- **Controlled Baseline**
  - **One Assembly/Test Site, One Fabrication Site**
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product Change Notification**
- **Qualification Pedigree†**
- **Optimized for Off-line and DC to DC Converters**
- **Low Start Up Current (<0.5 mA)**
- **Trimmed Oscillator Discharge Current**

- **Automatic Feed Forward Compensation**
- **Pulse-by-Pulse Current Limiting**
- **Enhanced Load Response Characteristics**
- **Under-Voltage Lockout With Hysteresis**
- **Double Pulse Suppression**
- **High Current Totem Pole Output**
- **Internally Trimmed Bandgap Reference**
- **500 kHz Operation**
- **Low R_O Error Amp**

† Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

D PACKAGE
(TOP VIEW)
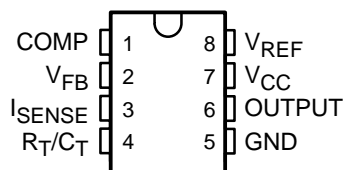
COMP	1	8 V_{REF}
V_{FB}	2	7 V_{CC}
I_{SENSE}	3	6 OUTPUT
R_T/C_T	4	5 GND

description

The UC1842A/3A/4A/5A family of control ICs is a pin for pin compatible improved version of the UC3842/3/4/5 family. Providing the necessary features to control current mode switched mode power supplies, this family has the following improved features. Start up current is guaranteed to be less than 0.5 mA. Oscillator discharge is trimmed to 8.3 mA. During under voltage lockout, the output stage can sink at least 10 mA at less than 1.2 V for V_{CC} over 5 V.

The difference between members of this family are shown in the table below.

PART NUMBER	UVLO ON	UVLO OFF	MAXIMUM DUTY CYCLE
UC1842A	16 V	10 V	<100%
UC1843A	8.5 V	7.9 V	<100%
UC1844A	16 V	10 V	<50%
UC1845A	8.5 V	7.9 V	<50%

ORDERING INFORMATION‡

T_A	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	SOP – D	Tape and reel	UC1842AMDREP	1842AME
–55°C to 125°C	SOP – D	Tape and reel	UC1843AMDREP	1843AME
–55°C to 125°C	SOP – D	Tape and reel	UC1844AMDREP	1844AME
–55°C to 125°C	SOP – D	Tape and reel	UC1845AMDREP	1845AME

‡ Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

TEXAS INSTRUMENTS

UC1842A-EP, UC1843A-EP, UC1844A-EP, UC1845A-EP
CURRENT-MODE PWM CONTROLLER

block diagram

Vcc [7/12]
34V
UVLO
S/R̄
5V REF
Gnd [5/9]
VREF 5.0V 50mA [8/14]
2.50V
VREF Good Logic
Internal Bias
RT\CT [4/7]
Osc
Vc [7/11]
T
Error Amp
+
−
S
Output [6/10]
VFB [2/3]
2R
R
1V
PWM Latch
R
Comp [1/1]
Current Sense Comparator
Pwr Ground [5/8]
C/S [3/5]

NOTES: 1.   A = DIL-8 Pin Number. B = SO-14 Pin Number.
          2.   Toggle flip flop used only in 1844A and 1845A.

Ordering Information

UC 184 **4** **A** **M** **D** **R** EP

- ENHANCED PLASTIC INDICATOR
- TAPE and REEL INDICATOR
- PACKAGE
  D   =   Plastic SOIC
- MILITARY TEMPERATURE RANGE INDICATOR
- IMPROVED PERFORMANCE INDICATOR
- PRODUCT OPTION
  2 through 5

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†‡

V_{CC} voltage (low impedance source)	30 V
V_{CC} voltage (I_{CC} mA)	self limiting
Output current, I_O	±1 A
Output energy (capacitive load)	5 μJ
Analog Inputs (pins 3, 5)	−0.3 V to 6.3 V
Error Amp Output Sink current	10 mA
Power Dissipation at T_A < +25°C (D package)	1 W
Package thermal impedance, θ_{JA} (see Note 1): D (8-pin) package	97°C/W
Storage temperature range, T_{stg}	−65°C to 150°C
Lead temperature soldering 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

‡ Unless otherwise indicated, voltages are reference to ground and currents are positive into and negative out of the specified terminals.

NOTE 1: Long term high–temperature storage and/or extended use at maximum recommended operating conditions may result in a reduction of overall device life. See http://www.ti.com/ep_quality for additional information on enhanced plastic packaging.

electrical characteristics, T_A = −55°C to 125°C for the UC184xAM-EP, V_{CC} = 15 V (see Note 1), R_T = 10 kΩ, C_T = 3.3 nF, and T_A = T_J (unless otherwise stated)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Reference Section						
Output voltage	T_J = 25°C, I_O = 1 mA		4.95	5.0	5.05	V
Line regulation voltage	V_{IN} = 12 V to 25 V			6	20	mV
Load regulation voltage	I_O = 1 mA to 20 mA			6	25	mV
Temperature stability	See Notes 2 and 3			0.2	0.4	mV/°C
Total output variation voltage	Line, Load, Temp.		4.9		5.1	V
Output noise voltage	f = 10 Hz to 10 kHz, See Note 2	T_J = 25°C		50		μV
Long term stability	1000 hours, See Note 2	T_A = 125°C		5	25	mV
Output short-circuit current			−30	−100	−180	mA
Oscillator Section						
Initial accuracy	See Note 4	T_J = 25°C	47	52	57	kHz
Voltage stability	V_{CC} = 12 V to 25 V			0.2	1	%
Temperature stability	T_A = MIN to MAX, See Note 2			5		%
Amplitude peak-to-peak	V pin 7, See Note 2			1.7		V
Discharge current	V pin 7 = 2 V, See Note 5	T_J = 25°C	7.8	8.3	8.8	mA
		T_J = Full range	7.5		8.8	

electrical characteristics, T_A = –55°C to 125°C for the UC184xAM-EP, V_{CC} = 15 V (see Note 1), R_T = 10 kΩ, C_T = 3.3 nF, and T_A = T_J (unless otherwise stated)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Error Amplifier Section						
Input voltage	COMP = 2.5 V		2.45	2.5	2.55	V
Input bias current				–0.3	–1	µA
Open loop voltage gain (A_{VOL})	V_O = 2 V to 4 V		65	90		dB
Unity gain bandwidth	See Note 2	T_J = 25°C	0.7	1		MHz
PSRR	V_{CC} = 12 V to 25 V		60	70		dB
Output sink current	FB = 2.7 V, COMP = 1.1 V		2	6		mA
Output source current	FB = 2.3 V, COMP = 5 V		–0.5	–0.8		mA
V_{OUT} high	FB = 2.3 V, R_L = 15 kΩ to GND		5	6		V
V_{OUT} low	FB = 2.7 V, R_L = 15 kΩ to V_{REF}			0.7	1.1	V
Current Sense Section						
Gain	See Notes 6 and 7		2.85	3	3.15	V/V
Maximum input signal	COMP = 5 V, See Note 6		0.9	1	1.1	V
PSRR	V_{CC} = 12 V to 25 V, See Note 6			70		dB
Input bias current				–2	–10	µA
Delay to output	I_{SENSE} = 0 V to 2 V, See Note 2			150	300	ns
Output Section (OUT)						
Low-level output voltage	I_{OUT} = 20 mA			0.1	0.4	V
	I_{OUT} = 200 mA			15	2.2	
High-level output voltage	I_{OUT} = –20 mA		13	13.5		V
	I_{OUT} = –200 mA		12	13.5		
Rise time	C_L = 1 nF, See Note 2	T_J = 25°C		50	150	ns
Fall time	C_L = 1 nF, See Note 2	T_J = 25°C		50	150	ns
UVLO saturation	V_{CC} = 5 V, I_{OUT} = 10 mA			0.7	1.2	V
Undervoltage Lockout Section						
Start threshold		UC1842A, UC1844A	15	16	17	V
		UC1843A, UC1845A	7.8	8.4	9	
Minimum operation voltage after turn on		UC1842A, UC1844A	9	10	11	V
		UC1843A, UC1845A	7	7.6	8.2	

electrical characteristics, T_A = –55°C to 125°C for the UC184xAM-EP, V_{CC} = 15 V (see Note 1), R_T = 10 kΩ, C_T = 3.3 nF, and T_A = T_J (unless otherwise stated)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNITS
PWM Section						
Maximum duty cycle		UC1842A, UC1843A	94	96	100	%
		UC1844A, UC1845A	47	48	50	
Minimum duty cycle					0	%
Total Standby Current						
Start-up current				0.3	0.5	mA
Operating supply current	FB = 0 V, SENSE = 0 V			11	17	mA
V_{CC} internal zener voltage	I_{CC} = 25 mA		30	34		V

NOTES: 1. Adjust V_{CC} above the start threshold before setting at 15 V.
2. Not production tested.
3. Temperature stability, sometimes referred to as average temperature coefficient, is described by the equation:

Temp Stability = $\dfrac{V_{REF}\,(max) - V_{REF}\,(min)}{T_J\,(max) - T_J\,(min)}$. V_{REF} (max) and V_{REF} (min) are the maximum and minimum reference voltage

measured over the appropriate temperature range. Note that the extremes in voltage do not necessarily occur at the extremes in temperature.
4. Output frequency equals oscillator frequency for the UC1842A and UC1843A. Output frequency is one half oscillator frequency for the UC1844A and UC1845A.
5. This parameter is measured with R_T = 10 kΩ to V_{REF}. This contributes approximately 300 μA of current to the measurement. The total current flowing into the $R_{T/C}$ pin will be approximately 300 μA higher than the measured value.
6. Parameter measured at trip point of latch with V_{FB} at 0 V.
7. Gain is defined by: $A = \dfrac{\Delta V_{COMP}}{\Delta V_{SENSE}}$; $0 \le V_{SENSE} \le 0.8$ V.

PARAMETER MEASUREMENT INFORMATION
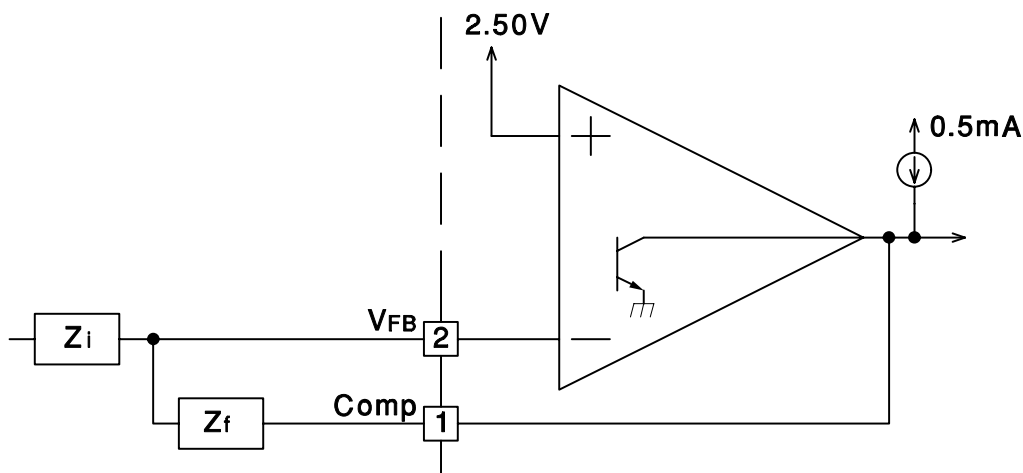
Error Amp can source and sink up to 0.5 mA, and sink up to 2 mA.

Figure 1. Error Amp Configuration

PARAMETER MEASUREMENT INFORMATION

	UC1842A UC1844A	UC1843A UC1845A
V_{ON}	16 V	8.4 V
V_{OFF}	10 V	7.6 V

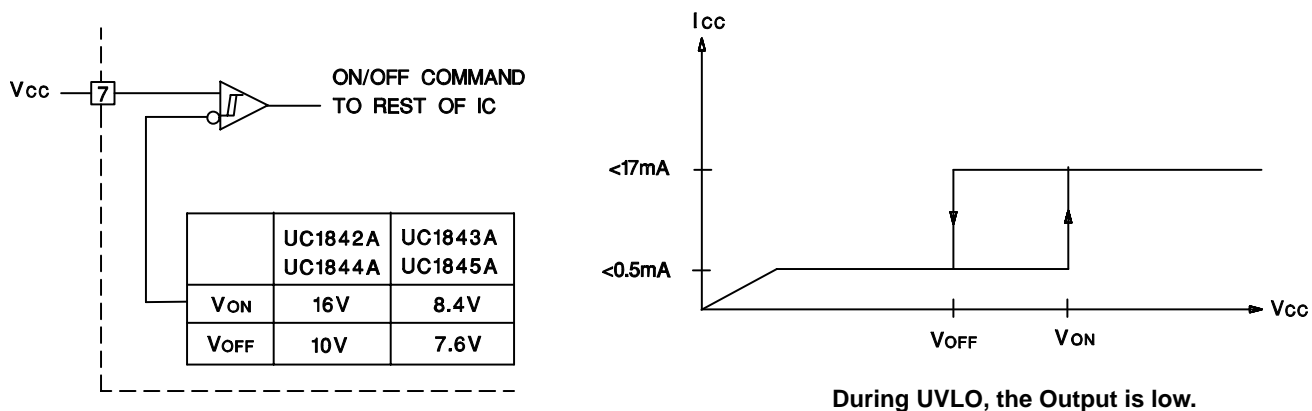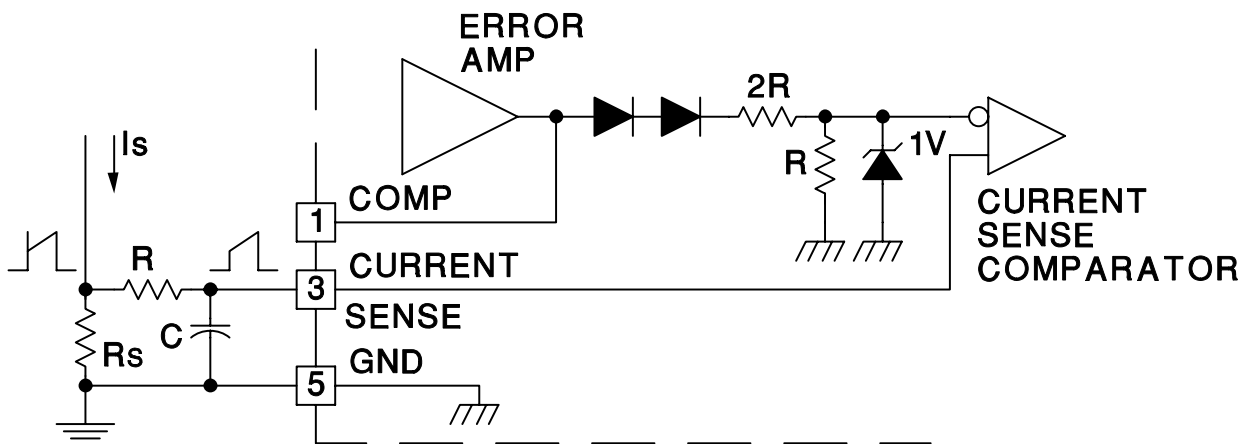**During UVLO, the Output is low.**

Figure 2. Under Voltage Lockout

Peak Current (Is) is Determined By The Formula:

$$\text{Ismax}' \frac{1.0V}{RS}$$

A small RC filter may be required to supress switch transients.

Figure 3. Current Sense Circuit

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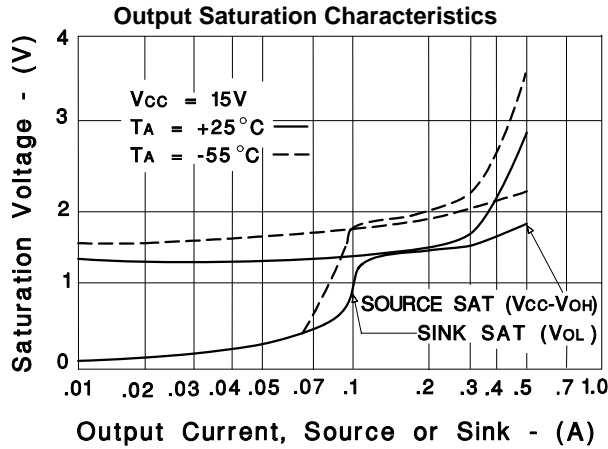POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

PARAMETER MEASUREMENT INFORMATION

Output Saturation Characteristics

$V_{CC} = 15V$
$T_A = +25°C$ ——
$T_A = -55°C$ - - -

SOURCE SAT ($V_{CC}-V_{OH}$)
SINK SAT (V_{OL})

Figure 4

Error Amplifier Open-Loop Frequency Response

φ

Av
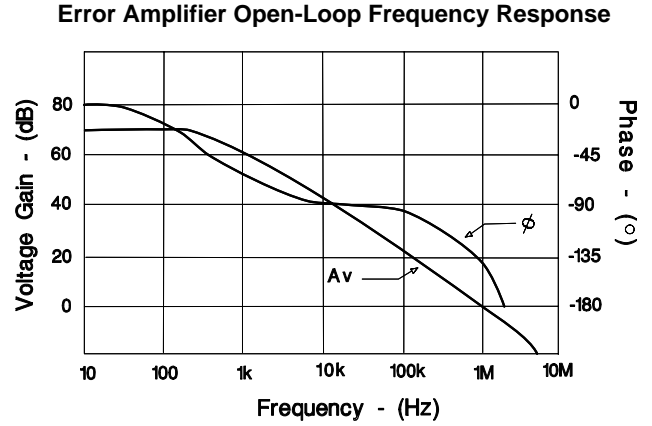
Figure 5

APPLICATION INFORMATION
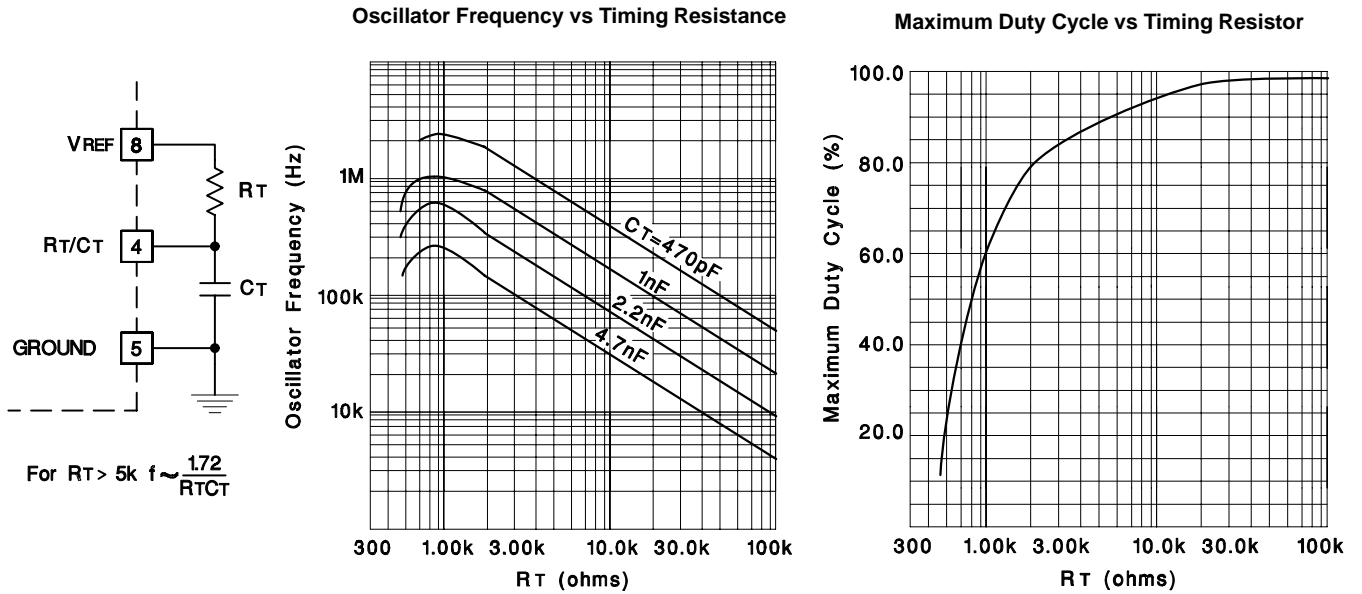
Oscillator Frequency vs Timing Resistance

VREF 8

RT/CT 4

GROUND 5

RT

CT

For $R_T > 5k$ $f \approx \dfrac{1.72}{R_T C_T}$

$C_T=470pF$
1nF
2.2nF
4.7nF

Maximum Duty Cycle vs Timing Resistor

Figure 6. Oscillator

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7

APPLICATION INFORMATION
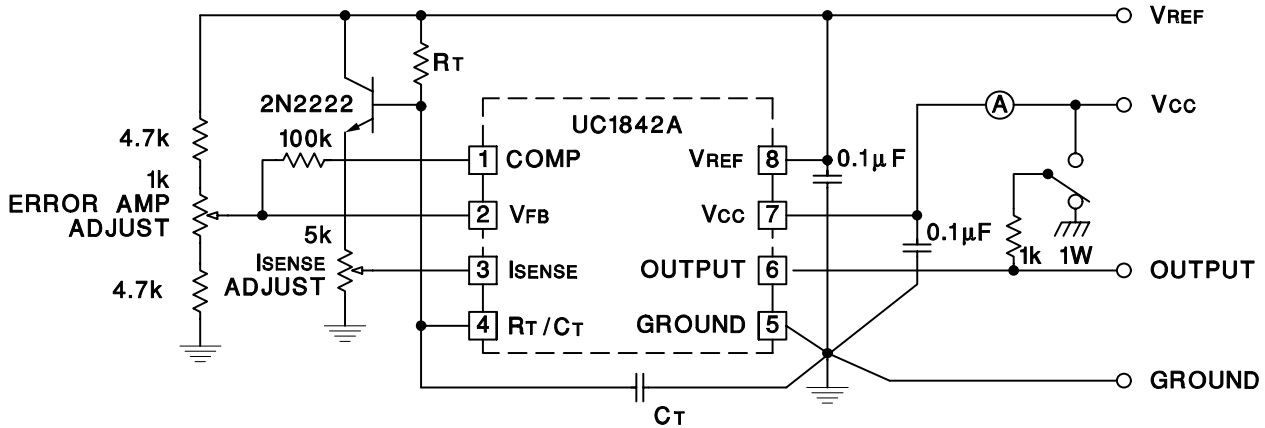
High peak currents associated with capacitive loads necessitate careful grounding techniques. Timing and bypass capacitors should be connected close to pin 5 in a single point ground. The transistor and 5k potentiometer are used to sample the oscillator waveform and apply an adjustable ramp to pin 3.

Figure 7. Open-Loop Laboratory Text Fixture
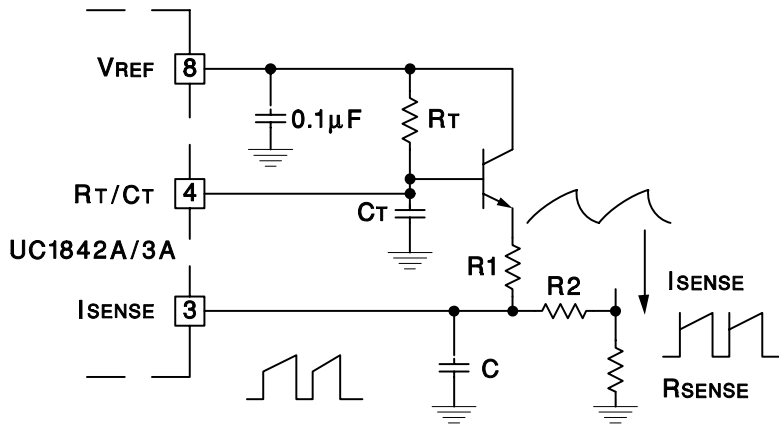
A fraction of the oscillator ramp can be resistively summed with the current sense signal to provide slope compensation for converters requiring duty cycles over 50%.

Note that capacitor, C, forms a filter with R2 to suppress the leading edge switch spikes.

Figure 8. Slope Complression

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APPLICATION INFORMATION
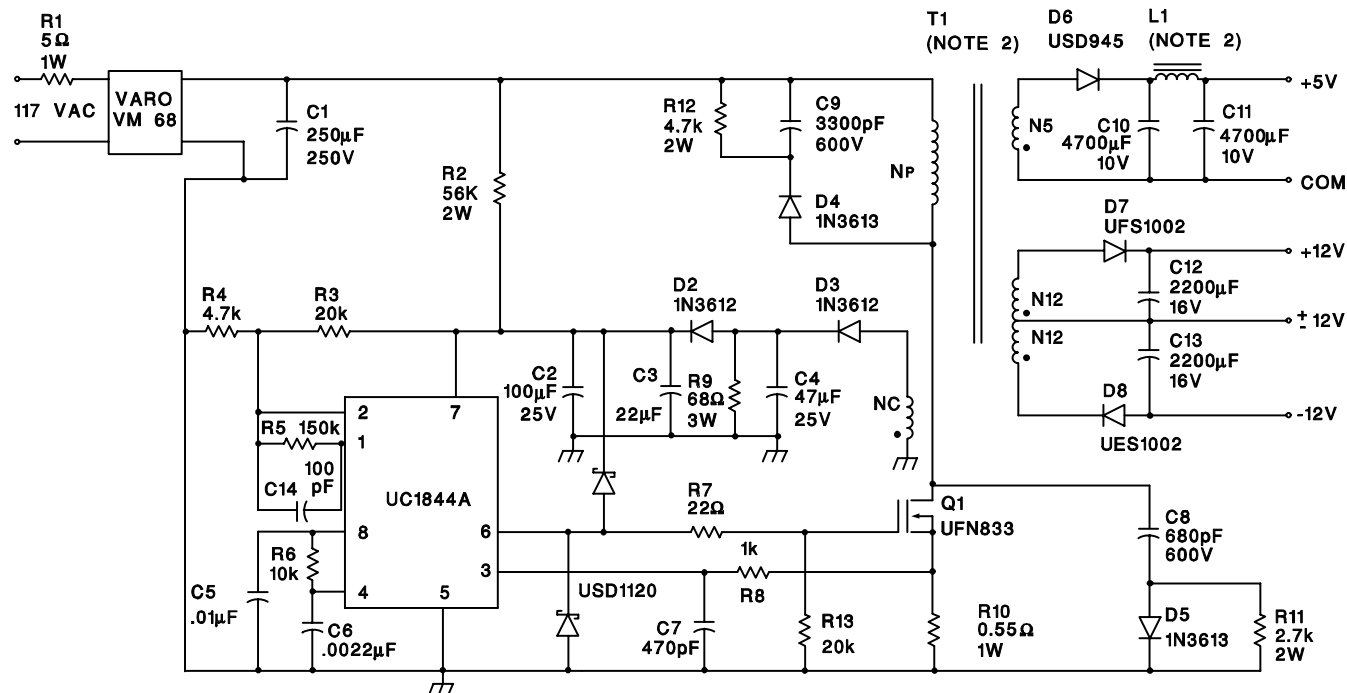
Power Supply Specifications

1. Input Voltage   95VAC to 130VAC (50Hz/60Hz)
2. Line Isolation   3750V
3. Switching Frequency   40 kHz
4. Efficiency, Full Load   70%
5. Output Voltage:
   A. +5V, $\pm$5%; 1A to 4A Load
   B. +12V, $\pm$3%; 0.1A to 0.3A Load Ripple voltage: 100 mV P-P Max
   C. −12V, $\pm$3%; 0.1A to 0.3A Load Ripple voltage: 100 mV P-P Max

Figure 9. Off-Line Flyback Regulator

MECHANICAL DATA

D (R-PDSO-G)**   **PLASTIC SMALL-OUTLINE PACKAGE**

8 PINS SHOWN
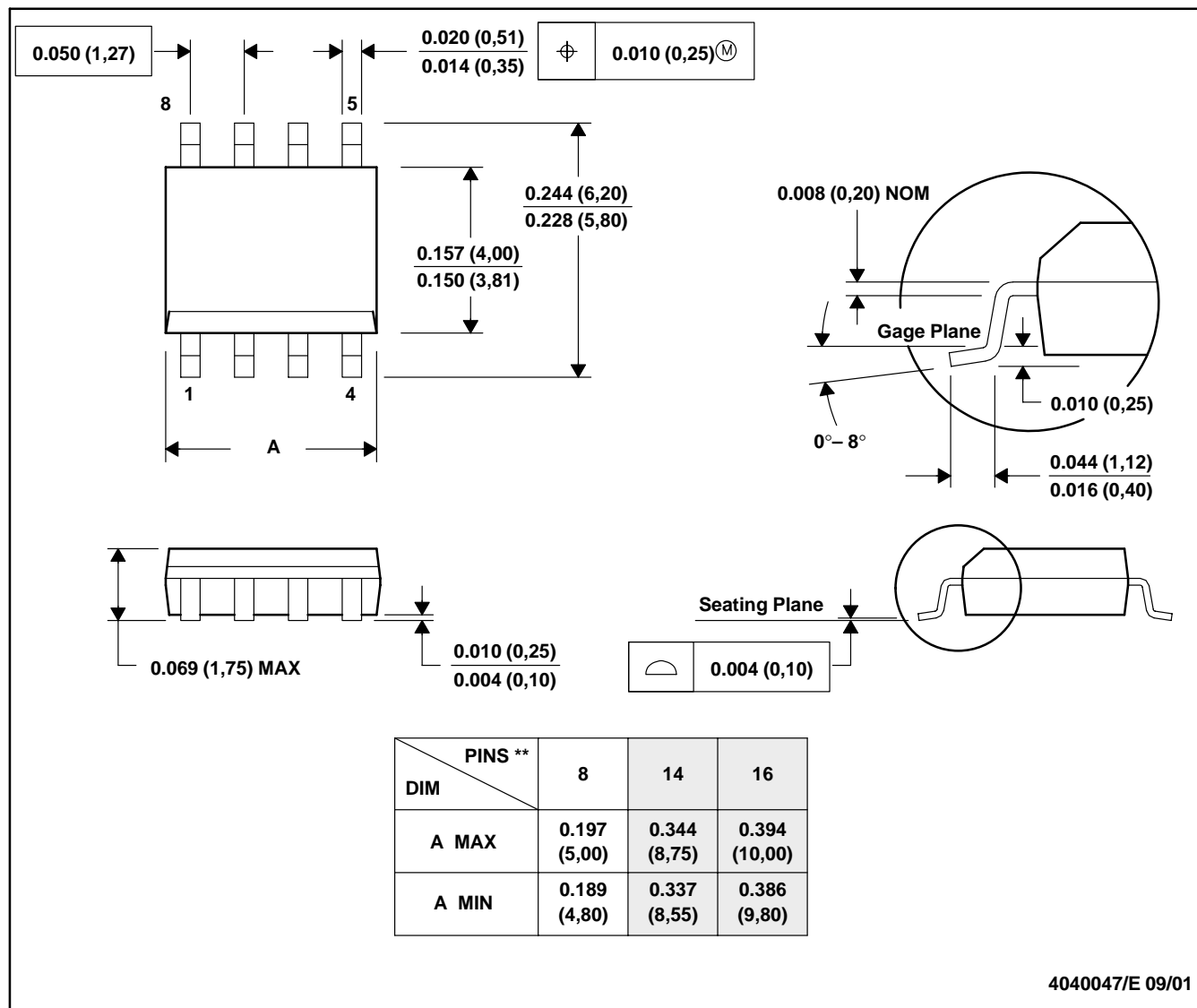
DIM \ PINS **	8	14	16
A MAX	0.197 (5,00)	0.344 (8,75)	0.394 (10,00)
A MIN	0.189 (4,80)	0.337 (8,55)	0.386 (9,80)

