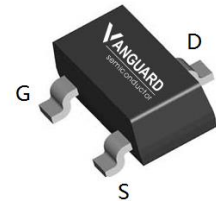


## Features

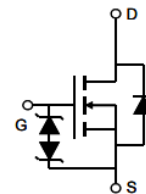
- N-Channel
- Enhancement Mode
- Fast Switching
- ESD Protected by HBM up to 2.5KV
- Pb-free lead plating; RoHS compliant

$V_{DS}$	60	V
$R_{DS(on),typ@VGS=10V}$	1	$\Omega$
$R_{DS(on),typ@VGS=4.5V}$	1.1	$\Omega$
$I_D$	0.76	A

### SOT23



Part ID	Package Type	Marking	Tape and reel information
VS2N7002K	SOT23	72K	3000pcs/reel



## Maximum ratings, at $T_j=25\text{ }^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	60	V
$V_{GS}$	Gate-Source voltage	$\pm 16$	V
$I_S$	Diode continuous forward current	$T_A=25\text{ }^\circ\text{C}$ 0.8	A
$I_D$	Continuous drain current @ $V_{GS}=10\text{V}$	$T_A=25\text{ }^\circ\text{C}$ 0.76	A
		$T_A=100\text{ }^\circ\text{C}$ 0.48	A
$I_{DM}$	Pulse drain current tested ①	$T_A=25\text{ }^\circ\text{C}$ 3	A
$P_D$	Maximum power dissipation	$T_A=25\text{ }^\circ\text{C}$ 1	W
$T_{STG}, T_J$	Storage and operating temperature range	-55 to 150	$^\circ\text{C}$

### Thermal characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JL}$	Thermal Resistance, Junction-to-Lead	80	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	125	$^\circ\text{C/W}$

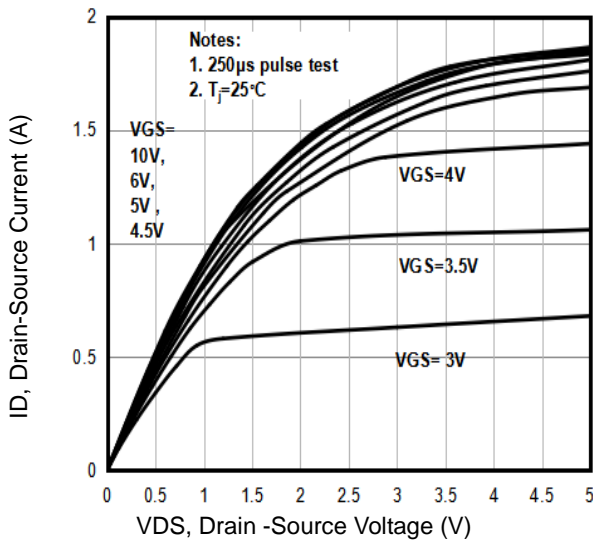
**Electrical Characteristics**

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ T<sub>j</sub>=25°C (unless otherwise stated)</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T <sub>j</sub> =125°C)	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V	--	--	±10	μA
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.2	2.5	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance ②	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A	--	1	3	Ω
		T <sub>j</sub> =100°C	--	1.3	--	Ω
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance ②	V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.05A	--	1.1	3	Ω
<b>Dynamic Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	20	26	32	pF
C <sub>oss</sub>	Output Capacitance		--	11	16	pF
C <sub>riss</sub>	Reverse Transfer Capacitance		--	7	12	pF
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>DS</sub> =30V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V	--	1.43	--	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge		--	0.7	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	0.35	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	0.22	--	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =30V, I <sub>D</sub> =0.5A, R <sub>G</sub> =3Ω, V <sub>GS</sub> =10V	--	2.4	--	ns
t <sub>r</sub>	Turn-on Rise Time		--	2.8	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	5.6	--	ns
t <sub>f</sub>	Turn-Off Fall Time		--	18	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
V <sub>SD</sub>	Forward on voltage	I <sub>SD</sub> =0.5A, V <sub>GS</sub> =0V	--	0.9	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	T <sub>j</sub> =25°C, I <sub>sd</sub> =0.5A, V <sub>GS</sub> =0V	--	10.4	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	--	4.7	--	nC

