

# TLF35584 (C-Step)

Getting started with the Evaluation Environment

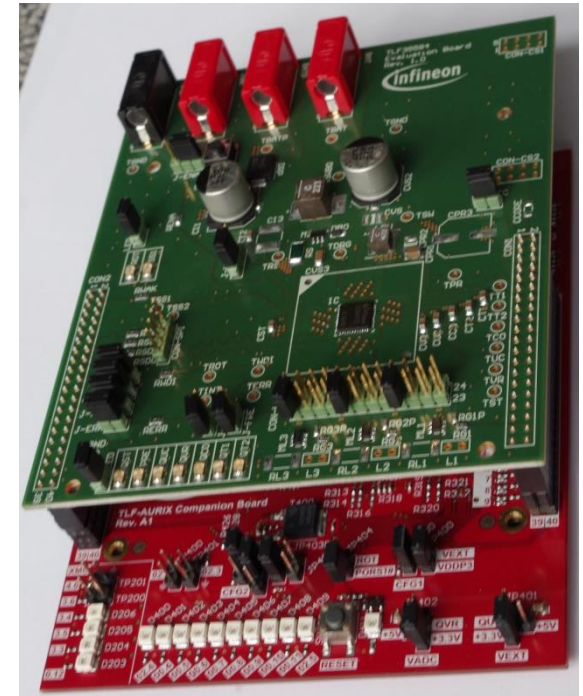
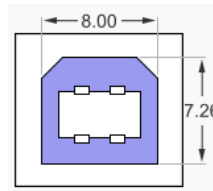
19.09.2019

V2.1



# Board Setup

- › The Evaluation Environment consist of two boards
  - TLF35584 Evaluation Board (green)
    - TLF35584 IC and all external components
    - Pin headers (soldered) to connect it
  - TLF-AURIX Companion Board (red)
    - Fully equipped with connector and firmware
    - Needs USB cable (Type B) for connection to your PC/Notebook

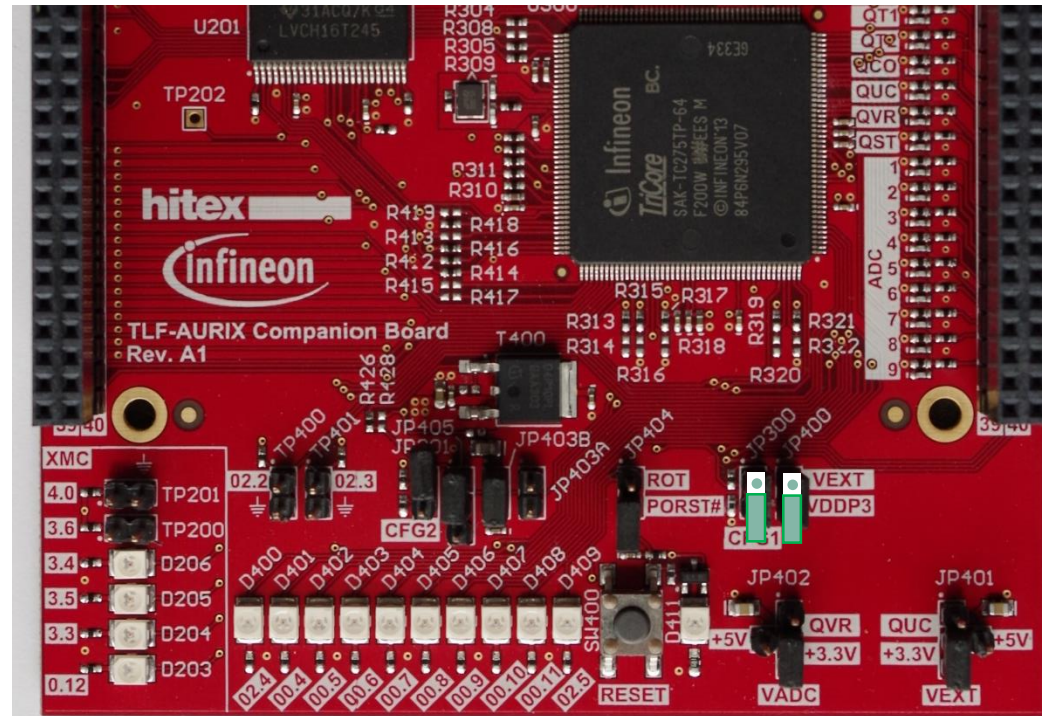


- GUI is available to be run on the PC, which is communicating with an attached Companion board to control and monitor the TLF35584 (ask FAE for the files)

