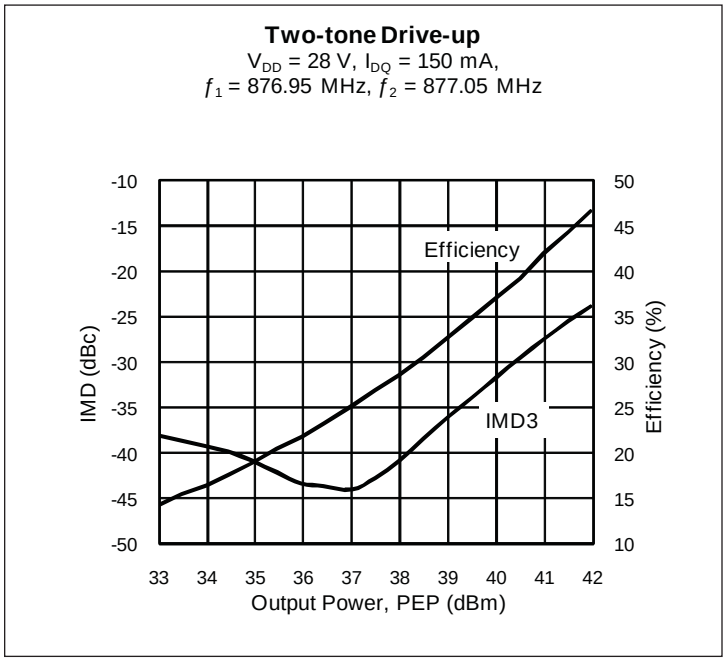
# High Power RF LDMOS Field Effect Transistor
# 12 W, 28 V, 700 – 2200 MHz

## Description

The PTFA220121M is an unmatched 12-watt LDMOS FET intended for power amplifier applications in the 700 to 2200 MHz. This LDMOS device offers excellent gain, efficiency and linearity performance in a small overmolded plastic package.

PTFA220121M
Package PG-SON-10




## Features

- Typical two-carrier WCDMA performance at 2140 MHz, 8 dB PAR
  - $P_{OUT}$ = 33 dBm Avg
  - ACPR = –45.5 dBc
- Typical two-carrier WCDMA performance at 877 MHz, 8 dB PAR
  - $P_{OUT}$ = 33 dBm Avg
  - ACPR = –44.5 dBc
- Typical CW performance, 2140 MHz, 28 V
  - $P_{OUT}$ = 41.6 dBm
  - Efficiency = 53.5%
  - Gain = 15.5 dB
- Typical CW performance, 877 MHz, 28 V
  - $P_{OUT}$ = 41.8 dBm
  - Efficiency = 60%
  - Gain = 19.9 dB
- Capable of handling 10:1 VSWR @ 28 V, 12 W (CW) output power
- Integrated ESD protection
- Excellent thermal stability
- Pb-free and RoHS compliant

## RF Characteristics

**Two-tone Measurements** (not subject to production test – verified by design / characterization in Infineon test fixture)
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $P_{OUT}$ = 12 W PEP, $f$ = 877 MHz, tone spacing = 1 MHz

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Gain | $G_{ps}$ | 20 | 20.5 | — | dB |
| Drain Efficiency | ηD | 41 | 42.5 | — | % |
| Intermodulation Distortion | IMD | — | –33 | –32 | dBc |

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

**ESD:** Electrostatic discharge sensitive device—observe handling precautions!

## RF Characteristics (cont.)

**Two-tone Measurements** (not subject to production test – verified by design / characterization in Infineon test fixture)
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $P_{OUT}$ = 9.3 W PEP, $f$ = 2140 MHz, tone spacing = 1 MHz

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Gain | $G_{ps}$ | — | 16.2 | — | dB |
| Drain Efficiency | $\eta D$ | — | 37 | — | % |
| Intermodulation Distortion | IMD | — | –29.4 | — | dBc |

## DC Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_{DS}$ = 10 µA | $V_{(BR)DSS}$ | 65 | — | — | V |
| Drain Leakage Current | $V_{DS}$ = 28 V, $V_{GS}$ = 0 V | $I_{DSS}$ | — | — | 1.0 | µA |
| On-State Resistance | $V_{GS}$ = 10 V, $V_{DS}$ = 0.1 A | $R_{DS(on)}$ | — | 2.01 | — | Ω |
| Operating Gate Voltage | $V_{DS}$ = 28 V, $I_{DQ}$ = 150 mA | $V_{GS}$ | 2.0 | 2.5 | 3.0 | 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 | $V_{GS}$ | –0.5 to +12 | V |
| Junction Temperature | $T_J$ | 175 | °C |
| Storage Temperature Range | $T_{STG}$ | –40 to +150 | °C |
| Thermal Resistance ($T_{CASE}$ = 70°C, 12 W CW) | $R_{\theta JC}$ | 3.4 | °C/W |

## Moisture Sensitivity Level

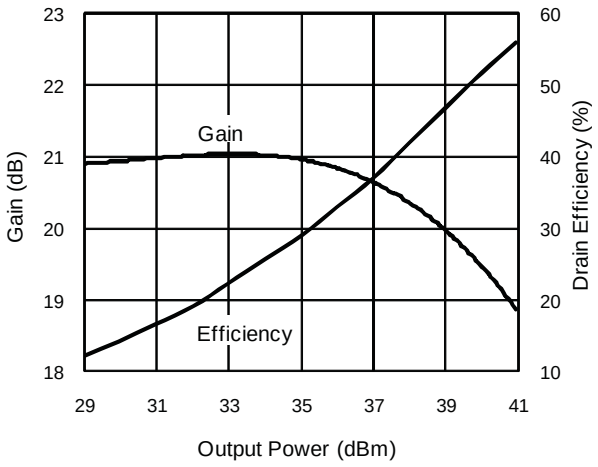
| Level | Test Standard | Package Temperature | Unit |
|---|---|---|---|
| 3 | IPC/JEDEC J-STD-020 | 260 | °C |

## Ordering Information

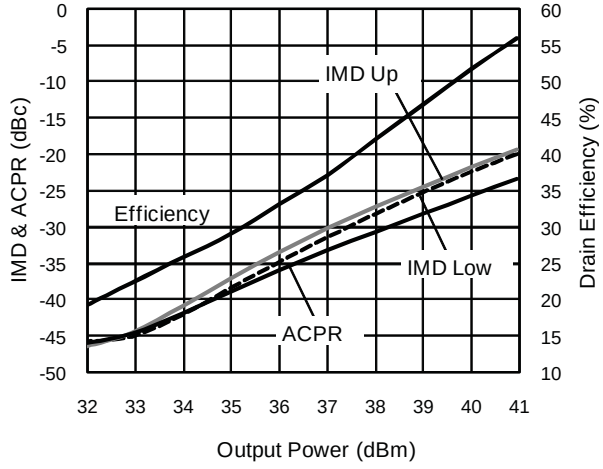
| Type and Version | Order Code | Package and Description | Shipping |
|---|---|---|---|
| PTFA220121M V4 R1K | PTFA220121MV4R1KV4XUMA1 | PG-SON-10, Molded plastic, SMD | Tape & Reel, 1,000 pcs |

## Typical Performance, 877 MHz (data taken in a production test fixture)

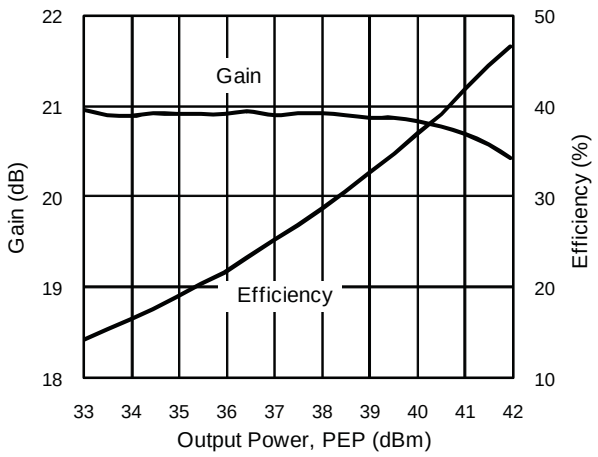
**Two-carrier WCDMA 3GPP**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 877 MHz
3GPP WCDMA, P/AR = 8:1, 10 MHz carrier spacing, BW 3.84 MHz



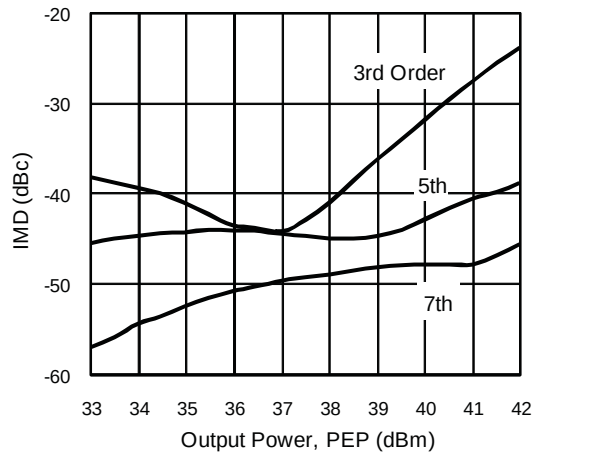

**Two-carrier WCDMA 3GPP Drive-up**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 877 MHz
3GPP WCDMA, P/AR = 8:1, 10 MHz carrier spacing, BW 3.84 MHz



