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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RENESAS

DATA SHEET

MOS FIELD EFFECT TRANSISTOR
2SK4147

SWITCHING
N-CHANNEL MOSFET

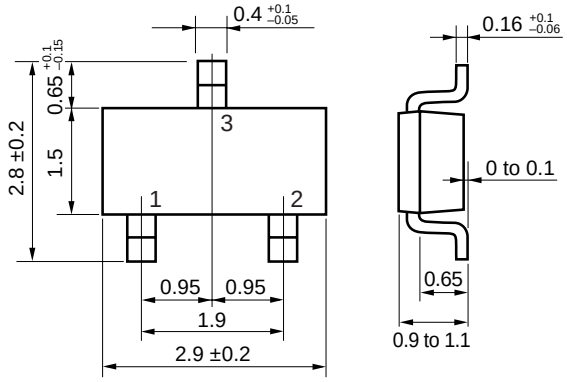
DESCRIPTION

The 2SK4147 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, excelling in the switching characteristics, and providing the small surface mounting outline, the 2SK4147 is ideal for use in high-speed switching of the devices on which space-saving and automation of mounting are promoted.

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
- Small and surface mount package (SC-96)

PACKAGE DRAWING (Unit: mm)



1. Gate
2. Source
3. Drain

ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SK4147-T1B-AT Note	Pure Sn (Tin)	Tape 3000 p/reel	SC-96 (Mini Mold Thin Type) 0.011 g TYP.
2SK4147-T2B-AT Note			

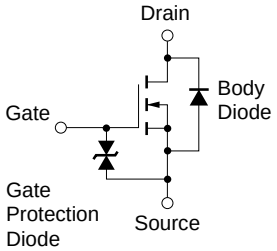
Note Pb-free (This product does not contain Pb in the external electrode and other parts.)

Marking: XR

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) Note1	$I_{D(pulse)}$	±2.0	A
Total Power Dissipation (T_A = 25°C)	P_{T1}	0.2	W
Total Power Dissipation (T_A = 25°C) Note2	P_{T2}	1.25	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%
2. Mounted on FR-4 board of 50 mm x 50 mm x 1.6 mm, t ≤ 5 sec

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.

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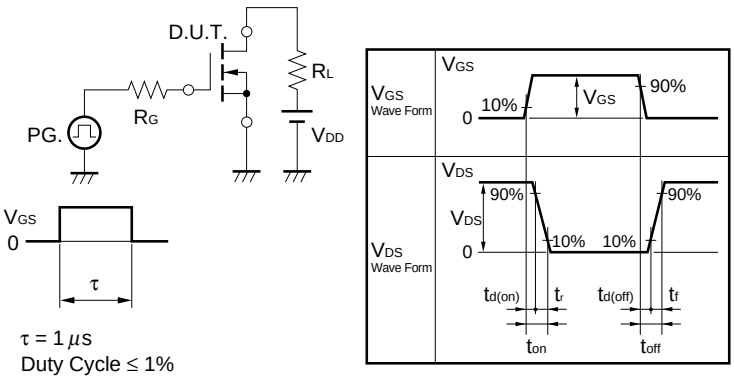
Printed in Japan

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

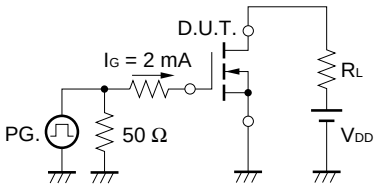
Note Pulsed

TEST CIRCUIT 1 SWITCHING TIME



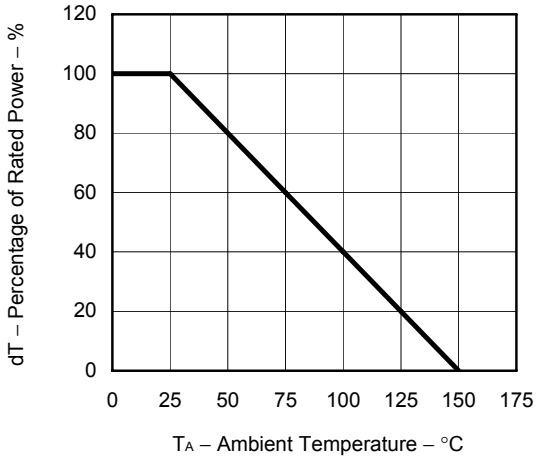
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

