

FEATURES

- **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 ⁽¹⁾**
- **Enhanced Replacements for UC2842A Family With Pin-to-Pin Compatibility**
- **1 MHz Operation**
- **50 μA Standby Current, 100 μA Maximum**

(1) 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.

- **Low Operating Current of 2.3 mA at 52 kHz**
- **Fast 35 ns Cycle-by-Cycle Overcurrent Limiting**
- **± 1 A Peak Output Current**
- **Rail-to-Rail Output Swings With 25 ns Rise and 20 ns Fall Times**
- **$\pm 1\%$ Initial Trimmed 2.5 V Error Amplifier Reference**
- **Trimmed Oscillator Discharge Current**
- **New Undervoltage Lockout Versions**
- **MSOP-8 Package Minimizes Board Space**

APPLICATIONS

- **Switch Mode Power Supplies**
- **DC-to-DC Converters**
- **Board Mount Power Modules**

DESCRIPTION

The UCC28C4x family are high performance current mode PWM controllers. They are enhanced BiCMOS versions with pin-for-pin compatibility to the industry standard UC284xA family and UC284x family of PWM controllers. In addition, lower startup voltage versions of 7 V are offered as UCC28C40 and UCC28C41.

Providing necessary features to control fixed frequency, peak current mode power supplies, this family offers several performance advantages. These devices offer high frequency operation up to 1 MHz with low start up and operating currents, thus minimizing start up loss and low operating power consumption for improved efficiency. The devices also feature a fast current sense to output delay time of 35 ns, and a ± 1 A peak output current capability with improved rise and fall times for driving large external MOSFETs directly.

The UCC28C4x family is offered in 8-pin package SOIC (D).



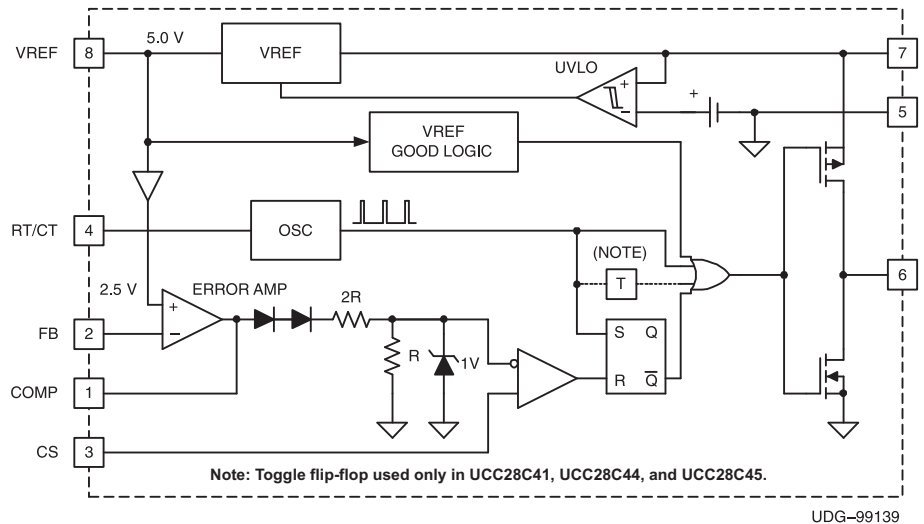
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

AVAILABLE OPTIONS

T_A	MAXIMUM DUTY CYCLE	UVLO ON/OFF	SOIC-8 SMALL OUTLINE (D) ⁽¹⁾
-55°C to 125°C	100%	14.5 V/9 V	UCC28C42MDREP ⁽²⁾
		8.4 V/7.6 V	UCC28C43MDREP
		7 V/6.6 V	UCC28C40MDREP ⁽²⁾
	50%	14.5 V/9 V	UCC28C44MDREP ⁽²⁾
		8.4 V/7.6 V	UCC28C45MDREP
		7 V/6.6 V	UCC28C41MDREP ⁽²⁾

- (1) D (SOIC-8) packages are available taped and reeled. Add R suffix to device type (e.g., UCC28C42DREP) to order quantities of 2500 devices per reel. Tube quantities are 75 for D packages (SOIC-8).
(2) Product Preview

FUNCTIONAL BLOCK DIAGRAM



Absolute Maximum Ratings⁽¹⁾⁽²⁾

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
Supply voltage	VDD		20	V
	Max I _{CC}		30	mA
Output current, I _{OUT} peak			±1	A
Output energy, capacitive load			5	μJ
Voltage rating	COMP, CS, FB	-0.3	6.3	V
	OUT	-0.3	20	
	RT/CT	-0.3	6.3	
	VREF		7	
Error amplifier output sink current			10	mA
T _J	Operating junction temperature range ⁽³⁾	-55	150	°C
T _{stg}	Storage temperature range	-65	150	°C
Lead temperature (soldering, 10 s)			300	°C

- (1) 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.
- (2) All voltages are with respect to ground. Currents are positive into and negative out of the specified terminals.
- (3) 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 about enhanced plastic packaging.

Dissipation Ratings

PACKAGE	θ _{ja} (°C/W)	T _A < 25°C POWER RATING	DERATING FACTOR ABOVE T _A = 25°C	T _A = 70°C POWER RATING	T _A = 85°C POWER RATING	T _A = 125°C POWER RATING
D	176	710 mW	5.68 mW/°C	454 mW	369 mW	142 mW

Recommended Operating Conditions

		MIN	MAX	UNIT
V _{DD}	Input voltage		18	V
V _{OUT}	Output voltage range		18	V
I _{OUT} ⁽¹⁾	Average output current		200	mA
I _{OUT(ref)} ⁽¹⁾	Reference output current		-20	mA
T _J ⁽¹⁾	Operating junction temperature	-55	150	°C

- (1) It is not recommended that the device operate under conditions beyond those specified in this table for extended periods of time.

Electrical Characteristics

$V_{DD} = 15\text{ V}^{(1)}$, $R_T = 10\text{ k}\Omega$, $C_T = 3.3\text{ nF}$, $C_{VDD} = 0.1\text{ }\mu\text{F}$ and no load on the outputs, $T_A = T_J = -55^\circ\text{C}$ to 125°C for the UCC28C4x

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference					
Output voltage, initial accuracy	$T_A = 25^\circ\text{C}$, $I_{OUT} = 1\text{ mA}$	4.9	5	5.1	V
Line regulation	$V_{DD} = 12\text{ V}$ to 18 V		0.2	20	mV
Load regulation	1 mA to 20 mA		3	25	mV
Temperature stability	(2)		0.2	0.4	mV/°C
Total output variation	(2)	4.82		5.18	V
Output noise voltage	10 Hz to 10 kHz, $T_A = 25^\circ\text{C}$		50		μV
Long term stability	1000 hours, $T_A = 125^\circ\text{C}^{(2)}$		5	25	mV
Output short circuit		-30	-45	-55	mA
Oscillator					
Initial accuracy	$T_A = 25^\circ\text{C}^{(3)}$	50.5	53	55	kHz
	$T_A = \text{Full Range}^{(3)}$	50.5		57	KHz
Voltage stability	$V_{DD} = 12\text{ V}$ to 18 V		0.2	2.85	%
Temperature stability	T_{MIN} to $T_{MAX}^{(2)}$		1	2.5	%
Amplitude	RT/CT pin peak to peak		1.9		V
Discharge current	$T_A = 25^\circ\text{C}$, RT/CT = 2 V ⁽⁴⁾	7.7	8.4	9	mA
	RT/CT = 2 V ⁽⁴⁾	7.2	8.4	9.5	mA
Error Amplifier					
Feedback input voltage, initial accuracy	$V_{COMP} = 2.5\text{ V}$, $T_A = 25^\circ\text{C}$	2.475	2.500	2.525	V
Feedback input voltage, total variation	$V_{COMP} = 2.5\text{ V}$	2.45	2.50	2.55	V
Input bias current			-0.1	-2	μA
A_{VOL} Open-loop voltage gain	$V_{OUT} = 2\text{ V}$ to 4 V	65	90		dB
Unity gain bandwidth			1.5		MHz
PSRR Power-supply rejection ratio	$V_{DD} = 12\text{ V}$ to 18 V	60			dB
Output sink current	$V_{FB} = 2.7\text{ V}$, $V_{COMP} = 1.1\text{ V}$	2	14		mA
Output source current	$V_{FB} = 2.3\text{ V}$, $V_{COMP} = 5\text{ V}$	-0.5	-1		mA
V_{OH} High-level output voltage	$V_{FB} = 2.3\text{ V}$, $R_{LOAD} = 15\text{ k}$ to GND	5	6.8		V
V_{OL} Low-level output voltage	$V_{FB} = 2.7\text{ V}$, $R_{LOAD} = 15\text{ k}$ to VREF		0.1	1.1	V
Current Sense					
Gain	$T_A = 25^\circ\text{C}^{(5)(6)}$	2.85	3	3.15	V/V
	$T_A = \text{Full Range}^{(5)(6)}$	2.825		3.15	V/V
Maximum input signal	$V_{FB} < 2.4\text{ V}$	0.9	1	1.1	V
PSRR Power-supply rejection ratio	$V_{DD} = 12\text{ V}$ to $18\text{ V}^{(2)(5)}$		70		dB
Input bias current			-0.1	-2	μA
CS to output delay			35	70	ns
COMP to CS offset	$V_{CS} = 0\text{ V}$		1.15		V
Output					
V_{OUT} low ($R_{DS(on)}$ pull-down)	$I_{SINK} = 200\text{ mA}$		5.5	15	Ω
V_{OUT} high ($R_{DS(on)}$ pull-up)	$I_{SOURCE} = 200\text{ mA}$		10	25	Ω

(1) Adjust V_{DD} above the start threshold before setting at 15 V.

(2) Not production tested.

(3) Output frequencies of the UCC28C41, UCC28C44, and UCC28C45 are one-half the oscillator frequency.

(4) Oscillator discharge current is measured with $R_T = 10\text{ k}\Omega$ to V_{REF} .

(5) Parameter measured at trip point of latch with $V_{FB} = 0\text{ V}$.

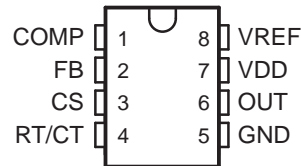
(6) Gain is defined as $ACS = \frac{\Delta V_{COM}}{\Delta V_{CS}}$, $0\text{ V} \leq V_{CS} \leq 900\text{ mV}$

Electrical Characteristics (continued)

$V_{DD} = 15\text{ V}$, $R_T = 10\text{ k}\Omega$, $C_T = 3.3\text{ nF}$, $C_{VDD} = 0.1\text{ }\mu\text{F}$ and no load on the outputs, $T_A = T_J = -55^\circ\text{C}$ to 125°C for the UCC28C4x

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Rise time	$T_A = 25^\circ\text{C}$, $C_{LOAD} = 1\text{ nF}$		25	50	ns
Fall time	$T_A = 25^\circ\text{C}$, $C_{LOAD} = 1\text{ nF}$		20	40	ns
Undervoltage Lockout (UVLO)					
Start threshold	UCC28C42-EP, UCC28C44-EP	13.5	14.5	15.5	V
	UCC28C43-EP, UCC28C45-EP	7.8	8.4	9	
	UCC28C40-EP, UCC28C41-EP	6.5	7	7.5	
Minimum operating voltage	UCC28C42-EP, UCC28C44-EP	8	9	10	V
	UCC28C43-EP, UCC28C45-EP	7	7.6	8.2	
	UCC28C40-EP, UCC28C41-EP	6.1	6.6	7.1	
PWM					
Maximum duty cycle	UCC28C42-EP, UCC28C43-EP, UCC28C40-EP, UCC28C44-EP, UCC28C45-EP, UCC28C41-EP	94	96		%
		47	48		
Minimum duty cycle				0%	
Current Supply					
$I_{START-UP}$ Start-up current	$V_{DD} = \text{UVLO start threshold } (-0.5\text{ V})$		50	100	μA
I_{DD} Operating supply current	$V_{FB} = V_{CS} = 0\text{ V}$		2.3	3	mA

PDIP (P) or SOIC (D) PACKAGE
(TOP VIEW)



Pin Assignments

COMP: This pin provides the output of the error amplifier for compensation. In addition, the COMP pin is frequently used as a control port by utilizing a secondary-side error amplifier to send an error signal across the secondary-primary isolation boundary through an opto-isolator.

CS: The current-sense pin is the noninverting input to the PWM comparator. This is compared to a signal proportional to the error amplifier output voltage. A voltage ramp can be applied to this pin to run the device with a voltage mode control configuration.

FB: This pin is the inverting input to the error amplifier. The noninverting input to the error amplifier is internally trimmed to $2.5\text{ V} \pm 1\%$.

GND: Ground return pin for the output driver stage and the logic-level controller section.

OUT: The output of the on-chip drive stage. OUT is intended to directly drive a MOSFET. The OUT pin in the UCC28C40, UCC28C42, and UCC28C43 is the same frequency as the oscillator, and can operate near 100% duty cycle. In the UCC28C41, UCC28C44, and the UCC28C45, the frequency of OUT is one-half that of the oscillator due to an internal T flipflop. This limits the maximum duty cycle to $<50\%$.

RT/CT: Timing resistor and timing capacitor. The timing capacitor should be connected to the device ground using minimal trace length.

VDD: Power supply pin for the device. This pin should be bypassed with a $0.1\text{ }\mu\text{F}$ capacitor with minimal trace lengths. Additional capacitance may be needed to provide hold up power to the device during startup.

UCC28C4x-EP BiCMOS LOW-POWER CURRENT-MODE PWM CONTROLLERS

SGLS352B–DECEMBER 2006–REVISED MAY 2007

VREF: 5-V reference. For stability, the reference should be bypassed with a 0.1 μ F capacitor to ground using the minimal trace length possible.

APPLICATION INFORMATION

This device is a pin-for-pin replacement of the bipolar UC2842 family of controllers—the industry standard PWM controller for single-ended converters. Familiarity with this controller family is assumed.

The UCC28C4x series is an enhanced replacement with pin-to-pin compatibility to the bipolar UC284x and UC284xA families. The new series offers improved performance when compared to older bipolar devices and other competitive BiCMOS devices with similar functionality. Note that these improvements discussed below generally consist of tighter specification limits that are a subset of the older product ratings, maintaining drop-in capability. In new designs these improvements can be utilized to reduce the component count or enhance circuit performance when compared to the previously available devices.

Advantages

This device increases the total circuit efficiency whether operating off-line or in dc input circuits. In off-line applications the low start-up current of this device reduces steady state power dissipation in the startup resistor, and the low operating current maximizes efficiency while running. The low running current also provides an efficiency boost in battery-operated supplies.

Low-Voltage Operation

Two members of the UCC28C4x family are intended for applications that require a lower start-up voltage than the original family members. The UCC28C40 and UCC28C41 have a turn-on voltage of 7 V typical and exhibit hysteresis of 0.4 V for a turn-off voltage of 6.6 V. This reduced start-up voltage enables use in systems with lower voltages, such as 12 V battery systems that are nearly discharged.

High-Speed Operation

The BiCMOS design allows operation at high frequencies that were not feasible in the predecessor bipolar devices. First, the output stage has been redesigned to drive the external power switch in approximately one-half the time of the earlier devices. Second, the internal oscillator is more robust, with less variation as frequency increases. In addition, the current sense to output delay has been reduced by a factor of three, to 45 ns typical. These features combine to provide a device capable of reliable high-frequency operation.

The UCC28C4x family oscillator is true to the curves of the original bipolar devices at lower frequencies, yet extends the frequency programmability range to at least 1 MHz. This allows the device to offer pin-to-pin capability where required, yet capable of extending the operational range to the higher frequencies typical of latest applications. When the original UC2842 was released in 1984, most switching supplies operated between 20 kHz and 100 kHz. Today, the UCC28C4x can be used in designs cover a span roughly ten times higher than those numbers.

Start/Run Current Improvements

The start-up current is only 60 μ A typical, a significant reduction from the bipolar device's ratings of 300 μ A (UC284xA). For operation over the temperature range of -55°C to 125°C , the UCC28C4x devices offer a maximum startup current of 100 μ A, an improvement over competitive BiCMOS devices. This allows the power-supply designer to further optimize the selection of the start-up resistor value to provide a more efficient design. In applications where low component cost overrides maximum efficiency the low run current of 2.3 mA typical may allow the control device to run directly through the single resistor to (+) rail, rather than needing a bootstrap winding on the power transformer, along with a rectifier. The start/run resistor for this case must also pass enough current to allow driving the primary switching MOSFET, which may be a few milliamps in small devices.

$\pm 1\%$ Initial Reference Voltage

The BiCMOS internal reference of 2.5 V has an enhanced design and utilizes production trim to allow initial accuracy of $\pm 1\%$ at room temperature and $\pm 2\%$ over the full temperature range. This can be used to eliminate an external reference in applications that do not require the extreme accuracy afforded by the additional device. This is very useful for nonisolated dc-to-dc applications where the control device is referenced to the same common as the output. It is also applicable in offline designs that regulate on the primary side of the isolation boundary by looking at a primary bias winding, or perhaps from a winding on the output inductor of a buck-derived circuit.

APPLICATION INFORMATION (continued)

Reduced Discharge Current Variation

The original UC2842 oscillator did not have trimmed discharge current, and the parameter was not specified on the data sheet. Since many customers attempted to use the discharge current to set a crude dead-time limit, the UC2842A family was released with a trimmed discharge current specified at 25°C. The UCC28C4x series now offers even tighter control of this parameter, with approximately ±3% accuracy at 25°C, and less than 10% variation over temperature using the UCC28C4x devices. This level of accuracy can enable a meaningful limit to be programmed, a feature not currently seen in competitive BiCMOS devices. The improved oscillator and reference also contribute to decreased variation in the peak-to-peak variation in the oscillator waveform, which is often used as the basis for slope compensation for the complete power system.

Soft-Start

Figure 1 provides a typical soft-start circuit for use with the UCC28C42. The values of R and C should be selected to bring the COMP pin up at a controlled rate, limiting the peak current supplied by the power stage. After the soft-start interval is complete, the capacitor continues to charge to V_{REF} , effectively removing the PNP transistor from circuit considerations.

The optional diode in parallel with the resistor forces a soft-start each time the PWM goes through UVLO and the reference (V_{REF}) goes low. Without the diode, the capacitor otherwise remains charged during a brief loss of supply or brownout, and no soft-start is enabled upon reapplication of V_{IN} .

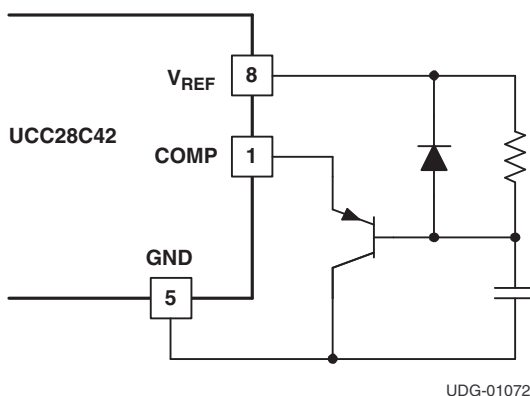


Figure 1.

Oscillator Synchronization

The UCC28C4x oscillator has the same synchronization characteristics as the original bipolar devices. Thus, the information in the application report U-100A, *UC2842/3/4/5 Provides Low-Cost Current-Mode Control* (SLUA143) still applies. The application report describes how a small resistor from the timing capacitor to ground can offer an insertion point for synchronization to an external clock (see Figure 2 and Figure 3). Figure 2 shows how the UCC28C42 can be synchronized to an external clock source. This allows precise control of frequency and dead time with a digital pulse train.

APPLICATION INFORMATION (continued)

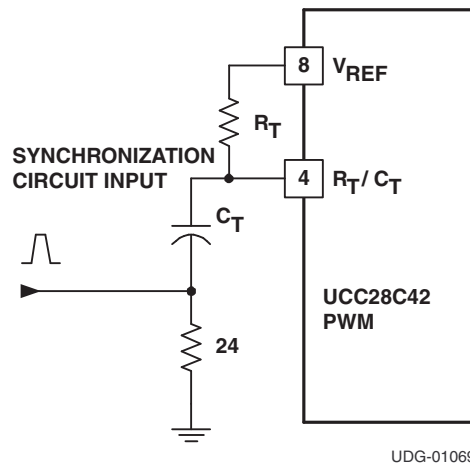


Figure 2. Oscillator Synchronization Circuit

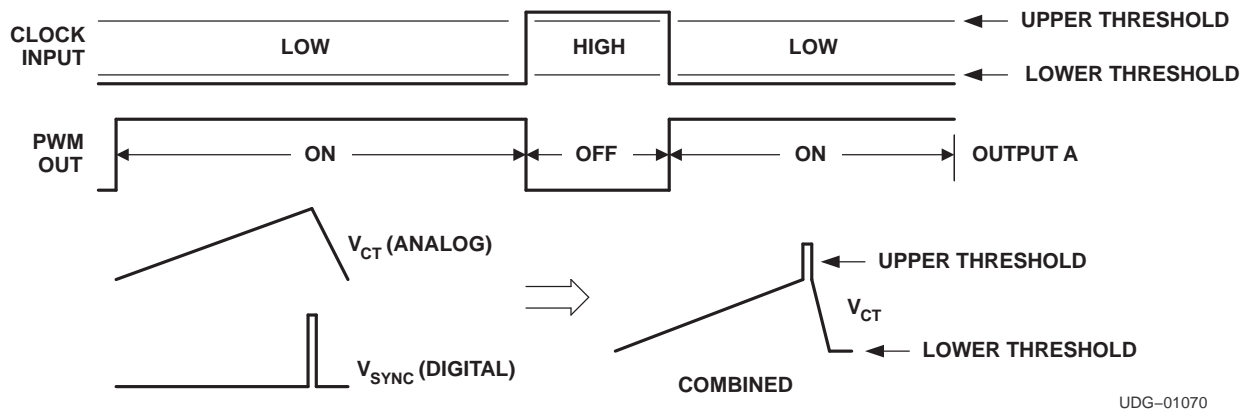


Figure 3. Synchronization to an External Clock

Precautions

The absolute maximum supply voltage is 20 V, including any transients that may be present. If this voltage is exceeded, device damage is likely. This is in contrast to the predecessor bipolar devices that could survive up to 30 V. Thus, the supply pin should be decoupled as close to the ground pin as possible. Also, since no clamp is included in the device, the supply pin should be protected from external sources that could exceed the 20 V level.

