

DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR

2SK4070

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK4070 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
 $R_{DS(on)} = 11 \Omega$ MAX. ($V_{GS} = 10$ V, $I_D = 0.5$ A)
- Low gate charge
 $Q_G = 5$ nC TYP. ($V_{DD} = 450$ V, $V_{GS} = 10$ V, $I_D = 1.0$ A)
- Gate voltage rating : ± 30 V
- Avalanche capability ratings

<R> ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SK4070-S15-AY ^{Note}	Pure Sn (Tin)	Tube 70 p/tube	TO-251 (MP-3-a) typ. 0.39 g
2SK4070(1)-S27-AY ^{Note}		Tube 75 p/tube	TO-251 (MP-3-b) typ. 0.34 g
2SK4070-ZK-E1-AY ^{Note}		Tape 2500 p/reel	TO-252 (MP-3ZK) typ. 0.27 g
2SK4070-ZK-E2-AY ^{Note}			

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

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

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) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 1.0	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 4.0	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	22	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$) ^{Note2}	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to $+150$	$^\circ\text{C}$
Single Avalanche Current ^{Note3}	I_{AS}	0.8	A
Single Avalanche Energy ^{Note3}	E_{AS}	38.4	mJ

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

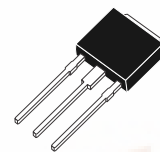
2. Mounted on glass epoxy board of 40 mm \times 40 mm \times 1.6 mm

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

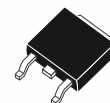
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(TO-251)



(TO-252)

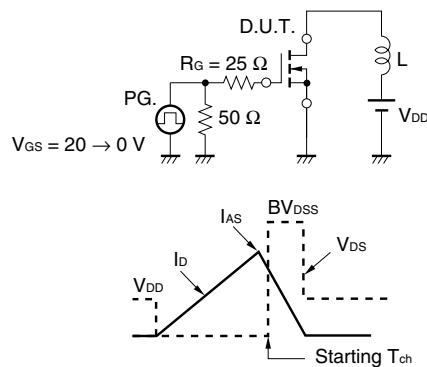


ELECTRICAL CHARACTERISTICS (T_A = 25°C)

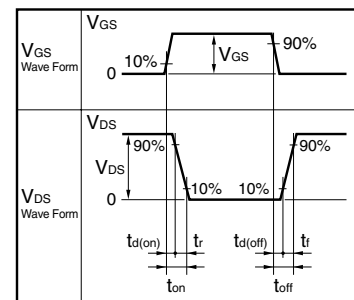
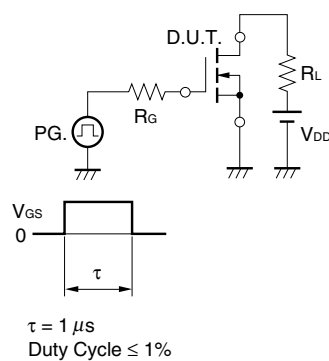
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±100	nA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5	2.9	3.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10 V, I _D = 0.5 A	0.2	0.4		S
Drain to Source On-state Resistance Note	R _{DS(on)}	V _{GS} = 10 V, I _D = 0.5 A		9.2	11	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V,		110		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V,		50		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		11		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 0.5 A,		7.5		ns
Rise Time	t _r	V _{GS} = 10 V,		6		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		11		ns
Fall Time	t _f			18		ns
Total Gate Charge	Q _G	V _{DD} = 450 V,		5		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V,		1		nC
Gate to Drain Charge	Q _{GD}	I _D = 1.0 A		2.8		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 1.0 A, V _{GS} = 0 V		0.86	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 1.0 A, V _{GS} = 0 V,		135		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		285		nC

