

SLUS349B – DECEMBER 1994 – REVISED APRIL 2005

9-LINE 3 TO 5 VOLT LOW CAPACITANCE SCSI ACTIVE TERMINATOR

FEATURES

- **Complies with SCSI, SCSI−2 and SPI−2 Single Ended Standards**
- **2.7-V to 5.25-V Operation**
- **1.8-pF Channel Capacitance during Disconnect**
- **0.5-μA Supply Current in Disconnect Mode**
- **110-Ω/2.5-kΩ Programmable Termination**
- **Completely Meets SCSI Hot Plugging**
- **−400-mA Sourcing Current for Termination**
- **+400-mA Sinking Current for Active Negation Drivers**
- **Trimmed Termination Current to 4%**
- **Trimmed Impedance to 7%**
- **Current Limit and Thermal Shutdown Protection**

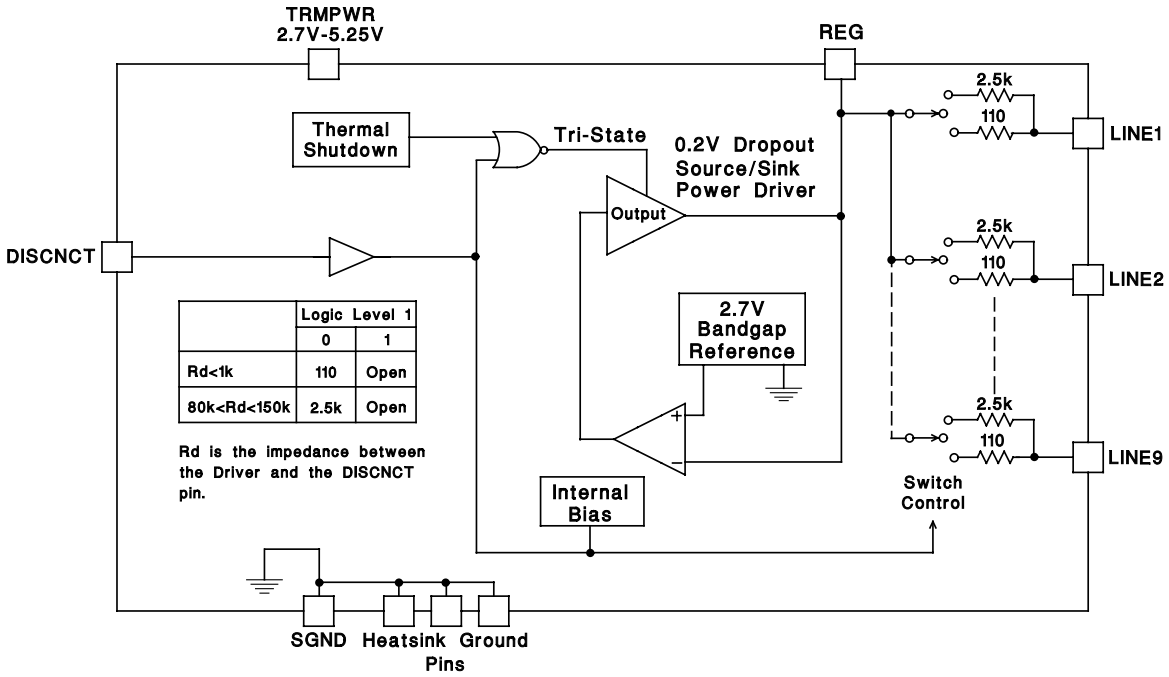
DESCRIPTION

The UCC5614 provides 9 lines of active termination for a small computer system's interface (SCSI) parallel bus. The SCSI standard recommends active termination at both ends of the cable segment.

The UCC5614 is ideal for high performance 3.3-V SCSI systems. The key features contributing to such low operating voltage are the 0.1-V drop-out regulator and the 2.7-V reference. During disconnect the supply current is typically only 0.5 μA, which makes the device attractive for battery powered systems.

