

Description

The HSBB4052 is the high cell density trench N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

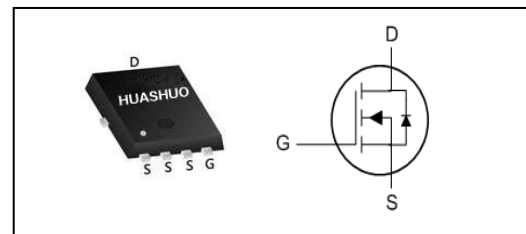
The HSBB4052 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

V _{DS}	40	V
R _{DS(ON),typ}	6.9	mΩ
I _D	43	A

PRPAK3X3 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _C =25°C	Continuous Drain Current ₁	43	A
I _D @T _C =100°C	Continuous Drain Current ₁	28	A
I _{DM}	Pulsed Drain Current ₂	60	A
EAS	Single Pulse Avalanche Energy ₃	48	mJ
I _{AS}	Avalanche Current	31	A
P _D @T _C =25°C	Total Power Dissipation ₄	27.8	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 _{θJA}	Thermal Resistance Junction-ambient (Steady State) ₁	---	60	°C/W
R _{θJC}	Thermal Resistance Junction-Case ₁	---	4.5	°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	40	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =12A	---	6.9	8.5	mΩ
		V _{GS} =4.5V, I _D =10A	---	10.5	15	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	1.5	2.5	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =32V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.7	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =20V, V _{GS} =4.5V, I _D =12A	---	5.8	---	nC
Q _{gs}	Gate-Source Charge		---	3	---	
Q _{gd}	Gate-Drain Charge		---	1.2	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =1A	---	14.3	---	ns
T _r	Rise Time		---	5.6	---	
T _{d(off)}	Turn-Off Delay Time		---	20	---	
T _f	Fall Time		---	11	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	690	---	pF
C _{oss}	Output Capacitance		---	193	---	
C _{rss}	Reverse Transfer Capacitance		---	38	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	20	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V

Note :

- 1.The data tested by surface mounted on a 1 inch² 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}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=31A
- 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.



