# μPA2815T1S

## P-channel MOSFET
## –30 V, –21 A, 11 mΩ

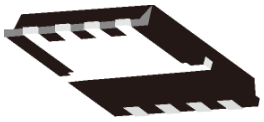
R07DS0777EJ0101
Rev.1.01
May 28, 2013

## Description

The μPA2815T1S is P-channel MOS Field Effect Transistor designed for DC/DC converter and power management applications of portable equipment.

## Features

- $V_{DSS}$ = –30 V ($T_A$ = 25°C)
- Low on-state resistance
  — $R_{DS(on)}$ = 11 mΩ MAX. ($V_{GS}$ = –10 V, $I_D$ = –21 A)
- 4.5 V Gate-drive available
- Small & thin type surface mount package with heat spreader
- Pb-free and Halogen free



HWSON-8

## Ordering Information

| Part No. | Lead Plating | Packing | Package |
|---|---|---|---|
| μPA2815T1S-E2-AT *1 | Pure Sn | Tape 5000 p/reel | HWSON-8<br>typ. 0.022 g |

Note: *1. Pb-free (This product does not contain Pb in external electrode and other parts.)

## Absolute Maximum Ratings ($T_A$ = 25°C)

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to Source Voltage ($V_{GS}$ = 0 V) | $V_{DSS}$ | –30 | V |
| Gate to Source Voltage ($V_{DS}$ = 0 V) | $V_{GSS}$ | ∓20 | V |
| Drain Current (DC) ($T_C$ = 25°C) | $I_{D(DC)}$ | ∓21 | A |
| Drain Current (pulse) *1 | $I_{D(pulse)}$ | ∓84 | A |
| Total Power Dissipation *2 | $P_{T1}$ | 1.5 | W |
| Total Power Dissipation (PW = 10 sec) *2 | $P_{T2}$ | 3.8 | W |
| Total Power Dissipation ($T_C$ = 25°C) | $P_{T3}$ | 14.5 | W |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +150 | °C |
| Single Avalanche Current *3 | $I_{AS}$ | 19 | A |
| Single Avalanche Energy *3 | $E_{AS}$ | 36.1 | mJ |

## Thermal Resistance

| | | | |
|---|---|---|---|
| Channel to Ambient Thermal Resistance *2 | $R_{th(ch-A)}$ | 83.3 | °C/W |
| Channel to Case (Drain) Thermal Resistance | $R_{th(ch-C)}$ | 8.6 | °C/W |

Notes: *1. PW ≤ 10 μs, Duty Cycle ≤ 1%
*2. Mounted on a glass epoxy board of 25.4 mm x 25.4 mm x 0.8 mmt
*3. Starting $T_{ch}$ = 25°C, $V_{DD}$ = –15 V, $R_G$ = 25 Ω, $V_{GS}$ = –20 → 0 V, L = 100 μH



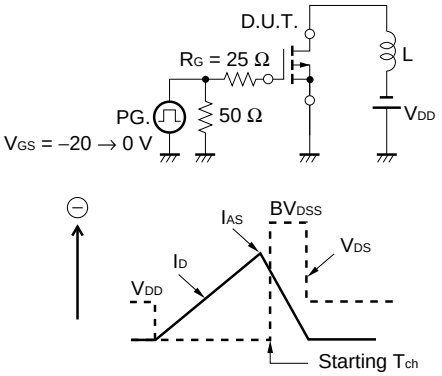
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## Electrical Characteristics ($T_A$ = 25°C)

