

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3635 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, and designed for high voltage applications such as DC/DC converter.

★ ORDERING INFORMATION

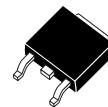
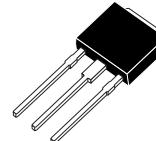
PART NUMBER	PACKAGE
2SK3635	TO-251 (MP-3)
2SK3635-Z	TO-252 (MP-3Z)

FEATURES

- High voltage: $V_{DSS} = 200$ V
- Gate voltage rating: ± 30 V
- Low on-state resistance
 $R_{DS(on)} = 0.43 \Omega$ MAX. ($V_{GS} = 10$ V, $I_D = 4.0$ A)
- Low C_{iss} : $C_{iss} = 390$ pF TYP.
- Built-in gate protection diode
- TO-251/TO-252 package
- Avalanche capability rated (TO-251)

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

Drain to Source Voltage ($V_{GS} = 0$ V)	V_{DSS}	200	V
Gate to Source Voltage ($V_{DS} = 0$ V)	V_{GSS}	± 30	V
Drain Current (DC) ($T_c = 25^\circ\text{C}$)	$I_{D(DC)}$	± 8.0	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 24	A
Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_{T1}	24	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.0	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}	8	A
Single Avalanche Energy ^{Note2}	E_{AS}	6.4	mJ
Repetitive Avalanche Current ^{Note3}	I_{AR}	8	A
Repetitive Avalanche Energy ^{Note3}	E_{AR}	2.4	mJ



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

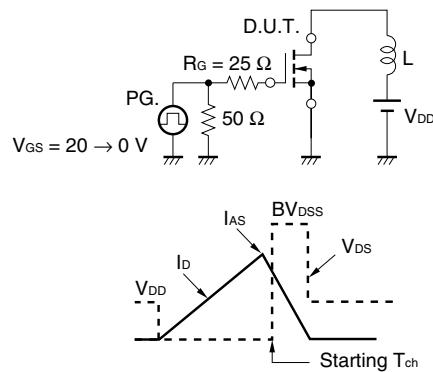
2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 100$ V, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0$ V, $L = 100 \mu\text{H}$
3. $T_{ch} \leq 125^\circ\text{C}$, $R_G = 25 \Omega$, $V_{DD} = 100$ V

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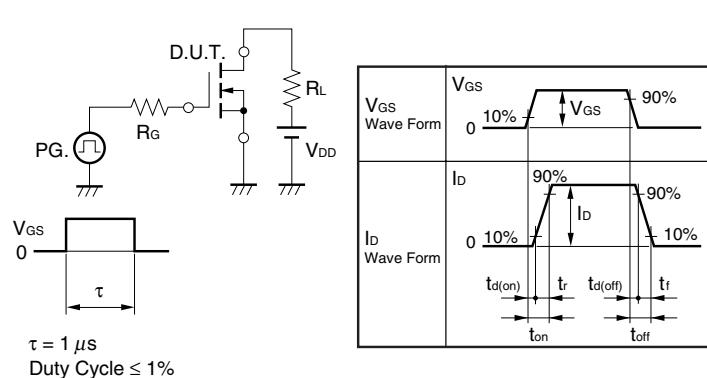
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200 \text{ V}$, $V_{GS} = 0 \text{ V}$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0 \text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$	2.5	3.5	4.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10 \text{ V}$, $I_D = 4.0 \text{ A}$	3	5		S
Drain to Source On-state Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$, $I_D = 4.0 \text{ A}$		0.34	0.43	Ω
Input Capacitance	C_{iss}	$V_{DS} = 10 \text{ V}$		390		pF
Output Capacitance	C_{oss}	$V_{GS} = 0 \text{ V}$		95		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1 \text{ MHz}$		45		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 100 \text{ V}$, $I_D = 4.0 \text{ A}$		5		ns
Rise Time	t_r	$V_{GS} = 10 \text{ V}$		7		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 0 \Omega$		19		ns
Fall Time	t_f			6		ns
Total Gate Charge	Q_G	$V_{DD} = 160 \text{ V}$		12		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 10 \text{ V}$		2		nC
Gate to Drain Charge	Q_{GD}	$I_D = 8.0 \text{ A}$		6		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 8 \text{ A}$, $V_{GS} = 0 \text{ V}$		1.0		V
Reverse Recovery Time	t_{rr}	$I_F = 8 \text{ A}$, $V_{GS} = 0 \text{ V}$		110		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100 \text{ A}/\mu\text{s}$		360		nC