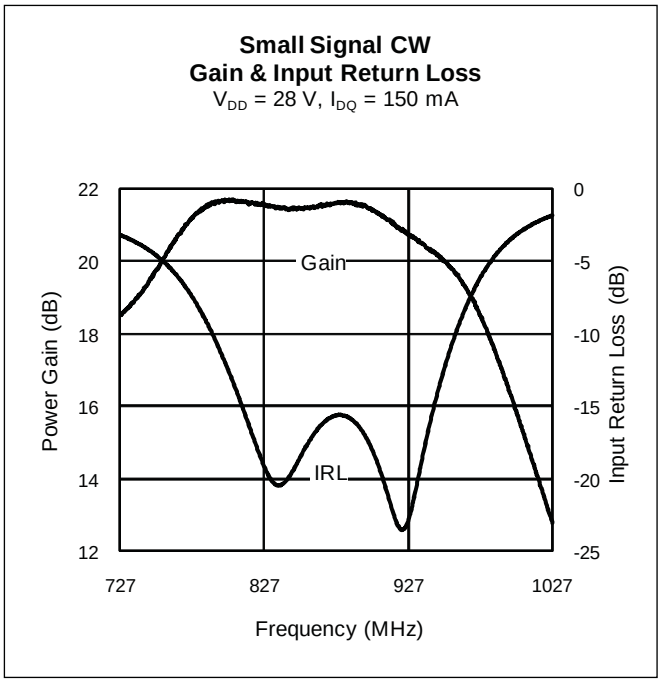

**Two-tone Drive-up**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA,
$f_1$ = 876.95 MHz, $f_2$ = 877.05 MHz




**Intermodulation Distortion vs. Output Power**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA,
$f_1$ = 876.95 MHz, $f_2$ = 877.05 MHz

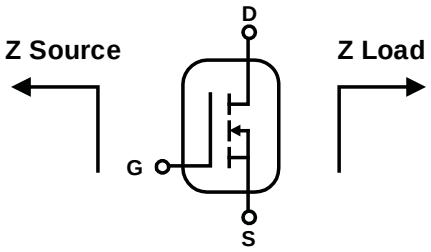


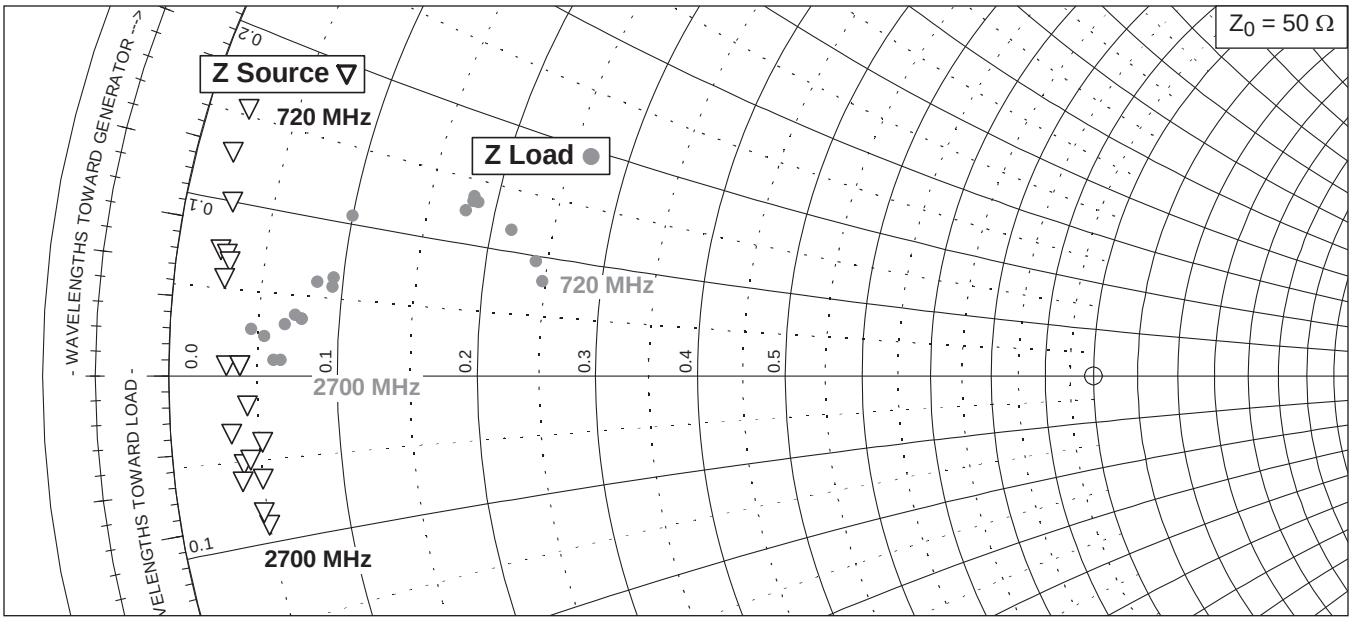
## Typical Performance, 877 MHz (cont.)



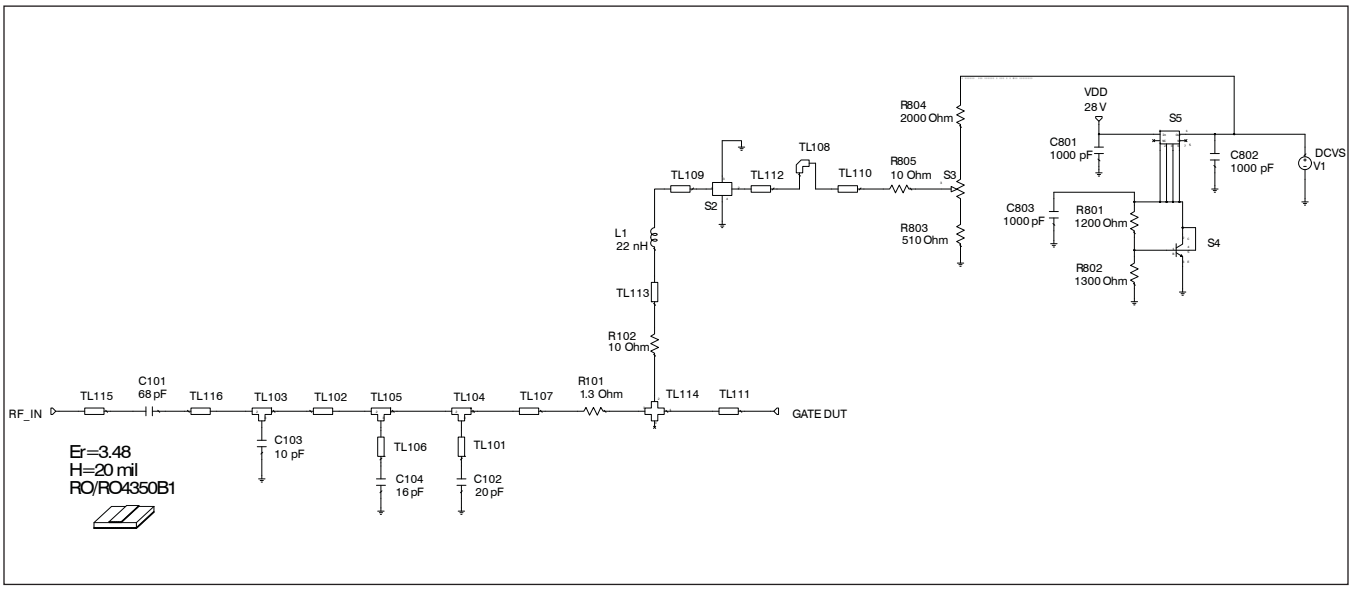
## Broadband Circuit Impedance

| Frequency | Z Source Ω | | Z Load Ω | |
|---|---|---|---|---|
| MHz | R | jX | R | jX |
| 720 | 1.1 | 7.7 | 12.0 | 4.8 |
| 820 | 1.0 | 6.4 | 12.4 | 4.0 |
| 869 | 1.3 | 5.0 | 10.8 | 5.9 |
| 894 | 1.2 | 3.6 | 9.3 | 6.7 |
| 920 | 1.4 | 3.5 | 9.1 | 6.7 |
| 940 | 1.5 | 3.3 | 9.1 | 6.9 |
| 960 | 1.4 | 2.8 | 8.9 | 6.3 |
| 1675 | 1.6 | 0.3 | 5.0 | 5.3 |
| 1805 | 2.0 | 0.3 | 4.7 | 3.2 |
| 1880 | 2.0 | 0.3 | 4.7 | 2.9 |
| 1930 | 2.2 | –0.9 | 4.2 | 3.0 |
| 1990 | 2.6 | –2.0 | 3.8 | 1.8 |
| 2110 | 2.5 | –3.1 | 3.8 | 1.8 |
| 2170 | 2.0 | –2.6 | 3.6 | 1.9 |
| 2300 | 1.7 | –1.7 | 3.3 | 1.6 |
| 2400 | 2.2 | –2.5 | 3.2 | 0.5 |
| 2500 | 2.5 | –4.5 | 3.0 | 0.5 |
| 2600 | 2.4 | –4.1 | 2.7 | 1.2 |
| 2700 | 1.9 | –3.1 | 2.3 | 1.4 |

