

# Product Document



## Application Note

AN000622

# AS72xx

## External Flash Program and Update

v1-00 • 2019-May-22

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# Content Guide

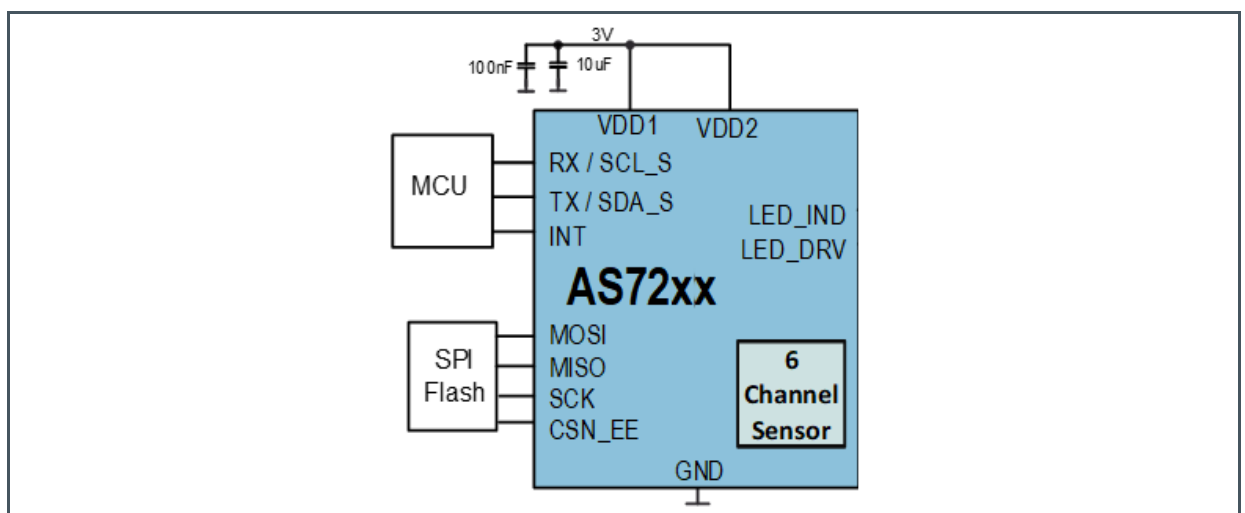
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# 1 General Description

AS72xx products use a serial Flash memory programmed with a pre-designed firmware of **ams** (part of the product delivery) for standard sensor operations like register configuration, measurement, calibration and matching, communication and networking. After power on and during the boot operation, the Scotty internal firmware checks the availability of the Flash and then it works with the Flash firmware. Note, not all Flash types are can be used and the Flash memories must have defined technical parameters to work.

This Application Note describes using the AS72xx UART interface for updating the external program Flash. This app note applies to UART capable AS72xx devices: AS7211, AS7220, AS7221, AS7225, AS7261, AS7262, AS7263 and AS7265x.

**Figure 1:**  
**Block Diagram AS72xx with Connected MCU, Flash & Power Supply**



## 2 First Time Flash Programming

Get the latest “\*.bin” file (512KB) from **ams** for the specific AS72xx device. Have the **ams** approved serial Flash manufacturer (see Figure 2) or one of their distributors.<sup>1</sup> use the “\*.bin” file to program the Flash for first time. They routinely provide this service. Alternatively use a Programming setup as to program the Flash (assumes programming tool access to the Flash is available. e.g. FlashCatUSB - see application note “AN\_AS72xx How to Program Firmware with FlashCatUSB”).

In Figure 2 **ams** proofed Flash memories are listened which are recommend to use. They are characterized by the following properties, among others:

- Flash size: at minimum 4Mbit
- Address bits: 24
- SPI clock: 16MHz

**Figure 2:**  
Flash and Manufacturer Approved by ams

Serial Flash	Manufacturer	Comment
M95M02-XXXX	ST Micro (Serial EEPROM <sup>(1)</sup> , not Flash)	Only for firmware version v3.x and 4.0.xx
AT25SF041xx AT25DF041xx	Adesto Technology	No firmware restrictions
MX25L4006Exxl-12G	Macronix	No firmware restrictions
SST25PF040C	Microchip Technology	No firmware restrictions
W25X40CLSNIG	Winbond Electronics	No firmware restrictions
LE25U40CMD	ON Semiconductor	No firmware restrictions
GD25Q40C	GigaDevice	No firmware restrictions
FS25Q004F1	FORESEE	No firmware restrictions

(1) xx = alternative packages

(2) EEPROMs are not supported longer for Scotty firmware version higher than v3.x and 4.0.xx – for more details see the application note “EEPROM Updating using I<sup>2</sup>C”

After the programming for first time, an update for firmware will be possible also by a special GUI function in the test software. More details are in the document later or see the details in the user manuals for the test software.

