24-bit Load Cell ADC - HX711 - Trēo™ Module

Module Features

- AVIA HX711
- RoHS Compliant
- Software Library
- NightShade Trēo™ Compatible
- Breakout Headers

HX711 Features

(from AVIA)

- 2 Input Channels
- Low Noise PGA
- Selectable Gain of 32, 64, and 128
- 80 Samples Per Second

Applications

- Strain Gauges
- Load Cells
- Weigh Scales

Trēo™ Compatibility

Electrical

Communication	GPIO
Max Current, 3.3V	2mA
Max Current, 5V	0mA

Mechanical

- 35mm x 35mm Outline
- 30mm x 30mm Hole Pattern
- M2.5 Mounting Holes

Description

The HX711 Trēo™ Module is a 24-bit Load Cell ADC module that that features AVIA's HX711 24-bit Load Cell ADC. It provides an excitation voltage and measures the output from the load cells with gains of 32, 64, or 128. This module is a part of the NightShade Treo system, patent pending.

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1 Summary

Load cells are comprised of four resistive strain gauge elements wired into a Wheatstone bridge circuit. The HX711 provides an excitation voltage for the Wheatstone bridge and then measures the resulting signal from the load cell. The output of the load cell can be wired to channel A or B. The HX711 sensor is setup by calling the begin() method at the start of the program. A measurement is started by calling the conversion() method. The conversion method also returns the last conversion result when it is called. An offset error can be compensated for with the setOffset() method. This offset will be subtracted from each measurement.

2 What is Trēo™?

NightShade Trēo is a system of electronic modules that have standardized mechanical, electrical, and software interfaces. It provides you with a way to quickly develop electronic systems around microprocessor development boards. The grid attachment system, common connector/cabling, and extensive cross-platform software library allow you more time to focus on your application. Trēo is supported with detailed documentation and CAD models for each device.

Learn more about Trēo here.

3 Electrical Characteristics

	Minimum	Nominal	Maximum
Voltages			
$V_{i/o}$ (PDSCK, DOUT)	-0.3V	-	3.6V
$V_{3.3V}$	3.1V	3.3V	3.5V
Measurement			
Sample Rate	10Hz	-	80Hz
Range	-51.5mV	-	+51.5mV
Precision	3nV/LSB	-	12nV/LSB
Error	-	-	0.3%
Operating Temperature	-25°C	-	+85°C

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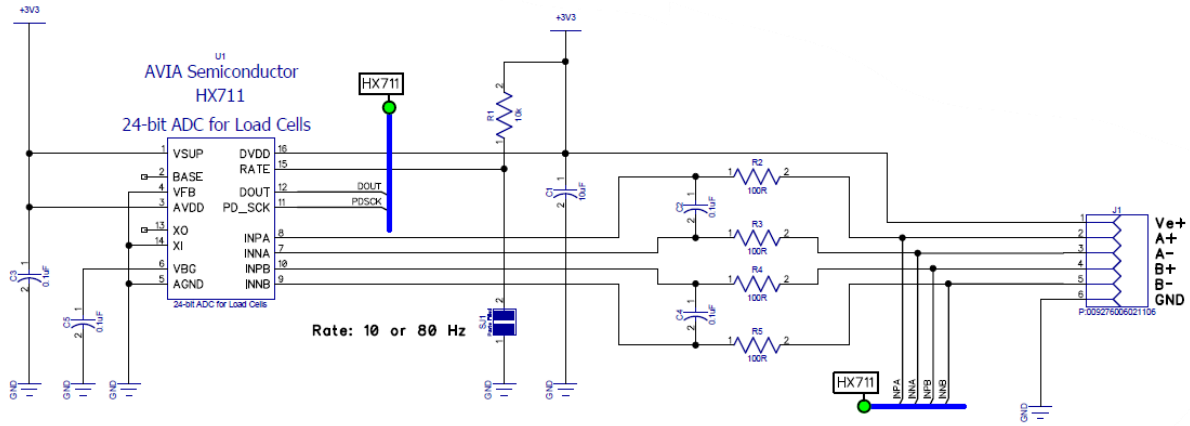
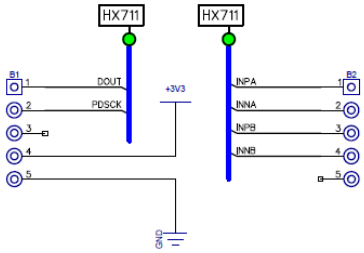
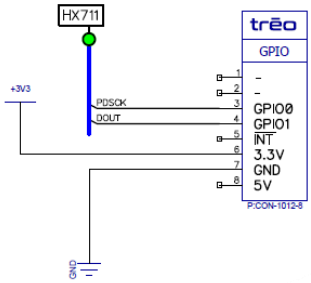
4 Electrical Schematic



