

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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SWITCHING
N-CHANNEL MOSFET

DESCRIPTION

The N2500N is N-channel MOS Field Effect Transistor designed for DC-DC converter and 2.5 V drive switching applications.

FEATURES

- 2.5 V drive available
- Low on-state resistance
 $R_{DS(on)1} = 5.8 \Omega$ MAX. ($V_{GS} = 4.5$ V, $I_D = 0.25$ A)
 $R_{DS(on)2} = 6.6 \Omega$ MAX. ($V_{GS} = 2.5$ V, $I_D = 0.25$ A)
- Low input capacitance
 $C_{iss} = 145$ pF TYP.
- Small and surface mount package (SC-96)
- Built-in gate protection diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
N2500N-T1B-AT ^{Note}	SC-96 (Mini Mold Thin Type)
N2500N-T2B-AT ^{Note}	

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

Marking: YA

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage ($V_{GS} = 0$ V)	V_{DSS}	250	V
Gate to Source Voltage ($V_{DS} = 0$ V)	V_{GSS}	± 12	V
Drain Current (DC) ($T_A = 25^\circ\text{C}$)	$I_{D(DC)}$	± 0.5	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 2.0	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	0.2	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$) ^{Note2}	P_{T2}	1.25	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Notes 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

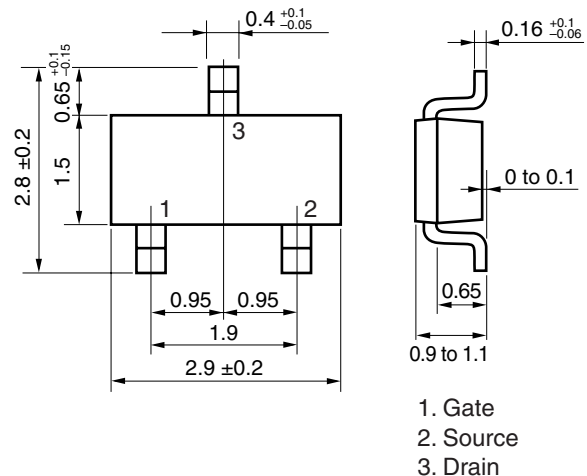
2. Mounted on FR-4 board of 50 mm x 50 mm x 1.6 mm, $t \leq 5$ sec

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.

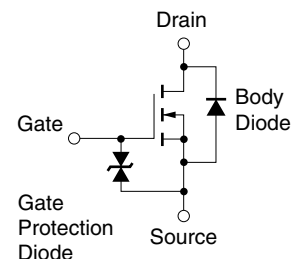
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PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT

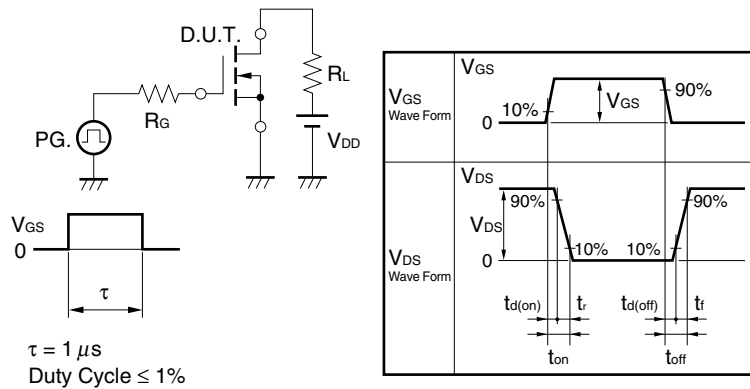


ELECTRICAL CHARACTERISTICS (TA = 25°C)

