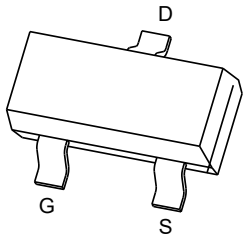
2N7002KL

60V N-Channel MOSFET

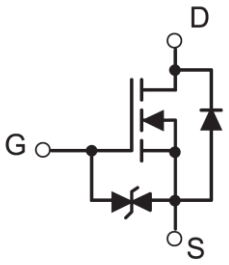
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	1.8Ω@10V	0.34A
	2.1Ω@4.5V	

SOT-23



Schematic diagram



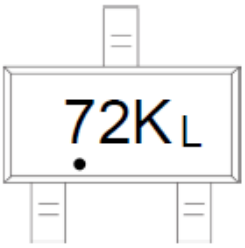
Feature

- Surface Mount Package
- High Density Cell Design for Extremely Low $R_{DS(ON)}$
- Voltage Controlled Small Signal Switch
- Rugged and Reliable
- ESD Protcet

Application

- Small Servo Motor Controls
- Power MOSFET Gate Drivers
- Switching Application

MARKING:



ABSOLUTE MAXIMUM RATINGS (Ta = 25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1,2]	I_D	0.34	A
Pulsed Drain Current (tp=10μs)	I_{DM}	1.36	A
Power Dissipation	P_D	0.35	W
Thermal Resistance from Junction to Ambient[1,2]	$R_{\theta JA}$	350	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_A = 25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 48V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±5	μA
On Characteristics[3]						
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.5	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.3A		1.8	2.5	Ω
		V_{GS} = 4.5V, I_D = 0.2A		2.1	3.0	
Forward tranconductance	g_{FS}	V_{DS} = 10V, I_D = 0.2A	80			mS
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 30V, V_{GS} = 0V, f = 1MHz		16.6		pF
Output Capacitance	C_{oss}			1.79		
Reverse Transfer Capacitance	C_{rss}			2.38		
Switchig Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 30V, V_{GS} = 10V, R_L = 100Ω, R_G = 3Ω		3.8		ns
Turn-on Rise Time	t_r			2.9		
Turn-off Delay Time	$t_{d(off)}$			14		
Turn-off Fall Time	t_f			8		
Total Gate Charge	Q_g	V_{DS} =30V, I_D =0.3A, V_{GS} =10V		1.3		nC
Gate-Source Charge	Q_{gs}			0.14		
Gate-Drain Charge	Q_{gd}			0.45		
Diode Characteristics						
Diode Forward Voltage[3]	V_{SD}	I_S =0.3A, V_{GS} = 0V			1.4	V

Notes :

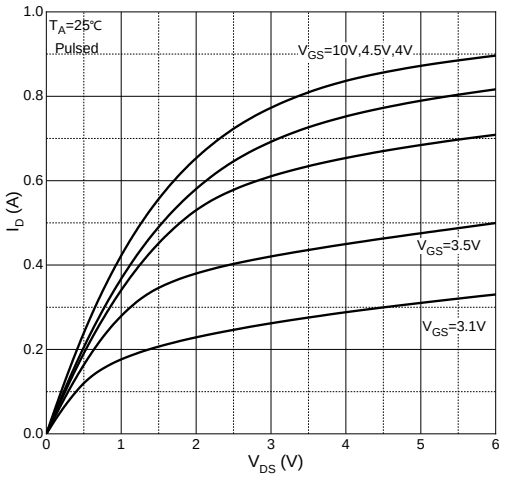
1.$R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR4 board with 1oz. single side copper, in a still air environment with T_A = 25°C.

2.$R_{\theta JA}$ is measured in the steady state

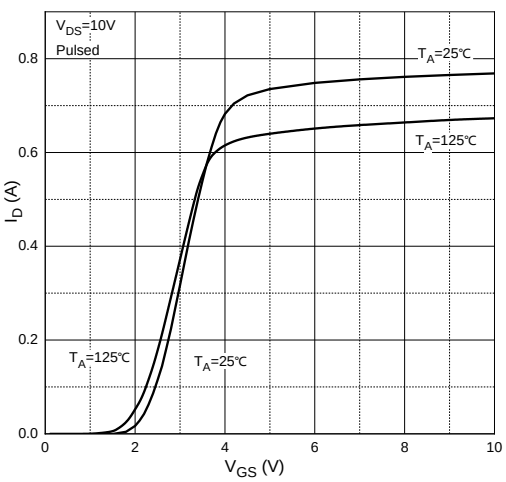
3.Pulse test : Pulse width ≤ 380μs, duty cycle ≤ 2%.

