

Features ➤ Super Low Gate Charge ➤ Green Device Available ➤ Excellent Cdv/dt effect decline ➤ Advanced high cell density Trench technology	Bvdss	Rdson	ID
	60V	1900mΩ	300mA
	Application ➤ Battery protection ➤ Load Switch ➤ Uninterruptible power supply		



Package			
Marking and pin assignment	SOT23 top view	Schematic diagram	

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
K72	2N7002K	SOT23	3000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_D@T_A=25^{\circ}\text{C}$	0.3	A
	$I_D@T_A=100^{\circ}\text{C}$	0.2	A
Pulsed Drain Current ¹	I_{DM}	1.2	A
Single Pulse Avalanche Energy	EAS	-	mJ
Total Power Dissipation	$P_D@T_A=25^{\circ}\text{C}$	0.35	W
Storage Temperature Range	T_{STG}	-55 ~ 150	$^{\circ}\text{C}$
Operating Junction Temperature Range	T_J	-55 ~ 150	$^{\circ}\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction-ambient ¹	$R_{\theta JA}$	-	357	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	-	-	$^{\circ}\text{C}/\text{W}$



Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	S	D	
HL2N7002K	SOT23	1	2	3	Tape Reel

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate- Source Forward Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.5	V
Drain-Source On-State Resistance ²	$R_{DS(on)}$	$V_{GS}=10V, I_D=0.3A$	-	1900	2200	m Ω
		$V_{GS}=4.5V, I_D=0.2A$	-	2050	2870	m Ω
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1MHz$	-	28	-	pF
Output Capacitance	C_{oss}		-	11	-	
Reverse Transfer Capacitance	C_{rss}		-	4	-	
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=10V, V_{DD}=10V,$ $I_D=0.2A, R_G=10\Omega$	-	2	-	nS
Turn-on Rise Time	t_r		-	15	-	
Turn-Off Delay Time	$t_{d(off)}$		-	7	-	
Turn-Off Fall Time	t_f		-	20	-	
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=0.3A,$ $V_{GS}=4.5V$	-	1.7	-	nC
Gate-Source Charge	Q_{gs}		-	0.3	-	
Gate-Drain Charge	Q_{gd}		-	0.6	-	
Maximum Continuous Drain-Source Diode Forward Current	I_S	-	-	-	0.3	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	-	-	-	1.2	A
Drain to Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=0.3A$	-	-	1.2	V

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

Typical Performance Characteristics

Figure 1: Output Characteristics

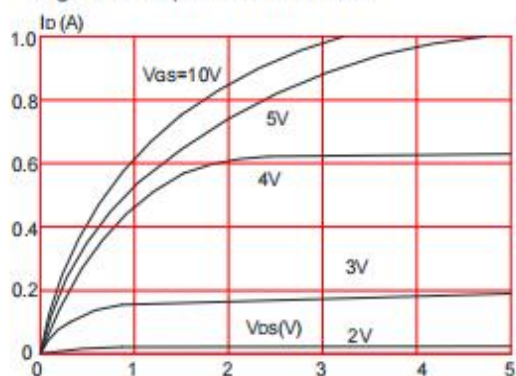


Figure 2: Typical Transfer Characteristics

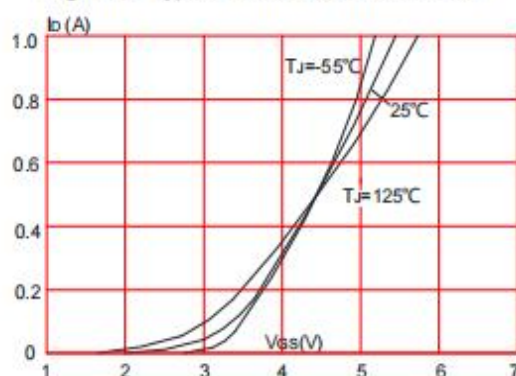


Figure 3: On-resistance vs. Drain Current

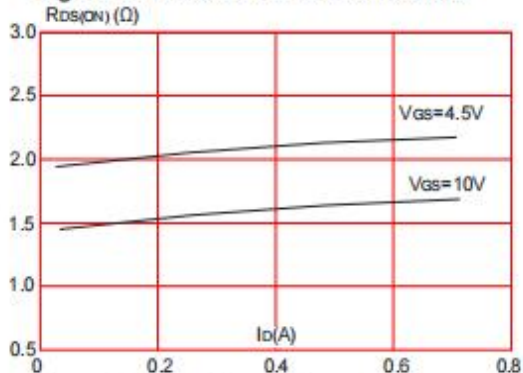


Figure 4: Body Diode Characteristics

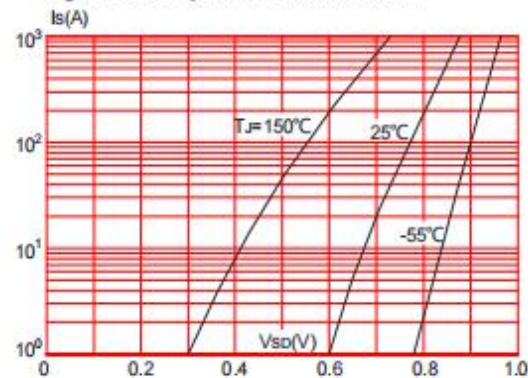


Figure 5: Gate Charge Characteristics

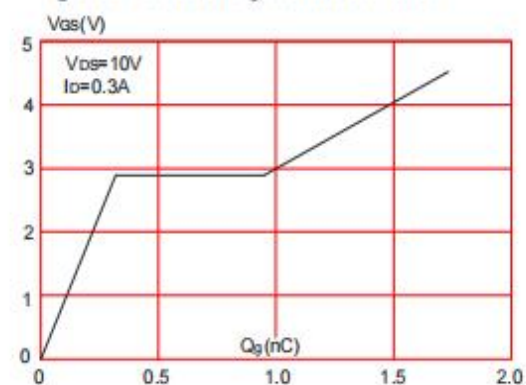


Figure 6: Capacitance Characteristics

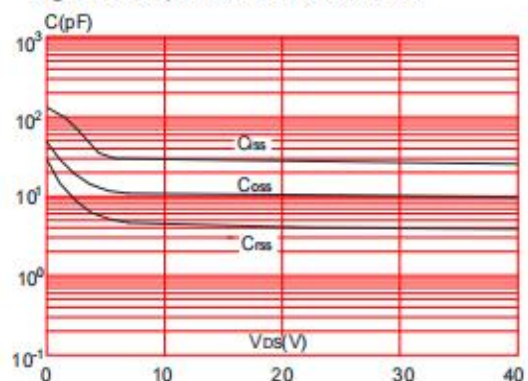


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

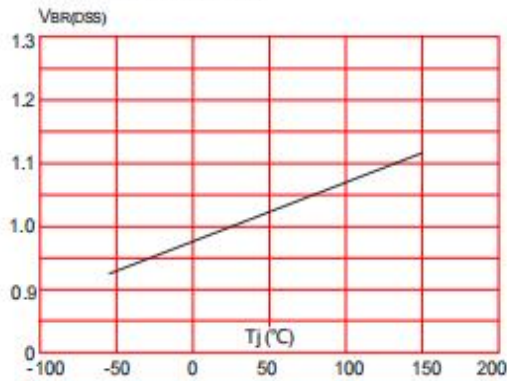


Figure 8: Normalized on Resistance vs. Junction Temperature

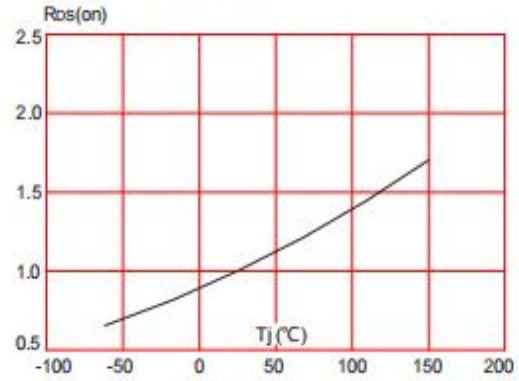


Figure 9: Maximum Safe Operating Area

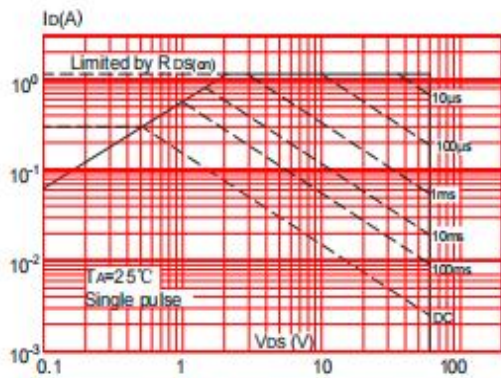


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

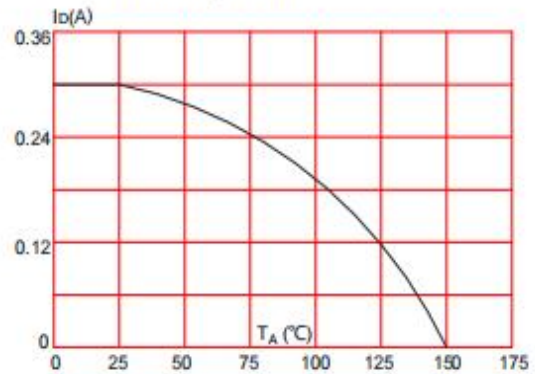
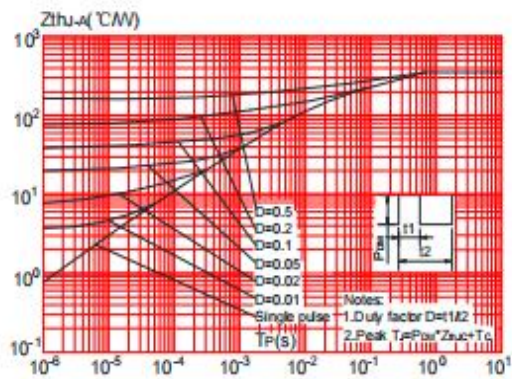
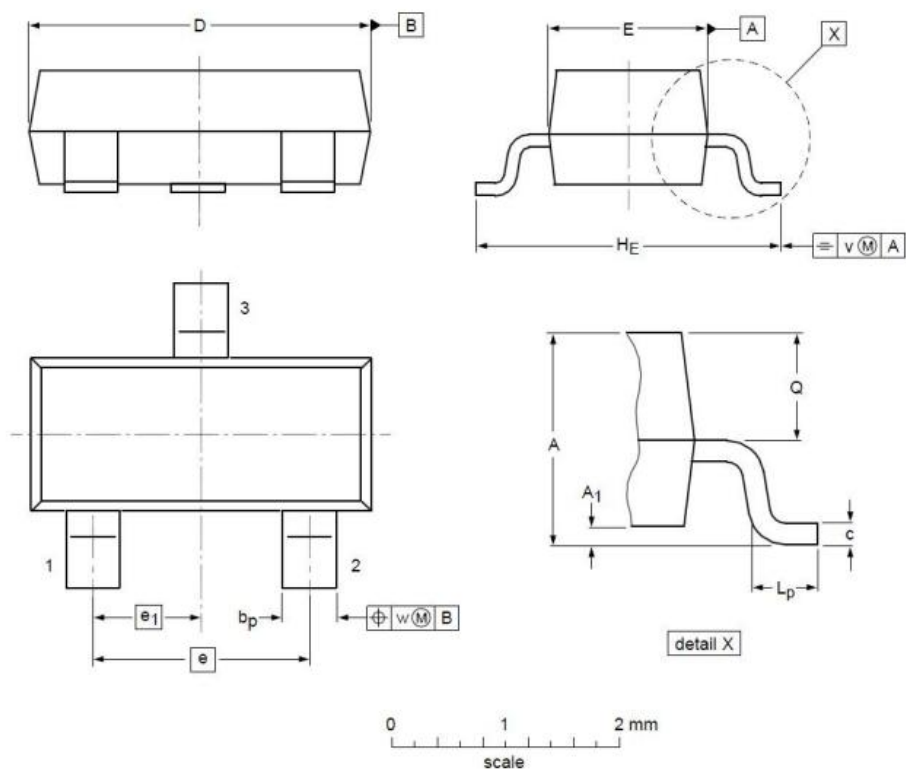


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Package Dimensions SOT23

DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A ₁	0.01	0.05	0.10
b _p	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e ₁	--	0.95	--
H _E	2.25	2.40	2.55	L _p	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				



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