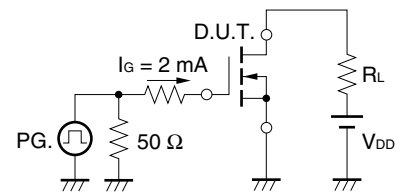
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
Gate to Source Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1.0\text{ mA}$	0.5	1.0	1.5	V
Forward Transfer Admittance <small>Note</small>	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 0.25\text{ A}$	0.8			S
Drain to Source On-state Resistance <small>Note</small>	$R_{DS(on)1}$	$V_{GS} = 4.5\text{ V}, I_D = 0.25\text{ A}$		4.2	5.8	Ω
	$R_{DS(on)2}$	$V_{GS} = 2.5\text{ V}, I_D = 0.25\text{ A}$		4.3	6.6	Ω
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V},$		145		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V},$		17		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1.0\text{ MHz}$		5		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 125\text{ V}, I_D = 0.25\text{ A},$		7		ns
Rise Time	t_r	$V_{GS} = 4.5\text{ V},$		12		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		22		ns
Fall Time	t_f			35		ns
Total Gate Charge	Q_G	$V_{DD} = 200\text{ V},$		4.7		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 4.5\text{ V},$		0.4		nC
Gate to Drain Charge	Q_{GD}	$I_D = 0.5\text{ A}$		2.5		nC
Body Diode Forward Voltage <small>Note</small>	$V_{F(S-D)}$	$I_F = 0.5\text{ A}, V_{GS} = 0\text{ V}$		0.82	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 0.5\text{ A}, V_{GS} = 0\text{ V},$		45		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}$		36		nC

Note Pulsed

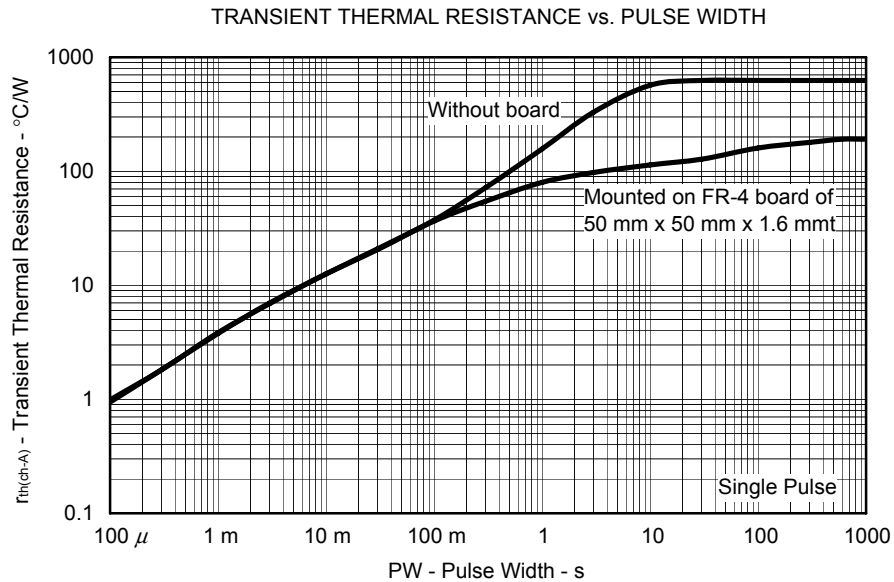
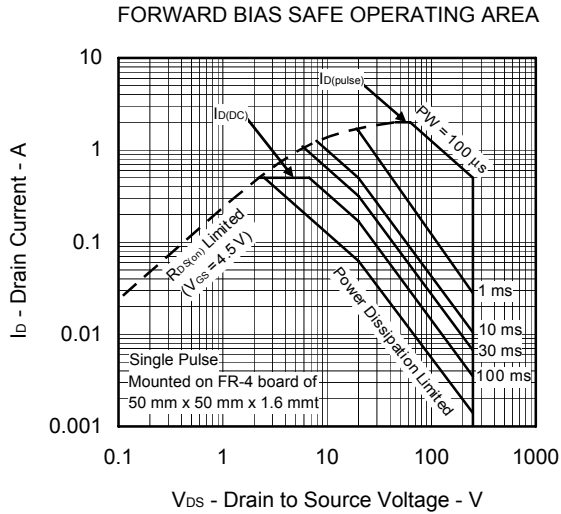
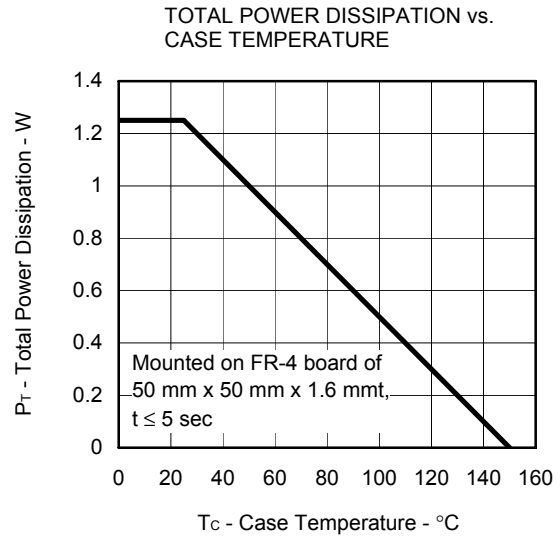
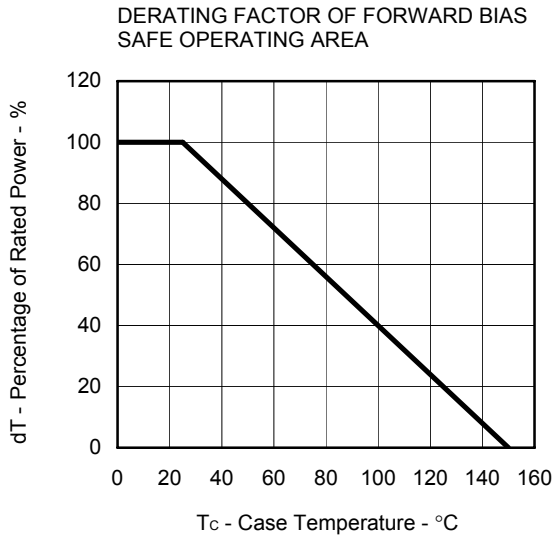
TEST CIRCUIT 1 SWITCHING TIME



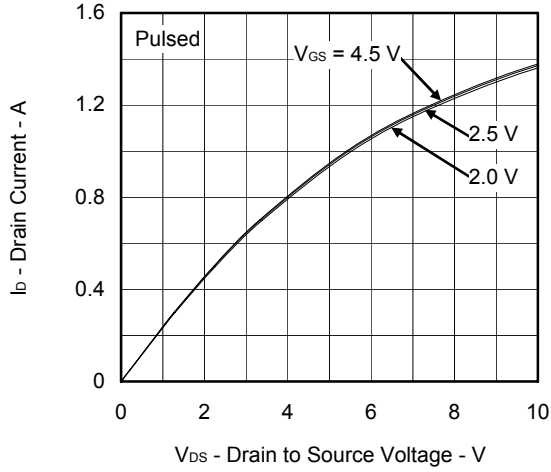
TEST CIRCUIT 2 GATE CHARGE



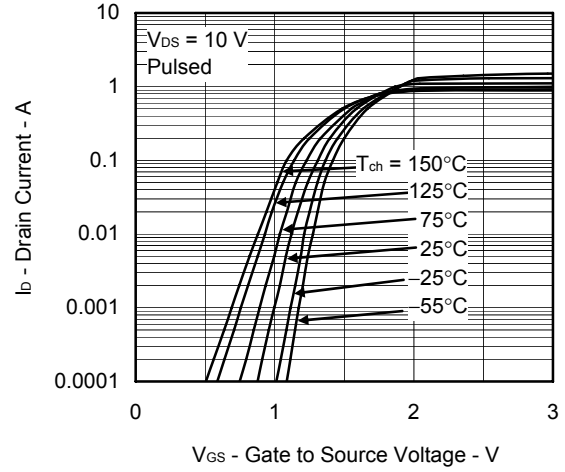
TYPICAL CHARACTERISTICS (T_A = 25°C)



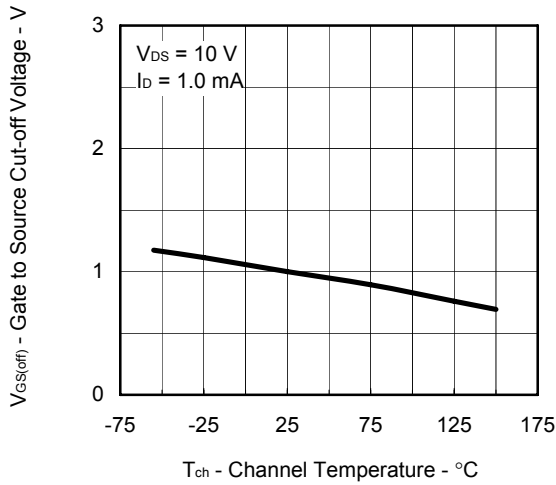
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



