2N7002KM

60V/0.115A N-Channel MOSFET

Features

- •Trench Power MV MOSFET technology
- •Voltage controlled small signal switch
- •Low input Capacitance and Fast Switching Speed
- •Low Input / Output Leakage
- •ESD protected

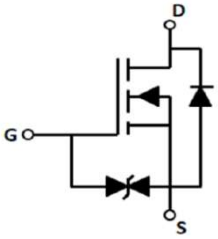
Application

- •Battery operated systems
- •Solid-state relays

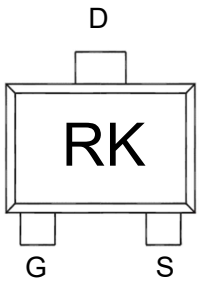
Product Summary

V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
60V	7.5Ω@10V	0.115A
	7.5Ω@5V	

SOT-723 top view



Schematic diagram



RK: Device code

Marking and pin assignment

Pb-Free RoHS Halogen-Free

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DS}	Drain-Source Breakdown Voltage		60	V
V_{GS}	Gate-Source Voltage		±20	V
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-50 to 155	°C
I_S	Diode Continuous Forward Current	Tc=25°C	0.115	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested	Tc=25°C	0.8	A
I_D	Continuous Drain Current	Tc=25°C	0.115	A
P_D	Maximum Power Dissipation	Tc=25°C	0.15	W
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient		833	°C/W
E_{SD}	Gate-Source ESD Rating (HBM, Method 3015)		2000	V

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
2N7002KM	SOT-723	RK	8,000	120,000	480,000	7"reel

Electrical Characteristics (TJ=25℃ unless otherwise noted)						
Symbol	**Parameter**	**Condition**	**Min**	**Typ**	**Max**	**Unit**
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$BV_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V，I_D=250μA	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V，V_{GS}=0V	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V，V_{DS}=0V	--	--	±20	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=250μA	0.8	1.6	3.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=10V，I_D=0.3A	--	1.6	7.5	Ω
		V_{GS}=5V，I_D=0.2A	--	2.1	7.5	Ω
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=30V，V_{GS}=0V， f=1MHz	--	27	--	pF
C_{OSS}	Output Capacitance		--	6	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	4	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=30V，I_D=0.115A，V_{GS}=10V	--	1.22	2.4	nC
Q_{gs}	Gate-Source Charge		--	0.5	--	nC
Q_{gd}	Gate-Drain Charge		--	0.18	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V，I_D=0.115A，V_{GS}=10V，R_G=50Ω	--	7	--	nS
t_r	Turn-on Rise Time		--	19	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	20	--	nS
t_f	Turn-off fall Time		--	84	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=0.115A	--	--	1.2	V

