

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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## SWITCHING N-CHANNEL POWER MOS FET

### DESCRIPTION

The 2SK2488 is N-Channel MOS Field Effect Transistors designed for high voltage switching applications.

### FEATURES

- Low on-state resistance  
 $R_{DS(on)} = 1.2 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 5.0 \text{ A)}$
- Low input capacitance  
 $C_{iss} = 2\,900 \text{ pF TYP.}$
- High Avalanche Capability Ratings

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25 \text{ }^\circ\text{C}$ )

Drain to Source Voltage ( $V_{GS} = 0 \text{ V}$ )	$V_{DSS}$	900	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 30$	V
Drain Current (DC)	$I_D(\text{DC})$	$\pm 10$	A
Drain Current (pulse)*	$I_D(\text{pulse})$	$\pm 20$	A
Total Power Dissipation ( $T_c = 25 \text{ }^\circ\text{C}$ )	$P_{T1}$	150	W
Total Power Dissipation ( $T_A = 25 \text{ }^\circ\text{C}$ )	$P_{T2}$	3.0	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Single Avalanche Current**	$I_{AS}$	10	A
Single Avalanche Energy**	$E_{AS}$	294	mJ

\*  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1 \%$

\*\* Starting  $T_{ch} = 25 \text{ }^\circ\text{C}$ ,  $R_G = 25 \Omega$ ,  $V_{GS} = 20 \text{ V} \rightarrow 0$

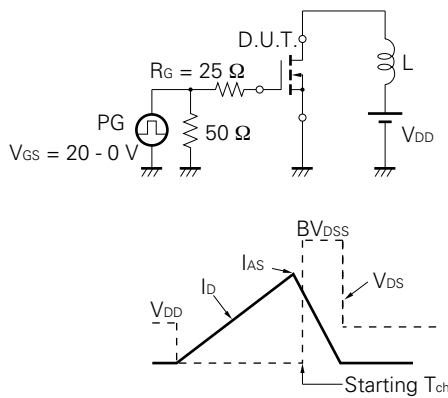
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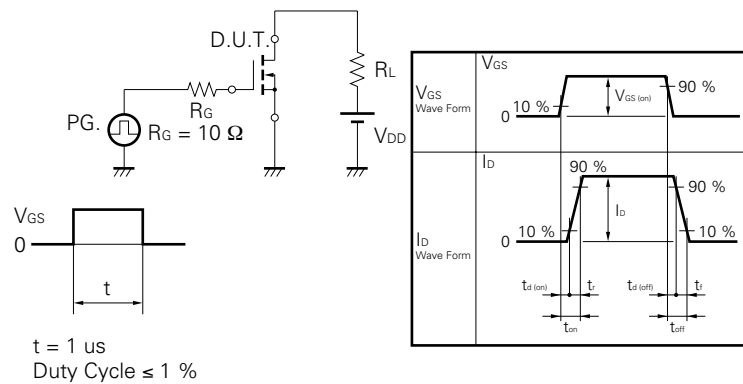
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	R <sub>DS(on)</sub>		1.0	1.2	Ω	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5.0 A
Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	2.5		3.5	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Forward Transfer Admittance	y <sub>fs</sub>	3.5			S	V <sub>DS</sub> = 20 V, I <sub>D</sub> = 5.0 A
Drain Leakage Current	I <sub>DSS</sub>			100	μA	V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0
Gate to Source Leakage Current	I <sub>GSS</sub>			±100	nA	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0
Input Capacitance	C <sub>iss</sub>		2 900		pF	V <sub>DS</sub> = 10 V
Output Capacitance	C <sub>oss</sub>		400		pF	V <sub>GS</sub> = 0
Reverse Transfer Capacitance	C <sub>rss</sub>		70		pF	f = 1 MHz
Turn-On Delay Time	t <sub>d(on)</sub>		35		ns	I <sub>D</sub> = 5.0 A
Rise Time	t <sub>r</sub>		30		ns	V <sub>GS</sub> = 10 V
Turn-Off Delay Time	t <sub>d(off)</sub>		160		ns	V <sub>DD</sub> = 150 V
Fall Time	t <sub>f</sub>		32		ns	R <sub>G</sub> = 10 Ω
Total Gate Charge	Q <sub>G</sub>		90		nC	I <sub>D</sub> = 10 A
Gate to Source Charge	Q <sub>GS</sub>		16		nC	V <sub>DD</sub> = 450 V
Gate to Drain Charge	Q <sub>GD</sub>		40		nC	V <sub>GS</sub> = 10 V
Body Diode Forward Voltage	V <sub>F(S-D)</sub>		1.0		V	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0
Reverse Recovery Time	t <sub>rr</sub>		990		ns	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0
Reverse Recovery Charge	Q <sub>rr</sub>		7.0		μC	di/dt = 50 A/μs

