Low Power Measurement Mode
For SHTC3 Humidity and Temperature Sensor

Introduction

For applications requiring minimal power consumption, the SHTC3 provides a dedicated low power measurement mode with a specific set of commands. This application note provides specifications, information and usage examples for this measurement mode to help optimize repeatability while maintaining ultra-low power consumption.

Characteristics of the Low Power Mode

The SHTC3 provides a low power measurement mode with a specific set of commands (see Table 1). Using the low power mode significantly shortens the measurement duration and thus minimizes the energy consumption per measurement (see Table 2).

Measurement Commands for Low Power Mode			
Clock Stretching Enabled		Clock Stretching Disabled	
Read T First	Read H First	Read T First	Read H First
0x6458	0x44DE	0x609C	0x401A

Table 1 Measurement commands for low power measurement mode.

The benefit of ultra-low power consumption comes at the cost of reduced repeatability of the sensor signals: while the impact on the relative humidity signal is negligible and does not affect accuracy, it has an effect on temperature accuracy, as stated in Table 2.

Default conditions of 25 °C and 3.3 V supply voltage apply to values in the table below, unless otherwise stated.

Parameter	Low Power Mode	Normal Mode	Units
Measurement Duration	0.7	10.8	ms
Supply current during measurement	270	430	µA
Average supply current @ 1 measurement per second	0.5	4.9	µA
Average power consumption @ 1 measurement per second	1.6	16.3	µW
Energy consumption per measurement at 3.3 V	0.62	15.4	µJ
Energy consumption per measurement at 1.8 V	0.34	8.4	µJ
RH accuracy tolerance	±2.0	±2.0	%RH
T accuracy tolerance	±0.8	±0.2	°C
RH repeatability[1]	0.4	0.1	%RH
T repeatability[1]	0.4	0.1	°C

Table 2 Characteristic values for measurements in low power mode.

Note that when using the low power mode Sensirion recommends keeping the I2C bus free of communication while the SHTC3 is measuring. Activity on the SCL line during the measurement may further affect the repeatability of the sensor signals.

Usage Examples of Low Power Mode

A good way to find the best trade-off between power consumption and overall accuracy for a specific application is to alternate between measurements in low power mode and measurements in normal mode. Taking measurements in low power mode whenever conditions are not critical for the application helps save power during uncritical periods.

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[1] The stated repeatability is 3 times the standard deviation (3σ) of multiple consecutive measurement values at constant conditions and is a measure for the noise on the physical sensor output.

Whenever conditions become critical for the application and best possible repeatability of the sensor signals is required, measurements can be taken in normal mode. See examples below for further illustration:

Example 1

Application: smart thermostat

- Take periodic measurements in low power mode to save power.

- Change to normal mode if a significant change is seen on the sensor signals (indicating that strong RH/T change is happening in the environment) to get best repeatability during critical phase.

- Change back to low power mode after environmental conditions have stabilized.

Example 2

Application: cold chain data logger

- Take periodic measurements in low power mode to save power.

- Change to normal mode if sensor readings get within 1°C of excursion limits defined by the application (e.g. 2°C low limit, 8°C high limit) in order to monitor potential excursions with best possible repeatability.

- Change back to low power mode as soon as sensor readings are back within excursion limits by 1°C.

Of course, there are many other smart ways to combine normal mode and low power mode measurements, depending on the application the sensor is used in.

Revision history

Date	Revision	Changes
May 2018	1	Initial release

Important Notices

Warning, Personal Injury

Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.
See application note "ESD, Latchup and EMC" for more information.

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