



General Description

This MOSFET has been designed to minimize the Drain-source on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

Features

- Low $R_{DS(ON)}$ & FOM
- Low Input Capacitance
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery
- ESD Protected up to 2kV



Applications

- Motor Control
- Power mangement
- Backlighting

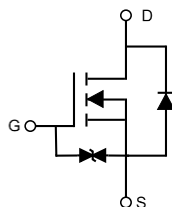
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(ON), max} @ V_{GS}=10V$	2.5	Ω

Marking Information

Product Name	Package	Marking
2N7002K	SOT-23	002K

Package & Pin information



Absolute Maximum Ratings at $T_j=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	300	mA
Pulsed Drain Current ¹⁾	$I_{D,pulse}$	1.5	A
Power Dissipation	P_D	300	mW
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-ambient ²⁾	$R_{\theta JA}$	350	$^{\circ}\text{C/W}$

Electrical Characteristics at $T_j=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	60			V	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		0.97	2.5	Ω	$V_{GS}=10\text{ V}, I_D=0.5\text{ A}$
			1.1	3	Ω	$V_{GS}=4.5\text{ V}, I_D=0.5\text{ A}$
Gate-source leakage current	I_{GSS}			10	μA	$V_{GS}=20\text{ V}$
				-10		$V_{GS}=-20\text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		33		pF	$V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		12		pF	
Reverse transfer capacitance	C_{rss}		4		pF	
Turn-on Delay Time	$t_{d(on)}$		10		ns	$V_{GS}=10\text{ V}$, $V_{DS}=30\text{ V}$, $R_G=10\ \Omega$, $I_D=0.2\text{ A}$
Turn-on Rise Time	t_r		50		ns	
Turn-Off Delay Time	$t_{d(off)}$		17		ns	
Turn-Off Fall Time	t_f		10		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total Gate Charge	Q_g		1.8		nC	$V_{GS}=4.5\text{ V}$, $V_{DS}=25\text{ V}$, $I_D=0.3\text{ A}$

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Source drain current (Body Diode)	I_{SD}			300	mA	$T_A=25^\circ\text{C}$
Diode forward voltage ²⁾	V_{SD}			1.3	V	$I_S=0.3\text{ A}$, $V_{GS}=0\text{ V}$

Note: 1) Pulse width limited by maximum allowable junction temperature.
 2) Repetitive Rating: Pulse width limited by maximum junction temperature.

