DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR
2SK3058

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

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

FEATURES

- Super Low On-State Resistance
  $R_{DS(on)1}$ = 17 mΩ MAX. (V_{GS} = 10 V, I_D = 28 A)
  $R_{DS(on)2}$ = 27 mΩ MAX. (V_{GS} = 4.0 V, I_D = 28 A)
- Low C_{iss} : C_{iss} = 2100 pF (TYP.)
- Built-in Gate Protection Diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3058	TO-220AB
2SK3058-S	TO-262
2SK3058-ZJ	TO-263
★ 2SK3058-Z	TO-220SMD[Note]

Note TO-220SND package is produced only in Japan.

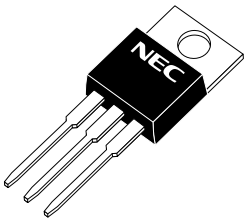
ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage (V_{GS} = 0)	V_{DSS}	60	V
Gate to Source Voltage (V_{DS} = 0)	$V_{GSS(AC)}$	±20	V
Gate to Source Voltage (V_{DS} = 0)	$V_{GSS(DC)}$	+20, –10	V
Drain Current (DC)	$I_{D(DC)}$	±55	A
Drain Current (Pulse)[Note1]	$I_{D(pulse)}$	±165	A
Total Power Dissipation (T_C = 25°C)	P_T	58	W
Total Power Dissipation (T_A = 25°C)	P_T	1.5	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to + 150	°C
Single Avalanche Current[Note2]	I_{AS}	27.5	A
Single Avalanche Energy[Note2]	E_{AS}	75.6	mJ

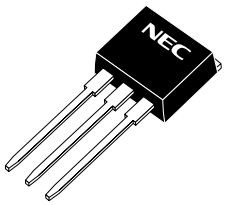
Notes 1. PW ≤ 10 μs, Duty cycle ≤ 1 %

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

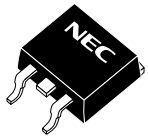
(TO-220AB)



(TO-262)



(TO-263, TO-220SMD)



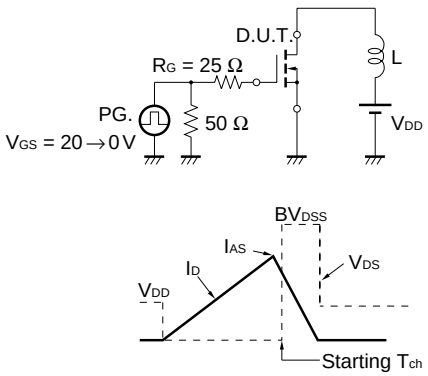
Document No. D13097EJ2V0DS00 (2nd edition)
Date Published April 2001 NS CP(K)
Printed in Japan

The mark ★ shows major revised points.

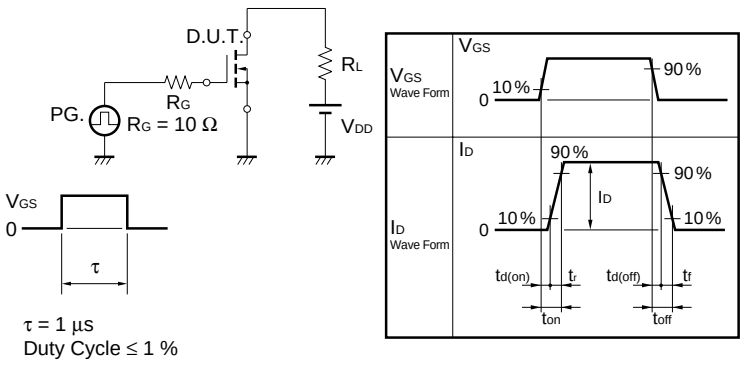
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 28 A		12	17	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 28 A		19	27	mΩ
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.0	1.6	2.0	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 28 A	13	42		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 = 28 A		36		ns
★ Rise Time	t_r	V_{GS} = 10 V		410		ns
Turn-off Delay Time	$t_{d(off)}$	V_{DD} = 30 V		130		ns
Fall Time	t_f	R_G = 10 Ω		260		ns
Total Gate Charge	Q_G	I_D = 55 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 = 55 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 55 A, V_{GS} = 0 V		60		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100A/μs		100		nC

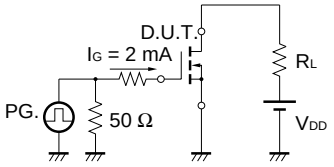
TEST CIRCUIT 1 AVALANCHE CAPABILITY



★ TEST CIRCUIT 2 SWITCHING TIME

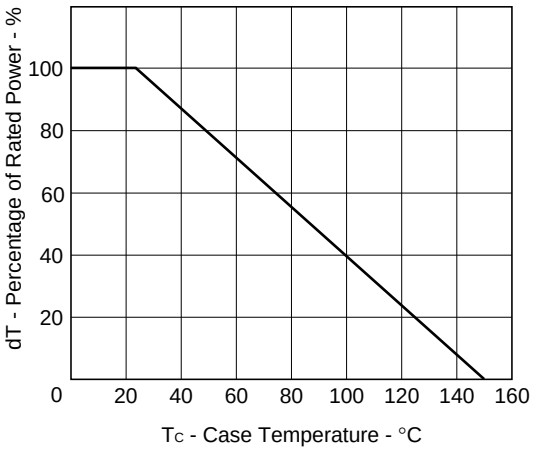


TEST CIRCUIT 3 GATE CHARGE

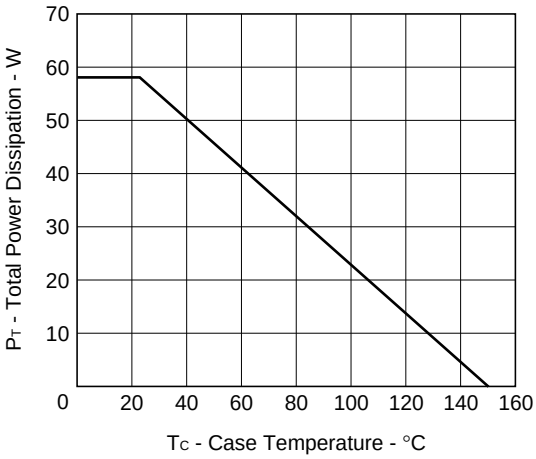


TYPICAL CHARACTERISTICS (T_A = 25 °C)

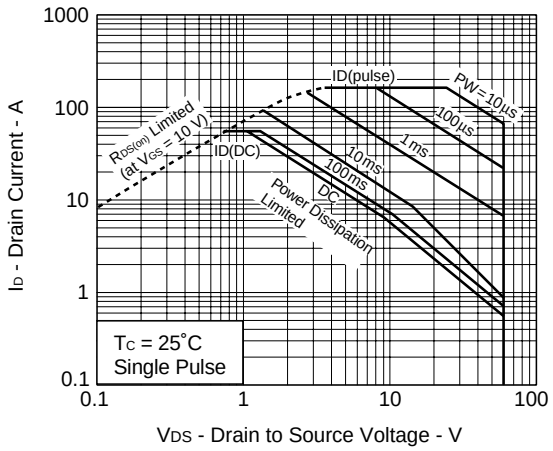
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



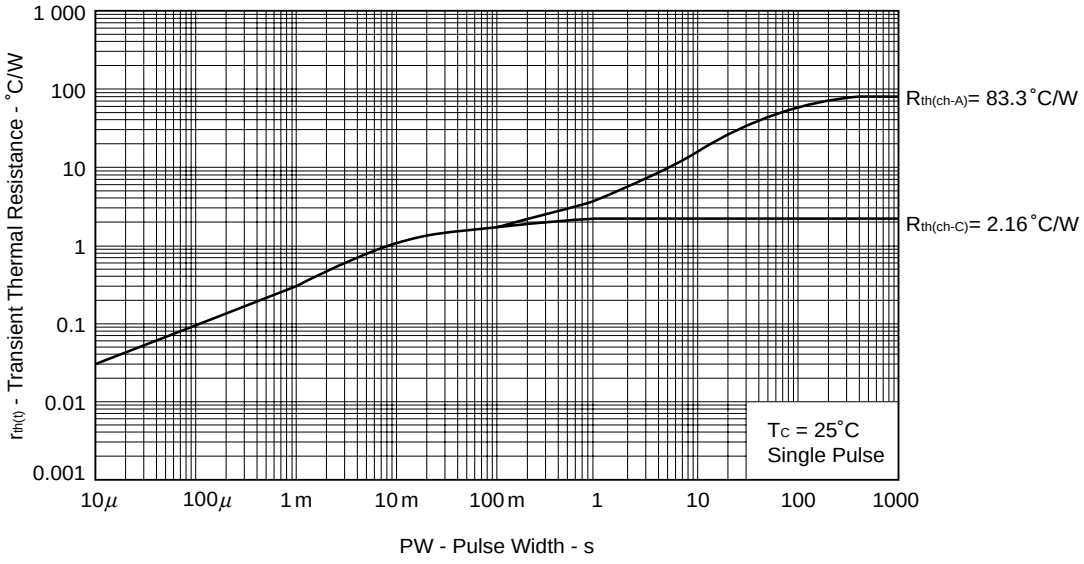
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



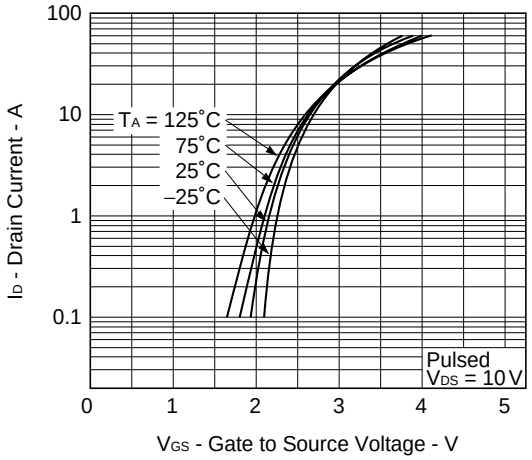
★ FORWARD BIAS SAFE OPERATING AREA



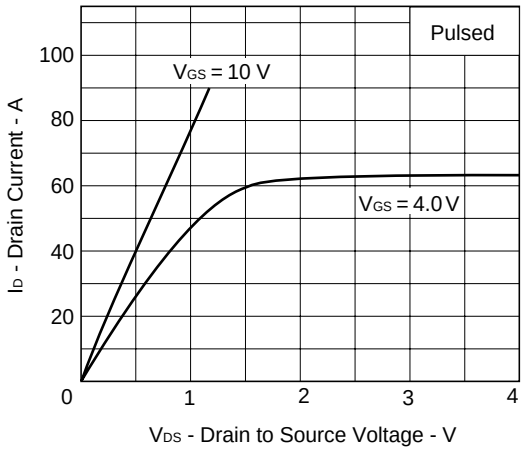
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



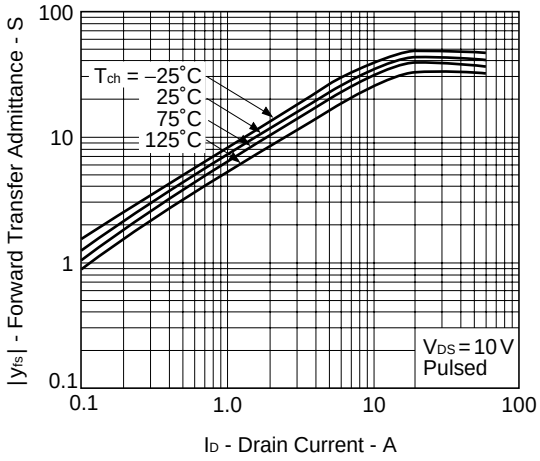
FORWARD TRANSFER CHARACTERISTICS



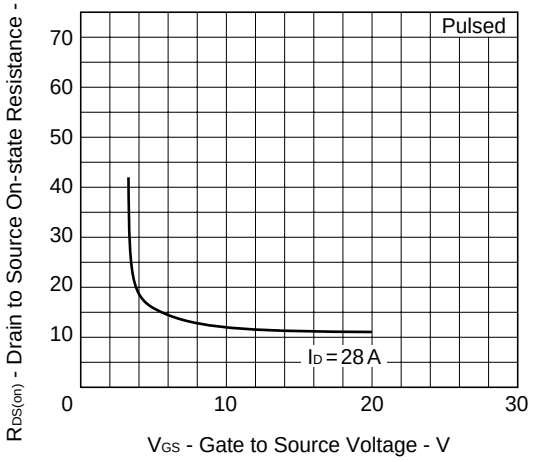
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



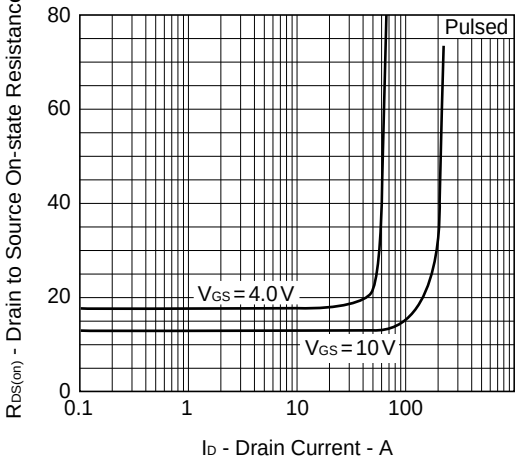
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



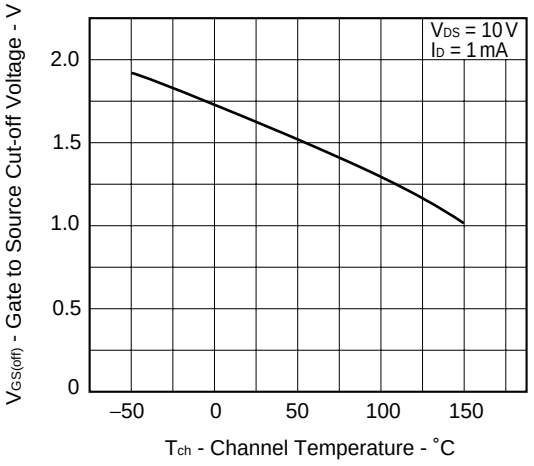
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



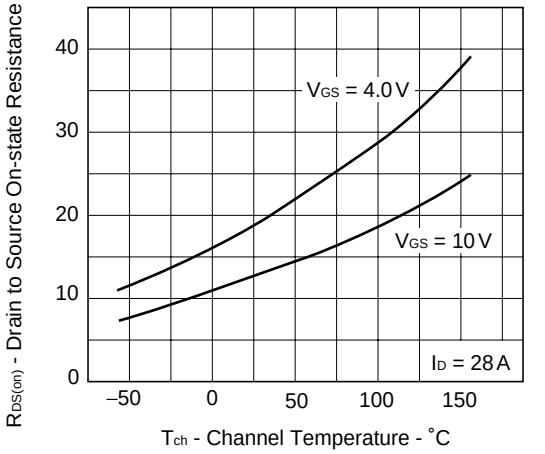
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



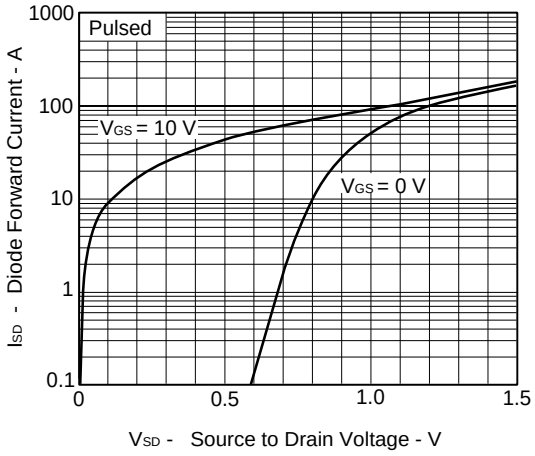
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



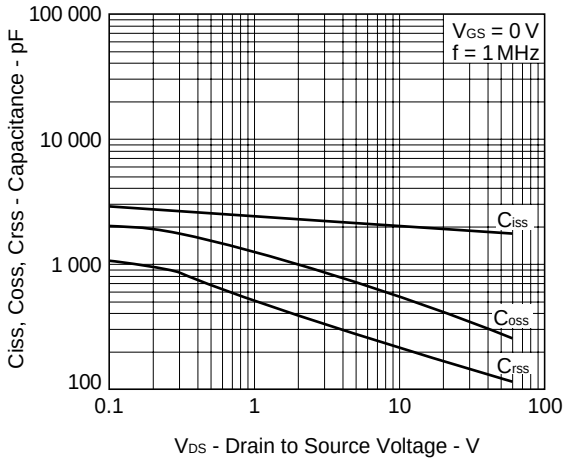
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



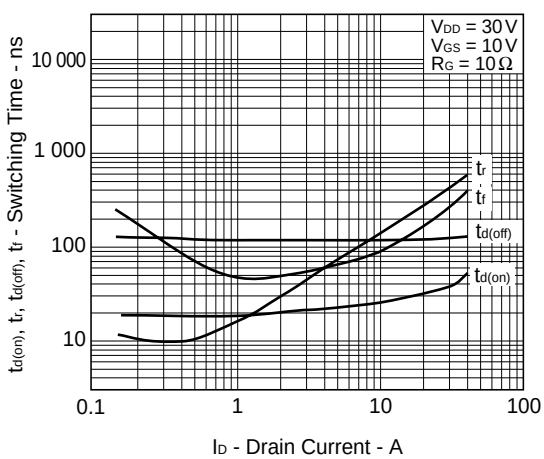
★ SOURCE TO DRAIN DIODE FORWARD VOLTAGE



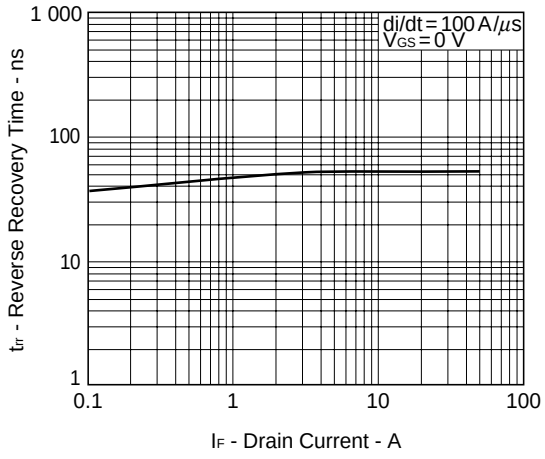
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



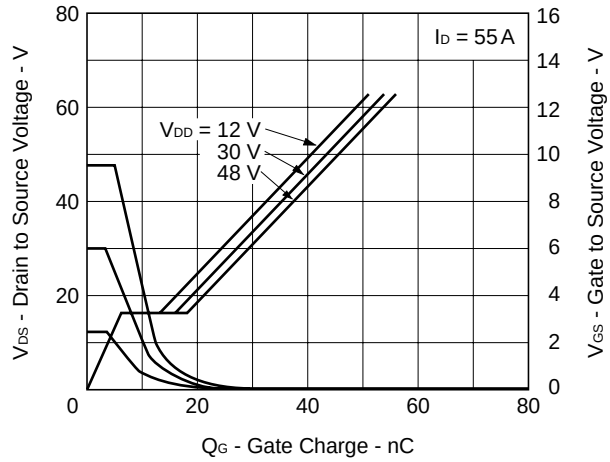
SWITCHING CHARACTERISTICS



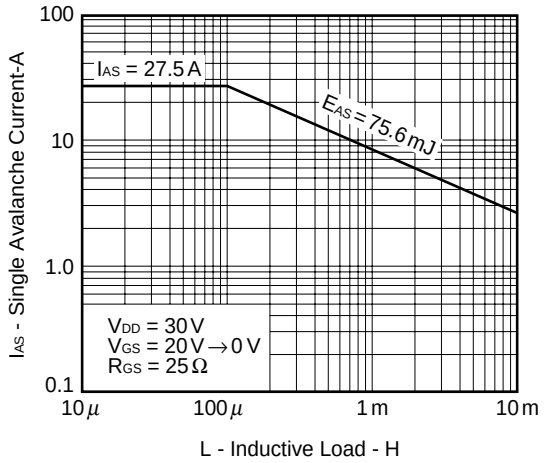
REVERSE RECOVERY TIME vs. DRAIN CURRENT



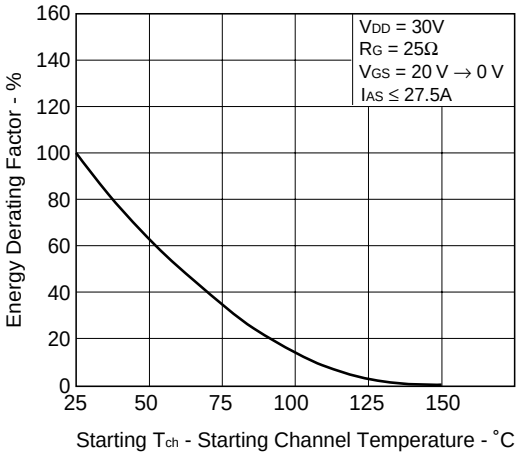
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



★ SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

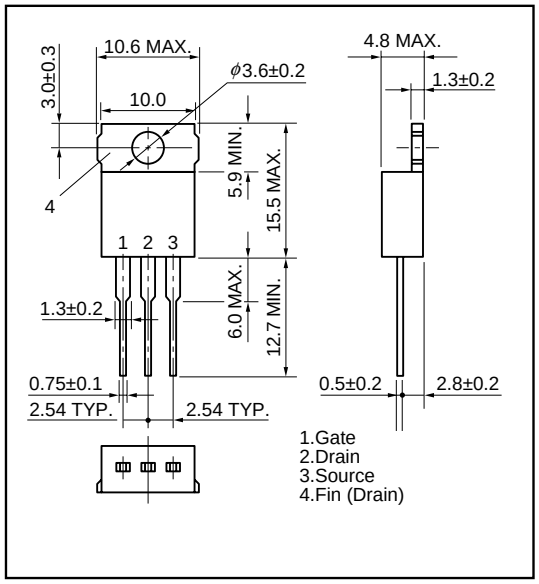


SINGLE AVALANCHE ENERGY DERATING FACTOR

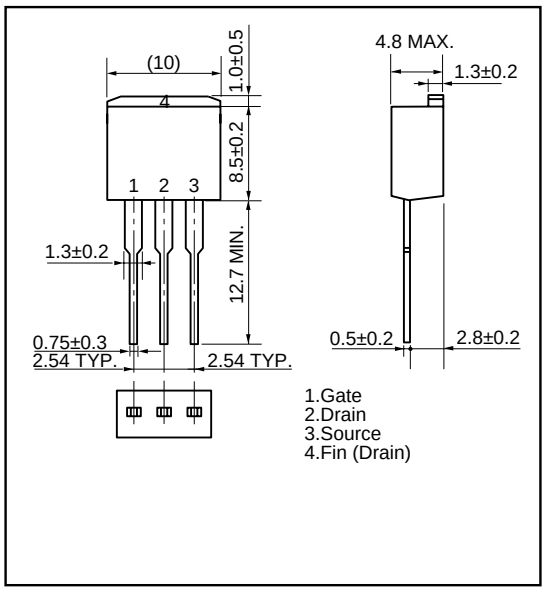


PACKAGE DRAWINGS (Unit : mm)

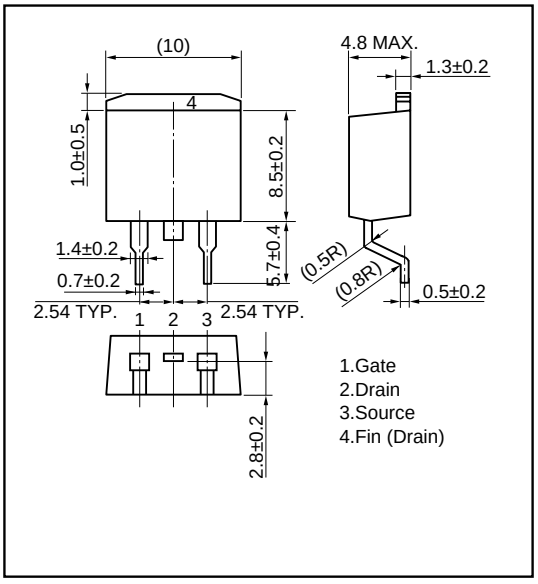
1)TO-220AB (MP-25)



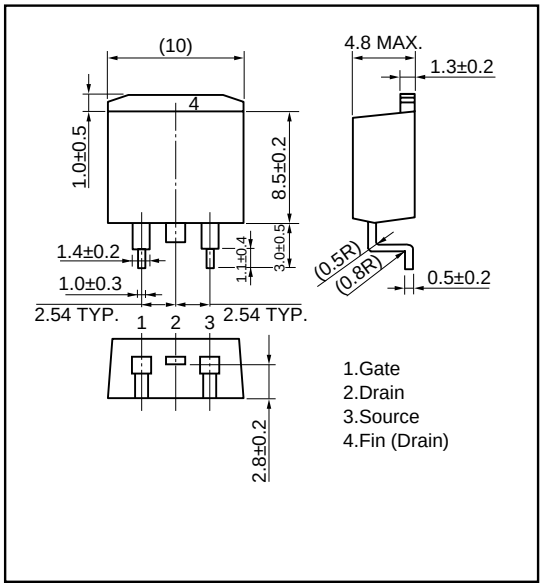
2)TO-262 (MP-25 Fin Cut)



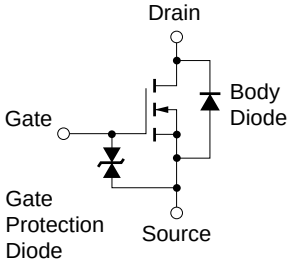
3)TO-263 (MP-25ZJ)



★ 3)TO-220SMD (MP-25Z)[Note]



EQUIVALENT CIRCUIT



Note This package is produced only in Jaman.

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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