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SN74AHCT240DBR

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SNx4AHCT240 Octal Buffers/Drivers With 3-State Outputs

1 Features

- Inputs are TTL-Voltage Compatible
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- 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

- Network Switches
- Health and Fitness
- Televisions
- Power Infrastructures

3 Description

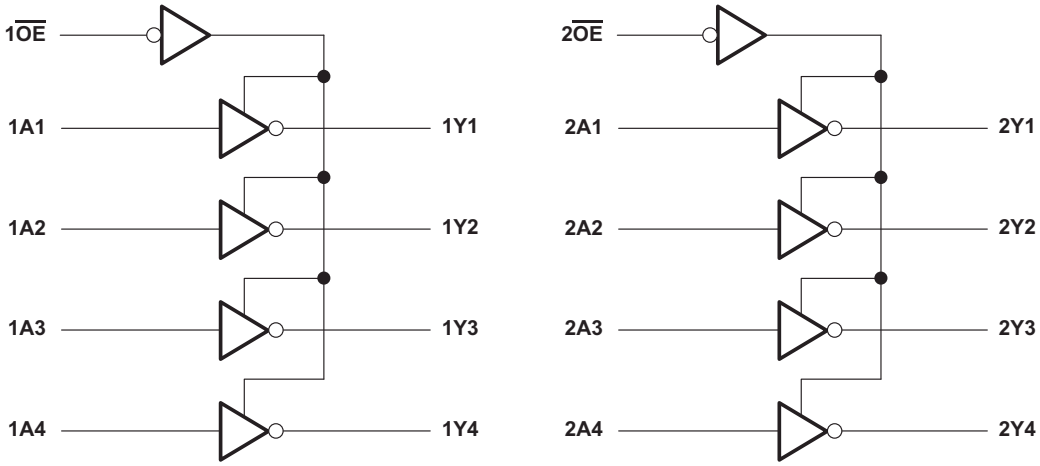
The SNx4AHCT240 octal buffers/drivers are designed specifically to improve both the performance and density of 3-state memory-address drivers, clock drivers, and bus-oriented receivers and transmitters.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SNx4AHCT240	SSOP (20)	7.50 mm × 5.30 mm
	SOP (20)	12.60 mm × 5.30 mm
	TSSOP (20)	6.50 mm × 4.40 mm
	SOIC (20)	12.80 mm × 7.50 mm

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

4 Simplified Schematic



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5 Revision History

Changes from Revision L (October 2014) to Revision M — **Page**

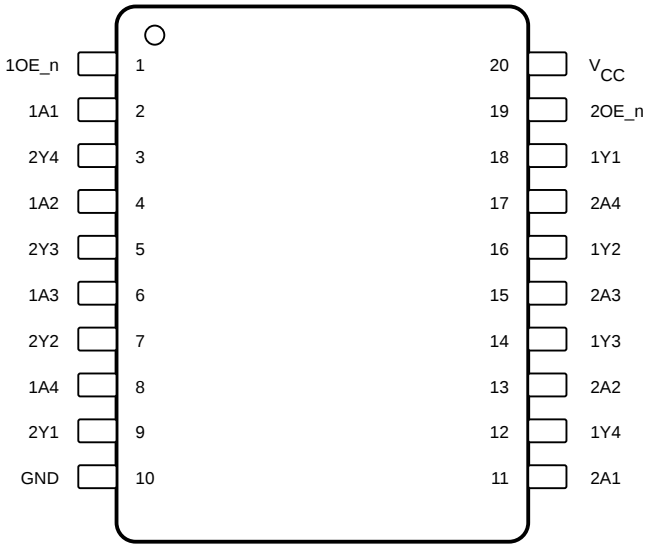
- Changed *Handling Ratings* table title to *ESD Ratings* ... 2
- Changed *Handling Ratings* table title to *ESD Ratings* ... 4
- Added –40°C to 85°C to SN74AHCT240 header in *Electrical Characteristics* table to differentiate from neighboring temperature range. ... 5
- Added –40°C to 85°C to SN74AHCT240 header in *Switching Characteristics* table to differentiate from neighboring temperature range. ... 6

Changes from Revision K (July 2003) to Revision L — **Page**

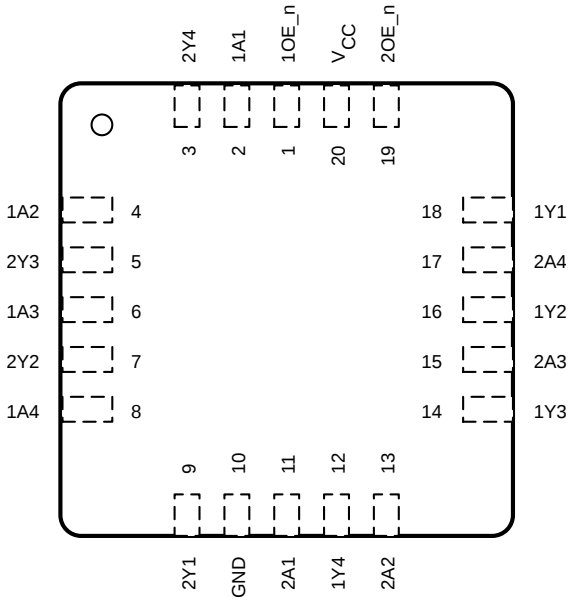
- Updated document to new TI data sheet format. ... 1
- Deleted Ordering Information table. ... 1
- Added Military Disclaimer to Features list. ... 1
- Added Applications. ... 1
- Extended operating temperature range to 125°C. ... 4
- Added Thermal Information table. ... 5
- Added –40°C to 125°C for SN74AHCT240 in the Electrical Specifications table. ... 5
- Added –40°C to 125°C for SN74AHCT240 in the Switching Characteristics table. ... 6
- Added Detailed Description section. ... 8
- Added Application and Implementation section. ... 9
- Added Power Supply Recommendations and Layout sections. ... 10

6 Pin Configuration and Functions

SN54AHCT240, J or W Package
SN74AHCT240, DB, DGV, DW, N, NS, or PW Package (20) Pin
Top View



SN54AHCT240 FK Package (20) Pin
Top View



Pin Functions

PIN		I/O	DESCRIPTION
NO.	NAME		
1	1OE_n	I	Output Enable 1
2	1A1	I	1A1 Input
3	2Y4	O	2Y4 Output
4	1A2	I	1A2 Input
5	2Y3	O	2Y3 Output
6	1A3	I	1A3 Input
7	2Y2	O	2Y2 Output
8	1A4	I	1A4 Input
9	2Y1	O	2Y1 Output
10	GND	—	Ground Pin
11	2A1	I	2A1 Input
12	1Y4	O	1Y4 Output
13	2A2	I	2A2 Input
14	1Y3	O	1Y3 Output
15	2A3	I	2A3 Input
16	1Y2	O	1Y2 Output
17	2A4	I	2A4 Input
18	1Y1	O	1Y1 Output
19	2OE_n	I	Output Enable 2
20	V_{CC}	—	Power Pin

7 Specifications

7.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		–0.5	7	V
V_I	Input voltage range(2)		–0.5	7	V
V_O	Output voltage range(2)		–0.5	V_{CC} + 0.5	V
I_{IK}	Input clamp current	V_I < 0		–20	mA
I_{OK}	Output clamp current	V_O < 0 or V_O > V_{CC}		±20	mA
I_O	Continuous output current	V_O = 0 to V_{CC}		±25	mA
	Continuous current through V_{CC} or GND			±75	mA

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

7.2 ESD Ratings

			MIN	MAX	UNIT
T_{stg}	Storage temperature range		–65	150	°C
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	0	1000	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins(2)	0	2000	

(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.

7.3 Recommended Operating Conditions

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

		SN54AHCT240		SN74AHCT240		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level Input voltage		0.8		0.8	V
V_I	Input voltage	0	5.5	0	5.5	V
V_O	Output voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–8		–8	mA
I_{OL}	Low-level output current		8		8	mA
T_A	Operating free-air temperature	–55	125	–40	125	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs* (SCBA004).

