

Description

The SX2305MI 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

$V_{DS} = -20V$ $I_D = -4.9A$

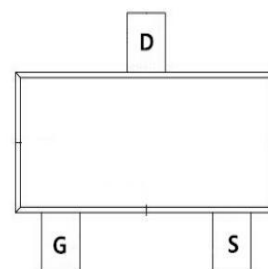
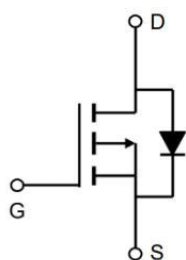
$R_{DS(ON)} < 38m\Omega$ @ $V_{GS} = -4.5V$

Application

Battery protection

Load switch

Uninterruptible power supply



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-4.9	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-3.9	A
I_{DM}	Pulsed Drain Current ²	-14	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ³	1.31	W
$P_D @ T_A = 70^\circ C$	Total Power Dissipation ³	0.84	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	120	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$)	95	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	-20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA	---	-0.014	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-4.5V , I _D =-4.9A	---	32	38	mΩ
		V _{GS} =-2.5V , I _D =-3.4A	---	45	55	
		V _{GS} =-1.8V , I _D =-2A	---	65	85	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-0.4	---	-1.0	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	3.95	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-16V , V _{GS} =0V , T _J =25°C	---	---	-1	uA
		V _{DS} =-16V , V _{GS} =0V , T _J =55°C	---	---	-5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V , V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =-5V , I _D =-3A	---	12.8	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-15V , V _{GS} =-4.5V , I _D =-3A	---	10.2	14.3	nC
Q _{gs}	Gate-Source Charge		---	1.89	2.6	
Q _{gd}	Gate-Drain Charge		---	3.1	4.3	
T _{d(on)}	Turn-On Delay Time	V _{DD} =-10V , V _{GS} =-4.5V , R _G =3.3 , I _D =-3A	---	5.6	11.2	ns
T _r	Rise Time		---	40.8	73	
T _{d(off)}	Turn-Off Delay Time		---	33.6	67	
T _f	Fall Time		---	18	36	
C _{iss}	Input Capacitance	V _{DS} =-15V , V _{GS} =0V , f=1MHz	---	857	1200	pF
C _{oss}	Output Capacitance		---	114	160	
C _{rss}	Reverse Transfer Capacitance		---	108	151	
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V , Force Current	---	---	-4.9	A
I _{SM}	Pulsed Source Current ^{2,4}		---	---	-14	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V , I _S =-1A , T _J =25°C	---	---	-1	V
t _{rr}	Reverse Recovery Time	I _F =-3A , di/dt=100A/μs , T _J =25°C	---	21.8	---	nS
Q _{rr}	Reverse Recovery Charge		---	6.9	---	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 Δ300us , duty cycle Δ2%
- 3、The power dissipation is limited by 150°C junction temperature
- 4、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

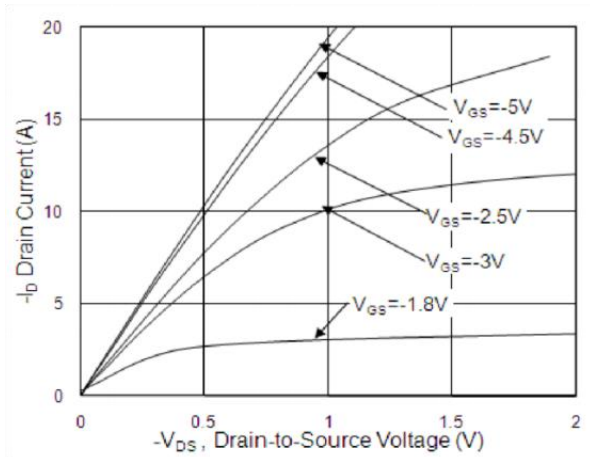


Fig.1 Typical Output Characteristics

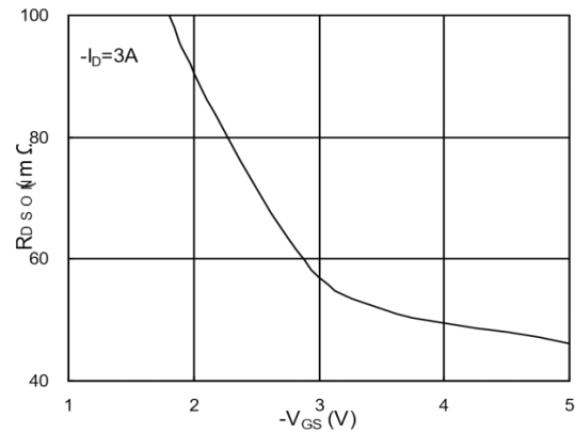


Fig.2 On-Resistance vs. G-S Voltage

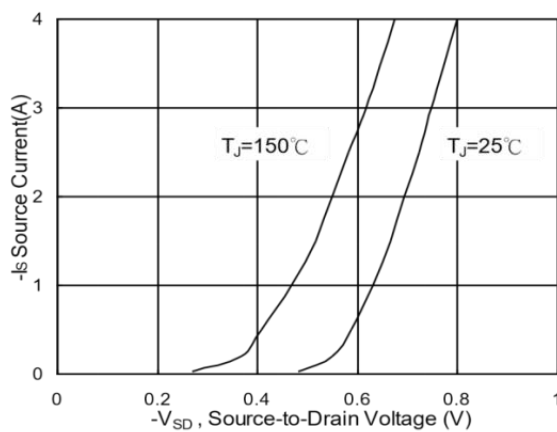


Fig.3 Forward Characteristics of Reverse

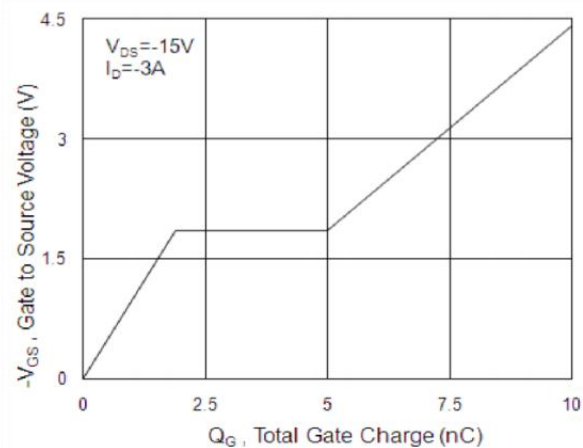


Fig.4 Gate-charge Characteristics

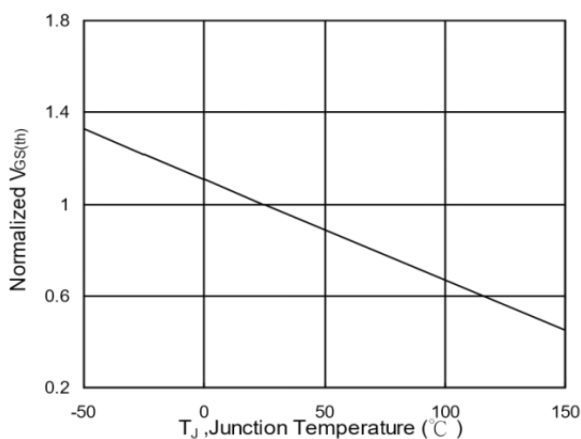


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

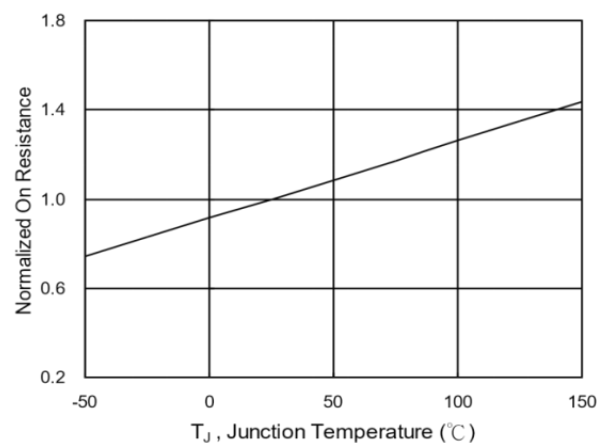


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Typical Characteristics

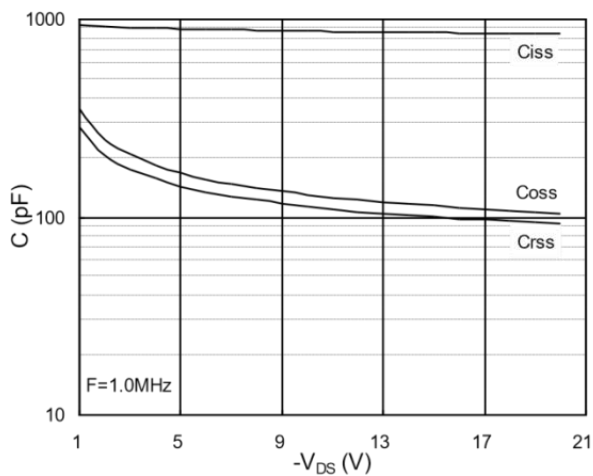


Fig.7 Capacitance

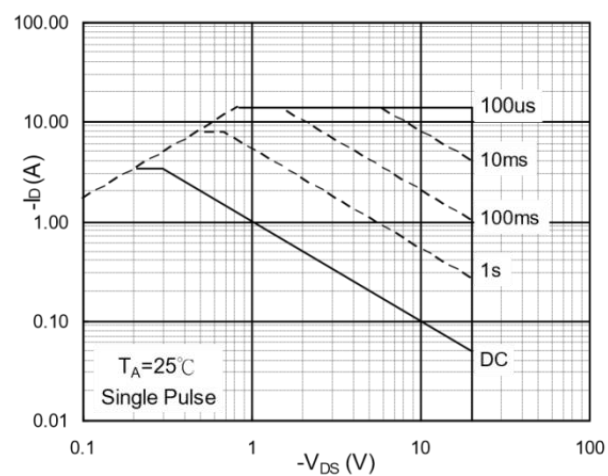


Fig.8 Safe Operating Area

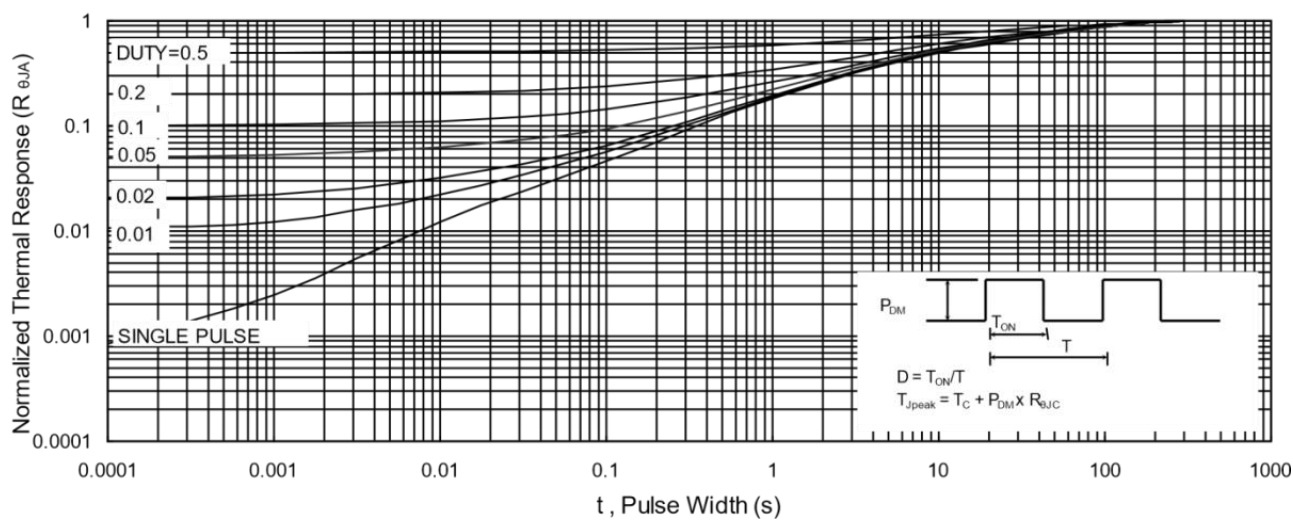


Fig.9 Normalized Maximum Transient Thermal Impedance

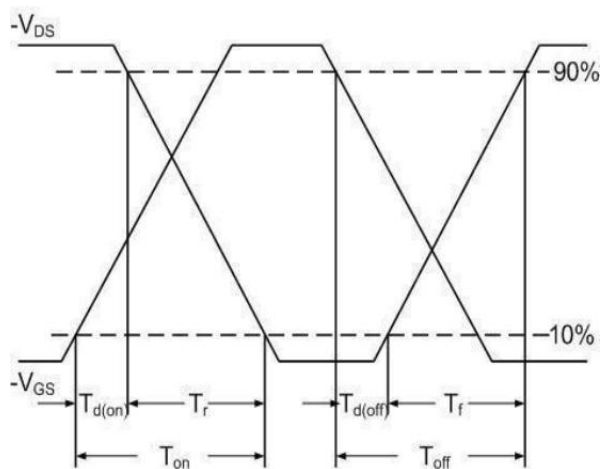


Fig.10 Switching Time Waveform

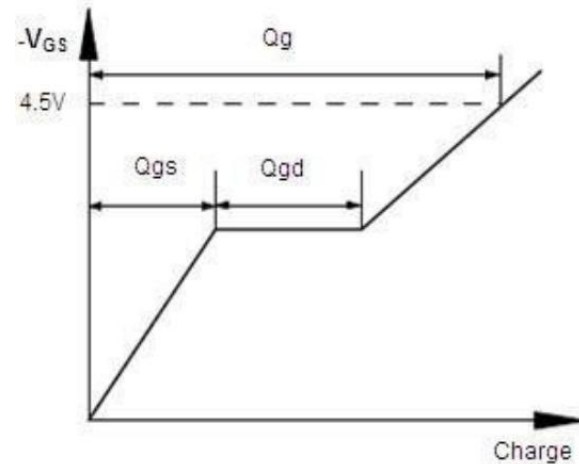
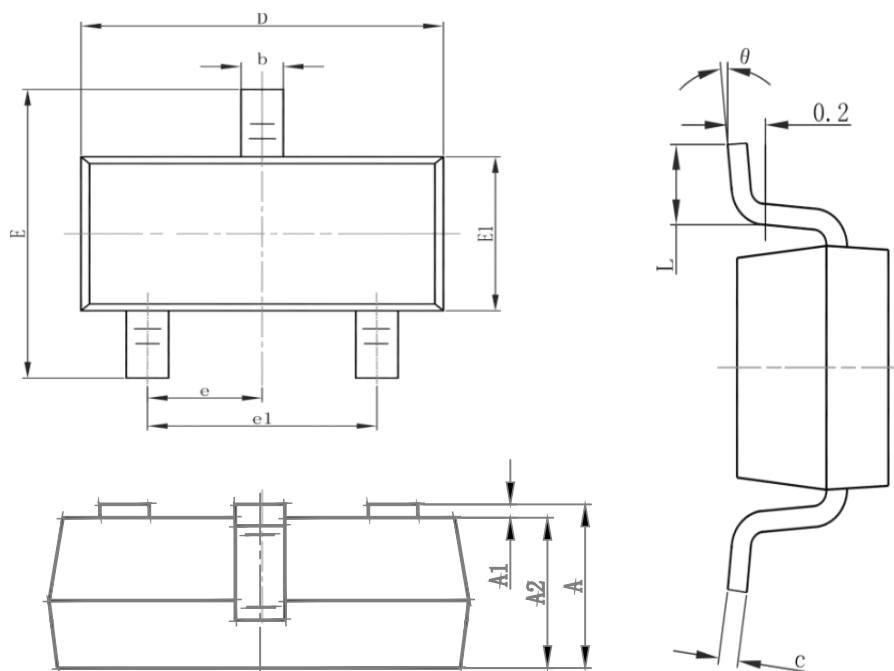


Fig.11 Gate Charge Waveform

Package Mechanical Data-SOT23-3L Single



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	SOT-23-3L		3000