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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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for new design

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FX50SMJ-2

High-Speed Switching Use
Pch Power MOS FET

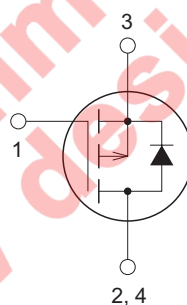
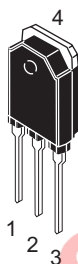
REJ03G1454-0200
(Previous: MEJ02G0285-0101)
Rev.2.00
Aug 07, 2006

Features

- Drive voltage : 4 V
- $V_{DSS} : -100 \text{ V}$
- $r_{DS(ON) (max)} : 50 \text{ m}\Omega$
- $I_D : -50 \text{ A}$
- Integrated Fast Recovery Diode (TYP.) : 100 ns

Outline

RENESAS Package code: PRSS0004ZB-A
(Package name: TO-3P)



1. Gate
2. Drain
3. Source
4. Drain

Applications

Motor control, Lamp control, Solenoid control, DC-DC converters, etc.

Maximum Ratings

(Tc = 25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Drain-source voltage	V_{DSS}	-100	V	$V_{GS} = 0 \text{ V}$
Gate-source voltage	V_{GSS}	± 20	V	$V_{DS} = 0 \text{ V}$
Drain current	I_D	-50	A	
Drain current (Pulsed)	I_{DM}	-200	A	
Avalanche drain current (Pulsed)	I_{DA}	-50	A	$L = 30 \mu\text{H}$
Source current	I_S	-50	A	
Source current (Pulsed)	I_{SM}	-200	A	
Maximum power dissipation	P_D	150	W	
Channel temperature	T_{ch}	- 55 to +150	°C	
Storage temperature	T_{stg}	- 55 to +150	°C	
Mass	—	4.8	g	Typical value

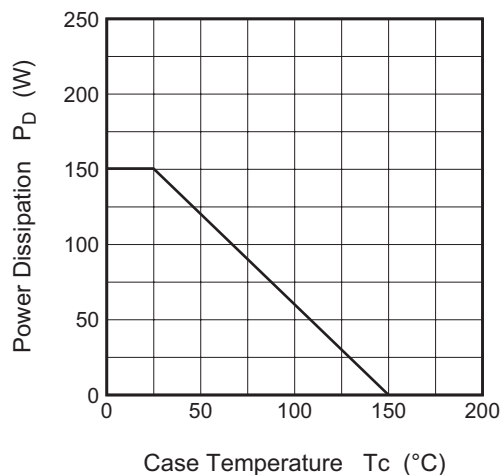
Electrical Characteristics

(T_{ch} = 25°C)

