

# MOS FIELD EFFECT TRANSISTOR 2SK2984

## SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

### DESCRIPTION

This product is N-Channel MOS Field Effect Transistor designed for high current switching application.

### FEATURES

- Low on-resistance  
 $R_{DS(on)1} = 10 \text{ m}\Omega$  (MAX.) ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 20 \text{ A}$ )  
 $R_{DS(on)2} = 15 \text{ m}\Omega$  (MAX.) ( $V_{GS} = 4.5 \text{ V}$ ,  $I_D = 20 \text{ A}$ )
- Low  $C_{iss}$   $C_{iss} = 2850 \text{ pF}$  TYP.
- Built-in gate protection diode

### ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK2984	TO-220AB
2SK2984-S	TO-262
2SK2984-ZJ	TO-263

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

Drain to Source Voltage <sup>Note1</sup>	$V_{DSS}$	30	V
Gate to Source Voltage <sup>Note2</sup>	$V_{GSS}$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 40$	A
Drain Current (pulse) <sup>Note3</sup>	$I_{D(pulse)}$	$\pm 160$	A
Total Power Dissipation ( $T_A = 25^\circ\text{C}$ )	$P_T$	1.5	W
Total Power Dissipation ( $T_c = 25^\circ\text{C}$ )	$P_T$	60	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

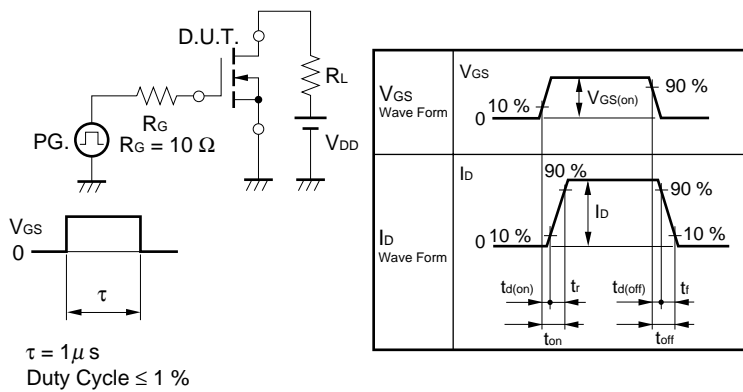
- Notes.1**  $V_{GS} = 0 \text{ V}$   
**2**  $V_{DS} = 0 \text{ V}$   
**3**  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1 \%$

The information in this document is subject to change without notice.

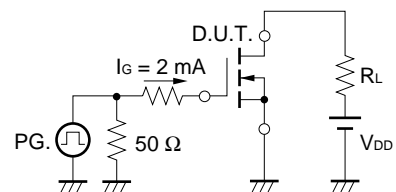
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		6.5	10	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		8.5	13	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.0	1.5	2.0	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 20 A	18	36		S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			10	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V		2600		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		1150		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		500		pF
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = 20 A		70		ns
Rise Time	t <sub>r</sub>	V <sub>GS(on)</sub> = 10 V		1100		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>DD</sub> = 15 V		210		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		310		ns
Total Gate Charge	Q <sub>G</sub>	I <sub>D</sub> = 40 A		65		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>DD</sub> = 24 V		9.5		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = 10 V		12.5		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 40 A, V <sub>GS</sub> = 0 V		0.8		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 40 A, V <sub>GS</sub> = 0 V		50		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A / μS		100		nC

