

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3574 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
 $R_{DS(on)1} = 13.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 24 \text{ A)}$
- Low gate charge
 $Q_G = 22 \text{ nC TYP. (} V_{DD} = 24 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 48 \text{ A)}$
- Built-in gate protection diode
- Avalanche capability ratings
- Surface mount device available

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	30	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) Note1	$I_{D(pulse)}$	± 140	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}	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current Note2	I_{AS}	19	A
Single Avalanche Energy Note2	E_{AS}	36	mJ

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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 15 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

★ ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3574	TO-220AB
2SK3574-S	TO-262
2SK3574-ZK	TO-263
2SK3574-Z	TO-220SMD ^{Note}

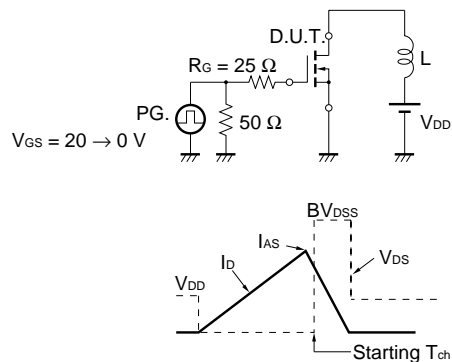
Note TO-220SMD package is produced only in Japan.

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 Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

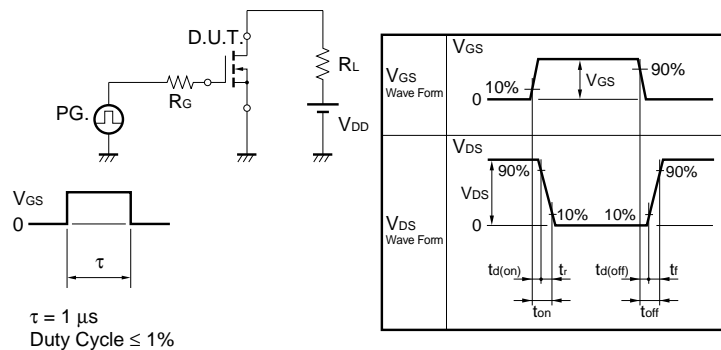
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 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	7.0			S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 24 A		10.1	13.5	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 15 A		15	24	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		940		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		245		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		170		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 24 A		12		ns
Rise Time	t _r	V _{GS} = 10 V		18		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		39		ns
Fall Time	t _f			12		ns
Total Gate Charge	Q _G	V _{DD} = 24 V		22		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		3.8		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		29		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		24.8		nC

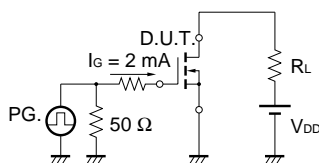
★ **TEST CIRCUIT 1 AVALANCHE CAPABILITY**