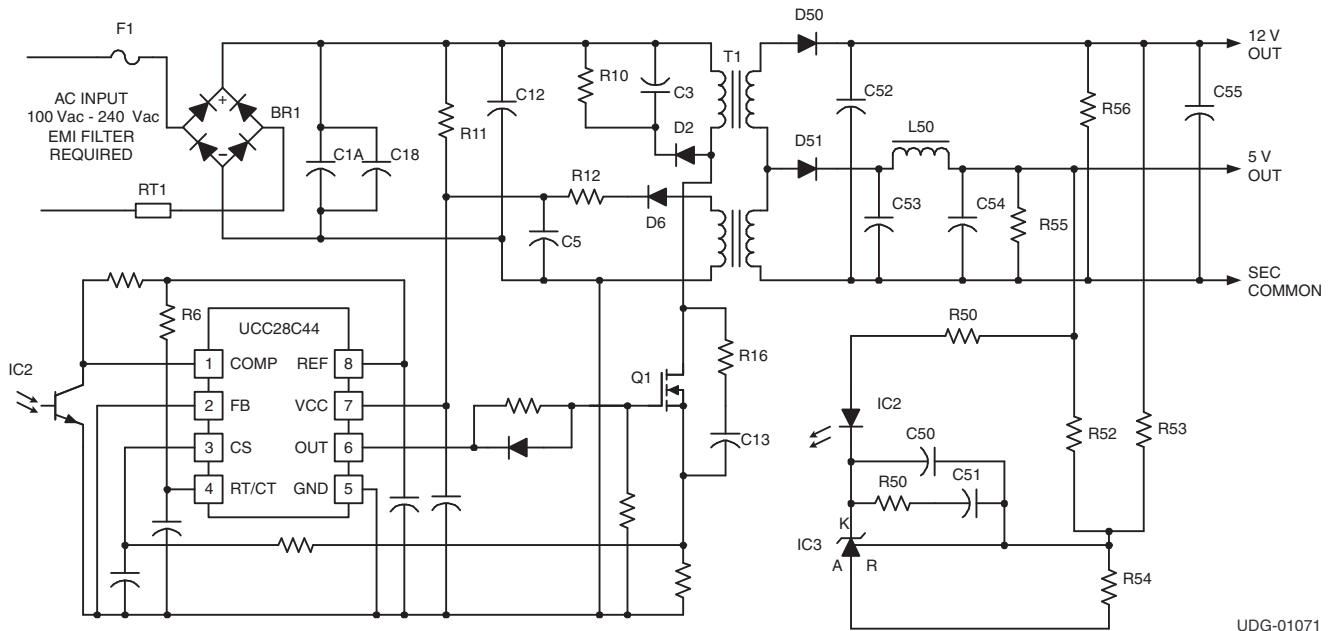
Careful layout of the printed board has always been a necessity for high-frequency power supplies. As the device switching speeds and operating frequencies increase, the layout of the converter becomes increasingly important.

This 8-pin device has only a single ground for the logic and power connections. This forces the gate drive current pulses to flow through the same ground that the control circuit uses for reference. Thus, the interconnect inductance should be minimized as much as possible. One implication is to place the device (gate driver) circuitry close to the MOSFET it is driving. Note that this can conflict with the need for the error amplifier and the feedback path to be away from the noise generating components.

Circuit Applications

Figure 4 shows a typical off-line application.

APPLICATION INFORMATION (continued)



UDG-01071

Figure 4. Typical Off-Line Application

Figure 5 shows the forward converter with synchronous rectification. This application provides 48 V to 3.3 V at 10 A with over 85% efficiency, and uses the UCC28C42 as the secondary-side controller and UCC3961 as the primary-side startup control device.

APPLICATION INFORMATION (continued)

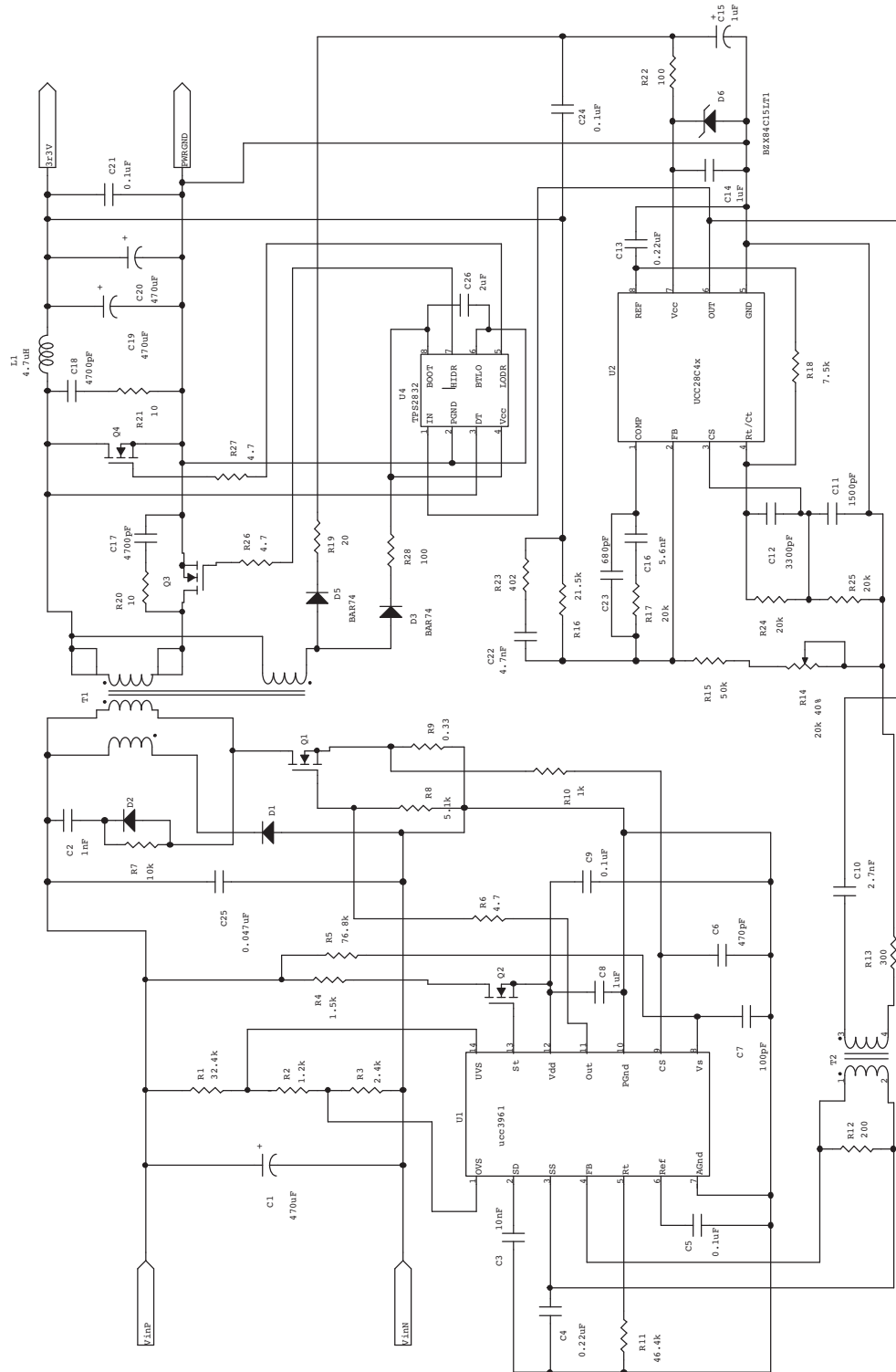


Figure 5. Forward Converter With Synchronous Rectification Using the UCC28C42 as the Secondary-Side Controller

APPLICATION INFORMATION (continued)

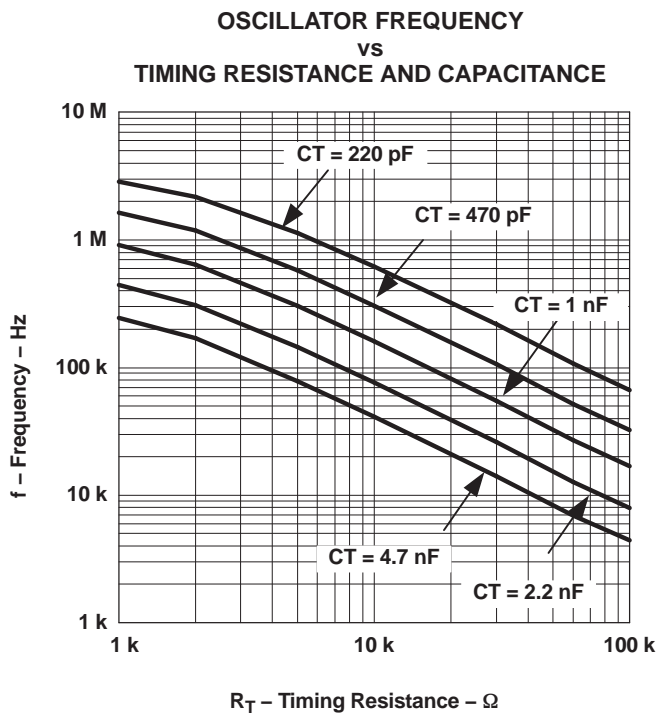


Figure 6.

