CAIMANICS

EzTemp&RH Rev 1.0

EzTemp&RH is a temperature and relative humidity sensor that works using the serial port. It features a precision 1% NTC thermistor and a professional Honeywell HIH5030 humidity sensor. Communication and signal conditioning is performed on-board with a low-power PSoC4 ARM Cortex-M0 with upgradeable firmware via bootloader.

Features

- 3.3V operation.
- Temperature with 0.1 °C degree resolution.
- Relative humidity with 0.1% resolution.
- Acquisition of external signal.
- Serial communication over UART.
- Upgradeable firmware.
- Design files under the MIT OpenSource License.

Input/Output

P1	3.3V	3.3V power supply
	TX	TX pin of the sensor. Connect to RX pin on the host device.
	RX	RX pin of the sensor. Connect to TX pin on the host device.
	GND	Connect to ground.
P2	3.3V	Pin to supply power to an external circuit.
	EXT	Input of external signal.
	EN	'Enable' signal for the external circuit. This pin goes high 70ms before the external signal is acquired and goes back to low immediately after.
	GND	Connect to ground.
P3	SWD	Header for programming using the 5pin header on Cypress MiniProg-3

Warning: *Failing to connect 3.3V and GND properly might make the device unusable.*
Do not invert polarization!

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Working ratings

	Min	Typ	Max	Unit
Input Voltage (VCC)	2.8	3.3	3.3 *	V
Temperature	-20	25	+80	°C
Humidity	0	-	100	%
External Input	GND		VCC	

* Tolerable input voltage without breaking the device is 5.5V.

UART Configuration

EzTemp&RH communicates over UART with an external host:

Data rate	9600 bps
Data bits	8 bits
Parity	None
Stop bits	1
Flow control	None

Communication Protocol

Packet description

EzTemp&RH responds to 1-byte ASCII commands.

Response packet contains the command echo, payload (if applicable) and checksum for data integrity.

Cmd Echo	PAYLOAD	Checksum

Protocol

After successfully receiving a command, the device responds with the same byte of the command. If response carries any data, it is sent *most significant byte* first. The last byte is the checksum.

Checksum is calculated subtracting the precedent bytes to 0xFF.

Commands

Below are the available commands and their responses. Examples are at 25 °C (77 F), 50% RH and 1023 ADC counts out of 2047 for the external signal.

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Command 'c'
Get temperature in Celsius degrees.

Response:

Byte	0	1	2	3
Content	Cmd Echo	Temperature	Checksum	-
Example	0x63 ('c')	0x19	0x83	-

Command 'd'
Get temperature in Celsius degrees with 0.1 °C resolution. Returns temperature multiplied by 10.

Response:

Byte	0	1	2	3
Content	Cmd Echo	Temperature		Checksum
Example	0x64 ('d')	0x00	0xFA	0x05

Command 'f'
Get temperature in Fahrenheit.

Response:

Byte	0	1	2	3
Content	Cmd Echo	Temperature	Checksum	-
Example	0x66 ('f')	0x4D	0x4C	-

Command 'g'
Get temperature in Fahrenheit with 0.1 °C resolution. Returns temperature multiplied by 10.

Response:

Byte	0	1	2	3
Content	Cmd Echo	Temperature		Checksum
Example	0x67 ('g')	0x03	0x02	0x8E

Command 'h'
Get relative humidity with 1% resolution.

Response:

Byte	0	1	2	3
Content	Cmd Echo	RH	Checksum	-
Example	0x68 ('h')	0x32	0x65	-

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Command 'i'

Get relative humidity with 0.1% resolution. Returns relative humidity multiplied by 10.

Response:

Byte	0	1	2	3
Content	Cmd Echo	RH		Checksum
Example	0x69 ('i')	0x01	0xF4	0xA1

Command 'x'

Get ADC counts for external signal. Maximum ADC counts is 2047, so signal voltage is: counts * 3.3V / 2047.

Response:

Byte	0	1	2	3
Content	Cmd Echo	ADC counts		Checksum
Example	0x78 ('x')	0x03	0xFF	0xE4

Firmware upgrade

(1) Remove power from device.
(2) Tie EN pin to the 3.3V pin next to it using a jumper or wire.
(3) Connect power. Now the device is on bootloader mode.
(4) Open the Cypress Bootloader Host * and flash new firmware.
(5) Remove EN jumper and reset power.

* Bootloader Host can be found on Cypress PSoC Creator, under "Tools > Bootloader Host…".

Revision

Jan 21, 2015.	Initial publication.