<sup>1</sup> See for [adesto\\_3rd.Party.Memory.Device.Programmer.Sources\\_11.22.16.pdf](#)

## 3 Flash Updating

Several methods are possible to update a new firmware release to a programmed Flash memory in the **ams** test systems and evaluation boards (or similar customer boards). It is depending on the used hardware, the pro-programmed firmware version and the available tools. The following table gives an overview for possible programming methods for each AS72xx type depending on the re-programmed firmware version.

**Figure 3:**  
**Methods for Flash Updating ams Test Systems**

Sensor Name	FlashCatUSB Programmer Tool	Special Firmware Update GUI (UART Communication)	Sensor Test Software <sup>(1)</sup> (I <sup>2</sup> C or UART depending on the used software)
AS7261	All versions (*.bin 512 or 256KB)	2Vx.x – 11Vx.x (*.bin 56KB)	≥11Vx.x (*.bin 56KB)
AS7262	All versions (*.bin 512 or 256KB)	2Vx.x – 11Vx.x (*.bin 56KB)	≥11Vx.x (*.bin 56KB)
AS7263	All versions (*.bin 512 or 256KB)	2Vx.x – 11Vx.x (*.bin 56KB)	≥11Vx.x (*.bin 56KB)
AS7265 FW - Gen 1	All versions till 10Vx.x (AS7265_complete_moonlight.bin 256KB)	1V2.8 - 10Vx.x (*.bin 56KB) OR use the special AS7265_Complete_moonlight.bin for HW until 1Vx	1V2.8 - 10Vx.x (*.bin 56KB) OR use the special AS7265_Complete_moonlight.bin for HW until 1Vx
AS7265 FW - Gen 2 <sup>(2)</sup>	Special AS7265_Complete_moonlight.bin for HW until 1Vx Standard ≥11Vx.x supported for HW 2Vx and higher	At least one time flashing with FlashCatUSB 11Vx.x or higher, then it will support update with 11Vx.x or higher in this method	At least one time flashing with FlashCatUSB ≥11Vx.x or higher, then it will support update with ≥11Vx.x
AS7221	All version (*.bin 256 KB)	4V0.x – 11Vx.x (*.bin 56KB)	4V0.x – ≥11Vx.x (*.bin 56KB)
AS7225	All version (*.bin 256 KB)	-----	≥12Vx.x