The UCC5614 is designed with an ultra low channel capacitance of 1.8 pF, which eliminates effects on signal i cted terminators at interim points on the bus.

BLOCK DIAGRAM



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.

Copyright © 2005, Texas Instruments Incorporated

DESCRIPTION (CONTINUED)

The UCC5614 can be programmed for either a 110-Ω or 2.5-kΩ termination. The 110-Ω termination is used for standard SCSI bus lengths and the 2.5-kΩ termination is typically used in short bus applications. When driving the TTL compatible DISCNCT pin directly, the 110-Ω termination is connected when the DISCNCT pin is driven low, and disconnected when driven high. When the DISCNCT pin is driven through an impedance between 80 kΩ and 150 kΩ, the terminator is in short bus mode. The 2.5-kΩ termination is connected when the DISCNCT pin is driven low and disconnected when driven high.

The power amplifier output stage allows the UCC5614 to source full termination current and sink active negation current when all termination lines are actively negated.

The UCC5614 is pin for pin compatible with Unitrode's other 9-line SCSI terminators, allowing lower capacitance and lower voltage upgrades to existing systems. The UCC5614, as with all Unitrode terminators, is completely hot pluggable and appears as high impedance at the terminating channels with VTRMPWR = 0 V or open.

Internal circuit trimming is utilized, first to trim the 110-Ω termination impedance to a 7% tolerance, and then most importantly, to trim the output current to a 4% tolerance, as close to the max SCSI specification as possible, which maximizes noise margin in fast SCSI operation.

Other features include thermal shutdown and current limit.

This device is offered in low thermal resistance versions of the industry standard 16-pin narrow body SOIC, 16-pin N and 24-pin TSSOP.

ORDERING INFORMATION

T_A	PACKAGED DEVICE		
	SOIC-16 (DP)†	**DIL-16 (N)**	**TSSOP-24 (PW)‡**
0°C to 70°C	UCC5614DP	UCC5614N	UCC5614PW

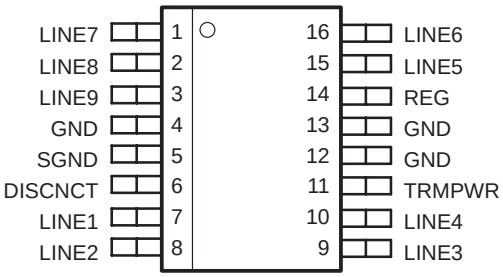
†

† The DP package is available taped and reeled in quanities of 2,500. Add TR suffix to device type (e.g. UCC5614DPTR) to order quantities of 2,500 devices per reel.

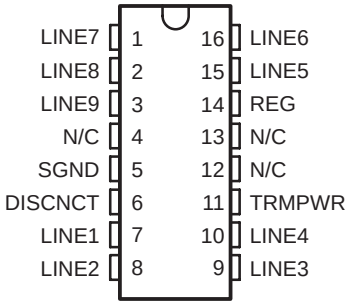
‡ The PW package is available taped and reeled in quanities of 2,000. Add TR suffix to device type (e.g. UCC5614PWTR) to order quantities of 2,000 devices per reel.

CONNECTION DIAGRAMS

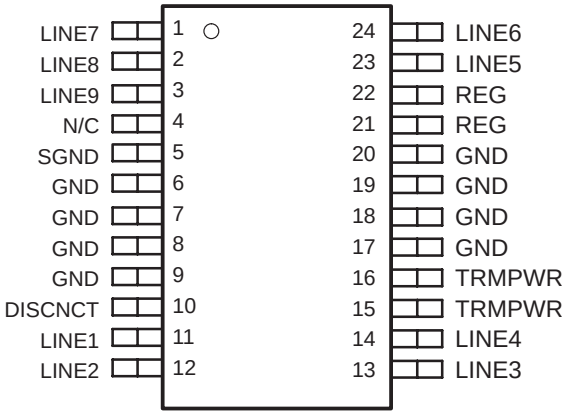
SOIC−16 (Top View)
DP Package (1) (2)



DIL−16 (Top View)
N Package (1)



TSSOP−24 (Top View)
PW Package (1) (3)



NOTES: (1). Drawings are not to scale.
(2). DP package pin 5 serves as ground and pins 4,12 and 13 serve as heatsink ground.
(3). PW package pin 5 serves as ground and pins 6,7,8,9,17,18,19 and 20 serve as heatsink ground.

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range unless otherwise noted†‡

	UCC5629	UNIT
TRMPWR voltage	6	V
Input voltage	0 to 7	
Regulator output current	2	W
Storage temperature, T_{stg}	−65 to 150	°C
Operating junction temperature, T_J	–55 to 150	
Lead temperature (soldering, 10 sec.)	300	

† 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. All voltages are with respect to GND. Currents are positive into and negative out of, the specified terminal.

‡ Currents are positive into, negative out of the specified terminal. Consult Packaging Section of Databook for thermal limitations and considerations of packages. All voltages are referenced to GND.

RECOMMENDED OPERATING CONDITIONS

	MIN	NOM	MAX	UNIT
TRMPWR voltage	2.7		5.25	V
Temperature ranges	0		70	°C
Signal line voltage	0		5	V
DISCNCT input voltage	0		TRMPWR	

ELECTRICAL CHARACTERISTICS

T_A = 0°C to 70°C, TRMPWR = 3.3 V, DISCNCT = 0 V, $R_{DISCNCT}$ = 0 Ω, T_A = T_J, (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current Section					
Termpwr supply current	All termination lines = Open		1	2	mA
	All termination lines = 0.2 V		210	218	
Power down mode	DISCNCT = Trmpwr		0.5	5	µA
Output Section (110 Ω − Terminator Lines)					
Terminator impedance		102.3	110	117.7	Ohms
Output high voltage	(Note 1)	2.5	2.7	3.0	V
Max output current	VLINE = 0.2 V TJ = 25°C	−22.1	−23	−24	mA
	VLINE = 0.2 V	−21	−23	−24	
	VLINE = 0.2 , TRMPWR = 3 V, TJ = 25°C (Note 1)	−20.2	−23	−24	
	VLINE = 0.2 V, TRMPWR = 3 V (Note 1)	−19	−23	−24	
	VLINE = 0.5 V			−22.4	
Output leakage	DISCNCT = 2.4 V, TRMPWR = 0 V to 5.25 V		10	400	nA
Output capacitance	DISCNCT = 2.4 V (Note 2) (DP Package)		1.8	2.5	pF
Output Section (2.5 kΩ − Terminator Lines) (RDISCNCT = 80 kΩ)					
Terminator impedance		2	2.5	3	kΩ
Output high voltage	TRMPWR = 3 V (Note 1)	2.5	2.7	3.0	V
Max output current	VLINE = 0.2 V	−0.7	−1	−1.4	mA
	VLINE = 0.2 V, TRMPWR = 3 V (Note 1)	−0.6	−1	−1.5	
Output leakage	DISCNCT = 2.4 V, TRMPWR = 0 to 5.25 V		10	400	nA
Output capacitance	DISCNCT = 2.4 V (Note 2) (DP Package)		1.8	2.5	pF
Regulator Section					
Regulator output voltage	5.25 V > TRMPWR > 3 V	2.5	2.7	3.0	V
Drop out voltage	All Termination Lines = 0.2 V		0.1	0.2	
Short circuit current	VREG = 0 V	−200	−400	−800	mA
Sinking current capability	VREG = 3 V	200	400	800	
Thermal shutdown	(Note 2)		170		°C
Thermal shutdown hysteresis	(Note 2)		10		
Disconnect Section					
Disconnect threshold	RDISCNCT = 0 & 80 kΩ	0.8	1.5	2.0	V
Input current	DISCNCT = 0 V		30	50	mA

NOTES: 1. Measuring each termination line while other eight are low (0.2 V).
2. Ensured by design. Not production tested.

Terminal Functions

TERMINAL NAME	TERMINAL NO.	I/O	DESCRIPTION
DISCNCT	7	I	Taking this pin high causes the 9 channels to become high impedance and the chip to go into low power mode. In short laptop buses an 80-kΩ to 150-kΩ resister to ground terminates the bus at 2.5 kΩ. Less than 110 Ω to ground enables the terminator.
GND	9		Ground reference for the device
LINE1 TO LINE9	4	I	110-Ω termination channels
REG	9	o	Output of the internal 2.7-V regulator
TRMPWR	4	I	Power for the device

APPLICATION INFORMATION

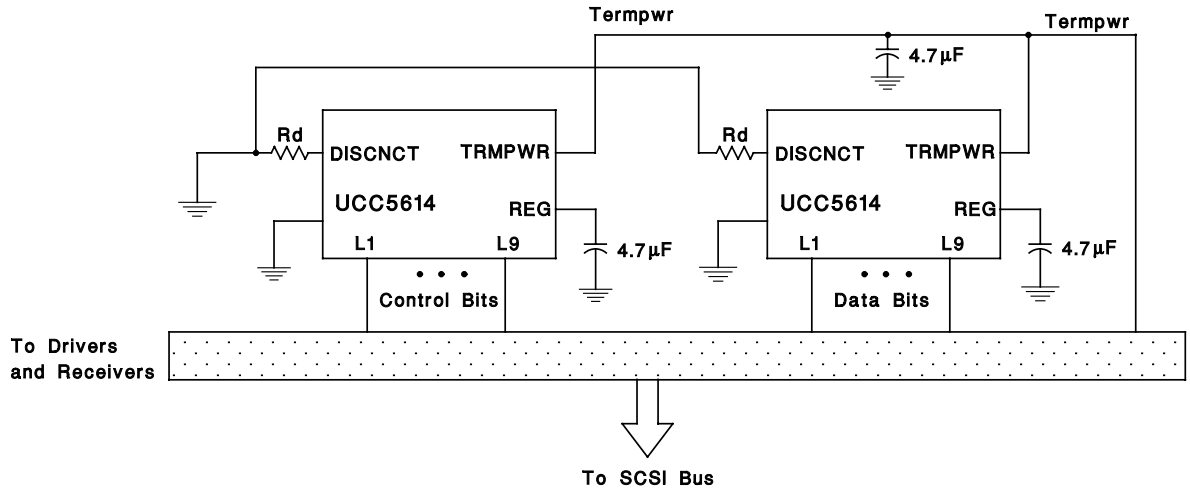


Figure 1. Typical SCSI Bus Configuration Utilizing two UCC5614 Devices

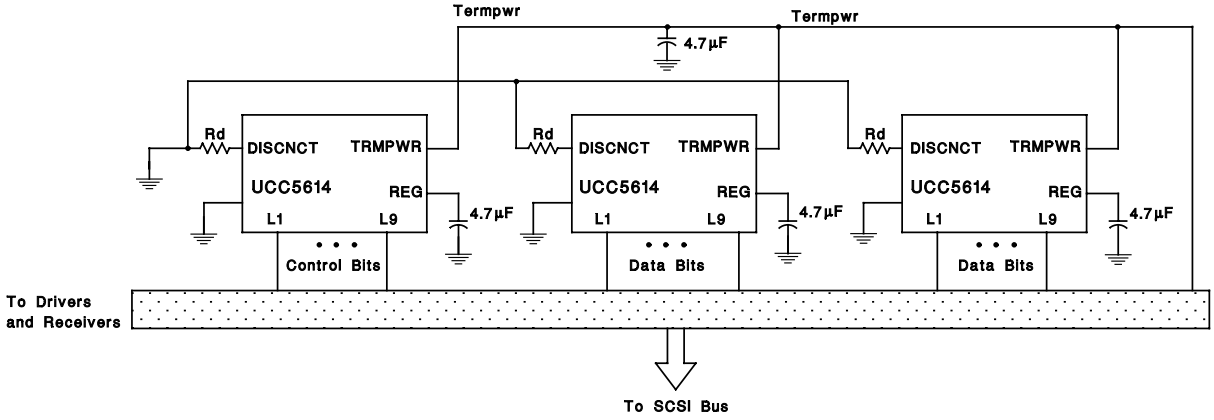


