20V N-Channel Trench Power MOSFET

General Description

The SJD20N054 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a wide variety of applications.

Features

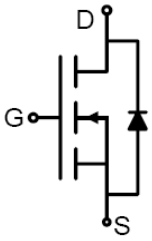
- Low Gate Charge
- 100% UIS Tested, 100% DVDS Tested
- High Power and current handing capability
- Lead free product is acquired

Application

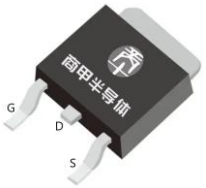
- PWM Applications
- Load Switch
- Power Management

Key Performance Parametes

Parameter	Value	Unit
V_{DS}	20	V
$R_{DS(ON)\_TYP}$	4.3	mΩ
I_D	64	A
Q_G	22	nC



Schematic Diagram



TO-252(DPAK) top view

RoHS

Package Marking and Ordering Information

Device/Ordering Code	Marking	Package	Packing	Reel Size	Tape width	Quantity
SJD20N054	SJD20N054	TO-252	Tape	\	\	2500 Pcs

Table 1. Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	20	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±20	V
I_D	Drain Current-Continuous(T_C=25℃)	64	A
	Drain Current-Continuous(T_C=100℃)	40	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	256	A
P_D	Maximum Power Dissipation(T_C=25℃)	33	W
	Maximum Power Dissipation(T_C=100℃)	13	W
E_{AS}	Avalanche energy (Note 2)	90	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		3.8	℃/W

Table 3. Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V T_J=25℃			1	μA
		V_{DS}=20V, V_{GS}=0V T_J=125℃			100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V, V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	0.4		1	V
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		82		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=20A T_J=25℃		4.3	5.6	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=2.5V, I_D=15A T_J=25℃		5.3	7	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=10V,V_{GS}=0V, f=1.0MHz		1987		pF
C_{oss}	Output Capacitance			243		pF
C_{rss}	Reverse Transfer Capacitance			224		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		1.6		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=4.5V, V_{DS}=10V, R_L=0.5Ω, R_{GEN}=3Ω		10		nS
t_r	Turn-on Rise Time			22		nS
$t_{d(off)}$	Turn-Off Delay Time			40		nS
t_f	Turn-Off Fall Time			25		nS
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=20A		22		nC
Q_{gs}	Gate-Source Charge			4		nC
Q_{gd}	Gate-Drain Charge			7		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				64	A
V_{SD}	Forward on Voltage (Note 3)	V_{GS}=0V, I_S=20A			1.2	V
t_{rr}	Reverse Recovery Time	I_F=20A, dI/dt=100A/μs		8		ns
Q_{rr}	Reverse Recovery Charge	I_F=20A, dI/dt=100A/μs		3		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.E_{AS} condition: T_J=25℃,V_{DD}=20V,V_G=10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

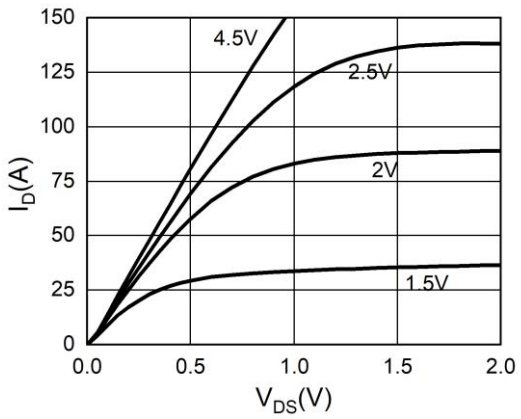


Figure 2. Transfer Characteristics

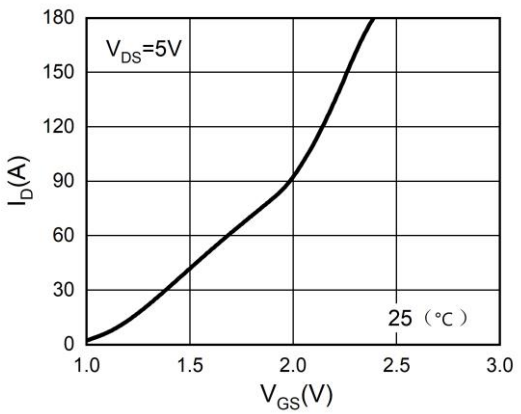


Figure 3. Power Dissipation

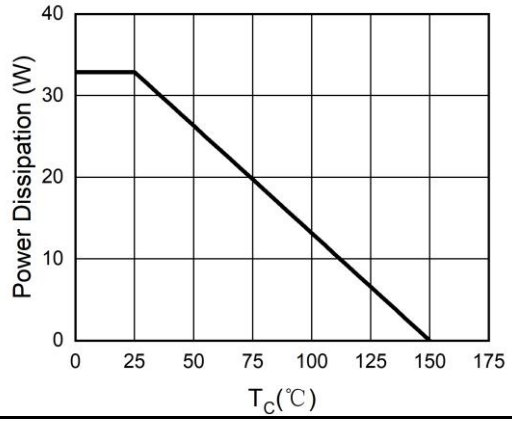


Figure 4. Drain Current

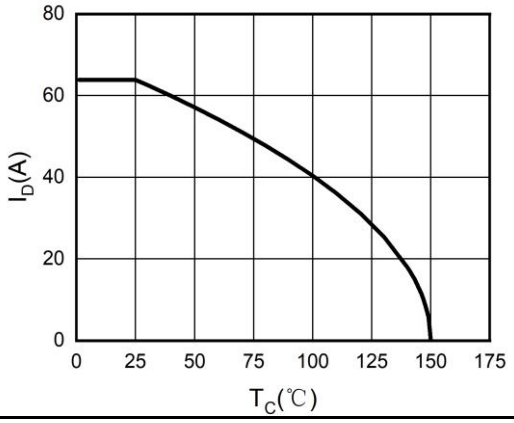


Figure 5. BV_{DSS} vs Junction Temperature

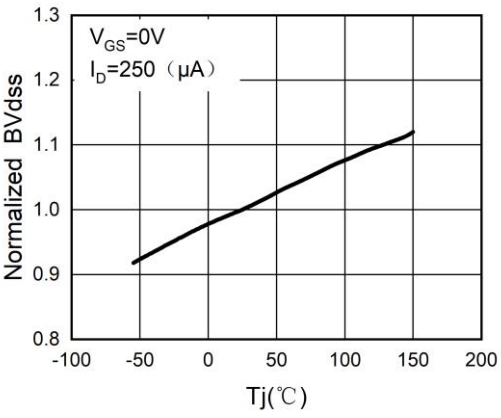
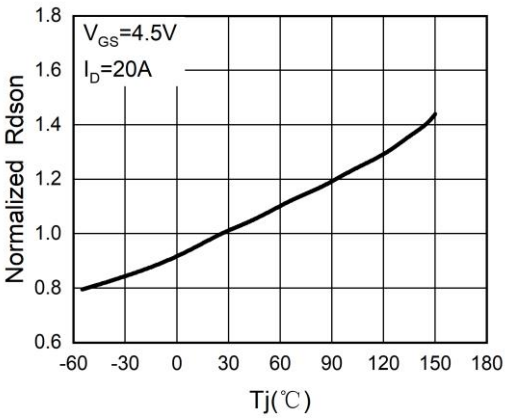


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



Typical Electrical And Thermal Characteristics (Curves)

Figure 7. Gate Charge Waveforms

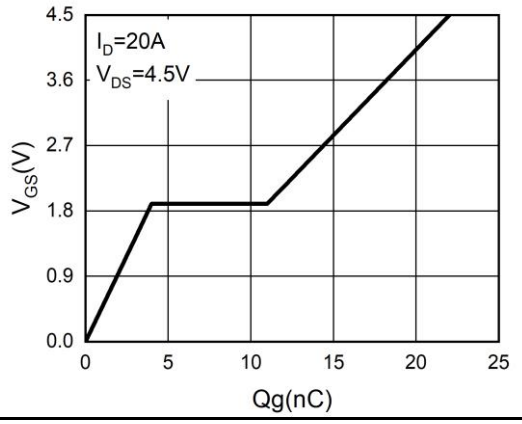


Figure 8. Capacitance

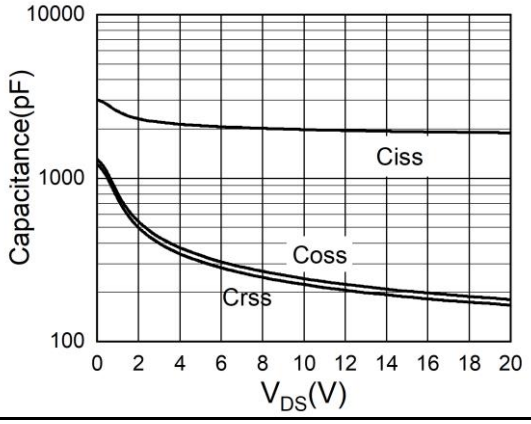


Figure 9. Body-Diode Characteristics

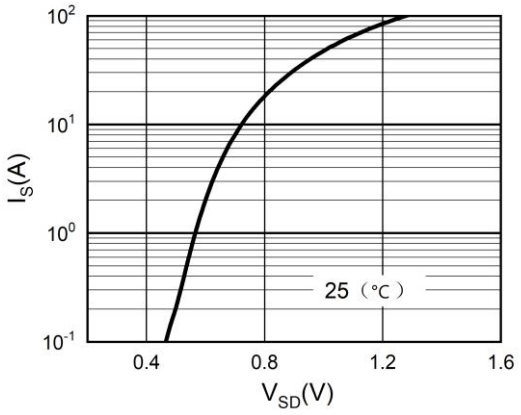
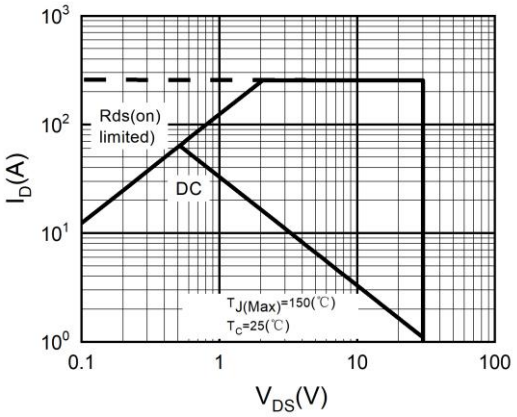
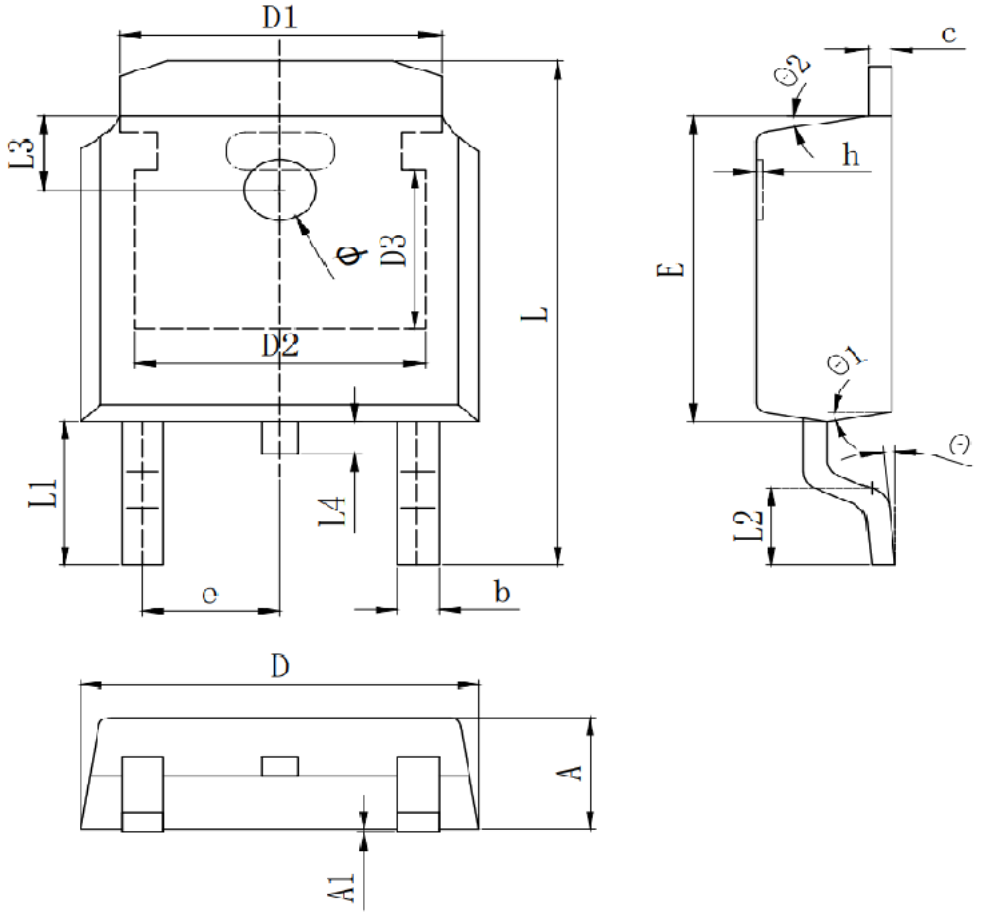


Figure 10. Maximum Safe Operating Area



TO-252 Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.640	0.690	0.740
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	4.826 REF		
D3	3.166 REF		
E	6.000	6.100	6.200
e	2.286 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.888 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.600	0.800	1.000
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

Attention

This product described in this document can not be used in life support devices or systems, aircraft's control systems, and other applications whose failure can be reasonably expected to result in serious physical and/or material damage，apart from that when an application agreement is signed between customer and Wuxi Shangjia Semiconductor.

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