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..

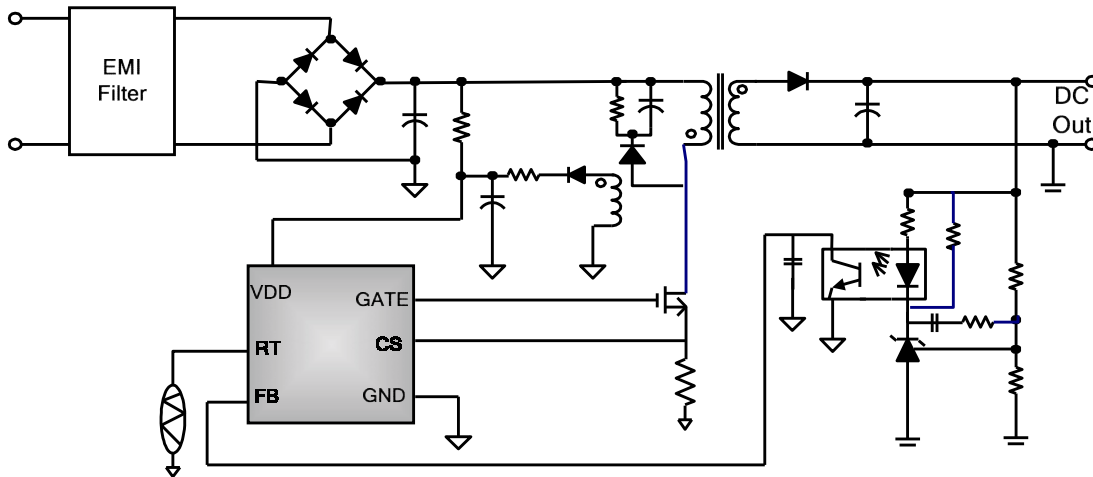BL8851 is offered in SOT23-6 package.

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
  - o VDD Under Voltage Lockout with Hysteresis(UVLO)
  - o Over Temperature Protection (OTP) with auto-recovery
  - o Cycle-by-cycle over current threshold setting for constant output power limiting over universal input voltage range
  - o Overload Protection (OLP) with auto- recovery
  - o Over voltage Protection(OVP) with auto-recovery
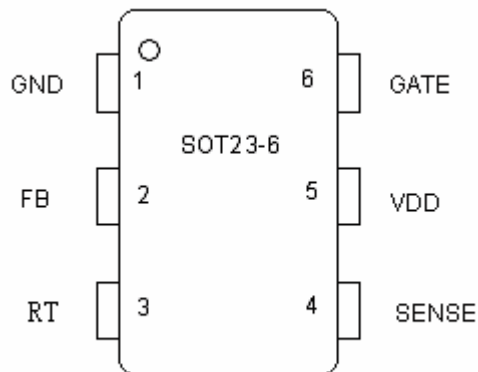 - o Adjustable OVP through external Zener

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_A	Operating Ambient Temperature	-20 to 85	℃

Absolute Maximum Ratings

Parameter	Value
VDD DC Supply Voltage	40 V
VDD Zener Clamp Voltage[Note]	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 TJ	-20 to 150 oC
Min/Max Storage Temperature Tstg	-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
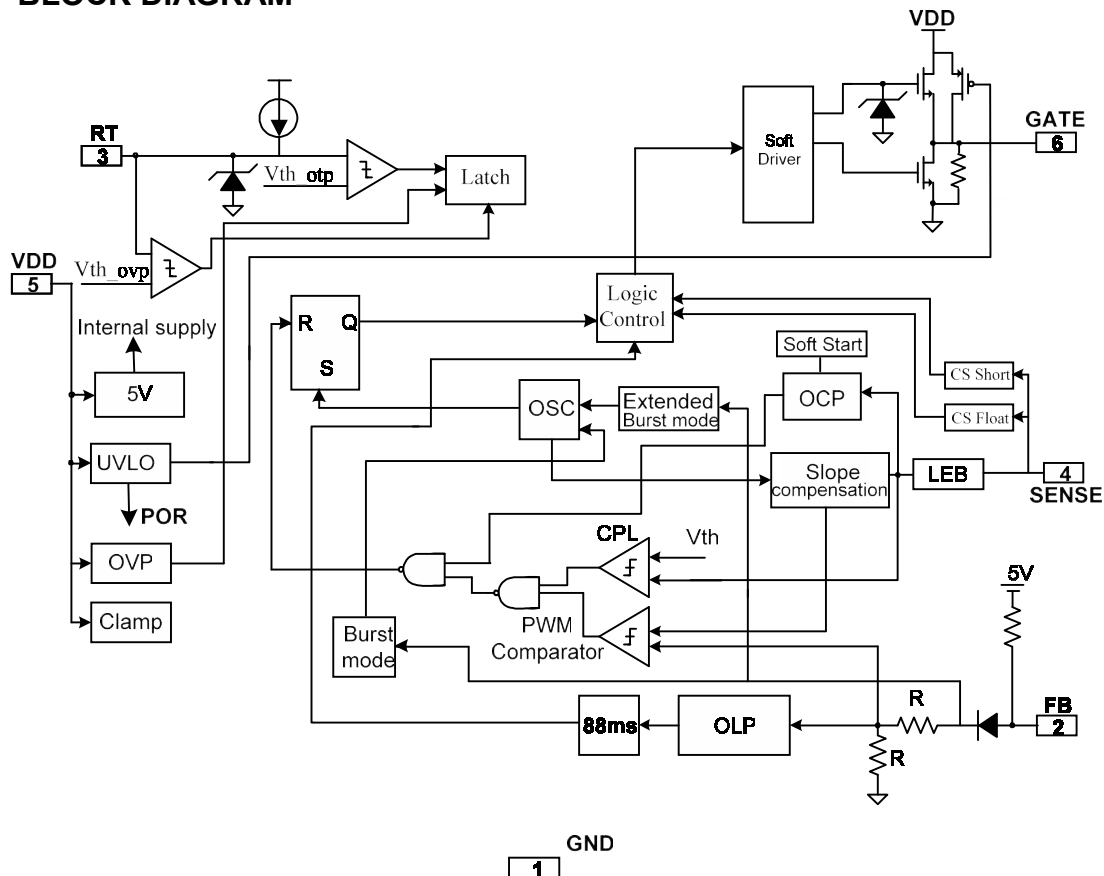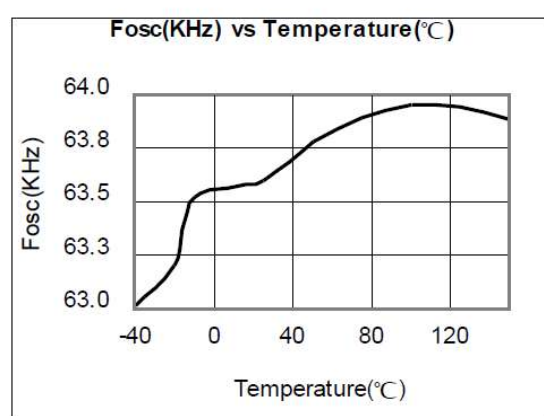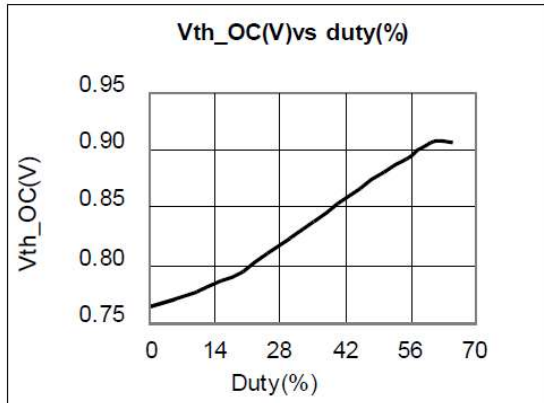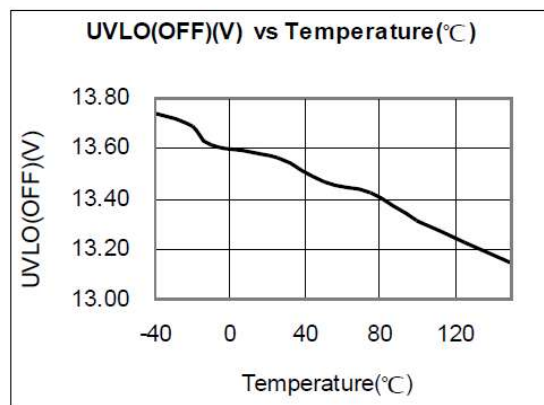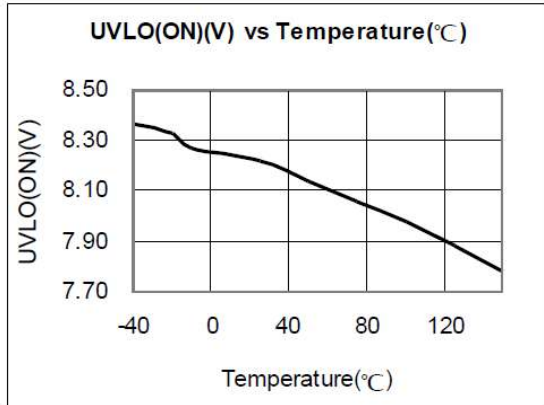
ELECTRICAL CHARACTERISTICS

(T_A = 25℃, VDD=16V, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Voltage (VDD)						
Istartup	VDD Start up Current	VDD=11V,Measure Leakage current into VDD		5	20	uA
I_VDD_Operation	Operation Current	V_{FB}=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
Vpull-up	Pull-up PMOS active			13		V
Vdd_clamp		Ivdd=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
Vlatch_release	Latch release voltage			5		V
Feedback Input Section(FB Pin)						
V_{FB} Open	V_{FB} Open Loop Voltage		3.9	4.2		V
Avcs	PWM input gain △VFB/△VCS			2		V/V
Maximum duty cycle	Max duty cycle @ VDD=14V,VFB=3V,VCS=0V		75	80	85	%
Vref_green	The threshold enter green mode			2		V
Vref_burst_H	The threshold exit burst mode			1.275		V
Vref_burst_L	The threshold enter burst mode			1.175		V
I_{FB}_Short	FB pin short circuit current	Short FB pin to GND and measure current		0.4		mA
V_{TH}_PL	Power Limiting FB Threshold Voltage			3.7		V
T_D_PL	Power limiting Debounce Time		80	88	96	mSec
Z_{FB}_IN	Input Impedance			4		Kohm
Current Sense Input(Sense Pin)						
Soft start time				4		ms
T_blanking	Leading edge blanking time			220		ns
Z_{SENSE}_IN	Input Impedance			40		Kohm
T_D_OC	Over Current Detection and Control Delay	From Over Current Occurs till the Gatedrive output start to turn off		120		nSec
V_{TH}_OC	Internal Current Limiting Threshold Voltage	FB=3.3V		0.75		V
Vocp_clamper	CS voltage clamper			0.9		V
Oscillator						
F_{OSC}	Normal Oscillation Frequency	VDD=14V, FB=3V, CS=0V	60	65	70	KHZ
△f_OSC	Frequency jittering			+/-4		%
F_shuffling	Shuffling frequency			32		Hz
△f_Temp	Frequency Temperature Stability			1		%

f_VDD	Frequency Voltage Stability			1		%
F_Burst	Burst Mode Base Frequency			22		KHZ
Gate driver						
VOL	Ouput low level @ VDD=14V, Io=5mA				1	V
VOH	Ouput 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
Over temperature protection						
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℃ condition applies if not otherwise noted.

Istartup(uA) vs Temperature(℃)

Vth_otp(V) vs Temperature(℃)

UVLO(ON)(V) vs Temperature(℃)

UVLO(OFF)(V) vs Temperature(℃)

Vth_OC(V)vs duty(%)

Fosc(KHz) vs Temperature(℃)

OUTLINE DRAWING

SOT-23-6   Unit: mm