SNx407 and SNx417 Hex Buffers and Drivers With Open-Collector High-Voltage Outputs

1 Features

- Convert TTL Voltage Levels to MOS Levels
- High Sink-Current Capability Design
- Open-Collector Driver for Indicator Lamps
- Inputs Fully Compatible With Most TTL Circuits
- On Products Compliant to MIL-PRF-38535, All Parameters Are Tested Unless Otherwise Noted. On All Other Products, Production Processing Does Not Necessarily Include Testing of All Parameters.

2 Applications

- Audio Docks: Portable
- Blu-ray Disc® Players and Home Theaters
- MP3 Players or Recorders
- Personal Digital Assistants (PDAs)
- Power: Telecom and Server AC or DC Supply: Single Controllers: Analog and Digital
- Solid-State Drive (SSD): Client and Enterprise
- TV: LCD, Digital, and High-Definition (HDTV)
- Tablets: Enterprise
- Video Analytics: Servers
- Wireless Headsets, Keyboards, and Mice

3 Description

These TTL hex buffers and drivers feature high-voltage open-collector outputs for interfacing with high-level circuits (such as MOS) or for driving high-current loads (such as lamps or relays), and also are characterized for use as buffers for driving TTL inputs. The SN5407 and SN7407 devices have minimum breakdown voltages of 30 V, and the SN5417 and SN7417 devices have minimum breakdown voltages of 15 V. The maximum sink current is 30 mA for the SN5407 and SN5417 devices and 40 mA for the SN7407 and SN7417 devices.

These devices perform the Boolean function Y = A in positive logic.

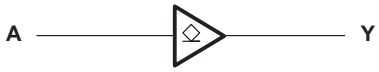
These circuits are completely compatible with most TTL families. Inputs are diode clamped to minimize transmission-line effects, which simplifies design. Typical power dissipation is 145 mW, and average propagation delay time is 14 ns.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SNx407J, SNx417J	CDIP (14)	19.56 mm × 6.92 mm
SN74x7D	SOIC (14)	8.65 mm × 3.91 mm
SN74x7N	PDIP (14)	19.30 mm × 6.35 mm
SNJ5407FK	LCCC (20)	8.89 mm × 8.89 mm
SNJ5407W	CFP (14)	9.21 mm × 5.97 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Logic Diagram, Each Buffer and Driver (Positive Logic)



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4 Revision History

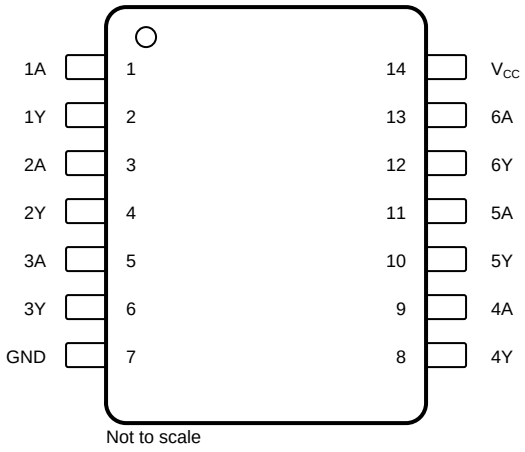
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision G (May 2004) to Revision H	Page
• Added *ESD Ratings* table, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section.	1
• Deleted *Ordering Information* table; see POA at the end of the data sheet.	1
• Added Military Disclaimer to Features	1
• Changed $R_{\theta JA}$ values for SN7404: D (SOIC) from 86 to 86.8, N (PDIP) from 80 to 52.1, and NS (SO) from 76 to 85.9	5

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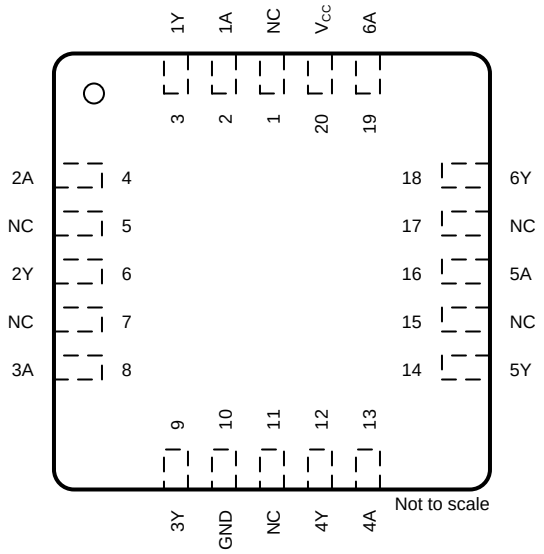
5 Pin Configuration and Functions

D, N, NS, J, or W Package
14-Pin SOIC, PDIP, CDIP, or CFP
Top View



Not to scale

FK Package
20-Pin LCCC
Top View



Not to scale

NC – No internal connection

Pin Functions

PIN			I/O	DESCRIPTION
NAME	SOIC, PDIP, CDIP, CFP	LCCC		
1A	1	2	I	Input 1
1Y	2	3	O	Output 1
2A	3	4	I	Input 2
2Y	4	6	O	Output 2
3A	5	8	I	Input 3
3Y	6	9	O	Output 3
4A	9	13	I	Input 4
4Y	8	12	O	Output 4
5A	11	16	I	Input 5
5Y	10	14	O	Output 5
6A	13	19	I	Input 6
6Y	12	18	O	Output 6
GND	7	10	—	Ground Pin
NC	—	1, 5, 7, 11, 15, 17	—	No Connect
V_{CC}	14	20	—	Power Pin

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6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage			7	V
V_I	Input voltage(2)			5.5	V
V_O	Output voltage(2)(3)	SN5407, SN7407		30	V
		SN5417, SN7417		15	
T_J	Junction temperature			150	ºC
T_{stg}	Storage temperature		–65	150	ºC

(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 voltage values are with respect to GND.
(3) This is the maximum voltage that can safely be applied to any output when it is in the OFF state.

6.2 ESD Ratings

			VALUE	UNIT
SN7407 AND SN7417				
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±2000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101(2)	±1000	
SN5407 AND SN5417				
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	±2000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	SN5407, SN5417	4.5	5	5.5	V
		SN7407, SN7417	4.75	5	5.25	
V_{IH}	High-level input voltage		2			V
V_{IL}	Low-level input voltage				0.8	V
V_{OH}	High-level output voltage	SN5407, SN7407			30	V
		SN5417, SN7417			15	
I_{OL}	Low-level output current	SN5407, SN5417			30	mA
		SN7407, SN7417			40	
T_A	Operating free-air temperature	SN5407, SN5417	–55		125	°C
		SN7407, SN7417	0		70	

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See *Implications of Slow or Floating CMOS Inputs,*.