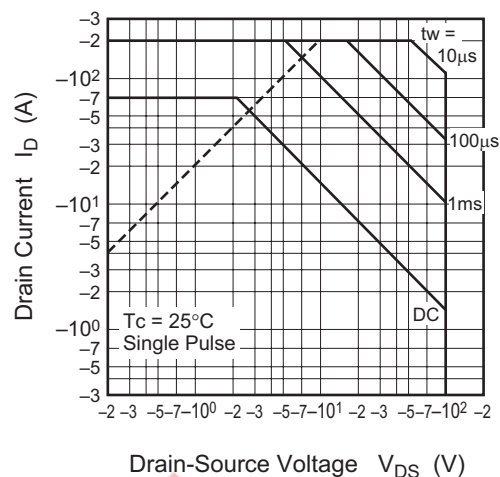
Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain-source breakdown voltage	$V_{(BR)DSS}$	-100	—	—	V	$I_D = -1 \text{ mA}$, $V_{GS} = 0 \text{ V}$
Gate-source leakage current	I_{GSS}	—	—	±0.1	μA	$V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$
Drain-source leakage current	I_{DSS}	—	—	0.1	mA	$V_{DS} = -100 \text{ V}$, $V_{GS} = 0 \text{ V}$
Gate-source threshold voltage	$V_{GS(th)}$	-1.3	-1.8	-2.3	V	$I_D = -1 \text{ mA}$, $V_{DS} = -10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	39	50	mΩ	$I_D = -25 \text{ A}$, $V_{GS} = -10 \text{ V}$
Drain-source on-state resistance	$r_{DS(ON)}$	—	47	61	mΩ	$I_D = -25 \text{ A}$, $V_{GS} = -4 \text{ V}$
Drain-source on-state voltage	$V_{DS(ON)}$	—	-0.98	-1.25	V	$I_D = -25 \text{ A}$, $V_{GS} = -10 \text{ V}$
Forward transfer admittance	$ y_{fs} $	—	49.2	—	S	$I_D = -25 \text{ A}$, $V_{DS} = -10 \text{ V}$
Input capacitance	C_{iss}	—	11130	—	pF	$V_{DS} = -10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	896	—	pF	
Reverse transfer capacitance	C_{rss}	—	480	—	pF	
Turn-on delay time	$t_{d(on)}$	—	57	—	ns	$V_{DD} = -50 \text{ V}$, $I_D = -25 \text{ A}$, $V_{GS} = -10 \text{ V}$, $R_{GEN} = R_{GS} = 50 \Omega$
Rise time	t_r	—	118	—	ns	
Turn-off delay time	$t_{d(off)}$	—	828	—	ns	
Fall time	t_f	—	380	—	ns	
Source-drain voltage	V_{SD}	—	-1.0	-1.5	V	$I_S = -25 \text{ A}$, $V_{GS} = 0 \text{ V}$
Thermal resistance	$R_{th(ch-c)}$	—	—	0.83	°C/W	Channel to case
Reverse recovery time	t_{rr}	—	100	—	ns	$I_S = -50 \text{ A}$, $d_i/d_t = 100 \text{ A}/\mu\text{s}$

Performance Curves

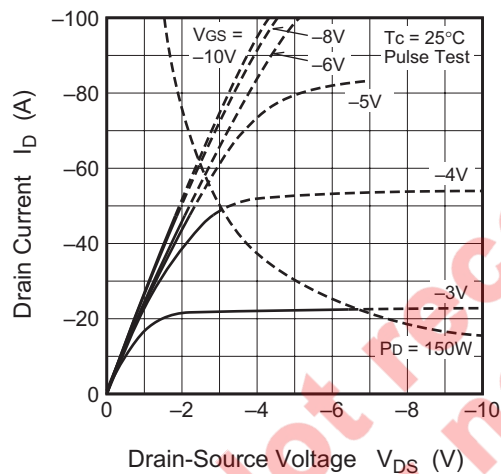
Power Dissipation Derating Curve



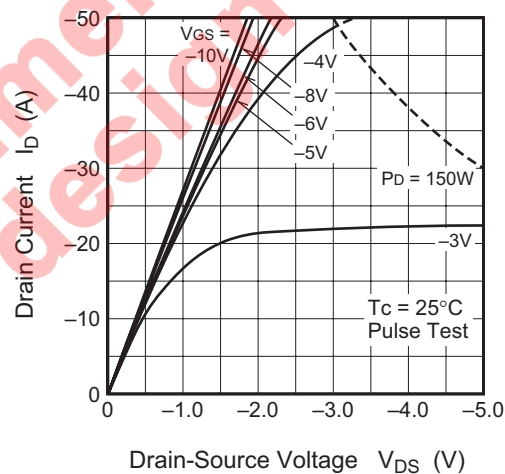
Maximum Safe Operating Area



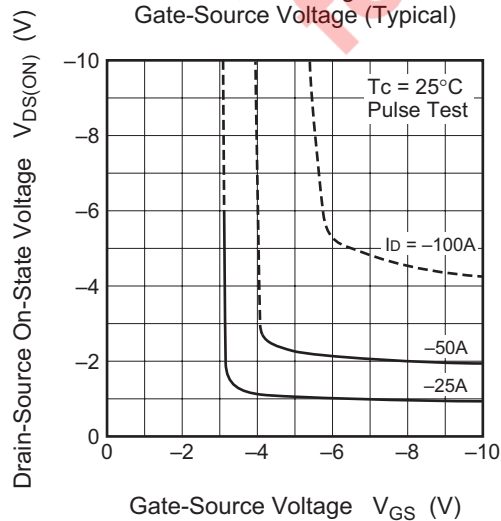
Output Characteristics (Typical)



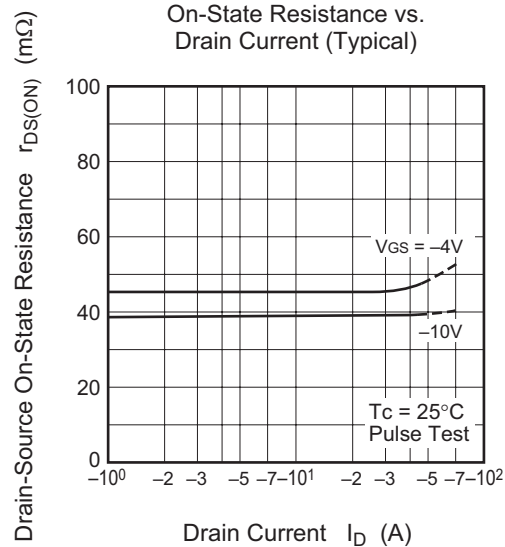
Output Characteristics (Typical)



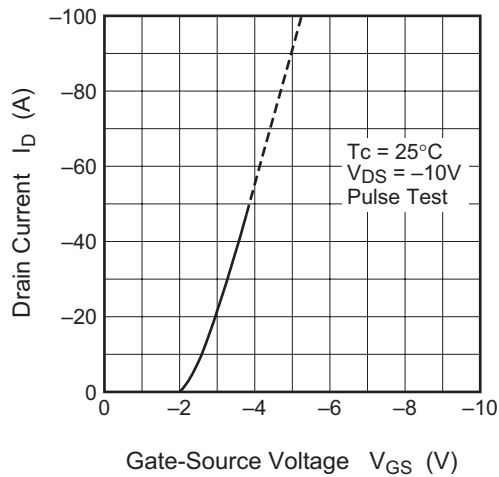
On-State Voltage vs. Gate-Source Voltage (Typical)



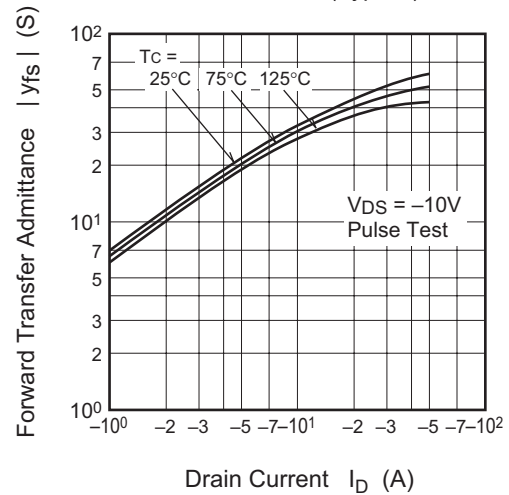
On-State Resistance vs. Drain Current (Typical)



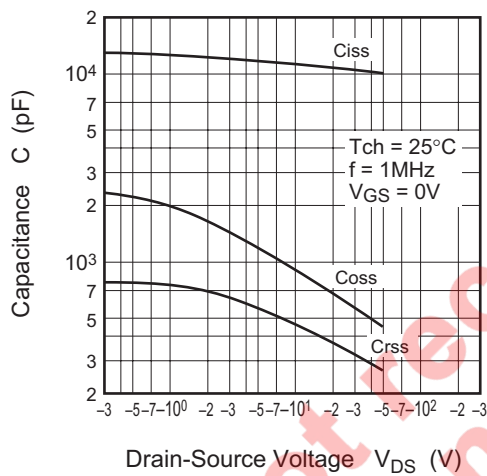
Transfer Characteristics (Typical)



