Applications

- Power Management in Desktop Computer or DC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial.

Product Summary

V_{DS}	30	V
$R_{DS(ON),typ}$	8	mΩ
I_D	45	A

Features

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

PRPAK3*3 Pin Configuration
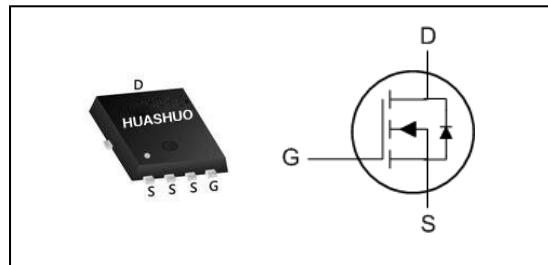
Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	45	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1]	28	A
I_{DM}	Pulsed Drain Current[2]	50	A
EAS	Single Pulse Avalanche Energy[3]	33	mJ
I_{AS}	Avalanche Current	26	A
P_D@T_C=25°C	Total Power Dissipation[4]	21	W
P_D@T_A=25°C	Total Power Dissipation[4]	1.8	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
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	65	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	6	°C/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	30	---	---	V
△BV$_{DSS}$/△T$_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I$_D$=1mA	---	0.021	---	V/℃
R$_{DS(ON)}$	Static Drain-Source On-Resistance2	V$_{GS}$=10V , I$_D$=12A	---	8	9.8	mΩ
		V$_{GS}$=4.5V , I$_D$=12A	---	12	15.8	
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1.3	1.7	2.3	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-5.73	---	mV/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=55℃	---	---	5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=5V , I$_D$=12A	---	45	---	S
R$_g$	Gate Resistance	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	1	3	5	Ω
Q$_g$	Total Gate Charge (4.5V)	V$_{DS}$=15V , V$_{GS}$=10V , I$_D$=12A	---	4.5	---	nC
Q$_{gs}$	Gate-Source Charge		---	2.4	---	
Q$_{gd}$	Gate-Drain Charge		---	1.6	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=3Ω I$_D$=12A	---	5	---	ns
T$_r$	Rise Time		---	3.7	---	
T$_{d(off)}$	Turn-Off Delay Time		---	18.5	---	
T$_f$	Fall Time		---	3.2	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=15V , V$_{GS}$=0V , f=1MHz	---	562	---	pF
C$_{oss}$	Output Capacitance		---	274	---	
C$_{rss}$	Reverse Transfer Capacitance		---	28	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current1,5	V$_G$=V$_D$=0V , Force Current	---	---	45	A
V$_{SD}$	Diode Forward Voltage2	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	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$_{AS}$=26A
4. The power dissipation is limited by 150℃ 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.
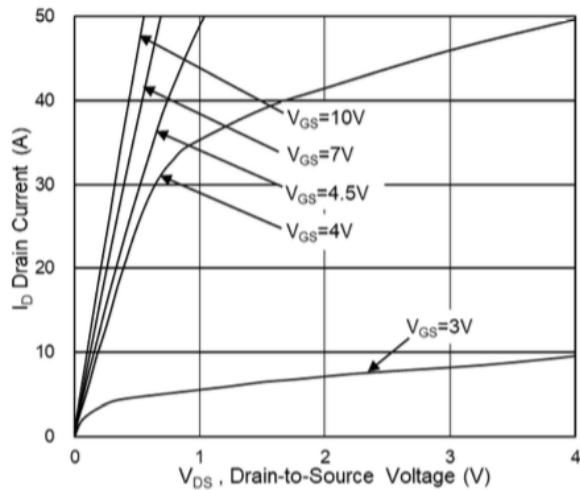
Fig.1 Typical Output Characteristics
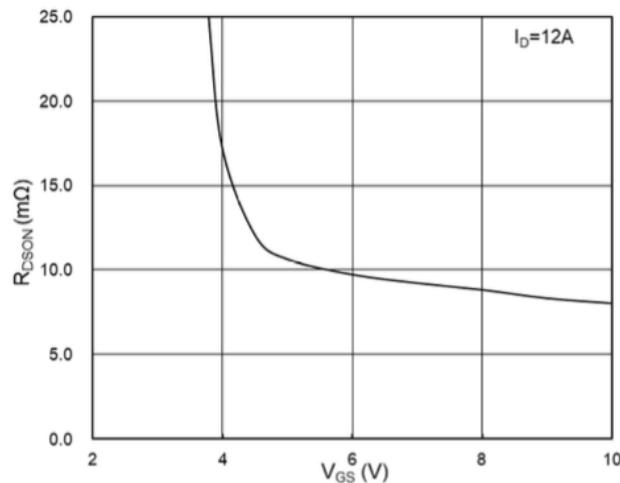

