



Low-cost host-target interface

Datasheet – preliminary data

Features

- Supports connection to a single ST40 or ARM core in compatible ST SoCs (the supported core depends on the version of the STMCLite ordered)
- USB Type B connection to host computer
- JTAG connection to target
 - STMCLite-TypeA (MB938) supports ST Micro Connect Type A and Type J pinouts
 - STMCLite-TypeH (MB941) supports ST Micro Connect Type H and Type J pinouts
- Connects to a target's RS-232 port for data relay
- Provides system startup, program download, debug and I/O services
- Support for Windows XP, Windows 7 32-bit and Red Hat Linux hosts

Description

The ST Micro Connect Lite (STMCLite) is a low-cost host-target interface for connecting to a single ST40 or ARM core in a range of ST system-on-chip (SoC) devices.

It is connected to a local host using the USB 2.0 connector (USB 1.1 compatible).

The STMCLite connects to a target development board's JTAG connector and provides host software with the ability to start up the target board, download programs and debug them in the target.

The ST Micro Connection Package is the software required to use the STMCLite. It is available from your ST FAE or ST support center and provides software utilities and drivers, including example ST TargetPacks for ST development boards.

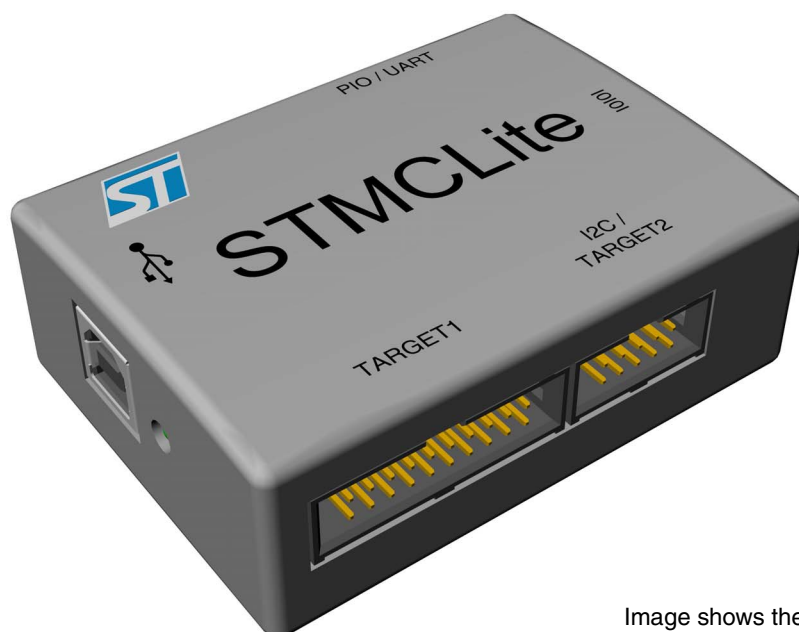


Image shows the STMCLite-TypeA

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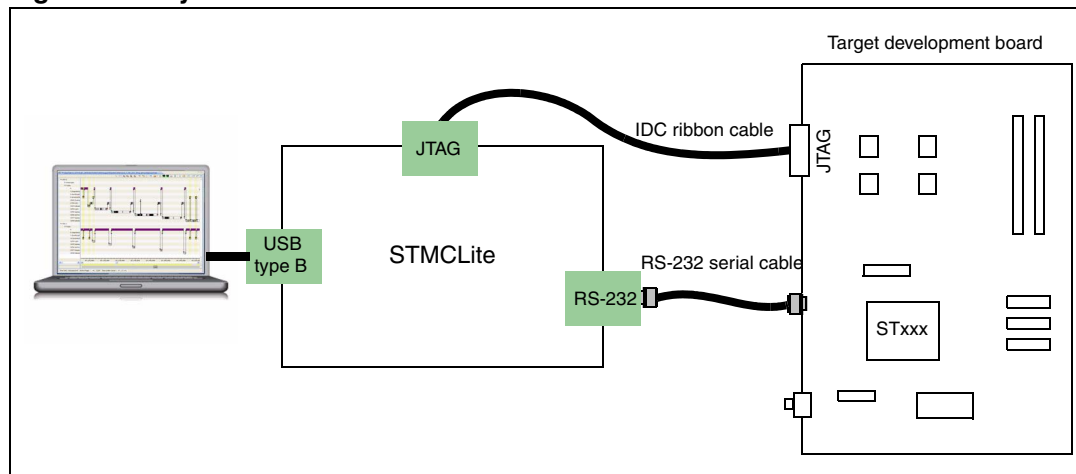
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1 Introduction

The ST Micro Connect Lite (STMCLite) is a low-cost host-target interface for a single ST40 core (order code STMCLite-TypeA) or a single ARM core (order code STMCLite-TypeH) in compatible ST SoCs^(a). It enables Windows or Linux hosts to connect to one or two target development boards with debug support.

Figure 1 shows how the STMCLite is used in a system.

Figure 1. System overview



The STMCLite is connected to the host by plugging it into a USB port. Both USB 1.1 and 2.0 are supported. The STMCLite is powered through the USB connection. The power LED adjacent to the USB connector illuminates when the STMCLite has power.

Connection to the development board is through a JTAG connector. The connector used depends on the type of connector present on the development board. See *ST system-on-chip (SoC) debug interfaces technical note* (8339250) for information about the different types of connector.

- For boards using a Type A pinout, an STMCLite-TypeA must be used. The 20-way IDC to 20-way IDC cable is used to connect between the Target1 JTAG connector (see [Section A.4 on page 15](#)) and the JTAG port on the board.
- For boards using a Type H pinout, an STMCLite-TypeH must be used. The 34-way 1.27 mm pitch IDC to 34-way 1.27 mm pitch IDC cable is used to connect between the Target1 JTAG connector (see [Section A.5 on page 16](#)) and the JTAG port on the board.
- For boards using a Type J pinout, either STMCLite can be used. The 10-way IDC to 10-way IDC cable is used to connect between the I²C/Target2 JTAG connector (see [Section A.6 on page 17](#)) and the JTAG port on the board.

An RS-232 serial port connector is provided for connection to the development board. This enables serial data to be relayed between the target and the host through the STMCLite. A terminal emulation program can be run on the host to receive serial data and for the user to transmit serial data. See [Chapter 3: Serial port connection on page 9](#) for further information.

[Appendix A: Connectors on page 11](#) provides detailed information about the physical connectors on the STMCLite.

a. Contact your ST FAE or ST support centre for the list of ST SoCs compatible with the STMCLite.

1.1 ST Micro Connection Package

The ST Micro Connection Package is the software required by the STMCLite. It supports a number of ST Micro Connect products. For the STMCLite, the ST Micro Connection Package provides:

- libraries and drivers
- a host tool, **romgen**, that generates initialization code from ST TargetPacks for use by “boot from ROM” bootstraps^(b)
- example ST TargetPacks for some ST development boards^(c)
- documentation that includes:
 - this *ST Micro Connect Lite Datasheet*
 - *ST TargetPack User manual* (8020851)
 - *Developing with an ST Micro Connect and ST TargetPacks* (8174498)
 - *ST system-on-chip (SoC) debug interfaces technical note* (8339250)

ST TargetPacks are a unified way of describing target systems and preparing them for downloading and debugging applications over a JTAG interface. ST TargetPacks are also used to generate the code to initialize targets by boot from ROM bootstraps. ST TargetPacks are available for a range of STMicroelectronics SoCs and development boards. A number of example ST TargetPacks are supplied with the ST Micro Connection Package^(c).

To find out whether a new ST Micro Connection Package is available and how to get it, please contact your ST FAE or ST support centre.

1.1.1 Environment variables

A number of environment variables must be set on the host in order for the ST Micro Connection Package to function correctly.

Locale

The ST Micro Connection Package uses American English. If you encounter problems, set a compatible locale on your system by performing the following steps:

- Linux hosts:
 - To set the environment variable `LANG` to use American English and the UTF-8 Unicode standard, enter:

<code>setenv LANG en_US.utf-8</code>	on csh compatible shells
<code>export LANG=en_US.utf-8</code>	on POSIX compatible shells
 - To set all locale environment variables (those prefixed with `LC_`) to use American English and the UTF-8 Unicode standard, enter:

<code>setenv LC_ALL en_US.utf-8</code>	on csh compatible shells
<code>export LC_ALL=en_US.utf-8</code>	on POSIX compatible shells

b. For STMCLite, **romgen** can only be used **without** connecting to the target, this is described in the *ST TargetPack User manual* (8020851).

c. Contact your ST FAE or ST support centre for the latest ST TargetPacks to be used with your ST development board.

- Windows XP hosts:
 1. From the Windows **start** menu, open the **Control Panel**.
 2. Click on **Regional and Language Options** to display the **Regional and Language Options** window.
 3. In the **Regional Options** tab, select **English (United States)** from the drop-down menu.
 4. In the **Languages** tab, click on **Details....** The **Text Services and Input Languages** window is displayed.
 5. In the **Settings** tab, select the option **English (United States)** from the **Default input language** drop-down menu.
 6. Click on **OK**.
 7. In the **Regional and Language Options** window, click on **OK**.
- Windows 7 32-bit hosts:
 1. From the Windows **Start** menu, open the **Control Panel**.
 2. Click on **Region and Language** to display the **Regional and Language Options/Region and Language** window.
 3. In the **Formats** tab, select **English (United States)** from the drop-down menu.
 4. In the **Keyboards and Languages** tab, click on **Change keyboards....** The **Text Services and Input Languages** window is displayed.
 5. In the **General** tab, select the option **English (United States)** from the **Default input language** drop-down menu.
 6. Click on **OK**.
 7. In the **Regional and Language Options/Region and Language** window, click on **OK**.

PATH environment variable

For all hosts include the absolute path to the `bin` subdirectory of the ST Micro Connection Package in the `PATH` environment variable.

Note: On Windows, the ST Micro Connection Package installer sets up the `PATH`, unless this option is de-selected.

LD_LIBRARY_PATH environment variable

On Linux hosts, include the absolute path to the `lib` directory of the ST Micro Connection Package in the `LD_LIBRARY_PATH` environment variable.

STMCLITE_ENABLE_USB_RESET environment variable

On Linux hosts running older versions of the Linux operating system, it is necessary to set the `STMCLITE_ENABLE_USB_RESET` environment variable to 1 in order to workaround interoperability issues with the STMCLite software supplied with the ST Micro Connection Package and these older versions of the Linux operating system.