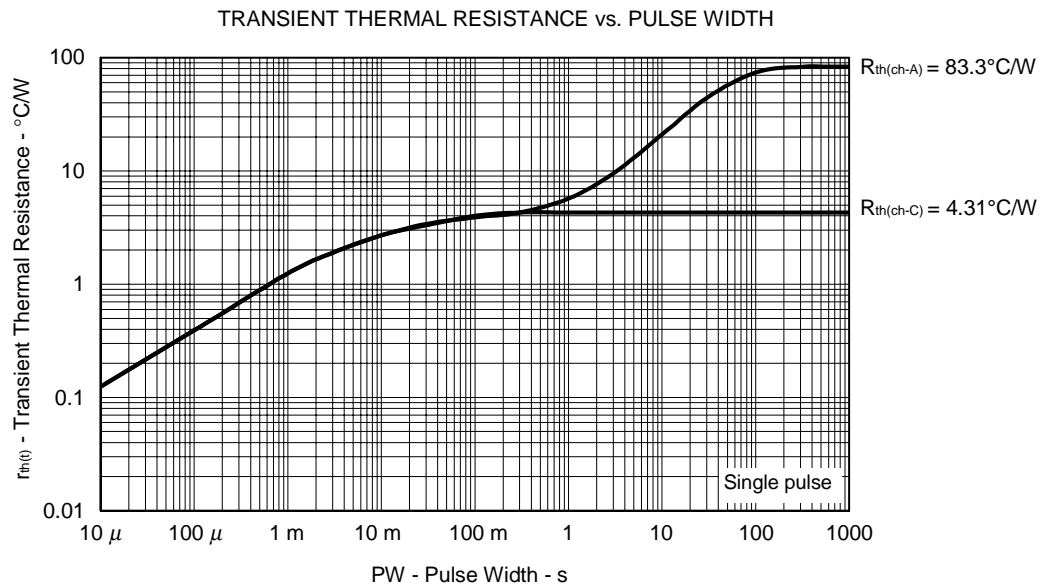
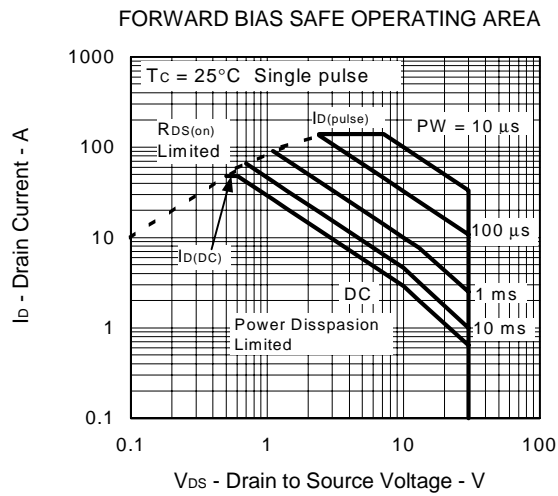
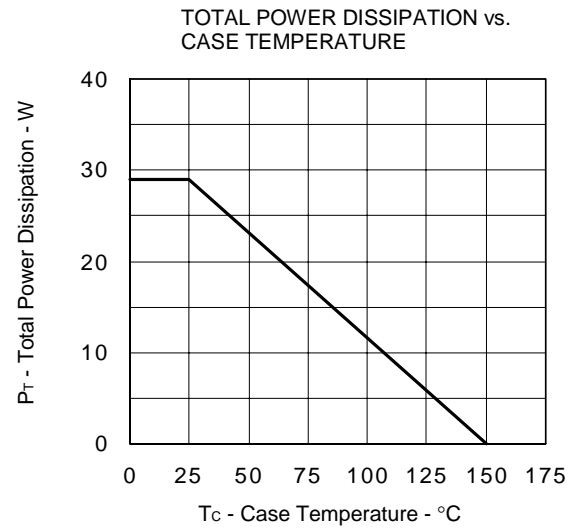
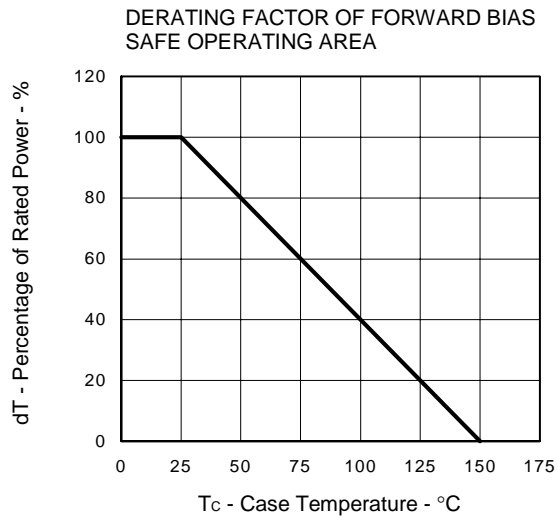
TEST CIRCUIT 2 SWITCHING TIME



