Himax

HX5186-B

Charge Pump Controller
Preliminary version 01 October, 2011

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HX5186-B

Charge Pump Controller

Himax Technologies, Inc.

http://www.himax.com.tw

Preliminary Version 01

October, 2011

1. General Description

The HX5186-B is a dedicated high performance and low noise DC/DC pumping controller IC with a feature of low cost solution on specified power application. HX5186-B can be used charge pumping architecture with different pumping factor that is controlled by master driver.

2. Features

- Adjustable frequency operation of charge pumping on Master
- Adaptive x1.5/ x2/x3 mode switchover for positive voltage and x-1 mode for negative voltage
- 2.3V to 4.8V Supply Voltage Range
- VSP output range 4.5V to 6.0V
- VSN output range -4.5V to -6.0V
- Control signals voltage 2.3V to 4.8V
- 12-pin 3.0mm x 1.5mm x 0.5mm TDFN12 package
- Applications for power conversion

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3. Block Diagram

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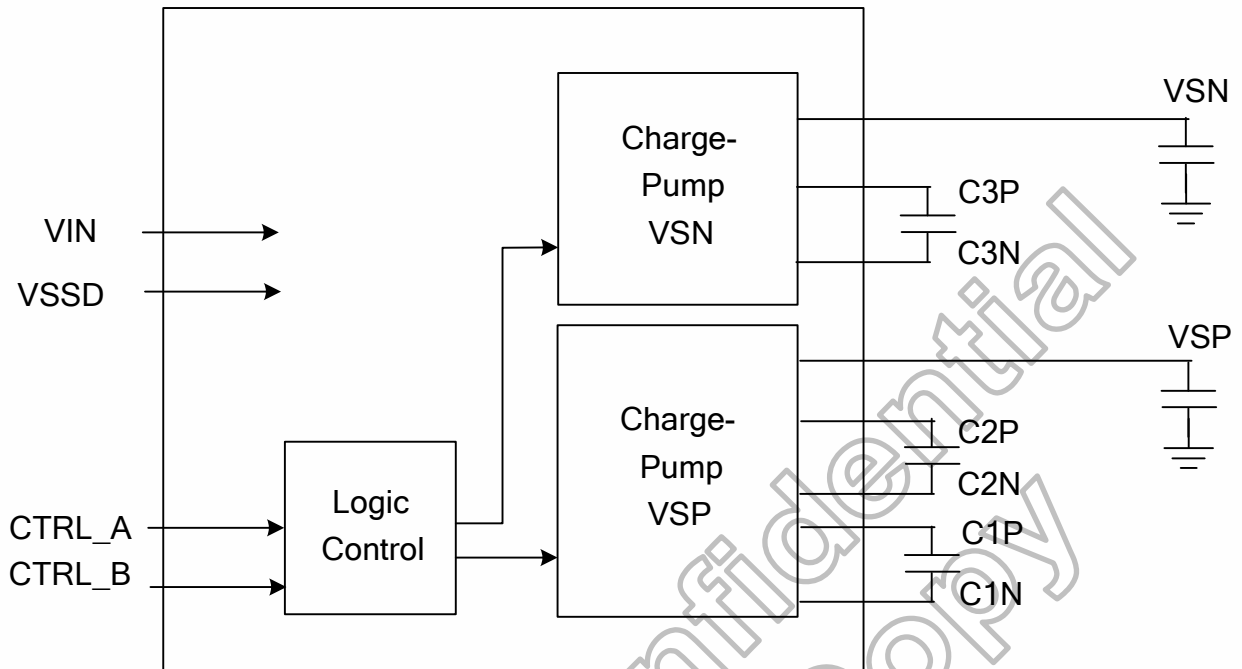
4. Typical Operating Circuit
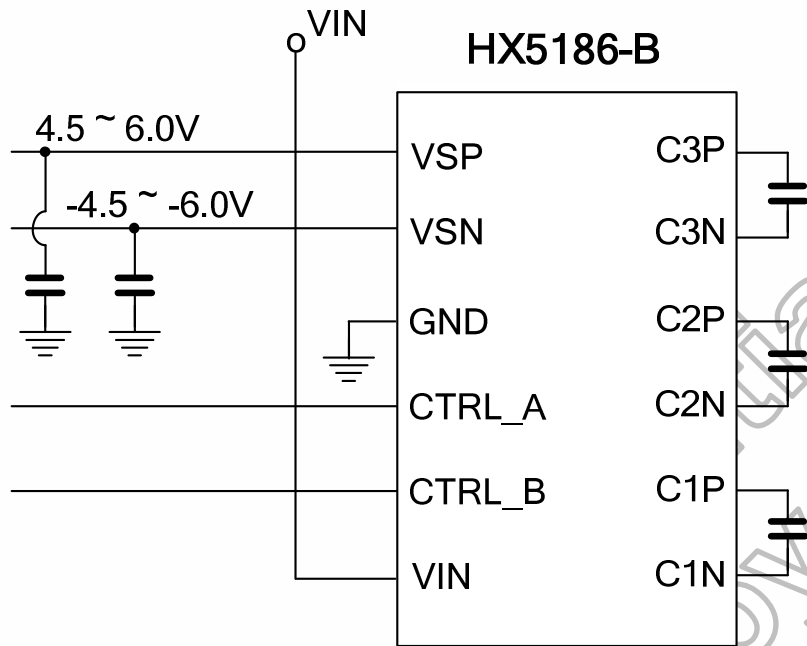
Figure 4.1: Typical operating circuit

5. Pin Description

Pin name	Pin no.	Description
VSP	1	Positive terminal of the output
VSN	2	Negative terminal of the output
GND	3	Ground
CTRL_A	4	Control signal 1, this signal should be low when no pump.
CTRL_B	5	Control signal 2, this signal should be low when no pump.
VIN	6	Power supply
C1N	7	Negative terminal of the charge-pump transfer capacitor 1(1.0uF/10V)
C1P	8	Positive terminal of the charge-pump transfer capacitor 1(1.0uF/10V)
C2N	9	Negative terminal of the charge-pump transfer capacitor 2(1.0uF/10V)
C2P	10	Positive terminal of the charge-pump transfer capacitor 2(1.0uF/10V)
C3N	11	Negative terminal of the charge-pump transfer capacitor 3(1.0uF/10V)
C3P	12	Positive terminal of the charge-pump transfer capacitor 3(1.0uF/10V)
Dummy	13	Dummy pad, please let it open.

6. Pin Assignment

VSP	1 ●		12	C3P
VSN	2		11	C3N
GND	3		10	C2P
CTRL_A	4	13	9	C2N
CTRL_B	5		8	C1P
VIN	6		7	C1N

HX5186-B

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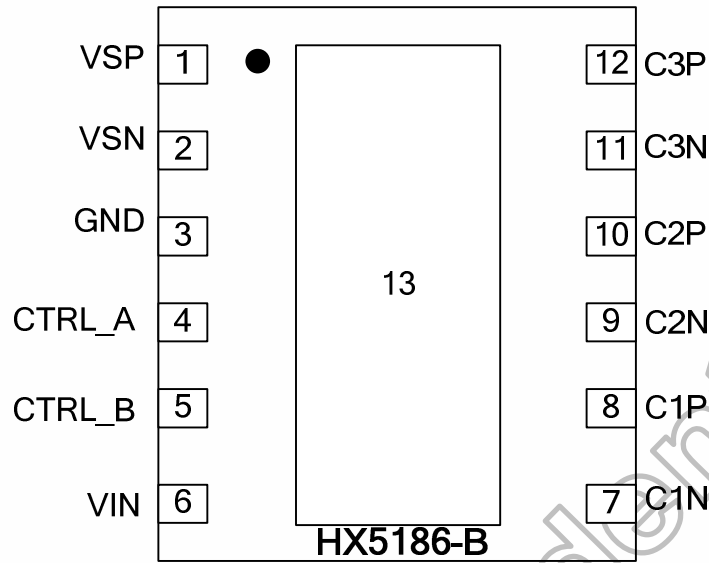
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7. Package Information

