

SM702x User's Manual

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LIST OF ABBREVIATIONS

SPJETPLSPJ Embedded Technologies Pvt. Ltd.DBDaughter Board



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1 Introduction

This is user's manual for SM702x series Modules from SPJ Embedded Technologies. These modules offer a quick way to use AduC70xx microcontrollers for any application. These modules support 4 microcontrollers from the ADuC702x family, yet all 4 modules come in same size and shape and very similar connector pinout. Hence, this is a combined User's Manual for all the modules.

CAUTION: These modules contain components that are sensitive to Electrostatic Discharge (ESD). The module must be handled carefully, so as not to subject it to ESD. As far as possible, do not touch any conducting part on the module – including any component or connector pins – as this may damage parts of the module permanently. If you must touch any of the parts, make sure to discharge yourself to earth. Parts damaged due to ESD are not covered by the limited warranty.



2 Module Specifications:

2.1 Hardware specifications:

- Supported microcontrollers: ADuC7024, ADuC7025, ADuC7026 and ADuC7027.
- All these microcontrollers are ARM7TDMI architecture.
- On-chip 62KB ISP flash, 8KB SRAM. This is enough for many applications like Instrumentation or PID loop controllers etc.
- Supply voltage required: 5VDC (minimum 4.75V, maximum 5.25V). The microcontroller chip itself operates on 3.3V, but the module includes a small voltage regulator that produces 3.3V from 5V.
- Power consumption during normal operation: 35 mA @ 5VDC (speed = 5.22 MHz); 65 mA @ 5VDC (speed = 41.78 MHz).
- Module includes crystal for main clock. Default operating speed is 5.22MHz; can be boosted to 41.78MHz using on-chip PLL.
- Alternatively, external clock up to 44MHz can be supplied to module.
- Module includes power-on reset circuit as well as push-button for manual reset.
- All port pins (up to 40 GPIO) and JTAG pins available on connector.
- All digital I/O pins are 5V tolerant.
- RS232 (3 wire) on separate connector, useful for In-System-Programming or any other purpose. Separate push-button included for selecting ISP Program mode.
- Other interfaces: Two I2C configurable as Master or Slave; SPI master or slave, up to 3.48 MHz.
- Module includes I2C compatible 64KB EEPROM (AT24C512) for non-volatile data storage.
- Also includes I2C compatible RTC (DS1338). Battery for RTC maybe connected externally. Module connector has pins for connecting external battery (3VDC only).
- Analog Inputs: up to 16 ADC channels, 12 bit resolution, 1 Mega-samples per second. Default internal VREF is 2.5V; external VREF from 0.625 to 3.3V can be applied.
- On-chip temperature sensor (±3°C).
- On-chip voltage comparator.
- Analog outputs: up to 4 DAC channels, 12 bit resolution.
- Miscellaneous features: 4 timers, wakeup and watchdog timer, power supply monitor, 3 phase 16 bit PWM generator, Programmable Logic Array (PLA).
- Compact footprint, 35 mm X 45 mm. Module has 2 through-hole connectors (2 mm pitch male pins), each with 38 pins (2 rows of 19 pins).
- Operating Temperature Range: -20°C to +70°C.

2.2 Support:

- EAGLE libraries available, so module can be used as a component in your EAGLE schematic and PCB. Similar libraries will be soon made available for other CAD packages.
- Sample programs and "library" of many useful functions available.

2.3 Optional accessories:

- Serial Cable: This is a small cable with 3 pin connector on one side compatible with the module; and DB9 female connector on the other side compatible with a computer's COM port. This is very useful for programming the module, with the help of programming software running on computer. Programming software is available from Analog Devices web-site.
- SM-BaseBoard: has sockets compatible with the SM70xx modules. The BaseBoard provides some prototyping area as well as connectors in more standard format for example DB9 for RS232.



