

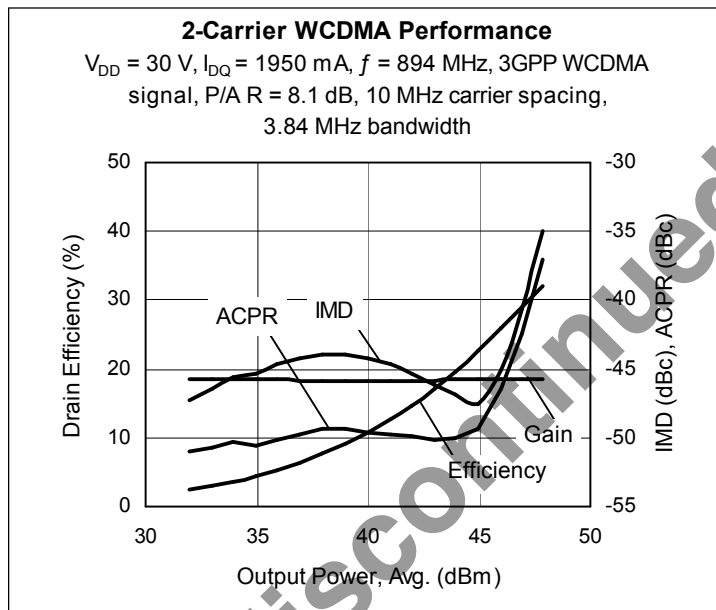
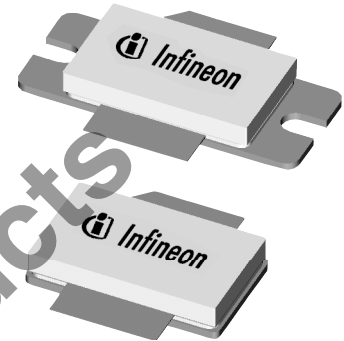
## Thermally-Enhanced High Power RF LDMOS FETs 220 W, 869 – 894 MHz

### Description

The PTFA082201E and PTFA082201F are 220-watt LDMOS FETs designed for CDMA and WCDMA power amplifier applications in the 869 to 894 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.

PTFA082201E  
Package H-36260-2

PTFA082201F  
Package H-37260-2



### Features

- Thermally-enhanced packages, Pb-free and RoHS compliant
- Broadband internal matching
- Typical two-carrier WCDMA performance at 894 MHz, 30 V
  - Average output power = 55 W
  - Linear Gain = 18.0 dB
  - Efficiency = 30%
  - Intermodulation distortion = -37 dBc
  - Adjacent channel power = -39.5 dBc
- Typical CW performance, 894 MHz, 30 V
  - Output power at P-1dB = 250 W
  - Efficiency = 59%
- Integrated ESD protection: Human Body Model, Class 2 (minimum)
- Excellent thermal stability, low HCI drift
- Capable of handling 10:1 VSWR at 30 V, 220 W (CW) output power

### RF Characteristics

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

$V_{DD} = 30\text{ V}$ ,  $I_{DQ} = 1950\text{ mA}$ ,  $P_{OUT} = 55\text{ W}$  average

$f_1 = 884\text{ MHz}$ ,  $f_2 = 894\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8.1 dB @ 0.01% CCDF

| Characteristic             | Symbol   | Min | Typ  | Max | Unit |
|----------------------------|----------|-----|------|-----|------|
| Gain                       | $G_{ps}$ | —   | 18.0 | —   | dB   |
| Drain Efficiency           | $\eta_D$ | —   | 30   | —   | %    |
| Intermodulation Distortion | IMD      | —   | -37  | —   | 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-tone Measurements (tested in Infineon test fixture)

$V_{DD} = 30\text{ V}$ ,  $I_{DQ} = 1950\text{ mA}$ ,  $P_{OUT} = 220\text{ W PEP}$ ,  $f = 894\text{ MHz}$ , tone spacing = 1 MHz

| Characteristic             | Symbol   | Min  | Typ  | Max | Unit |
|----------------------------|----------|------|------|-----|------|
| Gain                       | $G_{ps}$ | 17.5 | 18.0 | —   | dB   |
| Drain Efficiency           | $\eta_D$ | 40   | 43   | —   | %    |
| Intermodulation Distortion | IMD      | —    | —    | -29 | 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  | $\mu\text{A}$ |
|                                | $V_{DS} = 63\text{ V}$ , $V_{GS} = 0\text{ V}$     | $I_{DSS}$     | —   | —    | 10.0 | $\mu\text{A}$ |
| On-State Resistance            | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$   | $R_{DS(on)}$  | —   | 0.04 | —    | $\Omega$      |
| Operating Gate Voltage         | $V_{DS} = 30\text{ V}$ , $I_{DQ} = 1950\text{ mA}$ | $V_{GS}$      | 2.0 | 2.5  | 3.0  | V             |
| Gate Leakage Current           | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$     | $I_{GSS}$     | —   | —    | 1.0  | $\mu\text{A}$ |

