

Description The 2N7002

is the new generation trench N-ch MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high

Features

efficiency power management applications

- 60V, 0.3A, $R_{DS(ON)} = 1.6\Omega @ V_{GS} = 10V$
- Fast Switching Speed
- for extremely low $R_{DS(ON)}$
- Lead-Free, Halogen-Free; RoHS Compliant

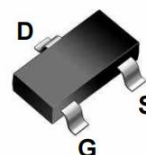
Applications

- Power-management functions
- Industrial DC/DC Conversion Circuits
- Backlighting

V_{DSS}	60V
I_D	0.3A
$R_{DS(ON) Typ}$	$1.6\Omega @ V_{GS}=10V$
$R_{DS(ON) Typ}$	$1.8\Omega @ V_{GS}=4.5V$

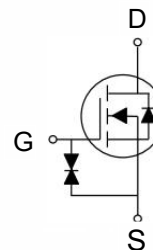
Outline

SOT-23



Equivalent

- (1) Gate
(2) Source
(3) Drain



Packaging specifications

Part No.	Package	Marking	Basic ordering unit.(pcs)
2N7002	SOT-23		3000

Absolute Maximum Ratings

Parameter		Symbol	Limit	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current-Continuous(Note2)	$T_C=25^\circ C$	I_D	0.3	A
	$T_C=70^\circ C$		0.24	A
-Pulsed(Note 1· Note 2)		I_{DM}	1.5	A
Maximum Power Dissipation	$T_C=25^\circ C$	P_D	0.7	W
	$T_C=70^\circ C$		0.46	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$
Thermal Resistance Junction-Ambient		$R_{\theta JA}$	180	$^\circ C / W$

Electrical Characteristics (T_C=25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V , I _D =250uA	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V , V _{GS} =0V			1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V , V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =250uA	1.0	1.5	2.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V , I _D =0.3A		1.6	1.8	Ω
		V _{GS} =4.5V , I _D =0.2A		1.8	2.0	Ω
DYNAMIC CHARACTERISTICS Note4						
Input Capacitance	C _{ISS}	V _{DS} =30V , V _{GS} =0 V , f =1.0MHz		28		pF
Output Capacitance	C _{OSS}			14		pF
Reverse Transfer Capacitance	C _{RSS}			6		pF
Gate resistance	R _g	V _{GS} =0V,V _{DS} =0V, f=1MHz		30		Ω
Total Gate Charge	Q _g	V _{DS} =30V , I _D =0.2A , V _{GS} =10V		0.9		nC
Gate-Source Charge	Q _{gs}			0.4		nC
Gate-Drain Charge	Q _{gd}			0.2		nC
SWITCHING CHARACTERISTICS Note4						
Turn-On Delay Time	t _{D(ON)}	V _{DD} =30V , I _D =0.2A , V _{GS} =10V , R _{GEN} =25 Ω		3.2		ns
Rise Time	t _r			16		ns
Turn-Off Delay Time	t _{D(OFF)}			11		ns
Fall Time	t _f			15		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Diode Forward Voltage	V _{SD}	V _{GS} =0V , I _S =0.2A			1.0	V

Notes:

- 1、Pulse Test Width < 300us,Duty Cycle< 2%
- 2、Drain current limited by maximum junction temperature.
- 3、Guaranteed by design,not subject to production testing.

