DATA SHEET

MOS FIELD EFFECT TRANSISTOR
2SK3635

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.

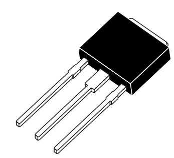
★ ORDERING INFORMATION

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

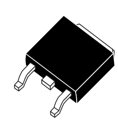
FEATURES

- High voltage: V_{DSS} = 200 V
- Gate voltage rating: ±30 V
- Low on-state resistance
  $R_{DS(on)}$ = 0.43 Ω 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)



(TO-252)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°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°C)	$I_{D(DC)}$	±8.0	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±24	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	24	W
Total Power Dissipation (T_A = 25°C)	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°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 ≤ 10 μs, Duty Cycle ≤ 1%

2. Starting T_{ch} = 25°C, V_{DD} = 100 V, R_G = 25 Ω, V_{GS} = 20 → 0 V, L = 100 μH

3. T_{ch} ≤ 125°C, R_G = 25 Ω, V_{DD} = 100 V

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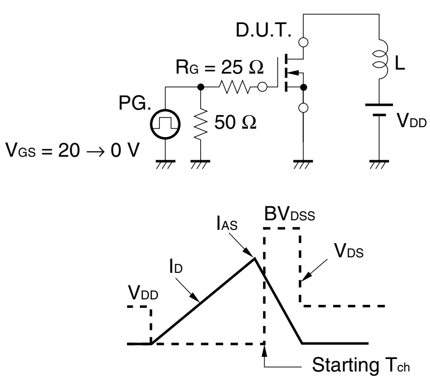
The mark ★ shows major revised points.

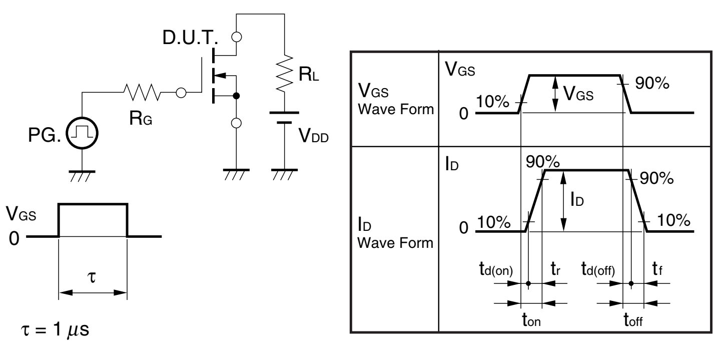
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

