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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

2SK3385

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3385 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 28 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 15 \text{ A)}$
 $R_{DS(on)2} = 45 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 15 \text{ A)}$
- Low C_{iss} : $C_{iss} = 1500 \text{ pF TYP.}$
- Built-in gate protection diode
- TO-251/TO-252 package

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	60	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 30	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 100	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	36	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}	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	22	A
Single Avalanche Energy ^{Note2}	E_{AS}	48	mJ

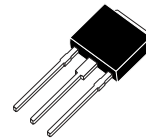
Notes 1. $PW \leq 10 \mu\text{s}$, Duty cycle $\leq 1\%$

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 30 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

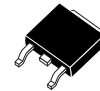
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3385	TO-251 (MP-3)
2SK3385-Z	TO-252 (MP-3Z)

(TO-251)



(TO-252)



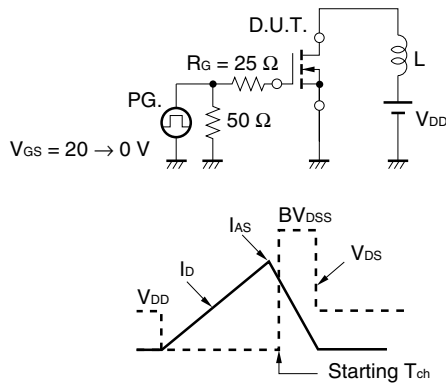
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

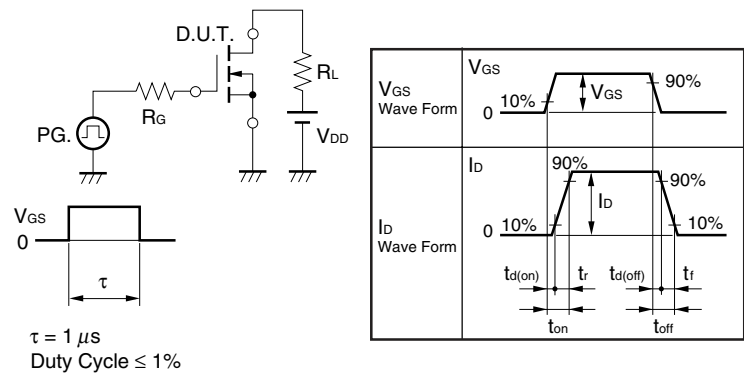
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10 V, I _D = 15 A	8	16		S
Drain to Source On-state Resistance Note	R _{DS(on)1}	V _{GS} = 10 V, I _D = 15 A		22	28	mΩ
	R _{DS(on)2}	V _{GS} = 4.0 V, I _D = 15 A		31	45	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		1500		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		250		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		130		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 30 V, I _D = 15 A		22		ns
Rise Time	t _r	V _{GS} = 10 V		250		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		77		ns
Fall Time	t _f			77		ns
Total Gate Charge	Q _G	V _{DD} = 48 V		30		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		4.8		nC
Gate to Drain Charge	Q _{GD}	I _D = 30 A		8.6		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 30 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 30 A, V _{GS} = 0 V		44		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		79		nC

Note Pulsed

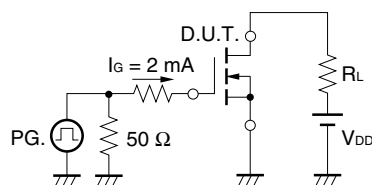
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

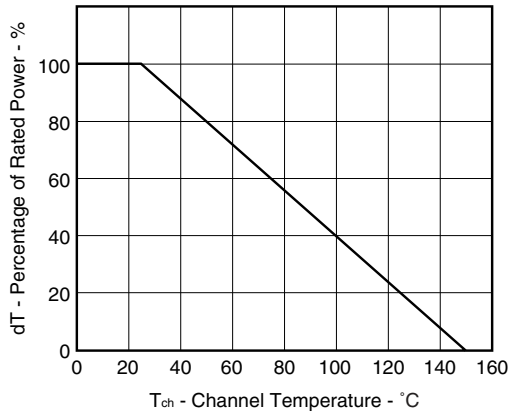


TEST CIRCUIT 3 GATE CHARGE

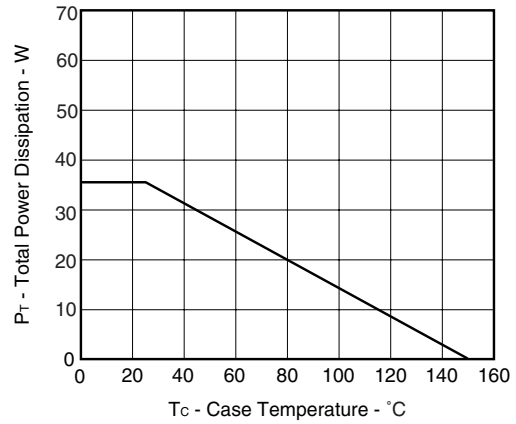


TYPICAL CHARACTERISTICS (T_A = 25°C)

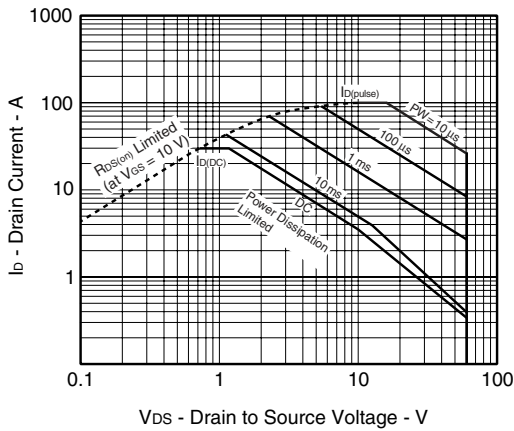
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



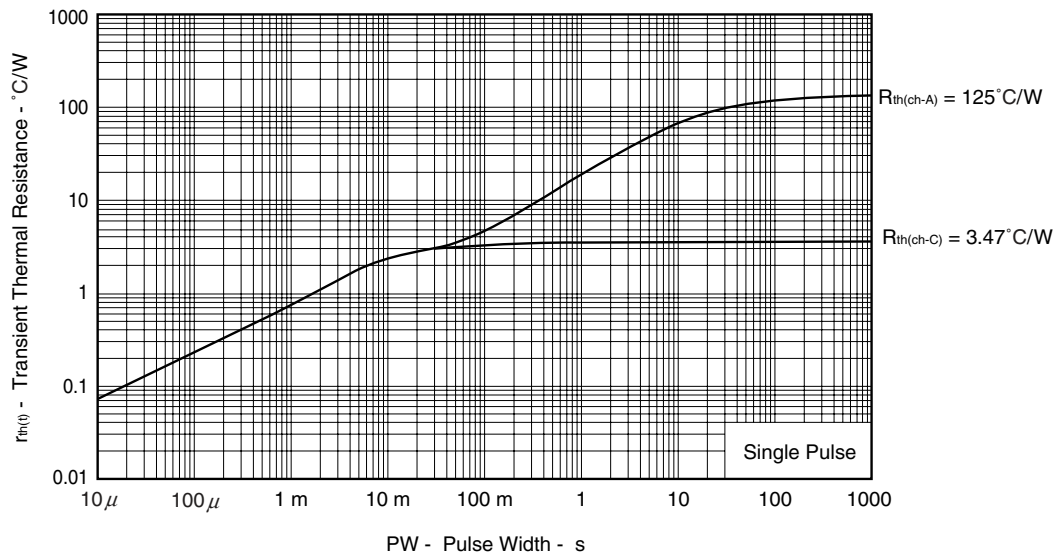
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



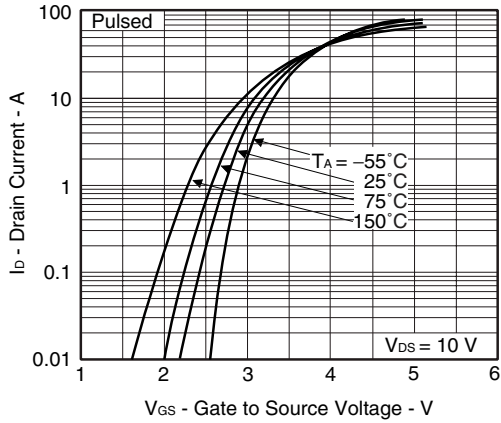
FORWARD BIAS SAFE OPERATING AREA



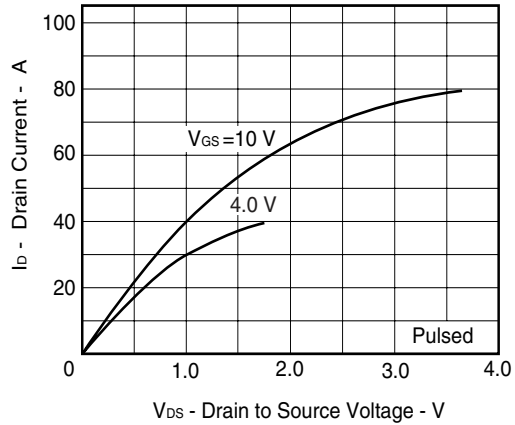
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



