

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MOS FIELD EFFECT TRANSISTOR N0300N

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The N0300N is a switching device which can be driven directly by a 4.5 V power source.

The device 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

- 4.5 V drive available
- Low on-state resistance
 $R_{DS(on)1} = 50 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 2.0 \text{ A)}$
 $R_{DS(on)2} = 83 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 2.0 \text{ A)}$
- Built-in gate protection diode

ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------------------------|-----------------------------|
| N0300N-T1B-AT ^{Note} | SC-96 (Mini Mold Thin Type) |

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

Marking: XY

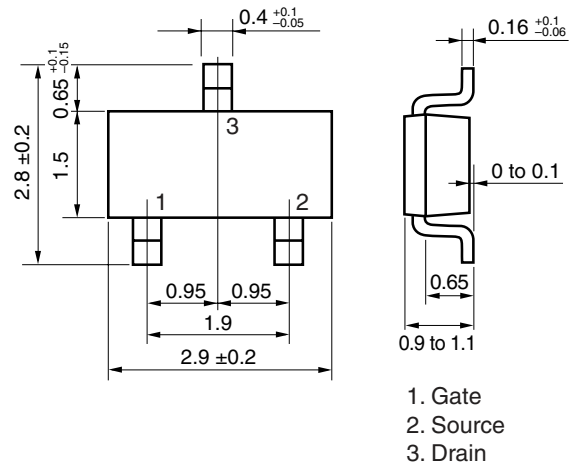
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| | | | |
|---|-----------------------|-------------|----|
| 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) | 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} | 1.25 | W |
| Channel Temperature | T _{ch} | 150 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

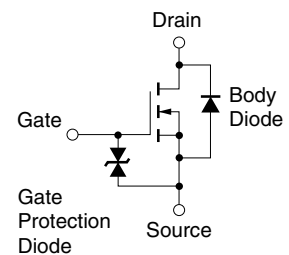
- Notes**
1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 2. Mounted on FR-4 board of 50 mm x 50 mm x 1.6 mm, $t \leq 5 \text{ sec}$

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.

PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT



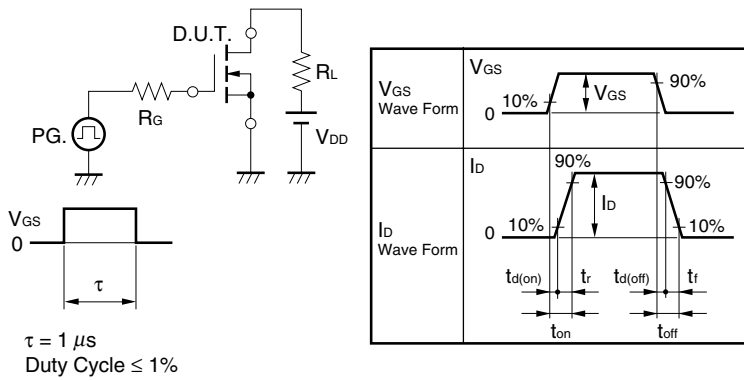
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

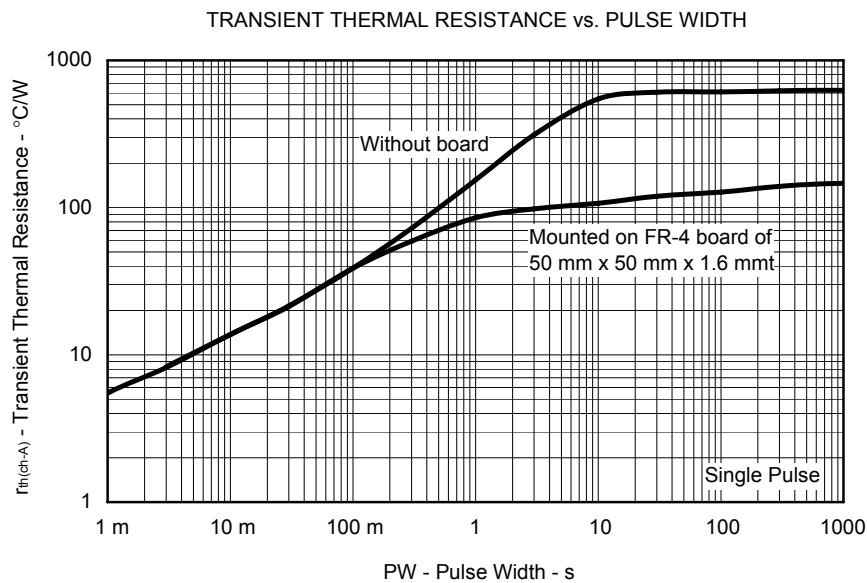
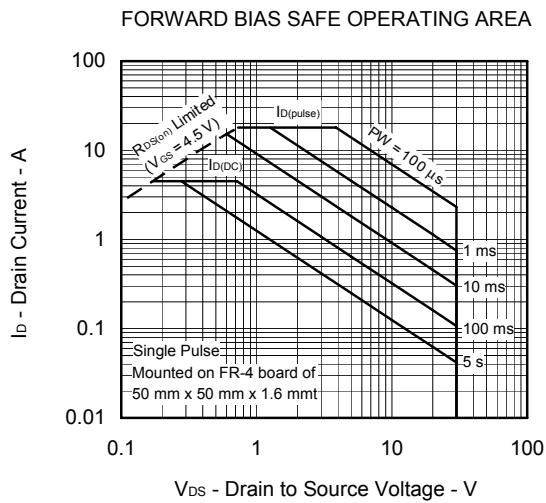
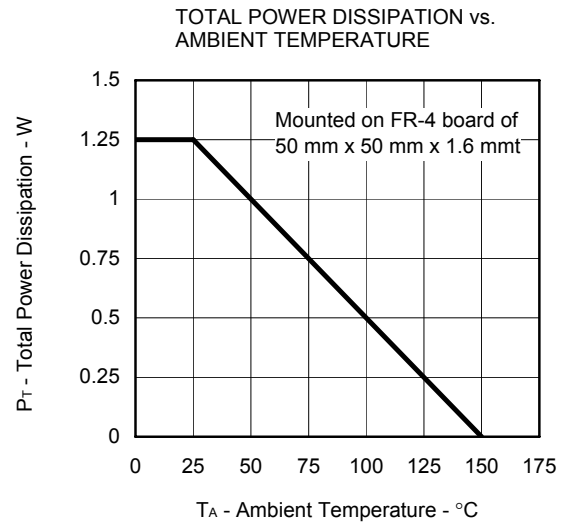
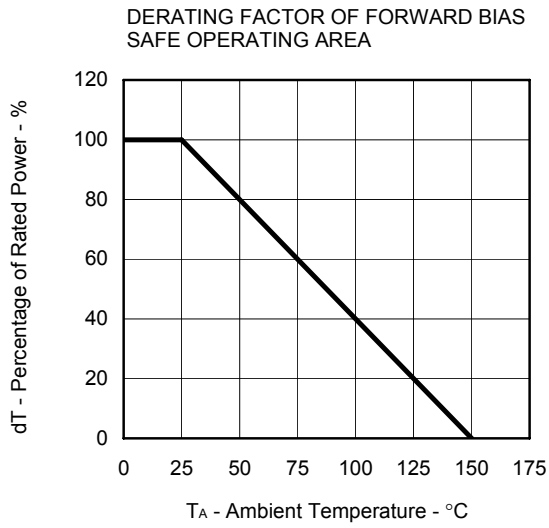
| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|----------------------|--|------|------|------|------|
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 30 V, V _{GS} = 0 V | | | 1 | μA |
| Gate Leakage Current | I _{GSS} | V _{GS} = ±16 V, V _{DS} = 0 V | | | ±10 | μA |
| Gate to Source Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1.0 mA | 1.0 | | 2.5 | V |
| Forward Transfer Admittance ^{Note} | y _{fs} | V _{DS} = 10 V, I _D = 2.0 A | 1.0 | | | S |
| Drain to Source On-state Resistance ^{Note} | R _{DS(on)1} | V _{GS} = 10 V, I _D = 2.0 A | | 38 | 50 | mΩ |
| | R _{DS(on)2} | V _{GS} = 4.5 V, I _D = 2.0 A | | 48 | 83 | mΩ |
| Input Capacitance | C _{iss} | V _{DS} = 10 V, | | 350 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V, | | 65 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1.0 MHz | | 30 | | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 15 V, I _D = 2.0 A, | | 6.5 | | ns |
| Rise Time | t _r | V _{GS} = 10 V, | | 3.0 | | ns |
| Turn-off Delay Time | t _{d(off)} | R _G = 6 Ω | | 16.5 | | ns |
| Fall Time | t _f | | | 3.0 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 24 V, V _{GS} = 10 V, I _D = 4.5 A | | 7.4 | | nC |
| Body Diode Forward Voltage ^{Note} | V _{F(S-D)} | I _F = 4.5 A, V _{GS} = 0 V | | 0.9 | | V |

Note Pulsed

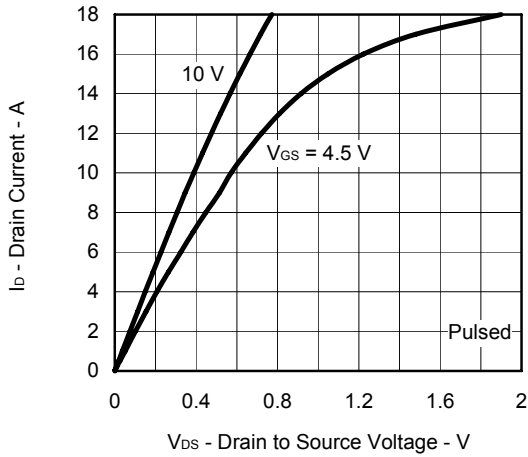
TEST CIRCUIT SWITCHING TIME



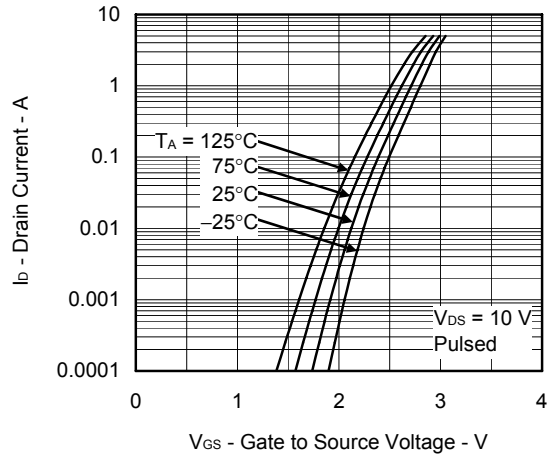
TYPICAL CHARACTERISTICS (T_A = 25°C)



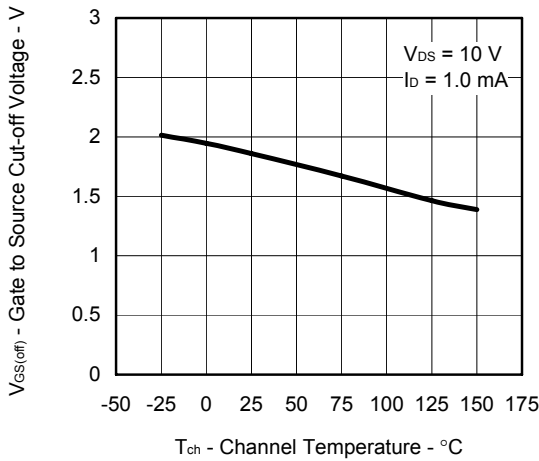
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



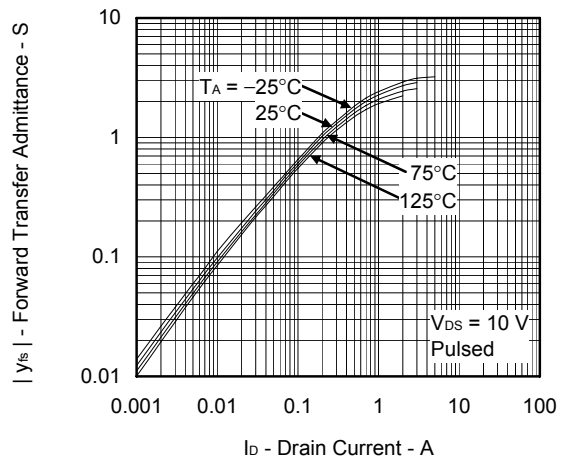
FORWARD TRANSFER CHARACTERISTICS



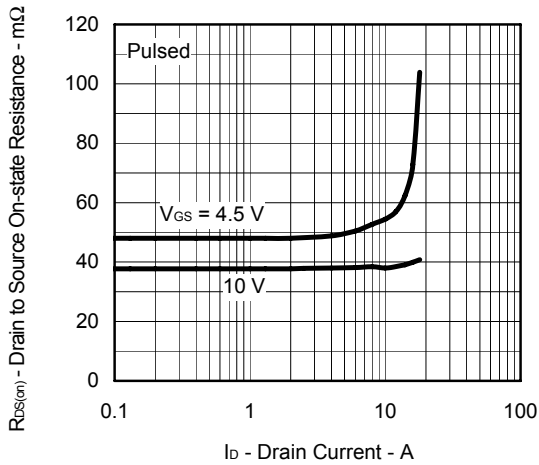
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



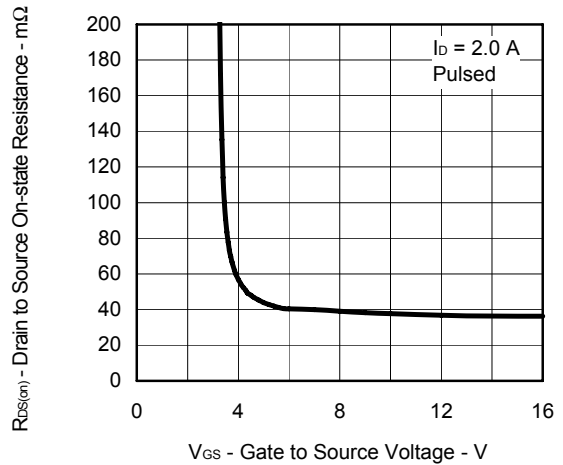
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