Electrical Characteristics Diagrams

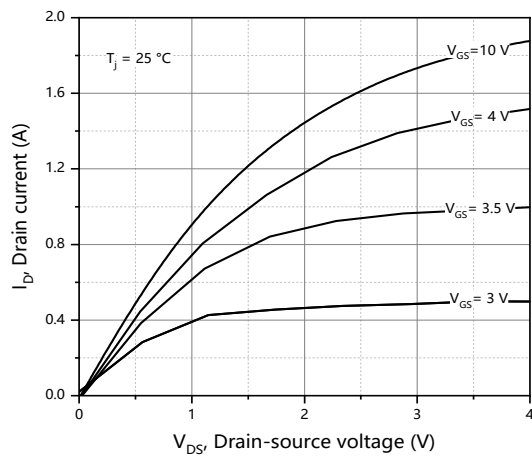


Figure 1. Typ. output characteristics

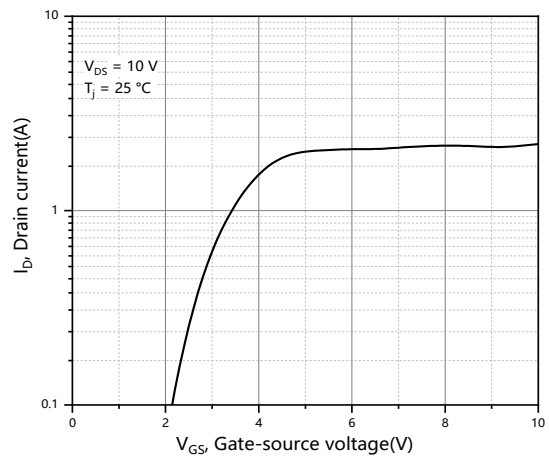


Figure 2. Typ. transfer characteristics

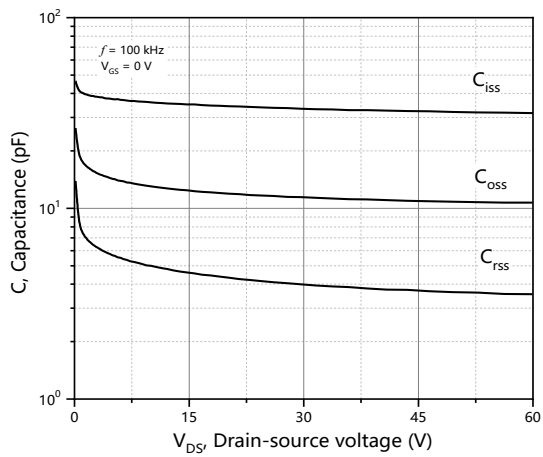


Figure 3. Typ. capacitances

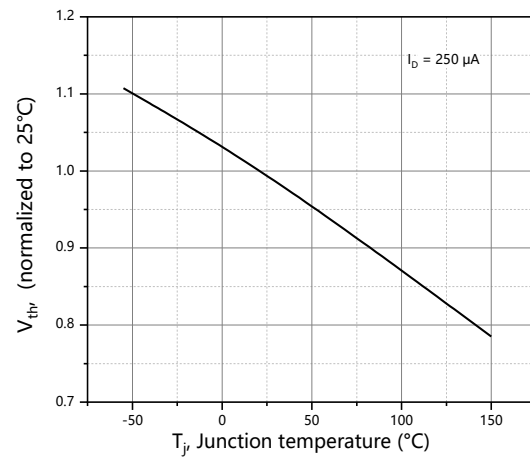


Figure 4. Threshold voltage

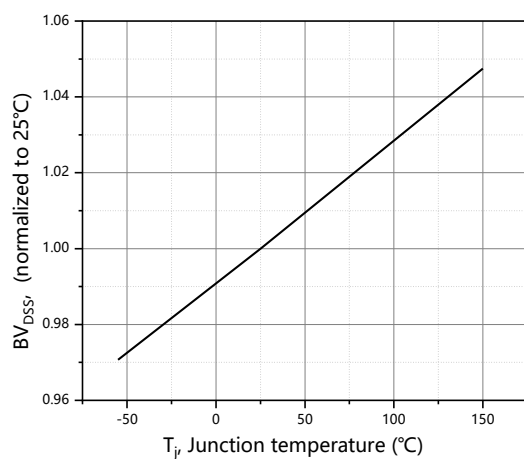


Figure 5. Drain-source breakdown voltage

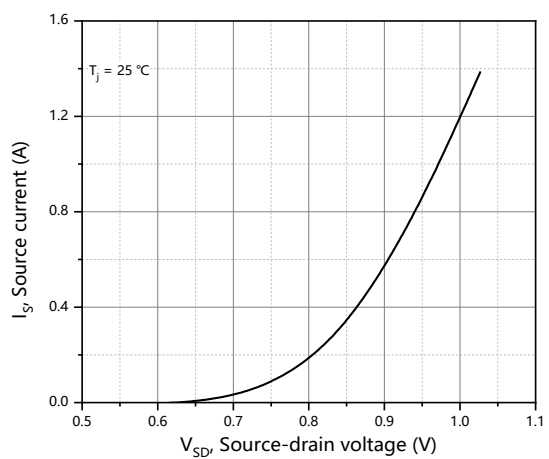


Figure 6. Forward characteristic of body diode

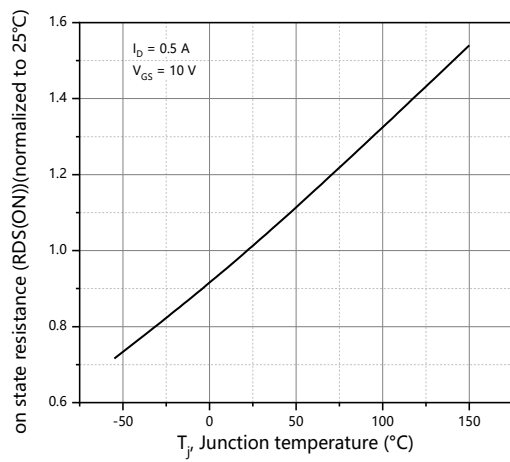