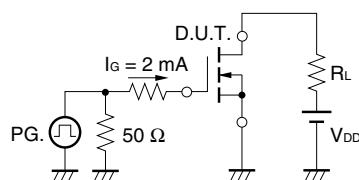
TEST CIRCUIT 1 AVALANCHE CAPABILITY

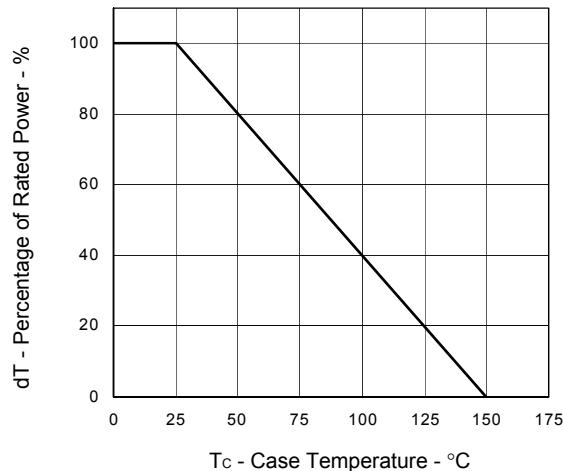
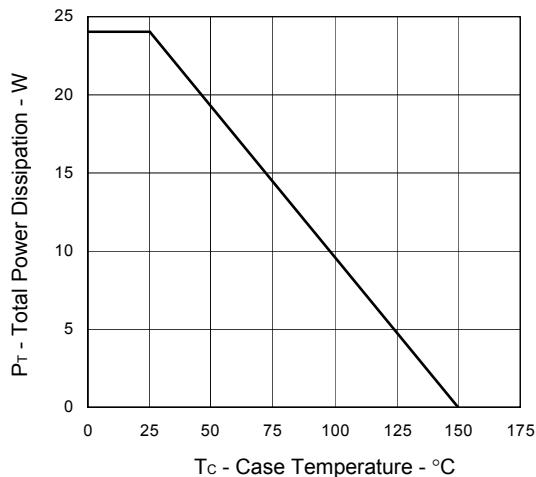


