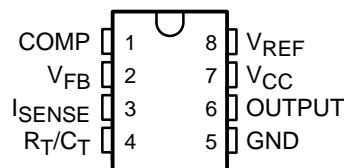


# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

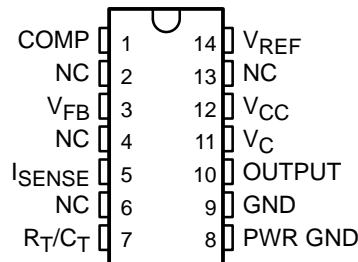
SGLS164 – APRIL 2003

- Extended Temperature Performance of  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- Optimized for Off-line and DC to DC Converters
- Low Start Up Current ( $<0.5\text{ mA}$ )
- 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

D 8-PIN PACKAGE  
(TOP VIEW)



D 14-PIN PACKAGE  
(TOP VIEW)



## description

The UC2842A/3A/4A/5A family of control ICs is a pin for pin compatible improved version of the UC2842/3/4/5 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
UC2842A	16 V	10 V	<100%
UC2843A	8.5 V	7.9 V	<100%
UC2844A	16 V	10 V	<50%
UC2845A	8.5 V	7.9 V	<50%



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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2003, Texas Instruments Incorporated

# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

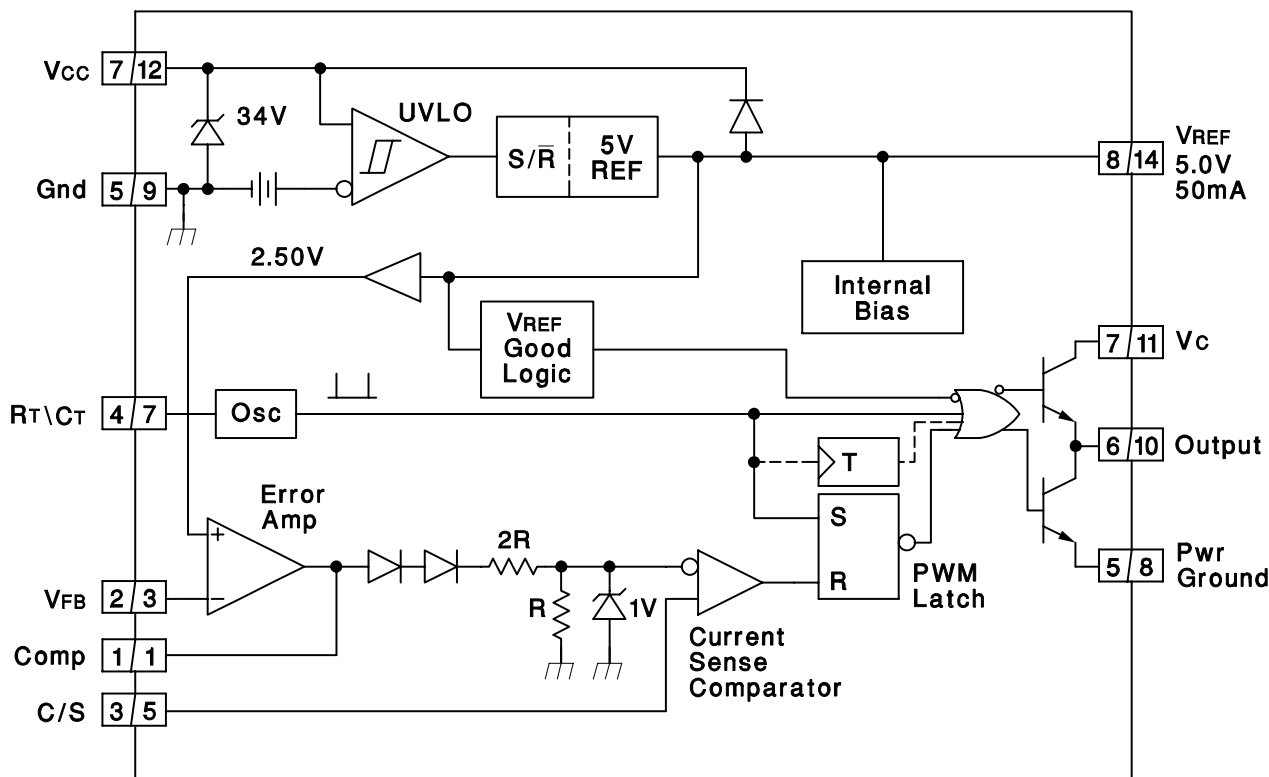
SGLS164 – APRIL 2003

## ORDERING INFORMATION†

TA	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 125°C	SOIC-8 – D8	Tape and reel	UC2842AQD8R	2842AQ
	SOIC-8 – D8	Tube	UC2842AQD8	2842AQ
	SOIC-14 – D	Tape and reel	UC2842AQDR	2842AQ
	SOIC-14 – D	Tube	UC2842AQD	2842AQ
	SOIC-8 – D8	Tape and reel	UC2843AQD8R	2843AQ
	SOIC-8 – D8	Tube	UC2843AQD8	2843AQ
	SOIC-14 – D	Tape and reel	UC2843AQDR	2843AQ
	SOIC-14 – D	Tube	UC2843AQD	2843AQ
	SOIC-8 – D8	Tape and reel	UC2844AQD8R	2844AQ
	SOIC-8 – D8	Tube	UC2844AQD8	2844AQ
	SOIC-14 – D	Tape and reel	UC2844AQDR	2844AQ
	SOIC-14 – D	Tube	UC2844AQD	2844AQ
	SOIC-8 – D8	Tape and reel	UC2845AQD8R	2845AQ
	SOIC-8 – D8	Tube	UC2845AQD8	2845AQ
	SOIC-14 – D	Tape and reel	UC2845AQDR	2845AQ
	SOIC-14 – D	Tube	UC2845AQD	2845AQ

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

## block diagram

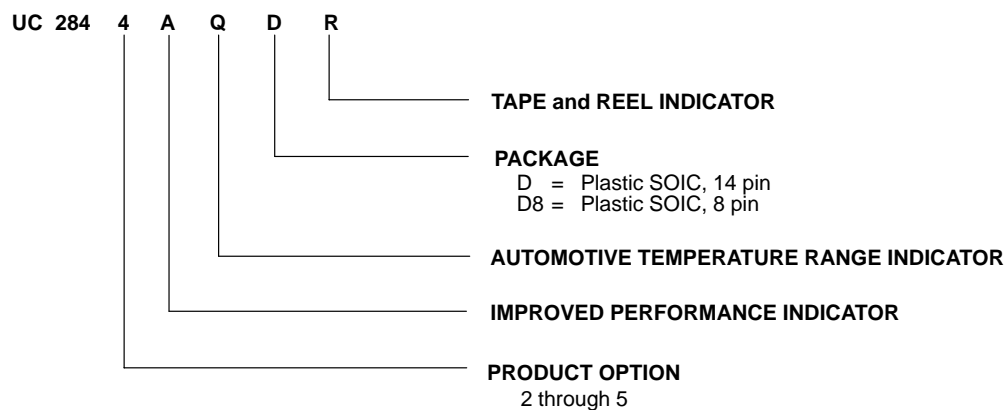


- NOTES: 1. A = DIL-8 Pin Number. B = SO-14 Pin Number.  
2. Toggle flip flop used only in 2844A and 2845A.

# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

SGLS164 – APRIL 2003

## Ordering Information



# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

SGLS164 – APRIL 2003

## 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, $I_O$	$\pm 1$ A
Output energy (capacitive load)	5 $\mu$ J
Analog Inputs (pins 3, 5)	-0.3 V to 6.3 V
Error Amp Output Sink current	10 mA
Power Dissipation at $T_A < +25^\circ\text{C}$ (D package)	1 W
Package thermal impedance, $\theta_{JA}$ (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](http://www.ti.com/ep_quality) for additional information on enhanced plastic packaging.

## electrical characteristics, $T_A = -40^\circ\text{C}$ to $125^\circ\text{C}$ , $V_{CC} = 15\text{ V}$ (see Note 1), $R_T = 10\text{ k}\Omega$ , $C_T = 3.3\text{ nF}$ , and $T_A = T_J$ (unless otherwise stated)

