

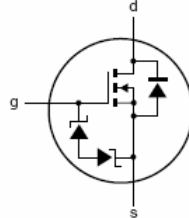


2N7002K

N-Channel MOSFET

Features

- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- High density cell design for low $R_{DS(ON)}$
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- Marking : 72K
- ESD Protected up to 2KV (HBM)



Maximum Ratings @ 25°C Unless Otherwise Specified

Symbol	Rating	Rating	Unit
V_{DS}	Drain-source Voltage	60	V
V_{GS}	Gate-source Voltage	± 20	V
I_D	Drain Current	340	mA
P_D	Total Power Dissipation	350	mW
T_J	Operating Junction Temperature	-55 to +150	°C
T_{STG}	Storage Temperature	-55 to +150	°C
R_{thJA}	Thermal Resistance from Junction to Ambient	357	°C/W

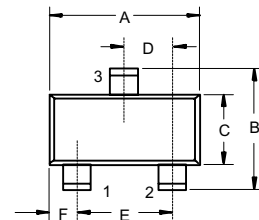
Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter	Min	Typ	Max	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage ($V_{GS}=0V_{dc}$, $I_D=10\mu A_{dc}$)	60	---	---	Vdc
$V_{GS(th)}$	Gate-Threshold Voltage ($V_{DS}=V_{GS}$, $I_D=1mA_{dc}$)	1.0	---	---	Vdc
I_{GSS}	Gate-body Leakage ($V_{DS}=0V_{dc}$, $V_{GS}=\pm 10V_{dc}$) ($V_{DS}=0V_{dc}$, $V_{GS}=\pm 5V_{dc}$)	---	---	± 200 ± 100	nAdc nAdc
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS}=48V_{dc}$, $V_{GS}=0V_{dc}$)	---	---	1	μA_{dc}
$r_{DS(on)}$	Drain-Source On-Resistance ($V_{GS}=4.5V_{dc}$, $I_D=200mA_{dc}$) ($V_{GS}=10V_{dc}$, $I_D=500mA_{dc}$)	---	---	5.3 5.0	Ω
V_{SD}	Diode Forward Voltage ($V_{GS}=0V_{dc}$, $I_S=300mA_{dc}$)	---	---	1.5	Vdc
Q_r	Recovered charge ($V_{GS}=0V$, $I_S=300mA$, $V_R=25V$) ($di_S/dt=-100A/\mu S$)	---	30	---	nC
C_{iss}	Input Capacitance	$V_{DS}=10V_{dc}$, $V_{GS}=0V_{dc}$, $f=1MHz$	---	40	pF
C_{OSS}	Output Capacitance		---	30	
C_{RSS}	Reverse Transfer Capacitance		---	10	

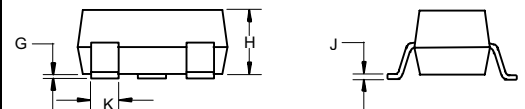
Switching

$t_{d(on)}$	Turn-on Time	$V_{DD}=50V$, $R_L=250\Omega$, $R_{GS}=50\Omega$, $V_{GS}=10V$, $R_G=50\Omega$	---	---	10	ns
$t_{d(off)}$	Turn-off Time		---	---	15	
t_{rr}	Reverse recovery time	$V_{GS}=0V$, $I_S=300mA$, $V_R=25V$, $di_S/dt=-100A/\mu S$	---	30	---	

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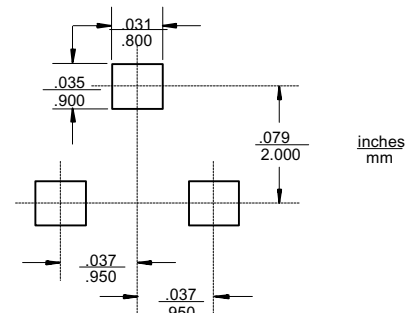


