RH850 Evaluation Platform

RH850/F1x-80pin
RH850/R1x-80pin

PiggyBack board

Table of Contents

Chapter 1 Introduction

The RH850/F1x & RH850/R1x 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 & RH850/R1x microcontrollers. The piggyback board (Y-RH850-F1X-80PIN-PB-T1-V1) can be used as a standalone board, or can be mated with a mainboard (e.g. Y-RH850-X1X-MB-T1-V1) 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.

For details regarding the operation of the microcontrollers, refer to the RH850/F1L or RH850/R1x User Manual.

Chapter 2 Overview

2.1 Overview

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

Device pin #1

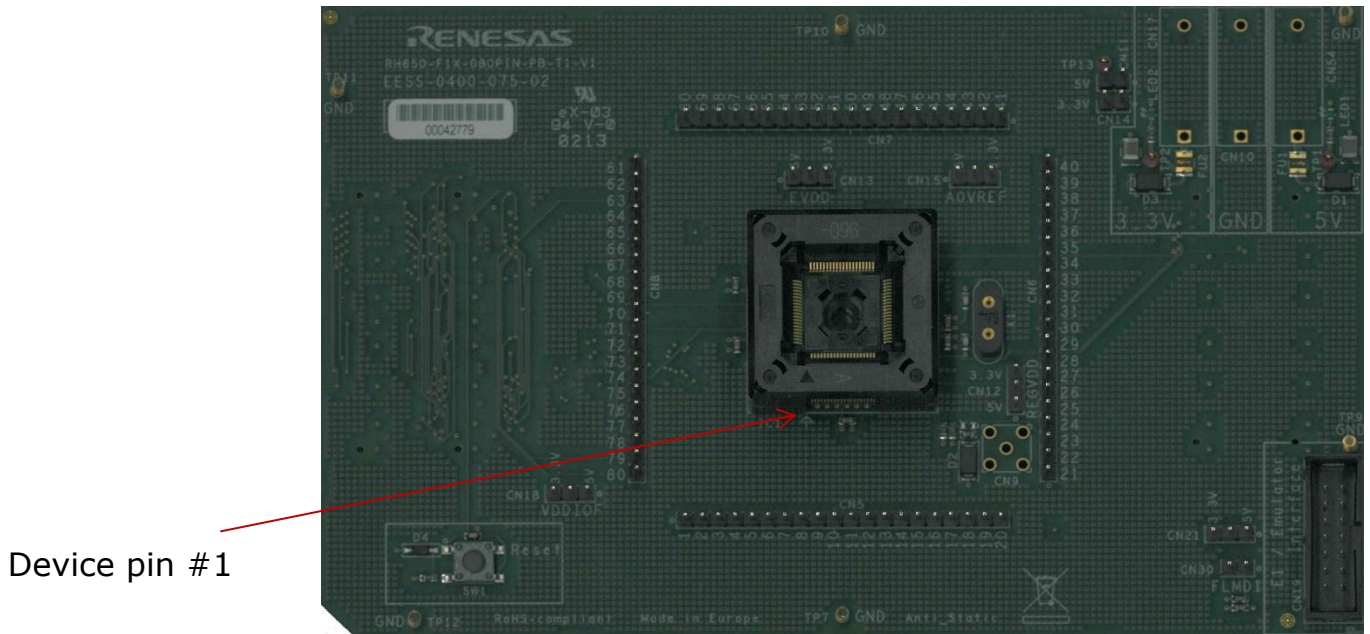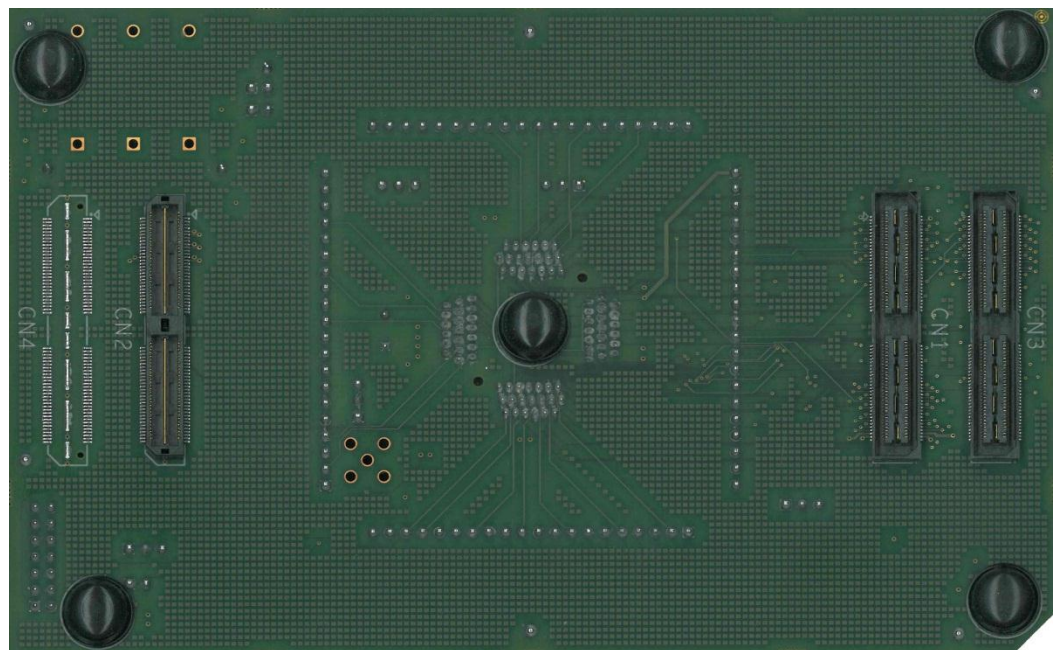*Figure 1 – PiggyBoard top view*

