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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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HS56021

Silicon N Channel MOS FET High Speed Power Switching

REJ03G1670-0200

Rev.2.00

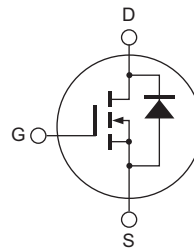
Apr 24, 2008

Features

- Low on-resistance
- Low drive current
- High density mounting

Outline

RENESAS Package code: PRSS0003DC-A
(Package name: TO-92 Mod)



1. Gate
2. Drain
3. Source

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	600	V
Gate to source voltage	V_{GSS}	± 30	V
Drain current	I_D	0.2	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	0.8	A
Body-drain diode reverse drain current	I_{DR}	0.2	A
Body-drain diode reverse drain peak current	$I_{DR(pulse)}$ ^{Note1}	0.8	A
Channel dissipation	Pch	0.9	W
Channel to ambient thermal impedance	θ_{ch-a}	139	°C/W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$

Electrical Characteristics

(Ta = 25°C)

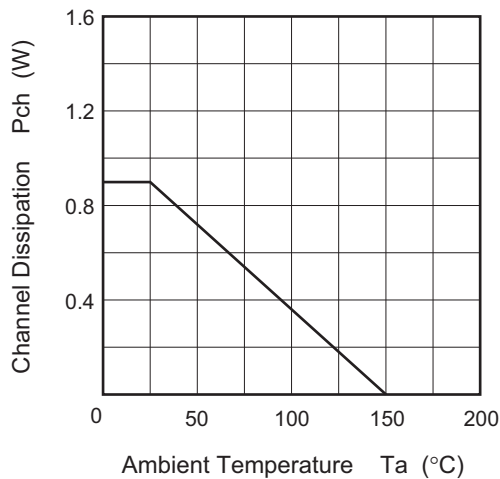
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	600	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 600 \text{ V}$, $V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 0.1	μA	$V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	3	—	5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	13	15	Ω	$I_D = 0.1 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note2}
Input capacitance	C_{iss}	—	84	—	pF	$V_{DS} = 25 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	11	—	pF	
Reverse transfer capacitance	C_{rss}	—	2	—	pF	
Turn-on delay time	$t_{d(on)}$	—	31	—	ns	$I_D = 0.1 \text{ A}$ $V_{GS} = 10 \text{ V}$ $R_L = 3000 \Omega$ $R_g = 10 \Omega$
Rise time	t_r	—	14	—	ns	
Turn-off delay time	$t_{d(off)}$	—	53	—	ns	
Fall time	t_f	—	173	—	ns	
Total gate charge	Q_g	—	4.5	—	nC	$V_{DD} = 480 \text{ V}$ $V_{GS} = 10 \text{ V}$ $I_D = 0.2 \text{ A}$
Gate to source charge	Q_{gs}	—	0.6	—	nC	
Gate to drain charge	Q_{gd}	—	2.6	—	nC	
Body-drain diode forward voltage	V_{DF}	—	0.77	1.25	V	$I_F = 0.2 \text{ A}$, $V_{GS} = 0$ ^{Note2}
Body-drain diode reverse recovery time	t_{rr}	—	150	—	ns	$I_F = 0.2 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 2. Pulse test

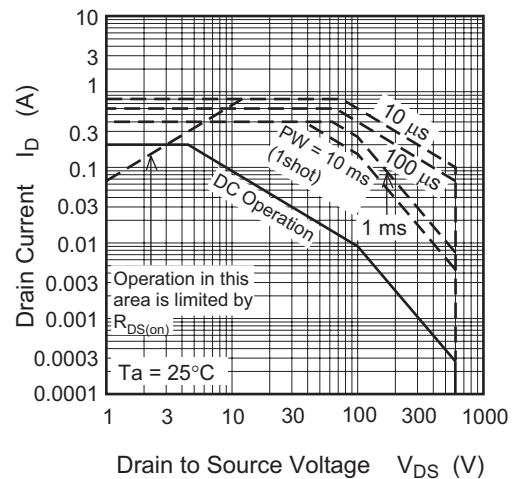
3. Since this device is equipped with high voltage FET chip ($V_{DSS} \geq 600 \text{ V}$), high voltage may be supplied. Therefore, please be sure to confirm about Electric discharge between Drain terminal and other terminal.

