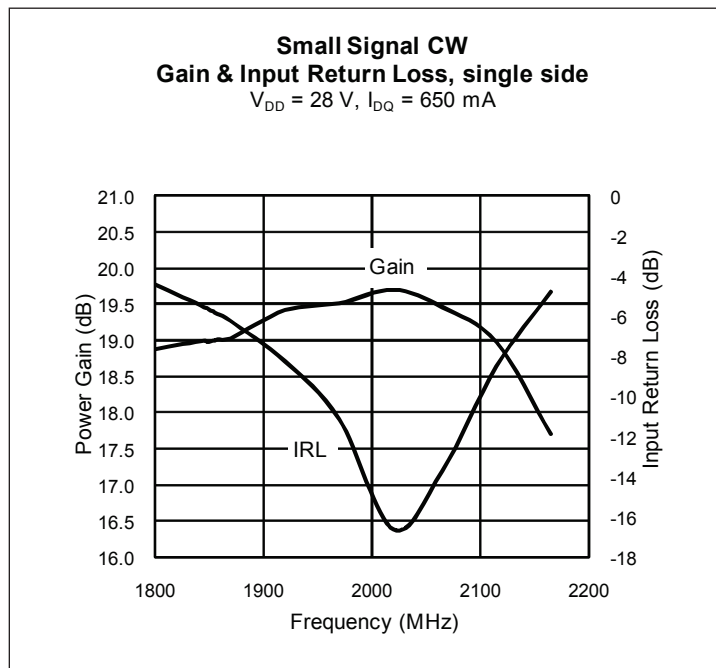


High Power RF LDMOS Field Effect Transistor 140 W, 28 V, 2010 – 2025 MHz

Description

The PTFB201402FC integrates two 70 W LDMOS FETs into one open-cavity ceramic package. It is designed primarily for Doherty cellular amplifier applications in the 2010 to 2025 MHz frequency band. Manufactured with Infineon’s advanced LDMOS process, this device offers excellent thermal performance and superior reliability.

PTFB201402FC
Package H-37248-4



Features

- Broadband internal matching
- Typical CW performance, 28 V, single side
 - Output power, $P_{1dB} = 70\text{ W}$
 - Efficiency = 56%
- Integrated ESD protection
- Excellent thermal stability
- Capable of handling 10:1 VSWR @ 28 V, 70 W (CW) output power, per side
- Pb-free and RoHS-compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Infineon Doherty test fixture)

$V_{DD} = 28\text{ V}, I_{DQ}(\text{main}) = 500\text{ mA}, V_{GSPK} = 42.6\% \times V_{GS1}, f_1 = 1880\text{ MHz}, f_2 = 2025\text{ MHz}, P_{OUT} = 20\text{ W}, \text{PAR} = 10\text{ dB @ } 0.01\% \text{ CCDF probability}$

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------------------|----------|-----|-------|-----|------|
| Gain | G_{ps} | 15 | 16 | — | dB |
| Drain Efficiency | η_D | 34 | 36 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -38.5 | -33 | dBc |

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics (single side)

| 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 | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ A}$ | $R_{DS(on)}$ | — | 0.3 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 28\text{ V}, I_{DQ} = 650\text{ mA}$ | 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 |

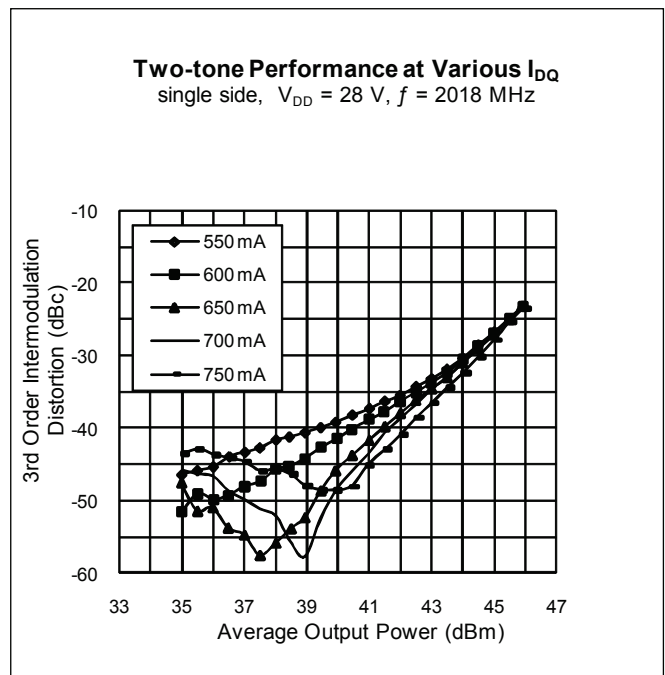
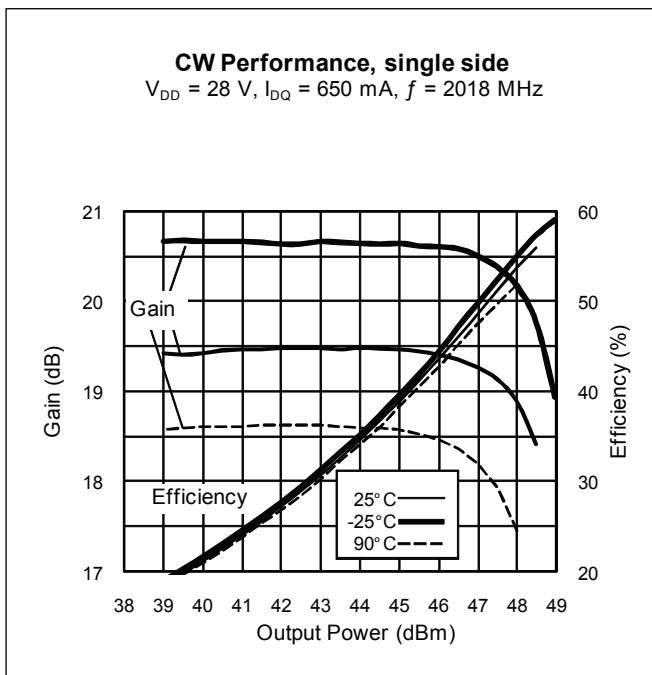
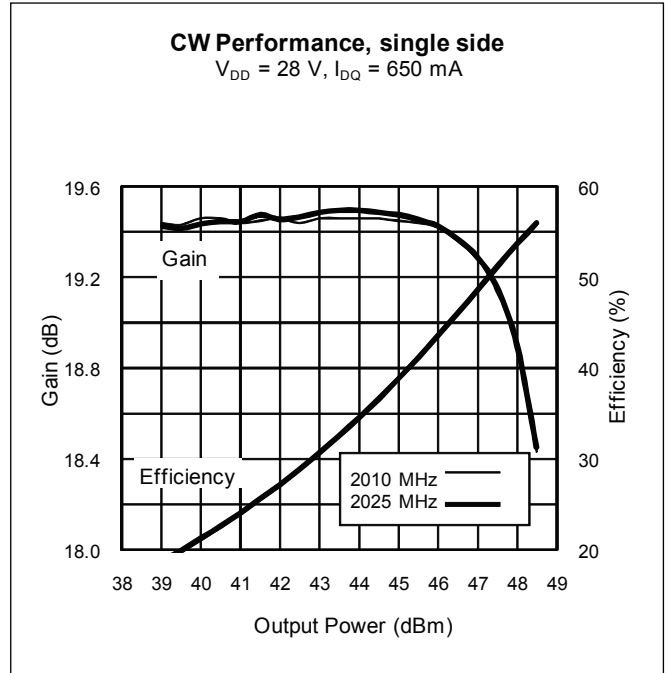
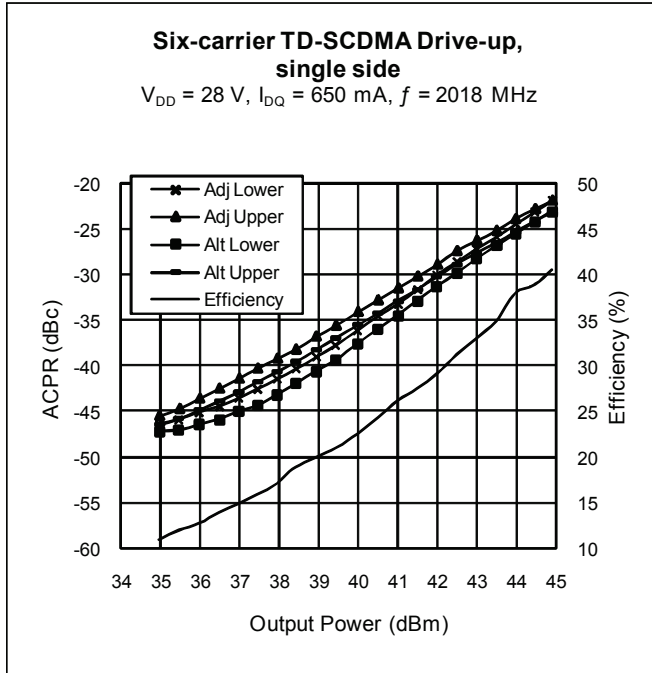
Maximum Ratings

