IPS2550STKIT
GETTING STARTED

20230620
RENESAS ELECTRONICS CORPORATION

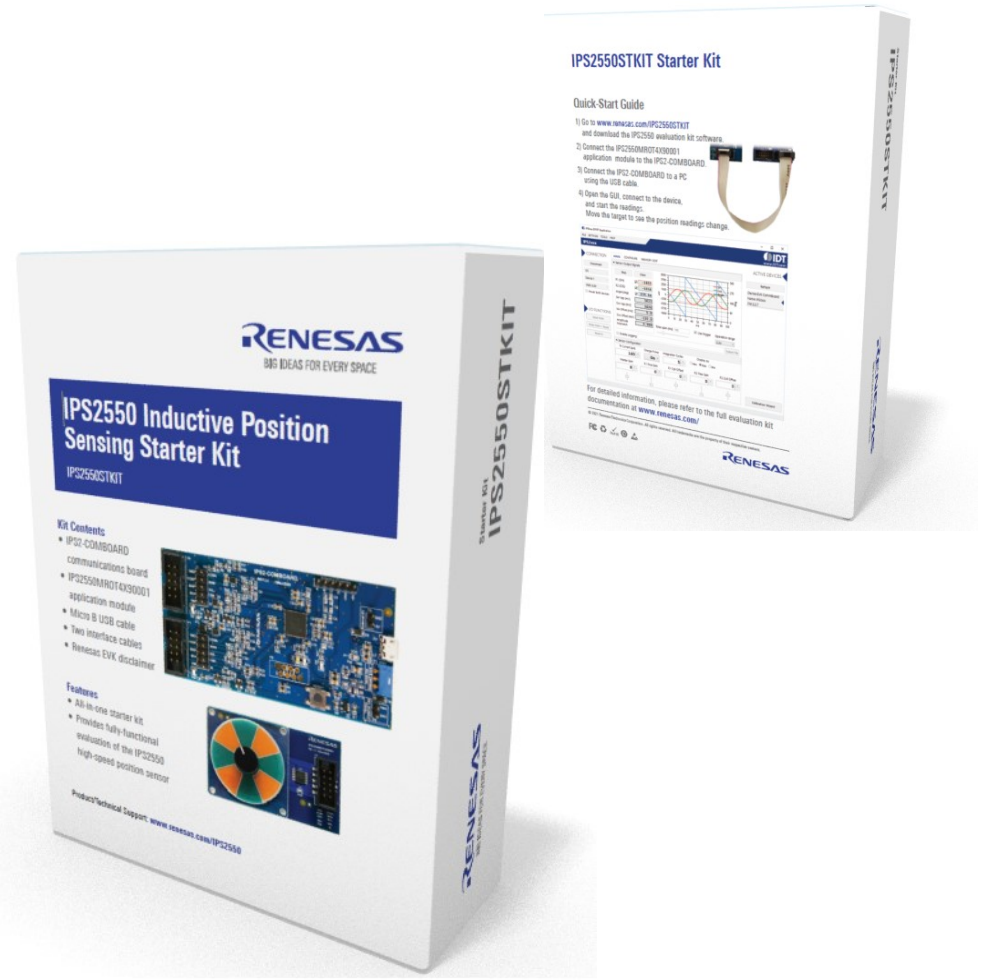
CONTENT

IPS2550STKIT Content

IPS2-Comboard, Micro B USB cable

IPS2550MROT4x90001, Two 10pin ribbon cables

Renesas disclaimer document



Getting Started Index

IPS2550 OVERVIEW: HIGH-SPEED POSITION SENSOR

AECQ100 Grade-0 Automotive Qualified

Interface: sin/cos single ended or differential

Temperature range: -40° to 160° C ambient

Functional Safety: supports ASIL-C single

Voltage Supply: 3.3V ±10% or 5.0V ±10% supply

Speed: 600.000 (el) rpm

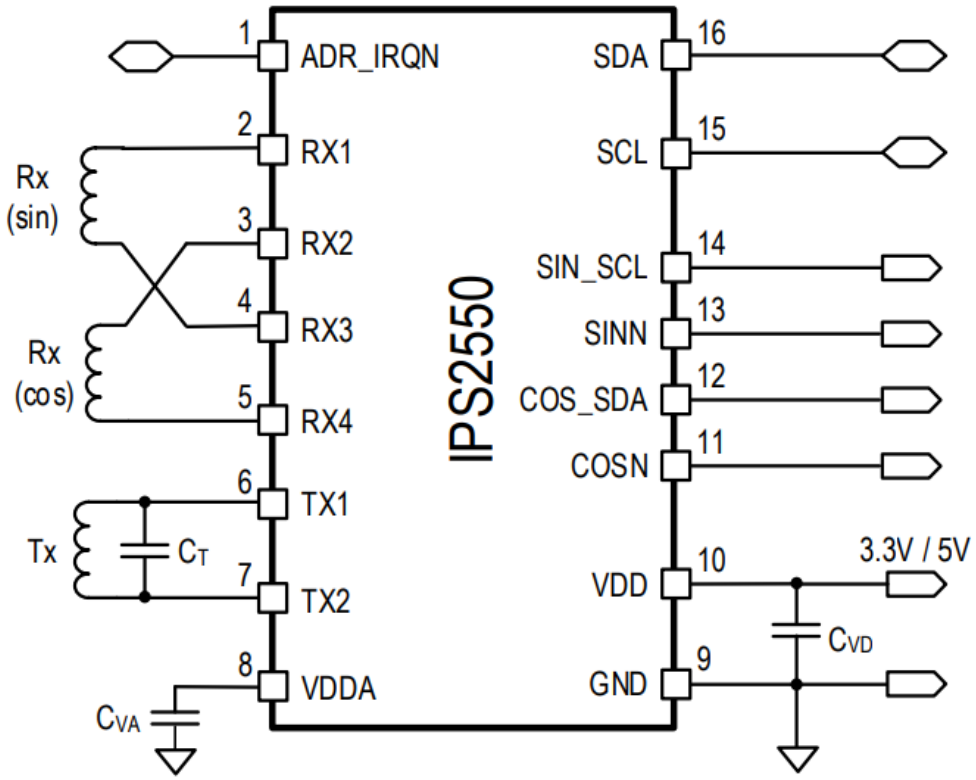
Propagation delay: 4µs

Overvoltage, reverse polarity, short-circuit protected

Programming interface: I²C or over output pins
Diagnostics interrupt to external MCU