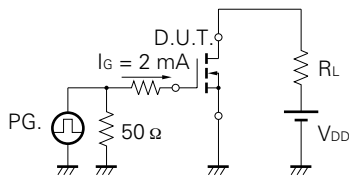
**Test Circuit 1 Avalanche Capability**



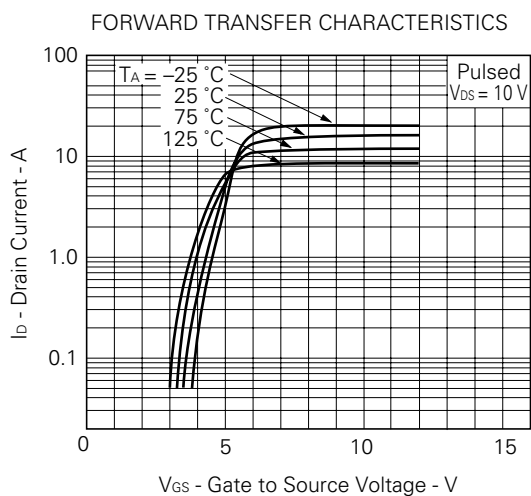
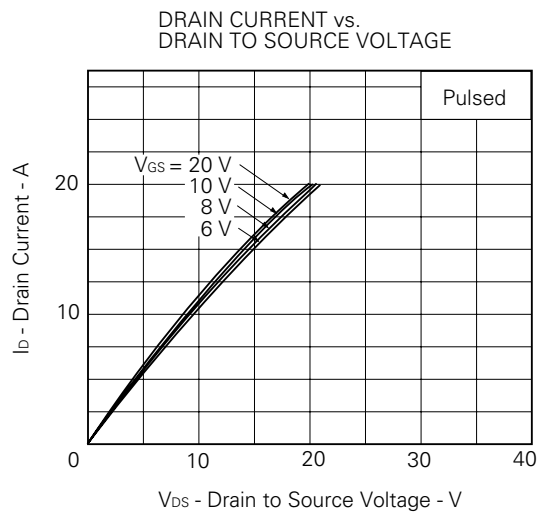
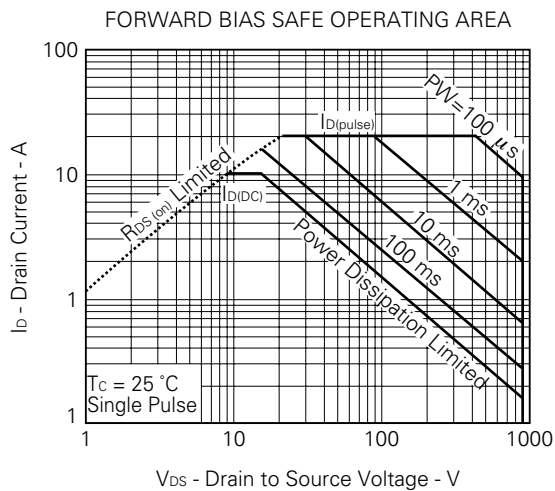
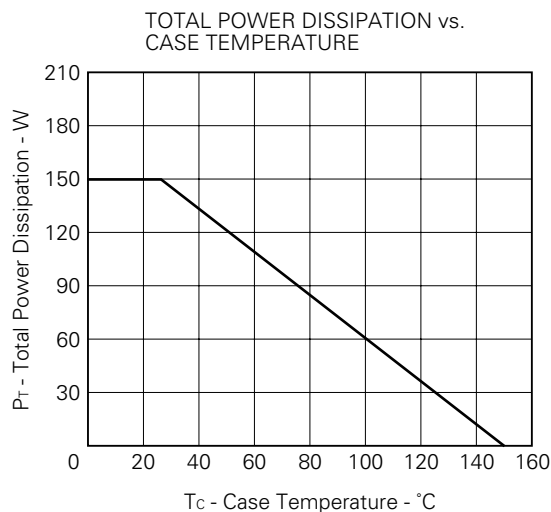
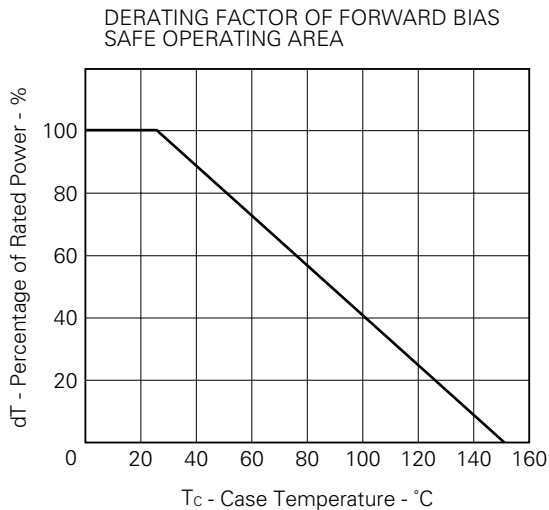
**Test Circuit 2 Switching Time**



