User's Manual

32

RH850 Evaluation Platform

RH850/C1M-A2 Starter Kit

User's Manual: Hardware

Y-ASK-RH850C1M-A2

Renesas Electronics
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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 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 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.

Table of Contents

1. Introduction

The 'RH850/1M-A2 Starter Kit' serves as a simple and easy to use platform for evaluating the features and performance of Renesas Electronics' 32-bit RH8650/C1M-A2 microcontrollers.

Notes

1. This document describes the functionality of the communication board and guides the user through its operation.
   For details regarding the operation of the microcontroller, refer to the device's Hardware User's Manual.
2. In this document low active signals are marked by an appended 'Z' to the pin or signal name. E.g. the reset pin is named RESETZ.
3. In this document following abbreviations are used:
   – H level, L level: high or low signal level of a digital signal, the absolute voltage value depends on the signal

1.1 Package Components

The Y-ASK-RH850C1M-A2 product package consists of the following items. After you have unpacked the box, check if your Y-ASK-RH850C1M-A2 package contains all of these items. *Table 1.1 Package Components for the Y-ASK-RH850C1M-A2* shows the packing components of the Y-ASK-RH850C1M-A2 package.

Table 1.1 Package Components for the Y-ASK-RH850C1M-A2

Item	Description	Quantity
D017988	RH850/C1M-A2 starter kit board	1
D018516	Software installation CD	1
D018515-11	Quick start guide	1
D010816-24	China RoHS document	1
D018515-24	Product contents list	1
Jumpers (2-way, 0.1")	In the bag	20
226-000040-01	Renesas E1 OCD emulator unit	1
228-000109-01	USB cable [type A to type micro-B]	1
230-000109-01	Parallel Cable [1x D-SUB connector 9-pin - 1x DIL connector 10-pin]	3
230-000110-01	Sub-D male to male gender changer, 9-pin	3
236-000009-05	Power supply unit, 12V/1A Incl. 4 international AC-plugs	1

Note

Please keep the Y-ASK-RH850C1M-A2 packing box at hand for later reuse in sending the product for repairs or for other purposes. Always use the original packing box when transporting the Y-ASK-RH850C1M-A2. If packing of your product is not complete, it may be damaged during transportation.

1.2 Main Features

- Connections for on-chip debugging and flash memory programming
- Access to all microcontroller pins
- External power supply (12V DC input)
- Debugging and programming interface:
  - 14-pin LPD/JTAG Debug Connector (e. g. for using E1 or E2 OCD Emulator or PG-FP6 Flash Programmer)
- Pin headers for direct access to each device pin
- Reset switch
- External clock circuit with a 20 MHz Crystal Resonator
- General purpose signaling LEDs
- Analog signal input using 2 potentiometers
- Access to R/D (resolver-to-digital) converter
- Motor control signal outputs
- Jumpers for configuration options
- Output for motor control signals
- Inputs for resolver signals for motor control
- On-board interface connector for
  - LIN Master I/F
  - UART I/F
  - CAN I/F
  - SENT I/F
- Operating temperature from 0 °C to +40 °C

1.3 Starter Kit Board View

Below picture shows the top view of the starter kit board.

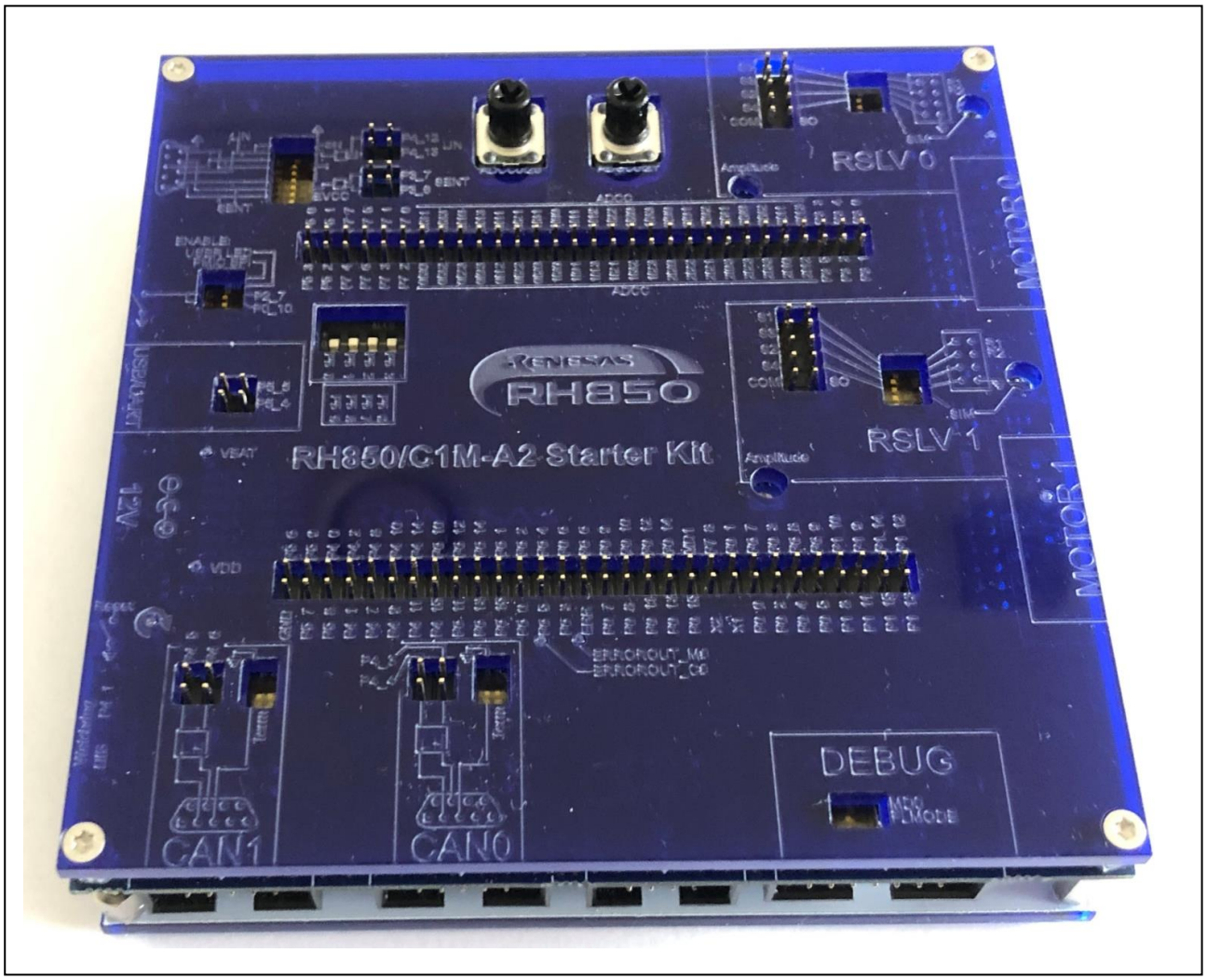


Figure 1.1 Starter kit board top view

1.4 Used Device

The board uses the following device:

- R7F701275EABG (RH850/C1M-A2)

The device is soldered to the pcb.

2. Jumpers, Connectors, Switches and LEDs

This section provides complete lists of all jumpers, connectors, switches, and LEDs.

The placement of these components on the board is depicted in the figure below.

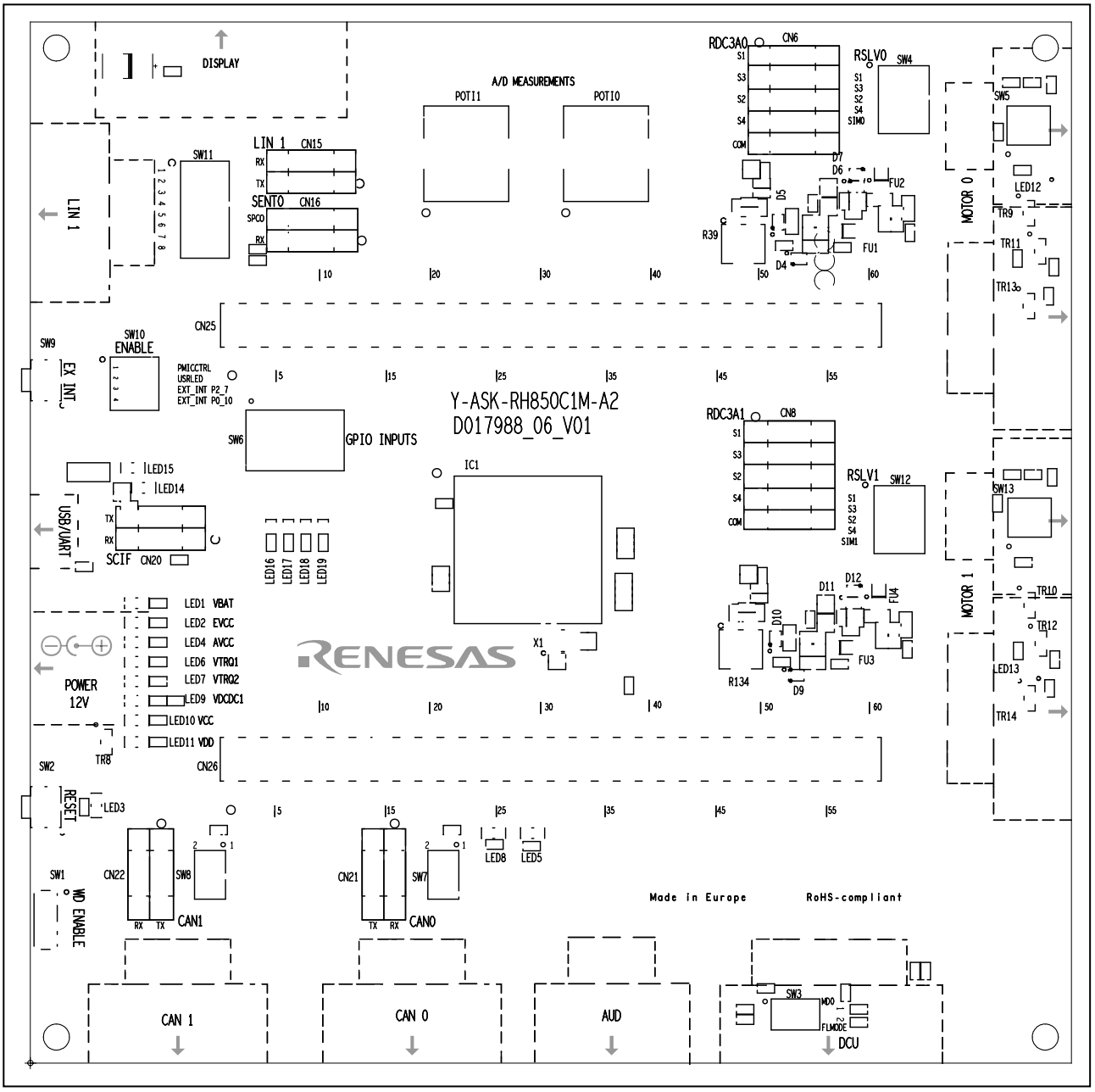


Figure 2.1 Placement of jumpers, connectors and LEDs

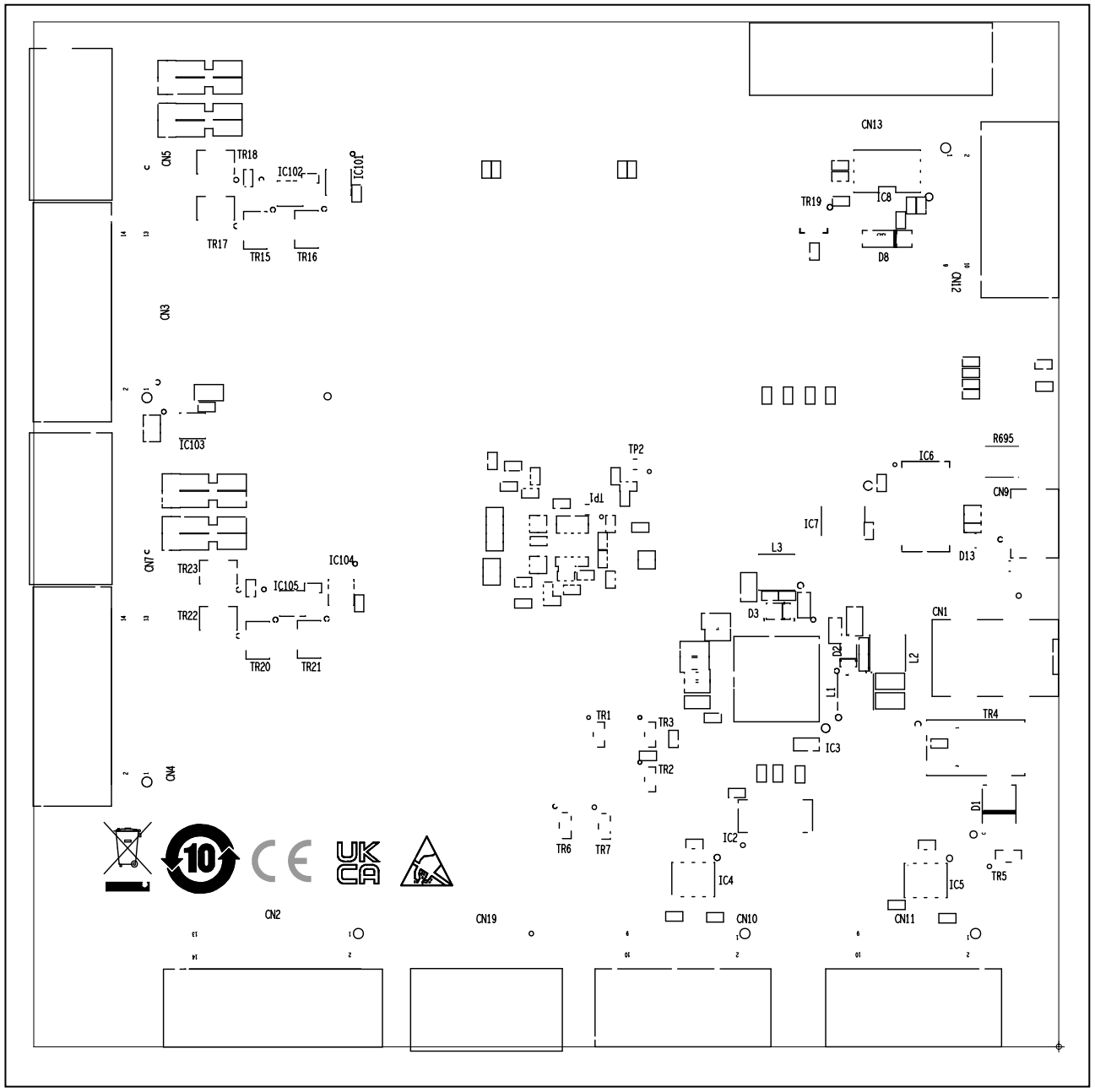


Figure 2.2 Placement of connectors on bottom side

2.1 Switches Overview

The following table provides an overview of all connectors.

