



AMC3842B/43B

CURRENT MODE PWM CONTROLLER

DESCRIPTION	FEATURES
The AMC3842B/43B are fixed frequency current-mode PWM controllers specially designed for OFF-Line switching power supply and DC-to-DC converters with a minimum number of external components. These devices feature a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and high current totem pole output which is suitable for driving MOSFETs. The under voltage lock-out (U.V.L.O.) is designed to operated with 200μA typ. start-up current, allowing an efficient bootstrap supply voltage design. The U.V.L.O. thresholds for the AMC3842B are 16V (on) and 10V (off) which are ideal for off-line applications. The corresponding typical threshold for the AMC3843B are 8.4V (on) and 7.6V (off). The AMC3842B/43B can operated within 100% duty cycle.	■ Low Start-Up current (typ. 200μA) ■ Optimized for Off-Line and DC-to-DC Converters ■ Maximum Duty Cycle ■ U.V.L.O. with Hysteresis □ Operating Frequency Up to 500KHz □ Internal Trimmed Bandgap Reference □ High Current Totem Pole Output □ Error Amplifier With Low Output Resistance □ Available in 8-Pin Plastic DIP and Surface Mount 14-Pin S.O.I.C. □ Identical pin assignment to earlier UC384X series.

APPLICATIONS			
■ Off-line flyback or forward converters. ■ DC-to-DC buck or boost converter. ■ Monitor Power Supply			
AVAILABLE OPTIONS			
Device	Start-UP Voltage	Hysteresis	Max. Duty Cycle
AMC3842B	16V	6V	< 100%
AMC3843B	8.4V	0.8V	< 100%

PACKAGE PIN OUT	
COMP V_{FB} I_{SENSE} R_T/C_T V_{REF} V_{CC} OUTPUT GND	
8-Pin Plastic DIP (Top View)	
COMP NC V_{FB} NC I_{SENSE} NC R_T/C_T V_{REF} V_{CC} V_C OUTPUT GND PWR	COMP V_{FB} I_{SENSE} R_T/C_T V_{REF} V_{CC} OUTPUT GND
14-Pin Plastic S.O.I.C. Surface Mount (Top View)	8-Pin Plastic S.O.I.C. Surface Mount (Top View)

ORDER INFORMATION						
T _A (°C)	M	Plastic DIP-8	D	Plastic SO-14	DM	Plastic SO-8
		8-pin		14-pin		8-pin
0 to 70	AMC384XBM		AMC384XBD		AMC384XBDM	
Note: All surface-mount packages are available in Tape & Reel. Append the letter “T” to part number (i.e. AMC384XBDT, or AMC384XBDMT).						

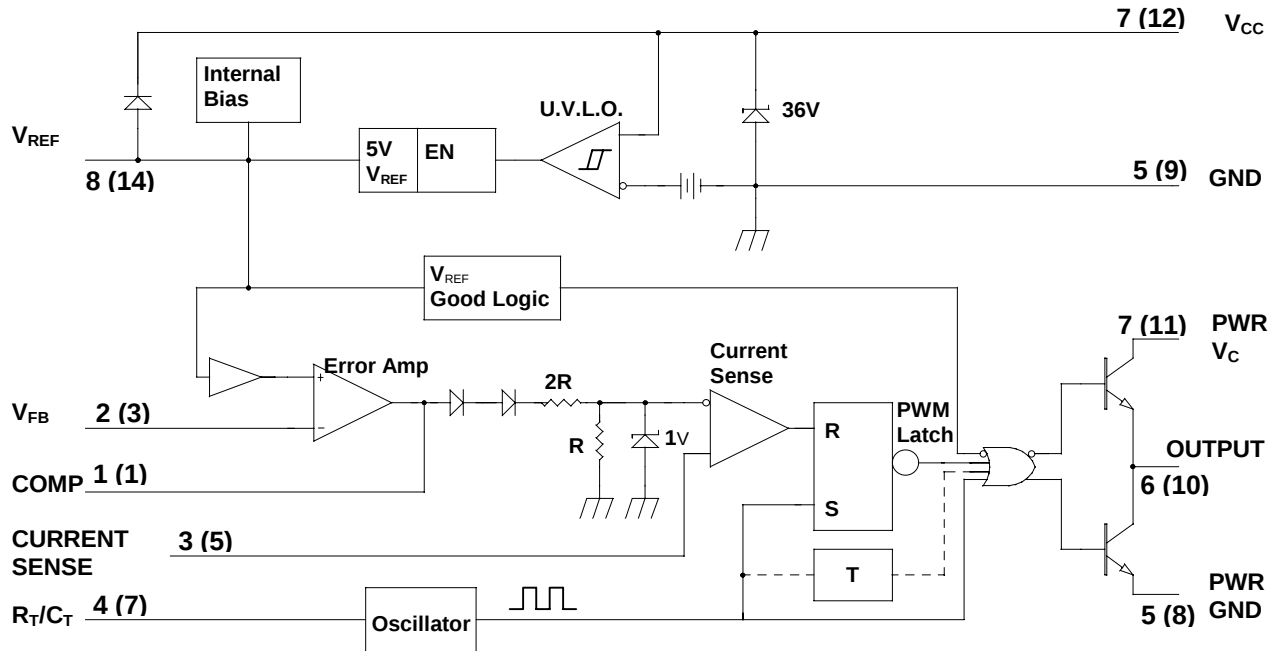
ABSOLUTE MAXIMUM RATINGS (Note 1)	
Supply voltage, V_{CC}	35V
Output current, I_O	$\pm 1A$
Analog inputs, V_I	-0.3V to 6.3V
Error amp output sink current, $I_{SINK(EA)}$	10mA
Power dissipation ($T_A = 25^\circ C$), P_D	1W
Maximum juncture temperature, T_J	$150^\circ C$
Storage temperature range	$-65^\circ C$ to $150^\circ C$
Lead temperature (soldering, 10 seconds)	$260^\circ C$
Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.	