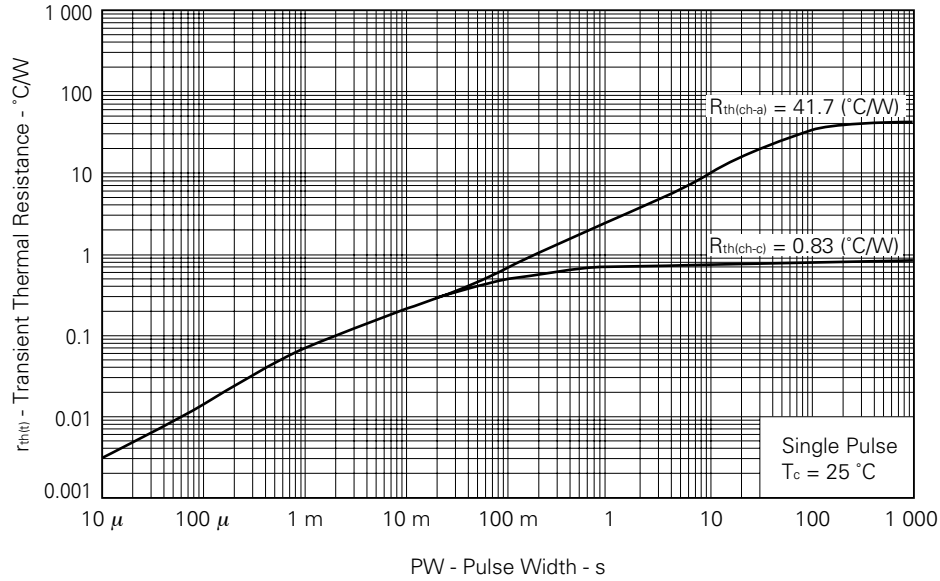
**Test Circuit 3 Gate Charge**



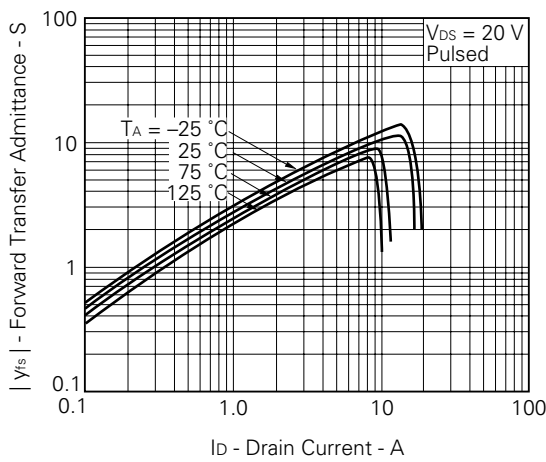
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



