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SENSIRION
THE SENSOR COMPANY

Datasheet SHT3x-LSS

Humidity and Temperature Sensor

- Fully calibrated, digital output
- Wide supply voltage range, from 2.4 to 5.5 V
- Sensibus Communication
- Typical accuracy of ± 2%RH and ± 0.3°C
- Compatible with the SHT1x/SHT7x protocol
- Tiny 8-Pin DFN package



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Product Summary

SHT3x-LSS is the next generation of Sensirion's temperature and humidity sensors. It builds on a new CMOSens® sensor chip that is at the heart of Sensirion's new humidity and temperature platform. The SHT3x-LSS has increased intelligence, reliability and improved accuracy specifications compared to its predecessor. Its functionality includes enhanced signal processing, compatible with the SHT1x/SHT7x communication protocol. The DFN package has a footprint of 2.5 x 2.5 mm while keeping a height of 0.9 mm. This allows for integration of the SHT3x-LSS into a great variety of applications. Additionally, the wide supply voltage range of 2.4 to 5.5 V guarantees compatibility with diverse assembly situations. All in all, the SHT3x-LSS incorporates 15 years of knowledge of Sensirion, the leader in the humidity sensor industry.

Benefits of Sensirion's CMOSens® Technology

- High reliability and long-term stability
- Industry-proven technology with a track record of more than 15 years
- Designed for mass production
- High process capability
- Low signal noise

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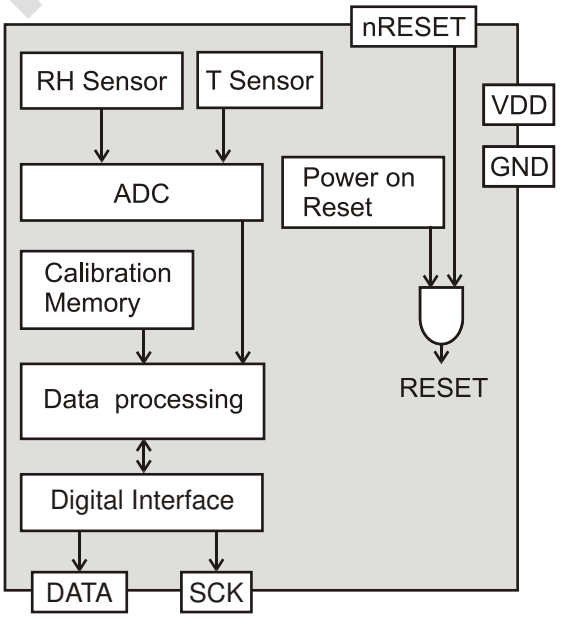


Figure 1 Functional block diagram of the SHT3x-LSS. The sensor signals for humidity and temperature are factory calibrated and compensated for supply voltage dependencies.

1 Sensor Performance

1.1 Humidity Sensor Performance

Parameter	Conditions	Value	Units
SHT30 Accuracy tolerance[1]	Typ.	±3	%RH
	Max.	Figure 2	%RH
SHT31 Accuracy tolerance[1]	Typ.	±2	%RH
	Max.	Figure 4	%RH
Repeatability[2]		0.2	%RH
Resolution		12/8	bit
Hysteresis	25°C	±0.8	%RH
Specified range[3]	extended[4]	0 to 100	%RH
Response time[5]	63%	8	s
Long-term drift	Typ.[6]	<0.25	%RH/yr