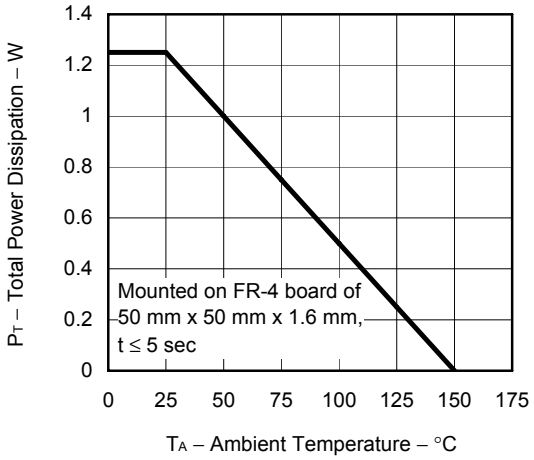


TYPICAL CHARACTERISTICS (T_A = 25°C)

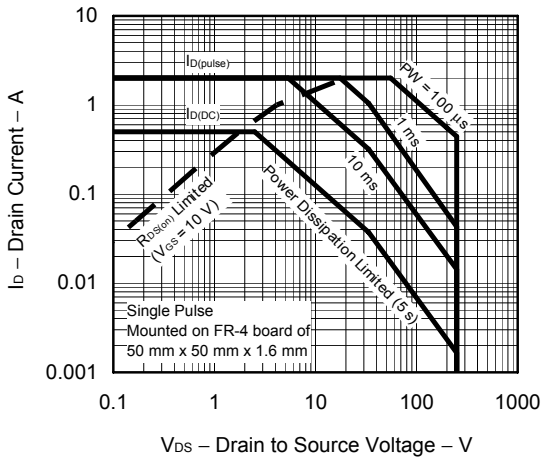
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



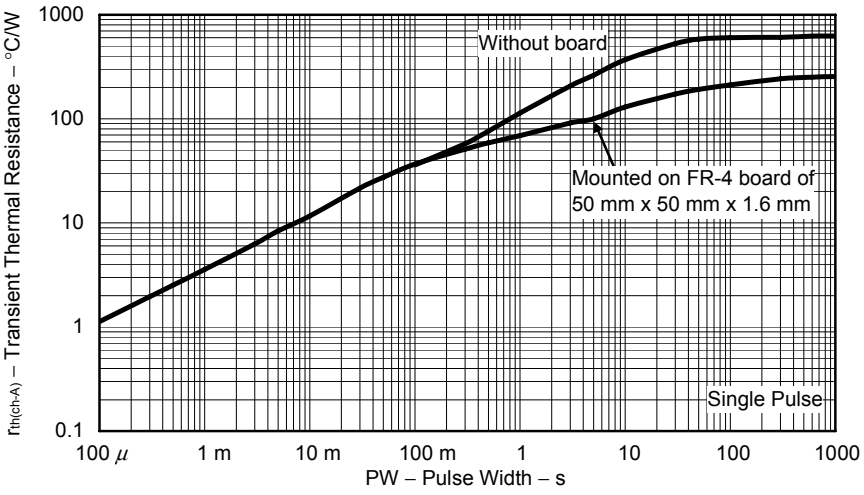
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



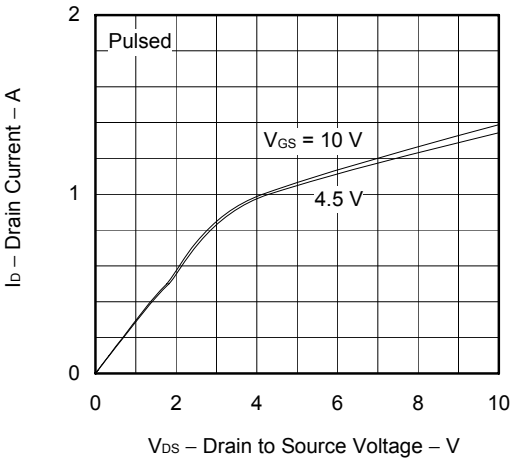
FORWARD BIAS SAFE OPERATING AREA



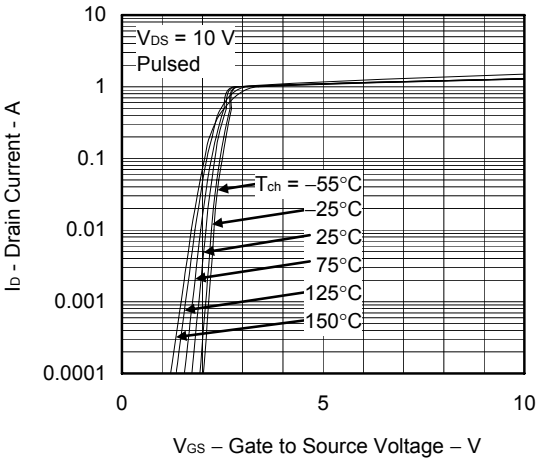
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



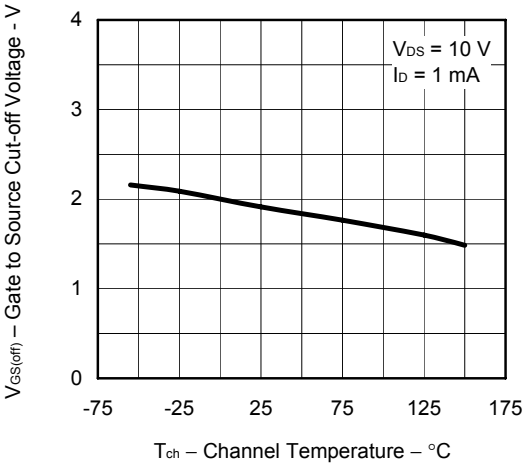
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



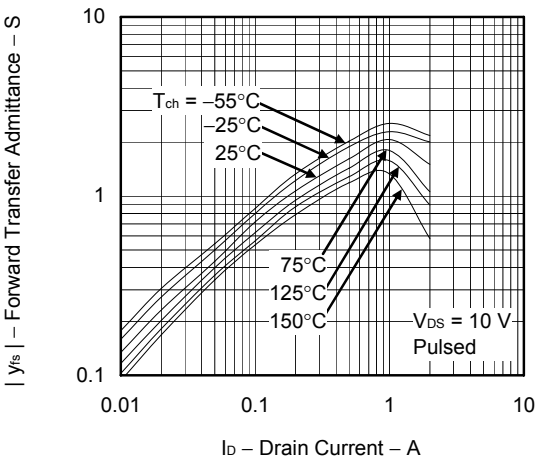
FORWARD TRANSFER CHARACTERISTICS



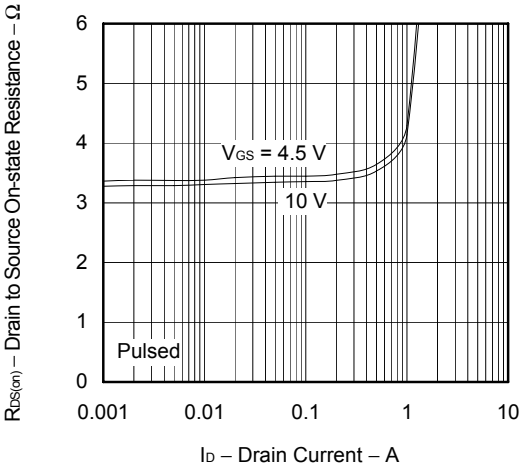
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



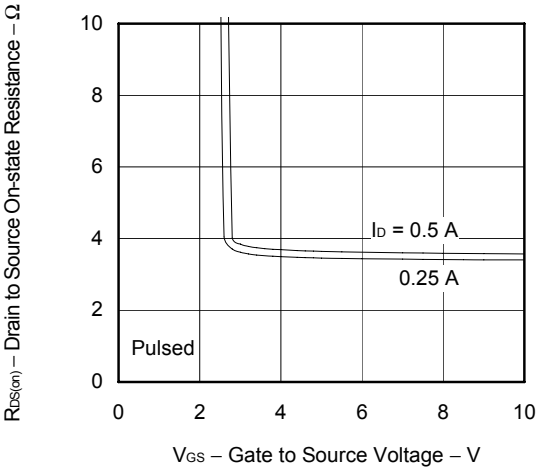
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



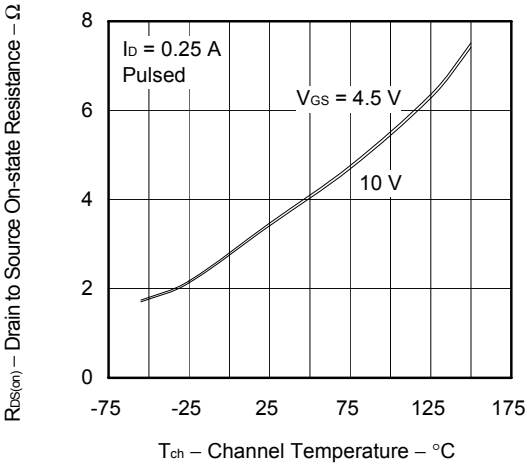
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



