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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MOS FIELD EFFECT TRANSISTOR

2SK3570

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3570 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, designed for low voltage high current applications such as DC/DC converter with synchronous rectifier.

FEATURES

- 4.5V drive available.
- Low on-state resistance,
 $R_{DS(on)1} = 12 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 24 \text{ A)}$
- Low gate charge
 $Q_G = 23 \text{ nC TYP. (} V_{DD} = 16 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 48 \text{ A)}$
- Built-in gate protection diode
- Surface mount device available

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	20	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 48	A
Drain Current (pulse) Note	$I_{D(pulse)}$	± 160	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}	29	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Note $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

★ ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3570	TO-220AB
2SK3570-S	TO-262
2SK3570-ZK	TO-263
2SK3570-Z	TO-220SMD Note

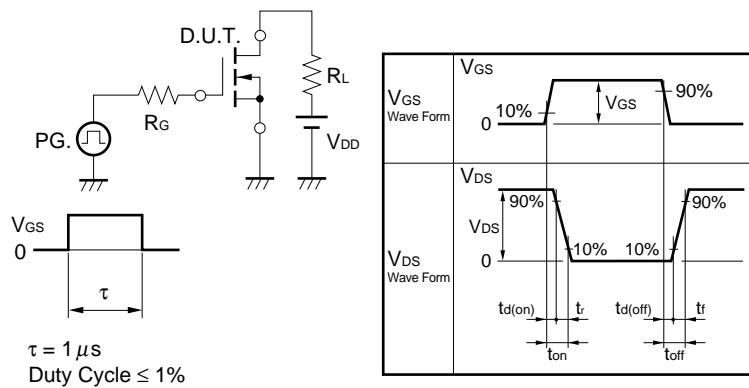
Note TO-220SMD package is produced only in Japan.

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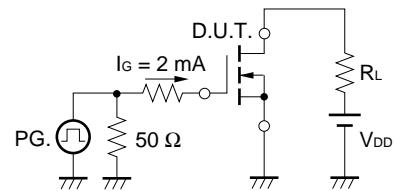
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Zero Gate Voltage Drain Current	I _{bss}	V _{DS} = 20 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		2.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 24 A	8.0			S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 24 A		8.2	12	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 15 A		12.3	22	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		930		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		360		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		250		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10 V, I _D = 24 A		13		ns
Rise Time	t _r	V _{GS} = 10 V		20		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		39		ns
Fall Time	t _f			14		ns
Total Gate Charge	Q _G	V _{DD} = 16 V		23		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		4		nC
Gate to Drain Charge	Q _{GD}	I _D = 48 A		7		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 48 A, V _{GS} = 0 V		1.1		V
Reverse Recovery Time	t _{rr}	I _F = 48 A, V _{GS} = 0 V		33		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		25		nC