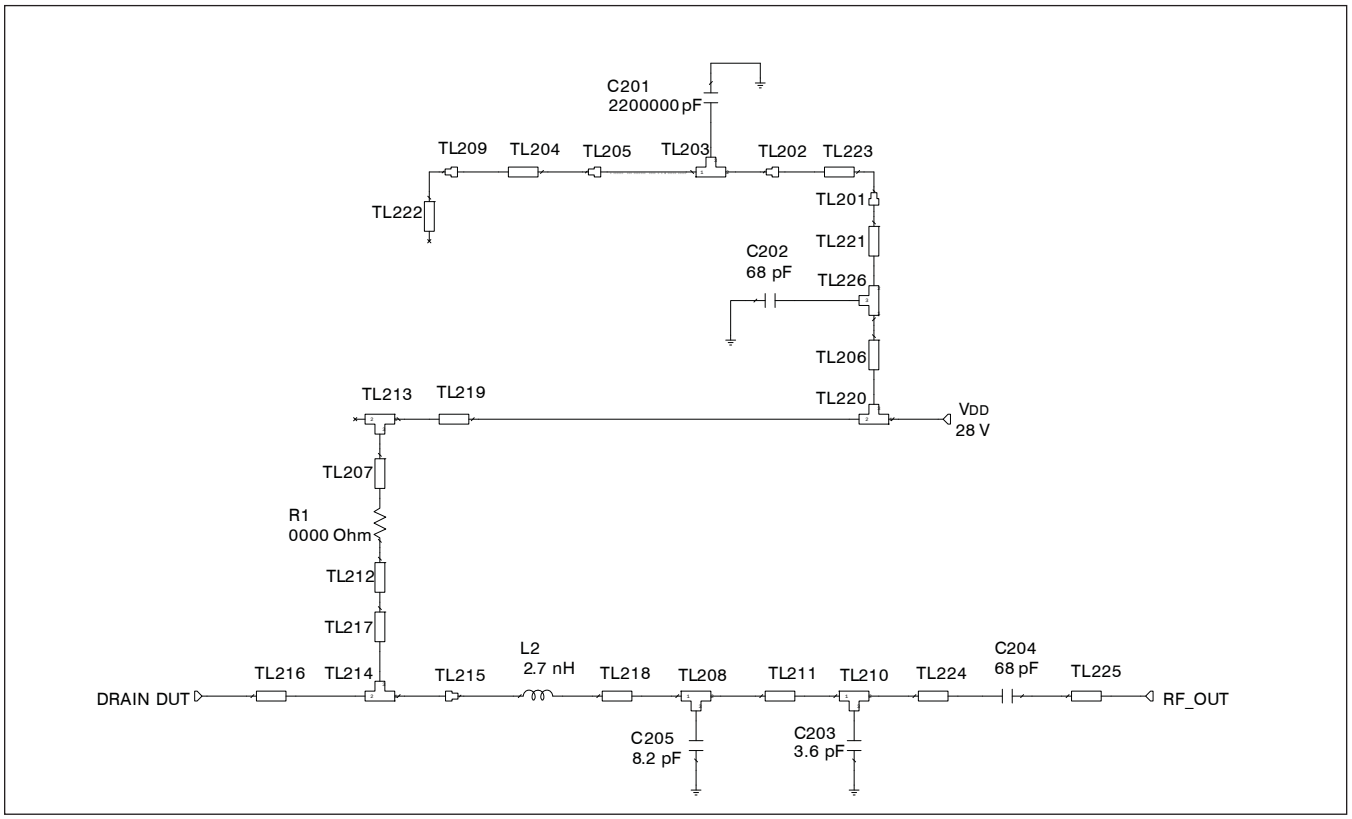


## Reference Circuit, 877 MHz




*Reference circuit input schematic for ƒ = 877 MHz*




*Reference circuit output schematic for ƒ = 877 MHz*

## Reference Circuit, 877 MHz (cont.)

| Description | |
|---|---|
| DUT | PTFA220121M |
| PCB | 0.508 mm [.020"] thick, εr = 3.48, Rogers 4350, 1 oz. copper |

**Electrical Characteristics at 877 MHz**

| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|---|---|---|---|
| **Input** | | | |
| TL101, TL106 | | W = 0.000, L = 0.000 | W = 0, L = 0 |
| TL102 | 0.050 λ, 51.98 Ω | W = 1.087, L = 10.262 | W = 43, L = 404 |
| TL103, TL104, TL105 | 0.004 λ, 51.98 Ω | W1 = 1.087, W2 = 1.087, W3 = 0.813 | W1 = 43, W2 = 43, W3 = 32 |
| TL107 | 0.004 λ, 51.98 Ω | W = 1.087, L = 0.813 | W = 43, L = 32 |
| TL108 | | W = 1.524 | W = 60 |
| TL109 | 0.007 λ, 54.17 Ω | W = 1.016, L = 1.524 | W = 40, L = 60 |
| TL110 | 0.025 λ, 41.75 Ω | W = 1.524, L = 5.080 | W = 60, L = 200 |
| TL111 | 0.009 λ, 25.04 Ω | W = 3.048, L = 1.778 | W = 120, L = 70 |
| TL112 | 0.002 λ, 41.75 Ω | W = 1.524, L = 0.508 | W = 60, L = 20 |
| TL113 | 0.006 λ, 41.75 Ω | W = 1.524, L = 1.270 | W = 60, L = 50 |
| TL114 | | 1W1 = 3.048, W2 = 0.762, W3 = 3.048, W4 = 0.762 | W1 = 120, W2 = 30, W3 = 120, W4 = 30 |
| TL115 | 0.016 λ, 51.98 Ω | W = 1.087, L = 3.264 | W = 43, L = 129 |
| TL116 | 0.044 λ, 51.98 Ω | W = 1.087, L = 9.093 | W = 43, L = 358 |

