

To our customers,

Old Company Name in Catalogs and Other Documents

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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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SWITCHING N-CHANNEL MOSFET

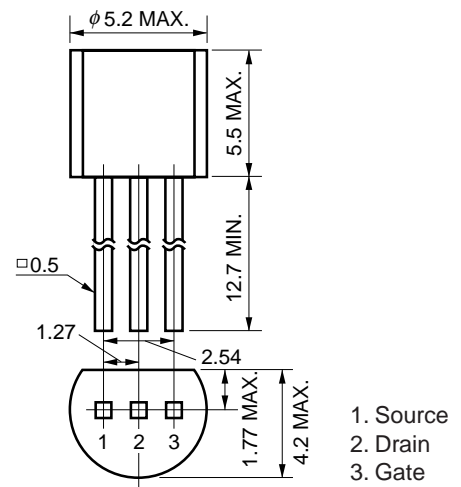
DESCRIPTION

The 2SK4148 is a switching element that is most suitable for use in DC-DC converter whose DC input voltage is 24 to 48 V. Having low on-resistance, and excelling in the switching characteristics, the 2SK4148 is ideal for use in high-speed switching.

FEATURES

- Low input capacitance
C_{iss} = 120 pF TYP.
- Low on-state resistance
R_{DS(on)1} = 4.5 Ω MAX. (V_{GS} = 10 V, I_D = 0.25 A)
R_{DS(on)2} = 5.2 Ω MAX. (V_{GS} = 4.5 V, I_D = 0.25 A)
R_{DS(on)3} = 6.0 Ω MAX. (V_{GS} = 4 V, I_D = 0.25 A)
- 4.5 V drive available
- Through hole mount package (TO-92)

PACKAGE DRAWING (Unit: mm)



ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SK4148-AZ <small>Note</small>	Sn-Ag-Cu	500 p/package	TO-92 (SC-43A)
2SK4148-T-AZ <small>Note</small>		Box type Tape 2500 p/box	0.26 g TYP.

Note Pb-free (This product does not contain Pb in the external electrode.)

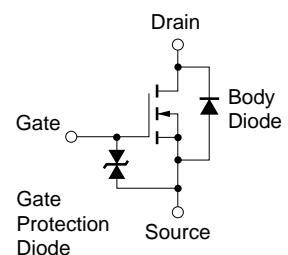
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V _{GS} = 0 V)	V _{DSS}	250	V
Gate to Source Voltage (V _{DS} = 0 V)	V _{GSS}	±20	V
Drain Current (DC) (T _A = 25°C)	I _{D(DC)}	±0.5	A
Drain Current (pulse) <small>Note</small>	I _{D(pulse)}	±2.0	A
Total Power Dissipation (T _A = 25°C)	P _T	0.75	W
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

Note PW ≤ 10 μs, Duty Cycle ≤ 1%

Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

EQUIVALENT CIRCUIT



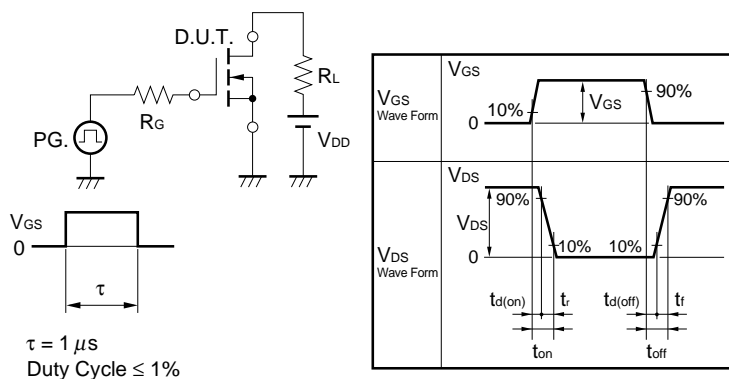
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

