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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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Phase-out/Discontinued
**SWITCHING
N-CHANNEL POWER MOS FET**
DESCRIPTION

The NP82N03KDF is N-channel MOS Field Effect Transistors designed for high current switching application.

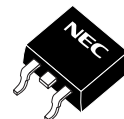
ORDERING INFORMATION

PART NUMBER	PACKAGE
NP82N03KDF	TO-263 (MP-25ZK)

FEATURES

- Channel temperature 175°C rating
- Super low on-state resistance and 4.5 V gate drive type
- ★ $R_{DS(on)1} = 3.5 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 10 \text{ V}$, $I_D = 41 \text{ A}$)
- ★ $R_{DS(on)2} = 5.3 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.5 \text{ V}$, $I_D = 41 \text{ A}$)
- Low C_{iss} : $C_{iss} = 3300 \text{ pF TYP.}$

(TO-263)

**ABSOLUTE MAXIMUM RATINGS (T_A = 25°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) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	±82	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	±328	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	1.8	W
★ Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	162	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	-55 to +175	°C
Single Avalanche Current ^{Note2}	I_{AS}	60	A
Single Avalanche Energy ^{Note2}	E_{AS}	360	mJ

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

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

THERMAL RESISTANCE

★ Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.93	°C/W
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	°C/W

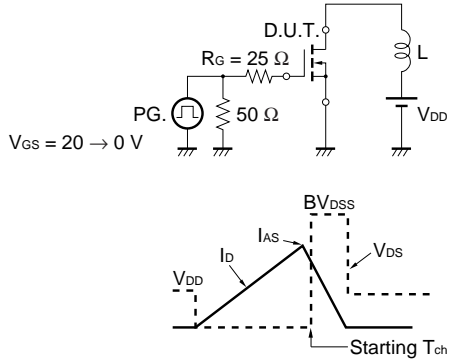
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

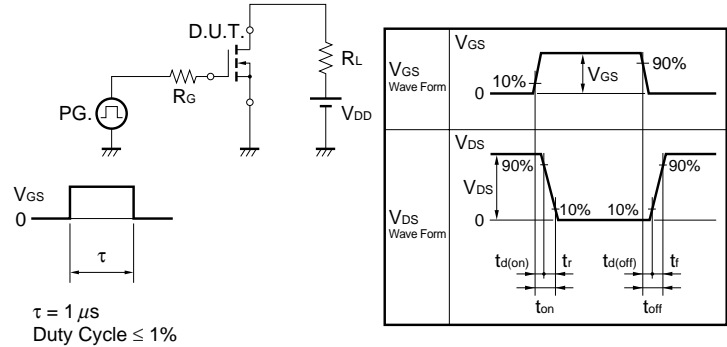
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
Gate to Source Threshold Voltage Note	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.5	2.0	2.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10 V, I _D = 41 A	28	55		S
Drain to Source On-state Resistance Note	R _{DS(on)1}	V _{GS} = 10 V, I _D = 41 A		2.8	3.5	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 41 A		4.0	5.3	mΩ
Input Capacitance	C _{iss}	V _{DS} = 25 V		3300	4950	pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		910	1370	pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		330	595	pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 41 A		14	31	ns
Rise Time	t _r	V _{GS} = 10 V		12	30	ns
Turn-off Delay Time	t _{d(off)}	R _G = 0 Ω		69	138	ns
Fall Time	t _f			12	30	ns
Total Gate Charge	Q _G	V _{DD} = 24 V		65	98	nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		11		nC
Gate to Drain Charge	Q _{GD}	I _D = 82 A		20		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 82 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 82 A, V _{GS} = 0 V		59		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		70		nC

Note Pulsed

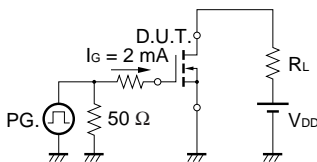
TEST CIRCUIT 1 AVALANCHE CAPABILITY



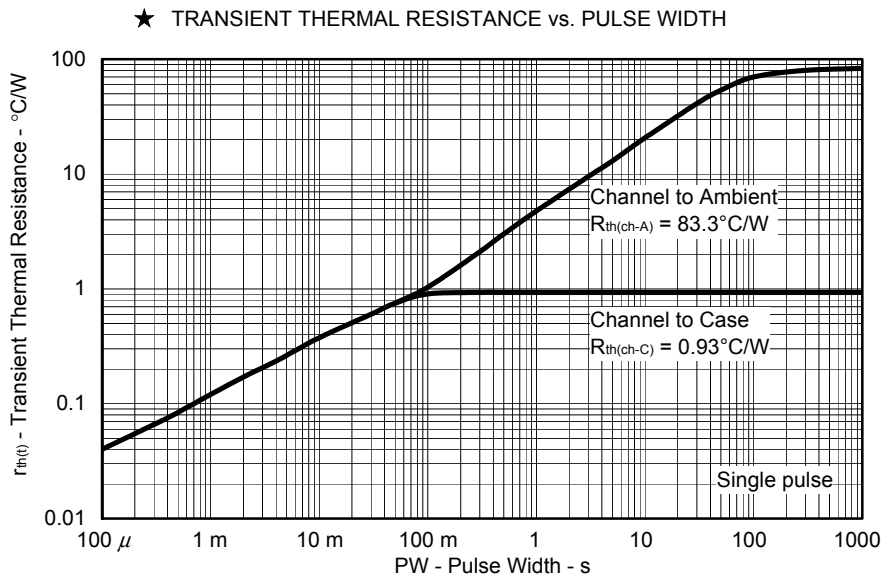
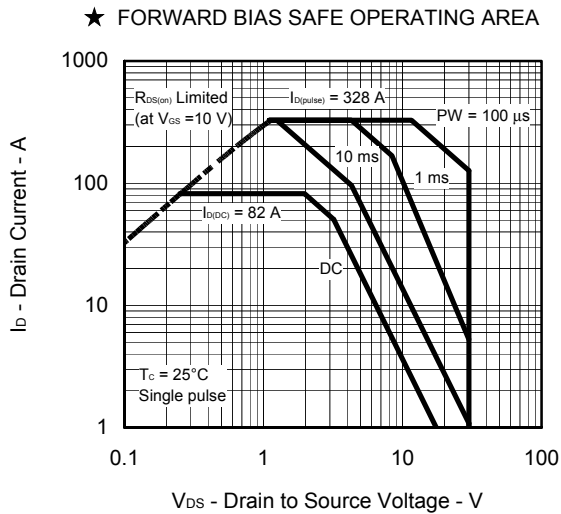
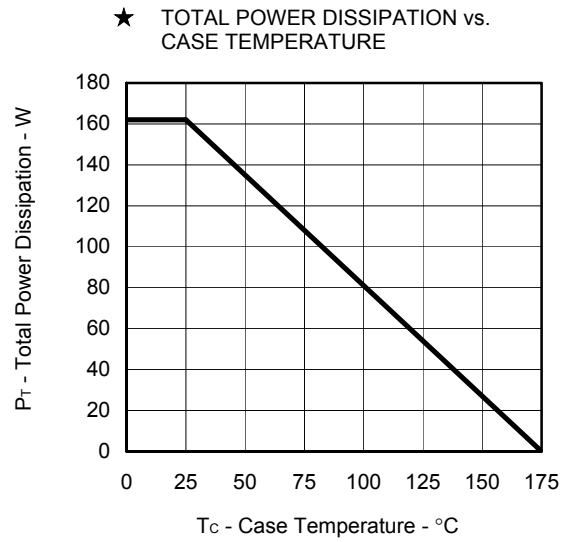
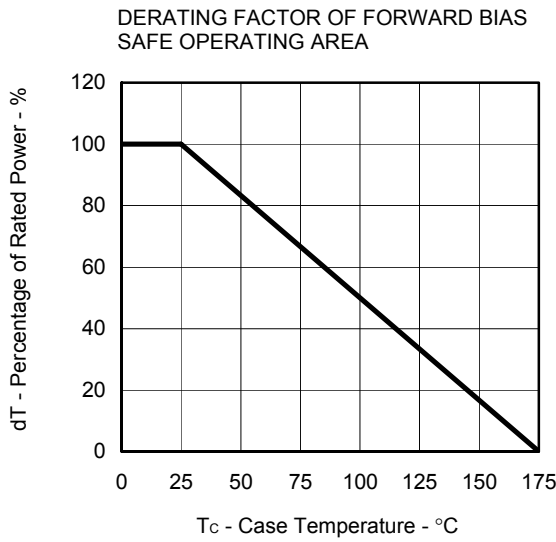
TEST CIRCUIT 2 SWITCHING TIME



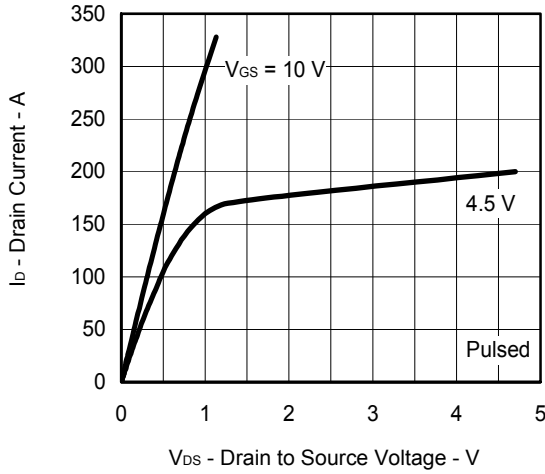
TEST CIRCUIT 3 GATE CHARGE



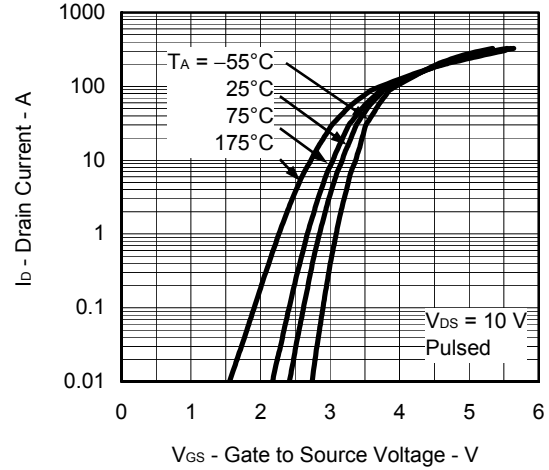
TYPICAL CHARACTERISTICS (T_A = 25°C)



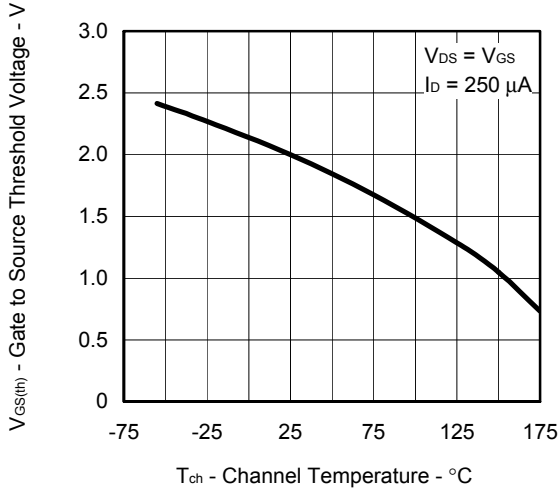
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



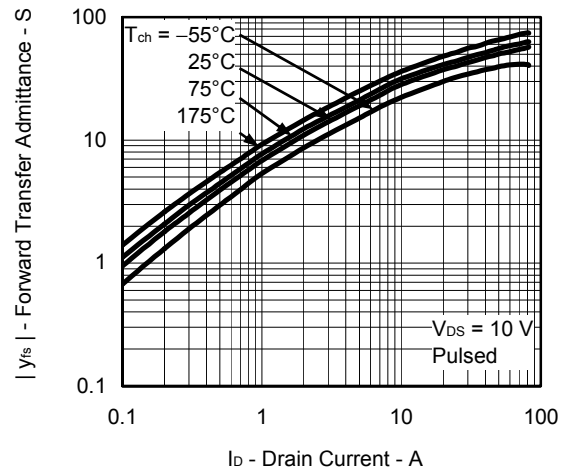
FORWARD TRANSFER CHARACTERISTICS



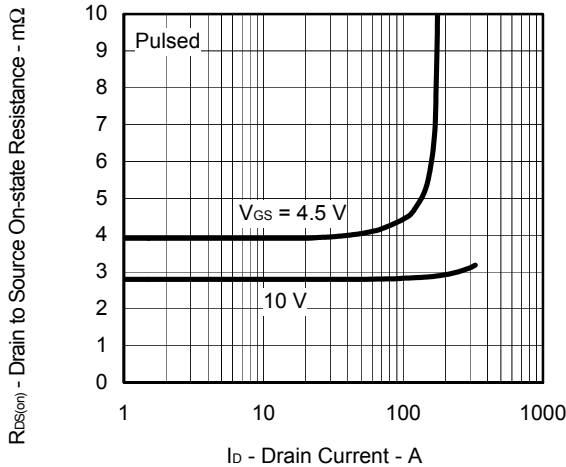
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



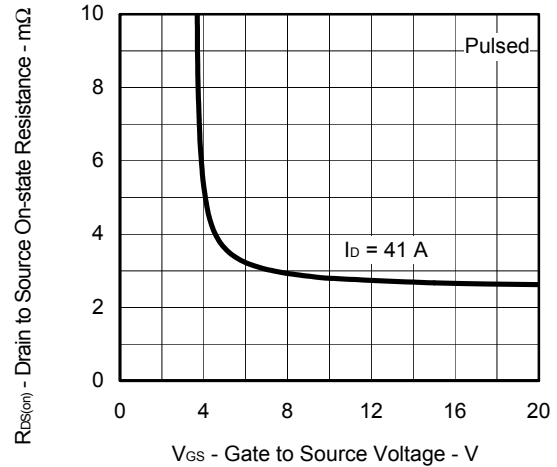
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



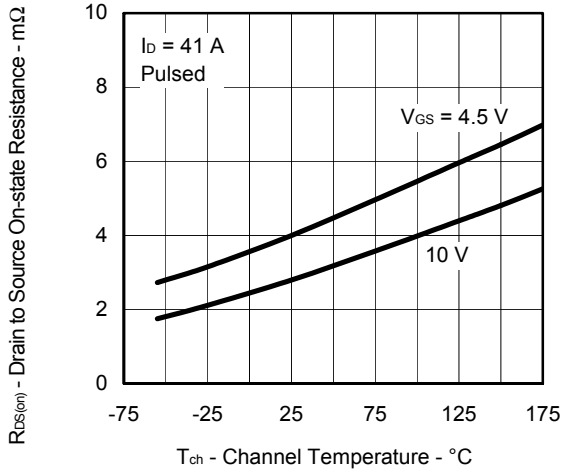
★ DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



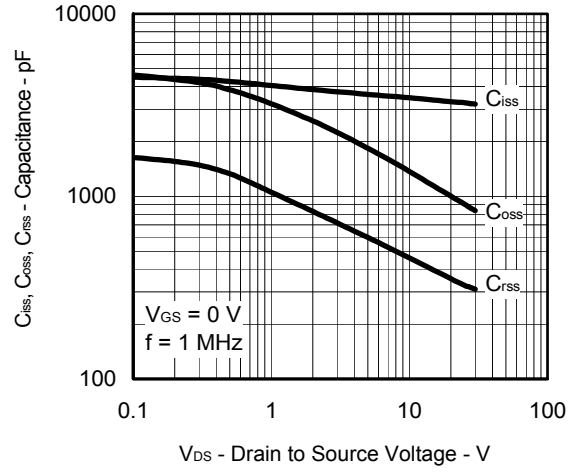
★ DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



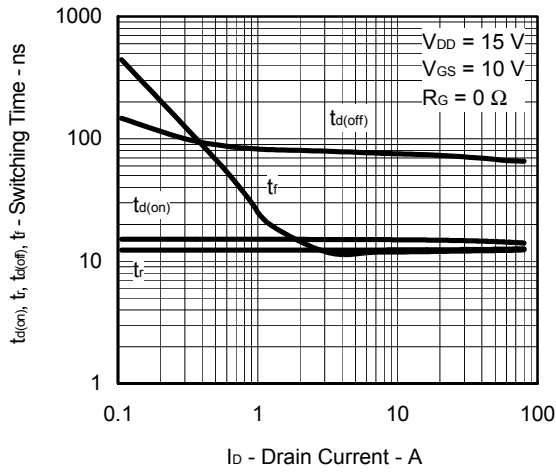
★ DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



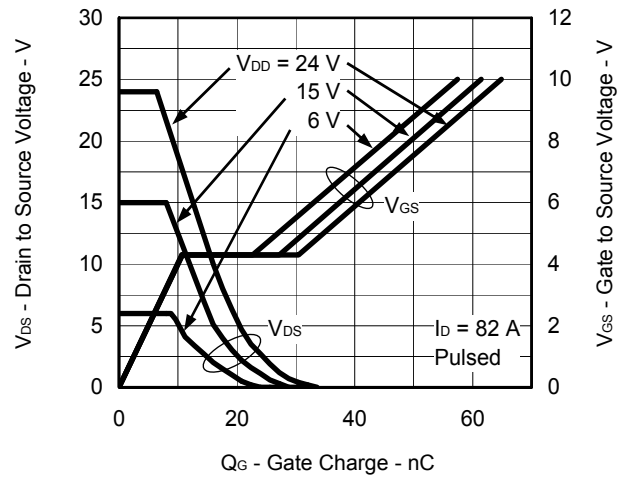
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



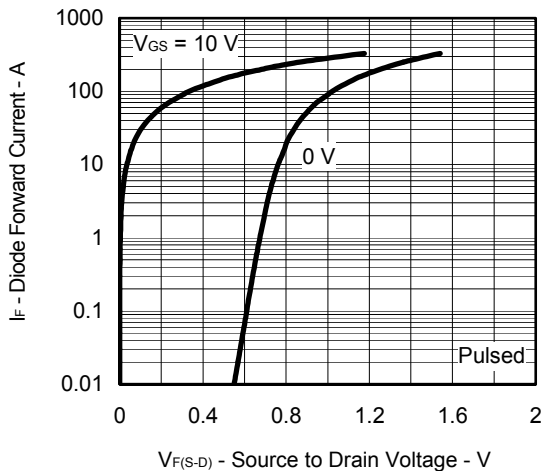
SWITCHING CHARACTERISTICS



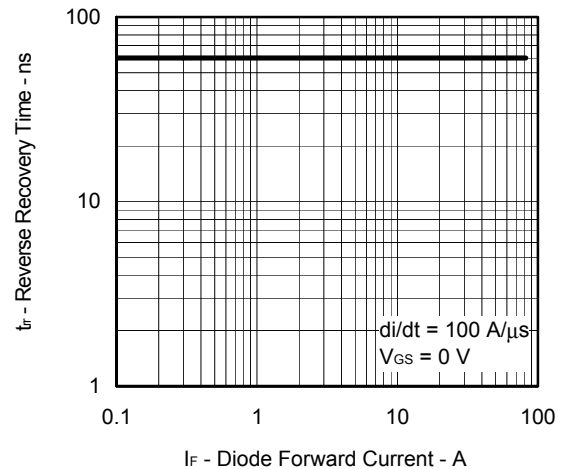
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