Main Characteristics

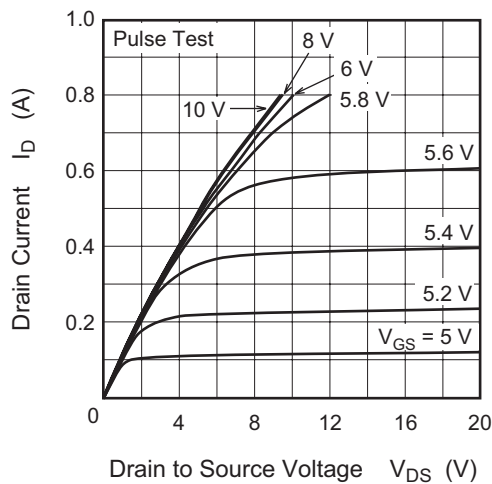
Power vs. Temperature Derating



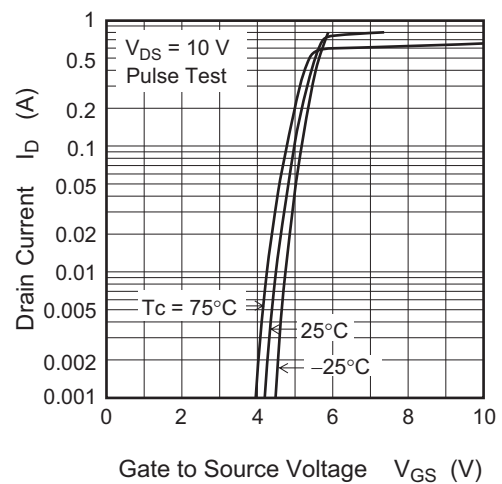
Maximum Safe Operation Area



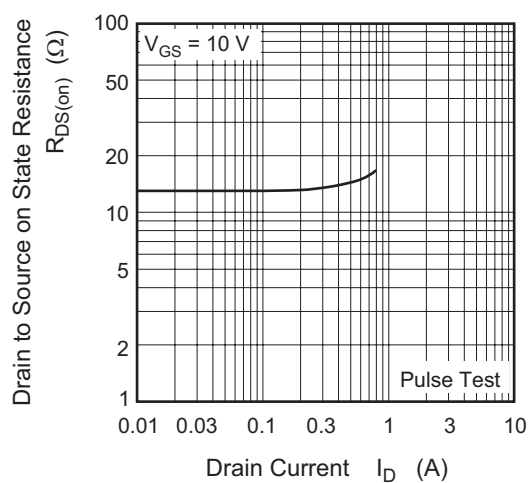
Typical Output Characteristics



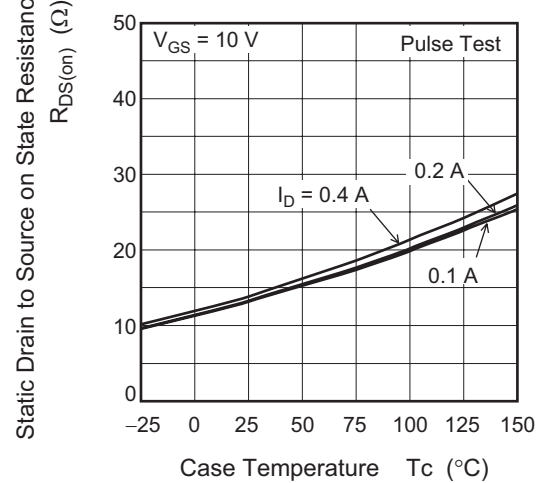
Typical Transfer Characteristics



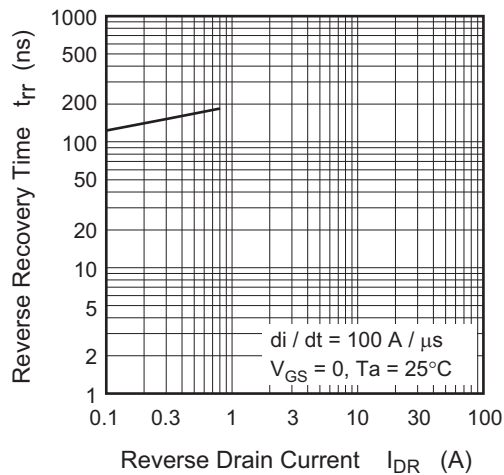
Static Drain to Source on State Resistance vs. Drain Current



