ADuC-MT7020 development board

Users Manual

Pb-free, Green

All boards produced by Olimex are ROHS compliant

Rev. A, September 2005

INTRODUCTION

ADuC-MT7020 is small terminal board with USB link for PC, two buttons, LCD 16x2 with backlight and ADuC7020 with the unique 1Msps ADCs/DACs which are accessable on separate AEXT connector.

BOARD FEATURES

- MCU: **ADuC7020** - ARM7TDMI Core, 16/32-bit RISC architecture, 5 Channels 12-bit, 1MSPS ADC, Differential and single-ended modes, 0 to Vref Analog Input Range, 4 Outputs 12-bit Voltage Output DACs, On-Chip 20ppm/°C Voltage Reference, On-Chip Temperature Sensor (±3°C), Uncommitted Voltage Comparator, JTAG Port, Clocking options: Trimmed On-Chip Oscillator (± 2%), External Watch crystal, External clock source 45MHz PLL with Programmable Divider, 62k Bytes Flash/EE Memory, 8k Bytes SRAM, In-Circuit Download, JTAG based Debug, Software triggered in-circuit re-programmability, UART, dual I2C and SPI Serial I/O, 14-Pin GPIO Port, 2 X General Purpose Timers, Wake-up and Watchdog Timers, Power Supply Monitor, PLA – Programmable Logic (Array), Power Specified for 3V operation, Active Mode: 6mW (@1MHz) 300mW (@45MHz), Fully specified for –40°C to 85°C operation;
- JTAG connector for in-circuit programming and debugging with ARM-JTAG
- USB-RS232 convertor and interface to ADuC7020, can be used for serial download
- I^2C connector
- RESET supervisor IC and button
- SERIAL DOWNLOAD (bootloader enable) button
- Two buttons
- LCD 16x2 display with BACKLIGHT
- 32 768 Hz oscillator crystal
- Power supply filtering capacitor and ferite bead
- Extension header for ADC and DAC ports
- On-chip Bootloader, which can be accessed via USB using ARMWSD.exe. When you open ARMWSD.exe, click button Start and after that will be appeared message “Press Download and pulse Reset on hardware” - press button SD on AduC-MT7020 and pulse Reset button – this will give you access to Bootloader, where you can load your own program.
- PCB: FR-4, 1.5 mm (0,062"), green soldermask, white silkscreen component print

ELECTROSTATIC WARNING

The ADuC-MT7020 board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

BOARD USE REQUIREMENTS

Cables: Depends on the used programming/debugging tool. It could be 1.8 meter USB A-B cable to connect ARM-JTAG-EW to USB host on PC or LPT cable in case of ARM-JTAG or other programming/debugging tools. You will need a serial cable if not for programming, than for configuring the board.

Hardware: Programmer/Debugger – some of Olimex programmers are applicable, for example **ARM-JTAG**, **ARM-JTAG-EW**, or other compatible programming/debugging tool.

PROCESSOR FEATURES

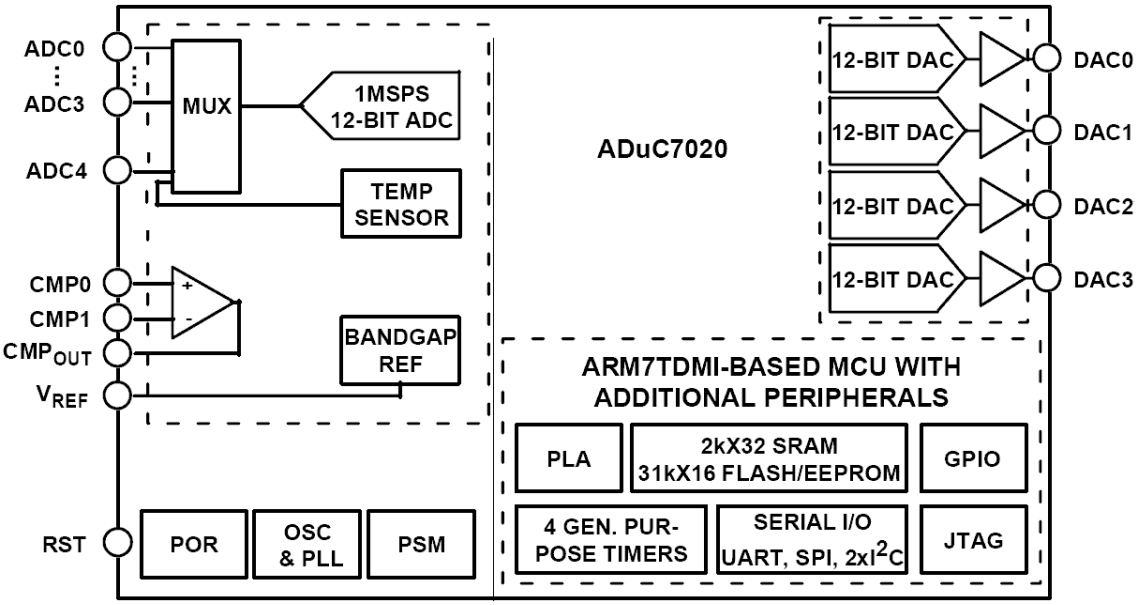
ADuC-MT7020 board use fully integrated, 1 MSPS, 12-bit data acquisition systems incorporating a high performance multichanel ADC, a 16/32-bit MCU and Flash/EE Memory on a single chip with these features:

- Analog I/O
- Multi-Channel, 12-bit, 1 MSPS ADC – 5 Channels
- Differential and single-ended modes
- 0 to Vref Analog Input Range
- Multi-Channel 12-bit Voltage Output DACs - 4 Outputs
- On-Chip 20ppm/°C Voltage Reference
- On-Chip Temperature Sensor (±3°C)
- Uncommitted Voltage Comparator
- Microcontroller
    - ARM7TDMI Core, 16/32-bit RISC architecture
    - JTAG Port supports code download and debug
- Clocking options:
    - Trimmed On-Chip Oscillator (± 2%)
    - External Watch crystal
    - External clock source
- 45MHz PLL with Programmable Divider Memory
- 62k Bytes Flash/EE Memory, 8k Bytes SRAM
- In-Circuit Download, JTAG based Debug
- Software triggered in-circuit re-programmability
- On-Chip Peripherals
    - UART, dual I^2C and SPI Serial I/O

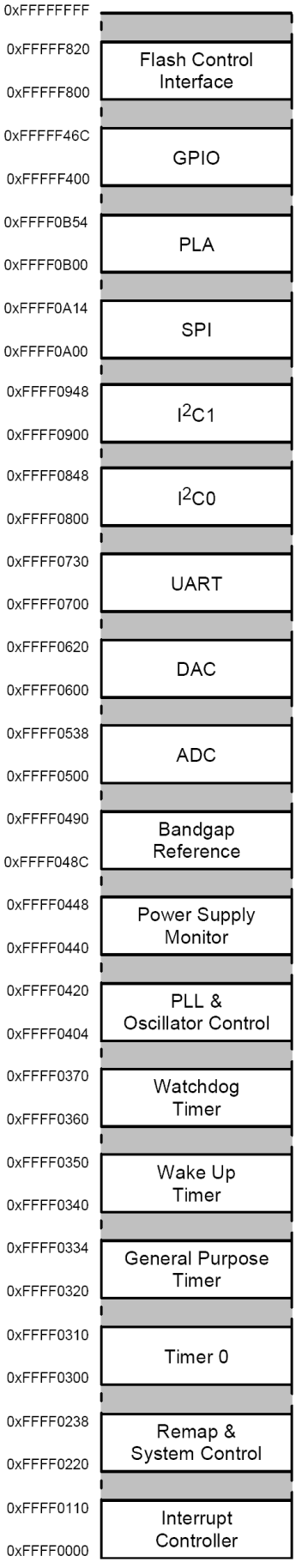
- 14-Pin GPIO Port
- 2 X General Purpose Timers
- Wake-up and Watchdog Timers
- Power Supply Monitor
- PLA – Programmable Logic (Array)

– Power
  - Specified for 3V operation
  - Active Mode: 6mW (@1MHz)
    300mW (@45MHz)

