CEP8131

USB Dedicated Fast-Charging Port Controller

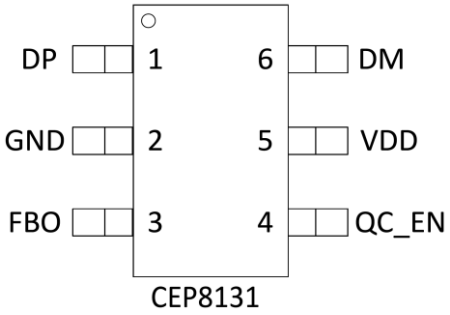
■ FEATURES

- Support HiSilicon Fast Charge Protocol **(FCP)**
- Support Samsung Adaptive Fast Charging **(AFC)**
- Support Qualcomm Quick Charging 3.0/2.0 **(QC3.0/QC2.0)** Protocol
- Support USB DCP applying 2.7V on DP and DM line, output Current up to 2.4A for **Apple** Device
- Meets Battery Charging Specification **BC 1.2** for DCP
- Meets Chinese Telecommunication Industrial Standard YD/T 1591-2009
- Automatic Selection of D+/D- mode for an attached device
- Power Consumption below 1mW at 5V output
- SOT23-6 Package

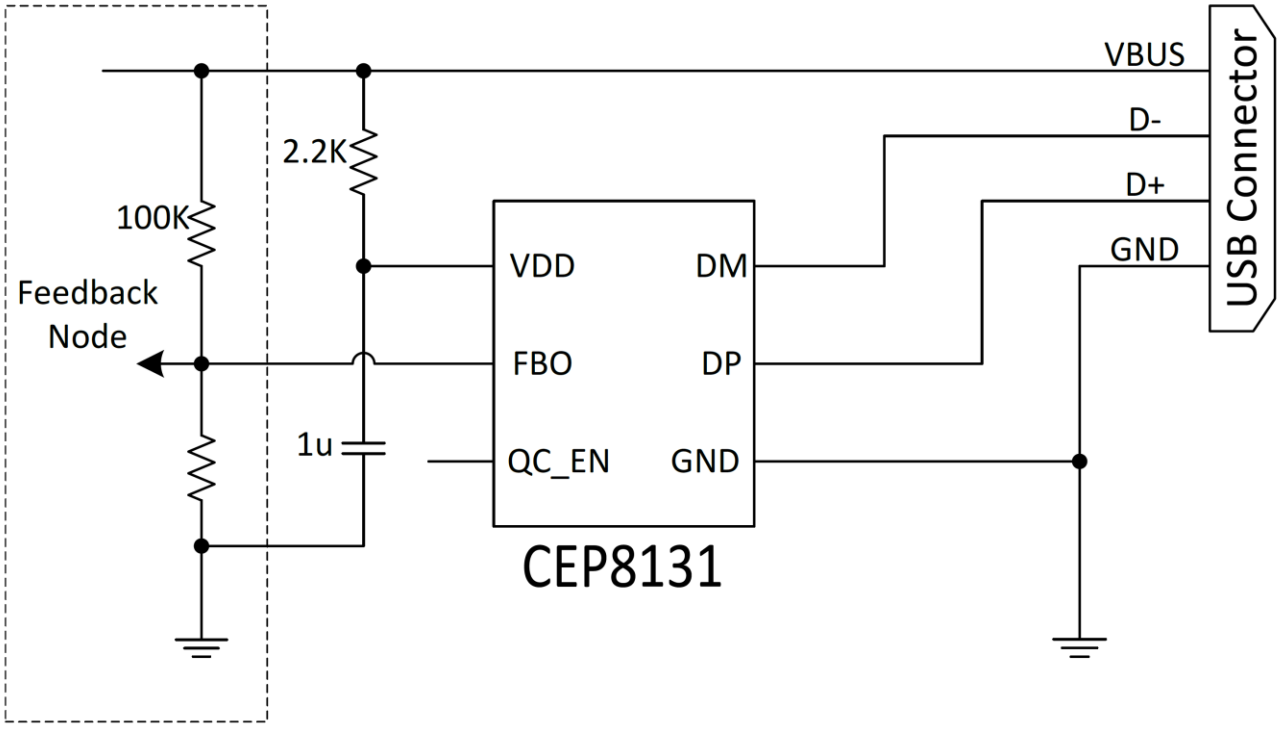
■ APPLICATIONS

- Adapter
- Car Charger
- USB Power Output Ports
- Power Bank

■ PACKAGE and SIMPLIFIED APPLICATION DIAGRAM



NO.	NAME	TYPE	DESCRIPTION
1	DP	I/O	USB positive data line.
2	GND	P	Ground connection.
3	FBO	I/O	Feedback output. Current source/sink output.
4	QC_EN	I	FCP/QC function enable, H-z to enable FCP/QC and LOW to disable.
5	VDD	P	Power supply.
6	DM	I/O	USB negative data line.



