OSX – Open-SDI12-Blue

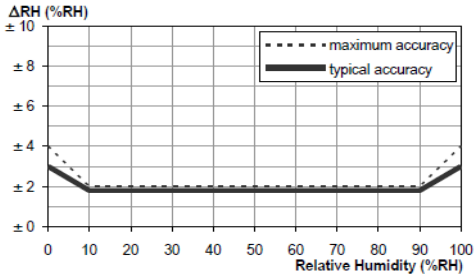
Version SHT2x Temperature/rel. Humidity, Type 340

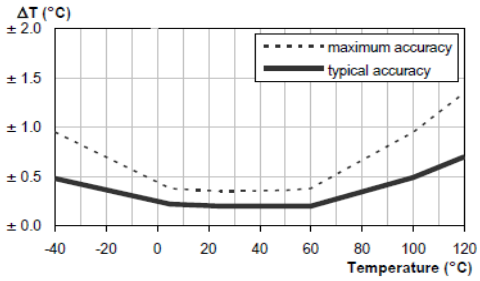
1 Quick setup

SHT2x (only sensor) in different versions

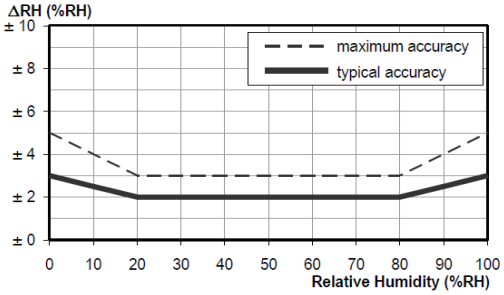
The OSX SHT2x is a SDI12 Interface to Industrial Standard Temperature / relative Humidity Sensors of SHT2x (Sensirion). The SHT2x exists in several versions. E.g:

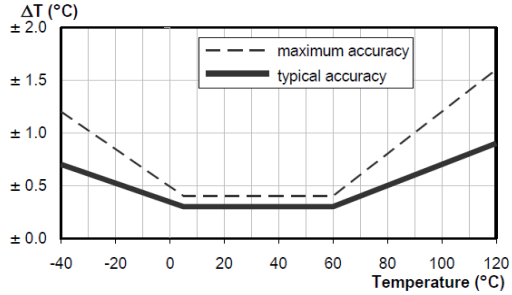
- **SHT25:** (precise) typical +/- 1.8% rel. Humidity and +/- 0.2°C Temperature accuraracy:





- **SHT21**: (very popular) typical +/- 2% rel. Humidity and +/- 0.3°C Temperature accuracy:





Normally a PTFE protection filter cap is recommended (externally or as membrane on the sensor)

Cable length to the SHT2x can be up to (max.) 1 mtr.

The parameters of the SDI12-Interface (based on Open-SDI12-Blue platform) can be changed via Bluetooth. Also it is possible to use a custom 2-point calibration.

SDI12-Cable (core cable ends):

BLACK: GND
BROWN: 3.6V-16V Supply
WHITE: SDI12 Signal

The command set is based on standard SDI12 (V1.3) command set. Most important commands:

aAn! : Change Address from ‘a’ to ‘n’. (a might be always be a ‘?’ as wild card).

aI! : Identify Node (should identify as ‘a13TT_SHT_A_0340_OSXxxxxxxxx’)

aM! : Start measure (also ‘aMC!’). This will start the measure. After finishing all measured values are available in an internal cache. Up to 2 data may be read with the „D“- command: a.) rel. Humidity (in %) and b.) Temperature (in °C)

aM1! : Start measure (also ‘aMC1!’). This will start the measure including Supply Voltage. After finishing all measured values are available in an internal cache. Up to 3 data may be read with the „D“- command:
a.) relative Humidity (in %), b.) Temperature (in °C) and c.) Voltage

aD0! : This will read the 1 to max. 3 measures from the preceding „M“- command.

Error codes (all values lower than -1000.000):

-1009.0: Sensor internal error (‘No Reply’) probably sensor or internal connection broken)
-10xx.0: Data corrupt (may water in the sensor or cable).
others: Displayed as text in BLX.JS or BlueShell

2 The Open-SDI12-Blue platform

OSX Sensors are based on an open platform:

Link: https://github.com/joembedded/Open-SDI12-Blue

3 Software

3.1.1 Software to access the sensor

OSX Sensors can accessed by SDI12 (V1.3) or Bluetooth BLE or SDI12 via Bluetooth.

- BlueShell for PC (Windows 10 / 11)
- BLX.JS (PC (Browsers: Chrome, Edge, Opera, …) or Android). No APP required!

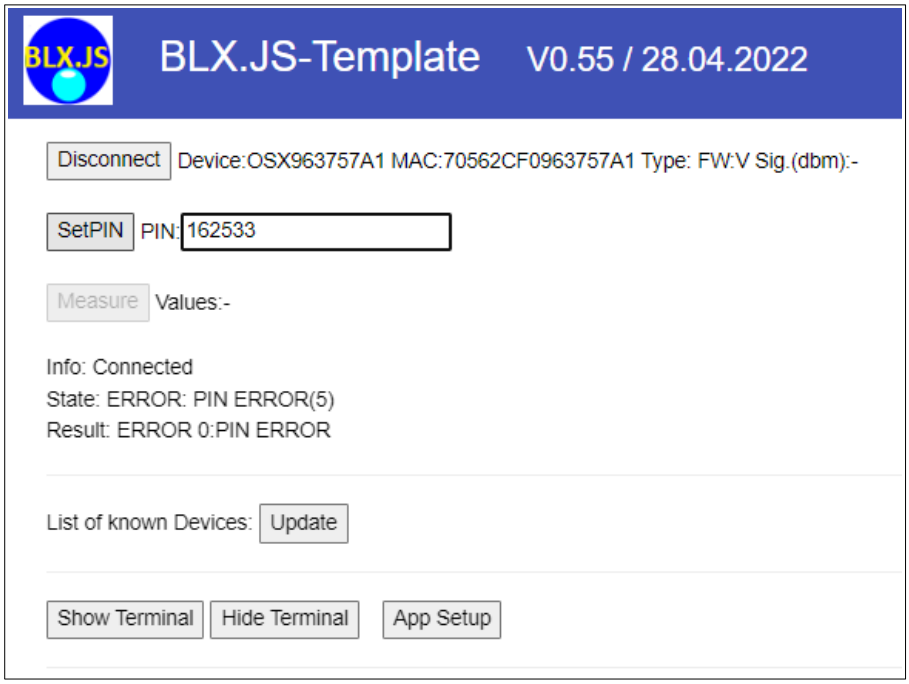
Link: Download Link BlueShell or BLX.JS

3.1.2 Software for SDI12

- A simple SDI12Term for PC (Windows) (connect SDI12 sensors via RS232)

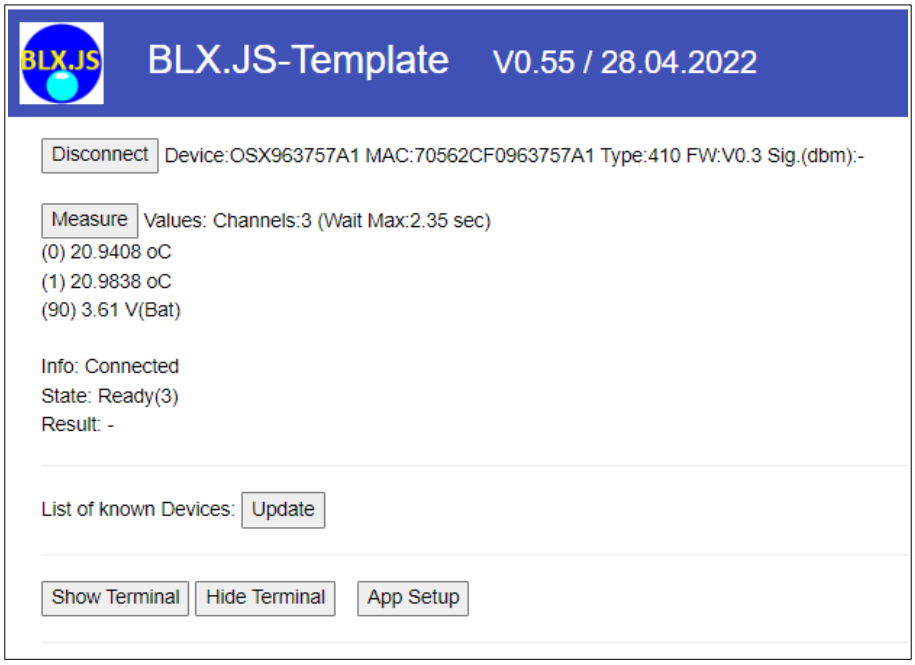
Link: https://github.com/joembedded/SDI12Term

4 Sample session BLX.JS



Enter PIN only required once!

The sensors are locked with a 6 digit PIN (Authentification method: Challenge-Response)



Measure (2 sensors connected (here another sensor type))

5 Commands

A selection of commands for setup (enter via BLX.JS or BlueShell Terminal)

5.1.1 Commands for this type (SHT2x Type 340):

Measure:

- M or MC or M1 or MC1 starts the measure, measure takes < 1 sec
- D replies the values

5.1.2 Standard commands for Open-SDI12-Blue (SDI12 via BLE):

All „SDI12 via BLE“ commands are preceded by ‚z‘:

> z?I!	SDI12 via BLE: Identify
Reply: '013TT_SHT_A_0340_OSX7740B474<CR><LF>'	
End: 'OK' (Runtime: 229 msec)	
> z?M!	SDI12: Measure
Reply: '00012<CR><LF>'	
Reply: '0<CR><LF>'	
End: 'OK' (Runtime: 358 msec)	
> z?D0!	SDI12: Values
Reply: '0+45.3+26.36<CR><LF>'	
End: 'OK' (Runtime: 302 msec)	
> z?MC!	SDI12: Measure+CRC
Reply: '00012<CR><LF>'	
Reply: '0<CR><LF>'	
End: 'OK' (Runtime: 387 msec)	
> z?D0!	SDI12: ‚CAa‘ is CRC
Reply: '0+45.3+26.37CAa<CR><LF>'	
End: 'OK' (Runtime: 290 msec)	
> z?XDevice!	SDI12: XDevice
Reply: '0M:2299983A7740B474,T:340,V1.0, P:321144!<CR><LF>'	SDI12: Red: Dev.PIN
End: 'OK' (Runtime: 299 msec)	
> z?XFactoryReset!	SDI12: Factors Reset:
Disconnected while Busy('z?XFactoryReset!')	SDI12: New setup
ERROR: Disconnected ('z?XFactoryReset!')	SDI12: required!

5.1.3 Some standard commands for BLX.JS (not available with BlueShell):

(Remark: BLX.JS is our BLE driver written in JavaScript, it could easily be used with other HTML too).

> .a Audio: RSSI: OFF, Term: ON	.a or .audio: „Finder♪“
> .audio 1 1 Audio: RSSI: ON, Term: ON	Audio & Finder♪ ‚ON‘
> .firmware Select new firmware (*.sec)...	Secure firmware update

5.1.4 Special commands for Open-SDI12-Blue (SDI12 via BLE):

Sensor setup / scan commands:

Important: our sensors are are delivered “ready-2-run” and no special setup is required (except e.g. after Factory Reset or if sensor configuration was changed). The following commands are only listed for technical completeness.

- Each channel has 2 coefficients for (optional) user calibration.
  By default these coefficients are 1.0 (Multi) and 0.0 (Offset), this means the values of the sensor are not changed. Since the SHT2x sensors are internally factory calibrated, user calibration coefficients are normally also not required. Mentioned only for completeness.
- The 4 Coefficients:
  Formula is (BLX standard): Formula: VALUE = (MEASURED * Multi) – Offset.
  K0: Humidity Multi (Default: 1.0)
  K1: Humidity Offset (Default: 0.0)
  K2: Temperature Multi (Default: 1.0)
  K3: Temperature Offset (Default: 0.0)
- The “Write” command writes changed parameters to Flash.

In this example K3 (Offset for Temperature) is ‘adjusted’ to display 1.23°C less:

> e	Measure
Measure (2 Channels in 300 msec) (0)43.9 %rH (1)26.47 oC End: 'OK' (Runtime: 564 msec)	
> z?XK3!	Coefficient for Temperature
Reply: '0K3=0.000000<CR><LF>' End: 'OK' (Runtime: 271 msec)	
> z?XK3=1.23!	Decrease Temp. by 1.23°C
Reply: '0K3=1.230000<CR><LF>' End: 'OK' (Runtime: 191 msec)	
> e	And check result
Measure (2 Channels in 300 msec) (0)43.8 %rH (1)25.24 oC	
> z?XWrite!	Save Settings to Flash
Reply: '0<CR><LF>' End: 'OK' (Runtime: 162 msec)	

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6 Power Supply

The OSX Sensor works from 2.8V to 16V (see Open-SDI12-Blue documentation).

However, for SHT2x at least 3.3V are required, recommended: 3.6V-16V

Measure: <5mA for ca. 500 msec

Operating Temperature: -40°C - +85°C

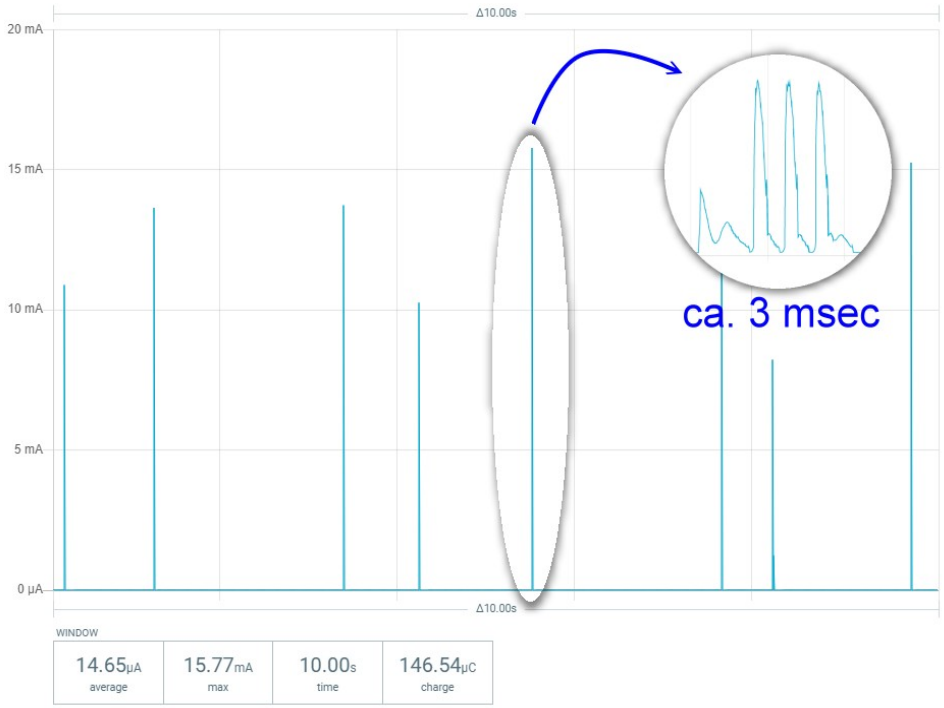
6.1 Power Profile

6.1.1 Power Up Sequence

The Sensor is ready after ca. 250 msec.

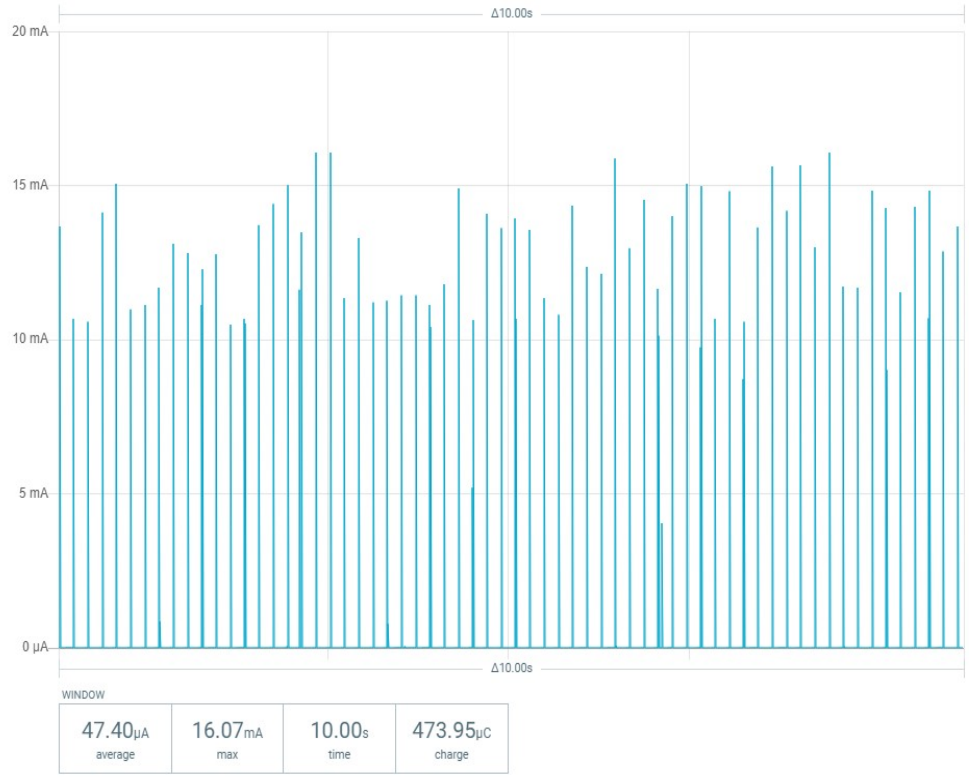
6.1.2 Advertising (in deep sleep)

Average power consumption in deep sleep is <15 µA @ 4V



Advertising power consumption (one peak zoomed)

6.2 Connected Mode



Connected power consumption

In Connected Mode (active BLE connection) the average power consumption is <50 µA @ 4V

7 Compliance (Version: SHT2x)

7.1 Compliance: CE, RoHS

- EN 55022 Emission, class B < 30 dBµV/m (0.03...1 GHz)
- EN 61000-4-2 Electrostatic discharge 4 kV contact / 8 kV air
- EN 61000-4-3 Irradiated RF 10V/m (0.1...1 GHz)
- EN 61000-4-4 Transients (burst) 4 kV
- EN 301 489-1 V2.1.1 and EN 301 489-17 V3.1.1 EMC
- EN 300 328 V2.1.1 EN 300 330 V2.1.1 Radio Emission
- Bluetooth SIG listed: ID 138612

The sensor OSX – Version SHT2x, Type 340 complies with the essential requirements of Radio Equipment Directive (RED) 2014/53/EU and with the Directive 2011/65/EU (EU RoHS 2) and its amendment Directive (EU) 2015/863 (EU RoHS 3).

Manufacturers:

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