

Am29806/Am29809

6-Bit Chip Select Decoder

9-Bit Equal-to-Comparator

DISTINCTIVE CHARACTERISTICS

- High-speed, expandable, 9-bit "equal-to" comparator (Am29809)
- High-speed comparator with chip select decoder (Am29806)
- Multibus™ compatible, open-collector acknowledge output
- Internal pull-up resistors on all B inputs
- Acknowledge timing control input
- Fully TTL-compatible inputs and outputs

GENERAL DESCRIPTION

Am29809 9-Bit Comparator

The Am29809 is a 9-bit "equal-to" comparator. Its combinatorial, active LOW output, \overline{E}_{OUT} , responds to the combination of a LOW input on the enable input \overline{G} and a match between input words A and B.

Am29806 Chip Select Decoder

The Am29806 combines a 6-bit "equal-to" comparator with a 2- to 4-line decoder to select one-of-four active LOW chip select outputs. The selected output becomes active in response to the select inputs S_0, S_1 and is enabled by an active LOW input on the enable input \overline{G} and a match between comparator inputs A and B. The active LOW output, Any Enable (\overline{ANYE}), responds to a valid comparison

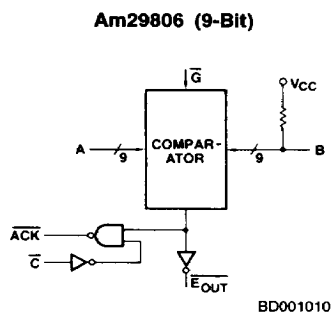
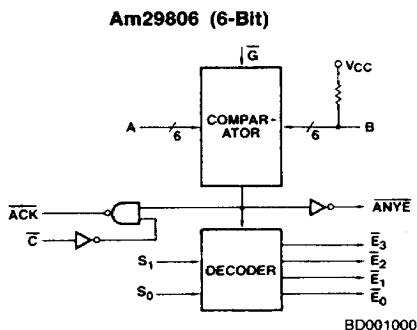
of A and B and is intended for use as an output enable control for data path buffers associated with the selected peripheral or board.

Both devices have open collector, active LOW acknowledge outputs with a conditional timing input \overline{C} that may be driven by a timing circuit or wait state generator. The acknowledge output responds to a valid comparison, $\overline{G} = \text{LOW}$ and $\overline{C} = \text{LOW}$.

Both devices have internal pull-up resistors on the comparator B-inputs for easy connection to SPST switches to ground selected input lines. The comparator function is described by:

$$\overline{E}_{OUT} = (\overline{A_0} \odot \overline{B_0}) (\overline{A_1} \cdot \overline{B_1}) (\overline{A_2} \cdot \overline{B_2}) \dots (\overline{A_i} \odot \overline{B_i}) \overline{G}$$

BLOCK DIAGRAM

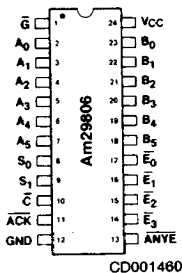


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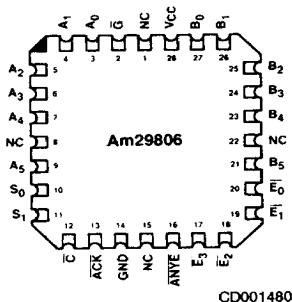
CONNECTION DIAGRAM Top View

D-24-SLIM



CD001480

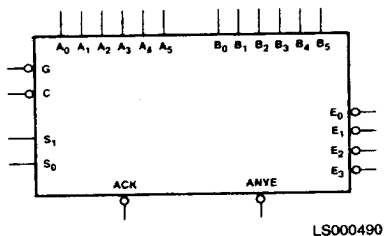
L-28-1



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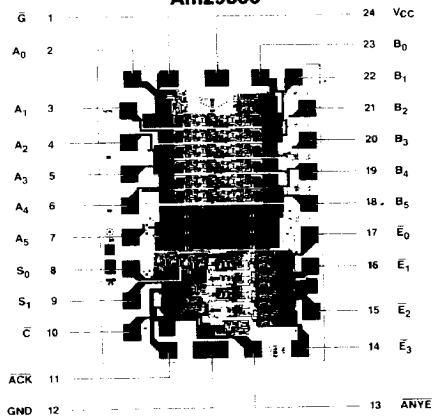
Note: Pin 1 is marked for orientation

LOGIC SYMBOL Am29806



LS000490

METALLIZATION AND PAD LAYOUT Am29806



DIE SIZE: .066" x .098"

ORDERING INFORMATION

AMD products are available in several packages and operating ranges. The order number is formed by a combination of the following: Device number, speed option (if applicable), package type, operating range and screening option (if desired).

Am29806

D

C

B

Screening Option
Blank - Standard processing
B - Burn-in

Temperature (See Operating Range)
C - Commercial (0°C to +70°C)
M - Military (-55°C to +125°C)

Package
D - 24-pin ceramic SLIMDIP (D-24-SLIM)
L - 28-pin Leadless Chip Carrier (L-28-1)
X - Dice

Device type

Am29806 - 6-Bit Chip Select Decoder
Am29809 - 9-Bit Equal-to-Comparator

Valid Combinations

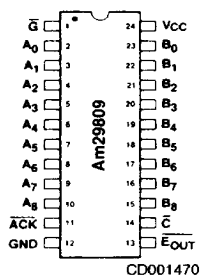
| | |
|---------|--------------|
| Am29806 | DC, DCB, DM, |
| Am29809 | DMB |
| | LC, LM, LMB |
| | XC, XM |

Valid Combinations

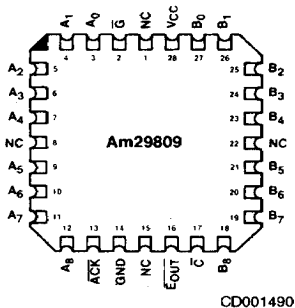
Consult the AMD sales office in your area to determine if a device is currently available in the combination you wish.

CONNECTION DIAGRAM Top View

D-24-SLIM

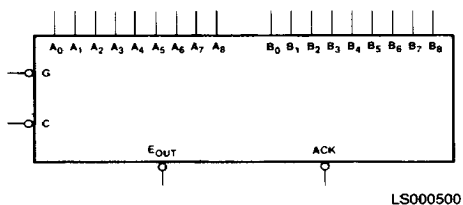


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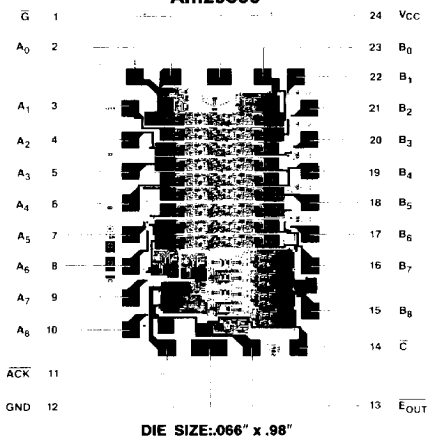


Note: Pin 1 is marked for orientation

LOGIC SYMBOL Am29809



METALLIZATION AND PAD LAYOUT Am29809



PIN DESCRIPTION

| Pin No. | Name | I/O | Description |
|---------|--------------------------------|-----|---|
| | A_i, B_i | I | Comparator data inputs. Each A_i is compared with each B_i on a bit basis. The comparator output is valid when all A_i bits match all B_i bits. |
| 11 | \overline{ACK} | O | Active LOW open collector acknowledge output. This output acknowledges memory of I/O transfers when A and B match and \overline{C} and \overline{G} are LOW. |
| 13 | \overline{ANYE} (Am29806) | O | Active LOW output. Any Enable (\overline{ANYE}) is LOW when $\overline{G} = \text{LOW}$ and there is a match between A and B. |
| 10 | \overline{C} | I | Active LOW input. This input is used to control when \overline{ACK} is active. It will normally be connected to GND when no wait states or timing delays need to be inserted. It may be connected to a wait state generator or timer. |
| 13 | \overline{EOUT} (Am29809) | O | Active LOW output. The comparator output is active for $\overline{G} = \text{LOW}$ and a match between A and B. |
| 1 | \overline{G} | I | Active LOW input. The comparator's input enable determines if the comparator's output is valid. \overline{G} is normally used as an expansion input (connected to Am29809 \overline{EOUT}). |

Am29806 Only

| | | | |
|-------|--|---|--|
| 9,8 | S_1, S_0 | I | Decoder select inputs. These inputs are decoded to produce a 1-of-4 selection of the \overline{E}_i outputs. |
| 17-14 | $\overline{E}_0, \overline{E}_1, \overline{E}_2, \overline{E}_3$ | O | Active LOW outputs. 1-of-4 outputs is active as selected by S_1 and S_0 . |

FUNCTION TABLES

COMPARATOR FUNCTION TABLE

| \overline{G} | A | B | \overline{EOUT} or \overline{ANYE} |
|----------------|------------|---|--|
| H | X | X | H |
| L | A = B | | L |
| | A \neq B | | H |

ACKNOWLEDGE FUNCTION TABLE

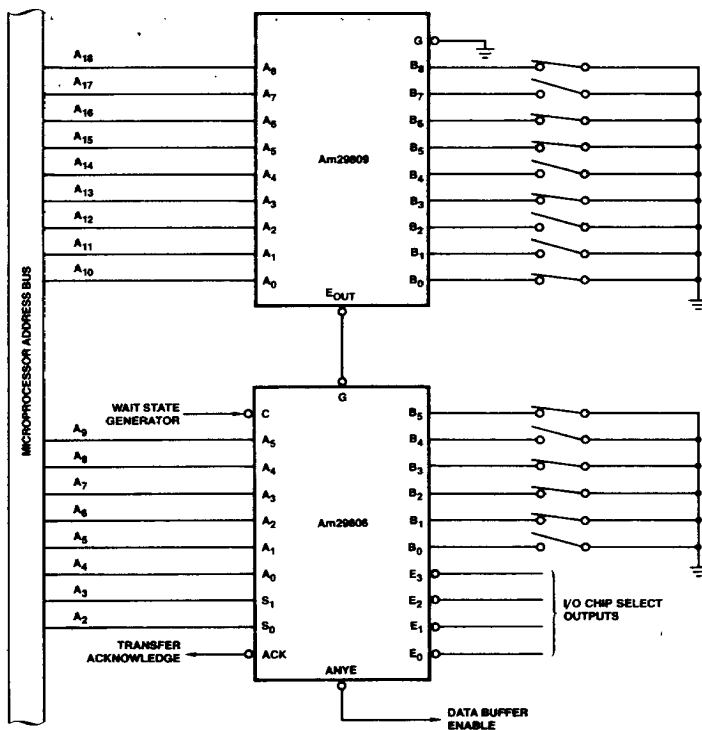
| \overline{ANYE} or \overline{EOUT} | \overline{C} | \overline{ACK} |
|--|----------------|------------------|
| H | X | H* |
| X | H | H* |
| L | L | L |

* Assumes pull-up resistor.

DECODER FUNCTION TABLE (Am29806)

| \overline{ANYE} | S_1 | S_0 | \overline{E}_0 | \overline{E}_1 | \overline{E}_2 | \overline{E}_3 |
|-------------------|-------|-------|------------------|------------------|------------------|------------------|
| H | X | X | H | H | H | H |
| L | L | L | L | H | H | H |
| | L | H | H | L | H | H |
| | H | L | H | H | L | H |
| | H | H | H | H | H | L |

TYPICAL APPLICATION **MICROPROCESSOR ENABLE CONTROLLED, SELECTABLE, ADDRESS DECODER**

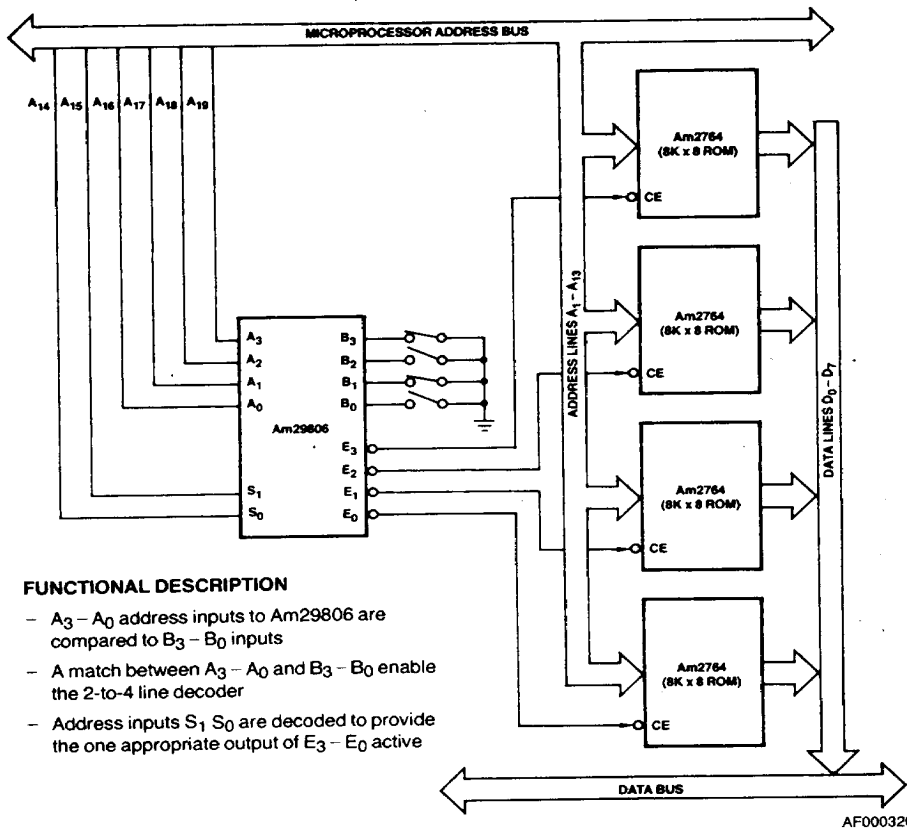


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MAX ENABLE (HIGH - to - LOW) DELAY OVER 15 BITS **(Commercial Range)**

| | | |
|------------------|---|----|
| t _{PHL} | A ₁ or B ₁ to \overline{EOUT} | 13 |
| t _{PHL} | \overline{G} to ANYE | 11 |
| Total | | 24 |

TYPICAL APPLICATION **ADDRESS DECODING** **Am29806 Decodes and Enables 1 of 4 Banks of Memory**



ABSOLUTE MAXIMUM RATINGS

Storage Temperature -65°C to +150°C
 Ambient Temperature with
 Power Applied -55°C to +125°C
 Supply Voltage to Ground -0.5V to +7.0V
 DC Voltage Applied to Outputs
 for High Output State -0.5V to V_{CCmax}
 DC Input Voltage -0.5V to +7.0V
 DC Output Current, into Outputs 30mA
 DC Input Current -30mA to +5.0mA

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES**Commercial (C) Devices**

Temperature 0°C to +70°C
 Supply Voltage +4.5V to +5.5V

Military (M) Devices

Temperature -55°C to +125°C
 Supply Voltage +4.5V to +5.5V

Operating ranges define those limits over which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range unless otherwise specified

| Parameters | Description | Test Conditions | | Min | Typ (Note 1) | Max | Units |
|------------|--|---|--|-----|-----------------|------|---------|
| V_{OH} | Output HIGH Voltage (Note 2) | $V_{CC} = MIN$, $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -3.0mA$ | 2.4 | | | Volts |
| V_{OL} | Output LOW Voltage | $V_{CC} = MIN$, $V_{IN} = V_{IH}$ or V_{IL} | ACK $I_{OL} = 32mA$ All Others $I_{OL} = .24mA$ | | | 0.5 | Volts |
| V_{IH} | Input HIGH Level | Guaranteed Input Logical HIGH Voltage for All Inputs | | 2.0 | | | Volts |
| V_{IL} | Input LOW Level | Guaranteed Input Logical LOW Voltage for All Inputs | | | | 0.8 | Volts |
| V_I | Input Clamp Voltage | $V_{CC} = MIN$, $I_{IN} = -18mA$ | | | | -1.2 | Volts |
| I_{IL} | Input LOW Current | $V_{CC} = MAX$, $V_{IN} = 0.5V$ | A_i | | | -0.6 | mA |
| | | | B_i | | | -1.0 | |
| | | | All Others | | | -0.6 | |
| I_{IH} | Input HIGH Current | $V_{CC} = MAX$, $V_{IN} = 2.4V$ | A_i | | | 20 | μA |
| | | | B_i (Note 4) | | | -250 | |
| | | | All Others | | | 20 | |
| I_i | Input HIGH Current | $V_{CC} = MAX$, $V_{IN} = 5.5V$ | A_i | | | 0.1 | mA |
| | | | B_i | | | 0.1 | |
| | | | All Others | | | 0.1 | |
| I_{SC} | Output Short Circuit Current (Note 3) | $V_{CC} = MAX$ | | -60 | | -150 | mA |
| I_{CC} | Power Supply Current | $V_{CC} = MAX$ | 0 to 70°C | | 35 | 50 | mA |
| | | | +70°C | | | 45 | |
| | | | -55 to +125°C | | 35 | 50 | |
| | | | +125°C | | | 40 | |

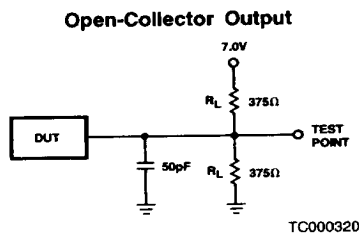
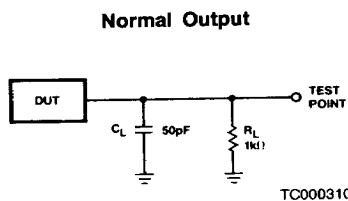
Notes: 1. Typical limits are $T_A = 25^\circ C$, $V_{CC} = 5.0V$.

2. Except one-collector acknowledge output.

3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.

4. Due to internal pull-up resistor: 27k Ω nominal.

SWITCHING TEST CIRCUIT



Note: C_L includes scope probe, wiring and stray capacitances without device in test fixture.

Figure 2.

SWITCHING CHARACTERISTICS ($T_A = +25^\circ\text{C}$, $V_{CC} = 5.0\text{V}$)

| Parameters | Description | Test Conditions (See Figure 2) | Min | Typ | Max | Units |
|--------------------|--|--|-----|-----|-----|-------|
| t_{PLH} | A_i or B_i to \bar{E}_i and $\bar{A}N\bar{Y}E$ | $C_L = 50\text{pF}$ $R_L = 1\text{k}\Omega$ | | 8 | 11 | ns |
| t_{PHL} | | | | 8 | 11 | |
| t_{PLH} | \bar{G} to \bar{E}_i and $\bar{A}N\bar{Y}E$ | | | 8 | 10 | ns |
| t_{PHL} | | | | 8 | 10 | |
| t_{PLH} (Note 1) | A_i or B_i to $\bar{A}CK$ | $C_L = 50\text{pF}$ $R_L = 375\Omega$ | | 9 | 12 | ns |
| t_{PHL} (Note 1) | | | | 8 | 12 | |
| t_{PLH} (Note 1) | \bar{C} to $\bar{A}CK$ | | | 9 | 12 | ns |
| t_{PHL} (Note 1) | | | | 7 | 11 | |
| t_{PLH} (Note 1) | \bar{G} to $\bar{A}CK$ | $C_L = 50\text{pF}$ $R_L = 375\Omega$ | | 9 | 12 | ns |
| t_{PHL} (Note 1) | | | | 7 | 11 | |
| t_{PLH} | S_i to \bar{E}_i | | | 7 | 11 | ns |
| t_{PHL} | | | | 7 | 11 | |