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

TEST CIRCUIT 1 AVALANCHE CAPABILITY

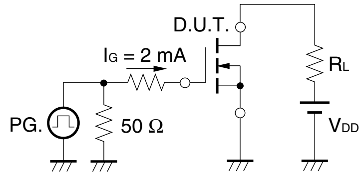


TEST CIRCUIT 2 SWITCHING TIME

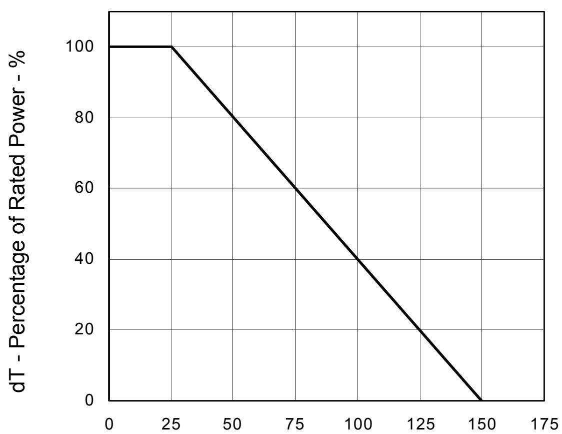


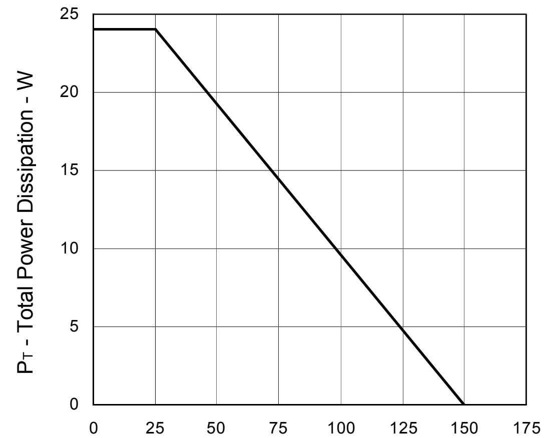
τ = 1 μs
Duty Cycle ≤ 1%

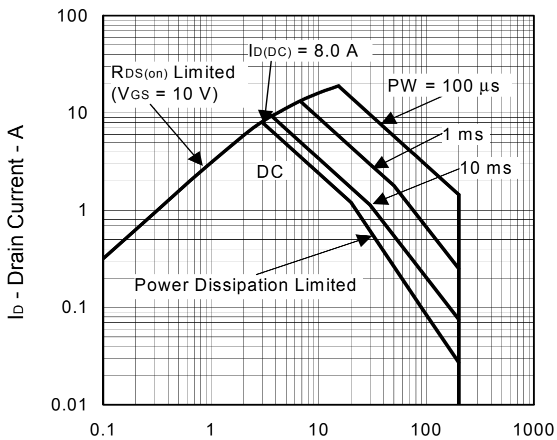
TEST CIRCUIT 3 GATE CHARGE

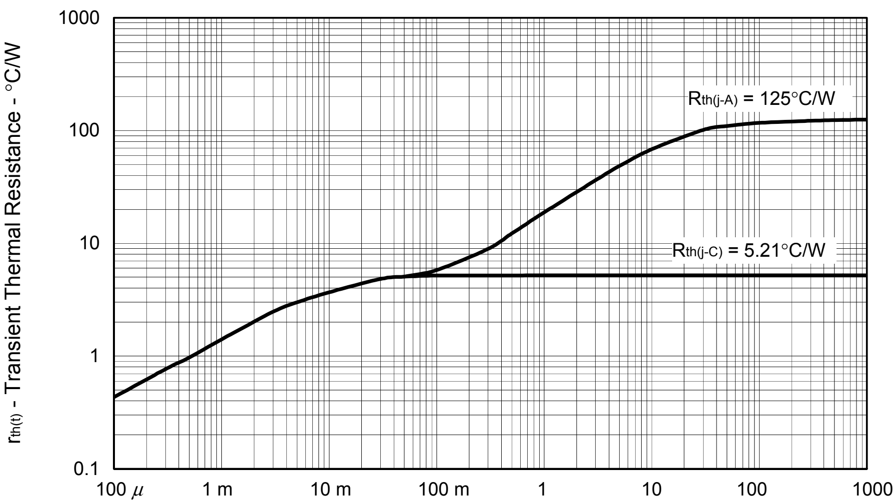


TYPICAL CHARACTERISTICS (T_A = 25°C)