If this workaround is required (see [Table 1](#)) then only one STMCLite device can be in use at any time; if an attempt is made to use multiple STMCLite devices simultaneously then unpredictable results will occur.

[Table 1](#) lists the versions of the Linux operating system known to require the `STMCLITE_ENABLE_USB_RESET` environment variable to be set to 1 in order for the

STMCLite software to function correctly. [Table 1](#) also lists the versions of the Linux operating system which are known to not require the workaround.

Table 1. STMCLite workaround required

Operating system	Workaround required
Red Hat Enterprise Linux 5	Yes
Fedora 6	Yes
Fedora 7 to Fedora 12	Untested
Fedora 13	No
Fedora 14 to 17	Untested

Note: The list of Linux operating system versions in [Table 1](#) is not exhaustive. If an STMCLite is being using on a version of the Linux operating system not listed in [Table 1](#) and the STMCLite software is not functioning correctly then try setting the `STMCLITE_ENABLE_USB_RESET` environment variable to 1. If problems persist then please contact your ST FAE or ST support centre for assistance.

1.1.2 Software installation

The ST Micro Connection Package software must be installed before connecting an STMCLite to your host computer.

Installation of the STMCLite USB drivers is described in [Chapter 2: USB driver installation on page 7](#).

1.2 System interface

The STMCLite-TypeA can operate in conjunction with the following STMicroelectronics software products:

- ST40 Micro Toolset R5.1.0 and later
- ST40 STLinux 2.4 and later

The STMCLite-TypeH can operate in conjunction with the ARM STLinux 2.4 and later.

For details of the latest product availability please contact your ST FAE or ST support centre.

1.3 Terminology

The original ST Micro Connect product was named the **ST Micro Connect**. With the introduction of the ST Micro Connect 2 and the ST Micro Connect Lite, the original product is now known as the ST Micro Connect 1 and the generic term ST Micro Connect refers to the family of ST Micro Connect devices. In some instances these names are abbreviated to STMC, STMC1, STMC2 and STMCLite as described in [Appendix C: Glossary on page 21](#).

2 USB driver installation

The ST Micro Connect Lite (STMCLite) and the ST Micro Connection Package are compatible with the following operating systems:

- Windows XP
- Windows 7 32-bit
- Red Hat Enterprise Linux 5 or later
- Fedora 6 or later

Limitations

Multiple STMCLites can be connected to the same Windows host and be used simultaneously. However, there are some limitations when using multiple STMCLites with Linux hosts depending on the version of the operating system. With older versions of the Linux operating system it is not possible to simultaneously use multiple STMCLites connected to the same Linux host. This capability is only available with more recent versions of the Linux operating system.

In order to function correctly with older versions of the Linux operating system, it may be necessary to set the environment variable `STMCLITE_ENABLE_USB_RESET` to 1. This variable provides a workaround for the interoperability issues between the STMCLite and older versions of the Linux operating system. See [STMCLITE_ENABLE_USB_RESET environment variable on page 5](#) for further details.

2.1 Windows installation

When the ST Micro Connection Package is installed on Windows, the STMCLite USB drivers are also installed. If the driver installation is cancelled, they must be manually installed before connecting to an STMCLite, see [Section 2.1.3: Manual driver installation](#).

When an STMCLite is connected to the host for the first time, Windows configures the USB drivers for the STMCLite. This process varies depending on the Windows version, see [Section 2.1.1: Windows XP](#) and [Section 2.1.2: Windows 7 32-bit](#).

The STMCLite is a USB composite device which Windows views as a collection of USB devices. When an STMCLite is connected, the following STMCLite devices will be installed:

- ST Micro Connect Lite A
- ST Micro Connect Lite B
- ST Micro Connect Lite C
- ST Micro Connect Lite D
- STMCLite Serial Port
- STMCLite Serial Port

2.1.1 Windows XP

On Windows XP, when connecting an STMCLite to the host for the first time, proceed through the **Found New Hardware Wizard** as follows for each ST Micro Connect Lite device and for each STMCLite Serial Port device:

1. If the **Found New Hardware Wizard** presents the question **Can Windows connect to Windows Update to search for software?**, select **No, not at this time** and click on **Next**.
2. Accept the default option of **Install the software automatically (Recommended)** and click on **Next**.
3. In the **Hardware Installation** warning dialog box, click on **Continue Anyway**.
4. Click on **Finish** to complete the installation.

2.1.2 Windows 7 32-bit

The installation process for the STMCLite devices on Windows 7 32-bit is automatic.

2.1.3 Manual driver installation

If the STMCLite drivers are not installed during the installation of the ST Micro Connection Package, they can be manually installed by running the `DPInstx86.exe` driver installer tool in the `drivers/stmclite` directory and following the on-screen instructions.

Note: During the installation process a warning dialog box may be displayed stating that the driver is not signed and offering the options to either stop or continue with the driver installation. This is expected and the option to continue should be selected.

2.2 Linux installation

The installation of an STMCLite device on a Linux host is handled automatically by the operating system.

*Note: The Linux installer for the ST Micro Connection Package creates a rules file for the STMCLite (`99-stmclite.rules`) in the `/etc/udev/rules.d` directory that configures the **udev** dynamic device manager (see `udev(7)`) to create devices for the STMCLite (in `/dev/bus/usb`) with global read/write permissions (mode `0666`). This allows the STMCLite devices to be accessed by any user without requiring any special privilege.*

3 Serial port connection

The ST Micro Connect Lite (STMCLite) can relay the RS-232 serial port input and output from a target board to a terminal emulation program running on the host. Characters typed in the terminal emulation program are sent to the target's serial port. Characters received from the target's serial port are echoed in the terminal emulation program on the host. The serial port communication is carried over the same USB connection that is used for the debug connection with the target board.

Note: Currently the ST Micro Connection Package only supports Windows and Fedora 14 (and later) hosts for relay of data from the target's serial port using the STMCLite. Please contact your ST FAE or ST support center for information on STMCLite serial port support on other Linux hosts.

The sequence of actions that must be carried out are:

1. Connect the target board to the STMCLite RS-232 connector. The RS-232 connector is described in [Section A.7 on page 18](#).
2. Start a terminal emulation program on the host and connect to the communications port attached to the STMCLite.

On Windows, the communications (COM) ports connected to the STMCLite can be determined using the **Device Manager**:

1. In the **Control Panel**, select **Administrative Tools > Computer Management** (Windows XP) or **Device Manager** (Windows 7).
2. In the **Device Manager**, expand the **Ports (COM & LPT)** category.

The COM ports connected to the STMCLite are displayed with the device name **STMCLite Serial Port**.

There are two COM ports instantiated when an STMCLite is connected to a Windows host. The COM port associated with the RS-232 connector is the lower numbered COM port. For example, if COM ports COM5 and COM6 appear in the **Device Manager** (under the device name of **STMCLite Serial Port**) when the STMCLite is connected, then COM5 is the COM port associated with the RS-232 connector (and COM6 is associated with the PIO UART connector, see [Section A.8 on page 19](#)).

Note: The COM ports are allocated sequentially for each new STMCLite connected to the Windows host and COM ports previously allocated to another STMCLite will not be reused (even if not connected to the Windows host at the time a new STMCLite is installed).

4 Device identification

The STMCLite has the following USB vendor identifier (VID) and product identifier (PID) codes:

VID = 0x0483 (STMicroelectronics)
PID = 0x3747 (ST Micro Connect Lite)

The product identification string is **ST Micro Connect Lite**.

On a Windows host, the product identification string is the name reported by Windows when the STMCLite is installed. The product identification string is also displayed in the **Device Manager**:

1. In the **Control Panel**, select **Administrative Tools > Computer Management** (Windows XP) or **Device Manager** (Windows 7).
2. In the **Device Manager**, expand the **Universal Serial Bus controllers** category.

The serial number for the STMCLite takes the form **STMCLT`code`**, where *code* is a decimal number. Every STMCLite has a unique serial number printed on the label on the base of the STMCLite.

Appendix A Connectors

[Section A.1: STMCLite-TypeA connectors](#) and [Section A.2: STMCLite-TypeH connectors](#) describe the layout of the connectors on each STMCLite variant. The remaining sections in this appendix provide details of each connector.

A.1 STMCLite-TypeA connectors

The connector placements on the STMCLite-TypeA are shown in [Figure 2](#) and listed in [Table 2](#).

