



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



MPC5777C EVB User Guide

Prototype Board

by: Kumar Sendhil
Automotive Micro-Controller Group
Austin, Texas USA

1. Introduction

This user guide details the setup and configuration of the Freescale MPC5777C Evaluation Board (hereafter referred to as the EVB). The EVB is intended to provide a mechanism for easy customer evaluation of the MPC57xx family of microprocessors, and to facilitate hardware and software development.

At the time of writing this document, the MPC57xx family consists of the 55nm powertrain and safety devices. For the latest product information, please speak to your Freescale representative or consult the MPC57xx website at www.freescale.com.

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

Contents

1.	Introduction.....	1
2.	EVB Features	3
3.	Configuration — Motherboard	4
4.	Configuration — MPC5777C-416DS Daughter card	13
5.	Configuration — MPC5777C-516DS Daughter card	26
6.	Board Interface Connector	37
7.	Default Jumper Summary Table	50
8.	List of Acronyms.....	53

1.1 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 MPC57xx family. High density connectors provide the interface between the EVB and MCU daughter cards as shown [Figure 1](#) See [Section 4&5](#), “

Introduction

Configuration — MPC5777C-416DS Daughter card, Configuration — MPC5777C-516DS Daughter card” for more details on the daughter cards and Section 6, “Board Interface Connector” for more details on the interface connectors.

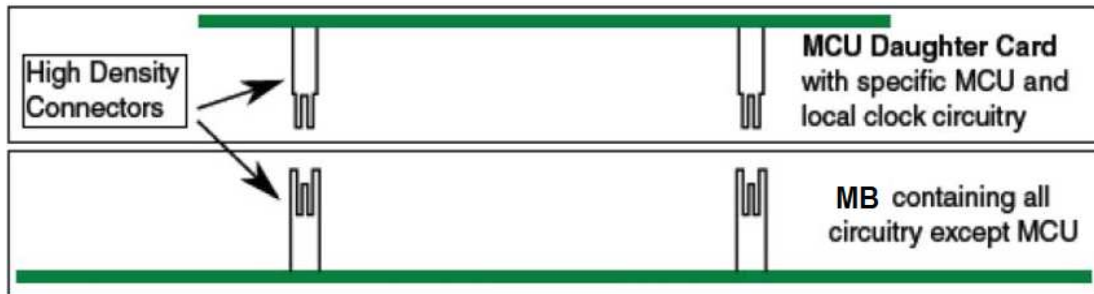


Figure 1: Modular concept – Mother Board (MB) and MCU daughter card

Please consult the MPC57xx website at www.freescale.com or speak to your Freescale representative for more details on the availability of MCU daughter cards.

The EVB is designed to be used with the motherboard and standalone configurations

NOTE

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

1.2 Daughter Card Availability

A number of compatible daughter cards are available for the motherboard across a number of devices. Table 1 gives an overview of daughter cards that can be used with MPC57xx motherboard (Part Number: MPC5746MMB) and associated MPC5777C devices, package sizes and part numbers.

Table 1: Daughter Card Overview

Daughter card number	Device	Package	Socket	Nexus
MPC5777C-416DS	MPC5777C	416 BGA	Yes	Yes
MPC5777C-516DS	MPC5777C	516 BGA	Yes	Yes

All daughter cards will be similar in design and concept. For details on the daughter cards please refer to Section 4&5, “

Introduction

[Configuration — MPC5777C-416DS Daughter card](#), [Configuration — MPC5777C-516DS Daughter card](#)".

2. 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 MPC57xx MCUs by utilizing MCU daughter cards
- Single 12 V external power supply input with four on-board regulators providing all of the necessary EVB and MCU voltages; power supplied to the EVB via a 2.1mm barrel style power jack or a 2-way level connector; 12 V operation allows in-car use if desired
- 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 0.1inch pitch headers
- RS232/SCI physical interface and standard DB9 connector
- LINFlexD interface , Ethernet interface
- 2 CAN interfaces, one configurable to be connected to one out of two CAN modules, and one connected to a dedicated third CAN module
- Variable resistor, driving between 5 V and ground
- 4 user switches and 4 user LEDs, freely connectable
- Liberal scattering of GND test points (surface mount loops) placed throughout the EVB

**Mother Board has FlexRAY connector, but this feature is not used on MPC5777C

The daughter cards provide the following features:

- MCU (soldered or through a socket)
- 40MHz onboard clock oscillator circuit in EVB for MCU Clocking
- User reset switch with reset status LEDs and Power Indication LEDs
- Standard 14-pin JTAG debug connector and 50-pin SAMTEC Nexus connector
- USB (Type B) / UART transceiver to interface with MCU
- Liberal scattering of ground and test points (surface mount loops) placed throughout the EVB
- Power SBC for standalone function of Daughter Card
- 1 CAN and 1 LIN connector supported by Power SBC

NOTE

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

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.

3. Configuration — Motherboard

This section details the configuration of each of the Mother Board functional blocks.

The Mother Board has been designed with ease of use in mind and has been segmented into functional blocks as shown in Figure 2 Detailed silkscreen legend has been used throughout the board to identify all switches, jumpers and user connectors.

