

Programming the QF4A512 EEPROM

A. Introduction



Inside the QF4A512 is a 4K EEPROM to hold configuration and calibration data. There are several ways to program that memory. It can be programmed at runtime, using the device Configuration interface, during development, using the Quickfilter QF4A512-PA programming adapter, or in production using volume programming.

This application note describes the following:

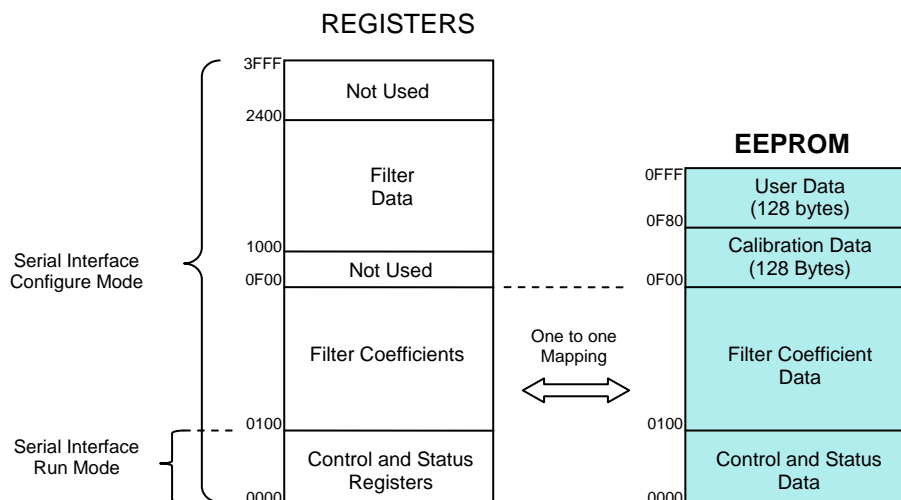
- How to program a device using the Quickfilter QF4A512-PA Programming Adapter
- How to contact Source Electronics, our third-party device programming partner
- How to generate an EEPROM image from the Quickfilter Pro software
- How to program the QF4A512 at runtime
- How to configure the QF4A512 device for pin compatibility with the ATMEL AT25320A device

B. Background

In order to simplify the task of programming the QF4A512 EEPROM in a bulk production environment, the QF4A512 offers an Atmel-compatible programming mode. The algorithm that Atmel specifies for programming their EEPROM devices is well established, and stable programming modules exist for major device programmers.

The QF4A512 memory map is as follows –

Figure 1 - QF4A512 Memory Map



A. Programming with the QF4A512-PA Programming Adapter



During development, and for short production runs, the Quickfilter QF4A512-PA Programming Adapter provides an easy solution for device programming. The Programming Adapter is an add-on board that mounts on top of the [QF4A512-DK Development Board](#). When attached and selected in the Quickfilter Pro software, the adapter behaves like the QF4A512 mounted on the DK board below, except the device is mounted in a zero-insertion-force socket for easy removal. To order, contact your authorized distributor.

B. Third-Party Bulk Programming Services for the QF4A512

Reliably programming large quantities of production parts can be a challenge. Quickfilter has joined forces with Source Electronics to provide volume programming services for its Programmable Signal Converter devices.

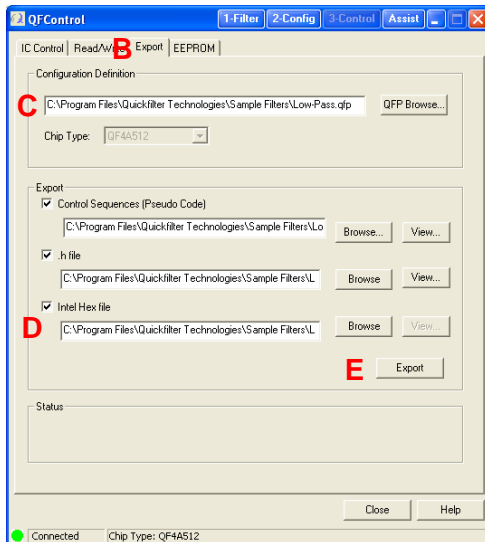


www.sourceee.com 1-800-227-2909

C. Generating an EEPROM Image from the Quickfilter Pro software

Before programming the QF4A512, the contents of the EEPROM, called an image, must be generated by the Quickfilter Pro software. The image file can be in either raw binary or Intel Hex format. The EEPROM image is generated as follows -

Figure 2 - Image Export Window



- A. Start the Quickfilter Pro software. Then select **3-Control** on the right side of the Title bar. The dialog in Figure 1 will appear.
- B. Select the Export tab
- C. Select the .qfp file that contains the design of interest.
- D. Provide a file name for the Intel hex output file and be sure the check box is selected.
- E. Select the Export button to produce the Intel hex file.
- F. Use the Intel hex file to program the QF4A512 device.

D. Programming the QF4A512 at Runtime

Configure mode is used to read and write registers in the QF4A512. Among the registers available to the user are EE_TRANS, EE_COPY, EE_VAL and EE_STATUS, which control transfers between the registers and EEPROM. Runtime software can use those registers to perform full or partial transfers to or from the EEPROM.

E. Configuring the QF4A512 for Pin Compatibility with the AT25320A

Once an EEPROM image is created, the next step is to electrically configure the QF4A512 to appear as an ATMEL AT25320A to the programmer. Figures 1 & 2 below show the required connections.

