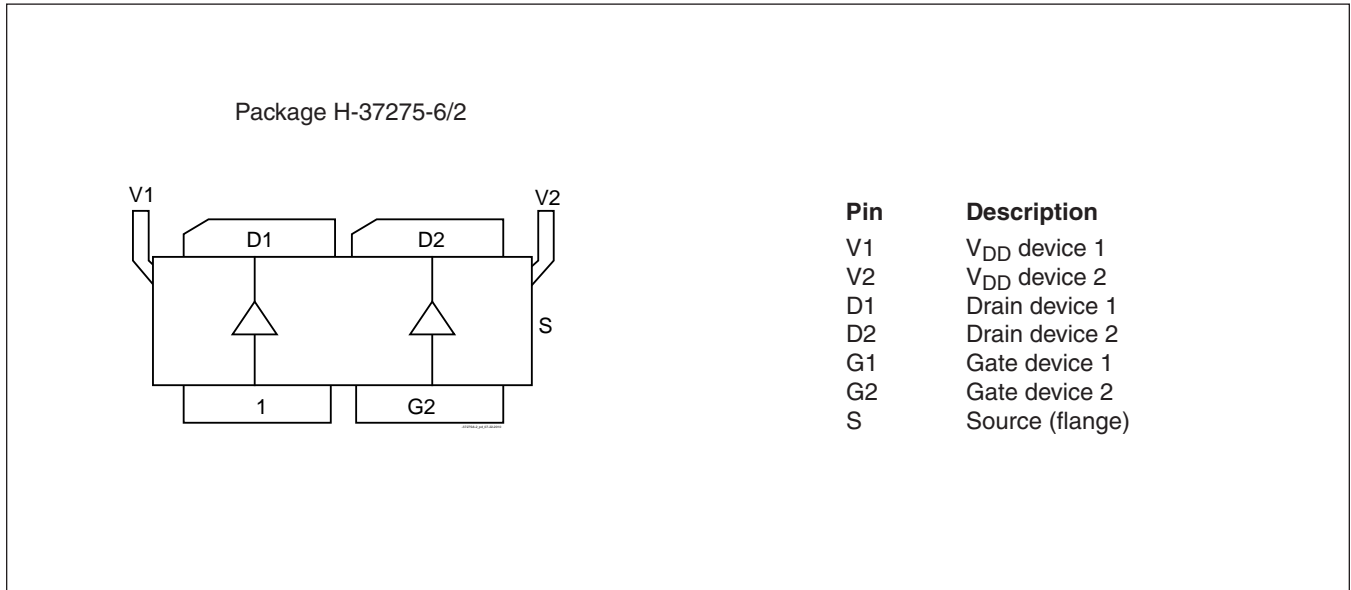
Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

