

SN54S124, SN74S124 DUAL VOLTAGE-CONTROLLED OSCILLATORS

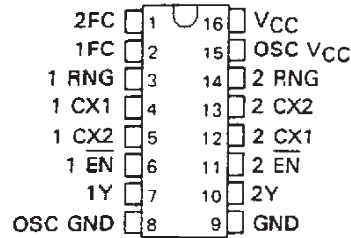
SDLS201A – DECEMBER 1983 – REVISED APRIL 2004

- Two independent VCOs in a 16-Pin Package
- Output Frequency Set by Single External Component:
Capacitor for Fixed- or Variable-Frequency Operation
- Separate Supply Voltage Pins for Isolation of Frequency Control Inputs and Oscillators from Output Circuitry
- Highly Stable Operation over Specified Temperature and/or Supply Voltage Ranges
- Typical f_{max} 85 MHz
Typical Power Dissipation 525 mW
- Frequency Spectrum . . . 1 Hz to 60 MHz

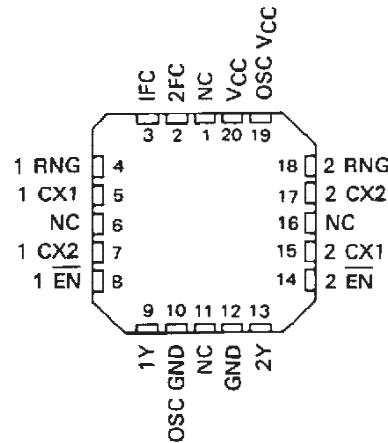
description

The 'S124 features two independent voltage-controlled oscillators (VCO) in a single monolithic chip. The output frequency of each VCO is established by an external capacitor in combination with two voltage-sensitive inputs, one for frequency range and one for frequency control. These inputs can be used to vary the output frequency as shown under typical characteristics. These highly stable oscillators can be set to operate at any frequency typically between 0.12 hertz and 85 megahertz. ¹

SN54S124 . . . J OR W PACKAGE
SN74S124 . . . D OR N PACKAGE
(TOP VIEW)



SN54S124 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

While the enable input is low, the output is enabled.
While the enable input is high, the output is high.

These devices can operate from a single 5-volt supply. However, one set of supply-voltage and ground pins (V_{CC} and GND) is provided for the enable, synchronization-gating, and output sections, and a separate set (⊖V_{CC} and ⊖GND) is provided for the oscillator and associated frequency-control circuits so that effective isolation can be accomplished in the system.

The enable input of these devices starts or stops the output pulses when it is low or high, respectively. The internal oscillator of the 'S124 is started and stopped by the enable input. The enable input is one standard load; it and the buffered output operate at standard Schottky-clamped TTL levels.

The pulse synchronization-gating section ensures that the first output pulse is neither clipped nor extended. Duty cycle of the square-wave output is fixed at approximately 50 percent.

The SN54S124 is characterized for operation over the full military temperature range of –55°C to 125°C; the SN74S124 is characterized for operation from 0°C to 70°C.



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**

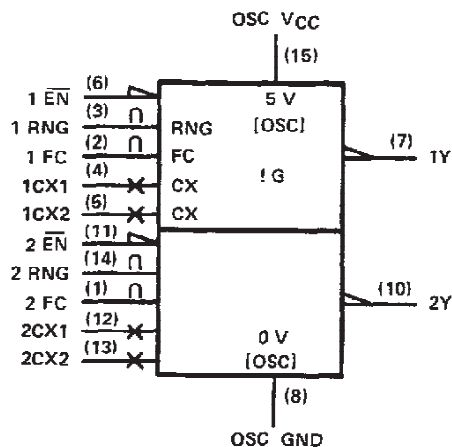
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2004, Texas Instruments Incorporated