Figure 2. STMCLite-TypeA connector layout

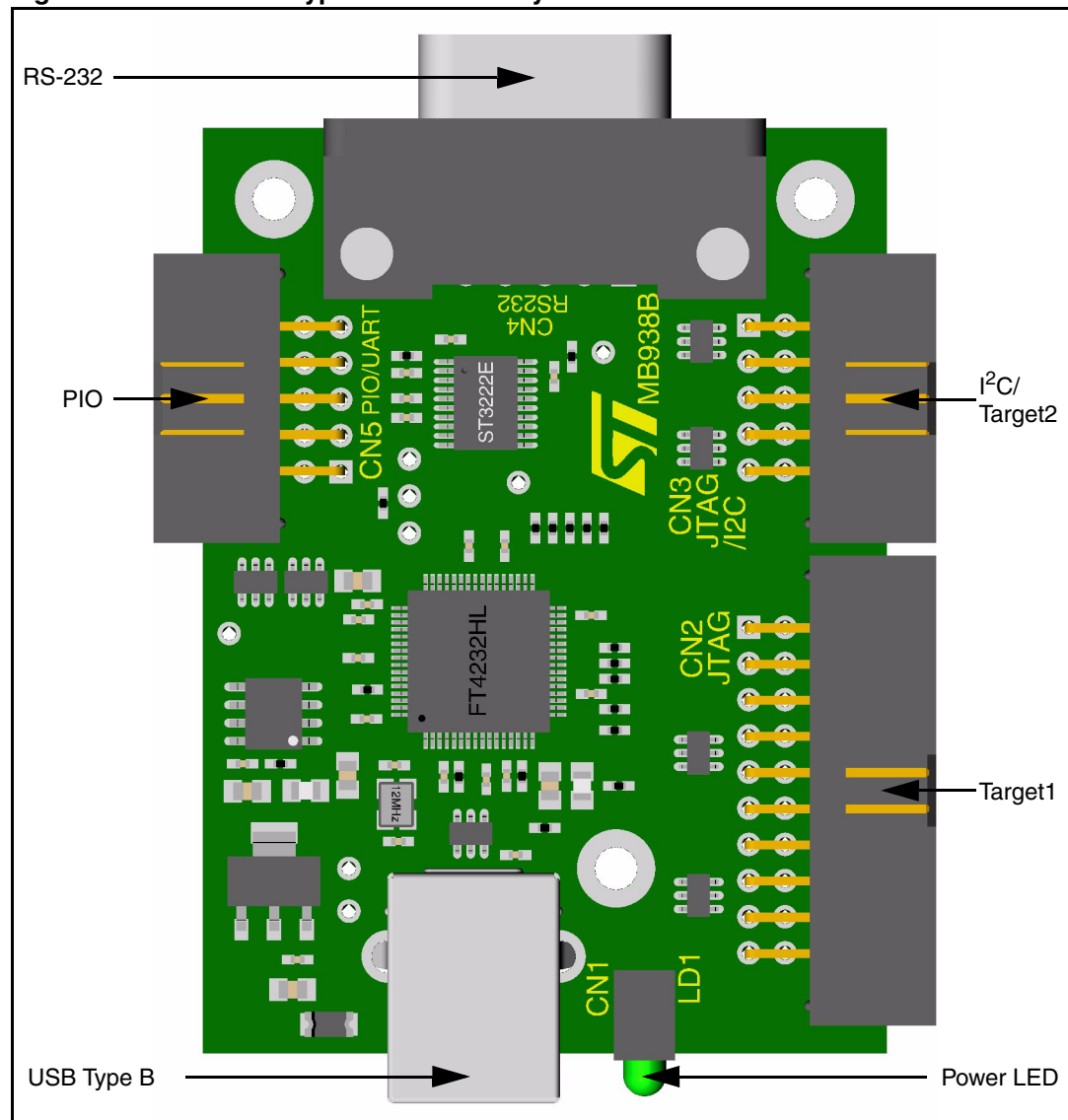


Table 2. STMCLite-TypeA connectors

Type of connector	Connector number	Reference
USB Type B connector	CN1	Section A.3 on page 14
Target1 JTAG connector	CN2	Section A.4 on page 15
I ² C/Target2 JTAG connector	CN3	Section A.6 on page 17
RS-232 connector	CN4	Section A.7 on page 18
PIO UART connector	CN5	Section A.8 on page 19

A.2 STMCLite-TypeH connectors

The connector placements on the STMCLite-TypeH are shown in [Figure 3](#) and listed in [Table 3](#).