3 Module photos:

3.1 As seen from top:





3.2 3D view:





4 Connectors and Switches:



Figure1: Component locations on SM7026 and SM7027 modules.



Figure2: Component locations on SM7024 and SM7025 modules.

4.1 Connector description:

Locations of various connectors are shown in Figure 1 and Figure 2.



4.1.1 IO-A

It is a 19 x 2 male header, with it's pins protruding down from the bottom of module. Many pins have same meaning across all 4 modules, but some have different meaning, as shown below:

Pin #	SM7024 signal	SM7025 signal	SM7026 signal	SM7027 signal
1	+5V	+5V	+5V	+5V
2	+VBAT	+VBAT	+VBAT	+VBAT
3	+3v3	+3v3	+3v3	+3v3
4	AVDD	AVDD	AVDD	AVDD
5	RS232-RXD	RS232-RXD	RS232-RXD	RS232-RXD
6	RS232-TXD	RS232-TXD	RS232-TXD	RS232-TXD
7	P0.0	P0.0	P0.0	P0.0
8	NC	NC	P0.1	P0.1
9	NC	NC	P0.2	P0.2
10	P0.3	P0.3	P0.3	P0.3
11	NRST	NRST	NRST	NRST
12	TDO	TDO	TDO	TDO
13	TCK	TCK	TCK	TCK
14	TDI	TDI	TDI	TDI
15	TMS	TMS	TMS	TMS
16	NC	NC	DAC3	ADC15
17	NC	NC	DAC2	ADC14
18	DAC1	ADC13	DAC1	ADC13
19	DAC0	ADC12	DAC0	ADC12
20	DAC-VREF	DAC-VREF	DAC-VREF	DAC-VREF
21	ADCNEG	ADCNEG	ADCNEG	ADCNEG
22	NC	NC	ADC11	ADC11
23	NC	NC	ADC10	ADC10
24	ADC9	ADC9	ADC9	ADC9
25	ADC8	ADC8	ADC8	ADC8
26	ADC7	ADC7	ADC7	ADC7
27	ADC6	ADC6	ADC6	ADC6
28	ADC5	ADC5	ADC5	ADC5
29	ADC4	ADC4	ADC4	ADC4
30	ADC3	ADC3	ADC3	ADC3
31	ADC2	ADC2	ADC2	ADC2
32	ADC1	ADC1	ADC1	ADC1
33	ADC0	ADC0	ADC0	ADC0
34	VREF_INT	VREF_INT	VREF_INT	VREF_INT
35	AGND	AGND	AGND	AGND
36	AGND	AGND	AGND	AGND
37	DGND	DGND	DGND	DGND
38	DGND	DGND	DGND	DGND



4.1.2 IO-B

It is a 19 x 2 male header, with it's pins protruding down from the bottom of module. Many pins have same meaning across all 4 modules, but some have different meaning, as shown below:

Pin #	SM7024 signal	SM7025 signal	SM7026 signal	SM7027 signal
1	P3.0	P3.0	P3.0	P3.0
2	P3.1	P3.1	P3.1	P3.1
3	P3.2	P3.2	P3.2	P3.2
4	P3.3	P3.3	P3.3	P3.3
5	P3.4	P3.4	P3.4	P3.4
6	P3.5	P3.5	P3.5	P3.5
7	P3.6	P3.6	P3.6	P3.6
8	P3.7	P3.7	P3.7	P3.7
9	P0.4	P0.4	P0.4	P0.4
10	P0.5	P0.5	P0.5	P0.5
11	P0.6	P0.6	P0.6	P0.6
12	P0.7	P0.7	P0.7	P0.7
13	P1.0	P1.0	P1.0	P1.0
14	P1.1	P1.1	P1.1	P1.1
15	P1.2	P1.2	P1.2	P1.2
16	P1.3	P1.3	P1.3	P1.3
17	P1.4	P1.4	P1.4	P1.4
18	P1.5	P1.5	P1.5	P1.5
19	P1.6	P1.6	P1.6	P1.6
20	P1.7	P1.7	P1.7	P1.7
21	P2.0	P2.0	P2.0	P2.0
22	NC	NC	P2.1	P2.1
23	NC	NC	P2.2	P2.2
24	NC	NC	P2.3	P2.3
25	NC	NC	P2.4	P2.4
26	NC	NC	P2.5	P2.5
27	NC	NC	P2.6	P2.6
28	NC	NC	P2.7	P2.7
29	P4.0	P4.0	P4.0	P4.0
30	P4.1	P4.1	P4.1	P4.1
31	P4.2	P4.2	P4.2	P4.2
32	P4.3	P4.3	P4.3	P4.3
33	P4.4	P4.4	P4.4	P4.4
34	P4.5	P4.5	P4.5	P4.5
35	P4.6	P4.6	P4.6	P4.6
36	P4.7	P4.7	P4.7	P4.7
37	DGND	DGND	DGND	DGND
38	DGND	DGND	DGND	DGND