table continued on page 8

## Reference Circuit, 877 MHz (cont.)

**Electrical Characteristics at 877 MHz**

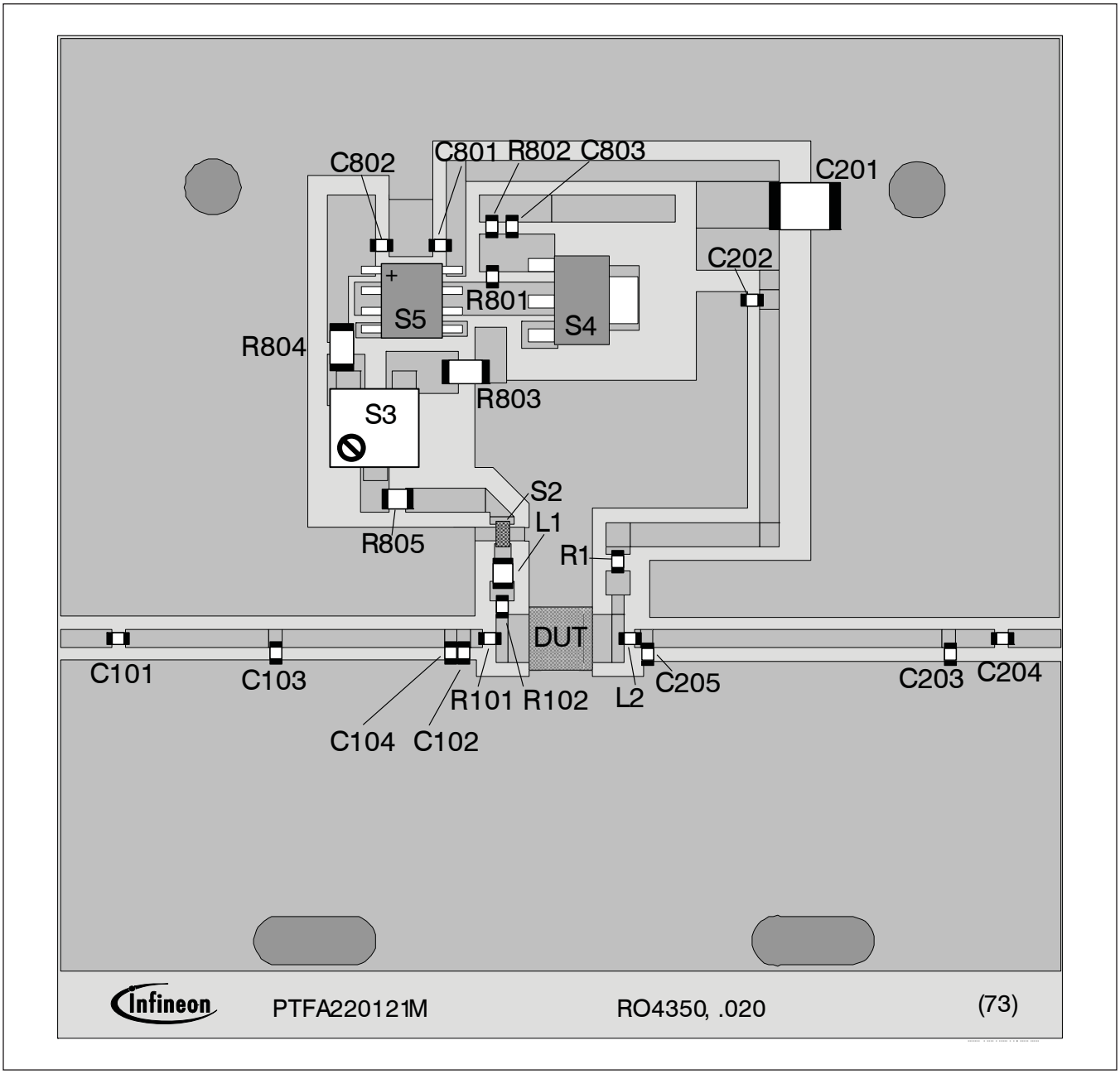
| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|---|---|---|---|
| **Output** | | | |
| TL201 | | W1 = 1.270, W2 = 5.283, Offset = –2.007 | W1 = 50, W2 = 208, Offset = –79 |
| TL202 | | W1 = 5.283, W2 = 5.283, Offset = 0.000 | W1 = 208, W2 = 208, Offset = 0 |
| TL203 | 0.016 λ, 15.92 Ω | W1 = 5.283, W2 = 5.283, W3 = 3.023 | W1 = 208, W2 = 208, W3 = 119 |
| TL204 | 0.007 λ, 4.80 Ω | W = 19.850, L = 1.270 | W = 782, L = 50 |
| TL205 | | W1 = 19.812, W2 = 19.812, Offset = 7.264 | W1 = 780, W2 = 780, Offset = 286 |
| TL206 | 0.066 λ, 47.12 W | W = 1.270, L = 13.467 | W = 50, L = 530 |
| TL207 | 0.002 λ, 41.75 Ω | W = 1.524, L = 0.508 | W = 60, L = 20 |
| TL208, TL210 | 0.004 λ, 51.98 Ω | W1 = 1.087, W2 = 1.087, W3 = 0.813 | W1 = 43, W2 = 43, W3 = 32 |
| TL209 | | W1 = 1.270, W2 = 1.270, Offset = 10.566 | W1 = 50, W2 = 50, Offset = 416 |
| TL211 | 0.089 λ, 51.98 Ω | W = 1.087, L = 18.313 | W = 43, L = 721 |
| TL212 | 0.007 λ, 41.75 Ω | W = 1.524, L = 1.524 | W = 60, L = 60 |
| TL213 | 0.007 λ, 41.75 Ω | W1 = 1.524, W2 = 1.524, W3 = 1.524 | W1 = 60, W2 = 60, W3 = 60 |
| TL214 | 0.004 λ, 25.04 Ω | W1 = 3.048, W2 = 3.048, W3 = 0.762 | W1 = 120, W2 = 120, W3 = 30 |
| TL215 | | W1 = 1.087, W2 = 3.048 | W1 = 43, W2 = 120 |
| TL216 | 0.009 λ, 25.04 Ω | W = 3.048, L = 1.778 | W = 120, L = 70 |
| TL217 | 0.006 λ, 63.89 Ω | W = 0.762, L = 1.270 | W = 30, L = 50 |
| TL218 | 0.002 λ, 51.98 Ω | W = 1.087, L = 0.356 | W = 43, L = 14 |
| TL219 | 0.040 λ, 41.75 Ω | W = 1.524, L = 8.204 | W = 60, L = 323 |
| TL220 | 0.006 λ, 41.75 Ω | W1 = 1.524, W2 = 1.524, W3 = 1.270 | W1 = 60, W2 = 60, W3 = 50 |
| TL221 | 0.006 λ, 47.12 Ω | W = 1.270, L = 1.191 | W = 50, L = 47 |
| TL222 | 0.035 λ, 47.12 Ω | W = 1.270, L = 7.290 | W = 50, L = 287 |
| TL223 | 0.014 λ, 15.92 Ω | W = 5.283, L = 2.667 | W = 208, L = 105 |
| TL224 | 0.012 λ, 51.98 Ω | W = 1.087, L = 2.502 | W = 43, L = 99 |
| TL225 | 0.016 λ, 51.98 Ω | W = 1.087, L = 3.264 | W = 43, L = 129 |
| TL226 | 0.006 λ, 47.12 Ω | W1 = 1.270, W2 = 1.270, W3 = 1.270 | W1 = 50, W2 = 50, W3 = 50 |

## Reference Circuit, 877 MHz (cont.)

**Circuit Assembly Information**

| | |
|---|---|
| Test Fixture Part No. | LTN/ PTFA220121M–8 |

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



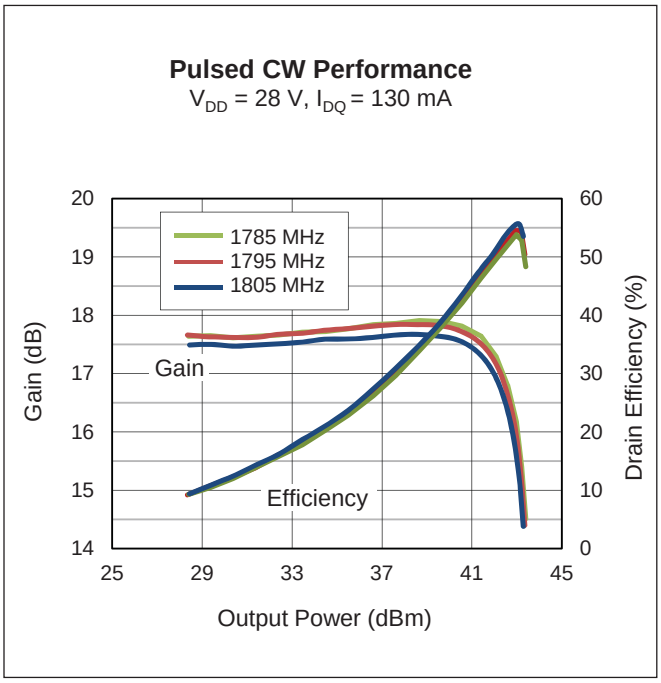

*Reference circuit assembly diagram (not to scale)*

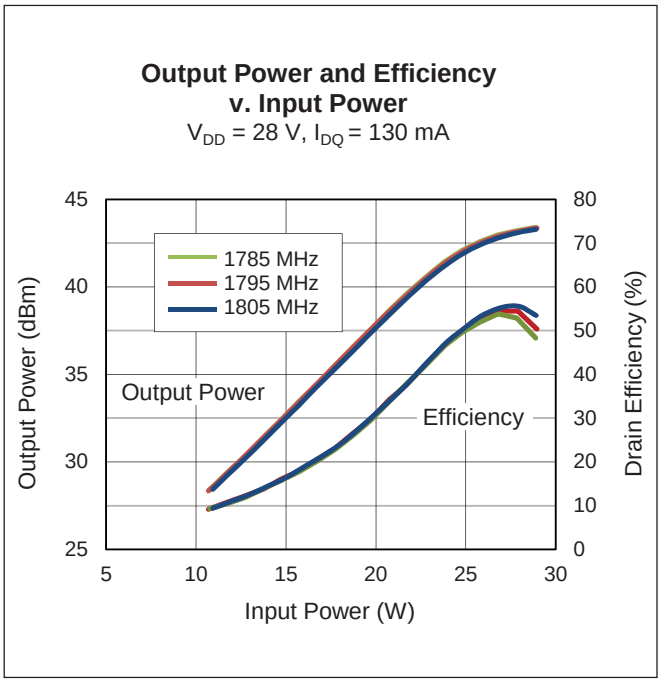
## Reference Circuit, 877 MHz (cont.)