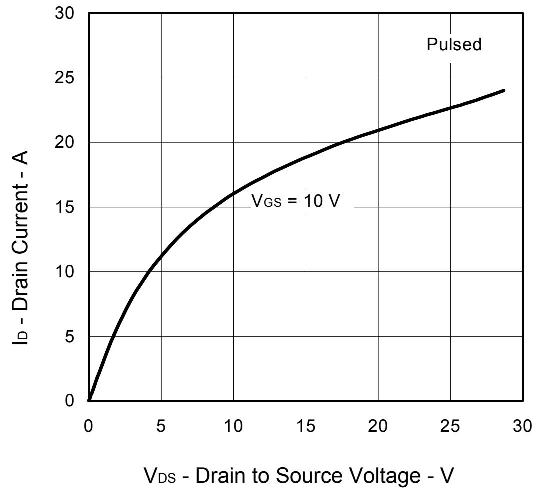




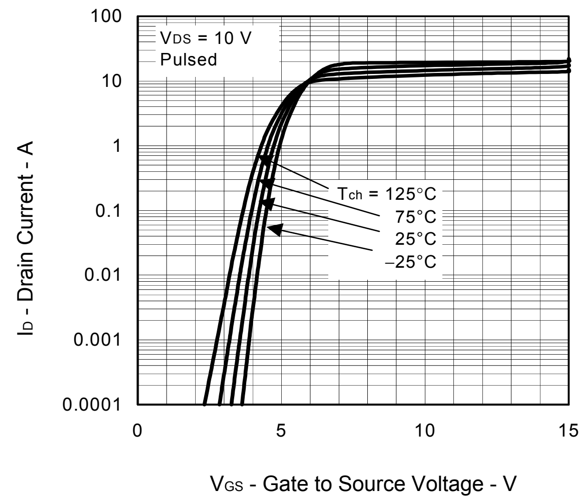




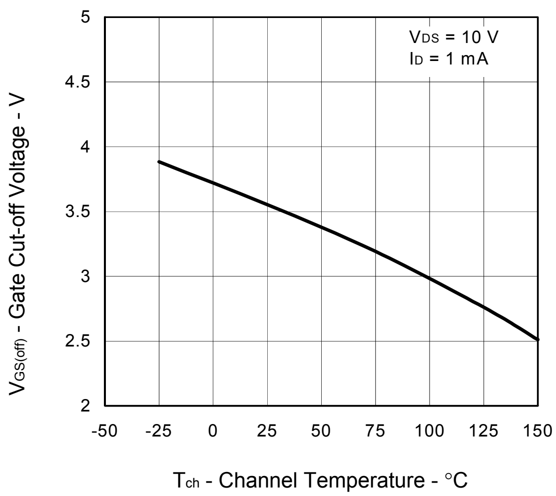
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



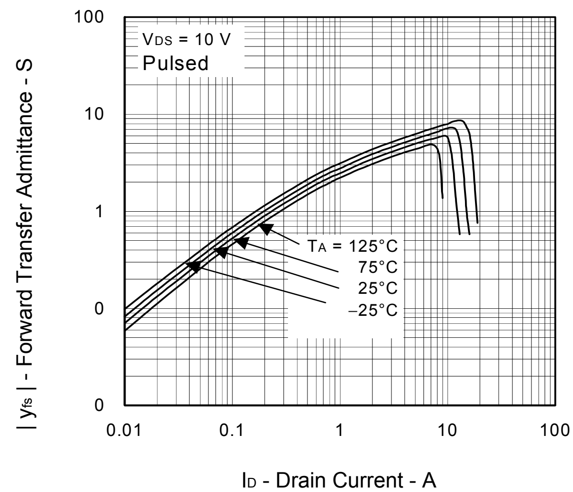
FORWARD TRANSFER CHARACTERISTICS



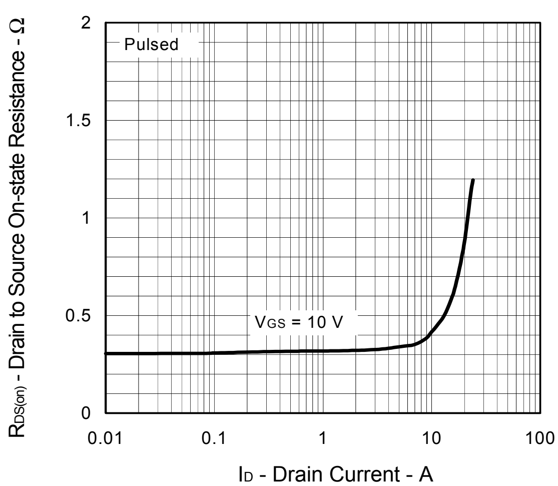
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



