



AS6031-QF_DK

Development Kit User Guide

AS6031-QF_DK User Guide

Revision: 6 Release Date: 2023-02-10 Document Status: Production





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Introduction 1

The AS6031-DK development kit allows customers a quick and intuitive approach to using the AS6031 UFC in ultrasonic flow meter applications.



Figure 1: AS6031-QF_DK Development kit

The kit includes the following elements:

AS6031-QF_DK_RB reference board V2.0



PicoProg Lite with USB-C - USB cable



Figure 2: Functional Blocks

Please download the software for the kit from https://downloads.sciosense.com/as6031 and look for the latest version of UfcEvaluationSoftware....zip.

1.1 **Ordering Codes**

Table 1: Pin description

Ordering code	Part Number	Description
AS6031-QF_DK V1.0	221020003	AS6031 Demo kit including PICOPROG and cables
AS6031-QF_DK_RB V2.0	221020002	AS6031 reference board



2 Quick Start Guide

This section describes how to quickly set up the AS6031 development kit, to establish basic operation and to make first measurements.

Please install the software before connecting the evaluation kit to your computer. The software can be downloaded here: <u>https://downloads.sciosense.com/as6031</u>

- Unzip the package to the desired directory,
- Connect the PicoProg Lite to the computer and the AS6031 board to the SPI connector on the PicoProg Lite.
- Connect your spool piece to US_UP and US_DOWN. US_UP fires upstream, means versus flow. US_DOWN fires downstream, with the flow.
- Open "UFCEvaluationSoftware.exe"

The following screen will appear:

O UFC Evaluation Software v1.2.1		- 🗆 X
ScioSense	Verify Interface and Hardware $^{\odot}$	Projects
Daskboard Daskboard Wizard C Wizard C Uhrander Measurement Results Spirt Burst C Emportant Materianement Results & Control Common Graphs C Ray Memory C Requisters C	Chip Status C Chip Type ASS031 Communication with Chip OK? OK H5 Clock Frequency 7.9863 MHz IP Mode Enabled Measured VCC C Status Interface Device Type PicoProgLite PicoProgLite Firmware Version 12.1	Open or Save Project Project files include all configuration settings. firmware data and custor CPU value data. Load Project Configurations Configs Ready to use with Evaluation System Custor Config
Firmware C	System Status	Recently Used Configurations
Start Measurement Write Config * System Reset Watchdog Chip Status Chip Status TOT SUM 00 00 00 00 00 00 00 00	MCT is Running MCT Count Low MCT Count High Bus Occupied Communication Failed	
Diff. TOF SUM AVG 0 Amplitude Massurement 1 Puble Width Ratio 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Store Data to File Enable Storing Measurement Data to File Enable Storing	

Figure 3: Opening page

- Verify that the right device is selected and interface status is ok.
- Select a project or one of the ready configuration files, press "Load Project" or "Load Config" and then on the left side press "Write Config".
- Finally, press "Start Measurement" to begin measuring.





3 Hardware Description

3.1 Introduction

The AS6031-QF_DK_RB board, shown in figure 3, is a front-end for a water or heat meters. The transducers and temperature sensors can be connected to this board directly. It comes with a 32.768 kHz quartz (X2) and a 8 MHz ceramic oscillator (X1).

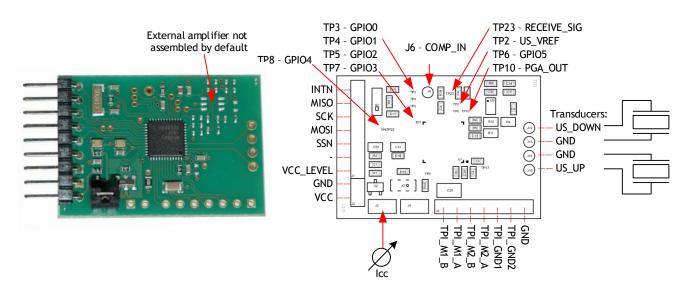


Figure 4: AS6031-QF_DK_RB

3.2 Communication Interface

The PicoProg Lite is a USB-to-SPI converter that connects the AS6031 board to a PC. The PICOPROG is registered by the operating system initially as "PicoProg LITE V1.0". The board converts SPI into USB communication. The USB connector is a USB-C one.

The PicoProg Lite comes with two connectors, one for SPI communication and one for I2C communication. For the AS6031 please use the SPI connector.

PicoProg Lite reads interrupt-triggered from the AS6031 board.





4 UFC Evaluation Software

The software opens with the dashboard window. It should detect the connected board automatically and indicate operability by green status information (1).

