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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



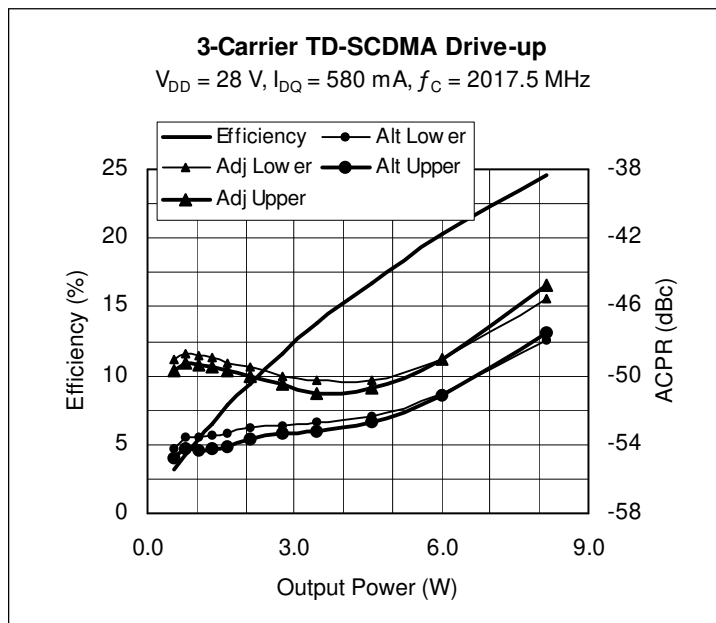
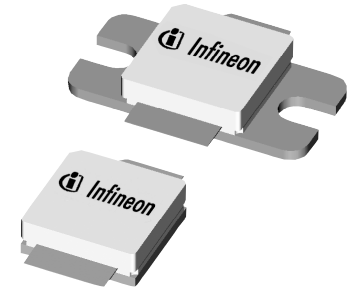
Thermally-Enhanced High Power RF LDMOS FETs 45 W, 2010 – 2025 MHz and 2110 – 2170 MHz

Description

The PTF210451E and PTF210451F are 45-watt internally-matched *GOLDMOS*® FETs intended for TD-SCDMA applications from 2010 to 2025 MHz, and WCDMA applications from 2110 to 2170 MHz. Thermally-enhanced packaging provides the coolest operation available. Full gold metallization ensures excellent device lifetime and reliability.

PTF210451E
 Package H-30265-2

PTF210451F
 Package H-31265-2



Features

- Thermally-enhanced packages, Pb-free and RoHS-compliant
- Internal matching for wideband performance
- Typical three-carrier TD-SCDMA performance
 - Average output power = 3 W
 - Gain = 14 dB
 - Efficiency = 12.5%
 - ACPR = -50 dBc
- Typical CW performance
 - Output power at P-1dB = 50 W
 - Linear gain = 14 dB
 - Efficiency = 53%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI Drift
- Capable of handling 10:1 VSWR @ 28 V, 45 W (CW) output power

RF Characteristics

WCDMA Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{OUT} = 11.5\text{ W AVG}$

$f_1 = 2140\text{ MHz}$, $f_2 = 2150\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------------------|----------|-----|-----|-----|------|
| Intermodulation Distortion | IMD | — | -37 | — | dBc |
| Gain | G_{ps} | — | 14 | — | dB |
| Drain Efficiency | η_D | — | 27 | — | % |

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-tone Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{OUT} = 45\text{ W PEP}$, $f = 2170\text{ MHz}$, tone spacing = 1 MHz

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------------------|----------|-----|-----|-----|------|
| Gain | G_{ps} | 13 | 14 | — | dB |
| Drain Efficiency | η_D | 35 | 38 | — | % |
| Intermodulation Distortion | IMD | — | -32 | -30 | dBc |

DC Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|---|---------------|-----|-----|-----|---------------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}$, $I_D = 10\text{ }\mu\text{A}$ | $V_{(BR)DSS}$ | 65 | — | — | V |
| Drain Leakage Current | $V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1.0 | μA |
| On-State Resistance | $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.2 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 28\text{ V}$, $I_{DQ} = 500\text{ mA}$ | V_{GS} | 2.5 | 3.2 | 4.0 | V |
| Gate Leakage Current | $V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 1.0 | μA |

