

To our customers,

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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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MOS FIELD EFFECT TRANSISTOR

2SK3299B

SWITCHING

N-CHANNEL POWER MOSFET

DESCRIPTION

The 2SK3299B is N-channel MOSFET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

FEATURES

- Low gate charge
 $Q_G = 30 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 10 \text{ A)}$
- Gate voltage rating : $\pm 30 \text{ V}$
- Low on-state resistance
 $R_{DS(on)} = 0.75 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 5.0 \text{ A)}$
- Avalanche capability ratings

ORDERING INFORMATION

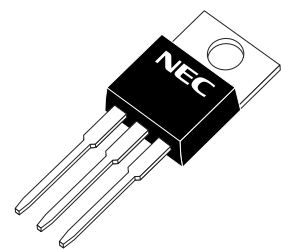
PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SK3299B-S19-AY ^{Note}	Pure Sn (Tin)	Tube 50 p/tube	TO-220AB (MP-25) typ. 1.9 g

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

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

(TO-220AB)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	600	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 10	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 40	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	1.5	W
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	75	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	10	A
Single Avalanche Energy ^{Note2}	E_{AS}	66.7	mJ



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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

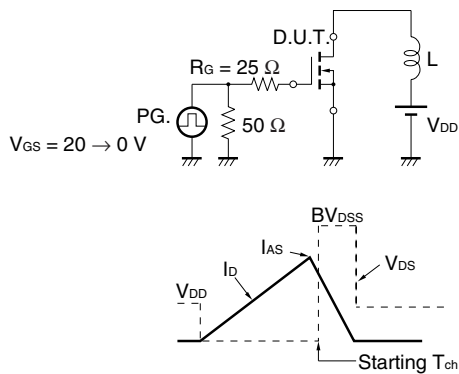
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

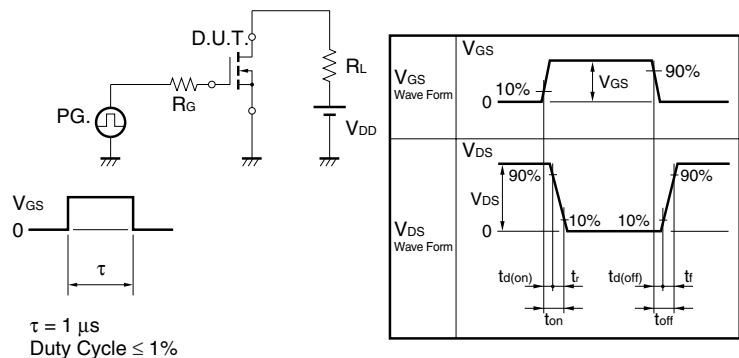
Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±100	nA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5		3.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 5.0 A	2.0			S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)}	V _{GS} = 10 V, I _D = 5.0 A		0.59	0.75	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V,		1730		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V,		320		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		20		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 5.0 A,		25		ns
Rise Time	t _r	V _{GS} = 10 V,		10		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		45		ns
Fall Time	t _f			11		ns
Total Gate Charge	Q _G	V _{DD} = 450 V,		30		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V,		11		nC
Gate to Drain Charge	Q _{GD}	I _D = 10 A		11		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 10 A, V _{GS} = 0 V		0.9		V
Reverse Recovery Time	t _{rr}	I _F = 10 A, V _{GS} = 0 V,		450		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		2700		nC

