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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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SWITCHING N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3480 is N-channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Super low on-state resistance:
 $R_{DS(on)1} = 31 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 25 \text{ A)}$
 $R_{DS(on)2} = 36 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 25 \text{ A)}$
- Low C_{iss} : $C_{iss} = 3600 \text{ pF TYP.}$
- Built-in gate protection diode

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	100	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 50	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 100	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	84	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.5	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	34	A
Single Avalanche Energy ^{Note2}	E_{AS}	116	mJ

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

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

THERMAL RESISTANCE

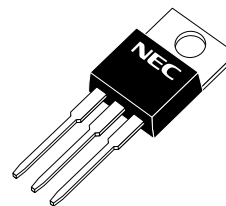
Channel to Case	$R_{th(ch-C)}$	1.48	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

ORDERING INFORMATION

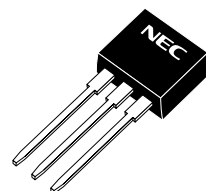
PART NUMBER	PACKAGE
2SK3480	TO-220AB
2SK3480-S	TO-262
2SK3480-ZJ	TO-263
2SK3480-Z	TO-220SMD ^{Note}

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

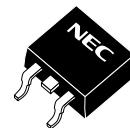
(TO-220AB)



(TO-262)



(TO-263, TO-220SMD)

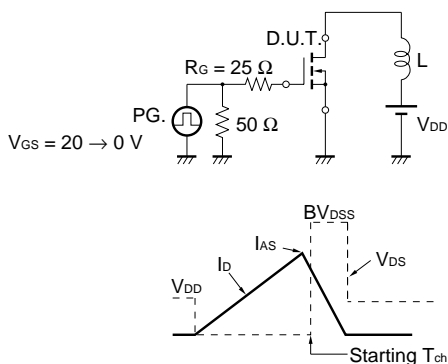


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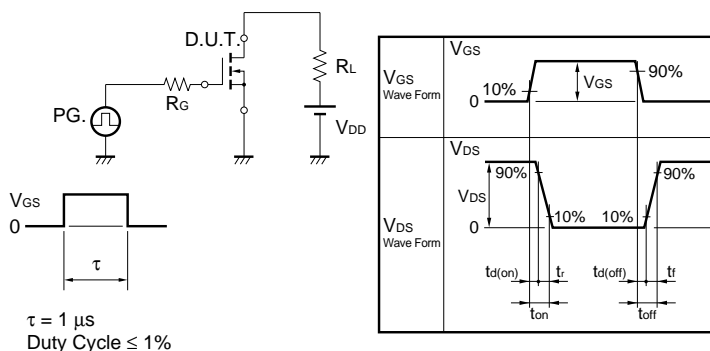
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10V, I_D = 1mA$	1.5	2.0	2.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10V, I_D = 25A$	17	34		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = 10V, I_D = 25A$		25	31	$m\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.5V, I_D = 25A$		27	36	$m\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10V$		3600		pF
Output Capacitance	C_{oss}	$V_{GS} = 0V$		360		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1MHz$		190		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 50V, I_D = 25A$		15		ns
Rise Time	t_r	$V_{GS} = 10V$		11		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 0\Omega$		68		ns
Fall Time	t_f			6.0		ns
Total Gate Charge	Q_G	$V_{DD} = 80V$		74		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 10V$		10		nC
Gate to Drain Charge	Q_{GD}	$I_D = 50A$		20		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 50A, V_{GS} = 0V$		1.0		V
Reverse Recovery Time	t_{rr}	$I_F = 50A, V_{GS} = 0V$		70		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100A/\mu s$		180		nC