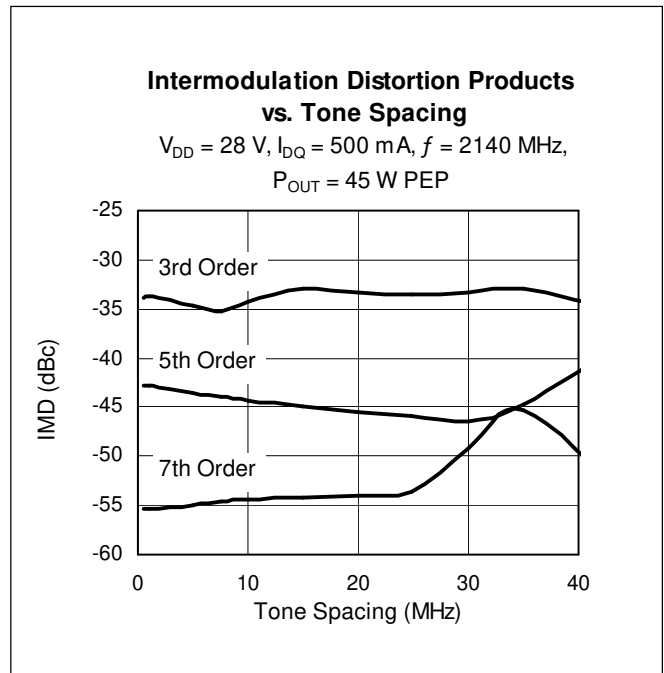
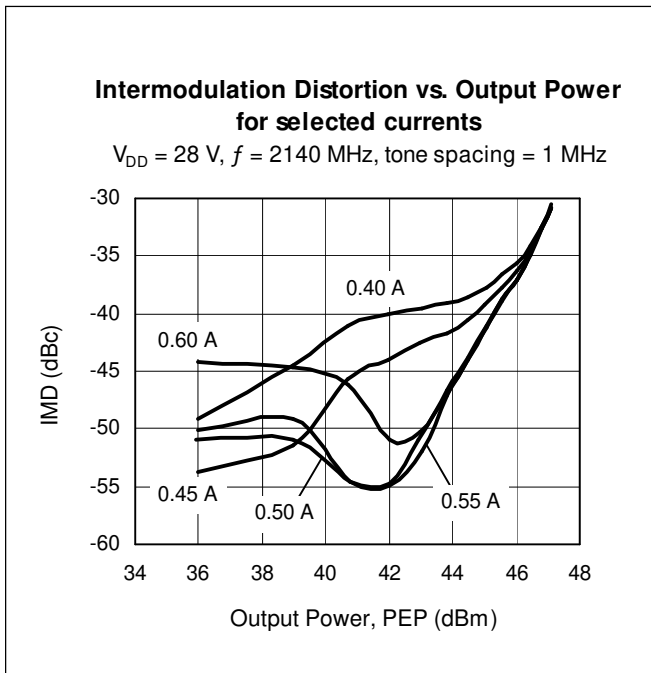
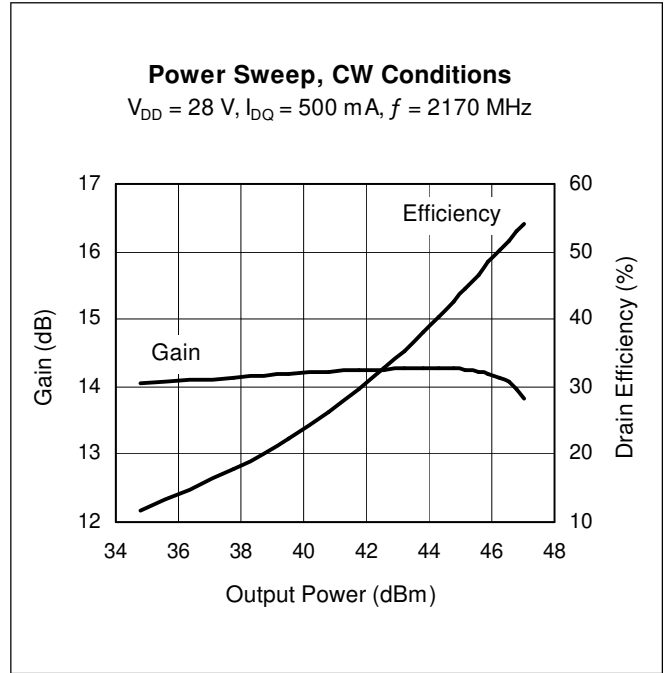
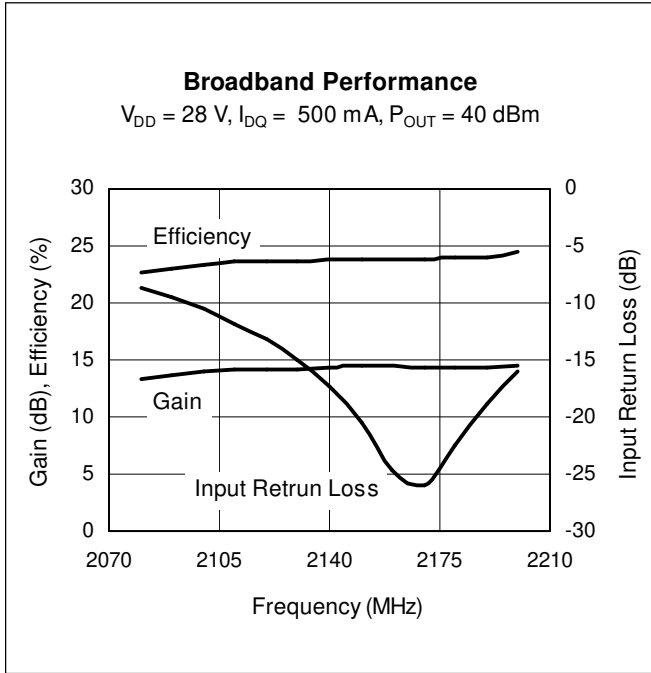
Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------------|-----------------------|
| Drain-Source Voltage | V_{DSS} | 65 | V |
| Gate-Source Voltage | V_{GS} | -0.5 to +12 | V |
| Junction Temperature | T_J | 200 | $^{\circ}\text{C}$ |
| Total Device Dissipation | P_D | 175 | W |
| Above 25 $^{\circ}\text{C}$ derate by | | 1.0 | W/ $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -40 to +150 | $^{\circ}\text{C}$ |
| Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 45 W CW) | $R_{\theta JC}$ | 1.0 | $^{\circ}\text{C/W}$ |

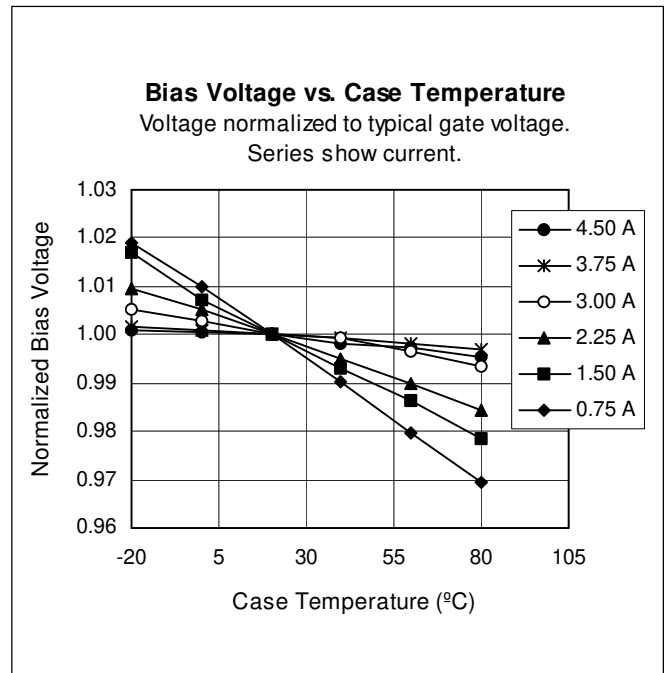
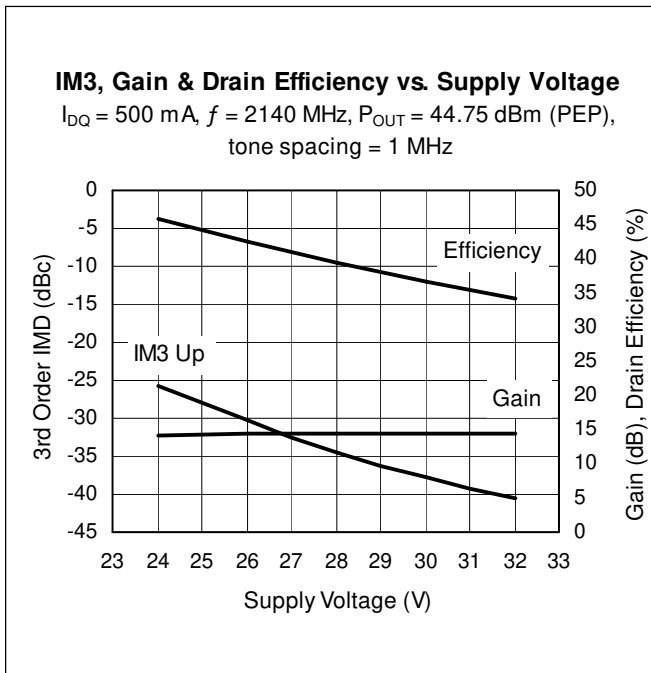
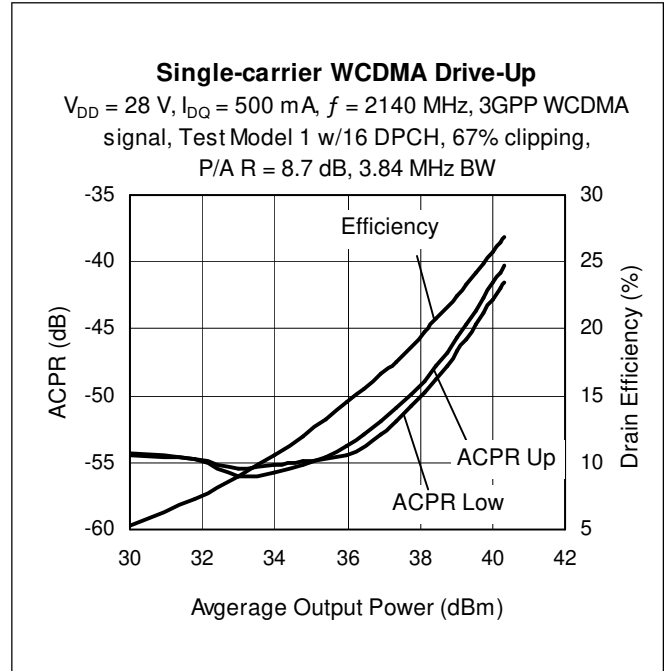
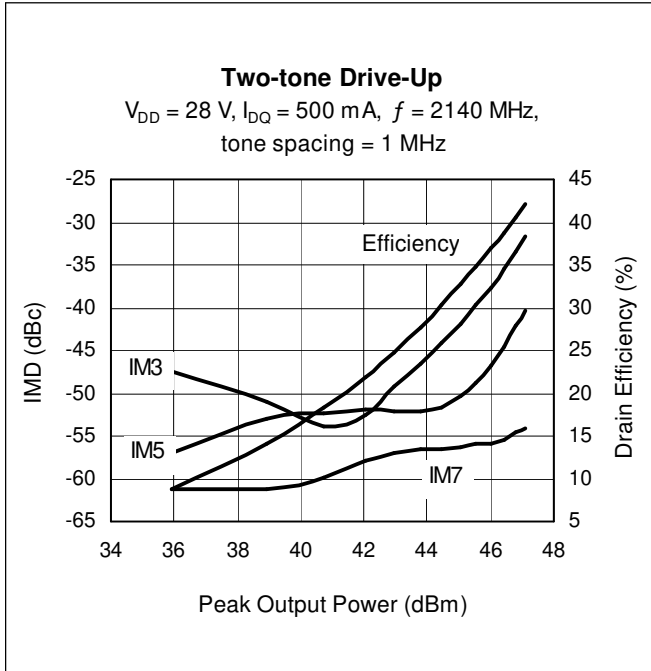
Ordering Information