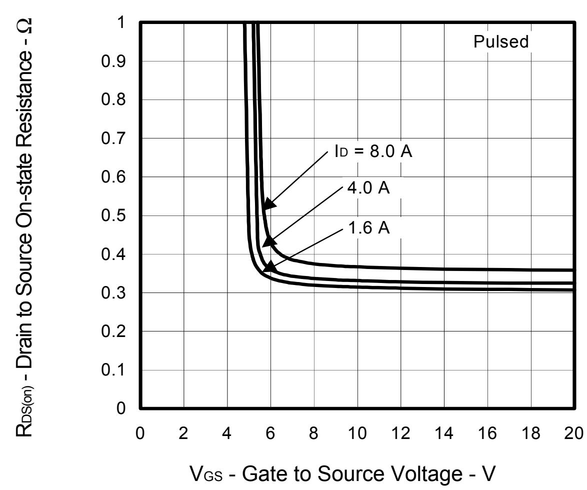
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



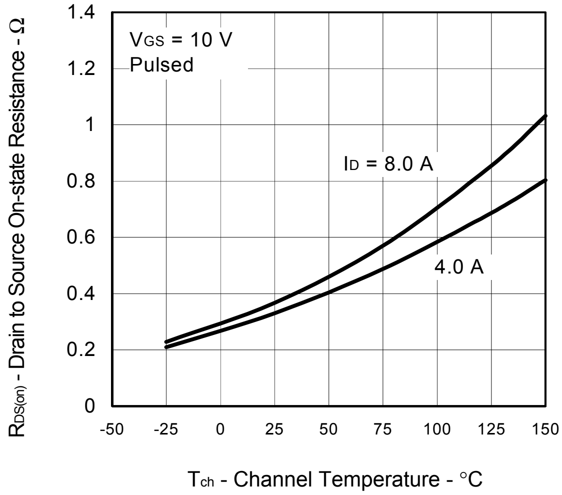
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



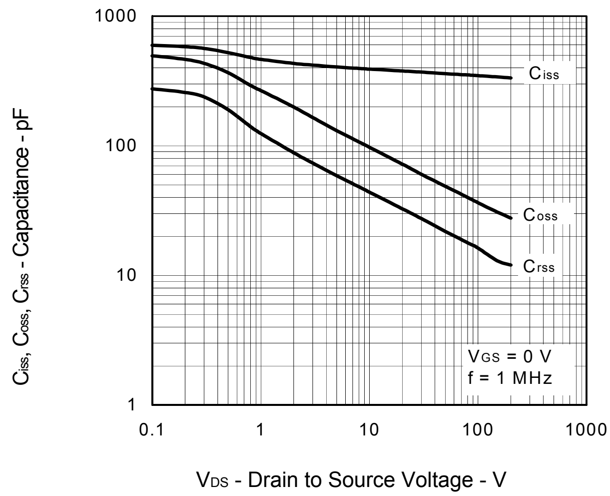
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



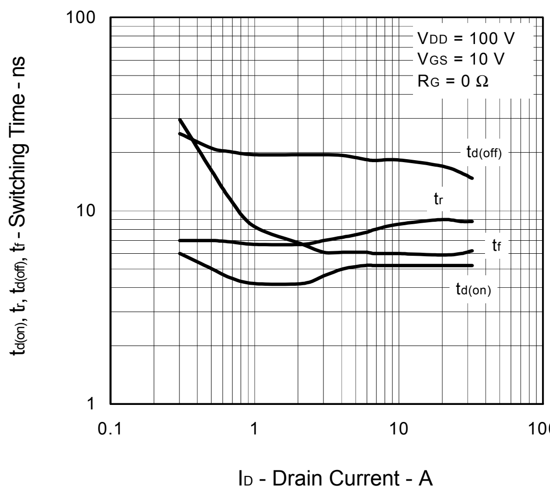
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