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6.4 Thermal Information

THERMAL METRIC[1]		SN7407			SN7417		UNIT
		D (SOIC)	N (PDIP)	NS (SO)	D (SOIC)	N (PDIP)	
		14 PINS	14 PINS	14 PINS	14 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance[2]	86.8	52.1	85.9	88.8	52.1	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	47.1	39.4	43.9	50.4	39.4	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	41	32	44.7	43	32	°C/W
ψ_{JT}	Junction-to-top characterization parameter	15.6	24.2	14.6	16.5	24.2	°C/W
ψ_{JB}	Junction-to-board characterization parameter	40.8	31.8	44.4	42.8	31.8	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report.
(2) The package thermal impedance is calculated in accordance with JESD 51-7.

6.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)[1][2]

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = –12 mA				–1.5	V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IL} = 0.8 V	I_{OL} = 16 mA			0.4	V
			I_{OL} = 30 mA, SN5407, SN5417			0.7	
			I_{OL} = 40 mA, SN7407, SN7417			0.7	
I_{OH}	High-level output current	V_{CC} = MIN, V_{IH} = 2 V	V_{OH} = 30 V, SN5407, SN7407			0.25	mA
			V_{OH} = 15 V, SN5417, SN7417			0.25	
I_I	Input current	V_{CC} = MAX, V_I = 5.5 V				1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_{IH} = 2.4 V				40	µA
I_{IL}	Low-level input current	V_{CC} = MAX, V_{IL} = 0.4 V				–1.6	mA
I_{CCH}	High-level supply current	V_{CC} = MAX			29	41	mA
I_{CCL}	Low-level supply current	V_{CC} = MAX			21	30	mA

(1) All typical values are at V_{CC} = 5 V, T_A = 25°C.
(2) For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

6.6 Switching Characteristics

V_{CC} = 5 V, T_A = 25°C (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	A	Y	R_L = 110 Ω, C_L = 15 pF		6	10	ns
t_{PHL}					20	30	
t_{PLH}	A	Y	R_L = 150 Ω, C_L = 50 pF			15	ns
t_{PHL}						26	

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6.7 Typical Characteristics

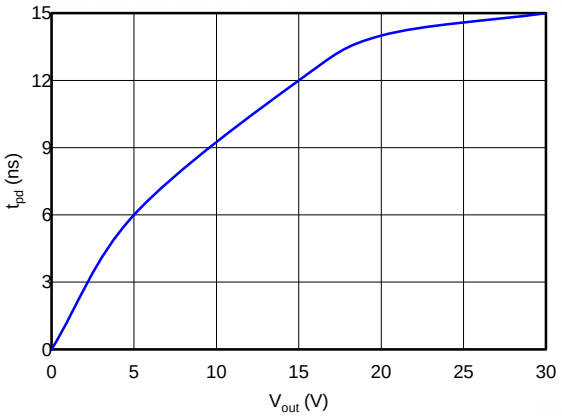
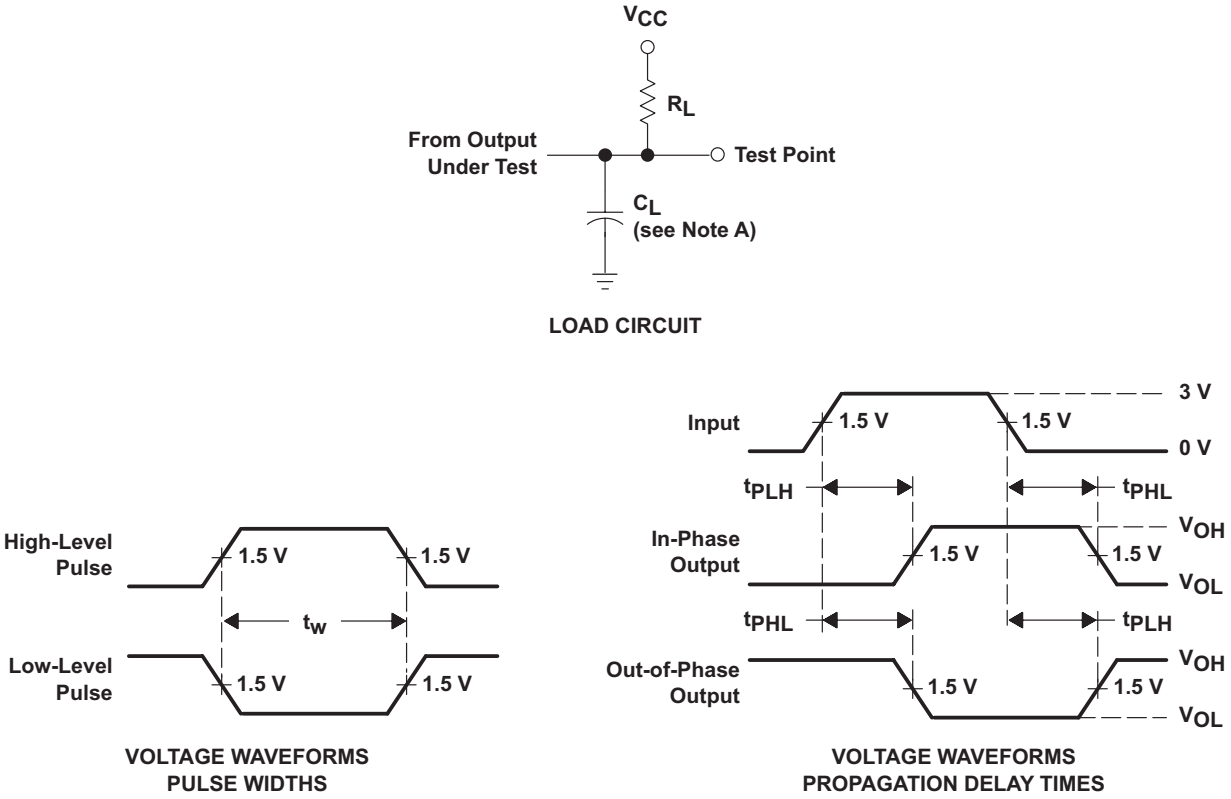


Figure 1. Time Low to High vs V_{OUT}

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7 Parameter Measurement Information



A. C_L includes probe and jig capacitance.

B. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily.