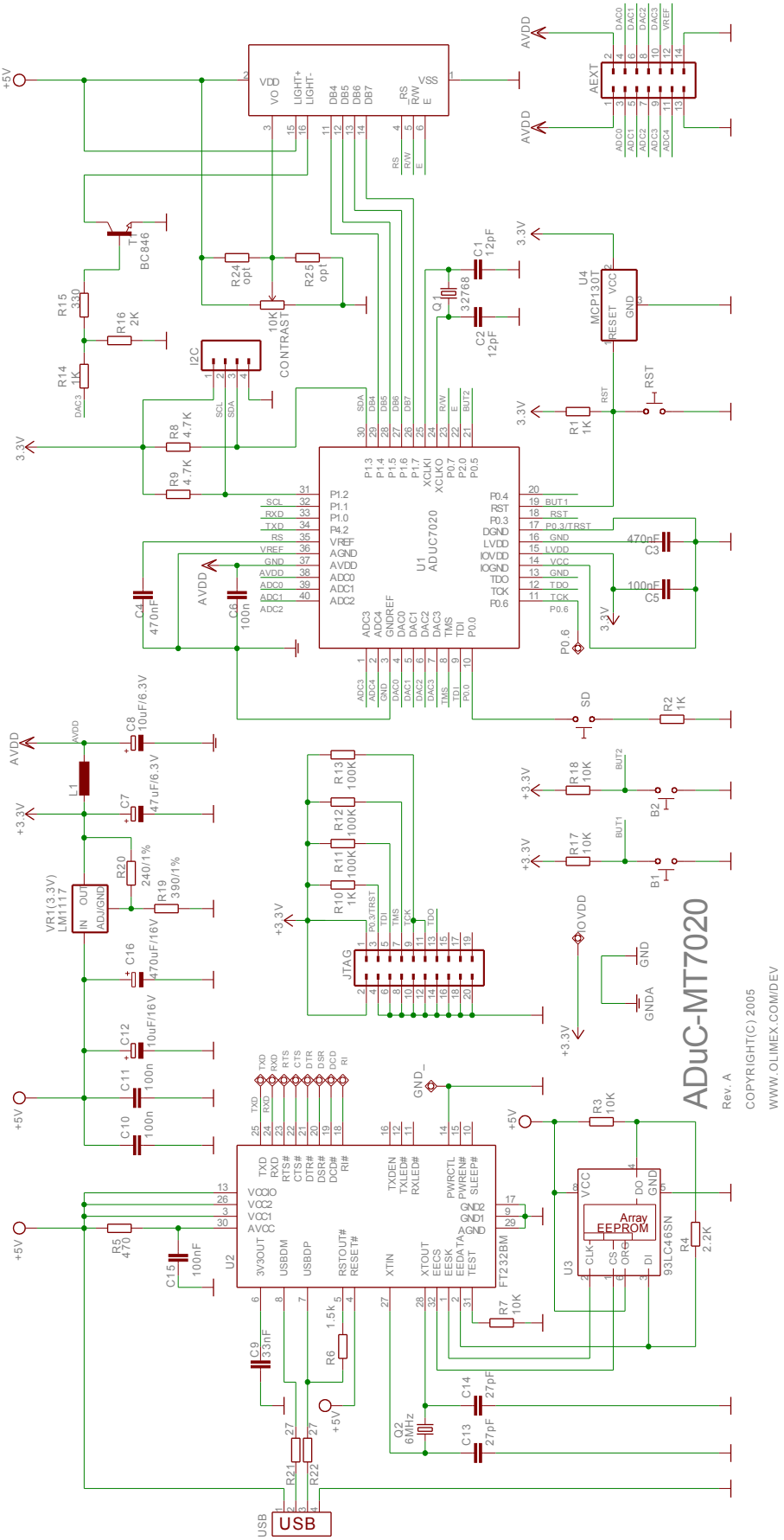
BLOCK DIAGRAM



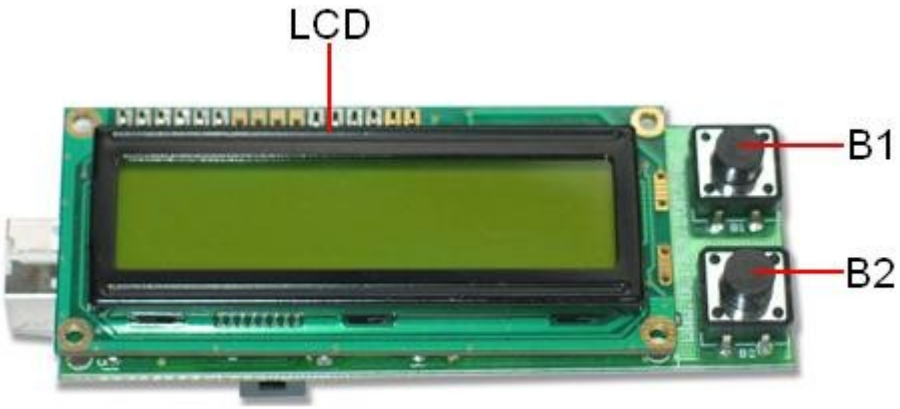
MEMORY MAP

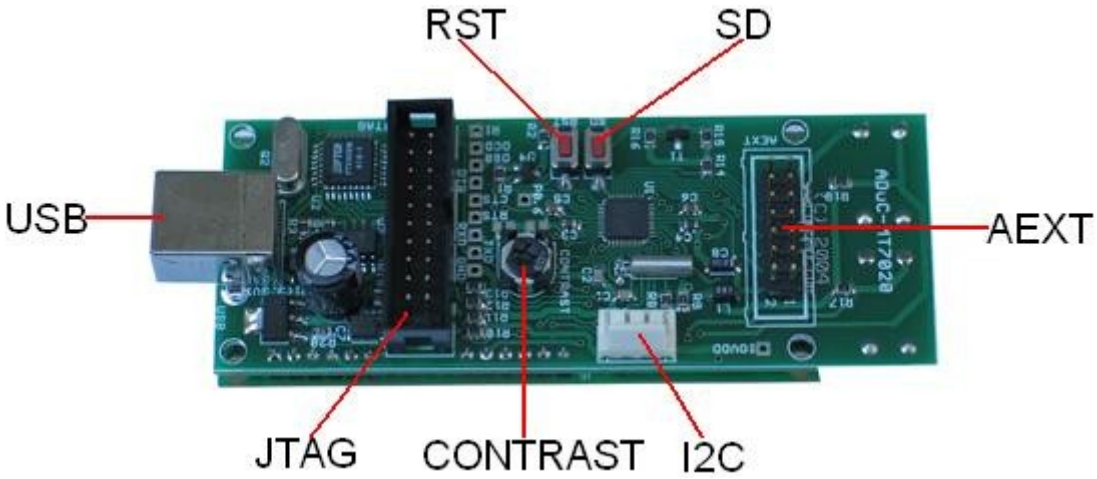

0xFFFFFFFF
0xFFFFF820
Flash Control Interface
0xFFFFF800
0xFFFFF46C
GPIO
0xFFFFF400
0xFFFF0B54
PLA
0xFFFF0B00
0xFFFF0A14
SPI
0xFFFF0A00
0xFFFF0948
I2C1
0xFFFF0900
0xFFFF0848
I2C0
0xFFFF0800
0xFFFF0730
UART
0xFFFF0700
0xFFFF0620
DAC
0xFFFF0600
0xFFFF0538
ADC
0xFFFF0500
0xFFFF0490
Bandgap Reference
0xFFFF048C
0xFFFF0448
Power Supply Monitor
0xFFFF0440
0xFFFF0420
PLL & Oscillator Control
0xFFFF0404
0xFFFF0370
Watchdog Timer
0xFFFF0360
0xFFFF0350
Wake Up Timer
0xFFFF0340
0xFFFF0334
General Purpose Timer
0xFFFF0320
0xFFFF0310
Timer 0
0xFFFF0300
0xFFFF0238
Remap & System Control
0xFFFF0220
0xFFFF0110
Interrupt Controller
0xFFFF0000

SCHEMATIC


ADuC-MT7020
Rev. A
COPYRIGHT(C) 2005
WWW.OLIMEX.COM/DEV
U1 ADUC7020
U2 FT232BM
U3 93LC46SN
U4 MCP130T
JTAG
USB
I2C
CONTRAST
VR1(3.3V) LM1117
Array EEPROM

BOARD LAYOUT





POWER CIRCUIT

ADuC-MT7020 can take power from USB +5 V.

RESET CIRCUIT

ADuC-MT7020 reset circuit is includes R1 (1k) pull-up, U4 (MCP130T), ADuC7020 pin 19 and RST button.

CLOCK CIRCUIT

Quartz crystal 32.768 KHz is connected to **ADuC7020** pin 24 (XCLKO) and pin 25 (XCLKI).

JUMPER DESCRIPTION

There are no jumpers on this board.

INPUT/OUTPUT

Reset button with name **RST**, connected to ADuC7020 pin 19 (RST).

User button with name **SD**, connected to ADuC7020 pin 10 (P0.0).

User button with name **B1**, connected to ADuC7020 pin 20 (P0.4).

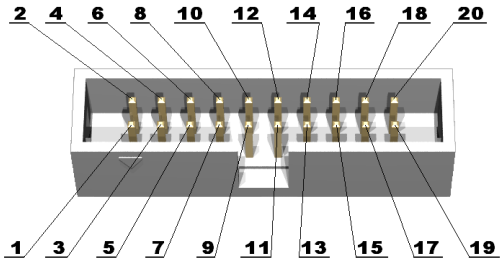
User button with name **B2**, connected to ADuC7020 pin 21 (P0.5).

LCD 16x2 display with BACKLIGHT, connected as follows: RS – to ADuC7020 pin 34 (P4.2); R/W – to ADuC7020 pin 23 (P0.7); E – to ADuC7020 pin 22 (P2.0), DB4 – to ADuC7020 pin 29 (P1.4), DB5 – to ADuC7020 pin 28 (P1.5), DB6 – to ADuC7020 pin 27 (P1.6), DB7 to ADuC7020 pin 26 (P1.7).

Potentiometer with name **Contrast** for setting LCD contrast voltage.

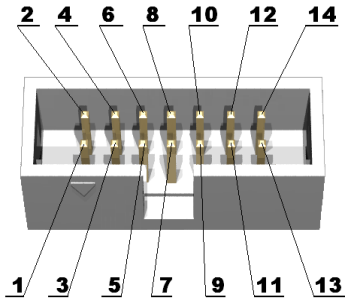
EXTERNAL CONNECTORS DESCRIPTION

JTAG



Pin #	Signal Name	Pin #	Signal Name
1	+3.3 V	2	+3.3 V
3	P0.3/TRST	4	GND
5	TDI	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	TCK	12	GND
13	TDO	14	GND
15	Not Connected	16	GND
17	Not Connected	18	GND
19	Not Connected	20	GND

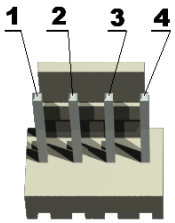
AEXT



Pin #	Signal Name	Pin #	Signal Name
1	AVDD	2	AVDD
3	ADC0	4	DAC0
5	ADC1	6	DAC1
7	ADC2	8	DAC2
9	ADC3	10	DAC3
11	ADC4	12	VREF
13	GND	14	GND

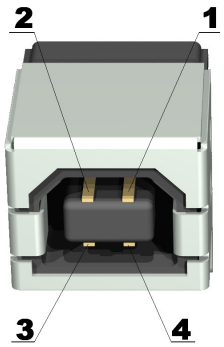
I2C

Pin #	Signal Name
1	+3.3 V
2	SCL
3	SDA
4	GND

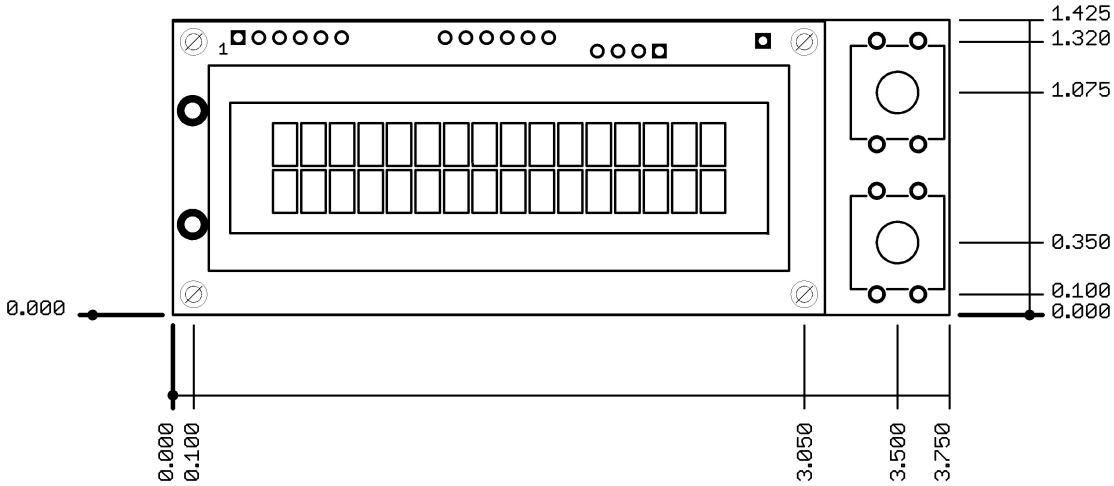


USB

PIN #	Signal Name
1	+5V_USB
2	USBDM
3	USBDP
4	GND



MECHANICAL DIMENSIONS



- All measures are in Inches.

AVAILABLE DEMO SOFTWARE

- RS232 initialization for EW-ARM
- LCD, DAC demo code for EW-ARM
- LCD write for EW-ARM
- ADC read DAC write demo code for EW-ARM
- Blink LED demo code for EW-ARM
- RS232 , UART, demo code for EW-ARM
- DAC sinusoidal generation demo code for EW-ARM
- SPI demo code for EW-ARM
- Basic initializations for ADUC7020 demo code for EW-ARM

ORDER CODE

ADuC-MT7020 - completely assembled and tested.

How to order?
You can order to us directly or by any of our distributors.
Check our web www.olimex.com/dev for more info.

Revision history:

REV. A - create September 2005

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