O UFC Evaluation Software v1.2.1		– 🗆 X
ScioSense*	Verify Interface and Hardware ^① 1	Projects
Wizard C Urraunic Mesurement Results Control Split Burst Temperature Mesurement Results & Control Common Control Task Timing Supplies Interfaces	Chip Status C Chip Type A56031 Communication with Chip OK? OK HS Clock Frequency 7.9863 MHz LP Mode Enabled Measured VCC C Interface Device Status	Open or Save Project Project files include all configuration settings, firmware data and custom CPU value data. Load Project Save Project Configurations Configs Ready to use with Evaluation System
Monitoring Graphs C RAM Memory C Registers C Firmware C	Interface Device Type PicoProgLite PicoProgLite Firmware Version 1.2.1 System Status	Load Config Recently Used Configurations
Start Measurement Start Measurement Write Config * System Reset Watchdog	 MCT is Running MCT Count Low MCT Count High 	Load Config Clear History
Chip Status MCT is OFF TOF SUM ↑ 0.0 Diff. TOF SUM AVG 0 Amplitude Measurement ↑ 0 mV Pulse Width Ratio ↑ 0.00	Bus Occupied Communication Failed Store Data to File	Import Config Export Config Export Config as Hex
Reset Flag COMA Frror Flag COMA About Remote Commands Expert Settings UFC Evaluation Software © 2020-2022 ScioSense B.V.	Enable Storing Measurement Data to File	~

Figure 5: Dashboard

The next steps could be to start with one of the default configurations, an existing project or an existing configuration by loading it into the GUI. To write the Data to the Chip you need to click on "Write Config" and then you can start the measurement (3).

Note: when you change parameters in the GUI this is indicated by a star behind "Write Config" (3). Do the write to make sure the chip has the current configuration. The star will then disappear.

Projects include the complete settings of the GUI, including the configuration, the firmware and firmware data, the settings for CPU window and flags.

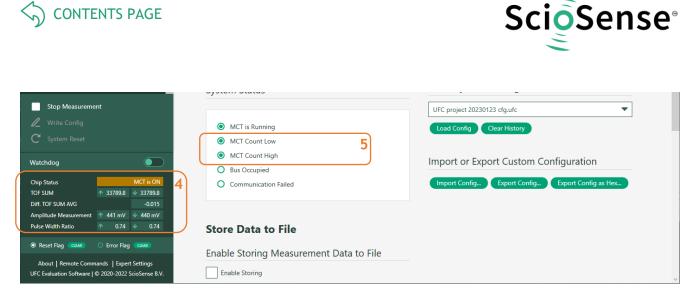


Figure 6: Dashboard active

On the left green bar the main measurement results are displayed: chip status, time-of-flight (TOF), difference up-down (TOF Difference), amplitude and pulse width ratio (4).

The flags for the measure cycle (5) timer should toggle for an active measurement. The results page will show the detailed ToF results:

ScioSense	-	OF Result	Tabla (i)	_				1S Clock	(i)			
ashboard		IOF Result					91/					10
fizard C				N for	r Avrg 1	\$ 100	÷ [nternal HS Clock		_		
onic Measurement		# Name		Result [r	ns] Averag	e [ns] Std.De	v. [ps]		7.9865 N	/Hz		
ults		1 TOF Sum Avera	age Up	227	88.55 33	788.55	36.2					
ntrol	- (-					788.55		IS Clock D	ivider			
plit Burst		2 TOF Sum Avera	-	337			HS clo		ideal)	HS Clo	ck Divider	
rature Measurement ults & Control		3 TOF Difference			0.00	0.00	39.8			5 ns		Set
on Control		4 TOF Sum (=Up	+ Down)	675	77.10 67	577.10	58.3	IS clock period		Cal Fac	tor HS clock	
: Timing								is clock period	125.211			1.0017
plies	-	Amplitude	Measure	ment								1.0017
rfaces		# Name		Result [r	mV] Avra. (r	nV] Std.De	ev. [mV]	Apply calibr	ated clock p	period to display	values	/
hitoring		1 AM UP (mV)				442.46	0.73					
ohs 🖸												
M Memory 🖸		2 AM DOWN (m	V)	4	40.83	440.83	0.65					
gisters 🕑 🗸		Show Detai	led TOF Data		7							
			TOF		Diffe	rence		Average		Stan	dard Deviation	
Stop Measurement				A [ma]			Up [ns]	Down [ns]	Δ [ns]	Up [ps]	Down [ps]	Δ [ps]
Stop Measurement Write Config		# Up [ns]	Down [ns]	Δ [ns]	Up [ns]	Down [ns]	ob [up]					
Write Config		# Up [ns]0 32040.05	32040.06	-0.01	Up [ns]	Down [ns]	32040.05	32040.06	-0.01	57.3	66.0	73.6
Write Config						Down [ns]			-0.01	57.3	66.0 57.3	73.6
Write Config System Reset		0 32040.05 1 32541.52	32040.06 32541.54	-0.01	- 501.47	- 501.48	32040.05 32541.52	32040.06 32541.54	-0.02	53.8	57.3	74.1
Write Config System Reset		0 32040.05 1 32541.52 2 33041.23	32040.06 32541.54 33041.24	-0.01 -0.02 -0.02	501.47 499.71	501.48	32040.05 32541.52 33041.23	32040.06 32541.54 33041.24	-0.02	53.8 59.6	57.3	74.1 71.0
Write Config System Reset hdog Status MCT is ON		0 32040.05 1 32541.52 2 33041.23 3 33540.43	32040.06 32541.54 33041.24 33540.52	-0.01 -0.02 -0.02 -0.08		- 501.48 499.71 499.27	32040.05 32541.52 33041.23 33540.43	32040.06 32541.54 33041.24 33540.52	-0.02 -0.02 -0.08	53.8 59.6 55.8	57.3 47.7 53.2	74.1 71.0 69.4
Write Config System Reset hdog Status MCT is ON SUM 13788.6 4 33788.6		0 32040.05 1 32541.52 2 33041.23 3 33540.43 4 34038.23	32040.06 32541.54 33041.24 33540.52 34038.22	-0.01 -0.02 -0.02 -0.08 0.01	501.47 499.71 499.20 497.80	501.48 499.71 499.27 497.71	32040.05 32541.52 33041.23 33540.43 34038.23	32040.06 32541.54 33041.24 33540.52 34038.22	-0.02 -0.02 -0.08 0.01	53.8 59.6 55.8 47.8	57.3 47.7 53.2 53.8	74.1 71.0 69.4 68.1
Write Config System Reset hdog Status NUM + 33788.6 4 33788.6 coF SUM AVG 0.0003		0 32040.05 1 32541.52 2 33041.23 3 3540.43 4 34038.23 5 34536.05	32040.06 32541.54 33041.24 33540.52 34038.22 34535.97	-0.01 -0.02 -0.02 -0.08 0.01 0.08	501.47 499.71 499.20 497.80 497.82	501.48 499.71 499.27 497.71 497.75	32040.05 32541.52 33041.23 33540.43 34038.23 34536.05	32040.06 32541.54 33041.24 33540.52 34038.22 34535.97	-0.02 -0.02 -0.08 0.01 0.08	53.8 59.6 55.8 47.8 58.8	57.3 47.7 53.2 53.8 52.6	74.1 71.0 69.4 68.1 71.7
Write Config System Reset hdog Status UM 133788.6 4 33788.6 UM 133788.6 4 33788.6 UM 1424 2 4 441 mV		0 32040.05 1 32541.52 2 33041.23 3 33540.43 4 34038.23	32040.06 32541.54 33041.24 33540.52 34038.22	-0.01 -0.02 -0.02 -0.08 0.01	501.47 499.71 499.20 497.80	501.48 499.71 499.27 497.71	32040.05 32541.52 33041.23 33540.43 34038.23	32040.06 32541.54 33041.24 33540.52 34038.22	-0.02 -0.02 -0.08 0.01	53.8 59.6 55.8 47.8	57.3 47.7 53.2 53.8	74.1 71.0 69.4 68.1
Write Config System Reset		0 32040.05 1 32541.52 2 33041.23 3 3540.43 4 34038.23 5 34536.05	32040.06 32541.54 33041.24 33540.52 34038.22 34535.97	-0.01 -0.02 -0.02 -0.08 0.01 0.08	501.47 499.71 499.20 497.80 497.82	501.48 499.71 499.27 497.71 497.75	32040.05 32541.52 33041.23 33540.43 34038.23 34536.05	32040.06 32541.54 33041.24 33540.52 34038.22 34535.97	-0.02 -0.02 -0.08 0.01 0.08	53.8 59.6 55.8 47.8 58.8	57.3 47.7 53.2 53.8 52.6	74.1 71.0 69.4 68.1 71.7
Write Config System Reset thdog Status MCT is ON SUM * 33788.6 5 33788.6 5 0003 105 SUM AVG 0003 105 SUM AVG 105		0 32040.05 1 32541.52 2 33041.23 3 33540.43 4 34038.23 5 34536.05 6 35035.51	32040.06 32541.54 33041.24 33540.52 34038.22 34535.97 35035.52	-0.01 -0.02 -0.02 -0.08 0.01 0.08 -0.01		501.48 499.71 499.27 497.71 497.75 499.55	32040.05 32541.52 33041.23 33540.43 34038.23 34536.05 35035.51	32040.06 32541.54 33041.24 33540.52 34038.22 34535.97 35035.52	-0.02 -0.02 -0.08 0.01 0.08 -0.01	53.8 59.6 55.8 47.8 58.8 53.9	57.3 47.7 53.2 53.8 52.6 50.8	74.1 71.0 69.4 68.1 71.7 67.9