Figure 2. Typical Wide SCSI Bus Configuration Utilizing three UCC5614 Devices

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
UCC5614DP	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	UCC5614DP	
UCC5614DPG4	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	UCC5614DP	
UCC5614PWP	OBSOLETE	TSSOP	PW	24		TBD	Call TI	Call TI	0 to 70	UCC5614PWP	
UCC5614Z	OBSOLETE		UTR	16		TBD	Call TI	Call TI	0 to 70		

(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.

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

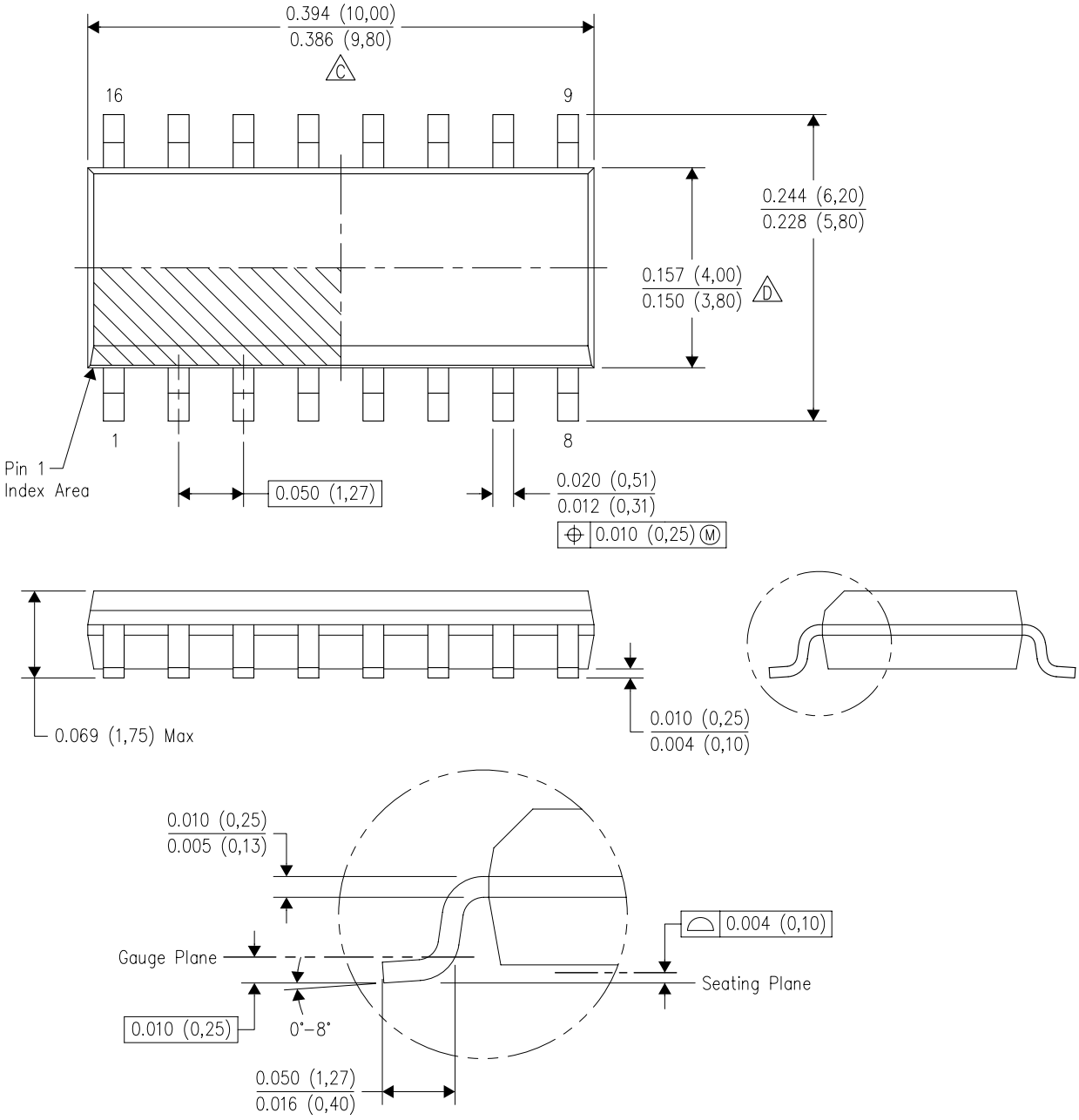
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) 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.

