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MB2146-220

# F<sup>2</sup>MC-8FX Family LQFP-64P (0.5mm Pitch) Header Board Operation Guide

Doc. # 002-07326 Rev. \*A

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# Preface



Thank you for purchasing the LQFP-64P (0.5 mm pitch) \*<sup>1</sup> header board (MB2146-220) for the F<sup>2</sup>MC \*<sup>2</sup>-8FX family.

The LQFP-64P header board is used in the header board unit to connect the MCU board (MB2146-3xx) which mounted F<sup>2</sup>MC-8FX family evaluation MCU board to a user system.

This manual explains the handling of the MB2146-220 header board for the F<sup>2</sup>MC-8FX family. Before using the MB2146-220 header board, 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 a MB2146-220 header board.

\*1: The lead pitch of PACKAGE (FPT-64P-M03) is 0.5 mm and the body size is 10 mm × 10 mm.

\*2: mm.Using the product safely.

## ■ 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 edge of the product with your bare hands.   |
| <b>Damage</b>  | When connect 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 bord 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

This product is a header board used to connect the MCU board (Part number : MB2146-3xx) carrying 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 three products: the header board, MCU board, and BGM adapter (Part number : MB2146-09).

For more information please visit our following websites:

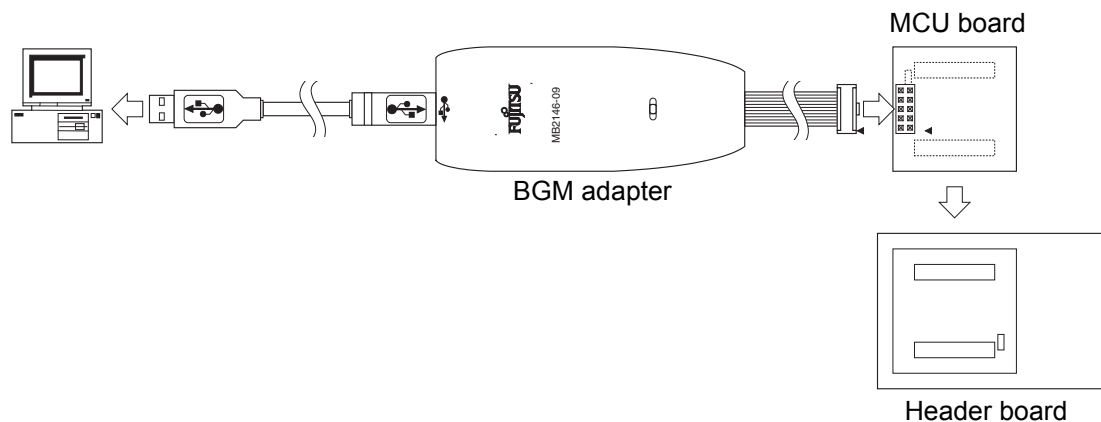
<http://www.cypress.com/documentation/development-kitsboards/mb2146-220>

<http://www.cypress.com/documentation/development-kitsboards/mb2146-09a-e>

<http://www.cypress.com/documentation/development-kitsboards/mb2146-301a-e>

<http://www.cypress.com/documentation/development-kitsboards/mb2146-303a-e>

Figure 1-1. System-configuration



## 1.2 Product configuration

Tables 1-1, and Table 1-2. list the product configuration in the header board package and options.

Table 1-1. Product Configuration

| Name   | Description  | Remarks                           |
|--|--|-----------------------------------|
| F <sup>2</sup> MC-8FX<br>LQFP-64P (0.5 mm pitch)<br>Header board<br>[Part number:MB2146-220] | Connector/LQFP64pin<br>(0.5 mm pitch) Package conversion             | —                                 |
| [Part number : YQPACK064SD]<br>(Tokyo Eletech Corporation)                                   | Header board-I/F between NQPACK                                      | Include<br>(Finishing connection) |
| [Part number : NQPACK064SD]<br>(Tokyo Eletech Corporation)                                   | User system mounting   | Include                           |
| [Part number : HQPACK064SD]<br>(Tokyo Eletech Corporation)                                   | It is used at the time of mass-production<br>MCU mounting to NQPACK. | Include                           |

