

**F<sup>2</sup>MC-16 Family EMULATOR**  
**LQFP-100P PROBE HEADER**  
**MB2147-584-E**  
**OPERATION MANUAL**

## PREFACE

Thank you for purchasing the LQFP-100P\*<sup>1</sup> probe header (model number: MB2147-584-E) for the F<sup>2</sup>MC\*<sup>2</sup>-16 family emulator.

MB2147-584-E is a header board\*<sup>3</sup> used to connect the F<sup>2</sup>MC-16L/16LX emulator (model number: MB2147-01-E)\*<sup>4</sup> and the F<sup>2</sup>MC-16L/16LX emulator PGA-299P adapter board (model number: MB2147-20-E)\*<sup>5</sup> to the user system that uses Fujitsu microcontroller F<sup>2</sup>MC-16LX family MB90F947 (LQFP-100P).

The manual explains how to handle the LQFP-100P probe header for the F<sup>2</sup>MC-16 family emulator. Before using the MB2147-584-E, be sure to read this manual.

Please contact the sales or support representative for details on the mass production and evaluation MCU models that can be used with this product.

\*1 : The package is the FPT-100P-M05 (Lead pitch: 0.5mm; Body size: 14mm × 14mm).

\*2 : F<sup>2</sup>MC is the abbreviation of FUJITSU Flexible Microcontroller.

\*3 : Referred to as “header board” in this manual.

\*4 : Referred to as “emulator” in this manual.

\*5 : Referred to as “adapter board” in this manual.

### ■ Handling and use

Refer to the following manuals for the handling and use of MB2147-584-E and notes regarding safety use.

- F<sup>2</sup>MC-16L/16LX EMULATOR MB2147-01-E OPERATION MANUAL
- F<sup>2</sup>MC-16L/16LX EMULATOR ADAPTER BOARD for PGA-299P MB2147-20-E OPERATION MANUAL

### ■ European RoHS compliance

Products with a -E suffix on the part number are European RoHS compliant products.

### ■ Notice on this document

All information included in this document is current as of the date it is issued. Such information is subject to change without any prior notice.

Please confirm the latest relevant information with the sales representatives.

### ■ Caution of the products described in this document

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



Indicates a feature that, if not used correctly, may result in minor or moderate injuries, and which may cause the customer system to malfunction.

<b>Cuts</b>	This product has parts with sharp points that are exposed. Do not touch 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 index mark (▲) on the header board, otherwise the emulator system 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. Checking the Delivered Product

Before using the MB2147-584-E, confirm that the following components are included in the box:

- LQFP-100P header board\*<sup>1</sup> : 1
- Screws for securing the header board (M2 × 10mm, 0.4mm pitch) : 4
- Washer : 4
- NQPACK100SD-ND\*<sup>2</sup> : 1
- HQPACK100SD\*<sup>3</sup> : 1
- Operation manual (Japanese version) : 1
- Operation manual (English version, this manual) : 1

\*1 : Header board (manufactured by Tokyo Eletech Corporation, referred to as the “YQPACK”), mounts YQPACK100SD-4W.

\*2 : The IC socket (manufactured by Tokyo Eletech Corporation, referred to as the “NQPACK” in this manual). The NQPACK includes a specialized screw driver and three guide pins. A more reliable compatible socket, the NQPACK100SD-ND-SL (sold separately; manufactured by Tokyo Eletech Corporation), can be used by making a screw hole in the user system board for affixing the IC socket.

\*3 : The IC socket cover (manufactured by Tokyo Eletech Corporation, referred to as the “HQPACK” in this manual). The Includes four screws (M2 × 6mm, 0.4mm pitch) for attaching the HQPACK.

MB2147-584-E can function as the adapter unit when used in combination with the adapter board (sold separately).

Please contact the sales or support representative for details on the adapter board and emulator that can be used with this product.