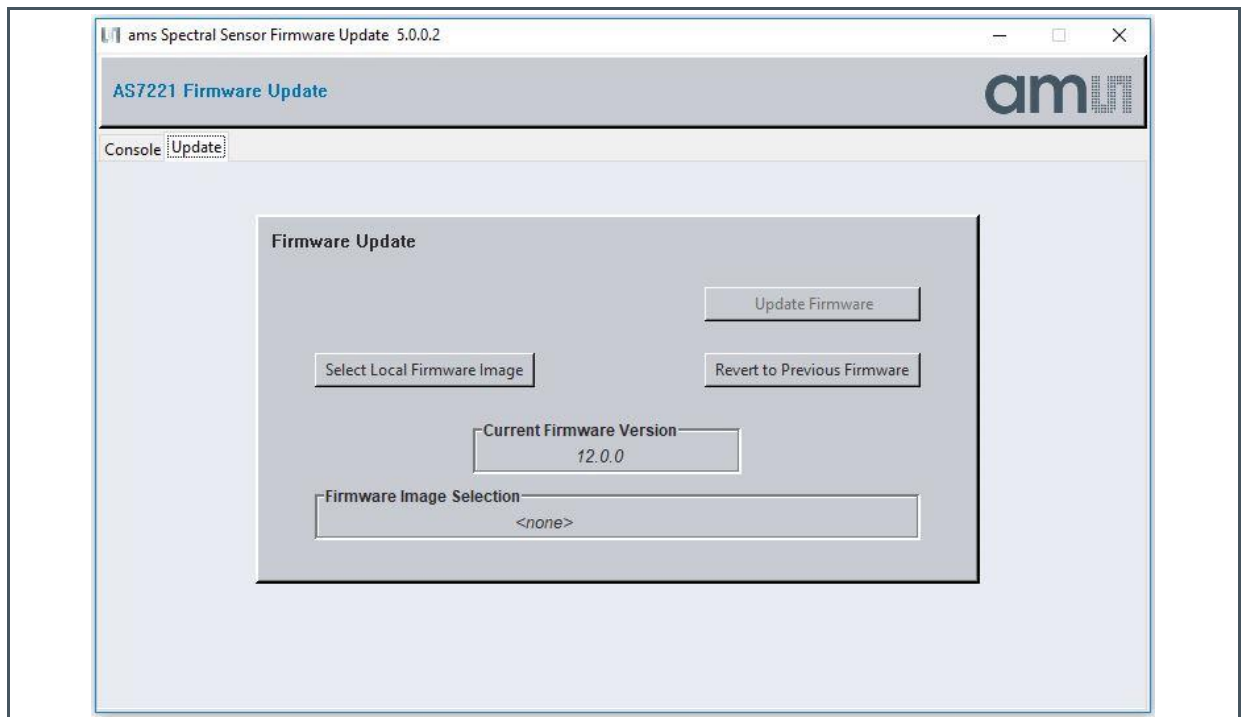
(1) AS726x iSPI software v3.3.x for spectral sensor (I<sup>2</sup>C) and Dashboard v4.2.x for AS7265 and AS72xx smart lighting manager sensors (via UART)

(2) Change in the pinning of AS7265, Please refer release-notes.txt of AS7265 for details

## 4 Flash Updating Using the Special Update GUI

AS72xx devices with UART can use the **ams** AS72xx Firmware Update GUI for updating the Flash. This GUI is described in a special application note “Firmware Update GUI”.

**Figure 4:**  
ams AS72xxx Firmware Update GUI



## 5 Flash Updating Using the GUI UART

AS72xx devices can use defined AT commands for updating the Flash via standard programmer devices with UART interface. The latest 56KB “\*.bin” file from **ams** for the specific AS72xx device must be available.

Figure 5 describes the AT commands for Flash Updating via UART. In this table, text appearing between angle brackets (<‘ and ‘>’) are commands or response arguments. A carriage return character, a linefeed character, or both may terminate commands and responses. Note that any command that encounters an error will generate an “ERROR” response.

**Figure 5:**  
AT Commands for Flash Updating

Command	Response	Description/Parameters
<b>Firmware Update</b>	Table text left aligned	Table text left aligned
<b>ATFWU=&lt;value&gt;</b>	OK	<value>= 16-bit checksum. Initializes the firmware update process. Number of bytes that follow are always 56 kBytes
<b>ATFW=&lt;value&gt;</b>	OK	Download new firmware Up to 7 bytes represented as hex chars with no leading or trailing 0x. Repeat command till all 56Kbytes of firmware are downloaded
<b>ATFWA</b>	OK	Causes target address for FW updates to advance. Should be called after every successful “OK” returned after “ATFW=<value>” command usage.
<b>ATFWS</b>	OK	Causes the active image to switch between the two possible current images and then resets the IC

