

60V N-Channel MOSFET

MOSFET Product Summary

V_{DS}	$R_{DS(ON)}(Typ.)$	I_D
60V	1.6Ω @ $V_{GS}=10V$	0.25A
	1.8Ω @ $V_{GS}=4.5V$	

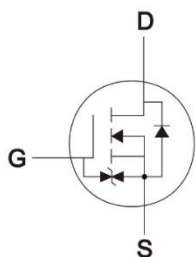
Description

The 2N7002KN uses advanced Trench technology and designs to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

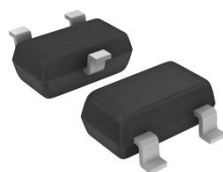
Features

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery

Dimensions and Pin Configuration



Circuit diagram



SOT-523

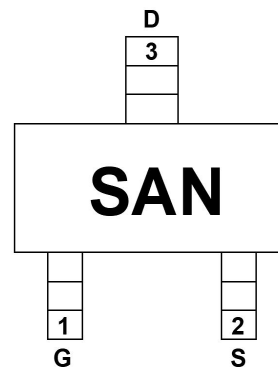
Mechanical Characteristics

- Package: SOT-523
- Case Material: "Green" Molding Compound
- Marking Information: See Below

Applications

- Load Switch for Portable Devices
- DC/DC Converter
- Power management
- Battery operated systems
- Level Shift Circuits

Marking Information



SAN = Device Marking Code

Ordering Information

Part Number	Shipping	Reel Size
2N7002KN	3000/Tape & Reel	7 inch

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current ^(Note1)	I_D	0.25	A
Pulsed Drain Current ^(Note2)	I_{DM}	0.8	A

Power Dissipation	P_D	0.22	W
Thermal Resistance from Junction to Ambient ^(Note3)	$R_{\theta JA}$	580	°C/W
Junction Temperature	T_J	-55~ +150	°C
Storage Temperature	T_{STG}	-55~ +150	°C

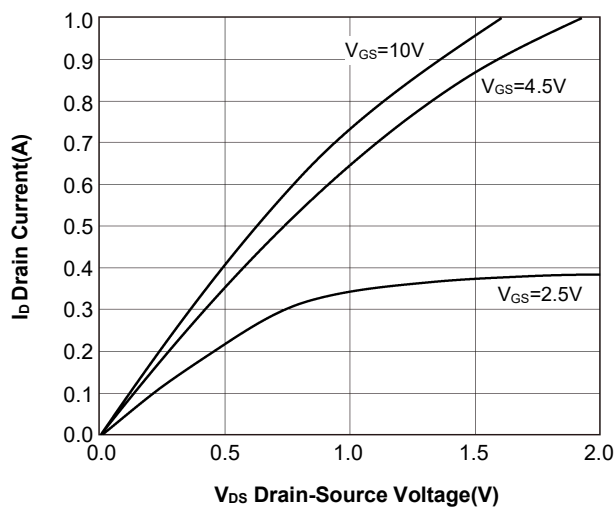
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 10	μA
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.0	V
Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=0.3A$	-	1.6	3.0	Ω
		$V_{GS}=4.5V, I_D=0.3A$	-	1.8	3.5	
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=0.2A$	-	0.87	1.25	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=5V, V_{GS}=0V, f=1MHz$	-	35	-	pF
Output Capacitance	C_{oss}		-	21	-	
Reverse Transfer Capacitance	C_{rss}		-	11	-	
Switching Characteristics						
Gate Total Charge	Q_g	$V_{GS}=10V, V_{DD}=30V, I_D=0.1A$	-	1.5	-	nC
Gate-to-Source Charge	Q_{gs}		-	0.35	-	
Gate-to-Drain Charge	Q_{gd}		-	0.38	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=5V, V_{DD}=5V, I_D=10mA, R_G=10\Omega$	-	8.3	-	ns
Turn-On Rise Time	t_r		-	3.7	-	
Turn-Off Delay Time	$t_{d(off)}$		-	22.5	-	
Turn-Off Fall Time	t_f		-	13.9	-	