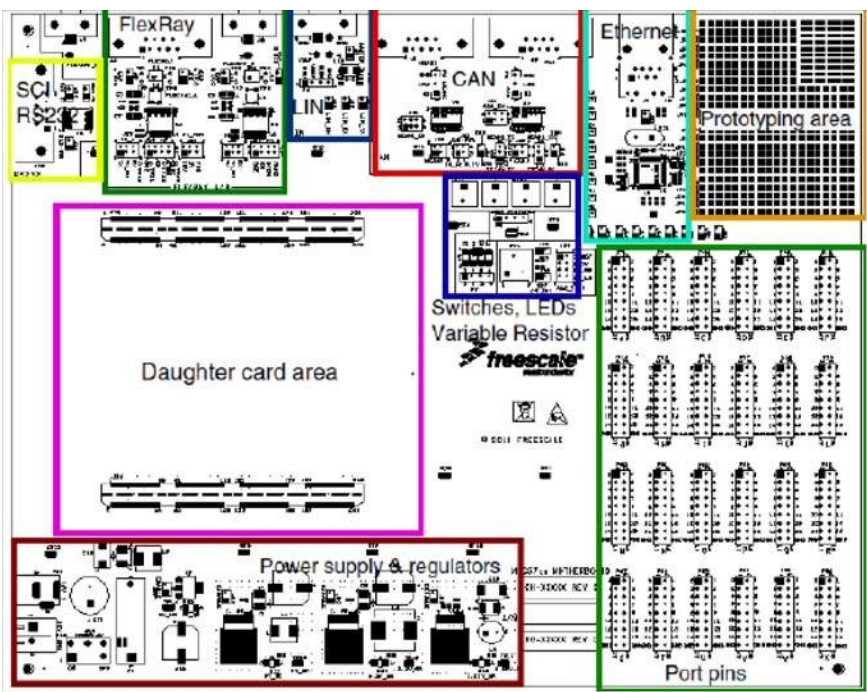


Figure 2: Mother Board - Functional Blocks

3.1 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, 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 Section 4.1.2, 4.1.3 “Daughter Card Standalone Power Input -External & Daughter Card Standalone Power Input –Power SBC” for details on the daughter card power input.

3.1.1 Motherboard Power Supply Connectors

2.1 mm Barrel Connector – P26:



Figure 3: 2.1 mm Power Connector

2-Way Lever Connector – P33:

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. Care must be taken to ensure correct connection.

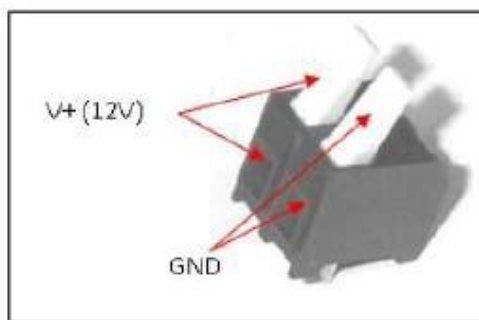


Figure 4: Lever Power Connector

3.1.2 Regulator Power Jumpers

There are four power regulator circuits on the MPC57xx motherboard that supply the required voltages to operate the MCUs:

- 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, debug and I/O
- 5V_LR: 5 V linear regulator for ADC supply and reference

All of the regulators have the option of being disabled/ enabled if they are not required. By default (jumpers are off), all of the 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 V linear regulator
- Disconnecting J58 enables the 5 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.

NOTE

Not all the supported daughter card MCUs require all the supplies to be switched on. Please refer to [Section 4](#),

[Configuration — MPC5777C-416DS Daughter card](#) for details.

3.1.3 Power Switch, Status LEDs and Fuse

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 20mm 1.5A fast blow fuse.

3.2 CAN Configuration

The EVB has two NXP TJA1041T high speed CAN transceivers and two standard DB9 connectors to provide physical CAN interfaces for the MCU.

The pinout of the DB9 connectors (J5/J6) is shown in [Figure 5](#).

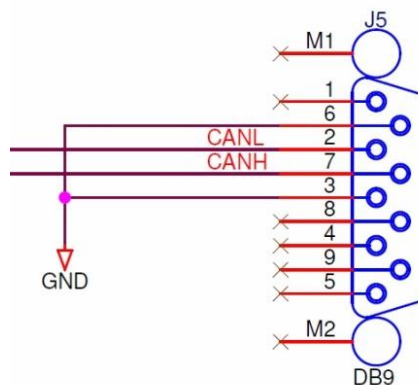


Figure 5: CAN DB9 connector Pin out

For flexibility, the CAN transceiver I/Os are also connected to two standard 0.1 in. connectors (P4 and P5) at the top side of the PCB. The pin-out for these connectors is shown in [Figure 6](#).

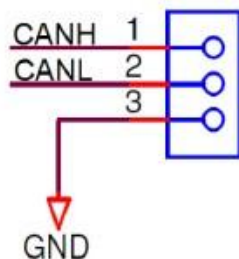


Figure 6: CAN 3pin header interface connector

By default the CAN interfaces are not enabled. To enable the CAN interfaces the jumpers detailed in [Table 2](#) need to be placed,

Table 2: CAN control jumpers

Jumper	Label	Description
J23	CAN2_EN	PHY U2 configuration 1-2: WAKE to GND 3-4: STB to 5V 5-6: EN to 5V
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: 12V to PHY U2 VBAT
J34	—	PHY U2 signal out 1: ERR 2: INH
J21	CAN_EN	PHY U1 configuration 1-2: WAKE to GND 3-4: STB to 5V 5-6: EN to 5V
J35	CAN	1-2: PHY TX to J37-2 3-4: PHY RX to J38-2
J37	CAN	PHY U1 TX to MCU 1-2: MCAN1 TX 2-3: TTCAN TX
J38	—	PHY U1 RX to MCU 1-2: MCAN1 RX 2-3: TTCAN RX
J36	—	PHY U1 signal out 1: ERR 2: INH

3.3 RS232 Configuration

DB9 connector J19 and TR3221 RS232 transceiver device provide a physical RS232 interface, allowing a direct RS232 connection to a PC or terminal.