Table 2.1 Switches overview

Connector	Function	Remark
SW1	Watchdog enable signal for power control IC RAA270000. SW1[2-1]: WD enabled SW1[2-3]: WD disabled	
SW2	Reset switch	refer to *6.2 RESET Switch*
SW3	Processor mode switches	refer to *6.1 Operation Mode Selection*
SW4	5-pole DIP switch to select input signal for Resolver 0	refer to *6.13 Resolver Interface*
SW5	4-position rotary switch to select input signal for Resolver 0	refer to *6.13 Resolver Interface*
SW6	Port input signals	refer to *6.6 Digital Signal Input*
SW7	CAN0	refer to *6.8 CAN Interfaces*
SW8	CAN1	refer to *6.8 CAN Interfaces*
SW9	External interrupt signal	refer to *6.4 External Interrupt Signal*
SW10	Enable switch	refer to *6.3 Enable Control Signals*
SW11	LIN / SENT interface switches	refer to *6.9 LIN and SENT Interfaces*
SW12	5-pole DIP switch to select input signal for Resolver 1	refer to *6.13 Resolver Interface*
SW13	4-position rotary switch to select input signal for Resolver 1	refer to *6.13 Resolver Interface*

2.2 Jumper Overview

The following table provides an overview of all connectors that will be used to add jumpers to configure the board functionality.

Table 2.2 Jumpers overview

Connector	Function	Remark
CN6	Resolver connector RESOLVER0	refer to *6.13 Resolver Interface*
CN8	Resolver connector RESOLVER1	
CN15	LIN interface connector	refer to *6.9 LIN and SENT Interfaces*
CN16	SENT interface connector	
CN21	CAN0 interface connector	refer to *6.8 CAN Interfaces*
CN22	CAN1 interface connector	

2.3 Connectors Overview

The following table provides an overview of all connectors.

Table 2.3 Connectors overview

Connector	Function	Remark
CN1	+12.0 V external power supply	refer to *3.2 Power Supply LEDs*
CN2	Debug connector	refer to *5 Debug and Flash Programming Interfaces*
CN3	Motor connector MOTOR0	Refer to *6.12 Motor Control*
CN4	Motor connector MOTOR1	
CN5	Resolver connector RESOLVER0	refer to *6.13 Resolver Interface*
CN7	Resolver connector RESOLVER1	
CN9	UART interface connector	refer to ***Error! Reference source not found.*** *REF _Ref74812242 \h * MERGEFORMAT* ***Error! Reference source not found.***
CN10	CAN0 interface connector	refer to *6.8 CAN Interfaces*
CN11	CAN1 interface connector	
CN12	LIN interface connector	refer to *6.9 LIN and SENT Interfaces*
CN19	AUD debug interface	refer to *5 Debug and Flash Programming Interfaces*
CN25	Device port connectors	refer to *9.12 Device Ports Connectors CN25 and CN26*
CN26		

2.4 LED Overview

The following table provides an overview of all LED.

Table 2.4 LED overview

LED	Function	Color	Remark
LED1	12.0 V power supply VBAT	green	refer to *3.2 Power Supply LEDs*
LED2	5.0 V power supply EVCC		
LED4	5.0 V power supply AVCC		
LED6	5.0 V power supply VTRQ1		
LED7	5.0 V power supply VTRQ2		
LED9	5.7 V power supply VDCDC1		
LED10	3.3 V power supply VCC		
LED11	1.25 V power supply VDD		
LED3	Reset switch SW2 on	red	refer to *6.2 RESET Switch*
LED5	Device ERROROUT signal	red	
LED12	MOTOR0 signaling LED	RGB	refer to *6.12 Motor Control*
LED13	MOTOR1 signaling LED	RGB	
LED14	UART1 signaling LED	yellow	refer to ***Error! Reference source not found. Error! Reference source not found.***
LED15	UART1 signaling LED	green	
LED16	User Signaling LED	blue	refer to *6.5 User LEDs*
LED17			
LED18			
LED19			

3. Power Supply

3.1 Board Power Connection

The board uses an external power supply of 12V and generates all required voltages using a Renesas power management IC RAA270000KFT for all the digital circuitry on the device and on the board.

The schematic below shows the voltage generation circuit and the LEDs indicating the generated voltages.

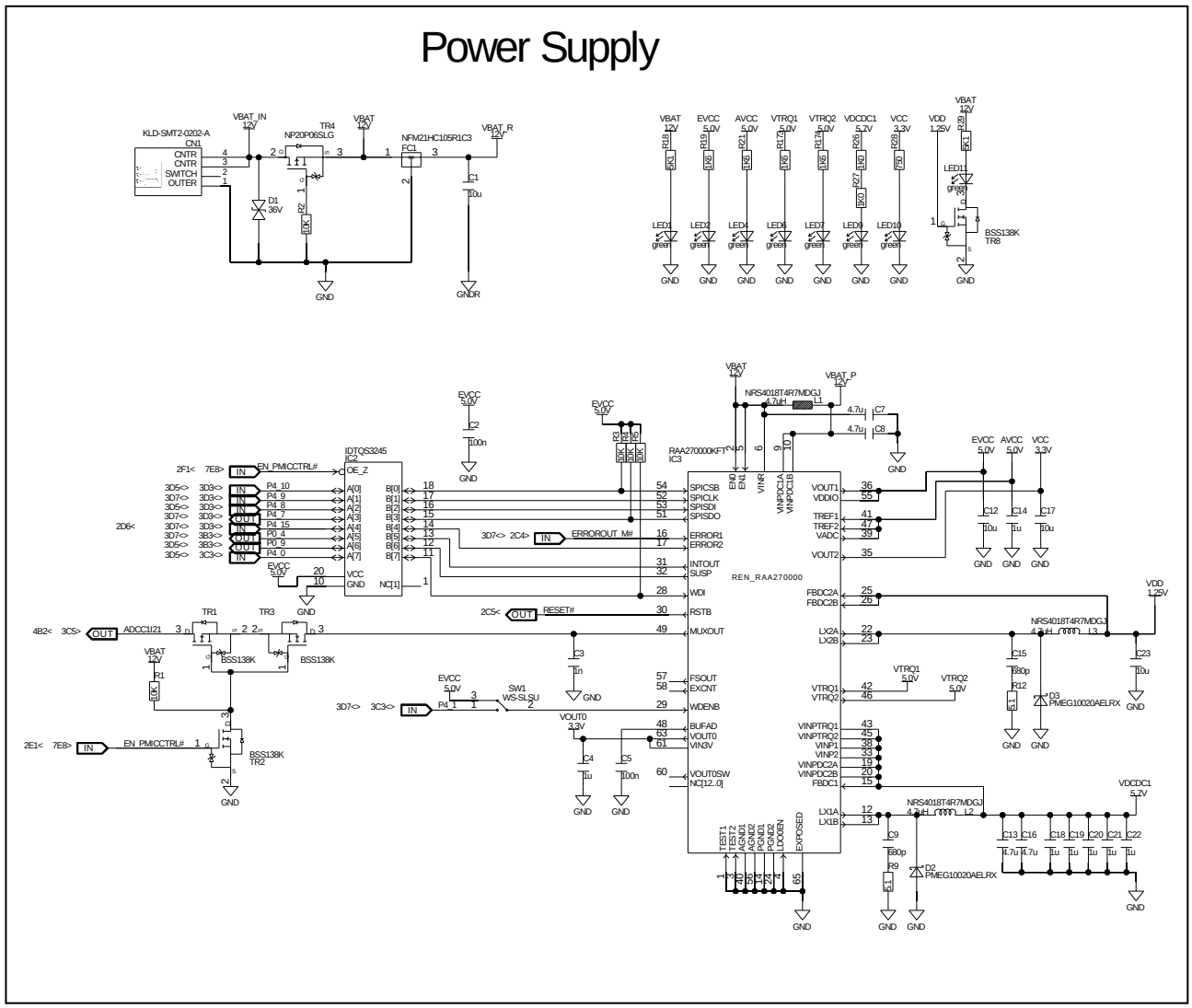


Figure 3.1 Power supply circuit on the starter kit board

Note

Within this document all voltage values are considered as ‘typical’.

Refer to the 'Electrical Characteristics' section of the Hardware User's Manual for allowed voltage ranges.

If a debugger or a flash programmer is connected to CN2 switch SW1 must be set to position [2-3]

3.2 Power Supply LEDs

The following green LEDs indicate the presence of various voltages on the piggyback board:

- LED1 for 12.0 V board supply voltage
- LED2 for 5.0 V power rail EVCC
- LED4 for 5.0 V power rail AVCC
- LED6 for 5.0 V power rail VTRQ1
- LED7 for 5.0 V power rail VTRQ2
- LED9 for 5.7 V power rail VDCDC1
- LED10 for 3.3 V power rail VCC
- LED11 for 1.25 V power rail VDD

4. Clock Supply

The board has a soldered oscillator of 20MHz that can be used for device clock generation.

It is possible to provide an external clock to the X1 terminal on connector CN26. In this case the oscillator must be removed from the starter kit.

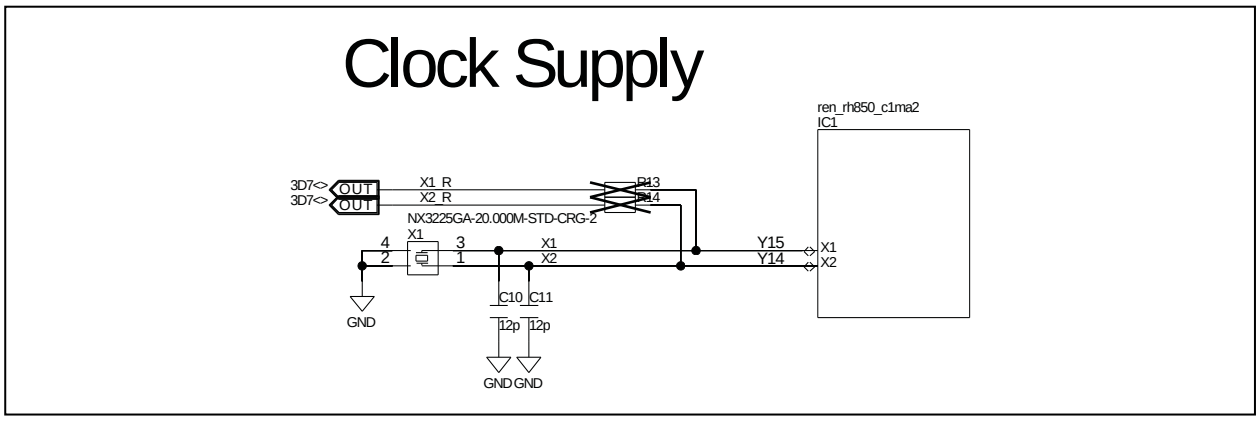


Figure 4.1 Clock supply

4.1 External Clock Input on CN26

To minimize disturbance on the resonator signal, the signals X1 and X2 are by default not connected to a pin header. If needed the signals can be connected to CN26 via 0 Ω resistors:

- X1: Pin 43 of CN26 to supply an external clock to the device via R13
- X2: Pin 41 of CN26 for measurement purposes of the clock via R14

5. Debug and Flash Programming Interfaces

For debugging and flash programming purposes debug and flash programming tools can be connected to the CN2 connector.

If a debugger or a flash programmer is connected to CN2, switch SW1 must be set to position [2-3].

Refer to *9.1 Power Supply Connector CN1* for details about the CN2 pin assignment.

The printed circuit board is also prepared to provide access to the advanced AUD debug interface using connector CN19. By default, connector CN19 is not fit on the pcb.

The Renesas standard emulator for RH850/C1M-A2 is the E2 emulator. This can be used as emulator for debugging or as flash programmer.

6. Other Circuitry

6.1 Operation Mode Selection

The starter kit board gives the possibility to configure the following switches for selection of the device operation mode:

Table 6.1 Device operation mode selection switches

Switch	Function
SW3-1	MD0 pin level • SW3-1[ON]: MD0 = H level • SW3-1[OFF]: MD0 – controlled by debugger or programming tool if a tool is connected via CN2 • GND, if no tool connected
SW3-2	FLMODE pin level • SW3-2[ON]: FLMODE = H level • SW3-2[OFF]: FLMODE – controlled by debugger or programming tool if a tool is connected via CN2 – GND, if no tool connected

CAUTION

Be careful in configuration of the operation mode related pins. The wrong configuration and operation of the device outside of its specification can cause irregular behavior of the device and long-term damage cannot be excluded. Be sure to check the corresponding Hardware User's Manual for details, which modes are specified for the used device.

Notes

In most cases the 'normal operating mode' of the device will be used.
This mode is for execution of the user program. The on-chip debug functions also use this mode.

To select the 'normal operating mode' of the device, the FLMD0 pin must be pulled low. To do so, remove the jumper JP41.

All other jumpers related to the mode selection can be left open.

6.2 RESET Switch

The switch SW2 is a push button, which is used to issue a RESET to the device.

The lighted red LED3 indicates that SW2 is pushed, a reset is triggered from the board watchdog (IC3, RAA270000), or a reset is applied from the debugger or flash programmer.

6.3 Enable Control Signals

The starter kit has a 4-pole DIP switch SW10 to enable some control signals to be connected to RH850/C1M-A2.

Table 6.2 Enable control signal switches SW10

Switch	Function
SW10-1	Enable control signal from RAA270000 PMIC • SW10-1[ON]: Control signal connected to ADCC1|21 input • SW10-1[OFF]: Control signal disconnected
SW10-2	Enable user LED • SW10-2[ON]: Enable user LEDs • SW10-2[OFF]: User LEDs disconnected
SW10-3	Enable external interrupt • SW10-3[ON]: Connect external interrupt signal to port P2_7 • SW10-3[OFF]: Do not connect external interrupt signal to port P2_7
SW10-4	Enable external interrupt • SW10-4[ON]: Connect external interrupt signal to port P0_10 • SW10-4[OFF]: Do not connect external interrupt signal to port P0_10

6.4 External Interrupt Signal

The external interrupt can be triggered using push button SW9.

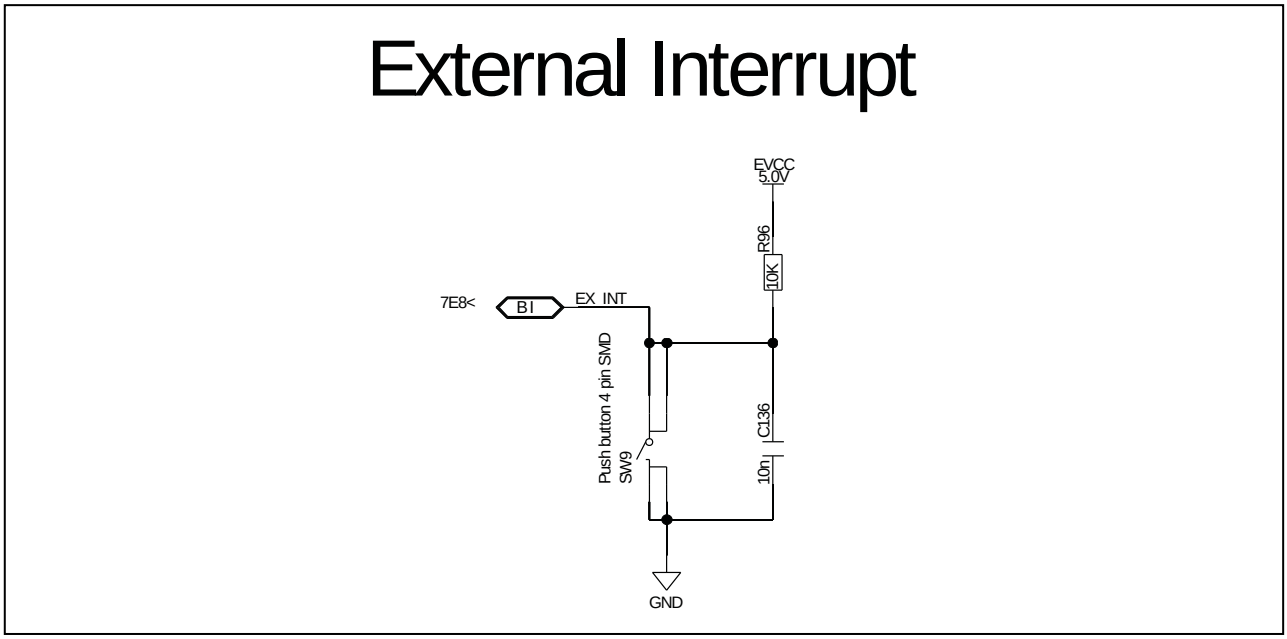


Figure 6.1 External interrupt input

6.5 User LEDs

Four LEDs are provided to allow visual observation of the output state of device port pins.

Usage of these LEDs is enabled by switch SW10-2. Refer to *6.3 Enable Control Signals*

Device pins P5_6 to P5_9 are connected to the output enable pins on the bus switch QS3125 (IC7), while the LEDs 16 to 19 are connected to the output pins of QS3125. The output enable pins of IC7 are connected to SW10-2.

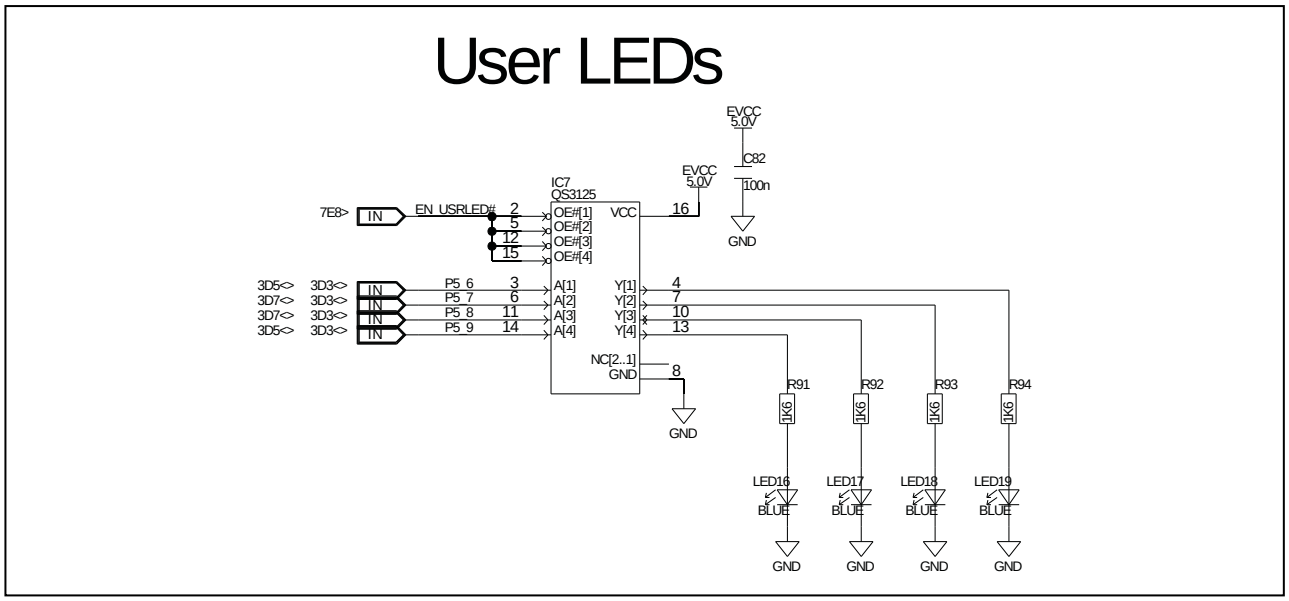


Figure 6.2 User LED connection

6.6 Digital Signal Input

The switch SW6 provides fixed voltage levels at pins P5_0 to P5_3.

Table 6.3 Digital signal input selection switches SW6

Switch	Function
SW6-1	P5_0 pin level • SW6-1[+]: P5_0 = H level • SW6-1[0]: P5_0 = Hi-Z • SW6-1[-]: P5_0 = L level
SW6-2	P5_1 pin level • SW6-2[+]: P5_1 = H level • SW6-2[0]: P5_1 = Hi-Z • SW6-2[-]: P5_1 = L level
SW6-3	P5_2 pin level • SW6-3[+]: P5_2 = H level • SW6-3[0]: P5_2 = Hi-Z • SW6-3[-]: P5_2 = L level
SW6-4	P5_3 pin level • SW6-4[+]: P5_3 = H level • SW6-4[0]: P5_3 = Hi-Z • SW6-4[-]: P5_3 = L level

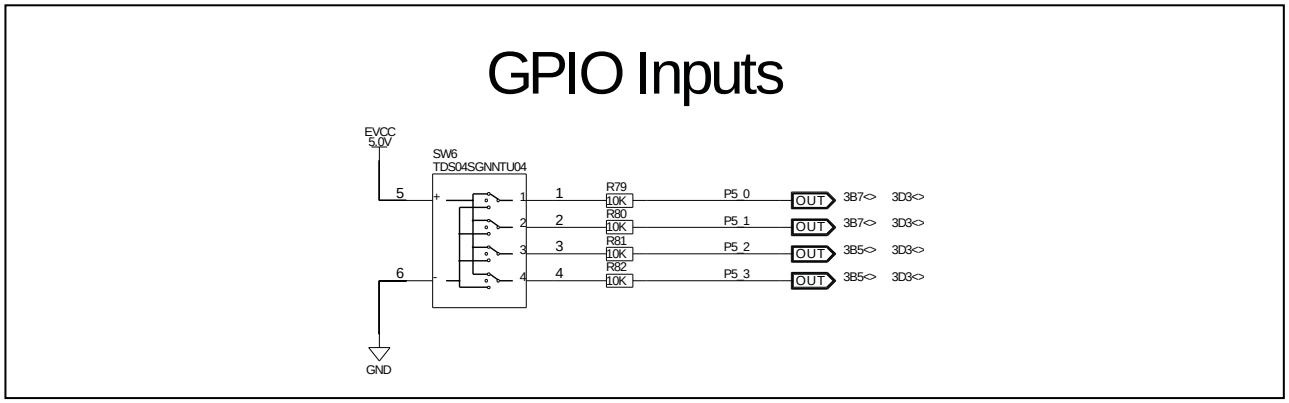


Figure 6.3 Digital signal input connection

6.7 Analog Signal Input

The starter kit includes 2 potentiometers that allow analog signal inputs to ports ADCC0I20 and ADCC0I21.

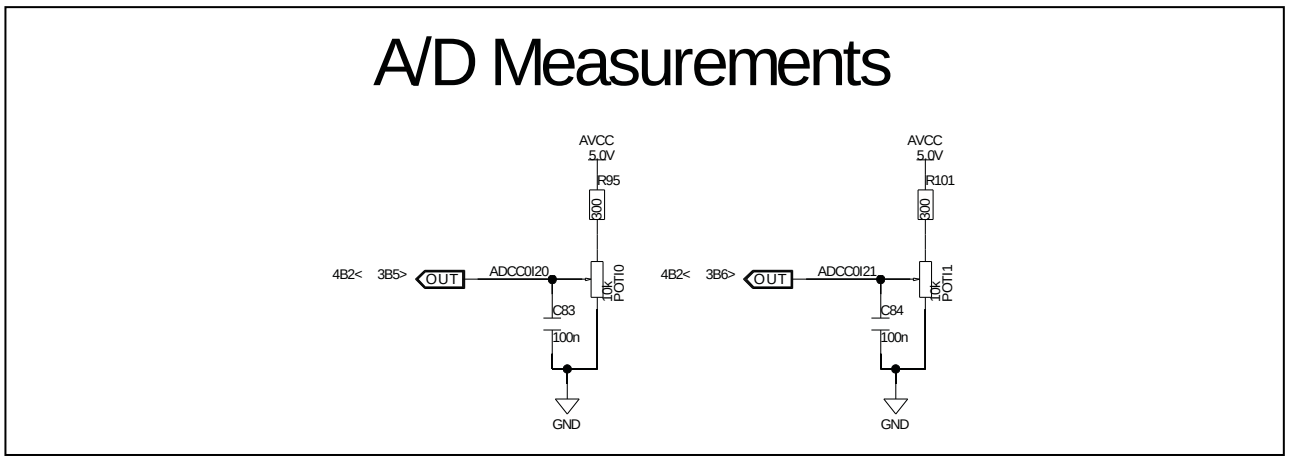


Figure 6.4 Potentiometer connection

6.8 CAN Interfaces

The starter kit provides 2 CAN interfaces. The interfaces use the connectors CN10 and CN11.

Refer to *9.8 CAN connector CN10* and *9.9 CAN connector CN11* for details on the connector.

To use the CAN interfaces please use jumpers on connectors CN21 and CN22 to connect the CAN ports CAN0 and CAN1 of RH850/C1M-A2 to the corresponding CAN transceiver on the starter kit.

Table 6.4 CAN signal connection

Connector	Function
CN21	CAN0 connection • CN21[1-2]: connect CAN0RX (P4_3) • CN21[3-4]: connect CAN0TX (P4_4)
CN22	CAN1 connection • CN22[1-2]: connect CAN1RX (P4_5) • CN22[3-4]: connect CAN1TX (P4_6)

The starter kit provides the possibility to activate bus termination on the CAN output ports using switches SW7 and SW8.

Table 6.5 CAN signal bus termination

Switch	Function
SW7-1	CAN0 bus termination • SW7-1[ON]: Add 120 Ohm resistor as bus termination between CAN0H and CAN0L
SW7-2	Pin 7 on connector CN10 • SW7-2[ON]: Connect to GND
SW8-1	CAN1 bus termination • SW8-1[ON]: Add 120 Ohm resistor as bus termination between CAN1H and CAN1L
SW8-2	Pin 7 on connector CN11 • SW8-2[ON]: Connect to GND

The circuit diagram shows the CAN circuit.