| Type and Version | Package Outline | Package Description | Marking |
|------------------|-----------------|---|------------|
| PTF210451E V1 | H-30265-2 | Thermally-enhanced slotted flange, single-ended | PTF210451E |
| PTF210451F V1 | H-31265-2 | Thermally-enhanced earless flange, single-ended | PTF210451F |

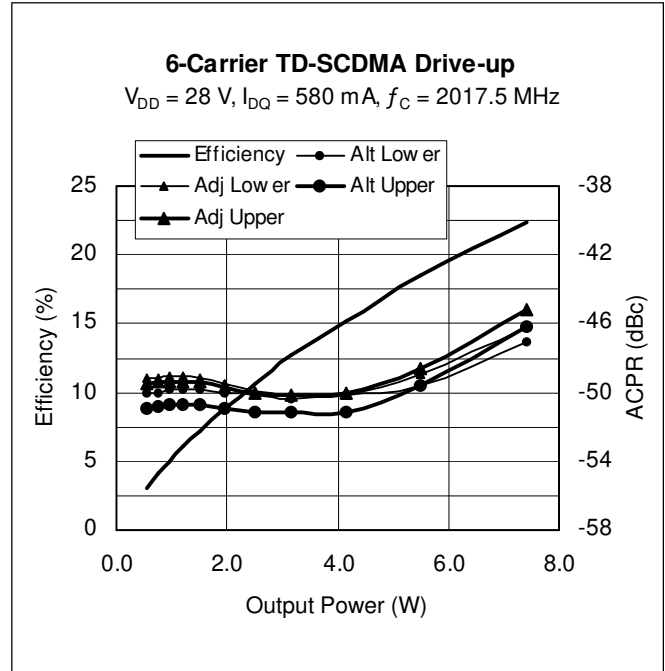
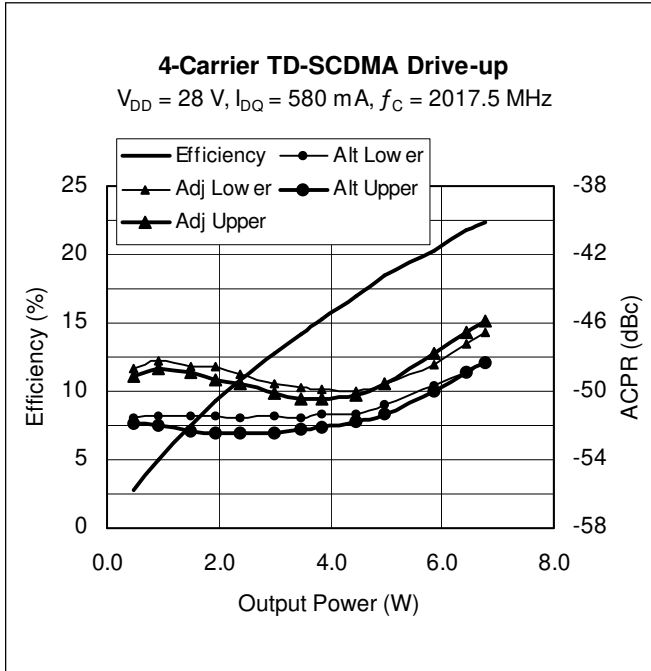
Typical Performance (data taken in production test fixture)