AGC to compensate air-gap variations

TSSOP-16 with exposed pad



IPS2550 is pin backward compatible
to IPS2200 in straight pinout mode

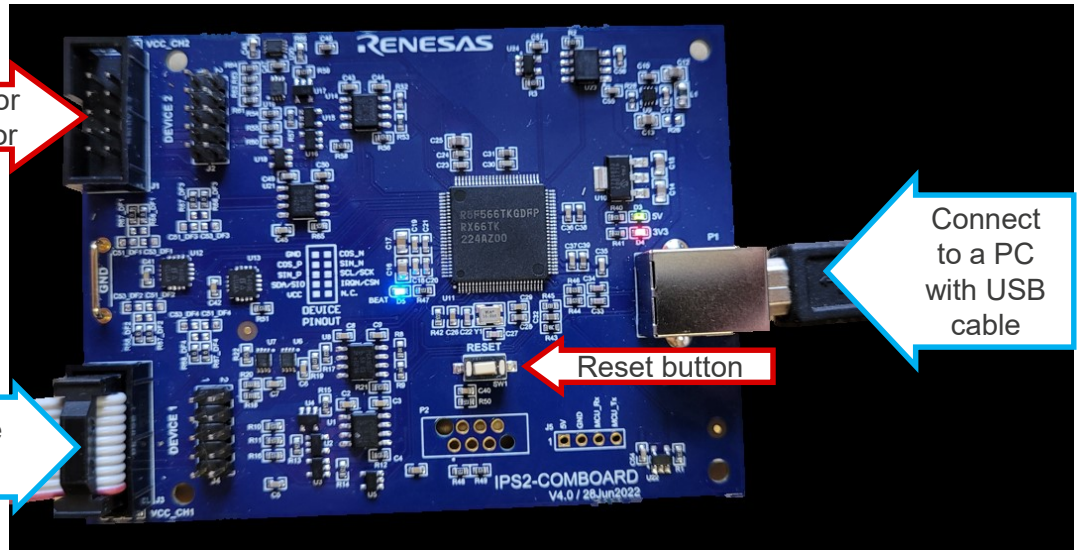
Improvement over IPS2200 in blue

EVALUATION KIT SETUP: STEP 1 - CONNECT BOARD

Connect the IPS2550MROT4X90001sensor module to the IPS-COMBOARD

IPS-COMBOARD
(Same for IPS2200 and IPS 2550)

IPS2550 Sensor Module
IPS2550MROT4X90001



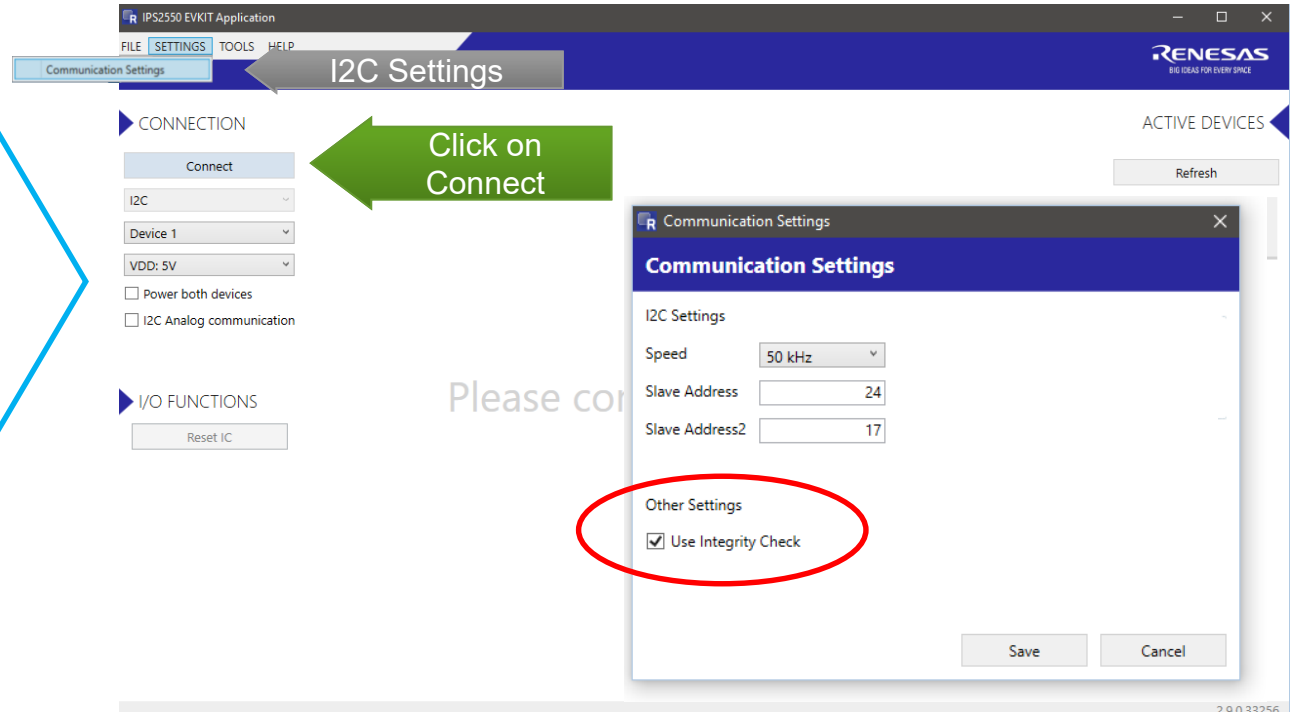
EVALUATION KIT SETUP: STEP 2 – INSTALL GUI AND CONNECT

Download and Install the IPS2550 EVKIT Application. Open the application and click on “Connect”

(Download Link: https://www.renesas.com/eu/en/products/sensor-products/position-sensors/ips2550stkit-evaluation-kit-ips2550#design_development)

Select connection settings:
(1) Select Device 1 (as connected)
(2) Select VDD: 5V (IPS2550MROT4X90001 default)

Optional:
(3) Change I2C address if needed in “Settings → Communication Settings”)
(4) Enable Integrity Check for default config



Default I2C Adresses:
24 dec (18h) → default + AdrPin High (IPS2550MROT4X90001)
17 dec (11h) → default + AdrPin Low
16 dec (10h) → old default