| 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 ($T_{CASE} = 70^{\circ}\text{C}, 120\text{ W CW}$) | $R_{\theta JC}$ | 0.39 | $^{\circ}\text{C/W}$ |

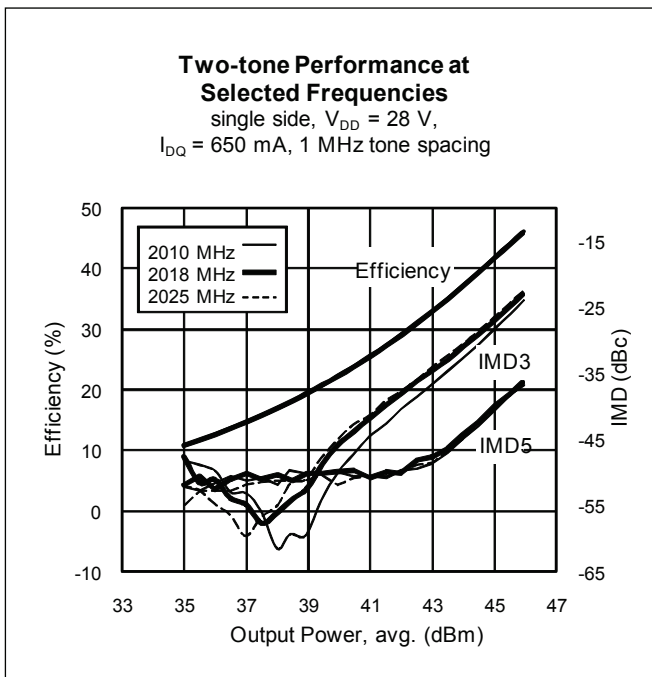
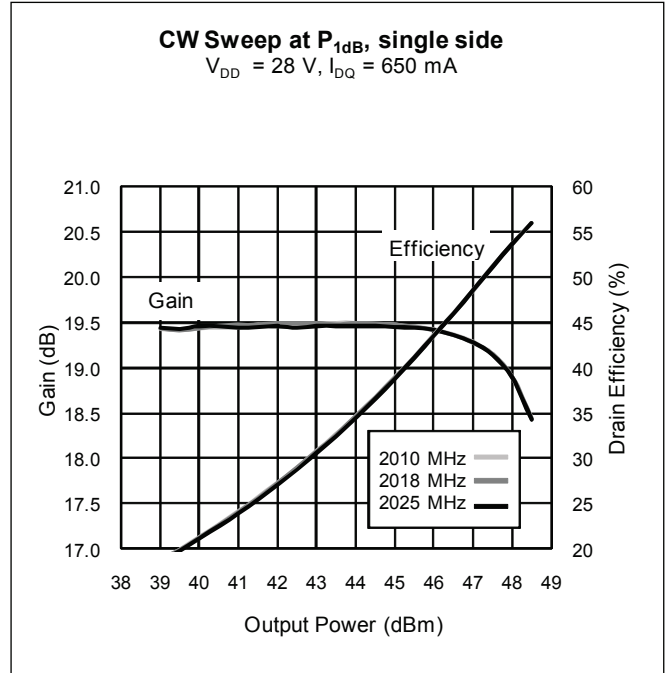
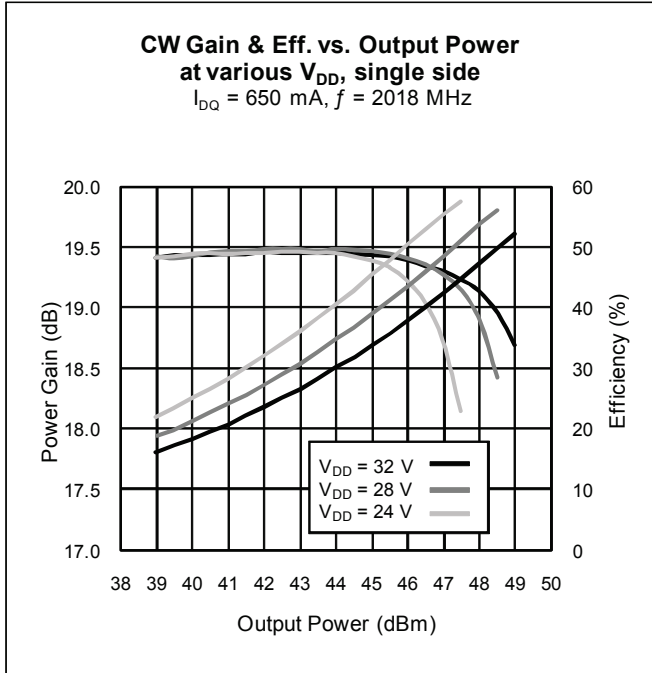
Ordering Information

