CellWise

CW3002

USB Charging Controller

Features

- D+/D- DCP Mode per USB Battery Charging Specification 1.2
- D+/D- Short Mode per Telecommunication Industry Standard YD/T1591-2009 (Chinese)
- Supports non-BC1.2 Charging Modes by Automatic Selection
  - D+/D- Option for Apple Device
  - D+/D- Option for Samsung Device
- Operating Voltage Range: 4.5V to 5.5V
- Maximum Power Consumption
  - 5uA When VDD<POR threshold
  - 180uA When VDD>POR threshold
- Lead(Pb)-Free, SOT23-5 Package
- 4KV HBM ESD Rating on D+/D- Pins

Applications

- Power bank
- USB Ports (Hosts and Hubs)
- MID OTG Port
- Wall Charging Adapters

General Description

The CW3002 is the USB dedicated charging controller IC, which is fully compatible with BC1.2 and other non-BC1.2 standards like YT/D1591-2009, Apple charging specification (for i-Pad & i-Phones) and specs from Samsung Galaxy family.

The IC is used to facilitate charging procedure when most of the mainstream handheld devices are detected.

The CW3002 is suitable for all the charger products using USB interface like power bank, wall adapter and even MID device with OTG function. The IC is provided with enhanced ESD protection up to +/-4kV with application on D+/D- Pins.

IC is provided with SOT23-5 package and requires minimum PCB resource with very few or even no external components.

Order Information

Name	Operation Temperature	Package	Package Mark
CW3002	-40℃ to 80℃	SOT23-5	CW3002AAAS

Function Block Diagram
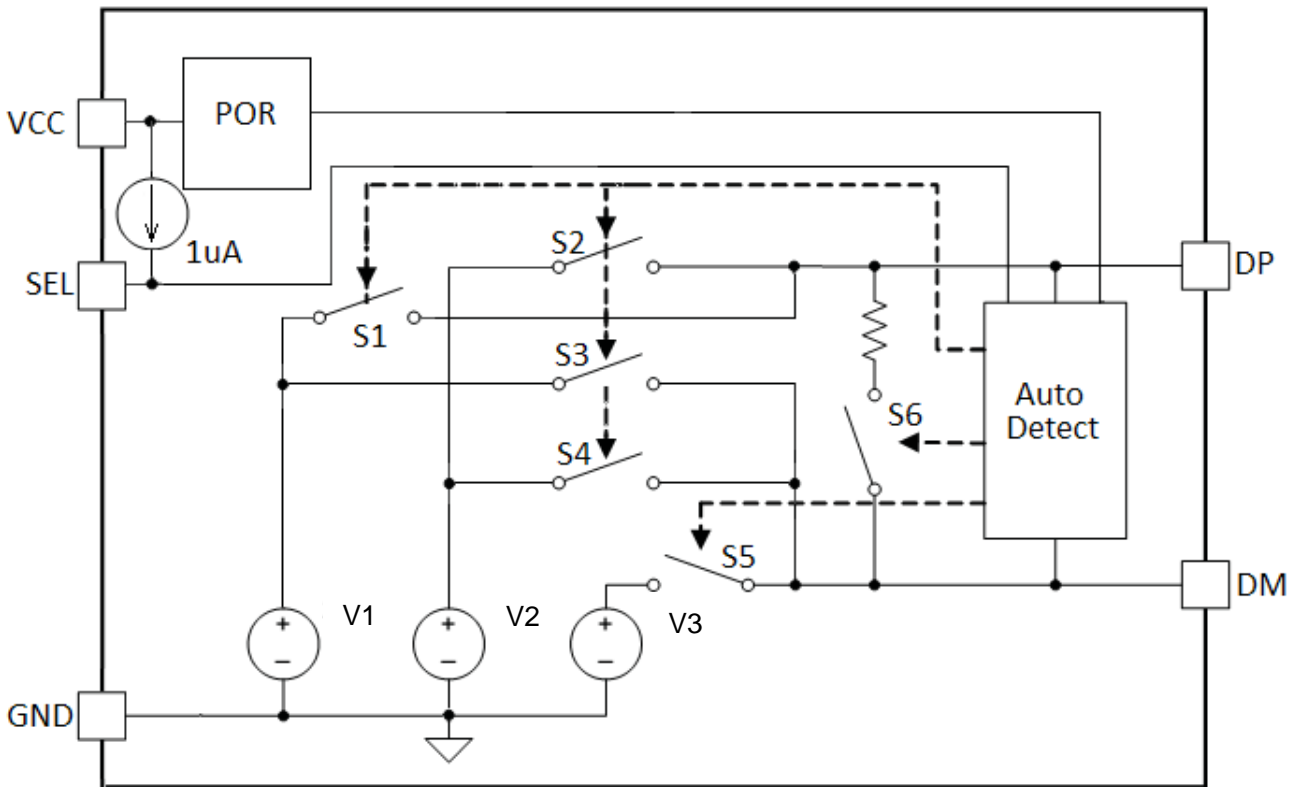
Fig1. Block diagram

