To our customers,

## Old Company Name in Catalogs and Other Documents

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April 1st, 2010
Renesas Electronics Corporation

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RENESAS

# MOS FIELD EFFECT TRANSISTOR

# μPA1915

## P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

### DESCRIPTION

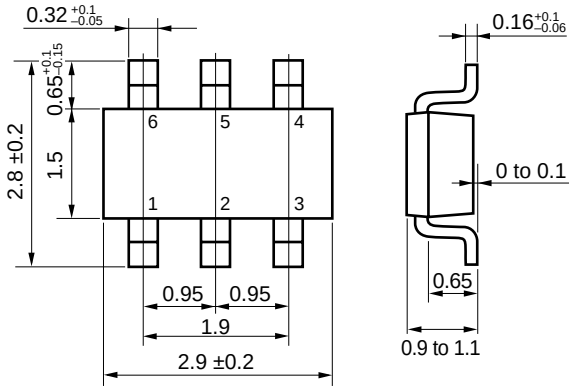
The μPA1915 is a switching device which can be driven directly by a 2.5-V power source.

The μPA1915 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

### FEATURES

- Can be driven by a 2.5-V power source
- Low on-state resistance
  - $R_{DS(on)1}$ = 55 mΩ MAX. ($V_{GS}$ = –4.5 V, $I_D$ = –2.5 A)
  - $R_{DS(on)2}$ = 58 mΩ MAX. ($V_{GS}$ = –4.0 V, $I_D$ = –2.5 A)
  - $R_{DS(on)3}$ = 82 mΩ MAX. ($V_{GS}$ = –2.7 V, $I_D$ = –2.5 A)
  - $R_{DS(on)4}$ = 90 mΩ MAX. ($V_{GS}$ = –2.5 V, $I_D$ = –2.5 A)

### PACKAGE DRAWING (Unit : mm)

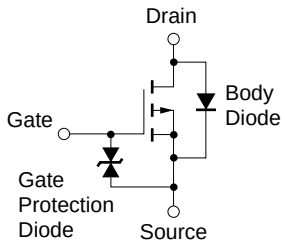



1, 2, 5, 6 : Drain
3 : Gate
4 : Source

### ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|---|---|
| μPA1915TE | SC-95 (Mini Mold Thin Type) |

### EQUIVALENT CIRCUIT




Marking: TH

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

| | | | |
|---|---|---|---|
| Drain to Source Voltage | $V_{DSS}$ | –20 | V |
| Gate to Source Voltage | $V_{GSS}$ | ±12 | V |
| Drain Current (DC) | $I_{D(DC)}$ | ±4.5 | A |
| Drain Current (pulse) Note1 | $I_{D(pulse)}$ | ±18 | A |
| Total Power Dissipation | $P_{T1}$ | 0.2 | W |
| Total Power Dissipation Note2 | $P_{T2}$ | 2 | W |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +150 | °C |

**Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1 %

**2.** Mounted on FR-4 Board, t ≤ 5 sec.

**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.

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Document No. G14761EJ2V0DS00 (2nd edition)
Date Published May 2001 NS CP(K)
Printed in Japan

The mark ★ shows major revised points.

