

DSU-FR EMULATOR
F²MC-16FX LQFP-144P HEADER TYPE 14
MB2198-507-E
OPERATION MANUAL

PREFACE

Thank you for purchasing the F²MC*¹-16FX LQFP-144P*² header type 14 (MB2198-507-E) for the DSU-FR*³ emulator.

The F²MC-16FX LQFP-144P header type 14 is a header board*⁴ used to connect the DSU-FR emulator (MB2198-01-E)*⁵ and the DSU-FR emulator F²MC-16FX BGA-416P adapter (MB2198-500-E)*⁶ to the user system that uses a MB96370 series (LQFP-144P) microcontroller from the FUJITSU F²MC-16FX family.

This manual explains how to handle the F²MC-16FX LQFP-144P header type 14 for the DSU-FR emulator. Read this manual before using the MB2198-507-E.

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 : F²MC is the abbreviation of FUJITSU Flexible Microcontroller.

*2 : The package is the FPT-144P-M08 (lead pitch: 0.5mm, body size: 20mm × 20mm).

*3 : FR, the abbreviation of FUJITSU RISC controller, is a line of products of FUJITSU MICRO-ELECTRONICS LIMITED.

*4 : Referred to as the "header board"

*5 : Referred to as the "emulator"

*6 : Referred to as the "adapter board"

■ Handling and use

See the following manuals for details on how to handle and use this product, and for precautions on using the product safely.

- DSU-FR EMULATOR MB2198-01-E OPERATION MANUAL
- DSU-FR EMULATOR F²MC-16FX BGA-416P ADAPTER MB2198-500-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 product 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.

Cuts	The product contains sharp edges that are left unavoidably exposed. Pointed parts may injure a body. Therefore, handle the product with due care.
Damage	When connect 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.
Damage	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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- The company names and brand names herein are the trademarks or registered trademarks of their respective owners.

1. Checking the Delivered Product

Before using the header board, confirm that the following components are included in the box:

- LQFP-144P header board*¹ : 1
- Screws for securing the header board (M2 × 10mm, 0.4mm pitch) : 4
- Washers : 4
- NQPACK144SD-ND*² : 1
- HQPACK144SD*³ : 1
- Operation manual (Japanese version) : 1
- Operation manual (English version, this manual) : 1

*1 : A YQPACK144SD-4W (manufactured by Tokyo Eletech Corporation and referred to as the “YQPACK”) is mounted on the header board.

*2 : The IC socket (manufactured by Tokyo Eletech Corporation and referred to as the “NQPACK”) which is supplied with a screwdriver and 3 guide pins.

The more reliable NQPACK144SD-ND-SL socket (Tokyo Eletech Corporation, sold separately) can be used by fabricating IC socket mounting holes in the user system board. For more information, contact Tokyo Eletech Corporation.

*3 : The IC socket cover (manufactured by Tokyo Eletech Corporation and referred to as the “HQPACK”). Includes 4 screws for securing the HQPACK (M2 × 6mm, 0.4mm pitch).

This product forms part of an emulator system when used in combination with an emulator and adapter board (both sold separately).

Consult the sales or support representative for information on the adapter boards and emulators that are used compatible with this product.

2. Handling Precautions

To always use the header board in an correct and good environment, note the following items.

- The header board is precision-manufactured to improve dimensional accuracy and to ensure reliable contact. The header board is therefore sensitive to mechanical shock. So, do not give any stress to NQPACK mounted in the user system while connecting the header board.
- The power supply of VCC and DVCC of mass produced MCU is connected on the header board. Therefore, the power shall be supplied from the same power supply circuit to the VCC pin and the DVCC pin of mass produced MCU installed in the user system (see Item 6. “Connector Pin Assignment”).

3. Notes on Designing

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

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

When designing the printed circuit board of the user system, consider the height of the parts within range of the header board as shown in Figure 1 such that components mounted on the user system and the header board do not interfere with each other.

