

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

 $Q_G = 5 \text{ nC TYP.}$ ($V_{DD} = 450 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 1.0 \text{ A}$)

- Gate voltage rating: ±30 V
- · Avalanche capability ratings

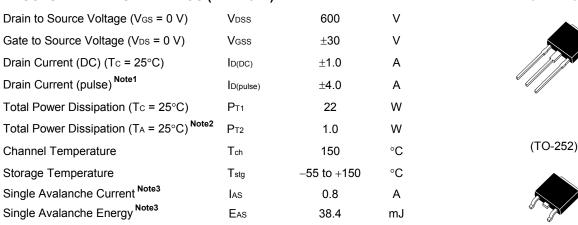
ORDERING INFORMATION

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 050 (MD 07K) L 0 07 .	
2SK4070-ZK-E2-AY Note			TO-252 (MP-3ZK) typ. 0.27 g	

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

ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

(TO-251)



Notes 1. PW \leq 10 μ 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 \rightarrow 0 V

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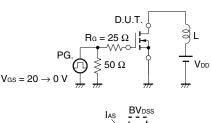
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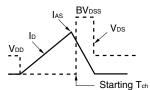
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	IDSS	V _{DS} = 600 V, V _{GS} = 0 V			100	μА
Gate Leakage Current	Igss	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	Ciss	V _{DS} = 10 V,		110		pF
Output Capacitance	Coss	V _{GS} = 0 V,		50		pF
Reverse Transfer Capacitance	Crss	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	tr	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 _G s	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	trr	I _F = 1.0 A, V _{GS} = 0 V,		135		ns
Reverse Recovery Charge	Qır	di/dt = 100 A/μs		285		nC

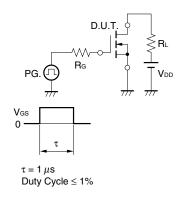
Note Pulsed

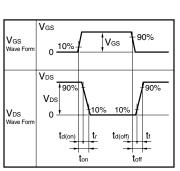
TEST CIRCUIT 1 AVALANCHE CAPABILITY





TEST CIRCUIT 2 SWITCHING TIME

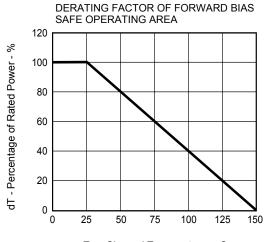




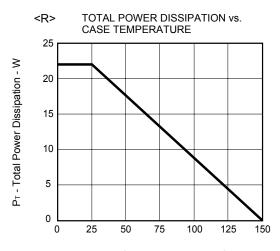
TEST CIRCUIT 3 GATE CHARGE

$$\begin{array}{c|c} D.U.T. & \\ \hline \\ I_G = 2 \text{ mA} \\ \hline \\ PG. & \\ \hline \\ \end{array} \begin{array}{c} PRL \\ \hline \\ \hline \\ \end{array}$$

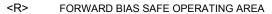
TYPICAL CHARACTERISTICS (TA = 25°C)

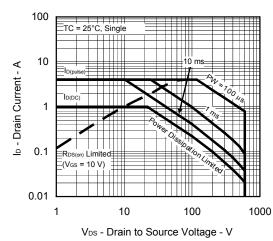


 T_{ch} - Channel Temperature - $^{\circ}\text{C}$

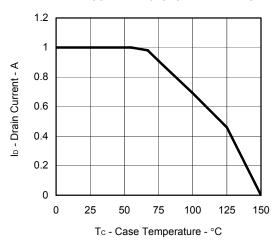


Tc - Case Temperature - °C

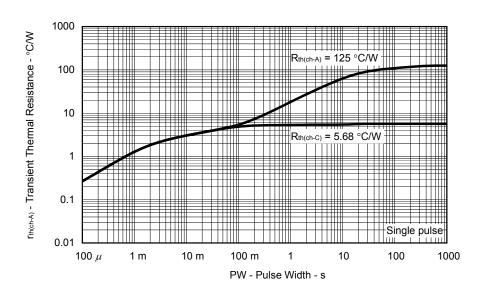




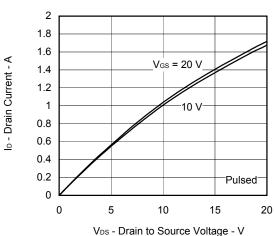
DRAIN CURRENT vs. CASE TEMPERATURE



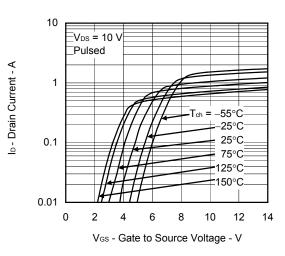
<R> TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