| Type and Version | Order Code | Package Description | Shipping |
|----------------------|-------------------------|---------------------------|----------------------|
| PTFB201402FC V1 R0 | PTFB201402FCV1R0XTMA1 | H-37248-4, earless flange | Tape & Reel, 50 pcs |
| PTFB201402FC V1 R250 | PTFB201402FCV1R250XTMA1 | H-37248-4, earless flange | Tape & Reel, 250 pcs |

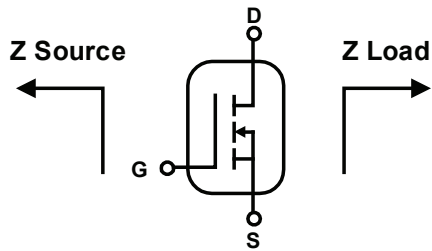
Typical Performance (data taken in a production test fixture)



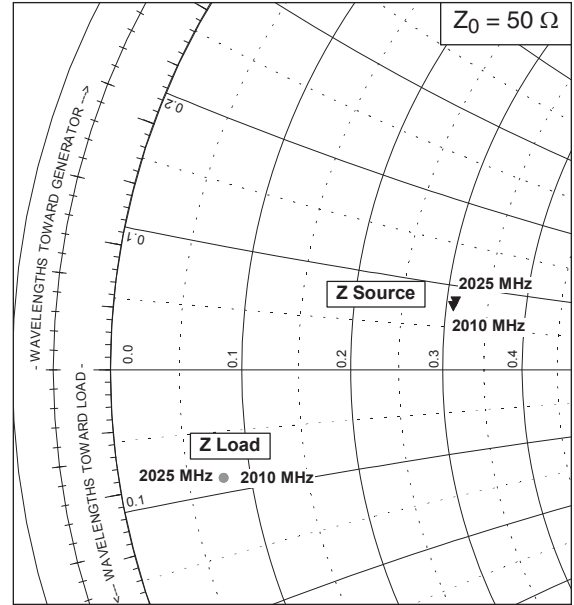
Typical Performance (cont.)



