



Primary-Side-Control CC/CV Controller

FEATURES

- Constant-Current (CC) and Constant-Voltage (CV) Control with Primary Side Control
- $\pm 5\%$ Constant Voltage Regulation
- $\pm 10\%$ Constant Current Regulation
- Eliminates Opto-Coupler and TL431
- External Power NPN Transistor for Low Cost
- Operation Frequency Modulation Improve System EMI
- Built-in Line Compensation
- Cycle-by-Cycle Current Limiting
- Over Voltage Protection (OVP)
- Over Temperature Protection (OTP)
- Open Circuit Protection
- Short Circuit Protection
- Pb-Free Device

TYPICAL APPLICATION

- Adapter/Charger for Cell/Cordless Phones, PDAs, MP3 and Other Portable Apparatus
- Standby and Auxiliary Power Supplies
- Set Top Boxes (STB)

DESCRIPTION

The FT830D controller device is optimized for low cost, low power switching mode power supply applications that not needed cable compensation . The FT830D facilitates CC/CV charger design by eliminating an opto-coupler and TL431. Its highly integrated functions such as Under Voltage Lockout (UVLO), Leading Edge Blanking (LEB), Built-in line compensation and Cycle-by-Cycle current limiting offer the users a high efficiency and low cost solution for AC/DC power applications.

Furthermore, FT830D features fruitful protections like OTP (Over Temperature Protection), OVP (Over Voltage Protection), and Open Circuit Protection, Short Circuit Protection to eliminate the external protection circuits and provide reliable operation. FT830D is available in SOT23-5 packages.

