Section 1
Introduction

This document describes the board included in the AT89STK-06 Starter Kit dedicated to
the T89C51CC01/CC02 and AT89C51CC03 CAN microcontrollers (for T89C51CC02
optionnal adaptor is required). This board is designed to allow an easy evaluation of the
product using demonstration software.

The AT89STK-06 Starter Kit can be used with the AT89C51AC3, TR89C51AC2, and
T89C5115 Flash Microcontrollers with ADC (for T89C5115 optional adapter is required).

1.1 Features

- CAN
  - On board CAN transceiver Atmel ATA6660
  - D-sub Connector Compliant to the CiA (User Group: "CAN in Automation")
    Recommendation for the CAN High Speed Bus
- Two Different Sockets to Support AT89C51CC03 and AT89C51AC3 in PLCC52 and all
  controllers in PLCC44 Packages
- Support of the T89C51CC02 & T89C5115 Microcontroller Requires the use of a PLCC28
  Adapter (CANADAPT28).
- The Board Comes with a AT89C51CC03-UA (PLCC44 package) and a AT89C51CC03-CA
  (PLCC52 package) Samples[1].
- Analog-to-Digital Converter
  - Potentiometer
  - Thermal Resistor
- On board ADC Reference Voltage
- On-board Reset, INT0, INT1, LEDs, EA, ISP and Programming Interface
- Power, ALE, RS232 Rx and Tx LEDs
- CAN, SPI and RS232 Hardware Connectors
- On-board Voltage Regulator
- Voltage Operation: 8V to 15V
- Operating Temperature Range: 0 to +70°C
- Dimension: 80 mm x 100 mm

Notes: 1. Samples for AT89C51AC3, T89C51CC01, T89C51AC2, T89C51CC02, and
T89C5115 can be ordered separately
Introduction

Figure 1-1. AT89STK-06 board
Section 2
Hardware Description

2.1 Block Diagram
Figure 2-1 shows a functional block diagram of the AT89STK-06 board, with the I/O usage.

*Figure 2-1.* Block Diagram of AT89STK-06 board

2.2 Power Supply
The on-board power supply circuitry allows various power supply configurations.

2.2.1 Power Supply Sources

The power supply source can come from two different and exclusive sources:

- either from J4, JACK PWR connector
- either from J5, 9V (Battery connector)

*J4 - JACK PWR connector:*  
- Need of a male JACK outlet
- Input supply from 8 up to 15V DC 500mA min
Hardware Description

- No specific polarization mandatory

**Note:** There is a diode voltage level between the negative output of the power supply and the “GND”. This could introduce some gap of voltage during measurement and instrumentation.

**Figure 2-2.** Male JACK Outlet and Wires

**Caution:** Do not mount more than one power supply source on AT89STK-06 board.

*J5 - 9V Battery connector:*  
- Need of a female 2 points connector  
- Input supply from 6 up to 10V DC (example: 9V battery)  
- Polarization mandatory

**Figure 2-3.** EXT PWR Female Connector / Cable for 9V Battery

**Caution:** Do not mount more than one power supply source on AT89STK-06 Starter Kit.

### 2.3 RESET

Although the AT89C51CC03 & AT89C51AC3 microcontrollers have on-chip RESET circuitry (c.f. microcontroller datasheet), the AT89STK-06 board provides to the microcontroller a RESET signal which can come from 2 different sources:

#### 2.3.1 Power-on RESET

The on-board RC network acts as power-on RESET.

#### 2.3.2 RESET Push Button

By pressing the RESET push button on the AT89STK-06 board, a warm RESET of the microcontroller is performed.
2.4 Serial Interfaces

2.4.1 RS-232C

All CAN microcontrollers have one on-chip UART peripheral. Only the asynchronous mode is supported by the AT89STK-06 board.

The AT89STK-06 board is supplied with a RS-232 driver/receiver. Only one female DB9 connector assumes the RS-232 connections. A full range of configuration can be set with two Rx lines and two Tx lines.

