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Kind regards,

Team Nexperia

# DATA SHEET

**74ALVCH16646**

16-bit bus transceiver/register (3-State)

Product specification

1998 Sep 03

IC24 Data Handbook

## 16-bit bus transceiver/register (3-State)

## 74ALVCH16646

## FEATURES

- Complies with JEDEC standard no. 8-1A
- CMOS low power consumption
- MULTIBYTE™ flow-through pin-out architecture
- Low inductance, multiple  $V_{CC}$  and ground pins for minimum noise and ground bounce
- Direct interface with TTL levels
- Current drive  $\pm 24$  mA at 3.0 V
- Output drive capability 50 $\Omega$  transmission lines @ 85°C
- All inputs have bushold circuitry

## DESCRIPTION

The 74ALVCH16646 consists of 16 non-inverting bus transceiver circuits with 3-State outputs, D-type flip-flops and control circuitry arranged for multiplexed transmission of data directly from the internal registers. Data on the 'A' or 'B' bus will be clocked in the internal registers, as the appropriate clock ( $CP_{AB}$  or  $CP_{BA}$ ) goes to a HIGH logic level. Output enable ( $\overline{OE}$ ) and direction ( $DIR$ ) inputs are provided to control the transceiver function. In the transceiver mode, data present at the high-impedance port may be stored in either the 'A' or 'B' register, or in both. The select source inputs ( $S_{AB}$  and  $S_{BA}$ ) can multiplex stored and real-time (transparent mode) data. The direction ( $DIR$ ) input determines which bus will receive data when  $\overline{OE}$  is active (LOW). In the isolation mode ( $\overline{OE}$  = HIGH), 'A' data may be stored in the 'B' register and/or 'B' data may be stored in the 'A' register.

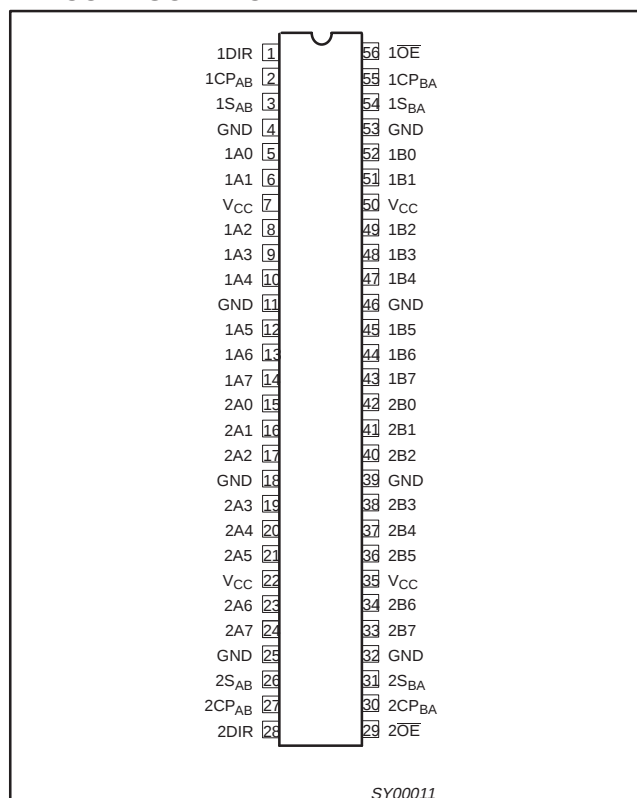
When an output function is disabled, the input function is still enabled and may be used to store and transmit data. Only one of the two buses, 'A' or 'B' may be driven at a time.

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/current-sourcing capability of the driver.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

## PIN CONFIGURATION



## QUICK REFERENCE DATA

$GND = 0V$ ;  $T_{amb} = 25^{\circ}C$ ;  $t_r = t_f \leq 2.5ns$

| SYMBOL            | PARAMETER                                 | CONDITIONS                                                       |                  | TYPICAL    | UNIT |
|-------------------|-------------------------------------------|------------------------------------------------------------------|------------------|------------|------|
| $t_{PHL}/t_{PLH}$ | Propagation delay<br>$nAx$ to $nBx$       | $V_{CC} = 2.5V$ , $C_L = 30pF$<br>$V_{CC} = 3.3V$ , $C_L = 50pF$ |                  | 2.6<br>2.7 | ns   |
| $C_i$             | Input capacitance                         |                                                                  |                  | 3.0        | pF   |
| $C_{PD}$          | Power dissipation capacitance per channel | $V_i = GND$ to $V_{CC}^1$                                        | Outputs enabled  | 36         | pF   |
|                   |                                           |                                                                  | Outputs disabled | 4          |      |
| $F_{max}$         | Maximum clock frequency                   | $V_{CC} = 2.5V$ , $C_L = 30pF$<br>$V_{CC} = 3.3V$ , $C_L = 50pF$ |                  | 300<br>320 | MHz  |

## NOTES:

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu W$ ):  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$  where:  
 $f_i$  = input frequency in MHz;  $C_L$  = output load capacity in pF;  
 $f_o$  = output frequency in MHz;  $V_{CC}$  = supply voltage in V;  
 $\sum (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

## ORDERING INFORMATION

| PACKAGES                     | TEMPERATURE RANGE | OUTSIDE NORTH AMERICA | NORTH AMERICA | DWG NUMBER |
|------------------------------|-------------------|-----------------------|---------------|------------|
| 56-Pin Plastic TSSOP Type II | -40°C to +85°C    | 74ALVCH16646 DGG      | ACH16646 DGG  | SOT364-1   |

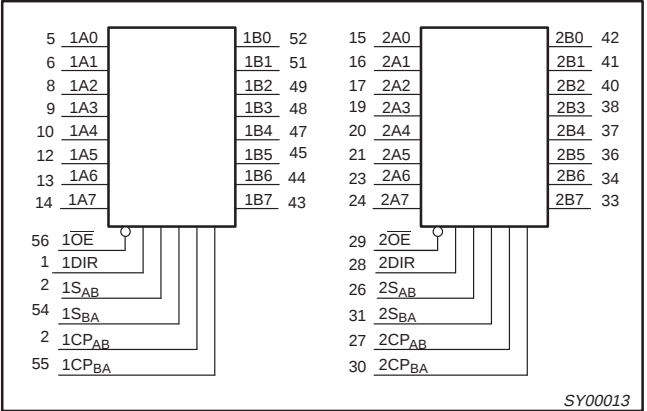
16-bit bus transceiver/register (3-State)

74ALVCH16646

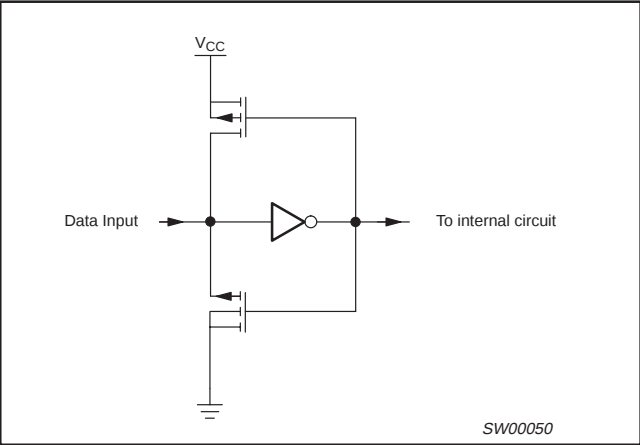
PIN DESCRIPTION

| PIN NUMBER                     | SYMBOL                   | NAME AND FUNCTION       |
|--------------------------------|--------------------------|-------------------------|
| 1, 28                          | nDIR                     | Direction control input |
| 2, 27                          | nCP <sub>AB</sub>        | Clock input A-to-B      |
| 3, 26                          | nS <sub>AB</sub>         | Select input A-to-B     |
| 5, 6, 8, 9, 10, 12, 13, 14     | 1A0 to 1A7               | Data inputs/outputs     |
| 4, 11, 18, 25, 32, 39, 46, 53  | GND                      | Ground (0V)             |
| 7, 22, 35, 50                  | V <sub>CC</sub>          | Positive supply voltage |
| 15, 16, 17, 19, 20, 21, 23, 24 | 2A0 to 2A7               | Data inputs/outputs     |
| 29, 56                         | n $\overline{\text{OE}}$ | Output enable           |
| 30, 55                         | nCP <sub>BA</sub>        | Clock input B-to-A      |
| 31, 54                         | nS <sub>BA</sub>         | Select input B-to-A     |
| 42, 41, 40, 38, 37, 36, 34, 33 | 2B0 to 2B7               | Data inputs/outputs     |
| 52, 51, 49, 48, 47, 45, 44, 43 | 1B0 to 1B7               | Data inputs/outputs     |

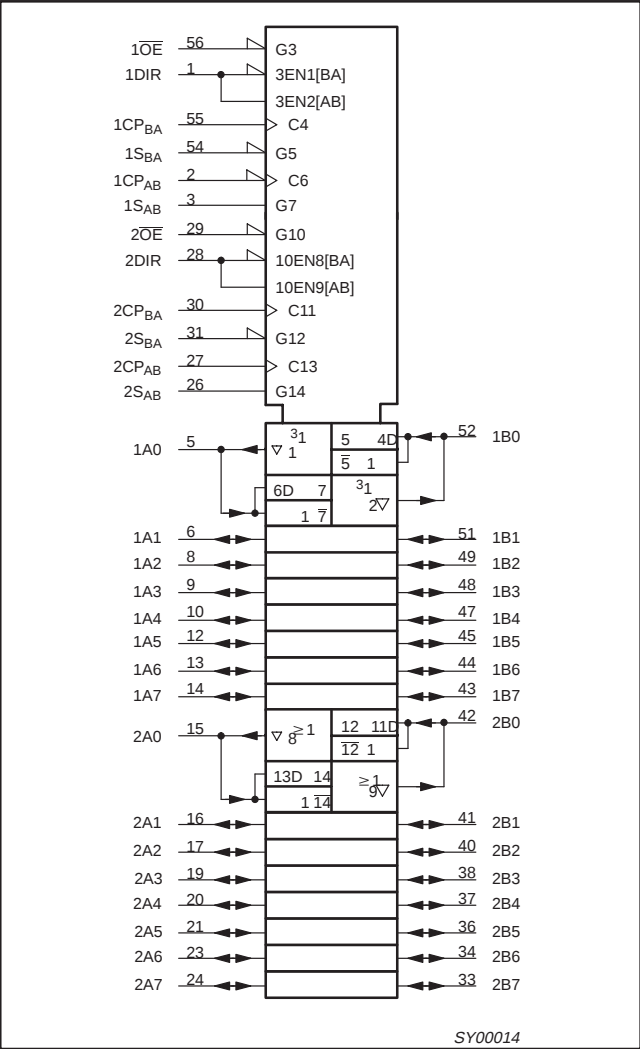
LOGIC SYMBOL



BUSHOLD CIRCUIT



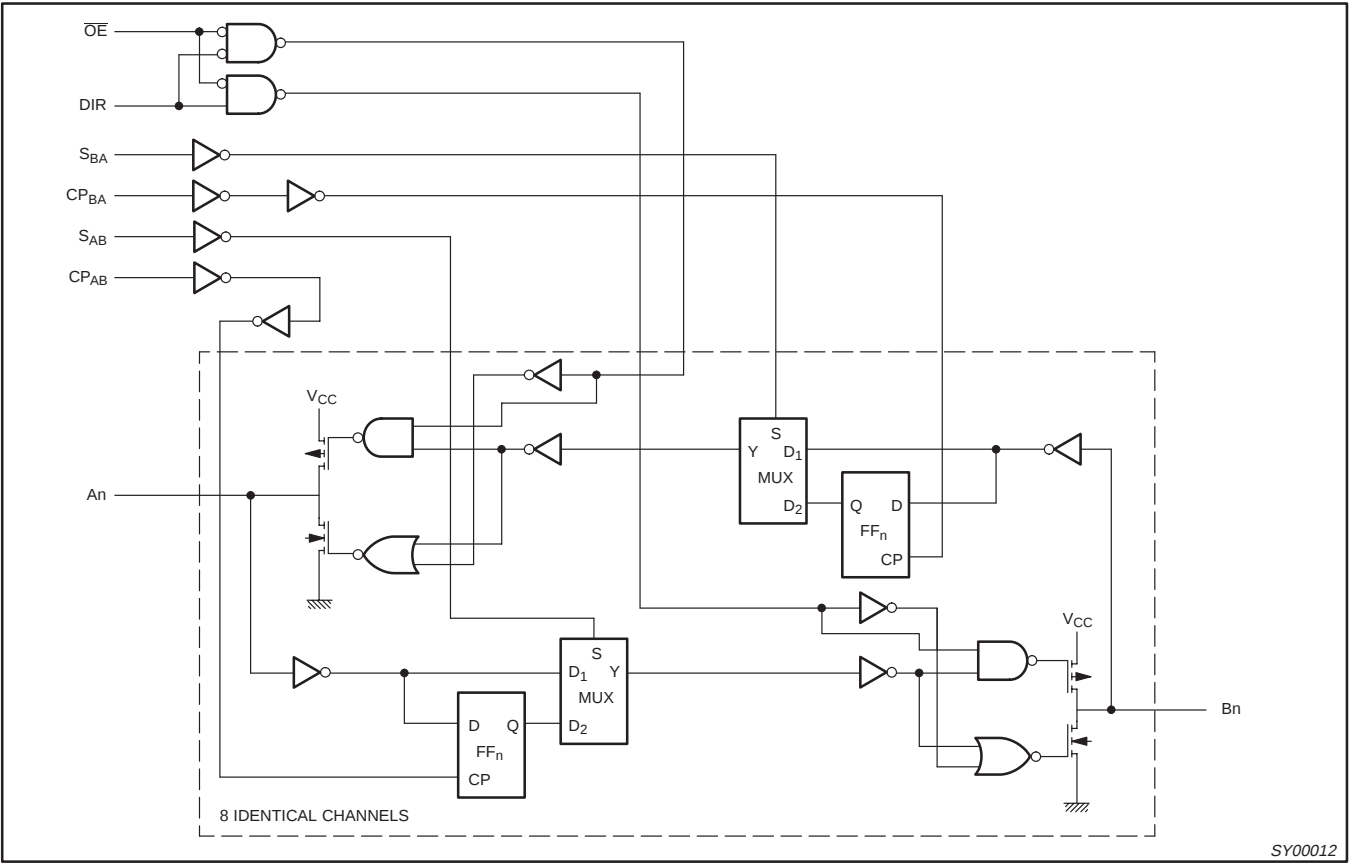
LOGIC SYMBOL (IEEE/IEC)



16-bit bus transceiver/register (3-State)

74ALVCH16646

LOGIC DIAGRAM (one section)



FUNCTION TABLE

| INPUTS |      |        |        |      |      | DATA I/O * |        | FUNCTION                      |
|--------|------|--------|--------|------|------|------------|--------|-------------------------------|
| nOE    | nDIR | nCPAB  | nCPBA  | nSAB | nSBA | nAx        | nBx    |                               |
| X      | X    | ↑      | X      | X    | X    | input      | un*    | store A, B unspecified*       |
| X      | X    | X      | ↑      | X    | X    | un*        | input  | store B, A unspecified*       |
| H      | X    | ↑      | ↑      | X    | X    | input      | input  | store A and B data, isolation |
| H      | X    | H or L | H or L | X    | X    | input      | input  | hold storage                  |
| 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        |
| L      | H    | X      | X      | L    | X    | input      | output | real-time A data to B bus     |
| L      | H    | H or L | X      | H    | X    | input      | output | stored A data to B bus        |

\* The data output functions may be enabled or disabled by various signals at the OE and DIR inputs. Data input functions are always enabled, i.e., data at the bus inputs will be stored on every LOW-to-HIGH transition on the clock inputs.

- un = unspecified
- H = HIGH voltage level
- L = LOW voltage level
- X = don't care
- ↑ = LOW-to-HIGH level transition

## 16-bit bus transceiver/register (3-State)

74ALVCH16646

## RECOMMENDED OPERATING CONDITIONS

| SYMBOL     | PARAMETER                                                                     | CONDITIONS                                           | LIMITS |          | UNIT |
|------------|-------------------------------------------------------------------------------|------------------------------------------------------|--------|----------|------|
|            |                                                                               |                                                      | MIN    | MAX      |      |
| $V_{CC}$   | DC supply voltage 2.5V range (for max. speed performance @ 30 pF output load) |                                                      | 2.3    | 2.7      | V    |
|            | DC supply voltage 3.3V range (for max. speed performance @ 50 pF output load) |                                                      | 3.0    | 3.6      |      |
| $V_I$      | DC Input voltage range                                                        |                                                      | 0      | $V_{CC}$ | V    |
| $V_O$      | DC output voltage range                                                       |                                                      | 0      | $V_{CC}$ | V    |
| $T_{amb}$  | Operating free-air temperature range                                          |                                                      | -40    | +85      | °C   |
| $t_r, t_f$ | Input rise and fall times                                                     | $V_{CC} = 2.3$ to $3.0V$<br>$V_{CC} = 3.0$ to $3.6V$ | 0<br>0 | 20<br>10 | ns/V |

## ABSOLUTE MAXIMUM RATINGS

In accordance with the Absolute Maximum Rating System (IEC 134)

Voltages are referenced to GND (ground = 0V)

| SYMBOL            | PARAMETER                                                            | CONDITIONS                                                                                                                     | RATING                 | UNIT |
|-------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------|------|
| $V_{CC}$          | DC supply voltage                                                    |                                                                                                                                | -0.5 to +4.6           | V    |
| $I_{IK}$          | DC input diode current                                               | $V_I < 0$                                                                                                                      | -50                    | mA   |
| $V_I$             | DC input voltage                                                     | For control pins <sup>1</sup>                                                                                                  | -0.5 to +4.6           | V    |
|                   |                                                                      | For data inputs <sup>1</sup>                                                                                                   | -0.5 to $V_{CC} + 0.5$ |      |
| $I_{OK}$          | DC output diode current                                              | $V_O > V_{CC}$ or $V_O < 0$                                                                                                    | ± 50                   | mA   |
| $V_O$             | DC output voltage                                                    | Note 1                                                                                                                         | -0.5 to $V_{CC} + 0.5$ | V    |
| $I_O$             | DC output source or sink current                                     | $V_O = 0$ to $V_{CC}$                                                                                                          | ± 50                   | mA   |
| $I_{GND}, I_{CC}$ | DC $V_{CC}$ or GND current                                           |                                                                                                                                | ± 100                  | mA   |
| $T_{stg}$         | Storage temperature range                                            |                                                                                                                                | -65 to +150            | °C   |
| $P_{TOT}$         | Power dissipation per package<br>-plastic thin-medium-shrink (TSSOP) | For temperature range: -40 to +125 °C<br>above +55°C derate linearly with 11.3 mW/K<br>above +55°C derate linearly with 8 mW/K | 850<br>600             | mW   |

## NOTE:

1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## 16-bit bus transceiver/register (3-State)

## 74ALVCH16646

**DC ELECTRICAL CHARACTERISTICS**

Over recommended operating conditions. Voltage are referenced to GND (ground = 0 V).

| SYMBOL            | PARAMETER                           | TEST CONDITIONS                                                                                                                 | LIMITS                |                        |      | UNIT |
|-------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------|------|------|
|                   |                                     |                                                                                                                                 | Temp = -40°C to +85°C |                        |      |      |
|                   |                                     |                                                                                                                                 | MIN                   | TYP <sup>1</sup>       | MAX  |      |
| V <sub>IH</sub>   | HIGH level Input voltage            | V <sub>CC</sub> = 2.3 to 2.7V                                                                                                   | 1.7                   | 1.2                    |      | V    |
|                   |                                     | V <sub>CC</sub> = 2.7 to 3.6V                                                                                                   | 2.0                   | 1.5                    |      |      |
| V <sub>IL</sub>   | LOW level Input voltage             | V <sub>CC</sub> = 2.3 to 2.7V                                                                                                   |                       | 1.2                    | 0.7  | V    |
|                   |                                     | V <sub>CC</sub> = 2.7 to 3.6V                                                                                                   |                       | 1.5                    | 0.8  |      |
| V <sub>OH</sub>   | HIGH level output voltage           | V <sub>CC</sub> = 2.3 to 3.6V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = -100μA                    | V <sub>CC</sub> - 0.2 | V <sub>CC</sub>        |      | V    |
|                   |                                     | V <sub>CC</sub> = 2.3V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = -6mA                             | V <sub>CC</sub> - 0.3 | V <sub>CC</sub> - 0.08 |      |      |
|                   |                                     | V <sub>CC</sub> = 2.3V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = -12mA                            | V <sub>CC</sub> - 0.6 | V <sub>CC</sub> - 0.26 |      |      |
|                   |                                     | V <sub>CC</sub> = 2.7V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = -12mA                            | V <sub>CC</sub> - 0.5 | V <sub>CC</sub> - 0.14 |      |      |
|                   |                                     | V <sub>CC</sub> = 3.0V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = -12mA                            | V <sub>CC</sub> - 0.6 | V <sub>CC</sub> - 0.09 |      |      |
|                   |                                     | V <sub>CC</sub> = 3.0V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = -24mA                            | V <sub>CC</sub> - 1.0 | V <sub>CC</sub> - 0.28 |      |      |
| V <sub>OL</sub>   | LOW level output voltage            | V <sub>CC</sub> = 2.3 to 3.6V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = 100μA                     |                       | GND                    | 0.20 | V    |
|                   |                                     | V <sub>CC</sub> = 2.3V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = 6mA                              |                       | 0.07                   | 0.40 | V    |
|                   |                                     | V <sub>CC</sub> = 2.3V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = 12mA                             |                       | 0.15                   | 0.70 | V    |
|                   |                                     | V <sub>CC</sub> = 2.7V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = 12mA                             |                       | 0.14                   | 0.40 |      |
|                   |                                     | V <sub>CC</sub> = 3.0V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; I <sub>O</sub> = 24mA                             |                       | 0.27                   | 0.55 |      |
| I <sub>I</sub>    | Input leakage current               | V <sub>CC</sub> = 2.3 to 3.6V;<br>V <sub>I</sub> = V <sub>CC</sub> or GND                                                       |                       | 0.1                    | 5    | μA   |
| I <sub>OZ</sub>   | 3-State output OFF-state current    | V <sub>CC</sub> = 2.7 to 3.6V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND |                       | 0.1                    | 10   | μA   |
| I <sub>CC</sub>   | Quiescent supply current            | V <sub>CC</sub> = 2.3 to 3.6V; V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0                                      |                       | 0.2                    | 40   | μA   |
| ΔI <sub>CC</sub>  | Additional quiescent supply current | V <sub>CC</sub> = 2.3V to 3.6V; V <sub>I</sub> = V <sub>CC</sub> - 0.6V; I <sub>O</sub> = 0                                     |                       | 150                    | 750  | μA   |
| I <sub>BHL</sub>  | Bus hold LOW sustaining current     | V <sub>CC</sub> = 2.3V; V <sub>I</sub> = 0.7V <sup>2</sup>                                                                      | 45                    | —                      |      | μA   |
|                   |                                     | V <sub>CC</sub> = 3.0V; V <sub>I</sub> = 0.8V <sup>2</sup>                                                                      | 75                    | 150                    |      |      |
| I <sub>BHH</sub>  | Bus hold HIGH sustaining current    | V <sub>CC</sub> = 2.3V; V <sub>I</sub> = 1.7V <sup>2</sup>                                                                      | -45                   |                        |      | μA   |
|                   |                                     | V <sub>CC</sub> = 3.0V; V <sub>I</sub> = 2.0V <sup>2</sup>                                                                      | -75                   | -175                   |      |      |
| I <sub>BHLO</sub> | Bus hold LOW overdrive current      | V <sub>CC</sub> = 3.6V <sup>2</sup>                                                                                             | 500                   |                        |      | μA   |
| I <sub>BHHO</sub> | Bus hold HIGH overdrive current     | V <sub>CC</sub> = 3.6V <sup>2</sup>                                                                                             | -500                  |                        |      | μA   |

**NOTES:**

1. All typical values are at  $T_{amb} = 25^\circ C$ .
2. Valid for data inputs of bus hold parts.

## 16-bit bus transceiver/register (3-State)

74ALVCH16646

**AC CHARACTERISTICS FOR  $V_{CC} = 2.3V$  TO  $2.7V$  RANGE**GND = 0V;  $t_r = t_f \leq 2.0ns$ ;  $C_L = 30pF$ 

| SYMBOL                             | PARAMETER                                                               | WAVEFORM | LIMITS                        |     |     | UNIT |
|------------------------------------|-------------------------------------------------------------------------|----------|-------------------------------|-----|-----|------|
|                                    |                                                                         |          | V <sub>CC</sub> = 2.5V ± 0.2V |     |     |      |
|                                    |                                                                         |          | MIN                           | TYP | MAX |      |
| t <sub>PLH</sub> /t <sub>PHL</sub> | Propagation delay<br>nAx to nBx, nBx to nAx                             | 1        | 1.0                           | 2.7 | 4.8 | ns   |
|                                    | Propagation delay<br>nCP <sub>AB</sub> to nBx, nCP <sub>BA</sub> to nAx | 3        | 1.0                           | 3.4 | 5.6 |      |
|                                    | Propagation delay<br>nS <sub>AB</sub> to nBx, nS <sub>BA</sub> to nAx   | 2        | 1.0                           | 3.4 | 6.8 |      |
| t <sub>PZH</sub> /t <sub>PZL</sub> | 3-State output enable time<br>nOE to nAx, nBx                           | 4        | 1.0                           | 3.3 | 6.5 | ns   |
| t <sub>PHZ</sub> /t <sub>PLZ</sub> | 3-State output disable time<br>nOE to nAx, nBx                          | 4        | 1.6                           | 2.8 | 5.7 | ns   |
| t <sub>PZH</sub> /t <sub>PZL</sub> | 3-State output enable time<br>nDIR to nAx, nBx                          | 5        | 1.0                           | 3.4 | 7.8 | ns   |
| t <sub>PHZ</sub> /t <sub>PLZ</sub> | 3-State output disable time<br>nDIR to nAx, nBx                         | 5        | 1.5                           | 3.0 | 6.5 | ns   |
| t <sub>W</sub>                     | Pulse width HIGH or LOW<br>nCP <sub>AB</sub> , nCP <sub>BA</sub>        | 3        | 3.3                           | 1.2 |     | ns   |
| t <sub>SU</sub>                    | Set up time nAx to nCP <sub>AB</sub> ,<br>nBx to nCP <sub>BA</sub>      | 3        | 1.6                           | 0.2 |     | ns   |
| t <sub>h</sub>                     | Hold time nAx to nCP <sub>AB</sub> ,<br>nBx to nCP <sub>BA</sub>        | 3        | 0.6                           | 0.1 |     | ns   |
| F <sub>max</sub>                   | Maximum clock pulse frequency                                           | 3        | 150                           | 300 |     | MHz  |

**NOTE:**1. All typical values are at  $V_{CC} = 2.5V$  and  $T_{amb} = 25^\circ C$ .**AC CHARACTERISTICS FOR  $V_{CC} = 3.0V$  TO  $3.6V$  RANGE AND  $V_{CC} = 2.7V$** GND = 0V;  $t_r = t_f = 2.5ns$ ;  $C_L = 50pF$ 

| SYMBOL                             | PARAMETER                                                               | WAVEFORM | LIMITS                        |                     |     |                        |                  |     | UNIT |
|------------------------------------|-------------------------------------------------------------------------|----------|-------------------------------|---------------------|-----|------------------------|------------------|-----|------|
|                                    |                                                                         |          | V <sub>CC</sub> = 3.3V ± 0.3V |                     |     | V <sub>CC</sub> = 2.7V |                  |     |      |
|                                    |                                                                         |          | MIN                           | TYP <sup>1, 2</sup> | MAX | MIN                    | TYP <sup>1</sup> | MAX |      |
| t <sub>PHL</sub> /t <sub>PLH</sub> | Propagation delay<br>nAx to nBx, nBx to nAx                             | 1        | 1.0                           | 2.6                 | 3.9 | 1.0                    | 2.8              | 4.5 | ns   |
| t <sub>PHL</sub> /t <sub>PLH</sub> | Propagation delay<br>nCP <sub>AB</sub> to nBx, nCP <sub>BA</sub> to nAx | 3        | 1.4                           | 2.9                 | 4.5 | 1.4                    | 3.1              | 5.2 | ns   |
| t <sub>PHL</sub> /t <sub>PLH</sub> | Propagation delay<br>nSAB to nBx, nSBA to nAx                           | 2        | 1.3                           | 3.1                 | 5.3 | 1.3                    | 3.5              | 6.4 | ns   |
| t <sub>PZH</sub> /t <sub>PZL</sub> | 3-State output enable time<br>nOE to nAx, nBx                           | 4        | 1.0                           | 2.3                 | 5.1 | 1.0                    | 3.2              | 6.2 | ns   |
| t <sub>PHZ</sub> /t <sub>PLZ</sub> | 3-State output disable time<br>nOE to nAx, nBx                          | 4        | 1.0                           | 2.9                 | 4.7 | 1.0                    | 3.1              | 5.0 | ns   |
| t <sub>PZH</sub> /t <sub>PZL</sub> | 3-State output enable time<br>nDIR to nAx, nBx                          | 5        | 1.4                           | 3.0                 | 5.1 | 1.4                    | 3.4              | 6.2 | ns   |
| t <sub>PHZ</sub> /t <sub>PLZ</sub> | 3-State output disable time<br>nDIR to nAx, nBx                         | 5        | 1.4                           | 2.5                 | 5.3 | 1.4                    | 3.3              | 6.0 | ns   |
| t <sub>W</sub>                     | Pulse width HIGH or LOW<br>nCP <sub>AB</sub> , nCP <sub>BA</sub>        | 3        | 3.3                           | 0.7                 |     | 3.3                    | 1.0              |     | ns   |
| t <sub>SU</sub>                    | Set up time nAx to nCP <sub>AB</sub> ,<br>nBx to nCP <sub>BA</sub>      | 3        | 1.4                           | 0.3                 |     | 1.7                    | 0.2              |     | ns   |
| t <sub>h</sub>                     | Hold time nAx to nCP <sub>AB</sub> ,<br>nBx to nCP <sub>BA</sub>        | 3        | 0.7                           | 0.2                 |     | 0.4                    | 0.1              |     | ns   |
| F <sub>max</sub>                   | Maximum clock pulse frequency                                           | 3        | 150                           | 320                 |     | 150                    | 320              |     | MHz  |

**NOTES:**1. All typical values are at  $T_{amb} = 25^\circ C$ .2.  $V_{CC} = 3.3V$

16-bit bus transceiver/register (3-State)

74ALVCH16646

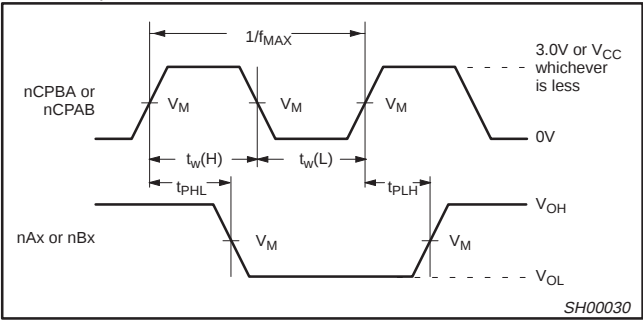
AC WAVEFORMS

V<sub>CC</sub> = 2.3 TO 2.7 V RANGE

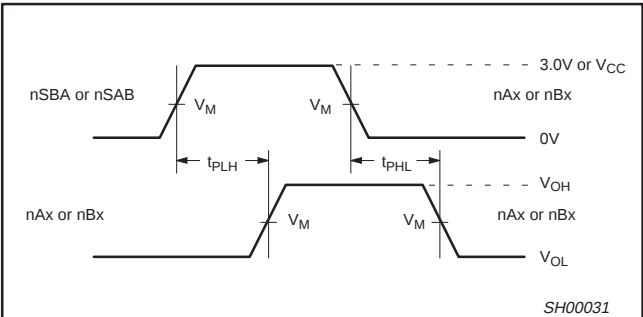
- 1. V<sub>M</sub> = 0.5 V
- 2. V<sub>X</sub> = V<sub>OL</sub> + 0.15V
- 3. V<sub>Y</sub> = V<sub>OH</sub> - 0.15V
- 4. V<sub>I</sub> = V<sub>CC</sub>
- 5. V<sub>OL</sub> and V<sub>OH</sub> are the typical output voltage drop that occur with the output load.

V<sub>CC</sub> = 3.0 TO 3.6 V RANGE AND V<sub>CC</sub> = 2.7 V

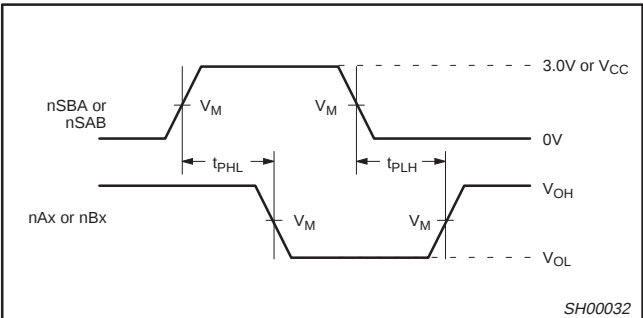
- 1. V<sub>M</sub> = 1.5 V
- 2. V<sub>X</sub> = V<sub>OL</sub> + 0.3V
- 3. V<sub>Y</sub> = V<sub>OH</sub> - 0.3V
- 4. V<sub>I</sub> = 2.7 V
- 5. V<sub>OL</sub> and V<sub>OH</sub> are the typical output voltage drop that occur with the output load.



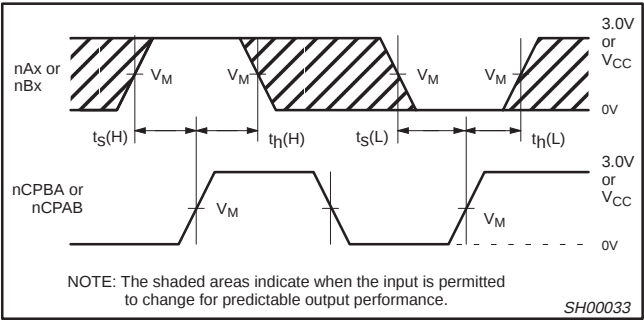
Waveform 1. Propagation Delay, Clock Input to Output, Clock Pulse Width, and Maximum Clock Frequency



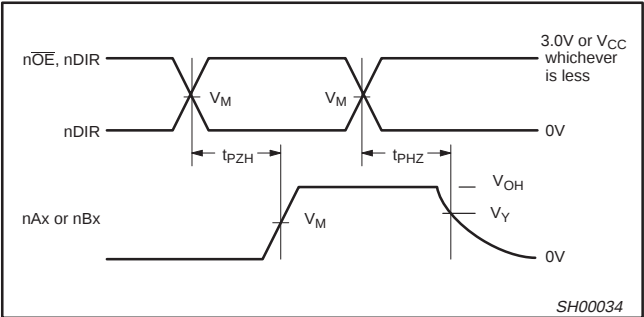
Waveform 2. Propagation Delay, nSAB to nBx or nSAB to nAx, nAx to nBx or nBx to nAx



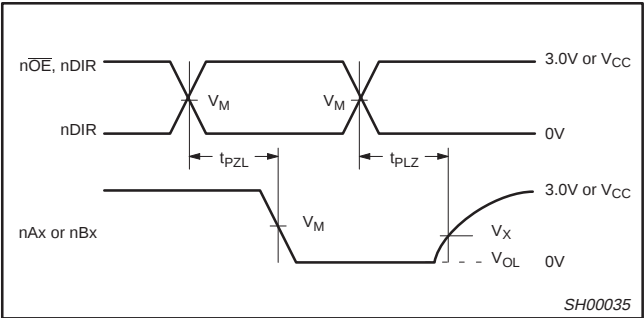
Waveform 3. Propagation Delay, nSBA to nAx or nSAB to nBx



Waveform 4. Data Setup and Hold Times

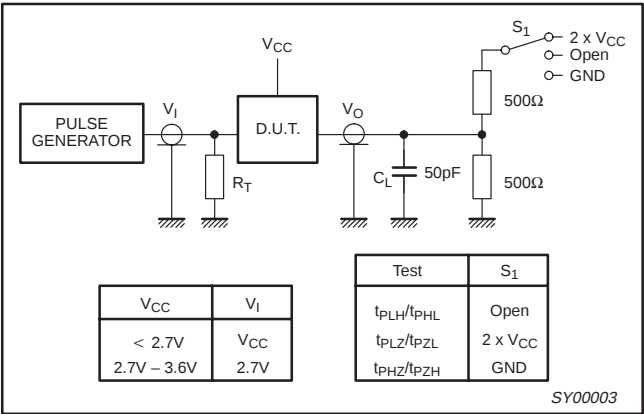


Waveform 5. 3-State Output Enable Time to High Level and Output Disable Time from High Level



Waveform 6. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

TEST CIRCUIT

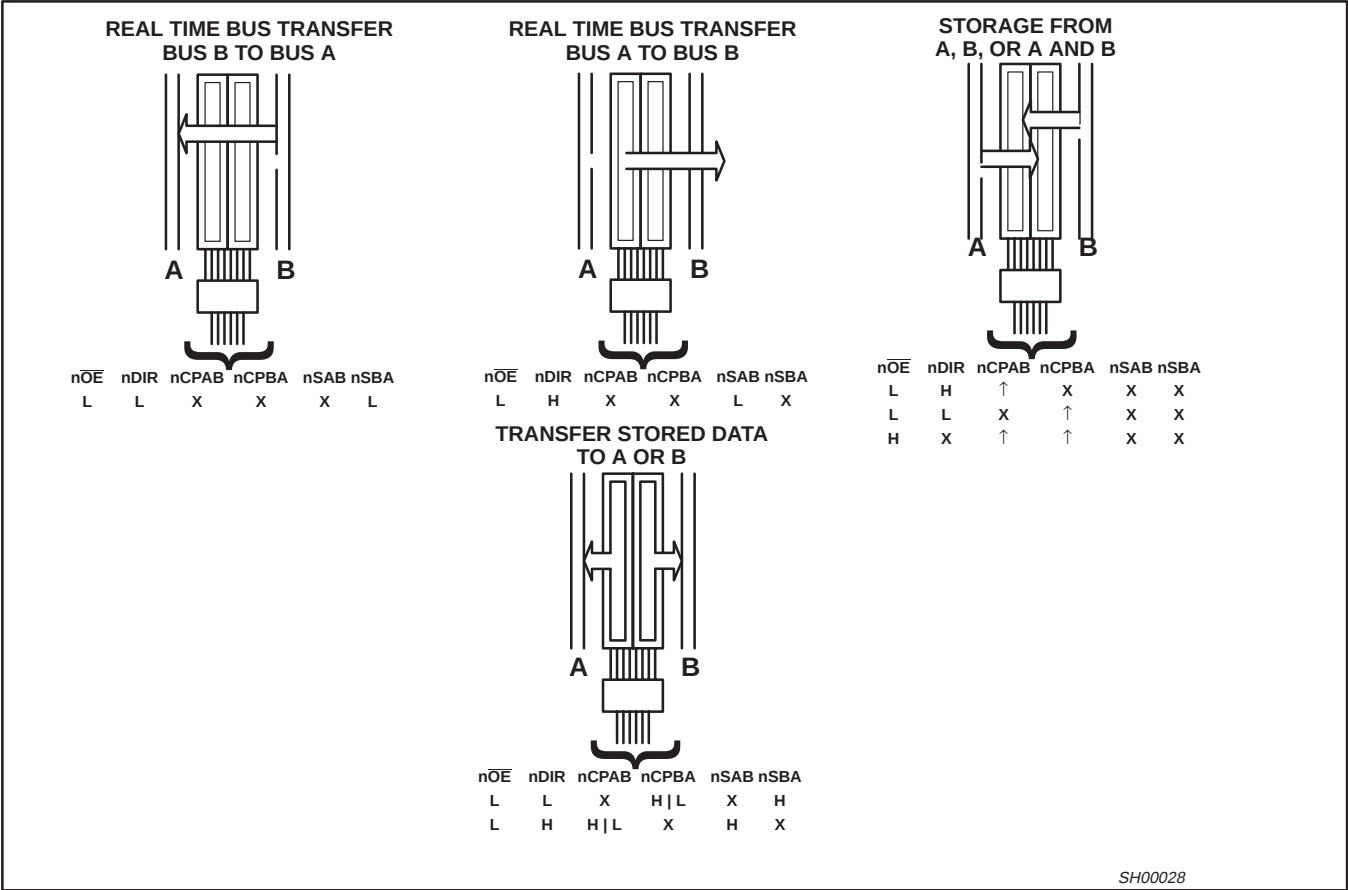


Load circuitry for switching times

16-bit bus transceiver/register (3-State)