# Board Setup – Voltage Selection

## TLF35584QVVS1 (QUC=5V)

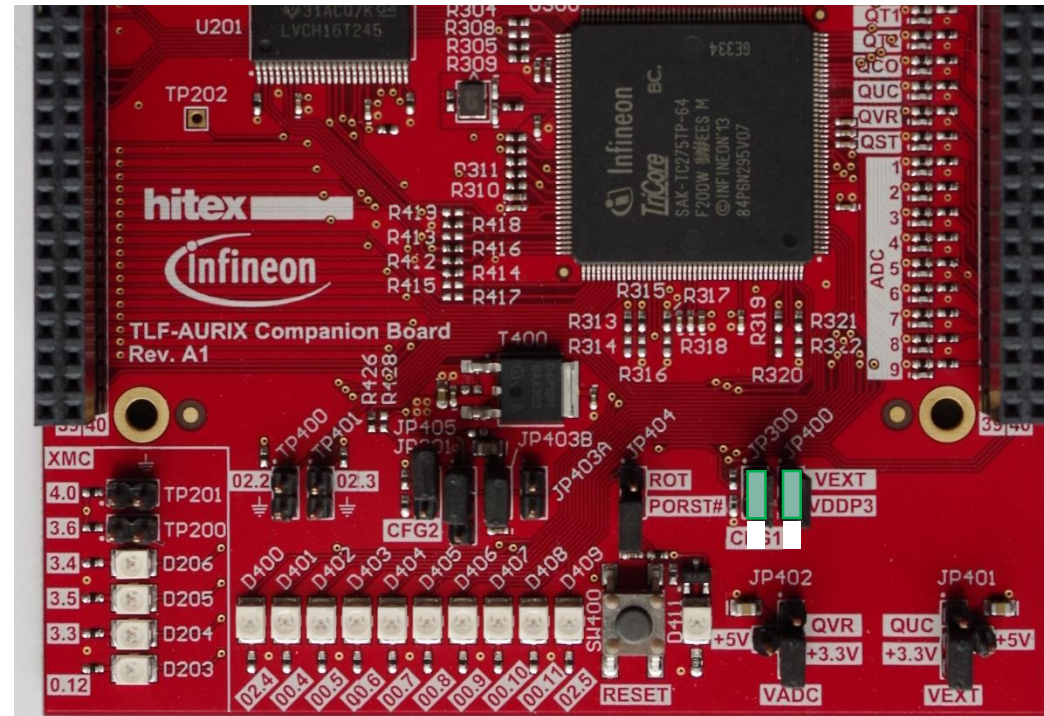
- › Please verify the variant of TLF35584 used (check marking) against the configuration on the Companion Board
- › VS1/5V:
  - Open JP400
  - Open JP300



# Board Setup – Voltage Selection

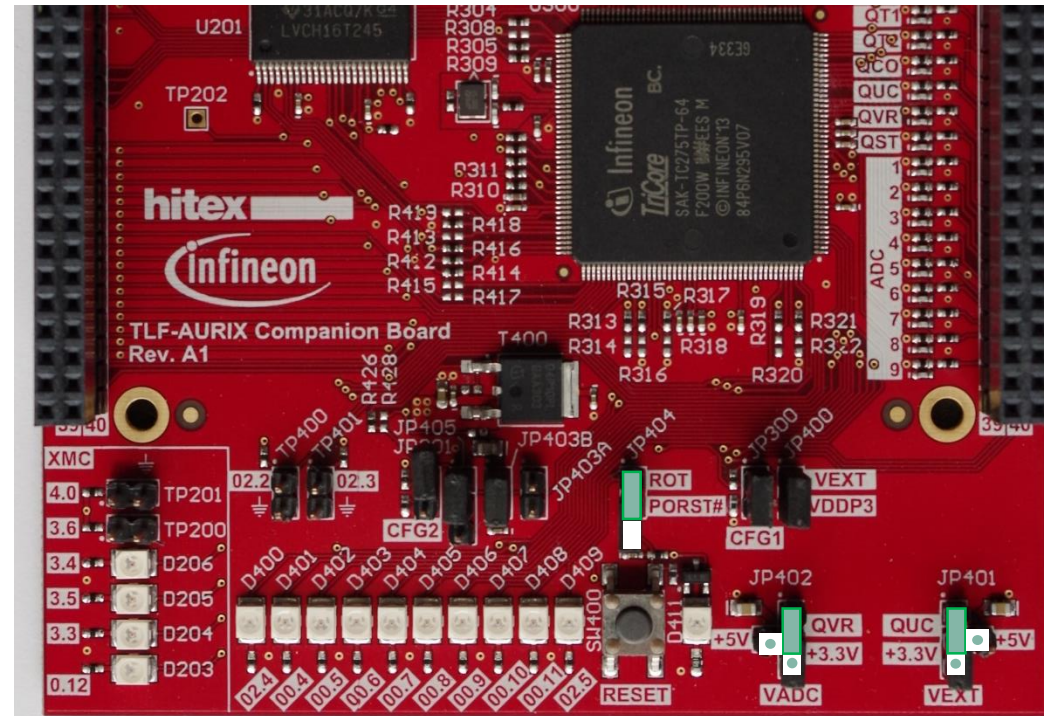
## TLF35584QVVS2 (QUC=3.3V)

