

## SWITCHING N-CHANNEL POWER MOS FET

### DESCRIPTION

These products are N-Channel MOS Field Effect Transistors designed for high voltage switching applications.

### FEATURES

- Low on-state resistance  
2SK2371:  $R_{DS(on)} = 0.25 \Omega$  MAX. ( $V_{GS} = 13 \text{ V}$ ,  $I_D = 10 \text{ A}$ )  
2SK2372:  $R_{DS(on)} = 0.27 \Omega$  MAX. ( $V_{GS} = 13 \text{ V}$ ,  $I_D = 10 \text{ A}$ )
- Low input capacitance  
 $C_{iss} = 3600 \text{ pF}$  TYP.
- High Avalanche Capability Ratings

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

Drain to Source Voltage ( $V_{GS} = 0 \text{ V}$ ) (2SK2371/2372)	$V_{DSS}$	450/500	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 30$	V
Drain Current (DC)	$I_D$ (DC)	$\pm 25$	A
Drain Current (pulse)*	$I_D$ (pulse)	$\pm 100$	A
Total Power Dissipation ( $T_c = 25^\circ\text{C}$ )	$P_{T1}$	160	W
Total Power Dissipation ( $T_A = 25^\circ\text{C}$ )	$P_{T2}$	3.0	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Single Avalanche Current**	$I_{AS}$	25	A
Single Avalanche Energy**	$E_{AS}$	446	mJ

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

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

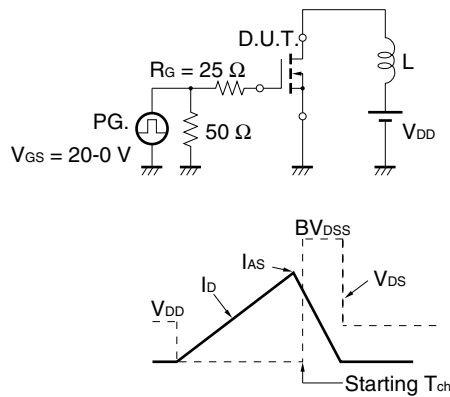
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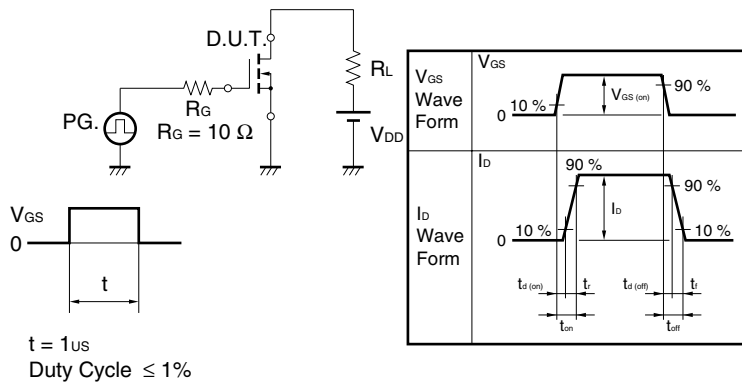
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	R <sub>DS(on)</sub>		0.20	0.25	Ω	V <sub>GS</sub> = 10 V
			0.23	0.27		I <sub>D</sub> = 13 A
Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	2.5	3.0	3.5	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Forward Transfer Admittance	y <sub>fs</sub>	8.0	13		S	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 13 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>		3600		pF	V <sub>DS</sub> = 10 V
Output Capacitance	C <sub>oss</sub>		700		pF	V <sub>GS</sub> = 0
Reverse Transfer Capacitance	C <sub>rss</sub>		50		pF	f = 1 MHz
Turn-On Delay Time	t <sub>d(on)</sub>		40		ns	I <sub>D</sub> = 13 A
Rise Time	t <sub>r</sub>		70		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>		60		ns	R <sub>G</sub> = 10 Ω
Total Gate Charge	Q <sub>G</sub>		95		nC	I <sub>D</sub> = 25 A
Gate to Source Charge	Q <sub>GS</sub>		20		nC	V <sub>DD</sub> = 400 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> = 25 A, V <sub>GS</sub> = 0
Reverse Recovery Time	t <sub>rr</sub>		500		ns	I <sub>F</sub> = 25 A, V <sub>GS</sub> = 0
Reverse Recovery Charge	Q <sub>rr</sub>		4.5		μC	di/dt = 50 A/μs