EVALUATION KIT SETUP: STEP 3 – READ OUTPUT SIGNALS

A) Place Target over the Sensor Module

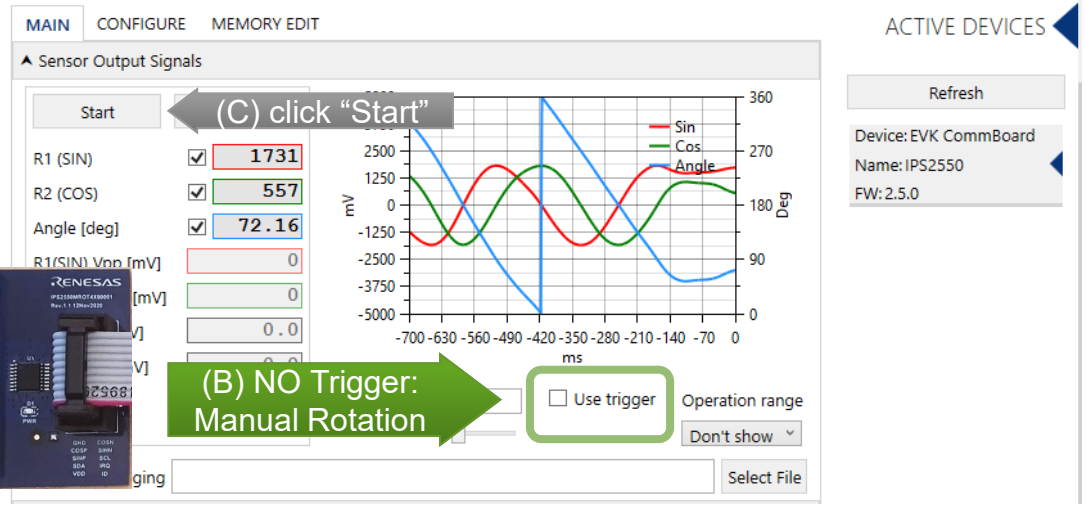
B) Decide for Automatic Trigger

Manual Rotation: **NO** Trigger

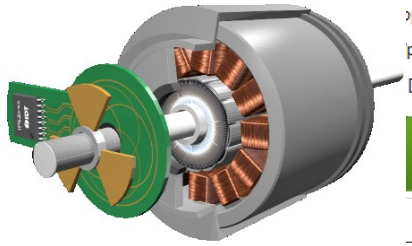
Motor Rotation: USE Trigger

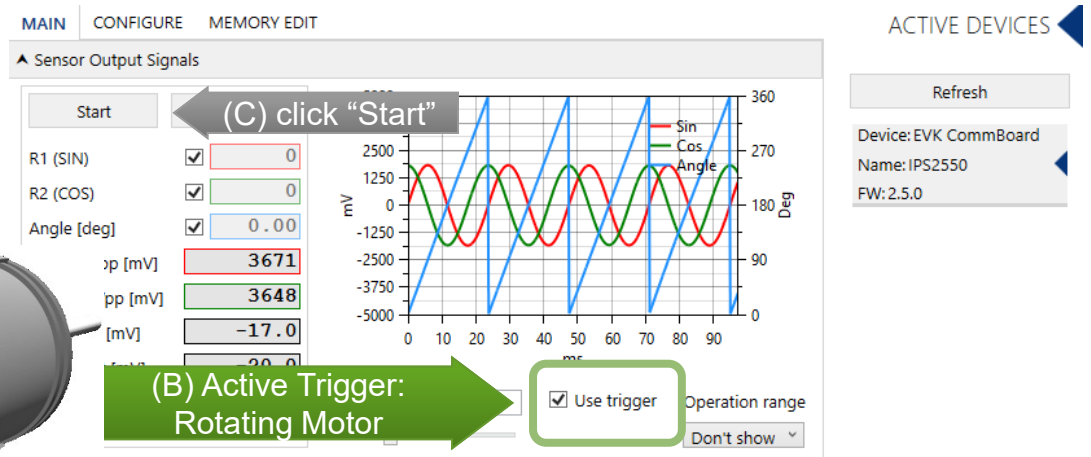
C) Click „Start“ to display data

Rotation by hand:
No trigger &
configure time span



Motor rotating (preferred):
automatic trigger &
select periods



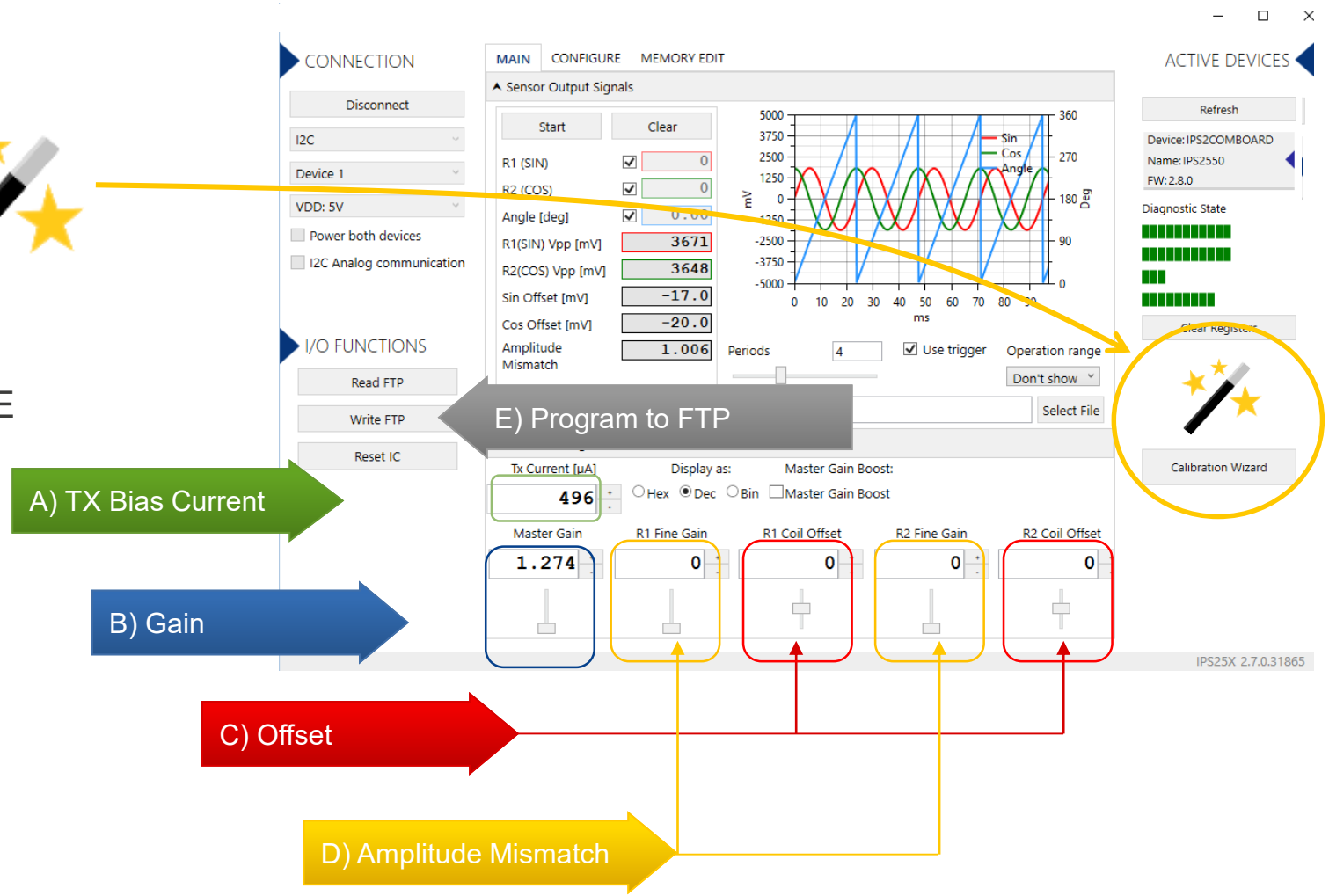


EVALUATION KIT SETUP: STEP 4 – SENSOR CALIBRATION

Step 4: Sensor Configuration Options:

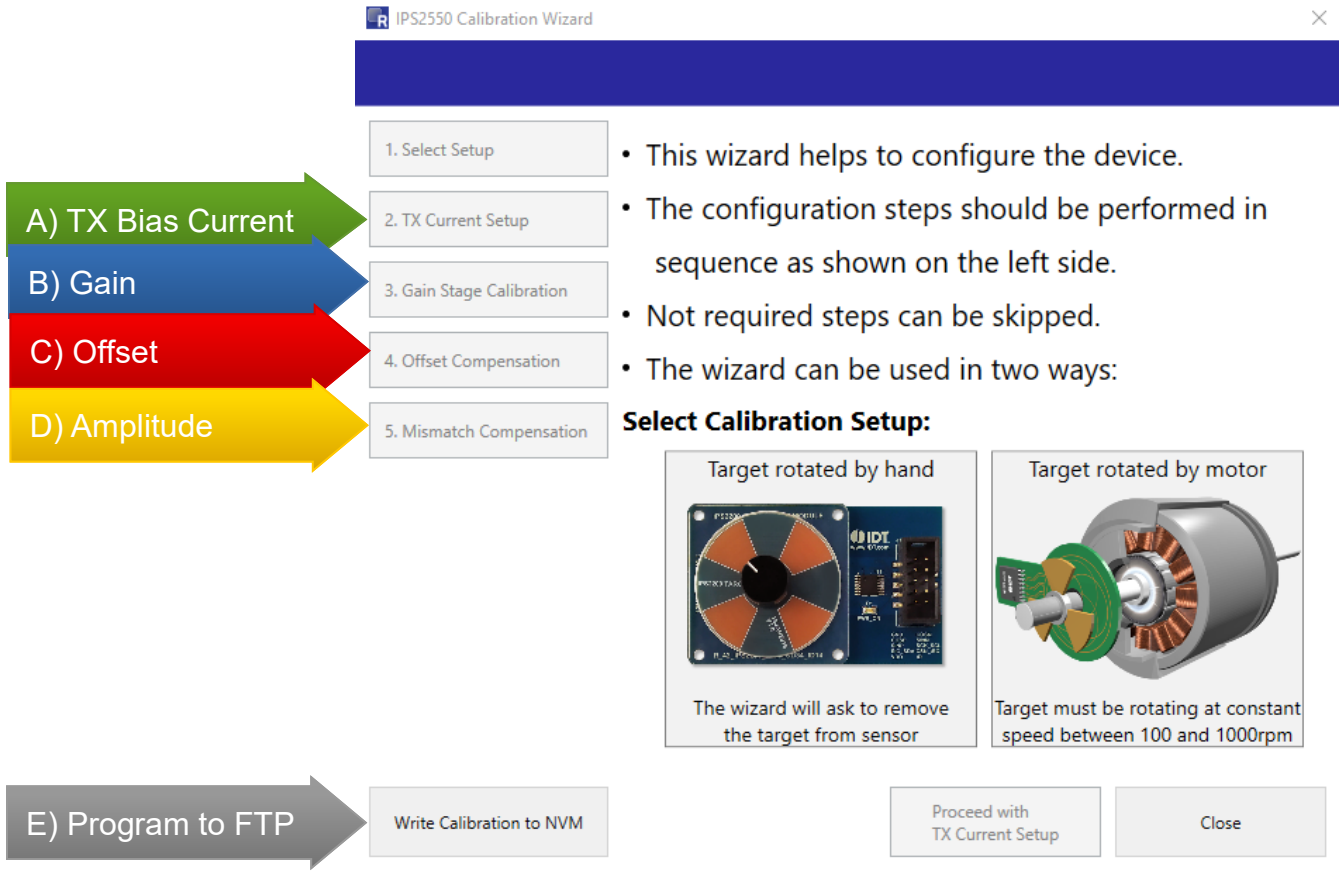
1. Use the Calibration Wizard

2. Alternatively configure steps A …E manually (refer to the IPS2550 Programming Manual)



SENSOR CONFIGURATION USING THE CALIBRATION WIZARD

Select the setup and follow required steps A …E in the wizard.



MANUAL SENSOR CONFIGURATION WITH ROTATING MOTOR

Preparation:

Disable the AGC: AGC code is configured as static gain

A) TX current

Keep the default or set-up with programming manual

B) Gain

Adjust the master gain for desired output amplitudes only if AGC is not enabled after configuration

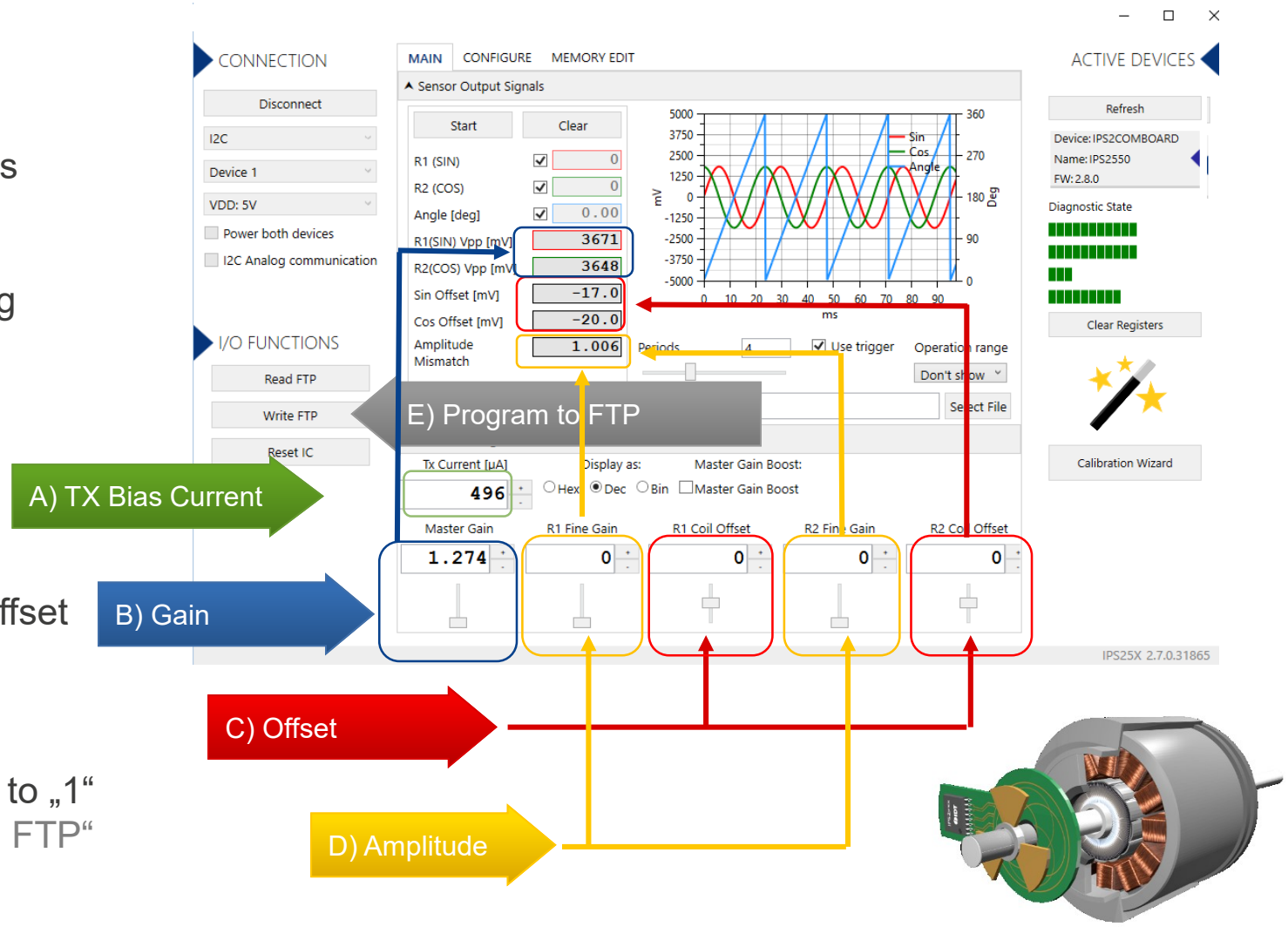
C) Offset compensation

Adjust Coil Offset Compensation until the Offset is as close as possible to „0“

D) Amplitude Mismatch compensation

Adjust Fine Gain Compensation until the Amplitude Mismatch is as close as possible to „1“

