

Description

The HSBA3331 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

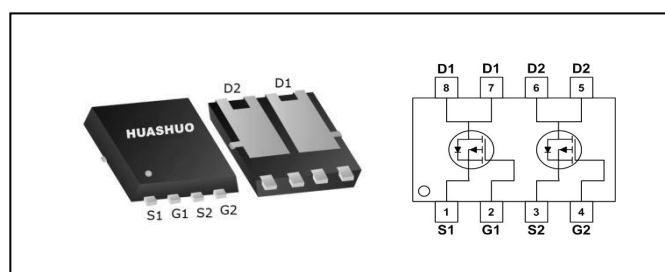
The HSBA3331 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

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

Product Summary

V_{DS}	-30	V
$R_{DS(ON),typ}$	6.5	m Ω
I_D	-60	A

PRPAK5X6 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, V_{GS} @ -10V ^{1,6}	-60	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, V_{GS} @ -10V ^{1,6}	-40	A
I_{DM}	Pulsed Drain Current ²	-200	A
EAS	Single Pulse Avalanche Energy ³	80	mJ
I_{AS}	Avalanche Current	-40	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	40	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 ¹ ($t \leq 10S$)	---	35	$^{\circ}C/W$
	Thermal Resistance Junction-ambient ¹ (Steady State)	---	55	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case ¹	---	2.2	$^{\circ}C/W$

Electrical Characteristics ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-20A$	---	6.5	7.7	$m\Omega$
		$V_{GS}=-4.5V, I_D=-15A$	---	8.2	10	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.5	-2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	-1	μA
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^{\circ}\text{C}$	---	---	-5	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	1.2	---	Ω
Q_g	Total Gate Charge (-10V)	$V_{DS}=-15V, V_{GS}=-10V, I_D=-18A$	---	60	---	nC
Q_{gs}	Gate-Source Charge		---	9	---	
Q_{gd}	Gate-Drain Charge		---	15	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-20A$	---	17	---	ns
T_r	Rise Time		---	40	---	
$T_{d(off)}$	Turn-Off Delay Time		---	55	---	
T_f	Fall Time		---	13	---	
C_{iss}	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V, f=1\text{MHz}$	---	3450	---	pF
C_{oss}	Output Capacitance		---	255	---	
C_{rss}	Reverse Transfer Capacitance		---	140	---	

