

### General Description

The HSBB15N20A is the highest performance SGT N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSBB15N20A meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

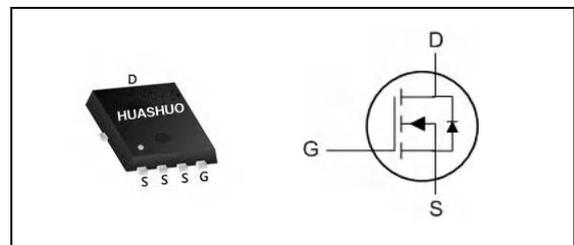
### Features

- Super Low Gate Charge
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density SGT MOS Technology

### Product Summary

$V_{DS}$	200	V
$R_{DS(ON),typ}$	95	m $\Omega$
$I_D$	15	A

### PRPAK3\*3 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	9	A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.7	A
$I_D@T_A=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.2	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	30	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	40	mJ
$I_{AS}$	Avalanche Current	28	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>3</sup>	45	W
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>3</sup>	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	2.8	$^\circ C/W$

### Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	200	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	---	95	120	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	2.9	3.5	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =160V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =160V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	0.9	---	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A	---	14	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.9	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	3.5	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω I <sub>D</sub> =10A	---	8.3	---	ns
T <sub>r</sub>	Rise Time		---	18.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	15	---	
T <sub>f</sub>	Fall Time		---	3.8	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz	---	887	---	pF
C <sub>oss</sub>	Output Capacitance		---	49	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	5.3	---	

