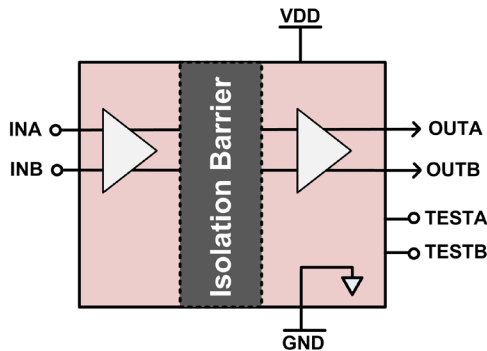


May 2018

### GENERAL DESCRIPTION

The HI-8460 and HI-8461 are galvanically isolated single ARINC 429 line receivers with internal lightning protection circuitry. The devices are available in compact 16-pin QFN and 8-pin SOIC packages. Capacitive isolation and power regulation provide 800V isolation between the line receiver and the logic interface. This is an ideal device for systems that must tolerate different grounds. Although power and ground are isolated between the line receiver and the logic interface, the IC only requires one VDD and one GND. This allows the SO-8 version of HI-8460 to be pin for pin compatible with the HI-8450, HI-8588 and HI-8591, making it easy to add galvanic isolation and lightning level 3 compliance to existing sockets.



The internal lightning protection circuitry ensures compliance with RTCA/DO-160G, Section 22 Level 3 Pin Injection Test Waveform Set A (3 & 4), Set B (3 & 5A) and Set Z (3 & 5B) without the use of any external components. Pin surge levels for Level 3 are summarized below.

Waveform 3	Waveform 4	Waveform 5A	Waveform 5B
VOC/ISC 600V/24A	VOC/ISC 300V/60A	VOC/ISC 300V/300A	VOC/ISC 300V/300A

The devices are designed to operate from a 3.3V supply. Each receiver channel translates incoming ARINC 429 data bus signals to a pair of TTL / CMOS outputs.

The TESTA and TESTB inputs bypass the analog inputs for testing purposes. They force the receiver outputs to the specified ZERO, ONE or NULL state. The ARINC inputs are ignored when the devices are in test mode.

The HI-8461 produces a low output when the TESTA and TESTB inputs are held high, whereas the HI-8460 produces a high impedance output when the TESTA and TESTB inputs are held high.

The parts are available in Industrial -40°C to +85°C, or Extended -55°C to +125°C temperature ranges. Optional burn-in is available on the extended temperature range.

### FEATURES

- Airbus ABD0100H specification compliant Galvanically isolated ARINC 429 receiver providing 800V isolation between the line receiver and the logic interface
- Drop-in compatible with HI-8450/51, HI-8588 and HI-8591
- Internal lightning protection circuitry ensures compliance with RTCA/DO-160G, Section 22 Level 3 Pin Injection Test Waveform Set A (3 & 4), Set B (3 & 5A) and Set Z (3 & 5B)
- Direct connection to ARINC 429 bus with no external components
- 3.3V single supply operation
- Ultra low supply current
- Test inputs bypass analog inputs and force digital outputs to a one, zero, or null state
- Industrial and Extended temperature ranges
- Burn-in available

### PIN CONFIGURATION (TOP VIEW)

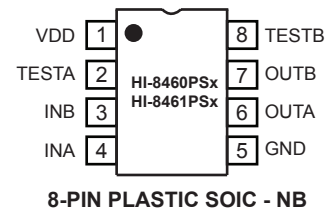


Table 1. Function Table

ARINC INPUTS INA - INB	TESTA	TESTB	OUTA	OUTB
-2.5 to +2.5V	0	0	0	0
< -6.5V	0	0	0	1
> +6.5V	0	0	1	0
x	0	1	0	1
x	1	0	1	0
x	1	1	HI-Z <sup>(1)</sup>	HI-Z <sup>(1)</sup>
x	1	1	0 <sup>(2)</sup>	0 <sup>(2)</sup>

Note (1): HI-8460 only.

Note (2): HI-8461 only.

## FUNCTIONAL DESCRIPTION

Figure 1 shows the general architecture of the galvanically isolated ARINC 429 receiver. The inputs INA and INB may be connected directly to the ARINC 429 bus. Internal lightning protection circuitry ensures

compliance with RTCA/DO-160G, Section 22 Level 3 Pin Injection Test Waveform Set A (3 & 4), Set B (3 & 5A) and Set Z (3 & 5B) without the use of any external components.

The inputs go into a differential amplifier where the signal is compared to internally generated levels. The amplifier output signal is encoded, then capacitively coupled across the galvanic isolation barrier. On the host interface side, the signal is decoded. The status of the ARINC receiver input is then 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. This allows control logic to be connected to the test inputs for system self-test purposes. If TESTA and TESTB are both One, the outputs are pulled low (HI-8461 only). In the case of HI-8460, if TESTA and TESTB are both One, the outputs are high impedance (HI-Z).

## BLOCK DIAGRAM

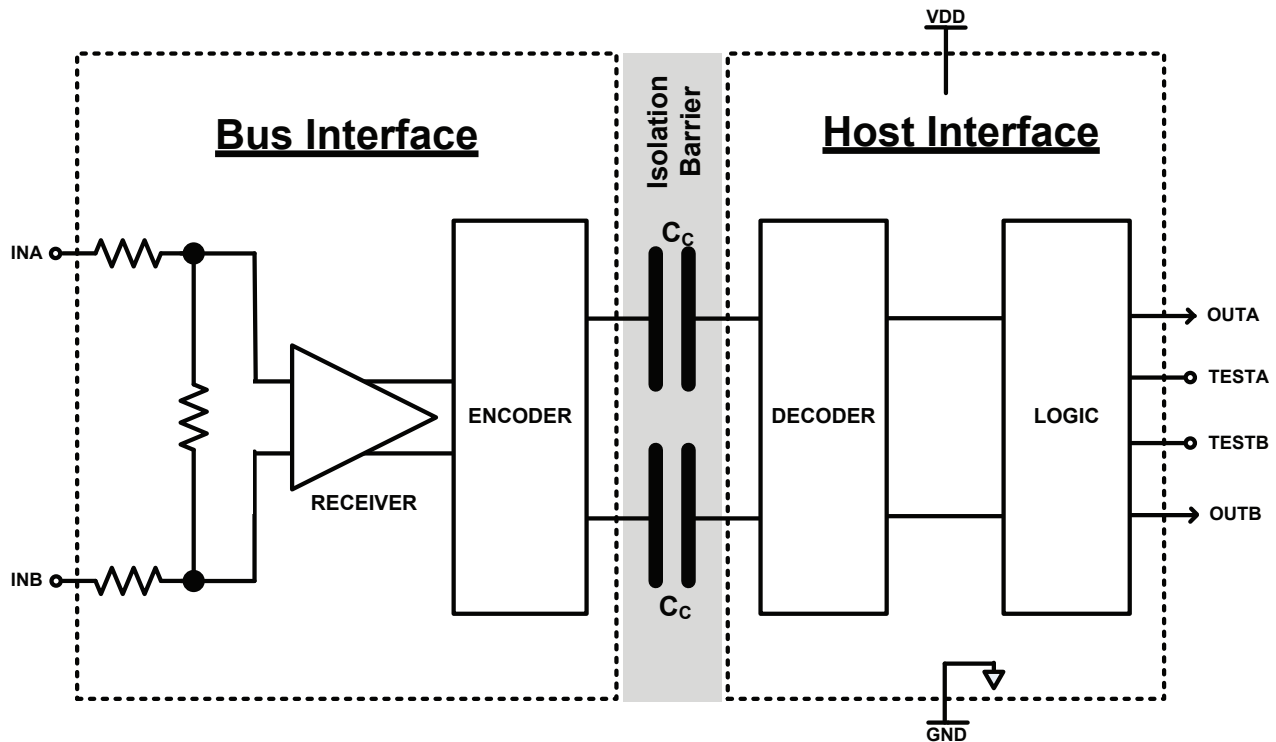


Figure 1. Galvanically Isolated Line Receiver Block Diagram

**PIN DESCRIPTIONS**

Table 2. Pin Descriptions

Symbol	Function	Description
VDD	POWER	+3.3V supply voltage
TESTA	LOGIC INPUT	Test input
INB	ARINC INPUT	Receiver negative input
INA	ARINC INPUT	Receiver positive input
GND	POWER	Ground supply voltage
OUTA	LOGIC OUTPUT	Receiver "ONE" output
OUTB	LOGIC OUTPUT	Receiver "ZERO" output
TESTB	LOGIC INPUT	Test input
NC	Not connected	Not connected

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage ( $V_{DD}$ )	-0.3V to +7.0V
Logic input voltage range	-0.3V to VDD + 0.6V
Voltage at pins INA and INB	-1,000V to +1,000V
Power dissipation at 25°C	350mW
Common-Mode Input Voltage (with respect to GND)	+/- 1,000V
Solder Temperature (reflow)	260°C
Storage Temperature	-65°C to +150°C

**RECOMMENDED OPERATING CONDITIONS**

Supply Voltages	
$V_{DD}$ .....	+3.3V ± 5%
Temperature Range	
Industrial Screening .....	-40°C to +85°C
Extended 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.*

**RTCA/DO-160G, Section 22 pin injection**

Waveform	Voc/Isc
3	1,000V/40A
4	500V/100A
5A	500V/500A
5B	500V/500A

**ELECTRICAL CHARACTERISTICS**

Table 3. DC Electrical Characteristics

$V_{DD} = +3.3V \pm 5\%$ ,  $GND = 0V$ ,  $T_A$  = Operating Temperature Range (unless otherwise stated)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Units	
<b>ARINC INPUTS</b>							
Input Voltage	ONE or ZERO	$V_{DIN}$	Differential Input voltage	6.5	10	13	V
	NULL	$V_{NIN}$	Differential Input voltage			2.5	V
	Common mode	$V_{COM}$	with respect to GND			$\pm 800$	V
Input Resistance	INA to INB	$R_{DIFF}$	Dynamic		28		k $\Omega$
	Input to $GND_{DD}$	$R_{SUP}$		$10^9$			k $\Omega$
Input Hysteresis		$V_{HYS}$	3.3V	0.15	0.4		V
Input Capacitance	ARINC differential	$C_{AD}$			19	30	pF
	ARINC single ended to GND	$C_{AS}$				30	pF
DC Isolation Voltage	All inputs with respect to bus pins					$\pm 800$	V
<b>TEST INPUTS</b>							
Logic Input Voltage	High	$V_{IH}$		$70\%V_{DD}$		$V_{DD} + 0.3$	V
	Low	$V_{IL}$		-0.3		$30\%V_{DD}$	V
Logic Input Current	Sink	$I_{IH}$	$V_{IH} = V_{DD}$			200	$\mu A$
	Source	$I_{IL}$	$V_{IL} = 0V$	-1.0			$\mu A$
<b>OUTPUTS</b>							
Logic Output Voltage (CMOS)	High	$V_{OHC}$	$I_{OH} = -1\mu A$	90%			$V_{DD}$
	Low	$V_{OLC}$	$I_{OL} = 1\mu A$			10%	$V_{DD}$
<b>SUPPLY CURRENT</b>							
$V_{DD}$ Current (HI-8460, HI-8461)	$I_{DD}$	$V_{DD} = 3.3V$		200			$\mu A$

# HI-8460, HI-8461

Table 4. AC Electrical Characteristics

$V_{DD} = +3.3V \pm 5\%$ ,  $GND = 0V$ ,  $T_A$  = Operating Temperature Range (unless otherwise stated)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Units
<b>SWITCHING CHARACTERISTICS</b>						
Propagation Delay IN to OUT	$t_{LH}$	$C_L = 50pF$		0.75	1.5	$\mu s$
	$t_{HL}$	$C_L = 50pF$		0.75	1.5	$\mu s$
Output Rise Time	$t_R$	10% to 90%, $C_L = 50pF$		8	16	ns
Output Fall Time	$t_F$	90% to 10%, $C_L = 50pF$		8	16	ns
Propagation Delay TEST to OUT	$t_{TOH}$	$C_L = 50pF$		50	125	ns
	$t_{TOL}$	$C_L = 50pF$		50	125	ns
Test Mode Operating Frequency		$C_L = 50pF$			25	MHz

**LIGHTNING INDUCED TRANSIENT VOLTAGE WAVEFORMS**

**Waveform 3.**

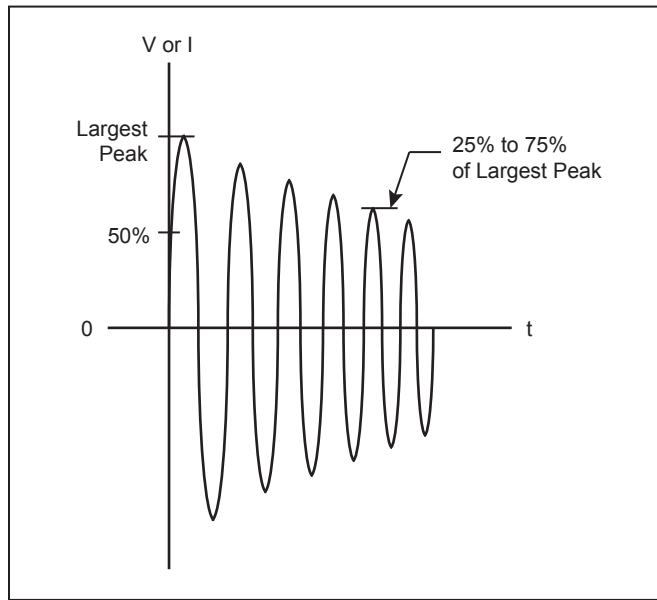


Figure 2. DO-160G Lightning Induced Transient Voltage Waveform 3.  
Voc = 600V, Isc = 24A, Frequency = 1MHz  $\pm$  20%.

**Waveform 4.**

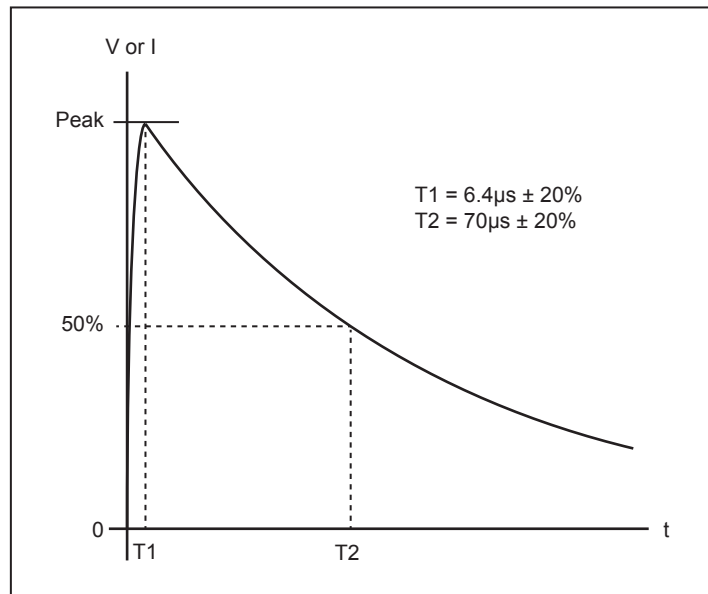


Figure 3. DO-160G Lightning Induced Transient Voltage Waveform 4.  
Voc = 300V, Isc = 60A.

Waveform 5.

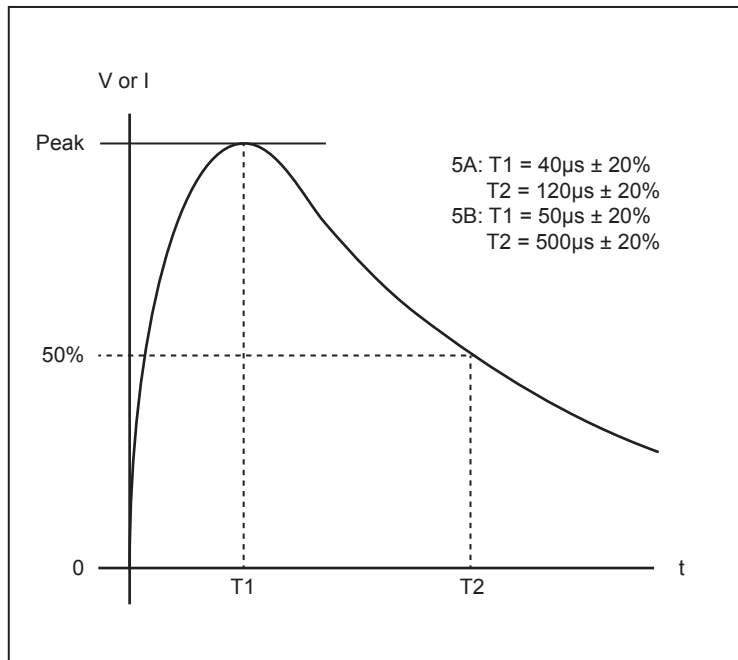
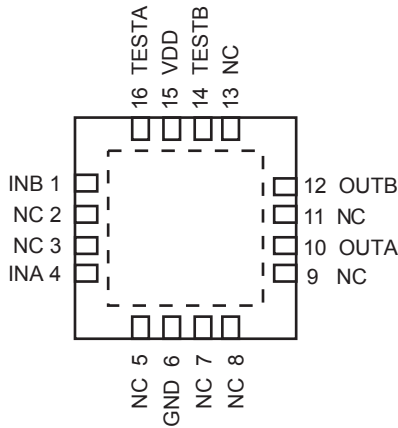


Figure 4. DO-160G Lightning Induced Transient Voltage Waveforms 5A and 5B.  
 $V_{oc} = 300V$ ,  $I_{sc} = 300A$ .



**ADDITIONAL PACKAGES**



**16-Pin 4mm x 4mm QFN**

**ORDERING INFORMATION**

HI - 846xxx x x (Plastic)

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
8460PS	8 PIN PLASTIC NARROW BODY SOIC (8HN)
8460PC	16 PIN PLASTIC 4x4 mm QFN (16PCS); not available with "M" flow
8461PS	8 PIN PLASTIC NARROW BODY SOIC (8HN)
8461PC	16 PIN PLASTIC 4x4 mm QFN (16PCS); not available with "M" flow