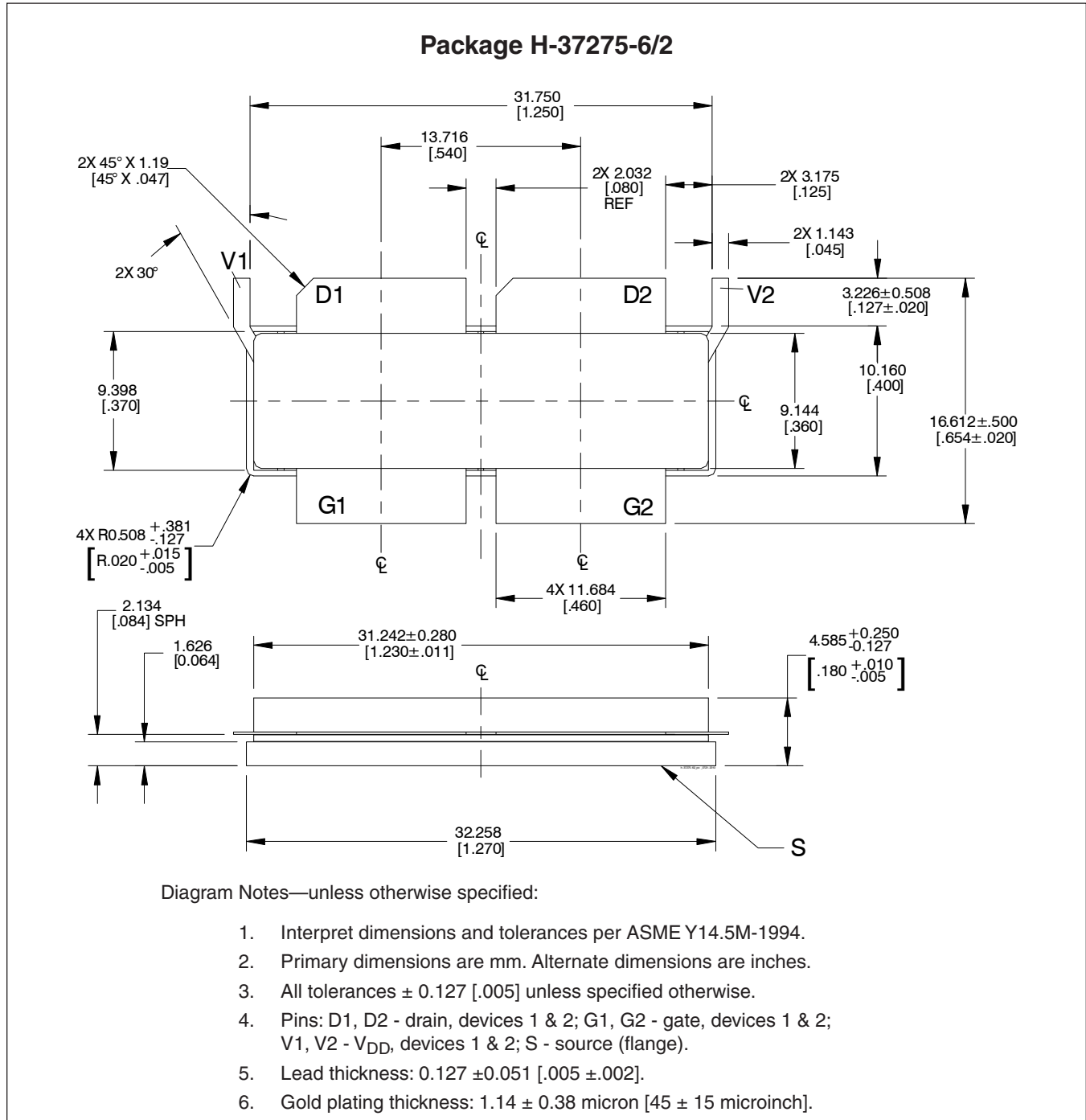
Component ID	Description	Suggested Manufacturer	P/N
C101, C102	Chip capacitor, 1 μ F	ATC	NFM18PS105R0J30
C103, C104	Capacitor, 10 μ F	Digi-Key	490-4393-2-ND
C105, C106, C204, C205	Capacitor, 18 pF	ATC	800A180JT
C107	Capacitor, 1.5 pF	ATC	800A1R5BT
C801	Capacitor, 1 μ F	Digi-Key	490-4736-2-ND
C802, C804	Capacitor, 10 μ F	Digi-Key	587-1818-2-ND
C803	Chip capacitor, 1000 pF	Digi-Key	PCC1772CT-ND
L101, L102	Inductor, 22 nH	Digi-Key	0805W220JT
R101, R102	Resistor, 1000 Ω	Digi-Key	P1.0KECT-ND
R103, R104	Resistor, 10 Ω	Digi-Key	P10GTR-ND
R801	Resistor, 100 Ω	Digi-Key	P100GTR-ND
R802	Resistor, 1300 Ω	Digi-Key	P1.3KGTR-ND
R803	Resistor, 10 Ω	Digi-Key	P101GTR-ND
R804	Resistor, 1200 Ω	Digi-Key	P1.2KGTR-ND
S1	Potentiometer	Digi-Key	3224W-202ECT-ND
S2	Transistor	Digi-Key	BCP56-ND, BCP56
S3	Voltage regulator	Digi-Key	LM780L05ACM-ND, 7805
C201	Capacitor, 0.8 pF	ATC	800A0R8BT
C202, C203	Capacitor, 100 μ F	Digi-Key	PCE4442TR-ND
C206, C207, C208, C209	Capacitor, 4.7 μ F	Digi-Key	490-1864-2-ND
C210, C211, C212, C213	Capacitor, 10 μ F	Digi-Key	587-1818-2-ND

Pinout Diagram



See next page for package outline specifications

Package Outline Specifications



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

Revision History: 2011-01-24

Previous Version: 2010-12-16, Data Sheet

Page	Subjects (major changes since last revision)
1, 2	RF tables revised for clarity.

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