

Description

GM384XA series is high performance with fixed-frequency current mode PWM controllers. They are specially designed for off-Line and DC-to-DC converter applications with minimum 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 operate with 0.17mA typ. start-up current, allowing an efficient bootstrap supply voltage design. The U.V.L.O. thresholds for the GM3842A/44A are 16V (on) and 10V (off) which are ideal for off-line applications. The corresponding typical threshold for the GM3843A/45A is 8.4V (on) and 7.6V (off). The GM3842A/43A can operate within 100% duty cycle and the GM3844A/45A can operate within 50% duty cycle.

Available Options

Device	Start-UP Voltage	Hysteresis	Max. Duty Cycle
GM3842A	16V	6V	< 100%
GM3843A	8.4V	0.8V	< 100%
GM3844A	16V	6V	< 50%
GM3845A	8.4V	0.8V	< 50%

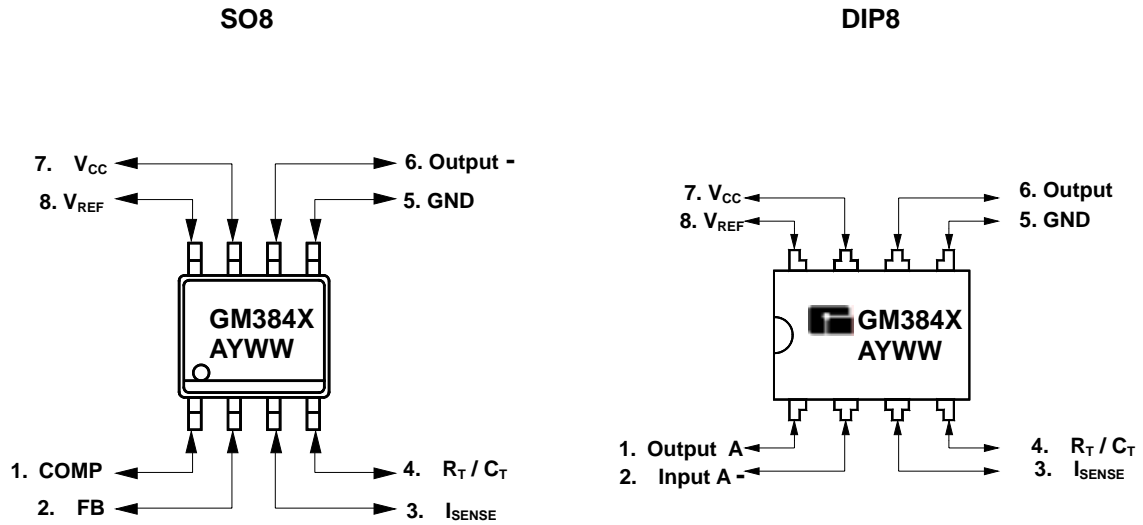
Features

- ◆ Low Start-Up and Operating Current
- ◆ Automatic Feed Forward Compensation
- ◆ Current Mode Operating Frequency up to 500KHz
- ◆ Trimmed Oscillator Discharge Current for Precise Duty Cycle Control
- ◆ Latching PWM for Cycle-By-Cycle Current Limiting
- ◆ Under Voltage Lockout with Hysteresis
- ◆ High Current totem Pole Output Stage

Application

Off-line flyback or forward converters
DC-to DC buck boost converter
Monitor Power Supply

Marking Information and Pin Configurations (Top View)