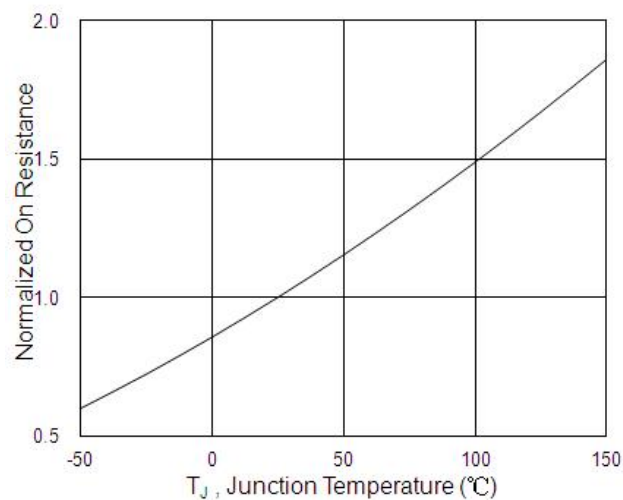
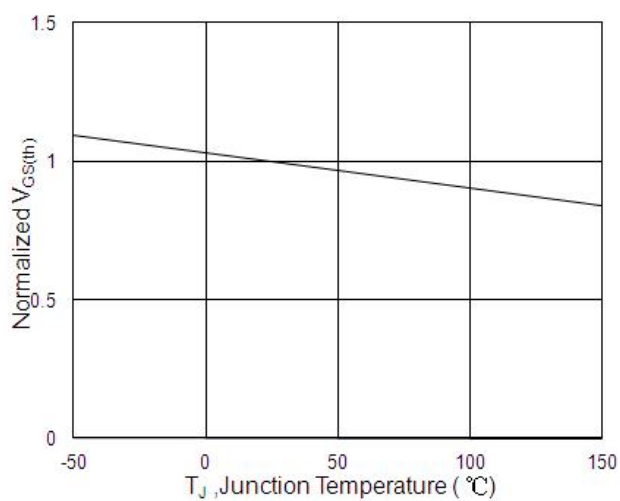
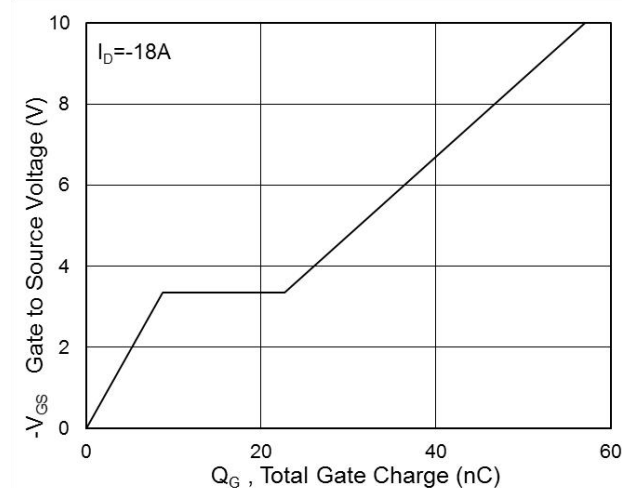
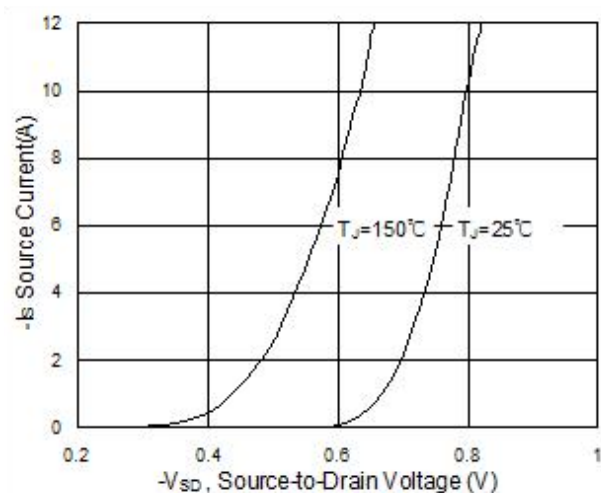
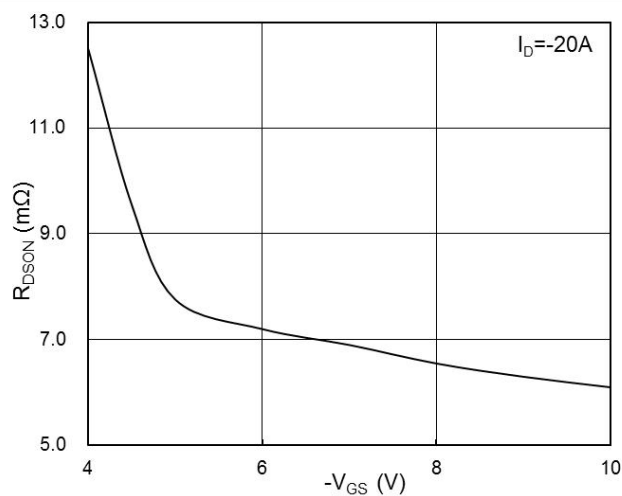
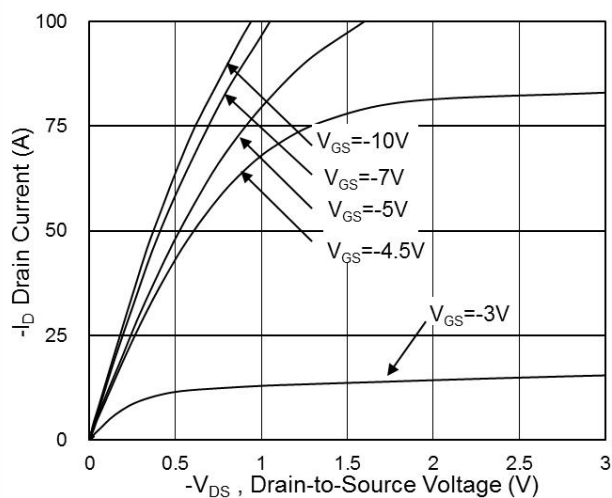
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	-60	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-20A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	---	22	---	nS
Q_{rr}	Reverse Recovery Charge		---	72	---	nC

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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=-50V, V_{GS}=-10V, L=0.1mH, I_{AS}=-40A$
- 4.The power dissipation is limited by 150 $^{\circ}\text{C}$ 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
- 6.The maximum current rating is package limited.