- › Please verify the variant of TLF35584 used (check marking) against the configuration on the Companion Board
- › VS2/3.3V:
  - Close JP400
  - Close JP300



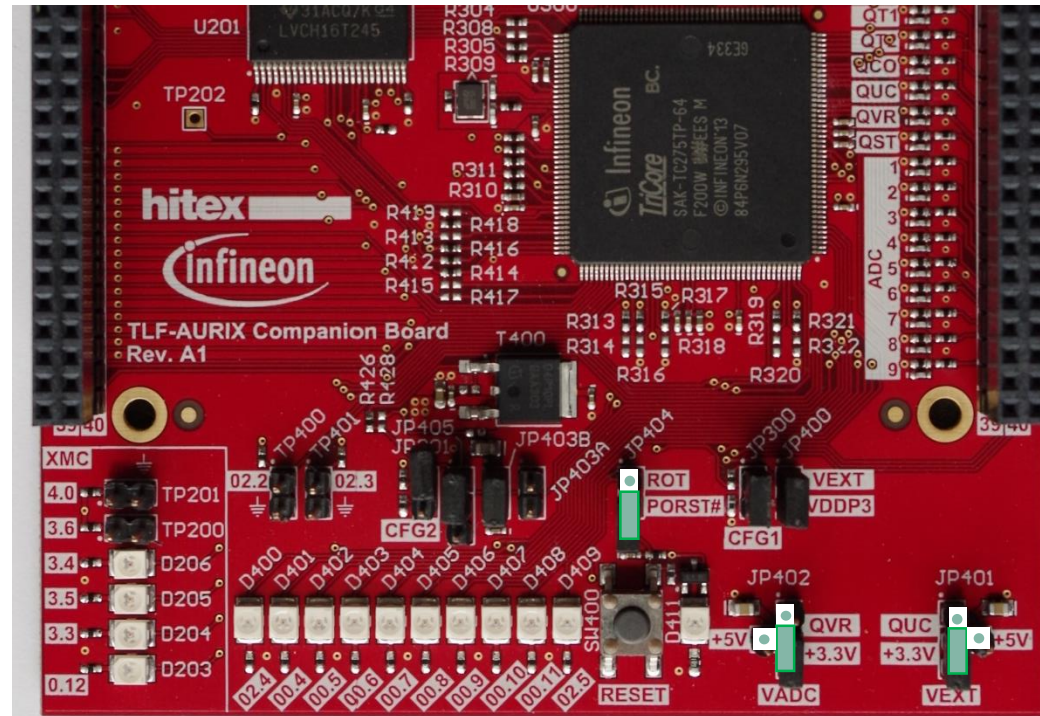
# Board Setup – AURIX Supply and PORST (1)

- › The Companion Board offers the possibility to supply the AURIX by the TLF35584 directly or by the Companion Board (USB)
- › Supply by TLF35584:
  - Set JP402(VADC) to “QVR”
  - Set JP401(VEXT) to “QUC”
  - Close JP404 (PORST = ROT)