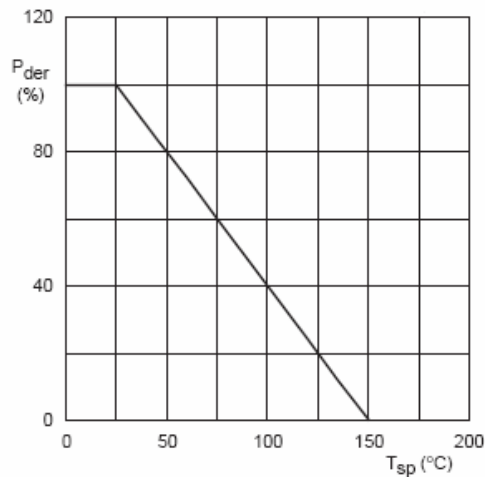
1. GATE
2. SOURCE
3. DRAIN



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.04	
B	.083	.104	2.10	2.64	
C	.047	.055	1.20	1.40	
D	.035	.041	.89	1.03	
E	.070	.081	1.78	2.05	
F	.018	.024	.45	.60	
G	.0005	.0039	.013	.100	
H	.035	.044	.89	1.12	
J	.003	.007	.085	.180	
K	.015	.020	.37	.51	

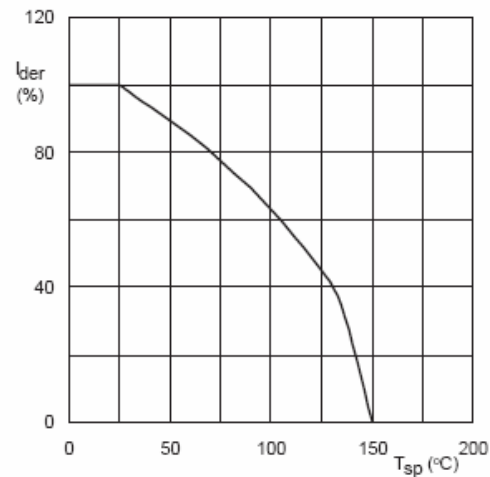
Suggested Solder Pad Layout





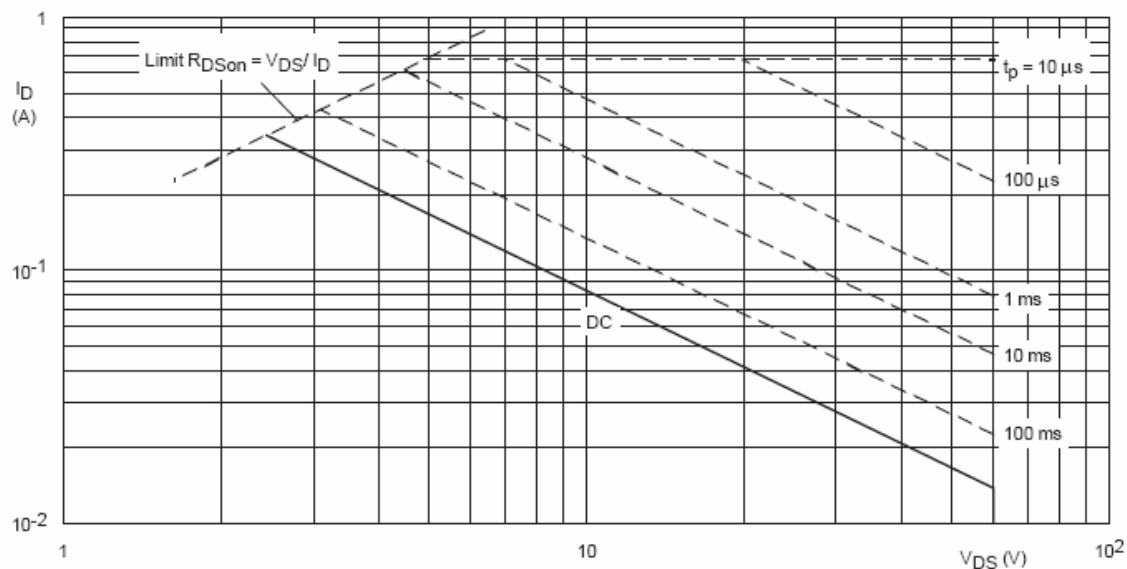
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}C)}} \times 100\%$$

