

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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EOL announced Product

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## SWITCHING

### N-CHANNEL POWER MOS FET

#### DESCRIPTION

The 2SK2515 is N-Channel MOS Field Effect Transistors designed for high current switching applications.

#### FEATURES

- Super Low on-state resistance  
 $R_{DS(on)1} = 9.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 25 \text{ A)}$   
 $R_{DS(on)2} = 14 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4 \text{ V, } I_D = 25 \text{ A)}$
- Low input capacitance  
 $C_{iss} = 3\,400 \text{ pF TYP.}$
- Built-in G-S Protection Diode

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

Drain to Source Voltage ( $V_{GS} = 0 \text{ V}$ )	$V_{DSS}$	60	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 20$	V
Drain Current (DC)	$I_D \text{ (DC)}$	$\pm 50$	A
Drain Current (pulse)*	$I_D \text{ (pulse)}$	$\pm 200$	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**	$I_{AS}$	50	A
Single Avalanche Energy**	$E_{AS}$	250	mJ

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

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

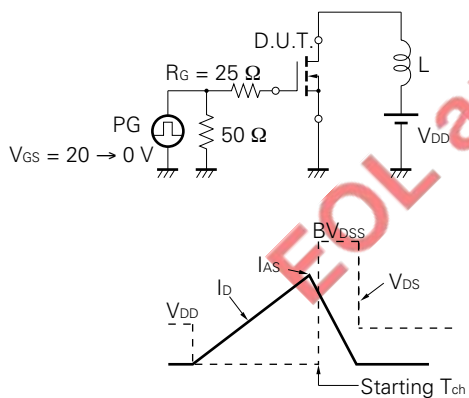
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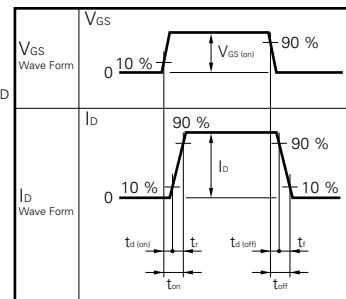
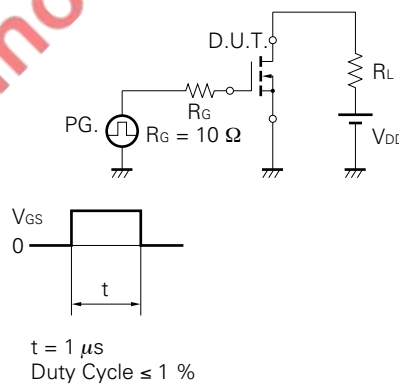
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	R <sub>DS(on)1</sub>		7.3	9.0	mΩ	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A
Drain to Source On-Resistance	R <sub>DS(on)2</sub>		11	14	mΩ	V <sub>GS</sub> = 4 V, I <sub>D</sub> = 25 A
Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	1.0	1.5	2.0	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Forward Transfer Admittance	y <sub>fs</sub>	20	58		S	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 25 A
Drain Leakage Current	I <sub>DSS</sub>			10	μA	V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0
Gate to Source Leakage Current	I <sub>GSS</sub>			±10	μA	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0
Input Capacitance	C <sub>iss</sub>		3 400		pF	V <sub>DS</sub> = 10 V
Output Capacitance	C <sub>oss</sub>		1 600		pF	V <sub>GS</sub> = 0
Reverse Transfer Capacitance	C <sub>rss</sub>		770		pF	f = 1 MHz
Turn-On Delay Time	t <sub>d(on)</sub>		55		ns	I <sub>D</sub> = 25 A
Rise Time	t <sub>r</sub>		360		ns	V <sub>GS(on)</sub> = 10 V
Turn-Off Delay Time	t <sub>d(off)</sub>		480		ns	V <sub>DD</sub> = 30 V
Fall Time	t <sub>f</sub>		360		ns	R <sub>G</sub> = 10 Ω
Total Gate Charge	Q <sub>G</sub>		152		nC	I <sub>D</sub> = 50 A
Gate to Source Charge	Q <sub>GS</sub>		11		nC	V <sub>DD</sub> = 48 V
Gate to Drain Charge	Q <sub>GD</sub>		60		nC	V <sub>GS</sub> = 10 V
Body Diode Forward Voltage	V <sub>F(S-D)</sub>		0.92		V	I <sub>F</sub> = 50 A, V <sub>GS</sub> = 0
Reverse Recovery Time	t <sub>rr</sub>		105		ns	I <sub>F</sub> = 50 A, V <sub>GS</sub> = 0
Reverse Recovery Charge	Q <sub>rr</sub>		265		nC	di/dt = 100 A/μs

