



AiP384X High Performance Current Mode PWM Controller

Product Specification

Specification Revision History :

Version	Date	Description
2019-07-A1	2019-07	New
2020-01-A2	2020-01	Add Ordering Information
2021-07-A3	2021-07	Add Operating Temperature and Storage Temperature



1、 General Description

The AiP3842/AiP3843/AiP3844/AiP3845 are fixed frequency current-mode PWM controller. They are specially designed for Off-Line and DC-to-DC converter applications with minimum external components. These integrated circuits feature 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 circuit Includes built in under-voltage lockout and current limiting. The AiP3842 and AiP3844 have UVLO thresholds of 16V (on) and 10V (off). The AiP3843 and AiP3845 are 8.8V (on) and 7.6V (off) .The AiP3842 and AiP3843 can operate within 100% duty cycle. The AiP3844 and AiP3845 can operate with 50% duty cycle.

Features:

- Low Start Up Current
- Maximum Duty Clamp
- UVLO With Hysteresis
- Operating Frequency Up To 500KHz
- Packaging form: DIP8/SOP8
- Wide range of operating temperatures: -40°C to +85°C

Ordering Information:

Tube packing specifications:

Type number	packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Packing box number	Packing quantity	Notes
AiP384X SA.TB	SOP8	AiP384X	100 PCS/tube	100 tube/box	10000 PCS/box	10 box/pack	100000 PCS/pack	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 1.27mm
AiP384X DA.TB	DIP8	AiP384X	50 PCS/tube	40 tube/box	2000 PCS/ box	10 box/pack	20000 PCS/pack	Dimensions of plastic enclosure: 9.2mm×6.4mm Pin spacing: 2.54mm

Reel packing specifications:

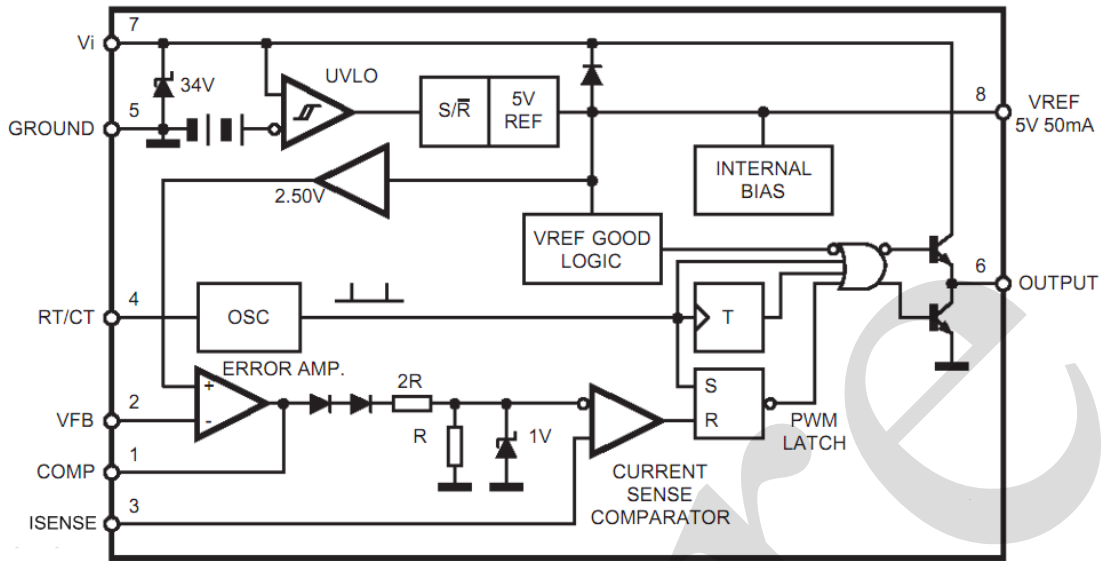
Type number	packaging form	Marking code	Reel quantity	Boxed reel quantity	Packing quantity	Notes
AiP384XSA.TR	SOP8(1)	AiP384X	4000 PCS/reel	8000 PCS/box	64000 PCS/pack	Dimensions of plastic enclosure:4.9mm×3.9mm Pin spacing:1.27mm
AiP384XSA.TR	SOP8(2)	AiP384X	2500 PCS/reel	5000 PCS/box	40000 PCS/pack	Dimensions of plastic enclosure:4.9mm×3.9mm Pin spacing:1.27mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