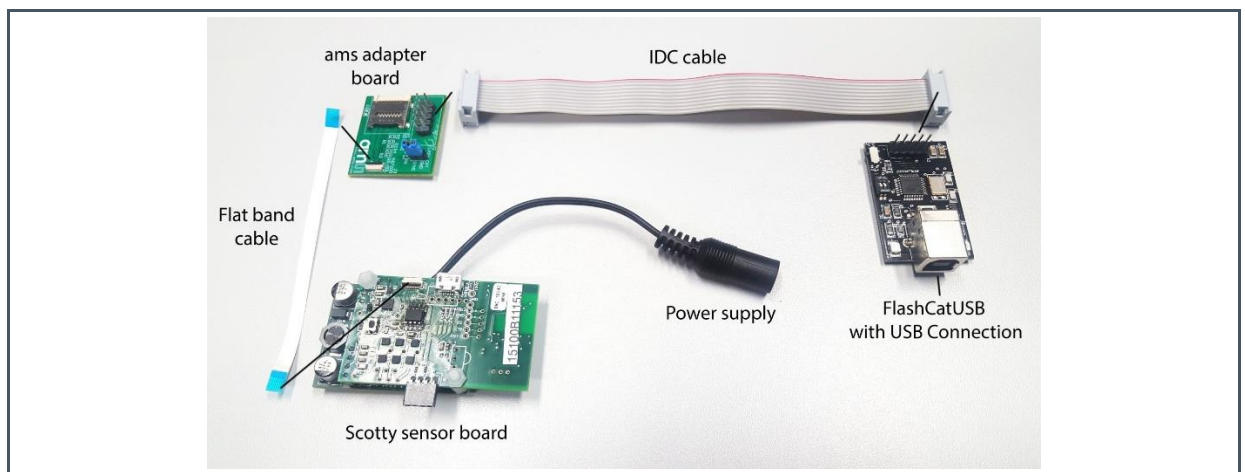
Refer to the appropriate AS72xx datasheet for more AT Command information.



## 6 Flash Updating Using the FlashCatUSB Programmer

The FlashCATUSB is a commercial programming tool that can be used to program the firmware to the Flash in conjunction with **ams** test boards AS72xx Demo kits. See an example here for flash updating using the FlashCatUSB programmer. For more details and alternative setup please see the application note “How to program AS72xx firmware with FlashCatUSB”.

**Figure 6:**  
Demo Board with FlashCatUSB Programmer and ams Adapter Board



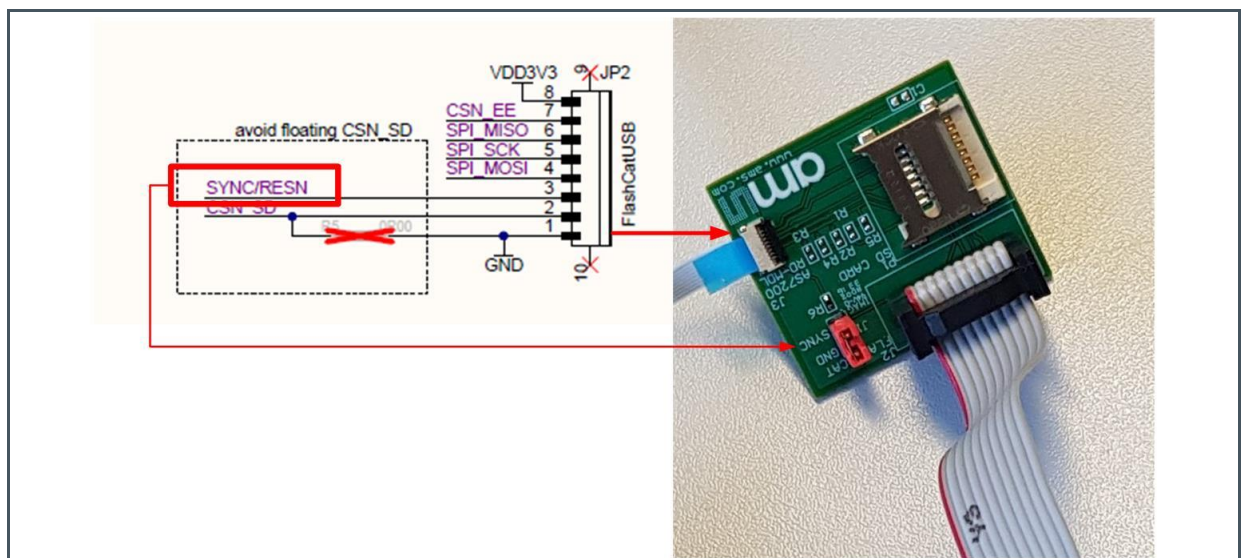
The system and procedure is described in an additional application note “AN\_AS72xx How to Program AS72xx Firmware with FlashCatUSB”.

# 7 Reset (RYNC/RESN) Pin Condition

For First Time Flash Programming or Flash Updating using the FlashCatUSB Programmer when 256kb firmware file is needed, the AS72xx device SYNC/RESN pin must be active low or connected to GND.

**Demo Kit with flat band cable:** Depending on the version, the AS72xx boards have a 8-pin programmer connector onboard which connect the sensor device to the FlashCatUSB programmer via **ams** adapter board and flat band cable. The **ams** adapter board has a jumper that ties SYNC/RESN pin to GND.