Fig.2 On-Resistance vs. G-S Voltage
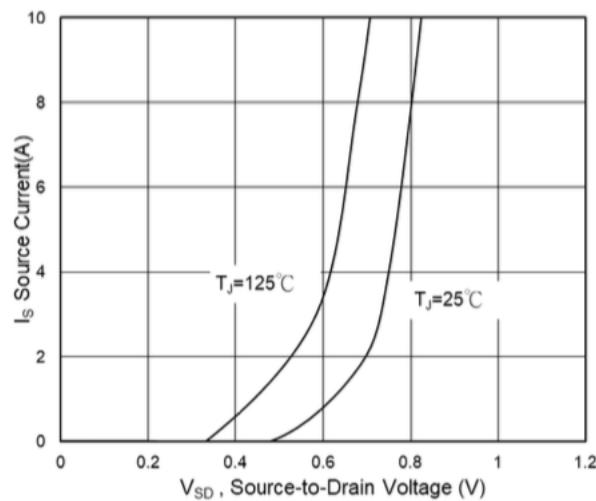
**Fig.3 Source Drain Forward Characteristics**
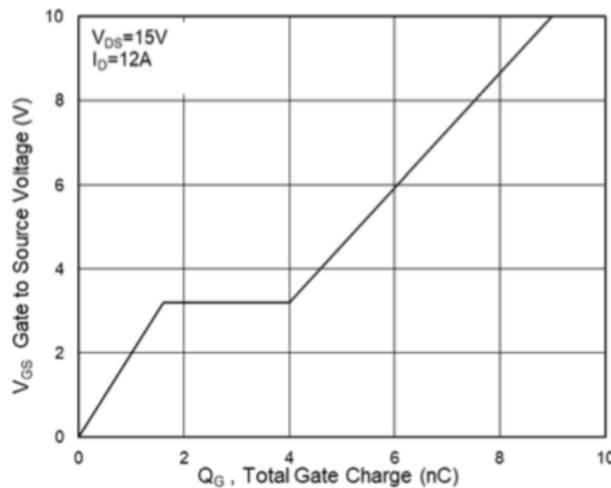
**Fig.4 Gate-charge Characteristics**
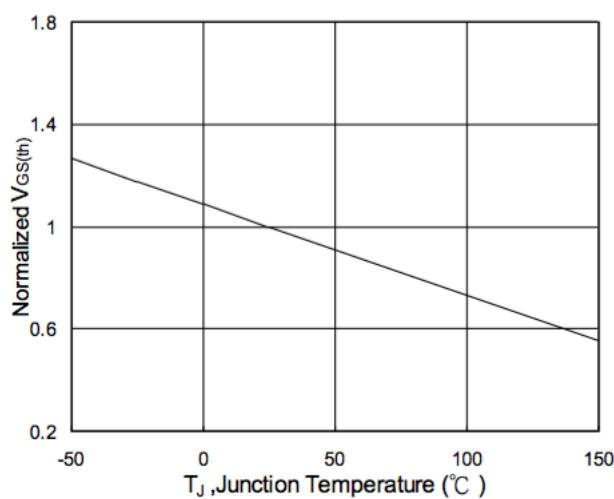

