



## COMBO SENSOR TINYSHIELD (13-DOF) 9-AXIS, TEMPERATURE/HUMIDITY, PRESSURE, LIGHT

ASD2511-R-N-T-P-L

This TinyShield features four of our popular TinyShield Sensors on a single board!

**9-Axis IMU:** This sensor lets you measure 9 degrees of freedom (9DOF) with your TinyDuino and features the ST LSM9DS1 - a system-in-package featuring a 3D digital linear acceleration sensor, a 3D digital angular rate sensor, and a 3D digital magnetic sensor. The LSM9DS1 has a linear acceleration full scale of  $\pm 2g/\pm 4g/\pm 8/\pm 16$  g, a magnetic field full scale of  $\pm 4/\pm 8/\pm 12/\pm 16$  gauss and an angular rate of  $\pm 245/\pm 500/\pm 2000$  dps.

**Temperature/Humidity:** This sensor lets you measure temperature and humidity with the TinyDuino. Based around the Silicon Labs Si7020-A10 sensor, this allows for accurate temperature measurement ( $\pm 0.4C$ ) and precision relative humidity readings.

**Barometric Pressure:** This sensor allows you to measure barometric pressure (and determine altitude) and temperature with your TinyDuino. Based around the Bosch BMP280

sensor, this allows you to measure barometric pressure with a +/- 1hPa absolute accuracy, and temperature with a +/- 1.0C accuracy.

**Ambient Light:** This sensor features a TAOS TSL2572 Ambient Light Sensor, that approximates human eye response to light intensity under a variety of lighting conditions and through a variety of attenuation materials. Accurate ALS measurements are the result of TAOS' patented dual-diode technology and the UV rejection filter incorporated in the package. In addition, the operating range is extended to 60,000 lux in sunlight when the low-gain mode is used.

This TinyShield uses I2C communication and incorporates level shifters and a local power supply to ensure proper and safe operation over the entire TinyDuino operating voltage range up to 5V.

*To learn more about the **TinyDuino Platform**, click [here](#)*

## TECHNICAL DETAILS

*To see what other TinyShields this will work with or conflict with, check out the **TinyShield Compatibility Matrix***

### **ST LSM9DS1 9-Axis DOF Specs**

- 3 acceleration channels, 3 angular rate channels, 3 magnetic field channels
- $\pm 2/\pm 4/\pm 8/\pm 16$  g linear acceleration full scale
- $\pm 4/\pm 8/\pm 12/\pm 16$  gauss magnetic full scale
- $\pm 245/\pm 500/\pm 2000$  dps angular rate full scale
- 16-bit data output
- "Always-on" eco power mode down to 1.9 mA
- Embedded temperature sensor

- Embedded FIFO
- Position and motion detection functions
- Click/double-click recognition

### **Si7020-A10 Specs**

- Precision Relative Humidity Sensor
  - +-4% RH, 0-80% RH
  - 0 - 100% RH operating range
- High Accuracy Temperature Sensor
  - +-0.4C, -10 to +85C
- Factory Calibrated
- Integrated on-chip heater
- Excellent long term stability

### **Bosch BMP280 Barometric Pressure Sensor Specs**

- Pressure Range: 300 -> 1100 hPa (equiv to +9000 to -500m above/below sea level)
- Relative Accuracy: +/- 0.12 hPa, equiv to +/- 1m
- Absolute Accuracy: +/- 1 hPa
- Absolute Accuracy Temperature: +/- 1.0C

### **TAOS TSL2572 Ambient Light Sensor Specs**

- Approximates Human Eye Response
- 45,000,000:1 Dynamic Range
- Operation to 60,000 lux in Sunlight
- Package UV Rejection Filter
- Wide Magnetic Field Range (+/-8 Oe)
- Low Power – Active: 200uA, Wait: 90uA, Sleep: 2.2u

## TinyDuino Power Requirements

- Voltage: 3.0V - 5.5V
- Current: 5.1mA (Normal Mode). Due to the low current, this board can be run using the TinyDuino coin cell option

## Pins Used

- A5/SCL - I2C Serial Clock line
- A4/SDA - I2C Serial Data line

## Dimensions

- 20mm x 20mm (.787 inches x .787 inches)
- Max Height (from lower bottom TinyShield Connector to upper top TinyShield Connector): 5.11mm (0.201 inches)
- Weight: 1 gram (.04 ounces)

## NOTES

- You can also use this shield without the TinyDuino – there are 0.1" spaced connections for power, ground, and the two I2C signals along the side of the TinyShield to allow you to connect a different system. **Warning:** Revision 4 boards have a mistake on the silkscreen, the pin marked VCC is actually SCL, the pin marked SCL is actually SDA, and the pin marked SDA is actually VCC. If you connect this up the way it is marked you will not damage the board.

## DOWNLOADS

- ST LSM9DS1 product page
- Si7020 product page
- Bosch BMP280 Barometric Pressure product page
- TAOS TSL2572 product page
- Schematic
- Eagle Files
- Sample Arduino code