# 2. Handling Precautions

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

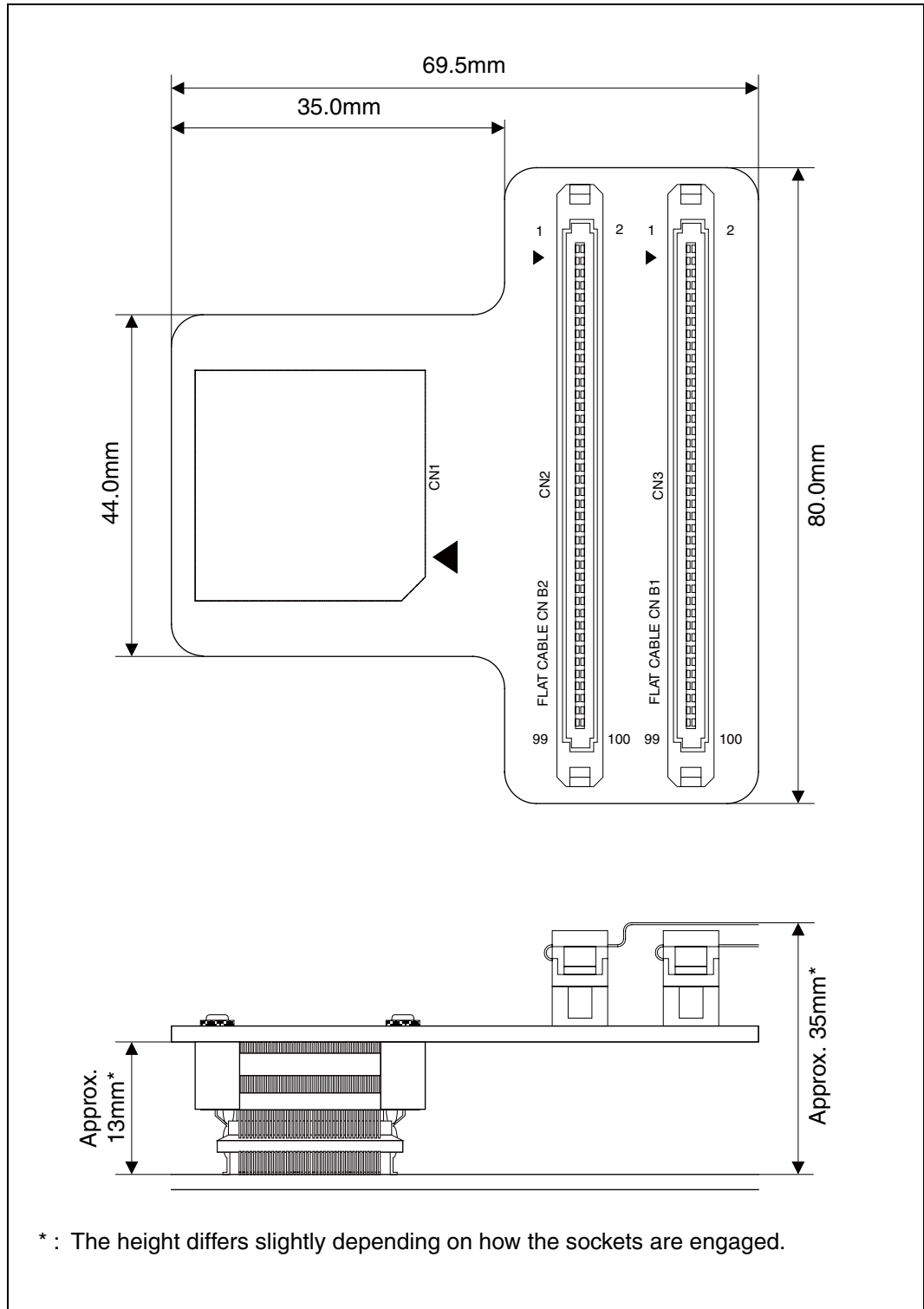
- Avoid placing a stress on the NQPACK mounted on the user system when connecting the header board.

