

Description

The SX12N40D is silicon N -channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

General Features

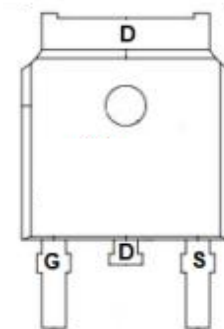
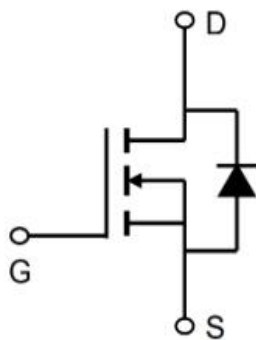
$V_{DS} = 400V$ $I_D = 12A$

$R_{DS(ON)} < 500m\Omega$ @ $V_{GS}=10V$

Application

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)



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

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage ($V_{GS} = 0V$)	400	V
I_D	Continuous Drain Current	12	A
I_{DM}	Pulsed Drain Current (note1)	44	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy (note2)	368	mJ
I_{AR}	Avalanche Current (note1)	11	A
E_{AR}	Repetitive Avalanche Energy (note1)	28	mJ
P_D	Power Dissipation ($T_c = 25^{\circ}C$)	33.2	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	$-55 \sim +150$	$^{\circ}C$
R_{thJC}	Thermal Resistance, Junction-to-Case	3.8	$^{\circ}C/W$
R_{thJA}	Thermal Resistance, Junction-to-Ambient	62.5	$^{\circ}C/W$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	400	450		V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D =250μA, Referenced to 25°C		0.43		V/°C
IDSS	Zero Gate Voltage Drain Current	V _{DS} = 400 V, V _{GS} = 0 V			1	μA
		V _{DS} = 320 V, T _C = 125°C			10	μA
IGSSF	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V			100	nA
IGSSR	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V			-100	nA
V _{GS} (TH)	Gate Threshold voltage	V _{DS} =V _{GS} , I _D =250 uA	2.0		4.0	V
R _{DS} (On)	Drain-Source on-state resistance	V _{GS} =10V, I _D = 5.5A, T _J =25°C		0.460	0.575	Ω
g _{FS}	Forward Transconductance	V _{DS} =40V, I _D = 5.5A (Note 4)		6.5		S
C _{iss}	Input capacitance	V _{DS} = 25V, V _{GS} =0V, f=1.0MHz		755		pF
C _{oss}	Output capacitance			132		pF
C _{rss}	Reverse transfer capacitance			9.0		pF
t _d (on)	Turn On Delay Time	V _{DD} =200 V, I _D =11A, R _G = 25Ω (Note 4, 5)		11		ns
t _r	Rising Time			25		ns
t _d (off)	Turn Off Delay Time			28		ns
t _f	Fall Time			26		ns
Q _g	Total Gate Charge	V _{DS} = 320 V, I _D = 11 A, V _{GS} = 10 V (Note 4, 5)		9.6		nC
Q _{gs}	Gate-Source Charge			3.0		nC
Q _{gd}	Gate-Drain Charge			2.5		nC
ISM	Maximum Pulsed Drain-Source Diode Forward Current				44	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 11 A			1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 11 A, dI _F / dt = 100 A/μs Note 4)		356		ns
Q _{rr}	Reverse Recovery Charge			2.4		μC

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The EAS data shows Max. rating . L=4.1Mh IAS=11A, VDD=50V, RG=25Ω, Starting T_J = 25 °C
- 3、The test condition is Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%
- 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

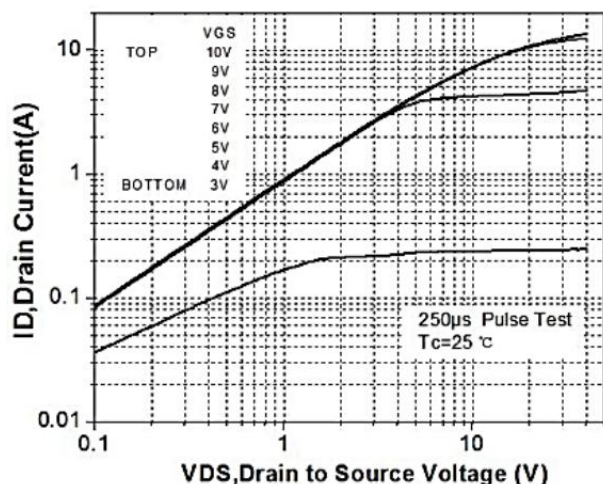


Figure 1. On-Region Characteristics

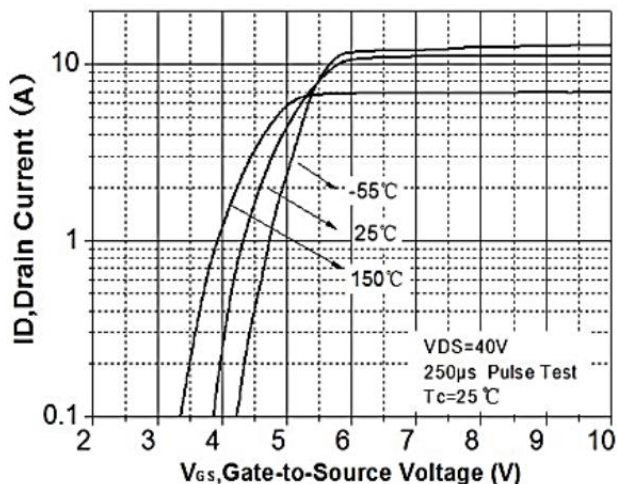


Figure 2. Transfer Characteristics

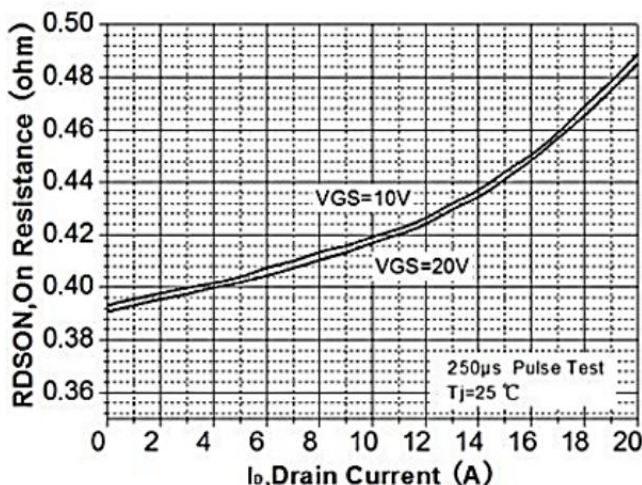


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

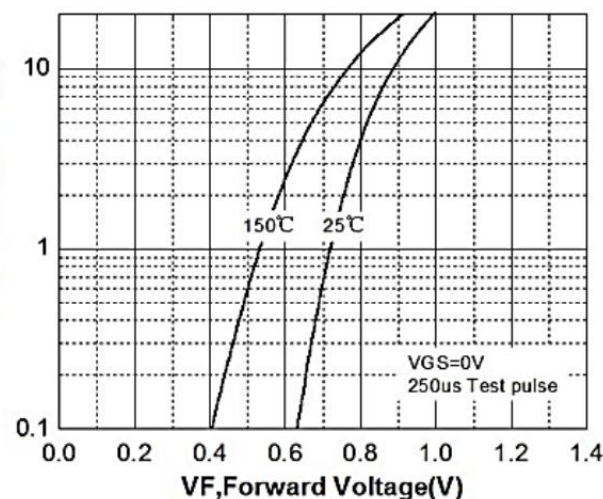


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

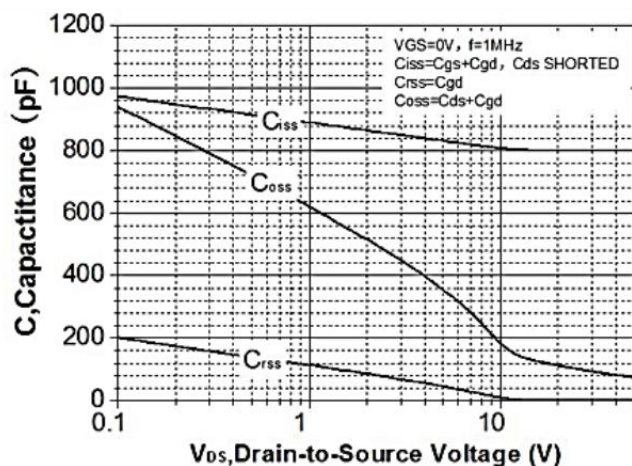


Figure 5. Capacitance Characteristics

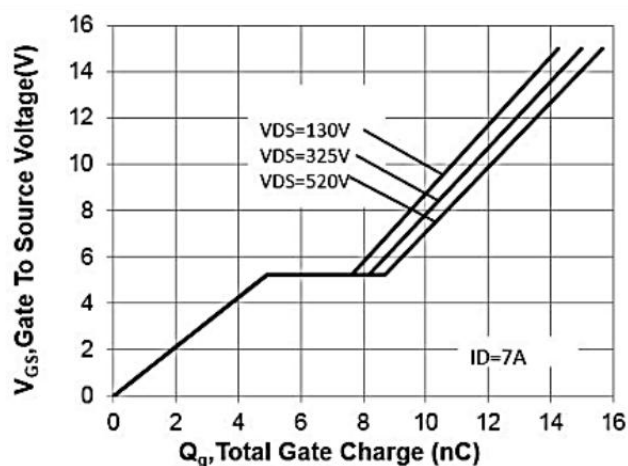


Figure 6. Gate Charge Characteristics

Typical Characteristics

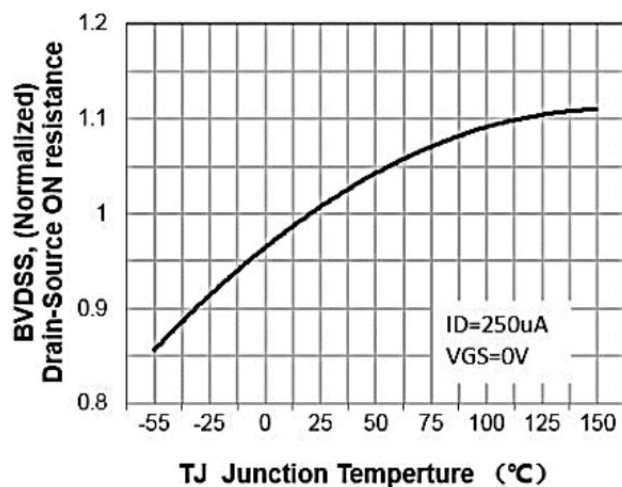


Figure 7. Breakdown Voltage Variation vs Temperature

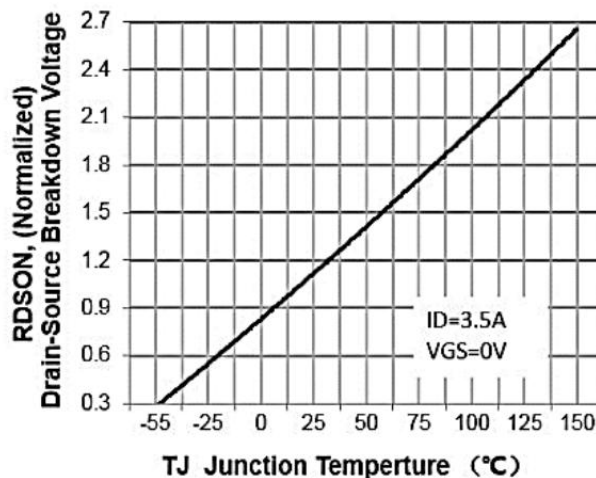


Figure 8. On-Resistance Variation vs Temperature

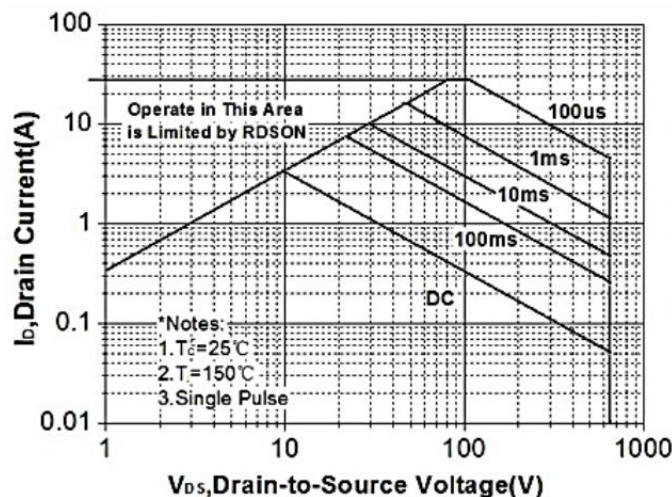


Figure 9. Maximum Safe Operating Area

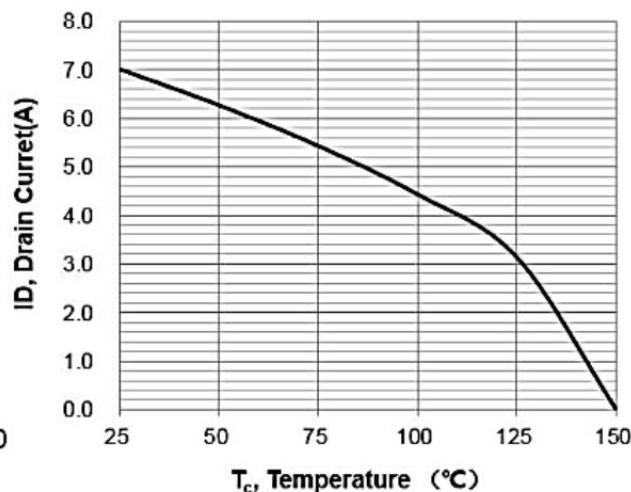


Figure 10. Maximum Drain Current vs Case Temperature

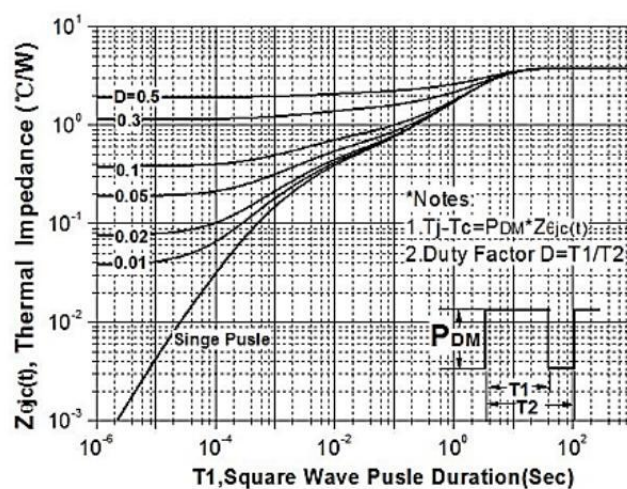
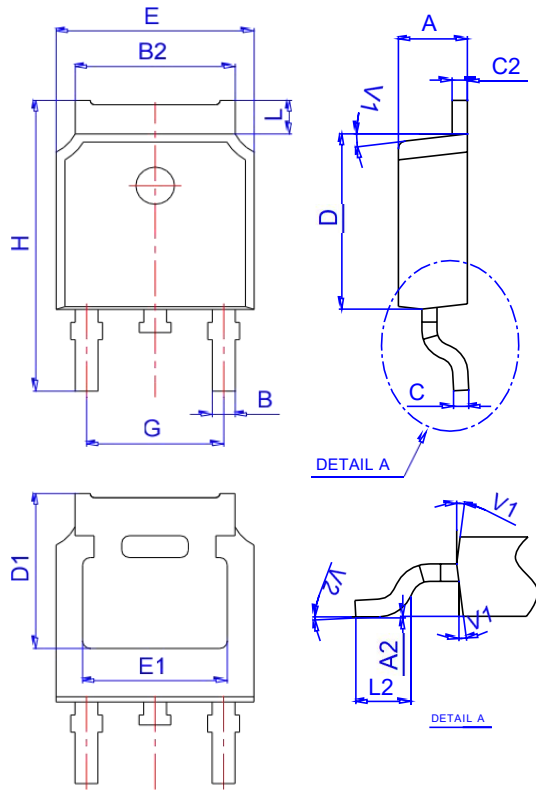


Figure 11. Transient Thermal Response Curve

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