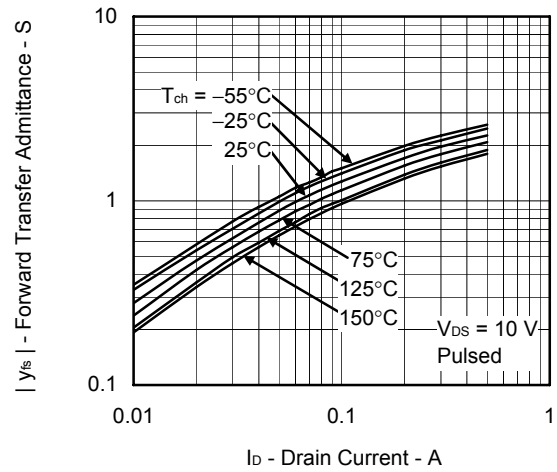
FORWARD TRANSFER CHARACTERISTICS



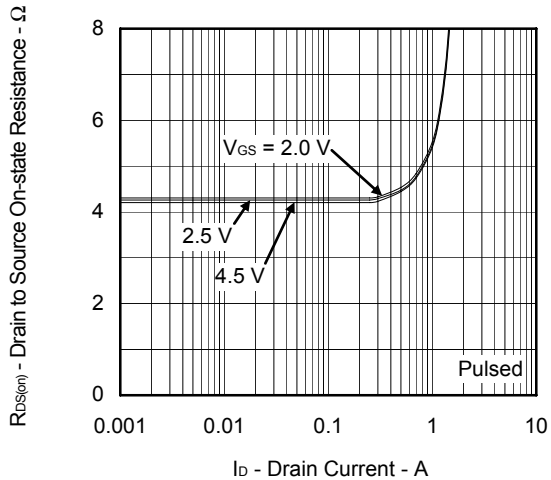
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



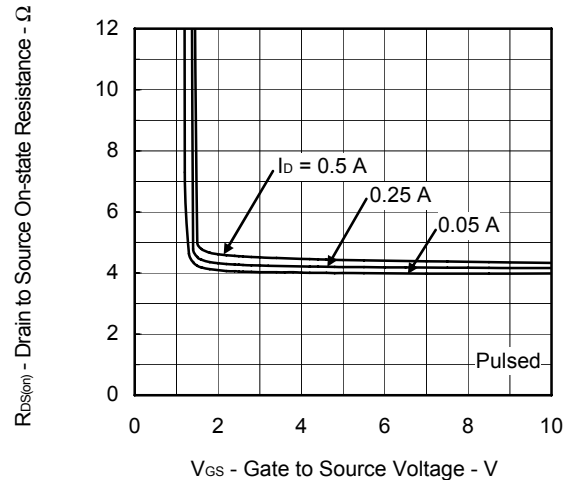
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



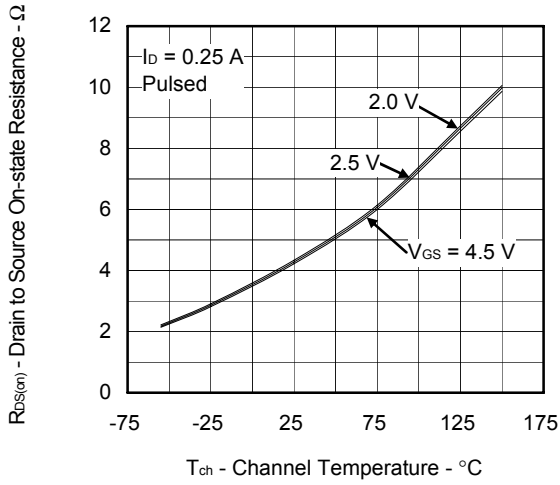
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