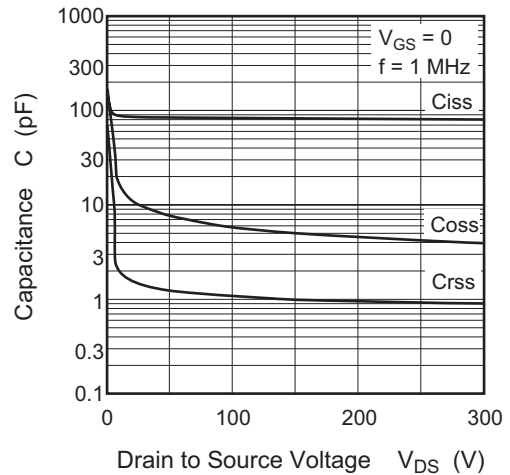
Static Drain to Source on State Resistance vs. Temperature



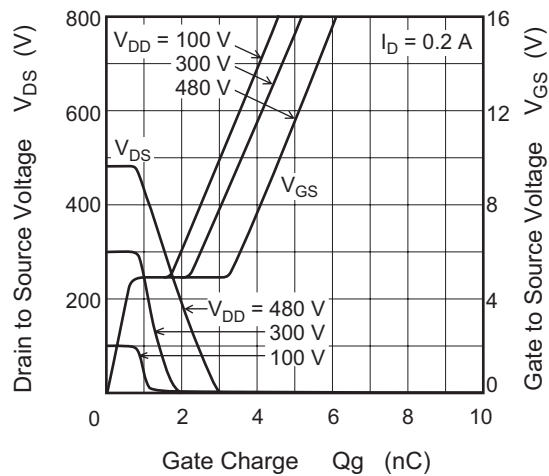
Body-Drain Diode Reverse Recovery Time



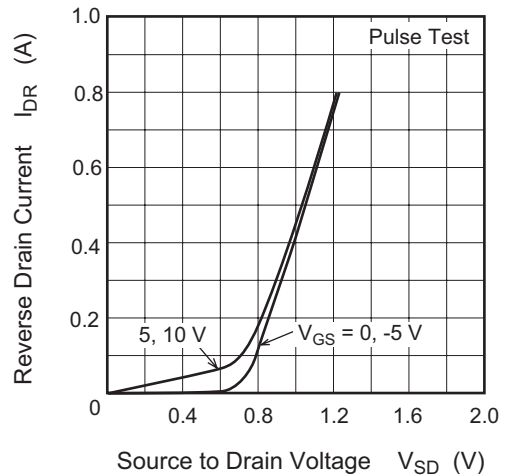
Typical Capacitance vs. Drain to Source Voltage