TEST CIRCUIT 2 SWITCHING TIME

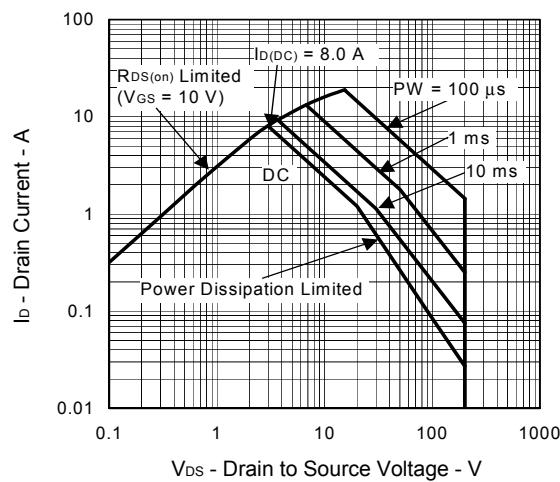


TEST CIRCUIT 3 GATE CHARGE

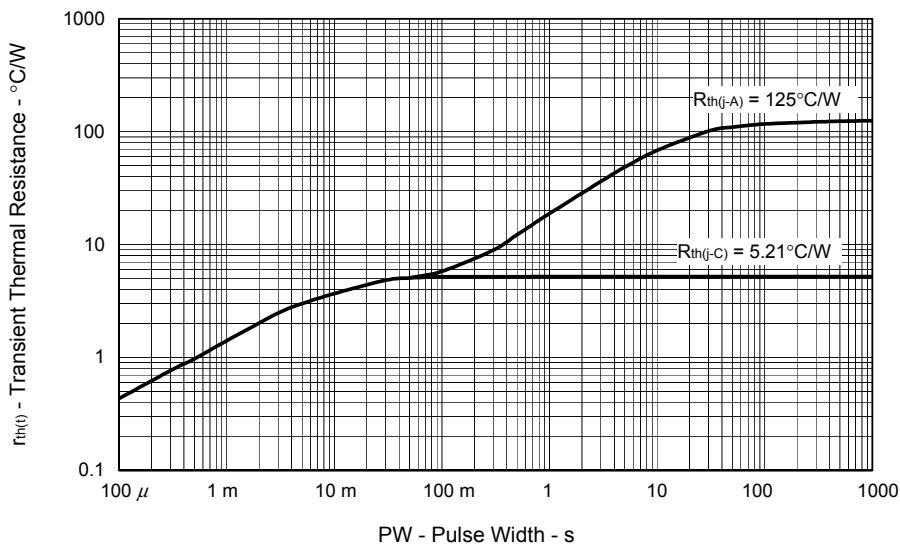


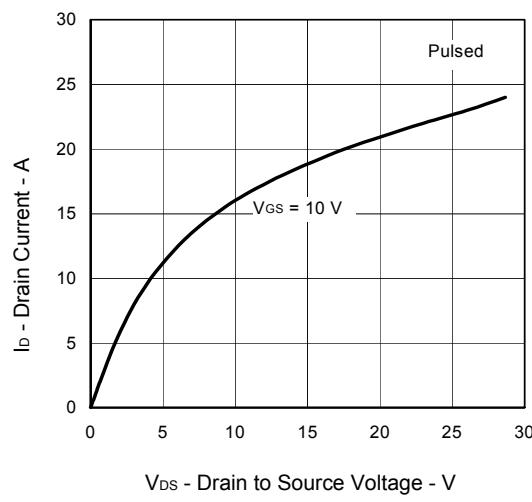
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREATOTAL POWER DISSIPATION vs.
CASE TEMPERATURE

FORWARD BIAS SAFE OPERATING AREA

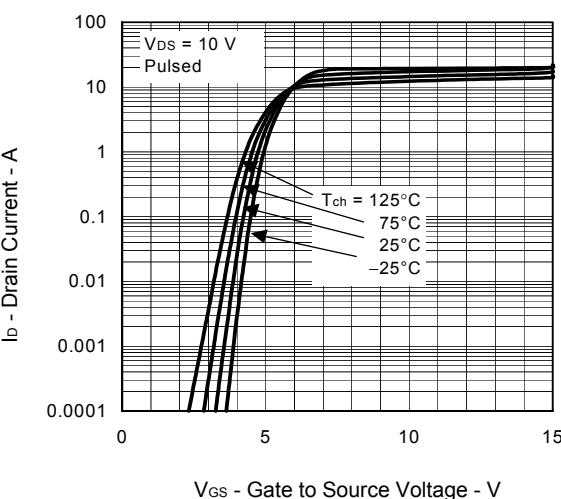
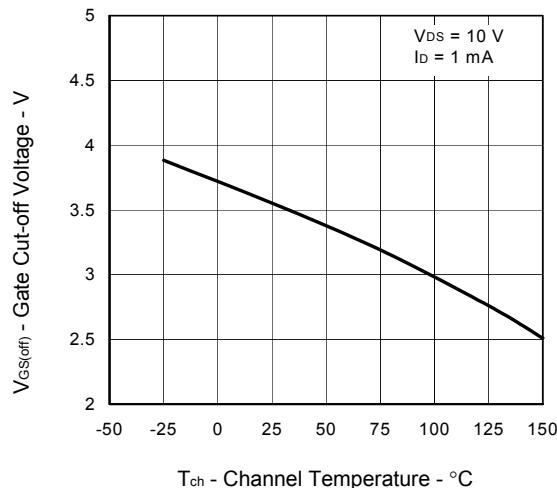
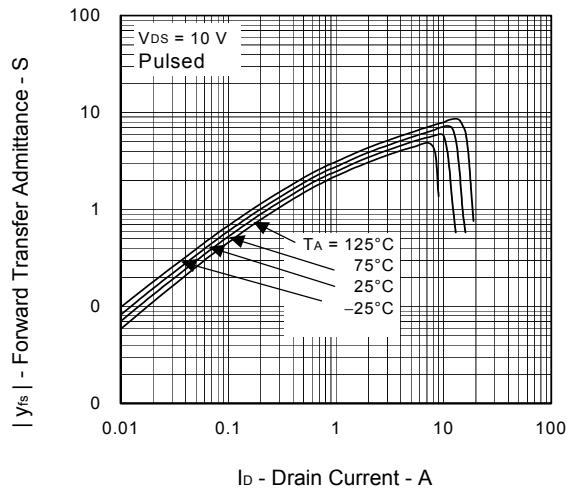
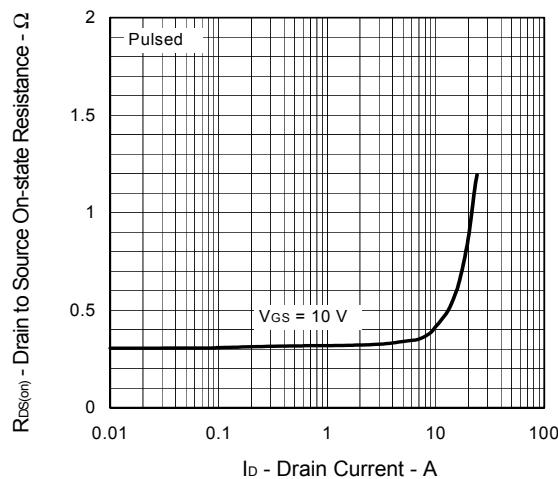
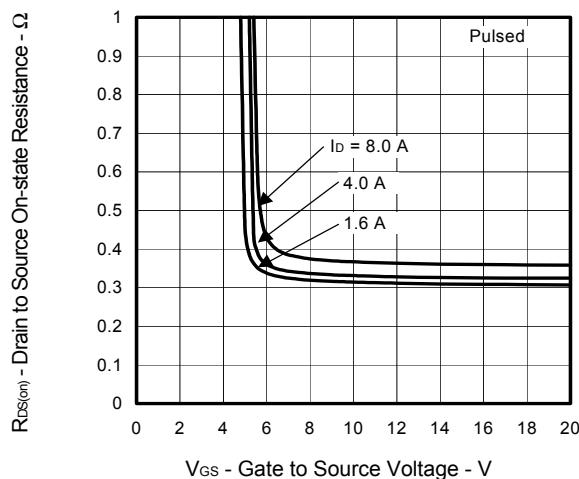


