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 arror 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.

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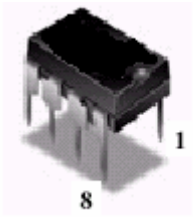
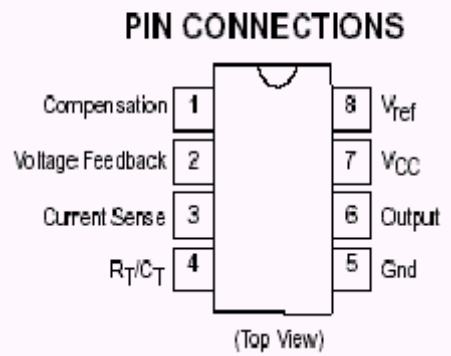
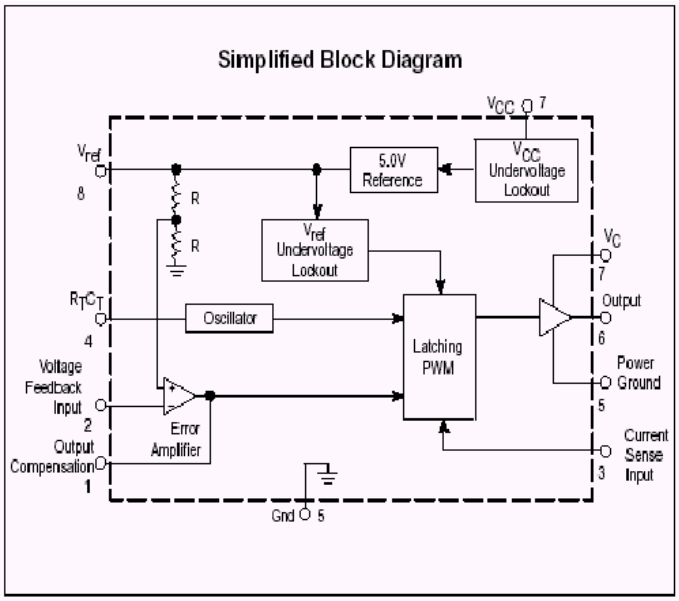


DIP-8

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° to +70°C	DIP-8

PIN FUNCTION DESCRIPTION

Pin No.	Function	Description
1	Compensation	This pln 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 outpul 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 conlrol 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 chsarging current for capacitor C_T through resistor R_T

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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°C:	P_D	0.862	W
Thermal Resistance,Junction-to-Air	$R_{\theta JA}$	145	°C/W
Operating Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{stg}	-65 ~ +150	°C

ELECTRICAL CHARACTERISTICS (Vcc=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)	Vfinal	4.82	5.18	V
Output Short Circuit Current (V_{CC}=15V)	I_{SC}	-30	-180	mA
OSCILLATOR SECTION				
Frequency (V_{CC}=15V, Tj=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)	$\Delta f_{osc}/\Delta V$		1.0	%
Discharge Current (Vosc=2.0V, V_{CC}=15V) Tj=25°C T_A=Tlow to Thigh	Idisch	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, Vo=3.0V, 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)	Av	2.85	3.15	V/V
Maximum Current Sense Input Threshold (V_{FB}=0V, V_{CC}=15V, T_A=Tlow to Thigh)	Vth	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

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ELECTRICAL CHARACTERISTICS (Vcc=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
ONDERVOLTAGE LOCKOUT SECTION				
Startup Threshold (V_{CC}=0V to 15V,T_A=Tlow to Thigh)	Vth	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)	 DCmax DCmin	 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)	Vz	30	40	V

NOTES: 1. Vfinal= V_{ref25} ±(Reg_{line}+ Reg_{load})/1000± | V_{ref70}(V_{ref0})-V_{ref25} |
V_{ref25}=Vref @ T_A=25°C;
V_{ref70}=Vref @ T_A=70°C;
V_{ref0} =Vref @ T_A=0°C.

2. Tlow= 0°C ; Thigh=+70°C

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N SUFFIX PLASTIC DIP
(MS – 001BA)

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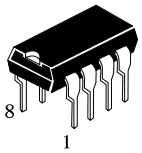

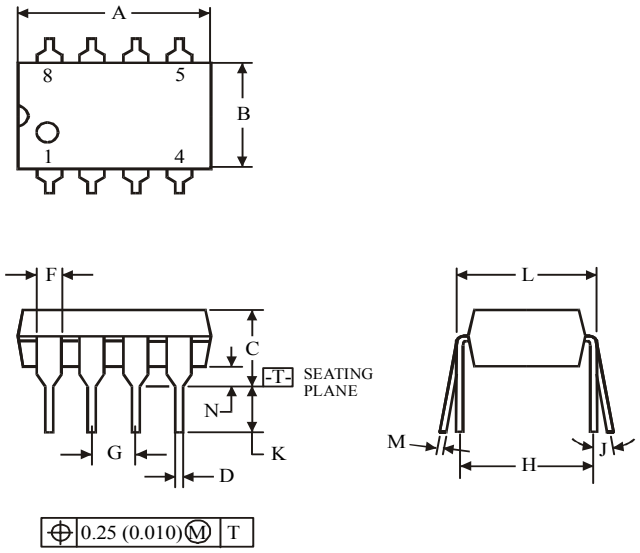

	Dimension, mm	
Symbol	**MIN**	**MAX**
A	8.51	10.16
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

NOTES:

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