# Board Setup – AURIX Supply and PORST (2)

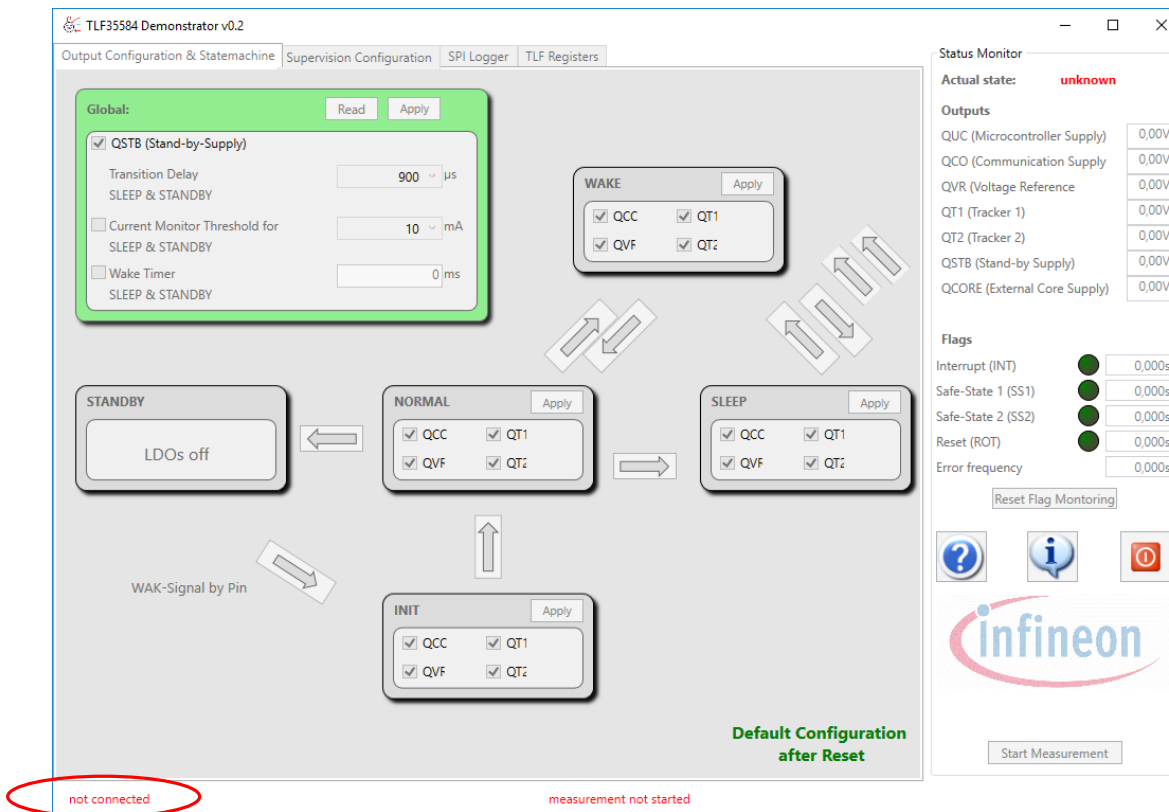
- > The Companion Board offers the possibility to supply the AURIX by the TLF35584 directly or by the Companion Board (USB)
- > Supply by Companion Board (USB):
  - Set JP402(VADC) to “3.3V” or “5V” according to the setting of JP300 & JP 400 (Slide 3-4)
  - Set JP401(VEXT) to “3.3V” or “5V” according to the setting of JP300 & JP 400 (Slide 3-4)
  - Open JP404 (PORST != ROT)



\* Only 3.3V option is shown in the picture!

# How to get it up and running (1)

- › Before connecting the Companion Board to your PC!
- › Start the GUI by executing the file “TLF\_Demonstrator\_V2.1.exe” from the GUI-files
  - GUI will come up showing “not connected” and appearing grey



