STMicroelectronics

ST7-EPB Programming board

UM0028
User manual

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User manual

ST7-EPB
Programming board

Introduction

Thanks for choosing ST7! This manual will help you setup and start using your ST7-EPB programming board.

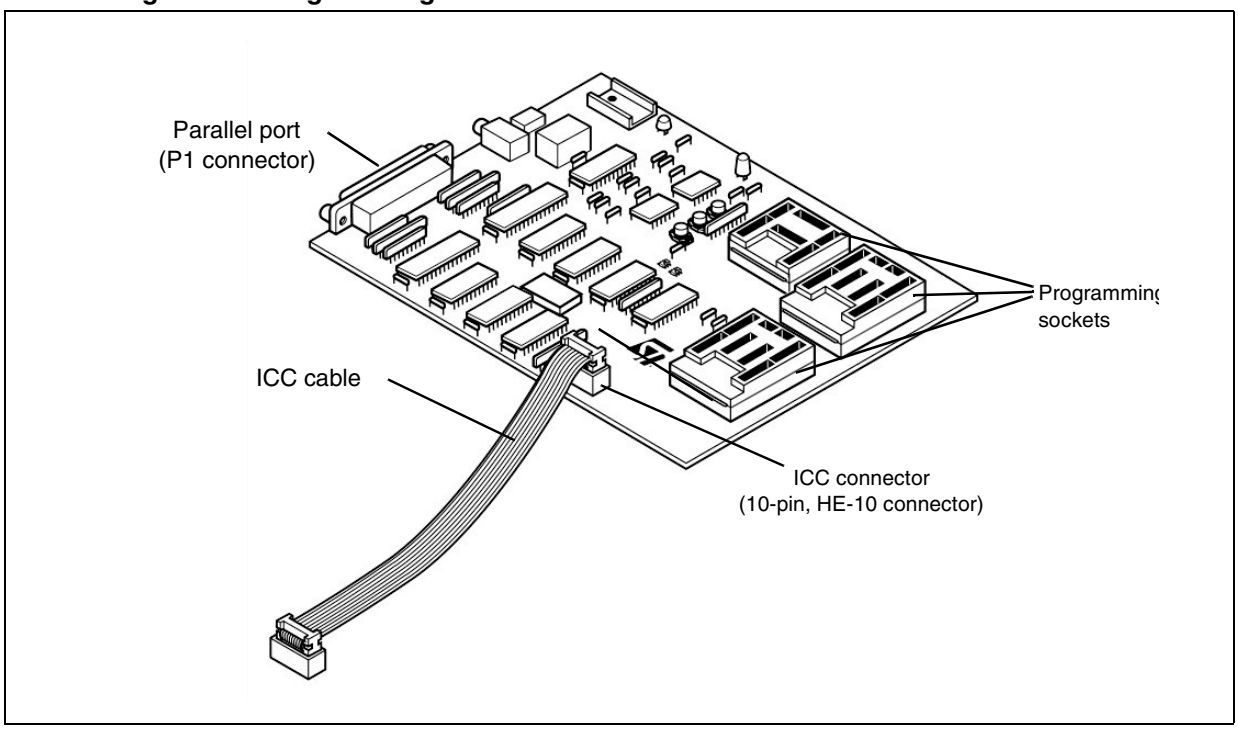
ST7-EPB programming boards allow you to program ST7 microcontrollers that have EPROM, EEPROM and FLASH memories. Your programming board links, via parallel port, to a host PC running ST7 Visual Programmer (STVP7) software. This software interface allows you to customize and control the programming of an application to your ST7.

The layout of your programming board varies depending on the type of EPB you have ordered, as each programming board is designed to program a different sub-family of ST7 MCUs.

Some programming boards also support either In-Circuit Programming (ICP), or In Situ Programming (ISP) of your ST7 while it is mounted on your application board.

*Note: A complete listing of the ST7 family of programming tools, including the devices and programming modes that they support is provided in **ST7 Visual Programmer (STVP7° Release Notes**.*

Figure 1. Programming board with ICC cable



About the user manuals...

This manual will help you setup your ST7-EPB programming board and connect it to your PC. Here, you will find:

- Setup instructions
- Information about in-circuit programming connections

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

- ***ST7 Visual Programmer online help*** - program your MCU
- ***ST7 Programming Board Descriptions*** - a complete list of programming boards, including the devices and programming modes they support
- ***In-Circuit Programming Considerations*** - information about setting up your application board for in-circuit programming
- ***ST7xxxx Datasheet*** - programming information that is specific to your MCU

Host PC system requirements

Both the hardware and software that you will use to program your ST7 have been designed to operate with:

- Microsoft® Windows® 2000 or XP®.
- Intel® Pentium (or compatible) processor with minimum speed of 133 MHz.
- Minimum RAM of 32 MB (64 MB recommended).
- 60 MB of free hard disk space to install all of the ST7 tools.

Note: Windows® 2000 and XP® users must have administrator privileges to install STVP7.

Getting assistance

For more information, application notes, FAQs and software updates relevant to all the ST microcontroller families, check out the CD-ROM or our website:

www.st.com/mcu

For assistance on all ST microcontroller subjects, or for help using your programming board, refer to the contact list provided in *Product Support* on page 14. We'll be glad to help you.

Contents

1 Getting Started 6

1.1 Delivery Checklist 6

1.2 Setting up your ST7-EPB 7

1.3 Using the programming sockets 7

1.4 Using an in-circuit programming connection 8

1.5 Additional information about programming in ISP mode 10

2 Hardware Features 11

2.1 Parallel port connection 11

2.2 About jumpers on the ST7 EPB 11

Appendix A Revision history 12

Appendix B Safety Requirements 13

Appendix C Product Support. 14

1 Getting Started

Your ST7-EPB programming board is equipped with the sockets you will need to program a sub-family of ST7 MCUs. In addition, some programming boards also support connections for In-Circuit Programming (ICP) or In Situ Programming (ISP).

To help you get started programming with your EPB, the following sections provide:

- *Section 1.1* – a checklist of components delivered with your ST7-EPB
- *Section 1.2* – instructions for setting up your programming board
- *Section 1.3* – instructions on the use of programming sockets
- *Section 1.4* – instructions on setting up a connection for in-circuit programming
- *Section 1.5* – additional notes about in situ programming

1.1 Delivery Checklist

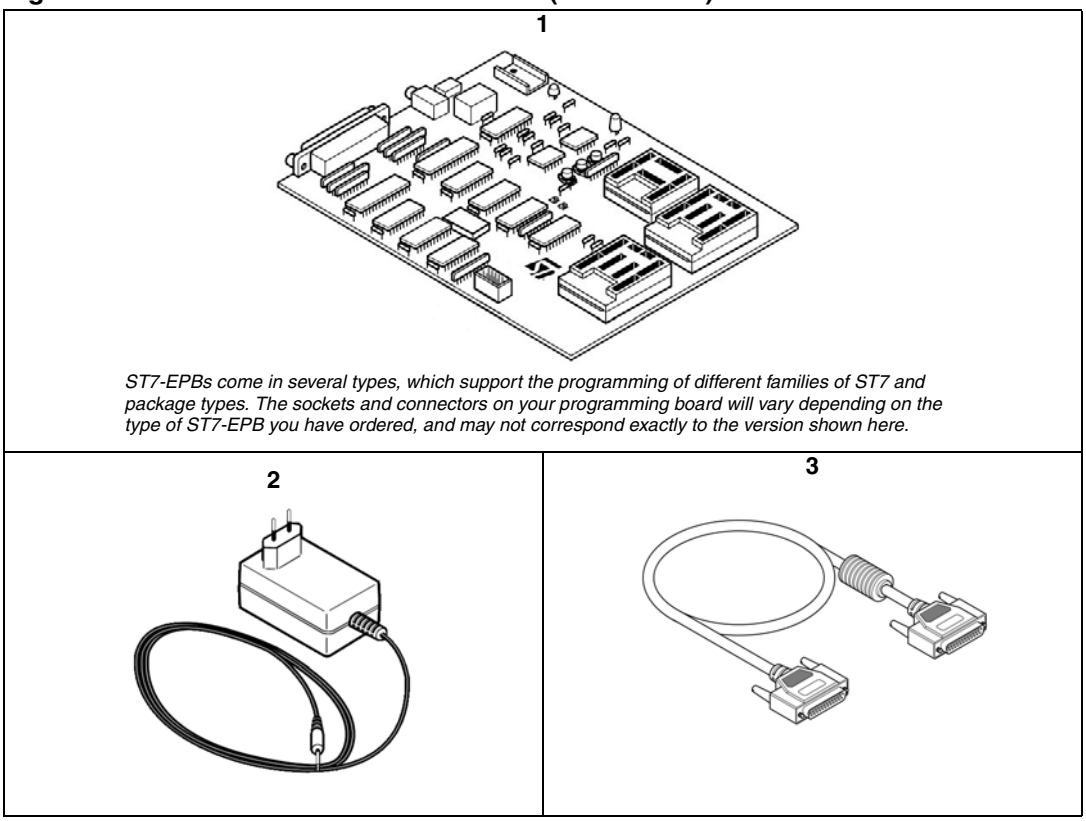
The following items are delivered with your programming board (see *Figure 2*):