### Components Information

| Component | Description | Manufacturer | P/N |
|---|---|---|---|
| **Input** | | | |
| C101 | Chip capacitor, 68 pF | ATC | ATC100A680JW150X |
| C102 | Chip capacitor, 20 pF | ATC | ATC100A200JW150X |
| C103 | Chip capacitor, 10 pF | ATC | ATC100A100JW150X |
| C104 | Chip capacitor, 16 pF | ATC | ATC100A160JW150X |
| C801, C802, C803 | Chip capacitor, 1000 pF | Panasonic Electronic Components | ECJ-1VB1H102K |
| L1 | Inductor, 22 nH | Coilcraft | 0805HT-22NX_BG |
| R101 | Resistor, 1.3 Ω | Panasonic Electronic Components | ERJ-8GEYJ1R3V |
| R102, R805 | Resistor, 10 Ω | Panasonic Electronic Components | ERJ-8GEYJ100V |
| R801 | Resistor, 1200 Ω | Panasonic Electronic Components | ERJ-8GEYJ122V |
| R802 | Resistor, 1300 Ω | Panasonic Electronic Components | ERJ-8GEYJ132V |
| R803 | Resistor, 510 Ω | Panasonic Electronic Components | ERJ-8GEYJ511V |
| R804 | Resistor, 2000 Ω | Panasonic Electronic Components | ERJ-8GEYJ202V |
| S2 | EMI Suppression Capacitor | Murata | NFM18PS105R0J3D |
| S3 | Potentiometer, 2k Ω | Bourns Inc. | 3224W-1-202E |
| S4 | Transistor | Fairchild Semiconductor | BCP56 |
| S5 | Voltage regulator | Fairchildl Semiconductor | LM7805 |
| **Output** | | | |
| C201 | Chip capacitor, 2.2 µF | TDK Corporation | C4532X7R1H225M160KA |
| C202, C204 | Chip capacitor, 68 pF | ATC | ATC100A680JW150X |
| C203 | Chip capacitor, 3.6 pF | ATC | ATC100A3R6CW150X |
| C205 | Chip capacitor, 8.2 pF | ATC | ATC100A8R2CW150X |
| L2 | Inductor, 2.7 nH | Coilcraft | 0402CS-2N7X_BG |
| R201 | Resistor, 0.0 Ω | Panasonic Electronic Components | ERJ-8GEY0R00V |

## Typical Performance, 1805 MHz



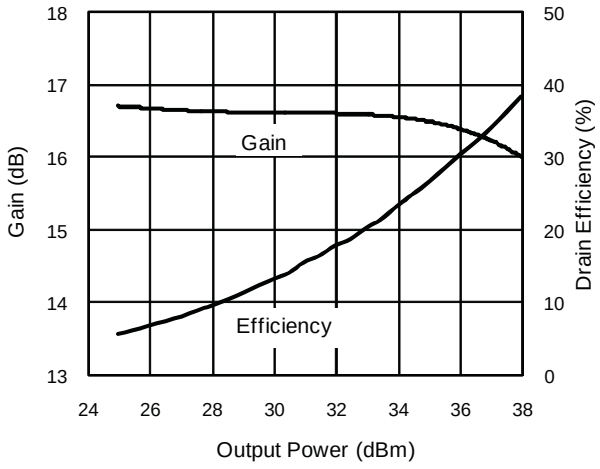

## RF Characteristics

**Pulsed CW Performance** (not subject to production test – verified by design / characterization in Infineon test fixture)
$V_{DD}$ = 28 V, $I_{DQ}$ = 130 mA, $P_{OUT}$ = 42 W $P_{1dB}$, $f$ = 1805 MHz
16 µs pulse width, 10% duty cycle, class AB test

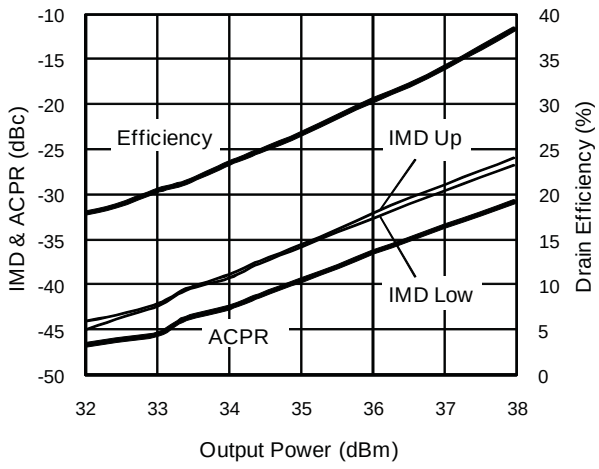
| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Gain | $G_{ps}$ | — | 17 | — | dB |
| Drain Efficiency | ηD | — | 52 | — | % |

## Typical Performance, 2140 MHz

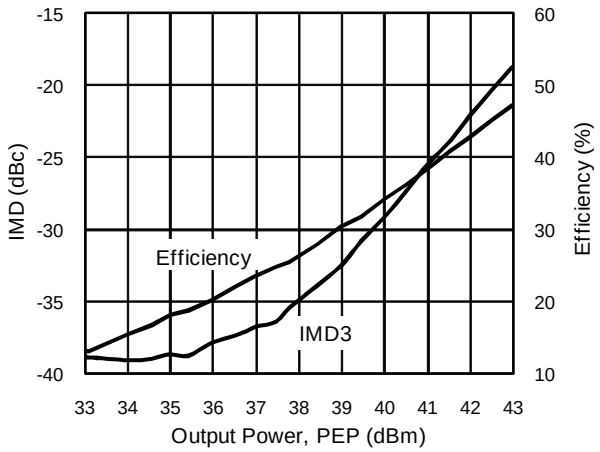
**Two-carrier WCDMA 3GPP**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 2140 MHz
3GPP WCDMA, P/AR = 8:1, 10 MHz carrier spacing, BW 3.84 MHz



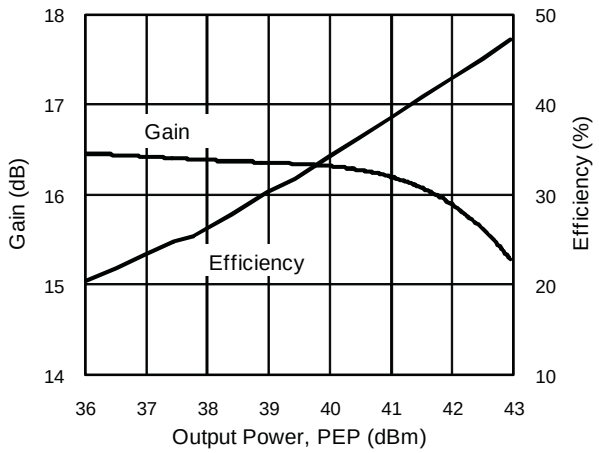

**Two-carrier WCDMA 3GPP Drive-up**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 2140 MHz
3GPP WCDMA, P/AR = 8:1, 10 MHz carrier spacing, BW 3.84 MHz




**Two-tone Drive-up**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA,
$f_1$ = 2139.05 MHz, $f_2$ = 2140.05 MHz

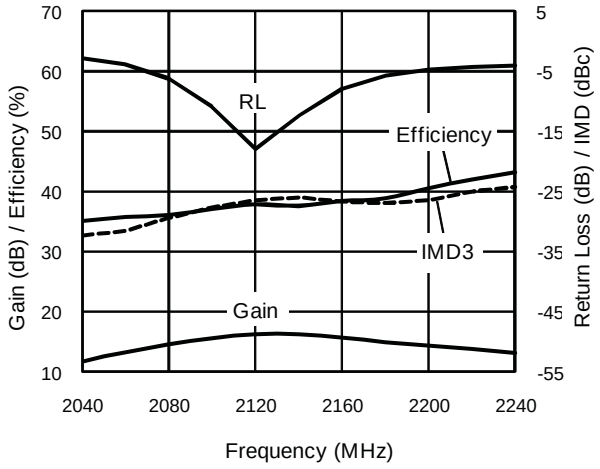



**Two-tone Drive-up**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA,
$f_1$ = 2139.05 MHz, $f_2$ = 2140.05 MHz

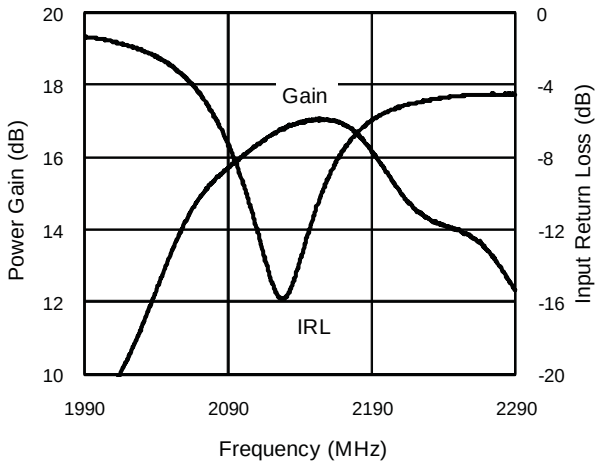


## Typical Performance, 2140 MHz (cont.)

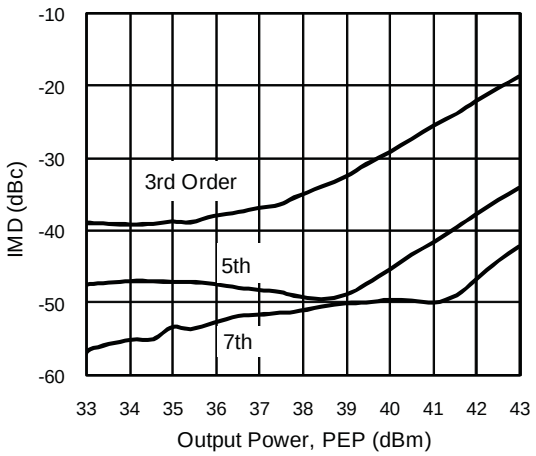
**Two-tone Broadband**
**Gain, Efficiency & RL vs. Frequency**
$V_{DD}$ = 28V, $I_{DQ}$ = 150 mA, Avg. PEP = 12 W,
tone pacing = 100 kHz



