

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3458 is N-channel DMOS FET device that features a low gate charge and excellent switching characteristics, designed for high voltage applications such as switching power supply.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3458	TO-220AB
2SK3458-S	TO-262
2SK3458-ZK	TO-263

FEATURES

- Low gate charge
 $Q_g = 25 \text{ nC TYP. } (V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 6.0 \text{ A})$
- Gate voltage rating $\pm 30 \text{ V}$
- Low on-state resistance
 $R_{DS(on)} = 2.2 \Omega \text{ MAX. } (V_{GS} = 10 \text{ V, } I_D = 3.0 \text{ A})$
- Avalanche capability ratings
- Surface mount package available

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	800	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain Current (DC) ($T_c = 25^\circ\text{C}$)	$I_D(\text{DC})$	± 6.0	A
Drain Current (pulse) ^{Note1}	$I_D(\text{pulse})$	± 24	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}	100	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}	6.0	A
Single Avalanche Energy ^{Note2}	E_{AS}	66.5	mJ

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

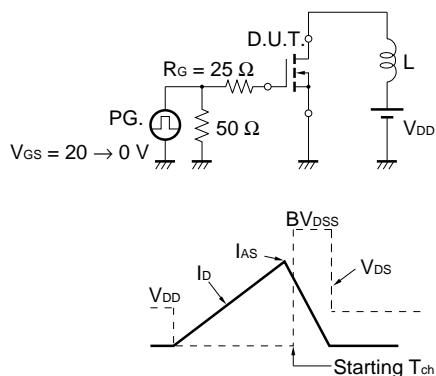
2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150 \text{ V}$, $R_g = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

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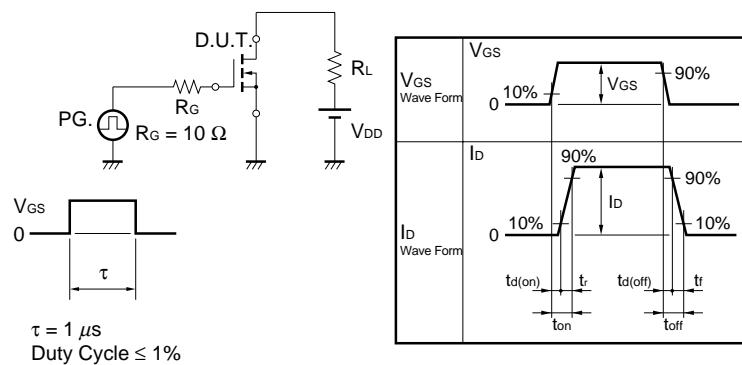
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 800 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GS}	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	y _{fs}	V _{DS} = 10 V, I _D = 3.0 A	2.0			S
Drain to Source On-state Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 3.0 A		1.8	2.2	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V		1220		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		170		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		16		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 3.0 A		17		ns
Rise Time	t _r	V _{GS} = 10 V		7		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		43		ns
Fall Time	t _f			11		ns
Total Gate Charge	Q _G	V _{DD} = 450 V		25		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		6		nC
Gate to Drain Charge	Q _{GD}	I _D = 6.0 A		10		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 6.0 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 6.0 A, V _{GS} = 0 V		1490		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		7.5		μC