Figure 7: Results page

The ToF results table (6) shows the average of the selected zero crossings per measurement in up and down direction, the difference of up and down (proportional to the flow rate), and the sum of up and down (proportional to speed of sound). By selecting detailed data (7) an additional table pops up that shows each individual zero crossing measurement (8).



The "no. of Avrg." (9) define the numbers of samples for a software average in the GUI. The number on the right, above Std.Dev. define the number of samples used in the mathematics for the calculation of the standard deviation.

The HS Clock block shows the measured period of the high speed clock and the correction factor in comparison to the ideal value. There is a select option for application of this correction factor to the measurement results (10).

The control page shows the main parameters for setting the ultrasonic frontend.

O UFC Evaluation Software v1.2.1		- D X
ScioSense	Ultrasonic Measurement Control [©]	
Dashboard Wizard 12	Fire Burst Generator	Amplitude Measurement Show Diagram
Results	Clock Divider for Burst Generator	AM Peak Detection starts after:
Control		AM peak detection starts after ultrasonic release delay expires 🗢
Split Burst		Peak Detection End after ht
Results & Control	No. of Fire Pulses 16 🗢	₹ ♦
Task Timing	First Hit Level	TOF Measurement
Supplies	First Hit Level Up 25.52 mV	Timeout TOF
Interfaces Monitoring		120 yıl
Graphs 12	First fit Level Down 29 🗢 2552 mV	Direction Mode
RAM Memory C	Release Timing	Always starting fring via UP-buffer
Registers (2)	Noise Mask Window	Selected Start Hit after First Hit Detection
Stop Measurement		¢
& West Carbo		No. of IOF Hits for sum
C System Javet	Multihit Release Delay Down	
	DxCB (CP, USM_PRC), Bir(19) USM_RLS_MODE / not used	No. sf a mored Hita
Watchdog	Starfrelease condition der red by Ultrasonic Release Delay onl 🔻	
Chip Status MCT is ONC TOF SUM + 33782.9 + 31782.9		Endble Pulse Width Detection
DVR. TOF SUM AVG		
Amplitude Measurement 441 mW + 40 mW	Fire Buffer	
Pube Width Ratio * 0.75 + 0.73	Transducer Fire Buffer Impedance	
Reset Flag (0000) Error Flag (0000)	Enables 350 Ohm buffer	
About Remote Commands Expert 2 millings		
UFC Evaluation Software © 2020-2022 Selectense B.V.	PGA	
2V > Stop C1 C2 8 192 samples at 100	MHz 2023-01-25 14:41:44.613	
re		V Time 🕲
L4 ~ ~	Release delay energ	Position: 23 us v Base: S us/dv v
	Release delay opens the measurement	
.2	channel (suppress trigger by noise)	E Optons ·
		Add Channel
	Noise mask window	✓ Channel 1 (1±) €) Offset: -1.5 V ▼
	better describes as	Range: S00 mV/div *
	to receive	V Channel 2 (2±)
		Offset: -600 mV -
X1: -1.6468 us C1: 1.225 V C2: 490 mV	1	Range: 200 mV/div 💌
		111111111
	MMMmmmm	
0.2 III''		1
et Indundani		
Kry-2us 3us 8us	13 us 18 us 23 us 28 us	33 us 38 us 43 us 48 us Manual Trigger Discovery2 C 59i:210321A36A48 US8 @WF3.18.1 Status: OK
		Manual Trigger Discovery2 C SN:210321A36A48 US8 27WF3.18.1 Status: OK

Figure 8: Control page





In this page you set the fire frequency, derived from the high spedd clock.

With the noise mask window you set the time when to switch from sending to receiving.

The release delay sets the end of a window to suppress wrong triggers by noise.