SN54S124, SN74S124 DUAL VOLTAGE-CONTROLLED OSCILLATORS

SDLS201A - DECEMBER 1983 - REVISED APRIL 2004

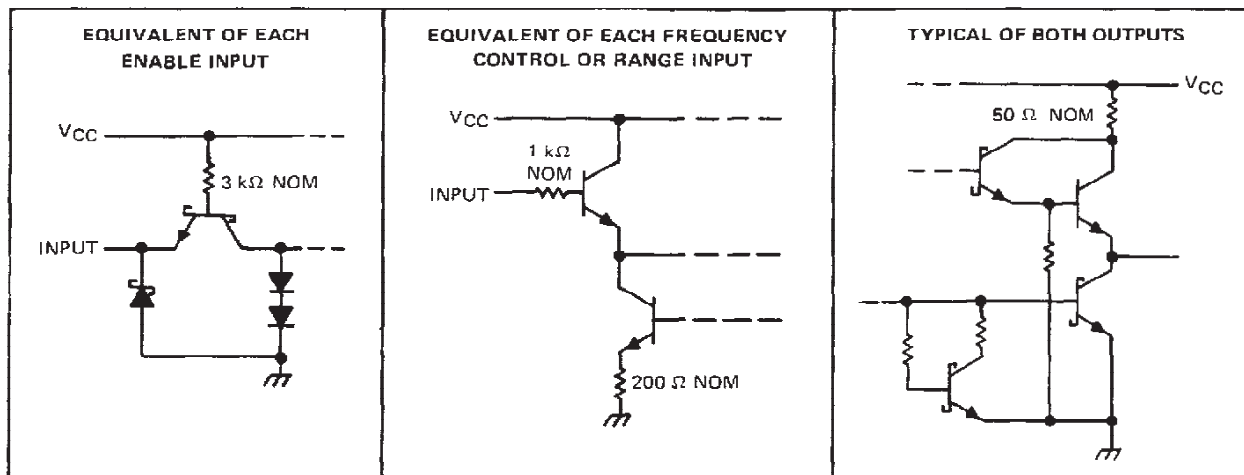
logic symbol[†]



[†]This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, J, N, and W packages.

schematics of inputs and outputs



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

Supply voltage, V_{CC} (See Notes 1 and 2)	7V
Input voltage	5.5 V
Operating free-air temperature range: SN54S124	-55°C to 125°C
SN74S124	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTES: 1. Voltage values are with respect to the appropriate ground terminal.

2. Throughout this data sheet, the symbol V_{CC} is used for the voltage applied to both the V_{CC} and $\ominus V_{CC}$ terminals, unless otherwise noted.

SN54S124, SN74S124 DUAL VOLTAGE-CONTROLLED OSCILLATORS

SDLS201A – DECEMBER 1983 – REVISED APRIL 2004

recommended operating conditions

	SN54S124			SN74S124			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC} (see Note 1)	4.5	5	5.5	4.75	5	6.25	V
Input voltage at frequency control or range input, $V_{I(freq)}$ or $V_{I(rng)}$	1		5	1		5	V
High-level output current, I_{OH}			-1			-1	mA
Low-level output current, I_{OL}			20			20	mA
Output frequency (enabled), f_o	1			1			Hz
			60			60	MHz
Operating free-air temperature, T_A	-55		125	0		70	°C

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

PARAMETER			TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IH}	High-level input voltage at enable				2			V
V_{IL}	Low-level input voltage at enable						0.8	V
V_{IK}	Input clamp voltage at enable		$V_{CC} = \text{MIN}$, $I_I = -18 \text{ mA}$				-1.2	V
V_{OH}	High-level output voltage		$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OH} = -1 \text{ mA}$	SN54S*	2.6	3.4		V
				SN74S*	2.7	3.4		
V_{OL}	Low-level output voltage		$V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$, $I_{OL} = 20 \text{ mA}$				0.5	V
I_I	Input current	Freq control or range	$V_{CC} = \text{MAX}$	$V_I = 5 \text{ V}$		10	50	μA
				$V_I = 1 \text{ V}$		1	15	
I_{II}	Input current at maximum input voltage	Enable	$V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$			1		mA
I_{IH}	High-level input current	Enable	$V_{CC} = \text{MAX}$, $V_I = 2.7 \text{ V}$				50	μA
I_{IL}	Low-level input current	Enable	$V_{CC} = \text{MAX}$, $V_I = 0.5 \text{ V}$				-2	mA
I_{OS}	Short-circuit output current §		$V_{CC} = \text{MAX}$		-40		-100	mA
I_{CC}	Supply current, total into V_{CC} and $\odot V_{CC}$		$V_{CC} = \text{MAX}$, See Note 3			105	150	mA
			$V_{CC} = \text{MAX}$, $T_A = 125^\circ\text{C}$, See Note 3	W package only			110	

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

§Not more than one output should be shorted at a time and duration of the short-circuit should not exceed one second.

