

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010
Renesas Electronics Corporation

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

Send any inquiries to <http://www.renesas.com/inquiry>.

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(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

To all our customers

Regarding the change of names mentioned in the document, such as Mitsubishi Electric and Mitsubishi XX, to Renesas Technology Corp.

The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.)

Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

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

FS40SM-6

HIGH-SPEED SWITCHING USE

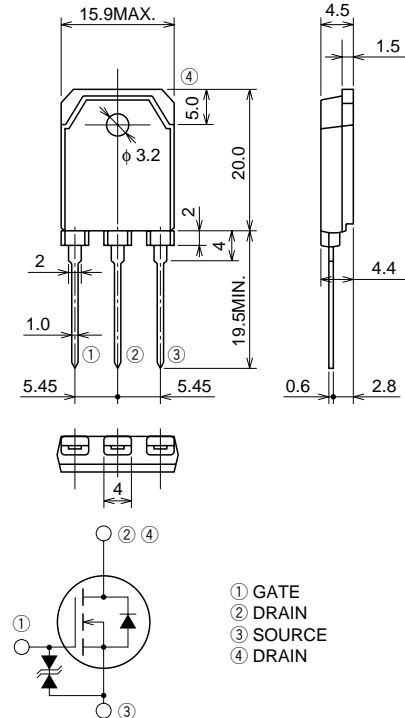
FS40SM-6



- V_{DS} 300V
- $r_{DS(ON)}(MAX)$ 0.114Ω
- I_D 40A

OUTLINE DRAWING

Dimensions in mm



TO-3P

APPLICATION

SMPS, DC-DC Converter, battery charger, power supply of printer, copier, HDD, FDD, TV, VCR, personal computer etc.

MAXIMUM RATINGS (Tc = 25°C)

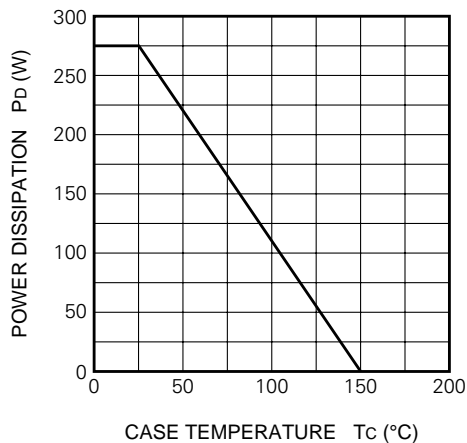
Symbol	Parameter	Conditions	Ratings	Unit
V_{DS}	Drain-source voltage	$V_{GS} = 0V$	300	V
V_{GS}	Gate-source voltage	$V_{DS} = 0V$	± 30	V
I_D	Drain current		40	A
I_{DM}	Drain current (Pulsed)		120	A
P_D	Maximum power dissipation		275	W
T_{ch}	Channel temperature		$-55 \sim +150$	°C
T_{stg}	Storage temperature		$-55 \sim +150$	°C
—	Weight	Typical value	4.8	g

ELECTRICAL CHARACTERISTICS (T_{ch} = 25°C)