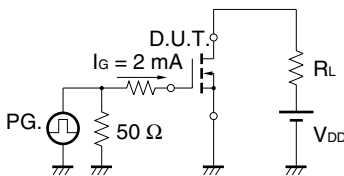
**Test Circuit 1 Avalanche Capability**



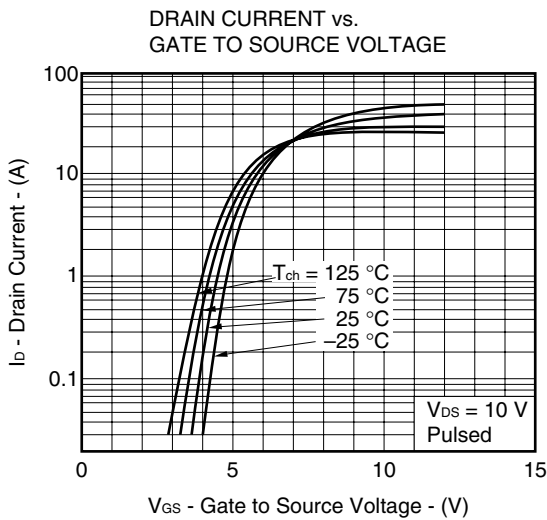
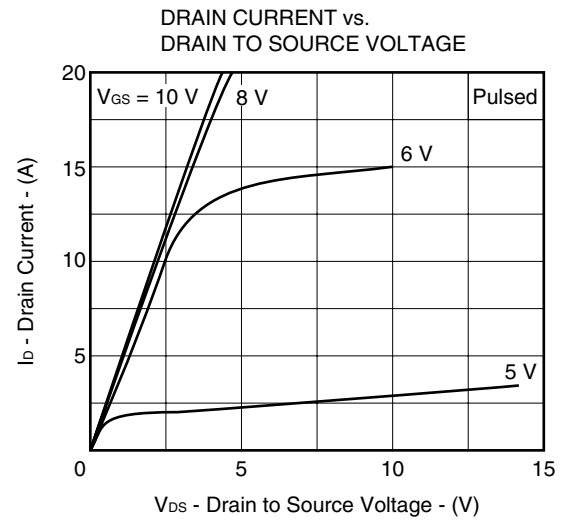
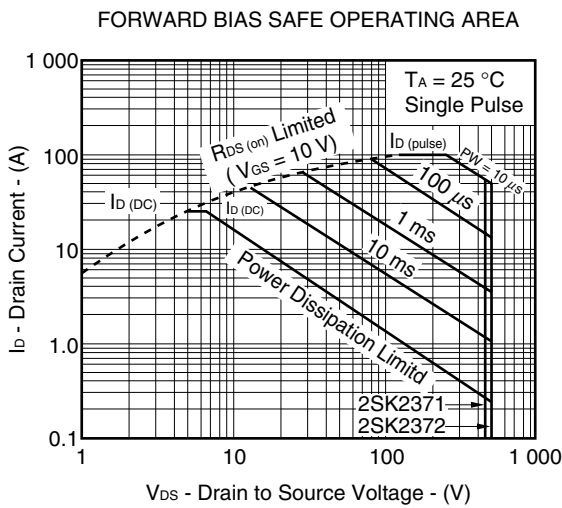
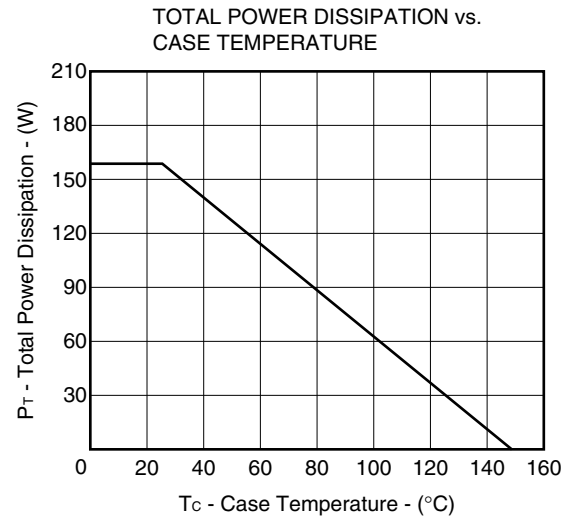
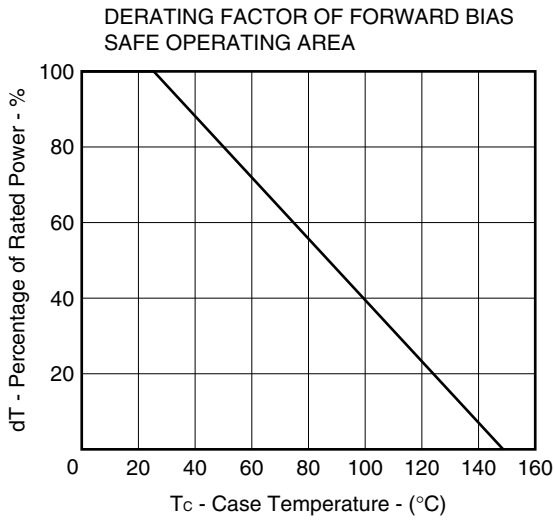
**Test Circuit 2 Switching Time**