A: Assembly / Test site code
Y: Year
WW: Week

Ordering Information

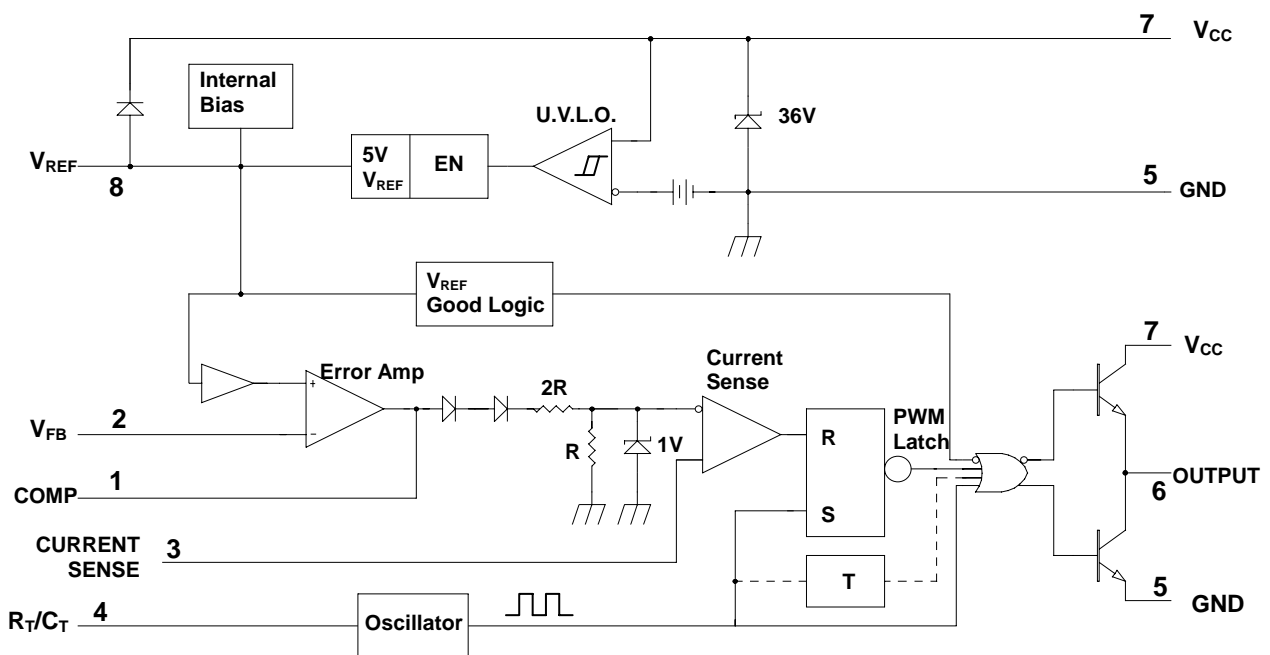
Ordering Number	Package	Shipping
GM3842AD8T	DIP-8	60 Units / Tube
GM3842AS8T	SOP-8	100 Units / Tube
GM3842AS8R	SOP-8	2,500 Units / Tape & Reel
GM3843AD8T	DIP-8	60 Units / Tube
GM3843AS8T	SOP-8	100 Units / Tube
GM3843AS8R	SOP-8	2,500 Units / Tape & Reel
GM3844AD8T	DIP-8	60 Units / Tube
GM3844AS8T	SOP-8	100 Units / Tube
GM3844AS8R	SOP-8	2,500 Units / Tape & Reel
GM3845AD8T	DIP-8	60 Units / Tube
GM3845AS8T	SOP-8	100 Units / Tube
GM3845AS8R	SOP-8	2,500 Units / Tape & Reel

Absolute Maximum Ratings

PARAMETER	Symbol	RATINGS	UNITS
Supply Voltage (low impedance source)	V_{CC}	30	V
Output Current, Source or Sink *	I_O	± 1	A
Input Voltage (analog inputs pins 2, and 3)	V_I	- 0.3 to + 5.5	V
Maximum Power Dissipation ($T_A = 25^\circ\text{C}$)	P_D	1.0	W
Error Amp Output Sink Current	$I_{\text{SINK(E.A.)}}$	10	mA
Operating Ambient Temperature Range	T_A	- 40 to 125-	
Storage Temperature		- 65 to 150	
Lead Temperature (soldering 10 sec.)		260	

* Maximum Package Power Dissipation Limits must be observed.

