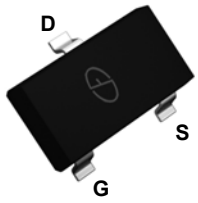
GOOD-ARK SEMICONDUCTOR

2N7002K

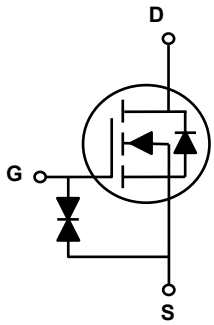
60V N-Channel MOSFET

Main Product Characteristics

V_{DS}	60V
$R_{DS(ON)}$	3.0Ω
I_D	300mA



SOT-23



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

RoHS Compliant

Description

The 2N7002K utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

Absolute Maximum Ratings (T_a=25°C unless otherwise specified)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous@ Current-Pulsed (Note 1)	I_D	0.3	A
	I_D (70°C)	0.26	
	I_{DM}	0.8	A
Maximum Power Dissipation	P_D	0.43	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	°C

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	350	°C/W

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ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{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}=±5V,V_{DS}=0V			100	nA
		V_{GS}=±10V,V_{DS}=0V			150	nA
		V_{GS}=±20V,V_{DS}=0V			10	uA
Gate-Source Breakdown Voltage	BV_{GSO}	V_{DS}=0V, I_G=±250uA	±20			V
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1		2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=0.5A			3	Ω
		V_{GS}=5V, I_D=0.05A			3.5	
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=0.2A	0.08			S
DYNAMIC CHARACTERISTICS (Note4)						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz		30		PF
Output Capacitance	C_{oss}			6		PF
Reverse Transfer Capacitance	C_{rss}			3		PF
SWITCHING CHARACTERISTICS (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,V_{GS}=10V, R_{GEN}=10Ω, R_L=150Ω I_D=0.2A			25	nS
Turn-Off Delay Time	$t_{d(off)}$				35	nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=0.25A,V_{GS}=4.5V		0.4	0.6	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=0.2A			1.3	V