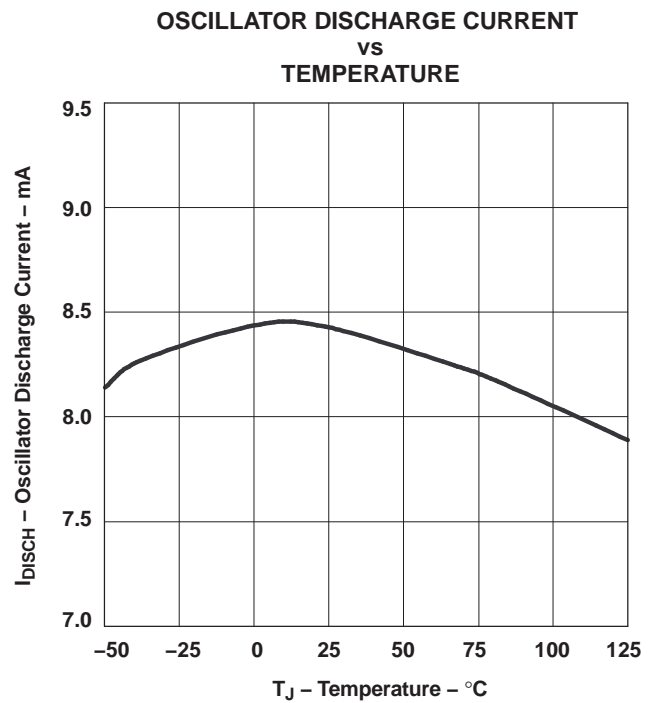


Figure 7.

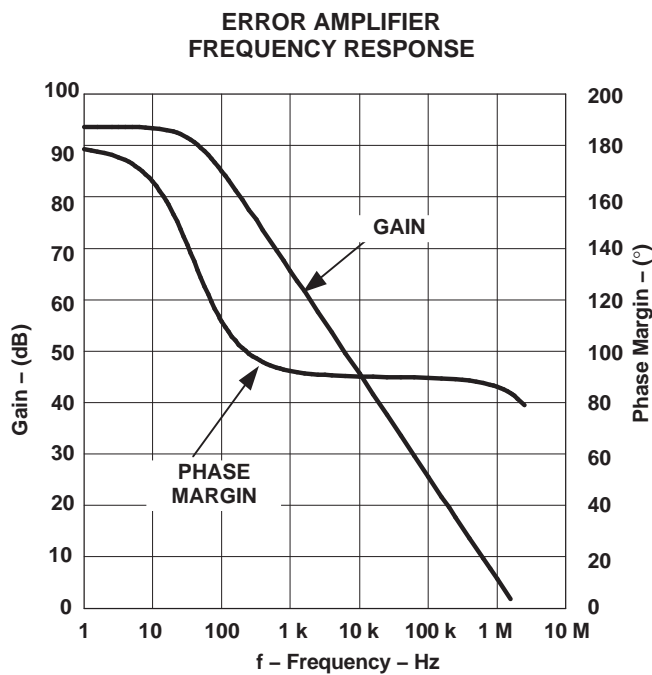


Figure 8.

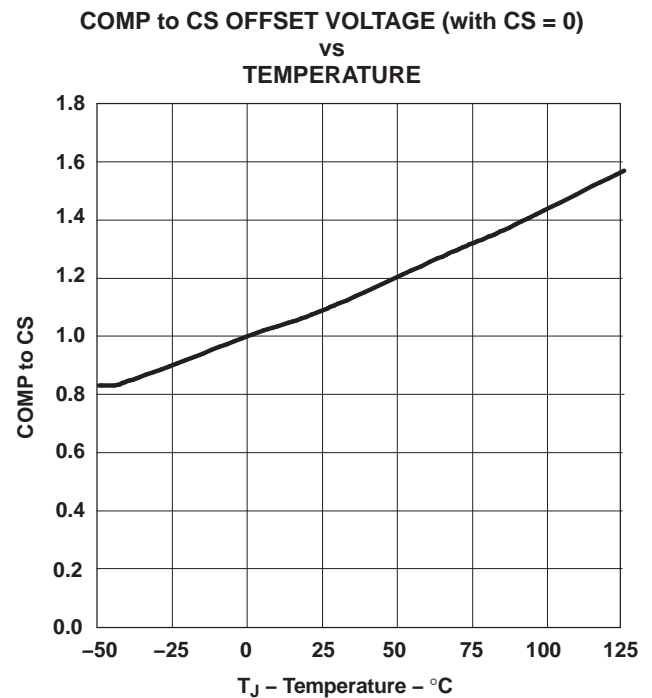


Figure 9.

APPLICATION INFORMATION (continued)

**REFERENCE VOLTAGE
 VS
 TEMPERATURE**

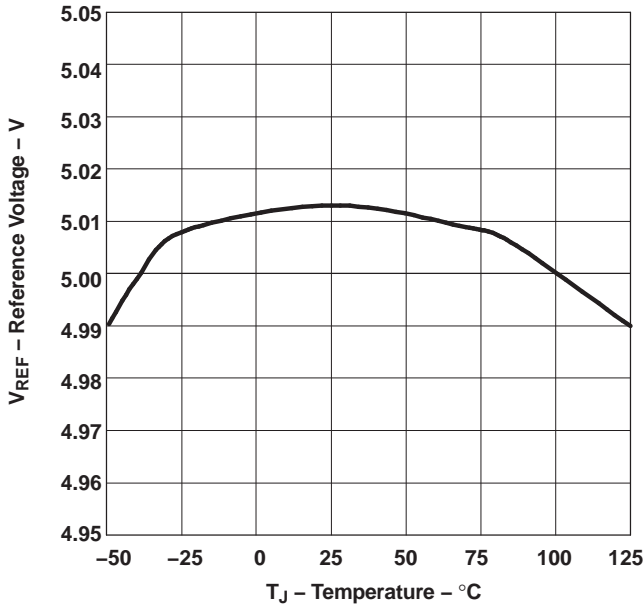


Figure 10.

**ERROR AMPLIFIER REFERENCE VOLTAGE
 VS
 TEMPERATURE**

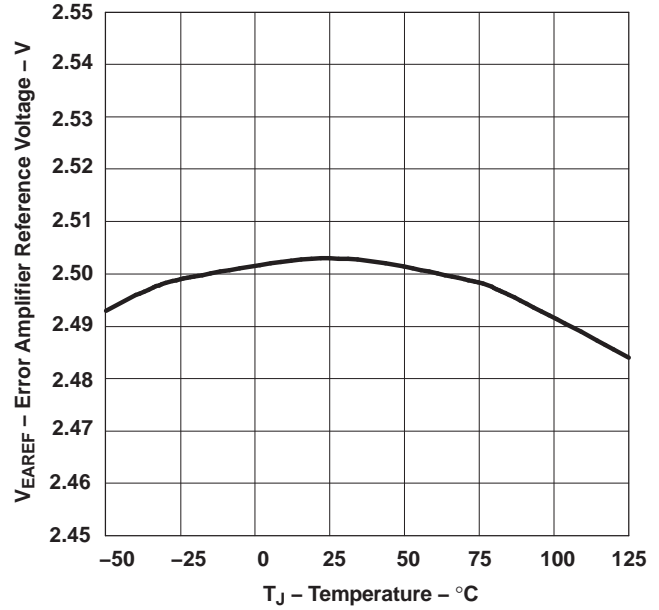


Figure 11.

