

General Description

The HSBB4606 is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSBB4606 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

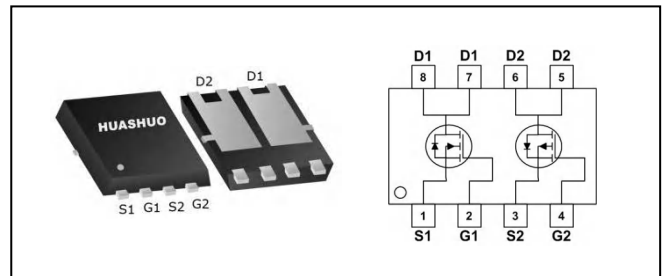
Features

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

Product Summary

BVDSS	RDSON,typ	ID
30V	16mΩ	20A
-30V	22mΩ	-18A

PRPAK3*3 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V _{DS}	Drain-Source Voltage	30	-30	V
V _{GS}	Gate-Source Voltage	±20	±20	V
I _D @T _A =25°C	Continuous Drain Current, V _{GS} @ 10V ¹	20	-18	A
I _D @T _A =75°C	Continuous Drain Current, V _{GS} @ 10V ¹	16	-14.5	A
I _{DM}	Pulsed Drain Current(Package Limited)	80	-72	A
EAS	Single Pulse Avalanche Energy ³	36	49	mJ
P _D @T _A =25°C	Total Power Dissipation	40	40	W
P _D @T _A =75°C	Total Power Dissipation	32	32	W
T _{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ≤ 10s ¹	---	3.13	°C/W

Note :

1.Surface mounted on 1" x 1" FR4 board.

2.Pulse width limited by maximum junction temperature.

3.EAS condition : T_J=25°C, VDD=15V, VGS=10V, L=0.5mH, Rg=25Ω, IAS=12A / T_J=25°C, VDD=15V, VGS=10V, L=0.5mH, Rg=25Ω, IAS=-14A



N-Channel 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	$V_{GS}=10V$, $I_D=10A$	---	16	22	$m\Omega$
		$V_{GS}=4.5V$, $I_D=6A$	---	22	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	1.6	2.2	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	1.3	---	Ω
Q_g	Total Gate Charge	$V_{DS}=15V$, $V_{GS}=10V$, $I_D=10A$	---	12.4	---	nC
Q_{gs}	Gate-Source Charge		---	1.4	---	
Q_{gd}	Gate-Drain Charge		---	2.7	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=6\Omega$, $I_D=10A$	---	8	---	ns
T_r	Rise Time		---	10	---	
$T_{d(off)}$	Turn-Off Delay Time		---	27	---	
T_f	Fall Time		---	13	---	
C_{iss}	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	515	---	pF
C_{oss}	Output Capacitance		---	59	---	
C_{rss}	Reverse Transfer Capacitance		---	49	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=5A$, $T_J=25^{\circ}\text{C}$	---	---	1.2	V

Note :

1. Pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$.

2. Guaranteed by design, not subject to production testing.



P-Channel 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 =-250μA	-30	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-9A	---	22	30	mΩ
		V _{GS} =-4.5V, I _D =-6A	---	30	45	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250μA	-1.0	-1.6	-2.2	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-30V, V _{GS} =0V, T _J =25°C	---	---	1	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _G	Gate resistance	f=1.0MHz	---	12	---	Ω
Q _g	Total Gate Charge	V _{DS} =-15V, V _{GS} =-10V, I _D =-9A	---	13.7	---	nC
Q _{gs}	Gate-Source Charge		---	2.0	---	
Q _{gd}	Gate-Drain Charge		---	1.4	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =-15V, V _{GS} =-10V, R _G =6Ω, I _D =-9A	---	9	---	ns
T _r	Rise Time		---	10	---	
T _{d(off)}	Turn-Off Delay Time		---	39	---	
T _f	Fall Time		---	21	---	
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	---	842	---	pF
C _{oss}	Output Capacitance		---	100	---	
C _{rss}	Reverse Transfer Capacitance		---	80	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =-4.5A, T _J =25°C	---	---	-1.2	V

Note :