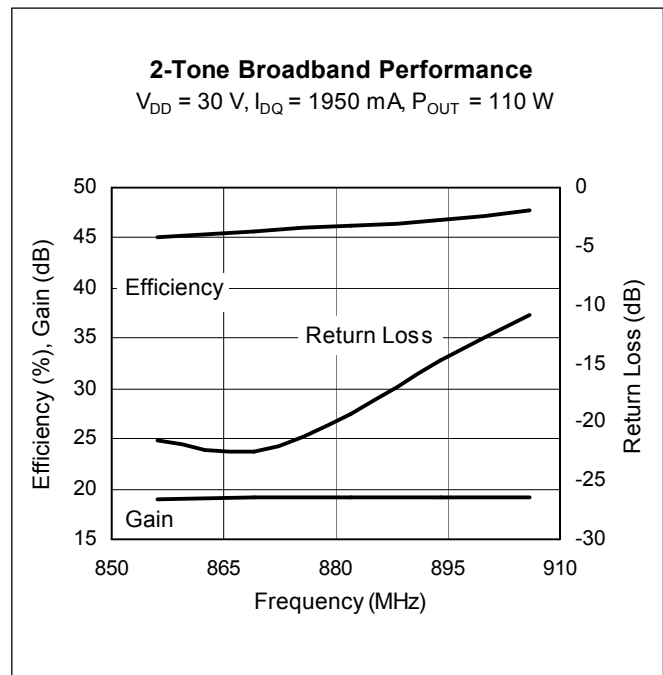
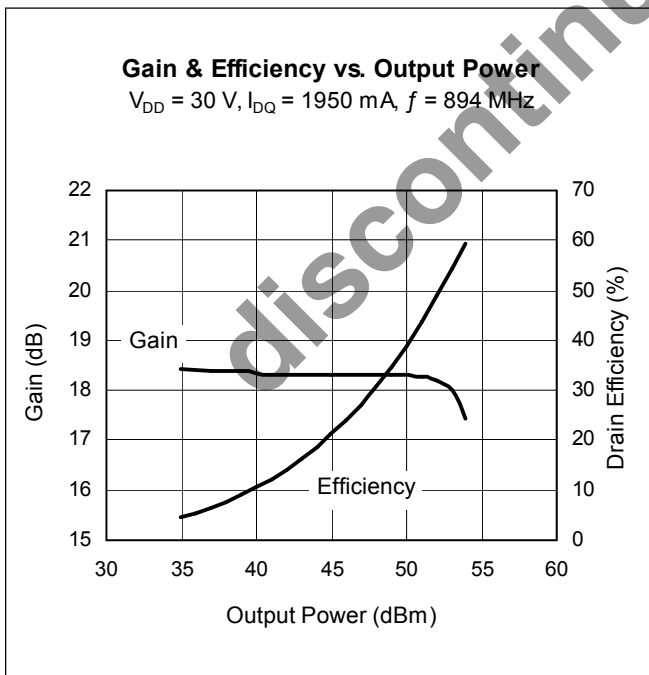
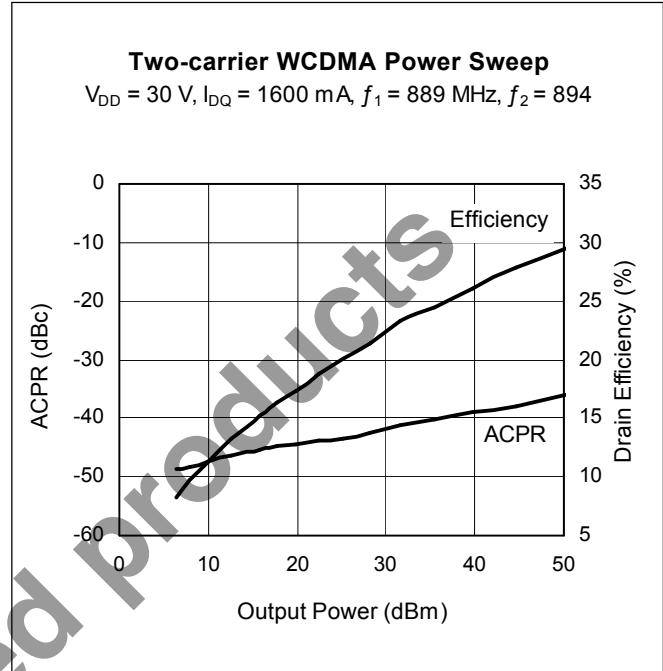
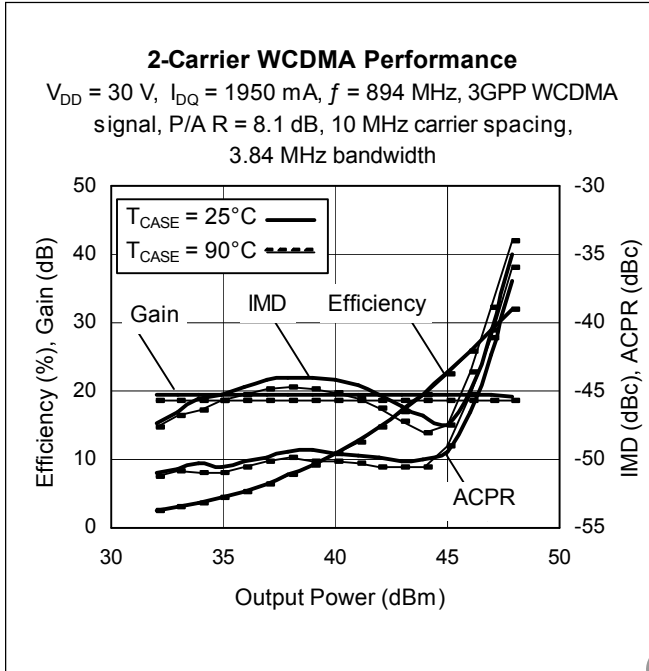
## Maximum Ratings

| 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<br>Above 25 $^{\circ}\text{C}$ derate by | $P_D$           | 700         | W                           |
|   |                 | 4.0         | W/ $^{\circ}\text{C}$       |
| Storage Temperature Range   | $T_{STG}$       | -40 to +150 | $^{\circ}\text{C}$          |
| Thermal Resistance ( $T_{CASE} = 70^{\circ}\text{C}$ , 220 W CW)  | $R_{\theta JC}$ | 0.25        | $^{\circ}\text{C}/\text{W}$ |

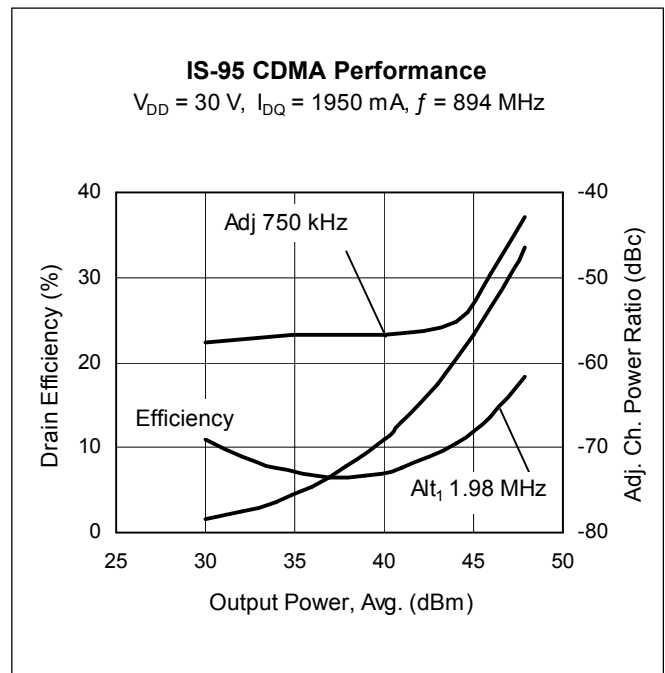
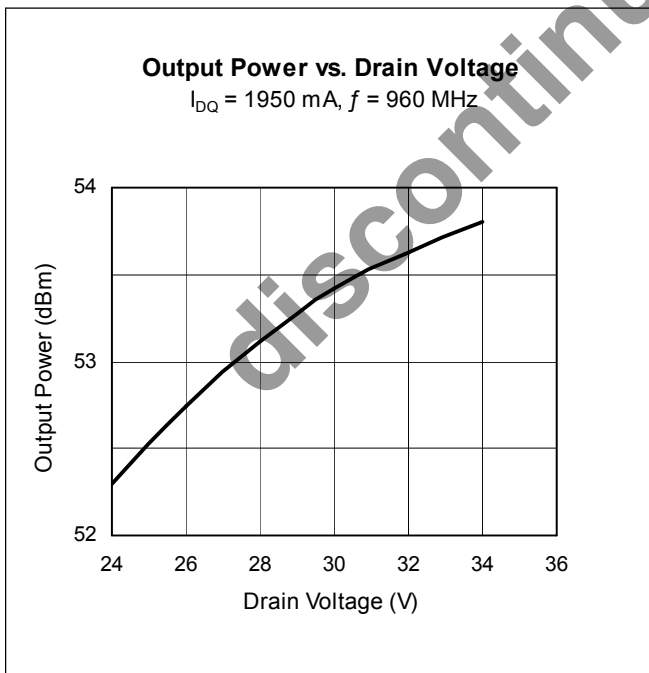
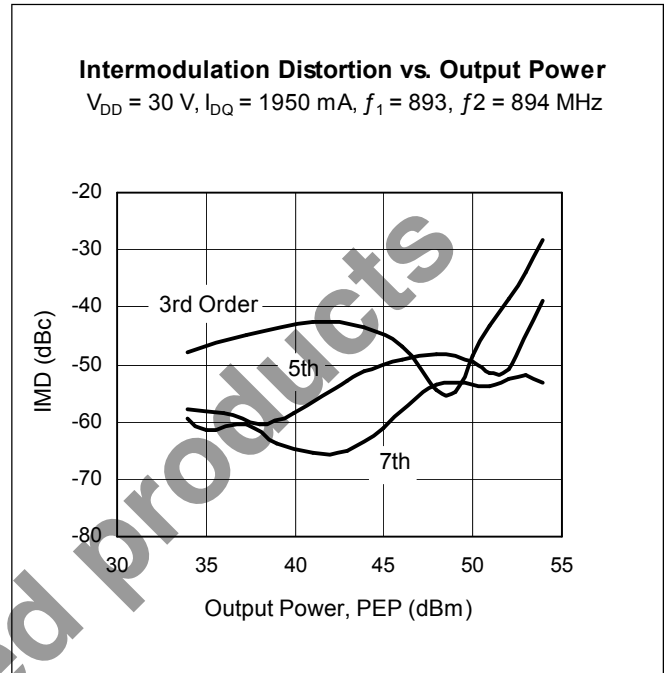
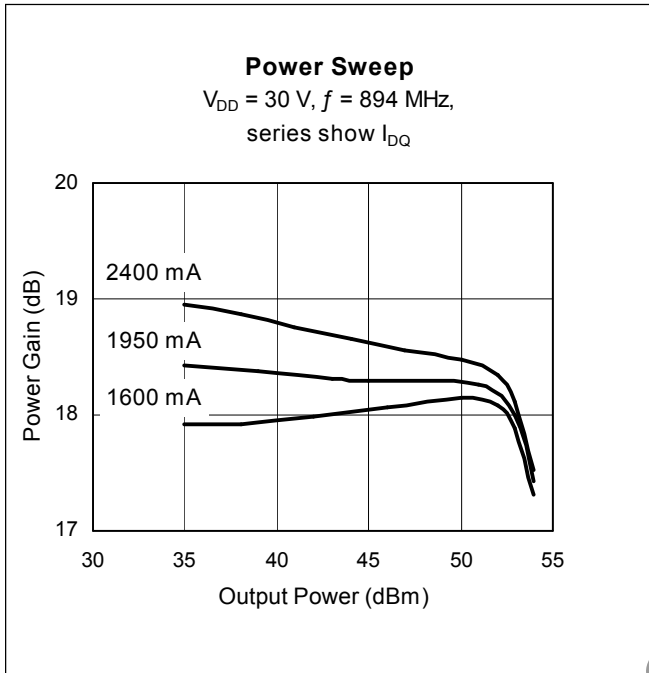
## Ordering Information

| Type and Version | Package Outline | Package Description                             | Shipping | Marking     |
|------------------|-----------------|---|----------|-------------|
| PTFA082201E V4   | H-36260-2       | Thermally-enhanced slotted flange, single-ended | Tray     | PTFA082201E |
| PTFA082201F V4   | H-37260-2       | Thermally-enhanced earless flange, single-ended | Tray     | PTFA082201F |

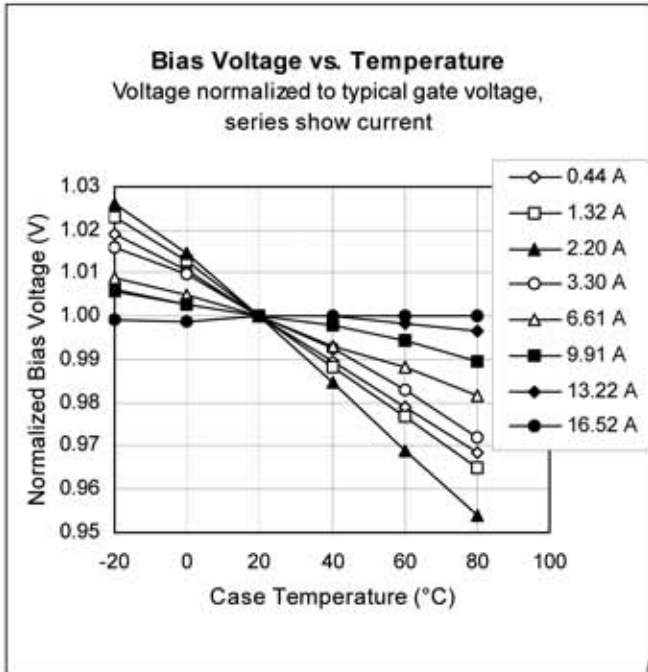
**Typical Performance** (data taken in a production test fixture)



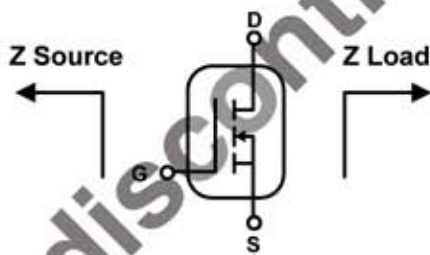
Typical Performance (cont.)



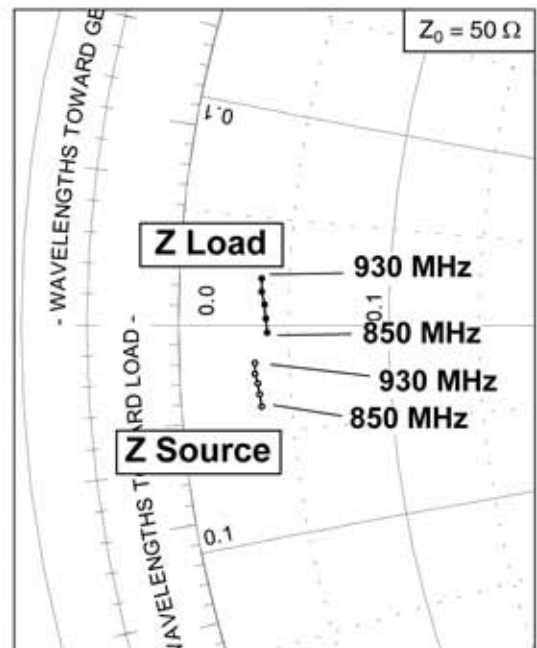
Typical Performance (cont.)



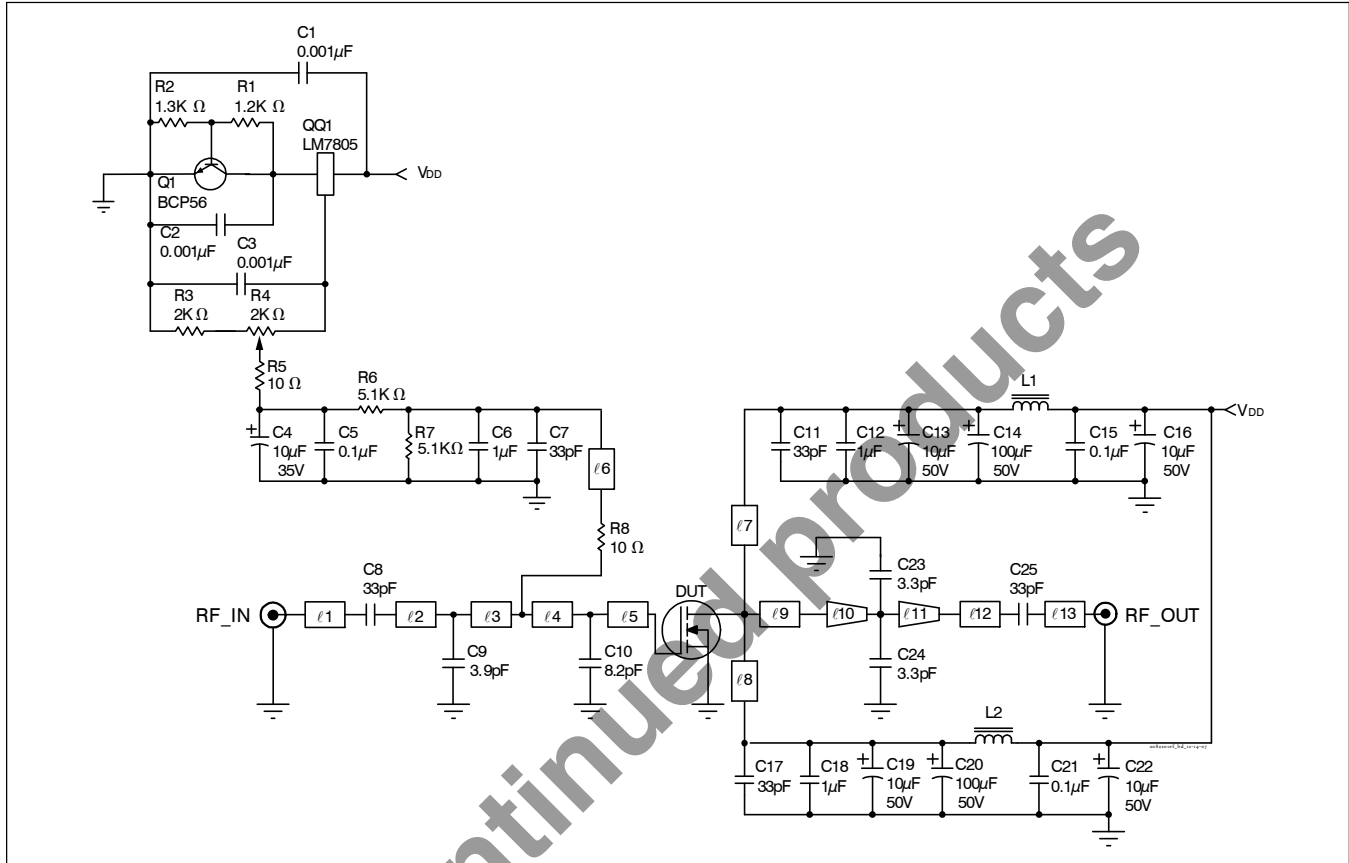
Broadband Circuit Impedance



| Frequency<br>MHz | Z Source $\Omega$ |        | Z Load $\Omega$ |        |
|------------------|-------------------|--------|-----------------|--------|
|                  | R                 | jX     | R               | jX     |
| 850              | 1.792             | -1.910 | 1.999           | -0.196 |
| 870              | 1.764             | -1.624 | 1.963           | 0.165  |
| 890              | 1.737             | -1.360 | 1.924           | 0.485  |
| 910              | 1.693             | -1.147 | 1.854           | 0.793  |
| 930              | 1.703             | -0.896 | 1.853           | 1.087  |



### Reference Circuit



Reference circuit schematic for  $f = 894 \text{ MHz}$

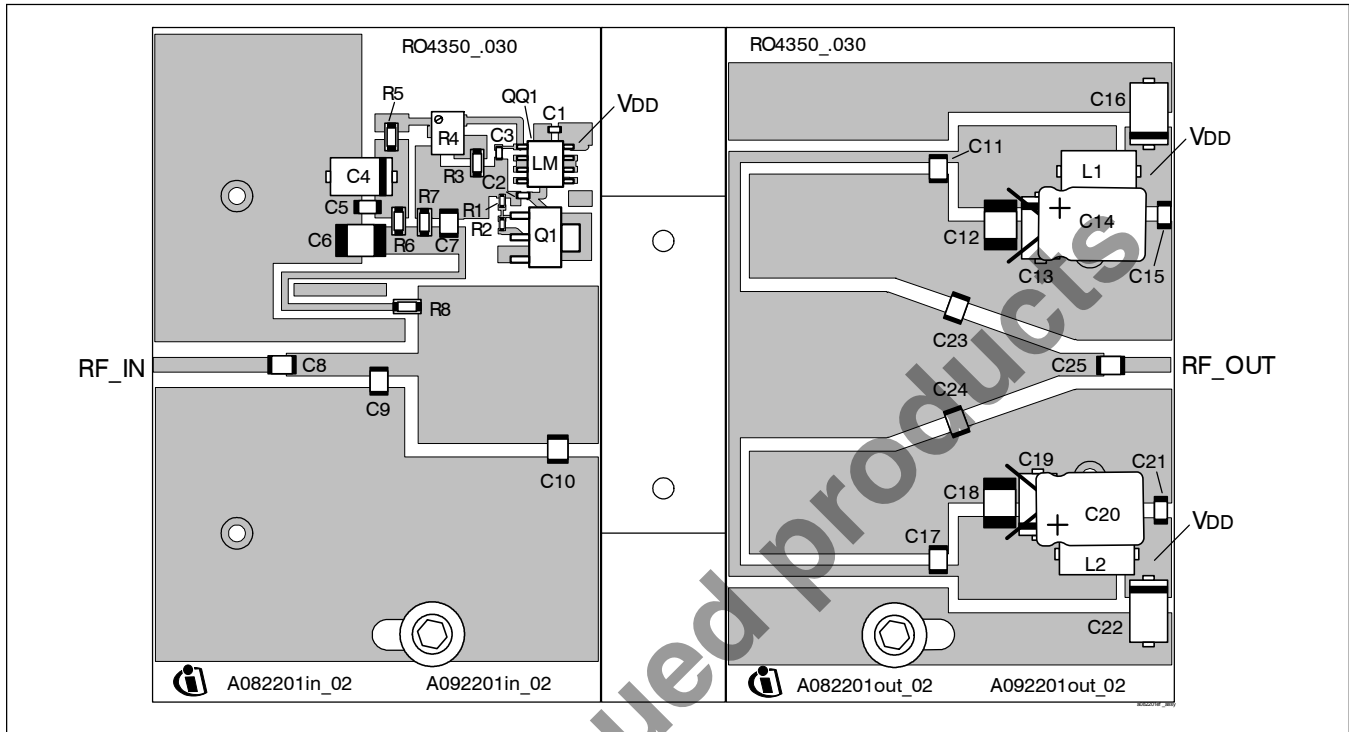
#### Circuit Assembly Information

|     |   |                  |              |
|-----|---|------------------|--------------|
| DUT | PTFA082201E or PTFA082201F                  | LDMOS Transistor |              |
| PCB | 0.76 mm [0.030"] thick, $\epsilon_r = 3.48$ | Rogers RO4350    | 1 oz. copper |

| Microstrip       | Electrical Characteristics at 894 MHz <sup>1</sup> | Dimensions: L x W ( mm ) | Dimensions: L x W ( in. ) |
|------------------|--|--------------------------|---------------------------|
| $l_1$            | $0.065 \lambda$ , 50.0 $\Omega$                    | 13.13 x 1.60             | 0.517 x 0.063             |
| $l_2$            | $0.049 \lambda$ , 38.0 $\Omega$                    | 9.78 x 2.54              | 0.385 x 0.100             |
| $l_3$            | $0.024 \lambda$ , 38.0 $\Omega$                    | 4.83 x 2.54              | 0.190 x 0.100             |
| $l_4$            | $0.083 \lambda$ , 7.8 $\Omega$                     | 15.44 x 17.83            | 0.608 x 0.702             |
| $l_5$            | $0.027 \lambda$ , 7.8 $\Omega$                     | 4.95 x 17.83             | 0.195 x 0.702             |
| $l_6$            | $0.190 \lambda$ , 78.0 $\Omega$                    | 40.64 x 0.74             | 1.600 x 0.029             |
| $l_7, l_8$       | $0.183 \lambda$ , 60.0 $\Omega$                    | 37.54 x 1.24             | 1.478 x 0.049             |
| $l_9$            | $0.095 \lambda$ , 8.4 $\Omega$                     | 17.68 x 16.48            | 0.696 x 0.649             |
| $l_{10}$ (taper) | $0.031 \lambda$ , 8.4 $\Omega$ / 11.2 $\Omega$     | 5.94 x 16.48 / 11.91     | 0.234 x 0.649 / 0.469     |
| $l_{11}$ (taper) | $0.077 \lambda$ , 11.2 $\Omega$ / 37.0 $\Omega$    | 14.53 x 11.91 / 2.64     | 0.572 x 0.469 / 0.104     |
| $l_{12}$         | $0.025 \lambda$ , 37.0 $\Omega$                    | 4.98 x 2.64              | 0.196 x 0.104             |
| $l_{13}$         | $0.028 \lambda$ , 50.0 $\Omega$                    | 5.74 x 1.60              | 0.226 x 0.063             |

<sup>1</sup>Electrical characteristics are rounded.

Reference Circuit (cont.)

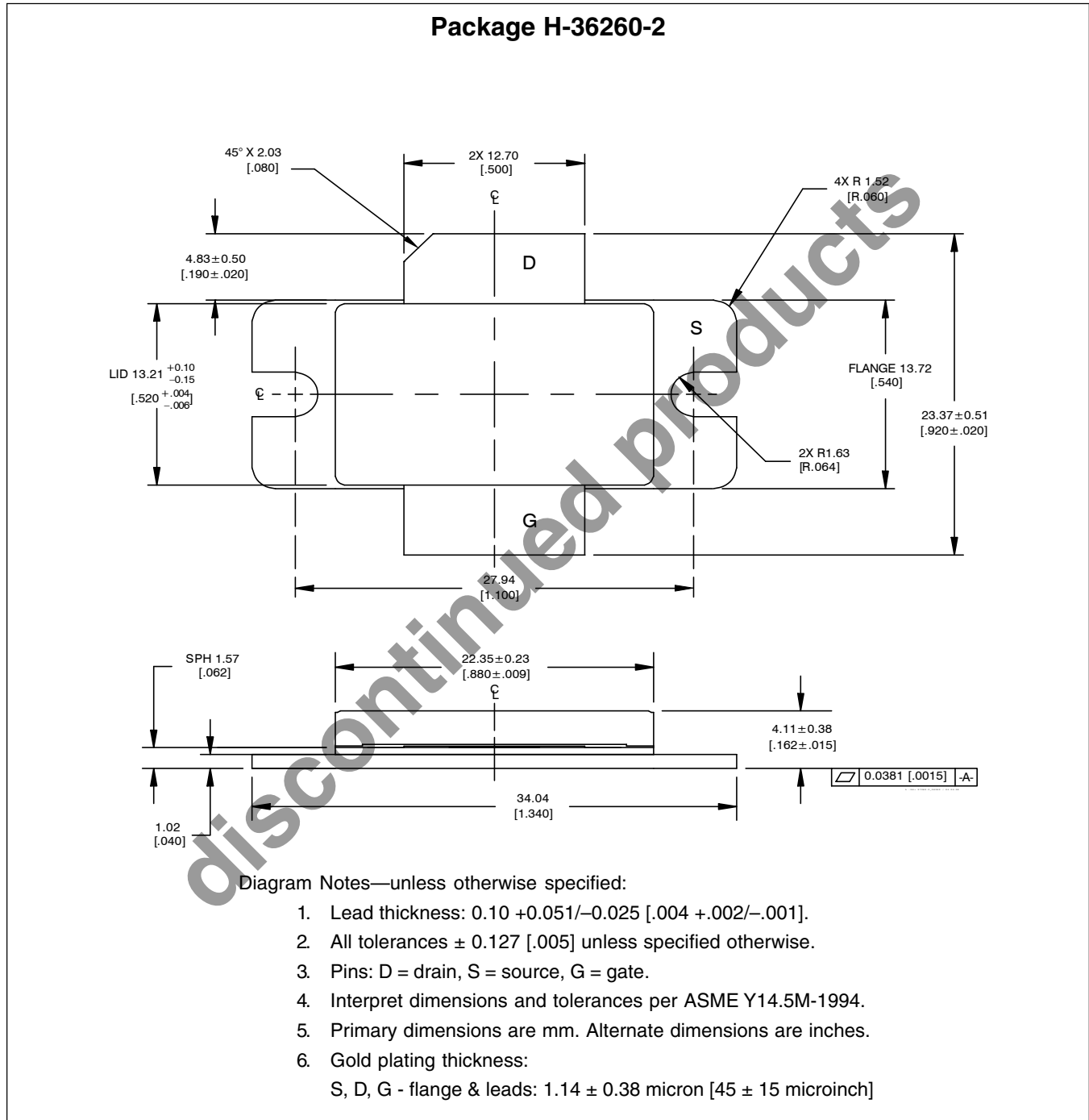


Reference circuit assembly diagram (not to scale)\*

| Component             | Description                               | Suggested Manufacturer | P/N or Comment    |
|-----------------------|---|------------------------|-------------------|
| C1, C2, C3            | Capacitor, 0.001 $\mu$ F                  | Digi-Key               | PCC1772CT-ND      |
| C4                    | Tantalum capacitor, 10 $\mu$ F, 35 V      | Digi-Key               | 399-1655-2-ND     |
| C5, C15, C21          | Capacitor, 0.1 $\mu$ F                    | Digi-Key               | PCC104BCT-ND      |
| C6, C12, C18          | Capacitor, 1 $\mu$ F                      | ATC                    | 920C105           |
| C7, C8, C11, C17, C25 | Ceramic capacitor, 33 pF                  | ATC                    | 100B 330          |
| C9                    | Ceramic capacitor, 3.9 pF                 | ATC                    | 100B 3R9          |
| C10                   | Ceramic capacitor, 8.2 pF                 | ATC                    | 100B 8R2          |
| C13, C16, C19, C22    | Tantalum capacitor, 10 $\mu$ F, 50 V      | Garrett Electronics    | TPSE106K050R0400  |
| C14, C20              | Electrolytic capacitor, 100 $\mu$ F, 50 V | Digi-Key               | P5182-ND          |
| C23, C24              | Ceramic capacitor, 3.3 pF                 | ATC                    | 100B 3R3          |
| 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, R8                | Chip resistor 10 ohms                     | Digi-Key               | P10ECT-ND         |
| R6, R7                | Chip resistor 5.1 k-ohms                  | Digi-Key               | P5.1KECT-ND       |

