

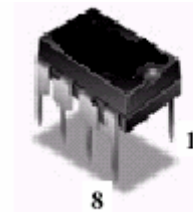
Fixed Frequency Current Mode PWM Controller

IL3843

DESCRIPTION

Fixed frequency current-mode PWM controller. It is specially designed for Off Line And DC-to-DC converter applications with minimal external component. This integrated circuit features a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totempole output ideally suited for driving a power MOSFET.

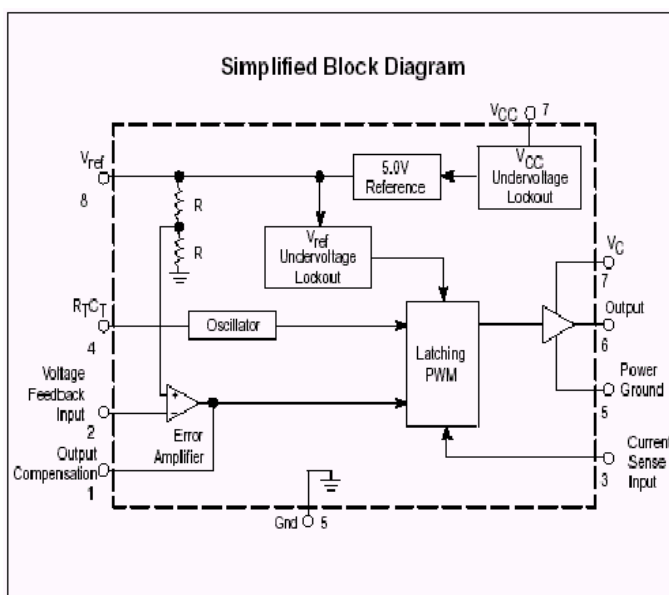
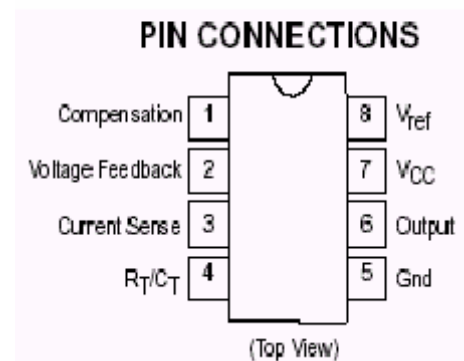
Protection circuitry includes built in under-voltage lockout and current limiting.



DIP-8

FEATURES

- ◆ Automatic Feed Forward Compensation
- ◆ High Gain Totem Pole Output
- ◆ Internally Trimmed Bandgap Reference
- ◆ Undervoltage Lockout with Hysteresis
- ◆ Low Start Up Current
- ◆ Optimized for offline converter
- ◆ Double pulse suppression
- ◆ Current mode operation to 500KHz



ORDERING INFORMATION

Device	Operating Temperature Range	Package
IL3843	$T_A = 0^\circ \text{ to } +70^\circ\text{C}$	DIP-8

PIN FUNCTION DESCRIPTION

Pin No.	Function	Description
1	Compensation	This pin is the Error Amplifier output and is made available for loop compensation
2	Voltage Feedback	This is the inverting input of the Error Amplifier. It is normally connected to the switching power supply output through a resistor divider.
3	Current Sense	A voltage proportional to inductor current is connected to this input. The PWM uses this information to terminate the output switch conduction
4	RT/CT	The Oscillator frequency and maximum Output duty cycle are programmed by connecting resistor R_T to V_{REF} and capacitor C_T to ground. Operation to 500kHz is possible.
5	GND	This pin is the combined control circuitry and power ground
6	Output	This output directly drives the gate of a power MOSFET. Peak currents up to 1.0A are sourced and sunk by this pin.
7	Vcc	This pin is the positive supply of the control IC.
8	V_{REF}	This is the reference output. It provides charging current for capacitor C_T through resistor R_T

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Total Power Supply and Zener Current	$(I_{CC} + I_Z)$	30	mA
Output Current	I_O	± 1.0	A
Output Energy (Capacitive Load per Cycle)	W	5.0	μJ
Error Amp Output Sink Current	I_{OE}	10	mA
Current Sense and Voltage Feedback Inputs	Vin	-0.3 to 5.5	V
Maximum Power Dissipation @ $T_A = 25^\circ C$:	P_D	0.862	W
Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	145	$^\circ C/W$
Operating Junction Temperature	T_J	+150	$^\circ C$
Storage Temperature Range	T_{stg}	-65 ~ +150	$^\circ C$

ELECTRICAL CHARACTERISTICS ($V_{CC}=15V$ unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
REFERENCE SECTION				
Reference Output Voltage ($I_O=1.0mA$, $V_{CC}=15V$, $T_A=25\pm 10^\circ C$) ($I_O=1.0mA$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	V_{ref}	4.9 4.865	5.1 5.135	V
Line Regulation ($V_{CC}=12V$ to $25V$, $T_A=T_{low}$ to Thigh)	Reg_{line}		20	mV
Load Regulation ($I_O=1.0$ to $20mA$, $T_A=T_{low}$ to Thigh)	Reg_{load}		25	mV
Total Output Variation over Line, Load, Temperature (Note1) ($V_{CC}=12V$, $I_O=1.0mA$, $T_A=T_{low}$ to Thigh) ($V_{CC}=25V$, $I_O=20mA$, $T_A=T_{low}$ to Thigh)	V_{final}	4.82	5.18	V
Output Short Circuit Current ($V_{CC}=15V$)	I_{SC}	-30	-180	mA
OSCILLATOR SECTION				
Frequency ($V_{CC}=15V$, $T_j=25^\circ C$, $R_T=10k$, $C_T=3.3nF$) ($V_{CC}=15V$, $T_A=T_{low}$ to Thigh, $R_T=10k$, $C_T=3.3nF$)	f_{osc}	47 46	57 60	kHz
Frequency Change with Voltage ($V_{CC}=12V$ to $25V$, $T_A=T_{low}$ to Thigh, $R_T=10k$, $C_T=3.3nF$)	$\Delta f_{osc}/\Delta V$		1.0	%
Discharge Current ($V_{osc}=2.0V$, $V_{CC}=15V$) $T_j=25^\circ C$ $T_A=T_{low}$ to Thigh	I_{disch}	7.5 7.2	9.3 9.5	mA
ERROR AMPLIFIER SECTION				
Voltage Feedback Input ($V_O=2.5V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	V_{FB}	2.42	2.58	V
Input Bias Current ($V_{FB}=2.7V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	I_{IB}		-2.0	μA
Open Loop Voltage Gain ($V_O=2.0V$ to $4.0V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	A_{VOL}	65		dB
Unity Gain Bandwidth ($V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	BW	0.7		MHz
Power Supply Rejection Ratio ($V_{CC}=12V$ to $25V$, $V_O=3.0V$, $T_A=T_{low}$ to Thigh)	PSRR	60		dB
Output Current Sink ($V_O=1.1V$, $V_{FB}=2.7V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh) Source ($V_O=5.0V$, $V_{FB}=2.3V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	I_{Sink} I_{Source}	2.0 -0.5		mA
Output Voltage Swing High State ($V_{FB}=2.3V$, $V_{CC}=15V$, $R_{L(GND)}=15k$, $T_A=T_{low}$ to Thigh) Low State ($V_{FB}=2.7V$, $V_{CC}=15V$, $R_{L(5.0)}=15k$, $T_A=T_{low}$ to Thigh)	V_{OH} V_{OL}	5.0	1.1	V
CURRENT SENSE SECTION				
Current Sense Input Voltage Gain ($V_{FB}=0V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	A_v	2.85	3.15	V/V
Maximum Current Sense Input Threshold ($V_{FB}=0V$, $V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	V_{th}	0.9	1.1	V
Input Bias Current ($V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	I_{IB}		-10	μA
Propagation Delay (Current Sense Input to Output) ($V_{CC}=15V$, $T_A=T_{low}$ to Thigh)	t_{PLH}		300	ns

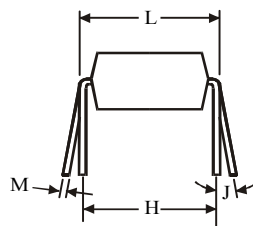
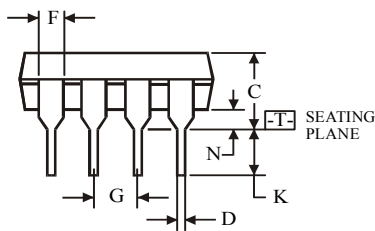
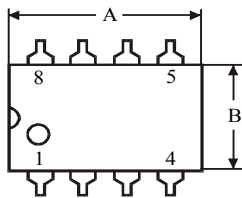
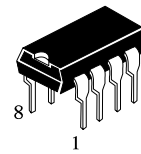
ELECTRICAL CHARACTERISTICS (V_{CC}=15V unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
OUTPUT SECTION				
Output Voltage Low State (Sink=20mA, V _{CC} =15V) (Sink=200mA, V _{CC} =15V) High State (Sink=-20mA, V _{CC} =15V) (Sink=-200mA, V _{CC} =15V)	V _{OL} V _{OH}	 13 12	 0.4 2.2	 V
Output Voltage with UVLO Activated (V _{CC} =6.0V, I _{Sink} =1.0mA, T _A =Tlow to Thigh)	V _{OL(UVLO)}		1.1	V
Output Voltage Rise Time (C _L =1.0nF, V _{CC} =15V, T _A =Tlow to Thigh)	tr		150	ns
Output Voltage Fall Time (C _L =1.0nF, V _{CC} =15V, T _A =Tlow to Thigh)	tf		150	ns
UNDERVOLTAGE LOCKOUT SECTION				
Startup Threshold (V _{CC} =0V to 15V, T _A =Tlow to Thigh)	V _{th}	7.8	9.0	V
Minimum Operating Voltage After Turn-On (V _{CC} =15V to 0V, T _A =Tlow to Thigh)	V _{CC(min)}	7.0	8.2	V
PWM SECTION				
Duty Cycle Maximum (V _{CC} =15V, T _A =Tlow to Thigh, R _T =10k, C _T =3.3nF) Minimum (V _{CC} =15V, T _A =Tlow to Thigh, R _T =10k, C _T =3.3nF)	DC _{max} DC _{min}	94	0	%
TOTAL DEVICE				
Power Supply Current Startup: V _{CC} =6.5V V _{CC} =15V Operating	I _{CC}		1.0 17	mA
Power Supply Zener Voltage (I _{CC} =25mA, V _{CC} =0 to 40V)	V _Z	30	40	V

NOTES: 1. $V_{final} = V_{ref25} \pm (Reg_{line} + Reg_{load})/1000 \pm |V_{ref70}(V_{ref0}) - V_{ref25}|$
 $V_{ref25} = V_{ref} @ T_A = 25^\circ C;$
 $V_{ref70} = V_{ref} @ T_A = 70^\circ C;$
 $V_{ref0} = V_{ref} @ T_A = 0^\circ C.$

2. Tlow= 0°C ; Thigh=+70°C

**N SUFFIX PLASTIC DIP
(MS - 001BA)**



$\text{⌀} 0.25 (0.010) \text{Ⓜ} \text{T}$

Symbol	Dimension, mm	
	MIN	MAX
A	8.51	10.16
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

NOTES:

- Dimensions "A", "B" do not include mold flash or protrusions.
Maximum mold flash or protrusions 0.25 mm (0.010) per side.