# μPA2806

## MOS FIELD EFFECT TRANSISTOR

R07DS0008EJ0100
Rev.1.00
June 01, 2010

## Description

The μPA2806 is N-channel MOSFET designed for DC/DC converter and power management applications.

## Features

- Low on-state resistance
  - $R_{DS(on)1}$ = 57 mΩ MAX. ($V_{GS}$ = 10 V, $I_D$ = 10 A)
  - $R_{DS(on)2}$ = 70 mΩ MAX. ($V_{GS}$ = 8 V, $I_D$ = 10 A)
- Low $C_{iss}$: $C_{iss}$ = 780 pF TYP. ($V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 MHz)
- Built-in gate protection diode
- Thin type surface mount package with heat spreader (8-pin HVSON)
- RoHS Compliant

## Ordering Information

| Part No. | LEAD PLATING | PACKING | Package |
|---|---|---|---|
| μPA2806T1L-E1-AY *1 | Pure Sn (Tin) | Tape 3000 p/reel | 8-pin HVSON (3333) typ. 0.028 g |
| μPA2806T1L-E2-AY *1 | | | |

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

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

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to Source Voltage ($V_{GS}$ = 0 V) | $V_{DSS}$ | 100 | 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 | $I_{D(pulse)}$ | ±31 | 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) *2 | $P_{T3}$ | 52 | W |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +150 | °C |
| Single Avalanche Current *3 | $I_{AS}$ | 14.3 | A |
| Single Avalanche Energy *3 | $E_{AS}$ | 20.4 | mJ |

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, $V_{DD}$ = 50 V, $R_G$ = 25 Ω, $V_{GS}$ = 20 → 0 V, L = 100 μH

## Thermal Resistance

| | | | |
|---|---|---|---|
| Channel to Ambient Thermal Resistance *1 | $R_{th(ch-A)}$ | 83.3 | °C/W |
| Channel to Case (Drain) Thermal Resistance | $R_{th(ch-C)}$ | 2.4 | °C/W |

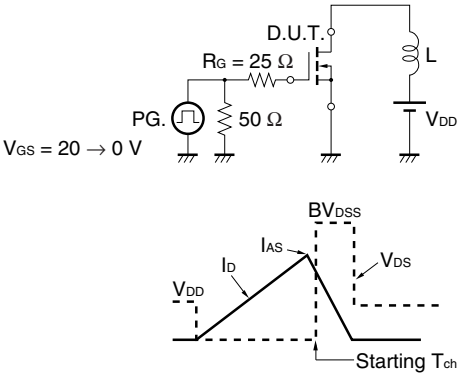
Note: *1. Mounted on a glass epoxy board of 25.4 mm x 25.4 mm x 0.8 mmt