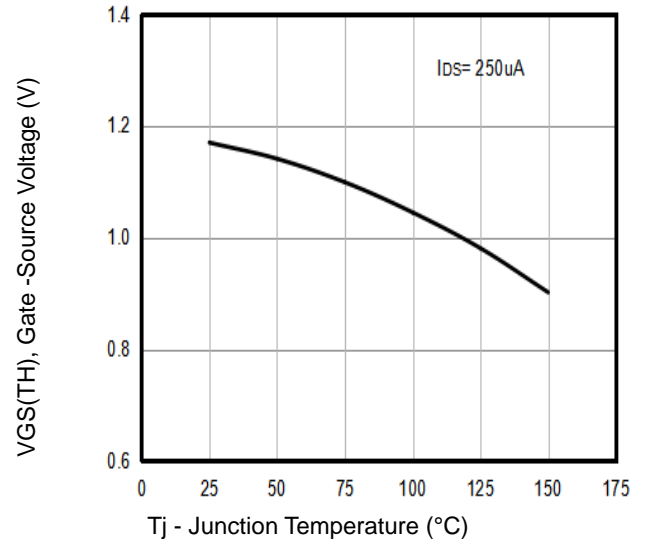
NOTE:

- ① Repetitive rating; pulse width limited by max junction temperature.  
 ② Pulse width ≤ 300μs; duty cycle ≤ 2%.

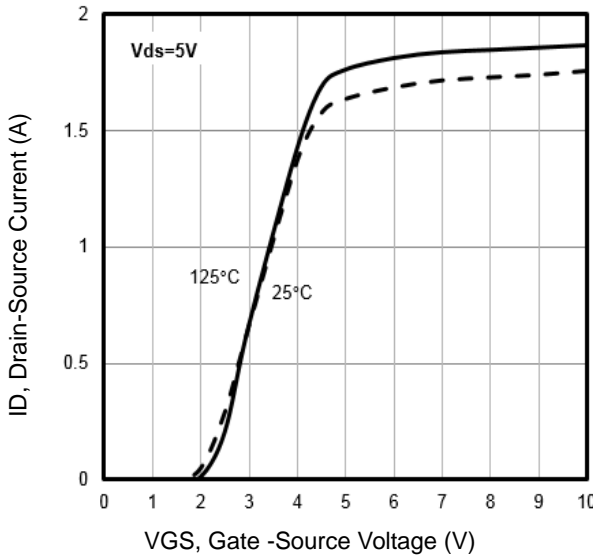
**Typical Characteristics**



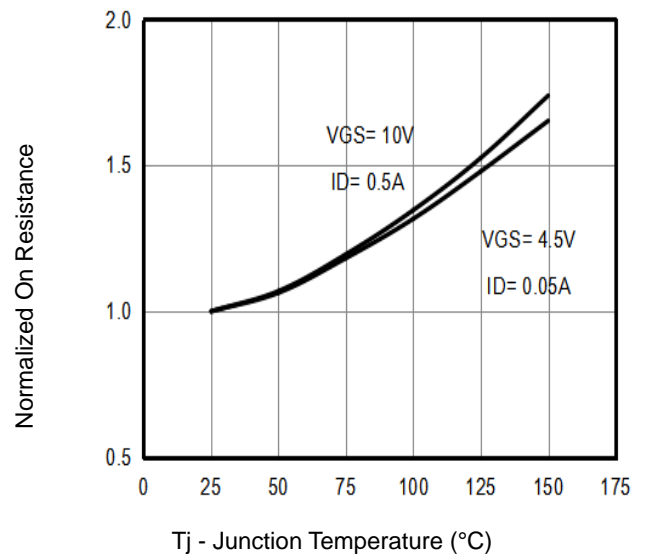
**Fig1.** Typical Output Characteristics