Typical Characteristics



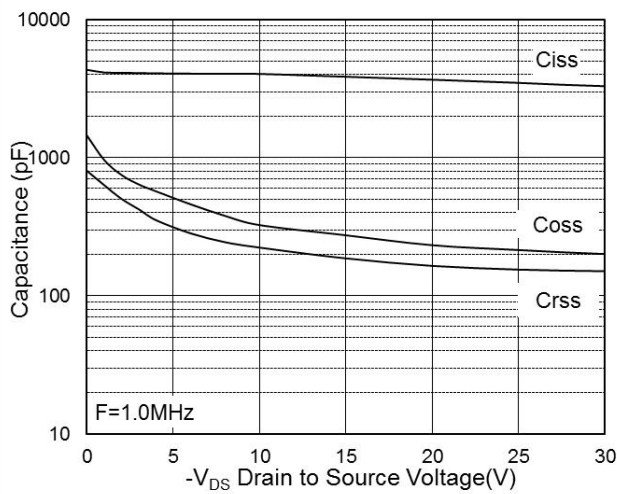


Fig.7 Capacitance

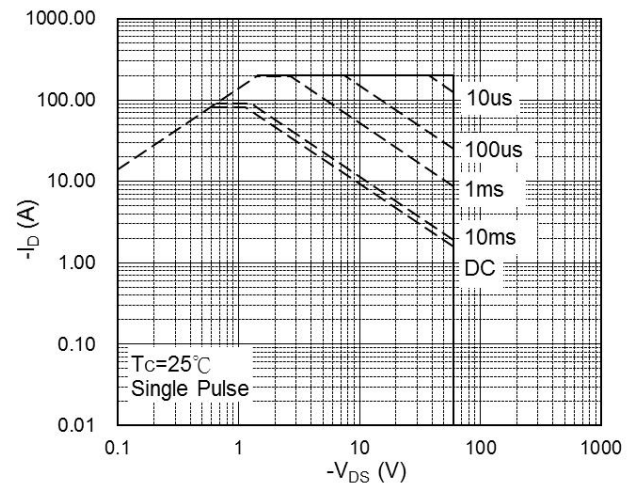


Fig.8 Safe Operating Area

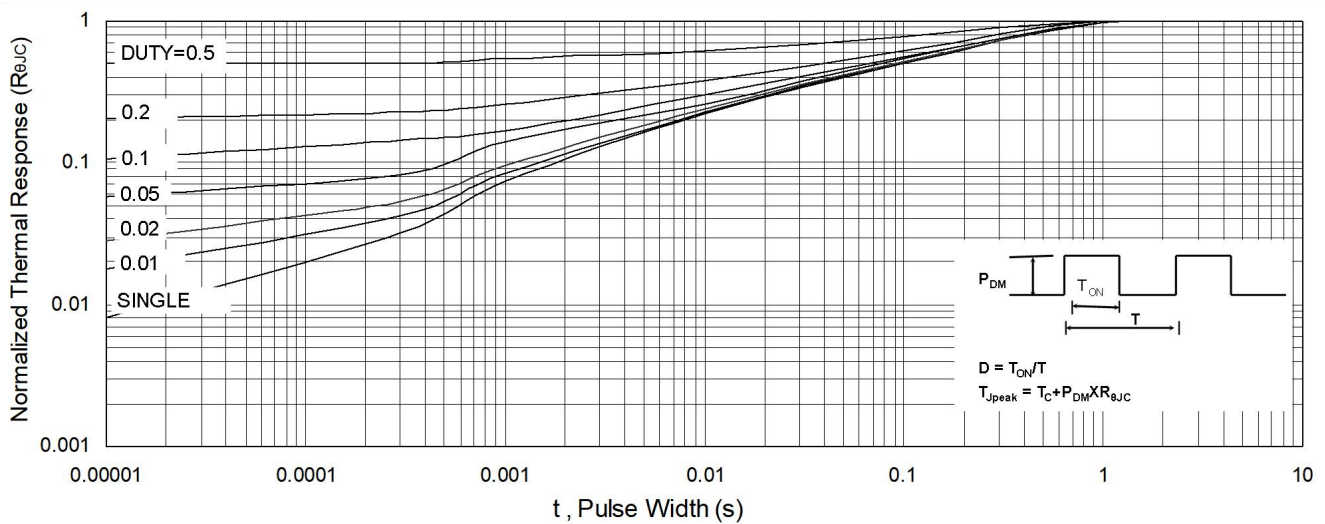


Fig.9 Normalized Maximum Transient Thermal Impedance

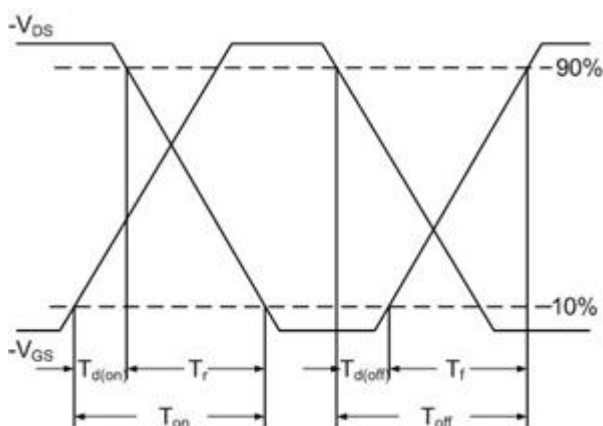


Fig.10 Switching Time Waveform

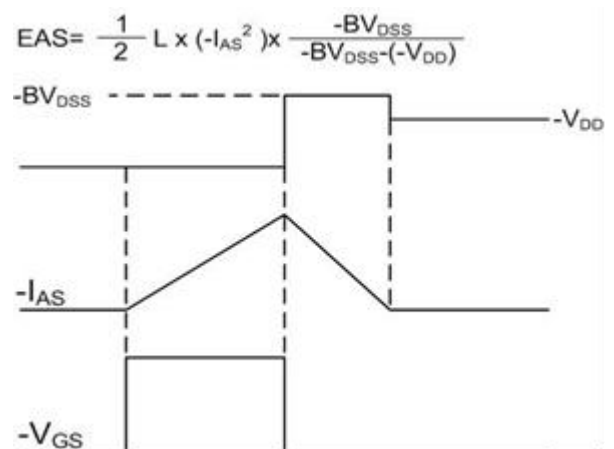
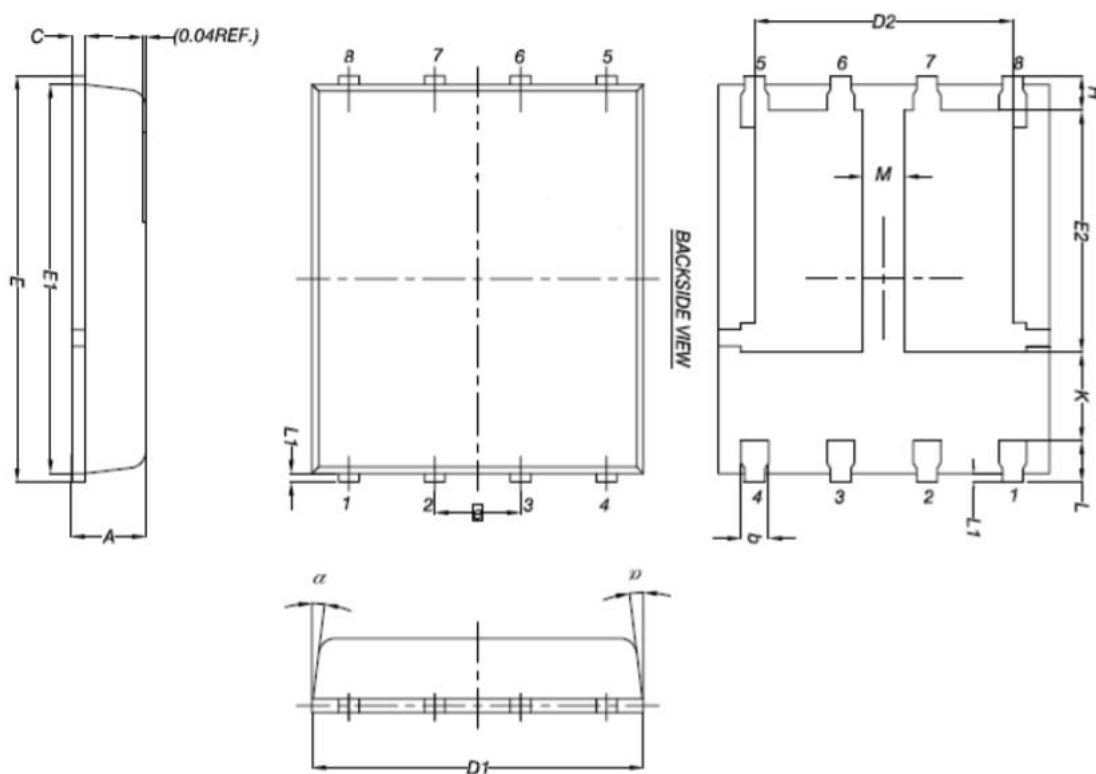


Fig.11 Unclamped Inductive Switching Waveform



PRPAK5x6-8L Dual EP2 Package Outline



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.17	0.035	0.046
b	0.33	0.51	0.013	0.020
C	0.20	0.30	0.008	0.012
D1	4.80	5.20	0.189	0.205
D2	3.61	3.96	0.142	0.156
E	5.90	6.15	0.232	0.242
E1	5.70	5.85	0.224	0.230
E2	3.30	3.78	0.130	0.149
e	1.27 BSC		0.05 BSC	
H	0.38	0.61	0.015	0.024
K	1.10	---	0.043	---
L	0.38	0.61	0.015	0.024
L1	0.05	0.25	0.002	0.010
M	0.50	---	0.020	---
α	0°	12°	0°	12°