CRC Checksum Calculation
For Safe Communication with SHT2x Sensors

Preface

SHT2x humidity and temperature sensors can communicate with the standard I2C protocol as well as the Sensirion specific SHT1x/7x protocol. In both cases, communication can be verified using a CRC error detection scheme. This document provides the information needed for implementation of CRC for both communication protocols.

Basic Considerations

CRC stands for Cyclic Redundancy Check. It is one of the most effective error detection schemes and requires a minimal amount of hardware.

The types of errors that are detectable with CRC that is implemented in SHT2x sensors are:

- Any odd number of errors anywhere within the data transmission
- All double-bit errors anywhere within the transmission
- Any cluster of errors that can be contained within an 8-bit "window" (1-8 bits incorrect)
- Most larger clusters of errors

CRC for SHT2x Sensors Using I2C Protocol

When SHT2x sensors are run by communicating with the standard I2C protocol, an 8 bit CRC can be used to detect transmission errors. The CRC covers all read data transmitted by the sensor. CRC properties for SHT2x sensors communicating with I2C protocol are listed in **Table 1**. The implementation of the CRC routine is included in the SHT2x sample code which can be downloaded from www.sensirion.com/sht-downloadcenter.

CRC with I2C Protocol	
Generator polynomial	$x^8 + x^5 + x^4 + 1$
Initialization	'00000000'
Protected data	read data
Final operation	none

Table 1 CRC properties for SHT2x communicating with I2C protocol.

CRC for SHT2x Sensors Using SHT1x/7x Protocol (SBus)

SHT2x sensors may also be run by communicating with the Sensirion specific communication protocol used for SHT1x and SHT7x (SBus). In this case, a specific CRC routine must be applied. While the generator polynomial is identical, a special initialization is used, which contains values of the user register. Further differences are the extent of CRC protected data as well as the final operation. For more information on CRC calculation with SHT2x sensors using SHT1x/7x protocol, please consult Sensirion's Application Note "CRC Calucation for SHT1x/7x Sensors". CRC properties for SHT2x sensors communicating with SHT1x/7x protocol are listed in **Table 2**.

CRC with SHT1x/7x Protocol (SBus)	
Generator Polynomial	$x^8 + x^5 + x^4 + 1$
Initialization	user register bits [0:2] & '00000' ($s_0s_1s_20'0000$)
Protected data	last command and read data
Final operation	reverse bit order

Table 2 CRC properties for SHT2x communicating with SHT1x/7x protocol.

Revision History

Date	Version	Changes
December 2011	1	Initial release

Headquarters and Subsidiaries

SENSIRION AG
Laubisruetistr. 50
CH-8712 Staefa ZH
Switzerland

phone: +41 44 306 40 00
fax: +41 44 306 40 30
info@sensirion.com
www.sensirion.com

Sensirion AG (Germany)
phone: +41 44 927 11 66
info@sensirion.com
www.sensirion.com

Sensirion Inc., USA
phone: +1 805 409 4900
info_us@sensirion.com
www.sensirion.com

Sensirion Japan Co. Ltd.
phone: +81 3 3444 4940
info@sensirion.co.jp
www.sensirion.co.jp

Sensirion Korea Co. Ltd.
phone: +82 31 345 0031 3
info@sensirion.co.kr
www.sensirion.co.kr

Sensirion China Co. Ltd.
phone: +86 755 8252 1501
info@sensirion.com.cn
www.sensirion.com.cn

To find your local representative, please visit www.sensirion.com/contact