Block Diagram



Electrical Characteristics ($T_A = 0^\circ\text{C}$ to 70°C , $V_{CC}=15\text{V}$, $C_T=3.3\text{nF}$, $R_T=10\text{k}$, unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reference Section						
Reference output Voltage	V_{REF}	$T_J = 25^\circ\text{C}$, $I_{REF} = 1\text{mA}$	4.9	5.0	5.1	V
Line Regulation	ΔV_{REF-V}	$12\text{V} \leq V_{CC} \leq 25\text{V}$		6.0	20	mV
Load Regulation	ΔV_{REF-I}	$1\text{mA} \leq I_{REF} \leq 20\text{mA}$		6.0	25	mV
Short Circuit output Current	I_{SC}	$T_A = 25^\circ\text{C}$		-100	-180	mA
Oscillator Section						
Oscillation Frequency	f	$T_J = 25^\circ\text{C}$	47	52	57	KHz
Frequency Change with Voltage	$\Delta f/\Delta V_{CC}$	$12\text{V} \leq V_{CC} \leq 25\text{V}$		0.05	1	%
Oscillator Amplitude	$V(\text{osc})$	(Peak to Peak)		1.6		V
Error Amplifier Section						
Input Bias Current	I_{BIAS}	$V_{FB} = 3\text{V}$		-0.1	-2	μA
Input Voltage	$V_{I(EA)}$	$V_{PIN1} = 2.5\text{V}$	2.42	2.5	2.58	V
Open Loop Voltage Gain	$A_{VOL(EA)}$	$2\text{V} \leq V_O \leq 4\text{V}$	65	90		dB
Power Supply Rejection Ratio	$PSRR_{(EA)}$	$12\text{V} \leq V_{CC} \leq 25\text{V}$	60	70		dB
Output Sink Current	$I_{SINK(EA)}$	$V_{PIN2} = 2.7\text{V}$, $V_{PIN1} = 1.1\text{V}$	2	7		mA
Output Source Current	$I_{SOURCE(EA)}$	$V_{PIN2} = 2.3\text{V}$, $V_{PIN1} = 5\text{V}$	-0.5	-1.0		mA
High Output Voltage	$V_{OH(EA)}$	$V_{PIN2} = 2.3\text{V}$, $R_L = 15\text{K}$ to GND	5.0	6.0		V
Low Output Voltage	$V_{OL(A)}$	$V_{PIN2} = 2.7\text{V}$, $R_L = 15\text{K}$ to GND		0.8	1.1	V
Current Sense Section						
Current Sense Input Voltage Gain	G_V	(Note 1 and 2)	2.85	3.0	3.15	V/V
Maximum Input Signal	$V_{I(MAX)}$	$V_{PIN1} = 5\text{V}$ (Note 1)		1.0	1.1	V
Supply Voltage Rejection	SVR	$12\text{V} \leq V_{CC} \leq 25\text{V}$ (Note 1)		70		dB
Input Bias Current	I_{BIAS}	$V_{PIN3} = 3\text{V}$		-3.0	-10	μA
Output Section						
Low Output Voltage	V_{OL}	$I_{SINK} = 20\text{mA}$		0.8	0.4	V
		$I_{SINK} = 200\text{mA}$		1.4	2.2	
High Output Voltage	V_{OH}	$I_{SOURCE} = -20\text{mA}$	13	13.5		V
		$I_{SOURCE} = -200\text{mA}$	12	13		
Rise Time	t_r	$T_J = 25^\circ\text{C}$, $C_L = 1\text{nF}$ (Note 3)		45	150	ns
Fall Time	t_f	$T_J = 25^\circ\text{C}$, $C_L = 1\text{nF}$ (Note 3)		35	150	ns