Breakout Headers





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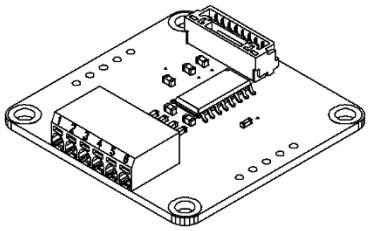
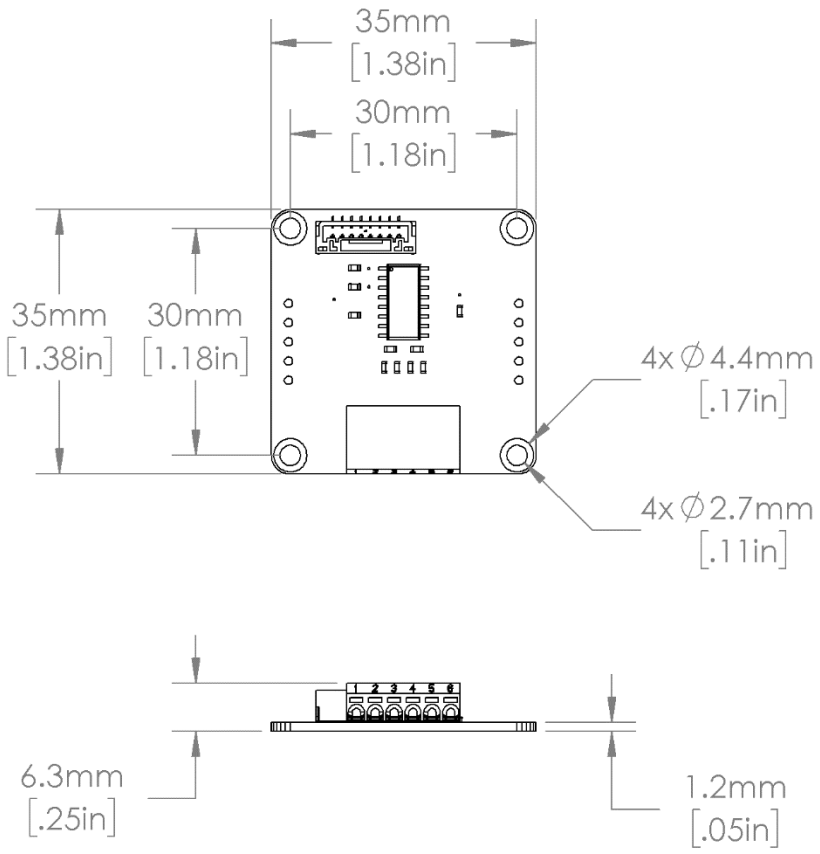
5 Mechanical Outline





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6 Example Arduino Program

```
/**********************************************************
  HX711_LoadCellAmplifier - NightShade_Treo by NightShade Electronics

  This sketch demonstrates the functionality of the
  NightShade Trēo HX711 load cell amplifier module.
  (NSE-1132-1) It prints the measured signal from channel A
  to Serial at 115200 baudrate.

  Created by Aaron D. Liebold
  on February 15, 2021

  Links:
  NightShade Trēo System: https://nightshade.net/treo
  Product Page: https://nightshade.net/product/treo-24-bit-load-cell-adc-hx711/

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  https://opensource.org/licenses/MIT
**********************************************************/

// Include NightShade Treo Library
#include <NightShade_Treo.h>

// Declare Objects
NightShade_Treo_HX711 sensor(5, 4);

void setup() {
  sensor.begin();
  Serial.begin(115200);

  // Tare sensor (5 reads)
  unsigned long tare = 0;
  for (int x=0; x<5; ++x) {
    tare += sensor.conversion(0);
  }
  sensor.setOffset(tare / 5);
}

void loop() {
  Serial.println(sensor.conversion(0));
  delay(1000);
}
```


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7 Library Overview (C++ & Python)

C++ Class

NightShade_Treo_HX711 <classObject>();

Python Module

<classObject> = NightShade_Treo_HX711()

7.1 Constructors

NightShade_Treo_HX711(int PDSCK_gpio0, int DOUT_gpio1)

Creates a HX711 object.

Arguments:

PDSCK_gpio0	GPIO pin number connected to PDSCK (GPIO0)
DOUT_gpio1	GPIO pin number connected to DOUT (GPIO1)

Returns:

Nothing

7.2 Methods

begin()

Initializes the HX711.

Arguments:

None

Returns:

Error	0 = Success

conversion(int mode)

Reads the last conversion result and starts a new ADC measurement. The *mode* parameter determines the channel and gain to be converted.

Arguments:

mode	0: Channel A – 64x gain 1: Channel A – 128x gain 2: Channel B – 64x gain

Returns:

Error	0 = Success

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enableSleep(int enable)

Enables sleep mode.

Arguments:

enable	true/false

Returns:

Error	0 = Success

setOffset(int offset)

Set a measurement offset for calibration.

Arguments:

offset	Value in LSB

readOffset()

Read the current offset value.

Arguments:

None

Returns:

Error	0 = Success

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