**REFERENCE SHORT-CIRCUIT CURRENT
 VS
 TEMPERATURE**

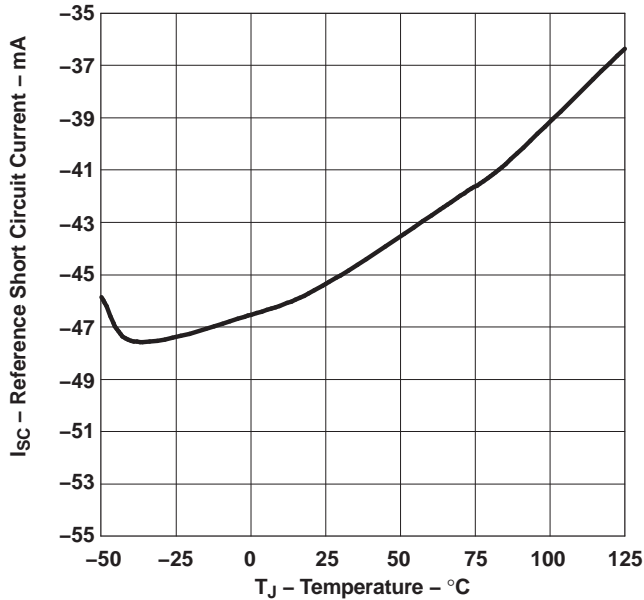


Figure 12.

**ERROR AMPLIFIER INPUT BIAS CURRENT
 VS
 TEMPERATURE**

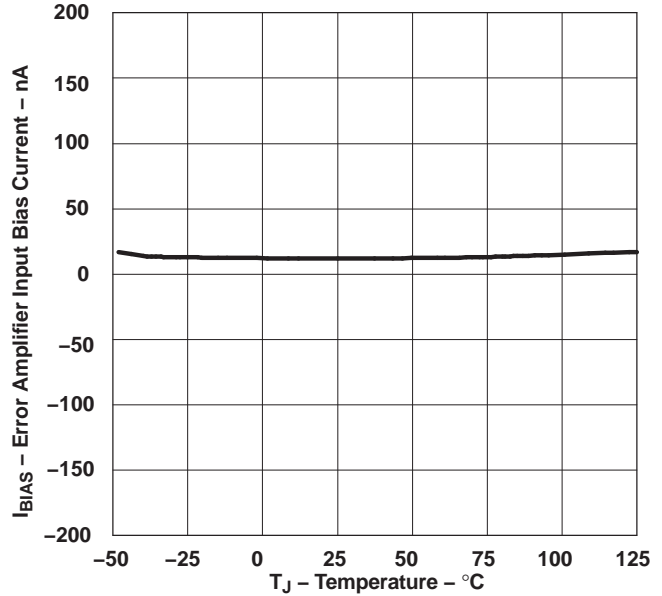


Figure 13.

APPLICATION INFORMATION (continued)

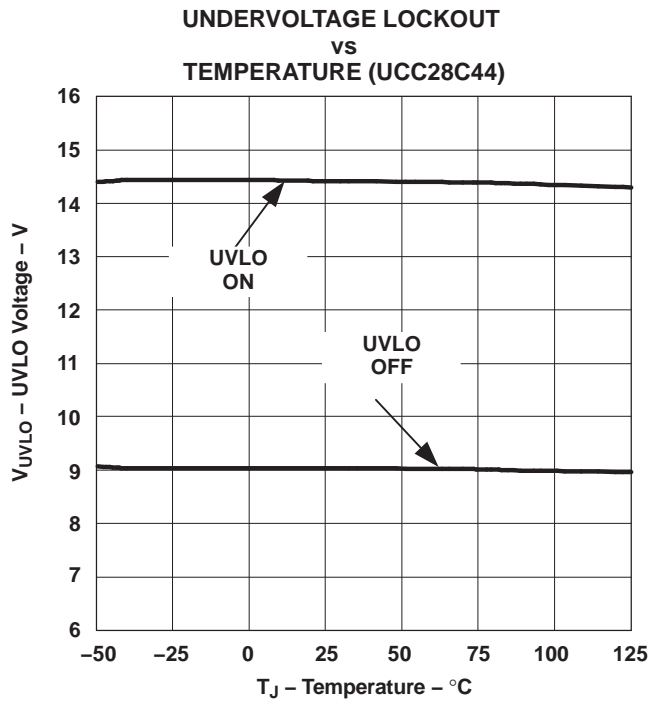


Figure 14.

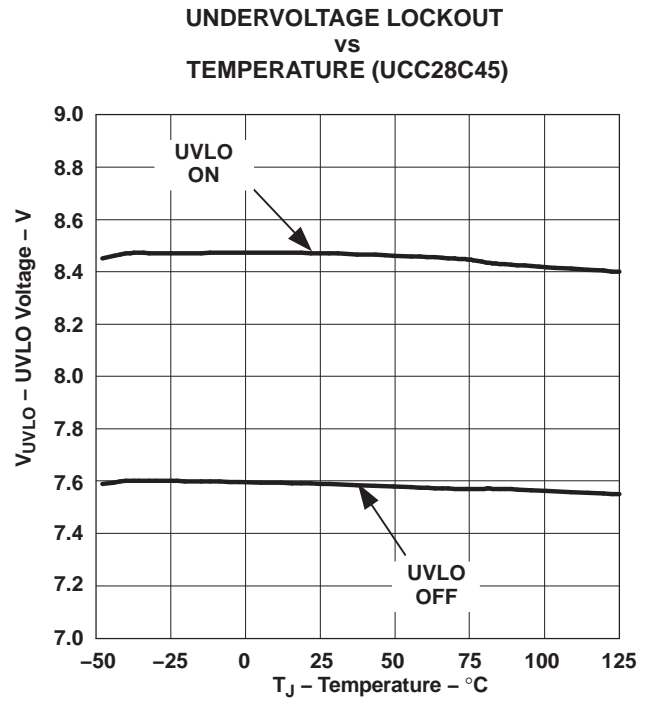


Figure 15.

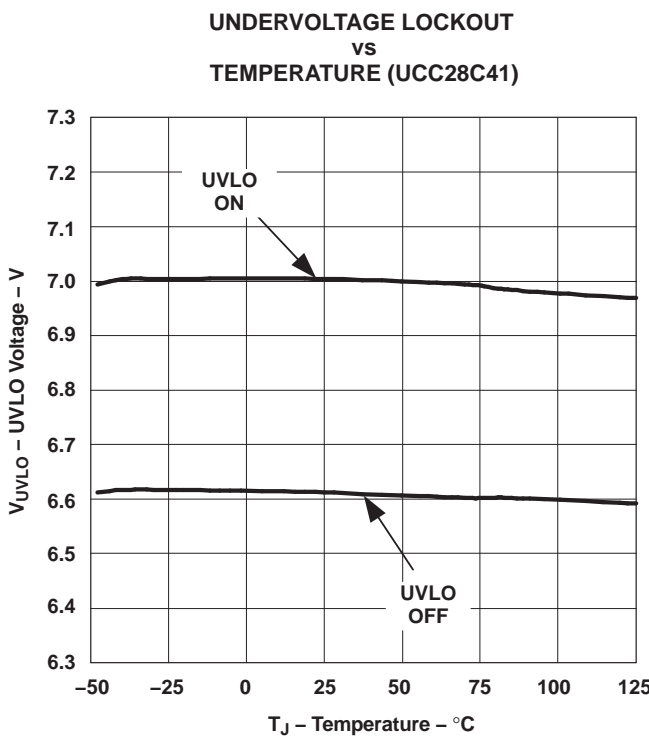


Figure 16.

