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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MOS FIELD EFFECT TRANSISTOR

2SK3793

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3793 is N-channel MOS Field Effect Transistor designed for high current switching applications.

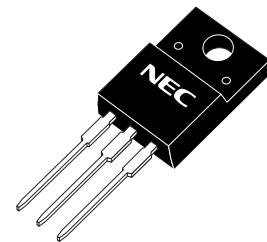
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3793	Isolated TO-220

FEATURES

- Super low on-state resistance
 $R_{DS(on)1} = 125 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 6 \text{ A)}$
 $R_{DS(on)2} = 148 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 6 \text{ A)}$
- Low C_{iss} : $C_{iss} = 900 \text{ pF TYP.}$
- Built-in gate protection diode

(Isolated TO-220)



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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	100	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 12	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 22	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	20	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	2.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	10	A
Single Avalanche Energy ^{Note2}	E_{AS}	10	mJ

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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 50 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

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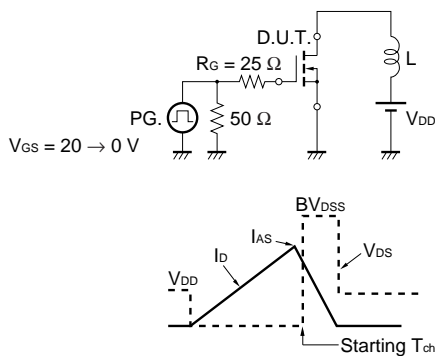
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

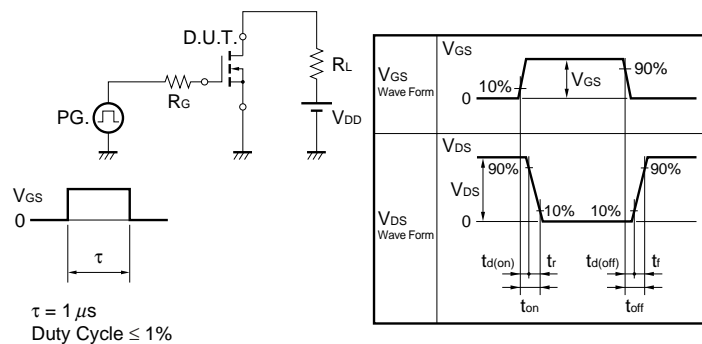
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 100 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 6 A	5.0	10.3		S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = 10 V, I _D = 6 A		89	125	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 6 A		96	148	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		900		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		110		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		50		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 50 V, I _D = 6 A		9		ns
Rise Time	t _r	V _{GS} = 10 V		5		ns
Turn-off Delay Time	t _{d(off)}	R _G = 0 Ω		30		ns
Fall Time	t _f			4		ns
Total Gate Charge	Q _G	V _{DD} = 80 V		21		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		3.0		nC
Gate to Drain Charge	Q _{GD}	I _D = 12 A		6.2		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 12 A, V _{GS} = 0 V		0.89	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 12 A, V _{GS} = 0 V		52		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		94		nC

