User´s Manual

32

RH850 Evaluation Platform

RH850/F1x 48pin
RH850/F1Kx 48pin

PiggyBack board V1

Y-RH850-F1X-048PIN-PB-T1-V1

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General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins
   Handle unused pins in accordance 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 **s**tabilized.
   – 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 a product with a different part number, confirm that the change will not lead to problems.
   – The characteristics of Microprocessing unit or Microcontroller unit products in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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Chapter 1 Introduction

The RH850/F1x Application Board is part of the RH850 Evaluation Platform and serves as a simple and easy to use platform for evaluating the features and performance of Renesas Electronics 32-bit RH850/F1x microcontrollers. The piggyback board (Y-RH850-F1X-048PIN-PB-T1-V1) can be used as a standalone board, or can be mated with a mainboard (e.g. Y-RH850-X1X-MB-Tx-Vx) for extended functionality.

Main features:

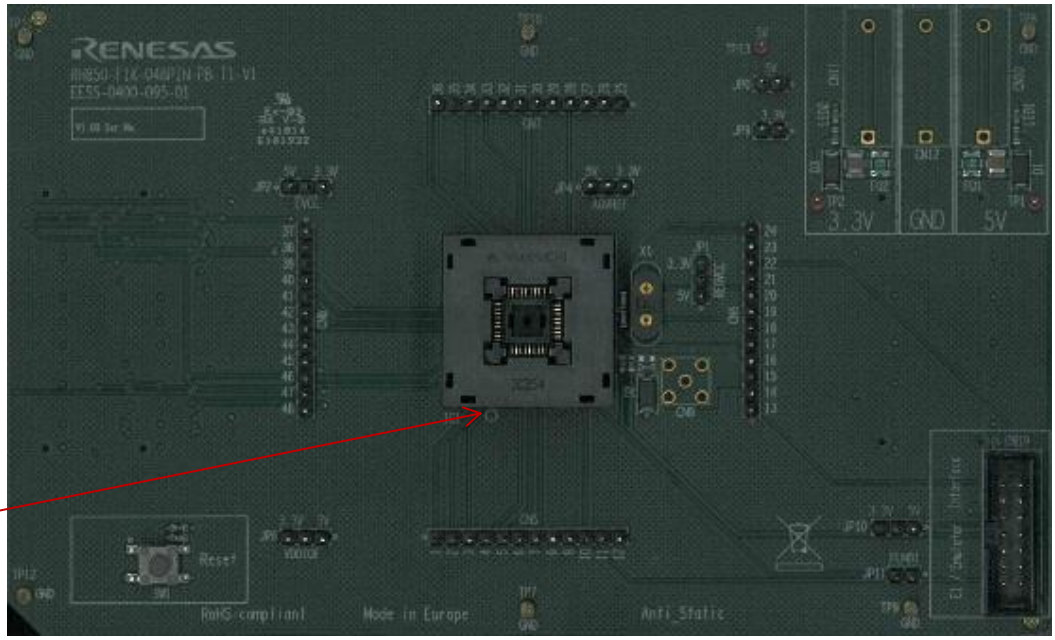
- Socket for mounting of device
- Standalone operation of the board
- Direct supply of device voltage (typ. 3.3V-5.0V)
- Device programming capability
- Device debugging capability
- Pin headers for direct access to each device pin
- Reset switch
- MainOSC circuitry
- Connectors to MainBoard

This document describes the functionality provided by the piggyback board and guides the user through its operation.

Chapter 2 Overview

2.1 Overview

Figures 1 and 2 provide the views of the Piggyback Board.



Device pin #1

Figure 1 – PiggyBoard top view

Figure 2 – PiggyBoard bottom view

2.2 Mounting of the device

The board is designed for use with the following device:

- RH850/F1L 48pin
- RH850/F1KM-S1 48pin

The device must be placed inside the socket IC1. To insert the device, press down the lid, align the #1 pin of the device to the #1pin of the socket, insert the device inside the socket and release the lid.

For details regarding the operation of the microcontrollers, refer to the RH850/F1L or RH850/F1KM User's Manual.