Figure 2 – PiggyBoard bottom view

2.2   Mounting of the device

The board is designed for use with the following devices:

RH850/F1L-80pin

RH850/R1x-80pin

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.

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* (CN54) and *Voltage2* (CN17).
    - A black connector for VSS connection (CN10).
  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
REGVDD	Supply for the device internal regulators for the digital logic.
EVDD	Supply for ports of AWO/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 CN11 and CN20.

* The IO supply voltage for the Mainboard (VDDIOF) can be selected via jumper CN18 from either the Voltage1 or the Voltage2..
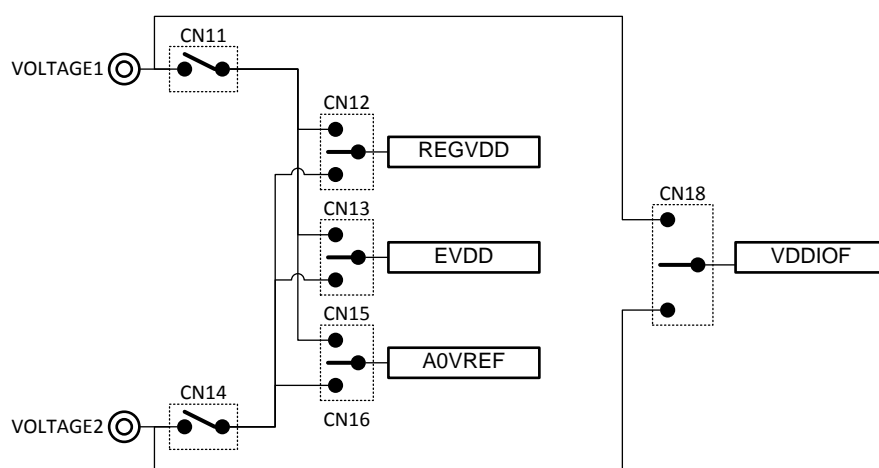
Chapter 4 Clock sources

An external crystal oscillator for the device clock supply is provided with the board.

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	-	-
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 CN30 must be closed.

Refer to chapter "3.1 Board power connections" for information about the 'Voltage 1' connection on CN19 pin 8.