Broadband Circuit Impedance

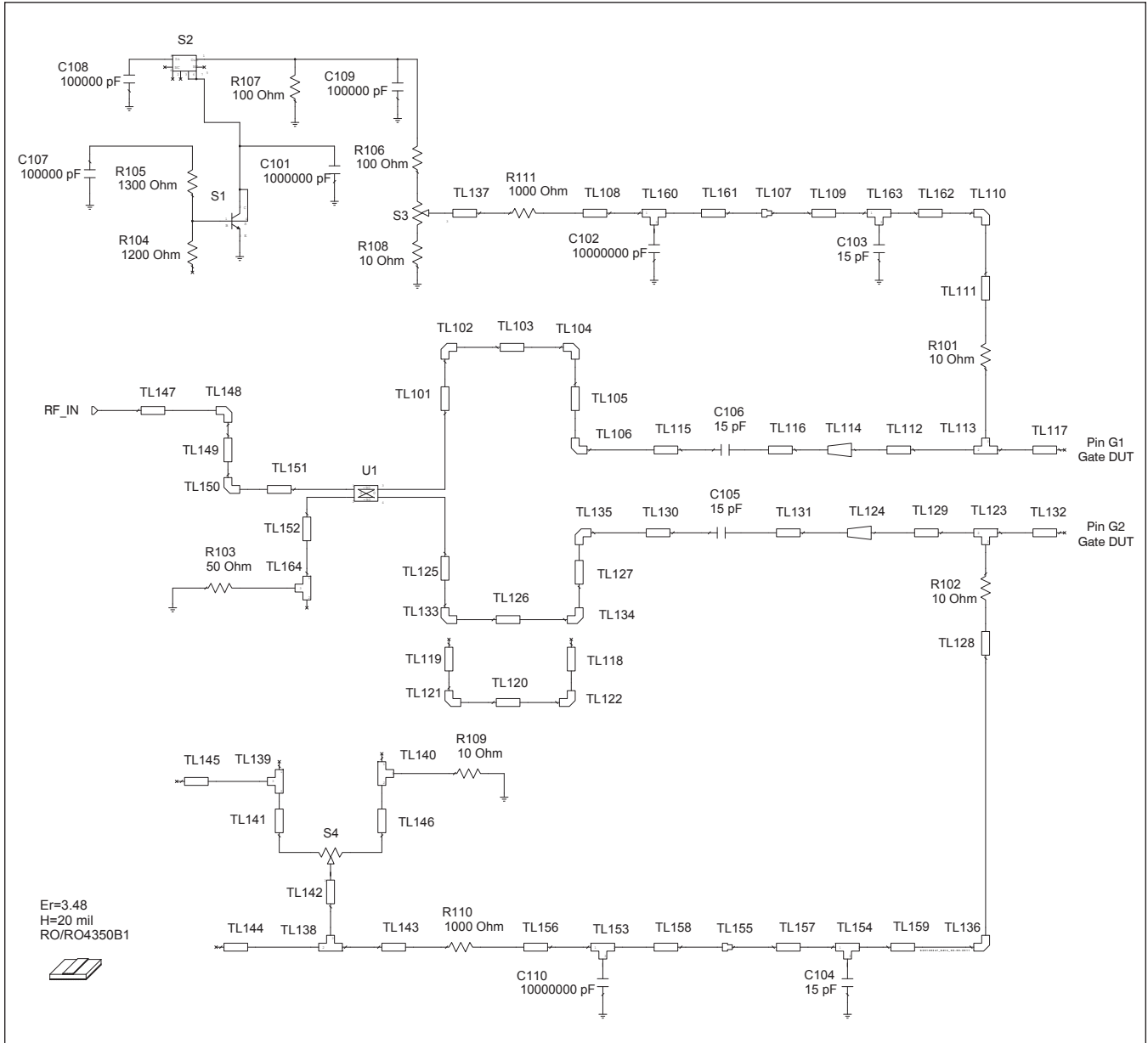


| Frequency MHz | Z Source Ω | | Z Load Ω | |
|------------------|-------------------|-----|-----------------|------|
| | R | jX | R | jX |
| 2010 | 15.4 | 3.8 | 3.9 | -4.4 |
| 2025 | 15.5 | 4.1 | 3.9 | -4.4 |



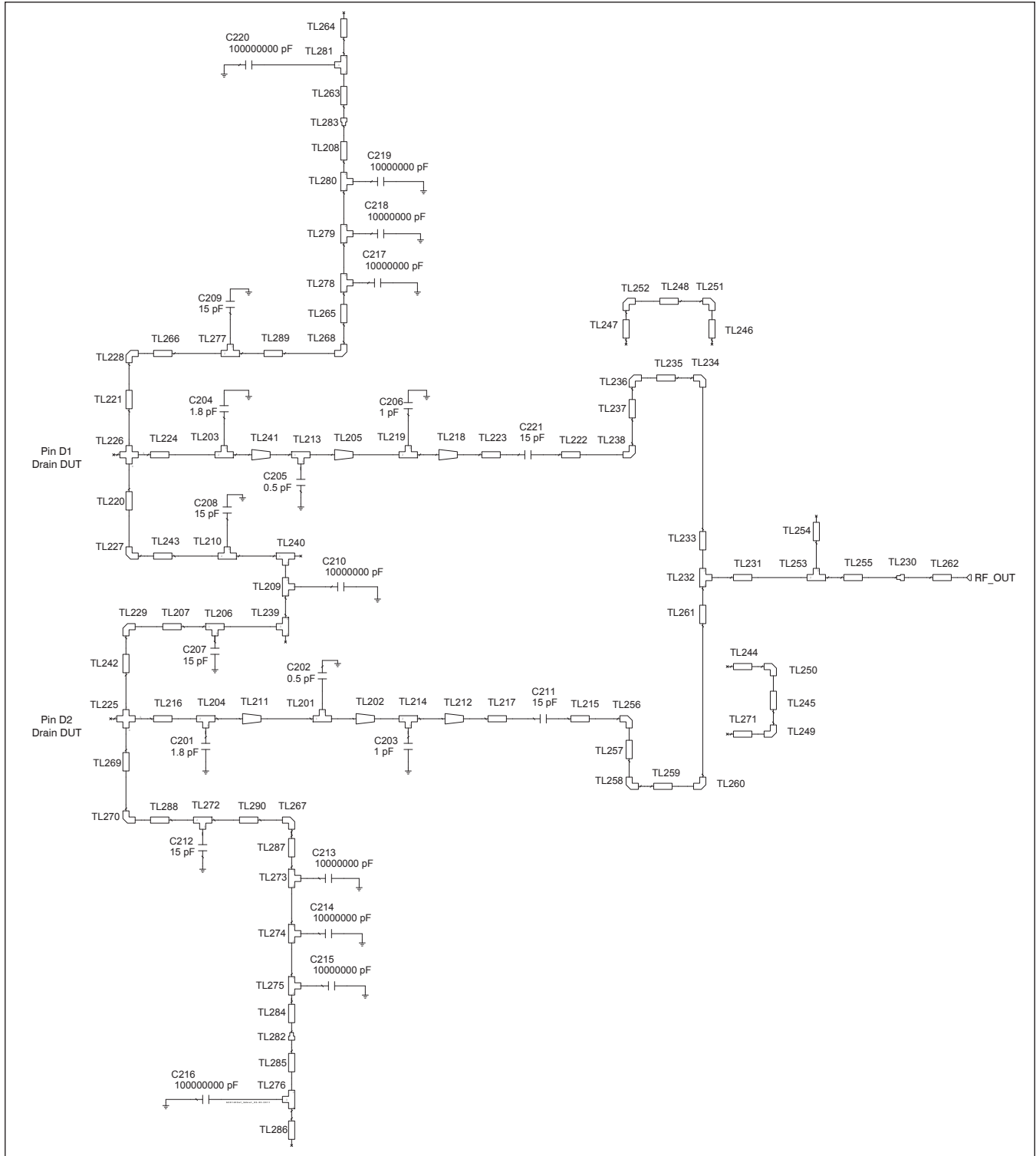
See next page for reference circuit information

Reference Circuit



Reference circuit input schematic for $f = 2170$ MHz

Reference Circuit (cont.)



Reference circuit output schematic for $f = 2170$ MHz

Reference Circuit (cont.)

| Description | |
|-------------|---|
| DUT | PTFB201402FC |
| PCB | 0.508 mm [.020"] thick, $\epsilon_r = 3.48$, Rogers 4350, 2 oz. copper |

Electrical Characteristics at 2170 MHz

| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|--|----------------------------------|--|-----------------------------|
| Input | | | |
| TL101 | 0.083 λ , 52.28 Ω | W = 1.077, L = 6.977 | W = 42, L = 275 |
| TL102, TL104, TL106, TL121, TL122, TL133, TL134, TL135, TL148, TL150 | | W = 0.001, M = 0.500 | W = 1, M = 19685 |
| TL103 | 0.019 λ , 52.28 Ω | W = 1.077, L = 1.567 | W = 42, L = 62 |
| TL105 | 0.031 λ , 52.28 Ω | W = 1.077, L = 2.565 | W = 42, L = 101 |
| TL107, TL155 | | W1 = 0.002, W2 = 0.001, Offset = 0.000 | W1 = 2, W2 = 30, Offset = 0 |
| TL108, TL156 | 0.048 λ , 35.71 Ω | W = 1.905, L = 3.912 | W = 75, L = 154 |
| TL109, TL157 | 0.067 λ , 63.89 Ω | W = 0.762, L = 5.636 | W = 30, L = 222 |
| TL110, TL136 | | W = 0.001, M = 0.300 | W = 1, M = 11811 |
| TL111 | 0.109 λ , 63.89 Ω | W = 0.762, L = 9.268 | W = 30, L = 365 |
| TL112, TL129 | 0.023 λ , 10.63 Ω | W = 8.382, L = 1.801 | W = 330, L = 71 |
| TL113, TL123 | 0.010 λ , 10.63 Ω | W1 = 8.382, W2 = 8.382, W3 = 0.762 | W1 = 330, W2 = 330, W3 = 30 |
| TL114, TL124 (taper) | 0.072 λ , 10.63 Ω | W1 = 8.382, W2 = 1.080, L = 5.588 | W1 = 330, W2 = 43, L = 220 |
| TL115 | 0.032 λ , 52.21 Ω | W = 1.080, L = 2.649 | W = 43, L = 104 |
| TL116, TL131 | 0.012 λ , 52.21 Ω | W = 1.080, L = 0.988 | W = 43, L = 39 |
| TL117 | 0.029 λ , 10.63 Ω | W = 8.382, L = 2.212 | W = 330, L = 87 |
| TL118, TL119 | 0.064 λ , 52.28 Ω | W = 1.077, L = 5.334 | W = 42, L = 210 |
| TL120 | 0.019 λ , 52.21 Ω | W = 1.080, L = 1.570 | W = 43, L = 62 |
| TL125 | 0.082 λ , 52.28 Ω | W = 1.077, L = 6.850 | W = 42, L = 270 |
| TL126 | 0.022 λ , 52.21 Ω | W = 1.080, L = 1.854 | W = 43, L = 73 |
| TL127 | 0.031 λ , 52.21 Ω | W = 1.080, L = 2.565 | W = 43, L = 101 |
| TL128 | 0.138 λ , 63.89 Ω | W = 0.762, L = 11.702 | W = 30, L = 461 |
| TL130 | 0.028 λ , 52.21 Ω | W = 1.080, L = 2.362 | W = 43, L = 93 |
| TL132 | 0.029 λ , 10.63 Ω | W = 8.382, L = 2.212 | W = 330, L = 87 |
| TL137 | 0.085 λ , 35.71 Ω | W = 1.905, L = 6.914 | W = 75, L = 272 |
| TL138 | 0.023 λ , 35.71 Ω | W1 = 1.905, W2 = 1.905, W3 = 1.905 | W1 = 75, W2 = 75, W3 = 75 |
| TL139, TL140 | 0.037 λ , 35.71 Ω | W1 = 1.905, W2 = 1.905, W3 = 3.048 | W1 = 75, W2 = 75, W3 = 120 |
| TL141, TL142, TL146 | 0.023 λ , 35.71 Ω | W = 1.905, L = 1.905 | W = 75, L = 75 |
| TL143 | 0.076 λ , 35.71 Ω | W = 1.905, L = 6.231 | W = 75, L = 245 |
| TL144 | 0.030 λ , 35.71 Ω | W = 1.905, L = 2.477 | W = 75, L = 98 |
| TL145 | 0.046 λ , 25.04 Ω | W = 3.048, L = 3.713 | W = 120, L = 146 |
| TL147 | 0.042 λ , 52.28 Ω | W = 1.077, L = 3.470 | W = 42, L = 137 |
| TL149 | 0.020 λ , 52.28 Ω | W = 1.077, L = 1.684 | W = 42, L = 66 |

table continued on page 9

Reference Circuit (cont.)
Electrical Characteristics at 2170 MHz

| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|--|---|--|--------------------------------------|
| Input | | | |
| TL151 | 0.078 λ , 52.21 Ω | W = 1.080, L = 6.561 | W = 43, L = 258 |
| TL152 | 0.042 λ , 52.28 Ω | W = 1.077, L = 3.472 | W = 42, L = 137 |
| TL153, TL160 | 0.009 λ , 35.71 Ω | W1 = 1.905, W2 = 1.905, W3 = 0.762 | W1 = 75, W2 = 75, W3 = 30 |
| TL154, TL163 | 0.011 λ , 63.89 Ω | W1 = 0.762, W2 = 0.762, W3 = 0.889 | W1 = 30, W2 = 30, W3 = 35 |
| TL158, TL161 | 0.007 λ , 35.71 Ω | W = 1.905, L = 0.610 | W = 75, L = 24 |
| TL159, TL162 | 0.026 λ , 63.89 Ω | W = 0.762, L = 2.184 | W = 30, L = 86 |
| TL164 | 0.013 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 1.080 | W1 = 43, W2 = 43, W3 = 43 |
| Output | | | |
| TL201, TL213 | 0.000 λ , 14.83 Ω | W1 = 5.740, W2 = 5.740, W3 = 0.025 | W1 = 226, W2 = 226, W3 = 1 |
| TL202, TL205 (taper) | 0.021 λ , 14.94 Ω / 25.04 Ω | W1 = 5.690, W2 = 3.048, L = 1.651 | W1 = 224, W2 = 120, L = 65 |
| TL203, TL204 | 0.026 λ , 8.71 Ω | W1 = 10.447, W2 = 10.447, W3 = 2.032 | W1 = 411, W2 = 411, W3 = 80 |
| TL206, TL210, TL239, TL240 | 0.013 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 1.080 | W1 = 43, W2 = 43, W3 = 43 |
| TL207, TL243 | 0.094 λ , 52.28 Ω | W = 1.077, L = 7.882 | W = 42, L = 310 |
| TL208 | 0.006 λ , 52.28 Ω | W = 1.077, L = 0.516 | W = 42, L = 20 |
| TL209 | 0.008 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 0.660 | W1 = 43, W2 = 43, W3 = 26 |
| TL211, TL241 (taper) | 0.037 λ , 8.73 Ω / 14.81 Ω | W1 = 10.422, W2 = 5.751, L = 2.819 | W1 = 410, W2 = 226, L = 111 |
| TL212, TL218 (taper) | 0.015 λ , 25.04 Ω / 51.68 Ω | W1 = 3.048, W2 = 1.097, L = 1.189 | W1 = 120, W2 = 43, L = 47 |
| TL214, TL219 | 0.000 λ , 25.04 Ω | W1 = 3.048, W2 = 3.048, W3 = 0.025 | W1 = 120, W2 = 120, W3 = 1 |
| TL215, TL222 | 0.018 λ , 52.28 Ω | W = 1.077, L = 1.516 | W = 42, L = 60 |
| TL216, TL224 | 0.034 λ , 8.73 Ω | W = 10.424, L = 2.604 | W = 410, L = 103 |
| TL217, TL223, TL245 | 0.024 λ , 52.21 Ω | W = 1.080, L = 2.032 | W = 43, L = 80 |
| TL220 | 0.013 λ , 52.21 Ω | W = 1.080, L = 1.097 | W = 43, L = 43 |
| TL221, TL269 | 0.051 λ , 52.21 Ω | W = 1.080, L = 4.239 | W = 43, L = 167 |
| TL225, TL226 | | W1 = 10.422, W2 = 1.080, W3 = 10.422, W4 = 1.080 | W1 = 410, W2 = 43, W3 = 410, W4 = 43 |
| TL227, TL228, TL229, TL234, TL236, TL238, TL249, TL250, TL251, TL252, TL256, TL258, TL260, TL267, TL268, TL270 | | W = 0.001, M = 0.500 | W = 1, M = 19685 |
| TL230 | | W1 = 1.880, W2 = 1.080, | W1 = 74, W2 = 43 |
| TL231 | 0.043 λ , 36.06 Ω | W = 1.880, L = 3.495 | W = 74, L = 138 |
| TL232 | 0.022 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 1.880 | W1 = 43, W2 = 43, W3 = 74 |
| TL233 | 0.081 λ , 52.28 Ω | W = 1.077, L = 6.774 | W = 42, L = 267 |
| TL235, TL259 | 0.023 λ , 52.21 Ω | W = 1.080, L = 1.900 | W = 43, L = 75 |
| TL237 | 0.052 λ , 52.28 Ω | W = 1.077, L = 4.389 | W = 42, L = 173 |

