QE for AFE[RA] V1.0.0

Release Note

Thank you very much for using the QE for AFE[RA] V1.0.0.

This release note covers product installation, restrictions, and so on. Please read this document before using the product.

Contents

1. About QE for AFE

1.1   Summary

QE for AFE[RA] is an evaluation tool for embedded system development that performs graphical tuning with an integrated analog front end (AFE). Using this tool, you can configure AFE registers, write register into evaluation board and monitor the A/D conversion results in a waveform.

QE for AFE[RA] is a standalone version tool (.exe) running on local PC. To use this tool, you firstly need an evaluation board. QE for AFE[RA] communicates with the evaluation board by a USB cable connecting between PC and board.

1.2   Functions

The main functions are listed below:

1. Connect and operate the evaluation board

2. Set AFE related registers with GUI

3. Display graphics of AD conversion result and digital filter frequency response

1.3   Supported Environment

- Host PC: Windows10 (64 bit)

- Evaluation board: EK-RA2A1

- Sample project: The sample project attached in the application note (RA2A1 Groupe Board Control Program for "QE for AFE": R01AN5795EJ0100) must be loaded by e2 studio and run on the evaluation board. Please refer to the application note for details.

1.4   Supported Microcontrollers

- RA Family (only MCUs that incorporate the AFE)
  — RA2A Series: RA2A1

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2.   Installation and Uninstallation

2.1   Installing This Product

QE for AFE[RA] is provided as a compressed package (.zip). Follow the procedure below to use this product:

1.   Extract ".zip" file to a user-specified location on the PC.
       Note: Please do not put the tool under OS program folder (C:\Program Files)
2.   Start this product by double clicking "\eclipse\ qe-afe.exe".
3.   For the first time this product starts, there is a dialog of license agreement. After checking the license, you can select "Agree" or "Disagree".
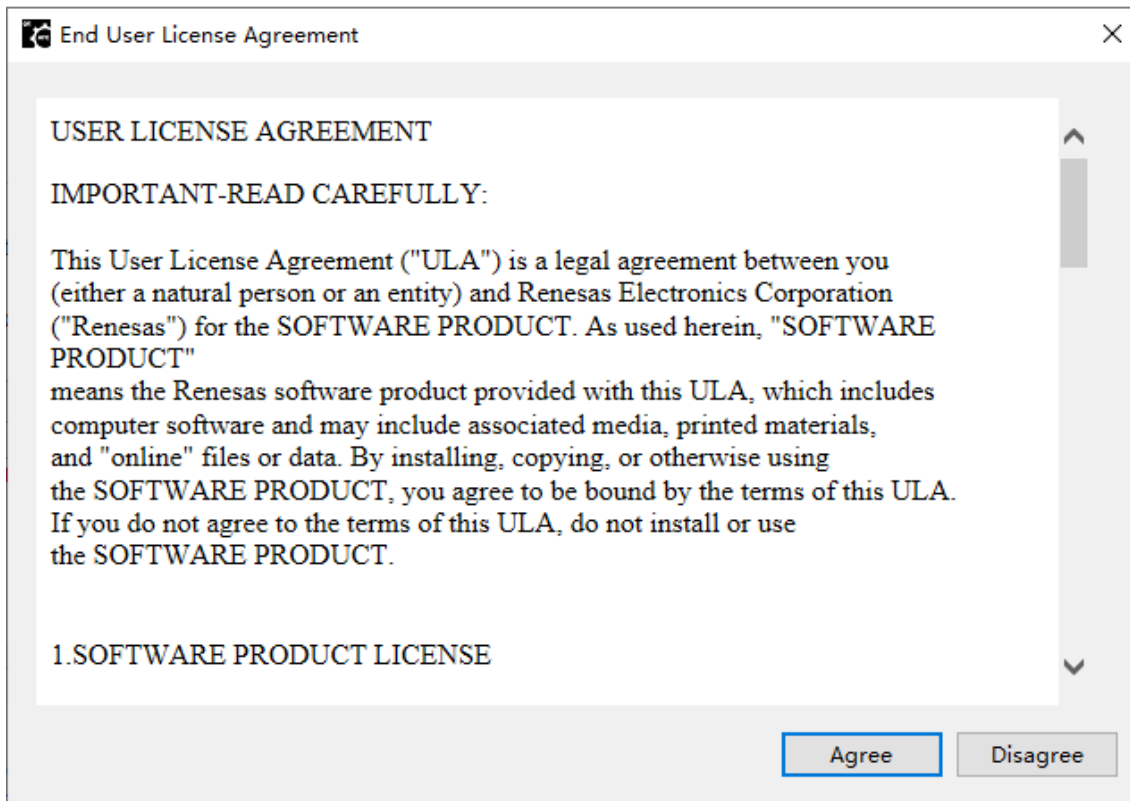
Figure 2-1.   License agreement dialog