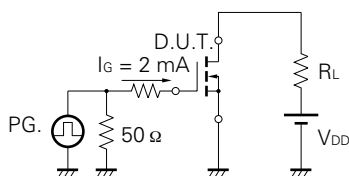
**Test Circuit 1 Avalanche Capability**



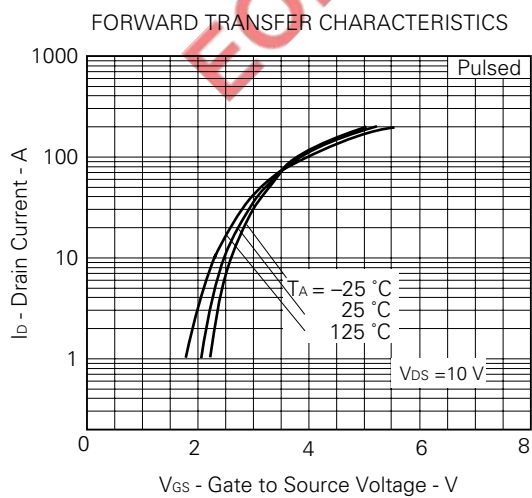
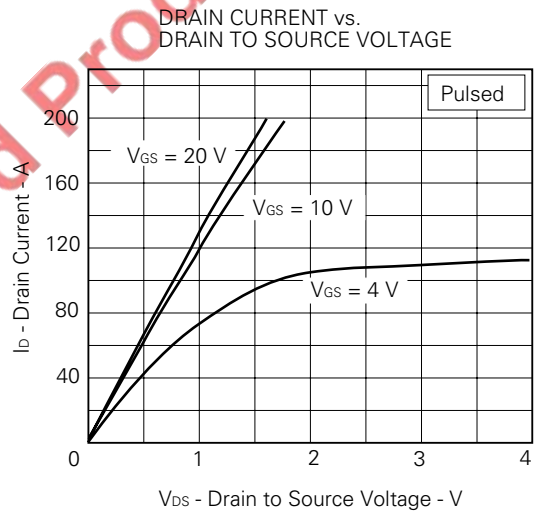
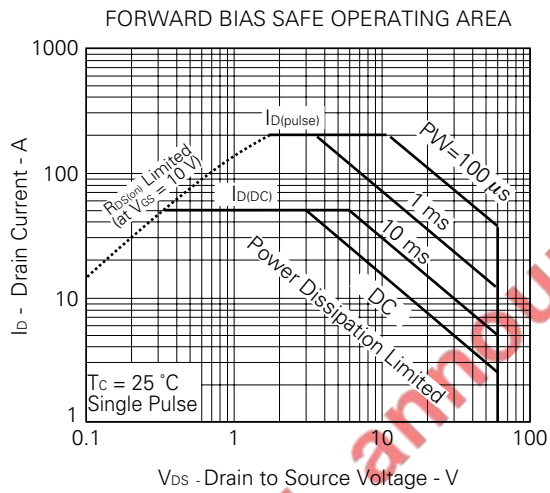
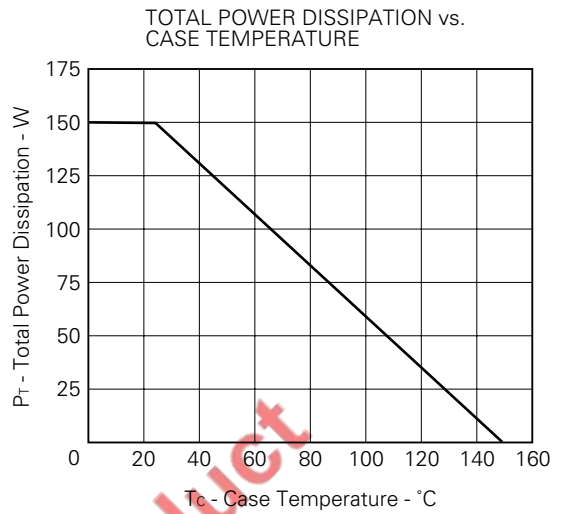
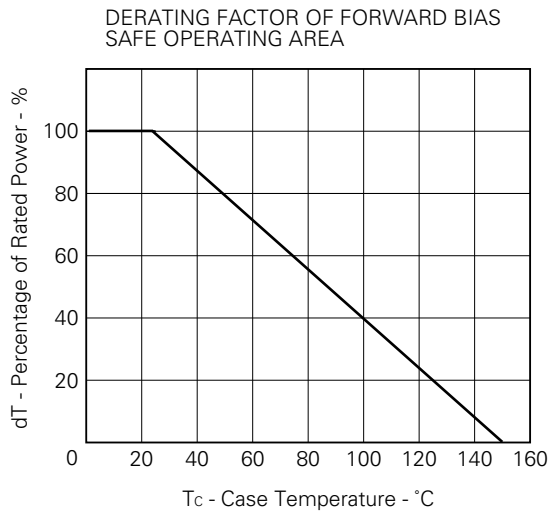
**Test Circuit 2 Switching Time**



