

SWITCHING N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3113B is N-channel MOS 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.

FEATURES

- Low on-state resistance
 $R_{DS(on)} = 4.4 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 1.0 \text{ A)}$
- Low gate charge
 $Q_G = 7.9 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 2.0 \text{ A)}$
- Gate voltage rating : $\pm 30 \text{ V}$
- Avalanche capability ratings

<R> ORDERING INFORMATION

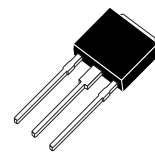
PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SK3113B-S15-AY ^{Note}	Pure Sn (Tin)	Tube 70 p/tube	TO-251 (MP-3-a) typ. 0.39 g
2SK3113B(1)-S27-AY ^{Note}		Tube 75 p/tube	TO-251 (MP-3-b) typ. 0.34 g
2SK3113B-ZK-E1-AY ^{Note}		Tape 2500 p/reel	TO-252 (MP-3ZK) typ. 0.27 g
2SK3113B-ZK-E2-AY ^{Note}			

Note Pb-free (This product does not contain Pb in external electrode.)

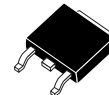
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V _{GS} = 0 V)	V _{DSS}	600	V
Gate to Source Voltage (V _{DS} = 0 V)	V _{GSS}	±30	V
Drain Current (DC) (T _C = 25°C)	I _{D(DC)}	±2.0	A
Drain Current (pulse) ^{Note1}	I _{D(pulse)}	±8.0	A
Total Power Dissipation (T _C = 25°C)	P _{T1}	20	W
Total Power Dissipation (T _A = 25°C) ^{Note2}	P _{T2}	1.0	W
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C
Single Avalanche Current ^{Note3}	I _{AS}	2.0	A
Single Avalanche Energy ^{Note3}	E _{AS}	2.7	mJ

(TO-251)



(TO-252)



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

2. Mounted on glass epoxy board of 40 mm × 40 mm × 1.6 mm

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

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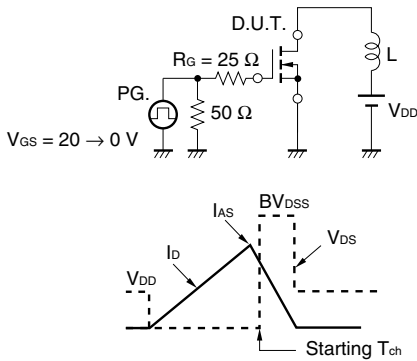
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

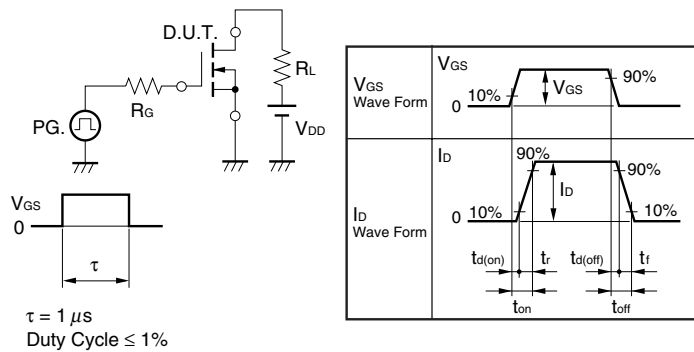
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{bss}	V _{DS} = 600 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5		3.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 1.0 A	0.5	0.9		S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)}	V _{GS} = 10 V, I _D = 1.0 A		3.2	4.4	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V		290		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		75		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		7		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 1.0 A		10.5		ns
Rise Time	t _r	V _{GS} = 10 V		4.8		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		15.8		ns
Fall Time	t _f	R _L = 10 Ω		10.5		ns
Total Gate Charge	Q _G	V _{DD} = 450 V		7.9		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		2.7		nC
Gate to Drain Charge	Q _{GD}	I _D = 2.0 A		3.2		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 2.0 A, V _{GS} = 0 V		0.8		V
Reverse Recovery Time	t _{rr}	I _F = 2.0 A, V _{GS} = 0 V		190		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		500		nC