Absolute Maximum Ratings

Voltage on VCC Pin Relative to GND	·································	GND-0.3 to GND+6V
Voltage on SEL Pin Relative to GND	·································	GND-0.3 to VCC+0.3V
Voltage on DP DM Relative to GND	·································	GND-0.3 to VCC+0.3V
Operating Temperature Range	·································	-30℃ to 80℃
Junction Temperature	·································	150℃
Store Temperature Range	·································	-55℃ to 125℃

Caution:

Stresses beyond "Absolute Maximum Ratings" condition may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Pin Arrangement and Description

Fig2. Pin arrangement

Pin No.	Pin Name	Description
1	SEL	Work Mode Selection with 1uA pull up current
2	GND	Ground
3	VCC	Power
4	DP	USB positive data-channel to external USB device
5	DM	USB negative data-channel to external USB device

Table1. Pin description

Electrical Characteristics Recommended DC Operating Conditions

(4.5≤VCC≤5.5, T_A= -40~80°C, unless otherwise specified.)

PARAMETER	SYMBOL	CONDITIONS	Min.	Typ.	Max.	UNITS
VCC Voltage			4.5		5.5	V
VCC POR Voltage	VCC_{POR}		3.5		3.9	V
	VCC_{POR_HYS}			250		mV

Table2. Electrical Operating Parameters

DC Electrical Characteristics

(4.5≤VDD≤5.5, T_A= -40~80°C, unless otherwise specified.)

PARAMETER	SYMBOL	CONDITIONS	Min.	Typ.	Max.	UNITS
DC Current Consumption	I_{VCC}			180	240	µA
DP Voltage	V_{DP}	SEL="1"		2.7		V
		SEL="0"		2.0		V
DM Voltage	V_{DM}	SEL="1"		2.0		V
		SEL="0"		2.7		V
Output Resistance on DP/DM pin	R_{OUT}	Output voltage=2.0		30		kΩ
		Output voltage=2.7		23		kΩ
Short Condition Resistance	R_{DMDP}			50		Ω
SEL pull up current	I_{SEL_PU}			1		µA

Table3. DC Electrical Characteristics

* Actual charging current is programmed by the external resistor connected to the Ichg pin

Function

CW3002 is specified USB charger controller IC for external device charging. CW3002 embedded the intelligent USB device detect circuits, can identify the most handed equipments, such as Apple, Samsung, HTC and other general USB devices.

After identification, CW3002 emulates the corresponding USB type for the device requirements. Device can employs a big current as MAX as 2.1A to charge itself.

CW3002 is only change the D+/D- voltage to suitable with the different device, the charge current is determined by the power supply and the charge IC in device.

SEL Pin

CW3002 use a SEL pin to choose the different Apple charge current.

Pull high, for 2A option; Pull low, for 1A option.