Note Pulsed

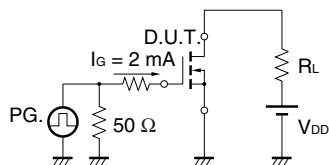
TEST CIRCUIT 1 AVALANCHE CAPABILITY



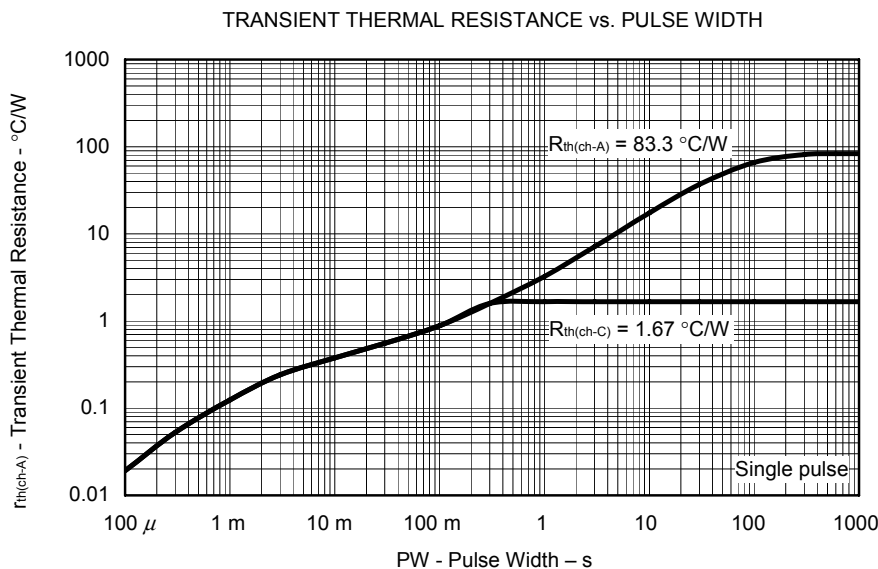
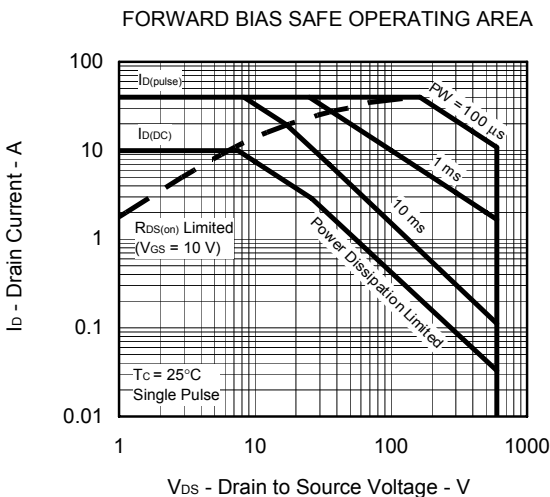
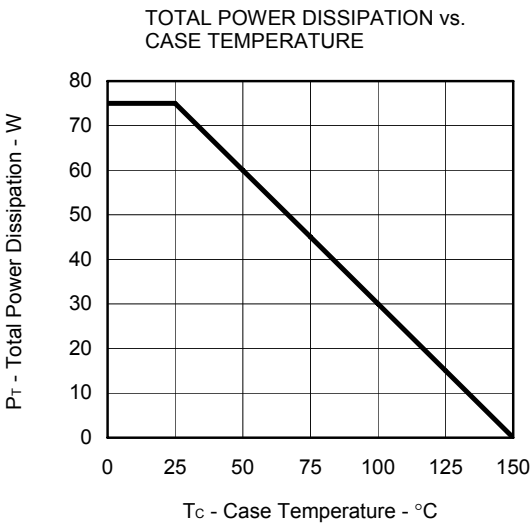
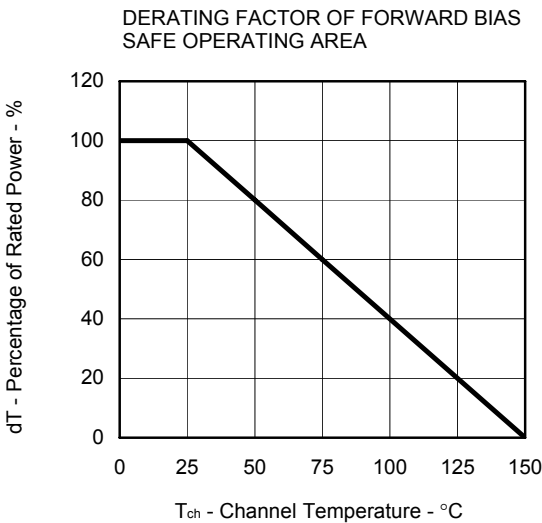
TEST CIRCUIT 2 SWITCHING TIME