Table 1 Humidity sensor specification

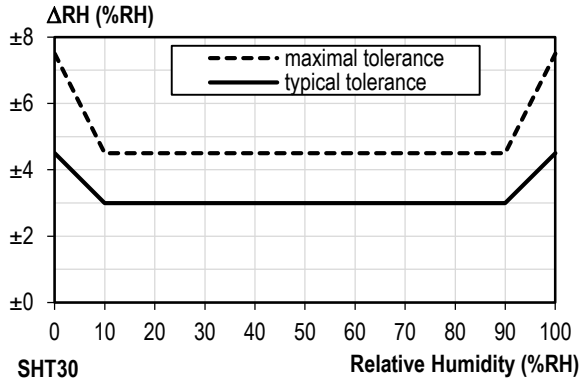


Figure 2 Tolerance of RH at 25°C for SHT30

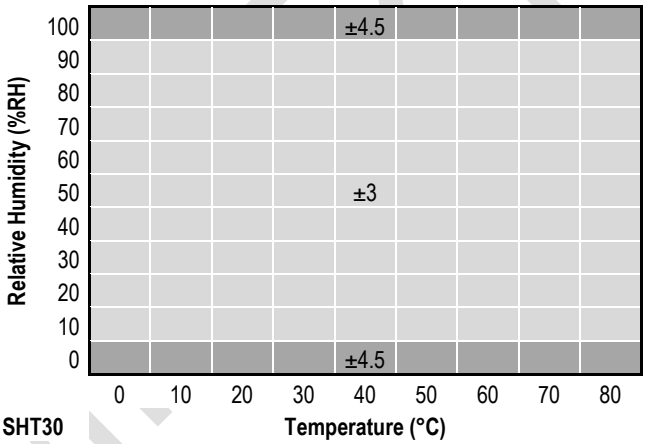


Figure 3 Typical tolerance of RH over T for SHT30

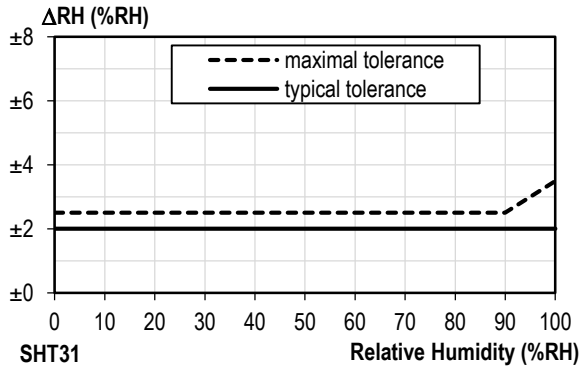


Figure 4 Tolerance of RH at 25°C for SHT31

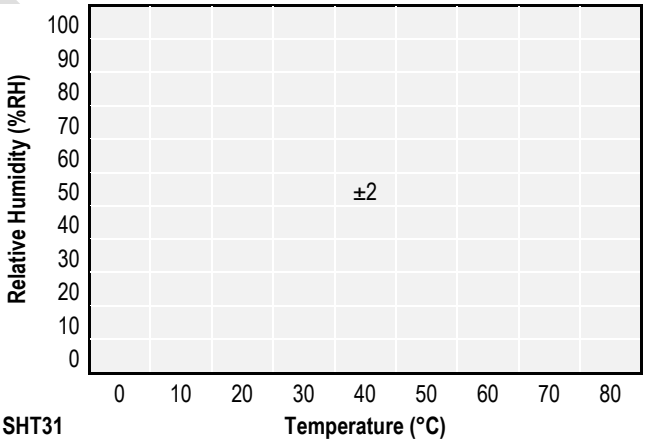


Figure 5 Typical tolerance of RH over T for SHT31

[1] For definition of typical and maximum accuracy tolerance, please refer to the document "Sensirion Humidity Sensor Specification Statement".

[2] The stated repeatability is 3 times the standard deviation (3σ) of multiple consecutive measurements at constant conditions. It is a measure for the noise on the physical sensor output. Repeatability is stated for best possible resolution setting.

[3] Specified range refers to the range for which the humidity or temperature sensor specification is guaranteed.

[4] For details about recommended humidity and temperature operating range, please refer to section 1.2.

[5] Time for achieving 63% of a humidity step function, valid at 25°C and 1m/s airflow. Humidity response time in the application depends on the design-in of the sensor.

[6] See section 1.2

Temperature Sensor Performance

Parameter	Condition	Value	Units
Accuracy tolerance[1]	Typ. 10 to +55	±0.3	°C
Repeatability[2]		0.1	°C
Resolution		14/12	bit
Specified Range	-	-40 to 125	°C
Response time [7]	63%	>2	s
Long Term Drift	max	<0.03	°C/yr

Table 2 Temperature sensor specification0

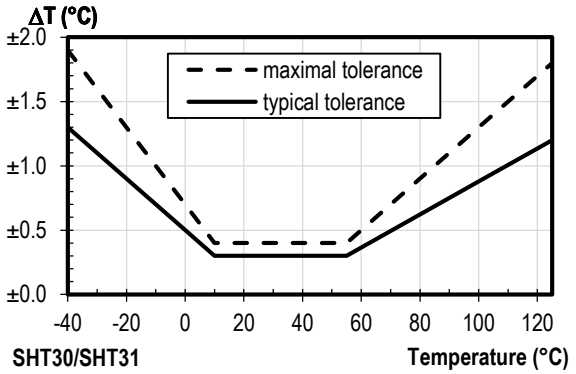


Figure 6 Accuracy of the relative humidity in °C for the SHT30 and SHT31 not supply voltage dependent

1.2 Recommended Operating Condition

The sensor shows best performance when operated within recommended normal temperature and humidity range of 5 – 60 °C and 20 – 80 %RH, respectively. Long term exposure to conditions outside normal range, especially at high humidity, may temporarily offset the RH signal (e.g.+3%RH after 60h at >80%RH). After returning into the normal temperature and humidity range the sensor will slowly come back to calibration state by itself. Prolonged exposure to extreme conditions may accelerate ageing. To ensure stable operation of the humidity sensor, the conditions described in the document "SHTxx Assembly of SMD Packages", section "Storage and Handling Instructions" regarding exposure to volatile organic compounds have to be met. Please note as well that this does apply not only to transportation and manufacturing, but also to operation of the SHT3x-LSS.

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[7] Temperature response times strongly depends on the design-in of the sensor in the final application. Minimal response time can be achieved when the thermalized sensor at T1 is placed on a well conducting surface with temperature T2.

2 Specifications

2.1 Electrical Specifications

Parameter	Symbol	Condition	Min	Typ.	Max	Units	Comments
Supply voltage	V_{DD}		2.4	5	5.5	V	-
Power-up/down level	V_{POR}		2.2	2.28	2.35	V	
Supply current	I_{DD}	Not measuring	110	140	330	µA	Current when sensor is not performing a measurement.
		Measuring	500	800	1700	µA	Current consumption while sensor is measuring (valid for all resolutions)
		Average		150	340	µA	Average current consumption (operation with one measurement per second all resolutions)
Low level Output Voltage	V_{OL}	I_{OL} @ 3 mA VDD = 5V		210	340	mV	
		IOL @ 3 mA VDD = 3.3V		280	460	mV	
High level output voltage	V_{OH}	R_P < 25 kΩ	90%		100%	VDD	
Low level input voltage	V_{IL}		0		20%	VDD	Negative going
High level input voltage	V_{IH}		80%		100%	VDD	Positive going
Input current on pads					1	µA	
Heater power	P_{Heater}	Heater running	5		25	mW	Depending on the supply voltage

Table 3 Electrical specifications, Specification are valid at 25°C and typical VDD

