

Description

The AP2N7002AK uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS}=60V$ $I_D=0.5A$

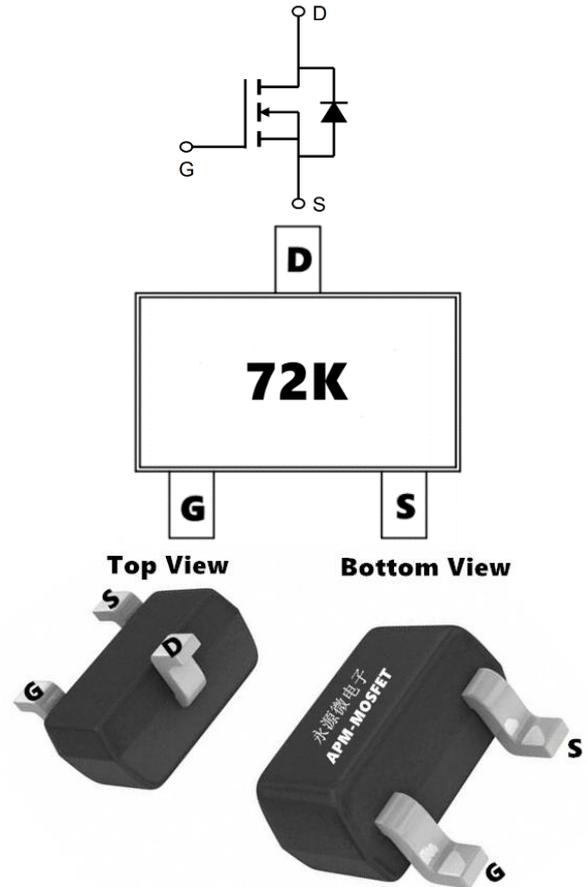
$R_{DS(ON)} < 1600m\Omega$ @ $V_{GS}=10V$ (Type: 1100m Ω)

ESD Rating: HBM \geq 2200V

Application

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2N7002AK	SOT523-3L	72K	3000

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	0.5	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	0.13	A
I_{DM}	Pulsed Drain Current ²	1.5	A
EAS	Single Pulse Avalanche Energy ³	1	mJ
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	350	mW
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	128	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	15	$^\circ\text{C}/\text{W}$

60V N-Channel Enhancement Mode MOSFET

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	VGS= 0V, ID= 250 μ A	60	72	-	V
IGSS	Gate leakage Current	VGS= \pm 20V, VDS= 0V	-	-	\pm 10	μ A
IDSS	Drain Cut-off Current	VDS= 60V, VGS= 0V	-	-	1	μ A
VGS(th)	Gate Threshold Voltage	VDS= VGS, ID= 250 μ A	1.0	1.3	2.0	V
RDS(on)	Drain-Source On-state Resistance ³	VGS= 10V, ID= 0.3A	-	1100	1600	m Ω
		VGS= 4.5V, ID= 0.2A	-	1300	2000	m Ω
Ciss	Input Capacitance	V DS = 30V, V GS = 0V, f = 1MHz		25		pF
Coss	Output Capacitance			5.6		pF
Crss	Reverse Transfer Capacitance			2.2		pF
Qg	Total Gate Charge	VGS = 4.5V, VDS = 30V, ID = 0.3A	-	0.61	-	nC
Qgs	Gate-Source Charge		-	0.27	-	nC
Qgd	Gate-Drain Charge		-	0.23	-	nC
td(on)	Turn-on Delay Time	VGS = 10V, VDD = 30V, ID = 0.3A, RG= 3 Ω	-	4.3	-	ns
tr	Turn-on Rise Time		-	2.4	-	ns
td(off)	Turn-off Delay Time		-	21	-	ns
tf	Turn- off Fall Time		-	14.5	-	ns
VSD	Diode Forward Voltage ³	IS= 0.3A ,VGS=0V,	-	-	1.5	V
IS	Continuous Source Current	-	-	-	0.5	A

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width \leq 300us , duty cycle \leq 2%
- 3、 The power dissipation is limited by 150 $^\circ\text{C}$ junction temperature
- 4、 The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

Typical Characteristics

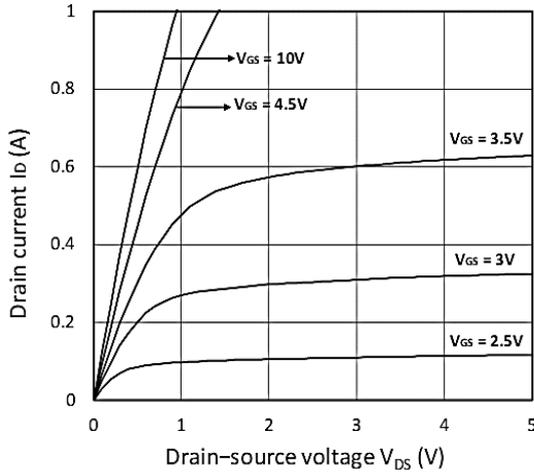


Figure 1. Output Characteristics

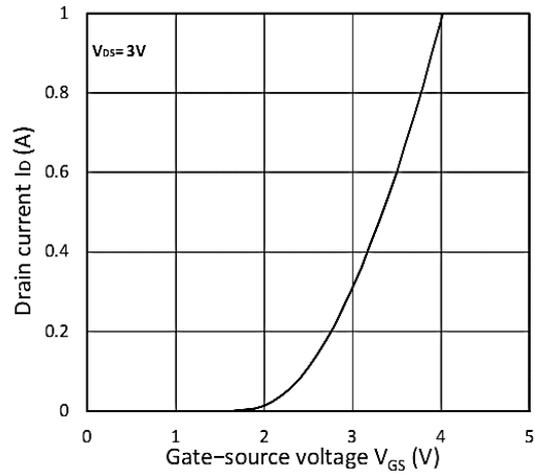


Figure 2. Transfer Characteristics

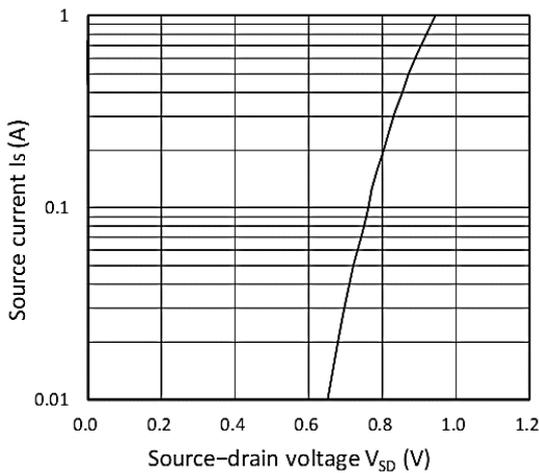


Figure 3. Forward Characteristics of Reverse

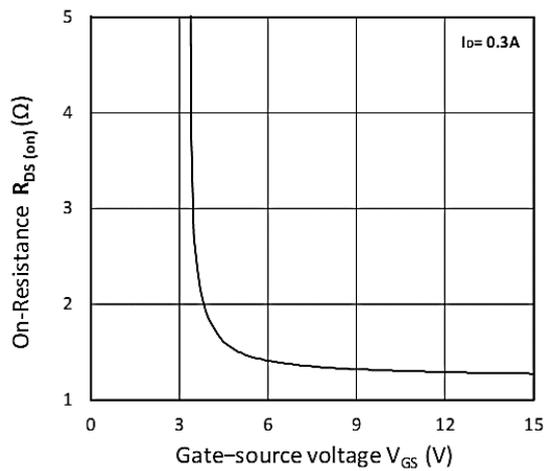


Figure 4. RDS(ON) vs. VGS

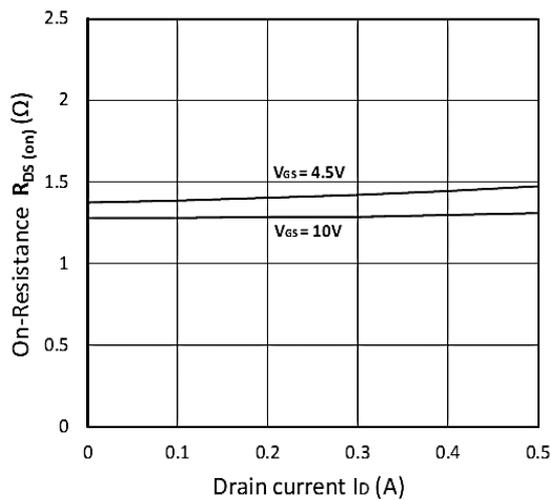


Figure 5. RDS(ON) vs. ID

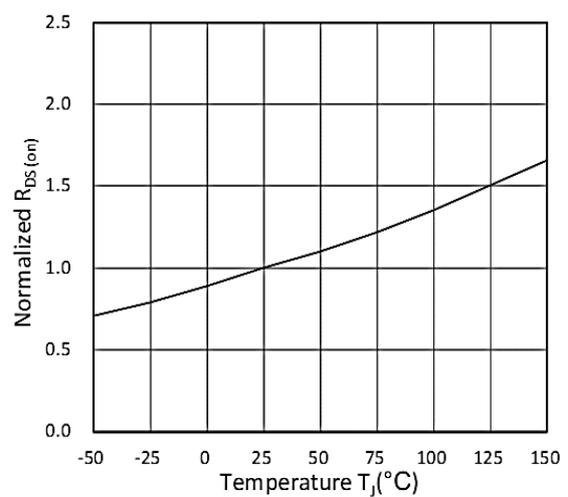


Figure 6. Normalized RDS(on) vs. Temperature

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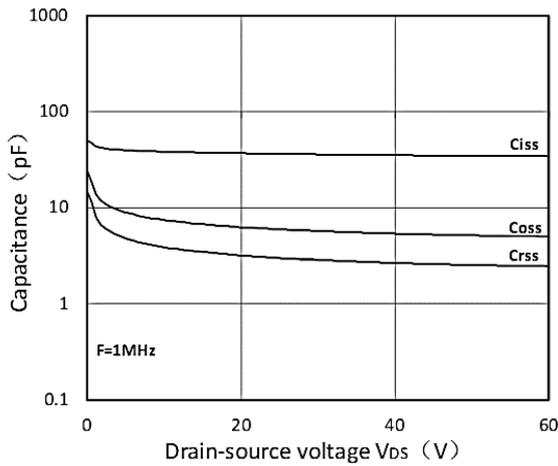


Figure 7. Capacitance Characteristics

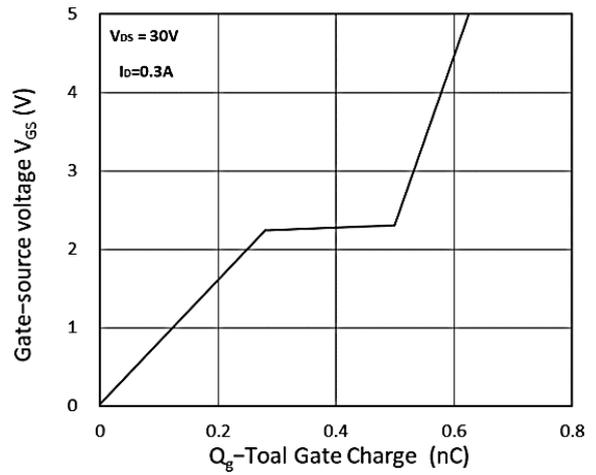


Figure 8. Gate Charge Characteristics

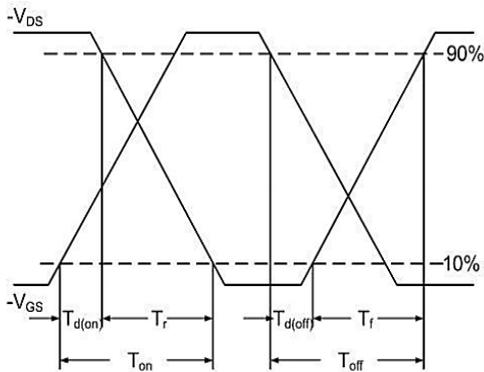


Figure.9 Switching Time Waveform

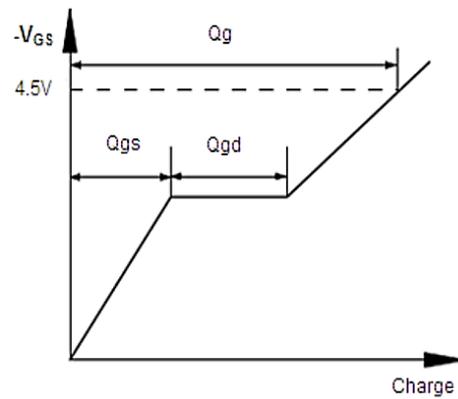
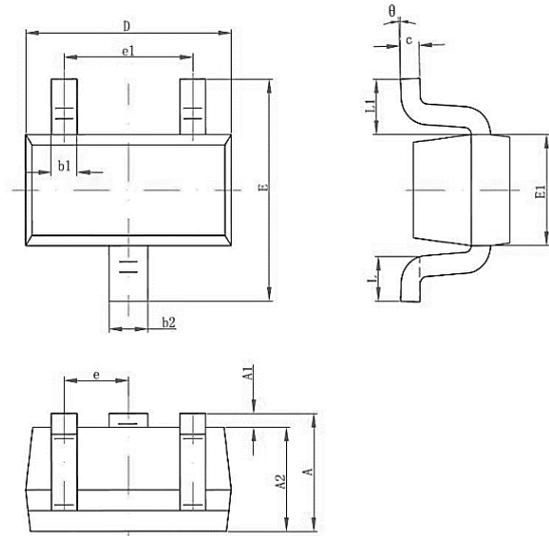


Figure.10 Gate Charge Waveform

Package Mechanical Data-SOT523-3-Single


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	0.70	0.90
A1	0.00	0.10
A2	0.70	0.80
b1	0.15	0.29
b2	0.25	0.39
C	0.10	0.20
D	1.50	1.70
E	1.45	1.75
E1	0.70	0.90
e	0.500 (Typ)	
e1	0.90	1.10
L	0.26	0.46
θ	0°	8°

60V N-Channel Enhancement Mode MOSFET**Attention**

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Edition	Date	Change
REV1.0	2023/3/8	Initial release

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