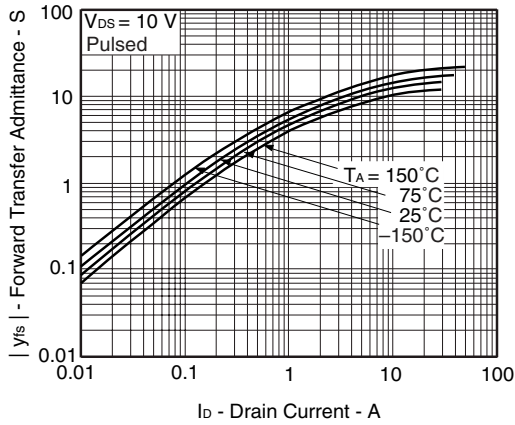
FORWARD TRANSFER CHARACTERISTICS



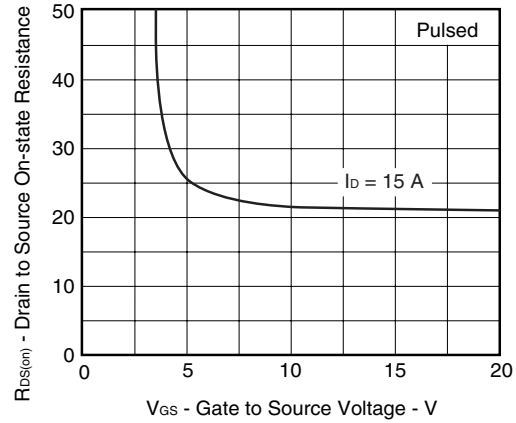
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



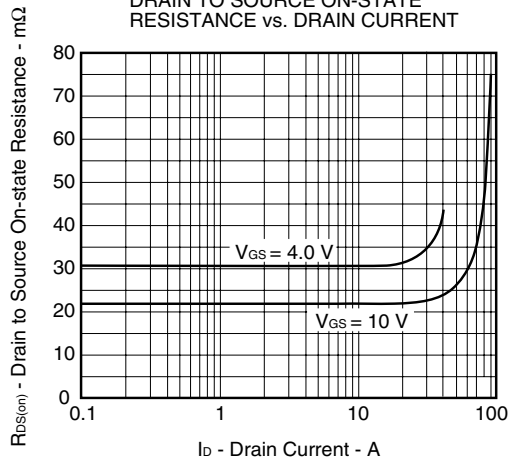
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



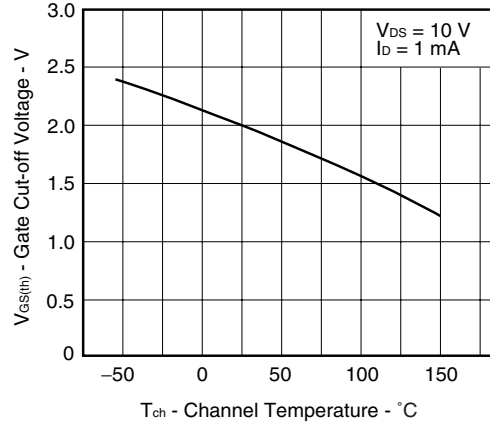
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