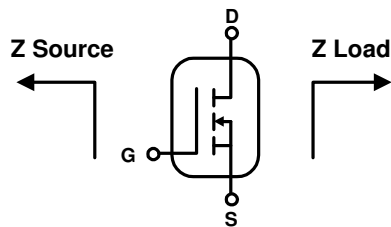
Typical Performance (cont.)



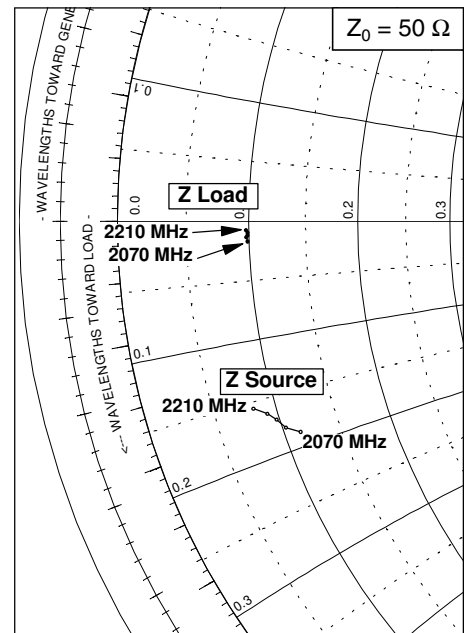
Typical Performance (cont.)



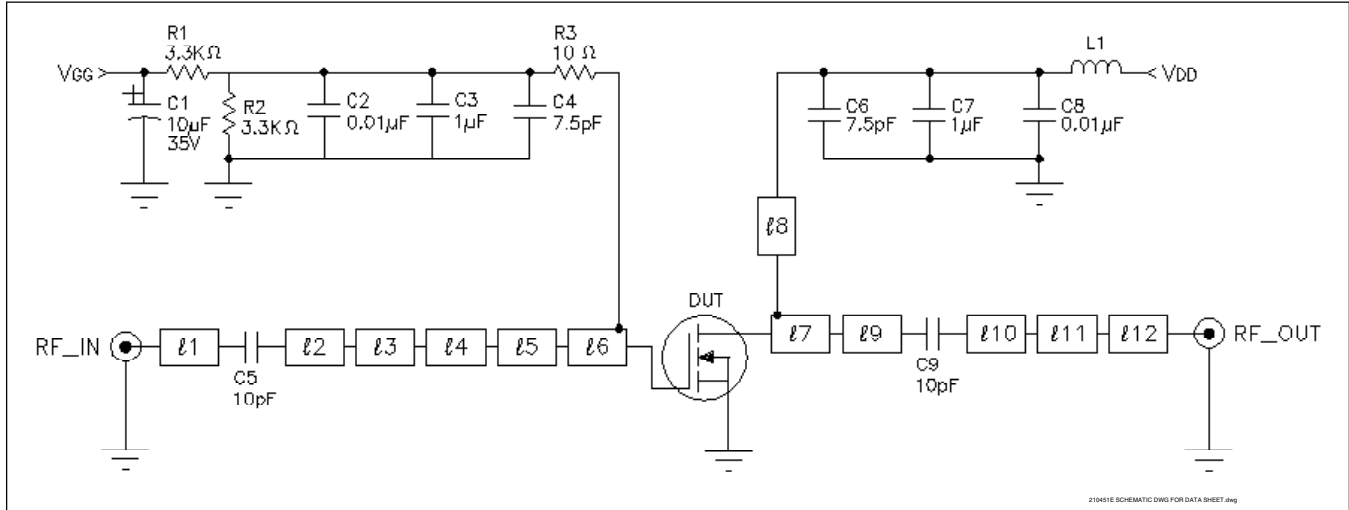
Broadband Circuit Impedance Data



| Frequency MHz | Z Source Ω | | Z Load Ω | |
|------------------|-------------------|-------|-----------------|-------|
| | R | jX | R | jX |
| 2070 | 5.72 | -9.36 | 4.94 | -0.87 |
| 2110 | 5.17 | -8.97 | 4.90 | -0.69 |
| 2140 | 4.88 | -8.52 | 4.96 | -0.60 |
| 2170 | 4.59 | -8.16 | 4.96 | -0.49 |
| 2210 | 4.08 | -7.79 | 4.88 | -0.39 |



