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)

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RENESAS

HANNEL MOS FIELD EFFECT POWER TRANSISTOR

Phase-out/Discontinued

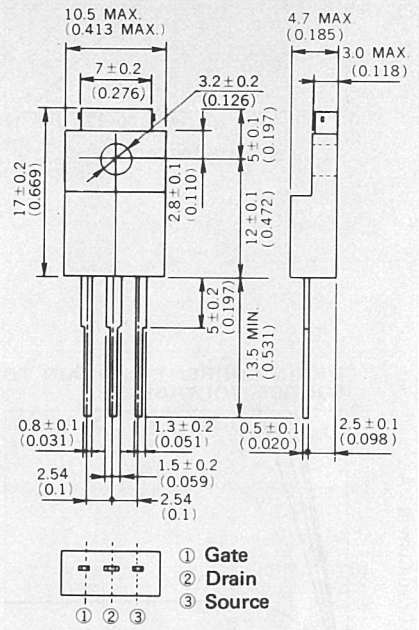
2SK659

DESCRIPTION The 2SK659 is N-Channel MOS Field Effect Power Transistor designed for solenoid, motor and lamp driver.

FEATURES

- 4 V Gate Drive — Logic level —
- Low $R_{DS(on)}$
- No Secondary Breakdown

PACKAGE DIMENSIONS
in millimeters (inches)



ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

- Storage Temperature . . . . . −55 to +150 °C
- Channel Temperature . . . . . 150 °C Maximum

Maximum Power Dissipations

Total Power Dissipation (T_a = 25 °C) . . .	2.0	W
Total Power Dissipation (T_c = 25 °C) . . .	35	W

Maximum Voltages and Currents (T_a = 25 °C)

V_{DSS}	Drain to Source Voltage	60	V
V_{GSS}	Gate to Source Voltage	±20	V
$I_{D(DC)}$	Drain Current (DC)	±12	A
$I_{D(pulse)}$	Drain Current (pulse)*	±60	A

*PW ≦ 300 μs, Duty Cycle ≦ 10 %

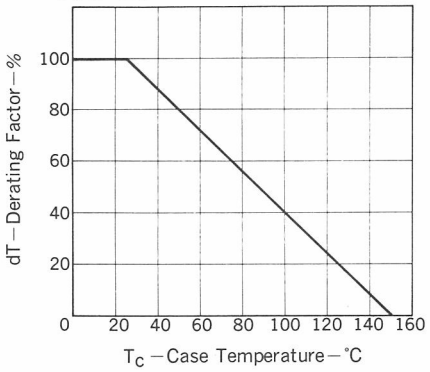
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$R_{DS(on)}$	Drain to Source On-State Resistance			0.075	Ω	V_{GS} = 10 V, I_D = 6 A
$R_{DS(on)}$	Drain to Source On-State Resistance			0.095	Ω	V_{GS} = 4 V, I_D = 6 A
$V_{GS(off)}$	Gate to Source Cutoff Voltage	1		2.5	V	V_{DS} = 10 V, I_D = 1 mA
$\|y_{fs}\|$	Forward Transfer Admittance	5			S	V_{DS} = 10 V, I_D = 6 A
I_{DSS}	Drain Leakage Current			10	μA	V_{DS} = 60 V, V_{GS} = 0
I_{GSS}	Gate to Source Leakage Current			±100	nA	V_{GS} = ±20 V, V_{DS} = 0
C_{iss}	Input Capacitance		1300		pF	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz
C_{oss}	Output Capacitance		600		pF	
C_{rss}	Reverse Transfer Capacitance		260		pF	
$t_{d(on)}$	Turn-On Delay Time		15		ns	I_D = 6 A, V_{CC} ≒ 30 V R_L = 5 Ω, $V_{GS(on)}$ = 10 V R_{in} = 10 Ω
t_r	Rise Time		75		ns	
$t_{d(off)}$	Turn-Off Delay Time		80		ns	
t_f	Fall Time		80		ns	

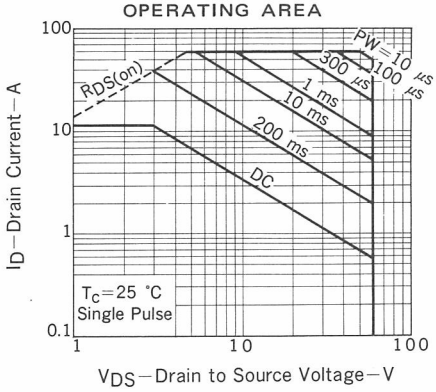
Phase-out/Discontinued

TYPICAL CHARACTERISTICS (T_a = 25 °C)

