NEC

MOS FIELD EFFECT TRANSISTOR
2SJ605

SWITCHING
P-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SJ605 is P-channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Super low on-state resistance:
  $R_{DS(on)1}$ = 20 mΩ MAX. (V_{GS} = –10 V, I_D = –33 A)
  $R_{DS(on)2}$ = 31 mΩ MAX. (V_{GS} = –4.0 V, I_D = –33 A)
- Low input capacitance
★ C_{iss} = 4600 pF TYP. (V_{DS} = –10 V, V_{GS} = 0 A)
- Built-in gate protection diode

ORDERING INFORMATION

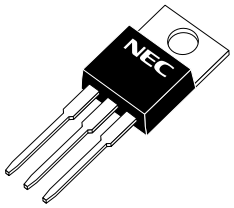
PART NUMBER	PACKAGE
2SJ605	TO-220AB
2SJ605-S	TO-262
2SJ605-ZJ	TO-263
2SJ605-Z	TO-220SMD[Note]

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

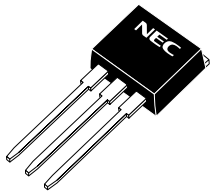
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	–60	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓ 20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	∓ 65	A
Drain Current (pulse) [Note1]	$I_{D(pulse)}$	∓ 200	A
Total Power Dissipation (T_C = 25°C)	P_T	100	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}	–45	A
Single Avalanche Energy [Note2]	E_{AS}	203	mJ

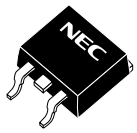
(TO-220AB)



(TO-262)



(TO-263, TO-220SMD)



Notes 1. PW ≤ 10 μs, Duty cycle ≤ 1%
★ **2.** Starting T_{ch} = 25°C, V_{DD} = –30 V, R_G = 25 Ω, V_{GS} = –20 ⟶ 0 V

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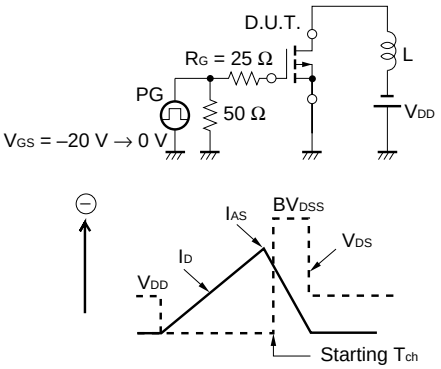
The mark ★ shows major revised points.

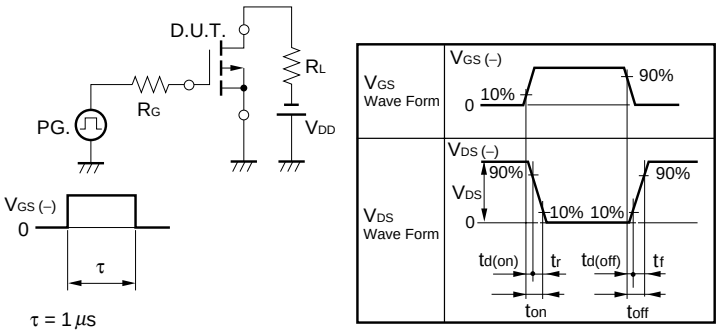
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

	CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
	Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –60 V, V_{GS} = 0 V			–10	μA
	Gate Leakage Current	I_{GSS}	V_{GS} = ∓ 20 V, V_{DS} = 0 V			∓ 10	μA
★	Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = –10 V, I_D = –1 mA	–1.5	–2.0	–2.5	V
	Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –33 A	30	59		S
	Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = –10 V, I_D = –33 A		17	20	mΩ
		$R_{DS(on)2}$	V_{GS} = –4.0 V, I_D = –33 A		22	31	mΩ
	Input Capacitance	C_{iss}	V_{DS} = –10 V		4600		pF
	Output Capacitance	C_{oss}	V_{GS} = 0 V		820		pF
	Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		330		pF
★	Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –30 V, I_D = –33 A		15		ns
	Rise Time	t_r	V_{GS} = –10 V		14		ns
	Turn-off Delay Time	$t_{d(off)}$	R_G = 0 Ω		100		ns
	Fall Time	t_f			58		ns
	Total Gate Charge	Q_G	V_{DD}= –48 V		87		nC
	Gate to Source Charge	Q_{GS}	V_{GS} = –10 V		15		nC
	Gate to Drain Charge	Q_{GD}	I_D = –65 A		22		nC
★	Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 65 A, V_{GS} = 0 V		1.0		V
★	Reverse Recovery Time	t_{rr}	I_F = 65 A, V_{GS} = 0 V		53		ns
★	Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		110		nC

