

## **Current Mode PWM Power Switch**

### **GENERAL DESCRIPTION**

BL8851 combines a dedicated current mode PWM controller. It is optimized for high performance, low standby power, and cost effective off- line flyback converter applications in 40W~60W range.

BL8851 offers complete protection coverage with automatic self-recovery feature including Cycle- by-Cycle current limiting (OCP),CS short protection, CS floating protection, over load protection (OLP), and VDD under voltage lockout (UVLO), over temperature protection (OTP), over voltage(fixed or adjustable) protection (OVP).

The tone energy at below 20KHZ is minimized in the design and audio noise is eliminated during operation..

BL8851 is offered in SOT23-6 package.

### **FEATURES**

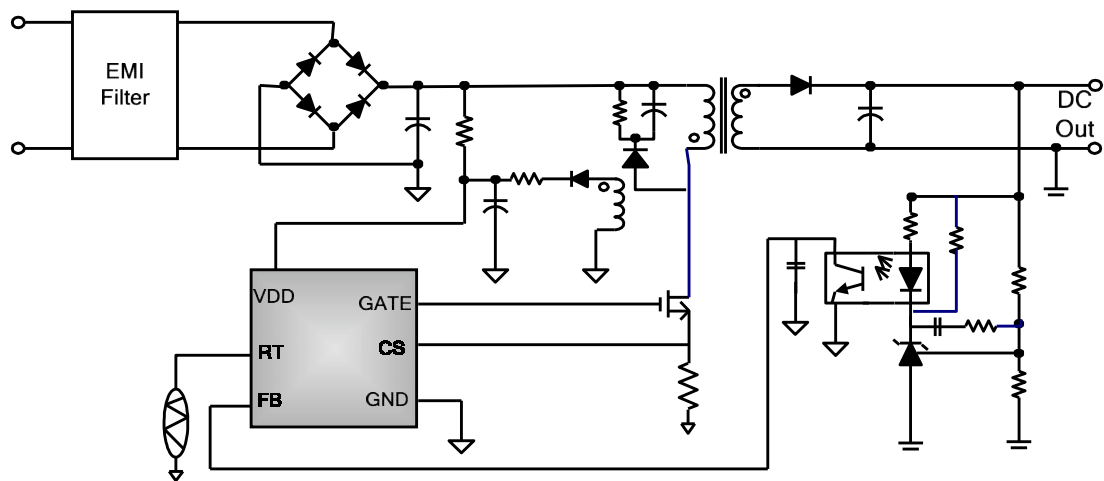
- Power on Soft Start Reducing MOSFET Vds Stress
- Frequency shuffling for EMI
- Extended Burst Mode Control For Improved Efficiency and Minimum Standby Power Design
- Audio Noise Free Operation
- Fixed 65KHZ Switching Frequency
- Internal Synchronized Slope Compensation
- Leading Edge Blanking on Current Sense Input
- Good Protection Coverage With Auto Self Recovery
  - VDD Under Voltage Lockout with Hysteresis(UVLO)
  - Over Temperature Protection (OTP) with auto-recovery
  - Cycle-by-cycle over current threshold setting for constant output power limiting over universal input voltage range
  - Overload Protection (OLP) with auto- recovery
  - Over voltage Protection(OVP) with auto-recovery
  - Adjustable OVP through external Zener

### **APPLICATIONS**

Offline AC/DC flyback converter for

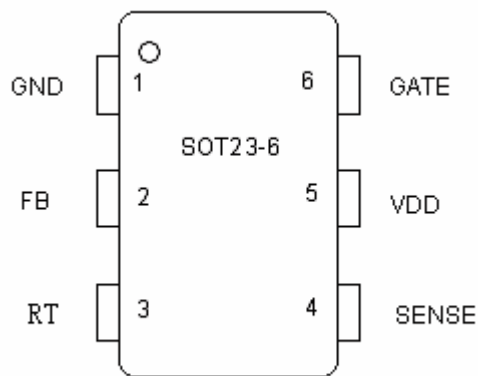
- AC/DC adapter
- PDA power supplies
- Digital Cameras and Camcorder Adapter
- VCR, SVR, STB, DVD&DVCD Player SMPS
- Set-Top Box Power
- Auxiliary Power Supply for PC and Server
- Open-frame SMPS

TYPICAL APPLICATION



Pin Configuration

The BL8851 is offered in SOT23-6 package, shown as below.



Pin Name	I/O	Description
GND	P	Ground
FB	I	Feedback input pin. The PWM duty cycle is determined by voltage level into this pin and the current-sense signal at Pin 3.
RT	I	Dual function pin. Either connected through a NTC resistor to ground for over temperature shutdown/latch control or connected through Zener to VDD for adjustable over voltage protection
CS	I	Current sense input
VDD	P	Power Supply
Gate	O	Totem-pole gate driver output for power Mosfet

## RECOMMENDED OPERATING CONDITION

Symbol	Parameter	Min/Max	Unit
VDD	VDD Supply Voltage	10 to 30	V
T <sub>A</sub>	Operating Ambient Temperature	-20 to 85	°C

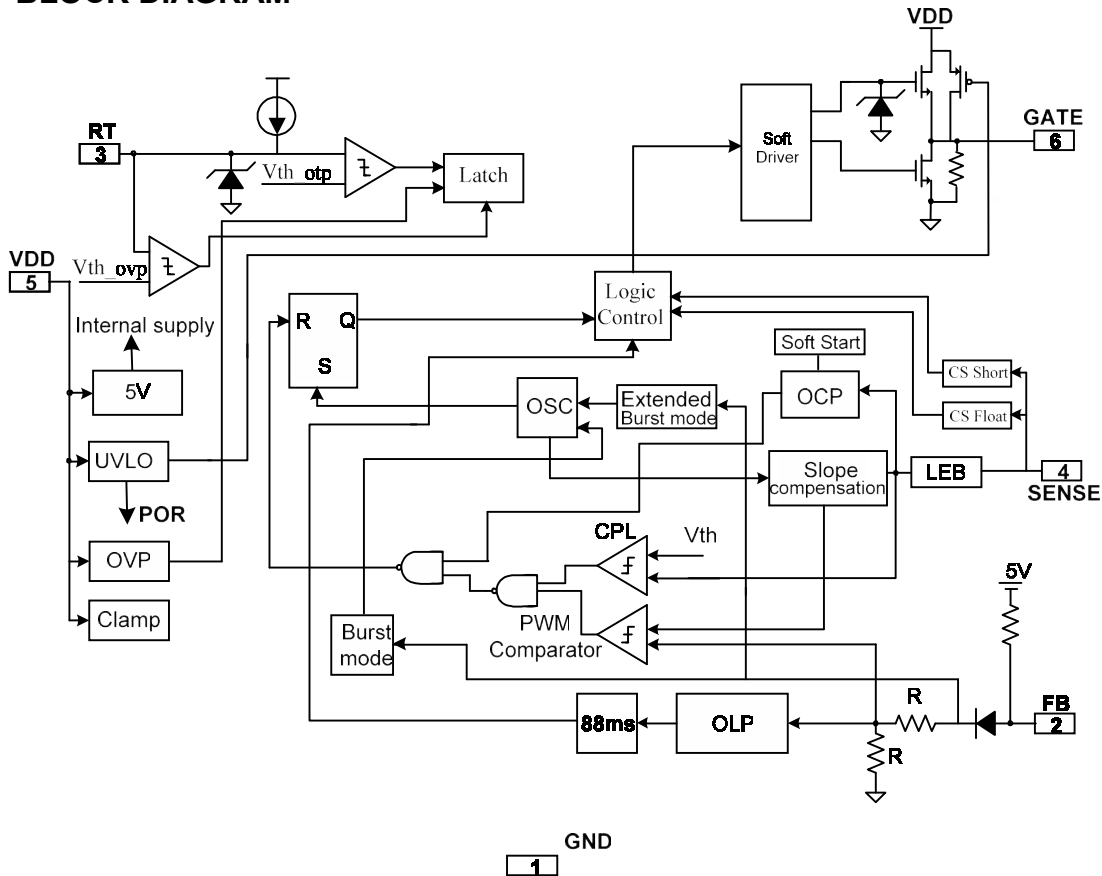
## Absolute Maximum Ratings

Parameter	Value
VDD DC Supply Voltage	40 V
VDD Zener Clamp Voltage <sup>Note</sup>	VDD_Clamp+0.1V
VDD DC Clamp Current	10 mA
FB Input Voltage	-0.3 to 7V
Sense Input Voltage	-0.3 to 7V
RT Input Voltage	-0.3 to 7V
Min/Max Operating Junction Temperature T <sub>J</sub>	-20 to 150 oC
Min/Max Storage Temperature T <sub>stg</sub>	-55 to 160 oC