TYPICAL APPLICATION CIRCUIT

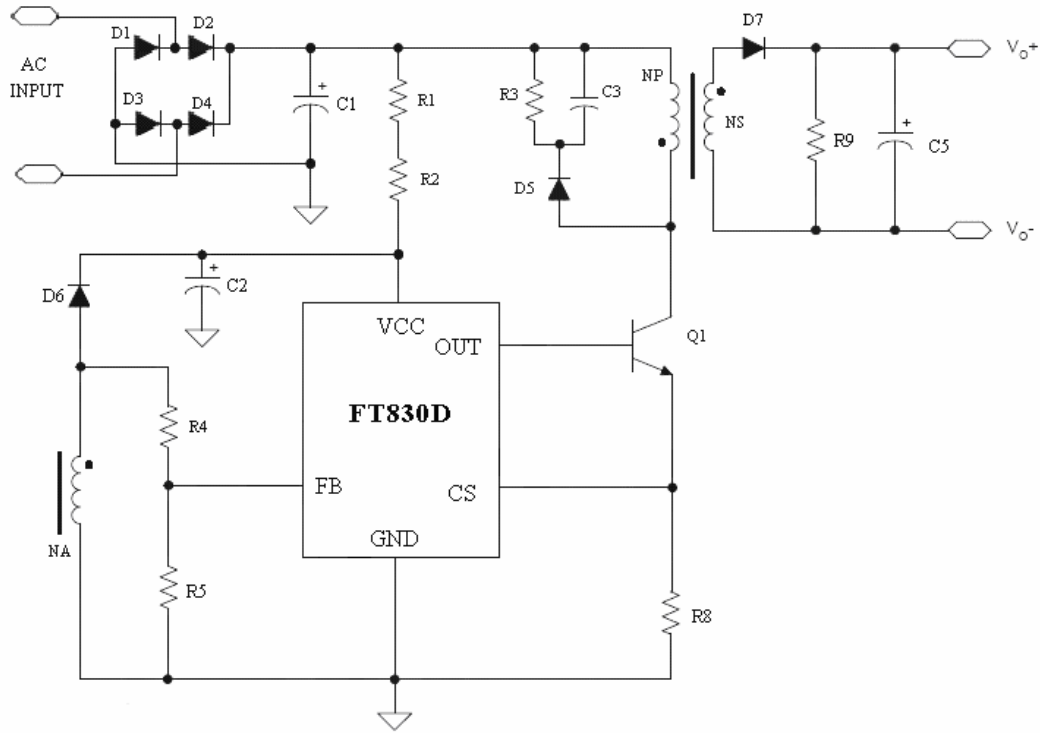


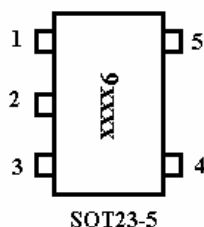
Figure 1: Typical Application Circuit

ABSOLUTE MAXIMUM RATINGS

FB to GND.....	-0.3V to +9V
CS to GND.....	-0.3V to +9V
VCC to GND.....	-0.3V to +18V
OUT to GND.....	-0.3V to +9V
Operating Temperature Range.....	-40°C to +125°C
Junction Temperature.....	-40°C to +150°C
Storage Temperature Range	-60°C to +150°C
ESD Protection HBM.....	2000V
MM.....	500V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

PIN CONFIGURATION



SOT23-5

Figure 2: Pin Assignments

Pat No.	Package	Pin Definition				
		1	2	3	4	5
FT830D	SOT23-5	CS	FB	GND	OUT	VCC

Table 2: Pin Definition

TERMINAL DEFINITION

Pin	Description
GND	Ground.
FB	Output voltage feedback pin
CS	Primary current sense
VCC	Supply voltage
OUT	NPN switch base driver

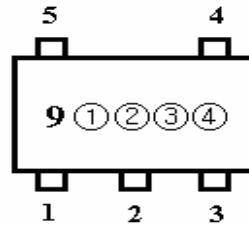
Table 3

ORDERING INFORMATION

Product	Ordering Information
FT830D	FT830D

Table 4

MARKING RULE



SOT23-5

Figure 3: Marking Rule

SOT23-5:

- ①: Represents Version (D)
②: Represents package (a: SOT23-5; b: SOT23-6)
③④: for internal reference

