

2N5003T

50V N-Channel Enhancement Mode MOSFET

1. Description

This 50V N-channel MOSFET is based on MDD's unique device design to achieve low $R_{DS(on)}$ and fast switching and good ESD rating performance.

2. Features

- $V_{DS}=50V$, $I_D=0.3A$, $R_{DS(on)typ}=1.8\Omega$ @ $V_{GS}=4.5V$
- Exceptional on-resistance and maximum DC current capability
- JESD22-A114-B ESD rating of class 2 per human body model.

3. Application

- Load Switch for Portable Devices
- Battery Powered System
- DC-DC converter
- LCD Display inverter

4. Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

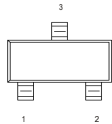
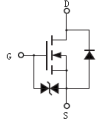
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1)	I_D	0.3	A
Pulsed Drain Current (Note 1)	I_{DM}	1.2	A
Thermal Resistance, Junction-Ambient (Note 2)	$R_{\theta JA}$	500	$^\circ C/W$
Power Dissipation	P_D	0.25	W
Junction Temperature	T_J	$-55 \sim +150$	$^\circ C$
Storage Temperature	T_{stg}	$-55 \sim +150$	$^\circ C$

- Stresses exceeding Maximum Ratings may damage the device.
- Maximum Ratings are stress ratings only.
- Functional operation above the Recommended Operating Conditions is not implied.
- Extended exposure to stresses above the recommended Operating Conditions may affect device reliability

Notes: 1.Pulse width limited by maximum allowable junction temperature

2.Surface Mounted on FR-4 Board

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
1	G	Gate			5003	SOT-523
2	S	Source				
3	D	Drain				

6. $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter		Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		$V_{GS}=0V, I_D=250\mu A$	50	—	—	V
I_{SS}	Gate-Source Leakage Current	Forward	$V_{GS}=20V$	—	—	10	μA
		Reverse	$V_{GS}=-20V$	—	—	-10	μA
I_{DSS}	Drain-Source Leakage Current		$V_{DS}=50V, V_{GS}=0V$	—	—	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage		$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.85	1	V
$R_{DS(ON)}$	Drain-Source On-State Resistance		$V_{GS}=4.5V, I_D=0.1A$	—	1.8	2.5	Ω
			$V_{GS}=2.5V, I_D=0.05A$	—	2.1	3.0	Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0MHz$	—	22	—	pF
C_{oss}	Output Capacitance		—	3	—	pF
C_{rss}	Reverse Transfer Capacitance		—	2	—	pF
Q_g	Total Gate Charge	$V_{GS}=4.5V$ $V_{DS}=10V$ $I_D=0.3A$	—	1.8	—	nC
Q_{gs}	Gate Source Charge		—	0.4	—	nC
Q_{gd}	Gate Drain Charge		—	0.7	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=10V$ $V_{DS}=10V$ $I_D=0.2A$ $R_G=10\Omega$	—	2	—	ns
t_r	Turn on Rise Time		—	16	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	7	—	ns
t_f	Turn Off Fall Time		—	19	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=0.3A, V_{GS}=0V$	—	0.8	1.2	V
I_{SD}	Source drain current(Body Diode)	$T_A=25^{\circ}\text{C}$	—	—	0.3	A