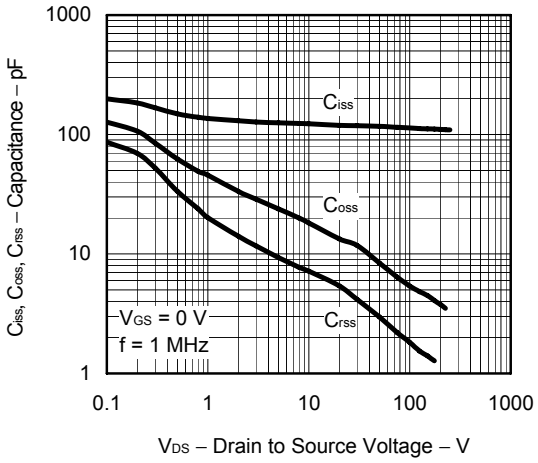
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



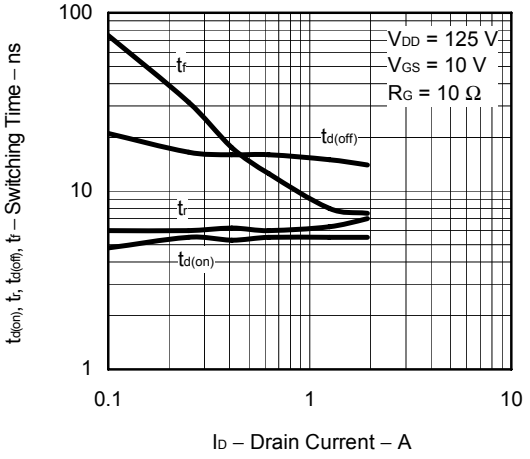
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



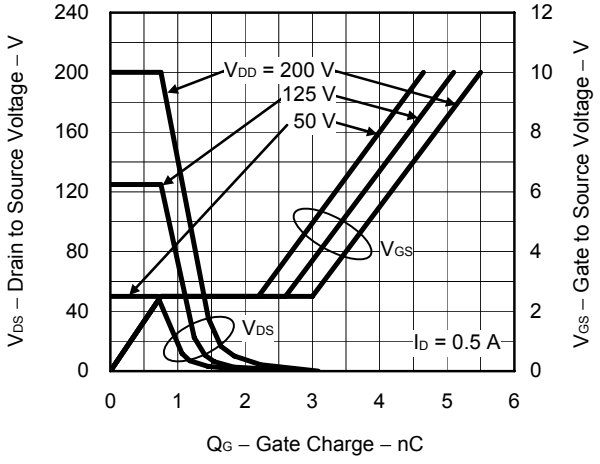
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



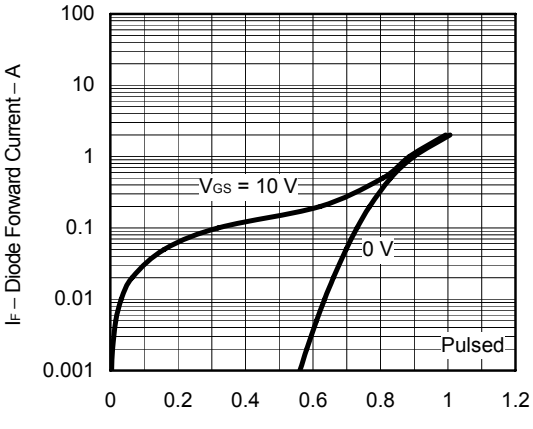
SWITCHING CHARACTERISTICS



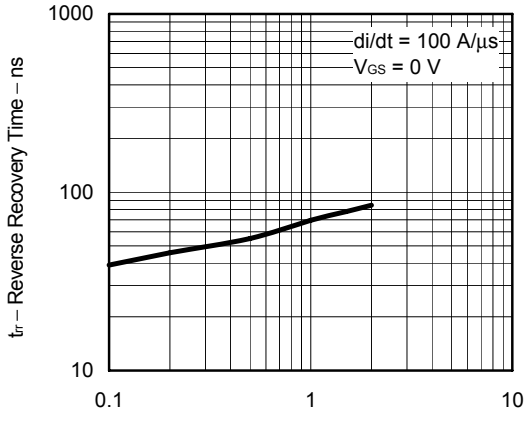
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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