### 3. Notes on Designing

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

When the header board is connected to the user system, the heights of parts mounted around the header board are restricted.

When the printed circuit board for the user system is designed, consider the height of the parts so that components mounted to the user system and the header board do not interfere within range of the header board as shown in Figure 1.



■ MCU footprint design notes

Figure 2 shows the recommended footprint dimensions of the NQPACK mounted on the printed circuit board for the user system.

Take this footprint into consideration as well as the recommended footprint of the mass production MCU when designing the printed circuit board for the user system.

For details of the footprint, contact the Tokyo Eletech Corporation.

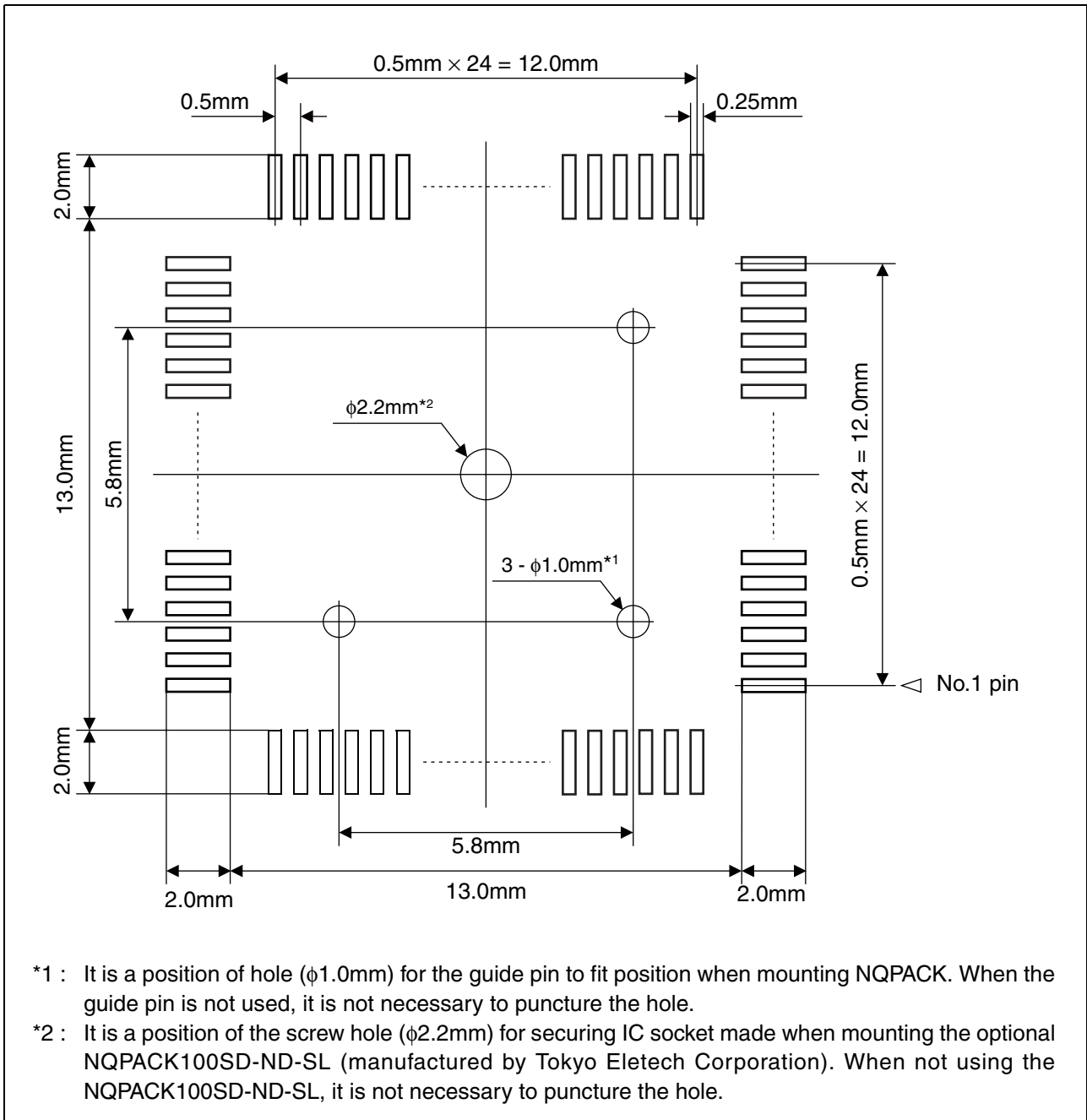


Figure 2 Dimensions of the footprint for mounting the NQPACK

## 4. Connecting to the User System

Before using the MB2147-584-E, mount the supplied NQPACK on the user system.  
To connect the header board to the adapter board, use the two lines of the flat cables (standard or long) supplied with the emulator sold separately. Refer to the hardware manuals of the emulator or the adapter board for how to connect the flat cable.

### ■ Connecting

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 the index mark (▲) on the header board and then insert it (see “Figure 3”). The pins of YQPACK are thin and easily bent. When you are connecting the YQPACK to the NQPACK, ensure that the YQPACK pins are not bent before pushing it all the way into the NQPACK.
2. Insert each screw for securing header board through the washer in each of the four screw holes on the header board and then tighten the four screws diagonally in equal forces, using the special screwdriver supplied with the NQPACK (see “Figure 4”).  
Be careful not to over-tighten the screws as this may result in bad connections.