Table 1-2. Option (sold separately)

| Name                                     | Description                            | Remarks  |
|--|--|--|
| BGM adapter<br>[Part number : MB2146-09] | The ICE unit for F <sup>2</sup> MC-8FX | —  |
| MCU board<br>[Part number : MB2146-3xx]  | MB95FV100-xxx Built in                 | F <sup>2</sup> MC-8FX evaluation MCU<br>Built in * |

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

## 2. Checking the Delivered Product



Before using the LQFP-64P header board, confirm that the following components are included in the box:

- |   |     |
|---|-----|
| ■ LQFP-64P (0.5 mm pitch) Header board * <sup>1</sup>         | : 1 |
| ■ Screws for securing Header board (M2 × 10 mm, 0.4 mm pitch) | : 4 |
| ■ NQPACK064SD * <sup>2</sup>                                  | : 1 |
| ■ HQPACK064SD * <sup>3</sup>                                  | : 1 |
| ■ Operation manual (English version, this manual)             | : 1 |

\*<sup>1</sup>: Referred to as "header board". Header board is mounted on YQPACK064SD (Tokyo Eletech Corporation), referred to as "YQPACK".

\*<sup>2</sup>: IC socket manufactured by Tokyo Eletech Corporation, referred to as "NQPACK", and supplied with a special screwdriver and 2 guide pins. A socket offering higher reliability, NQPACK064SD-SL (Tokyo Eletech Corporation, sold separately), can be used by making an IC socket mounting hole on the user system board. For more information, contact Tokyo Eletech Corporation.

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

### 3. Handling Precautions



The header board is precision-manufactured to improve dimensional accuracy and to ensure reliable contact. The header is therefore sensitive to mechanical shock. To ensure correct use of the header in the proper environment, observe the following points regarding its insertion and removal:

- To avoid placing stress on the NQPACK mounted on the user system board during connecting the header board.