Figure 3. STMCLite-TypeH connector layout

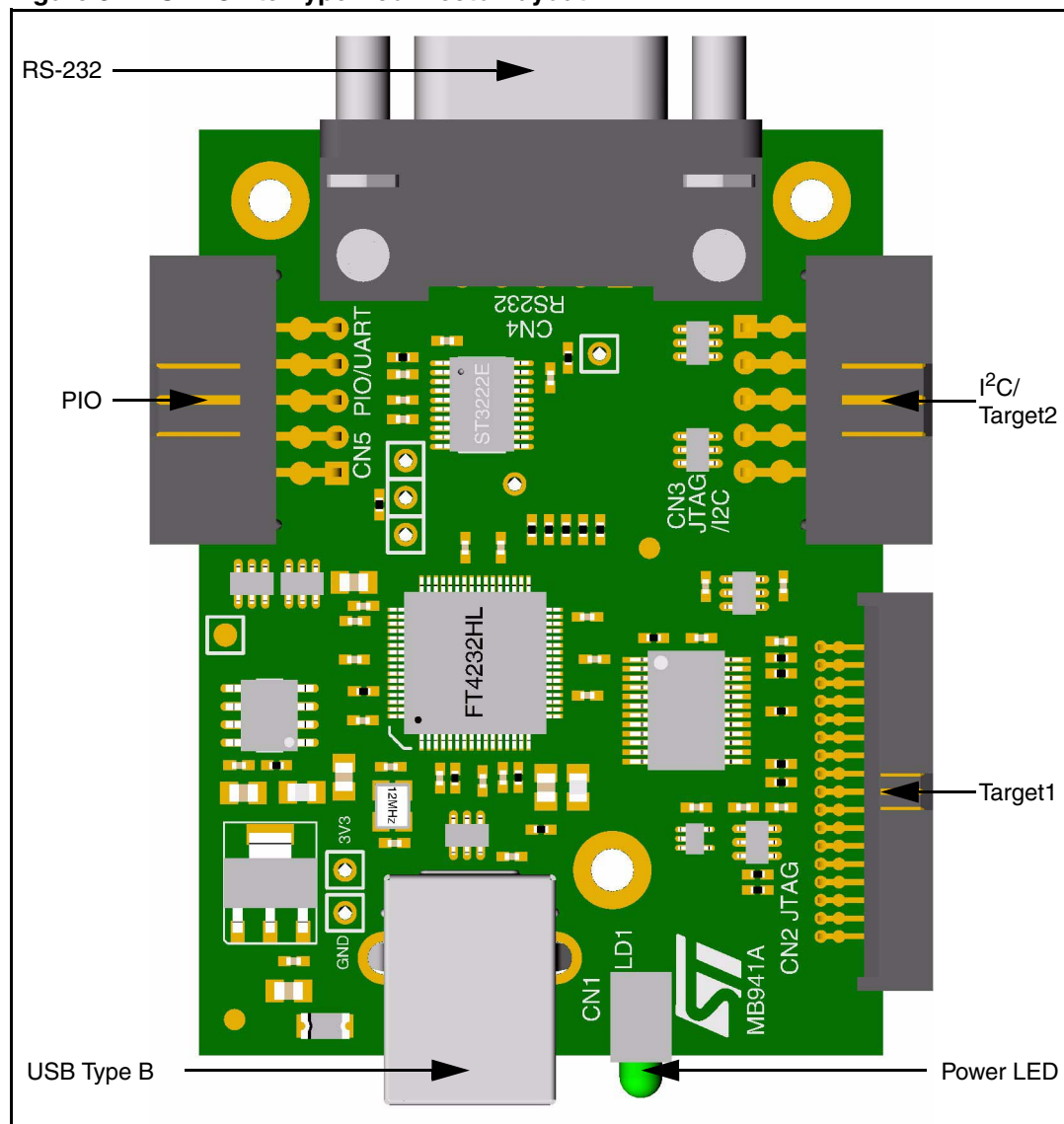


Table 3. STMCLite-TypeH connectors

Type of connector	Connector number	Reference
USB Type B connector	CN1	Section A.3 on page 14
Target1 JTAG connector	CN2	Section A.5 on page 16
I²C/Target2 JTAG connector	CN3	Section A.6 on page 17
RS-232 connector	CN4	Section A.7 on page 18
PIO UART connector	CN5	Section A.8 on page 19

A.3 USB Type B connector

This is CN1 on the STMCLite-TypeA and the STMCLite-TypeH.
A standard 4-pin USB Type B connector provides an interface connection for USB 2.0.

Figure 4. USB Type B connector

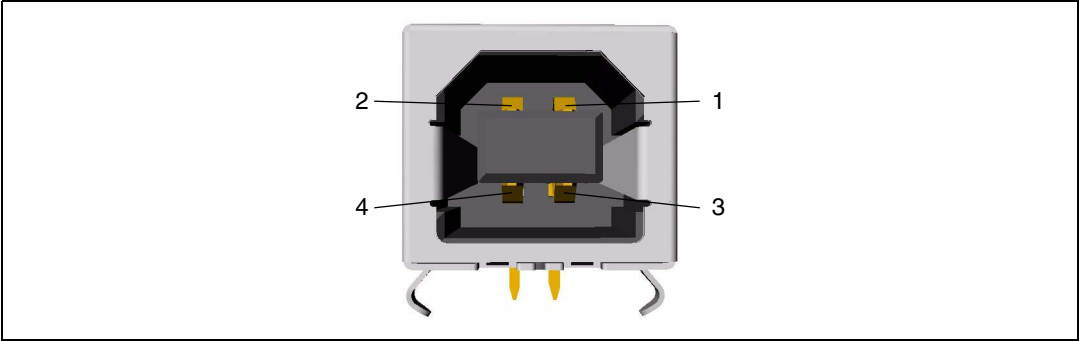


Table 4. USB Type B connector pin allocation

Pin	Description	Signal direction	Pin	Description	Signal direction
1	VBUS	N/A	3	DP	Bi-directional
2	DN	Bi-directional	4	GROUND	N/A

A.4 Target1 JTAG connector

This is CN2 on the STMCLite-TypeA.

A 2 x 10-way connector provides a standard JTAG debug interface. It is used to connect a TTL host interface with the target processor under debug/development. A 20-way IDC to 20-way IDC ribbon cable is provided with the STMCLite-TypeA to use with this connector.

Figure 5. Target1 JTAG debug connector

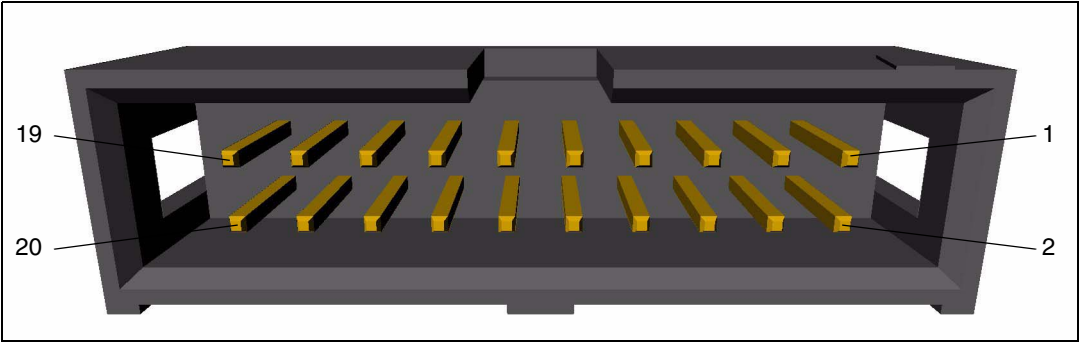


Table 5. Target1 JTAG debug connector pin allocation

Pin	Description	Signal direction	Pin	Description	Signal direction
Even pins	GROUND	N/A	11	TCK	To target board
1	Reserved	N/A	13	TDI	To target board
3			15	TDO	From target board
5	TRIGIN	To target board	17	notSYSRESET	To target board
7	notASEBRK	Bi-directional	19	notTRST	To target board
9	TMS	To target board			

A.5 Target1 MIPI-34 connector

This is CN2 on the STMCLite-TypeH.

A 34-pin connector provides a standard JTAG debug interface. It is used to connect a TTL host interface with the target processor under debug/development. A 34-way 1.27 mm pitch IDC to 34-way 1.27 mm pitch IDC ribbon cable is provided with the STMCLite-TypeH to use with this connector.

Figure 6. MIPI-34 connector

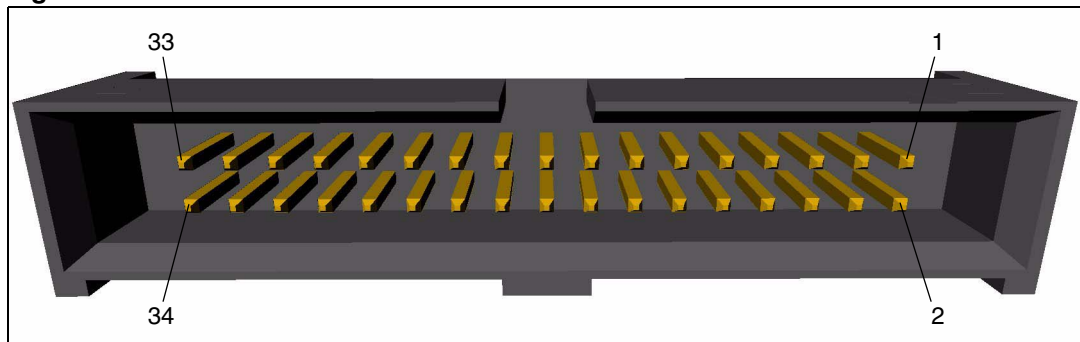


Table 6. MIPI-34 connector pin allocation

Pin	Description	Signal direction	Pin	Description	Signal direction
1	VREF_DEBUG	N/A	2	TMS	To target board
3	GROUND	N/A	4	TCK	To target board
5			6	TDO	From target board
7	NC	N/A	8	TDI	To target board
9			10	notSYSRESET	To target board
11	GROUND	N/A	12	NC	N/A
13			14		
15			16	notTRST	To target board
17			18	TRIGIN	To target board
19			20	TRIGOUT	From target board
21			22	NC	N/A
23			24		
25			26		
27			28		
29			30		
31			32		
33			34		

A.6 I²C/Target2 JTAG connector

This is CN3 on the STMCLite-TypeA and the STMCLite-TypeH.

A 2 x 5-way debug connector provides a JTAG standard debug interface. It is used to connect a TTL host interface with the target processor under debug/development and can also be used to connect an external I²C driver^(d). A 10-way IDC to 10-way IDC ribbon cable is provided with the STMCLite to use with this connector.

Figure 7. I²C/Target2 JTAG connector

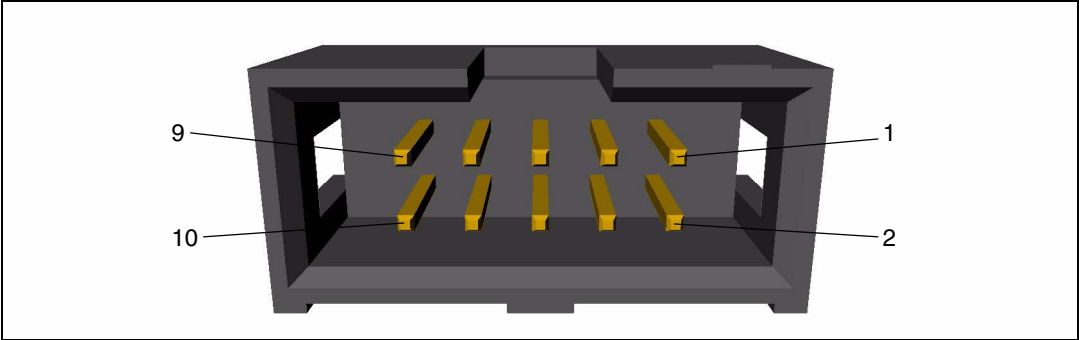


Table 7. I²C/Target2 JTAG connector pin allocation

Pin	Description	Signal direction	Pin	Description	Signal direction
1	TCK2_SCL	To target board	2	notASEBRK2_USR4	Bi-directional
3	TMS2_USR1	To target board	4	GROUND	N/A
5	TDO2_SDAO	From target board	6		
7	TDI2_SDAI	To target board	8		
9	notTRST2_USR2	To target board	10	notSYSRESET2_USR3	To target board

d. I²C connectivity is currently not supported.

A.7 RS-232 connector (Rx/Tx/RTS/CTS)

This is CN4 on the STMCLite-TypeA and the STMCLite-TypeH.
A 9-pin, male D-type RS-232 connector with data and flow control.