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

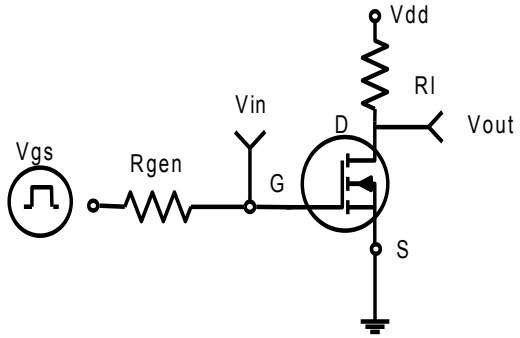


Figure 1. Switching Test Circuit

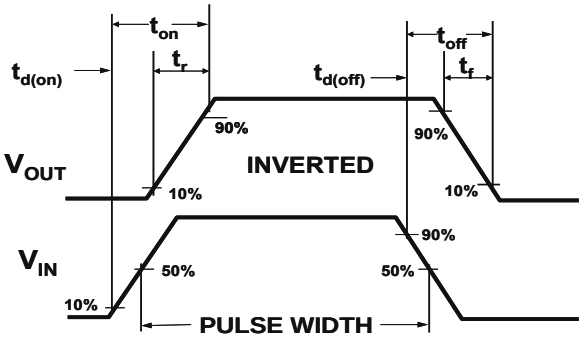


Figure 2. Switching Waveforms

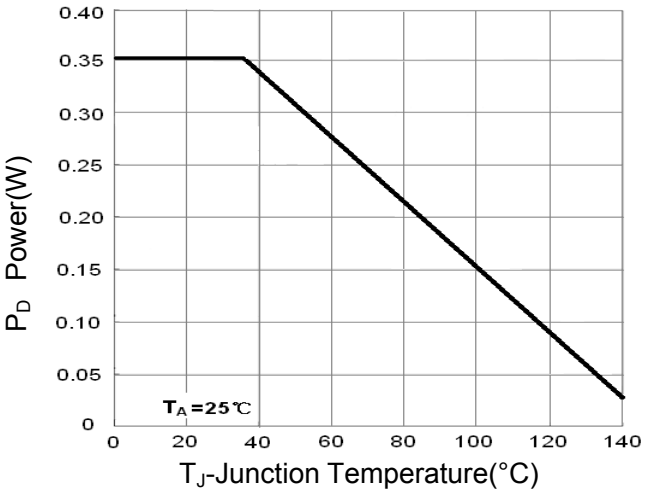


Figure 3. Power Dissipation

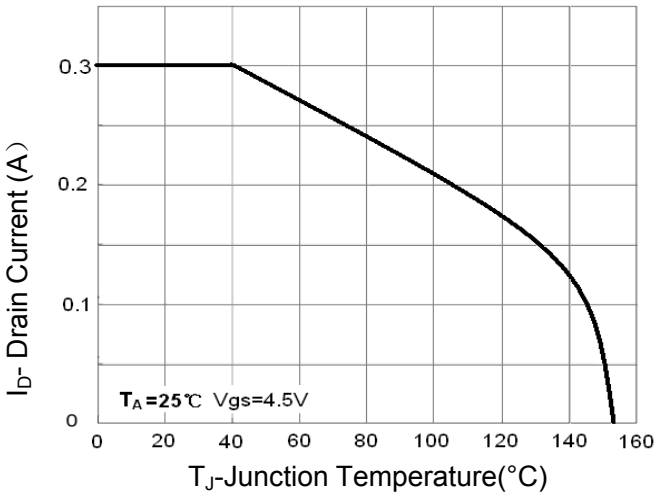


