NEC

MOS FIELD EFFECT TRANSISTOR
2SK3225

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK3225 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Low On-state Resistance
  $R_{DS(on)1}$ = 18 mΩ MAX. (V_{GS} = 10 V, I_D = 17 A)
  $R_{DS(on)2}$ = 27 mΩ MAX. (V_{GS} = 4.0 V, I_D = 17 A)
- Low C_{iss} : C_{iss} = 2100 pF TYP.
- Built-in Gate Protection Diode
- TO-251/TO-252 package

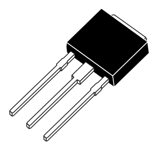
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3225	TO-251
2SK3225-Z	TO-252

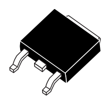
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	$V_{GSS(AC)}$	±20	V
Gate to Source Voltage	$V_{GSS(DC)}$	+20, –10	V
Drain Current (DC)	$I_{D(DC)}$	±34	A
Drain Current (Pulse) Note1	$I_{D(pulse)}$	±136	A
Total Power Dissipation (T_C = 25°C)	P_T	40	W
Total Power Dissipation (T_A = 25°C)	P_T	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}	22	mJ

(TO-251)



(TO-252)



Note1. PW ≤ 10 μs, Duty cycle ≤ 1%

★ **2.** Starting T_{ch} = 25°C, V_{DD} = 30 V, R_G = 25 Ω, V_{GS} = 20 V → 0 V

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The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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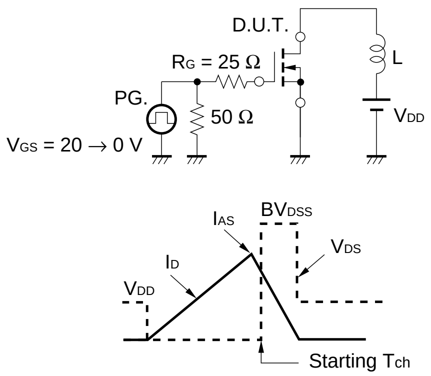
The mark ★ shows major revised points.

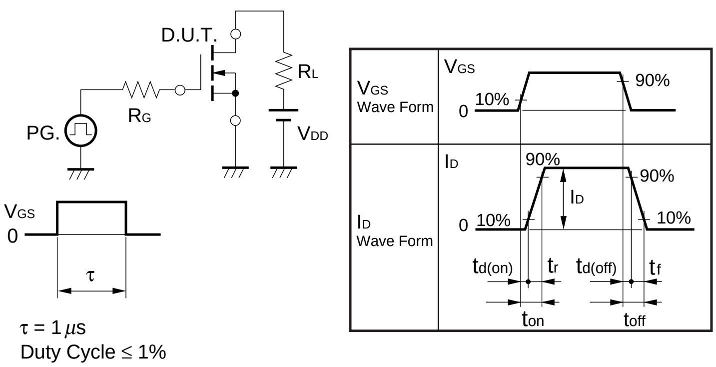
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 17 A		13	18	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 17 A		18	27	mΩ
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.0	1.5	2.0	V
Forward Transfer Admittance	$\| y_{fs} \|$	V_{DS} = 10 V, I_D = 17 A	13	27		S
Drain Leakage Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V			10	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±10	μA
Input Capacitance	C_{iss}	V_{DS} = 10 V		2100		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		550		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		220		pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 17 A		32		ns
Rise Time	t_r	V_{GS} = 10 V		300		ns
Turn-off Delay Time	$t_{d(off)}$	V_{DD} = 30 V		110		ns
Fall Time	t_f	R_G = 10 Ω		140		ns
Total Gate Charge	Q_G	I_D = 34 A		45		nC
Gate to Source Charge	Q_{GS}	V_{DD} = 48 V		7		nC
Gate to Drain Charge	Q_{GD}	V_{GS} = 10 V		13		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 34 A, V_{GS} = 0 V		0.94		V
Reverse Recovery Time	t_{rr}	If = 34 A, V_{GS} = 0 V		60		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		95		nC

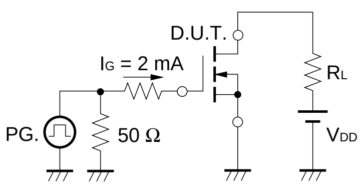
TEST CIRCUIT 1 AVALANCHE CAPABILITY



★ TEST CIRCUIT 2 SWITCHING TIME

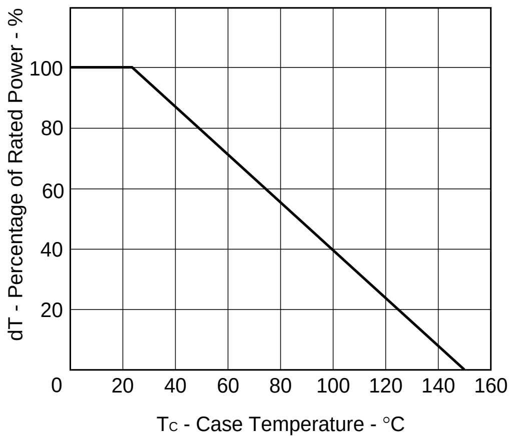


TEST CIRCUIT 3 GATE CHARGE

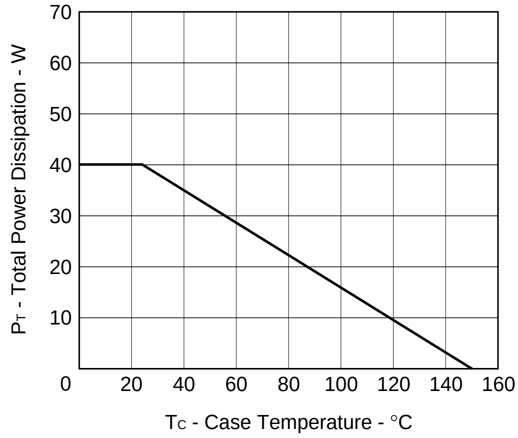


TYPICAL CHARACTERISTICS (TA = 25°C)

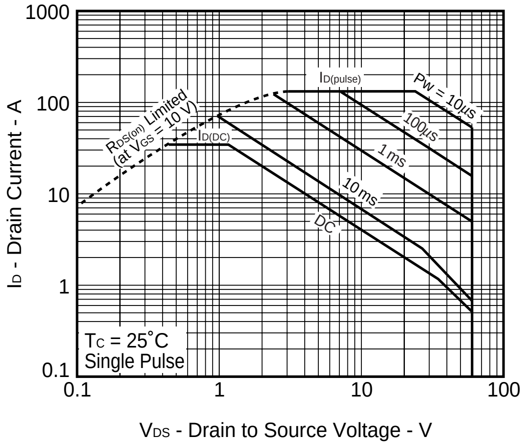
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



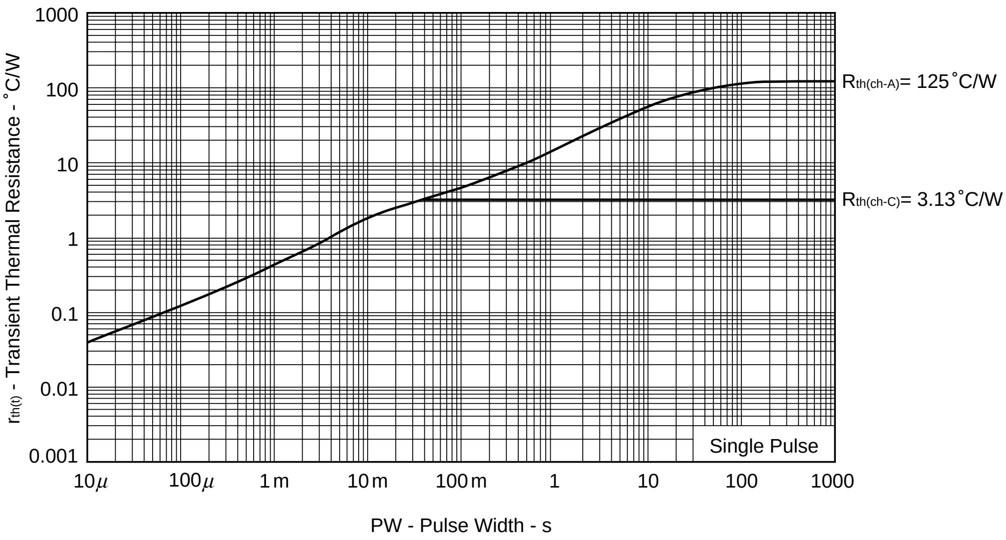
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



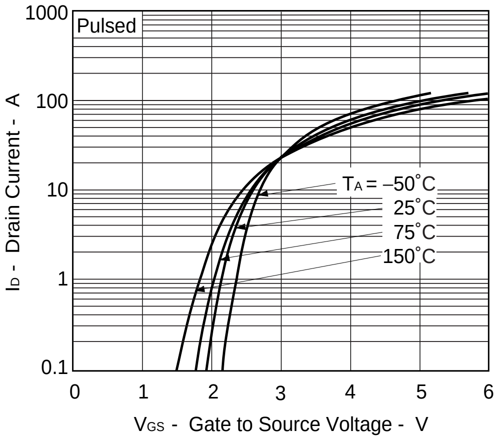
★ FORWARD BIAS SAFE OPERATING AREA



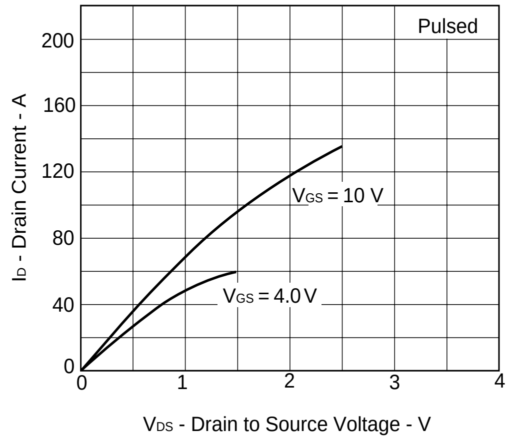
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



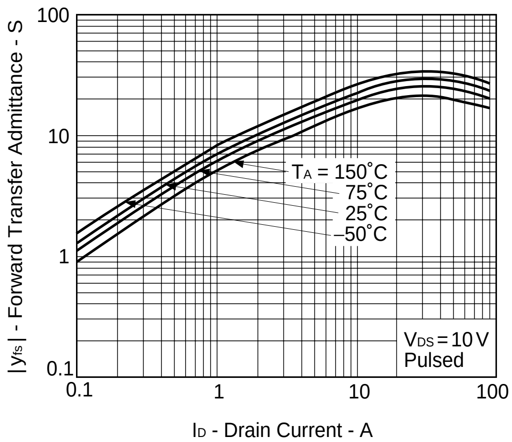
FORWARD TRANSFER CHARACTERISTICS



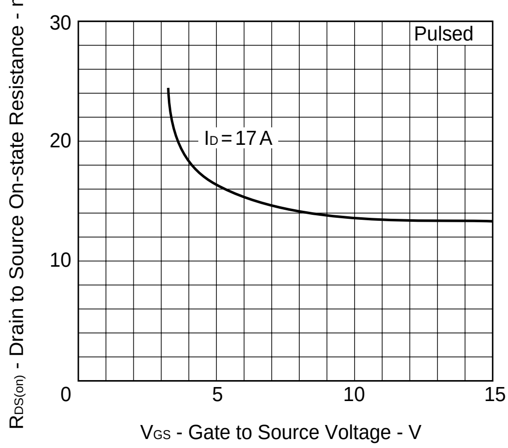
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



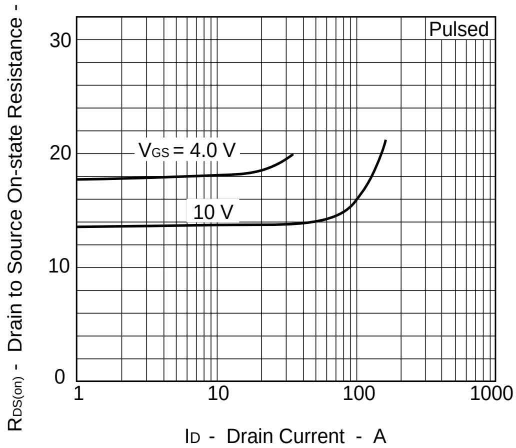
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



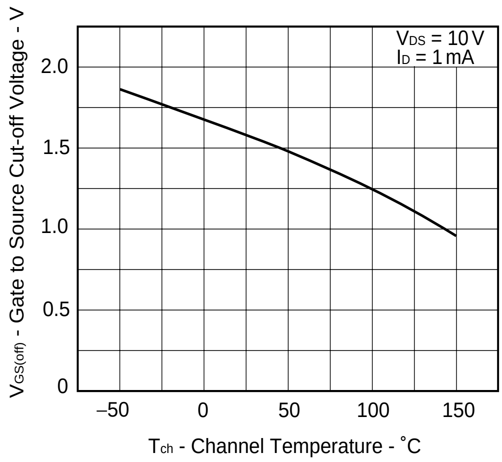
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



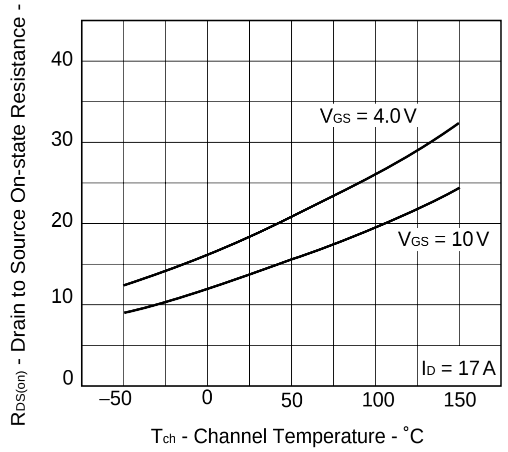
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



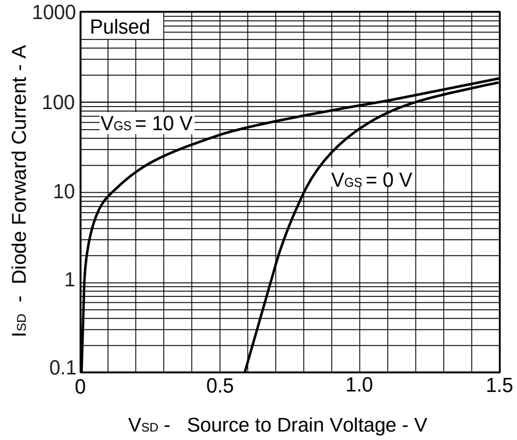
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



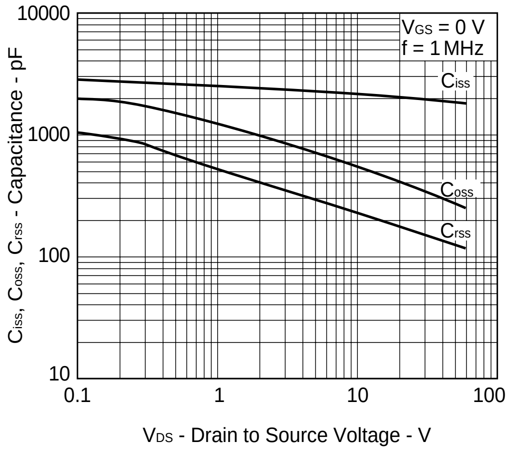
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



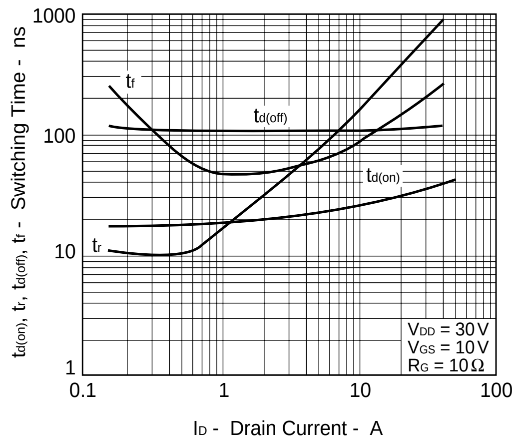
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



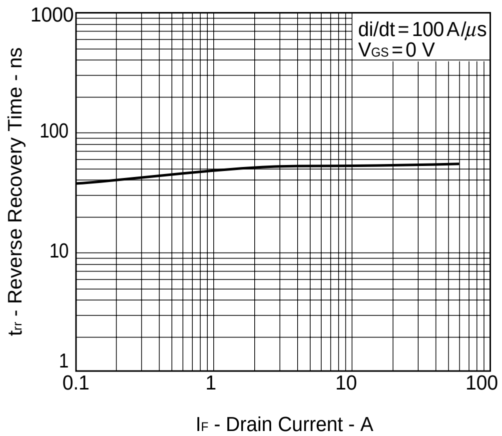
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



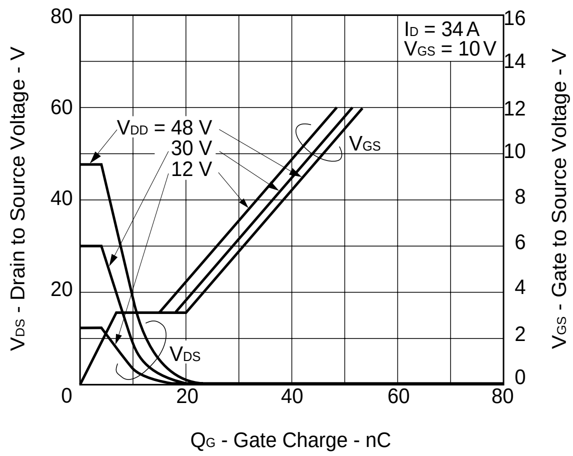
SWITCHING CHARACTERISTICS



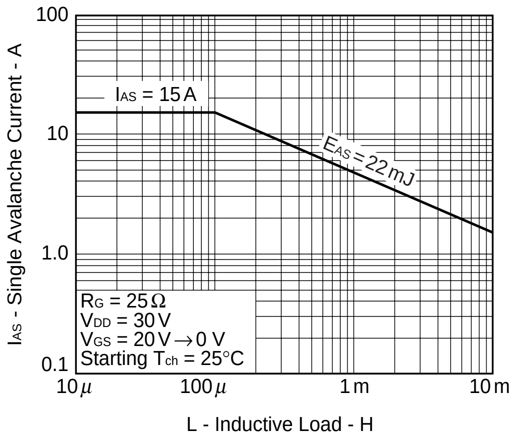
REVERSE RECOVERY TIME vs. DRAIN CURRENT



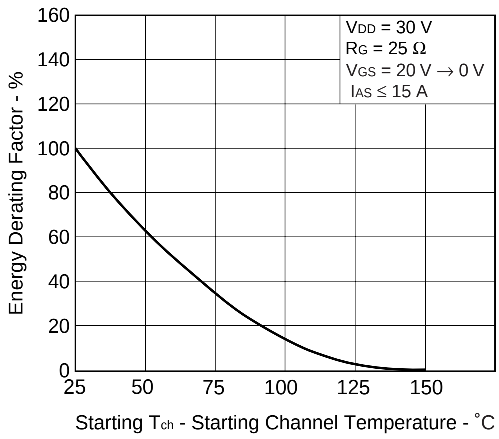
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



★ SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

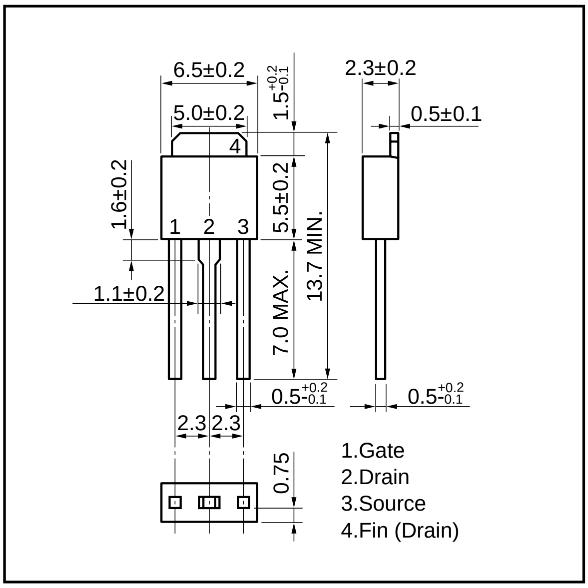


SINGLE AVALANCHE ENERGY DERATING FACTOR

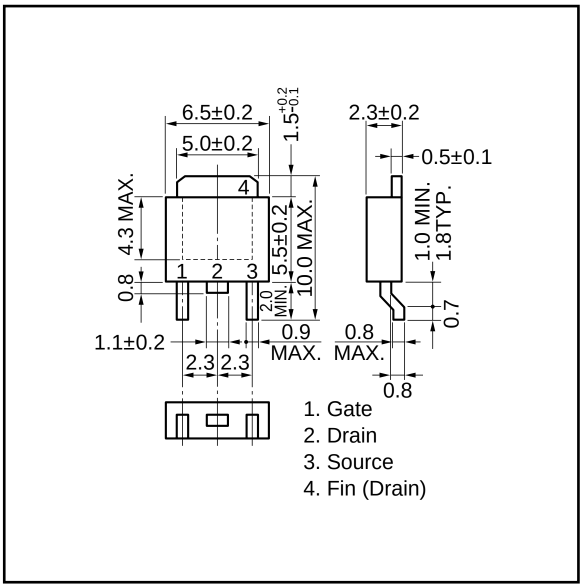


PACKAGE DRAWINGS (Unit : mm)

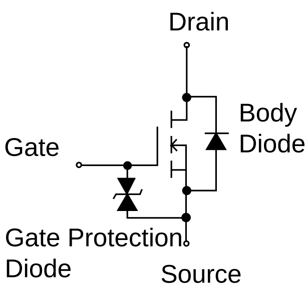
1)TO-251 (MP-3)



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.