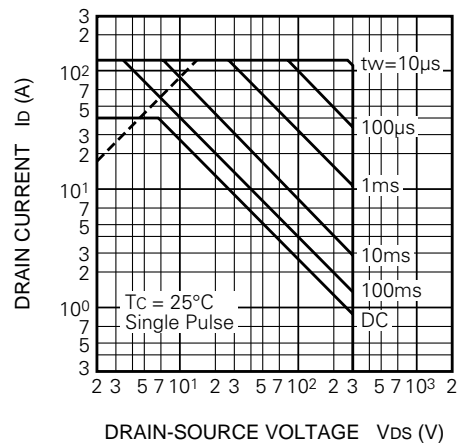
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
V (BR) DSS	Drain-source breakdown voltage	I _D = 1mA, V _{GS} = 0V	300	—	—	V
V (BR) GSS	Gate-source breakdown voltage	I _G = ±100μA, V _{DS} = 0V	±30	—	—	V
I _{GSS}	Gate-source leakage current	V _{GS} = ±25V, V _{DS} = 0V	—	—	±10	μA
I _{DSS}	Drain-source leakage current	V _{DS} = 300V, V _{GS} = 0V	—	—	1	mA
V _{GS} (th)	Gate-source threshold voltage	I _D = 1mA, V _{DS} = 10V	2	3	4	V
r _{DS} (ON)	Drain-source on-state resistance	I _D = 20A, V _{GS} = 10V	—	0.088	0.114	Ω
V _{DS} (ON)	Drain-source on-state voltage	I _D = 20A, V _{GS} = 10V	—	1.76	2.28	V
y _{fs}	Forward transfer admittance	I _D = 20A, V _{DS} = 10V	12.0	18.0	—	S
C _{iss}	Input capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz	—	2850	—	pF
C _{oss}	Output capacitance		—	580	—	pF
C _{rss}	Reverse transfer capacitance		—	110	—	pF
t _d (on)	Turn-on delay time	V _{DD} = 150V, I _D = 20A, V _{GS} = 10V, R _{GEN} = R _{GS} = 50Ω	—	45	—	ns
t _r	Rise time		—	125	—	ns
t _d (off)	Turn-off delay time		—	310	—	ns
t _f	Fall time		—	140	—	ns
V _{SD}	Source-drain voltage	I _S = 20A, V _{GS} = 0V	—	1.5	2.0	V
R _{th} (ch-c)	Thermal resistance	Channel to case	—	—	0.45	°C/W

PERFORMANCE CURVES

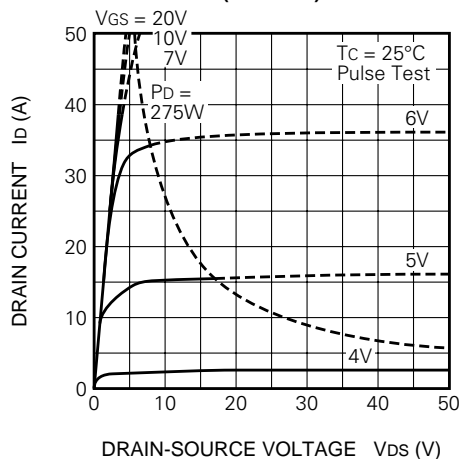
POWER DISSIPATION DERATING CURVE



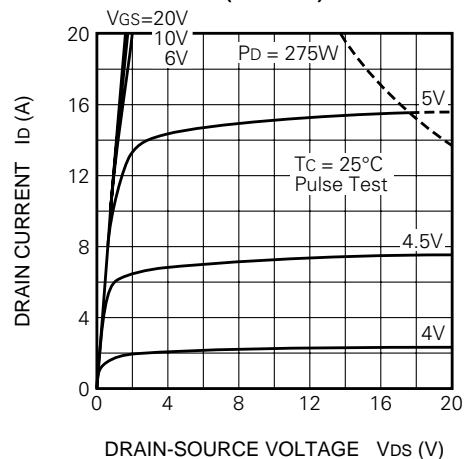
MAXIMUM SAFE OPERATING AREA



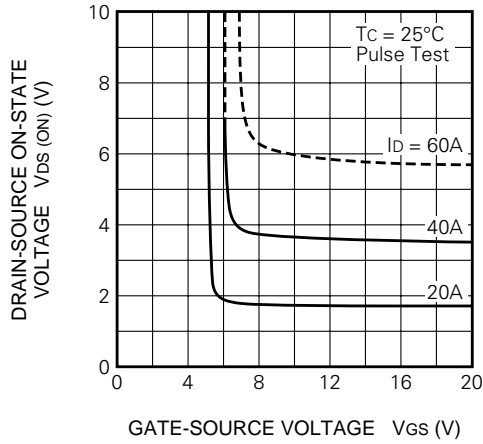
OUTPUT CHARACTERISTICS (TYPICAL)



