

FEATURES

- Member of the Texas Instruments Widebus™ Family
- UBT™ Transceiver Combines D-Type Latches and D-Type Flip-Flops for Operation in Transparent, Latched, or Clocked Modes
- Operates From 1.65 V to 3.6 V
- Max t_{pd} of 4.4 ns at 3.3 V
- ± 12 -mA Output Drive at 3.3 V
- Outputs Ports Have Equivalent 26- Ω Series Resistors, So No External Resistors Are Required
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

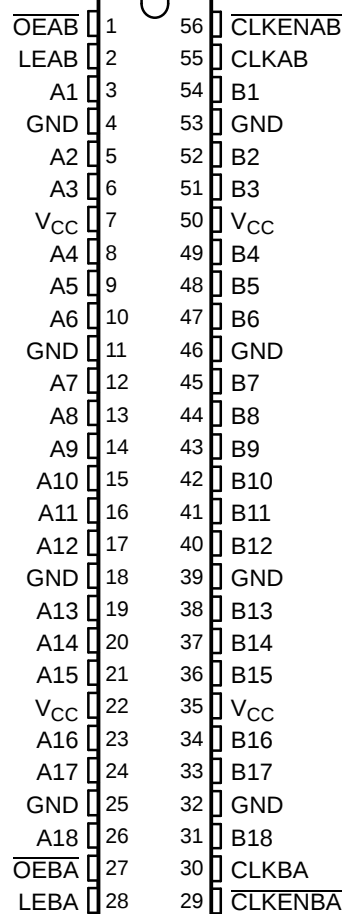
DESCRIPTION/ORDERING INFORMATION

This 18-bit universal bus transceiver is designed for 1.65-V to 3.6-V V_{CC} operation.

The SN74ALVCHR16601 combines D-type latches and D-type flip-flops to allow data flow in transparent, latched, clocked, and clock-enabled modes.

Data flow in each direction is controlled by output-enable ($\overline{OEAB}$ and $\overline{OEBA}$), latch-enable ($\overline{LEAB}$ and $\overline{LEBA}$), and clock ($\overline{CLKAB}$ and $\overline{CLKBA}$) inputs. The clock can be controlled by the clock-enable ($\overline{CLKENAB}$ and $\overline{CLKENBA}$) inputs. For A-to-B data flow, the device operates in the transparent mode when $\overline{LEAB}$ is high. When $\overline{LEAB}$ is low, the A data is latched if $\overline{CLKAB}$ is held at a high or low logic level. If $\overline{LEAB}$ is low, the A data is stored in the latch/flip-flop on the low-to-high transition of $\overline{CLKAB}$. When $\overline{OEAB}$ is low, the outputs are active. When $\overline{OEAB}$ is high, the outputs are in the high-impedance state.

DGG, DGV, OR DL PACKAGE
(TOP VIEW)



ORDERING INFORMATION

T_A	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	SSOP - DL	Tube	SN74ALVCHR16601DL	ALVCHR16601
		Tape and reel	SN74ALVCHR16601LR	
	TSSOP - DGG	Tape and reel	SN74ALVCHR16601GR	ALVCHR16601
	TVSOP - DGV	Tape and reel	SN74ALVCHR16601VR	VR601

(1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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SN74ALVCHR16601

18-BIT UNIVERSAL BUS TRANSCEIVER

WITH 3-STATE OUTPUTS

SCES123I–SEPTEMBER 1997–REVISED SEPTEMBER 2004

DESCRIPTION/ORDERING INFORMATION (CONTINUED)

Data flow for B to A is similar to that of A to B, but uses $\overline{OEBA}$, LEBA, CLKBA, and $\overline{CLKENBA}$.

The outputs include equivalent 26- Ω series resistors to reduce overshoot and undershoot.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Active bus-hold circuitry holds unused or undriven inputs at a valid logic state. Use of pullup or pulldown resistors with the bus-hold circuitry is not recommended.

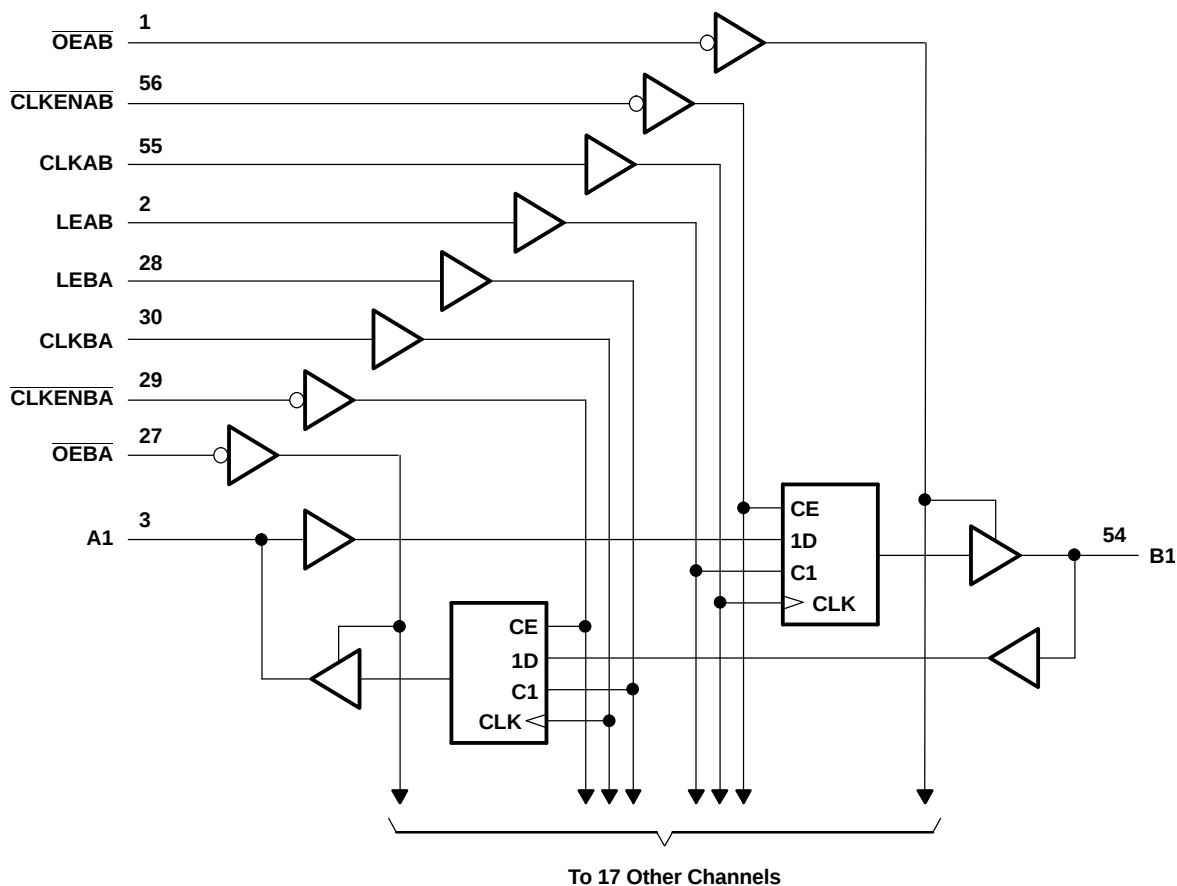
FUNCTION TABLE⁽¹⁾

INPUTS					OUTPUT B
$\overline{CLKENAB}$	$\overline{OEAB}$	LEAB	CLKAB	A	
X	H	X	X	X	Z
X	L	H	X	L	L
X	L	H	X	H	H
H	L	L	X	X	B ₀ ⁽²⁾
L	L	L	↑	L	L
L	L	L	↑	H	H
L	L	L	L or H	X	B ₀ ⁽²⁾

(1) A-to-B data flow is shown; B-to-A flow is similar, but uses $\overline{OEBA}$, LEBA, CLKBA, and $\overline{CLKENBA}$.

(2) Output level before the indicated steady-state input conditions were established

LOGIC DIAGRAM (POSITIVE LOGIC)



ABSOLUTE MAXIMUM RATINGS⁽¹⁾

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

		MIN	MAX	UNIT
V_{CC}	Supply voltage range	-0.5	4.6	V
V_I	Input voltage range	-0.5	4.6	V
			$V_{CC} + 0.5$	
V_O	Output voltage range ⁽²⁾⁽³⁾	-0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current	$V_I < 0$		-50
I_{OK}	Output clamp current	$V_O < 0$		-50
I_O	Continuous output current			± 50
	Continuous current through each V_{CC} or GND			± 100
θ_{JA}	Package thermal impedance ⁽⁴⁾	DGG package		64
		DGV package		48
		DL package		56
T_{stg}	Storage temperature range	-65	150	$^{\circ}\text{C}$

- (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) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) This value is limited to 4.6 V maximum.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

SN74ALVCHR16601
18-BIT UNIVERSAL BUS TRANSCEIVER
WITH 3-STATE OUTPUTS

SCES123I–SEPTEMBER 1997–REVISED SEPTEMBER 2004

RECOMMENDED OPERATING CONDITIONS⁽¹⁾

			MIN	MAX	UNIT
V _{CC}	Supply voltage		1.65	3.6	V
V _{IH}	High-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V	1.7		
		V _{CC} = 2.7 V to 3.6 V	2		
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V		0.7	
		V _{CC} = 2.7 V to 3.6 V		0.8	
V _I	Input voltage		0	V _{CC}	V
V _O	Output voltage		0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 1.65 V		-2	mA
		V _{CC} = 2.3 V		-6	
		V _{CC} = 2.7 V		-8	
		V _{CC} = 3 V		-12	
I _{OL}	Low-level output current	V _{CC} = 1.65 V		2	mA
		V _{CC} = 2.3 V		6	
		V _{CC} = 2.7 V		8	
		V _{CC} = 3 V		12	
Δt/Δv	Input transition rise or fall rate			10	ns/V
T _A	Operating free-air temperature		-40	85	°C

- (1) All unused control 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*, literature number SCBA004.

ELECTRICAL CHARACTERISTICS

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

PARAMETER		TEST CONDITIONS	V _{CC}	MIN	TYP ⁽¹⁾	MAX	UNIT
V _{OH}		I _{OH} = -100 µA	1.65 V to 3.6 V	V _{CC} - 0.2			V
		I _{OH} = -2 mA	1.65 V	1.2			
		I _{OH} = -4 mA	2.3 V	1.9			
		I _{OH} = -6 mA	2.3 V	1.7			
			3 V	2.4			
		I _{OH} = -8 mA	2.7 V	2			
		I _{OH} = -12 mA	3 V	2			
V _{OL}		I _{OL} = 100 µA	1.65 V to 3.6 V	0.2			V
		I _{OL} = 2 mA	1.65 V	0.45			
		I _{OL} = 4 mA	2.3 V	0.4			
		I _{OL} = 6 mA	2.3 V	0.55			
			3 V	0.55			
		I _{OL} = 8 mA	2.7 V	0.6			
		I _{OL} = 12 mA	3 V	0.8			
I _I		V _I = V _{CC} or GND	3.6 V			±5	µA
I _{I(hold)}		V _I = 0.58 V	1.65 V	25			µA
		V _I = 1.07 V		-25			
		V _I = 0.7 V	2.3 V	45			
		V _I = 1.7 V		-45			
		V _I = 0.8 V	3 V	75			
		V _I = 2 V		-75			
		V _I = 0 to 3.6 V ⁽²⁾	3.6 V			±500	
I _{OZ} ⁽³⁾		V _O = V _{CC} or GND	3.6 V			±10	µA
I _{CC}		V _I = V _{CC} or GND, I _O = 0	3.6 V			40	µA
ΔI _{CC}		One input at V _{CC} - 0.6 V, Other inputs at V _{CC} or GND	3 V to 3.6 V			750	µA
C _i	Control inputs	V _I = V _{CC} or GND	3.3 V			4	pF
C _{iO}	A or B ports	V _O = V _{CC} or GND	3.3 V			8	pF

(1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

(2) This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to another.

(3) For I/O ports, the parameter I_{OZ} includes the input leakage current.

SN74ALVCHR16601

18-BIT UNIVERSAL BUS TRANSCEIVER

WITH 3-STATE OUTPUTS

SCES123I–SEPTEMBER 1997–REVISED SEPTEMBER 2004

TIMING REQUIREMENTS

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

				$V_{CC} = 1.8\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		UNIT	
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
f_{clock}	Clock frequency			(1)		150		150		150		MHz	
t_w	Pulse duration	LE high		(1)		3.3		3.3		3.3		ns	
		CLK high or low		(1)		3.3		3.3		3.3			
t_{su}	Setup time	Data before CLK↑		(1)		2.3		2.4		2.1		ns	
		Data before LE↓	CLK high		(1)		2		1.6		1.6		
			CLK low		(1)		1.3		1.2		1.1		
		CLKEN before CLK↑		(1)		2		2		1.7			
t_h	Hold time	Data after CLK↑		(1)		0.7		0.7		0.8		ns	
		Data after LE↓	CLK high		(1)		1.3		1.6		1.4		
			CLK low		(1)		1.7		2		1.7		
		CLKEN after CLK↑		(1)		0.3		0.5		0.6			

(1) This information was not available at the time of publication.

SWITCHING CHARACTERISTICS

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 1.8\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		UNIT
			MIN	TYP	MIN	MAX	MIN	MAX	MIN	MAX	
f_{max}			(1)		150		150		150		MHz
t_{pd}	A or B	B or A	(1)		1	4.8	5.1		1	4.4	ns
	LEAB or LEBA		(1)		1	5.5	5.8		1	5.1	
	CLKAB or CLKBA		(1)		1.2	5.9	6.3		1.4	5.4	
t_{en}	$\overline{\text{OEAB}}$ or $\overline{\text{OEBA}}$	B or A	(1)		1.1	6.3	6.6		1.1	5.6	ns
t_{dis}	$\overline{\text{OEAB}}$ or $\overline{\text{OEBA}}$	B or A	(1)		1	4.2	5.1		1.6	4.7	ns

(1) This information was not available at the time of publication.

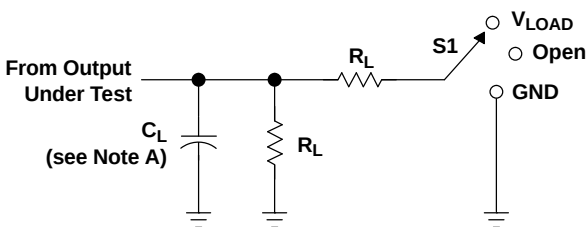
OPERATING CHARACTERISTICS

$T_A = 25^\circ\text{C}$

PARAMETER			TEST CONDITIONS	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	UNIT
				TYP	TYP	TYP	
C_{pd}	Power dissipation capacitance	Outputs enabled	$C_L = 0$, $f = 10\text{ MHz}$	(1)	56	63	pF
		Outputs disabled		(1)	12	13	

(1) This information was not available at the time of publication.

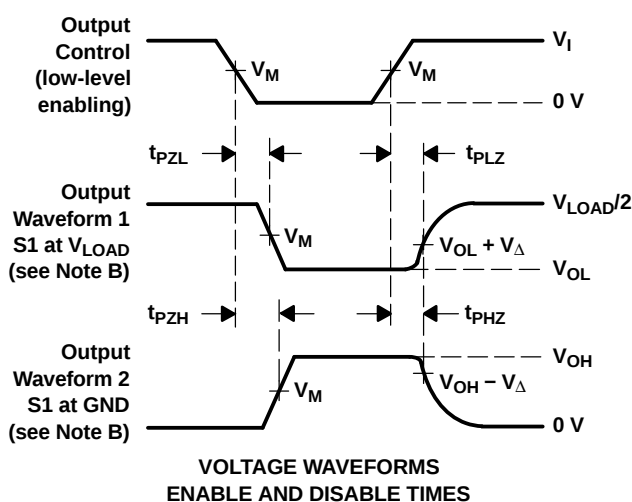
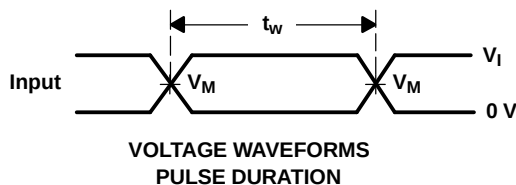
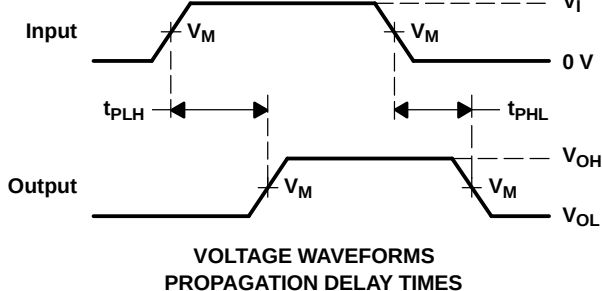
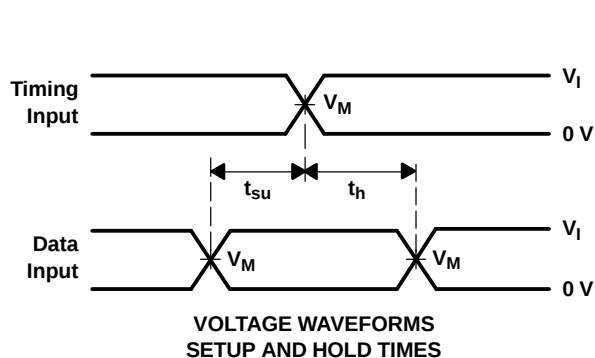
PARAMETER MEASUREMENT INFORMATION



LOAD CIRCUIT

TEST	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	INPUT		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
1.8 V	V_{CC}	≤ 2 ns	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k Ω	0.15 V
2.5 V $\pm$ 0.2 V	V_{CC}	≤ 2 ns	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 Ω	0.15 V
2.7 V	2.7 V	≤ 2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
3 V $\pm$ 0.3 V	2.7 V	≤ 2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V



- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 10$ MHz, $Z_O = 50$ Ω .
 - The outputs are measured one at a time, with one transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PLH} and t_{PHL} are the same as t_{pd} .
 - All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74ALVCHR16601DLG4	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ALVCHR16601GRE4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ALVCHR16601GRG4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ALVCHR16601LRG4	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ALVCHR16601VRE4	ACTIVE	TVSOP	DGV	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74ALVCHR16601VRG4	ACTIVE	TVSOP	DGV	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALVCHR16601DL	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALVCHR16601GR	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALVCHR16601LR	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALVCHR16601VR	ACTIVE	TVSOP	DGV	56	2000	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.

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.

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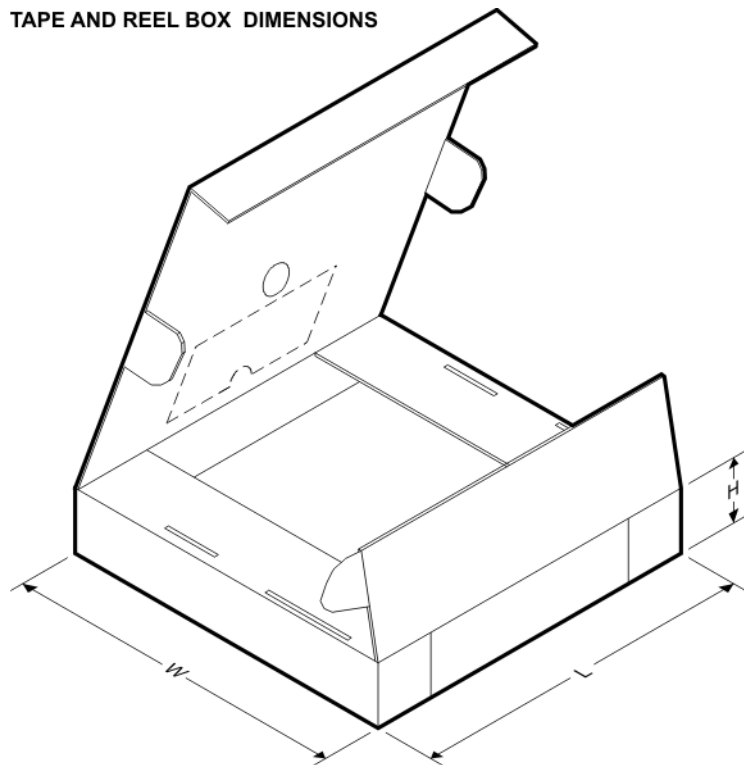
TAPE AND REEL INFORMATION



*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
SN74ALVCHR16601GR	TSSOP	DGG	56	2000	330.0	24.4	8.6	15.6	1.8	12.0	24.0	Q1
SN74ALVCHR16601LR	SSOP	DL	56	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1
SN74ALVCHR16601VR	TVSOP	DGV	56	2000	330.0	24.4	6.8	11.7	1.6	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALVCHR16601GR	TSSOP	DGG	56	2000	346.0	346.0	41.0
SN74ALVCHR16601LR	SSOP	DL	56	1000	346.0	346.0	49.0
SN74ALVCHR16601VR	TVSOP	DGV	56	2000	346.0	346.0	41.0

DGG (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

48 PINS SHOWN

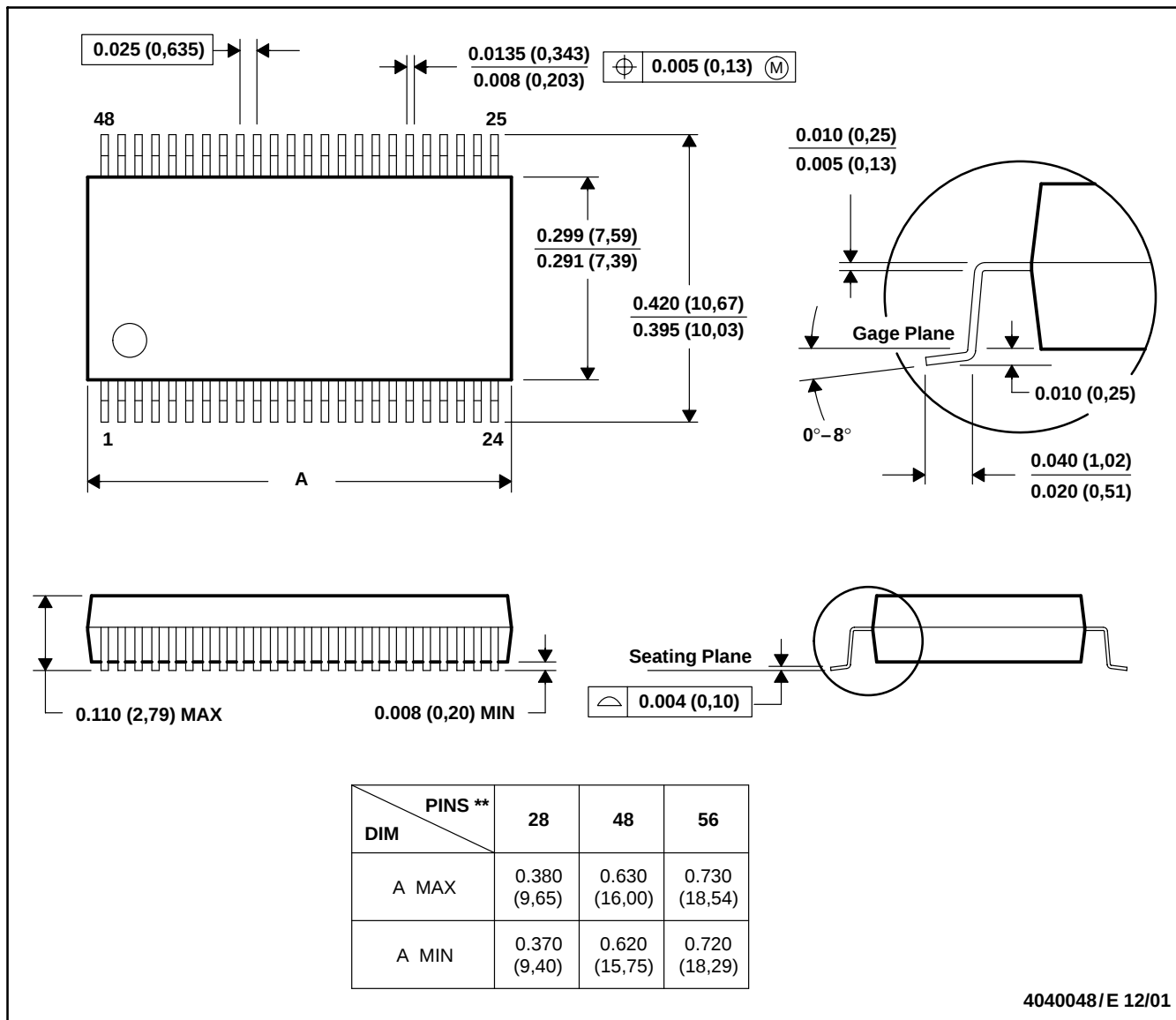


- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

DL (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

48 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 D. Falls within JEDEC MO-118

DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

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)
SN74ALVCHR16601DL	Active	Production	SSOP (DL) 56	20 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCHR16601
SN74ALVCHR16601DL.B	Active	Production	SSOP (DL) 56	20 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCHR16601
SN74ALVCHR16601GR	Active	Production	TSSOP (DGG) 56	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCHR16601
SN74ALVCHR16601GR.B	Active	Production	TSSOP (DGG) 56	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCHR16601
SN74ALVCHR16601LR	Active	Production	SSOP (DL) 56	1000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCHR16601
SN74ALVCHR16601LR.B	Active	Production	SSOP (DL) 56	1000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCHR16601
SN74ALVCHR16601VR	Active	Production	TVSOP (DGV) 56	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VR601
SN74ALVCHR16601VR.B	Active	Production	TVSOP (DGV) 56	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VR601

⁽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.

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TAPE AND REEL INFORMATION



*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
SN74ALVCHR16601GR	TSSOP	DGG	56	2000	330.0	24.4	8.9	14.7	1.4	12.0	24.0	Q1
SN74ALVCHR16601LR	SSOP	DL	56	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1
SN74ALVCHR16601VR	TVSOP	DGV	56	2000	330.0	24.4	6.8	11.7	1.6	12.0	24.0	Q1

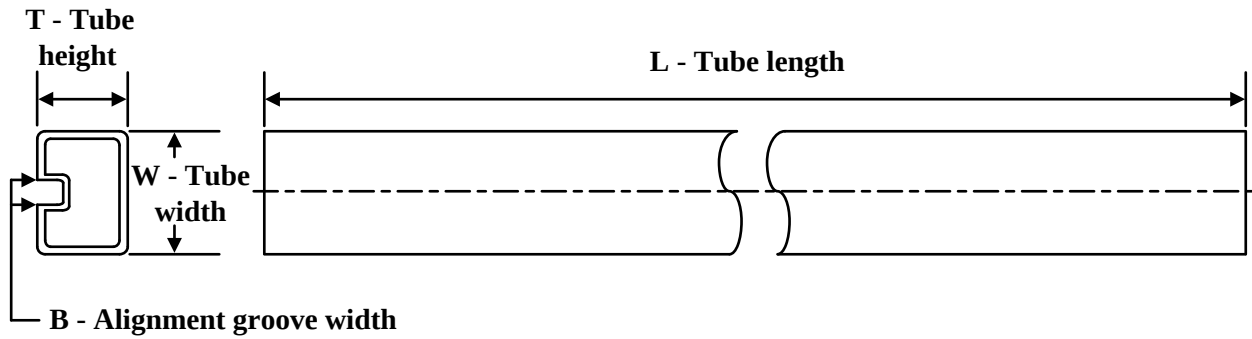
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALVCHR16601GR	TSSOP	DGG	56	2000	356.0	356.0	45.0
SN74ALVCHR16601LR	SSOP	DL	56	1000	356.0	356.0	53.0
SN74ALVCHR16601VR	TVSOP	DGV	56	2000	356.0	356.0	45.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74ALVCHR16601DL	DL	SSOP	56	20	473.7	14.24	5110	7.87
SN74ALVCHR16601DL.B	DL	SSOP	56	20	473.7	14.24	5110	7.87

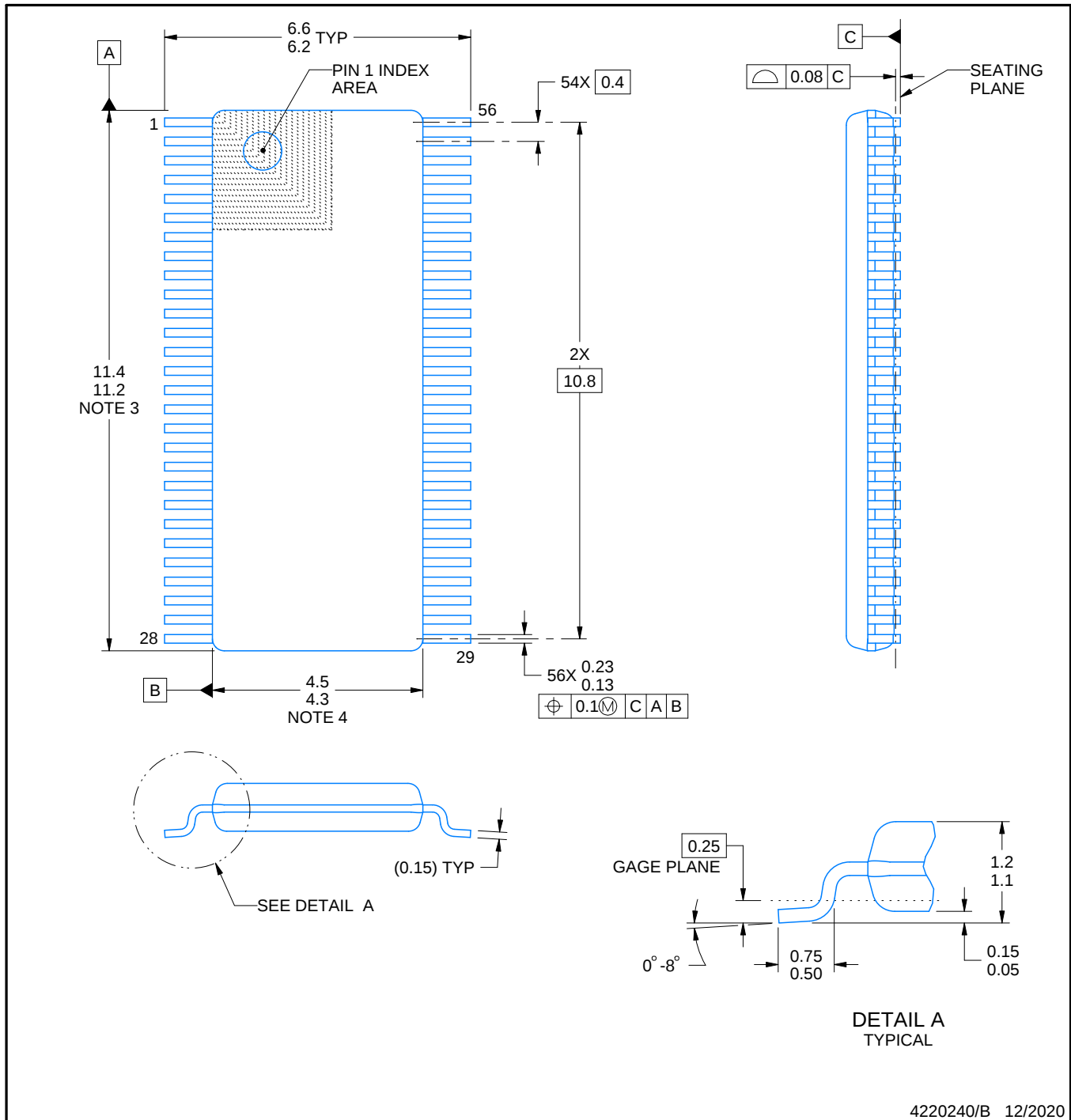
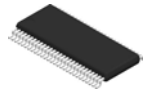
DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194



NOTES:

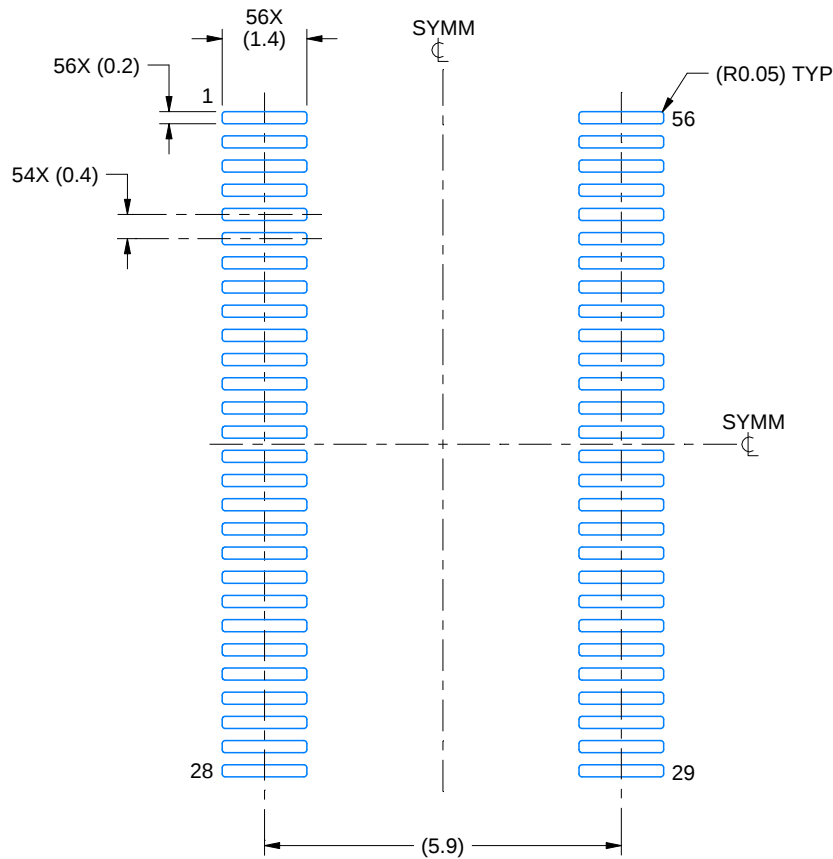
- All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
- This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- Reference JEDEC registration MO-194.

EXAMPLE BOARD LAYOUT

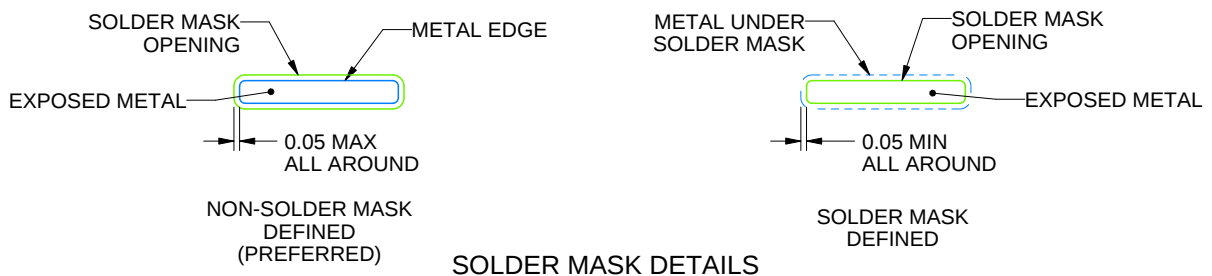
DGV0056A

TVSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 8X



4220240/B 12/2020

NOTES: (continued)

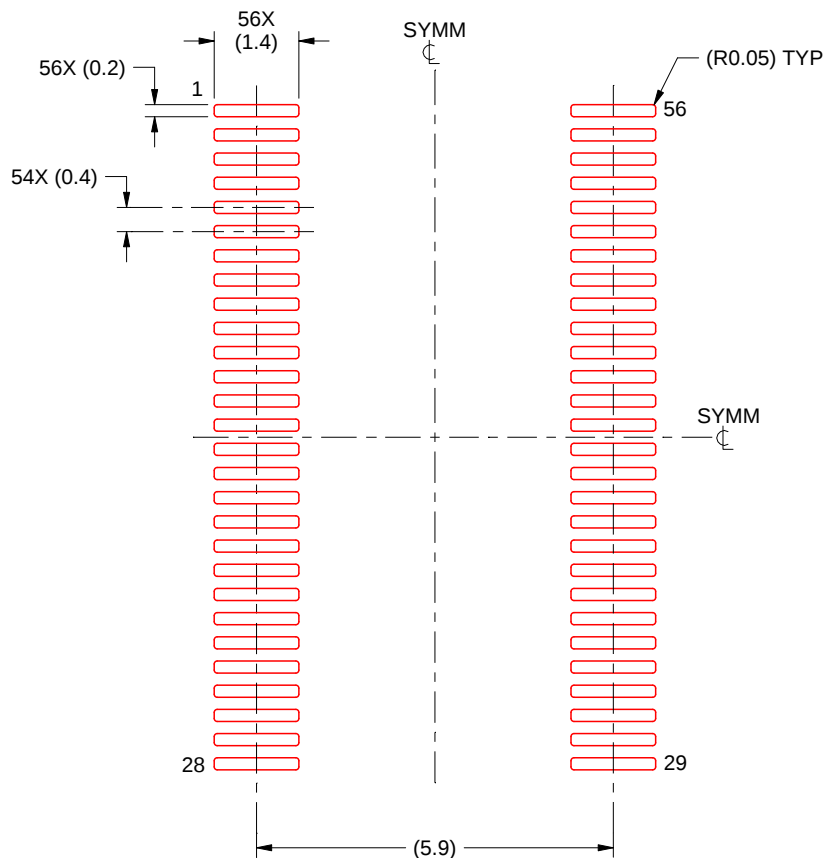
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DGV0056A

TVSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 8X

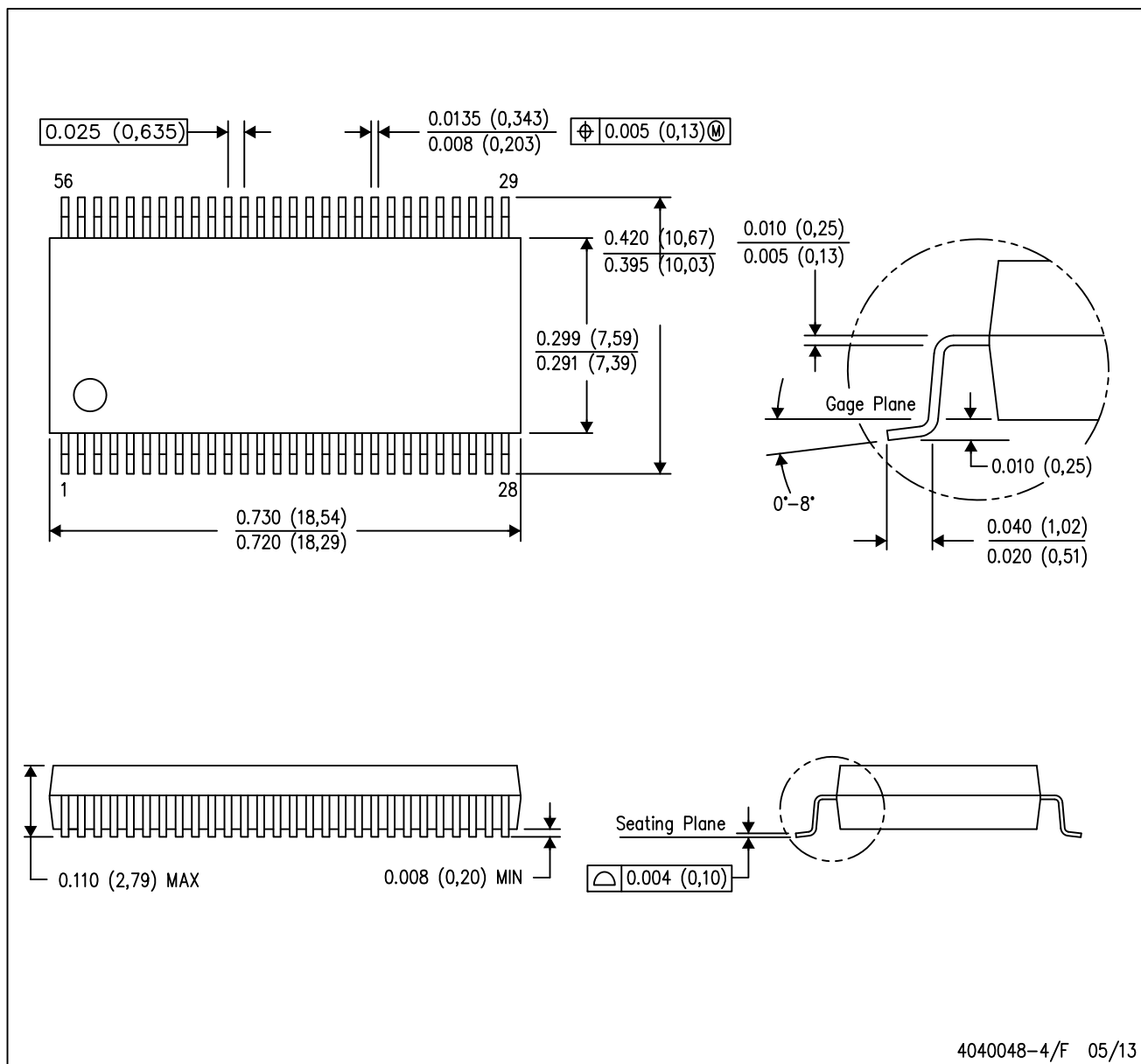
4220240/B 12/2020

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.

DL (R-PDSO-G56)

PLASTIC SMALL-OUTLINE PACKAGE



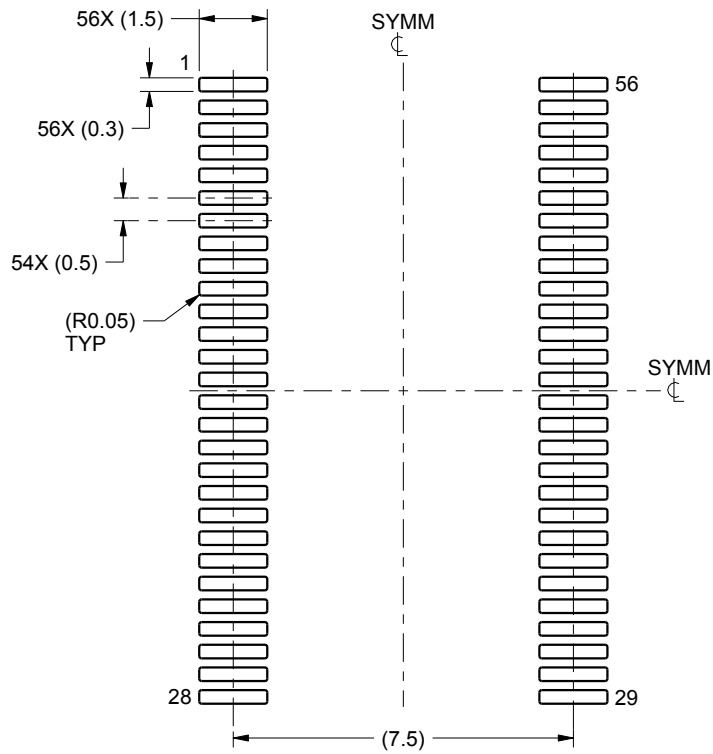
- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MO-118

EXAMPLE BOARD LAYOUT

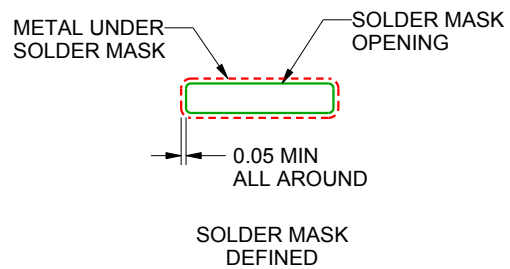
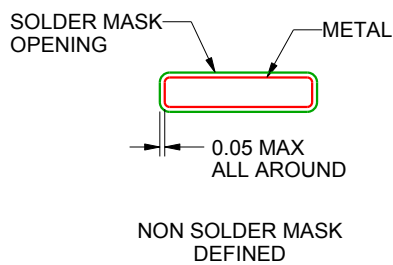
DGG0056A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4222167/A 07/2015

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

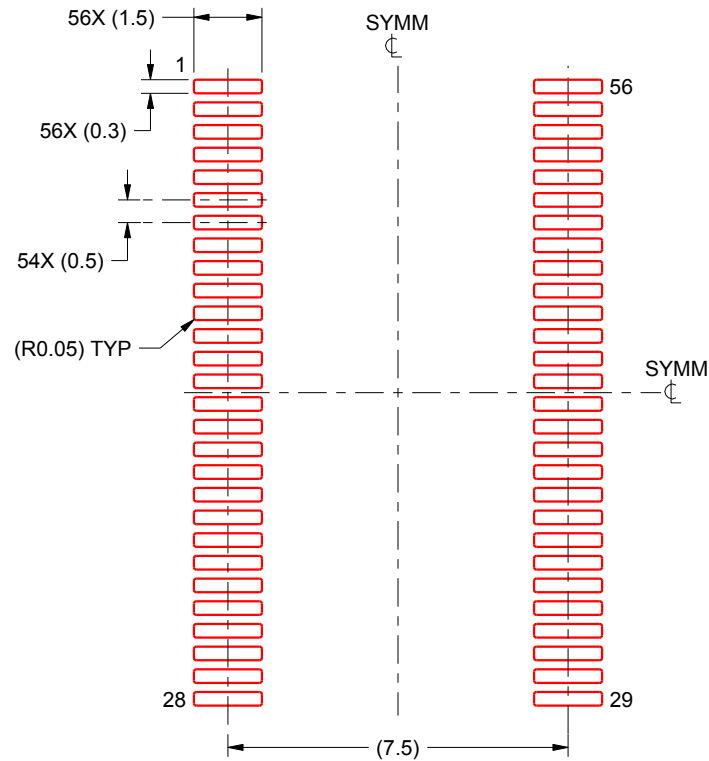
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DGG0056A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4222167/A 07/2015

NOTES: (continued)

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

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