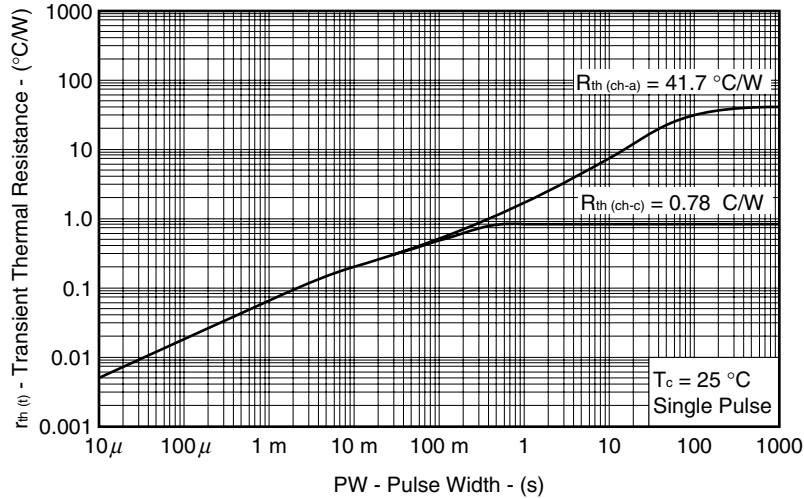
**Test Circuit 3 Gate Charge**



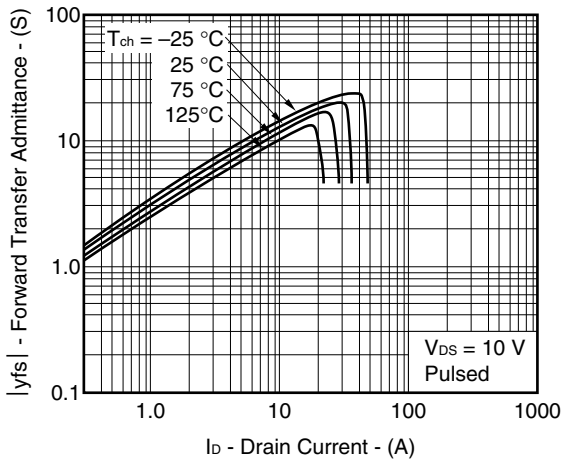
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