Chapter 3 Power supply

3.1 Board power connections

For operation of the device, a supply voltage must be connected to the board. Though a single supply voltage is sufficient for the operation of the device, two (different) voltages can be supplied to the board.

Within this document the following voltages are considered as ‘typical’ connections:

Voltage1 = 5.0V

Voltage2 = 3.3V

The following connectors are available to supply those voltages:

- Three 4mm ‘banana-type’ connectors:
  - Two red connectors for voltages *Voltage1* (CN10) and *Voltage2* (CN11).
  - A black connector for VSS connection (CN12).

  Note: The three connectors are supplied with the board but not assembled.
- The E1 emulator that is used for debug purposes and flash programming can also supply a single operating voltage (‘Dbg_Voltage’).
  The voltage is programmable via the E1 GUI as 3.3 or 5.0V (typ).
  See the documentation of the E1 and chapter 5 ‘Debug and Programming interface’ for details.
- In case the PiggyBoard is mounted on a MainBoard, the voltages *Voltage1* and *Voltage2* are supplied by the on-board regulators of the MainBoard.

NOTE: *Do not supply any voltage directly to the PiggyBoard in case it is mounted on the MainBoard.*

For each of the two voltages, ‘Voltage 1 ‘ and ‘Voltage 2’, a green LED (LED1 and LED2) is available to signal that the related voltage is available on the PiggyBoard.

3.2 Voltage distribution

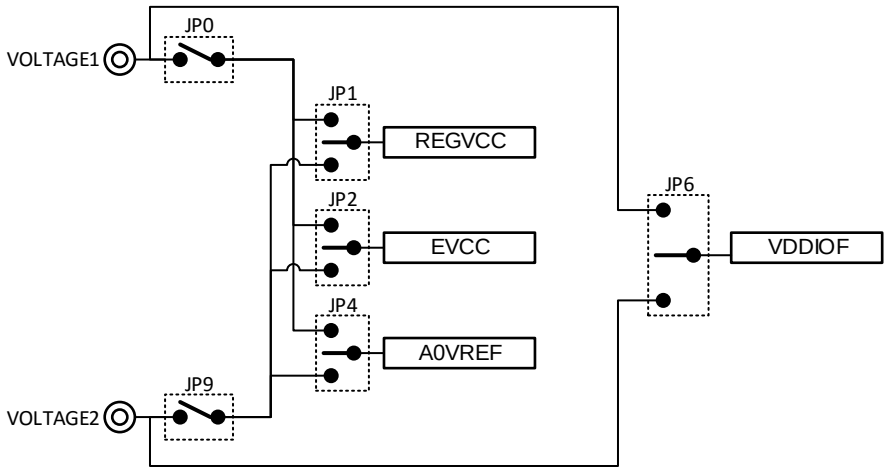
The table shows the required device power supply pins and their function:

Device supply pin	Function
REGVCC	Supply for the device internal regulators for the digital logic.
EVCC	Supply for ports of AWO and ISO area.
A0VREF	Supply for ports and analog functions of ADC0.

Additionally one power supply for MainBoard can be selected:

Supply voltage	Function
VDDIOF	IO supply voltage for components located on a connected mainboard.

- For each of the above voltages, the voltage source can be selected from *Voltage1* (typ. 5.0V) or *Voltage2* (typ. 3.3V) by the jumpers JP1, JP2, JP4, JP6, respectively the jumpers JP0 and JP9.



Chapter 4 Clock sources

4.1.1 MainOsc

A crystal or ceramic resonator in the range of 8MHz to 24MHz can be mounted on socket X1.

A 8MHz and 16Mhz oscillator is supplied with the board.

Chapter 5 Debug and Programming interface

For connection of the microcontroller debug and flash programming tools, the connector CN19 is provided.

