

**DSU-FR EMULATOR**  
**F<sup>2</sup>MC-16FX QFP-100P HEADER TYPE 3**  
**MB2198-501**  
**OPERATION MANUAL**

## PREFACE

Thank you for purchasing the F<sup>2</sup>MC-16FX\*<sup>1</sup> QFP-100P\*<sup>2</sup> header type 3 (MB2198-501) for the DSU-FR\*<sup>3</sup> emulator.

The F<sup>2</sup>MC-16FX QFP-100P header type 3 is a header board\*<sup>4</sup> used to connect the DSU-FR emulator (MB2198-01)\*<sup>5</sup> and the DSU-FR emulator F<sup>2</sup>MC-16FX BGA-416P adapter (MB2198-500)\*<sup>6</sup> to a user system that uses an MB96340 series (QFP-100P) microcontroller from the Fujitsu F<sup>2</sup>MC-16FX family.

This manual explains how to handle the F<sup>2</sup>MC-16FX QFP-100P header type 3 for the DSU-FR emulator. Read this manual before using the MB2198-501.

Consult a Fujitsu Limited sales or support representative for details on the mass production MCUs and evaluation MCUs compatible with this product.

\*1 : F<sup>2</sup>MC is the abbreviation of FUJITSU Flexible Microcontroller.

\*2 : The package is the FPT-100P-M06 (0.65mm lead pitch, 14mm × 20mm body size).

\*3 : FR is an abbreviation of FUJITSU RISC CONTROLLER and is a product of Fujitsu 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 HARDWARE MANUAL
- DSU-FR EMULATOR F<sup>2</sup>MC-16FX BGA-416P ADAPTER MB2198-500 OPERATION MANUAL

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

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



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

- QFP-100P header board\*1 : 1
- Screws for securing the header board (M2 × 10 mm, 0.4 mm pitch) : 4
- Washers : 4
- NQPACK100RB179-A\*2 : 1
- HQPACK100RB179\*3 : 1
- Operation manual (Japanese version) : 1
- Operation manual (English version, this manual) : 1

\*1 : A YQPACK100RB (manufactured by Tokyo Eletech Corporation and referred to as the “YQ-PACK”) is mounted on the header board.

\*2 : The IC socket (manufactured by Tokyo Eletech Corporation and referred to as the “NQ-PACK”) which is supplied with a specialized screwdriver and 3 guide pins. The more reliable NQPACK100RB179-SL-A 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 “HQ-PACK”). 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 a Fujitsu Limited sales or support representative for information on the adapter boards and emulators that are compatible with this product.

## 2. 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. Observe the following points to ensure that the header board can be used in the proper environment:

- Avoid placing any stress on the NQPACK mounted on the user system while the header board is connected.

### 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.

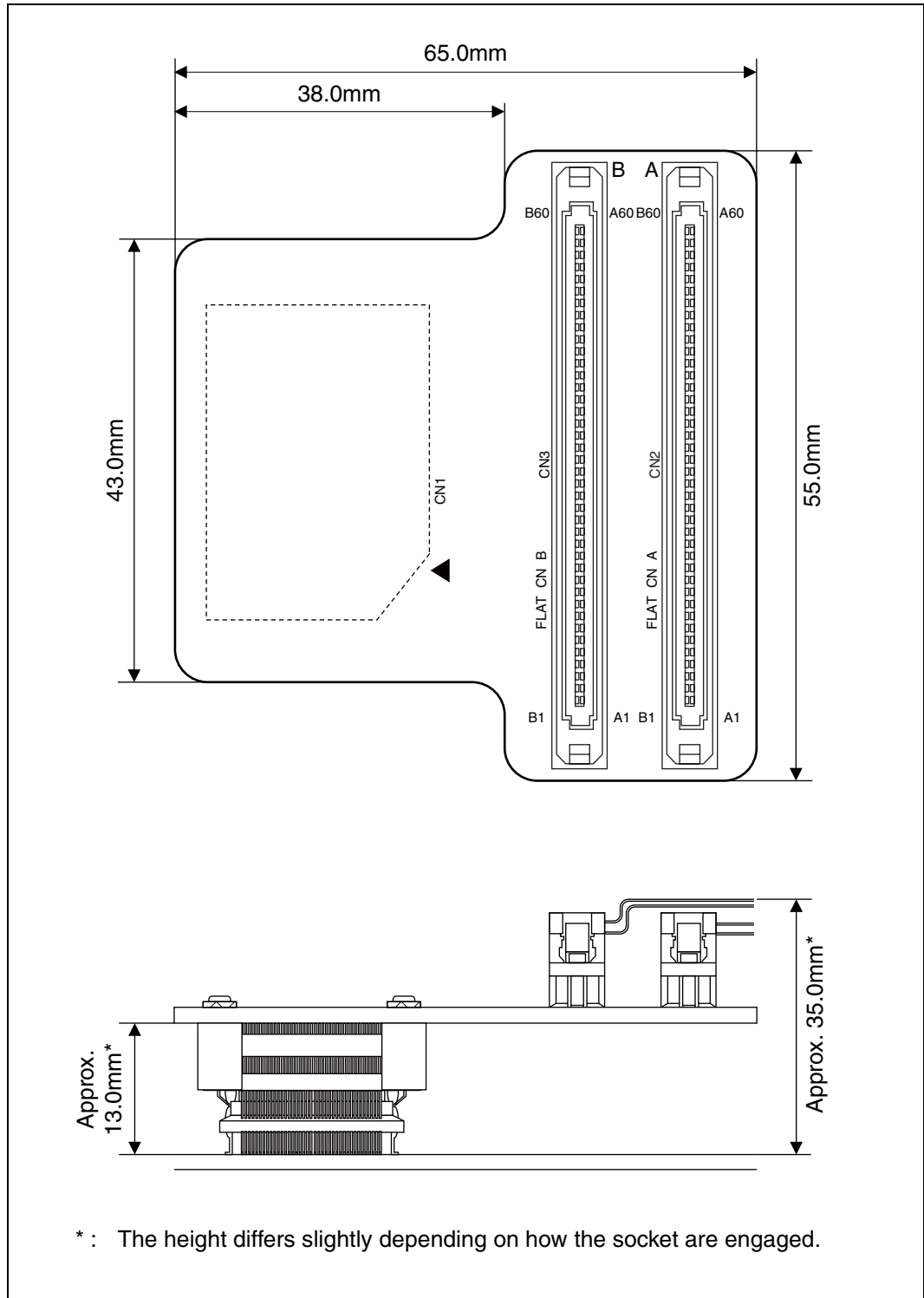


Figure 1 Header board dimensions

## ■ 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.

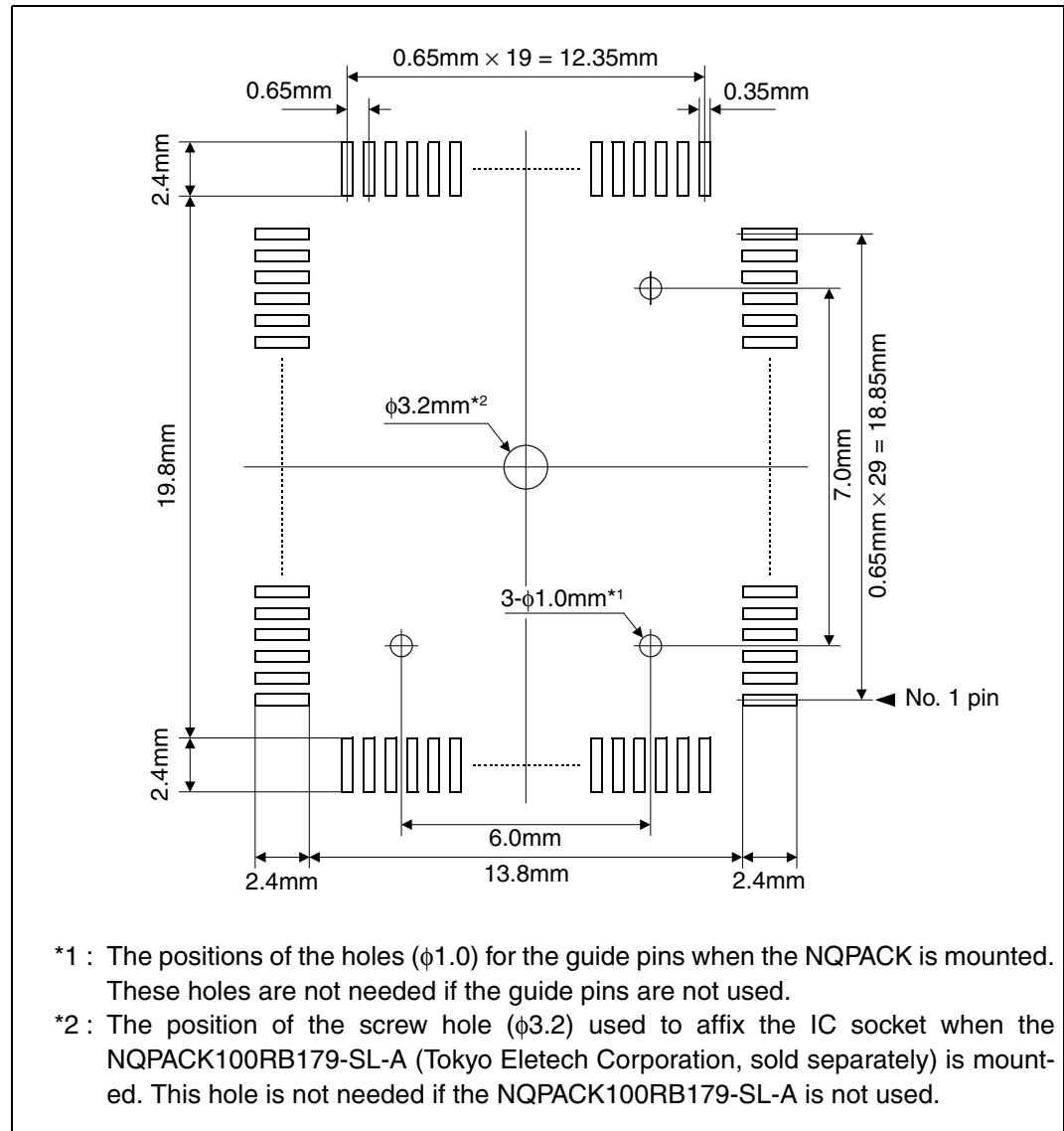


Figure 2 Recommended dimensions of the footprint for mounting the NQPACK

## ■ Notes on the sub clock

When using this product, it is not possible to supply the sub clock from the user system to the evaluation MCU. If the evaluation MCU operates using the sub clock, use the sub clock on the adapter board.

See the operation manual for the adapter board for details.

## 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 bend. 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 special 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.

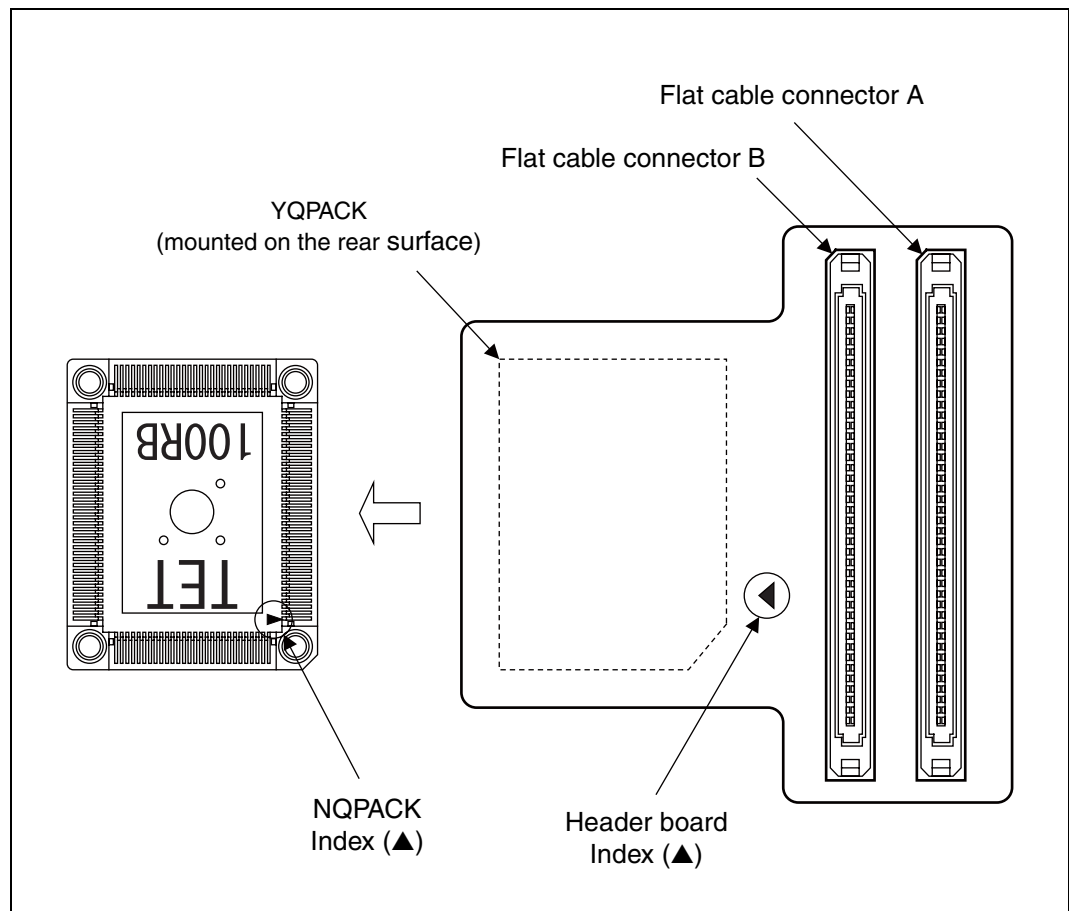


Figure 3 Index Position

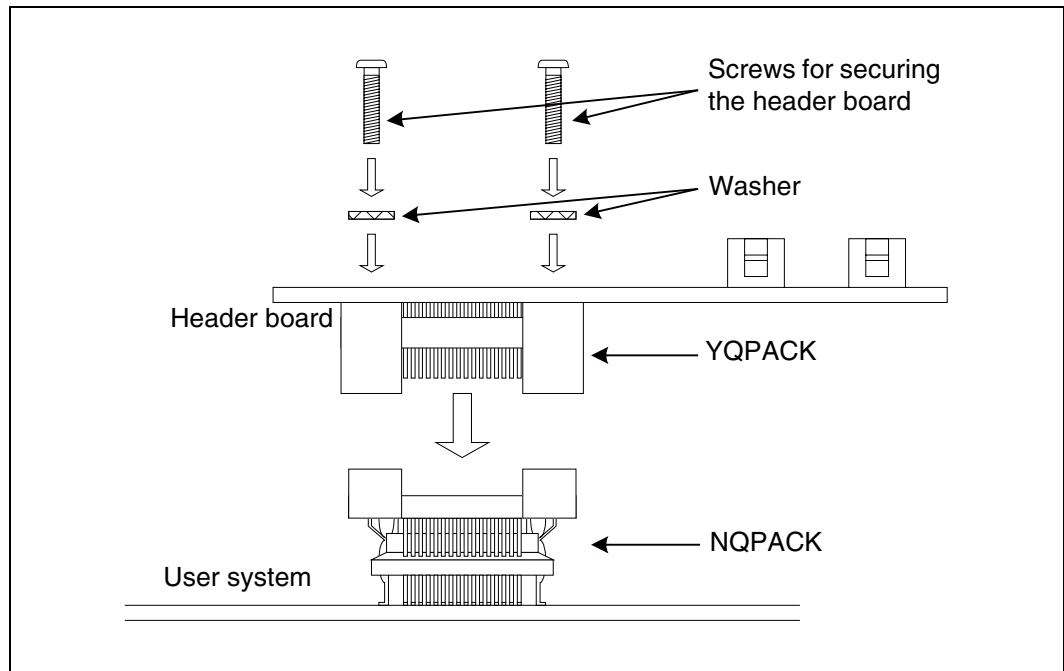


Figure 4 Header board connection

■ **Disconnection**

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 bend. 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 special screwdriver that was included with the NQPACK. Be careful to avoid overtightening the screws as this may cause a bad connection.

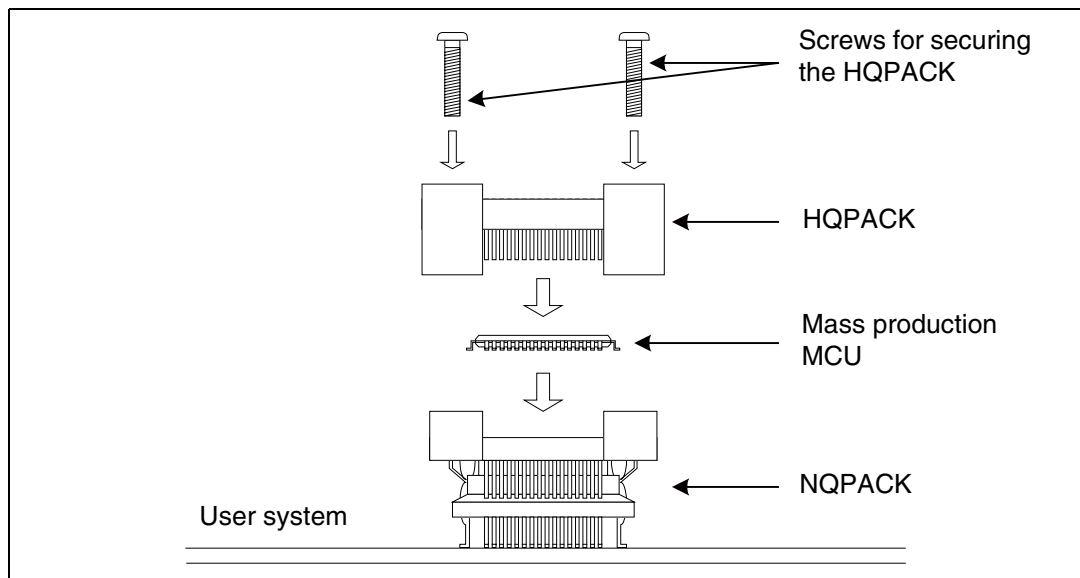


Figure 5 Mounting a mass production MCU

### ■ Disconnection

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

## 6. Connector Pin Assignment

The signals from the evaluation MCU that is mounted on the adapter board are connected to the YQ-PACK (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 (which is sold separately). 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 : PIDB and PIDA are left unconnected (open) and connected to GND, respectively (for determining the header connection).

\*2 : For the shared ports (P04\_1/X1A and P04\_0/X0A), set the port selection circuit (CLKSEL0/1) on the adapter board to match the production MCU port specifications.

— : Unconnected pin (left open).


 : UVCC

The pin numbers of the power supply (UVCC) pins on the evaluation MCU are as follows.

VCC = E2, R2, AE4, AG6, AG10, AG13

The pin numbers of the power supply (UVCC) pins on the mass production MCU are as follows.


VCC = 15, 65, 90

 : DVCC

The pin numbers of the power supply (DVCC) pins on the evaluation MCU are as follows.

VCC = A11, D6, D10, F4

The mass production MCU does not have a DVCC pin. Connect the power supply to the VCC pin on the mass production MCU.

 : VSS

The pin numbers of the ground (VSS) pins on the evaluation MCU are as follows.

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

The pin numbers of the ground (VSS) pins on the mass production MCU are as follows.

VSS = 16, 44, 66, 91

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	53
A8	AJ7	52	B8	AH8	51
A9	VSS		B9	VSS	
A10	AG9	54	B10	AK2	17
A11	VSS		B11	VSS	
A12			B12		
A13	AK7	92	B13	AK6	93
A14	VSS		B14	VSS	
A15	AJ8	14*2	B15	AK8	13*2
A16	VSS		B16	VSS	
A17	AG5	5	B17	AH4	6
A18	AJ3	7	B18	AJ2	8
A19	AH3	9	B19	AJ1	10
A20	AH2	11	B20	AG3	12
A21	VSS		B21	VSS	
A22	AE2	—	B22	AD4	—
A23	AD3	—	B23	AD1	—
A24	AE1	—	B24	AC3	—
A25	AD2	—	B25	AC2	—
A26	VSS		B26	VSS	
A27	Y3	—	B27	AA1	—
A28	Y1	—	B28	W3	—
A29	Y2	—	B29	W1	—
A30	W2	—	B30	V4	—
A31	VSS		B31	VSS	
A32	T2	36	B32	T1	37
A33	R1	38	B33	R4	39
A34	R3	40	B34	P1	41
A35	P2	42	B35	N1	43
A36	VSS		B36	VSS	
A37	—	—	B37	—	—
A38	L4	32	B38	L3	33
A39	K1	34	B39	L1	35
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	67	B52	A7	68
A53	A6	69	B53	C8	70
A54	B7	71	B54	B8	72
A55	A8	73	B55	C9	74
A56	VSS		B56	VSS	
A57	UVCC		B57	DVCC	UVCC
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	77	B2	AJ13	78
A3	AJ12	79	B3	AK12	80
A4	AJ11	81	B4	AH12	82
A5	AK11	83	B5	AK10	84
A6	VSS		B6	VSS	
A7	AH11	85	B7	AG11	86
A8	AK9	87	B8	AJ10	88
A9	AH10	89	B9	AJ9	94
A10	AH7	95	B10	AG7	96
A11	VSS		B11	VSS	
A12	AJ6	97	B12	AK5	98
A13	AJ5	99	B13	AK4	100
A14	AH6	1	B14	AJ4	2
A15	AH5	3	B15	AK3	4
A16	VSS		B16	VSS	
A17	AF4	—	B17	AH1	—
A18	AF3	18	B18	AG2	19
A19	AE3	20	B19	AG1	21
A20	AF2	22	B20	AF1	23
A21	VSS		B21	VSS	
A22	AC1	—	B22	AB3	—
A23	AB4	—	B23	AB2	—
A24	AA3	—	B24	AA2	—
A25	AB1	—	B25	Y4	—
A26	VSS		B26	VSS	
A27	V2	24	B27	V3	25
A28	U3	26	B28	V1	27
A29	U2	28	B29	U1	29
A30	T3	30	B30	T4	31
A31	VSS		B31	VSS	
A32	P3	45	B32	N3	46
A33	N2	47	B33	N4	48
A34	M2	49	B34	M1	50
A35	L2	55	B35	M3	56
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	—	B42	F3	—
A43	D2	—	B43	E3	—
A44	C1	—	B44	E4	—
A45	D3	—	B45	C2	—
A46	VSS		B46	VSS	
A47	C5	57	B47	B4	58
A48	C6	59	B48	A4	60
A49	B5	61	B49	A5	62
A50	B6	63	B50	D7	64
A51	VSS		B51	VSS	
A52	D9	75	B52	B9	76
A53	C10	—	B53	B10	—
A54	A9	—	B54	D11	—
A55	C11	—	B55	A10	—
A56	VSS		B56	VSS	
A57	UVCC		B57	DVCC	UVCC
A58			B58		
A59	—	—	B59	—	—
A60	VSS		B60	VSS	

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