Typical Characteristics

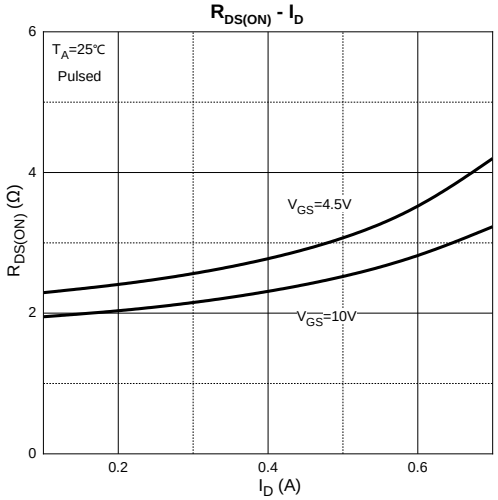
Output Characteristics



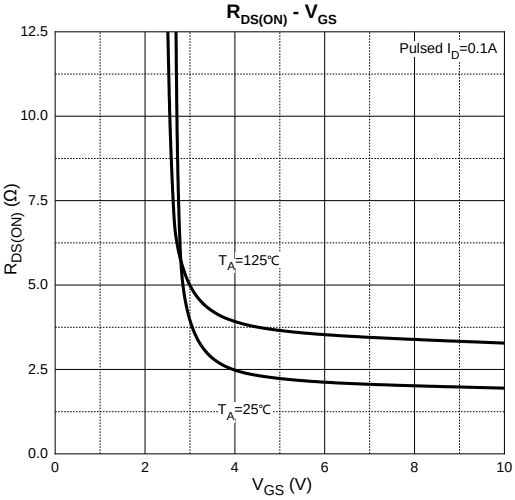
Transfer Characteristics



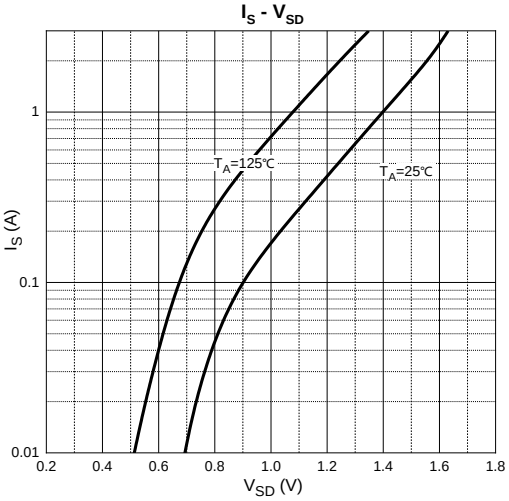
$R_{DS(ON)}$ - I_D



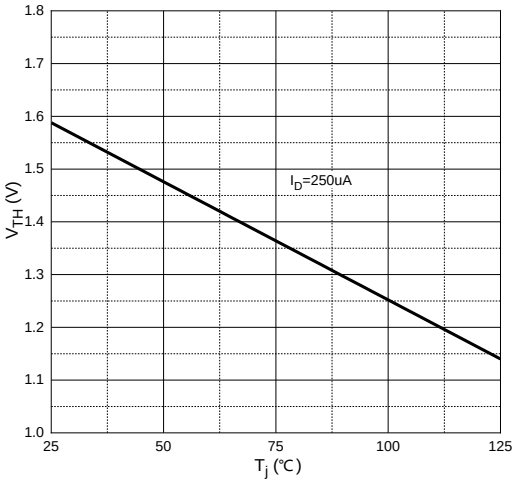
$R_{DS(ON)}$ - V_{GS}



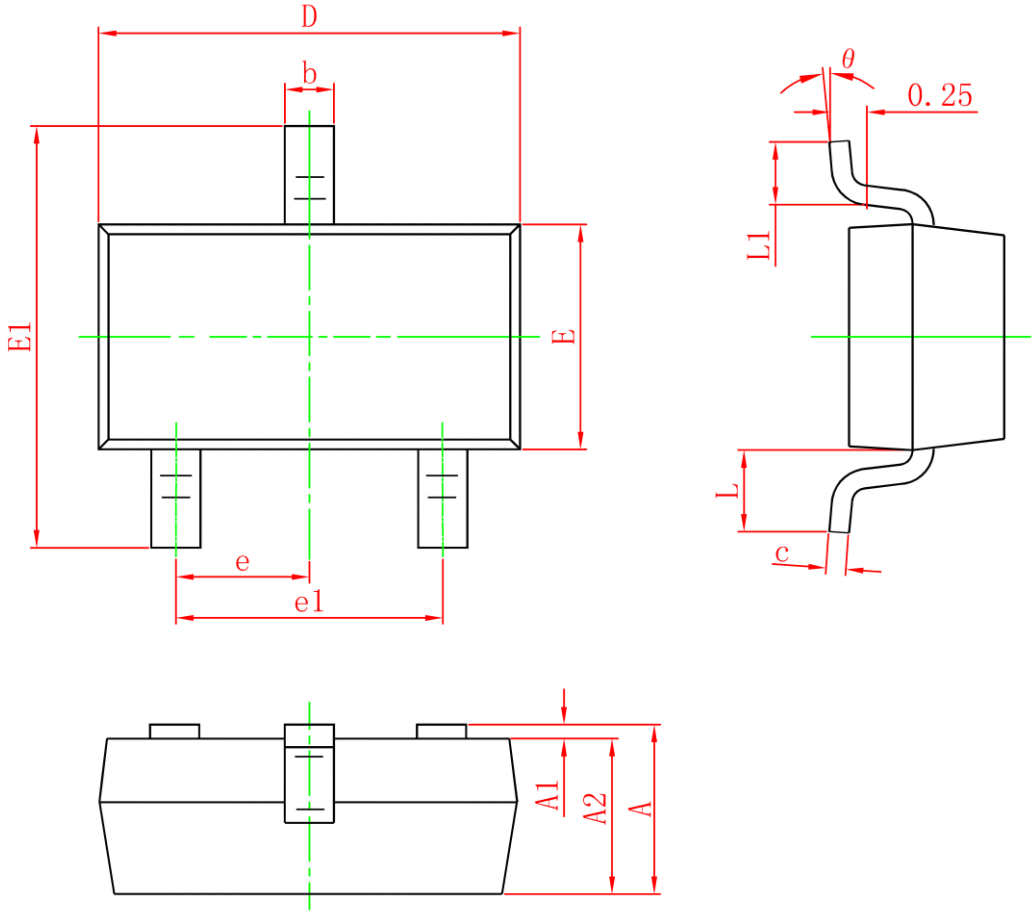
I_S - V_{SD}



Threshold Voltage



SOT-23 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0	0.100	0	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.150	1.500	0.045	0.059
E1	2.250	2.650	0.089	0.104
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

Attention：

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