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 CN21:

CN21 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

Four connectors (CN1 to CN4) 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	P0_6
11	INT2	P9_2		12	INT3	P9_3
13	-	-		14	-	-
15	UART0TX	P10_10		16	UART1TX	P0_5
17	UART0RX	P10_9		18	UART1RX	P0_4
19	LIN0TX	P10_10		20	LIN1TX	P0_8
21	LIN0RX	P10_9		22	LIN1RX	P0_7
23	IIC0SDL	P10_3		24	IIC1SDL	-
25	IIC0SDA	P10_2		26	IIC1SDA	-
27	CAN0TX	P10_1		28	CAN1TX	P0_3
29	CAN0RX	P10_0		30	CAN1RX	P0_2
31	SENTIN0	-		32	SENTIN1	-
33	SENTOUT0	-		34	SENTOUT1	-
35	PSI50Rx	-		36	PSI51Rx	-
37	PSI50Tx	-		38	PSI51Tx	-
39	PSI50Snyc	-		40	PSI51Sync	-
41	FLX0TX	P11_1		42	FLX0EN	P10_11
43	FLX0RX	P10_14		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	F1L: DIGIO_0 R1x: CVMOUT	F1L: P8_0 R1x: CVMOUT	86	DIGIO_1	P8_1
87	DIGIO_2	P8_2	88	DIGIO_3	P8_3
89	DIGIO_4	P8_4	90	DIGIO_5	P8_5
91	DIGIO_6	P8_6	92	DIGIO_7	P11_0
93	DIGIO_8	P10_0	94	DIGIO_9	P10_7
95	DIGIO_10	P10_8	96	DIGIO_11	P10_15
97	DIGIO_12	P0_9	98	DIGIO_13	P0_10
99	DIGIO_14	P0_11	100	DIGIO_15	P0_12
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	-	-	116	-	-
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	P0_10	10	LIN3Tx	-
11	LIN2Rx	P0_9	12	LIN3Rx	-
13	LIN4Tx	-	14	LIN5Tx	-
15	LIN4Rx	-	16	LIN5Rx	-
17	LIN6Tx	P0_12	18	LIN7Tx	-
Q	LIN6Rx	P0_11	20	LIN7Rx	-
21	LIN8Tx	-	22	LIN9Tx	-
23	LIN8Rx	-	24	LIN9Rx	-
25	LIN10Tx	P10_10	26	LIN11Tx	P0_5
27	LIN10Rx	P10_9	28	LIN11Rx	P0_4
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	-	-
51	-	-	52	-	-
53	-	-	54	-	-
55	-	-	56	-	-
57	-	-	58	-	-
59	-	-	60	-	-
61	-	-	62	-	-
63	-	-	64	-	-
65	-	-	66	-	-
67	-	-	68	-	-
69	-	-	70	-	-
71	-	-	72	-	-
73	-	-	74	-	-
75	-	-	76	-	-
77	-	-	78	-	-
79	-	-	80	-	-

81	-	-	82	-	-
83	-	-	84	-	-
85	-	-	86	-	-
87	-	-	88	-	-
89	-	-	90	-	-
91	-	-	92	-	-
93	-	-	94	-	-
95	-	-	96	-	-
97	-	-	98	-	-
99	-	-	100	-	-
101	-	-	102	-	-
103	-	-	104	-	-
105	-	-	106	-	-
107	-	-	108	-	-
109	-	-	110	-	-
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_4	12	PWM11	P0_1
13	PWM12	P0_2	14	PWM13	P0_3
15	F1L: PWM14 R1x: CVMOUT	F1L: P8_0 R1x: CVMOUT	16	PWM15	P8_1
17	PWM16	P10_11	18	PWM17	P10_12
Q	PWM18	P10_13	20	PWM19	P10_14
21	PWM20	P9_2	22	PWM21	P9_3
23	PWM22	P8_2	24	PWM23	P8_3
25	PWM24	P10_15	26	PWM25	P11_0
27	PWM26	P11_1	28	PWM27	P11_2
29	PWM28	P11_3	30	PWM29	P11_4
31	PWM30	-	32	PWM31	-
33	PWM32	-	34	PWM33	P9_4
35	PWM34	P9_5	36	PWM35	P9_6