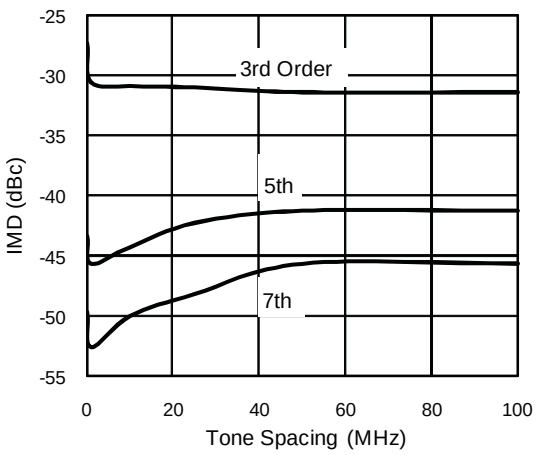

**Small Signal CW**
**Gain & Input Return Loss**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA




**Intermodulation Distortion**
**vs. Output Power**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA,
$f_1$ = 2139.05 MHz, $f_2$ = 2140.05 MHz

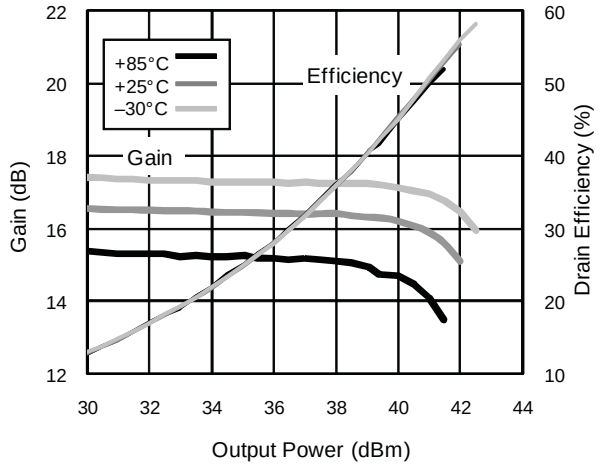



**Intermodulation Distortion**
**vs. Tone Spacing**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 2140 MHz,
PEP = 11.22 W

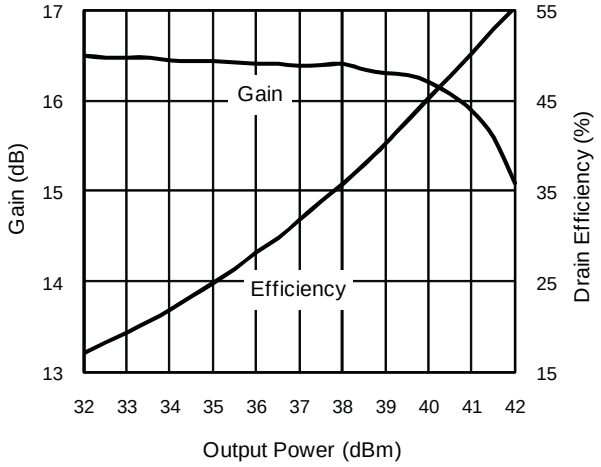


## Typical Performance, 2140 MHz (cont.)

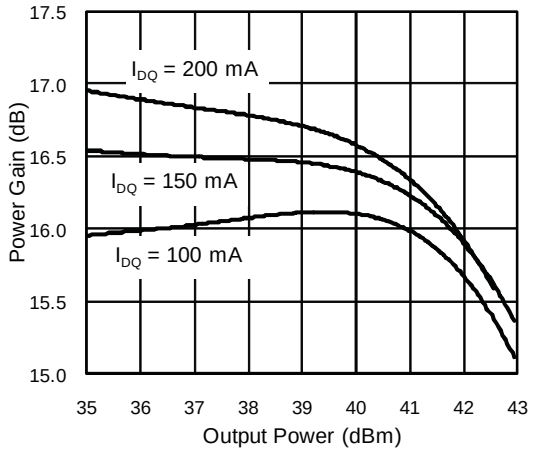
**CW Performance**
**Gain & Efficiency vs. Output Power**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 2140 MHz