4040047/E 09/01

NOTES: A. All linear dimensions are in inches (millimeters).
        B. This drawing is subject to change without notice.
        C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).
        D. Falls within JEDEC MS-012

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PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
UC1842AMDREP	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
UC1843AMDREP	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
UC1844AMDREP	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
UC1845AMDREP	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/03625-01XE	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/03625-02XE	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/03625-03XE	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/03625-04XE	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

[2] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)
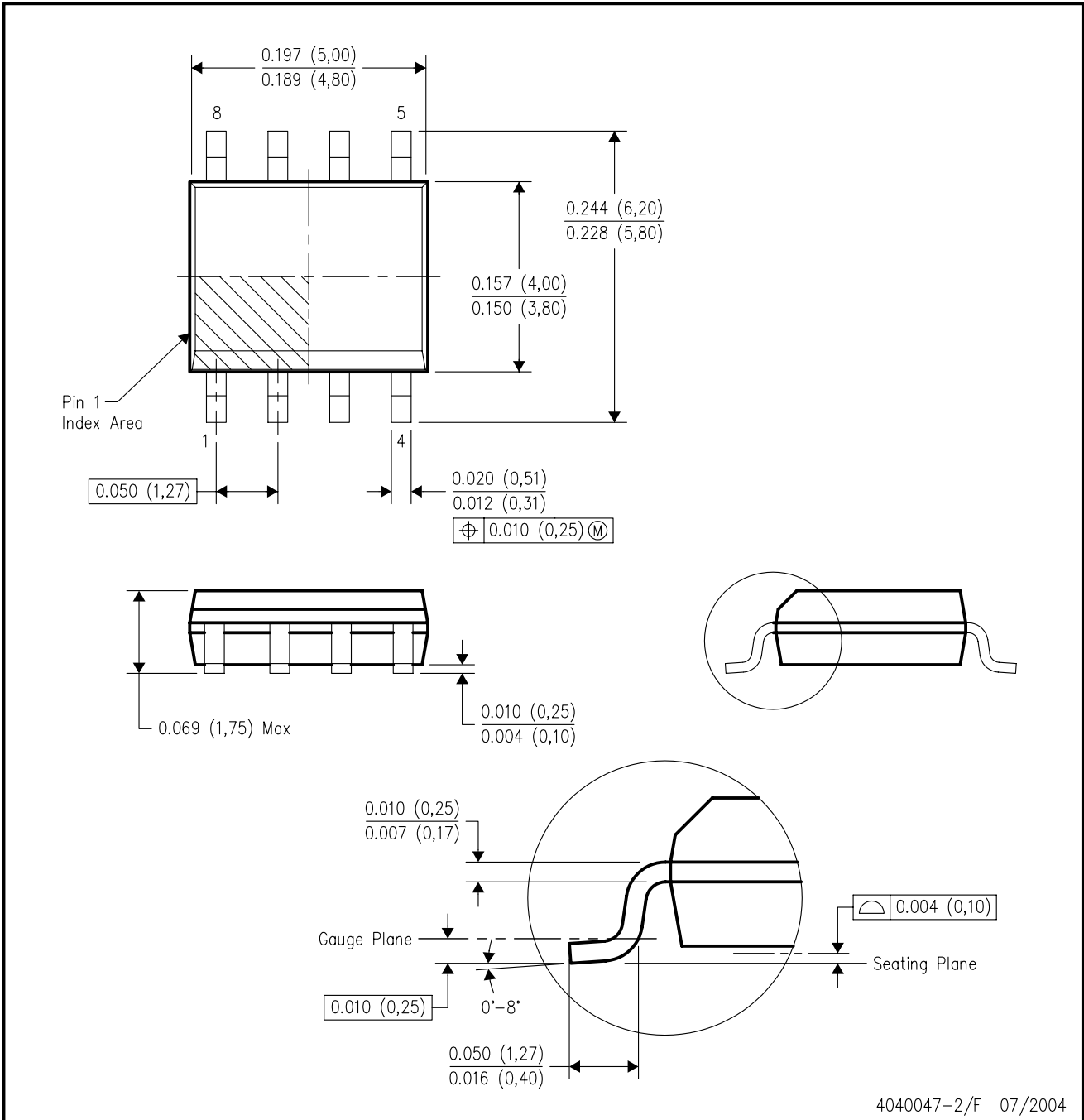
[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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D (R−PDSO−G8)   PLASTIC SMALL−OUTLINE PACKAGE

0.197 (5,00)
0.189 (4,80)

8   5

0.244 (6,20)
0.228 (5,80)

0.157 (4,00)
0.150 (3,80)

Pin 1
Index Area

1   4

0.050 (1,27)

0.020 (0,51)
0.012 (0,31)

⊕ 0.010 (0,25) Ⓜ

0.069 (1,75) Max

0.010 (0,25)
0.004 (0,10)

0.004 (0,10)

0.010 (0,25)
0.007 (0,17)

Gauge Plane

Seating Plane

0.010 (0,25)

0°−8°

0.050 (1,27)
0.016 (0,40)

4040047−2/F   07/2004

NOTES: A.   All linear dimensions are in inches (millimeters).
         B.   This drawing is subject to change without notice.
         C.   Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
         D.   Falls within JEDEC MS−012 variation AA.