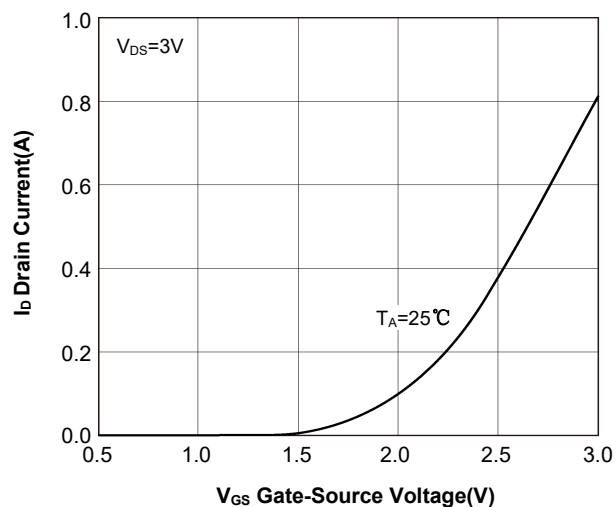
Notes:

1. This current is chip limited, which is calculated based on $R_{\theta JA}$.
2. This current is calculated on single pulse with 10 μs Pulse & Duty Cycle = 1%.
3. The value of $R_{\theta JA}$, which is steady state, is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, with $T_A=25^\circ\text{C}$.

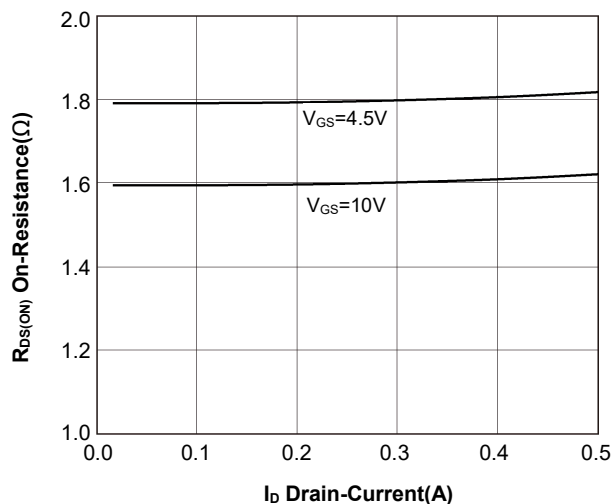
Typical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise specified)