The first hit level defines the voltage level for the comparator to detect the first hit of the receive burst.

The start hit defines how many waves to wait after first hit level detection before starting collection of ToF data. This time is typically needed by the transducers to follow the fixed fire frequency and to oscillate with a stable period.

The number of Tof hits defines how many zero crossings are summarized for a single measurement in either up or down direction.

Finally, the gain of the PGA is set on this page, too.

Another important page is the Task Timing page:

O UFC Evaluation Software v1.2.1		-	×
ScioSense	Set Timings, Measurement & Calibration Rates $^{\odot}$		^
Dashboard ^ Wizard 亿	Settings		
Ultrasonic Measurement Results Control	Base Frequency Select 50 Hz 20 ms		
Split Burst	Cycle Time Task Sequencer 97.7 ms		
Temperature Measurement Results & Control	TOF Rate		
Common Control	Pause between two Ultrasonic Measurements		
Task Timing Supplies	1.0 * T(BF_SEL) ms 20 ms		
Interfaces	Amplitude Measurement Rate		
Monitoring 🗸	Every TOF Trigger		
Stop Measurement	Amplitude Measurement Calibration Rate		
/ Write Config	Every 10th Amplitude Measurement		
C System Reset	Zero Cross Calibration Rate Window Snip		
	Disabled		
Watchdog	Temperature Measurement every Sequence Cycle Triggers		
Chip Status MCT is ON	0		
TOF SUM 133774.9 133775.4	Temperature Measurement Subtask Handling (Pause Time)		
Diff. TOF SUM AVG -0,504 Amplitude Measurement ↑ 435 mV ↓ 434 mV	No Pause, Only One Measurement 🔹 0 ms		
Pulse Width Ratio 1.73 0.73	HS_CLK Calibration Rate		
	Every 100th Measurement		
Reset Flag CLAR O Error Flag CLAR	Voltage Measurement Rate		
About Remote Commands Expert Settings UFC Evaluation Software © 2020-2022 ScioSense B.V.	Every 100th Measurement		~

Figure 9: Task timing page

Here you define the sample rate as a combination of the cycle time and the TOF rate (one ToF every N cycles, N typically 1).





Besides the numerical display of the result page the software offers an export of the data into a file as well as a graphical display (which could be fond in the graphs page).

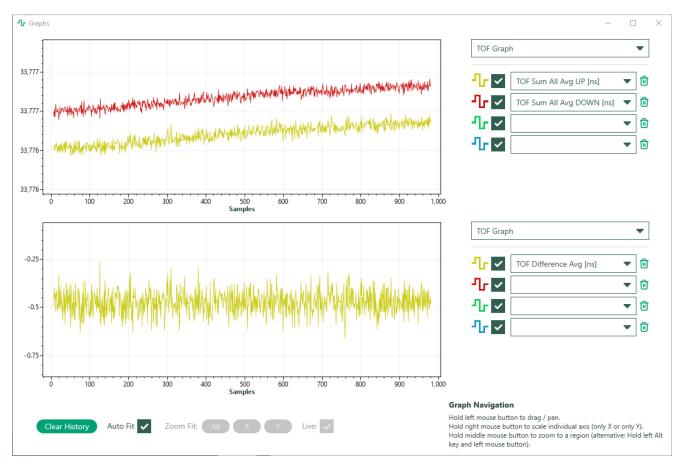


Figure 10: Graphs page

The parameters to be displayed are selectable. By means of the CPU window, any RAM cell can be reported and also graphically displayed.

The export to file is enabled on the main dashboard. The user can select which values should imported.

Note that the file is working with place holders which means that the selection can be changed any time during data acquisition. So you may start with ToF data only, and when you see unexpected behavior then you can add amplitude e.g..

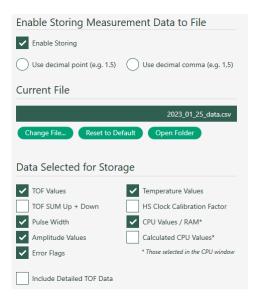


Figure 11: Export selection





The CPU values themselves are defined in the CPU values window and need to correlate with the firmware in the chip. Below is an example of the ScioSense AS6031-F1 Version.

Note: AS6031F1 is a variant of the AS6031 ultrasonic flow converter that comes with a protected flow firmware by ScioSense already programmed into the NVRAM. Based on these algorithms and together with the appropriate calibration and operation parameters, the chip is ready to do the complete flow and volume calculation as well as error handling on chip.