Typical Characteristics

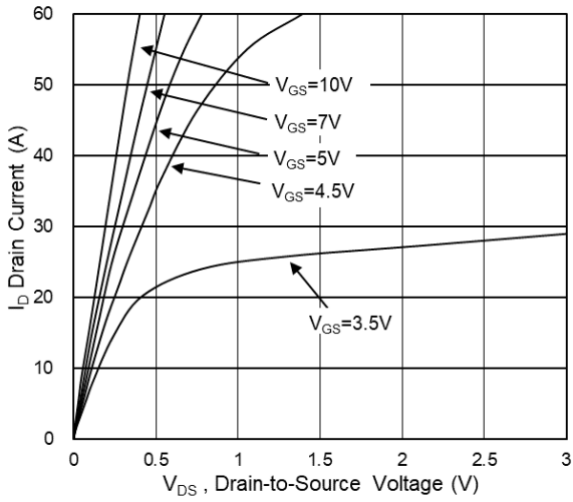


Fig.1 Typical Output Characteristics

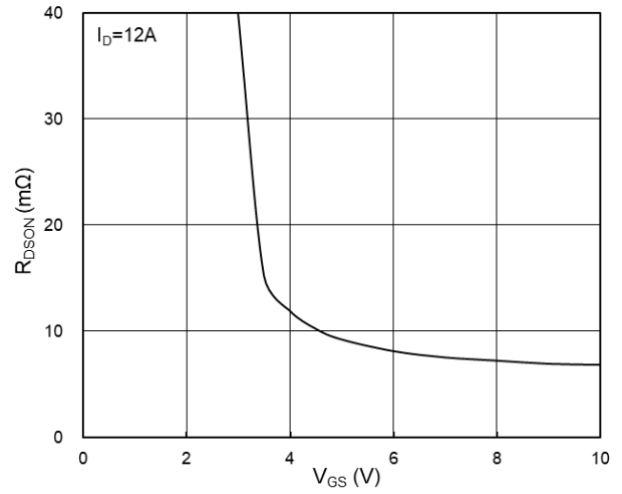


Fig.2 On-Resistance vs. G-S Voltage

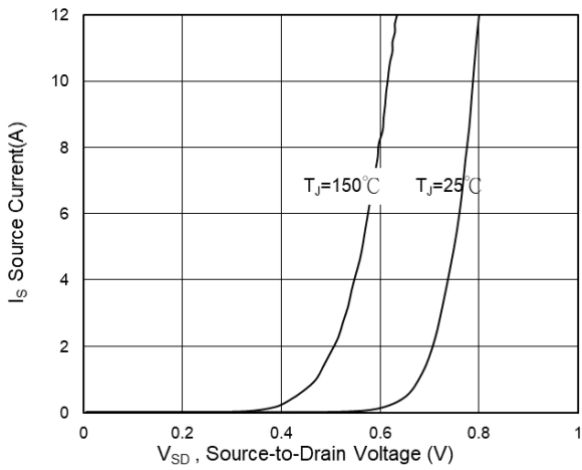


Fig.3 Source Drain Forward Characteristics

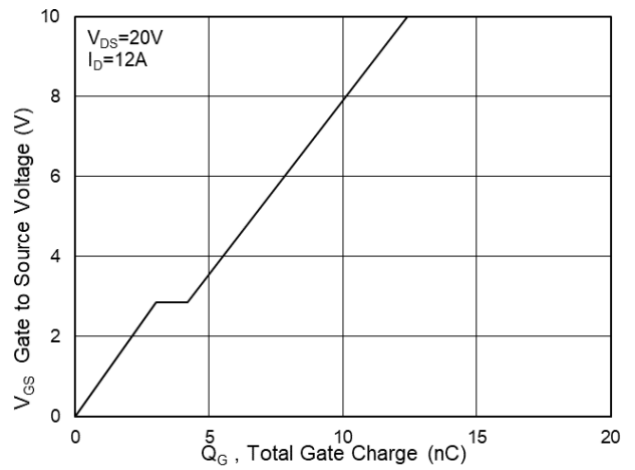


Fig.4 Gate-Charge Characteristics

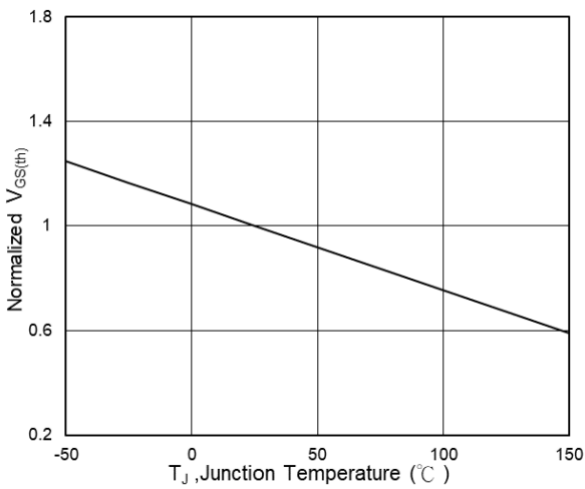


