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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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4AM11

Silicon N-Channel/P-Channel Power MOS FET Array



ADE-208-1209 (Z)
1st. Edition
Mar. 2001

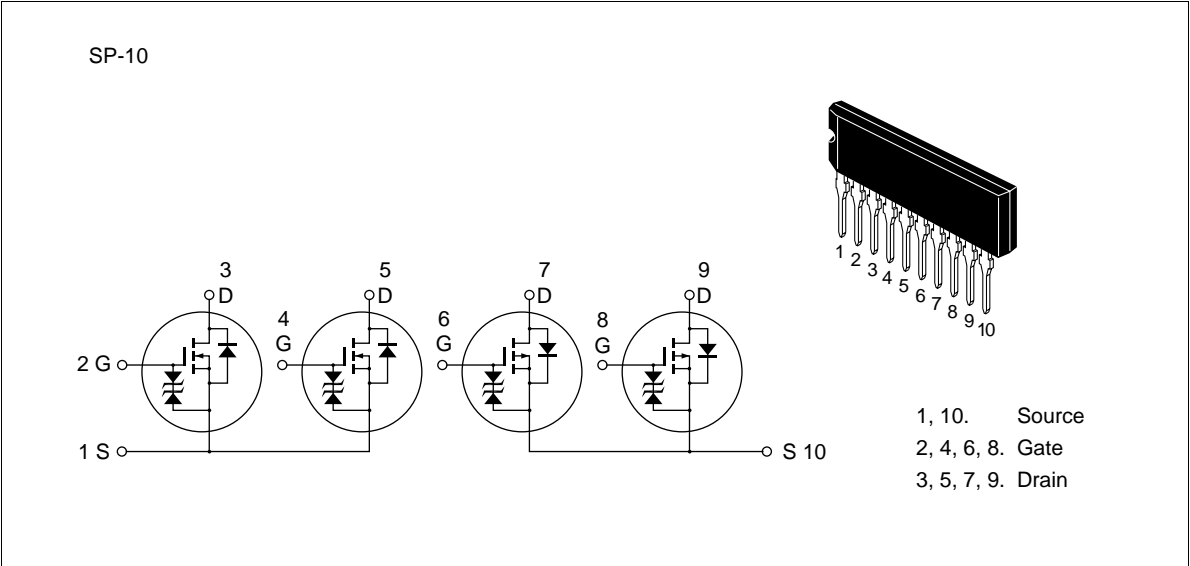
Application

High speed power switching

Features

- Low on-resistance
N-channel: $R_{DS(on)} \leq 0.17$, $V_{GS} = 10$ V, $I_D = 2.5$ A
P-channel: $R_{DS(on)} \leq 0.2$, $V_{GS} = -10$ V, $I_D = -2.5$ A
- Capable of 4 V gate drive
- Low drive current
- High speed switching
- High density mounting
- Suitable for H-bridged motor driver

Outline



Absolute Maximum Ratings (Ta = 25°C) (1 Unit)

| Item | Symbol | Rating | | Unit |
|---|-----------------------------------|-------------|-----|------|
| | | Nch | Pch | |
| Drain to source voltage | V_{DSS} | 60 | -60 | V |
| Gate to source voltage | V_{GSS} | ±20 | ±20 | V |
| Drain current | I_D | 5 | -5 | A |
| Drain peak current | $I_{D(pulse)}^{*1}$ | 20 | -20 | A |
| Body to drain diode reverse drain current | I_{DR} | 5 | -5 | A |
| Channel dissipation | $P_{ch} (T_c = 25^{\circ}C)^{*2}$ | 28 | | W |
| Channel dissipation | P_{ch}^{*2} | 4 | | W |
| Channel temperature | T_{ch} | 150 | | °C |
| Storage temperature | T_{stg} | -55 to +150 | | °C |

