

Description

The SX40N02D 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

$V_{DS} = 20V$ $I_D = 48A$

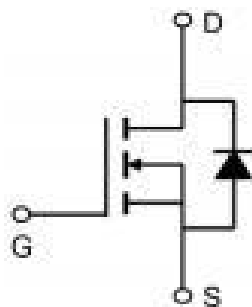
$R_{DS(ON)} < 8.5m\Omega$ @ $V_{GS}=4.5V$

Application

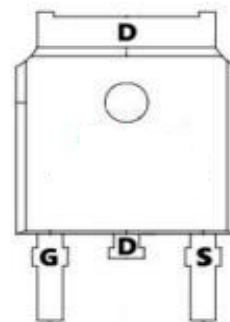
3.3V MCU Drive

Load switch

Uninterruptible power supply



TO-252-3L



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

Symbol	Parameter	Max.	Units
VDSS	Drain-Source Voltage	20	V
VGSS	Gate-Source Voltage	± 12	V
$I_{D@TA=25^\circ C}$	Continuous Drain Current, V_{GS} @ 4.5V	48	A
$I_{D@TA=70^\circ C}$	Continuous Drain Current, V_{GS} @ 4.5V	30	A
IDM	Pulsed Drain Current ^{note1}	120	A
EAS	Single Pulsed Avalanche Energy ^{note2}	147.6	mJ
PD@TA=25°C	Power Dissipation	37	W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +175	°C
R θ JA	Thermal Resistance Junction-Ambient ¹	62	°C/W
R θ JC	Thermal Resistance, Junction to Case	4	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20	24	-	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V,	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.4	0.7	1.1	V
RDS(on)	Static Drain-Source on-Resistance note3	V _{GS} =4.5V, I _D =25A	-	6.2	8.5	mΩ
		V _{GS} =2.5V, I _D =10A	-	8.8	13	
Ciss	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz	-	1458	-	pF
Coss	Output Capacitance		-	238	-	pF
Crss	Reverse Transfer Capacitance		-	212	-	pF
Qg	Total Gate Charge	V _{DS} =10V, I _D =25A, V _{GS} =4.5V	-	19	-	nC
Qgs	Gate-Source Charge		-	3	-	nC
Qgd	Gate-Drain(“Miller”) Charge		-	6.4	-	nC
td(on)	Turn-on Delay Time	V _{DS} =10V, I _D =10A, R _{GEN} =3Ω, V _{GS} =4.5V	-	10	-	ns
tr	Turn-on Rise Time		-	21	-	ns
td(off)	Turn-off Delay Time		-	39	-	ns
tr	Turn-off Fall Time		-	19	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	50	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	200	A
VSD	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	IF=20A, dI/dt=100A/μs	-	25	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	20	-	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 test condition is T_J=25°C, V_{DD}=10V, V_G=4.5V, L=0.5mH, R_G=25Ω, I_{AS}=12A
- 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