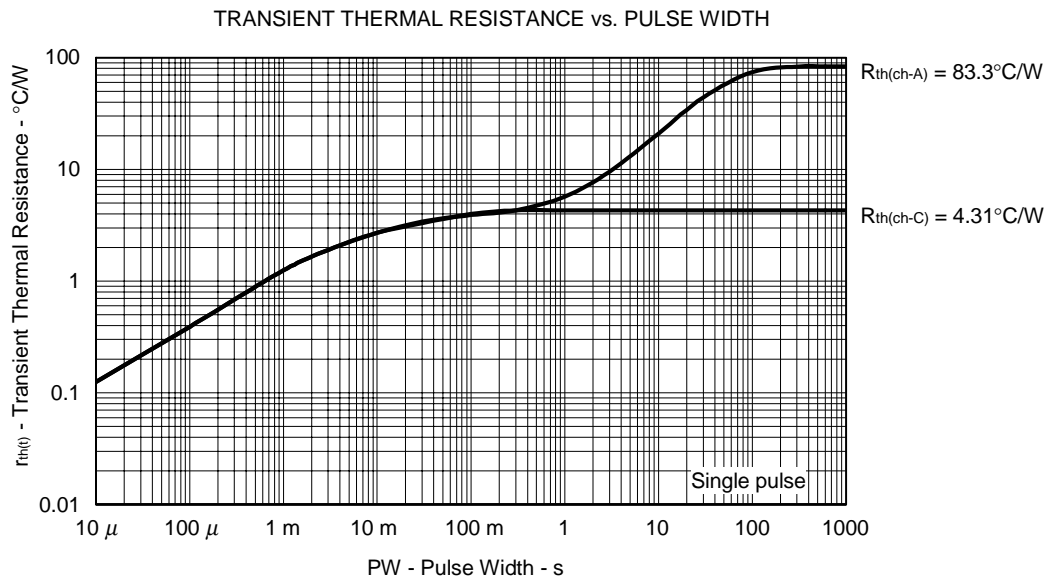
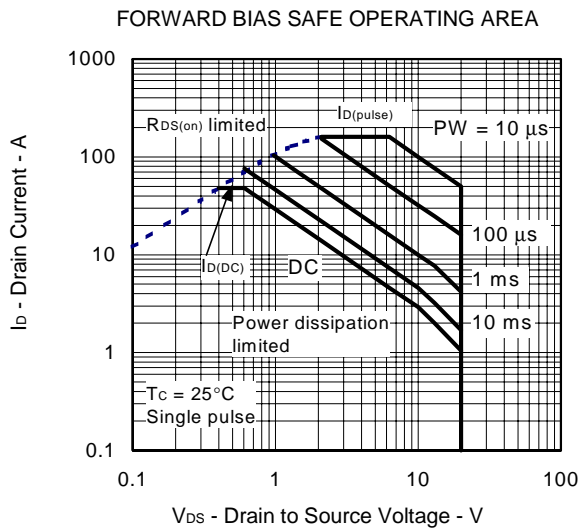
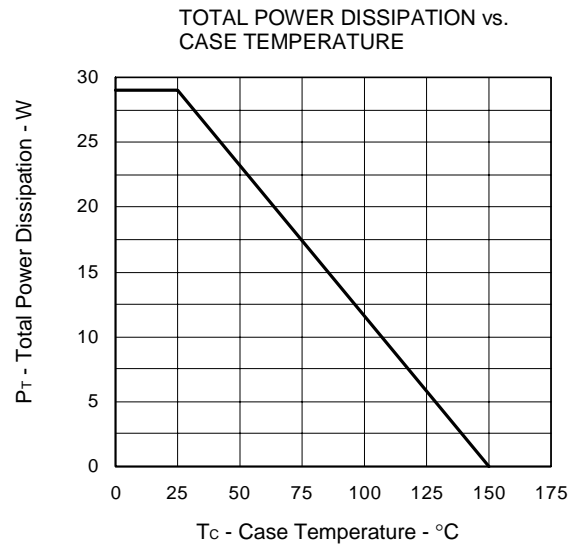
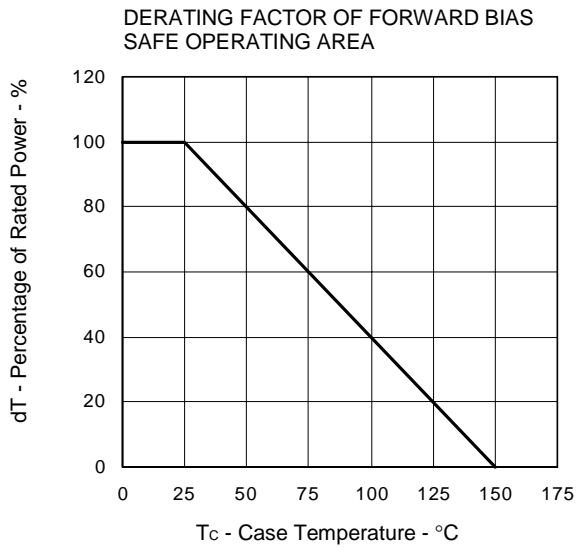
★ **TEST CIRCUIT 1 SWITCHING TIME**



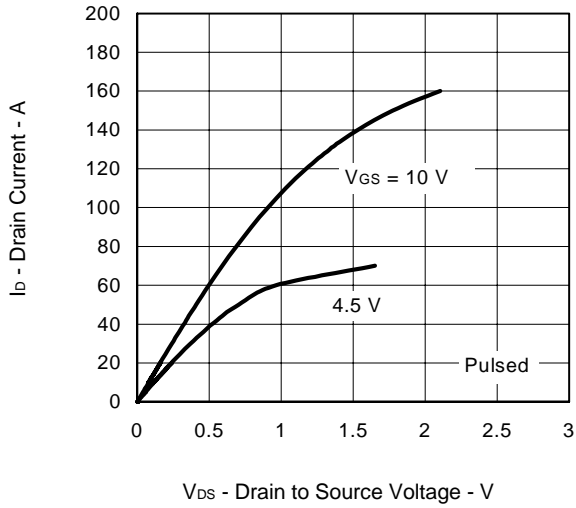
TEST CIRCUIT 2 GATE CHARGE



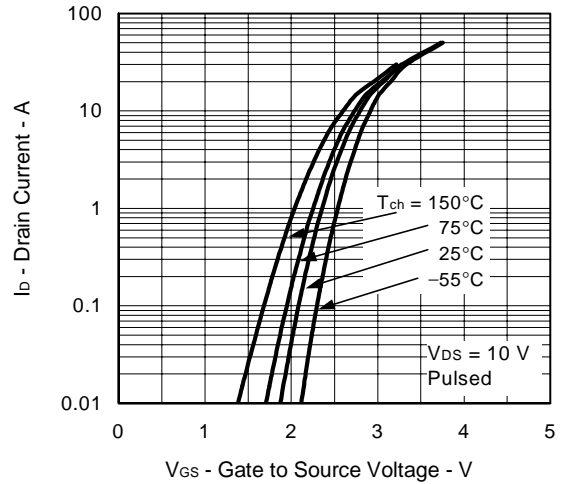
★ TYPICAL CHARACTERISTICS (T_A = 25°C)



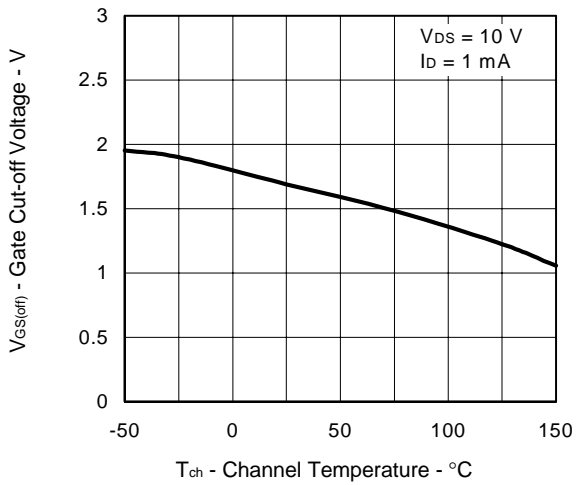
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



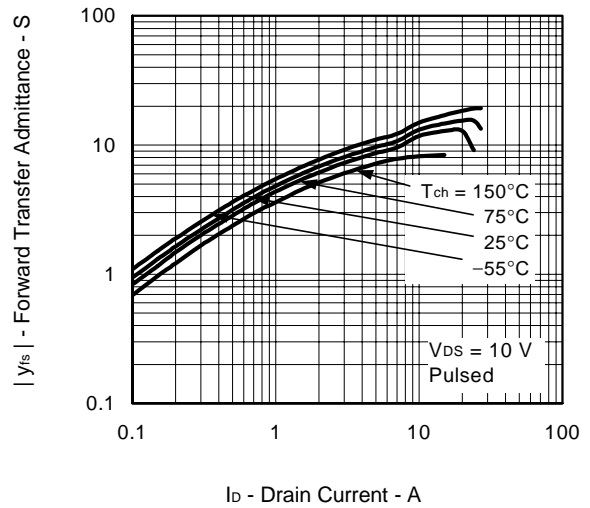
FORWARD TRANSFER CHARACTERISTICS



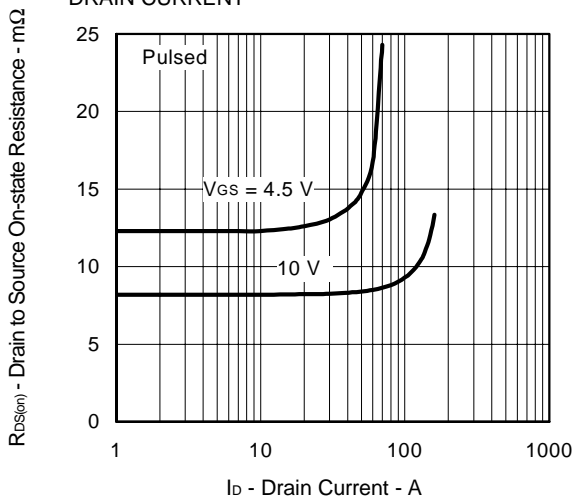
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



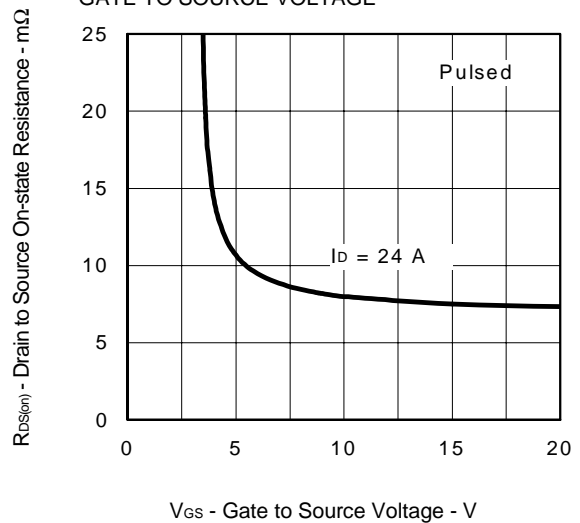
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



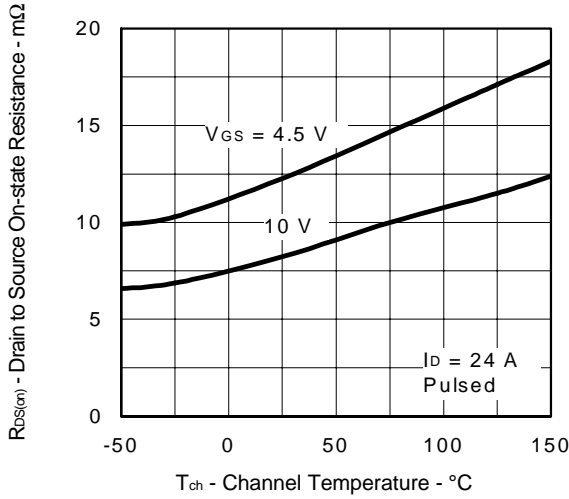
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



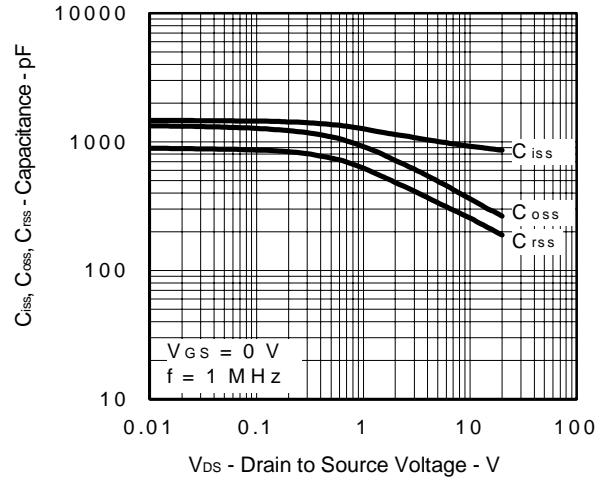
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



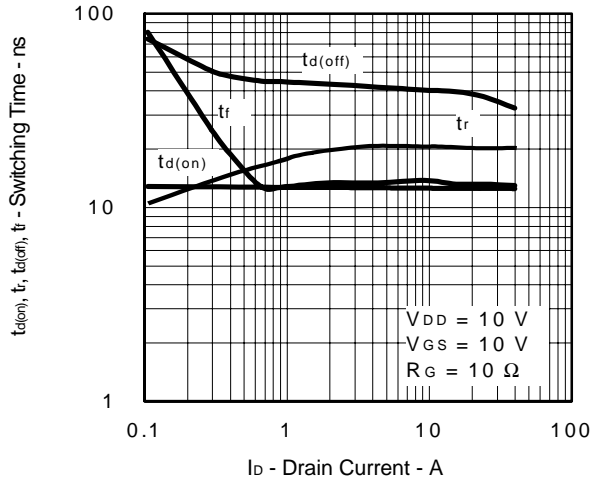
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



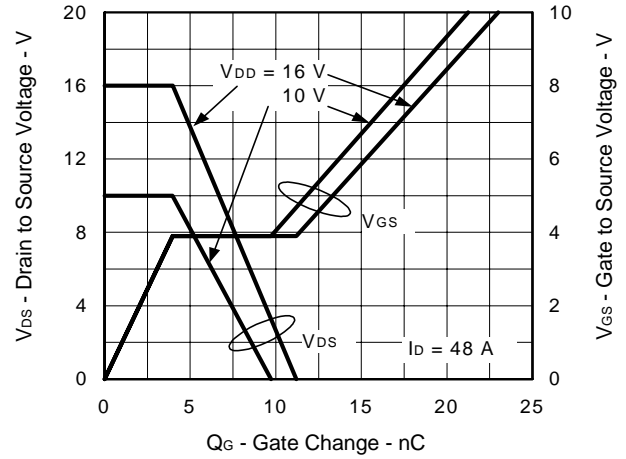
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



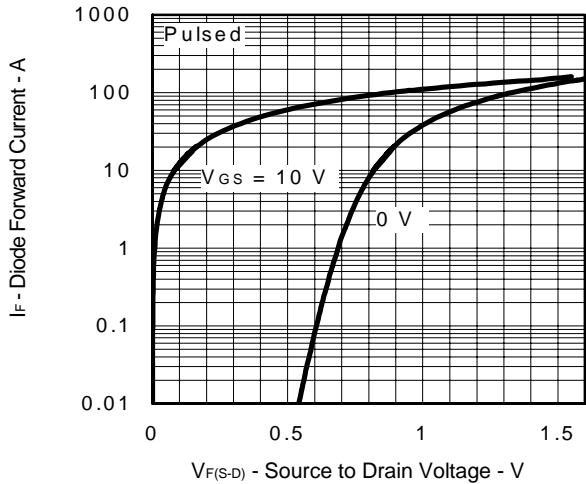
SWITCHING CHARACTERISTICS



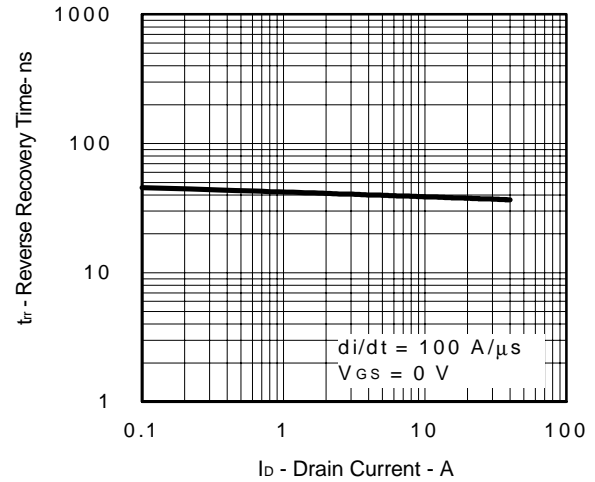
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