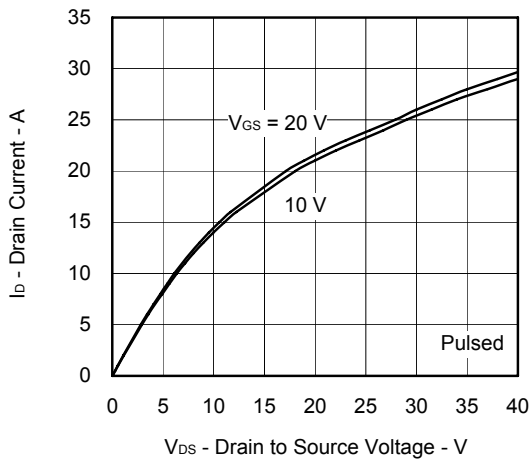
TEST CIRCUIT 3 GATE CHARGE



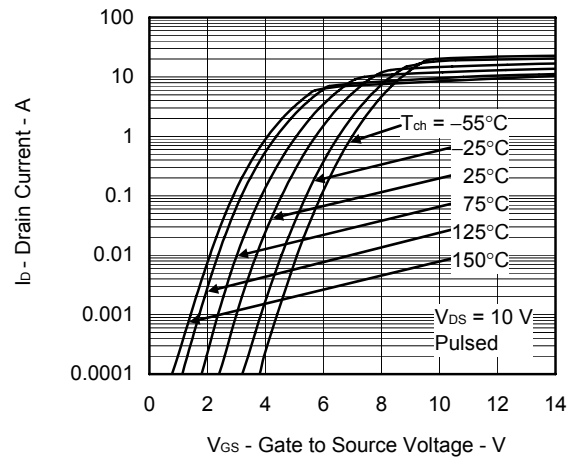
TYPICAL CHARACTERISTICS (T_A = 25°C)



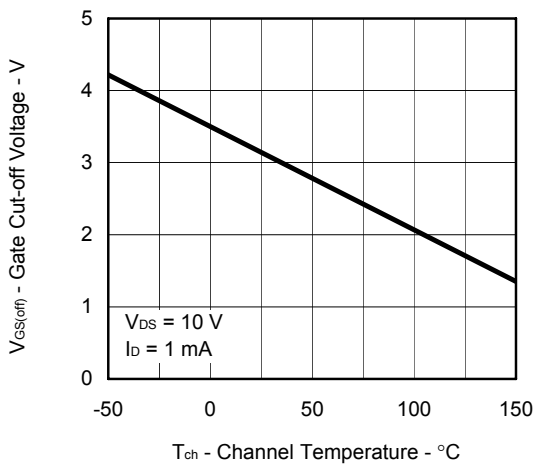
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



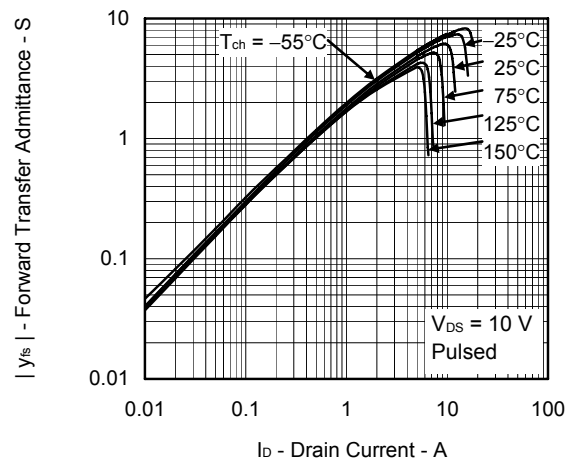
FORWARD TRANSFER CHARACTERISTICS



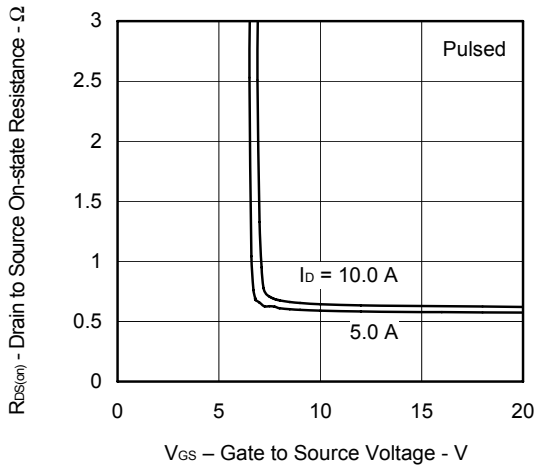
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



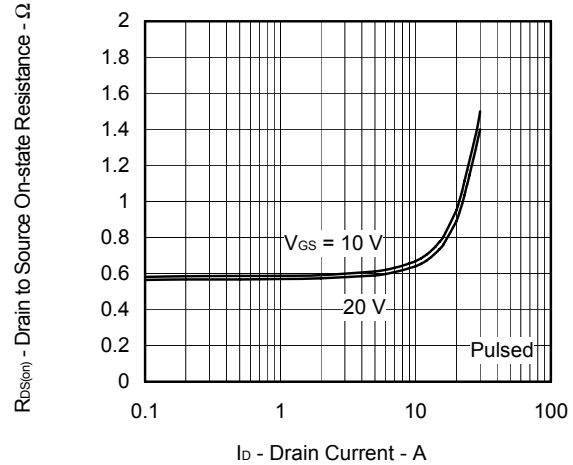
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