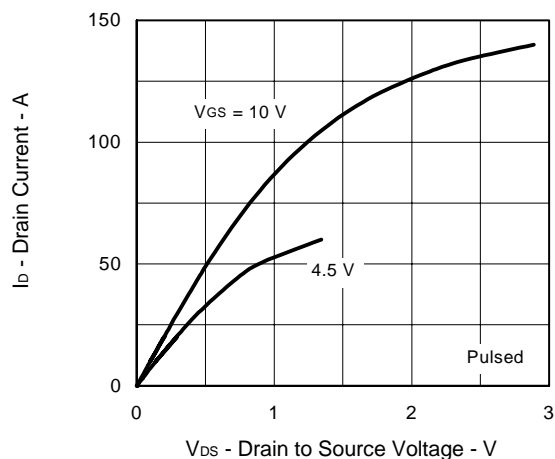
TEST CIRCUIT 3 GATE CHARGE



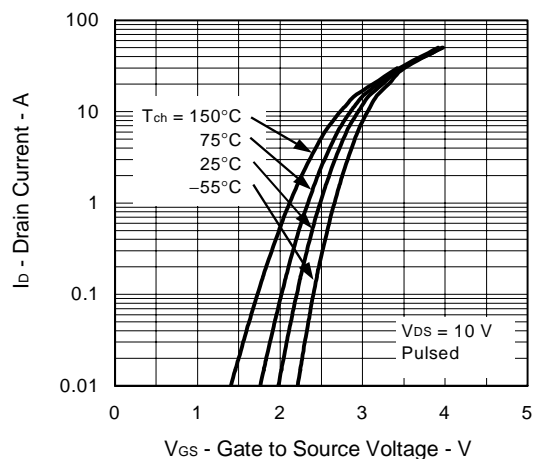
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



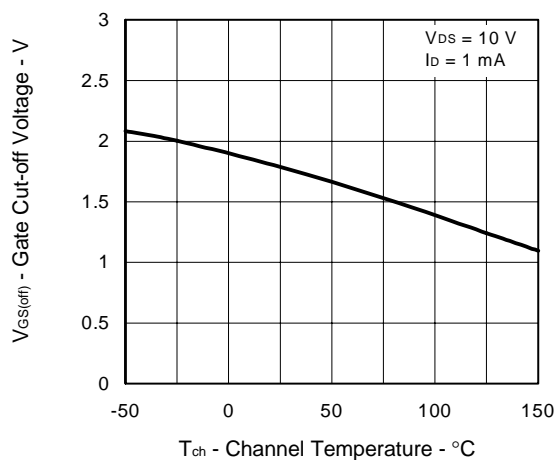
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



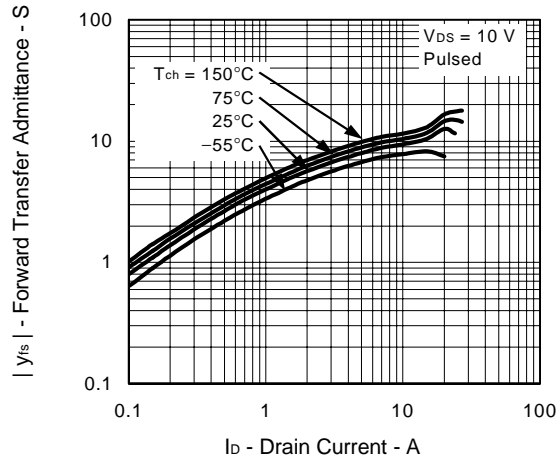
FORWARD TRANSFER CHARACTERISTICS



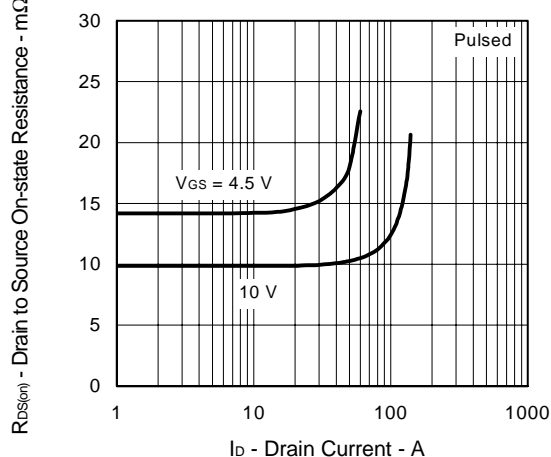
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



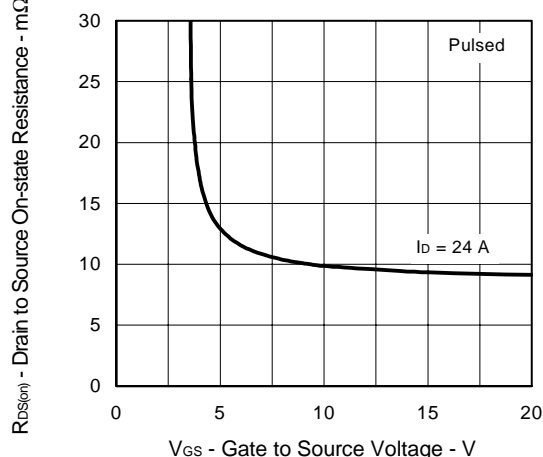
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



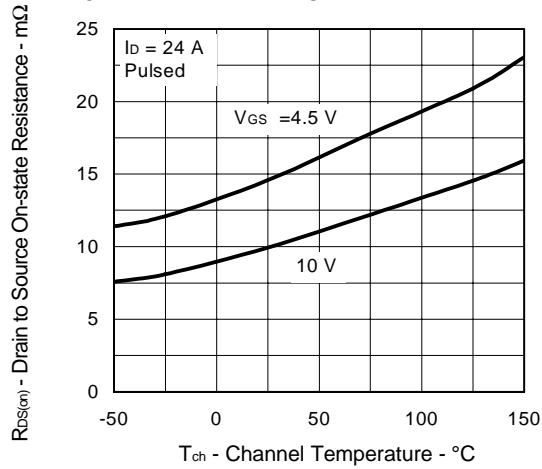
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



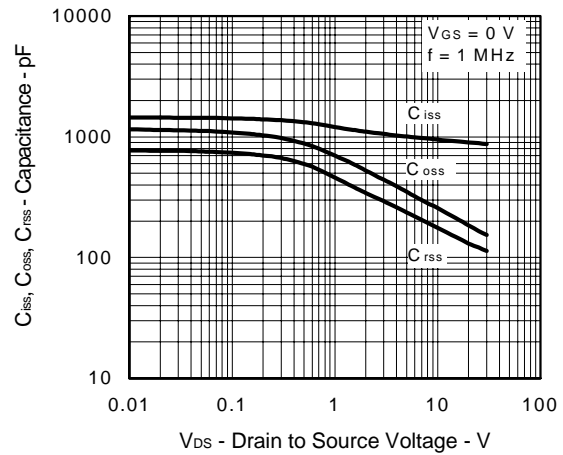
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



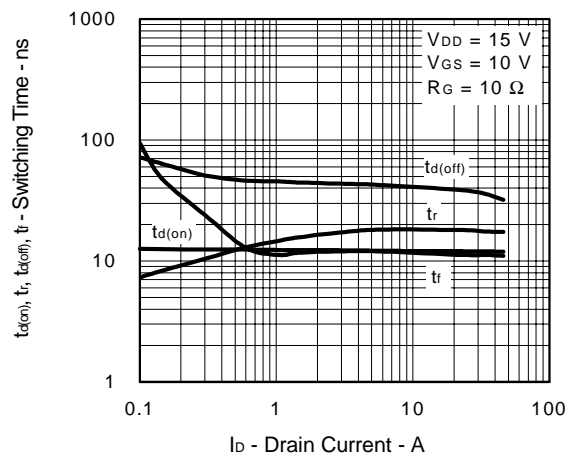
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



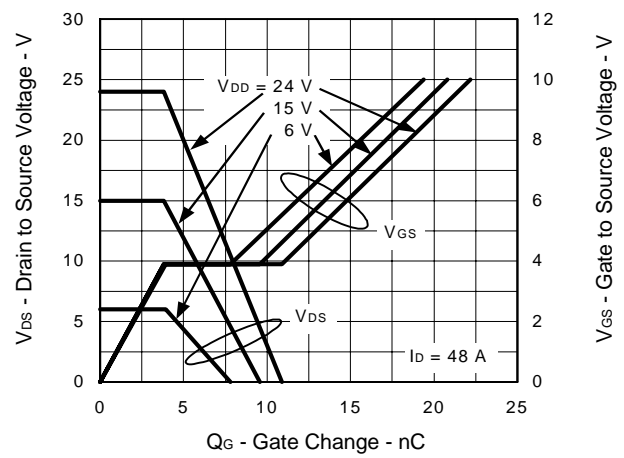
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