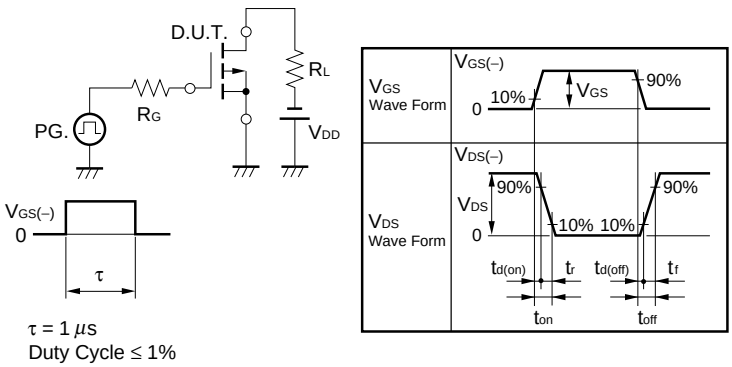
| Item | Symbol | MIN. | TYP. | MAX. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | −1 | μA | $V_{DS}$ = −30 V, $V_{GS}$ = 0 V |
| Gate Leakage Current | $I_{GSS}$ | | | ∓100 | nA | $V_{GS}$ = ∓20 V, $V_{DS}$ = 0 V |
| Gate Cut-off Voltage | $V_{GS(off)}$ | −1.0 | | −2.5 | V | $V_{DS}$ = −10 V, $I_D$ = −1 mA |
| Forward Transfer Admittance *1 | $\|y_{fs}\|$ | 15 | | | S | $V_{DS}$ = −5 V, $I_D$ = −10.5 A |
| Drain to Source On-state Resistance *1 | $R_{DS(on)1}$ | | 9 | 11 | mΩ | $V_{GS}$ = −10 V, $I_D$ = −21 A |
| | $R_{DS(on)2}$ | | 16 | 23 | mΩ | $V_{GS}$ = −4.5 V, $I_D$ = −10.5 A |
| Input Capacitance | $C_{iss}$ | | 1760 | | pF | $V_{DS}$ = −10 V, |
| Output Capacitance | $C_{oss}$ | | 850 | | pF | $V_{GS}$ = 0 V, |
| Reverse Transfer Capacitance | $C_{rss}$ | | 750 | | pF | f = 1 MHz |
| Turn-on Delay Time | $t_{d(on)}$ | | 13 | | ns | $V_{DD}$ = −15 V, $I_D$ = −10.5 A, |
| Rise Time | $t_r$ | | 40 | | ns | $V_{GS}$ = −10 V, |
| Turn-off Delay Time | $t_{d(off)}$ | | 88 | | ns | $R_G$ = 10 Ω |
| Fall Time | $t_f$ | | 171 | | ns | |
| Total Gate Charge | $Q_G$ | | 47 | | nC | $V_{DD}$ = −24 V, |
| Gate to Source Charge | $Q_{GS}$ | | 4.2 | | nC | $V_{GS}$ = −10 V, |
| Gate to Drain Charge | $Q_{GD}$ | | 24 | | nC | $I_D$ = −21 A |
| Body Diode Forward Voltage *1 | $V_{F(S-D)}$ | | 0.9 | | V | $I_F$ = 21 A, $V_{GS}$ = 0 V |
| Reverse Recovery Time | $t_{rr}$ | | 166 | | ns | $I_F$ = 21 A, $V_{GS}$ = 0 V, |
| Reverse Recovery Charge | $Q_{rr}$ | | 222 | | nC | di/dt = 100 A/μs |

Note: *1. Pulsed

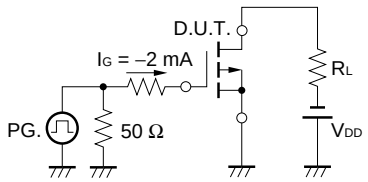
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**