The pin-out of these connectors is detailed in [Figure 7](#) Note that hardware flow control is not supported on this implementation.

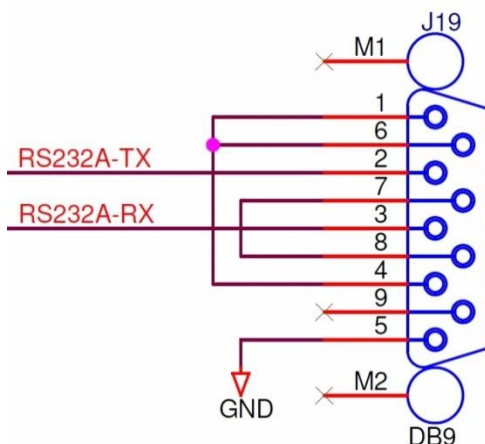


Figure 7: RS232 physical interface connector

On default the RS232 interface is not enabled. To enable the RS232 interface the user needs to place the jumpers detailed in [Table 3](#).

Table 3: RS232 control jumpers

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

3.4 LIN Configuration

The EVB is fitted with a Freescale MC33662LEF LIN transceiver (U50) and two different style connectors: A standard LIN Molex connector (J4) at the edge of the board and a standard 0.1 in. connector (P3).

The pin-out of the Molex connector J4 is shown in [Figure 8](#).

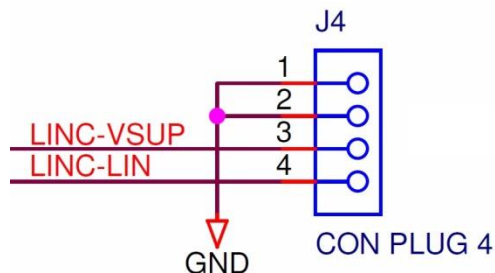


Figure 8: LIN Molex connector

For flexibility, the LIN transceiver is also connected to a standard 0.1 in. connector (P3) at the top side of the PCB as shown in Figure 9. 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 in. jumper shunt.

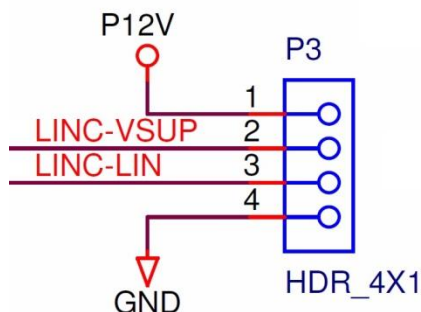


Figure 9: LIN 4pin header interface connector

By default the LIN interface is not enabled. To enable the LIN interface the jumpers detailed in Table 4 need to be placed.

Table 4: 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

3.5 Ethernet Configuration

The EVB is fitted with a standard RJ45 Ethernet connector (J7) and a DP83848C 10/100 Ethernet transceiver (U6).

By default, the Ethernet interface is enabled. The Ethernet interface the jumpers are detailed in

Table 5.

Table 5: Ethernet control jumpers

Jumpe	Description
J22	PHY power(3.3V_SR) 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

3.6 User Area

There is a rectangular prototype area on the EVB top right corner, consisting of a 0.1in. 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 0.1in. 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 5V onto the respective pins on 0.1in. Connector P6 when pressed. The switch outputs are pulled to GND via 10 kΩ.

Potentiometer RV1 can be connected to port pin PB[0] via J53 and is adjustable between GND and 5 V from the linear regulator. 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: 5.0V_SR_SR to PB[3]
- 7-8: 5V_LR to PB[4]

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

3.7 Test points — Motherboard

A number of test points of different shape and functionality is scattered around the EVB to allow easy access to MCU and reference signals. This chapter summarizes and describes the available test points. Motherboard test points are listed and detailed in [Table 6](#).

Table 6: Test Points- Mother Board

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

Configuration—Motherboard

Signal	TP name	Shape	Description
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	Unused
FRA-INH1	TP1	Pad	Unused
FRA-ERRN	TP2	Pad	Unused
FRA-RXEN	TP6	Pad	Unused
FRB-INH2	TP7	Pad	Unused
FRB-INH1	TP3	Pad	Unused
FRB-ERRN	TP4	Pad	Unused
FRB-RXEN	TP8	Pad	Unused
FR_DBG0	TP10	Pad	Unused
FR_DBG1	TP11	Pad	Unused
FR_DBG2	TP12	Pad	Unused
FR_DBG3	TP13	Pad	Unused
FEC 25MHz	TP9	Pad	Ethernet clock

4. Configuration — MPC5777C-416DS Daughter card

This section details the configuration of each of the MPC5777C-416DS daughter card’s functional blocks.

The daughter card has been designed with ease of use in mind and has been segmented into functional blocks as shown in Figure 10. Detailed silkscreen legend has been used throughout the board to identify all switches, jumpers and user connectors.