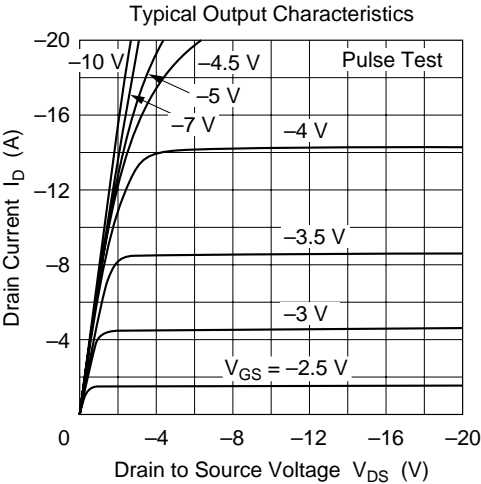
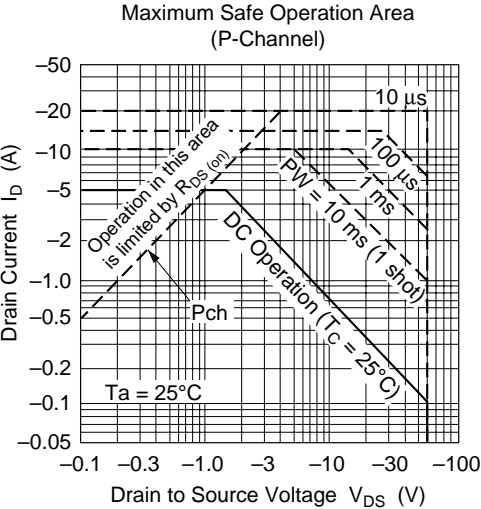
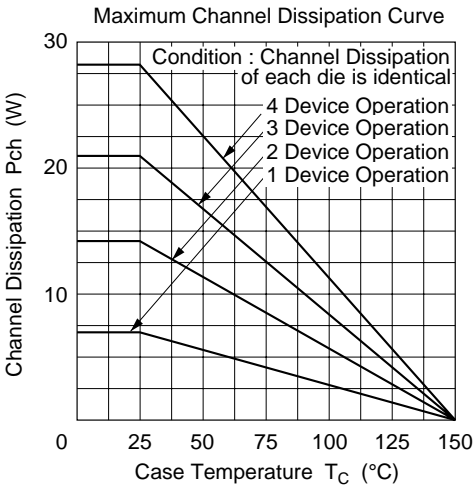
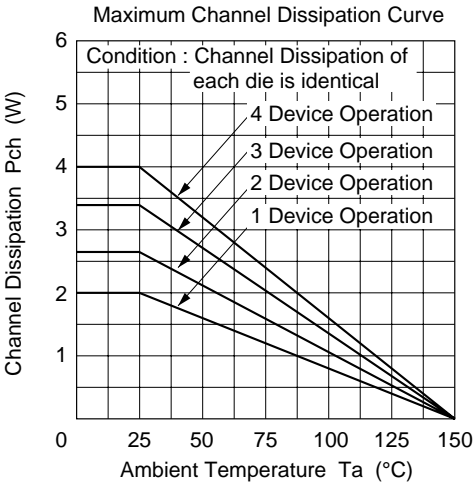
Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$
2. 4 Devices operation

Electrical Characteristics (Ta = 25°C) (1 Unit)