Note Pulsed

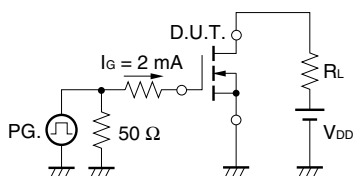
TEST CIRCUIT 1 AVALANCHE CAPABILITY



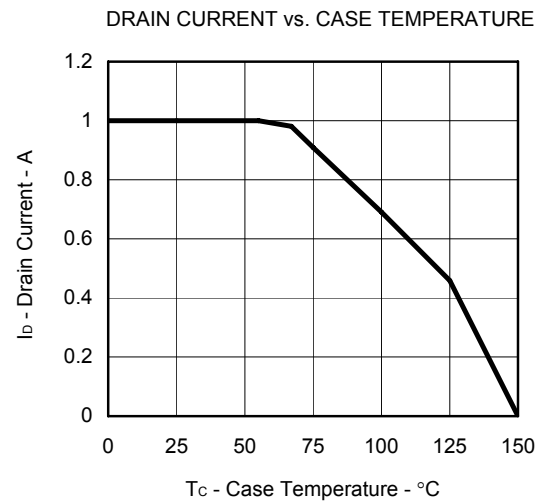
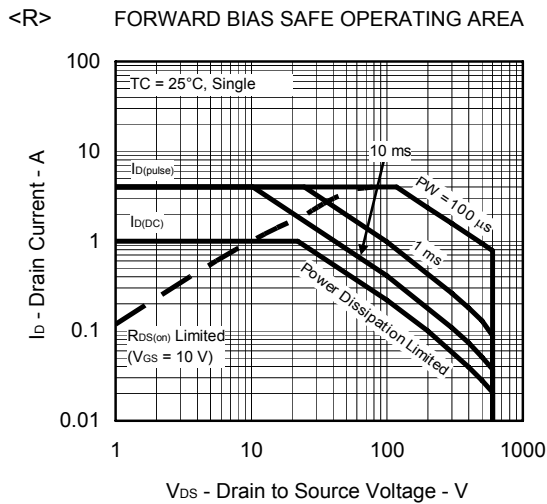
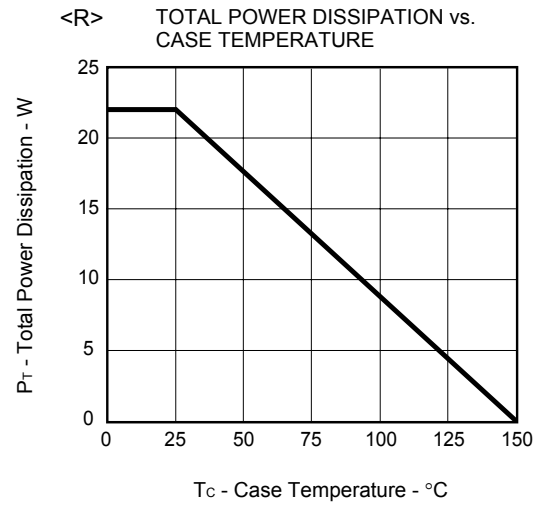
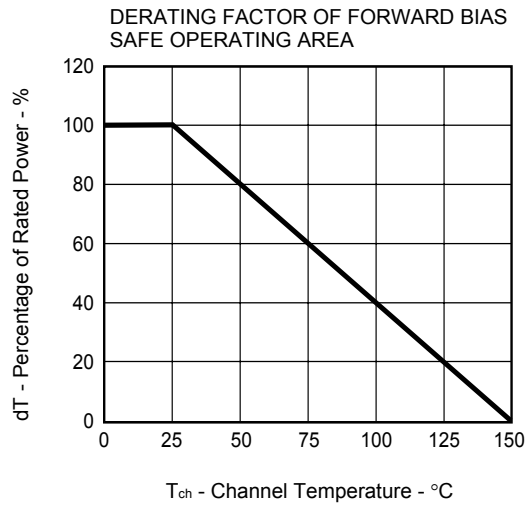
TEST CIRCUIT 2 SWITCHING TIME