Test Circuit



Test circuit schematic for 2170 MHz

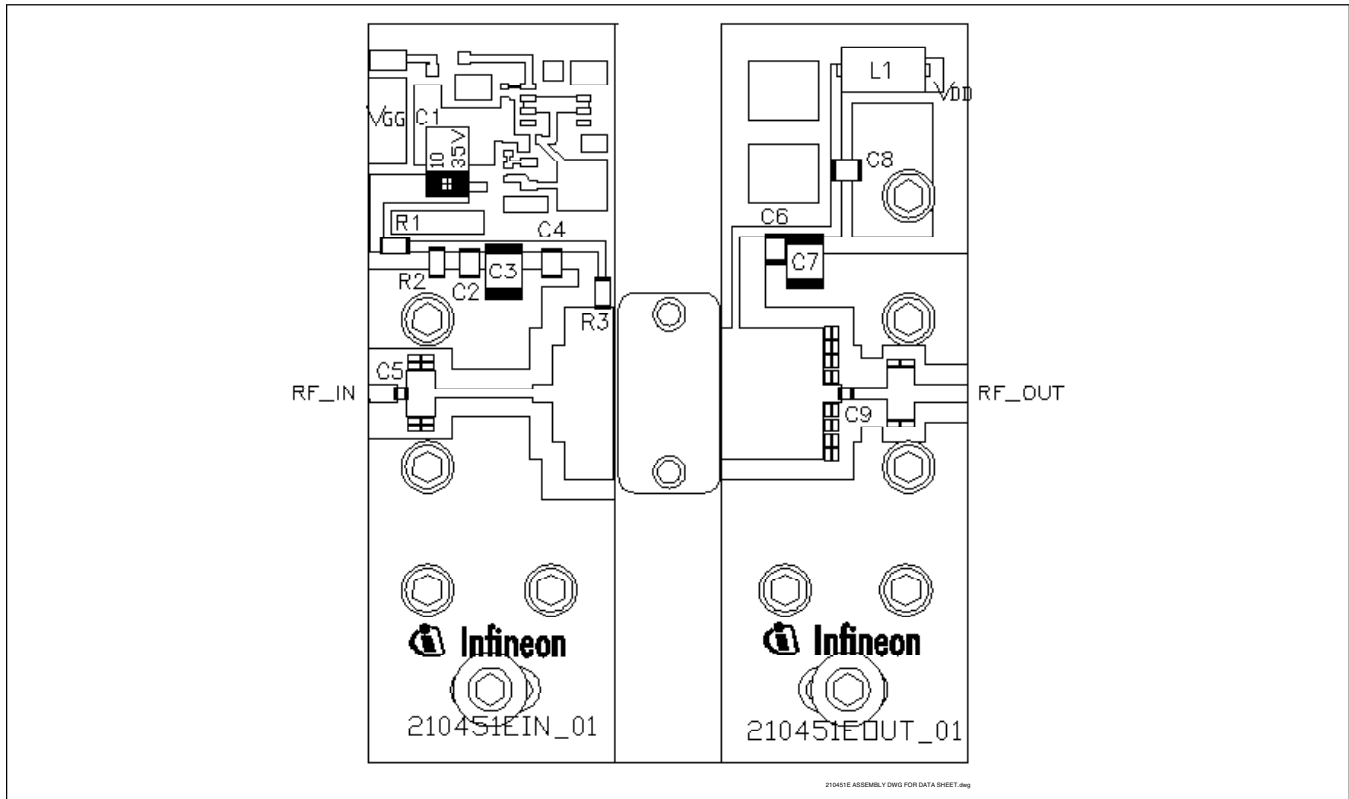
Circuit Assembly Information

| | | | |
|---------------|---|---------------------------|--|
| DUT | PTF210451E or PTF210451F | LDMOS Transistor | |
| Circuit Board | 0.79 mm [.031"] thick, $\epsilon_r = 4.5$ | Rogers TMM4, 2 oz. copper | |

| Microstrip | Electrical Characteristics at 2170 MHz ¹ | Dimensions: L x W (mm) | Dimensions: L x W (in.) |
|------------|---|------------------------|-------------------------|
| l1 | 0.047 λ , 45 Ω | 3.48 x 1.78 | 0.137 x 0.070 |
| l2 | 0.040 λ , 23 Ω | 2.87 x 4.57 | 0.113 x 0.180 |
| l3 | 0.132 λ , 66 Ω | 10.08 x 0.89 | 0.397 x 0.035 |
| l4 | 0.028 λ , 45 Ω | 2.08 x 1.78 | 0.082 x 0.070 |
| l5 | 0.018 λ , 12 Ω | 1.27 x 10.06 | 0.050 x 0.396 |
| l6 | 0.074 λ , 7 Ω | 4.98 x 17.68 | 0.196 x 0.696 |
| l7 | 0.152 λ , 9 Ω | 10.34 x 13.56 | 0.407 x 0.534 |
| l8 | 0.257 λ , 68 Ω | 19.76 x 0.84 | 0.778 x 0.033 |
| l9 | 0.027 λ , 44 Ω | 1.98 x 1.83 | 0.078 x 0.072 |
| l10 | 0.056 λ , 56 Ω | 4.22 x 1.22 | 0.166 x 0.048 |
| l11 | 0.036 λ , 19 Ω | 2.57 x 5.74 | 0.101 x 0.226 |
| l12 | 0.076 λ , 44 Ω | 5.64 x 1.80 | 0.222 x 0.071 |

¹Electrical Characteristics are rounded.