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

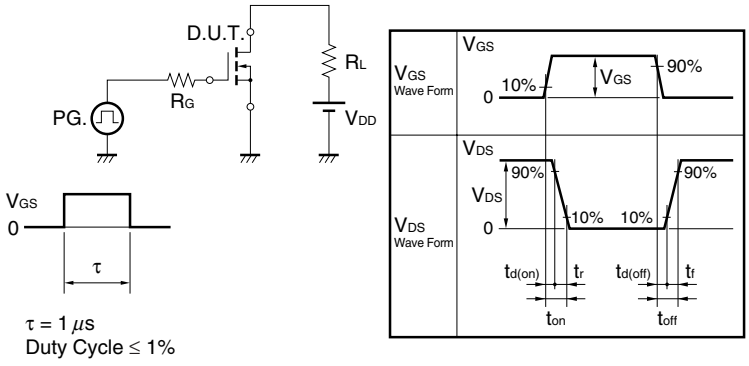
| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 10 | μA | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V |
| Gate Leakage Current | $I_{GSS}$ | | | ±10 | μA | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V |
| Gate Cut-off Voltage | $V_{GS(off)}$ | 2.0 | | 4.0 | V | $V_{DS}$ = 10 V, $I_D$ = 1 mA |
| Forward Transfer Admittance *1 | $\|y_{fs}\|$ | 5 | | | S | $V_{DS}$ = 10 V, $I_D$ = 10 A |
| Drain to Source On-state Resistance *1 | $R_{DS(on)1}$ | | 47 | 57 | mΩ | $V_{GS}$ = 10 V, $I_D$ = 10 A |
| | $R_{DS(on)2}$ | | 49 | 70 | mΩ | $V_{GS}$ = 8 V, $I_D$ = 10 A |
| Input Capacitance | $C_{iss}$ | | 780 | | pF | $V_{DS}$ = 10 V, |
| Output Capacitance | $C_{oss}$ | | 150 | | pF | $V_{GS}$ = 0 V, |
| Reverse Transfer Capacitance | $C_{rss}$ | | 51 | | pF | f = 1 MHz |
| Turn-on Delay Time | $t_{d(on)}$ | | 20 | | ns | $V_{DD}$ = 50 V, $I_D$ = 10 A, |
| Rise Time | $t_r$ | | 10 | | ns | $V_{GS}$ = 10 V, |
| Turn-off Delay Time | $t_{d(off)}$ | | 46 | | ns | $R_G$ = 10 Ω |
| Fall Time | $t_f$ | | 7 | | ns | |
| Total Gate Charge | $Q_G$ | | 18 | | nC | $V_{DD}$ = 50 V, |
| Gate to Source Charge | $Q_{GS}$ | | 5 | | nC | $V_{GS}$ = 10 V, |
| Gate to Drain Charge | $Q_{GD}$ | | 6 | | nC | $I_D$ = 21 A |
| Body Diode Forward Voltage *1 | $V_{F(S-D)}$ | | 0.88 | | V | $I_F$ = 21 A, $V_{GS}$ = 0 V |
| Reverse Recovery Time | $t_{rr}$ | | 50 | | ns | $I_F$ = 21 A, $V_{GS}$ = 0 V, |
| Reverse Recovery Charge | $Q_{rr}$ | | 110 | | nC | di/dt = 100 A/μs |
| Gate Resistance | $R_G$ | | 2.2 | | Ω | f = 1 MHz |

Note: *1. Pulsed

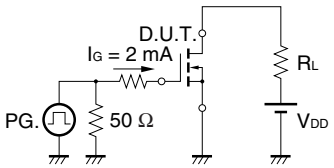
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**