Fig 1. Normalized total power dissipation as a function of solder point temperature.



$$I_{der} = \frac{I_D}{I_{D(25^{\circ}C)}} \times 100\%$$

Fig 2. Normalized continuous drain current as a function of solder point temperature.



T_{sp} = 25 °C; I_{DM} is single pulse; V_{GS} = 10 V

Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

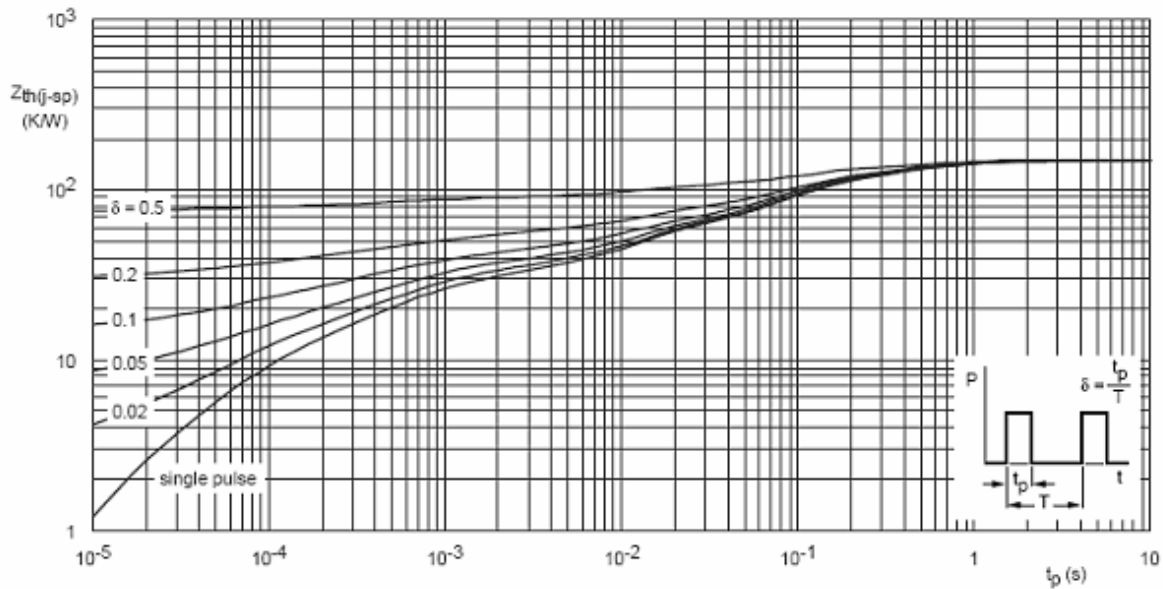
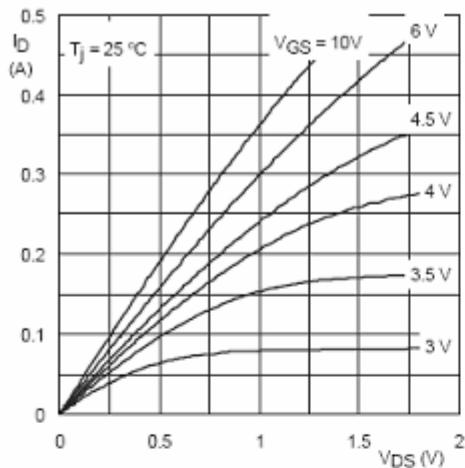
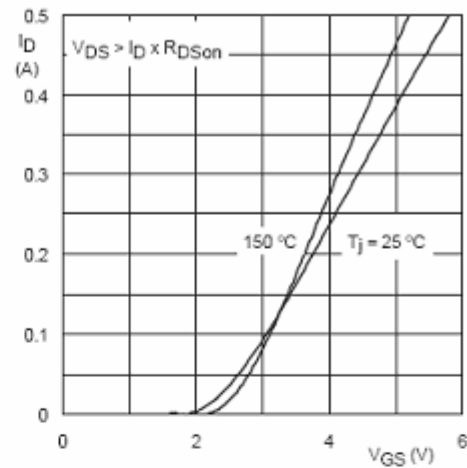


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration.



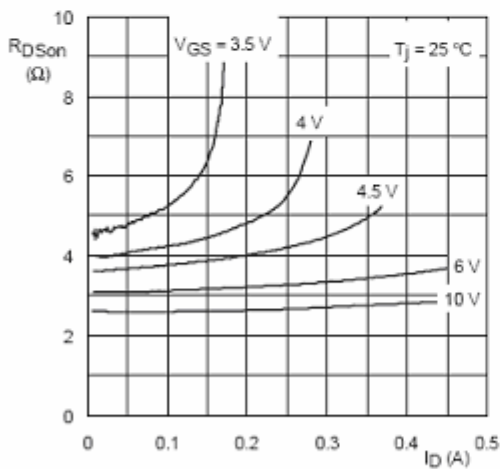
$T_J = 25^\circ\text{C}$

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values.



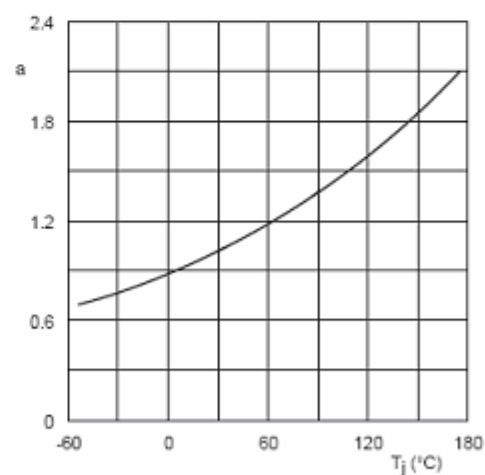
$T_J = 25^\circ\text{C}$ and 150°C ; $V_{DS} > I_D \times R_{DS(on)}$

Fig 6. Transfer characteristics: drain current as a function of gate-source voltage; typical values.



$T_J = 25^\circ\text{C}$

Fig 7. Drain-source on-state resistance as a function of drain current; typical values.



$$a = \frac{R_{DS(on)}}{R_{DS(on)}(25^\circ\text{C})}$$

Fig 8. Normalized drain-source on-state resistance factor as a function of junction temperature.

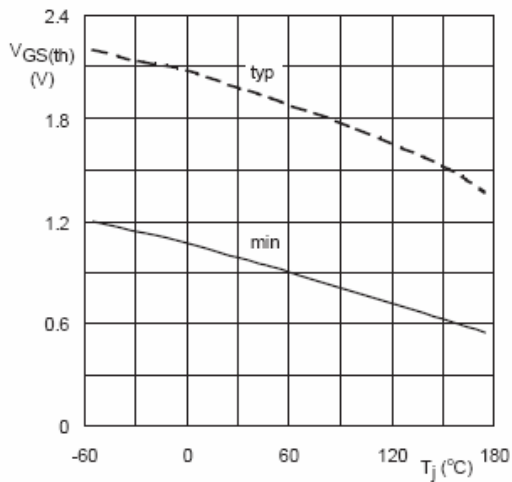

 $I_D = 1 \text{ mA}; V_{DS} = V_{GS}$

Fig 9. Gate-source threshold voltage as a function of junction temperature.