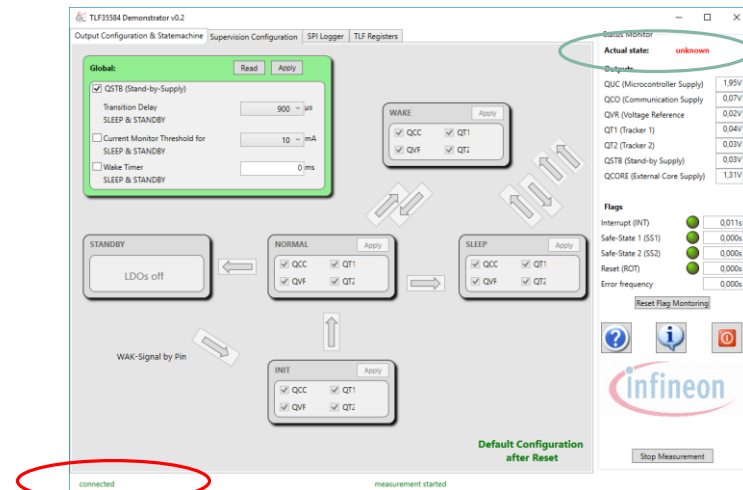
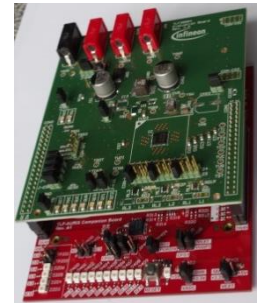
## How to get it up and running (2)

- › Ensure that the AURIX Firmware update to V2R2 has been done or simply redo it
  - Refer to the file  
“TLF35584-Evaluation-Environment\_Firmware-Update.pdf”
  - Otherwise the Companion Board cannot properly communicate with the TLF35584 C-Step Silicon
  
- › Ensure that the TLF35584 Evaluation Board (green) is equipped with a B/C-Step silicon
  - Check the marking on the IC
    - A-Step: “35584VS1” (5V) or “35584VS2” (3V3)
    - B-Step:
      - Line 1: “35584”
      - Line 2: “VS1” (5V) or “VS2” (3V3)
    - C-Step:
      - Line 1: “TLF35584”
      - Line 2: “VS1” (5V) or “VS2” (3V3)



# How to get it up and running (3)

- › Make sure that the Evaluation and Companion Board are properly interconnected as visible on slide 7 (and right)
- › Connect the Companion Board to an USB-Port of your PC using the USB cable (Type B)
  - Drivers-should install automatically
  - Some LEDs on the bottom left corner should start flashing (XMC is running and communicates with the GUI)
    - GUI shows “connected” (red circle)
    - Status monitor shows “unknown” as TLF35584 is still unsupplied (blue circle)
  - The XMC microcontroller is only used for PC interface, instruction of AURIX and silent monitoring of the SPI
  - All communication and function towards TLF35584 is only done by AURIX!



# How to get it up and running (4)

- › Connect a power supply to the TLF Evaluation Board
  - Use Banana-Jack connectors “GND”(black) and “BATP” (red one in the middle)
  - $V_{Bat}$  of 12V and a current limit of at least 1A
  - Switch it ON to apply the input voltage

## – GUI:

- State diagram gets active and shows the TLF35584 in INIT state (red circle)
- Measurement of output voltages of shows all LDOs being started (blue circle)
- Check also LEDs on TLF35584 Evaluation board for status

The screenshot displays the 'TLF35584 Demonstrator v0.2' software interface. The main window shows a state diagram with four states: STANDBY (LDOs off), NORMAL, SLEEP, and INIT. The INIT state is highlighted with a red circle. A 'Global' configuration panel is visible, with 'QSTB (Stand-by-Supply)' checked and a transition delay of 900 µs. The 'WAKE' and 'SLEEP' panels show checkboxes for QCC, QVQ, QT1, and QT2. The 'Status Monitor' panel on the right shows the 'Actual state' as INIT and a list of output voltages: QUC (3.33V), QCO (5.00V), QVR (5.00V), QT1 (4.99V), QT2 (4.99V), QSTB (3.29V), and QCORE (1.31V). The 'Flags' section shows Interrupt (INT), Safe-State 1 (SS1), Safe-State 2 (SS2), Reset (ROT), and Error frequency, all with green indicators. The Infineon logo and 'Stop Measurement' button are also visible.

## How to get it up and running (5)

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- › The TLF35584 is up and running
  - All LDOs are kept ON and state is INIT
  - Default configuration is active
- › The AURIX microcontroller is up and running
  - Service of window watchdog and ERR monitoring is done according to the default configuration of the TLF35584

# Using the GUI to control TLF35584 and AURIX (1)

- › The ribbon “Output Configuration & State machine”
  - A green “state-box” indicates the current state of TLF35584
  - LDOs can be switched ON and OFF using the checkbox in the respective state, the configuration is taken over when the respective apply button is pressed (e.g. red circle)
    - Output voltages can be read from the status monitor (Blue circle)
  - A green arrows indicates a possible state transition
    - E.g. INIT to NORMAL
    - A pre selection of the LDO configuration for the next state can be done before the request (green circle)

The screenshot displays the 'TLF35584 Demonstrator v0.2' software interface. The main window is titled 'Output Configuration & State machine' and contains several state configuration panels: 'Global', 'WAKE', 'STANDBY', 'NORMAL', 'SLEEP', and 'INIT'. The 'INIT' panel is highlighted with a green border and a red circle around its 'Apply' button. A green arrow points from the 'INIT' panel to the 'NORMAL' panel, which is also highlighted with a green border and a green circle around its 'Apply' button. The 'Global' panel has a green border. To the right, the 'Status Monitor' window is open, showing the 'Actual state: INIT' and a table of output voltages. A blue circle highlights the 'Outputs' section of the status monitor.

Outputs	Voltage
QUC (Microcontroller Supply)	3.33V
QCO (Communication Supply)	5.00V
QVR (Voltage Reference)	5.00V
QT1 (Tracker 1)	4.99V
QT2 (Tracker 2)	4.99V
QSTB (Stand-by Supply)	3.29V
QCORE (External Core Supply)	1.31V

Flags:

- Interrupt (INT): 0.011s
- Safe-State 1 (SS1): 0.000s
- Safe-State 2 (SS2): 0.000s
- Reset (ROT): 0.011s
- Error frequency: 0.000s

Buttons: ? (Help), i (Info), Stop Measurement

Infineon logo and 'Stop Measurement' button are visible at the bottom right.

# Using the GUI to control TLF35584 and AURIX (2)

- › The ribbon “Output Configuration & State machine”
  - “Global” settings are used independently from state
    - Configuration for the Standby-LDO
    - Configurations for the movements into SLEEP and STANDBY (Delay time and Current Monitor)
      - Please mind the check-box for the current monitor is related to the option of the TLF35584 to shorten the transition time based on the current of the  $\mu\text{C}$ . In SLEEP it is mandatory to be below the current threshold, otherwise the TLF35584 will move to WAKE state.
  - Wake up timer

TLF35584 Demonstrator v0.2

Output Configuration & State machine | Supervision Configuration | SPI Logger | TLF Registers

**Global:** Read Apply

- QSTB (Stand-by-Supply)
- Transition Delay SLEEP & STANDBY: 900  $\mu\text{s}$
- Current Monitor Threshold for SLEEP & STANDBY: 10 mA
- Wake Timer SLEEP & STANDBY: 0 ms

WAKE Apply

- QCC  QT1
- QVF  QT2

STANDBY LDOs off

WAK-Signal by Pin

NORMAL Apply

- QCC  QT1
- QVF  QT2

SLEEP Apply

- QCC  QT1
- QVF  QT2

INIT Apply

- QCC  QT1
- QVF  QT2

Default Configuration after Reset

Status Monitor

Actual state: INIT

Outputs

QUC (Microcontroller Supply)	3.33V
QCO (Communication Supply)	5.00V
QVR (Voltage Reference)	5.00V
QT1 (Tracker 1)	4.99V
QT2 (Tracker 2)	4.99V
QSTB (Stand-by Supply)	3.29V
QCORE (External Core Supply)	1.31V

Flags

Interrupt (INT)	0.011s
Safe-State 1 (SS1)	0.000s
Safe-State 2 (SS2)	0.000s
Reset (ROT)	0.011s
Error frequency	0.000s