**Note:** VDD\_Clamp has a nominal value of 32V.

Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

## BLOCK DIAGRAM



## ELECTRICAL CHARACTERISTICS

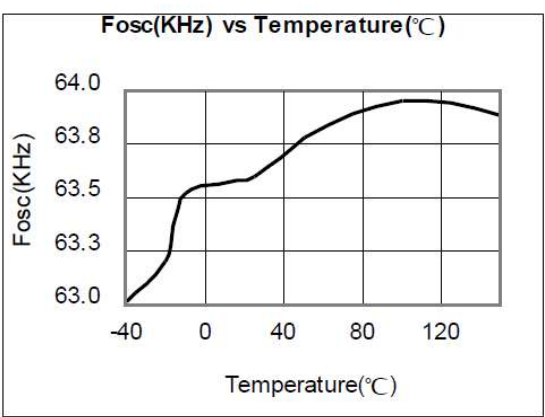
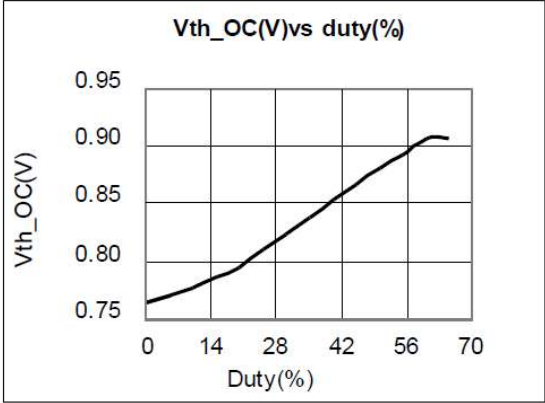
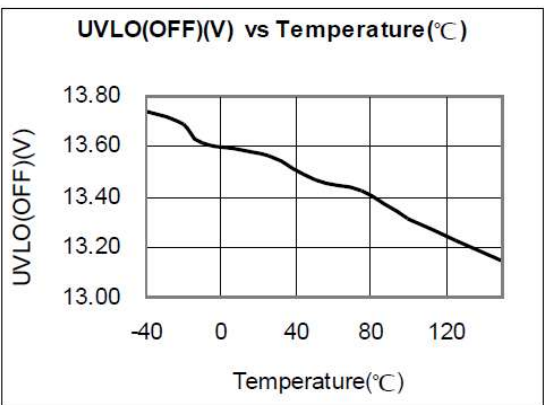
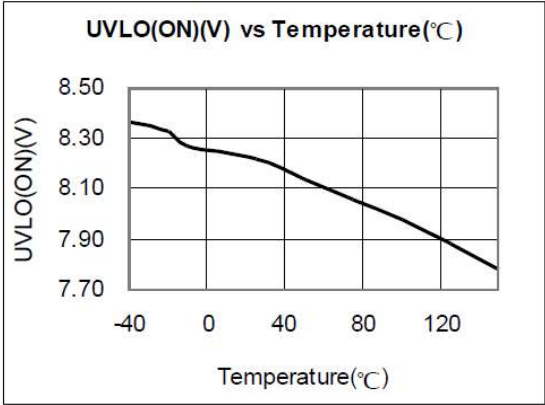
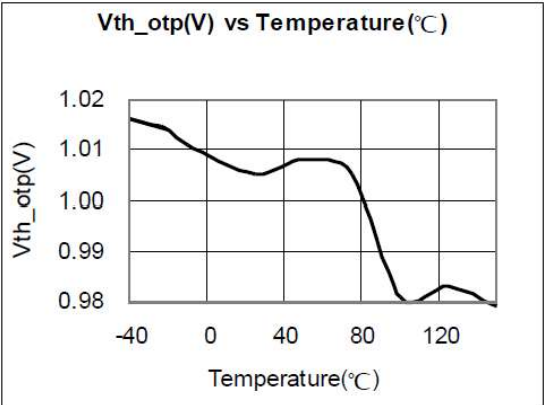
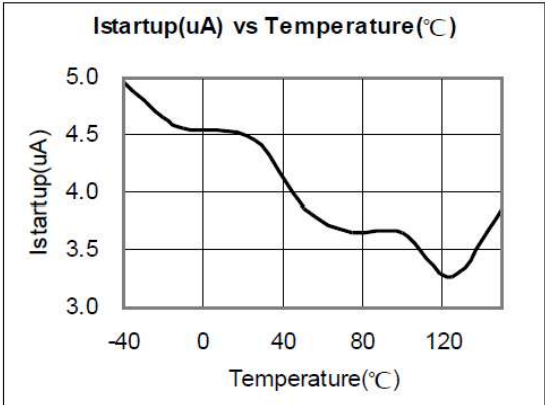
(T<sub>A</sub> = 25°C, VDD=16V, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Supply Voltage (VDD)</b>						
I <sub>startup</sub>	VDD Start up Current	VDD=11V, Measure Leakage current into VDD		5	20	uA
I <sub>VDD_Operation</sub>	Operation Current	V <sub>FB</sub> =3V		2		mA
UVLO(ON)	VDD Under Voltage Lockout Enter		8	9	10	V
UVLO(OFF)	VDD Under Voltage Lockout Exit (Recovery)		14.3	15.3	16.3	V
V <sub>pull-up</sub>	Pull-up PMOS active			13		V
V <sub>dd_clamp</sub>		I <sub>vdd</sub> =10mA	30	32	34	V
OVP(ON)	Over voltage protection voltage	CS=0V, FB=3V Ramp up VDD until gate clock is off	24	26	28	V
V <sub>latch_release</sub>	Latch release voltage			5		V
<b>Feedback Input Section(FB Pin)</b>						
V <sub>FB_Open</sub>	V <sub>FB</sub> Open Loop Voltage		3.9	4.2		V
A <sub>vcs</sub>	PWM input gain $\Delta V_{FB}/\Delta V_{CS}$			2		V/V
Maximum duty cycle	Max duty cycle @ VDD=14V, VFB=3V, VCS=0V		75	80	85	%
V <sub>ref_green</sub>	The threshold enter green mode			2		V
V <sub>ref_burst_H</sub>	The threshold exit burst mode			1.275		V
V <sub>ref_burst_L</sub>	The threshold enter burst mode			1.175		V
I <sub>FB_Short</sub>	FB pin short circuit current	Short FB pin to GND and measure current		0.4		mA
V <sub>TH_PL</sub>	Power Limiting FB Threshold Voltage			3.7		V
T <sub>D_PL</sub>	Power limiting Debounce Time		80	88	96	mSec
Z <sub>FB_IN</sub>	Input Impedance			4		Kohm
<b>Current Sense Input(Sense Pin)</b>						
Soft start time				4		ms
T <sub>blanking</sub>	Leading edge blanking time			220		ns
Z <sub>SENSE_IN</sub>	Input Impedance			40		Kohm
T <sub>D_OC</sub>	Over Current Detection and Control Delay	From Over Current Occurs till the Gatedrive output start to turn off		120		nSec
V <sub>TH_OC</sub>	Internal Current Limiting Threshold Voltage	FB=3.3V		0.75		V
V <sub>ocp_clamper</sub>	CS voltage clamper			0.9		V
<b>Oscillator</b>						
F <sub>osc</sub>	Normal Oscillation Frequency	VDD=14V, FB=3V, CS=0V	60	65	70	KHZ
$\Delta f_{OSC}$	Frequency jittering			+/-4		%
F <sub>shuffling</sub>	Shuffling frequency			32		Hz
$\Delta f_{Temp}$	Frequency Temperature Stability			1		%

f_VDD	Frequency Voltage Stability			1		%
F_Burst	Burst Mode Base Frequency			22		KHZ
<b>Gate driver</b>						
VOL	Output low level @ VDD=14V, Io=5mA				1	V
VOH	Output high level @ VDD=14V, Io=20mA		6			V
V_clamp	Output clamp voltage			15		V
T_r	Output rising time 1V ~ 12V @ CL=1000pF			175		nS
T_f	Output falling time 12V ~ 1V @ CL=500pF			85		nS
<b>Over temperature protection</b>						
IRT	Output current of RT pin		95	100	105	uA
VOTP	Threshold voltage for OTP		0.95	1	1.05	V
Td_OTP	OTP debounce time			32		Cycle
VRT_FL	Float voltage at RT pin			2.3		V
Vth_OVP	External OVP threshold voltage			4		V

CHARACTERIZATION PLOTS

VDD = 18V, TA = 25°C condition applies if not otherwise noted.



OUTLINE DRAWING