The signal connection of the connector CN19 is shown in the picture below:

CN19 pin	Device Port	Device signal
1	JP0_2	DCUTCK / LPDCLK
2	GND	GND
3	JP0_4	DCUTRST
4	FLMD0	FLMD0
5	JP0_1	DCUTDO / LPDO
6	P10_8*	FLMD1
7	JP0_0	DCUTDI / LPDI
8	‘Dbg_Voltage’	-
9	JP0_3	DCUTMS
10	-	-
11	JP0_5	DCURDY / LPDCLKOUT
12	GND	-
13	RESET	-
14	GND	-

* In case the FLMD1 signal must be controlled by the debug/programming tool, the pin header JP11 must be closed.

The ‘Dbg_Voltage’ (on CN19 pin 8) is monitored or supplied by the debug and flash programming tools. Therefore, it is necessary to select either Voltage1 (5V) or the Voltage2 (3.3V) by pin header JP10:

JP10 pin	Selection for Dbg_Voltage
1-2	5V is selected
2-3	3.3V is selected

Chapter 6 Connectors for ports of device

Connection to each pin of the device is possible via the connectors CN5 to CN8.

Note :The pin headers are directly connected to the pins, therefore special care must be taken to avoid any electrostatic or other damage to the device.

6.1 Push button for RESET

In order to issue a RESET to the device, the push-button SW1 is available.

6.2 Connectors to MainBoard

Three connectors (CN1 to CN3) are available to connect the PiggyBoard to a MainBoard.

The signal connection of each connector is described in the following tables:

6.2.1 Connector CN1

Pin	Function	Device Port		Pin	Function	Device Port
1	VDDA	-		2	VDDA	-
3	VDDA	-		4	VDDA	-
5	RESET	_RESET		6	NMI	P9_0
7	WAKE	-		8	-	-
9	INT0	P9_1		10	INT1	-
11	-	-		12	INT3	-
13	-	-		14	-	-
15	UART0TX	P10_10		16	-	-
17	UART0RX	P10_9		18	-	-
19	LIN0TX	P10_10		20	LIN1TX	P0_1
21	LIN0RX	P10_9		22	LIN1RX	P0_0
23	IIC0SDL	P10_3		24	IIC1SDL	-
25	IIC0SDA	P10_2		26	IIC1SDA	-
27	CAN0TX	P10_1		28	CAN1TX	-
29	CAN0RX	P10_0		30	CAN1RX	-
31	SENTIN0	-		32	SENTIN1	-
33	SENTOUT0	-		34	SENTOUT1	-
35	PSI50Rx	-		36	PSI51Rx	-
37	PSI50Tx	-		38	PSI51Tx	-
39	PSI50Snyc	-		40	PSI51Sync	-
41	FLX0TX	-		42	FLX0EN	-
43	FLX0RX	-		44	-	-

45	FLX1TX	-	46	FLX1EN	-
47	FLX1RX	-	48	-	-
49	-	-	50	-	-
51	ETH0MDIO	-	52	ETH0MDC	-
53	ETH0RXD0	-	54	EH0TXD0	-
55	ETH0RXD1	-	56	EH0TXD1	-
57	ETH0RXD2	-	58	EH0TXD2	-
59	ETH0RXD3	-	60	EH0TXD3	-
61	ETH0RXDCLK	-	62	ETH0TXCLK	-
63	ETH0RXER	-	64	ETH0TXER	-
65	ETH0CRSDV	-	66	ETH0TXEN	-
67	ETH0RXDV	-	68	ETH0COL	-
69	ETH0RESET	-	70	-	-
71	-	-	72	-	-
73	USB0UDMF	-	74	USB0UDMH	-
75	USB0UDPF	-	76	USB0UDPH	-
77	-	-	78	-	-
79	-	-	80	-	-
81	-	-	82	-	-
83	-	-	84	-	-
85	DIGIO_0	P8_0	86	DIGIO_1	P8_1
87	-	-	88	-	-
89	-	-	90	-	-
91	-	-	92	DIGIO_7	P0_0
93	DIGIO_8	P10_0	94	DIGIO_9	P10_7
95	DIGIO_10	P10_8	96	-	-
97	-	-	98	-	-
99	-	-	100	-	-
101	-	-	102	-	-
103	MUX0	P10_4	104	MUX1	P10_5
105	MUX2	P10_6	106	-	-
107	ADC0	AP0_0	108	ADC1	AP0_1
109	ADC2	AP0_2	110	ADC3	AP0_3
111	ADC4	AP0_4	112	ADC5	AP0_5
113	ADC6	AP0_6	114	ADC7	AP0_7
115	VDDIOF	-	116	VDDIOF	-
117	VDDB	-	118	VDDB	-
119	VDDB	-	120	VDDB	-

6.2.2 Connector CN2

Pin	Function	Device Port	Pin	Function	Device Port
1	CAN2Tx	-	2	CAN3Tx	-
3	CAN2Rx	-	4	CAN3Rx	-
5	CAN4Tx	-	6	CAN5Tx	-
7	CAN4Rx	-	8	CAN5Rx	-
9	LIN2Tx	P10_5	10	LIN3Tx	-
11	LIN2Rx	P10_4	12	LIN3Rx	-
13	LIN4Tx	-	14	LIN5Tx	-
15	LIN4Rx	-	16	LIN5Rx	-
17	LIN6Tx	-	18	LIN7Tx	-
Q	LIN6Rx	-	20	LIN7Rx	-
21	LIN8Tx	-	22	LIN9Tx	-
23	LIN8Rx	-	24	LIN9Rx	-
25	LIN10Tx	P10_10	26	LIN11Tx	-
27	LIN10Rx	P10_9	28	LIN11Rx	-
29	LIN12Tx	-	30	LIN13Tx	-
31	LIN12Rx	-	32	LIN13Rx	-
33	LIN14Tx	-	34	LIN15Tx	-
35	LIN14Rx	-	36	LIN15Rx	-
37	-	-	38	-	-
39	-	-	40	-	-
41	MLBCLK	-	42	MLBRESET	-
43	MLBSIG	-	44	MLBDAT	-
45	-	-	46	-	-
47	-	-	48	-	-
49	-	-	50	-	-
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53	-	-	54	-	-
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111	-	-	112	-	-
113	-	-	114	-	-
115	-	-	116	-	-
117	-	-	118	-	-
119	-	-	120	-	-

6.2.3 Connector CN3

Pin	Function	Device Port	Pin	Function	Device Port
1	PWM00	P10_0	2	PWM01	P10_1
3	PWM02	P10_2	4	PWM03	P10_3
5	PWM04	P10_7	6	PWM05	P10_8
7	PWM06	P10_9	8	PWM07	P10_10
9	PWM08	P9_0	10	PWM09	P9_1
11	PWM10	P0_0	12	PWM11	P0_1
13	PWM12	P0_2	14	PWM13	-
15	PWM14	-	16	PWM15	-
17	PWM16	-	18	PWM17	-
Q	PWM18	-	20	PWM19	-
21	PWM20	-	22	PWM21	-
23	PWM22	-	24	PWM23	-
25	PWM24	-	26	PWM25	-
27	PWM26	-	28	PWM27	-
29	PWM28	-	30	PWM29	-
31	PWM30	-	32	PWM31	-
33	PWM32	-	34	PWM33	-
35	PWM34	-	36	PWM35	-