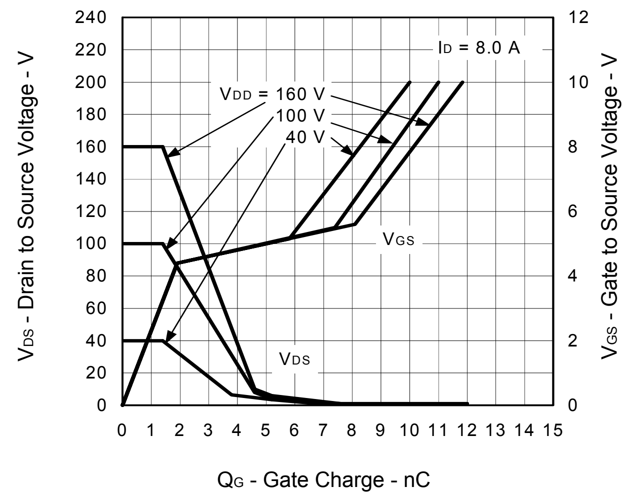
CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE



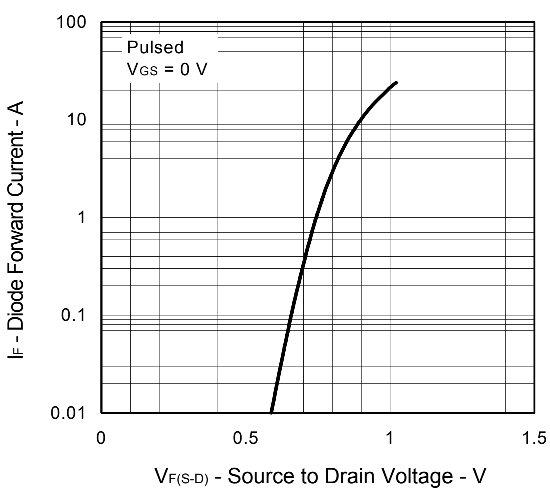
SWITCHING CHARACTERISTICS



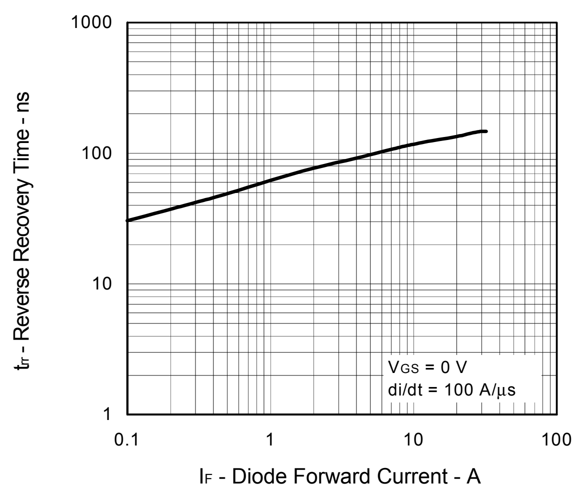
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



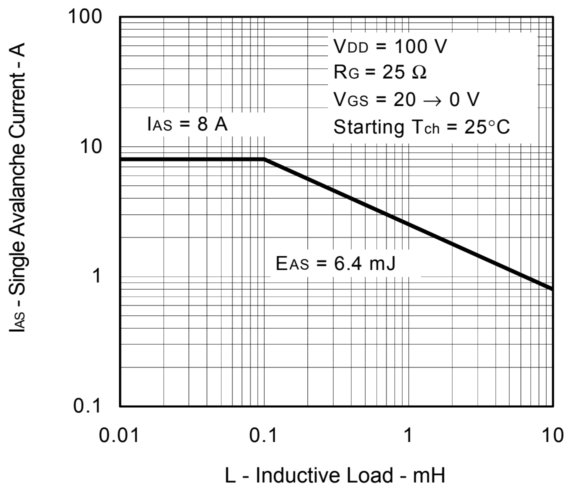
SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



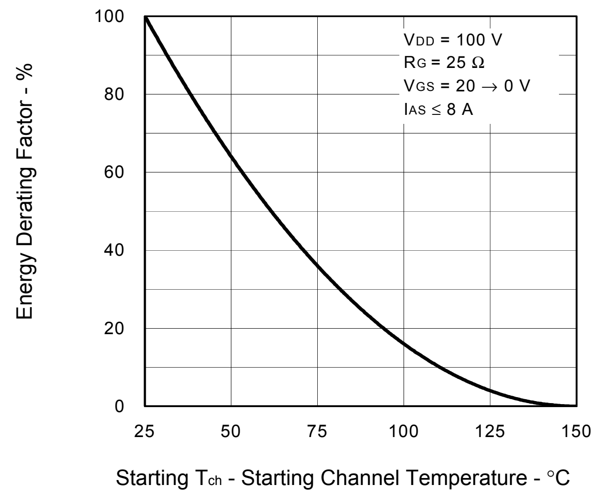
REVERSE RECOVERY TIME vs.
DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD

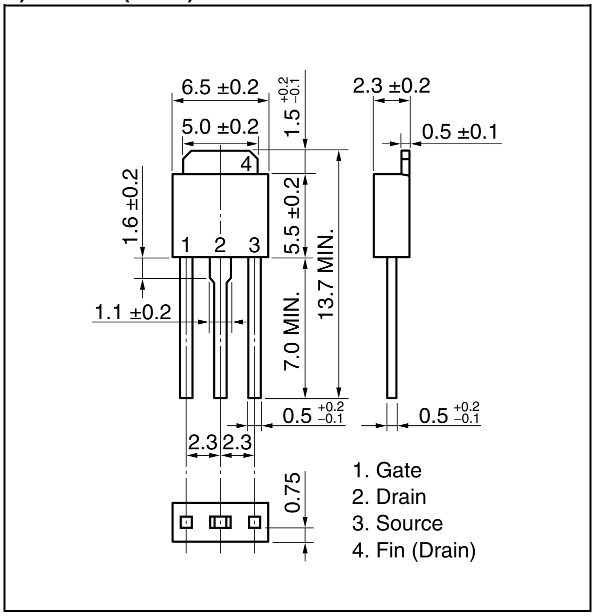


SINGLE AVALANCHE ENERGY
DERATING FACTOR

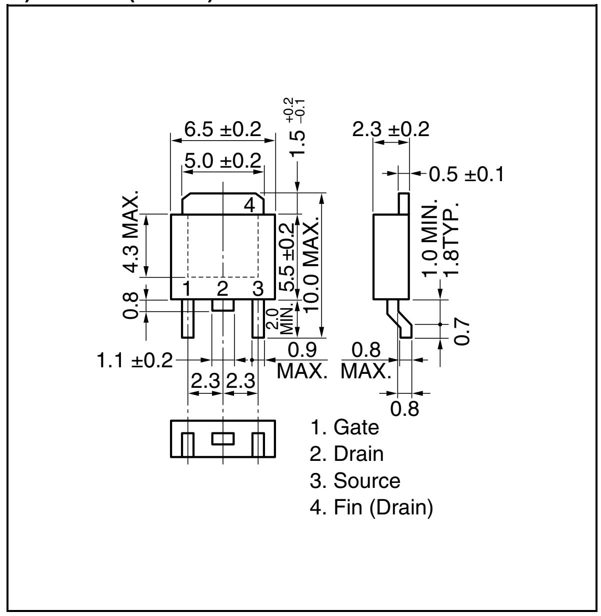


★ PACKAGE DRAWINGS (Unit: mm)

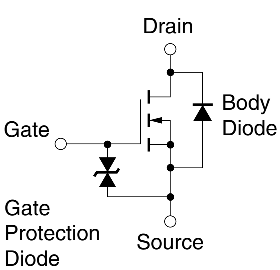
1) TO-251 (MP-3)



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.