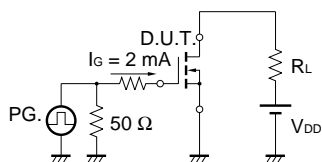
TEST CIRCUIT 1 AVALANCHE CAPABILITY



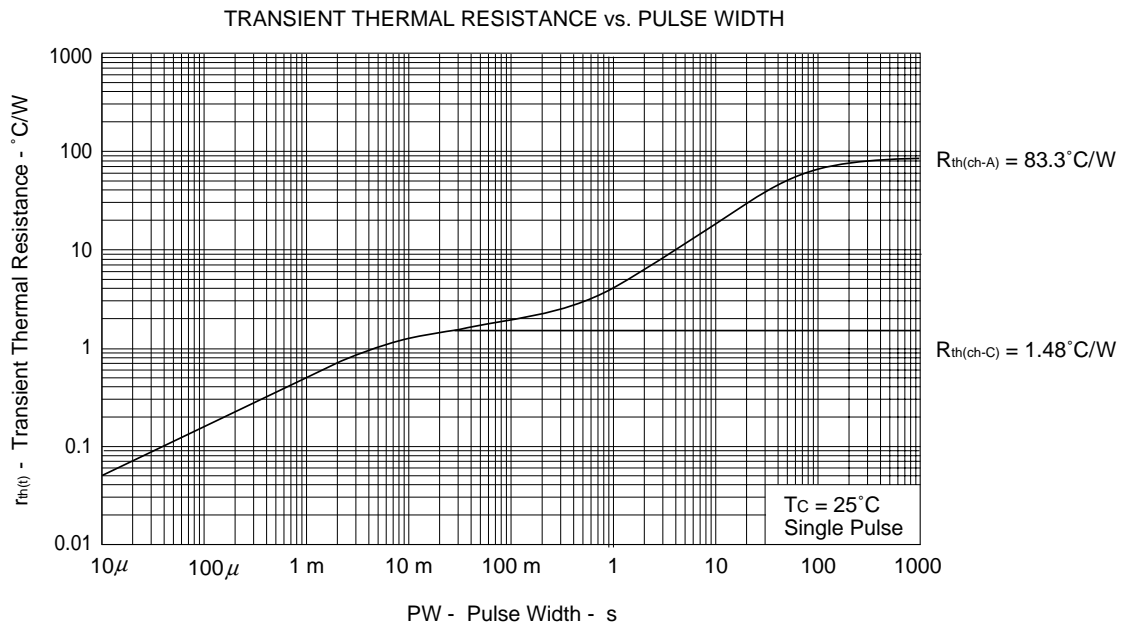
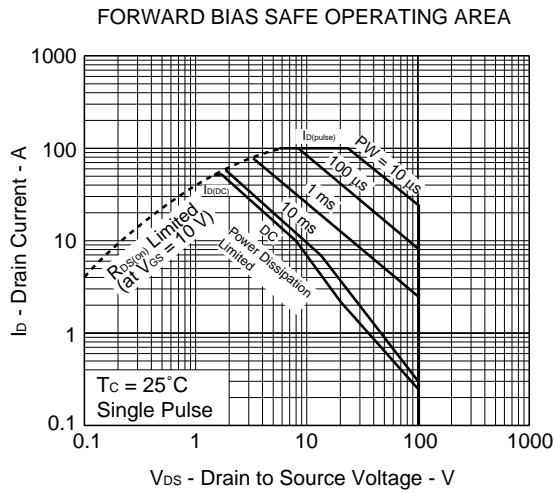
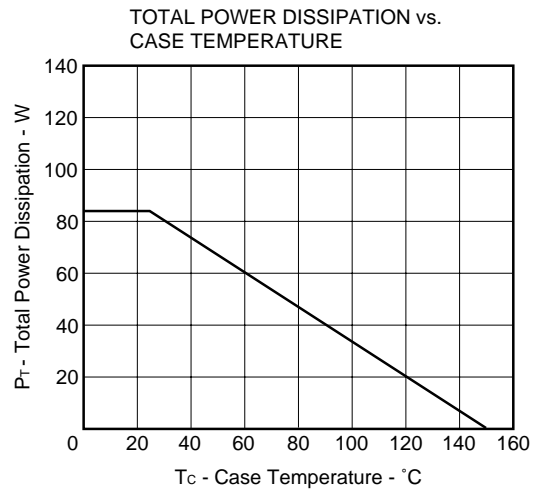
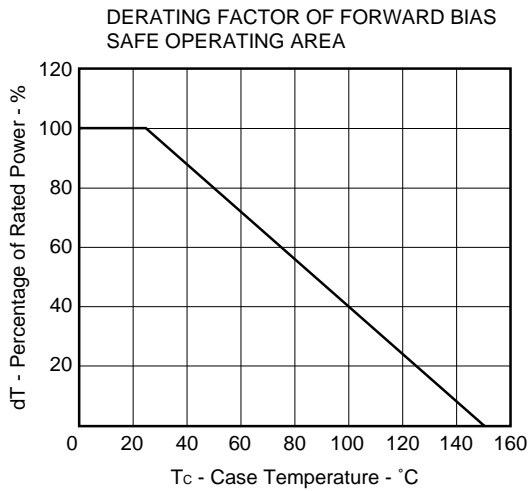
TEST CIRCUIT 2 SWITCHING TIME



