

FEATURES

Enhanced system-level ESD performance per IEC 61000-4-x

High temperature operation: 125°C

Narrow body, RoHS-compliant, 8-lead SOIC

Low power operation

5 V operation

1.7 mA per channel maximum at 0 Mbps to 1 Mbps

4.1 mA per channel maximum at 10 Mbps

8.4 mA per channel maximum at 25 Mbps

3.3 V operation

1.5 mA per channel maximum at 0 Mbps to 1 Mbps

2.6 mA per channel maximum at 10 Mbps

5.2 mA per channel maximum at 25 Mbps

Precise timing characteristics

High common-mode transient immunity: >25 kV/μs

Safety and regulatory approvals (pending)

UL recognition: 2500 V rms for 1 minute per UL 1577

CSA Component Acceptance Notice #5A

VDE certificate of conformity

DIN V VDE V 0884-10 (VDE V 0884-10):2006-12

$V_{IORM} = 560$ V peak

ENHANCED FEATURES

Supports defense and aerospace applications (AQEC standard)

Military temperature range: -55°C to +125°C

Controlled manufacturing baseline

Enhanced product change notification

Qualification data available on request

APPLICATIONS

Size-critical multichannel isolation

SPI interface/data converter isolation

RS-232/RS-422/RS-485 transceiver isolation

Digital field bus isolation

Gate drive interfaces

GENERAL DESCRIPTION

The ADuM3210-EP/ADuM3211-EP¹ are dual-channel digital isolators based on Analog Devices, Inc., iCoupler® technology. Combining high speed CMOS and monolithic transformer technology, this isolation component provides outstanding performance characteristics superior to alternatives such as optocoupler devices.

The ADuM3210-EP/ADuM3211-EP isolators provide two independent isolation channels in two channel configurations with data rates up to 25 Mbps (see the Ordering Guide). They operate with 3.3 V or 5 V supply voltages on either side, providing compatibility with lower voltage systems, as well as enabling voltage translation functionality across the isolation barrier. The ADuM3210-EP/ADuM3211-EP isolators have a default output low characteristic in comparison to the ADuM3200/ADuM3201 models, which have a default output high characteristic.

In comparison to the ADuM1200-EP isolator, the ADuM3210-EP/ADuM3211-EP isolators contain various circuit and layout changes providing increased capability relative to system-level IEC 61000-4-x testing (ESD, burst, and surge). The precise capability in these tests for either the ADuM1200-EP or ADuM3210-EP/ADuM3211-EP products is strongly determined by the design and layout of the user's board or module. For more information, see the AN-793 Application Note, *ESD/Latch-Up Considerations with iCoupler Isolation Products*.

Refer to the ADuM3210/ADuM3211 data sheet for additional application and technical information.

FUNCTIONAL BLOCK DIAGRAMS

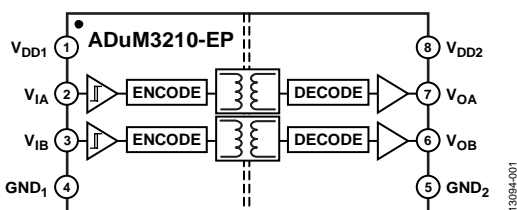


Figure 1. ADuM3210-EP Functional Block Diagram

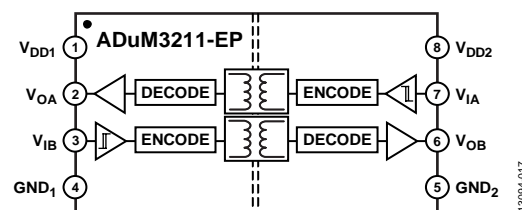


Figure 2. ADuM3211-EP Functional Block Diagram

¹ Protected by U.S. Patents 5,952,849; 6,873,065; and 7,075,239.

Rev. A

[Document Feedback](#)

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REVISION HISTORY

10/15—Rev. 0 to Rev. A

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5/15—Revision 0: Initial Version

SPECIFICATIONS

ELECTRICAL CHARACTERISTICS—5 V, 125°C OPERATION

All typical specifications are at $T_A = 25^\circ\text{C}$, $V_{DD1} = V_{DD2} = 5\text{ V}$. Minimum/maximum specifications apply over the entire recommended operation range: $4.5\text{ V} \leq V_{DD1} \leq 5.5\text{ V}$, $4.5\text{ V} \leq V_{DD2} \leq 5.5\text{ V}$, and $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$, unless otherwise noted. Switching specifications are tested with $C_L = 15\text{ pF}$ and CMOS signal levels, unless otherwise noted.

Table 1.

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|--------------------------|--------------------|-----|-----|-----|-------|--------------------------|
| SWITCHING SPECIFICATIONS | | | | | | |
| Data Rate | | | | 25 | Mbps | Within PWD limit |
| Propagation Delay | t_{PHL}, t_{PLH} | 20 | | 50 | ns | 50% input to 50% output |
| Pulse Width Distortion | PWD | | | 3 | ns | $ t_{PLH} - t_{PHL} $ |
| Change vs. Temperature | | | 5 | | ps/°C | |
| Pulse Width | PW | 40 | | | ns | Within PWD limit |
| Propagation Delay Skew | t_{PSK} | | | 18 | ns | Between any two units |
| Channel Matching | | | | | | |
| Codirectional | t_{PSKCD} | | | 3 | ns | |
| Opposing Directional | t_{PSKOD} | | | 18 | ns | |
| Output Rise/Fall Time | t_R/t_F | | 2.5 | | ns | 10% to 90% |

Table 2.

| Parameter | Symbol | 1 Mbps | | | 10 Mbps | | | 25 Mbps | | | Unit |
|----------------|-----------|--------|-----|-----|---------|-----|-----|---------|-----|-----|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| SUPPLY CURRENT | | | | | | | | | | | |
| ADuM3210-EP | I_{DD1} | 1.3 | 1.7 | | 3.5 | 4.8 | | 7.6 | 9.9 | | mA |
| | I_{DD2} | 1.0 | 1.6 | | 2.0 | 2.8 | | 3.8 | 5.1 | | mA |
| ADuM3211-EP | I_{DD1} | 1.1 | 1.5 | | 3.0 | 4.0 | | 6.4 | 8.7 | | mA |
| | I_{DD2} | 1.3 | 1.8 | | 3.1 | 4.1 | | 6.1 | 8.0 | | mA |

Table 3. For All Models

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments | |
|---|--------------|-----------------|-----------------|-----|-------------------|---|---|
| DC SPECIFICATIONS | | | | | | | |
| Logic High Input Threshold | V_{IH} | $0.7 V_{DDx}$ | | | V | | |
| Logic Low Input Threshold | V_{IL} | | | | $0.3 V_{DDx}$ | | |
| Logic High Output Voltages | V_{OH} | $V_{DDx} - 0.1$ | V_{DDx} | | V | $I_{Ox} = -20\ \mu\text{A}$, $V_{Ix} = V_{IxH}$ | |
| | | $V_{DDx} - 0.5$ | $V_{DDx} - 0.2$ | | V | $I_{Ox} = -3.2\ \text{mA}$, $V_{Ix} = V_{IxH}$ | |
| Logic Low Output Voltages | V_{OL} | 0.0 | | | 0.1 | V | $I_{Ox} = 20\ \mu\text{A}$, $V_{Ix} = V_{IxL}$ |
| | | 0.2 | | | 0.4 | V | $I_{Ox} = 3.2\ \text{mA}$, $V_{Ix} = V_{IxL}$ |
| Input Current per Channel | I_i | -10 | +0.01 | +10 | μA | $0\text{ V} \leq V_{Ix} \leq V_{DDx}$ | |
| Supply Current per Channel | | | | | | | |
| Quiescent Input Supply Current | $I_{DDI(Q)}$ | 0.4 | | | 0.8 | mA | |
| Quiescent Output Supply Current | $I_{DDO(Q)}$ | 0.4 | | | 0.8 | mA | |
| Dynamic Input Supply Current | $I_{DDI(D)}$ | 0.19 | | | | mA/Mbps | |
| Dynamic Output Supply Current | $I_{DDO(D)}$ | 0.05 | | | | mA/Mbps | |
| AC SPECIFICATIONS | | | | | | | |
| Common-Mode Transient Immunity ¹ | $ CM $ | 25 | 35 | | kV/ μs | $V_{Ix} = V_{DDx}$, $V_{CM} = 1000\text{ V}$, transient magnitude = 800 V | |
| Refresh Rate | f_r | 1.2 | | | | Mbps | |

¹ $|CM|$ is the maximum common-mode voltage slew rate that can be sustained while maintaining $V_O > 0.8 V_{DD}$. The common-mode voltage slew rates apply to both rising and falling common-mode voltage edges.

ELECTRICAL CHARACTERISTICS—3.3 V, 125°C OPERATION

All typical specifications are at $T_A = 25^\circ\text{C}$, $V_{DD1} = V_{DD2} = 3.3\text{ V}$. Minimum/maximum specifications apply over the entire recommended operation range: $3.0\text{ V} \leq V_{DD1} \leq 3.6\text{ V}$, $3.0\text{ V} \leq V_{DD2} \leq 3.6\text{ V}$, and $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$, unless otherwise noted. Switching specifications are tested with $C_L = 15\text{ pF}$ and CMOS signal levels, unless otherwise noted.

Table 4.

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|--------------------------|--------------------|-----|-----|-----|-------|--------------------------|
| SWITCHING SPECIFICATIONS | | | | | | |
| Data Rate | | | | 25 | Mbps | Within PWD limit |
| Propagation Delay | t_{PHL}, t_{PLH} | 20 | | 60 | ns | 50% input to 50% output |
| Pulse Width Distortion | PWD | | | 4 | ns | $ t_{PLH} - t_{PHL} $ |
| Change vs. Temperature | | | 5 | | ps/°C | |
| Pulse Width | PW | 40 | | | ns | Within PWD limit |
| Propagation Delay Skew | t_{PSK} | | | 22 | ns | Between any two units |
| Channel Matching | | | | | | |
| Codirectional | t_{PSKCD} | | | 3 | ns | |
| Opposing Directional | t_{PSKOD} | | | 20 | ns | |
| Output Rise/Fall Time | t_R/t_F | | 3.0 | | ns | 10% to 90% |

Table 5.

| Parameter | Symbol | 1 Mbps | | | 10 Mbps | | | 25 Mbps | | | Unit |
|----------------|-----------|--------|-----|-----|---------|-----|-----|---------|-----|-----|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| SUPPLY CURRENT | | | | | | | | | | | |
| ADuM3210-EP | I_{DD1} | 0.8 | 1.3 | | 2.1 | 3.2 | | 4.6 | 6.1 | | mA |
| | I_{DD2} | 0.7 | 1.0 | | 1.3 | 1.9 | | 2.4 | 3.4 | | mA |
| ADuM3211-EP | I_{DD1} | 0.7 | 1.3 | | 1.8 | 2.6 | | 3.8 | 5.4 | | mA |
| | I_{DD2} | 0.8 | 1.6 | | 1.9 | 2.5 | | 3.7 | 5.0 | | mA |

Table 6. For All Models

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|---|--------------|-----------------|-----------------|-----|-------------------|---|
| DC SPECIFICATIONS | | | | | | |
| Logic High Input Threshold | V_{IH} | $0.7 V_{DDx}$ | | | | V |
| Logic Low Input Threshold | V_{IL} | | | | $0.3 V_{DDx}$ | V |
| Logic High Output Voltages | V_{OH} | $V_{DDx} - 0.1$ | V_{DDx} | | | V $I_{Ox} = -20\ \mu\text{A}, V_{Ix} = V_{IxH}$ |
| | | $V_{DDx} - 0.5$ | $V_{DDx} - 0.2$ | | | V $I_{Ox} = -3.2\ \text{mA}, V_{Ix} = V_{IxH}$ |
| Logic Low Output Voltages | V_{OL} | | 0.0 | 0.1 | | V $I_{Ox} = 20\ \mu\text{A}, V_{Ix} = V_{IxL}$ |
| | | | 0.2 | 0.4 | | V $I_{Ox} = 3.2\ \text{mA}, V_{Ix} = V_{IxL}$ |
| Input Current per Channel | I_I | -10 | +0.01 | +10 | | μA $0\text{ V} \leq V_{Ix} \leq V_{DDx}$ |
| Supply Current per Channel | | | | | | |
| Quiescent Input Supply Current | $I_{DDI(Q)}$ | | 0.3 | 0.5 | | mA |
| Quiescent Output Supply Current | $I_{DDO(Q)}$ | | 0.3 | 0.5 | | mA |
| Dynamic Input Supply Current | $I_{DDI(D)}$ | | 0.10 | | | mA/Mbps |
| Dynamic Output Supply Current | $I_{DDO(D)}$ | | 0.03 | | | mA/Mbps |
| AC SPECIFICATIONS | | | | | | |
| Common-Mode Transient Immunity ¹ | $ CM $ | 25 | 35 | | kV/ μs | $V_{Ix} = V_{DDx}, V_{CM} = 1000\text{ V}$, transient magnitude = 800 V |
| Refresh Rate | f_r | | 1.1 | | Mbps | |

¹ $|CM|$ is the maximum common-mode voltage slew rate that can be sustained while maintaining $V_o > 0.8 V_{DD}$. The common-mode voltage slew rates apply to both rising and falling common-mode voltage edges.

ELECTRICAL CHARACTERISTICS—MIXED 5 V/3.3 V, 125°C OPERATION

All typical specifications are at $T_A = 25^\circ\text{C}$, $V_{DD1} = 5\text{ V}$, $V_{DD2} = 3.3\text{ V}$. Minimum/maximum specifications apply over the entire recommended operation range: $4.5\text{ V} \leq V_{DD1} \leq 5.5\text{ V}$, $3.0\text{ V} \leq V_{DD2} \leq 3.6\text{ V}$, and $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$, unless otherwise noted. Switching specifications are tested with $C_L = 15\text{ pF}$ and CMOS signal levels, unless otherwise noted.

Table 7.

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|--------------------------|--------------------|-----|-----|-----|-------|--------------------------|
| SWITCHING SPECIFICATIONS | | | | | | |
| Data Rate | | | | 25 | Mbps | Within PWD limit |
| Propagation Delay | t_{PHL}, t_{PLH} | 15 | | 55 | ns | 50% input to 50% output |
| Pulse Width Distortion | PWD | | | 3 | ns | $ t_{PLH} - t_{PHL} $ |
| Change vs. Temperature | | | 5 | | ps/°C | |
| Pulse Width | PW | 40 | | | ns | Within PWD limit |
| Propagation Delay Skew | t_{PSK} | | | 22 | ns | Between any two units |
| Channel Matching | | | | | | |
| Codirectional | t_{PSKCD} | | | 3 | ns | |
| Opposing Directional | t_{PSKOD} | | | 20 | ns | |
| Output Rise/Fall Time | t_R/t_F | | 3.0 | | ns | 10% to 90% |

Table 8.

| Parameter | Symbol | 1 Mbps | | | 10 Mbps | | | 25 Mbps | | | Unit |
|----------------|-----------|--------|-----|-----|---------|-----|-----|---------|-----|-----|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| SUPPLY CURRENT | | | | | | | | | | | |
| ADuM3210-EP | I_{DD1} | | 1.3 | 1.7 | | 3.5 | 4.8 | | 7.6 | 9.9 | mA |
| | I_{DD2} | | 0.7 | 1.0 | | 1.3 | 1.9 | | 2.4 | 3.4 | mA |
| ADuM3211-EP | I_{DD1} | | 1.1 | 1.5 | | 2.9 | 4.0 | | 6.4 | 8.7 | mA |
| | I_{DD2} | | 0.8 | 1.6 | | 1.9 | 2.5 | | 3.7 | 5.0 | mA |

Table 9. For All Models

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|---|--------------|-----------------|-----------------|---------------|-------------------|---|
| DC SPECIFICATIONS | | | | | | |
| Logic High Input Threshold | V_{IH} | $0.7 V_{DDx}$ | | | V | |
| Logic Low Input Threshold | V_{IL} | | | $0.3 V_{DDx}$ | V | |
| Logic High Output Voltages | V_{OH} | $V_{DDx} - 0.1$ | V_{DDx} | | V | $I_{Ox} = -20\ \mu\text{A}$, $V_{Ix} = V_{IxH}$ |
| | | $V_{DDx} - 0.5$ | $V_{DDx} - 0.2$ | | V | $I_{Ox} = -3.2\ \text{mA}$, $V_{Ix} = V_{IxH}$ |
| Logic Low Output Voltages | V_{OL} | | 0.0 | 0.1 | V | $I_{Ox} = 20\ \mu\text{A}$, $V_{Ix} = V_{IxL}$ |
| | | | 0.2 | 0.4 | V | $I_{Ox} = 3.2\ \text{mA}$, $V_{Ix} = V_{IxL}$ |
| Input Current per Channel | I_I | -10 | +0.01 | +10 | μA | $0\text{ V} \leq V_{Ix} \leq V_{DDx}$ |
| Supply Current per Channel | | | | | | |
| Quiescent Input Supply Current | $I_{DDI(Q)}$ | | 0.4 | 0.8 | mA | |
| Quiescent Output Supply Current | $I_{DDO(Q)}$ | | 0.3 | 0.5 | mA | |
| Dynamic Input Supply Current | $I_{DDI(D)}$ | | 0.19 | | mA/Mbps | |
| Dynamic Output Supply Current | $I_{DDO(D)}$ | | 0.03 | | mA/Mbps | |
| AC SPECIFICATIONS | | | | | | |
| Common-Mode Transient Immunity ¹ | $ CM $ | 25 | 35 | | kV/ μs | $V_{Ix} = V_{DDx}$, $V_{CM} = 1000\text{ V}$, transient magnitude = 800 V |
| Refresh Rate | f_r | | 1.2 | | Mbps | |

¹ $|CM|$ is the maximum common-mode voltage slew rate that can be sustained while maintaining $V_O > 0.8 V_{DD}$. The common-mode voltage slew rates apply to both rising and falling common-mode voltage edges.

ELECTRICAL CHARACTERISTICS—MIXED 3.3 V/5 V, 125°C OPERATION

All typical specifications are at $T_A = 25^\circ\text{C}$, $V_{DD1} = 3.3\text{ V}$, $V_{DD2} = 5.0\text{ V}$. Minimum/maximum specifications apply over the entire recommended operation range: $3.0\text{ V} \leq V_{DD1} \leq 3.6\text{ V}$, $4.5\text{ V} \leq V_{DD2} \leq 5.5\text{ V}$, and $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$, unless otherwise noted. Switching specifications are tested with $C_L = 15\text{ pF}$ and CMOS signal levels, unless otherwise noted.

Table 10.

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|---------------------------------|--------------------|-----|-----|-----|-------|--------------------------|
| SWITCHING SPECIFICATIONS | | | | | | |
| Data Rate | | | | 25 | Mbps | Within PWD limit |
| Propagation Delay | t_{PHL}, t_{PLH} | 15 | | 55 | ns | 50% input to 50% output |
| Pulse Width Distortion | PWD | | | 4 | ns | $ t_{PLH} - t_{PHL} $ |
| Change vs. Temperature | | | 5 | | ps/°C | |
| Pulse Width | PW | 40 | | | ns | Within PWD limit |
| Propagation Delay Skew | t_{PSK} | | | 22 | ns | Between any two units |
| Channel Matching | | | | | | |
| Codirectional | t_{PSKCD} | | | 3 | ns | |
| Opposing Directional | t_{PSKOD} | | | 20 | ns | |
| Output Rise/Fall Time | t_R/t_F | | 2.5 | | ns | 10% to 90% |

Table 11.

| Parameter | Symbol | 1 Mbps | | | 10 Mbps | | | 25 Mbps | | | Unit |
|-----------------------|-----------|--------|-----|-----|---------|-----|-----|---------|-----|-----|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| SUPPLY CURRENT | | | | | | | | | | | |
| ADuM3210-EP | I_{DD1} | | 0.8 | 1.3 | | 2.1 | 3.2 | | 4.6 | 6.1 | mA |
| | I_{DD2} | | 1.0 | 1.6 | | 2.0 | 2.8 | | 3.7 | 5.1 | mA |
| ADuM3211-EP | I_{DD1} | | 0.7 | 1.3 | | 1.8 | 2.6 | | 3.8 | 5.4 | mA |
| | I_{DD2} | | 1.3 | 1.8 | | 3.1 | 4.1 | | 6.1 | 8.0 | mA |

Table 12. For All Models

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|---|--------------|-----------------|-----------------|---------------|-------------------|---|
| DC SPECIFICATIONS | | | | | | |
| Logic High Input Threshold | V_{IH} | $0.7 V_{DDx}$ | | | V | |
| Logic Low Input Threshold | V_{IL} | | | | V | |
| Logic High Output Voltages | V_{OH} | $V_{DDx} - 0.1$ | V_{DDx} | $0.3 V_{DDx}$ | V | $I_{Ox} = -20\ \mu\text{A}$, $V_{Ix} = V_{IxH}$ |
| | | $V_{DDx} - 0.5$ | $V_{DDx} - 0.2$ | | V | $I_{Ox} = -3.2\ \text{mA}$, $V_{Ix} = V_{IxH}$ |
| Logic Low Output Voltages | V_{OL} | | 0.0 | 0.1 | V | $I_{Ox} = 20\ \mu\text{A}$, $V_{Ix} = V_{IxL}$ |
| | | | 0.2 | 0.4 | V | $I_{Ox} = 3.2\ \text{mA}$, $V_{Ix} = V_{IxL}$ |
| Input Current per Channel | I_I | -10 | +0.01 | +10 | μA | $0\text{ V} \leq V_{Ix} \leq V_{DDx}$ |
| Supply Current per Channel | | | | | | |
| Quiescent Input Supply Current | $I_{DDI(Q)}$ | | 0.4 | 0.8 | mA | |
| Quiescent Output Supply Current | $I_{DDO(Q)}$ | | 0.5 | 0.8 | mA | |
| Dynamic Input Supply Current | $I_{DDI(D)}$ | | 0.10 | | mA/Mbps | |
| Dynamic Output Supply Current | $I_{DDO(D)}$ | | 0.05 | | mA/Mbps | |
| AC SPECIFICATIONS | | | | | | |
| Common-Mode Transient Immunity ¹ | $ CM $ | 25 | 35 | | kV/ μs | $V_{Ix} = V_{DDx}$, $V_{CM} = 1000\text{ V}$, transient magnitude = 800 V |
| Refresh Rate | f_r | | 1.1 | | Mbps | |

¹ $|CM|$ is the maximum common-mode voltage slew rate that can be sustained while maintaining $V_O > 0.8 V_{DD}$. The common-mode voltage slew rates apply to both rising and falling common-mode voltage edges.

PACKAGE CHARACTERISTICS

Table 13.

| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions/Comments |
|--|------------------|-----|------------------|-----|------|--|
| Resistance (Input-to-Output) ¹ | R _{I-O} | | 10 ¹² | | Ω | f = 1 MHz Thermocouple located at center of package underside |
| Capacitance (Input-to-Output) ¹ | C _{I-O} | | 1.0 | | pF | |
| Input Capacitance | C _I | | 4.0 | | pF | |
| IC Junction-to-Case Thermal Resistance, Side 1 | θ _{JCI} | | 46 | | °C/W | |
| IC Junction-to-Case Thermal Resistance, Side 2 | θ _{JCO} | | 41 | | °C/W | |

¹ The device is considered a 2-terminal device; Pin 1 through Pin 4 are shorted together, and Pin 5 through Pin 8 are shorted together.

REGULATORY INFORMATION

The ADuM3210-EP/ADuM3211-EP are pending approval by the organizations listed in Table 14.

Table 14.

| UL (Pending) | CSA (Pending) | VDE (Pending) |
|---|--|---|
| Recognized under UL 1577 component recognition program ¹ | Approved under CSA Component Acceptance Notice #5A | Certified according to DIN V VDE V 0884-10 (VDE V 0884-10):2006-12 ² |
| Single/basic 2500 V rms isolation voltage | Basic insulation per CSA 60950-1-03 and IEC 60950-1, 400 V rms (566 V peak) maximum working voltage Functional insulation per CSA 60950-1-03 and IEC 60950-1, 800 V rms (1131 V peak) maximum working voltage | Reinforced insulation, 560 V peak |
| File E214100 | File 205078 | File 2471900-4880-0001 |

¹ In accordance with UL 1577, each ADuM3210-EP/ADuM3211-EP is proof tested by applying an insulation test voltage ≥ 3000 V rms for 1 sec.

² In accordance with DIN V VDE V 0884-10 (VDE V 0884-10):2006-12, each ADuM3210-EP/ADuM3211-EP is proof tested by applying an insulation test voltage ≥ 1050 V peak for 1 sec (partial discharge detection limit = 5 pC). The asterisk (*) marking branded on the component designates DIN V VDE V 0884-10 (VDE V 0884-10):2006-12 approval.

INSULATION AND SAFETY-RELATED SPECIFICATIONS

Table 15.

| Parameter | Symbol | Value | Unit | Test Conditions/Comments |
|--|--------|-----------|--------|---|
| Rated Dielectric Insulation Voltage | | 2500 | V rms | 1-minute duration |
| Minimum External Air Gap (Clearance) | L(I01) | 4.0 | mm min | Measured from input terminals to output terminals, shortest distance through air, in the plane of the PCB |
| Minimum External Tracking (Creepage) | L(I02) | 4.0 | mm min | Measured from input terminals to output terminals, shortest distance path along body |
| Minimum Internal Distance (Internal Clearance) | | 0.017 min | mm min | Insulation distance through insulation |
| Tracking Resistance (Comparative Tracking Index) | CTI | >400 | V | DIN IEC 112/VDE 0303, Part 1 |
| Isolation Group | | II | | Material Group (DIN VDE 0110, 1/89, Table 1) |

INSULATION CHARACTERISTICS (DIN V VDE V 0884-10 (VDE V 0884-10):2006-12)

These isolators are suitable for reinforced isolation only within the safety limit data. Maintenance of the safety data is ensured by protective circuits. The asterisk (*) marking branded on the component designates DIN V VDE V 0884-10 (VDE V 0884-10):2006-12 approval for a 560 V peak working voltage.

Table 16.

| Description | Test Conditions/Comments | Symbol | Characteristic | Unit |
|---|--|-------------------|--------------------------------|--------|
| Installation Classification per DIN VDE 0110 For Rated Mains Voltage ≤ 150 V rms For Rated Mains Voltage ≤ 300 V rms For Rated Mains Voltage ≤ 400 V rms | | | I to IV I to III I to II | |
| Climatic Classification | | | 40/125/21 | |
| Pollution Degree per DIN VDE 0110, Table 1 | | | 2 | |
| Maximum Working Insulation Voltage | | V _{IORM} | 560 | V peak |
| Input-to-Output Test Voltage, Method B1 | V _{IORM} × 1.875 = V _{PR} , 100% production test, t _m = 1 sec, partial discharge < 5 pC | V _{PR} | 1050 | V peak |
| Input-to-Output Test Voltage, Method A After Environmental Tests Subgroup 1 | V _{IORM} × 1.6 = V _{PR} , t _m = 60 sec, partial discharge < 5 pC | V _{PR} | 896 | V peak |
| After Input and/or Safety Tests Subgroup 2 and Subgroup 3 | V _{IORM} × 1.2 = V _{PR} , t _m = 60 sec, partial discharge < 5 pC | V _{PR} | 672 | V peak |
| Highest Allowable Overvoltage | Transient overvoltage, t _{TR} = 10 sec | V _{TR} | 4000 | V peak |
| Surge Isolation Voltage | V _{PEAK} = 10 kV, 1.2 μs rise time, 50 μs, 50% fall time | V _{IOSM} | 4000 | V peak |
| Safety-Limiting Values | Maximum value allowed in the event of a failure (see Figure 3) | | | |
| Case Temperature | | T _S | 150 | °C |
| Total Power Dissipation at 25°C | | P _S | 1.56 | W |
| Insulation Resistance at T _S | V _{IO} = 500 V | R _S | >10 ⁹ | Ω |

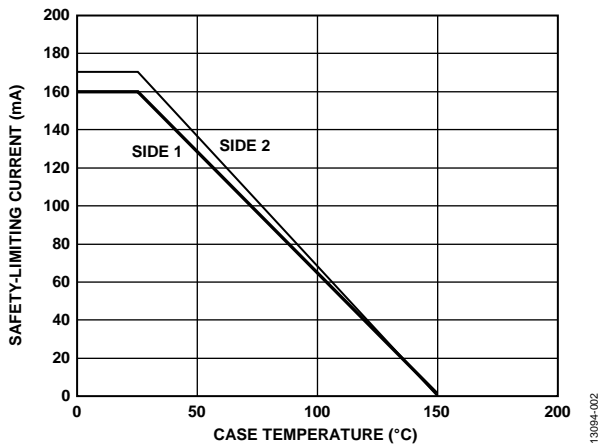


Figure 3. Thermal Derating Curve, Dependence of Safety-Limiting Values on Case Temperature per DIN V VDE V 0884-10

RECOMMENDED OPERATING CONDITIONS

Table 17.

| Parameter | Symbol | Rating |
|--|-------------------------------------|-----------------|
| Operating Temperature | T _A | -55°C to +125°C |
| Supply Voltages ¹ | V _{DD1} , V _{DD2} | 3 V to 5.5 V |
| Maximum Input Signal Rise and Fall Times | | 1 ms |
| Start-Up Current | I _{DD1} , I _{DD2} | 20 mA |

¹ All voltages are relative to their respective ground.

ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$, unless otherwise noted.

Table 18.

| Parameter | Rating |
|---|--|
| Storage Temperature (T_{ST}) | -55°C to $+150^\circ\text{C}$ |
| Ambient Operating Temperature (T_A) | -55°C to $+125^\circ\text{C}$ |
| Supply Voltages (V_{DD1} , V_{DD2}) ¹ | -0.5 V to $+7.0\text{ V}$ |
| Input Voltage (V_{IA} , V_{IB}) ^{1,2} | -0.5 V to $V_{DD1} + 0.5\text{ V}$ |
| Output Voltage (V_{OA} , V_{OB}) ^{1,2} | -0.5 V to $V_{DDO} + 0.5\text{ V}$ |
| Average Output Current per Pin (I_o) ³ | -22 mA to $+22\text{ mA}$ |
| Common-Mode Transients (CM_H , CM_L) ⁴ | $-100\text{ kV}/\mu\text{s}$ to $+100\text{ kV}/\mu\text{s}$ |

¹ Each voltage is relative to its respective ground.

² V_{DD1} and V_{DDO} refer to the supply voltages on the input and output sides of a given channel, respectively.

³ See Figure 3 for maximum allowable current values for various temperatures.

⁴ Refers to common-mode transients across the insulation barrier. Common-mode transients exceeding the absolute maximum rating can cause latch-up or permanent damage.

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

Table 19. Maximum Continuous Working Voltage

| Parameter | Max | Unit | Constraint |
|-------------------------------|------|--------|--|
| AC Voltage, Bipolar Waveform | 565 | V peak | 50-year minimum lifetime |
| AC Voltage, Unipolar Waveform | | | |
| Functional Insulation | 1131 | V peak | Maximum approved working voltage per IEC 60950-1 |
| Basic Insulation | 560 | V peak | Maximum approved working voltage per IEC 60950-1 and VDE V 0884-10 |
| DC Voltage | | | |
| Functional Insulation | 1131 | V peak | Maximum approved working voltage per IEC 60950-1 |
| Basic Insulation | 560 | V peak | Maximum approved working voltage per IEC 60950-1 and VDE V 0884-10 |

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATIONS AND FUNCTION DESCRIPTIONS



Figure 4. ADuM3210-EP Pin Configuration

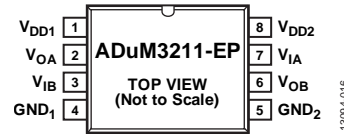


Figure 5. ADuM3211-EP Pin Configuration

Table 20. ADuM3210-EP Pin Function Descriptions

| Pin No. | Mnemonic | Description |
|---------|------------------|---|
| 1 | V _{DD1} | Supply Voltage for Isolator Side 1, 3.0 V to 5.5 V. |
| 2 | V _{IA} | Logic Input A. |
| 3 | V _{IB} | Logic Input B. |
| 4 | GND ₁ | Ground 1. Ground reference for Isolator Side 1. |
| 5 | GND ₂ | Ground 2. Ground reference for Isolator Side 2. |
| 6 | V _{OB} | Logic Output B. |
| 7 | V _{OA} | Logic Output A. |
| 8 | V _{DD2} | Supply Voltage for Isolator Side 2, 3.0 V to 5.5 V. |

Table 21. ADuM3211-EP Pin Function Descriptions

| Pin No. | Mnemonic | Description |
|---------|------------------|---|
| 1 | V _{DD1} | Supply Voltage for Isolator Side 1, 3.0 V to 5.5 V. |
| 2 | V _{OA} | Logic Output A. |
| 3 | V _{IB} | Logic Input B. |
| 4 | GND ₁ | Ground 1. Ground reference for Isolator Side 1. |
| 5 | GND ₂ | Ground 2. Ground reference for Isolator Side 2. |
| 6 | V _{OB} | Logic Output B. |
| 7 | V _{IA} | Logic Input A. |
| 8 | V _{DD2} | Supply Voltage for Isolator Side 2, 3.0 V to 5.5 V. |

TRUTH TABLES

Table 22. ADuM3210-EP Truth Table (Positive Logic)

| V _{IA} Input ¹ | V _{IB} Input ¹ | V _{DD1} State | V _{DD2} State | V _{OA} Output ¹ | V _{OB} Output ¹ | Notes |
|------------------------------------|------------------------------------|------------------------|------------------------|-------------------------------------|-------------------------------------|---|
| H | H | Powered | Powered | H | H | |
| L | L | Powered | Powered | L | L | |
| H | L | Powered | Powered | H | L | |
| L | H | Powered | Powered | L | H | |
| X | X | Unpowered | Powered | L | L | Outputs return to the input state within 1 μs of V _{DD1} power restoration |
| X | X | Powered | Unpowered | Indeterminate | Indeterminate | Outputs return to the input state within 1 μs of V _{DD0} power restoration |

¹ H is logic high, L is logic low, and X is don't care.

Table 23. ADuM3211-EP Truth Table (Positive Logic)

| V _{IA} Input ¹ | V _{IB} Input ¹ | V _{DD1} State | V _{DD2} State | V _{OA} Output ¹ | V _{OB} Output ¹ | Notes |
|------------------------------------|------------------------------------|------------------------|------------------------|-------------------------------------|-------------------------------------|---|
| H | H | Powered | Powered | H | H | |
| L | L | Powered | Powered | L | L | |
| H | L | Powered | Powered | H | L | |
| L | H | Powered | Powered | L | H | |
| X | X | Unpowered | Powered | Indeterminate | L | Outputs return to the input state within 1 μs of V _{DD1} power restoration |
| X | X | Powered | Unpowered | L | Indeterminate | Outputs return to the input state within 1 μs of V _{DD0} power restoration |

¹ H is logic high, L is logic low, and X is don't care.

TYPICAL PERFORMANCE CHARACTERISTICS

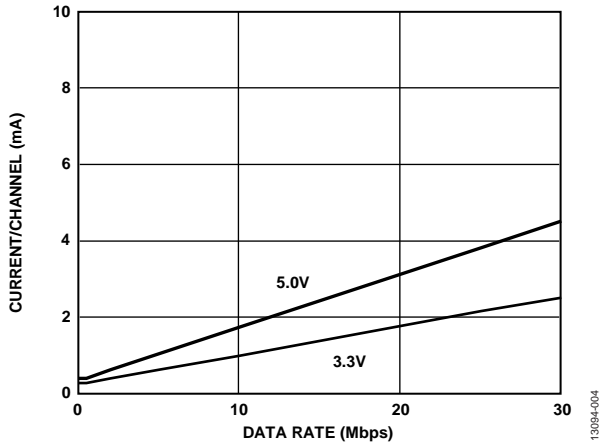


Figure 6. Typical Input Supply Current per Channel vs. Data Rate for 5.0V and 3.3V Operation

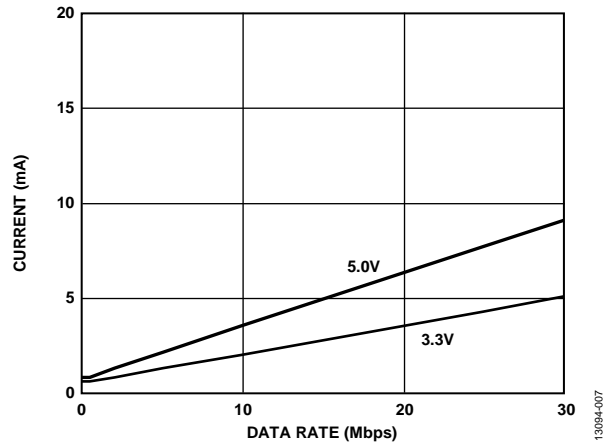


Figure 9. ADuM3210-EP Typical I_{DD1} Supply Current vs. Data Rate for 5.0V and 3.3V Operation

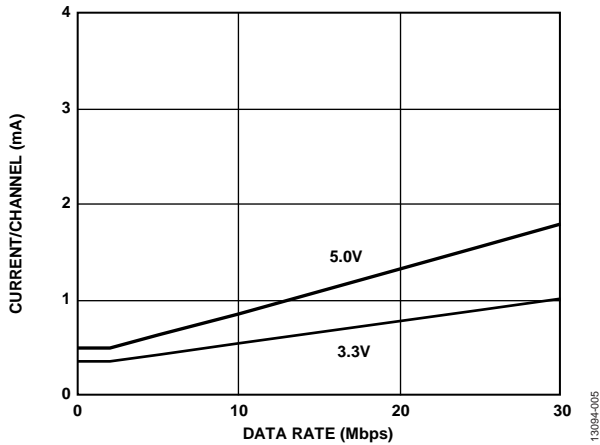


Figure 7. Typical Output Supply Current per Channel vs. Data Rate for 5.0V and 3.3V Operation (No Output Load)

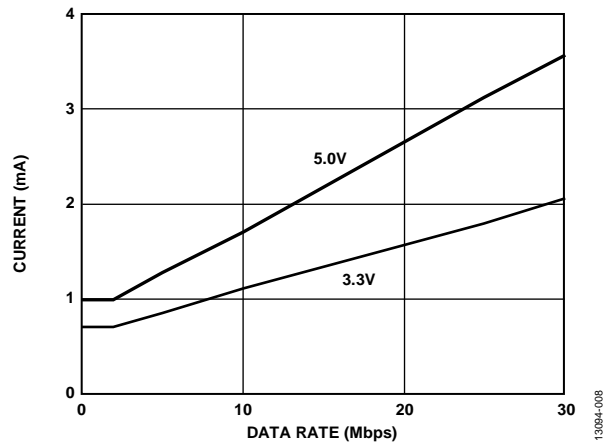


Figure 10. ADuM3210-EP Typical I_{DD2} Supply Current vs. Data Rate for 5.0V and 3.3V Operation

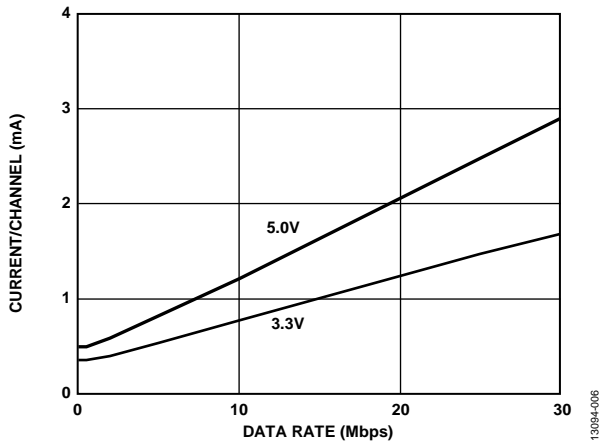


Figure 8. Typical Output Supply Current per Channel vs. Data Rate for 5.0V and 3.3V Operation (15 pF Output Load)

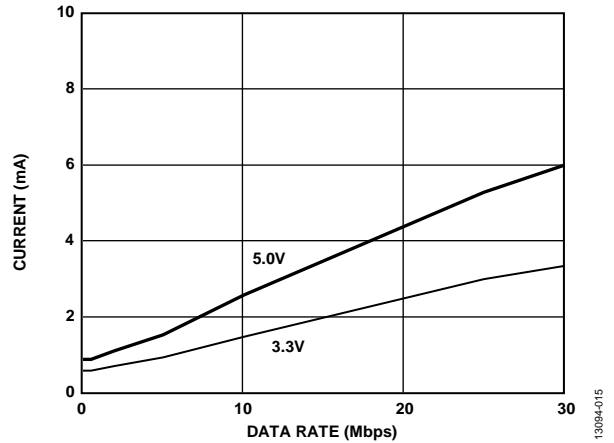
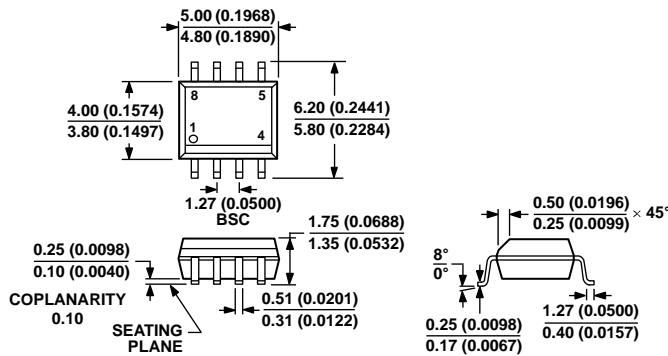


Figure 11. ADuM3211-EP Typical I_{DD1} or I_{DD2} Supply Current vs. Data Rate for 5.0V and 3.3V Operation

OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AA
 CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS
 (IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR
 REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 12. 8-Lead Standard Small Outline Package [SOIC_N]
 Narrow Body
 (R-8)

Dimensions shown in millimeters and (inches)

ORDERING GUIDE

| Model ¹ | Number of Inputs, V _{DD1} Side | Number of Inputs, V _{DD2} Side | Maximum Data Rate (Mbps) | Maximum Propagation Delay, 5 V (ns) | Maximum Pulse Width Distortion (ns) | Temperature Range | Package Description | Package Option ² |
|--------------------|---|---|--------------------------|-------------------------------------|-------------------------------------|-------------------|---------------------|-----------------------------|
| ADuM3210TRZ-EP | 2 | 0 | 25 | 50 | 3 | -55°C to +125°C | 8-Lead SOIC_N | R-8 |
| ADuM3210TRZ-EP-RL7 | 2 | 0 | 25 | 50 | 3 | -55°C to +125°C | 8-Lead SOIC_N | R-8 |
| ADuM3211TRZ-EP | 1 | 1 | 25 | 50 | 4 | -55°C to +125°C | 8-Lead SOIC_N | R-8 |
| ADuM3211TRZ-EP-RL7 | 1 | 1 | 25 | 50 | 4 | -55°C to +125°C | 8-Lead SOIC_N | R-8 |

¹ Z = RoHS Compliant Part.
² R-8 means 8-lead, narrow body SOIC_N.

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