

Product Summary

- $V_{DS} = 60V, I_D = 0.3A$
- $R_{DS(on)} < 2.3\Omega @ V_{GS} = 10V$
- $R_{DS(on)} < 2.9\Omega @ V_{GS} = 4.5V$

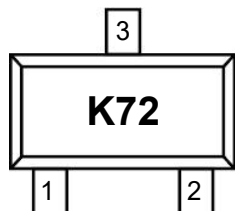
Features

- ESD Protected(HBM) up to 2KV
- Advanced Trench Technology
- RoHS and Reach Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 1

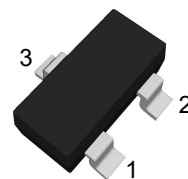
Application

- Battery Operated Systems
- Direct Logic-level Interface:TTL/CMOS
- Solid-State Relays

Marking Code



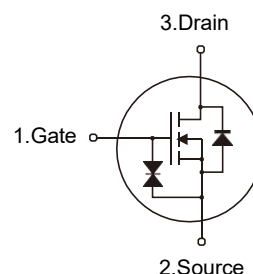
SOT-23



(Top View)

Pin	Description
1	Gate
2	Source
3	Drain

Schematic Diagram



Absolute Maximum Ratings

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	0.3	A
Maximum Power Dissipation	P_D	0.35	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient ^{Note1}	$R_{\theta JA}$	357	°C/W
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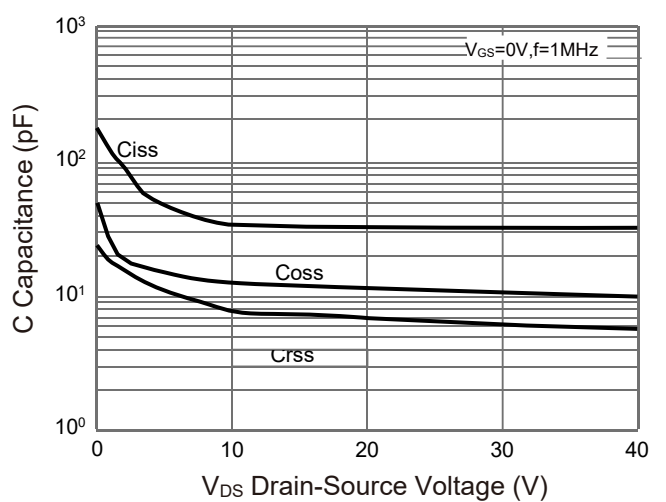
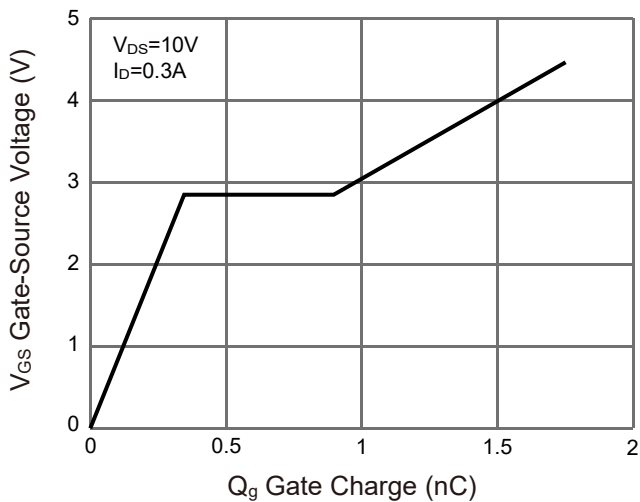
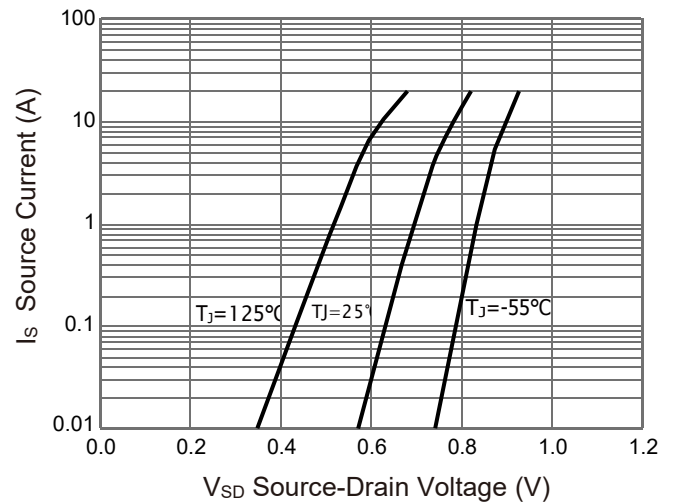
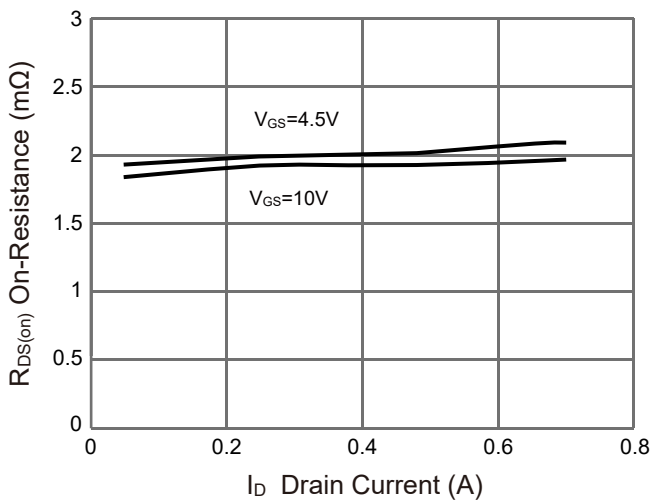
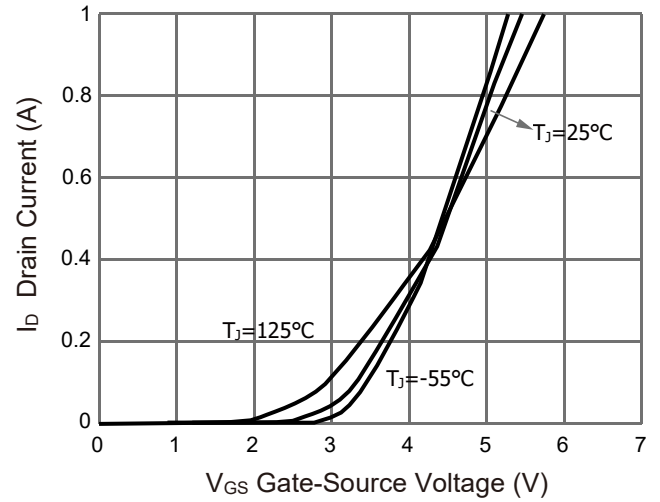
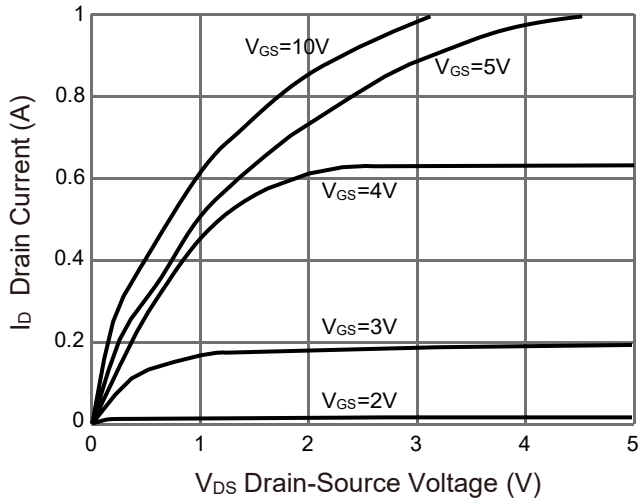
Electrical Characteristics