2.2 Timing Specification for the Sensor System

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	Comments
Power-up time	t_{PU}	After hard reset, $V_{DD} \geq V_{POR}$		0.7	1	ms	Time between V_{DD} reaching V_{POR} and sensor entering idle state
Soft reset time	t_{SR}	After soft reset.		0.7	1	ms	Time between ACK of soft reset command and sensor entering idle state
Duration of reset pulse			350			ns	
Measurement duration	$t_{MEAS,l}$			5	7	ms	Measurement duration for acquiring a humidity value with 8 bit or temperature value with 12 bit
Measurement duration	$t_{MEAS,h}$			15	20	ms	Measurement duration for acquiring a humidity value with 12 bit or temperature value with 14 bit

Table 4 System Timing Specification, Specifications are valid from -40 to 125 °C and 2.4 to 5.5 V

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2.3 Absolute Minimum and Maximum Ratings

Stress levels beyond those listed in Table 5 may cause permanent damage to the device or affect the reliability of the sensor. These are stress ratings only and functional operation of the device at these conditions cannot be guaranteed.

Parameter	Rating	Units
Supply voltage V_{DD}	-0.3 to 6	V
Max Voltage on pins (pin 1 (DATA); pin 4(SCK); pin 6(nRESET))	-0.3 to VDD+0.3	V
Input current on any pin	±100	mA
Operating temperature range	-40 to 125	°C
Storage temperature range	-40 to 150	°C
ESD HBM (human body model)	4	kV
ESD MM (machine model)	200	V
ESD CDM (charge device model)	750	V

Table 5 Absolute minimum and maximum ratings

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3 Pin Assignment

The SHT3x-LSS comes in a tiny 8-pin DFN package – see Table 6.

Pin	Name	Comments
1	DATA	Output open-drain
2	R	No electrical function; recommended to connect to GND
3	R	No electrical function; recommended to connect to GND
4	SCK	Input, no pull-up required
5	VDD	Supply voltage; input
6	nRESET	Reset pin active low; Input; if not used it is recommended to connect to VDD
7	R	No electrical function; recommended to connect to GND
8	GND	Ground

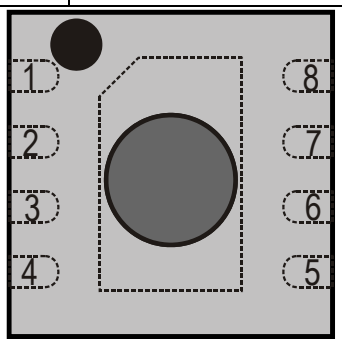


Table 6 SHT3x-LSS pin assignment (Transparent top view). Dashed lines are only visible from the bottom. The die pad is internally connected to GND.

3.1 Power Pins (VDD, GND)

The supply voltage of SHT3x-LSS must be in the range of 2.4 to 5.5V, recommended supply voltage is 5 V. Power supply pins Supply Voltage (VDD) and Ground (GND) must be decoupled with a 100 nF capacitor – see Figure 7.

The serial interface of the SHT3x-LSS is optimized for sensor readout and effective power consumption. The sensor cannot be addressed by I²C protocol; however, the sensor can be connected to an I²C bus without interference with other devices connected to the bus. The controller must switch between the protocols.

3.2 Serial Clock (SCK)

SCK is used to synchronize the communication between microcontroller and the SHT3x-LSS. Since the interface consists of fully static logic there is no minimum SCK frequency.

3.3 Serial Data (DATA)

The DATA open-drain pin is used to transfer data in and out of the sensor. For sending a command to the sensor, DATA is valid on the rising edge of the serial clock (SCK) and must remain stable while SCK is high. After the falling edge of SCK the DATA value may be changed. For safe communication DATA valid shall be extended T_{SU} and T_{HO} before the rising and after the falling edge of SCK, respectively – see Figure 12. For reading data from the sensor, DATA is valid T_V after SCK has gone low and remains valid until the next falling edge of SCK.

To avoid signal contention the microcontroller must only drive DATA low. An external pull-up resistor (e.g. 10kΩ) is required to pull the signal high – it should be noted that pull-up resistors may be included in I/O circuits of microcontrollers. See Table 2 for detailed I/O characteristic of the sensor.

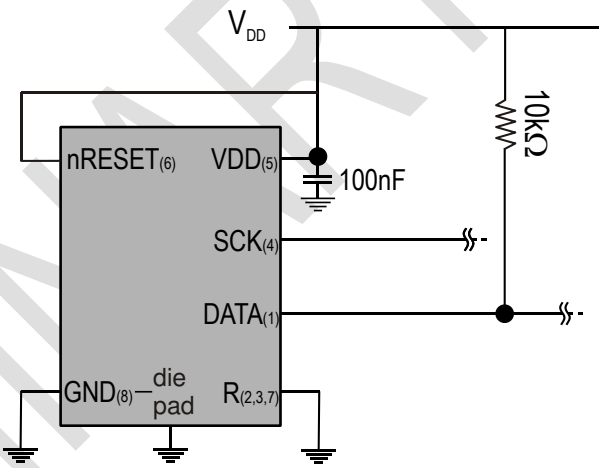


Figure 7 Typical application circuit. Please note that the positioning of the pins does not reflect the position on the real sensor. This is shown in Table 6.

3.4 Die Pad (center pad)

The die pad or center pad is visible from below and located in the center of the package. It is electrically connected to GND. Hence electrical considerations do not impose constraints on the wiring of the die pad. However, due to mechanical reasons it is recommended to solder the center pad to the PCB. For more information on design-in, please refer to the document "SHTxx Design Guide".