Figure 3 - QF4A512 EEPROM Programming Pin Assignments and AT25320A Pin Cross Reference

QF4A512 Pin (32-lead LQFP)		AT25320A Pin (8-lead PDIP or TSSOP)		Description
Number	Name	Number	Name	
13	DRDY/SEL	8	VCC	+3.3V, puts device in EEPROM mode
17	/RST	n/a		+3.3V
16	SCLK	6	SCK	Programmer's Clock signal
15	SDI	5	SI	Programmer's Data Input signal
14	SDO	2	SO	Programmer's Data Output signal
12	/CS	1	/CS	Programmer's Chip Select signal
22	XIN	n/a	n/a	Ground or clock ⁽³⁾ input w/o internal PU or PD
11	TST	n/a	n/a	Ground. Keep chip out of scan mode.
1,2,3,4,5,6,7,8	AnP/N	n/a	n/a	Ground
n/a		3	/WP	No translation to QF4A512. Leave open.
n/a		7	/HOLD	No translation to QF4A512. Leave open.
23	XOUT	n/a	n/a	Output. Unconnected.
20,32	DVDD	8	VCC	+3.3V DC Power ⁽²⁾
9,19,21,26,28,29	DVDD18	n/a	n/a	+1.8V DC Power ⁽²⁾
10,11,18,24, 25,27,30,31	DGND	4	GND	Ground

Notes -

1. The non-programming pins of the QF4A512 must be held in a known state during programming.
2. Both the 3.3V and 1.8V supplies are required during EEPROM programming. The 3.3V supply must provide at least 11mA and the 1.8V supply must provide at least 0.6 mA. The order in which the supplies are applied is unimportant.
3. No oscillator (XIN) is needed to access the EEPROM, however the presence of an oscillator will only slightly increase power consumption, it will not interfere with EEPROM programming.

The circuit representing the connections in Figure 3 is shown in Figure 4 on the next page.

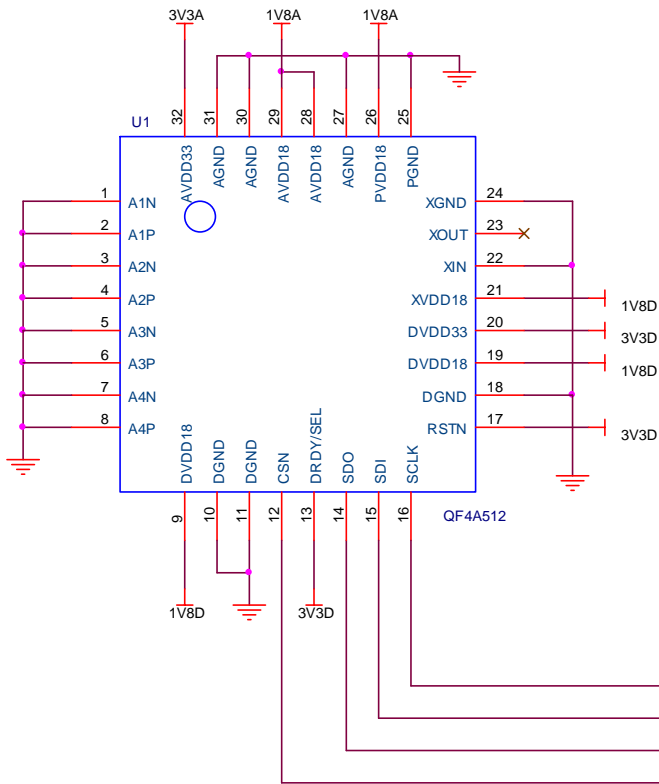
The image generated by Quickfilter Pro is ready to use. No further translation is needed. Be sure to leave the image offset at 0.

B. Conclusion

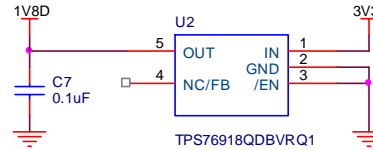
The EEPROM in the QF4A512 can be programmed in a variety of ways, including at runtime, using the QF4A512-PA Programming Adapter, using a third-party resource, or configuring the QF4A512 to appear like an Atmel AT25320A to a general-purpose programmer. This Application Note describes each of those options.

Figure 4 – Schematic for QF4A512 EEPROM Programming Jig

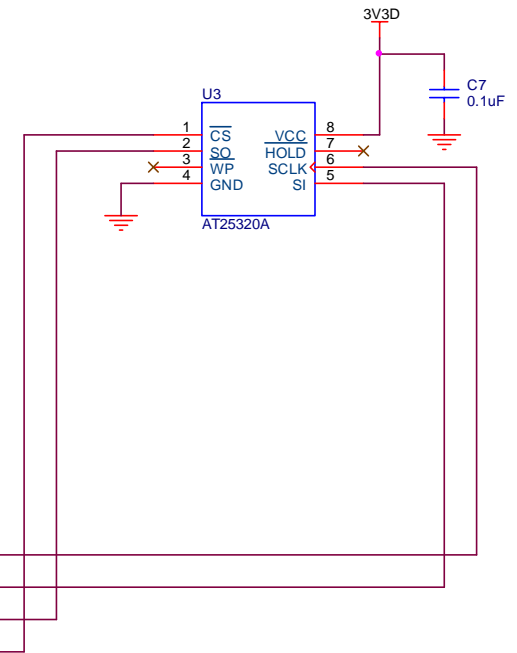
QF4A512 Device Being Programmed



1.8V Supply



EEPROM Pinout Connected to Programmer



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