TEST CIRCUIT 1 AVALANCHE CAPABILITY

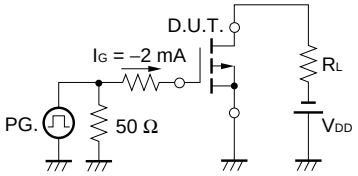


★ **TEST CIRCUIT 2 SWITCHING TIME**



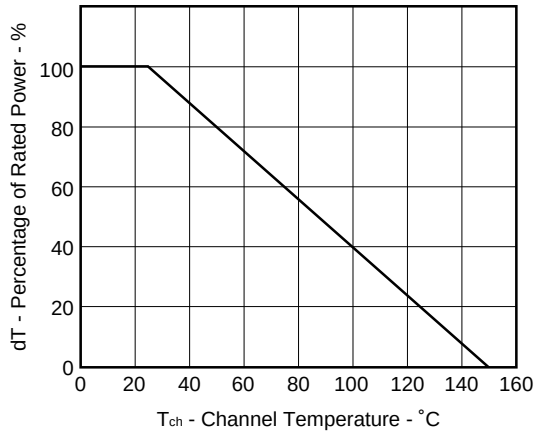
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 3 GATE CHARGE

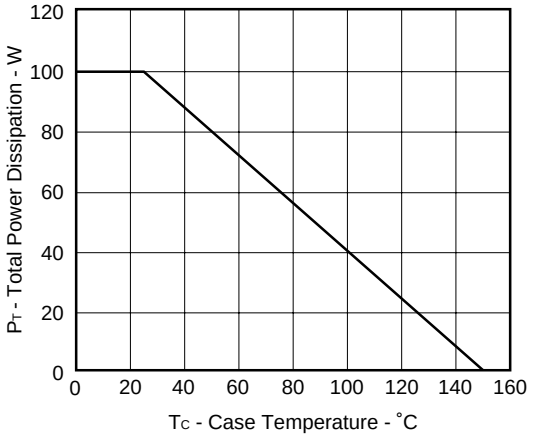


★ TYPICAL CHARACTERISTICS (TA = 25°C)

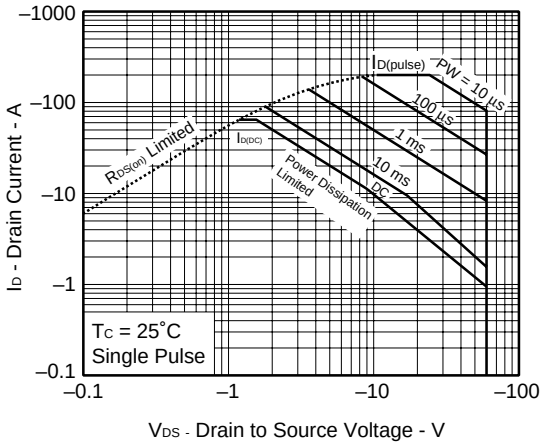
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



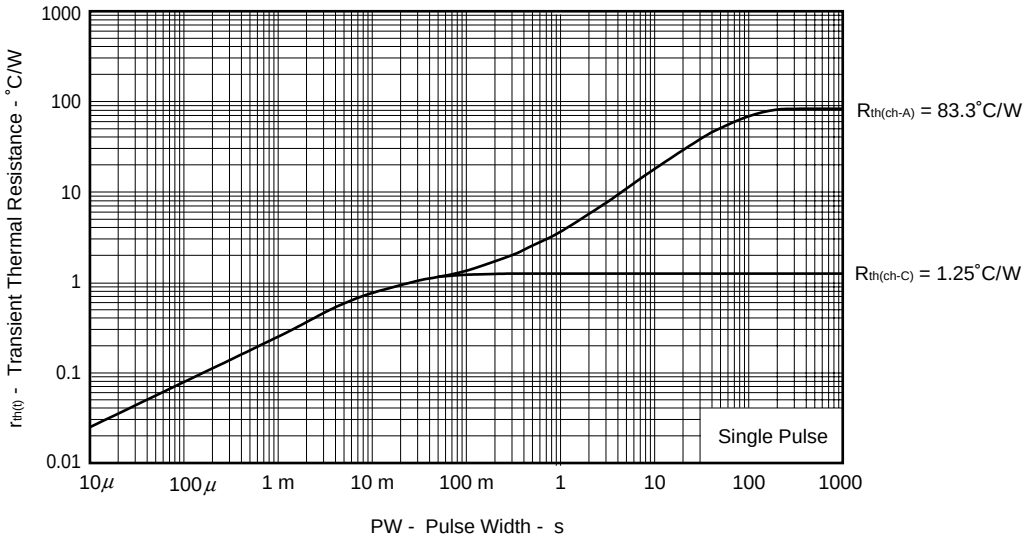
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



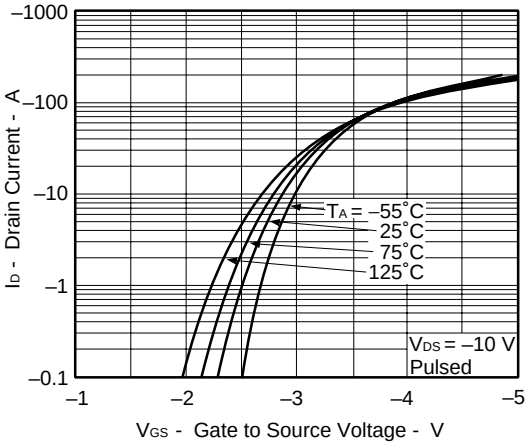
FORWARD BIAS SAFE OPERATING AREA



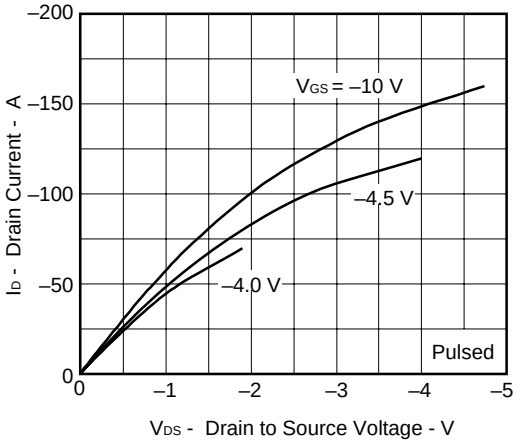
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



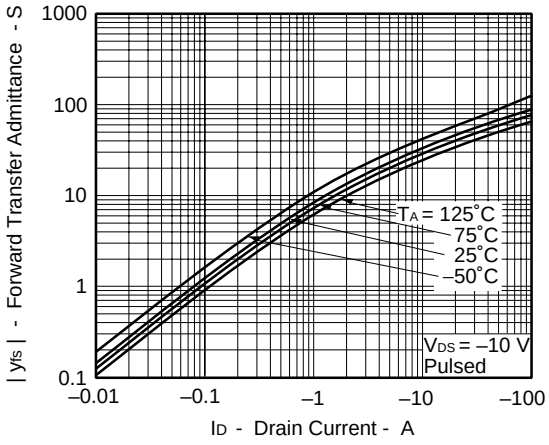
FORWARD TRANSFER CHARACTERISTICS



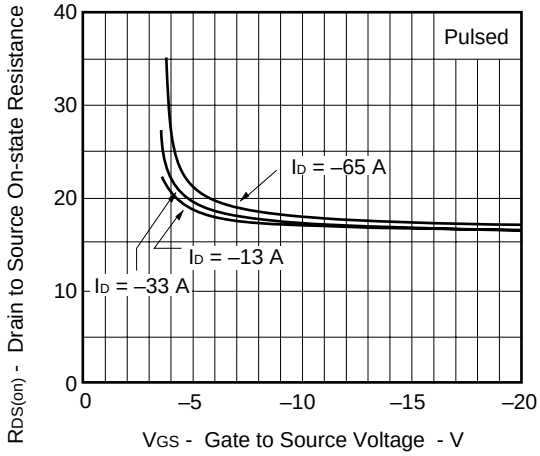
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



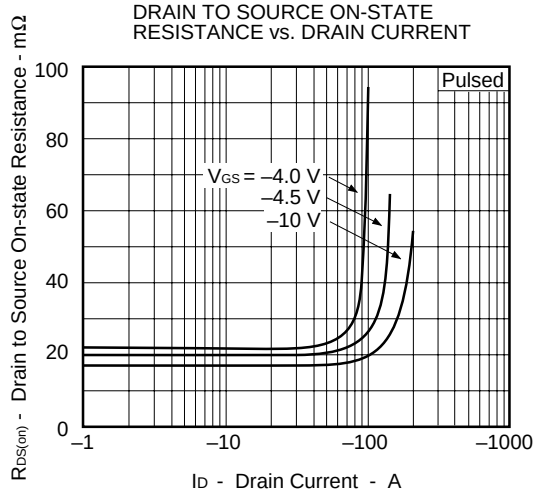
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



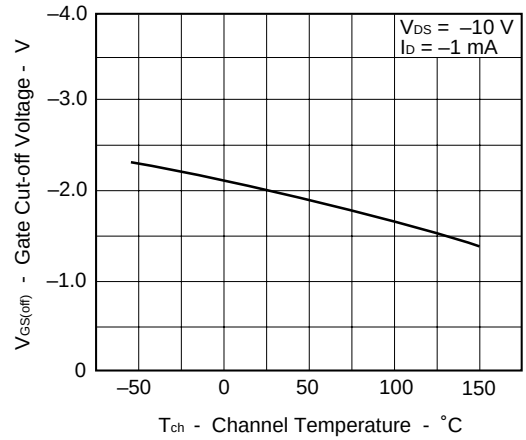
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



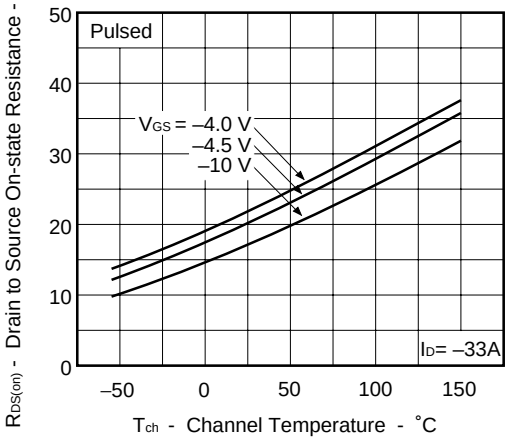
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



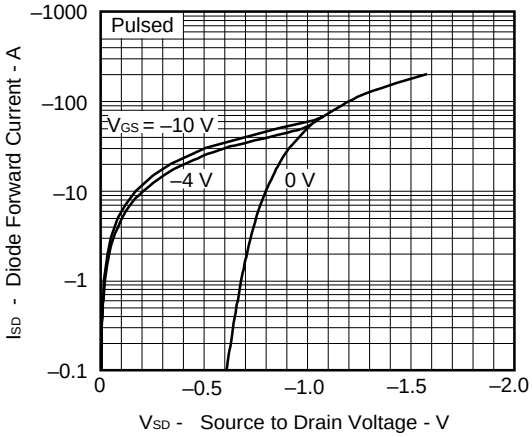
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



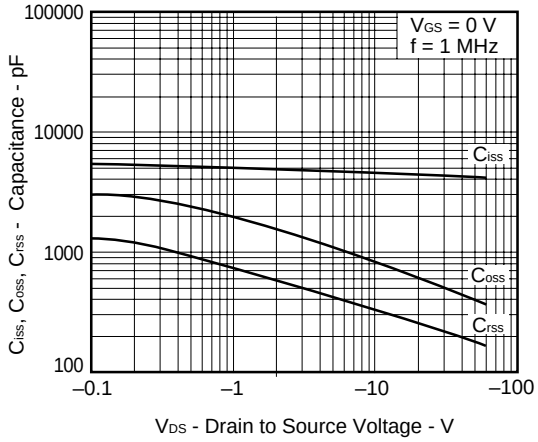
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



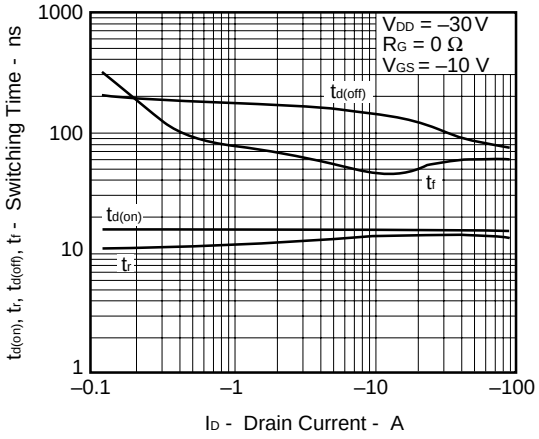
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



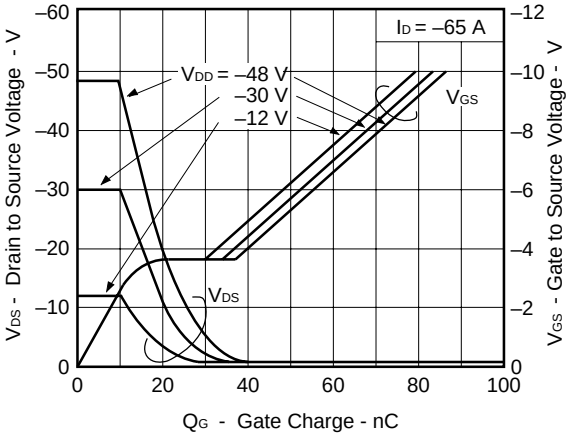
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



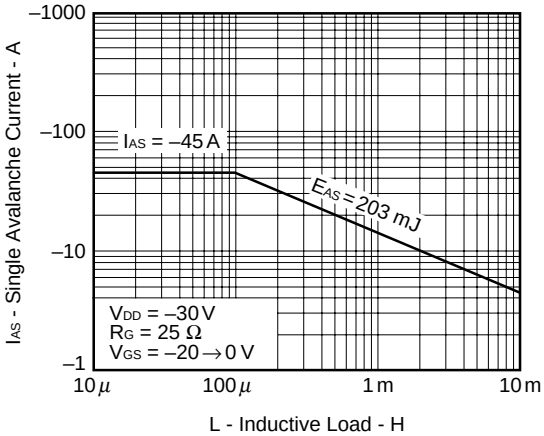
SWITCHING CHARACTERISTICS



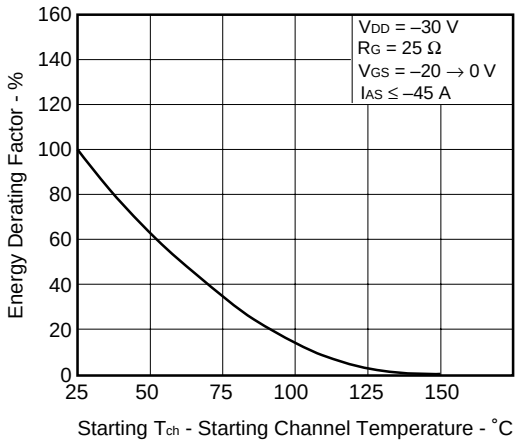
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

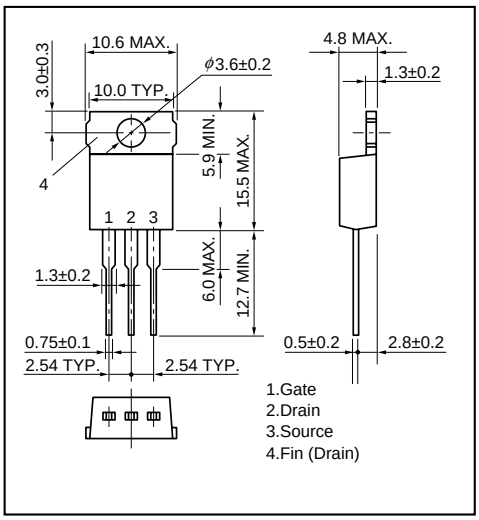


SINGLE AVALANCHE ENERGY
DERATING FACTOR

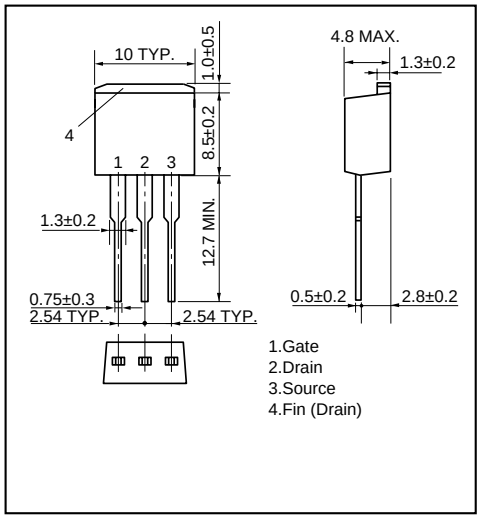


★ PACKAGE DRAWINGS(Unit: mm)

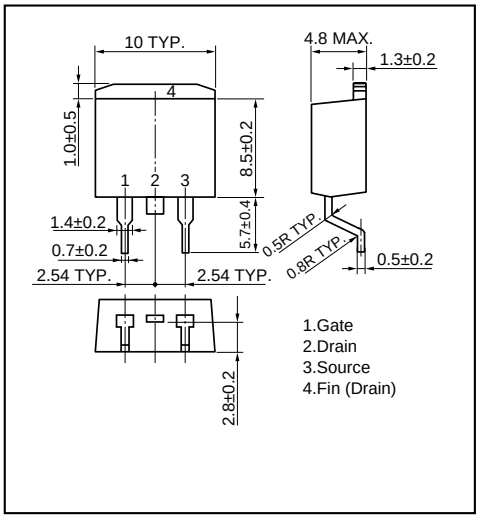
1) TO-220AB(MP-25)



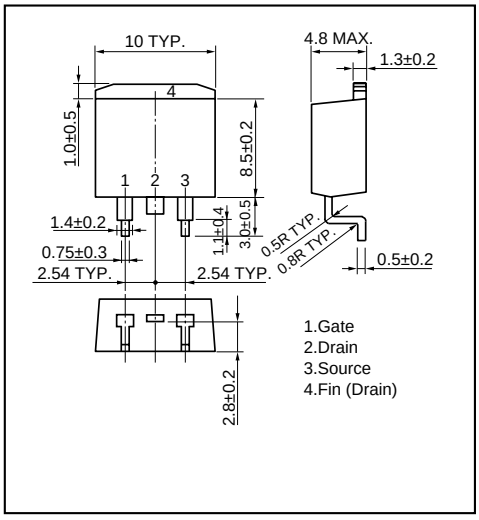
2) TO-262(MP-25 Fin Cut)



3) TO-263 (MP-25ZJ)

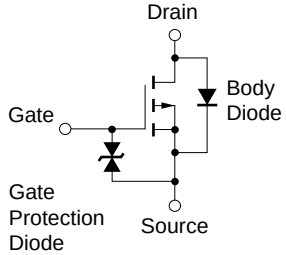


4) TO-220SMD(MP-25Z)[Note]



Note This package is produced only in Japan.

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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