# IPS2550STKIT GETTING STARTED

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# CONTENT

#### **IPS2550STKIT Content**

IPS2-Comboard, Micro B USB cable

IPS2550MROT4x90001, Two 10pin ribbon cables

Renesas disclaimer document

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# **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:  $3.3V \pm 10\%$  or  $5.0V \pm 10\%$  supply

Speed: 600.000 (el) rpm

Propagation delay: 4µs

Overvoltage, reverse polarity, short-circuit protected

Programming interface: I<sup>2</sup>C or over output pins Diagnostics interrupt to external MCU

AGC to compensate air-gap variations

TSSOP-16 with exposed pad



IPS2550 is pin <u>backward compatible</u> to IPS2200 in straight pinout mode

# **EVALUATION KIT SETUP: STEP 1 - CONNECT BOARD**

Connect the IPS2550MROT4X90001sensor module to the IPS-COMBOARD

IPS2550 Sensor Module IPS2550MROT4X90001 IPS-COMBOARD (Same for IPS2200 and IPS 2550)



# **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/document/swr/ips2550stkit-evaluation-software-gui)



# **EVALUATION KIT SETUP: STEP 3 – READ OUTPUT SIGNALS**





# **EVALUATION KIT SETUP: STEP 4 – SENSOR CONFIGURATION**



# SENSOR CONFIGURATION USING THE CALIBRATION WIZARD

Configure the Sensor by performing steps A ... E (WITH ROTATING MOTOR ONLY)







# **MANUAL SENSOR CONFIGURATION**

# Configure the Sensor by performing steps A ... E (WITH ROTATING MOTOR ONLY )

#### 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  $_{\rm m}0^{\rm m}$ 

### **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 CONFIG: CHANGE CONFIGURATION IN CONFIGURE TAB**

All configuration of the IPS2550 can be changed here.

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)

CONNECTION					ACTIVE DEVICES
Disconnect	ALL REGISTERS ALL REGISTERS				
12C	Shown memory type FTP *				Device: EVK CommBoard
Device 1	i2c_slave_sub_addr	2	afe_r1_offset_cal	0	Name: IPS2550
VDD: 5V	afe_r2_offset_cal	0	exc_current_cal_base	62	FVV.2.3.0
Power both devices	exc_freq_wdg	0	exc_freq_ll	0	
I2C Analog communication	exc_freq_ul	0	irq_wdg	0	
	agc_plause_err_dis	0	rc_osc_cal	55	
	cmode_trim_val	8	sinp_offs_trim	1	
	cmode_trim_sign	0	sinn_offs_trim	7	
Read FTP	prob_dly_trim_lsb	0	cosp_offs_trim	3	
Write FTP	over_temp_trim	4	prob_dly_trim_msb	0	
Read SRB	cosn_offs_trim	2	customer_id	0	
Write SRB	product_id	0	fab_code	0	
Read SFR	wafer_id	0	l2_lot_id	0	
Write SER	l1_lot_id	0	I3_lot_id	0	
White Silk	l2_msb_lot_id	0	I4_I5_lot_id	0	
Reset IC	die v nos	n	die v nos	0	·

# **IPS2550 CONFIG: 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)



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# **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, 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
    imper wires. As well the pull-ups on the IPS-comboard must be reduced to 2K4. (eg. add additional 4K7 resistors in parallel)





# **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





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