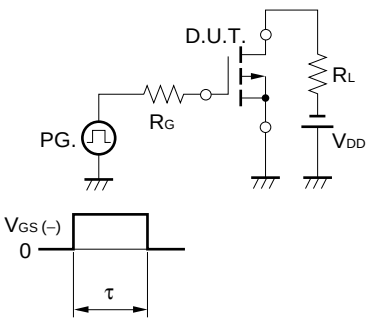
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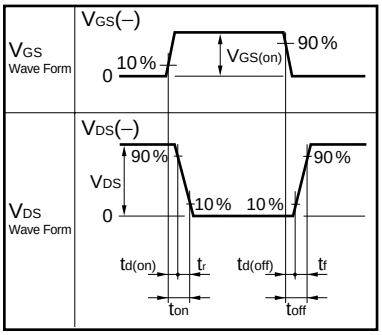
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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = –20 V, $V_{GS}$ = 0 V | | | –10 | μA |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±12 V, $V_{DS}$ = 0 V | | | ±10 | μA |
| Gate to Source Cut-off Voltage | $V_{GS(off)}$ | $V_{DS}$ = –10 V, $I_D$ = –1 mA | –0.5 | –1.1 | –1.5 | V |
| Forward Transfer Admittance | $\|y_{fs}\|$ | $V_{DS}$ = –10 V, $I_D$ = –2.5 A | 3 | 8.8 | | S |
| Drain to Source On-state Resistance | $R_{DS(on)1}$ | $V_{GS}$ = –4.5 V, $I_D$ = –2.5 A | | 45 | 55 | mΩ |
| | $R_{DS(on)2}$ | $V_{GS}$ = –4.0 V, $I_D$ = –2.5 A | | 47 | 58 | mΩ |
| | $R_{DS(on)3}$ | $V_{GS}$ = –2.7 V, $I_D$ = –2.5 A | | 61 | 82 | mΩ |
| | $R_{DS(on)4}$ | $V_{GS}$ = –2.5 V, $I_D$ = –2.5 A | | 67 | 90 | mΩ |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = –10 V | | 820 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$ = 0 V | | 210 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | f = 1 MHz | | 100 | | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = –10 V | | 16 | | ns |
| Rise Time | $t_r$ | $I_D$ = –2.5 A | | 14 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $V_{GS(on)}$ = –4.0 V | | 58 | | ns |
| Fall Time | $t_f$ | $R_G$ = 10 Ω | | 46 | | ns |
| Total Gate Charge | $Q_G$ | $V_{DD}$ = –16 V | | 5.0 | | nC |
| Gate to Source Charge | $Q_{GS}$ | $I_D$ = –4.5 A | | 2.0 | | nC |
| Gate to Drain Charge | $Q_{GD}$ | $V_{GS}$ = –4.0 V | | 2.5 | | nC |
| Diode Forward Voltage | $V_{F(S-D)}$ | $I_F$ = 4.5 A, $V_{GS}$ = 0 V | | 0.86 | | V |

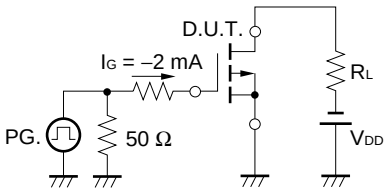
### TEST CIRCUIT 1 SWITCHING TIME




τ = 1 μs
Duty Cycle ≤ 1 %

### TEST CIRCUIT 2 GATE CHARGE

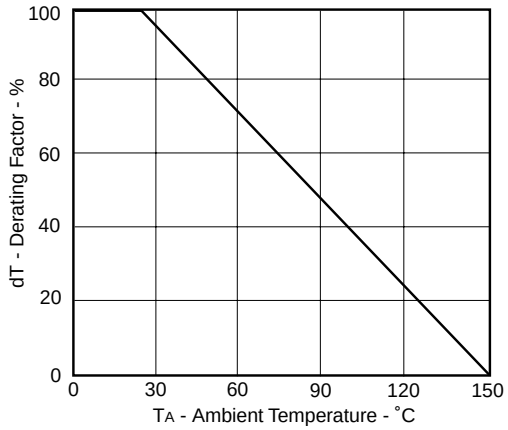




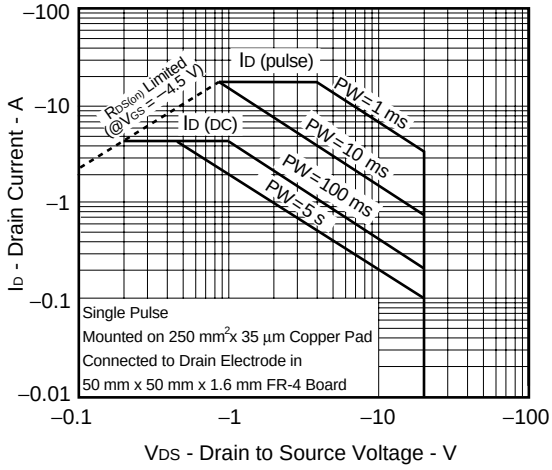

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## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

