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MB2146-260

# F<sup>2</sup>MC-8FX Family LQFP-52P (0.65 mm pitch) Header Board Operation Guide

Doc. # 002-07427 Rev. \*A

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# Preface



Thank you for purchasing the LQFP-52P (0.65 mm pitch) \*<sup>1</sup> header board (model number : MB2146-260) for the F<sup>2</sup>MC -8FX family.

MB2146-260 is a header board used to connect the MCU board (model number : MB2146-301, MB2146-303) which mounts the F<sup>2</sup>MC-8FX family evaluation MCU to a user system.


This manual explains the handling of the MB2146-260. Before using MB2146-260, be sure to read this manual.

Consult the Sales representatives or the Support representatives of Cypress for mass-produced MCUs and evaluation MCUs which correspond on MB2146-260.

\*1: The lead pitch of package (FPT-52P-M01) is 0.65 mm and the body size is 10 mm × 10 mm.

## ■ Caution of the products described in this document

The following precautions apply to the product described in this manual.

|  |  |
|--|--|
|  <b>CAUTION</b> | The wrong use of a device will give an injury and may cause malfunction on customers system. |
|--|--|

|               |  |
|---------------|--|
| <b>Cuts</b>   | This product has parts with sharp points that are exposed.<br>Do not touch an edge of the product with your bare hands.  |
| <b>Damage</b> | When connecting the header board to the user system, correctly position the index mark (▲) on the NQPACK mounted on the user system with the 1 pin direction(1) on the header board, otherwise the MCU board and user system might be damaged. |
| <b>Damage</b> | When mounting a mass production MCU, correctly position pin 1, otherwise the mass production MCU and user system might be damaged.   |

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# 1. Product Outline



## 1.1 Product Outline

MB2146-260 is a header board (referred to as header board) used to connect the MCU board (model number : MB2146-301, MB2146-303) which mounts an evaluation MCU in the F<sup>2</sup>MC-8FX family of Cypress 8-bit microcontrollers to a user system. To build an F<sup>2</sup>MC-8FX evaluation environment, combine the three products as shown in Figure 1-1: the header board, a MCU board, and a BGM adapter (model number : MB2146-09).

For more information please visit our following websites:

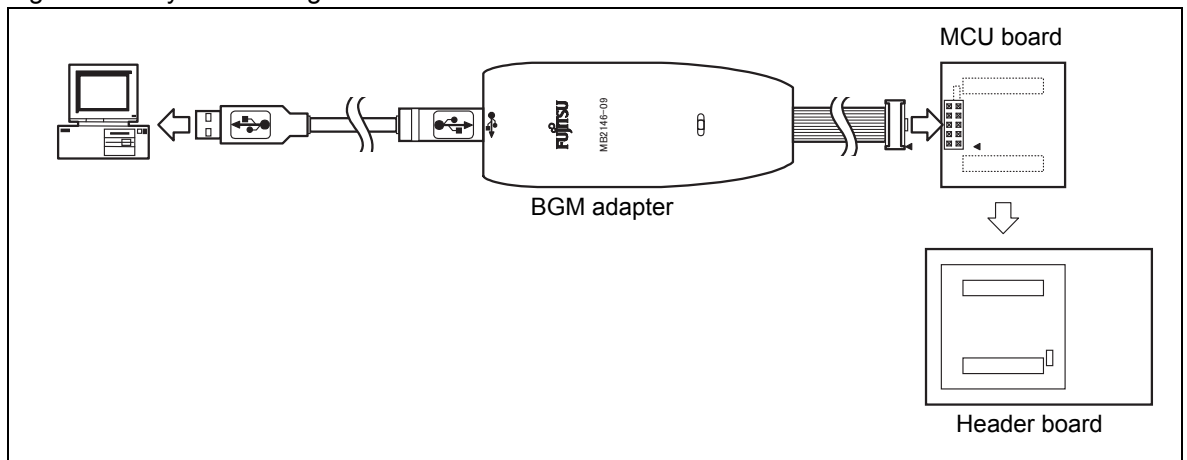
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Figure 1-1. System Configuration



## 1.2 Product Configuration

Table 1-1 lists the product configuration in the header board, and Table 1-2 lists options.

Table 1-1. Product Configuration

| Name   | Description   | Remarks               |
|--|---|-----------------------|
| F <sup>2</sup> MC-8FX<br>LQFP-52P (0.65 mm pitch)<br>header board<br>[Model number : MB2146-260] | Connector/LQFP52pin<br>(0.65 mm pitch) Package conversion | -                     |
| [Model number : YQPACK052SB]<br>(Tokyo Eletech Corporation)                                      | I/F between header board and NQPACK                       | Accessory (connected) |
| [Model number : NQPACK052SB]<br>(Tokyo Eletech Corporation)                                      | For mounted on user system                                | Accessory             |
| [Model number : HQPACK052SB]<br>(Tokyo Eletech Corporation)                                      | Used when mounting mass production MCU to NQPACK.         | Accessory             |

Table 1-2. Options

| Name   | Description                             | Remarks   |
|--|---|---|
| BGM adapter<br>[Model number : MB2146-09]            | ICE unit for F <sup>2</sup> MC-8FX      | -   |
| MCU board<br>[Model number : MB2146-301, MB2146-303] | Built-in MB95FV100B-101, MB95FV100B-103 | Built-in F <sup>2</sup> MC-8FX evaluation MCU * |

\* : Multiple types of evaluation MCUs are available depending on their applications. Purchase the one that satisfies the service conditions.

## 2. Checking the Delivered Product



Before using the MB2146-260, confirm that the following components are included in the box:

|   |     |
|---|-----|
| ■ LQFP-52P (0.65 mm pitch) header board * <sup>1</sup>        | : 1 |
| ■ Screws for securing header board (M2 × 10 mm, 0.4 mm pitch) | : 4 |
| ■ NQPACK052SB * <sup>2</sup>                                  | : 1 |
| ■ HQPACK052SB * <sup>3</sup>                                  | : 1 |
| ■ Operation manual (English version, this manual)             | : 1 |

\*1: Header board manufactured by Tokyo Eletech Corporation, referred to as "YQPACK", mounts YQPACK052SB.

\*2: IC socket manufactured by Tokyo Eletech Corporation, referred to as "NQPACK", is supplied with a special screwdriver and 2 guide pins. A socket offering higher reliability, NQPACK052SB-SL (manufactured by Tokyo Eletech Corporation and sold separately), can be used by making an IC socket mounting hole on the user system board. For more information, contact Tokyo Eletech Corporation.

\*3: IC socket cover manufactured by Tokyo Eletech Corporation, referred to as "HQPACK", is supplied with 4 screws for securing HQPACK (M2 × 6 mm, 0.4 mm pitch).



### 3. Handling Precautions



The header board is precision-manufactured to improve the dimensional accuracy and to ensure a reliable contact. The header board is therefore sensitive to mechanical shocks. To ensure a correct use of the header board in the proper environment, observe the following:

- Avoid placing a stress on the NQPACK mounted on the user system board when connecting the header board.

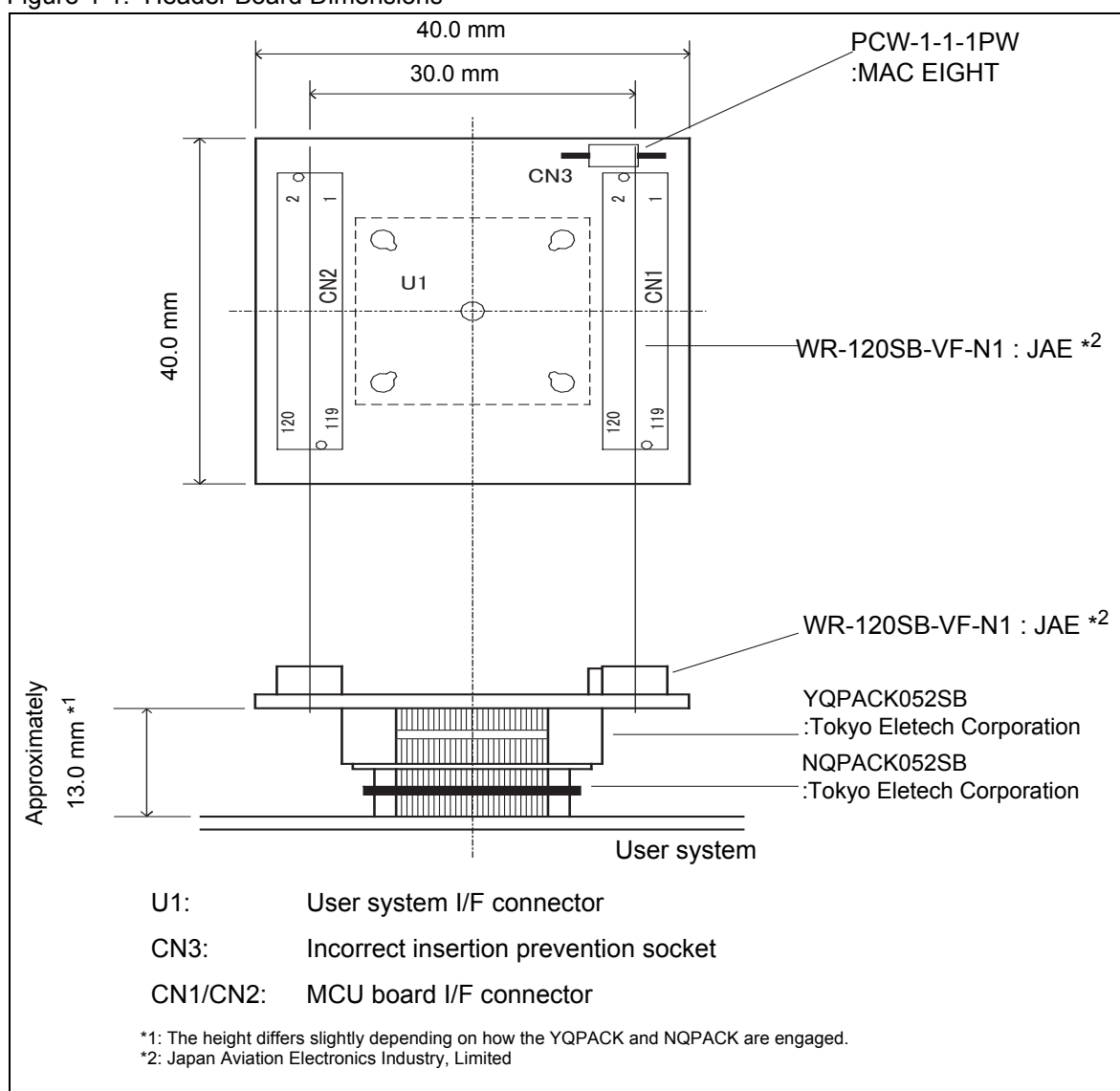
## 4. Notes on Designing



### 4.1 Notes on designing printed circuit board for the user system

When the header board is connected to the user system, some part mounted around the NQPACK in the user system may be contacting the header board if the height of the part is tall. To prevent this, design the printed circuit board for the user system so that the components do not exceed the height shown in Figure 4-1. Figure 4-1 shows the dimension figure of the header board.

Figure 4-1. Header Board Dimensions

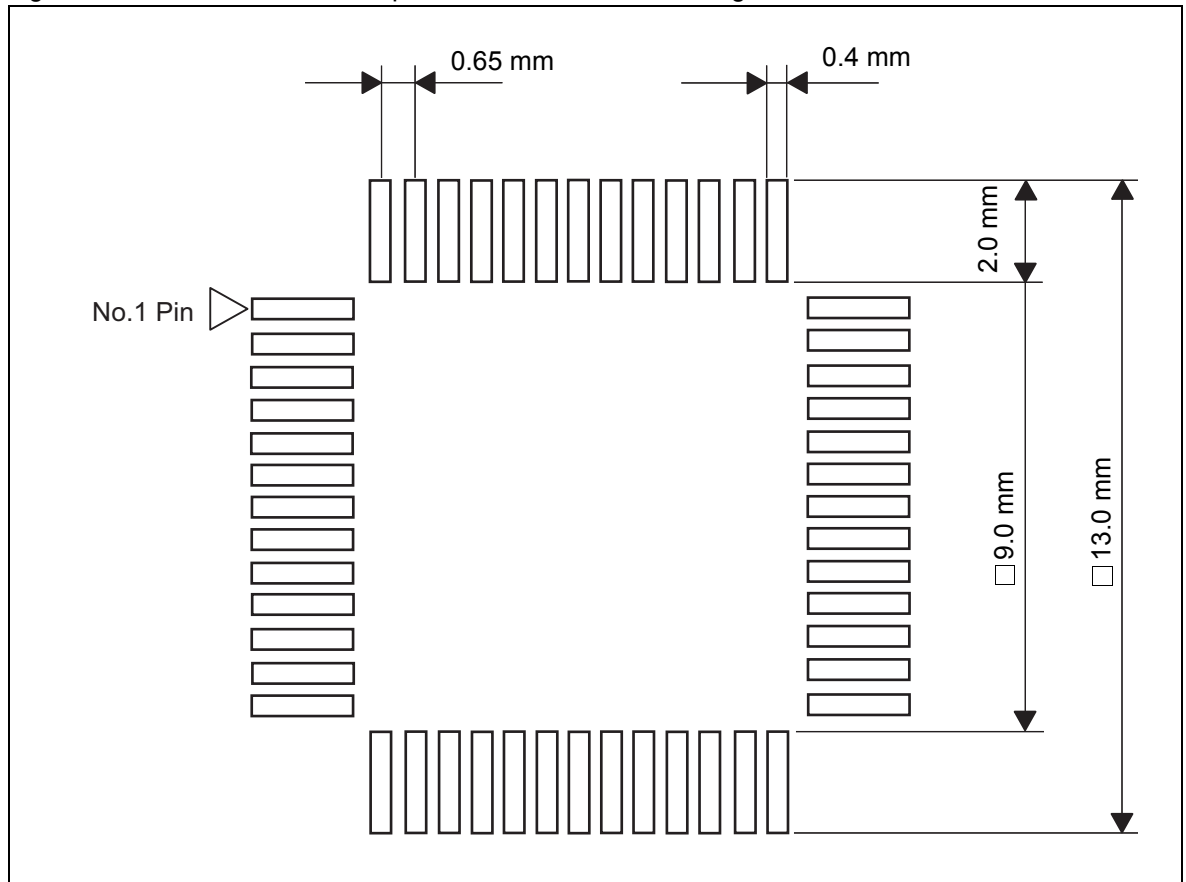


## 4.2 MCU Footprint Design Notes

Figure 4-2 shows the recommended footprint dimensions of the NQPACK mounted on the printed circuit board for the user system. Take the footprint in Figure 4-2 into consideration as well as the footprint of the mass production MCU when designing the printed circuit board for the user system.

To follow the most updated information, be sure to contact Tokyo Eletech Corporation whenever designing the printed circuit board.

Figure 4-2. Recommended Footprint Dimensions for Mounting the NQPACK



## 5. Connecting to the User System

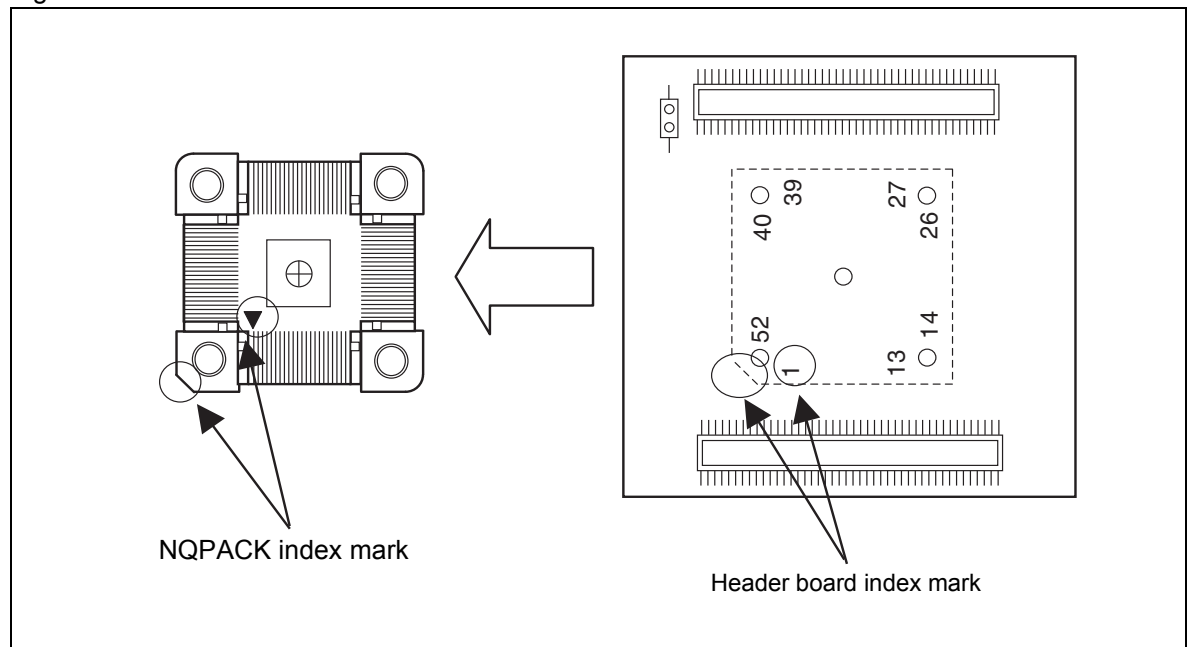


### 5.1 Connecting

Mount the supplied NQPACK on the user system before using the MB2146-260.

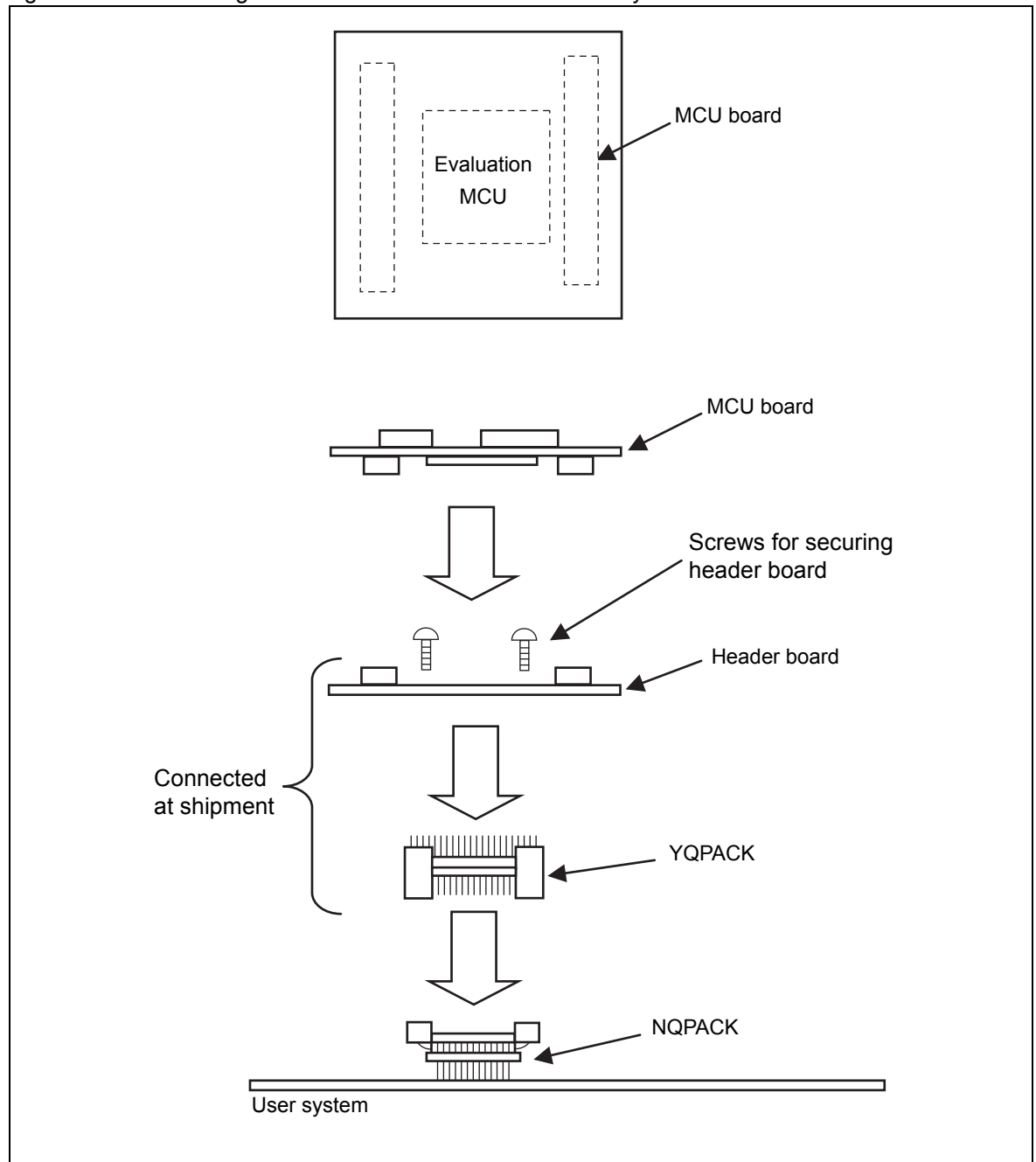
1. To connect the header board to the user system, match pin 1 indicated by the index mark (▲) on the NQPACK mounted on the user system with pin 1 indicated by the index mark (an angle cut linearly at one place only in silk screen) on the header board and then insert it (see Figure 5-1). The pins of YQPACK are thin and easy to bend. Insert NQPACK after confirming that the pins of YQPACK are not bent.

Figure 5-1. Index Position



2. Insert each screw for securing the header board into each of the four tapped holes on the header board, and then tighten the screws diagonally. The center screw hole is not used. To tighten the screws, use the special screwdriver supplied with the NQPACK to equally tighten the four screws in sequence. Tightening the screws too tight might result in a defective contact.
3. Connect the MCU board to the header board while being careful not to excessively force the NQPACK. The MCU board can be connected to the header board only in the correct orientation as they have an incorrect insertion prevention header socket to prevent a reverse connection. Figure 5-2 illustrates how the MCU board, header board, NQPACK, and user system are connected together.

Figure 5-2. Connecting MCU Board/Header Board to User System



## 5.2 Disconnection

1. Remove the MCU board from the header board. Detach the four corners slowly in sequence, not excessively forcing the junction with the NQPACK.
2. Remove all of the four screws from the header board. Pull out the header board vertically from the NQPACK. Remove the header board slowly not excessively forcing the junction with the NQPACK.

## 6. Mounting Mass Production MCUs

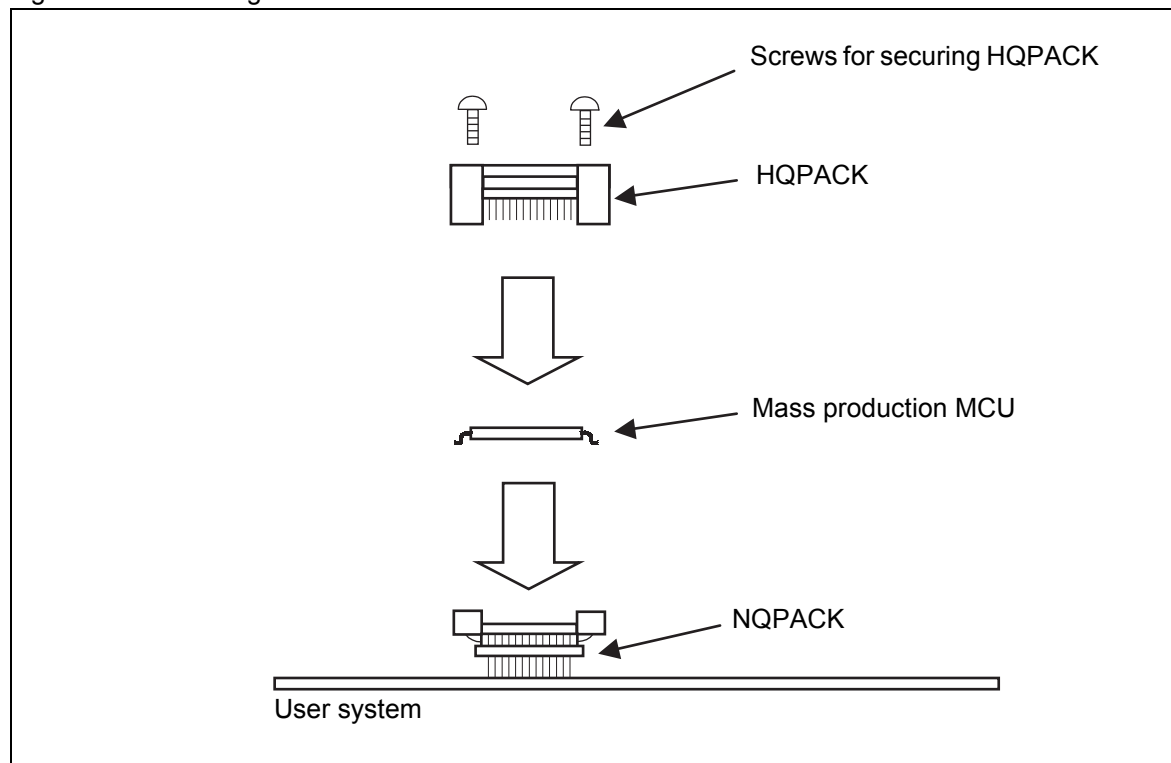


### 6.1 Mounting

To mount a mass production MCU on the user system, use the supplied HQPACK (IC socket cover) (see “Figure 6-1”) .

1. To mount a mass production MCU on the user system, match the index mark (▲) on the NQPACK mounted on the user system with the index mark (●) on the mass production MCU.
2. Confirm that the mass production MCU is correctly mounted on the NQPACK. Next, match the index mark of HQPACK with the index mark of NQPACK and insert it (angle cut linearly at one place only) .  
The pins of HQPACK are thin and easy to bend. Insert NQPACK after confirming that pins of HQPACK are not bent.
3. Insert each screw for securing HQPACK in each of four tapped holes on the HQPACK, and then tighten the screws diagonally. To tighten the screws, use the special screwdriver supplied with the NQPACK to finally tighten the four screws in sequence. Tightening the screws too tight might result in a defective contact.

Figure 6-1. Mounting a Mass Production MCU



## 6.2 Disconnection

To remove the HQPACK, remove all of the four screws and pull out the HQPACK vertically from the NQPACK. When taking out the mass production MCU, absorb the mass production MCU using a vacuum pick-up tool special for removing IC. Do not attempt to remove the mass production MCU forcibly, for example, using a screwdriver to do so can bend the pins of the mass production MCU or break the NQPACK.

## 7. Product Specifications



### 7.1 General Specifications

Table 7-1 lists the general specifications of the header board.

Table 7-1. General Specifications

| Item  | Description  |
|---|--|
| Operating temperature and storage temperature | 5°C to 35°C (operation) , 0°C to 40°C (storage)                                    |
| Operating humidity and storage humidity       | 20 % to 80 % (operation) , 20 % to 80 % (storage)                                  |
| Dimensions                                    | Approximately 40 mm × 40 mm × 16 mm<br>(Height contains that of YQPACK and NQPACK) |

### 7.2 Main Part

The main part of a header board is shown in Table 7-2.

Table 7-2. Main Part

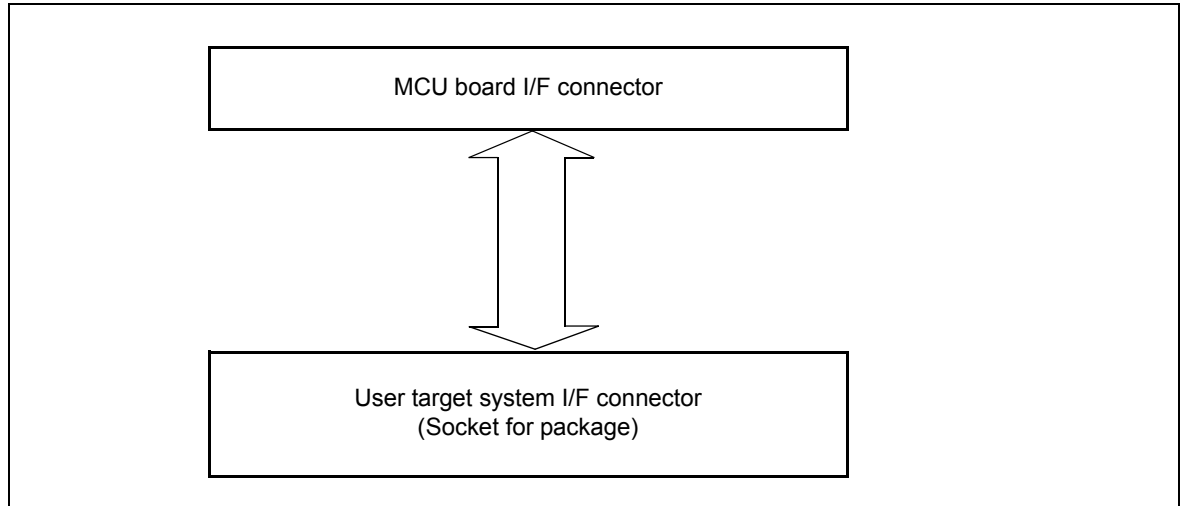
| Name                                  | Description   |
|---------------------------------------|---|
| MCU board I/F connector               | 120 pin, 0.5 mm pitch, 2-piece connector<br>(straight) × 2<br>[Model number : WR-120SB-VF-N1<br>(from Japan Aviation Electronics Industry, Limited) ] |
| Incorrect insertion prevention socket | 2 pin, 2.54 mm pitch, 1-piece socket<br>(Straight)<br>[Model number : PCW-1-1-1PW (from MAC EIGHT) ]  |
| User target system I/F connector      | Socket<br>52 pin, 0.65 mm pitch<br>[Model number : YQPACK052SB (from Tokyo Eletech Corporation) ]   |



## 7.3 Functional Block Diagram

A header board performs socket conversion between the MCU board I/F connector and YQPACK. The header board does not contain any component such as an IC internally. Figure 7-1 shows the block diagram.

Figure 7-1. Functional Block Diagram



## 7.4 MCU Board I/F Connector (CN1, CN2, and CN3)

CN1 and CN2 are MCU board I/F connectors. CN3 is the incorrect insertion prevention socket of a MCU board. The pin assignment of the MCU board I/F connector CN1 is shown in Table 7-3, and the pin assignment of the MCU board I/F connector CN2 is shown in Table 7-4.

Table 7-3. Pin Assignment of the MCU Board I/F Connector CN1

| Connector Pin Number | Evaluation MCU Pin Number | Signal name | Connector Pin Number | Evaluation MCU Pin Number | Signal name | Connector Pin Number | Evaluation MCU Pin Number | Signal name |
|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
| 1                    | A9                        | PC4         | 41                   | E2                        | LVR3        | 81                   | P3                        | BSOUT       |
| 2                    | B9                        | PC1         | 42                   | E1                        | LVSS        | 82                   | P4                        | BDBMX       |
| 3                    | C9                        | PC2         | 43                   | F4                        | LVDREXT     | 83                   | R1                        | P83         |
| 4                    | D9                        | PC3         | 44                   | F3                        | LVDBGR      | 84                   | R2                        | BRSTX       |
| 5                    | A8                        | PC0         | 45                   | F2                        | LVDEX       | 85                   | R3                        | X0A         |
| 6                    | B8                        | PB4         | 46                   | F1                        | P22A        | 86                   | R4                        | RSTX        |
| 7                    | C8                        | PB5         | 47                   | -                         | GND         | 87                   | T1                        | ROMS1       |
| 8                    | D8                        | PB6         | 48                   | -                         | GND         | 88                   | T2                        | BSIN        |
| 9                    | A7                        | PB7         | 49                   | G4                        | P20A        | 89                   | T3                        | Vss         |
| 10                   | B7                        | PB2         | 50                   | G3                        | NC1         | 90                   | T4                        | X0          |
| 11                   | C7                        | PB0         | 51                   | G2                        | P21A        | 91                   | U1                        | BEXCK       |
| 12                   | D7                        | PB1         | 52                   | G1                        | P23A        | 92                   | U2                        | X1          |
| 13                   | A6                        | PB3         | 53                   | H4                        | P24A        | 93                   | U3                        | MOD         |
| 14                   | B6                        | PA2         | 54                   | H3                        | P25A        | 94                   | U4                        | PF2         |
| 15                   | C6                        | P95         | 55                   | H2                        | P26A        | 95                   | V1                        | X1A         |
| 16                   | D6                        | PA0         | 56                   | H1                        | P27A        | 96                   | V2                        | Vcc53       |
| 17                   | A5                        | PA3         | 57                   | J4                        | P24B        | 97                   | -                         | GND         |
| 18                   | B5                        | P94         | 58                   | J3                        | P50         | 98                   | -                         | GND         |
| 19                   | C5                        | P90         | 59                   | J2                        | P23B        | 99                   | V3                        | PINT0       |
| 20                   | D5                        | P91         | 60                   | J1                        | P51         | 100                  | V4                        | PSEL_EXT    |
| 21                   | A4                        | PA1         | 61                   | K1                        | P52         | 101                  | R5                        | PF1         |
| 22                   | A3                        | P93         | 62                   | K2                        | P55         | 102                  | T5                        | PF0         |
| 23                   | -                         | GND         | 63                   | K3                        | P54         | 103                  | U5                        | NC2         |
| 24                   | -                         | GND         | 64                   | K4                        | P53         | 104                  | V5                        | PENABLE     |
| 25                   | A2                        | CSVENX      | 65                   | L1                        | P70         | 105                  | R6                        | APBENX      |
| 26                   | A1                        | Vss         | 66                   | L2                        | P74         | 106                  | T6                        | PINT1       |
| 27                   | B4                        | P92         | 67                   | L3                        | P73         | 107                  | U6                        | PCLK        |
| 28                   | B3                        | TCLK        | 68                   | L4                        | P72         | 108                  | V6                        | PADDR0      |
| 29                   | B2                        | LVCC        | 69                   | M1                        | P71         | 109                  | R7                        | PACTIVE     |
| 30                   | B1                        | LVDIN       | 70                   | M2                        | P76         | 110                  | T7                        | PLOCK       |
| 31                   | C4                        | Cpin        | 71                   | M3                        | P80         | 111                  | U7                        | PWRITE      |
| 32                   | C3                        | Vcc51       | 72                   | M4                        | P77         | 112                  | V7                        | PADDR1      |
| 33                   | C2                        | LVDEX2      | 73                   | -                         | GND         | 113                  | R8                        | PADDR2      |
| 34                   | C1                        | LVR4        | 74                   | -                         | GND         | 114                  | T8                        | PADDR3      |
| 35                   | D4                        | TESTO       | 75                   | N1                        | P75         | 115                  | U8                        | PADDR4      |
| 36                   | D3                        | LVDOUT      | 76                   | N2                        | P82         | 116                  | V8                        | PADDR5      |
| 37                   | D2                        | LVR2        | 77                   | N3                        | PG0         | 117                  | R9                        | PADDR7      |
| 38                   | D1                        | BGOENX      | 78                   | N4                        | P84         | 118                  | T9                        | PRDATA0     |
| 39                   | E4                        | LVR1        | 79                   | P1                        | P81         | 119                  | U9                        | PADDR6      |
| 40                   | E3                        | LVR0        | 80                   | P2                        | ROMS0       | 120                  | V9                        | PRDATA1     |

