Version: 1.08

MG26P701

Datasheet

USB Quick Charge with Voltage Boost Controller

Version 1.08

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1. Description

MG26P701 is a low-cost USB High Voltage Dedicated Charging Port (HVDCP) specification V1.2 Interface IC. It works smart to support 10W or 12W @ 5V for Apple devices.

MG26P701 combined voltage boost circuit in single chip to support Quick Charge 2.0 Class A, 5V, 9V, and 12V standard.

MG26P701 will automatically detect the input device and give the proper feedback to the Powered Device (PD) before supply the power. If the PD not supports the high charging voltage, MG26P701 will safely provide the standard 5V.

In addition, MG26P701 has combined power save circuit to reach very low power consumption in standby mode.

For the boost function, MG26P701 support both Sync-PWM and Asynchronous-PWM driving mode to support high performance of efficiency or low cost product line.

2. Features

- Support Quick Charge 2.0 Class A
  - ■ 5V, 9V, and 12V Output
- Support Apple 10W and 12W charge mode
- Support Samsung Charge mode
- Backward compatible with USB Battery charging Specification V1.2 (BC 1.2) Dedicated Charging Port (DCP)
- To boost voltage from USB 5V to 9V, and 12V under QC2.0 Standard
- Typical 3uA Standby Current
- SOP 16 / QFN32 package
- Voltage boost function
- Bulk Boost voltage regulation for battery charge mode
- Current detection
- Over Current Production
- USB Plug In detection
- Power save mode for standby

2.1 Application

- Wall Adapter
- Power Bank
- Car charger
- Portable Device

3. Pin Configurations

3.1 SOP16 – MG26P701AS16

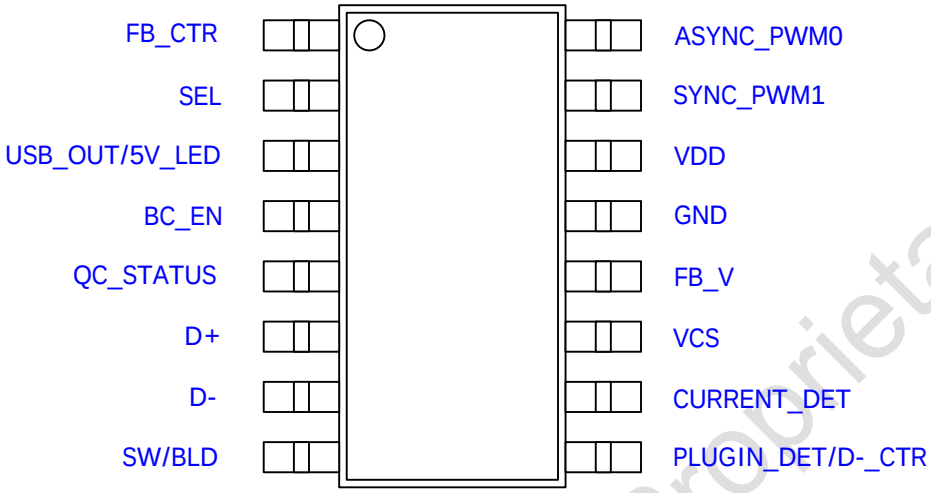

Figure 3-1 package SOP16

Pin	Name	Type	Description
1	FB_CTR	B	Feedback Control, to reduce standby power consumption.
2	SEL	B	To set power consumption either Apple 10W or 12W.
3	USB_OUT/ 5V_LED	O	To use this pin enable power transfer out to PD after USB plug-in detect. When over load occur, can use this pin the turn off the switch to protect whole system. The pin can also drive the LED as a power on indicator.
4	BC_EN	O	To drive external MOSFET to induce 200 ohm between D-/D+ for BC1.2 protocol
5	QC_STATUS	O	Quick Charge Status Pin. It will send out square wave to report the quick charge voltage. When the frequency equal to 200Hz, it means the quick charge voltage is 9V. When the frequency equal to 100Hz, it means the quick charge voltage is 12V. It can be used one LED on this pin to make it work as Quick Charge Enable LED.
6	D-	B	USB D- In.
7	D+	B	USB D+ In.
8	SW/BLD	O	5V Output indicator. Optional discharge control when high voltage reduces to low voltage. When the transient time longer than 500ms, it can use this pin to driver an external MOSFET to enable discharge path to speed up the discharge time.
9	PLUGIN_DET/ D-_CTR	I	USB plug in detect. It will be keep high until USB plug in.
10	CURRENT_DET	I	Output current detection. To use with an external sensing resistor 0.05 ohm.
11	VCS	O	For non-Battery application, pull down this pin. For Battery application connect this pin the external 2.5V reference voltage.
12	FB_V	I	Boost voltage feedback.
13	GND	G	GND

14	VDD	P	Positive power pins
15	SYNC_PWM1	B	For better power transfer efficiency needs to use Sync PWM method.
16	ASYNC_PWM0	B	To control the switch of the boost converter.

Note: In the “Type” field,

“B” means bi-direction, “I” means input, “O” means output

“P” means Power, “G” means Ground.

3.2 QFN32 – MG26P701AQ32

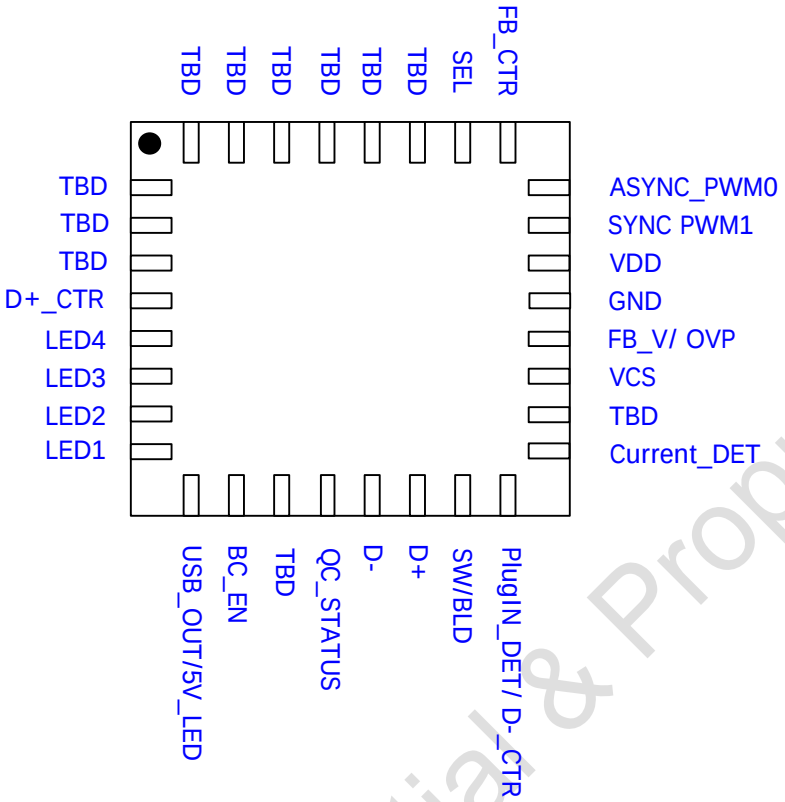

Figure 3-2 package QFN32

Pin	Name	Type	Description
1	TBD	O	TBD
2	TBD	O	TBD
3	TBD	O	TBD
4	D+_CTR	O	Reserve for D+ Pull down control.
5	LED4	O	TBD
6	LED3	O	QC 12V Status LED
7	LED2	O	QC 9V Status LED
8	LED1	O	5V Status LED
9	USB_OUT	O	To use this pin enable power transfer to PD after USB plug-in detect for dis-charge mode. When over load occur, can use this pin the turn off the switch to protect whole system.
10	BC_EN	O	To drive external MOSFET between D-/D+ for BC1.2 protocol
11	TBD	O	TBD
12	QC_STATUS	O	Quick Charge Status Pin. It will send out square wave to report the quick charge voltage. When the frequency equal to 200Hz, it means the quick charge voltage is 9V. When the frequency equal to 100Hz, it means the quick charge voltage is 12V. It can be used one LED on this pin to make it work as

			Quick Charge Enable LED.
13	D-	B	USB D- In.
14	D+	B	USB D+ In.
15	SW/BLD	O	5V Output indicator. Optional discharge control when high voltage reduces to low voltage. When the transient time longer than 500ms, it can use this pin to driver an external MOSFET to enable discharge path to speed up the discharge time.
16	PLUGIN_DET/ D-_CTR	I	USB plug in detect. It will be keep high until USB plug in. After initial state, this pin use to pull down D- within QC reorganization period by 24.9K to GND.
17	CURRENT_DET	I	Output current detection. To use with an external sensing resistor 0.05 ohm.
18	TBD	O	TBD
19	VCS	O	For non-Battery application, pull down this pin. For Battery application connect this pin the external 2.5V reference voltage.
20	FB_V/ OVP	I	Boost voltage feedback.
21	GND	G	GND
22	VDD	P	Positive power pins
23	SYNC_PWM1	B	For better power transfer efficiency needs to use Sync PWM method.
24	ASYNC_PWM0	B	To control the switch of the boost converter.
25	FB_CTR	B	Feedback Control, to reduce standby power consumption.
26	SEL	B	To set power consumption either Apple 10W or 12W.
27	TBD	O	TBD
28	TBD	O	TBD
29	TBD	O	TBD
30	TBD	O	TBD
31	TBD	O	TBD
32	TBD	O	TBD

3.3 Quick Charge Voltage select lookup table

D+	D-	Output	Description		
			S1	S2	S3
3.3V	3.3V	TBD	0	0	0
0.6V	0.6V	12V	0	0	1
3.3V	0.6V	9V	0	1	1
0.6V	GND	5V (Default)	1	1	1

3.4 Apple & Samsung Device Voltage Output table

D+	D-	Mode
2.7V	2V	Apple 10W
2.7V	2.7V	Apple 12W
1.2V	1.2V	Samsung

4. Electrical Characteristics

4.1 Absolute Maximum Rating

PARAMETER	RATING	UNIT
Supply Voltage to Ground Potential	VSS-0.3 to VSS+4.0	V
Applied Input / Output Voltage	VSS-0.3 to VDD+0.3	V
Ambient Operating Temperature	0 to +70	°C
Storage Temperature	-50 to +125	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

4.2 DC Characteristics

(VDD-VSS = 3.0 V, Ta = 25° C; unless otherwise specified)

PARAMETER	SYM.	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply Voltage						
Operating Voltage	VDD	-	3.0	-	5.5	V
Logic Level						
Input High Voltage	V_{IH}	-	0.7 VDD	-	VDD	V
Input Low Voltage	V_{IL}	-	0	-	0.3 VDD	V
Operation current						
Op. Current	I_{OP}	-	-	2.0	5.6	mA
Stop Current	I_{STB2}	-	-	3		*u*A
I/O Character						
Input Port Pull-high Resistor		VIL = 0V	30K	50K	70K	Ω
I/O drive current	I_{OH1}	VOH = 2.4V, VDD = 3.0V	5	-	-	mA
I/O sink current	I_{OL1}	VOL = 0.4V, VDD = 3.0V	10	-	-	mA
SEL drive current	I_{OH3}	VOH = 2.6V, VDD = 3.0V	50	-	-	mA
		VOH = 4.6V, VDD = 5.0V	100			
SEL sink current	I_{OL3}	VOL = 0.4V, VDD = 3.0V	50	-	-	mA
		VOL = 0.4V, VDD = 5.0V	100			
D+/D- Maximum Input Voltage	V_{IU_MAX}	-	-	-	V_{IH}+0.3	V
Protection						
Low Voltage Reset	V_{LVR}	-	-	2.0	-	V
Output Current Limitation	I_{OCP}	Sensor resistor = 50mΩ	2.5	-	-	A
OCP sensor voltage	V_{OCP}	-	-	125	-	mV
OCP Active time	T_{OCP}	Sensor resistor = 50mΩ	5	-	-	ms
PWM						
PWM0 Frequency	f_0	-	-	125K	-	Hz
PWM1 Frequency	f_1	-	-	125K	-	Hz
Synchronize Dead Zeon	T_{DEAD}	PWM=125KHz	30	-	60	ns
PWM drive current	I_{GH}	VOH = 2.6V, VDD = 3.0V	50	-	-	mA
		VOH = 4.6V, VDD = 5.0V	100			
PWM sink current	I_{GL}	VOL = 0.4V, VDD = 3.0V	50	-	-	mA
		VOL = 0.4V, VDD = 5.0V	100			

5. Reversion History

Revision	Page	Descriptions	Date
V1.00		1. Initial release.	2015/05/15
V1.01		1. Added additional application circuit 2. Modified pin defines	2015/05/27
V1.02		1. Add PWM Switching frequency	2015/05/28
V1.03		1. Add QFN32 Pin assignment	2015/06/10
V1.04		1. Changed QFN32 Pin assignment	2015/06/12
V1.05		1. Separate application circuit to application note 2. Add protection spec	2015/07/07
V1.06		1. Add Apple and Samsung Device D+/D- Output voltage	2015/07/22
V1.07		1. Removed QC2.0 Class B support	2015/08/17
V1.08		1. Changed the model description.	2015/11/13