3.5 nRESET Pin

The nReset pin may be used to generate a reset of the sensor. A minimum pulse duration of 350 ns is required to reliably trigger a reset of the sensor. Its function is explained in more detail in section 4. If not used it is recommended to connect to VDD.

4 Operation and Communication

4.1 Power-up of the Sensor

As a first step the sensor is powered up to the chosen supply voltage. This takes less than 1 ms. Commands

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sent before the power-up is finished will not be processed.

4.2 Sending a Command

To initiate a transmission, a Transmission Start sequence has to be issued. It consists of a lowering of the DATA line while SCK is high, followed by a low pulse on SCK and raising DATA again while SCK is still high – see Figure 8.

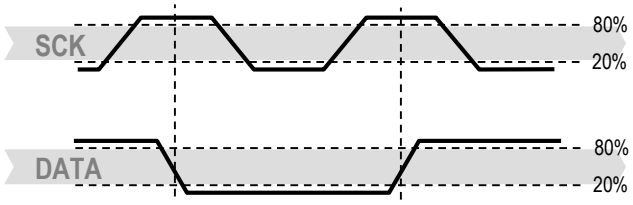


Figure 8 "Transmission Start" sequence

The subsequent command consists of three address bits (only '000' is supported) and five command bits. The SHT3x-LSS indicates the proper reception of a command by pulling the DATA pin low (ACK bit) after the falling edge of the 8th SCK clock. The DATA line is released (and goes high) after the falling edge of the 9th SCK clock.

Command	Code
Reserved	0000x
Measure Temperature	**00011**
Measure Relative Humidity	**00101**
Read Status Register	00111
Write Status Register	00110
Reserved	0101x-1110x
Soft reset, resets the interface, clears the status register to default values. Wait minimum 1 ms before next command	**11110**

Table 7 SHT3x-LSS list of commands

4.3 Measurement of RH and T

After issuing a measurement command ('00000101' for relative humidity, '00000011' for temperature) the controller has to wait for the measurement to complete. This takes a maximum of 20 ms for a measurement. The time varies with the speed of the internal oscillator and can be lower (see Table 4). To signal the completion of a measurement, the SHT3x-LSS pulls data line low and enters Idle Mode. The controller must wait for this Data Ready signal before restarting SCK to readout the data. Measurement data is stored until readout, therefore the controller can continue with other tasks and readout at its convenience.

Two bytes of measurement data and one byte of CRC checksum (optional) will then be transmitted. The micro controller must acknowledge each byte by pulling the DATA line low. All values are MSB first, right justified (e.g. the 5th SCK is MSB for a 12bit value, for a 8bit result the first byte is not used).

Communication terminates after the acknowledge bit of the CRC data. If CRC-8 checksum is not used the controller may terminate the communication after the measurement data LSB by keeping ACK high. The device automatically returns to Sleep Mode after measurement and communication are completed.

4.4 Reset

Connection reset sequence

If communication with the device is lost the following signal sequence will reset the serial interface: While leaving DATA high, toggle SCK nine or more times – see Figure 9. This must be followed by a Transmission Start sequence preceding the next command. This sequence resets the interface only. The status register preserves its content.

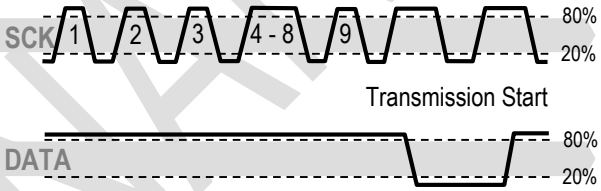


Figure 9 Connection Reset Sequence

Reset through the nReset Pin

Pulling the nReset pin low (see Table 6) generates a reset similar to a hard reset (switching the power supply to the V_{DD} Pin off and then on again). The reset pin is internally connected to VDD through a pull-up and hence active low. The nReset pin has to be pulled low for at least 350 ns to generate a reset.

4.5 CRC Checksum calculation

The whole digital transmission is secured by an 8bit checksum. It ensures that any wrong data can be detected and eliminated. As described above this is an additional feature of which may be used or abandoned. Please consult Application Note "CRC Checksum" for information on how to calculate the CRC.

4.6 Status Register

In order to secure compatibility with the Sensibus protocol used for SHT1x/SHT7x the Status register can be addressed and changed using the same command as for SHT1x/SHT7x. If certain bits are addressed the behavior of SHT3x-LSS will not be changed. It is however possible to read and write from those bits. The following section gives a brief overview of these features. The status register is presented in Table 10.

After the command Status Register Read or Status Register Write – see Table 7 – the content of 8 bits of the status register may be read out or written. For the communication compare

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Table 8 and Table 9– the assignation of the bits is displayed in Table 10.

Command	Code
Status Register Write	00110

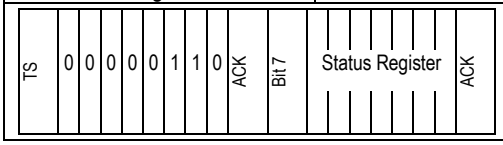


Table 8 Status Register Write command (TS = Trans-mission Start)

Command	Code
Status Register Read	00111

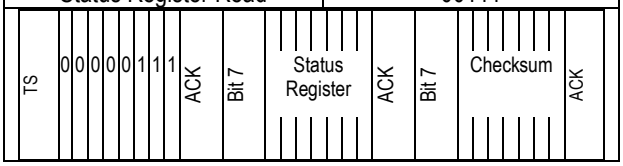


Table 9 Status Register Read

Bit	Type	Description	Default	
7		reserved	0	
6	R	former end of battery	X	inactive
5		reserved	0	
4		reserved	0	
3		reserved	0	
2	R/W	heater	0	off
1	R/W	former OTP reload	0	reload is always active
0	R/W	'1' = 8bit RH / 12bit Temp. resolution '0' = 12bit RH / 14bit Temp. resolution	0	12bit RH 14bit Temp.

