

DATA SHEET

74F242

Quad transceiver, inverting (3-State)

74F243

Quad transceiver (3-State)

Product specification

1990 Aug 31

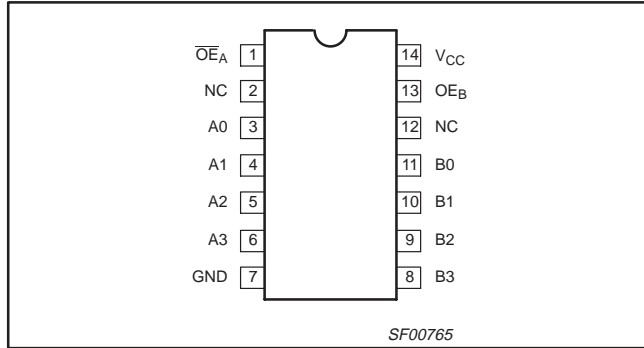
IC15 Data Handbook

Transceivers

74F242/74F243

74F242 Quad Transceiver, Inverting (3-State)
 74F243 Quad Transceiver (3-State)

PIN CONFIGURATION



| TYPE | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|--------|---------------------------|--------------------------------|
| 74F242 | 4.3ns | 31.2mA |
| 74F243 | 4.0ns | 66mA |

ORDERING INFORMATION

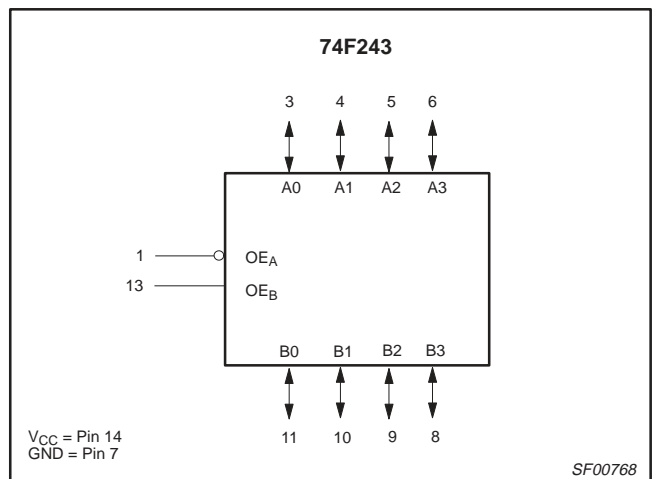
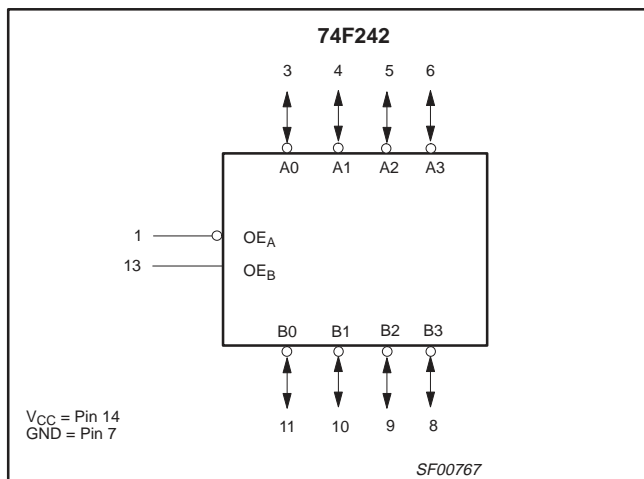
| DESCRIPTION | COMMERCIAL RANGE V _{CC} = 5V ±10%, T _{amb} = 0°C to +70°C | PKG DWG # |
|--------------------|---|-----------|
| 14-pin plastic DIP | N74F242N, N74F243N | SOT27-1 |
| 14-pin plastic SO | N74F242D, N74F243D | SOT108-1 |

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS | DESCRIPTION | 74F (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-------------------|----------------------------------|---------------------|---------------------|
| An, Bn | Data inputs (74F242) | 3.5/1.67 | 70µA/1.0mA |
| An, Bn | Data inputs (74F243) | 3.5/2.67 | 70µA/1.6mA |
| \overline{OE}_A | Output enable input (active Low) | 1.0/1.67 | 20µA/1.0mA |
| OE _B | Output enable input | 1.0/1.67 | 20µA/1.0mA |
| An, Bn | Data outputs | 750/106.7 | 15mA/64mA |

NOTE: One (1.0) FAST unit load is defined as: 20µA in the High state and 0.6mA in the Low state.

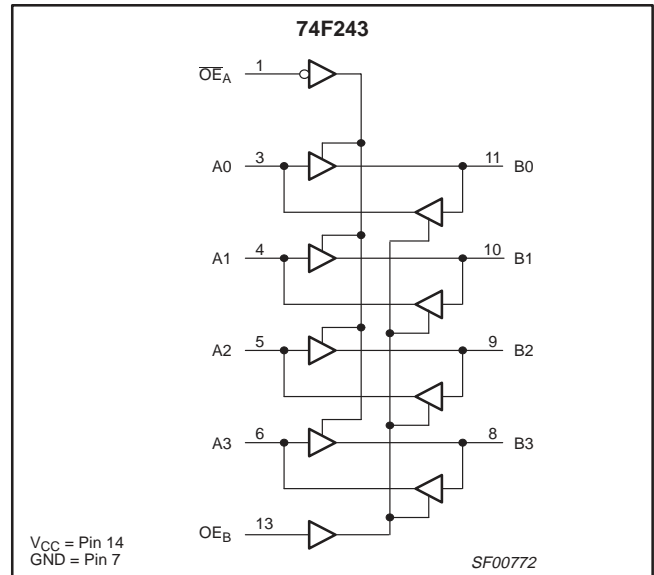
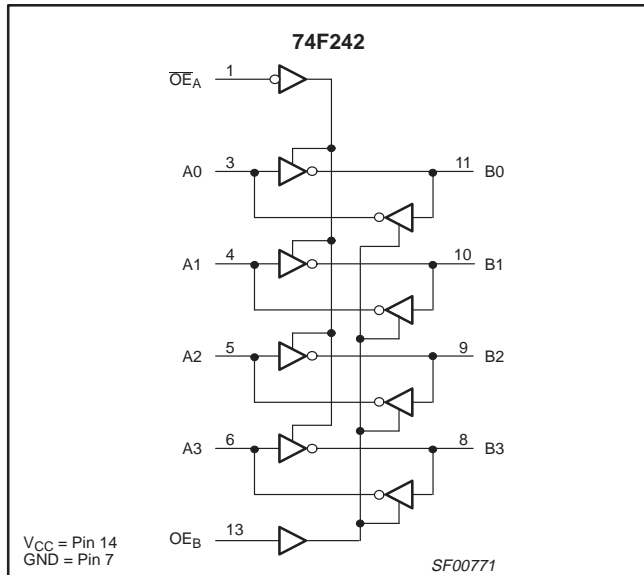
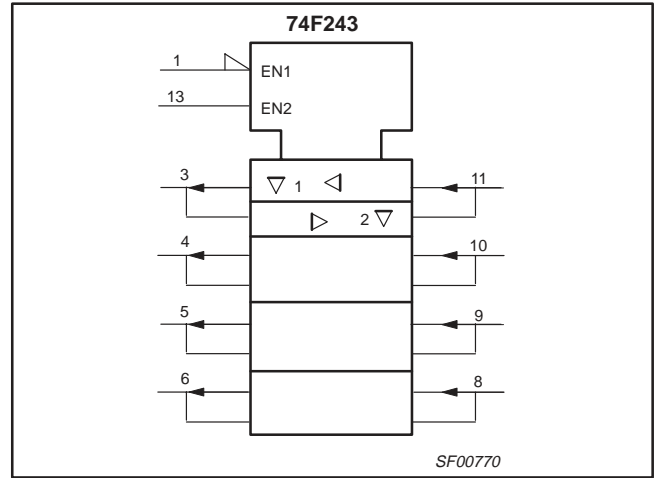
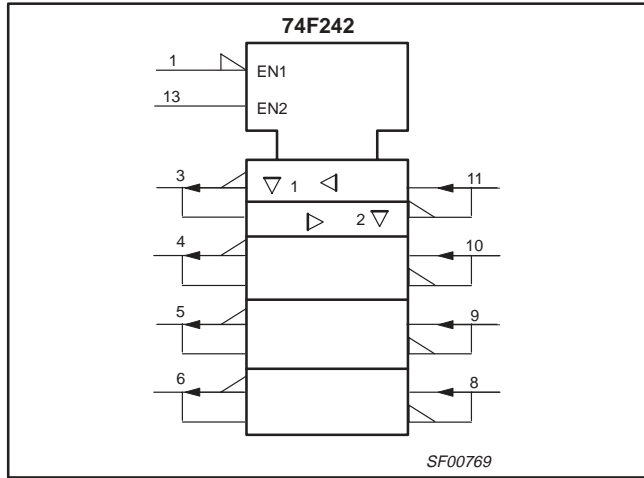
LOGIC SYMBOLS



Transceivers

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LOGIC SYMBOLS (IEEE/IEC)



LOGIC DIAGRAMS

FUNCTION TABLE, 74F242

| INPUTS | | OUTPUTS | |
|-------------------|--------|--------------------|--------------------|
| \overline{OE}_A | OE_B | A_n | B_n |
| L | L | INPUT | $B = \overline{A}$ |
| H | L | Z | Z |
| L | H | a | a |
| H | H | $A = \overline{B}$ | INPUT |

FUNCTION TABLE, 74F243

| INPUTS | | OUTPUTS | |
|-------------------|--------|---------|---------|
| \overline{OE}_A | OE_B | A_n | B_n |
| L | L | INPUT | $B = A$ |
| H | L | Z | Z |
| L | H | a | a |
| H | H | $A = B$ | INPUT |

H = High voltage level
 L = Low voltage level
 Z = High impedance "off" state
 a = This condition is not allowed due to excessive currents

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ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits set forth in this table may impair the useful life of the device.
Unless otherwise noted these limits are over the operating free-air temperature range.)

| SYMBOL | PARAMETER | RATING | UNIT |
|------------------|--|-------------------------|------|
| V _{CC} | Supply voltage | -0.5 to +7.0 | V |
| V _{IN} | Input voltage | -0.5 to +7.0 | V |
| I _{IN} | Input current | -30 to +5 | mA |
| V _{OUT} | Voltage applied to output in High output state | -0.5 to V _{CC} | V |
| I _{OUT} | Current applied to output in Low output state | 128 | mA |
| T _{amb} | Operating free-air temperature range | 0 to +70 | °C |
| T _{stg} | Storage temperature | -65 to +150 | °C |

RECOMMENDED OPERATING CONDITIONS

| SYMBOL | PARAMETER | LIMITS | | | UNIT |
|------------------|--------------------------------------|--------|-----|-----|------|
| | | MIN | NOM | MAX | |
| V _{CC} | Supply voltage | 4.5 | 5.0 | 5.5 | V |
| V _{IH} | High-level input voltage | 2.0 | | | V |
| V _{IL} | Low-level input voltage | | | 0.8 | V |
| I _{IK} | Input clamp current | | | -18 | mA |
| I _{OH} | High-level output current | | | -15 | mA |
| I _{OL} | Low-level output current | | | 64 | mA |
| T _{amb} | Operating free-air temperature range | 0 | | 70 | °C |

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DC ELECTRICAL CHARACTERISTICS

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

| SYMBOL | PARAMETER | | TEST CONDITIONS ¹ | | | LIMITS | | | UNIT | |
|-----------------------------------|--|-------------------------------------|---|--|-----------------------|--------|------------------|------|------|----|
| | | | | | | MIN | TYP ² | MAX | | |
| V _{OH} | High-level output voltage | | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OH} = -3mA | ±10%V _{CC} | 2.4 | | | V | |
| | | | | | ±5%V _{CC} | 2.7 | 3.3 | | | |
| | | | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OL} = -15mA | ±10%V _{CC} | 2.0 | 3.2 | | V | |
| | | | | | ±5%V _{CC} | 2.0 | 3.1 | | | |
| V _{OL} | Low-level output voltage | | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OH} = MAX | ±10%V _{CC} | | | 0.55 | V | |
| | | | | | ±5%V _{CC} | | 0.42 | 0.55 | | |
| V _{IK} | Input clamp voltage | | V _{CC} = MIN, I _I = I _{IK} | | | | -0.73 | -1.2 | V | |
| I _I | Input current at maximum input voltage | A0-A3, B0-B3 | V _{CC} = MAX, V _I = 5.5V | | | | | 1 | mA | |
| | | \overline{OE}_A , OE _B | V _{CC} = MAX, V _I = 7.0V | | | | | 100 | μA | |
| I _{IH} | High-level input current | OE _A , OE _B | V _{CC} = MAX, V _I = 2.7V | | | | | 20 | μA | |
| I _{IL} | Low-level input current | only | V _{CC} = MAX, V _I = 0.5V | | | | | -1 | mA | |
| I _{IH} +I _{OZH} | Off-state output current High-level voltage applied | | V _{CC} = MAX, V _O = 2.7V | | | | | 70 | μA | |
| I _{IL} +I _{OZL} | Off-state output current Low-level voltage applied | | 74F242 | V _{CC} = MAX, V _O = 0.5V | | | | | -1.0 | mA |
| | | | 74F243 | | | | | | -1.6 | |
| I _{OS} | Short-circuit output current ³ | | V _{CC} = MAX | | | -100 | | -225 | mA | |
| I _{CC} | Supply current (total) | | 74F242 | I _{CCH} | V _{CC} = MAX | | 22 | 35 | mA | |
| | | | | I _{CCL} | | | 40 | 55 | mA | |
| | | | | I _{CCZ} | | | 32 | 45 | mA | |
| | | | 74F243 | I _{CCH} | | | 64 | 80 | mA | |
| | | | | I _{CCL} | | | 64 | 90 | mA | |
| | | | | I _{CCZ} | | | 71 | 90 | mA | |

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
- Not more than one output should be shorted at a time. For testing I_{OS}, the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

Transceivers

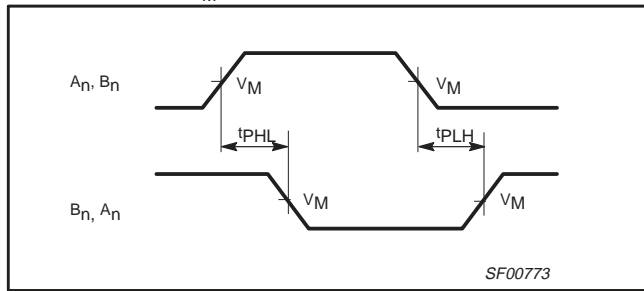
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AC ELECTRICAL CHARACTERISTICS

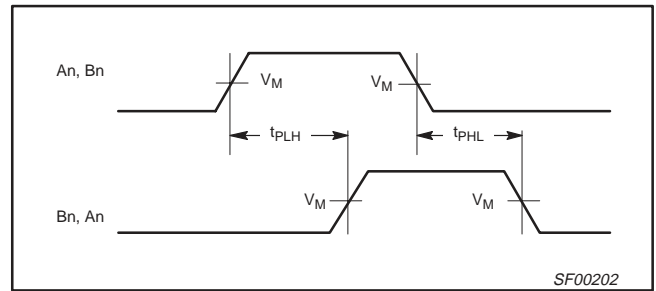
| SYMBOL | PARAMETER | TEST CONDITION | LIMITS | | | | | UNIT | | |
|--------------------------------------|---|----------------|---|-----|------------|--|------------|------------|-------------|----|
| | | | V _{CC} = +5V T _{amb} = +25°C C _L = 50pF, R _L = 500Ω | | | V _{CC} = +5V ± 10% T _{amb} = 0°C to +70°C C _L = 50pF, R _L = 500Ω | | | | |
| | | | MIN | TYP | MAX | MIN | MAX | | | |
| t _{PLH} t _{PHL} | Propagation delay An, Bn to Bn, An | 74F242 | Waveform NO TAG | | 2.5 2.0 | 3.5 3.0 | 6.0 4.5 | 2.5 2.0 | 7.0 4.5 | ns |
| t _{PZH} t _{PZL} | Output Enable time to High or Low level | | Waveform 3 Waveform 4 | | 3.0 3.5 | 4.0 6.5 | 7.0 9.0 | 3.0 3.5 | 8.0 10.5 | |
| t _{PHZ} t _{PLZ} | Output Disable time from High or Low level | | Waveform 3 Waveform 4 | | 3.5 3.5 | 5.5 6.0 | 8.5 9.5 | 3.5 3.5 | 9.0 11.0 | |
| t _{PLH} t _{PHL} | Propagation delay An, Bn to Bn, An | 74F243 | Waveform 2 | | 2.5 2.5 | 4.0 4.0 | 5.2 5.2 | 2.0 2.0 | 6.2 6.5 | ns |
| t _{PZH} t _{PZL} | Output Enable time to High or Low level | | Waveform 3 Waveform 4 | | 2.0 2.0 | 4.5 5.0 | 5.7 7.5 | 2.0 2.0 | 6.7 8.5 | |
| t _{PHZ} t _{PLZ} | Output Disable time from High or Low level | | Waveform 3 Waveform 4 | | 2.0 2.0 | 4.0 4.5 | 6.0 6.0 | 2.0 2.0 | 7.0 7.0 | |

AC WAVEFORMS

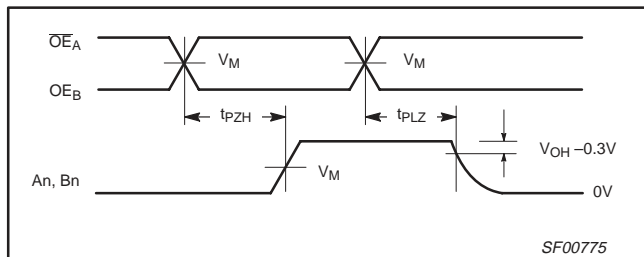
For all waveforms, V_M = 1.5V.



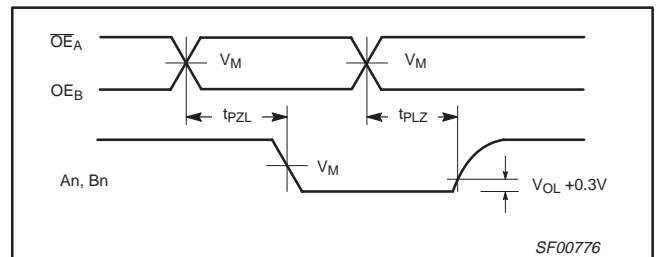
Waveform 1. For Inverting Outputs



Waveform 2. For Non-Inverting Outputs



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

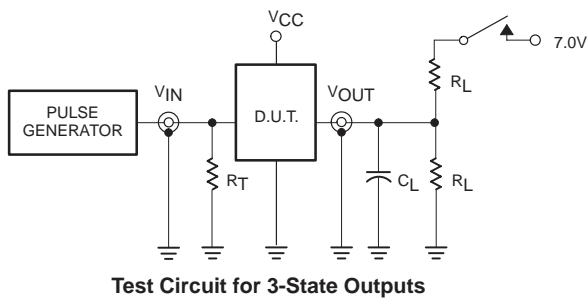


Waveform 4. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

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TEST CIRCUIT AND WAVEFORMS



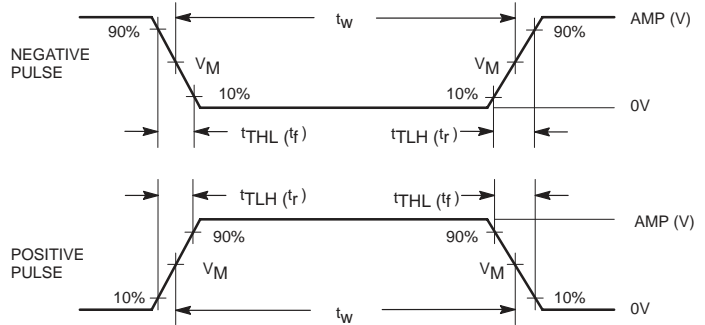
Test Circuit for 3-State Outputs

SWITCH POSITION

| TEST | SWITCH |
|-----------|--------|
| t_{PLZ} | closed |
| t_{PZL} | closed |
| All other | open |

DEFINITIONS:

R_L = Load resistor; see AC electrical characteristics for value.
 C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
 R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.



Input Pulse Definition

| family | INPUT PULSE REQUIREMENTS | | | | | |
|--------|--------------------------|-------|-----------|-------|-----------|-----------|
| | amplitude | V_M | rep. rate | t_w | t_{TLH} | t_{THL} |
| 74F | 3.0V | 1.5V | 1MHz | 500ns | 2.5ns | 2.5ns |

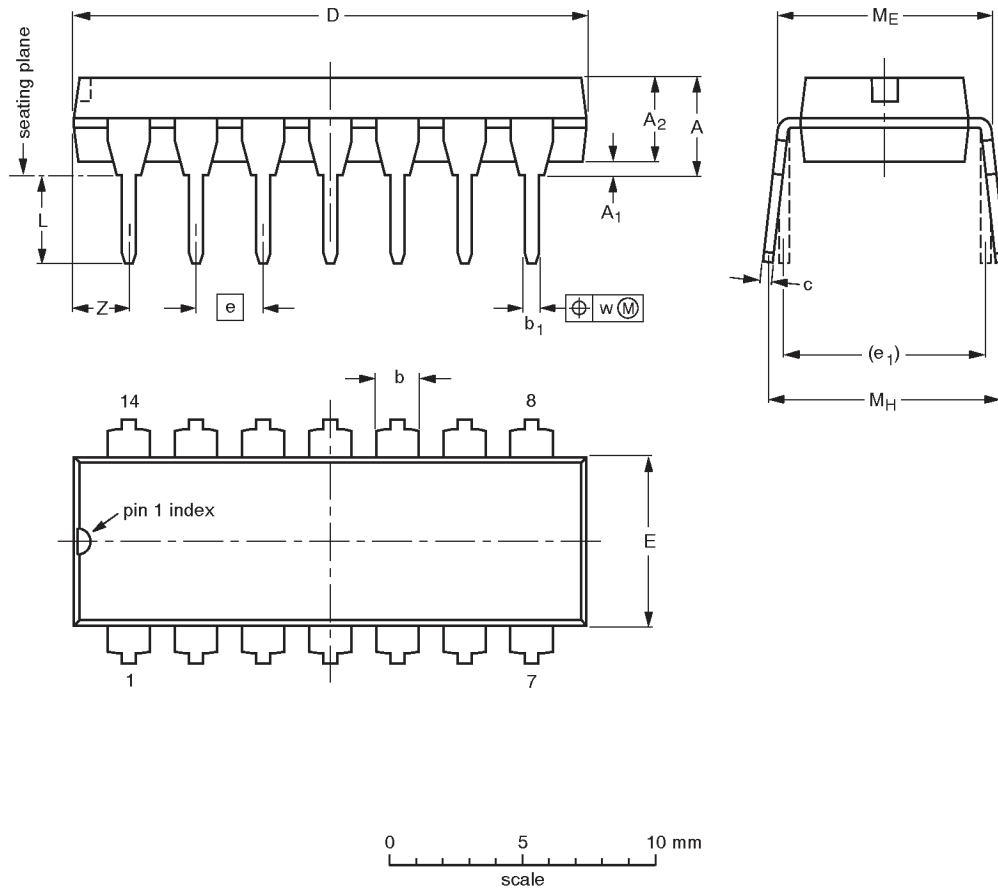
SF00777

Transceivers

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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT | A max. | A ₁ min. | A ₂ max. | b | b ₁ | c | D ⁽¹⁾ | E ⁽¹⁾ | e | e ₁ | L | M _E | M _H | w | Z ⁽¹⁾ max. |
|--------|--------|---------------------|---------------------|----------------|----------------|----------------|------------------|------------------|------|----------------|--------------|----------------|----------------|-------|-----------------------|
| mm | 4.2 | 0.51 | 3.2 | 1.73 1.13 | 0.53 0.38 | 0.36 0.23 | 19.50 18.55 | 6.48 6.20 | 2.54 | 7.62 | 3.60 3.05 | 8.25 7.80 | 10.0 8.3 | 0.254 | 2.2 |
| inches | 0.17 | 0.020 | 0.13 | 0.068 0.044 | 0.021 0.015 | 0.014 0.009 | 0.77 0.73 | 0.26 0.24 | 0.10 | 0.30 | 0.14 0.12 | 0.32 0.31 | 0.39 0.33 | 0.01 | 0.087 |

Note

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

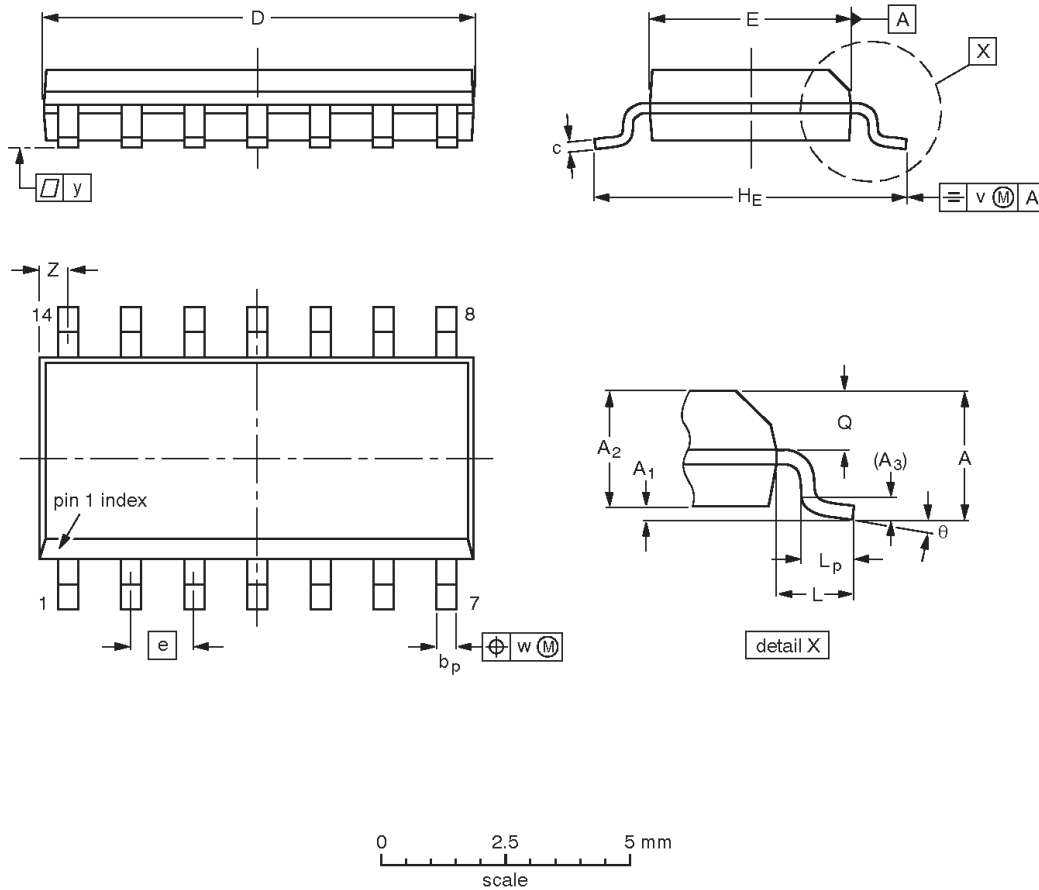
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|----------|------|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | |
| SOT27-1 | 050G04 | MO-001AA | | | 92-11-17 95-03-11 |

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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | H _E | L | L _p | Q | v | w | y | Z ⁽¹⁾ | θ |
|--------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|-------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm | 1.75 0.10 | 0.25 1.25 | 1.45 0.49 | 0.25 0.36 | 0.49 0.19 | 0.25 0.19 | 8.75 8.55 | 4.0 3.8 | 1.27 | 6.2 5.8 | 1.05 | 1.0 0.4 | 0.7 0.6 | 0.25 | 0.25 | 0.1 | 0.7 0.3 | 8° 0° |
| inches | 0.069 0.004 | 0.010 0.049 | 0.057 0.049 | 0.01 | 0.019 0.014 | 0.0100 0.0075 | 0.35 0.34 | 0.16 0.15 | 0.050 | 0.244 0.228 | 0.041 | 0.039 0.016 | 0.028 0.024 | 0.01 | 0.01 | 0.004 | 0.028 0.012 | |

Note

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

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|----------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT108-1 | 076E06S | MS-012AB | | | | 95-01-23 97-05-22 |

Transceivers

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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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