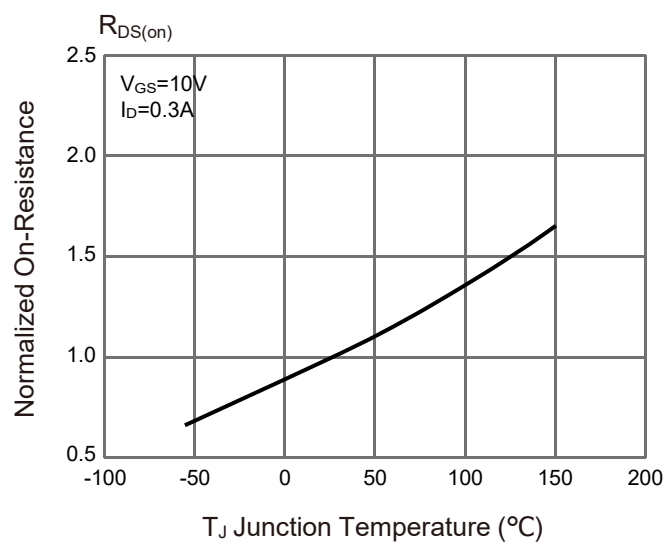
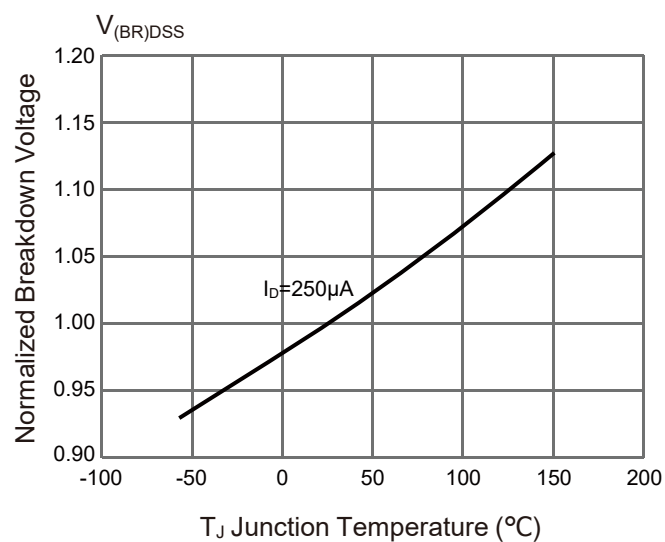
(Ta=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static 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} =60V, V _{GS} =0V	--	--	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	--	--	±10	μA
Gate Threshold Voltage ^{Note2}	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2.5	V
Drain-Source On-Resistance ^{Note2}	R _{DS(on)}	V _{GS} =10V, I _D =0.3A	--	1.8	2.3	Ω
		V _{GS} =4.5V, I _D =0.2A	--	2	2.9	Ω
Forward Transconductance ^{Note2}	g _{FS}	V _{DS} =5V, I _D =0.2A	--	0.35	--	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f=1MHz	--	31	--	pF
Output Capacitance	C _{oss}		--	11	--	pF
Reverse Transfer Capacitance	C _{rss}		--	6.5	--	pF
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	--	nC
Gate-Drain Charge	Q _{gd}		--	0.6	--	nC
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V, I _D =0.2A, V _{GS} =10V, R _{GEN} =10Ω	--	2	--	nS
Turn-on Rise Time	t _r		--	15	--	nS
Turn-off Delay Time	t _{d(off)}		--	7	--	nS
Turn-off Fall Time	t _f		--	20	--	nS
Source-Drain Diode Characteristics						
Diode Forward Voltage ^{Note2}	V _{SD}	V _{GS} =0V, I _S =0.3A	--	--	1.2	V
Diode Forward Current ^{Note1}	I _S		--	--	0.3	A

Note: 1. Surface Mounted on FR4 Board, $t \leq 10$ sec.
2. Pulse Test: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Typical Characteristic Curves