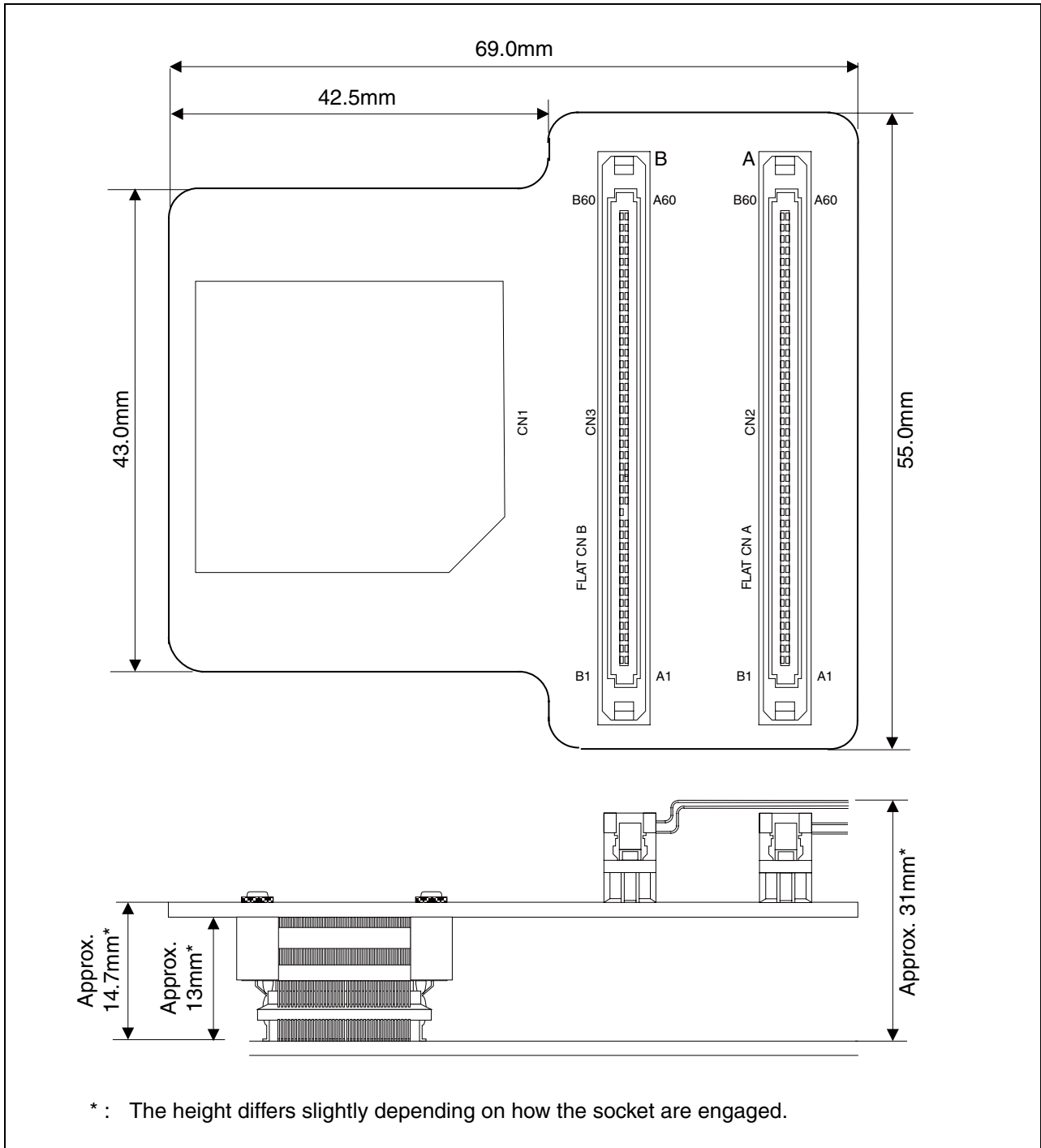


Figure 1 Header board dimensions

■ **MCU footprint design notes**

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

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

For more information, contact Tokyo Eletech Corporation.