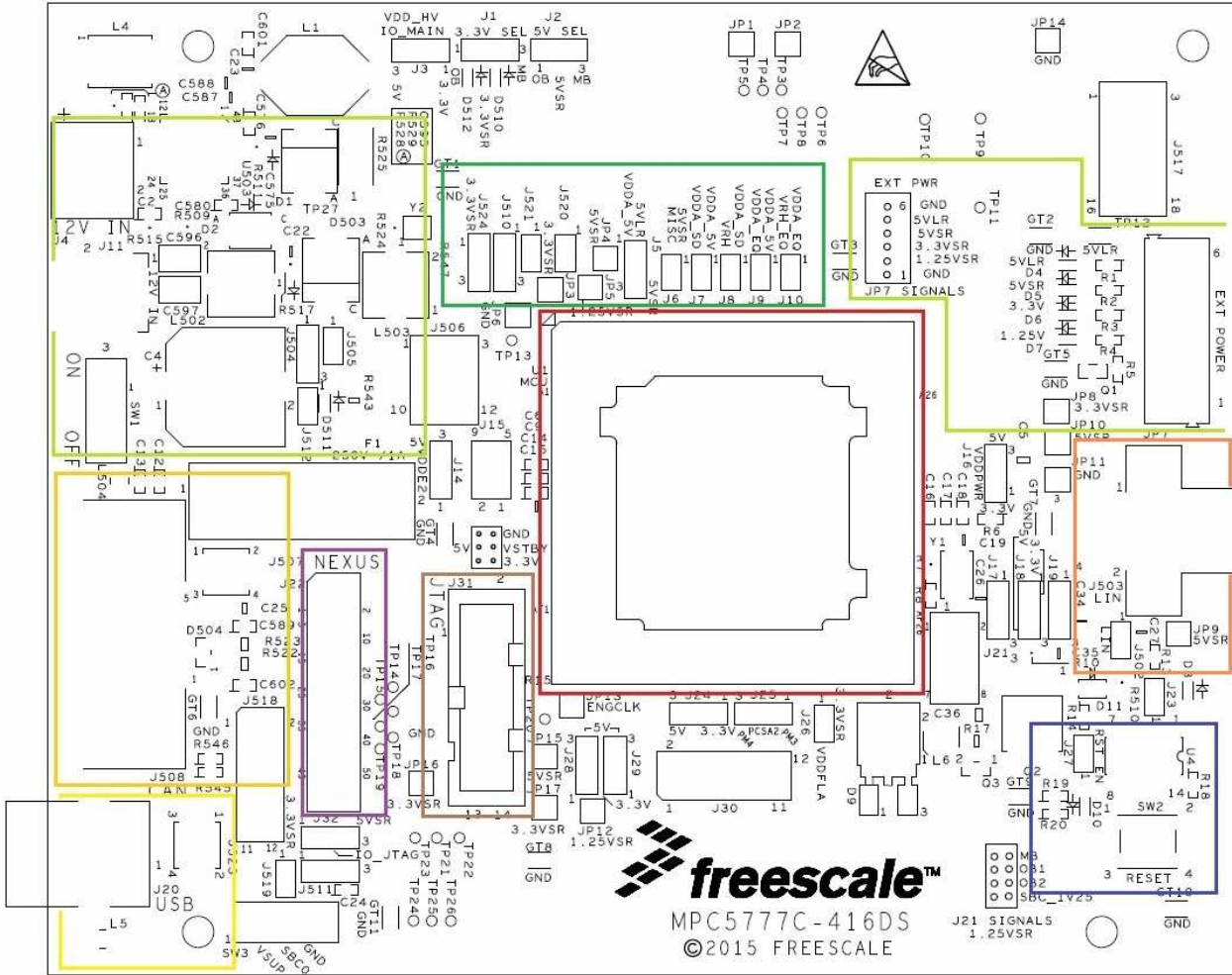


Figure 10: MPC5777C-416DS Daughter card — functional blocks

4.1 MCU Power

4.1.1 Supply Routing and Jumpers

The different MCU supplies are connected to the regulators on the Mother Board through the interface connector. Also daughter card has option to connect MCU supplies to either Mother Board supplies or onboard regulators. Figure 11 shows how the MCU power domains are connected to the regulators.

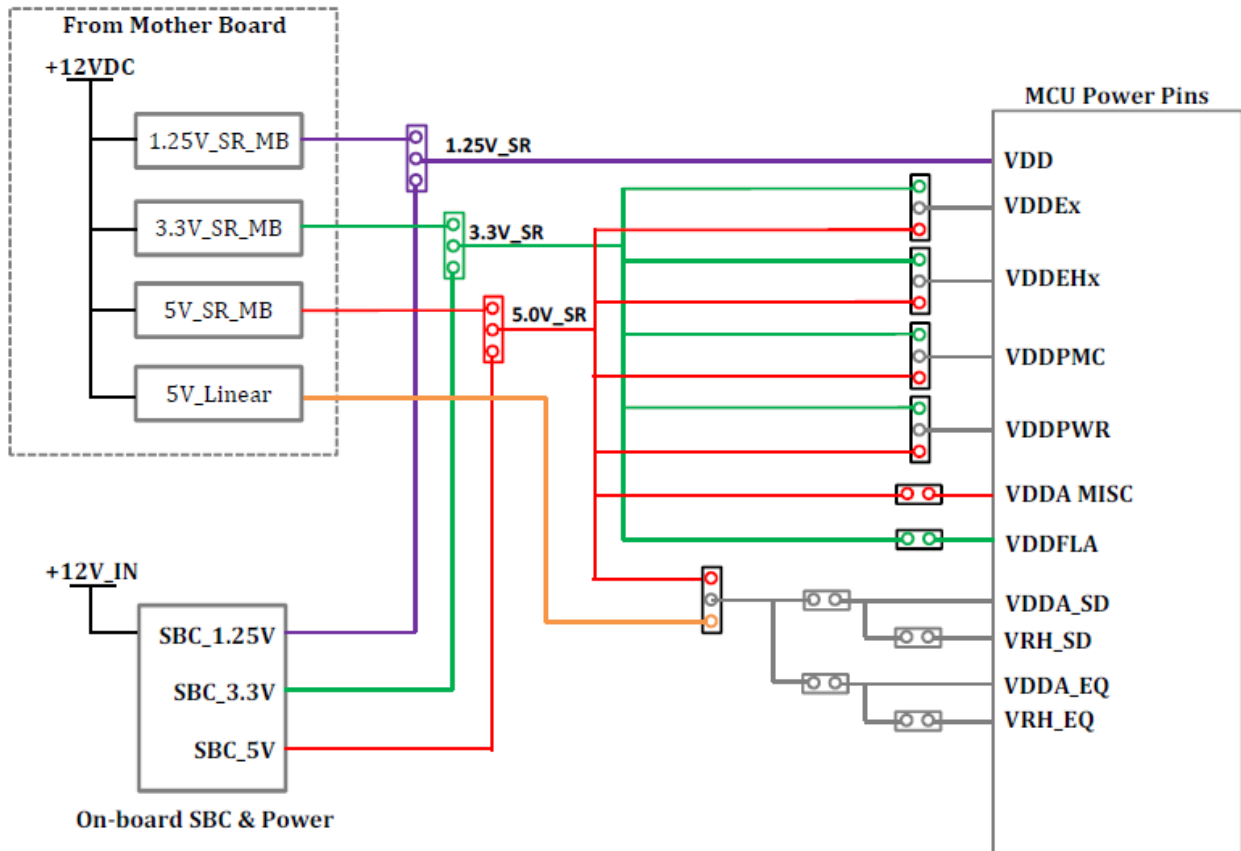


Figure 11: Daughter card power distribution

Available power supply modes of MPC577C are listed in [Table 7](#)

Table 7: Power modes of MPC5777C

Configuration	Mode Name	3.3V Flash Supply	1.2V Regulator controller	REGSEL	VDDFLA	VDDPMC&V DDPWR
Internal 3.3V Flash regulator with 1.2V linear regulator controller	LDO5V	Internal Regulator	Internal Linear Mode	Low/GND	Bypass caps	External 5V supply
Internal 3.3V regulator with 1.2V SMPS regulator controller	SMPS5V	Internal Regulator	Internal SMPS	High/5V	Bypass caps	External 5V supply
External 3.3V regulator with internal 1.2V linear regulator controller	LDO3V	External	Internal Linear Mode	Low/GND	External 3.3V supply	External 3.3V supply
External 3.3V regulator with internal 1.2V SMPS regulator controller	SMPS3V	External	Internal SMPS	High/3.3V	External 3.3V supply	External 3.3V supply
External supplies with on-chip low voltage detect	External	External	External Supply	Low/GND	External 3.3V supply	External 3.3V supply
External supplies, except flash powered by internal regulator	External	Internal Regulator	External Supply	Low/GND	Bypass caps	External 5V supply

Jumper options to achieve the above power supply modes are shown in [Table 8](#):

Table 8: Jumper options for various power modes

Mode name	J17 (REGSEL_TO_GND)	J26 (VDDFLA_SEL)	J16 (VDDPWR_SE L)	J18 (VDDPMC_SE L)	J19 (REGCTL_SE L)	J21 (1V25_SR_MB_SEL)
LDO5V	2&3 -GND	OPEN - Bypass caps	2&3 - 5V_SR	2&3 - 5V_SR	2&3 for LV Linear Regulator	3&4 for 1.25V_SR_OB1 (LR)
SMPS5V	1&2 - HIGH - 5V	OPEN - Bypass caps	2&3 - 5V_SR	2&3 - 5V_SR	1&2 for LV SPMS	5&6 for 1.25V_SR_OB2(SR)
LDO3V	2&3 -GND	CLOSED - VDDPWR& VDDPMC	1&2 - 3V3_SR	1&2 - 3V3_SR	2&3 for LV Linear Regulator	3&4 for 1.25V_SR_OB1 (LR)
SMPS3V	1&2 - HIGH - 3V3	CLOSED - VDDPWR& VDDPMC	1&2 - 3V3_SR	1&2 - 3V3_SR	1&2 for LV SPMS	5&6 for 1.25V_SR_OB2(SR)
External	2&3 -GND	CLOSED - VDDPWR& VDDPMC	1&2 - 3V3_SR	1&2 - 3V3_SR	N/C	1&2 for 1.25V_SR_MB 7&8 for SBC_1V25
External	2&3 -GND	OPEN - Bypass caps	2&3 - 5V_SR	2&3 - 5V_SR	N/C	1&2 for 1.25V_SR_MB 7&8 for SBC_1V25

The connection of any power domain to a regulator has to be enabled by a dedicated jumper as described in [Table 9](#).

