

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3322 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
2SK3322	TO-220AB (MP-25)
2SK3322-S	TO-262
2SK3322-ZJ	TO-263(MP-25ZJ)
★ 2SK3322-ZK	TO-263(MP-25ZK)

FEATURES

- ★ • Low gate charge :
 $Q_G = 15 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 5.5 \text{ A)}$
- Gate voltage rating : $\pm 30 \text{ V}$
- Low on-state resistance :
 $R_{DS(on)} = 2.2 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 2.8 \text{ A)}$
- Avalanche capability ratings
- Surface mount package available

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	600	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 5.5	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 20	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	1.5	W
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	65	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}	4.0	A
Single Avalanche Energy ^{Note2}	E_{AS}	10.7	mJ

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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

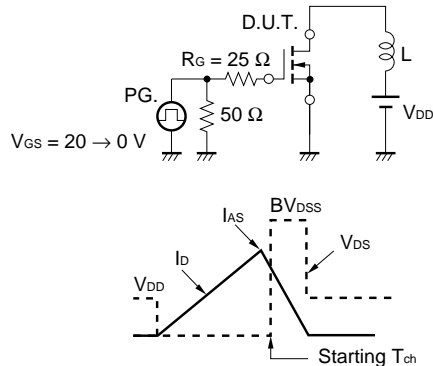
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★ ELECTRICAL CHARACTERISTICS (T_A = 25°C)

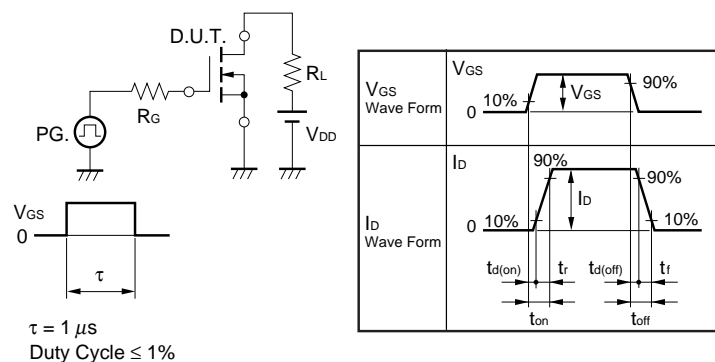
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5		3.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10 V, I _D = 2.8 A	1.0			S
Drain to Source On-state Resistance Note	R _{DS(on)}	V _{GS} = 10 V, I _D = 2.8 A		1.7	2.2	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V,		550		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V,		115		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		13		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 2.8 A,		12		Ns
Rise Time	t _r	V _{GS} = 10 V,		10		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		35		ns
Fall Time	t _f			12		ns
Total Gate Charge	Q _G	V _{DD} = 450 V,		15		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V,		4		nC
Gate to Drain Charge	Q _{GD}	I _D = 5.5 A		4.4		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 5.5 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 5.5 A, V _{GS} = 0 V,		1.6		μs
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		5.3		μC

Note Pulsed

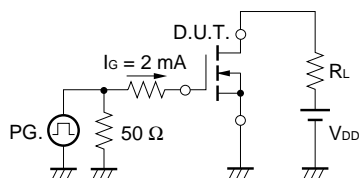
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