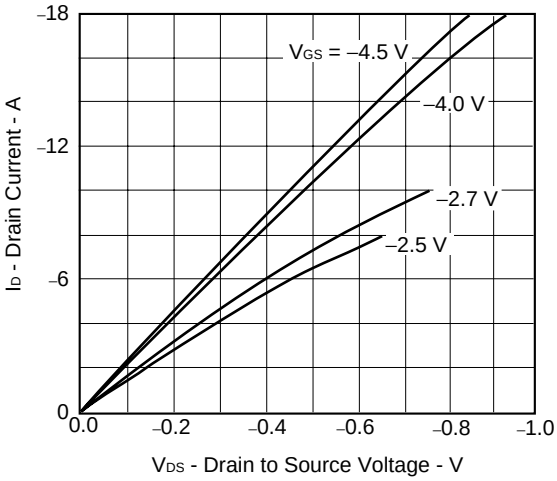
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



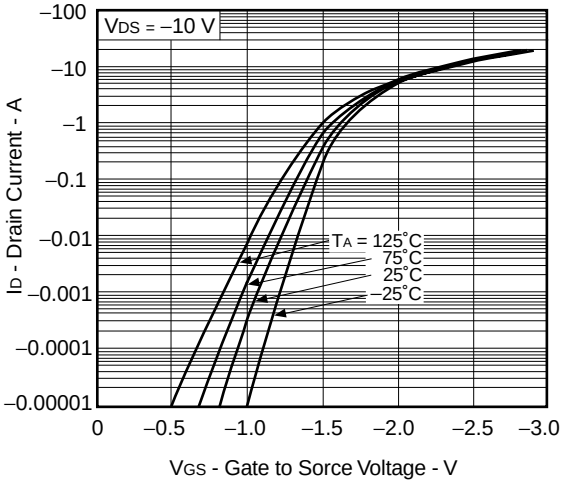

★ FORWARD BIAS SAFE OPERATING AREA



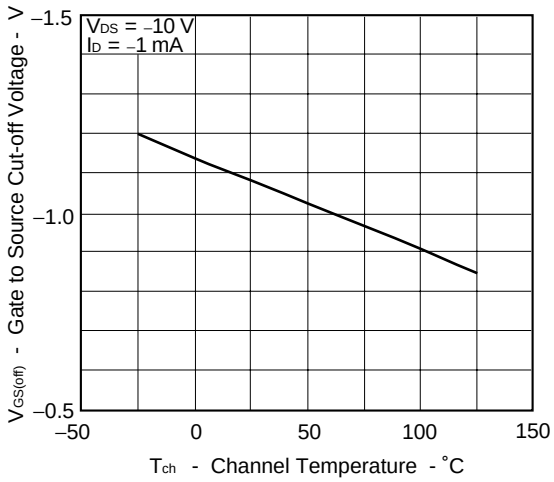

DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



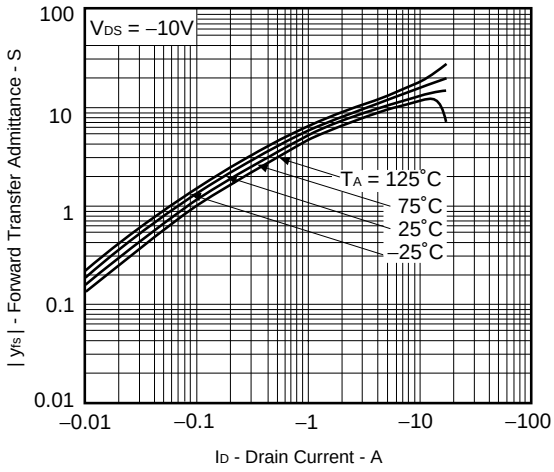

TRANSFER CHARACTERISTICS




GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



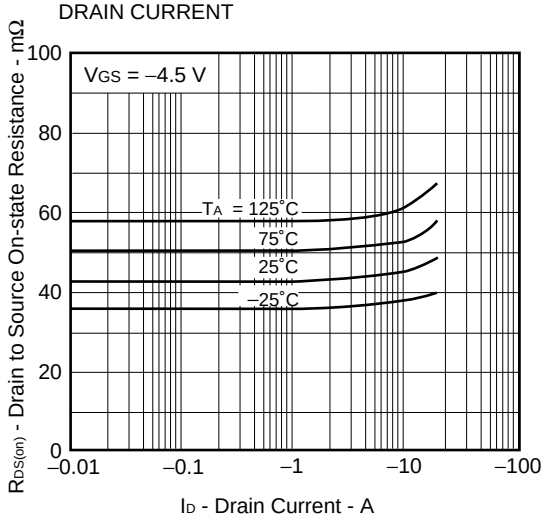

FORWARD TRANSFER ADMITTANCE Vs. DRAIN CURRENT



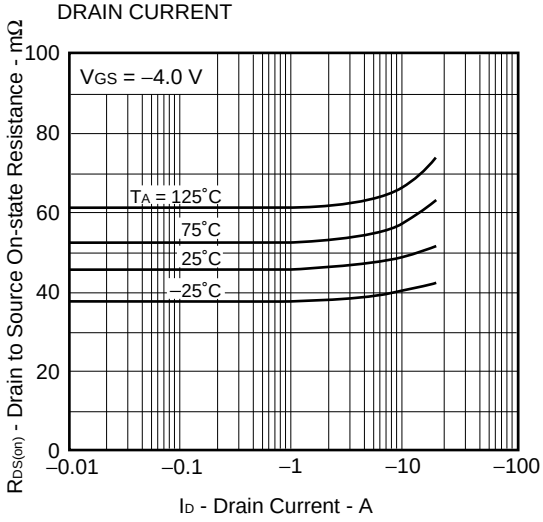



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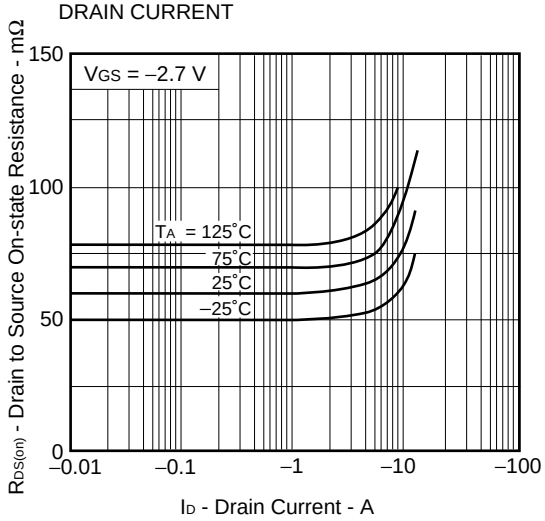
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