Results								Current File	
Addr. (Hex)	Description	Raw Data (Hex)	Factor	Result	Unit	Ex			
00	RAM_R_FLOW_VOLUME_INT	00000000	1	0	m³		. ^	Import File Reload File	xport File
01	RAM_R_FLOW_VOLUME_FRAC	00000000	2.3283E-10	0	m³			Reload File	xport File
02	RAM_R_FLOW_LPH	00000000	1.52587E-05	0	l/h				
03	RAM_FILTERED_FLOW_LPH	00000000	1.52587E-05	0	l/h				
04	RAM_R_THETA	00000000	1.52587E-05	0	°C				
05	RAM_SOUND_VEL	00000000	0.00390625	0	m/s				
06	RAM_FLOW_SPEED	00000000	1.52587E-05	0	m/s				
07	RAM_R_TOF_DIFF	00000000	0.0038147	0	ns				
08	RAM_R_TOF_SUM	00000000	0.0038147	0	ns				
25	RAM_R_FW_STATUS	00000000	1	0					

Figure 12: CPU values example

The monitoring page allows to select flags to be displayed and the flags themselves in action.

UFC Evaluation Software v1.2.1				- 🗆 ×
ScioSense	Selected Error Indicators	Interrupt Sources for Remote Interface	Errors	o î
Dashkawat Witawa (Conserved) Results Control Spith Bant Results & Control Results & Control Taux Tenney Spiphes Interfaces Mechanory RAM Memory (C) Regular (C) Re	TOC Timeout ToC Timeout ToC Timeout To Tomeout Themperature Open Circuit Themperature Open Circuit Themperature Open Circuit Temperature Short Circuit Temperature Sequence Timeout Themperature Sequence Timeout Themperature Sequence Timeout Task Sequencer Timeout Task Sequen	End of Task Sequencer End of Firemare Transaction End of Firemare Transaction End of Boold Checksum Synchronous FW NIT Request Task Sequencer Timeout Encr Flag	TDC Timeout TDF Timeout TDF Timeout Anothick Measurement Timeout Timperature Open Circuit Timperature Open Circuit Timperature Sheen Circuit Zoro Croca Calkanation firer Love Battery Detect Untraunic Sequence Timeout Taids Sequence Timeout E& Advanued Seguer Common Coupy Ample Trans NMM INVOL firer NMM INVOL firer	
Start Measurement Write Config Value Config Value Config Value Config Value Config Value Config	NVM FWDU Error NVM FWA Error CPU Error			
Chip Shaha MCT is OFF DD Shah 93776-3 DH Tof SJah Ang 3376-7 DH Tof SJah Ang 3376-7 Anghaba Measuremet + 4174-78 Martin Ling Mana 1 Enor Flag Abad I Rende Commands Espet Setting UC Calulatos Schwart 0 2028-3022 Escience V.	Custom Flags © BNR_AMP_DIFF_TOO_HIGH © BNR_MP_VAL_TOO_LOW © BNR_VM_DIFF_NOT_OK © BNR_VM_DIFF_NOT_OK	0 0		Y

Figure 13: Monitoring page





For applications with firmware on the chip it is possible to add custom flags according to the firmware. The definition is made in the firmware window.

Download (Code and Data	User Cod	e Data C	ustom Flags	
Custom Flags				Current Fil	le
Reg. Addr. (Hex)	Register Name	Bit Number	Bit Name		
27	RAM_R_FW_ERR_FLAGS1	1	BNR_AMP_DIFF_TOO_HIGH	D Cimport from	File Reload File Export
27	RAM_R_FW_ERR_FLAGS1	2	BNR_AMP_VAL_TOO_LOW	Û	
27	RAM_R_FW_ERR_FLAGS1	3	BNR_PW_DIFF_NOT_OK	0	
27	RAM_R_FW_ERR_FLAGS1	4	BNR_SUMTOF_DEV	1	
27	RAM_R_FW_ERR_FLAGS1	5	BNR_FHL_NOT_OK	0	
27	RAM_R_FW_ERR_FLAGS1	6	BNR_MEAS_NOT_OK	0	
27	RAM_R_FW_ERR_FLAGS1	7	BNR_HARDWARE_FAILURE	Ū.	
27	RAM_R_FW_ERR_FLAGS1	8	BNR_FLOW_BT_2MAX	Ū	
27	RAM_R_FW_ERR_FLAGS1	9	BNR_FLOW_LT_NEGLIM	Ū	
27	RAM_R_FW_ERR_FLAGS1	10	BNR_VOL_ERR		
27	RAM_R_FW_ERR_FLAGS1	11	BNR_PH_S_FW_VALID_WRG	۵.	
27	RAM_R_FW_ERR_FLAGS1	12	BNR_PH_S_FW_JUMP_DET_ERR		
27	RAM_R_FW_ERR_FLAGS1	13	BNR_VEL_ERROR	0	
27	RAM_R_FW_ERR_FLAGS1	14	BNR_BUBBLE	1	
				2	

Figure 14: Monitoring Example custom flags

If you want to work with firmware on the AS6031 the you need the Firmware window.

