

Description

The SX10P04D 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.

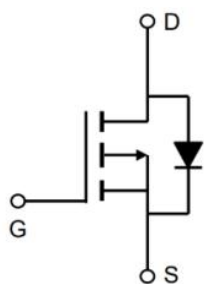
General Features

$V_{DS} = -40V$ $I_D = -10A$

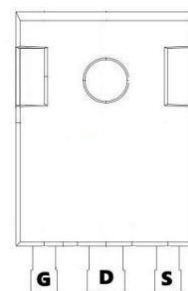
$R_{DS(ON)} < 65m\Omega$ @ $V_{GS} = -10V$

Application

Battery
protection Load
switch
Uninterruptible power supply



TO-252-3L



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-10	A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-7	A
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-4.5	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-3.6	A
I_{DM}	Pulsed Drain Current ²	-32	A
EAS	Single Pulse Avalanche Energy ³	21	mJ
I_{AS}	Avalanche Current	-20.5	A
$P_D @ T_c = 25^\circ C$	Total Power Dissipation ⁴	25	W
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ⁴	2	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	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	5	$^\circ C/W$

Electrical Characteristics (T_J=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	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.015	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-8A	---	60	65	mΩ
		V _{GS} =-4.5V, I _D =-4A	---	85	100	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.6	-2.5	V
ΔVGS(th)	V _{GS(th)} Temperature Coefficient		---	3.52	---	V/°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} =-10V, I _D =-10A	---	6	---	S
Qg	Total Gate Charge (-4.5V)	V _{DS} =-20V, V _{GS} =-4.5V, I _D =-8A	---	5.8	---	nC
Qgs	Gate-Source Charge		---	1.2	---	
Qgd	Gate-Drain Charge		---	2.1	---	
Td(on)	Turn-On Delay Time	V _{DD} =-12V, V _{GS} =-10V, R _G =3.3Ω, I _D =-1A	---	13.2	---	ns
T _r	Rise Time		---	8	---	
Td(off)	Turn-Off Delay Time		---	40	---	
T _f	Fall Time		---	3.5	---	
Ciss	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	---	620	---	pF
Coss	Output Capacitance		---	69	---	
Crss	Reverse Transfer Capacitance		---	52	---	
IS	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	-16	A
ISM	Pulsed Source Current ^{2,5}		---	---	-32	A
VSD	Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch 2 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=-20.5A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation

Typical Characteristics

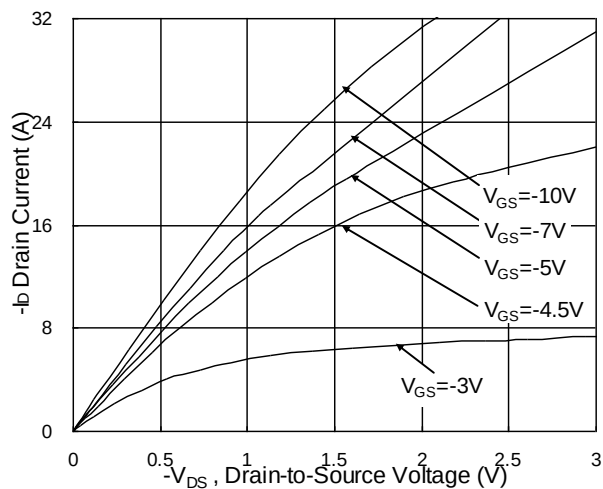


Fig.1 Typical Output Characteristics

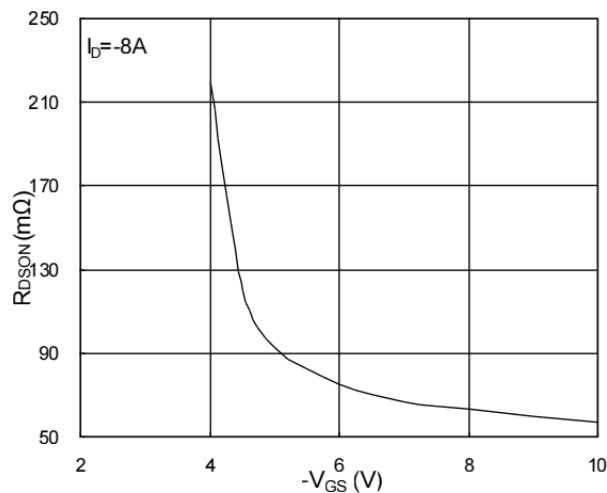


Fig.2 On-Resistance v.s Gate-Source

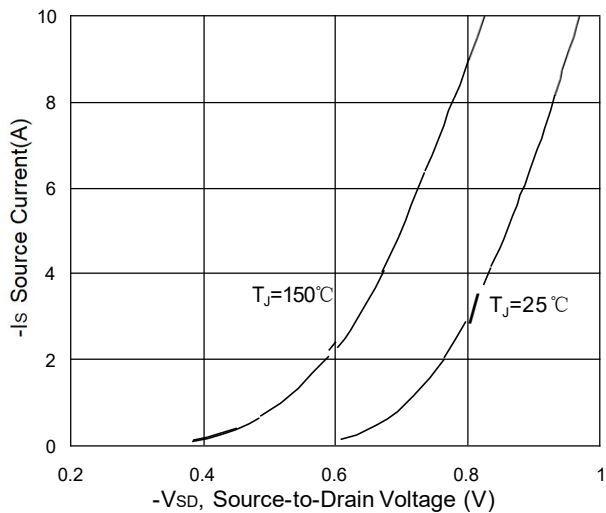


Fig.3 Forward Characteristics Of Reverse

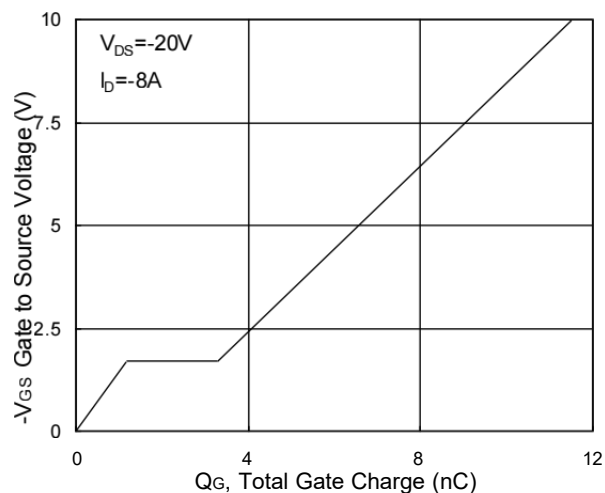


Fig.4 Gate Charge Characteristics

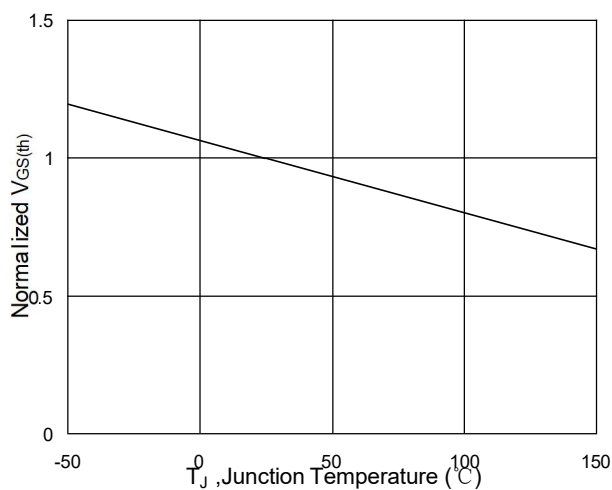


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

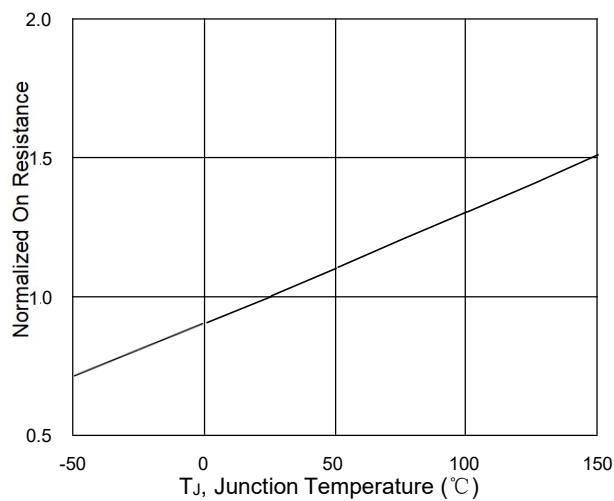


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

Typical Characteristics

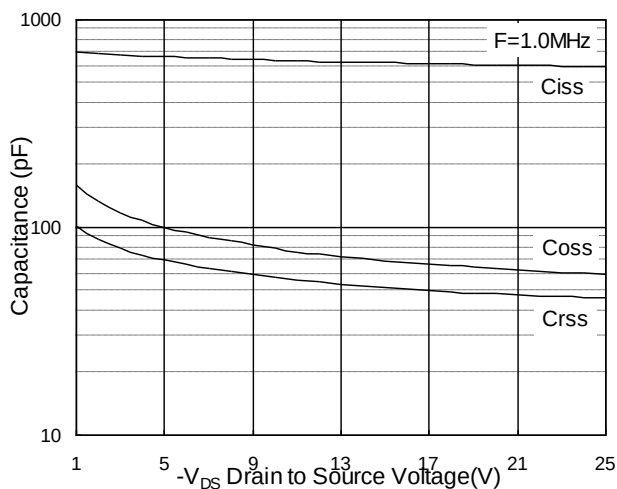


Fig.7 Capacitance

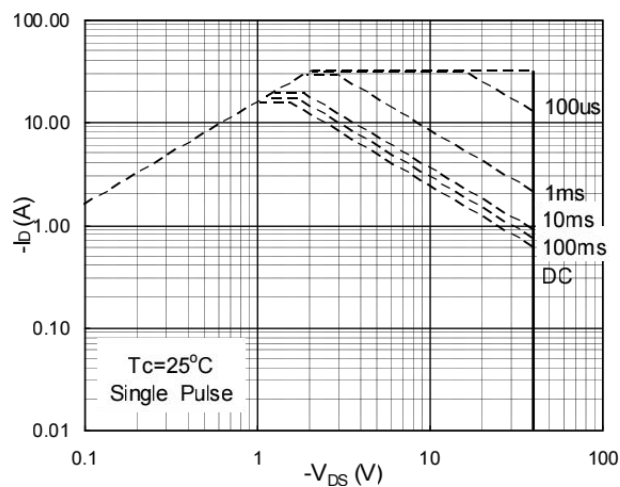


Fig.8 Safe Operating Area

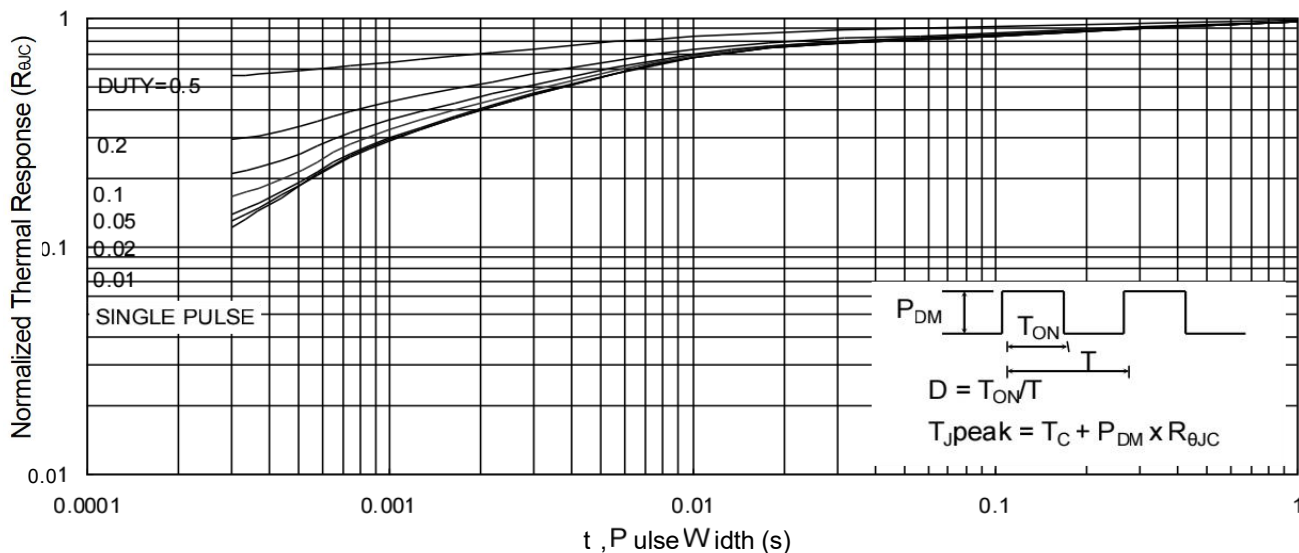


Fig.9 Normalized Maximum Transient Thermal Impedance

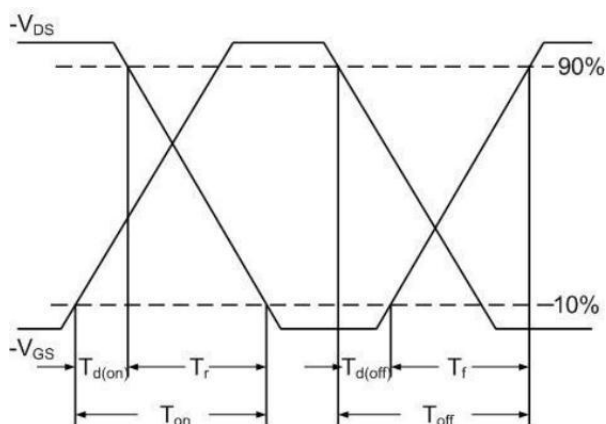


Fig.10 Switching Time Waveform

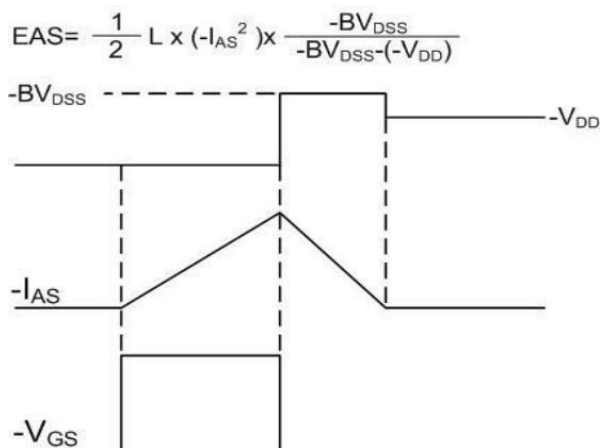
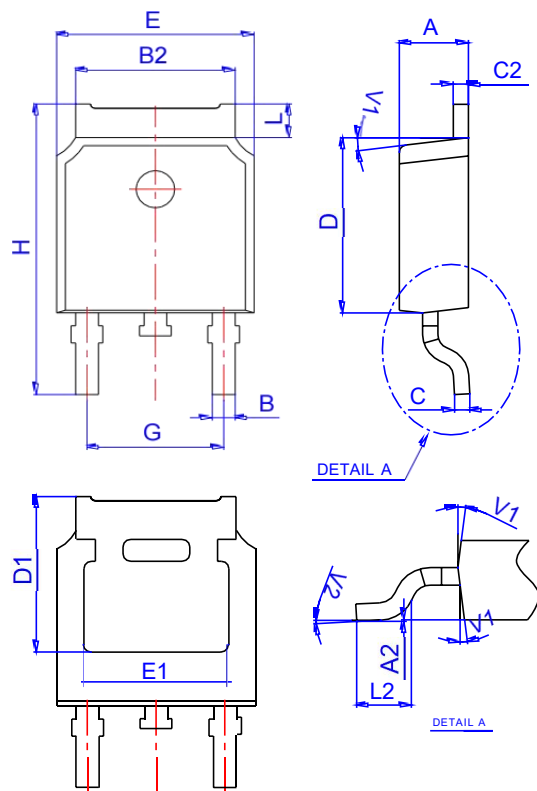


Fig.11 Unclamped Inductive Switching Waveform

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