

DATA SHEET

74F862

Bus transceiver, inverting (3-State)

Product data
Replaces data sheet 74F862, 74F863 of 2000 Mar 24

2004 Jan 23

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74F862

FEATURES

- Provide high performance bus interface buffering for wide data/address paths or buses carrying parity
- High impedance NPN base inputs for reduced loading (20 μ A in HIGH and LOW states)
- I_{IL} is 20 μ A for minimum bus loading
- Buffered control inputs for light loading, or increased fan-in as required with MOS microprocessors
- Positive and negative over-shoots are clamped to ground
- 3-State outputs glitch free during power-up and power-down
- Slim dual in-line (DIP) 300 mil package
- Broadside pinout
- Outputs sink 64 mA

DESCRIPTION

The 74F862 bus transceiver provides a high performance inverting bus interface for wide data/address paths of buses carrying parity.

| TYPE | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|--------|---------------------------|--------------------------------|
| 74F862 | 6.0 ns | 150 mA |

ORDERING INFORMATION

COMMERCIAL RANGE: $V_{CC} = 5 V \pm 10\%$; $T_{amb} = 0^\circ C$ to $+70^\circ C$

| Type number | Package | | |
|-----------------------|---------|--|----------|
| | Name | Description | Version |
| N74F862N | DIP24 | plastic dual in-line package; 24 leads (300 mil) | SOT222-1 |
| N74F862D (see Note 1) | SO24 | plastic small outline package; 24 leads; body width 7.5 mm | SOT137-1 |

NOTE:

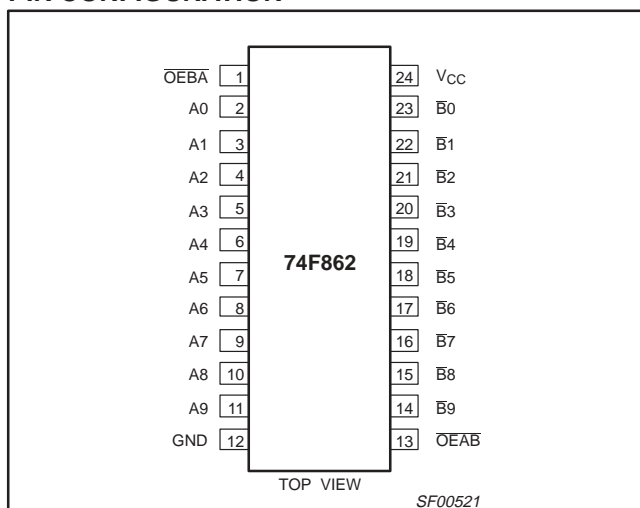
1. Thermal mounting techniques are recommended. See SMD Process Applications for a discussion of thermal considerations for surface mounted devices.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS | DESCRIPTION | 74F(U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-------------------------|------------------------------|--------------------|-------------------------|
| A0 – A9 | Data transmit inputs | 1.0/0.033 | 20 μ A / 20 μ A |
| $\bar{B}0$ – $\bar{B}9$ | Data receive inputs | 1.0/0.033 | 20 μ A / 20 μ A |
| $\bar{O}EBA$ | Transmit output enable input | 1.0/0.033 | 20 μ A / 20 μ A |
| $\bar{O}EAB$ | Receive output enable input | 1.0/0.033 | 20 μ A / 20 μ A |

NOTE: One (1.0) FAST Unit Load is defined as: 20 μ A in the HiGH state and 0.6 mA in the LOW state.

PIN CONFIGURATION



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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 +5.5 | 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 | - | - | -24 | 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} = -1 mA | ± 10% V _{CC} | 2.4 | - | - | V |
| | | | | | ± 5% V _{CC} | 2.4 | 3.3 | - | V |
| | | | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OH} = -24 mA | ± 10% V _{CC} | 2.0 | - | - | V |
| | | | | | ± 5% V _{CC} | 2.0 | - | - | V |
| V _{OL} | LOW-level output voltage | | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OL} = 48 mA | ± 10% V _{CC} | - | 0.38 | 0.55 | V |
| | | | | I _{OL} = 64 mA | ± 5% V _{CC} | - | 0.42 | 0.55 | V |
| 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 | OEAB, OEBA | V _{CC} = 0.0 V, V _I = 7.0 V | | - | - | 100 | μA | |
| | | A _n , B _n | V _{CC} = 5.5 V, V _I = 5.5 V | | - | - | 1 | mA | |
| I _{IH} | HIGH-level input current | | V _{CC} = MAX, V _I = 2.7 V | | - | - | 20 | μA | |
| I _{IL} | LOW-level input current | | V _{CC} = MAX, V _I = 0.5 V | | - | - | -20 | μA | |
| I _{IH} + I _{OZH} | Off-state output current HIGH-level voltage applied | A _n , B _n | V _{CC} = MAX, V _O = 2.7 V | | - | - | 70 | μA | |
| | | | V _{CC} = MAX, V _O = 0.5 V | | - | - | -70 | μA | |
| I _{IL} + I _{OZL} | Off-state output current LOW-level voltage applied | A _n , B _n | V _{CC} = MAX, V _O = 2.7 V | | - | - | 70 | μA | |
| | | | V _{CC} = MAX, V _O = 0.5 V | | - | - | -70 | μA | |
| I _{OS} | Short-circuit output current ³ | | V _{CC} = MAX | | -100 | - | -225 | mA | |
| I _{CC} | Supply current total | I _{CCH} | V _{CC} = MAX | | - | 90 | 130 | mA | |
| | | I _{CCL} | V _{CC} = MAX | | - | 120 | 170 | mA | |
| | | I _{CCZ} | V _{CC} = MAX | | - | 130 | 160 | 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} = 5 V, 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.

AC ELECTRICAL CHARACTERISTICS

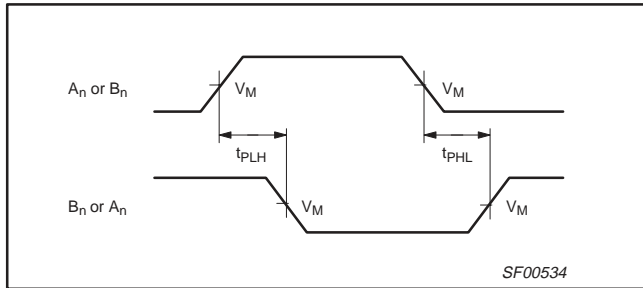
| SYMBOL | PARAMETER | TEST CONDITION | LIMITS | | | | | UNIT |
|--------------------------------------|---|--------------------------|--|------------|--------------|--|--------------|------|
| | | | T _{amb} = +25 °C V _{CC} = 5 V C _L = 50 pF; R _L = 500 Ω | | | T _{amb} = 0 °C to +70 °C V _{CC} = 5 V ± 10% C _L = 50 pF; R _L = 500 Ω | | |
| | | | MIN | TYP | MAX | MIN | MAX | |
| t _{PLH} t _{PHL} | Propagation delay A _n or B _n | Waveform 1 | 4.0 1.5 | 6.0 3.5 | 9.0 6.5 | 3.0 1.5 | 10.0 7.0 | ns |
| t _{PLH} t _{PHL} | Propagation delay B _n or A _n | Waveform 1 | 4.0 1.5 | 6.0 3.5 | 9.0 6.5 | 3.5 1.5 | 10.0 7.0 | ns |
| t _{PZH} t _{PZL} | Output Enable time HIGH or LOW level OEBA to A _n | Waveform 2 Waveform 3 | 6.5 6.0 | 8.5 7.5 | 12.0 12.0 | 5.5 5.0 | 13.5 14.0 | ns |
| t _{PZH} t _{PZL} | Output Enable time HIGH or LOW level OEAB to B _n | Waveform 2 Waveform 3 | 6.5 6.0 | 8.5 7.5 | 12.0 12.0 | 5.5 5.0 | 13.5 14.0 | ns |
| t _{PHZ} t _{PLZ} | Output Disable time HIGH or LOW level OEBA to A _n | Waveform 2 Waveform 3 | 3.0 2.5 | 5.0 4.0 | 8.5 8.5 | 2.5 2.0 | 9.5 9.0 | ns |
| t _{PHZ} t _{PLZ} | Output Disable time HIGH or LOW level OEAB to B _n | Waveform 2 Waveform 3 | 3.0 2.5 | 5.0 4.0 | 8.5 8.5 | 2.5 2.0 | 9.5 9.0 | ns |

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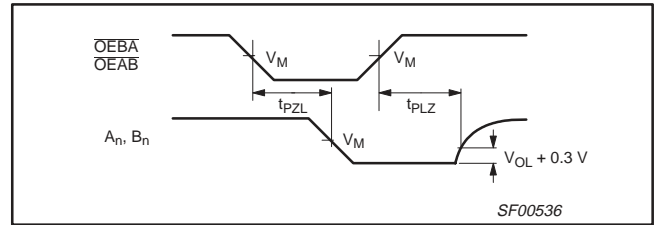
74F862

AC WAVEFORMS

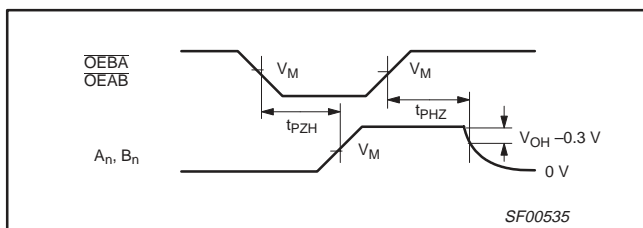
For all waveforms, $V_M = 1.5$ V.



Waveform 1. Propagation delay for inverting output



Waveform 3. 3-State Output Enable time to LOW level and Output Disable time from LOW level



Waveform 2. 3-State Output Enable time to HIGH level and Output Disable time from HIGH level

TEST CIRCUITS AND WAVEFORMS

Test Circuit for Open Collector Outputs

| 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 | 3.0 V | 1.5 V | 1 MHz | 500 ns | 2.5 ns | 2.5 ns |

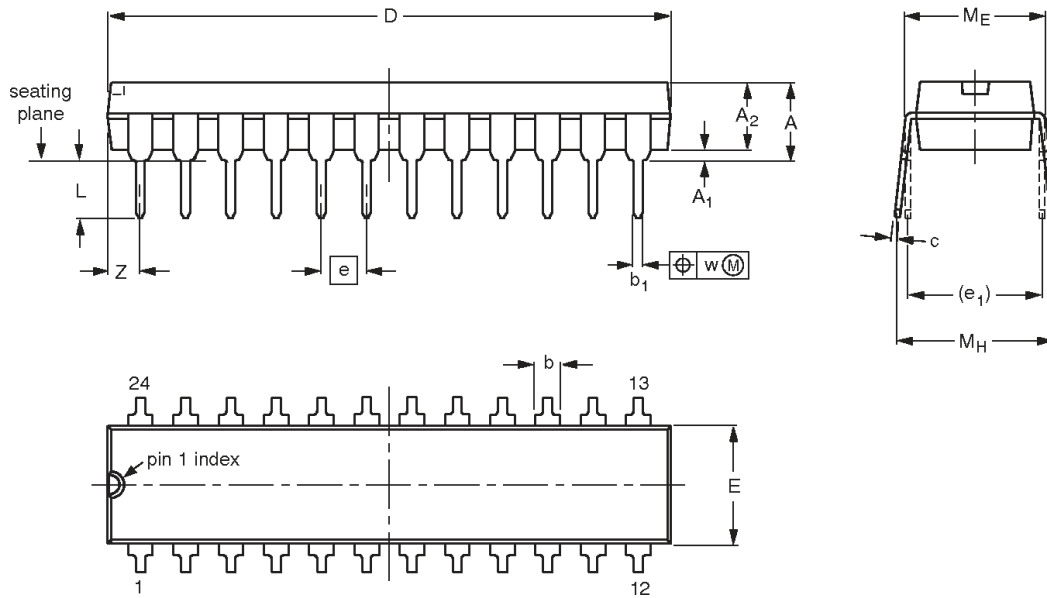
SF00128

Bus transceiver, inverting (3-State)

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DIP24: plastic dual in-line package; 24 leads (300 mil)

SOT222-1



DIMENSIONS (mm dimensions are derived from the original inch 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 | 4.7 | 0.38 | 3.94 | 1.63 1.14 | 0.56 0.43 | 0.36 0.25 | 31.9 31.5 | 6.73 6.25 | 2.54 | 7.62 | 3.51 3.05 | 8.13 7.62 | 10.03 7.62 | 0.25 | 2.05 |
| inches | 0.185 | 0.015 | 0.155 | 0.064 0.045 | 0.022 0.017 | 0.014 0.010 | 1.256 1.240 | 0.265 0.246 | 0.1 | 0.3 | 0.138 0.120 | 0.32 0.30 | 0.395 0.300 | 0.01 | 0.081 |

Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

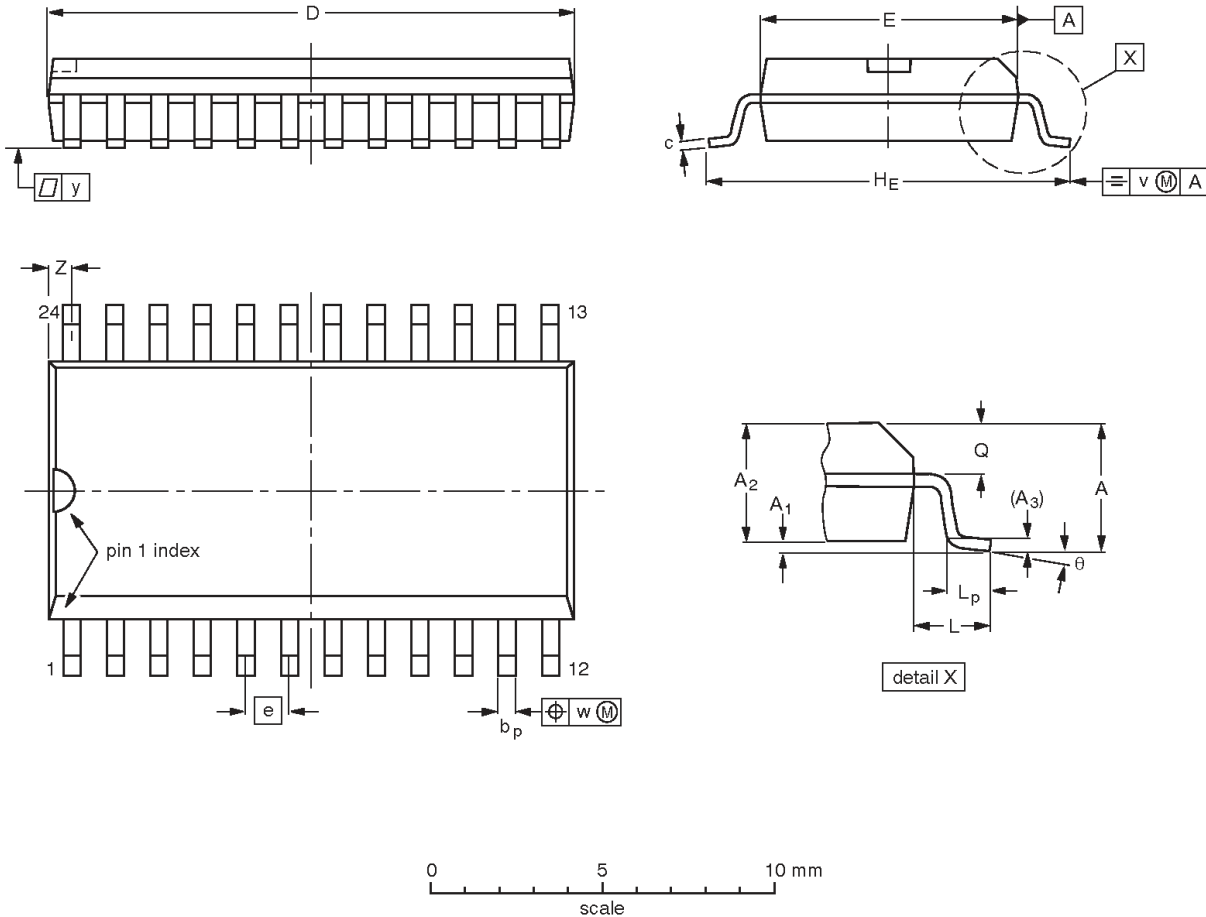
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|---------------------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT222-1 | | MS-001 | | | | 99-12-27 03-03-12 |

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SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1



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 | 2.65 | 0.3 0.1 | 2.45 2.25 | 0.25 | 0.49 0.36 | 0.32 0.23 | 15.6 15.2 | 7.6 7.4 | 1.27 | 10.65 10.00 | 1.4 | 1.1 0.4 | 1.1 1.0 | 0.25 | 0.25 | 0.1 | 0.9 0.4 | 8° 0° |
| inches | 0.1 | 0.012 0.004 | 0.096 0.089 | 0.01 | 0.019 0.014 | 0.013 0.009 | 0.61 0.60 | 0.30 0.29 | 0.05 | 0.419 0.394 | 0.055 | 0.043 0.016 | 0.043 0.039 | 0.01 | 0.01 | 0.004 | 0.035 0.016 | |

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|-----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT137-1 | 075E05 | MS-013 | | | | -99-12-27 03-02-19 |

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REVISION HISTORY

| Rev | Date | Description |
|-----|----------|---|
| _5 | 20040123 | <p>Product data (9397 750 12749). ECN 853-0881 A15378 of 22 January 2004. Replaces Product specification 74F862_74F863_4 dated 2000 Mar 24 (9397 750 06999).</p> <p>Modifications:</p> <ul style="list-style-type: none"> • Delete all references to 74F863 (product discontinued). • "Input and output loading and fan-out table" on page 2; for Pins A0 – A9 and $\bar{B}0$ – $\bar{B}9$: <ul style="list-style-type: none"> – change 74F(U.L.) HIGH/LOW from "3.5/0.117" to "1.0/0.033" – change Load value HIGH/LOW from "70 μA / 70 μA" to "20 μA / 20 μA" • "DC electrical characteristics" table on page 5; V_{OL} test condition, at $\pm 10\%$ V_{CC}: change "$I_{OL} = -48$ mA" to "$I_{OL} = 48$ mA" |
| _4 | 20000324 | <p>Product specification (9397 750 06999). ECN 853-0881 23378 of 24 March 2000. Supersedes data of 1999 Jan 08.</p> |

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Data sheet status

| Level | Data sheet status ^[1] | Product status ^{[2] [3]} | Definitions |
|-------|----------------------------------|-----------------------------------|--|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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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