Note Pulsed

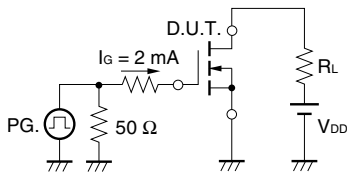
TEST CIRCUIT 1 AVALANCHE CAPABILITY



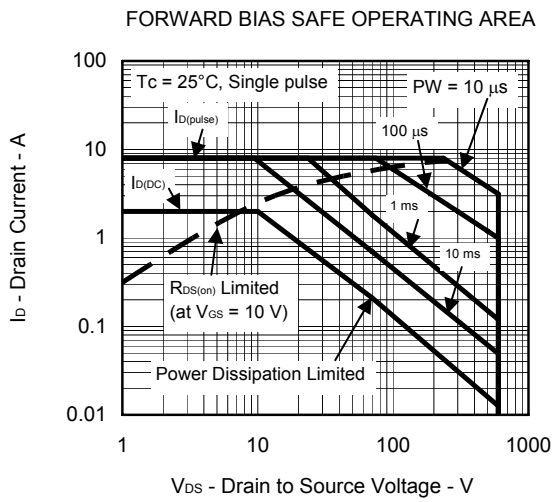
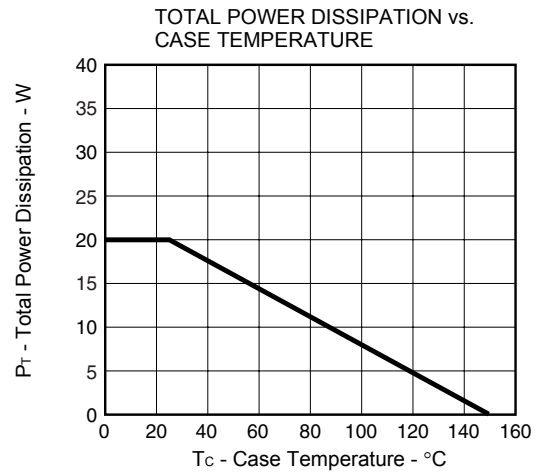
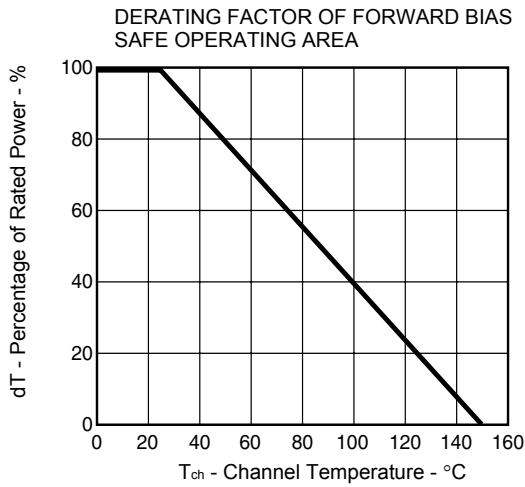
TEST CIRCUIT 2 SWITCHING TIME