### Diode Characteristics

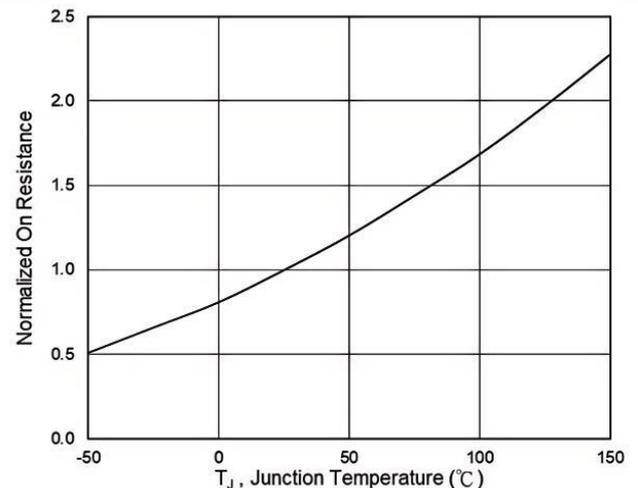
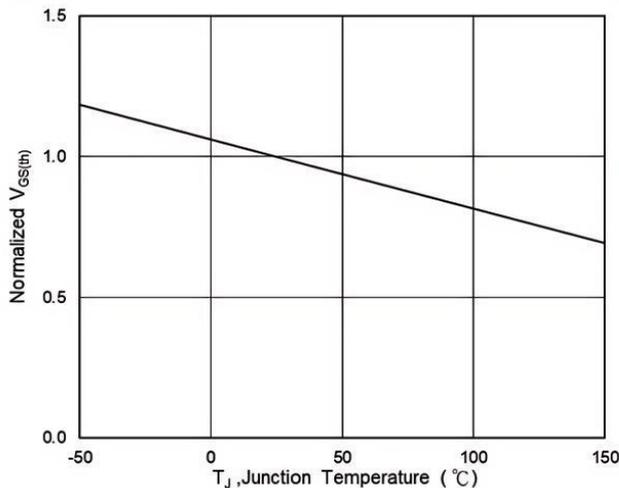
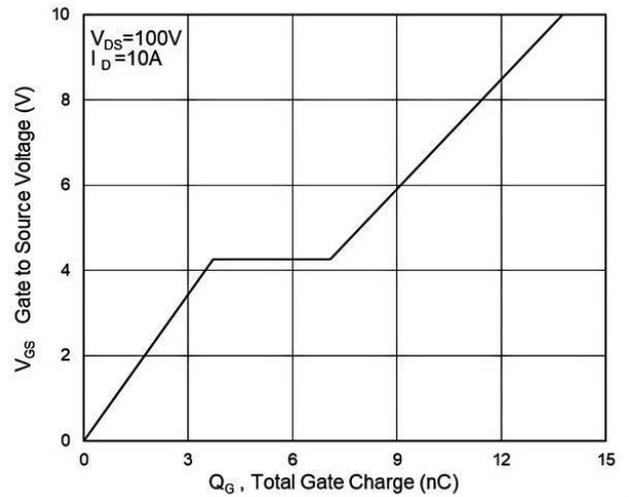
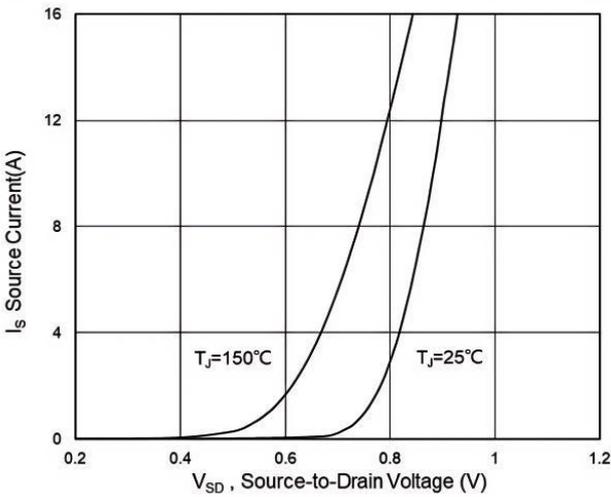
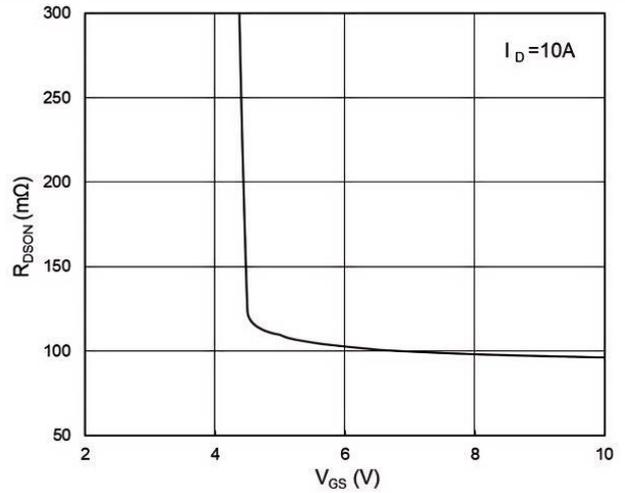
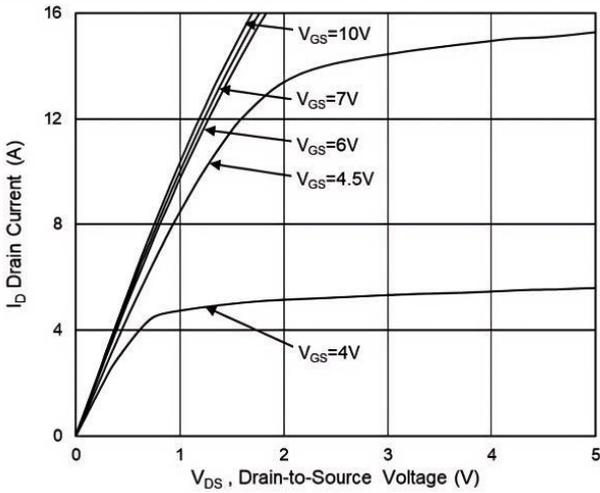
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	15	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	30	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =10A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	87	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	303	---	nC

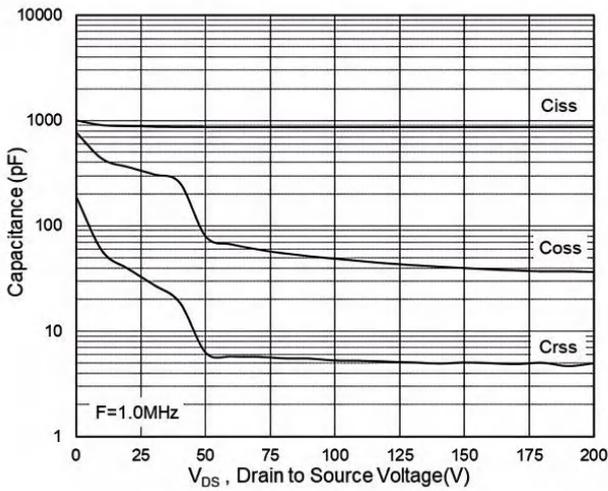
#### Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=28A
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