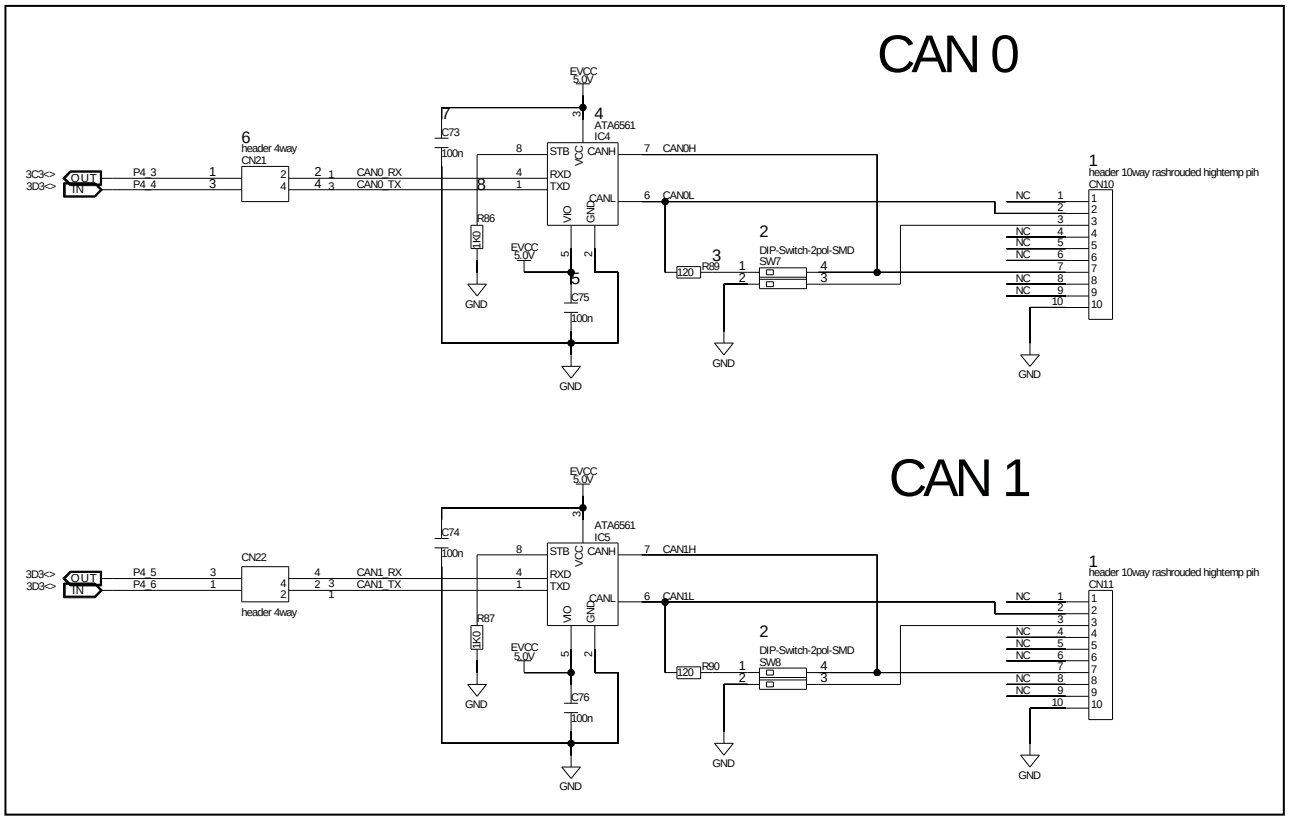


Figure 6.5 CAN interfaces

6.9 LIN and SENT Interfaces

The starter kit offers a LIN Master interface and a SENT interface. The signals of both interfaces are output on connector CN12.

For details on connector CN12 please refer to *9.10 LIN/SENT connector CN12*.

6.9.1 LIN Interface

The LIN output is enabled using jumpers on connector CN15.

Table 6.6 LIN signal connection

Connector	Function
CN15	LIN connection • CN15[1-2]: connect LIN30TX (P4_13) • CN15[3-4]: connect LIN30RX (P4_12)

The LIN interface signals are output to CN12 when switches SW8-2 (LIN1, output CN12-7) and SW8-4 (LIN1_BAT, output CN12-9) are set to “ON”.

6.9.2 SENT Interface

The SENT interface is enabled using jumpers on connector CN16.

Table 6.7 SENT signal connection

Connector	Function
CN16	LIN connection • CN16[1-2]: connect RSENT3RX (P3_6) • CN16[3-4]: connect RSENT3SPCO (P3_7)

The SENT interface signal is output to CN12 when switch SW8-7 (SENT, output CN12-8) is set to “ON”.

6.9.3 Circuit Diagram

This picture shows the circuit diagram of the LIN and SENT interface.

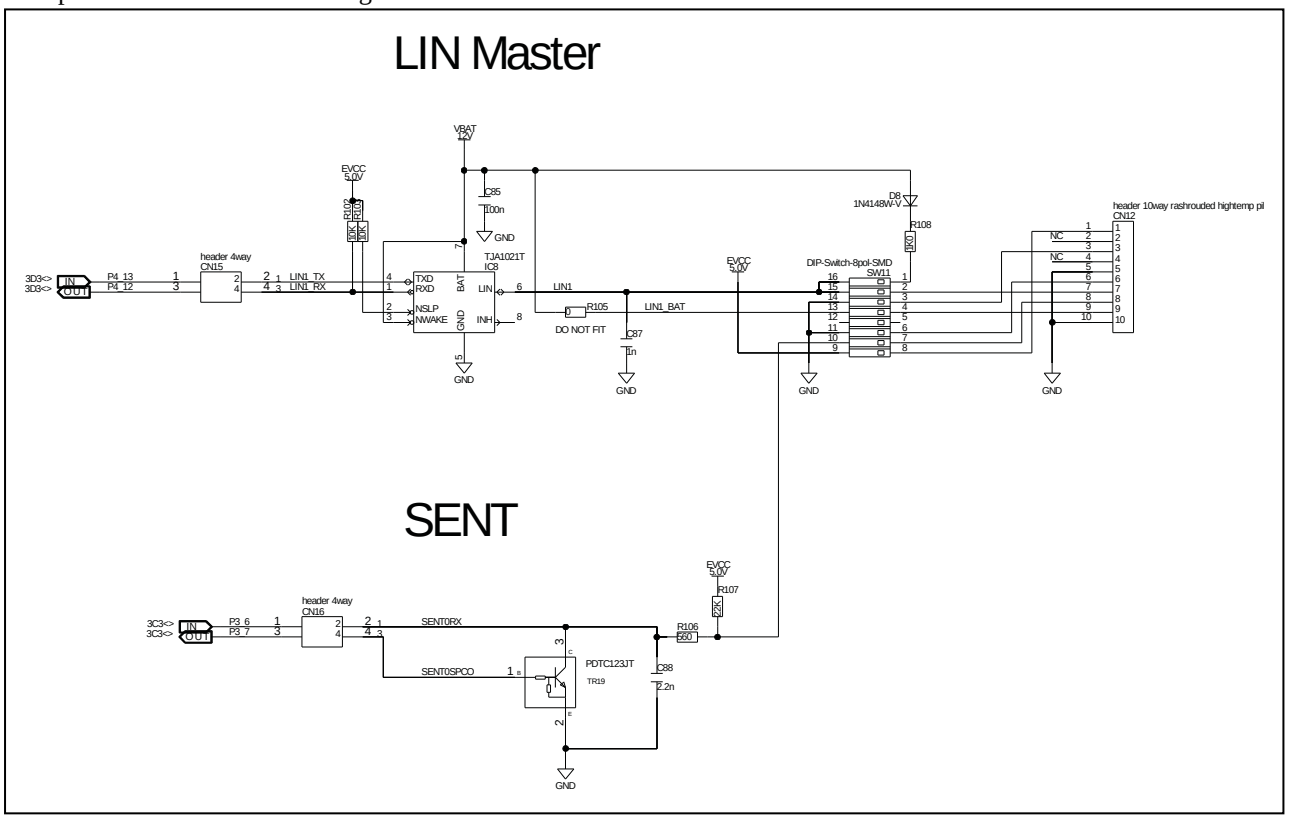


Figure 6.6 LIN and SENT interface

6.10 Connection Cable for CAN and LIN Interfaces

The starter kit includes 3 connection cables from 10-pin DIL to 9-pin D-SUB, that can be used for CAN and LIN connections to external hardware.

The DIL connector can be plugged-in to the connectors CN10 and CN11 for CAN interfaces or CN12 for LIN interface.

Table 6.8 shows the connection between the 10-pin connector and the 9-pin D- SUB connector, and the functions when the cable is connected to the CAN or LIN ports.

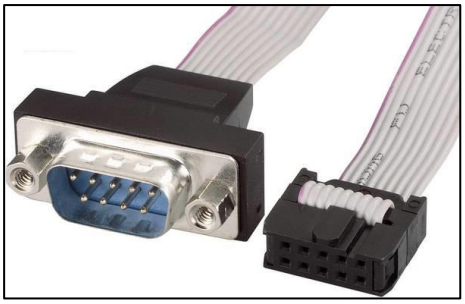


Figure 6.7 CAN / LIN cable

Table 6.8 Connection between 10-pin connector and 9-pin D-SUB connector

Pin number on DIL connector	Pin number on D-SUB connector	Function		
		When connected to CN10 (CAN0)	When connected to CN11 CAN1)	When connected to CN12 (LIN)
1	1	–	–	EVCC (when SW8-1 is ON)
2	2	CANL	CANL	NC
3	3	GND (when SW7-2 is ON)	GND (when SW8-2 is ON)	GND (when SW8-3 is ON)
4	4	–	–	NC
5	5	–	–	GND
6	6	–	–	GND (SW8-6 ON)
7	7	CANH	CANH	LIN1 (SW8-2 ON)
8	8	–	–	SENT (SW8-7 ON)
9	9	–	–	LIN1_BAT (when SW8-4 is ON)
10	–			

6.11 UART Interface

The starter kit offers to output a UART signal from interface SCI1 in form of an USB interface.

The UART output must be enabled using jumpers on connector CN20.

Table 6.9 UART signal connection

Connector	Function
CN20	UART connection • CN20[1-2]: connect SCI1RX (P5_4) • CN20[3-4]: connect SCI1TX (P5_5)

The LED LED14 and LED15 show bus activity on the UART I/O.

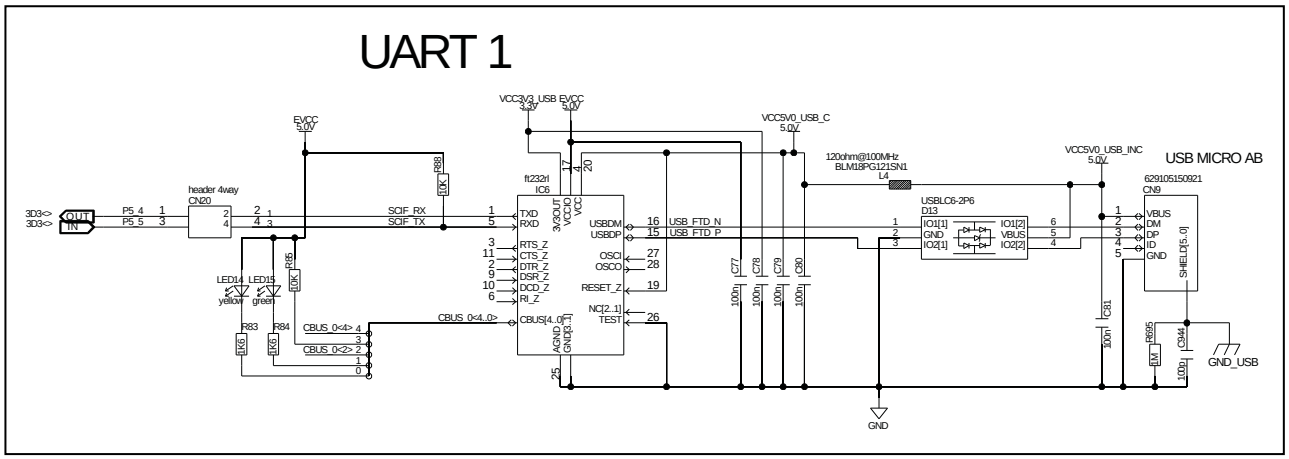


Figure 6.8 UART interface

The USB signal is output on connector CN9.

Table 6.10 USB connector CN9

Pin	Function
1	VBUS
2	DM
3	DP
4	ID
5	GND

6.12 Motor Control I/O

The starter kit provides 2 motor connections. The motor signals are output on connectors CN3 (motor 0) and CN4 (motor1).

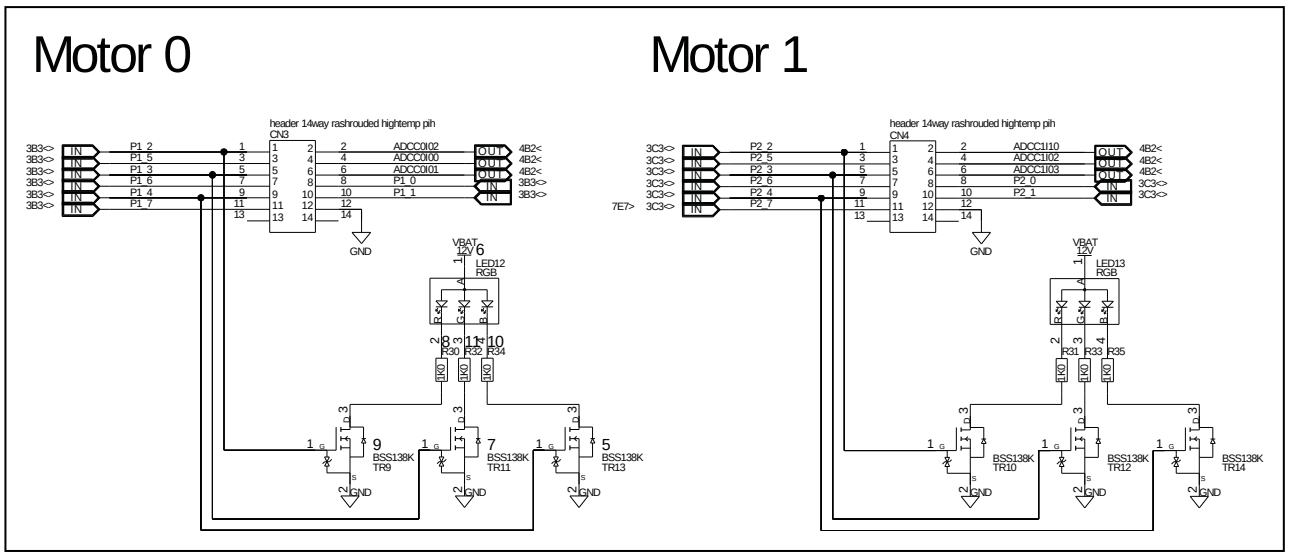


Figure 6.9 Motor connection

6.13 Resolver Interface

The starter kit includes 2 resolver circuits that allows the signal connection from the motor control to the resolver ports of RH850/C1M-A2.

