HUASHUO SEMICONDUCTOR

HSBB50N02

N-Ch 20V Fast Switching MOSFETs

General Description

The HSBB50N02 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSBB50N02 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

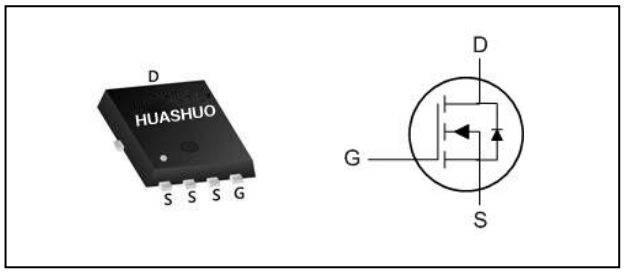
Product Summary

V_{DS}	20	V
$R_{DS(ON),typ}$	5.3	mΩ
I_D	50	A

Features

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Battery protection
- Power management

PRPAK3*3 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	50	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	30	A
I_{DM}	Pulsed Drain Current[2]	200	A
EAS	Single Pulse Avalanche Energy[3]	135	mJ
P_D@T_C=25℃	Total Power Dissipation[4]	29	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State)[1]	---	70	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	4.3	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.028	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=4.5V , I_D=20A	---	5.3	7.0	mΩ
		V_{GS}=2.5V , I_D=15A	---	6.5	8.6	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.5	0.7	0.9	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.16	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=20V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=10V , I_D=20A	10	---	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.2	---	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=20V , V_{GS}=10V , I_D=20A	---	23	---	nC
Q_{gs}	Gate-Source Charge		---	4.5	---	
Q_{gd}	Gate-Drain Charge		---	7.5	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=10V , V_{GS}=4.5V , R_G=3.3Ω I_D=15A	---	15	---	ns
T_r	Rise Time		---	33	---	
$T_{d(off)}$	Turn-Off Delay Time		---	44	---	
T_f	Fall Time		---	95	---	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , f=1MHz	---	2250	---	pF
C_{oss}	Output Capacitance		---	200	---	
C_{rss}	Reverse Transfer Capacitance		---	125	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	50	A
I_{SM}	Pulsed Source Current[2,5]		---	---	200	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=20A , T_J=25℃	---	---	1.0	V
t_{rr}	Reverse Recovery Time	IF=20A , dI/dt=100A/μs , T_J=25℃	---	12	---	nS
Q_{rr}	Reverse Recovery Charge		---	2.6	---	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}=10V,V_{GS}=10V,L=0.5mH
4.The power dissipation is limited by 175℃ 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.

Typical Characteristics

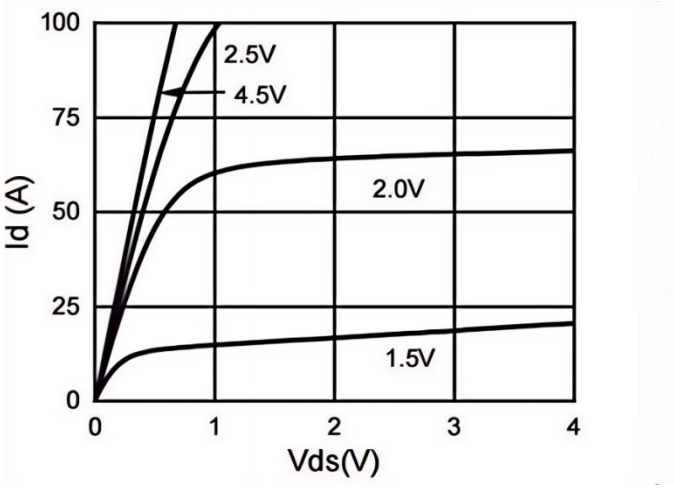


Fig.1 Typical Output Characteristics

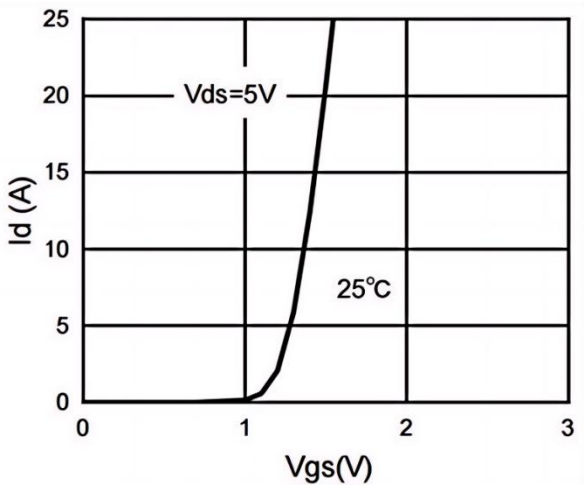


Fig.2 Transfer Characteristics

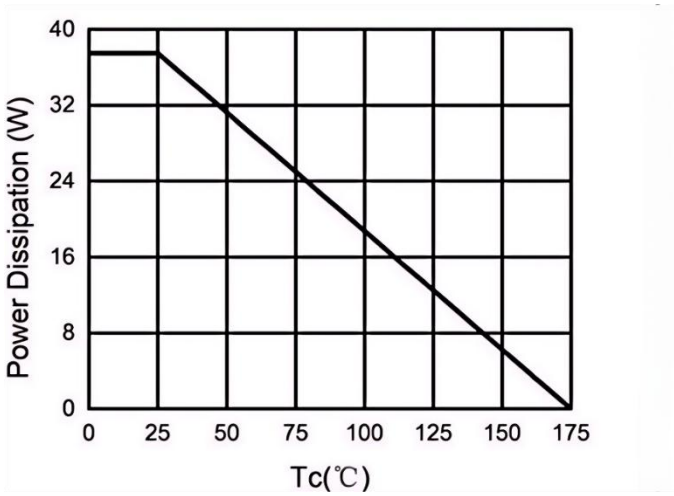


Fig.3 Power Dissipation

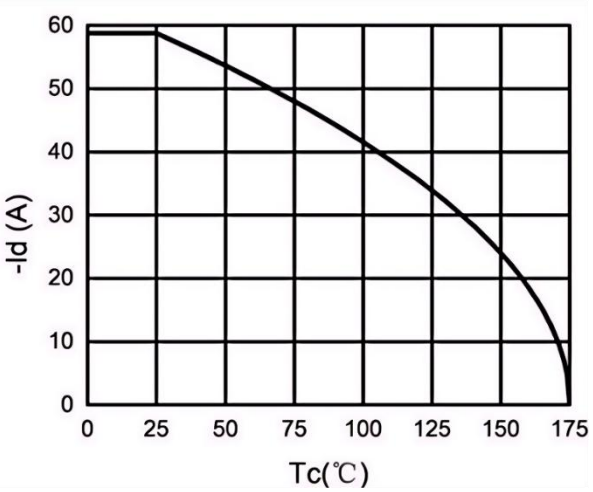


Fig.4 Drain Current

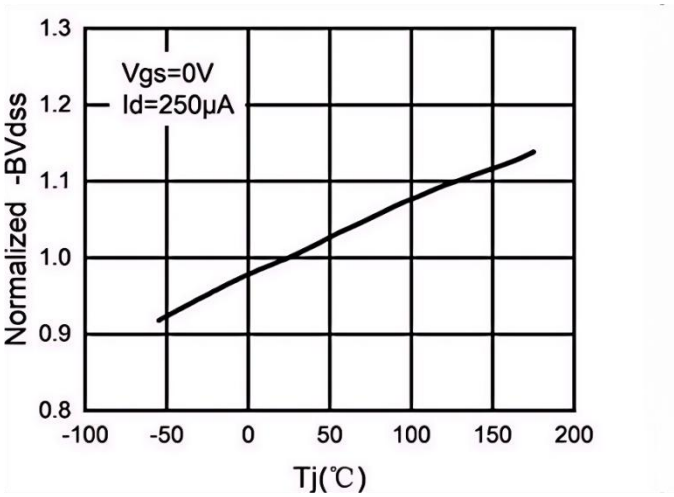


Fig.5 BV_{DSS} vs Junction Temperature

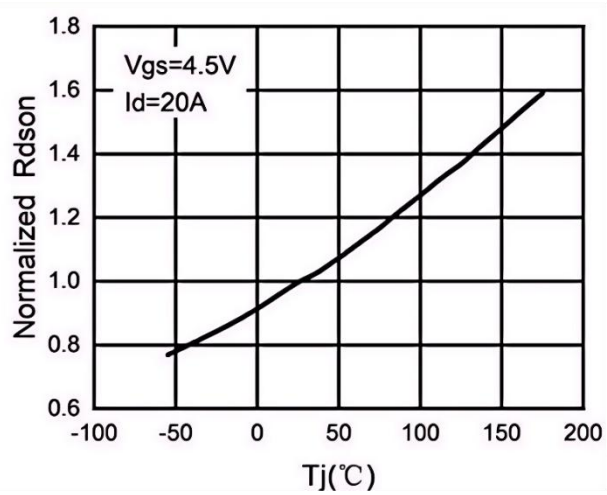


Fig.6 $R_{DS(ON)}$ vs Junction Temperature

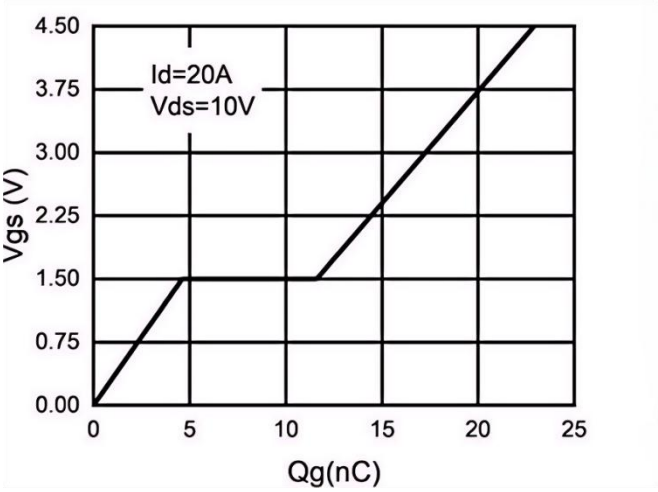


Fig.7 Gate Charge Waveforms

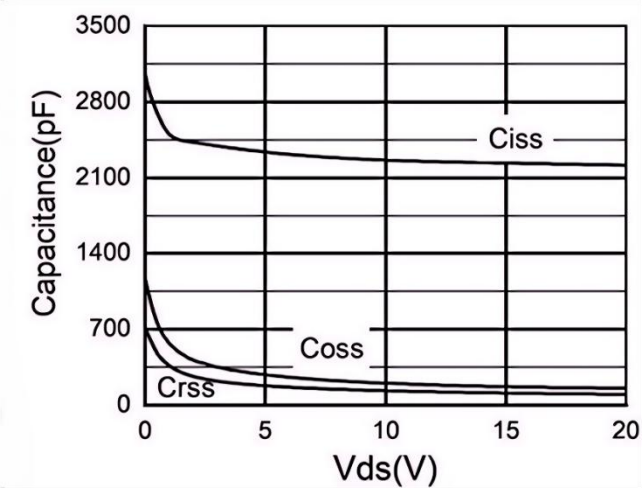


Fig.8 Capacitance

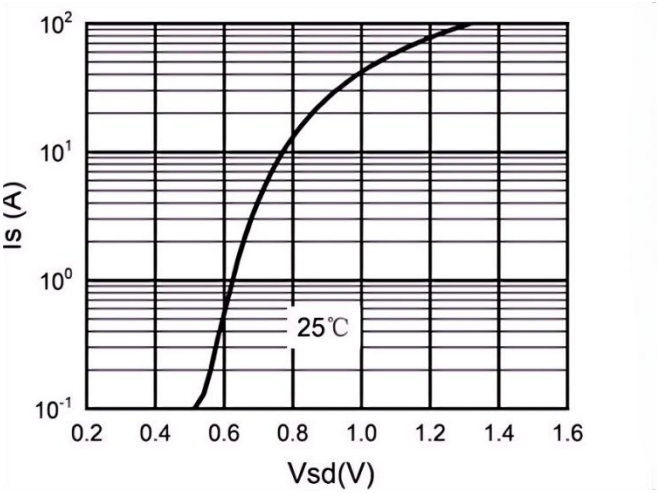


Fig.9 Body Diode Characteristics

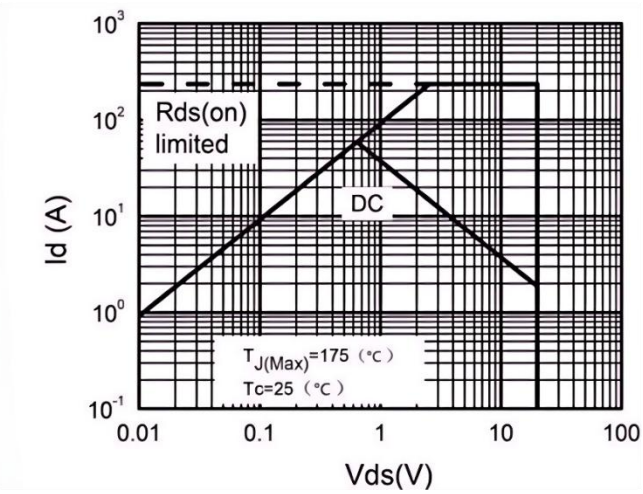
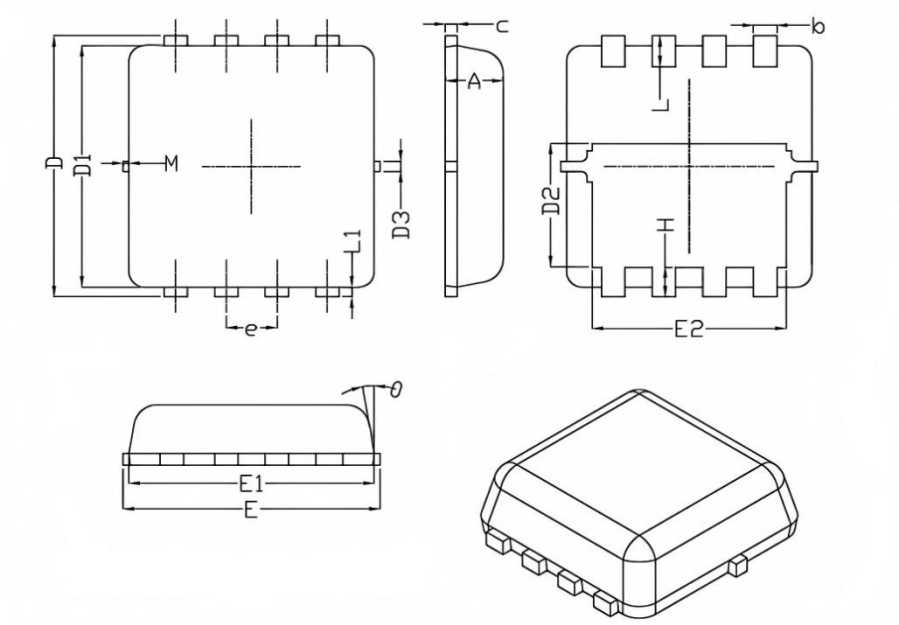


Fig.10 Maximum Safe Operating Area

Ordering Information

Part Number	Package code	Packaging
HSBB50N02	PRPAK3*3	3000/Tape&Reel

PRPAK3*3(E) Single Package Outline



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
C	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	-	0.13	-
E	3.15	3.30	3.45
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	-	0.13	-
M	*	*	0.15
θ		10°	12°

HSBB50N02 Marking:

