

DSU-FR EMULATOR
F²MC-16FX LQFP-144P HEADER TYPE13
MB2198-506-E
OPERATION MANUAL

PREFACE

Thank you for purchasing the F²MC-16FX*¹ LQFP-144P*² header type13 (MB2198-506-E) for the DSU-FR*³ emulator.

The F²MC-16FX LQFP-144P header type13 is a header board*⁴ used to connect the DSU-FR emulator (MB2198-01)*⁵ and the DSU-FR emulator F²MC-16FX BGA-416P adapter (MB2198-500)*⁶ to a user system that uses an MB96330 series (LQFP-144P) microcontroller from the Fujitsu F²MC-16FX family.

This manual explains how to handle the F²MC-16FX LQFP-144P header type13 for the DSU-FR emulator. Read this manual before using the MB2198-506-E.

Please contact your 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 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 F²MC-16FX BGA-416P ADAPTER MB2198-500 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 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. |
| 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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- Exportation/release of any products described in this document may require necessary procedures in accordance with the regulations of the Foreign Exchange and Foreign Trade Control Law of Japan and/or US export control laws.
- 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 × 10 mm, 0.4 mm pitch) : 4
- Washers : 4
- NQPACK144SD-ND*2 : 1
- HQPACK144SD*3 : 1
- Operation manual (English version, this manual) : 1
- Operation manual (Japanese version) : 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 specialized 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 a sales or support representative for information on the adapter boards and emulators that are used 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.

■ 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.

Refer to the operating manual for details on the adapter board.

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.

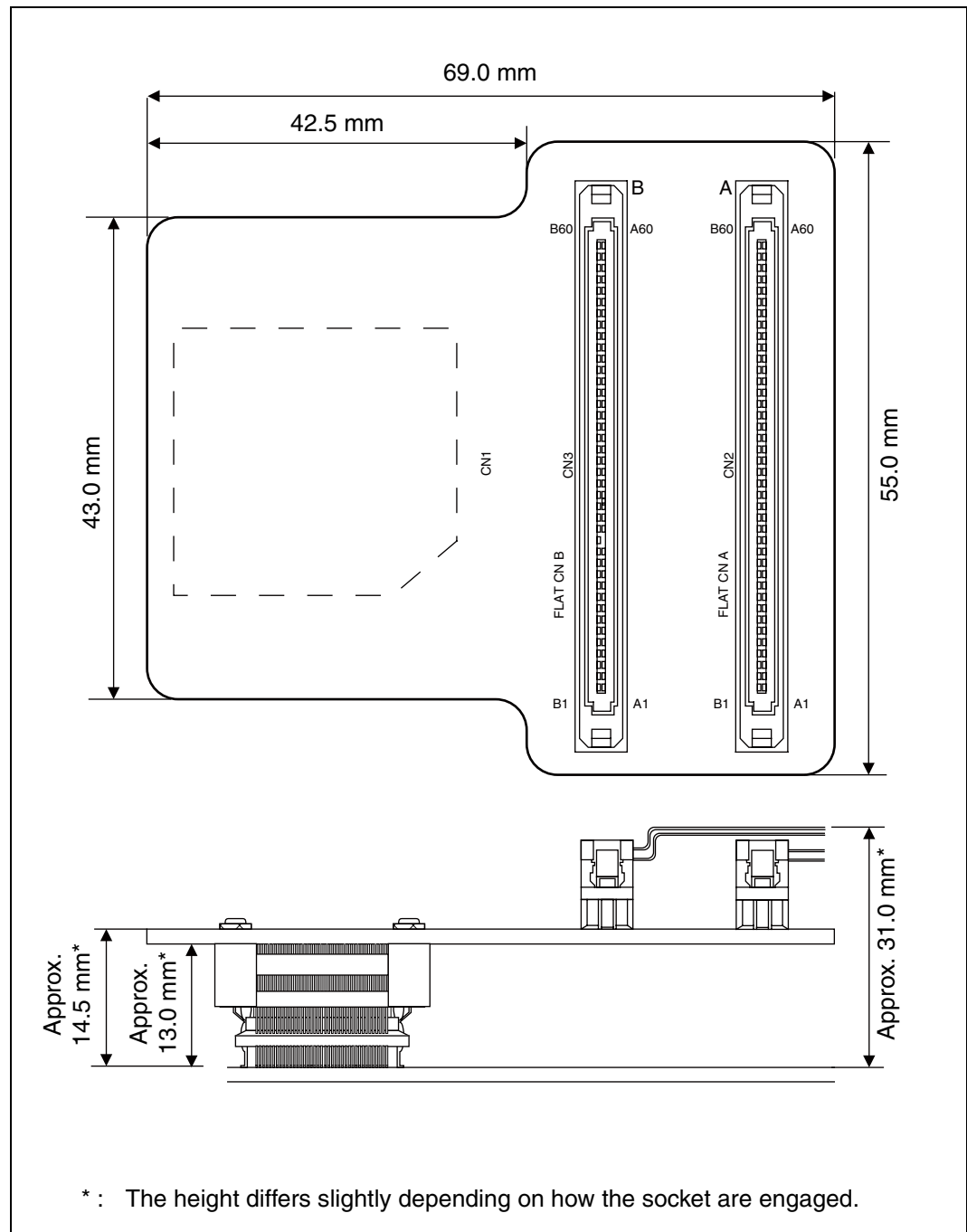


Figure 1 Header board dimensions

■ 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.

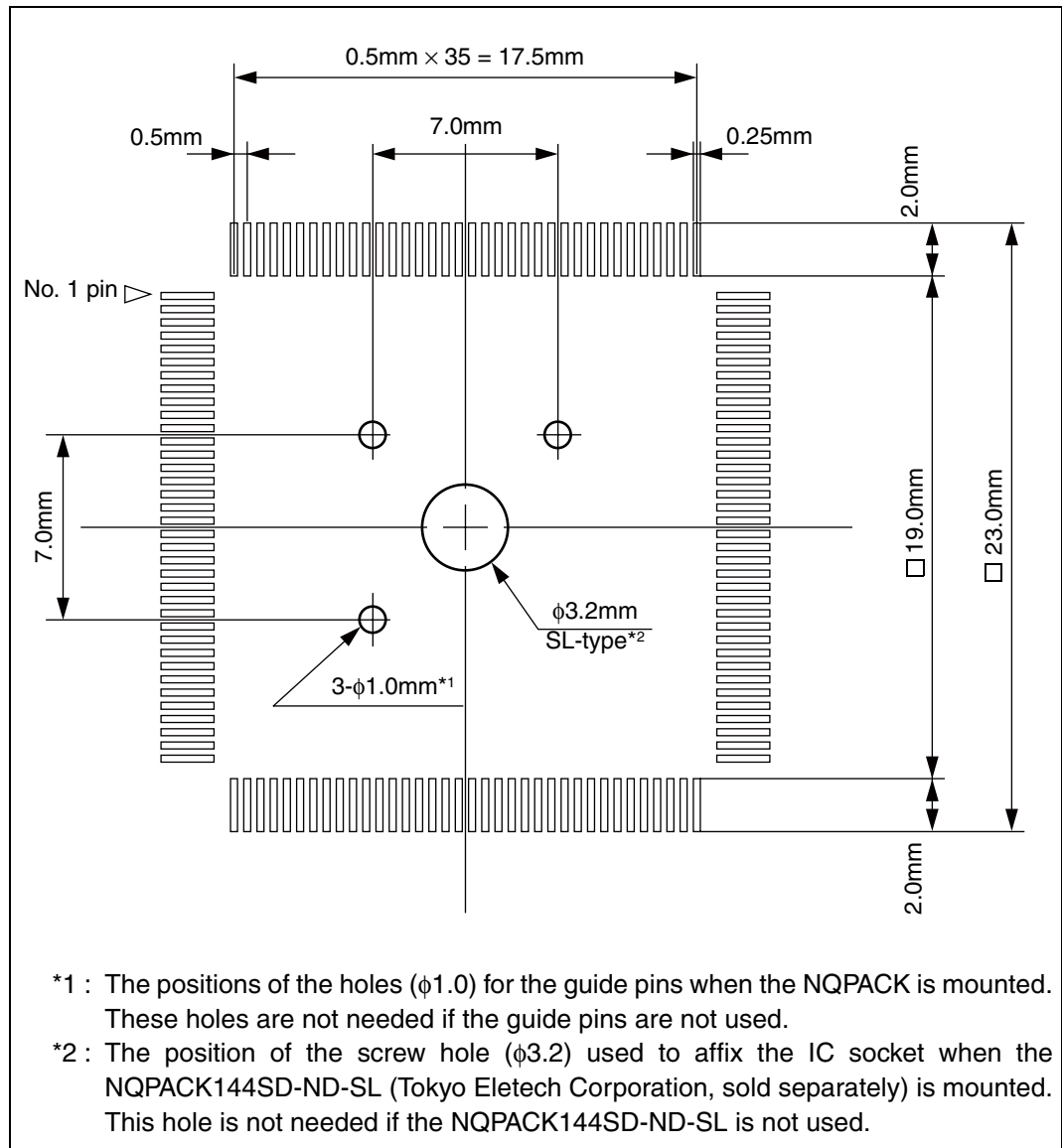


Figure 2 Recommended dimensions of the footprint for mounting the NQPACK

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.

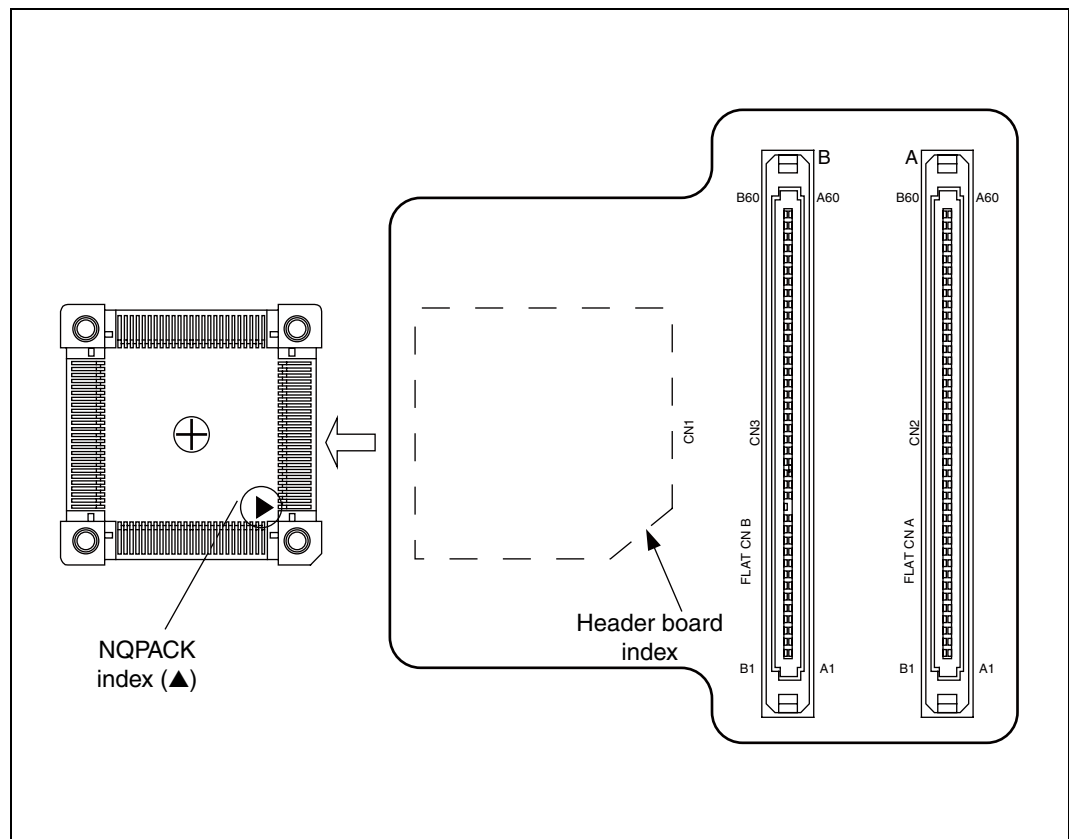


Figure 3 Index position

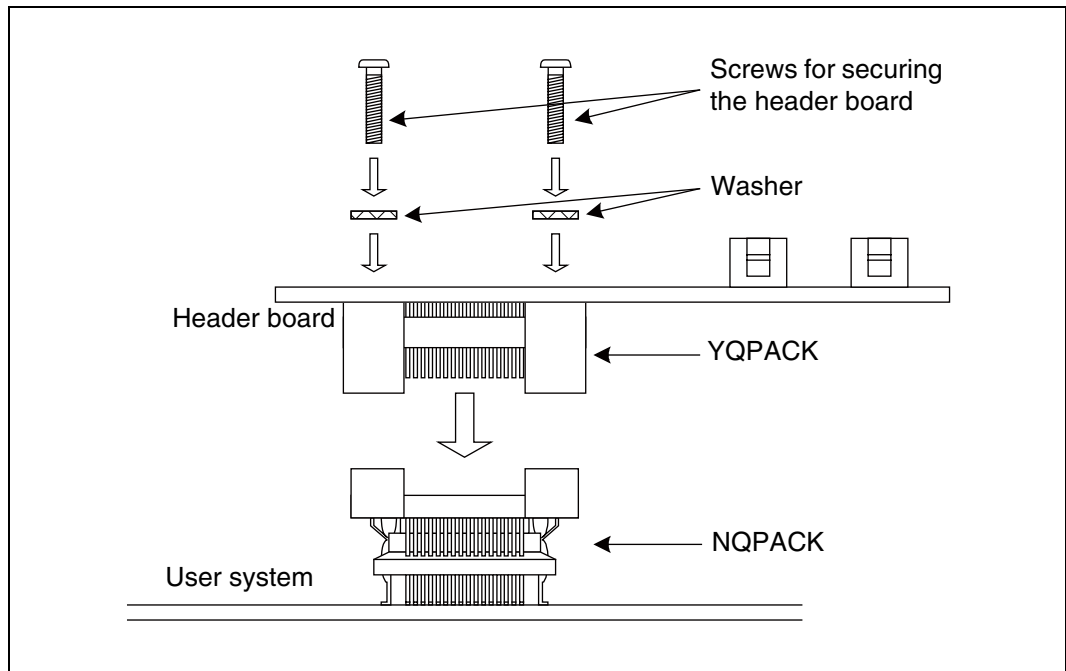


Figure 4 Header board connection

■ **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 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.

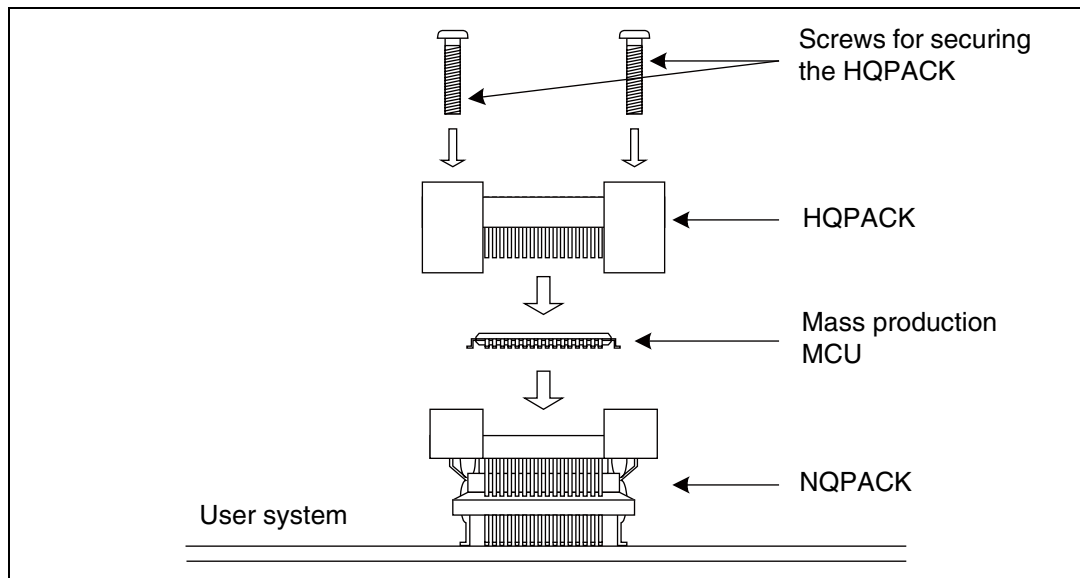


Figure 5 Mounting a mass production MCU

■ Disconnecting

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 (X1A/P04_1 and X0A/P04_0), set the port selection circuit (CLKSEL0/CLKSEL1) on the adapter board to match the production MCU port specifications (For devices with a “W” suffix in the mass production MCU part number: X1A, X0A. For devices with an “S” suffix: P04_1, P04_0).

— : 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 = 36, 72, 108, 144

 : 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 UVCC 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 = 1, 37, 73, 79, 109

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 | 140 |
| A21 | VSS | | B21 | VSS | |
| A22 | AE2 | — | B22 | AD4 | — |
| A23 | AD3 | — | B23 | AD1 | — |
| A24 | AE1 | 141 | B24 | AC3 | 142 |
| A25 | AD2 | 143 | B25 | AC2 | 3 |
| A26 | VSS | | B26 | VSS | |
| A27 | Y3 | 12 | B27 | AA1 | 13 |
| A28 | Y1 | 14 | B28 | W3 | 15 |
| A29 | Y2 | 16 | B29 | W1 | 17 |
| A30 | W2 | 18 | B30 | V4 | 19 |
| A31 | VSS | | B31 | VSS | |
| A32 | T2 | 34 | B32 | T1 | 35 |
| 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 | 44 | B38 | L3 | 45 |
| A39 | K1 | 46 | B39 | L1 | 47 |
| A40 | — | — | B40 | — | — |
| A41 | VSS | | B41 | VSS | |
| A42 | G2 | 64 | B42 | H3 | 65 |
| A43 | F1 | 66 | B43 | G1 | 67 |
| A44 | G3 | 68 | B44 | G4 | 69 |
| A45 | F2 | 70 | B45 | E1 | 71 |
| A46 | VSS | | B46 | VSS | |
| A47 | B1 | — | B47 | B2 | — |
| A48 | C3 | — | B48 | A2 | 96 |
| A49 | B3 | 97 | B49 | C4 | — |
| A50 | D5 | 98 | B50 | A3 | — |
| A51 | VSS | | B51 | VSS | |
| A52 | C7 | 99 | B52 | A7 | 100 |
| A53 | A6 | 101 | B53 | C8 | 102 |
| A54 | B7 | 103 | B54 | B8 | 104 |
| A55 | A8 | 105 | B55 | C9 | 106 |
| 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 | 107 | B2 | AJ13 | 110 |
| A3 | AJ12 | 111 | B3 | AK12 | 112 |
| A4 | AJ11 | 113 | B4 | AH12 | 114 |
| A5 | AK11 | 115 | B5 | AK10 | 116 |
| A6 | VSS | | B6 | VSS | |
| A7 | AH11 | 117 | B7 | AG11 | 118 |
| A8 | AK9 | 119 | B8 | AJ10 | 120 |
| A9 | AH10 | 121 | B9 | AJ9 | 122 |
| A10 | AH7 | 123 | B10 | AG7 | 124 |
| A11 | VSS | | B11 | VSS | |
| A12 | AJ6 | 125 | B12 | AK5 | 126 |
| A13 | AJ5 | 127 | B13 | AK4 | 128 |
| A14 | AH6 | 129 | B14 | AJ4 | 130 |
| A15 | AH5 | 131 | B15 | AK3 | 132 |
| A16 | VSS | | B16 | VSS | |
| A17 | AF4 | — | B17 | AH1 | — |
| A18 | AF3 | 20 | B18 | AG2 | 21 |
| A19 | AE3 | 22 | B19 | AG1 | 23 |
| A20 | AF2 | 24 | B20 | AF1 | 25 |
| A21 | VSS | | B21 | VSS | |
| A22 | AC1 | 4 | B22 | AB3 | 5 |
| A23 | AB4 | 6 | B23 | AB2 | 7 |
| A24 | AA3 | 8 | B24 | AA2 | 9 |
| A25 | AB1 | 10 | B25 | Y4 | 11 |
| A26 | VSS | | B26 | VSS | |
| A27 | V2 | 26 | B27 | V3 | 27 |
| A28 | U3 | 28 | B28 | V1 | 29 |
| A29 | U2 | 30 | B29 | U1 | 31 |
| A30 | T3 | 32 | B30 | T4 | 33 |
| A31 | VSS | | B31 | VSS | |
| A32 | P3 | 48 | B32 | N3 | 49 |
| A33 | N2 | 50 | B33 | N4 | 51 |
| A34 | M2 | 52 | B34 | M1 | 53 |
| A35 | L2 | 54 | B35 | M3 | 55 |
| A36 | VSS | | B36 | VSS | |
| A37 | J1 | 56 | B37 | K2 | 57 |
| A38 | K3 | 58 | B38 | J2 | 59 |
| A39 | J4 | 60 | B39 | J3 | 61 |
| A40 | H1 | 62 | B40 | H2 | 63 |
| 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 | 83 | B47 | B4 | 84 |
| A48 | C6 | 85 | B48 | A4 | 86 |
| A49 | B5 | 87 | B49 | A5 | 88 |
| A50 | B6 | 89 | B50 | D7 | 90 |
| A51 | VSS | | B51 | VSS | |
| A52 | D9 | 91 | B52 | B9 | 92 |
| A53 | C10 | 93 | B53 | B10 | 94 |
| A54 | A9 | 95 | 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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