Figure 2-4. RS-232 DB9 Connections

Figure 2-5. Typical PC Connection Lay-out

<table>
<thead>
<tr>
<th>AT89C51CC0x / RS-232 DB9</th>
<th>Pin Nb</th>
<th>Function</th>
<th>AT89C51CC0x / RS-232 DB9</th>
<th>Pin Nb</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>TxD (AT89C51CC0x)</td>
<td>2</td>
<td></td>
<td>TxD (PC)</td>
<td>2</td>
<td>RxD (PC)</td>
</tr>
<tr>
<td>RxD (AT89C51CC0x)</td>
<td>3</td>
<td></td>
<td>TxD (PC)</td>
<td>3</td>
<td>RxD (PC)</td>
</tr>
<tr>
<td>Gnd</td>
<td>5</td>
<td></td>
<td>Gnd</td>
<td>5</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

Figure 2-6. RS-232 DB9
Hardware Description

2.4.2 CAN

The microcontroller is a microcontroller with an on-chip full-CAN controller.

The AT89STK-06 board is supplied with an Atmel CAN transceiver (ATA6660). A female DB9 connector assumes the CAN bus connections.

**Figure 2-7.** CAN DB9 Connections

If a network termination is needed, JP3 switch inserts a 120Ω resistor between CAN-H and CAN-L.

A red LED indicates a TxCAN traffic, a green one indicates a RxCAN traffic.

**Figure 2-8.** CAN LEDs

2.4.3 SPI

The AT89C51CC03 in PLCC52 is a microcontroller with an on-chip full duplex SPI interface, master or slave.

A 6-pin male connector assumes the SPI bus connections. The SPI 6-pin connector also provides to the user Vcc and Gnd.

**Figure 2-9.** SPI 6-pin Connections
2.5 Board Settings

The AT89STK-06 board has two types of settings:

- Jumpers
- Solder strap
- Test points

Table 2-1, Table 2-2 and Table 2-3 provide an overview of the available settings and test points.

2.5.1 Jumpers

Table 2-1. Default Jumper Setting

<table>
<thead>
<tr>
<th>Reference</th>
<th>PCB Name</th>
<th>Comments (guidelines)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP1</td>
<td>EA</td>
<td>ON: allows external execution&lt;br&gt;OFF: Internal code execution</td>
<td>Open (OFF)</td>
</tr>
<tr>
<td>JP2</td>
<td>MUTE</td>
<td>ON: Enable C51 generic extension board (optional) buzzer&lt;br&gt;OFF: Disable C51 generic extension board (optional) buzzer</td>
<td>Open (OFF)</td>
</tr>
<tr>
<td>JP3</td>
<td>CANRes</td>
<td>ON: Enable CAN terminator resistor&lt;br&gt;OFF: Disable CAN terminator resistor</td>
<td>Open (OFF)</td>
</tr>
<tr>
<td>JP4</td>
<td>RTS</td>
<td>ON: Enable RTS line to control ISP mode (for AutoISP mode)&lt;br&gt;OFF: Disable RTS line to control ISP mode</td>
<td>Open (OFF)</td>
</tr>
<tr>
<td>JP5</td>
<td>DTR</td>
<td>ON: Enable DTR line to drive MCU reset (for AutoISP mode)&lt;br&gt;OFF: Disable DTR line to drive MCU reset</td>
<td>Open (OFF)</td>
</tr>
<tr>
<td>JP6</td>
<td>Batt</td>
<td>ON: Enable Battery charge&lt;br&gt;OFF: Disable Battery charge</td>
<td>Open (OFF)</td>
</tr>
</tbody>
</table>

![Figure 2-10. Jumper Setting Definition](image)

strap

jumper header

ON or Ex: 1-2

OFF
**2.5.2 Solder straps**

Solder straps allow to modify the board configuration for specific usage such as T89C51CC02 compatibility.

---

**Table 2-2. Table of Solder Strap**

<table>
<thead>
<tr>
<th>Reference</th>
<th>PCB Name</th>
<th>Comments (guidelines)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1</td>
<td>CC02 &amp; C5115 mode</td>
<td>For T89C51CC02 usage, allows to redirect the ISP signal to P1.0, for hardware conditions.</td>
<td>Open</td>
</tr>
<tr>
<td>SP2</td>
<td>X2_44</td>
<td>Connect PLCC44 Xtal2 to XTAL2 of the generic extension board (optionnal)</td>
<td>Open</td>
</tr>
<tr>
<td>SP3</td>
<td>X2_52</td>
<td>Connect PLCC52 Xtal2 to XTAL2 of the generic extension board (optionnal)</td>
<td>Open</td>
</tr>
</tbody>
</table>

---

**2.5.2.1 T89C51CC02/T89C5115 Support (SP1)**

When using T89C51CC02 or T89C5115 products with the AT89STK-06 board (see "PLCC adapter for T89C51CC02 user guide: CANADAPT28), the SP1 solder pad should be closed to ensure correct hardware conditions setting on P1.0 port.

SP1 solder pad connects ISP push button to P1.0 microcontroller port and the CANADAPT28 adapter should be inserted in U2 (PLCC44) socket.

---

**Figure 2-11. Solder Strap definition**

---

**Figure 2-12. AT89STK-06 Board with CANADAPT28**
2.5.3 Test Points

Test points are used to check the internal power supply for AT89STK-06 Board.

**Table 2-3. Table of Test Points**

<table>
<thead>
<tr>
<th>Reference</th>
<th>PCB Name</th>
<th>Comments (guidelines)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>Vref</td>
<td>Vref for ADC</td>
</tr>
<tr>
<td>TP2</td>
<td>Vpot</td>
<td>Test point for Potentiometer voltage</td>
</tr>
<tr>
<td>TP3</td>
<td>Vtemp</td>
<td>Test point for Thermal resistor voltage</td>
</tr>
<tr>
<td>TP4</td>
<td>Vcc</td>
<td>Test point for Vcc</td>
</tr>
<tr>
<td>TP5</td>
<td>GND</td>
<td>Test point for GND</td>
</tr>
</tbody>
</table>
Section 3

Device Programming

3.1 In-System Programming

The on-chip memories and configuration bytes of the AT89C51CC0x parts can be programmed using the ISP mode of the device.

3.1.1 Manual ISP Mode

3.1.1.1 Board Configuration

To use ISP mode, the board should be configured as follow:

- POWER switch (SW1) on "ON" position
- EA jumper should be open (internal code execution only).
- Before using ISP mode for T89C51CC02 or T89C5115 device, be sure to close SP1 solder pad (See Section "T89C51CC02/T89C5115 Support (SP1)", page 8).

3.1.1.2 Operating Mode

To enter in ISP mode, press both the RESET (SW5) and ISP (SW4) buttons simultaneously. First release the RESET button and then the ISP button. The device enters in ISP mode.

3.1.2 Auto ISP Mode

The Auto ISP is available only for parts with UART bootloader (-UA devices). It allows the host PC application (Atmel FLIP software for example) to control the hardware conditions from the serial lines RTS and DTR.

Thus with the Auto ISP mode, the user does not need to push the ISP and RESET buttons.

3.1.2.1 Board Configuration

To use Auto ISP mode, put the board in the same configuration as ISP mode and also:

- Close RTS (JP4) jumper
- Close DTR (JP5) jumper
Section 4

Appendix A: Board Layout

Figure 4-1. Board Components View Diagram
## Appendix B: Bill of Materials

### Figure 4-2. Bill of Materials Table

<table>
<thead>
<tr>
<th>Item</th>
<th>Code no</th>
<th>Description</th>
<th>Quantity</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>74HC125-SO</td>
<td>74HC125 SO14</td>
<td>1</td>
<td>U6</td>
</tr>
<tr>
<td>2</td>
<td>74HC14-SO</td>
<td>74HC14 SO14</td>
<td>1</td>
<td>U10</td>
</tr>
<tr>
<td>3</td>
<td>AT89C51CC01-SPLC</td>
<td>PLCC44</td>
<td>1</td>
<td>U2</td>
</tr>
<tr>
<td>4</td>
<td>AT89C51CC03-SPLC</td>
<td>PLCC52</td>
<td>1</td>
<td>U1</td>
</tr>
<tr>
<td>5</td>
<td>AT86660-S08</td>
<td>AT86660 CAN TRANSCEIVER SO8 ATMEL</td>
<td>1</td>
<td>U4</td>
</tr>
<tr>
<td>6</td>
<td>MAX202ECSE-SO</td>
<td>MAX202ECSE SO16 MAXIM</td>
<td>2</td>
<td>U5, U7</td>
</tr>
<tr>
<td>7</td>
<td>MAX6129-SOT23-5P</td>
<td>MAX6129 SOT23-5 MAXIM</td>
<td>1</td>
<td>U3</td>
</tr>
<tr>
<td>8</td>
<td>MC78M05CT-TO252</td>
<td>REG MC78M05CT TO252 ON SEMICONDUCT</td>
<td>1</td>
<td>U9</td>
</tr>
<tr>
<td>9</td>
<td>PONT-DF005S</td>
<td>PONT REDRESSEUR DF005S GENERAL SEMI</td>
<td>1</td>
<td>U8</td>
</tr>
<tr>
<td>11</td>
<td>BAR2-24-ESQ124-2</td>
<td>2X24PTS A 2.54 ESQ124-24-T-</td>
<td>2</td>
<td>J1, J2</td>
</tr>
<tr>
<td>12</td>
<td>BARZY-MTA2-54</td>
<td>MALE 2PTS MTA 2.54</td>
<td>1</td>
<td>J5</td>
</tr>
<tr>
<td>13</td>
<td>BAR6Y-MTA2-54-IN</td>
<td>MALE 6PTS MTA 2.54 I</td>
<td>1</td>
<td>J3</td>
</tr>
<tr>
<td>14</td>
<td>JACK-PWR-D2-5</td>
<td>JACK PWR DIAM 2.5MM</td>
<td>1</td>
<td>J4</td>
</tr>
<tr>
<td>15</td>
<td>STR-2CMS-NCC</td>
<td>SOLDER STRAP</td>
<td>3</td>
<td>SP1, SP2, SP3</td>
</tr>
<tr>
<td>16</td>
<td>SW-1K2-09-03201-</td>
<td>SW 1K2 09-03201-02 EOA SE</td>
<td>1</td>
<td>SW1</td>
</tr>
<tr>
<td>17</td>
<td>BAR3</td>
<td>3PTS A 2.54</td>
<td>2</td>
<td>Y1, Y2</td>
</tr>
<tr>
<td>18</td>
<td>DBS09V8G</td>
<td>SUBD FEMALE 90° 9PTS</td>
<td>2</td>
<td>P1, P2</td>
</tr>
<tr>
<td>19</td>
<td>BP-DTSM3</td>
<td>BP CMS DTSM3 APEM</td>
<td>4</td>
<td>SW2, SW3, SW4, SW5</td>
</tr>
<tr>
<td>20</td>
<td>PT1-6</td>
<td>TEST POINT</td>
<td>5</td>
<td>TP1, TP2, TP3, TP4, TP5, TP6</td>
</tr>
<tr>
<td>21</td>
<td>CA-0805-100NF</td>
<td>CAPA CMS 0805 100NF</td>
<td>22</td>
<td>C3, C7, C9, C10, C12, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C29, C32</td>
</tr>
<tr>
<td>22</td>
<td>CA-0805-10NF</td>
<td>CAPA CMS 0805 10NF</td>
<td>1</td>
<td>C11</td>
</tr>
<tr>
<td>23</td>
<td>CA-0805-1UF</td>
<td>CAPA CMS 080510523VAC KEMET</td>
<td>1</td>
<td>C31</td>
</tr>
<tr>
<td>24</td>
<td>CA-0805-22NF</td>
<td>CAPA CMS 0805 22NF</td>
<td>2</td>
<td>C5, C8</td>
</tr>
<tr>
<td>25</td>
<td>CA-0805-22PF</td>
<td>CAPA CMS 0805 22PF</td>
<td>4</td>
<td>C1, C2, C4, C6</td>
</tr>
<tr>
<td>26</td>
<td>CO-VS-B-4.7UF</td>
<td>CAPA VS-B 4.7UF 35V PANASONIC</td>
<td>2</td>
<td>C28, C30</td>
</tr>
<tr>
<td>27</td>
<td>DIO-MRA4007-SMA</td>
<td>DIODE RECTIF. MRA4007 SMA ON</td>
<td>1</td>
<td>D7</td>
</tr>
<tr>
<td>28</td>
<td>LED-LPM670-G</td>
<td>MINI TOPELED VERTE LPM670-G OSRAM</td>
<td>3</td>
<td>D1, D4, D5</td>
</tr>
<tr>
<td>29</td>
<td>LED-LSM676</td>
<td>HYPER MINI TOPELED SUPER-RED LSM676</td>
<td>4</td>
<td>D2, D3, D6, D8</td>
</tr>
</tbody>
</table>
Appendix C: Board Schematics

Figure 4-3. AT89STK-06 Board Schematics (1 of 4)
Figure 4-4. AT89STK-06 Board Schematics (2 of 4)
Figure 4-5. AT89STK-06 Board Schematics (3 of 4)
Figure 4-6. AT89STK-06 Board Schematics (4 of 4)
## Appendix D: Default Configuration

### Table 1. Default Configuration

<table>
<thead>
<tr>
<th>Reference</th>
<th>Name</th>
<th>Function</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1</td>
<td>CC02 mode</td>
<td>For T89C51CC02/T89C5115 usage, allow to redirect the ISP signal to P1.0, for hardware conditions.</td>
<td>Open</td>
</tr>
<tr>
<td>SP2</td>
<td>X2_44</td>
<td>Connect PLCC44 Xtal2 to XTAL2 of the generic extension board</td>
<td>Open</td>
</tr>
<tr>
<td>SP3</td>
<td>X2_52</td>
<td>Connect PLCC52 Xtal2 to XTAL2 of the generic extension board</td>
<td>Open</td>
</tr>
</tbody>
</table>
| JP1       | EA       | ON : allows external execution  
OFF: Internal code execution                                              | Open (OFF)       |
| JP2       | MUTE     | ON : Enable C51 generic extension board buzzer  
OFF: Disable C51 generic extension board buzzer                            | Open (OFF)       |
| JP3       | CANRes   | ON : Enable CAN terminator resistor  
OFF: Disable CAN terminator resistor                                       | Open (OFF)       |
| JP4       | RTS      | ON : Enable RTS line to control ISP mode  
OFF: Disable RTS line to control ISP mode                                   | Open (OFF)       |
| JP5       | DTR      | ON : Enable DTR line to drive MCU reset  
OFF: Disable DTR line to drive MCU reset                                    | Open (OFF)       |
| JP6       | Batt     | ON : Enable Battery charge  
OFF: Disable Battery charge                                                  | Open (OFF)       |
Appendix E: References/Acronyms

4.1 References

- AT89C51CC03, T89C51CC02, T89C51CC01, T89C5115, AT89C51AC3, T89C51AC2 Product Datasheets*

4.2 Acronyms

- API: Application Programming Interface
- FLIP: FLexible In-system Programming
- HPC: High Pin Count microcontroller (by opposition to LPC)
- ISP: In-System Programming
- LPC: Low Pin Count microcontroller