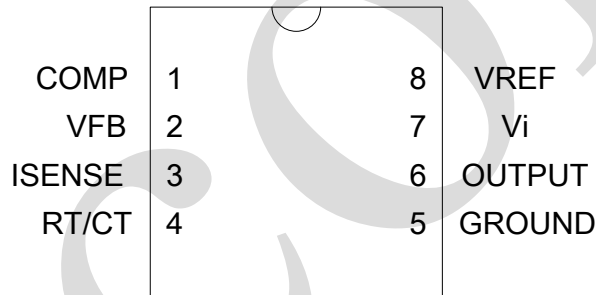


2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	COMP	This pin is the Error Amplifier output and is made available for loop compensation.
2	VFB	This is the inverting input of the Error Amplifier. It is normally connected to the switching power supply output through a resistor divider.
3	ISENSE	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 RT to VREF and capacitor CT to ground. Operation to 500kHz is possible.
5	GROUND	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 1A are sourced and sunk by this pin.
7	Vi	This pin is the positive supply of the control IC.
8	VREF	This is the reference output. It provides charging current for capacitor CT through resistor RT



3、Electrical Parameter

3.1、Absolute Maximum Ratings

($T_{amb}=25^{\circ}\text{C}$, unless otherwise specified)

Characteristic	Symbol	Conditions	Value	Unit
supply voltage (low impedance source)	V_i	-	30	V
output current	I_O	-	± 1	A
power dissipation	P_D	-	1	W
error amplifier output sink current	$I_{sink}(EA)$	-	10	mA
analog inputs	$V_{in}(EA)$	-	-0.3 to +6.3	V
operating temperature	T_{amb}	-	-40 to 85	$^{\circ}\text{C}$
storage temperature	T_{stg}	-	-65 to 150	$^{\circ}\text{C}$
soldering temperature	T_L	10s	DIP8 245	$^{\circ}\text{C}$
			SOP8 250	

3.2、Electrical Characteristics

($T_{amb}=-40\sim 85^{\circ}\text{C}$, $V_i=15\text{V}$, $R_T=10\text{k}\Omega$, $C_T=3.3\text{nF}$, unless otherwise specified)

Characteristic	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reference Section						
reference output voltage	V_{REF}	$I_o=1\text{mA}$	4.90	5.00	5.10	V
line regulation	ΔV_{REF}	$12\text{V}\leq V_i\leq 25\text{V}$	-	2	20	mV
load regulation	ΔV_{REF}	$1\leq I_o\leq 20\text{mA}$	-	3	25	mV
short circuit output current	$\Delta V_{REF}/\Delta T$	-	-	0.2	-	$\text{mV}/^{\circ}\text{C}$
total output variation	-	line, load, temperature	4.82	-	5.18	V
output Noise voltage	eN	$10\text{Hz}\leq f\leq 10\text{KHz}$, $T_j=25^{\circ}\text{C}$	-	50	-	μV
output Short circuit	I_{SC}	-	-30	-100	-180	mA
Oscillator Section						
frequency	f_{OSC}	$T_j=25^{\circ}\text{C}$	49	52	55	kHz
		$T_{amb}=T_{low}$ to T_{high}	48	-	56	kHz
		$T_j=25^{\circ}\text{C}$ ($R_T=6.2\text{k}\Omega$, $C_T=1\text{nF}$)	225	250	275	kHz
frequency change with volt	$\Delta f_{OSC}/\Delta V$	$V_i=12\text{V}\sim 25\text{V}$	-	0.2	1	%
frequency change with temp.	$\Delta f_{OSC}/\Delta T$	$T_{amb}=-40$ to 85°C	-	0.5	-	%
oscillator voltage swing	V_{OSC}	(peak to peak)	-	1.6	-	V
discharge current ($V_{OSC}=2\text{V}$)	I_{dischg}	$T_j=25^{\circ}\text{C}$, $T_{amb}=-40$ to 85°C	7.8	8.3	8.8	mA
Error AMP Section						
input voltage	V_2	$V_{PIN1}=2.5\text{V}$	2.42	2.50	2.58	V
input bias current	I_b	$V_{FB}=5\text{V}$	-	-0.1	-2	μA
-	A_{VOL}	$2\text{V}\leq V_o\leq 4\text{V}$	65	90	-	dB
unity gain bandwidth	BW	$T_j=25^{\circ}\text{C}$	0.7	1	-	MHz