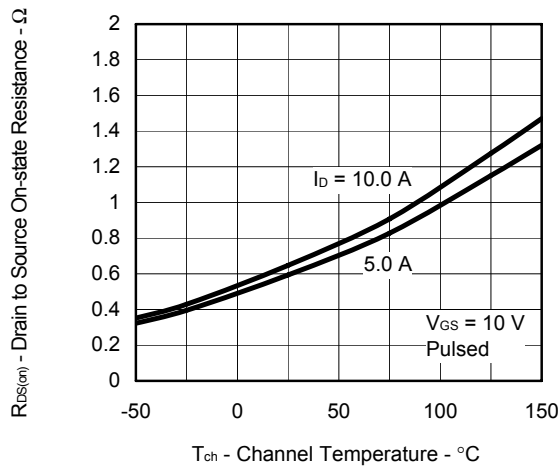
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



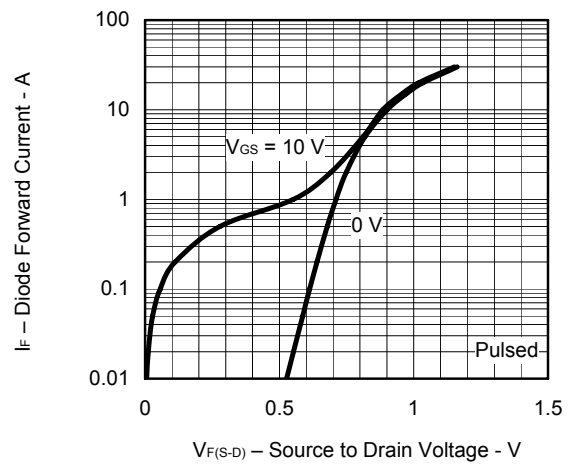
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



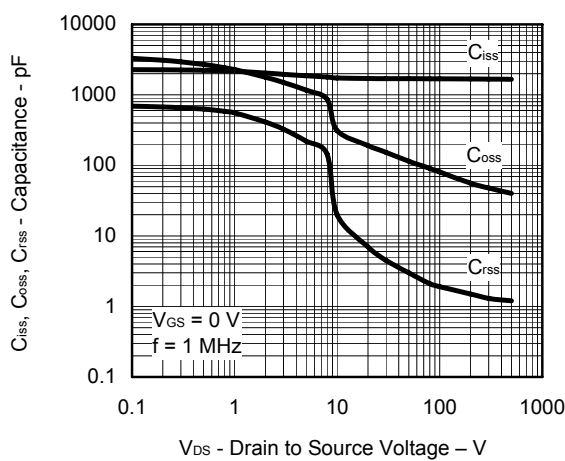
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



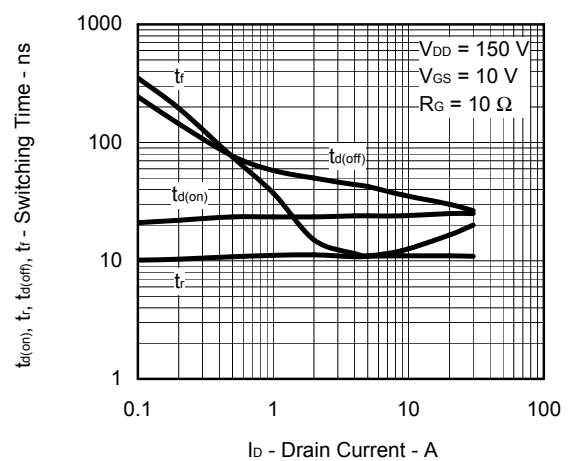
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



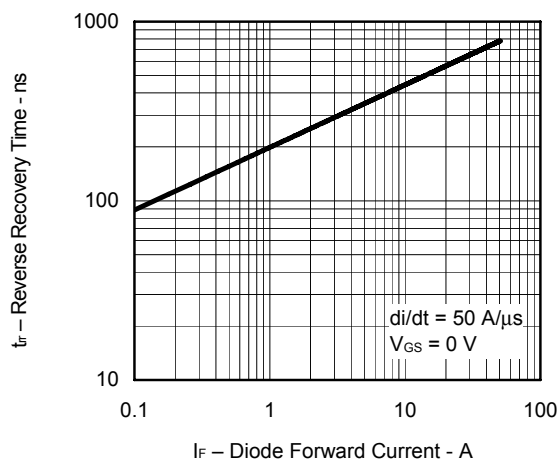
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