table continued on page 10

Reference Circuit (cont.)

Electrical Characteristics at 2170 MHz

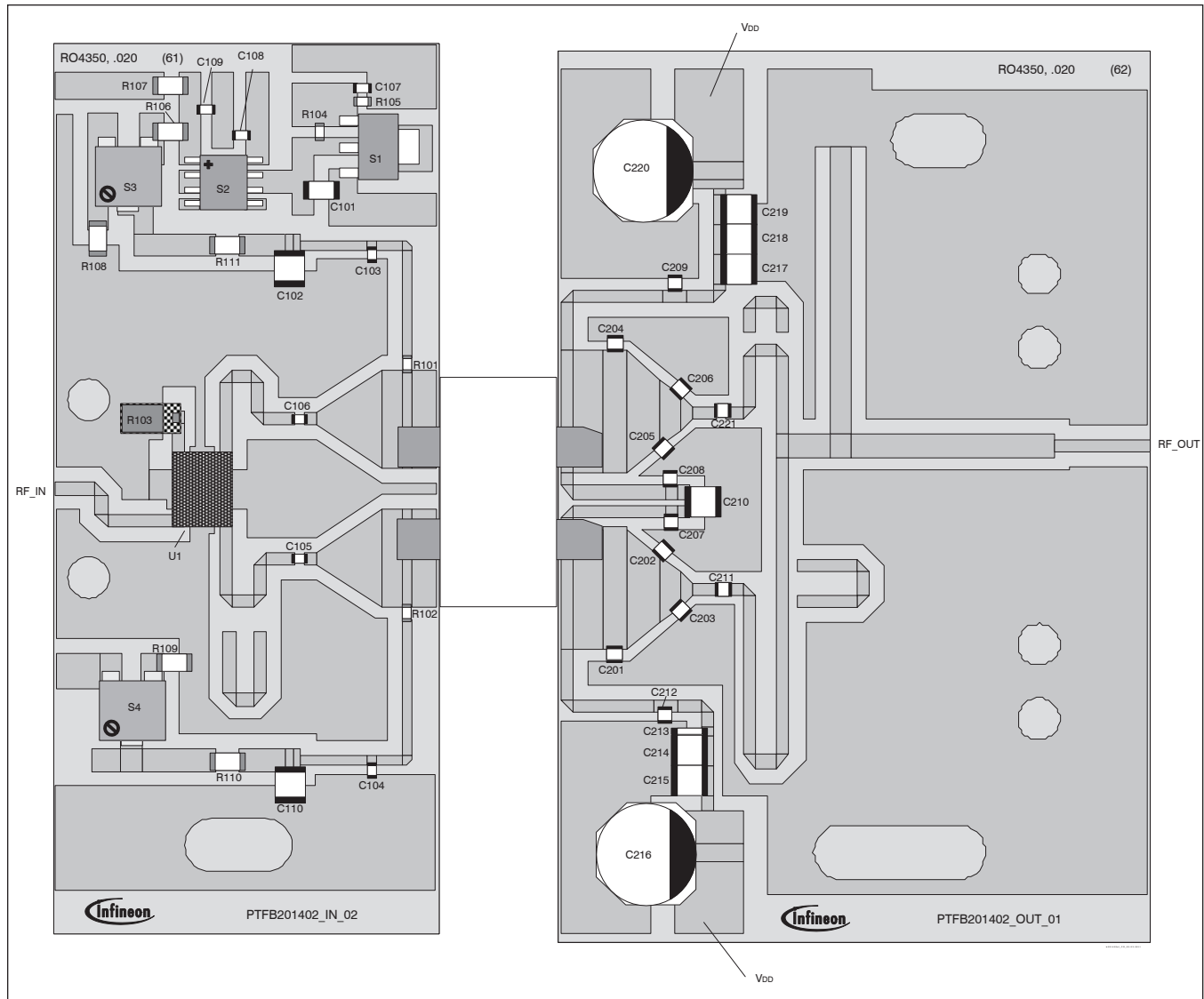
| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|---------------------|----------------------------------|--|-------------------------------|
| Output | | | |
| TL242 | 0.010 λ , 52.21 Ω | W = 1.080, L = 0.813 | W = 43, L = 32 |
| TL244, TL271 | 0.060 λ , 52.28 Ω | W = 1.077, L = 5.019 | W = 42, L = 198 |
| TL246, TL247 | 0.024 λ , 52.28 Ω | W = 1.077, L = 2.032 | W = 42, L = 80 |
| TL248 | 0.023 λ , 52.21 Ω | W = 1.080, L = 1.900 | W = 43, L = 75 |
| TL253 | 0.023 λ , 36.06 Ω | W1 = 1.880, W2 = 1.880, W3 = 1.880 | W1 = 74, W2 = 74, W3 = 74 |
| TL254 | 0.300 λ , 36.06 Ω | W = 1.880, L = 24.526 | W = 74, L = 966 |
| TL255 | 0.212 λ , 36.06 Ω | W = 1.880, L = 17.371 | W = 74, L = 684 |
| TL257 | 0.164 λ , 52.21 Ω | W = 1.080, L = 13.701 | W = 43, L = 539 |
| TL261 | 0.306 λ , 52.28 Ω | W = 1.077, L = 25.593 | W = 42, L = 1008 |
| TL262 | 0.099 λ , 52.28 Ω | W = 1.077, L = 8.247 | W = 42, L = 325 |
| TL263 | 0.012 λ , 14.50 Ω | W = 5.893, L = 0.965 | W = 232, L = 38 |
| TL264 | 0.102 λ , 14.50 Ω | W = 5.893, L = 7.976 | W = 232, L = 314 |
| TL265 | 0.006 λ , 52.28 Ω | W = 1.077, L = 0.533 | W = 42, L = 21 |
| TL266 | 0.092 λ , 52.28 Ω | W = 1.077, L = 7.696 | W = 42, L = 303 |
| TL272, TL277 | 0.024 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 2.032 | W1 = 43, W2 = 43, W3 = 80 |