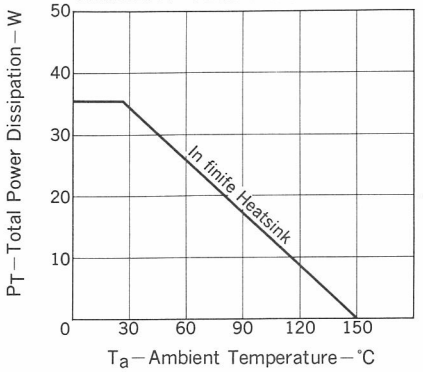
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



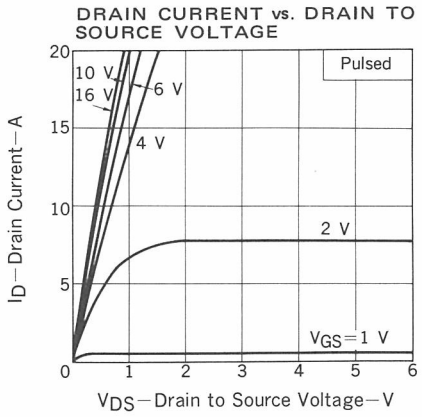
FORWARD BIAS SAFE OPERATING AREA



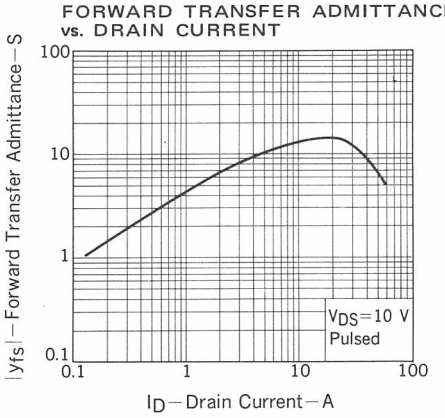
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



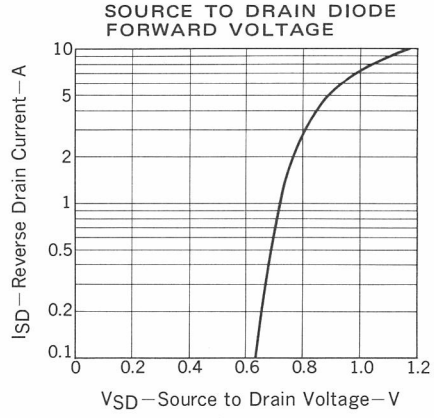
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



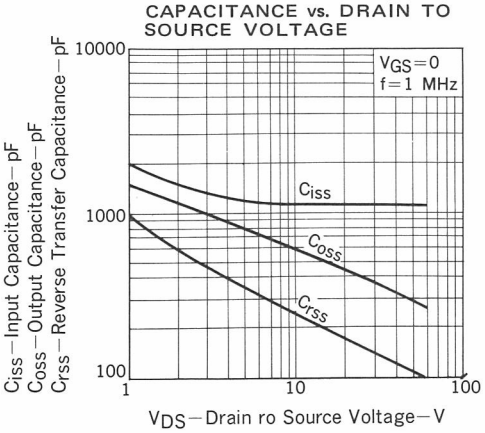
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



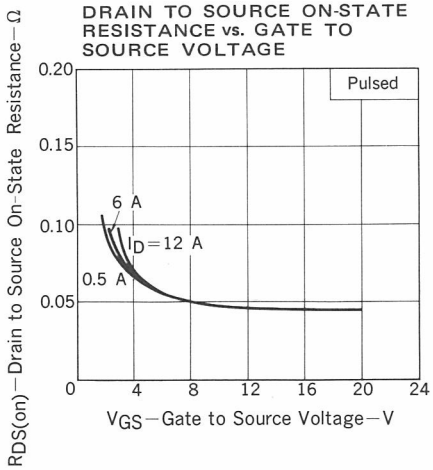
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