10. Test Circuits And Waveforms

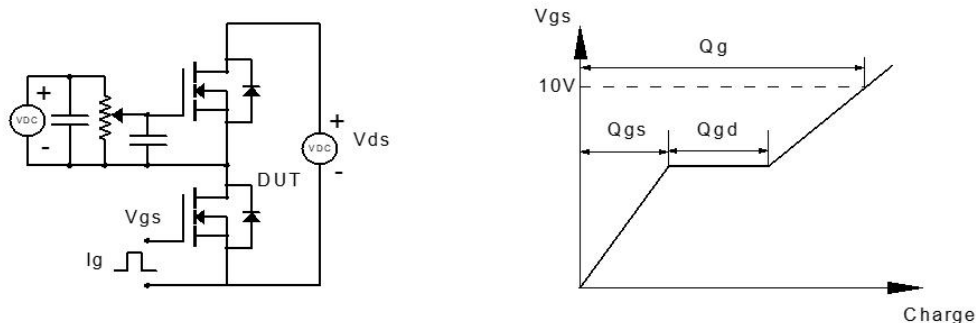


Figure 1. Gate Charge test Circuit

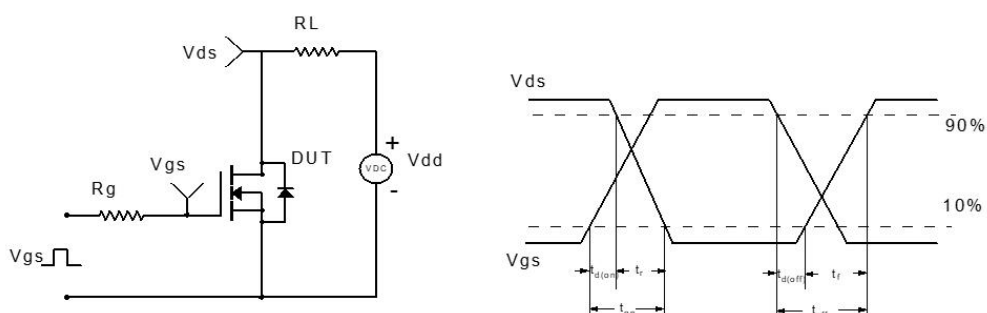


Figure 2. Switching time test circuit & waveforms

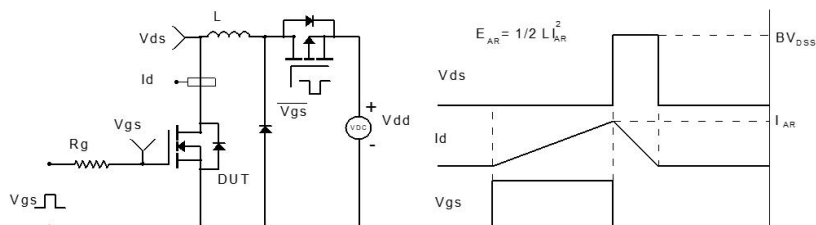


Figure 3. Unclamped Inductive Switching Test Circuit & Waveform

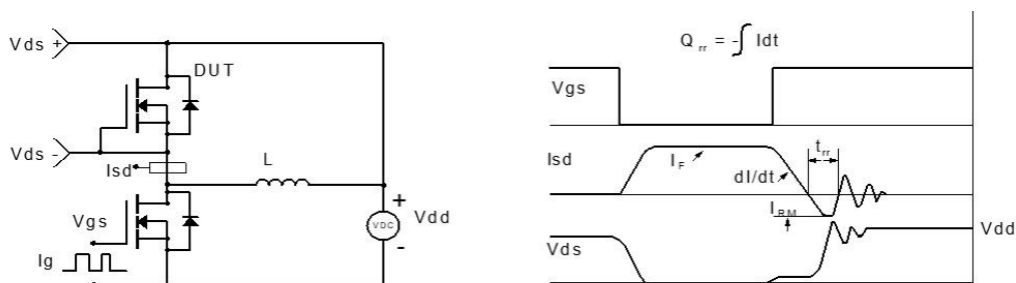


Figure 4 : Diode Recovery Test Circuit & Waveform

The curve above is for reference only.

11. Electrical Characteristics Diagrams

Figure 1: Output Characteristics

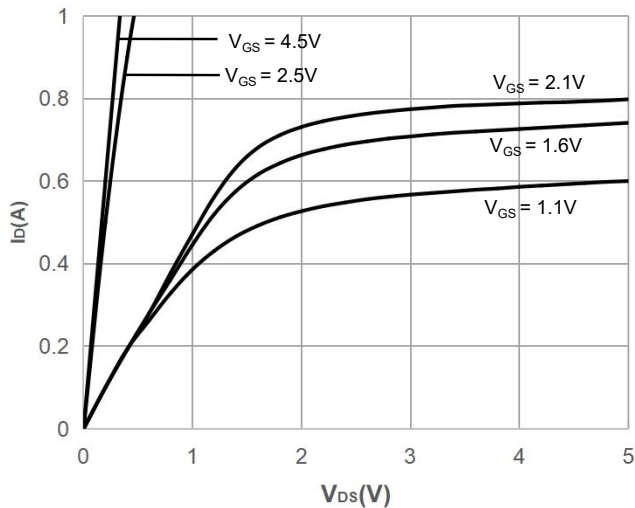


Figure 2: Typical Transfer Characteristics

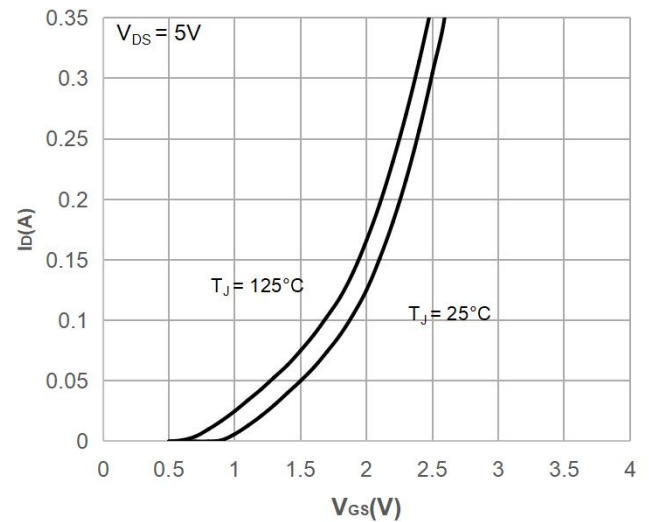


Figure 3: On-resistance vs. Drain Current

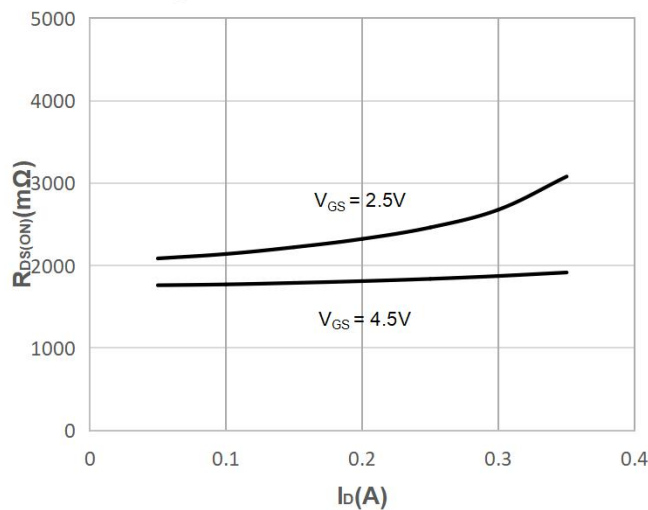


Figure 4: Body Diode Characteristics