Figure 7. Drain-source on-state resistance

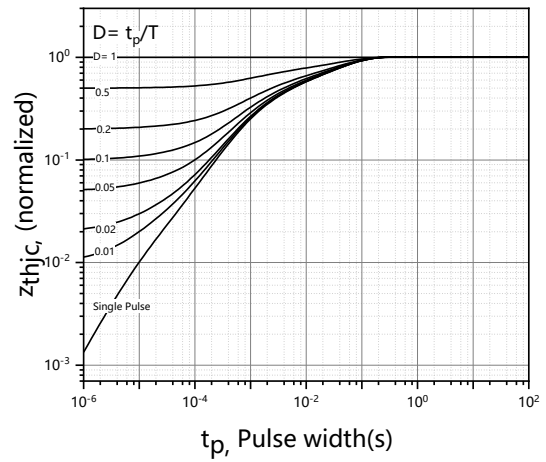
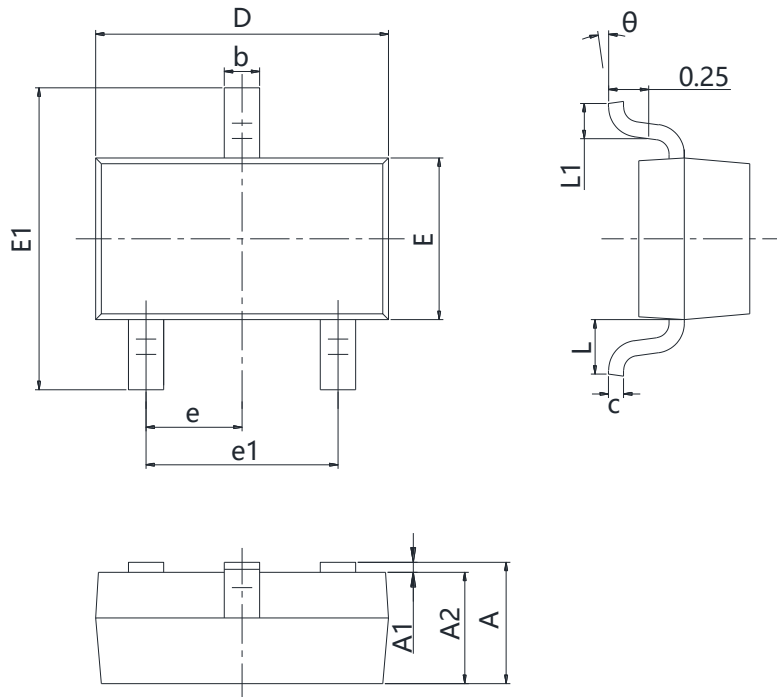


Figure 8. Max. transient thermal impedance

Package Information



Symbol	mm	
	Min	Max
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	0.280	3.000
E	1.200	1.400
e	0.950 TYP	
e1	1.800	2.000
L	0.550 REF	
L1	0.300	0.500
θ	0°	8°

Version : SOT-23-V package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
SOT-23-V	3000	15	45000	4	180000

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