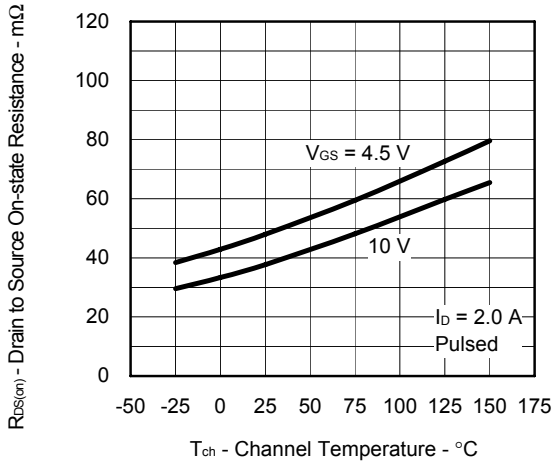
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



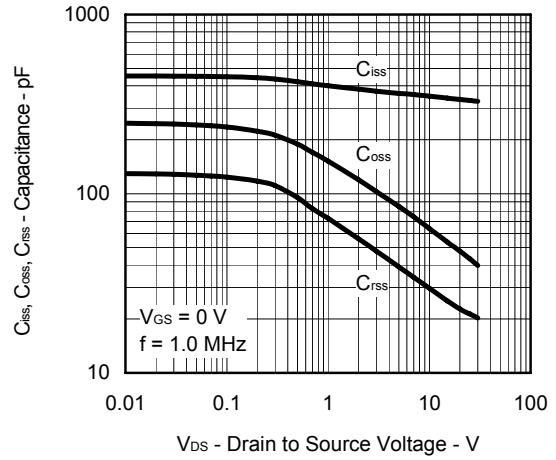
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



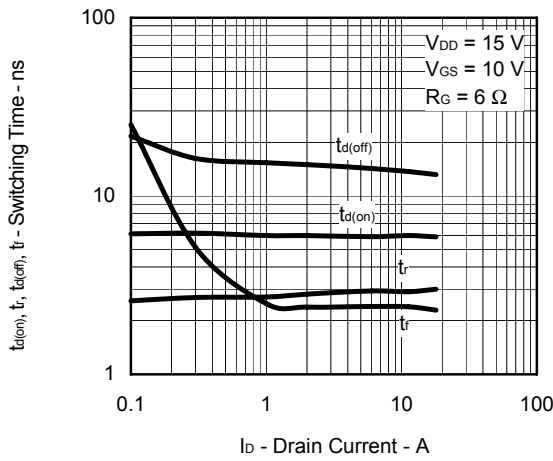
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



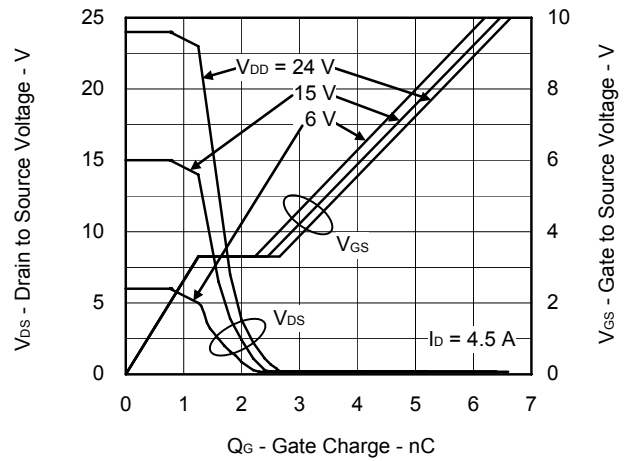
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



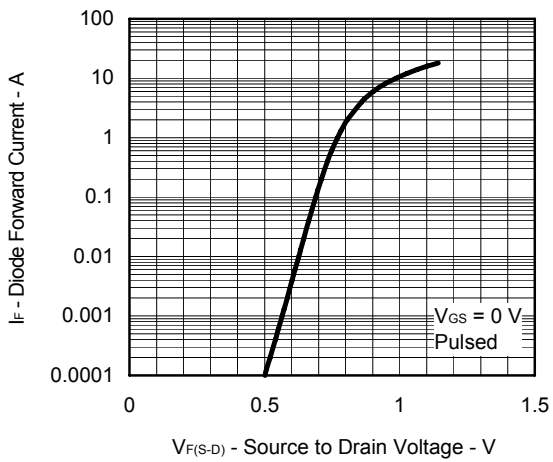
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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