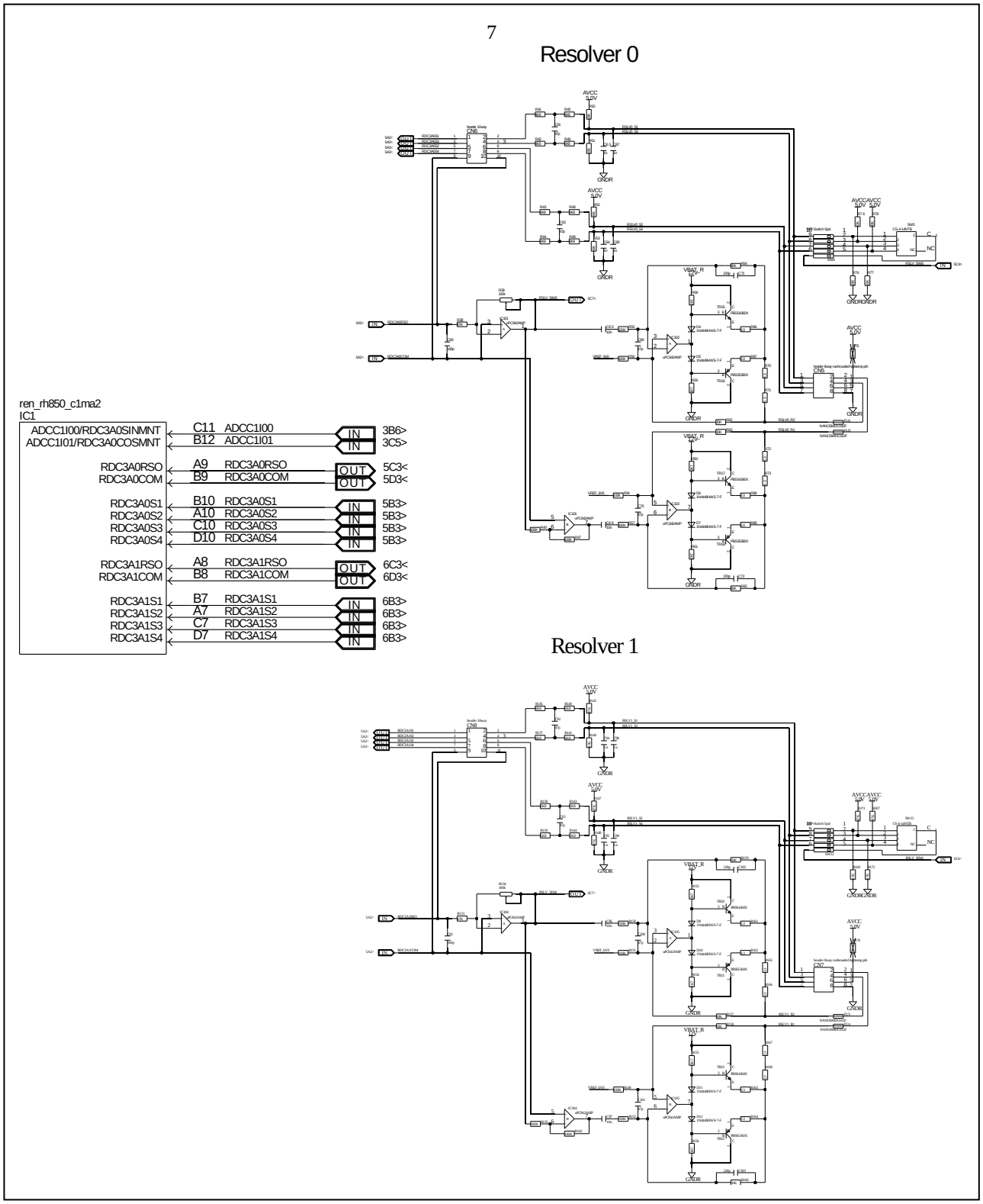


Figure 6.10 Resolver interface

The resolver control signals are selected using switches SW4 and SW5 for resolver 0 and switches SW12 and SW13 for resolver 1.

Table 6.11 Resolver control signal selection

Switch	Function
SW4	5-pole DIP switch for Resolver 0 SW4-1: Connect resolver input RSLV0_S1 to SW5-1 SW4-2: Connect resolver input RSLV0_S2 to SW5-2 SW4-3: Connect resolver input RSLV0_S3 to SW5-3 SW4-4: Connect resolver input RSLV0_S4 to SW5-4 SW4-5: Connect excitation signal RSLV0_SIM0 to SW5
SW5	4-position rotary switch for Resolver 0 Pos 1: Connect RSLV0SIM0 to RSLV0_S1 Pos 2: Connect RSLV0SIM0 to RSLV0_S2 Pos 3: Connect RSLV0SIM0 to RSLV0_S3 Pos 4: Connect RSLV0SIM0 to RSLV0_S4
SW12	5-pole DIP switch for Resolver 1 SW4-1: Connect resolver input RSLV1_S1 to SW5-1 SW4-2: Connect resolver input RSLV1_S2 to SW5-2 SW4-3: Connect resolver input RSLV1_S3 to SW5-3 SW4-4: Connect resolver input RSLV1_S4 to SW5-4 SW4-5: Connect excitation signal RSLV1_SIM0 to SW5
SW13	4-position rotary switch for Resolver 1 Pos 1: Connect RSLV0SIM0 to RSLV1_S1 Pos 2: Connect RSLV0SIM0 to RSLV1_S2 Pos 3: Connect RSLV0SIM0 to RSLV1_S3 Pos 4: Connect RSLV0SIM0 to RSLV1_S4

The connection of the control signals to the microcontroller is done using jumpers on connectors CN6 for resolver 0 and CN8 for resolver 1.

Table 6.12 Resolver control signal connection

Connector	Function
CN6	Jumper for Resolver 0 CN6]1-2]: Connect resolver input RSLV0_S1 to port RDC3A0S1 CN6]3-4]: Connect resolver input RSLV0_S3 to port RDC3A0S3 CN6]5-6]: Connect resolver input RSLV0_S2 to port RDC3A0S2 CN6]7-8]: Connect resolver input RSLV0_S4 to port RDC3A0S4
CN8	Jumper for Resolver 1 CN8]1-2]: Connect resolver input RSLV1_S1 to port RDC3A1S1 CN8]3-4]: Connect resolver input RSLV1_S3 to port RDC3A1S3 CN8]5-6]: Connect resolver input RSLV1_S2 to port RDC3A1S2 CN8]7-8]: Connect resolver input RSLV1_S4 to port RDC3A1S4

7. Development Tools

7.1 E1 On-Chip Debug Emulator [R0E000010KCE00] (discontinued product)

The E1 on-chip debug emulator is a powerful debugging tool with flash programming functions. It supports various Renesas microcontrollers and is included in the starter kit package.

Technical details about E1, the latest manuals and the actual version of the USB driver can be found on the Renesas website for E1: E1 emulator [R0E000010KCE00] (Discontinued product) | Renesas

7.2 E2 On-Chip Debug Emulator [RTE0T00020KCE00000R] (successor of E1)

The E2 on-chip debug emulator is a powerful debugging tool with flash programming functions which supports various Renesas microcontrollers. In comparison to E1 it offers enhanced debug features for RH850 microcontrollers such as:

- Software Trace Function
- CAN Communications Time Measurement Solution
- Support of external trigger signals (input and output)

Technical details about E2, the latest manuals and the actual version of the USB driver can be found on the Renesas website for E2: E2 emulator [RTE0T00020KCE00000R] | Renesas

7.3 Software Development Tools

The following software development tools are included in the starter kit package:

- Green Hills MULTI IDE (90 days evaluation version)
- IAR Embedded Workbench EWRH850 for Renesas RH850 (128KB kickstart version or 30 days evaluation version)
- CS+ integrated development environment with compiler CC-RH (compiler is 60 days evaluation version, afterwards it can be used as 256KB code size limited version)
- Renesas Flash Programmer (Renesas Flash Programmer (Programming GUI) | Renesas)
- Renesas Smart Configurator (Smart Configurator | Renesas)

Installation and usage of these tools is described in the Quick-Start-Guide (D018515-11), which is also part of the Starter Kit package.

8. RH850/C1M-A2 Starter Kit Example Software

Example software for the RH850/C1M-A2 Starter Kit can be downloaded from the following website:

http://www.renesas.eu/update?oc=Y-ASK-RH850C1M-A2

A description of the sample software is included in each package.

9. Connectors

9.1 Power Supply Connector CN1

Please refer to *3 Power Supply* for details on the function of these pins.

Table 9.1 Power supply connector CN1

Pin	Function
1	GND
2	–
3	+12V
4	+12V

9.2 Debug Connector CN2

Please refer to *5 Debug and Flash Programming Interfaces* for details on the function of these pins.

Table 9.2 On-chip debug connector CN2

Pin	Function	Device port
1	TCK	DCUTCK
3	TDO	DCUTDO
5	TDO	DCUTDO
7	TDI	DCUTDI
9	TMS	DCUTMS
11	RDY	DCURDY
13	RESET	

Pin	Function	Device port
2	GND	
4	MD0	
6	FLMODE	
8	E0VCC	
10	–	
12	GND	
14	GND	

9.3 Motor Connector CN3

Please refer to *6.12 Motor Control I/O* for details on the function of these pins.

Table 9.3 Motor connector CN3

Pin	Device port
1	P1_2
3	P1_5
5	P1_3
7	P1_6
9	P1_4
11	P1_7
13	NC

Pin	Device port
2	ADCC0I02
4	ADCC0I00
6	ADCC0I01
8	P1_0
10	P1_1
12	GND
14	NC

9.4 Motor Connector CN4

Please refer to *6.12 Motor Control I/O* for details on the function of these pins.

Table 9.4 Motor connector CN4

Pin	Device port	Pin	Device port
1	P2_2	2	ADCC1I10
3	P2_5	4	ADCC1I02
5	P2_3	6	ADCC1I03
7	P2_6	8	P2_0
9	P2_4	10	P2_1
11	P2_7	12	GND
13	NC	14	NC

9.5 Resolver Connector CN5

Please refer to *6.13 Resolver Interface* for details on the function of these pins.

Table 9.5 Resolver connector CN5

Pin	Device port	Pin	Device port
1	RSLV0_S1	2	RSLV0_R1
3	RSLV0_S3	4	RSLV0_R2
5	RSLV0_S2	6	Pull-up AVCC (not fit)
7	RSLV0_S4	14	GNDR

9.6 Resolver Connector CN7

Please refer to *6.13 Resolver Interface* for details on the function of these pins.

Table 9.6 Resolver connector CN7

Pin	Device port	Pin	Device port
1	RSLV1_S1	2	RSLV1_R1
3	RSLV1_S3	4	RSLV1_R2
5	RSLV1_S2	6	Pull-up AVCC (not fit)
7	RSLV1_S4	14	GNDR

9.7 UART connector CN9

Please refer to ***Error! Reference source not found. Error! Reference source not found.*** for details on the function of th ese pins.

Table 9.7 UART connector CN9

Pin	Function
1	VBUS
2	DM
3	DP
4	ID
5	GND

9.8 CAN connector CN10

Please refer to *6.8 CAN Interfaces* for details on the function of these pins.

Table 9.8 CAN connector CN10

Pin	Function
1	NC
2	CANL
3	SW7-2
4	NC
5	NC
6	NC
7	CANH
8	NC
9	NC
10	GND

9.9 CAN connector CN11

Please refer to *6.8 CAN Interfaces* for details on the function of these pins.

Table 9.9 CAN connector CN11

Pin	Function
1	NC
2	CANL
3	SW8-2
4	NC
5	NC
6	NC
7	CANH
8	NC
9	NC
10	GND

9.10 LIN/SENT connector CN12

Please refer to *6.9 LIN and SENT Interfaces* for details on the function of these pins.

Table 9.10 LIN and SENT connector CN12

Pin	Function
1	EVCC (SW8-1 ON)
2	NC
3	GND (SW8-3 ON)
4	NC
5	GND
6	GND (SW8-6 ON)
7	LIN1 (SW8-2 ON)
8	SENT (SW8-7 ON)
9	LIN1_BAT (SW8-4 ON)
10	GND

9.11 AUD Debug Connector CN19

Please refer to *5 Debug and Flash Programming Interfaces* for details on the function of these pins.

Table 9.11 AUD debug connector CN19

Pin	Function	Device port
1	AUDSYNC	AUDSYNC
2	AUDRST	AUDRST
3	AUDCK	AUDCK
4	AUDATA0	AUDATA0
5	AUDATA1	AUDATA1
6	AUDATA2	AUDATA2
7	AUDATA3	AUDATA3
8	GND	

9.12 Device Ports Connectors CN25 and CN26

The device port connectors enable easy connection to almost all ports of the device.

CAUTION

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.

9.12.1 Device Ports Connector CN25

Table 9.12 Device ports connector CN25

Pin	Device port	Pin	Device port
1	P5_3	2	P5_0
3	P5_2	4	P5_1
5	P7_6	6	P7_7
7	P7_3	8	P7_5
9	P7_2	10	P7_1
11	P7_15	12	P7_0
13	ADCC0|30	14	ADCC0|31
15	ADCC0|32	16	ADCC0|33
17	ADCC0|23	18	ADCC0|10
19	ADCC0|03	20	ADCC0|13
21	ADCC0|12	22	ADCC0|11
23	ADCC0|22	24	ADCC0|21
25	ADCC0|20	26	ADCC1|31
27	ADCC1|30	28	ADCC1|00
29	ADCC1|01	30	ADCC1|11
31	ADCC1|13	32	ADCC1|12
33	ADCC1|21	34	ADCC1|22
35	ADCC1|32	36	ADCC1|20
37	ADCC1|23	38	ADCC1|33
39	ADCC1|20	40	ADCC2|00
41	ADCC1|22	42	ADCC2|01
43	ADCC1|21	44	ADCC2|02
45	ADCC1|03	46	ADCC2|31
47	ADCC1|23	48	ADCC2|30
49	ADCC1|33	50	ADCC2|32
51	ADCC1|10	52	ADCC2|11
53	ADCC1|12	54	ADCC2|13
55	P3_5	56	P3_3
57	P3_2	58	P3_4
59	P3_1	60	P3_0

9.12.2 Device Ports Connector CN26

Table 9.13 Device ports connector CN26

Pin	Device port	Pin	Device port
1	GND	2	P5_6
3	P5_7	4	P5_9
5	P5_8	6	P4_0
7	P4_1	8	P4_2
9	P4_7	10	P4_8
11	P4_9	12	P4_10
13	P4_11	14	P4_14
15	P4_15	16	P6_10
17	P6_11	18	P6_12
19	P6_13	20	P6_14
21	P6_15	22	P6_1
23	P6_0	24	P6_2
25	P6_5	26	P6_4
27	P6_3	28	P0_6
29	ERROROUT_M#	30	P6_6
31	P0_7	32	P0_9
33	P0_8	34	P0_10
35	P0_11	36	P0_12
37	P0_13	38	P0_14
39	P0_15	40	MD1
41	X2_R	42	P7_8
43	X1_R	44	P0_1
45	P0_0	46	P6_7
47	P0_2	48	P0_3
49	P0_4	50	P6_8
51	P0_5	52	P6_9
53	P1_8	54	P1_10
55	P1_11	56	P1_9
57	P1_15	58	P1_14
59	P1_13	60	P1_12

10. Precautions

10.1 Print on PCB for CAN1

In the silkscreen on the PCB is a mistake in the print for CAN1 interface. The marked print in below picture should read “CAN1”. The picture in *Figure 2.1 Placement of jumpers, connectors and LEDs* shows the corrected print.

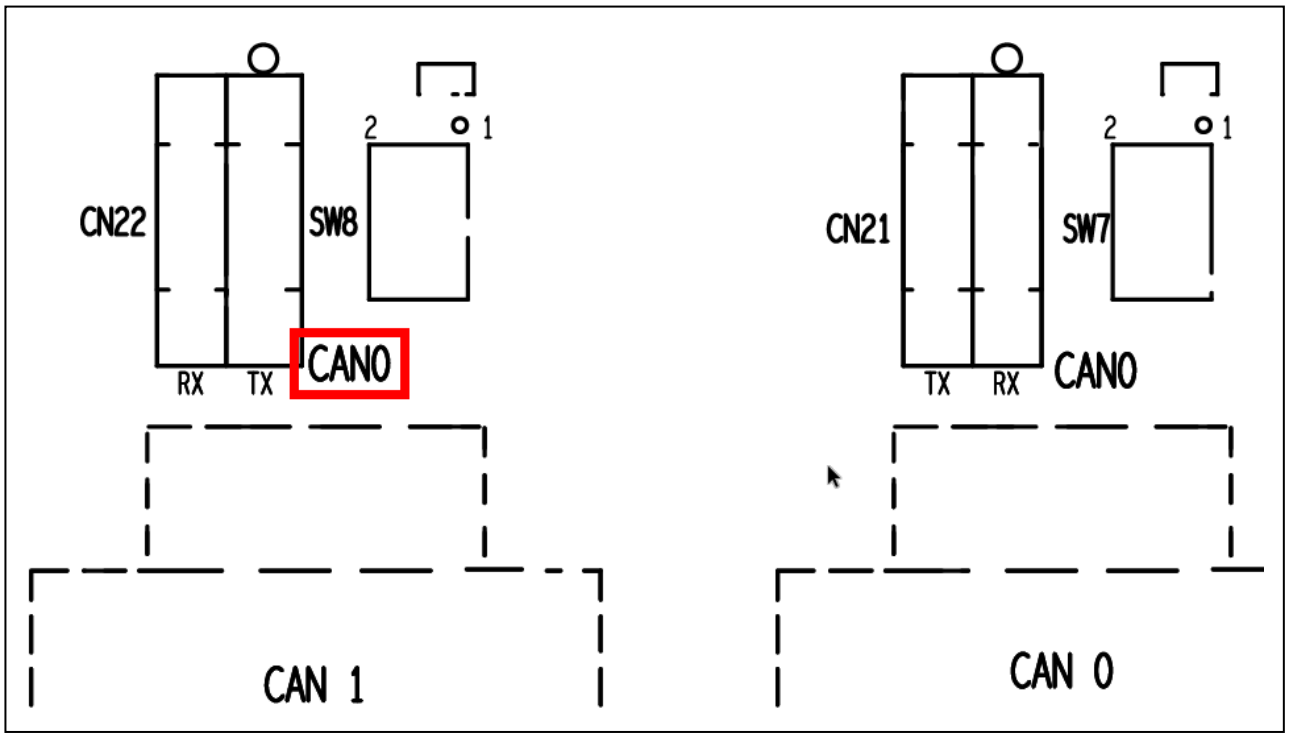


Figure 10.1 Silkscreen top

10.2 Display Connector CN13

Please do not use the display connector. Unfortunately the connections on the display connector are wrong and cannot be used.

11. Mechanical Dimensions

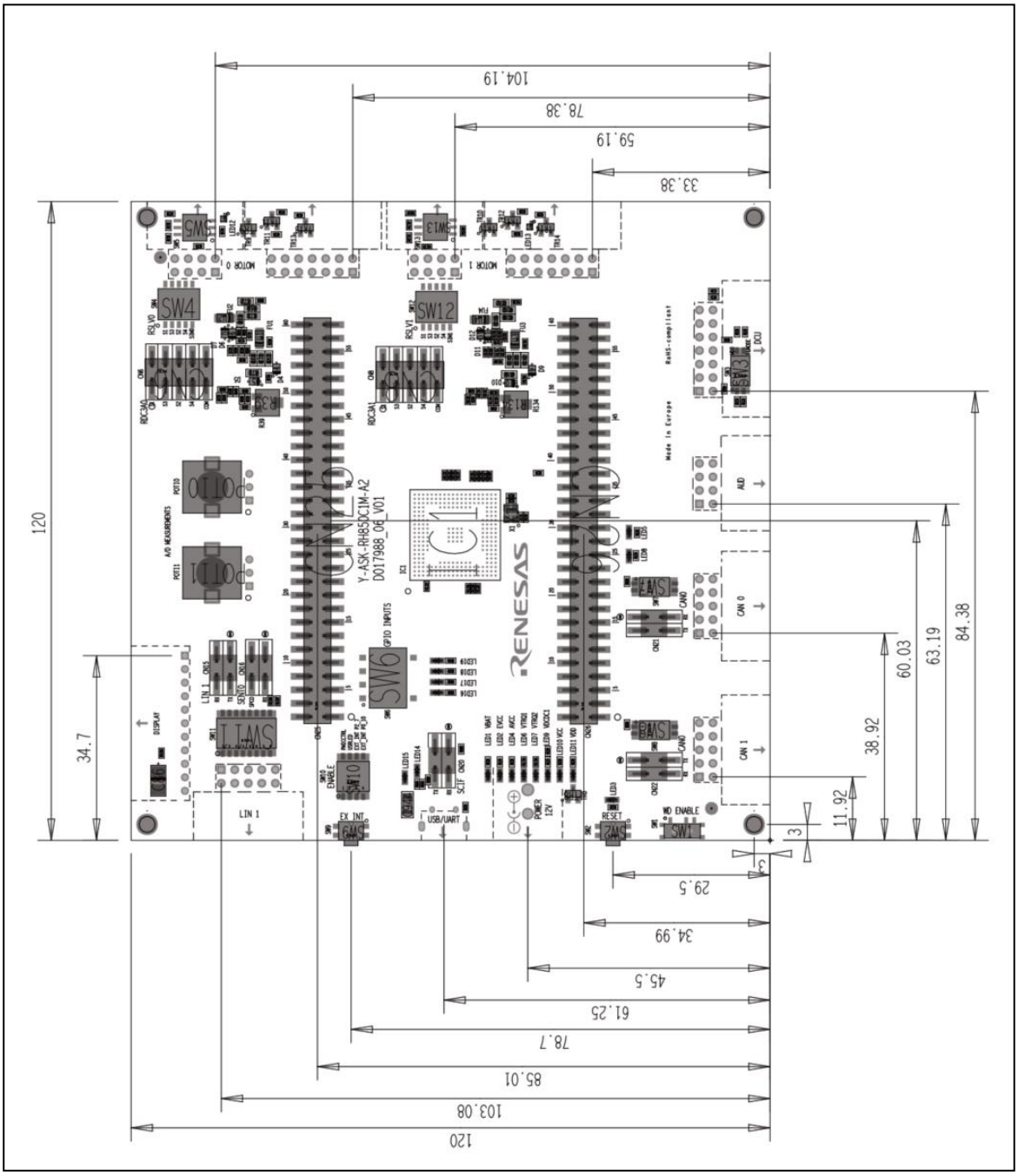


Figure 11.1 Mechanical dimensions

12. Schematics

CAUTION

The schematics shown in this document are not intended to be used as a reference for mass production. Any usage in an application design is in sole responsibility of the customer.

The following components described in the schematics are not provided with the board upon delivery:

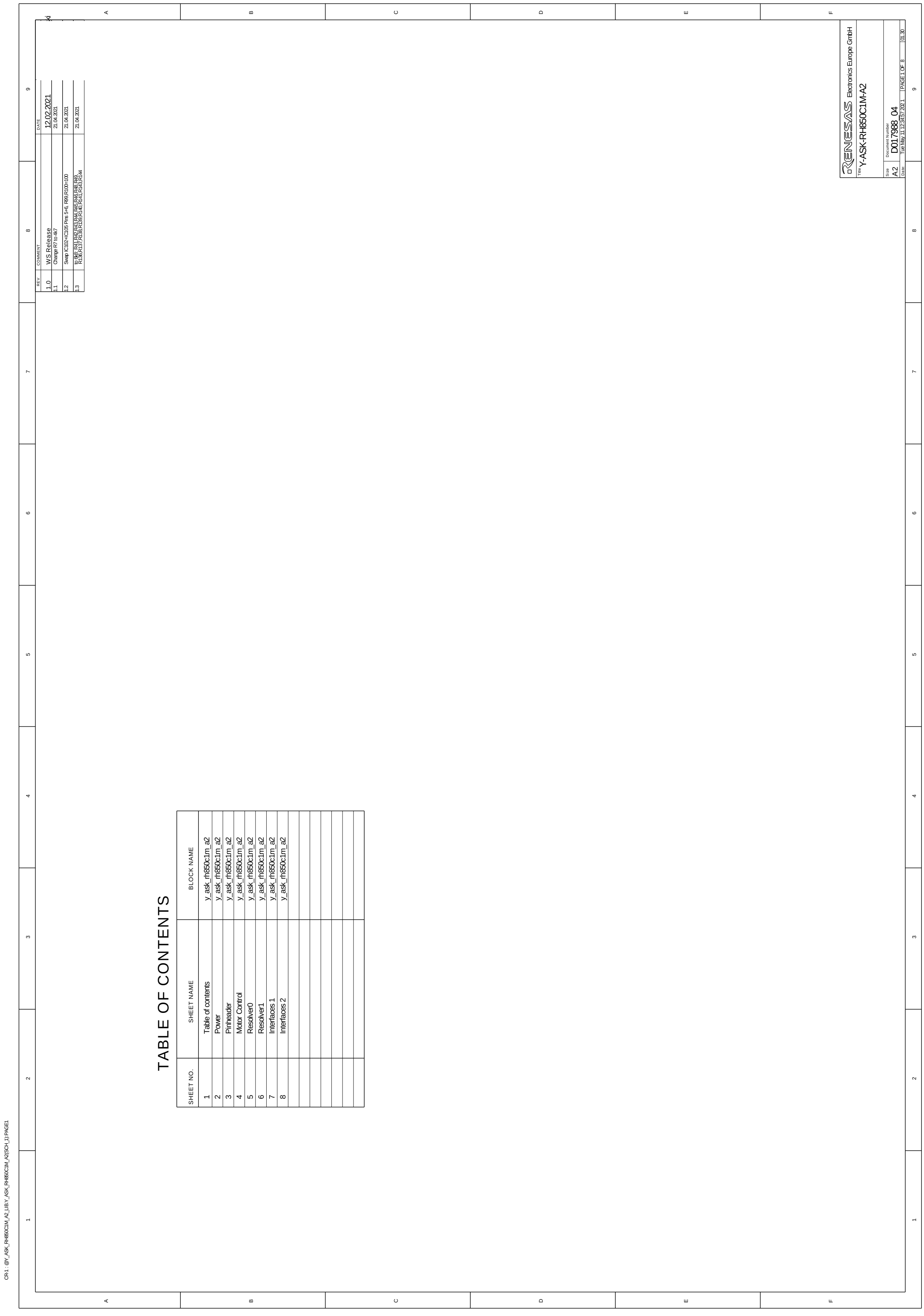
- Resistors: R105

The above components are indicated with "DO NOT FIT" in the schematics.

The following components described in the schematics are provided with but not mounted on the board upon delivery:

- 20 jumpers, 2.54 mm, black

12.1 Page 1



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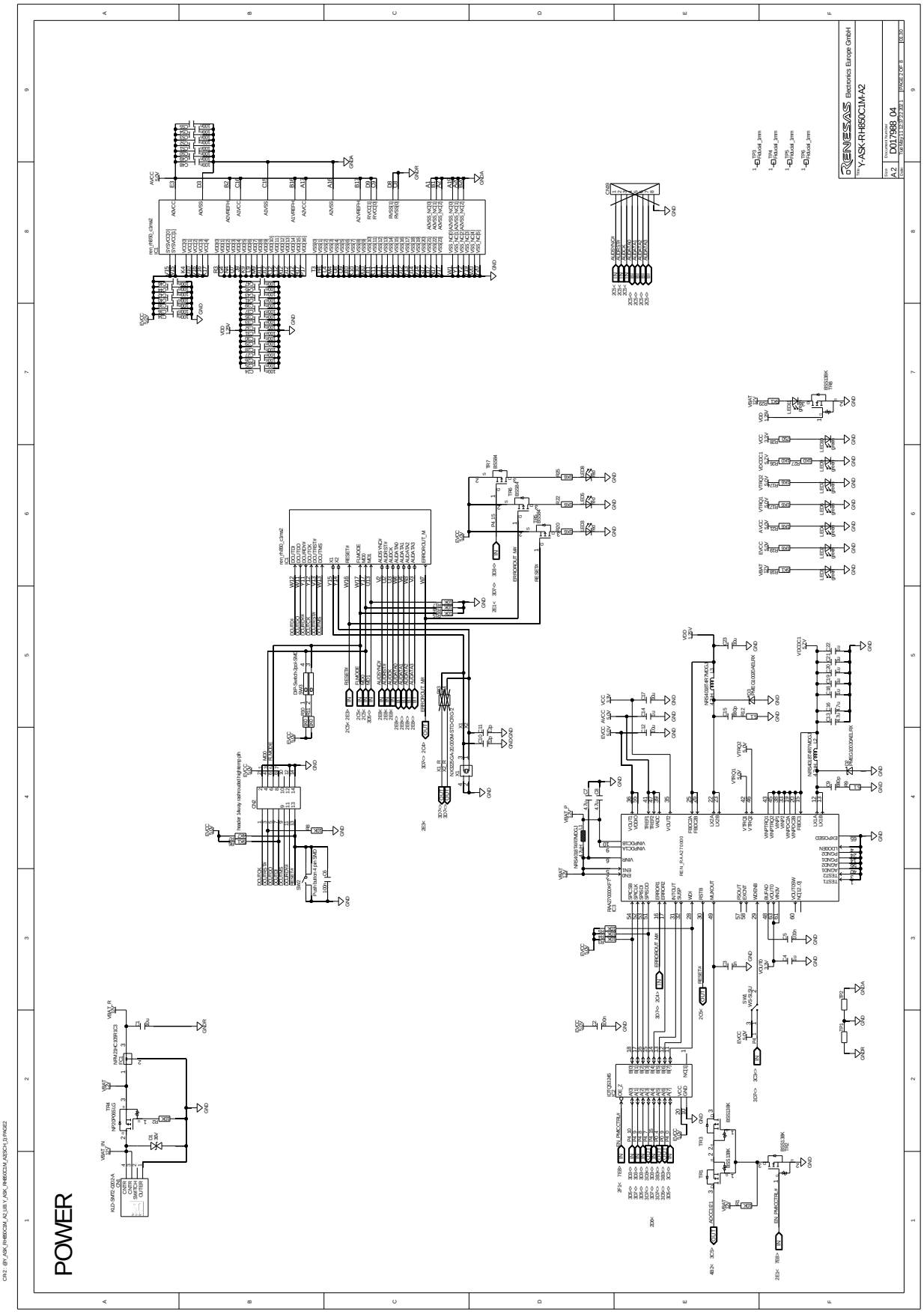
12.2 Page 2


POWER
RENESAS Electronics Europe GmbH
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D017988_04
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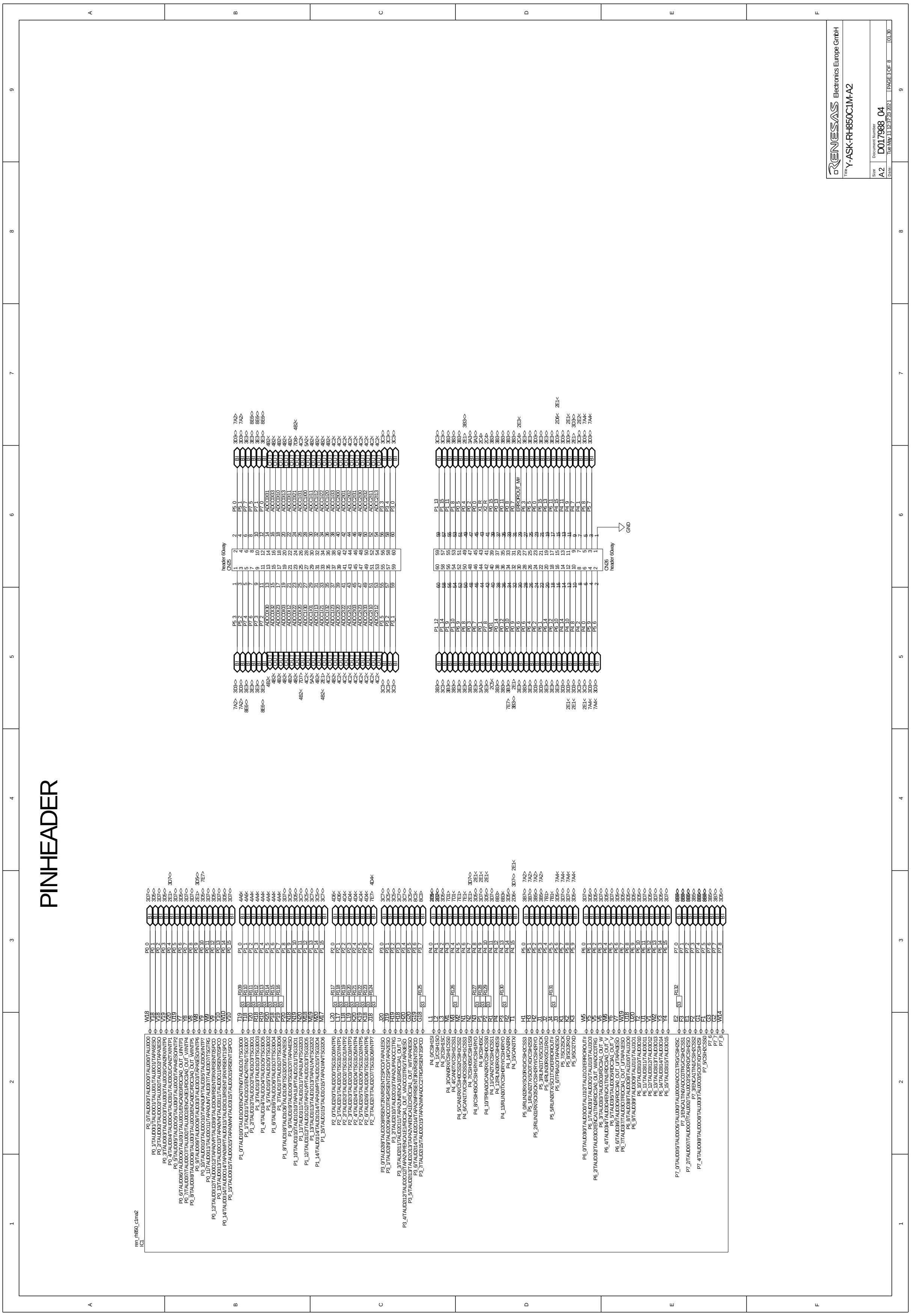
12.3 Page 3



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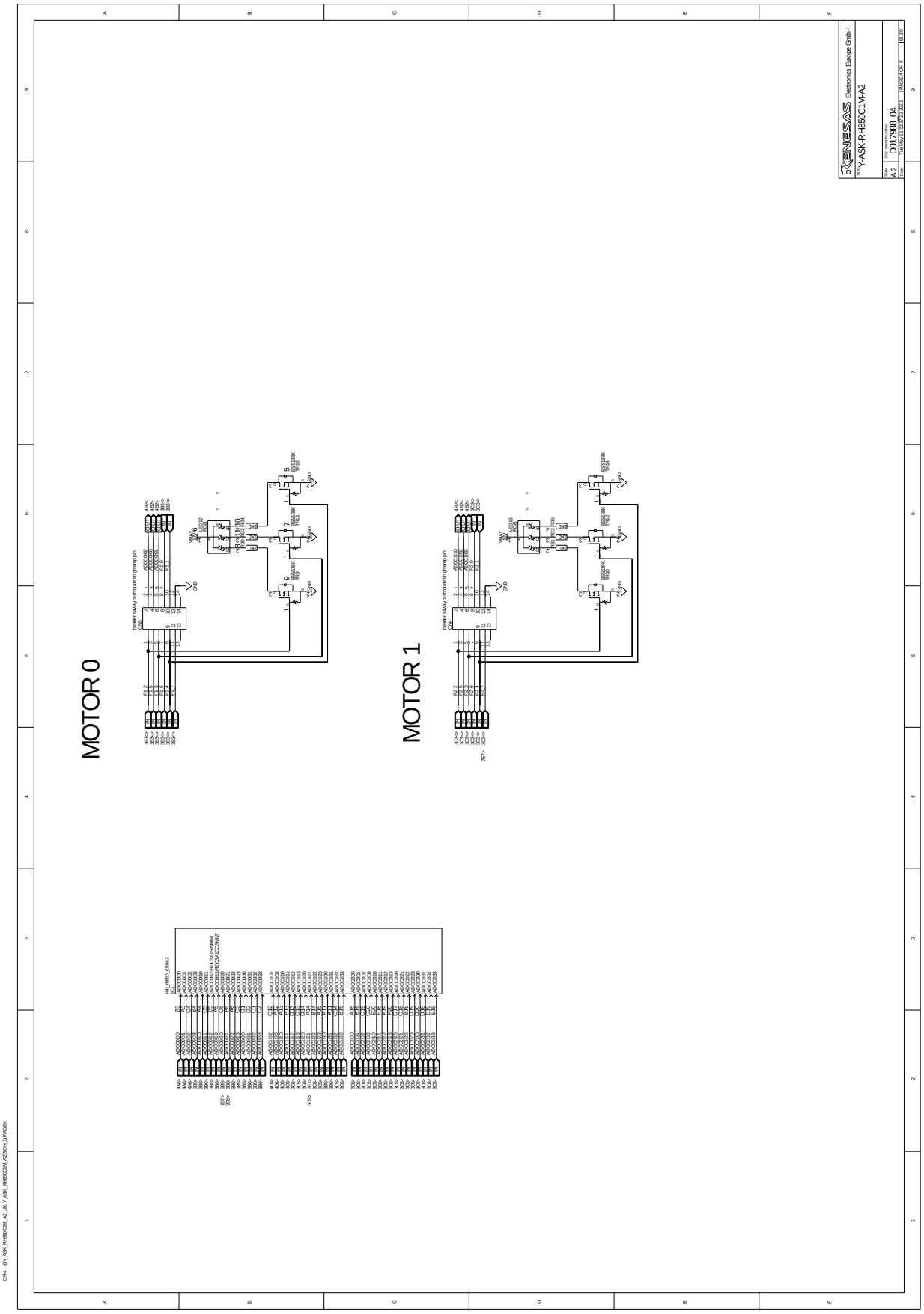
12.4 Page 4


MOTOR 0
MOTOR 1
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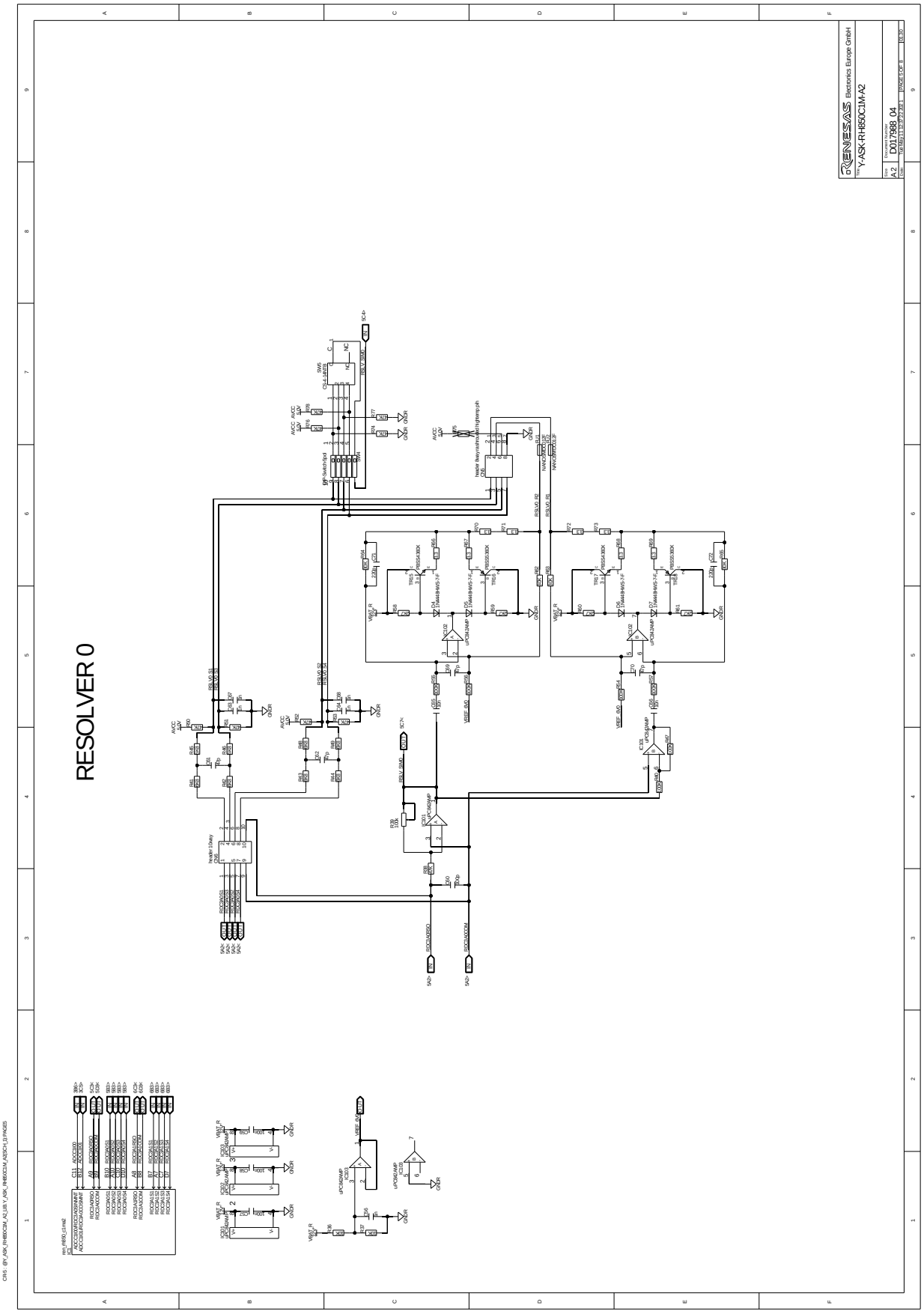
12.5 Page 5


RESOLVER 0
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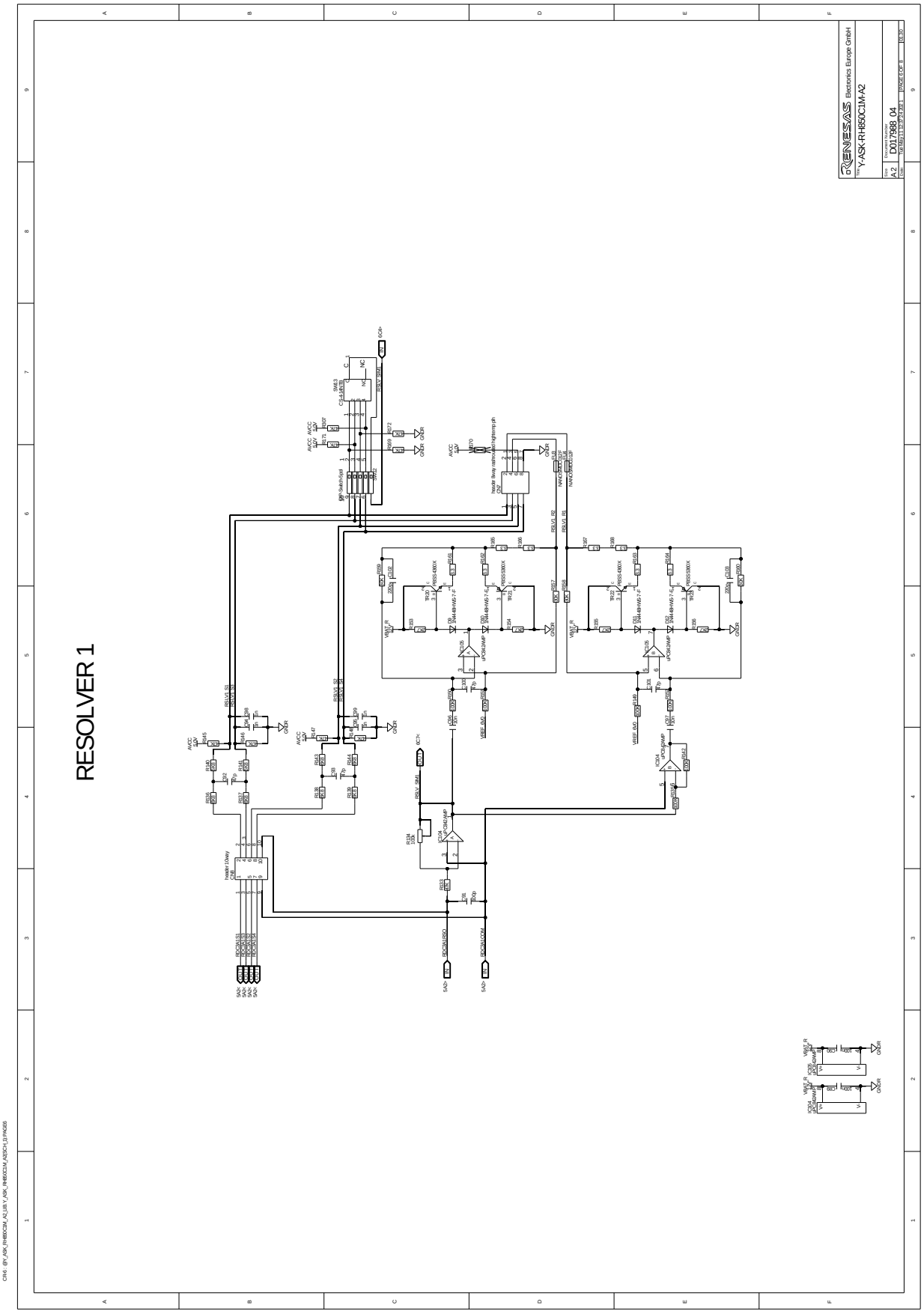
12.6 Page 6


RESOLVER 1
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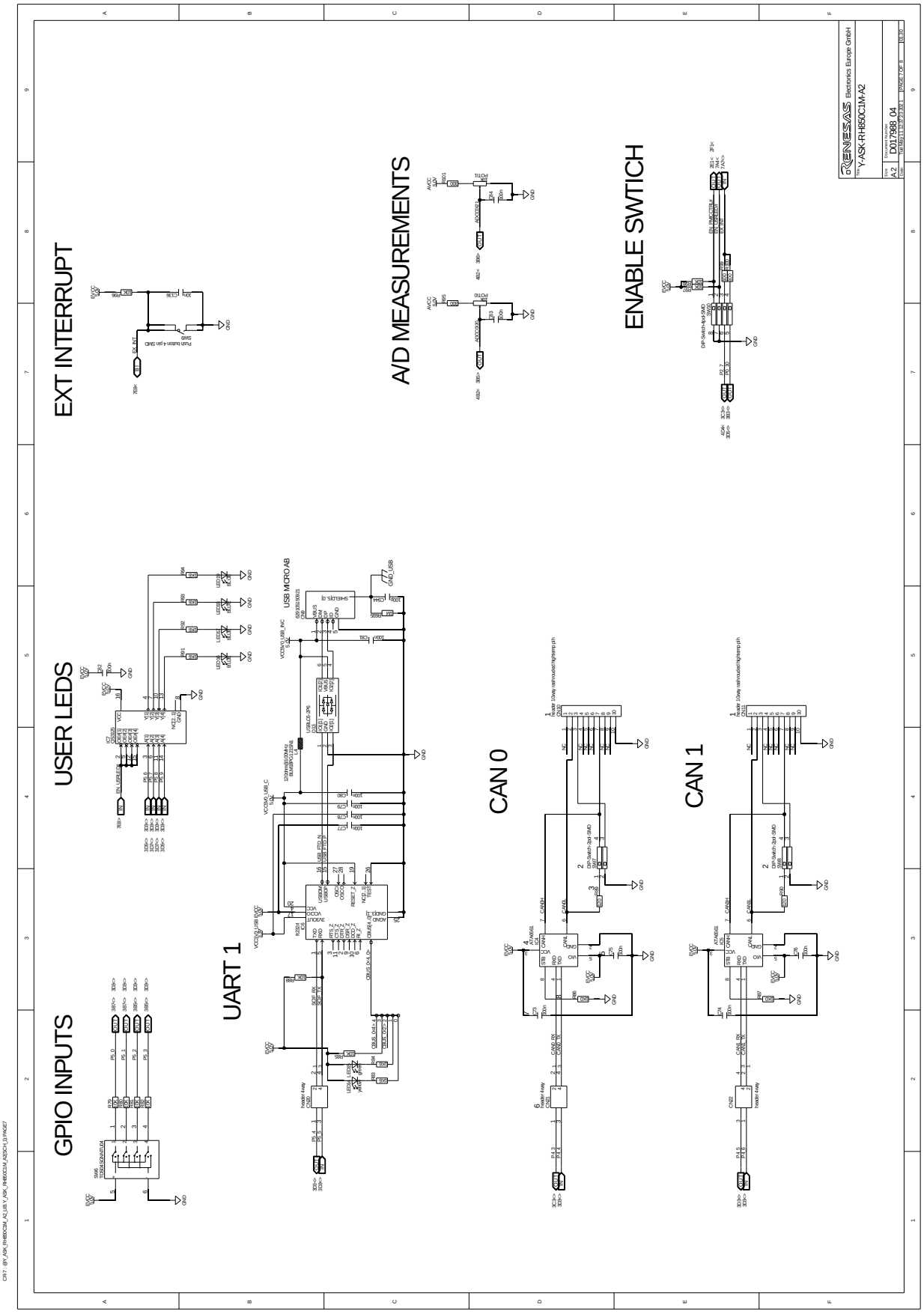
12.7 Page 7


EXT INTERRUPT
A/D MEASUREMENTS
ENABLE SWTICH
USER LEDS
GPIO INPUTS
UART 1
CAN 0
CAN 1
USB MCRO AB
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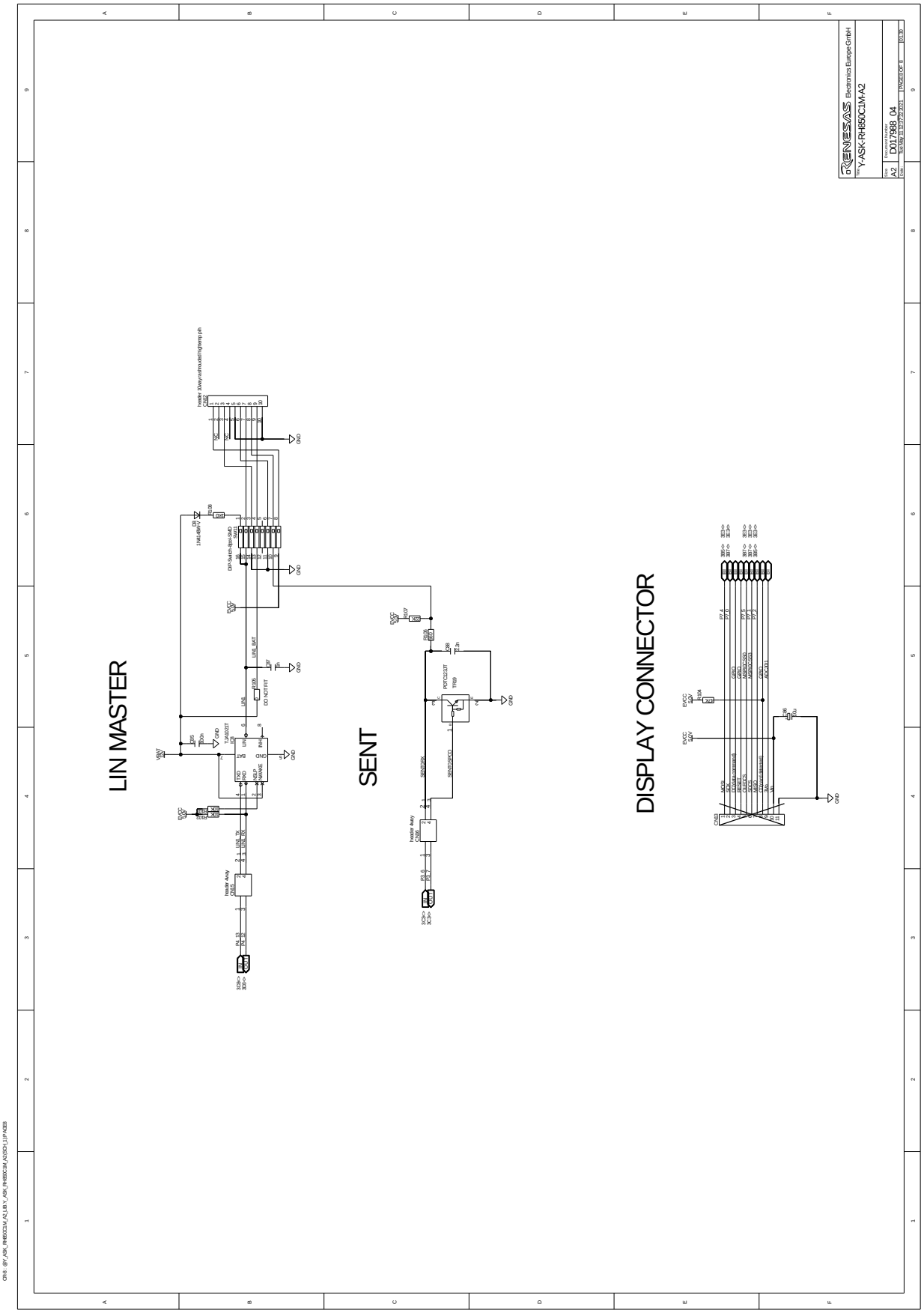
12.8 Page 8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Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
V1.00	2021-08-23	–	Initial release

RH850/C1M-A2 Starter Kit User's Manual: Hardware

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