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# PTFA260851E
# PTFA260851F

green Product

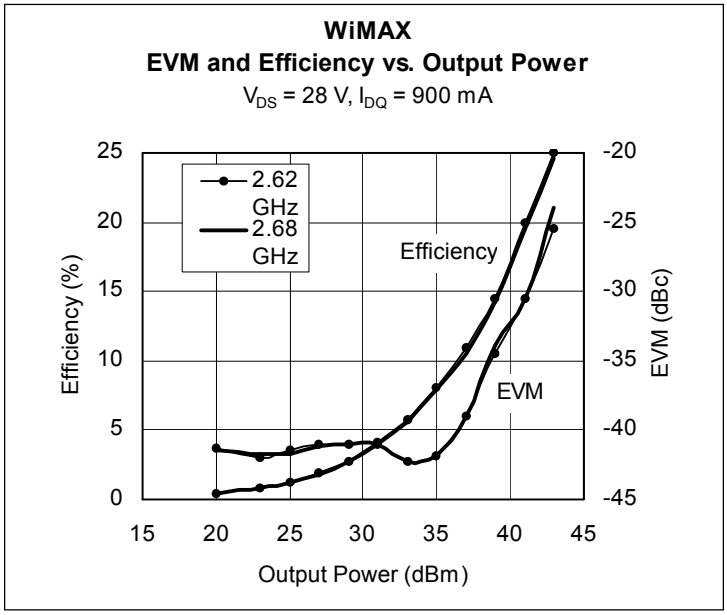
# Thermally-Enhanced High Power RF LDMOS FET
# 85 W, 2500 – 2700 MHz

## Description

The PTFA260851E and PTFA260851F are 85-watt LDMOS FETs designed for WiMAX power amplifier applications in the 2500 to 2700 MHz band. Features include input and output matching, and thermally-enhanced packages with slotted or earless flanges. Manufactured with Infineon's advanced LDMOS process, these devices provide excellent thermal performance and superior reliability.

PTFA260851E
Package H-30248-2


PTFA260851F
Package H-31248-2


## Features

- Thermally-enhanced, Pb-free and RoHS-compliant packages
- Broadband internal matching
- Typical WiMAX performance at 2680 MHz, 28 V
  - Average output power = 16 W
  - Linear Gain = 14 dB
  - Efficiency = 22%
  - Error Vector Magnitude = –29 dB
- Typical CW performance, 2680 MHz, 28 V
  - Output power at P–1dB = 100 W
  - Efficiency = 47%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 85 W (CW) output power

## RF Characteristics

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

$V_{DD}$ = 28 V, $I_{DQ}$ = 900 mA, $P_{OUT}$ = 16 W average, $f$ = 2680 MHz, modulation = 64 QAM 2/3, channel bandwidth = 3.5 MHz, sample rate = 4 MHz

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Gain | $G_{ps}$ | — | 14 | — | dB |
| Drain Efficiency | $\eta_D$ | — | 22 | — | % |
| Error Vector Magnitude | EVM | — | –29 | — | dB |

*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** (tested in Infineon test fixture)

$V_{DD}$ = 28 V, $I_{DQ}$ = 900 mA, $P_{OUT}$ = 85 W PEP, $f$ = 2680 MHz, tone spacing = 1 MHz

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Gain | $G_{ps}$ | 13 | 14 | — | dB |
| Drain Efficiency | $\eta_D$ | 33 | 36 | — | % |
| Intermodulation Distortion | IMD | — | –30 | –28 | dBc |

## DC Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_{DS}$ = 10 mA | $V_{(BR)DSS}$ | 65 | — | — | V |
| Drain Leakage Current | $V_{DS}$ = 28 V, $V_{GS}$ = 0 V | $I_{DSS}$ | — | — | 1.0 | µA |
| | $V_{DS}$ = 63 V, $V_{GS}$ = 0 V | $I_{DSS}$ | — | — | 10.0 | µA |
| On-State Resistance | $V_{GS}$ = 10 V, $V_{DS}$ = 0.1 V | $R_{DS(on)}$ | — | 0.095 | — | Ω |
| Operating Gate Voltage | $V_{DS}$ = 28 V, $I_{DQ}$ = 900 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 | $T_J$ | 200 | °C |
| Total Device Dissipation | $P_D$ | 437.5 | W |
| Above 25°C derate by | | 2.5 | W/°C |
| Storage Temperature Range | $T_{STG}$ | –40 to +150 | °C |
| Thermal Resistance ($T_{CASE}$ = 70°C, 85 W CW) | $R_{\theta JC}$ | 0.4 | °C/W |