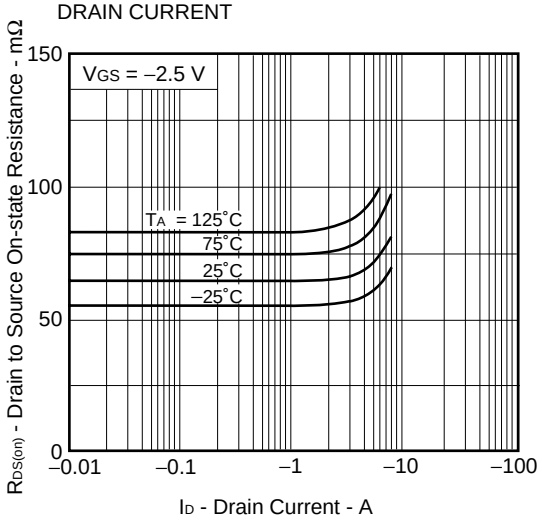

DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



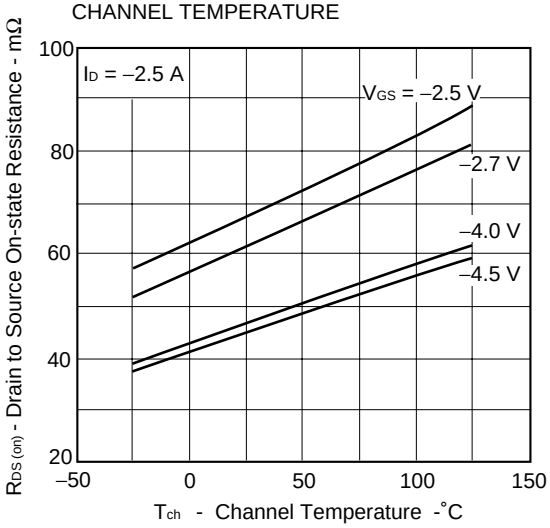

DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



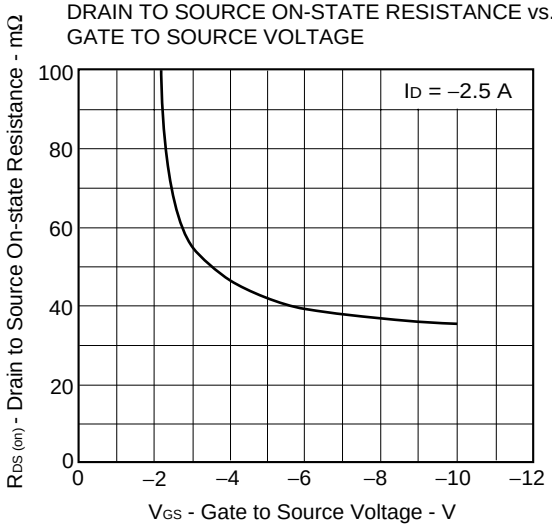

DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT




DRAIN TO SOURCE ON STATE RESISTANCE vs. CHANNEL TEMPERATURE



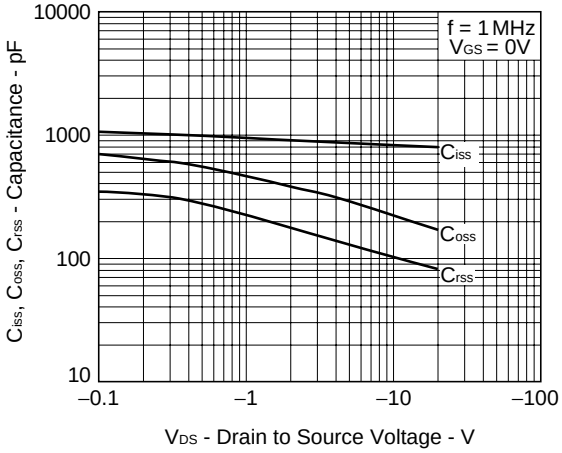

DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