NOTE 3: I_{CC} is measured with the outputs disabled and open.

switching characteristics, $V_{CC} = 5 \text{ V}$, $R_L = 280 \Omega$, $C_L = 15 \text{ pF}$, $T_A = 25^\circ\text{C}$ (see note 4)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
f _o	Output frequency	C _{ext} = 2 pF	V _I (freq) = 4 V, V _I (rng) = 1 V	60	85		MHz
			V _I (freq) = 1 V, V _I (rng) = 5 V	25	40		
Output duty cycle		C _{ext} = 8.3 pF to 500 μF			50%		
t _{PHL}	Propagation delay time, high-to-low-level output from enable	f _o = 1 Hz to 20 MHz			1.4 f _o (Hz)		s
		f _o > 20 MHz			70		ns

NOTE 4: Load circuits and voltage waveforms are shown in Section 1.

SN54S124, SN74S124 DUAL VOLTAGE-CONTROLLED OSCILLATORS

SDLS201A - DECEMBER 1983 - REVISED APRIL 2004

TYPICAL CHARACTERISTICS

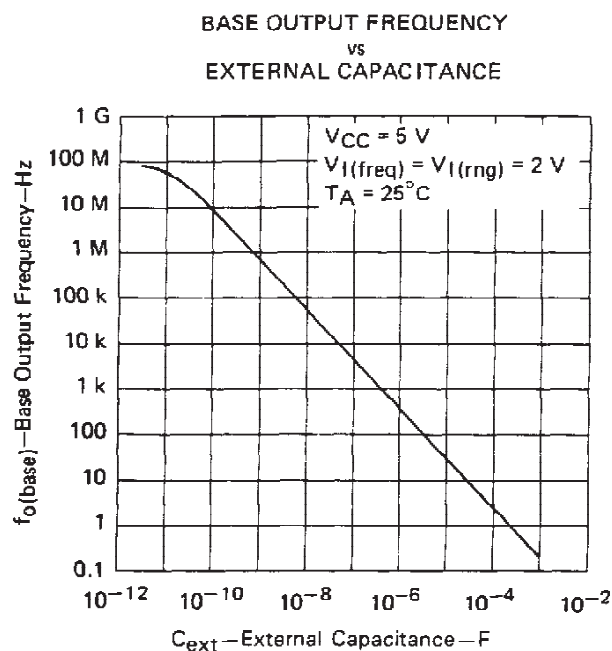


FIGURE 1

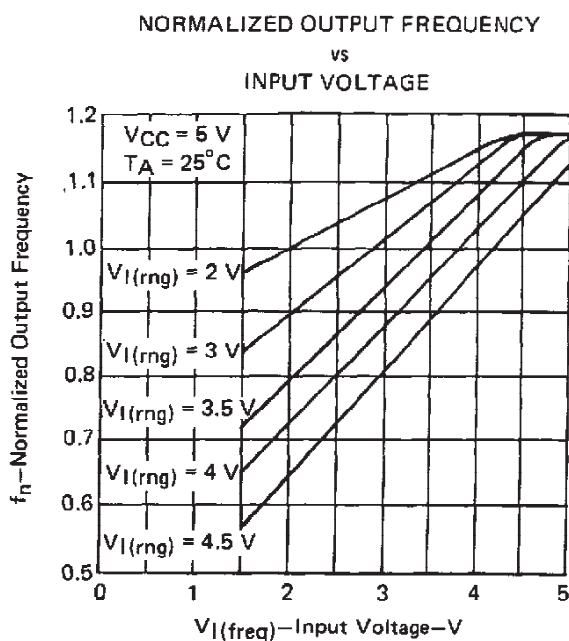


FIGURE 2

NOTE: $f_o = f_n \times f_o(\text{base})$

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN54S124J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54S124J
SN54S124J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54S124J
SN74S124D	Active	Production	SOIC (D) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	S124
SN74S124D.A	Active	Production	SOIC (D) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	S124
SN74S124N	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74S124N
SN74S124N.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74S124N
SN74S124NE4	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74S124N
SNJ54S124J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SNJ54S124J
SNJ54S124J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SNJ54S124J

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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 SN54S124, SN74S124 :

- Catalog : [SN74S124](#)
- Military : [SN54S124](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74S124D	D	SOIC	16	40	507	8	3940	4.32
SN74S124D.A	D	SOIC	16	40	507	8	3940	4.32
SN74S124N	N	PDIP	16	25	506	13.97	11230	4.32
SN74S124N	N	PDIP	16	25	506	13.97	11230	4.32
SN74S124N.A	N	PDIP	16	25	506	13.97	11230	4.32
SN74S124N.A	N	PDIP	16	25	506	13.97	11230	4.32
SN74S124NE4	N	PDIP	16	25	506	13.97	11230	4.32
SN74S124NE4	N	PDIP	16	25	506	13.97	11230	4.32

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD

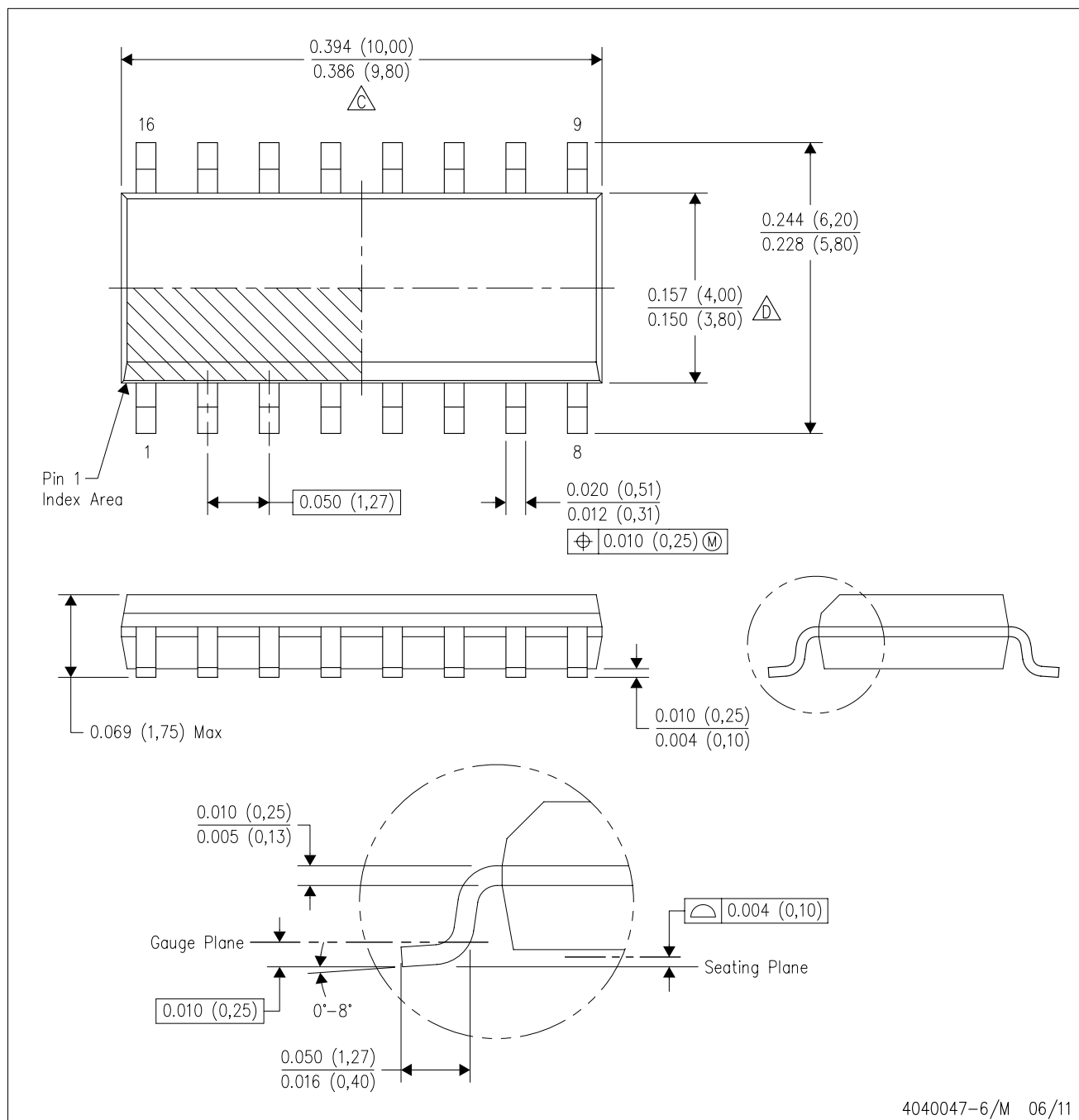


4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 -  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 -  The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4040047-6/M 06/11

- 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.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2025, Texas Instruments Incorporated