**TEST CIRCUIT 2 SWITCHING TIME**

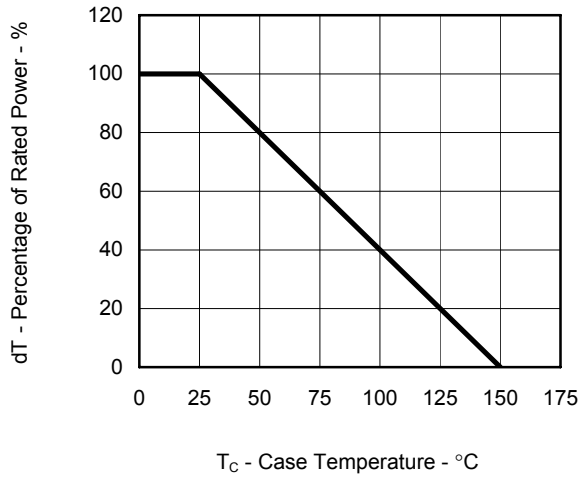



**TEST CIRCUIT 3 GATE CHARGE**

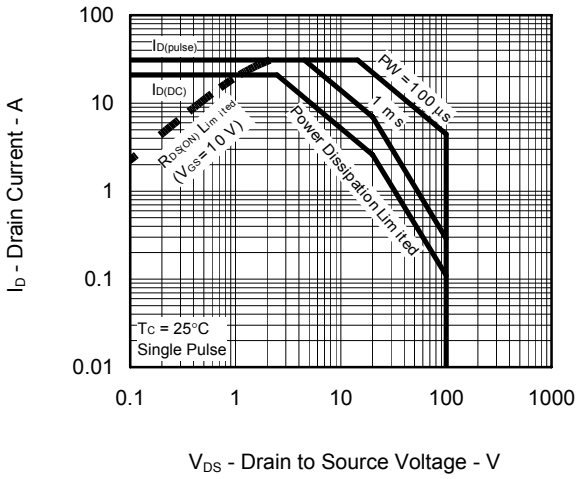


## Typical Characteristics ($T_A$ = 25°C)

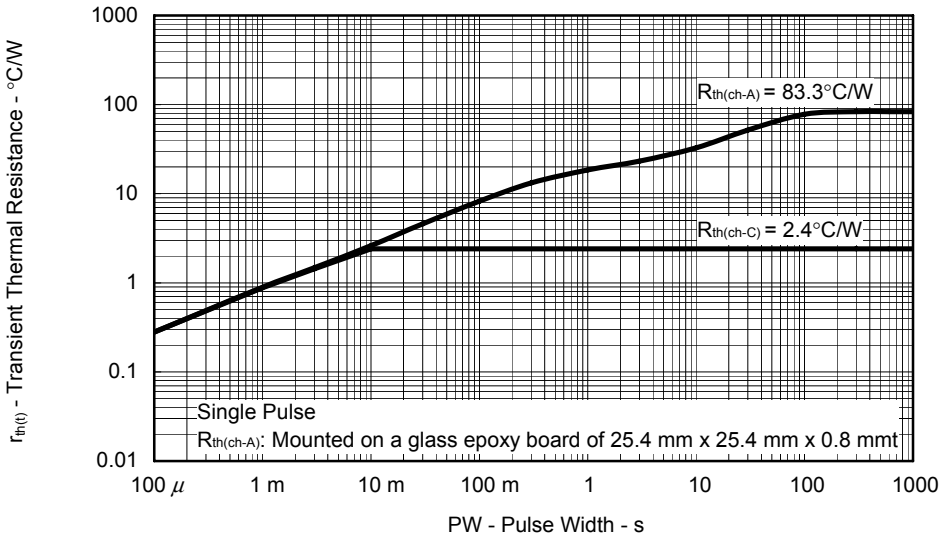
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



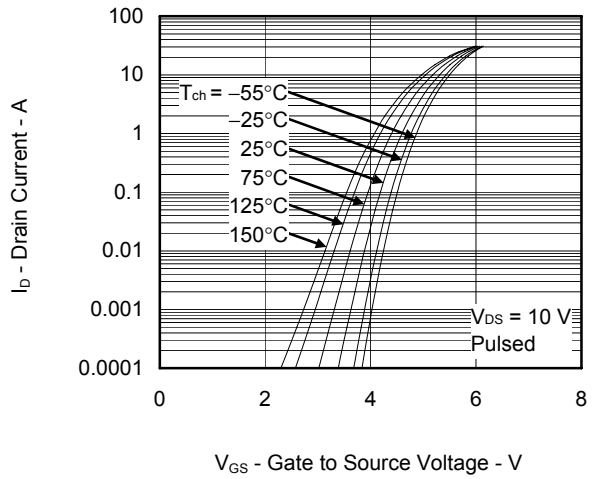

FORWARD BIAS SAFE OPERATING AREA



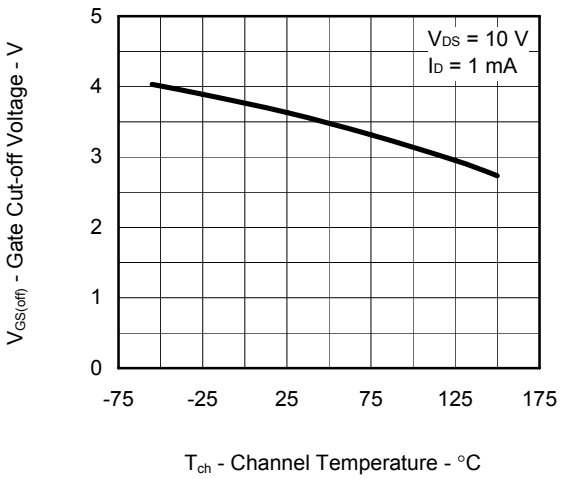

TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



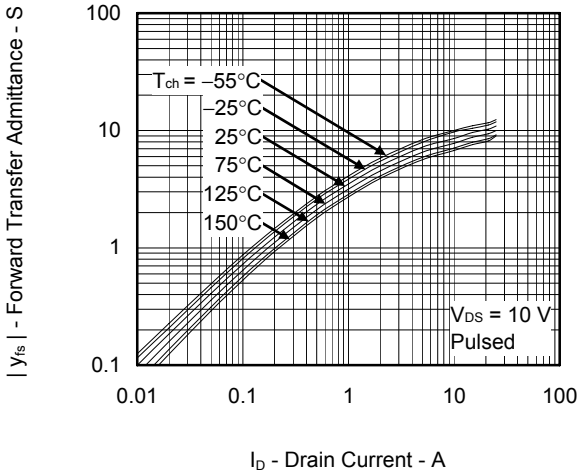

FORWARD TRANSFER CHARACTERISTICS



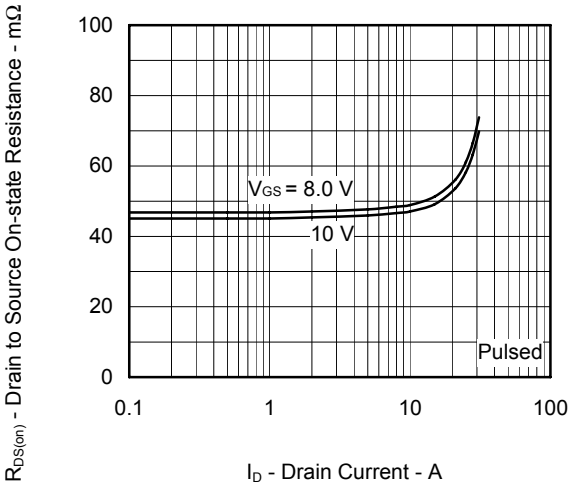

GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



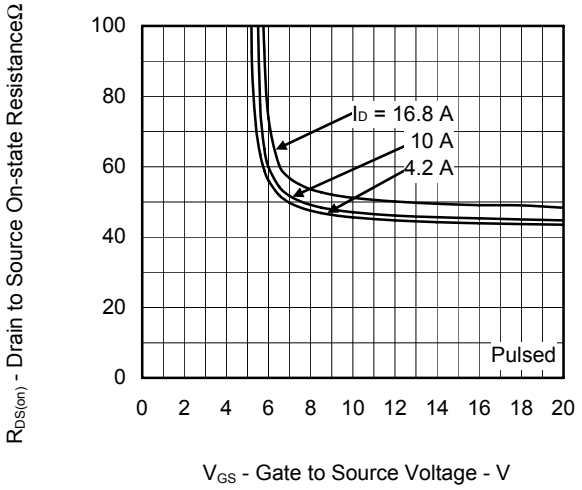
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