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

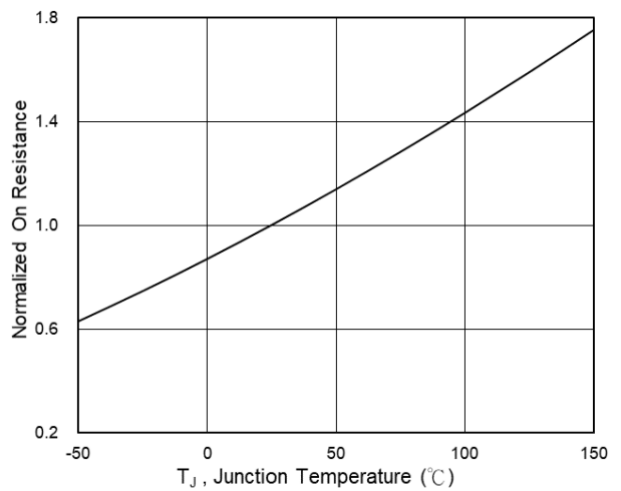


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



N-Ch 40V Fast Switching MOSFETs

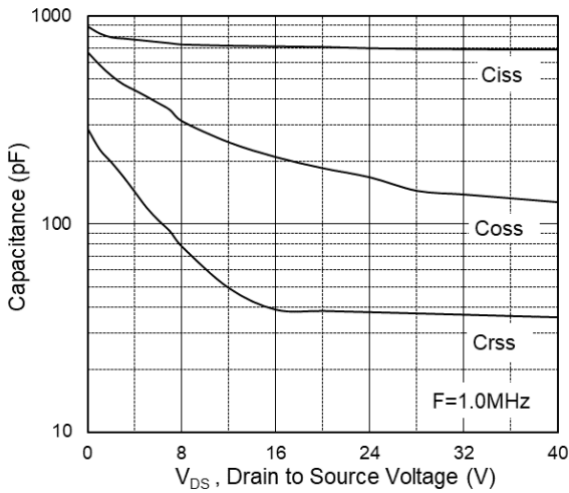


Fig.7 Capacitance

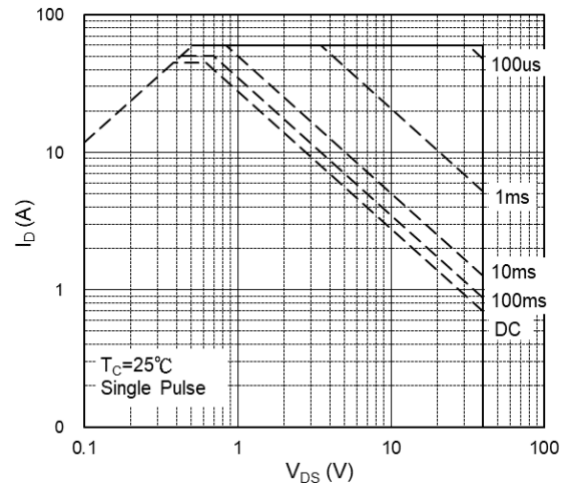


Fig.8 Safe Operating Area

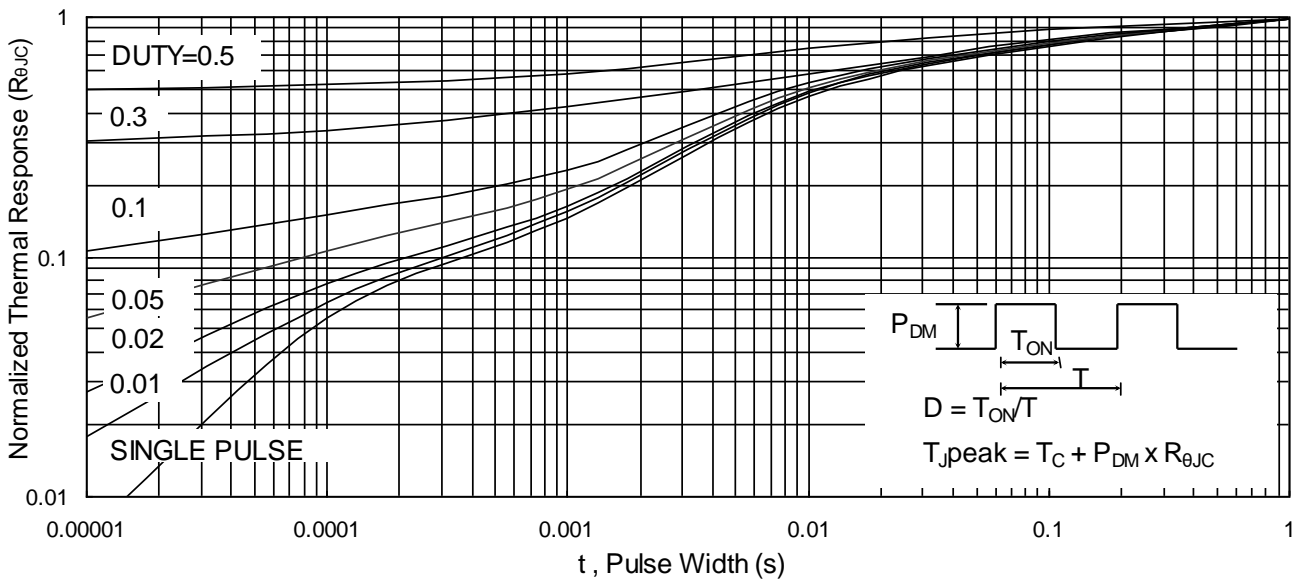