4.   If "Agree" is selected in above step, the product is launched then you can use it; if "Disagree" is selected in above step, the product won't be launched.

2.2   Updating This Product

If you have already used this product, you can update it in the same way as the procedure for installation.

2.3   Uninstalling This Product

Delete the entire folder in which .zip package is extracted.

3.   Notes / Restrictions

3.1   Usage Considerations

Please pay attention to the following items.

3.1.1   Notes on SDADC24 Configuration

The SDADC24 reference clock which is input on the GUI must be consistent with the actual clock used on the evaluation board, otherwise SDADC24 can't work as expected and the graphics displayed in QE for AFE isn't correct.
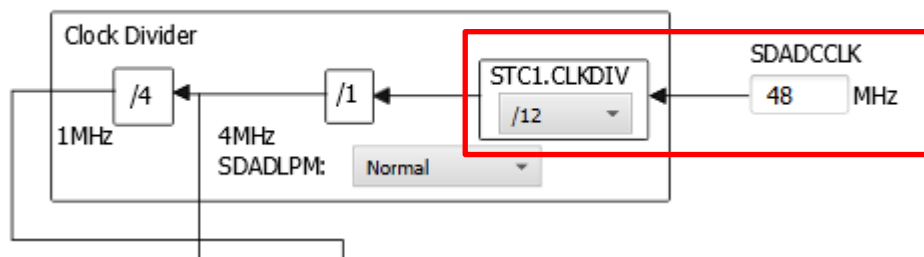

Figure 3-1   SDADC24 clock setting

When using USB communication with evaluation board, please set STC1.CLKDIV as "1/12", set SDADCCLK as 48MHz; when using UART communication with evaluation board, please set STC1.CLKDIV as "1/16", set SDADCCLK as 64MHz. For detailed explanation, please refer to the application note (RA2A1 Groupe Board Control Program for "QE for AFE": R01AN5795EJ0100).