**TEST CIRCUIT 1 SWITCHING TIME**

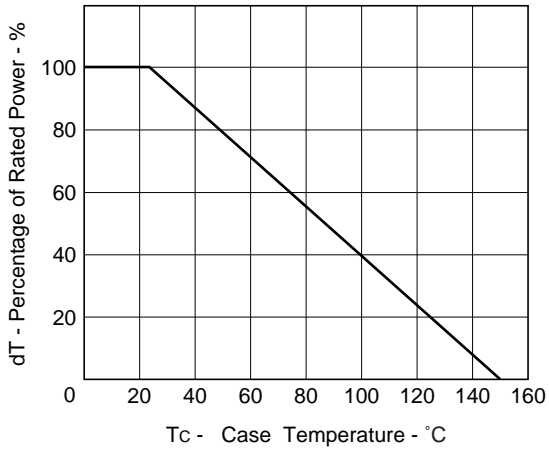


**TEST CIRCUIT 2 GATE CHARGE**

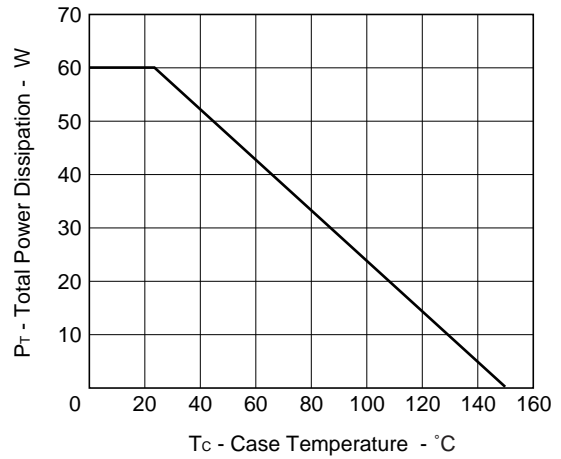


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

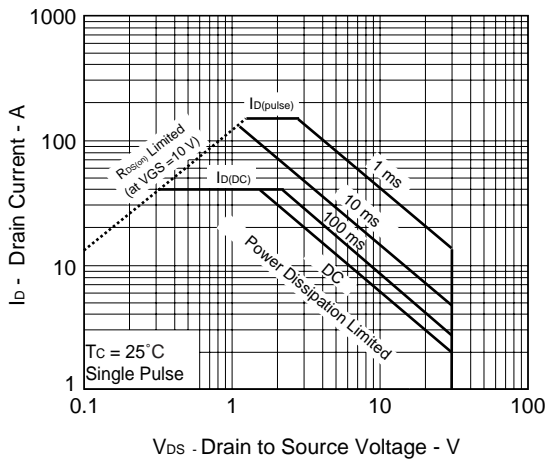
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



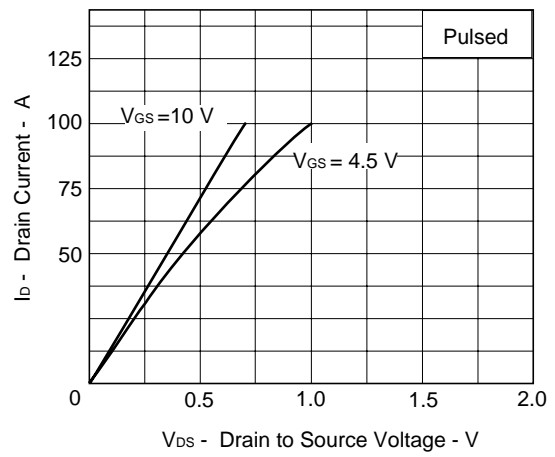
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



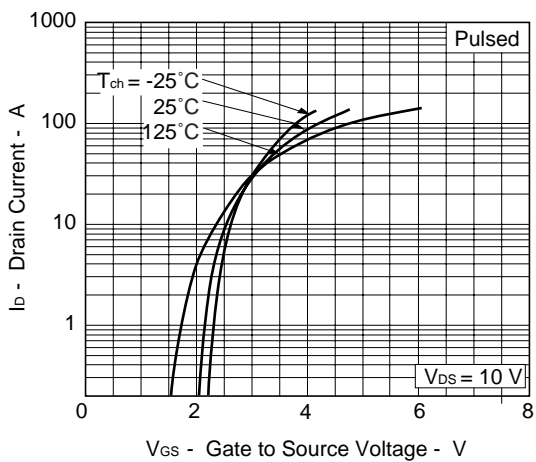
FORWARD BIAS SAFE OPERATING AREA



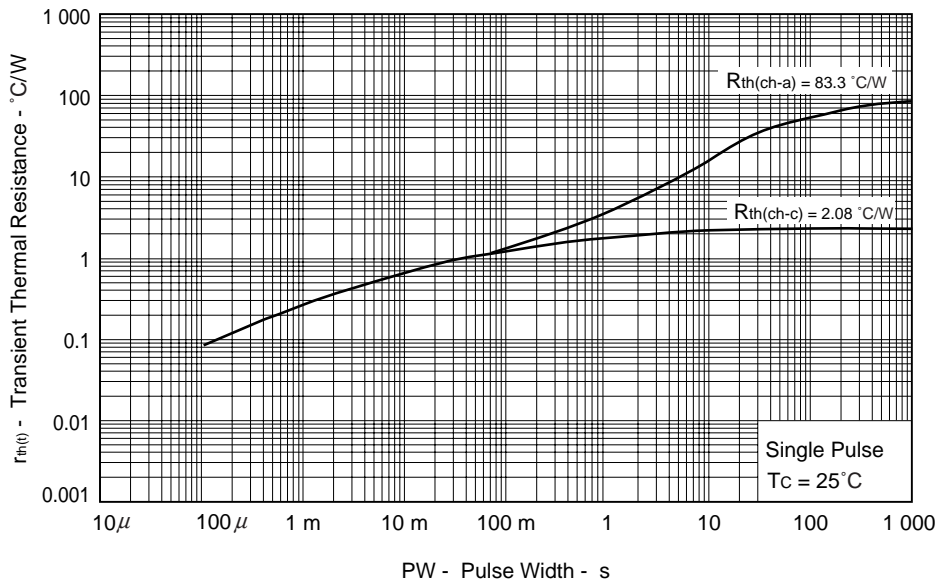
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



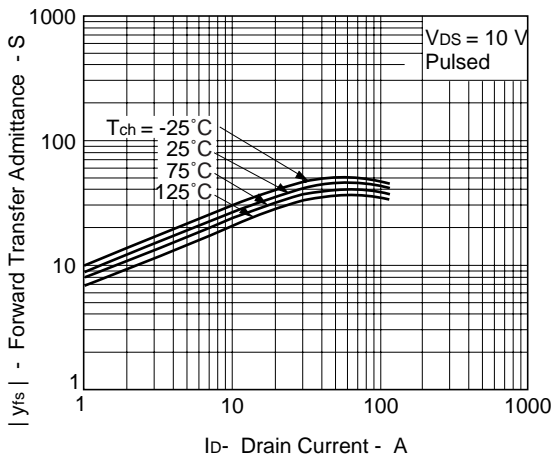
FORWARD TRANSFER CHARACTERISTICS



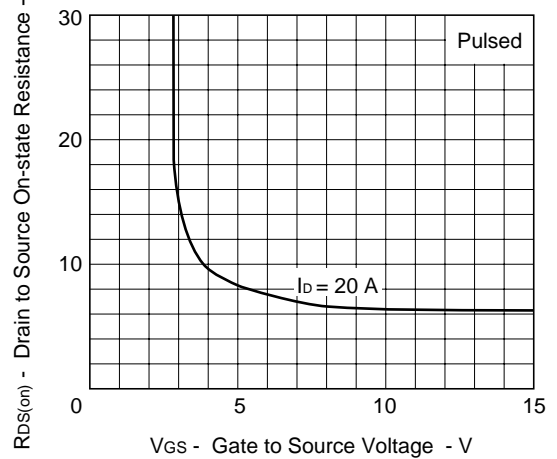
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



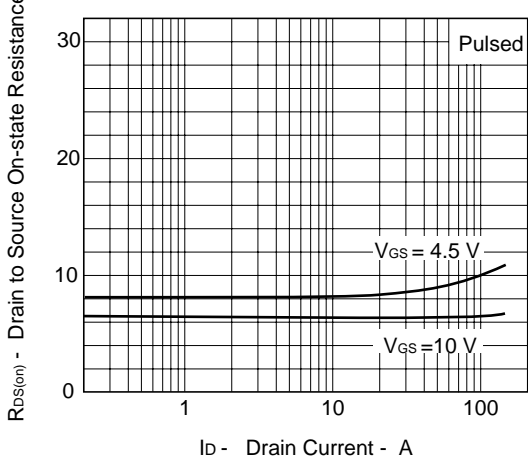
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



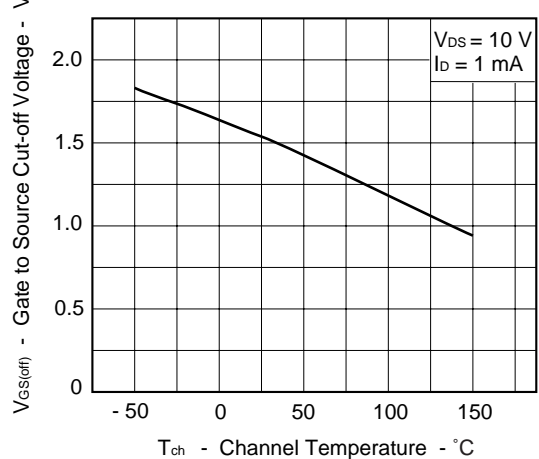
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



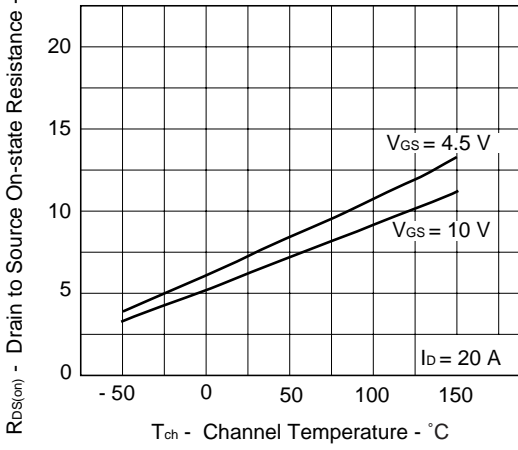
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



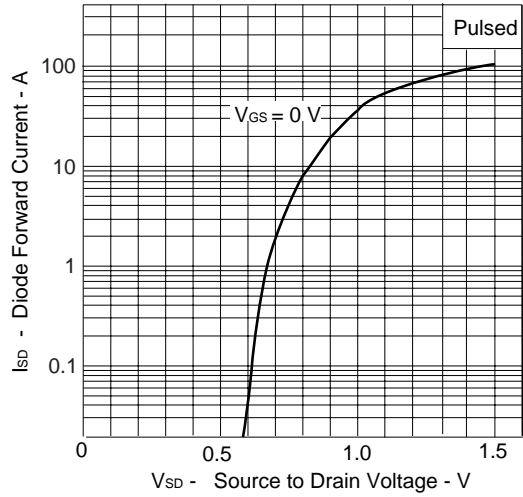
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



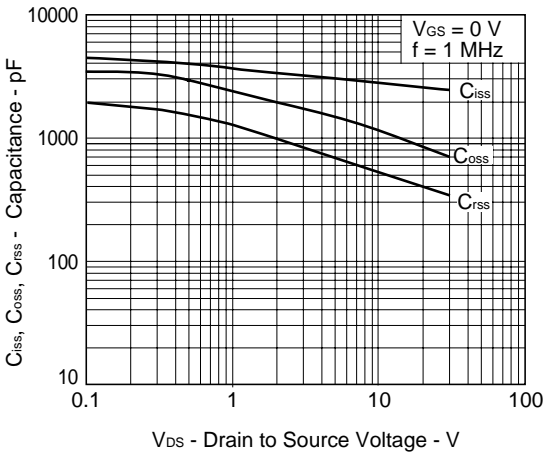
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



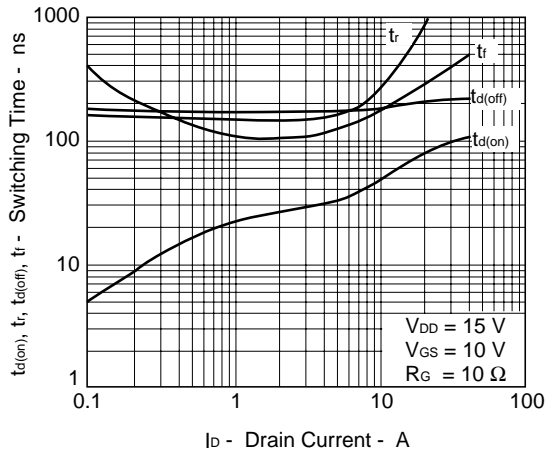
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



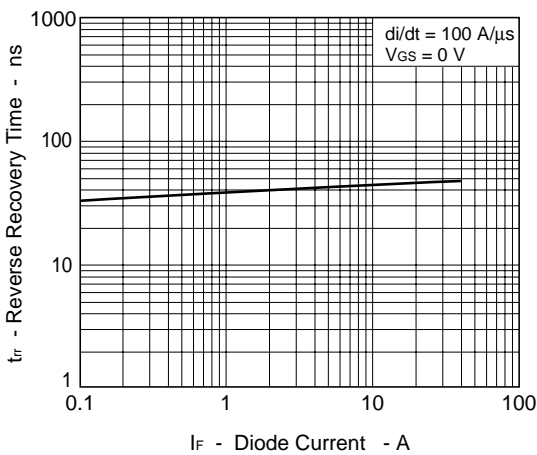
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