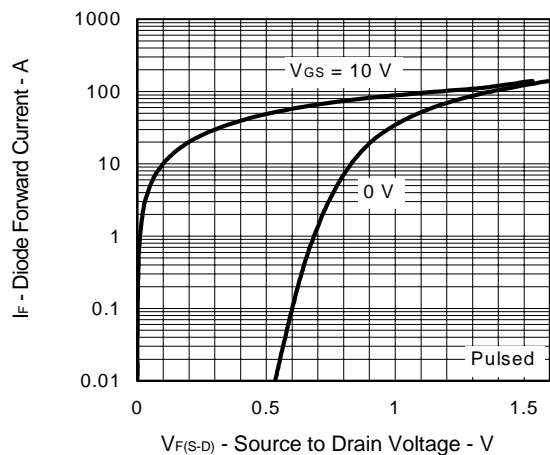
SWITCHING CHARACTERISTICS



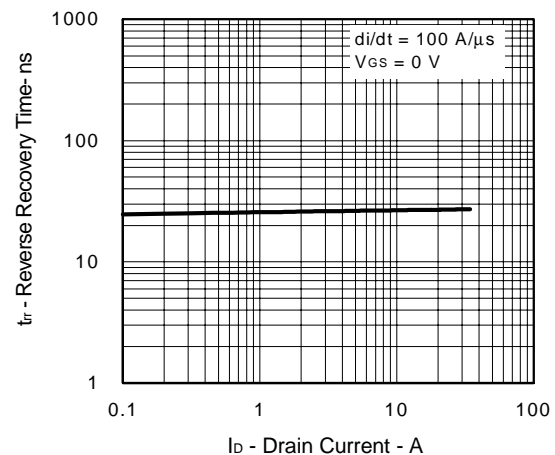
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

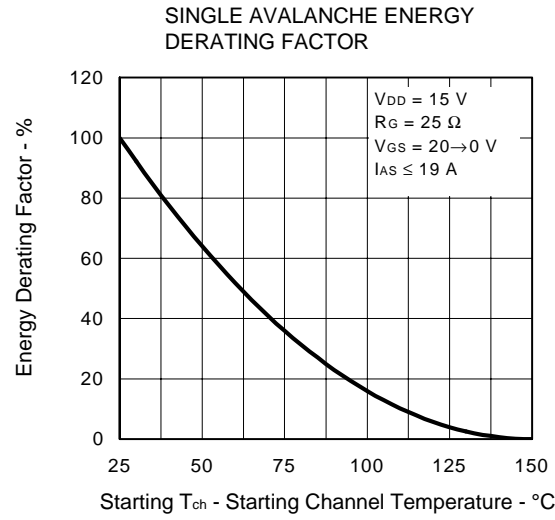
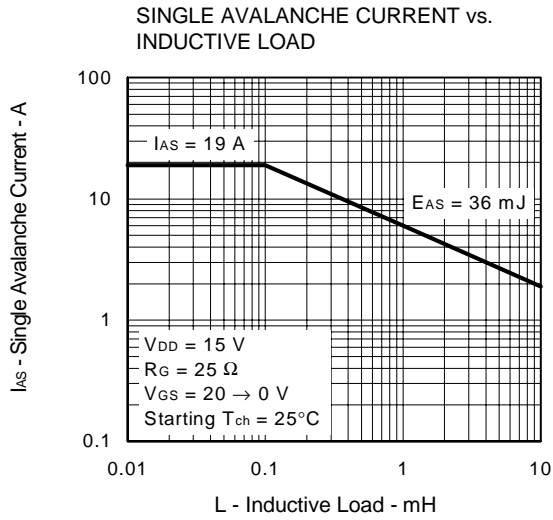