TOP VIEW

BOTTOM VIEW
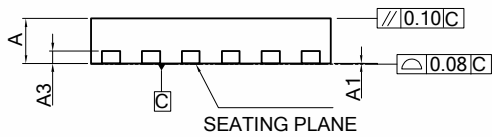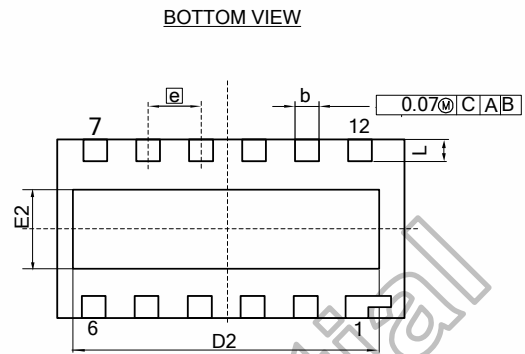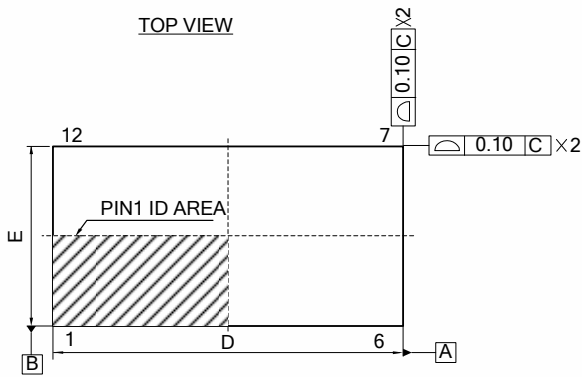
SYMBOL	DIMENSION(MM)			DIMENSION(MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.40	0.45	0.50	15.7	17.7	19.7
A1	0.00	0.02	0.05	0	0.8	2
A3	0.203 REF			8 REF		
b	0.15	0.20	0.25	5.9	7.8	9.8
D	2.90	3.00	3.10	114.2	118.1	122.0
D2	2.75	2.80	2.85	108.3	110.2	112.2
E	1.40	1.50	1.60	55.1	59.0	63.0
E2	0.65	0.70	0.75	25.6	27.5	29.5
e	0.45 BSC			17.7 BSC		
L	0.15	0.20	0.25	5.9	7.9	9.8

SEATING PLANE

NOTES:
1.CONTROLLING DIMENSION : MILLIMETERS.

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8. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply voltage	VIN	-0.3 to 6	V
Control signals output current	Output current	60	mA
Control signals voltage range	Logic Input	-0.3 to 6	V
Output control driver	Output voltage VSP	0 to 6	V
	Output voltage VSN	0 to -6	

9. Thermal Information

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Operating junction temperature	T_J	-40	-	125	℃
Operating temperature range (Ambient)	T_{OP}	-40	-	85	℃
Storage temperature range	T_{STG}	-55	-	150	℃
Lead soldering temperature, 10 seconds	-	-	-	260	℃

10. ESD Rating

Parameter	Symbol	Value	Unit
Human Body Model	HBM	2	KV
Machine Model	MM	200	V

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11. Electrical Specifications

HX5186-B can be used charge pumping architecture with adaptive x1.5/ x2/x3 pumping factor.

(Non-feedback mode, testing is done under VIN=2.3~3.8V, T$_A$=25℃, unless otherwise specified.)

Parameter	Symbol	Conditions	Spec. Min.	Spec. Typ.	Spec. Max.	Unit
Input Power Supply						
Supply voltage	VIN	-	2.3	-	3.8	V
Supply current	IVIN	VIN=2.3V (x3 mode)	-	-	TBD	mA
		VIN=2.8V (x2 mode)	-	-	TBD	
		VIN=3.8V (x1.5 mode)	-	-	TBD	
Output Power Supply						
Positive output voltage	VSP	-	4.5	-	6.0	V
Negative output voltage	VSN	-	-6.0	-	-4.5	V
Positive output current	IVSP	VIN=2.3V (x3 mode)	0	-	TBD	mA
		VIN=2.8V (x2 mode)	0	-	TBD	
		VIN=3.8V (x1.5 mode)	0	-	TBD	
Negative output current	IVSN	VIN=2.3V (x3 mode)	0	-	TBD	mA
		VIN=2.8V (x2 mode)	0	-	TBD	
		VIN=3.8V (x1.5 mode)	0	-	TBD	
Control Signal Voltage Level						
Input high voltage	V$_{IH}$(IN)	-	0.8 VIN	-	VIN	V
Input low voltage	V$_{IL}$(IN)	-	0	-	0.2 VIN	V
Output Power Supply						
Output / Input	Efficiency	VIN=2.3V IVIN=8mA (x3 mode)	TBD	TBD	-	%
		VIN=2.8V IVIN=8mA (x2 mode)	TBD	TBD	-	
		VIN=3.8V IVIN=8mA (x1.5 mode)	TBD	TBD	-	

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HX5186-B also can communicate with Himax driver IC and support feedback mode for larger supply voltage range (VIN=2.3~4.8v).

