

Description

The SX50N04D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 40V$ $I_D = 50A$

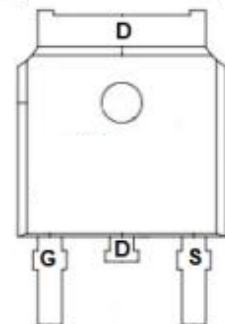
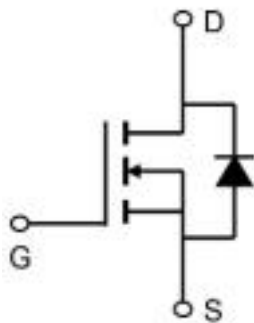
$R_{DS(ON)} < 17m\Omega$ @ $V_{GS}=10V$

Application

VBUS

Wireless impact

Mobile phone fast charging



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_c=25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V ¹	50	A
$I_D@T_c=100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V ¹	23	A
I_{DM}	Pulsed Drain Current ²	85	A
E_{AS}	Single Pulse Avalanche Energy ³	31.3	mJ
I_{AS}	Avalanche Current	25	A
$P_D@T_c=25^\circ\text{C}$	Total Power Dissipation ⁴	31.3	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ⁴	2	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-ambient	62.5	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	3	$^\circ\text{C/W}$

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	40	47	---	V
ΔBVDSS/ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.032	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =10V , I _D =15A	---	12	17	mΩ
		V _{GS} =4.5V , I _D =10A	---	16	24	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	-4.8	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =32V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =32V , V _{GS} =0V , T _J =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =5V , I _D =15A	---	34	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	2.1	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =32V , V _{GS} =4.5V , I _D =15A	---	10	---	nC
Q _{gs}	Gate-Source Charge		---	2.55	---	
Q _{gd}	Gate-Drain Charge		---	4.8	---	
Td(on)	Turn-On Delay Time	V _{DD} =20V , V _{GS} =10V , R _G =3.3Ω I _D =15A	---	2.8	---	ns
T _r	Rise Time		---	12.8	---	
Td(off)	Turn-Off Delay Time		---	21.2	---	
T _f	Fall Time		---	6.4	---	
Ciss	Input Capacitance	V _{DS} =15V , V _{GS} =0V , f=1MHz	---	1013	---	pF
Coss	Output Capacitance		---	107	---	
Crss	Reverse Transfer Capacitance		---	76	---	
IS	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current	---	---	40	A
ISM	Pulsed Source Current ^{2,5}		---	---	85	A
VSD	Diode Forward Voltage ²	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1.2	V
trr	Reverse Recovery Time	IF=15A , dI/dt=100A/μs , T _J =25°C	---	10	---	nS
Q _{rr}	Reverse Recovery Charge		---	3.1	---	nC

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.1mH,IAS=25A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

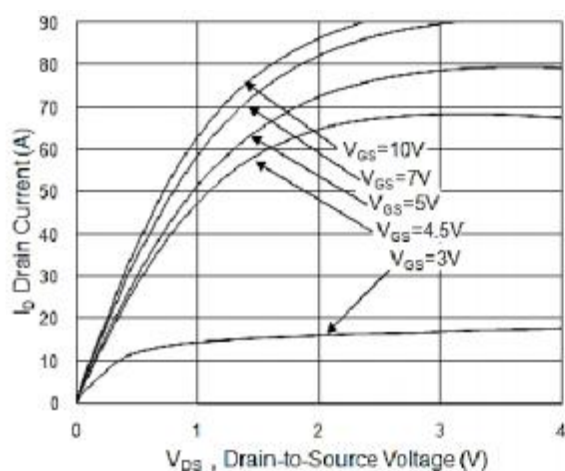


Fig.1 Typical Output Characteristics

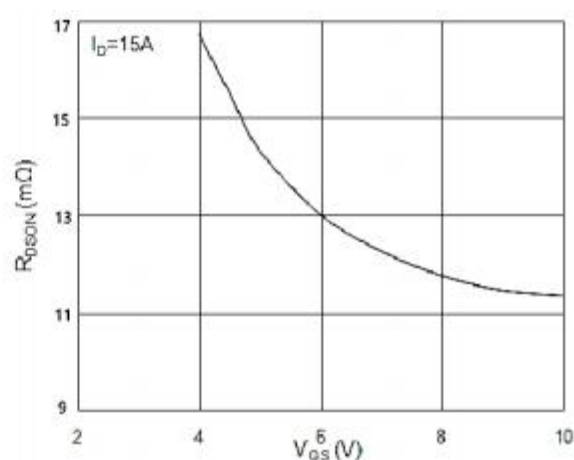


Fig.2 On-Resistance vs. G-S Voltage

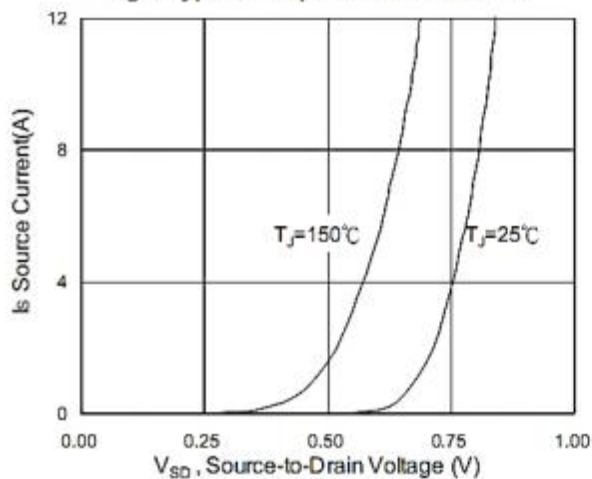


Fig.3 Forward Characteristics Of Reverse

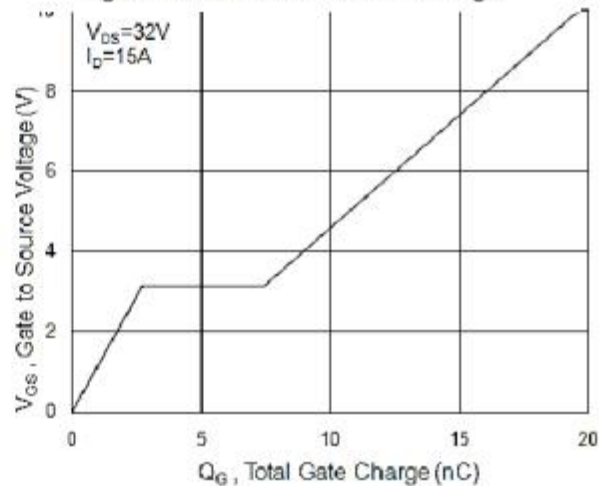


Fig.4 Gate-Charge Characteristics

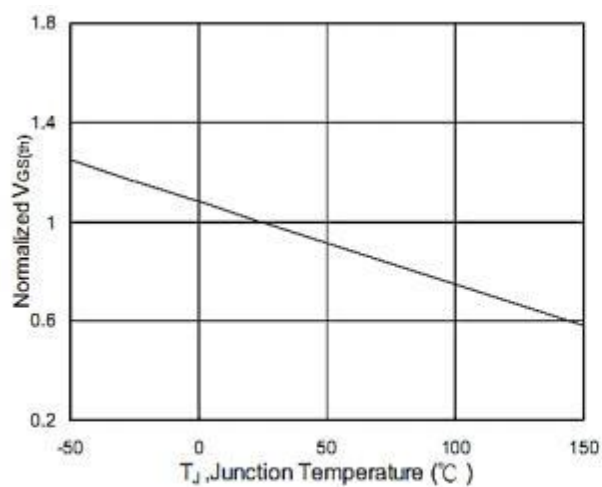


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

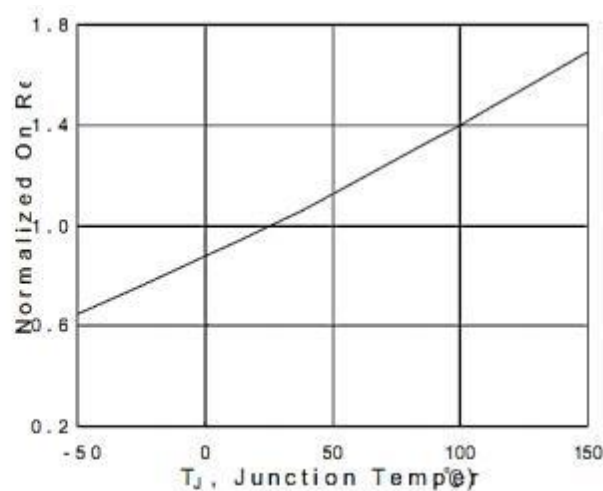


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Typical Characteristics

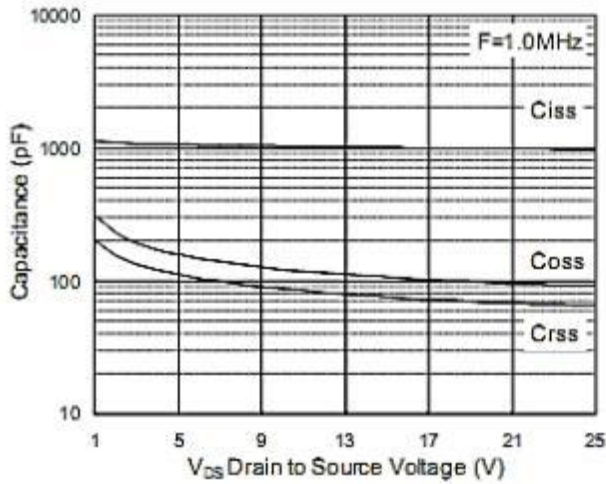


Fig.7 Capacitance

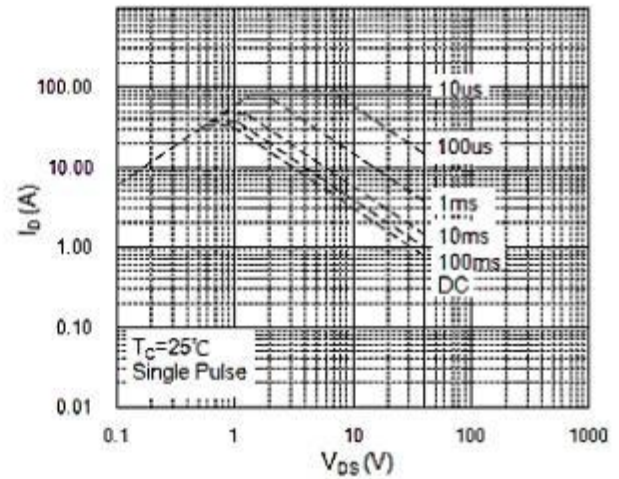


Fig.8 Safe Operating Area

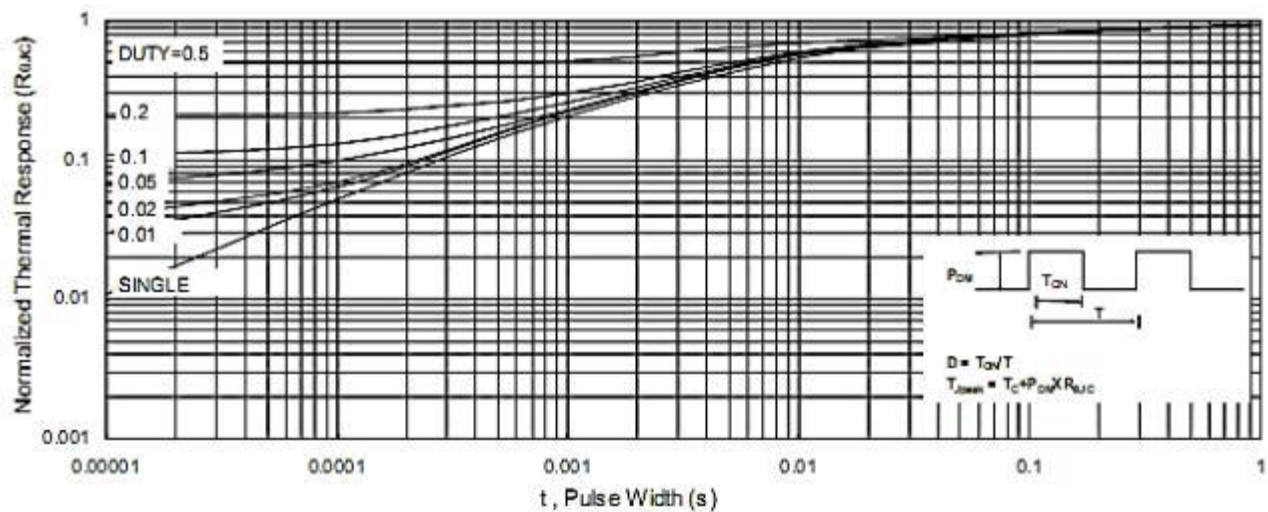


Fig.9 Normalized Maximum Transient Thermal Impedance

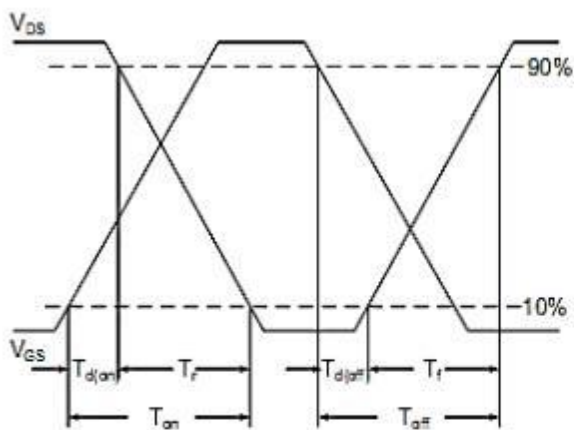


Fig.10 Switching Time Waveform

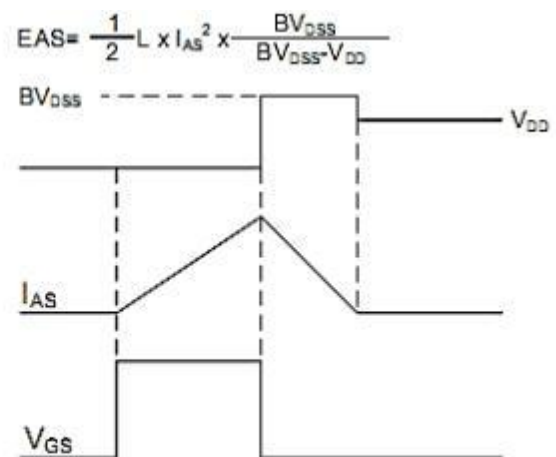
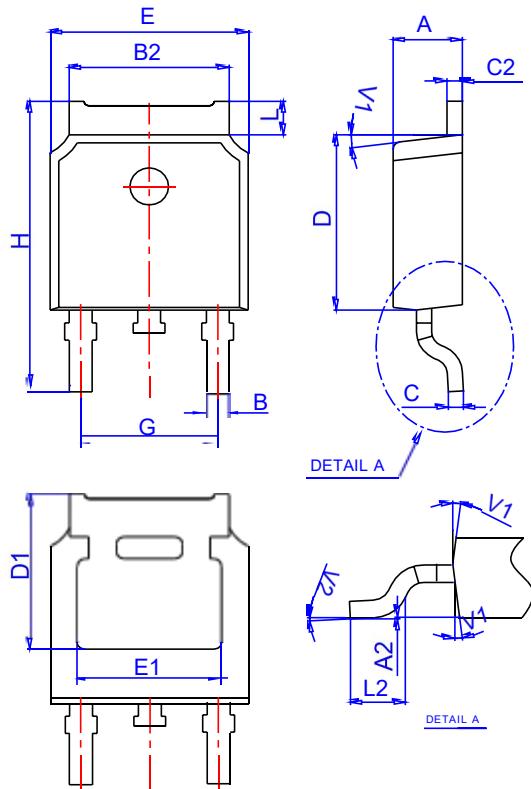


Fig.11 Unclamped Inductive Switching Waveform

Package Mechanical Data:TO-252-3L



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	TO-252-3L		2500