Note Pulsed

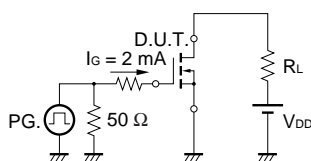
TEST CIRCUIT 1 AVALANCHE CAPABILITY



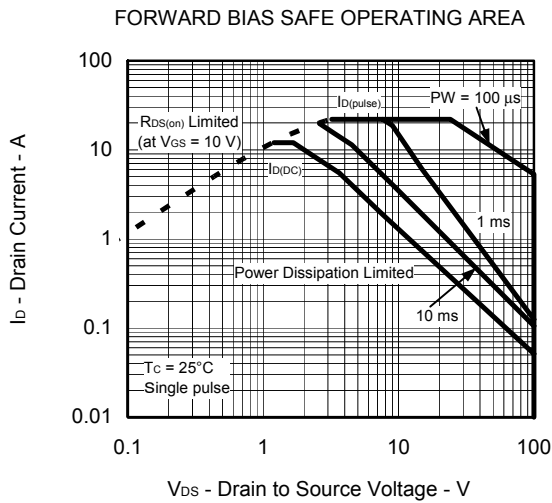
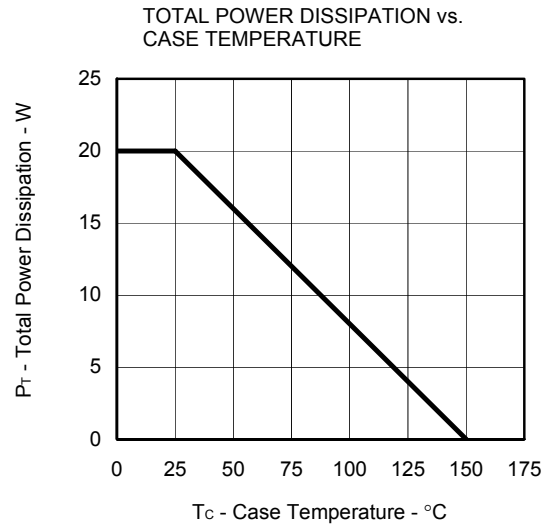
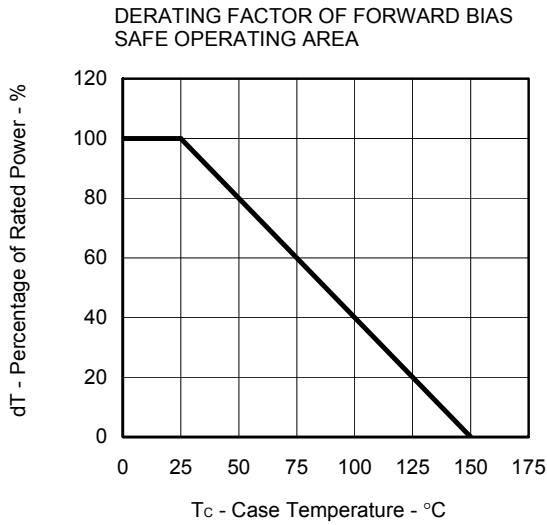
TEST CIRCUIT 2 SWITCHING TIME



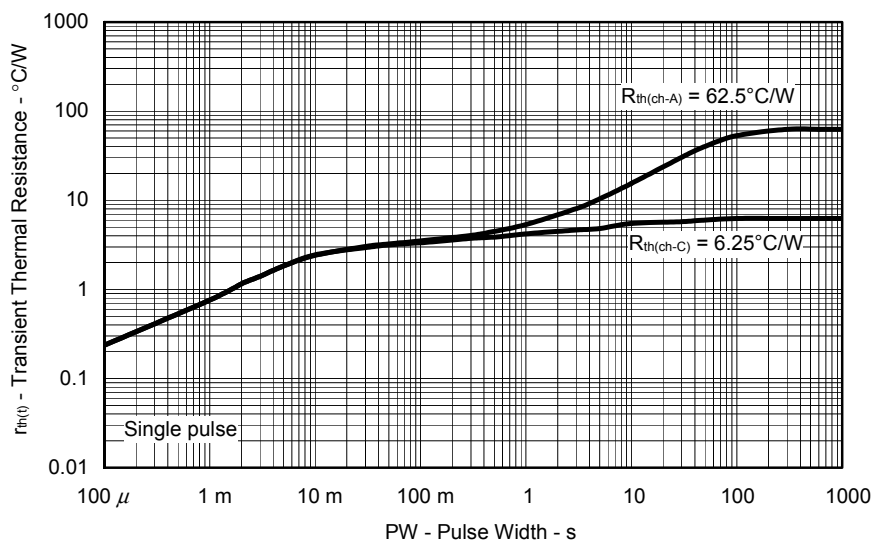
TEST CIRCUIT 3 GATE CHARGE



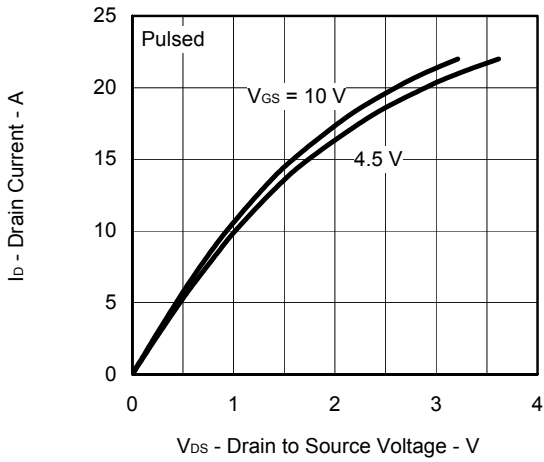
TYPICAL CHARACTERISTICS (T_A = 25°C)