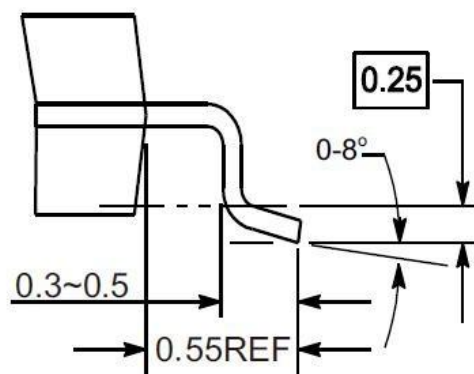
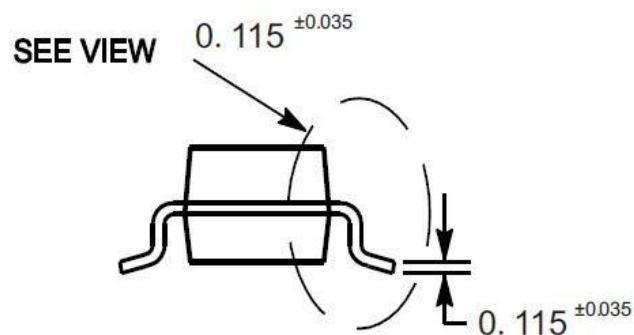
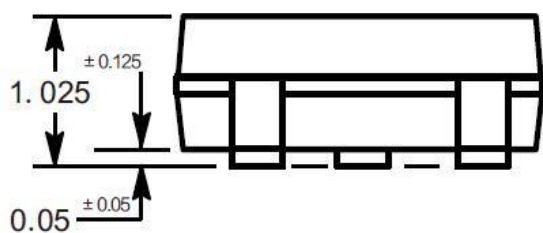
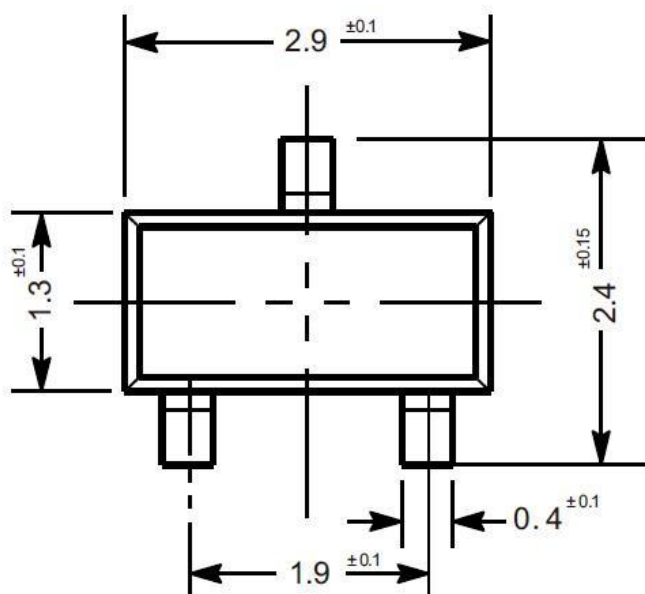