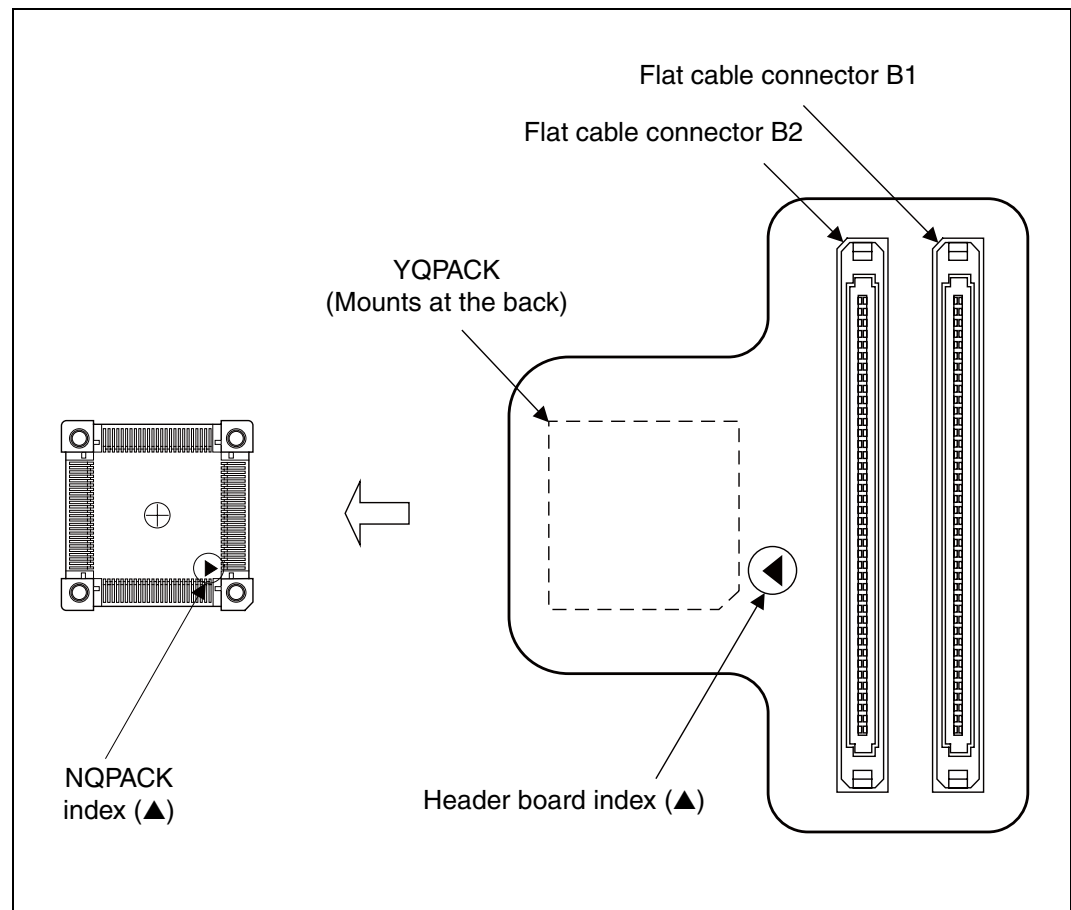


Figure 3 Index position

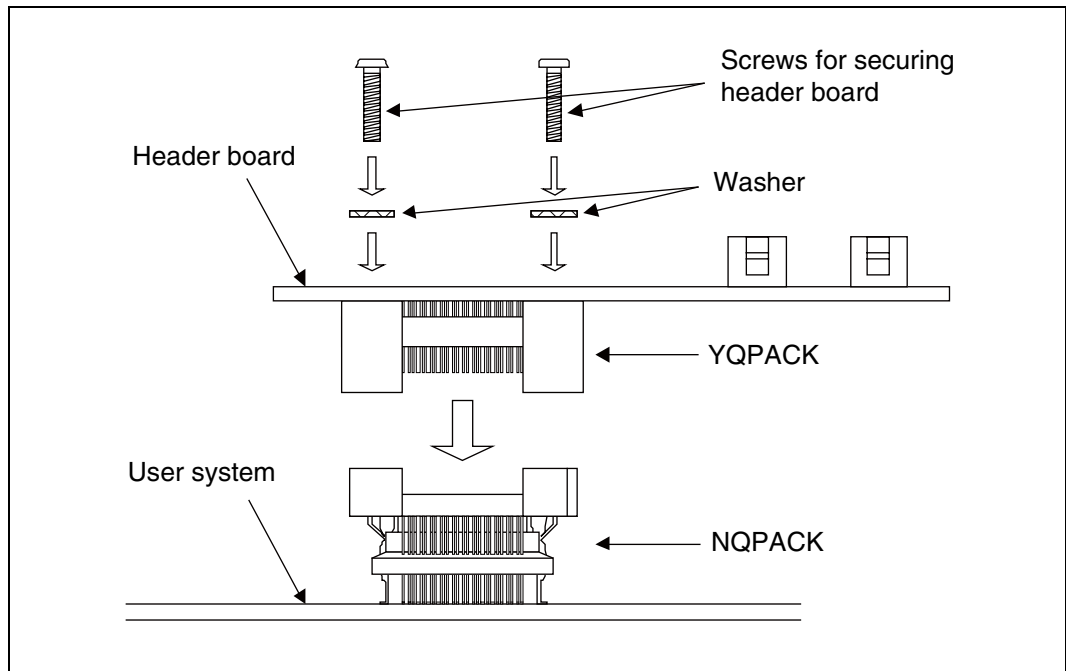


Figure 4 Header board connection

■ **Disconnection**

To disconnect the header board from the user system, remove all of the four screws, and then pull the header board vertically from the NQPACK.



## 5. Mounting Mass Production MCUs

To mount a mass production MCU on the user system, use the supplied HQPACK.

### ■ 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. Confirming beforehand that the mass production MCU is correctly mounted on the NQPACK, match the index mark (a linear angle cut made only on one corner) of HQPACK with the index mark of NQPACK, and insert it (see “Figure 5”).

The pins of HQPACK are thin and easy to bend. Insert NQPACK after confirming that the pins of HQPACK are not bent.

3. Insert each screw for securing HQPACK in each of the four screw holes on the HQPACK and tighten the screw diagonally.

To tighten the screws, tighten them evenly using the special screw driver that was included with the NQPACK. Tightening the screws too tight might result in a defective contact.