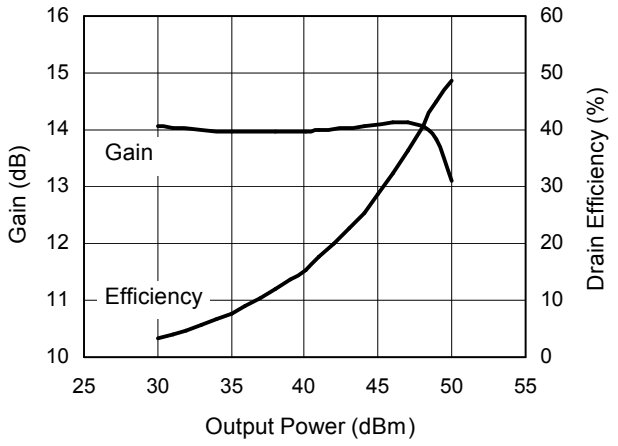
## Ordering Information

| Type and Version | Package Type | Package Description | Marking |
|---|---|---|---|
| PTFA260851E V1 | H-30248-2 | Thermally-enhanced slotted flange, single-ended | PTFA260851E |
| PTFA260851F V1 | H-31248-2 | Thermally-enhanced earless flange, single-ended | PTFA260851F |

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

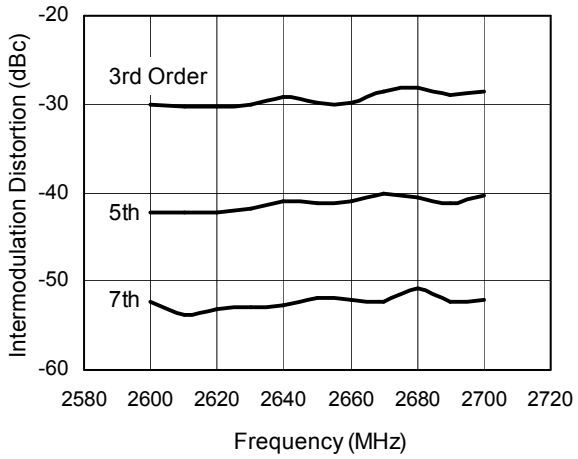
**Gain & Efficiency vs. Output Power**

$V_{DD}$ = 28 V, $I_{DQ}$ = 900 mA, $f$ = 2.68 GHz



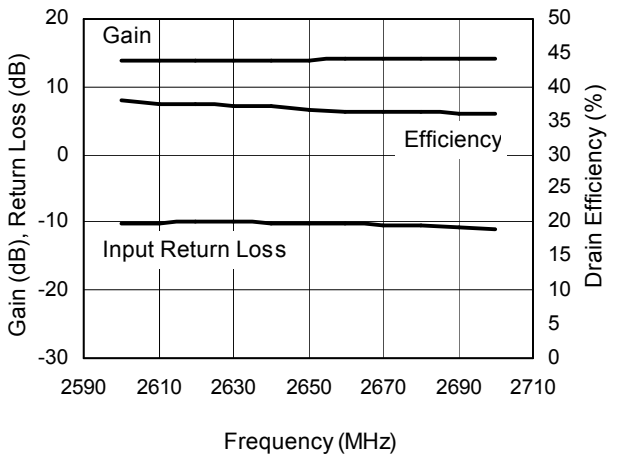

**Two–tone Broadband Performance**

$V_{DD}$ = 28 V, $I_{DQ}$ = 900 mA, $P_{OUT}$ = 42.5 W



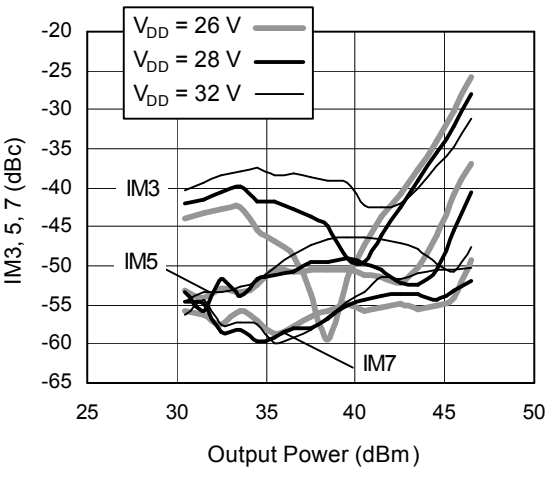

**Two–tone Broadband Performance**

$V_{DD}$ = 28 V, $I_{DQ}$ = 900 mA, $P_{OUT}$ = 42.5 W




**Two–tone Performance, various voltages**

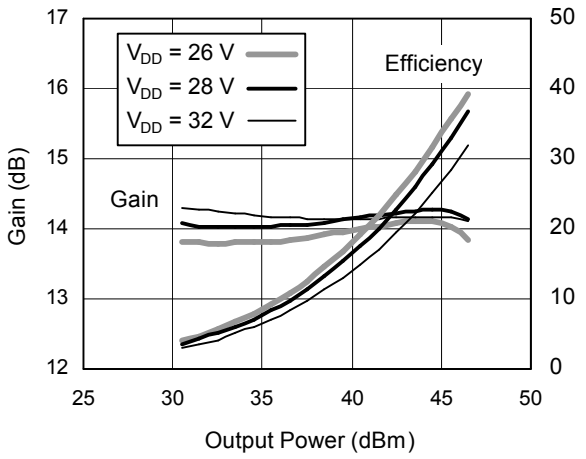
$I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, tone spacing = 1 MHz



