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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
2SK3377

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3377 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Low On-state Resistance
 $R_{DS(on)1} = 44 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 10 \text{ A)}$
 $R_{DS(on)2} = 78 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 10 \text{ A)}$
- Low C_{iss} : $C_{iss} = 760 \text{ pF TYP.}$
- Built-in Gate Protection Diode
- TO-251/TO-252 package

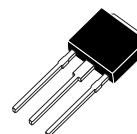
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3377	TO-251 (MP-3)
2SK3377-Z	TO-252 (MP-3Z)

ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	$I_{D(DC)}$	± 20	A
Drain Current (Pulse) ^{Note1}	$I_{D(pulse)}$	± 50	A
Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_{T1}	30	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	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}	15	A
Single Avalanche Energy ^{Note2}	E_{AS}	23	mJ

(TO-251)



(TO-252)



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

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

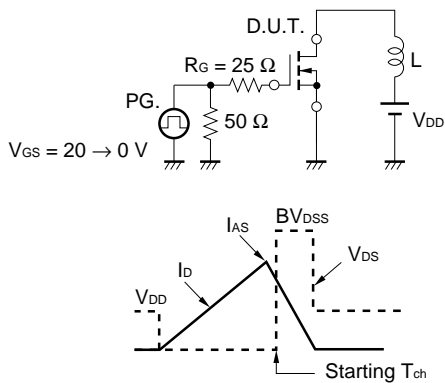
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ELECTRICAL CHARACTERISTICS (TA = 25°C)

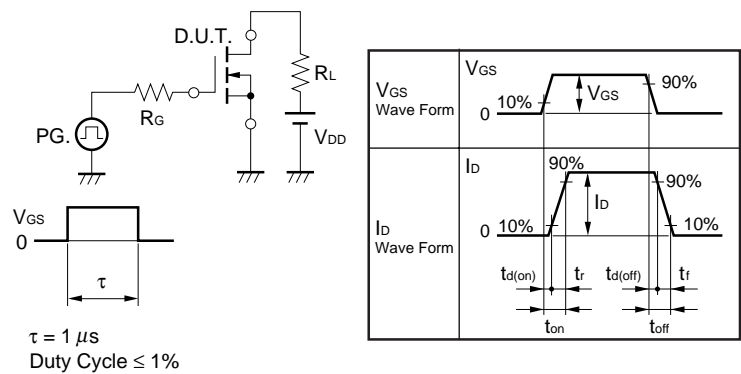
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	2.0	2.5	V
Forward Transfer Admittance ^{Note}	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$	5	10		S
Drain to Source On-state Resistance ^{Note}	$R_{DS(on)1}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		35	44	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.0\text{ V}, I_D = 10\text{ A}$		54	78	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$		760		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		150		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1\text{ MHz}$		71		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, I_D = 10\text{ A}$		13		ns
Rise Time	t_r	$V_{GS} = 10\text{ V}$		170		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		43		ns
Fall Time	t_f			34		ns
Total Gate Charge	Q_G	$V_{DD} = 48\text{ V}$		17		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 10\text{ V}$		3.0		nC
Gate to Drain Charge	Q_{GD}	$I_D = 20\text{ A}$		4.7		nC
Body Diode Forward Voltage ^{Note}	$V_{F(S-D)}$	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		1.0		V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		39		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}$		62		nC