Table 9: MCU power selection jumpers

Jumper	Description	Jumper Setting (* - Default)
J1	3.3V Selection	1-2: 3.3V from onboard Power SBC 2-3: 3.3V from Mother Board*
J2	5V Selection	1-2: 5V from onboard Power SBC 2-3: 5V from Mother Board*
J3	IO Levels in the Mother Board - VDD_HV_IO_MAIN	1-2: Select 3.3V 2-3: Select 5V*
J5	ADC Analog Supply Selection	1-2: Select 5V from Linear Regulator* 2-3: Select 5V from Switching Regulator
J6	Connect TRNG, Internal RC oscillator Supply - VDDA_MISC	1-2: Connect VDDA_MISC to 5V_SR*
J7 & J8	Connect SD ADC supply & Reference –VDDA_SD, VRH_SD	J7, 1-2: Connect VDDA_SD* J8, 1-2: Connect VRH_SD*
J9 & J10	Connect eQADC supply & Reference – VDDA_EQ, VRH_EQ	J9, 1-2: Connect VDDA_EQ* J10, 1-2: Connect VRH_EQ*
J14	Fast I/O Pads supply selection - VDDE2	1-2: Select 3.3V* 2-3: Select 5V
J15	RAM Standby supply selection -VSTBY	1-3: Select 3.3V 5-3: Select GND* 4-3: Select 5V
J16	SMPS Driver Supply Selection - VDDPWR	1-2: Select 3.3V 2-3: Select 5V*
J17	Core Supply generation, Regulation Mode - REGSEL	1-2: Select SMPS Configuration (VDD_PMC) 2-3: Select Linear Configuration (GND)*
J18	PMC Supply Selection – VDDPMC	1-2: Select 3.3V 2-3: Select 5V*
J19	Core Supply generation, Regulator Control -REGCTL	1-2: Select SMPS to derive (1.25V_SR_OB2) 2-3: Select Linear to derive (1.25V_SR_OB1)*
J21	VDD Core Supply Selection	1-2: 1.25V from Mother Board* 3-4: 1.25V onboard Regulator (Linear Mode) 5-6: 1.25V onboard Regulator (Switching Mode) 7-8: 1.25V from onboard Power SBC
J24	Medium I/O Pads supply selection – VDDEH3A	1-2: Select 3.3V 2-3: Select 5V*
J26	Connect Flash Core Supply - VDDFLA	1-2: Connect VDDFLA to 3.3V_SR
J28	Fast I/O Pads supply selection - VDDE2A	1-2: Select 3.3V* 2-3: Select 5V
J29	Medium I/O Pads supply selection - VDDEHx	1-2: Select 3.3V 2-3: Select 5V*

Jumper	Description	Jumper Setting (* - Default)
J30	Medium I/O Pads supply enable – VDDEHx	1-2: Connect VDDEH1* 3-4: Connect VDDEH3* 5-6: Connect VDDEH4* 7-8: Connect VDDEH5* 9-10: Connect VDDEH6* 11-12: Connect VDDEH7* All jumpers in J30 placed by Default
J32	JTAG IO Level - VDD_HV_IO_JTAG	1-2: Select 3.3V* 2-3: Select 5V
J520	Connect LED for ETPUA0	1-2: Connect LED with Signal ETPUA0*
J521	Connect LED for ETPUA1	1-2: Connect LED with Signal ETPUA1*

4.1.2 Daughter Card Standalone Power Input -External

A terminal power input is provided on the daughter card to enable use of the daughter card without the motherboard.

When power is applied to the Daughter Card from Motherboard or External Terminal input or PowerSBC with respective jumper selection, four green power LEDs adjacent to the terminal power input connector (JP7) show the presence of the supply voltages as follows:

- LED D4 – Indicates that the 5.0 V linear regulator is enabled and working correctly
- LED D5 – Indicates that the 5.0 V switching regulator is enabled and working correctly
- LED D6 – Indicates that the 3.3 V switching regulator is enabled and working correctly
- LED D7 – Indicates that the 1.25 V switching regulator is enabled and working correctly

The connections of the JP7 power terminal are detailed in [Figure 12](#).

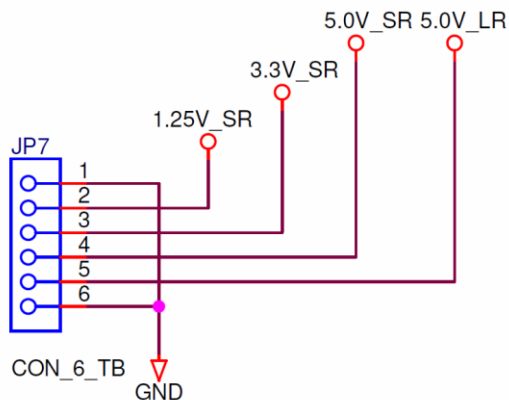


Figure 12: Terminal power input connections

4.1.3 Daughter Card Standalone Power Input –Power SBC

Daughter Card has been designed to have onboard Power System Basis Chip (SBC), [MC33908LAE](#). This chip adds following options in the card,

- SMPS Pre-regulators
- Linear Regulators
- SPI Interface
- Fail Safe Output
- RESET output to MCU (RSTB)
- Interrupt Pulses to MCU (INTB)
- High Speed CAN Transceiver
- LIN Transceiver
- Debug Mode

Power Switch SW1 should be in ON position to use Daughter card in standalone mode which enables the use Power SBC supplies to MCU power domain.