Test Circuit (cont.)

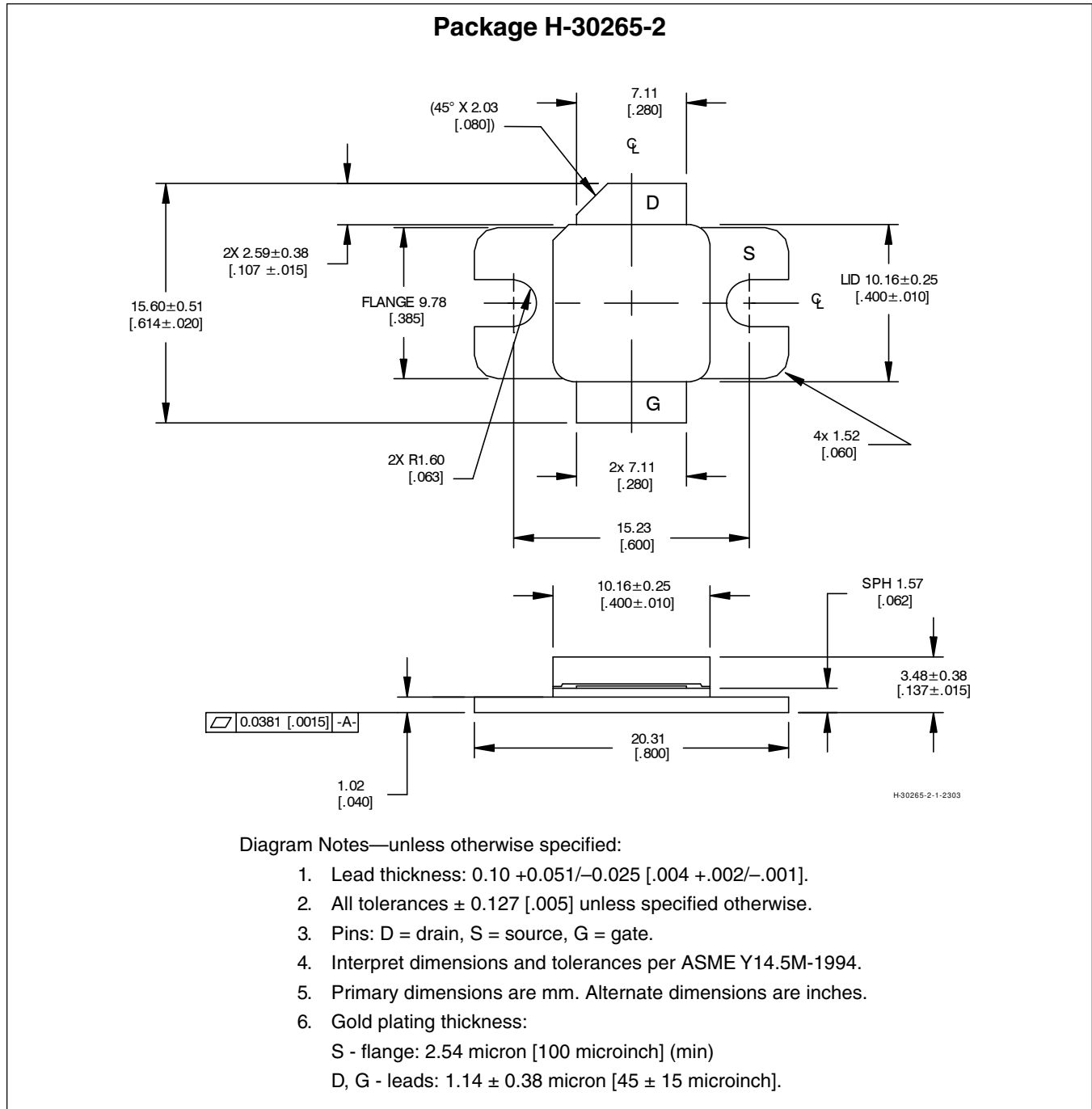


Test circuit assembly diagram* (not to scale)

| Component | Description | Suggested Manufacturer | P/N or Comment |
|-----------|---|------------------------|-----------------------------|
| C1 | Capacitor, 10 μ F, 35 V, Tant TE series | Digi-Key | PCS6106TR-ND, SMD |
| C2, C8 | Capacitor, 0.01 μ F | ATC | X08J103AFB ATC 200B103MW |
| C3, C7 | Capacitor, 1 μ F | ATC | X24L105BVC |
| C4, C6 | Capacitor, 7.5 pF | ATC | 100B 7R5 |
| C5, C9 | Capacitor, 10 pF | ATC | 100A 100 |
| L1 | Ferrite Bead | Elne Magnetic | #BDS31314.6-452 |
| R1, R2 | Resistor, 3.3K ohm, 1/4 W | Digi-Key | P3.3K ECT-ND |
| R3 | Resistor, 10 ohm, 1/4 W | Digi-Key | P10 ECT-ND |