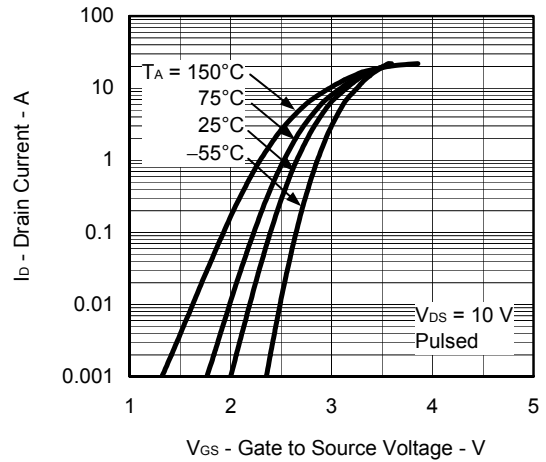
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



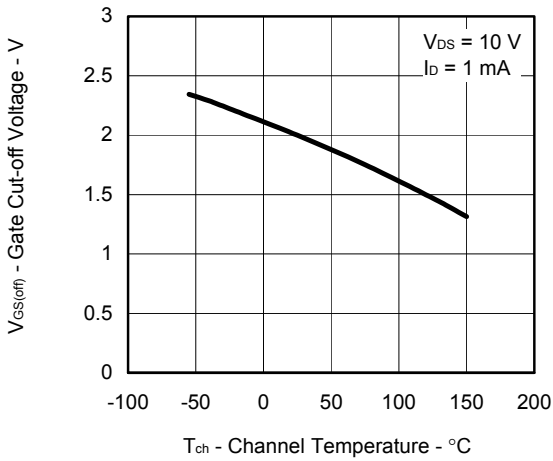
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



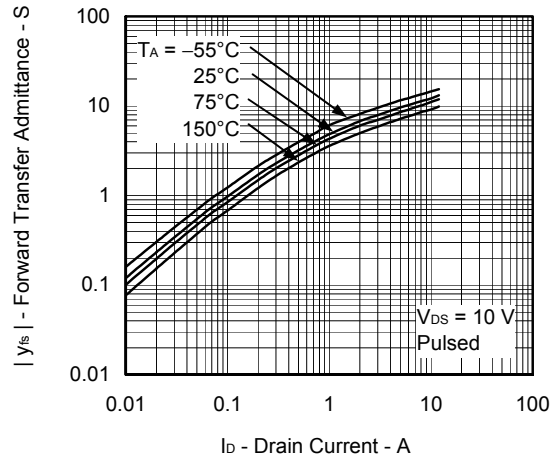
FORWARD TRANSFER CHARACTERISTICS



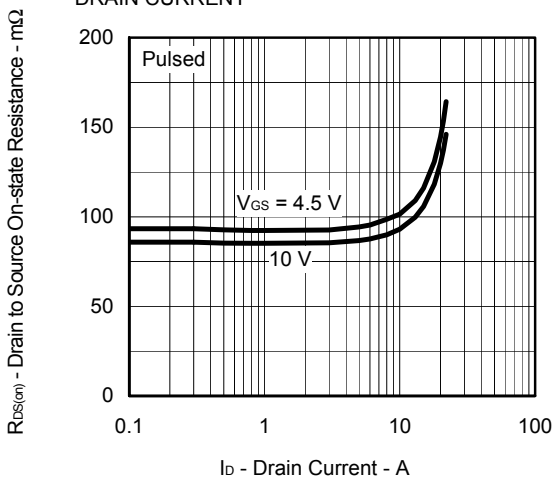
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



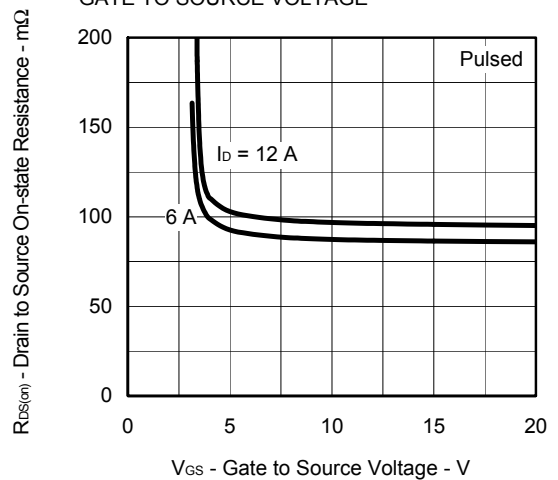
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



