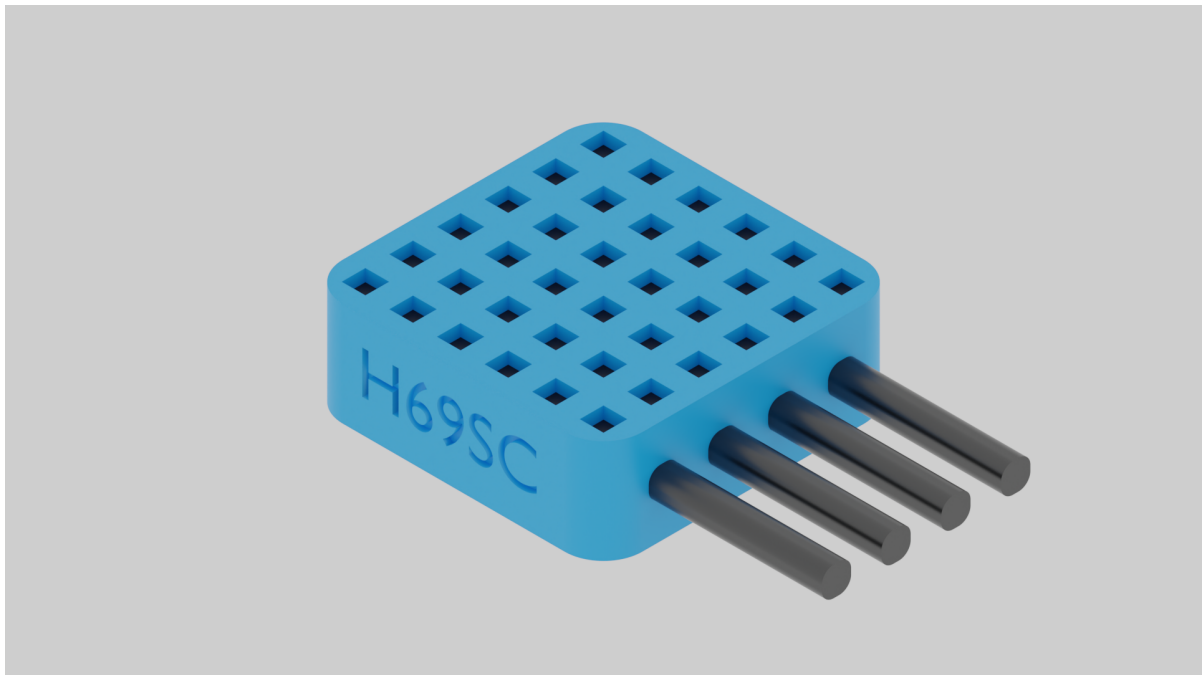# H69SC Humidity

H69SC Humidity sensor features a humidity sensor complex with a calibrated digital signal output.

1. Introduction

H69SC Humidity sensor features a humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

Each H69SC element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmes in the OTP memory, which are used by the sensor's internal signal detecting process. The communication protocol interface makes system integration quick and easy. Its small size, low power consuption and up-to-20 meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package. It is convenient to connect and special packages can be provided according to users' request.

2. Technical Specifications:

Overview

Item	Measurement range	Humidity accuracy	Resolution	Package
H69SC	20-90%RH	±5%RH	1	4 pin single row

Detailed specifications:

Parameters	Conditions	Minimum	Typical	Maximum
Humidity resolution		1%RH	1%RH	1%RH
Repeatability			±1%RH	
Accuracy	25°C		±4%RH	
Accuracy	0-50°C			±5%RH
Interchangeability	Fully			
Measurement range #1	0°C	30%RH		90%RH
Measurement range #2	25°C	20%RH		90%RH
Measurement range #3	50°C	20%RH		80%RH
Response time [seconds]	1/e(63%)25°C, 1m/s Air		Instantaneous	
Hysteresis			±1%RH	
Long-term stability	Typical		±1%RH/year	

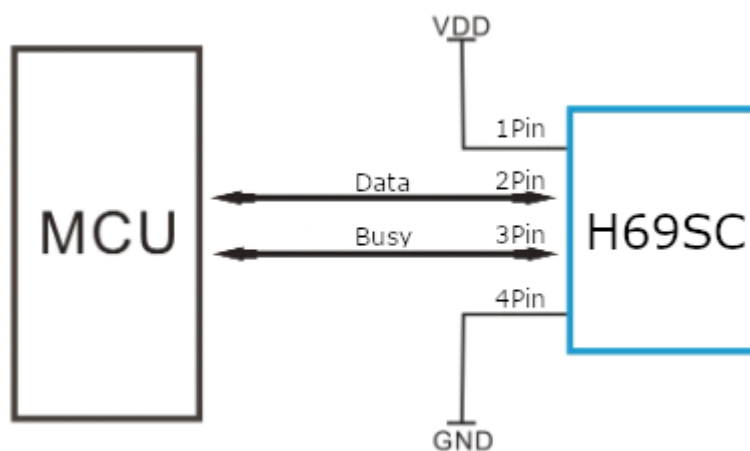# 3. Typical application (Figure 1)

Figure 1 Typical Application

4. Power and Pin

H69SC's power supply is 3-5.5V. When power is supplied to the sensor, do not send any instruction to the sensor in within one second in order to pass the unstable status. One capacitor valued 100nF can be added between VDD and GND for power filtering.