1. One ST7MDTxx-EPB programing board.
2. One power supply
3. One parallel cable

Optional

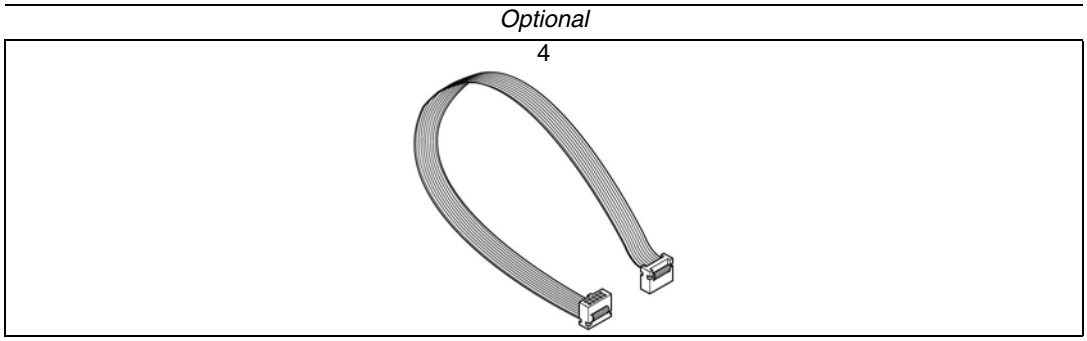
4. One 10-pin, HE-10 type ribbon cable with programming boards that support ICP or ISP

Figure 2. Parts delivered with ST7-EPBs (not to scale)



ST7-EPBs come in several types, which support the programming of different families of ST7 and package types. The sockets and connectors on your programming board will vary depending on the type of ST7-EPB you have ordered, and may not correspond exactly to the version shown here.

Figure 2. Parts delivered with ST7-EPBs (not to scale)



1.2 Setting up your ST7-EPB

To setup your ST7-EPB programming board:

1. Shut down and power-off the host PC.
2. Connect one end of the supplied parallel cable to the EPB's **P1 connector** and the other end to one of the host PC's parallel ports (LPT1 or LPT2).

Note: Be sure to use the parallel cable provided with your kit — using a longer parallel cable may cause malfunctions.

Connect the cable directly between the host PC and the programming board — inserting additional cables or switch boxes between the host PC and the programming board may cause malfunctions.

If a dongle (a hardware key required by some software packages) is already connected to the PC's parallel port, it should not interfere with the programming board. However, if a malfunction of the board occurs, please remove the dongle and reconnect your EPB.

1. Connect the power supply to the programming board. Ensure that the power supply is adapted to the mains voltage and outlet type used in your country.

Note: The board can be supplied from the integrated power supply provided with the board, or from an external +15 V_{DC} / 0.5 A power supply.

2. Power on the host PC.

1.3 Using the programming sockets

All ST7-EPBs come with one or more sockets for programming. The sockets that are available to you for programming will vary depending on the packages for the ST7 sub-family that your programming board supports.