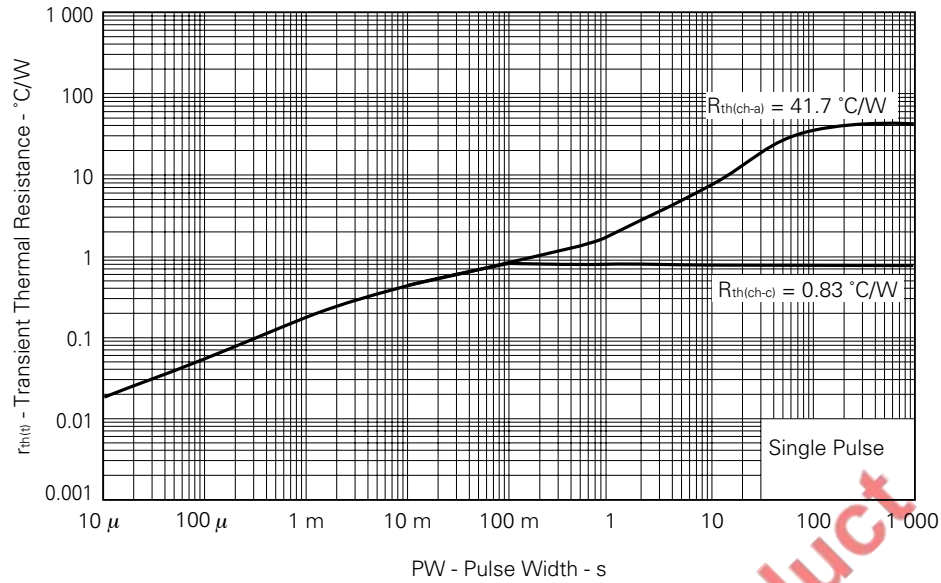
**Test Circuit 3 Gate Charge**



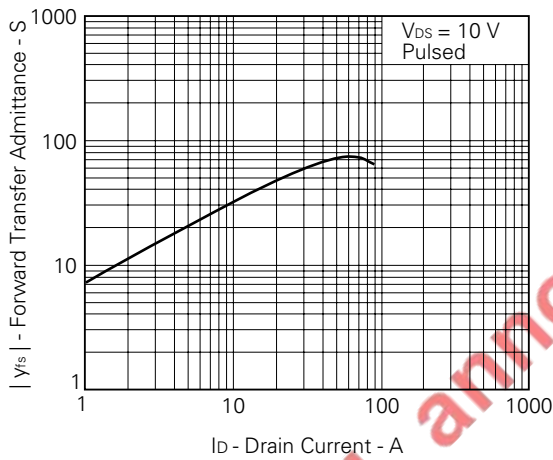
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