37	PWM36	P8_4	38	PWM37	P8_5
39	PWM38	P8_6	40	PWM39	-
41	PWM40	-	42	PWM41	-
43	PWM42	-	44	PWM43	-
45	PWM44	-	46	PWM45	P0_12
47	PWM46	-	48	PWM47	-
49	PWM48	-	50	PWM49	-
51	PWM50	-	52	PWM51	-
53	PWM52	-	54	PWM53	-
55	PWM54	-	56	PWM55	-
57	PWM56	-	58	PWM57	-
59	PWM58	-	60	PWM59	-
61	PWM60	-	62	PWM61	-
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	AP0_8	82	PWMADC01	AP0_9
83	PWMADC02	AP0_10	84	PWMADC03	-
85	PWMADC04	-	86	PWMADC05	-
87	PWMADC06	-	88	PWMADC07	-
89	PWMADC08	-	90	PWMADC09	-
91	PWMADC10	-	92	PWMADC11	-
93	PWMADC12	-	94	PWMADC13	-
95	PWMADC14	-	96	PWMADC15	-
97	-	-	98	-	-
99	-	-	100	-	-
101	-	-	102	-	-
103	-	-	104	-	-
105	-	-	106	-	-
107	-	-	108	-	-
109	-	-	110	-	-
111	-	-	112	-	-
113	-	-	114	-	-
115	-	-	116	-	-
117	-	-	118	-	-
119	-	-	120	-	-

6.3 Differences RH850/F1L-80pin and RH850/R1x-80pin

The pin out of the RH850/F1L-80pin device and the RH850/R1L-80pin device differs on the following port/pin:

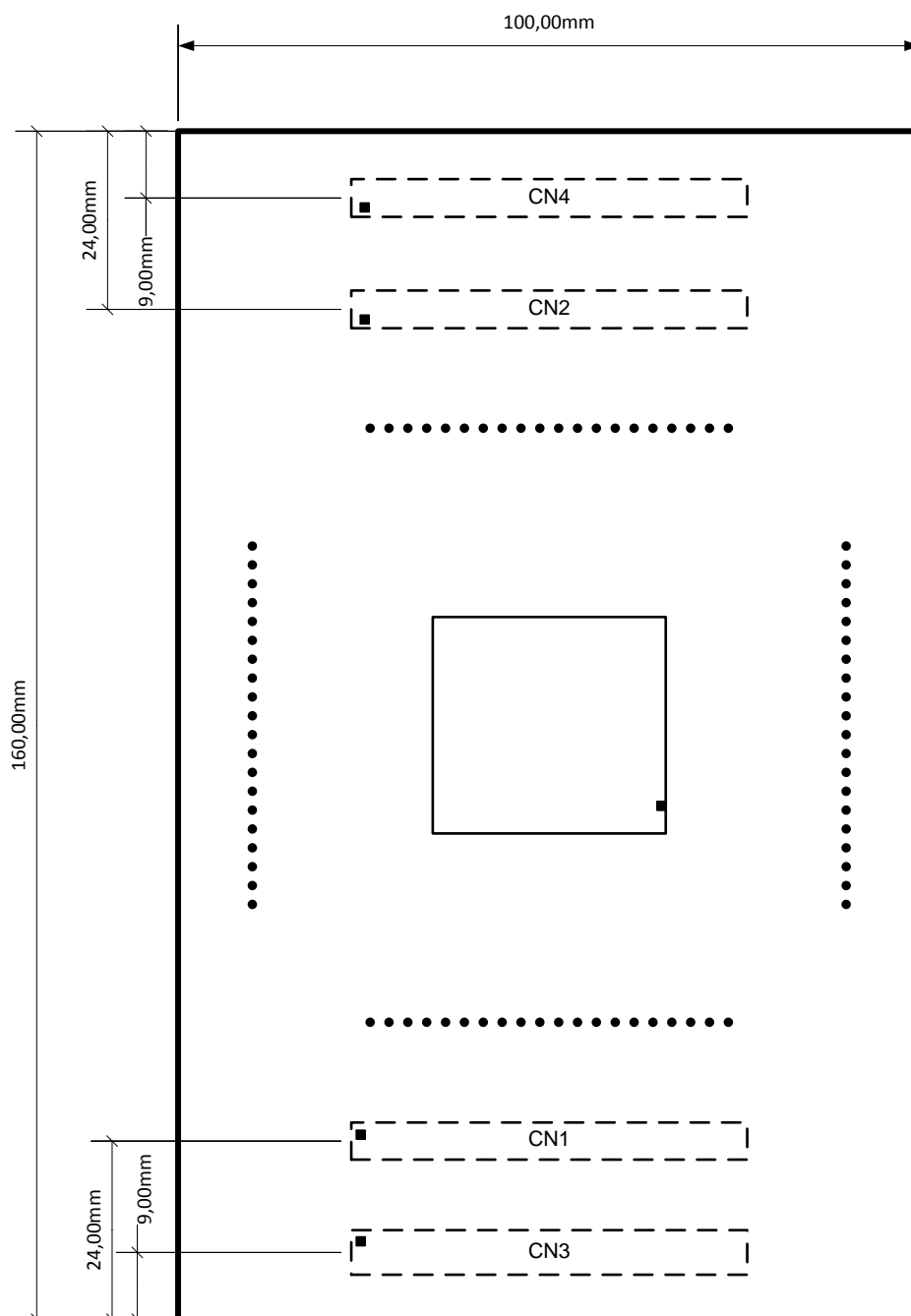| Device Pin	Function on RH850/F1L-80pin	Function on RH850/R1x-80pin
35	P8_0	CVMOUT

