

ZSSC3240 CURRENT LOOP / OWI

ZSSC3240 Configuration

Recommended AFE configuration
for test application using the
Sensor Replacement Board

Default mode is the Cyclic Mode.
After IC-reset the ZSSC3240 starts
autonomously the measurements.

OWI interface is activated for 50ms
after IC-reset.

If in this period the command 0xD9
(START_UP_OWI) is received, the
ZSSC240 stays in OWI communication
mode. Otherwise it provides the
measurement results after 50ms at
AOUT.

SM Config 1/2	Ext. Temp. Config 1/2
Gain: 28	Gain: 1.32
Polarity: Positive	Polarity: Positive
ADC Resolution: 16 Bit	ADC Resolution: 16 Bit
ADC Offset: 44%	ADC Offset: 0%
ADC Reference: Ratiometric	ADC Reference: Bandgap
IOFFSC: 0mV (no shift)	IOFFSC: 0mV (no shift)
Tbias out: 5uA	Tbias out: 5uA
ADC Gain/Offset: On	ADC Gain/Offset: Off
CM Adjustment: On	CM Adjustment: Off

Smart Sensor Feature Reg. 1	Smart Sensor Feature Reg. 2
Default Mode: Cyclic Mode	DAC resolution: 13Bit
OWI Listen Time: 50ms	Dithering: Dithering Off
OWI SU Case: Startup Window	DAC Input: Sensor -> DAC
Temp. Source: internal PTAT	Analog Out: DAC Output enabled
Sensor Supply: Ratiometric Supply VDDB	Aout Setup: Current loop / OWI1 / OWI2
Internal Rt: 1.3kOhm	Diagnostic: Analog Diagnostic Off
External Rt: No	LDOctrl: On
OWI off: OWI enabled	LDOctrl Voltage: VDD = 4.8V
NVM lock: NVM write OK	AZ Sensor: AZM Sensor Off
Charge Pump: On	AZ Temp.: AZM Temp. Off
	Oversampling: No Overs.

Desired DAC resolution

Sensor choice for analog output

DAC functionality has to be enabled

Necessary configuration for
Current Loop application in
combination with OWI.

Desired regulated VDD voltage

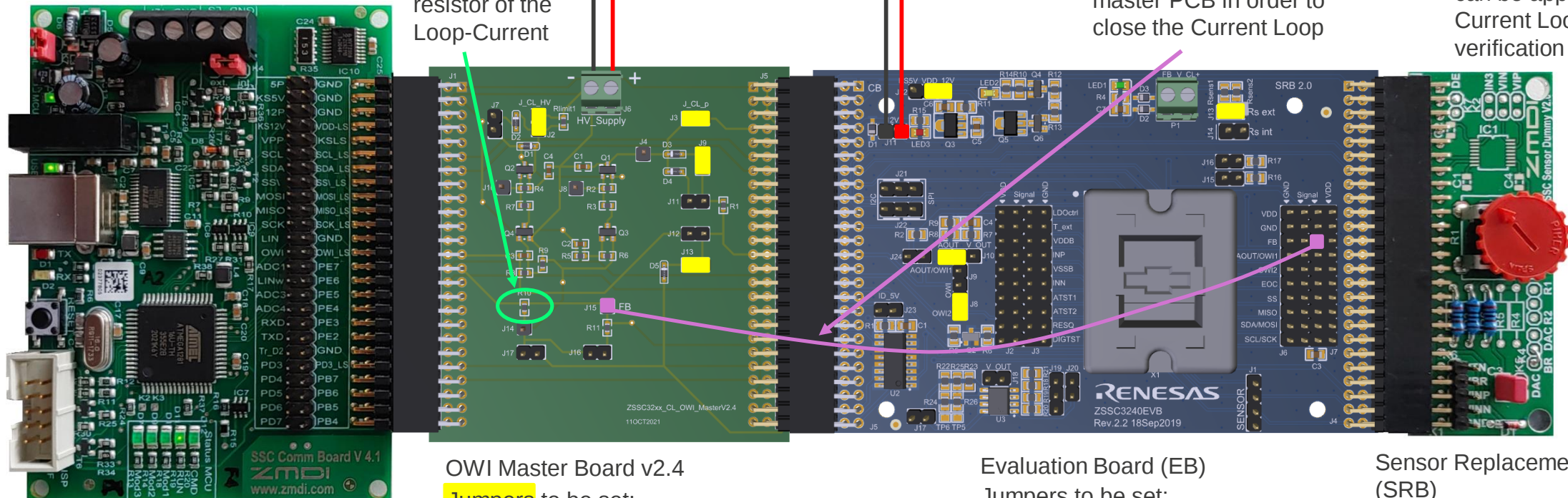
ZSSC3240 CURRENT LOOP / OWI HW SETUP

HV supply voltage = 26V
(recommended current
limitation: 40mA)

