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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DATA SHEET

RENESAS

MOS FIELD EFFECT TRANSISTOR
2SK3305

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3305 is N-channel DMOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3305	TO-220AB
2SK3305-S	TO-262
2SK3305-ZJ	TO-263

FEATURES

- Low gate charge
  Q_G = 13 nC TYP. (V_{DD} = 400 V, V_{GS} = 10 V, I_D = 5.0 A)
- Gate voltage rating: ±30 V
- Low on-state resistance
  $R_{DS(on)}$ = 1.5 Ω MAX. (V_{GS} = 10 V, I_D = 2.5 A)
- Avalanche capability ratings

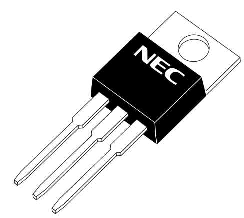
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	500	V
Gate to Source Voltage (V_{DS} = 0 V)	$V_{GSS(AC)}$	±30	V
Drain Current (DC)	$I_{D(DC)}$	±5	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±20	A
Total Power Dissipation (T_C = 25°C)	P_T	75	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}	5.0	A
Single Avalanche Energy Note2	E_{AS}	125	mJ

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Starting T_{ch} = 25°C, V_{DD} = 150 V, R_G = 25 Ω, V_{GS} = 20 → 0 V

(TO-220AB)



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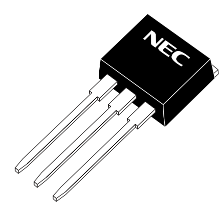

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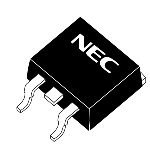

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Date Published July 2004 NS CP(K)
Printed in Japan

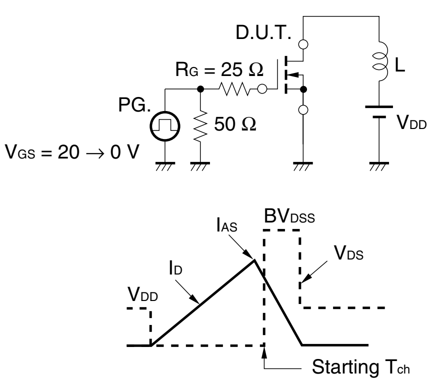
The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

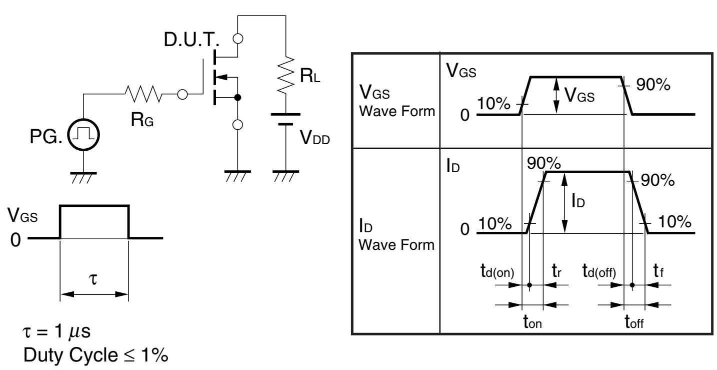
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V			100	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V			±100	nA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	2.5		3.5	V
Forward Transfer Admittance **Note**	| y_{fs} |	V_{DS} = 10 V, I_D = 2.5 A	1.0	3.0		S
★ Drain to Source On-state Resistance **Note**	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 2.5 A		1.1	1.5	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V		700		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		115		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		6		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 150 V, I_D = 2.5 A		16		ns
Rise Time	t_r	V_{GS} = 10 V		3		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		33		ns
Fall Time	t_f	R_L = 60 Ω		5.5		ns
Total Gate Charge	Q_G	V_{DD} = 400 V		13		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		4		nC
Gate to Drain Charge	Q_{GD}	I_D = 5.0 A		4.5		nC
Body Diode Forward Voltage **Note**	$V_{F(S-D)}$	I_F = 5.0 A, V_{GS} = 0 V		0.9		V
Reverse Recovery Time	t_{rr}	I_F = 5.0 A, V_{GS} = 0 V		0.6		μs
★ Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		3.3		μC

Note Pulsed

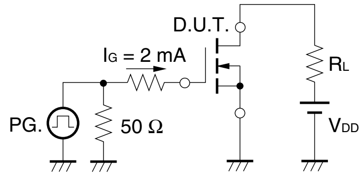
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME



TEST CIRCUIT 3 GATE CHARGE



TYPICAL CHARACTERISTICS (T_A = 25°C)

Figure1. DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA

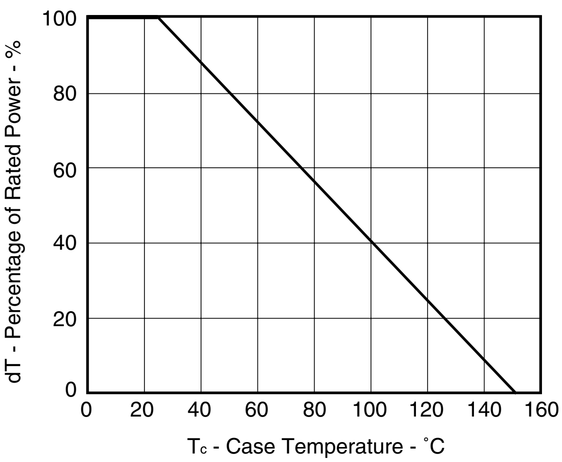


Figure2. TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

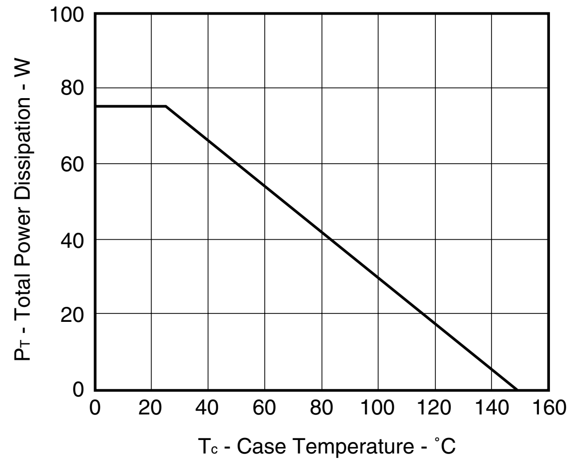


Figure3. FORWARD BIAS SAFE OPERATING AREA

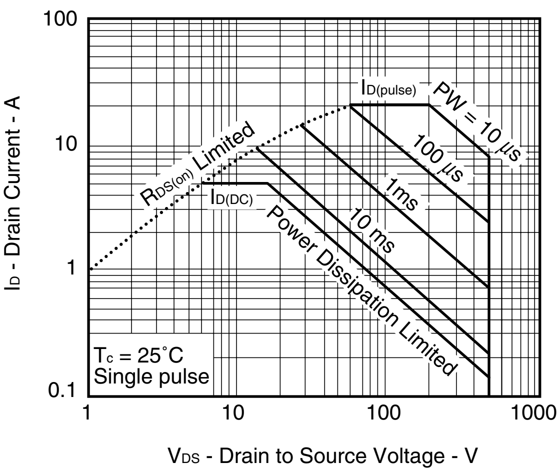


Figure4. DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE

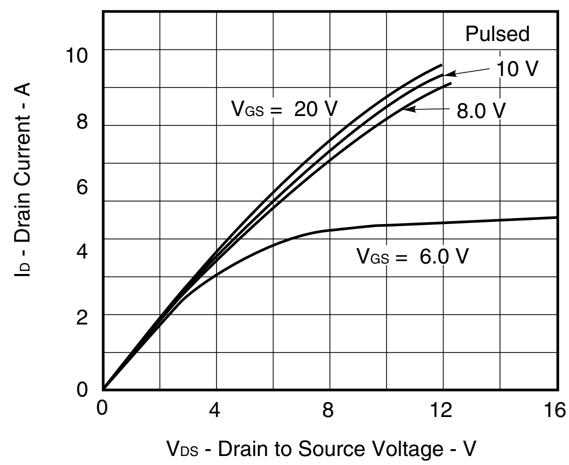


Figure5. DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE

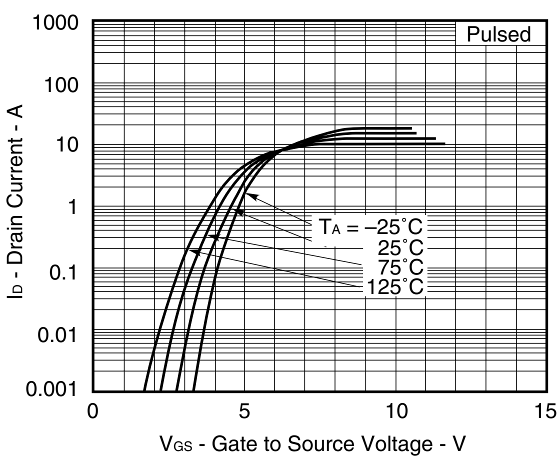


Figure6. TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

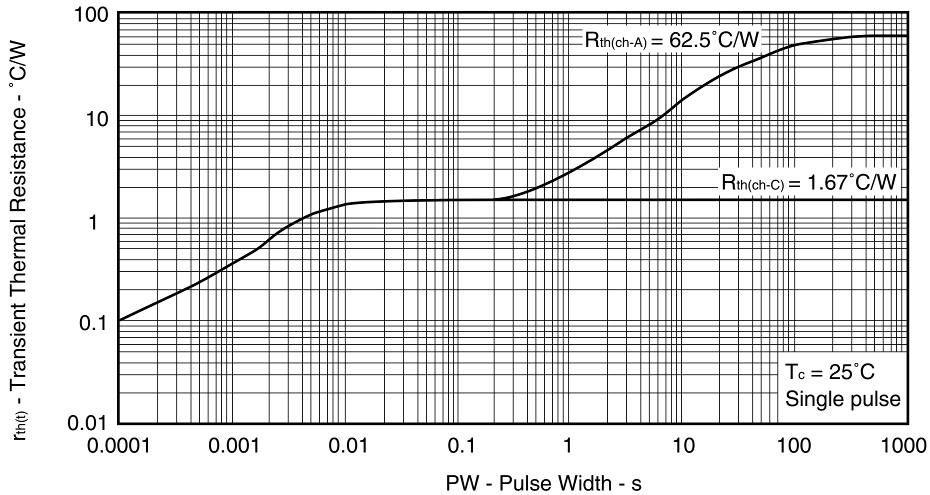


Figure7. FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

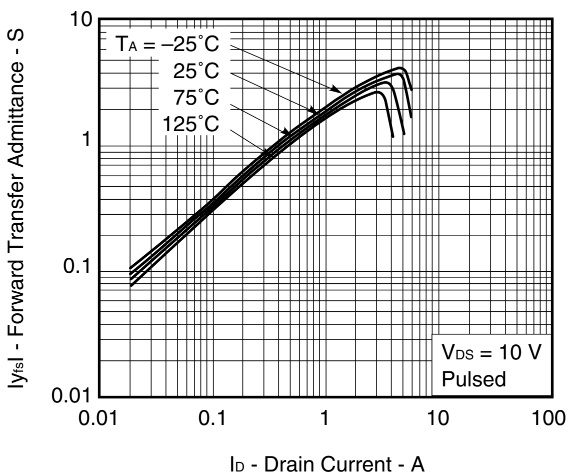


Figure8. DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

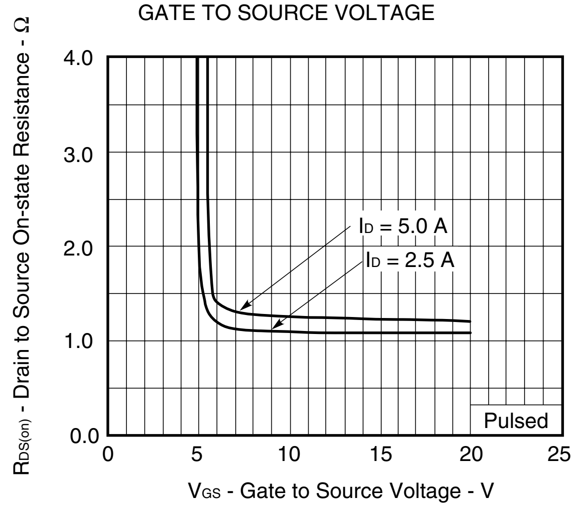


Figure9. DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

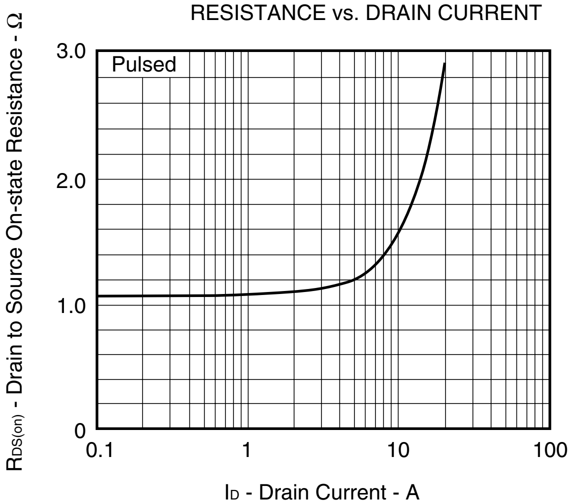


Figure10. GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE

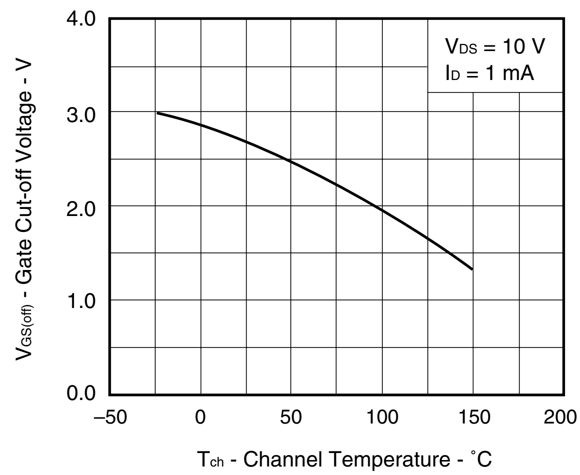


Figure11. DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE

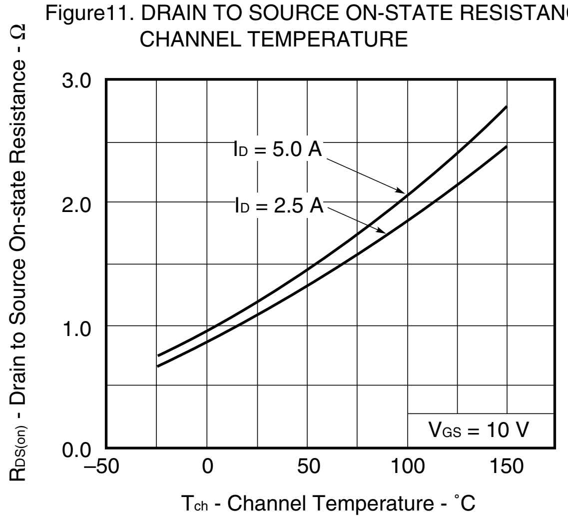


Figure12. SOURCE TO DRAIN DIODE FORWARD VOLTAGE

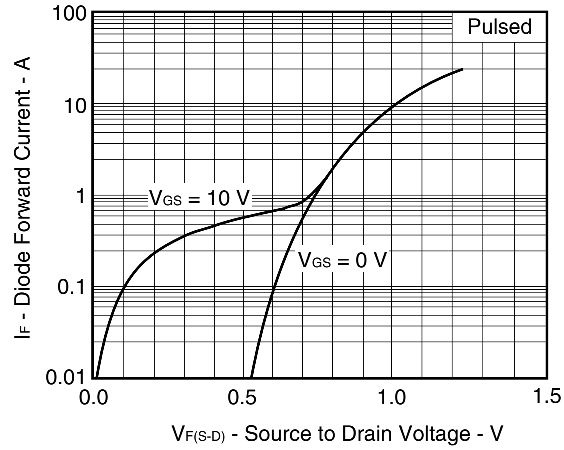


Figure13. CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE

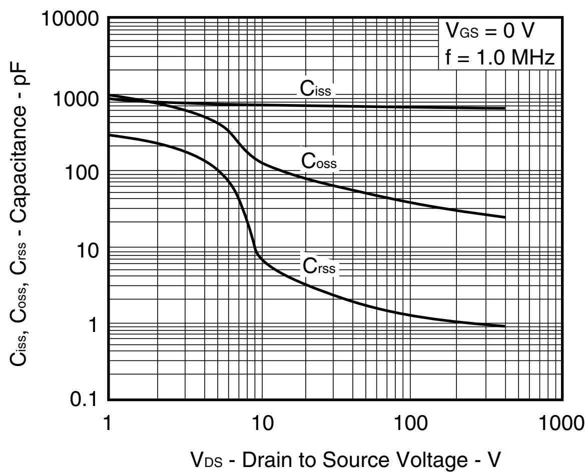


Figure14. SWITCHING CHARACTERISTICS

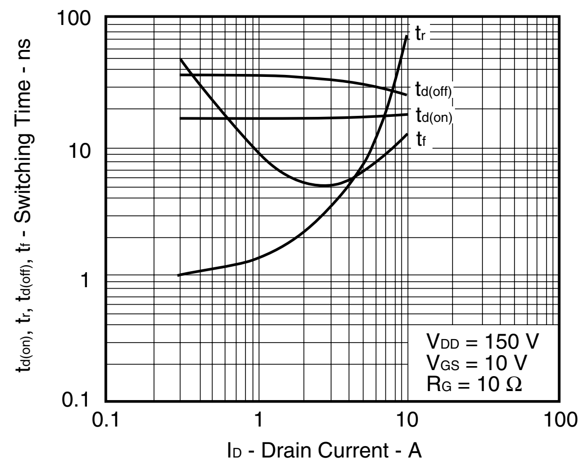


Figure15. REVERSE RECOVERY TIME vs. DRAIN CURRENT

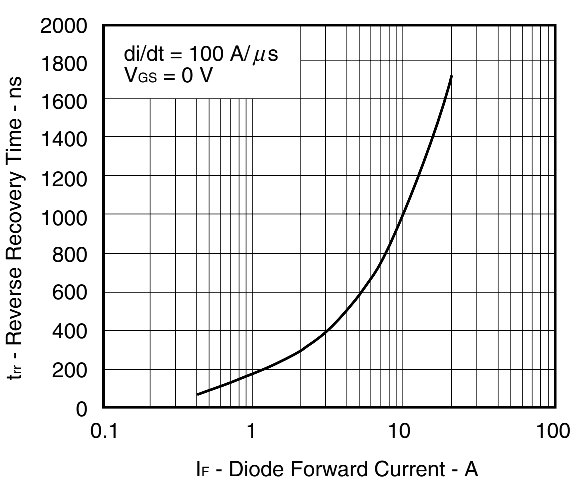


Figure16. DYNAMIC INPUT/OUTPUT CHARACTERISTICS

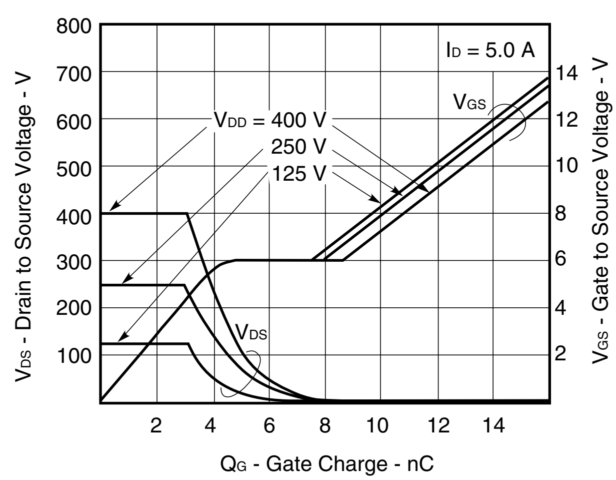


Figure17. SINGLE AVALANCHE ENERGY vs STARTING CHANNEL TEMPERATURE

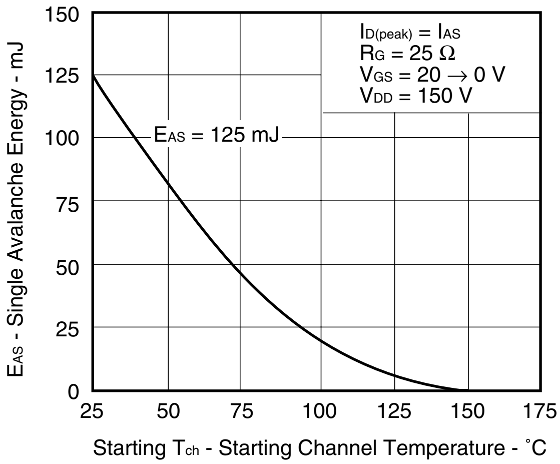
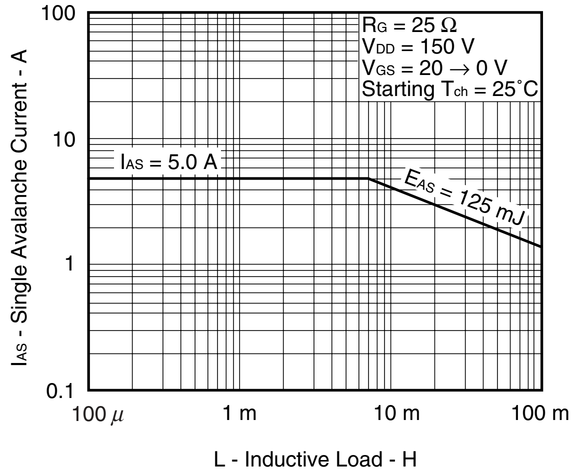
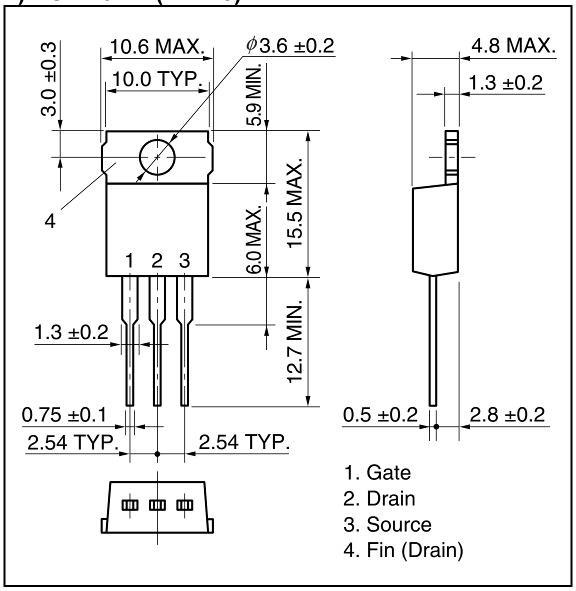


Figure18. SINGLE AVALANCHE CURRENT vs INDUCTIVE LOAD

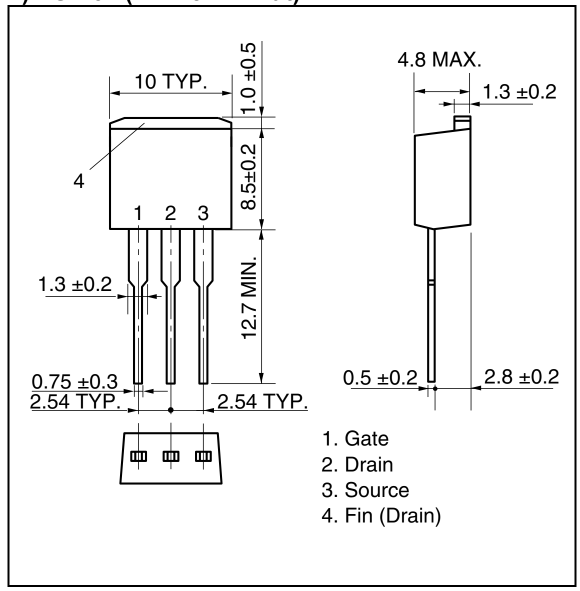


★ PACKAGE DRAWINGS (Unit: mm)

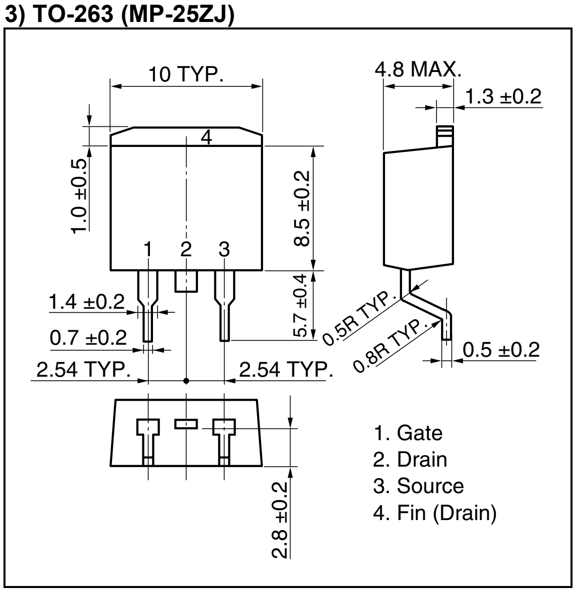
1) TO-220AB (MP-25)



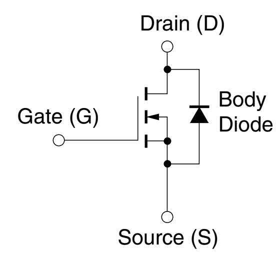
2) TO-262 (MP-25 Fin Cut)



3) TO-263 (MP-25ZJ)



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.