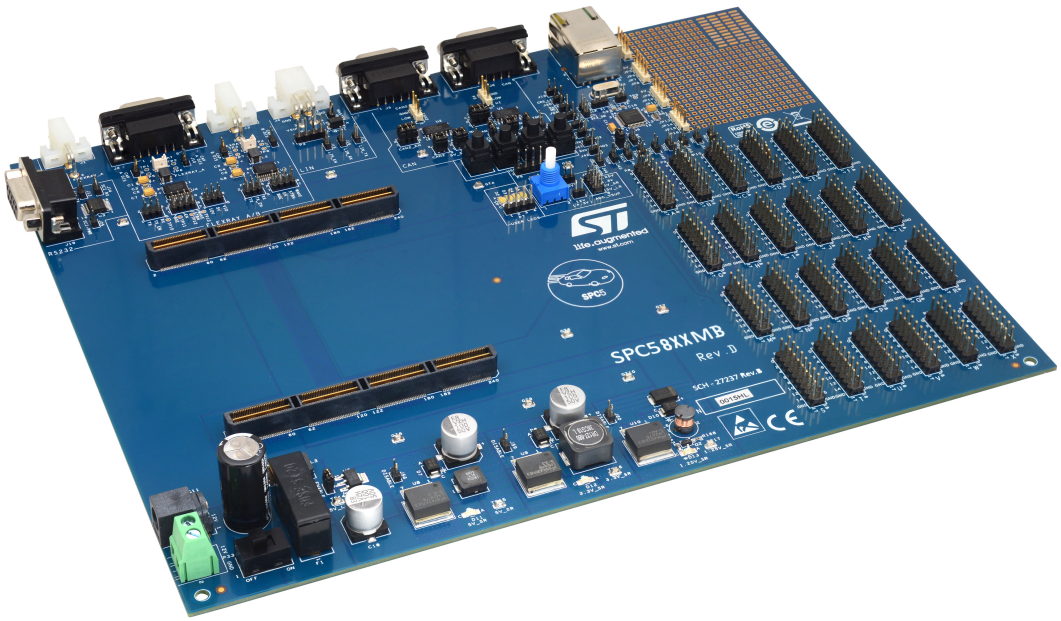
SPC58XXMB evaluation board

Introduction

This document describes the STMicroelectronics SPC58XXMB evaluation board.

Figure 1. SPC58XXMB



1 Overview

This user's manual details the setup and configuration of the STMicroelectronics SPC58XXMB evaluation board (hereafter referred to as the EVB). The EVB is intended to provide a mechanism for easy customer evaluation of the SPC58xx family and SPC57xx family of microcontrollers, and to facilitate hardware and software development.

At the time of writing this document, the SPC58xx family will consist of the 40 nm powertrain and safety devices and SPC57xx family will consist of the 55 nm powertrain and safety devices.

The EVB is intended for bench / laboratory use and has been designed using normal temperature specified components (+70°C).

1.1 Package contents

An SPC58XXMB evaluation board package includes the following items:

- SPC58XXMB evaluation board
- Power supply 12 VDC – 2 A
- EULA

2 License agreement

The packaging of this evaluation board was sealed with a seal stating, " by breaking this seal, you agree to the terms and conditions of the evaluation board license agreement, the terms and conditions of which are available at https://www.st.com/resource/en/evaluation_board_terms_of_use/evaluationproductlicenseagreement.pdf ". Upon breaking the seal, you and STMicroelectronics entered into the evaluation board license agreement, a copy of which is also enclosed with the evaluation board for convenience.

Attention: *This evaluation board only offers limited features for evaluating ST products. It has not been tested for use with other products and is not suitable for any safety or other commercial or consumer application. This evaluation board is otherwise provided “AS IS” and STMicroelectronics disclaims all warranties, express or implied, including the implied warranties of merchantability and fitness for a particular purpose.*

3 Handling precautions

Please take care to handle the package contents in a manner such as to prevent electrostatic discharge.

Before the EVB is used or power is applied, please fully read the following sections on how to correctly configure the board. Failure to correctly configure the board may cause irreparable component, MCU or EVB damage.

4 Hardware description

4.1 List of acronyms

The table below provides a list and description of acronyms used throughout this document.

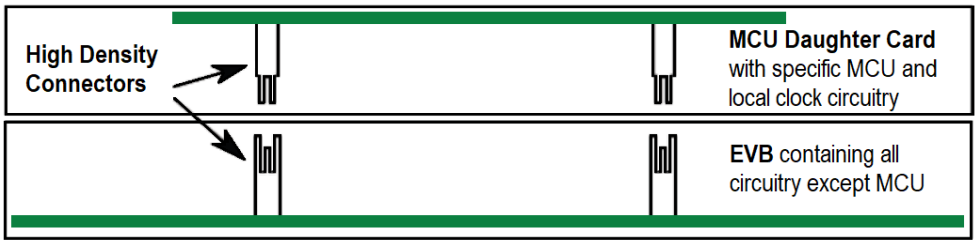
Table 1. List of acronyms

Acronym	Description
1.25V_SR	Supply voltage from the 1.25 V switching regulator
3.3V_SR	Supply voltage from the 3.3 V switching regulator
5V_LR	Supply voltage from the 5.0 V linear regulator
5V_SR	Supply voltage from the 5.0 V switching regulator
ADC	Analog-to-Digital converter
ESR0	External signal reset
EVB	Evaluation board
FEC	Fast ethernet controller module
GND	Ground
HV	High voltage (3.3 V and/or 5 V)
LED	Light emitting diode
LV	Low voltage (1.25 V)
MCU	Microcontroller
OSC	Oscillator
P12V	12 V EVB supply power domain
PORST	Power-on reset
PWR	Power
RX	Receive
SIPI	Serial Interprocessor Interface
TBD	To be defined
TX	Transmit
VSS	Ground

4.2 Modular concept

For maximum flexibility and simplicity, the EVB has been designed as a modular development platform. The EVB main board does not contain an MCU. Instead, the MCU is fitted to an MCU daughter card (occasionally referred to as an adapter board). This approach means that the same EVB platform can be used for multiple packages and MCU derivatives within the SPC58xx family and the SPC57xx family. High density connectors provide the interface between the EVB and MCU daughter cards as shown in the figure below. See Section 4.3 Daughter card availability for more details on the daughter cards and Section 4.17 Board interface connectors for more details on the interface connectors.

Figure 2. Modular concept - motherboard and MCU daughter card



For details on your specific daughter card, please consult the instructions included with the daughter card.

The EVB is designed to use the motherboard and the daughter in conjunction. However, it is possible to use the daughter cards standalone.

4.3 Daughter card availability

Table 2. **Daughter card**

Daughter card number	Device
SPC58NHADPT176S	SPC58NHxxE7
SPC58NHADPT302S	SPC58NHxxC3
SPC58NHADPT386S	SPC58NHxxC5
SPC58XCADPT176S	SPC584BxxE7 SPC58xCxxE7
SPC58XCADPT292S	SPC584CxxC5
SPC58XXADPT64S	SPC582BxxE1 SPC584BxxE1 SPC58xCxxE1
SPC58XXADPT100S	SPC582BxxE3 SPC584BxxE3 SPC58xCxxE3 SPC58xGxxE3
SPC58XXADPT144S	SPC582BxxE5 SPC584BxxE5 SPC58xCxxE5 SPC58xGxxE5
SPC58XXADPT176S	SPC58xGxxE3 SPC58xExxE3 SPC58xNxxE3
SPC58XXADPT292S	SPC58xGxxC5 SPC58xExxC5
SPC582BADPT48S	SPC582BxxQ3
SPC584BADPT176S	SPC584BxxE7 SPC58xCxxE7
SPC570SADPT64S	SPC570SxxE1
SPC570SADPT100S	SPC570SxxE3 SPC574SxxE3
SPC572LADPT80S	SPC572LxxF2
SPC572LADPT100S	SPC572LxxE3
SPC574KADPT144S	SPC574KxxE5
SPC574SADPT100S	SPC574SxxE3
SPC574SADPT144S	SPC574SxxE5
SPC574SADPT244S	SPC574SxxC2
SPC56HKADPT257S	SPC56HKxxC3

4.4 EVB features

The EVB system consists of a motherboard and a daughter card, both with distinct features.

The mother board provides the following key features:

- Support provided for different SPC58xx MCUs and SPC57xx MCUs by utilizing MCU daughter cards
- Single 12 V external power supply input with four on-board regulators providing all the necessary EVB and MCU voltages; power supplied to the EVB via a 2.1 mm barrel style power jack or a 2-way level connector
- Master power switch and regulator status LEDs
- Two 240-way high-density daughter card expansion connectors allowing connection of the MCU daughter card or a custom board for additional application specific circuitry
- All MCU signals readily accessible at a port-ordered group of 0.1” pitch headers
- RS232/SCI physical interface and standard DB9 female connector
- FlexRAY interface
- LINFlexD interface
- CAN FD interfaces (data rates up to 5 Mbit/s), one configurable to be connected to one out of two CAN modules, and one connected to a dedicated third CAN module
- 10/100 Mbps ethernet interface
- Variable resistor, driving between 5 V and ground
- user switches and 4 user LEDs, freely connectable
- Liberal scattering of GND test points (surface mount loops) placed throughout the EVB

The daughter cards provide the following features:

- MCU (soldered or through a socket)
- Flexible MCU clocking options allow provision of an external clock via SMA connector or 40 MHz EVB clock oscillator circuit. Jumpers on the daughter card allow selection between these external clocks. SMA connector on MCU-CLKOUT signal for easy access.
- User reset switch with reset status LEDs
- Standard 14-pin JTAG debug connector and 34-pin Samtec Nexus3+ connector
- 10-pin Serial Interprocessor Interface (SIPI) connector
- Liberal scattering of ground and test points (surface mount loops) placed throughout the EVB

Note: To avoid confusion between jumpers and headers, all EVB jumpers are implemented as 2 mm pitch whereas headers are 0.1 inch (2.54 mm). This prevents inadvertently fitting a jumper to a header.

4.5 Caution

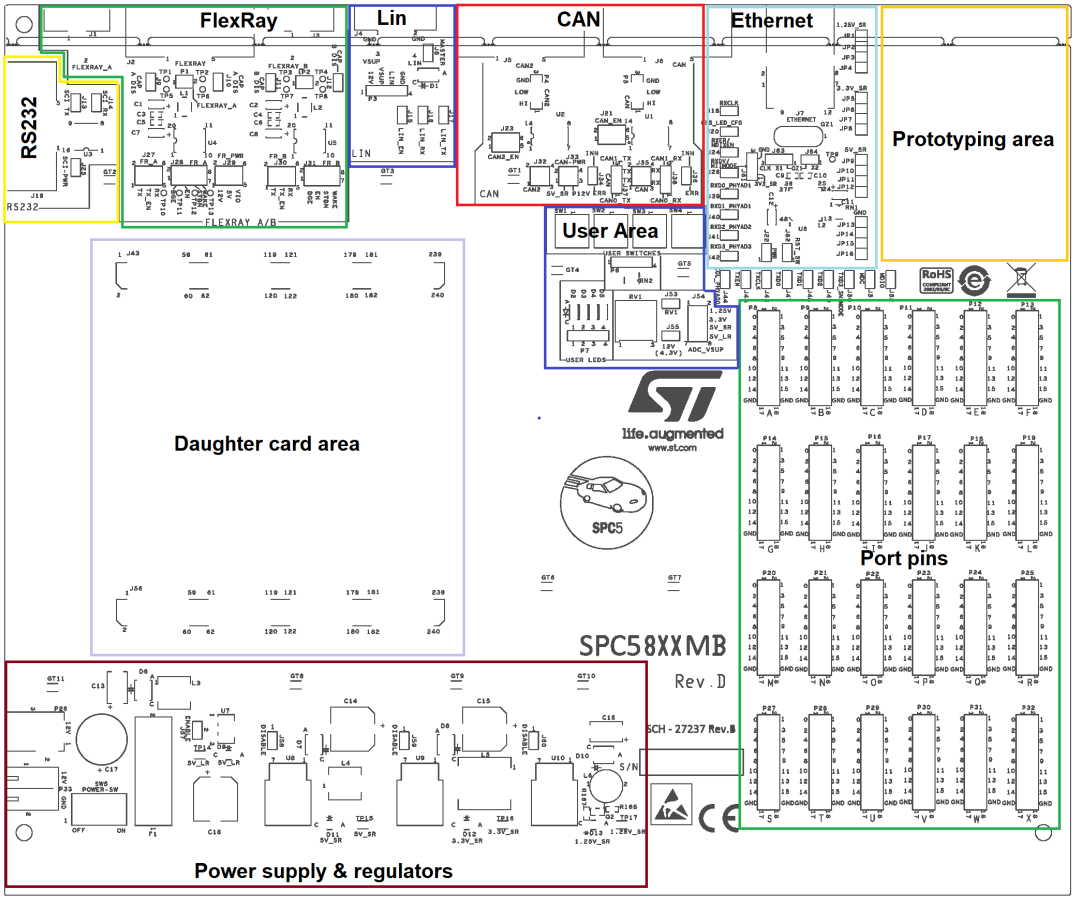
Before the EVB is used or power is applied, please fully read the following sections on how to correctly configure the board. Failure to correctly configure the board may cause irreparable component, MCU or EVB damage.

4.6 Configuration

This section details the configuration of each of the EVB functional blocks.

The EVB has been designed keeping in mind the ease of use, and has been segmented into functional blocks as shown in the figure below. A detailed silkscreen legend has been used throughout the board to identify all switches, jumpers and user connectors.

Figure 3. EVB functional blocks



4.7 Power supply configuration

The EVB requires an external power supply voltage of 12 V DC, minimum 1 A. This allows the EVB to be easily used in a vehicle if required. The single input voltage is regulated on-board using three switching regulators to provide the necessary EVB and MCU operating voltages of 5.0 V, 3.3 V and 1.25 V, and one 5 V linear regulator for the ADC supplies and references.

For flexibility there are two different power supply input connectors on the motherboard as detailed below. There is also a power supply option on the daughter card to use the daughter card in standalone mode. Please refer to daughter card documents for details on power input.

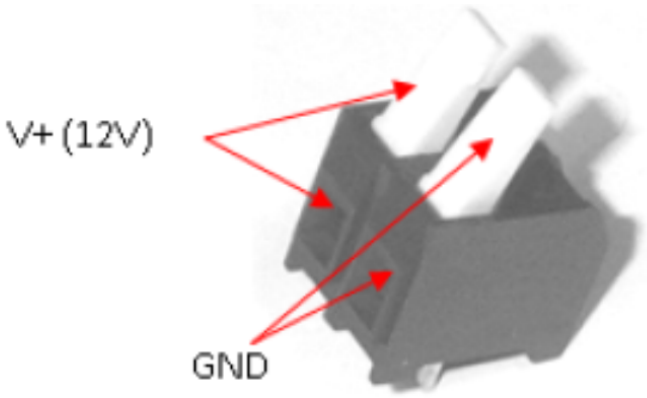
4.8 Motherboard power supply connectors

2.1 mm barrel connector – P28:

Figure 4. Power supply barrel connector

2-way lever connector – P32:

Figure 5. 2-lever power connector



This can be used to connect a bare wire lead to the EVB, typically from a laboratory power supply. The polarization of the connectors is clearly marked on the EVB. A special care must be taken to ensure correct connection.

4.9 Regulator power jumpers

There are four power regulator circuits on the SPC58xx motherboard that supply the required voltages to operate the MCUs:

- 1.25V_SR: 1.25 V switching regulator to supply the core voltage
- 5V_SR: 5 V switching regulator to supply the power management controller, I/O and peripherals
- 3.3V_SR: 3.3 V switching regulator for Ethernet, FlexRAY, debug and I/O
- 5V_LR: 5 V linear regulator for ADC supply and reference

All regulators have the option of being disabled/enabled if they are not required. By default (jumpers are off), all switching regulators are enabled and the 5 V linear regulator is disabled. The regulators can be enabled individually by the following jumper settings:

- Connecting J57 enables the 5.0 V linear regulator
- Disconnecting J58 enables the 5.0 V switching regulator
- Disconnecting J59 enables the 3.3 V switching regulator
- Disconnecting J60 enables the 1.25 V switching regulator

The regulators supply power to the daughter cards through the board connector. The individual selection and configuration of the MCU supplies are done on the daughter cards.

Not all the supported daughter card MCUs require all the supplies to be switched on. Please refer to the individual daughter card user guide for details.

4.10 Power switch, status LEDs and use

The main power switch (slide switch SW5) can be used to isolate the power supply input from the EVB voltage regulators if required.

- Moving the slide switch to the right (away from connector P33) will turn the EVB on
- Moving the slide switch to the left (towards connector P33) will turn the EVB off

When power is applied to the EVB, four green power LEDs adjacent to the voltage regulators show the presence of the supply voltages as follows:

- LED D9 – Indicates that the 5.0 V linear regulator is enabled and working correctly
- LED D11 – Indicates that the 5.0 V switching regulator is enabled and working correctly
- LED D12 – Indicates that the 3.3 V switching regulator is enabled and working correctly
- LED D13 – Indicates that the 1.25 V switching regulator is enabled and working correctly

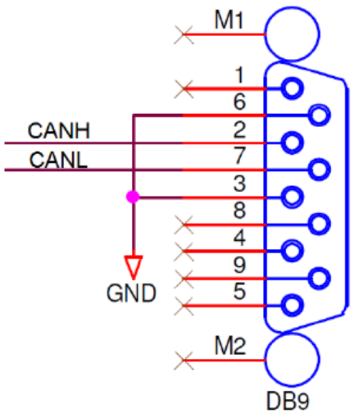
If no LED is illuminated when power is applied to the EVB and the regulators are correctly enabled using the appropriate jumpers, it is possible that either power switch SW5 is in the “OFF” position or that the fuse F1 has blown. The fuse will blow if power is applied to the EVB in reverse-bias, where a protection diode ensures that the main fuse blows rather than causing damage to the EVB circuitry. If the fuse has blown, check the bias of your power supply connection then replace fuse F1 with a 20 mm 1.5 A fast blow fuse.

4.11 CAN configuration

The EVB has two high speed CAN FD transceivers and two female standard DB9 connectors to provide physical CAN FD interfaces for the MCU.

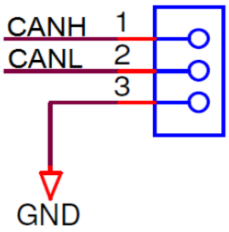
The pinout of the DB9 female connector (J5) is shown in the below figure.

Figure 6. CAN DB9 connector pinout



For flexibility, the CAN FD transceiver I/Os are also connected to two standard 0.1” connectors (P4 and P5) at the top side of the PCB. The figure below shows the pin-out for these connectors.

Figure 7. CAN 3pin header interface connector



By default, the CAN interfaces are not enabled. To enable the CAN interfaces the jumpers detailed in the table below need to be placed.

Table 3. **CAN control jumpers**

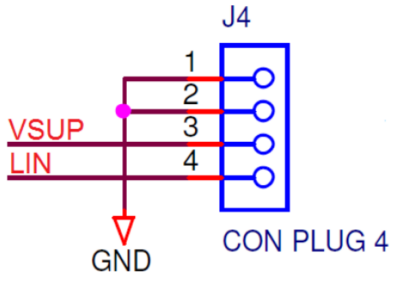
Jumper	Label	Description
J23	CAN2_EN	PHY U2 configuration 1-2: WAKE to GND 3-4: STB to 5 V 5-6: EN to 5 V
J32	CAN2	1-2: PHY TX to MCU 3-4: PHY RX to MCU
J33	CAN-PWR	1-2: 5.0V_SR to PHY U2 VCC 3-4: 12 V to PHY U2 VBAT
J34	INH/ERR	PHY U2 signal out 1: ERR 2: INH
J21	CAN_EN	PHY U1 configuration 1-2: WAKE to GND 3-4: STB to 5 V 5-6: EN to 5 V
J35	CAN-PWR	1-2: 5.0V_SR to PHY U1 VCC 3-4: 12 V to PHY U1 VBAT
J37	TTCAN_TX/MCAN1_TX	PHY U1 TX to MCU 1-2: TTCAN TX 2-3: MCAN1 TX
J38	TTCAN/MCAN1	PHY U1 RX to MCU 1-2: TTCAN RX 2-3: MCAN1 RX
J36	INH/ERR	PHY U1 signal out 1: ERR 2: INH

4.12 RS232 configuration

A female DB9 connector J19 and a RS232 transceiver device provide a physical RS232 interface, allowing a direct RS232 connection to a PC or terminal.

The figure below shows the pin-out of the RS232 connector. It is to note that the hardware flow control is not supported on this implementation.

Figure 8. **RS232 physical interface connector**



By default the RS232 interface is not enabled. The user needs to place the jumpers detailed in Table 4. RS232 control jumpers to enable the RS232 interface.

Table 4. RS232 control jumpers

Jumper	Label	Description
J13	SCI TX	TX enable
J14	SCI RX	RX enable
J25	SCI_PWR	Transceiver power on

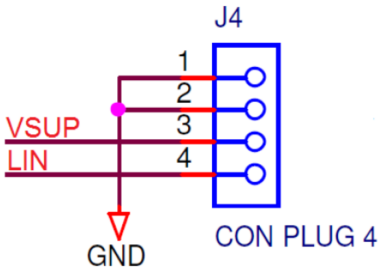
4.13 LIN configuration

The EVB is fitted with a LIN transceiver (U50) and two different style connectors:

- a standard LIN Molex connector (J14) at the edge of the board
- a standard 0.1" connector (P3).

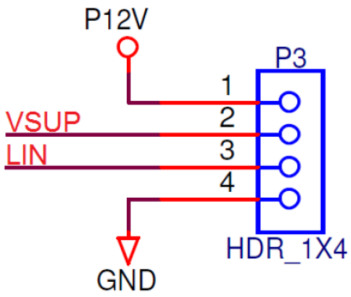
The figure below shows the pin-out of the Molex connector J4.

Figure 9. LIN molex connector



For flexibility, the LIN transceiver is also connected to a standard 0.1” connector (P3) at the top side of the PCB as shown in Figure 10. LIN 4pin header interface connector. For ease of use, the 12 V EVB supply is fed to pin1 of P3 and the LIN transceiver power input to pin2. This allows the LIN transceiver to be powered directly from the EVB supply by simply linking pins 1 and 2 of connector P3 using a 0.1" jumper shunt.

Figure 10. LIN 4pin header interface connector



By default, the LIN interface is not enabled. To enable the LIN interface the jumpers detailed in the table below need to be placed.

Table 5. **LIN control jumpers**

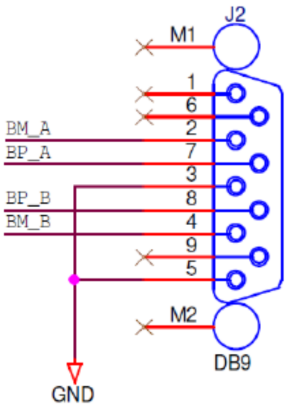
Jumper	Label	Description
J15	LIN_EN	LIN PHY (U50) enable
J16	LIN_RX	LIN RX enable
J17	LIN_TX	LIN TX enable

4.14 FlexRAY configuration

The EVB is fitted with two FlexRAY transceivers, a female DB9 connector (for both transceivers) and two alternative connectors. Jumpers J27 and J30 are provided to route the respective MCU signals to the physical interfaces.

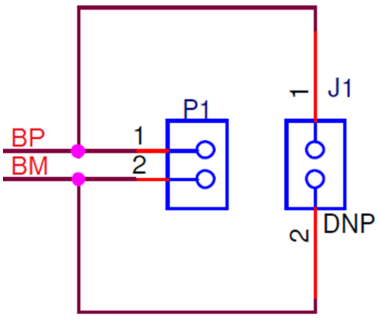
The figure below shows the pin-out of the DB9 connector (J2).

Figure 11. **FlexRAY DB9 connector pinout**



For flexibility, the FlexRAY transceiver is also connected to two FlexRAY connectors (P1 & P2) and two 2pin Molex connectors (J1 & J3, not populated by default) at the top side of the EVB. the figure below shows the connections for both types of connectors.

Figure 12. **FlexRAY alternative connector pin-outs**



By default, the FlexRAY interface is not enabled. To enable the FlexRAY interface the jumpers detailed in the below table FlexRAY control jumpers need to be placed.

Table 6. FlexRAY control jumpers

Jumper	Label	Description
J29	FR_PWR	FlexRay transceiver VIO selection 1-2: 12 V to VBAT 3-4: 5V_SR to VCC and VBUF 5-6: 3.3V_SR to VIO
J27	FR_A	1-2: PHY U4 TX to MCU 3-4: PHY U4 TXEN to MCU 5-6: PHY U4 RX to MCU
J28	FR_A	PHY U4 configuration: 1-2: 3.3 V (VIO) to BGE 3-4: 3.3 V (VIO) to EN 5-6: 3.3 V (VIO) to STBY 7-8: GND to WAKE
J30	FR_B	1-2: PHY U5 TX to MCU 3-4: PHY U5 TXEN to MCU 5-6: PHY U5 RX to MCU
J31	FR_B	PHY U5 configuration: 1-2: 3.3 V (VIO) to BGE 3-4: 3.3 V (VIO) to EN 5-6: 3.3 V (VIO) to STBY 7-8: GND to WAKE

4.15 Ethernet configuration

The EVB is fitted with a standard RJ45 Ethernet connector (J7) and an Ethernet transceiver (U6).

By default, the Ethernet interface is not enabled. To enable the Ethernet interface the jumpers detailed in Table 5. LIN control jumpers need to be placed.

Table 7. Ethernet control jumpers

Jumper	Description
J22	PHY power on (jumper placed on default)
J18	RXCLK
J20	CRS_LEDCFG
J24	RXER_MDIXEN
J26	RXDV_MIIMODE
J39	RXD0_PHYAD1
J40	RXD1_PHYAD1
J41	RXD2_PHYAD2
J42	RXD3_PHYAD3
J44	COL_PHYAD0
J45	TXEN
J46	TXCLK
J47	TXD0
J48	TXD1
J49	TXD2
J50	TXD3_SNIMODE
J51	MDC
J52	MDIO

4.16 Motherboard test points

Several test points of different shapes and functionalities are scattered around the EVB to allow an easy access to MCU and reference signals. This chapter summarizes and describes the available test points. Motherboard test points are listed and detailed in the below table.

Table 8. Test points - motherboard

Signal	TP name	Shape	Description
GND	GT1	Hook	Ground reference
GND	GT2	Hook	Ground reference
GND	GT3	Hook	Ground reference
GND	GT4	Hook	Ground reference
GND	GT5	Hook	Ground reference
GND	GT6	Hook	Ground reference
GND	GT7	Hook	Ground reference
GND	GT8	Hook	Ground reference
GND	GT9	Hook	Ground reference
GND	GT10	Hook	Ground reference
GND	GT11	Hook	Ground reference
1.25V_SR	JP1	Pin	1.25V_SR reference
1.25V_SR	JP2	Pin	1.25V_SR reference
1.25V_SR	JP3	Pin	1.25V_SR reference
1.25V_SR	JP4	Pin	1.25V_SR reference
3.3V_SR	JP5	Pin	3.3V_SR reference
3.3V_SR	JP6	Pin	3.3V_SR reference
3.3V_SR	JP7	Pin	3.3V_SR reference
3.3V_SR	JP8	Pin	3.3V_SR reference
5V_SR	JP9	Pin	5V_SR reference
5V_SR	JP10	Pin	5V_SR reference
5V_SR	JP11	Pin	5V_SR reference
5V_SR	JP12	Pin	5V_SR reference
GND	JP13	Pin	Ground reference
GND	JP14	Pin	Ground reference
GND	JP15	Pin	Ground reference
GND	JP16	Pin	Ground reference
5V_SR	TP15	Hook	5V_SR reference
5V_LR	TP14	Hook	5V_LR reference
3.3V_SR	TP16	Hook	3.3V_SR reference
1.25V_SR	TP17	Hook	1.25V_SR reference
FRA-INH2	TP5	Pad	FlexRAY
FRA-INH1	TP1	Pad	FlexRAY
FRA-ERRN	TP2	Pad	FlexRAY
FRA-RXEN	TP6	Pad	FlexRAY

Signal	TP name	Shape	Description
FRB-INH2	TP7	Pad	FlexRAY
FRB-INH1	TP3	Pad	FlexRAY
FRB-ERRN	TP4	Pad	FlexRAY
FRB-RXEN	TP8	Pad	FlexRAY
FR_DBG0	TP10	Pad	FlexRAY debug0
FR_DBG1	TP11	Pad	FlexRAY debug1
FR_DBG2	TP12	Pad	FlexRAY debug2
FR_DBG3	TP13	Pad	FlexRAY debug3
FEC 25MHz	TP9	Pad	Ethernet clock

4.17 Board interface connectors

This chapter provides a useful cross reference to see the connection from the motherboard to the board interface connector, and what MCU pins are connected to the interface connector on the daughter cards.

The Table 7. Ethernet control jumpers lists all the connections to the board interface connector on both motherboard and daughter cards. The table on the left lists the 240 connections for the first interface connector (J43), the table on the right lists the 240 connections for the second interface connector (J56): the column 'Motherboard' shows the motherboard connections to the interface connectors like power supply connections and user area port pins.

Ground signals are not listed here. A solid ground connection is achieved through the middle bar of the interface connector.

Table 9. Board interface connector details

Connector	Motherboard	Connector	Motherboard
A-1	1.25V_SR	B-240	1.25V_SR
A-2	1.25V_SR	B-239	1.25V_SR
A-3	1.25V_SR	B-238	1.25V_SR
A-4	1.25V_SR	B-237	1.25V_SR
A-5	PA0	B-236	PB0
A-6	PA1	B-235	PB1
A-7	PA2	B-234	PB2
A-8	PA3	B-233	PB3
A-9	PA4	B-232	PB4
A-10	PA5	B-231	PB5
A-11	PA6	B-230	PB6
A-12	PA7	B-229	PB7
A-13	PA8	B-228	PB8
A-14	PA9	B-227	PB9
A-15	PA10	B-226	PB10
A-16	PA11	B-225	PB11
A-17	PA12	B-224	PB12
A-18	PA13	B-223	PB13
A-19	PA14	B-222	PB14
A-20	PA15	B-221	PB15
A-21	5.0V_SR	B-220	5.0V_SR
A-22	5.0V_SR	B-219	5.0V_SR
A-23	5.0V_SR	B-218	5.0V_SR
A-24	5.0V_SR	B-217	5.0V_SR
A-25	PC0	B-216	PD0
A-26	PC1	B-215	PD1
A-27	PC2	B-214	PD2
A-28	PC3	B-213	PD3
A-29	PC4	B-212	PD4
A-30	PC5	B-211	PD5
A-31	PC6	B-210	PD6

Connector	Motherboard	Connector	Motherboard
A-32	PC7	B-209	PD7
A-33	PC8	B-208	PD8
A-34	PC9	B-207	PD9
A-35	PC10	B-206	PD10
A-36	PC11	B-205	PD11
A-37	PC12	B-204	PD12
A-38	PC13	B-203	PD13
A-39	PC14	B-202	PD14
A-40	PC15	B-201	PD15
A-41	3.3V_SR	B-200	3.3V_SR
A-42	3.3V_SR	B-199	3.3V_SR
A-43	3.3V_SR	B-198	3.3V_SR
A-44	3.3V_SR	B-197	3.3V_SR
A-45	PE0	B-196	PF0
A-46	PE1	B-195	PF1
A-47	PE2	B-194	PF2
A-48	PE3	B-193	PF3
A-49	PE4	B-192	PF4
A-50	PE5	B-191	PF5
A-51	PE6	B-190	PF6
A-52	PE7	B-189	PF7
A-53	PE8	B-188	PF8
A-54	PE9	B-187	PF9
A-55	PE10	B-186	PF10
A-56	PE11	B-185	PF11
A-57	PE12	B-184	PF12
A-58	PE13	B-183	PF13
A-59	PE14	B-182	PF14
A-60	PE15	B-181	PF15
A-61	1.25V_SR	B-180	1.25V_SR
A-62	1.25V_SR	B-179	1.25V_SR
A-63	1.25V_SR	B-178	1.25V_SR
A-64	1.25V_SR	B-177	1.25V_SR
A-65	PG0	B-176	PH0
A-66	PG1	B-175	PH1
A-67	PG2	B-174	PH2
A-68	PG3	B-173	PH3
A-69	PG4	B-172	PH4
A-70	PG5	B-171	PH5
A-71	PG6	B-170	PH6
A-72	PG7	B-169	PH7

Connector	Motherboard	Connector	Motherboard
A-73	PG8	B-168	PH8
A-74	PG9	B-167	PH9
A-75	PG10	B-166	PH10
A-76	PG11	B-165	PH11
A-77	PG12	B-164	PH12
A-78	PG13	B-163	PH13
A-79	PG14	B-162	PH14
A-80	PG15	B-161	PH15
A-81	5.0V_SR	B-160	3.3V_SR
A-82	5.0V_SR	B-159	3.3V_SR
A-83	5.0V_SR	B-158	3.3V_SR
A-84	5.0V_SR	B-157	3.3V_SR
A-85	PI0	B-156	PJ0
A-86	PI1	B-155	PJ1
A-87	PI2	B-154	PJ2
A-88	PI3	B-153	PJ3
A-89	PI4	B-152	PJ4
A-90	PI5	B-151	PJ5
A-91	PI6	B-150	PJ6
A-92	PI7	B-149	PJ7
A-93	PI8	B-148	PJ8
A-94	PI9	B-147	PJ9
A-95	PI10	B-146	PJ10
A-96	PI11	B-145	PJ11
A-97	PI12	B-144	PJ12
A-98	PI13	B-143	PJ13
A-99	PI14	B-142	PJ14
A-100	PI15	B-141	PJ15
A-101	N.C.	B-140	N.C.
A-102	N.C.	B-139	N.C.
A-103	N.C.	B-138	N.C.
A-104	N.C.	B-137	N.C.
A-105	PK0	B-136	PL0
A-106	PK1	B-135	PL1
A-107	PK2	B-134	PL2
A-108	PK3	B-133	PL3
A-109	PK4	B-132	PL4
A-110	PK5	B-131	PL5
A-111	PK6	B-130	PL6
A-112	PK7	B-129	PL7
A-113	PK8	B-128	PL8

Connector	Motherboard	Connector	Motherboard
A-114	PK9	B-127	PL9
A-115	PK10	B-126	PL10
A-116	PK11	B-125	PL11
A-117	PK12	B-124	PL12
A-118	PK13	B-123	PL13
A-119	PK14	B-122	PL14
A-120	PK15	B-121	PL15
A-121	5.0V_LR	B-120	5.0V_LR
A-122	5.0V_LR	B-119	5.0V_LR
A-123	5.0V_LR	B-118	5.0V_LR
A-124	5.0V_LR	B-117	5.0V_LR
A-125	PM0	B-116	PN0
A-126	PM1	B-115	PN1
A-127	PM2	B-114	PN2
A-128	PM3	B-113	PN3
A-129	PM4	B-112	PN4
A-130	PM5	B-111	PN5
A-131	PM6	B-110	PN6
A-132	PM7	B-109	PN7
A-133	PM8	B-108	PN8
A-134	PM9	B-107	PN9
A-135	PM10	B-106	PN10
A-136	PM11	B-105	PN11
A-137	PM12	B-104	PN12
A-138	PM13	B-103	PN13
A-139	PM14	B-102	PN14
A-140	PM15	B-101	PN15
A-141	RST-SW	B-100	N.C.
A-142	N.C.	B-99	N.C.
A-143	N.C.	B-98	N.C.
A-144	N.C.	B-97	N.C.
A-145	PO0	B-96	PP0
A-146	PO1	B-95	PP1
A-147	PO2	B-94	PP2
A-148	PO3	B-93	PP3
A-149	PO4	B-92	PP4
A-150	PO5	B-91	PP5
A-151	PO6	B-90	PP6
A-152	PO7	B-89	PP7
A-153	PO8	B-88	PP8
A-154	PO9	B-87	PP9

Connector	Motherboard	Connector	Motherboard
A-155	PO10	B-86	PP10
A-156	PO11	B-85	PP11
A-157	PO12	B-84	PP12
A-158	PO13	B-83	PP13
A-159	PO14	B-82	PP14
A-160	PO15	B-81	PP15
A-161	1.25V_SR	B-80	1.25V_SR
A-162	1.25V_SR	B-79	1.25V_SR
A-163	1.25V_SR	B-78	1.25V_SR
A-164	1.25V_SR	B-77	1.25V_SR
A-165	PQ0	B-76	PR0
A-166	PQ1	B-75	PR1
A-167	PQ2	B-74	PR2
A-168	PQ3	B-73	PR3
A-169	PQ4	B-72	PR4
A-170	PQ5	B-71	PR5
A-171	PQ6	B-70	PR6
A-172	PQ7	B-69	PR7
A-173	PQ8	B-68	PR8
A-174	PQ9	B-67	PR9
A-175	PQ10	B-66	PR10
A-176	PQ11	B-65	PR11
A-177	PQ12	B-64	PR12
A-178	PQ13	B-63	PR13
A-179	PQ14	B-62	PR14
A-180	PQ15	B-61	PR15
A-181	5.0V_SR	B-60	5.0V_SR
A-182	5.0V_SR	B-59	5.0V_SR
A-183	5.0V_SR	B-58	5.0V_SR
A-184	5.0V_SR	B-57	5.0V_SR
A-185	PS0	B-56	PT0
A-186	PS1	B-55	PT1
A-187	PS2	B-54	PT2
A-188	PS3	B-53	PT3
A-189	PS4	B-52	PT4
A-190	PS5	B-51	PT5
A-191	PS6	B-50	PT6
A-192	PS7	B-49	PT7
A-193	PS8	B-48	PT8
A-194	PS9	B-47	PT9
A-195	PS10	B-46	PT10

Connector	Motherboard	Connector	Motherboard
A-196	PS11	B-45	PT11
A-197	PS12	B-44	PT12
A-198	PS13	B-43	PT13
A-199	PS14	B-42	PT14
A-200	PS15	B-41	PT15
A-201	3.3V_SR	B-40	3.3V_SR
A-202	3.3V_SR	B-39	3.3V_SR
A-203	3.3V_SR	B-38	3.3V_SR
A-204	3.3V_SR	B-37	3.3V_SR
A-205	PU0	B-36	PV0
A-206	PU1	B-35	PV1
A-207	PU2	B-34	PV2
A-208	PU3	B-33	PV3
A-209	PU4	B-32	PV4
A-210	PU5	B-31	PV5
A-211	PU6	B-30	PV6
A-212	PU7	B-29	PV7
A-213	PU8	B-28	PV8
A-214	PU9	B-27	PV9
A-215	PU10	B-26	PV10
A-216	PU11	B-25	PV11
A-217	PU12	B-24	PV12
A-218	PU13	B-23	PV13
A-219	PU14	B-22	PV14
A-220	PU15	B-21	PV15
A-221	VDD_HV_IO	B-20	VDD_HV_IO
A-222	VDD_HV_IO	B-19	VDD_HV_IO
A-223	VDD_HV_IO	B-18	VDD_HV_IO
A-224	VDD_HV_IO	B-17	VDD_HV_IO
A-225	PW0	B-16	PX0
A-226	PW1	B-15	PX1
A-227	PW2	B-14	PX2
A-228	PW3	B-13	PX3
A-229	PW4	B-12	PX4
A-230	PW5	B-11	PX5
A-231	PW6	B-10	PX6
A-232	PW7	B-9	PX7
A-233	PW8	B-8	PX8
A-234	PW9	B-7	PX9
A-235	PW10	B-6	PX10
A-236	PW11	B-5	PX11

Connector	Motherboard	Connector	Motherboard
A-237	PW12	B-4	PX12
A-238	PW13	B-3	PX13
A-239	PW14	B-2	PX14
A-240	PW15	B-1	PX15

5 Default jumper summary table

The following table details the DEFAULT jumper configuration of the EVB as set up on delivery.

5.1 Default jumper table - motherboard

On delivery the motherboard comes with a default jumper configuration. The table below lists and describes briefly the jumpers on the MPC58xx motherboard and indicates which jumpers are on/off on delivery of the board.

Table 10. Default jumper table - motherboard

Jumper	Default Pos	PCB Legend	Description
J8	Off	MASTER	LIN Master/Slave select
J9	Off	CAP A DIS	Disable capacitor circuitry for FlexRAY_A signals
J10	Off	CAP A DIS	Disable capacitor circuitry for FlexRAY_A signals
J11	Off	CAP B DIS	Disable capacitor circuitry for FlexRAY_B signals
J12	Off	CAP B DIS	Disable capacitor circuitry for FlexRAY_B signals
J13	Off	SCI TX	Connect SCI TX signal
J14	Off	SCI RX	Connect SCI RX signal
J15	Off	LIN_EN	Enable LIN PHY U50
J16	Off	LIN_RX	Connect LIN RX signal
J17	Off	LIN_TX	Connect LIN TX signal
J18	Off	-	Ethernet signal: RXCLK
J20	Off	-	Ethernet signal: CRS_LEDCFG
J21	Off	CAN2_EN	PHY U2 configuration: 1-2: WAKE to GND 3-4: STB to 5 V 5-6: EN to 5 V
J22	On	-	Ethernet phy power-on
J23	Off	CAN-EN	PHY U1 configuration: 1-2: WAKE to GND 3-4: STB to 5 V 5-6: EN to 5 V
J24	Off	-	Ethernet signal: RXER_MDIXEN
J25	Off	SCI-PWR	SCI phy power-on
J26	Off	-	Ethernet signal: RXDV_MIIMODE
J27	Off	FR-A	1-2: PHY U4 TX to MCU 3-4: PHY U4 TXEN to MCU 5-6: PHY U4 RX to MCU
J28	Off	FR-A	PHY U4 configuration: 1-2: 3.3V (VIO) to BGE 3-4: 3.3V (VIO) to EN 5-6: 3.3V (VIO) to STBY 7-8: GND to WAKE

Jumper	Default Pos	PCB Legend	Description
J29	Off	FR_PWR	FlexRAY transceiver VIO selection 1-2: 12 V to VBAT 3-4: 5V_SR to VCC and VBUF
J30	Off	FR_B	1-2: PHY U5 TX to MCU 3-4: PHY U5 TXEN to MCU 5-6: PHY U5 RX to MCU
J31	Off	FR_B	PHY U5 configuration: 1-2: 3.3 V (VIO) to BGE 3-4: 3.3 V (VIO) to EN 5-6: 3.3 V (VIO) to STBY 7-8: GND to WAKE
J32	Off	CAN2	1-2: PHY TX to MCU 3-4: WAKE to GND
J33	Off	CAN-PWR	1-2: 5V_SR to PHY U2 VCC 3-4: 12 V to PHY U2 VBAT
J34	Off	-	MCAN2 signal out: 1: ERR 2: INH
J35	Off	CAN	1-2: 5V_SR to PHY U1 VCC 3-4: 12 V to PHY U1 VBAT
J36	Off	-	CAN PHY U1 signal out
J37	Off	-	CAN TX connect
J38	Off	-	CAN RX connect
J39	Off	-	Ethernet signal: RXD0_PHYAD1
J40	Off	-	Ethernet signal: RXD1_PHYAD1
J41	Off	-	Ethernet signal: RXD2_PHYAD2
J42	Off	-	Ethernet signal: RXD3_PHYAD3
J44	Off	-	Ethernet signal: COL_PHYAD0
J45	Off	-	Ethernet signal: TXEN
J46	Off	-	Ethernet signal: TXCLK
J47	Off	-	Ethernet signal: TXD0
J48	Off	-	Ethernet signal: TXD1
J49	Off	-	Ethernet signal: TXD2
J50	Off	-	Ethernet signal: TXD3_SNIMODE
J51	Off	-	Ethernet signal: MDC
J52	Off	-	Ethernet signal: MDIO
J53	Off	RV1	Connect RV1 to analug input AN0
J54	Off	ADC_VSUP	Connect EVB supply voltages to analog inputs
J55	Off	12V (4.3V)	Connect 12 V (scaled to 4.3 V) EVB power to analog input
J57	On	ENABLE	Enable 5 V linear regulator
J58	Off	DISABLE	Disable 1.25 V switching regulator
J59	Off	DISABLE	Disable 3.3 V switching regulator

Jumper	Default Pos	PCB Legend	Description
J60	Off	DISABLE	Disable 5.0 V switching regulator

5.2 User area

There is a rectangular prototype area on the EVB's top right corner, consisting of a 0.1-inch pitch array of through-hole plated pads. Power from all the three switching regulators is readily accessible along with GND through JP1 – JP16 next to the prototyping area. This area is ideal for the addition of any custom circuitry.

There are four active low user LEDs D2, D3, D4 and D5, these are driven by connecting a logic 0 signal to the corresponding pin on 0.1" header P7 (USER LEDS). The LED inputs are pulled to VDD_HV_IO_MAIN through 10 kΩ resistors.

There are 4 active high pushbutton switches SW1, SW2, SW3 and SW4 which will drive 5 V onto the respective pins on 0.1" connector P6 when pressed. The switch outputs are pulled to GND via 10 kΩ.

The potentiometer RV1 can be connected to the port pin PB[0] and is adjustable between GND and 5 V from the linear regulator. The power from all regulators can be connected to port pins as through J54:

- 1-2: 1.25V_SR to PB[1]
- 3-4: 3.3V_SR to PB[2]
- 5-6: 5V_SR to PB[3]
- 7-8: 5V_LR to PB[4]

The P12V rail from the 12 V input is scaled to 4.3 V through the voltage divider of R81 and R82 and the scaled voltage can be connected to PB[5] via J55.

6 BOM

Table 11. **BOM**

Itm	Qty	Reference	Part number	Part name	Part description
1	6	C1, C2, C7, C8, C11, C12	CTAN SMD 106-A-10	10µF	Tantalum Cap SMD - 10µF 10V - case A - AVX
2	29	C3, C4, C5, C6, C51, C52, C58, C65, C66, C70, C73, C74, C75, C77, C78, C80, C83, C84, C85, C86, C87, C88, C89, C90, C91, C96, C97, C98, C100	CER SMD 104-0603V	100 nF	Ceramic Cap. SMD - 100nF (0.1µF) 50V - X7R - 0603
3	2	C9, C10	CER SMD 330-0603	33pF	Ceramic cap. 33 pF 50 V C0G SMD 0603
4	1	C13	CTAN SMD 686-E-25	68µF	Tantalum cap. SMD 68µF 25 V CASE-E - AVX TPME686K025R0045
5	3	C14, C15 ,C18	EEEFC1V101AP	100µF	Electrolytic cap. 100µF 35V SMD - PANASONIC EEEFC1V101AP
6	1	C16	EEFSX0E391XE	390µF	Electrolytic cap. 390µF 2,5V SMD LOW ESR (6mR) - PANASONIC EEFSX0E391XE
7	1	C17	CER 501000-151	1000µF	Electrolytic capacitor 1000µF 50V
8	9	C50, C54, C59, C72, C76, C79, C81, C82,C99	GMC10X7R102J50NT-LF	1nF	Ceramic cap. 1nF 50V 5% SMD 0603 - MURATA GMC10X7R102J50NT-LF
9	3	C57,C60,C95	CER SMD 103-0603	10 nF	Ceramic cap. 10nF=10000pF 50V X7R SMD0603
10	4	C61, C64,C67, C69	CER SMD 100-0603A	10 pF	Ceramic cap. 10pF 100V 2% C0G SMD 0603 - AVX 06031A100GAT2A
11	2	C62, C68	CER SMD 472-0603V	4,7 nF	Ceramic cap. 4,7nF 100V X7R SMD 0603
12	1	C71	CER SMD 474-0603X	470 nF	Ceramic cap. 470nF SMD 0603 16V X7R
13	2	C92, C93	CER SMD 225-0603	2.2µF	Cap. CER 2,2 uF 16 V SMD 0603 X5R
14	1	C94	GCM188R71E105KA64	1µF	Ceramic cap. 1µF 25V X7R 10% SMD0603 - MURATA GCM188R71E105KA64
15	1	D1	GF1A-E3/67A	GF1A	DIODE GF1A-E3/67A 1A 50V SMD D0214BA - VISHAY
16	4	D2, D3, D4, D5	LED SMD YELLOW-1206	Yellow led	Yellow led smd 1206
17	4	D6, D7, D8, D10	DB130LB-SMD	B130LB-13	DIODE Rect. B130LB - 13 1A 30 V SMD SMB
18	4	D9, D11, D12, D13	LED SMD GREEN-1206	Led green	LED SMD GREEN 1206 - 0805
19	1	F1	FUS 5X20-1,5AR	Fuse Holder	FUSE 5X20 1,5A Fast
20	15	GT1, GT2, GT3, GT4, GT5, GT6, GT7, GT8, GT9, GT10, GT11, TP14, TP15, TP16, TP17	TEST 1-SMD	TEST POINT	SOLDERING POINT SMD KEYSTONE K5015

Itm	Qty	Reference	Part number	Part name	Part description
21	16	JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10, JP11, JP12, JP13, JP14, JP15, JP16	SAM- HTSW10107SMS	HDR 1X1	HDR 1X1 TH -- 330H AU 100L
22	2	J1, J3	MOLEX2P-39291028	Cap. PLUG 2	CONN MOLEX 2P MALE 39291028
23	4	J2, J5, J6, J19	F 9 POLES 90	DB9	CONN 9 POLI 90 CS FEMALE
24	1	J4	MOLEX 4P-39295043	Cap. PLUG 4	CONN MOLEX 4P MALE 39295043
25	1	J7	J1011F21PNL	RJ45-8	Ethernet Connector RJ45 - J1011F21PNL
26	37	J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J20, J24, J25, J26, J34, J36, J39, J40, J41, J42, J44, J45, J46, J47 J48, J49, J50, J51, J52, J53, J55, J58, J59, J60 J62, J64	SAM-TMM10202GS	HDR 1X2	CONN Samtec 1X2P TMM-102-02-G-S
27	2	J22, J57	SAM-TMM10202GS	HDR 1X2	CONN Samtec 1X2P TMM-102-02-G-S - NORMALLY CLOSED
28	5	J21, J23, J27, J29, J30	SAM-TMM10302GD	HDR 2X3	CONN Samtec 2X3P TMM-103-02-G-D
29	3	J28, J31, J54	SAM-TMM10402GD	HDR 2X4	CONN Samtec 2X4P TMM-104-02-G-D
30	3	J32, J33, J35	SAM-TMM10202GD	HDR 2X2	CONN Samtec 2X2P TMM-102-02-G-D
31	4	J37, J38, J61, J63	SAM-TMM10302GS	HDR 1X3	CONN Samtec 1X3P TMM-103-02-G-S
32	2	J43, J56	SAM-QTH12002LDA	QTH-120-02-L-D- A	CONN Samtec 120X2P SMD QTH-120-02-L-D-A
33	2	L1, L2	DLW43SH101XK2	100µH	Inductor SMD 100µH 1812 Murata - DLW43SH101XK2
34	2	L3, L4	IND SMD 47UH-SH	47µH	Inductor 47µH SMD SHIELDED PWR
35	1	L5	IND SMD 68UH-SH	68µH	Inductor 68µH SMD SHIELDED PWR - C.E.T. DR125/127-680-R
36	1	L6	RCH664NP-220K	22µH	Inductor 22µH 1,27A - SUMIDA RCH664NP-220K
37	2	P1, P2	MOLEX53047-0210	CONN 1X2	MOLEX Connector 53047-0210
38	3	P3, P6, P7	SAM-TSW10407GS	HDR 1X4	CONN Samtec 1X4P TSW-104-07-G-S
39	2	P4, P5	SAM-HTSW10307SS	HDR 1X3	CONN Samtec 1X3P HTSW-103-07-S-S
40	24	P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P27, P28, P29, P30, P31, P32	SAM-TSW10907SD	HDR 2X9	CONN Samtec 9X2P TSW-109-07-S-D
41	1	P26	RAPC722X	CON 1 PWR	Power connector
42	1	P33	TYCO-1437671-1	CON 2 TB	CONN TYCO 2 POS. 1437671-1
43	1	QZ1	FOXSLF/250F-20	25MHz	Crystal 25MHz PTH HC49 - FOX ELECTRONICS FOXSLF/250F-20
44	1	Q2	TRMMBT3904-SMD	MMBT3904LT1G	TRANSISTOR MMBT3904 SMD NPN SOT23
45	1	RN1	RRSMD-49R9-1206	49R9	Resistor array 49R9 SMD CASE 1206 SERIE CAY 16

Itm	Qty	Reference	Part number	Part name	Part description
46	3	RN2, RN50, RN51	RRSMD-103-1206	10 K	Resistor array 10K SMD CASE 1206 SERIE CAY 16
47	1	RN55	RRSMD-471-1206	470R	Resistor array 470R SMD CASE 1206 SERIE CAY 16
48	3	RN52, RN53, RN54	RRSMD-220-0804	22R	Resistor array 22R SMD CASES 0804 SERIES CAY 10
49	1	RV1	RTR-3310Y-2K	2 K	TRIMMER 2 K PTH 3310Y-001-202L BOURNS
50	3	R50, R81, R83	RESMD102-0603	1 K	RESISTANCE SMD 1 K 1/16 W 1% 0603
51	1	R51	RESMD103-0603	10 K	Resistor SMD 10K 1/10W 1% 0603
52	4	R52, R53, R56, R61	RESMD470-0603	47R	Resistor SMD 47R 1/10 W 1% 0603
53	2	R54, R55	RESMD2490-0603	249R	Resistor SMD 249R 1/10 W 1% 0603
54	4	R57, R58, R59, R60	RESMD60R4-805	60R4	Resistor SMD 60R4 1/10 W 1% 0805
55	2	R62,R63	RESMD473-0603	47 K	Resistor SMD 47 K 1/16 W 1% 0603
56	14	R64, R67, R68, R69, R70, R71, R72, R73, R74, R76, R77, R78, R79, R80	RESMD222-0603	2K2	Resistor SMD 2K2 1/16 W 1% 0603
57	1	R65	RESMD472-0603	4K7	Resistor SMD 4K7 1/10 W 1% 0603
58	1	R66	RESMD152-0603	1K5	Resistor SMD 1K50 1/10 W 1% 0603
59	1	R75	RESMD220-0603	22R	Resistor SMD 22R 1/10 W 1% 0603
60	4	R82, R84, R88, R168	RESMD561-0603	560R	Resistor SMD 560R 1/10 W 1% 0603
61	1	R85	RESMD33R2-0603	33R2	Resistor SMD 33R2 1/10 W 1% 0603
62	1	R87	RESMD271-0603	270R	Resistor SMD 270R 1% 0603
63	1	R167	RESMD101-0603	100R	Resistor SMD 100R 1/8 W 1% 0603
64	4	SW1, SW2, SW3, SW4	PULS-B3WN-6002	B3WN-6002	Switch B3WN-6002 OMRON
65	1	SW5	G-107-0513 CW	G-107-0513	Inductor G-107-0513 CW INDUSTRIES
66	13	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13	TJA1041T-SMD	TEST POINT	IC TJA1041T SMD SO-14 NXP-Philips
67	2	U1, U2	TJA1041T-SMD	TJA1041T	
68	1	U3	MAX3221-SMD	MAX3221	IC MAX3221ECAE+ SMD SSOP-16
69	2	U4, U5	TJA1080T-SMD	TJA1080TS/N	IC TJA1080T SMD SSOP-20
70	1	U6	DP83848CVV-SMD	10/100 single phy	IC DP83848CVV/NOPB SMD LQFP48
71	1	U7	LM2937-5,0-SMD	LM2937-5.0	VOLTAGE REG. LM2937IMP-5,0 SMD SOT223
72	1	U8	LM2676S-5.0-SMD	LM2676S-5.0	VOLTAGE REG. LM2676S-5,0 SMD TO263-8
73	1	U9	LM2676S-3,3-SMD	LM2676S-3.3	VOLTAGE REG. LM2676S-3,3 SMD TO263-8
74	1	U10	LM2676S-ADJ-SMD	LM2676S-ADJ	VOLTAGE REG. LM2676S-ADJ SMD TO263-8
75	1	U50	MC33661DR2-SMD	MC33661PEF	IC XCVR LIN 10-20KBIT/S 6-18V SO8

7 Schematic

Figure 13. **Power**

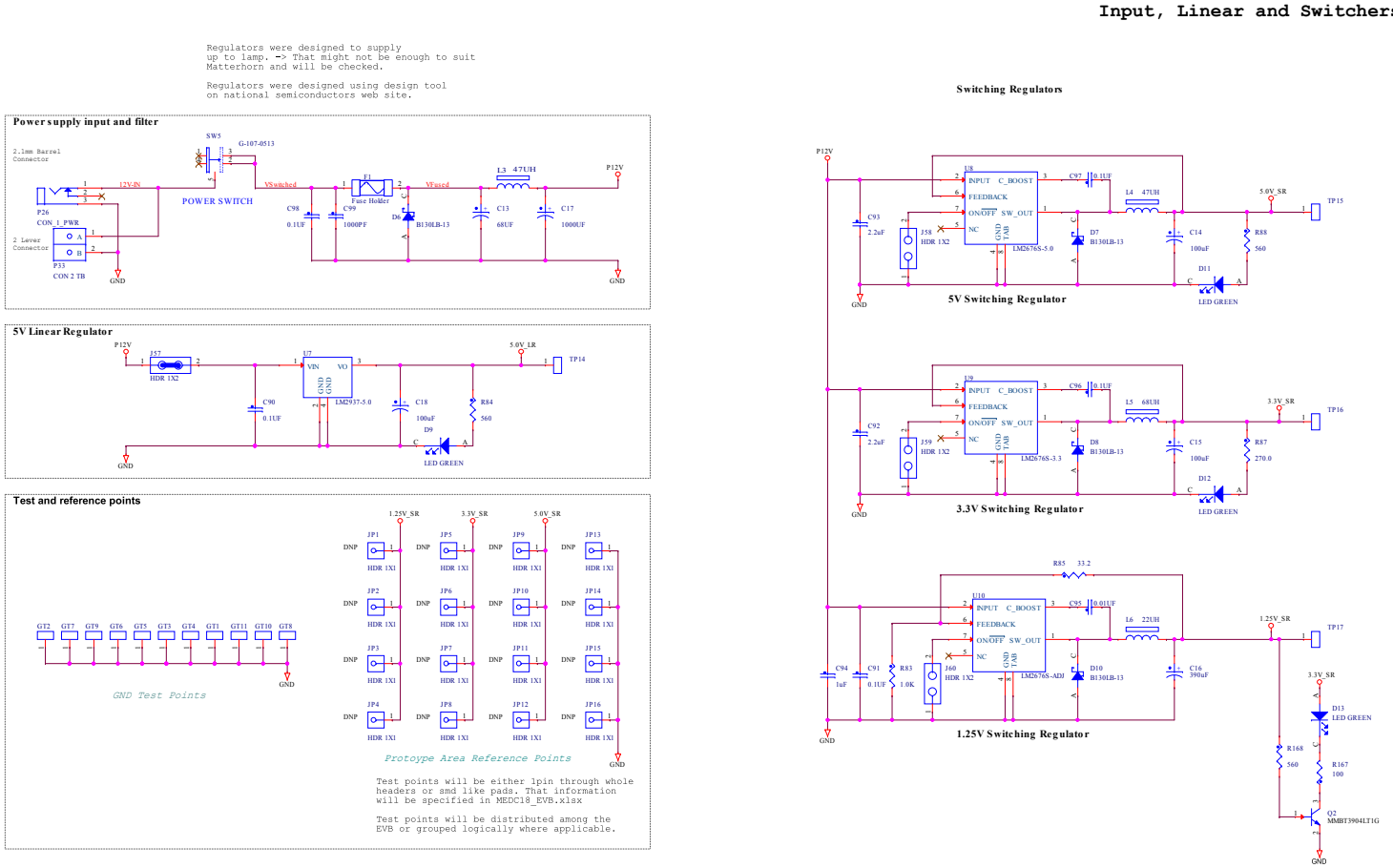


Figure 14. Mother board connector

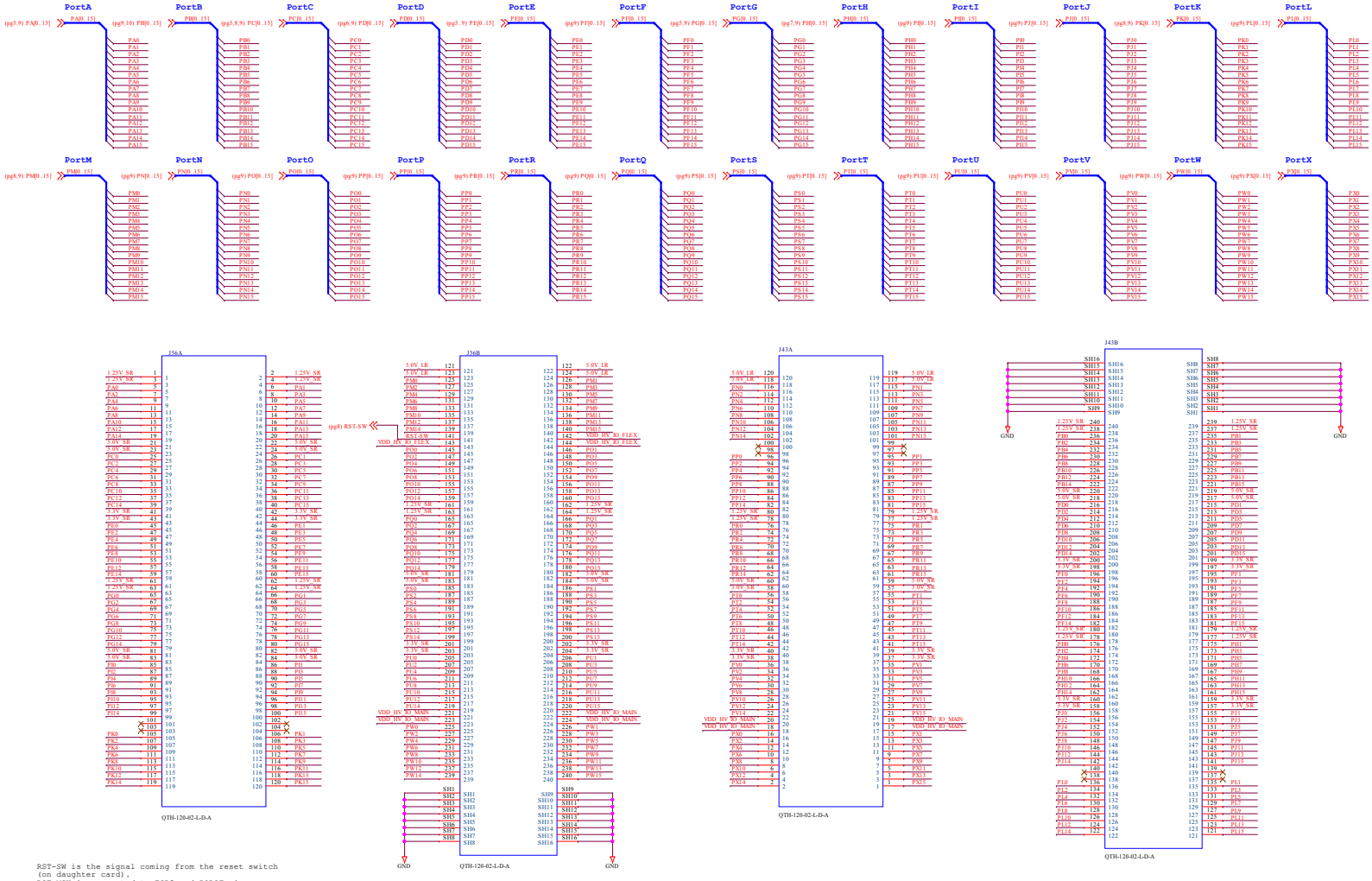


Figure 15. **CAN interface**

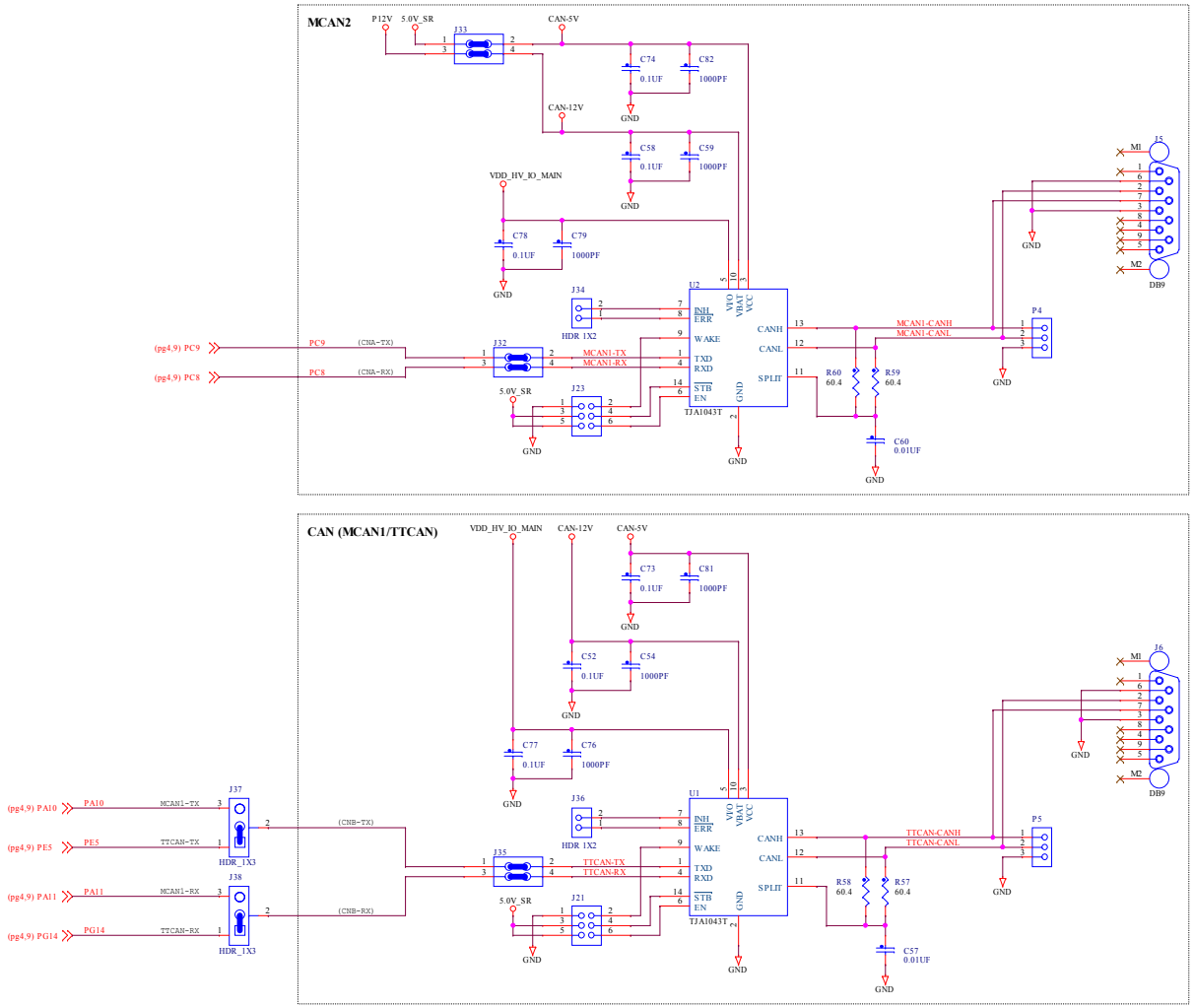


Figure 16. SPI/RS232 and LIN interface

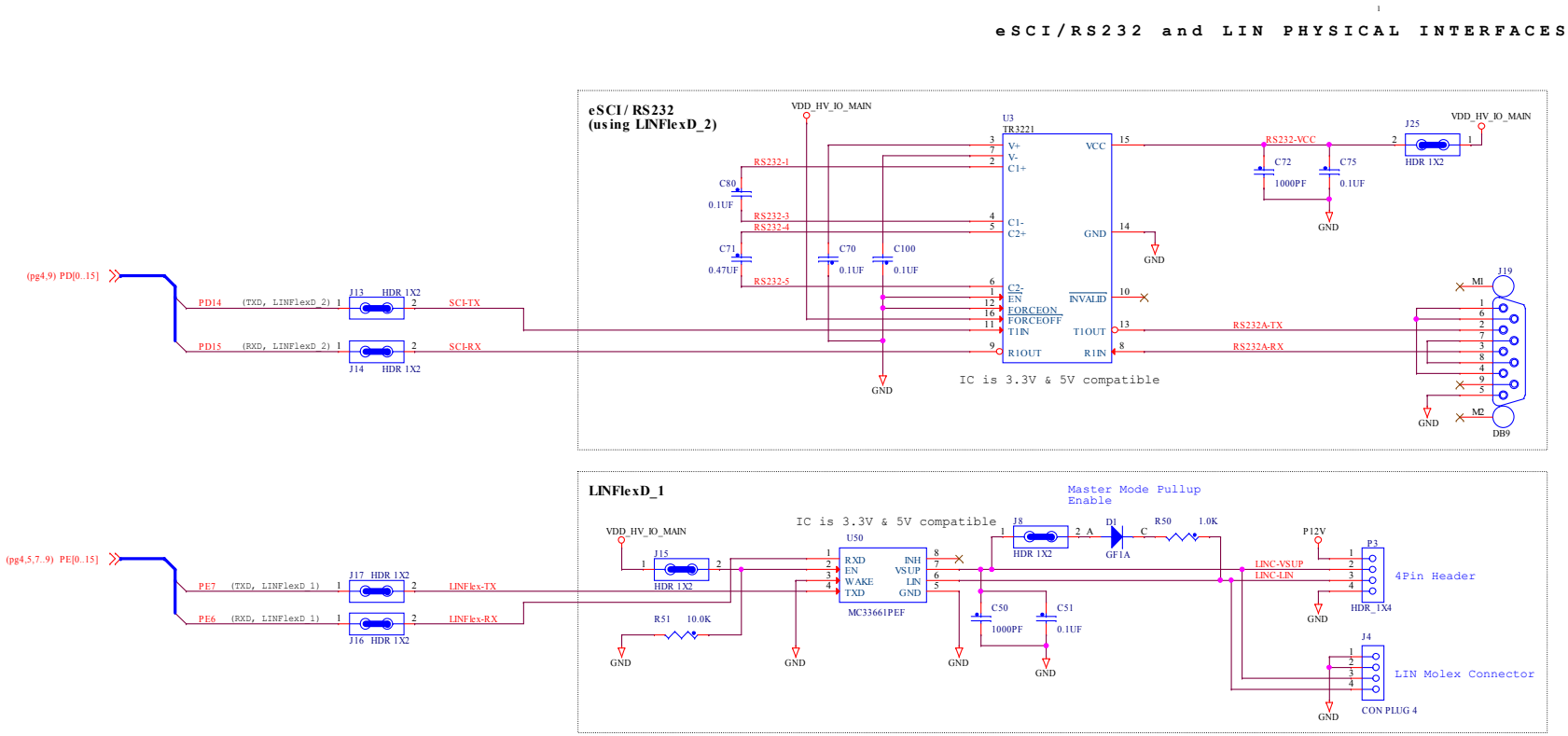


Figure 17. FlexRay

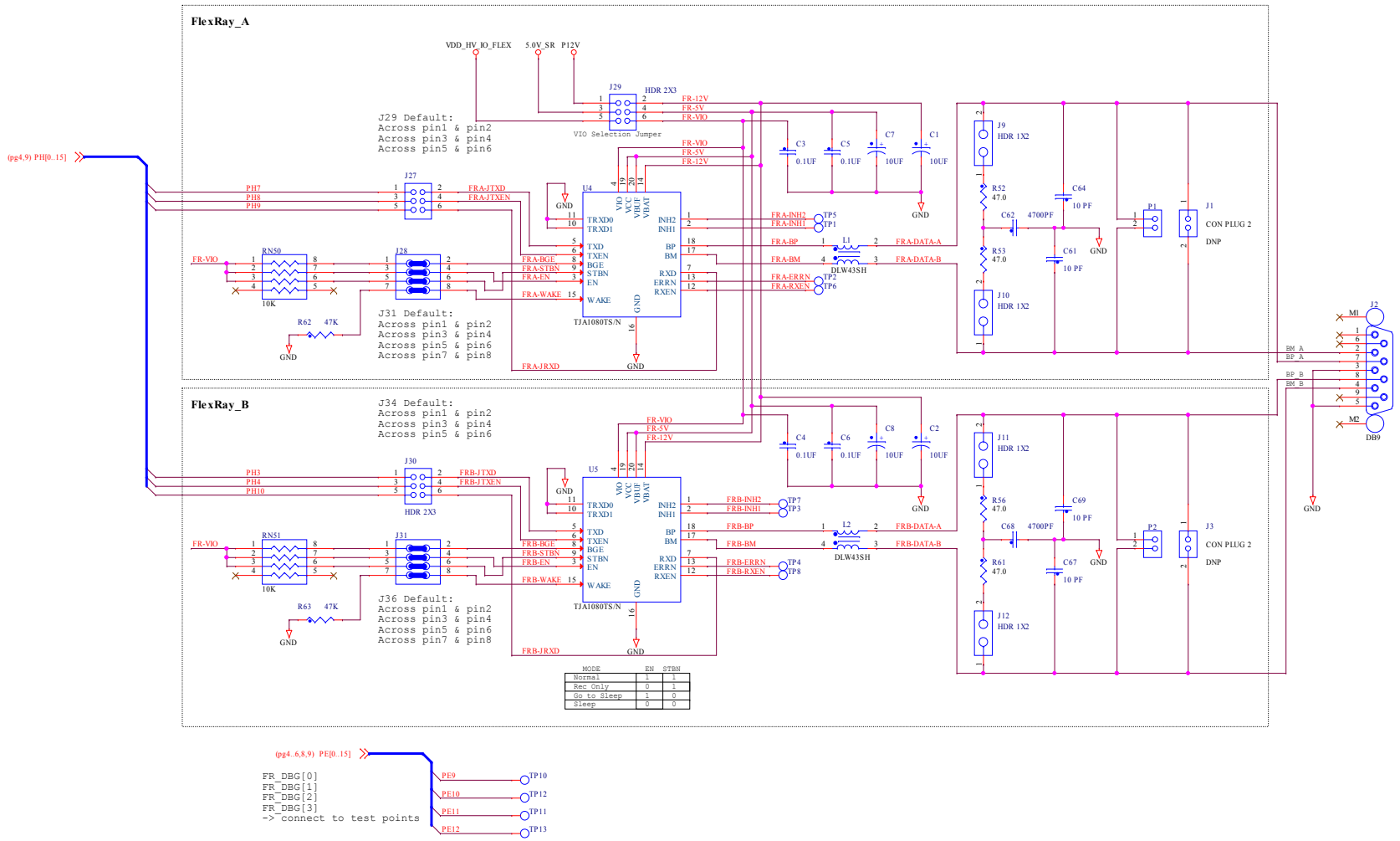


Figure 18. Fast Ethernet controller

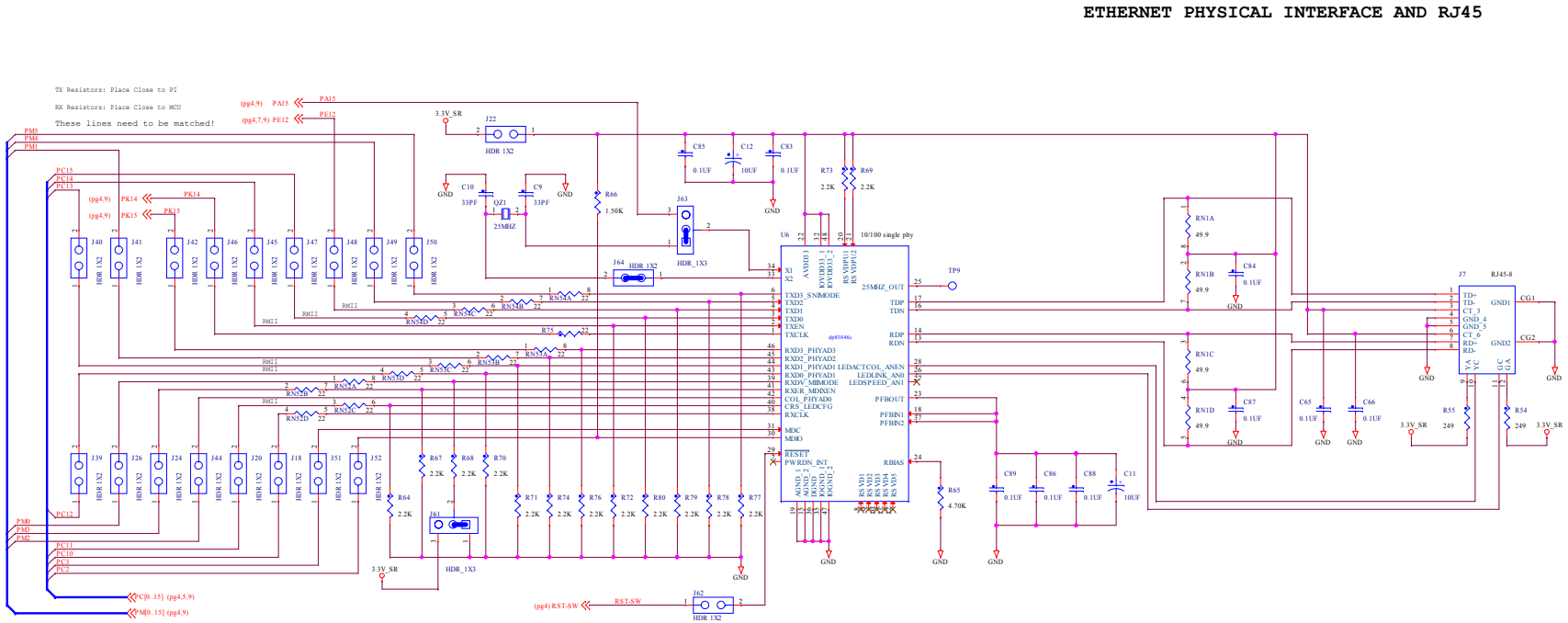
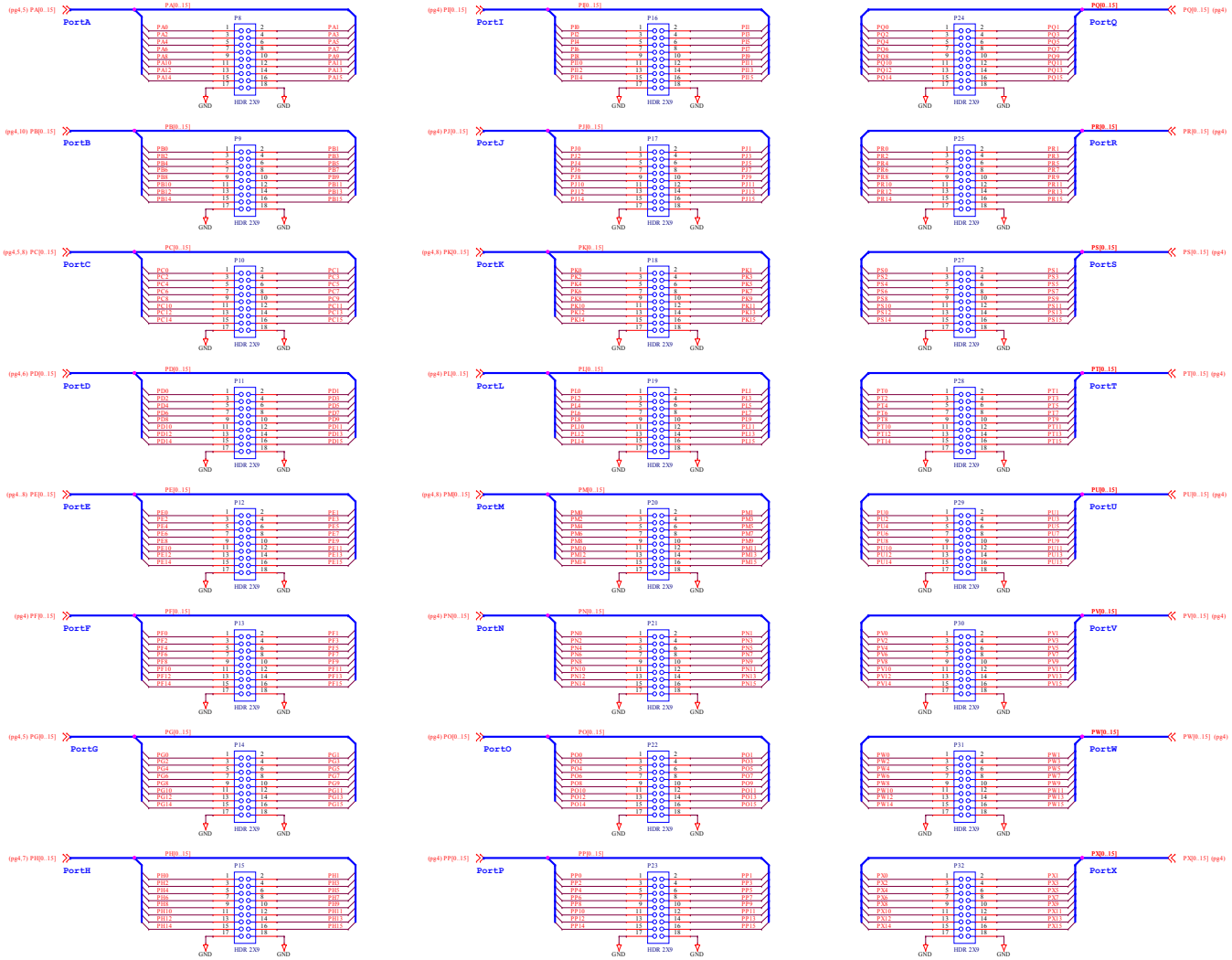
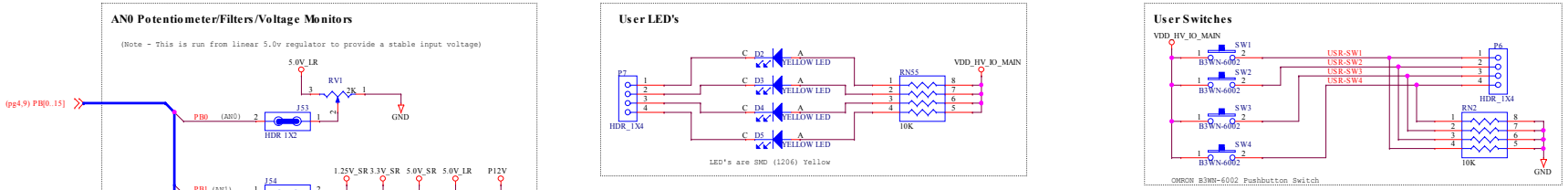


Figure 19. User I/O



NOTE: All Connectors are 0.1" through-hole headers

Figure 20. User peripherals inc. prototyping




```
Prototyping Area Still missing.
To be added later.
```

Revision history

Table 12. **Document revision history**

Date	Version	Changes
25-Jan-2021	1	Initial release.

Contents

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