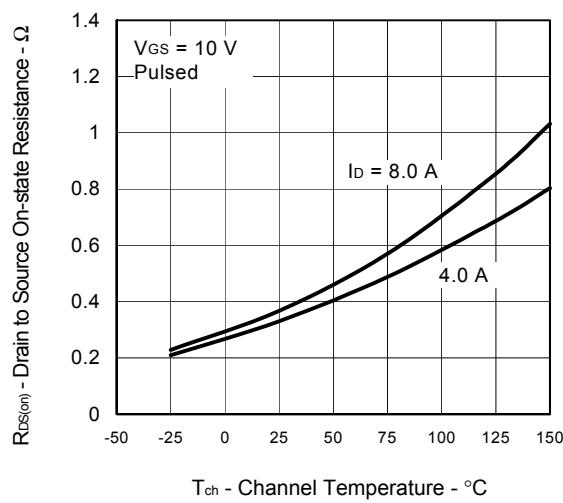
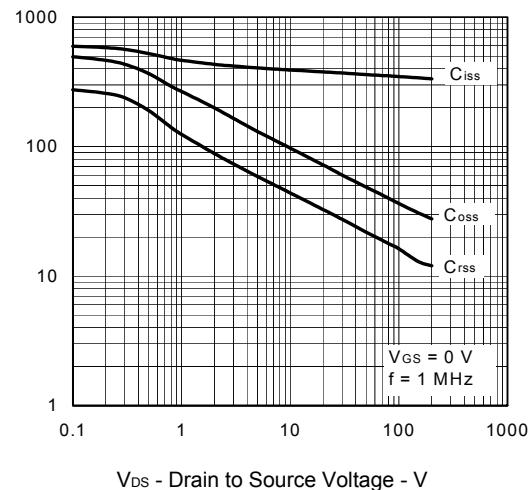
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



