EMDB65xx V2.0 MANUAL

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1. INTRODUCTION

This document describes EMDB65xx general 4-bits microcontroller Demo board.

EM offers **MFP (MTP) versions** of its ROM MCUs, best suited for engineering and development phases of a project, where the ROM memory is replaced by EEPROM

This board contains the different MFP's as EM6503, 04, 17, 20, 21, 22, 40 or 80 and additional parts to evaluate the selected EM65xx product or to evaluate quickly your application.

You will be able to :

- Program with external programmer the Flash / EEPROM EM65xx through the dedicated In-System-Programming connector.
- Evaluate or run your application with the help of the existing components assembled on the board (push-button, leds, buzzer, switches) and open extensions (connectors, user area).
- The EM65xx on the Demo board has to be programmed through the programming box. The programming box is manufactured by EM Microelectronic or from our 3rd party : ELNEC.
- The EM6580 can be programmed only with ELNEC tools.

2. HARDWARE DESCRIPTION

2.1 EMDB65XX
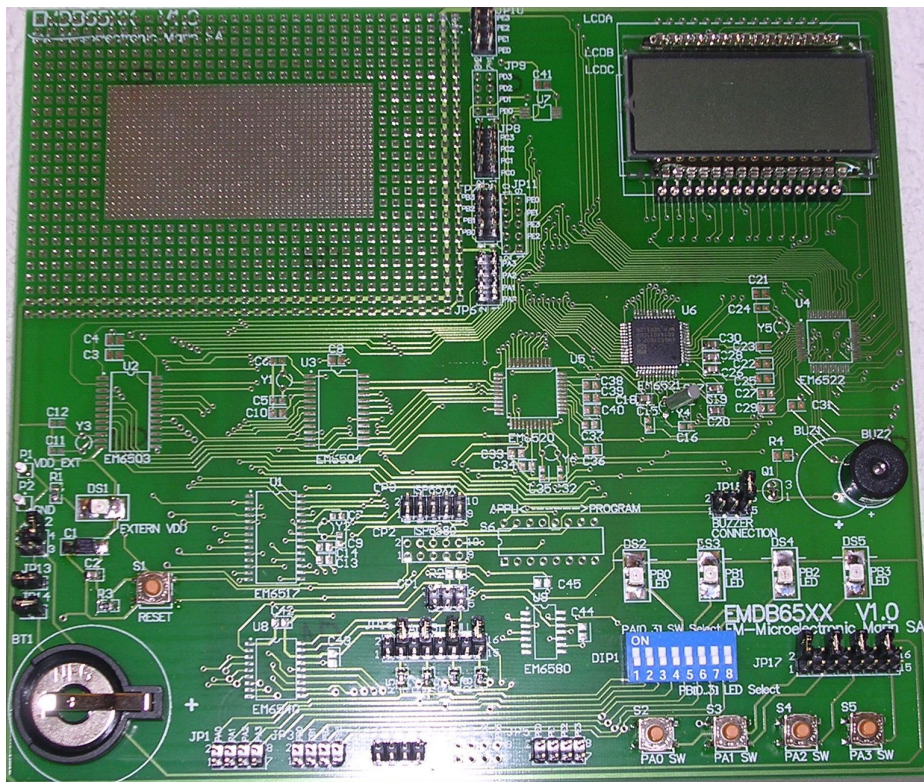
2.2 HARDWARE BOARD VERSIONNING

DemoBoard V2.0

2.3 DEMOBOARD DESCRIPTION

PCB size : 180 mm X 160mm

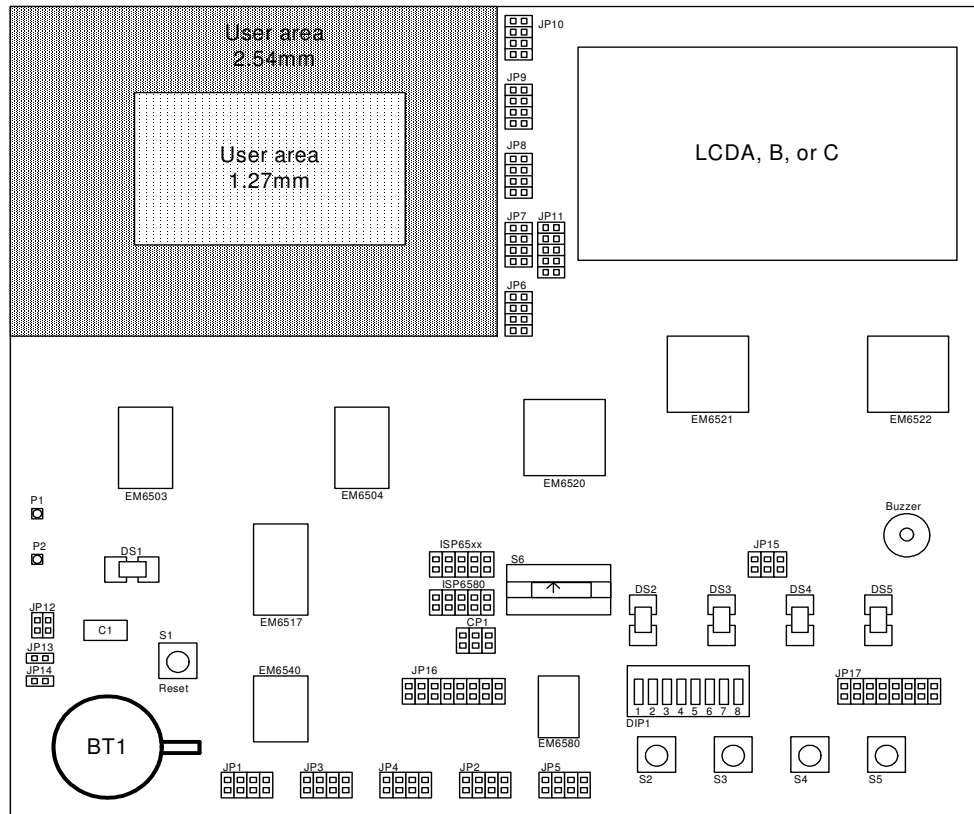|	
USER AREA	Free user area (2.54 mm and 1.27 mm) with power lines (GND and VDD_IN)
S1	Reset Push-Button
S2…S5	4 Push-Buttons connected to PA0-PA3 through DIP1 1-4 switches
S6	Appli <=> program selection for ISP or program operation mode on EM6580
DS1	Low-power red led connected to EXT_VDD
DS2…DS5	4 Low-power red leds connected to PB0-PB3 through DIP1 [8:5] switches
BUZ1/BUZ2	Buzzers connected to PB0 through DIP2-10 switches
DIP1 [4:1]	Switches S1 to S4 are used to connect switches (S2-S5) on (PA0-PA3)
DIP1 [8:5]	Switches S5 to S8 are used to connect LED (DS2-DS5) on (PB0-PB3)
BT1	Battery socket (2032)
U1, U6, U8, U9	Footprint for the MCU device, only one per board
U7	Footprint for SO6 for example DS1626 temperature sensor, not mounted
CP1	In-System-Programming connector for EM6503, 04, 17, 20, 21, 22 and 40 using EMDB65xx
CP2	In-System-Programming connector for EM6580 using smartprog programmer
CP3	In-System-Programming connector for EM6503, 04, 17, 20, 21, 22 and 40 using smartprog
P1	Input for VDD external connection
P2	Input for VSS external connection
JP1	Port A, user connector
JP2	Port B, user connector
JP3	Port C, user connector
JP4	Port D, user connector
JP5	Port E, user connector
JP6	Port A, user connector
JP7	Port B, user connector
JP8	Port C, user connector
JP9	Port D, user connector
JP10	Port E, user connector
JP11	Port E, user connector
JP12	Power supply selection if 1-2 = external supply if 3-4 = Vbat supply
JP13	Power supply for MCU only must be precent to supply it
JP14	Power supply for user area only must be precent to supply it
JP15	Buzzer Connection selection jumper
JP16	External Pull up/down selection for PA[3:0]
JP17	Switch level selection as VDD or VSS (S2-S5)
Q1	optional BC238 for more current on buzzer, not mounted

3. MFP PACKAGES

Refer to the EM65xx/EM66xx datasheets.

MCU	6503	6504	6517	6520	6521	6522	6540	6580
Package	SO24	SO24	SO28	TQFP44	TQFP52	TQFP64	SO18	SO14

6. MAIN CONNECTIONS

6.1 PROGRAMMING

6.1.1 Pins for MFP programming Box - EM6503/ 04/ 17/ 20/ 21/ 22/ 40

CP1 connector is used for this connection (Figure 1).
CP1 = Connector 2x3 pol male - 2.54 mm

6.1.2 Pins for Elnec programmer (ISP) - EM6580

CP2 connector is used for this connection (Figure 2).
CP2 = Connector 2x5 pol male - 2.54 mm

6.1.3 Pins for Elnec programmer (ISP) - EM6503/ 04/ 17/ 20/ 21/ 22/ 40

CP3 connector is used for this connection (Figure 3).
CP3 = Connector 2x5 pol male - 2.54 mm

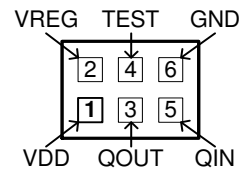#### 6.1.4 Programming interface pinout

VREG   TEST   GND

| 2 | 4 | 6 |
| 1 | 3 | 5 |

VDD   QOUT   QIN

Figure 1: **CP1 pinout**

N.C   TEST   SDIO SCLK VREG/VPP

| 2 | 4 | 6 | 8 | 10 |
| 1 | 3 | 5 | 7 | 9 |

VDD   RESET   N.C.   VSS   VSS

Figure 2: **CP2 pinout**

N.C.   TEST   QIN   QOUT VREG

| 2 | 4 | 6 | 8 | 10 |
| 1 | 3 | 5 | 7 | 9 |

VDD   RESET   N.C.   VSS   VSS
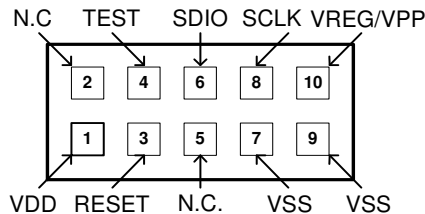
Figure 3: CP3 pinout
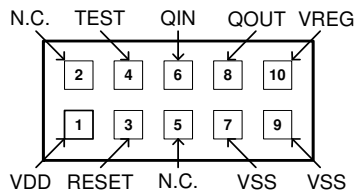
6.2 PORTS

All 4b MCU are connected up to 5 Ports connectors : PortA, PortB, PortC, PortD, PortE respectively PA, PB, PC, PD, PE connectors. Port connectors are available **twice** on the board. One close to the user area, one other on the side of the board. Each Port IO bit are available through a basic connector 2.54 mm double row (Figure 4)
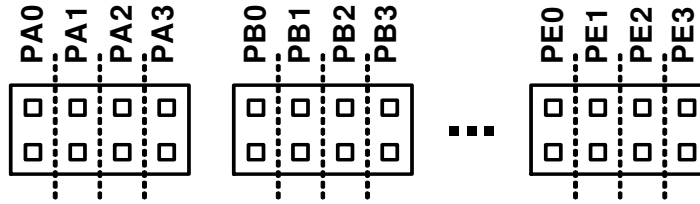
               www.emmicroelectronic.com

Figure 4: Port Connections

	6503	6504	6517	6520	6521	6522	6540	6580
PA0	PORT A0	PORT A0	PORT A0	PORT A0	PORT A0	PORT A0	PORT A0	PORT A0
PA1	PORT A1	PORT A1	PORT A1	PORT A1	PORT A1	PORT A1	PORT A1	PORT A1
PA2	PORT A2	PORT A2	PORT A2	PORT A2	PORT A2	PORT A2	PORT A2	PORT A2
PA3	PORT A3	PORT A3	PORT A3	PORT A3	PORT A3	PORT A3	PORT A3	PORT A3
PB0	PORT B0	PORT B0	PORT B0	PORT B0	PORT B0	PORT B0	PORT B0	PORT A4
PB1	PORT B1	PORT B1	PORT B1	PORT B1	PORT B1	PORT B1	PORT B1	PORT A5
PB2	PORT B2	PORT B2	PORT B2	PORT B2	PORT B2	PORT B2	PORT B2	
PB3	PORT B3	PORT B3	PORT B3	PORT B3	PORT B3	PORT B3	PORT B3	
PC0	PORT C0	PORT C0	PORT C0		STROBE	STROBE	PORT C0	
PC1	PORT C1	PORT C1	PORT C1				PORT C1	
PC2	PORT C2	PORT C2	PORT C2				PORT C2	
PC3	PORT C3	PORT C3	PORT C3				PORT C3	
PD0	PORT D0	STROBE	AIN					
PD1	PORT D1		BIN					
PD2	PORT D2		VREF					
PD3	PORT D3		VGND					
PE0	STROBE		DATA		PORT S0	PORT S0	PSDIO	
PE1			CLK		PORT S1	PORT S1	PSCK	
PE2			STROBE		PORT S2	PORT S2		
PE3					PORT S3	PORT S3		

6.3 GENERAL PURPOSE

VDD_EXT : is available from connector P1 as VDD P2 as VSS.

VSS is also available on several places with test point (for oscilloscope sonde).

7. SIGNALS NOTES

7.1 VDD

Several jumpers are used to allow different configurations (run / prog. mode / current meas.). Capacitor 100nF (decoupling) is placed as close as possible to MCU.
A 47uF capacitor is also used with jumper. It allow to power the application only with this capacitor.
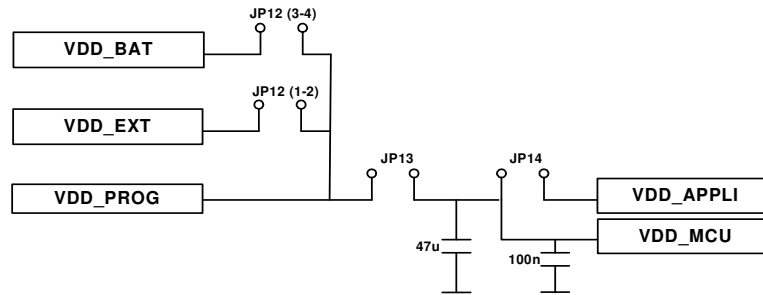

Figure 5: VDD selection

7.2 RESET

Weak pull-down is added. With push-button to force internal reset and available on external connection (only footprint).
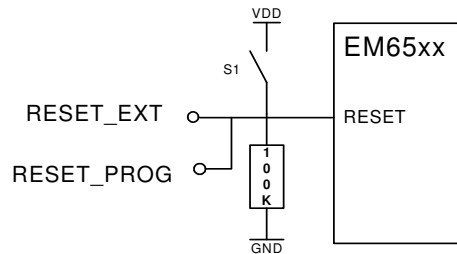

Figure 6: Reset connection

7.3 VSS

Common ground

7.4 TEST

Weak pull-down can be added(only footprint).

7.5 QIN / SDIO AND QOUT/SCLK

A 32768Hz Xtal has to be connected as close as possible to MCU. Near each MCU footprint, a Xtal footprint is placed. 2 footprints 0805 are present (just in case) for optional Xtal capacitor.
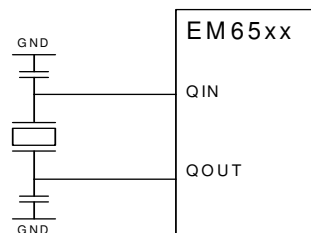

Figure 7: Xtal connections

7.6 VREG AND VREG/VPP

A 100nF is placed between VREG and VSS.