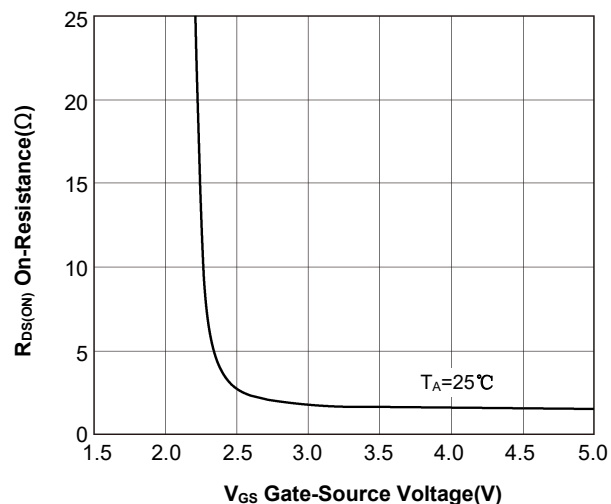
Drain Current vs. Drain-Source Voltage



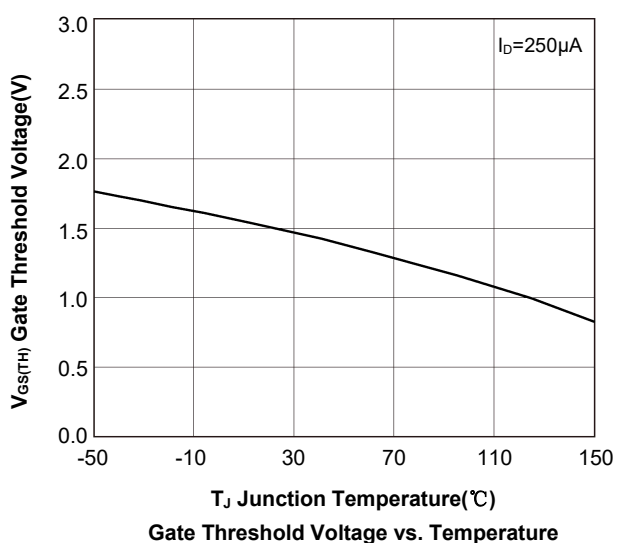
Drain Current vs. Gate-Source Voltage



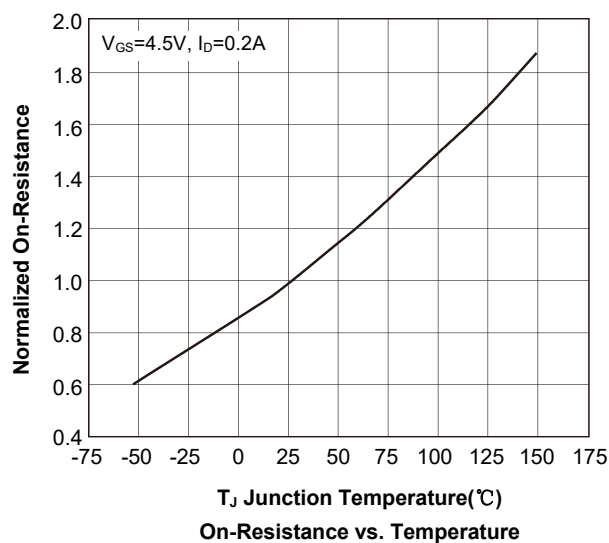
$R_{DS(ON)}$ On-Resistance vs. Drain-Current



