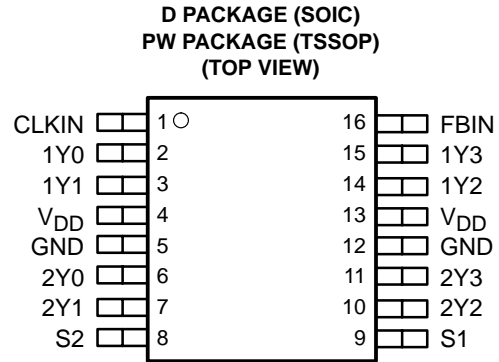


# CDCVF25081 3.3-V PHASED-LOCK LOOP CLOCK DRIVER

SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

- Phase-Locked Loop-Based Zero-Delay Buffer
- Operating Frequency: 8 MHz to 200 MHz
- Low Jitter (Cycle-Cycle):  $\pm 100$  ps Over the Range 66 MHz to 200 MHz
- Distributes One Clock Input to Two Banks of Four Outputs
- Auto Frequency Detection to Disable Device (Power Down Mode)
- Consumes Less Than 20  $\mu$ A in Power Down Mode
- Operates From Single 3.3-V Supply
- Industrial Temperature Range  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- 25- $\Omega$  On-Chip Series Damping Resistors
- No External RC Network Required
- Spread Spectrum Clock Compatible (SSC)
- Available in 16-Pin TSSOP or 16-Pin SOIC Packages



## description

The CDCVF25081 is a high-performance, low-skew, low-jitter, phase-lock loop clock driver. It uses a PLL to precisely align, in both frequency and phase, the output clocks to the input clock signal. The CDCVF25081 operates from a nominal supply voltage of 3.3 V. The device also includes integrated series-damping resistors in the output drivers that make it ideal for driving point-to-point loads.

Two banks of four outputs each provide low-skew, low-jitter copies of CLKIN. All outputs operate at the same frequency. Output duty cycles are adjusted to 50%, independent of duty cycle at CLKIN. The device automatically goes into power-down mode when no input signal is applied to CLKIN and the outputs go into a low state. Unlike many products containing PLLs, the CDCVF25081 does not require an external RC network. The loop filter for the PLL is included on-chip, minimizing component count, space, and cost.

Because it is based on a PLL circuitry, the CDCVF25081 requires a stabilization time to achieve phase lock of the feedback signal to the reference signal. This stabilization is required following power up and application of a fixed-frequency signal at CLKIN and any following changes to the PLL reference.

The CDCVF25081 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

**FUNCTION TABLE**

S2	S1	1Y0–1Y3	2Y0–2Y3	OUTPUT SOURCE	PLL SHUTDOWN
0	0	Hi-Z	Hi-Z	N/A.	Yes
0	1	Active	Hi-Z	PLL <sup>†</sup>	No
1	0	Active	Active	Input clock (PLL bypass)	Yes
1	1	Active	Active	PLL <sup>†</sup>	No

<sup>†</sup> CLK input frequency < 2 MHz switches the outputs to low level



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 © 2001 – 2003, Texas Instruments Incorporated

# CDCVF25081

## 3.3-V PHASED-LOCK LOOP CLOCK DRIVER

SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

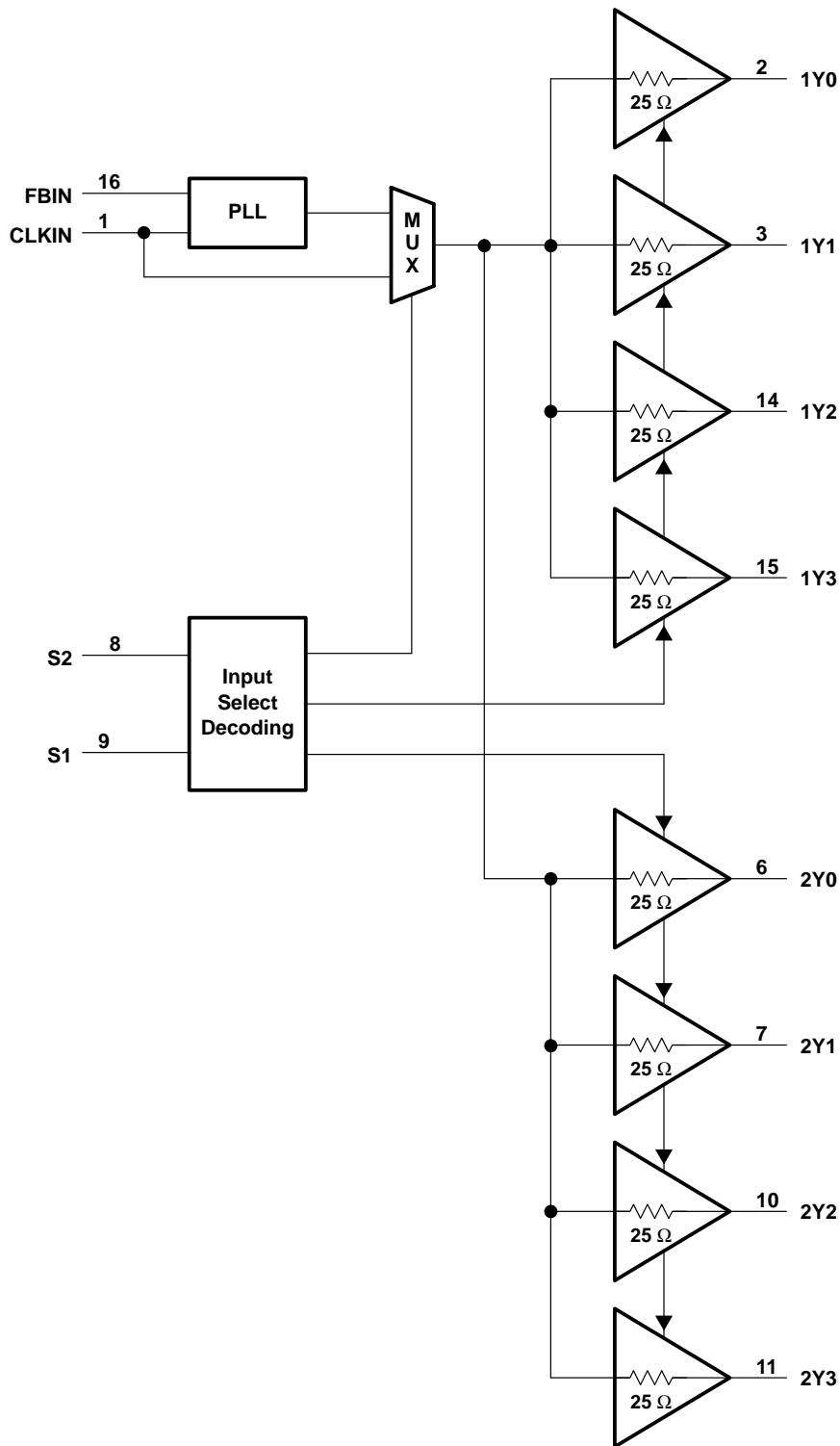
### Terminal Functions

TERMINAL NAME	PIN NO.	TYPE	DESCRIPTION
1Y[0:3]	2, 3, 14, 15	O	Bank 1Yn clock outputs. These outputs are low-skew copies of CLKIN. Each output has an integrated 25-Ω series-damping resistor.
2Y[0:3]	6, 7, 10, 11	O	Bank 2Yn clock outputs. These outputs are low-skew copies of CLKIN. Each output has an integrated 25-Ω series-damping resistor.
CLKIN	1	I	Clock input. CLKIN provides the clock signal to be distributed by the CDCVF25081 clock driver. CLKIN is used to provide the reference signal to the integrated PLL that generates the output signal. CLKIN must have a fixed frequency and phase in order for the PLL to acquire lock. Once the circuit is powered up and a valid signal is applied, a stabilization time is required for the PLL to phase lock the feedback signal to CLKIN.
FBIN	16	I	Feedback input. FBIN provides the feedback signal to the internal PLL. FBIN must be wired to one of the outputs to complete the feedback loop of the internal PLL. The integrated PLL synchronizes the FBIN and output signal so there is nominally zero-delay from input clock to output clock.
GND	5, 12	Ground	Ground
S1, S2	9, 8	I	Select pins to determine mode of operation. See the <i>FUNCTION TABLE</i> for mode selection options.
V <sub>DD</sub>	4, 13	Power	Supply voltage. The supply voltage range is 3 V to 3.6 V



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

functional block diagram



# CDCVF25081

## 3.3-V PHASED-LOCK LOOP CLOCK DRIVER

SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

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

Supply voltage range, $V_{DD}$	-0.5 V to 4.6 V
Input voltage range, $V_I$ (see Notes 1 and 2)	-0.5 V to 4.6 V
Output voltage range, $V_O$ (see Notes 1 and 2)	-0.5 V to $V_{DD} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	-50 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ )	-50 mA
Continuous total output current, $I_O$ ( $V_O = 0$ to $V_{DD}$ )	-50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 3): PW package	147°C/W
D package	112°C/W
Storage temperature range, $T_{stg}$	-65°C to 150°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.

- NOTES: 1. The input and output negative voltage ratings may be exceeded if the input and output clamp-current ratings are observed.  
 2. This value is limited to 4.6 V maximum.  
 3. The package thermal impedance is calculated in accordance with JESD 51.

### recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, $V_{DD}$	3	3.3	3.6	V
Low level input voltage, $V_{IL}$			0.8	V
High level input voltage, $V_{IH}$	2			V
Input voltage, $V_I$	0		3.6	V
High-level output current, $I_{OH}$			-12	mA
Low-level output current, $I_{OL}$			12	mA
Operating free-air temperature, $T_A$	-40		85	°C

### timing requirements over recommended ranges of supply voltage, load and operating free-air temperature

		MIN	NOM	MAX	UNIT
Clock frequency, $f_{clk}$	$C_L = 25$ pF	8		100	MHz
	$C_L = 15$ pF	66		200	



# CDCVF25081

## 3.3-V PHASED-LOCK LOOP CLOCK DRIVER

SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$V_{IK}$	Input voltage	$V_{DD} = 3\text{ V}$ , $I_I = -18\text{ mA}$			-1.2	V
$I_I$	Input current	$V_I = 0\text{ V}$ or $V_{DD}$			±5	μA
$I_{PD}‡$	Power down current	$f_{CLKIN} = 0\text{ MHz}$ , $V_{DD} = 3.3\text{ V}$			20	μA
$I_{OZ}$	Output 3-state	$V_O = 0\text{ V}$ or $V_{DD}$ , $V_{DD} = 3.6\text{ V}$			±5	μA
$C_I$	Input capacitance at FBIN, CLKIN	$V_I = 0\text{ V}$ or $V_{DD}$		4		pF
$C_I$	Input capacitance at S1, S2	$V_I = 0\text{ V}$ or $V_{DD}$		2.2		pF
$C_O$	Output capacitance	$V_I = 0\text{ V}$ or $V_{DD}$		3		pF
$V_{OH}$	High-level output voltage	$V_{DD} = \text{min to max}$ , $I_{OH} = -100\text{ μA}$	$V_{DD} - 0.2$			V
		$V_{DD} = 3\text{ V}$ , $I_{OH} = -12\text{ mA}$	2.1			
		$V_{DD} = 3\text{ V}$ , $I_{OH} = -6\text{ mA}$	2.4			
$V_{OL}$	Low-level output voltage	$V_{DD} = \text{min to max}$ , $I_{OL} = 100\text{ μA}$			0.2	V
		$V_{DD} = 3\text{ V}$ , $I_{OL} = 12\text{ mA}$			0.8	
		$V_{DD} = 3\text{ V}$ , $I_{OL} = 6\text{ mA}$			0.55	
$I_{OH}$	High-level output current	$V_{DD} = 3\text{ V}$ , $V_O = 1\text{ V}$			-24	mA
		$V_{DD} = 3.3\text{ V}$ , $V_O = 1.65\text{ V}$			-30	
		$V_{DD} = 3.6\text{ V}$ , $V_O = 3.135\text{ V}$			-15	
$I_{OL}$	Low-level output current	$V_{DD} = 3\text{ V}$ , $V_O = 1.95\text{ V}$			26	mA
		$V_{DD} = 3.3\text{ V}$ , $V_O = 1.65\text{ V}$			33	
		$V_{DD} = 3.6\text{ V}$ , $V_O = 0.4\text{ V}$			14	

† All typical values are at respective nominal  $V_{DD}$ .

‡ For  $I_{DD}$  over frequency see Figure 7.

# CDCVF25081

## 3.3-V PHASED-LOCK LOOP CLOCK DRIVER

SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

### switching characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t <sub>(lock)</sub>	PLL lock time	f = 100 MHz		10		μs
t <sub>(phoffset)</sub>	Phase offset (CLKIN to FBIN)	f = 8 MHz to 66 MHz, V <sub>th</sub> = V <sub>DD</sub> /2 (see Note 5)	-200		200	ps
		f = 66 MHz to 200 MHz, V <sub>th</sub> = V <sub>DD</sub> /2 (see Note 5)	-150		150	
t <sub>PLH</sub>	Low-to-high level output propagation delay	S2 = High, S1 = Low (PLL bypass)	2.5		6	ns
t <sub>PHL</sub>	High-to-low level output propagation delay	f = 1 MHz, C <sub>L</sub> = 25 pF				
t <sub>sk(o)</sub>	Output skew (Y <sub>n</sub> to Y <sub>n</sub> ) (see Note 4)				150	ps
t <sub>sk(pp)</sub>	Part-to-part skew	S2 = high, S1 = high (PLL mode)			600	ps
		S2 = high, S1 = low (PLL bypass)			700	
t <sub>jit(cc)</sub>	Jitter (cycle-to-cycle)	f = 66 MHz to 200 MHz, C <sub>L</sub> = 15 pF			±100	ps
		f = 66 MHz to 100 MHz, C <sub>L</sub> = 25 pF f = 8 MHz to 66 MHz (see Figure 6)			±150	
odc	Output duty cycle	f = 8 MHz to 200 MHz	43%		57%	
t <sub>sk(p)</sub>	Pulse skew	S2 = High, S1 = low (PLL bypass) f = 1 MHz, C <sub>L</sub> = 25 pF			0.7	ns
t <sub>r</sub>	Rise time rate	C <sub>L</sub> = 15 pF, See Figure 4	0.8		3.3	V/ns
		C <sub>L</sub> = 25 pF, See Figure 4	0.5		2	
t <sub>f</sub>	Fall time rate	C <sub>L</sub> = 15 pF, See Figure 4	0.8		3.3	V/ns
		C <sub>L</sub> = 25 pF, See Figure 4	0.5		2	

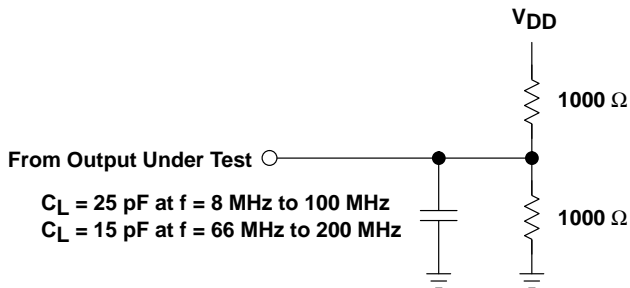
† All typical values are at respective nominal V<sub>DD</sub>.

NOTES: 4. The t<sub>sk(o)</sub> specification is only valid for equal loading of all outputs.

5. Similar waveform at CLKIN and FBIN are required. For phase displacement between CLKIN and Y-outputs see Figure 5.



PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All input pulses are supplied by generators having the following characteristics:  $Z_O = 50 \Omega$ ,  $t_r < 1.2 \text{ ns}$ ,  $t_f < 1.2 \text{ ns}$ .  
 C. The outputs are measured one at a time with one transition per measurement.

Figure 1. Test Load Circuit

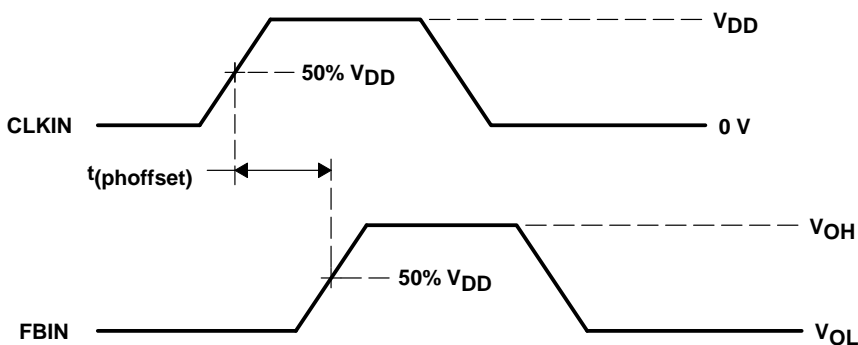
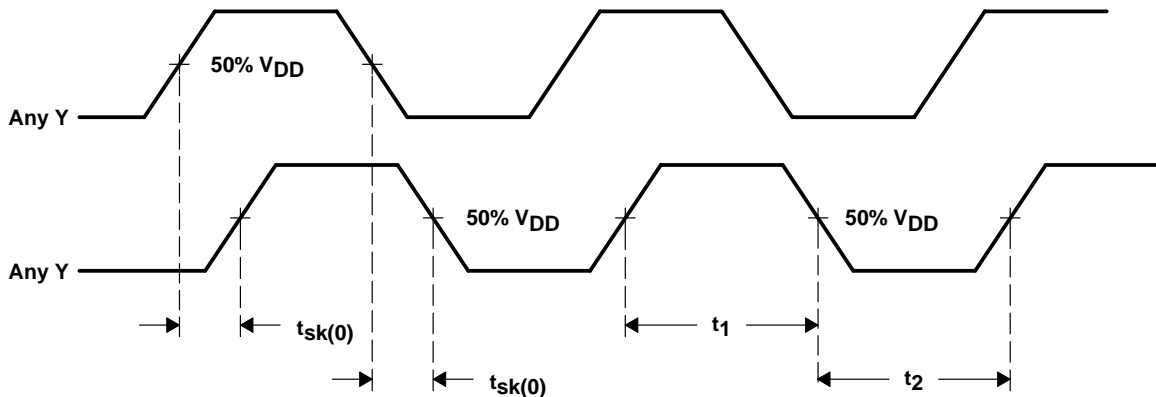


Figure 2. Voltage Thresholds for Measurements, Phase Offset (PLL Mode)



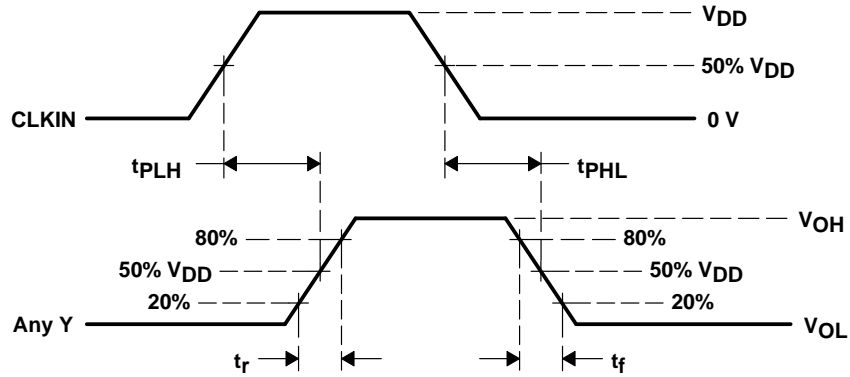
NOTE:  $odc = t_1 / (t_1 + t_2) \times 100\%$

Figure 3. Output Skew and Output Duty Cycle (PLL Mode)

**CDCVF25081**  
**3.3-V PHASED-LOCK LOOP CLOCK DRIVER**

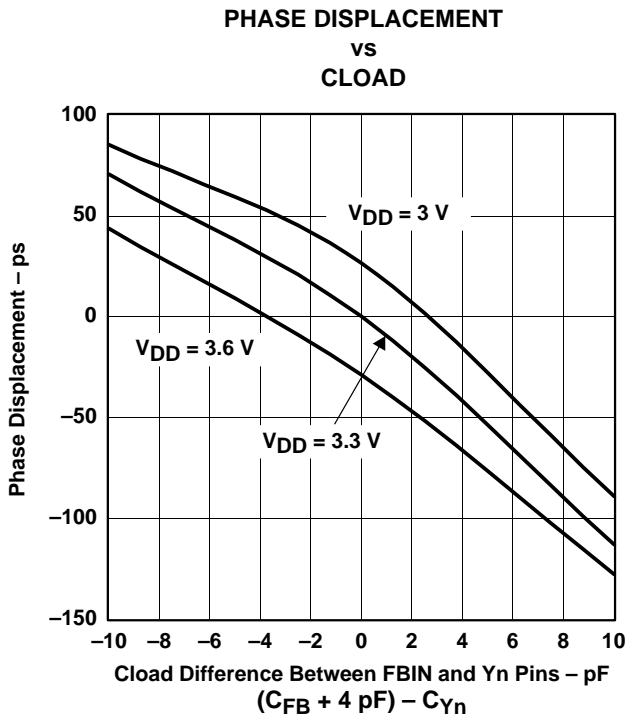
SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

**PARAMETER MEASUREMENT INFORMATION**

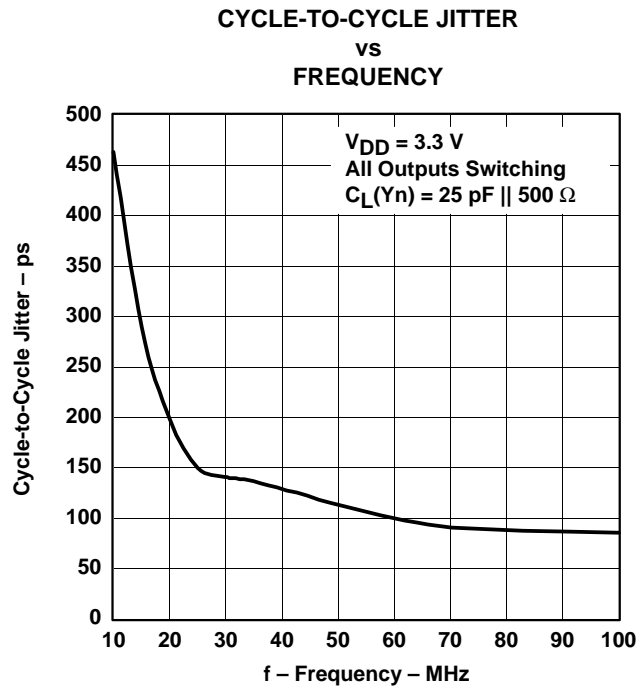


NOTE:  $t_{sk(p)} = |t_{PLH} - t_{PHL}|$

**Figure 4. Propagation Delay and Pulse Skew (Non-PLL Mode)**



**Figure 5**

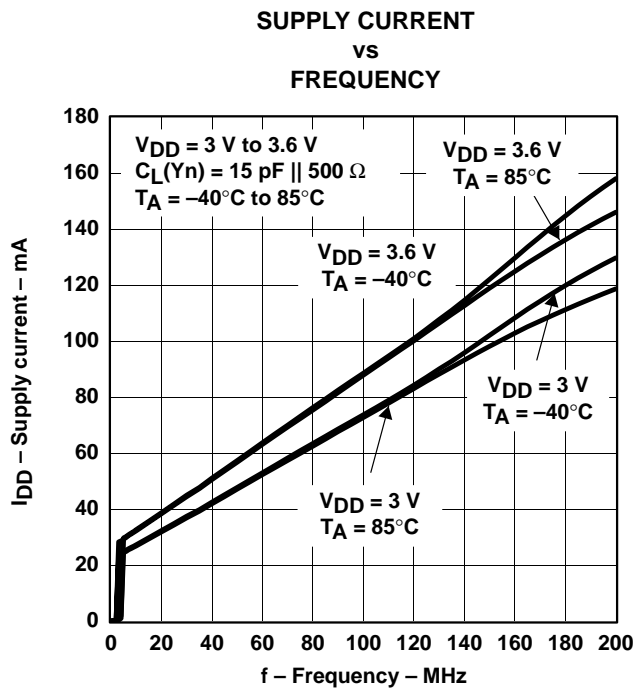


**Figure 6**





PARAMETER MEASUREMENT INFORMATION



# CDCVF25081 3.3-V PHASED-LOCK LOOP CLOCK DRIVER

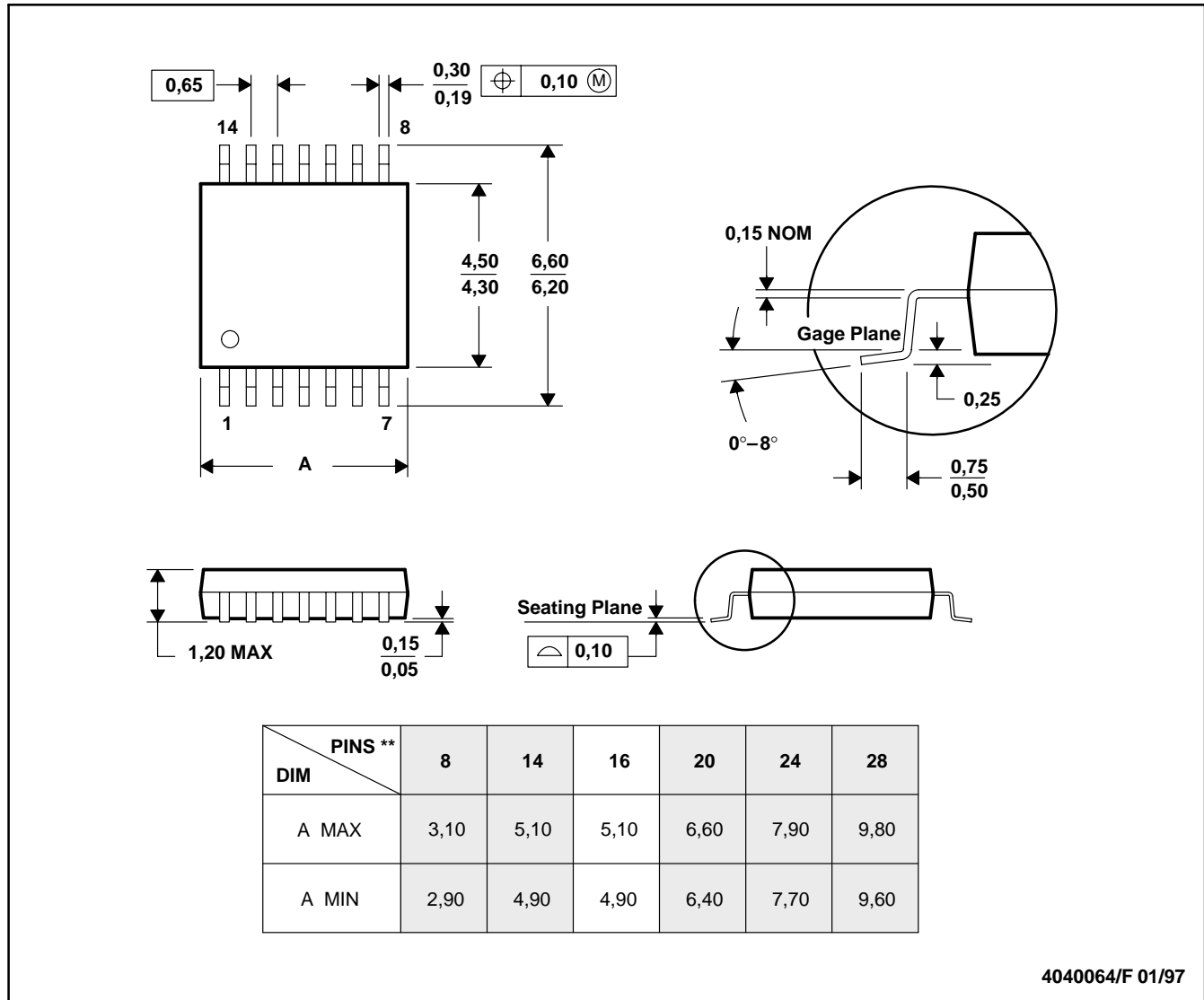
SCAS671A – OCTOBER 2001 – REVISED FEBRUARY 2003

## MECHANICAL DATA

PW (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



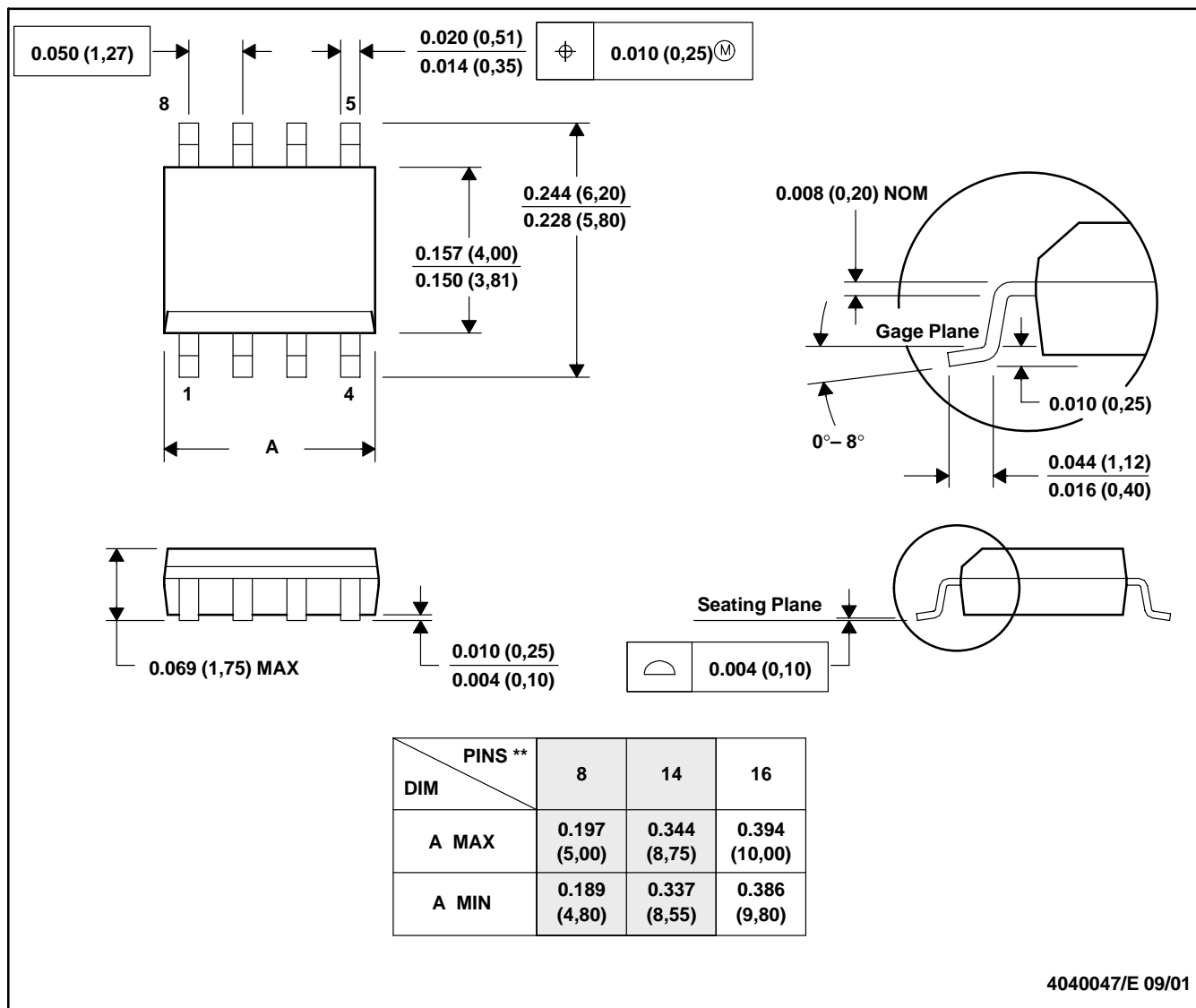
- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153

MECHANICAL DATA

D (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



- 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

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
CDCVF25081D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081PWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CDCVF25081PWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

**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
CDCVF25081DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CDCVF25081PWR	TSSOP	PW	16	2000	330.0	12.4	7.0	5.6	1.6	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)
CDCVF25081DR	SOIC	D	16	2500	346.0	346.0	33.0
CDCVF25081PWR	TSSOP	PW	16	2000	346.0	346.0	29.0

PW (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN

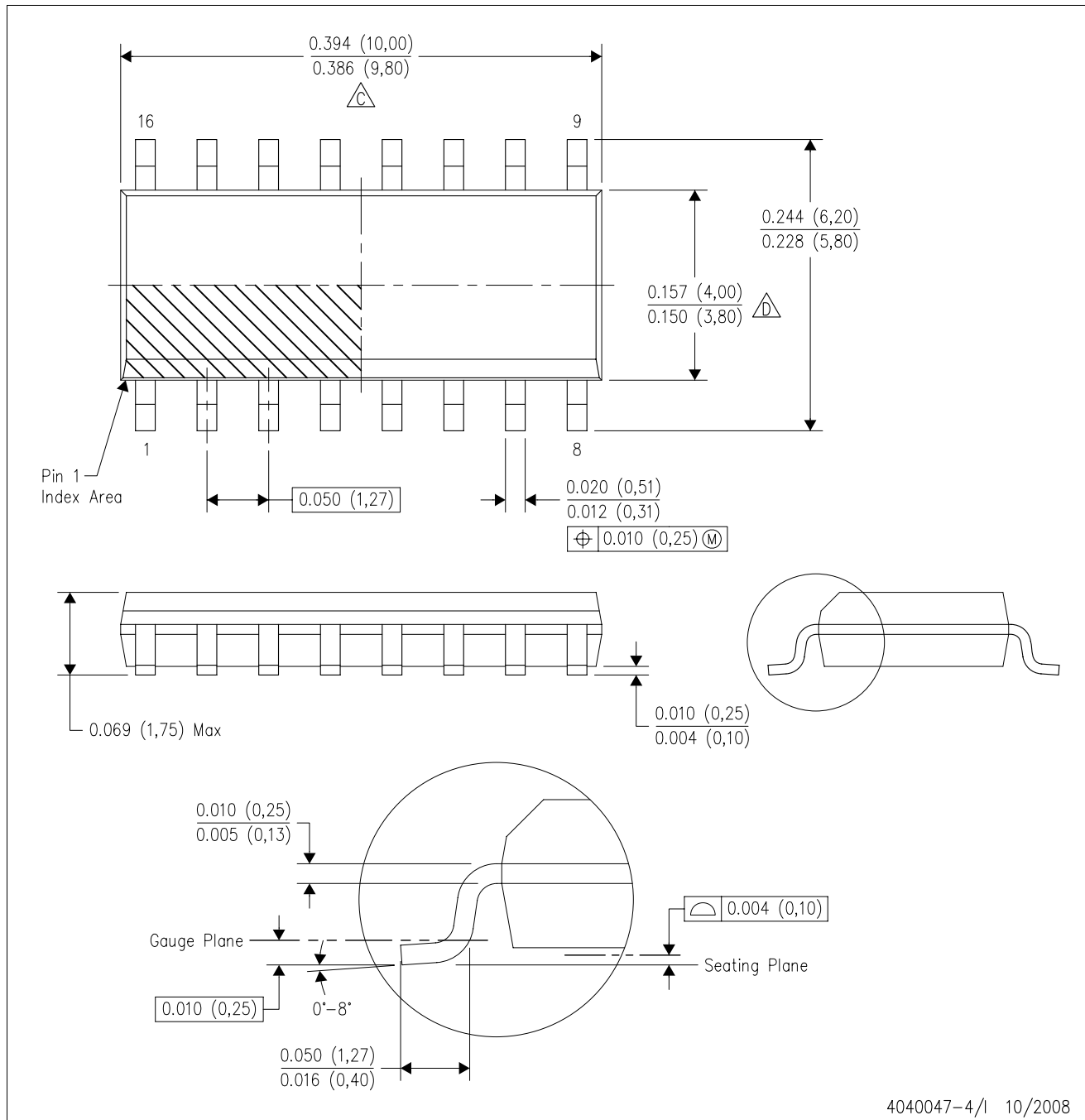


4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153

D (R-PDSO-G16)

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 AC.



## 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	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

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