E) Enable AGC again if needed & Click on „Write FTP“

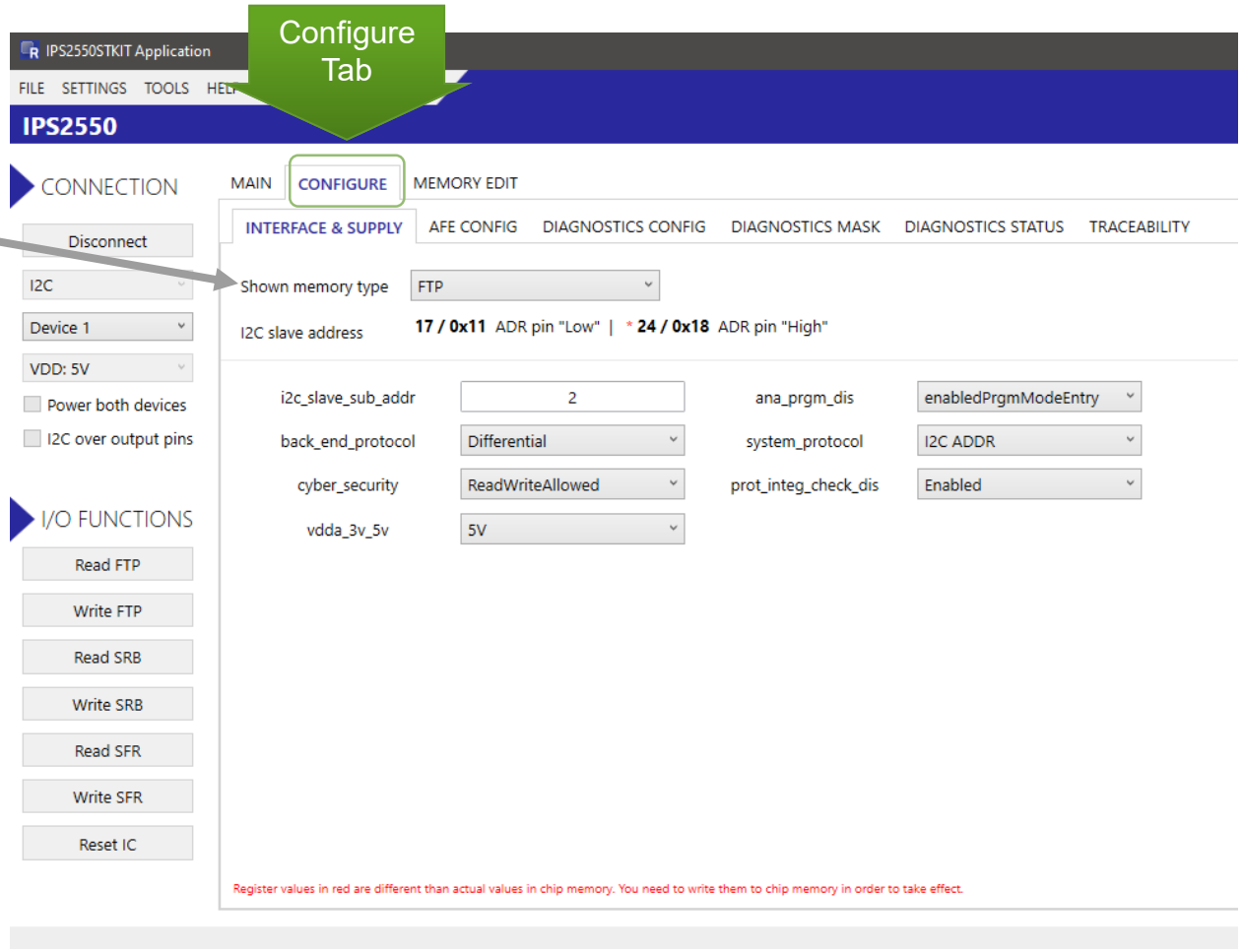


IPS2550: CONFIGURATION TAB

All IPS2550 device settings are available in the configure tab.

It consists of 3 register blocks:

- **FTP**
  - Few Times Programmable Register
  - (1000 write cycles max.)
- **SRB**
  - Shadow Register Bank
  - Volatile
- **SFR**
  - Special Function Register
  - Contains Status and Interrupt handling



(For details refer to the IPS2550 Programming Manual)

IPS2550: MEMORY EDIT

Default Setup:

5V Mode

I2C Interface with address pin

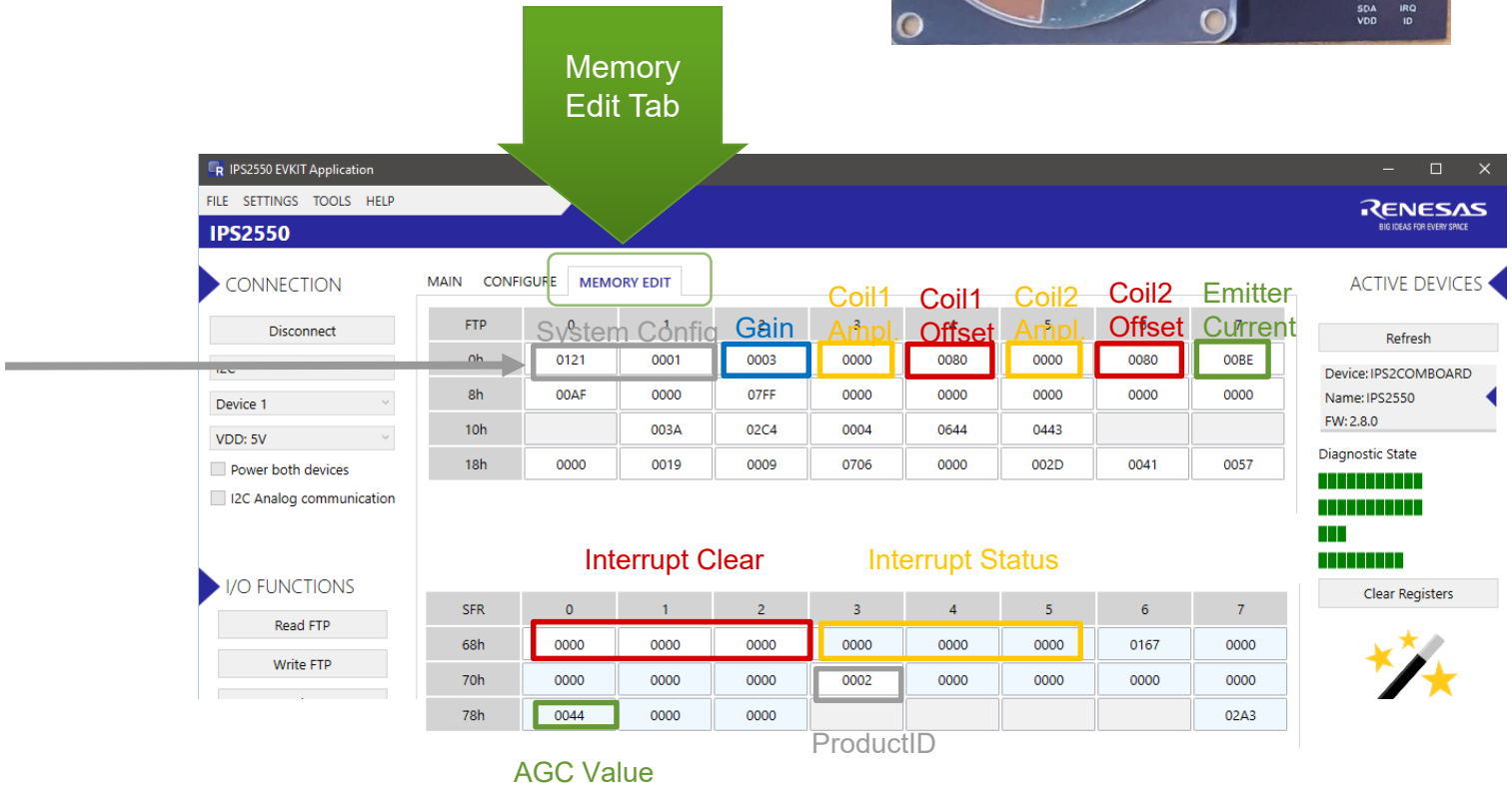
Differential Sin/Cos Output

AGC “ON”

Examples:

- System Config1 0x00 =
  - 0121h -> AGC ON (default)
  - 0321h-> AGC OFF

- System Config2 0x01 =
  - 0001h-> IPS2550 Pinout (default)
  - 0021h-> IPS2200 Pin Compatible

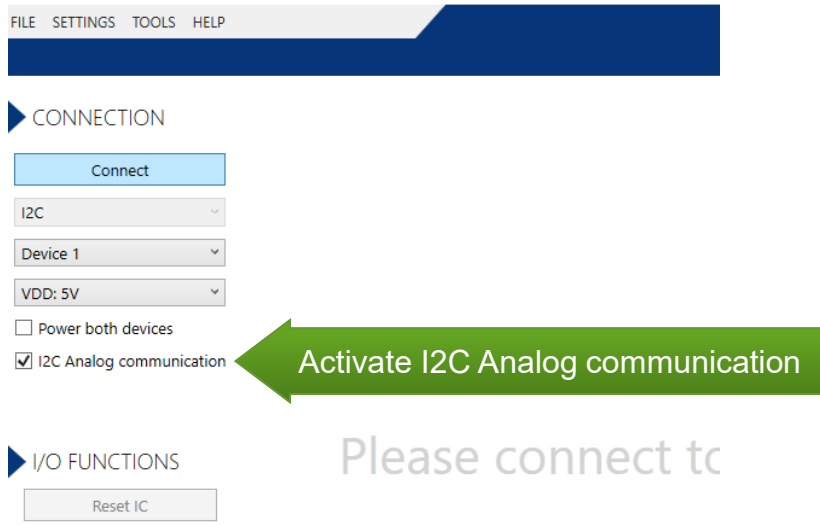


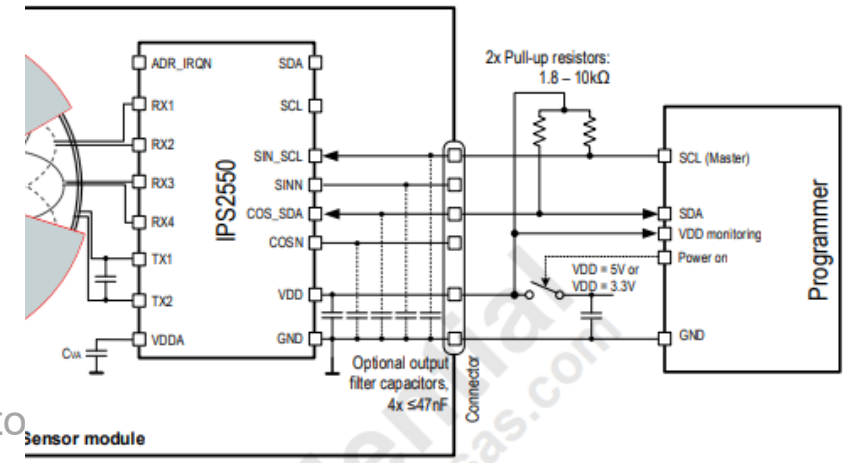
(For details refer to the IPS2550 Programming Manual)

PROGRAMMING OVER ANALOG OUTPUT PINS

It is possible to program the IC over the analog output pins. Select **“I2C Analog communication”**.

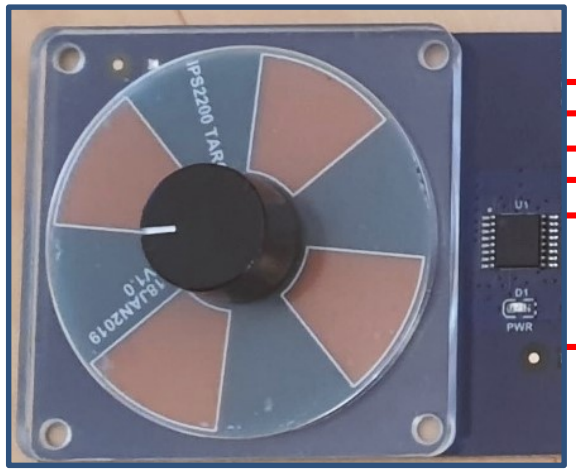
- When I2C over analog lines is selected 4KHz clock is used automatically
- If a customer programming board is used pull-ups should be 2.4K or lower.
- Filtering capacitors should be max 47nF
- If an IPS-comboard is used:
  - From Rev.2.4 and V4.0, the smaller pull-ups are activated automatically. Connect supply and output pins only.
  - Up to Rev.2.3 and FW:3.2 or newer, external 2K4 pull-ups must be added on SIN_SCL and COS_SDA pins. (Jumper wires not needed)
  - Up to Rev.2.3 and with FW:2.11 or older, analog output pins on the IPS-comboard must be connected to I2C pins of the IPS-comboard using jumper wires. As well the pull-ups on the IPS-comboard must be reduced to 2K4. (eg. add additional 4K7 resistors in parallel)



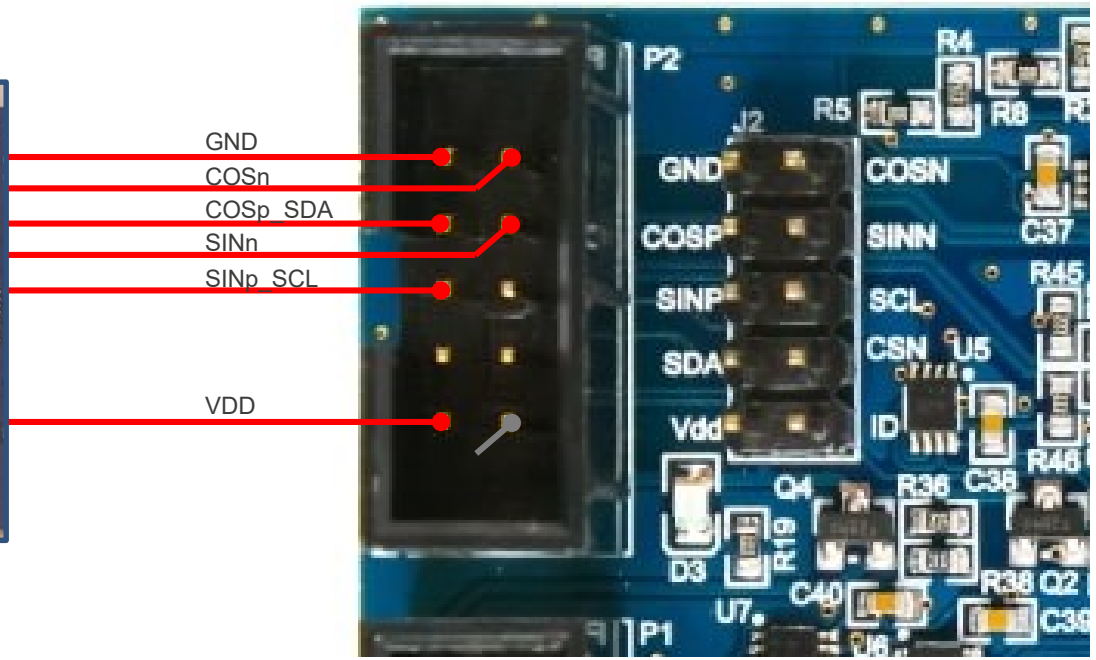


HOW TO CONNECT A SENSOR WITH 6 WIRES?

Sensor Module



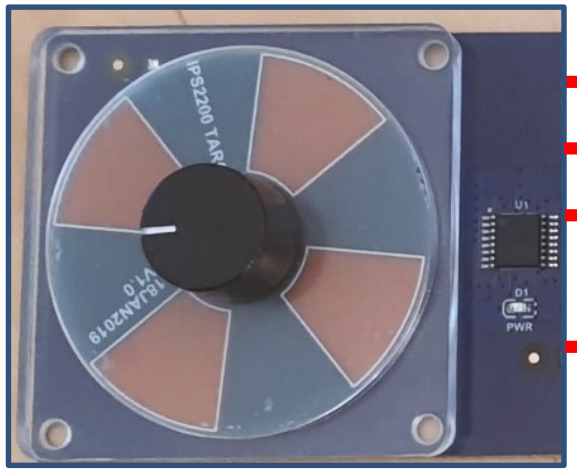
IPS-COMBOARD
(Same for IPS2200 and IPS 2550)



Software Connection Settings:

HOW TO CONNECT A SENSOR WITH 4 WIRES?

Sensor Module



IPS-COMBOARD
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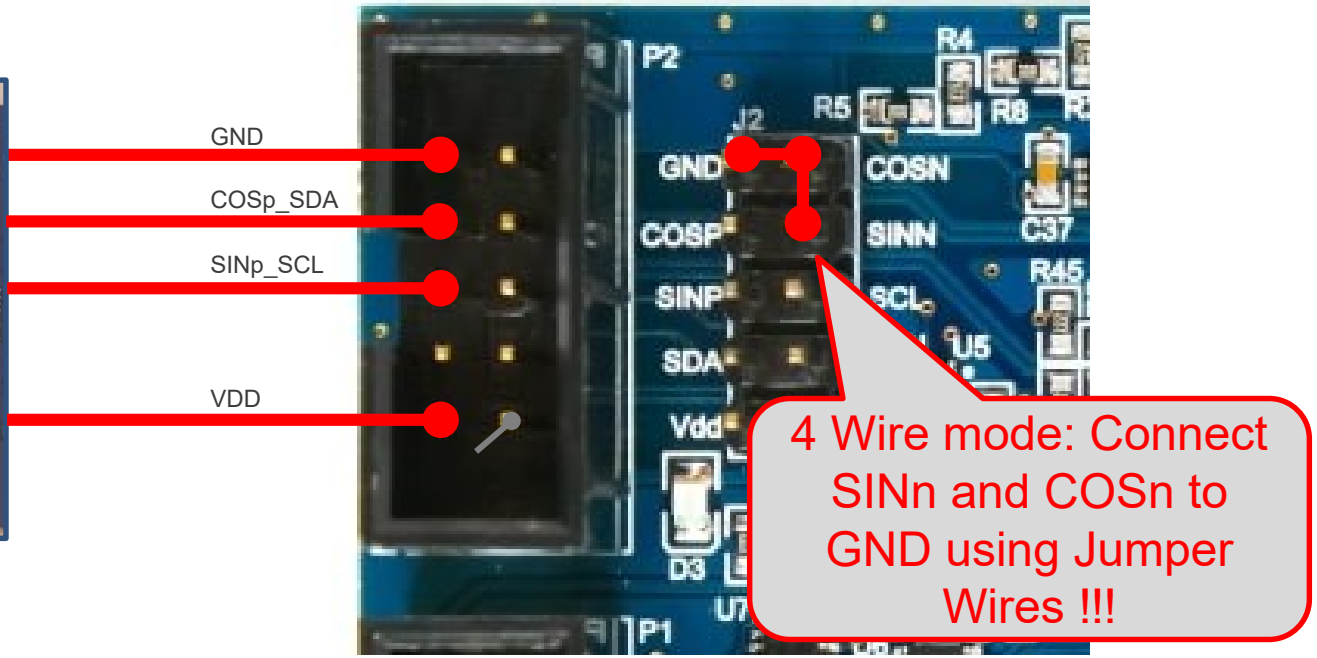


Software Connection Settings:

IPS2550 SUPPORT DOCUMENTS

IPS2550 Landing Page:

https://www.renesas.com/ips2550

IPS2550 Datasheet (secure link):

https://www.renesas.com/us/en/document/dst/ips2550-datasheet

IPS2550 Sensor and Coil Design Instruction Video (9min):

https://www.renesas.com/us/en/video/how-design-inductive-position-sensor

IPS2550 Customer Reference Board Catalog:

https://www.renesas.com/us/en/document/oth/ips2-customer-reference-board-catalog-crb

IPS2550 EMC Recommendations (secure link):

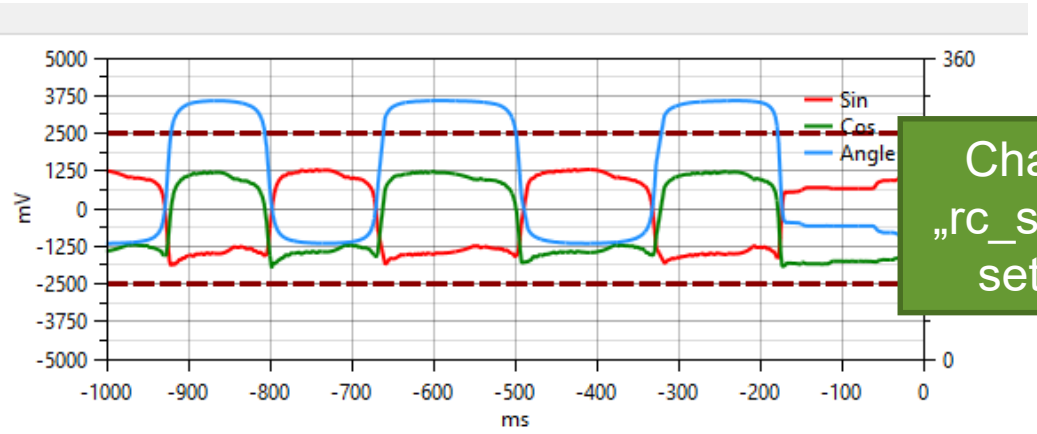
https://www.renesas.com/document/apn/ips2550-emc-recommendations

IPS2550 Programming Guide:

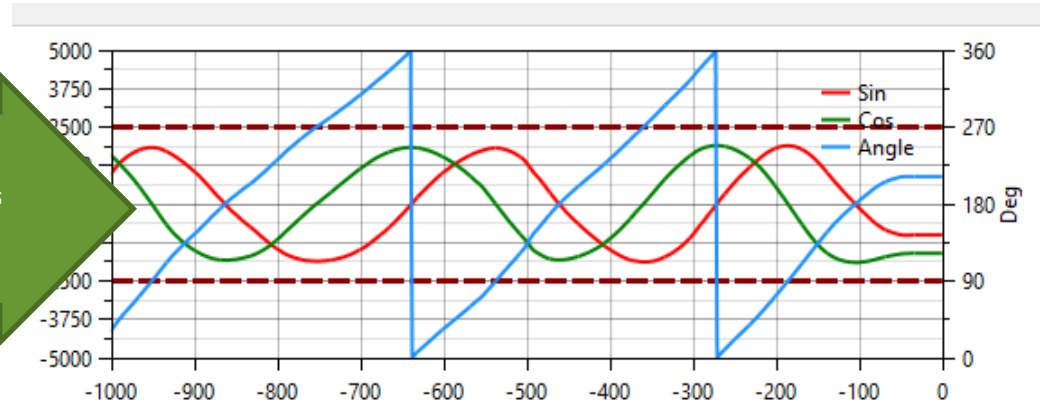
https://www.renesas.com/document/man/ips2550-programming-guide

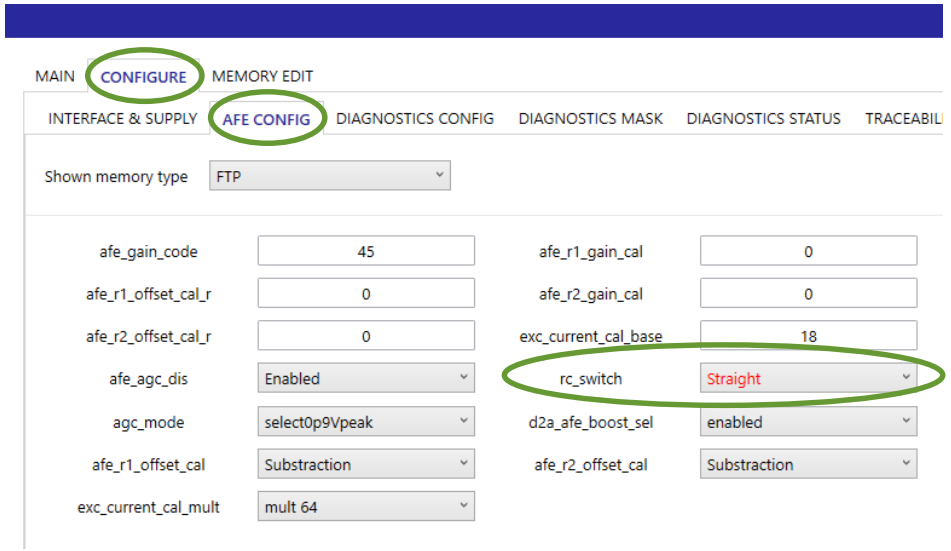
FREQUENTLY ASKED QUESTIONS

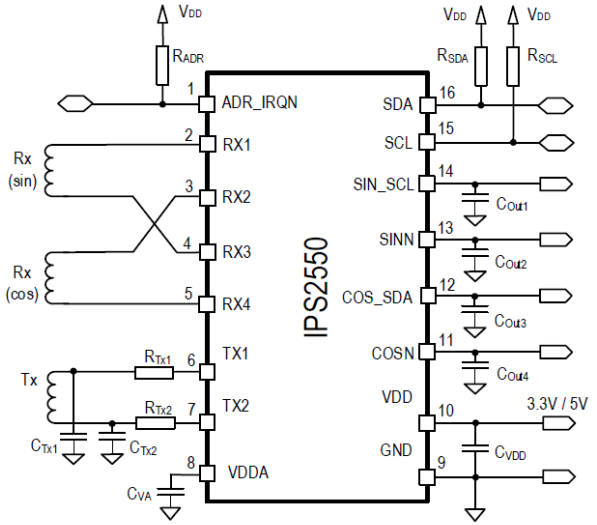
WHY ARE THE OUTPUT SIGNALS SHIFTED BY 180 DEG?

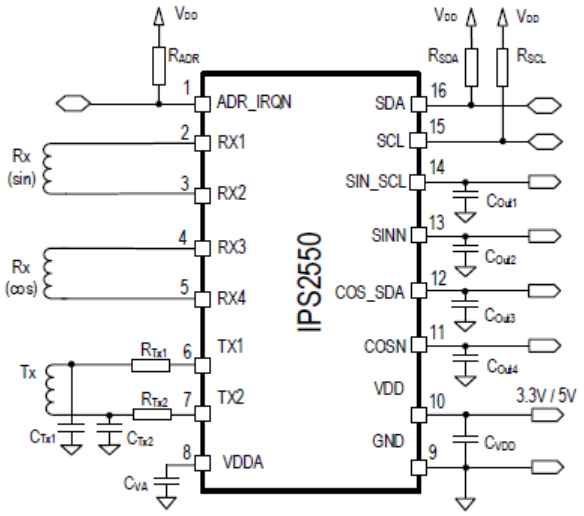


Change „rc_switch“ setting









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