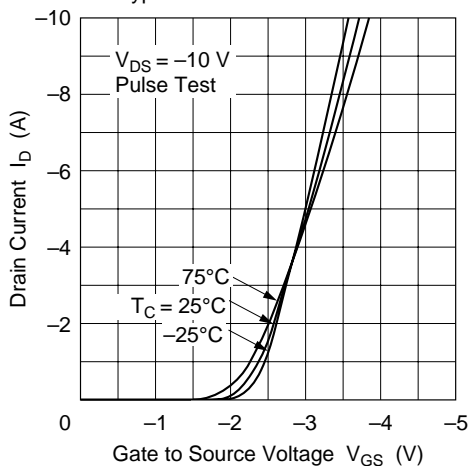
| Item | Symbol | N channel | | | P channel | | | Unit | Test conditions |
|--|---------------|-----------|------|------|-----------|------|------|------|---|
| | | Min | Typ | Max | Min | Typ | Max | | |
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 60 | — | — | −60 | — | — | V | $I_D = 10 \text{ mA}$, $V_{GS} = 0$ |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ±20 | — | — | ±20 | — | — | V | $I_G = \pm 100 \text{ } \mu\text{A}$, $V_{DS} = 0$ |
| Gate to source leak current | I_{GSS} | — | — | ±10 | — | — | ±10 | μA | $V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$ |
| Zero gate voltage drain current | I_{DSS} | — | — | 250 | — | — | −250 | μA | $V_{DS} = 50 \text{ V}$, $V_{GS} = 0$ |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.0 | — | 2.0 | −1.0 | — | −2.0 | V | $I_D = 1 \text{ mA}$, $V_{DS} = 10 \text{ V}$ |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.13 | 0.17 | — | 0.15 | 0.2 | Ω | $I_D = 2.5 \text{ A}$, $V_{GS} = 10 \text{ V}^{*1}$ |
| | | — | 0.18 | 0.24 | — | 0.20 | 0.27 | Ω | $I_D = 2.5 \text{ A}$, $V_{GS} = 4 \text{ V}^{*1}$ |
| Forward transfer admittance | $ y_{fs} $ | 2.7 | 4.5 | — | 2.7 | 5.0 | — | S | $I_D = 2.5 \text{ A}$, $V_{DS} = 10 \text{ V}^{*1}$ |
| Input capacitance | C_{iss} | — | 400 | — | — | 900 | — | pF | $V_{DS} = 10 \text{ V}$, $V_{GS} = 0$, $f = 1 \text{ MHz}$ |
| Output capacitance | C_{oss} | — | 220 | — | — | 460 | — | pF | |
| Reverse transfer capacitance | C_{rss} | — | 60 | — | — | 130 | — | pF | |
| Turn-on delay time | $t_{d(on)}$ | — | 5 | — | — | 8 | — | ns | $I_D = 2.5 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_L = 12 \text{ } \Omega$ |
| Rise time | t_r | — | 30 | — | — | 35 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 170 | — | — | 180 | — | ns | |
| Fall time | t_f | — | 75 | — | — | 85 | — | ns | |
| Body to drain diode forward voltage | V_{DF} | — | 1.0 | — | — | −1.0 | — | V | $I_F = 5 \text{ A}$, $V_{GS} = 0$ |
| Body to drain diode reverse recovery time | t_{rr} | — | 100 | — | — | 170 | — | μs | $I_F = 5 \text{ A}$, $V_{GS} = 0$, $dI_F/dt = 50 \text{ A}/\mu\text{s}$ |

Note: 1. Pulse Test

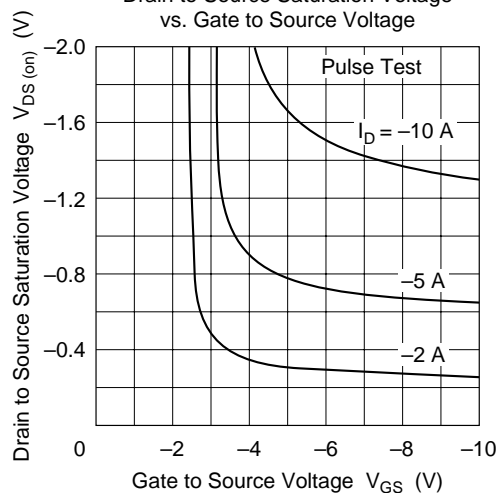
Polarity of test conditions for P channel device is reversed.



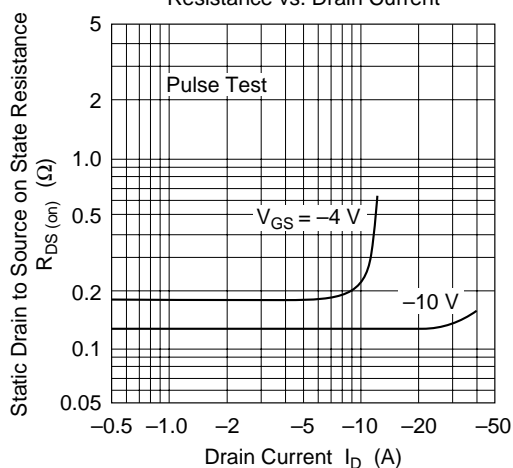
Typical Transfer Characteristics



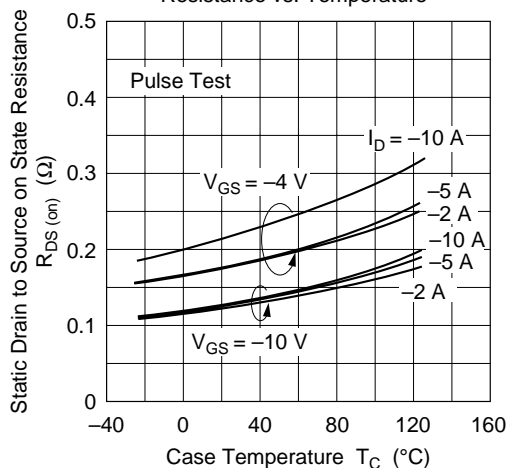
Drain to Source Saturation Voltage vs. Gate to Source Voltage



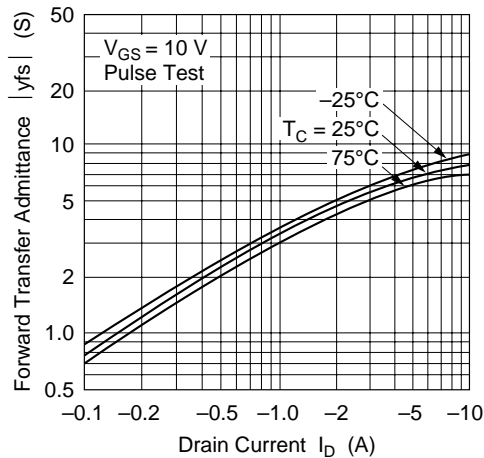
Static Drain to Source on State Resistance vs. Drain Current



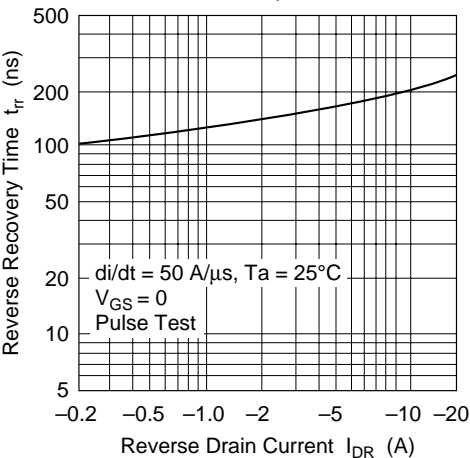
Static Drain to Source on State Resistance vs. Temperature



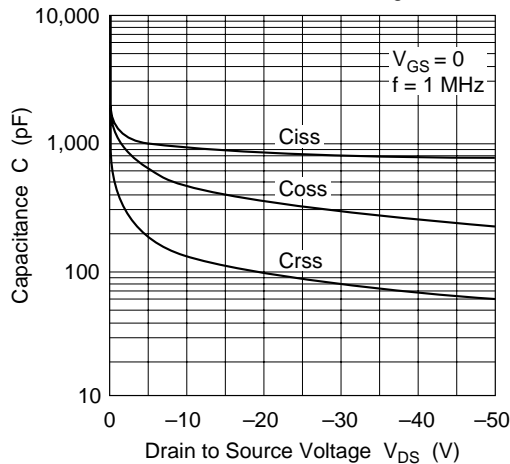
Forward Transfer Admittance
vs. Drain Current



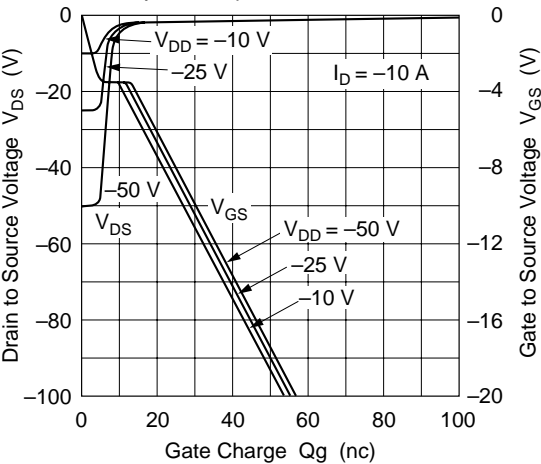
Body to Drain Diode Reverse
Recovery Time

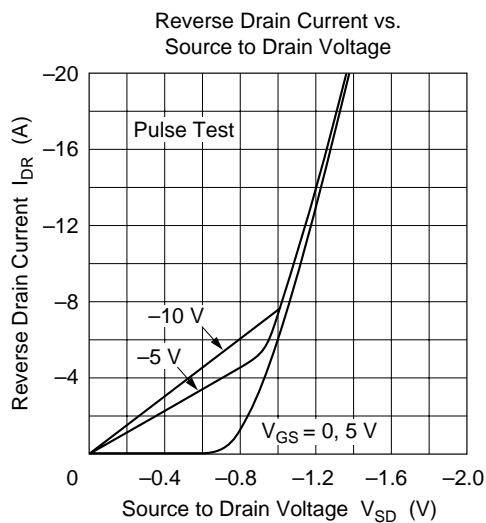
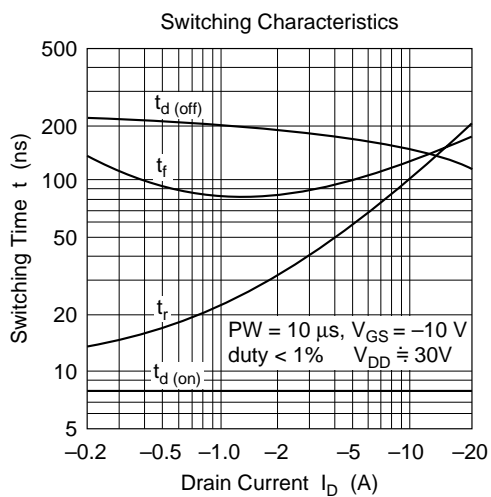


Typical Capacitance vs.
Drain to Source Voltage

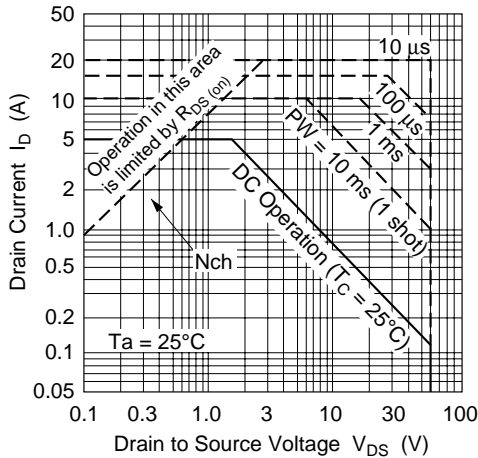


Dynamic Input Characteristics

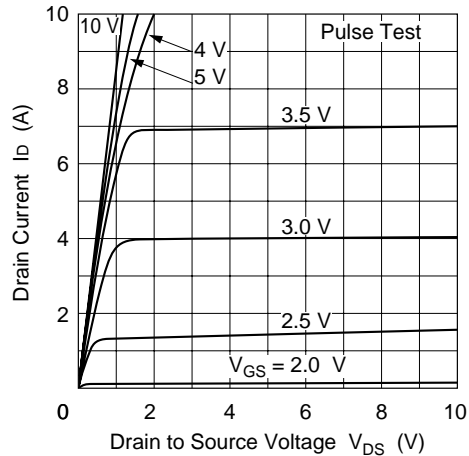




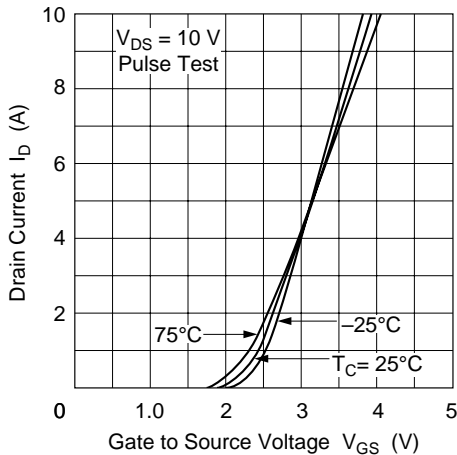
Maximum Safe Operation Area
(N-Channel)



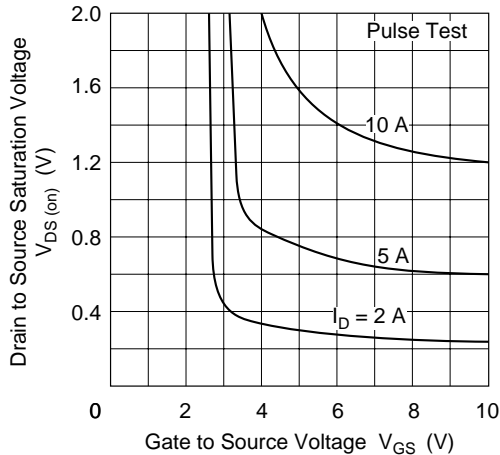
Typical Output Characteristics



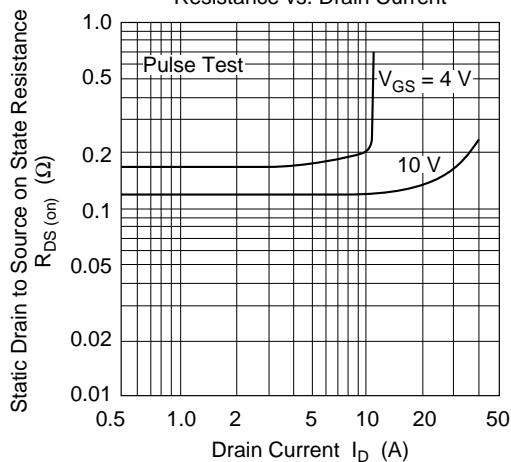
Typical Transfer Characteristics



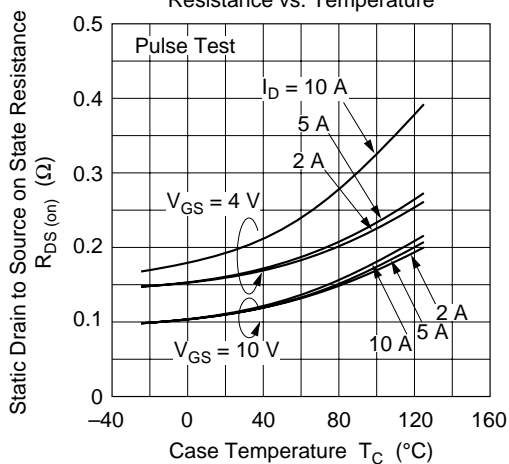
Drain to Source Saturation Voltage
vs. Gate to Source Voltage



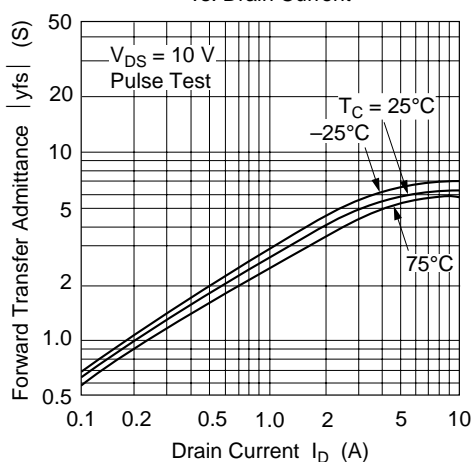
Static Drain to Source on State
Resistance vs. Drain Current



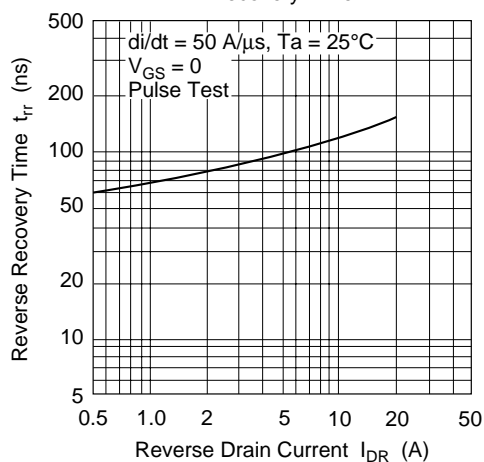
Static Drain to Source on State
Resistance vs. Temperature



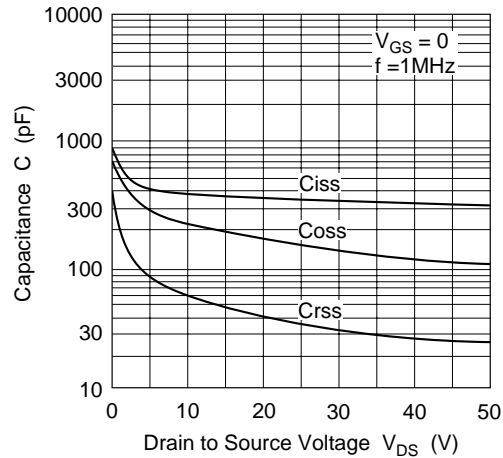
Forward Transfer Admittance
vs. Drain Current



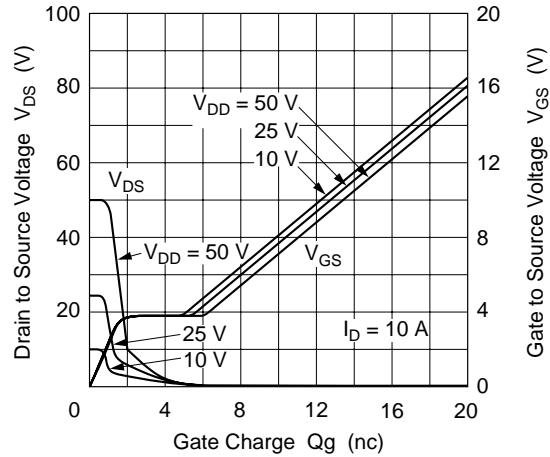
Body to Drain Diode Reverse
Recovery Time



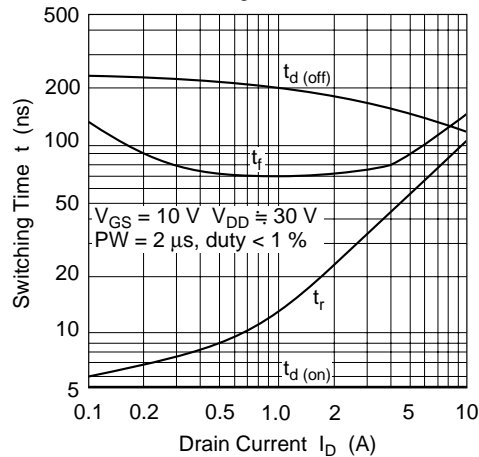
Typical Capacitance vs.
Drain to Source Voltage



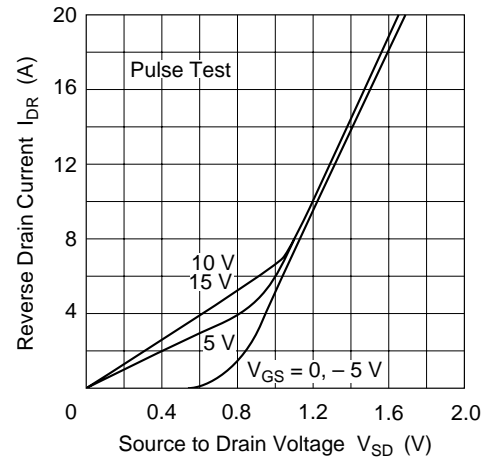
Dynamic Input Characteristics



Switching Characteristics



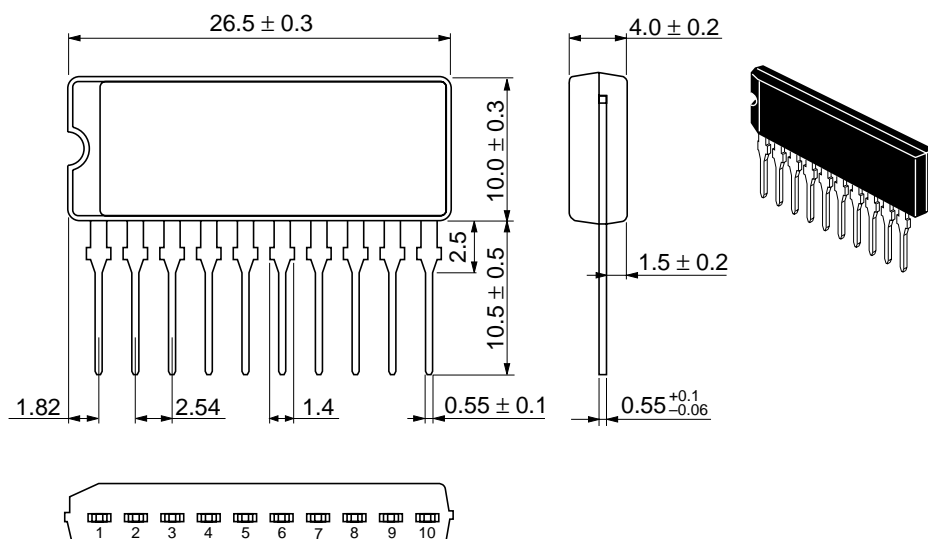
Reverse Drain Current vs.
Source to Drain Voltage



Package Dimensions

As of January, 2001

Unit: mm



| | |
|------------------------|-------|
| Hitachi Code | SP-10 |
| JEDEC | — |
| EIAJ | — |
| Mass (reference value) | 2.9 g |

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