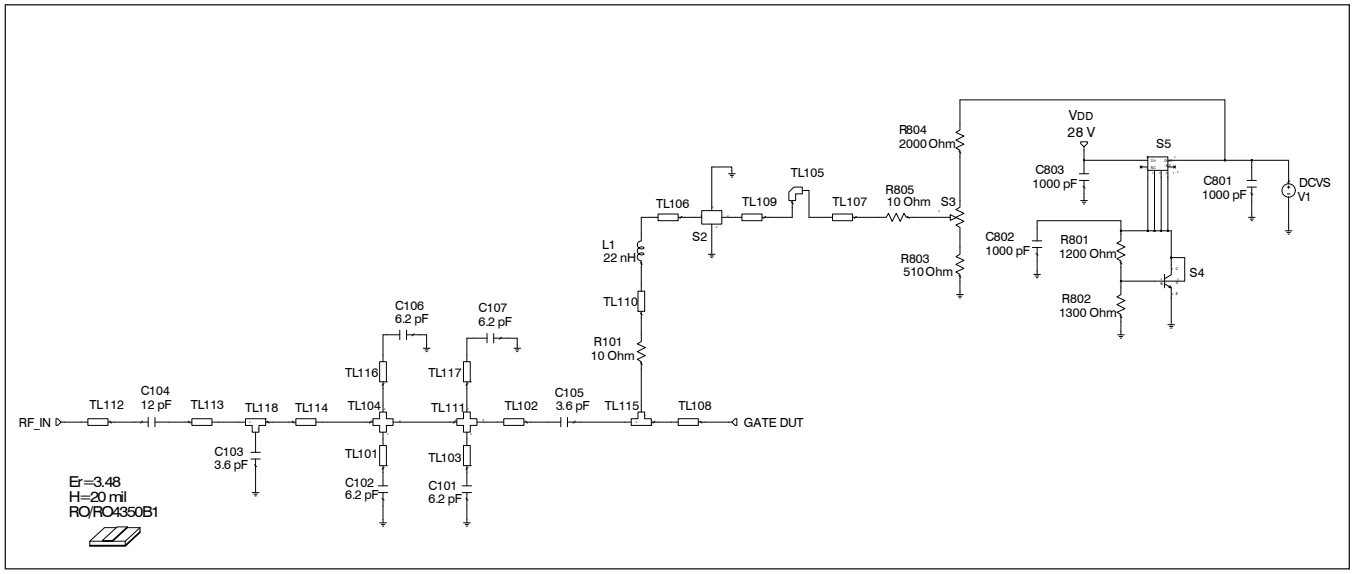

**Power Sweep, CW**
**Gain & Efficiency vs. Output Power**
$V_{DD}$ = 28 V, $I_{DQ}$ = 150 mA, $f$ = 2140 MHz



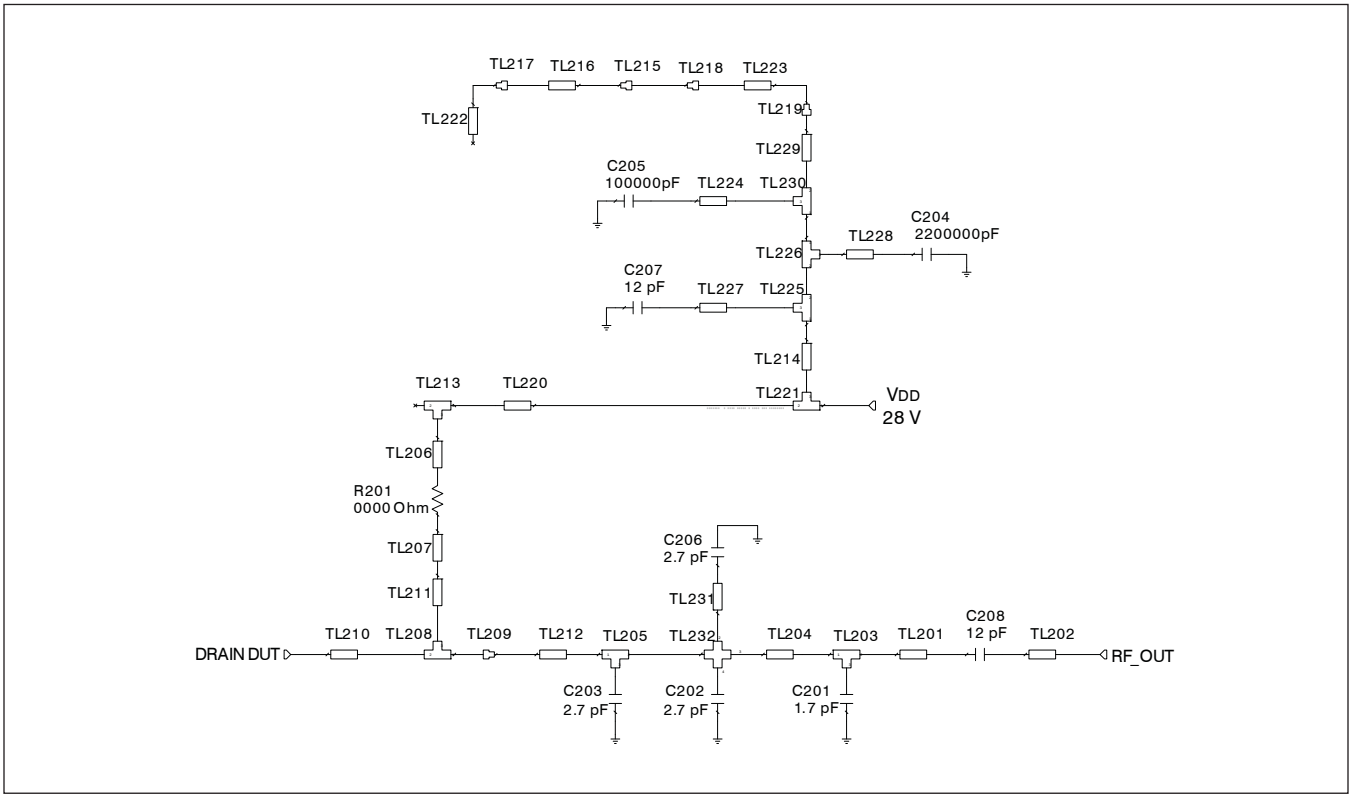

**Two-tone Gain vs. Output Power**
$V_{DD}$ = 28 V, $f_1$ = 2139.05 MHz, $f_2$ = 2140.05 MHz



## Reference Circuit, 2140 MHz




*Reference circuit input schematic for ƒ = 2140 MHz*




*Reference circuit output schematic for ƒ = 2140 MHz*

## Reference Circuit, 2140 MHz (cont.)

| Description | |
|---|---|
| DUT | PTFA220121M |
| PCB | 0.508 mm [.020"] thick, εr = 3.48, Rogers 4350, 1 oz. copper |

**Electrical Characteristics at 2140 MHz**

| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|---|---|---|---|
| **Input** | | | |
| TL101, TL103 | 0.000 λ, 144.35 Ω | W = 0.025, L = 0.000 | W = 1, L = 0 |
| TL102 | 0.019 λ, 51.98 Ω | W = 1.087, L = 1.575 | W = 43, L = 62 |
| TL104, TL111 | | W1 = 1.087, W2 = 0.813, W3 = 1.087, W4 = 0.813 | W1 = 43, W2 = 32, W3 = 43, W4 = 32 |
| TL105 | | W = 1.524 | W = 60 |
| TL106 | 0.018 λ, 54.17 Ω | W = 1.016, L = 1.524 | W = 40, L = 60 |
| TL107 | 0.061 λ, 41.75 Ω | W = 1.524, L = 5.080 | W = 60, L = 200 |
| TL108 | 0.022 λ, 25.04 Ω | W = 3.048, L = 1.778 | W = 120, L = 70 |
| TL109 | 0.006 λ, 41.75 Ω | W = 1.524, L = 0.508 | W = 60, L = 20 |
| TL110 | 0.015 λ, 41.75 Ω | W = 1.524, L = 1.270 | W = 60, L = 50 |
| TL112 | 0.039 λ, 51.98 Ω | W = 1.087, L = 3.264 | W = 43, L = 129 |
| TL113 | 0.180 λ, 51.98 Ω | W = 1.087, L = 15.291 | W = 43, L = 602 |
| TL114 | 0.039 λ, 51.98 Ω | W = 1.087, L = 3.302 | W = 43, L = 130 |
| TL115 | 0.009 λ, 25.04 Ω | W1 = 3.048, W2 = 3.048, W3 = 0.762 | W1 = 120, W2 = 120, W3 = 30 |
| TL116, TL117 | 0.000 λ, 144.35 Ω | W = 0.025, L = 0.000 | W = 1, L = 0 |
| TL118 | 0.010 λ, 51.98 Ω | W1 = 1.087, W2 = 1.087, W3 = 0.813 | W1 = 43, W2 = 43, W3 = 32 |

*table continued next page*

## Reference Circuit, 2140 MHz (cont.)

**Electrical Characteristics at 2140 MHz**

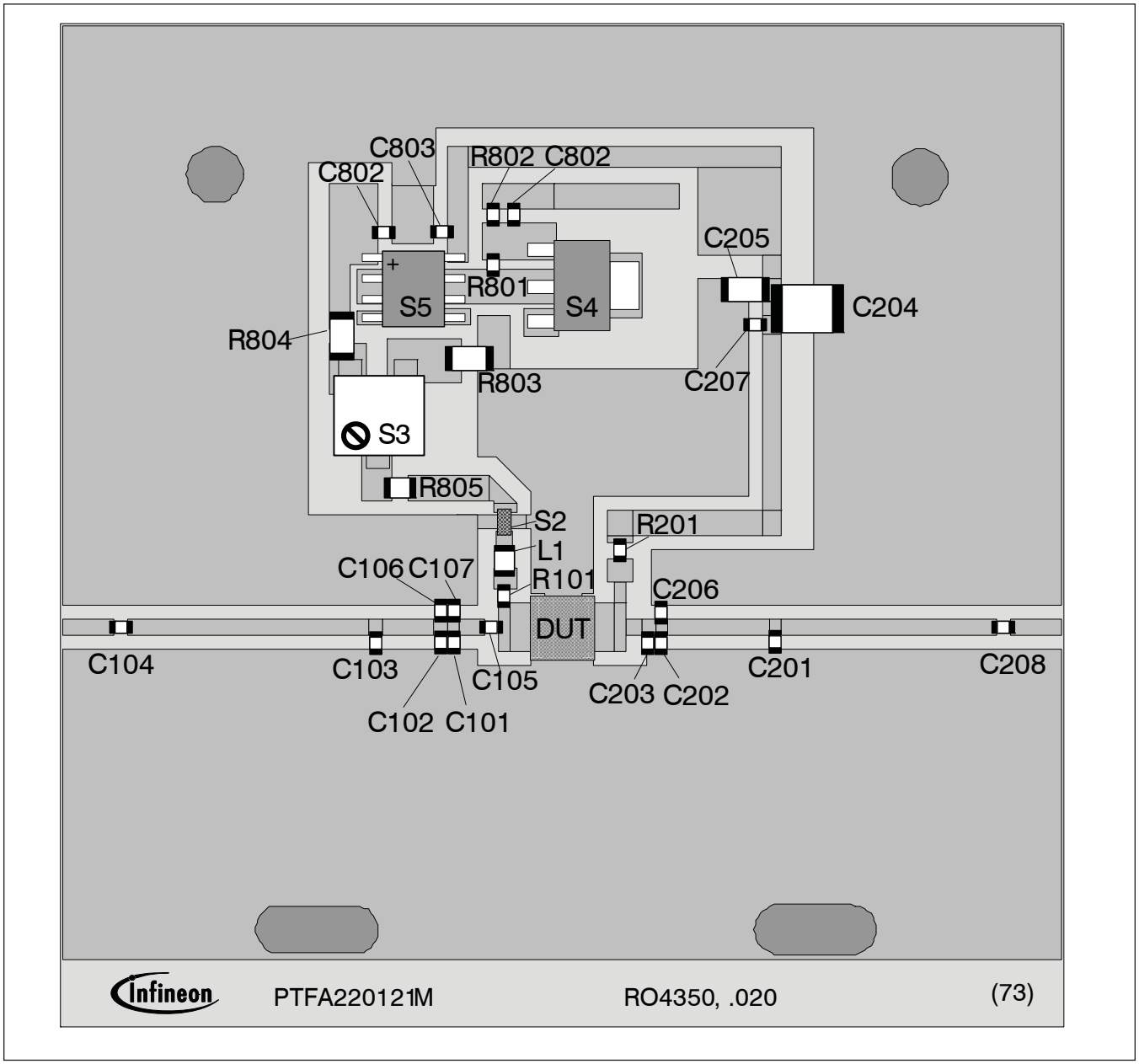
| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|---|---|---|---|
| **Output** | | | |
| TL201 | 0.161 λ, 51.98 Ω | W = 1.087, L = 13.627 | W = 43, L = 537 |
| TL202 | 0.039 λ, 51.98 Ω | W = 1.087, L = 3.264 | W = 43, L = 129 |
| TL203, TL205 | 0.010 λ, 51.98 Ω | W1 = 1.087, W2 = 1.087, W3 = 0.813 | W1 = 43, W2 = 43, W3 = 32 |
| TL204 | 0.075 λ, 51.98 Ω | W = 1.087, L = 6.375 | W = 43, L = 251 |
| TL206 | 0.006 λ, 41.75 Ω | W = 1.524, L = 0.508 | W = 60, L = 20 |
| TL207 | 0.018 λ, 41.75 Ω | W = 1.524, L = 1.524 | W = 60, L = 60 |
| TL208 | 0.009 λ, 25.04 Ω | W1 = 3.048, W2 = 3.048, W3 = 0.762 | W1 = 120, W2 = 120, W3 = 30 |
| TL209 | | W1 = 1.087, W2 = 3.048 | W1 = 43, W2 = 120 |
| TL210 | 0.022 λ, 25.04 Ω | W = 3.048, L = 1.778 | W = 120, L = 70 |
| TL211 | 0.015 λ, 63.89 Ω | W = 0.762, L = 1.270 | W = 30, L = 50 |
| TL212 | 0.012 λ, 51.98 Ω | W = 1.087, L = 1.041 | W = 43, L = 41 |
| TL213 | 0.018 λ, 41.75 Ω | W1 = 1.524, W2 = 1.524, W3 = 1.524 | W1 = 60, W2 = 60, W3 = 60 |
| TL214 | 0.133 λ, 47.12 Ω | W = 1.270, L = 11.186 | W = 50, L = 440 |
| TL215 | | W1 = 0.020, W2 = 0.020, Offset = 0.007 | W1 = 20, W2 = 780, Offset = 286 |
| TL216 | 0.017 λ, 4.80 Ω | W = 19.850, L = 1.270 | W = 782, L = 50 |
| TL217 | | W1 = 0.001, W2 = 0.001, Offset = 0.011 | W1 = 1, W2 = 50, Offset = 416 |
| TL218 | | W1 = 0.005, W2 = 0.005, Offset = 0.000 | W1 = 5, W2 = 208, Offset = 0 |
| TL219 | | W1 = 0.001, W2 = 0.005, Offset = –0.002 | W1 = 1, W2 = 208, Offset = –79 |
| TL220 | 0.098 λ, 41.75 Ω | W = 1.524, L = 8.204 | W = 60, L = 323 |
| TL221 | 0.015 λ, 41.75 Ω | W1 = 1.524, W2 = 1.524, W3 = 1.270 | W1 = 60, W2 = 60, W3 = 50 |
| TL222 | 0.087 λ, 47.12 Ω | W = 1.270, L = 7.290 | W = 50, L = 287 |
| TL223 | 0.071 λ, 15.92 Ω | W = 5.283, L = 5.690 | W = 208, L = 224 |
| TL224 | 0.000 λ, 41.75 Ω | W = 1.524, L = 0.000 | W = 60, L = 0 |
| TL225 | 0.014 λ, 47.12 Ω | W = 1.270, W2 = 1.270, W3 = 1.191 | W = 50, W2 = 50, W3 = 47 |
| TL226 | 0.009 λ, 47.12 Ω | W = 1.270, W2 = 1.270, W3 = 0.762 | W = 50, W2 = 50, W3 = 30 |
| TL227 | 0.000 λ, 63.89 Ω | W = 0.762, L = 0.000 | W = 30, L = 0 |
| TL228 | 0.000 λ, 25.04 Ω | W = 3.048, L = 0.000 | W = 120, L = 0 |
| TL229 | 0.017 λ, 47.12 Ω | W = 1.270, L = 1.422 | W = 50, L = 56 |
| TL230 | 0.018 λ, 47.12 Ω | W1 = 1.270, W2 = 1.270, W3 = 1.524 | W1 = 50, W2 = 50, W3 = 60 |
| TL231 | 0.000 λ, 144.35 Ω | W = 0.025, L = 0.000 | W = 1, L = 0 |
| TL232 | | W1 = 1.087, W2 = 0.813, W3 = 1.087<br>W4 = 0.813 | W1 = 43, W2 = 32, W3 = 43,<br>W4 = 32 |