**TEST CIRCUIT 2 SWITCHING TIME**




**TEST CIRCUIT 3 GATE CHARGE**

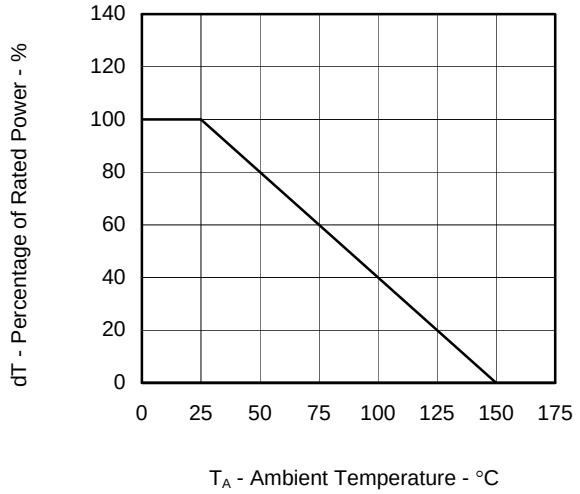




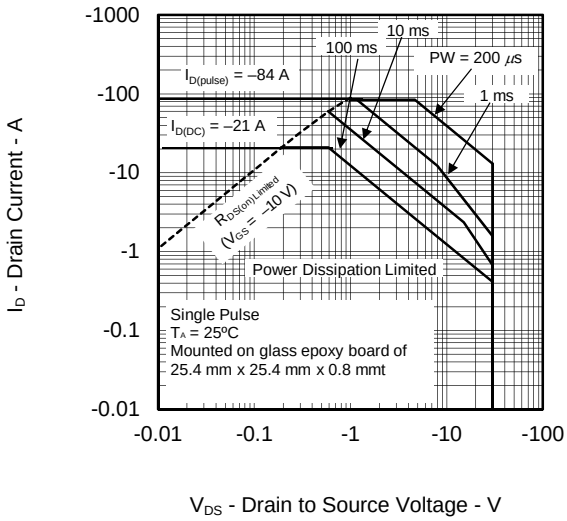

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## Typical Characteristics ($T_A$ = 25°C)

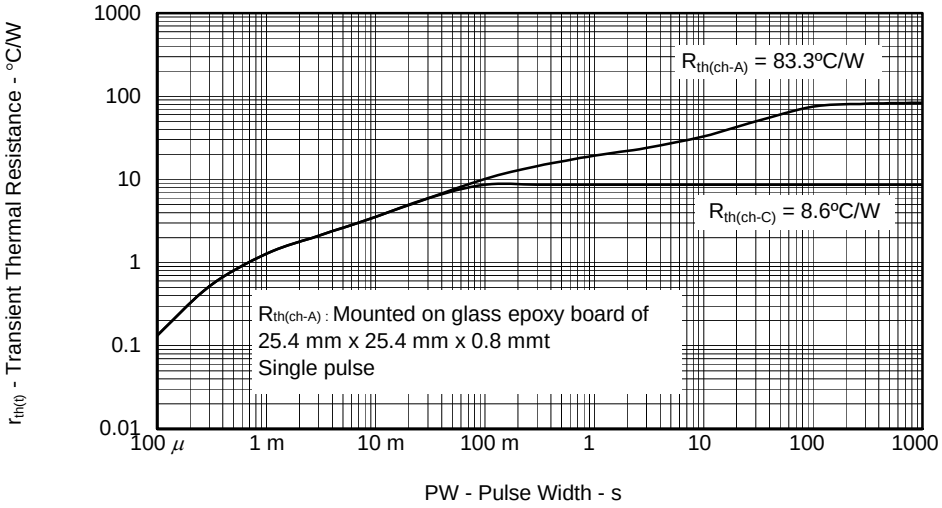
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