## Typical Performance (cont.)

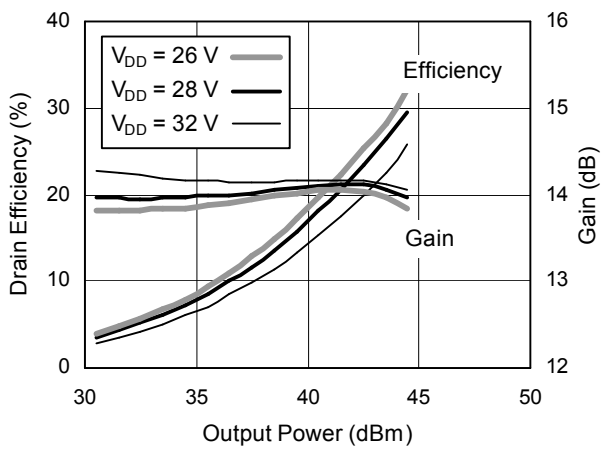
**Two–tone Performance, various voltages**

$I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, tone spacing = 1 MHz




**3-Carrier CDMA2000 Performance, various voltages**

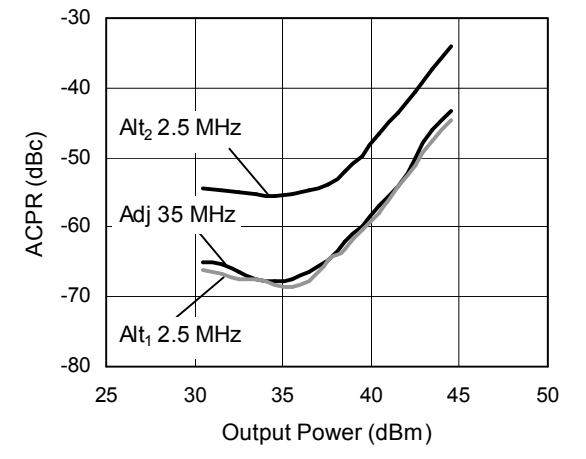
$I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, PAR = 7 dB




**3-Carrier CDMA2000 Performance**

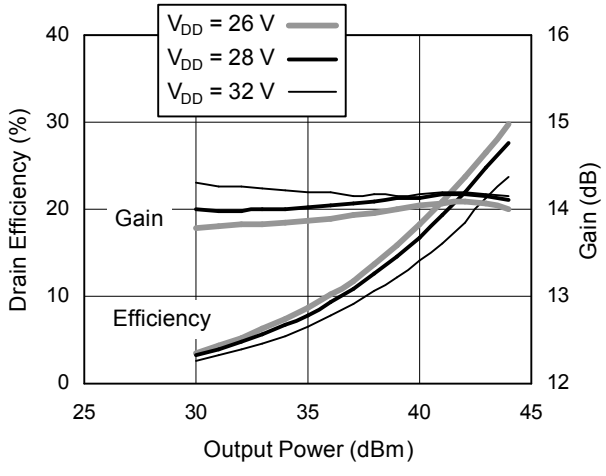
Adjacent Channel Power Ratio

$V_{DD}$ = 28 V, $I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, PAR = 7 dB




**WCDMA 3GPP Single-carrier Performance, various voltages**

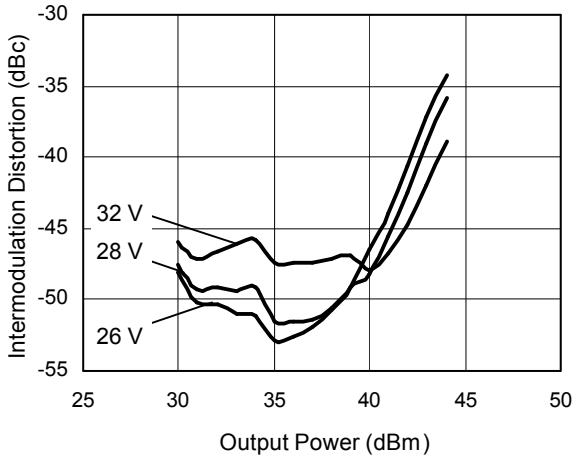
$I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, PAR = 8 dB