The connection of any power domain and interfaces to Power SBC has to be enabled by respective jumper as described in [Table 10](#).

Table 10: MCU power selection jumpers with PowerSBC

Jumper	Description	Jumper Setting
J1	3.3V Selection	1-2: 3.3V from onboard Power SBC to MCU
J2	5V Selection	1-2: 5V from onboard Power SBC to MCU
J5	ADC Analog Supply Selection	2-3: Select 5V from Switching Regulator
J21	VDD Core Supply Selection	7-8: 1.25V from onboard Power SBC to MCU
J504 & J505	PowerSBC VCCA selection & Current Driving Capability	<u>J504: 2-3, J505:1-2:</u> SBC_3V3 with External PNP Transistor (upto 300mA) <u>J504: 1-2, J505: Open:</u> SBC_3V3 with internal MOSFET (up to 100mA)
J511	MISO Buffer Supply (SPI Bus level to connect with MCU)	1-2: Select SBC 3.3V 2-3: Select SBC 5V*
J512	SBC Debug Mode	Open: Normal Operation Short: Enters into Debug Mode at Start-up
J517	SPI Bus Selection from SBC/ Mother Board	<u>Connect Power SBC SPI to MCU:</u> 1-2, 4-5, 7-8, 10-11, 13-14, 16-17 <u>Connect MB SPI to MCU:</u> 3-2, 6-5, 7-8, 12-11, 15-14
J523	SBC RESET & Interrupt Signals	1-2: Connect SBC Interrupt to MCU 3-4: Connect SBC RESET Output to MCU

NOTE

The PowerSBC does not connect to the 5.0V_LR power rail which is powered by 5 V linear regulator when used with the motherboard. This rail is powering the VDDA_SD & VDDA_EQ (ADC supply) and VRH_SD, VRH_SEQ (ADC reference voltage). When using the daughter card standalone (without the motherboard) it is required to connect the 5.0V_LR and the 5.0V_SR rail as mentioned in Table 10 in order for the microcontroller to come out of reset.

Power SBC has High Speed CAN Transceiver & LIN Transceiver. CAN bus from SBC is terminated with DB9 connector (J508) and LIN is terminated with 4-pin Molex connector (J503) in the Daughter Card.

The connections of the J508 (CAN) from PowerSBC are detailed in Figure 13.

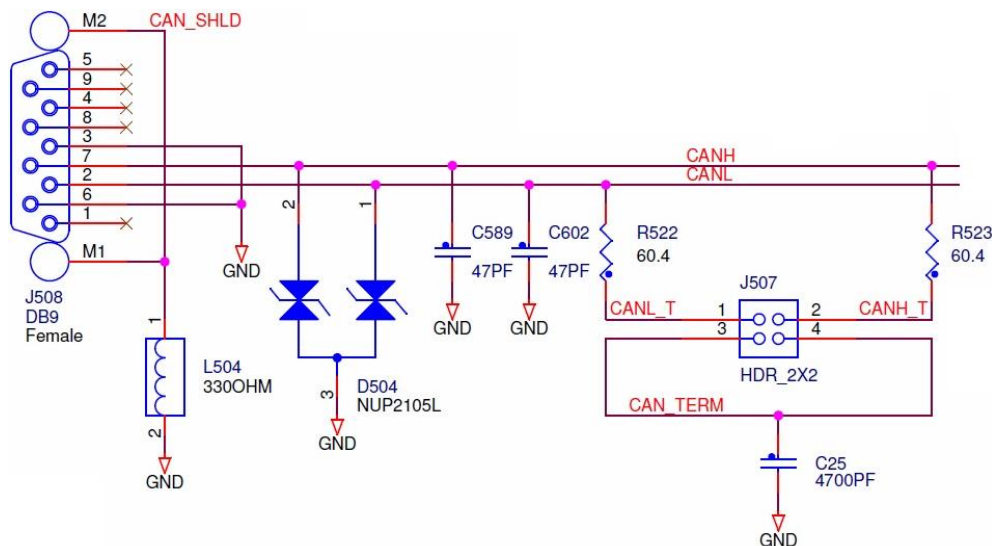


Figure 13: PowerSBC CAN Bus Circuit

The connections of the J503 (LIN) from PowerSBC are detailed in Figure 14.

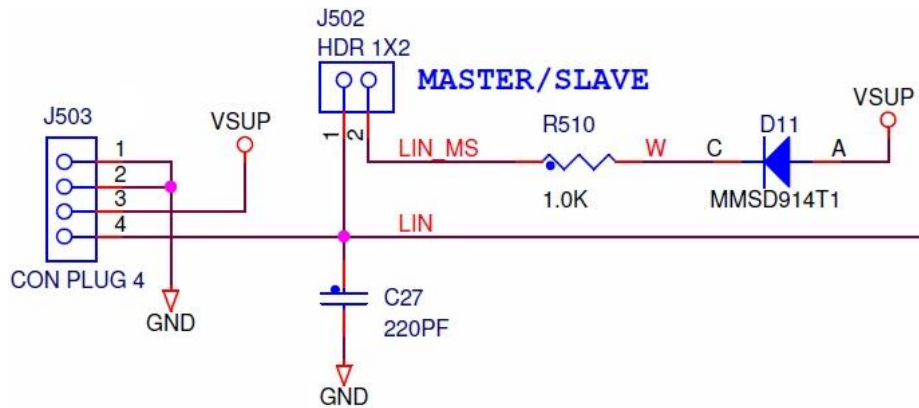


Figure 14: PowerSBC LIN Interface

The connection of CAN and LIN interface from Power SBC to MCU has to be enabled by respective jumper as described in [Table 11](#).