THERMAL DATA	
M PACKAGE:	
Thermal Resistance-Junction to Ambient, θ_{JA}	$95^\circ C/W$
D PACKAGE:	
Thermal Resistance-Junction to Ambient, θ_{JA}	$120^\circ C/W$
DM PACKAGE:	
Thermal Resistance-Junction to Ambient, θ_{JA}	$165^\circ C/W$
Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$. The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.	

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BLOCK DIAGRAM



() are 14 Pin S.O.I.C. pin number

Note 2 : V_{CC} and PWR V_C are internally connected for 8 pin packages.

Note 3 : PWR GND and GND are internally connected for 8 pin packages.

Note 4 : U.V.L.O. is 16V for 3842B and 8.4V for 3843B.

Note 5 : Hysteresis is 6V for 3842B and 0.8V for 3843B.

RECOMMENDED OPERATING CONDITIONS					
Parameter	Symbol	Recommended Operating Conditions			Units
		Min.	Typ.	Max.	
Supply Voltage	V_{CC} / V_C			30	V
Input Voltage	$V_{I,R_T/C_T}$	0		5.5	V
	$V_{I,I_{SENSE}/V_{FB}}$				
Output Voltage	V_O , Output	0		30	V
Supply Current	I_{CC}			25	mA
Average Output Current	I_O			200	mA
Reference Output Current	$I_{O(REF)}$			-20	mA
Timing Capacitor	C_T	1			nF
Oscillator Frequency	f_{OSC}		100	500	KHz
Operating Free-air Temperature	T_A	0		70	°C

ELECTRICAL CHARACTERISTICS						
Unless otherwise specified, these specifications apply over the operating ambient temperature for AMC384XB with $0^{\circ}\text{C} \leq \text{TA} \leq 70^{\circ}\text{C}$; $\text{V}_{\text{CC}} = 15\text{V}$ (note 6); $\text{R}_{\text{T}} = 10\text{K}$; $\text{C}_{\text{T}} = 3.3\text{nF}$. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.						
Parameter	Symbol	Test Conditions	AMC384XB			Units
			Min.	Typ.	Max.	
Reference Section						
Reference output Voltage	V_{REF}	$\text{T}_{\text{J}} = 25^{\circ}\text{C}$, $\text{I}_{\text{REF}} = 1\text{mA}$	4.9	5.0	5.1	V
Line Regulation		$12\text{V} \leq \text{V}_{\text{CC}} \leq 25\text{V}$, $\text{T}_{\text{J}} = 25^{\circ}\text{C}$		6	20	mV
Load Regulation		$1\text{mA} \leq \text{I}_{\text{REF}} \leq 20\text{mA}$		6	25	mV
Short Circuit Output Current	I_{SC}	$\text{T}_{\text{J}} = 25^{\circ}\text{C}$	-30	-100	-180	mA
Oscillator Section						
Oscillation Frequency	f	$\text{T}_{\text{J}} = 25^{\circ}\text{C}$		52		KHz
Frequency Change with Voltage		$12\text{V} \leq \text{V}_{\text{CC}} \leq 25\text{V}$		0.2	1.0	%
Frequency Change with Temperature (note 7)		$\text{T}_{\text{MIN}} \leq \text{T}_{\text{A}} \leq \text{T}_{\text{MAX}}$		5		%
Peak-to-peak Amplitude At $\text{R}_{\text{T}}/\text{C}_{\text{T}}$	V_{OSC}			1.7		V
Current Sense Section						
Gain (note 8 & 9)	A_{VOL}		2.85	3.00	3.15	V/V
Maximum Input Signal (note 8)	$\text{V}_{\text{I(MAX)}}$	COMP = 5V	0.9	1.0	1.1	V
Power Supply Rejection Ratio (note 8)	PSRR	$12\text{V} \leq \text{V}_{\text{CC}} \leq 25\text{V}$ (note 8)		70		dB
Input Bias Current	I_{BIAS}			-3.0	-10	μA

ELECTRICAL CHARACTERISTICS (Continued)						
Error Amplifier Section						
Input Bias Current	I _{BIAS}			-0.1	-2	μA
Input Voltage	V _{I(EA)}	COMP = 2.5V	2.42	2.50	2.58	V
Open Loop Voltage Gain	G _{VO}	2V ≤ V _O ≤ 4V	65	90		dB
Unity Gain Bandwidth (note 7)	UGBW	T _J = 25 °C	0.7	1		MHz
Power Supply Rejection Ratio	PSRR	12V ≤ V _{CC} ≤ 25V	60	70		dB
Output Sink Current	I _{SINK}	V _{FB} = 2.7V, COMP = 1.1V	2	7		mA
Output Source Current	I _{SOURCE}	V _{FB} = 2.3V, COMP = 5.0V	-0.5	-1.0		mA
High Output Voltage	V _{OH}	V _{FB} = 2.3V, R _L = 15KΩ to GND	5	6		V
Low Output Voltage	V _{OL}	V _{FB} = 2.7V, R _L = 15KΩ to V _{REF}		0.7	1.1	V
Output Section						
Output Low Level	V _{OL}	I _{SINK} = 20mA		0.1	0.4	V
		I _{SINK} = 200mA		1.4	2.2	
Output High Level	V _{OH}	I _{SOURCE} = 20mA	13	13.5		V
		I _{SOURCE} = 200mA	12	13.0		
Rise Time (note 7)	t _r	T _J = 25 °C, C _L = 1nF		50	150	ns
Fall Time (note 7)	t _f	T _J = 25 °C, C _L = 1nF		50	150	ns
Under-Voltage Lockout Section						
Start Threshold	V _{TH(ST)}	AMC3842B	14.5	16.0	17.5	V
		AMC3843B	7.8	8.4	9.0	
Min. Operating Voltage		AMC3842B	8.5	10	11.5	V
		AMC3843B	7.0	7.6	8.2	
PWM Section						
Maximum Duty Cycle		AMC3842B/43B	94	97	100	%
Total Standby Current						
Startup Current		AMC3842B		0.2	0.35	mA
		AMC3843B		0.5	1.0	
Operating Supply Current	I _{CC}	V _{FB} = I _{SENSE} = 0V		14	17	mA
Zener Voltage	V _Z	I _{CC} = 25mA	30	35		V
note 6: Adjust V _{CC} above the start threshold before setting at 15V						
note 7: These parameters, although guaranteed, are not 100% tested in production prior to shipment						
note 8: Parameters are measured at trip point of latch with V _{FB} = 2V						
note 9: Gain is measured between I _{SENSE} and COMP with the input changing from 0V to 0.8V						

Application Information

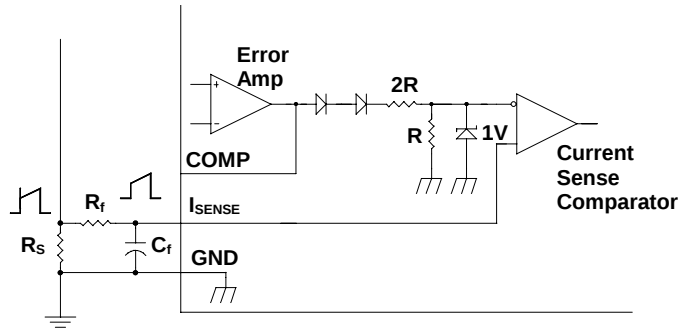


Fig. 1. Current Sense Circuit

Peak current (I_S) is set by: $I_{S(MAX)} = 1V/R_S$

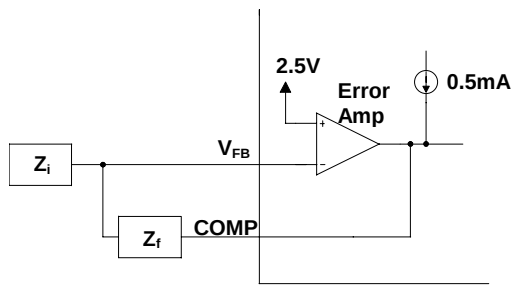


Fig. 2. Error Amplifier Configuration - the amplifier can source or sink up to 0.5mA

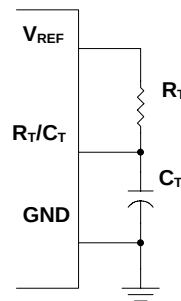


Fig. 3. Oscillator Section

$$\text{For } R_T < 5K, f = \frac{1.72}{R_T C_T}$$

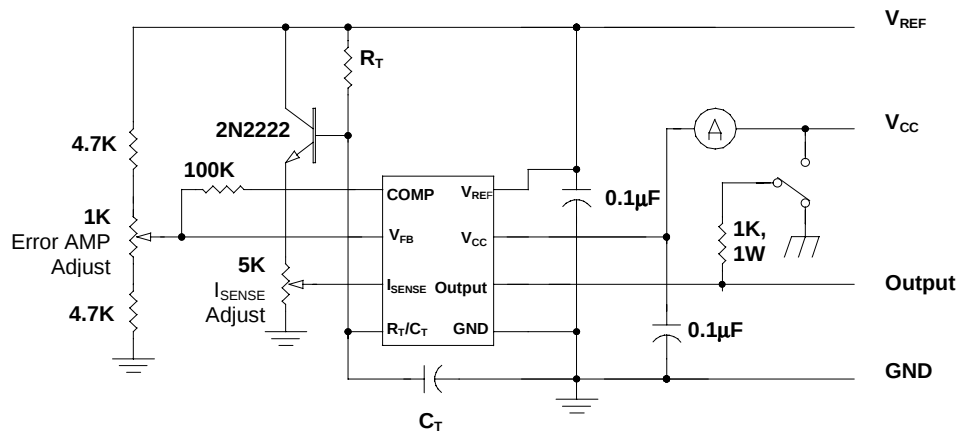


Fig. 4. Open-loop laboratory test fixture: Careful grounding techniques are necessary for high peak currents associated with capacitive loads. Timing and bypass capacitors should be connected to GND pin in a single point ground. The transistor and 5K potentiometer are used to sample the oscillator waveform and apply an adjustable ramp to the I_{SENSE} pin

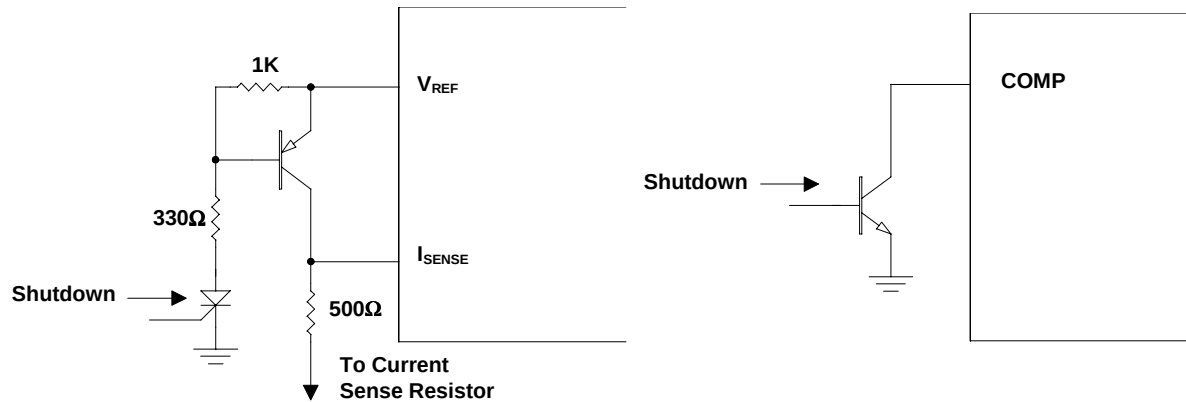
Application Information (continued)

Fig. 5. Shutdown Techniques - there are two ways to shutdown the PWM controller: 1) raise the voltage at I_{SENSE} above 1V or, 2) pull the COMP below a voltage two diodes above ground.