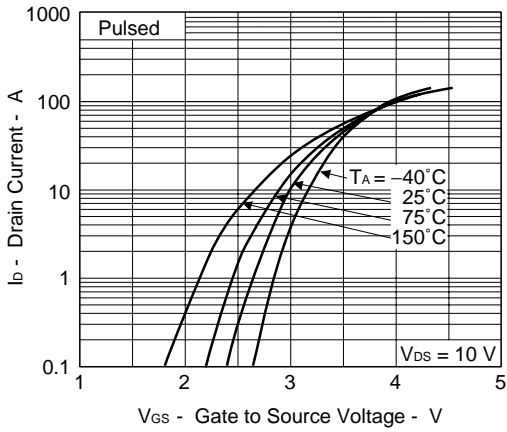
TEST CIRCUIT 3 GATE CHARGE



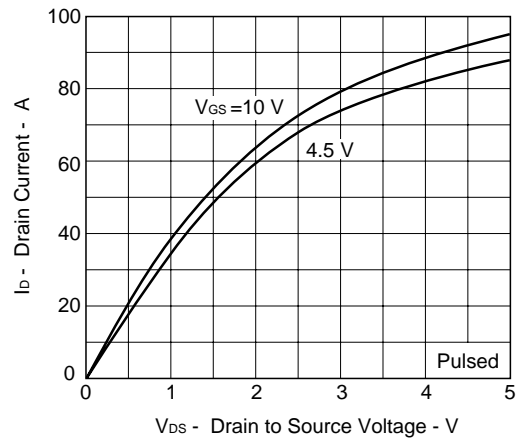
TYPICAL CHARACTERISTICS (T_A = 25°C)



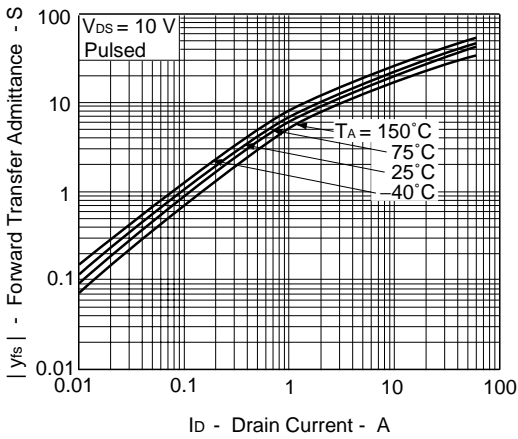
FORWARD TRANSFER CHARACTERISTICS



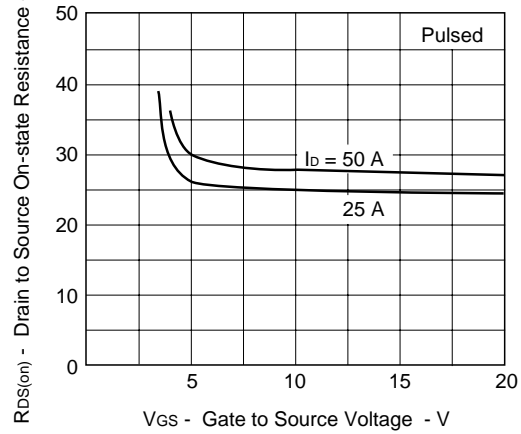
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



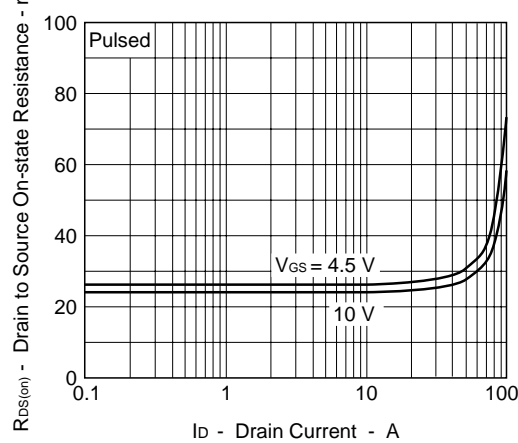
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



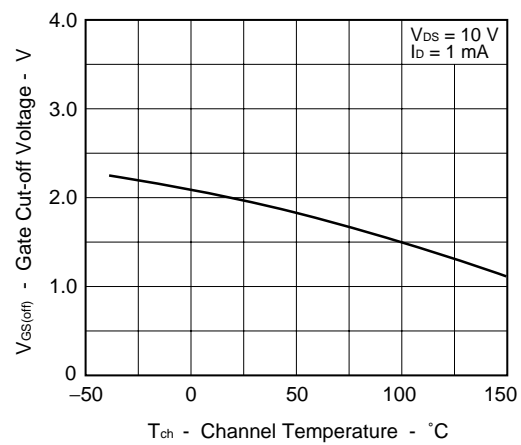
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



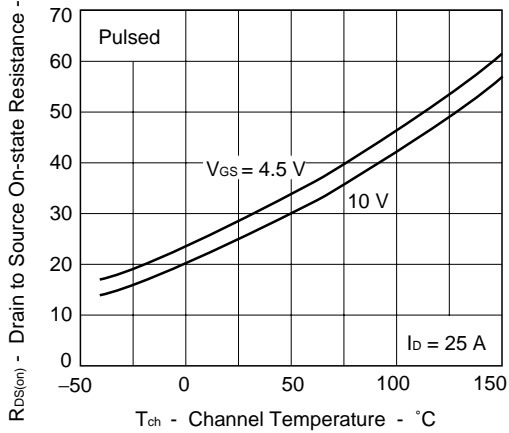
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



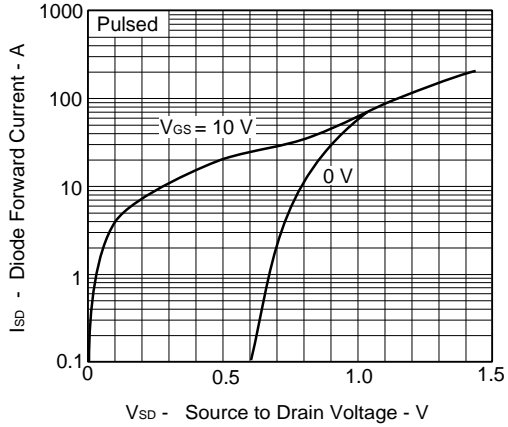
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



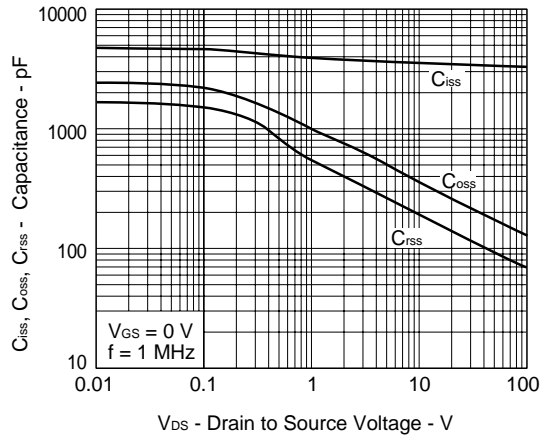
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



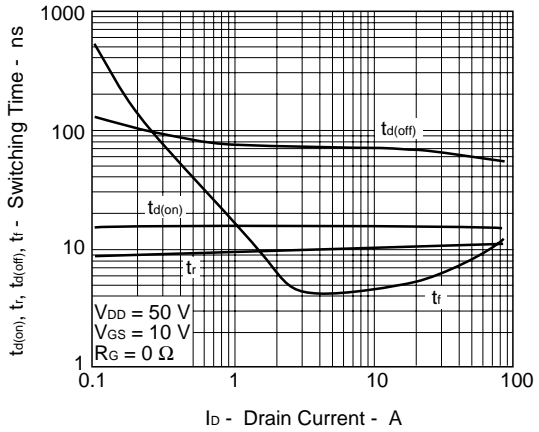
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



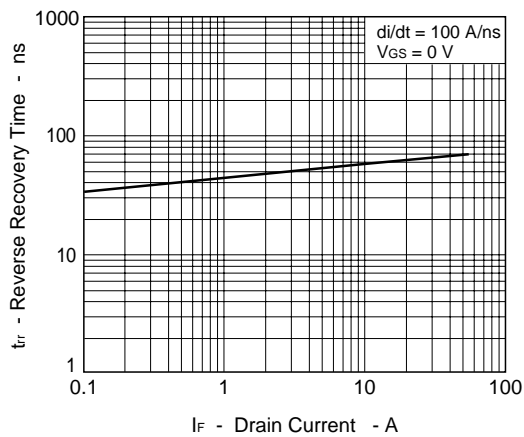
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



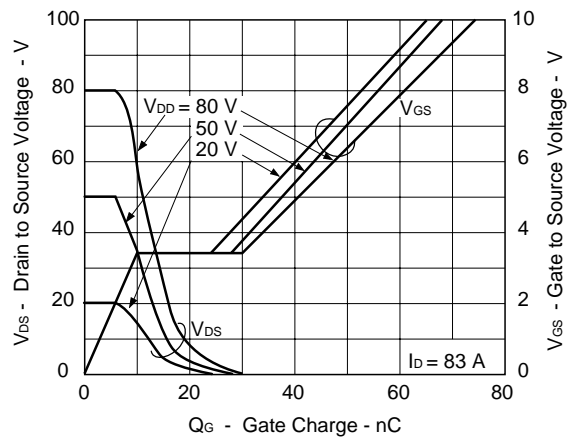
SWITCHING CHARACTERISTICS



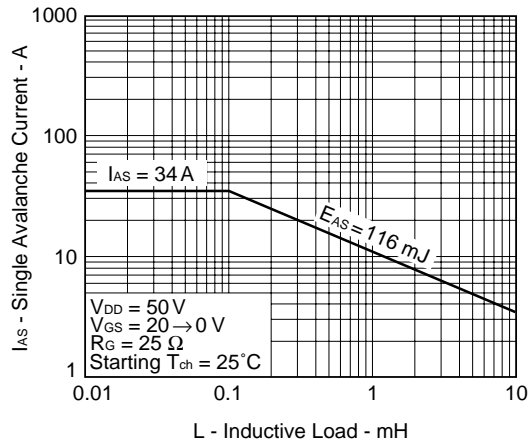
REVERSE RECOVERY TIME vs. DRAIN CURRENT



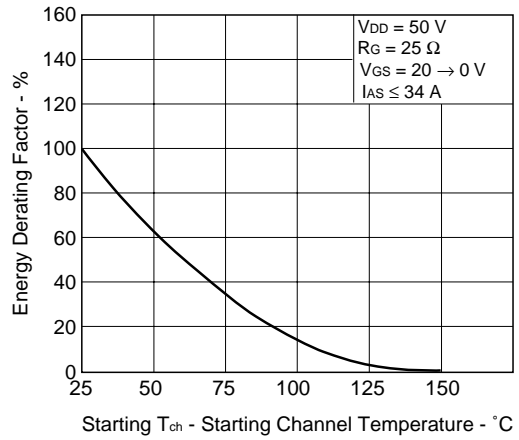
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

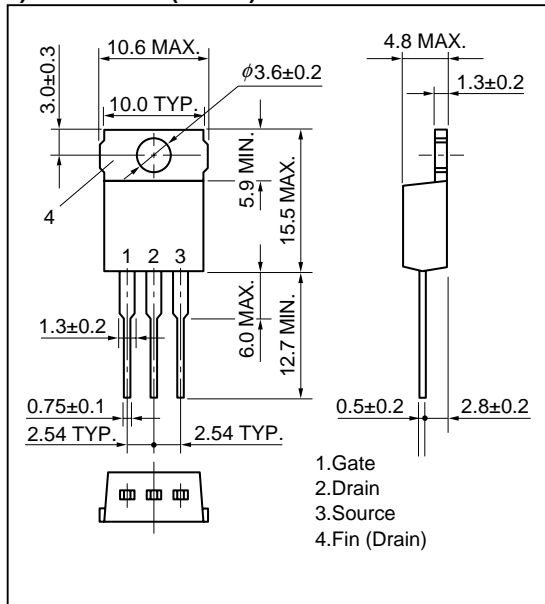


SINGLE AVALANCHE ENERGY DERATING FACTOR

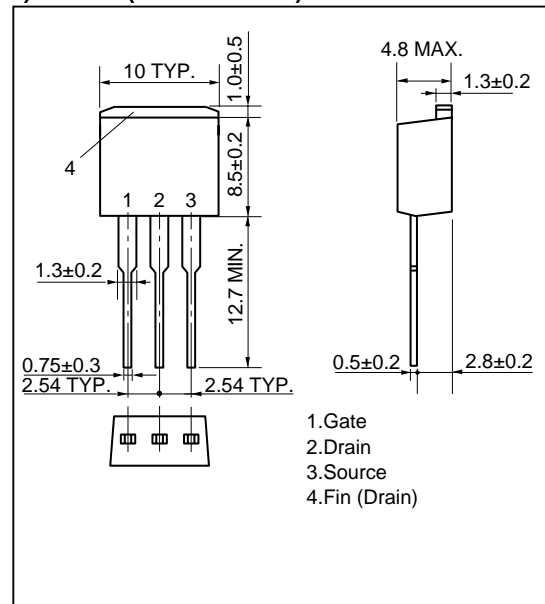


PACKAGE DRAWINGS (Unit: mm)

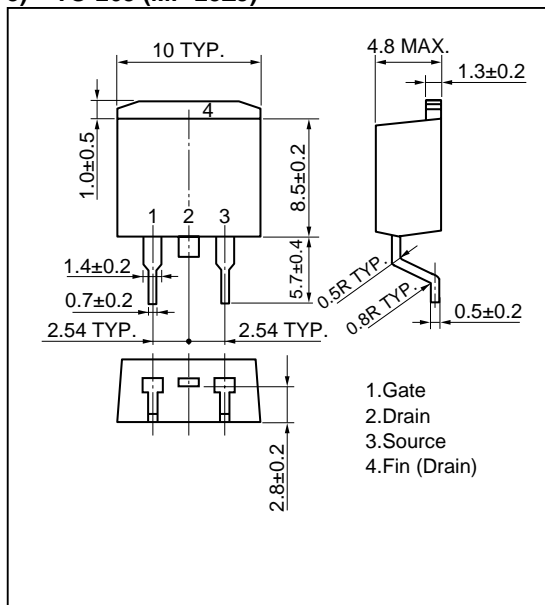
1) TO-220AB(MP-25)



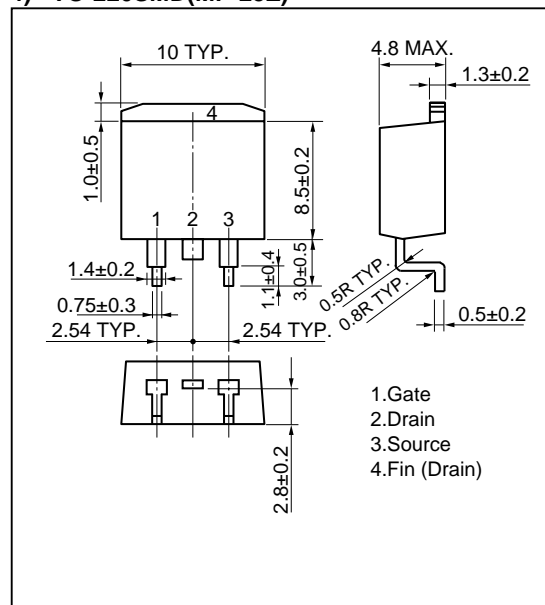
2) TO-262(MP-25 Fin Cut)



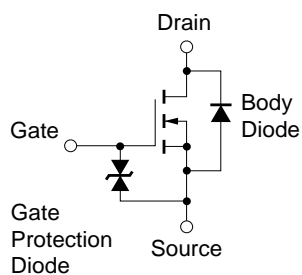
3) TO-263 (MP-25ZJ)



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



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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