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



# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

SGLS164 – APRIL 2003

electrical characteristics,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ ,  $V_{CC} = 15\text{ V}$  (see Note 1),  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , and  $T_A = T_J$  (unless otherwise stated)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNITS	
<b>Error Amplifier Section</b>							
Input voltage	COMP = 2.5 V		2.45	2.5	2.55	V	
Input bias current				-0.3	-1	$\mu\text{A}$	
Open loop voltage gain ( $A_{VOL}$ )	$V_O = 2\text{ V}$ to $4\text{ V}$		65	90		dB	
Unity gain bandwidth	See Note 2	$T_J = 25^\circ\text{C}$	0.7	1		MHz	
PSRR	$V_{CC} = 12\text{ V}$ to $25\text{ V}$		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,	$R_L = 15\text{ k}\Omega$ to GND	5	6		V	
$V_{OUT}$ low	FB = 2.7 V,	$R_L = 15\text{ k}\Omega$ to $V_{REF}$		0.7	1.1	V	
<b>Current Sense Section</b>							
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	$V_{CC} = 12\text{ V}$ to $25\text{ V}$ , See Note 6			70		dB	
Input bias current				-2	-10	$\mu\text{A}$	
Delay to output	$I_{SENSE} = 0\text{ V}$ to $2\text{ V}$ ,	See Note 2		150	300	ns	
<b>Output Section (OUT)</b>							
Low-level output voltage	$I_{OUT} = 20\text{ mA}$			0.1	0.4	V	
	$I_{OUT} = 200\text{ mA}$			15	2.2		
High-level output voltage	$I_{OUT} = -20\text{ mA}$		13	13.5		V	
	$I_{OUT} = -200\text{ mA}$		12	13.5			
Rise time	$C_L = 1\text{ nF}$ ,	See Note 2	$T_J = 25^\circ\text{C}$	50	150	ns	
Fall time	$C_L = 1\text{ nF}$ ,	See Note 2	$T_J = 25^\circ\text{C}$	50	150	ns	
UVLO saturation	$V_{CC} = 5\text{ V}$ ,	$I_{OUT} = 10\text{ mA}$		0.7	1.2	V	
<b>Undervoltage Lockout Section</b>							
Start threshold			UC2842A, UC2844A	15	16	17	V
			UC2843A, UC2845A	7.8	8.4	9	
Minimum operation voltage after turn on			UC2842A, UC2844A	9	10	11	V
			UC2843A, UC2845A	7	7.6	8.2	



# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

SGLS164 – APRIL 2003

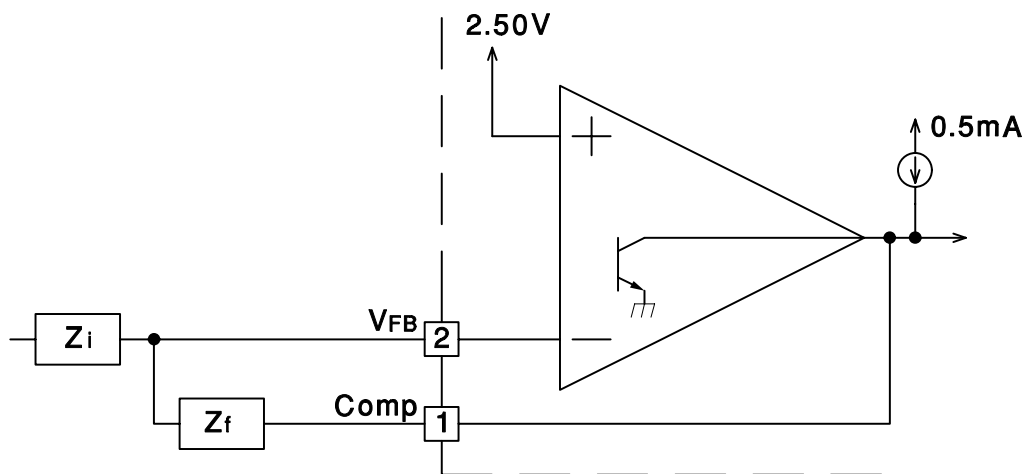
electrical characteristics,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ ,  $V_{CC} = 15\text{ V}$  (see Note 1),  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , and  $T_A = T_J$  (unless otherwise stated)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
<b>PWM Section</b>					
Maximum duty cycle	UC2842A, UC2843A	94	96	100	%
	UC2844A, UC2845A	47	48	50	
Minimum duty cycle				0	%
<b>Total Standby Current</b>					
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	$I_{CC} = 25\text{ mA}$	30	34		V

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

$$\text{Temp Stability} = \frac{V_{REF}(\text{max}) - V_{REF}(\text{min})}{T_J(\text{max}) - T_J(\text{min})}$$
 $V_{REF}(\text{max})$  and  $V_{REF}(\text{min})$  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.
  - Output frequency equals oscillator frequency for the UC2842A and UC2843A. Output frequency is one half oscillator frequency for the UC2844A and UC2845A.
  - This parameter is measured with  $R_T = 10\text{ k}\Omega$  to  $V_{REF}$ . This contributes approximately  $300\text{ }\mu\text{A}$  of current to the measurement. The total current flowing into the  $R_T/C$  pin will be approximately  $300\text{ }\mu\text{A}$  higher than the measured value.
  - Parameter measured at trip point of latch with  $V_{FB}$  at 0 V.
  - Gain is defined by:  $A = \frac{\Delta V_{COMP}}{\Delta V_{SENSE}}$ ;  $0 \leq V_{SENSE} \leq 0.8\text{ V}$ .

## 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

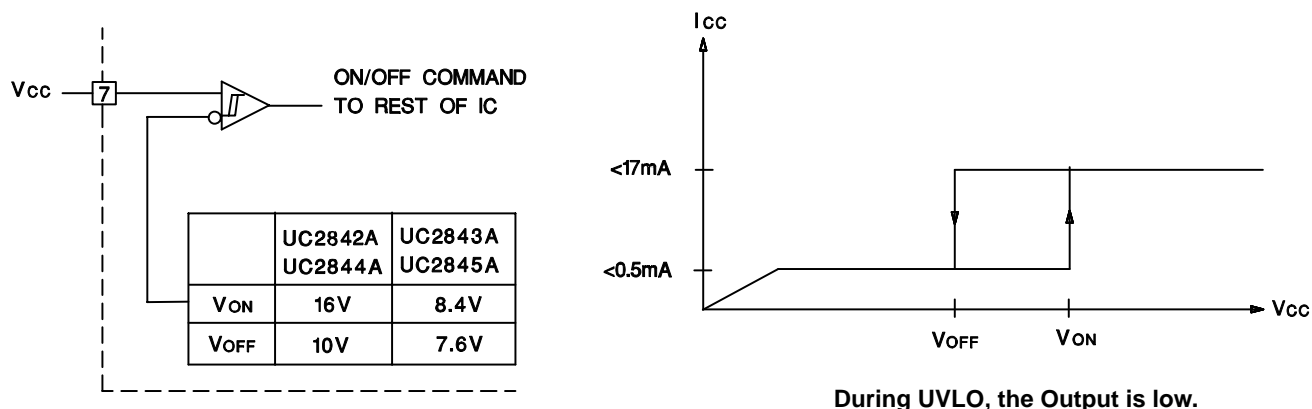
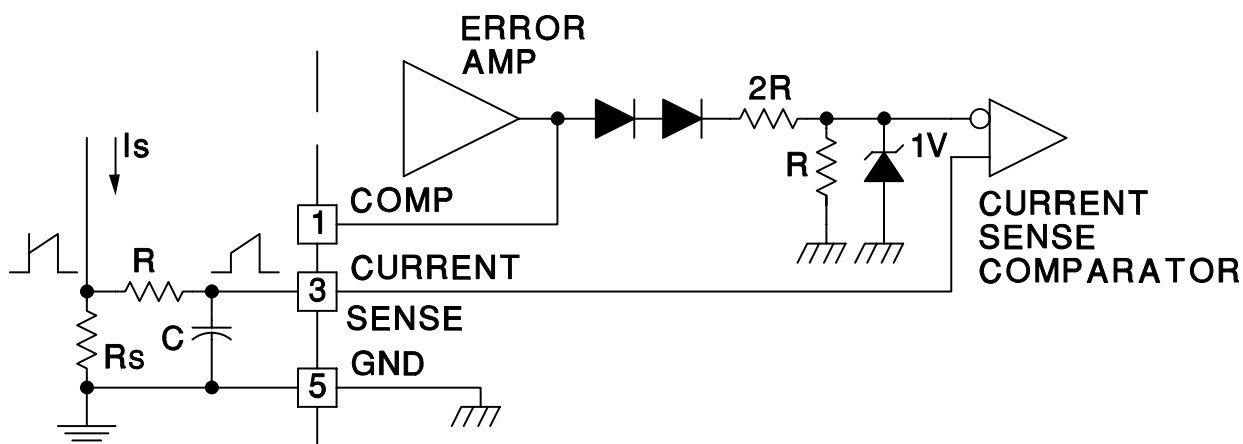


Figure 2. Under Voltage Lockout



Peak Current (Is) is Determined By The Formula:

$$I_{smax} = \frac{1.0V}{R_S}$$

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

Figure 3. Current Sense Circuit

# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

SGLS164 – APRIL 2003

## PARAMETER MEASUREMENT INFORMATION

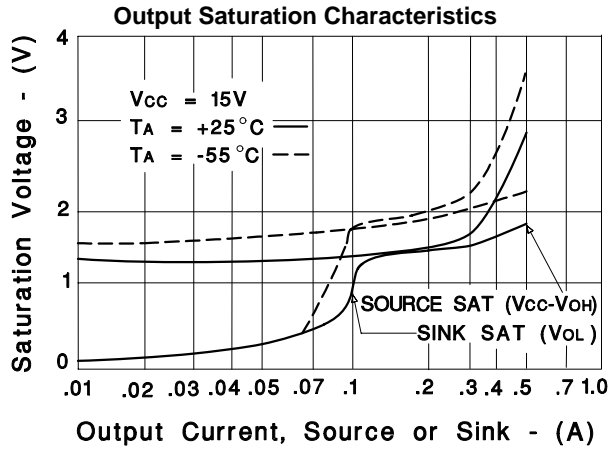


Figure 4

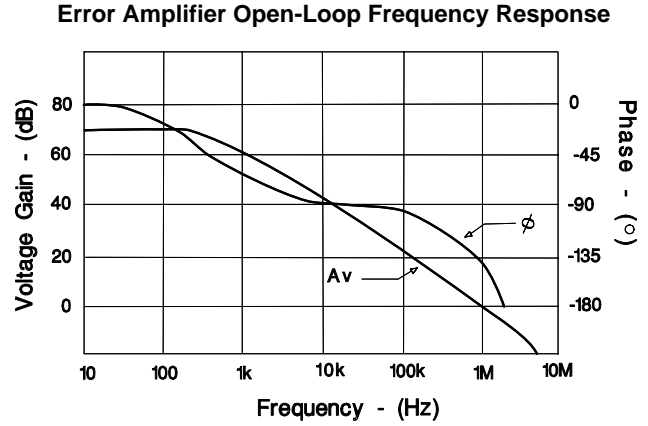


Figure 5

## APPLICATION INFORMATION

AP

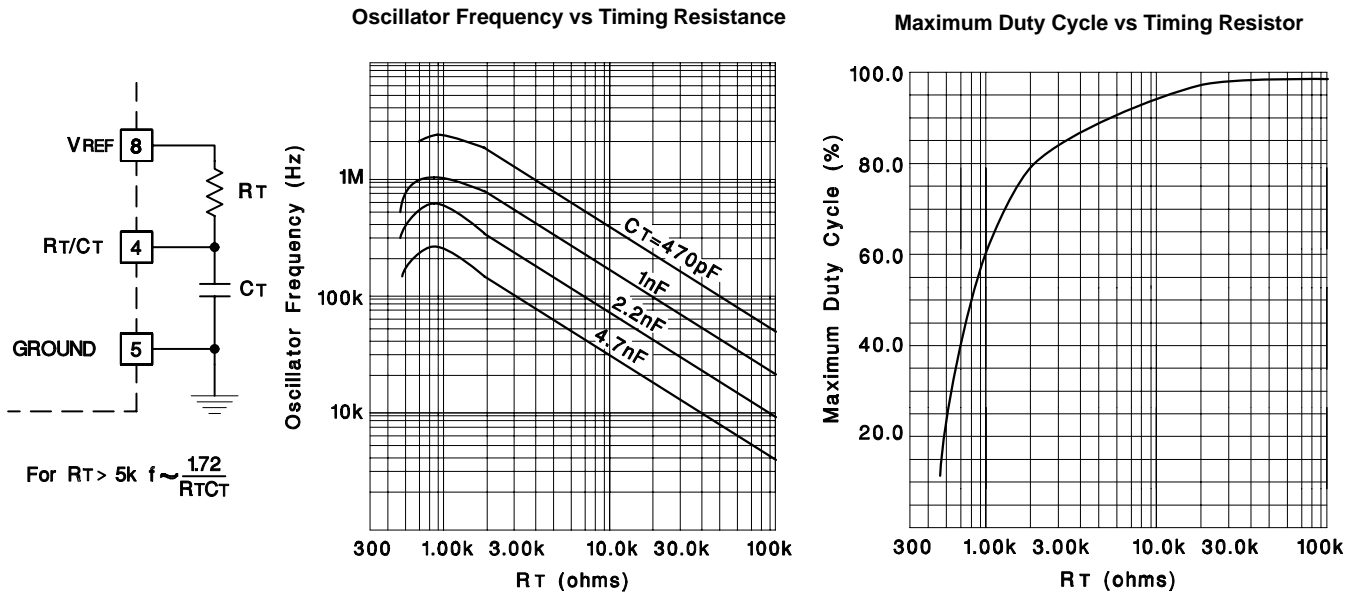
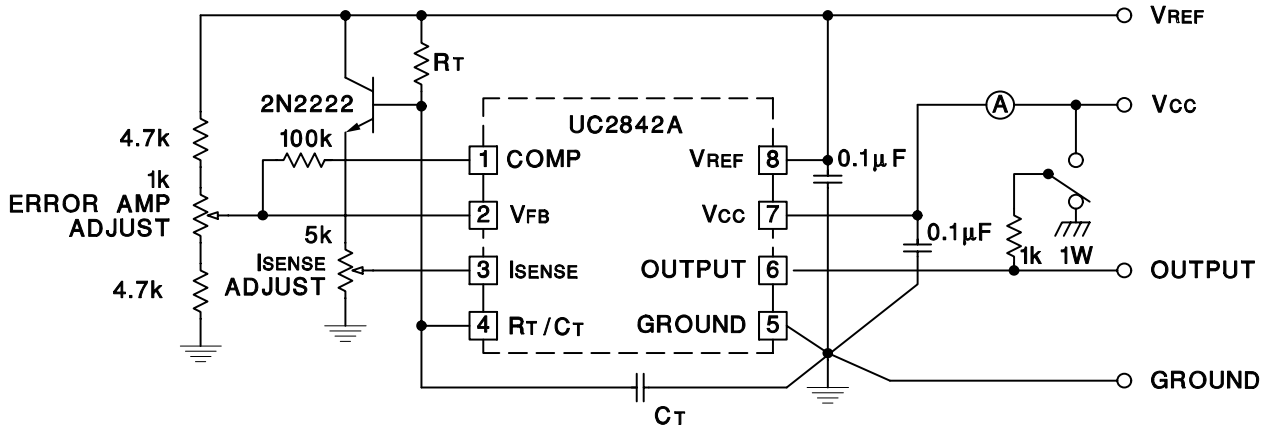


