

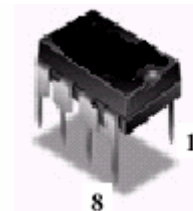
Fixed Frequency Current Mode PWM Controller

IL3842

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.

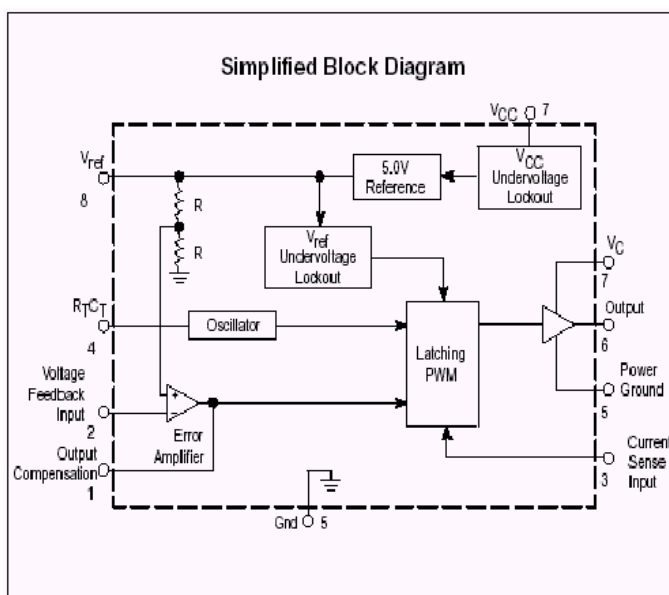
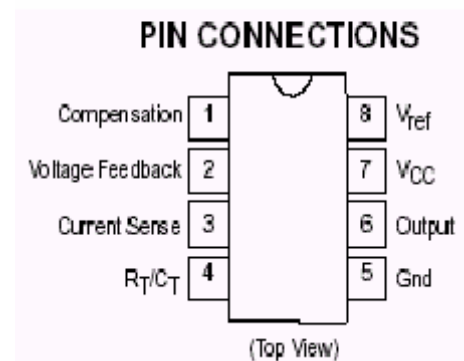
Protection circuitry includes built in under-voltage lockout and current limiting.



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
IL3842	$T_A = 0^\circ \text{ to } +70^\circ \text{C}$	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)

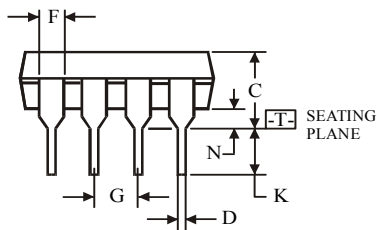
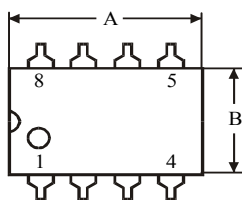
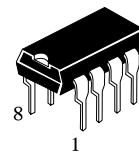
Characteristics	Symbol	Min	Max	Unit
REFERENCE SECTION				
Reference Output Voltage (I _O =1.0mA, V _{CC} =15V, T _A =25±10°C) (I _O =1.0mA, V _{CC} =15V, T _A =Tlow to Thigh)	V _{ref}	4.9 4.865	5.1 5.135	V
Line Regulation (V _{CC} =12V to 25V, T _A =Tlow to Thigh)	Reg _{line}		20	mV
Load Regulation (I _O =1.0 to 20mA, T _A =Tlow to Thigh)	Reg _{load}		25	mV
Total Output Variation over Line, Load, Temperature (Note1) (V _{CC} =12V, I _O =1.0mA, T _A =Tlow to Thigh) (V _{CC} =25V, I _O =20mA, T _A =Tlow 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°C, R _T =10k, C _T =3.3nF) (V _{CC} =15V, T _A =Tlow 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 =Tlow to Thigh, R _T =10k, C _T =3.3nF)	Δf _{osc} /ΔV		1.0	%
Discharge Current (V _{osc} =2.0V, V _{CC} =15V) T _j =25°C T _A =Tlow 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 =Tlow to Thigh)	V _{FB}	2.42	2.58	V
Input Bias Current (V _{FB} =2.7V, V _{CC} =15V, T _A =Tlow to Thigh)	I _{IB}		-2.0	μA
Open Loop Voltage Gain (V _O =2.0V to 4.0V, V _{CC} =15V, T _A =Tlow to Thigh)	A _{VOL}	65		dB
Unity Gain Bandwidth (V _{CC} =15V, T _A =Tlow to Thigh)	BW	0.7		MHz
Power Supply Rejection Ratio (V _{CC} =12V to 25V, T _A =Tlow to Thigh)	PSRR	60		dB
Output Current Sink (V _O =1.1V, V _{FB} =2.7V, V _{CC} =15V, T _A =Tlow to Thigh) Source (V _O =5.0V, V _{FB} =2.3V, V _{CC} =15V, T _A =Tlow 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 =Tlow to Thigh) Low State (V _{FB} =2.7V, V _{CC} =15V, R _{L(5.0)} =15k, T _A =Tlow 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 =Tlow to Thigh)	A _v	2.85	3.15	V/V
Maximum Current Sense Input Threshold (V _{FB} =0V, V _{CC} =15V, T _A =Tlow to Thigh)	V _{th}	0.9	1.1	V
Input Bias Current (V _{CC} =15V, T _A =Tlow to Thigh)	I _{IB}		-10	μA
Propagation Delay (Current Sense Input to Output) (V _{CC} =15V, T _A =Tlow 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 25V, T _A =Tlow to Thigh)	V _{th}	14.5	17.5	V
Minimum Operating Voltage After Turn-On (V _{CC} =0V to 25V, T _A =Tlow to Thigh)	V _{CC(min)}	8.5	11.5	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} =14V 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. $V_{final} = V_{ref25} \pm (\text{Reg}_{line} + \text{Reg}_{load})/1000 \pm |V_{ref70}(V_{ref0}) - V_{ref25}|$
 $V_{ref25} = V_{ref} @ T_A = 25^\circ\text{C}; \quad V_{ref70} = V_{ref} @ T_A = 70^\circ\text{C}; \quad V_{ref0} = V_{ref} @ T_A = 0^\circ\text{C}.$
 2. Tlow= 0°C ; Thigh=+70°C

**N SUFFIX PLASTIC DIP
(MS – 001BA)**



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

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.