Chapter 7 Precautions

1) The connector CN21 is only available on PCB versions 2, or later.

PCB version overview:

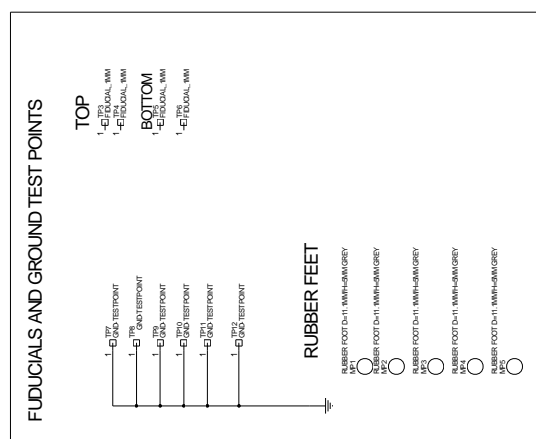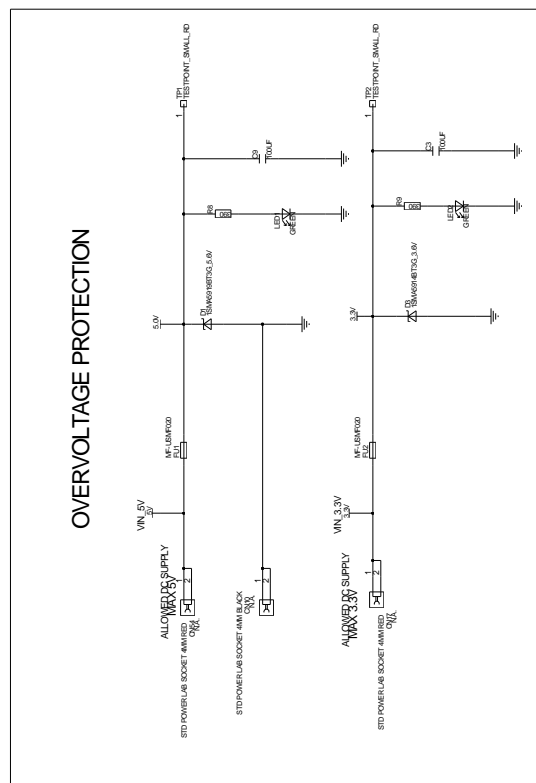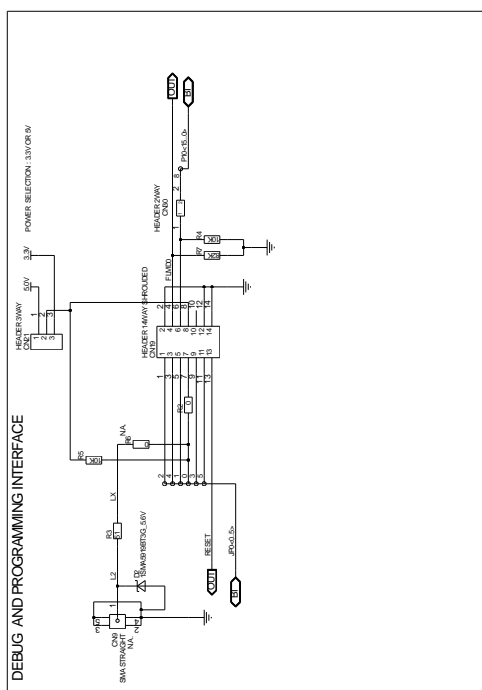| Version	Number	Change information
1	EESS-0402-077-01	Initial version
2	EESS-0400-075-02	Added CN21.