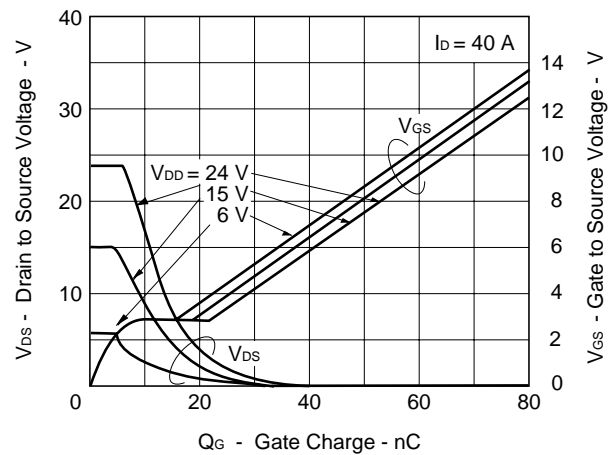
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT

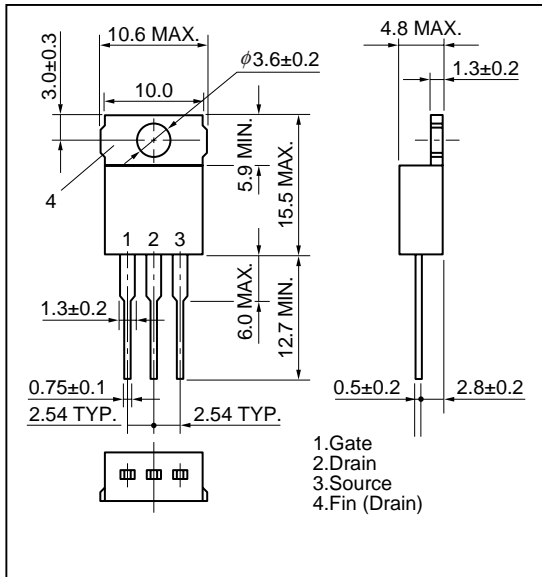


DYNAMIC INPUT/OUTPUT CHARACTERISTICS

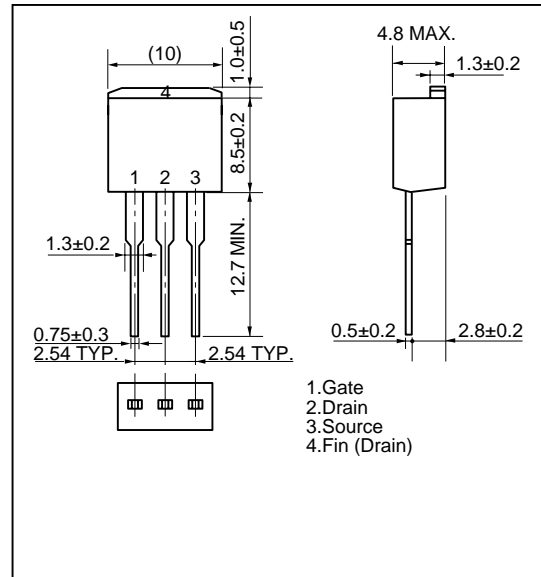


PACKAGE DRAWINGS (Unit : mm)

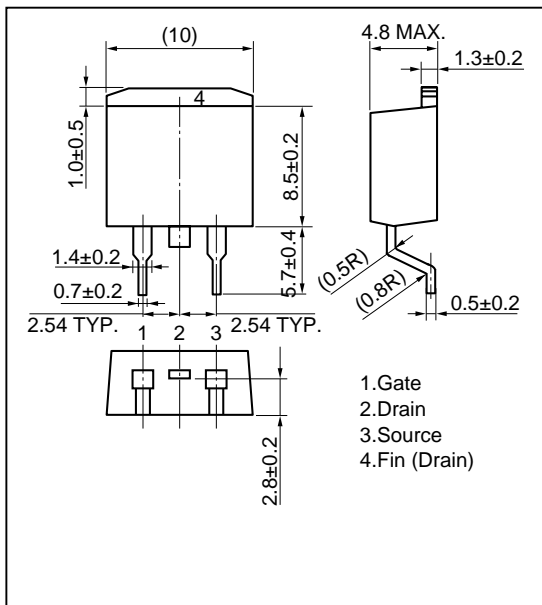
1)TO-220AB (MP-25)



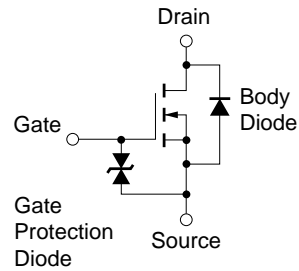
2)TO-262 (TO-220 Fin Cut:MP-25S)



3)TO-263 (JEDEC TYPE:MP-25ZJ)



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.

[MEMO]

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Anti-radioactive design is not implemented in this product.