

# AB-050-FX3-U

## V850ES/Fx3 Starter Board

32

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Technology Corp. website (<http://www.renesas.com>).

## Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics.

8. The quality grade of each Renesas Electronics product is “Standard” unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.
- “Standard”: Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.
- “High Quality”: Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti- crime systems; safety equipment; and medical equipment not specifically designed for life support.
- “Specific”: Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
9. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
10. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
11. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
12. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
13. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.
- (Note 1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its majority- owned subsidiaries.
- (Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

## General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

### 1. Handling of Unused Pins

Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.

The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

### 2. Processing at Power-on

The state of the product is undefined at the moment when power is supplied.

The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.

In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.

In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

### 3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

### 4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

### 5. Differences between Products

Before changing from one product to another, i.e. to one with a different part number, confirm that the change will not lead to problems.

The characteristics of MPU/MCU in the same group but having different part numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different part numbers, implement a system-evaluation test for each of the products.

## Regional Information

Some information contained in this document may vary from country to country. Before using any Renesas Electronics product in your application, please contact the Renesas Electronics office in your country to obtain a list of authorized representatives and distributors. They will verify:

- Device availability
- Ordering information
- Product release schedule
- Availability of related technical literature
- Development environment specifications (for example, specifications for third-party tools and components, host computers, power plugs, AC supply voltages, and so forth)
- Network requirements

In addition, trademarks, registered trademarks, export restrictions, and other legal issues may also vary from country to country.

Visit

<http://www.renesas.com>

to get in contact with your regional representatives and distributors.

# Preface

- Readers** This manual is intended for users who want to understand the functions of the concerned microcontrollers.
- Purpose** This manual presents the hardware manual for the concerned microcontrollers.
- Organisation** This system specification describes the following sections:
- Pin function
  - CPU function
  - Internal peripheral function
- Module instances** These microcontrollers may contain several instances of a dedicated module. In general the different instances of such modules are identified by the index “n”, where “n” counts from 0 to the number of instances minus one.
- Legend** Symbols and notation are used as follows:
- Weight in data notation: Left is high order column, right is low order column
  - Active low notation: xxx (pin or signal name is over-scored) or /xxx (slash before signal name) or \_xxx
  - Memory map address: High order at high stage and low order at low stage
- Note** Additional remark or tip
- Caution** Item deserving extra attention
- Numeric notation**
- |             |                  |
|-------------|------------------|
| Binary:     | xxxx or xxxB     |
| Decimal:    | xxxx             |
| Hexadecimal | xxxxH or 0x xxxx |
- Numeric prefixes** representing powers of 2 (address space, memory capacity):
- |           |                                   |
|-----------|-----------------------------------|
| K (kilo): | $2^{10} = 1024$                   |
| M (mega): | $2^{20} = 1024^2 = 1,048,576$     |
| G (giga): | $2^{30} = 1024^3 = 1,073,741,824$ |
- Register contents** X, x = don't care
- Diagrams** Block diagrams do not necessarily show the exact wiring in hardware but the functional structure. Timing diagrams are for functional explanation purposes only, without any relevance to the real hardware implementation.

## How to Use This Manual

### (1) Purpose and Target Readers

This manual is designed to provide the user with an understanding of the hardware functions and electrical characteristics of the MCU. It is intended for users designing application systems incorporating the MCU. A basic knowledge of electric circuits, logical circuits, and MCUs is necessary in order to use this manual. The manual comprises an overview of the product; descriptions of the CPU, system control functions, peripheral functions, and electrical characteristics; and usage notes.

Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to the xxx/xx Group. Make sure to refer to the latest versions of these documents. The newest versions of the documents listed may be obtained from the Renesas Electronics Web site.

Document Type	Description	Document Title	Document No.
Data Sheet	Hardware overview and electrical characteristics	xxx/xx Group Datasheet	R01DSxxxxEJxxxx
User's manual for Hardware	Hardware specifications (pin assignments, memory maps, peripheral function specifications, electrical characteristics, timing charts) and operation description. Note: Refer to the application notes for details on using peripheral functions.	xxx/xx User's manual for Hardware	This User's manual
User's manual for Software	Description of CPU instruction set	xxx/xx Series User's manual for Software	R01USxxxxEJxxxx
Application Note	Information on using peripheral functions and application examples. Sample programs. Information on writing programs in assembly language and C.	Available from Renesas Electronics Web site.	
Renesas Technical Update	Product specifications, updates on documents, etc.		

**(2) List of Abbreviations and Acronyms**

All trademarks and registered trademarks are the property of their respective owners.



## Table of Contents

<b>Chapter 1</b>	<b>Introduction .....</b>	<b>10</b>
<b>Chapter 2</b>	<b>Board description.....</b>	<b>11</b>
2.1	Overview 11	
2.1.1	Electrical Area.....	11
2.1.2	Functional Area.....	12
2.1.3	Connecting both areas.....	12
2.2	Reset 13	
2.3	NWire connection .....	13
2.4	PG-FP4 connection .....	13
2.5	RS-232 / LIN.....	14
2.6	CAN 18	
<b>Chapter 3</b>	<b>Mounting the FK3 device on the board .....</b>	<b>19</b>
<b>Chapter 4</b>	<b>Connecting the Power Supply.....</b>	<b>20</b>
<b>Chapter 5</b>	<b>UART / LIN CAN DSUB connectors .....</b>	<b>21</b>
5.1	UART / LIN connectors .....	21
5.2	CAN connectors .....	21
<b>Chapter 6</b>	<b>Mounting other Fx3 devices on the board .....</b>	<b>23</b>
6.1	Mounting devices .....	23
6.1.1	Mounting a FE3 device.....	23
6.1.2	Mounting a FF3 device.....	24
6.1.3	Mounting a FG3 device .....	24
6.1.4	Mounting a FJ3 device .....	25
6.2	Pin connection.....	26
6.2.1	Power supply pins.....	26
6.2.2	REGC pin.....	27
6.2.3	X1, X2 pins.....	28
6.2.4	XT1, FLMD0 .....	28
6.3	Functional pin connection .....	30
6.3.1	Jumper overview .....	30
6.3.2	Testpoints.....	31
6.3.3	Reset signal.....	31
6.3.4	NWIRE signals .....	32
6.3.5	Flash Programming interface.....	32
6.3.6	CAN interface .....	32
6.3.7	UARTD interface .....	34
<b>Chapter 7</b>	<b>Revision History .....</b>	<b>35</b>
<b>Chapter 8</b>	<b>Schematic .....</b>	<b>36</b>

## Chapter 1 Introduction

The AB-050-FX3-U is designed as a simple and easy to use Starter Board to support users with the first steps when starting with the Fx3-Series family.

The Starter Board is prepared to hold a V850ES/FK3 device (uPD70F3385). As the largest device of the Fx3-Series the FK3 offers the complete range of all Fx3 peripherals. Therefore software development for all other Fx3-Series devices is possible as well. Due to the software compatibility between the different family members porting of SW from FK3 to smaller devices is possible with only minimum efforts.

Mounting other members of the Fx3-Series on the board also is possible, at the cost of manual replacement of components and rewiring of signals.

With the NWire Debug interface and the Flash Programming interface for the RENESAS PG-FP4 Flash Programmer the standard RENESAS programming interfaces are directly available.

To enable further application development the board features drivers for five high speed CAN interfaces, eight RS-232 interfaces and eight LIN bus interfaces.

With on-board voltage regulator and reset generator a simple external DC power supply is sufficient to operate the board.

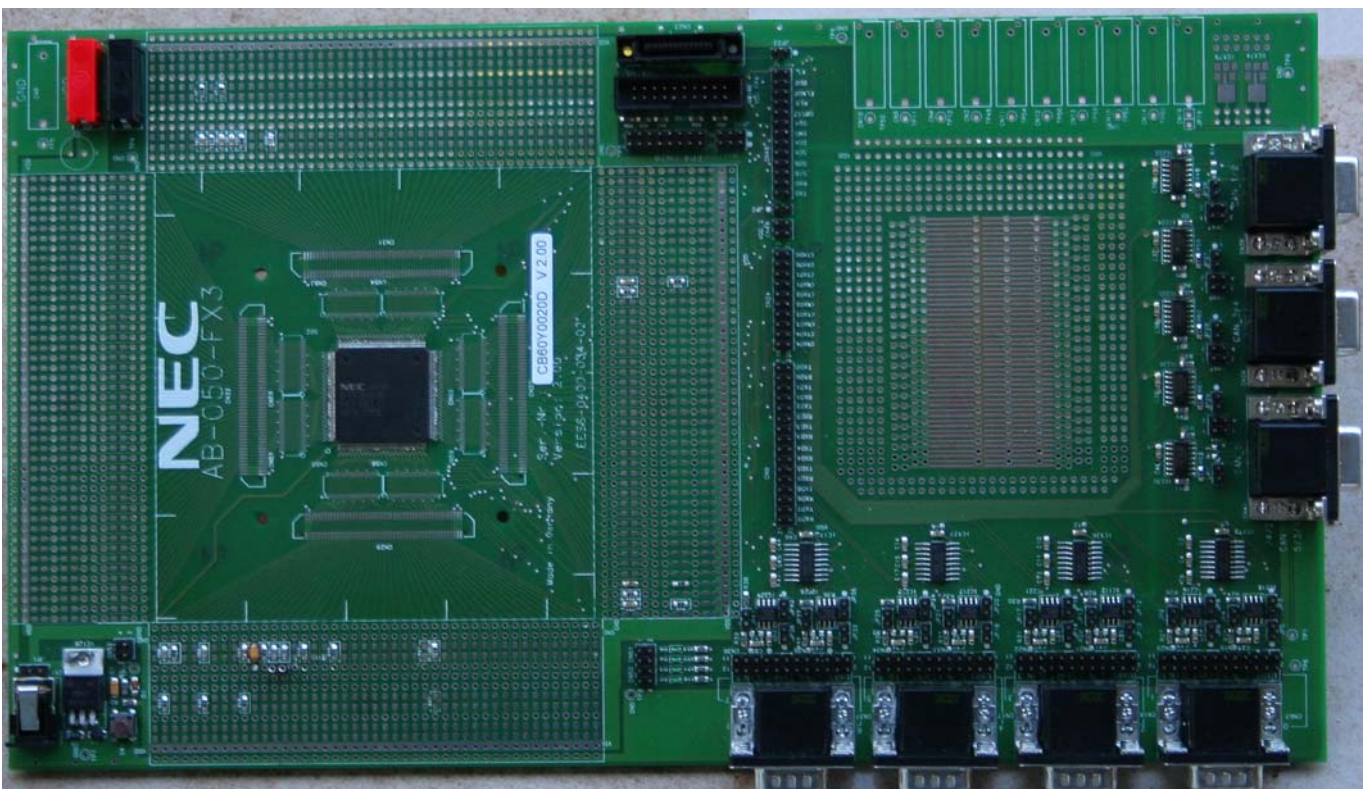


Figure 1 AB-050-FX3-U with FK3 Device

## Chapter 2 Board description

### 2.1 Overview

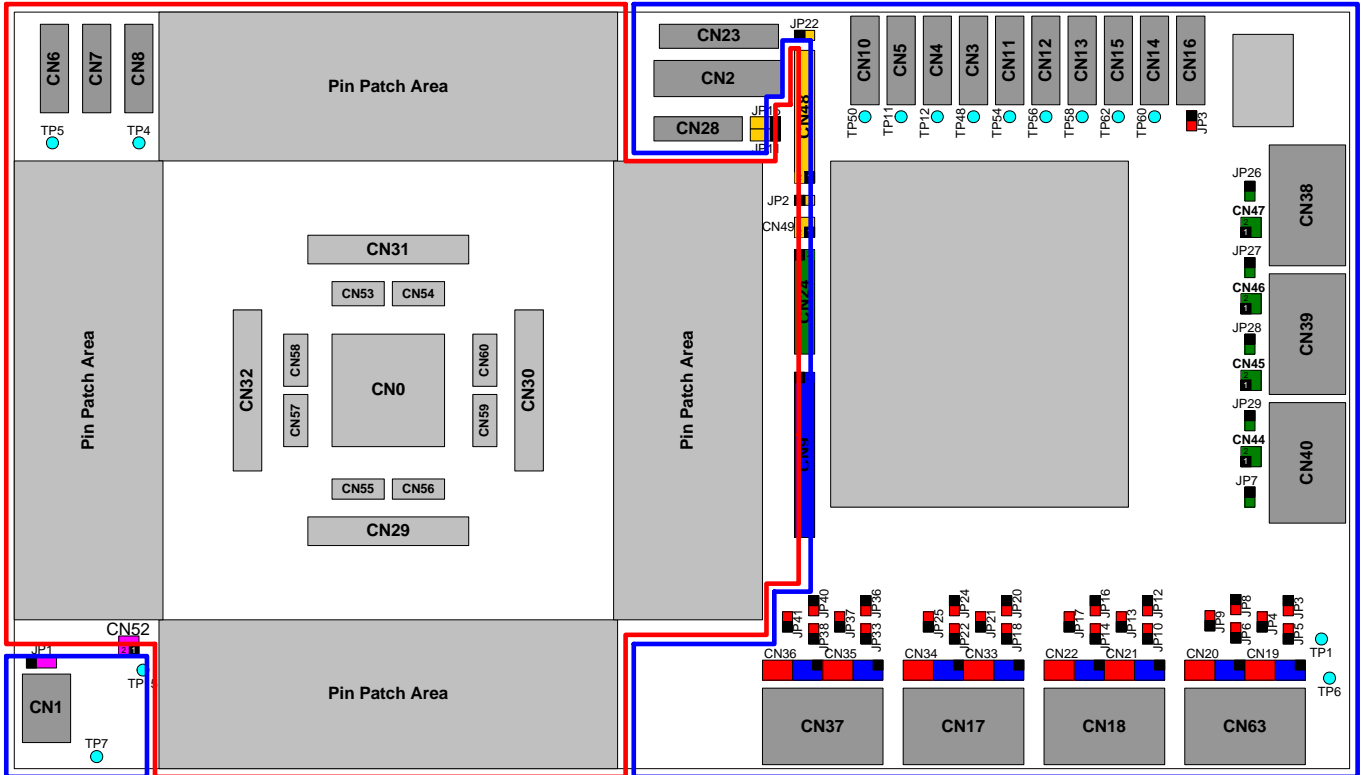


Figure 2-1 Board overview

Basically the board is divided into two areas, an ‘Electrical Area’ and a ‘Functional Area’.

In Figure 2-1 the Electrical Area is surrounded in by a red line and the Functional Area is surrounded by a blue line.

#### 2.1.1 Electrical Area

In the center of the Electrical Area a 180 pin SMD pad field is located that any of the F-Series devices can be assembled to.

On each side of the Device Pad Field a Pin Patch Area is located. In this patch area access is given to each pin of the device

- VDD
- VSS

Further more SMD and through hole components can directly be soldered onto the Pin Patch Area to allow simple networks to be easily built up.

The circuitry available at each pin inside the Pin Patch Area is described in the figure below:

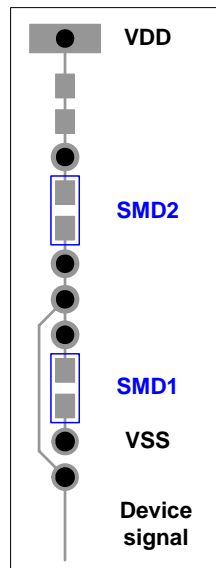


Figure 2-2 Pin Patch Area

A component assembled to the SMD1 field will therefore be connected between the device pin and VSS.

A component assembled to the SMD2 field will be connected between the device pin and VCC.

### 2.1.2 Functional Area

The Functional Area holds the drivers for RS-232, LIN bus and CAN. Additionally other patch areas are available as well to directly assemble LEDs, PowerDrivers and connectors to the board.

**Note:**

For detailed information about the operation of the used RS-232, LIN bus and CAN drivers refer to the related datasheets of those devices.

### 2.1.3 Connecting both areas

The Electrical and Functional Areas are not connected to one another except by a common VSS plane. Nevertheless by use of Jumpers a signal connection between the Electrical Area and the Functional Area is possible.

The following signals are available on the related jumper fields:

Signal	Jumper
_Reset	CN52
VDD	CN49
Flash programming (PG-FP4)	CN48 JP2
NWIRE	CN48
UARTDn (n=0..7)	CN9
CANn (n=0..4)	CN24

Table 2-1 Overview of functional signals

## 2.2 Reset

A simple Reset Generator using analog circuitry is available.

To connect the on-board Reset generator to the FK3 device close CN52 3-4.

If an external Reset signal shall be connected to the board the following setup must be used:

- Use TP15 to physically connect the external reset signal.
- Close CN52 1-2 to connect the external reset signal to the FK3 device.
- Open CN52 3-4 to disconnect the onboard Reset circuitry from the device.

## 2.3 NWire connection

The NWire debug cable from a RENESAS Debug Tool (e.g. MiniCube) can be connected to CN2.

Additionally a KEL connector (CN23) is available to connect third party NWire Debug Tools.

The following jumpers on CN48 must be closed in order to physically connect the NWire signals from CN2 to the corresponding pins of the FK3 device:

Signal	CN48 Pin number
SCK	9 – 10
DCK	11 – 12
DMS	13 – 14
DDI	15 – 16
DRST	17 – 18
RES	19 – 20
FLMD0	21 – 22
DDO	23 – 24

Table 2-2 CN48 – Nwire

Additionally JP2 must be closed.

## 2.4 PG-FP4 connection

The programming cable of the PG-FP4 Flash programmer can be connected to CN28.

To program the device via the CSI interface the following jumpers must be closed:

Connector	Pin number
JP15	2 – 3
JP11	2 – 3
CN48	5 – 6
	7 – 8

Table 2-3 FP4 (CSI) Jumpers

To program the device via the UART interface the following jumpers must be closed:

Connector	Pin number
JP15	1 – 2
JP11	1 – 2
CN48	1 – 2
	3 – 4

**Table 2-4 FP4 (UART) Jumpers**

For Flash programming using the PG-FP4 device power can either be supplied by the PG-FP4 or by the AB-050-FX3.

- For PG-FP4 power supply open JP2.
- For AB-050-FJ3 power supply close JP2.

If the clock supply for PG-FP4 programming is not on board, close CN48 Pins 25-26 to supply the clock from PG-FP4.

## 2.5 RS-232 / LIN

Close CN49 1 – 2 and 3 – 4 to supply power to RS-232 / LIN bus drivers.

For the LIN bus drivers additionally a VBAT voltage must be supplied. This voltage must be in a range of 5V to 12V.

For the exact specification refer to the Datasheet of the LIN Drivers.

To supply VBAT to the board use either of the two connections:

- Use TP1
- Close JP19 and use Cn16

Close the following jumpers on CN9 to physically connect the UARTD signals from the Electrical Area to the Functional Area.

Signal		CN9 Pin #
<b>UARTD0</b>	TXD0	1 – 2
	RXD0	3 – 4
<b>UARTD1</b>	TXD1	5 – 6
	RXD1	7 – 8
<b>UARTD2</b>	TXD2	9 – 10
	RXD2	11 – 12
<b>UARTD3</b>	TXD3	13 – 14
	RXD3	15 – 16
<b>UARTD4</b>	TXD4	17 – 18
	RXD4	19 – 20
<b>UARTD5</b>	TXD5	21 – 22
	RXD5	23 – 24
<b>UARTD7</b>	TXD6	25 – 26
	RXD6	27 – 28

<b>UARTD6</b>	TXD7	29 – 30
	RXD7	31 – 32

Table 2-5 UARTDn signal jumpers

To connect the RS-232 / LIN bus driver signals to the RS-232 / LIN bus connectors close the following jumpers:

Signal		Connector	Pin #
<b>UARTD0</b>	TXD0	CN19	1 – 2
	RXD0		3 – 4
	GND		5 – 6
<b>UARTD1</b>	TXD1	CN20	1 – 2
	RXD1		3 – 4
	GND		5 – 6
<b>UARTD2</b>	TXD2	CN21	1 – 2
	RXD2		3 – 4
	GND		5 – 6
<b>UARTD3</b>	TXD3	CN22	1 – 2
	RXD3		3 – 4
	GND		5 – 6
<b>UARTD4</b>	TXD4	CN33	1 – 2
	RXD4		3 – 4
	GND		5 – 6
<b>UARTD5</b>	TXD5	CN34	1 – 2
	RXD5		3 – 4
	GND		5 – 6
<b>UARTD6</b>	TXD6	CN35	1 – 2
	RXD6		3 – 4
	GND		5 – 6
<b>UARTD7</b>	TXD7	CN36	1 – 2
	RXD7		3 – 4
	GND		5 – 6

Table 2-6 RS-232 signal jumpers

To connect the LIN bus driver signals to the related RS-232/LIN bus connector close the following jumpers:

Signal		Connector	Pin #
<b>LIN0</b>	12V	CN19	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN1</b>	12V	CN20	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN2</b>	12V	CN21	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN3</b>	12V	CN22	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN4</b>	12V	CN33	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN5</b>	12V	CN34	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN6</b>	12V	CN35	7 – 8
	LIN		9 – 10
	GND		11 – 12
<b>LIN7</b>	12V	CN36	7 – 8
	LIN		9 – 10
	GND		11 – 12

**Table 2-7 LIN bus signal jumpers**

To enable the LIN drivers (IC218, IC219, IC172, IC221, IC217, IC223, IC228, IC229) the NSLP pin of the drivers must be pulled high. To do so a Jumper is available to connect the pin to VDD.



LIN channel	NSLP Jumper
0	JP3
1	JP8
2	JP12
3	JP16
4	JP20
5	JP24
6	JP40
7	JP36

The RxD pin of the LIN driver (pin #1) is an open drain output. The necessary pull-up resistor in order to interface to the Fx3 device is not assembled on the board. To enable operation of the RxD signal

- either connect an appropriate pull up resistor to the related RxD input pin of the LIN channel, or
- enable the internal Pull-Up resistors available in the Fx3 devices for each LIN input pin.

The corresponding input pin for each RxD pin can be found in Table 6-11.

For additional information on the LIN driver refer to its User's Manual / Datasheet.

Caution:	<p><b>The RXD reception output pin of the LIN driver (e.g. IC218 pin1) and the RxD reception output pin of the UART driver (e.g. IC173 pin 12) are physically connected to the same pin on connector CN9 (e.g. CN9 pin 4).</b></p> <p><b>Therefore</b></p> <ul style="list-style-type: none"> <li>- <b>when using the LIN driver lift the connected UART driver RxD output pin from the PCB.</b></li> <li>- <b>when using the UART driver place the connected LIN driver in standby mode or lift the LIN driver RxD output pin from the board.</b></li> </ul>
----------	---

## 2.6 CAN

Close CN49 1 – 2 and 3 – 4 to supply power to the CAN drivers.

Close the following jumpers to physically connect the devices CAN signals to the CAN interface drivers located on the Functional Area of the board:

Signal		CN24 Pin #
<b>CAN0</b>	CTXD0	1 – 2
	CRXD0	3 – 4
<b>CAN1</b>	CTXD1	5 – 6
	CRXD1	7 – 8
<b>CAN2</b>	CTXD2	9 – 10
	CRXD2	11 – 12
<b>CAN3</b>	CTXD3	13 – 14
	CRXD3	15 – 16

Table 2-8 CAN signal jumpers

## Chapter 3 Mounting the FK3 device on the board

The AB-050-FX3-U boards is shipped with a mounted V850ES/FK3 device. Nevertheless, if mounting of another V850ES/FK3 device is required at a later time the following guideline is supplied:

To mount a FK3 device on the AB-050-FX3-U place the package in the top right corner of the SMD area.

As the FK3 with 176 pins is placed on an SMD area with 180 pins 4 pads will not be used. Due to the alignment of the device in the top right corner two pads in the lowest line and two pads in the left most line remain empty. Therefore align pin 1 of the device with pin 2 of the SMD pad area.

For details see Figure 3-1 and Figure 3-2.

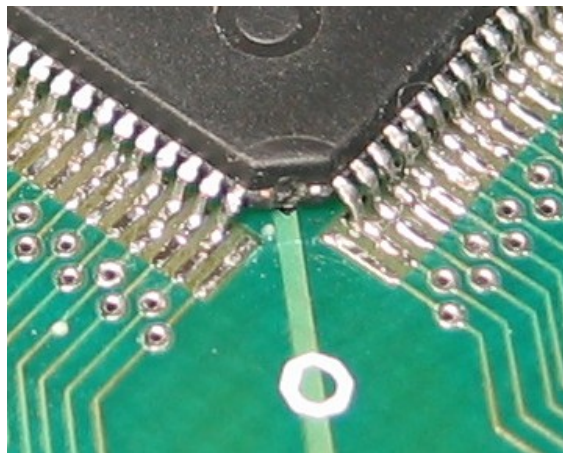


Figure 3-1 FK3 device mounting (1)

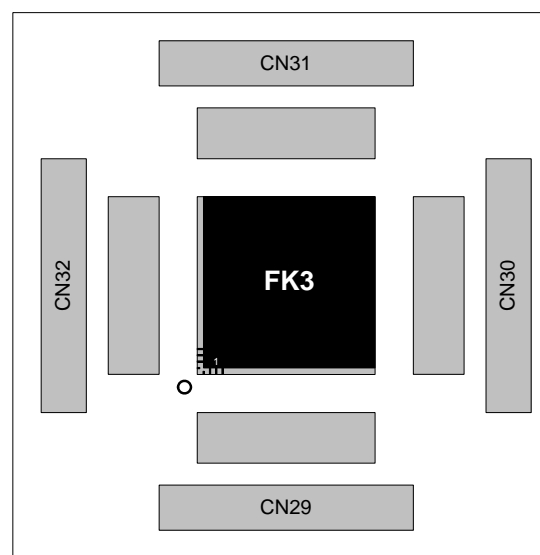


Figure 3-2 FK3 device mounting (2)

## Chapter 4 Connecting the Power Supply

Power can be supplied to the board either

- by directly supplying the device operating voltage, or
- via the onboard 7805 type voltage regulator.

### Direct voltage supply:

A direct supply of the device operating voltage can either be implied by using CN7 to connect VCC (typical +5V for Fx3 devices) and CN8 to connect VSS (0V), or by using CN1.

As the supplied voltage is directly connected to the device the input voltage must not exceed the specified power supply voltage range of the assembled device.

Close JP1 1-2 when directly supplying the devices voltage.

### Voltage regulator supply:

Use CN1 to supply a stabilized voltage of 6V - 12V to the board. The on board 7805 type regulator will generate the 5V supply of the board.

Close JP1 2-3 when using the on board voltage regulator.

Caution:	<b>On CN1 the inner pin connects to VSS and the outer pin connects to VCC.</b>
----------	--

Applying a voltage to the device outside the specified device operating voltage range may damage the device!

## Chapter 5 UART / LIN CAN DSUB connectors

To physically connect the Starter Board to other UART / LIN / CAN devices DSUB type connectors are available..

### 5.1 UART / LIN connectors

To interface the AB-050-FX3-U board to external to UART / LIN devices a 9 pin male D-SUB connector is supplied for each of the eight available UART / LIN interfaces.

The signal layout of the UART/LIN DSUB connector can be seen in Table 5-1.

Male D-SUB, 9pin	Function
1	n/c
6	n/c
2	RS-232 TxD
7	LIN
3	RS-232 Rxd or GND
8	n/c
4	n/c
9	+12V
5	GND

Table 5-1 UART / LIN DSUB connectors

Figure 5-1 displays the assignment of each DSUB connector to its related peripheral:

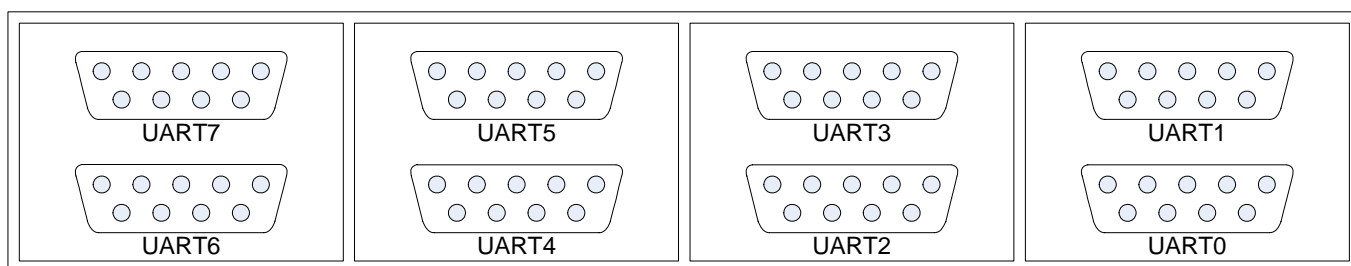


Figure 5-1 UART / LIN DSUB connectors

### 5.2 CAN connectors

To interface the AB-050-FX3-U board to external CAN devices a 9 pin female D-SUB connector is supplied for each of the five available CAN interfaces.

The pin functions of the CAN DSUB connectors can be seen in Table 5-2.

Female D-SUB, 9pin	Function
1	n/c
6	GND
2	CANL
7	CANH
3	GND (if jumpered)
8	n/c
4	n/c
9	n/c
5	n/c

Table 5-2 CAN DSUB connectors

Figure 5-2 displays the assignment of each DSUB connector to its related peripheral:

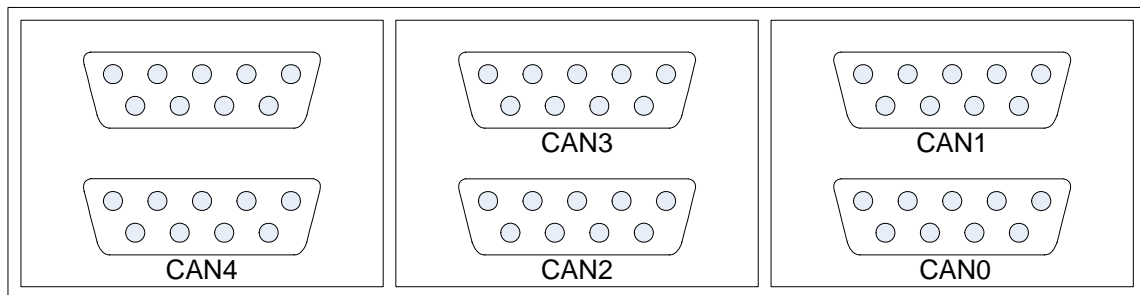


Figure 5-2 CAN DSUB connector

## Chapter 6 Mounting other Fx3 devices on the board

Even though the AB-050-FX3-U is prepared for operation of the FK3 device also other devices of the Fx3-Line can be mounted on the board.

Besides mounting the new device to the board

- the components in the Pin Patch Area must be replaced according to the pin layout of the new device and
- the signals between the device pins and the jumpers connecting the Electrical Area and the Functional Area must be wired manually.

Therefore the following changes must be applied:

### 6.1 Mounting devices

First the device must be mounted to the PCB. The alignment of the different Fx3-family devices is explained below.

#### 6.1.1 Mounting a FE3 device

To mount a FE3 device on the AB-050-FX3-U place the package in the lower left corner of the SMD area but do not use the two pins most in the corner. Place pin 1 of the device on pin 2 of the SMD area.

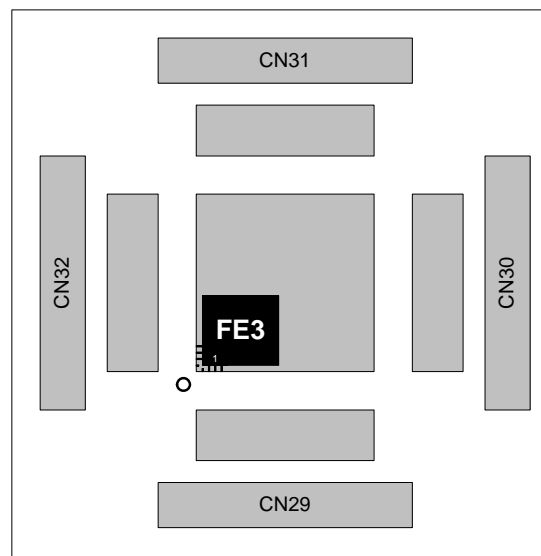


Figure 6-1 Mounting a FE3 device

### 6.1.2 Mounting a FF3 device

To mount a FF3 device on the AB-050-FX3-U place the package in the lower left corner of the SMD area but do not use the two pins most in the corner. Place pin 1 of the device on pin 2 of the SMD area.

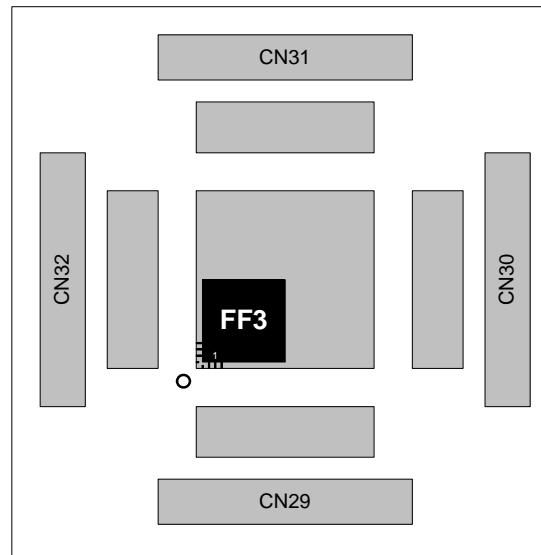


Figure 6-2 Mounting a FF3 device

### 6.1.3 Mounting a FG3 device

To mount a FF3 device on the AB-050-FX3-U place the package in the lower left corner of the SMD area. Place pin 1 of the device on pin 1 of the SMD area.

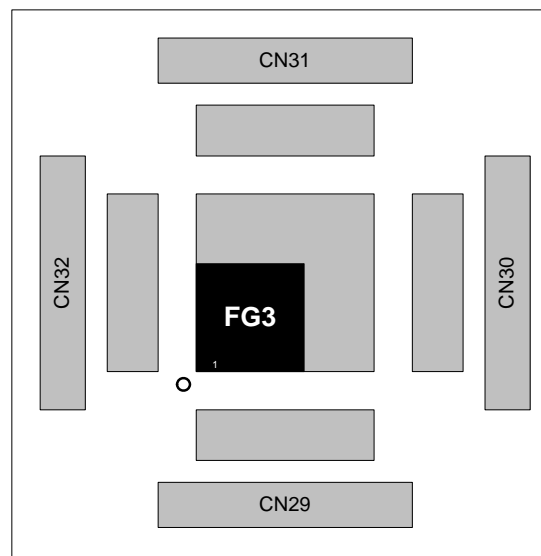
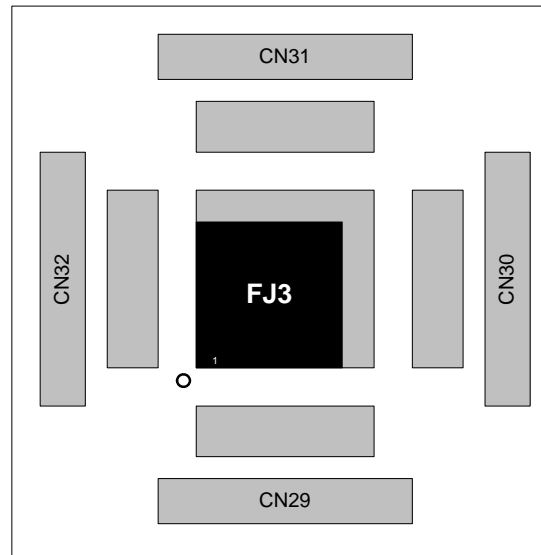


Figure 6-3 Mounting a FG3 device



### 6.1.4 Mounting a FJ3 device

To mount a FJ3 device on the AB-050-FX3-U place the package in the lower left corner of the SMD area. Place pin 1 of the device on pin 1 of the SMD area.



**Figure 6-4** Mounting a FJ3 device

## 6.2 Pin connection

### 6.2.1 Power supply pins

Connect the devices power supply pins to the related power lines using the available SMD pads in the Pin Patch Areas.

Refer to the Fx3 User's Manual and Table 6-1 for the location of the VDD and VSS pins on the different devices.

Connect the VDD and VSS pins in the Pin Patch Areas like this:

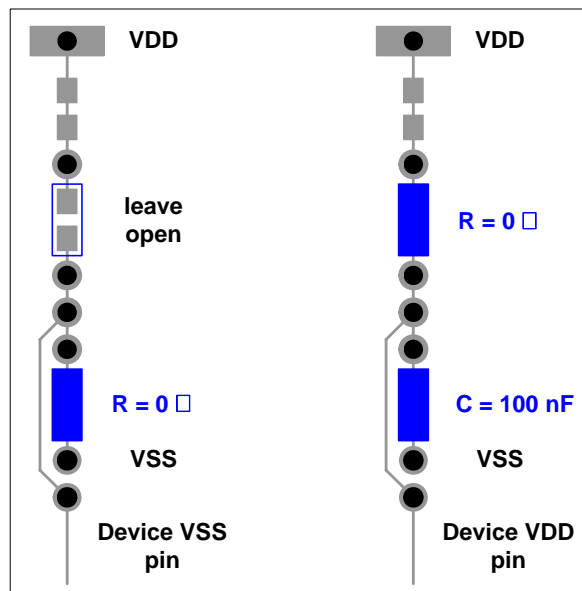


Figure 6-5 Device power supply

To connect the devices VSS pins to the VSS lane of the board place a 0 Ohm resistor on the SMD1 pad.

Signal	Fx3 pinning				
	FE3	FF3	FG3	FJ3	FK3
VSS	6	11	11	11	11
VSS1	n/a	n/a	n/a	n/a	124
AVSS	2	2	2	2	2
AVSS1	n/a	n/a	n/a	n/a	46
EVSS	32	30	33	33	28
	n/a	n/a	n/a	n/a	76
BVSS	n/a	n/a	69	103	127

Table 6-1 VSS signal connection

To connect the devices VDD pins to the VDD lane of the board place a 0 Ohm resistor on the SMD2 pad and place a 100 nF buffering capacitor on the SMD1 pad.

Signal	Fx3 pinning				
	FE3	FF3	FG3	FJ3	FK3
VDD	4	9	9	9	9
VDD1	n/a	n/a	n/a	n/a	126
AVREF0	1	1	1	1	1
AVREF1	n/a	n/a	n/a	n/a	45
EVDD	33	31	34	34	47
	n/a	n/a	5	5	5
	n/a	n/a	n/a	n/a	77
BVDD	n/a	n/a	70	104	128

Table 6-2 VDD signal connection

### 6.2.2 REGC pin

A buffering capacitor between the devices REGC pin(s) and VSS should be placed. Assemble the capacitor to the SMD1 pad field.

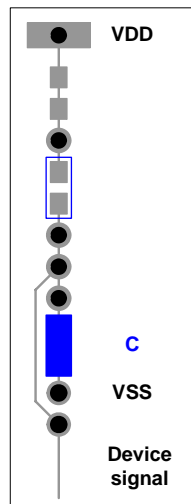


Figure 6-6 REGC pin components

Refer to the Fx3 User’s Manual and Table 6-3 for the location of the RECC pin on the different devices.

Signal	Fx3 pinning				
	FE3	FF3	FG3	FJ3	FK3
REGC	5	10	10	10	10
REGC1	n/a	n/a	n/a	n/a	125

Table 6-3 REGC signal connection

### 6.2.3 X1, X2 pins

An external oscillator can be connected to the X1 and X2 pins of the device. Connect the oscillator between the X1 and X2 pins and place a small capacitor on the SMD1 areas of those pins.

For size of the capacitor refer to the oscillator manufacturer specification / recommendation.

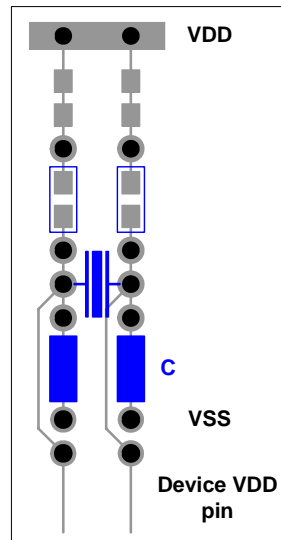


Figure 6-7 X1, X2 pin components

Refer to the Fx3 User's Manual and Table 6-4 for the location of the X1 and X2 pins on the different devices.

Signal	Fx3 pinning				
	FE3	FF3	FG3	FJ3	FK3
X1	7	12	12	12	12
X2	8	13	13	13	13

Table 6-4 X1, X2 signal connection

### 6.2.4 XT1, FLMD0

A pull-down resistor should be connected to input pins XT1 and FLMD0.

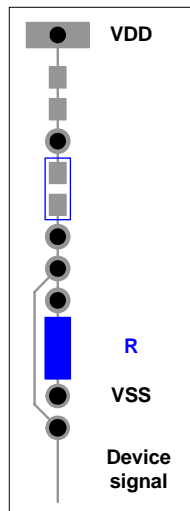


Figure 6-8 Pins with Pull-Down

Refer to the Fx3 User's Manual and Table 6-5 for the location of the XT1 and FLMD0 pins on the different devices.

Signal	Fx3 pinning				
	FE3	FF3	FG3	FJ3	FK3
<b>XT1</b>	10	15	15	15	15
<b>FLMD0</b>	3	8	8	8	8

Table 6-5 XT1, FLMD0 signal connection

### 6.3 Functional pin connection

As the routing of the functional signals (Reset, UARTDn, CANn, NWIRE and FP4) between the device SMD pad area and the Jumpers connecting the Electrical Area and Functional Area is based on the FK3 device, the routing of those signals for other Fx3 devices must be place manually.

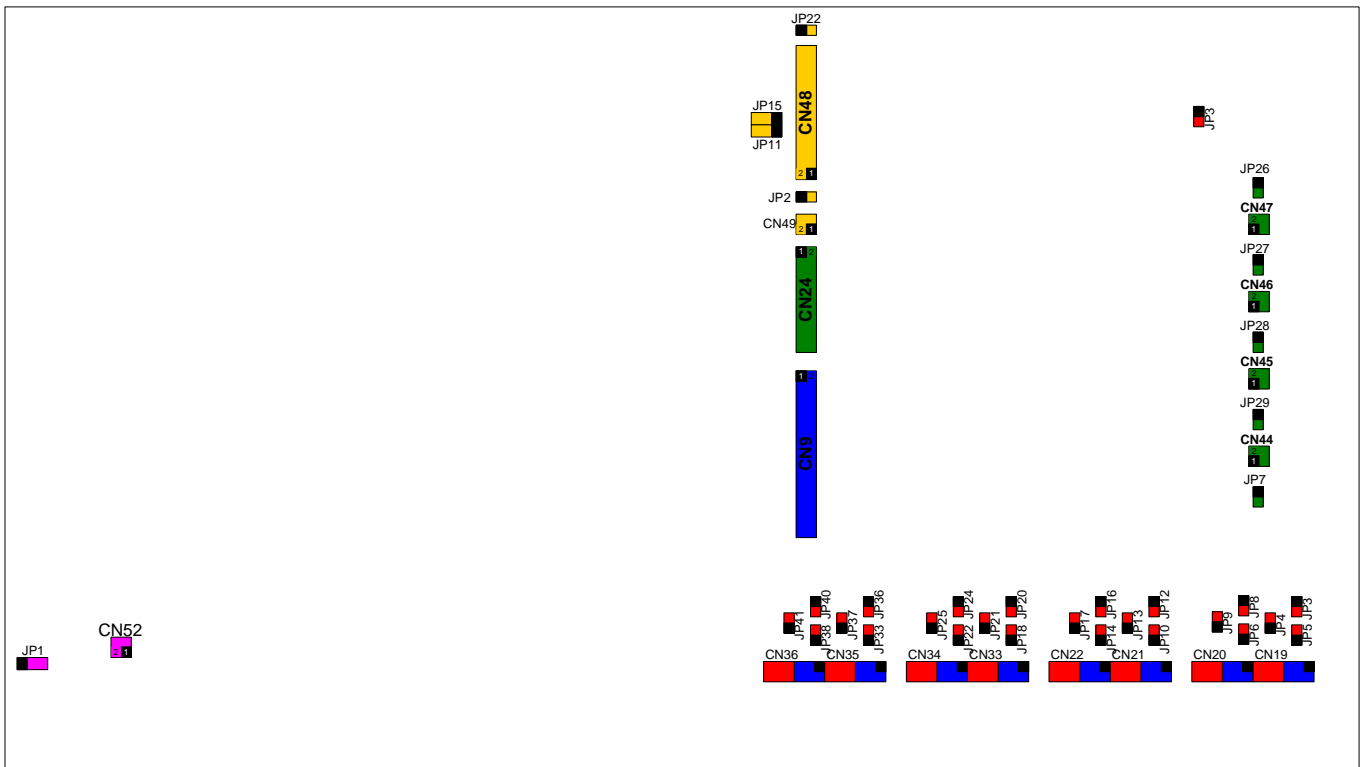
To do so, connect a wire between the device pin (e.g. from one of the through holes in the Pin Patch areas) and the functional side of the related signal jumper.

Caution:	<b>Do not close the related Jumpers of any of the newly routed signals as this can lead to a direct connection between different device pins.</b>
----------	---

Be aware that no further disconnection by the use of jumpers between the Electrical Area and Functional Area is possible after wiring the signals for other than FK3 devices.

#### 6.3.1 Jumper overview

The location of all jumpers located on the board can be seen in the Figure 6-9. Pin 1 of each Jumper field is marked with a black square.



**Figure 6-9 Jumpers location**

The different jumper groups are highlighted in different colours according to their related functionality:

Jumper colour	Related functionality
Yellow	NWire Debug interface and Flash programming interface
Green	CAN interface signals
Blue	RS-232 interface signals
Red	LIN bus interface signals
Magenta	Power supply and Reset

Table 6-6 Colours of Jumper functionality

### 6.3.2 Testpoints

The available Test Points can be seen in

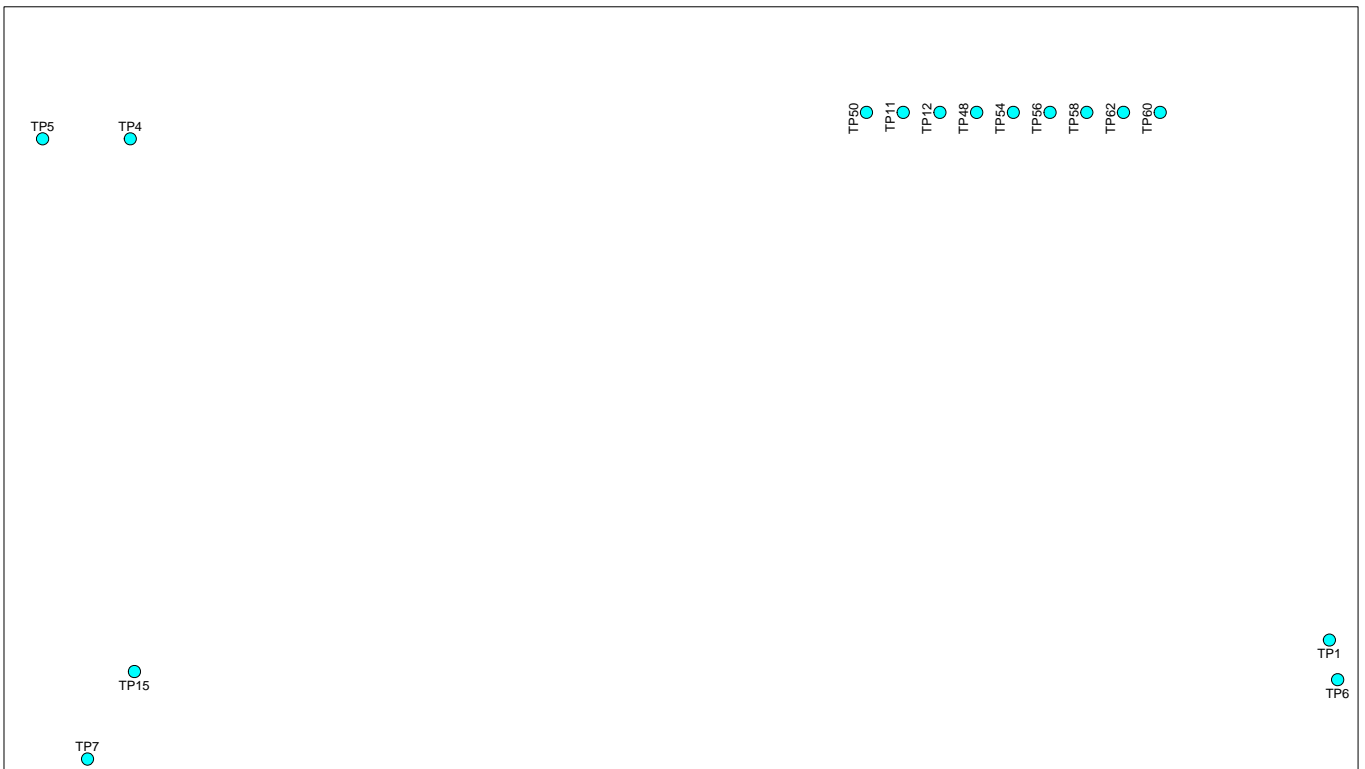


Figure 6-10 Test Point location

### 6.3.3 Reset signal

To connect the RESET signal place a wire according to the table below:

Signal	Fx3 pin number					CN52 pin number
	FE3	FF3	FG3	FJ3	FK3	
<b>Reset</b>	9	14	14	14	14	4

Table 6-7 Reset signal connection

### 6.3.4 NWIRE signals

To connect the NWIRE signals place wires according to the table below:

Signal	Fx3 pin number					CN48 pin number
	FE3	FF3	FG3	FJ3	FK3	
<b>DCK</b>	34	36	41	41	60	11
<b>DMS</b>	35	37	42	42	61	13
<b>DDI</b>	30	34	39	39	58	15
<b>DRSTZ</b>	17	17	20	20	21	17
<b>RESET</b>	9	14	14	14	14	19
<b>FLMD0</b>	3	8	8	8	8	21
<b>DDO</b>	31	35	40	40	59	23

Table 6-8 NWire interface signals

### 6.3.5 Flash Programming interface

To connect the Flash Programming signals place wires according to the table below:

Signal	Fx3 pin number					CN48 Pin number
	FE3	FF3	FG3	FJ3	FK3	
<b>TxD</b>	22	22	25	25	26	1
<b>RxD</b>	23	23	26	26	47	3
<b>SIB</b>	19	19	22	22	23	5
<b>SOB</b>	20	20	23	23	24	7
<b>SCK</b>	21	21	24	24	25	9

Table 6-9 Flash programming jumper settings

### 6.3.6 CAN interface

To connect the CAN interface signals place wires according to the table below:



Signal	Fx3 pin number					CN24 Pin number
	FE3	FF3	FG3	FJ3	FK3	
CTXD0	25 (*)	25 (*)	28 (*)	28 (*)	49 (*)	2
	18	18	21	21	22	
CRXD0	26 (*)	26 (*)	29 (*)	29 (*)	50 (*)	4
	16	7	19	19	20	
CTXD1	n/a	n/a	31	31	52	6
CRXD1	n/a	n/a	32	32	53	8
CTXD2	n/a	n/a	n/a	67 (*)	48 (*)	10
	n/a	n/a	n/a	71	92	
CRXD2	n/a	n/a	n/a	68 (*)	49 (*)	12
	n/a	n/a	n/a	72	93	
CTXD3	n/a	n/a	n/a	50	69	14
CRXD3	n/a	n/a	n/a	51	70	16
CTXD4	n/a	n/a	n/a	n/a	104	18
CRXD4	n/a	n/a	n/a	n/a	105	20

Table 6-10 CAN jumper settings

(\*) Compatible pinning to the corresponding Fx2 device.