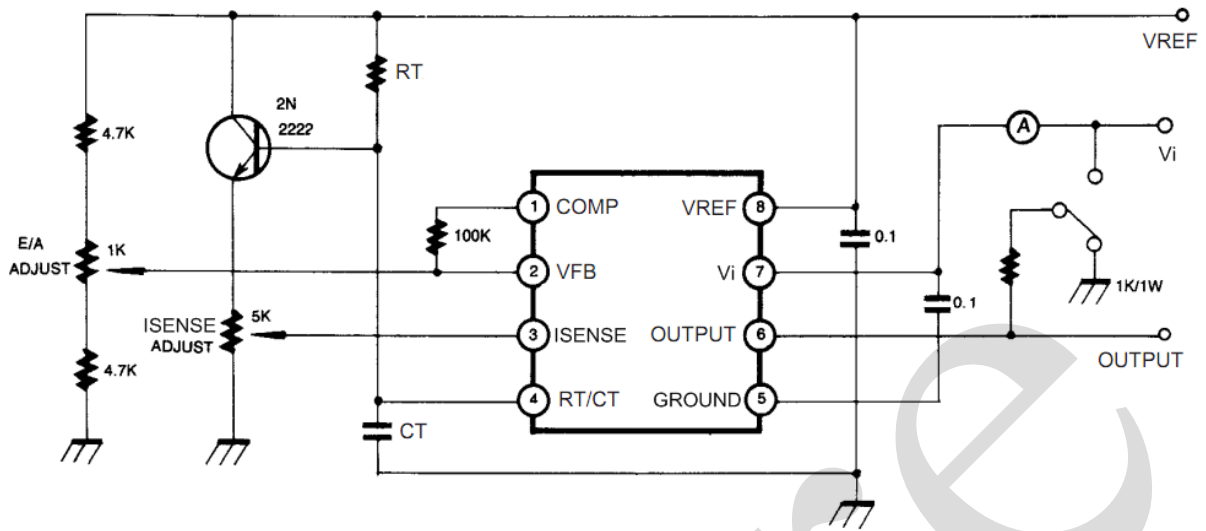
power supply rejec.ratio	PSRR	$12V \leq V_i \leq 25V$	60	70	-	dB
output sink current	I_O	$V_{PIN2}=2.7V, V_{PIN1}=1.1V$	2	12	-	mA
output source current	I_O	$V_{PIN2}=2.3V, V_{PIN1}=5V$	-0.5	-1	-	mA
VOUT High	$V_{OUT High}$	$V_{PIN2}=2.3V;$ $R_L=15K\Omega$ to ground	5	6.2	-	V
VOUT Low	$V_{OUT Low}$	$V_{PIN2}=2.7V;$ $R_L=15K\Omega$ to PIN 8	-	0.8	1.1	V
Current Sense Section						
Gain	G_V	-	2.85	3	3.15	V/V
maximum input signal	V3	$V_{PIN1}=5V$	0.9	1	1.1	V
supply voltage rejection	SVR	$12V \leq V_i \leq 25V$	-	-	70	dB
input bias current	I_b	-	-	-2	-10	μA
delay to output	-	-	-	150	300	ns
Output Section						
output Low level	V_{OL}	(Isink=20mA)	-	0.1	0.4	V
		(Isink=200mA)	-	1.6	2.2	V
output High level	V_{OH}	(Isourse=20mA)	13	13.5	-	V
		(Isourse=200mA)	12	13.5	-	V
UVLO saturation	V_{OLS}	$V_i=6V, I_{SINK}=1mA$	-	0.1	1.1	V
rise time	t_r	$C_L=1nF$	-	50	150	ns
fall time	t_f	$C_L=1nF$	-	50	150	
Under-voltage Lockout Section						
start threshold	$V_{TH(ST)}$	AiP3842/4	14.5	16	17.5	V
		AiP3843/5	7.8	8.8	9.4	V
min operating voltage after turn-on	$V_{OPR(MIN)}$	AiP3842/4	8.5	10	11.5	V
		AiP3843/5	7.0	7.6	8.2	V
PWM Section						
maximum duty cycle	-	AiP3842/3	95	97	100	%
		AiP3844/5	47	48	50	%
minimum duty cycle	-	-	-	-	0	%
Total Standby current						
start-up current	I_{st}	$V_i=6.5V, AiP3843/5$	-	0.3	0.5	mA
		$V_i=14V, AiP3842/4$	-	0.3	0.5	mA
operating supply current	I_i	$V_{PIN2}=V_{PIN3}=0V$	-	12	20	mA
zener voltage	V_{iz}	$I_i=25mA$	30	36	-	V