Measurement of the
Loop-Current

Feedback (FB) pin has to
be connected to J15 on the
master PCB in order to
close the Current Loop

The Sensor
Replacement Board
can be applied for
Current Loop
verification



Communication Board (EB)
(FW has to be v4.20)

OWI Master Board v2.4
Jumpers to be set:
J_CL_HV (J2)
J_CL_p (J3)
J9
J13

Evaluation Board (EB)
Jumpers to be set:
J8
J10 (pins 2-3)
J12 (pins 2-3)
J13

Sensor Replacement Board
(SRB)

CB FW UPDATE FOR OWI IN CURRENT LOOP

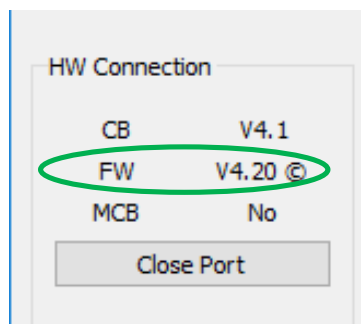
For the ability of the CB to decode OWI communication, in combination with Current Loop, the firmware (FW) of the CB has to be updated to revision V4.20.

The recent FW revision, Bootloader and the documentation for the updating process are available at the Renesas site:

<https://www.renesas.com/us/en/products/sensor-products/sensor-signal-conditioners-ssc-afe/ssc-cb-ssc-communication-board>

Follow the instructions in the *Communication Board Firmware Update* Application Note for flashing the FW version 4.20 to the CB controller.

After a successful flashing process, the HW information in the ZSSC3240 GUI displays the FW version:

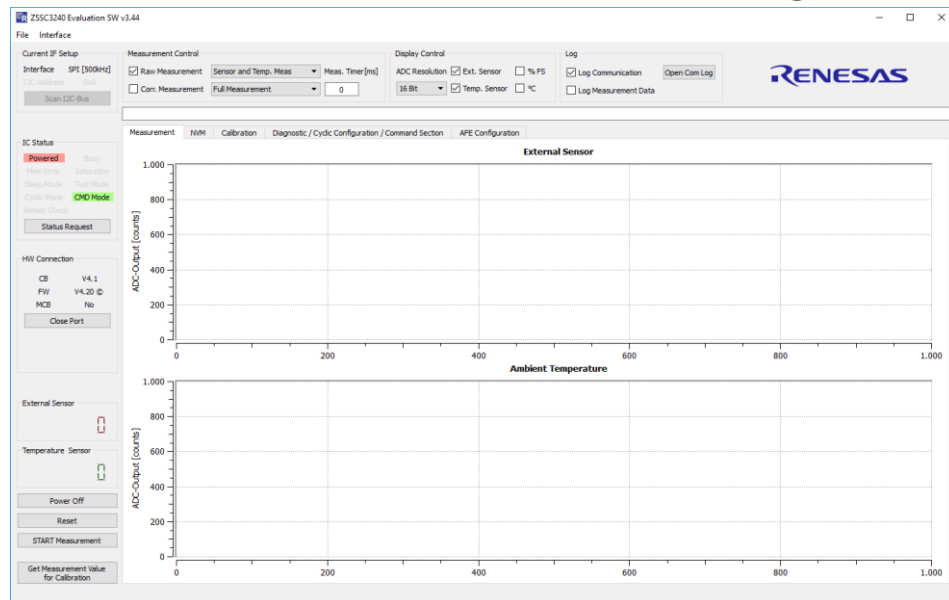


ZSSC3240 CURRENT LOOP - POWER UP

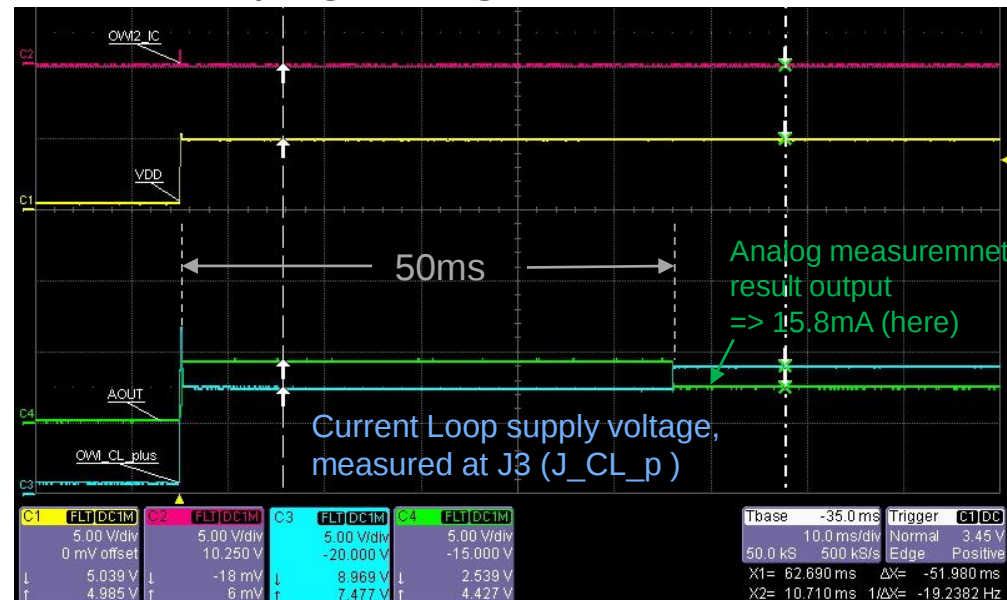
After ZSSC3240 configuration, HW connection, and FW flashing:

1. Connect the Communication Board via USB to a host PC and turn on HV supply (26V)
⇒ No current should be flowing in the Loop
2. Start the ZSSC3240 Evaluation SW
⇒ KS5V is set to 5V when the GUI is loaded, it enables the HV supply to EB. The Current Loop is supplied.
⇒ ZSSC3240 is in Cyclic Mode, providing the measurement result at AOUT pin. The AOUT voltage is driving the CL current.

ZSSC3240 GUI after launching



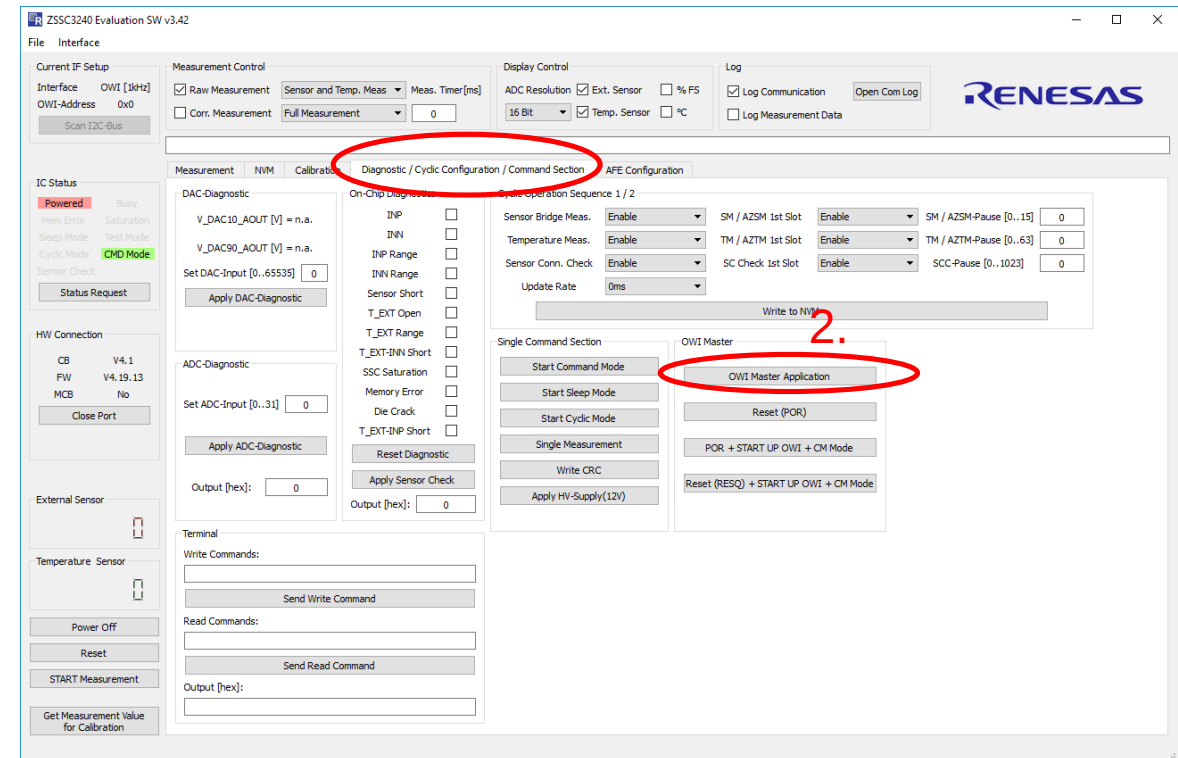
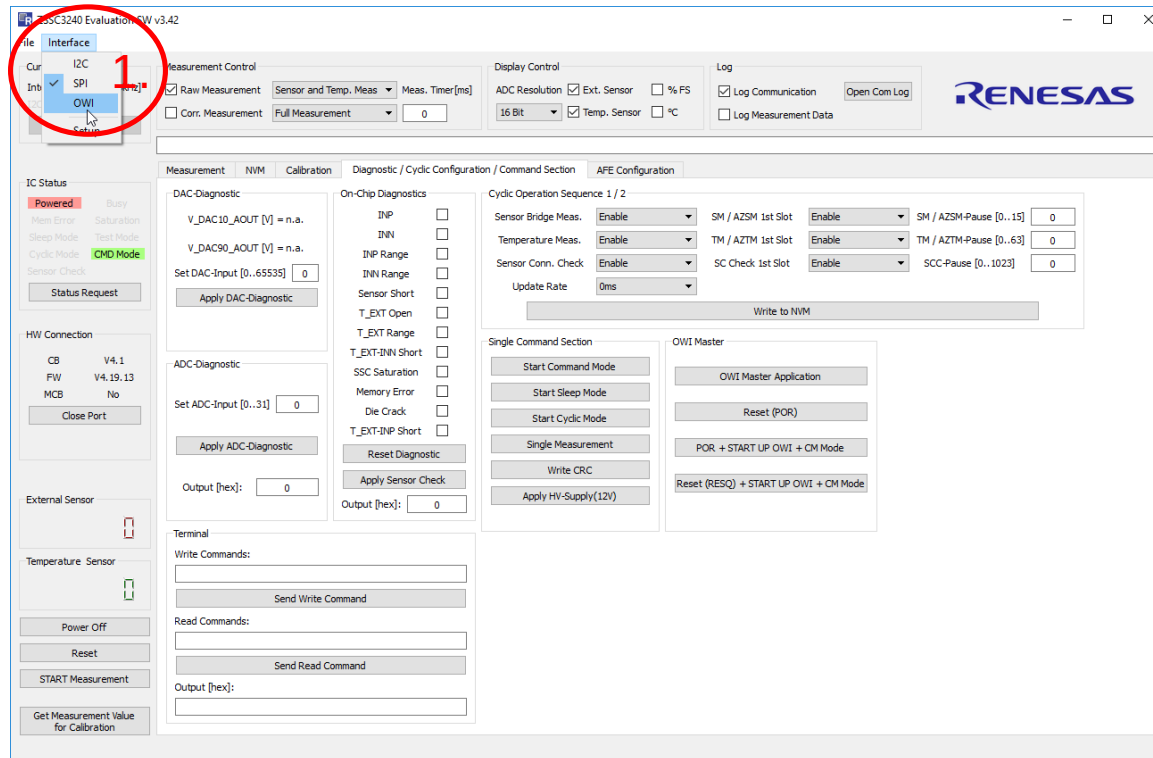
Scoping the signals after GUI start