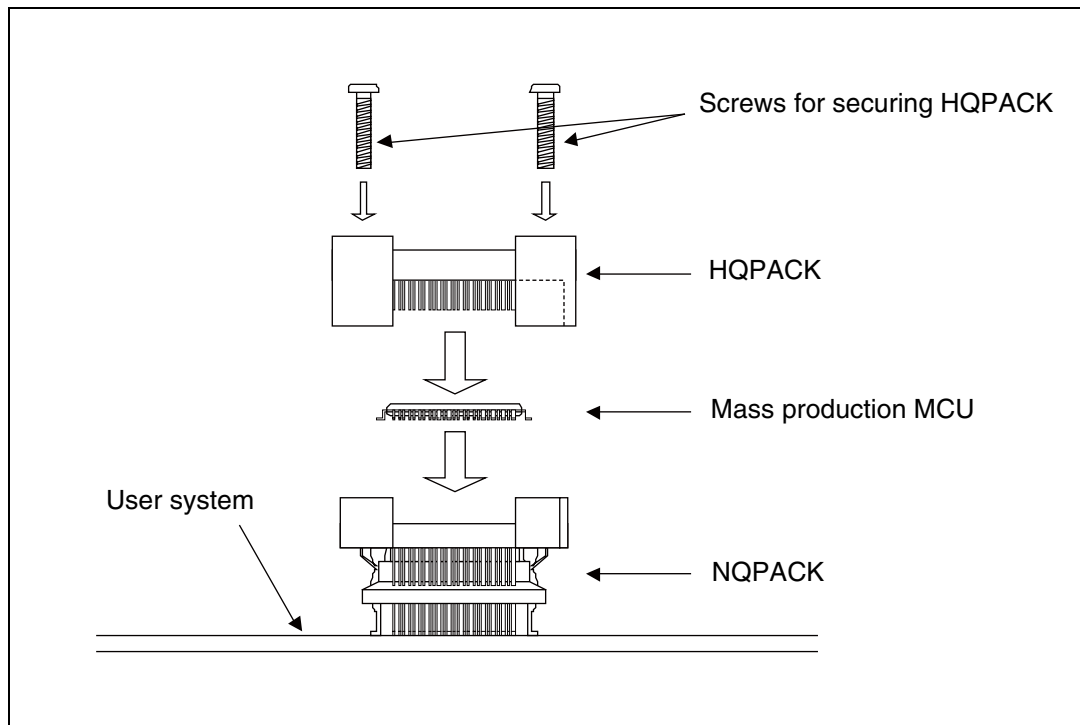


Figure 5 Mounting a mass production MCU

### ■ Disconnection

To remove the HQPACK, remove all of the four screws, and pull out the HQPACK vertically from NQPACK.

## 6. Connector Pin Assignment

The signal of evaluation MCU with which it was carried on the adapter board is connected to YQ-PACK (the same assignments as production MCU) via the flat cable connector (B1, B2) on the header board.

The adapter board and the header board are connected by the two flat cables (standard or long) supplied with the emulator (sold separately). Refer to the operation manual of the emulator or an adapter board for how to connect.

For details of a mass production MCU pin, refer to the data sheet or hardware manual of each MCU.


### ■ Pin assignment

Tables 1 and 2 list the pin assignments mapping among the flat cable connector(B1, B2), the evaluation MCU on the adapter board, and the production MCU.

For details on the names of signal conductors of the evaluation MCU, refer to the operation manual of the adapter board.

The following notes are related to the tables.


“ - ” : Unconnected pin (left open).

 : Vcc

The power supply (Vcc) pin number of evaluation MCU is as follows.

Vcc = 24, 72, 85, 90, 228, 246, 298

The power supply (Vcc) pin number of mass production MCU is 13, 88.

 : Vss

The ground (Vss) pin number of evaluation MCU is as follows.

Vss = 73, 102, 152, 161, 171, 249, 254, 265

The ground (Vss) pin numbers of production MCU are 14, 42 and 89.