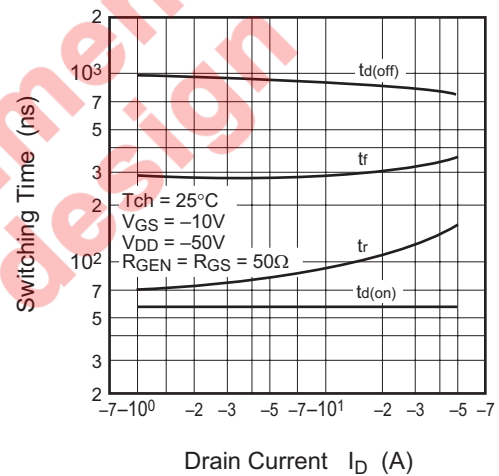
Forward Transfer Admittance vs. Drain Current (Typical)



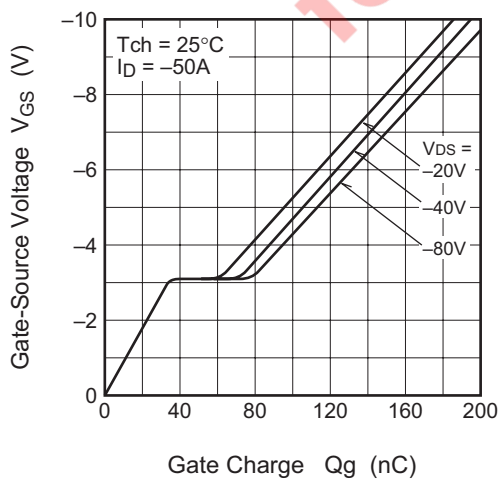
Capacitance vs. Drain-Source Voltage (Typical)



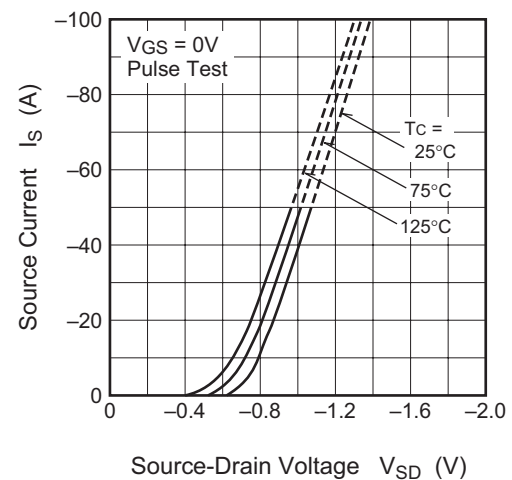
Switching Characteristics (Typical)