37	PWM36	-	38	PWM37	-
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41	PWM40	-	42	PWM41	-
43	PWM42	-	44	PWM43	-
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51	PWM50	-	52	PWM51	-
53	PWM52	-	54	PWM53	-
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57	PWM56	-	58	PWM57	-
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63	PWM62	-	64	PWM63	-
65	PWM64	-	66	PWM65	-
67	PWM66	-	68	PWM67	-
69	PWM68	-	70	PWM69	-
71	PWM70	-	72	PWM71	-
73	PWM72	-	74	PWM73	-
75	PWM74	-	76	PWM75	-
77	PWM76	-	78	PWM77	-
79	PWM78	-	80	PWM79	-
81	PWMADC00	-	82	PWMADC01	-
83	PWMADC02	-	84	PWMADC03	-
85	PWMADC04	-	86	PWMADC05	-
87	PWMADC06	-	88	PWMADC07	-
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91	PWMADC10	-	92	PWMADC11	-
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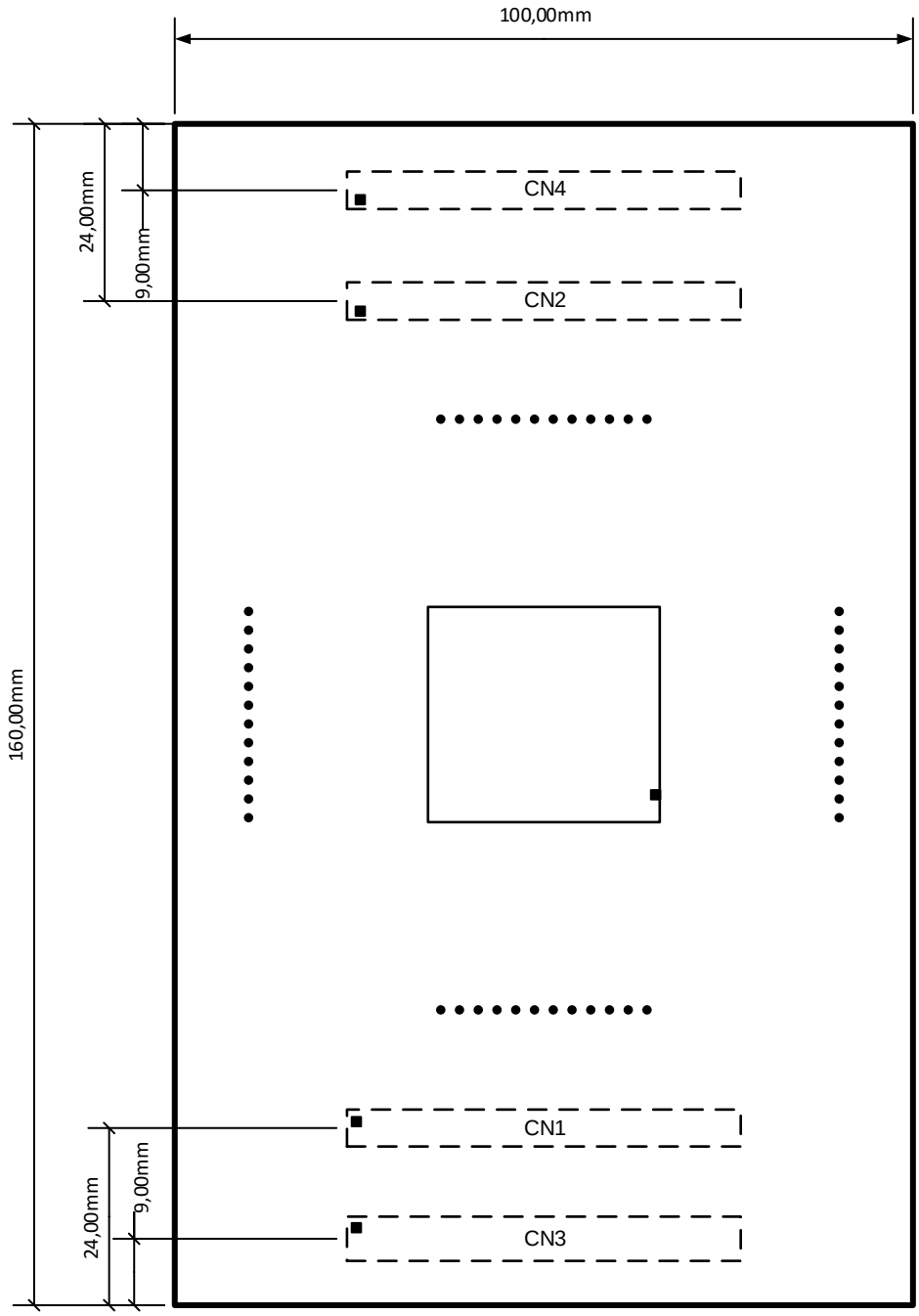
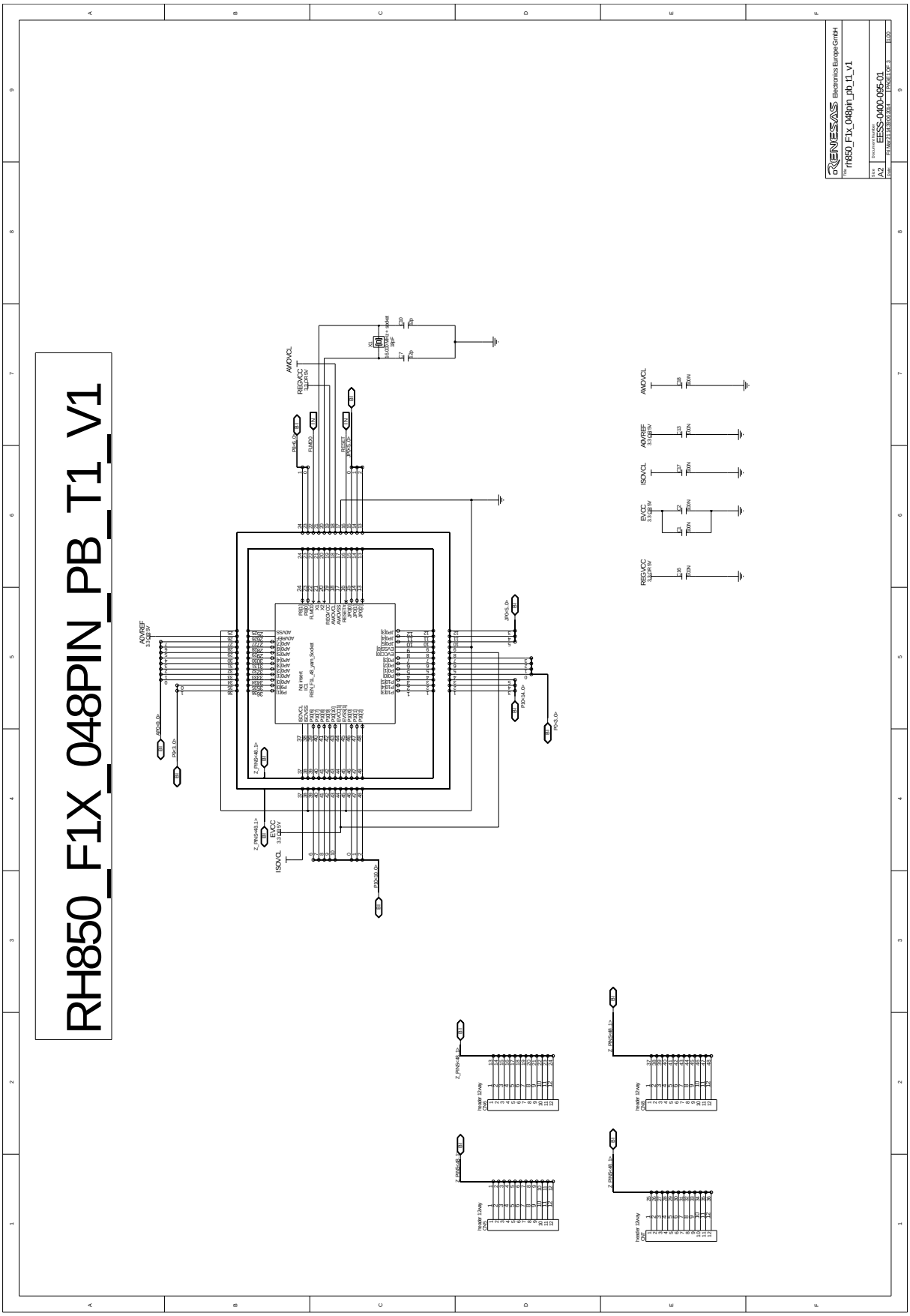
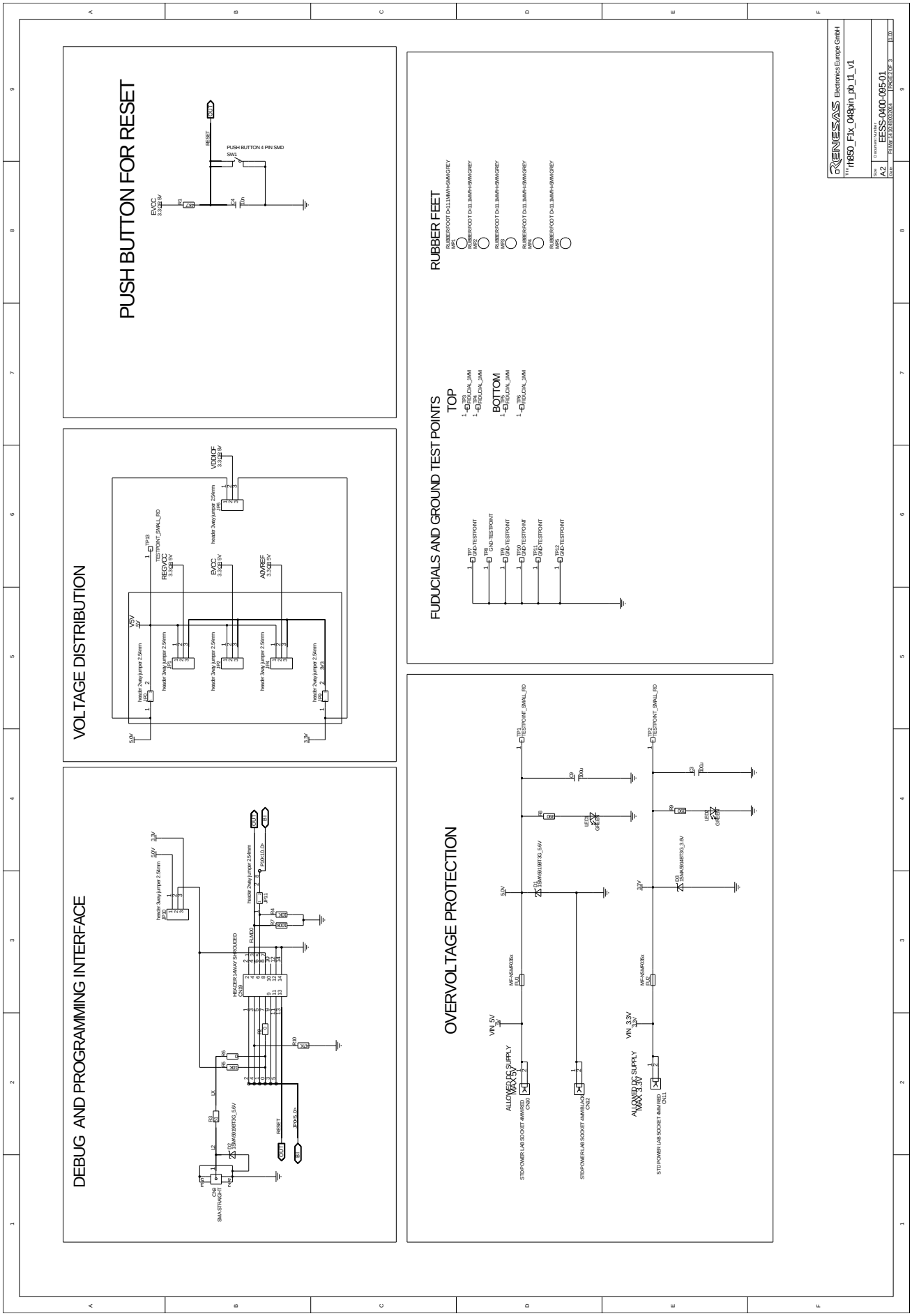
Chapter 7 Mechanical dimensions