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Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
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View ROHS Compliant Devices

clear gif

View RoHS Compliant Devices

UC1844A-EP, Status: ACTIVE
Military Enhanced Plastic Current Mode PWM Controller

clear gif

Features	Samples	Technical Documents
Quality & Pb-Free Data	Pricing/Packaging	Applications Notes
Related Products	Inventory	Simulation Models
Tools & Software	Symbols/Footprints	Reference Designs

Datasheet

Download Datasheet

Current-Mode PWM Controller (Rev. B) (uc1844a-ep.pdf, 515 KB)
03 Apr 2003 Download

	UC1844A	UC1844A-EP	UC2844A	UC3844A
Topology	Boost, Flyback, Forward		Boost, Buck, Flyback, Forward	Boost, Buck, Flyback, Forward
Control Method	Current Mode	Current Mode	Current Mode	Current Mode
Duty Cycle(Max)(%)	50	50	50	50
PWM Outputs(#)	1	1	1	1
Frequency(Max)(kHz)	450	500	450	450
UVLO Thresholds On/Off(V)	16/10	16/10	16/10	16/10
Pin/Package	20LCCC,8CDIP	8SOIC	14SOIC,8CDIP,8PDIP,8SOIC	14SOIC,8PDIP,8SOIC
Approx. 1KU Price (US$)	3.44	2.42	.9	.8
	Samples	Samples	Samples	Samples
	Inventory	Inventory	Inventory	Inventory

Product Information

| Features | | Save this to your personal library | |

Controlled Baseline
    One Assembly/Test Site, One Fabrication Site
Extended Temperature Performance of −55°C to 125°C
Enhanced Diminishing Manufacturing Sources (DMS) Support
Enhanced Product Change Notification

Qualification Pedigree [†]
Optimized for Off-line and DC to DC Converters
Low Start Up Current (<0.5 mA)
Trimmed Oscillator Discharge Current
Automatic Feed Forward Compensation
Pulse-by-Pulse Current Limiting
Enhanced Load Response Characteristics
Under-Voltage Lockout With Hysteresis
Double Pulse Suppression
High Current Totem Pole Output
Internally Trimmed Bandgap Reference
500 kHz Operation
Low R_O Error Amp

[†] Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

Description

The UC1842A/3A/4A/5A family of control ICs is a pin for pin compatible improved version of the UC3842/3/4/5 family. Providing the necessary features to control current mode switched mode power supplies, this family has the following improved features. Start up current is guaranteed to be less than 0.5 mA. Oscillator discharge is trimmed to 8.3 mA. During under voltage lockout, the output stage can sink at least 10 mA at less than 1.2 V for V_{CC} over 5 V.

The difference between members of this family are shown in the table below.

Pricing/Packaging/CAD Design Tools/Samples

				Price	Packaging			CAD Design Tools		Samples
Device	Status	Temp (°C)	DSCC #	Budget Price ($US) | QTY	Industry Standard (TI Pkg) | Pins	Top Side Marking	Standard Pack Quantity	Symbols	Footprints	Samples
UC1844AMDREP	ACTIVE	-55 to 125	V62/03625-03XE	2.42 | 1KU	SOIC (D) | 8	View	2500	☐	☐	Request Military Samples
V62/03625-03XE	ACTIVE	-55 to 125		2.42 | 1KU	SOIC (D) | 8	View	2500	☐	☐	Request Military Samples

Inventory

	TI Inventory Status			Reported Distributor Inventory			
UC1844AMDREP	As of 8:27 AM GMT, 25 Nov 2005			As of 8:27 AM GMT, 25 Nov 2005			
	In Stock	In Progress QTY | Date	Lead Time	Region	Company	In Stock	Purchase
	2500*	>10k | 28 Dec	8 Weeks	Americas	DigiKey	>1k	
V62/03625-03XE	As of 8:27 AM GMT, 25 Nov 2005			As of 8:27 AM GMT, 25 Nov 2005			
	In Stock	In Progress QTY | Date	Lead Time	Region	Company	In Stock	Purchase
	2500*	>10k | 28 Dec	8 Weeks	None Reported View Distributors			

View all Distributors

Choose a Region

⚠

* Our information is updated daily, so please check back with us soon if this does not meet your needs. You may also contact your TI Authorized Distributor, including those listed above, for real time stock information.

** Lead time information is not available at this time. However, our information is updated daily so please check back with us soon. Please contact your preferred TI Authorized Distributor for additional information.

Quality & Lead (Pb)-Free Data

	Product Content				MTBF/FIT Rate
Device	Eco Plan*	Lead/Ball Finish	MSL Rating/Peak Reflow	Details	Details
UC1844AMDREP ☐	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
V62/03625-03XE ☐	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View

* The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please click on the Product Content Details "View" link in the table above for the latest availability information and additional product content details.

If the information you are requesting is not available online at this time, contact one of our Product Information Centers regarding the availability of this information.

Technical Documents

Datasheets

Keep track of what's new

Current-Mode PWM Controller (Rev. B) (uc1844a-ep.pdf, 515 KB)

03 Apr 2003 Download

Application Notes

View Application Notes for PWM Power Supply Controllers

Related Products

i2 Technologies US, Inc.

HTML Pages converted to PDF Document

This document contain component information from the manufacturer's website which are not available in a revision controlled document from the manufacturer. To facilitate the addition of these parts into the Electronics Database, we are converting the HTML pages related to that part, from the manufacturer's website into Adobe PDF format. The contents of this document is based on the information provided on the manufacturer's website, therefore the information may have been changed by the manufacturer since this was created.

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