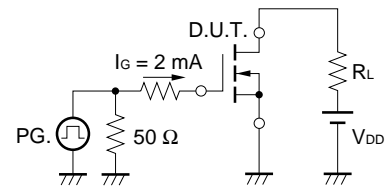
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 250 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.0	1.9	2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 0.25 A	0.55			S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = 10 V, I _D = 0.25 A		3.6	4.5	Ω
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 0.25 A		3.6	5.2	Ω
	R _{DS(on)3}	V _{GS} = 4 V, I _D = 0.25 A		3.6	6.0	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V,		120		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V,		18		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		7		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 125 V, I _D = 0.25 A,		5.5		ns
Rise Time	t _r	V _{GS} = 10 V,		6		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		16.5		ns
Fall Time	t _f			32		ns
Total Gate Charge	Q _G	V _{DD} = 200 V,		5.5		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V,		1		nC
Gate to Drain Charge	Q _{GD}	I _D = 0.5 A		2		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 0.5 A, V _{GS} = 0 V		0.84	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 0.5 A, V _{GS} = 0 V,		55		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		54		nC

Note Pulsed

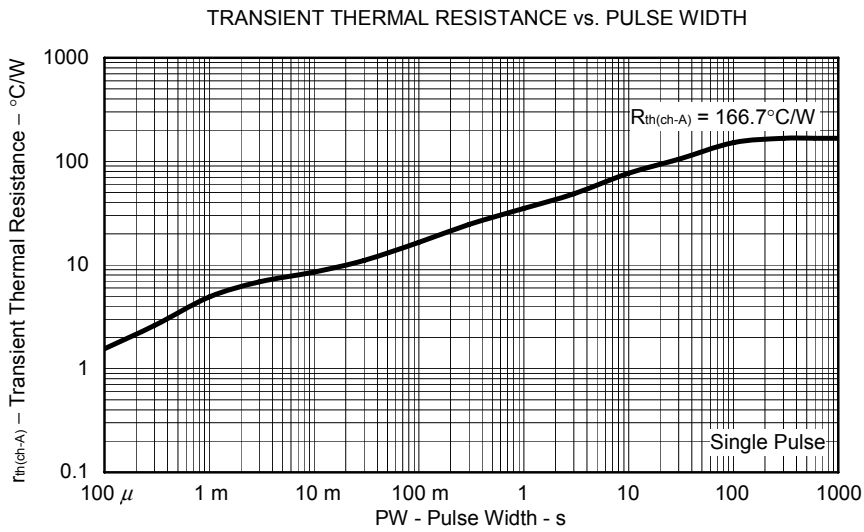
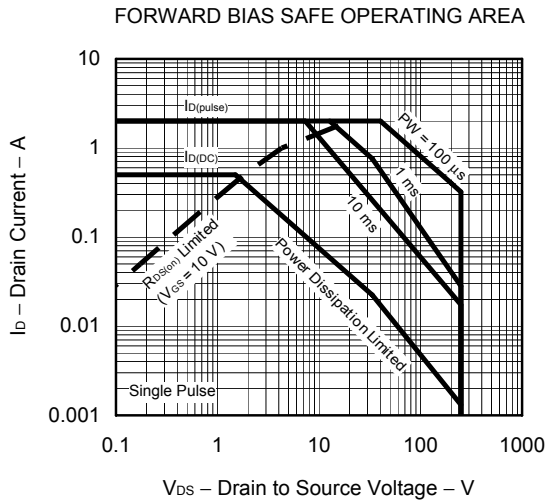
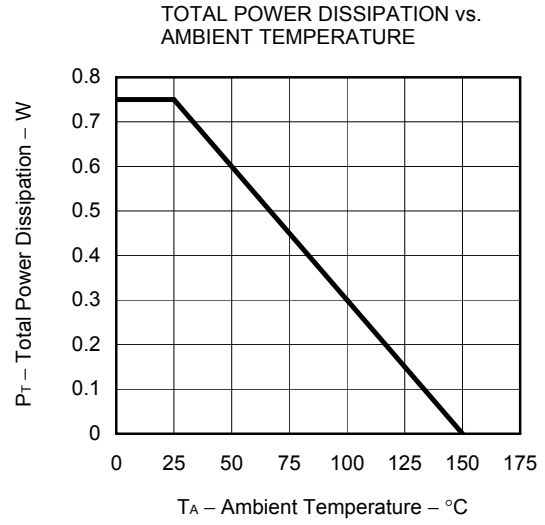
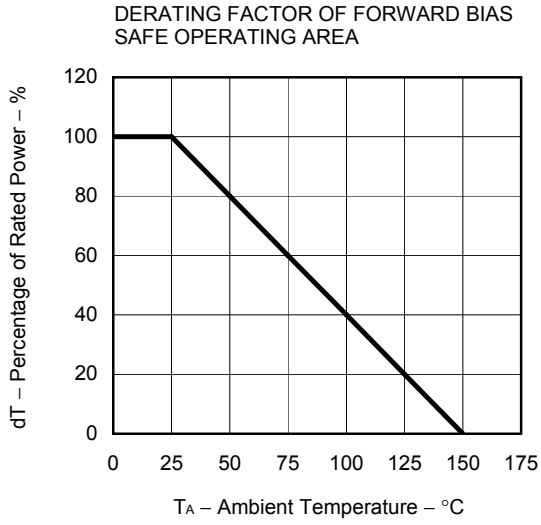
TEST CIRCUIT 1 SWITCHING TIME