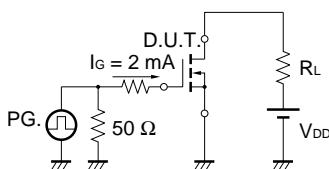
TEST CIRCUIT 1 AVALANCHE CAPABILITY

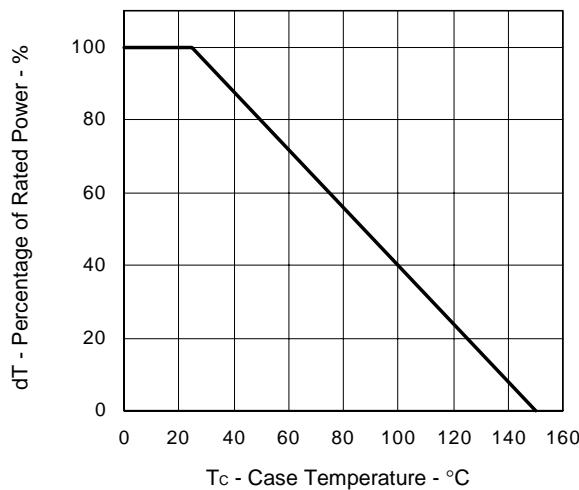
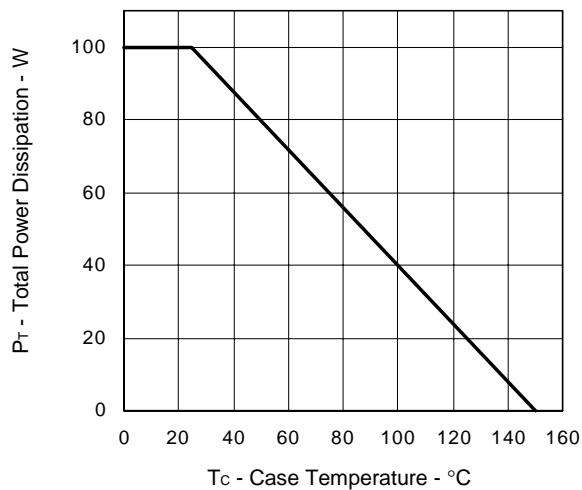


TEST CIRCUIT 2 SWITCHING TIME

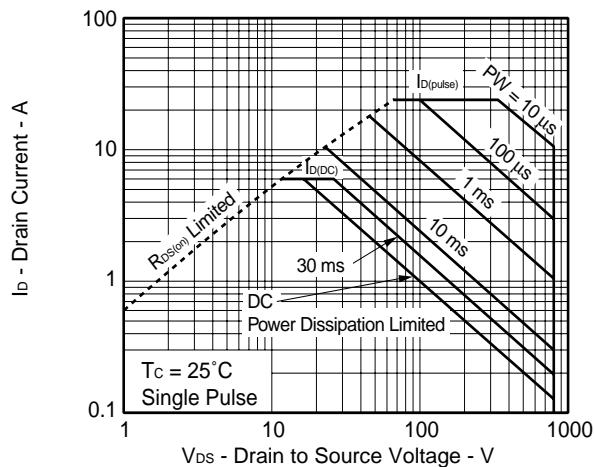


TEST CIRCUIT 3 GATE CHARGE

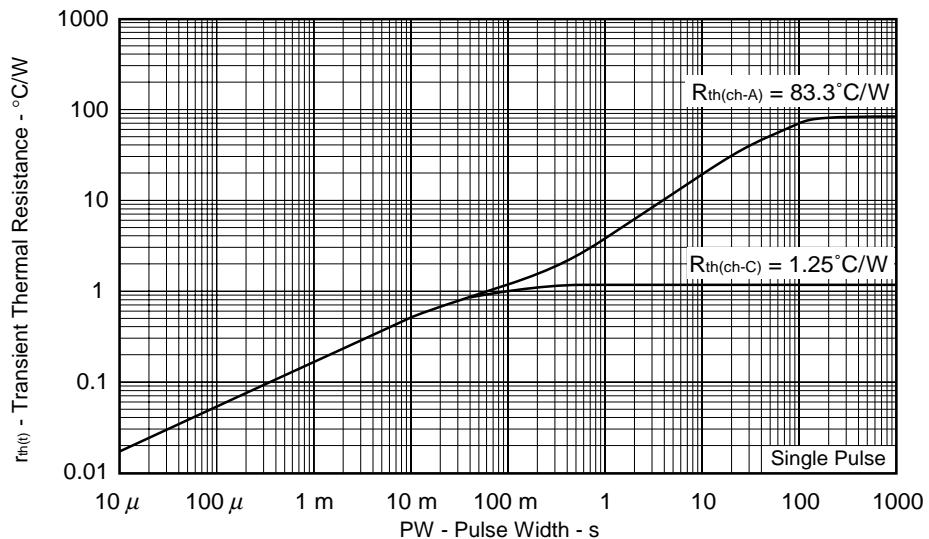


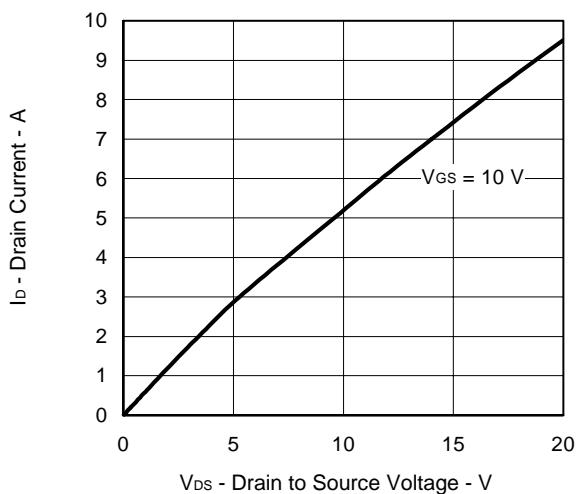
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREATOTAL POWER DISSIPATION vs.
CASE TEMPERATURE