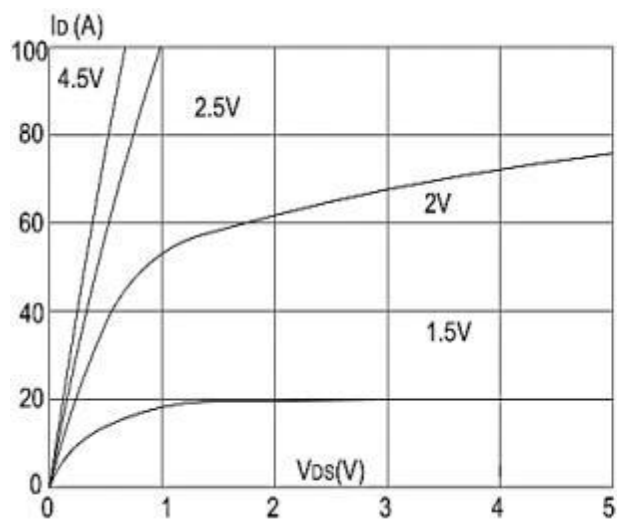


Figure 1: Output Characteristics

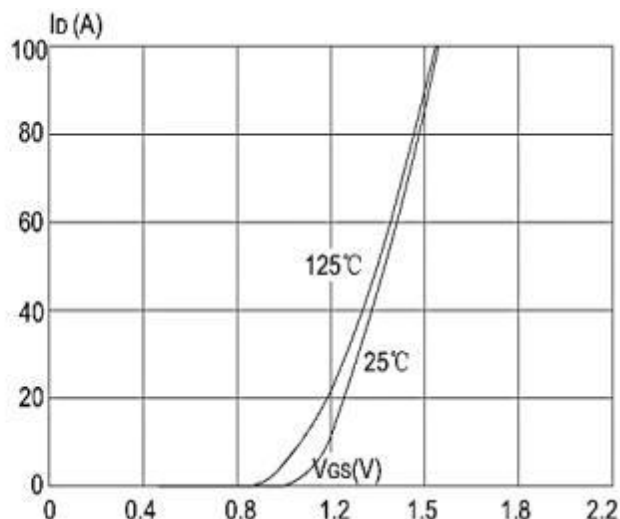


Figure 2: Typical Transfer Characteristics

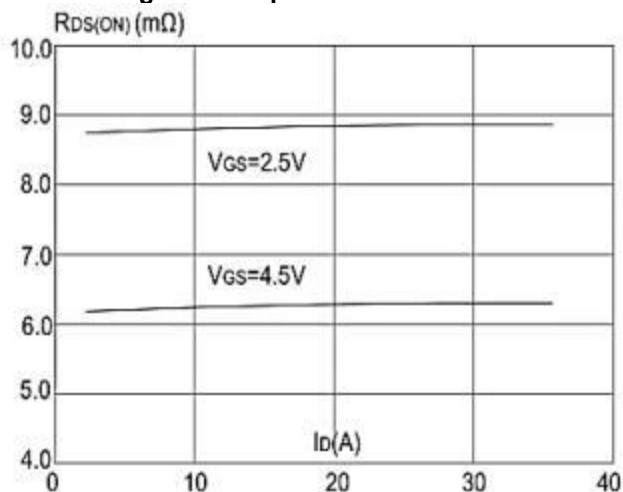


Figure 3: On-resistance vs. Drain Current

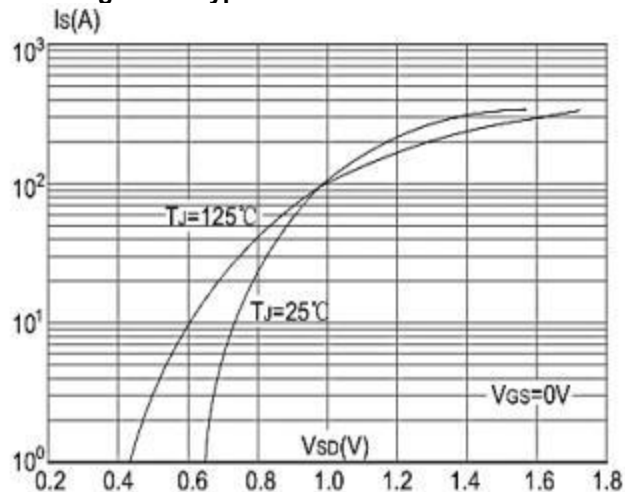


Figure 4: Body Diode Characteristics

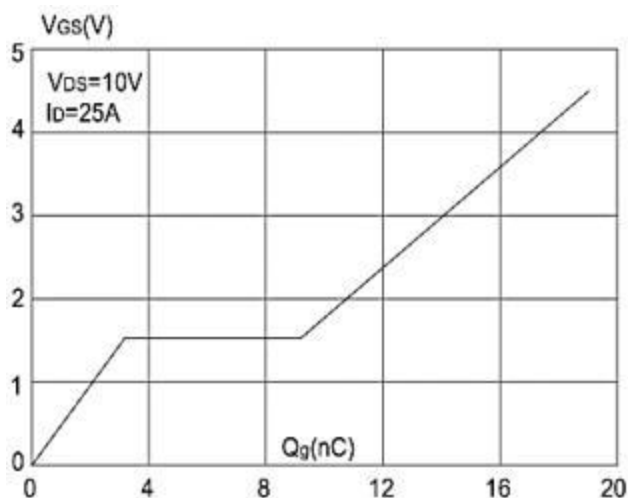


Figure 5: Gate Charge Characteristics

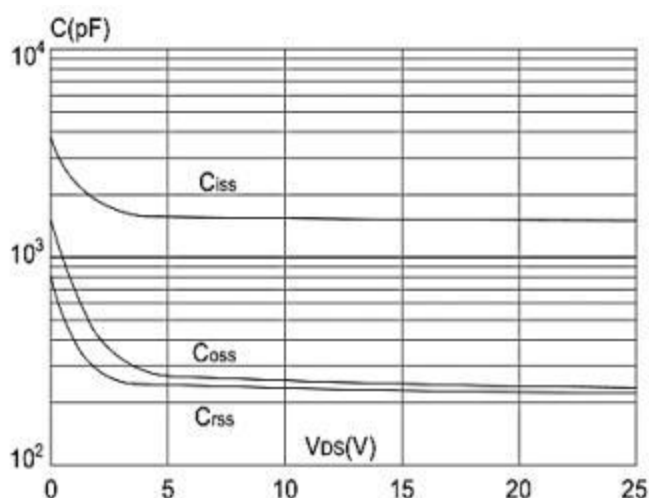


Figure 6: Capacitance Characteristics

Typical Characteristics

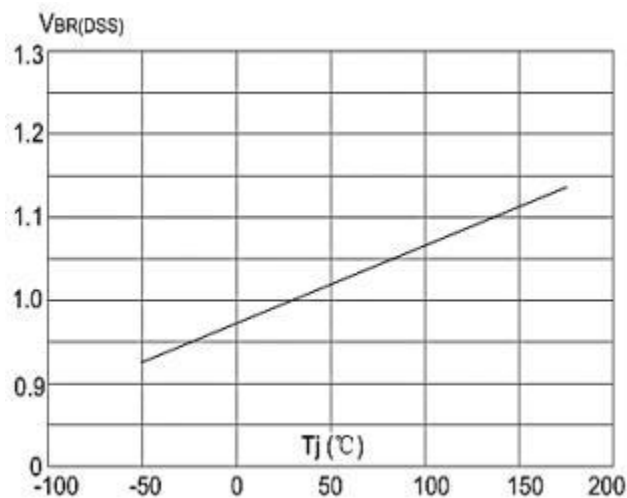


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

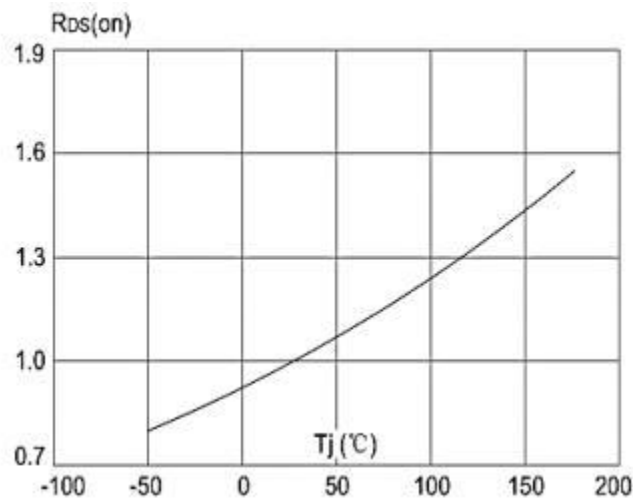


Figure 8: Normalized on Resistance vs. Junction Temperature

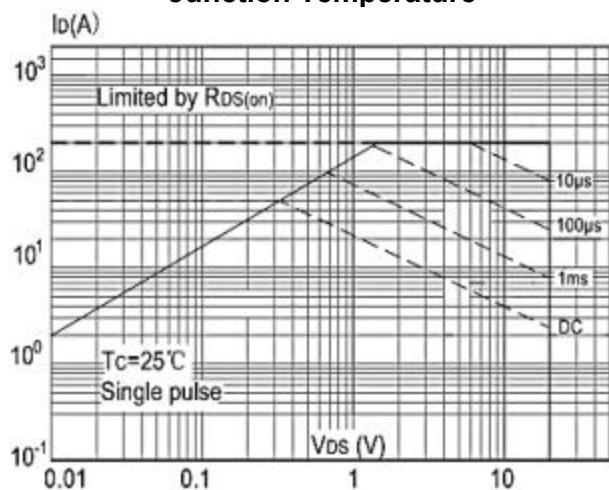


Figure 9: Maximum Safe Operating Area vs. Case Temperature

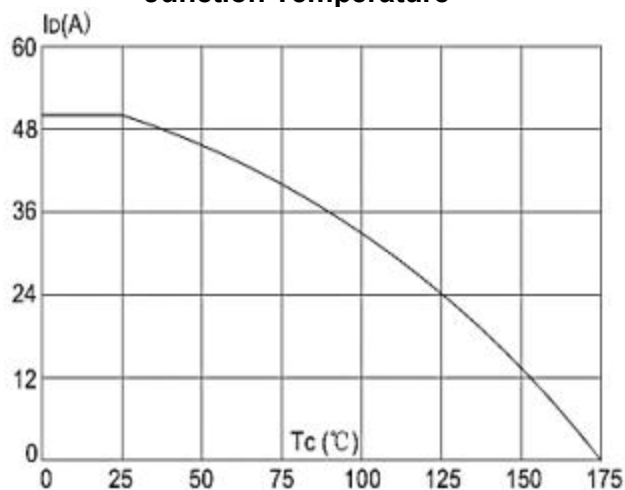


Figure 10: Maximum Continuous Drain Current

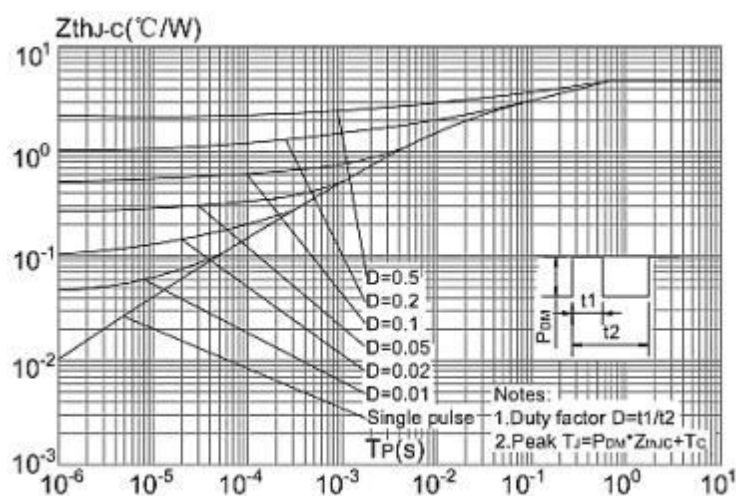
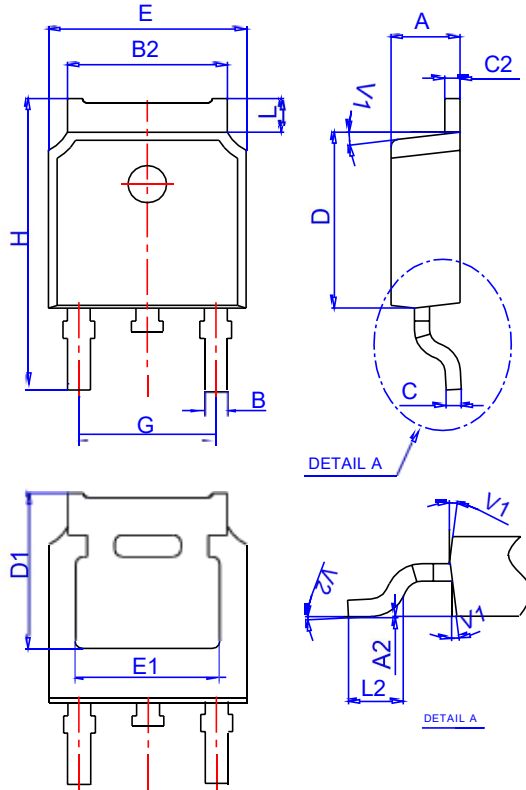


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

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