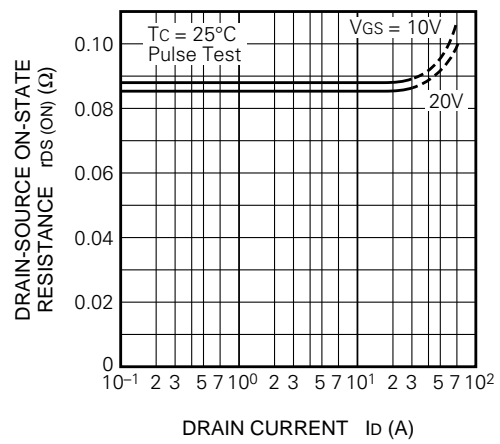
OUTPUT CHARACTERISTICS (TYPICAL)



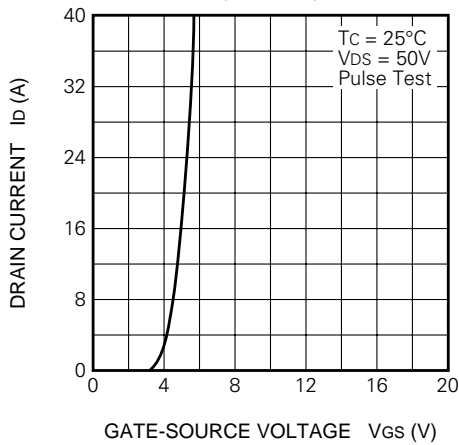
ON-STATE VOLTAGE VS.
GATE-SOURCE VOLTAGE
(TYPICAL)



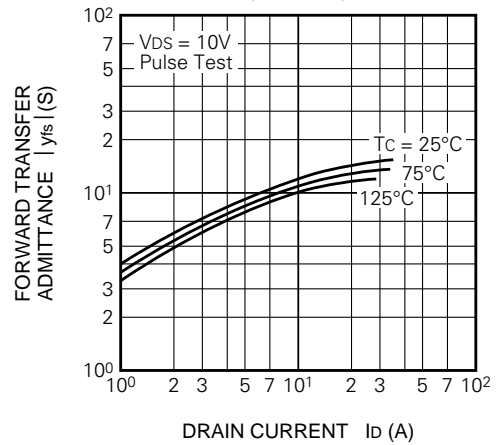
ON-STATE RESISTANCE VS.
DRAIN CURRENT
(TYPICAL)



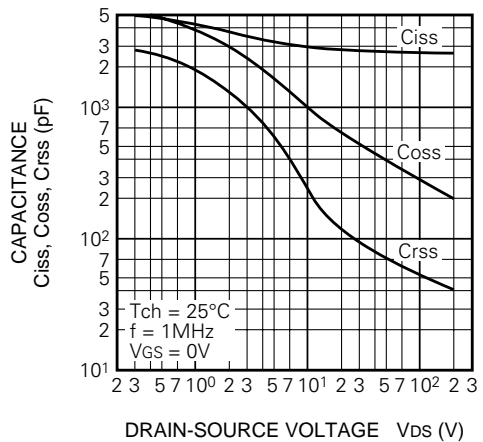
TRANSFER CHARACTERISTICS
(TYPICAL)



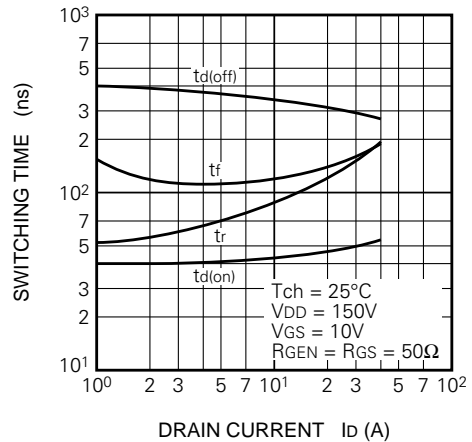
FORWARD TRANSFER ADMITTANCE
VS.DRAIN CURRENT
(TYPICAL)