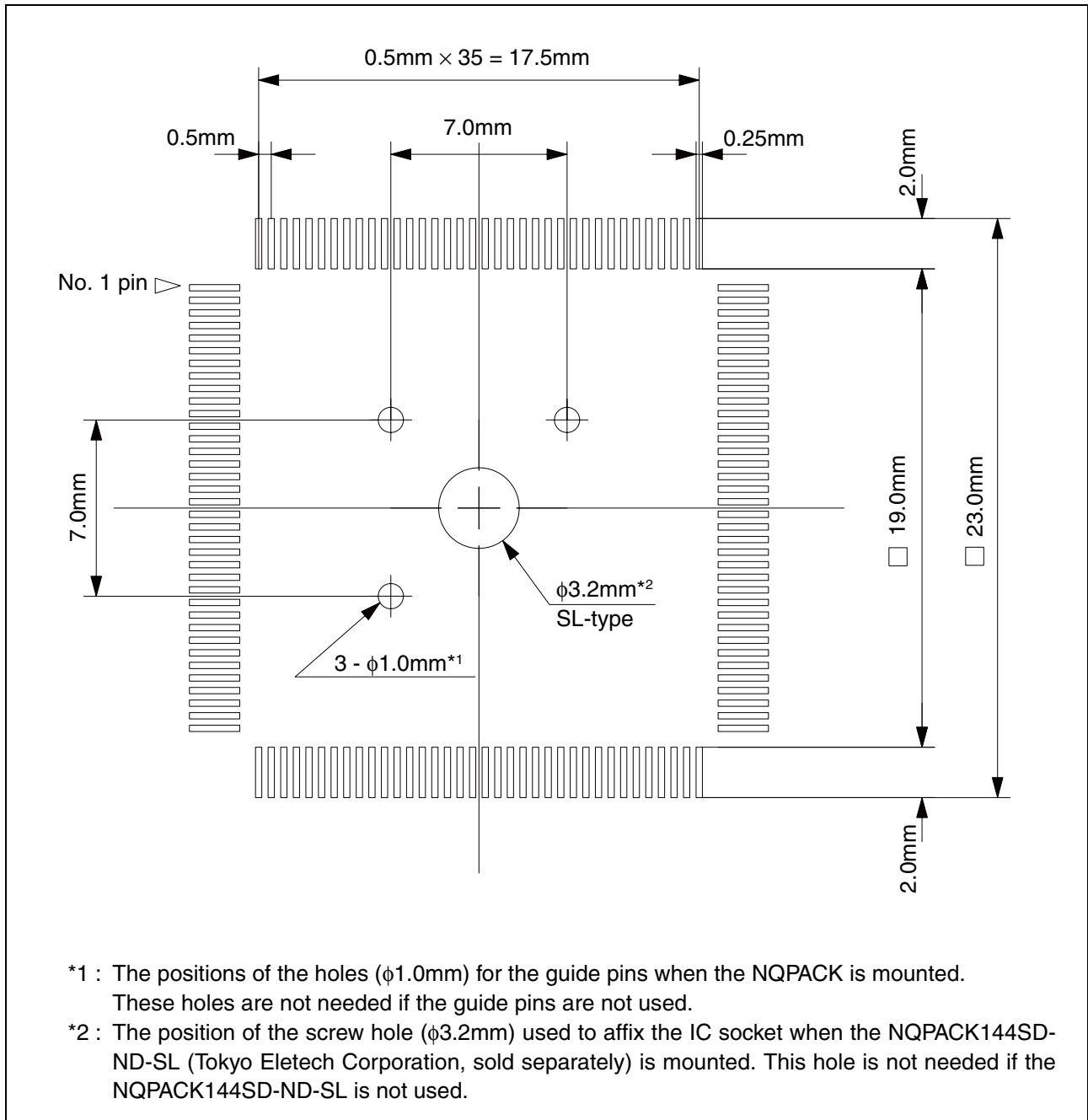


Figure 2 Recommended dimensions of the footprint for mounting the NQPACK

■ **Notes on the sub clock**

When using this product, the sub clock cannot be supplied to the evaluation MCU from the user system. To operate the evaluation MCU on the sub clock, use the sub clock on the adapter board.

See the operating manual for details on the adapter board.

4. Procedure for Connecting to the User System

Before using the header board, mount the supplied NQPACK on the user system.

The header board is connected to the adapter board using the 2 flat cables (standard or long) included with the adapter board (which is sold separately). See the operation manual of the adapter board for details on how to connect the flat cables.