On-Resistance vs. Gate-Source Voltage

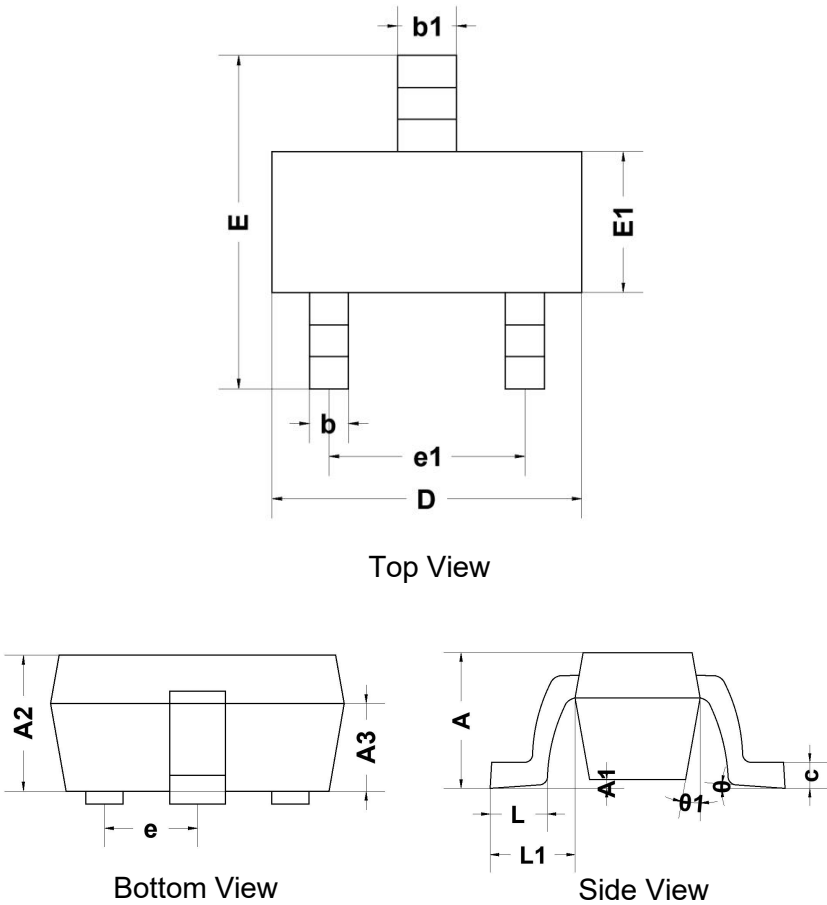


Gate Threshold Voltage vs. Temperature



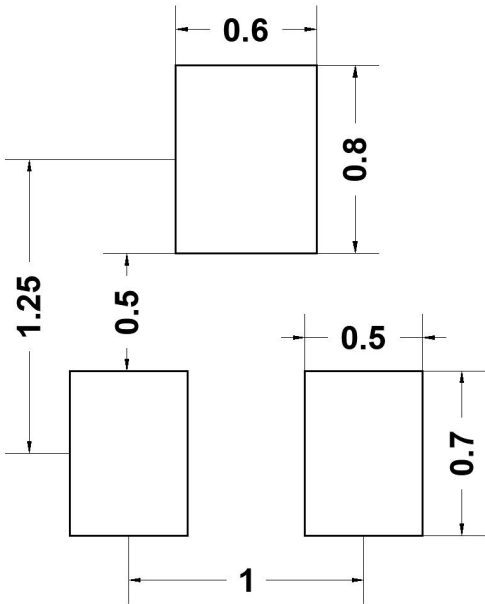
On-Resistance vs. Temperature

SOT-523 Package Outline Drawing



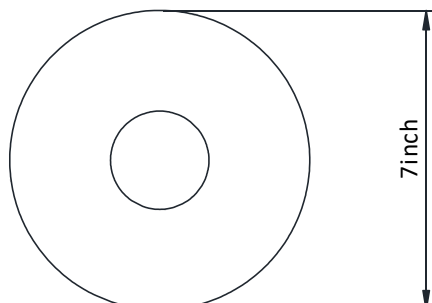
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.68	0.78	0.88
A1	0.01	0.05	0.10
A2	0.63	0.73	0.83
A3	0.42	0.47	0.52
b	0.15	0.20	0.25
b1	0.25	0.30	0.35
c	0.10	0.15	0.20
D	1.48	1.58	1.68
E1	0.62	0.72	0.82
E	1.55	1.70	1.85
e	0.50 BSC.		
e1	0.95	1.00	1.05
L1	0.49 REF.		
L	0.21	0.33	0.45
θ	0°	4°	8°
θ_1	10°		

Recommended PCB Layout (Unit: mm)

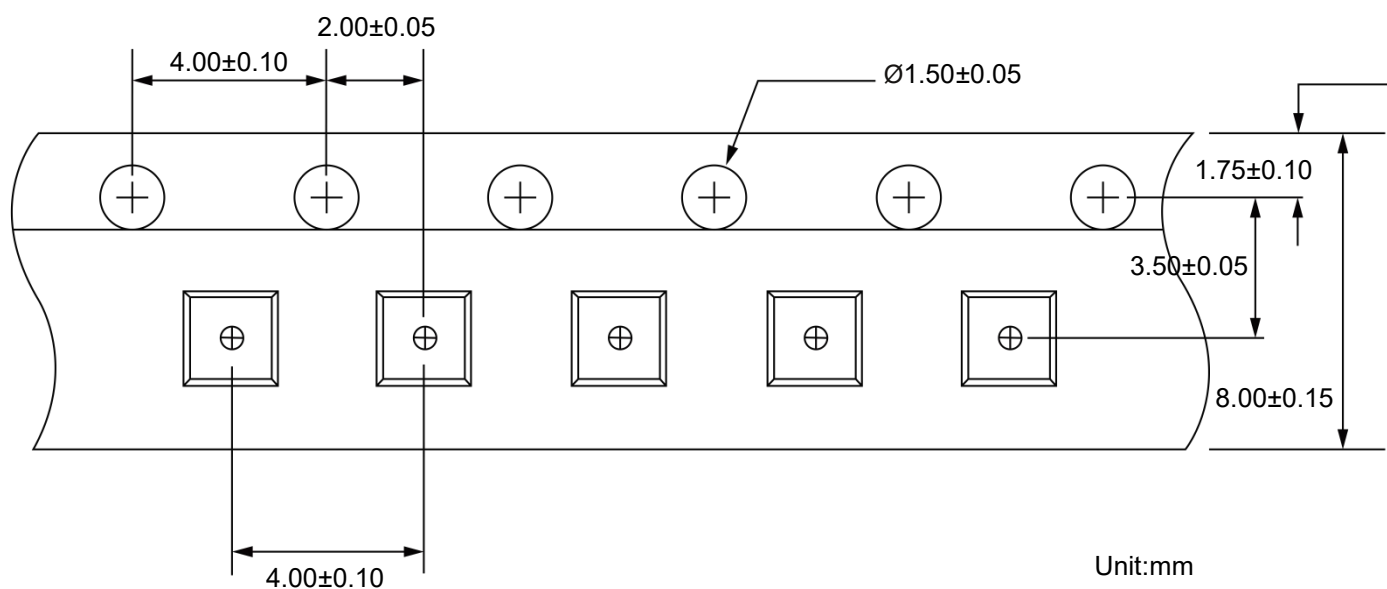


TAPE AND REEL INFORMATION

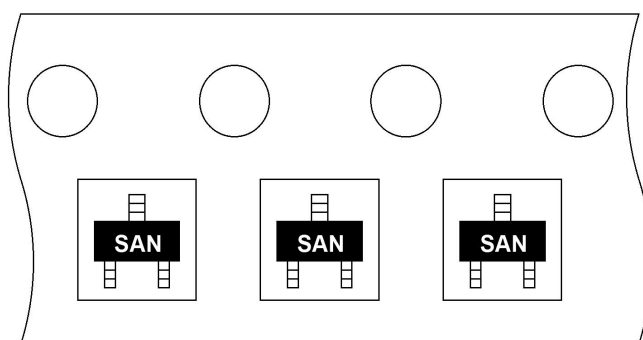
Reel Dimensions



Tape Dimensions



Unit:mm



User Direction of Feed

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