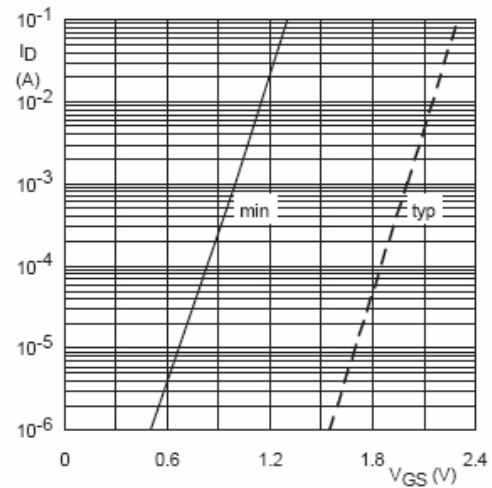

 $T_J = 25^{\circ}C; V_{DS} = 5 \text{ V}$

Fig 10. Sub-threshold drain current as a function of gate-source voltage.

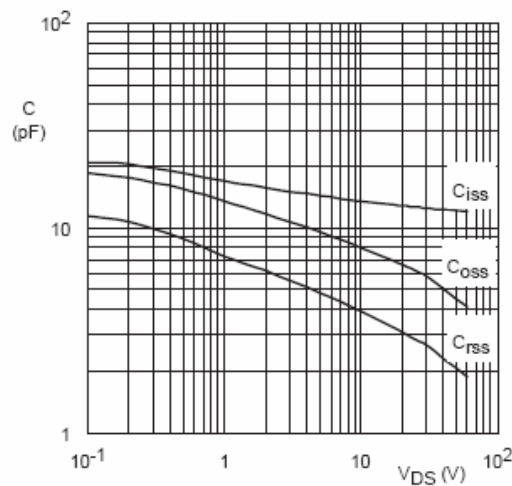
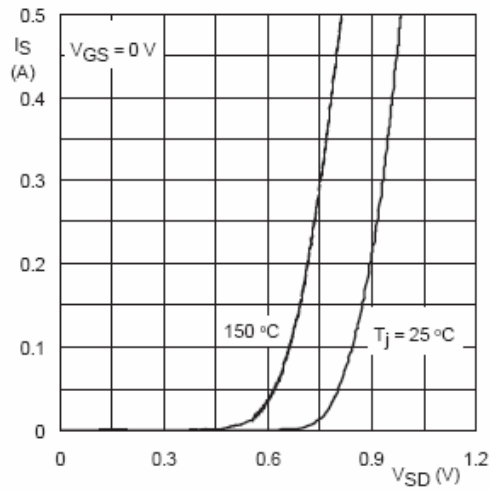
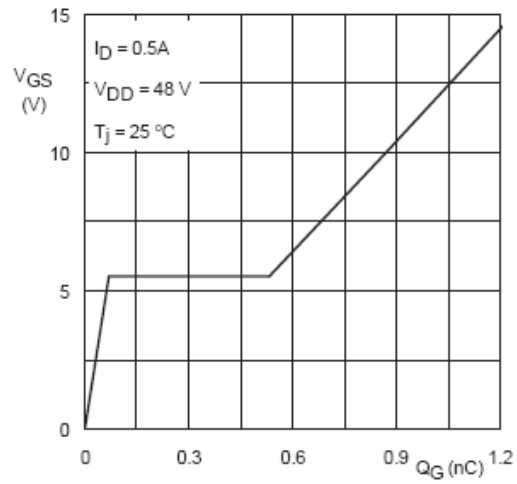

 $V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$

Fig 11. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.



$T_j = 25$ °C and 150 °C; $V_{GS} = 0$ V

Fig 12. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.



$I_D = 0.5$ A; $V_{DD} = 48$ V

Fig 13. Gate-source voltage as a function of gate charge; typical values.

Ordering Information :

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

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