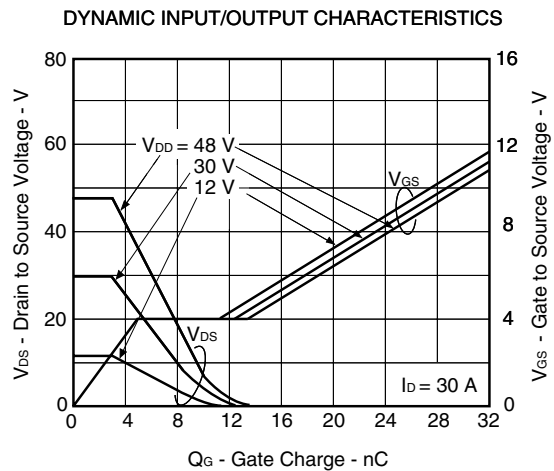
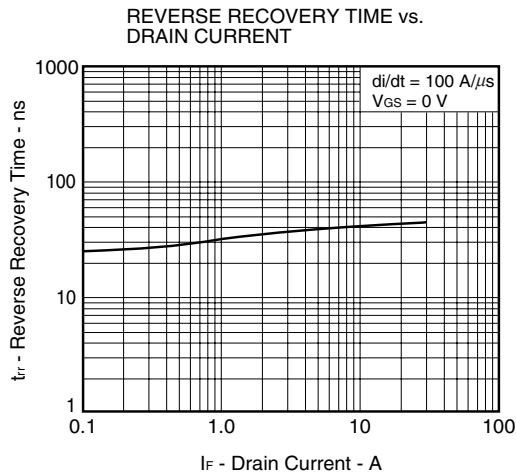
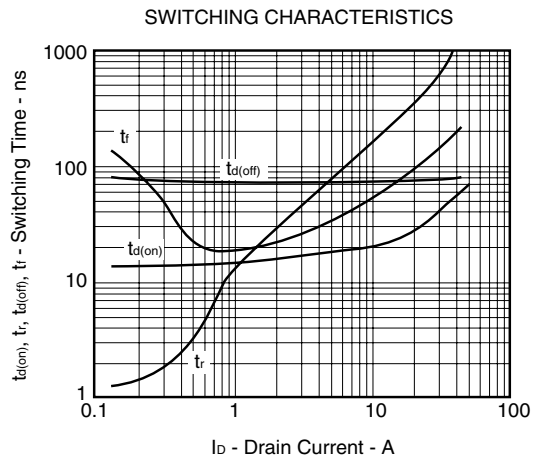
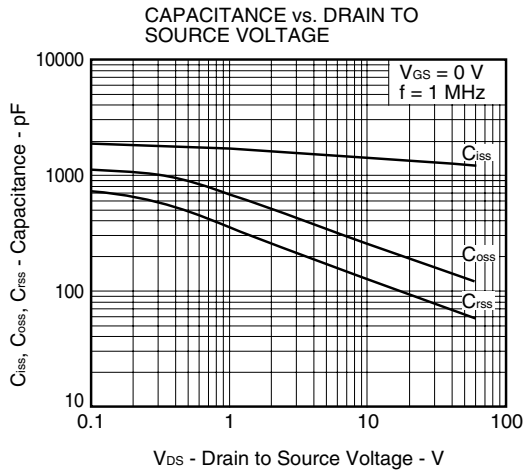
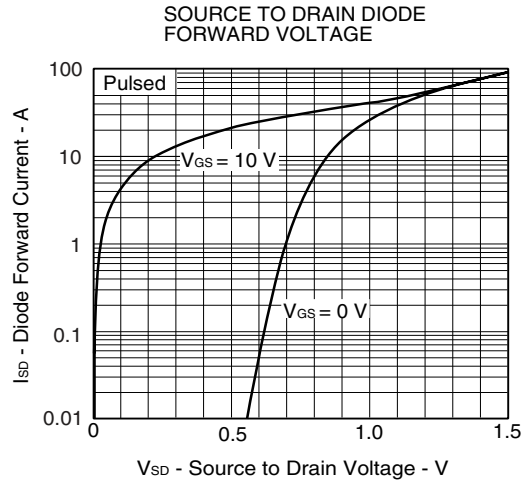
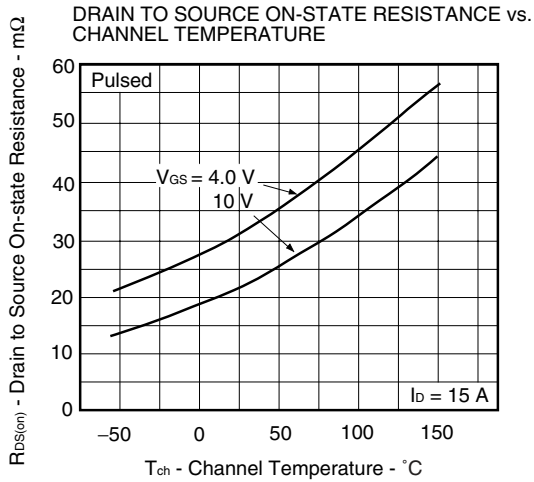