Note Pulsed

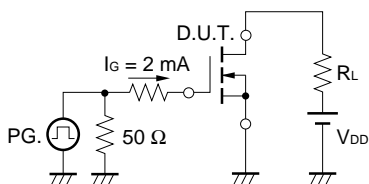
TEST CIRCUIT 1 AVALANCHE CAPABILITY



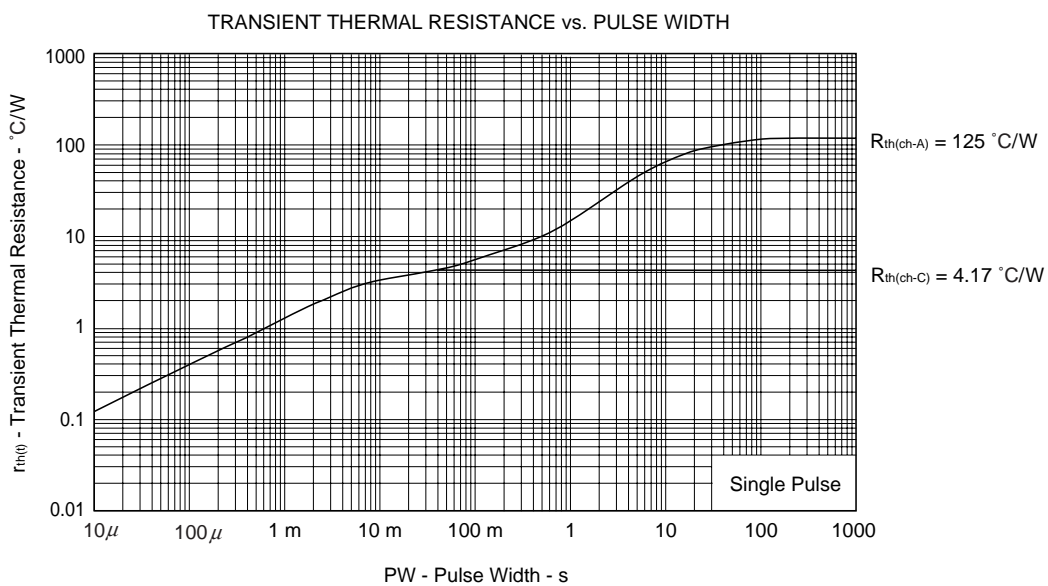
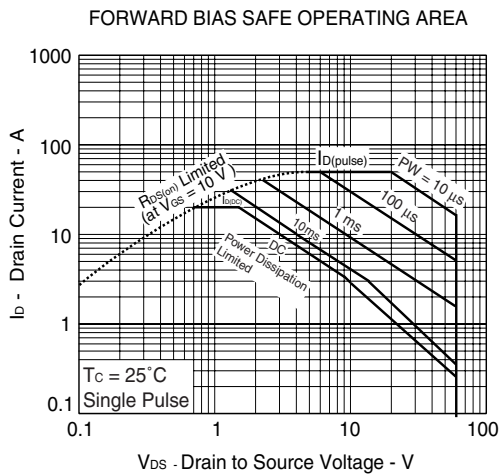
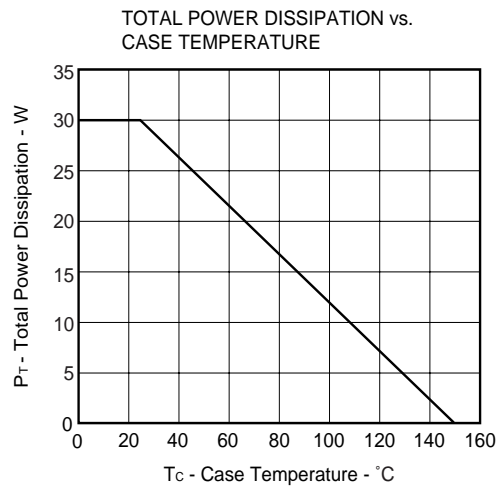
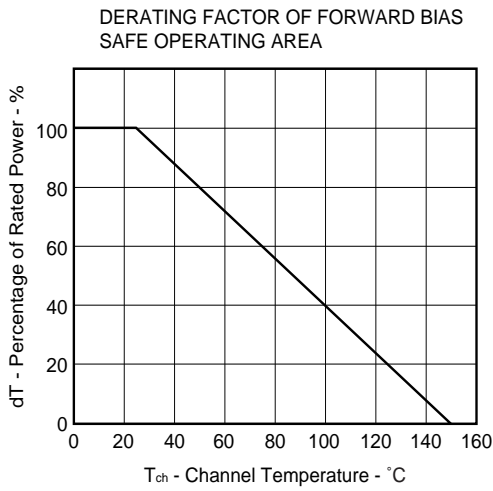
TEST CIRCUIT 2 SWITCHING TIME