Chapter 8 Mechanical dimensions

Chapter 9 Schematic

PUSH BUTTON FOR RESET

EVDD
3.3/2.5/1.5V
D4
1N4148W-V
RESET_Z

PUSH BUTTON 4 PIN SMD
SW1

VOLTAGE DISTRIBUTION

VDDLOF
3.3/2.5/1.5V
HEADER 3WAY
CN16

TP13
TESTPOINT_SMALL_RD
REGVDD
3.3/2.5/1.5V
EVDD
3.3/2.5/1.5V
A0VREF
3.3/2.5/1.5V

V5V
5V
HEADER 2WAY
CN11
HEADER 3WAY
CN12
HEADER 3WAY
CN13
HEADER 3WAY
CN15
V2V
3.3V
HEADER 2WAY
CN14

5.0V
3.3V

FUDICIALS AND GROUND TEST POINTS

TOP
TP3
E-FIDUCIAL_1MM
TP4
E-FIDUCIAL_1MM
BOTTOM
TP6
E-FIDUCIAL_1MM
TP5
E-FIDUCIAL_1MM

TP7
GND TESTPOINT
TP8
GND TESTPOINT
TP9
GND TESTPOINT
TP10
GND TESTPOINT
TP11
GND TESTPOINT
TP12
GND TESTPOINT

RUBBER FEET
MP1
RUBBER FOOT D=11.1MM/H=3MM/GREY
MP2
RUBBER FOOT D=11.1MM/H=3MM/GREY
MP3
RUBBER FOOT D=11.1MM/H=3MM/GREY
MP4
RUBBER FOOT D=11.1MM/H=3MM/GREY
MP5
RUBBER FOOT D=11.1MM/H=3MM/GREY

DEBUG AND PROGRAMMING INTERFACE

POWER SELECTION : 3.3V OR 5V
HEADER 2WAY
CN0
3.3V
5.0V
HEADER 3WAY
CN1
HEADER 3WAY
CN2
HEADER 44WAY SHROUDED
CN19

R5
R6 N.A.
L3

R3
L2
D2
1SMA5918BT3G_5.6V
RESET
JP1v0.5s

CN9
SMA STRAIGHT
N.A.

OVERVOLTAGE PROTECTION

TP1
TESTPOINT_SMALL_RD
C9
100uF
R6
LED1
GREEN

5.0V
D1
1SMA6919BT3G_5.6V
F1
MF-LSMF020

VIN_5V
5.0V
ALLOWED DC SUPPLY
MAX 5V
CN3
STD POWERLAB SOCKET 4MM RED
CN4
STD POWERLAB SOCKET 4MM BLACK

TP2
TESTPOINT_SMALL_RD
C3
100uF
R9
LED3
GREEN

3.3V
D3
1SMA6914BT3G_3.9V
F2
MF-LSMF020

VIN_3.3V
3.3V
ALLOWED DC SUPPLY
MAX 3.3V
CN5
STD POWERLAB SOCKET 4MM RED

MAIN BOARD CONNECTORS

CONNECTOR4

CONNECTOR2

CONNECTOR1

CONNECTOR3

Chapter 10 Revision History

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

Date	Version	Description
2012-11-12	1.0	Initial release
2013-03-21	1.1	• Updated description of debug interface • Updated schematic • Added chapter 'Chapter 7 Precautions'

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