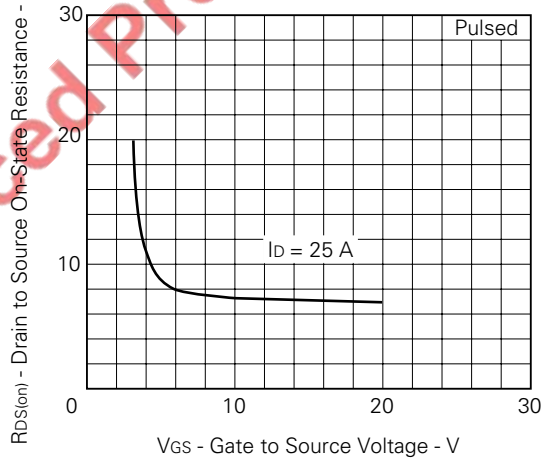
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



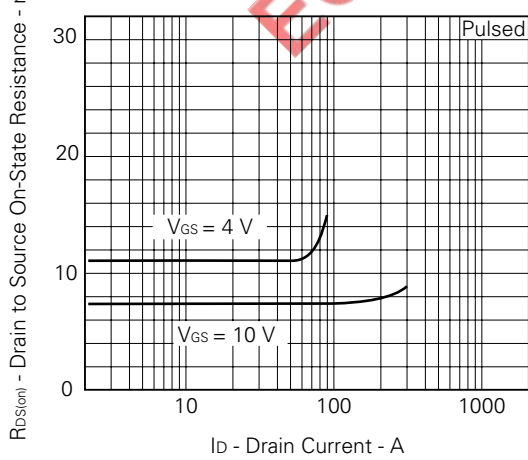
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



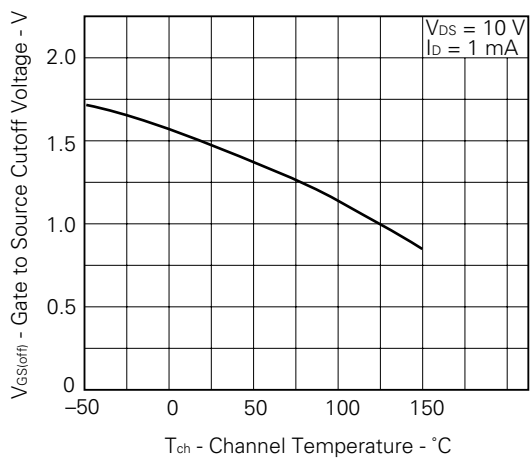
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



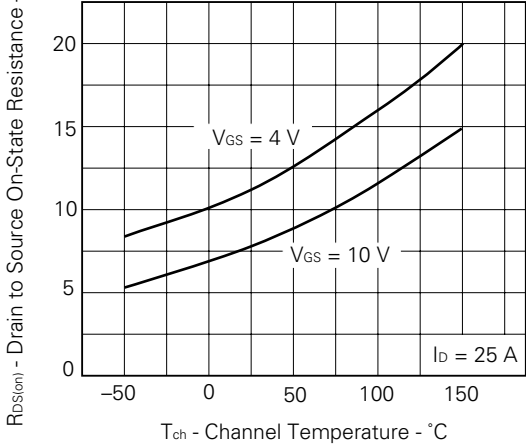
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



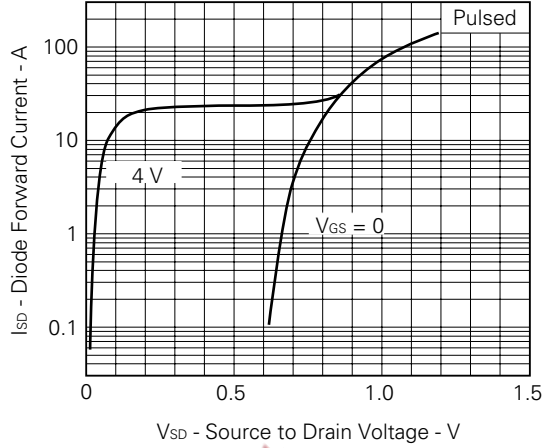
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