Table 10 Status Register Bits

Heater: An on chip heating element can be addressed by writing a command into status register. The heater may increase the temperature of the sensor by 5 – 10°C[8] beyond ambient temperature. The heater draws roughly 25 mW @ 5V supply voltage.

For example the heater can be helpful for functionality analysis: Humidity and temperature readings before and after applying the heater are compared. Temperature shall increase while relative humidity decreases at the same time. Dew point shall remain the same.

Examples of full communication cycle are displayed in Table 11 & Figure 10.

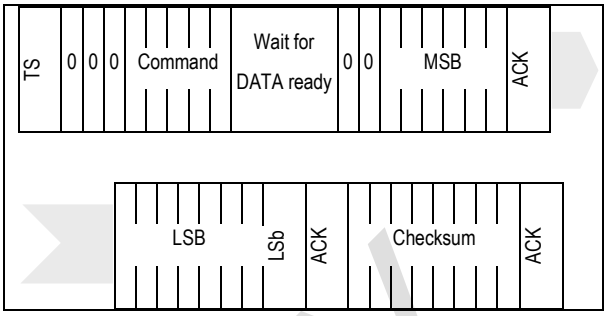


Table 11 Overview of Measurement Sequence. TS = Trans-mission Start, MSB = Most Significant Byte, LSB = Last Significant Byte, LSb = Last Significant Bit.

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[8] Corresponds to 9 – 18°F

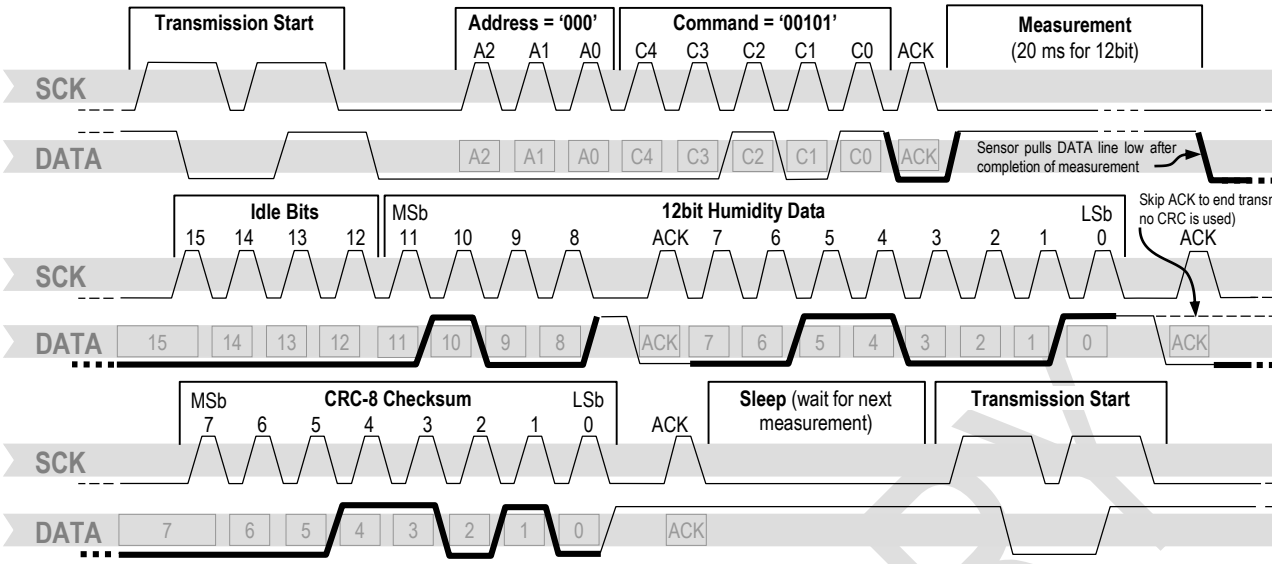


Figure 10: Example RH measurement sequence for value "0000'0100"0011'0001" = 1073 = 35.50%RH (without temperature compensation). DATA valid times are given and referenced in boxes on DATA line. Bold DATA lines are controlled by sensor while plain lines are controlled by the micro-controller.

4.7 Conversion of Relative Humidity

For compensating non-linearity of the humidity sensor – see Figure 11 – and for obtaining the full accuracy of the sensor it is recommended to convert the humidity readout (SO_{RH}) with the following formula with coefficients given in Table 6.

$$RH_{linear} = c_1 + c_2 \cdot SO_{RH} + c_3 \cdot SO_{RH}^{\ 2} \ (\%RH)$$

SO_{RH}	c_1	c_2	c_3
12 bit	-2.0468	0.0367	-1.5955E-6
8 bit	-2.0468	0.5872	-4.0845E-4

Table 12: Humidity conversion coefficients

Values higher than 99% RH indicate fully saturated air and must be processed and displayed as 100%RH[9]. Please note that the humidity sensor has no significant voltage dependency.