SW CONFIGURATION FOR OWI COMMUNICATION

1. Switch to OWI interface:
Menu -> Interface -> OWI

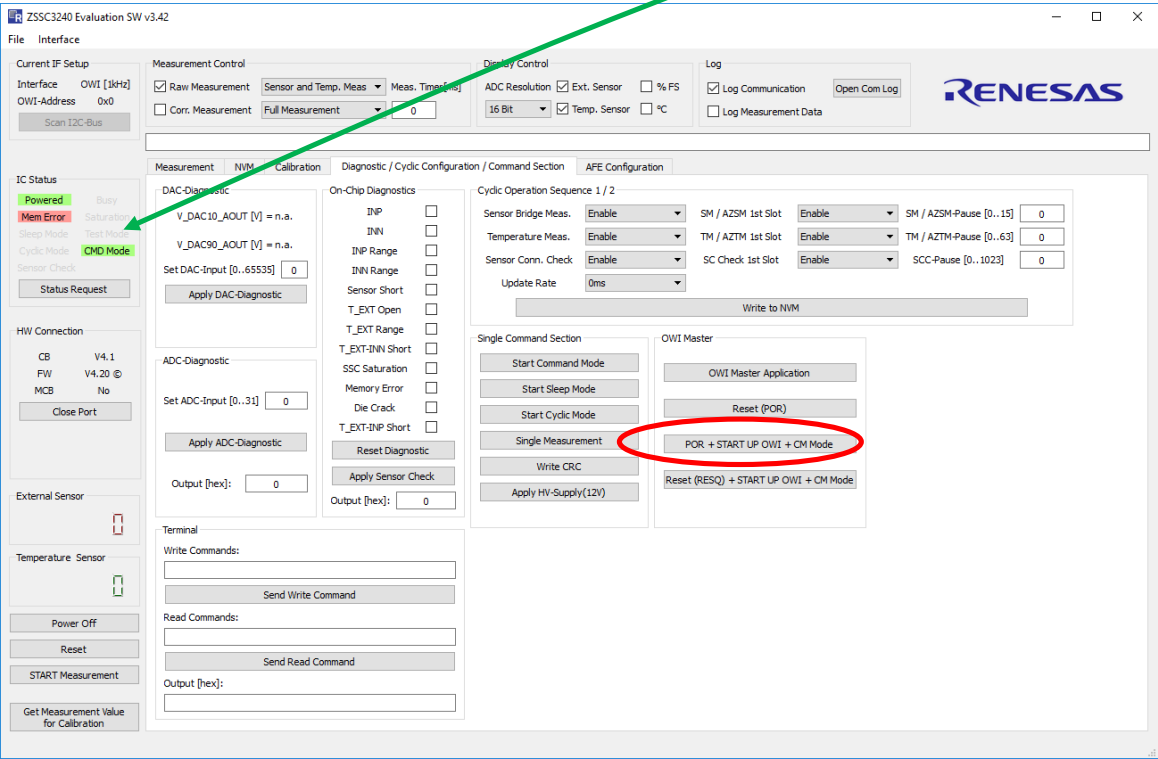
2. CB configuration to decode the ZSSC3240 OWI output (modulated on the Loop-Current):
Diagnostic / Cyclic... / Command Section tab -> OWI Master -> OWI Master Application