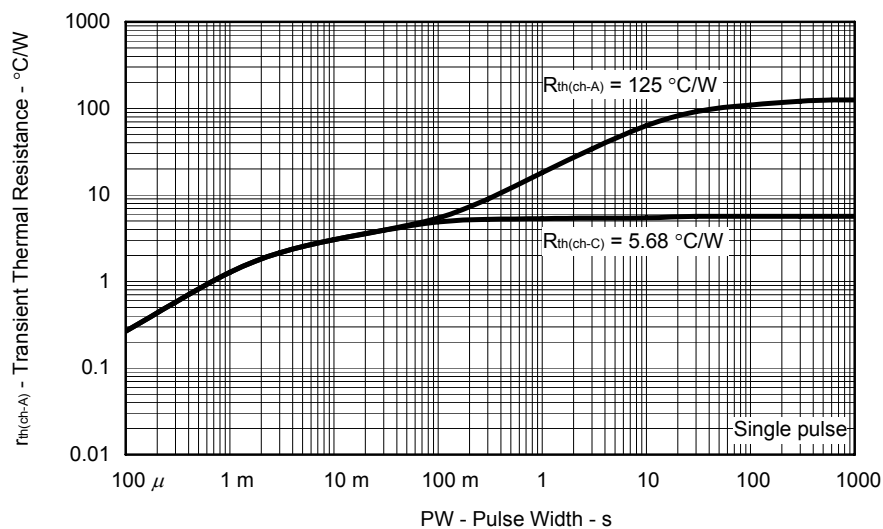
TEST CIRCUIT 3 GATE CHARGE



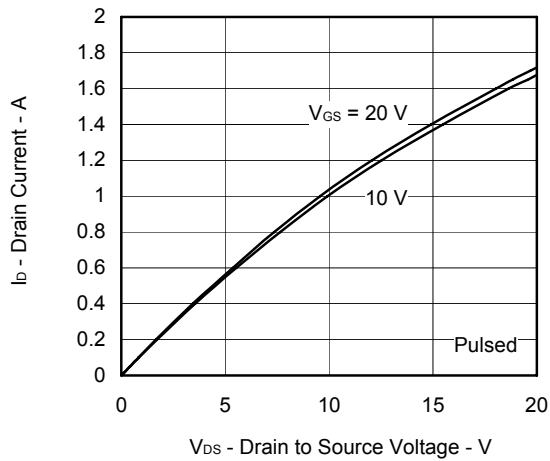
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



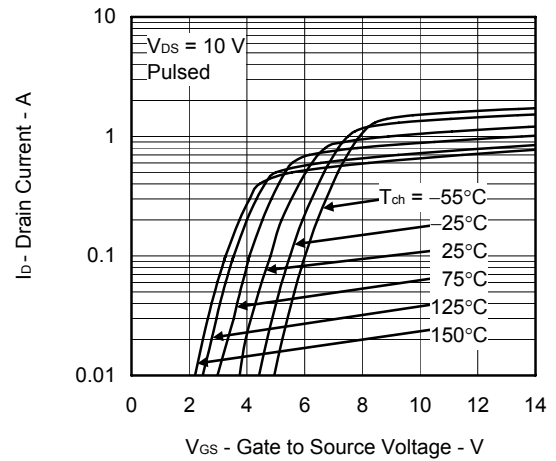
<R> TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



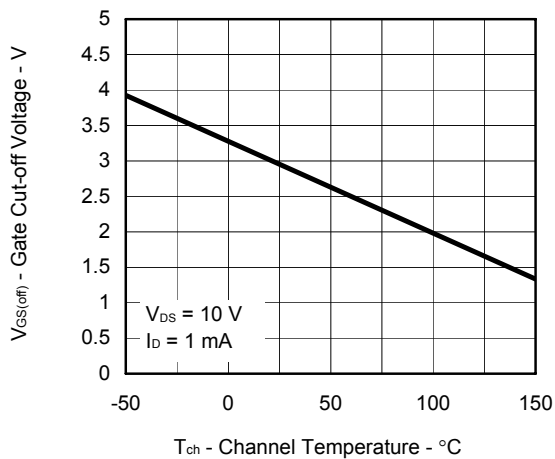
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