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



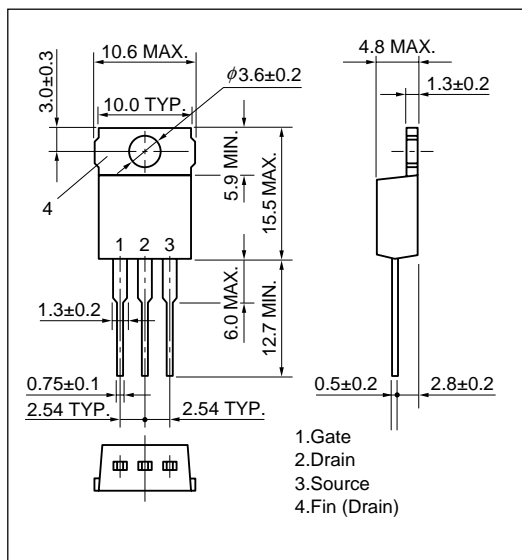
REVERSE RECOVERY TIME vs. DRAIN CURRENT



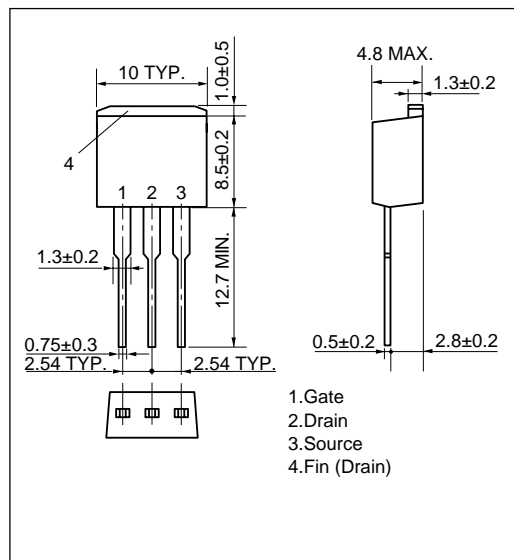


★ PACKAGE DRAWINGS (Unit: mm)

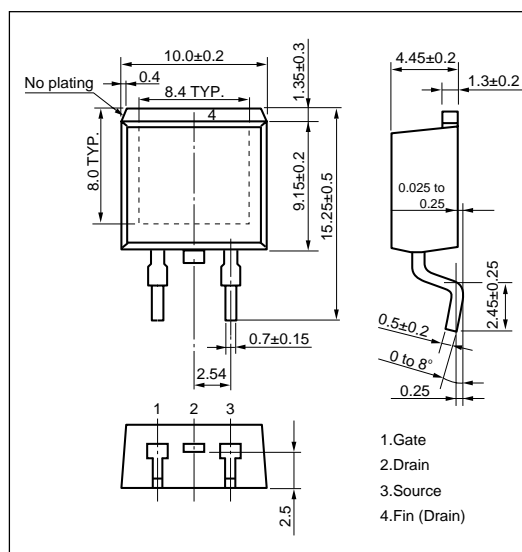
1) TO-220AB(MP-25)



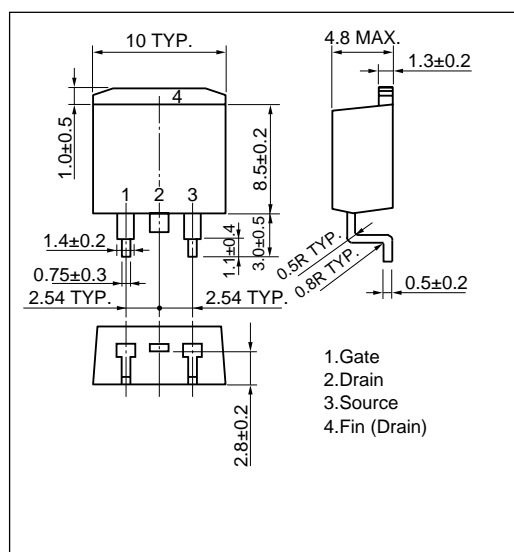
2) TO-262(MP-25 Fin Cut)



3) TO-263(MP-25ZK)

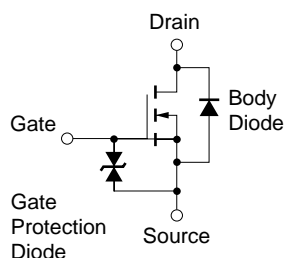


4) TO-220SMD(MP-25Z)^{Note}



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.

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