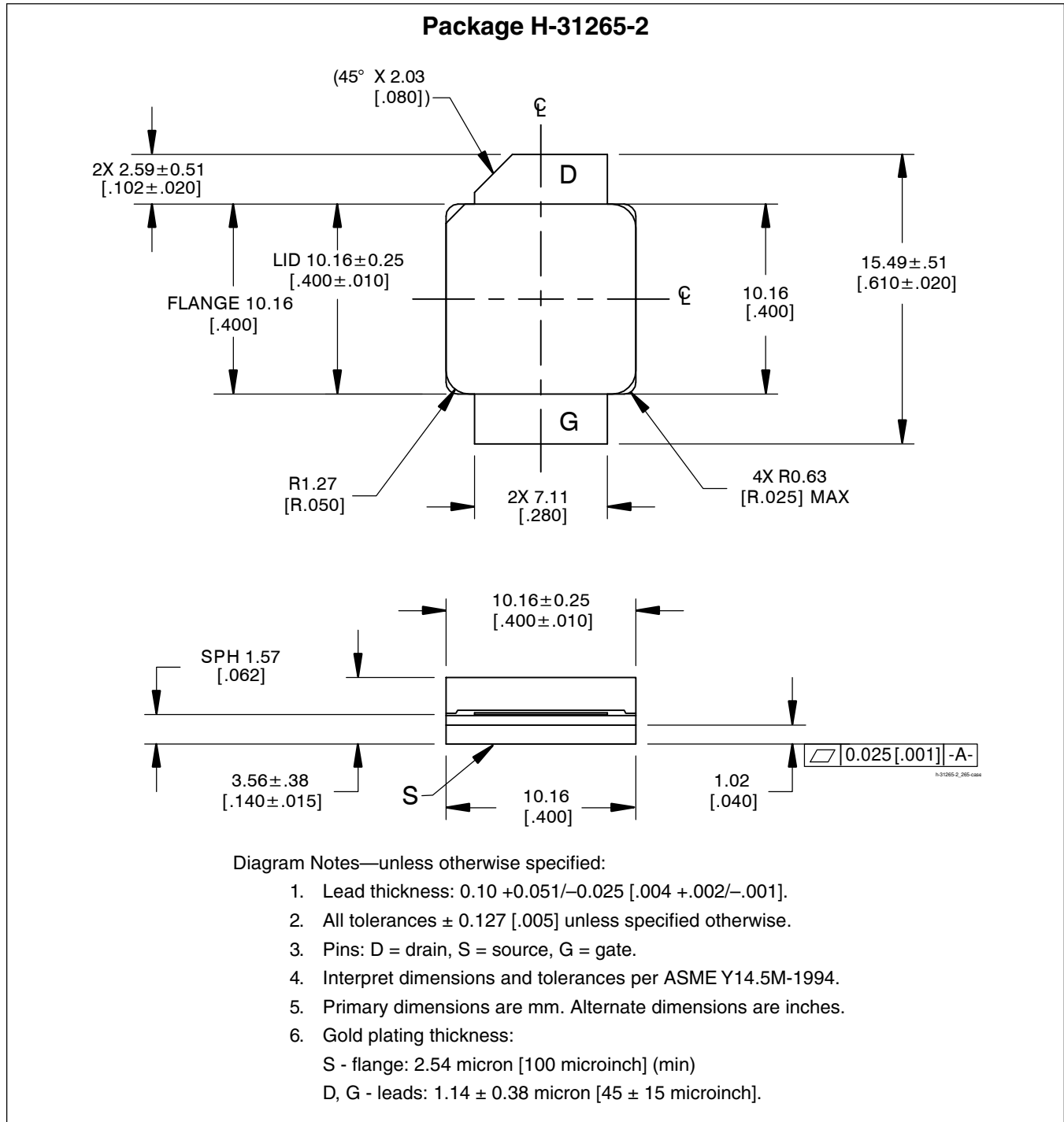
*Gerber files for this circuit available on request

Package Outline Specifications



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Package Outline Specifications (cont.)



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PTF210451EF

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Revision History: 2008-02-13

Data Sheet

Previous Version: 2006-09-05, Data Sheet

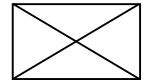
| Page | Subjects (major changes since last revision) |
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highpowerRF@infineon.com

To request other information, contact us at:
+1 877 465 3667 (1-877-GO-LDMOS) USA
or +1 408 776 0600 International



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