1. Pulse test: pulse width ≤ 300μs, duty ≤ 2%.

2. Guaranteed by design, not subject to production testing.



N-Channel Typical Characteristics

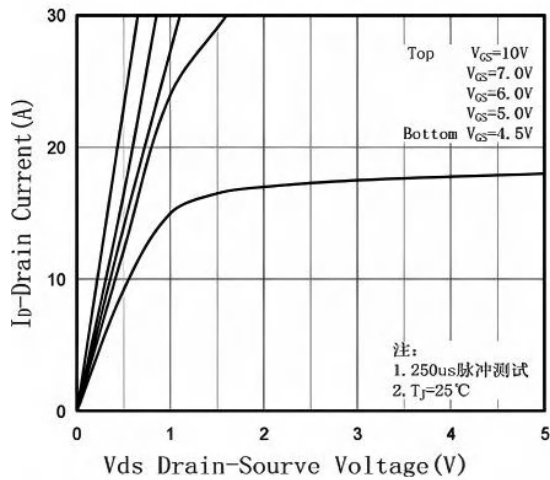


Fig.1 Output Characteristic

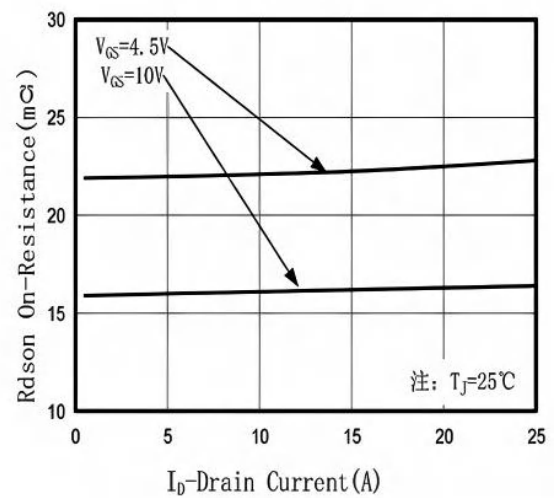


Fig.2 On-Resistance vs. Drain Current

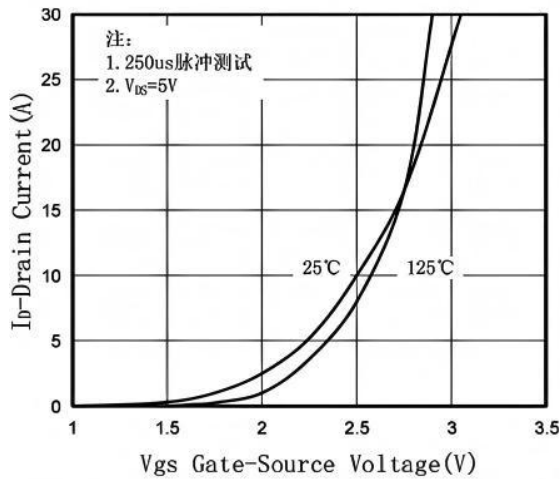


Fig.3 Transfer Characteristic

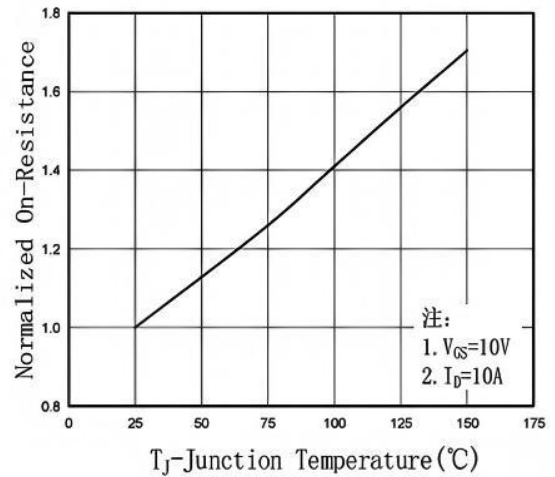


Fig.4 On-Resistance vs. Junction Temperature

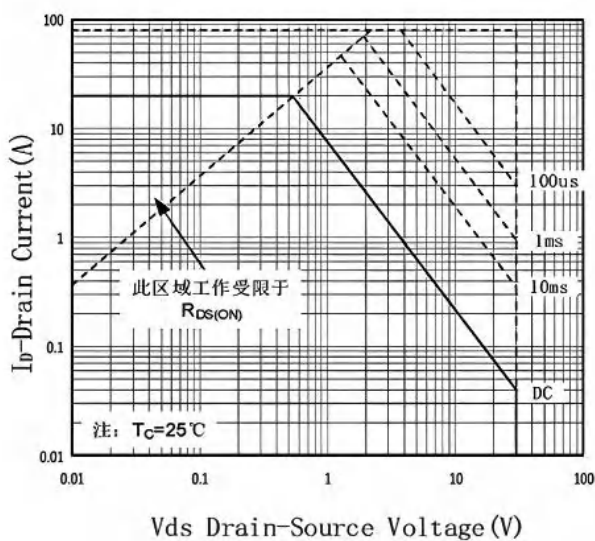


Fig.5 Safe Operation Area

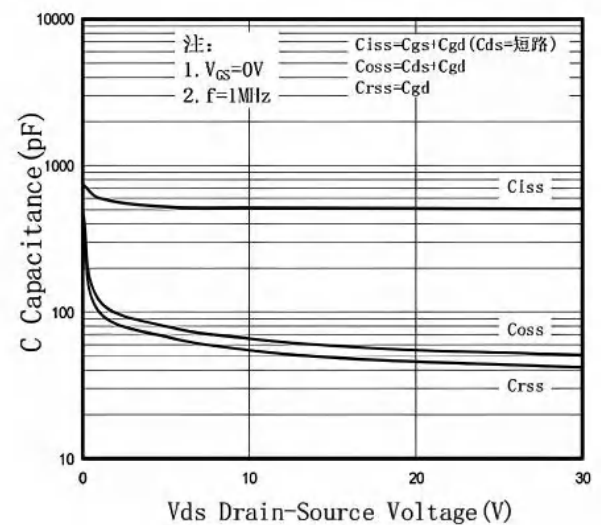


Fig.6 Capacitance Characteristic

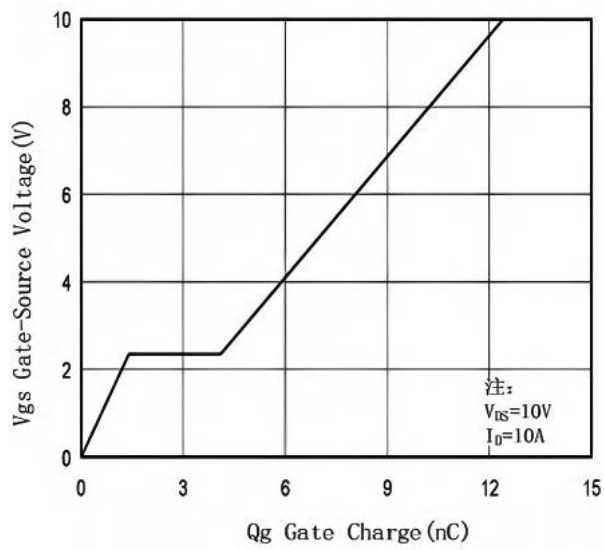


Fig.7 Gate-Charge Characteristic

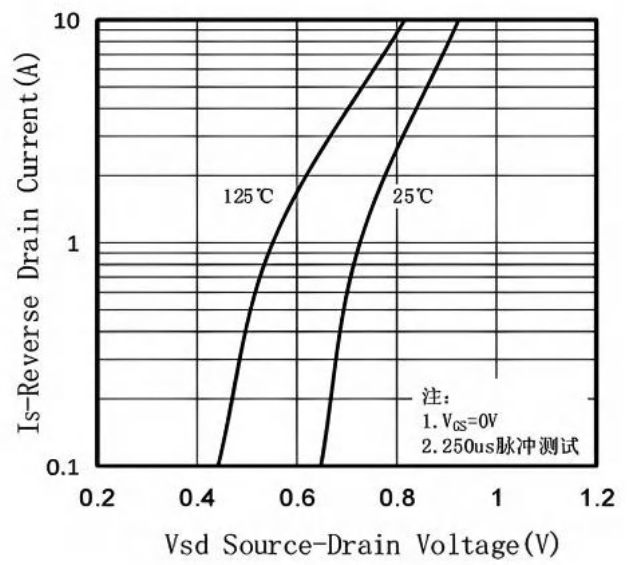


Fig.8 Body Diode Characteristic



P-Channel Typical Characteristics

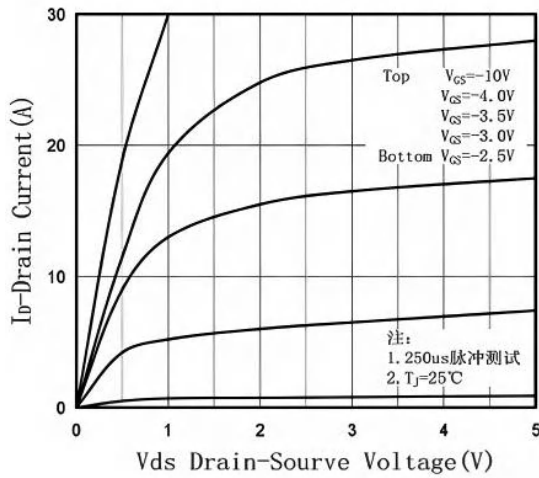


Fig.1 Output Characteristic

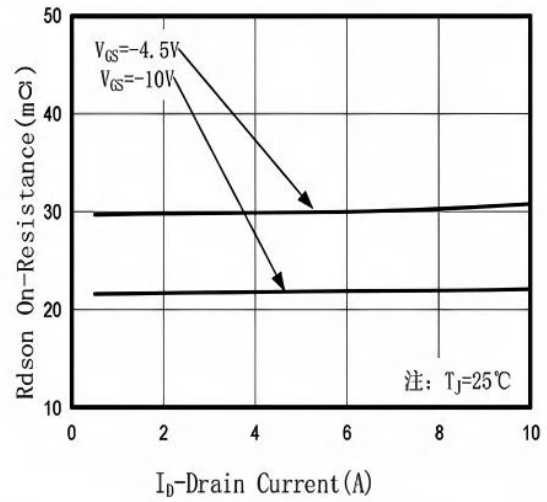


Fig.2 On-Resistance vs. Drain Current

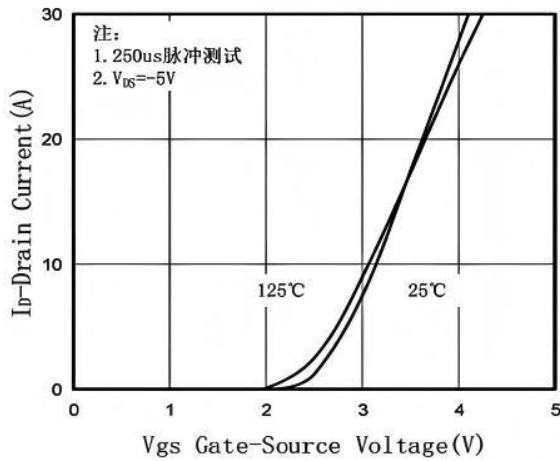


Fig.3 Transfer Characteristic

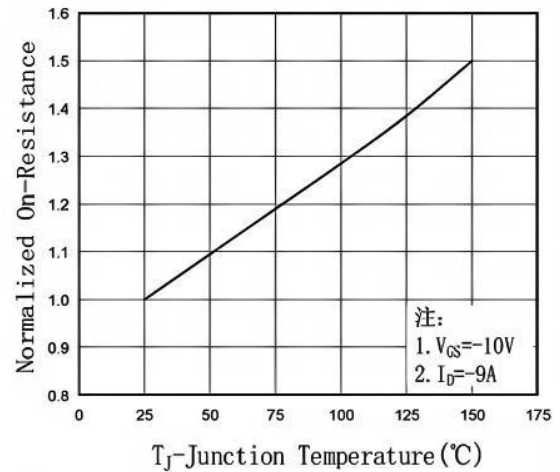


Fig.4 On-Resistance vs. Junction Temperature

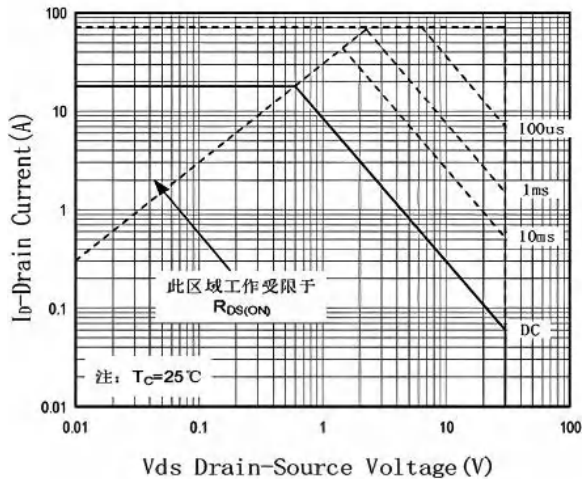


Fig.5 Safe Operation Area

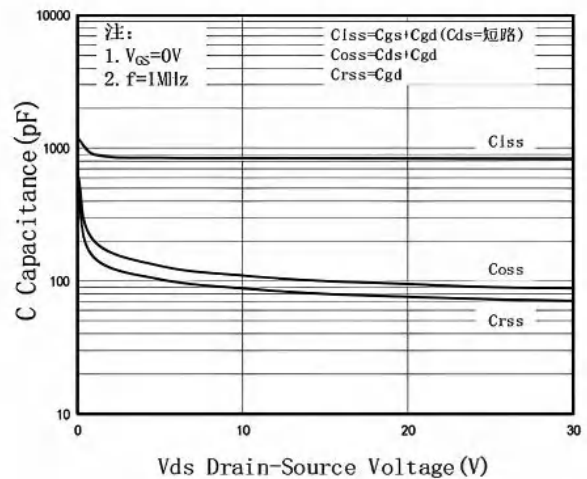


Fig.6 Capacitance Characteristic



N-Ch and P-Ch Fast Switching MOSFETs

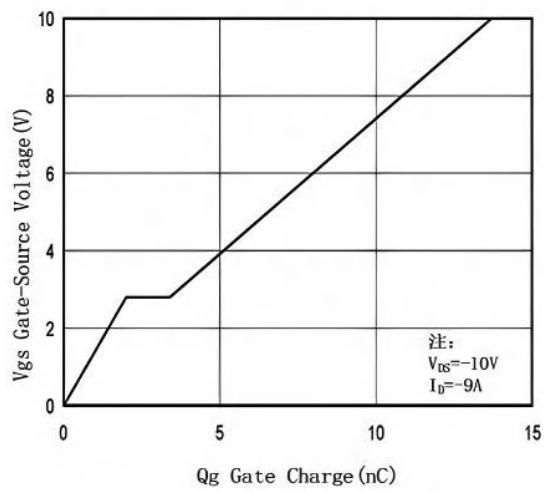


Fig.7 Gate-Charge Characteristic

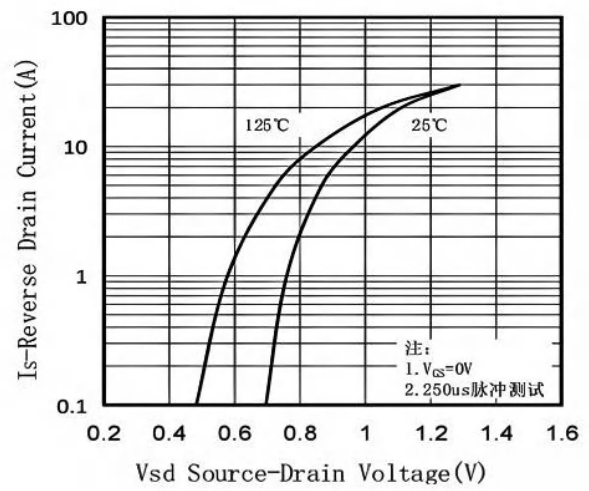


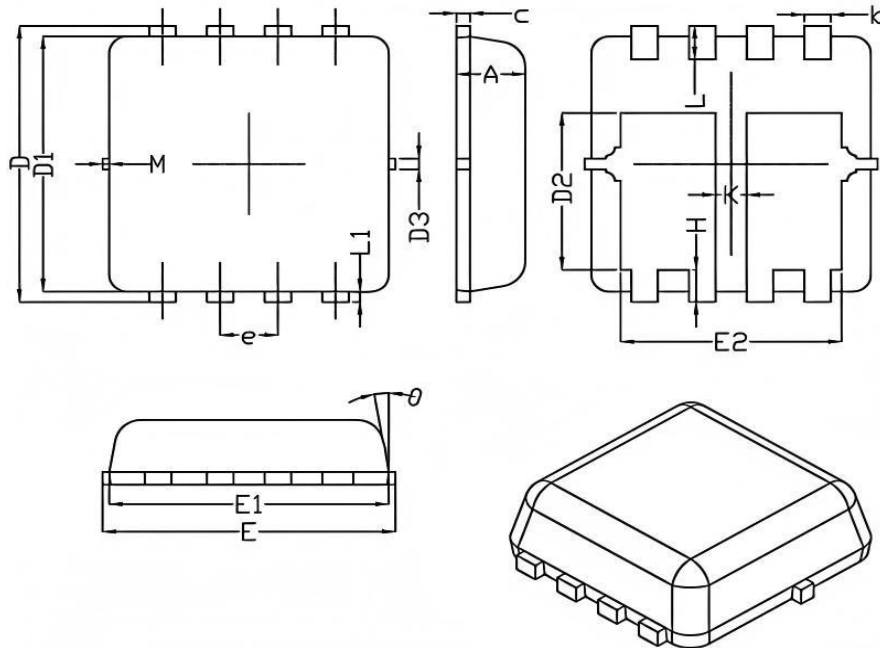
Fig.8 Body Diode Characteristic



Ordering Information

Part Number	Package code	Packaging
HSBB4606	PRPAK3*3	5000/Tape&Reel

PRPAK3*3 Dual 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	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
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	---
K	0.30	---	---
θ	---	10°	12°
M	*	*	0.15
*Not specified			



HSBB4606 Marking:

