ST62 in-circuit programming

In-circuit programming feature

The in-circuit programming process allows programming or reading of the non volatile memory of an ST62 device already fixed on the application board. This feature applies both to the EPROM memory containing the user ROM (Executable code and constants) and to the EEPROM content (Non volatile data). The capability to program memory locations initially unprogrammed and access the user ROM content allows a wide range of applications enhancement: Storage of informations after a maintenance operation on field, follow-up of the software revision on field, update of non volatile data space, In addition, this in-circuit programming process limits the handling on complex packages like PQFP since the handling cycles for the programming is suppressed and only the handling for the soldering on PCB is needed.

This note provides information on the steps required in order to perform in-circuit programming of ST62Exxx EPROM or OTP devices for both on-chip EPROM and EEPROM.
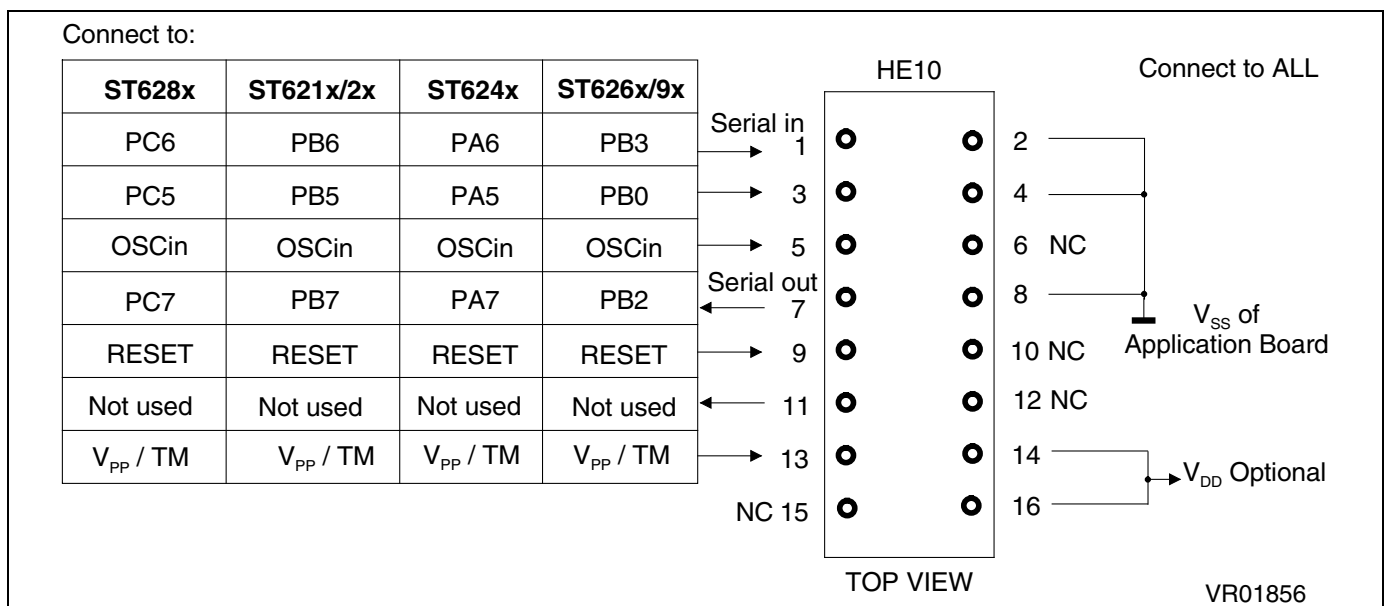
In-circuit programming procedure

During the in-circuit programming progress, the application board is used as remote socket for the programming tool and the programming process and software remains unchanged. The connection of the application board to/from the programming tool is made through a 16 pin cable plugged into a 16 pin connector (8x2 header HE10). That 16 pin connector has to be provided by the designer on the application board.

The connections between the 16 pins connector and the ST62 are summarized below:

Note: The connection to the pin3 of the connector is not necessary if a high voltage level is guaranteed by the application design (See Application design guidelines)

The VDD connection is optional depending whether or not the application supply can be disconnected. If the application supply is disconnected, it is possible to supply the application board through the pins 14 and 16 of the connector as long as the total load current does not exceed 100mA and the capacitive load is lower than 50F. In the opposite, if the application board keeps its own supply, the supply value must be set at 5V in order to be compatible with the signal levels to/from the programming tool.

Figure 1. 16-pin PCB Socket Connection

	ST628x	ST621x/2x	ST624x	ST626x/9x
	PC6	PB6	PA6	PB3
	PC5	PB5	PA5	PB0
	OSCin	OSCin	OSCin	OSCin
	PC7	PB7	PA7	PB2
	RESET	RESET	RESET	RESET
	Not used	Not used	Not used	Not used
	V_{PP} / TM	V_{PP} / TM	V_{PP} / TM	V_{PP} / TM

Application design guidelines

Some care has to be taken in the application design in order to be compatible with the in-circuit programming capability.

1) The OSCin pin is used to synchronize the programming operations with a clock sent by the programming tool through the 16 wire cable. This node must be directly tied to the relevant pin of the 16 wire cable. No isolation is needed as long as a quartz crystal or a ceramic resonator is used in the application. If an external clock generator is used in the application, it has to be disconnected during the in-circuit programming operation.

2) The RESET pin is used by the programming tool to control the programming mode entry. Then a direct connection to the device, and a correct isolation from other signals of the application is mandatory to prevent any voltage contention. It means that a direct connection to VDD, GND or any other signal has to be avoided. On the contrary, these pins can be connected to another CMOS input, a 2 Kohms pull-up or left open (Internal pull-up). The capacitive load on the RESET pin should not exceed 1F.

3) The pin 1 and 7 of the 16 wire cable are used to establish the communication between the programming tool and the device. Then a direct connection to the device, and a correct isolation from other nodes of the application is mandatory to prevent any voltage contention. It means that any direct connection to VDD, GND or an output has to be avoided. On the contrary, these pins can be connected to a CMOS input, a 2 Kohms pull-up, a 10Kohms pull-down or left open (Internal pull-up). If the pin 3 of the 16 pin connector is tied to the ST62 MCU, the same concerns apply. 4) Some I/O pins are not connected to the 16 wire cable and must be set at high level during the programming operation. This is normally achieved by the RESET signal sent by the programming tool through the 16 wire cable, setting the I/O lines as input with an internal 300 Kohms pull-up. In order to keep at high level these I/O lines, a direct connection of these pins to GND or to any other signal at low (even temporarily) voltage level has to be avoided. Only connections to another CMOS input, an external pull-up or a 10 MOhms pull down is allowed.

The following table summarizes the signal to be kept at high voltage level.

ST621X/2X	ST624X	ST626X	ST628X
PB3	PB0	PB6	PB3
PB5 *	PA5 *	PB0 *	PC5*

*: If not directly biased through the pin 3 of the 16 pin connector.

5) The pin Vpp/TM can not be directly tied to GND on the application in order to do not conflict with the biasing issued by the programming tool through the pin 13 of the connector. Instead it should be pulled down by a resistor with a minimum value of 10 Kohms. It is also mandatory to add a 100nF ceramic capacitor between Vpp/TM and Vss.

Revision history

Table 1. Revision history

Date	Revision	Description of changes
March 1993	1	Initial release
13-June-2008	2	Logo modified

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