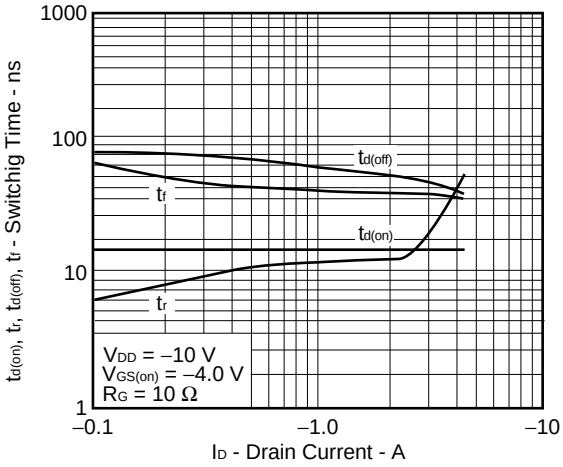



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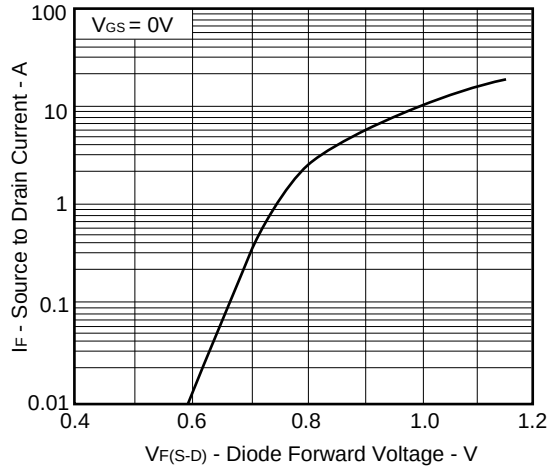
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



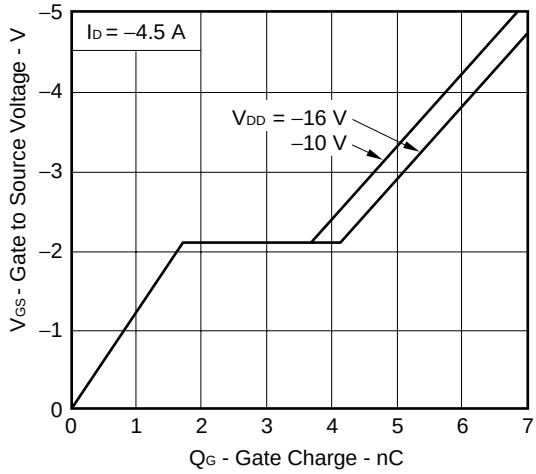

SWITCHING CHARACTERISTICS



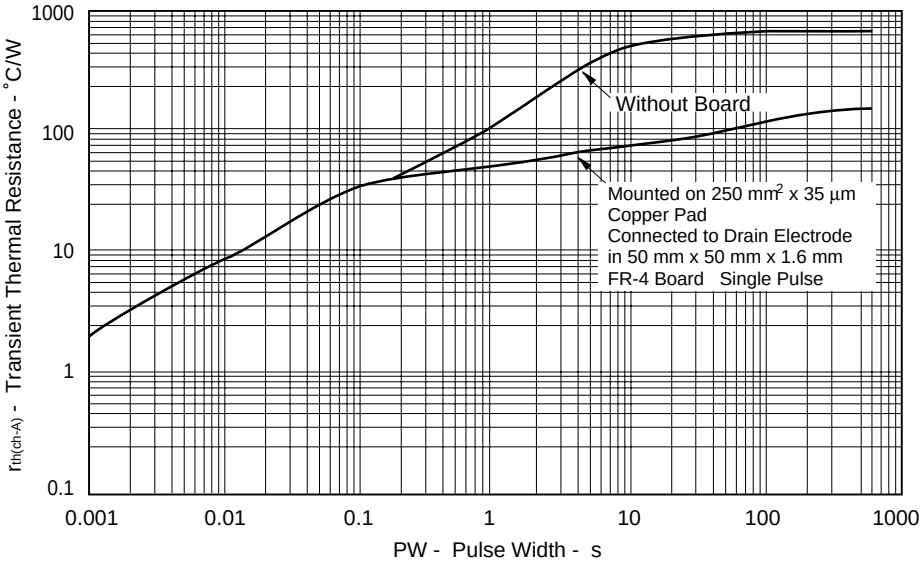

SOURCE TO DRAIN DIODE FORWARD VOLTAGE




DYNAMIC INPUT CHARACTERISTICS




★ TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH






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