(Feedback mode, testing is done under VIN=2.3~4.8V, T$_A$=25℃, unless otherwise specified.)

Parameter	Symbol	Conditions	Spec. Min.	Spec. Typ.	Spec. Max.	Unit
Input Power Supply						
Supply voltage	VIN	-	2.3	-	4.8	V
Supply current	IVIN	VIN=2.3V (Feedback mode)	-	-	TBD	mA
		VIN=2.8V (Feedback mode)	-	-	TBD	
		VIN=4.8V (Feedback mode)	-	-	TBD	
Output Power Supply						
Positive output voltage	VSP	-	4.5	-	6.0	V
Negative output voltage	VSN	-	-6.0	-	-4.5	V
Positive output current	IVSP	VIN=2.3V (Feedback mode)	0	-	TBD	mA
		VIN=2.8V (Feedback mode)	0	-	TBD	
		VIN=4.8V (Feedback mode)	0	-	TBD	
Negative output current	IVSN	VIN=2.3V (Feedback mode)	0	-	TBD	mA
		VIN=2.8V (Feedback mode)	0	-	TBD	
		VIN=4.8V (Feedback mode)	0	-	TBD	
Control Signal Voltage Level						
Input high voltage	V$_{IH}$(IN)	-	0.8 VIN	-	VIN	V
Input low voltage	V$_{IL}$(IN)	-	0	-	0.2 VIN	V
Output Power Supply						
Output / Input	Efficiency	VIN=2.3V IVIN=8mA (Feedback mode)	TBD	TBD	-	%
		VIN=2.8V IVIN=8mA (Feedback mode)	TBD	TBD	-	
		VIN=4.8V IVIN=8mA (Feedback mode)	TBD	TBD	-	

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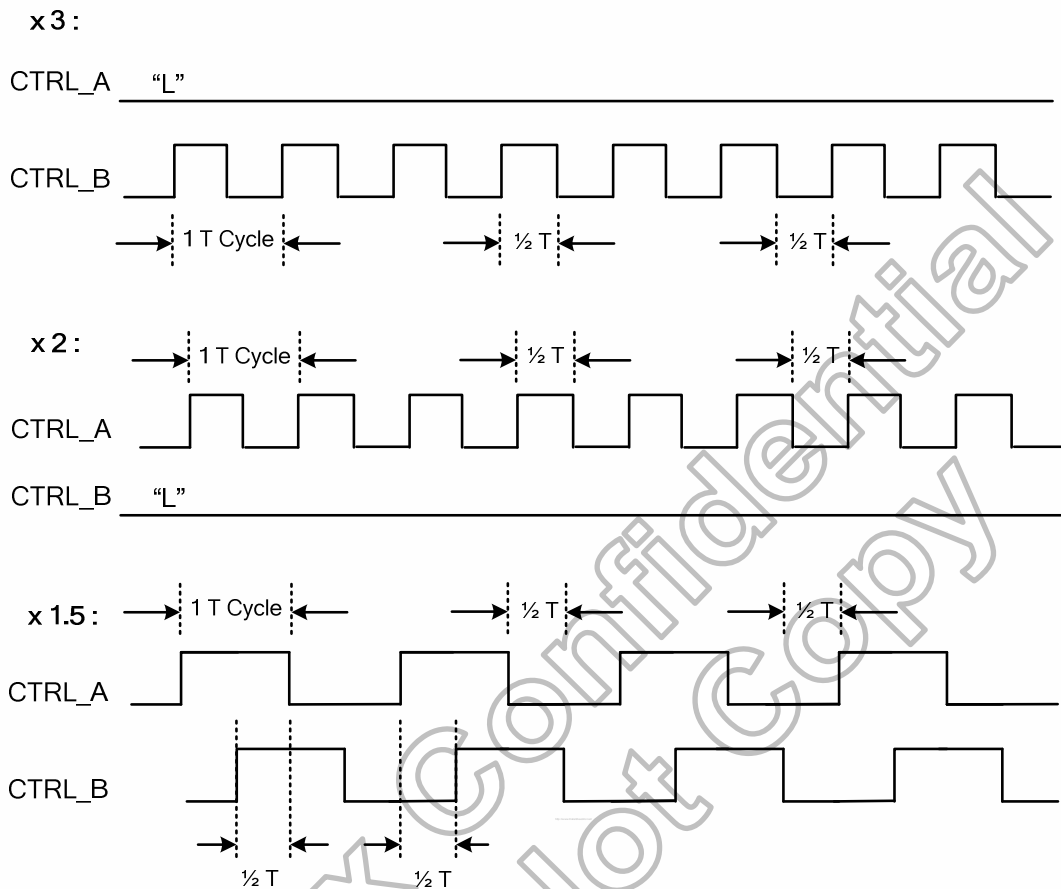## 12. Control Signals of HX5186-B

Figure 12.1: Control signals of HX5186-B
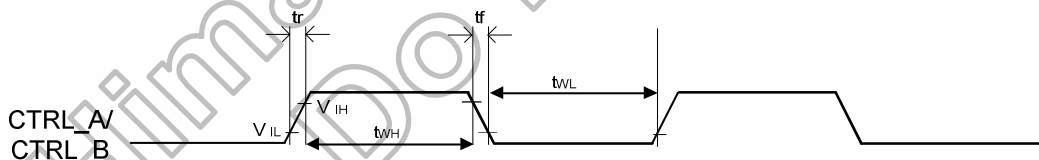
Figure 12.2: Control signal timing characteristics

(VIN=2.8V, T_A =-30 to 70℃)

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Rising time	tr	1	-	100	ns
Falling time	tf	1	-	100	ns
High pulse width	tWH	0.1	-	-	μs
Low pulse width	tWL	0.1	-	-	μs

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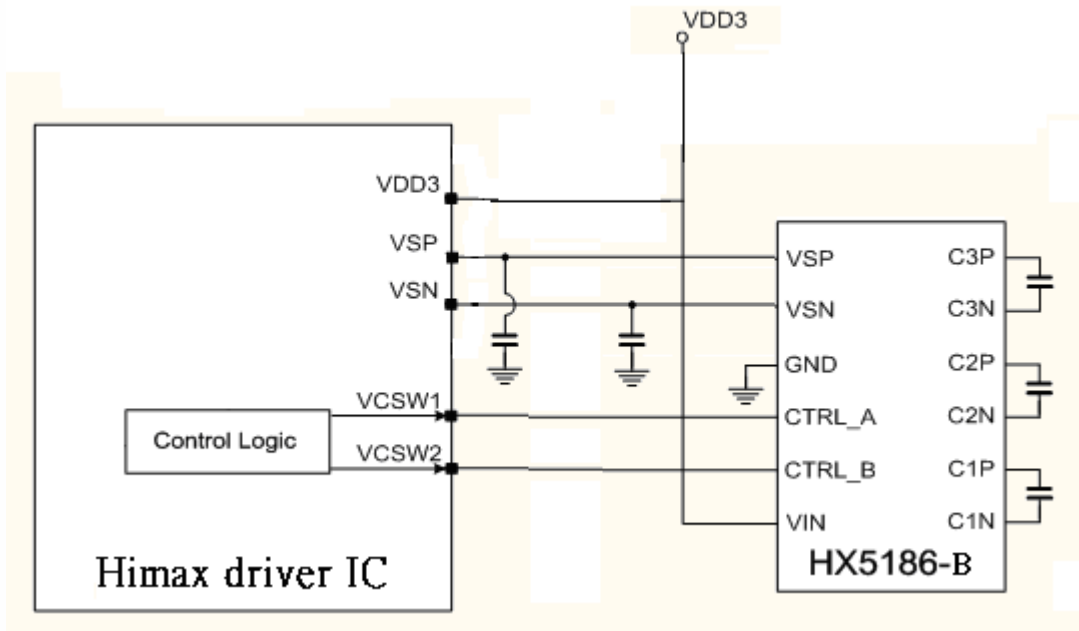
Figure 12.3: Feedback mode control

13. Ordering Information

Part No.	Package
HX5186-B00 xxxx	xxxx: mean bonding drawing number.

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14. Revision History

Version	Date	Description of Changes
01	2011/10/03	1. New setup

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