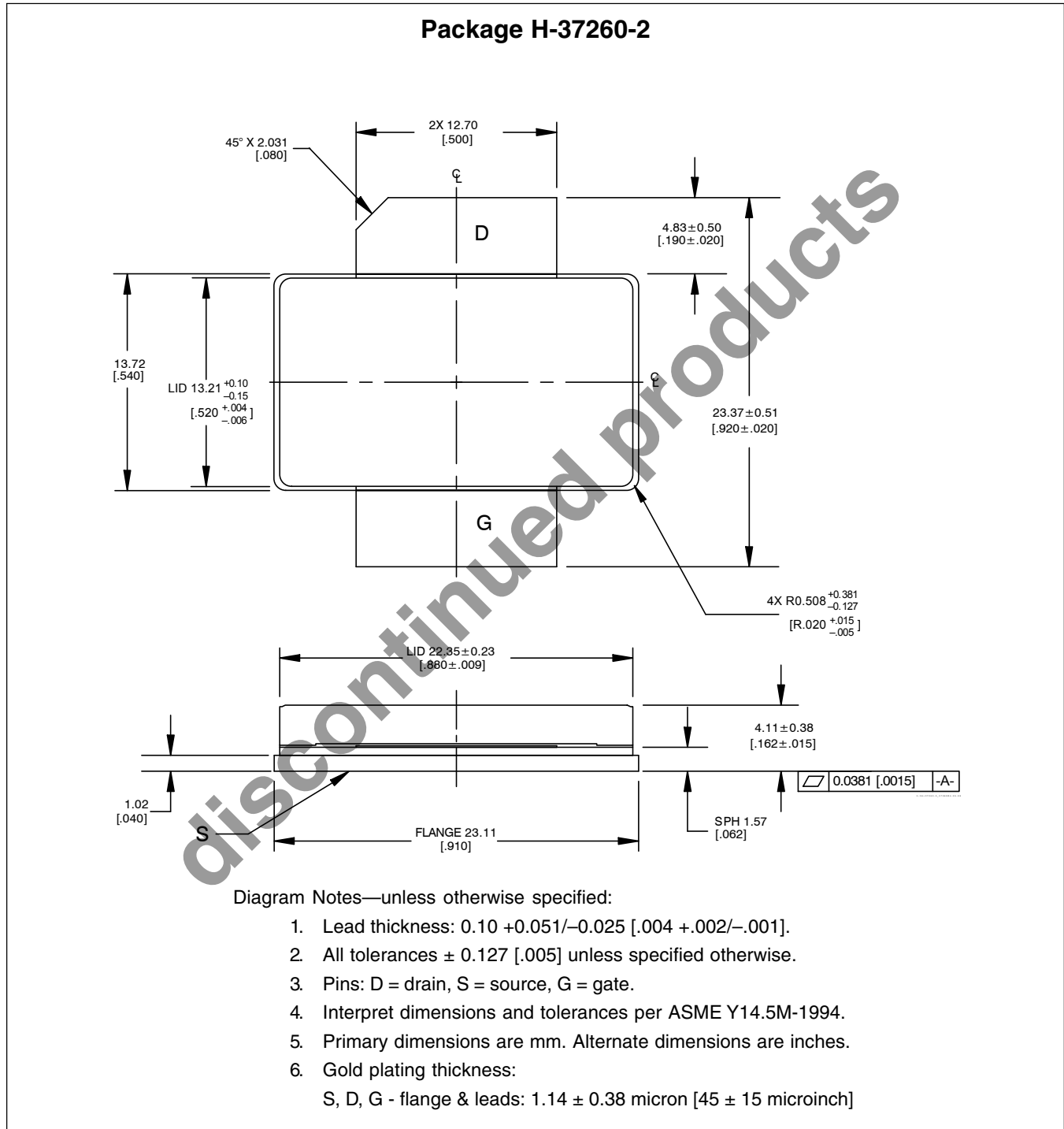
\*Gerber Files for this circuit available on request

## Package Outline Specifications





Package Outline Specifications (cont.)



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

Revision History: 2015-01-09

Data Sheet

Previous Version: 2009-02-20, Data Sheet

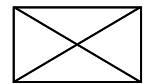
| Page | Subjects (major changes since last revision)           |
|------|--|
| All  | Product discontinued. Please see PD notes : PD_215_14. |
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+1 877 465 3667 (1-877-GO-LDMOS) USA  
or +1 408 776 0600 International



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