Typical Performance Characteristics

Fig.1 Continuous Drain Current vs. TC

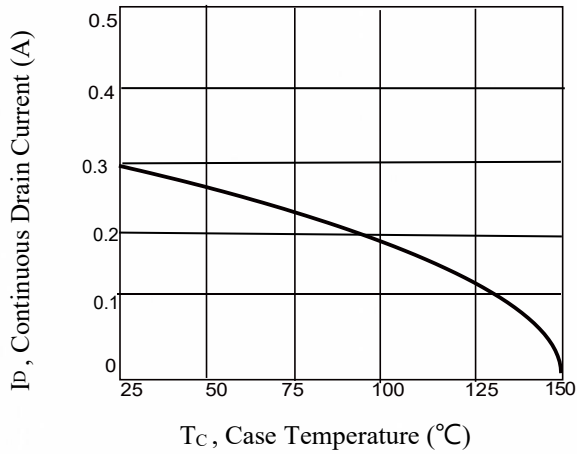


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

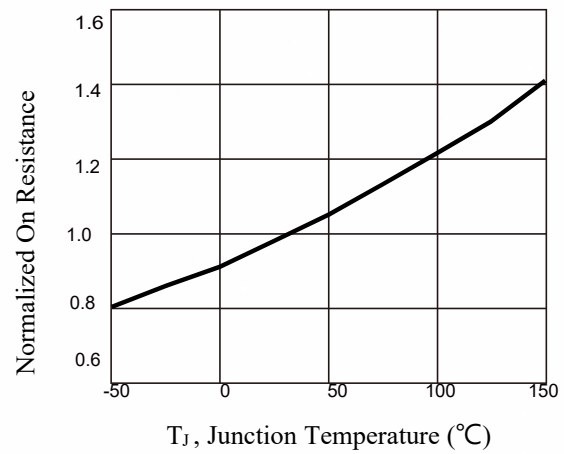


Fig.3 Normalized V_{th} vs. T_J

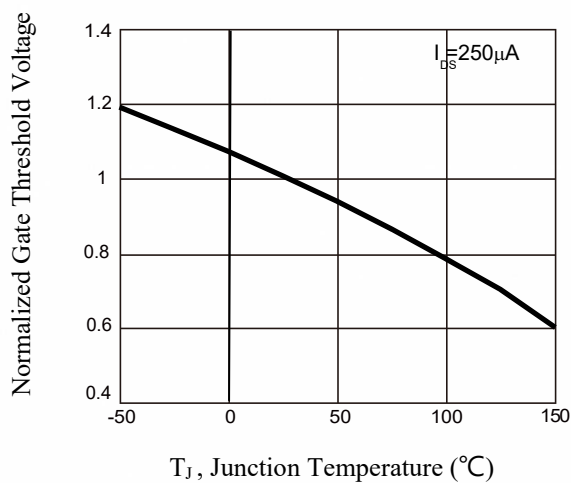


Fig.4 Gate Charge Waveform

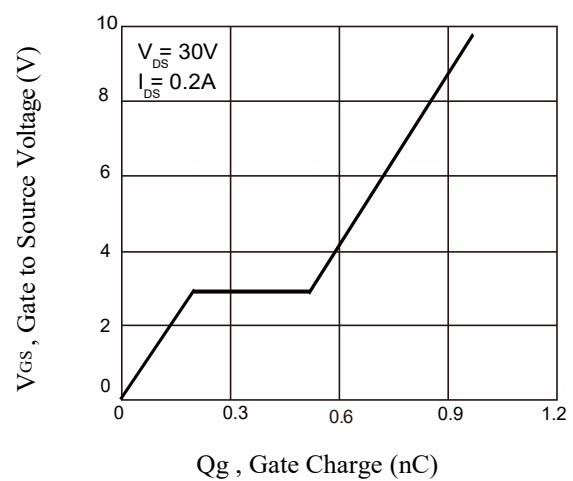


Fig.5 Typical Output Characteristics

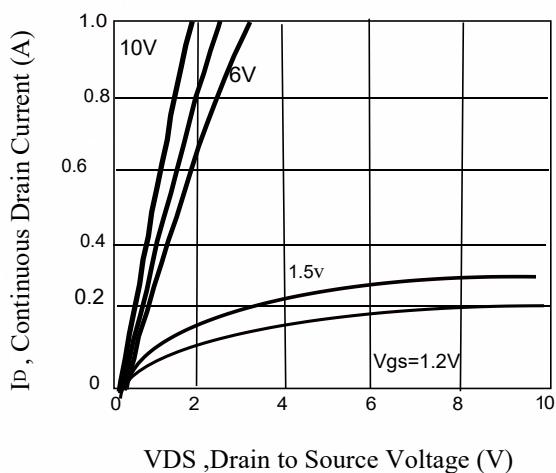


Fig.6 Turn-On Resistance vs. I_D

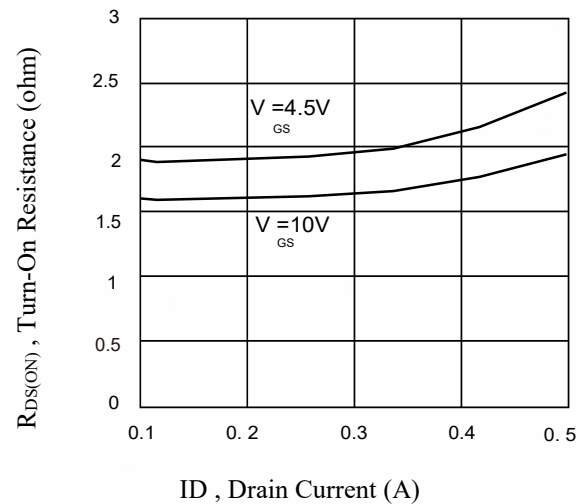


Fig.7 Capacitance

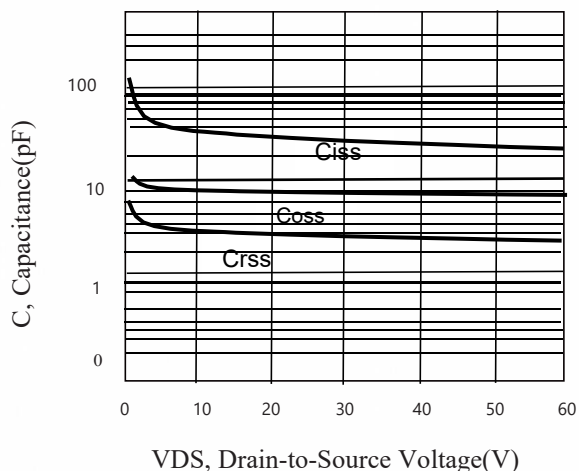


Fig.8 Typical Source-Drain Diode Forward Voltage

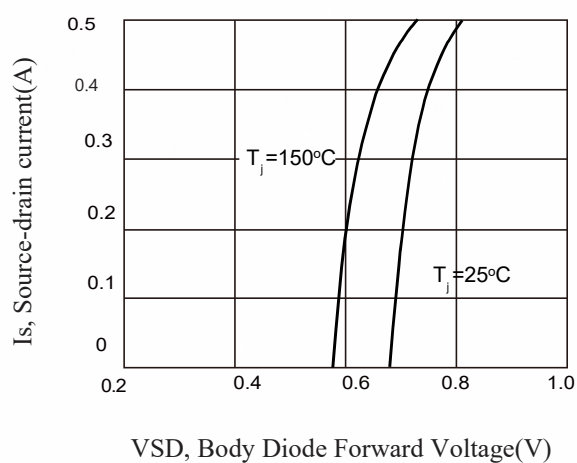


Fig.9 Normalized Transient Impedance

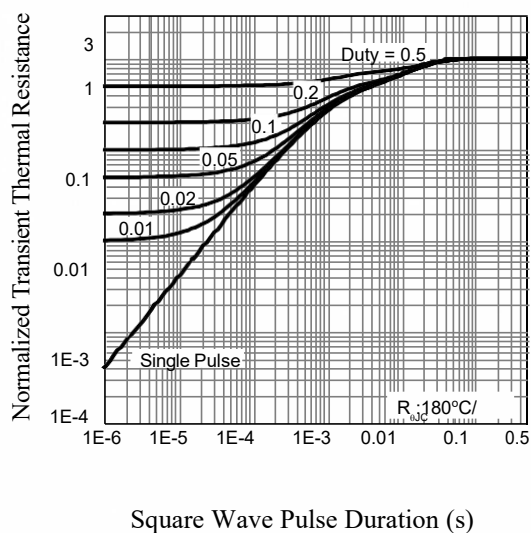


Fig.10 Maximum Safe Operation Area

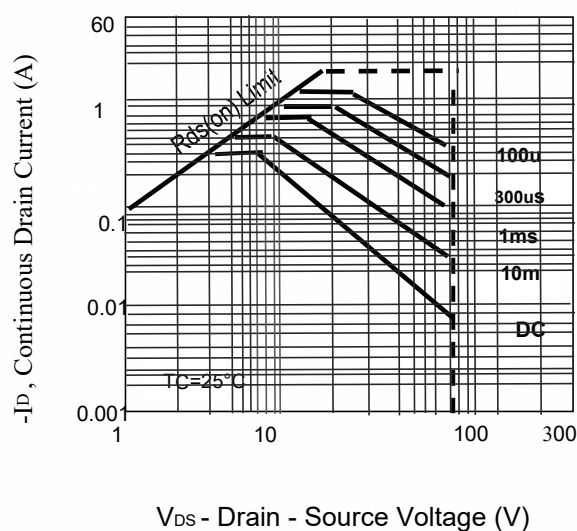


Figure11a. Switching Test Circuit

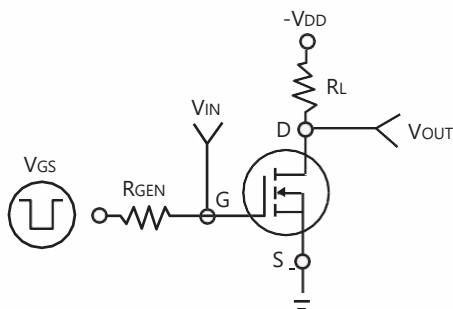