3.1.2   Notes on ADC16 Configuration

To display the ADC16 conversion results using QE for AFE, please increase the number of enabled channels and set the sampling time longer (see Figure 3-2). If LED1 on the evaluation board is always on, which means the board is not operating properly, please restart QE for AFE and reset the sample project to try again.
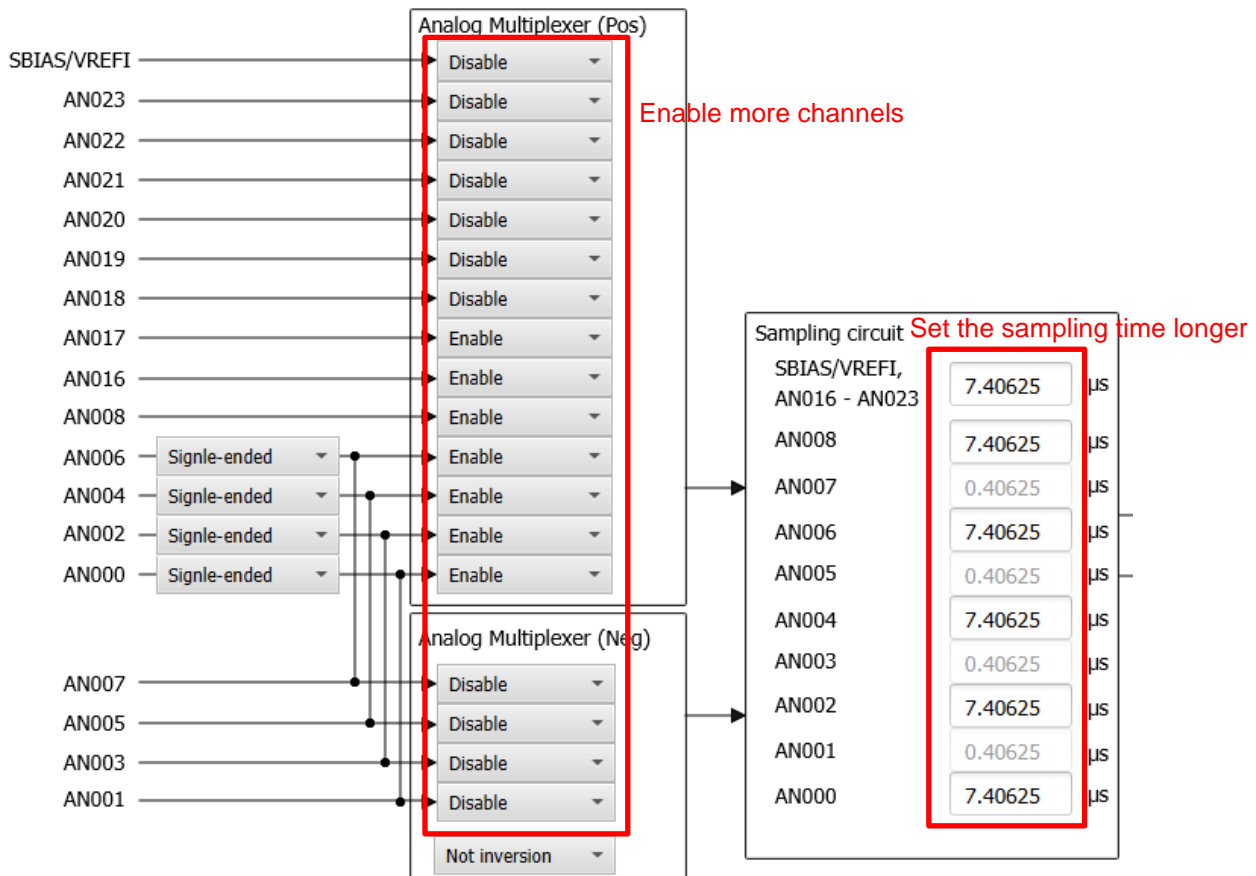

Figure 3-2   ADC16 configuration setting

3.1.3   Notes on "stop AFE tuning" Operation Failure

Occasionally user click "stop AFE tuning" button on [AD Monitor] tab but the tuning doesn't stop. As a workaround of this case, please click "Disconnect" button to disconnect QE for AFE with evaluation board. Then click "Connect" button after resetting the evaluation board.

3.1.4   Notes on Setting DAC8/DAC12 Output Pin Function

QE for AFE V1.0.0 doesn't support to set PmnPFS register which is used to set DAC8/DAC12 output pin function. Please set PmnPFS register in firmware program manually when you need to use DAC8/DAC12 output pin.

3.1.5   Notes on Tuning Time on [AD Monitor] Tab

When tuning on [AD Monitor] tab, QE for AFE obtains A/D conversion values from the evaluation board. If the tuning time is very long, too much data will lead to the host PC memory overflow. So, QE for AFE V1.0.0 supports tuning time no more than 1 hour. If tuning operates for more than 1 hour, the tool will stop tuning automatically and output a message to inform user that the tuning time can't exceed 1 hour.

3.1.6   Notes on Tuning ADC16 on [AD Monitor] Tab

Please note the follow procedure by which QE for AFE get ADC16 conversion result from the evaluation board:

1)   After user click "Start AFE tuning" button on [AD Monitor] Tab in QE for AFE, ADC16 starts conversion on evaluation board.

2)   On evaluation board, when the A/D conversion result buffer is full, the sample project stops ADC16 conversion and send response to QE for AFE.

3)   QE for AFE starts to read data from evaluation board until the result buffer is empty.

4)   QE for AFE restart ADC16 conversion, the procedure goes to 2)

Above 2) to 4) is internal communication between QE for AFE and sample project, which will continue until user click "stop AFE tuning" button.

3.1.7   Notes on UART connection

Please note the following items when using UART connection.

1)   After reset of the evaluation board, please set bitrate as 1000000bps in the [ConnectSetting] dialog, then click "connect" button.
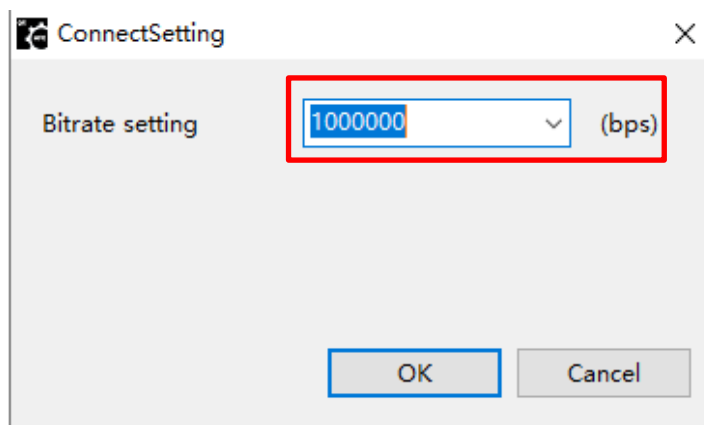

Figure 3-3   Bitrate setting

2)   After successful connection with evaluation board, you can open the [ConnectSetting] dialog to change the bitrate setting. 1000000bps, 1500000bps, 2000000bps, or 3000000bps can be input manually or selected from the combo box.

3)   It's rare case that the current bitrate information displayed in [ConnectSetting] dialog is invalid. When you met this case, please confirm the message output in [Console] window firstly. If the message is "[Info]Set bitrate successfully", the invalid information can be ignored. If bitrate change failed, please try it again.
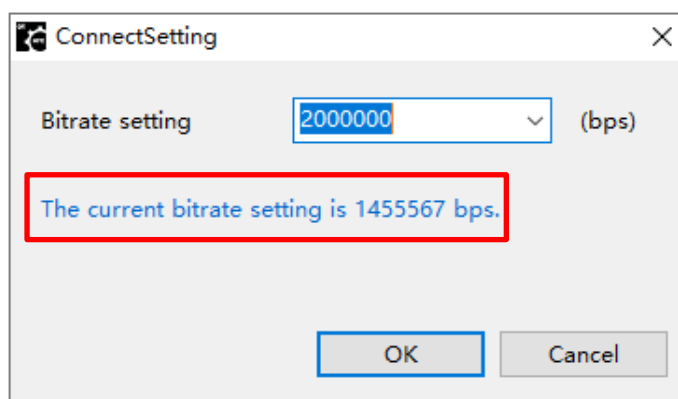
Figure 3-4   Invalid current bitrate information

3.1.8 Notes on switching monitoring targets in the [AD Monitor] tab

When the [Monitor target] is switched in the [AD Monitor] tab, the channel selected in the [Channel setting] may be not correctly. As a workaround, please click [Start AFE tuning] button once. It can correct [Channel setting] automatically when AFE tuning starts.

Figure 3-5   Monitor target setting

Revision History

| Rev. | Date | Description | |
		Page	Summary
1.0.0	Mar.31.21	-	First edition issued.

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

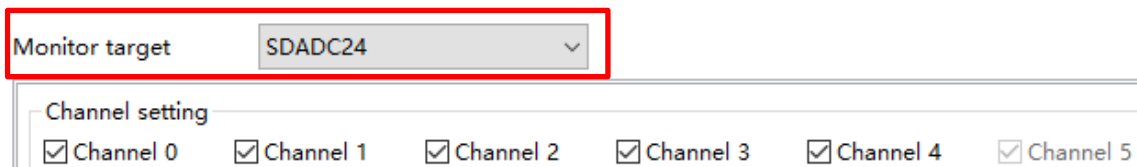The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).

7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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