

# Embedding SHT2x in 5V Supply

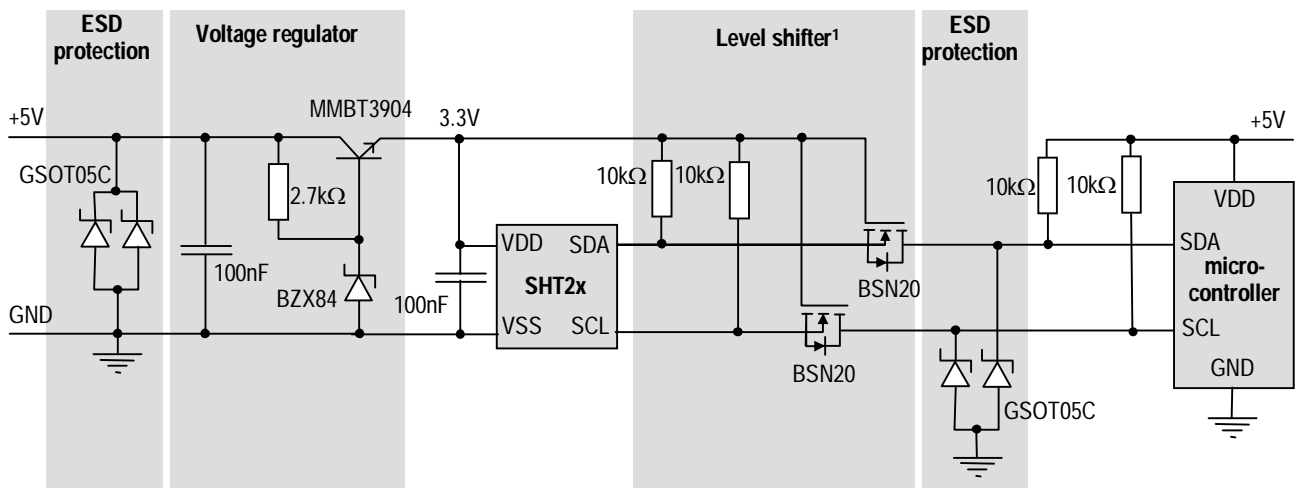
## Sample Scheme, ESD Protection and Material List

The new digital SHT2x humidity and temperature sensor series integrates multi-functionality on a small footprint. Due to the underlying physics of the highly integrated on-chip CMOS circuitry the supply voltage of the SHT2x is restricted to 2.2 - 3.6V. This application note provides sample schemes for embedding the SHT2x with I<sup>2</sup>C-bus (Chapter 0) and embedding of SHT2x with PWM interface (Chapter 0) into 5V power supply environment.

## I<sup>2</sup>C Interface

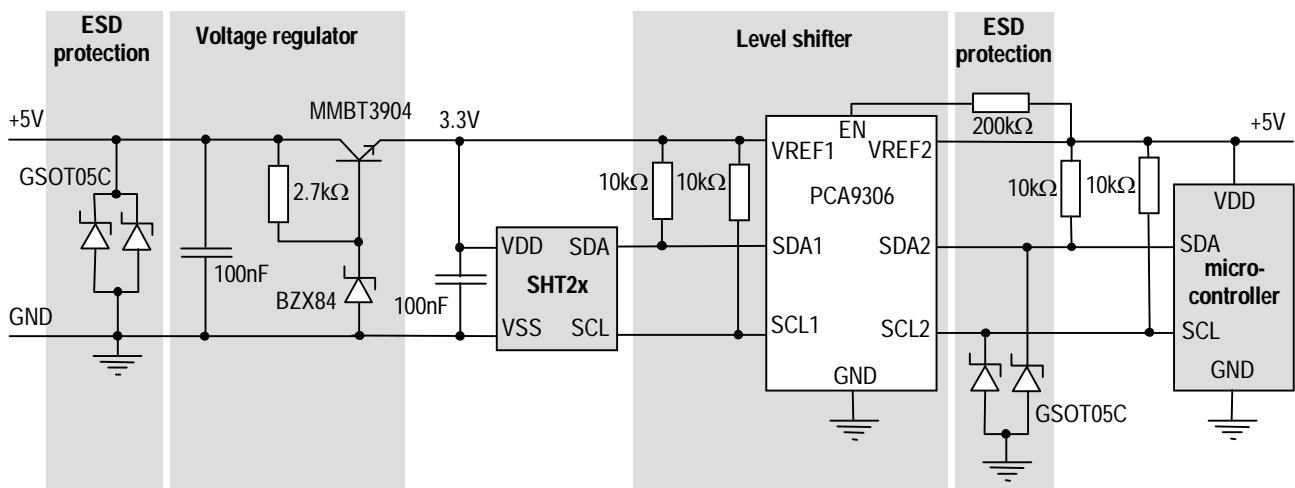
### Sample schemes

*Level shifter based on FET:* Low cost implementation of SHT2x by voltage regulator, optional ESD protection and bi-directional FET level shifter for I<sup>2</sup>C-bus.