SWITCHING CHARACTERISTICS over operating range unless otherwise specified

| Parameters | Description | Test Conditions (See Figure 2) | COMMERCIAL | | MILITARY | | Units |
|--------------------|--|--|------------|-----|----------|-----|-------|
| | | | Min | Max | Min | Max | |
| t_{PLH} | A_i or B_i to \bar{E}_i and $\bar{A}N\bar{Y}E$ | $C_L = 50\text{pF}$ $R_L = 1\text{k}\Omega$ | | 13 | | 14 | ns |
| t_{PHL} | | | | 11 | | 12 | ns |
| t_{PLH} | \bar{G} to \bar{E}_i and $\bar{A}N\bar{Y}E$ | | | 14 | | 15 | ns |
| t_{PHL} | | | | 13 | | 14 | ns |
| t_{PLH} (Note 1) | A_i or B_i to $\bar{A}CK$ | $C_L = 50\text{pF}$ $R_L = 375\Omega$ | | 13 | | 14 | ns |
| t_{PHL} (Note 1) | | | | 13 | | 14 | ns |
| t_{PLH} (Note 1) | \bar{C} to $\bar{A}CK$ | | | 13 | | 14 | ns |
| t_{PHL} (Note 1) | | | | 13 | | 14 | ns |
| t_{PLH} | S_i to \bar{E}_i | $C_L = 50\text{pF}$ $R_L = 1\text{k}\Omega$ | | 13 | | 14 | ns |
| t_{PHL} | | | | 13 | | 14 | ns |

Note: 1. This propagation time is dependent on the RC time constant of the external load applied.

SWITCHING CHARACTERISTICS (T_A = +25°C, V_{CC} = 5.0V)

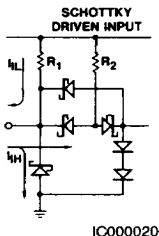
| Parameters | Description | Test Conditions (See Figure 2) | Min | Typ | Max | Units |
|---------------------------|--|--|-----|-----|-----|-------|
| t _{PLH} | A _i or B _i to $\overline{E_{OUT}}$ | C _L = 50pF R _L = 1kΩ | | 8 | 11 | ns |
| t _{PHL} | | | | 8 | 11 | |
| t _{PLH} | \overline{G} to $\overline{E_{OUT}}$ | | | 7 | 10 | ns |
| t _{PHL} | | | | 7 | 10 | |
| t _{PLH} (Note 1) | A _i or B _i to \overline{ACK} | C _L = 50pF R _L = 375Ω | | 9 | 12 | ns |
| t _{PHL} | | | | 8 | 12 | |
| t _{PLH} (Note 1) | \overline{C} to \overline{ACK} | | | 9 | 12 | ns |
| t _{PHL} | | | | 7 | 11 | |
| t _{PLH} (Note 1) | \overline{G} to \overline{ACK} | | | 7 | 12 | ns |
| t _{PHL} | | | | 7 | 11 | |

SWITCHING CHARACTERISTICS over operating range unless otherwise specified

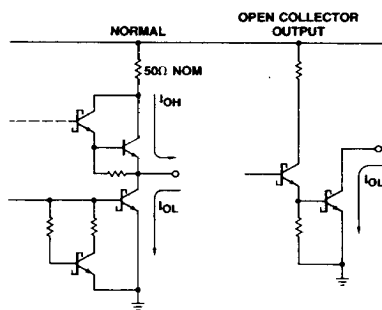
| Parameters | Description | Test Conditions (See Figure 2) | COMMERCIAL | | MILITARY | | Units | |
|---------------------------|--|--|------------|-----|----------|-----|-------|--|
| | | | Min | Max | Min | Max | | |
| t _{PLH} | A _i or B _j to $\overline{E_{OUT}}$ | C _L = 50pF R _L = 1kΩ | | 13 | | 14 | ns | |
| t _{PHL} | | | | | | | | |
| t _{PLH} | \overline{G} to $\overline{E_{OUT}}$ | | | 11 | | 12 | ns | |
| t _{PHL} | | | | | | | | |
| t _{PLH} (Note 1) | A _i or B _j to \overline{ACK} | C _L = 50pF R _L = 375Ω | | 14 | | 15 | ns | |
| t _{PHL} | | | | | | | | |
| t _{PLH} (Note 1) | \overline{C} to \overline{ACK} | | | 13 | | 14 | ns | |
| t _{PHL} | | | | | | | | |
| t _{PLH} (Note 1) | \overline{G} to \overline{ACK} | | | 13 | | 14 | ns | |
| t _{PHL} | | | | | | | | |

Note 1. This propagation time is dependent on the RC time constant of the external load applied.

INPUT/OUTPUT CURRENT INTERFACE CONDITIONS



$C_i \approx 5.0\text{pF}$, all inputs
 $R_1^* = 27\text{k}$ nominal
 $R_2 = 10\text{k}$ nominal
 *Used only on B_i inputs.



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