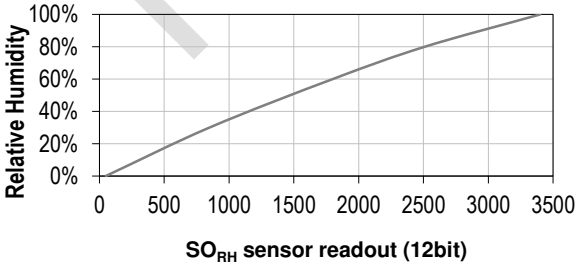


Figure 11 Conversion from SO_{RH} to relative humidity

Temperature compensation of Humidity Signal

For temperatures significantly different from 25°C (~77°F) the humidity signal requires temperature compensation. The temperature correction corresponds roughly to 0.12%RH/°C @ 50%RH. Coefficients for the temperature compensation are given in Table 13.

$$RH_{true} = (T_{°C} - 25) \cdot (t_1 + t_2 \cdot SO_{RH}) + RH_{linear}$$

SO_{RH}	t_1	t_2
12 bit	0.01	0.00008
8 bit	0.01	0.00128

Table 13 Temperature compensation coefficients

4.8 Conversion of Temperature

The band-gap temperature sensor is very linear by design. The temperature sensor is optimized for an operating voltage of 5V. Use the following formula to convert digital readout (SO_T) to temperature value, with coefficients given in Table 14: Please note that the temperature accuracy will deteriorate if voltage dependent coefficients are used, like for SHT1x/SHT7x/SHTA1 product series.

$$T = d_1 + d_2 \cdot SO_T$$

VDD	d_1 (°C)	d_1 (°F)
All	-40.1	-40.2

SO_T	d_2 (°C)	d_2 (°F)
14bit	0.01	0.018
12bit	0.04	0.072

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Table 14 Temperature conversion coefficients.

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4.9 Communication Timing

	Parameter	Conditions	min	typ	max	Units
F_{SCK}	SCK Frequency				1	MHz
T_{SCKx}	SCK hi/low time		100			ns
T_R/T_F	SCK rise/fall time		1	200	*	ns
T_{FO}	DATA fall time	OL = 5pF	30	40	200	ns
T_{RO}	DATA rise time		**	**	**	ns
T_V	DATA valid time		200	250	***	ns
T_{SU}	DATA setup time		100	150	***	ns
T_{HO}	DATA hold time		10	15	****	ns

* $T_{R_max} + T_{F_max} = (F_{SCK})^{-1} - T_{SCKH} - T_{SCKL}$

** T_{R0} is determined by the R_P*C_{bus} time-constant at DATA line

*** T_{V_max} and T_{SU_max} depend on external pull-up resistor (R_P) and total bus line capacitance (Cbus) at DATA line

**** $T_{H0_max} < T_V - \max(T_{R0}, T_{F0})$

Table 15 Communication timing specifications for the Senisbus protocol

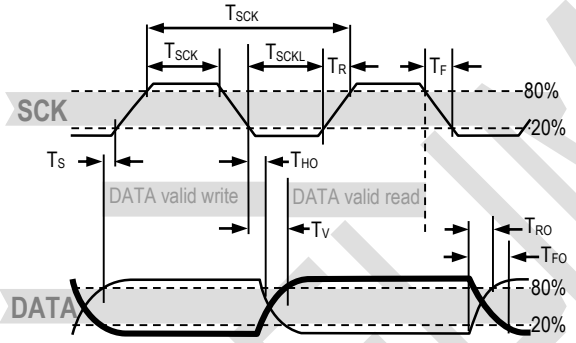


Figure 12 Timing Diagram, abbreviations are explained in Table 15. Bold DATA lines are controlled by the sensor, plain DATA lines are controlled by the micro-controller. Note that DATA valid read time is triggered by falling edge of anterior toggle.

5 Packaging

SHT3x-LSS sensors are provided in a DFN package. DFN stands for dual flat no leads. The humidity sensor opening is centered on the top side of the package.

The sensor chip is made of silicon and is mounted to a lead frame. The latter is made of Cu plated with Ni/Pd/Au. Chip and lead frame are overmolded by an epoxy-based mold compound leaving the central die pad and I/O pins exposed for mechanical and electrical connection. Please note that the side walls of the sensor are diced and therefore these diced lead frame surfaces are not covered with the respective plating.

The package (except for the humidity sensor opening) follows JEDEC publication 95, design registration 4.20, small scale plastic quad and dual inline, square and rectangular, No-LEAD packages (with optional thermal enhancements) small scale (QFN/SON), Issue D.01, September 2009.

5.1 Traceability

All SHT3x-LSS sensors are laser marked for easy identification and traceability. The marking on the sensor top side consists of a pin-1 indicator and two lines of text.

The top line consists of the pin-1 indicator, which is located in the top left corner, and the product name. The small letter x stands for the accuracy class.

The bottom line consists of 6 letters. The first two digits XY (=LS) describe the output mode. The third letter (A) represents the manufacturing year (4 = 2014, 5 = 2015, etc). The last three digits (BCD) represent an alphanumeric tracking code. That code can be decoded by Sensirion only and allows for tracking on batch level through production, calibration and testing – and will be provided upon justified request.

If viewed from below pin 1 is indicated by triangular shaped cut in the otherwise rectangular die pad. The dimensions of the triangular cut are shown in Figure 14 through the labels T1 & T2.

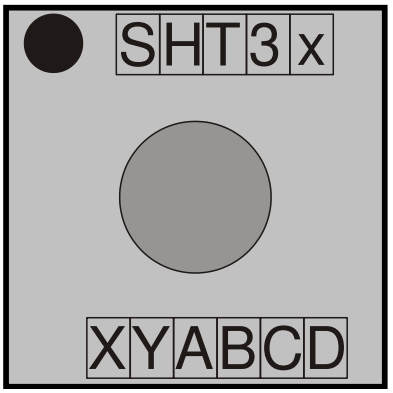


Figure 13 Top View of the SHT3x-LSS illustrating the laser marking.