■ Connecting

1. To connect the header board to the user system, align 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 the header board (see Figure 3).

The YQPACK pins are thin and easy to be bent. Check that the YQPACK pins are not bent before inserting the YQPACK into the NQPACK.

2. Insert each of the screws for securing the header board through a washer and into each of the four holes in the header board. To tighten the screws, use the screwdriver supplied with the NQPACK to evenly tighten the diagonally opposite screws in turn (see Figure 4).

Be careful to avoid overtightening the screws as this may cause a bad connection.

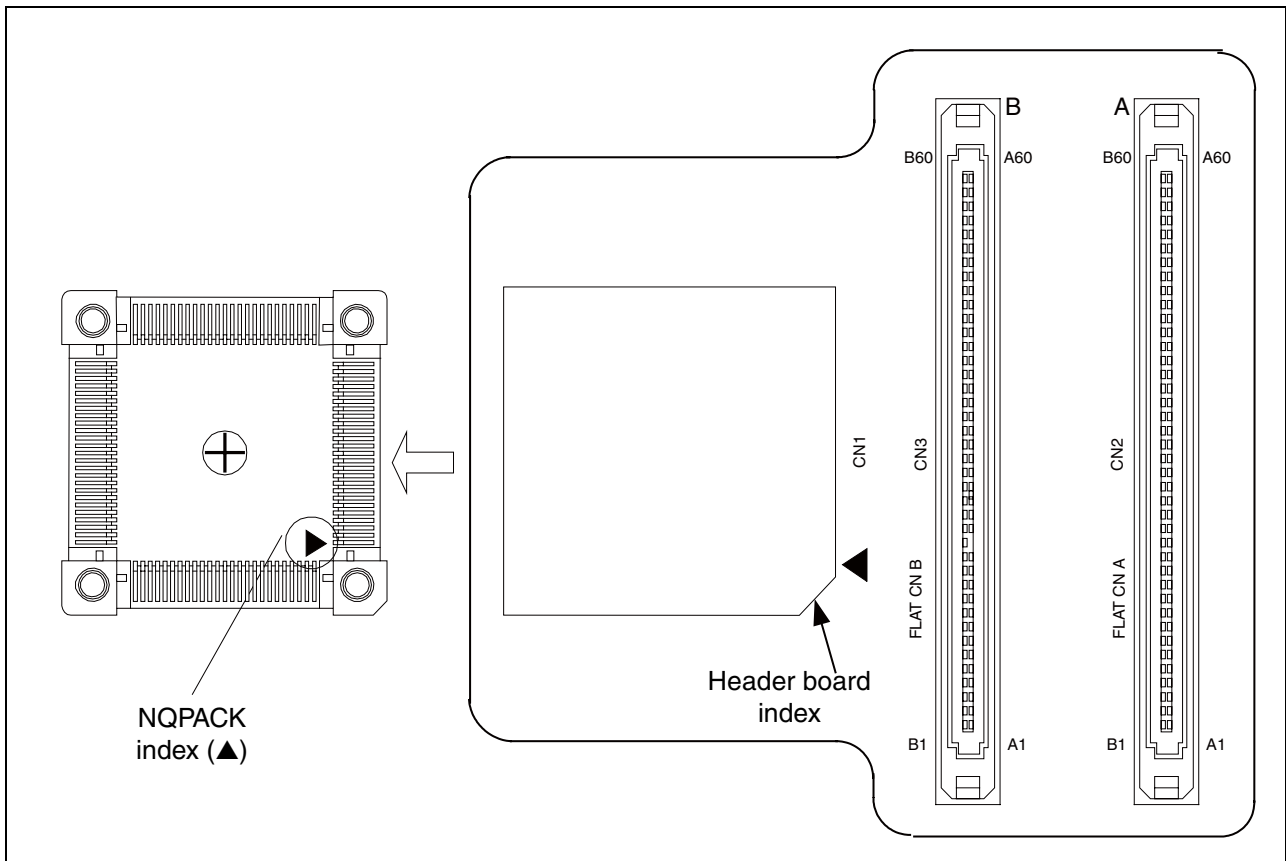


Figure 3 Index position

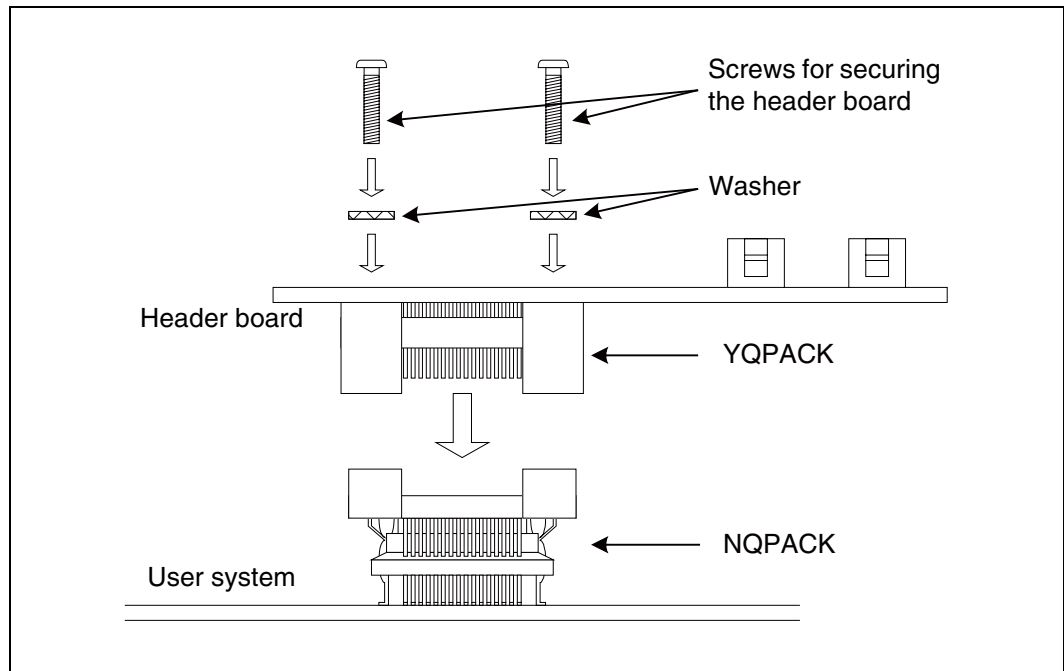


Figure 4 Header board connection

■ **Disconnecting**

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

5. Mounting Mass Production MCUs

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

■ Mounting

1. Align the index mark (▲) on the NQPACK mounted on the user system with the index mark (●) on the mass production MCU and mount the MCU on the NQPACK.
2. Confirm that the mass production MCU is correctly mounted on the NQPACK and then align the index mark on the HQPACK with the index mark on the NQPACK (the corner with an angle cut out of it) and insert the HQPACK into the NQPACK (see Figure 5).
The HQPACK pins are thin and easy to be bent. Check that the HQPACK pins are not bent before inserting it into the NQPACK.
3. Insert the screws for securing the HQPACK into the four holes in the HQPACK, and then evenly tighten the diagonally opposite screws in turn using the screwdriver that was included with the NQPACK. Be careful to avoid overtightening the screws as this may cause a bad connection.

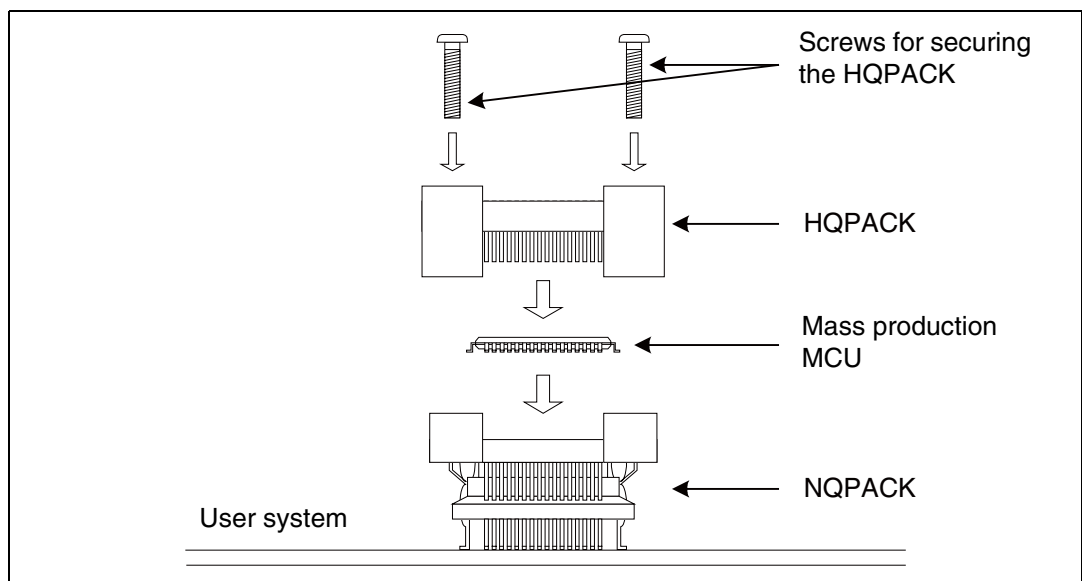


Figure 5 Mounting a mass production MCU

■ Disconnecting

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

6. Connector Pin Assignment

The signals from the evaluation MCU that is mounted on the adapter board are connected to the YQPACK (which has the same pin configuration as the production MCU) via flat cable connectors A and B on the header board.

The adapter board and header board are connected using the 2 flat cables (standard or long) that are included with the adapter board. See the operation manual for the adapter board for details on how to connect the flat cables.

See the data sheet or hardware manual of each of the mass production MCUs for details on the MCU pins.

■ Pin assignment

Tables 1 and 2 list the corresponding pin assignments for flat cable connectors A and B, the evaluation MCU on the adapter board, and the production MCU.

The notes in the tables have the following meanings:

*1 : These pins are header connection acknowledgement pins and left unconnected (open) and connected to GND, respectively.

*2 : These pins are connected with the sub clock input pins sharing ports of mass produced MCU. Set jumper plugs on the adapter board according to the port specifications of mass produced MCU. For the setting method, see the adapter board operation manual.

“—” : Unconnected pin (left open).



VCC

VCCs are composed of the following power supplies, and all of them are connected on the header board.

Evaluation MCU power supply

UVCC

The pin numbers of UVCC are E2, R2, AE4, AG6, AG10, and AG13.

DVCC

The pin numbers of DVCC are A11, D6, D10, and F4.

Mass produced MCU power supply

VCC

The pin numbers of VCC are 36, 72, 108, and 144.

DVCC

The pin numbers of DVCC are 47, 56, and 65.



VSS

VSSs are composed of the following power supplies, and all of them are connected on the header board.

Evaluation MCU ground

The pin numbers of VSS are as follows:

VSS = A1, D12, D19, D23, D27, A30, H27, M27, W27, AC27, AG27, AK30, AG23, AG19, AG12, AG8, AG4, AK1, AC4, W4, M4, H4, D4, and D8.

Mass produced MCU ground

The pin numbers of VSS are 1, 37, 73, 79, and 109.

The pin numbers of DVSS are 48, 57, and 66.