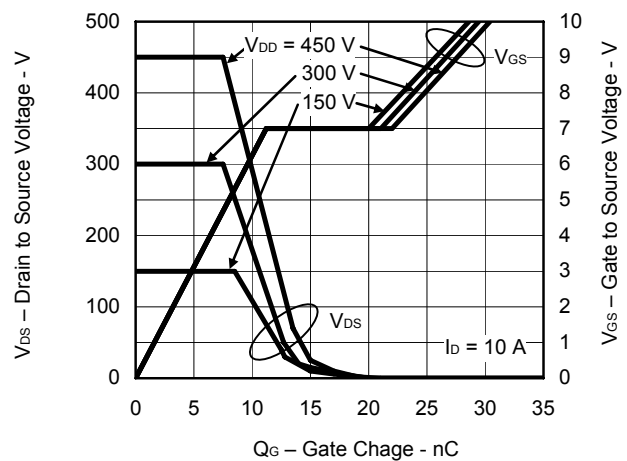
SWITCHING CHARACTERISTICS



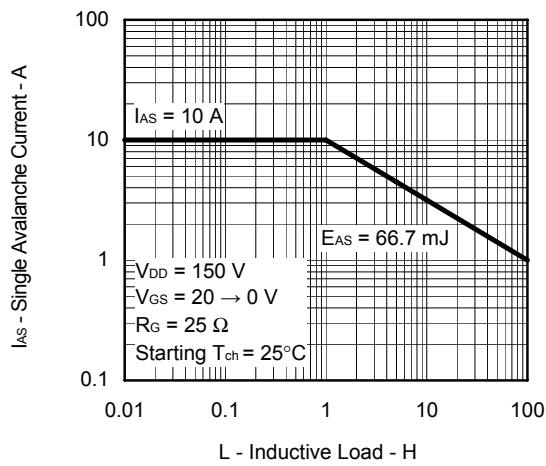
REVERSE RECOVERY TIME vs. DRAIN CURRENT



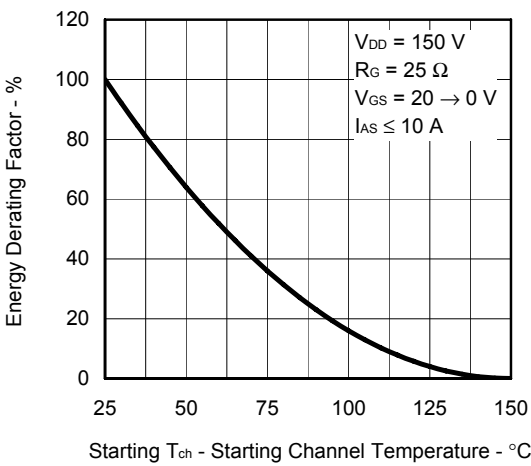
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



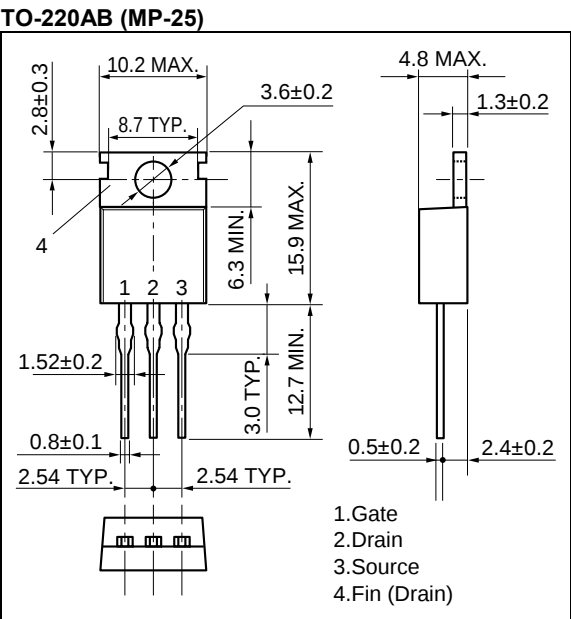
SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



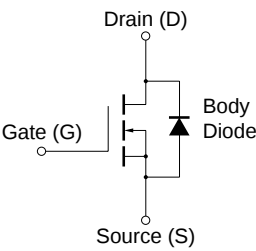
SINGLE AVALANCHE ENERGY
DERATING FACTOR



PACKAGE DRAWING (Unit: mm)



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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