I2C Communication Setup Checklist

The following checklist allows to systematically establish communication with an I2C target device. It provides a systematic approach to overcome common issues encountered when establishing an initial I2C communication.

Description	Done
Recheck that SCL and SDA are physically connected correctly	☐
Check if SDA, SCL can be pull-down or pull-up ● Set SDA to high and measure voltage level at SDA. Must be VCC ● Set SDA to low and measure voltage level at SDA. Must be 0V ● Set SCL to high and measure voltage level at SCL. Must be VCC ● Set SCL to low and measure voltage level at SCL. Must be 0V	☐
Check short between SCL and SDA ● Set SDA to high and SCL to low. Check that both levels are correct ● Set SDA to low and SCL to high. Check that both levels are correct	☐
Check for maximal clock frequency ● Apply a clock with the target frequency on SCL and measure the duty cycle. Check that the duty cycle is in the expected range ● Apply a clock with the target frequency on SDA and measure the duty cycle. Check that the duty cycle is in the expected range	☐
Send a command to the target and check if the Acknowledge (ACK) is received ● Perform a read within a given range or based on a given list of target addresses ● If no response (NACK) --> reduce speed (400kHz --> 100kHz) ● If no response (NACK) --> swap SDA / SCL and retry	☐
Check for the correct target device Perform a read test for known information (e.g. serial number, product ID…) Perform a write / read back test	☐

References:

- UM10204 NXP I2C-bus specification and user manual, Rev. 7.0 — 1 October 2021
- Wikipedia

In case you have any comments or suggestions to the “I2C Communication Setup Checklist” please send an email to office@semify-eda.com.