BLOCK DIAGRAM

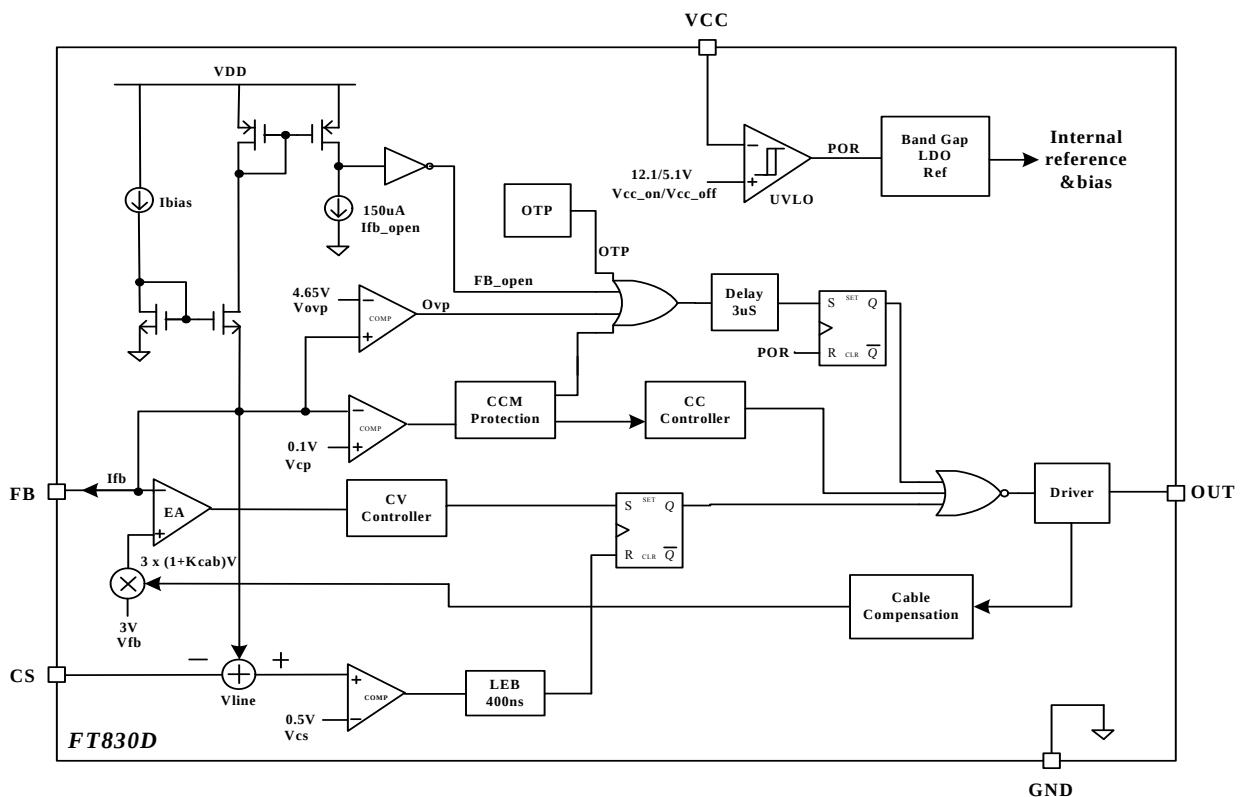


Figure 4: FT830D Block Diagram

**ELECTRICAL CHARACTERISTICS**(For typical values $T_j=25^{\circ}\text{C}$, $V_{cc}=10\text{V}$, unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Current Sense					
Maximum Current Threshold	Vcs_max	0.49	0.5	0.51	V
Pre-drive Current Threshold	Vcs_pre	0.44	0.45	0.46	V
Vcs_limit Temperature Stability ($-40^{\circ}\text{C}\sim 125^{\circ}\text{C}$)			1		%
Leading Edge Blanking Duration	Tleb		400		ns
Propagation Delay (OUT=1.0nF to GND)	Tpd			200	ns
Feedback Section					
Feedback Voltage Threshold	Vfb	2.97	3	3.03	V
FB Pin minimum current	Ifb_open		50		μA
OVP Protection Threshold Level	Vovp	4.55	4.65	4.75	V
CCM protection Threshold Level	Vcp		0.1		V
Supply Section					
Start Up Threshold Voltage	Vcc_on	13.5	15	17.2	V
Under Voltage Lockout Voltage	Vcc_off	4.8	5.4	6	V
VCC Start Up Current	Istart_up		6		μA
Operating Current	Iop		1.1		mA
Protection Section					
Feedback Loop Open Protection	Ifb_open		150		μA
Over Temperature Protection	Tsd		140		$^{\circ}\text{C}$
Base Driver					
Output Maximum Sink current	Isink	50			mA
Output Maximum Source current			30		mA
Compensation					
Line Compensation (Ifb=1mA)	Vline		45		mV

Table 5

**FUNCTIONAL DESCRIPTION****Operating Description**

FT830D are cost effective and high-performance AC-DC power supply controller for off-line low power AC-DC applications including battery chargers and adaptors. Without secondary feedback circuit, the constant voltage (CV) and constant current (CC) control can be achieved accurately.

Start up Control

Start-up current of FT830D is very low so that a start-up resistor with high resistance and low-wattage is allowed to supply the start-up power for the controller. The large value startup resistor can minimize the power loss in application and starts up quickly. A 2ohm, 0.25W start-up resistor and a 10uF/25V Vdd hold-up capacitor are sufficient for an AC-to DC power adapter.

Operating current

The operating current of FT830D is as low as 1mA. Good efficiency is achieved with the low operating current together with valley turn on of the external power NPN transistor. Low operating current also reduces the Vcc hold-up capacitance requirement.