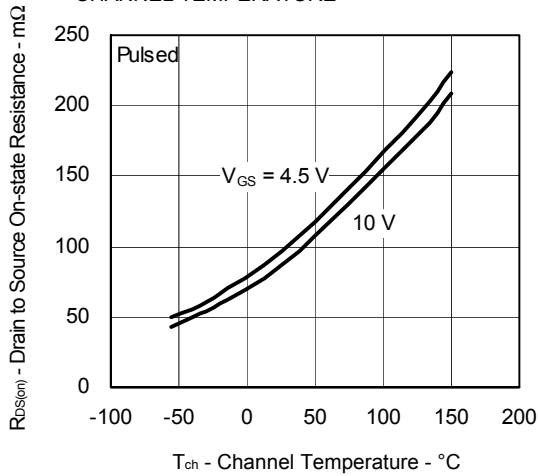
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



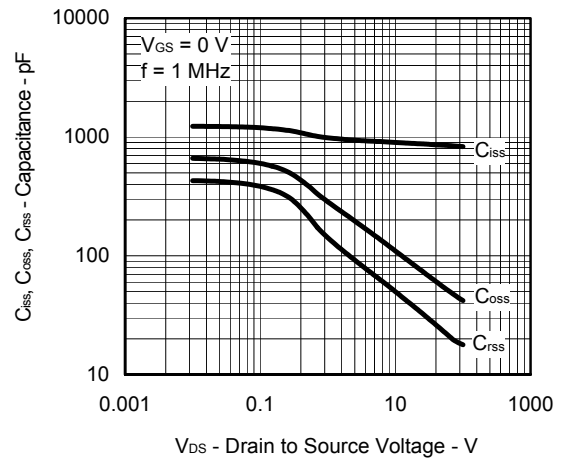
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



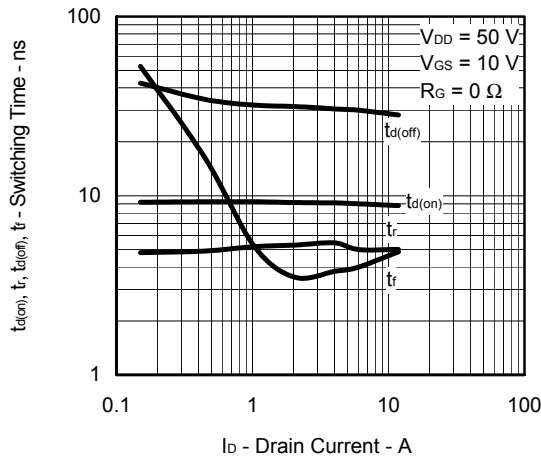
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



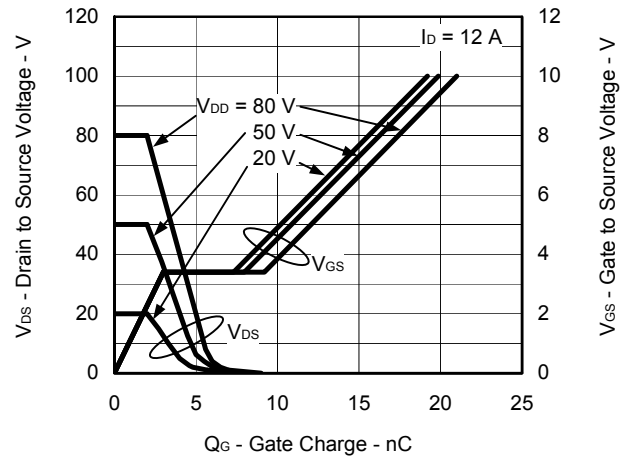
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