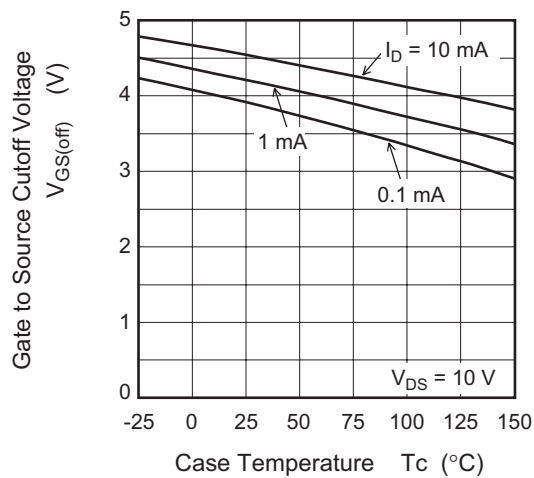
Dynamic Input Characteristics

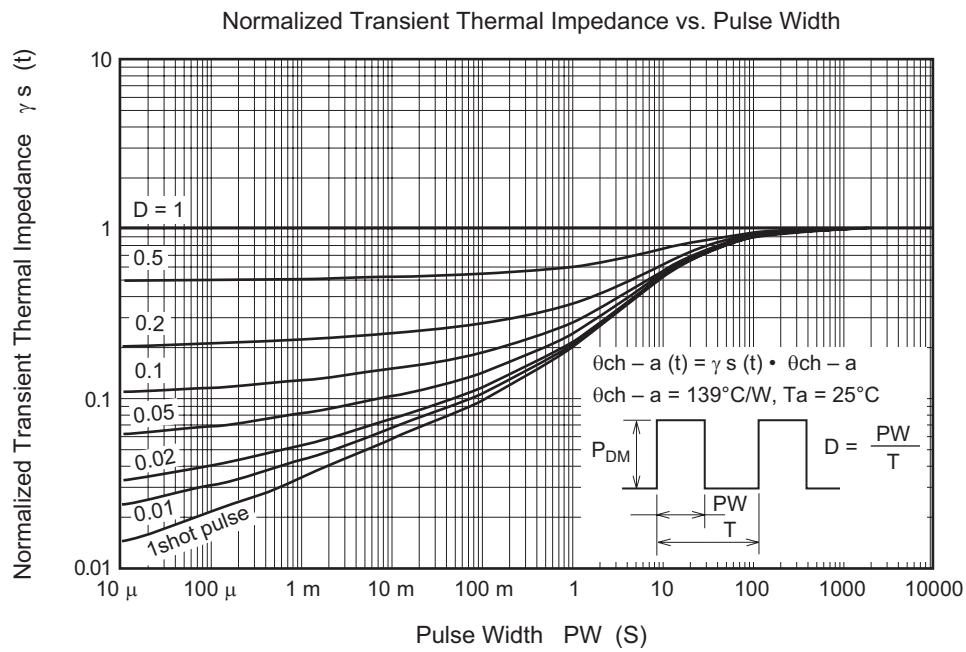


Reverse Drain Current vs. Source to Drain Voltage

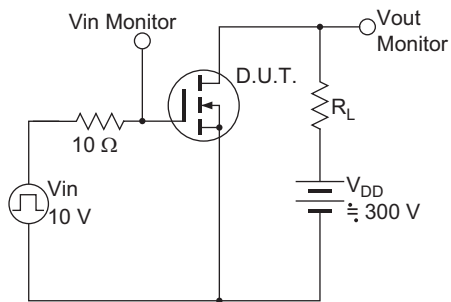


Gate to Source Cutoff Voltage vs. Case Temperature

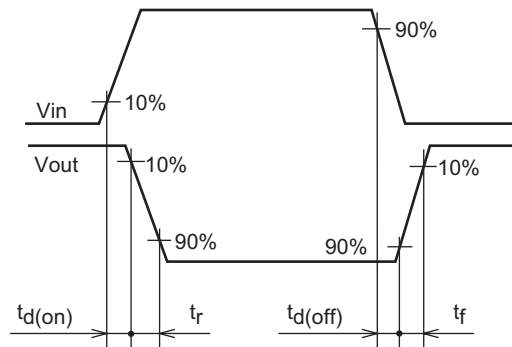




Switching Time Test Circuit



Waveform



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]	Unit: mm
TO-92 Mod	SC-51	PRSS0003DC-A	TO-92 Mod / TO-92 ModV	0.35g	

The diagram illustrates the mechanical dimensions of the HS56021 TO-92 package. The top view shows a rectangular body with a width of 4.8 ± 0.4 mm and a length of 8.0 ± 0.5 mm. The side view shows a height of 10.1 mm (minimum) and a maximum height of 10.1 mm. The bottom view shows a circular base with a diameter of 2.54 mm and a central pin diameter of 1.27 mm. The pin length is 0.7 mm. The pin diameter is 0.65 ± 0.1 mm, with maximum values of 0.75 mm, 0.60 mm, and 0.55 mm for different sections. The maximum pin length is 2.3 mm. The maximum pin diameter is 0.5 mm.

Since HS56021 is equipped with high voltage FET chip ($V_{DS} \geq 600$ V), high voltage may be supplied. Therefore, please be sure to confirm about Electric discharge between Drain terminal and other terminal.

Ordering Information

Part No.	Quantity	Shipping Container
HS56021TZ-E	2500 pcs	Hold Box, Radial Taping

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