Figure 6. Oscillator

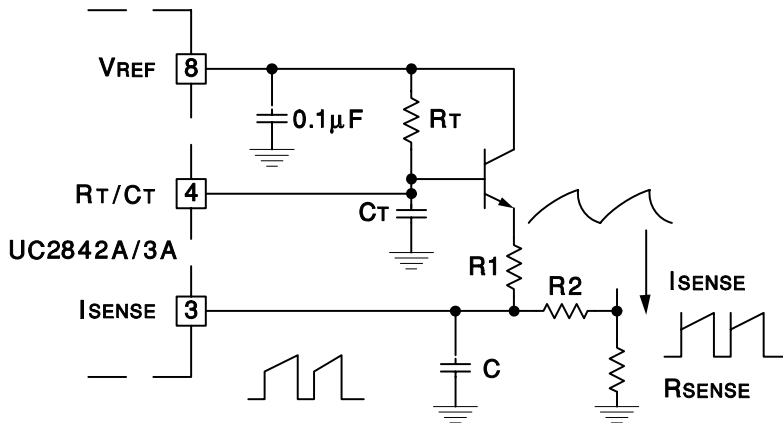


APPLICATION INFORMATION



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



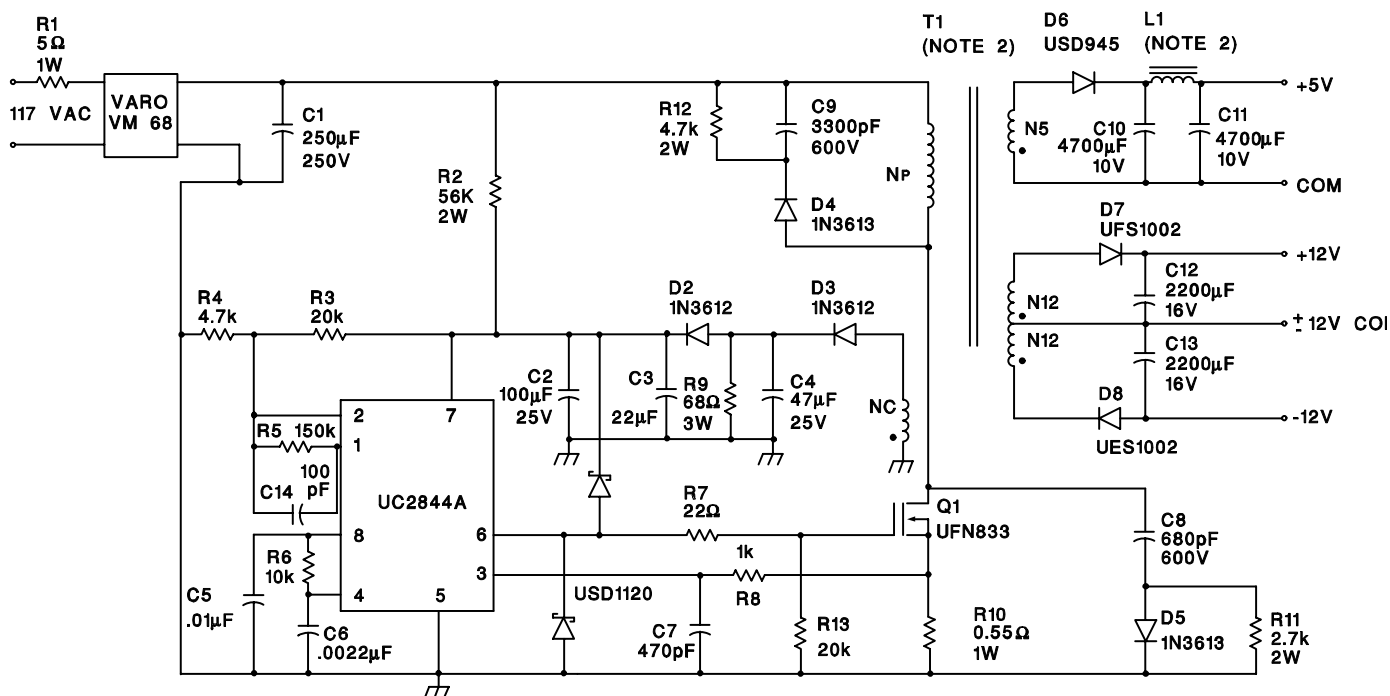
A fraction of the oscillator ramp can be resistively summed with the current sense signal to provide slope compensation for converters requiring duty cycles over 50%. Note that capacitor, C, forms a filter with R2 to suppress the leading edge switch spikes.