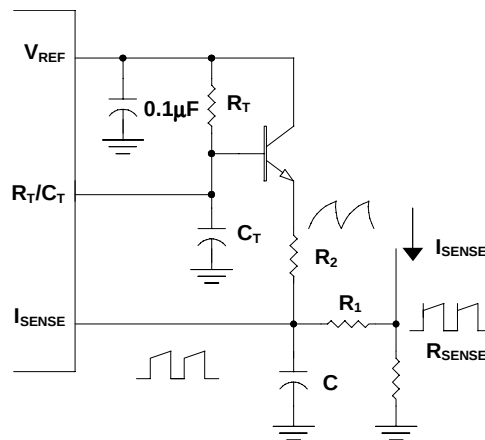
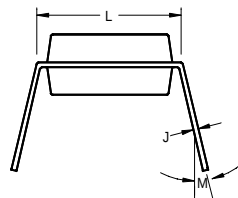
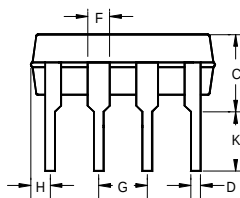
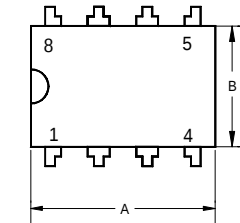


Fig 6. Slop Compensation – To achieve duty cycles over 50% for some applications , the above slope compensation technique is suggested by resistively summing a fraction of the oscillator ramp with the current sense signal.

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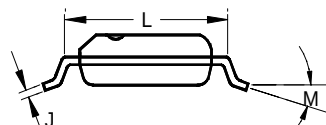
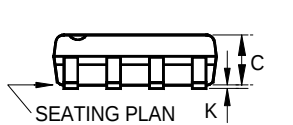
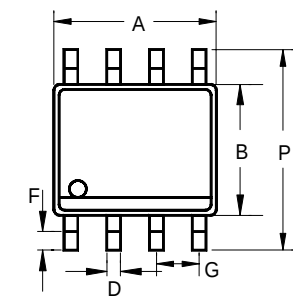
CURRENT MODE PWM CONTROLLER

8-Pin Plastic DIP



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.355	0.365	0.400	9.02	9.27	10.16
B	0.240	0.250	0.280	6.10	6.35	7.11
C	-	-	0.210	-	-	5.33
D	-	0.018	-	-	0.46	-
F	-	0.060	-	-	1.52	-
G	-	0.100	-	-	2.54	-
H	0.050	-	0.090	1.27	-	2.29
J	0.008	-	0.015	0.20	-	0.38
K	0.115	0.130	0.150	2.92	3.30	3.81
L	0.300 BSC.			7.62 BSC.		
M	-	7°	15°	-	7°	15°

8-Pin Plastic S.O.I.C.

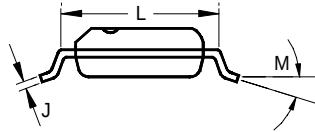
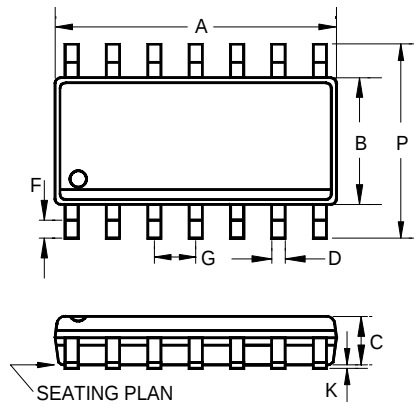


	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.183	-	0.202	4.65	-	5.13
B	0.144	-	0.163	3.66	-	4.14
C	0.068	-	0.074	1.73	-	1.88
D	0.010	-	0.020	0.25	-	0.51
F	0.015	-	0.035	0.38	-	0.89
G	0.050 BSC			1.27 BSC		
J	0.007	-	0.010	0.19	-	0.25
K	0.005	-	0.010	0.13	-	0.25
L	0.189	-	0.205	4.80	-	5.21
M	-	-	8°	-	-	8°
P	0.228	-	0.244	5.79	-	6.20

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CURRENT MODE PWM CONTROLLER

14-Pin Plastic S.O.I.C.



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.336	-	0.344	8.54	-	8.74
B	0.159	-	0.158	3.81	-	4.01
C	0.053	-	0.069	1.35	-	1.75
D	0.014	-	0.018	0.35	-	0.46
F	0.026	-	0.030	0.67	-	0.77
G	0.050 BSC			1.27 BSC		
J	0.007	-	0.010	0.19	-	0.25
K	0.004	-	0.010	0.10	-	0.25
L	0.189	-	0.205	4.82	-	5.21
M	-	-	8°	-	-	8°
P	0.228	-	0.244	5.79	-	6.20

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