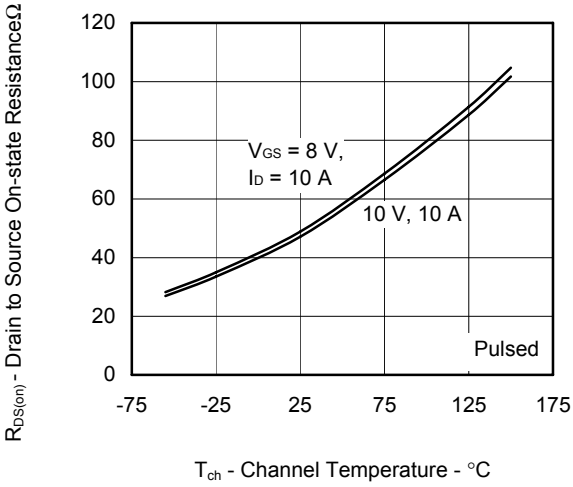

DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



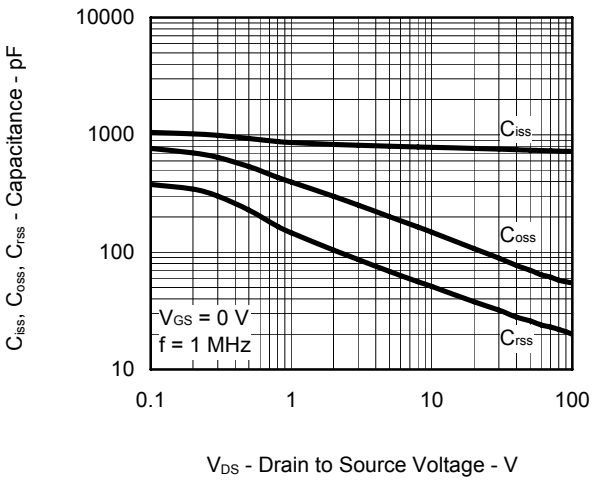

DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



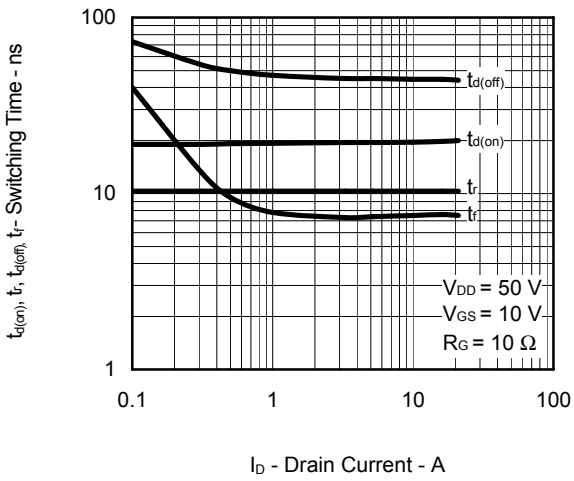

DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



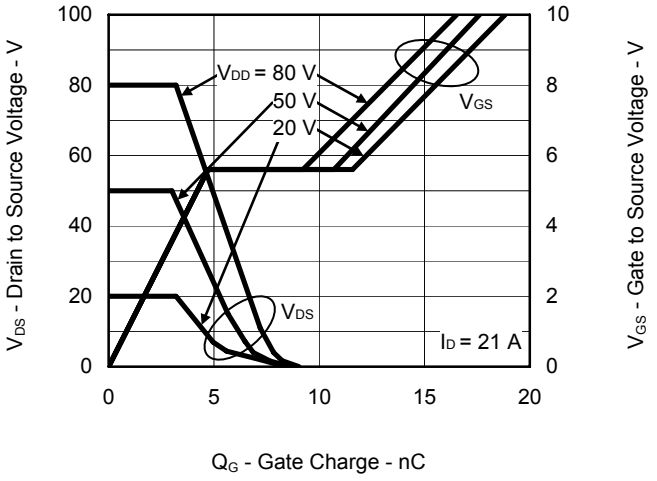

CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE




SWITCHING CHARACTERISTICS

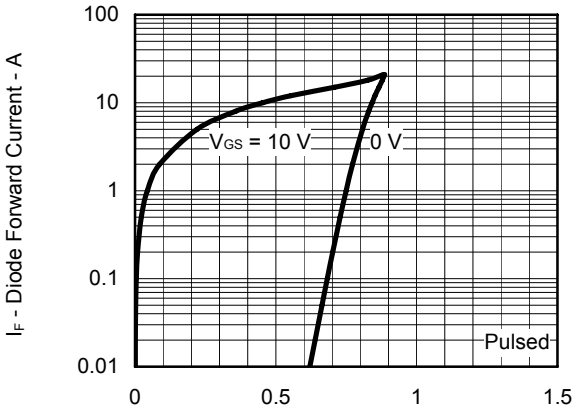


DYNAMIC INPUT/OUTPUT CHARACTERISTICS



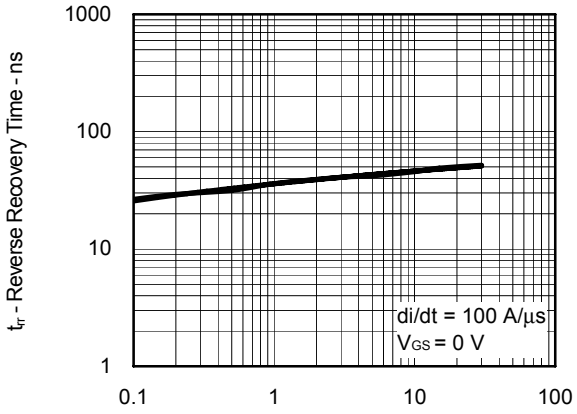

QG - Gate Charge - nC

SOURCE TO DRAIN DIODE FORWARD VOLTAGE



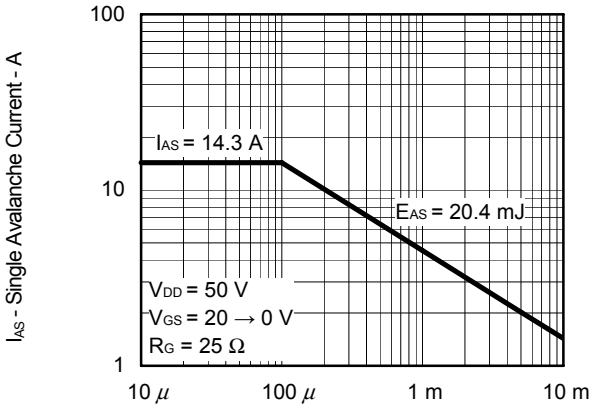