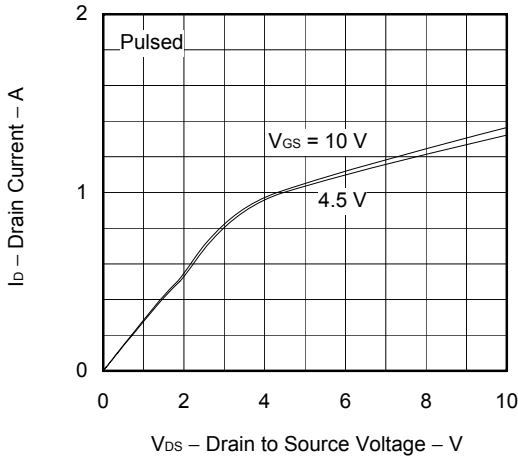
TEST CIRCUIT 2 GATE CHARGE



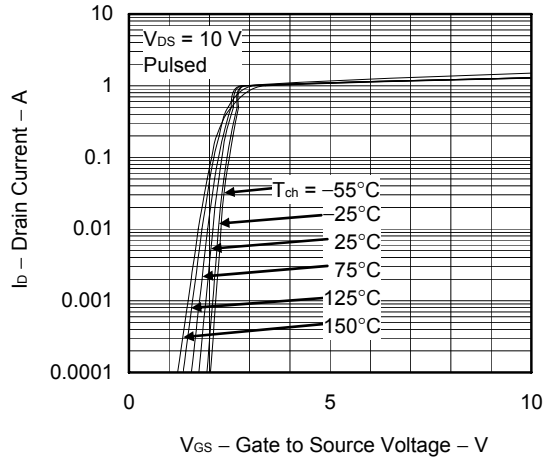
TYPICAL CHARACTERISTICS (T_A = 25°C)



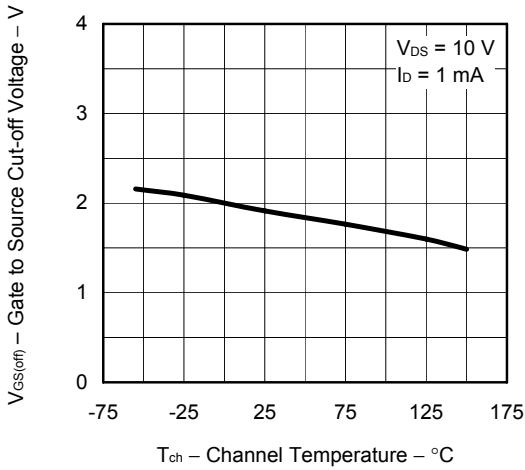
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



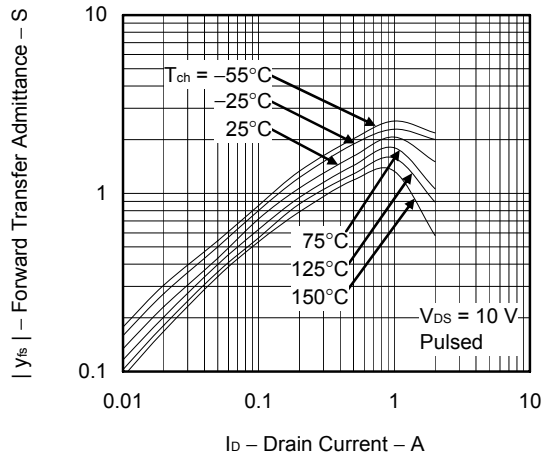
FORWARD TRANSFER CHARACTERISTICS



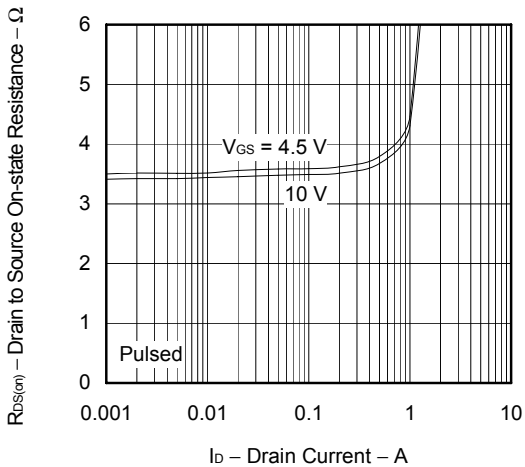
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



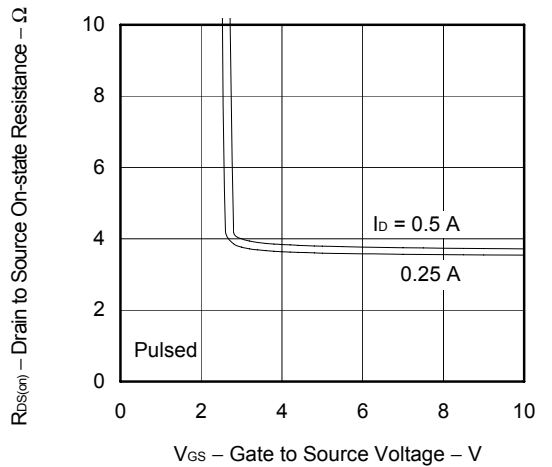
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



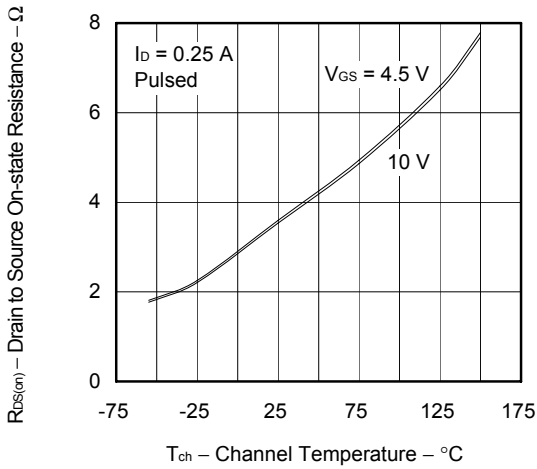
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



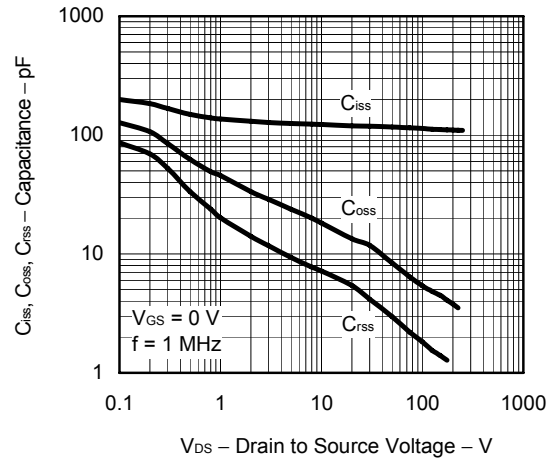
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