Electrical Characteristics ($T_A = 0^\circ\text{C}$ to 70°C , $V_{CC}=15\text{V}$, $C_T=3.3\text{nF}$, $R_T=10\text{k}$, unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Undervoltage Lockout Section						
Start Threshold	$V_{TH(ST)}$	GM3842A, GM3844A	14.5	16.0	17.5	V
		GM3843A, GM3845A	7.8	8.4	9.0	
Minimum Operating Voltage (after turn on)	$V_{OPR(MIN)}$	GM3842A, GM3844A	8.5	10	11.5	V
		GM3843A, GM3845A	7.0	7.6	8.2	
PWM Section						
Maximum Duty Cycle	$D_{(MAX)}$	GM3842A, GM3844A	95	97	100	%
		GM3843A, GM3845A	47	45	50	
Minimum Duty Cycle	$D_{(MIN)}$				0	%
Total Standby Current						
Start-Up Current	I_{ST}			0.17	0.3	mA
Operating Supply Current	$I_{CC(OPR)}$	$V_{PIN3} = V_{PIN2} = 0\text{V}$		13	17	mA
Zero Voltage	V_Z	$I_{CC} = 25\text{mA}$	30	35		V

* Adjust VCC above the Startup threshold before setting to I5 V.

Note 1: Parameter measured at trip point of latch with $V_{PIN2} = 0\text{V}$

Note 2: Gain defined as $A = V_{PIN1} / V_{PIN3}$; $0\text{V} < V_{PIN3} < 0.5\text{V}$

Note 3: These parameters, although guaranteed, are not 100% tested in production

Typical Performance Characteristics

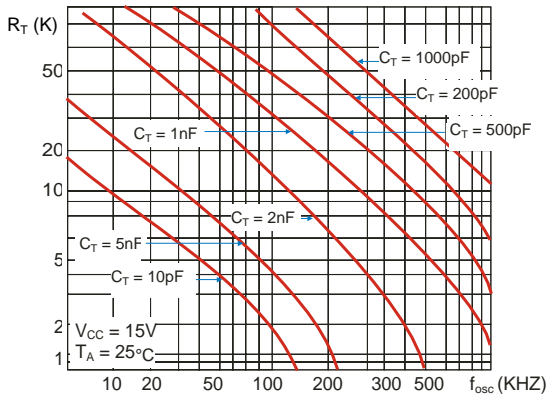


Figure 1. Timing Resistor vs. Oscillator Frequency

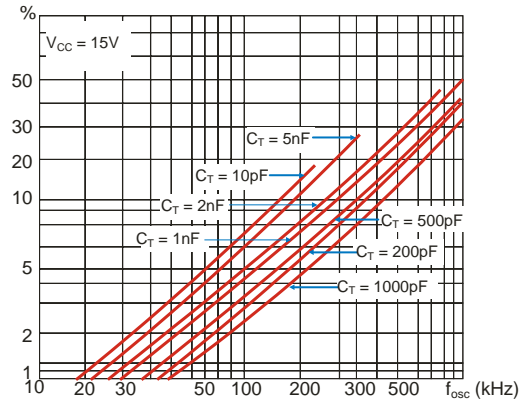


Figure 2. Output Dead-Time vs. Oscillator Frequency

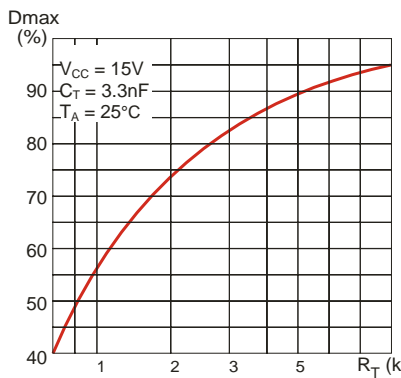


Figure 3. Maximum Output Duty Cycle vs. Timing Resistor (GM3842A/43A)