Figure 8. Slope Compression

# UC2842AQ, UC2843AQ, UC2844AQ, UC2845AQ CURRENT-MODE PWM CONTROLLER

SGLS164 – APRIL 2003

## 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

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
UC2842AQD8	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2842AQ ~ UC2842AQ)	<a href="#">Samples</a>
UC2842AQD8R	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2842AQ ~ UC2842AQ)	<a href="#">Samples</a>
UC2842AQDR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2842AQ ~ UC2842AQ)	<a href="#">Samples</a>
UC2843AQD8	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2843AQ ~ UC2843AQ)	<a href="#">Samples</a>
UC2843AQD8G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2843AQ ~ UC2843AQ)	<a href="#">Samples</a>
UC2843AQD8R	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2843AQ ~ UC2843AQ)	<a href="#">Samples</a>
UC2843AQD8RG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2843AQ ~ UC2843AQ)	<a href="#">Samples</a>
UC2843AQDR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2843AQ ~ UC2843AQ)	<a href="#">Samples</a>
UC2845AQD8	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2845AQ ~ UC2845AQ)	<a href="#">Samples</a>
UC2845AQD8R	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2845AQ ~ UC2845AQ)	<a href="#">Samples</a>
UC2845AQDR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(2845AQ ~ UC2845AQ)	<a href="#">Samples</a>

(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), Pb-Free (RoHS Exempt), 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.

---

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**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)

<sup>(3)</sup> MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
UC2842AQD8R	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UC2842AQDR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
UC2843AQD8R	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UC2843AQDR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
UC2845AQD8R	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UC2845AQDR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UC2842AQD8R	SOIC	D	8	2500	367.0	367.0	35.0
UC2842AQDR	SOIC	D	14	2500	367.0	367.0	38.0
UC2843AQD8R	SOIC	D	8	2500	367.0	367.0	35.0
UC2843AQDR	SOIC	D	14	2500	367.0	367.0	38.0
UC2845AQD8R	SOIC	D	8	2500	367.0	367.0	35.0
UC2845AQDR	SOIC	D	14	2500	367.0	367.0	38.0