C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 7 ns, t_f ≤ 7 ns.

D. The outputs are measured one at a time, with one input transition per measurement.

Figure 2. Load Circuit and Voltage Waveforms

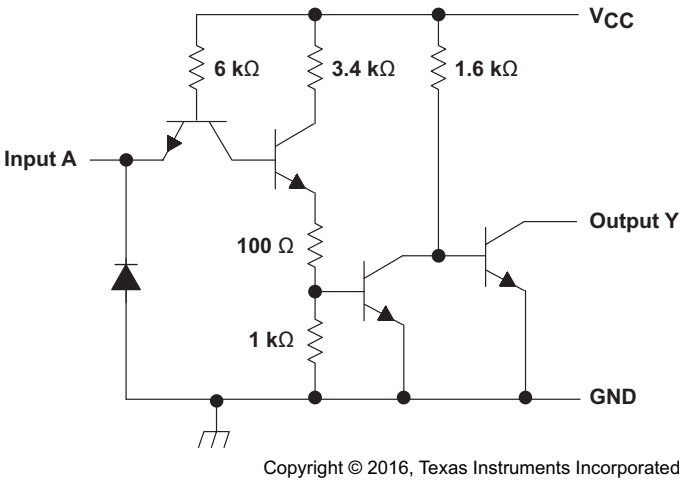
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8 Detailed Description

8.1 Overview

The SN74x7 is a high sink current capable open-collector buffer. This device is high-voltage tolerant on the output of up to 30 V on the SNx407 model and 15 V on the SNx417 model. The SN74x7 is also useful for converting TTL voltage levels to MOS levels.

8.2 Functional Block Diagram



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Resister values shown are nominal.

Figure 3. Schematic

8.3 Feature Description

The SNx407 and SNx417 devices are ideal for high voltage outputs. The SNx407 device has a maximum output voltage 30 V and the SNx417 device has a maximum output voltage 15 V.

The high sink current is up to 40 mA for the SN74x7.

8.4 Device Functional Modes

Table 1 lists the functions of the devices.

Table 1. Function Table

INPUT A	OUTPUT Y
H	High-Z
L	L

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9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The SN74x7 device is a high-drive, open-collector device that is used for multiple buffer-type functions. The device produces 30 mA of drive current. Therefore, this device is ideal for driving multiple inputs and for high-speed applications up to 100 MHz. The outputs are high voltage tolerant up to 30 V for the SNx407.

9.2 Typical Application

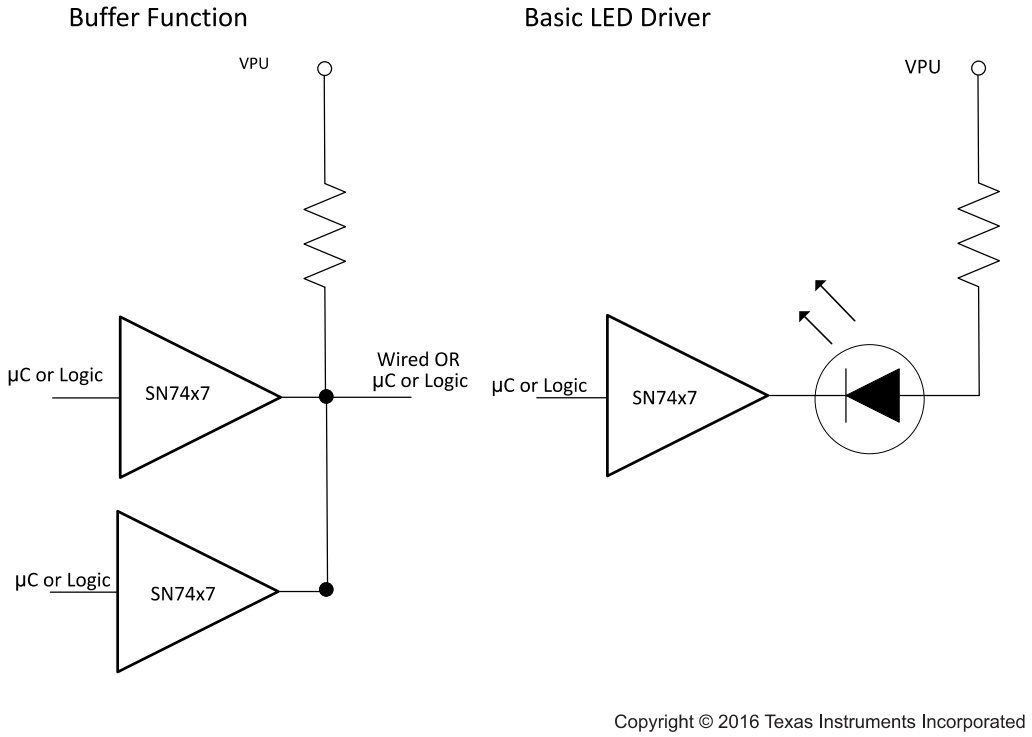


Figure 4. Typical Application Diagram

9.2.1 Design Requirements

Avoid bus contention because it can drive currents that would exceed maximum limits. The high drive also creates fast edges into light loads; therefore, routing and load conditions must be considered to prevent ringing.

9.2.2 Detailed Design Procedure

1. Recommended Input Conditions
   - Rise time and fall time specs: See t_{PHL} and t_{PLH} in *Switching Characteristics*.
   - Specified high and low levels: See V_{IH} and V_{IL} in *Recommended Operating Conditions*.
2. Recommend Output Conditions
   - Load currents must not exceed 30 mA.
   - Outputs must not be pulled above 30 V for the SNx407 device.

Typical Application (continued)

9.2.3 Application Curve

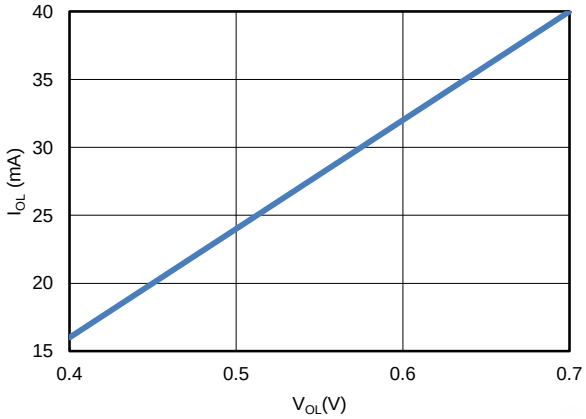


Figure 5. V_{OL} vs I_{OL}

10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating (see *Recommended Operating Conditions*).