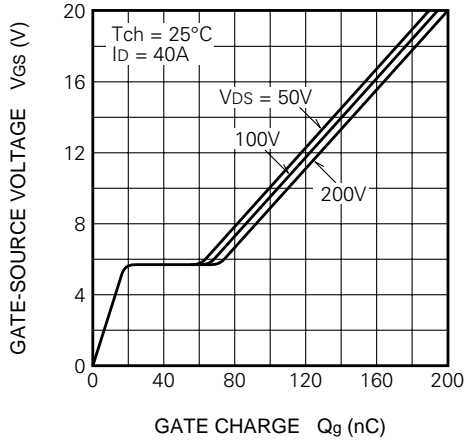
CAPACITANCE VS.
DRAIN-SOURCE VOLTAGE
(TYPICAL)



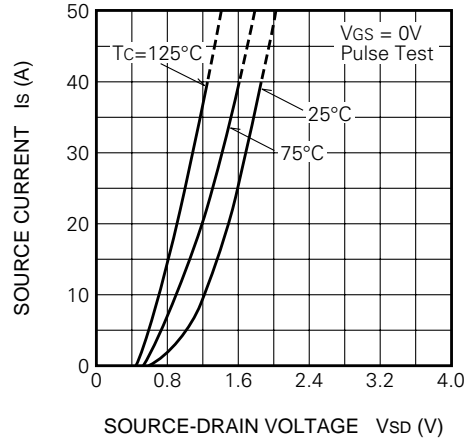
SWITCHING CHARACTERISTICS
(TYPICAL)



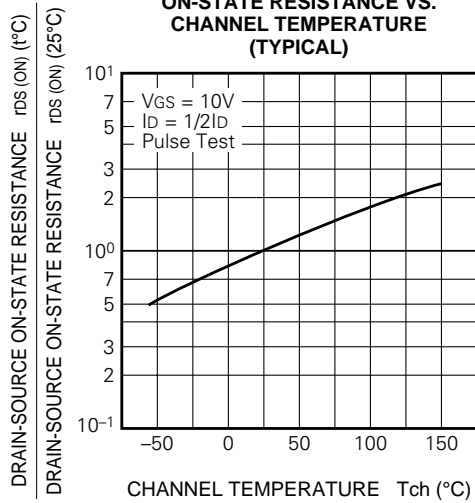
**GATE-SOURCE VOLTAGE
VS. GATE CHARGE
(TYPICAL)**



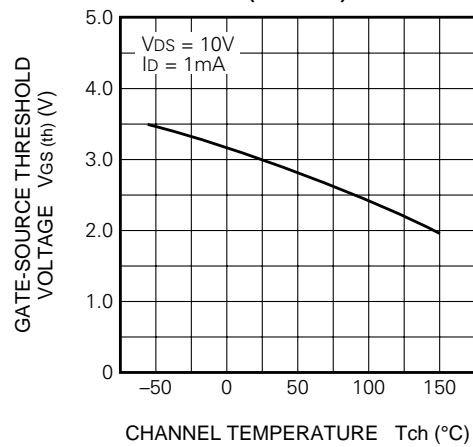
**SOURCE-DRAIN DIODE
FORWARD CHARACTERISTICS
(TYPICAL)**



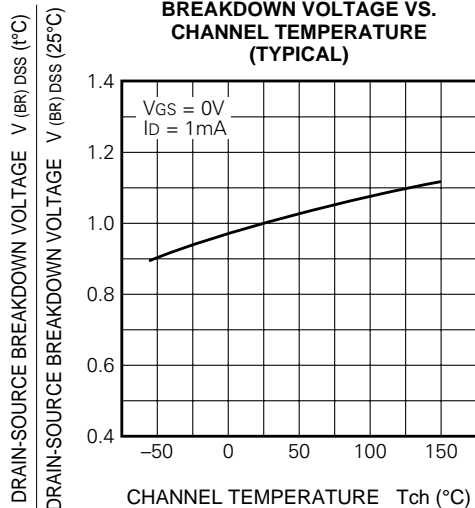
**ON-STATE RESISTANCE VS.
CHANNEL TEMPERATURE
(TYPICAL)**



**THRESHOLD VOLTAGE VS.
CHANNEL TEMPERATURE
(TYPICAL)**



**BREAKDOWN VOLTAGE VS.
CHANNEL TEMPERATURE
(TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE
CHARACTERISTICS**