Download Code and Data	User Code Data Cus	tom Flags
Q Verify Firmware	Import Firmware User Code from File	12 D Compile Firmware
🗊 Erase Firmware	🦆 Import Firmware Data from File	🛃 Download FW Code & Data
Open CPU Assembler Instruction Help 앱		Sys. Reset & Start Measurement after Download
Open CPU Assembler Instruction Help 앱 Checksums Software	Checksums Hardware	
Checksums Software	Checksums Hardware	Lock FW after Download
Checksums Software		Checksums FWD
Checksums Software	0 Firmware Code User Firmware Code ScioSense	Checksums FWD Firmware Code User

Figure 15: Firmware window

On the main page you can load the files with the firmware hex code and the firmware data (12). You download them (13) and monitor the checksums to see the success of the process.

The User Code page sets a focus to the firmware hex file.

The Data page allows to review the firmware data in detail, to add a description and also a scaling factor to convert the integer value into a reasonable physical value.

The assembler converts a text file into a hex file. There is no editor integrated. We recommend standard text editors like Notepad++.





Do	wnload Code and Da	ata	User (Code	Data	Custom	Flags	
FW	Data					Read 🖁	Current File	
#	Name	Signed	Value (dec)	Value (hex)	Factor	Calculated		
0	FWD_FWU_CS user code check		115021	0001C14D	1	115021	Import from File Reload File	
1	FWD_FWDU_CS user data chec		27283	00006A93	1	27283	Export Export Hex Values to File	
2	FWD_JUMP_FLAG		1	00000001	1	1	Transfor Configuration Satting	
3	FWD_ERROR_COUNT_CONF1		4294967295	FFFFFFF	1	4294967295	Transfer Configuration Settings	
4	FWD_ERROR_COUNT_CONF2		4294967295	FFFFFFF	1	4294967295	From GUI to FW Data From FW Data to C	GUI
5	FWD_ERROR_COUNT_21		0	00000000	1	0	Transfer Firmware Parameters	
6	FWD_ERROR_COUNT_43		0	00000000	1	0	Set Bootloader Release Code	
7	FWD_ERROR_COUNT_INV21		4294967295	FFFFFFF	1	4294967295		
8	FWD_ERROR_COUNT_INV43		4294967295	FFFFFFF	1	4294967295	FW Data	
9			0	00000000	1	0	Download Recall Read	
10			0	00000000	1	0	Checksums	£
11			0	00000000	1	0		
12			0	00000000	1	0		FWD
13			0	00000000	1	0	User 6B3B 0	0
14			0	00000000	1	0	ScioSense 46F	46F

Figure 16: Firmware Data page

The settings for the firmware data are stored in the project files, but can also be imported/exported.

You can read the firmware data that are in the chip by means of a recall and read and then transfer them into the GUI parameter settings (firmware data include the configuration).

Vice versa, you can transfer the configuration from the GUI into the firmware data and with a download into the non-volatile RAM of the chip.

For more details about how to write your own firmware please take a look into the application note: "AS6031/40 How to write custom firmware". <u>https://www.sciosense.com/wp-</u> <u>content/uploads/documents/SC-001548-AN-1-AS60xx-How-to-Write-Custom-Firmware.pdf</u>



5 Schematics, Layers & BOM

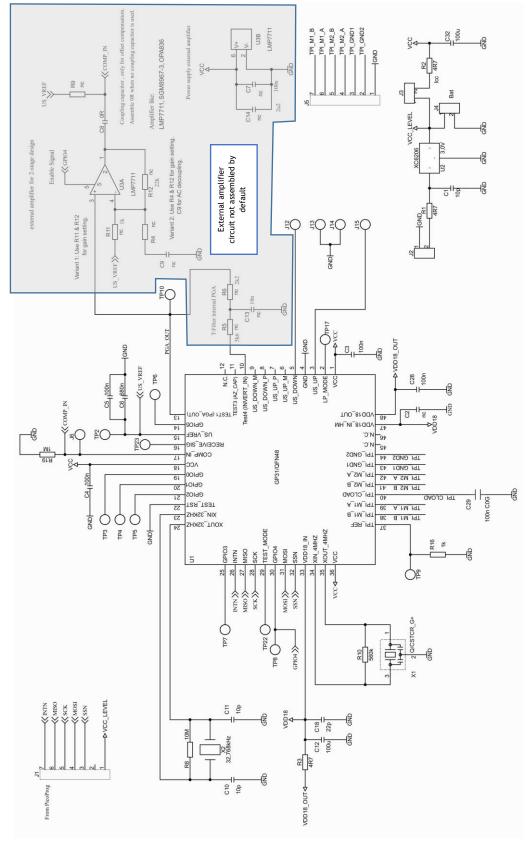
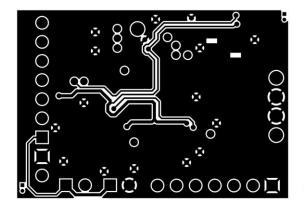


Figure 17: AS6031-QF_DK_RB schematics







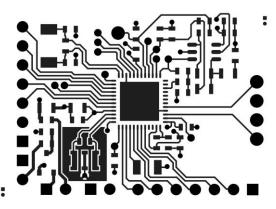


Figure 18: AS6031-QF_DK_RB layout 2:1t

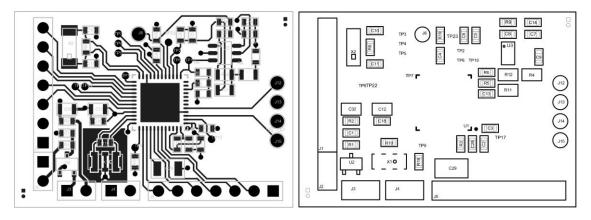


Figure 19: AS6031-QF_DK_RB assembly 2:1

Table 2: Bill of materials for AS6031-QF_DK_RB V2.0

Quantity	Designator	Value	Comment	Footprint
3	C1, C10, C11	10p	C603	0603
1	C2	nc	C603	0603
5	C3, C4, C5, C7, C28	100n	C603	0603
1	C6	680n	C603	0603
1	C8	0R	C603	0603
1	C9	330n	C603	0603
2	C12, C32	100u	C805	0805
1	C13	10n	C603	0603



CONTENTS PAGE

1	C14	2u2	C603	0603	
1	C18	22p	C603	0603	
1	C29	100n C0G	C1206	1206R	
2	J1, J5		ST/254_7_1R	ST/254_7_1R	
3	J2, J3, J4		ST/254_2	ST/254_2	
5	J6, J12, J13, J14, J15		PAD1.8mm	PAD1.8mm	
3	R1, R2, R3	4R7	R603	0603	
2	R4, R11	1k	R805	0805	
1	R5	5.6k	R603	0603	
1	R6	2.2k	R603	0603	
1	R8	10M	R603	0603	
1	R9	nc	R603	0603	
1	R10	560k	R603	0603	
1	R12	22k	R805	0805	
1	R16	1k	R603	0603	
1	R19	1M	R603	0603	
12	TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP17, TP22, TP23		PAD1mm	PAD1mm	
1	U1		AS6031-BQF	48QFN_7x7	
1	U2	3,0V	XC6206	SOT23_TOREX	
1	U3		LMP7711	SOT23_6	
1	X1	8MHz	Q/CSTCR_G+	Q/CSTCR_G - CSTNE8MHz	
1	X2	32,768kHz	Q/KX-327XS	Q/KX-327XS	





6 RoHS Compliance & ScioSense Green Statement

RoHS: The term RoHS compliant means that Sciosense B.V. products fully comply with current RoHS directives. Our semiconductor products do not contain any chemicals for all 6 substance categories, including the requirement that lead does not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, RoHS compliant products are suitable for use in specified lead-free processes.

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8 Revision information

Table 3: Revision history

Revision	Date	Comment	Page
2.0	2020 May 19	Change of ownership from ams to ScioSense, status to release	All
3.0	2020 Jun 30	Document number changed	All
4.0	2021 Apr 28	Software description now refers to new Software, iESLab plastic spool piece removed	All
5.0	2021 Oct 22	Reference to update schematics and layout of reference board. PICOPROG picture. Transfer into new ScioSense layout	All
6.0	2023 Feb 10	Old PICOPROG replaced by new PicoProg Lite. Section for software description added	All

Note(s) and/or Footnote(s):

- 1. Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- 2. Correction of typographical errors is not explicitly mentioned.



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