Reset Flag Monitoring

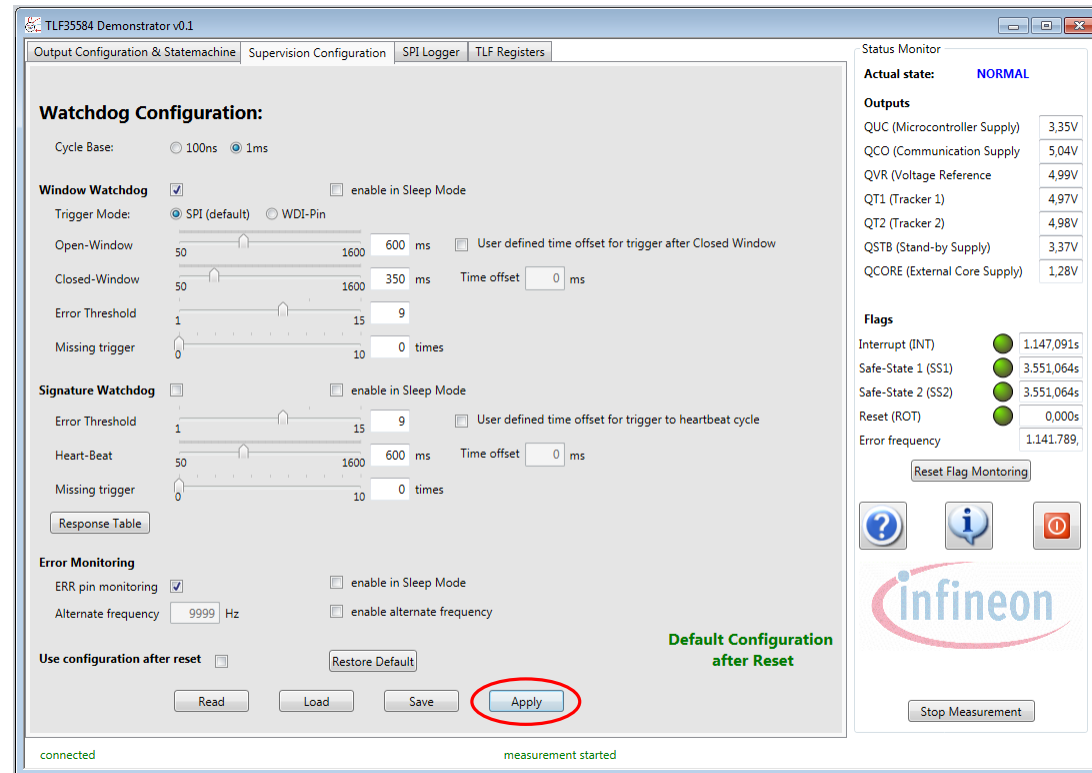
infineon

Stop Measurement

connected measurement started

# Using the GUI to configure supervision functions (1)

- › The ribbon “Supervision Configuration”
  - Offers possibility to configure the Watchdogs and Error Monitoring
    - Active functions
    - Window sizes
    - Error thresholds
  - The AURIX will change its service functions accordingly
  - Failure Injection by
    - Missing trigger events
    - Modification of functional watchdog response table
    - Alternated ERR signal frequency
  - Use the “Apply” button to send changed configuration (red circle)



# Using the GUI to monitor the SPI and Failure-Events (1)

## > The ribbon “SPI Logger”

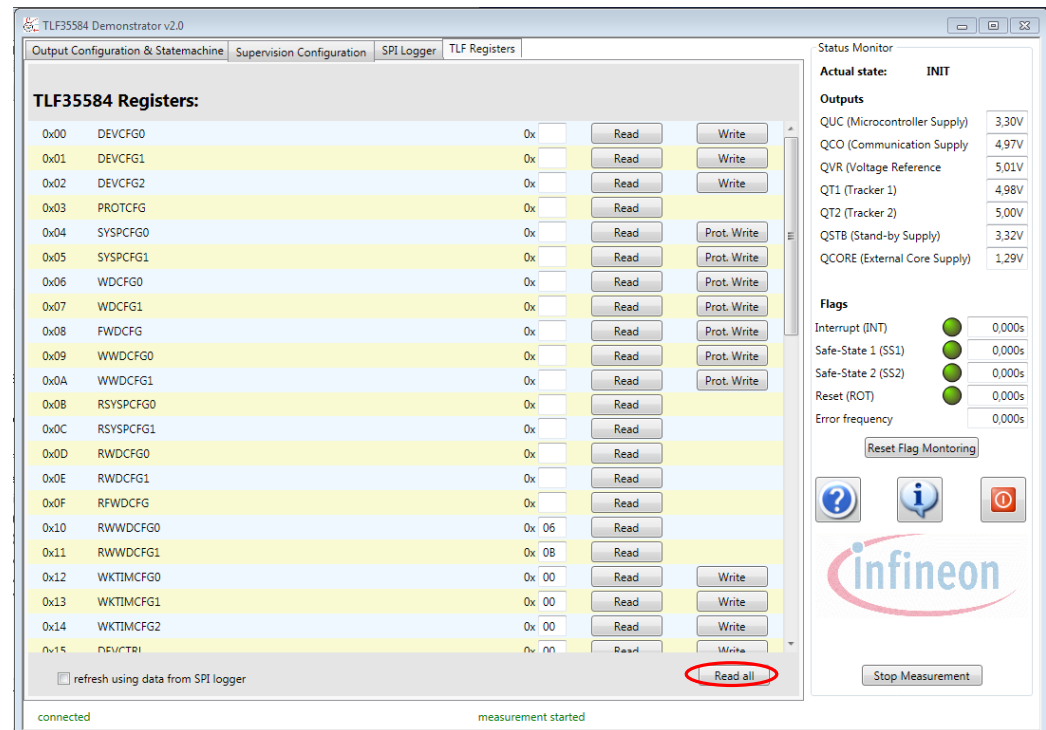
- All communication between AURIX and TLF35584 is logged and stored in this ribbon
- The list can be cleared and stored by the respective buttons
- The button “Start” or “Stop Measurement” (red circle) can be used to pause logging and measurements
- Interrupts will be logged and partially interpreted
- The “Command Line” is not supported yet.

The screenshot shows the TLF35584 Demonstrator v0.1 GUI. The main window is titled "TLF35584 Demonstrator v0.1" and has four tabs: "Output Configuration & StateMachine", "Supervision Configuration", "SPI Logger", and "TLF Registers". The "SPI Logger" tab is active, displaying an "SPI Communication Log" table with columns for Direction, Time(s), Address, Data(HEX), Data(BIN), and Name. The log contains 20 entries, including READ and WRITE operations to various registers like IF, SYSFAIL, INITERR, PROTSTAT, and WDCFG0. Below the log is a "Command Line" section with a text input field and "Clear" and "Save" buttons. On the right side, there is a "Status Monitor" panel showing the "Actual state: INIT" and a list of "Outputs" with their current values. Below that, there are "Flags" with green indicator lights and values. At the bottom right, there are three buttons: a question mark, an information icon, and a red power button. A red circle highlights the "Start Measurement" button at the bottom of the Status Monitor panel. The status bar at the bottom of the GUI shows "connected" in green and "measurement not started" in red.

Direction	Time(s)	Address	Data(HEX)	Data(BIN)	Name
READ	11,880	0x14	0x00	00000000	IF
READ	11,891	0x12	0x00	00000000	SYSFAIL
READ	11,891	0x13	0x00	00000000	INITERR
READ	11,891	0x20	0x01	00000001	PROTSTAT
WRITE	11,891	0x03	0xAB	10101011	PROTCFG
WRITE	11,891	0x03	0xEF	11101111	PROTCFG
WRITE	11,891	0x03	0x56	01010110	PROTCFG
WRITE	11,891	0x03	0x12	00010010	PROTCFG
READ	11,891	0x20	0x70	01110000	PROTSTAT
WRITE	11,891	0x04	0x0A	00001010	SYSPCFG0
WRITE	11,891	0x05	0x00	00000000	SYSPCFG1
WRITE	11,891	0x06	0x9B	10011011	WDCFG0
WRITE	11,891	0x07	0x09	00001001	WDCFG1
WRITE	11,891	0x08	0x0B	00001011	FWDCFG
WRITE	11,891	0x09	0x06	00000110	WWDCFG0
WRITE	11,891	0x0A	0x0B	00001011	WWDCFG1
READ	11,891	0x20	0x70	01110000	PROTSTAT
WRITE	11,891	0x03	0xDF	11011111	PROTCFG
WRITE	11,891	0x03	0x34	00110100	PROTCFG
READ	13,079	0x0F	0x01	00000001	WWDSCMD
WRITE	13,079	0x0F	0x00	00000000	WWDSCMD

# Using the GUI to manually write and read registers

- › The ribbon “TLF Registers”
  - All registers of the TLF35584 (C-step) are accessible for reading and writing manually
  - “Read all” button to update all in one step (red circle)
  - Be aware that this write commands are purely delivered to the TLF35584
    - AURIX will not change for instance watchdog service settings
    - Possible faulty service or reaction has to be considered!





## Further Information

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- › Further information can be found in the following documents:
  - Datasheet (C14-Step):  
TLF35584-Data-Sheet-20-Infineon.pdf
  
- › Please mind the current Evaluation Environment is valid for the C-Step silicon of TLF35584 just after the firmware update of the Companion Boards AURIX microcontroller!
  - For information's please refer to  
TLF35584-Evaluation-Environment\_Firmware-Update.pdf

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