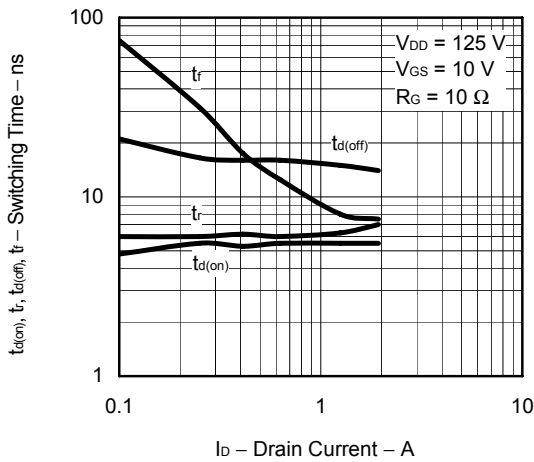
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



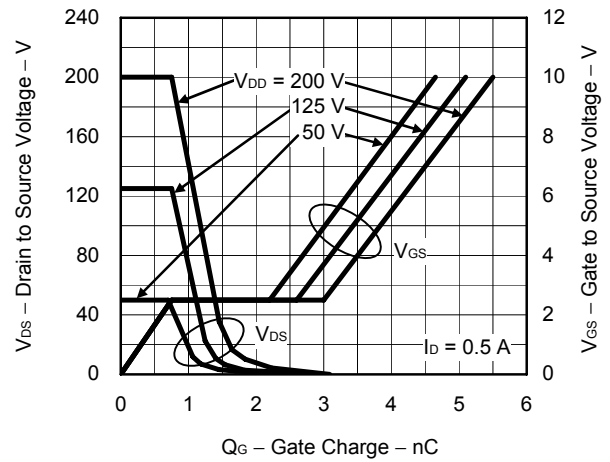
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



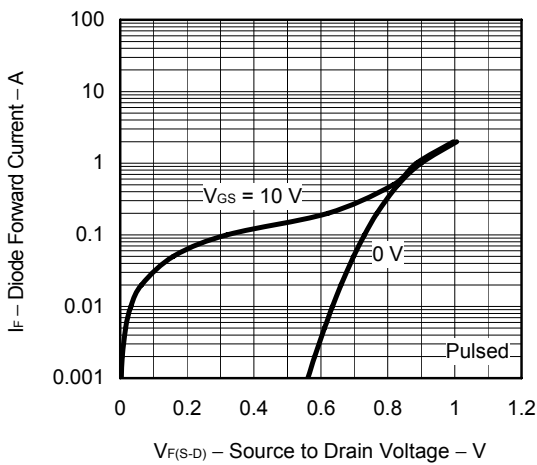
SWITCHING CHARACTERISTICS



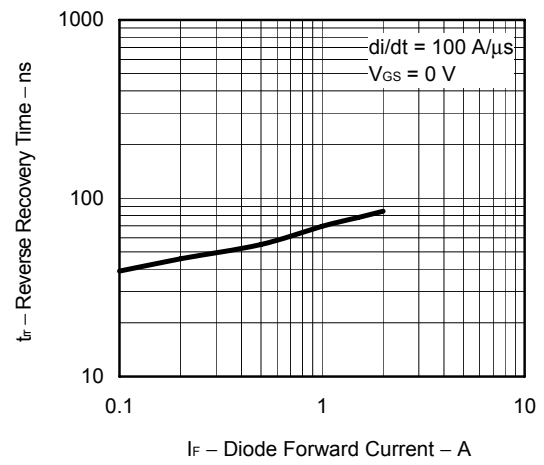
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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