### 6.3.7 UARTD interface

To connect the UARTD interface signal place wires according to the table below:

Signal	Fx3 pin number					CN9
	FE3	FF3	FG3	FJ3	FK3	
TxD0	22	22	25	25	26	5
RxD0	23	23	26	26	27	7
TxD1	36	38	43	61	82	1
RxD1	37	39	44	62	83	3
TxD2	n/a	n/a	35	54	28	9
RxD2	n/a	n/a	36	55	29	11
TxD3	n/a	n/a	23	60 (*)	81 (*)	13
				23	24	
RxD3	n/a	n/a	22	59 (*)	80 (*)	15
				22	23	
TxD4	n/a	n/a	58	76	97	17
RxD4	n/a	n/a	57	75	96	19
TxD5	n/a	n/a	n/a	73	94	21
RxD5	n/a	n/a	n/a	74	95	23
TxD6	n/a	n/a	n/a	n/a	64	25
RxD6	n/a	n/a	n/a	n/a	65	27
TxD7	n/a	n/a	n/a	n/a	78	29
RxD7	n/a	n/a	n/a	n/a	79	31

**Table 6-11 UARTD jumper settings**

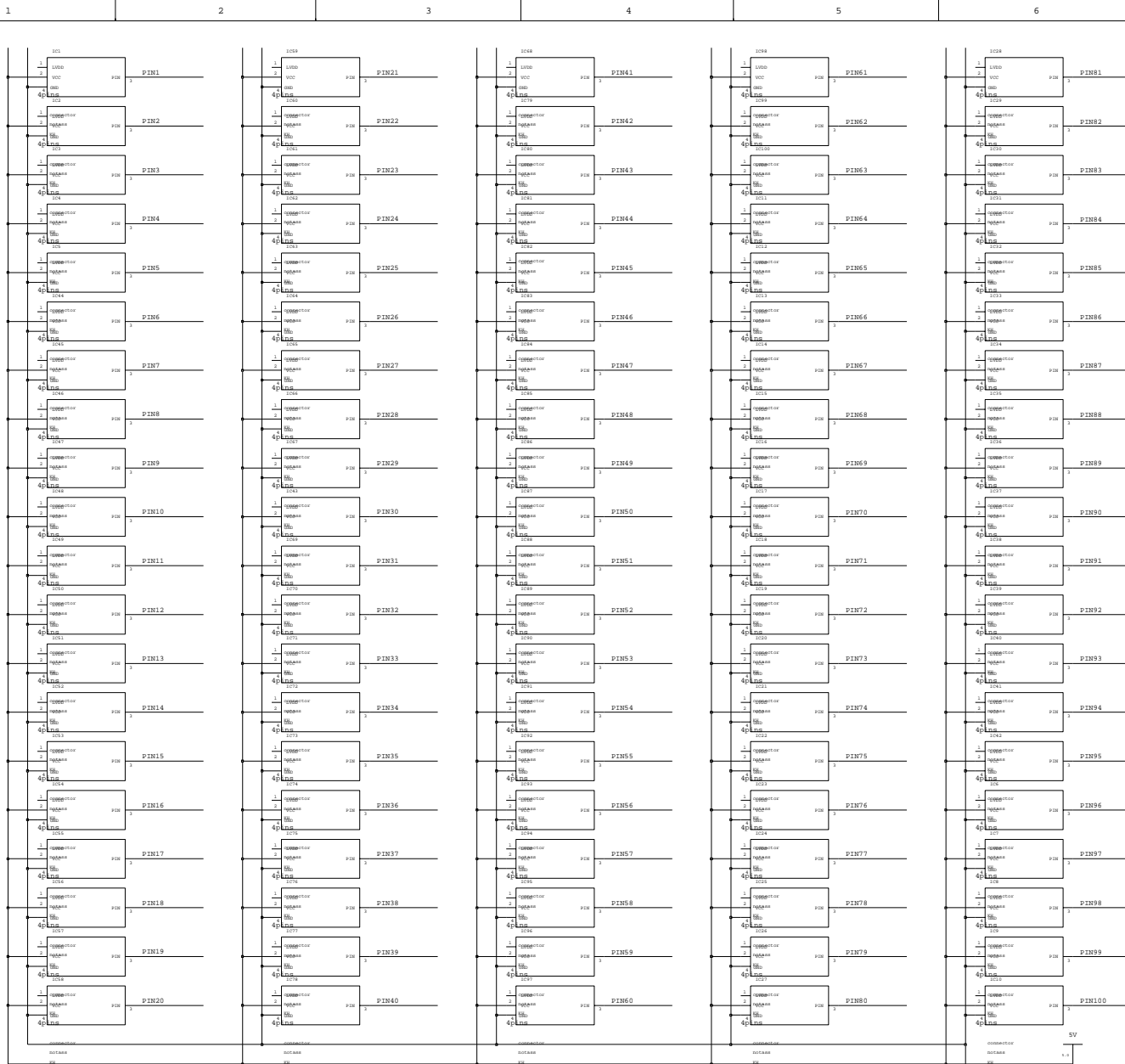
(\*) Compatible pinning to the corresponding Fx2 device.

## Chapter 7 Revision History

Version	Chapter	Comment
1.0		Initial release
1.1	6.2.1 - 6.2.4 6.3.3 - 6.3.7	Added pin tables for the different devices
	All	Modified / expanded text
	6	Added chapter 'Cautions'
	7	Added chapter 'Revision History'
1.2	5	Added chapter for cable description
	2.5	Added information on LIN operation
2.0		Update for V2.0 revision of the AB-050-FX3 board.
2.1		Updated naming of board to AB-050-FX3-U
	2.5	Added Caution on UART / LIN driver usage
2.2	All	Update for new document number

## Chapter 8 Schematic

Issue	
Version	Date
1	
2	
3	
4	
5	



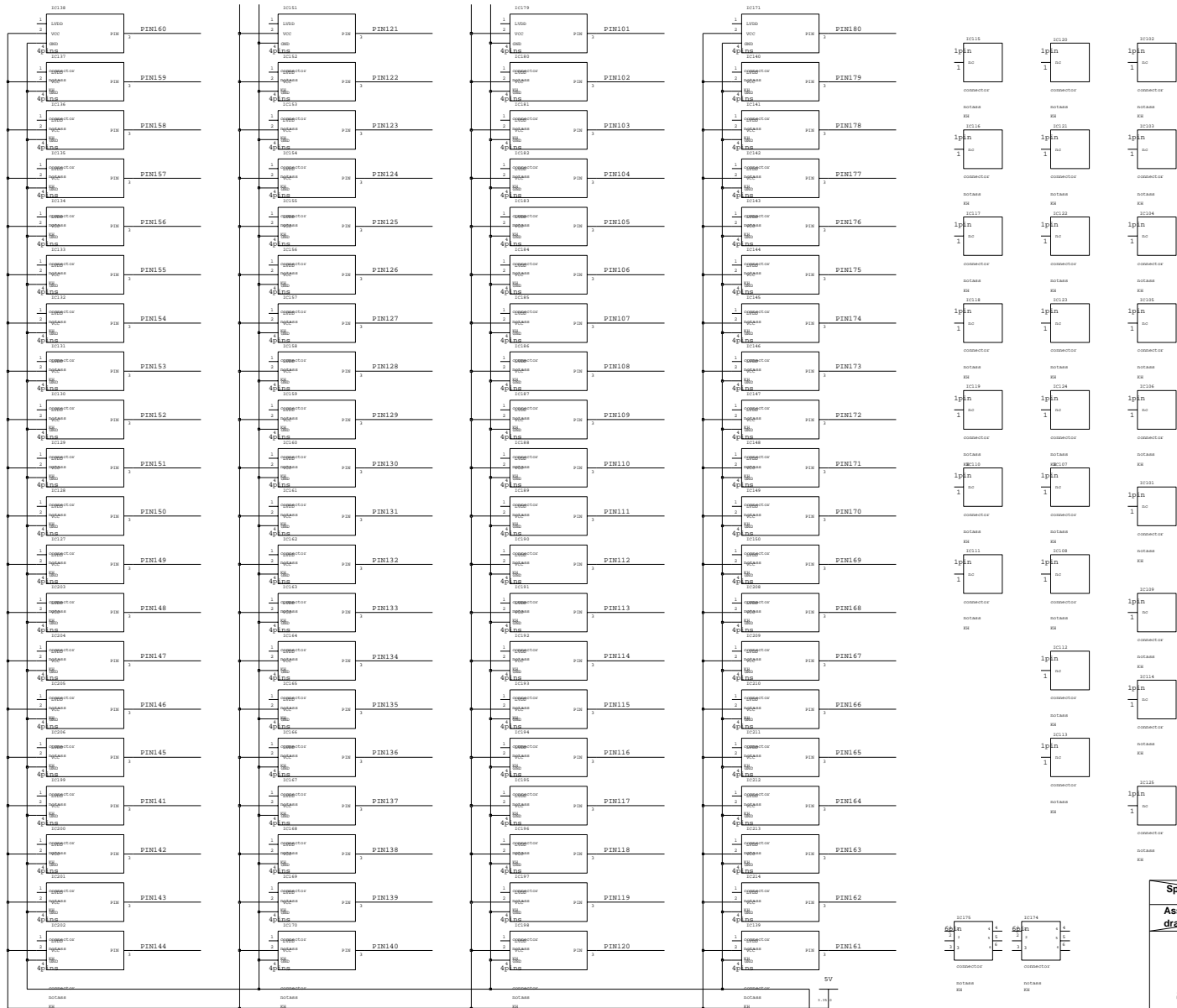
Version	Item	Approved
1		
Scale		
Designed	Checked	Approved
K.Hesse		S.Gupta
<del>Spec. Assembly drawing</del>		
<b>AB-050-FK3</b>		
Sheet1	Page	4/8
<b>EES-040-034-02</b>		

Distribution:

**Renesas Electronics**

1 2 3 4 5 6 7

Issue	
Version	Date
1	
2	
3	
4	
5	



Version	Item	Approved
		A
		B
		C
		D
		E
Scale		
Designed	Checked	Approved
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px;">Spec. Assembly drawing</div> <div style="border: 1px solid black; padding: 5px;">AB-050-FK3</div> </div>		
Sheet2		Page 1 / 8
EESS-0400-034-02		

Distribution:

Renesas Electronics

Issue	
Version	Date
1	
2	
3	
4	
5	

PIN177	177	PIN177
PIN178	178	PIN178
PIN179	179	PIN179
PIN180	180	PIN180
PIN181	181	PIN181
PIN182	182	PIN182
PIN183	183	PIN183
PIN184	184	PIN184
PIN185	185	PIN185
PIN186	186	PIN186
PIN187	187	PIN187
PIN188	188	PIN188
PIN189	189	PIN189
PIN190	190	PIN190
PIN191	191	PIN191
PIN192	192	PIN192
PIN193	193	PIN193
PIN194	194	PIN194
PIN195	195	PIN195
PIN196	196	PIN196
PIN197	197	PIN197
PIN198	198	PIN198
PIN199	199	PIN199
PIN200	200	PIN200
PIN201	201	PIN201
PIN202	202	PIN202
PIN203	203	PIN203
PIN204	204	PIN204
PIN205	205	PIN205
PIN206	206	PIN206
PIN207	207	PIN207
PIN208	208	PIN208
PIN209	209	PIN209
PIN210	210	PIN210
PIN211	211	PIN211
PIN212	212	PIN212
PIN213	213	PIN213
PIN214	214	PIN214
PIN215	215	PIN215
PIN216	216	PIN216
PIN217	217	PIN217
PIN218	218	PIN218
PIN219	219	PIN219
PIN220	220	PIN220
PIN221	221	PIN221
PIN222	222	PIN222
PIN223	223	PIN223
PIN224	224	PIN224
PIN225	225	PIN225
PIN226	226	PIN226
PIN227	227	PIN227
PIN228	228	PIN228
PIN229	229	PIN229
PIN230	230	PIN230
PIN231	231	PIN231
PIN232	232	PIN232
PIN233	233	PIN233
PIN234	234	PIN234
PIN235	235	PIN235
PIN236	236	PIN236
PIN237	237	PIN237
PIN238	238	PIN238
PIN239	239	PIN239
PIN240	240	PIN240
PIN241	241	PIN241
PIN242	242	PIN242
PIN243	243	PIN243
PIN244	244	PIN244
PIN245	245	PIN245
PIN246	246	PIN246
PIN247	247	PIN247
PIN248	248	PIN248
PIN249	249	PIN249
PIN250	250	PIN250
PIN251	251	PIN251
PIN252	252	PIN252
PIN253	253	PIN253
PIN254	254	PIN254
PIN255	255	PIN255
PIN256	256	PIN256
PIN257	257	PIN257
PIN258	258	PIN258
PIN259	259	PIN259
PIN260	260	PIN260
PIN261	261	PIN261
PIN262	262	PIN262
PIN263	263	PIN263
PIN264	264	PIN264
PIN265	265	PIN265
PIN266	266	PIN266
PIN267	267	PIN267
PIN268	268	PIN268
PIN269	269	PIN269
PIN270	270	PIN270
PIN271	271	PIN271
PIN272	272	PIN272
PIN273	273	PIN273
PIN274	274	PIN274
PIN275	275	PIN275
PIN276	276	PIN276
PIN277	277	PIN277
PIN278	278	PIN278
PIN279	279	PIN279
PIN280	280	PIN280
PIN281	281	PIN281
PIN282	282	PIN282
PIN283	283	PIN283
PIN284	284	PIN284
PIN285	285	PIN285
PIN286	286	PIN286
PIN287	287	PIN287
PIN288	288	PIN288
PIN289	289	PIN289
PIN290	290	PIN290
PIN291	291	PIN291
PIN292	292	PIN292
PIN293	293	PIN293
PIN294	294	PIN294
PIN295	295	PIN295
PIN296	296	PIN296
PIN297	297	PIN297
PIN298	298	PIN298
PIN299	299	PIN299
PIN300	300	PIN300
PIN301	301	PIN301
PIN302	302	PIN302
PIN303	303	PIN303
PIN304	304	PIN304
PIN305	305	PIN305
PIN306	306	PIN306
PIN307	307	PIN307
PIN308	308	PIN308
PIN309	309	PIN309
PIN310	310	PIN310
PIN311	311	PIN311
PIN312	312	PIN312
PIN313	313	PIN313
PIN314	314	PIN314
PIN315	315	PIN315
PIN316	316	PIN316
PIN317	317	PIN317
PIN318	318	PIN318
PIN319	319	PIN319
PIN320	320	PIN320
PIN321	321	PIN321
PIN322	322	PIN322
PIN323	323	PIN323
PIN324	324	PIN324
PIN325	325	PIN325
PIN326	326	PIN326
PIN327	327	PIN327
PIN328	328	PIN328
PIN329	329	PIN329
PIN330	330	PIN330
PIN331	331	PIN331
PIN332	332	PIN332
PIN333	333	PIN333
PIN334	334	PIN334
PIN335	335	PIN335
PIN336	336	PIN336
PIN337	337	PIN337
PIN338	338	PIN338
PIN339	339	PIN339
PIN340	340	PIN340
PIN341	341	PIN341
PIN342	342	PIN342
PIN343	343	PIN343
PIN344	344	PIN344
PIN345	345	PIN345
PIN346	346	PIN346
PIN347	347	PIN347
PIN348	348	PIN348
PIN349	349	PIN349
PIN350	350	PIN350
PIN351	351	PIN351
PIN352	352	PIN352
PIN353	353	PIN353
PIN354	354	PIN354
PIN355	355	PIN355
PIN356	356	PIN356
PIN357	357	PIN357
PIN358	358	PIN358
PIN359	359	PIN359
PIN360	360	PIN360
PIN361	361	PIN361
PIN362	362	PIN362
PIN363	363	PIN363
PIN364	364	PIN364
PIN365	365	PIN365
PIN366	366	PIN366
PIN367	367	PIN367
PIN368	368	PIN368
PIN369	369	PIN369
PIN370	370	PIN370
PIN371	371	PIN371
PIN372	372	PIN372
PIN373	373	PIN373
PIN374	374	PIN374
PIN375	375	PIN375
PIN376	376	PIN376
PIN377	377	PIN377
PIN378	378	PIN378
PIN379	379	PIN379
PIN380	380	PIN380
PIN381	381	PIN381
PIN382	382	PIN382
PIN383	383	PIN383
PIN384	384	PIN384
PIN385	385	PIN385
PIN386	386	PIN386
PIN387	387	PIN387
PIN388	388	PIN388
PIN389	389	PIN389
PIN390	390	PIN390
PIN391	391	PIN391
PIN392	392	PIN392
PIN393	393	PIN393
PIN394	394	PIN394
PIN395	395	PIN395
PIN396	396	PIN396
PIN397	397	PIN397
PIN398	398	PIN398
PIN399	399	PIN399
PIN400	400	PIN400
PIN401	401	PIN401
PIN402	402	PIN402
PIN403	403	PIN403
PIN404	404	PIN404
PIN405	405	PIN405
PIN406	406	PIN406
PIN407	407	PIN407
PIN408	408	PIN408
PIN409	409	PIN409
PIN410	410	PIN410
PIN411	411	PIN411
PIN412	412	PIN412
PIN413	413	PIN413
PIN414	414	PIN414
PIN415	415	PIN415
PIN416	416	PIN416
PIN417	417	PIN417
PIN418	418	PIN418
PIN419	419	PIN419
PIN420	420	PIN420
PIN421	421	PIN421
PIN422	422	PIN422
PIN423	423	PIN423
PIN424	424	PIN424
PIN425	425	PIN425
PIN426	426	PIN426
PIN427	427	PIN427
PIN428	428	PIN428
PIN429	429	PIN429
PIN430	430	PIN430
PIN431	431	PIN431
PIN432	432	PIN432
PIN433	433	PIN433
PIN434	434	PIN434
PIN435	435	PIN435
PIN436	436	PIN436
PIN437	437	PIN437
PIN438	438	PIN438
PIN439	439	PIN439
PIN440	440	PIN440
PIN441	441	PIN441
PIN442	442	PIN442
PIN443	443	PIN443
PIN444	444	PIN444
PIN445	445	PIN445
PIN446	446	PIN446
PIN447	447	PIN447
PIN448	448	PIN448
PIN449	449	PIN449
PIN450	450	PIN450
PIN451	451	PIN451
PIN452	452	PIN452
PIN453	453	PIN453
PIN454	454	PIN454
PIN455	455	PIN455
PIN456	456	PIN456
PIN457	457	PIN457
PIN458	458	PIN458
PIN459	459	PIN459
PIN460	460	PIN460
PIN461	461	PIN461
PIN462	462	PIN462
PIN463	463	PIN463
PIN464	464	PIN464
PIN465	465	PIN465
PIN466	466	PIN466
PIN467	467	PIN467
PIN468	468	PIN468
PIN469	469	PIN469
PIN470	470	PIN470
PIN471	471	PIN471
PIN472	472	PIN472
PIN473	473	PIN473
PIN474	474	PIN474
PIN475	475	PIN475
PIN476	476	PIN476
PIN477	477	PIN477
PIN478	478	PIN478
PIN479	479	PIN479
PIN480	480	PIN480
PIN481	481	PIN481
PIN482	482	PIN482
PIN483	483	PIN483
PIN484	484	PIN484
PIN485	485	PIN485
PIN486	486	PIN486
PIN487	487	PIN487
PIN488	488	PIN488
PIN489	489	PIN489
PIN490	490	PIN490
PIN491	491	PIN491
PIN492	492	PIN492
PIN493	493	PIN493
PIN494	494	PIN494
PIN495	495	PIN495
PIN496	496	PIN496
PIN497	497	PIN497
PIN498	498	PIN498
PIN499	499	PIN499
PIN500	500	PIN500
PIN501	501	PIN501
PIN502	502	PIN502
PIN503	503	PIN503
PIN504	504	PIN504
PIN505	505	PIN505
PIN506	506	PIN506
PIN507	507	PIN507
PIN508	508	PIN508
PIN509	509	PIN509
PIN510	510	PIN510
PIN511	511	PIN511
PIN512	512	PIN512
PIN513	513	PIN513
PIN514	514	PIN514
PIN515	515	PIN515
PIN516	516	PIN516
PIN517	517	PIN517
PIN518	518	PIN518
PIN519	519	PIN519
PIN520	520	PIN520
PIN521	521	PIN521
PIN522	522	PIN522
PIN523	523	PIN523
PIN524	524	PIN524
PIN525	525	PIN525
PIN526	526	PIN526
PIN527	527	PIN527
PIN528	528	PIN528
PIN529	529	PIN529
PIN530	530	PIN530
PIN531	531	PIN531
PIN532	532	PIN532
PIN533	533	PIN533
PIN534	534	PIN534
PIN535	535	PIN535
PIN536	536	PIN536
PIN537	537	PIN537
PIN538	538	PIN538
PIN539	539	PIN539
PIN540	540	PIN540
PIN541	541	PIN541
PIN542	542	PIN542
PIN543	543	PIN543
PIN544	544	PIN544
PIN545	545	PIN545
PIN546	546	PIN546
PIN547	547	PIN547
PIN548	548	PIN548
PIN549	549	PIN549
PIN550	550	PIN550
PIN551	551	PIN551
PIN552	552	PIN552
PIN553	553	PIN553
PIN554	554	PIN554
PIN555	555	PIN555
PIN556	556	PIN556
PIN557	557	PIN557
PIN558	558	PIN558
PIN559	559	PIN559
PIN560	560	PIN560
PIN561	561	PIN561
PIN562	562	PIN562
PIN563	563	PIN563
PIN564	564	PIN564
PIN565	565	PIN565
PIN566	566	PIN566
PIN567	567	PIN567
PIN568	568	PIN568
PIN56		

