HUASHUO
SEMICONDUCTOR

HSH250N10

N-Ch 100V Fast Switching MOSFETs

General Description

- 100% EAS Guaranteed
- Green Device Available
- Super Low $RDS_{(ON)}$
- Advanced high cell density Trench technology

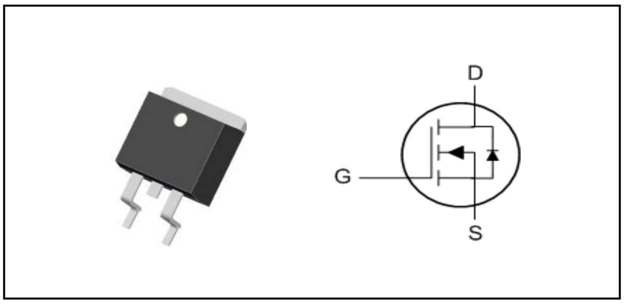
Product Summary

V_{DS}	100	V
$R_{DS(ON),typ}$	1.9	mΩ
I_D	250	A

Applications

- MOTOR Driver.
- BMS.
- High frequency switching and synchronous rectification.

TO263 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	±20/-12	V
I_D@T_C=25˚C	Continuous Drain Current, V_{GS} @ 10V[1,6]	250	A
I_D@T_C=100˚C	Continuous Drain Current, V_{GS} @ 10V[1,6]	158	A
I_{DM}	Pulsed Drain Current[2]	1000	A
EAS	Single Pulse Avalanche Energy[3]	940	mJ
I_{AS}	Avalanche Current	135	A
P_D@T_C=25˚C	Total Power Dissipation[4]	411	W
T_{STG}	Storage Temperature Range	-55 to 150	˚C
T_J	Operating Junction Temperature Range	-55 to 150	˚C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	62	˚C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	0.3	˚C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	100	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=40A	---	1.9	2.3	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2.0	3.0	4.0	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=100V , V_{GS}=0V , T_J=25˚C	---	---	1	uA
		V_{DS}=80V , V_{GS}=0V , T_J=85˚C	---	---	10	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=10V , I_D=3A	---	20	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.1	---	Ω
Qg	Total Gate Charge (10V)	V_{DS}=50V , V_{GS}=10V , I_D=10A	---	195	---	nC
Qgs	Gate-Source Charge		---	21	---	
Qgd	Gate-Drain Charge		---	30	---	
Td(on)	Turn-On Delay Time	V_{DD}=50V , V_{GS}=10V , R_G=3.3Ω, I_D=1A	---	21	---	ns
Tr	Rise Time		---	21	---	
Td(off)	Turn-Off Delay Time		---	69	---	
Tf	Fall Time		---	120	---	
Ciss	Input Capacitance	V_{DS}=50V , V_{GS}=0V , f=1MHz	---	10150	---	pF
Coss	Output Capacitance		---	2100	---	
Crss	Reverse Transfer Capacitance		---	55	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	250	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25˚C	---	---	1	V
t_{rr}	Reverse Recovery Time	I_F=10A , dI/dt=100A/µs , T_J=25˚C	---	95	---	nS
Q_{rr}	Reverse Recovery Charge		---	670	---	nC

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 V_{DD}=50V,V_{GS}=10V,L=0.1mH,Rg=25Ω,I_{AS}=138A

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.

6.Package limitation current.

Typical Characteristics

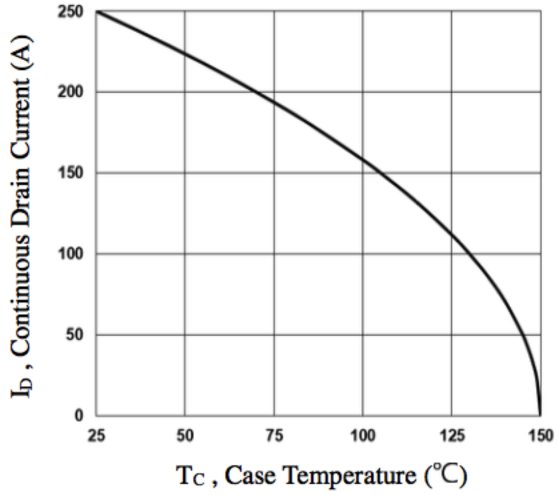


Fig.1 Continuous Drain Current vs. T_C

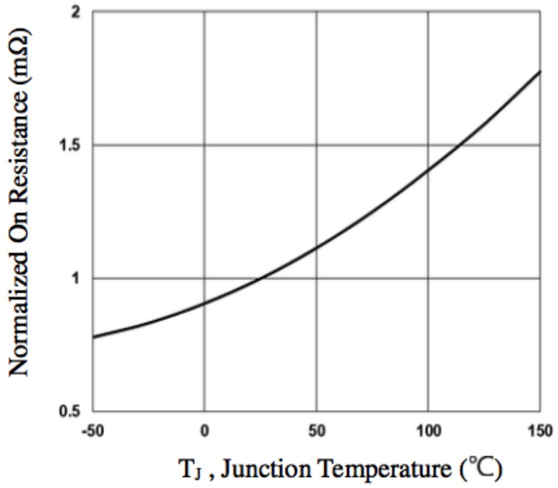


Fig.2 Normalized RDSON vs. T_J

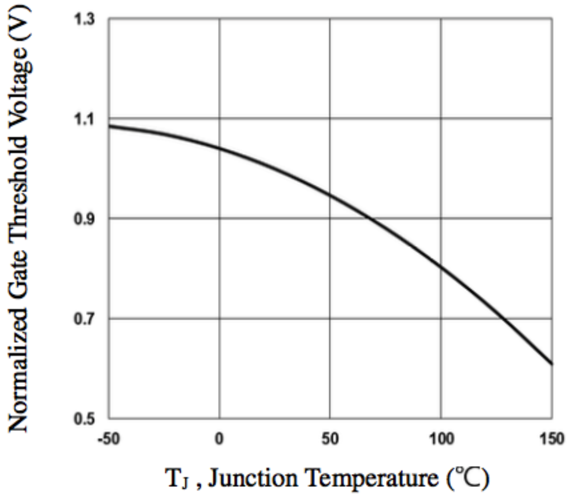


Fig.3 Normalized Vth vs. Tj

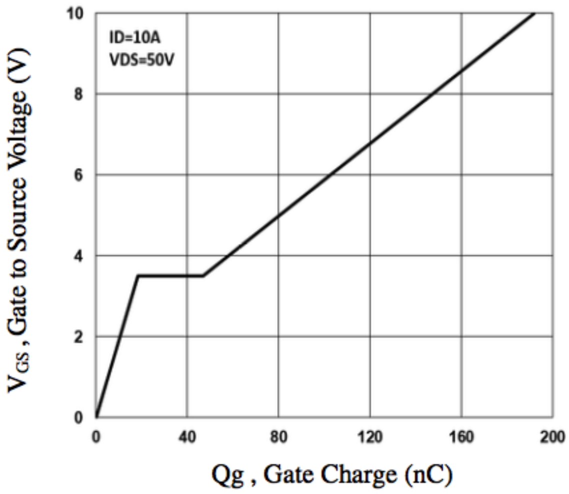


Fig.4 Gate Charge Characteristics

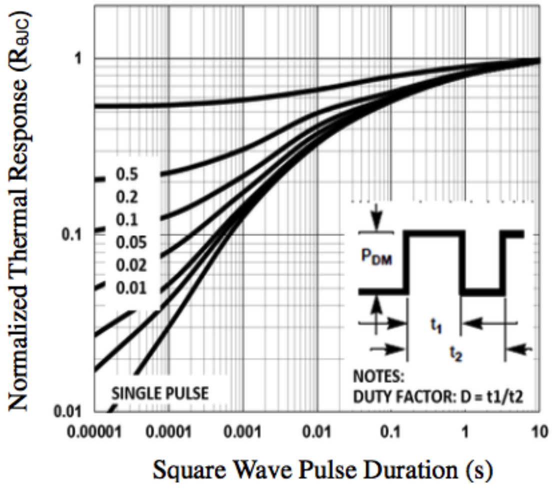


Fig.5 Normalized Transient Impedance

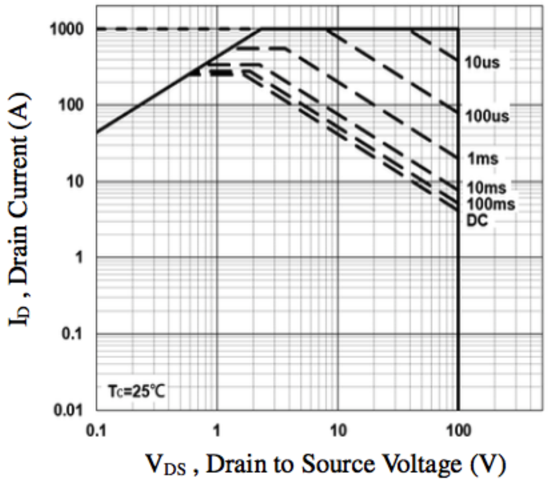


Fig.6 Maximum Safe Operation Area

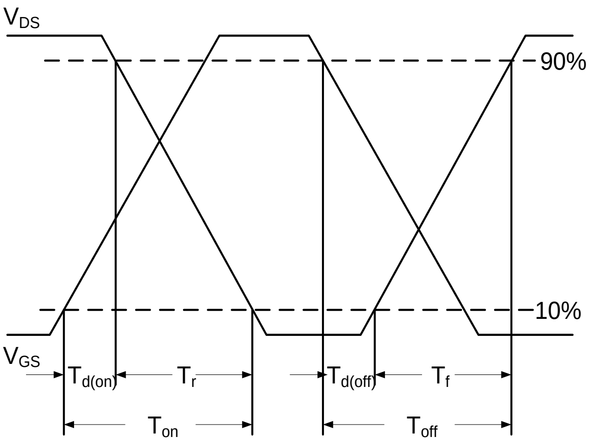


Fig.7 Switching Time Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

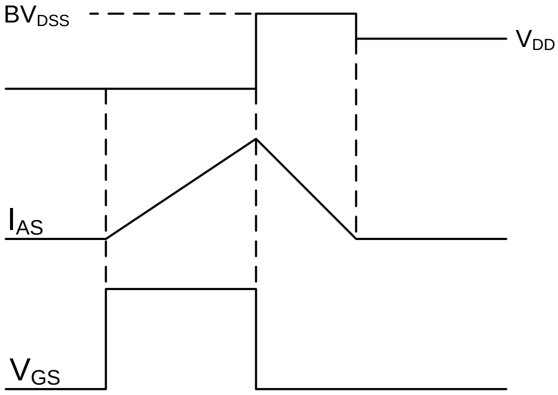
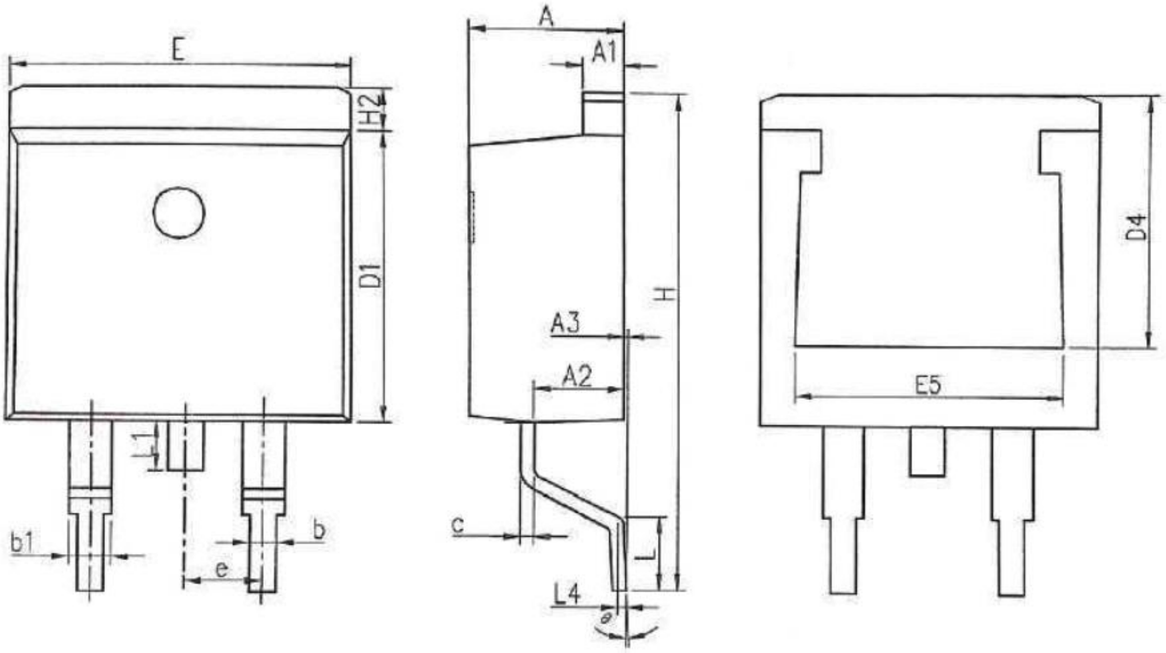


Fig.8 Unclamped Inductive Switching Waveform



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.370	4.770	0.172	0.188
A1	1.220	1.420	0.048	0.056
A2	2.200	2.890	0.087	0.114
A3	0.000	0.250	0.000	0.010
b	0.700	0.960	0.028	0.038
b1	1.170	1.470	0.046	0.058
c	0.300	0.530	0.012	0.021
D1	8.500	9.300	0.335	0.366
D4	6.600	-	0.260	-
E	9.860	10.36	0.388	0.408
E5	7.060	-	0.278	-
e	2.540 BSC		0.100 BSC	
H	14.70	15.70	0.579	0.618
H2	1.070	1.470	0.042	0.058
L	2.000	2.600	0.079	0.102
L1	1.400	1.750	0.055	0.069
L4	0.250 BSC		0.010 BSC	
Θ	0°	9°	0°	9°