

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
- Adjustable Base Driver Improve System EMI
- Adjustable Cable compensation for all Loading
- 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 FT834D controller device is optimized for high-performance, more than 5 Watt switching mode power supply applications. The FT834D 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), external adjustable base driver and cable compensation offer the users a high efficiency and low cost solution for AC/DC power applications.

Furthermore, FT834D 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. FT834D is available SOP8 packages.

TYPICAL APPLICATION CIRCUIT

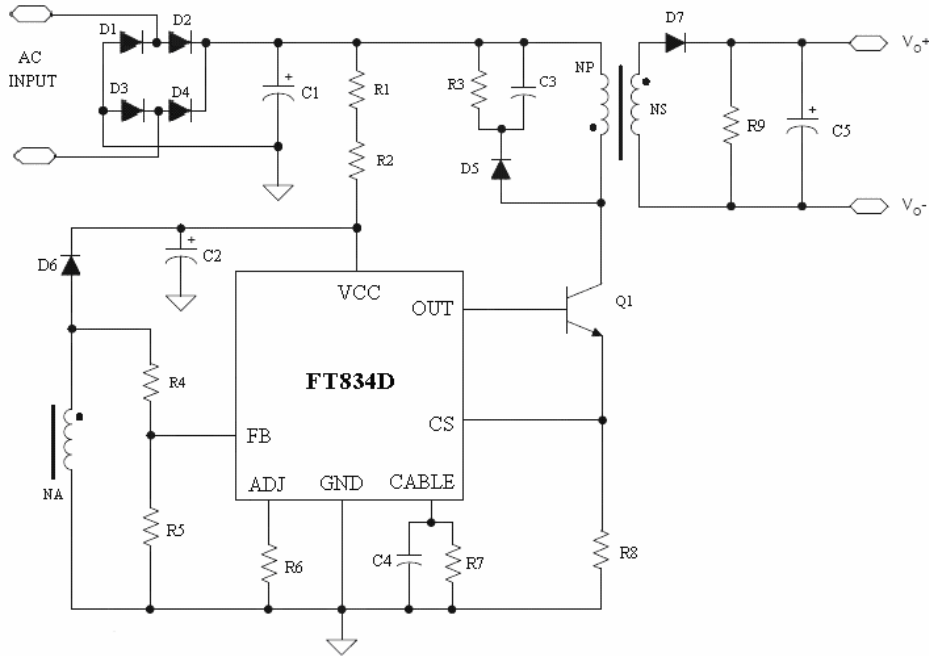


Figure 1: Typical Application Circuit

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
CABLE to GND.....	-0.3V to +9V
ADJ 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

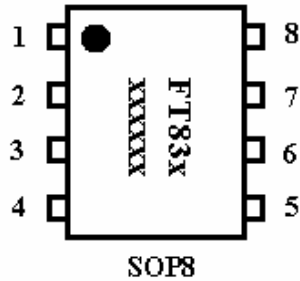


Figure 2: Pin Assignments

Pat No.	Package	Pin Definition							
		1	2	3	4	5	6	7	8
FT834D	SOP8	ADJ	NC	VCC	OUT	GND	FB	CS	CABLE

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
CABLE	Adjust cable compensation by an external resistor and capacitor to GND
ADJ	Adjust base driver current by an external resistor to GND

Table 3

ORDERING INFORMATION

Product	Ordering Information
FT834D	FT834D

Table 4

MARKING RULE

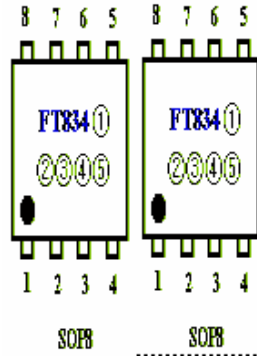


Figure 3: Marking Rule

SOP8:

- ①: Represents Version (D)
- ②③④⑤: for internal reference

BLOCK DIAGRAM

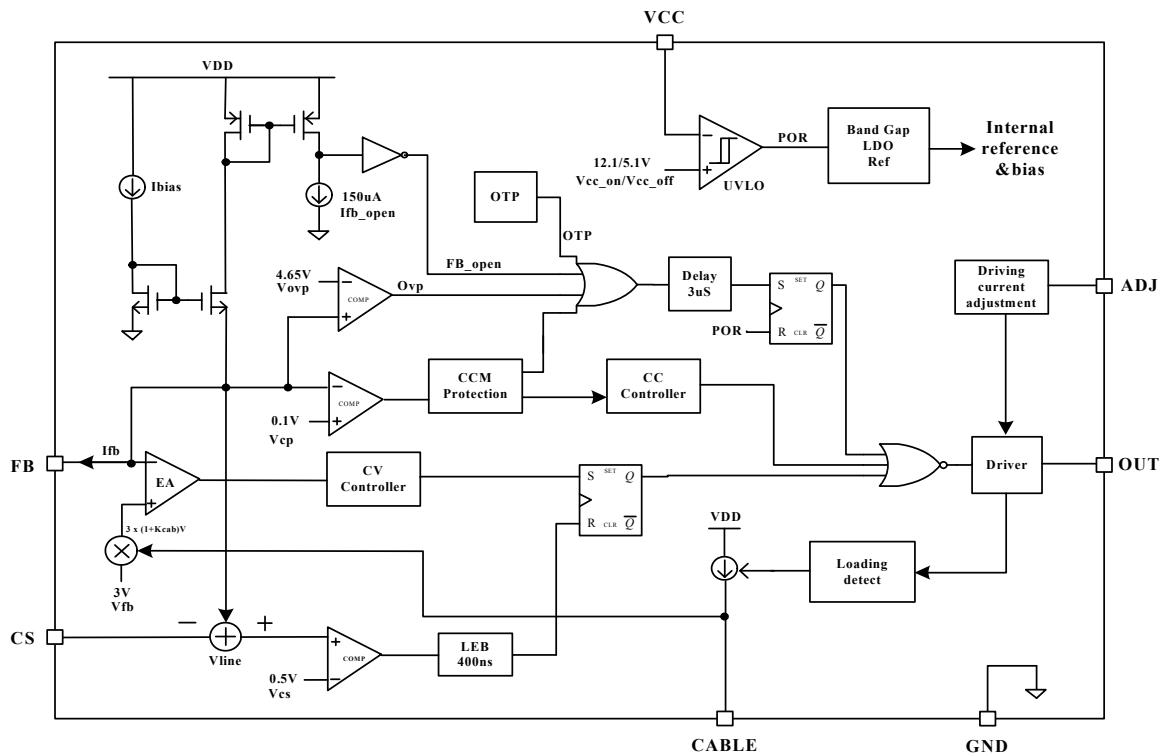


Figure 4: FT834D Block Diagram

ELECTRICAL CHARACTERISTICS

 (For typical values $T_j=25^{\circ}\text{C}$, $V_{cc}=14\text{V}$, 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		$^{\circ}\text{C}$
Over Voltage Protection	V_ovp		18.5		V
Base Driver					
Output Maximum Sink current	Isink	50			mA
Output Maximum Source current ($I_{\text{source}}=28+4.2/R_{\text{ADJ}}^{\ast 3}\times 10\text{e}+6$)	Isource		Isource		mA
Compensation					
Line Compensation (Ifb=1mA)	Vline		45		mV
Percentage of Output Cable Resistance Compensation ($K_{\text{cab}}=6.5/560\times R7^{\ast 1}\times 10\text{e}-3$)	Kcab ^{*2}		Kcab		%

Table 5

^{*1} (R7): Resistor connected between Pin CABLE and GND

^{*2} (Kcab): Cable compensation percentage in output voltage

^{*3} (RADJ): Resistor connected between Pin ADJ and GND

FUNCTIONAL DESCRIPTION

Operating Description

FT834D 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 FT834D 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 2Mohm, 0.25W start-up resistor and a 10uF/25V V_{dd} hold-up capacitor are sufficient for an AC-to DC power adapter.

Operating current

The operating current of FT834D 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 V_{cc} hold-up capacitance requirement.

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

The FT834D 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 R_{cs} 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)

FT834D turn-on [V_{cc(on)}] and turn-off [V_{cc(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 V_{cc} until power can be delivered from the auxiliary winding of the transformer. V_{cc} must not drop below 5.4V during this start-up process. This UVLO hysteresis window ensures that hold-up capacitor is sufficient to supply V_{cc} during start-up.

Protection control

With rich protection features of FT834D, 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

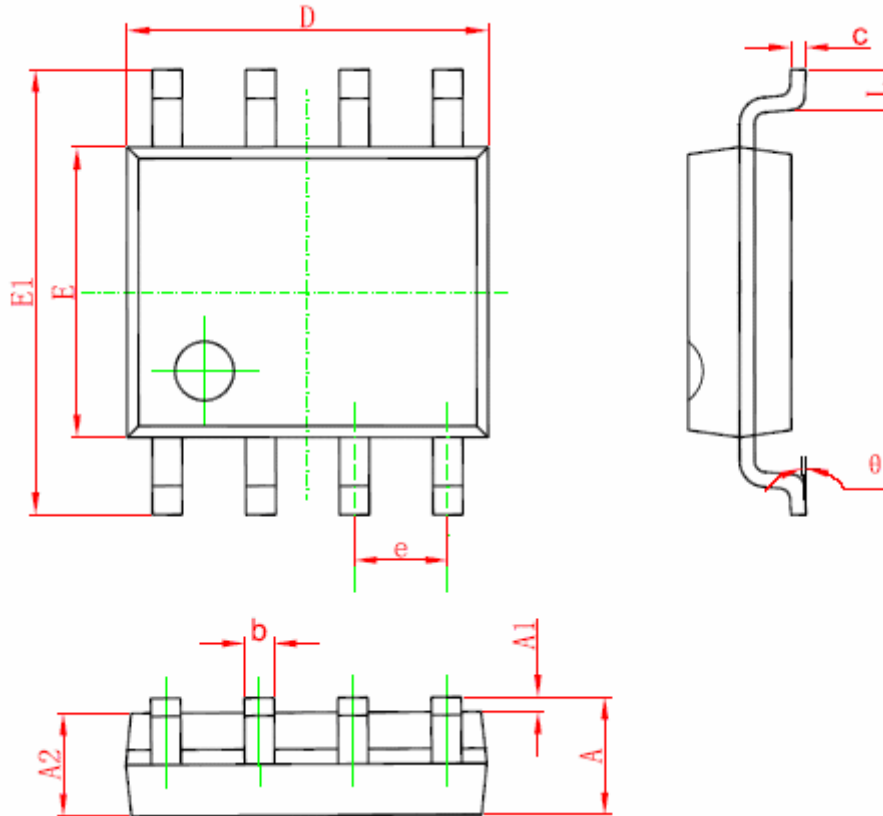
To minimize loss in the primary power NPN and prevent from second breakdown, the driving current is carefully controlled. The driving current also can be programmable externally in product FT834D.

Output cable compensation

The output cable compensation provides a constant output voltage at the end of the cable over the entire load rang in constant voltage mode. As the converter load increase from no-load to the peak power point, the voltage drop introduced across the output cable in compensated by increasing the feedback pin reference voltage. The correct degree of compensation can be adjustable externally in product FT834D . With this feature, user can conveniently determine the correct degree of compensation base on the cable selected.

PACKAGE INFORMATION

SOP8 Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

APPENDIX A: REVISION HISTORY

Version A0: Original data sheet for the FT834D.

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