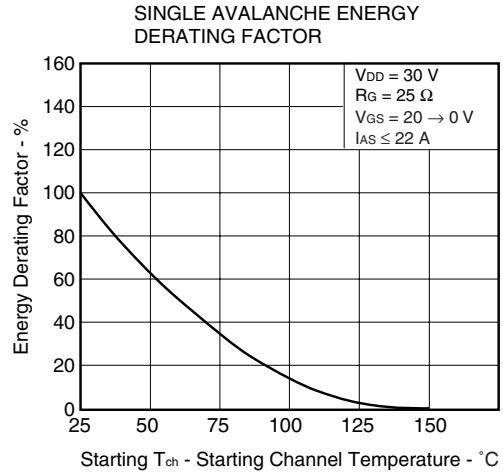
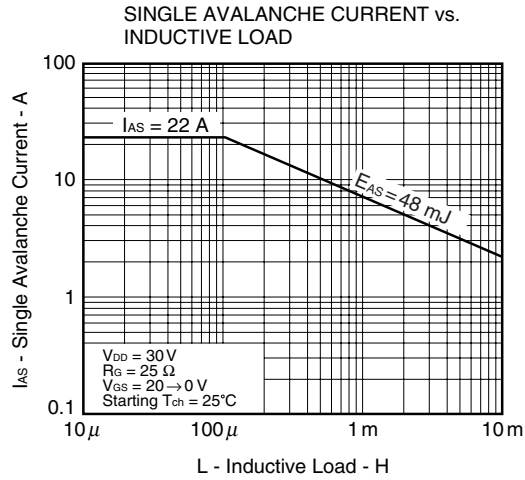
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



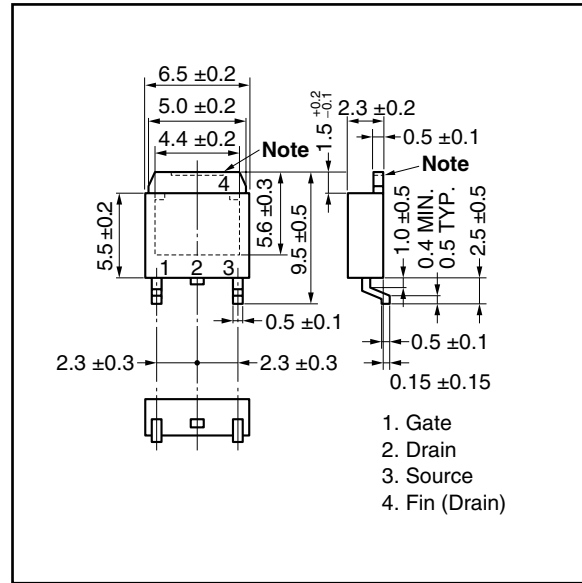
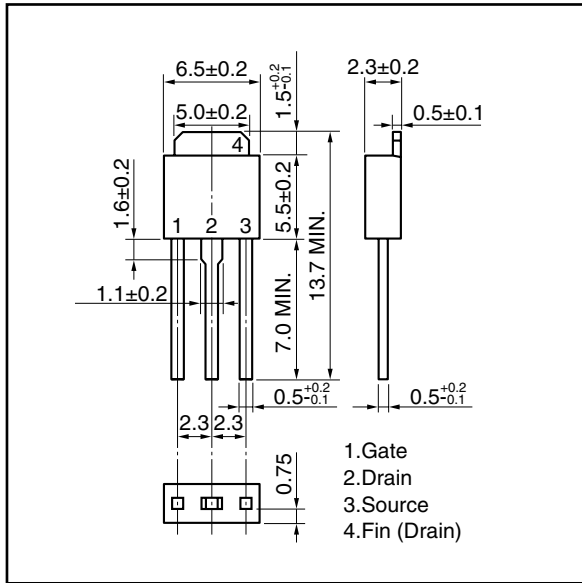




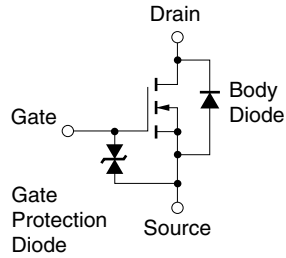
PACKAGE DRAWINGS (Unit: mm)

1) TO-251 (MP-3)

<R> 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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