SEL potential	Option
1	2A
0	1A

Table4. SEL pin for different current option

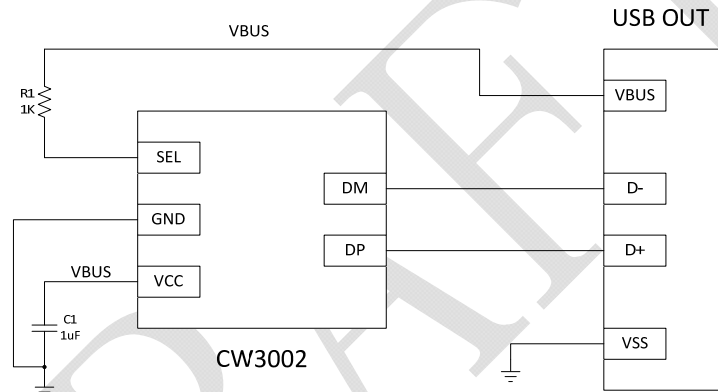## Application Circuits

Fig3. 2A Configuration / typical application circuits

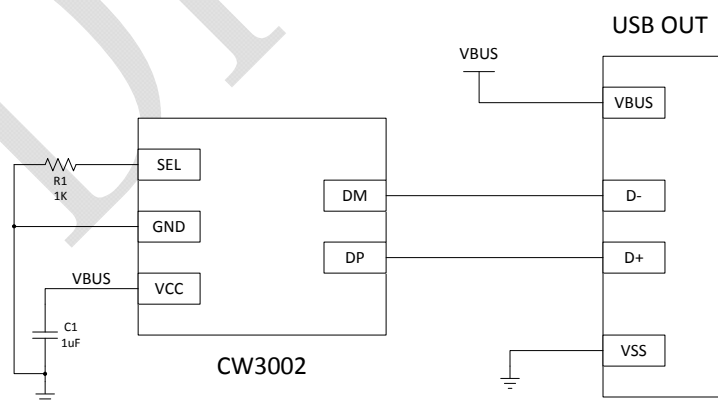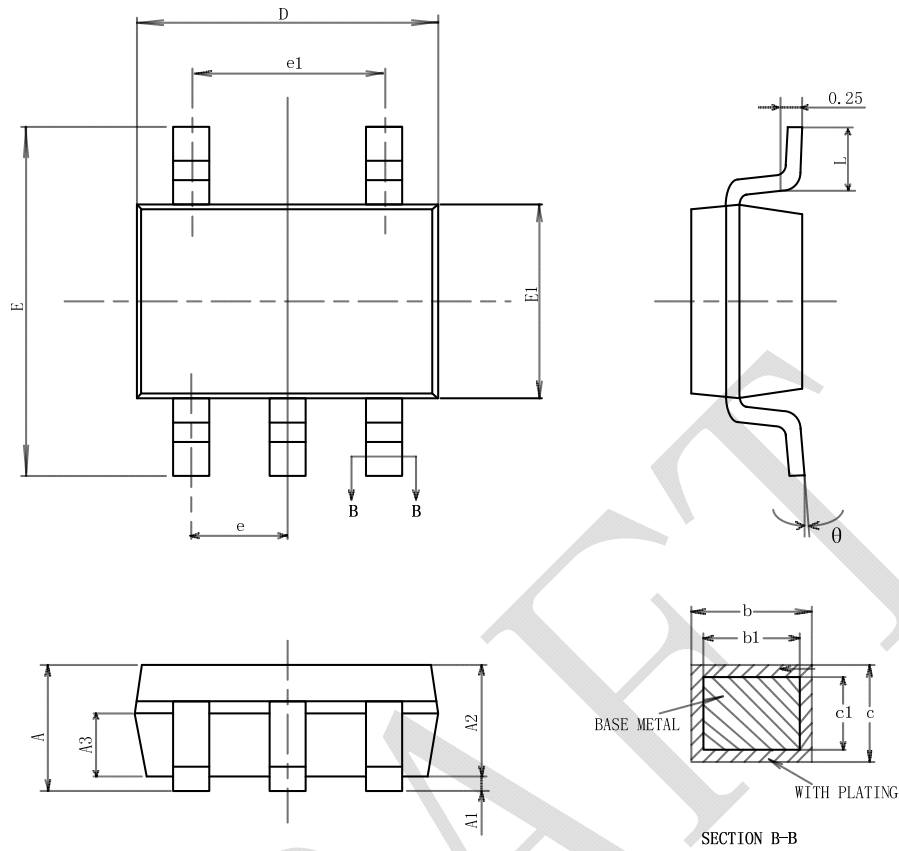Fig4. 1A Configuration / typical application circuits

Package Information

SYMBOL	MILLIMETER		
	MIN	TYP	MAX
A	——	——	1.35
A1	0.04	——	0.15
A2	1.00	1.10	1.20
A3	0.55	0.65	0.75
b	0.38	——	0.48
b1	0.37	0.40	0.43
c	0.11	——	0.21
c1	0.10	0.13	0.16
D	2.72	2.92	3.12
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95BSC		
e1	1.90BSC		
L	0.30	——	0.60
θ	0	——	8°
L/F size（mil）	47*47	——	46*64