7.4 Thermal Information

THERMAL METRIC[1]		SN74AHCT240						UNIT
		DW	DB	DGV	N	NS	PW	
		20 PINS	20 PINS	20 PINS	20 PINS	20 PINS	20 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	83.0	99.9	119.2	54.9	80.4	105.4	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	48.9	61.7	34.5	41.7	46.9	39.5	
$R_{\theta JB}$	Junction-to-board thermal resistance	50.5	55.2	60.7	35.8	47.9	56.4	
ψ_{JT}	Junction-to-top characterization parameter	21.1	22.6	1.2	27.9	19.9	3.1	
ψ_{JB}	Junction-to-board characterization parameter	50.1	54.8	60.0	35.7	47.5	55.8	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report (SPRA953).

7.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54AHCT240		–40°C to 85°C SN74AHCT240		–40°C to 125°C SN74AHCT240		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = –50 µA	4.5 V	4.4	4.5		4.4		4.4		4.4		V
	I_{OH} = –8 mA		3.94			3.8		3.8		3.8		
V_{OL}	I_{OL} = 50 µA	4.5 V			0.1		0.1		0.1		0.1	V
	I_{OL} = 8 mA				0.36		0.44		0.44		0.44	
I_{OZ}	V_O = V_{CC} or GND	5.5 V			±0.25		±2.5		±2.5		±2.5	µA
I_I	V_I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1[1]		±1		±1	µA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	5.5 V			4		40		40		40	µA
ΔI_{CC}[2]	One input at 3.4 V, Other inputs at V_{CC} or GND	5.5 V			1.35		1.5		1.5		1.5	mA
C_i	V_I = V_{CC} or GND	5 V		2.5	10				10		10	pF
C_o	V_O = V_{CC} or GND	5 V		3								pF

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested at V_{CC} = 0 V.
(2) This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

7.6 Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T_A = 25°C		SN54AHCT240		–40°C to 85°C SN74AHCT240		–40°C to 125°C SN74AHCT240		UNIT
				TYP	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	C_L = 15 pF	5.4(1)	7.4(1)	1(1)	8.5(1)	1	8.5	1	9.5	ns
t_{PHL}				5.4(1)	7.4(1)	1(1)	8.5(1)	1	8.5	1	9.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 15 pF	7.7(1)	10.4(1)	1(1)	12(1)	1	12	1	13	ns
t_{PZL}				7.7(1)	10.4(1)	1(1)	12(1)	1	12	1	13	
t_{PHZ}	$\overline{OE}$	Y	C_L = 15 pF	8.3(1)	10.4(1)	1(1)	12(1)	1	12	1	13	ns
t_{PLZ}				8.3(1)	10.4(1)	1(1)	12(1)	1	12	1	13	
t_{PLH}	A	Y	C_L = 50 pF	5.9	8.4	1	9.5	1	9.5	1	10.5	ns
t_{PHL}				5.9	8.4	1	9.5	1	9.5	1	10.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF	8.2	11.4	1	13	1	13	1	14	ns
t_{PZL}				8.2	11.4	1	13	1	13	1	14	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF	8.8	11.4	1	13	1	13	1	14	ns
t_{PLZ}				8.8	11.4	1	13	1	13	1	14	
$t_{sk(o)}$			C_L = 50 pF		1(2)		1		1		1	ns

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.
(2) On products compliant to MIL-PRF-38535, this parameter does not apply.

7.7 Noise Characteristics

V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C(1)

PARAMETER		SN74AHCT240			UNIT
		MIN	TYP	MAX	
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		4.1		V
$V_{IH(D)}$	High-level dynamic input voltage	2			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.8	V

(1) Characteristics are for surface-mount packages only.

7.8 Operating Characteristics

V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	No load,	f = 1 MHz	10	pF

7.9 Typical Characteristics

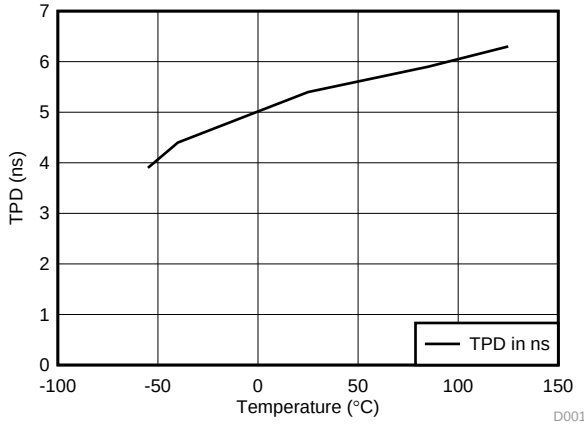
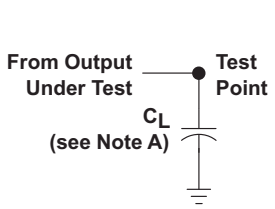
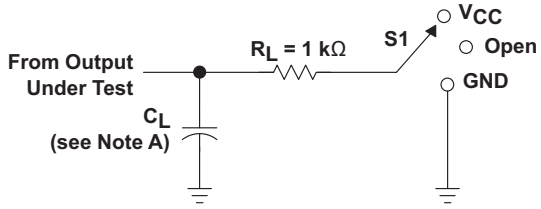


Figure 1. TPD vs Temperature

8 Parameter Measurement Information

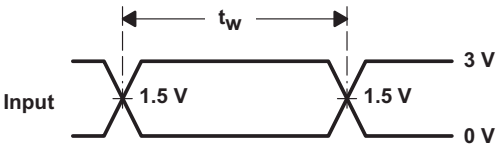


LOAD CIRCUIT FOR TOTEM-POLE OUTPUTS

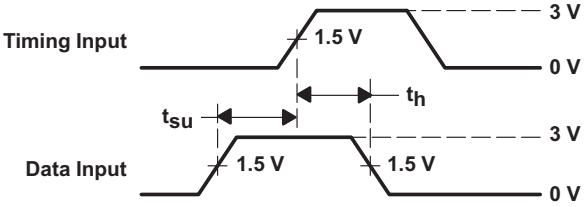


LOAD CIRCUIT FOR 3-STATE AND OPEN-DRAIN OUTPUTS

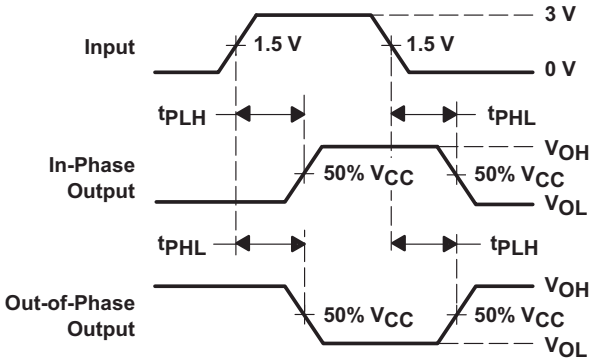
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}



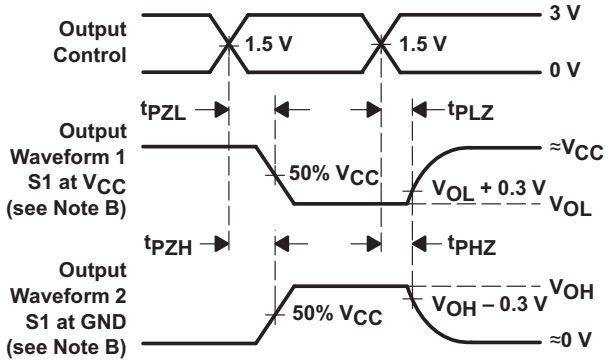
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.
E. All parameters and waveforms are not applicable to all devices.

