

Description

The SX40P02D 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 Battery protection or in other Switching application.

General Features

$V_{DS} = -20V$ $I_D = -40A$

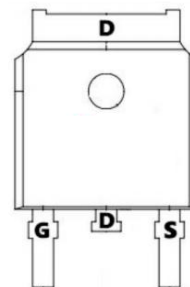
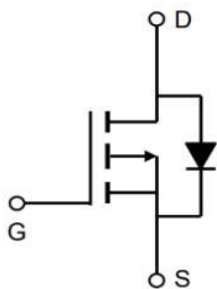
$R_{DS(ON)}$ Type: $12m\Omega$ @ $V_{GS} = -4.5V$

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
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-40	A
$I_D @ T_c = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-35	A
IDM	Pulsed Drain Current ²	-160	A
$P_D @ T_c = 25^\circ C$	Total Power Dissipation ³	2.5	W
$P_D @ T_c = 70^\circ C$	Total Power Dissipation ³	1.6	W
TSTG	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	65.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	24	$^\circ C/W$

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	-20	-23	---	V
ΔBVDSS/ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA	---	-0.012	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-4.5V , I _D =-20A	---	12	20	mΩ
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-2.5V , I _D =-10A	---	22	28	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-0.5	-0.6	-1.2	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	2.94	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =-20V , V _{GS} =0V , T _J =25°C	---	---	1	uA
IGSS	Gate-Source Leakage Current	V _{GS} =±12V , V _{DS} =0V	---	---	±100	nA
Qg	Total Gate Charge (-4.5V)	V _{DS} =-10V , V _{GS} =-4.5V , I _D =-6A	---	15.3	---	nC
Qgs	Gate-Source Charge		---	2.2	---	
Qgd	Gate-Drain Charge		---	4.4	---	
Td(on)	Turn-On Delay Time	V _{DD} =-10V , V _{GS} =-4.5V , R _G =3.3Ω , I _D =-10A	---	10	---	ns
Tr	Rise Time		---	31	---	
Td(off)	Turn-Off Delay Time		---	28	---	
Tf	Fall Time		---	8	---	
Ciss	Input Capacitance	V _{DS} =-10V , V _{GS} =0V , f=1MHz	---	2000	---	pF
Coss	Output Capacitance		---	242	---	
Crss	Reverse Transfer Capacitance		---	231	---	
IS	Continuous Source Current ^{1,4}	V _G =V _D =0V , Force Current	---	---	-20	A
ISM	Pulsed Source Current ^{2,4}		---	---	-48	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 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