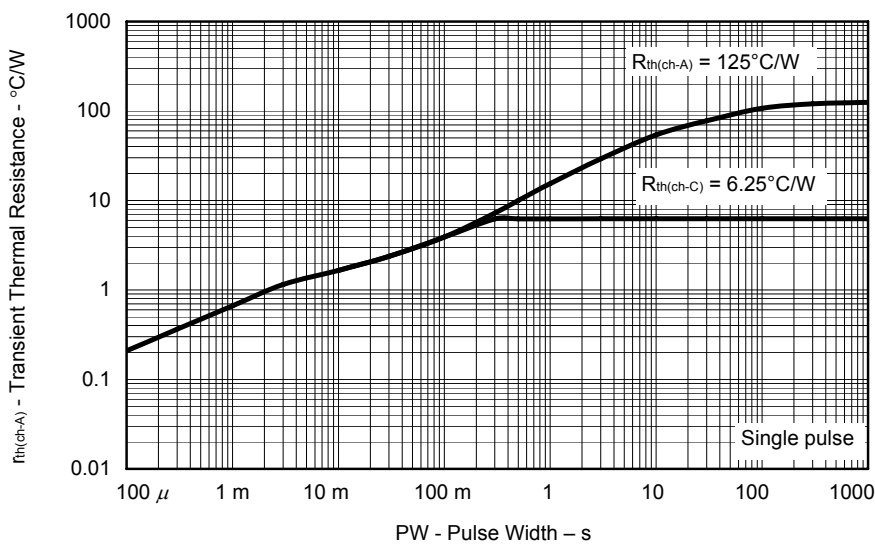
TEST CIRCUIT 3 GATE CHARGE



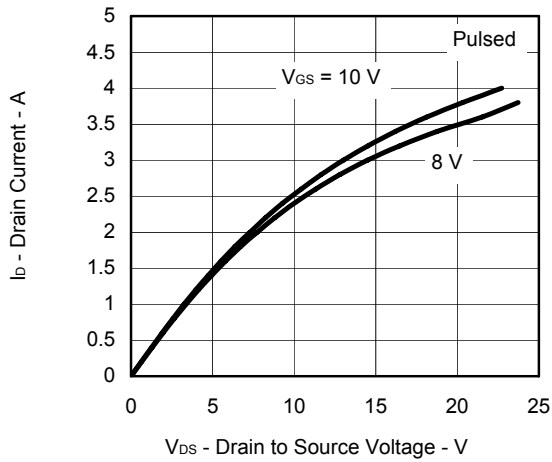
TYPICAL CHARACTERISTICS (T_A = 25°C)



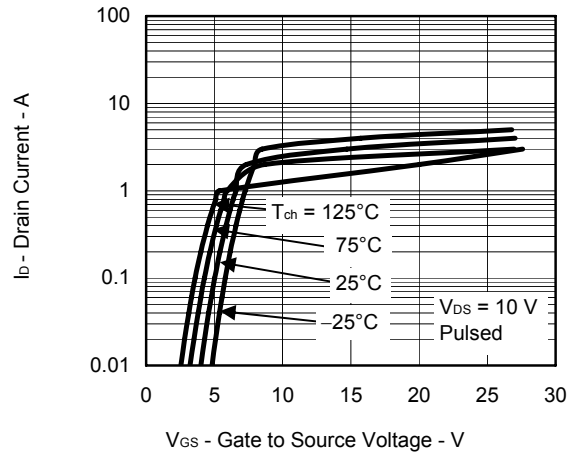
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



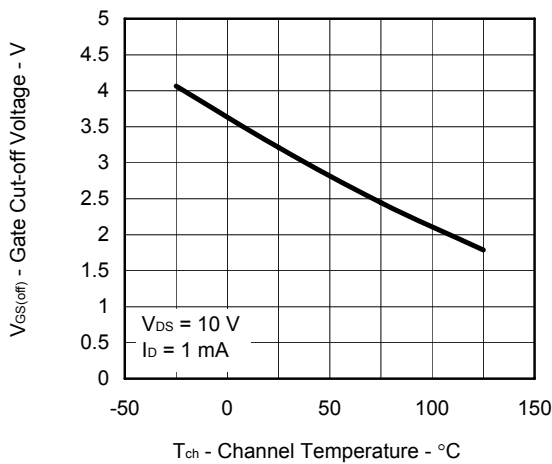
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



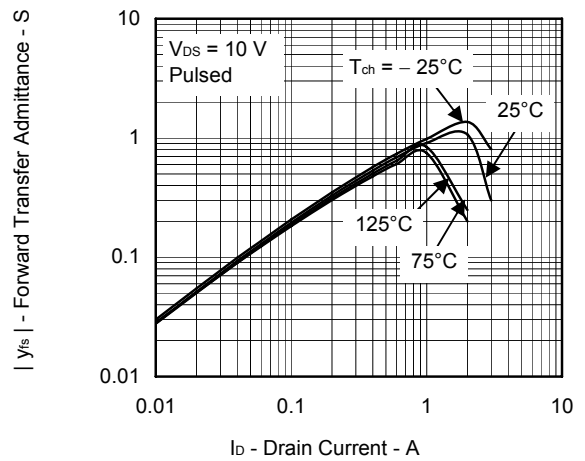
FORWARD TRANSFER CHARACTERISTICS



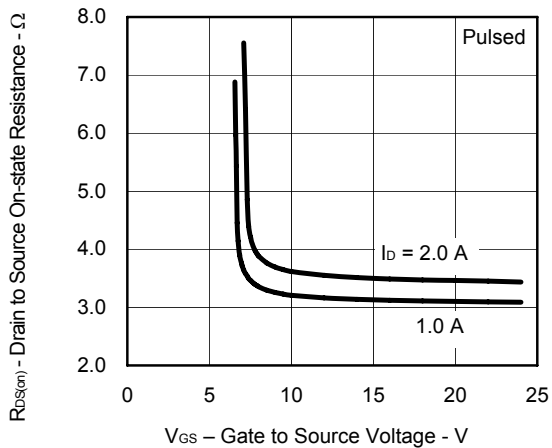
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