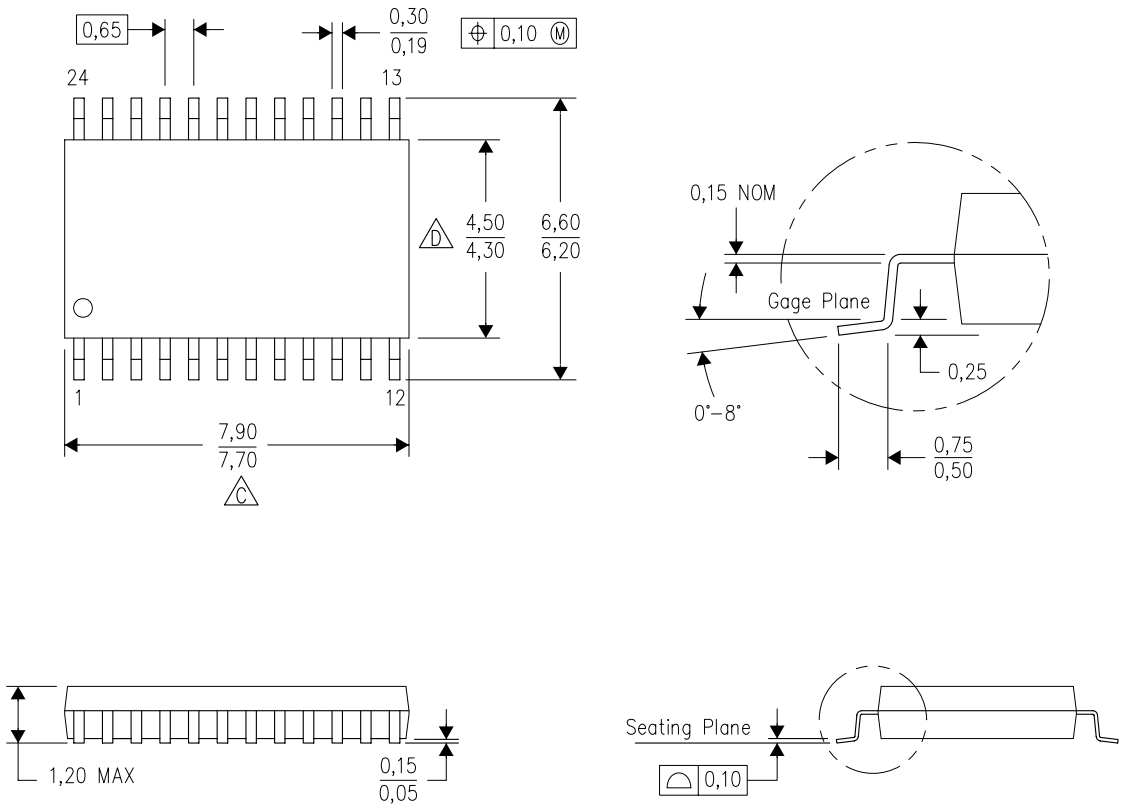
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

D (R–PDSO–G16) 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 AC.

PW (R–PDSO–G24) PLASTIC SMALL OUTLINE



4040064–6/G 02/11

NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
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 0,15 each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
E. Falls within JEDEC MO–153

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve 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. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

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

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license 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 significant portions 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. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2016, Texas Instruments Incorporated