

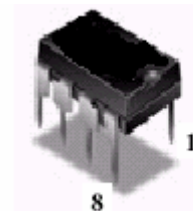
Fixed Frequency Current Mode PWM Controller

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.

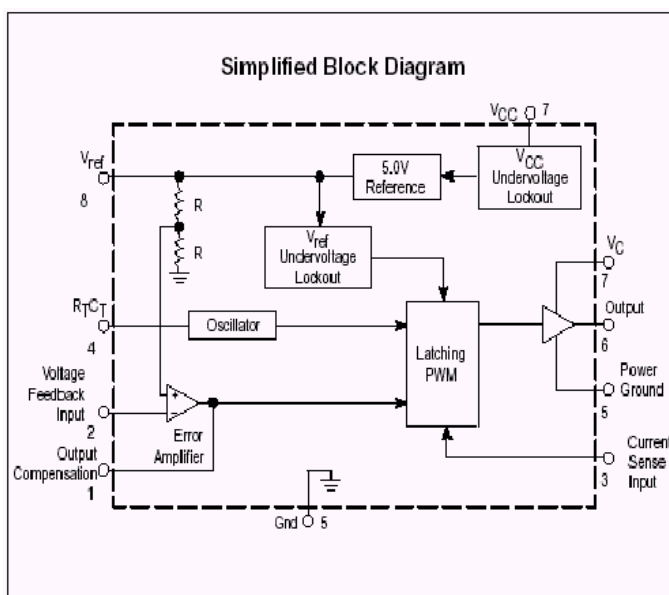
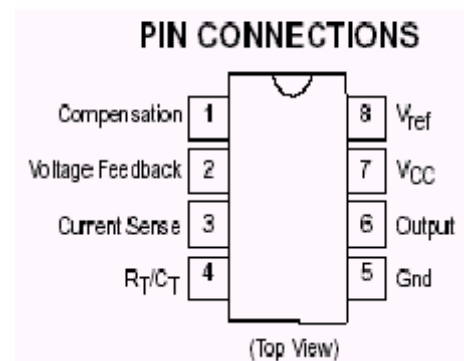
Protection circuitry includes built in under-voltage lockout and current limiting.



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)

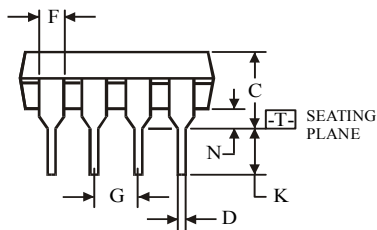
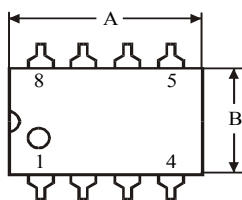
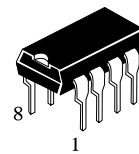
| Characteristics | Symbol | Min | Max | Unit |
|---|--|--------------|--------------|------|
| REFERENCE SECTION | | | | |
| Reference Output Voltage (I _O =1.0mA, V _{CC} =15V, T _A =25±10°C) (I _O =1.0mA, V _{CC} =15V, T _A =Tlow to Thigh) | V _{ref} | 4.9 4.865 | 5.1 5.135 | V |
| Line Regulation (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.