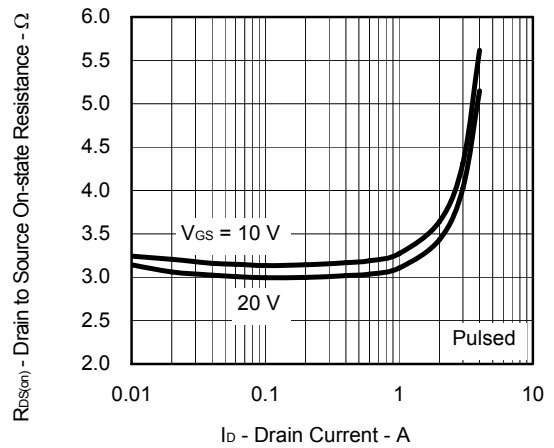
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



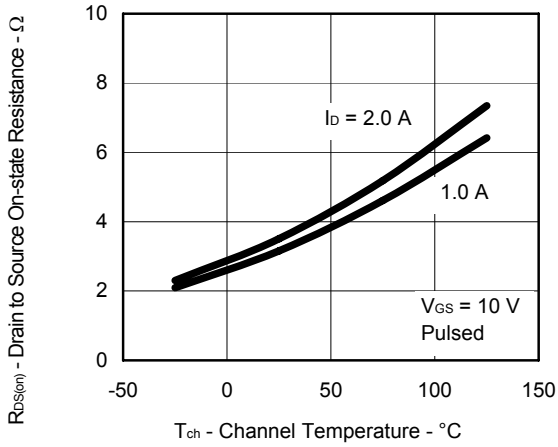
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



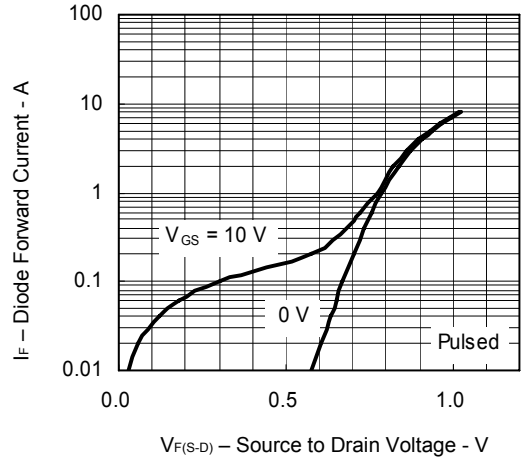
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



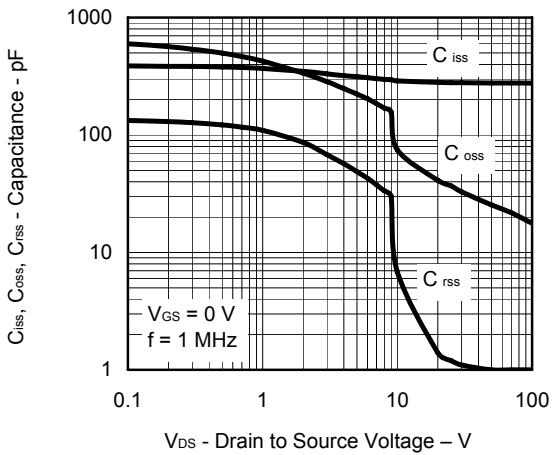
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



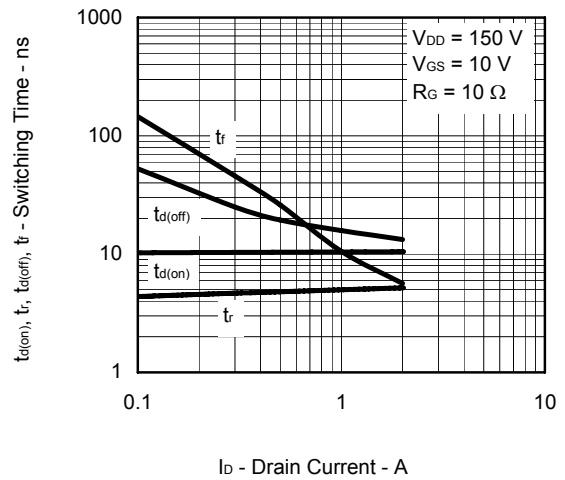
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



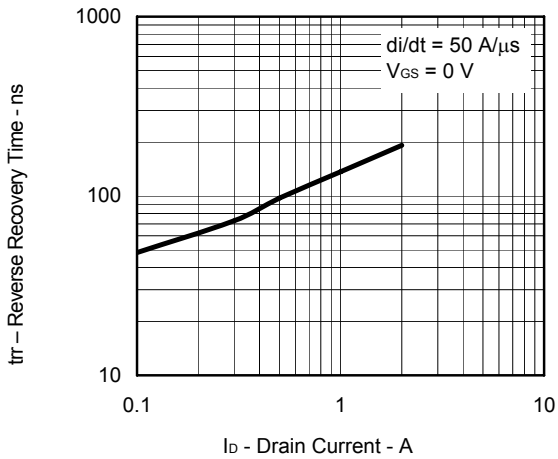
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



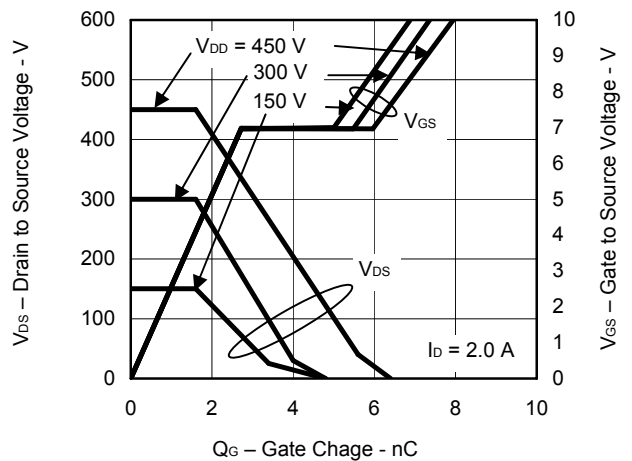
SWITCHING CHARACTERISTICS

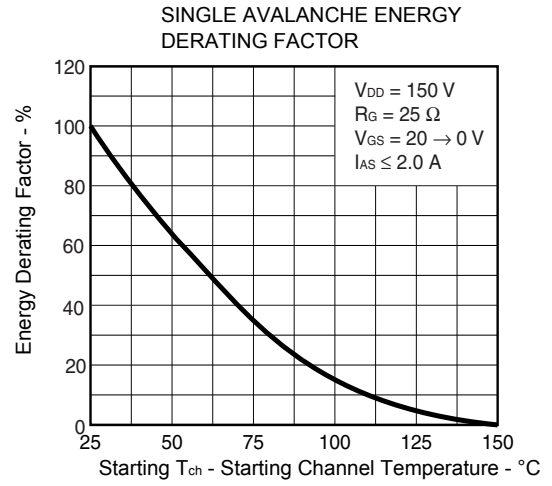
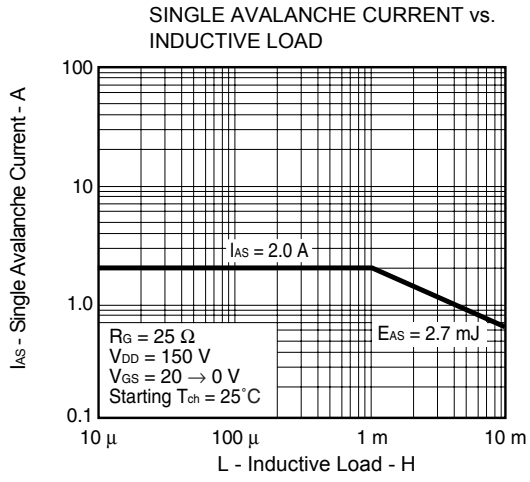


REVERSE RECOVERY TIME vs. DRAIN CURRENT



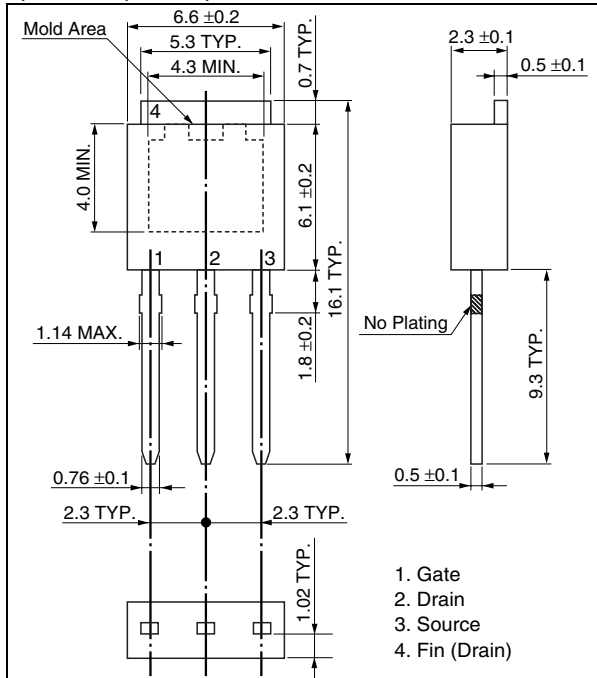
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



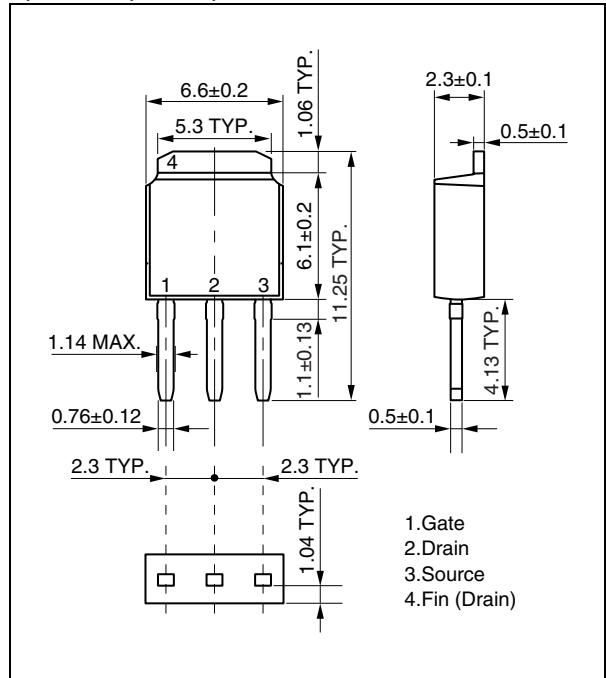


<R> PACKAGE DRAWINGS (Unit: mm)

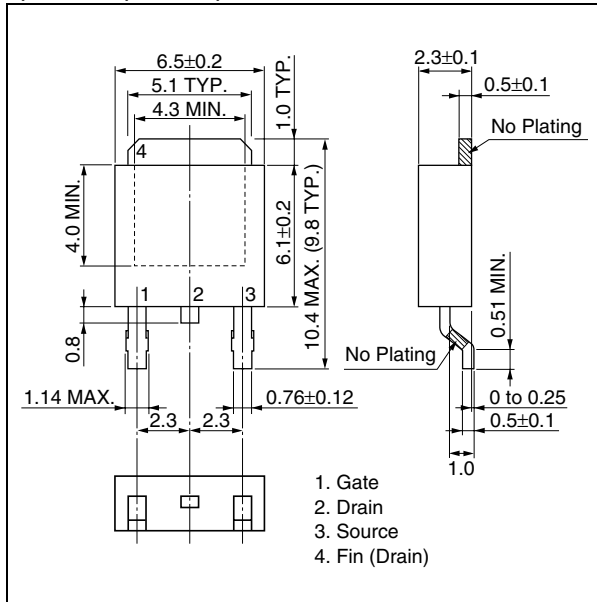
1) TO-251 (MP-3-a)



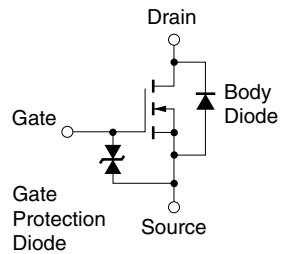
2) TO-251 (MP-3-b)



3) TO-252 (MP-3ZK)



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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