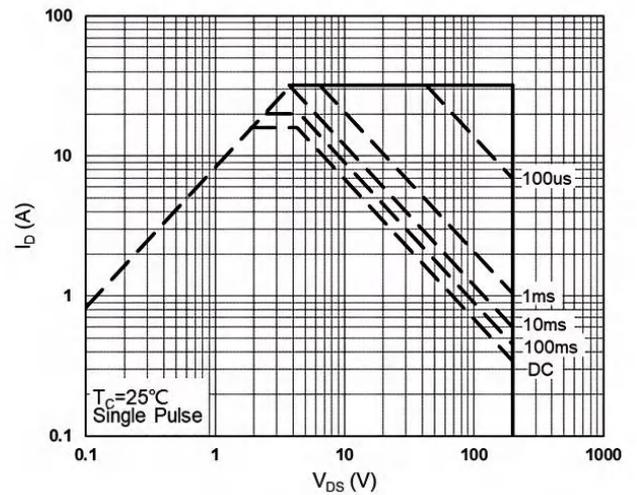


### Typical Characteristics

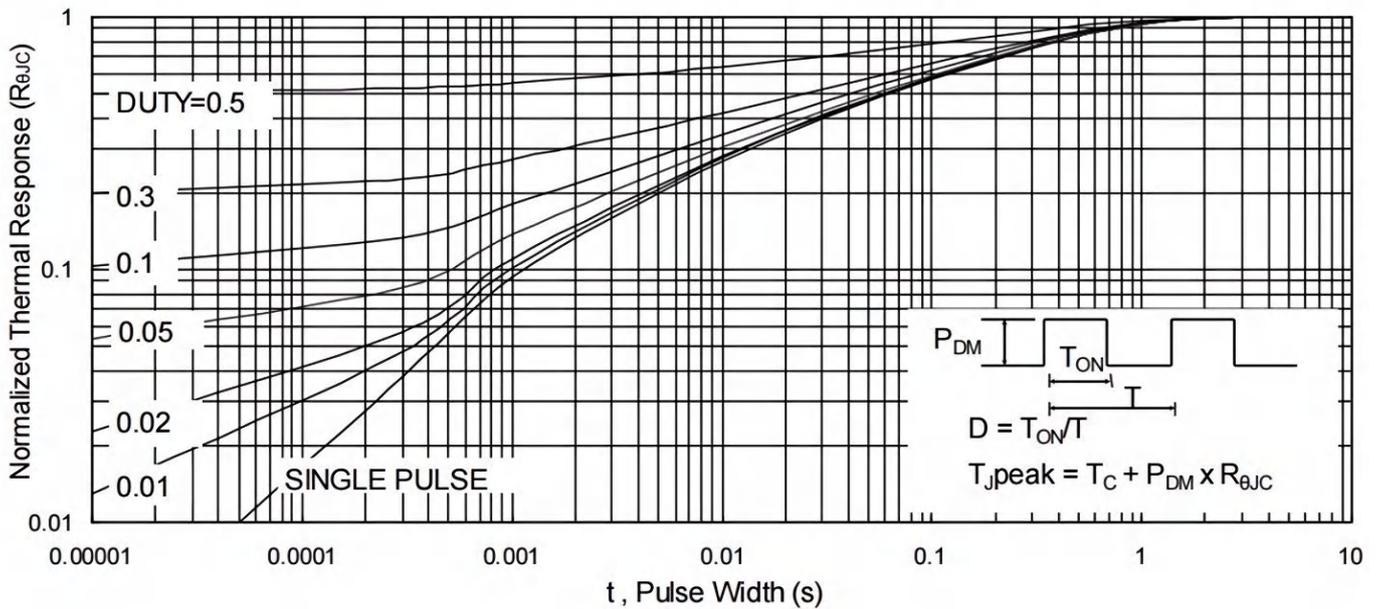




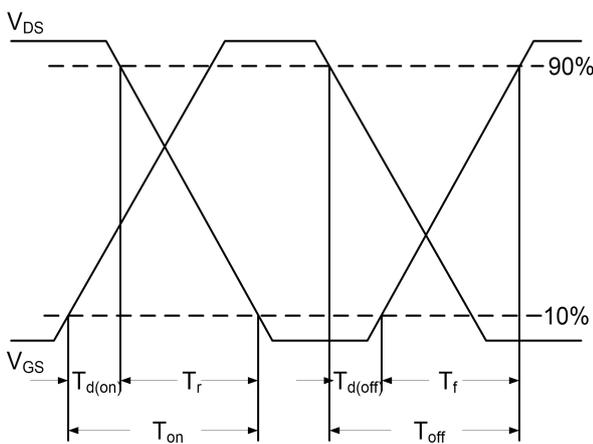
**Fig.7 Capacitance**



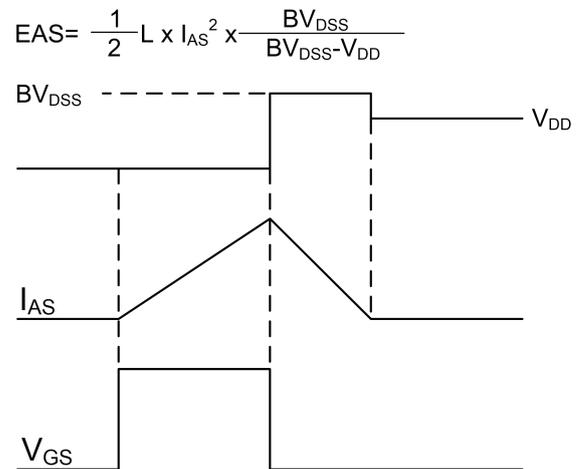
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