## Typical Performance (cont.)

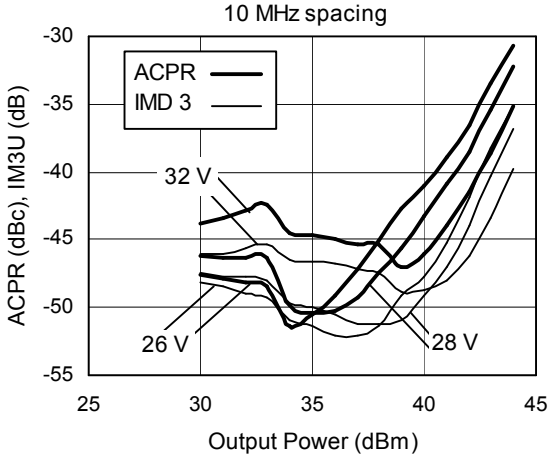
**WCDMA 3GPP Single-carrier Performance**

$I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, PAR = 8 dB



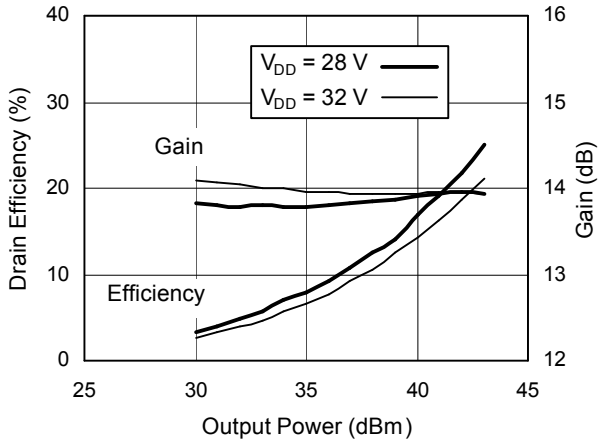

**WCDMA 3GPP 2-carrier Performance, various voltages**

$I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, PAR = 8 dB, 10 MHz spacing



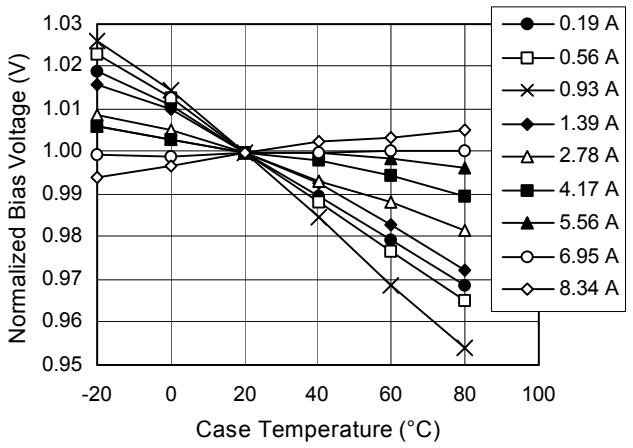

**WCDMA 3GPP 2-carrier Performance**

$V_{DD}$ = 28 V & 32 V, $I_{DQ}$ = 900 mA, $f$ = 2.68 GHz, PAR = 8 dB, 10 MHz spacing

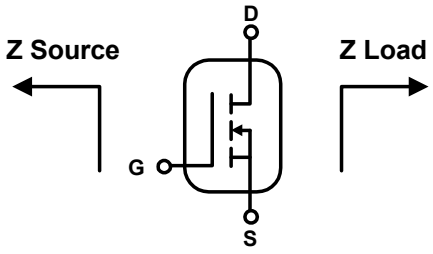



**Bias Voltage vs. Temperature**

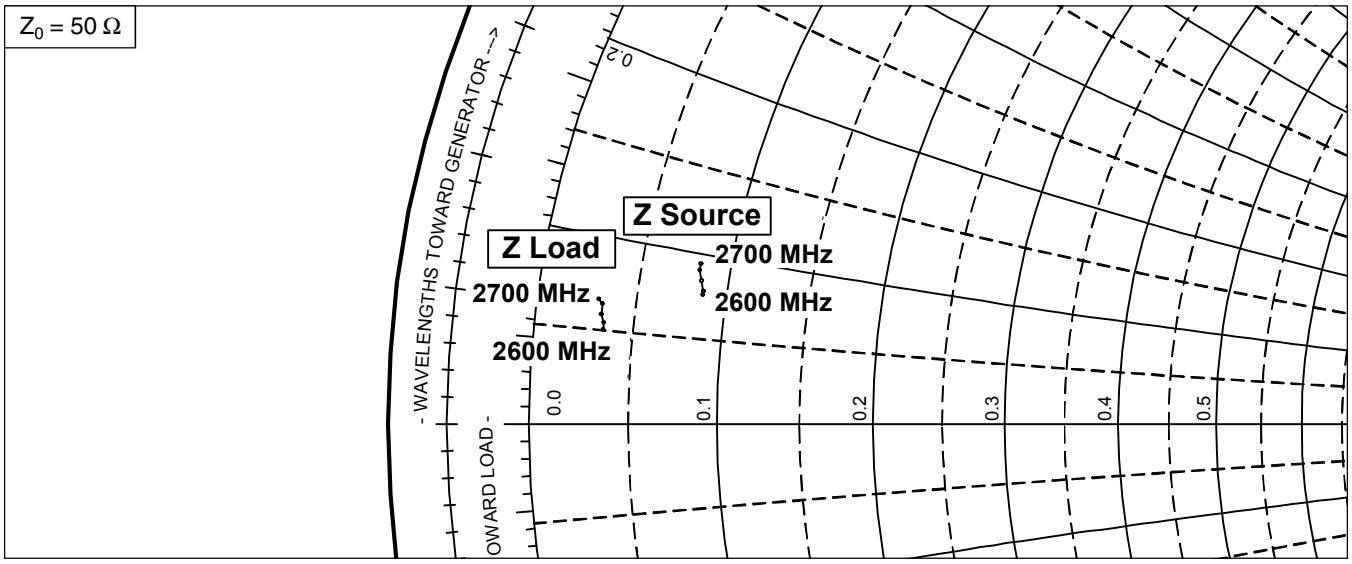
Voltage normalized to typical gate voltage, series show current



## Broadband Circuit Impedance

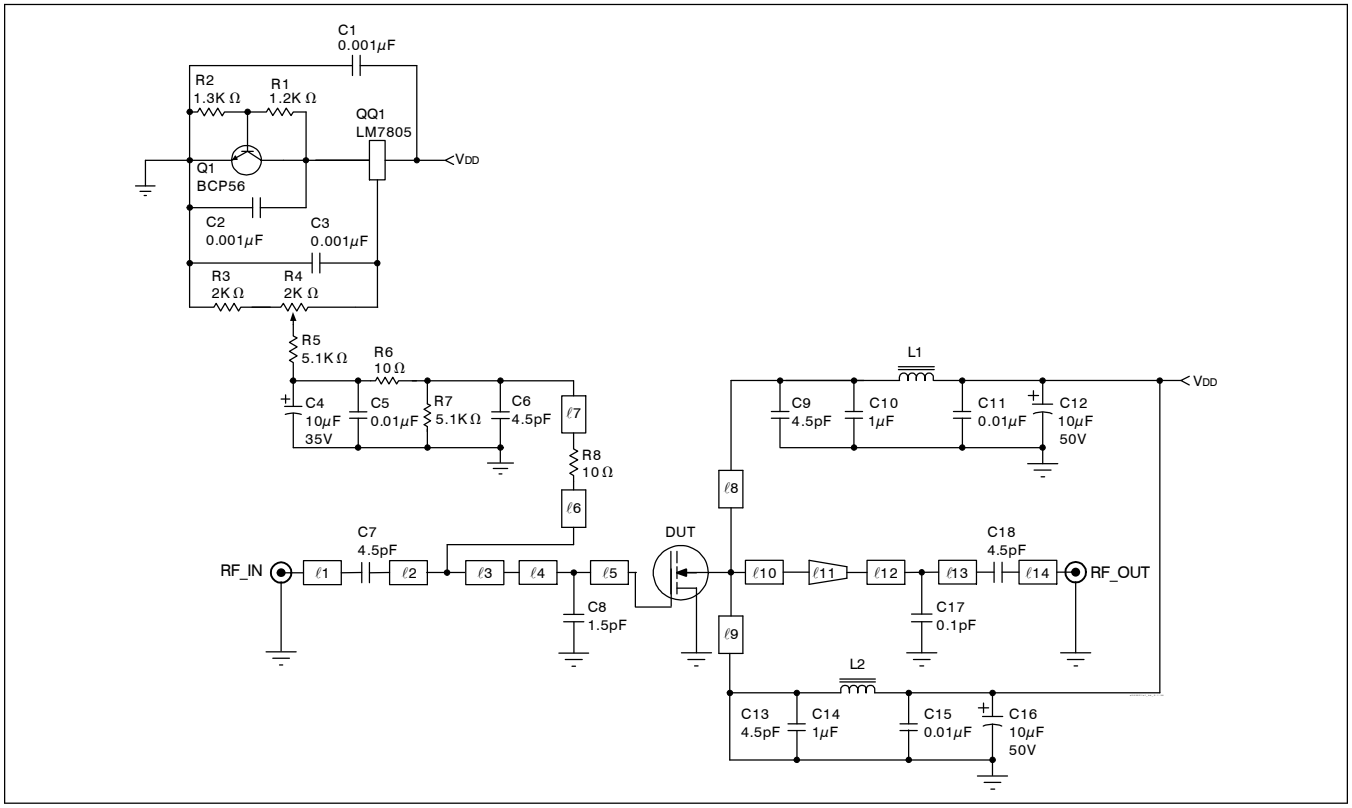



| Frequency | Z Source Ω | | Z Load Ω | |
|---|---|---|---|---|
| MHz | R | jX | R | jX |
| 2600 | 4.4 | 3.8 | 1.8 | 2.5 |
| 2620 | 4.4 | 3.9 | 1.8 | 2.7 |
| 2650 | 4.3 | 4.2 | 1.7 | 2.9 |
| 2680 | 4.2 | 4.5 | 1.7 | 3.2 |
| 2700 | 4.2 | 4.7 | 1.6 | 3.3 |