SWITCH FROM CYCLIC MODE TO COMMAND MODE

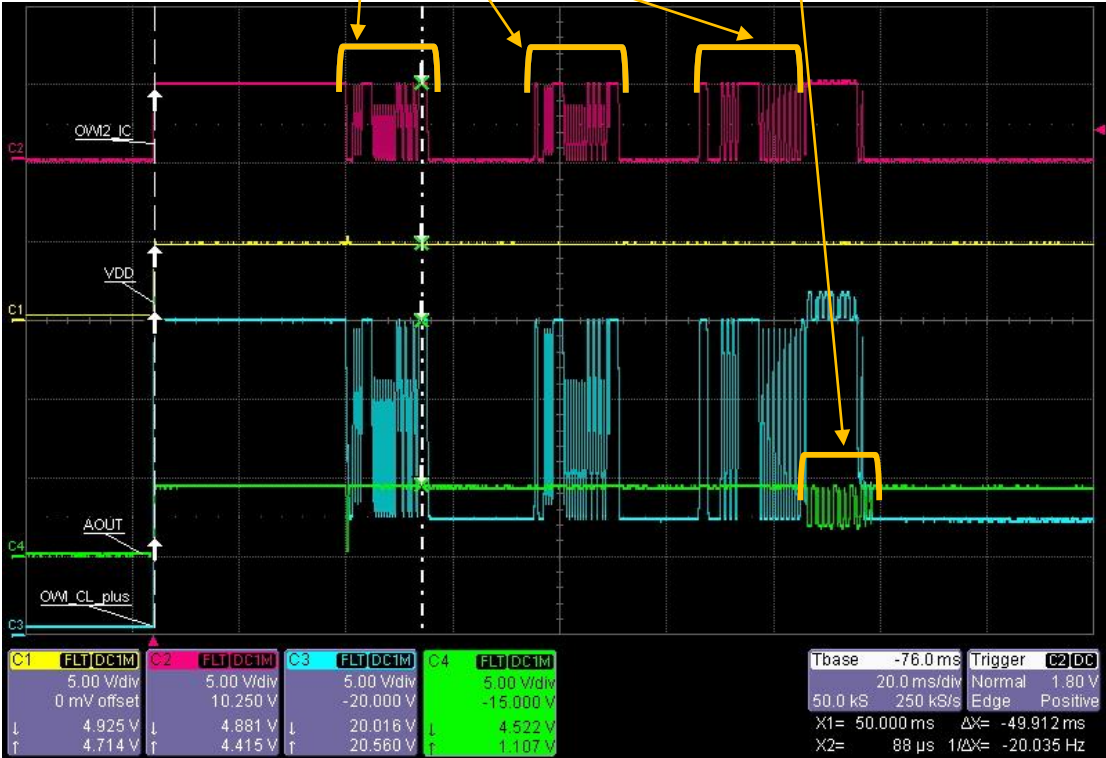
POR (Power-On Reset)

Diagnostic / Cyclic... / Command Section tab -> OWI Master -> POR START_UP_OWI_CM_Mode



