

Description

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

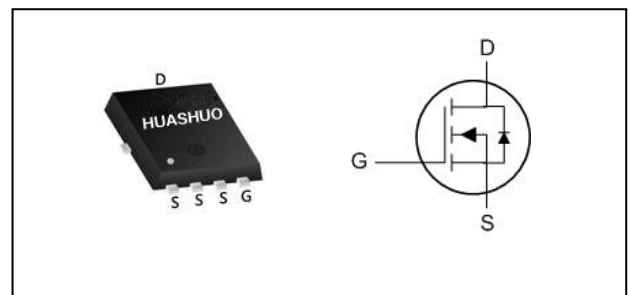
The HSBB50N02 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

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

Product Summary

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

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
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	50	A
$I_D@T_C=100^\circ\text{C}$	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
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	29	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

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



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	20	---	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.028	---	V/°C
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	---	0.9	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-6.16	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =20V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ± 12V, V _{DS} =0V	---	---	± 100	nA
g _{fs}	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°C	---	---	1.0	V
t _{rr}	Reverse Recovery Time	I _F =20A, dI/dt=100A/μs, T _J =25°C	---	12	---	nS
Q _{rr}	Reverse Recovery Charge		---	2.6	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z 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°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.



Typical Characteristics

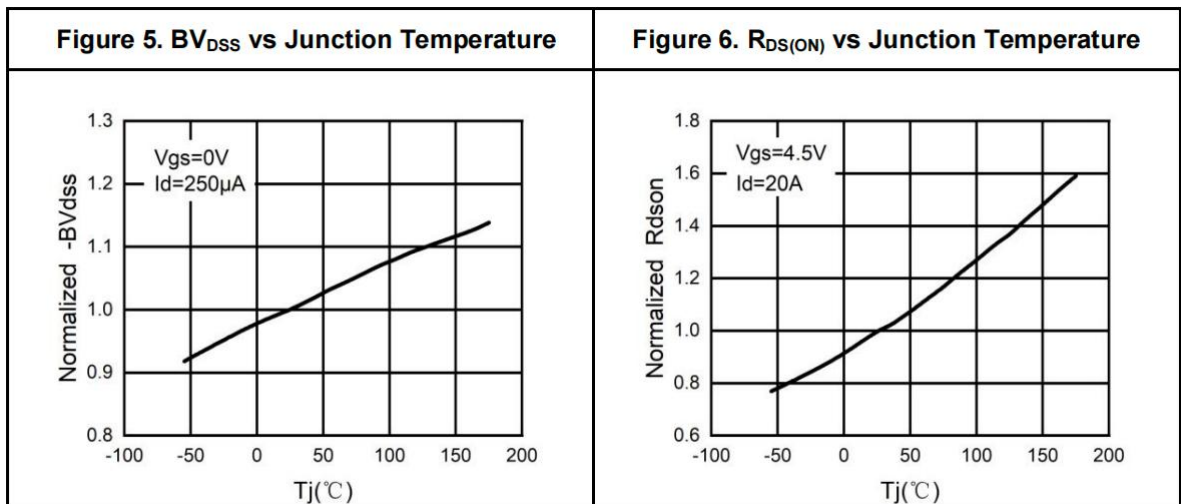
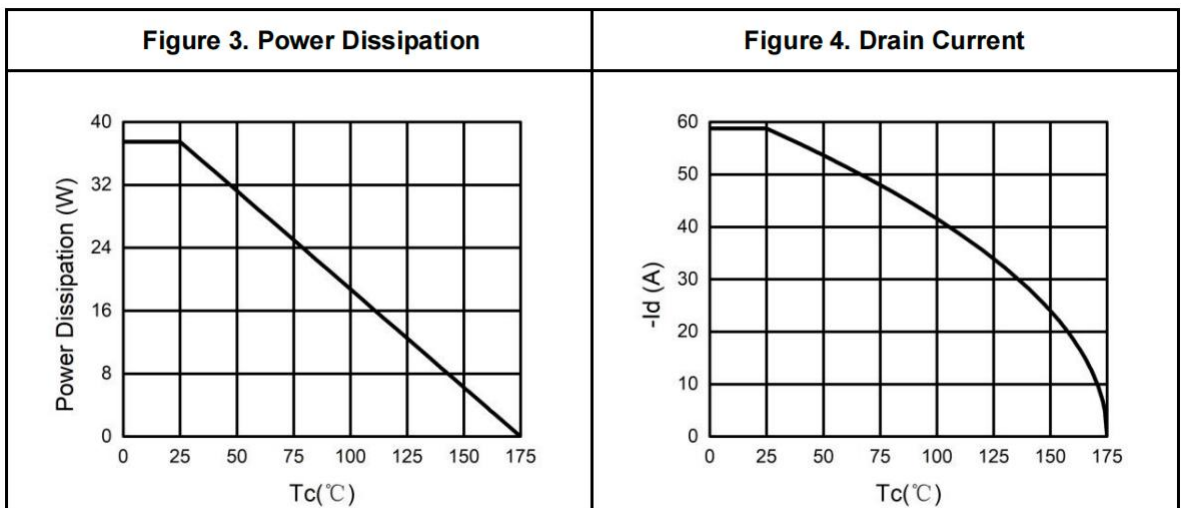
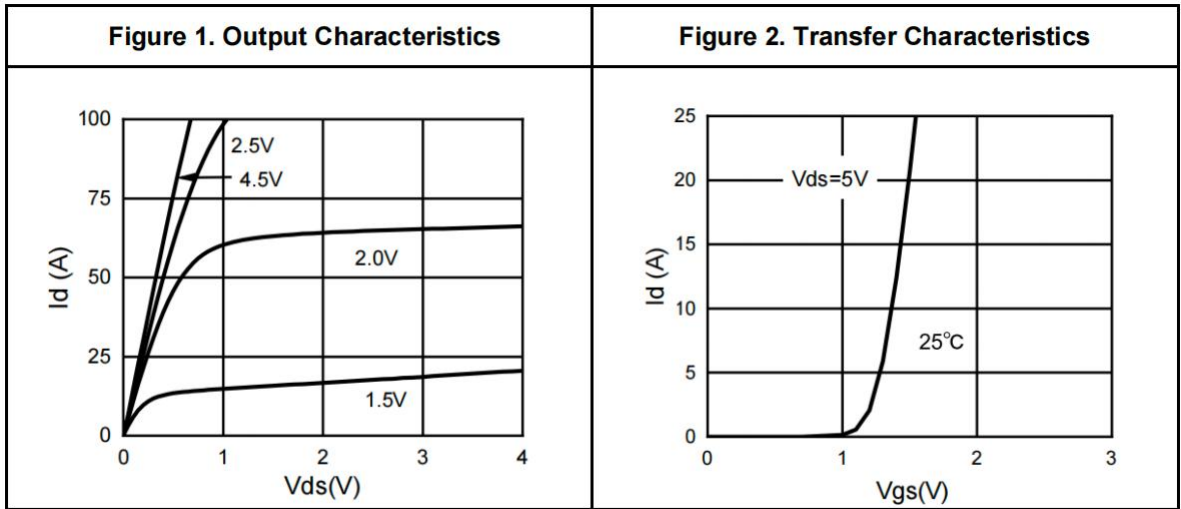