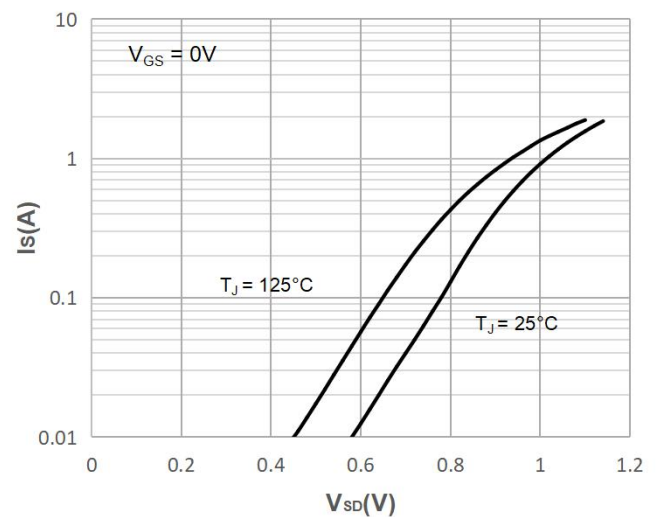


Figure 5: Gate Charge Characteristics

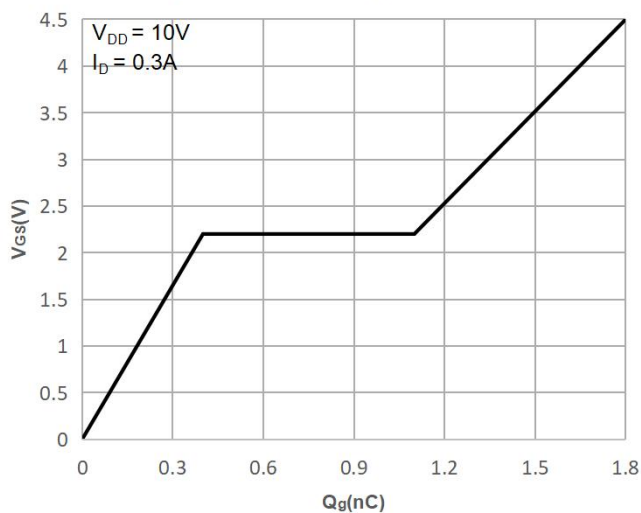
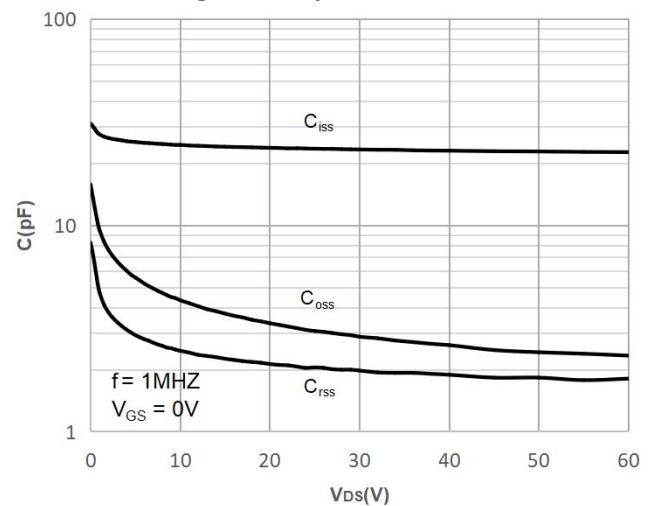
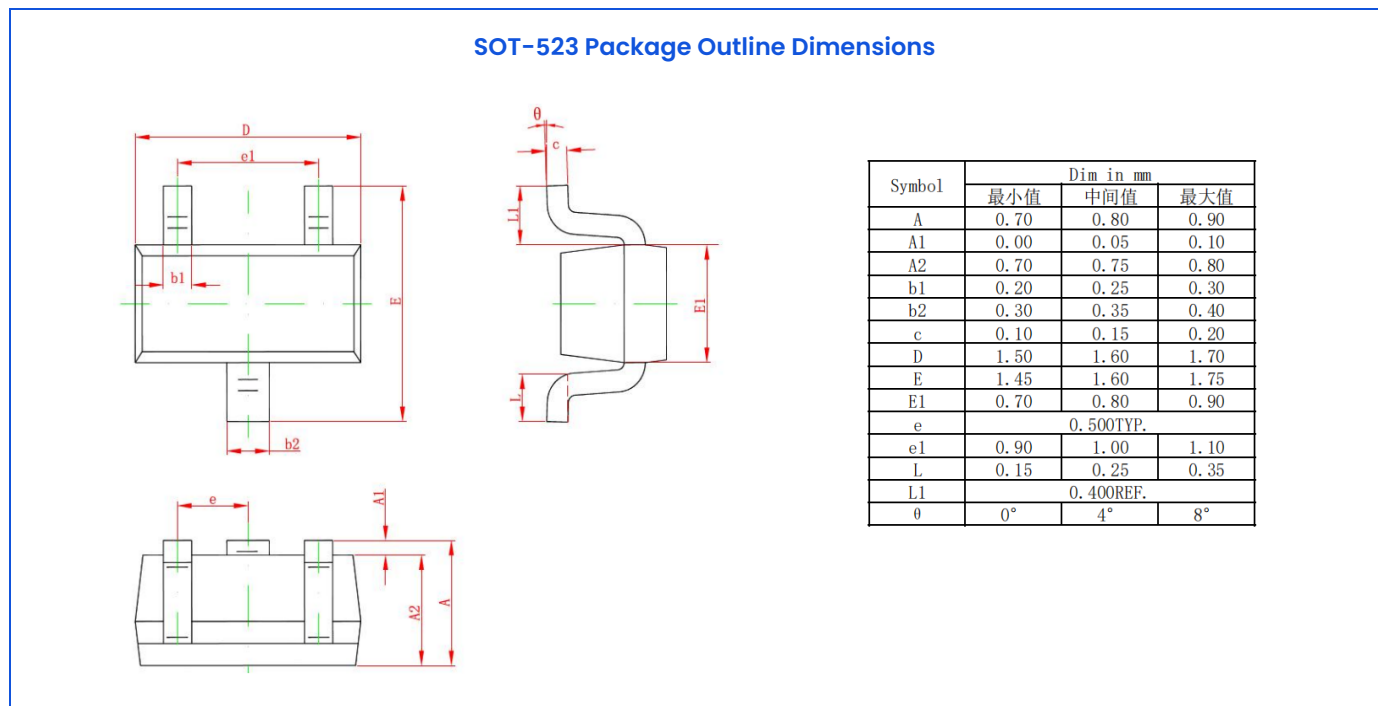


Figure 6: Capacitance Characteristics



12. Outline Drawing



13. Important Notice and Disclaimer

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