Table 11: PowerSBC CAN & LIN jumper selection

Jumper	Description	Jumper Setting (* - Default)
J502	LIN Master/Slave Selection	1-2: Master Mode* Open: Slave Mode
J506	CAN/LIN Selection SBC/ Mother Board	2-3, 5-6 : Select CAN from Mother Board* 8-9, 11-12: Select LIN from Mother Board* 1-2, 4-5 : Select CAN from PowerSBC 7-8, 10-11: Select LIN from PowerSBC
J507	CAN Termination	1-3: Enable CANL Termination* 2-4: Enable CANH Termination*

4.2 Reset Circuit

To enable standalone use, the reset circuitry is placed on the daughter card. It consists of a reset switch (SW2) that is connected to reset pins RESET_B via jumpers. It is also connected to the signal RST-SW_B that is connected to the mother board to reset peripherals and RST_B from PowerSBC is connected to MCU RESET_B via jumper in order to assert RESET from PowerSBC. RSTOUT_B from MCU is connected with LED to indicate the individual reset situations.

Due to the existence of chip internal Low Voltage Detect (LVD) and High Voltage Detect (HVD) circuits the EVB does not provide external voltage monitoring.

The EVB reset circuit provides the following functionality: It is indicated if the device is in reset through the red LED D8. The reset switch SW2 can be used to reset the MCU. The reset switch signal is connected to the MCU reset signals RESET (through jumper J23, J27) and the connections can be released by lifting the respective jumper. Pushing the reset switch will also reset peripherals that are connected to the board reset signal RST-SW. Orange LED D10 indicates when this signal is driven low by the reset switch (SW2).

Additionally Power SBC has option to reset the MCU by setting jumper J523 (3-4). Various jumpers setting to reset MCU are detailed in [Table 12](#).

Table 12: Reset circuit jumper settings

Jumper	Description	Jumper Setting
J23 & J27	Connect reset switch circuit to RESET pin	1-2: connect to MCU RESET_B
J523	Connect Power SBC reset to MCU Reset	3-4: SBC_RSTB connect to RESET_B

4.3 MCU External Clock Circuit

In addition to the internal 16 MHz oscillator, the MCU can also be clocked by external oscillator (Y1). The clock circuitry for the 40 MHz crystal is shown in Figure 15.

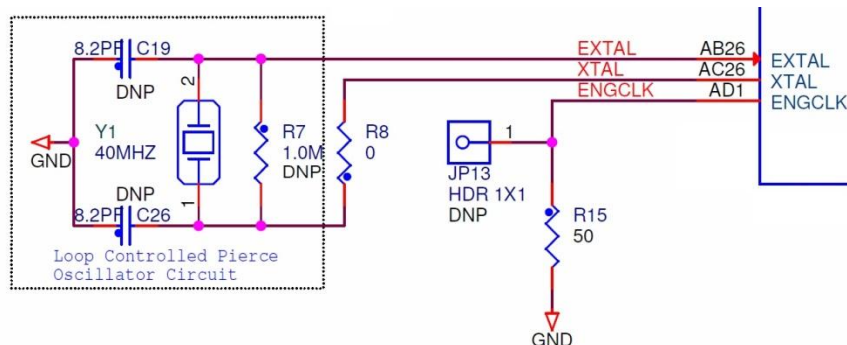


Figure 15: 40 MHz crystal circuit

4.4 JTAG Connector

The EVB is fitted with 14-pin JTAG debug connector. The Figure 16 shows the 14-pin JTAG connector pinout (0.1in. keyed header). Jumper J32 sets VDD_HV_IO_JTAG to either 3.3V or 5V supply. JTAG jumper setting is detailed in Table 13.

Table 13: JTAG jumper settings

Jumper	Description	Jumper Setting
J32	JTAG Power	1-2: Connect 3.3V to VDD_HV_IO_JTAG 2-3: Connect 5.0V to VDD_HV_IO_JTAG

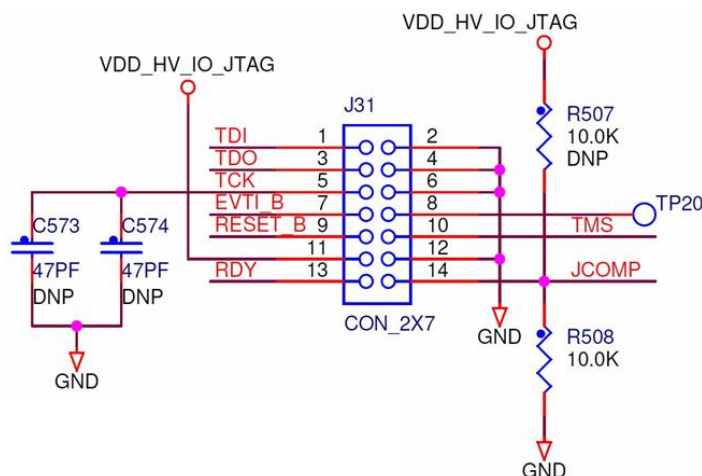


Figure 16: JTAG connector point