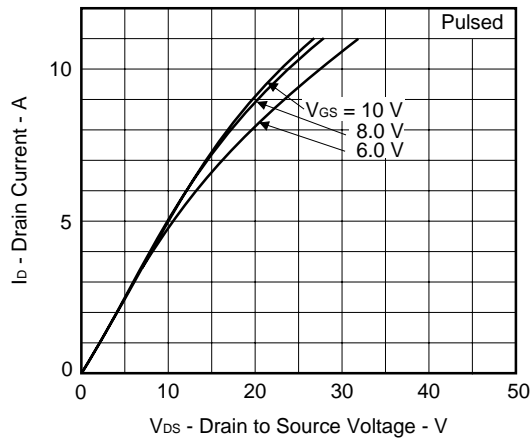


TEST CIRCUIT 3 GATE CHARGE

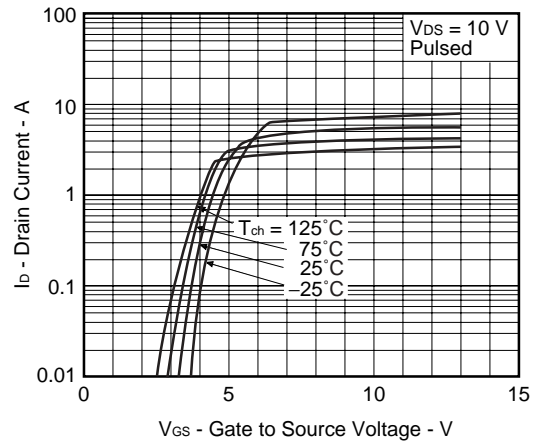


TYPICAL CHARACTERISTICS (T_A = 25°C)

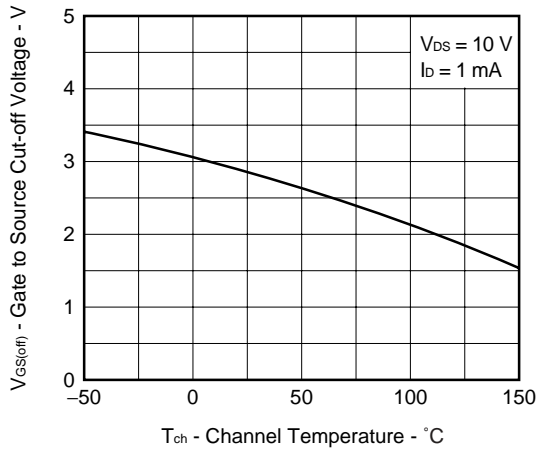
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



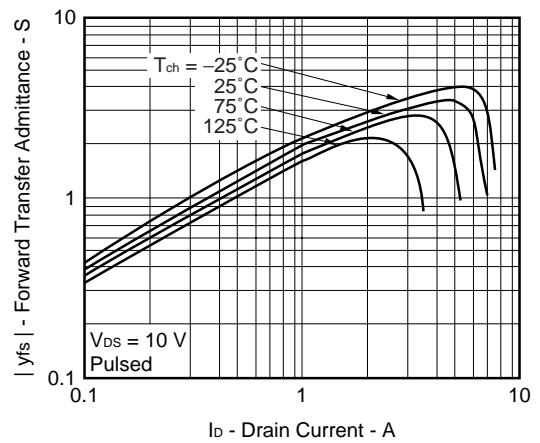
FORWARD TRANSFER CHARACTERISTICS



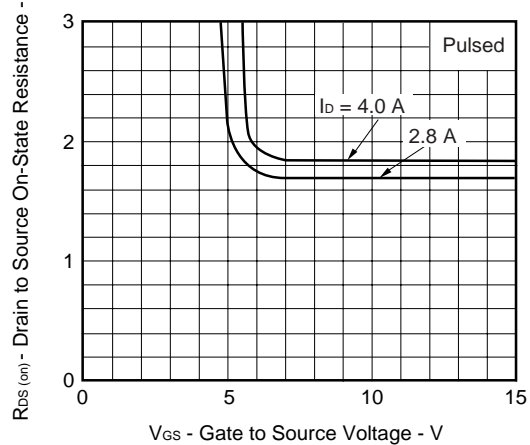
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



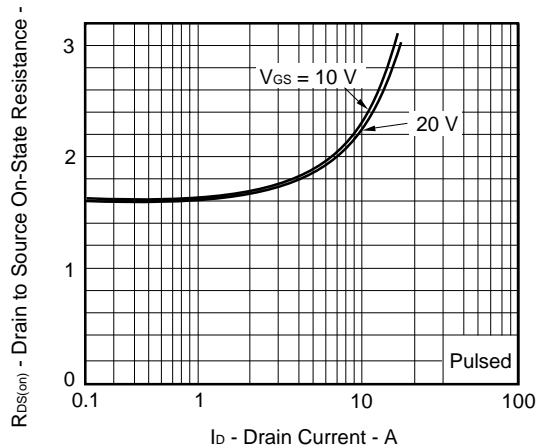
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

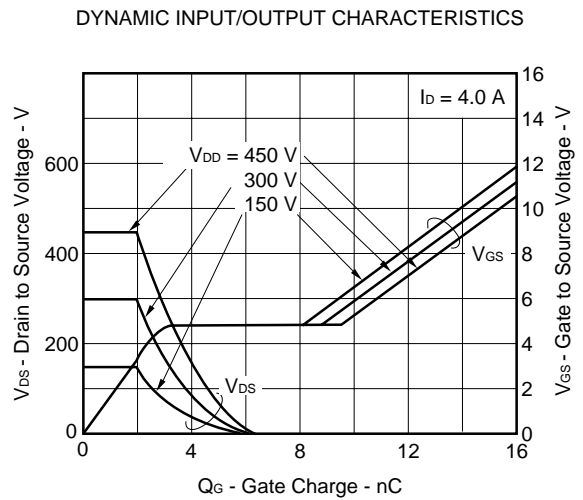
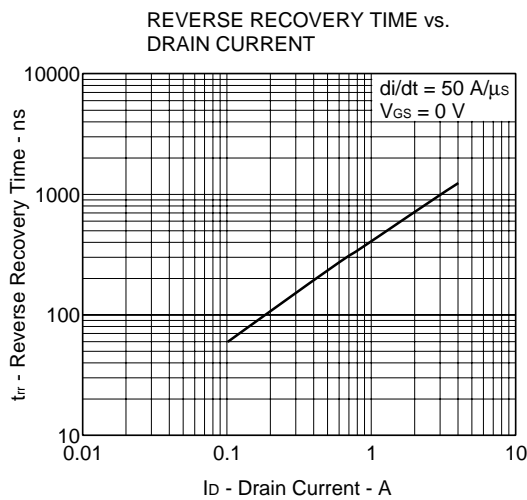
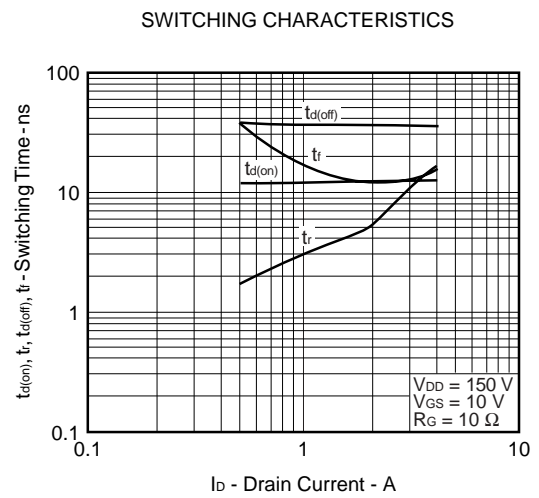
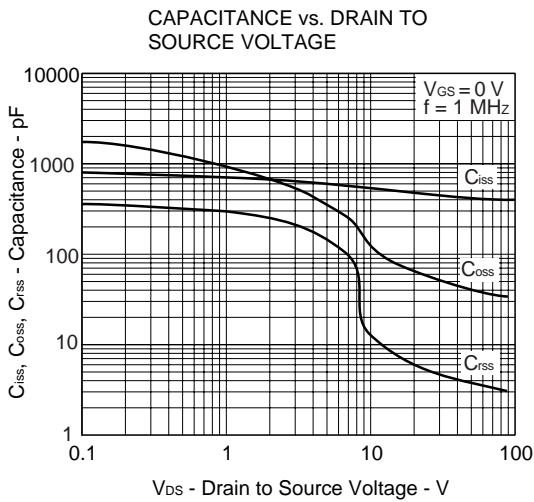
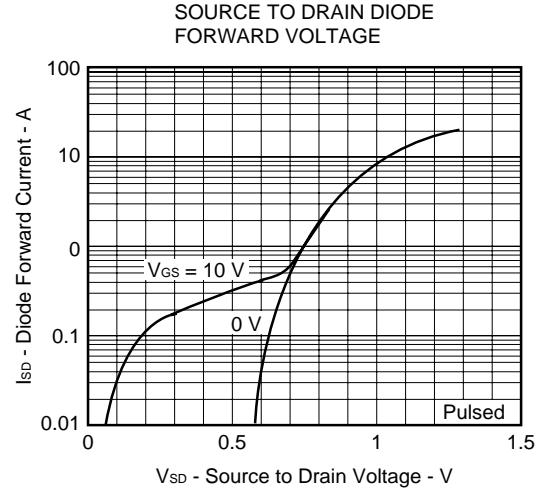
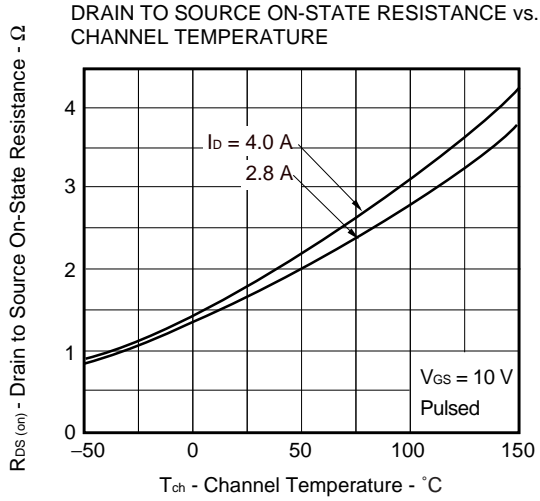


DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

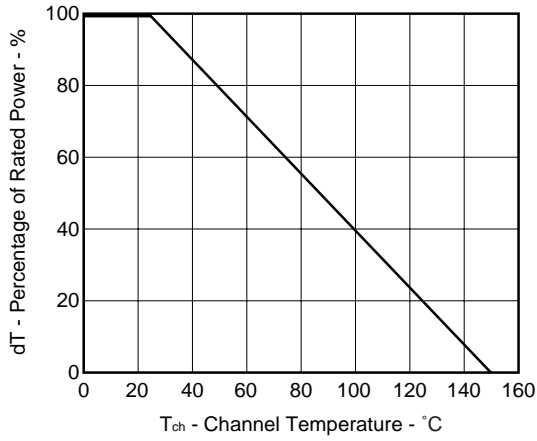


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

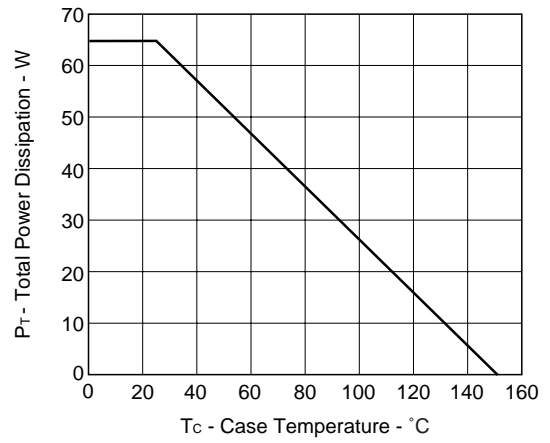




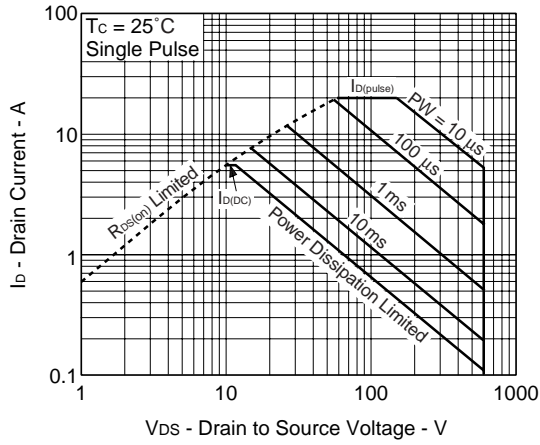
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



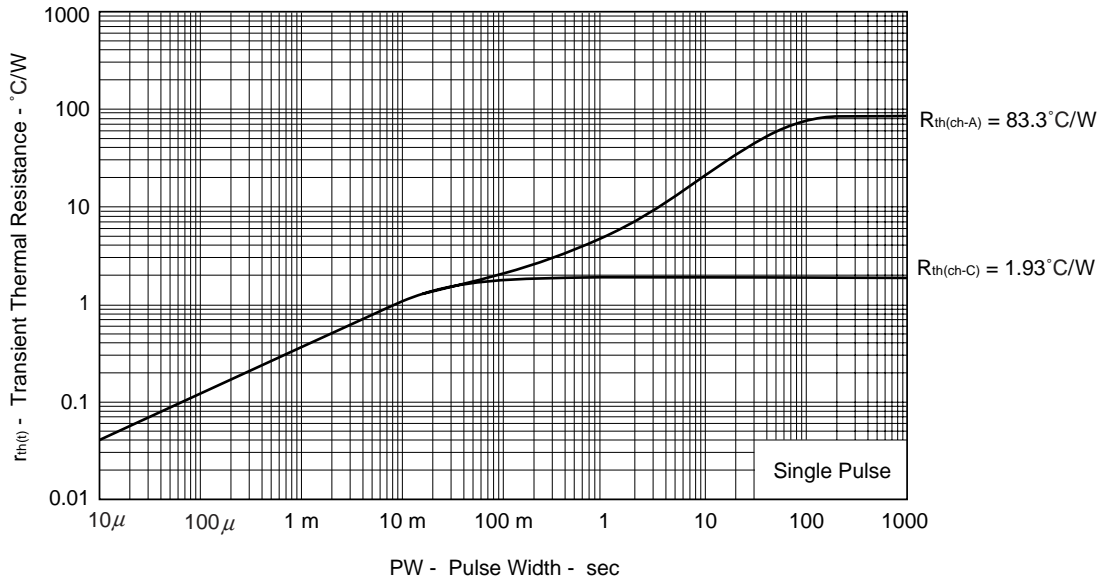
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

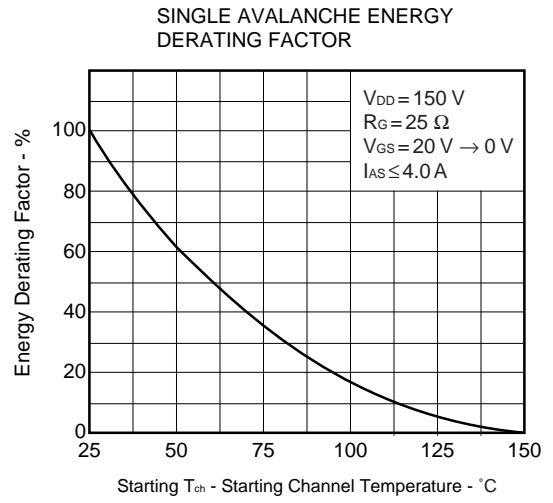
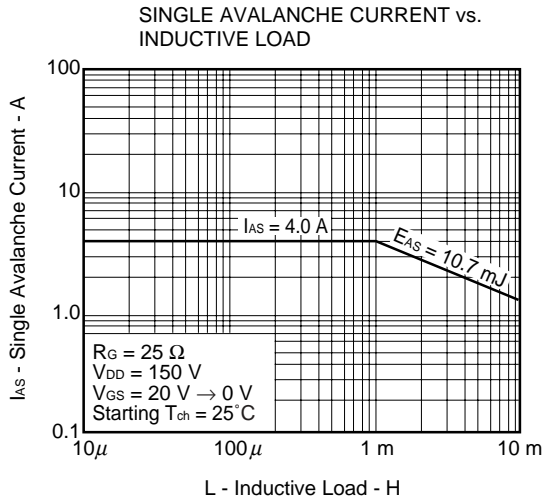


FORWARD BIAS SAFE OPERATING AREA



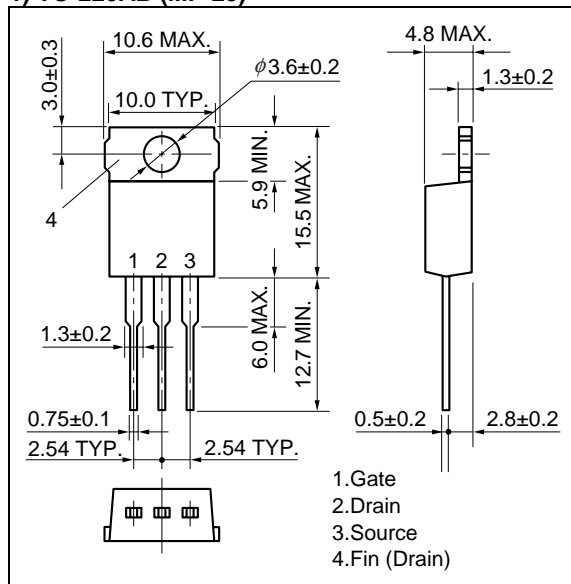
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



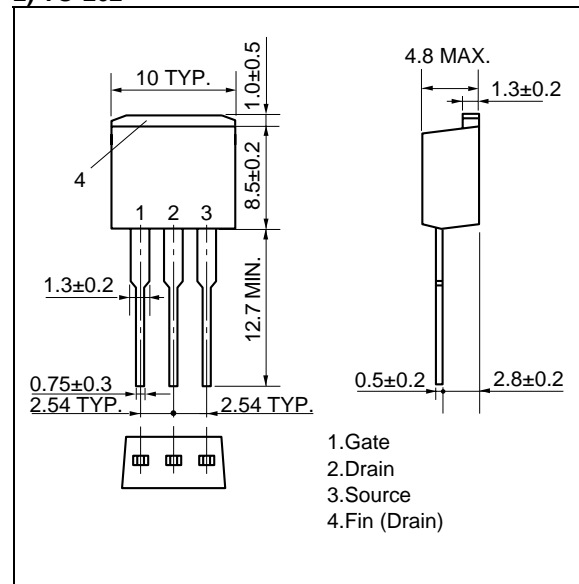


★ PACKAGE DRAWINGS (Unit: mm)

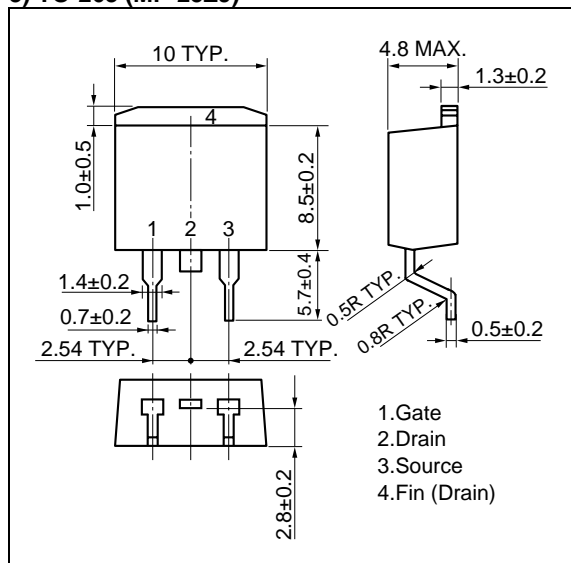
1) TO-220AB (MP-25)



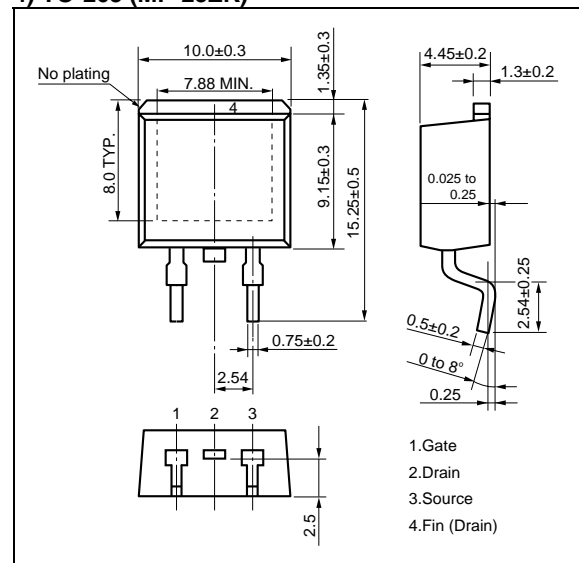
2) TO-262



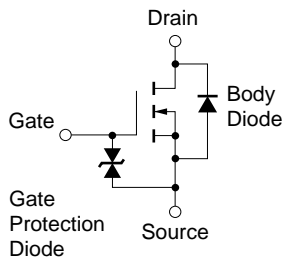
3) TO-263 (MP-25ZJ)



4) 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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