Constant voltage (CV) and constant current (CC) Operation

The FT830D can accurately achieve CV/CC characteristic output without secondary side voltage and current-feedback circuits. It operates in CV mode to regulate the output voltage by capturing the auxiliary winding feedback voltage at FB pin. The auxiliary winding feedback voltage is proportional to secondary winding, so it provides controller the feedback signal from secondary side and achieves constant-voltage output. In CC mode, the controller detects the secondary discharger peak current and the discharger time, which determines the off-time of the base driver to make the output average current constant. In the CV or CC mode, the primary side peak current is constant if the Rcs is settled.

Leading edge blanking

Each time the power NPN transistor is switched on, a turn-on spike occurs at the sense resistor. To avoid premature termination of the switching pulse, a 400ns leading edge blanking time is built in. Conventional RC filtering can therefore be omitted. During this blanking period, the current limit comparator is disabling and cannot switch off the base driver.

Under voltage lockout (UVLO)

FT830D turn-on [Vcc(on)] and turn-off [Vcc(off)] are 15V and 5.4V. During start-up, the hold-up capacitor must to be charged to 15V through the start-up resistor. The hold-up capacitor continues to supply Vcc until power can be delivered from the auxiliary winding of the transformer. Vcc must not drop below 5.4V during this start-up process. This UVLO hysteresis window ensures that hold-up capacitor is sufficient to supply Vcc during start-up.



Protection control

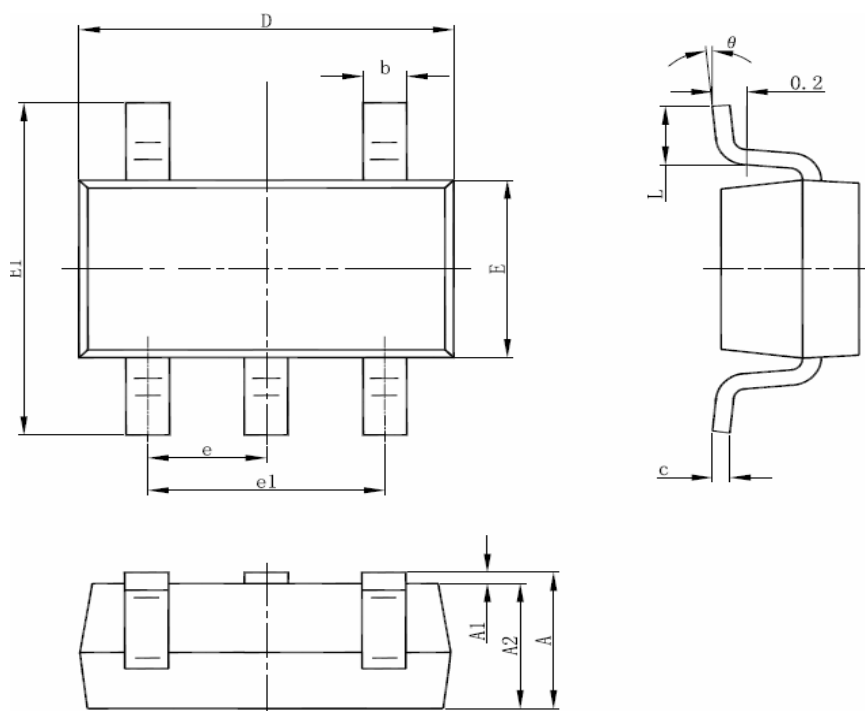
With rich protection features of FT830D, a good power supply system reliability is achieved. The protection features including cycle by cycle current limiting, Vcc over voltage protection and clamp, short circuit protection, feedback loop open protection, over temperature protection and under voltage lockout on Vcc.

Base driver

To minimize loss in the primary power NPN and prevent from second breakdown, the driving current is carefully controlled. The driving current have a default driving current 30mA.

PACKAGE INFORMATION

SOT23-5 Package



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	0.95 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	6°



APPENDIX A: REVISION HISTORY

Version A0: Original data sheet for the FT830D.

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