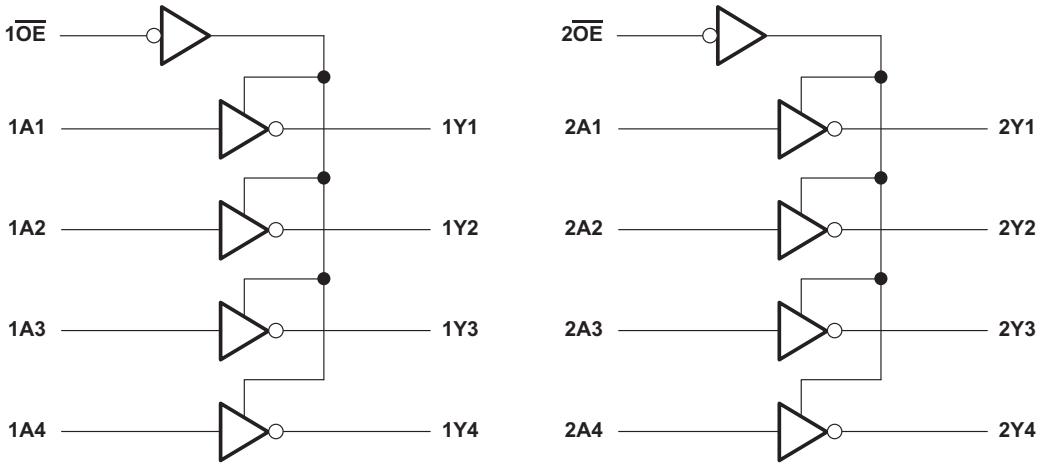
Figure 2. Load Circuit and Voltage Waveforms

9 Detailed Description

9.1 Overview

The SN74AHCT240 devices are organized as two 4-bit buffers/line drivers with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is low, the device passes inverted data from the A inputs to the Y outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state. To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pull-up resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

9.2 Functional Block Diagram



9.3 Feature Description

- V_{CC} is optimized at 5 V
- Allows up-voltage translation from 3.3 V to 5 V
  - Inputs accept V_{IH} levels of 2 V
- Slow edge rates minimize output ringing
- Inputs are TTL-voltage compatible

9.4 Device Functional Modes

Table 1. Function Table (Each 4-bit Buffer/Driver)

INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

10 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.

10.1 Application Information

The SNx4AHCT240 is a low-drive CMOS device that may be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The input switching levels have been lowered to accommodate TTL inputs of 0.8-V V_{IL} and 2-V V_{IH}. This feature makes the SNx4AHCT240 device ideal for translating up from 3.3 V to 5 V. Figure 3 shows this type of translation.

10.2 Typical Application

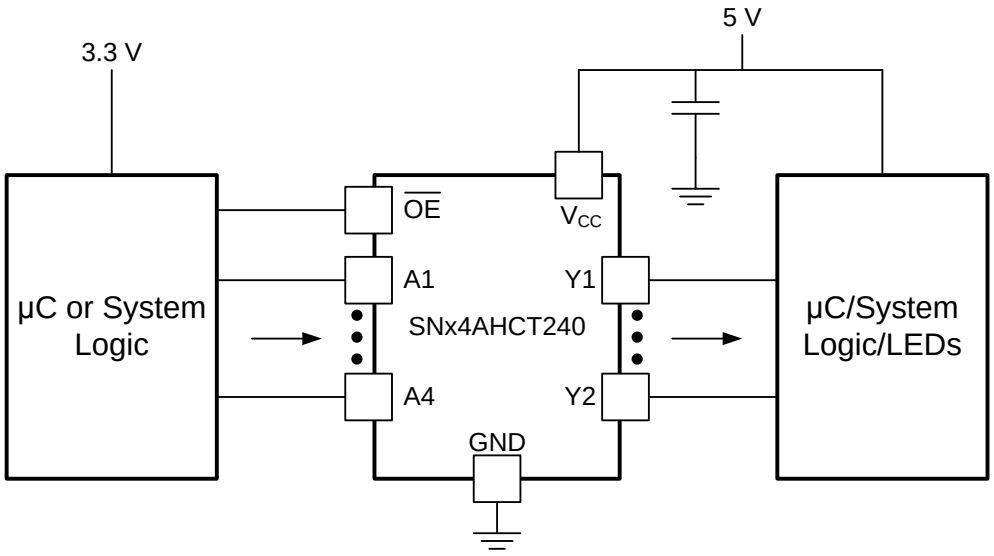


Figure 3. Application Diagram

10.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads; therefore, routing and load conditions should be considered to prevent ringing.

10.2.2 Detailed Design Procedure

1. Recommended Input Conditions:
   - For rise time and fall time specifications, see Δt/ΔV in the *Recommended Operating Conditions* table.
   - For specified high and low levels, see V_{IH} and V_{IL} in the *Recommended Operating Conditions* table.
   - Inputs are overvoltage tolerant, allowing them to go as high as 5.5 V at any valid V_{CC}.
2. Recommend Output Conditions:
   - Load currents should not exceed 25 mA per output and 75 mA total for the part.
   - Outputs should not be pulled above V_{CC}.

Typical Application (continued)

10.2.3 Application Curves

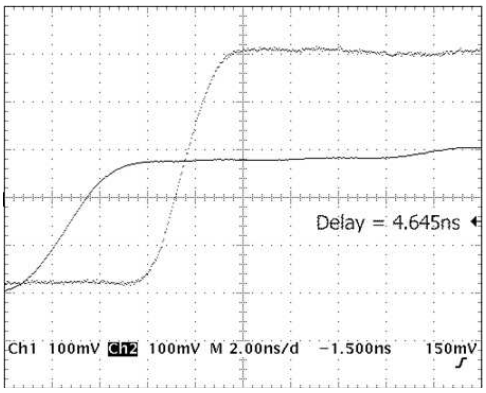


Figure 4. Application Scope Capture

11 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the *Recommended Operating Conditions*.

Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1 µF capacitor is recommended. If there are multiple V_{CC} terminals then 0.01 µF or 0.022 µF capacitors are recommended for each power terminal. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. 0.1 µF and 1.0 µF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for the best results.

12 Layout

12.1 Layout Guidelines

When using multiple bit logic devices, inputs should not float. In many cases, functions or parts of functions of digital logic devices are unused. Such examples are 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 should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states.

Specified in Figure 5 are 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 should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC}, whichever makes more sense or is more convenient. It is acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the outputs section of the part when asserted. This will not disable the input section of the I/Os so they also cannot float when disabled.

12.2 Layout Example

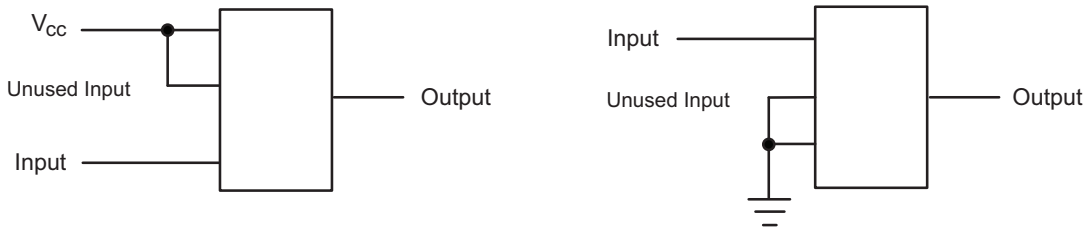


Figure 5. Layout Diagram

13 Device and Documentation Support

13.1 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.

13.2 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
SN54AHCT240	Click here	Click here	Click here	Click here	Click here
SN74AHCT240	Click here	Click here	Click here	Click here	Click here

13.3 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

13.4 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

13.5 Glossary

SLYZ022 — *TI Glossary*.

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

14 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.

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
5962-9680601Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9680601Q2A SNJ54AHCT 240FK	Samples
5962-9680601QRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9680601QR A SNJ54AHCT240J	Samples
5962-9680601QSA	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9680601QS A SNJ54AHCT240W	Samples
SN74AHCT240DBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI	-40 to 85		
SN74AHCT240DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB240	Samples
SN74AHCT240DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT240	Samples
SN74AHCT240DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT240	Samples
SN74AHCT240DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT240	Samples
SN74AHCT240N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 125	SN74AHCT240N	Samples
SN74AHCT240NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT240	Samples
SN74AHCT240NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT240	Samples
SN74AHCT240PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB240	Samples
SN74AHCT240PWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB240	Samples
SN74AHCT240PWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB240	Samples
SN74AHCT240PWLE	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI	-40 to 85		
SN74AHCT240PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB240	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
SN74AHCT240PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB240	Samples
SNJ54AHCT240FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9680601Q2A SNJ54AHCT 240FK	Samples
SNJ54AHCT240J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9680601QR A SNJ54AHCT240J	Samples
SNJ54AHCT240W	ACTIVE	CFP	W	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9680601QS A SNJ54AHCT240W	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.