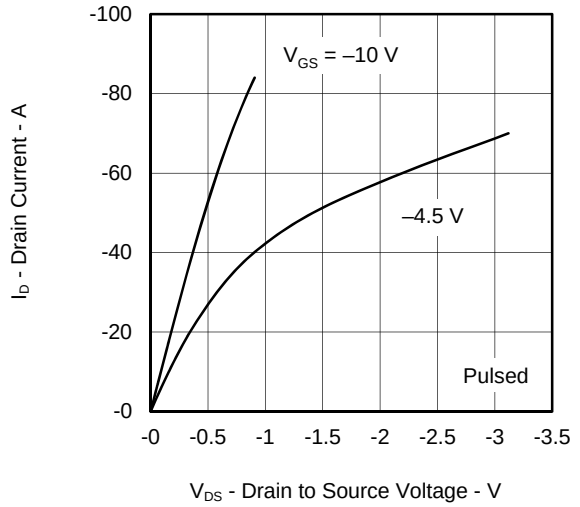

FORWARD BIAS SAFE OPERATING AREA



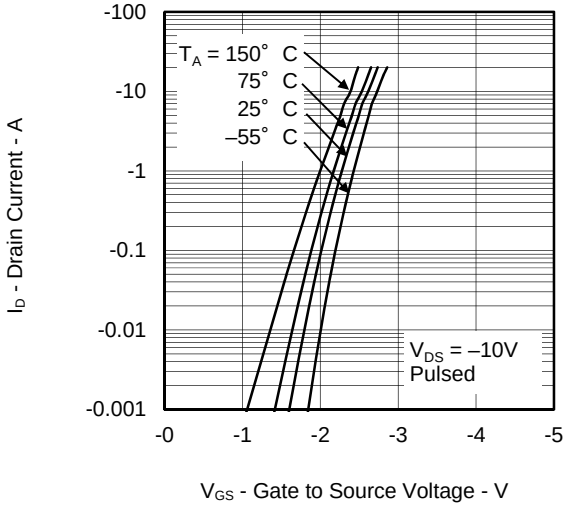

TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH




DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



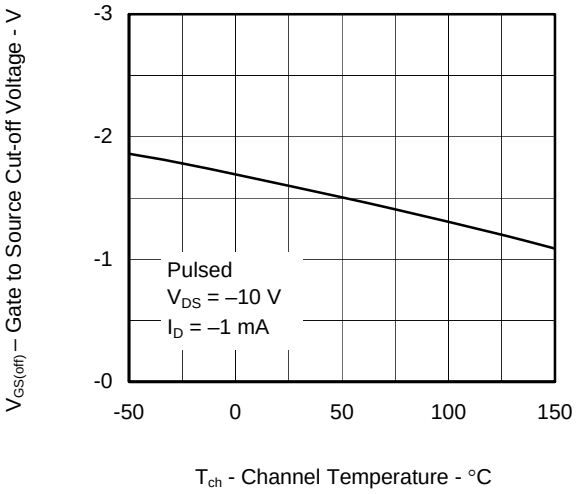

FORWARD TRANSFER CHARACTERISTICS



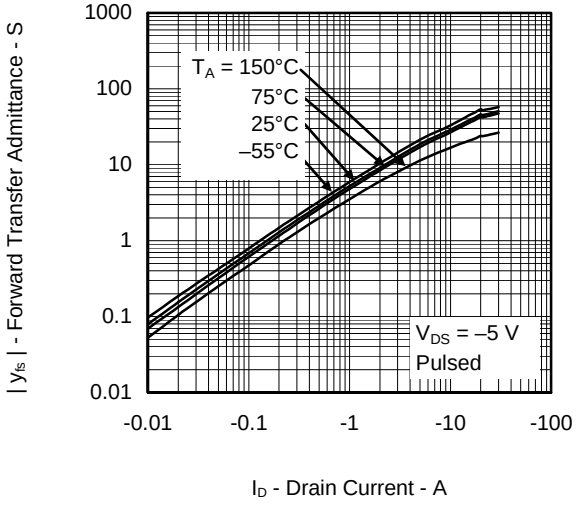



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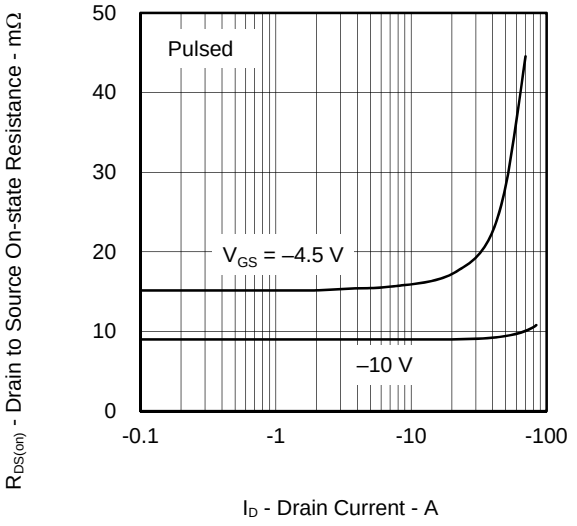
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



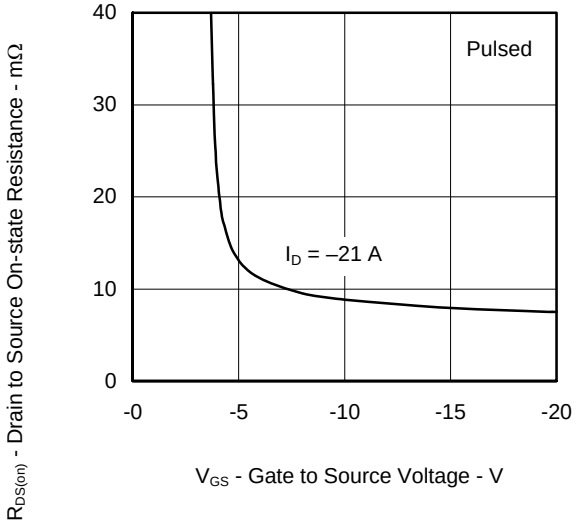

FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



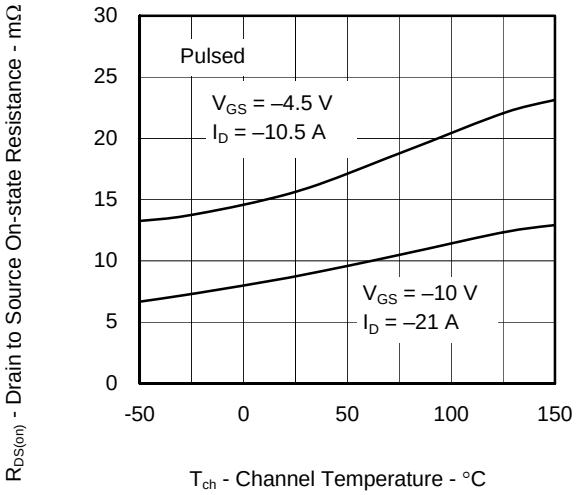

DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



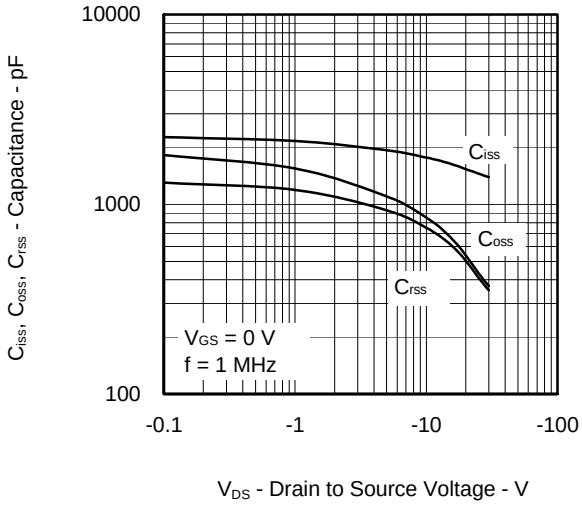

DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE




DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



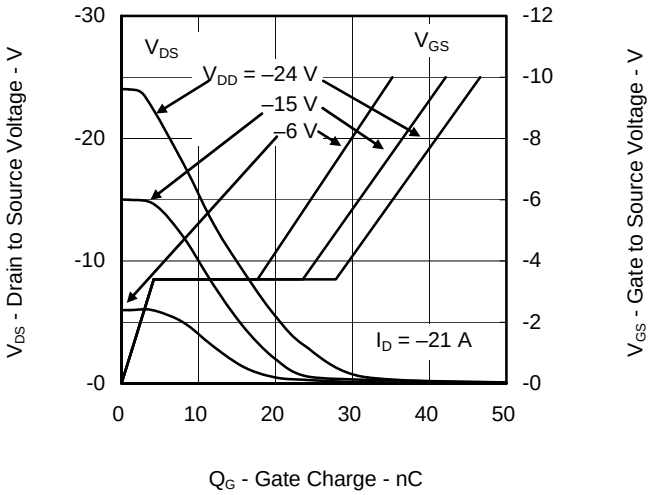

CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



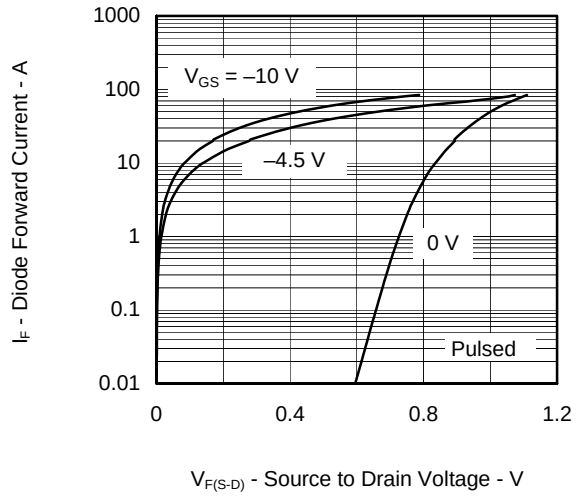



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DYNAMIC INPUT/OUTPUT CHARACTERISTICS




SOURCE TO DRAIN DIODE FORWARD VOLTAGE

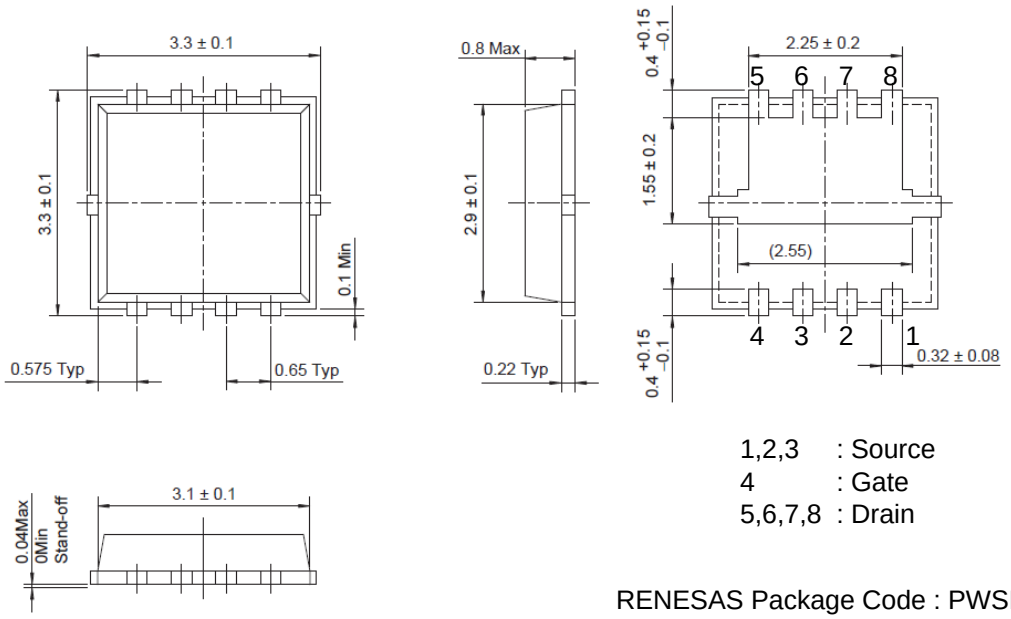





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## Package Drawings (Unit: mm)

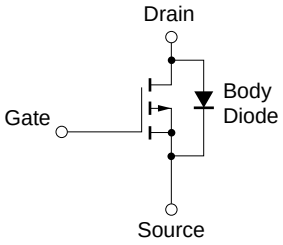
### HWSON-8




1,2,3 : Source
4 : Gate
5,6,7,8 : Drain

RENESAS Package Code : PWSN0008JB-A

## Equivalent Circuit




**Remark** Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.



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