For more details on bidirectional level shifter for I<sup>2</sup>C-bus please refer to US 5,689,196 and Application Note AN97055 by NXP: <http://www.standardics.nxp.com/support/documents/i2c/pdf/an97055.pdf>

*Level shifter based on IC:*



### Bill of material

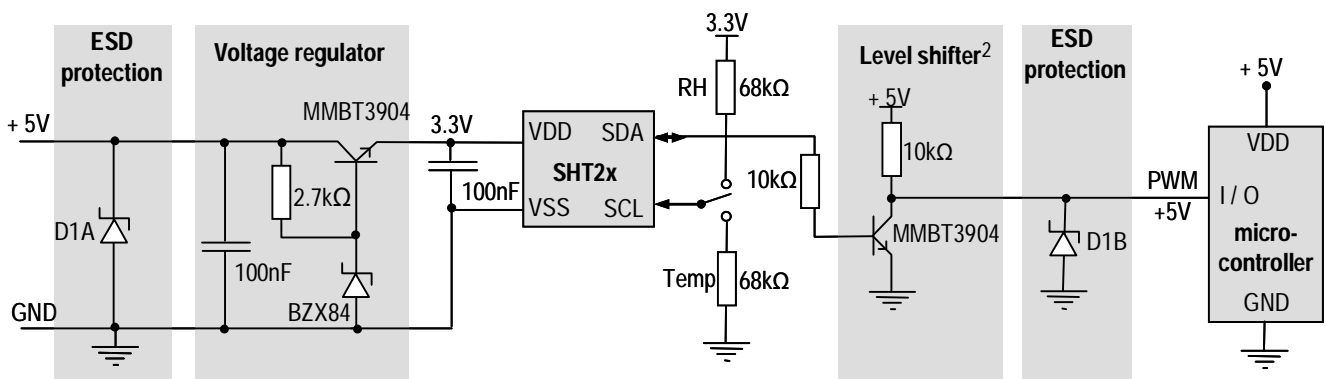
Component	Type	FET level shifter SDA & SCL, ESD protection	FET level shifter SDA & SCL, without ESD protection	IC level shifter SDA & SCL, ESD protection
Resistor	diverse 0603	3	3	3
Capacitor	100nF, 0603	2	2	2
Transistor	MMBT3904	1	1	1
Diodes	GSOT05C	2	0	2
Z-diode	BZX84C4V3	1	1	1
FET level shifter	BSN20	2	2	0
IC level shifter	PCA9306	0	0	1

The level shifter based on FET can be implemented at lower cost than the IC version. Please note, that the FET version is covered by patents of NXP.

### PWM Interface

Following sample scheme of embedding a SHT2x device into a 5V power supply environment is optimized to save costs of external components. In comparison to the embedding with I<sup>2</sup>C protocol according to setup in Chapter 0, especially the level shifter set-up is optimized for costs. The ESD protection is recommended but not mandatory if adequate ESD precautions in production are considered.

### Sample scheme – open collector output



**Important Notice:** The level shifter transistor at the signal output does invert the PWM sensor signal.

According to the PWM interface specifications of SHT2x series, the SCL line can be drawn high for relative humidity read out or grounded for temperature read out.

Above sample scheme implements an open collector output with a bipolar transistor. If a 5V push-pull output is needed, the single line driver of type 74AHCT1G125 can be used as a level shifter instead of the transistor driver.

### Bill of material

Component	Type	Transistor level shifter for SDA, ESD protection
Resistor	diverse 0603	5
Capacitor	100nF, 0603	2
Transistor	MMBT3904	2
Diodes (D1)	GSOT05C	1
Z-diode	BZX84C4V3	1

**Revision History**

Date	Revision	Changes
6 March 2009	1.0	Initial version (DHA)
14. July 2009	1.1	Chapter 2, PWM interface added (CLA), Sensirion CN added

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