■ GENERAL DESCRIPTION

CEP8131 is a low-cost USB Dedicated Fast Charging Port Controller which is fully compatible with BC1.2 and other non BC1.2 standards like YD/T 1591-2009 Apple & Samsung Charging Spec, HiSilicon Fast Charge Protocol, Qualcomm Quick Charging 3.0/2.0.

CEP8131 automatically detect whether a connected Power Device (PD) is Quick Charge 2.0/3.0 or FCP Capable before enabling output voltage adjustment. If a PD not compliant to Quick Charge 2.0/3.0 is detected the CEP8131 disables output voltage adjustment to ensure safe operation with legacy 5V only USB PDs.

The CEP8131 is available in SOT23-6 package.

■ ABSOLUTE MAXIMUM RATINGS(Note 1)

PARAMETER		MIN	MAX	UNIT
Voltage Range（To PGND）	VDD	-0.3	6.5	V
	Others	-0.3	6.5	V
Operating Junction Temperature	T_J	-40	150	℃
Storage Temperature Range	T_{STG}	-65	150	℃

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

■ ESD RATING

SYMBOL	PARAMETER	VALUE	UNIT
V_{ESD}	Human Body Model (HBM)	±4000	V

■ RECOMMENDED OPERATING CONDICTIONS

PARAMETER		MIN	TYP	MAX	UNIT
VDD	Input Supply Voltage	3.2	5	6.4	V
C_{VDD}	Input Capacitance	0.47			μF
T_A	Operation Temperature Range	-40		85	℃

■ ELECTRICAL CHARACTERISTICS

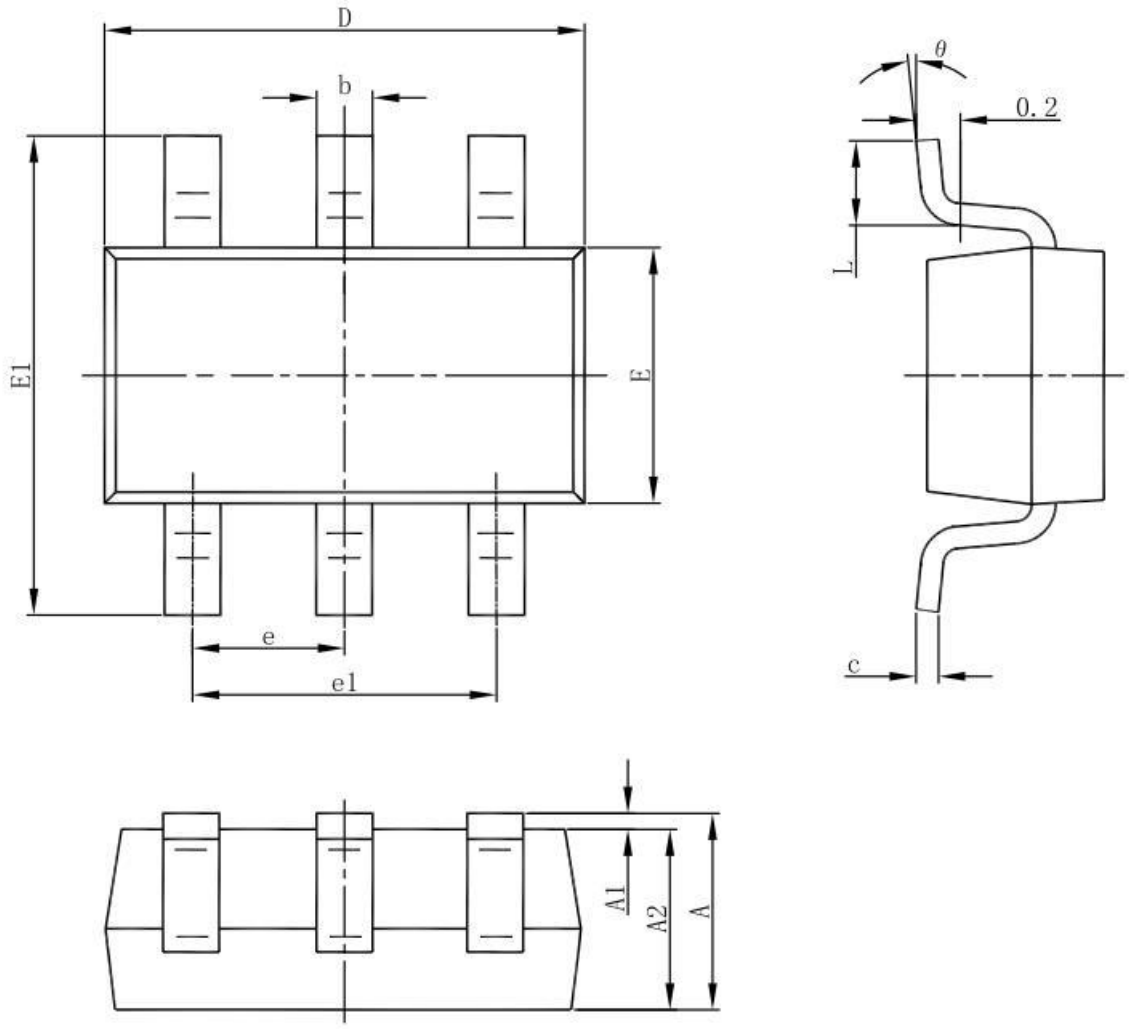
Conditions are T_J=25℃, VDD=5V.

PARAMETER		TEST CONDICTIONS	MIN	TYP	MAX	UNIT
INPUT POWER						
V_{VDD}	VDD Input Voltage Range		3.2		5.5	V
I_{VDD}	VDD Supply Current	VDD=5V		200		uA
$V_{VDD(SHUNT)}$	VDD Shunt Voltage	I_{VDD}=3.5mA		4.75		V
VDD UVLO Test						
$VDD_{(ON)}$	VDD (turn on threshold voltage)	V_{VDD} Rising	2.9	3.0	3.1	V
$VDD_{(OFF)}$	VDD (turn off threshold voltage)	V_{VDD} Falling	2.8	2.9	3.0	V
ΔV_{UVLO}	UVLO Hysteresis	$VDD_{(ON)}$- $VDD_{(OFF)}$		0.1		V
High Voltage Dedicated Charging Port (HVDCP)						

$V_{DAT(REF)}$	Data Detect Voltage		0.25	0.325	0.4	V
$V_{SEL(REF)}$	Output voltage selection reference		1.8	2	2.2	V
$T_{GLITCH(DP)HIGH}$	D+ High Glitch Filter Time		1	1.25	1.5	s
$T_{GLITCH(DM)LOW}$	D- Low Glitch Filter Time			1		ms
$T_{GLITCH(V)CHANGE}$	Output Voltage Glitch Filter Time		20	40	60	ms
$T_{GLITCH(CONT)CHANGE}$	Continuous Mode Glitch Filter Time		100	150	200	us
$R_{DAT(LKG)}$	D+ Leakage Resistance	VDD=3.1-7V, V(D+)=0.5-3.6V, Switch SW1=Off	300	500	800	KΩ
$R_{DM(DWN)}$	D- Pull-Down Resistance		14.2	19.5	24.5	KΩ
$R_{ON(N1)}$	Switch SW1 on-resistance	VDD=3.1-7V, V(D+)≤3.6V, I_{DRAIN}=200uA		20	40	Ω
C_{DAT}	Data Line Capacitance				1	nF
$V_{TH(PD)}$	Output Device Connection Detection threshold		0.25	0.325	0.4	V
TD_{PD}	Output Device connection Detection Glitch Filter Time		120	160	200	ms
$\Delta I_{T(UP)}$	Up Current Step	R_{IREF}=100KΩ		2		uA
$\Delta I_{T(DO)}$	Down Current Step	R_{IREF}=100KΩ		2		uA
$T_{DUR(step)}$	Duration for current step	QC3.0 mode	80	100	120	us
DCP 1.2V Mode						
$V_{DAT(1.2V)}$	D+_1.2V/D-_1.2V line output voltage		1.08	1.2	1.32	V
$R_{DAT(1.2V)}$	D+_1.2V/D-_1.2V line output Impedance			100		KΩ
Apple 2.4A Mode						
$V_{DAT(2.7V)}$	D+/D- line output voltage		2.57	2.7	2.84	V
$R_{DAT(2.7V)}$	D+/D- line output Impedance			33.6		KΩ
FCP Mode						
V_{TX-VOH}	D- FCP TX Valid High		2.35		3.6	V
V_{TX-VOL}	D- FCP TX Valid Low				0.3	V
V_{RX-VIH}	D- FCP RX Valid High		1.5		3.6	V
V_{RX-VIL}	D- FCP RX Valid High				1.0	V
R_{PD}	D- Pull-Down Resistance		400	500	600	Ω
T_{UI}	Unit Interval for PHY	F_{CLK}=125KHz	144	160	176	us
T_{RISE}	FCP Pulse Rise Time	10% - 90%		1	2.5	us
T_{FALL}	FCP Pulse Fall Time	90% - 10%		1	2.5	us

■ PACKAGE OUTLINE

SO23-6 PACKAGE OUTLINE AND DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950		0.037	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°