8. PORT A PULL-UP/DOWN SELECTION

For each microcontroller type it's possible to add an external Pull-Up/Down Resistor on the input port A, by using the specific JP16 Jumpers. (See following table for correct configuration)

Port I/O	Pull-Up	Pull-Down
PA0	JP16 1-2	JP16 3-4
PA1	JP16 5-6	JP16 7-8
PA2	JP16 9-10	JP16 11-12
PA3	JP16 13-14	JP16 15-16

9. PORT A SWITCHES CONNECTION

Each switches [S2 :S5] are bitwise configurable by using the DIP1 switches [1:4] for connecting or disconnecting the S switches.(ON position = switch connected)
Polarity selections of the S switches are done by using the specific JP17 jumper. (See following table for correct configuration)

Switches	Pull-Up	Pull-Down
S2 or PA0 SW	JP17 1-2	JP17 3-4
S3 or PA1 SW	JP17 5-6	JP17 7-8
S4 or PA2 SW	JP17 9-10	JP17 11-12
S5 or PA3 SW	JP17 13-14	JP17 15-16

10. PORT B LED CONNECTION

It's Possible to connect or disconnect separately the LED DS[2:5] from the output PB[0:3] by using the DP1 switches [5:8] .(ON position = LED connected)

10.1 LED CONNECTION SELECTION

It's possible to connect the LED on the Port PA[3:0] when the EM6580 is used.
The following table defines the possible configuration:

Resistor	LED Connected to
R9	PB[0]
R10	PB[1]
R11	PB[2]
R12	PB[3]
R13	PA[0]
R14	PA[1]
R15	PA[2]
R16	PA[3]

11. HOW TO CONNECT THE BUZZER

The dedicated JP15 connector is used to select directly which Output Pad is used as buzzer output.
The following table defines the possible configuration:

Devices	Buzzer Output	PB0 Output	PA0	PA1
EM6505/21/22	JP15 2-4	JP15 4-6	Input only	Input only
EM6503/17/40	No Buzzer Output	JP15 4-6	Input only	Input only
EM6580	No Buzzer Output	PA4 input only	JP15 1-3	JP15 3-5

12. HOW TO PROGRAM WITH ELNEC PROGRAMMER

12.1 HOW TO PROGRAM EM6580

It's only possible to program the EM6580 by the ELNEC programmer in ISP programming mode.
The connector of the ELNEC ISP cable must be connected into the CP2 connector (Pin 1 to Pin 1), the S6 switch must be placed in PROGRAM position (1), now it's possible to program the EM6580.

Caution: Jumper JP13 must be present for programming
Remark: Only one EM6580 can be placed on the programming wires in same time.

12.2 HOW TO PROGRAM THE OTHER EM65XX

To program all EM65xx MCU except the EM6580, the user must use the CP3 connector to connect the ELNEC ISP cable to the MCU. (pin 1 to Pin 1)
No any other manipulation is needed to start to program the device.

Caution: Jumper JP13 must be present for programming
Remark: Only one EM65xx can be placed on the programming wires in same time.

13. HOW TO PROGRAM WITH EMPB65XX PROGRAMMER

The EMPB65xx programmer is an internal programming solution using to program all EM65xx MCU version except the EM6580.
It's possible to program each device type by using the ISP mode through the CP1 connector.

Caution: Jumper JP13 must be present for programming
Remark: Only one EM65xx can be placed on the programming wires at the same time.

14. SPECIFICATION HISTORY / HISTORIQUE DE LA SPECIFICATION

Rev.	E.C.N.	Pages	Date	Resp.	Description
1.0			15.01.05		Creation
1.1			16.02.05		Add chapter 8,9,10,11,12, 13
2.0			12.09.05		Add chapter 10.1, New version of PCB v2.0