Fig.9 Normalized Maximum Transient Thermal Impedance

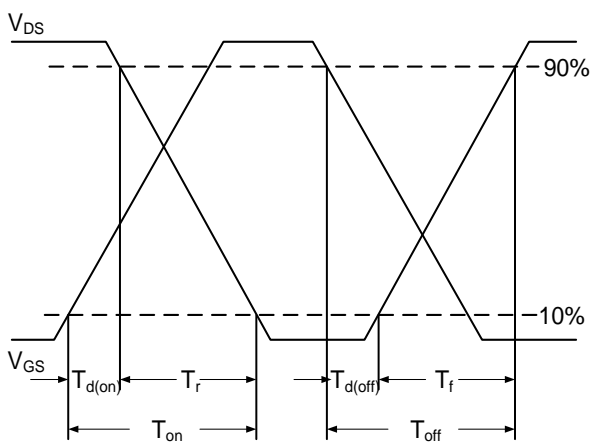


Fig.10 Switching Time Waveform

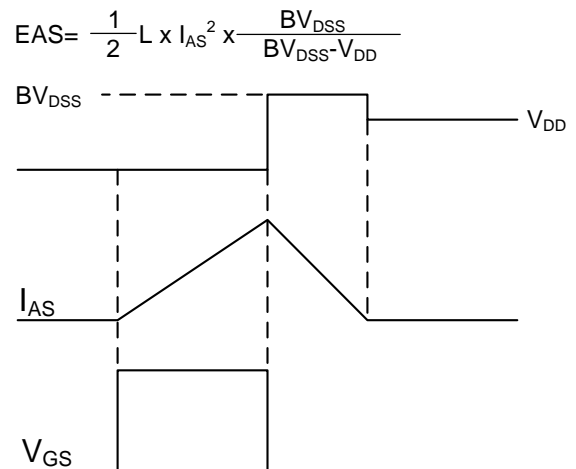
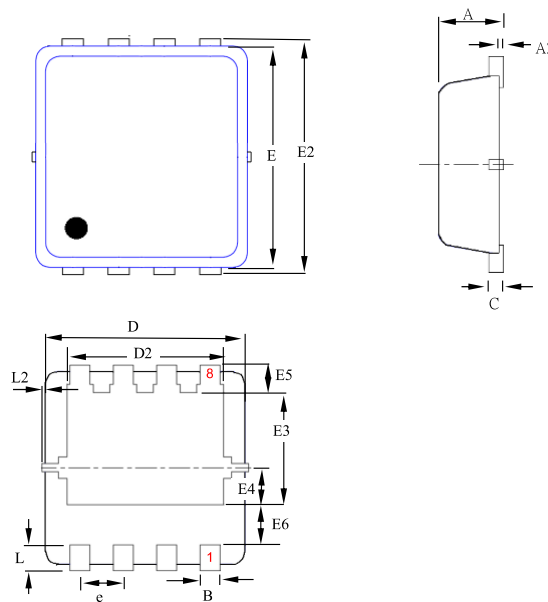


Fig.11 Unclamped Inductive Waveform

Ordering Information

Part Number	Package code	Packaging
HSBB4052	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	—