

74ACT11652
OCTAL BUS TRANSCEIVER AND REGISTER
WITH 3-STATE OUTPUTS

SCAS087A – APRIL 1993 – REVISED APRIL 1996

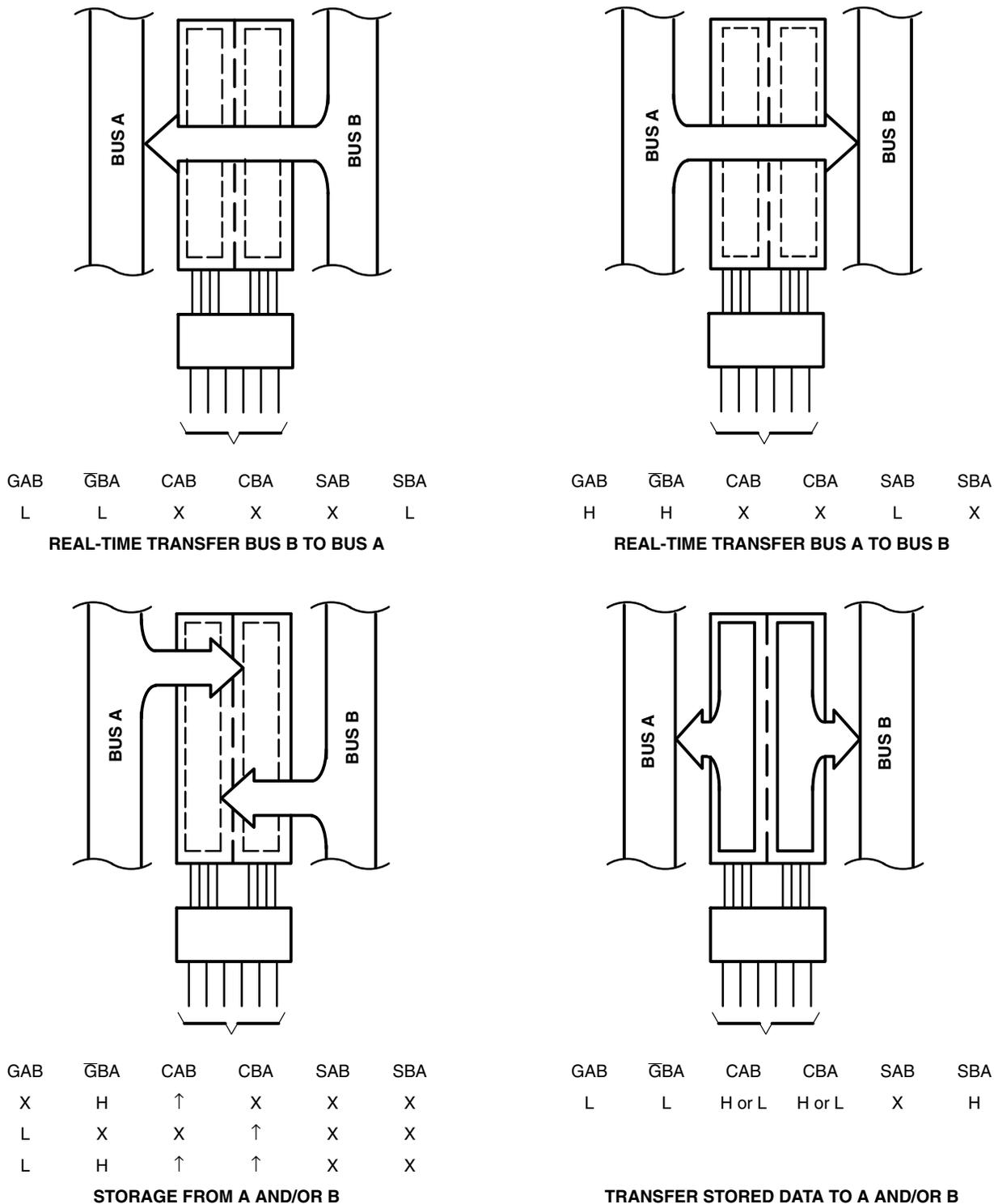


Figure 1. Bus Transfer Diagram

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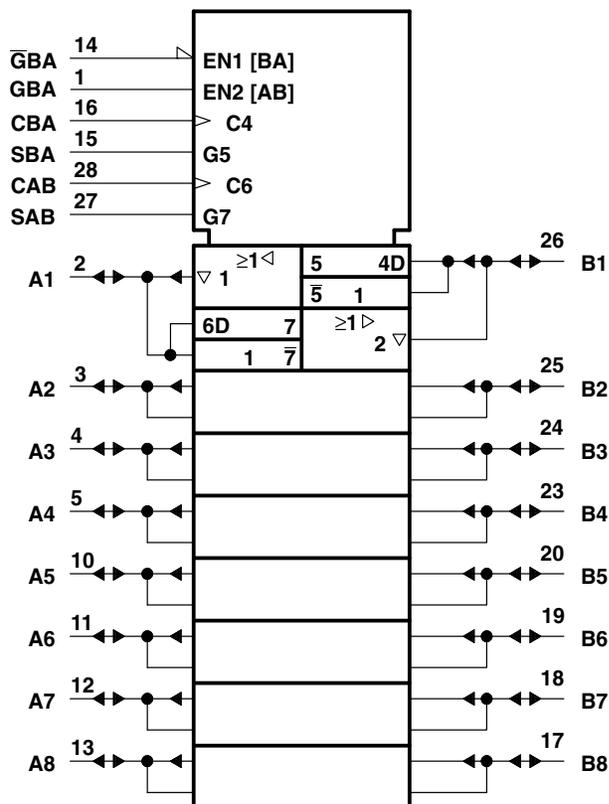
FUNCTION TABLE

INPUTS						DATA I/O†		OPERATION OR FUNCTION
GAB	$\bar{G}BA$	CAB	CBA	SAB	SBA	A1–A8	B1–B8	
L	H	H or L	H or L	X	X	Input	Input	Isolation
L	H	↑	↑	X	X	Input	Input	Store A and B data
X	H	↑	H or L	X	X	Input	Unspecified†	Store A, hold B
H	H	↑	↑	X‡	X	Input	Output	Store A in both registers
L	X	H or L	↑	X	X	Unspecified†	Input	Hold A, store B
L	L	↑	↑	X	X‡	Output	Input	Store B in both registers
L	L	X	X	X	L	Output	Input	Real-time B data to A bus
L	L	X	H or L	X	H	Output	Input	Stored B data to A bus
H	H	X	X	L	X	Input	Output	Real-time A data to B bus
H	H	H or L	X	H	X	Input	Output	Stored A data to B bus
H	L	H or L	H or L	H	H	Output	Output	Stored A data to B bus and stored B data to A bus

† The data-output functions may be enabled or disabled by various signals at the GAB or $\bar{G}BA$ inputs. Data-input functions are always enabled, i.e., data at the bus terminals is stored on every low-to-high transition on the clock inputs.

‡ Select control = L: clocks can occur simultaneously. Select control = H: clocks must be staggered to load both registers.

logic symbol§

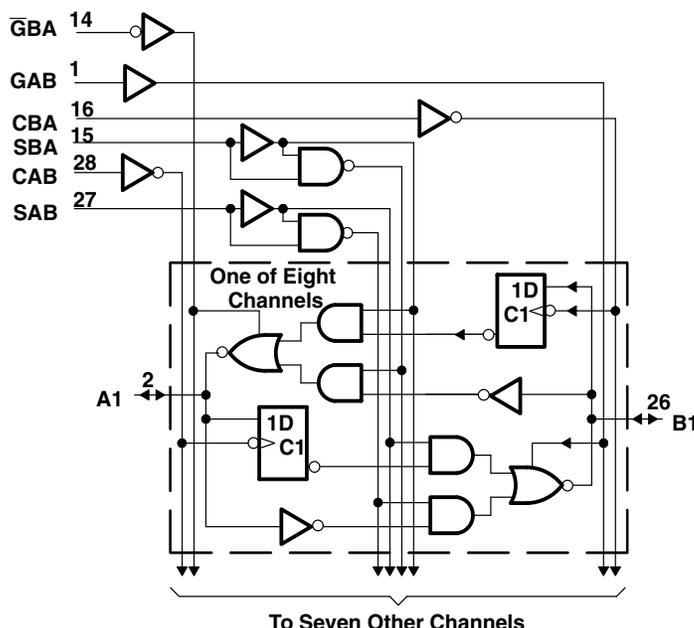


§ This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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logic diagram (positive logic)



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

Supply voltage, V_{CC}	-0.5 V to 7 V
Input voltage range, V_I (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Output voltage range, V_O (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 50 mA
Continuous current through V_{CC} or GND	± 200 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2)	1.7 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 voltage ratings may be exceeded if the input and output current ratings are observed.
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

recommended operating conditions (see Note 3)

	MIN	MAX	UNIT
V_{CC} Supply voltage	4.5	5.5	V
V_{IH} High-level input voltage	2		V
V_{IL} Low-level input voltage		0.8	V
V_I Input voltage	0	V_{CC}	V
V_O Output voltage	0	V_{CC}	V
I_{OH} High-level output current		-24	mA
I_{OL} Low-level output current		24	mA
$\Delta t/\Delta V$ Input transition rise or fall rate	0	10	ns/V
T_A Operating free-air temperature	-40	85	$^\circ\text{C}$

NOTE 3: Unused inputs must be held high or low to prevent them from floating.



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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			MIN	MAX	UNIT	
			MIN	TYP	MAX				
V _{OH}	I _{OH} = - 50 μA	4.5 V	4.4			4.4		V	
		5.5 V	5.4			5.4			
	I _{OH} = - 24 mA	4.5 V	3.94			3.8			
		5.5 V	4.94			4.8			
I _{OH} = - 75 mA [†]	5.5 V				3.85				
V _{OL}	I _{OL} = 50 μA	4.5 V				0.1		V	
		5.5 V				0.1			
	I _{OL} = 24 mA	4.5 V				0.36			
		5.5 V				0.36			
I _{OL} = 75 mA [†]	5.5 V				1.65				
I _{OZ}	A or B ports [‡]	V _O = V _{CC} or GND	5.5 V	±0.5			±5		μA
I _I	GAB or $\overline{\text{G}}\text{BA}$	V _I = V _{CC} or GND	5.5 V	±0.1			±1		μA
I _{CC}		V _I = V _{CC} or GND, I _O = 0	5.5 V	8			80		μA
ΔI _{CC} [§]		One input at 3.4 V, Other inputs at GND or V _{CC}	5.5 V	0.9			1		mA
C _i	GAB or $\overline{\text{G}}\text{BA}$	V _I = V _{CC} or GND	5 V	4.5					pF
C _o	A or B ports	V _O = V _{CC} or GND	5 V	12					pF

[†] Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

[‡] For I/O ports, the parameter I_{OZ} includes the input leakage current.

[§] This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 2)

PARAMETER		T _A = 25°C		MIN	MAX	UNIT
		MIN	MAX			
f _{clock}	Clock frequency	0	105	0	105	MHz
t _w	Pulse duration, CAB or CBA high or low	4.8		4.8		ns
t _{su}	Setup time, A before CLK [↑] or B before CBA [↑]	4		4		ns
t _h	Hold time, A after CAB [↑] or B after CBA [↑]	2.5		2.5		ns



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switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T _A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
f _{max}			105			105		MHz
t _{PLH}	A or B	B or A	3.8	7	9.9	3.8	11.1	ns
t _{PHL}			3.4	6.7	10.7	3.4	11.6	
t _{PLH}	CBA or CAB	A or B	5.4	8.4	11.8	5.4	13.1	ns
t _{PHL}			6.1	9.4	13.1	6.1	14.4	
t _{PLH}	SBA or SAB† with A or B high	A or B	2.8	6.2	10.1	2.8	11	ns
t _{PHL}			5.5	8.7	12.1	5.5	13.3	
t _{PLH}	SBA or SAB† with A or B low	A or B	4.9	7.8	11	4.9	12.2	ns
t _{PHL}			3.9	7.5	11.6	3.9	12.6	
t _{PZH}	$\overline{\text{G}}\text{BA}$	A	3.3	7.2	11.4	3.3	12.6	ns
t _{PZL}			4.1	7.8	12.6	4.1	13.8	
t _{PHZ}	$\overline{\text{G}}\text{BA}$	A	5.2	7.2	9.3	5.2	9.9	ns
t _{PLZ}			4.8	6.7	8.6	4.8	9.3	
t _{PZH}	GAB	B	5.1	9.1	13.4	5.1	15.2	ns
t _{PZL}			5.8	9.7	14.2	5.8	16.1	
t _{PHZ}	GAB	B	3.4	6.8	9.7	3.4	10.3	ns
t _{PLZ}			3.1	6	8.8	3.1	9.3	

† These parameters are measured with the internal output state of the storage register opposite that of the bus input.

operating characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	TYP	UNIT
C _{pd}	Power dissipation capacitance per transceiver	C _L = 50 pF, f = 1 MHz	59	pF
			14	



PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74ACT11652DWR	ACTIVE	SOIC	DW	28	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ACT11652DWRE4	ACTIVE	SOIC	DW	28	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ACT11652DWRG4	ACTIVE	SOIC	DW	28	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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.

OBSELETE: 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.

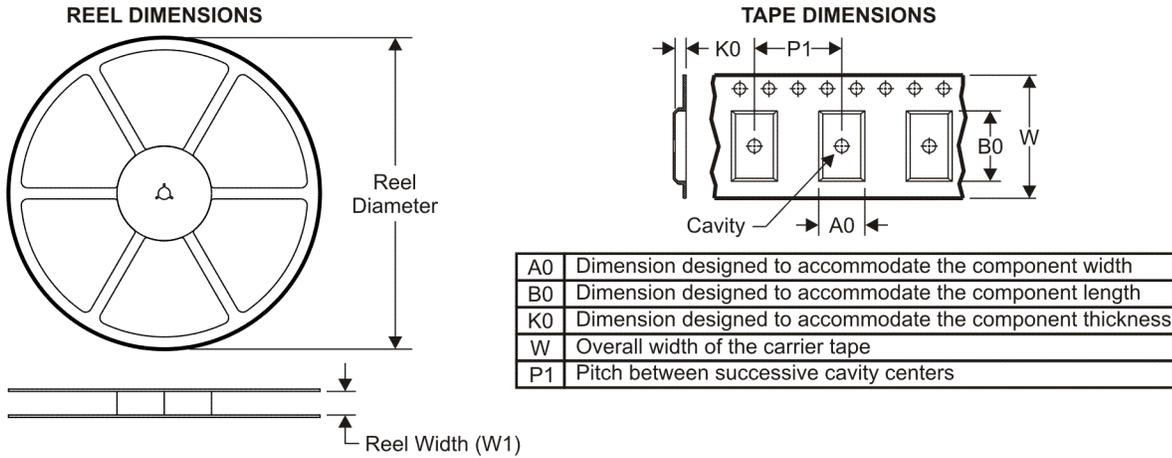
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

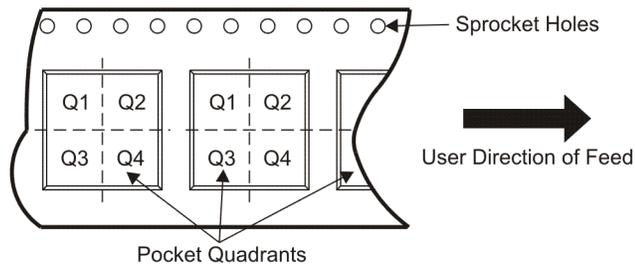
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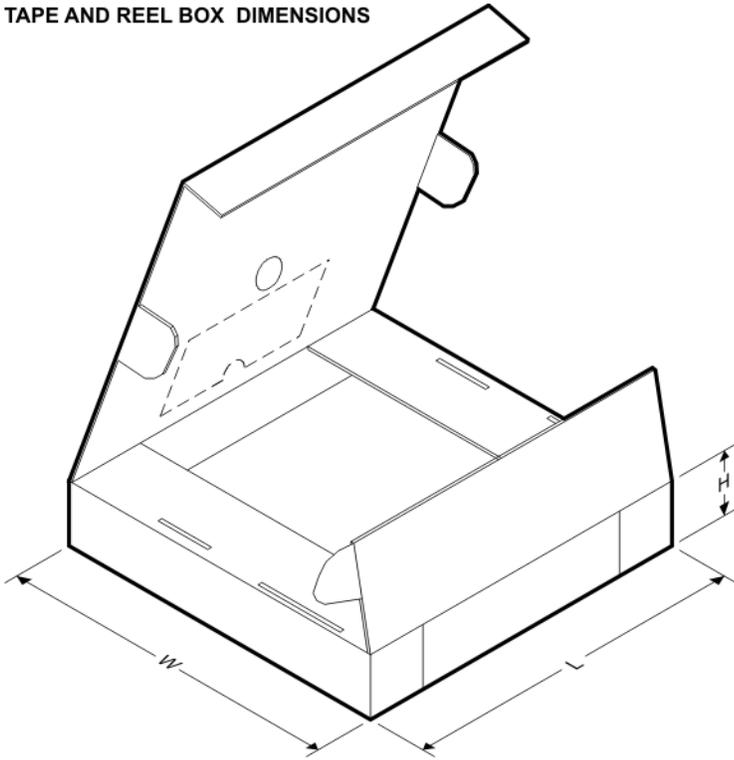
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
74ACT11652DWR	SOIC	DW	28	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1

TAPE AND REEL BOX DIMENSIONS

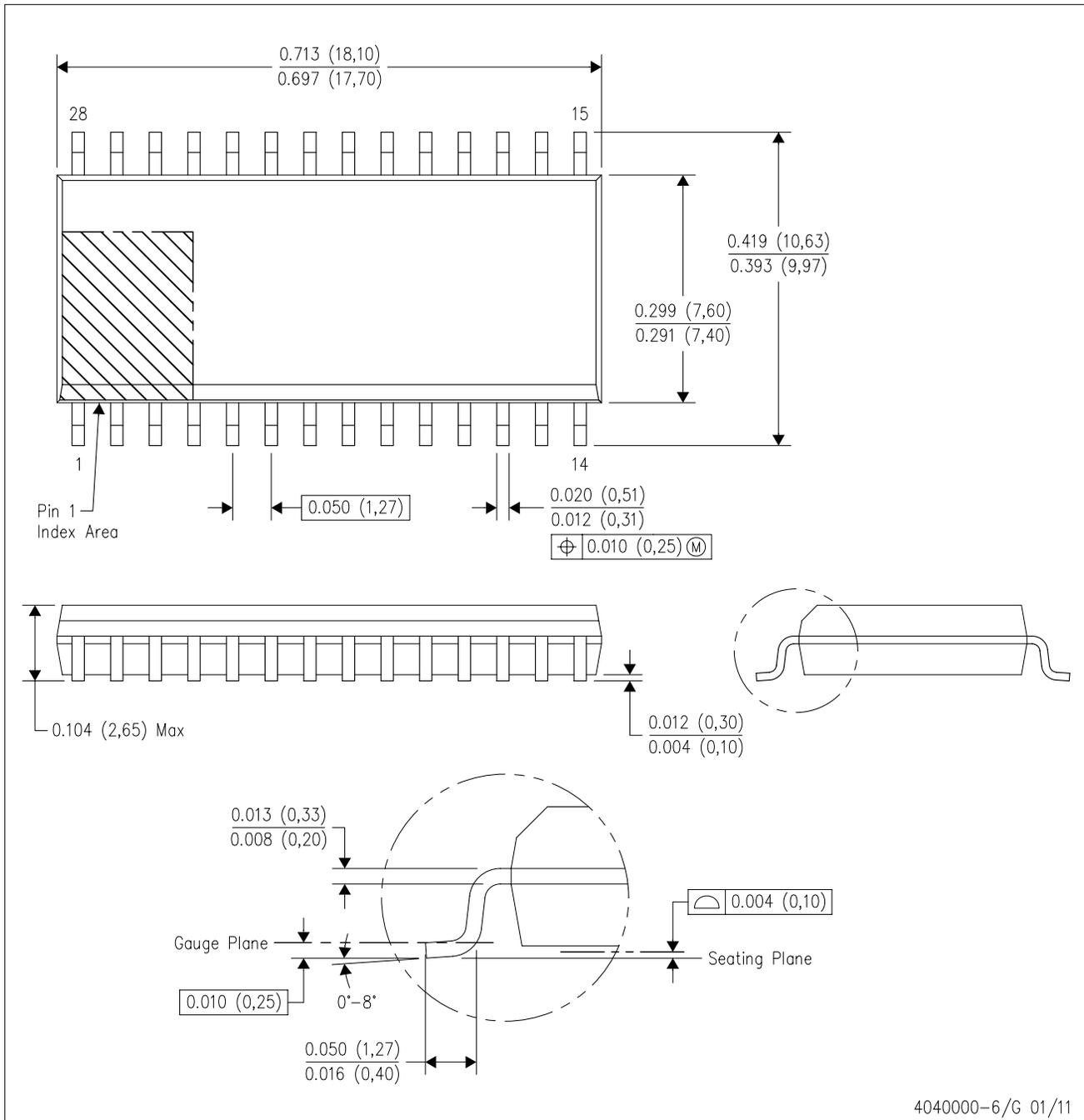


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74ACT11652DWR	SOIC	DW	28	1000	346.0	346.0	49.0

DW (R-PDSO-G28)

PLASTIC SMALL OUTLINE

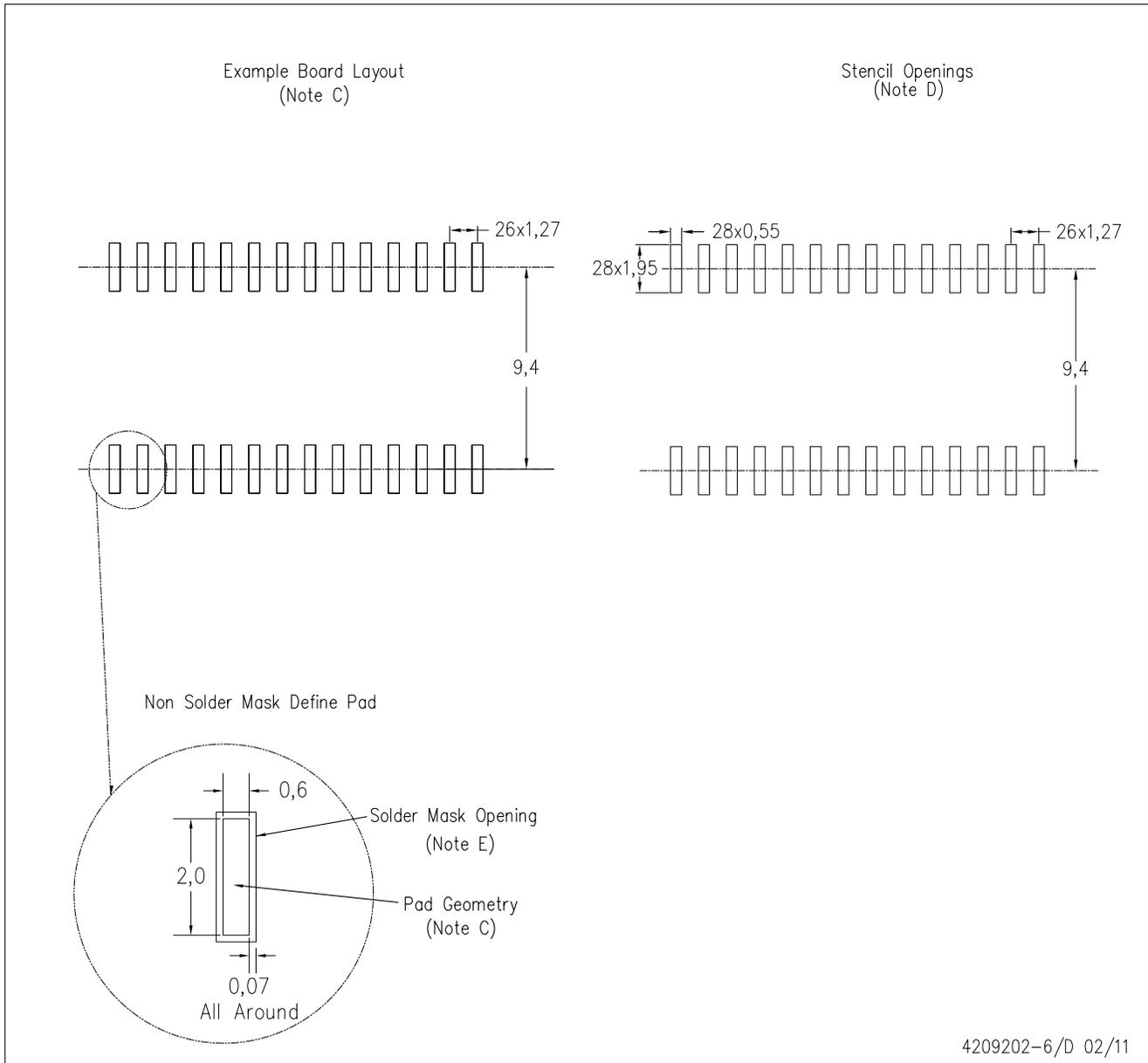


4040000-6/G 01/11

- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MS-013 variation AE.

DW (R-PDSO-G28)

PLASTIC SMALL OUTLINE



4209202-6/D 02/11

- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Refer to IPC7351 for alternate board 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
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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