$V_{F(S-D)}$ - Source to Drain Voltage - V

REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT




IF - Diode Forward Current - A

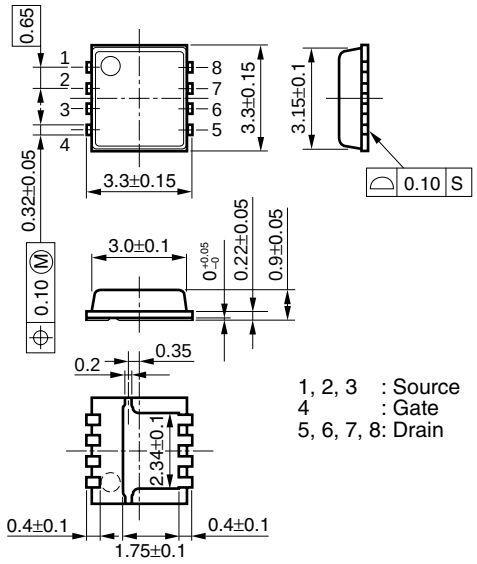
SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



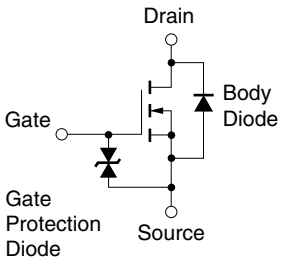

L - Inductive Load - H

## Package Drawings (Unit: mm)

### 8-pin HVSON (3333)




## Equivalent Circuit




**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

| Rev. | Date | Description | |
|---|---|---|---|
| | | Page | Summary |
| 1.00 | June 01, 2010 | – | First Eddition Issued |
| | | | |

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