Chapter 8 Schematic




PUSH BUTTON FOR RESET
VOLTAGE DISTRIBUTION
FUDUCIALS AND GROUND TEST POINTS
RUBBER FEET
DEBUG AND PROGRAMMING INTERFACE
OVERVOLTAGE PROTECTION
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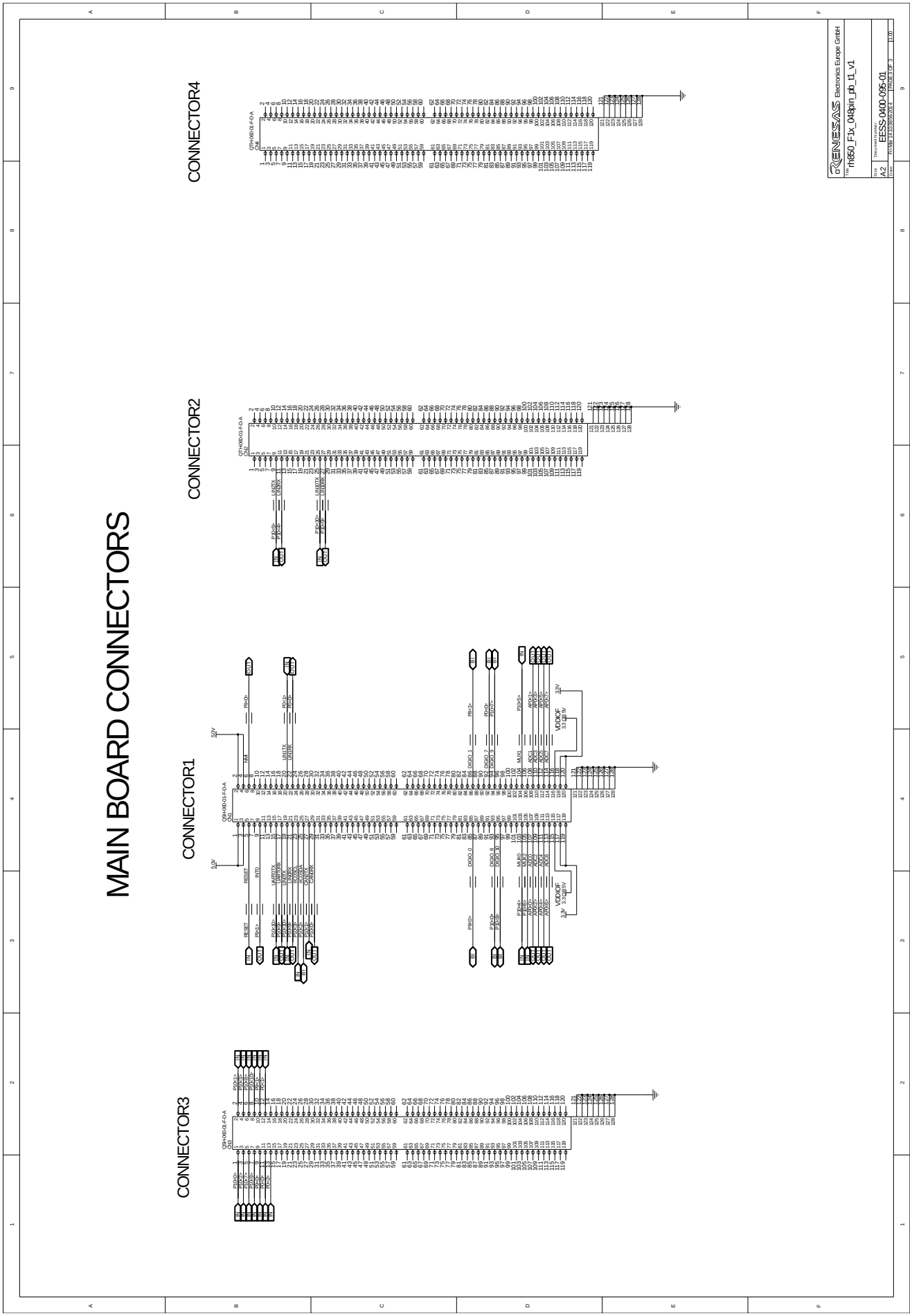
MAIN BOARD CONNECTORS



Chapter 9 Revision History

The table provides information about the major changes of the document versions.

Date	Version	Description
2014-05-21	1.0	Initial release
2014-05-28	1.1	Updated cover page
2015-10-21	1.2	Updated schematic for better readability (same content) Updated table for CN1 and CN2 (chapter 6.2) Updated table for CN19 pin6, chapter 5
2018-11-23	1.30	Added reference to F1KM-S1 device