Errata sheet

Design Deviation of TLx49012 - B12 and B13 design

About this document

This document describes the errata of TLx49012 B12 & B13 design steps.

Note: The design step of the sensor can be identified by reading <hw_fw_id_reg> register (address: 0x79) [1]

Scope and purpose

Provide a comprehensive list of known limitations of the TLx49012 B12 & B13 design steps and potential workarounds.

Intended audience

Customers using TLx49012 B12 & B13 design steps.

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1 System Self-Calibration in quadrature causes angle error after motor standstill

Expected behavior

After the motor comes to a standstill and starts turning again, the angle measurement continuous with same accuracy as before standstill.

Problem description

The System Self-Calibration in Quadrature mode updates the compensation parameter after completion of 3 full rotations. At typical application speeds ≥ 20 rpm, the performance is according to the expected behavior. However, for slow speeds and especially for prolonged periods at standstill, the compensation parameter calculation can become significantly affected by excessive accumulation of rounding errors.

Consequence

If the compensation parameters do not match the actual system inaccuracies, angle errors bigger than specified can occur.

Workaround

There are two work-around options possible.

- **Option 1:** Restart the SysCal

Read-out and store SysCal compensation parameter every time a motor standstill is initiated. Before starting the motor again, re-initialize the SysCal with the compensation parameters obtained before standstill.

- *Motor standstill initiated*
- Read the SysCal compensation parameters (offset x/y, ellipticity, oos rotation)
- Disable CRC-check by writing <stat_en_1_reg>.stat_bitmap_usr_crc_en=0_B
- Soft-configure SysCal compensation parameter to sensor
- Correct CRC
- Enable CRC-check by writing <stat_en_1_reg>.stat_bitmap_usr_crc_en=1
- Trigger sensor restart
- Sensor start-up time needs to be considered after sensor reset

Note: If no SPI interface will be used in the application, a compelete reset of the sensor via IFE pin is recommended. This starts a new initialization of the SysCal. Otherwise workaround option 2 is the preferred solution.

- **Option 2:** use SysCal Mode 5: Vector length calibration

Configure the system self-calibration to vector length mode by setting bitfield “syscal_mode” in the <usr_conifg_10_reg> register to 5 = 101_B.

The Vector length mode provides updates of compensation parameters every turn and is therefore faster than the default quadrature mode. However, the mode is more prone to noise and therefore typical angle accuracy is slightly worse than with the default quadrature mode.

Appendix -Workaround

The following code serves as example code for workaround option 1. It is intended for demonstration purposes only and is in no way guaranteed or warranted for use in mass production.

```
# 1) Read out calibration value registers:
syscal_angle_base_reg = sensor.read_nextFrame(43)
syscal_offset_x_reg = sensor.read_nextFrame(44)
syscal_offset_y_reg = sensor.read_nextFrame(45)
syscal_ellipticity_reg = sensor.read_inFrame(46)
syscal_oos_rotation_reg = sensor.read_inFrame(47)

# 2) Extract values from registers:
syscal_ellipticity_scale = (syscal_ellipticity_reg & 0xC000) >> 14
syscal_ellipticity = syscal_ellipticity_reg & 0x3FFF
syscal_oos_rotation = syscal_oos_rotation_reg >> 1

# 3) Calculate values to write back:
ellipticity = syscal_ellipticity >> (13 - syscal_ellipticity_scale)
ellipticity = round(ellipticity, 2)
ellipticity_write_value = int(round((ellipticity-1)*100,0))
if ellipticity_write_value < 0:
      ellipticity_write_value = 0
elif ellipticity_write_value > 255:
      ellipticity_write_value = 255
oos_rotation_write_value = (syscal_oos_rotation >> 4) & 0x03FF

# 4) Write values back to the sensor:
sensor.write_inFrame(0x78, 0x4711) # SPI register unlock
sensor.write_inFrame(0x04, 0x7F18) # disable bitmap / LUT CRC check
reg_val = sensor.read_nextFrame(74)
reg_val = (reg_val & 0x00FF) | (ellipticity_write_value << 8)
sensor.write_nextFrame(74, reg_val)
reg_val = sensor.read_nextFrame(75)
reg_val = (reg_val & 0x003F) | (oos_rotation_write_value << 6)
sensor.write_nextFrame(75, reg_val)

WriteUserConfigCRC() # correct the bitmap CRC – refer to User manual
sensor.write_inFrame(0x04, 0x7FD8) # enable bitmap / LUT CRC check again
sensor.write_inFrame(0x02, 0x8E82) # Trigger a sensor reset from bitmap
```

References

[1] Infineon Technologies AG, "TLx49012-Users manual," *Infineon-TLx49012-Users_Manual_v1_00-EN,* 2026.

[2] Infineon Technologies AG, "TLx49012-Datasheets (all variants)," *Infineon-TLx49012-Datasheet-v1_00-EN,* 2026.

Revision history

Document revision	Date	Description of changes
0.10	2024-08-22	Initial release – Prototype samples
0.20	2025-04-01	Initial release – Engineering samples
0.30	2026-04-01	Initial release – Qualified samples B12
1.00	2026-05-28	Refinement of reference code in work-around section and root-cause description
1.10	2026-09-23	Added reference to B13 design step Updated Reference to final version of Datasheet and User manual valid for B12 and B13 design step

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