Figure 4. Drain Current

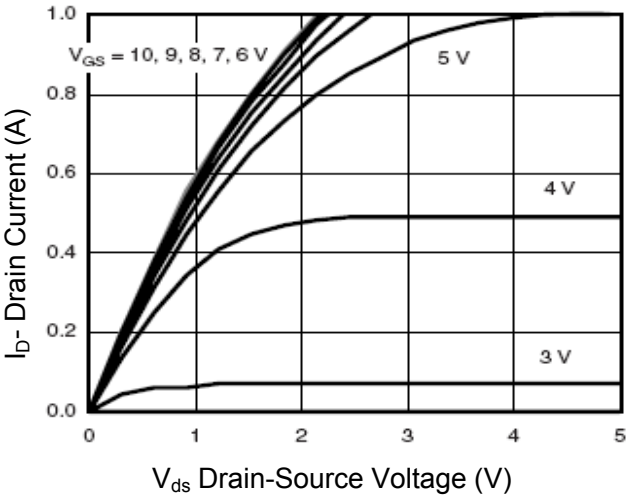


Figure 5. Output Characteristics

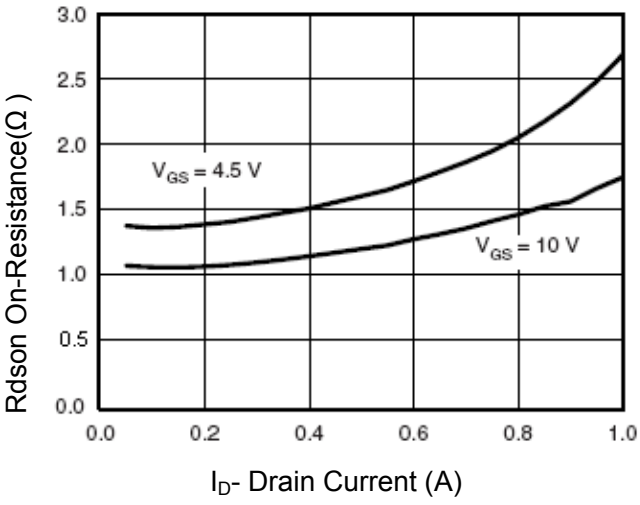


Figure 6. Drain-Source On-Resistance

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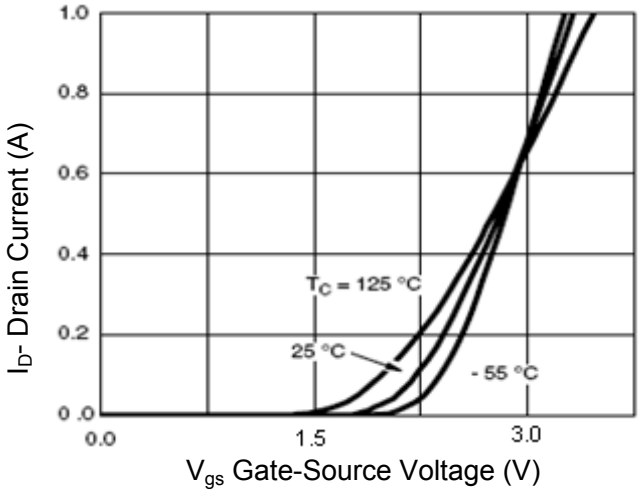