Table 1 Pin assignment of the flat cable connector B1

Connector pin number	Evaluation MCU pin number	Production MCU pin number	Connector pin number	Evaluation MCU pin number	Production MCU pin number
100	Vss	Vss	99	Vss	Vss
98	Vss	Vss	97	80	40
96	208	41	95	148	39
94	259	38	93	Vss	Vss
92	79	37	91	207	36
90	147	35	89	258	33
88	78	34	87	206	32
86	Vss	Vss	85	77	30
84	146	31	83	160	47
82	223	-	81	Vss	Vss
80	26	-	79	268	-
78	94	72	77	269	70
76	219	71	75	95	69
74	Vss	Vss	73	33	61
72	Vcc	Vcc	71	169	60
70	226	56	69	Vss	Vss
68	275	55	67	34	54
66	105	53	65	167	-
64	224	-	63	35	46
62	Vss	Vss	61	225	58
60	274	62	59	32	59
58	104	57	57	Vss	Vss
56	170	45	55	106	44
54	227	15	53	163	63
52	Vss	Vss	51	162	68
50	Vss	Vss	49	96	66
48	220	67	47	270	65
46	100	64	45	Vss	Vss
44	97	-	43	221	-
42	164	-	41	273	-
40	98	-	39	271	-
38	Vss	Vss	37	222	74
36	23	-	35	99	73
34	165	-	33	Vss	Vss
32	276	43	31	107	22
30	108	21	29	277	19
28	172	20	27	109	18
26	Vss	Vss	25	173	16
24	229	17	23	228	Vcc
22	130	10	21	Vss	Vss
20	292	9	19	193	8
18	131	7	17	194	5
16	247	6	15	132	4
14	Vss	Vss	13	Vss	Vss
12	293	3	11	61	2
10	248	1	9	Vss	Vss
8	133	100	7	195	99
6	62	98	5	63	96
4	134	97	3	294	95
2	Vss	Vss	1	Vss	Vss

Table 2 Pin assignment of the flat cable connector B2

Connector pin number	Evaluation MCU pin number	Production MCU pin number	Connector pin number	Evaluation MCU pin number	Production MCU pin number
100	Vss	Vss	99	Vss	Vss
98	-	-	97	159	48
96	Vss	Vss	95	217	12
94	267	11	93	Vss	Vss
92	149	23	91	81	24
90	260	25	89	82	27
88	209	26	87	83	-
86	Vss	Vss	85	87	-
84	218	-	83	212	-
82	263	-	81	Vss	Vss
80	153	-	79	86	-
78	8	-	77	150	28
76	Vcc	Vcc	75	84	-
74	Vss	Vss	73	272	-
72	5	29	71	168	-
70	103	-	69	Vss	Vss
68	166	-	67	7	-
66	Vss	Vss	65	210	-
64	151	-	63	261	-
62	Vss	Vss	61	158	-
60	6	-	59	216	-
58	92	-	57	Vss	Vss
56	266	-	55	157	-
54	91	-	53	156	-
52	215	-	51	155	-
50	Vss	Vss	49	88	-
48	16	-	47	15	-
46	264	-	45	Vss	Vss
44	213	-	43	154	-
42	14	-	41	255	-
40	203	-	39	143	-
38	Vss	Vss	37	202	-
36	299	-	35	142	-
34	201	-	33	Vss	Vss
32	141	-	31	101	-
30	110	49	29	230	51
28	278	50	27	262	52
26	Vss	Vss	25	140	91
24	Vss	Vss	23	200	90
22	Vcc	Vcc	21	Vss	Vss
20	252	75	19	199	76
18	71	77	17	70	79
16	138	78	15	251	80
14	Vss	Vss	13	198	82
12	296	81	11	137	83
10	136	84	9	Vss	Vss
8	197	85	7	295	86
6	250	87	5	64	93
4	135	92	3	196	94
2	Vss	Vss	1	Vss	Vss

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