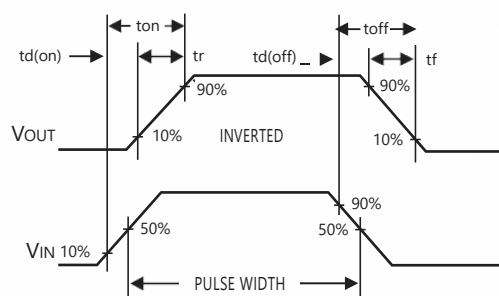
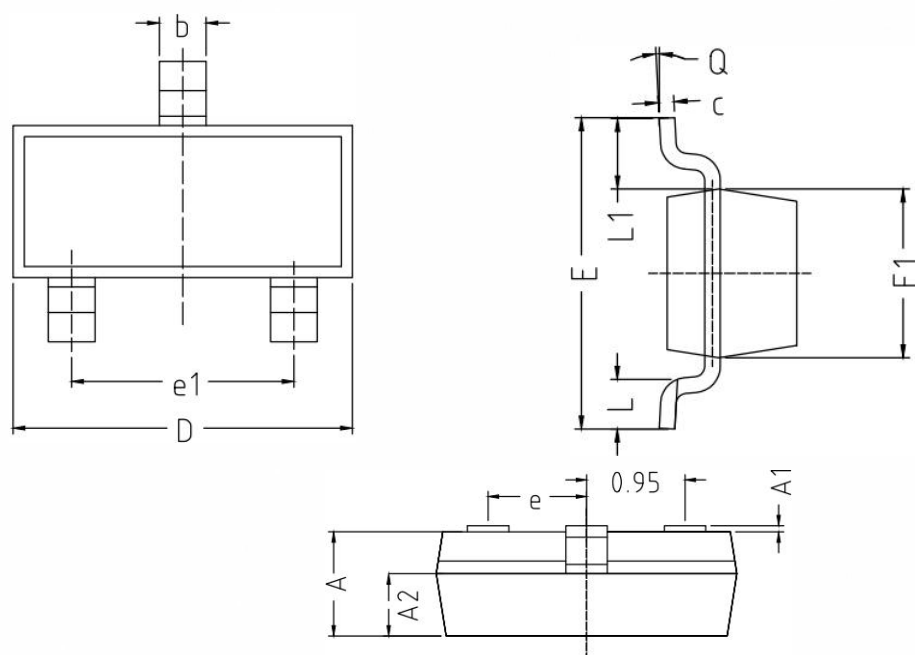


Figure11b. Switching Waveforms





SOT-23 PKG

SYMBOL	MIN	TYP	MAX
A	0.950	1.000	1.050
A1	0.000	0.050	0.100
A2	0.570	0.600	0.630
b	0.350	0.400	0.450
c	0.100	0.130	0.200
D	2.800	2.900	3.000
E	2.250	2.400	2.550
E1	1.200	1.300	1.400
e	0.950 TYP		
e1	1.800	1.900	2.000
L	0.290	0.390	0.490
L1	0.550REF		
Q	0°	4°	8°

NOTICE

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