Figure 7. Gate Charge Waveforms

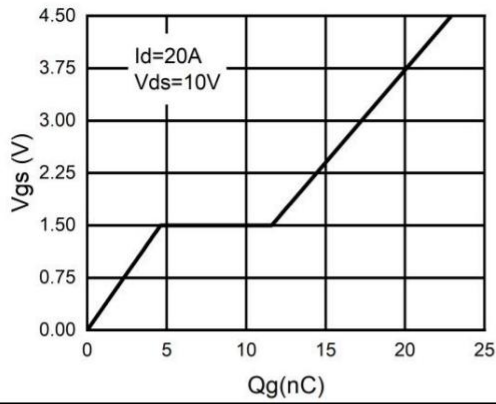


Figure 8. Capacitance

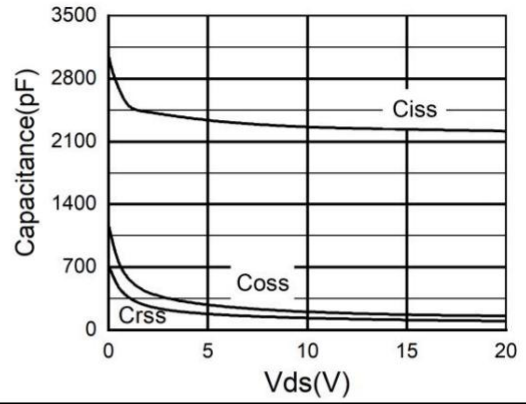


Figure 9. Body-Diode Characteristics

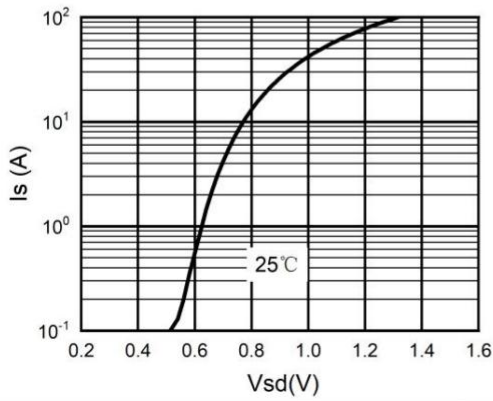
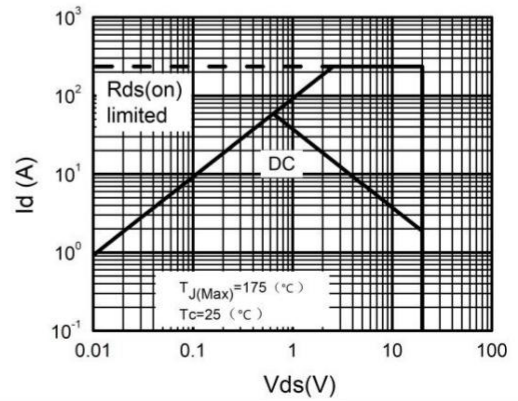


Figure 10. Maximum Safe Operating Area

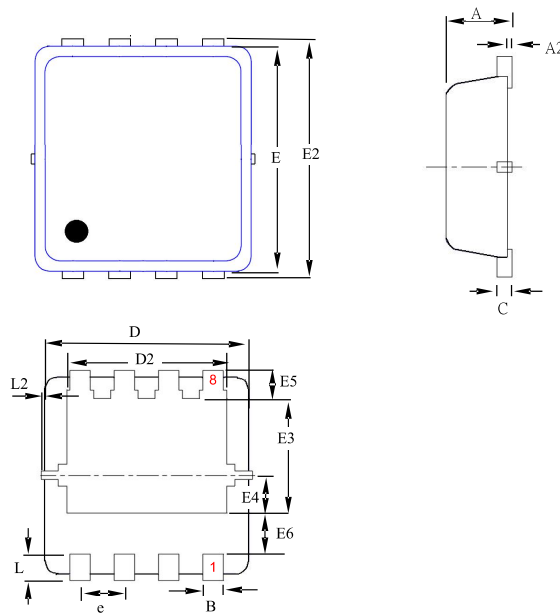




Ordering Information

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

PRPAK 3*3(E) Single Outline



SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.028	0.031	0.035
A2	0.00	--	0.05	0.000	--	0.002
B	0.24	0.30	0.35	0.009	0.012	0.014
C	0.10	0.15	0.25	0.004	0.006	0.010
D	2.90	3.00	3.20	0.114	0.118	0.126
D2	2.15	2.35	2.59	0.085	0.093	0.102
E	2.90	3.00	3.12	0.114	0.118	0.123
E2	3.05	3.20	3.45	0.120	0.126	0.136
E3	1.55	1.75	1.95	0.061	0.069	0.077
E4	0.48	0.58	0.68	0.019	0.023	0.027
E5	0.28	0.43	0.58	0.011	0.017	0.023
E6	0.43	0.63	0.87	0.017	0.025	0.034
L	0.30	0.40	0.50	0.012	0.016	0.020
L2	0.00	--	0.10	0.000	--	0.004
e	--	0.65	--	--	0.026	--

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