Issue	
Version	Date
1	
2	
3	
4	
5	

Version	Item	Approved
177	PIN177	177
178	PIN178	178
179	PIN179	179
180	PIN180	180
181	PIN181	181
182	PIN182	182
183	PIN183	183
184	PIN184	184
185	PIN185	185
186	PIN186	186
187	PIN187	187
188	PIN188	188
189	PIN189	189
190	PIN190	190
191	PIN191	191
192	PIN192	192
193	PIN193	193
194	PIN194	194
195	PIN195	195
196	PIN196	196
197	PIN197	197
198	PIN198	198
199	PIN199	199
200	PIN200	200
201	PIN201	201
202	PIN202	202
203	PIN203	203
204	PIN204	204
205	PIN205	205
206	PIN206	206
207	PIN207	207
208	PIN208	208
209	PIN209	209
210	PIN210	210
211	PIN211	211
212	PIN212	212
213	PIN213	213
214	PIN214	214
215	PIN215	215
216	PIN216	216
217	PIN217	217
218	PIN218	218
219	PIN219	219
220	PIN220	220
221	PIN221	221
222	PIN222	222
223	PIN223	223
224	PIN224	224
225	PIN225	225
226	PIN226	226
227	PIN227	227
228	PIN228	228
229	PIN229	229
230	PIN230	230
231	PIN231	231
232	PIN232	232
233	PIN233	233
234	PIN234	234
235	PIN235	235
236	PIN236	236
237	PIN237	237
238	PIN238	238
239	PIN239	239
240	PIN240	240
241	PIN241	241
242	PIN242	242
243	PIN243	243
244	PIN244	244
245	PIN245	245
246	PIN246	246
247	PIN247	247
248	PIN248	248
249	PIN249	249
250	PIN250	250
251	PIN251	251
252	PIN252	252
253	PIN253	253
254	PIN254	254
255	PIN255	255
256	PIN256	256
257	PIN257	257
258	PIN258	258
259	PIN259	259
260	PIN260	260
261	PIN261	261
262	PIN262	262
263	PIN263	263
264	PIN264	264
265	PIN265	265
266	PIN266	266
267	PIN267	267
268	PIN268	268
269	PIN269	269
270	PIN270	270
271	PIN271	271
272	PIN272	272
273	PIN273	273
274	PIN274	274
275	PIN275	275
276	PIN276	276
277	PIN277	277
278	PIN278	278
279	PIN279	279
280	PIN280	280
281	PIN281	281
282	PIN282	282
283	PIN283	283
284	PIN284	284
285	PIN285	285
286	PIN286	286
287	PIN287	287
288	PIN288	288

801  
qfp180\_05

Scale		
Designed	Checked	Approved

Spec.  
Assembly drawing

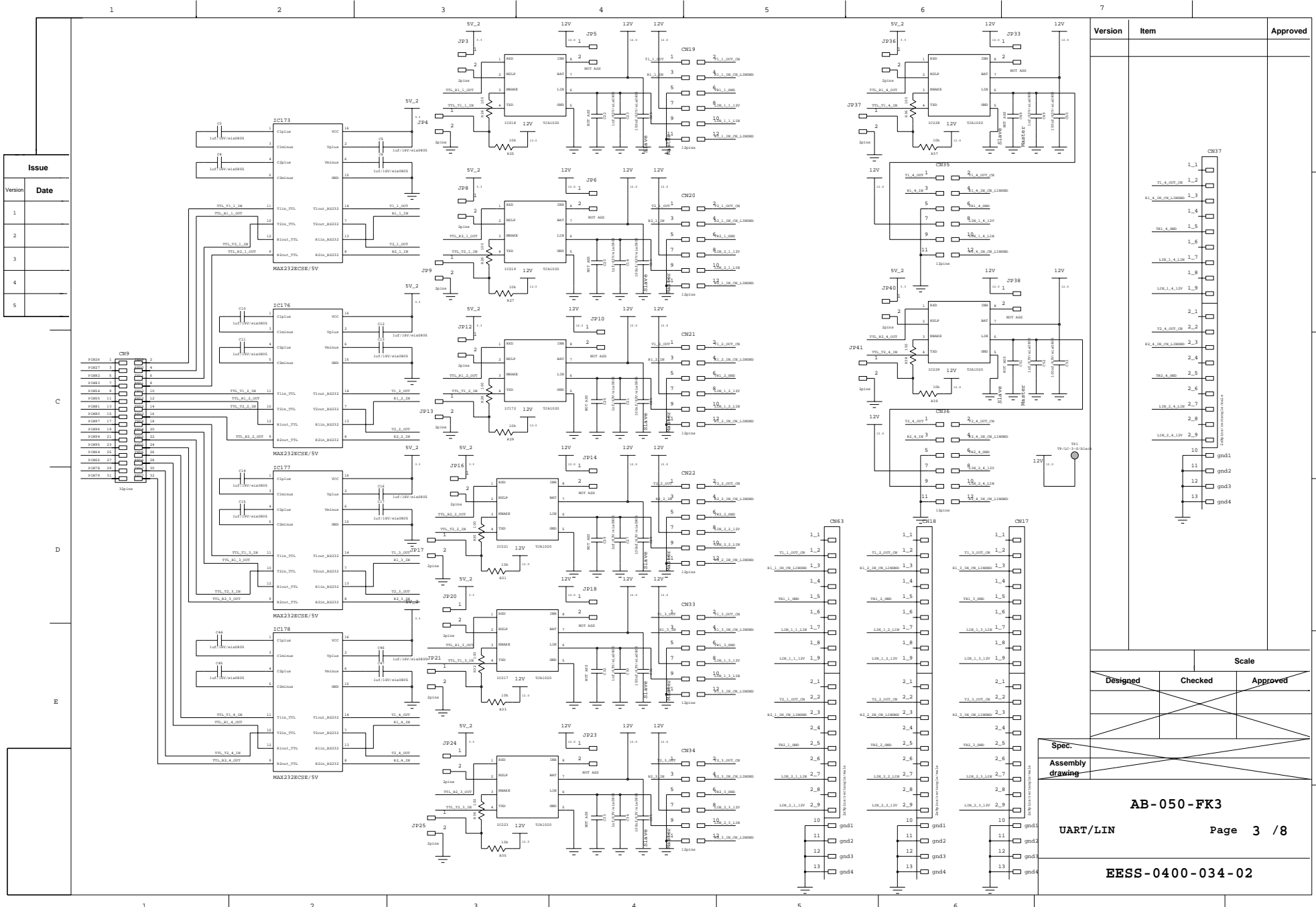
**AB-050-FK3**  
Board VER. 1.00  
**QFP180 Footprint** Page 5 / 8

**EES-0400-034-02**





Issue	
Version	Date
1	
2	
3	
4	
5	



Version	Item	Approved
		A
		B
		C
		D
		E

Scale		
Designed	Checked	Approved

Spec.	Assembly drawing
<b>AB-050-FK3</b>	
UART/LIN	Page 3 / 8
<b>EES-0400-034-02</b>	

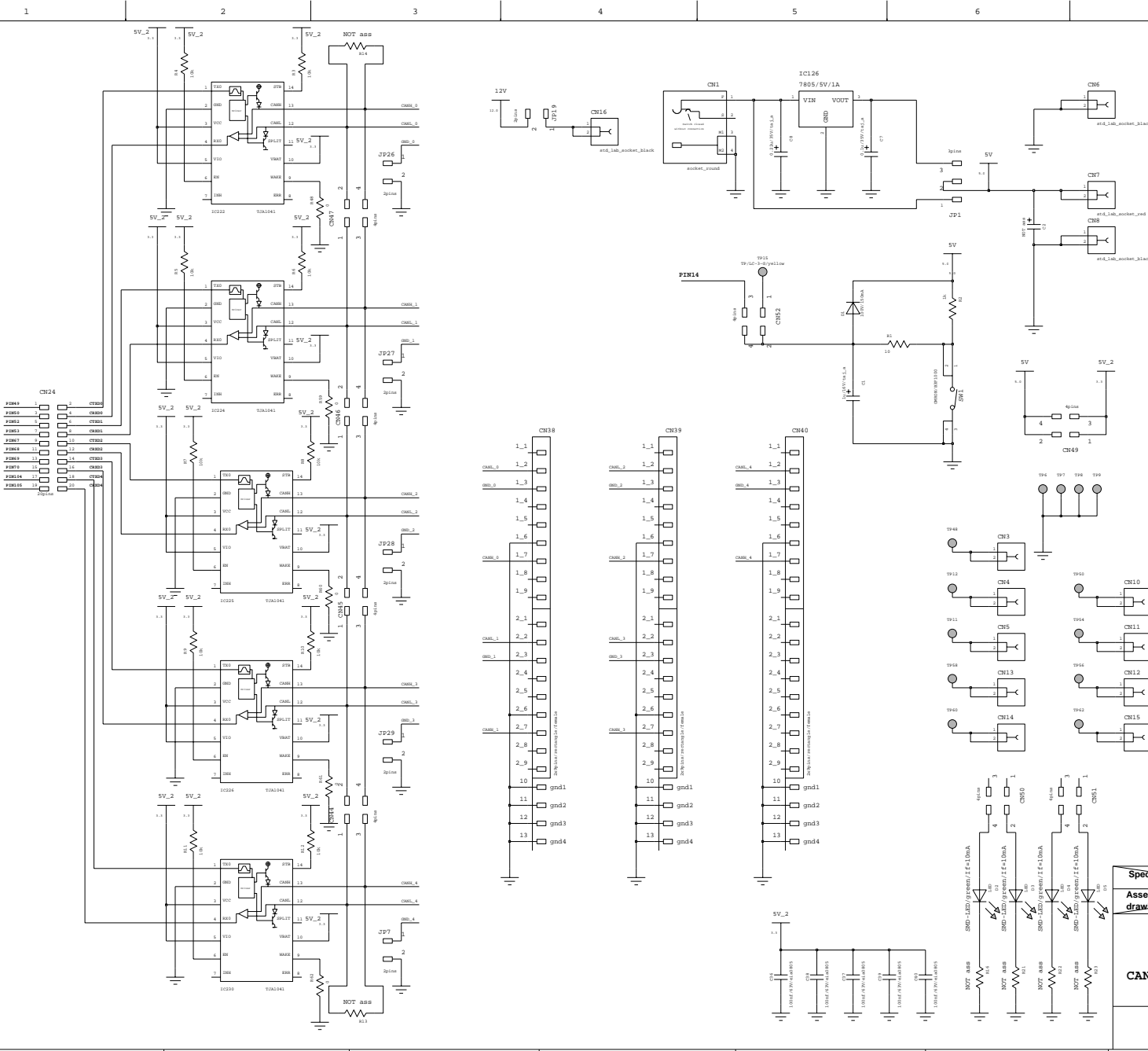
Distribution:

Issue	
Version	Date
1	
2	
3	
4	
5	

C

D

E



Version	Item	Approved
		A
		B
		C
		D
		E
Scale		
Designed	Checked	Approved
Spec. Assembly drawing		
<b>AB-050-FK3</b> Board VER. 1.00		
CAN/POWER/RESET		Page 6 / 8
<b>BESS-0400-034-02</b>		

Distribution:

**Renesas Electronics**



AB-050-FX3-U