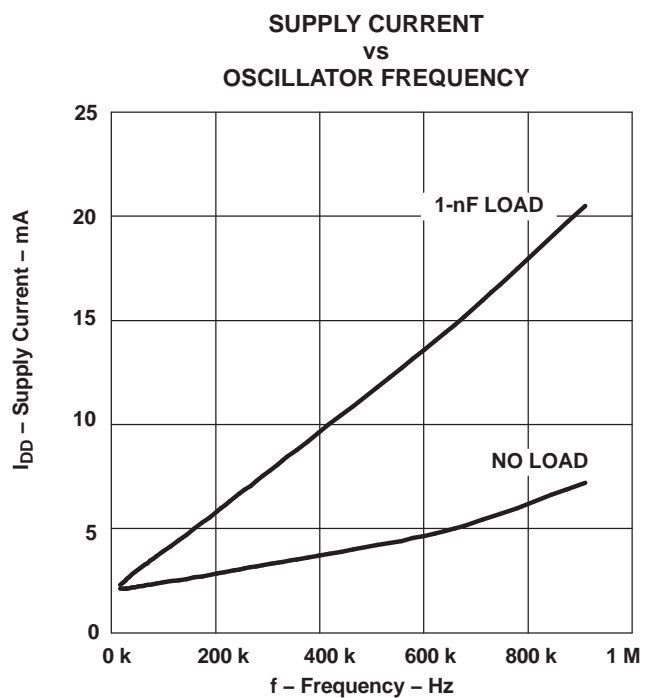


Figure 17.

APPLICATION INFORMATION (continued)

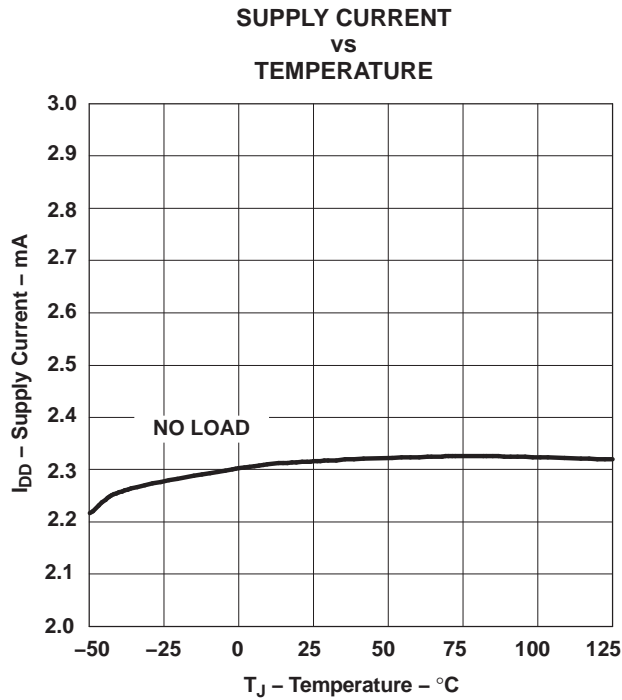


Figure 18.

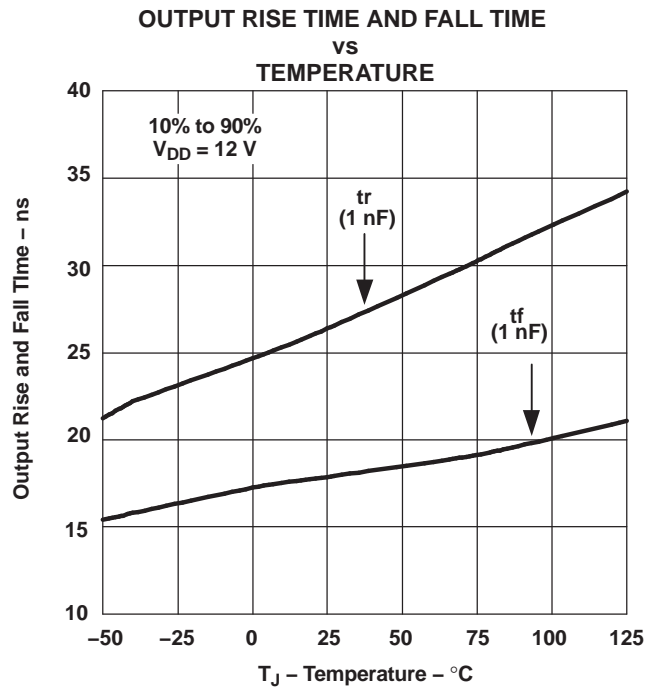


Figure 19.

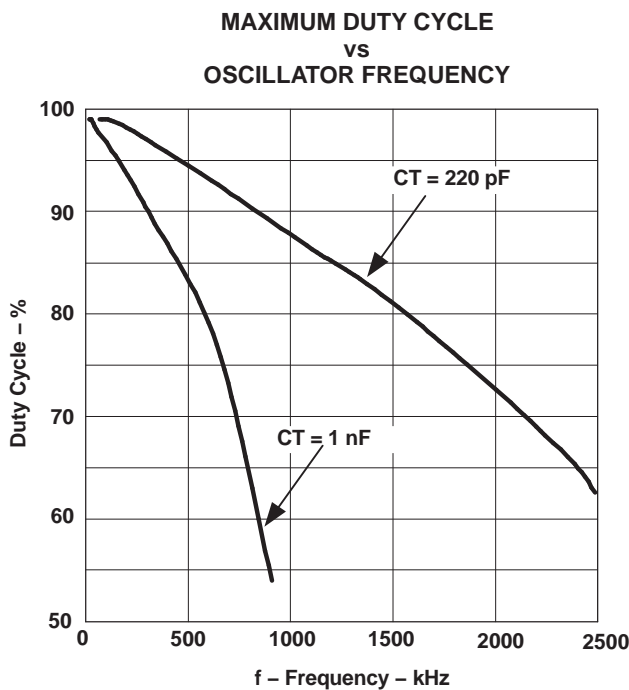


Figure 20.

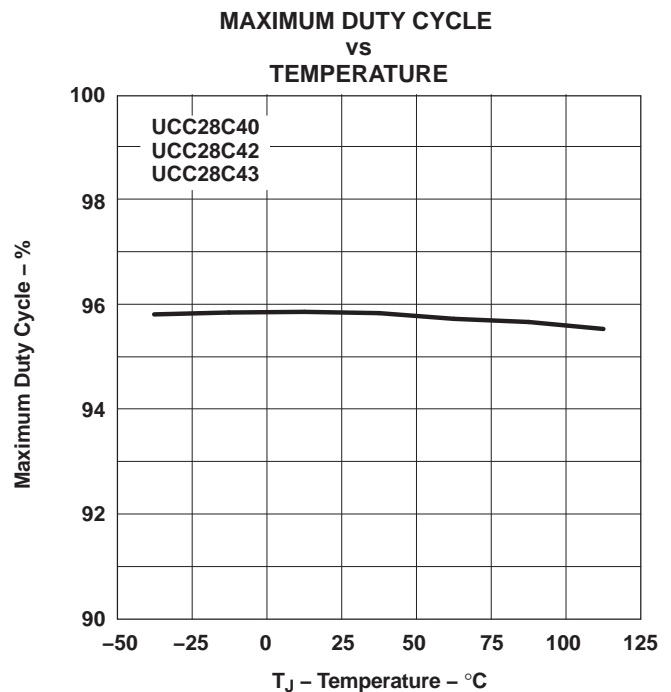


Figure 21.

APPLICATION INFORMATION (continued)

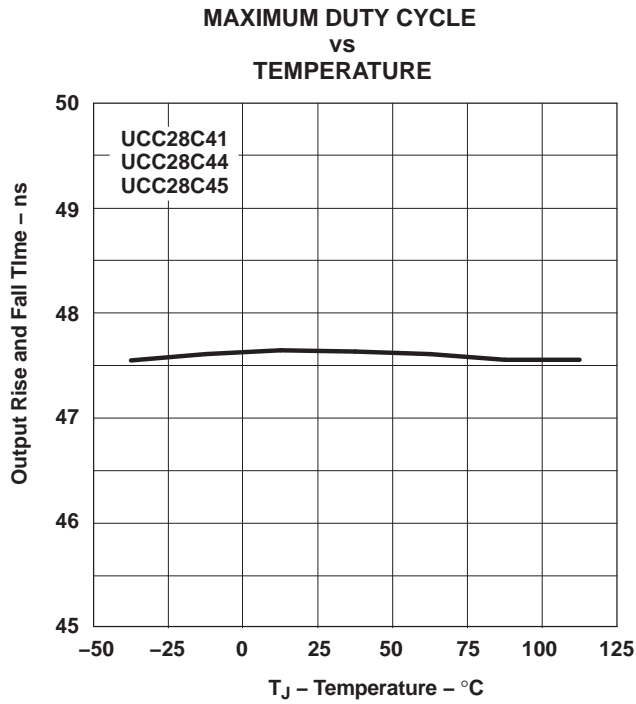


Figure 22.

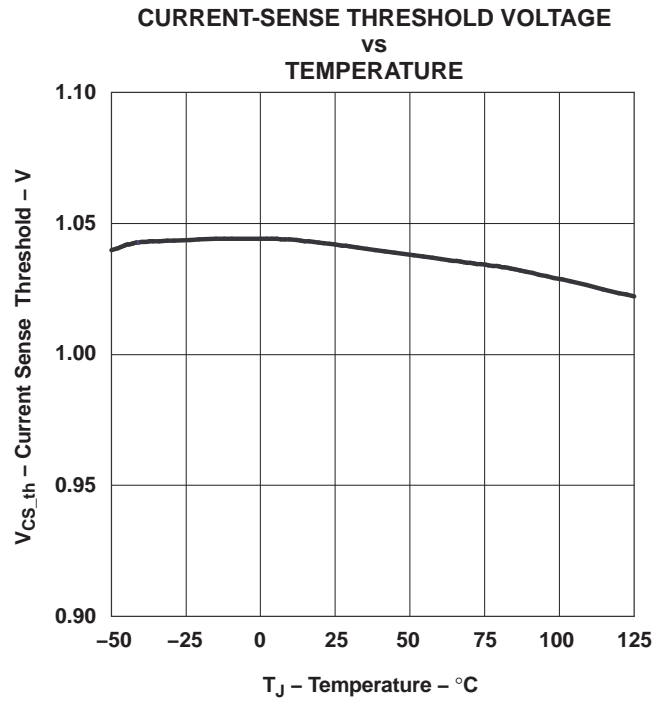


Figure 23.

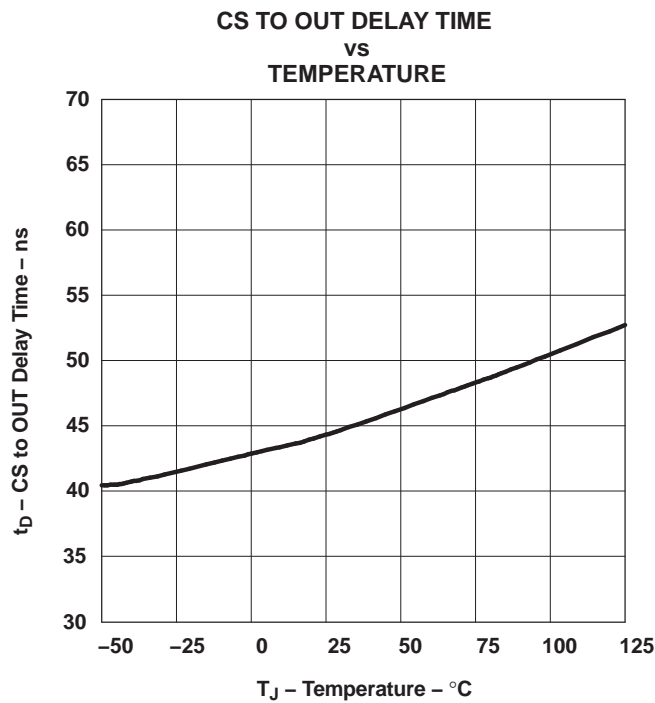


Figure 24.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
UCC28C43MDREP	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
UCC28C45MDREP	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/07615-01XE	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/07615-02XE	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), 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)

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

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.

OTHER QUALIFIED VERSIONS OF UCC28C43-EP, UCC28C45-EP :

- Catalog: [UCC28C43](#), [UCC28C45](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

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
UCC28C43MDREP	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC28C45MDREP	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS

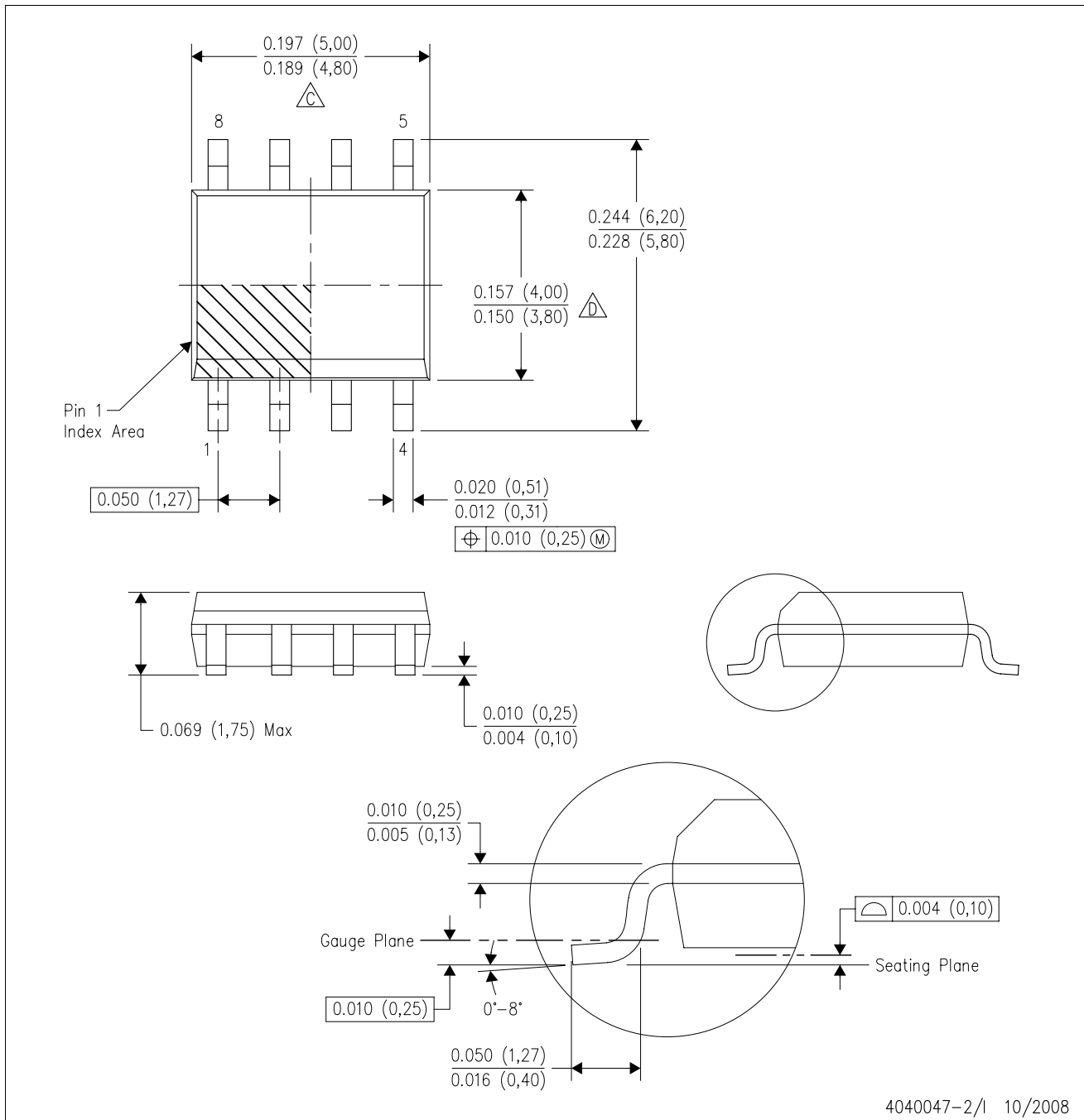


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UCC28C43MDREP	SOIC	D	8	2500	346.0	346.0	29.0
UCC28C45MDREP	SOIC	D	8	2500	346.0	346.0	29.0

D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- 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 .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AA.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information 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.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered 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.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated