To our customers,

Old Company Name in Catalogs and Other Documents

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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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RENESAS

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DATA SHEET

RENESAS

MOS FIELD EFFECT TRANSISTOR
2SK3575

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3575 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
  $R_{DS(on)1}$ = 4.5 mΩ MAX. (V_{GS} = 10 V, I_D = 42 A)
- Low gate charge
  Q_G = 70 nC TYP. (V_{DD} = 24 V, V_{GS} = 10 V, I_D = 83 A)
- Avalanche capability ratings
- Surface mount device available

★ ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3575	TO-220AB
2SK3575-S	TO-262
2SK3575-ZK	TO-263
2SK3575-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}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±83	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±332	A
Total Power Dissipation (T_A = 25°C)	P_{T1}	1.5	W
Total Power Dissipation (T_C = 25°C)	P_{T2}	105	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Single Avalanche Current Note2	I_{AS}	57	A
Single Avalanche Energy Note2	E_{AS}	325	mJ

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Starting T_{ch} = 25°C, V_{DD} = 15 V, R_G = 25 Ω, V_{GS} = 20 → 0 V

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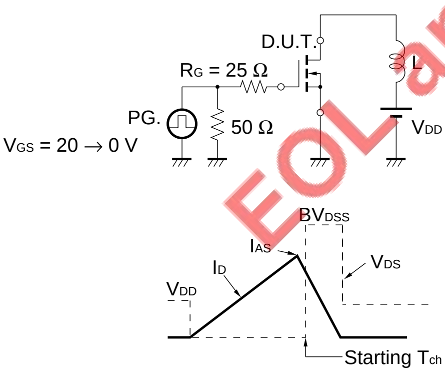
Printed in Japan

The mark ★ shows major revised points.

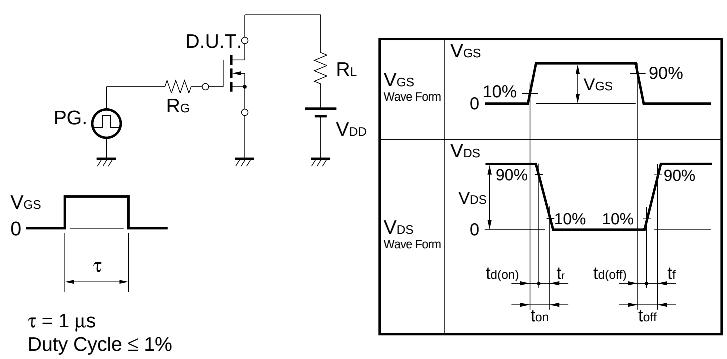
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
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 = 42 A	27			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 42 A		3.3	4.5	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 42 A		4.3	6.4	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		3700		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		1430		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		500		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15 V, I_D = 42 A		26		ns
Rise Time	t_r	V_{GS} = 10 V		27		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		110		ns
Fall Time	t_f			40		ns
Total Gate Charge	Q_G	V_{DD} = 24 V		70		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		12		nC
Gate to Drain Charge	Q_{GD}	I_D = 83 A		20		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 83 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 83 A, V_{GS} = 0 V		61		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		94		nC

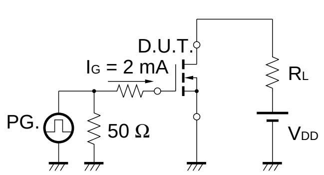
★ **TEST CIRCUIT 1 AVALANCHE CAPABILITY**



TEST CIRCUIT 2 SWITCHING TIME

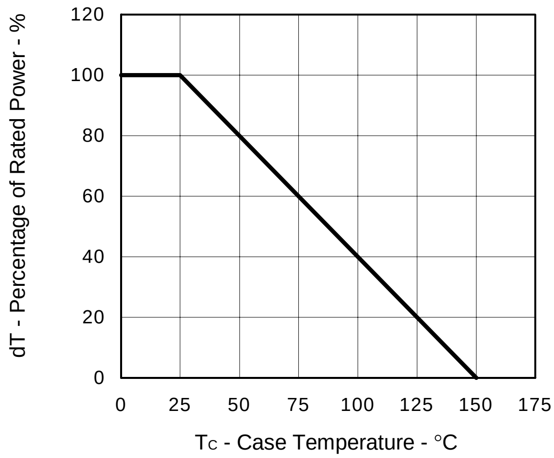


TEST CIRCUIT 3 GATE CHARGE

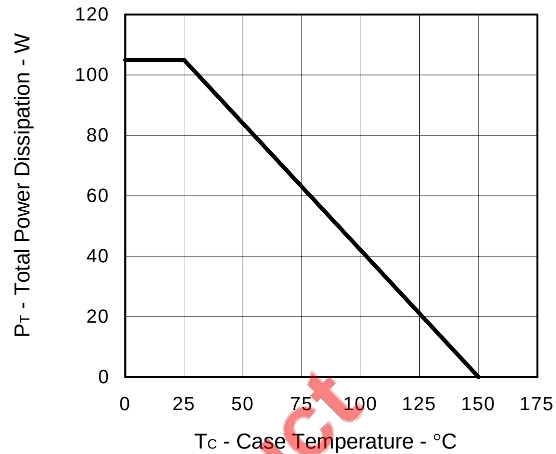


TYPICAL CHARACTERISTICS (T_A = 25°C)

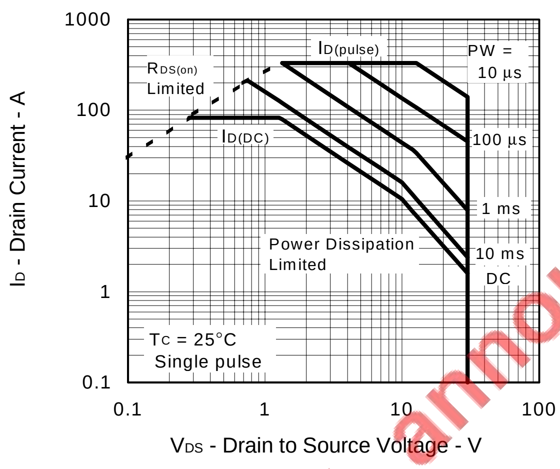
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



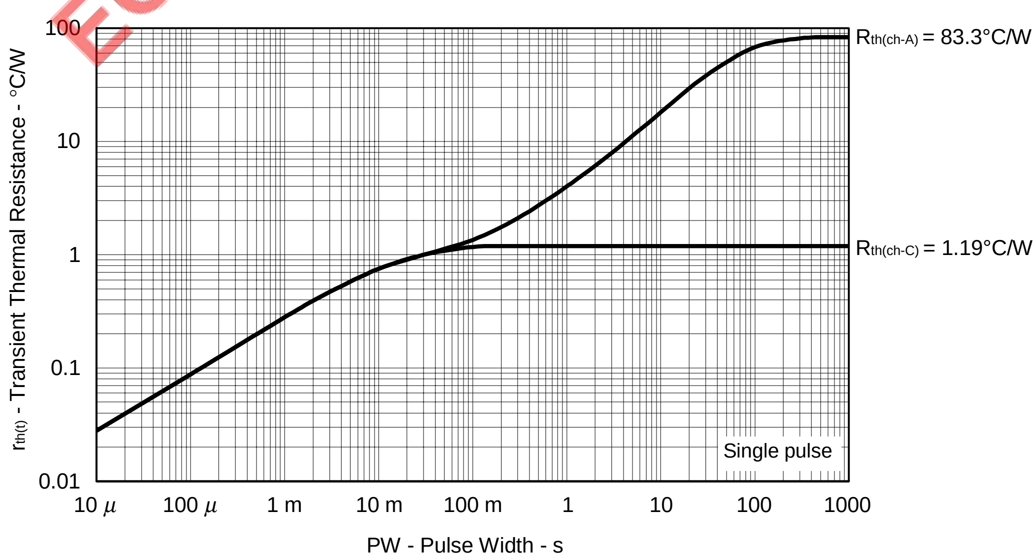
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



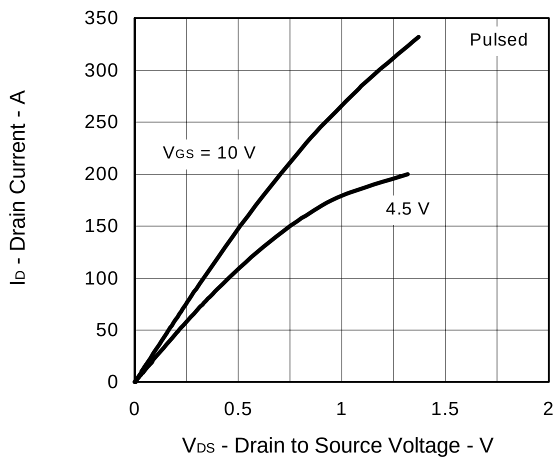
FORWARD BIAS SAFE OPERATING AREA



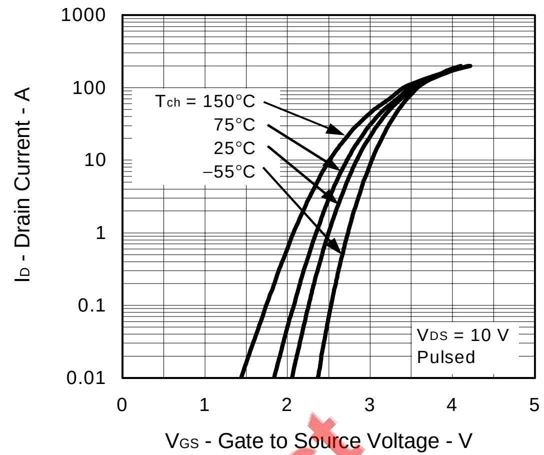
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



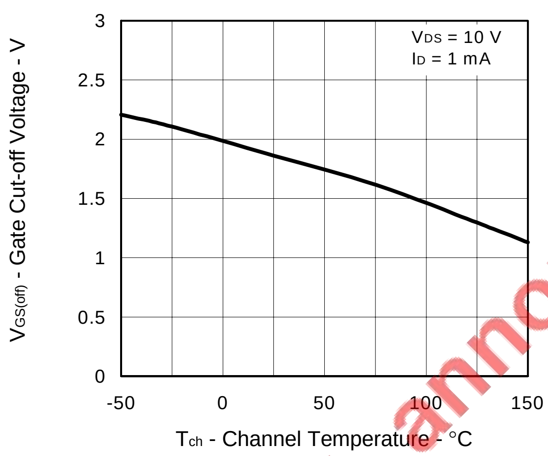
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



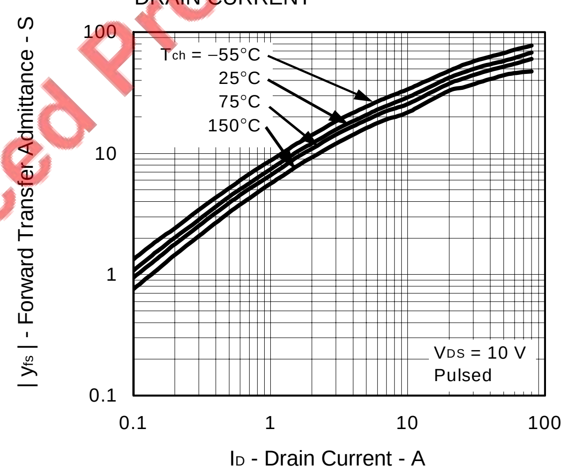
FORWARD TRANSFER CHARACTERISTICS



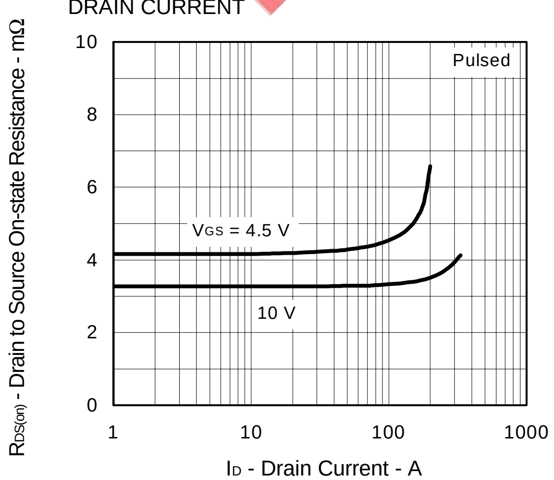
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



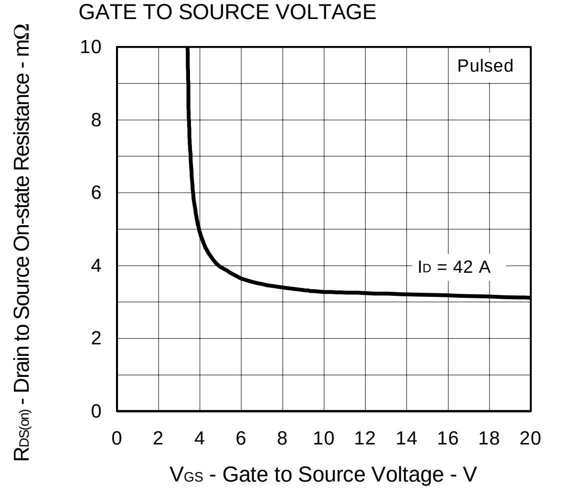
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



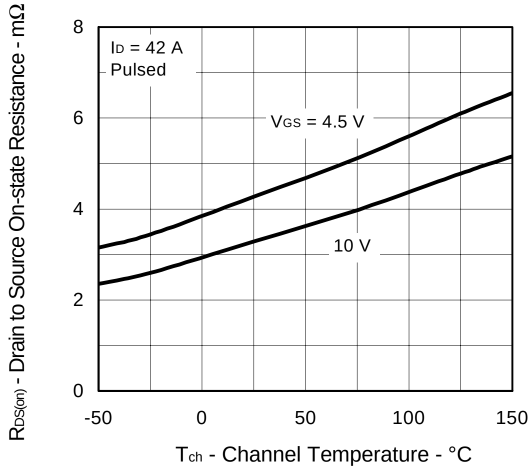
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



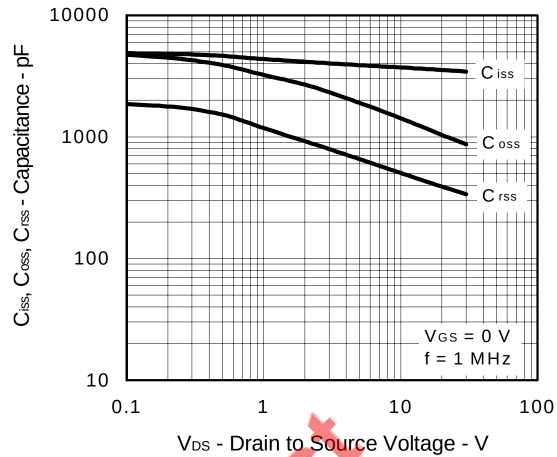
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



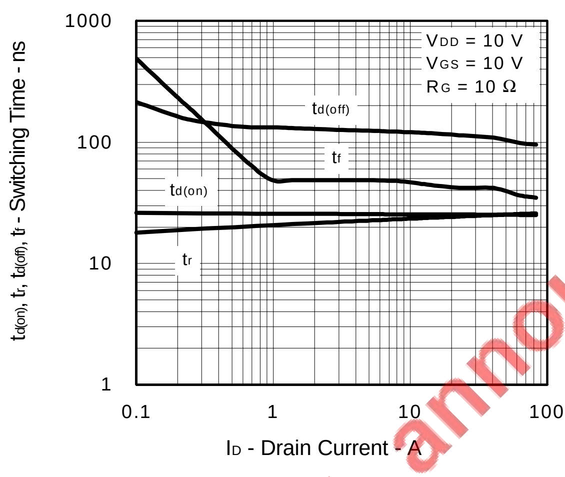
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



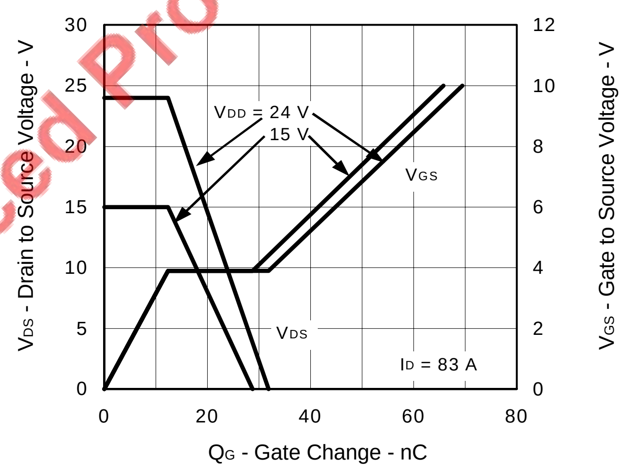
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



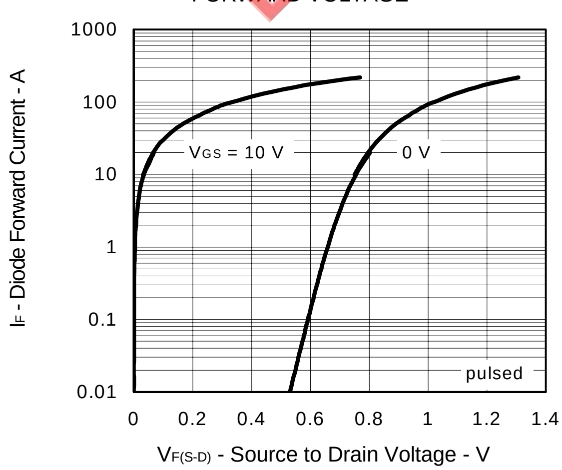
SWITCHING CHARACTERISTICS



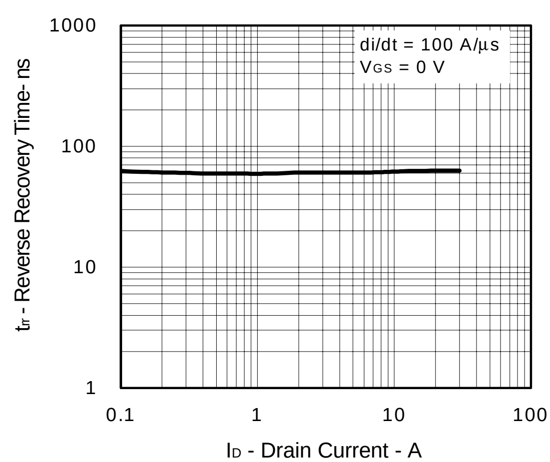
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



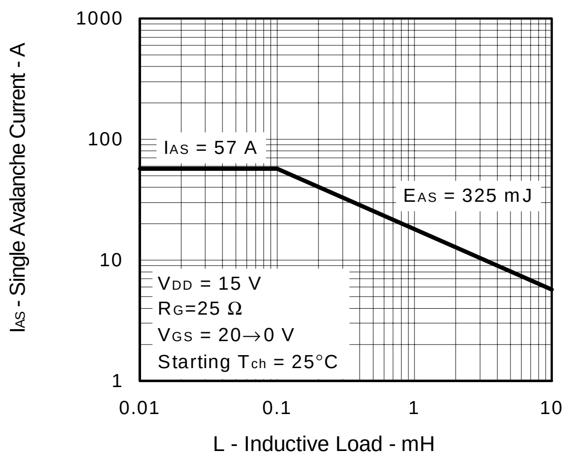
SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



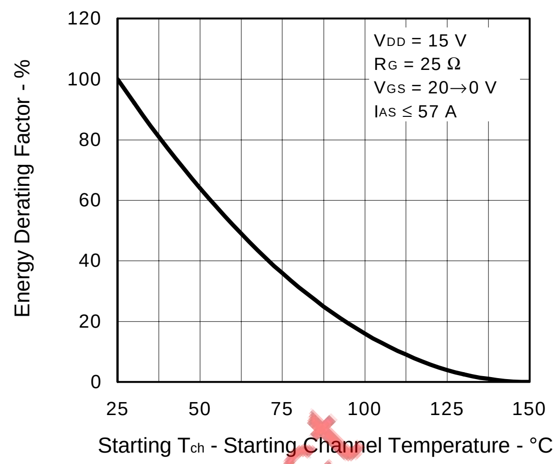
REVERSE RECOVERY TIME vs.
DRAIN CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

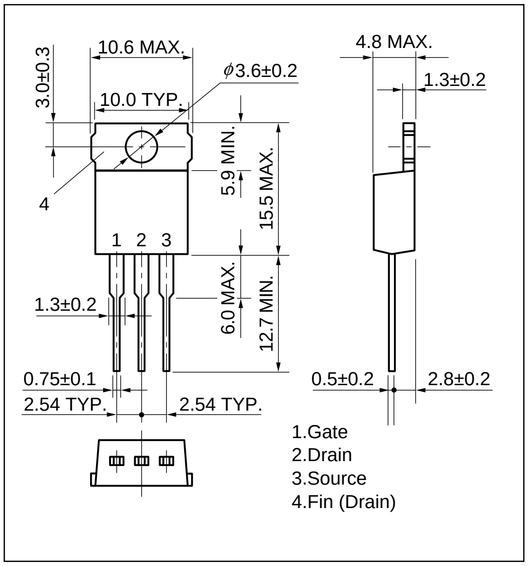


SINGLE AVALANCHE ENERGY DERATING FACTOR

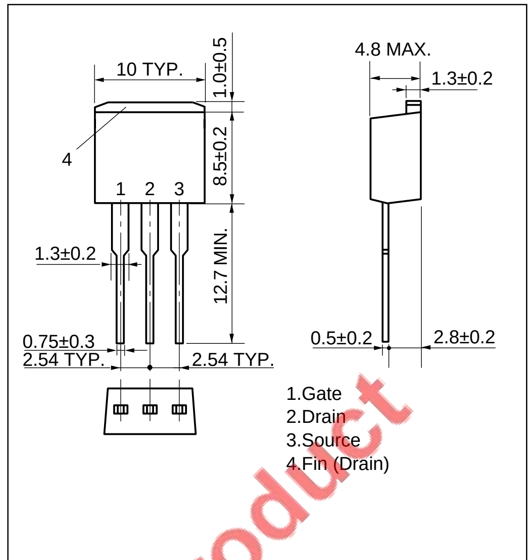


★ PACKAGE DRAWINGS (Unit: mm)

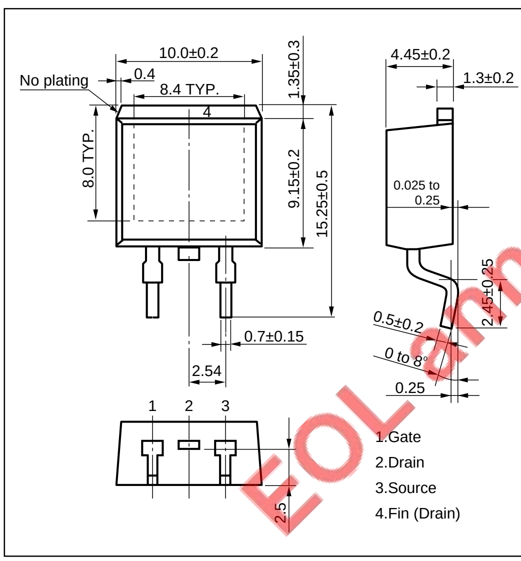
1) TO-220AB(MP-25)



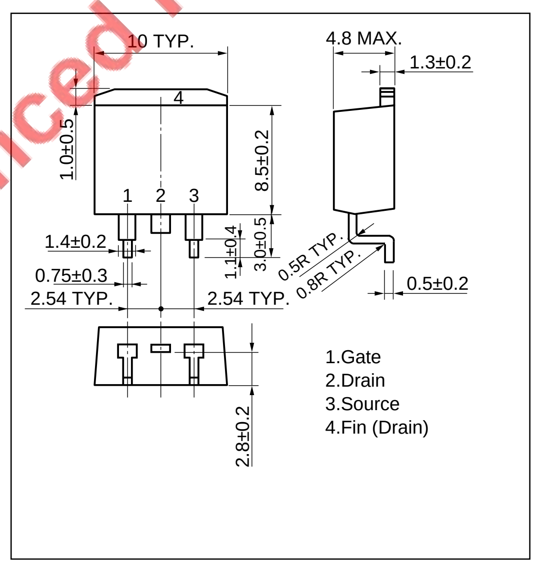
2) TO-262(MP-25 Fin Cut)



3) TO-263(MP-25ZK)



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



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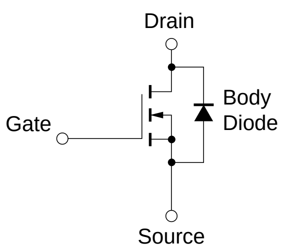
EQUIVALENT CIRCUIT



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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