Package Outline

SOT-23

Dimensions in mm



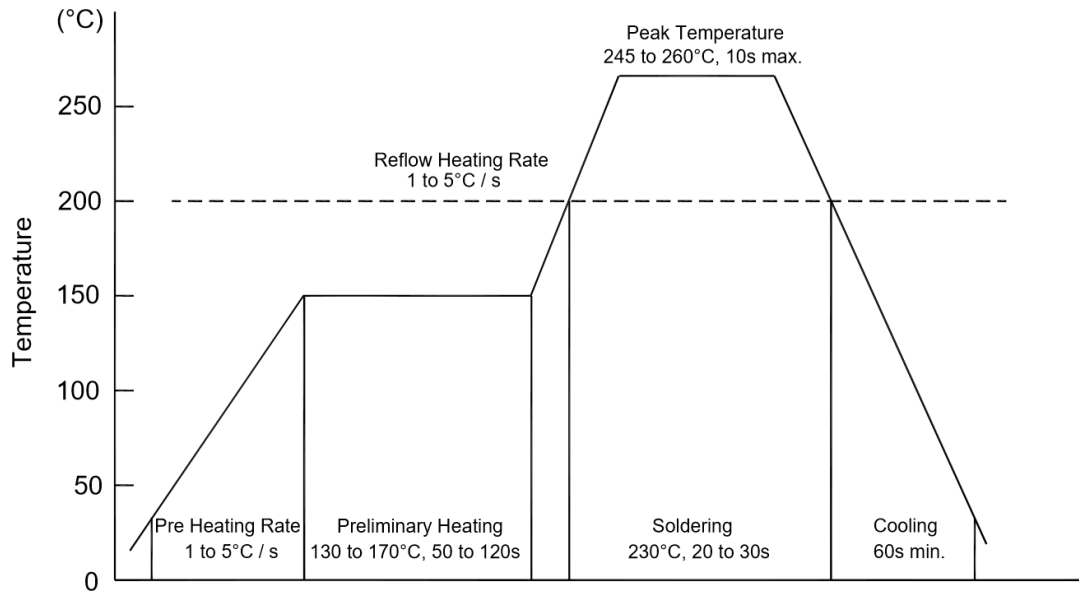
VIEW C

Ordering Information

Device	Package	Shipping
TN7002KNSA	SOT-23	3,000PCS/Reel&7inches

Conditions of Soldering and Storage

◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

◆ Conditions of hand soldering

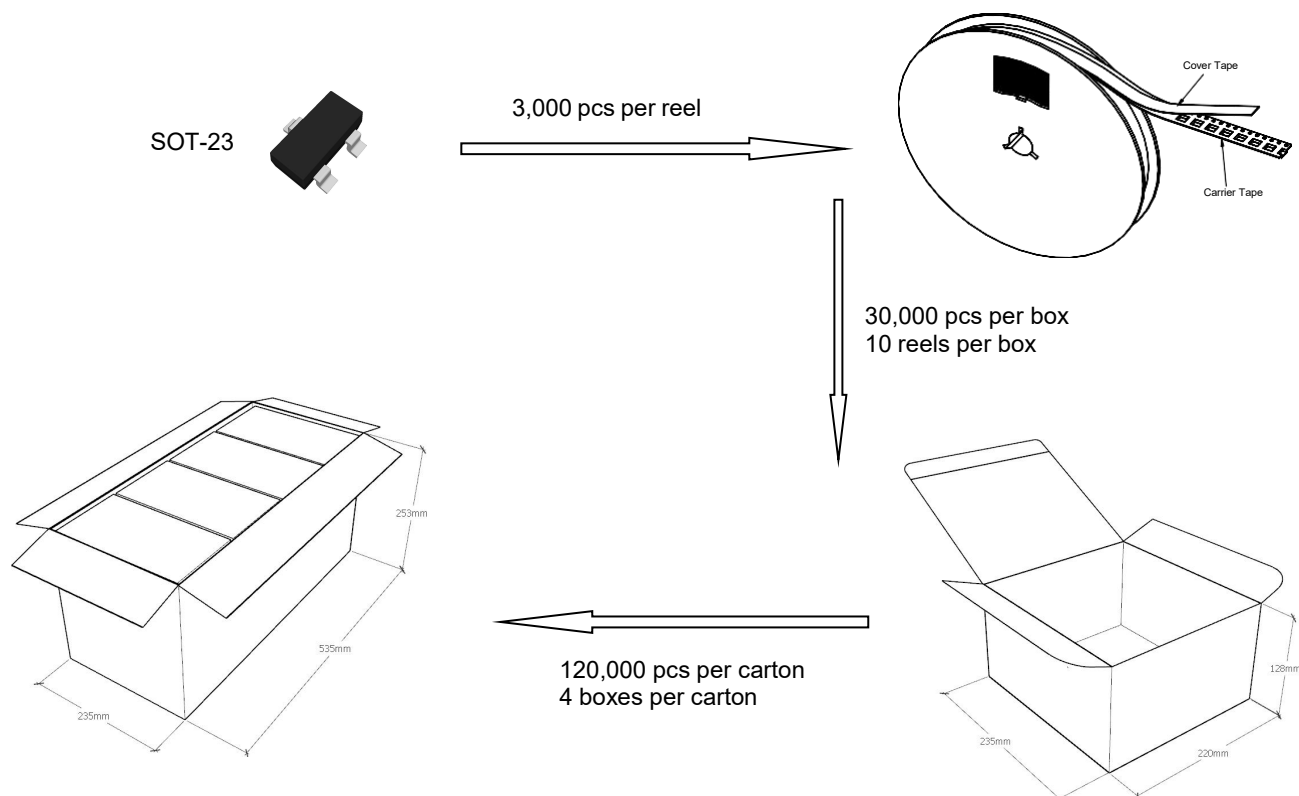
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

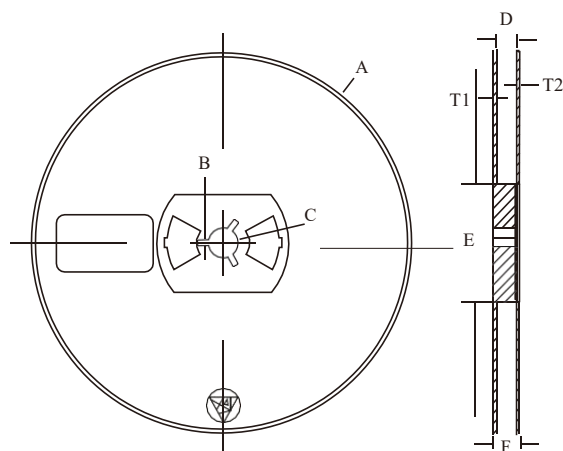
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging



◆ Embossed tape and reel data



Symbol	Value (unit: mm)
A	$\varnothing 177.8 \pm 1$
B	2.7 ± 0.2
C	$\varnothing 13.5 \pm 0.2$
E	$\varnothing 54.5 \pm 0.2$
F	12.3 ± 0.3
D	$9.6 \pm 2 / -0.3$
T1	1.0 ± 0.2
T2	1.2 ± 0.2

Reel (7")