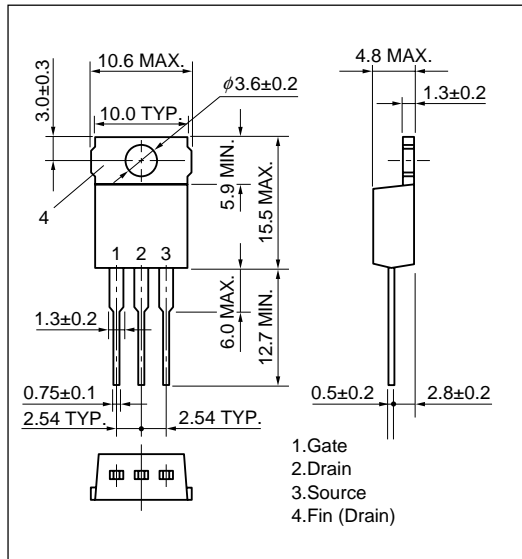


REVERSE RECOVERY TIME vs. DRAIN CURRENT

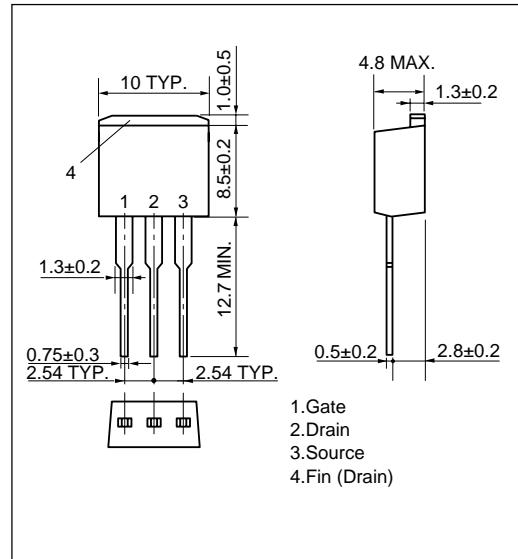


★ PACKAGE DRAWINGS (Unit: mm)

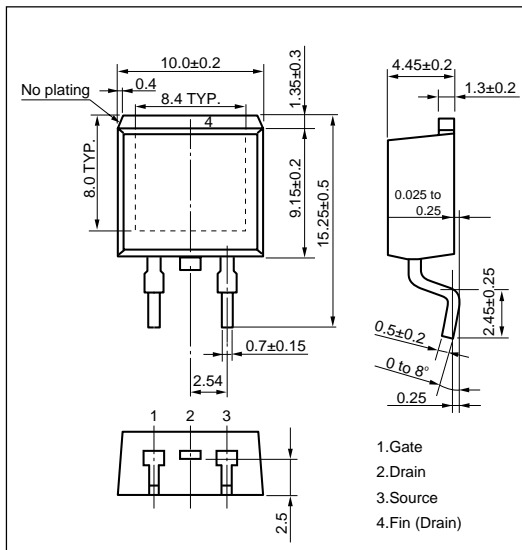
1) TO-220AB (MP-25)



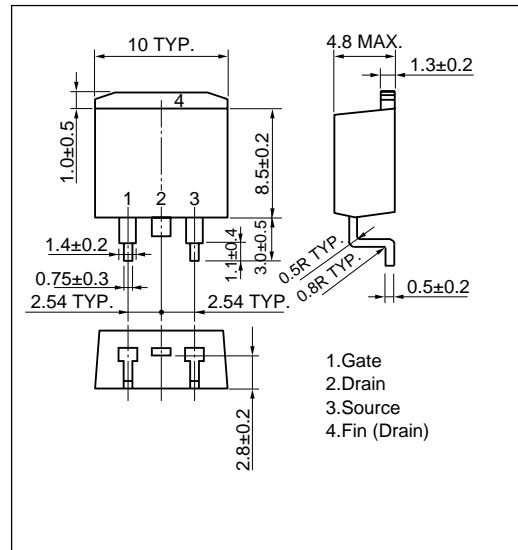
2) TO-262 (MP-25 Fin Cut)



3) TO-263 (MP-25ZK)

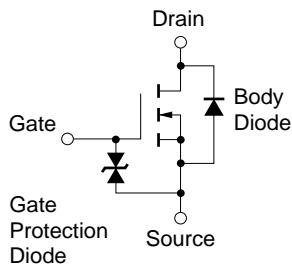


4) TO-220SMD (MP-25Z) **Note**



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.

[MEMO]

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