OTHER QUALIFIED VERSIONS OF SN54AHCT240, SN74AHCT240 :

- Catalog: SN74AHCT240
- Automotive: SN74AHCT240-Q1, SN74AHCT240-Q1
- Military: SN54AHCT240

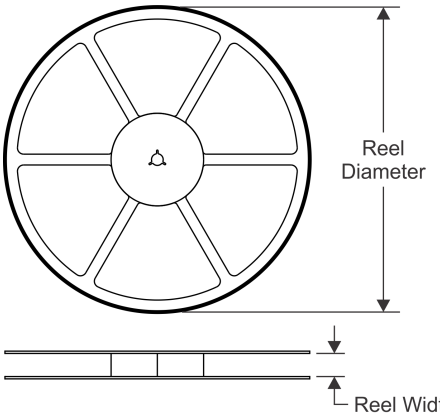
NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military - QML certified for Military and Defense Applications

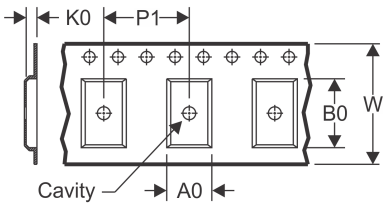
PACKAGE MATERIALS INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS

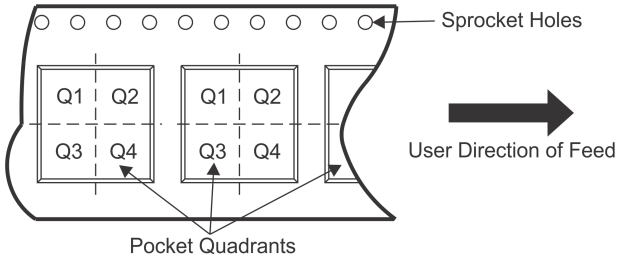


TAPE DIMENSIONS



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

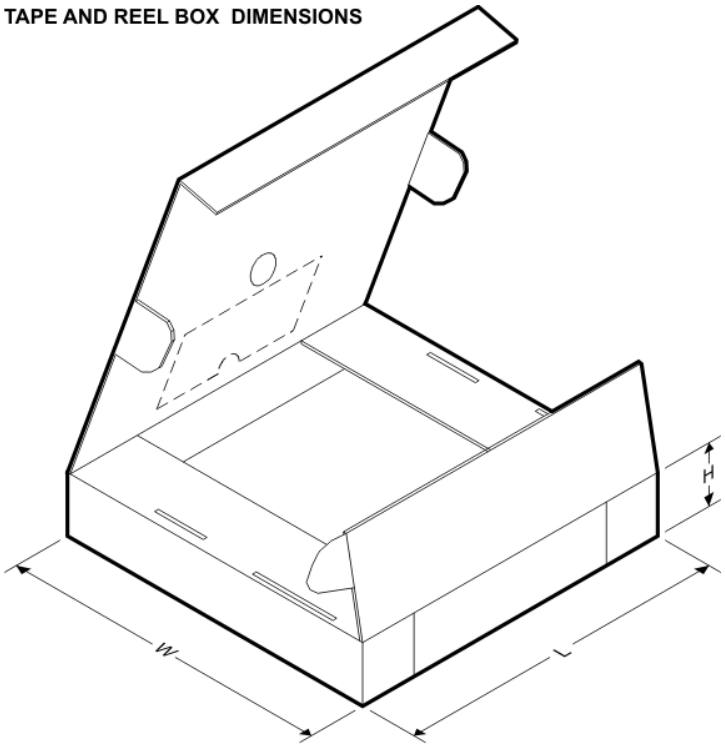


*All dimensions are nominal

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
SN74AHCT240DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74AHCT240DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AHCT240NSR	SO	NS	20	2000	330.0	24.4	9.0	13.0	2.4	4.0	24.0	Q1

PACKAGE MATERIALS INFORMATION

TAPE AND REEL BOX DIMENSIONS

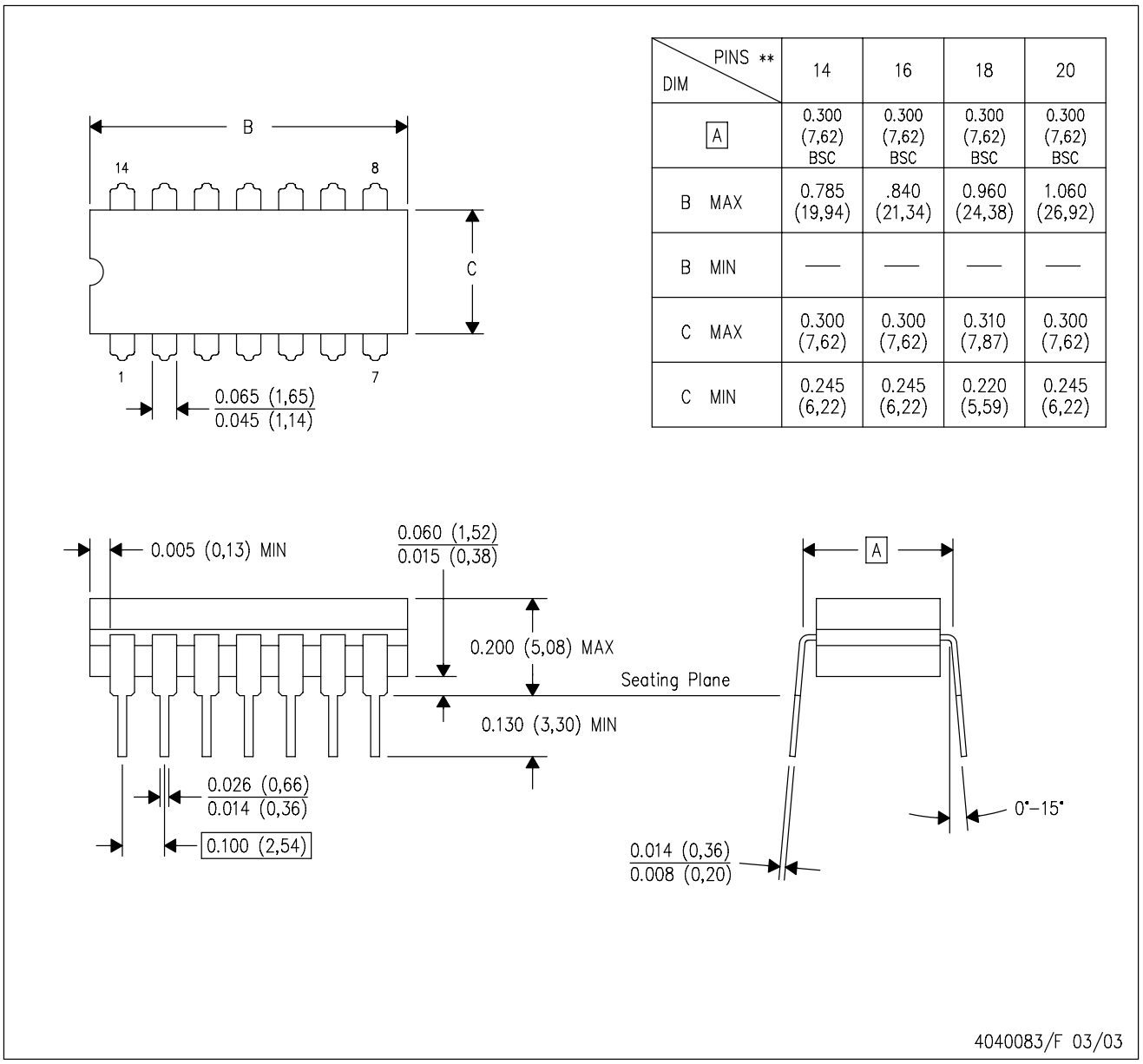


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT240DBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74AHCT240DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AHCT240NSR	SO	NS	20	2000	367.0	367.0	45.0

