

To our customers,

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## Old Company Name in Catalogs and Other Documents

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

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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N-CHANNEL MOS FET  
FOR HIGH-SPEED SWITCHING

The 2SK2159 is an N-channel vertical type MOS FET featuring an operating voltage as low as 1.5 V. Because it can be driven on a low voltage and it is not necessary to consider driving current, the 2SK2159 is suitable for driving actuators of low-voltage portable systems such as headphone stereo sets and camcorders.

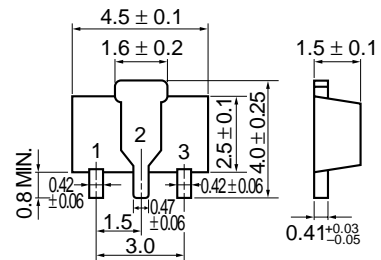
FEATURES

- Capable of drive gate with 1.5 V
- Small  $R_{DS(on)}$

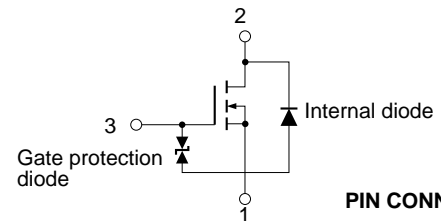
$R_{DS(on)} = 0.7 \Omega$  MAX. @  $V_{GS} = 1.5 V$ ,  $I_D = 0.1 A$

$R_{DS(on)} = 0.3 \Omega$  MAX. @  $V_{GS} = 4.0 V$ ,  $I_D = 1.0 A$

PACKAGE DIMENSIONS  
(in millimeters)



EQUIVALENT CIRCUIT



PIN CONNECTION

1. Source (S)
2. Drain (D)
3. Gate (G)

Marking: NW

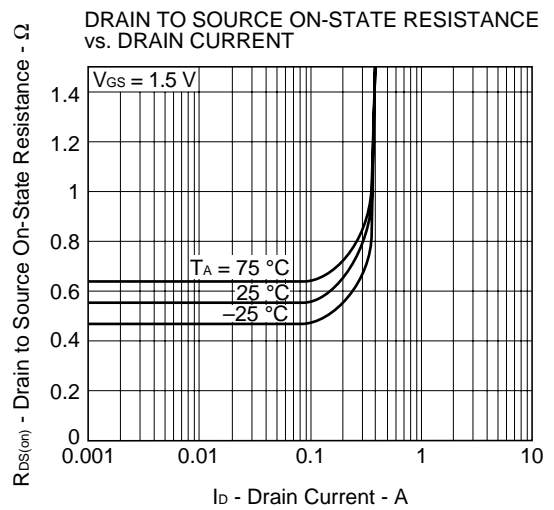
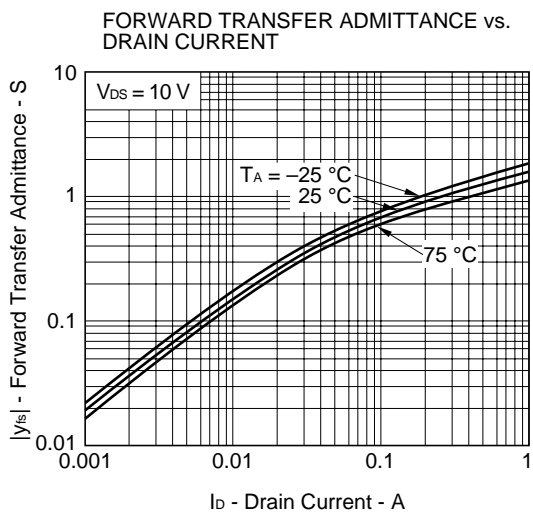
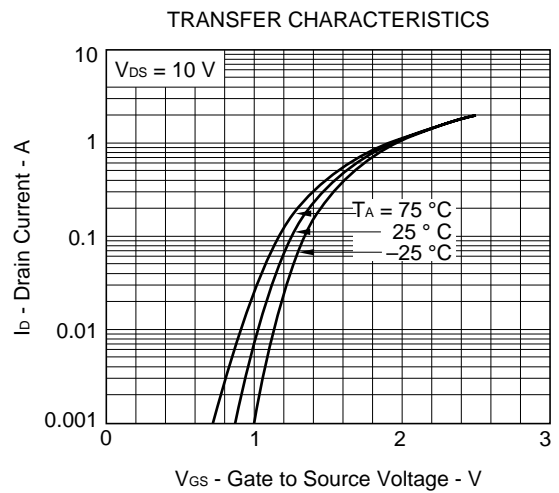
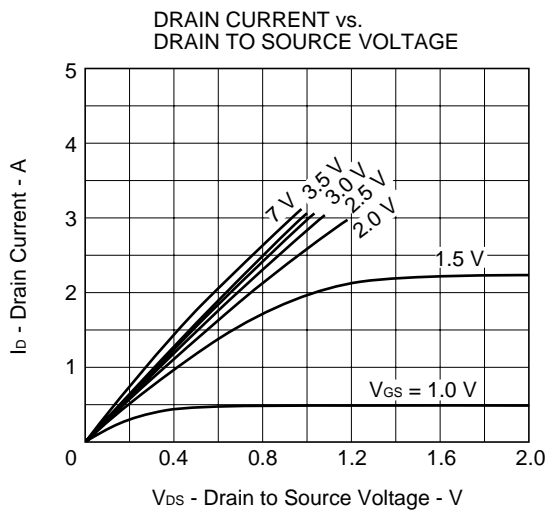
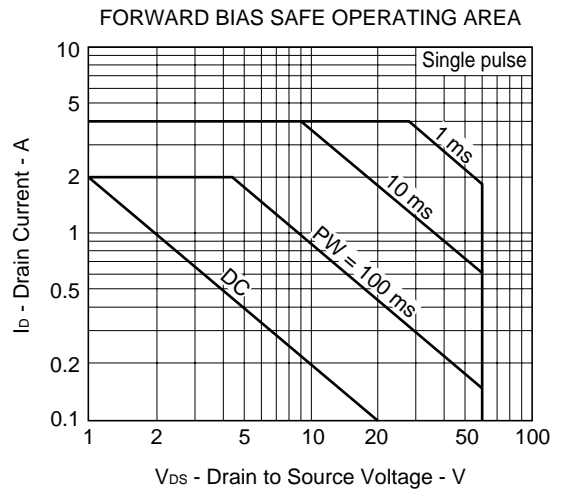
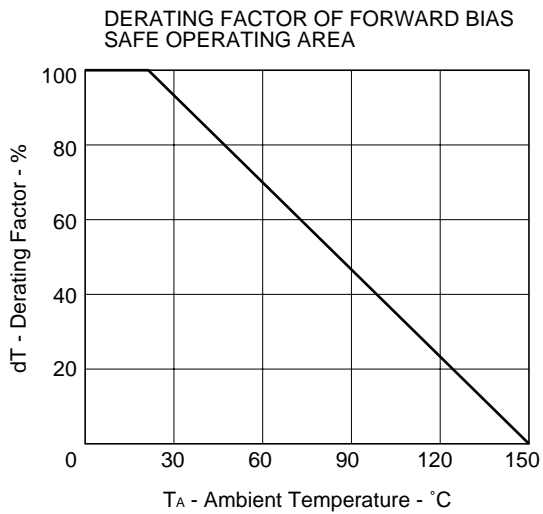
ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ )

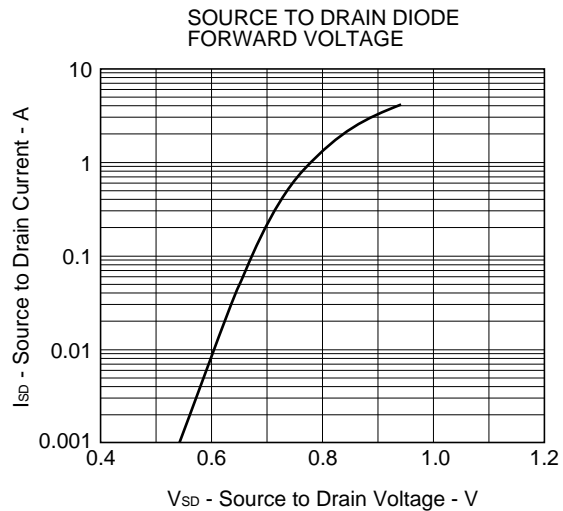
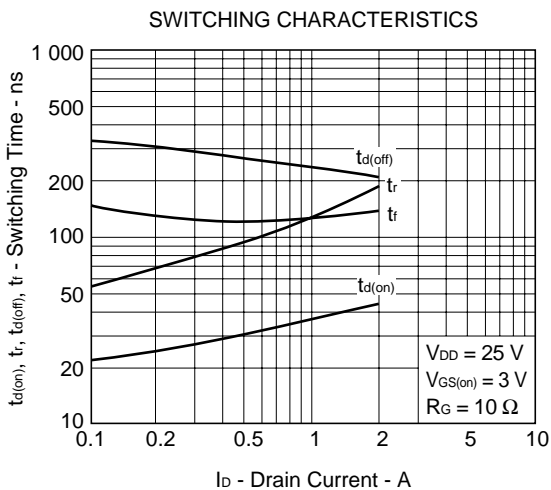
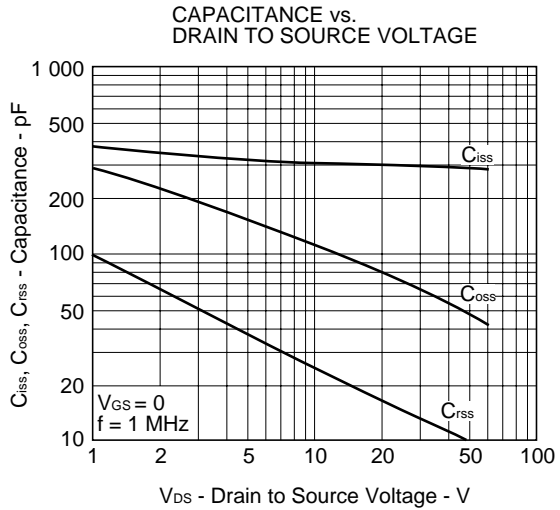
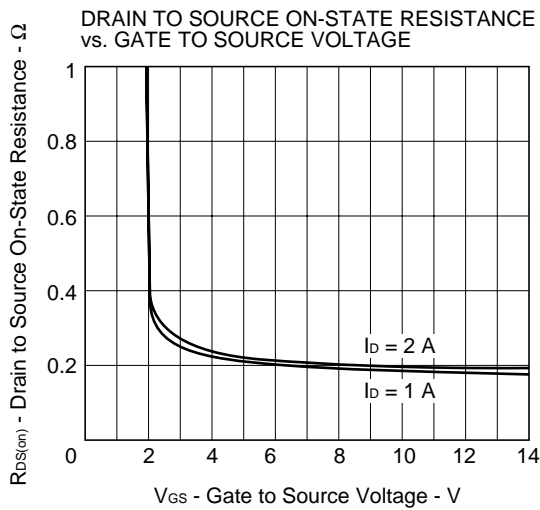
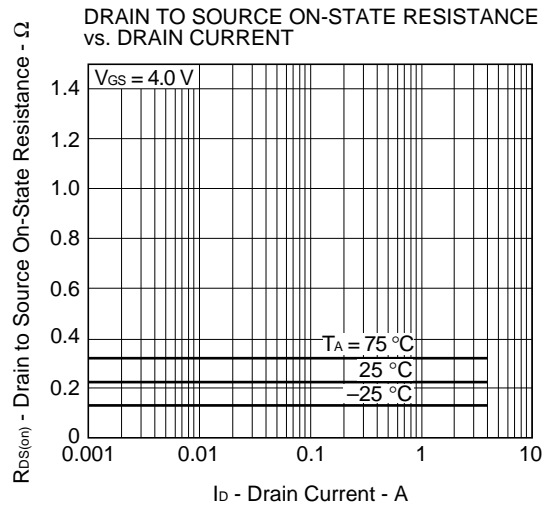
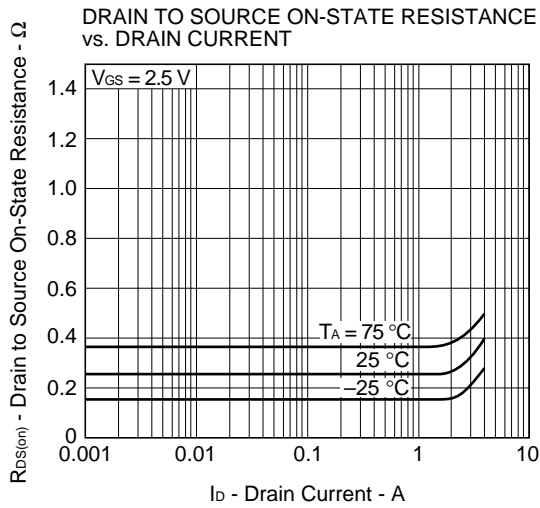
PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Drain to Source Voltage	$V_{DS}$	$V_{GS} = 0$	60	V
Gate to Source Voltage	$V_{GS}$	$V_{DS} = 0$	$\pm 14$	V
Drain Current (DC)	$I_{D(DC)}$		$\pm 2.0$	A
Drain Current (pulse)	$I_{D(pulse)}$	$PW \leq 10$ ms, Duty Cycle $\leq 50$ %	$\pm 4.0$	A
Total Power Dissipation	$P_T$	Mounted on $16 \text{ cm}^2 \times 0.7$ mm ceramic substrate.	2.0	W
Channel Temperature	$T_{ch}$		150	$^\circ C$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ C$

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0			1.0	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±14 V, V <sub>DS</sub> = 0			±10	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	0.5	0.9	1.1	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1.0 A	0.4			S
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 1.5 V, I <sub>D</sub> = 0.1 A		0.55	0.7	Ω
Drain to Source On-state Resistance	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 1.0 A		0.27	0.5	Ω
Drain to Source On-state Resistance	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 1.0 A		0.22	0.3	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0, f = 1.0 MHz		319		pF
Output Capacitance	C <sub>oss</sub>			109		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			22		pF
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 25 V, I <sub>D</sub> = 1.0 A		38		ns
Rise Time	t <sub>r</sub>	V <sub>GS(on)</sub> = 3 V, R <sub>G</sub> = 10 Ω		128		ns
Turn-Off Delay Time	t <sub>d(off)</sub>	R <sub>L</sub> = 25 Ω		237		ns
Fall Time	t <sub>f</sub>			130		ns

TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)





## REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system	TEI-1202
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	C10535E
Guide to quality assurance for semiconductor devices	MEI-1202
Semiconductor selection guide	X10679E

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