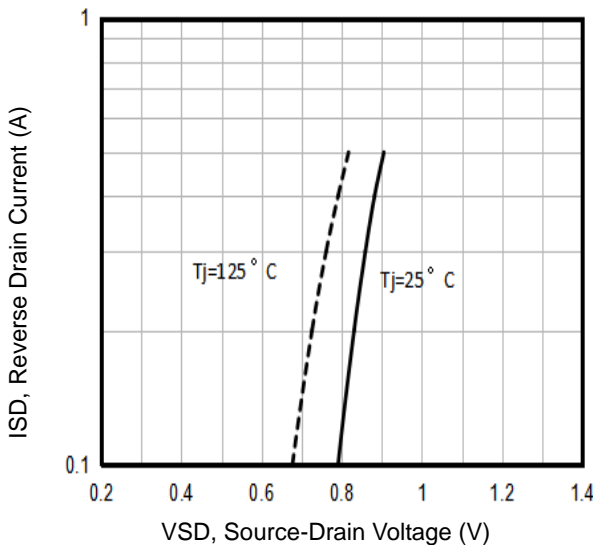
**Fig2.**  $V_{GS(TH)}$  Gate -Source Voltage Vs.  $T_j$



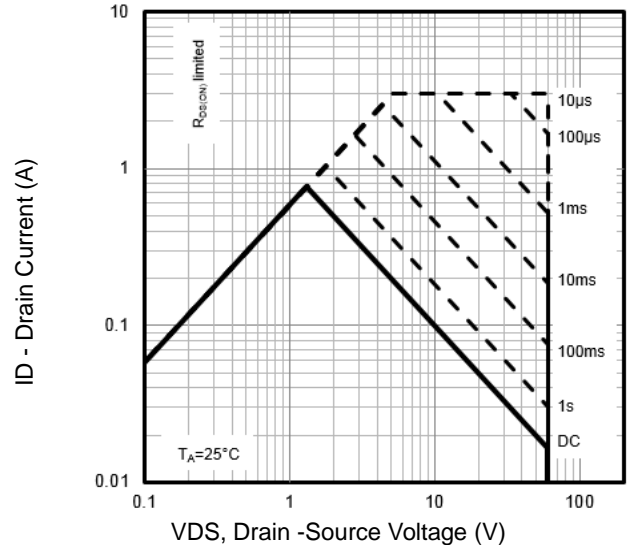
**Fig3.** Typical Transfer Characteristics



**Fig4.** Normalized On-Resistance Vs.  $T_j$



**Fig5.** Typical Source-Drain Diode Forward Voltage



**Fig6.** Maximum Safe Operating Area

Typical Characteristics

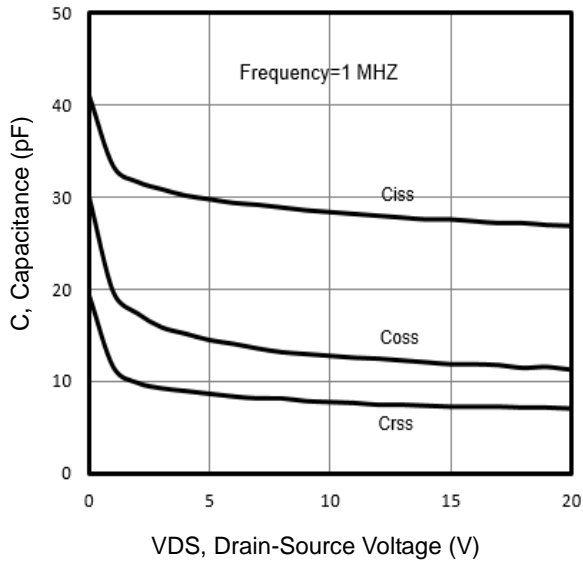


Fig7. Typical Capacitance Vs. Drain-Source Voltage

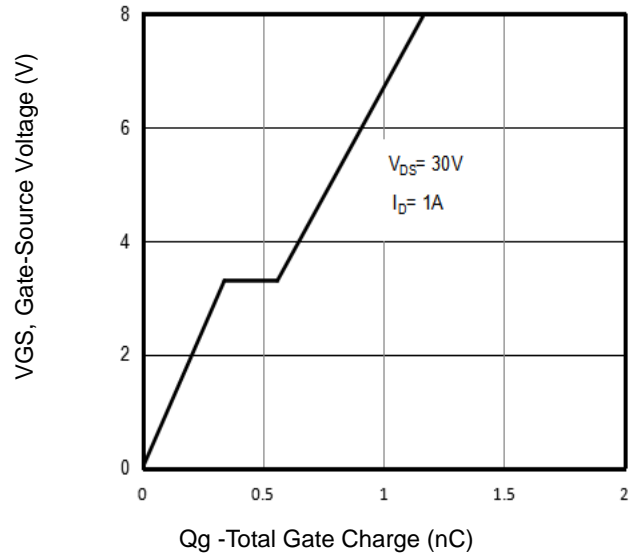


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

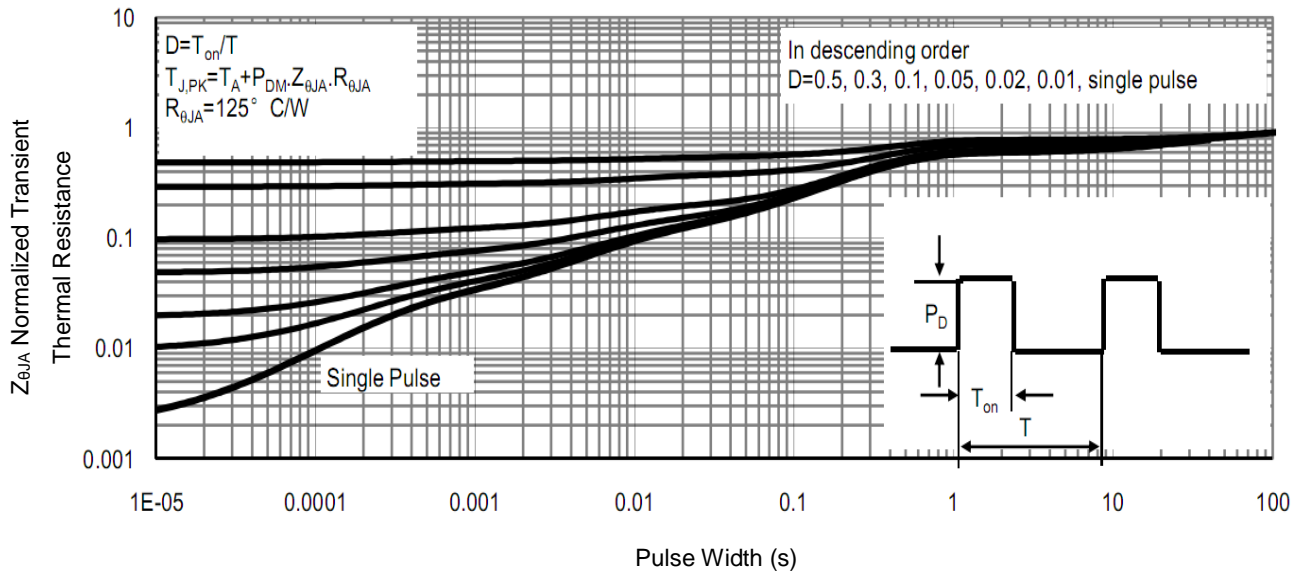


Fig9. Normalized Maximum Transient Thermal Impedance

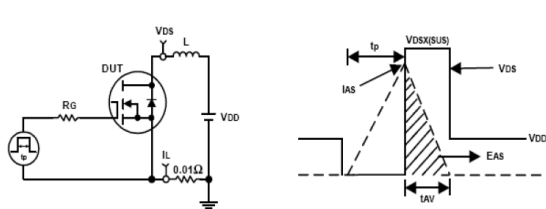


Fig10. Unclamped Inductive Test Circuit and waveforms

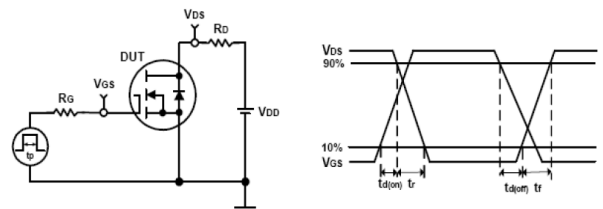
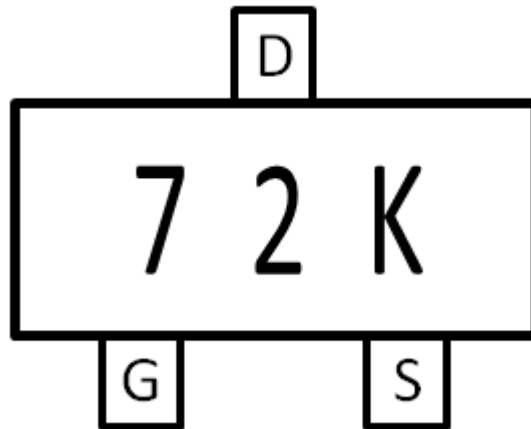


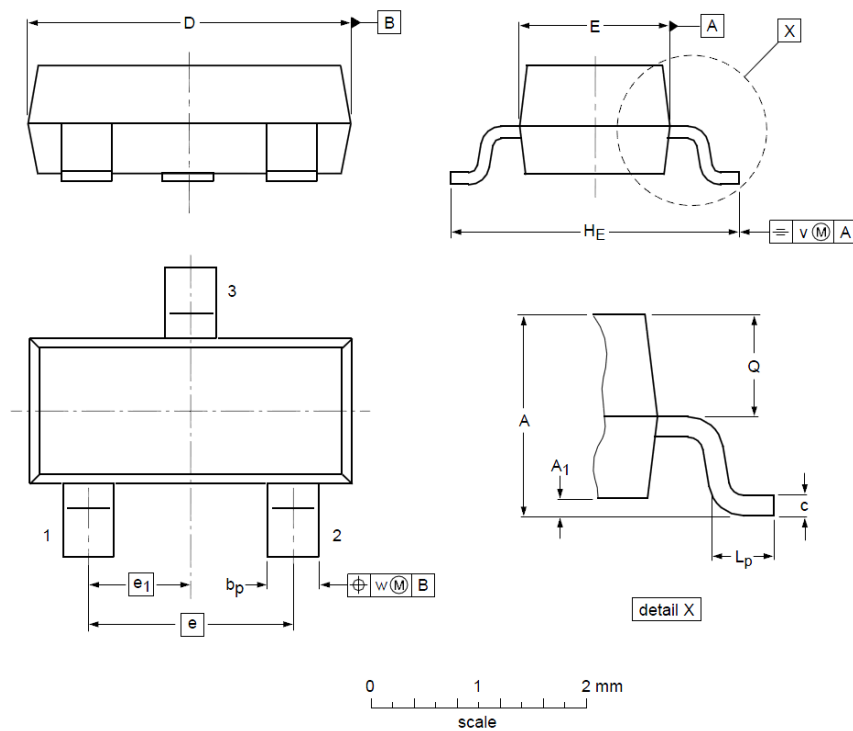
Fig11. Switching Time Test Circuit and waveforms

**Marking Information**



1<sup>st</sup> line: Part Number (72K)

### SOT23 Package Outline Data



Label	DIMENSIONS ( unit: mm )		
	Min	Typ	Max
<b>A</b>	0.90	1.03	1.10
<b>A<sub>1</sub></b>	0.01	0.05	0.10
<b>b<sub>p</sub></b>	0.38	0.42	0.48
<b>c</b>	0.09	0.13	0.15
<b>D</b>	2.80	2.92	3.00
<b>E</b>	1.20	1.33	1.40
<b>e</b>	--	1.90	--
<b>e<sub>1</sub></b>	--	0.95	--
<b>H<sub>E</sub></b>	2.10	2.40	2.50
<b>L<sub>p</sub></b>	0.40	0.50	0.60
<b>Q</b>	0.45	0.49	0.55
<b>v</b>	--	0.20	--
<b>w</b>	--	0.10	--

#### Notes:

1. Follow JEDEC TO-236, variation AB.
2. Dimension "D" does NOT include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.25mm per side.
3. Dimension "E" does NOT include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25mm per side.

## Customer Service

#### Sales and Service:

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