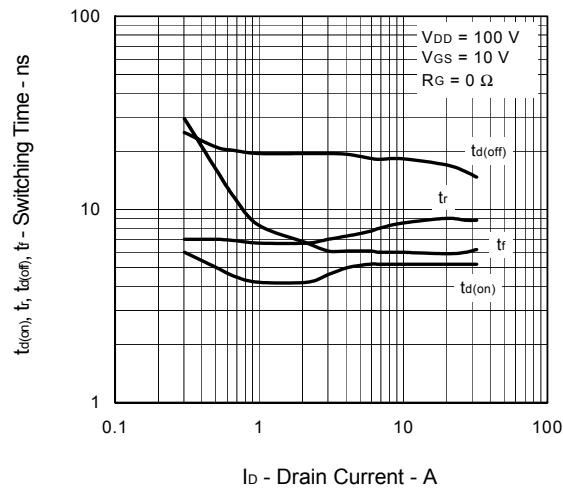
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE

FORWARD TRANSFER CHARACTERISTICS

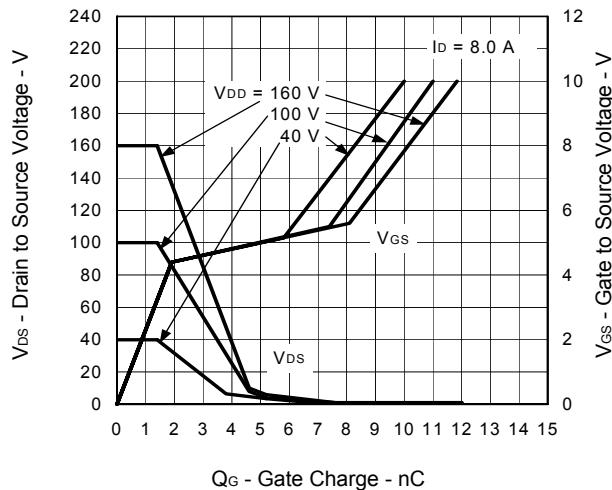
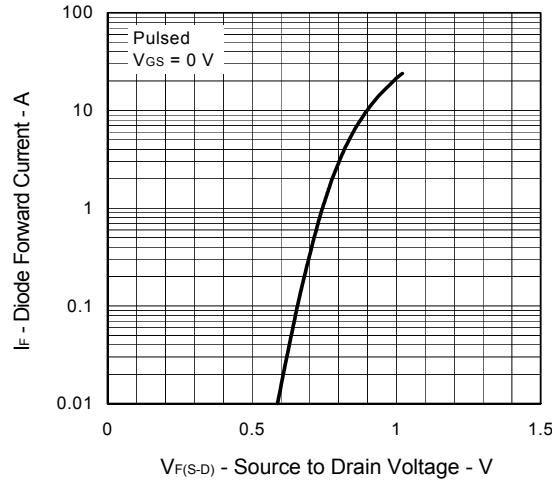
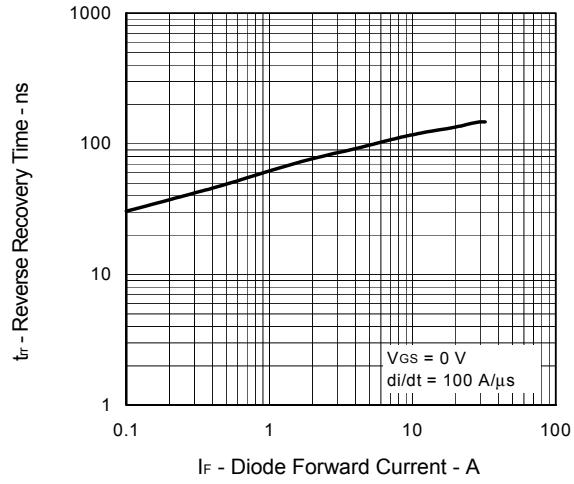
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATUREFORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE

DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURECAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE

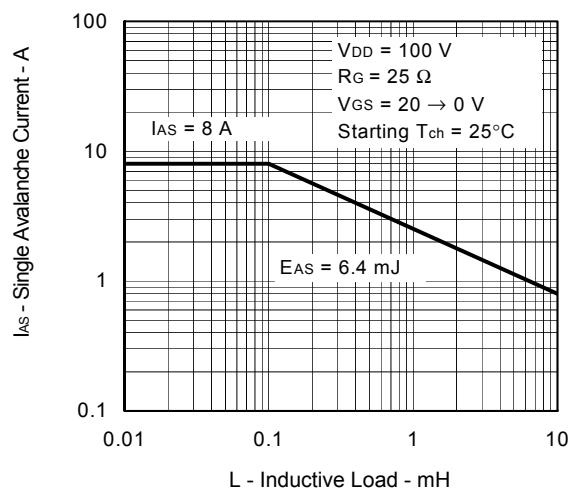
SWITCHING CHARACTERISTICS



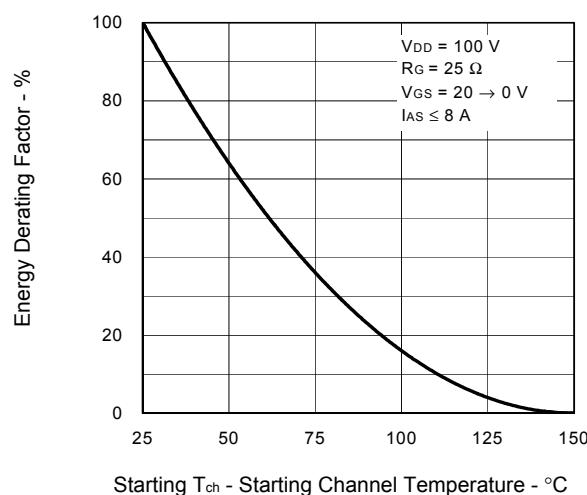
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

SOURCE TO DRAIN DIODE
FORWARD VOLTAGEREVERSE RECOVERY TIME vs.
DIODE FORWARD CURRENT

SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD

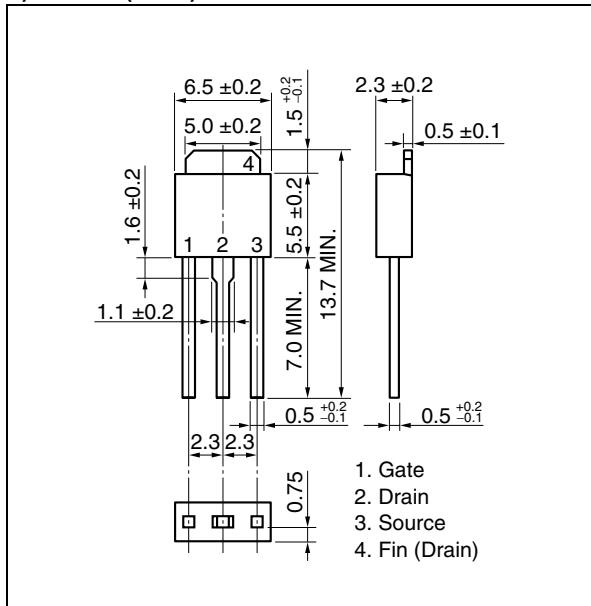


SINGLE AVALANCHE ENERGY
DERATING FACTOR

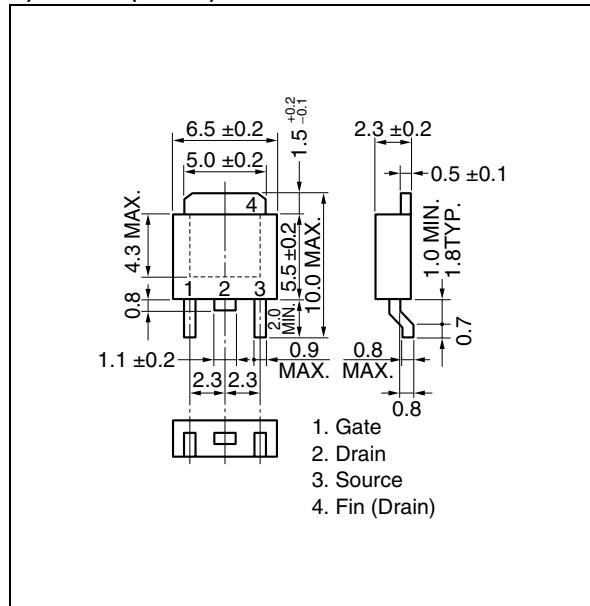


★ PACKAGE DRAWINGS (Unit: mm)

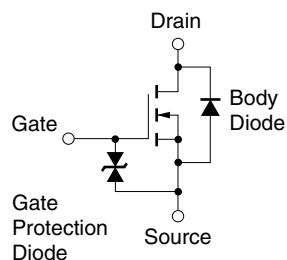
1) TO-251 (MP-3)



2) TO-252 (MP-3Z)



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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