J (R–GDIP–T**) CERAMIC DUAL IN–LINE PACKAGE

14 LEADS SHOWN



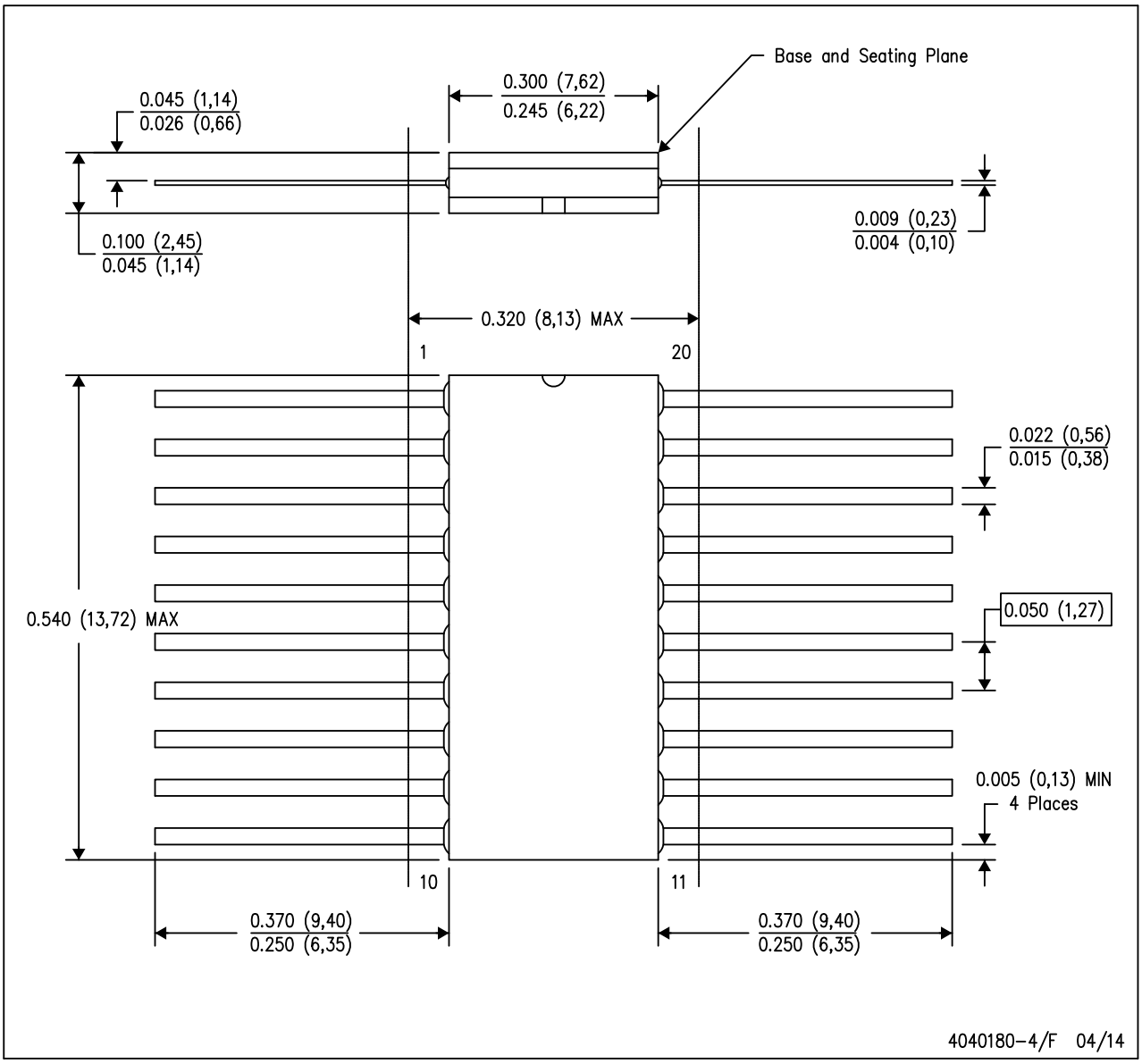
DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

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.

MECHANICAL DATA

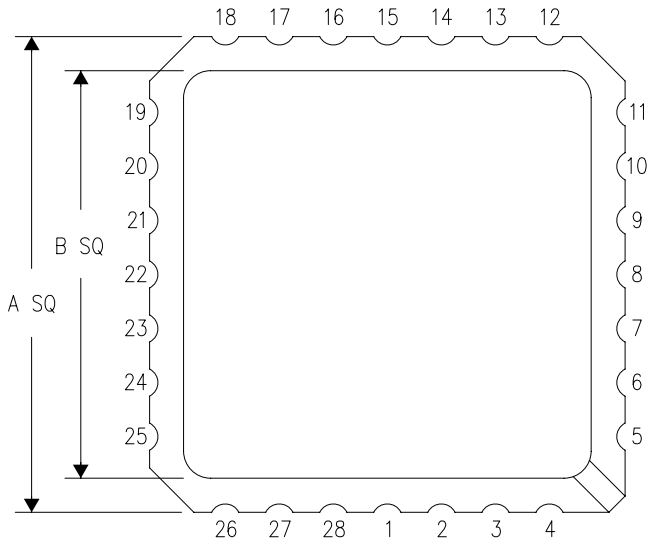
W (R–GDFP–F20) CERAMIC DUAL FLATPACK



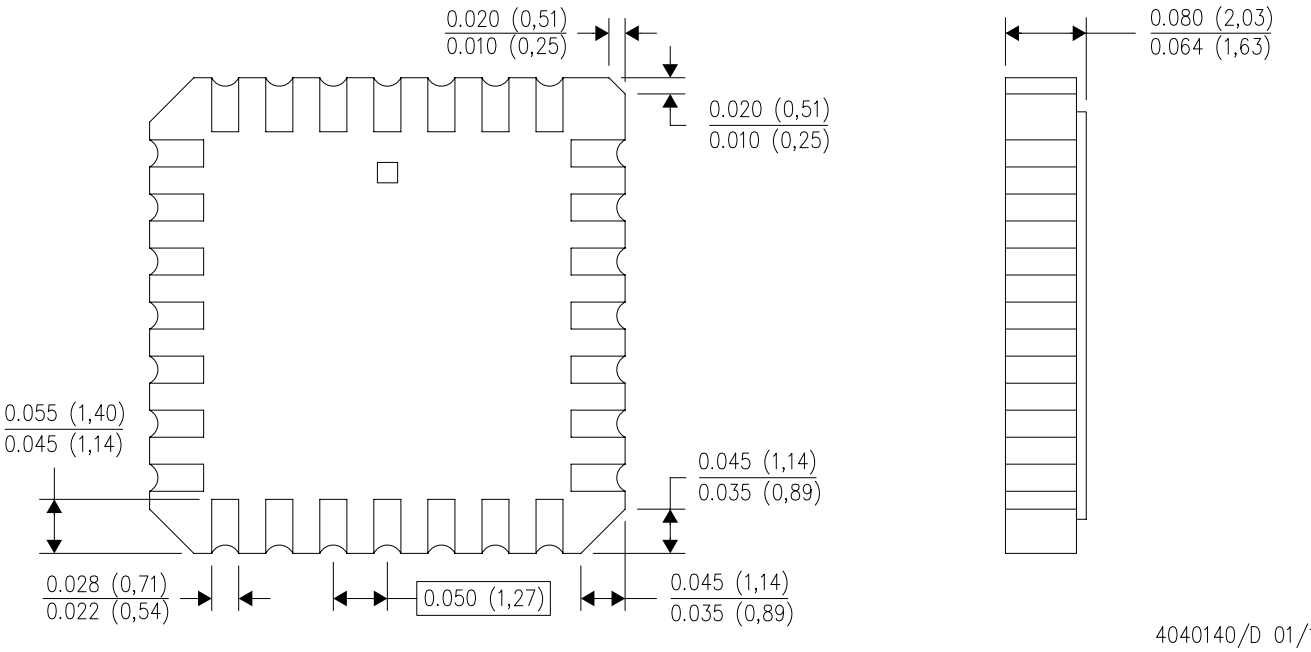
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within Mil–Std 1835 GDFP2–F20

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)