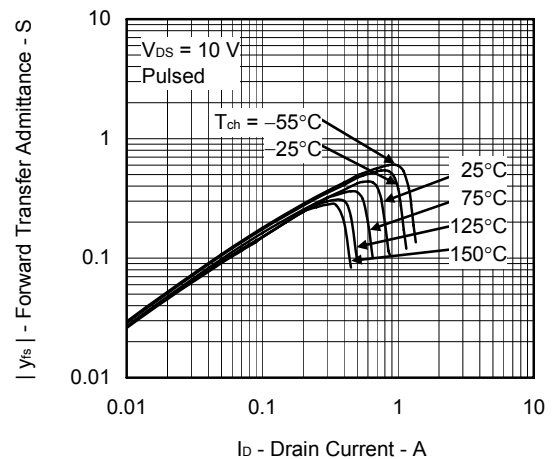
FORWARD TRANSFER CHARACTERISTICS



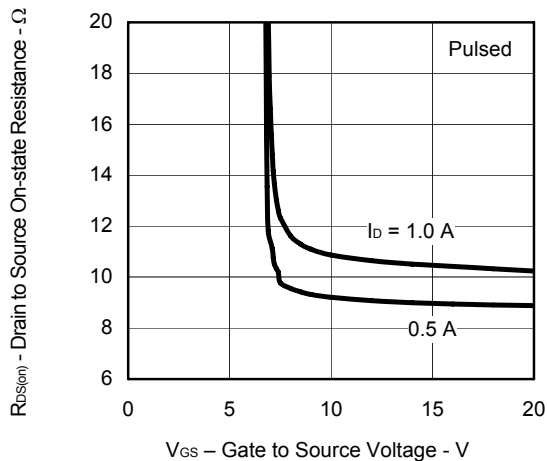
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



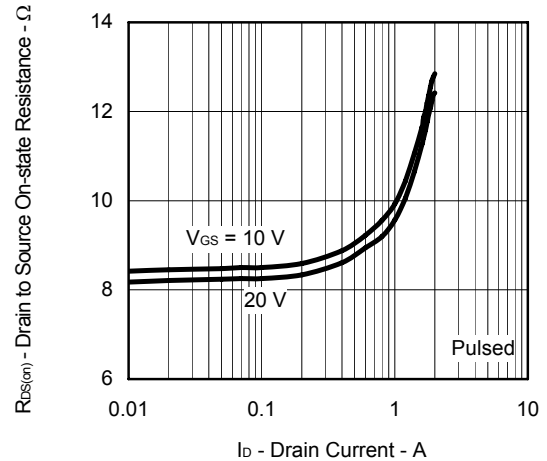
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT

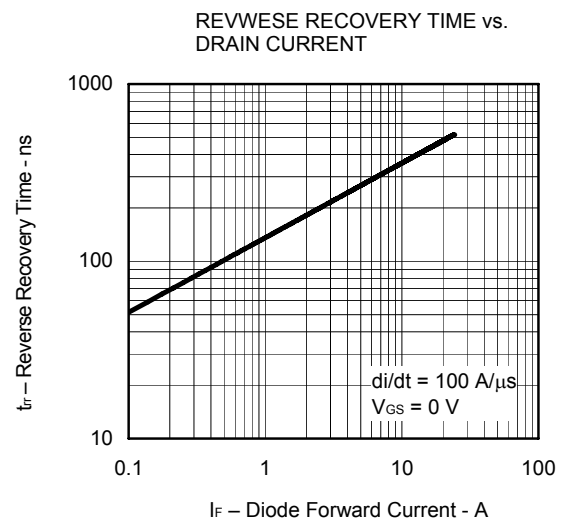
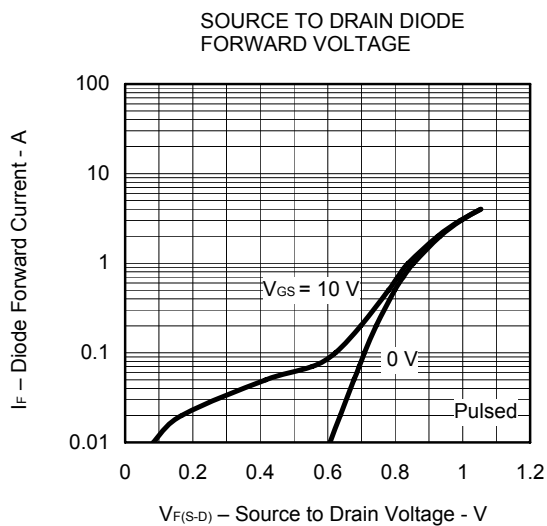
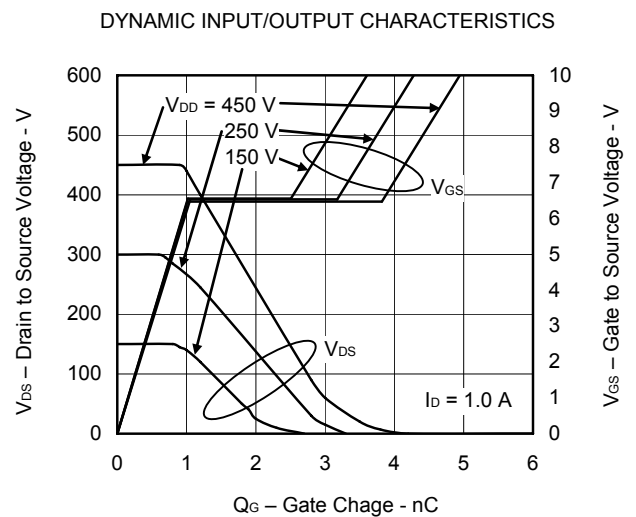
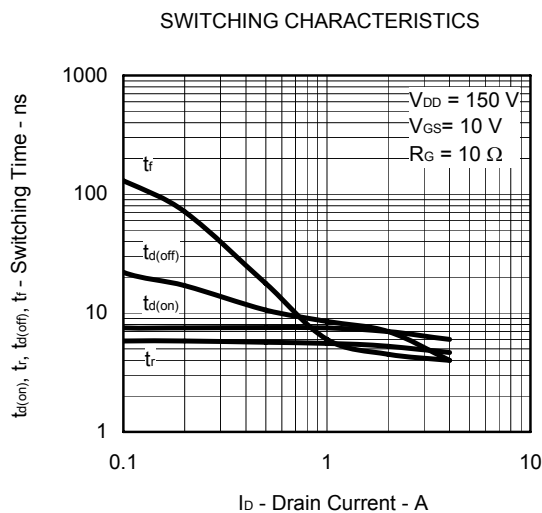
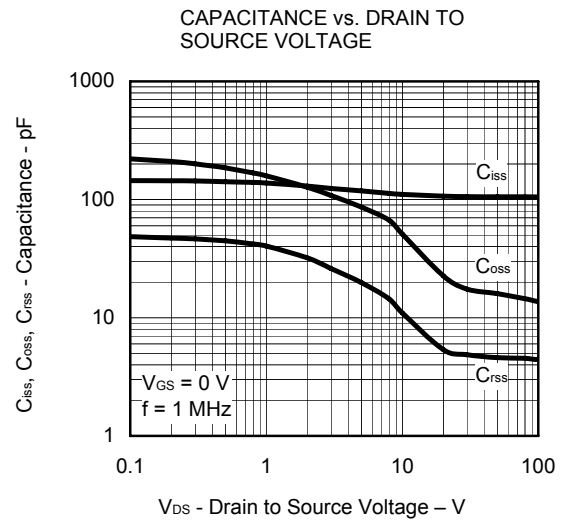
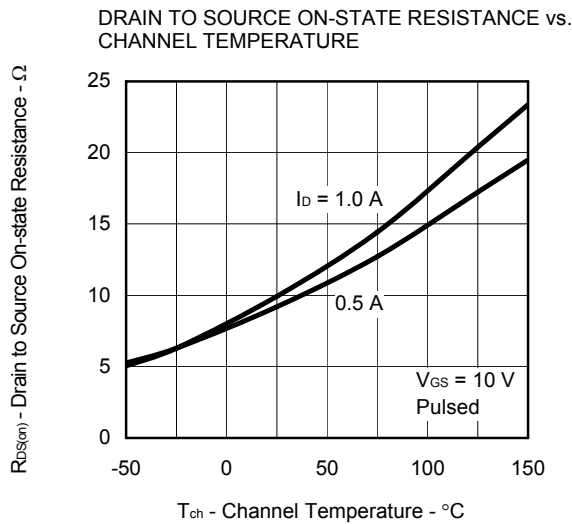