FORWARD BIAS SAFE OPERATING AREA

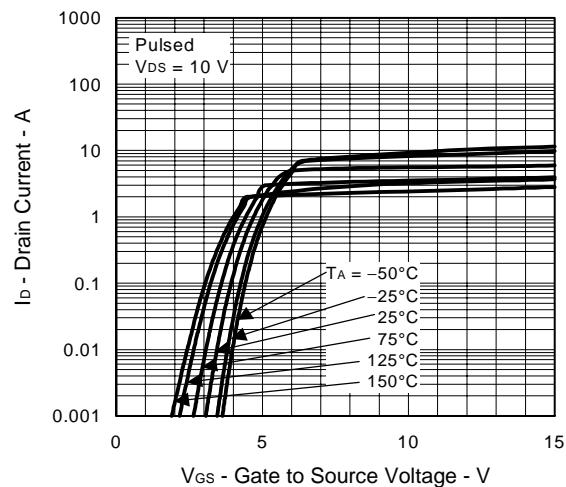
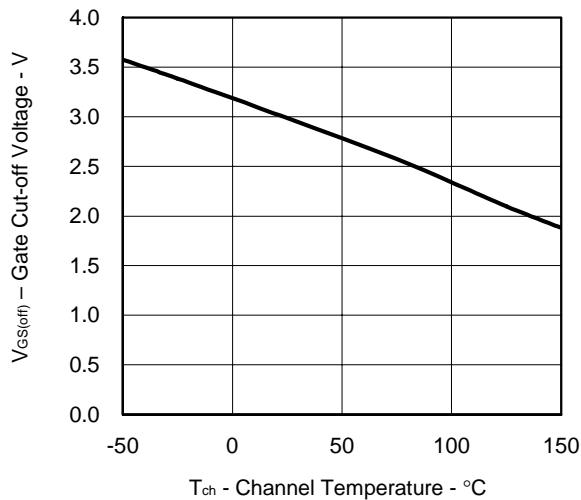
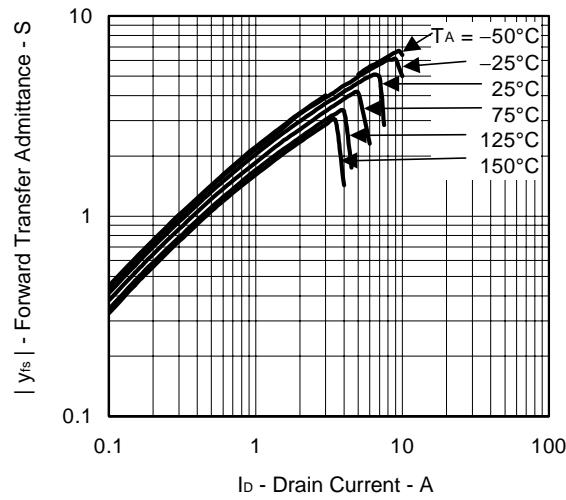
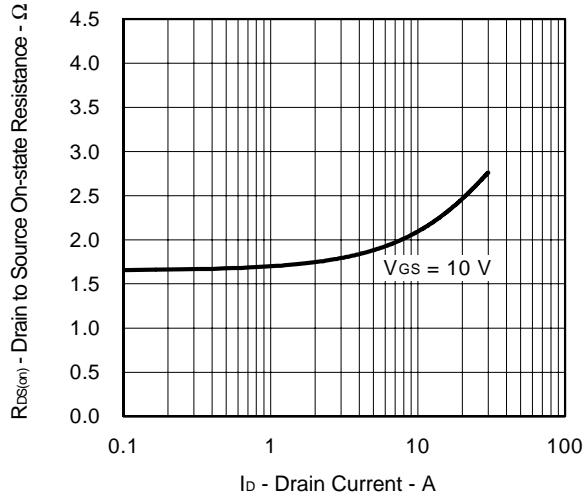
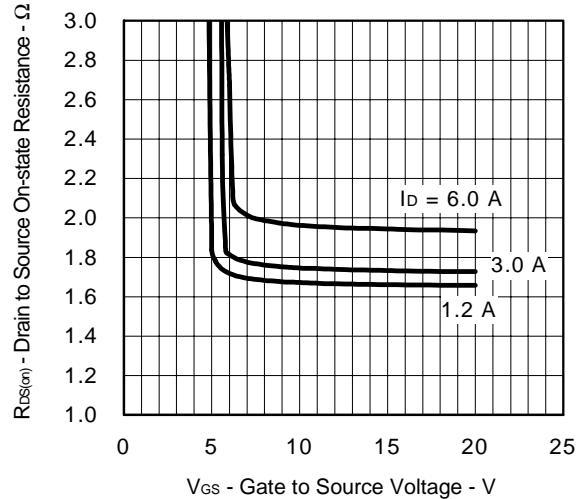


TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

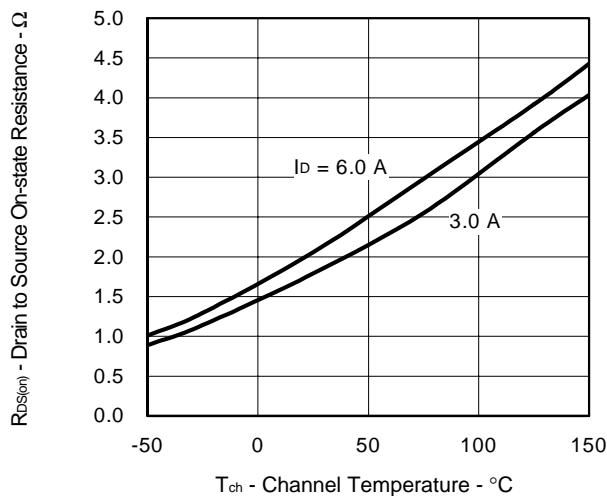


DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE

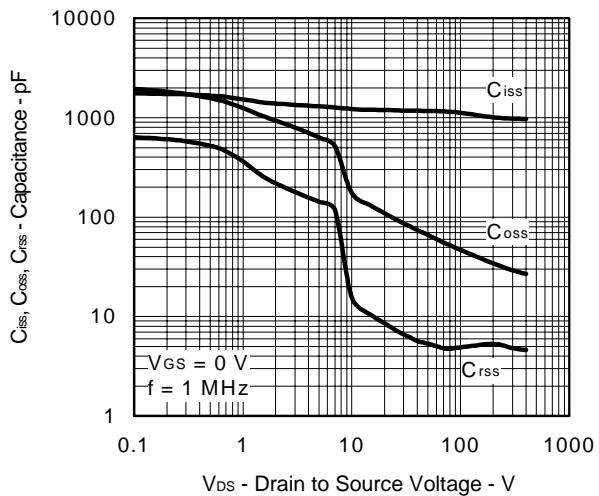
FORWARD TRANSFER CHARACTERISTICS

GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATUREFORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE

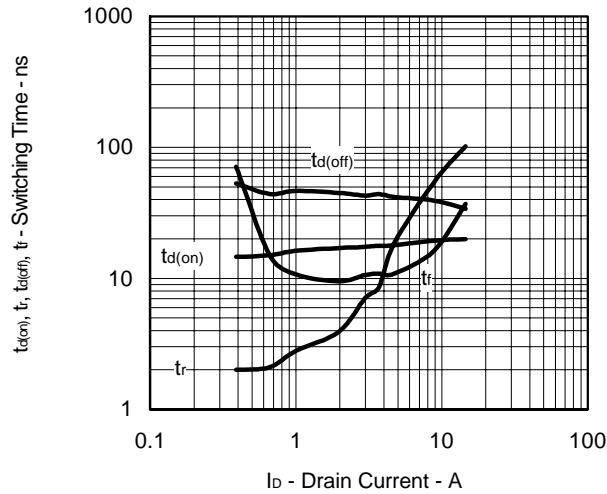
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