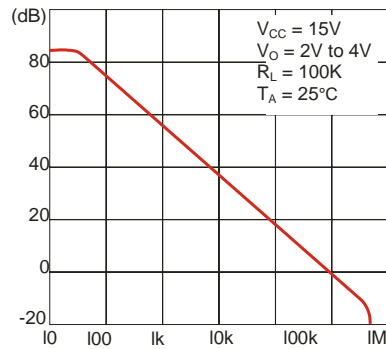


Figure 4. Error Amp Open-Loop Gain vs. Frequency

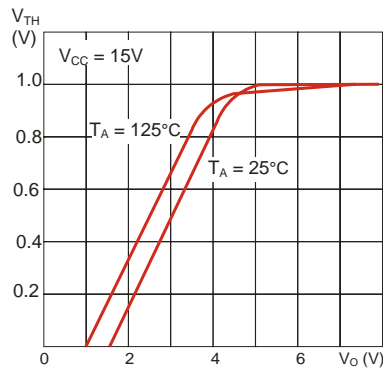


Figure 5. Current Sense Input Threshold vs. Error Amp Output Voltage

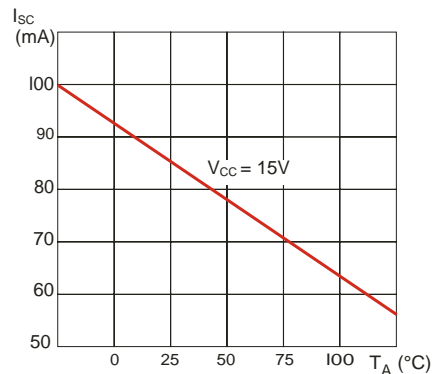


Figure 6. Reference Short Circuit Current vs. Temperature

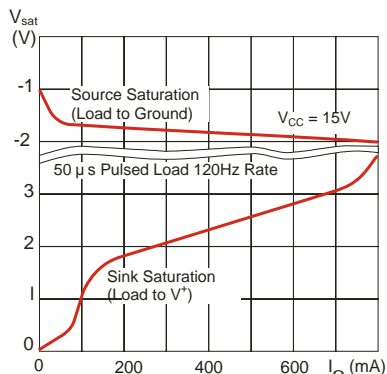


Figure 7. Output Saturation Voltage vs. Load Current $T_A = 25^\circ\text{C}$

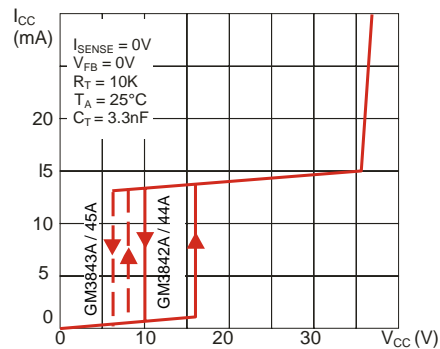
