

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3740 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, designed for high voltage applications such as lamp drive, DC/DC converter, and actuator driver.

FEATURES

- Gate voltage rating: ± 30 V
- Low on-state resistance
 $R_{DS(on)} = 160$ m Ω MAX. ($V_{GS} = 10$ V, $I_D = 10$ A)
- Low gate charge
 $Q_G = 47$ nC TYP. ($V_{DD} = 200$ V, $V_{GS} = 10$ V, $I_D = 20$ A)
- Surface mount package available

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

Drain to Source Voltage ($V_{GS} = 0$ V)	V_{DSS}	250	V
Gate to Source Voltage ($V_{DS} = 0$ V)	V_{GSS}	± 30	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 20	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 60	A
Total Power Dissipation	P_{T1}	1.5	W
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	100	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}	20	A
Single Avalanche Energy ^{Note2}	E_{AS}	40	mJ

Notes 1. $PW \leq 10$ μs , Duty Cycle $\leq 1\%$

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 125$ V, $R_G = 25$ Ω , $V_{GS} = 20 \rightarrow 0$ V, $L = 100$ μH

THERMAL RESISTANCE

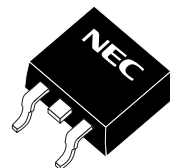
Channel to Case Thermal Resistance	$R_{th(ch-C)}$	1.25	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

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ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3740-ZK	TO-263 (MP-25ZK)

(TO-263)

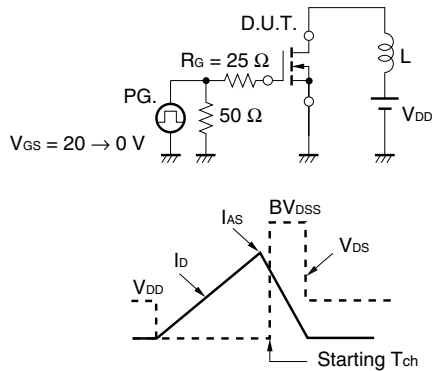


ELECTRICAL CHARACTERISTICS (T_A = 25°C)

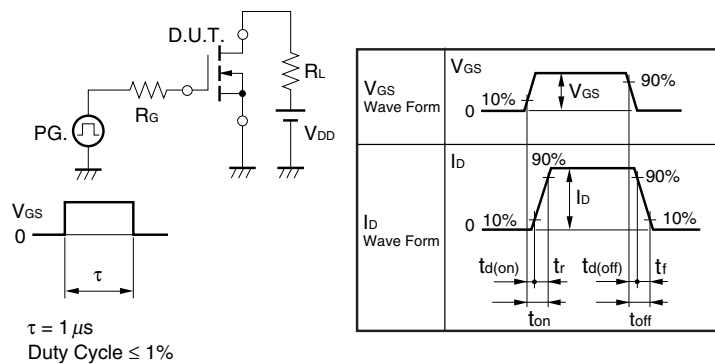
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 250 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1.0 mA	2.5	3.5	4.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10 V, I _D = 10 A	7.0	15		S
Drain to Source On-state Resistance Note	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A		0.12	0.16	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V		1720		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		330		pF
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz		170		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 125 V, I _D = 10 A		17		ns
Rise Time	t _r	V _{GS} = 10 V		17		ns
Turn-off Delay Time	t _{d(off)}	R _G = 0 Ω		49		ns
Fall Time	t _f			9		ns
Total Gate Charge	Q _G	V _{DD} = 200 V		47		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		7		nC
Gate to Drain Charge	Q _{GD}	I _D = 20 A		25		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 20 A, V _{GS} = 0 V		0.91		V
Reverse Recovery Time	t _{rr}	I _F = 20 A, V _{GS} = 0 V		210		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		1.4		μC

Note Pulsed

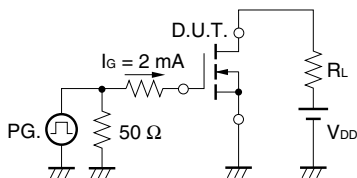
TEST CIRCUIT 1 AVALANCHE CAPABILITY



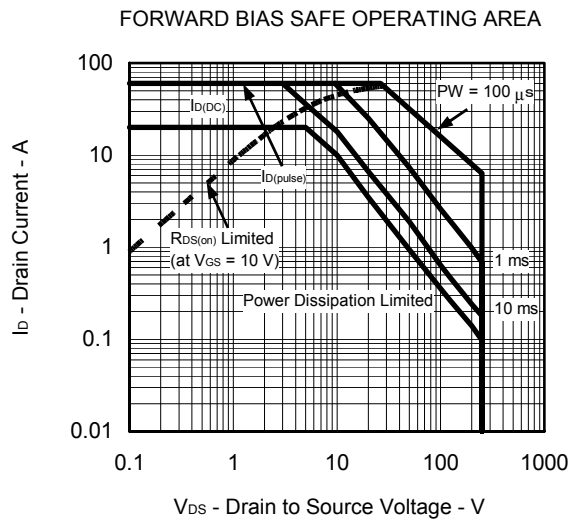
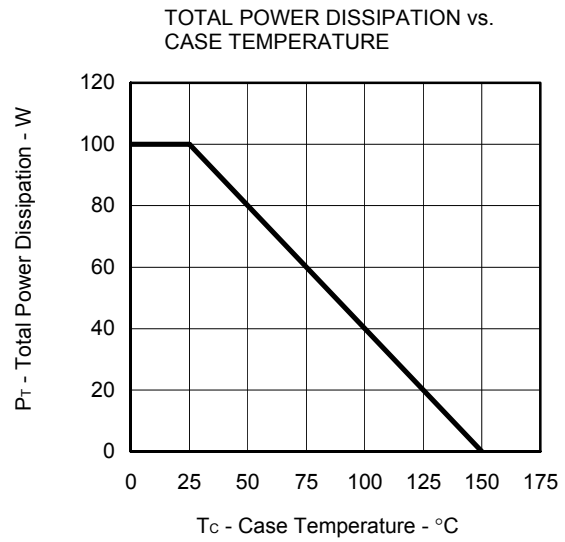
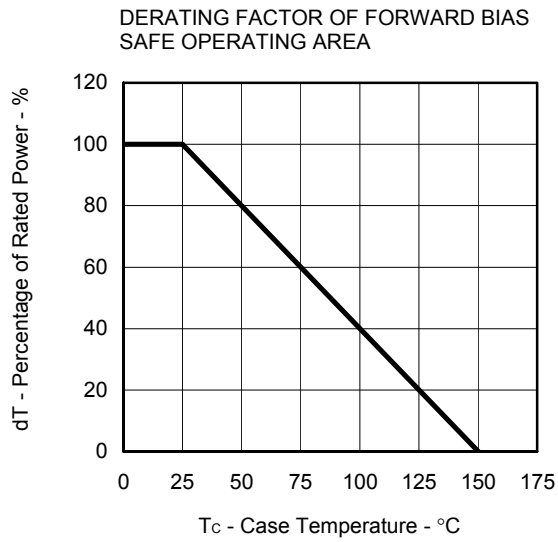
TEST CIRCUIT 2 SWITCHING TIME



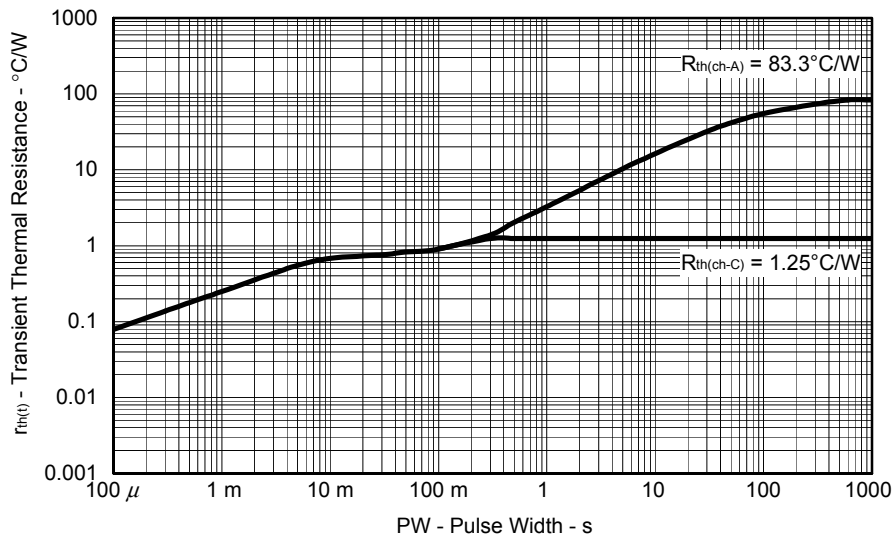
TEST CIRCUIT 3 GATE CHARGE



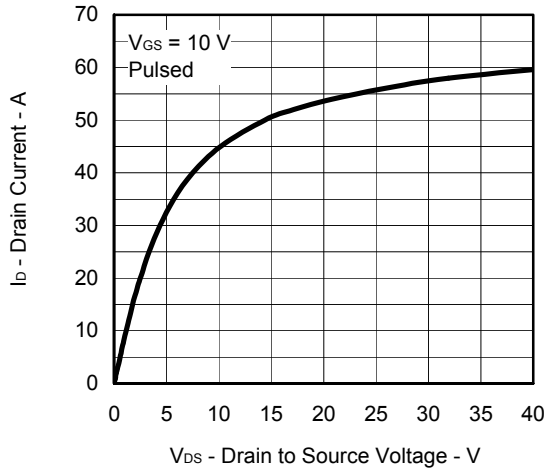
TYPICAL CHARACTERISTICS (T_A = 25°C)



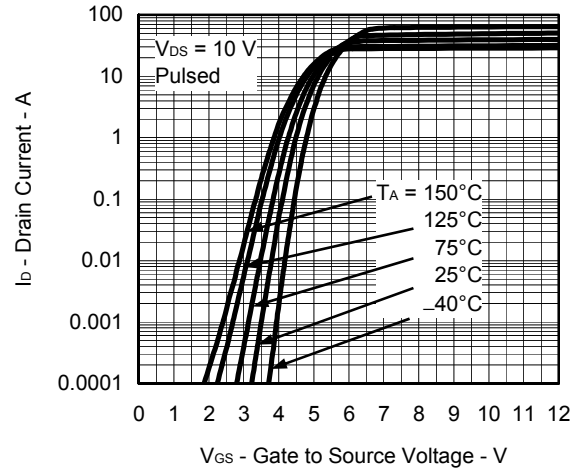
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



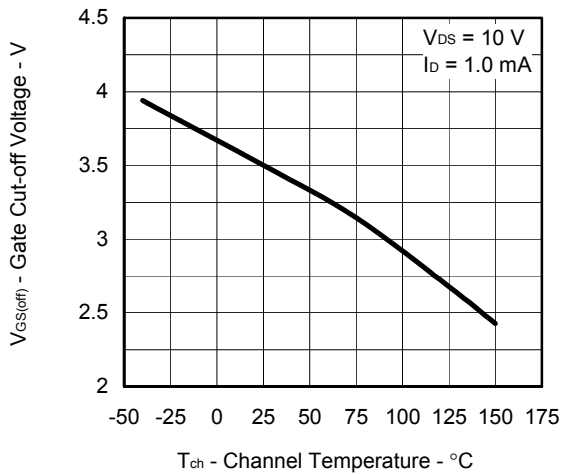
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



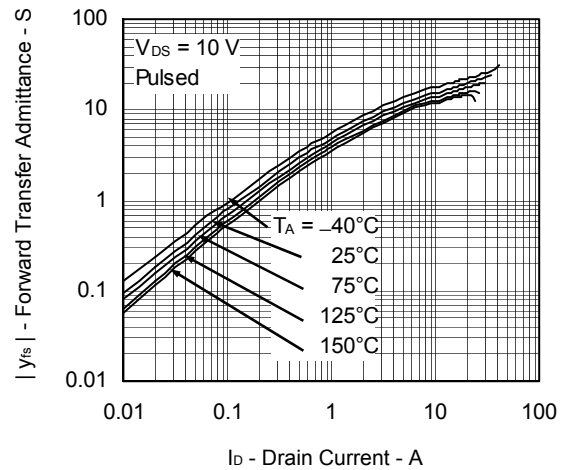
FORWARD TRANSFER CHARACTERISTICS



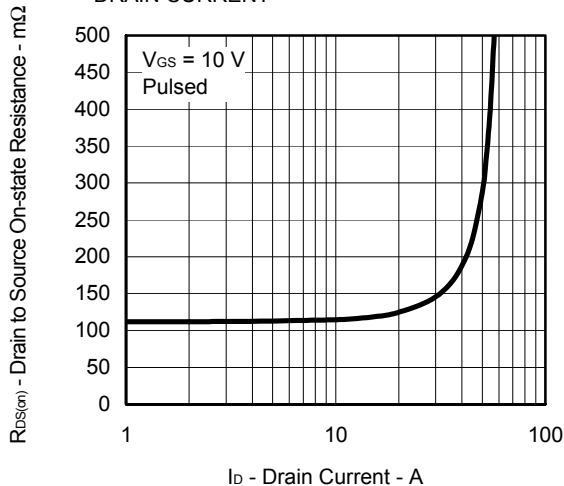
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



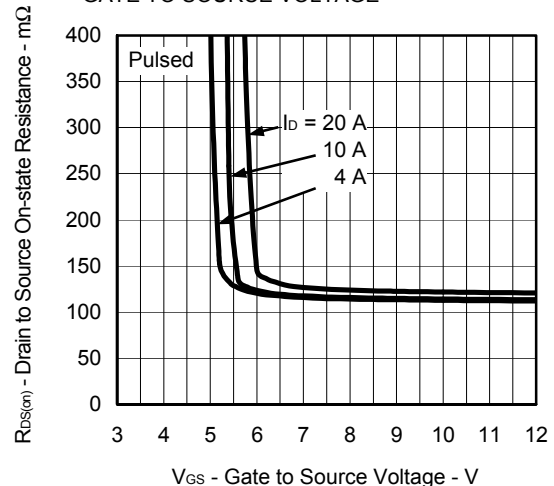
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



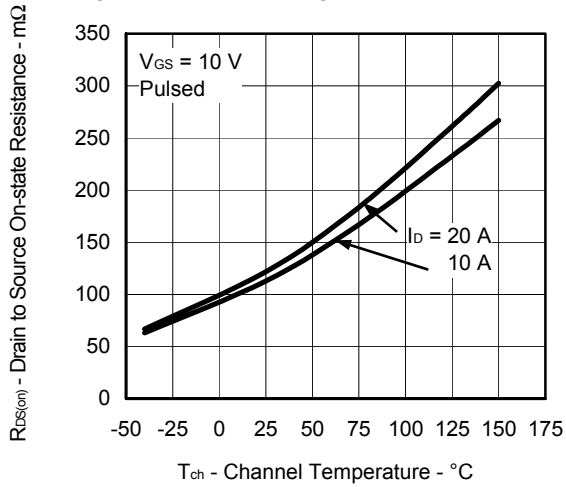
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



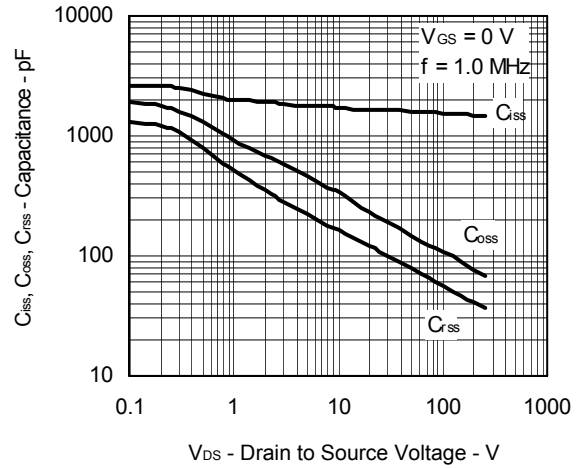
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



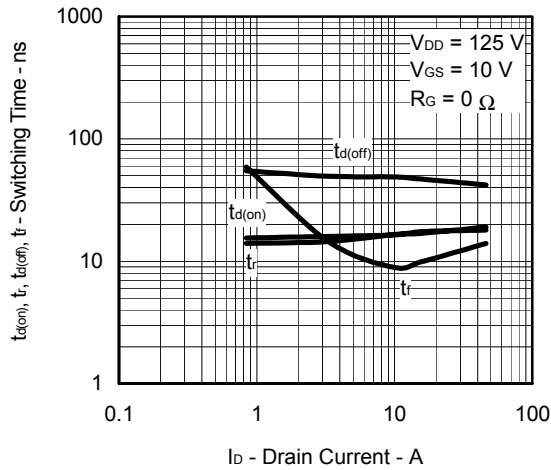
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



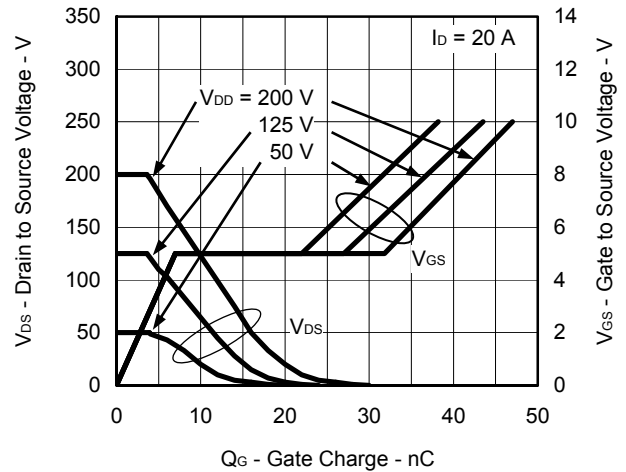
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



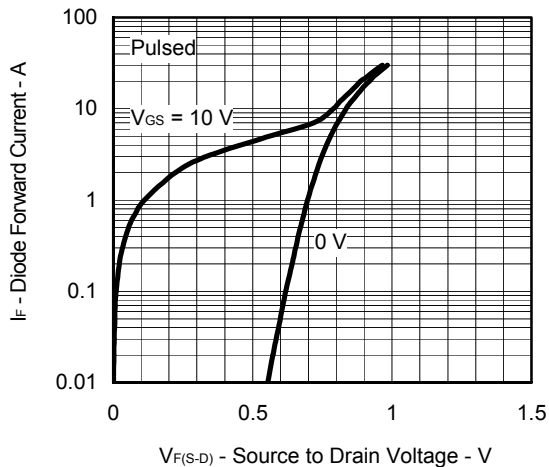
SWITCHING CHARACTERISTICS



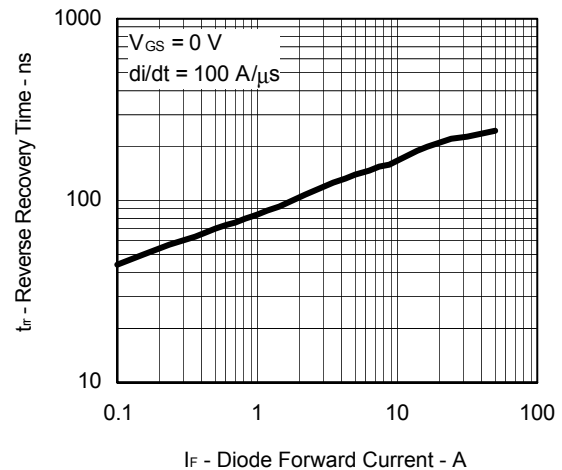
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



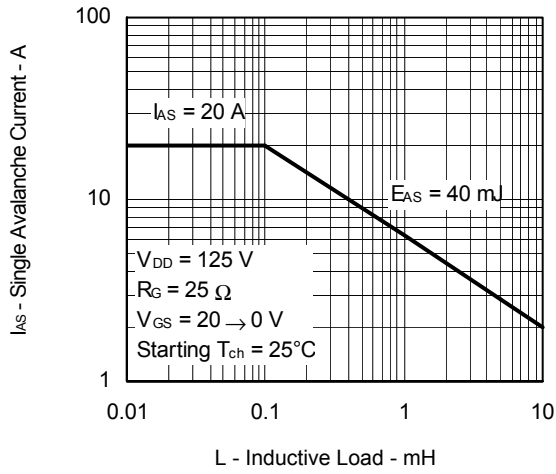
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



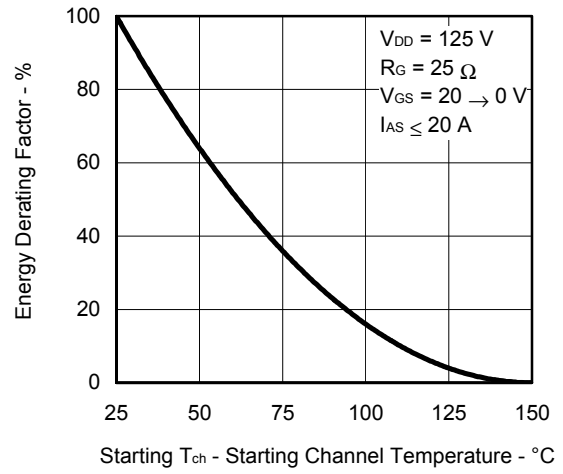
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD

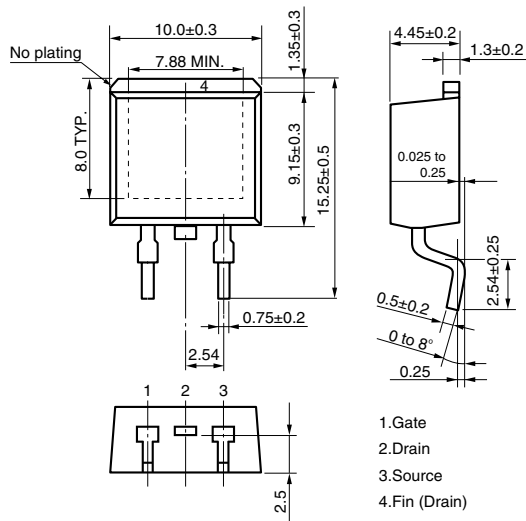


SINGLE AVALANCHE ENERGY DERATING FACTOR

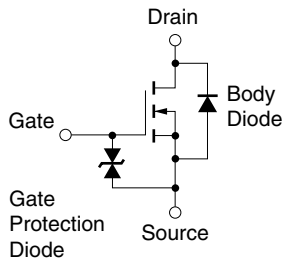


PACKAGE DRAWING (Unit: mm)

TO-263 (MP-25ZK)



EQUIVALENT CIRCUIT



Remark 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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