

Introduction

This manual is intended to complement the **ST7-EMU3** emulator user manual. It contains information that is specific to the ST7MDT40-EMU3 probe.

Your ST7MDT40-EMU3 probe is the component of the ST7-EMU3 emulator kit that contains target-emulating hardware. It connects to your PC via the ST Micro Connect box and it can connect to your application board in place of a microcontroller in the ST7234x family.

The EMU3 probe's target emulation board (TEB) contains the hardware that allows you to emulate a specific MCU or family of MCUs.

Table 1. MCUs emulated by the ST7MDT40-EMU3 emulator

RPN	CPN	Supported MCUs	Supported packages
ST7-EMU3	ST7MDT40-EMU3	ST7234x	LQFP32 (7 x 7) LQFP44 (10 x 10) LQFP48 (7 x 7)

About the user manuals

This manual will help you connect your emulator to your application board. Here you will find information about:

- Connecting your probe to your application in place of your microcontroller
- Emulation features

For information about the software and additional hardware intended for use with your emulator, refer to the following documents that are included with your emulator:

- *ST7 Visual Develop User Manual* - build and debug your application software
- *ST7-EMU3 Emulator User Manual* - set up instructions for your EMU3 emulator
- *ST72340, ST72344, ST72345 Datasheet* - information specific to your ST7 microcontroller

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1 Delivery checklist

The ST7MDT40-EMU3 probe is delivered as part of the ST7MDT40-EMU3 emulator kit. The emulator contains all the components required to connect to your host PC (refer to the delivery check list in your *ST7-EMU3 Emulator User Manual*), as well as the probe and connection accessories listed below.

The ST7MDT40-EMU3 emulator kit includes:

1. The ST7MDT40-EMU3 probe with ports for connection to the ST Micro Connect box, as well as an analyzer input connection (see [Figure 1 on page 4](#)). The ST7MDT40 target emulation board (ref.: DB635), which is already installed in the emulator's probe, has 4 connectors that allow connection to your application board via a flex adapter. These connectors are illustrated in [Figure 6: Identifying the socket for your flex adapter on page 7](#).
2. Connection accessories for the LQFP32 (7 x 7) package (see [Figure 2 on page 4](#)):
 - a) A flex adapter with LQFP32 (7 x 7) connector (ref.: DB522), for connection between the EMU3 probe and the socket on your application board.
 - b) One LQFP32 (7 x 7) socket (Ironwood ref.: SF-QFE32SA-L-01-MF) to solder to your application board.
3. Connection accessories for the LQFP44 (10 x 10) package (see [Figure 3 on page 4](#)):
 - a) A flex adapter with LQFP44 (10 x 10) connector (ref.: DB521), for connection between the EMU3 probe and the socket on your application board.
 - b) One LQFP44 (10 x 10) socket (Yamaichi ref.: IC/49-044-052-B5) to solder to your application board.
 - c) One LQFP44 (10 x 10) socket cover.
4. Connection accessories for the LQFP48 (7 x 7) package (see [Figure 4 on page 5](#)):
 - a) A flex adapter (ref.:DB720).
 - b) One LQFP48 (7 x 7) device adapter (ref.: DB718) for connecting between the flex adapter and the socket on the application board.
 - c) One LQFP48 (7 x 7) socket (CAB ref.: 3303238) to solder on your application board.
 - d) One LQFP48 socket cover.

Figure 1. ST7MDT40-EMU3 probe (not to scale)

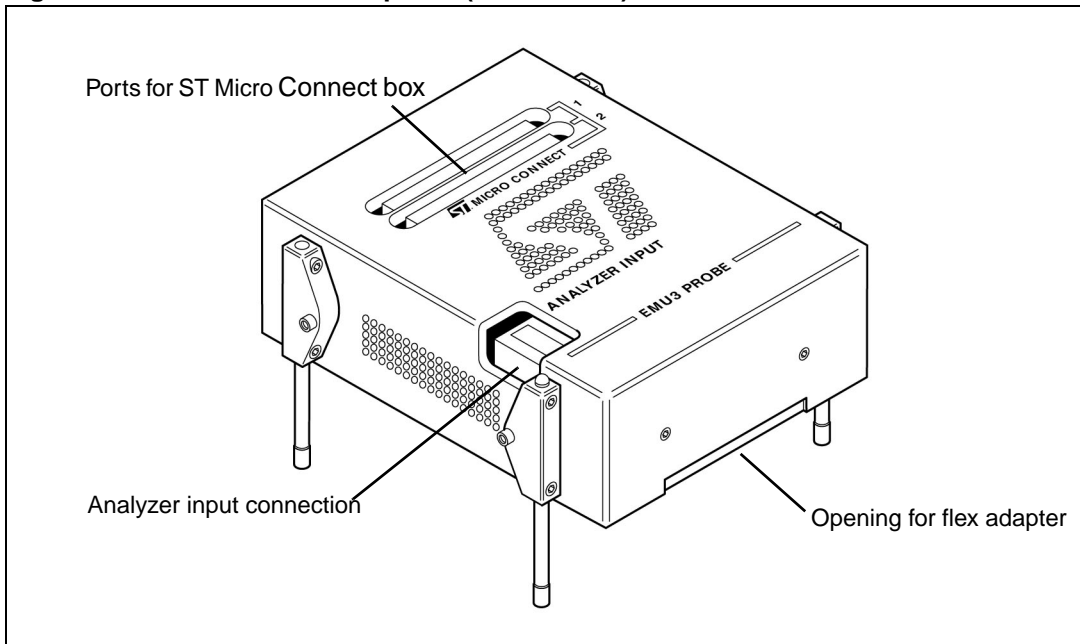


Figure 2. Connection accessories for the LQFP32 (7 x 7) package (not to scale)

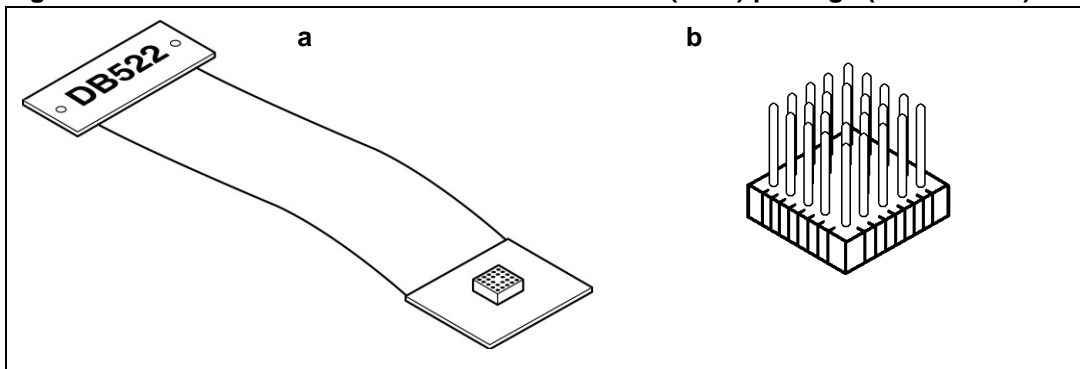


Figure 3. Connection accessories for the LQFP44 (10 x 10) package (not to scale)

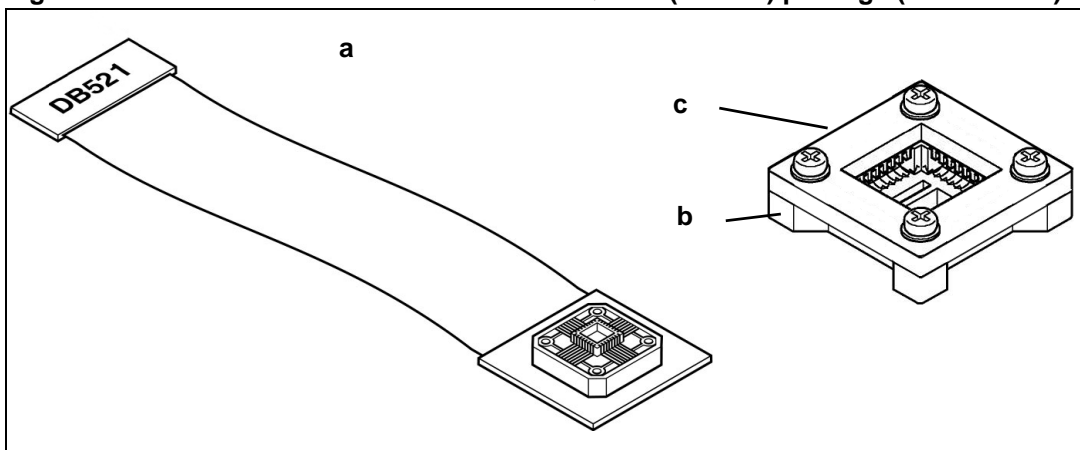
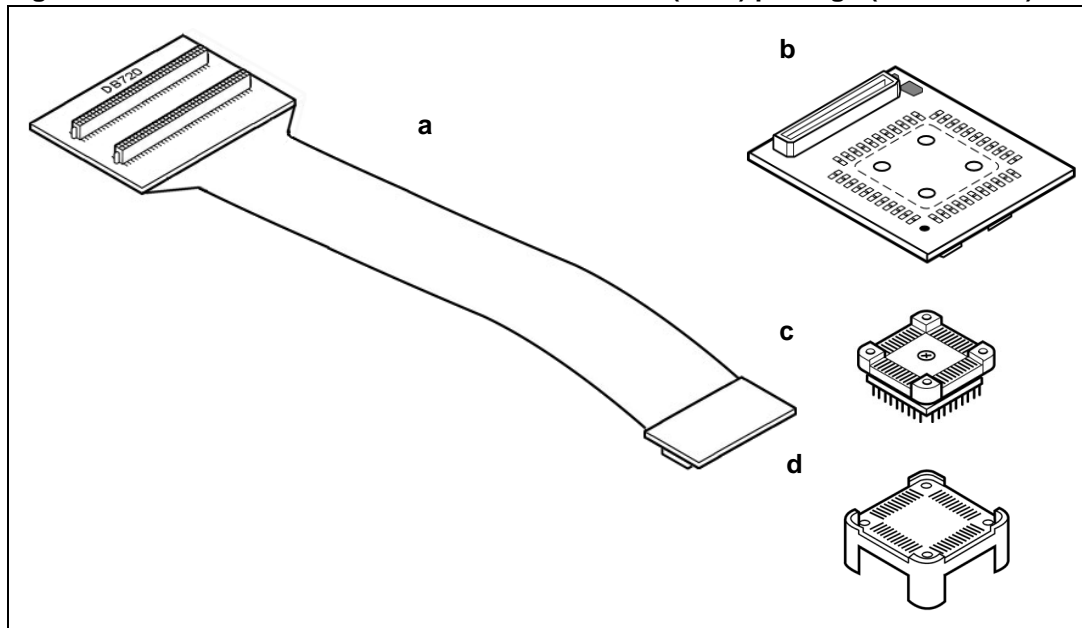


Figure 4. Connection accessories for the LQFP48 (7 x 7) package (not to scale)



2 Connecting your emulator to your application board

Your ST7MDT40-EMU3 probe serves as the hardware interface between your emulator and your application board. Your probe comes with the connectors and adapters you need to connect to the MCU socket on your application board.

To help you get started with your ST7MDT40-EMU3 emulator, the following sections tell you how to connect to your application board using the provided flex adapters, sockets and adapters.

2.1 Choosing and installing the flex adapter

The target MCUs that are emulated by the ST7MDT40-EMU3 emulator exist in various packages. To connect the emulator to your application board, you must choose a flex adapter and the corresponding connectors, adapters and sockets that are specific to your device's package.

[Table 2](#) shows the flex adapter, device adapter and on-application socket that is required for each microcontroller package. For the purpose of identification, the reference number is printed on the flex adapter's packaging and on the reverse side of the plug that connects it to the probe.

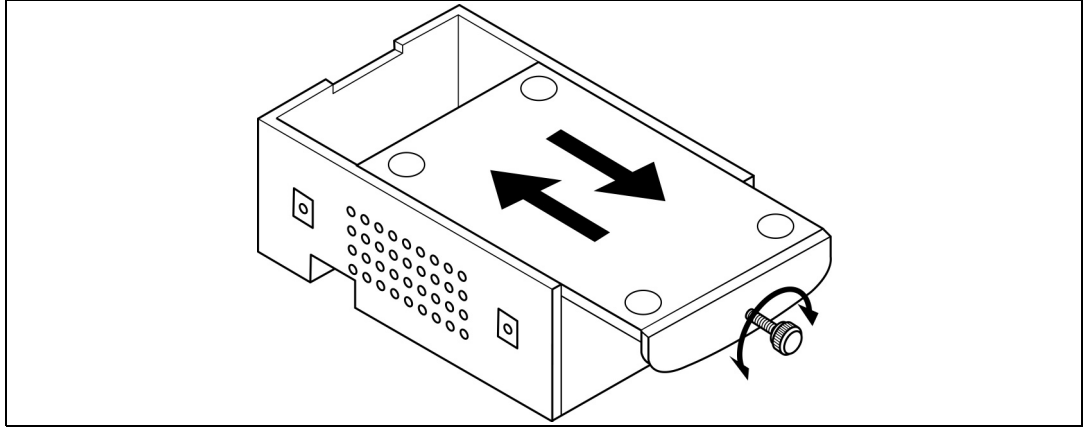
Table 2. Target MCU packages and their application connectors

Package	Flex adapter	Device adapter	Soldered on application board
LQFP32 (7 x 7)	DB522	none	LQFP32 (7 x 7) socket
LQFP44 (10 x 10)	DB521	none	LQFP44 (10 x 10) socket
LQFP48 (7 x 7)	DB720	DB718	LQFP48 (7 x 7) socket

Once you have selected the appropriate flex adapter, to install it:

1. Turn your probe upside-down, unscrew the retaining screw and slide the bottom out as shown in [Figure 5](#). When the probe is open, you will be able to see the target emulation board (TEB) and its connectors.

Figure 5. Opening the bottom of the probe

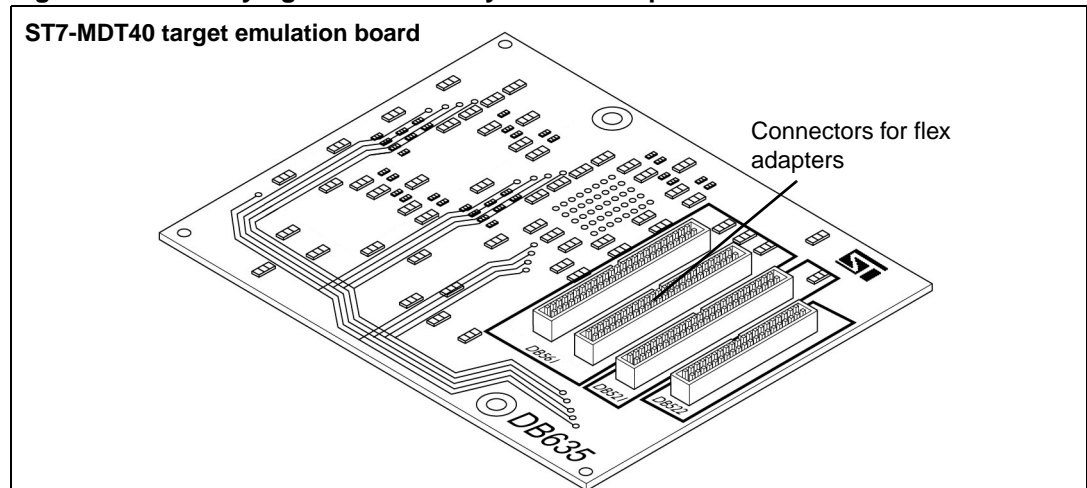


2. Identify the connector on the TEB where you will connect the flex adapter. These connectors are marked with the reference number of the flex adapter that they correspond to (see [Figure 6](#)).

The ST7MDT40-TEB has four connectors:

- one 40-pin connector for the LQFP32 (7 x 7) flex adapter (DB522),
- one 50-pin connector for the LQFP44 (10 x 10) flex adapter (DB521),
- and two 50-pin connectors for the LQFP48 (7 x 7) flex adapter (DB720). Note that this connector is marked DB561 on the board.

Figure 6. Identifying the socket for your flex adapter



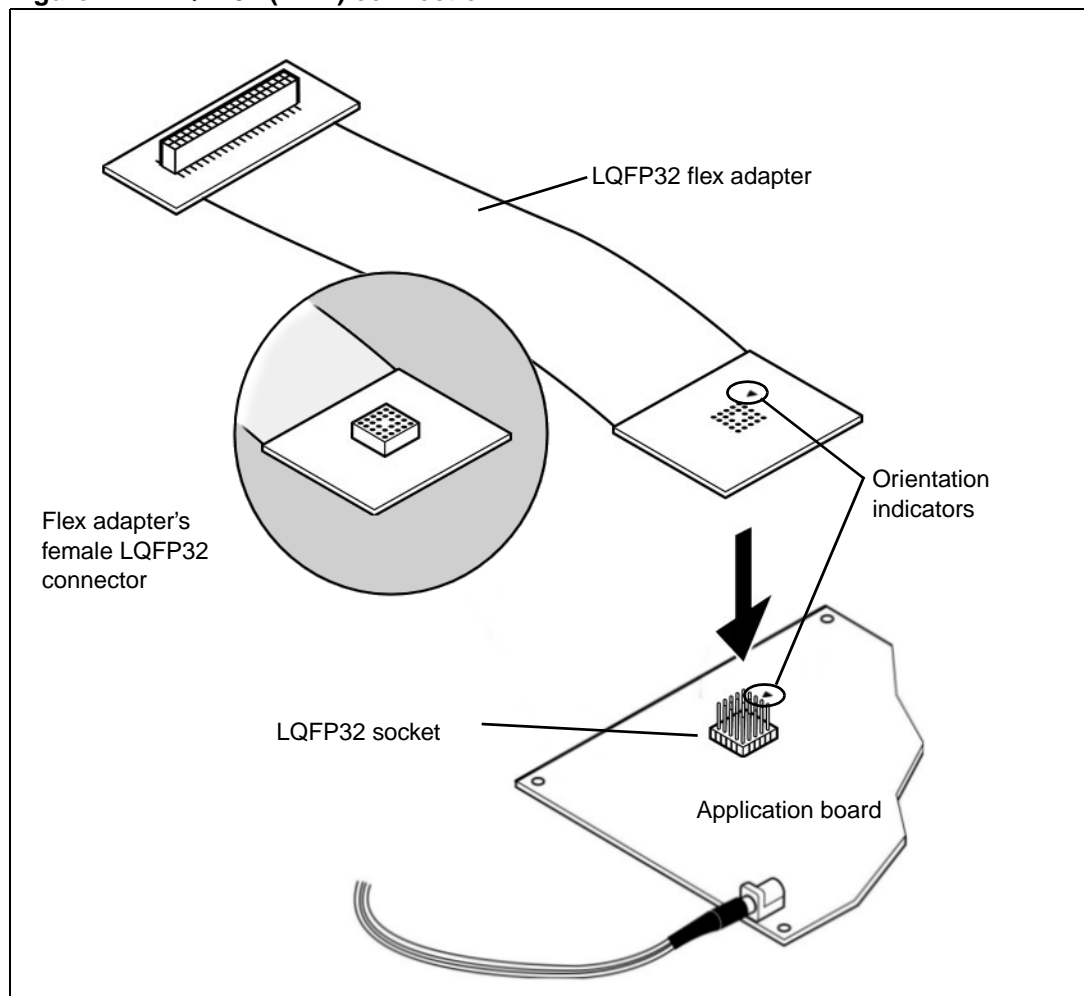
3. Insert the flex adapter's plug into the connector on the TEB.
4. Replace the bottom panel of the probe housing so that the flex adapter passes through the slot provided and tighten the retaining screw.

5. Reconnect the probe to the ST Micro Connect box by connecting the two 80-pin flat adapters to the ST Micro Connect connection ports on the top face of the probe housing.
6. Continue by connecting your flex adapter to your application board. A procedure for each package type is provided in the following sections:
 - [Section 2.2: Connection for LQFP32 \(7 x 7\) microcontroller package](#)
 - [Section 2.3: Connection for the LQFP44 \(10 x 10\) microcontroller package on page 9](#)
 - [Section 2.4: Connection for LQFP48 \(7 x 7\) microcontroller package on page 10](#)

2.2 Connection for LQFP32 (7 x 7) microcontroller package

1. Solder the male LQFP32 socket onto your application board.
2. Align the LQFP32 flex adapter (Ref.: DB522) and the socket on your application board, using the orientation indicators as shown in [Figure 7](#).
3. Insert socket's pins into the female connector on the LQFP32 flex adapter as shown in [Figure 7](#).

Figure 7. LQFP32 (7 x 7) connection



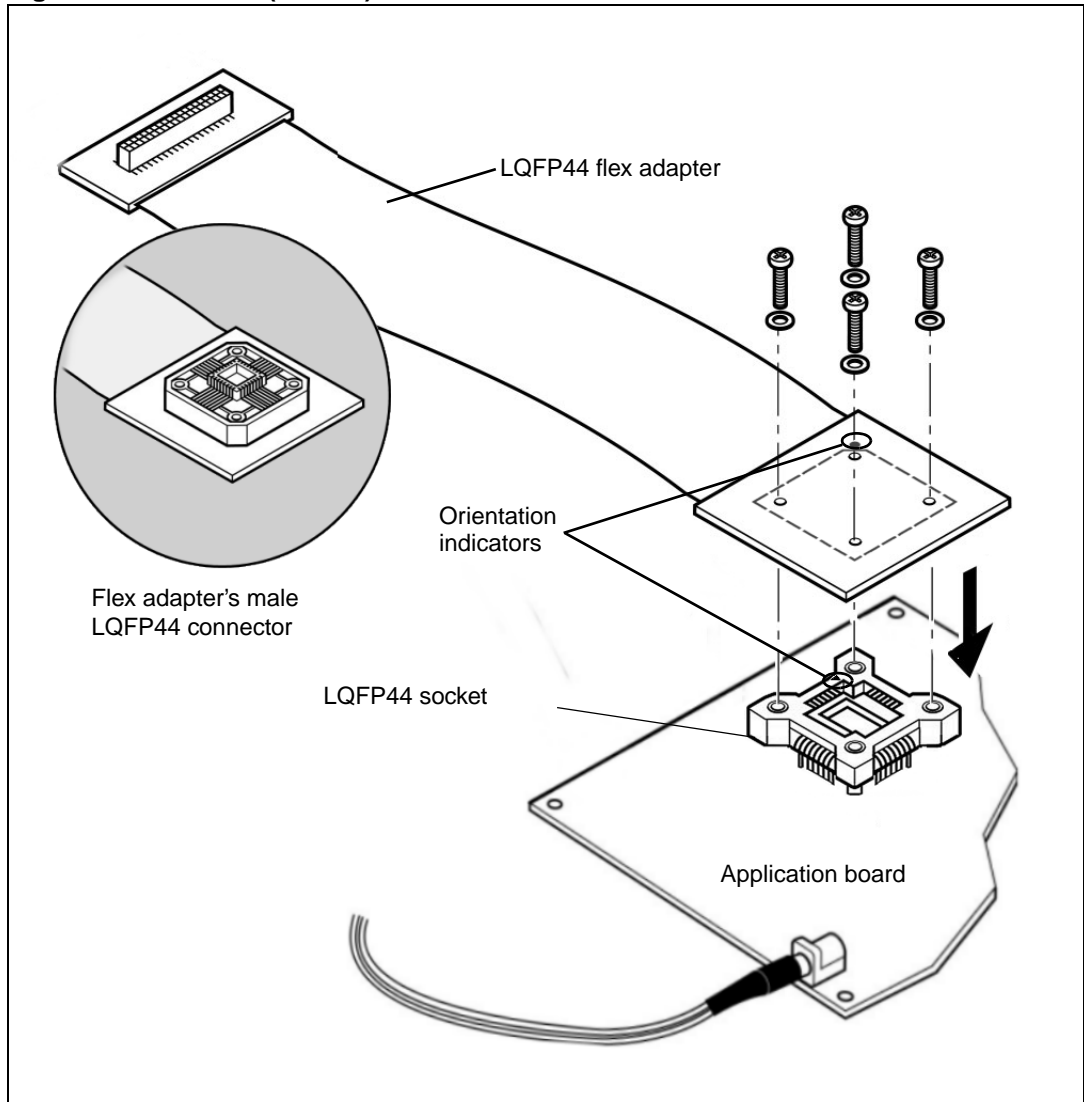
2.3 Connection for the LQFP44 (10 x 10) microcontroller package

1. Solder the LQFP44 socket onto your application board.

Note: Put aside the cover provided with the LQFP44 socket. You can use it later to fasten your microcontroller into the socket in place of the emulator's flex adapter.

2. Align the LQFP44 flex adapter (ref.: DB521) and the socket on your application board, using the orientation indicators as shown in [Figure 8](#).
3. Insert the male LQFP44 connector on the flex adapter into the socket on your application board as shown in [Figure 8](#), and fasten with the provided screws.

Figure 8. LQFP44 (10 x 10) connection



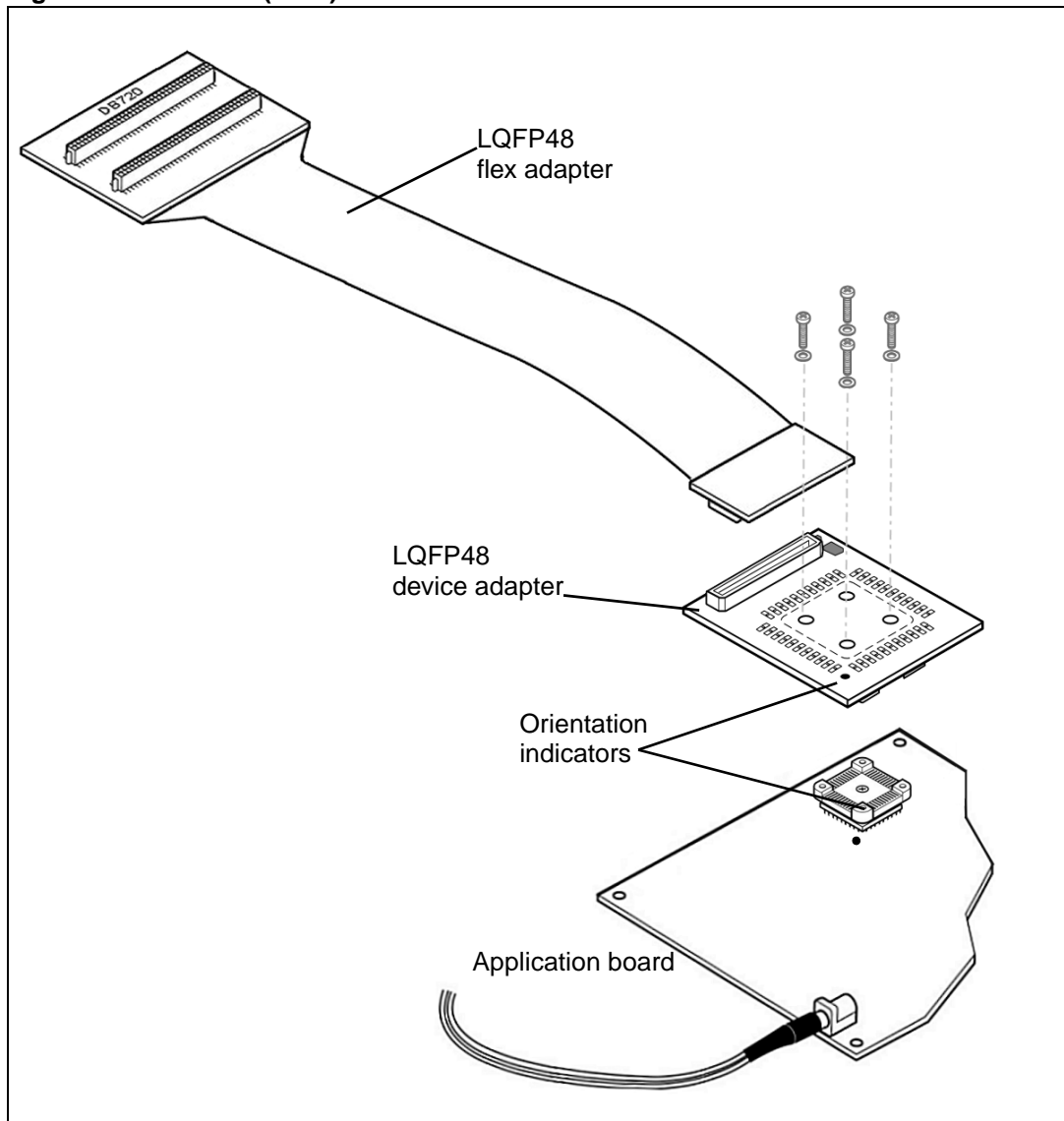
2.4 Connection for LQFP48 (7 x 7) microcontroller package

1. Solder the LQFP48 socket onto your application board in place of your microcontroller (see [Figure 9](#)).

Note: Put aside the cover provided with the LQFP48 socket. You can use it later to fasten your microcontroller into the socket in place of the emulator's flex adapter.

2. Connect the DB720 flex adapter to the LQFP48 device adapter (ref.: DB718) as shown in [Figure 9](#).
3. Align the LQFP48 device adapter and the socket on your application board, using the orientation indicators as shown in [Figure 9](#). On the socket, the beveled corner is the orientation indicator for pin 1.
4. Insert the pins of the LQFP48 device adapter into the socket on your application board as shown in [Figure 9](#) and fasten with the provided screws.

Figure 9. LQFP48 (7 x 7) connection



3 Emulation characteristics

3.1 MCU selection

In STVD7's **MCU Selection** window, choose the MCU that you are using in your application. A complete and up-to-date listing of supported MCU's for your ST7MDT40-EMU3 emulator is provided in the current version of the *STVD7 Release Notes*.

3.2 On-chip peripherals configuration

You can configure certain on-chip peripherals in ST7 Visual Develop's **MCU Configuration** dialog box so that the EMU3 probe accurately emulates your target device. The on-chip peripheral options available for configuration for the ST7MDT40-EMU3 emulator are described in this section.

For more information about peripheral configuration options for your MCU, refer to your *ST72340, ST72344, ST72345 Datasheet*.

Clock

The standard clock frequency options are summarized in [Table 3](#) below.

Table 3. Clock frequency options

Clock options	Clock source
16 MHz 8 MHz 4 MHz 2 MHz 1 MHz 500 kHz 250 kHz 125 kHz 62.5 kHz external	On probe fixed frequency divider
Other_freq_kHz	On probe programmable clock system

Other_freq_kHz

This feature allows you to enter the f_{OSC} value in kHz, that will be generated by the programmable clock system in the probe. If the entered f_{OSC} cannot be generated, a warning message will be displayed giving the two nearest values that the programmable clock system is able to generate. You will have to re-enter the correct value.

CSS (Clock security system)

This option allows you to *Enable* or *Disable* the clock security system function (CSS) which includes the clock filter and the backup safe oscillator.

I2C3SNS (I2C triple slave selection)

Enables and disables the I2C slave function for data transfer with serial-parallel format conversion.

RSTC (Reset clock cycle selection)

This option allows you to select the number of CPU cycles applied during the RESET phase and when exiting the HALT mode. You can choose between *4096 CPU cycles* and *256 CPU cycles*.

WDG.HALT (Watchdog halt)

There are two options for WDG HALT: *Reset* or *No Reset*. When the Watchdog is enabled in *Reset* mode, and a Halt instruction is encountered in the executable code, a chip reset is performed.

WDG.SW (Hardware or software watchdog)

This option allows you to choose whether the watchdog timer is enabled by software or by hardware.

TIMER_A and TIMER_B (timer A and timer B)

For these functions you can choose between two options:

- **Frozen_when_not_run** – the counter runs while the application runs, however when a breakpoint is encountered the counter stops.
- **Free_when_not_run** – the counter continues to run even if a breakpoint is encountered.

3.3 Emulator electrical characteristics

This section provides electrical characteristics that are specific to the ST7MDT40-EMU3 emulator.

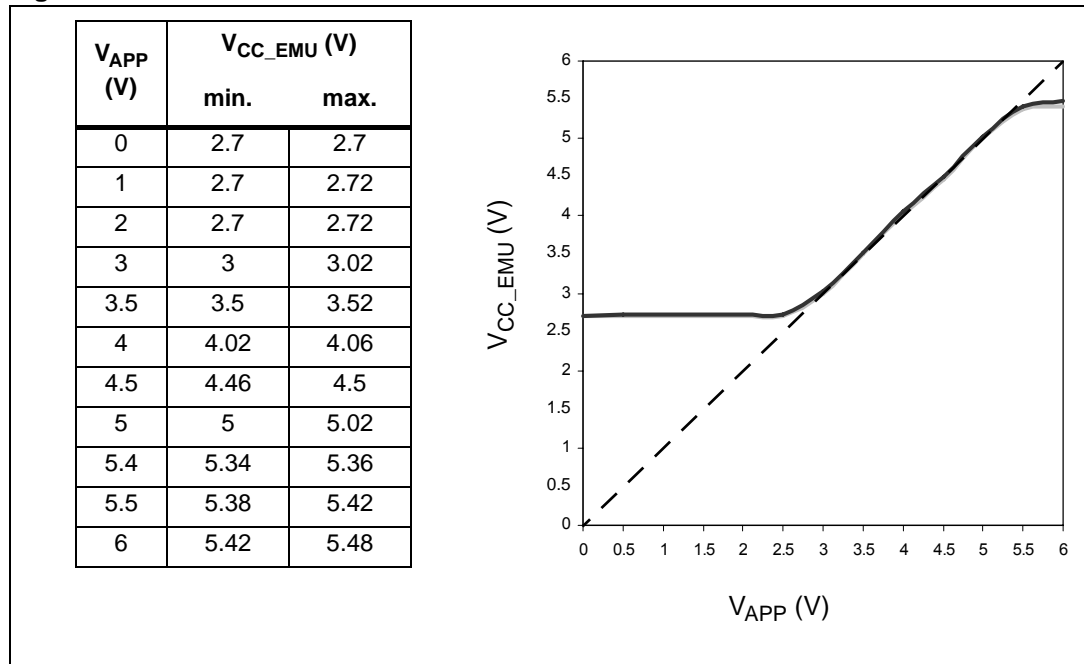
3.3.1 Power supply follower

The application power supply follower converts the application voltage V_{APP} to a voltage within the range of 2.7 V and 5.5 V.

The curve plotted on the graph below shows how the value of V_{CC_EMU} evolves with the value of V_{APP} .

Note: This data is provided only as a design guideline and is not tested with each emulator.

Figure 10. Power follower behavior



3.4 Functional limitations and discrepancies

Some MCU's may present specific limitations and discrepancies. You will find information specific to your MCU and your hardware configuration in STVD7's **Discrepancies window**. For more information, refer to the *STVD7 User Manual*.

Appendix A Product support

If you experience any problems with this product, or if you need spare parts or repairs, contact the distributor or the STMicroelectronics sales office where you purchased the product. Phone numbers for major sales regions are provided on the www.st.com web site.

From the www.st.com site, select **Products > Microcontrollers** to obtain a complete online selection guide, as well as documentation, software downloads and user discussion groups to help you answer questions and stay up to date with our latest product developments.

A.1 Software updates

All our latest software and related documentation are available for download from the STMicroelectronics Internet site, www.st.com/mcu.

If you are using software from a third-party tool provider, please refer to the third-party for software product support and downloads.

A.2 Hardware spare parts

Your development tool comes with the hardware you need to set it up, connect it to your PC and connect to your application. However, some components can be bought separately if you need additional ones. You can order extra components, such as sockets and adapters, from STMicroelectronics, from the component manufacturer or from a distributor.

To help you find what you need, a listing of accessories for STMicroelectronics development tools is available on the STMicroelectronics Internet site, www.st.com.

A.2.1 Sockets

Complete documentation and ordering information for P/LQFP sockets from Yamaichi, Ironwood, CAB and Enplas are provided at their respective Internet sites.

A.2.2 Connectors

Complete documentation and ordering information for SAMTEC connectors is provided at their Internet site.

A.3 Getting prepared before you call

Collect the following information about the product before contacting STMicroelectronics or your distributor:

1. Name of the company where you purchased the product.
2. Date of purchase.
3. Order Code: Refer to the side your emulators box. The order code will depend on the region in which it was ordered (i.e. the UK, Continental Europe or the USA).
4. Serial Number: The serial number is found located on the rear panel of the ST Micro Connect box and is also listed on the Global Reference card provided with the emulator.
5. TEB (Target Emulation Board) hardware and firmware versions: The hardware and firmware versions can be found by opening an STVD7 session, entering the debug context and selecting **Help > About** from the main menu. The TEB version numbers are given in the *Target box* – scroll downwards until you find the TEB version (hardware) and TEB PLD version (firmware).
6. Target Device: The sales type of the ST microcontroller you are using in your application.

Appendix B Revision history

Date	Revision	Changes
01-Oct-2004	1	Initial release.
28-Oct-2005	2	Remove reference to ST7MIDI-TEB part number. Transfer revision history to Appendix A.
04-Oct-2006	3	Changed product name from ST7Midi to ST7MDT40. Added information for new supported package, LQFP48. Removed information related to BGA56 package.
06-Feb-2009	4	Changed the cover page to reflect the root part number.

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