

MOS FIELD EFFECT TRANSISTOR 2SK3116

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

Description

The 2SK3116 is N channel DMOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

Features

- Low gate charge
 $Q_G = 26 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 7.5 \text{ A)}$
- Gate voltage rating $\pm 30 \text{ V}$
- Low on-state resistance
 $R_{DS(on)} = 1.2 \ \Omega \text{ (MAX.) (} V_{GS} = 10 \text{ V, } I_D = 3.75 \text{ A)}$
- Avalanche capability ratings

Ordering Information

Part number	Package
2SK3116	TO-220
2SK3116-S	TO-262
2SK3116-ZJ	TO-263

Absolute Maximum Rating ($T_A = 25^\circ\text{C}$)

Drain to source voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	600	V
Gate to source voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 7.5	A
Drain current (pulse) ^{Note1}	$I_{D(pulse)}$	± 30	A
Total power dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	1.5	W
Total power dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	70	W
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single avalanche current ^{Note2}	I_{AS}	7.5	A
Single avalanche energy ^{Note2}	E_{AS}	37.5	mJ
Diode recovery dv/dt ^{Note3}	dt/dt	3.5	V/ns

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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150 \text{ V}$, $R_G = 25 \ \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

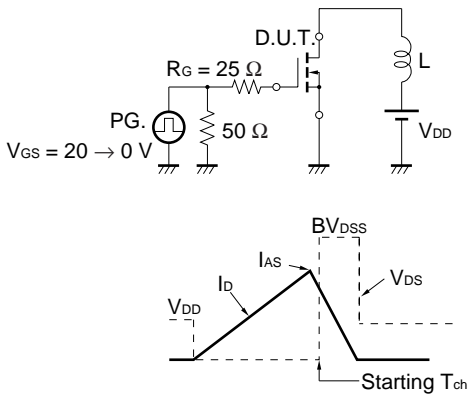
3. $I_F \leq 3.0 \text{ A}$, $V_{clamp} = 600 \text{ V}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $T_A = 25^\circ\text{C}$

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

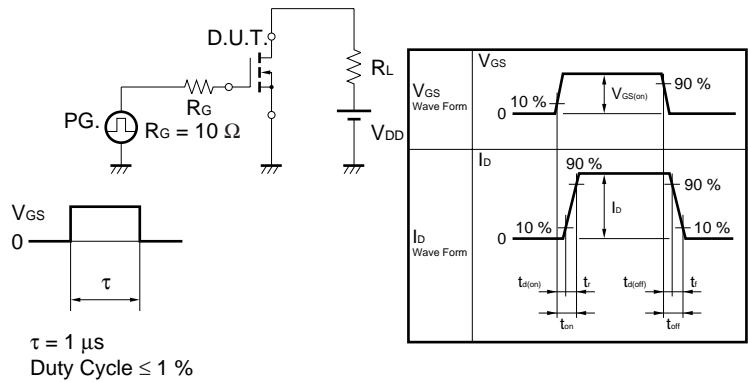
Electrical Characteristics (T_A = 25°C)

Characteristics	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Drain leakage current	I _{DSS}			100	μA	V _{DS} = 600 V, V _{GS} = 0 V
Gate leakage current	I _{GSS}			±100	nA	V _{GS} = ±30 V, V _{DS} = 0 V
Gate cut-off voltage	V _{GS(off)}	2.5		3.5	V	V _{DS} = 10 V, I _D = 1 mA
Forward transfer admittance	y _{fs}	2.0			S	V _{DS} = 10 V, I _D = 3.75 A
Drain to source on-state resistance	R _{DS(on)}		0.9	1.2	Ω	V _{GS} = 10 V, I _D = 3.75 A
Input capacitance	C _{iss}		1100		pF	V _{DS} = 10 V
Output capacitance	C _{oss}		200		pF	V _{GS} = 0 V
Reverse transfer capacitance	C _{rss}		20		pF	f = 1 MHz
Turn-on delay time	t _{d(on)}		18		ns	V _{DD} = 150 V, I _D = 3.75 A
Rise time	t _r		15		ns	V _{GS(on)} = 10 V
Turn-off delay time	t _{d(off)}		50		ns	R _G = 10 Ω
Fall time	t _f		15		ns	R _L = 50 Ω
Total gate charge	Q _G		26		nC	V _{DD} = 450 V
Gate to source charge	Q _{GS}		6		nC	V _{GS} = 10 V
Gate to drain charge	Q _{GD}		10		nC	I _D = 7.5 A
Diode forward voltage	V _{F(S-D)}		1.0		V	I _F = 7.5 A, V _{GS} = 0 V
Reverse recovery time	T _{rr}		1.6		μs	I _F = 7.5 A, V _{GS} = 0 V
Reverse recovery charge	Q _{rr}		7.6		μC	di/dt = 50 A/μs