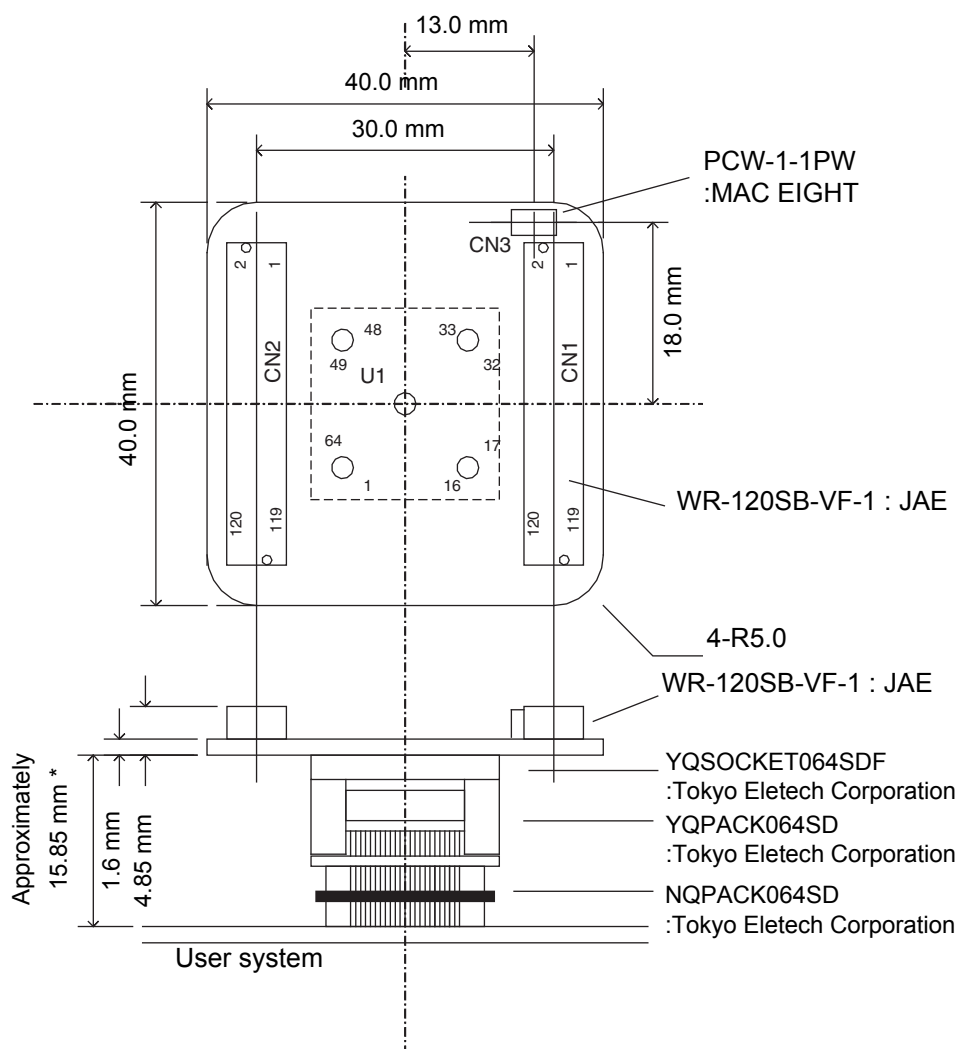
## 4. Notes on Designing



### 4.1 Restrictions of PC board for the user system

If a tall component is mounted around the NQPACK mounted on the user system, the header board connected to the user system touches the component. To prevent this, design the pc board of the user system such that the height specified in Figure 4-1 is not exceeded. Figure 4-1 shows dimension figure of the header board.

Figure 4-1. Header board dimensions



U1:User system I/F connector

CN3:Incorrect insertion preventive socket

CN1/CN2:MCU board I/F connector

\* : The height differs slightly depending on how the socket are engaged.

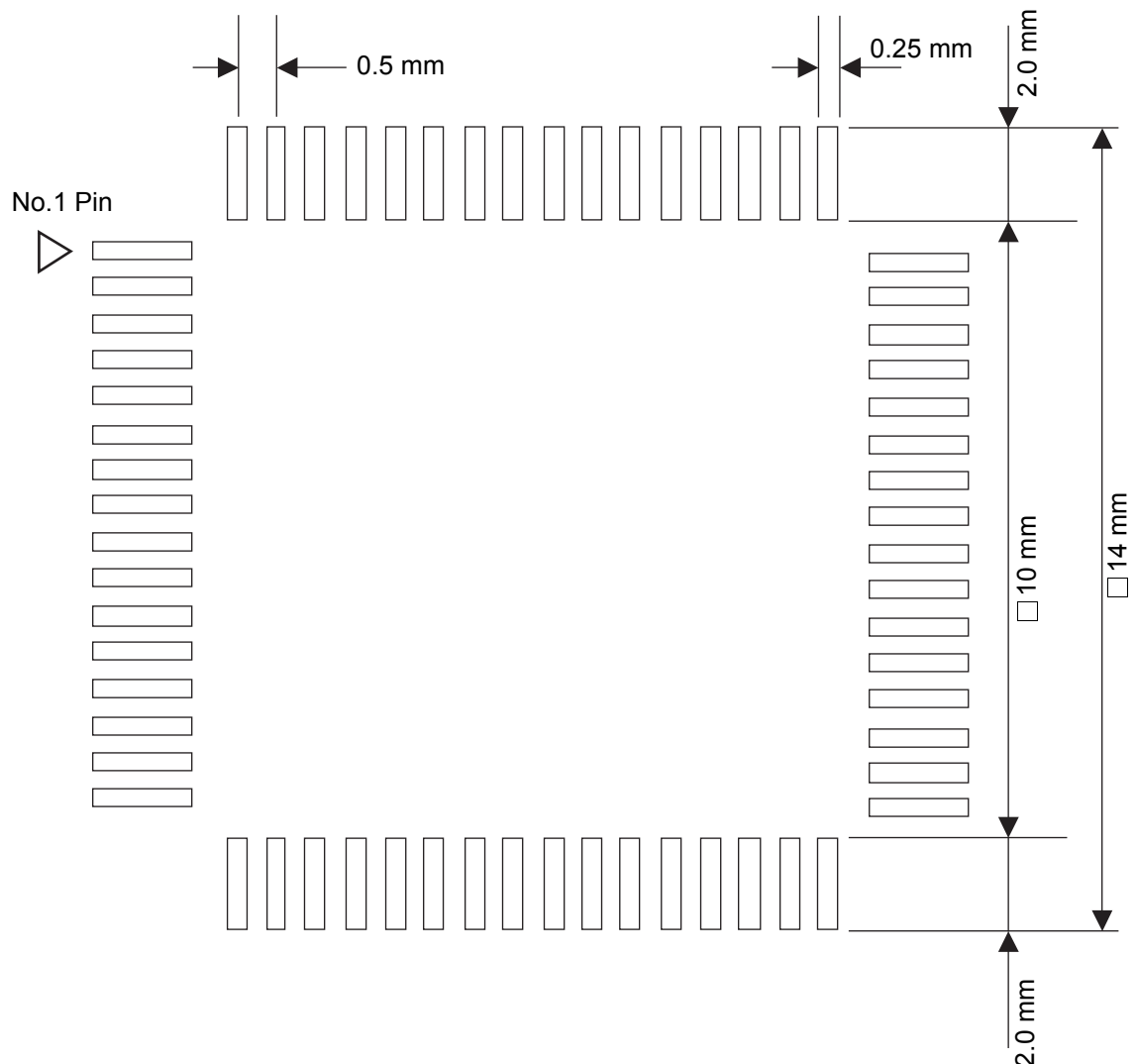
## 4.2 MCU footprint design notes

Figure 4-2 shows the recommended dimensions of the NQPACK footprint mounted on the PC board of the user system.

The PC board of the user system must be designed with due consideration given to this footprint as well as to the mass production MCU.

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

Figure 4-2. Recommended dimensions of the footprint for mounting the NQPACK



## 5. Procedure for Connecting the User System

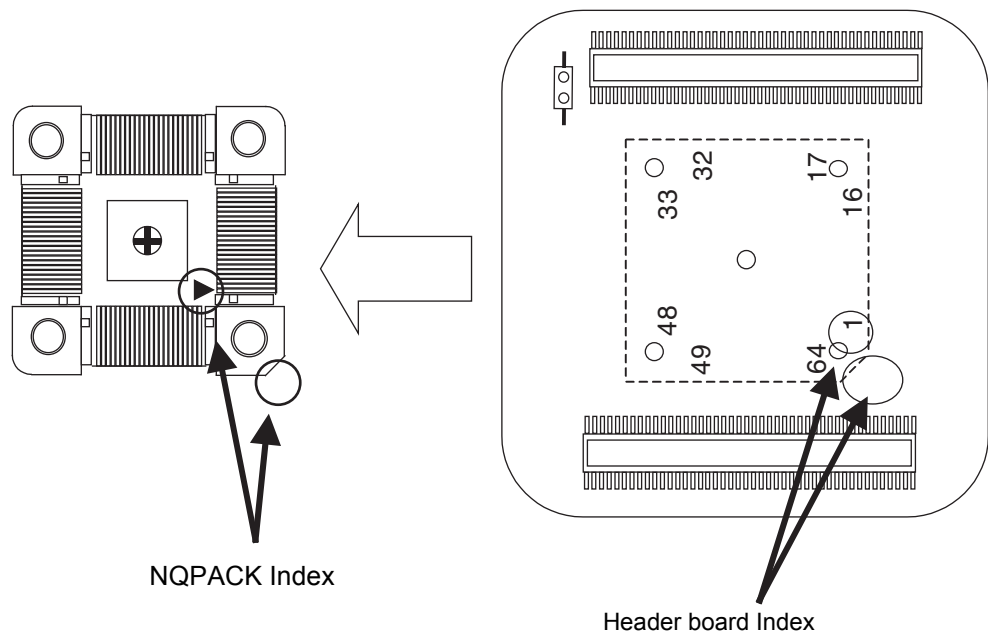


### 5.1 Connecting

Before using the LQFP-64P (0.5 mm pitch) header board, mount the supplied NQPACK on the user system.

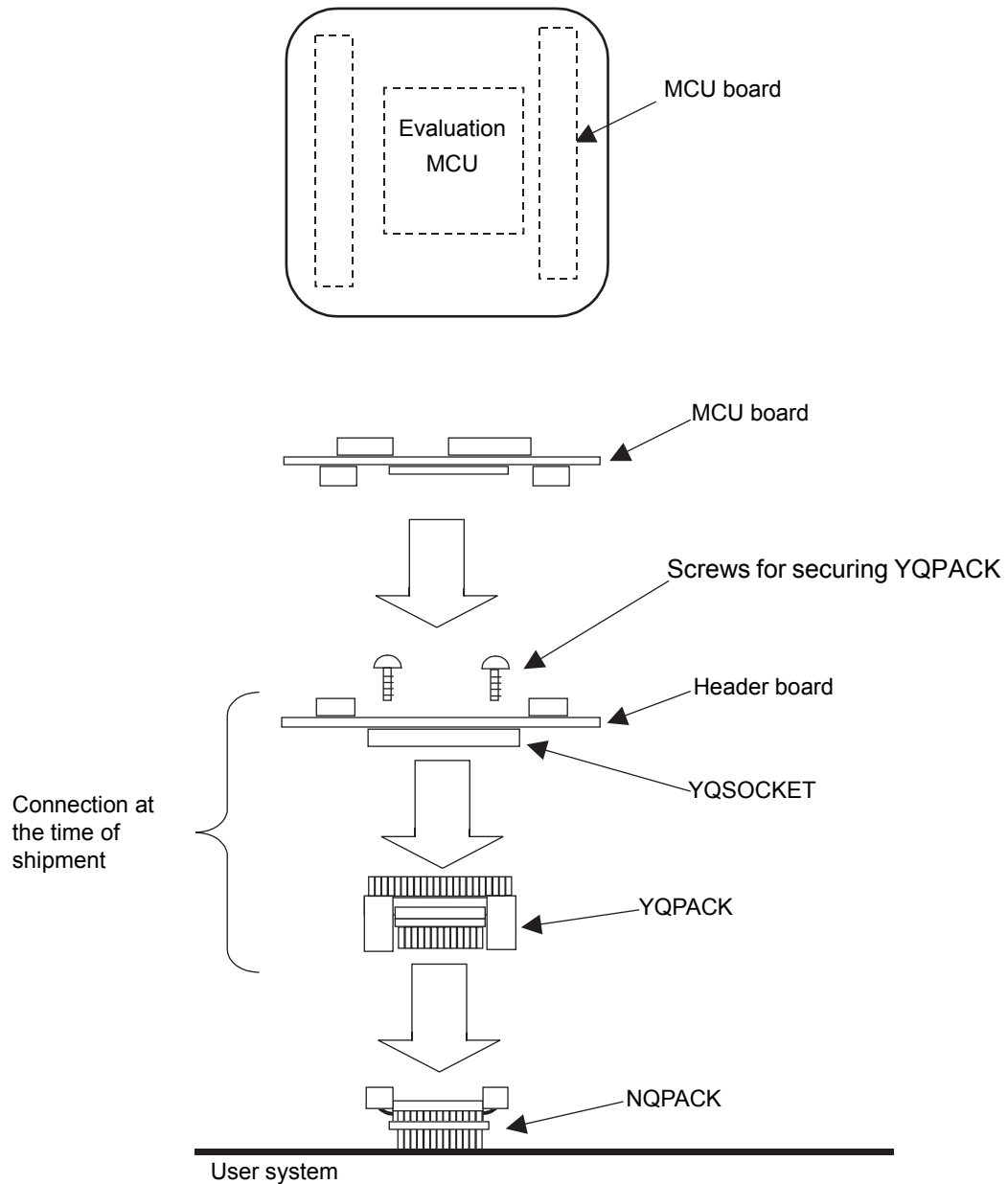
1. To connect the header board to the user system, match the index mark (▲) on the NQPACK mounted on the user system with the index mark (the notched corner of silk-screen printing) on the header board and then insert it (See Figure 5-1) . The pin of YQPACK is thin and easy to bent. Insert NQPACK after confirm that the pin of YQPACK is not bent.

Figure 5-1. Index Position



2. Insert each screw for securing header board in each of the four drilled holes on the header board, and then first tighten the screws in opposing corners followed by the two remaining screws (See Figure 5-1) . The center screw hole is not used.  
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.
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 a Incorrect insertion header socket to prevent reverse connection. Figure 5-2 illustrates how the MCU board, header board, NQPACK, and user system are connected together.

Figure 5-2. MCU board / header board Connection



## 5.2 Disconnection

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

## 6. Mounting Mass Production MCUs

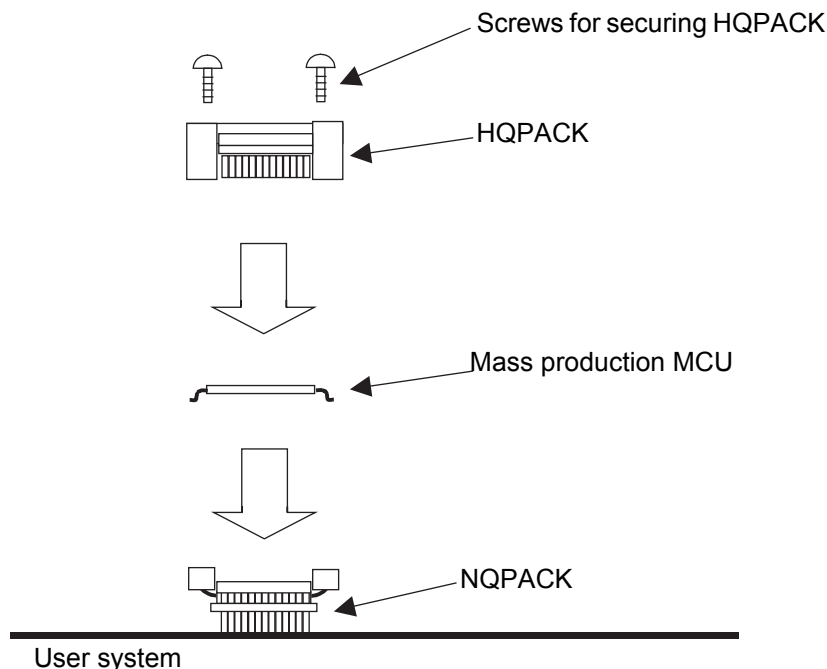


To mount a mass production MCU on the user system, use the supplied HQPACK (See Figure 6-1).

### 6.1 Mounting

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, insert the HQPACK into a NQPACK.  
The pin of HQPACK is thin and easy to bent. Insert NQPACK after confirm that the pin of HQPACK is not bent.
3. Insert each screw for securing HQPACK in each of four drilled holes on the HQPACK, and then first tighten the screws in opposing corners followed by the two remaining screws.  
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. If you take out an Mass production MCU, use a dropper jig dedicated to IC removal to remove the Mass production MCU by suction force. Do not attempt to remove the Mass production MCU forcibly, for example, using a screwdriver as doing so can bend the Mass production MCU leads or break the NQPACK.

## 7. Product specification



### 7.1 General specification

The general specification of a header board is shown in Table 7-1.

Table 7-1. General Specification

| Item                          | Description  |
|-------------------------------|--|
| Operating/storage temperature | 5°C to 35°C (At the time of operation)<br>0°C to 40°C (At the time of storage) |
| Operating/storage humidity    | 20% to 80% (At the time of operation)<br>20% to 80% (At the time of storage)   |
| Dimensions                    | 40 mm × 40 mm × 16 mm<br>(Height contains YQPACK and NQPACK)                   |
| Weight                        | Header board : About 11g   |

### 7.2 Main Composition

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

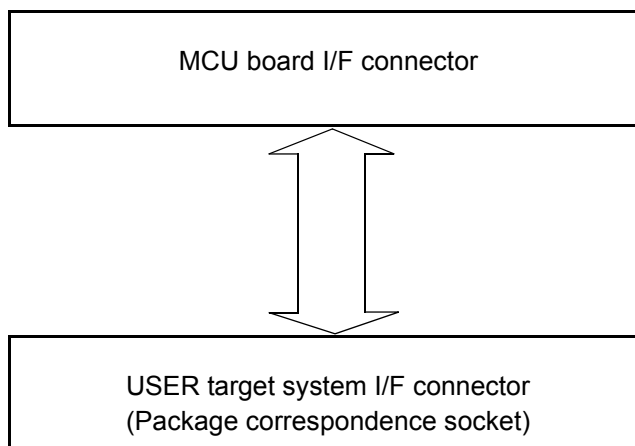
Table 7-2. Main Composition

| Item                                  | Description  |
|---------------------------------------|--|
| MCU board I/F connector               | 120 pins 0.5 mm pitch 2 piece connector<br>(straight) × 2<br>[Model number: WR-120SB-VF-1 (JAE)] |
| Incorrect insertion preventive socket | 2 pins 2.54 mm pitch 1 piece socket<br>(Straight)<br>[Model number:PCW-3-1-1PW (MAC EIGHT)]      |
| User target system I/F connector      | socket<br>64 pin 0.5 mm pitch<br>[Model number:YQSOCKET064SDF (Tokyo Eletech Corporation)]       |

## 7.3 Functional block diagram

A header board performs socket conversion between the I/F connector of a MCU board, and YQPACK. Parts, such as IC, are not in an inside. A block diagram is shown in Figure 7-1.

Figure 7-1. Functional block diagram



## 7.4 MCU board I/F connector(CN1/CN2/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 7-2, and the pin assignment of the MCU board I/F connector CN2 is shown in Table 7-3.

Table 7-3. Pin assignment of the MCU board I/F connector CN1

| Connect or Pin Numbers | Evaluation MCU Pin Numbers | Signal name | Connect or Pin Numbers | Evaluation MCU Pin Numbers | Signal name | Connect or Pin Numbers | Evaluation MCU Pin Numbers | 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                         | LVDSREXT    | 83                     | R1                         | P83         |
| 4                      | D9                         | PC3         | 44                     | F3                         | LVDBGR      | 84                     | R2                         | BRSTX       |
| 5                      | A8                         | PC0         | 45                     | F2                         | LVDSRX      | 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                         | LVDSIN      | 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                         | LVDSIN2     | 73                     | –                          | GND         | 113                    | R8                         | PADDR2      |
| 34                     | C1                         | LVR4        | 74                     | –                          | GND         | 114                    | T8                         | PADDR3      |
| 35                     | D4                         | TESTO       | 75                     | N1                         | P75         | 115                    | U8                         | PADDR4      |
| 36                     | D3                         | LVDSOUT     | 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 Numbers | Evaluation MCU Pin Numbers | Signal name | Connector Pin Numbers | Evaluation MCU Pin Numbers | Signal name | Connector Pin Numbers | Evaluation MCU Pin Numbers | 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 user system I/F YQPACK pin assignment of a header board is shown in Table 7-5.

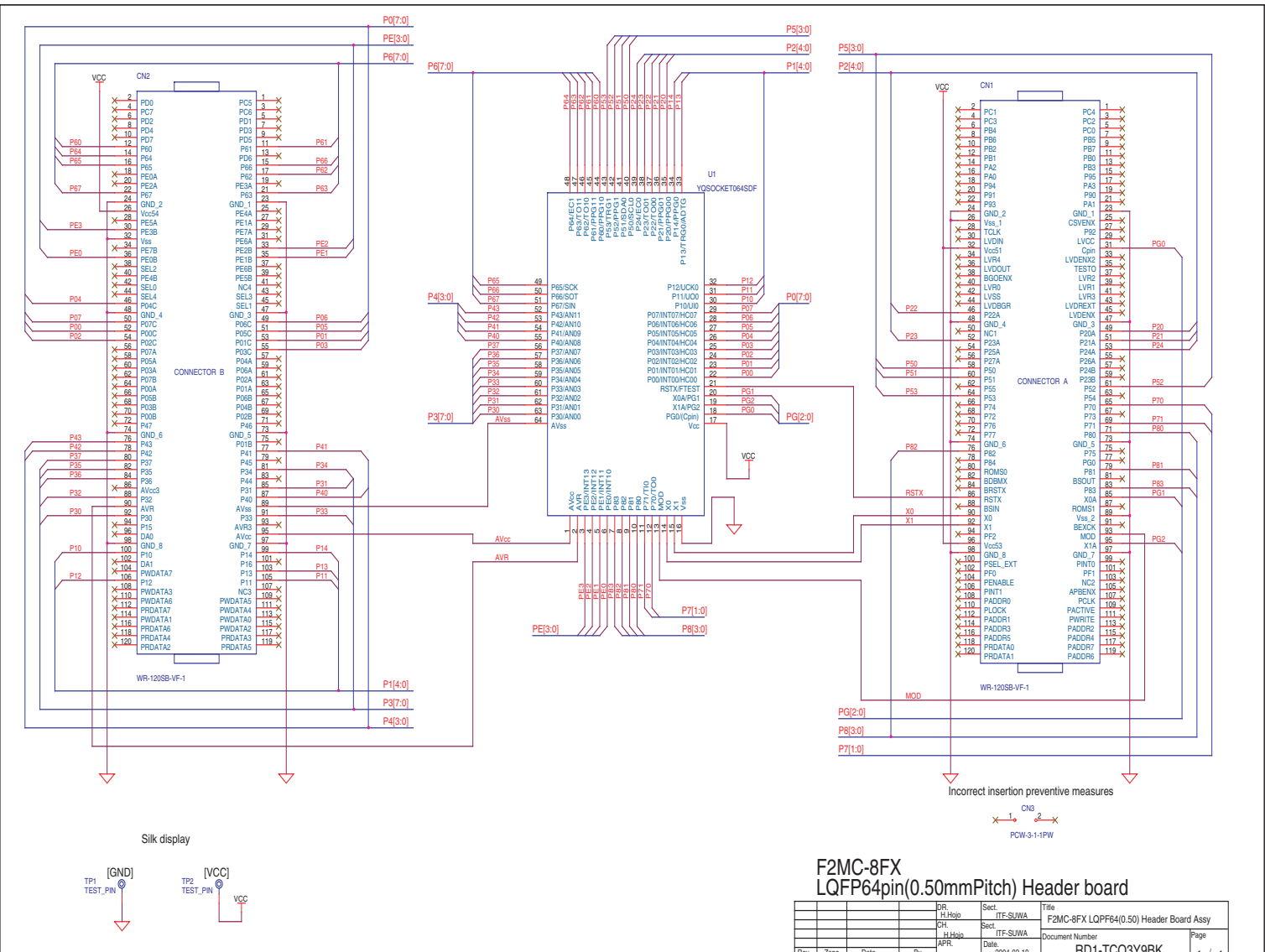
Table 7-5. Pin assignment of the User system I/F YQPACK