Figure 7. Transfer Characteristics

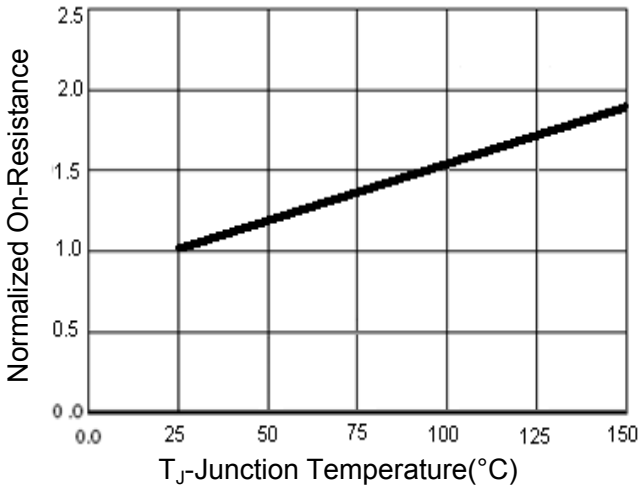


Figure 8. Drain-Source On-Resistance

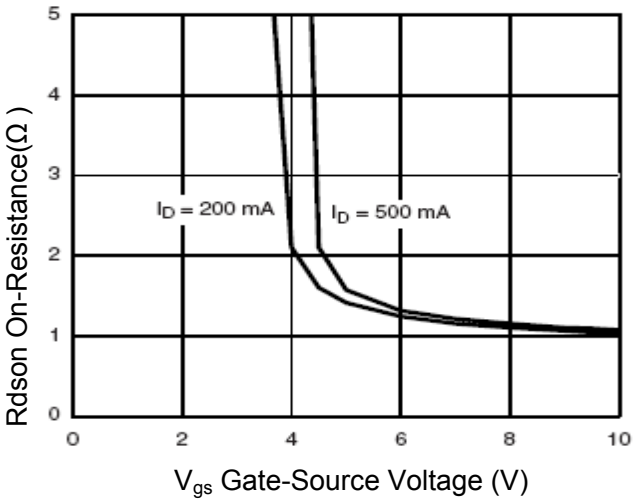


Figure 9. R_{dson} vs V_{gs}

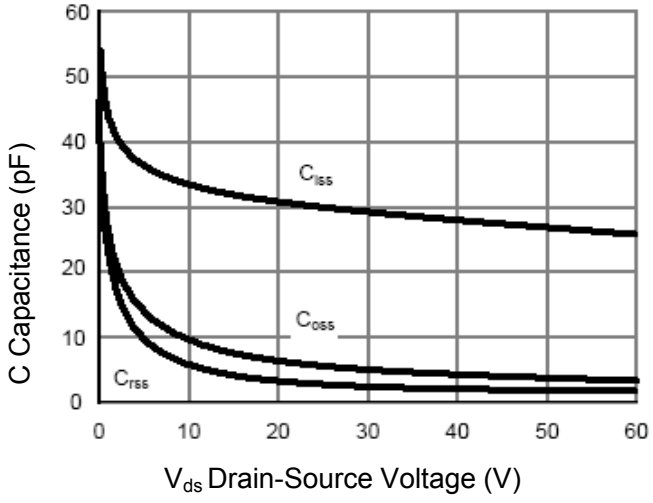


Figure 10. Capacitance vs V_{ds}

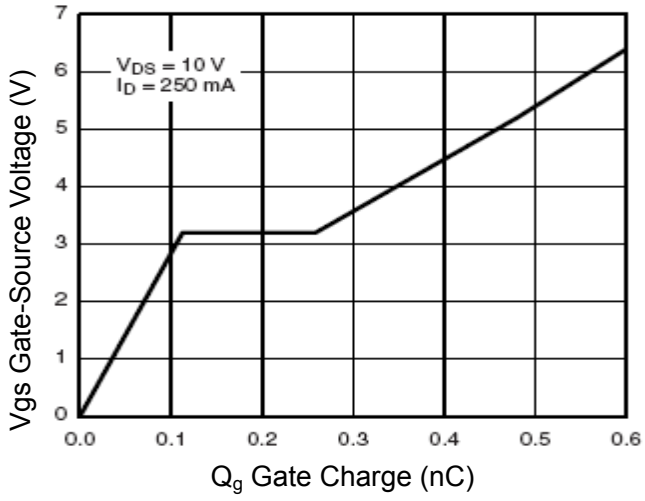


Figure 11. Gate Charge

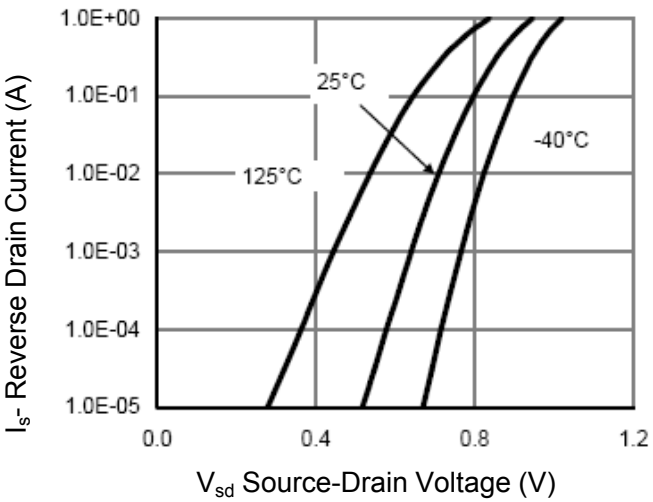


Figure 12. Source- Drain Diode Forward

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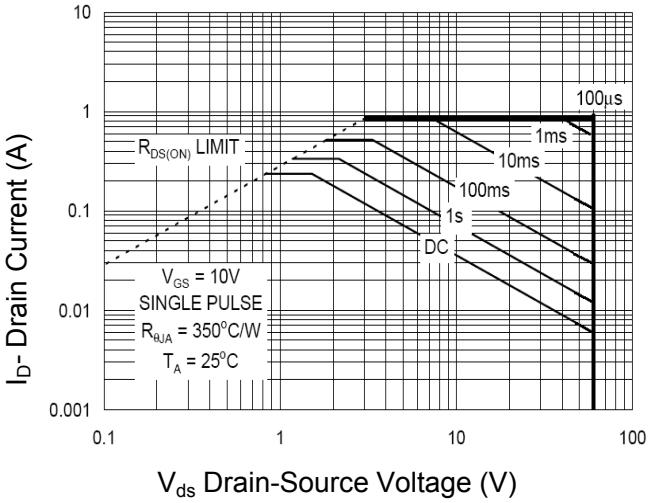


Figure 13. Safe Operation Area

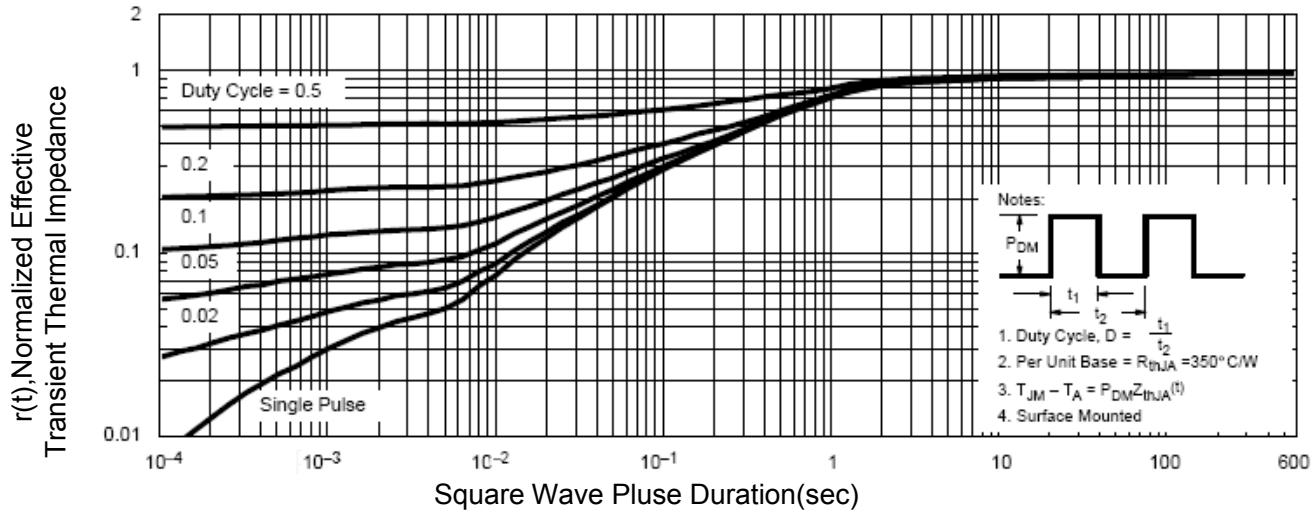
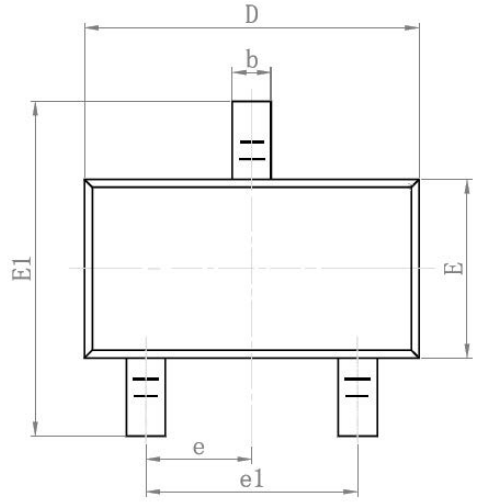


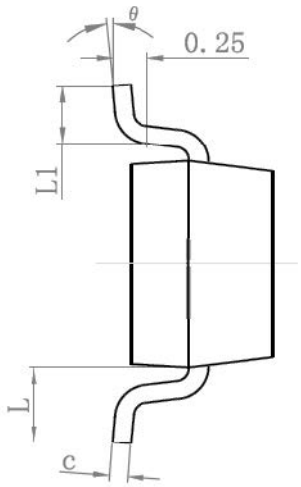
Figure 14. Normalized Maximum Transient Thermal Impedance

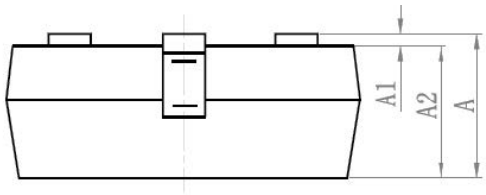
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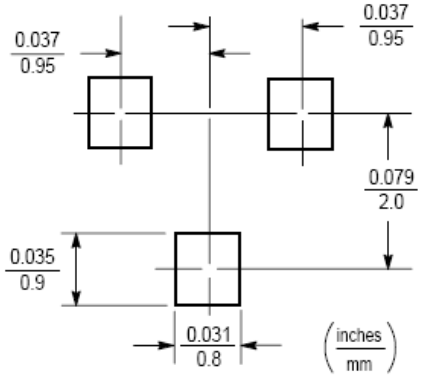
SOT-23 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)









Symbol	Dimensions in Millimeters	
	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	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

NOTES

1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified.
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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