## REVISION HISTORY

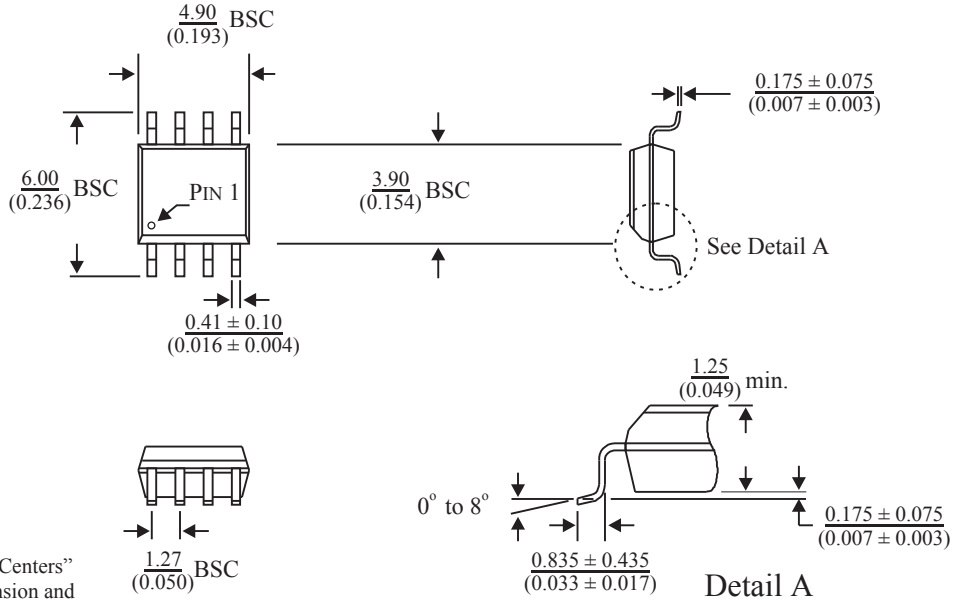
Revision		Date	Description of Change
DS8460	Rev. New.	03/17/17	Initial Release
	Rev. A	05/17/17	Add "Ultra Low Supply Current" to Features.
	Rev. B	05/22/18	Update Logic Output Voltage and Propagation Delays in "Electrical Characteristics".

**PACKAGE DIMENSIONS**

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

millimeters (inches)

Package Type: 8HN

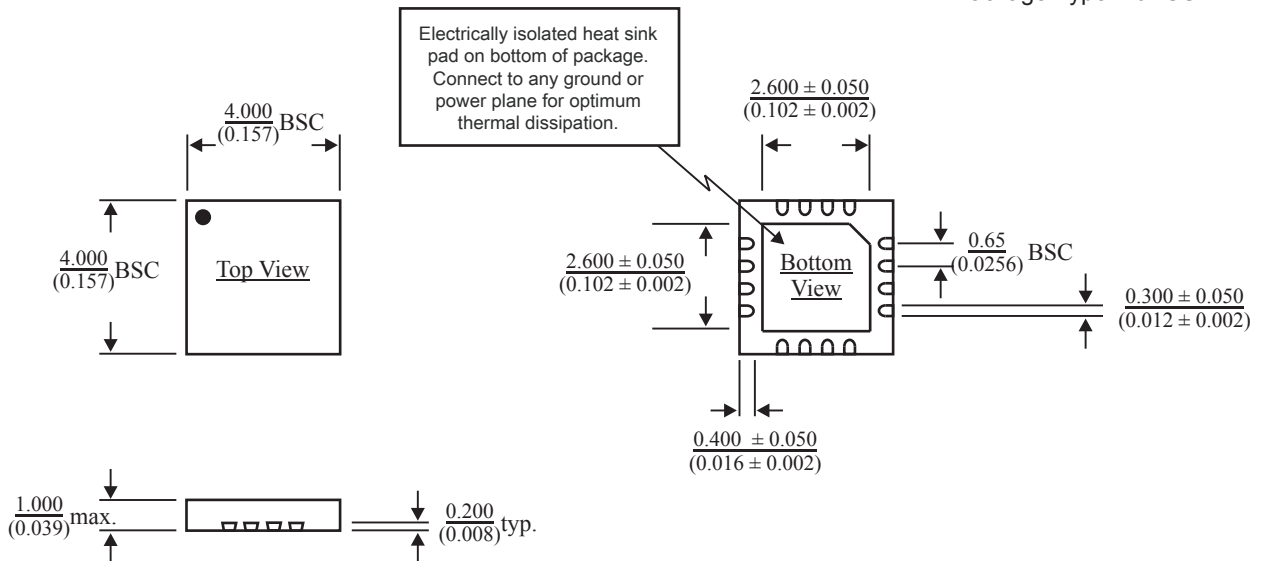


BSC = "Basic Spacing between Centers" is theoretical true position dimension and has no tolerance. (JEDEC Standard 95)

**16-PIN PLASTIC CHIP-SCALE PACKAGE (QFN)**

millimeters (inches)

Package Type: 16PCS



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