CAUTION: All signals on IO-A and IO-B connectors are directly pins of ADuC702x processor and <u>NOT</u> all the pins are **5V tolerant**. Users must take care that voltage on these pins shall never exceed 3.3V or Vref or 5V (as the case maybe for individual pin), as it may cause permanent damage to the module.

4.1.3 X1:

It is a 3 pin connector which has RS-232 signals.

13	griaio.	
	Pin #	Signal
	1	RS232-TXD
	2	RS232-TXD
	3	DGND



4.2 Switches description:

4.2.1 RST

This is a push-button for "user reset". Pressing this switch momentarily will apply a reset pulse to the RST pin of ADuC702x.

4.2.2 PGM

This is a push-button to enable "In System Programming". Refer to next section for usage of this switch.



5 Downloading user program into module and running it:

Follow these simple steps to download your program into the micro controller and run it:

- 1. Run the serial downloader program "ARMWSD" on the PC.
- 2. Click the "Configuration" button and select appropriate Part, COM port and Baud Rate. For downloading example programs select 9600 Baud.
- 3. Connect the Board to the serial port of PC. You may use Serial Cable (optional accessory) or your own cable, as long as you ensure right connection (please refer to description of connector X1).
- 4. Switch ON power to the module.
- 5. Use PGM and RST switches on module:
 - a. Initially, PGM and RST both will be released i.e. in UP position.
 - b. Press and hold down PGM switch.
 - c. Press RST switch.
 - d. Release RST switch.
 - e. Release PGM switch.
- 6. The above sequence of switch operation will put the ADuC702x microcontroller in Program mode. Now select the hex file to be downloaded.
- 7. Click on "Start " button of "ARMWSD" program.
- 8. The chip will be erased first and then the program will be downloaded.
- 9. To RUN the downloaded program, simply press **RST** momentarily.



a. PGM and RST released.







c. PGM and RST pressed.



d. RST released.



e. PGM released. Figure 3



6 Using SM702x Module in your hardware:

6.1 If you use EAGLE for schematic capture and PCB design:

We provide an EAGLE library, which contains these modules as if they were components. Name of this library is SM702x.lbr. It can be downloaded from our web-site. It has 4 components named SM7024 to SM7027. Each component has appropriate symbol. Footprint (package) for all these components is same.

To integrate this module in your hardware, simply create a schematic in EAGLE and add one of the 4 modules into it. It's footprint will automatically appear in corresponding PCB. You may complete PCB design as usual. When PCB is fabricated, you may solder 2 mm pitch female sockets (dual row 19X2 pins each) on it and then simply plug-in the module into the female sockets.

6.2 If you use some other software:

See below mechanical drawing of the module. Note that it is same for all 4 modules. However, pin connections (of IO-A and IO-B connectors) maybe different for different modules, as described above. You may design your PCB according to this mechanical drawing and the pin connections described above.