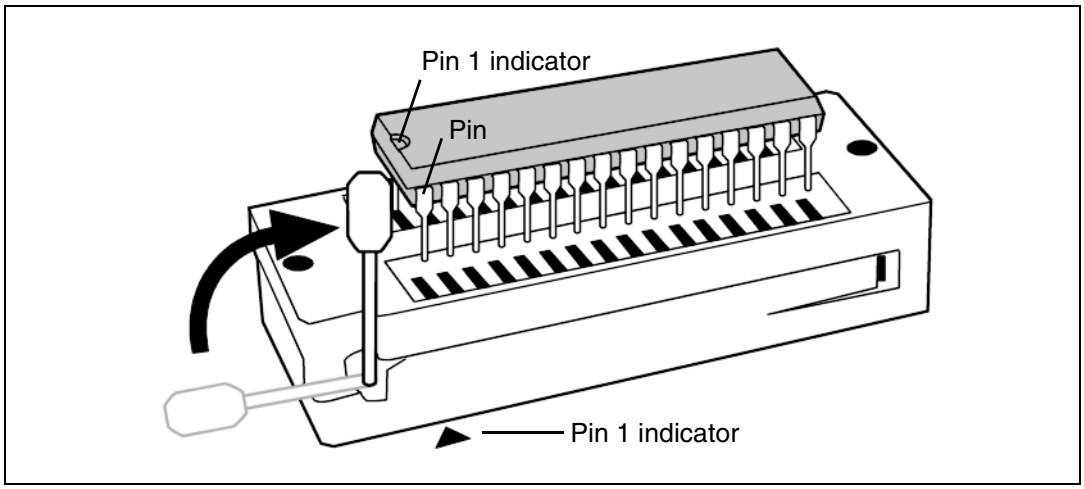
Regardless of the type of socket, when installing an ST7 for programming you must ensure that pin 1 of the ST7 corresponds with pin 1 of the socket.

To install your ST7:

1. Set up the EPB as described in *Section 1.2* on page 7.
2. Identify the socket for your device package on the programming board.
3. Open the socket, or lift the lever (for ZIF sockets) and place the device into the socket with pin 1 matching the pin 1 indicator on the programming board.

Caution: Take care when placing the device into a socket so as not to damage the device or the board. Forcing the MCU into the socket may result in damage to the socket.

Figure 3. Installing MCU in a ZIF socket



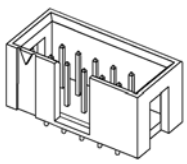
4. Lock the device in place by lowering the lever again.

Use *ST7 Visual Programmer* to program your device. For more detailed information about its use, refer to the software's online help.

1.4 Using an in-circuit programming connection

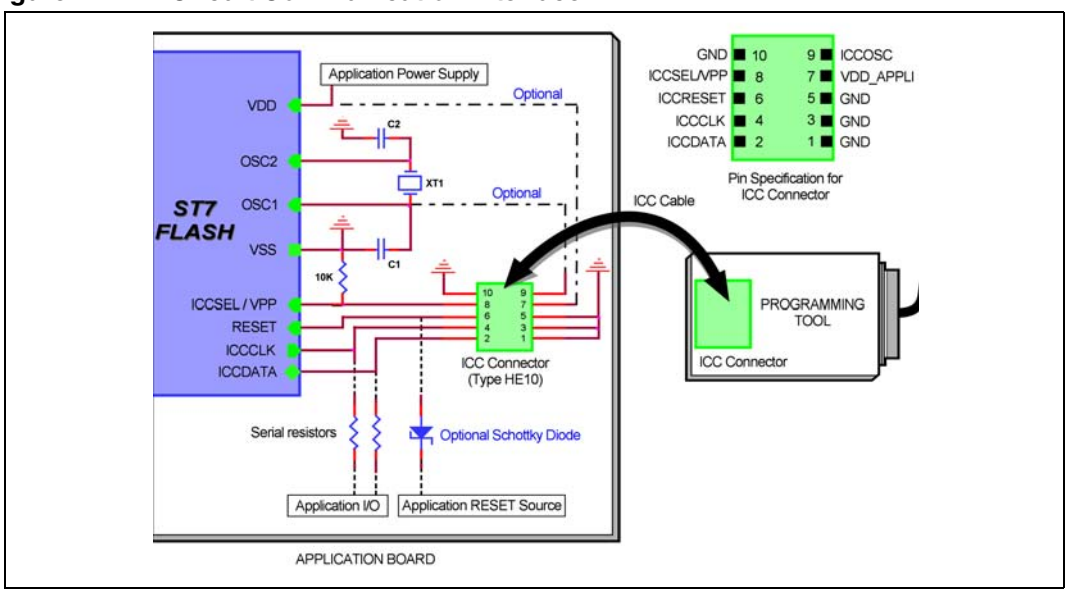
Some ST7-EPB programmers allow **in-circuit programming (ICP)** of supported ST7 Flash microcontrollers, thanks to the In-Circuit Communication (ICC) protocol developed for ST7. This section provides information to help you setup your application board for in-circuit programming of your ST7.