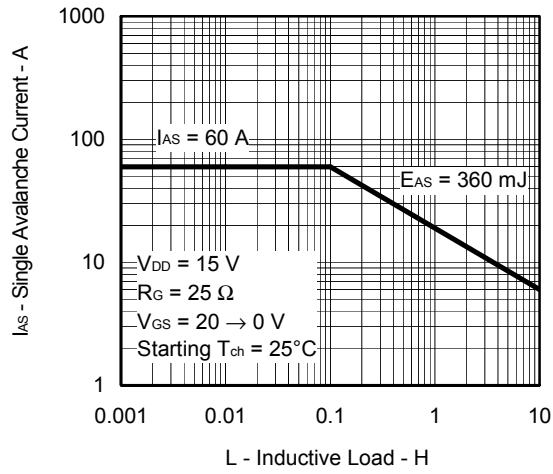
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



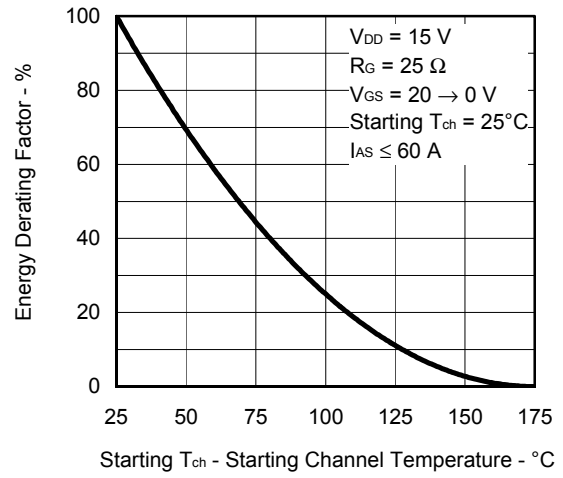
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

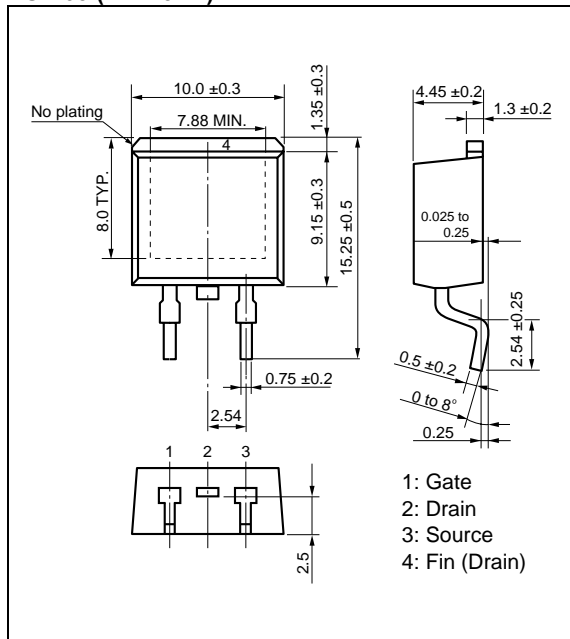


SINGLE AVALANCHE ENERGY DERATING FACTOR

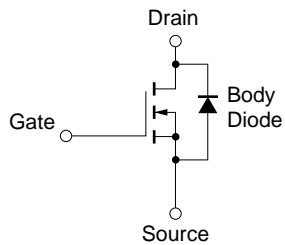


PACKAGE DRAWING (Unit: mm)

TO-263 (MP-25ZK)



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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