**See next page for circuit information**

## Reference Circuit

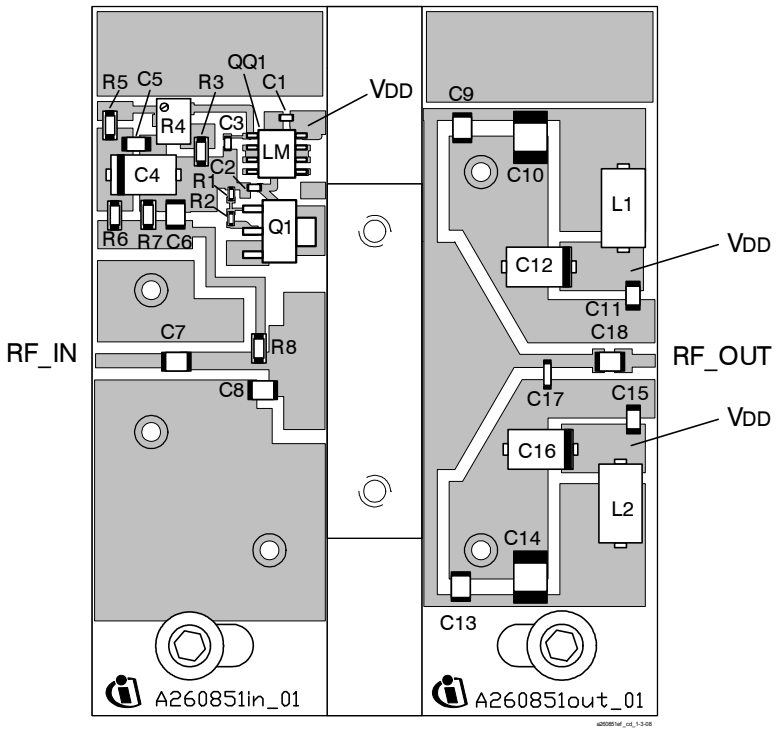



*Reference circuit schematic for ƒ = 2650 MHz*

| Circuit Assembly Information | | | |
|---|---|---|---|
| DUT | PTFA260851E or PTFA260851F | LDMOS Transistor | |
| PCB | 0.76 mm [.030"] thick, $\varepsilon_r$ = 4.5 | TMM4 | 2 oz. copper |

| Microstrip | Electrical Characteristics at 2650 MHz | Dimensions: L x W ( mm) | Dimensions: L x W (in.) |
|---|---|---|---|
| ℓ1 | 0.121 λ, 46.9 Ω | 7.42 x 1.52 | 0.292 x 0.060 |
| ℓ2 | 0.135 λ, 40.5 Ω | 8.20 x 1.93 | 0.323 x 0.076 |
| ℓ3 | 0.021 λ, 40.5 Ω | 1.27 x 1.93 | 0.050 x 0.076 |
| ℓ4 | 0.028 λ, 14.7 Ω | 1.60 x 7.54 | 0.063 x 0.297 |
| ℓ5 | 0.079 λ, 8.3 Ω | 4.37 x 14.66 | 0.172 x 0.577 |
| ℓ6 | 0.008 λ, 57.9 Ω | 0.51 x 1.04 | 0.020 x 0.041 |
| ℓ7 | 0.272 λ, 57.9 Ω | 16.79 x 1.04 | 0.661 x 0.041 |
| ℓ8 | 0.278 λ, 49.3 Ω | 16.89 x 1.40 | 0.665 x 0.055 |
| ℓ9 | 0.278 λ, 49.3 Ω | 16.89 x 1.40 | 0.665 x 0.055 |
| ℓ10 | 0.060 λ, 5.2 Ω | 3.28 x 24.36 | 0.129 x 0.959 |
| ℓ11 (taper) | 0.113 λ, 5.2 Ω / 49.3 Ω | 6.73 x 24.36 / 1.40 | 0.265 x 0.959 / 0.055 |
| ℓ12 | 0.048 λ, 49.3 Ω | 2.97 x 1.40 | 0.117 x 0.055 |
| ℓ13 | 0.095 λ, 49.3 Ω | 5.84 x 1.40 | 0.230 x 0.055 |
| ℓ14 | 0.070 λ, 49.3 Ω | 4.29 x 1.40 | 0.169 x 0.055 |