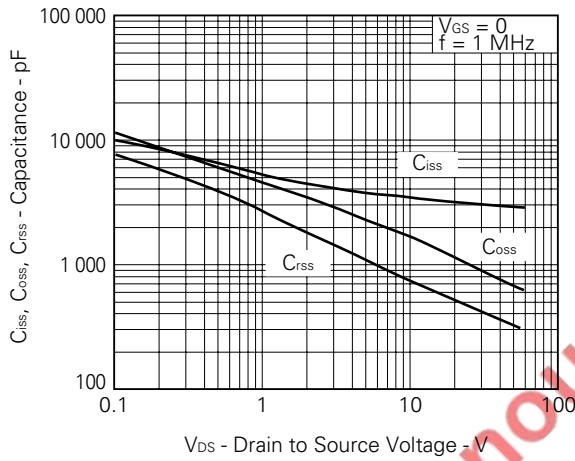
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



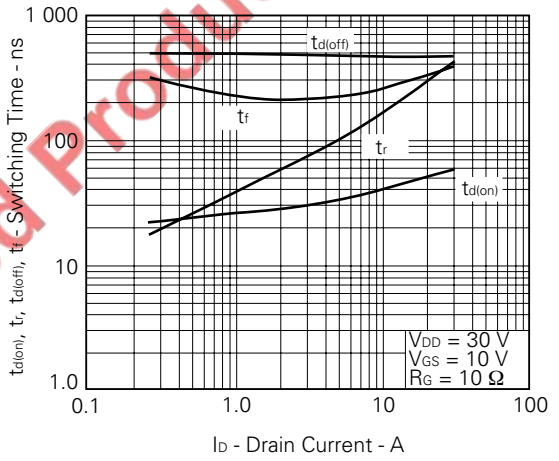
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



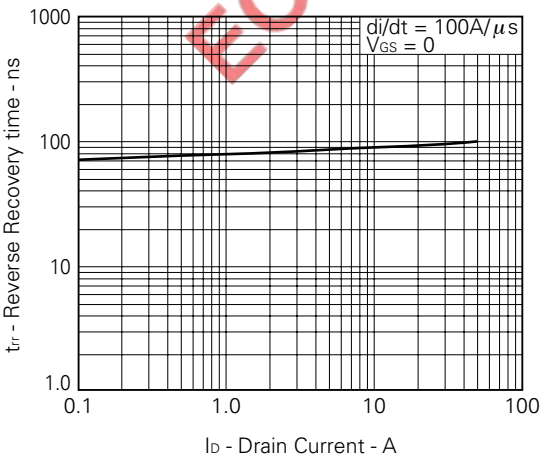
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