Table 1 Pin assignment of flat cable connector A

Connector pin number	Evaluation MCU pin number	Production MCU pin number	Connector pin number	Evaluation MCU pin number	Production MCU pin number
A1	VSS		B1	VSS	
A2	—	—	B2	—	—
A3	—	—	B3	—	—
A4	—	—	B4	—	—
A5	—	*1	B5	—	VSS*1
A6	VSS		B6	VSS	
A7	—	—	B7	AH9	74
A8	AJ7	75	B8	AH8	76
A9	VSS		B9	VSS	
A10	AG9	82	B10	AK2	2
A11	VSS		B11	VSS	
A12			B12		
A13	AK7	78	B13	AK6	77
A14	VSS		B14	VSS	
A15	AJ8	81*2	B15	AK8	80*2
A16	VSS		B16	VSS	
A17	AG5	133	B17	AH4	134
A18	AJ3	135	B18	AJ2	136
A19	AH3	137	B19	AJ1	138
A20	AH2	139	B20	AG3	3
A21	VSS		B21	VSS	
A22	AE2	85	B22	AD4	86
A23	AD3	87	B23	AD1	88
A24	AE1	89	B24	AC3	90
A25	AD2	91	B25	AC2	92
A26	VSS		B26	VSS	
A27	Y3	4	B27	AA1	5
A28	Y1	6	B28	W3	7
A29	Y2	8	B29	W1	9
A30	W2	10	B30	V4	11
A31	VSS		B31	VSS	
A32	T2	16	B32	T1	17
A33	R1	18	B33	R4	19
A34	R3	20	B34	P1	21
A35	P2	22	B35	N1	23
A36	VSS		B36	VSS	
A37	—	—	B37	—	—
A38	L4	24	B38	L3	25
A39	K1	26	B39	L1	27
A40	—	—	B40	—	—
A41	VSS		B41	VSS	
A42	G2	—	B42	H3	—
A43	F1	—	B43	G1	—
A44	G3	—	B44	G4	—
A45	F2	—	B45	E1	—
A46	VSS		B46	VSS	
A47	B1	—	B47	B2	—
A48	C3	—	B48	A2	—
A49	B3	—	B49	C4	—
A50	D5	—	B50	A3	—
A51	VSS		B51	VSS	
A52	C7	54	B52	A7	55
A53	A6	58	B53	C8	59
A54	B7	60	B54	B8	61
A55	A8	62	B55	C9	67
A56	VSS		B56	VSS	
A57	VCC		B57	VCC	
A58			B58		
A59	—	—	B59	—	—
A60	VSS		B60	VSS	

Table 2 Pin assignment of flat cable connector B

Connector pin number	Evaluation MCU pin number	Production MCU pin number	Connector pin number	Evaluation MCU pin number	Production MCU pin number
A1	VSS		B1	VSS	
A2	AH13	101	B2	AJ13	102
A3	AJ12	103	B3	AK12	110
A4	AJ11	111	B4	AH12	112
A5	AK11	113	B5	AK10	114
A6	VSS		B6	VSS	
A7	AH11	115	B7	AG11	116
A8	AK9	117	B8	AJ10	118
A9	AH10	119	B9	AJ9	120
A10	AH7	121	B10	AG7	122
A11	VSS		B11	VSS	
A12	AJ6	123	B12	AK5	124
A13	AJ5	125	B13	AK4	126
A14	AH6	127	B14	AJ4	128
A15	AH5	129	B15	AK3	130
A16	VSS		B16	VSS	
A17	AF4	—	B17	AH1	—
A18	AF3	—	B18	AG2	—
A19	AE3	12	B19	AG1	13
A20	AF2	140	B20	AF1	141
A21	VSS		B21	VSS	
A22	AC1	93	B22	AB3	94
A23	AB4	95	B23	AB2	96
A24	AA3	97	B24	AA2	98
A25	AB1	99	B25	Y4	100
A26	VSS		B26	VSS	
A27	V2	28	B27	V3	29
A28	U3	30	B28	V1	31
A29	U2	38	B29	U1	39
A30	T3	40	B30	T4	41
A31	VSS		B31	VSS	
A32	P3	32	B32	N3	33
A33	N2	34	B33	N4	35
A34	M2	14	B34	M1	15
A35	L2	142	B35	M3	143
A36	VSS		B36	VSS	
A37	J1	—	B37	K2	—
A38	K3	—	B38	J2	—
A39	J4	—	B39	J3	—
A40	H1	—	B40	H2	—
A41	VSS		B41	VSS	
A42	D1	131	B42	F3	132
A43	D2	83	B43	E3	84
A44	C1	104	B44	E4	105
A45	D3	106	B45	C2	107
A46	VSS		B46	VSS	
A47	C5	42	B47	B4	43
A48	C6	44	B48	A4	45
A49	B5	46	B49	A5	51
A50	B6	52	B50	D7	53
A51	VSS		B51	VSS	
A52	D9	68	B52	B9	69
A53	C10	70	B53	B10	71
A54	A9	49	B54	D11	50
A55	C11	63	B55	A10	64
A56	VSS		B56	VSS	
A57	VCC		B57	VCC	
A58			B58		
A59	—	—	B59	—	—
A60	VSS		B60	VSS	

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