## Reference Circuit (cont.)




*Reference circuit assembly diagram (not to scale)**

| Component | Description | Suggested Manufacturer | P/N or Comment |
|---|---|---|---|
| C1, C2, C3 | Capacitor, 0.001 µF | Digi-Key | PCC1772CT-ND |
| C4 | Tantalum capacitor, 10 µF, 35 V | Digi-Key | 399-1655-2-ND |
| C5, C11, C15 | Capacitor, 0.01 µF | ATC | 200B 103 |
| C6, C7, C9, C13, C18 | Ceramic capacitor, 4.5 pF | ATC | 100B 4R5 |
| C8 | Ceramic capacitor, 1.5 pF | ATC | 100B 1R5 |
| C10, C14 | Capacitor, 1 µF | ATC | 920C105 |
| C12, C16 | Tantalum capacitor, 10 µF, 50 V | Garrett Electronics | TPSE106K050R0400 |
| C17 | Ceramic capacitor, 0.1 pF | ATC | 100A 0R1 |
| L1, L2 | Ferrite, 8.9 mm | Elna Magnetics | BDS 4.6/3/8.9-4S2 |
| Q1 | Transistor | Infineon Technologies | BCP56 |
| QQ1 | Voltage regulator | National Semiconductor | LM7805 |
| R1 | Chip resistor 1.2 k-ohms | Digi-Key | P1.2KGCT-ND |
| R2 | Chip resistor 1.3 k-ohms | Digi-Key | P1.3KGCT-ND |
| R3 | Chip resistor 2 k-ohms | Digi-Key | P2KECT-ND |
| R4 | Potentiometer 2 k-ohms | Digi-Key | 3224W-202ETR-ND |
| R5, R7 | Chip resistor 5.1 k-ohms | Digi-Key | P5.1KECT-ND |
| R6, R8 | Chip resistor 10 ohms | Digi-Key | P10ECT-ND |

**Gerber Files for this circuit available on request*

## Package Outline Specifications

### Package H-30248-2

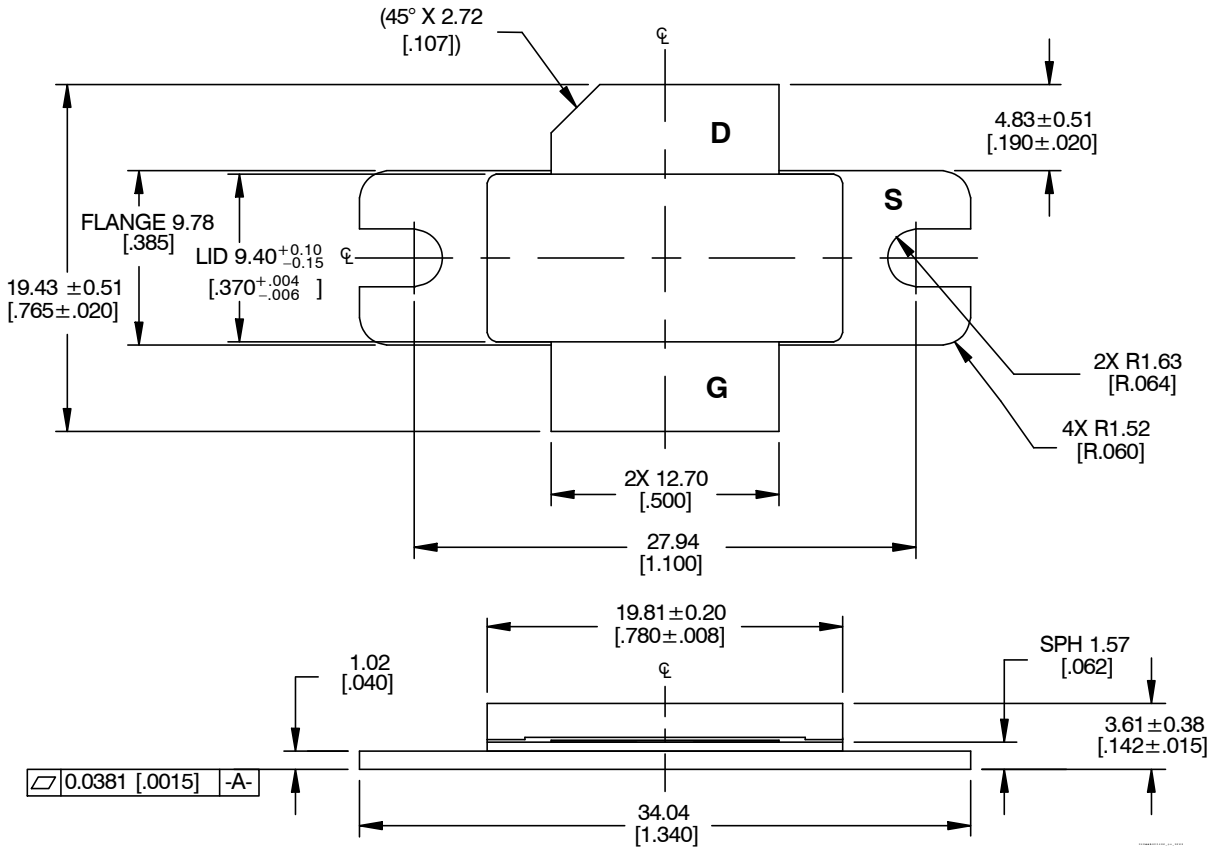



Diagram Notes—unless otherwise specified:

1. Lead thickness: 0.10 +0.051/–0.025 [.004 +.002/–.001].
2. All tolerances ± 0.127 [.005] unless specified otherwise.
3. Pins: D = drain, S = source, G = gate.
4. Interpret dimensions and tolerances per ASME Y14.5M-1994.
5. Primary dimensions are mm. Alternate dimensions are inches.
6. Gold plating thickness:
   S - flange: 2.54 micron [100 microinch] (min)
   D, G - leads: 1.14 micron ± 0.38 micron [45 microinch ± 15 microinch]

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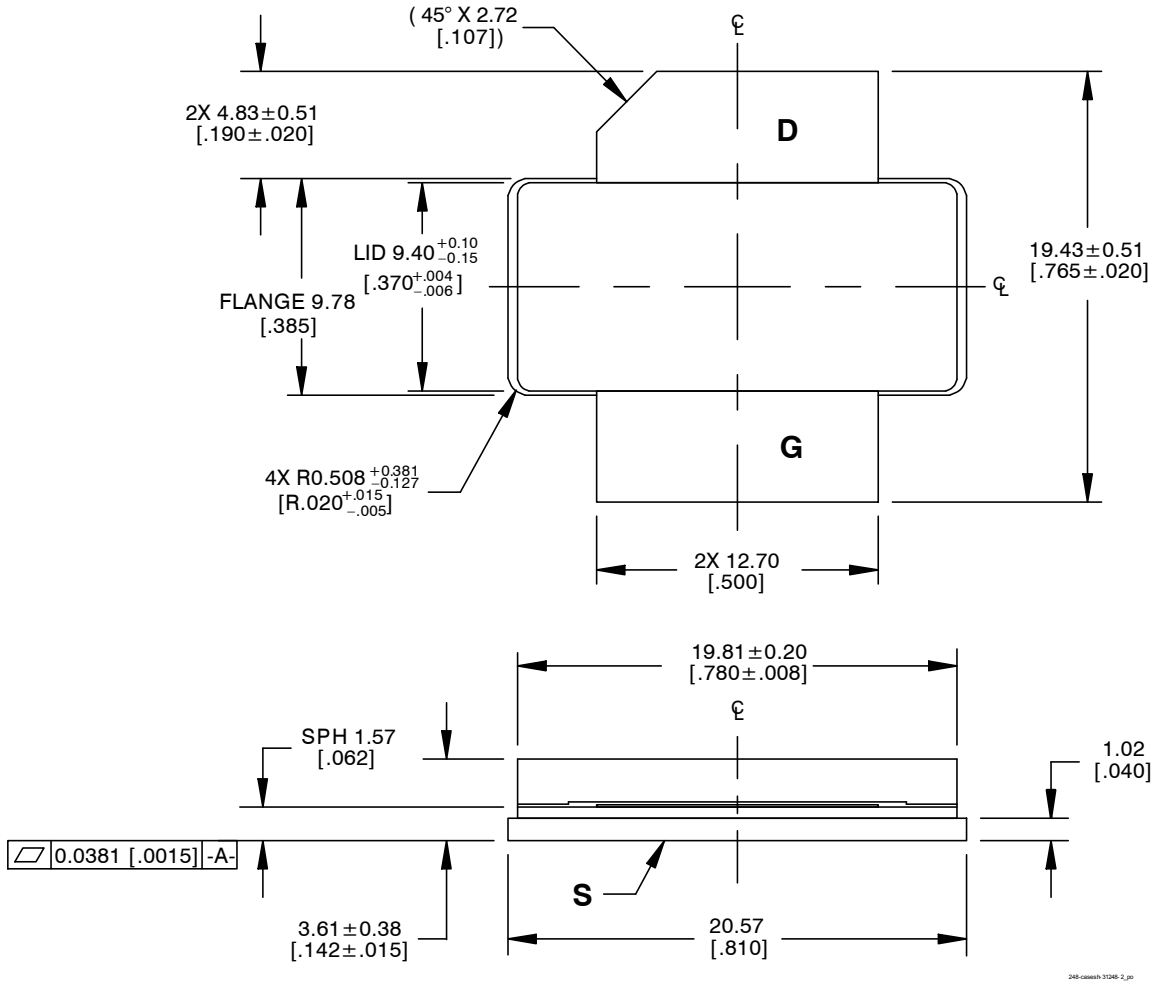
## Package Outline Specifications

### Package H-31248-2

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| | | |
|---|---|---|
| **Revision History:** | 2009-02-20 | Data Sheet |
| **Previous Version:** | 2006-07-21, Preliminary Data Sheet | |

| Page | Subjects (major changes since last revision) |
|---|---|
| 6, 7 | Add impedance and circuit information. |
| 1 | Increase bandwidth from 2620 – 2680 to 2500 – 2700. |
| 8 | Fixed typing error |
| | |
| | |

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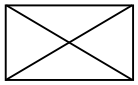

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