Fig.5 Normalized $V_{GS(th)}$ vs. T_J
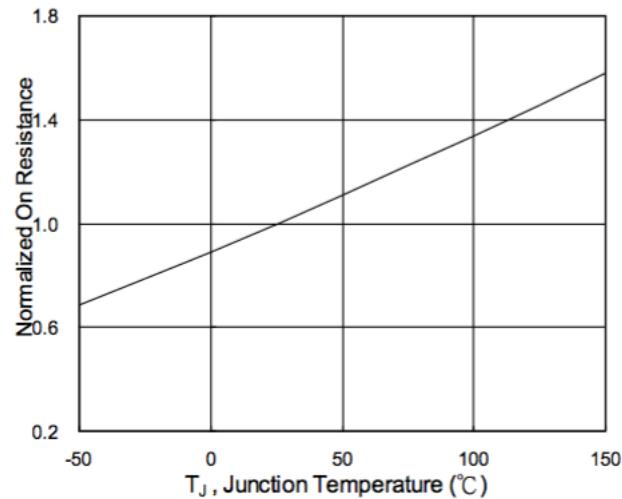
Fig.6 Normalized R_{DSON} vs. T_J
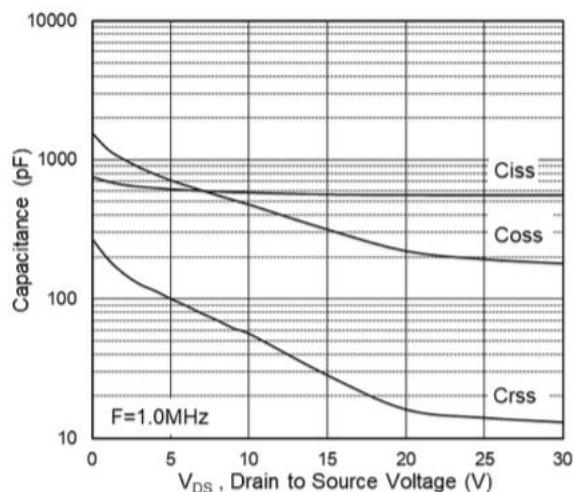
Fig.7 Capacitance
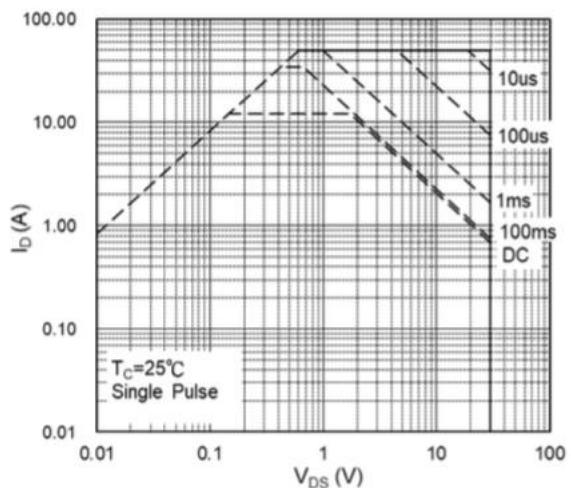
Fig.8 Safe Operating Area