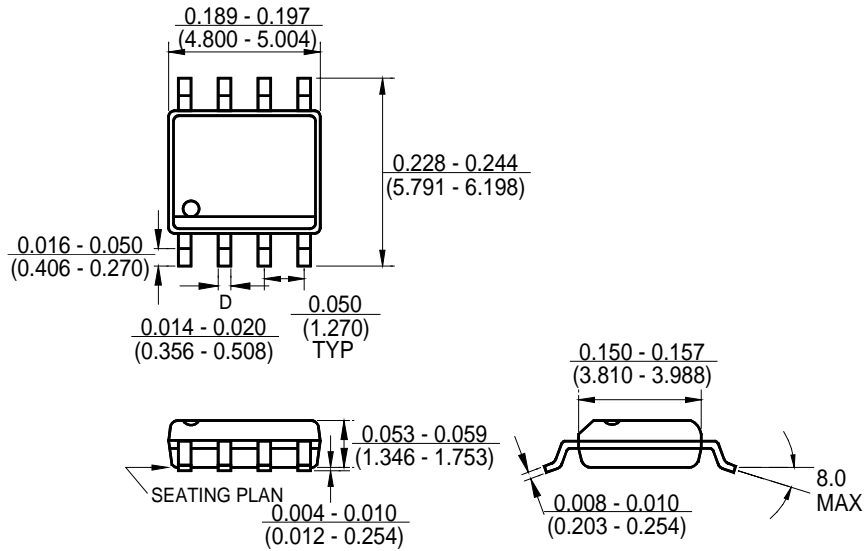
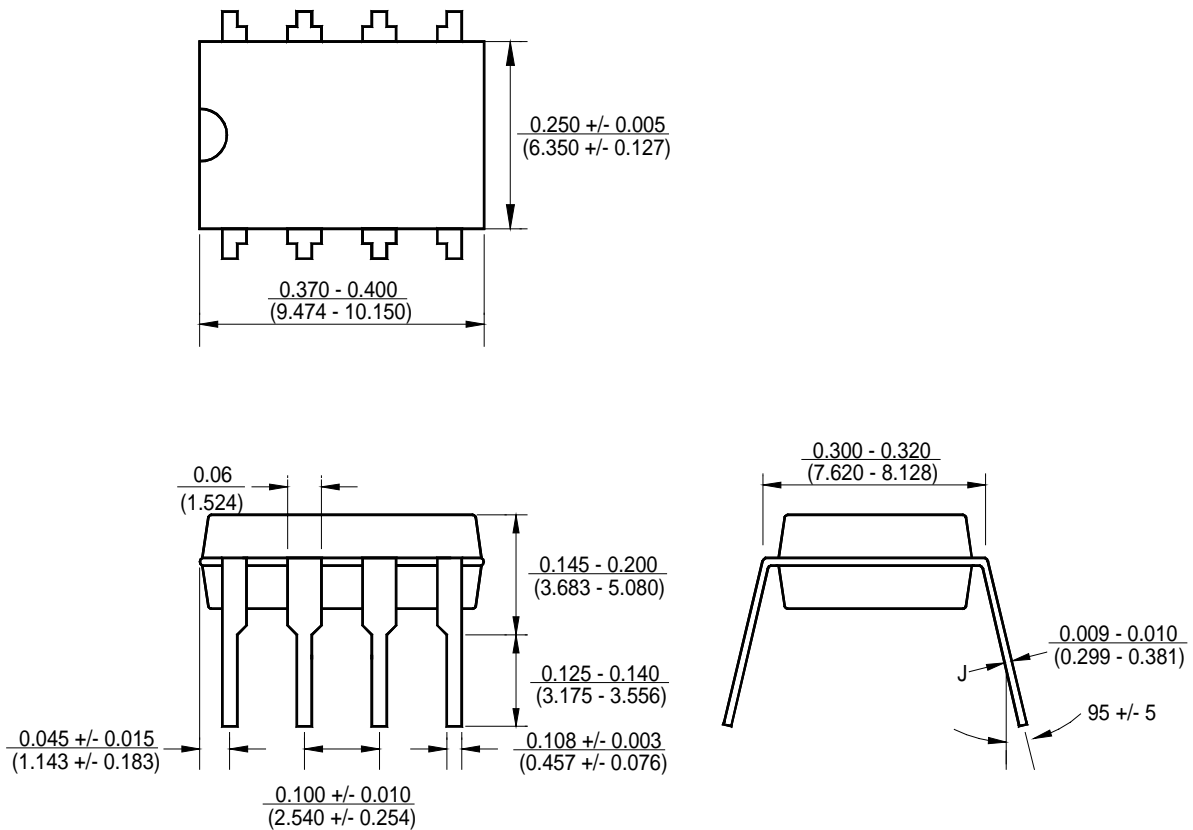


Figure 8. Supply Current vs. Supply Voltage

Package Outline Dimensions – SO 8



Package Outline Dimensions – DIP 8





GM3842A, GM3843A
GM3844A, GM3845A
CURRENT MODE PWM CONTROLLER

Ordering Number

GM **3842** **A** **S8** **R**

APM Gamma
Micro

Circuit
Type

Revision

Package
Type

S8: SO 8
D8: DIP 8

Shipping Type

R: Taping & Reel
T: Tube