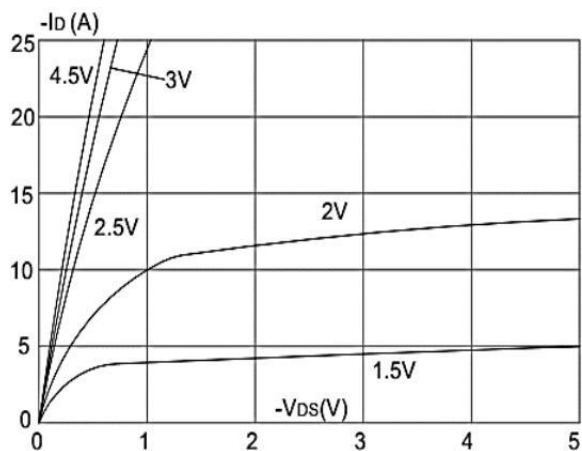


Figure1: Output Characteristics

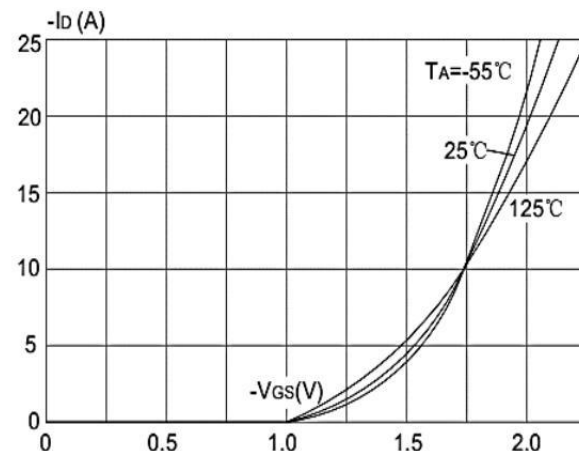


Figure 2: Typical Transfer Characteristics

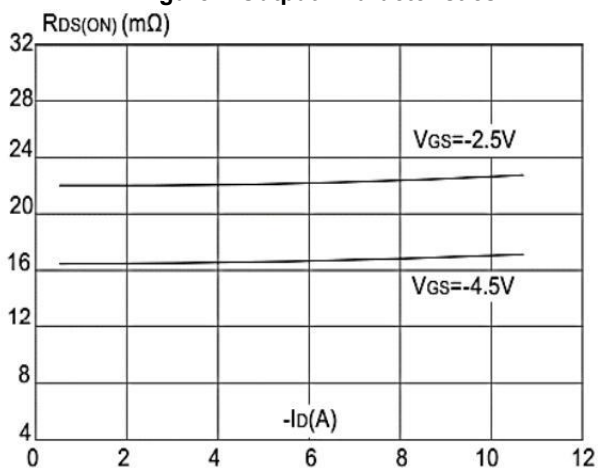


Figure 3: On-resistance vs. Drain Current

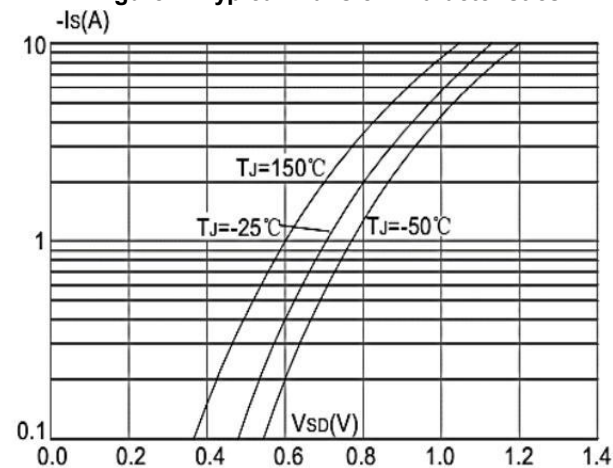


Figure 4: Body Diode Characteristics

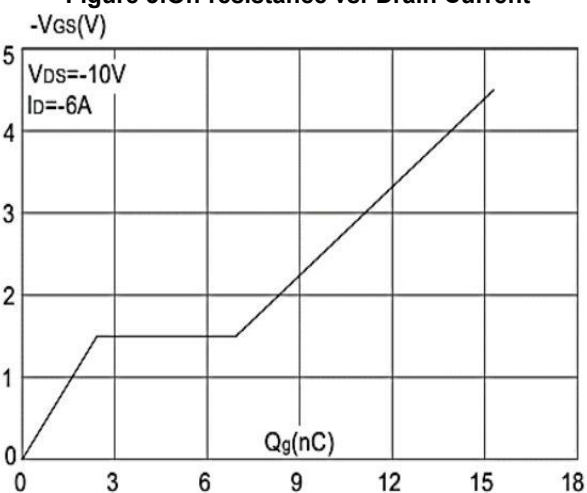


Figure 5: Gate Charge Characteristics

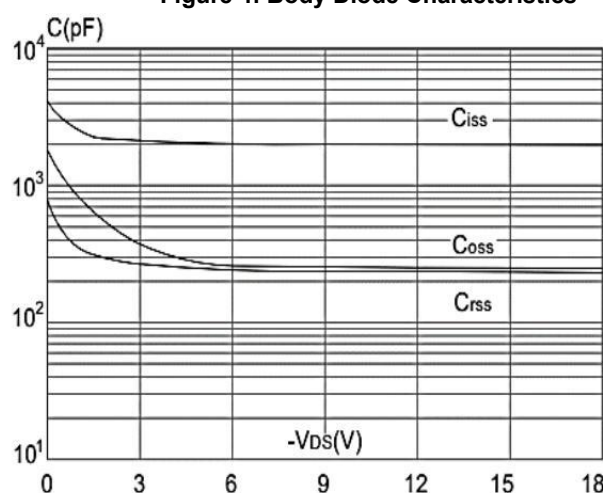


Figure 6: Capacitance Characteristics

Typical Characteristics

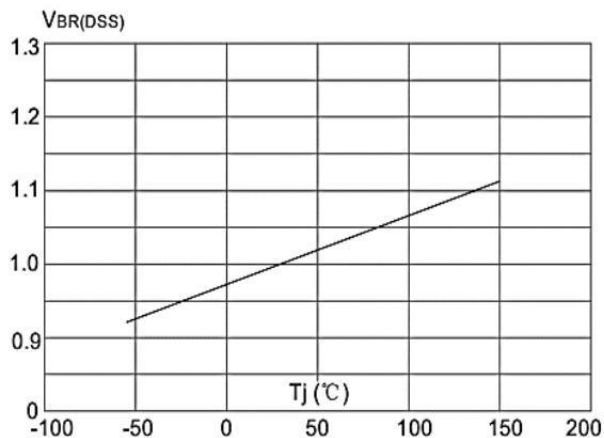


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

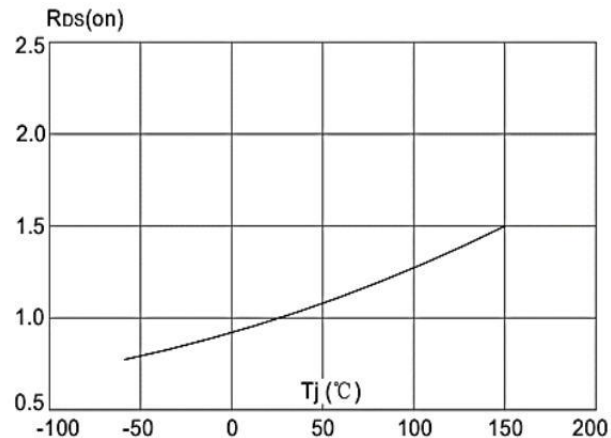


Figure 8: Normalized on Resistance vs. Junction Temperature

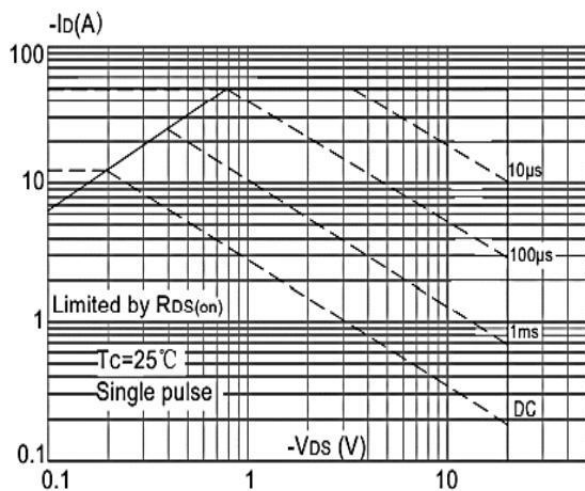


Figure 9: Maximum Safe Operating Area

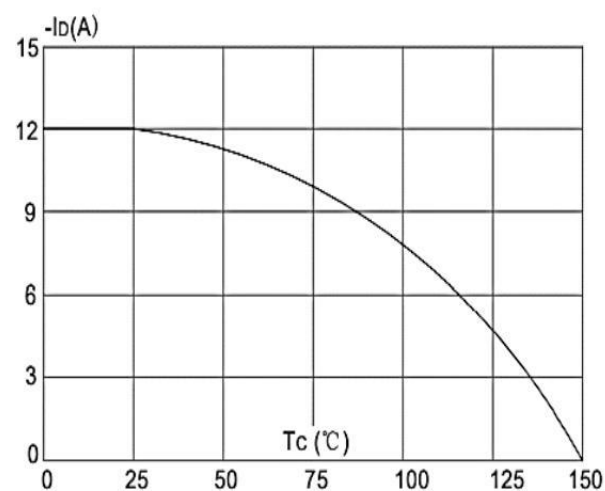


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

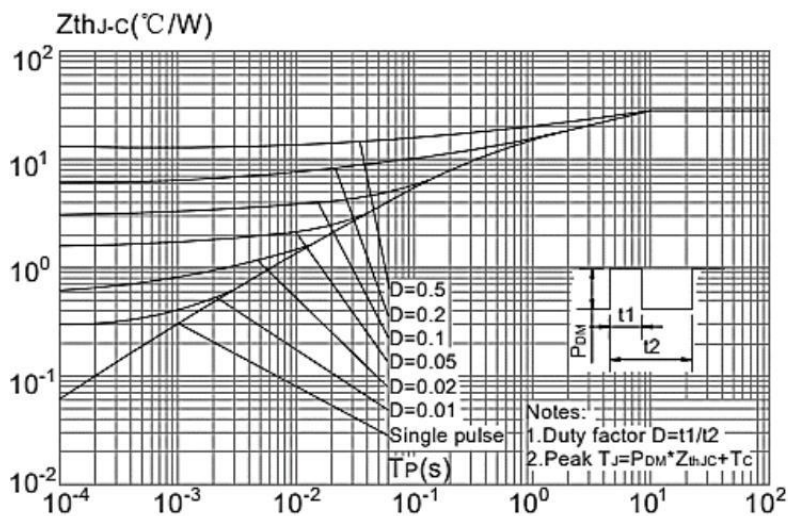
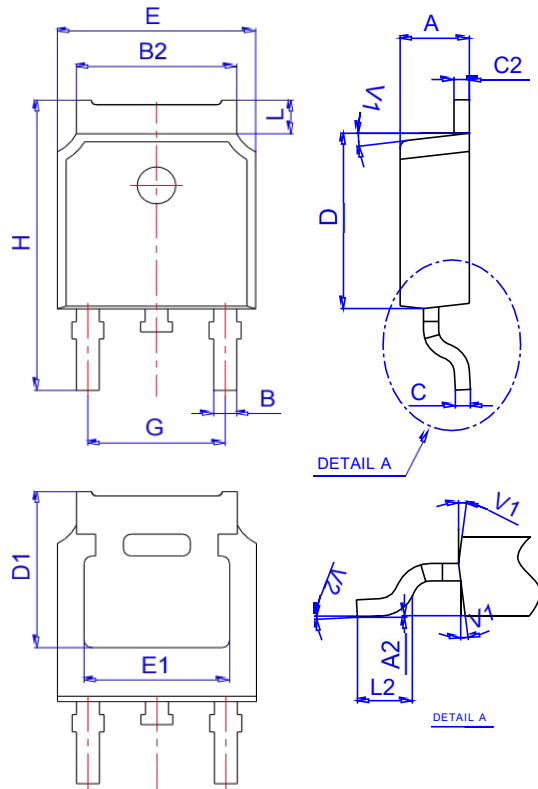


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

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