$$D = T_{ON}/T$$

$$T_J peak = T_C + P_{DM} \times R_{\theta JC}$$
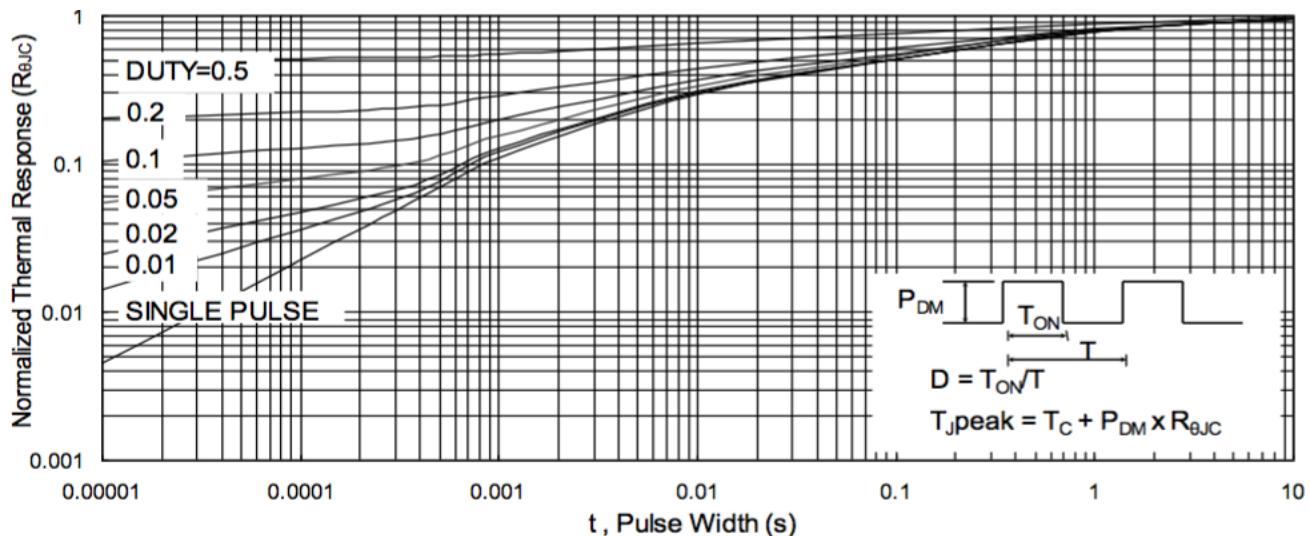
Fig.9 Normalized Maximum Transient Thermal Impedance
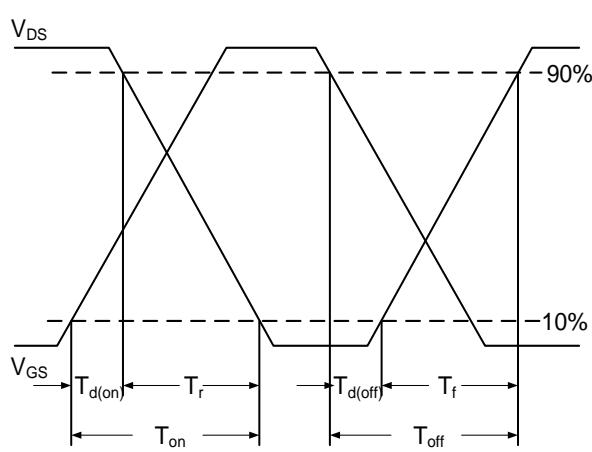
Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$
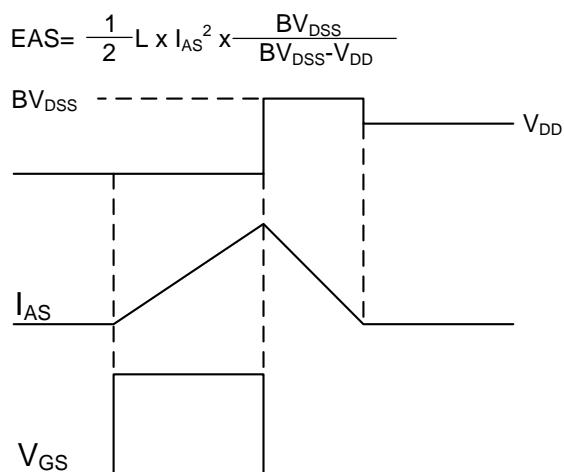
Fig.11 Unclamped Inductive Switching

Ordering Information

Part Number	Package code	Packaging
HSBB3060	PRPAK3*3	3000/Tape&Reel

PRPAK 3*3(E) Single Outline
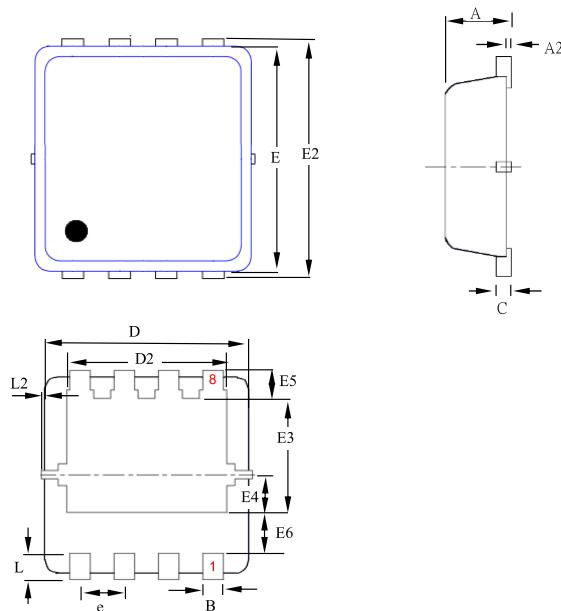
SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.028	0.031	0.035
A2	0.00	--	0.05	0.000	--	0.002
B	0.24	0.30	0.35	0.009	0.012	0.014
C	0.10	0.15	0.25	0.004	0.006	0.010
D	2.90	3.00	3.20	0.114	0.118	0.126
D2	2.15	2.35	2.59	0.085	0.093	0.102
E	2.90	3.00	3.12	0.114	0.118	0.123
E2	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	--