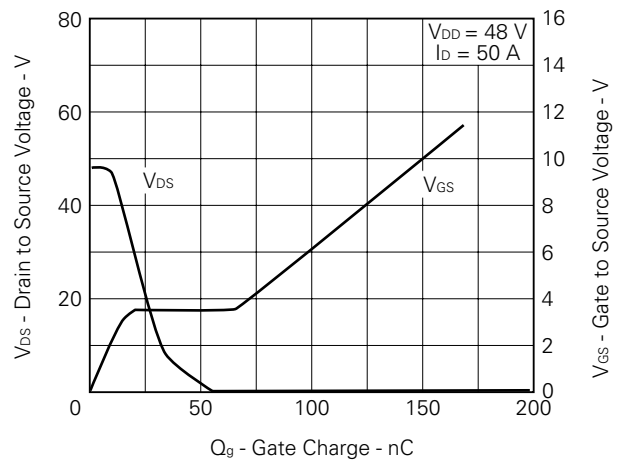
SWITCHING CHARACTERISTICS



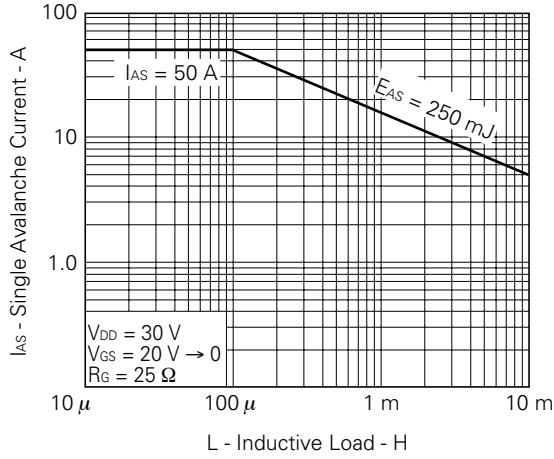
REVERSE RECOVERY TIME vs. DRAIN CURRENT



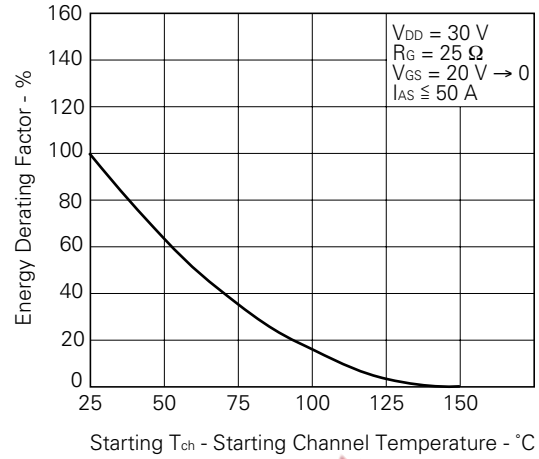
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY DERATING FACTOR

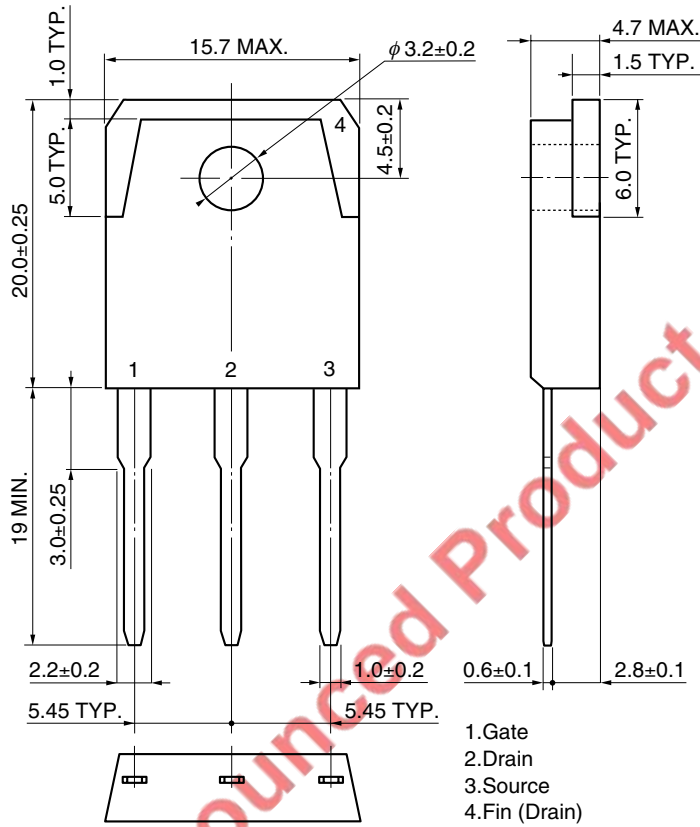


EOL announced Product

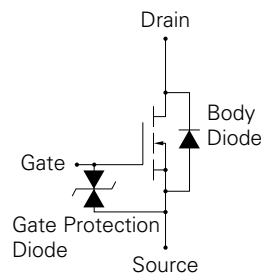


PACKAGE DRAWING (Unit: mm)

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



EQUIVALENT CIRCUIT



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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