Typical Operating Characteristics

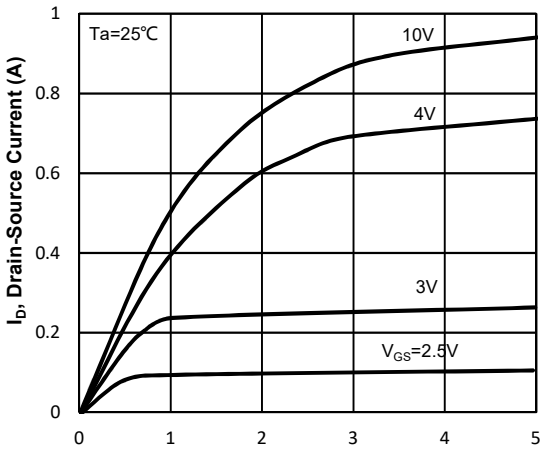


Fig1. Typical Output Characteristics

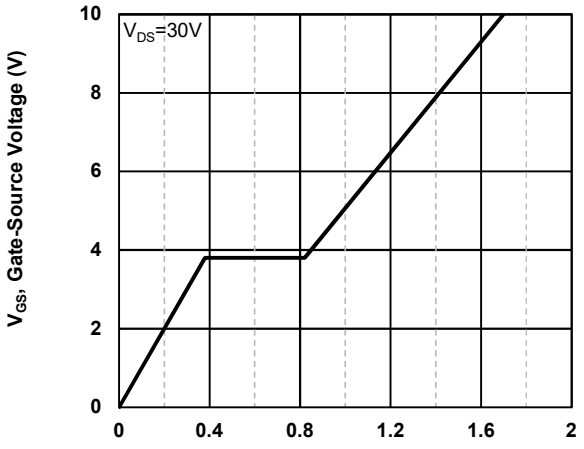


Fig2. Typical Gate Charge Vs.Gate-Source Voltage

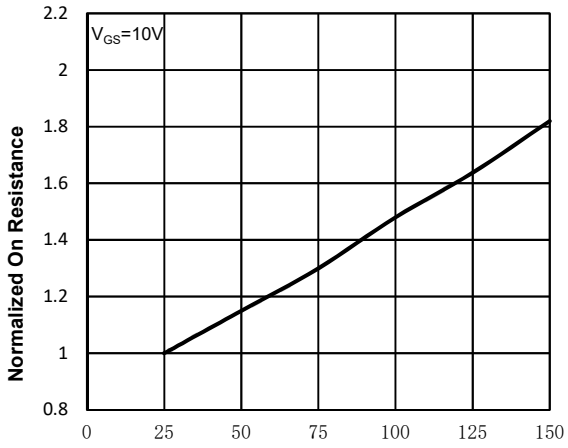


Fig3. Normalized On-Resistance Vs. Temperature

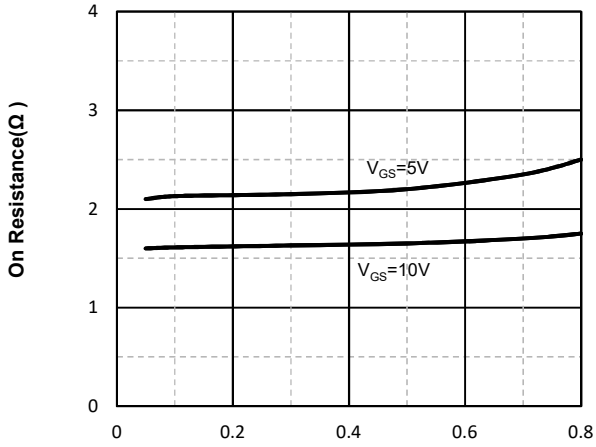


Fig4. On-Resistance Vs. Drain-Source Current

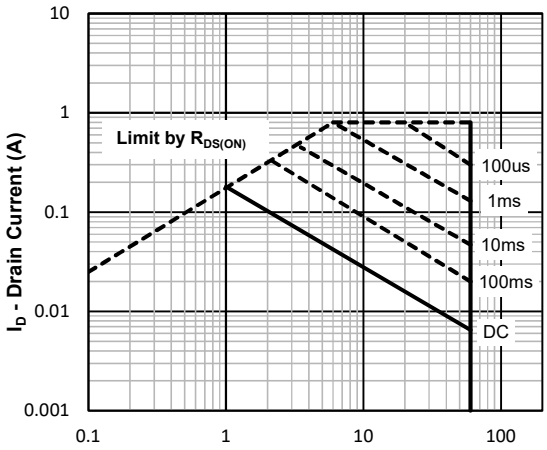


Fig5. Maximum Safe Operating Area