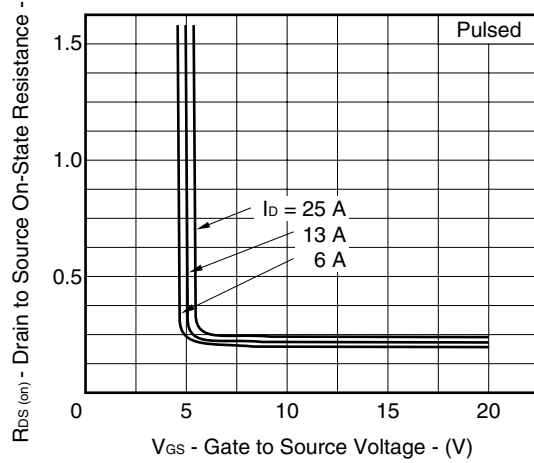
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



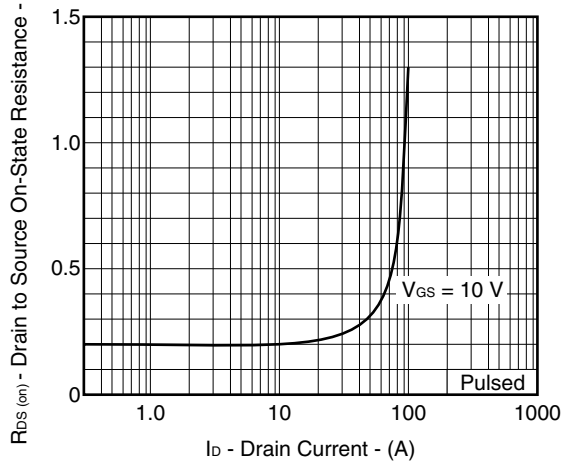
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



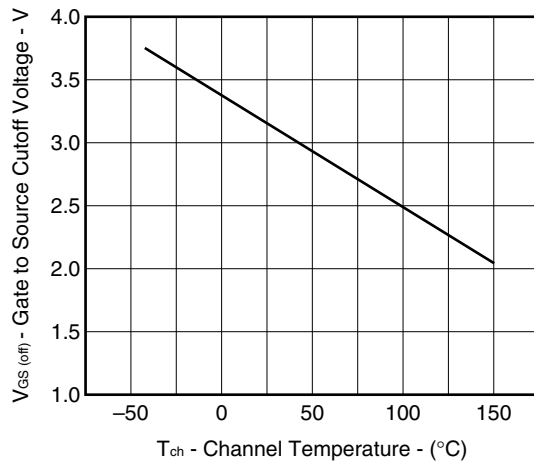
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

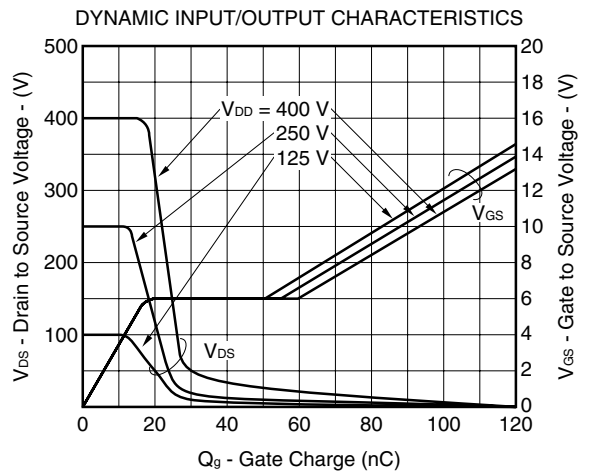
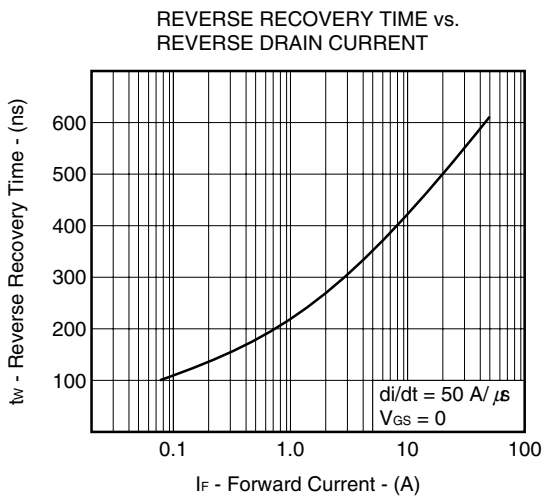
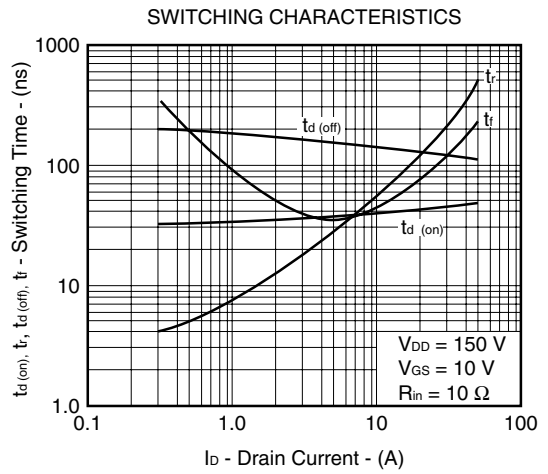
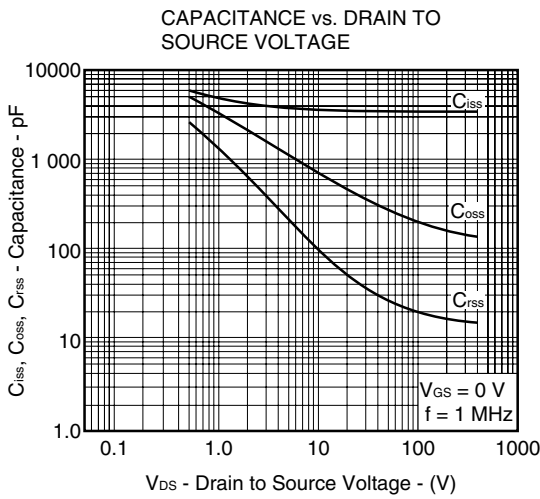
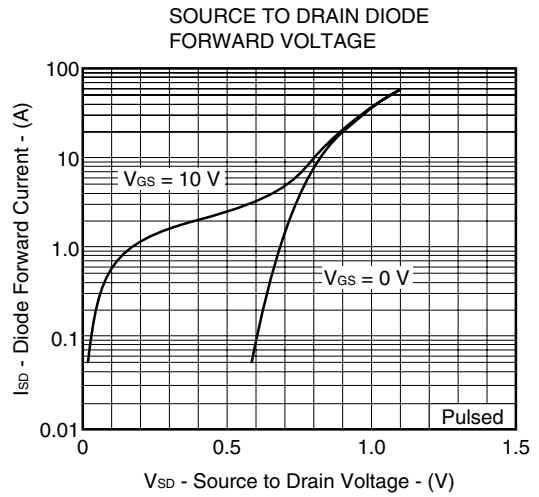
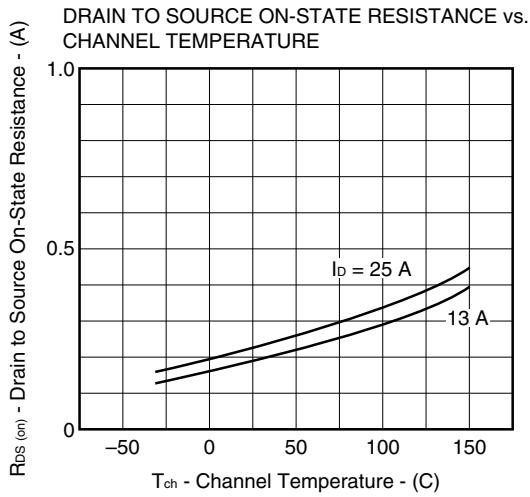


DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

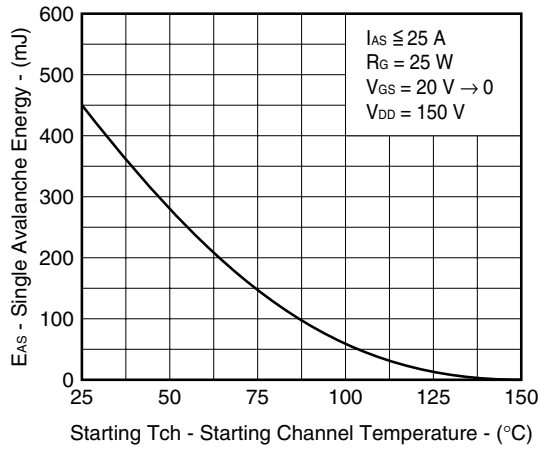


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE

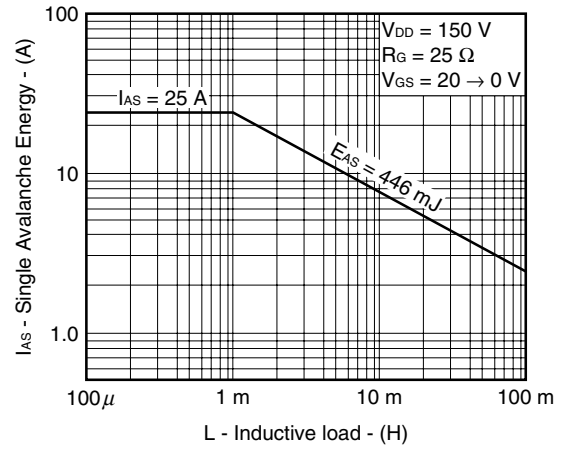




SINGLE AVALANCHE ENERGY vs.  
STARTING CHANNEL TEMPERATURE

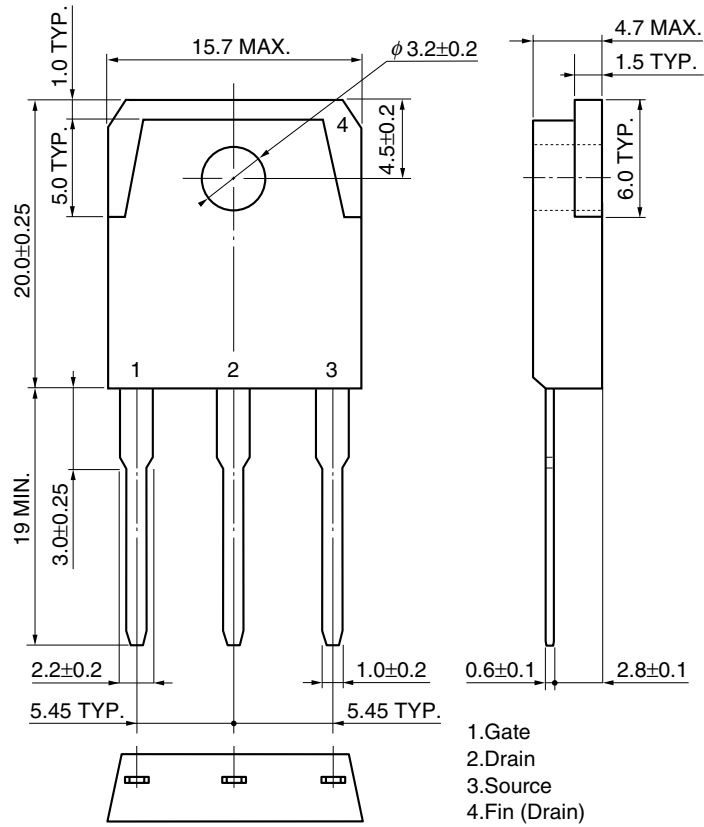


SINGLE AVALANCHE ENERGY vs.  
INDUCTIVE LOAD

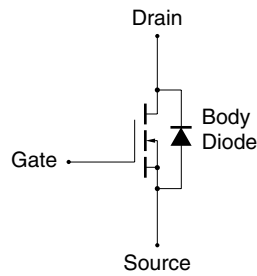


PACKAGE DRAWING (Unit: mm)

<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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