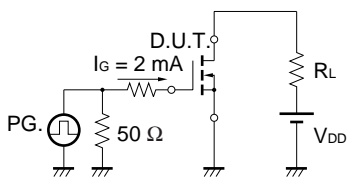
Test circuit 1 Avalanche capability



Test circuit 2 Switching time

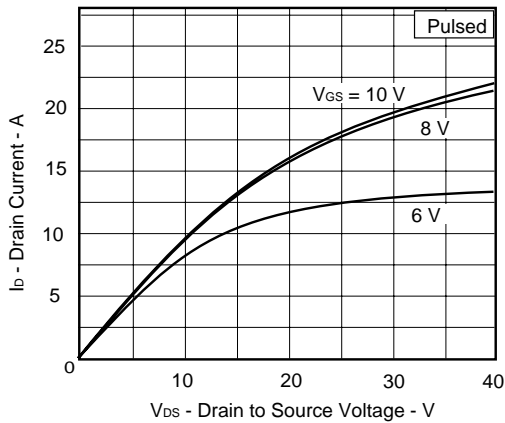


Test circuit 3 Gate charge

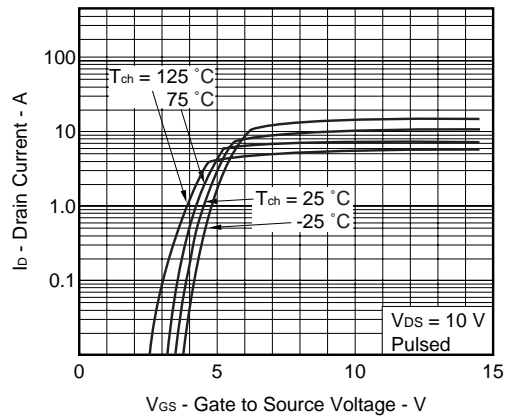


Typical Characteristics (T_A = 25°C)

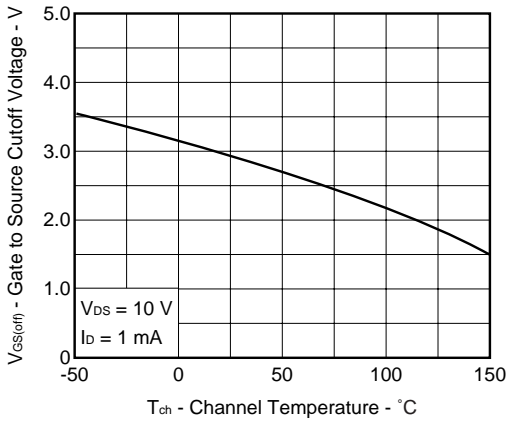
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



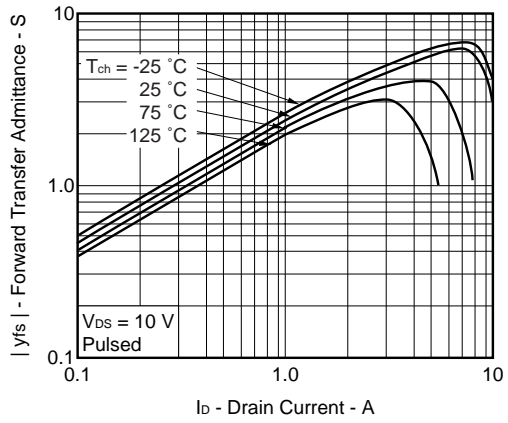
FORWARD TRANSFER CHARACTERISTICS



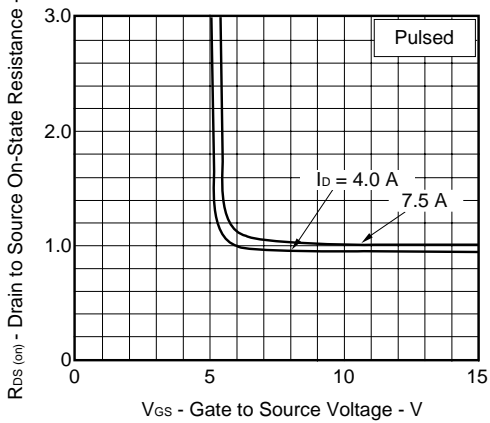
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



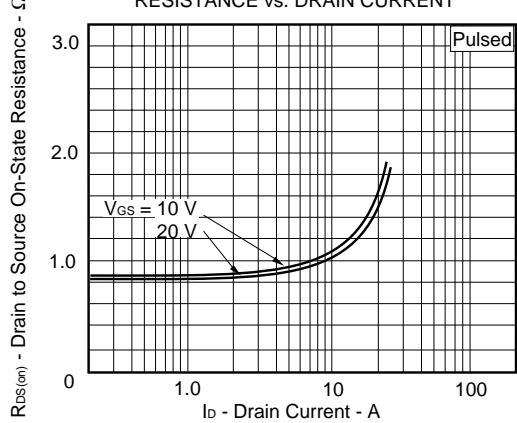
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

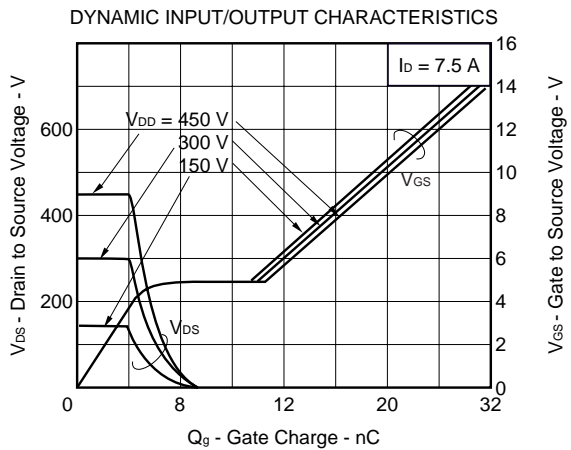
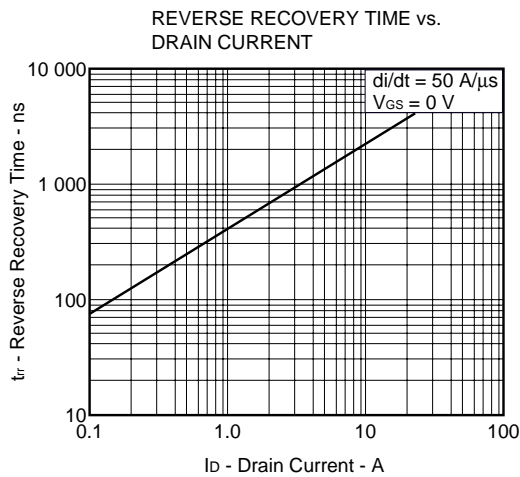
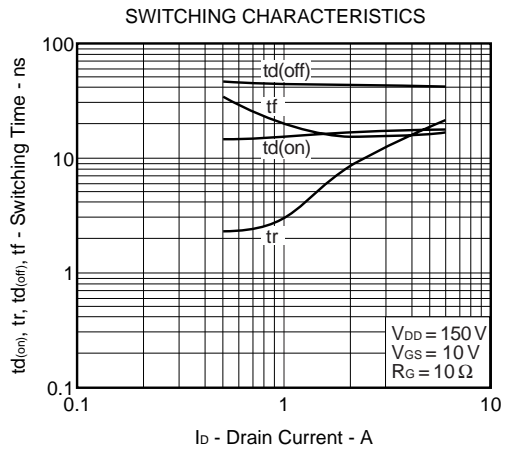
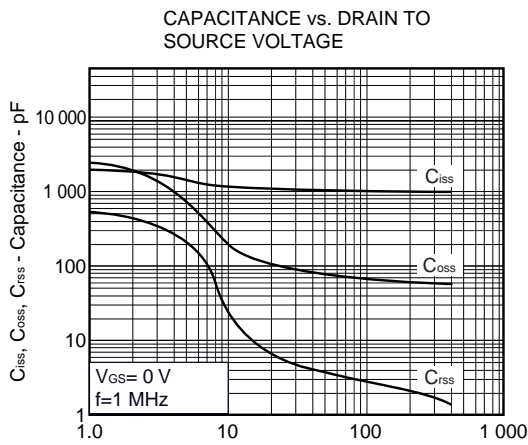
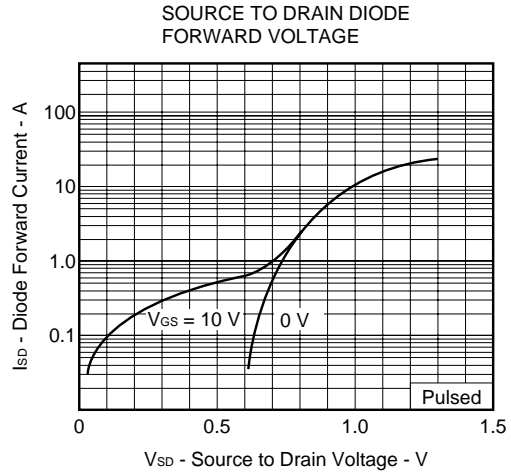
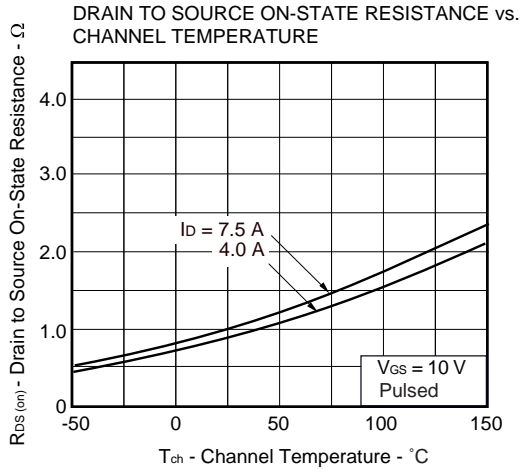


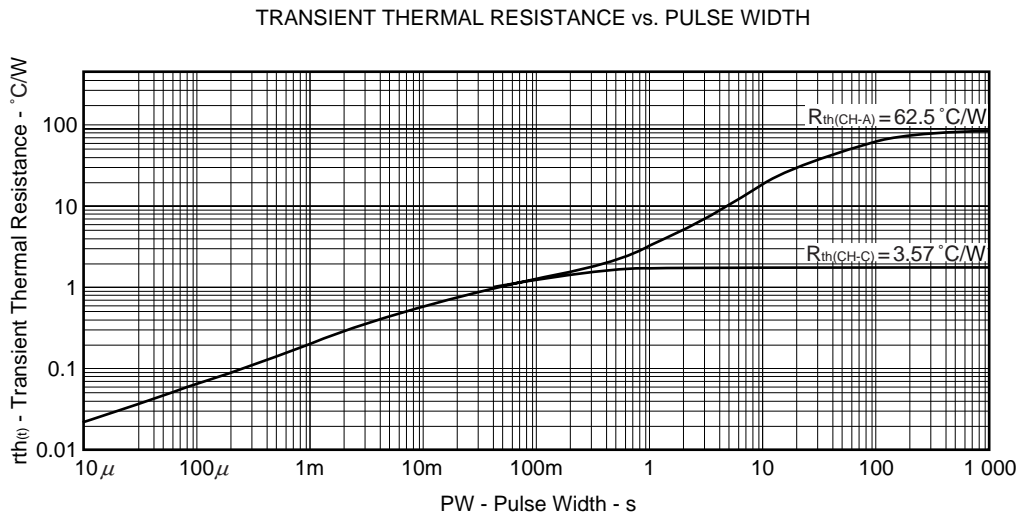
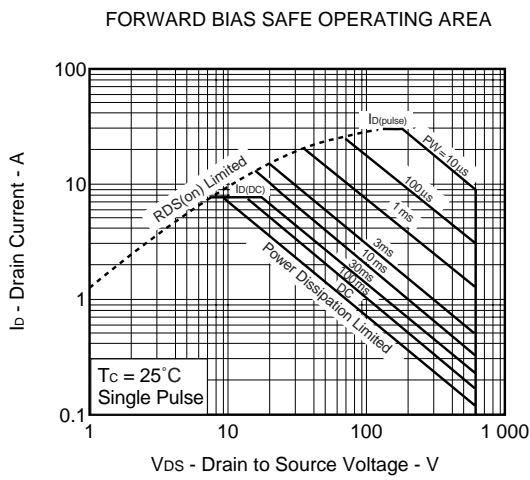
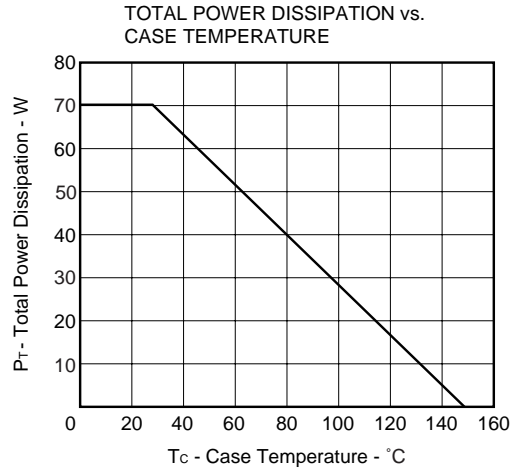
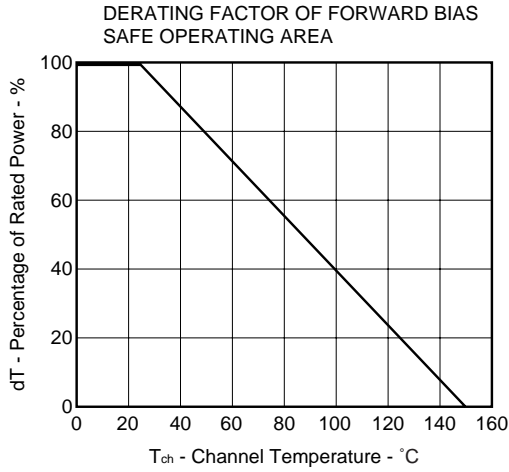
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

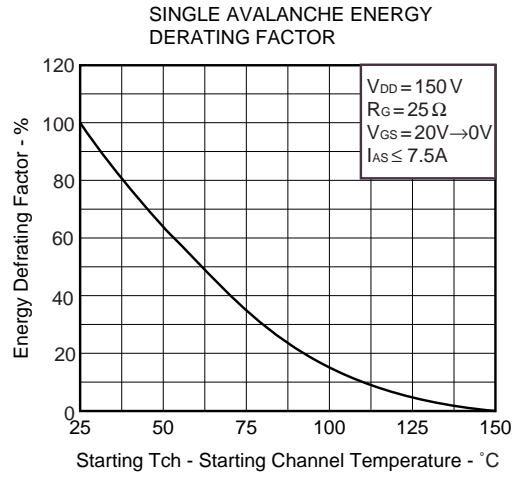
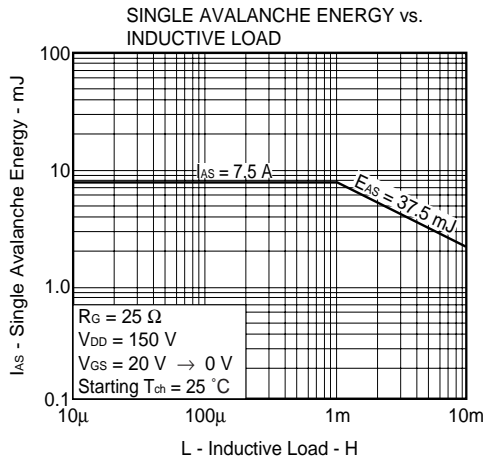


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



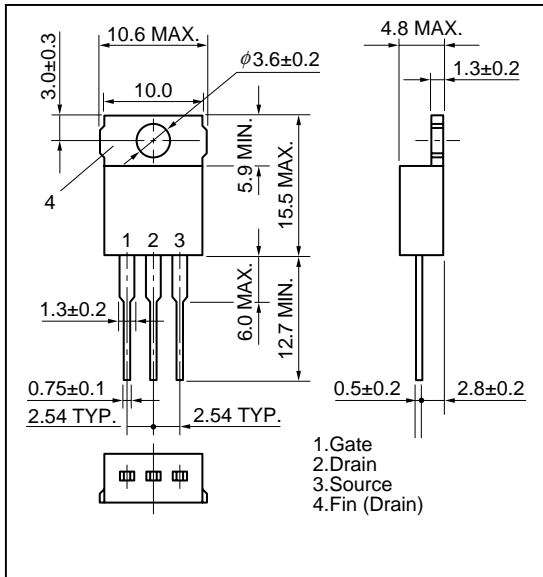




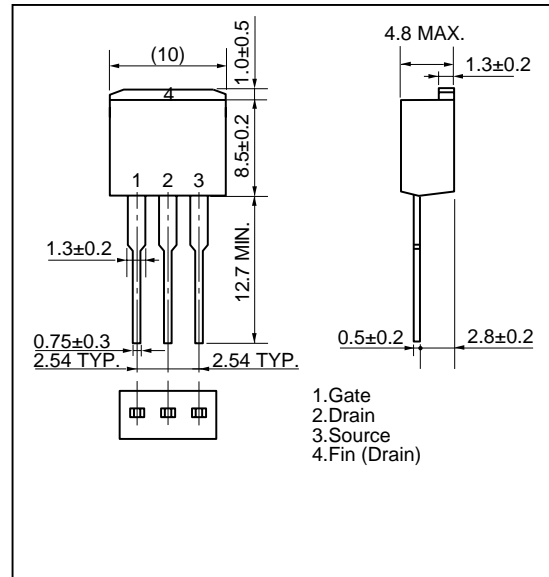


Package Drawing (Unit : mm)

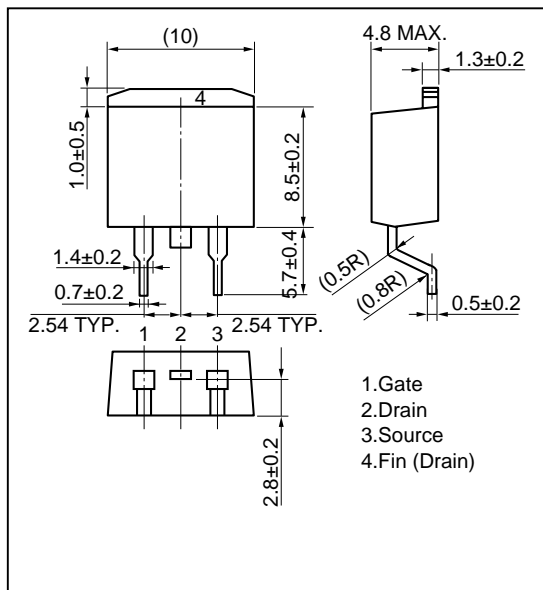
1)TO-220AB (MP-25)



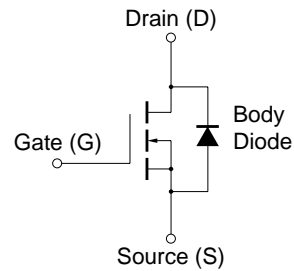
2)TO-262 (TO-220 Fin Cut:MP-25S)



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



Equivalent Circuit



Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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Anti-radioactive design is not implemented in this product.