Each V_{CC} pin must have a good bypass capacitor to prevent power disturbance. TI recommends 0.1 µF for devices with a single supply. If there are multiple V_{CC} pins, then TI recommends 0.01 µF or 0.022 µF for each power pin. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1 µF and a 1 µF are commonly used in parallel. The bypass capacitor must be installed as close to the power pin as possible for best results.

11 Layout

11.1 Layout Guidelines

When using multiple bit logic devices inputs must never float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Figure 6 specifies the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally they are tied to GND or V_{CC}, whichever makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver.

11.2 Layout Example

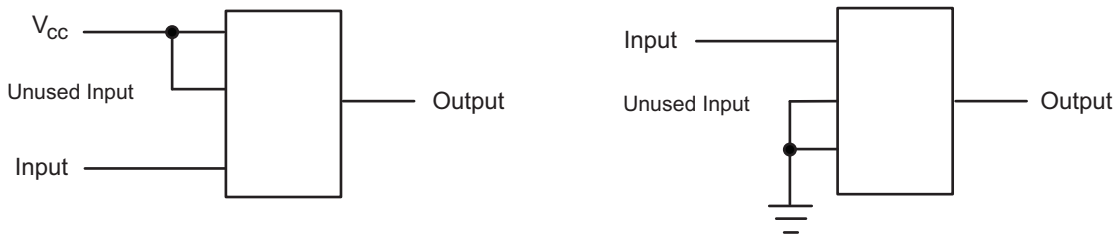


Figure 6. Layout Diagram

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12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

For related documentation see the following:

Implications of Slow or Floating CMOS Inputs, (SCBA004)

12.2 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 2. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN5407	Click here	Click here	Click here	Click here	Click here
SN5417	Click here	Click here	Click here	Click here	Click here
SN7407	Click here	Click here	Click here	Click here	Click here
SN7417	Click here	Click here	Click here	Click here	Click here

12.3 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me*to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

12.4 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.5 Trademarks

E2E is a trademark of Texas Instruments.
Blu-ray Disc is a registered trademark of Blue-ray Disc Association.
All other trademarks are the property of their respective owners.

12.6 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

12.7 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

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13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser based versions of this data sheet, refer to the left hand navigation.

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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
JM38510/00803BCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 00803BCA	Samples
JM38510/00803BDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 00803BDA	Samples
M38510/00803BCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 00803BCA	Samples
M38510/00803BDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 00803BDA	Samples
SN5407J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN5407J	Samples
SN5417J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN5417J	Samples
SN7407D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7407	Samples
SN7407DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7407	Samples
SN7407DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7407	Samples
SN7407DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7407	Samples
SN7407DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7407	Samples
SN7407DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7407	Samples
SN7407J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI	0 to 70		
SN7407N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN7407N	Samples
SN7407N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI	0 to 70		
SN7407NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN7407N	Samples
SN7407NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	SN7407	Samples
SN7407NSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	SN7407	Samples

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
SN7407NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	SN7407	Samples
SN7417D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7417	Samples
SN7417DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	7417	Samples
SN7417N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN7417N	Samples
SN7417N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI	0 to 70		
SN7417NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN7417N	Samples
SNJ5407FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	SNJ5407FK	Samples
SNJ5407J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	SNJ5407J	Samples
SNJ5407W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	SNJ5407W	Samples
SNJ5417J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	SNJ5417J	Samples

(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.

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OTHER QUALIFIED VERSIONS OF SN5407, SN5417, SN7407, SN7417 :

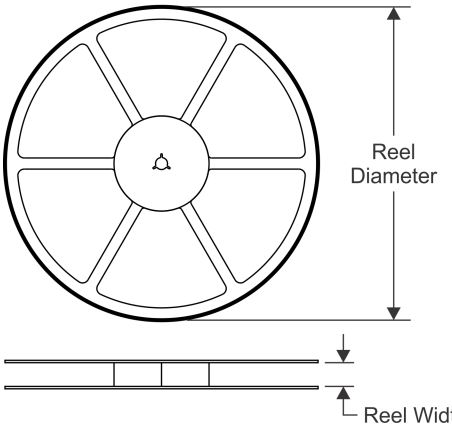
- Catalog: SN7407, SN7417
- Military: SN5407, SN5417

NOTE: Qualified Version Definitions:

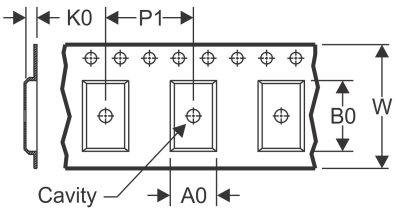
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

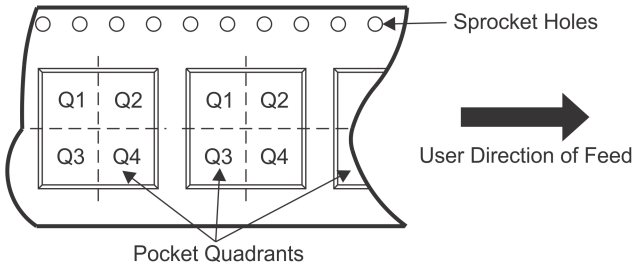


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

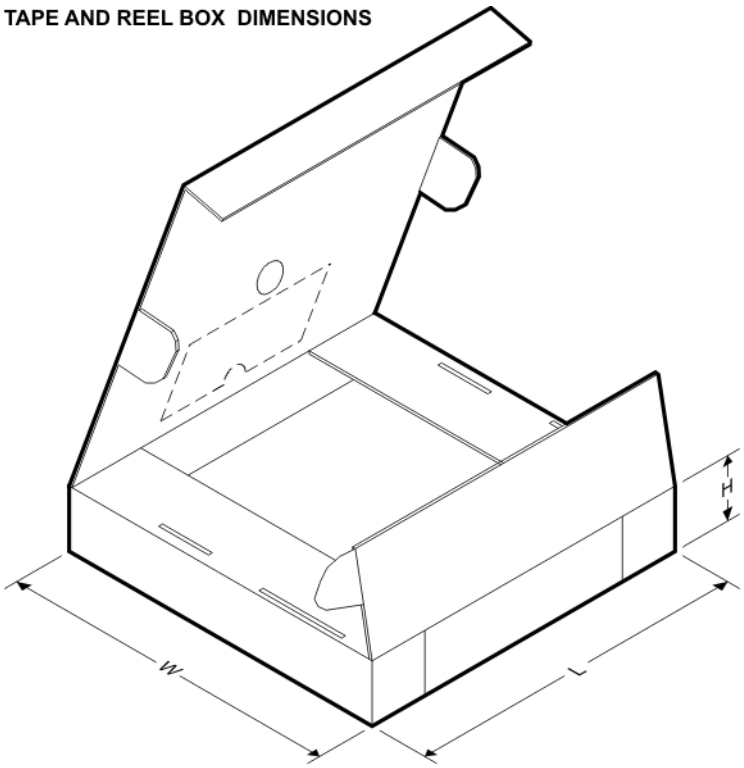
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN7407DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN7407DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN7407NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN7417DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



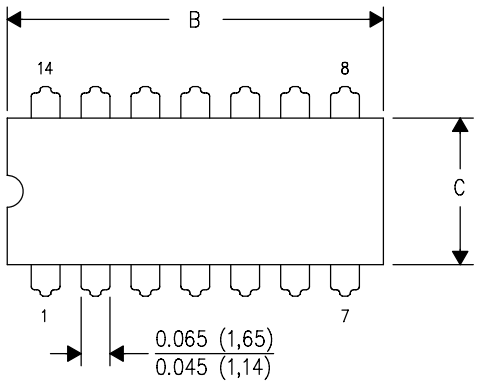
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN7407DR	SOIC	D	14	2500	333.2	345.9	28.6
SN7407DR	SOIC	D	14	2500	367.0	367.0	38.0
SN7407NSR	SO	NS	14	2000	367.0	367.0	38.0
SN7417DR	SOIC	D	14	2500	367.0	367.0	38.0

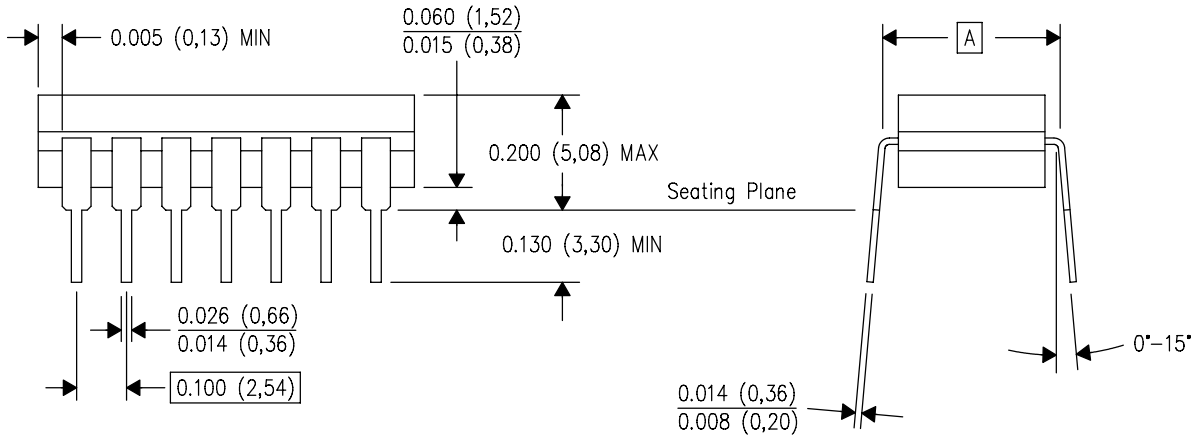
J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



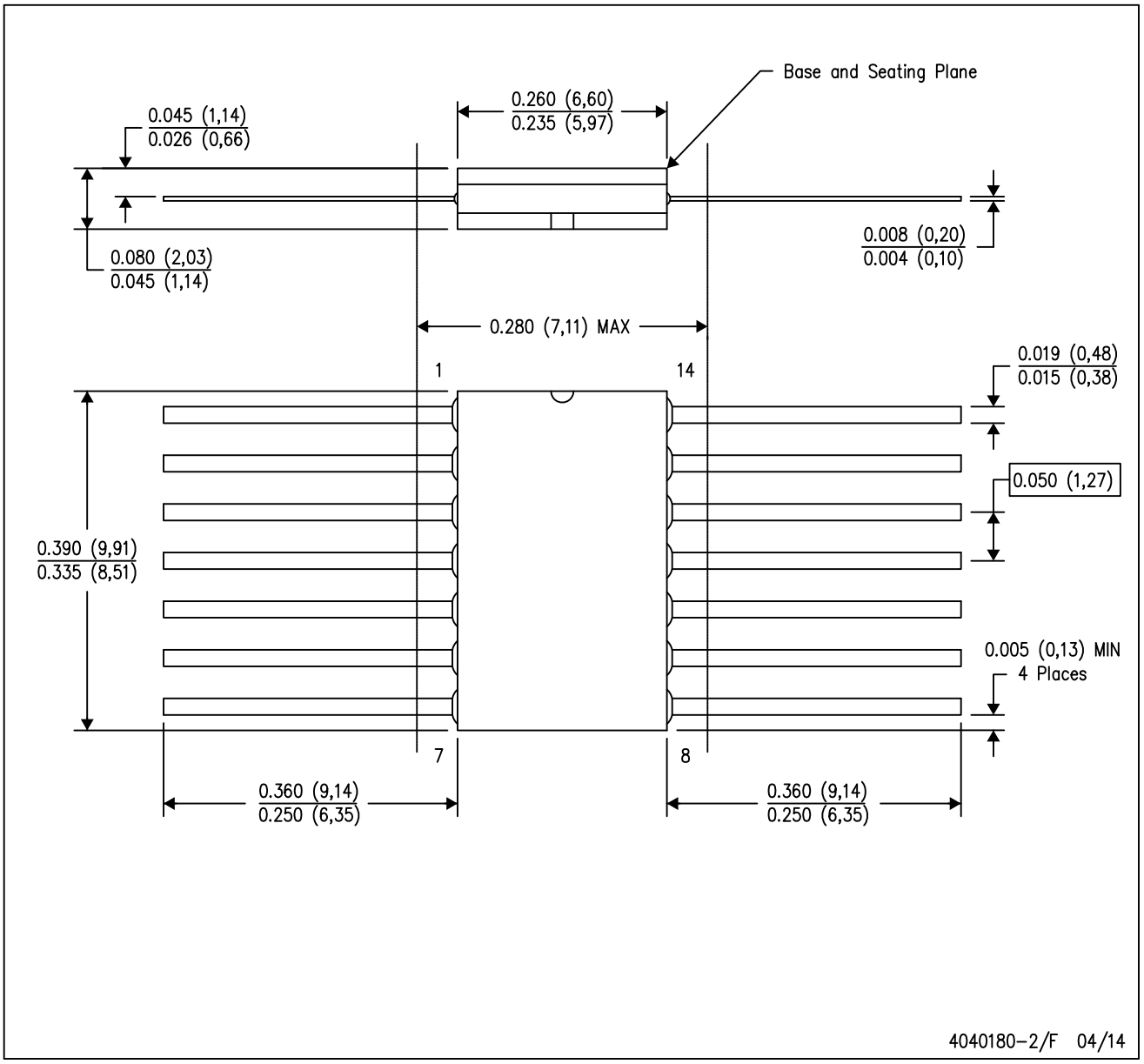
DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



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.

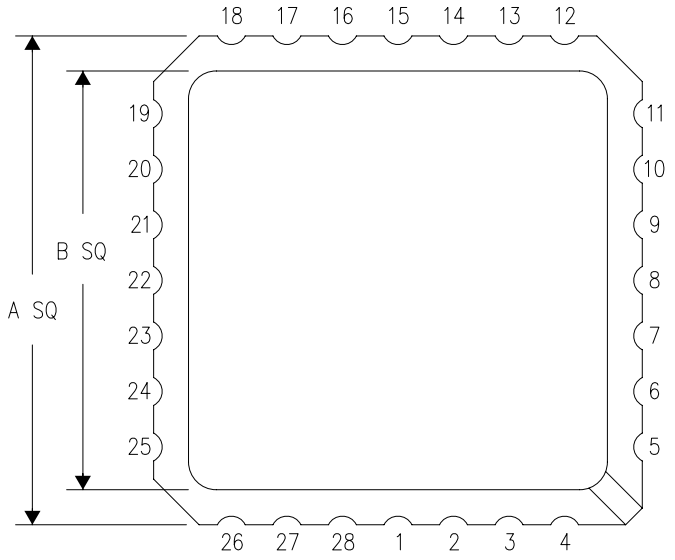
W (R–GDFP–F14) CERAMIC DUAL FLATPACK



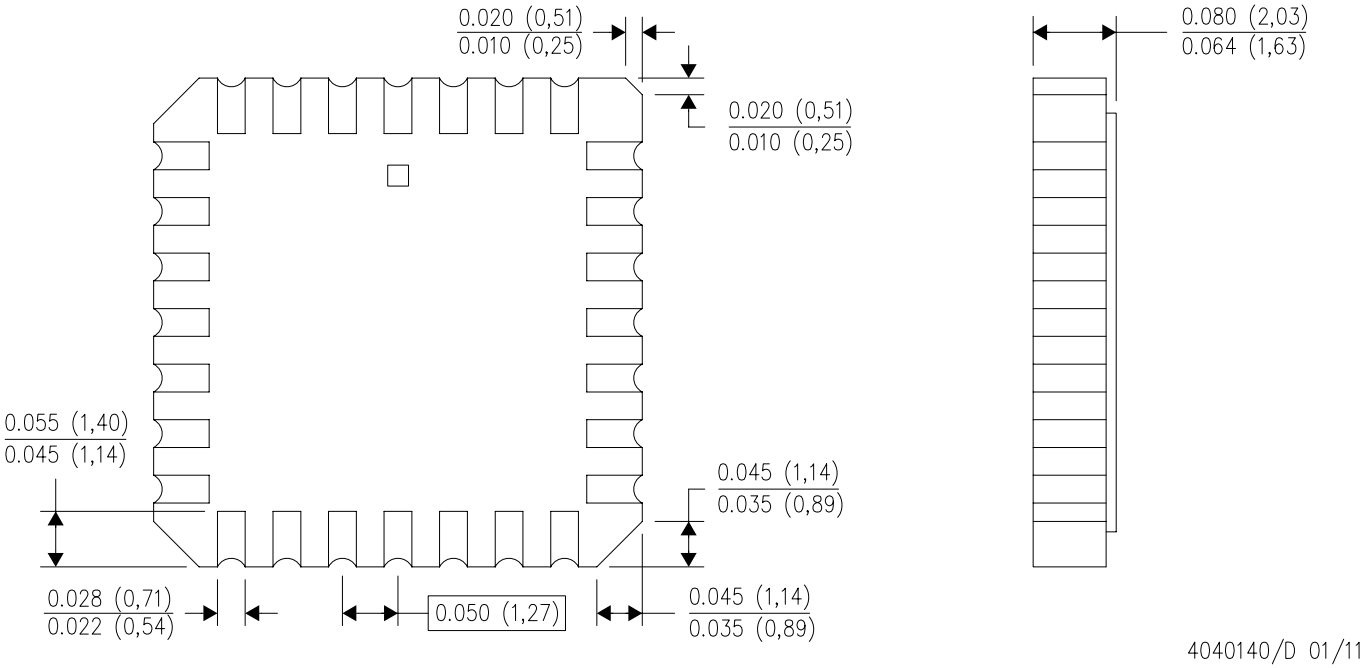
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within MIL STD 1835 GDFP1–F14

FK (S–CQCC–N**) LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



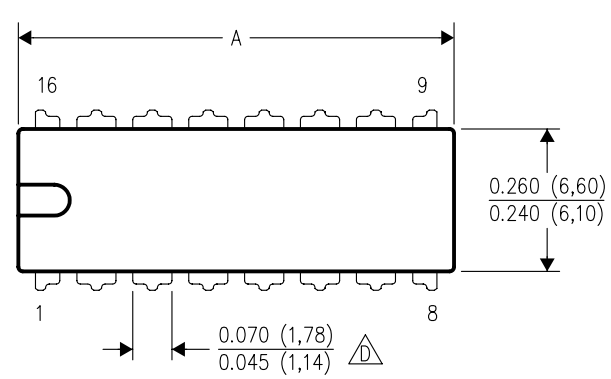
4040140/D 01/11

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a metal lid.
D. Falls within JEDEC MS–004

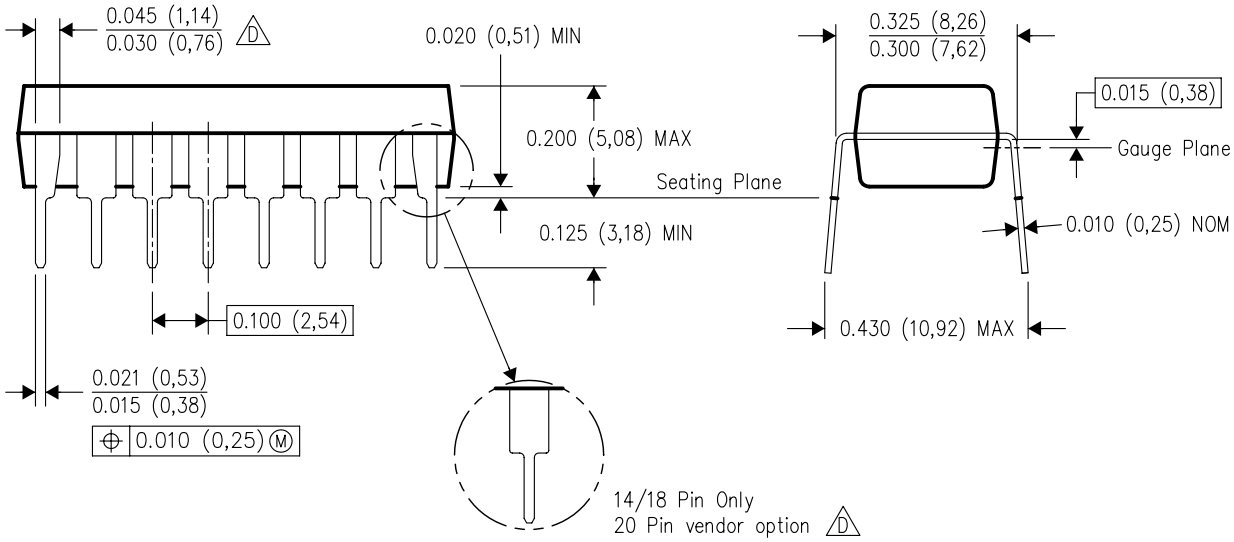
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



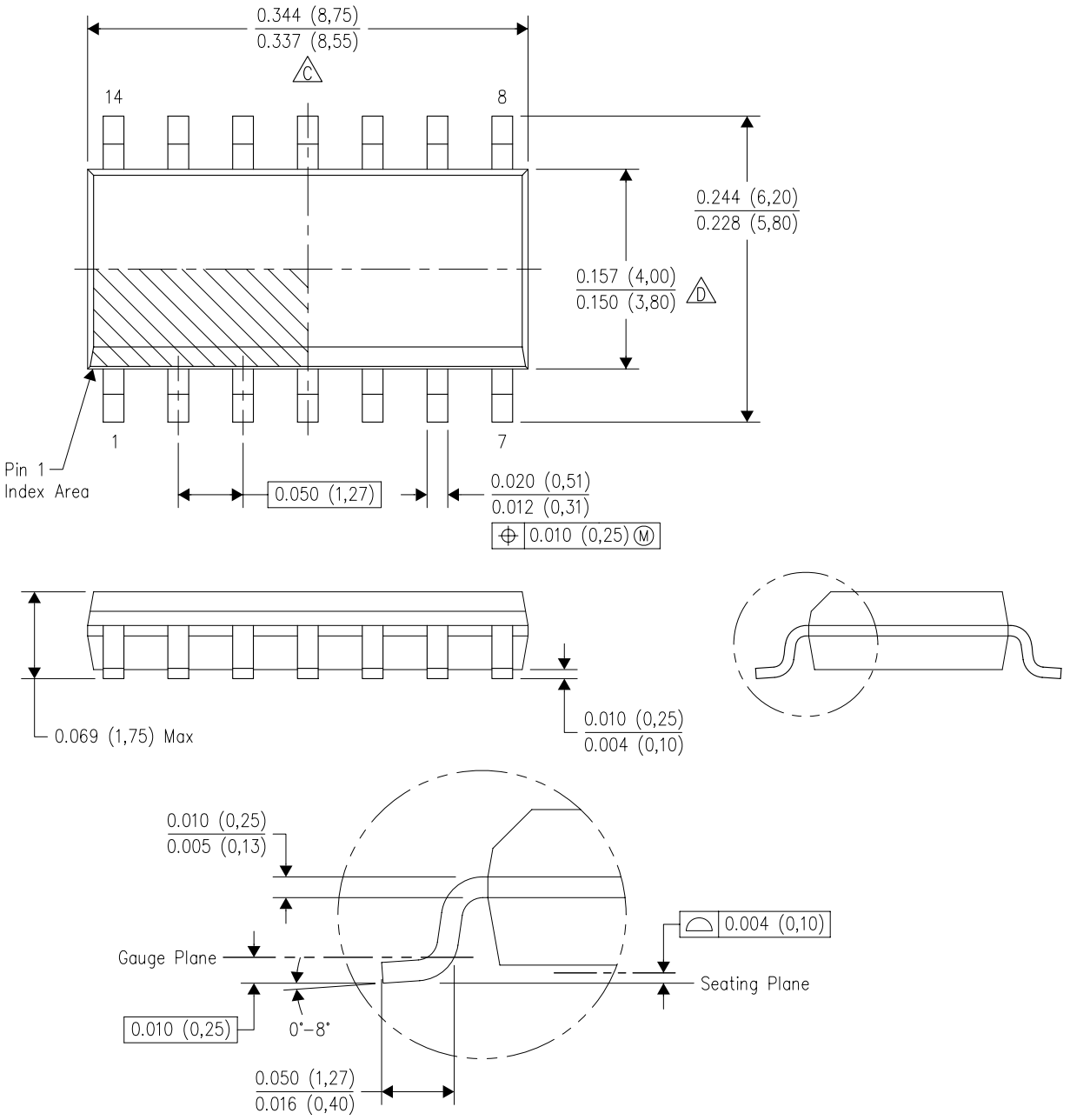
DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

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

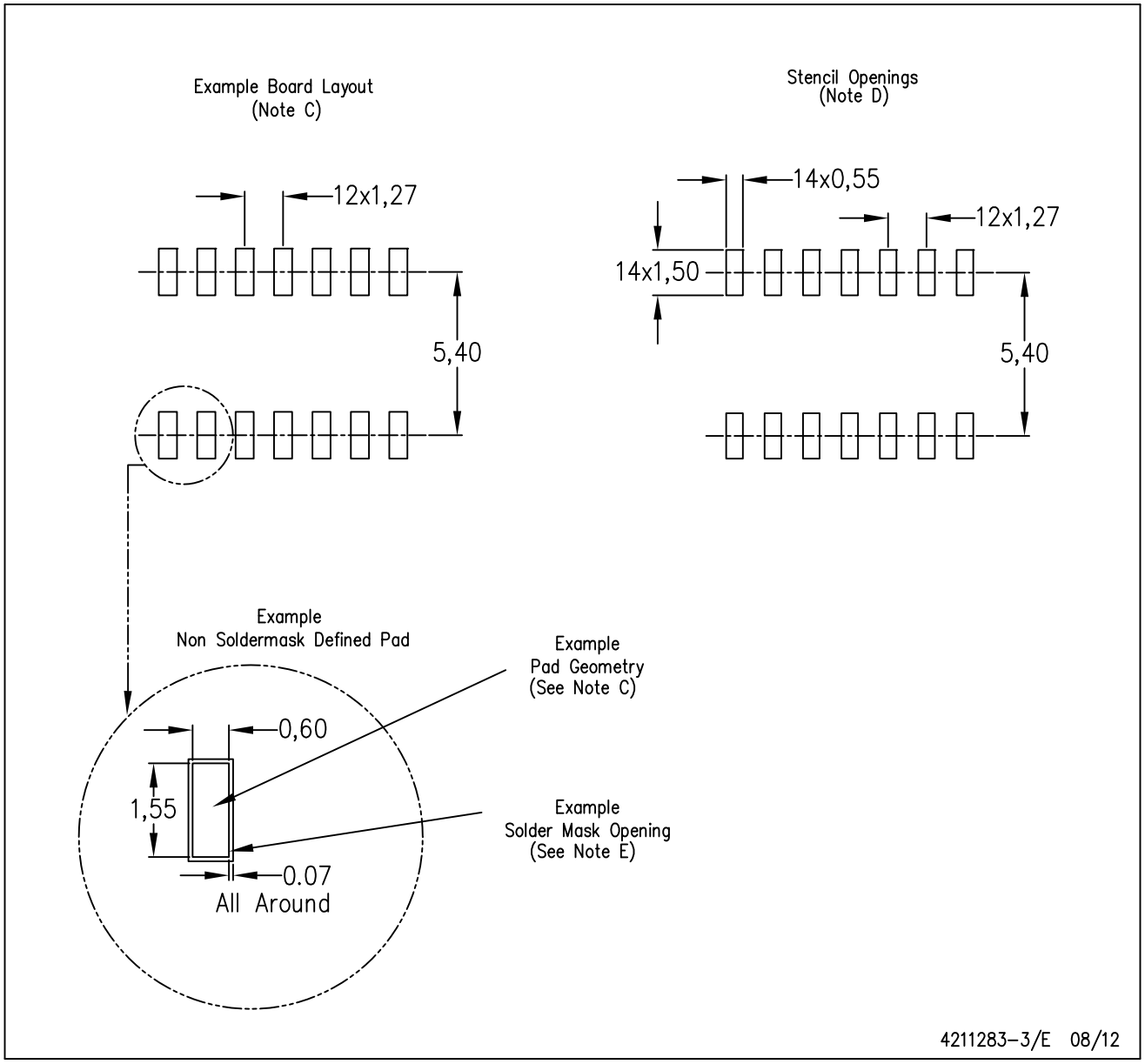
D (R–PDSO–G14) PLASTIC SMALL OUTLINE



4040047–5/M 06/11

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
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 AB.

D (R–PDSO–G14) PLASTIC SMALL OUTLINE

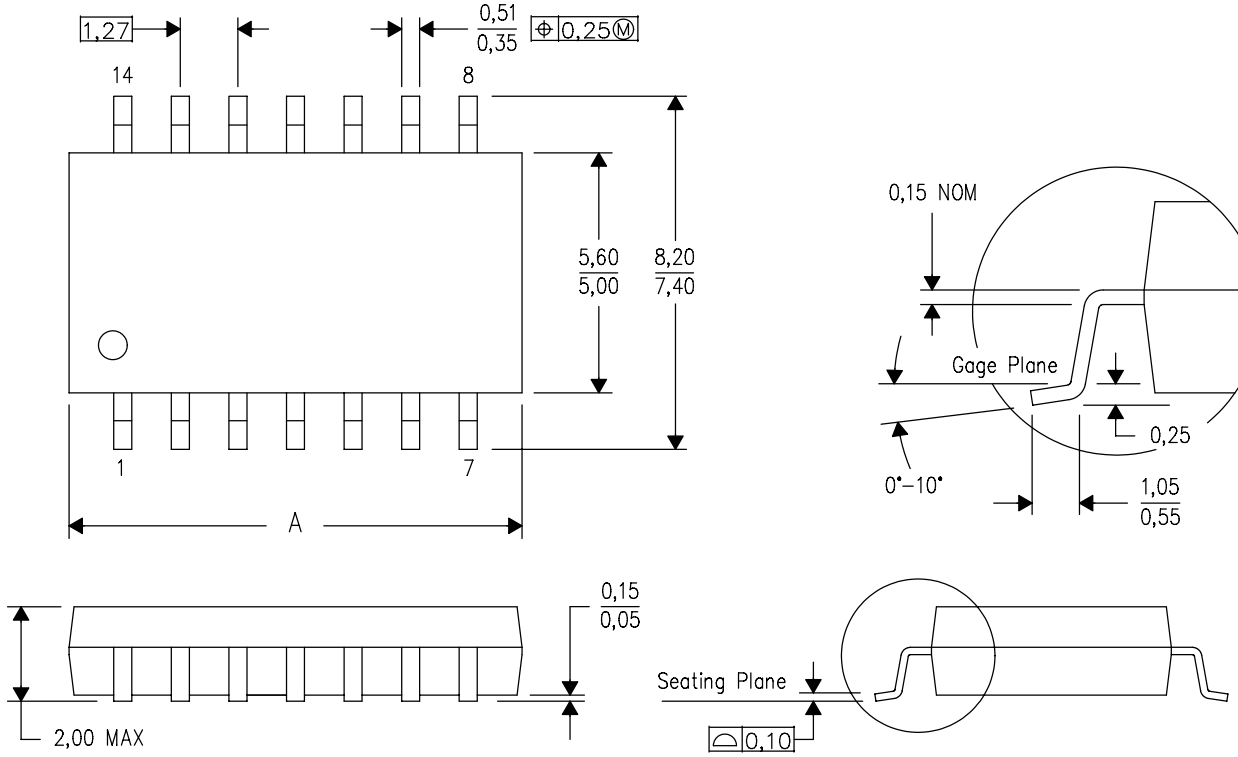


NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact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

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

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.

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