5. Communication process: serial interface (Double wire Two-Way)

Double-bus data format is used for communication and synchronization between MCU and H69SC sensor. one communication process is about 4ms.

Data consist of instruction and data. A complete data transmission is 16bit, and the sensor sends lower data bit first.

How the data should be sended: 8 bit instruction + 8 bit parameter; each bit value is acquired when pin 2 value is raising.

5.1 Overall communication process

When MCU sends a start signal, H69SC changes from the low-power-consuption mode to the running-mode, waiting for MCU completing the start signal. Is possible to set the sensor to be always ready to send.

5.2 MCU sends out start signal to H69SC

To activate the sensor, it needs a signal combination. The table below has the values in order to understand the sequence.

Time	Busy	Data
T	0	1
T+1	1	1
T+2	0	1
T+3	1	0

5.3 MCU sends instruction to H69SC

H69SC works with little commands in 2 byte format. The highest part contain the instruction (15 to 8 bits), the lowest part the value associated (7 to 0). The bits from 11 to 8 are ignored.

To know what instruction are supported, see the table of instruction below.

Name	OPCODE	Description
SET SRC REG	1010	Set source register address

Name	OPCODE	Description
SET DST REG	1011	Set destination register address
GET SRC REG	1110	Get SRC REG value
GET DST REG	1111	Get DST REG value
SET PARAM REG	1000	Set value of param register
GET PARAM REG	1001	Get PARAM REG value
MOVE	0100	Move value from address pointed by SRC into the register pointed in DST
CLEAR	0001	Clear param register
AND	0010	Execute and operation between src and dst register; save result into dst register
OR	0011	Execute or operation between src and dst register; save result into dst register
NOT	0101	Execute not operation on dst register
GETV	0110	Get humidity value

List of registers avaiable

Name	Addreds	Description	Default value
A	01000100	General purpose register A	0
B	01000010	General purpose register B	0
ORDER	01001100	Byte sending order	Big endian
MODE	10001100	Measurement mode	8bit size
DELAY	00000111	Time to wait before answering	0
POWER SAVE	00000001	Power save mode	SAVE
PARAM	00000011	Register for parameter, directly accessible from OPCODE	0

5.4 H69SC sends responde to MCU

H69SC sends various type of response: depends of it is configured. Each configuration have in common a response len of 16bit (or 2 byte).

To know what is sended by the sensor, see the tables in the next section.

5.5 Register values

DELAY values

The values accepted by delay register are unsigned char (1 byte).

POWER SAVE values

Name	Hex value	Description
SAVE	0x10	Require to be woke (view section 5.2 to know how to wake up)
ALWAYS_ACTIVE	0x69	The sensor is always ready

ORDER values

Name	Hex value	Description
Little endian	0x10	Set the byte order to little endian
Big endian	0x20	Set the byte order to big endian

MODE values

Name	Hex value	Description
8bit	0x10	The values are converted between 0 and 255
16bit	0x20	The values are converted between 0 and 65535

6. Electrical characteristics

VDD = 5V, TA=25°C (unless otherwise stated)

Description	Type	Minimum	Typical	Maximum
Power supply	DC	3V	5V	5.5V
Current supply	Measuring	0.5mA		2.5mA
Current supply	Average	0.2mA		1mA
Current supply	Standby	100uA		150uA
Sampling period [seconds]			1ns	

7. Attentions of application

(1) Operating conditions

Applying the H69Sc sensor beyond its working range stated in this datasheet can result in 3%RH signal shift/discrepancy. The H69SC sensor can recover to the calibrated status gradually when it gets back to the normal operating condition and works whithin its range. Please refer to (3) of this section to accelerate its recovery. Please be aware that operating the H69SC sensor in the non-normal working conditions will accelerate sensor's aging process.

(2) Attention to chemical materials

Vapor from chemical material may interfere with H69SC's sensitive-elements and debase its sensitivity. A high degree of chemical contamination can permanently damage the sensor.

(3) Restoration process when (1) & (2) happen

1. Step one: keep the H69SC sensor at the condition of temperature 50-60°C, humidity <10%RH for 2 hours;
2. Step two: keep the H69SC sensor at the condition of temperature 20-30°C, humidity >70%RH for 5 hours.

(4) Connection wires

The quality of connection wires will affect the quality and distance of communication and high quality shielding-wire is recommended.