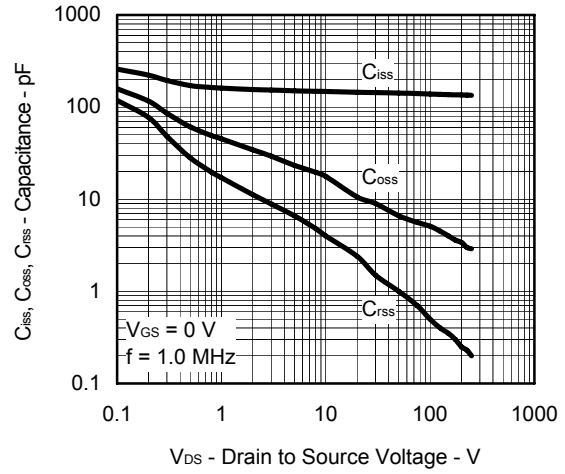
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



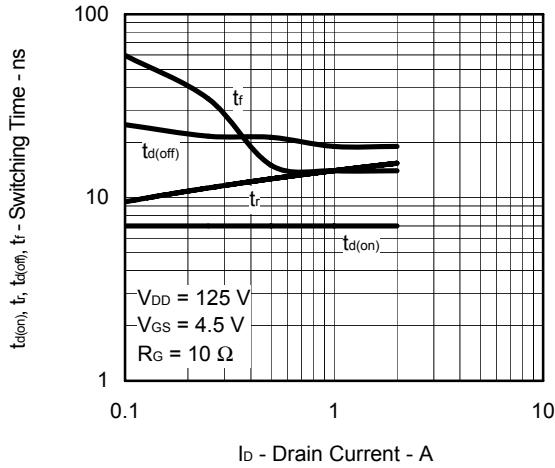
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



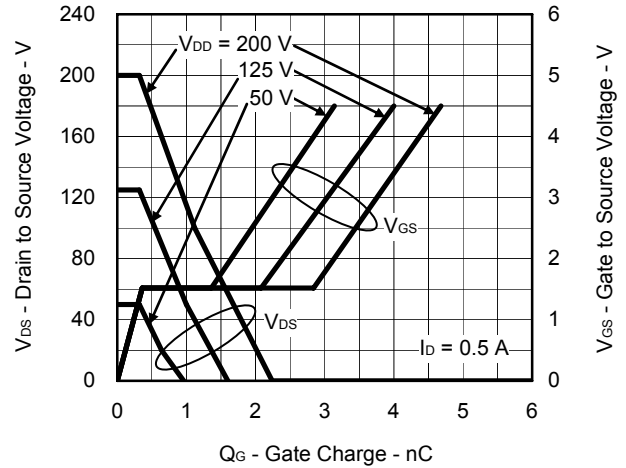
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



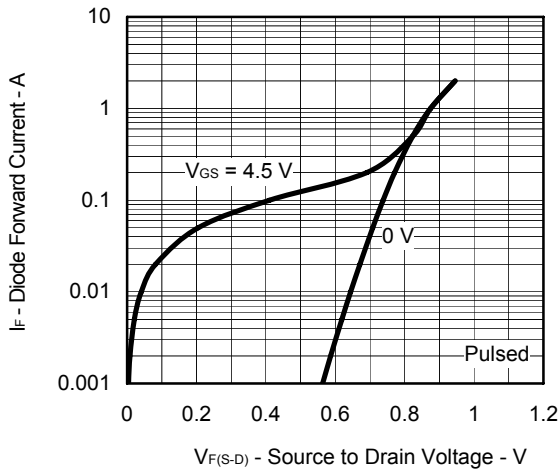
SWITCHING CHARACTERISTICS



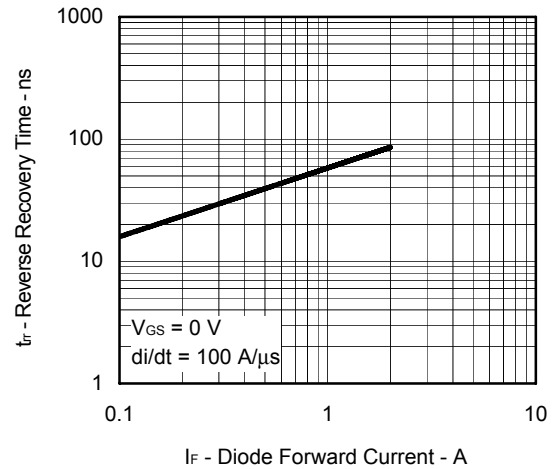
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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