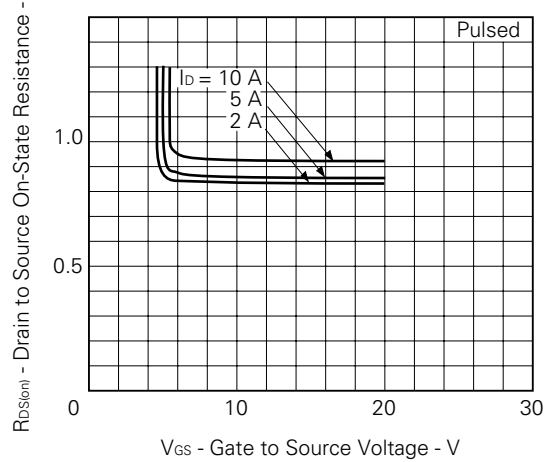
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



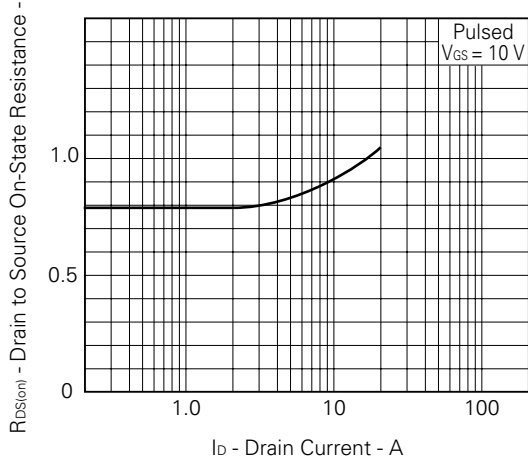
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



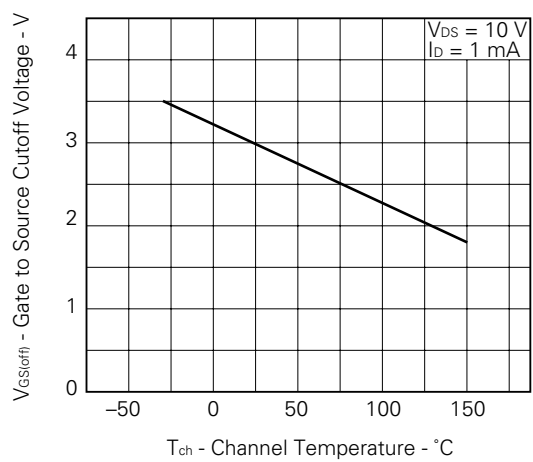
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



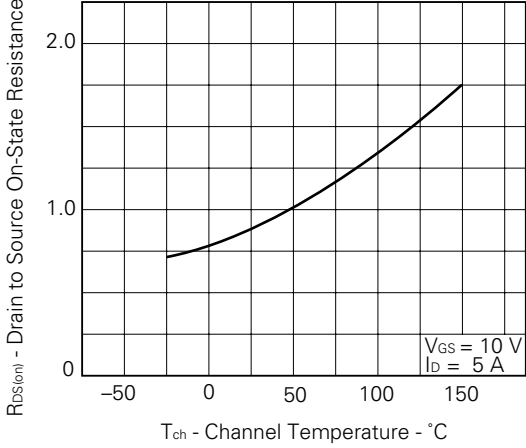
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



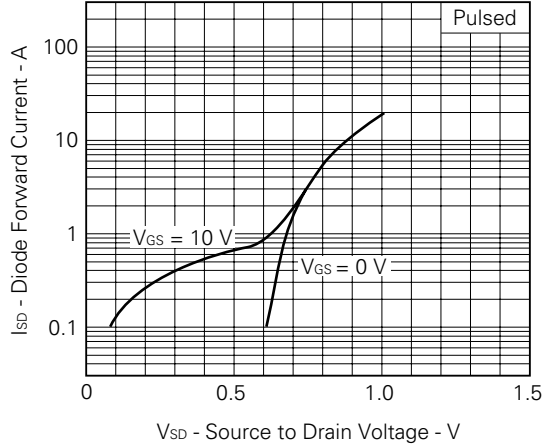
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



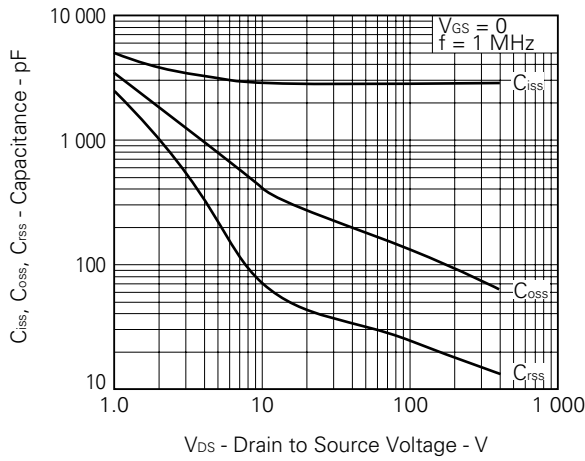
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



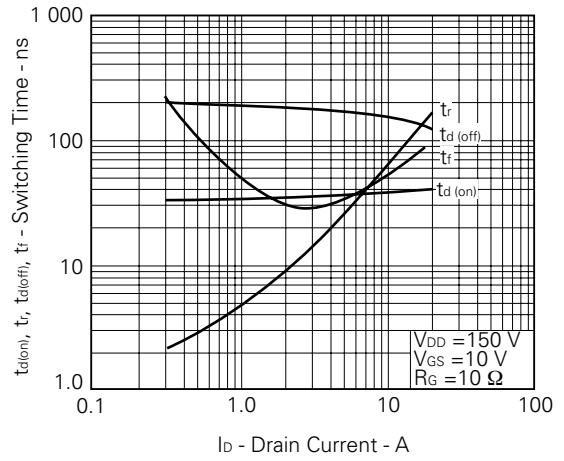
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



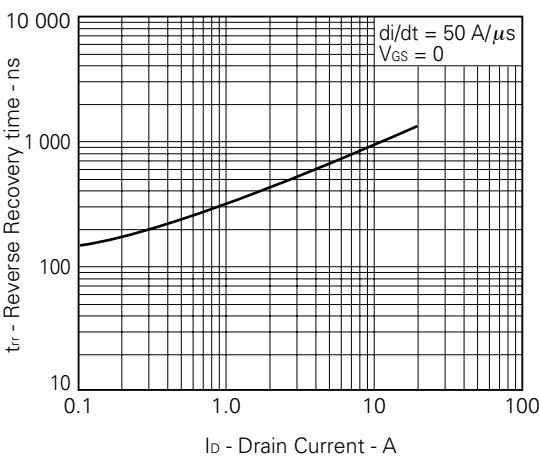
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



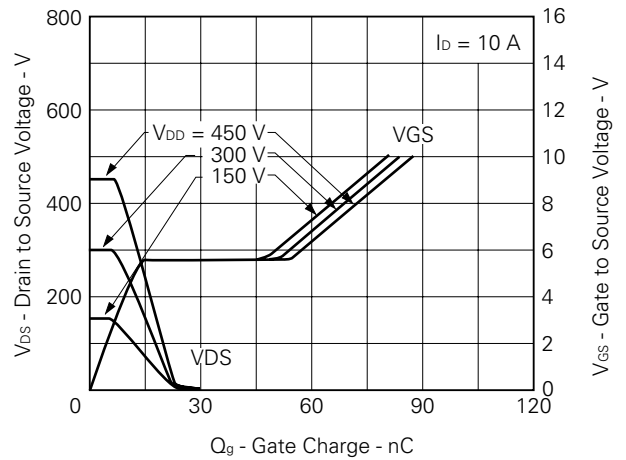
SWITCHING CHARACTERISTICS



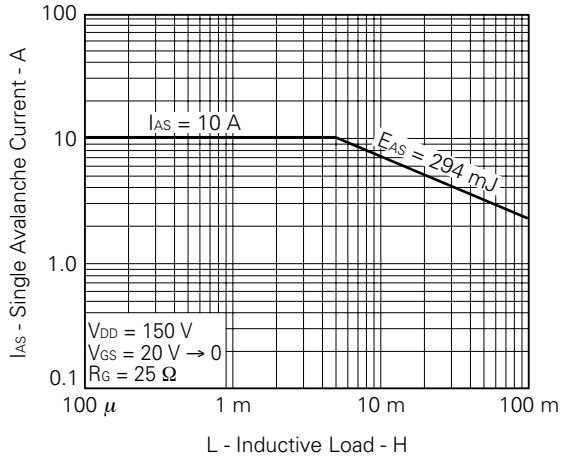
REVERSE RECOVERY TIME vs. DRAIN CURRENT



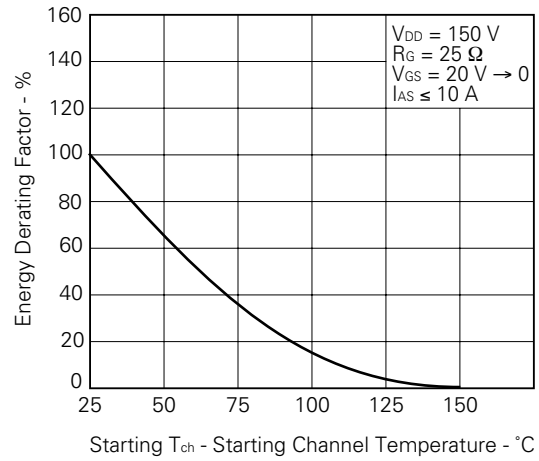
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



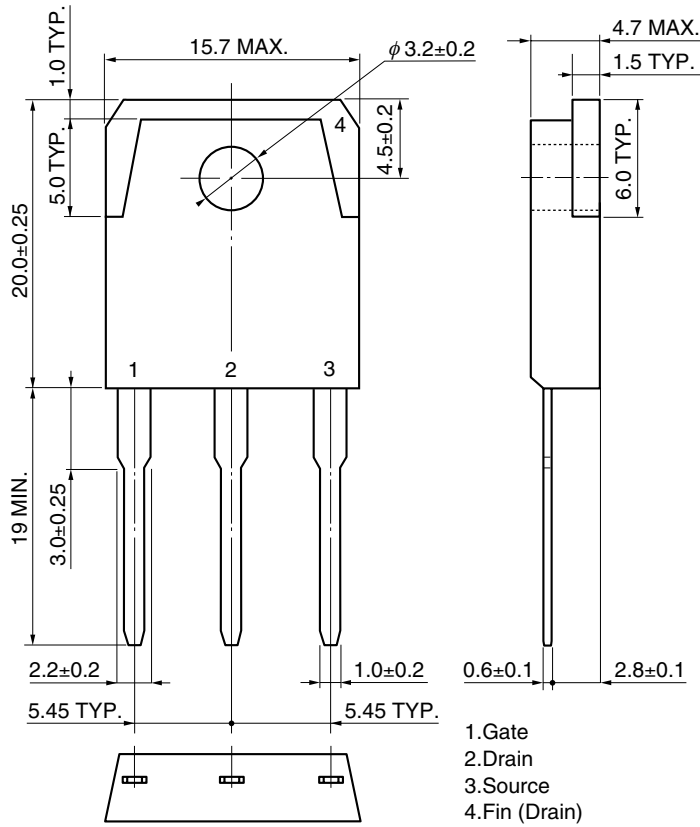
SINGLE AVALANCHE ENERGY DERATING FACTOR



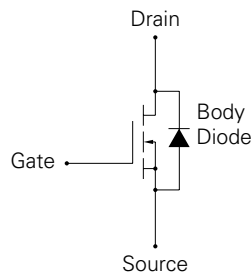


PACKAGE DRAWING (Unit: mm)

<R> TO-3P (MP-88)



EQUIVALENT CIRCUIT



**Remark** Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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