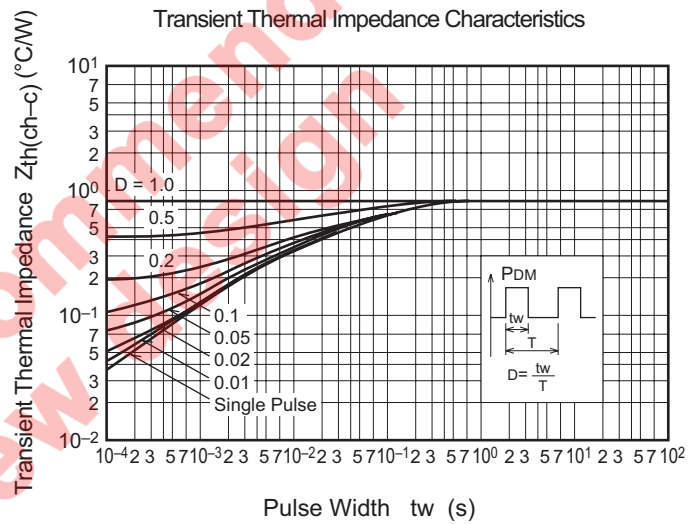
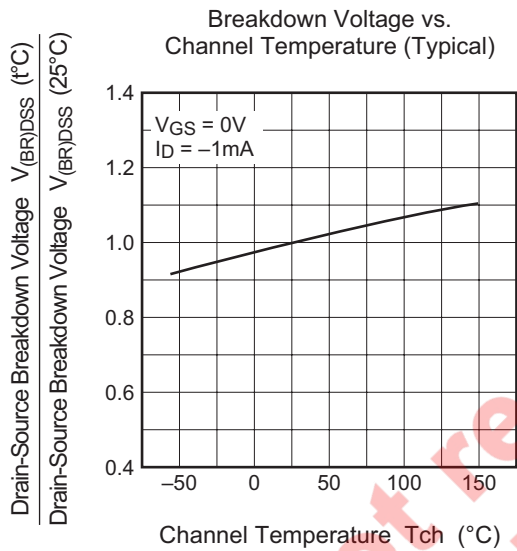
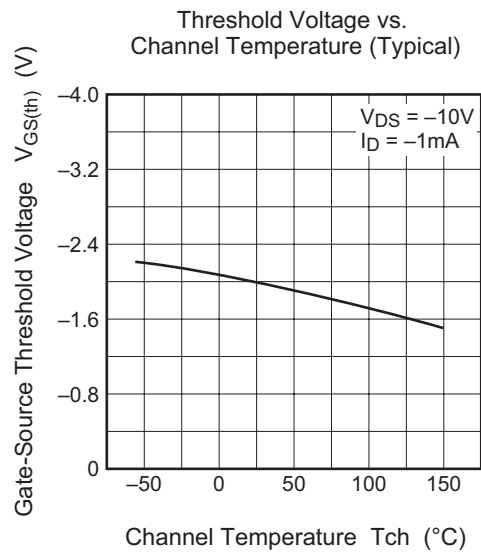
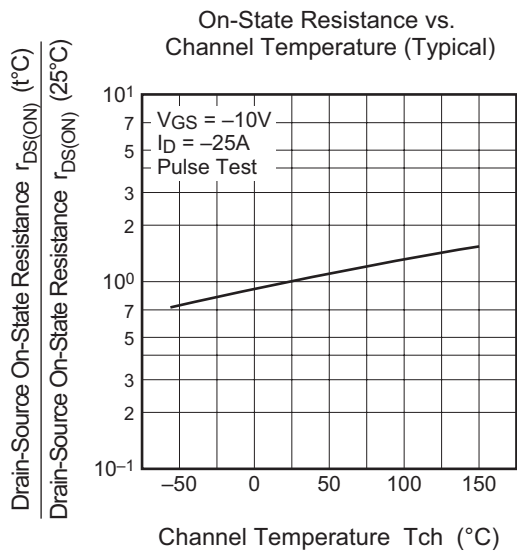


Gate-Source Voltage vs. Gate Charge (Typical)

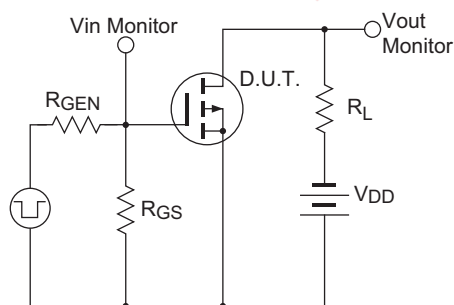


Source-Drain Diode Forward Characteristics (Typical)

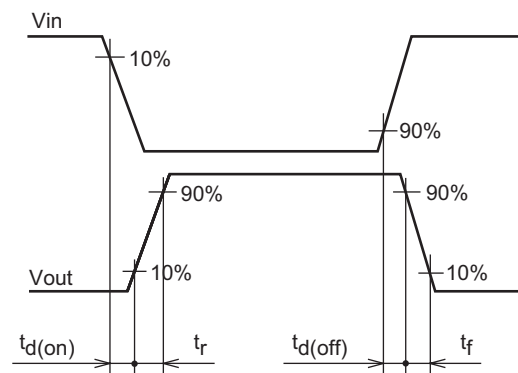




Switching Time Measurement Circuit



Switching Waveform



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Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.

Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.

Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510