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APPLICATION INFORMATION

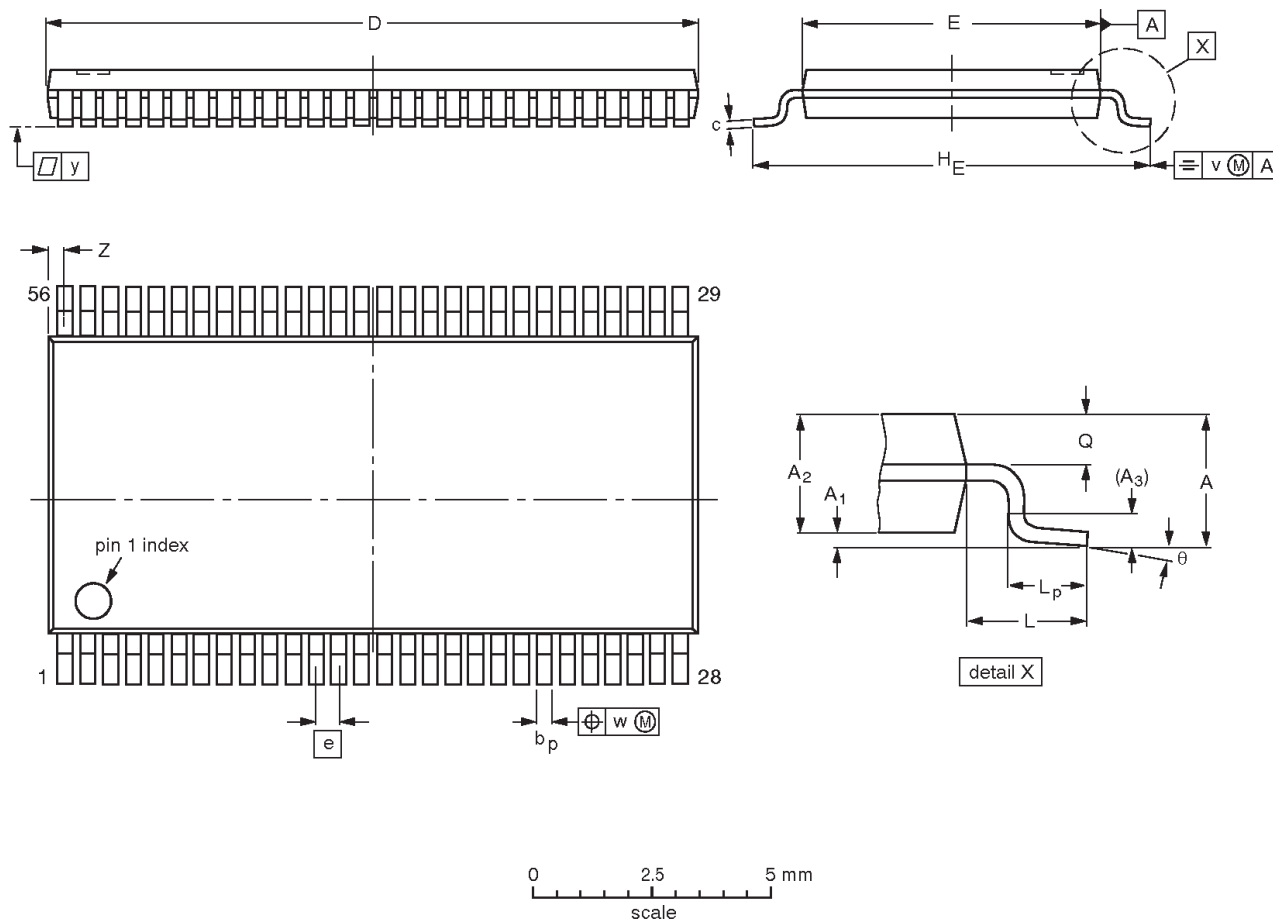


## 16-bit bus transceiver/register (3-State)

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**TSSOP56:** plastic thin shrink small outline package; 56 leads; body width 6.1mm

**SOT364-1**



**DIMENSIONS** (mm are the original dimensions).

| UNIT | A <sub>max.</sub> | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c          | D <sup>(1)</sup> | E <sup>(2)</sup> | e   | H <sub>E</sub> | L   | L <sub>p</sub> | Q            | v    | w    | y   | Z          | θ        |
|------|-------------------|----------------|----------------|----------------|----------------|------------|------------------|------------------|-----|----------------|-----|----------------|--------------|------|------|-----|------------|----------|
| mm   | 1.2               | 0.15<br>0.05   | 1.05<br>0.85   | 0.25           | 0.28<br>0.17   | 0.2<br>0.1 | 14.1<br>13.9     | 6.2<br>6.0       | 0.5 | 8.3<br>7.9     | 1.0 | 0.8<br>0.4     | 0.50<br>0.35 | 0.25 | 0.08 | 0.1 | 0.5<br>0.1 | 8°<br>0° |

## Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE<br>VERSION | REFERENCES |          |      |  |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE                      |
|--------------------|------------|----------|------|--|--|---------------------------------------------------------------------------------------|---------------------------------|
|                    | IEC        | JEDEC    | EIAJ |  |  |                                                                                       |                                 |
| SOT364-1           |            | MO-153EE |      |  |  |  | <del>93-02-03</del><br>95-02-10 |

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**16-bit bus transceiver/register (3-State)****74ALVCH16646**

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**NOTES**

## 16-bit bus transceiver/register (3-State)

74ALVCH16646

## Data sheet status

| Data sheet status         | Product status | Definition [1]                                                                                                                                                                                                                                             |
|---------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective specification   | Development    | This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.                                                                                                          |
| Preliminary specification | Qualification  | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
| Product specification     | Production     | This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.                                                       |

[1] Please consult the most recently issued datasheet before initiating or completing a design.

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**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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