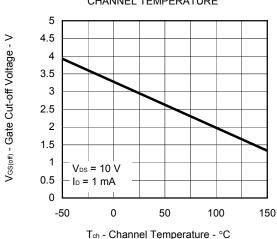
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



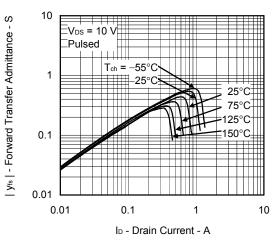
FORWARD TRANSFER CHARACTERISTICS



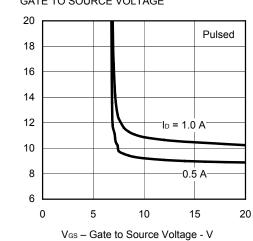
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



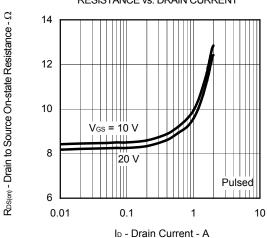
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



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

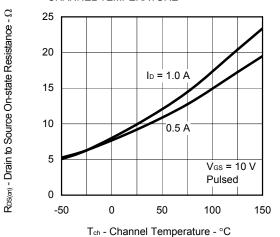


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

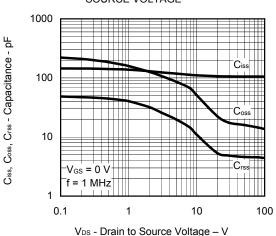


 $\mathsf{R}_{\mathsf{DS}(m)}$ - Drain to Source On-state Resistance - Ω

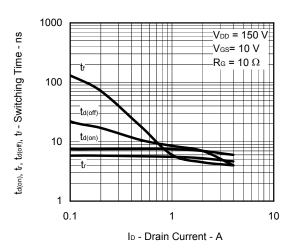
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



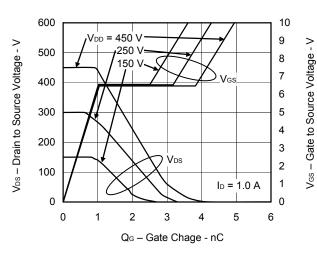
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



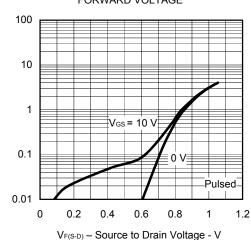
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS

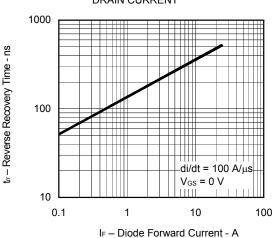


SOURCE TO DRAIN DIODE FORWARD VOLTAGE

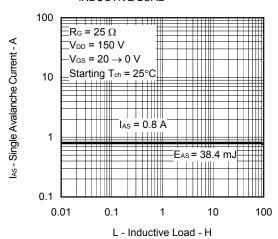


IF - Diode Forward Current - A

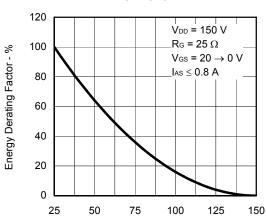
REVWESE RECOVERY TIME vs. DRAIN CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



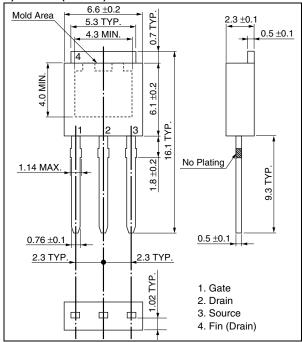
SINGLE AVALANCHE ENERGY DERATING FACTOR



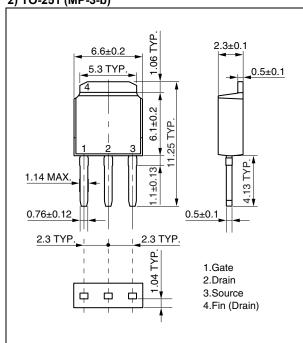
Starting T_{ch} - Starting Channel Temperature - $^{\circ}$ C

<R> PACKAGE DRAWINGS (Unit: mm)

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



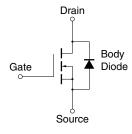
2) TO-251 (MP-3-b)



3) TO-252 (MP-3ZK)

2.3±0.1 6.5±0.2 1.0 TYP. 5.1 TYP. 0.5±0.1 4.3 MIN. No Plating 10.4 MAX. (9.8 TYP. 4.0 MIN 6.1±0.2 Σ 0.51 No Plating 1.14 MAX 0.76±0.12 0 to 0.25 0.5±0.1 1. Gate 2. Drain 3. Source 4. Fin (Drain)

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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