Figure 8. RS-232 connector

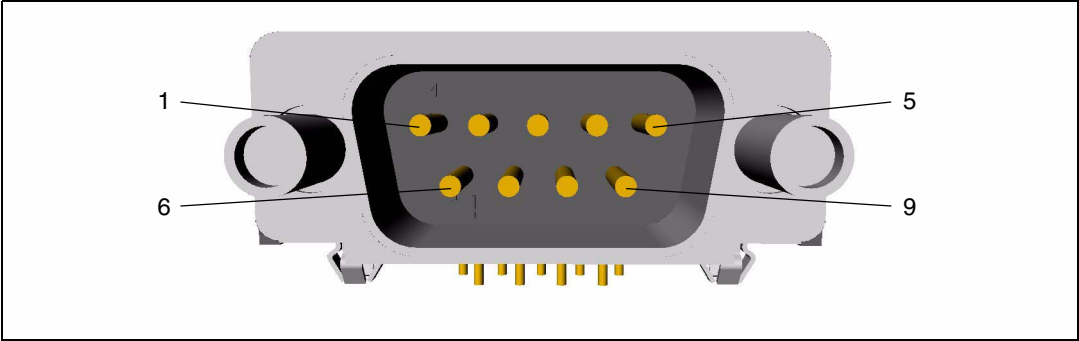


Table 8. RS-232 connector pin allocation

Pin	Description	Pin	Description
1	NC	6	NC
2	RXD	7	notRTS
3	TXD	8	notCTS
4	NC	9	NC
5	GROUND		

A.8 **PIO UART connector**

This is CN5 on the STMCLite-TypeA and the STMCLite-TypeH.
A 2 x 5-way 2.54 mm pitch connector.

Figure 9. TTL PIO connector

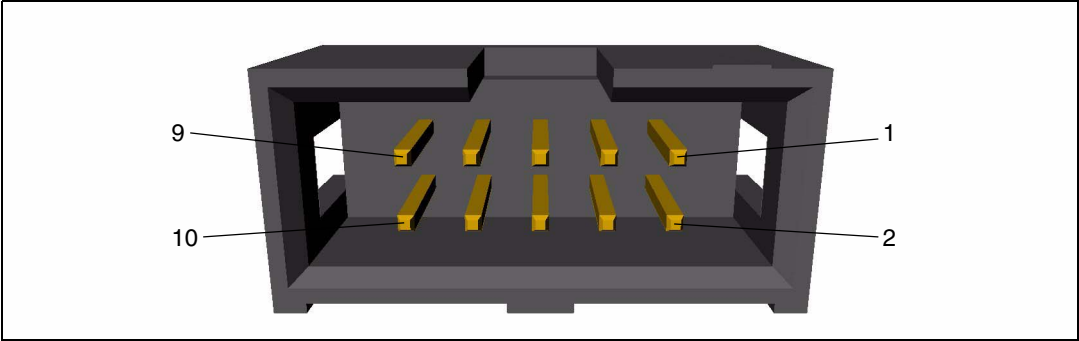


Table 9. TTL PIO connector pin allocation

Pin	Description	Pin	Description
1	TTLnotCTS	2	TTLnotDTR
3	TTLnotRTS	4	TTLnotDSR
5	TTLRXD	6	TTLnotDCD
7	TTLTXD	8	TTLnotRI_notTXDEN
9	GROUND	10	GROUND

Appendix B Ordering information

Table 10. Device summary

Order code	Description
STMCLite-TypeA	ST Micro Connect Lite low-cost host-target interface with a Type A and a Type J interface.
STMCLite-TypeH	ST Micro Connect Lite low-cost host-target interface with a Type H and a Type J interface.

Appendix C Glossary

I ² C	Inter-integrated circuit
IDC	Insulation-displacement connector
SoC	System-on-chip
STMC	The family of ST Micro Connect devices
STMC1	The first ST Micro Connect product, previously known as ST Micro Connect; it is now known as the ST Micro Connect 1
STMC2	ST Micro Connect 2
STMCLite	ST Micro Connect Lite
UART	Universal asynchronous receiver-transmitter
USB	Universal serial bus

Revision history

Table 11. Document revision history

Date	Revision	Changes
06-Oct-2010	A	Initial release.
10-Nov-2010	B	Moved some material from appendices to form Chapter 4: Device identification on page 10 . Updated description of pins 1, 3, 5 in Table 5 on page 15 . Clarified purpose of Table 5 and Table 7 on page 17 . Added footnote to Section A.6 on page 17 .
17-Nov-2011	3	Removed references to Windows 2000 and Windows Vista. Updated Section 1.1: ST Micro Connection Package on page 4 to add footnote about romgen use and to update the documentation included in the package. Restructured Appendix A: Connectors on page 11 . Removed Figure 5: Target1 interface wiring from Section A.4: Target1 JTAG connector on page 15 and Figure 7: Target2 interface wiring from Section A.6: I2C/Target2 JTAG connector on page 17 . This information is now found in the <i>ST system-on-chip (SoC) debug interfaces technical note</i> (8339250).
06-Dec-2011	4	Corrected reference to the <i>ST system-on-chip (SoC) debug interfaces technical note</i> (8339250) in Section 1.1: ST Micro Connection Package on page 4 .
15-Oct-2012	5	Added details of the STMCLite-TypeH. Section 4.1: Identification with the ST40 Micro Toolset and ST40 STLinux has been moved to the relevant toolset documentation.

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