Notes:

1. Max package power dissipation limits must be respected; low duty cycle pulse techniques are used during test maintain T_j as close to T_{amb} as possible.
2. These parameters, although guaranteed, are not 100% tested in production.
3. Parameter measured at trip point of latch with $V_{PIN2}=0$.
4. Gain defined as : $A=\Delta V_{PIN1}/\Delta V_{PIN3}; 0 \leq V_{PIN3} \leq 0.8V$
5. Adjust V_i above the start threshold before setting at 15V.



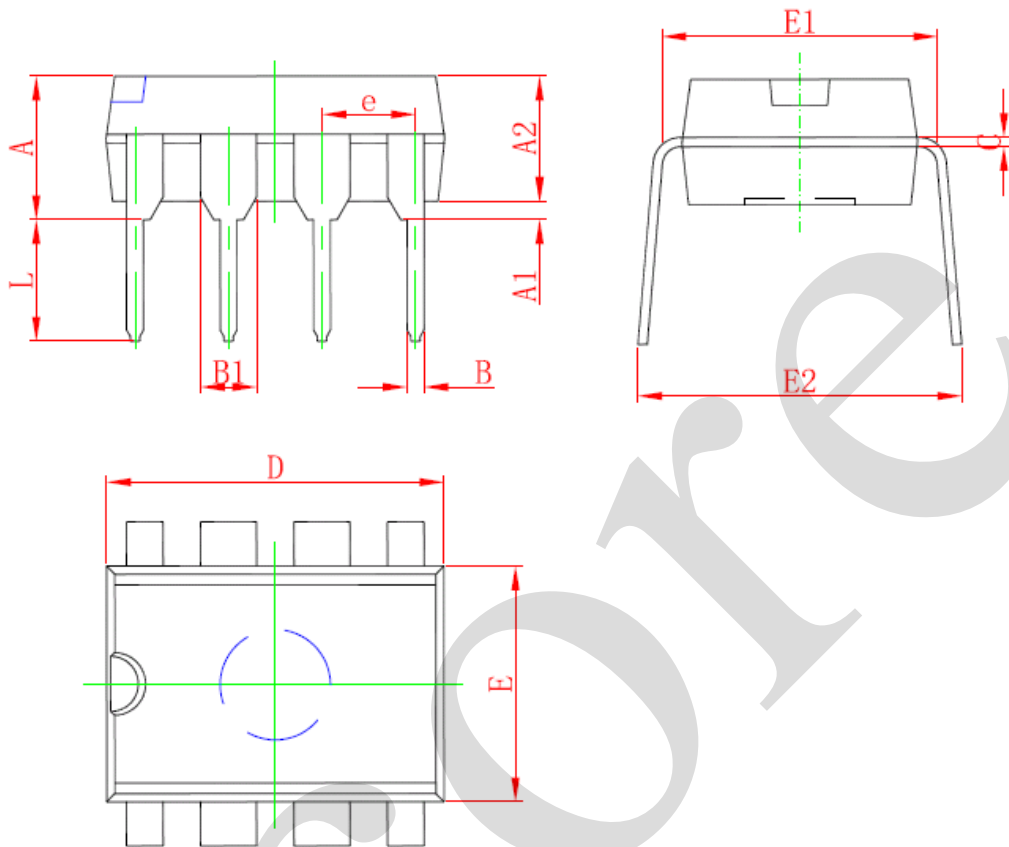
4、Typical Application Circuit





5、Package Information

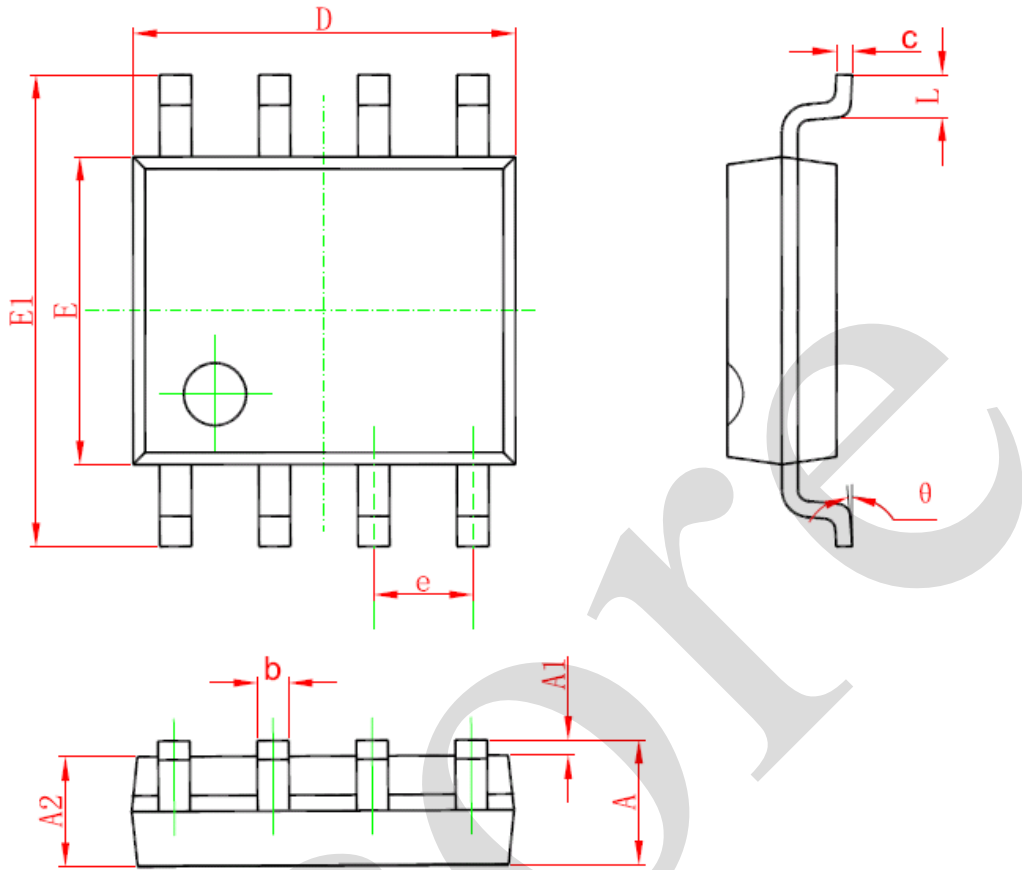
5.1、DIP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354



5.2、SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



6、 Statements And Notes:

6.1、 The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

6.2、 Notion:

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.