| TL273 | 0.009 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 0.762 | W1 = 43, W2 = 43, W3 = 30 |
| TL274, TL275 | 0.030 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 2.540 | W1 = 43, W2 = 43, W3 = 100 |
| TL276 | 0.019 λ , 14.50 Ω | W1 = 5.893, W2 = 5.893, W3 = 1.524 | W1 = 232, W2 = 232, W3 = 60 |
| TL278, TL279, TL280 | 0.030 λ , 52.21 Ω | W1 = 1.080, W2 = 1.080, W3 = 2.489 | W1 = 43, W2 = 43, W3 = 98 |
| TL281 | 0.019 λ , 14.50 Ω | W1 = 5.893, W2 = 5.893, W3 = 1.524 | W1 = 232, W2 = 232, W3 = 60 |
| TL282 | | W1 = 0.001, W2 = 0.005, Offset = 0.000 | W1 = 1, W2 = 180, Offset = 0 |
| TL283 | | W1 = 0.001, W2 = 0.005, Offset = 0.001 | W1 = 1, W2 = 180, Offset = 37 |
| TL284 | 0.016 λ , 52.28 Ω | W = 1.077, L = 1.303 | W = 42, L = 51 |
| TL285 | 0.035 λ , 14.50 Ω | W = 5.893, L = 2.743 | W = 232, L = 108 |
| TL286 | 0.079 λ , 14.50 Ω | W = 5.893, L = 6.198 | W = 232, L = 244 |
| TL287 | 0.016 λ , 52.28 Ω | W = 1.077, L = 1.372 | W = 42, L = 54 |
| TL288 | 0.084 λ , 52.28 Ω | W = 1.077, L = 6.985 | W = 42, L = 275 |
| TL289 | 0.027 λ , 52.28 Ω | W = 1.077, L = 2.258 | W = 42, L = 89 |
| TL290 | 0.024 λ , 52.28 Ω | W = 1.077, L = 2.029 | W = 42, L = 80 |

Reference Circuit (cont.)

Circuit Assembly Information

Test Fixture Part No. LTD/PTFB201402FC

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



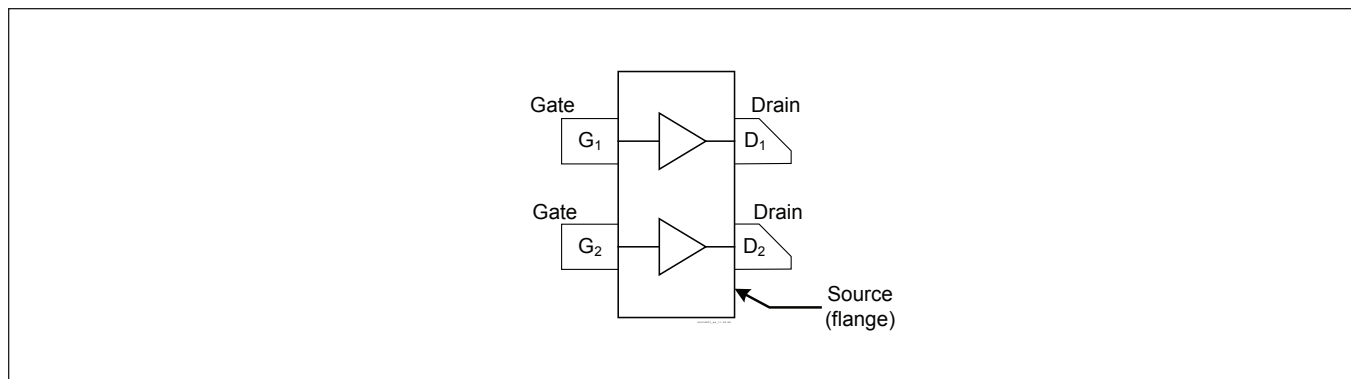
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Component Information

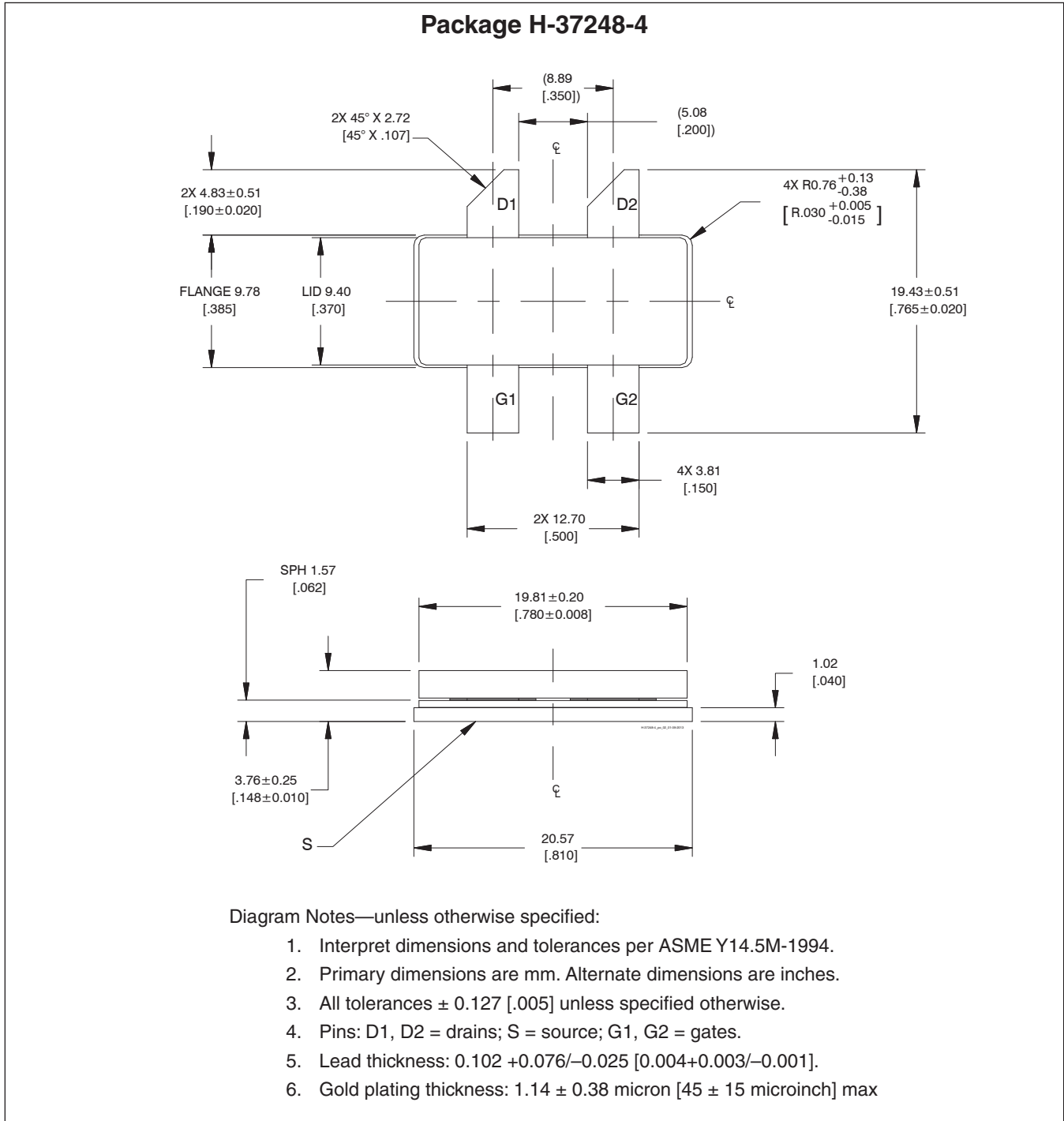
| Component | Description | Suggested Manufacturer | P/N |
|------------------------------------|-----------------------------|------------------------|-------------------|
| Input | | | |
| C101 | Chip capacitor, 1 μ F | ATC | 490-1863-2-ND |
| C102, C110 | Capacitor, 10 μ F | Digi-Key | 587-1818-2-ND |
| C103, C104, C105, C106 | Chip capacitor, 15 pF | ATC | ATC100A150JW150XB |
| C107, C108, C109 | Chip capacitor, 0.1 μ F | ATC | PCC1772CT-ND |
| R101, R102 | Resistor, 10 Ω | Digi-Key | P10GCT-ND |
| R103 | Resistor, 50 Ω | Digi-Key | C16A50Z4 |
| R104 | Resistor, 1200 Ω | Digi-Key | P1.2KGCT-ND |
| R105 | Resistor, 1300 Ω | Digi-Key | P1.3KGCT-ND |
| R106, R107 | Resistor, 100 Ω | Digi-Key | P100ECT-ND |
| R108, R109 | Resistor, 10 Ω | Digi-Key | P10ECT-ND |
| R110, R111 | Resistor, 1000 Ω | Digi-Key | P1.0KECT-ND |
| S1 | Transistor | Digi-Key | BCP5616TA-ND |
| S2 | Voltage Regulator | Digi-Key | LM78L05ACM-ND |
| S3, S4 | Potentiometer, 2k Ω | Digi-Key | 3224W-202ECT-ND |
| U1 | Hybrid coupler, 50 Ω | Anaren | X3C19P1-035 |
| Output | | | |
| C201, C204 | Chip capacitor, 1.8 pF | ATC | ATC800A1R8BW150XB |
| C202, C205 | Chip capacitor, 0.5 pF | ATC | ATC800A1R8BW150XB |
| C203, C206 | Chip capacitor, 1 pF | ATC | ATC800A1R0BW150XB |
| C207, C208, C209, C211, C212 | Chip capacitor, 15 pF | ATC | ATC800A150FW150XB |
| C210, C214, C215, C217, C218, C219 | Capacitor, 10 μ F | Digi-Key | 587-1818-2-ND |
| C213 | Capacitor, 10 μ F | Digi-Key | 399-1267-2-ND |
| C216, C220 | Capacitor, 100 μ F | Digi-Key | PCE4442TR-ND |
| C221 | Chip capacitor, 15 pF | ATC | ATC100A150FW150XB |

Pinout Diagram



Lead connections for PTFB201402FC

Package Outline Specifications



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

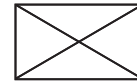
| | | |
|--------------------------|--|------------|
| Revision History: | 2016-06-14 | Data Sheet |
| Previous Version: | 2012-02-16, Data Sheet | |
| Page | Subjects (major changes since last revision) | |
| 2 | Updated ordering information to include R0 | |
| | | |
| | | |
| | | |

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Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.