| Connector Pin Numbers | Signal name    | Connector Pin Numbers | Signal name   |
|-----------------------|----------------|-----------------------|---------------|
| 1                     | AVcc           | 33                    | P13/TRG0/ADTG |
| 2                     | AVR            | 34                    | P14/PPG0      |
| 3                     | PE3/INT13      | 35                    | P20/PPG00     |
| 4                     | PE2/INT12      | 36                    | P21/PPG01     |
| 5                     | PE1/INT11      | 37                    | P22/TO00      |
| 6                     | PE0/INT10      | 38                    | P23/TO01      |
| 7                     | P83            | 39                    | P24/EC0       |
| 8                     | P82            | 40                    | P50/SCL0      |
| 9                     | P81            | 41                    | P51/SDA0      |
| 10                    | P80            | 42                    | P52/PPG1      |
| 11                    | P71/TI0        | 43                    | P53/TRG1      |
| 12                    | P70/TO0        | 44                    | P60/PPG10     |
| 13                    | MOD            | 45                    | P61/PPG11     |
| 14                    | X0             | 46                    | P62/TO10      |
| 15                    | X1             | 47                    | P63/TO11      |
| 16                    | VSS            | 48                    | P64/EC1       |
| 17                    | VCC            | 49                    | P65/SCK       |
| 18                    | PG0/(Cpin)     | 50                    | P66/SOT       |
| 19                    | X1A/PG2        | 51                    | P67/SIN       |
| 20                    | X0A/PG1        | 52                    | P43/AN11      |
| 21                    | RSTX/FTEST     | 53                    | P42/AN10      |
| 22                    | P00/INT00/HC00 | 54                    | P41/AN09      |
| 23                    | P01/INT01/HC01 | 55                    | P40/AN08      |
| 24                    | P02/INT02/HC02 | 56                    | P37/AN07      |
| 25                    | P03/INT03/HC03 | 57                    | P36/AN06      |
| 26                    | P04/INT04/HC04 | 58                    | P35/AN05      |
| 27                    | P05/INT05/HC05 | 59                    | P34/AN04      |
| 28                    | P06/INT06/HC06 | 60                    | P33/AN03      |
| 29                    | P07/INT07/HC07 | 61                    | P32/AN02      |
| 30                    | P10/UI0        | 62                    | P31/AN01      |
| 31                    | P11/UO0        | 63                    | P30/AN00      |
| 32                    | P12/UCK0       | 64                    | AVss          |

## 7.6 Circuit Diagram

The circuit diagram of a header board is shown in Figure 7-3.

Figure 7-2. Header board circuit diagram



# Revision History



## Document Revision

| Document Title: MB2146-220 F <sup>2</sup> MC-8FX Family LQFP-64P (0.5mm Pitch) Header Board Operation Guide |         |            |                  |  |
|---|---------|------------|------------------|--|
| Document Number: 002-07326  |         |            |                  |  |
| Revision  | ECN#    | Issue Date | Origin of Change | Description of Change  |
| **  | —       | 09/13/2004 | HUAL             | Initial release  |
| *A  | 5274552 | 05/26/2016 | HUAL             | Migrated Spansion Guide from SS01-26002-1E to Cypress format |