## Reference Circuit, 2140 MHz (cont.)

**Circuit Assembly Information**

| | |
|---|---|
| Test Fixture Part No. | LTN/ PTFA220121M |

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, 2140 MHz (cont.)

### Components Information

| Component | Description | Manufacturer | P/N |
|---|---|---|---|
| Input | | | |
| C101, C102, C106, C107 | Chip capacitor, 6.2 pF | ATC | ATC100A6R2CW150X |
| C103, C105 | Chip capacitor, 3.6 pF | ATC | ATC100A3R6CW150X |
| C104 | Chip capacitor, 12 pF | ATC | ATC100A120JW150X |
| C801, C802, C803 | Chip capacitor, 1000 pF | Panasonic Electronic Components | ECJ-1VB1H102K |
| L1 | Inductor, 22 nH | Coilcraft | 0805HT-22NX_BG |
| R101, R805 | Resistor, 10 Ω | Panasonic Electronic Components | ERJ-8GEYJ100V |
| R801 | Resistor, 1200 Ω | Panasonic Electronic Components | ERJ-8GEYJ122V |
| R802 | Resistor, 1300 Ω | Panasonic Electronic Components | ERJ-8GEYJ132V |
| R803 | Resistor, 510 Ω | Panasonic Electronic Components | ERJ-8GEYJ511V |
| R804 | Resistor, 2000 Ω | Panasonic Electronic Components | ERJ-8GEYJ202V |
| S2 | EMI Suppression Capacitor | Murata | NFM18PS105R0J3D |
| S3 | Potentiometer, 2k Ω | Bourns Inc. | 3224W-1-202E |
| S4 | Transistor | Fairchild Semiconductor | BCP56 |
| S5 | Voltage regulator | Fairchild Semiconductor | LM7805 |

| **Output** | | | |
|---|---|---|---|
| C201 | Chip capacitor, 1.7 pF | ATC | ATC100A1R7CW150X |
| C202, C203, C206 | Chip capacitor, 2.7 pF | ATC | ATC100A2R7CW150X |
| C204 | Chip capacitor, 2.2 µF | TDK Corporation | C4532X7R1H225M160KA |
| C205 | Chip capacitor, 0.1 µF | Panasonic Electronic Components | ECJ-3VB1H104K |
| C207, C208 | Chip capacitor, 12 pF | ATC | ATC100A120JW150X |
| R201 | Resistor, 0.0 Ω | Panasonic Electronic Components | ERJ-8GEY0R00V |

## Package Outline Specifications

### Package PG-SON-10

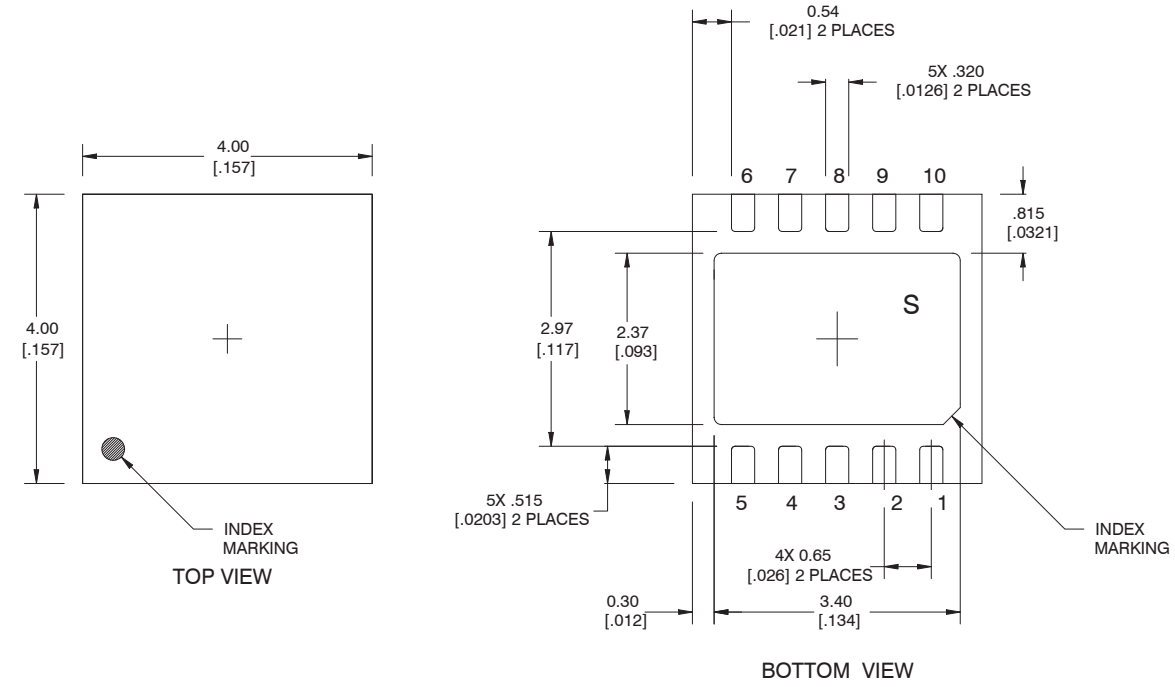



Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.1 [.004].
4. Package dimension: 4.00 mm x 4.00 mm x 1.42 mm.
5. Pins: S = source, 1 – 5 = gate, 6 – 10 = drain.
6. NiPdAu plating (gold top layer): 0.025 – 0.127 micron [1 – 5 microinch].

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

| Revision History: | 2013-06-17 | Data Sheet |
|---|---|---|
| Previous Revision: | 2011-04-11, Data Sheet | |

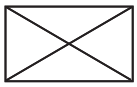
| Page | Subjects (major changes since last revision) |
|---|---|
| 2 | Change shipping quantity from 500 pcs. to 1,000 pcs. |
| | |
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