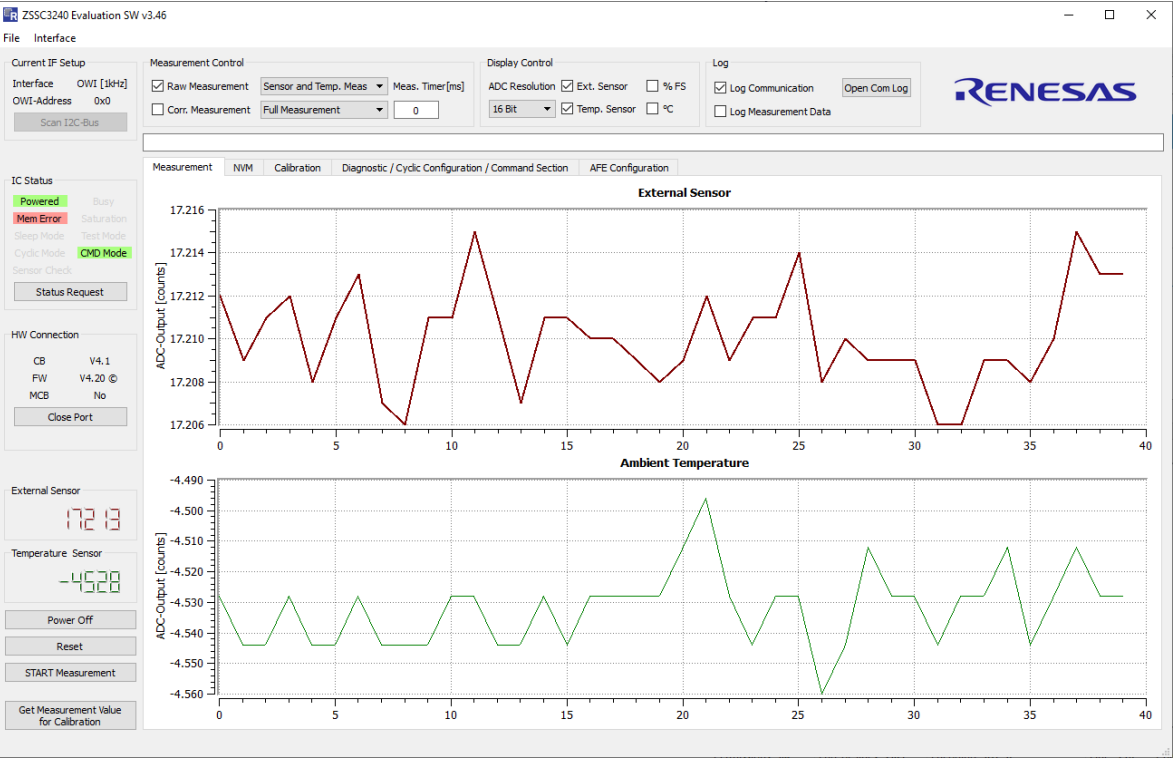
Communication Log:

...
send_cmd: 'OWT00001D2' response: 'ACK', (STARTUP OWI)
send_cmd: 'OW_00001A9' response: 'ACK', (ENTER COMMAND MODE)
receive_owi: 'OR_00001' response: 'ACK', '44', (READ 1 byte -> IC-status)
...



⇒ In Command Mode any digital interaction via OWI is applicable: NVM Reading / NVM Writing / Measuring

MEASUREMENT VIA OWI



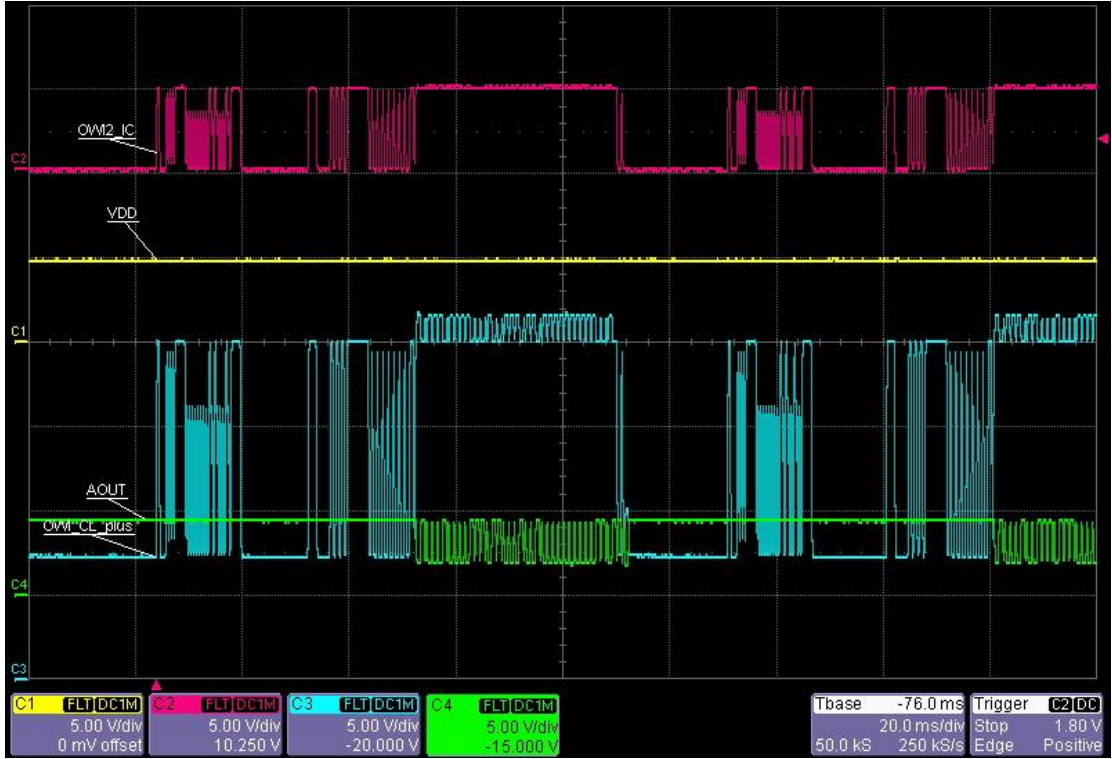
Consistency check, digital vs. analog output:

Measured Loop-Current at given SRB positistion: **15.8mA**

$$\begin{aligned} 17213 \text{ LSBs} + 32768 \text{ LSBs} &= 49981 \text{ LSBs} \\ 49959 \text{ LSBs} \div 65536 \text{ LSBs} &= 0.763 \% \text{ FSO} \\ 0.763 \% \text{ FSO} \times 20\text{mA} &= \mathbf{15.3mA} \Rightarrow \text{OK, small offset due to DAC deviation} \end{aligned}$$

Commnication Log:

```
...
send_owi: 'OW_00001A2' response: 'ACK', "
receive_owi: 'OR_00004' response: 'ACK', '44433D00'
send_owi: 'OW_00001A4' response: 'ACK', "
receive_owi: 'OR_00004' response: 'ACK', '44EE5000'
...
```



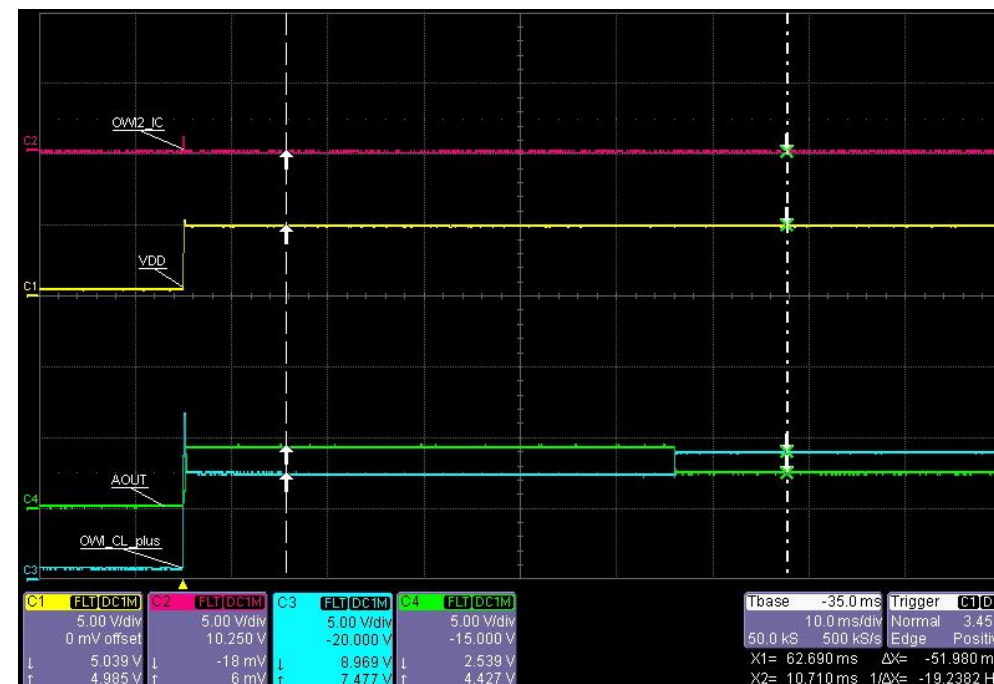
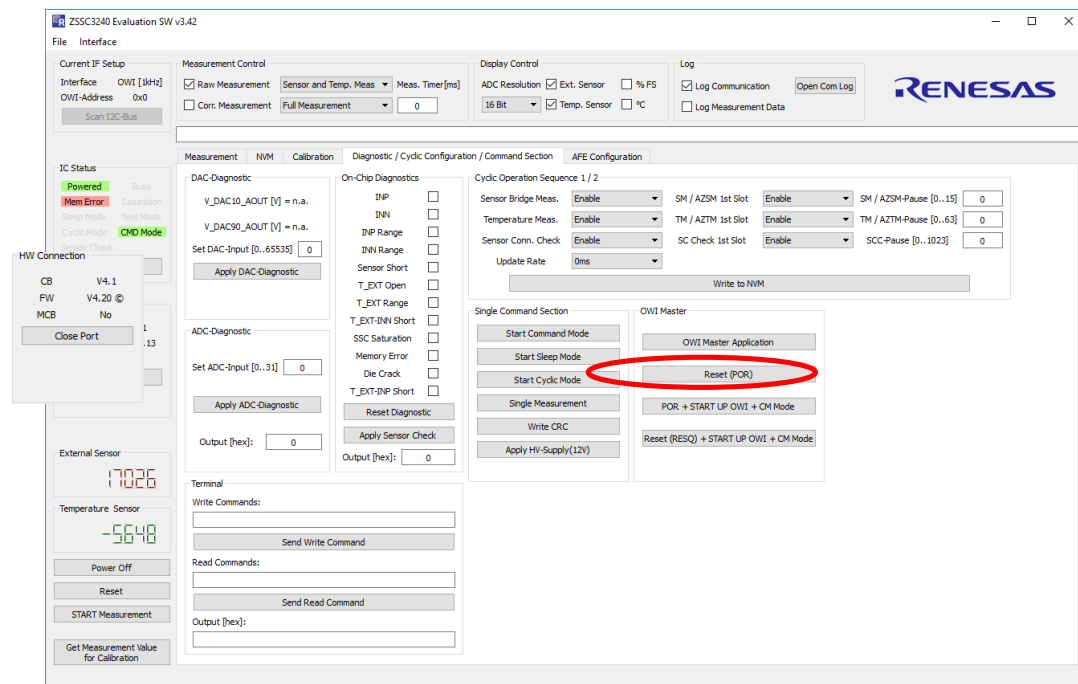
ENTERING CYCLIC MODE FROM COMMAND MODE

HV power supply is controlled by the KS5V signal on the CB. Toggling it causes a POR (power-on reset).

- ⇒ After the POR, the ZSSC3240 is restarting in the programmed default mode (here: Cycling Mode).
- ⇒ Sensor measurement results are provided at AOUT pin such that the Current Loop is driven by the sensor output

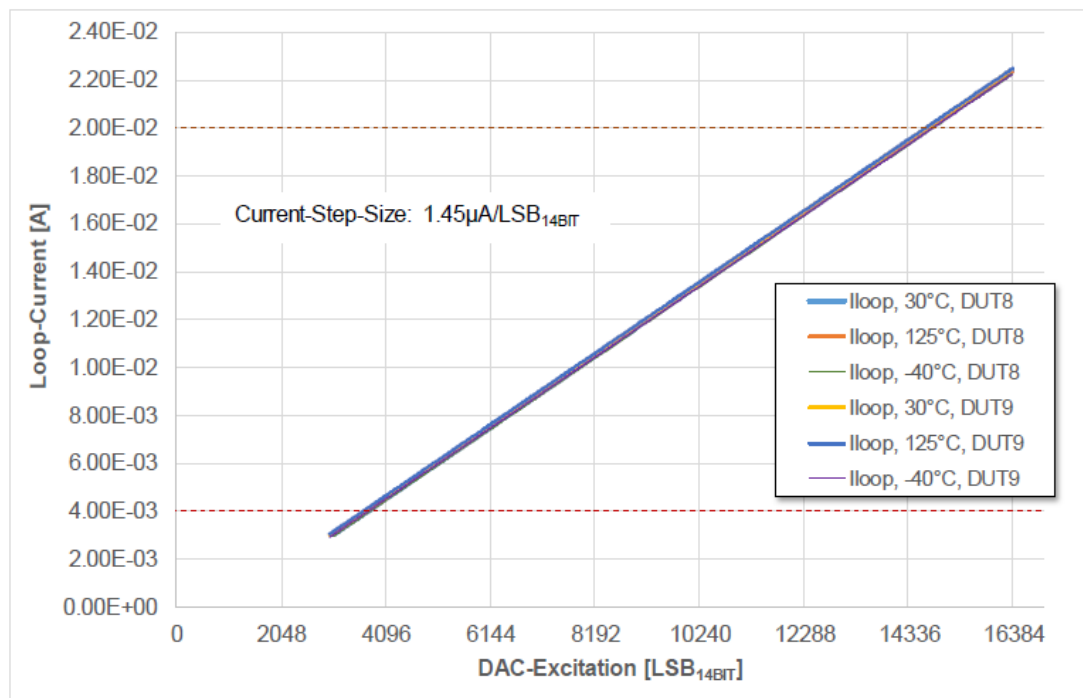
Communication Log (POR):

```
...
send_cmd: 'PS_A50' response: 'ACK', "
send_cmd: 'WAIT100' response: 'ACK', "
send_cmd: 'PS_A51' response: 'ACK', "
...
```



ZSSC3240 CURRENT LOOP CHARACTERISTIC

DAC Current-Loop Output



Corresponding Voltage at AOUT-pin