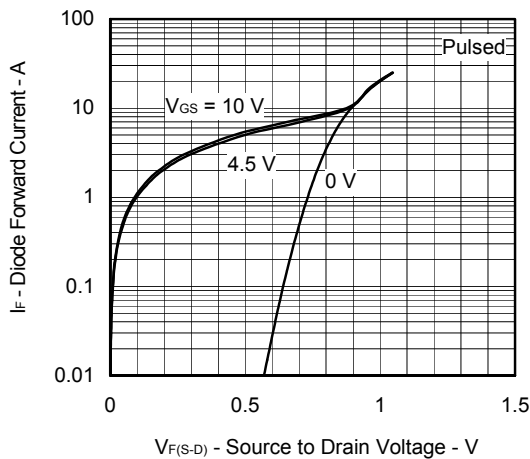
SWITCHING CHARACTERISTICS



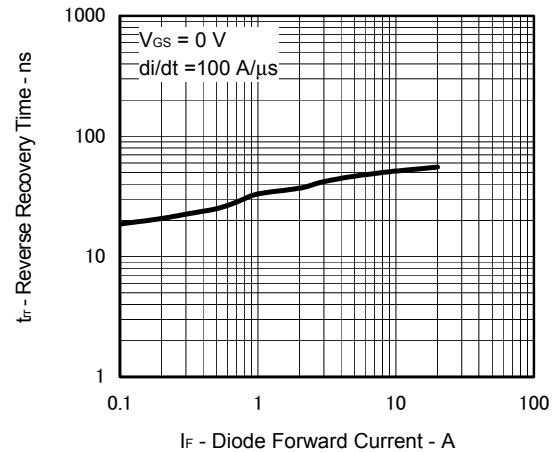
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



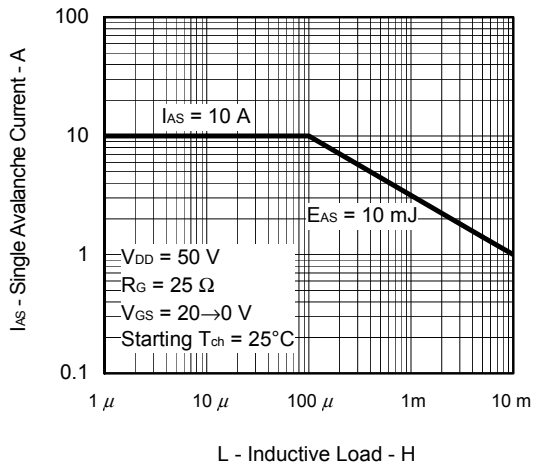
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



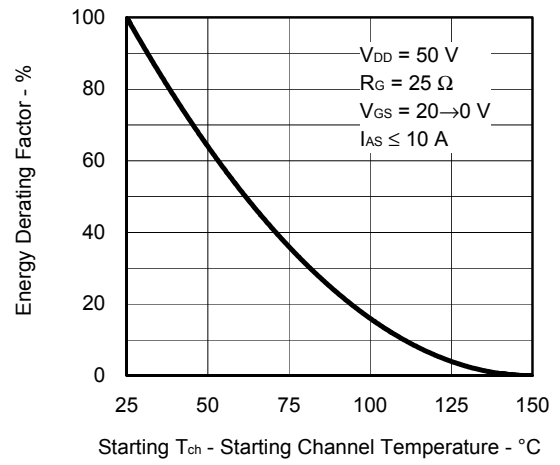
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

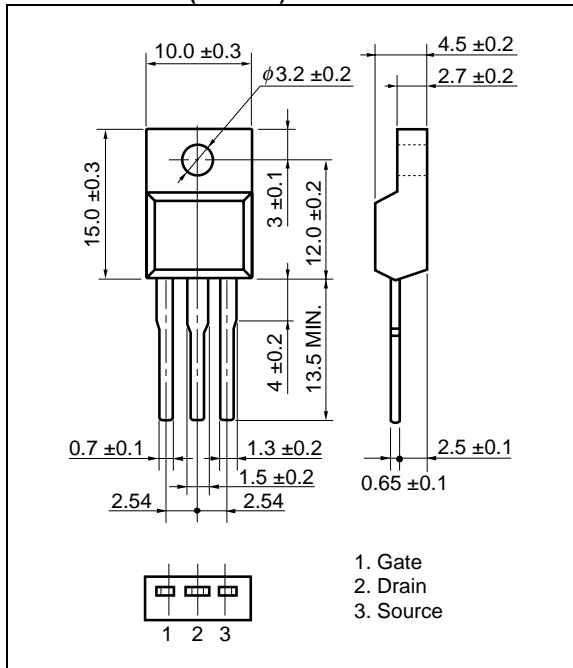


SINGLE AVALANCHE ENERGY DERATING FACTOR

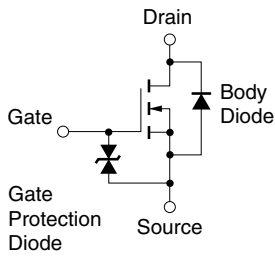


PACKAGE DRAWING (Unit: mm)

Isolated TO-220 (MP-45F)



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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