**Figure 7:**  
Jumper for Reset to GND

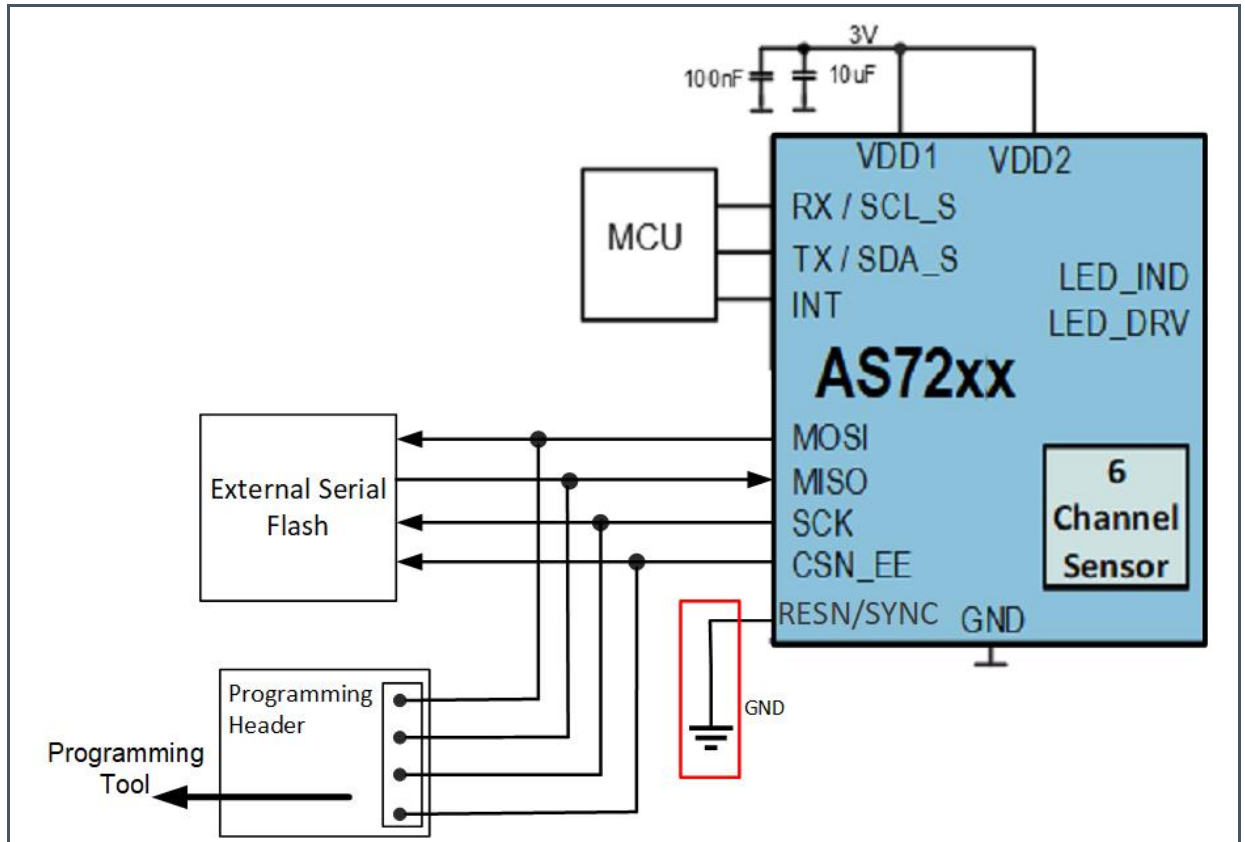


**Demo Kit with Tag-Connector:** New test boards have a 6 pole tag interface on the board which can be connected with the TC2030-clip. The Tag connector should be connected with the FlashCatUSB programmer via adapter board.

Note: Evaluation board version 1.0 requires specific requirement, e.g. RESN/SYNC pin should be connected to GND.

**AS72xx chip:** Make sure, the SYNC/RESN signal is active low during programming only (256kb firmware file) as shown in the figure (red mark).

Figure 8:  
Reset during Programming



## 8 Revision Information

Changes from previous version to current revision v1-00	Page
Initial version	

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

## 9 Legal Information

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