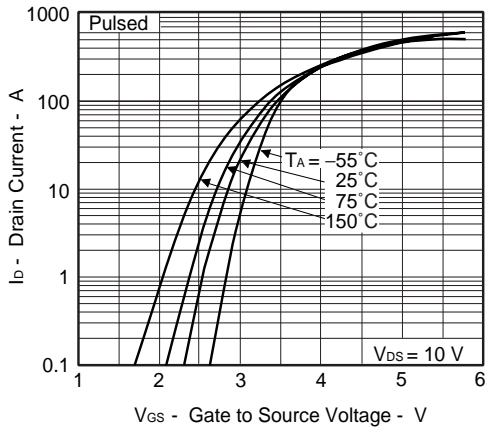
TEST CIRCUIT 3 GATE CHARGE



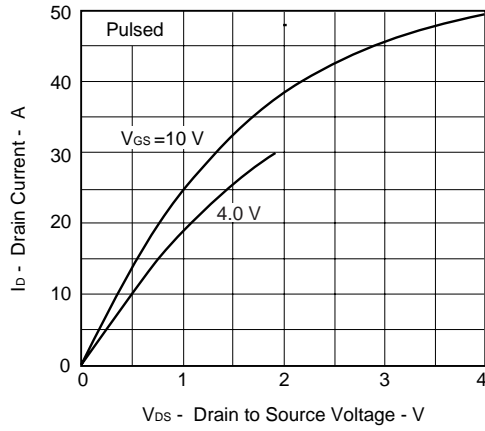
TYPICAL CHARACTERISTICS (T_A = 25°C)



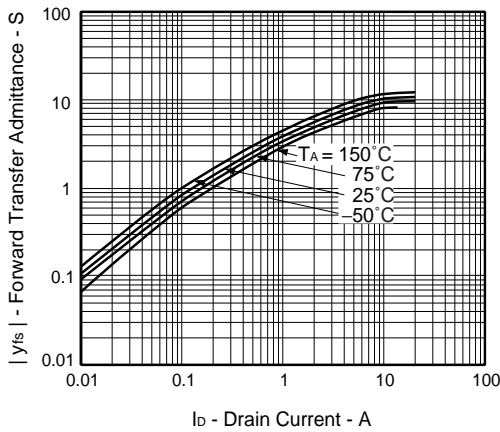
FORWARD TRANSFER CHARACTERISTICS



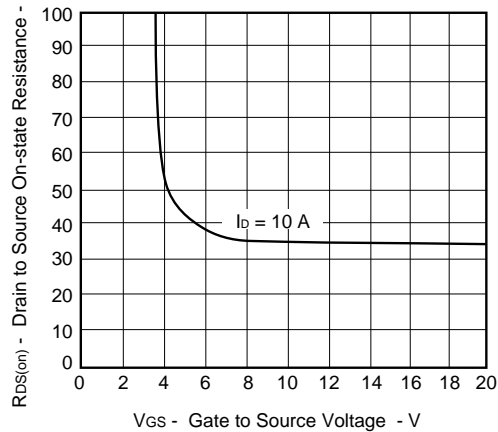
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



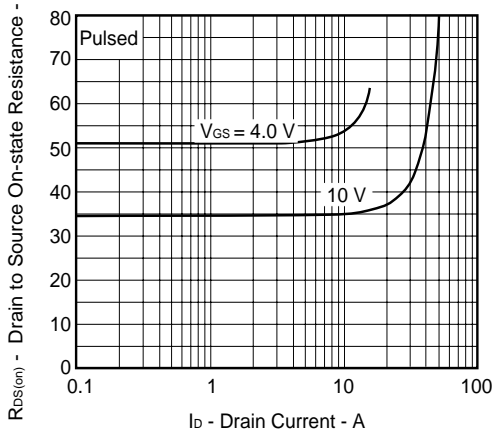
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



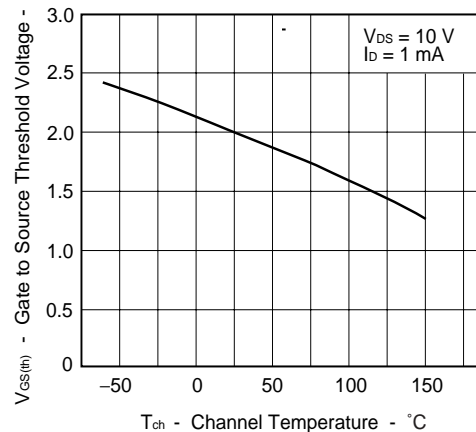
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



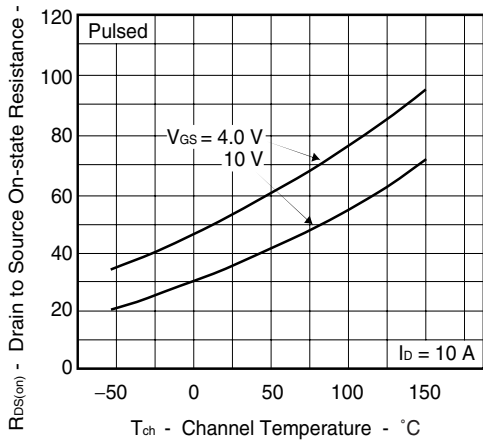
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



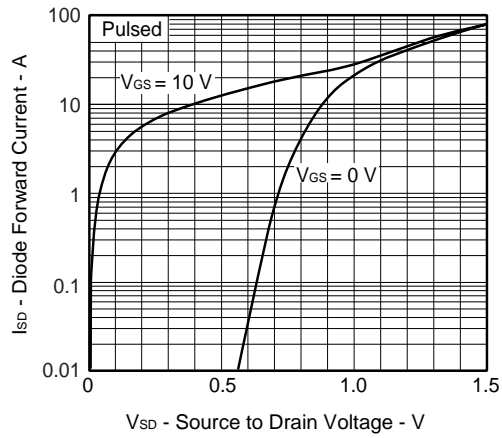
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



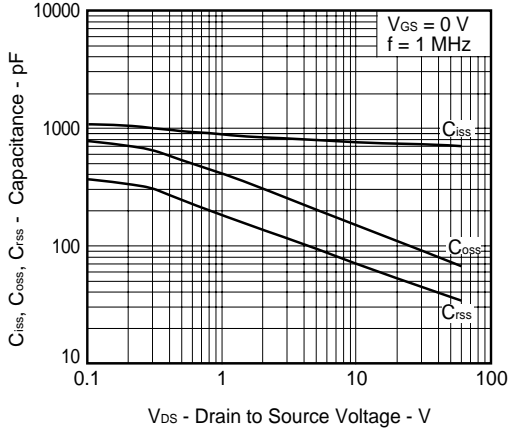
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



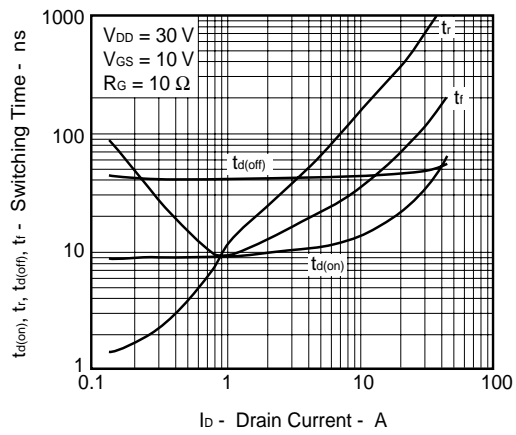
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



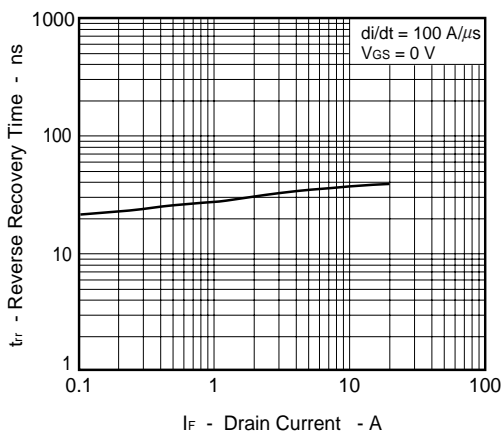
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



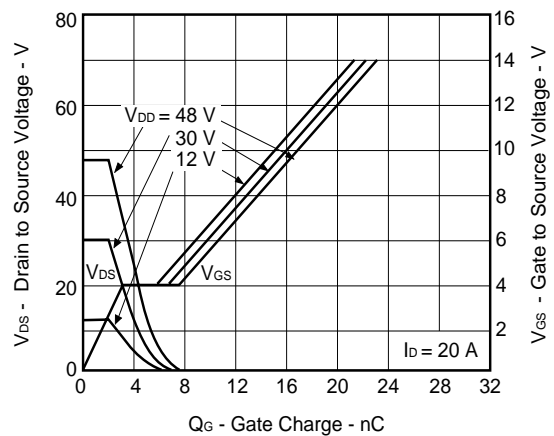
<R> SWITCHING CHARACTERISTICS

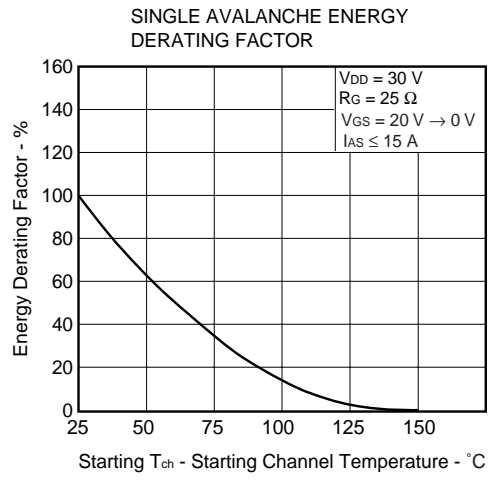
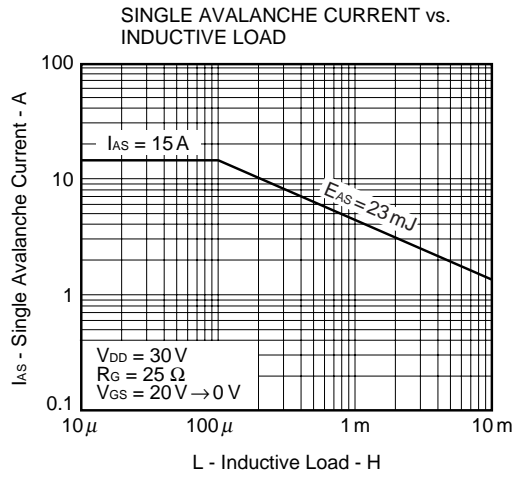


REVERSE RECOVERY TIME vs. DRAIN CURRENT



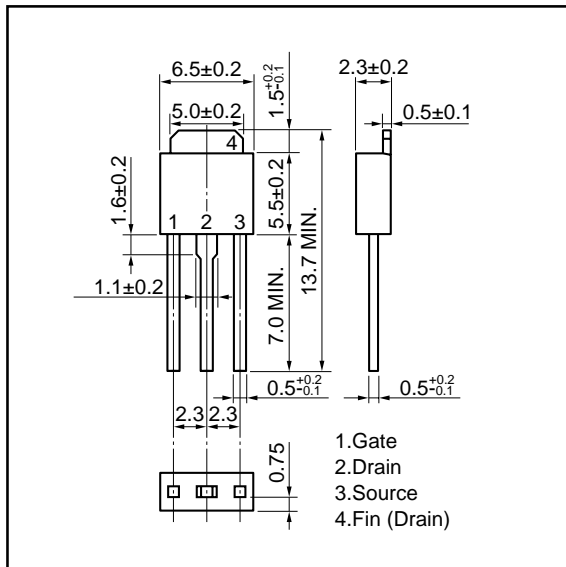
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



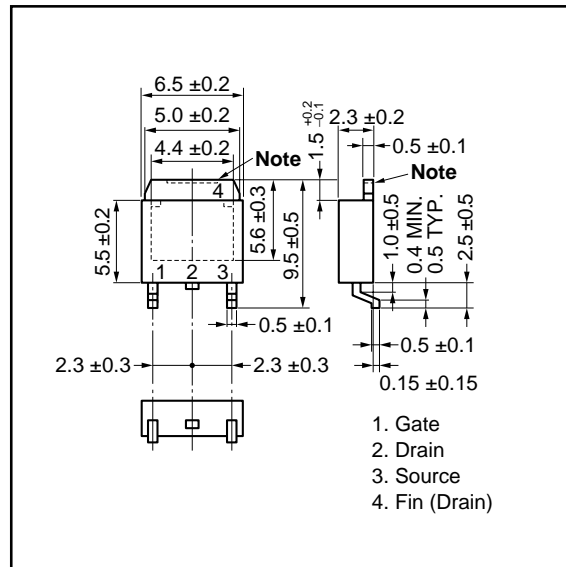


PACKAGE DRAWINGS (Unit: mm)

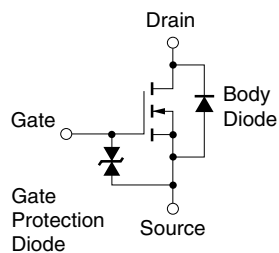
1) TO-251 (MP-3)



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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