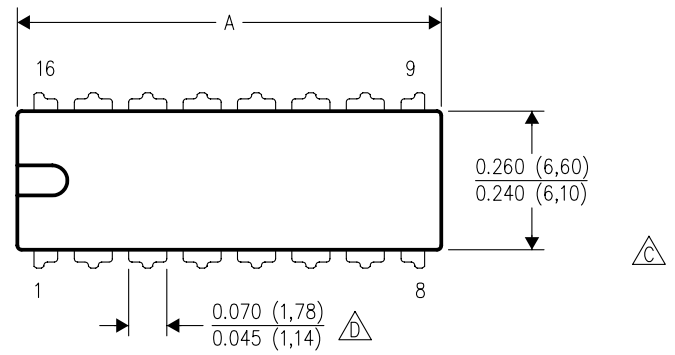
4040140/D 01/11

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

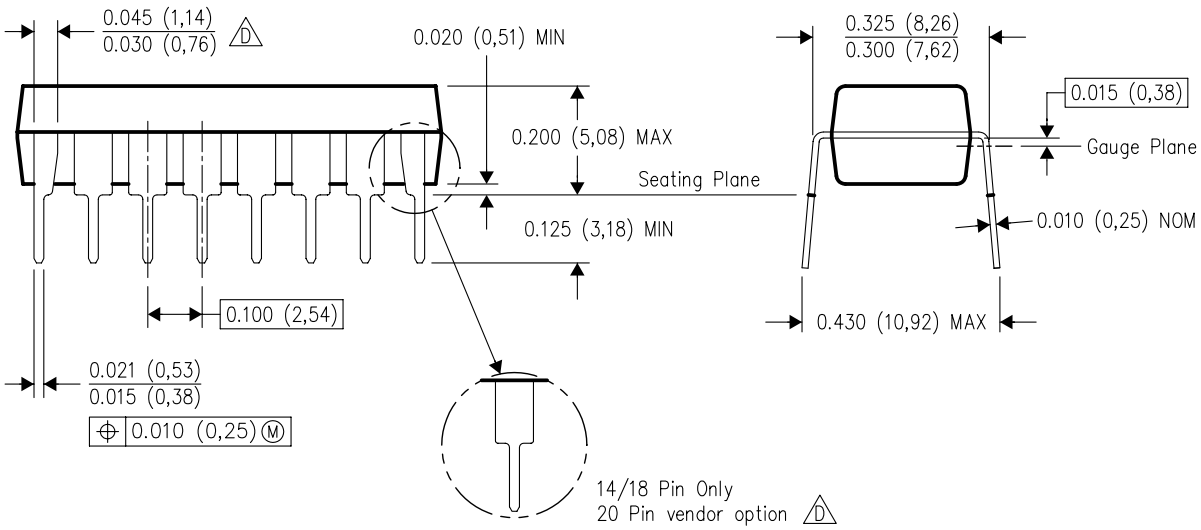
MECHANICAL DATA

N (R–PDIP–T**) PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN

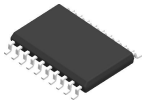


DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION	AA	BB	AC	AD



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.

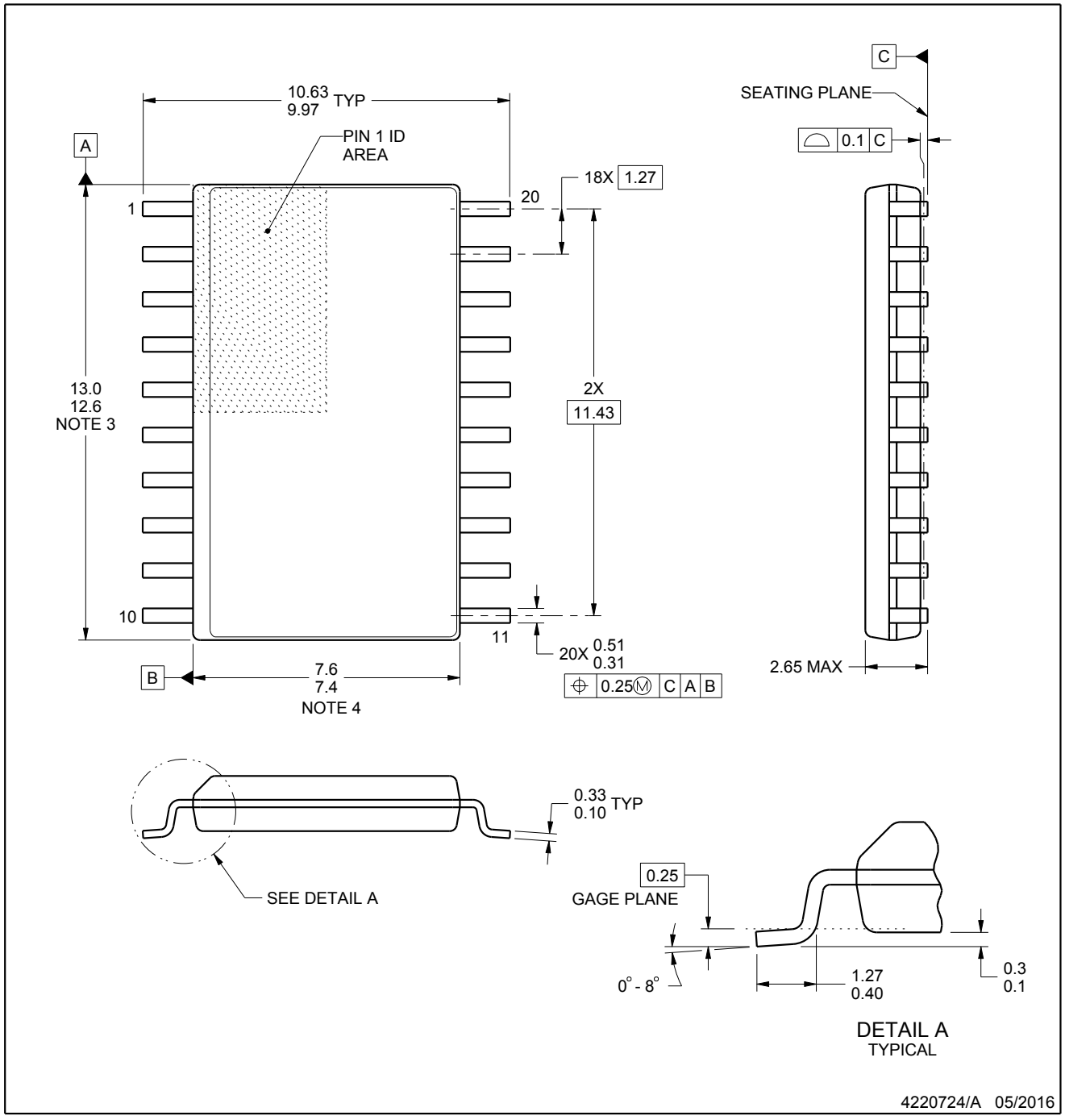


PACKAGE OUTLINE

DW0020A

SOIC - 2.65 mm max height

SOIC



NOTES:

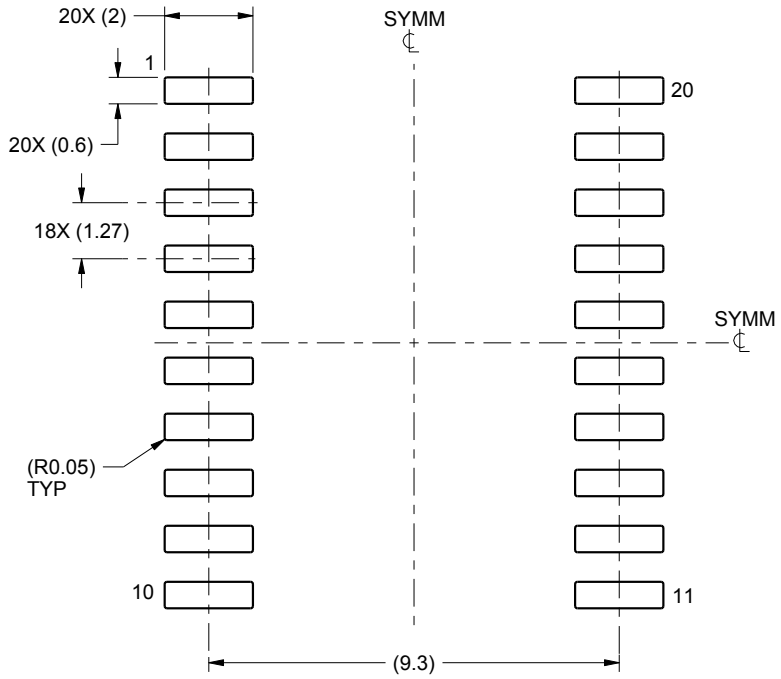
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