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5.2 Package Outline

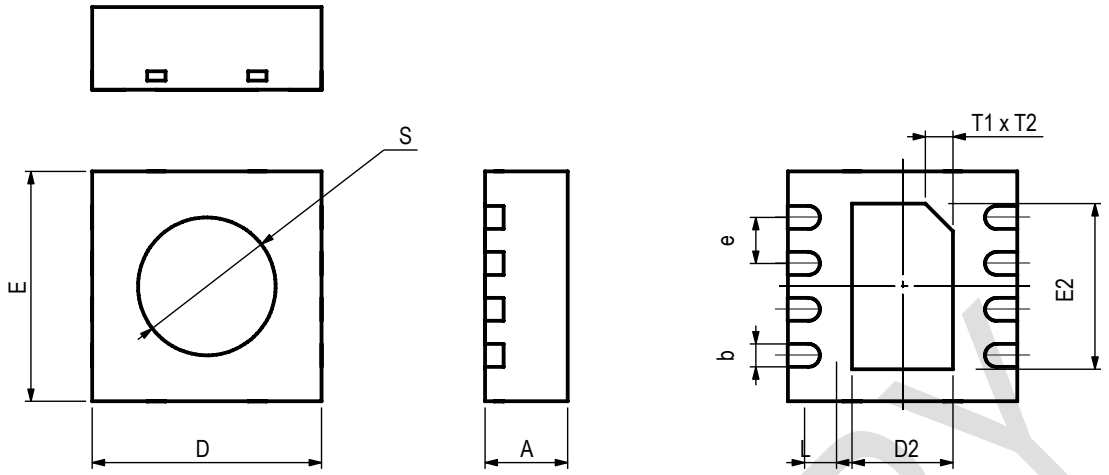


Figure 14 Dimensional drawing of SHT3x-LSS sensor package

Parameter	Symbol	Min	Nom.	Max	Units	Comments
Package height	A	0.8	0.9	1	mm	
Leadframe height	A3		0.2		mm	Not shown in the drawing
Pad width	b	0.2	0.25	0.3	mm	
Package width	D	2.4	2.5	2.6	mm	
Center pad length	D2	1	1.1	1.2	mm	
Package length	E	2.4	2.5	2.6	mm	
Center pad width	E2	1.7	1.8	1.9	mm	
Pad pitch	e	0	0.5	0	mm	
Pad length	L	0.3	0.35	0.4	mm	
Max cavity	S			1.5	mm	Only as guidance. This value includes all tolerances, including displacement tolerances. Typically the opening will be smaller.
Center pad marking	T1xT2		0.3x45°		mm	indicates the position of pin 1

Table 16 Package outline

5.3 Land Pattern

Figure 15 shows the land pattern. The land pattern is understood to be the metal layer on the PCB, onto which the DFN pads are soldered.

The solder mask is understood to be the insulating layer on top of the PCB covering the copper traces. It is recommended to design the solder mask as a Non-Solder Mask Defined (NSMD) type. For NSMD pads, the solder mask opening should provide a 60 µm to 75 µm design clearance between any copper pad and solder mask. As the pad pitch is only 0.5 mm we recommend to have one solder mask opening for all 4 I/O pads on one side.

For solder paste printing it is recommended to use a laser-cut, stainless steel stencil with electro-polished trapezoidal walls and with 0.1 or 0.125 mm stencil thickness. The length of the stencil apertures for the I/O pads should be the same as the PCB pads. However, the position of the stencil apertures should have an offset of 0.1 mm away from the center of the package. The die pad aperture should cover about 70 – 90 % of the die pad area –thus it should have a size of about 0.9 mm x 1.6 mm.

For information on the soldering process and further recommendation on the assembly process please consult the Application Note HT_AN_SHTxx_Assembly_of_SMD_Packages , which can be found on the Sensirion webpage.

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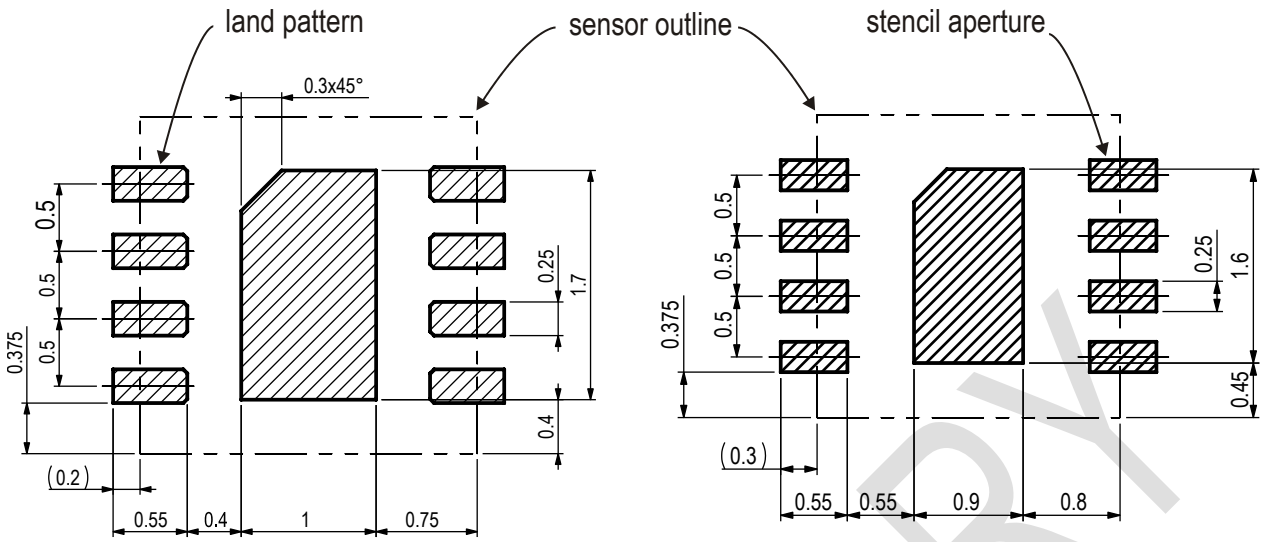


Figure 15 Recommended metal land pattern and stencil apertures for the SHT3x-LSS. The dashed lines represent the outer dimension of the DFN package. The PCB pads and stencil apertures are indicated through the shaded areas.

6 Shipping Package

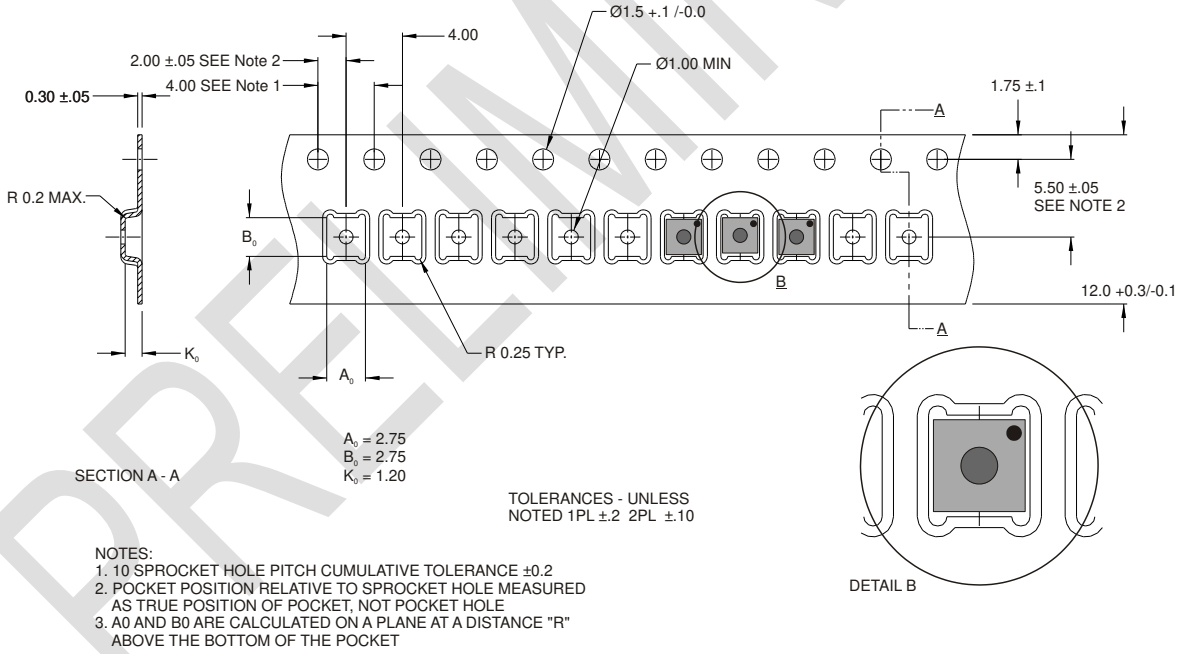


Figure 16 Technical drawing of the packaging tape with sensor orientation in tape. Header tape is to the right and trailer tape to the left on this drawing. Dimensions are given in millimeters.

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7 Quality

Qualification of the SHT3x-LSS is performed based on the AEC Q 100 qualification test method.

7.1 Material Contents

The device is fully RoHS and WEEE compliant, e.g. free of Pb, Cd, and Hg.

8 Ordering Information

The SHT3x-LSS can be ordered in tape and reel packaging with different sizes, see Table 17. The reels are sealed into antistatic ESD bags. The document (SHT3x shipping package) that shows the packaging tape with sensor orientation is available upon request.

Name	Quantity	Order Number
SHT30-LSS-B10kS	10000	1-101146-01
SHT31-LSS-B500E	500	1-101281-01
SHT31-LSS-B10kS	10000	1-101148-01

Table 17 SHT3x-LSS ordering options.

9 Further Information

For more in-depth information on the SHT3x-LSS and its application please consult the following documents:

Document Name	Description	Source
SHT3x Shipping Package	Information on Tape, Reel and shipping bags (technical drawing and dimensions)	Available upon request
SHTxx Assembly of SMD Packages	Assembly Guide (Soldering Instruction,)	Available for download at the Sensirion humidity sensors download center: www.sensirion.com/humidity-download
SHTxx Design Guide	Design guidelines for designing SHTxx humidity sensors into applications	Available for download at the Sensirion humidity sensors download center: www.sensirion.com/humidity-download
SHTxx Handling Instructions	Guidelines for proper handling of SHTxx humidity sensors (Reconditioning Procedure)	Available for download at the Sensirion humidity sensors download center: www.sensirion.com/humidity-download
Sensirion Humidity Sensor Specification Statement	Definition of sensor specifications.	Available for download at the Sensirion humidity sensors download center: www.sensirion.com/humidity-download

Table 18 Documents containing further information relevant for theSHT3x-LSS.

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Revision History

Date	Version	Page(s)	Changes
January 2015	0.91		Release of version 0.91
May 2015	0.93		Table 4, extended the range for the measurement duration Table 2, defined Long term drift as max Table 3, amended Power-up/down level, amended maximum current consumption Section 5, added section paragraph on package standard Section 8, Added ordering information
June 2015	0.94		Amended table 3

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