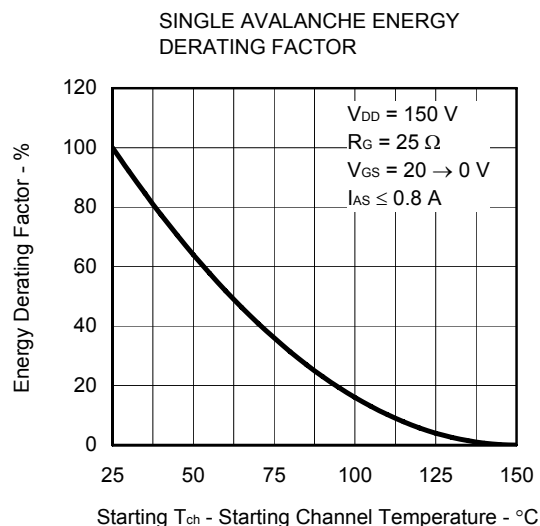
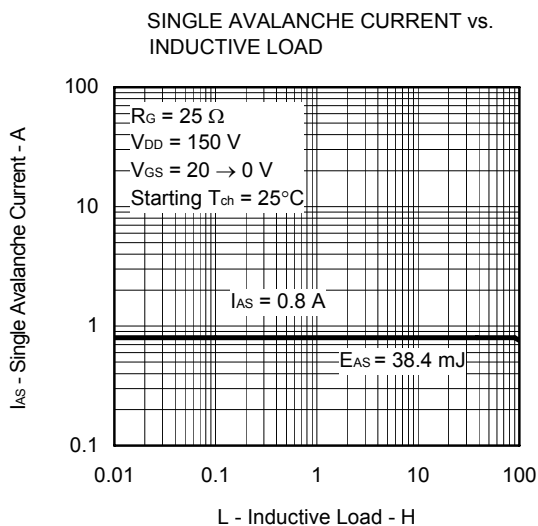
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT

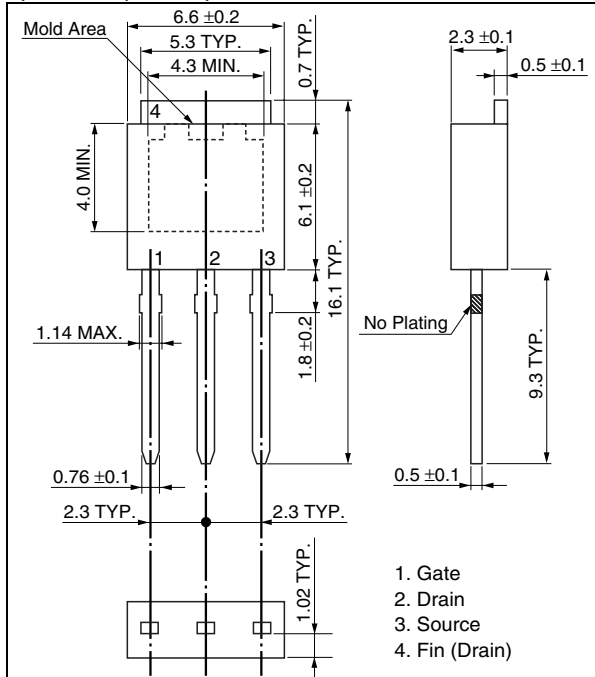




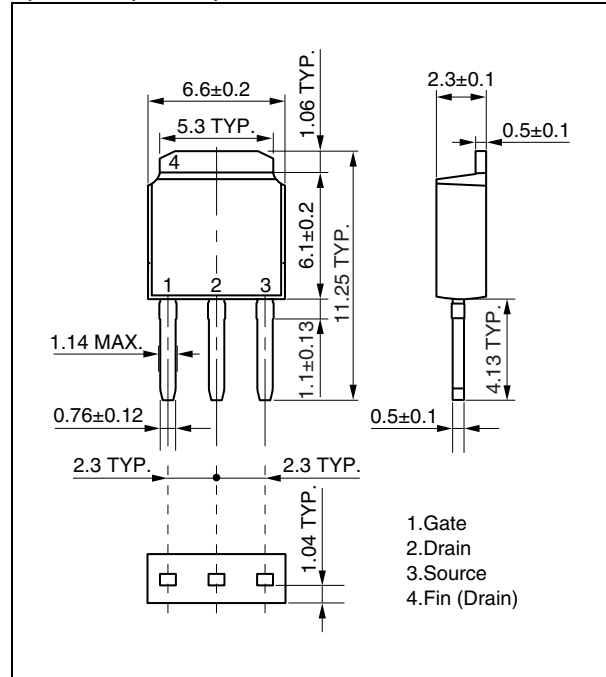


<R> PACKAGE DRAWINGS (Unit: mm)

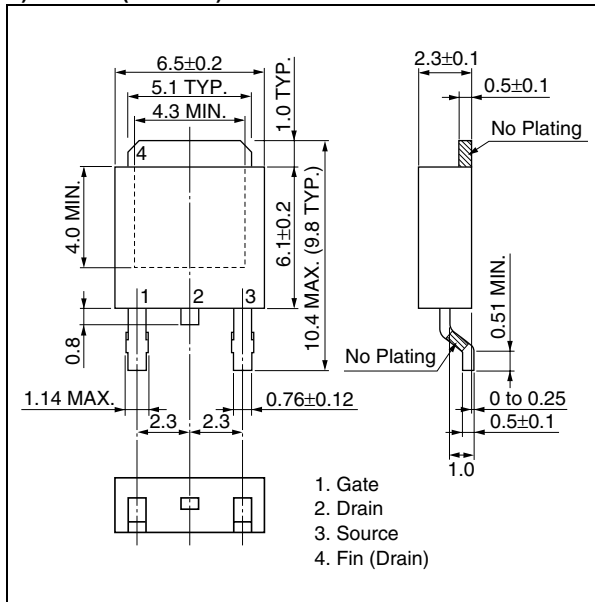
1) TO-251 (MP-3-a)



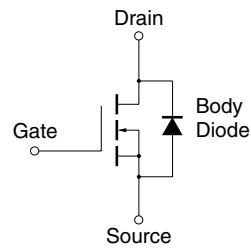
2) TO-251 (MP-3-b)



3) TO-252 (MP-3ZK)



EQUIVALENT CIRCUIT



Remark 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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