Table 7-4. Pin Assignment of the MCU Board I/F Connector CN2

| Connector Pin Number | Evaluation MCU Pin Number | Signal name | Connector Pin Number | Evaluation MCU Pin Number | Signal name | Connector Pin Number | Evaluation MCU Pin Number | Signal name |
|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
| 1                    | A10                       | PC5         | 41                   | E17                       | NC4         | 81                   | P16                       | P34         |
| 2                    | B10                       | PD0         | 42                   | E18                       | SEL0        | 82                   | P15                       | P35         |
| 3                    | C10                       | PC6         | 43                   | F15                       | SEL3        | 83                   | R18                       | P44         |
| 4                    | D10                       | PC7         | 44                   | F16                       | SEL4        | 84                   | R17                       | P36         |
| 5                    | A11                       | PD1         | 45                   | F17                       | SEL1        | 85                   | R16                       | P31         |
| 6                    | B11                       | PD2         | 46                   | F18                       | P04C        | 86                   | R15                       | AVcc3       |
| 7                    | C11                       | PD3         | 47                   | -                         | GND         | 87                   | T18                       | P40         |
| 8                    | D11                       | PD4         | 48                   | -                         | GND         | 88                   | T17                       | P32         |
| 9                    | A12                       | PD5         | 49                   | G15                       | P06C        | 89                   | T16                       | AVss        |
| 10                   | B12                       | PD7         | 50                   | G16                       | P07C        | 90                   | T15                       | AVR         |
| 11                   | C12                       | P61         | 51                   | G17                       | P05C        | 91                   | U18                       | P33         |
| 12                   | D12                       | P60         | 52                   | G18                       | P00C        | 92                   | U17                       | P30         |
| 13                   | A13                       | PD6         | 53                   | H15                       | P01C        | 93                   | U16                       | AVR3        |
| 14                   | B13                       | P64         | 54                   | H16                       | P02C        | 94                   | U15                       | P15         |
| 15                   | C13                       | P66         | 55                   | H17                       | P03C        | 95                   | V18                       | AVcc        |
| 16                   | D13                       | P65         | 56                   | H18                       | P07A        | 96                   | V17                       | DA0         |
| 17                   | A14                       | P62         | 57                   | J15                       | P04A        | 97                   | -                         | GND         |
| 18                   | B14                       | PE0A        | 58                   | J16                       | P05A        | 98                   | -                         | GND         |
| 19                   | C14                       | PE3A        | 59                   | J17                       | P06A        | 99                   | V16                       | P14         |
| 20                   | D14                       | PE2A        | 60                   | J18                       | P03A        | 100                  | V15                       | P10         |
| 21                   | A15                       | P63         | 61                   | K18                       | P02A        | 101                  | R14                       | P16         |
| 22                   | A16                       | P67         | 62                   | K17                       | P07B        | 102                  | T14                       | DA1         |
| 23                   | -                         | GND         | 63                   | K16                       | P01A        | 103                  | U14                       | P13         |
| 24                   | -                         | GND         | 64                   | K15                       | P00A        | 104                  | V14                       | PWDATA7     |
| 25                   | A17                       | PE4A        | 65                   | L18                       | P06B        | 105                  | R13                       | P11         |
| 26                   | A18                       | Vcc54       | 66                   | L17                       | P05B        | 106                  | T13                       | P12         |
| 27                   | B15                       | PE1A        | 67                   | L16                       | P04B        | 107                  | U13                       | NC3         |
| 28                   | B16                       | PE5A        | 68                   | L15                       | P03B        | 108                  | V13                       | PWDATA3     |
| 29                   | B17                       | PE7A        | 69                   | M18                       | P02B        | 109                  | R12                       | PWDATA5     |
| 30                   | B18                       | PE3B        | 70                   | M17                       | P00B        | 110                  | T12                       | PWDATA6     |
| 31                   | C15                       | PE6A        | 71                   | M16                       | P46         | 111                  | U12                       | PWDATA4     |
| 32                   | C16                       | Vss         | 72                   | M15                       | P47         | 112                  | V12                       | PRDATA7     |
| 33                   | C17                       | PE2B        | 73                   | -                         | GND         | 113                  | R11                       | PWDATA0     |
| 34                   | C18                       | PE7B        | 74                   | -                         | GND         | 114                  | T11                       | PWDATA1     |
| 35                   | D15                       | PE1B        | 75                   | N18                       | P01B        | 115                  | U11                       | PWDATA2     |
| 36                   | D16                       | PE0B        | 76                   | N17                       | P43         | 116                  | V11                       | PRDATA6     |
| 37                   | D17                       | PE6B        | 77                   | N16                       | P41         | 117                  | R10                       | PRDATA3     |
| 38                   | D18                       | SEL2        | 78                   | N15                       | P42         | 118                  | T10                       | PRDATA4     |
| 39                   | E15                       | PE5B        | 79                   | P18                       | P45         | 119                  | U10                       | PRDATA5     |
| 40                   | E16                       | PE4B        | 80                   | P17                       | P37         | 120                  | V10                       | PRDATA2     |

## 7.5 User System I/F YQPACK (U1)

The pin assignment of the user system I/F YQPACK in the header board is shown in Table 7-5.

Table 7-5. Pin Assignment of the User System I/F YQPACK in Header Board

| Connector Pin Number | Signal name      | Connector Pin Number | Signal name     |
|----------------------|------------------|----------------------|-----------------|
| 1                    | P65/SCK          | 27                   | V <sub>CC</sub> |
| 2                    | P66/SOT          | 28                   | Cpin            |
| 3                    | P67/SIN          | 29                   | X1A/PG2         |
| 4                    | P37/AN07         | 30                   | X0A/PG1         |
| 5                    | P36/AN06         | 31                   | RSTX            |
| 6                    | P35/AN05         | 32                   | P00/INT00/HC00  |
| 7                    | NC               | 33                   | NC              |
| 8                    | P34/AN04         | 34                   | P01/INT01/HC01  |
| 9                    | P33/AN03         | 35                   | P02/INT02/HC02  |
| 10                   | P32/AN02         | 36                   | P03/INT03/HC03  |
| 11                   | P31/AN01         | 37                   | P04/INT04/HC04  |
| 12                   | P30/AN00         | 38                   | P05/INT05/HC05  |
| 13                   | AV <sub>SS</sub> | 39                   | P06/INT06/HC06  |
| 14                   | AV <sub>CC</sub> | 40                   | P07/INT07/HC07  |
| 15                   | P24/EC0          | 41                   | P10/UI0         |
| 16                   | P23/TO01         | 42                   | P11/UO0         |
| 17                   | P22/TO00         | 43                   | P12/UCK0        |
| 18                   | P21/PPG01        | 44                   | P13/TRG0/ADTG   |
| 19                   | P20/PPG00        | 45                   | P14/PPG0        |
| 20                   | NC               | 46                   | NC              |
| 21                   | P51/SDA0         | 47                   | P15             |
| 22                   | P50/SCL0         | 48                   | P60/PPG10       |
| 23                   | MOD              | 49                   | P61/PPG11       |
| 24                   | X0               | 50                   | P62/TO10        |
| 25                   | X1               | 51                   | P63/TO11        |
| 26                   | V <sub>SS</sub>  | 52                   | P64/EC1         |

# Revision History



## Document Revision

| Document Title: MB2146-260 F <sup>2</sup> MC-8FX Family LQFP-52P (0.65 mm pitch) Header Board Operation Guide |         |            |                  |  |
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