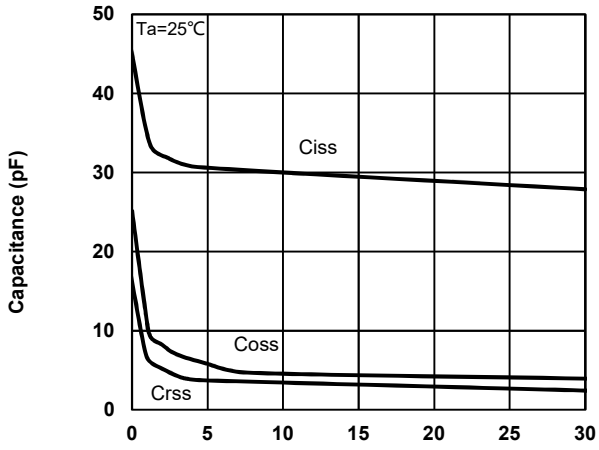
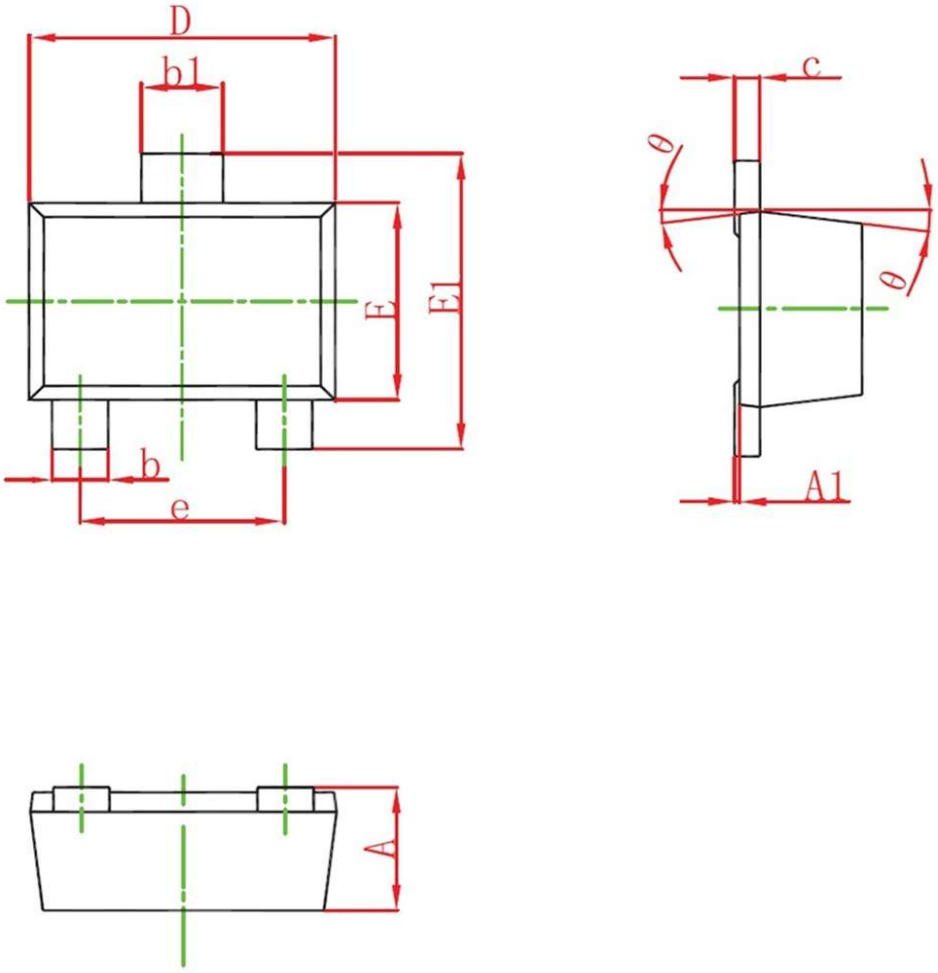


Fig6 Typical Capacitance Vs.Drain-Source Voltage

SOT-723 Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	0.320	0.400	0.012	0.016
A1	0.000	0.050	0.000	0.002
b	0.170	0.270	0.006	0.010
b1	0.270	0.370	0.010	0.014
c	0.080	0.150	0.003	0.006
D	1.150	1.250	0.046	0.050
E	0.750	0.850	0.030	0.034
E1	1.150	1.250	0.046	0.050
e	0.800TYP		0.020TYP	
θ	7°REF		7°REF	