HE-10 type connector



To take advantage of ICP you must have an **ICC connector** (10-pin HE-10 type) installed on your application board allowing you to connect it to your programming board with the provided ICC cable (10-pin ribbon cable). This connection is illustrated in *Figure 4*.

Figure 4. In-Circuit Communication interface



*Note: When using the ST7MDTS1-EPB, the VDD_APPLI is not connected to the ST7. When setting up your application for in-circuit programming, refer to the ICP Interface diagram in the **In-CIrcuit Programming** section of the **ST7SCR Datasheet,** instead of the diagram provided above.*

Using the ICC protocol for in-circuit programming requires that a minimum of **4** and as many as **6 pins** of your ST7 be connected to your programming board (see *Table 1*). Additional notes about these connections are provided in this section.

Table 1. ICC connection requirements

ST7 pin		Connects to...
ICCDATA	ICC input serial data pin	ICCDATA
ICCCLK	ICC output serial clock pin	ICCCLK
RESET	Device reset	ICCRESET
ICCSEL/VPP	Programming voltage	ICCSEL/VPP
OSC1 or OSCIN #	Main clock input for external	ICCOSC
VDD	Device power supply	VDD_APPLI
VSS	Device power supply (ground)	GND
# *Optional connection for ST7MDTxx-EPB, see text.*		

Note: For specific ICC connection requirements for microcontroller introduced after the publication of this document, please refer to the microcontroller datasheet.

Isolation of ICCDATA and ICCCLK pins

From the moment that your ST7-EPB is plugged into the application board, the ICCDATA and ICCCLK pins must not be used by other application devices, even when you are not programming the ST7. If the application uses these pins as inputs, isolation such as a serial resistor must be implemented to prevent other application devices from forcing a signal on either of these pins. The application board must not drive current in excess of 1mA.

If the ICCDATA and ICCCLK pins are only used as outputs by the application, no signal isolation is necessary.

For ST7 without an ICCSEL pin, during normal operation the ICCCLK pin must be pulled-up internally or externally (10KΩ pull-up required in noisy environments). This is to avoid entering ICC mode unintentionally during a reset.

Isolation of the RESET pin

During an ICC session, your ST7-EPB must control the ST7's RESET pin. No external reset can be generated by the application. This can lead to a conflict if the application reset circuitry signal exceeds 5mA (push-pull output or pull-up resistor <1k). To avoid such conflicts, a Shottky diode can be used to isolate the application reset circuit.

ICCSEL/VPP pin

The application pull-down resistor must not be lower than 10kΩ.

ICCOSC pin

The ICCOSC pin of the ICC connector must be connected to the ST7's OSC1 or OSCIN pin if the clock is not provided by the application, or if the application clock source is not programmed in the option byte. This connection allows you to start your ICP session using the **ICP OPT Disable** programming mode. In this mode, your ST7-EPB provides a clock source to initiate communication with the ST7 at a frequency of 16MHz.

For ST7 devices with multi-oscillator capability, when the ICCOSC pin is connected, the OSC2 pin should be grounded.

Caution: For all versions of the following EPBs, the ICCOSC pin must not be connect to the device's OSCIN pin:

- ST7MDTU2-EPB
- ST7MDTU3-EPB
- ST7MDTU5-EPB

If your application provides a clock signal and you are certain that it is programmed in the ST7's option byte, you can start your ICP session using the **ICP OPT Enable** programming mode. In this mode, your application clock source provides the clock signal for initiating communication with your ST7 and ICCOSC is not connected to your ST7.

Your ST7-EPB programming board provides a clock signal when using both the ICP OPT Disable and ICP OPT Enable programming modes. If you start your ICP session using ICP OPT Enable, the clock signal provided by the programmer may conflict with the application clock and can cause a communication failure with your ST7. To avoid this we recommend installing a jumper on the connection between ICCOSC and the ST7. This jumper is removed when starting in the ICP OPT Enable programming mode. If the user requires a clock signal from the programming board in order to start in the ICP OPT Disable mode, the jumper is left in place.