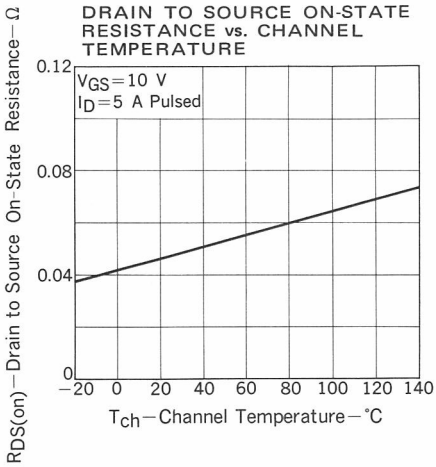
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



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

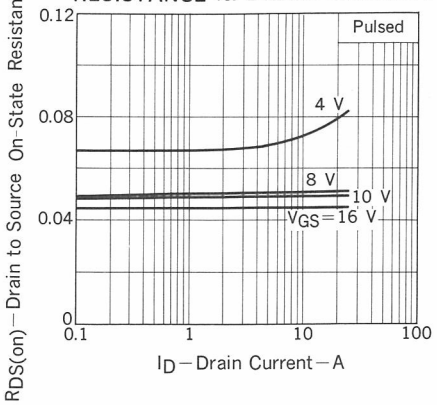


DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE

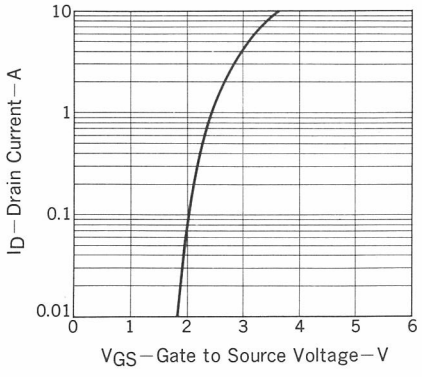


Phase-out/Discontinued

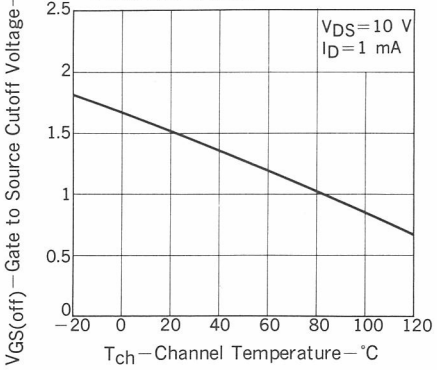
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



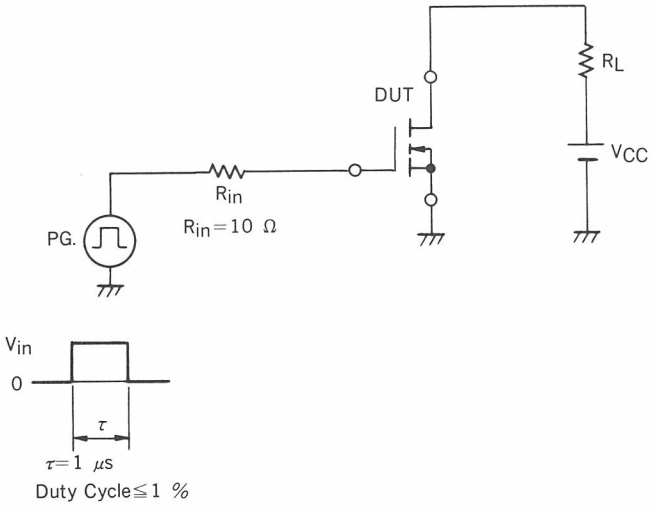
TRANSFER CHARACTERISTIC

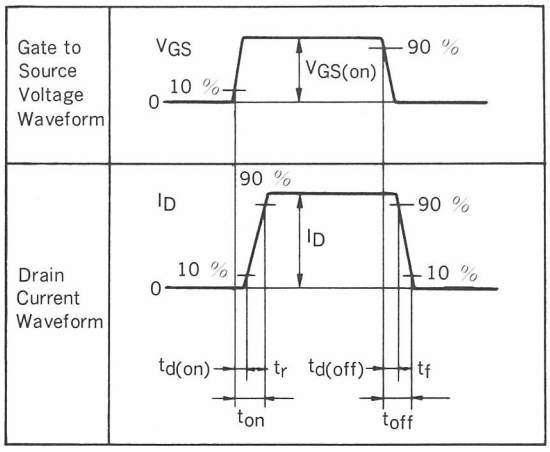


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



SWITCHING TIME TEST CIRCUIT





Phase-out/Discontinued

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