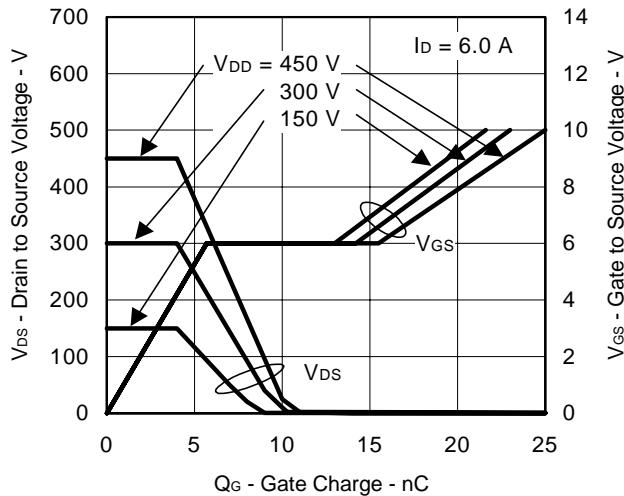
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



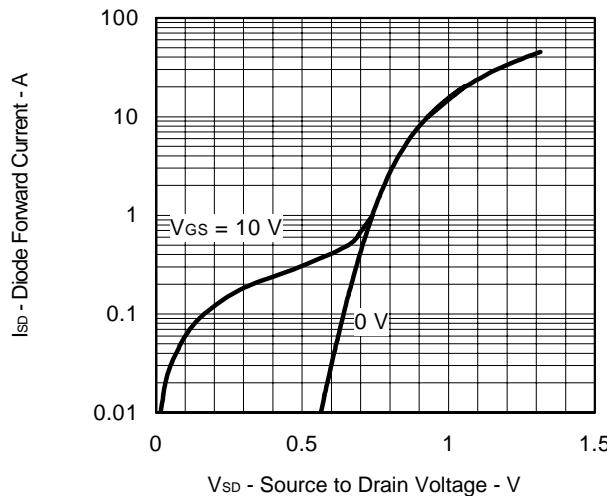
SWITCHING CHARACTERISTICS



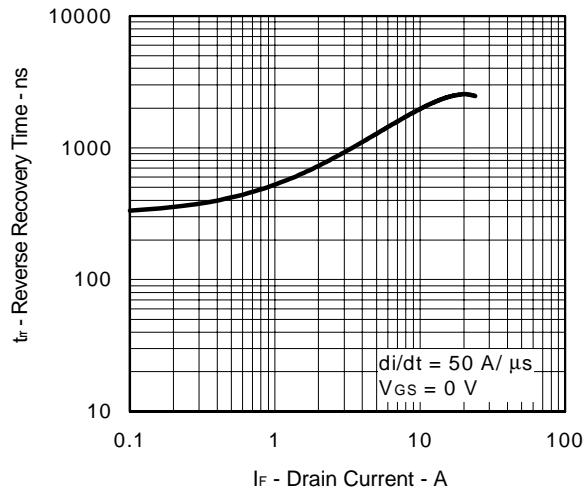
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

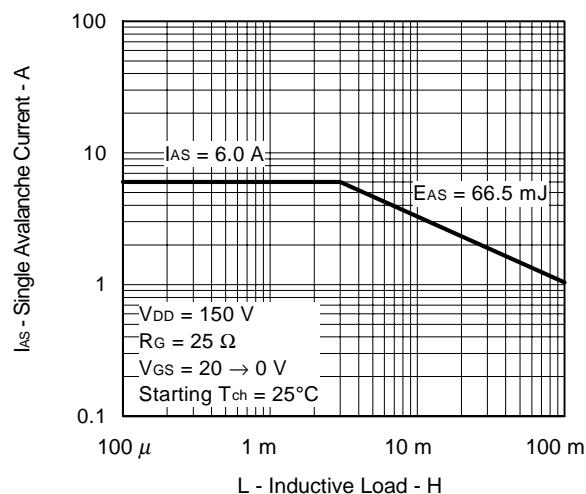
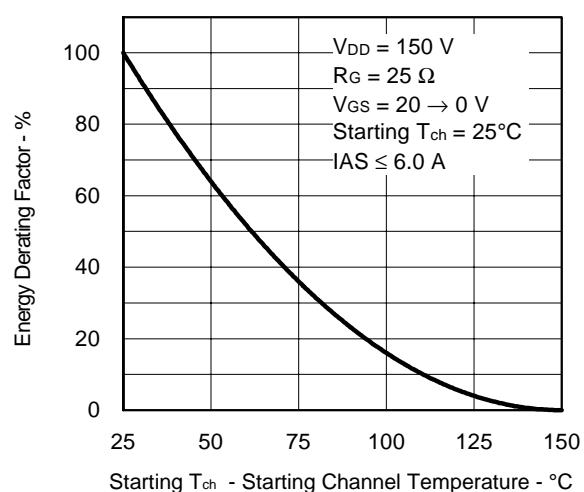


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



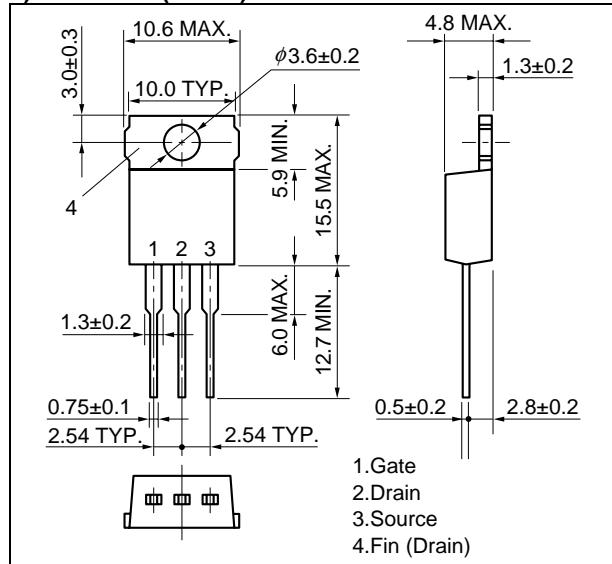
REVERSE RECOVERY TIME vs. DRAIN CURRENT



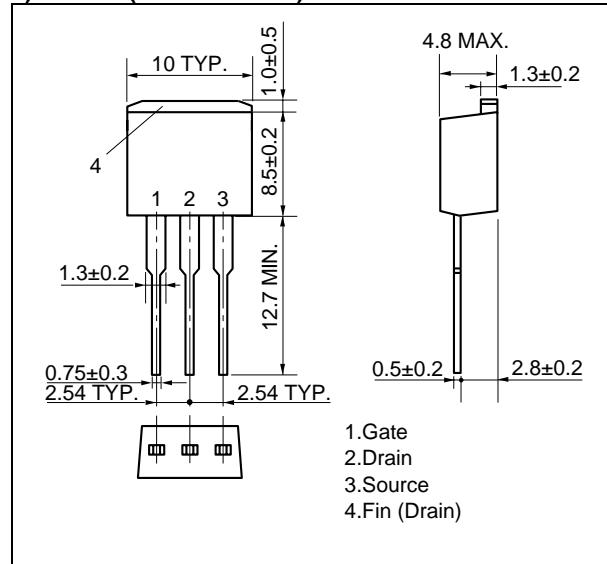
SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOADSINGLE AVALANCHE ENERGY
DERATING FACTOR

PACKAGE DRAWINGS (Unit: mm)

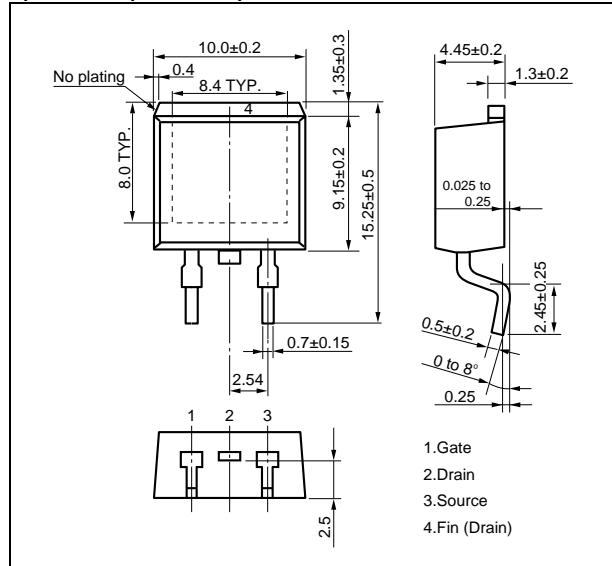
1) TO-220AB (MP-25)



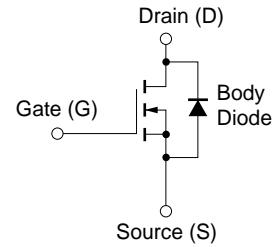
2) TO-262 (MP-25 Fin Cut)



3) TO-263 (MP-25ZK)



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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