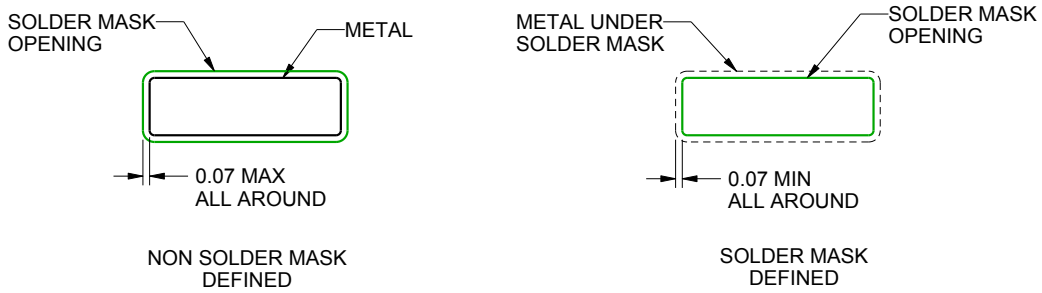
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

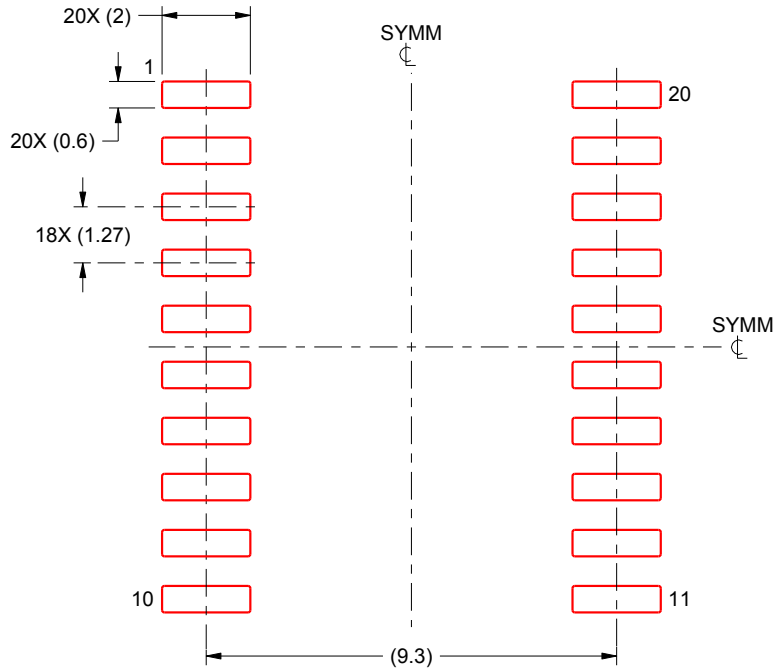
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

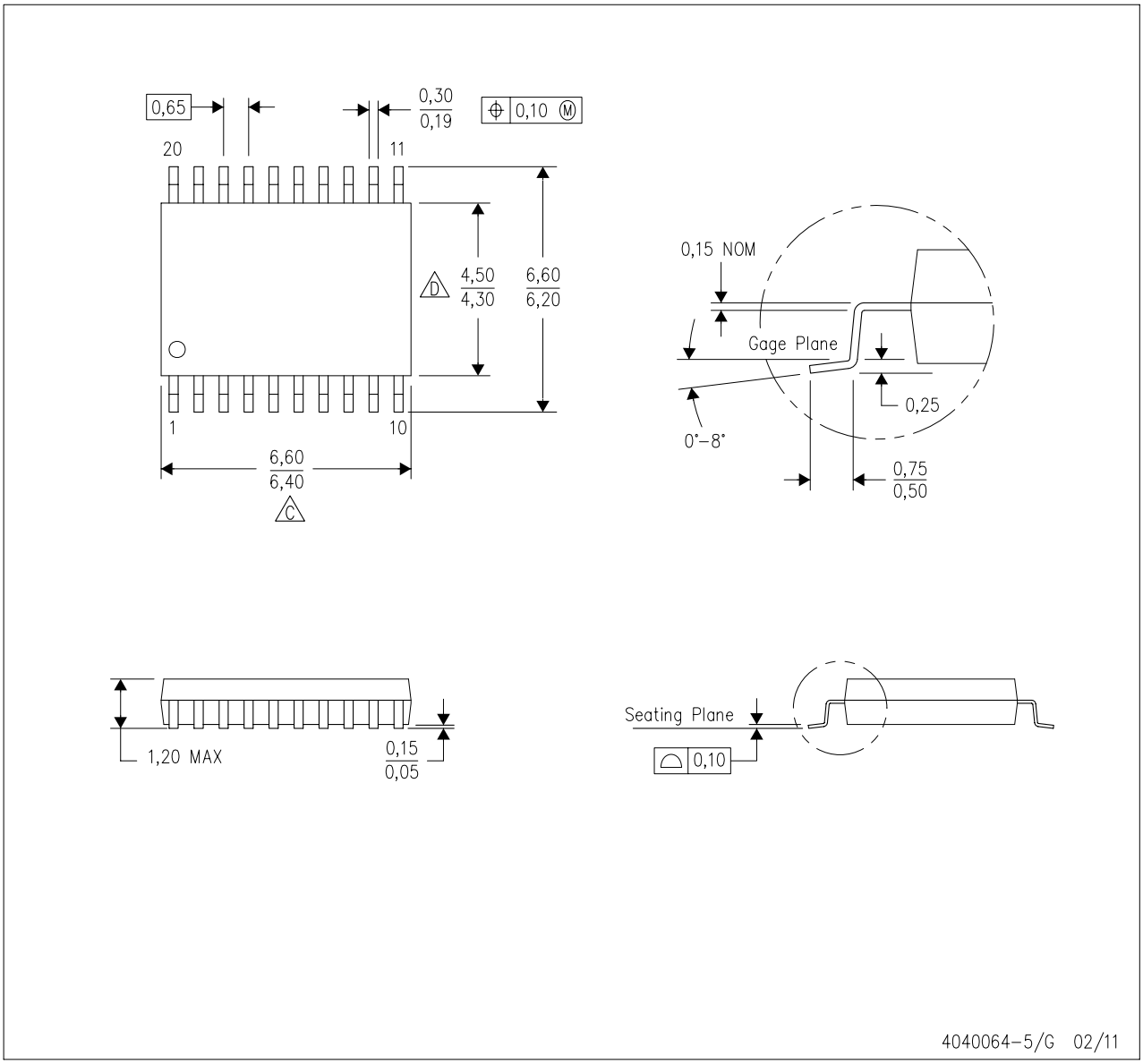
4220724/A 05/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

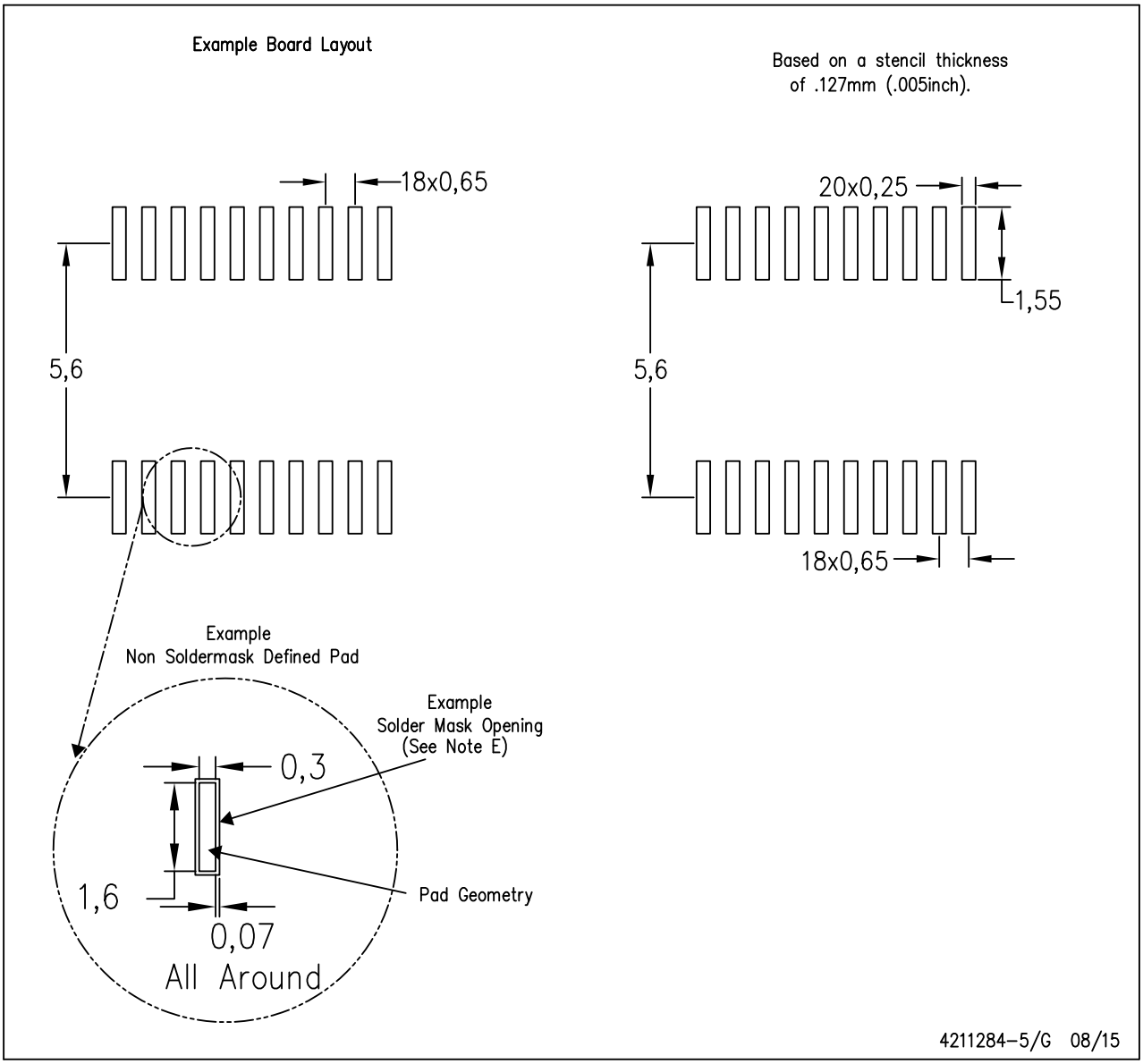
PW (R–PDSO–G20) PLASTIC SMALL OUTLINE



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

LAND PATTERN DATA

PW (R–PDSO–G20) PLASTIC SMALL OUTLINE



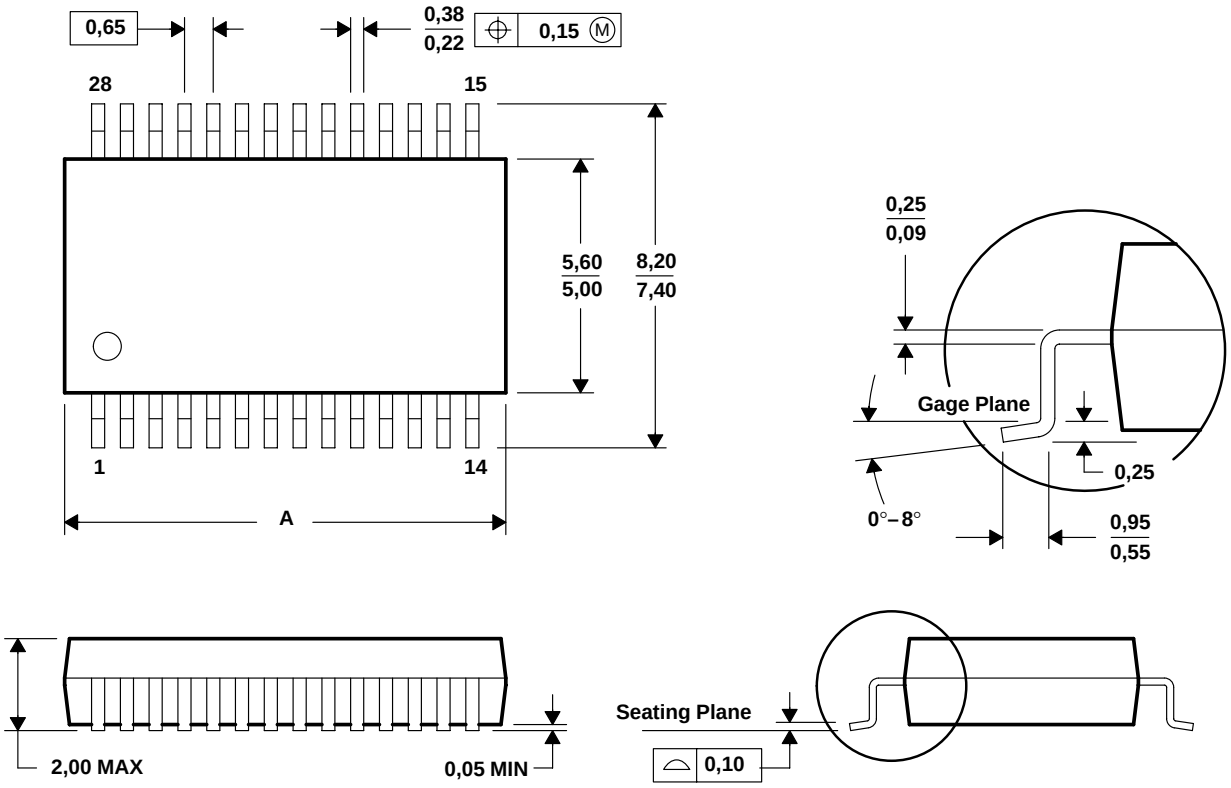
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate design.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their 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.

MSSO002E – JANUARY 1995 – REVISED DECEMBER 2001

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



DIM \ PINS **	14	16	20	24	28	30	38
A MAX	6,50	6,50	7,50	8,50	10,50	10,50	12,90
A MIN	5,90	5,90	6,90	7,90	9,90	9,90	12,30

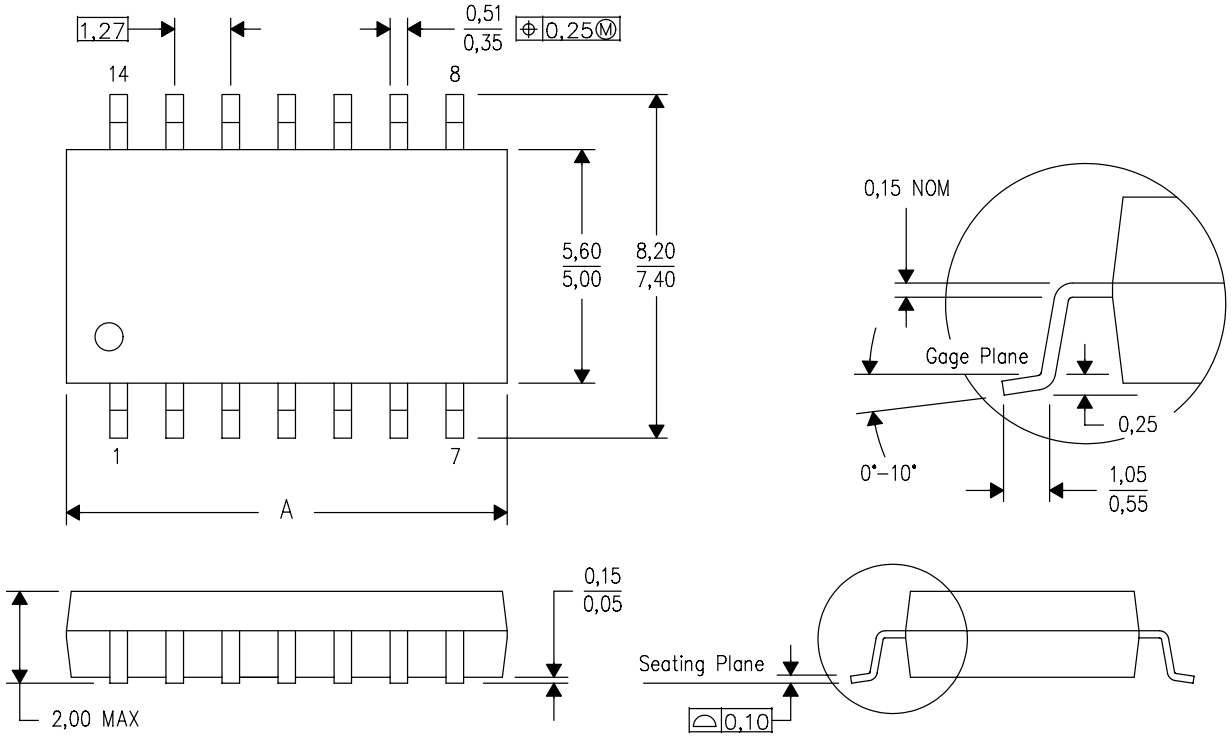
4040065 /E 12/01

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-150

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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