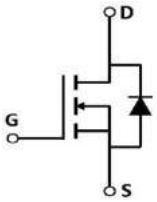
12N10D

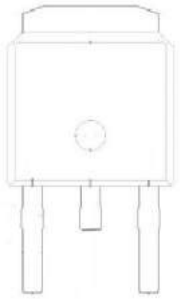
100V N-SGT Enhancement Mode MOSFET

General Description

12N10D use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable to use in





Features

Low RDS(on) & FOM

Extremely low switching loss

Excellent stability and uniformity or Invertors

Applications

Consumer electronic power supply

Motor control

Synchronous-rectification

Isolated DC

Synchronous-rectification applications

Absolute Maximum Ratings at T_j=25℃ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	VDS	100	V
Gate source voltage	VGS	±20	V
Continuous drain current[1], T_C=25 ℃	I_D	12	A
Pulsed drain current[2], T_C=25 ℃	ID, pulse	24	A
Power dissipation[3], T_C=25 ℃	P_D	17	W
Single pulsed avalanche energy[5]	EAS	1.2	mJ
Operation and storage temperature	Tstg，Tj	-55 to 150	℃
Thermal resistance, junction-case	RθJC	7.4	℃/W
Thermal resistance, junction-ambient[4]	RθJA	62	℃/W

100V N-SGT Enhancement Mode MOSFET

Electrical Characteristics at T_j=25 ℃ unless otherwise specified

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-source breakdown voltage	V_{GS}=0 V, I_D=250 μA	100	111		V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=250 μA	1.2	2.0	2.5	V
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS}=10 V, I_D=5 A		105	125	mΩ
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS}=4.5 V, I_D=3 A		115	145	mΩ
I_{GSS}	Gate-source leakage current	V_{GS}=20 V			100	nA
		V_{GS}=-20 V			-100	
I_{DSS}	Drain-source leakage current	V_{DS}=100 V, V_{GS}=0 V			1	uA
C_{iss}	Input capacitance	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz		206.1		pF
C_{oss}	Output capacitance			28.9		pF
C_{rss}	Reverse transfer capacitance			1.4		pF
$t_{d(on)}$	Turn-on delay time	V_{GS}=10 V, V_{DS}=50 V, R_G=2 Ω, I_D=5 A		14.7		ns
t_r	Rise time			3.5		ns
$t_{d(off)}$	Turn-off delay time			20.9		ns
t_f	Fall time			2.7		ns
Q_g	Total gate charge	I_D=5 A, V_{DS}=50 V, V_{GS}=10 V		4.3		nC
Q_{gs}	Gate-source charge			1.5		nC
Q_{gd}	Gate-drain charge			1.1		nC
$V_{plateau}$	Gate plateau voltage			5.0		V
I_S	Diode forward current	V_{GS}<V_{th}			7	A
I_{SP}	Pulsed source current				21	
V_{SD}	Diode forward voltage	I_S=7 A, V_{GS}=0 V			1.0	V
t_{rr}	Reverse recovery time	I_S=5 A, di/dt=100 A/μs		32.1		ns
Q_{rr}	Reverse recovery charge			39.4		nC
I_{rrm}	Peak reverse recovery current			2.1		A

Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.
5) V_{DD}=50 V, R_G=50 Ω, L=0.3 mH, starting T_j=25 °C.

Electrical Characteristics Diagrams

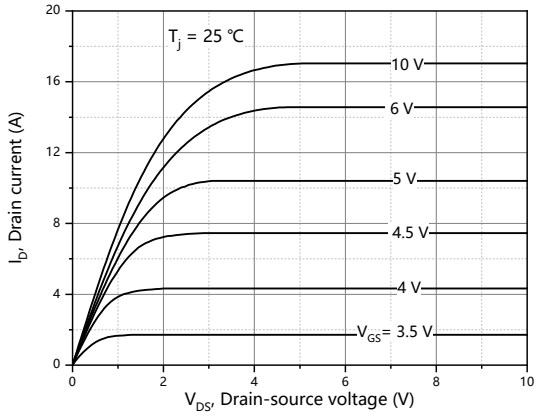


Figure 1, Typ. output characteristics

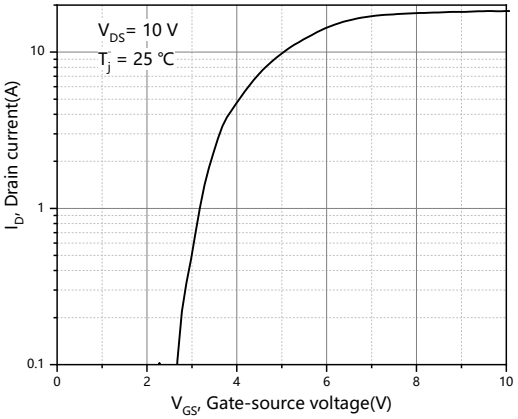


Figure 2, Typ. transfer characteristics

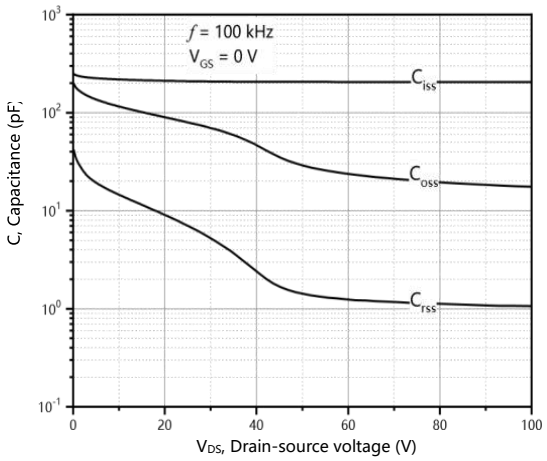


Figure 3, Typ. capacitances

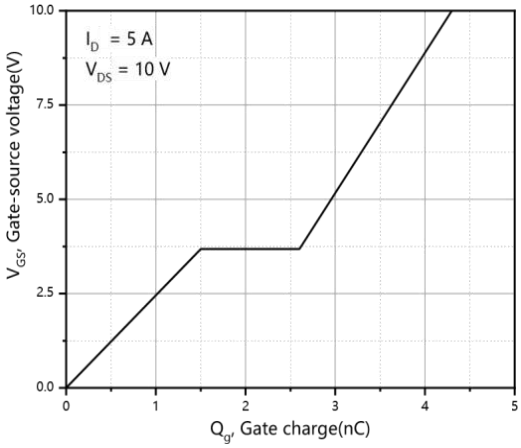


Figure 4, Typ. gate charge

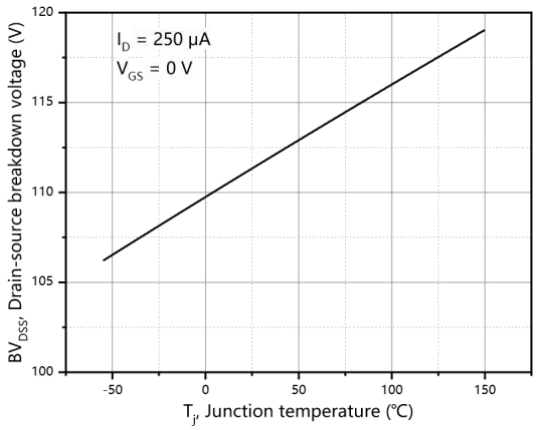


Figure 5, Drain-source breakdown voltage

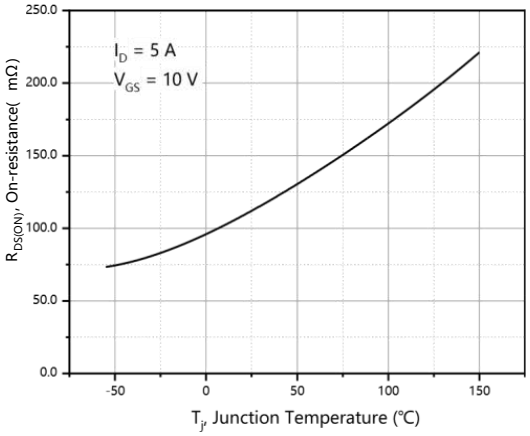


Figure 6, Drain-source on-state resistance

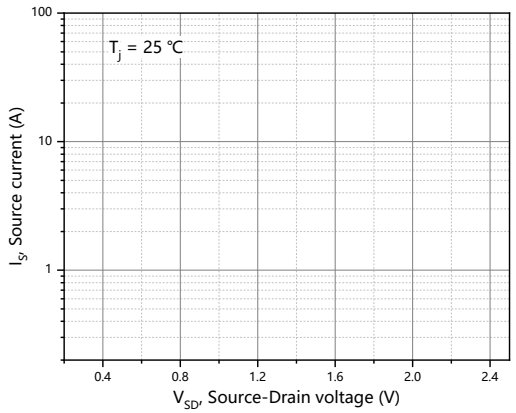


Figure 7, Forward characteristic of body diode

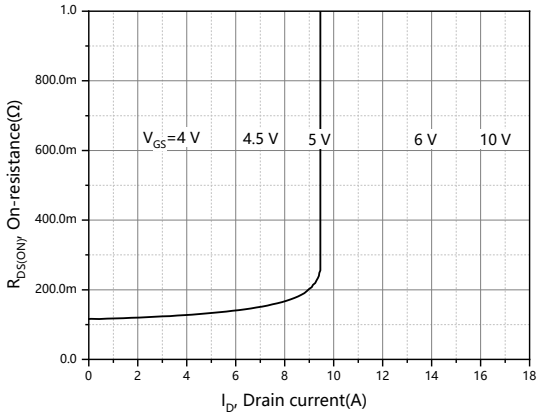


Figure 8, Drain-source on-state resistance

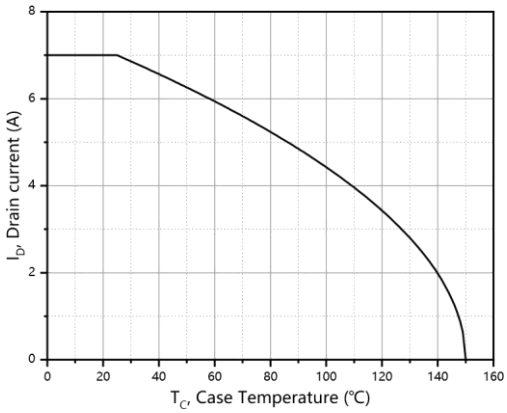


Figure 9, Drain current

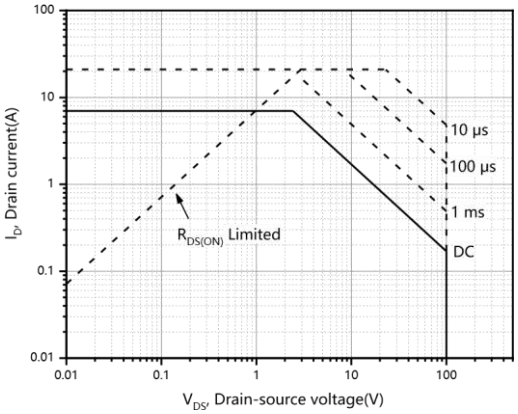


Figure 10, Safe operation area T_C=25 ℃

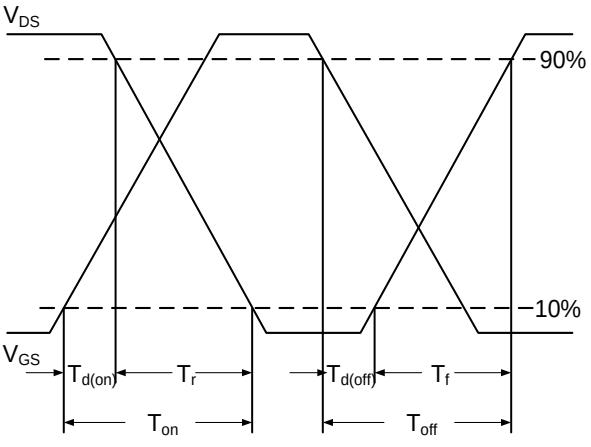


Fig.11 Switching Time Waveform

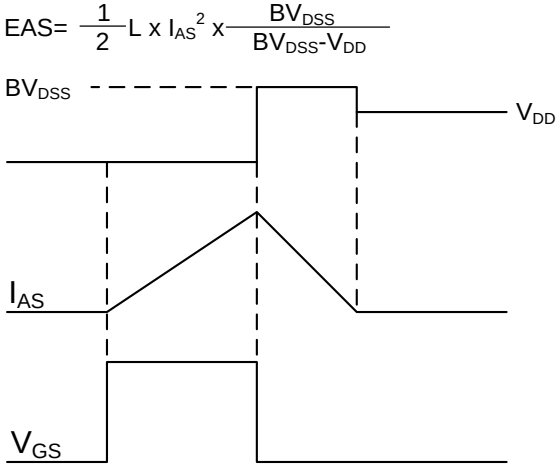
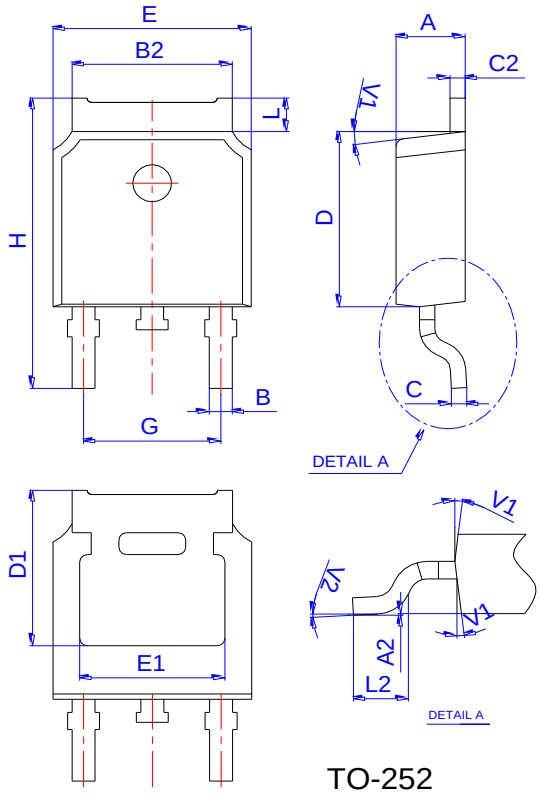


Fig.12 Unclamped Inductive Switching Waveform

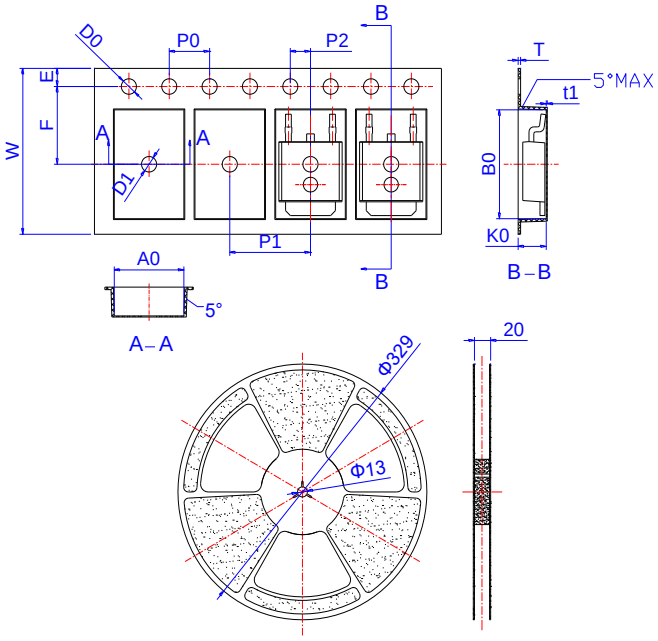
Package Mechanical Data-TO-252-3L



TO-252

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°

Reel Spectification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583