VDD_APPLI pin

This pin is used by the programming tool's power supply follower, which adapts the voltage of the tool's signals to your application's V_{DD}.

The VDD_APPLI pin must be connected when using any ST7MDTxx-EPB programmer with ICP capability, *except* the ST7MDTS1-EPB.

1.5 Additional information about programming in ISP mode

Before programming the OSCx option bits, make sure you have chosen the right options configuration.The OSCx option bits are very important. If you program the wrong OSCx option bits, depending on your hardware configuration, you may not be able to reprogram the device in ISP mode.

2 Hardware Features

2.1 Parallel port connection

The ST7 EPB communicates with your host PC (running STVP7) via a parallel port connection.

Most communication failures between the host PC running STVP7 and your programming board stem from problems in the parallel port connection.

To prevent communication problems, when setting up your parallel port connection:

- Configure your PC's parallel port suing either the Centronics, EPP, ECP, or bidirectional parallel port configuration.
- Use the parallel cable provided with your kit—using a longer parallel cable may cause malfunctions.
- Connect the cable directly between the host PC and the programming board—the insertion of additional cables or switch boxes between the host PC and the programming board may cause malfunctions.
- Remove any parallel port dongles.

2.2 About jumpers on the ST7 EPB

There are two jumpers, labelled JP2 and JP3, located on the following ST7 EPBs:

- ST7MDT1-EPB2
- ST7MDT2-EPB2
- ST7MDT6-EPB2
- ST7MDT7-EPB2

These jumpers are present for manufacturing testing only. **Use of these jumpers could permanently damage the programming board!**

Appendix A Revision history

Date	Revision	Changes
November-2000	2	• Transferred to user manual format • Added new programmers
18-June-2001	3	• Added information about programming in ICP mode • Removed list of programmers
21-April-2004	3.1	• Transferred software installation and use information to STVP7 on-line help. • Added Section 2.4 – considerations for setting up an ICP connection.
12-November-2004	3.1.1	• Added revision history.
27-June-2006	4	• Corrected introduction, list of EPBs and supported MCUs now found in *STVP7 Release Notes*. • Updated PC requirements • Added note - for ICC connection information for new microcontrollers refer to device datasheet.

Appendix B Safety Requirements

- Any tester, equipment, or tool used at any production step, or for any manipulation of semiconductor devices, must have its shield connected to ground.
- The product must be placed on a conductive table top, made of steel or clean aluminum, or covered by an antistatic surface (superficial resistivity equal to or higher than 0.5 MΩ/cm^2), grounded through a ground cable (conductive cable from protected equipment to ground isolated with a 1 MΩ resistor placed in series). All manipulation of finished goods goods must be done at such a grounded worktable.
- The worktable must be free of all non-antistatic plastic objects.
- An antistatic floor covering grounded through a conductive ground cable (with serial resistor between 0.9 and 1.5 MΩ) should be used.
- It is recommended that you wear an antistatic wrist or ankle strap, connected to the antistatic floor covering or to the grounded equipment.
- If no antistatic wrist or ankle strap is worn, before each manipulation of the powered-on tool, touch the surface of the grounded worktable.
- It is recommended that antistatic gloves or finger coats be worn.
- It is recommended that nylon clothing be avoided while performing any manipulation of parts.

Appendix C 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 in the *Contact List*, below.

In addition, at our Internet site **www.st.com/mcu**, you will find a complete listing of ST sales offices and distributors, 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.

Software updates

All our latest software and related documentation are available for download from the ST Internet site, **www.st.com/mcu**. For information about firmware and hardware revisions, call your distributor or ST using the *Contact List* provided below.

Contact List

North America

West Coast	Mid West	Canada and East Coast
STMicroelectronics, Inc. 1060 E. Brokaw Road San Jose, CA 95131 Phone: (408) 452-8585	STMicroelectronics 1300 East Woodfield Road, Suite 410 Schaumburg, IL 60173 Phone: (847) 585-3000	STMicroelectronics Lexington Corporate Center 10 Maguire Road, Building 1, 3rd floor Lexington, MA 02421 Phone: (781) 402-2650

Note: For American and Canadian customers seeking technical support the US/Canada is split in 3 territories. According to your area, contact the appropriate sales office from the list above and ask to be transferred to an 8-bit microcontroller Field Applications Engineer.

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