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4040047-5/M 06/11

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE

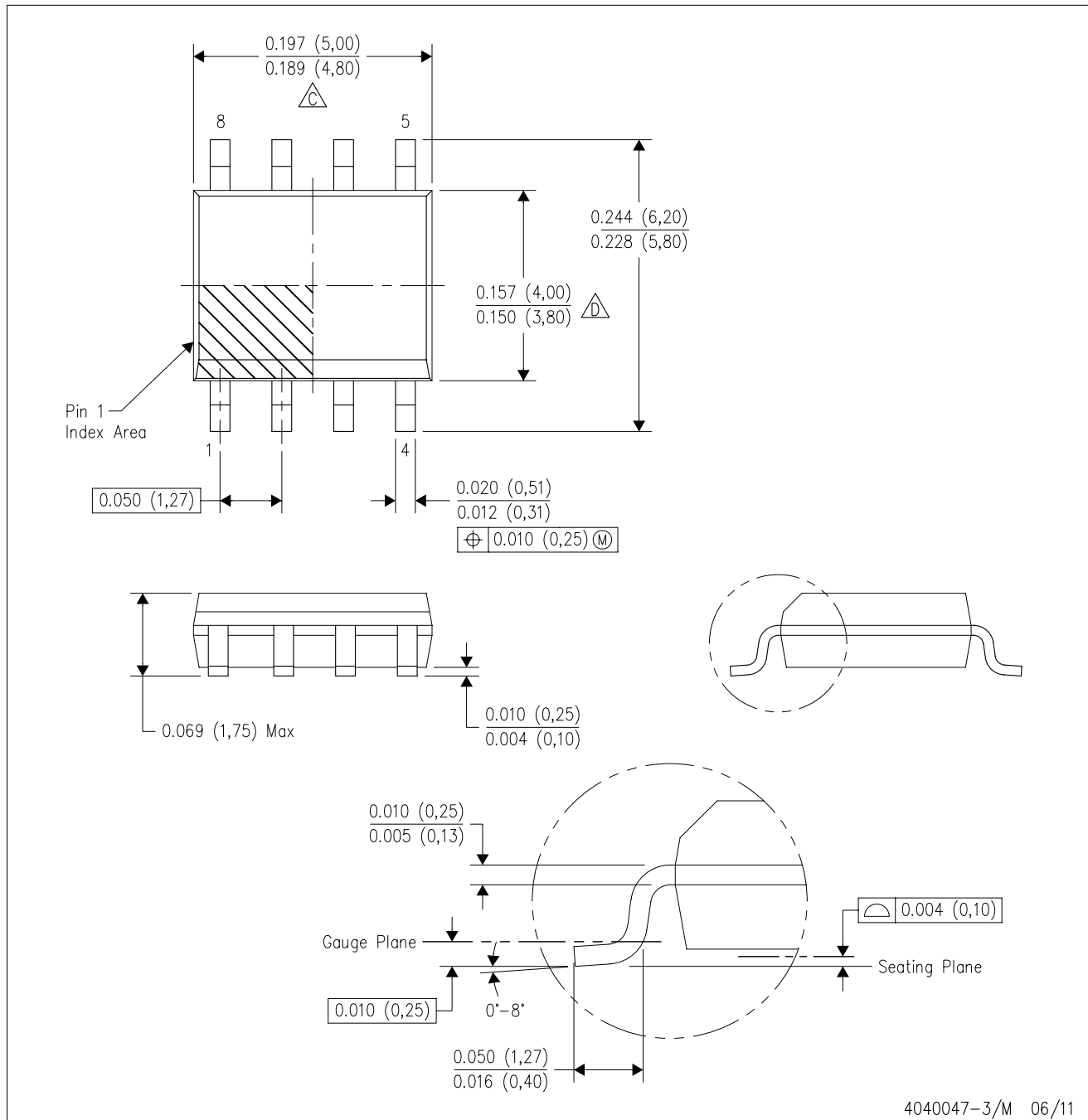


- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AA.

D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

## IMPORTANT NOTICE

Texas Instruments Incorporated (TI) reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

TI's published terms of sale for semiconductor products (<http://www.ti.com/sc/docs/stdterms.htm>) apply to the sale of packaged integrated circuit products that TI has qualified and released to market. Additional terms may apply to the use or sale of other types of TI products and services.

Reproduction of significant portions of TI information in TI data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such reproduced documentation. Information of third parties may be subject to additional restrictions. Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyers and others who are developing systems that incorporate TI products (collectively, "Designers") understand and agree that Designers remain responsible for using their independent analysis, evaluation and judgment in designing their applications and that Designers have full and exclusive responsibility to assure the safety of Designers' applications and compliance of their applications (and of all TI products used in or for Designers' applications) with all applicable regulations, laws and other applicable requirements. Designer represents that, with respect to their applications, Designer has all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. Designer agrees that prior to using or distributing any applications that include TI products, Designer will thoroughly test such applications and the functionality of such TI products as used in such applications.

TI's provision of technical, application or other design advice, quality characterization, reliability data or other services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using TI Resources in any way, Designer (individually or, if Designer is acting on behalf of a company, Designer's company) agrees to use any particular TI Resource solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

Designer is authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY DESIGNER AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Unless TI has explicitly designated an individual product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949 and ISO 26262), TI is not responsible for any failure to meet such industry standard requirements.

Where TI specifically promotes products as facilitating functional safety or as compliant with industry functional safety standards, such products are intended to help enable customers to design and create their own applications that meet applicable functional safety standards and requirements. Using products in an application does not by itself establish any safety features in the application. Designers must ensure compliance with safety-related requirements and standards applicable to their applications. Designer may not use any TI products in life-critical medical equipment unless authorized officers of the parties have executed a special contract specifically governing such use. Life-critical medical equipment is medical equipment where failure of such equipment would cause serious bodily injury or death (e.g., life support, pacemakers, defibrillators, heart pumps, neurostimulators, and implantables). Such equipment includes, without limitation, all medical devices identified by the U.S. Food and Drug Administration as Class III devices and equivalent classifications outside the U.S.

TI may expressly designate certain products as completing a particular qualification (e.g., Q100, Military Grade, or Enhanced Product). Designers agree that it has the necessary expertise to select the product with the appropriate qualification designation for their applications and that proper product selection is at Designers' own risk. Designers are solely responsible for compliance with all legal and regulatory requirements in connection with such selection.

Designer will fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of Designer's non-compliance with the terms and provisions of this Notice.