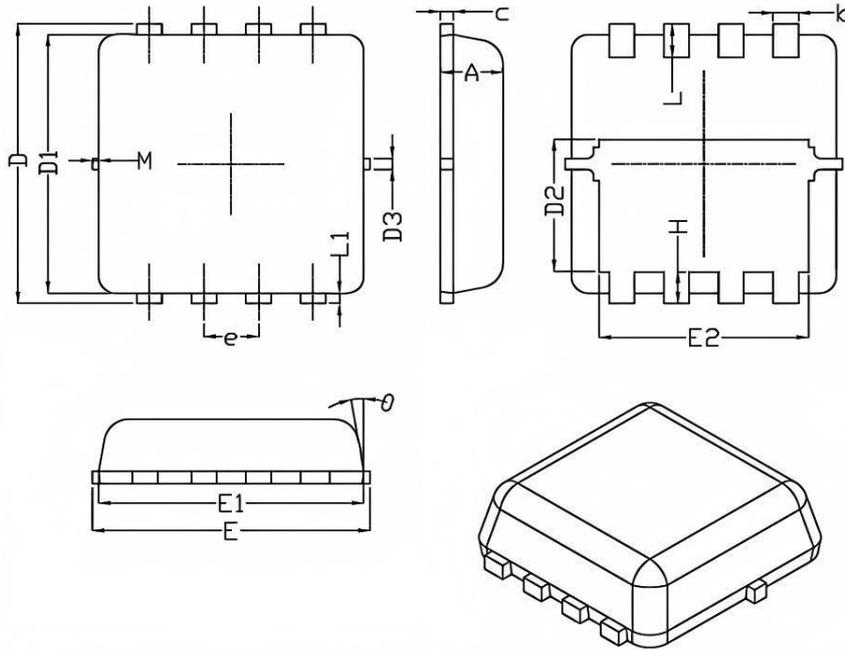
**Fig.11 Unclamped Inductive Switching Waveform**



**Ordering Information**

<b>Part Number</b>	<b>Package code</b>	<b>Packaging</b>
<b>HSBB15N20A</b>	<b>PRPAK3*3</b>	<b>3000/Tape&amp;Reel</b>

**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°



## HSBB15N20A Marking:

