

## DESCRIPTION

The HI-8588-10 ARINC 429 bus interface receiver is similar to the HI-8588 with the exception that it allows an external 10 Kohm resistor in series with each ARINC input without affecting the ARINC input thresholds. The product is especially useful in applications where lightning protection circuitry is also required. In addition, the test inputs force both of the outputs to zero instead of open circuit. The analog/digital CMOS product requires only a 5 volt supply and is available in a 8-pin SOIC package.

Each side of the ARINC bus must be connected through a 10 Kohm series resistor in order for the chip to detect the correct ARINC levels. The typical 10 volt differential signal is translated and input to a window comparator and latch. The comparator levels are set so that with the external 10 Kohm resistors they are just below the standard 6.5 volt minimum ARINC data threshold and just above the standard 2.5 volt maximum ARINC null threshold.

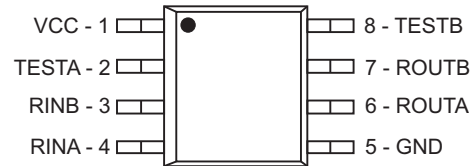
The TESTA and TESTB inputs bypass the analog inputs for testing purposes. Also if TESTA and TESTB are both taken high, the digital outputs are forced to zero.

See Holt Application Note AN-300 for more information on lightning protection.

## FEATURES

- ARINC 429 line receiver interface in a small outline package
- Lightning protection simplified with the ability to add 10 Kohm external series resistors
- Receiver input hysteresis at least 2 volts
- Test inputs bypass analog inputs and force digital outputs to an one, zero or null state
- Plastic and ceramic package options - surface mount and DIP

## PIN CONFIGURATION



HI-8588PSI-10, HI-8588PST-10 & HI-8588PSM-10  
8 - PIN PLASTIC NARROW BODY SOIC

## SUPPLY VOLTAGES

VCC = 5.0V ± 5%

## FUNCTION TABLE

### RECEIVER

| RINA            | RINB            | TESTA | TESTB | ROUTA | ROUTB |
|-----------------|-----------------|-------|-------|-------|-------|
| -1.25V to 1.25V | -1.25V to 1.25V | 0     | 0     | 0     | 0     |
| -3.25V to -6.5V | 3.25V to 6.5V   | 0     | 0     | 0     | 1     |
| 3.25V to 6.5V   | -3.25V to -6.5V | 0     | 0     | 1     | 0     |
| X               | X               | 0     | 1     | 0     | 1     |
| X               | X               | 1     | 0     | 1     | 0     |
| X               | X               | 1     | 1     | 0     | 0     |

## PIN DESCRIPTION TABLE

| PIN | SYMBOL | FUNCTION     | DESCRIPTION            |
|-----|--------|--------------|------------------------|
| 1   | VCC    | SUPPLY       | 5 VOLT SUPPLY          |
| 2   | TESTA  | LOGIC INPUT  | CMOS                   |
| 3   | RINB   | ARINC INPUT  | RECEIVER B INPUT       |
| 4   | RINA   | ARINC INPUT  | RECEIVER A INPUT       |
| 5   | GND    | POWER        | GROUND                 |
| 6   | ROUTA  | LOGIC OUTPUT | RECEIVER CMOS OUTPUT A |
| 7   | ROUTB  | LOGIC OUTPUT | RECEIVER CMOS OUTPUT B |
| 8   | TESTB  | LOGIC INPUT  | CMOS                   |

# FUNCTIONAL DESCRIPTION

## RECEIVER

Figure 1 shows the general architecture of the ARINC 429 receiver. The receiver operates off the VCC supply only. The inputs RINA and RINB each require 35KΩ of resistance of which 25KΩ is internal to the chip. The series resistance is connected to level translators whose resistance to Ground is typically 10KΩ. In order for the voltage translation not to be adversely affected, an external 10KΩ series resistor must be added to each ARINC input. The HI-8588-10 device is typically chosen for applications where external series resistors are required in its lightning protection circuitry.

After level translation, the inputs are buffered and become inputs to a differential amplifier. The amplitude of the differential signal is compared to levels derived from a divider

between VCC and Ground. The nominal settings correspond to a One/Zero amplitude of 6.0V and a Null amplitude of 3.3V.

The status of the ARINC receiver input is latched. A Null input resets the latches and a One or Zero input sets the latches.

The logic at the output is controlled by the test signal which is generated by the logical OR of the TESTA and TESTB pins. Unlike the HI-8588, if TESTA and TESTB are both One, the HI-8588-10 outputs are pulled low instead of being tri-stated. This allows the digital outputs of a transmitter to be connected to the test inputs through control logic for self-test purposes.

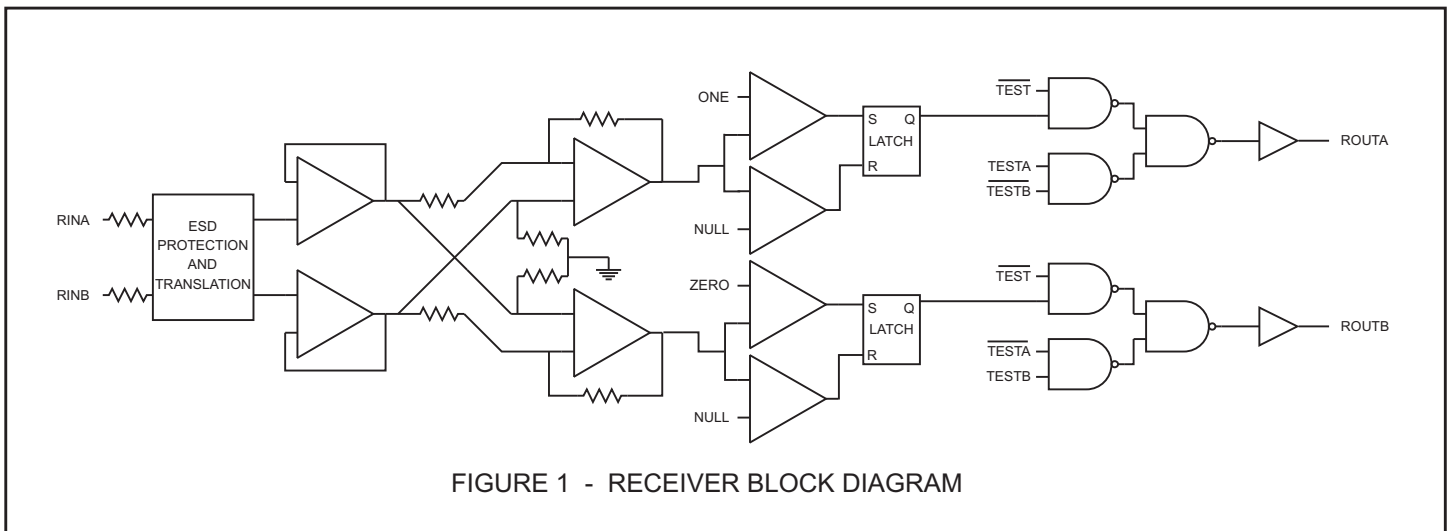


FIGURE 1 - RECEIVER BLOCK DIAGRAM

## APPLICATION INFORMATION

Figure 2 shows a possible application of the HI-8588-10 interfacing an ARINC receive channel to the HI-6010 which in turn interfaces to an 8-bit bus.

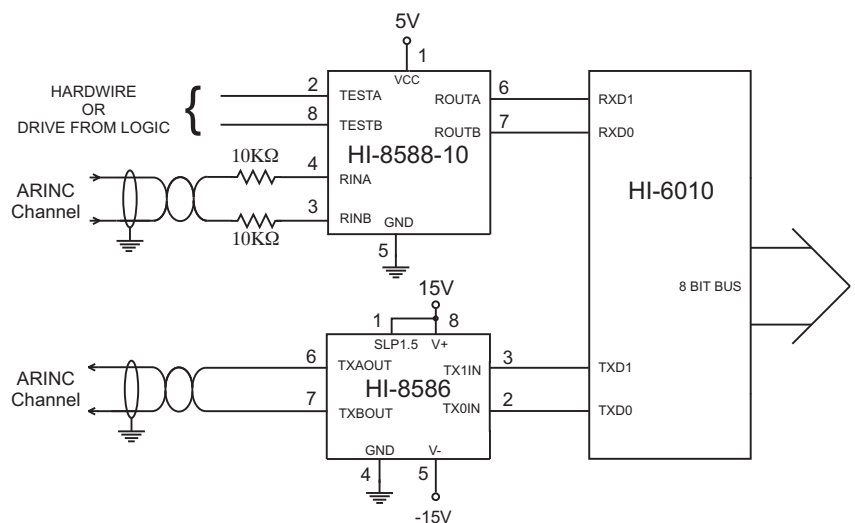


FIGURE 2 - APPLICATION DIAGRAM

**ABSOLUTE MAXIMUM RATINGS**

Voltages referenced to Ground

|   |
|---|
| Supply voltages<br>VCC.....7V   |
| ARINC input - pins 3 & 4<br>Voltage at either pin.....+120V to -120V      |
| DC current per input pin..... ±10mA                                       |
| Power dissipation at 25°C<br>plastic DIP.....0.7W<br>ceramic DIP.....0.5W |
| Solder Temperature (reflow) .....260°C                                    |
| Storage Temperature.....-65°C to +150°C                                   |

**RECOMMENDED OPERATING CONDITIONS**

|   |
|---|
| Supply Voltages<br>VCC.....5V ± 5%  |
| Temperature Range<br>Industrial Screening.....-40°C to +85°C<br>Hi-Temp Screening.....-55°C to +125°C |

*NOTE: Stresses above absolute maximum ratings or outside recommended operating conditions may cause permanent damage to the device. These are stress ratings only. Operation at the limits is not recommended.*

**DC ELECTRICAL CHARACTERISTICS**

OPERATING TEMPERATURE RANGE, VCC = 5.0V UNLESS OTHERWISE STATED

| PARAMETERS                             | SYMBOL            | TEST CONDITIONS                   | MIN | TYP  | MAX  | UNITS |
|--|-------------------|-----------------------------------|-----|------|------|-------|
| ARINC input voltage<br>one or zero     | V <sub>DIN</sub>  | diff. volt. thru 10KΩ, pins 3 & 4 | 6.5 | 10   | 13   | volts |
| null                                   | V <sub>NIN</sub>  | " " "                             | -   | -    | 2.5  | volts |
| common mode                            | V <sub>COM</sub>  | with respect to Ground            | -   | -    | 5.0  | volts |
| logic input voltage<br>high            | V <sub>IH</sub>   |                                   | 3.5 | -    | -    | volts |
| low                                    | V <sub>IL</sub>   |                                   | -   | -    | 1.5  | volts |
| ARINC input resistance<br>RINA to RINB | R <sub>DIFF</sub> | supplies floating & series 10KΩ   | 30  | 75   | -    | Kohm  |
| RINA or RINB to Gnd or VCC             | R <sub>SUP</sub>  | " " "                             | 19  | 40   | -    | Kohm  |
| logic input current<br>source          | I <sub>IH</sub>   | V <sub>IN</sub> = 0 V             | -   | -    | 0.1  | μA    |
| sink                                   | I <sub>IL</sub>   | V <sub>IN</sub> = 5 V             | -   | -    | 0.1  | μA    |
| logic output drive current<br>one      | I <sub>OH</sub>   | V <sub>OH</sub> = 4.6V            | -   | -1.6 | -0.8 | mA    |
| zero                                   | I <sub>OL</sub>   | V <sub>OL</sub> = 0.4V            | 3.6 | 5.6  | -    | mA    |
| Current drain<br>operating             | I <sub>CC1</sub>  | pins 2, 8 = 0V; pins 3, 4 open    | -   | 2.3  | 6.3  | mA    |

**AC ELECTRICAL CHARACTERISTICS**

OPERATING TEMPERATURE RANGE, VCC = 5.0V UNLESS OTHERWISE STATED

| PARAMETERS                       | SYMBOL            | TEST CONDITIONS                          | MIN | TYP | MAX | UNITS |
|----------------------------------|-------------------|--|-----|-----|-----|-------|
| Receiver propagation delay       |                   | defined in Figure 3, $C_L = 50\text{pF}$ |     |     |     |       |
| Output high to low               | $t_{\text{plhr}}$ |  | -   | 600 | -   | ns    |
| Output low to high               | $t_{\text{plhr}}$ |  | -   | 600 | -   | ns    |
| Receiver output transition times |                   |  |     |     |     |       |
| Output high to low               | $t_{\text{fr}}$   |  | -   | 50  | 80  | ns    |
| Output low to high               | $t_{\text{rr}}$   |  | -   | 50  | 80  | ns    |
| Input capacitance (1)            |                   |  |     |     |     |       |
| ARINC differential               | $C_{\text{AD}}$   |  | -   | 5   | 10  | pF    |
| ARINC single ended to Ground     | $C_{\text{AS}}$   |  | -   | -   | 10  | pF    |
| Logic                            | $C_{\text{IN}}$   |  | -   | -   | 10  | pF    |

Notes: 1. Guaranteed but not tested

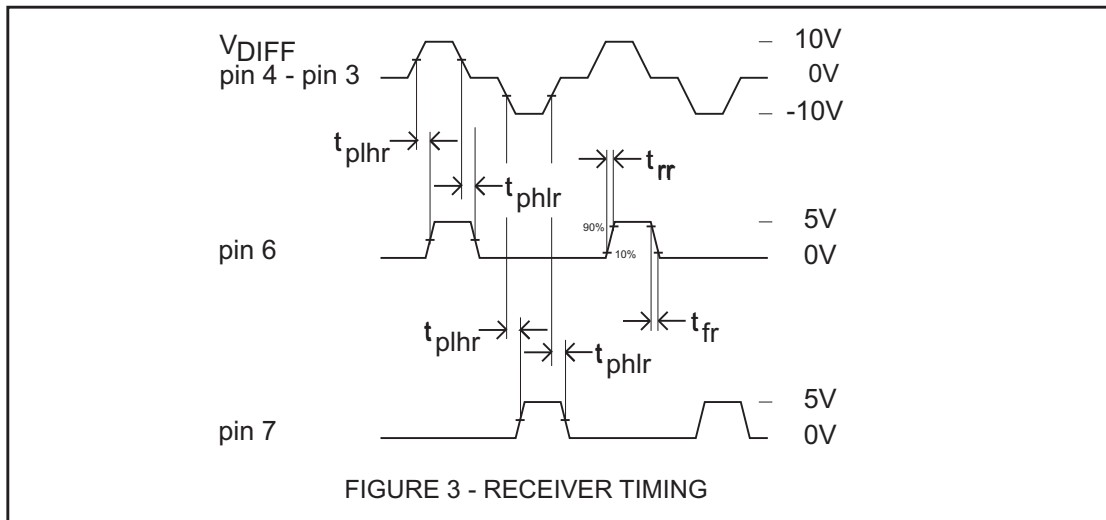


FIGURE 3 - RECEIVER TIMING

**ORDERING INFORMATION**

HI - 8588 xx x x - 10

| PART NUMBER | LEAD FINISH                              |
|-------------|--|
| Blank       | Tin / Lead (Sn / Pb) Solder              |
| F           | 100% Matte Tin (Pb-free, RoHS compliant) |

| PART NUMBER | TEMPERATURE RANGE | FLOW | BURN IN |
|-------------|-------------------|------|---------|
| I           | -40°C TO +85°C    | I    | No      |
| T           | -55°C TO +125°C   | T    | No      |
| M           | -55°C TO +125°C   | M    | Yes     |

| PART NUMBER | PACKAGE DESCRIPTION                                |
|-------------|--|
| PD          | 8 PIN PLASTIC DIP (8P) not available with "M" flow |
| PS          | 8 PIN PLASTIC NARROW BODY SOIC (8HN)               |
| CR          | 8 PIN CERDIP (8D) not available Pb-free            |

## REVISION HISTORY

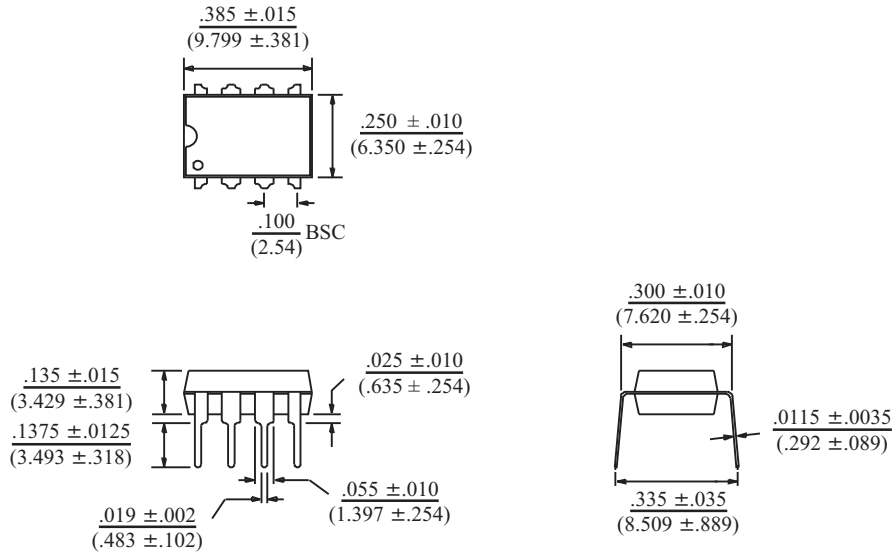
| P/N       | Rev | Date     | Description of Change   |
|-----------|-----|----------|---|
| DS8488-10 | E   | 08/05/14 | Update ARINC input pins 3 & 4 Absolute Maximum Rating to +/-120V.<br>Update solder reflow temperature. Remove Mil. temperature rating. Update SOIC-8 (8HN) package drawing. |

---

**8-PIN PLASTIC DIP**

*inches (millimeters)*

Package Type: 8P

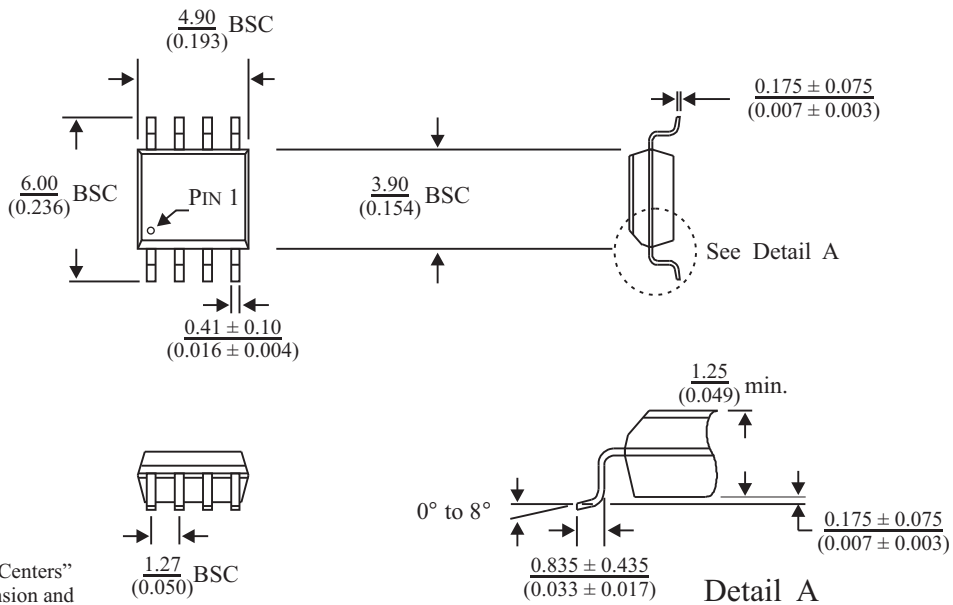


BSC = "Basic Spacing between Centers" is theoretical true position dimension and has no tolerance. (JEDEC Standard 95)

**8-PIN PLASTIC SMALL OUTLINE (SOIC) - NB  
(Narrow Body)**

*millimeters (inches)*

Package Type: 8HN

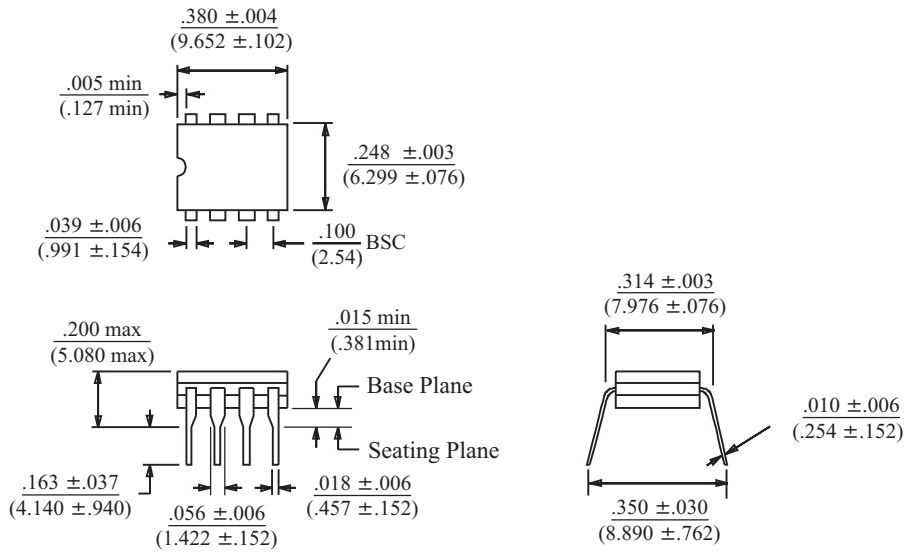


BSC = "Basic Spacing between Centers" is theoretical true position dimension and has no tolerance. (JEDEC Standard 95)

**8-PIN CERDIP**

*inches (millimeters)*

Package Type: 8D



BSC = "Basic Spacing between Centers"  
is theoretical true position dimension and  
has no tolerance. (JEDEC Standard 95)