

Hexagon Application Kit

For XMC4000 Family

COM_ETH-V1

Ethernet/CAN/RS485 Interface Card

Board User's Manual

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Introduction

This document describes the features and hardware details of the Ethernet/CAN/RS485 Interface Card (COM_ETH-V1) designed to work with Infineon's XMC4500 CPU board. This board is part of Infineon's Hexagon Application Kits.

1 Overview

The COM_ETH-V1 board is an application expansion satellite card of the Hexagon Application Kits. The satellite card along with a CPU board (e.g. CPU_45A-V2 board) demonstrates the communication capabilities of XMC4500. The main use case for this satellite card is to demonstrate the communication features of XMC4500 device including the toolchain. The focus is safe operation under evaluation conditions. The satellite card is not cost optimized and cannot be seen as reference design.

1.1 Key Features

The COM_ETH-V1 satellite card is equipped with following features

- Connection to CPU board (e.g. CPU_45A-V2) via satellite connector COM
- 10/100Mbps Ethernet (RJ45)
- CAN transceiver with CAN connector (DE-9 male)
- RS-485 transceiver, full-duplex, bootable (DE-9 female)
- CAN transceiver, bootable (4-pin header)
- I2C based IO expander with 8 channels
- Power supply
 - Powerjack for external 24 V supply
 - From CPU board via COM satellite connector

1.2 Block Diagram

Figure 1 shows the block diagram of the COM_ETH-V1 satellite card. There are following building blocks:

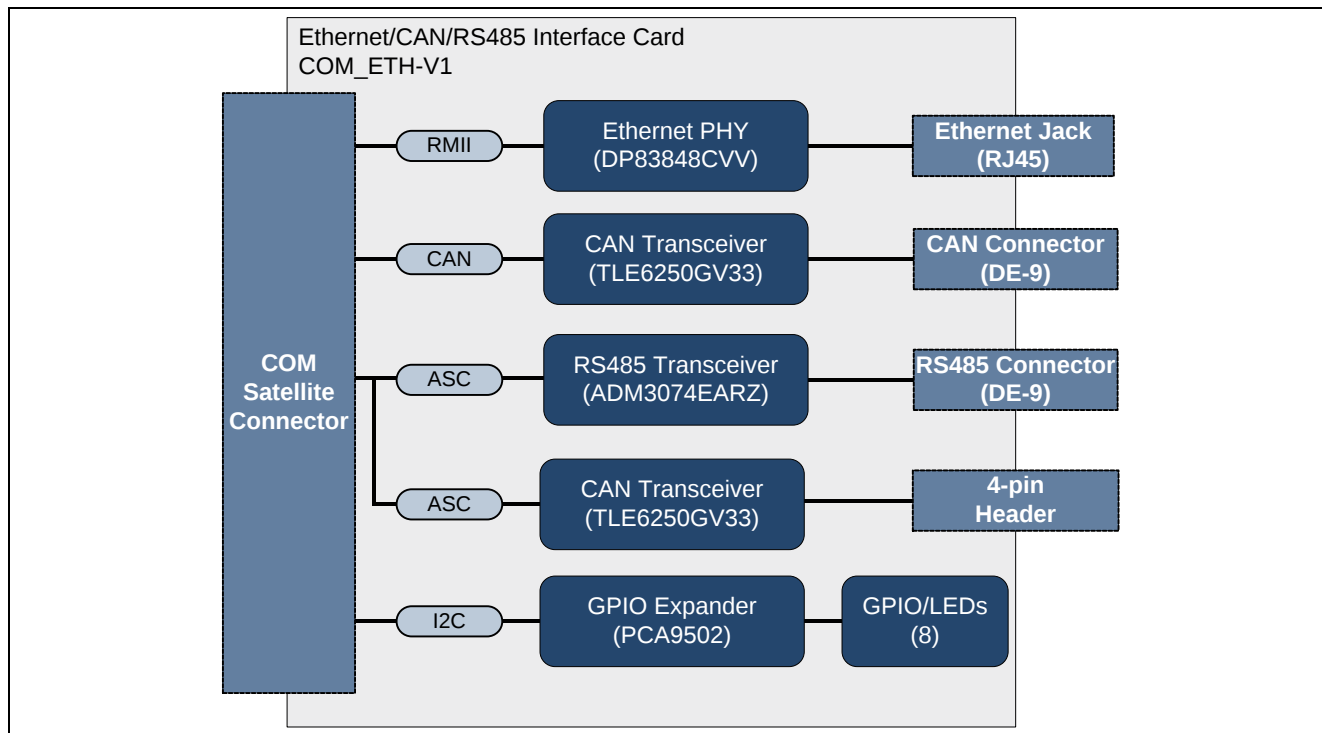


Figure 1 Block Diagram of the Ethernet/CAN/RS485 Interface Card

2 Hardware Description

The following sections give a detailed description of the hardware and how it can be used.

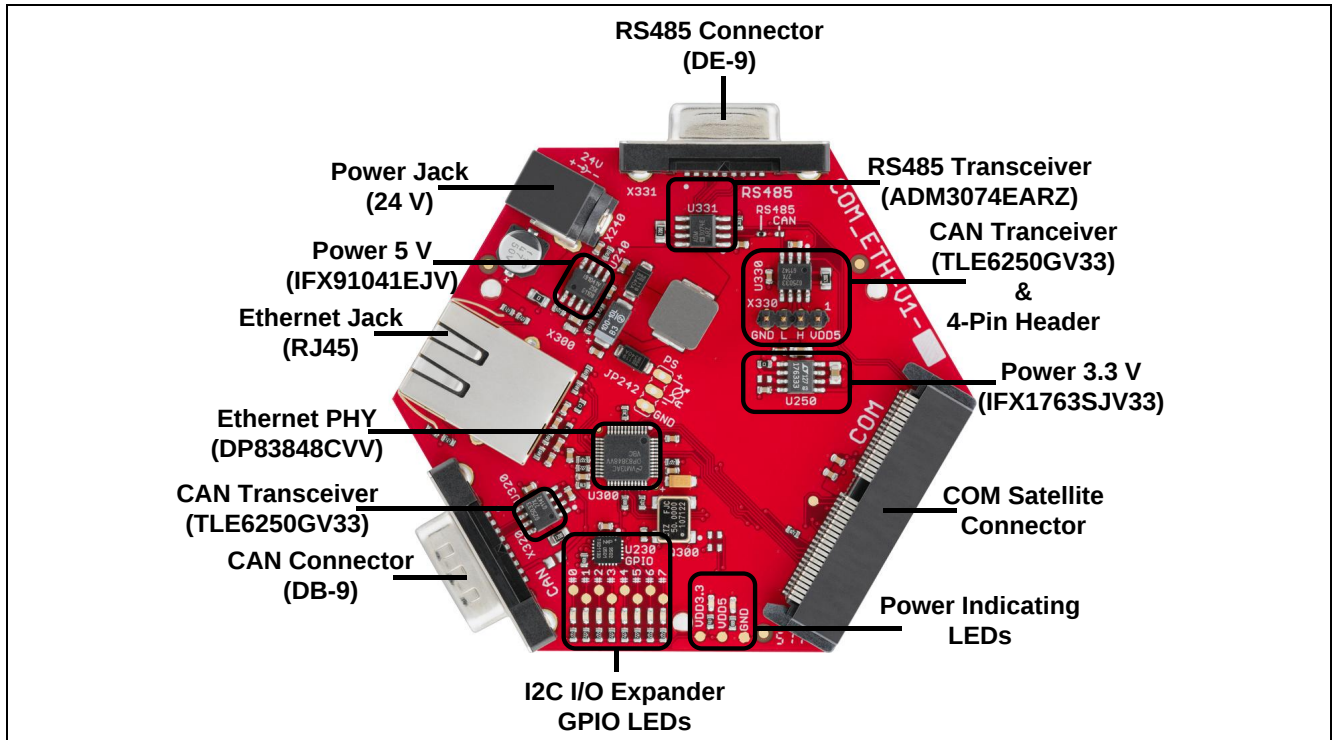


Figure 2 Ethernet/CAN/RS485 Interfaces Card (COM_ETH-V1)

2.1 Ethernet

The COM_ETH-V1 satellite card supports RJ45 jack with magnetic on board for communication to LAN. On board PHY device DP83848CVV is connected to the CPU via a RMII.

A 50 MHz crystal oscillator is used on board to generate the clock required by the RMI interface.

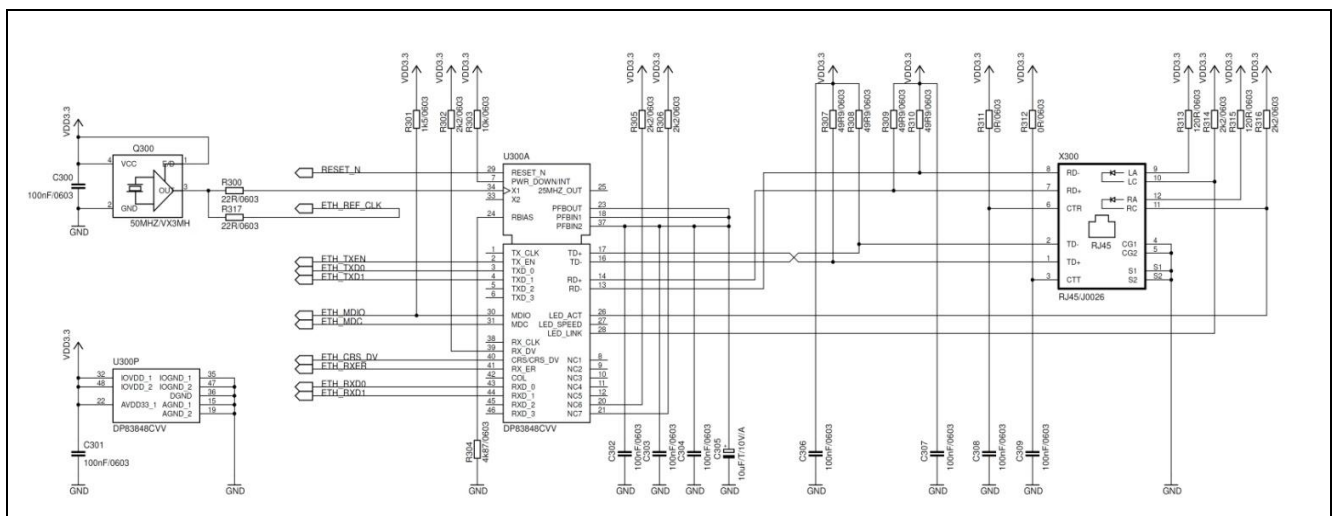


Figure 3 Ethernet Interface

Table 1 below gives the signal details of RJ45 connector.

Table 1 RJ45 Connector Pinout

Pin No.	Signal Name	Description
1	TD+	Tranmit Data Plus
2	TD-	Tranmit Data Minus
3	RD+	Receive Data Plus
4	NC	No Connection
5	NC	No Connection
6	RD-	Receive Data Minus
7	NC	No Connection
8	NC	No Connection

Table 2 shows the connection of the Ethernet signals to the COM satellite connector.

Table 2 Ethernet signal connection to the Satellite Connector

Pin No.	Signal Name	Description
22	ETH_REF_CLK	Clock
21	ETH_TXD0	Tansmit Data 0
14	ETH_TXD1	Tansmit Data 1
16	ETH_TXEN	Tansmit Enable
15	ETH_RXD0	Receive Data 0
13	ETH_RXD1	Receive Data 1
18	ETH_CRS_DV	Receive Data Valid
20	ETH_RXER	Receive Error
19	ETH_MDC	Management Clock
17	ETH_MDIO	Management Data

2.2 CAN

The COM_ETH-V1 satellite card supports a CAN interface on board via a DE-9 connector (X320). A CAN transceiver (U320) is connected to the CPU via the 80-pin satellite connector.

The CAN bus on board has a 120 Ohm termination resistor.

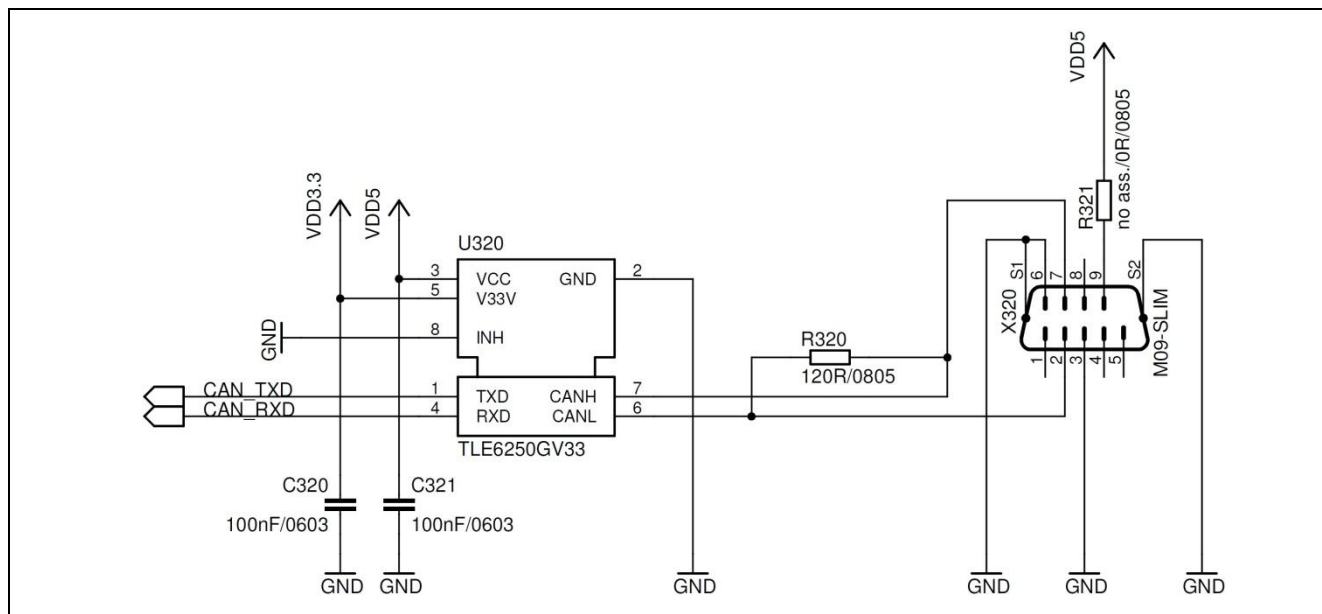


Figure 4 CAN Interface

Table 3 gives the details of CAN connector pin mapping.

Table 3 CAN Connector Pinout (X320)

Pin No.	Signal Name	Description
1	NC	No Connection
2	CANL	CAN Low
3	GND	Ground
4	NC	No Connection
5	NC	No Connection
6	GND	Ground
7	CANH	CAN High
8	NC	No Connection
9	VDD	5 V

Table 4 shows the connection of the CAN signals to the COM satellite connector.

Table 4 CAN signal connection to the Satellite Connector

Pin No.	Signal Name	Description
28	CAN_TXD	CAN Transmit Data
30	CAN_RXD	CAN Receive Data

2.3 RS485/CAN Boot Loader

The COM_ETH-V1 satellite card supports RS485 interface via a DE-9 connector (X331). The satellite card uses a RS485 transceiver (U331) connected to the CPU via the 80-pin satellite connector.

Table 5 gives the details of RS485 connector pin mapping.

Table 5 RS485 Connector Pinout (X331)

Pin No.	Signal Name	Description
1	NC	No Connection
2	TX+	Transmit Data Plus
3	GND	Ground
4	RX+	Receive Data Plus
5	NC	No Connection
6	NC	No Connection
7	TX-	Transmit Data Minus
8	RX-	Receive Data Minus
9	NC	No Connection

The COM satellite card supports booting of the CPU via RS485 (default) or CAN. Boot option can be chosen using the solder jumpers SJ1/SJ2. SJ2 (RS485) is closed by default. For booting through CAN use connector X330, for booting through RS485 use connector X331.

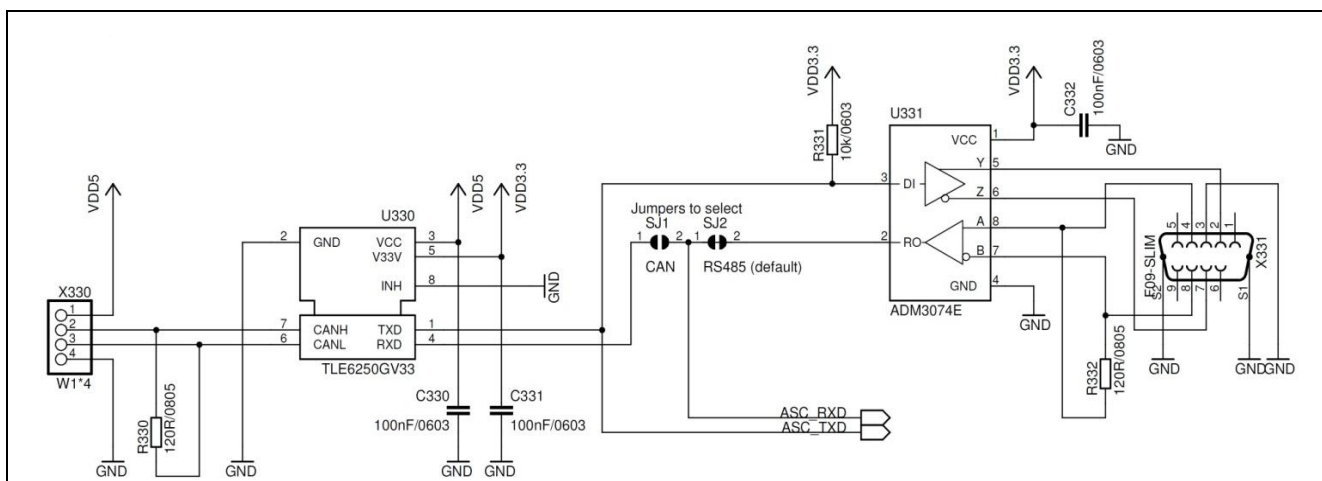


Figure 5 RS485/CAN BootLoader

Table 6 CAN Connector Pinout (X330)

Pin No.	Signal Name	Description
1	VDD	5 V
2	CANH	CAN High
3	CANL	CAN Low
4	GND	Ground

Both RS485 as well as CAN bus have a 120 Ohm termination resistor.

Table 7 shows the connection of the RS485/CAN signals to the COM satellite connector.

Table 7 RS485/CAN signal connection to the Satellite Connector

Pin No.	Signal Name	Description
29	ASC_TXD	ASC Transmit Data
27	ASC_RXD	ASC Receive Data

2.4 IO Expander

The COM_ETH-V1 satellite card supports GPIO expansion through I2C IO-Expander on board (U230). The I2C address for the IO expander device is 0x1001100X. The satellite card supports 8 such GPIO's. All the GPIO's are connected to LEDs (V230-V237) and SMD-Pads (TP230 – TP237). The table below gives the GPIO channel and corresponding LED/PAD mapping.

Table 8 GPIO channel LED/SMD pad mapping

GPIO	LED reference	SMD pad Reference
GPIO0	V230	TP230
GPIO1	V231	TP231
GPIO2	V232	TP232
GPIO3	V233	TP233
GPIO4	V234	TP234
GPIO5	V235	TP235
GPIO6	V236	TP236
GPIO7	V237	TP237

Table 9 shows the connection of the IO Expander device to the COM satellite connector.

Table 9 IO Expander I2C signal connection to the Satellite Connector

Pin No.	Signal Name	Description
38	I2C_SCL	I2C Clock
37	I2C_SDA	I2C Data

2.5 Power

The COM_ETH-V1 satellite card can be supplied by an external power supply (24 V / 1 A) to be connected to the power jack X240 or by a 5 V supply via the 80-pin COM satellite connector. An external power supply is necessary only in case the current coming via the COM satellite connector is not sufficient.

A DC-DC converter on board (U240) steps down the input voltage from the power jack X240 to 5 V (VDD5). The input voltage can be in the range from 12 V to 24 V. An on board linear voltage regulator is generating a 3.3 V (VDD3.3) power supply out of the VDD5.

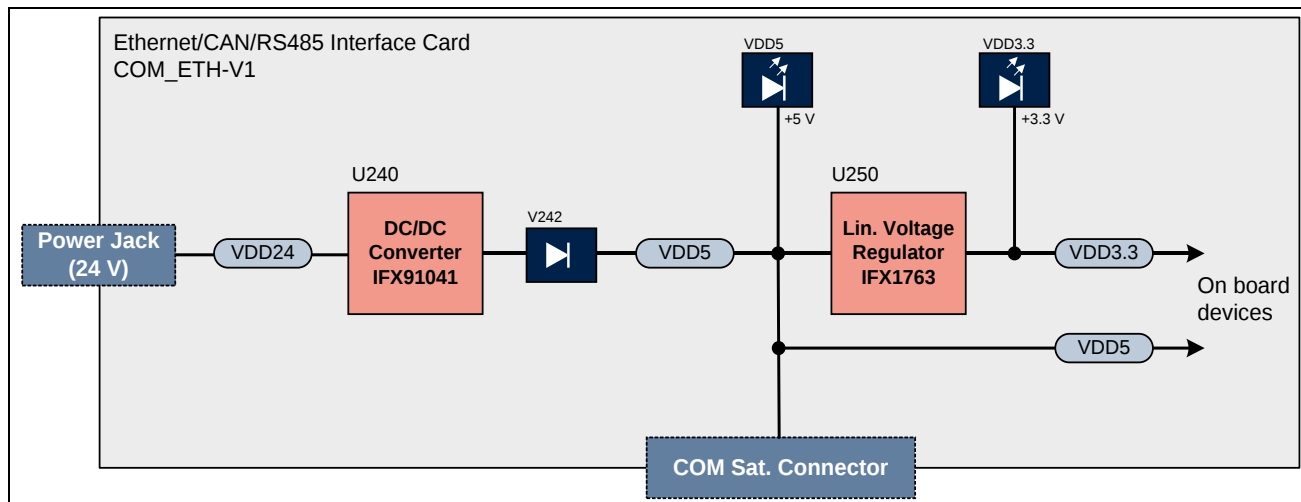


Figure 6 Power Circuit

A Diode V242 protects the reverse flow of current to an external source. Therefore a simultaneous power supply of the satellite boards via both the power jack and the satellite connector with not harm.

LED V210 indicates the presence of 5 V power and LED V211 indicates the presence of 3.3 V power.

Table 10 Power LED's

LED	Power Rail	Voltage	Note
V210	VDD5	5 V	Must always be "ON"
V211	VDD3.3	3.3 V	Must always be "ON"

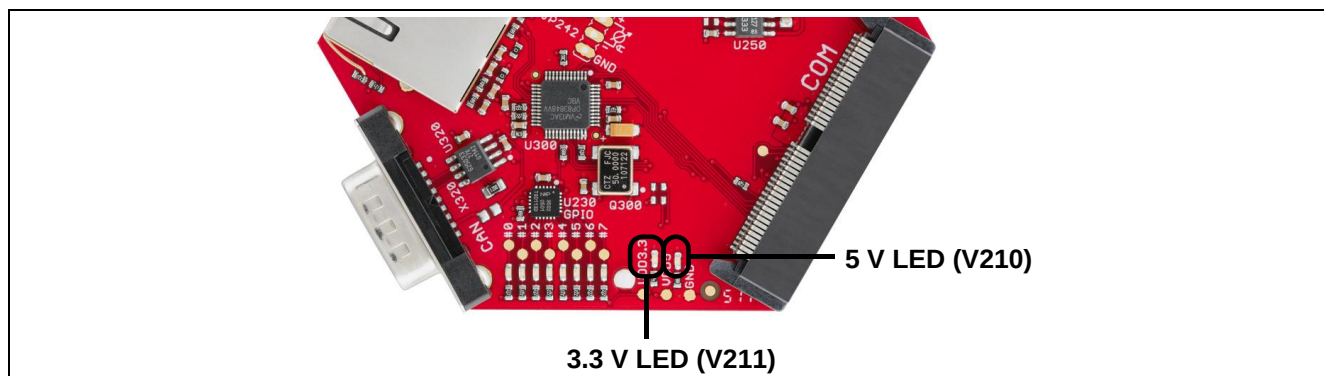


Figure 7 Power LED's

The COM_ETH-V1 satellite card supports a PowerScale probe for power measurement purpose.

Table 11 PowerScale Jumper

Jumper	Function	Description
JP242	PowerScale	At this point a Hitex PowerScale probe can be connected for current sensing VDD (complete power delivered by U240) Default: pos. 1-2 (closed) <i>Note: On the PCB bottom side there will be a shorting trace between pin 1-2. This trace has to be cut first, before using PowerScale</i>

Table 12 shows the power connection to to the COM satellite connector.

Table 12 Power connection to the Satellite Connector

Pin No.	Signal Name	Description
43,44,45,46	VDD5	5 V
1,2,24,61,79,80	GND	Ground

2.6 Satellite Connector

The satellite connector of the COM_ETH-V1 satellite card interfaces it's the signals to a CPU board e.g. CPU_45A-V2. Take care to connect the COM satellite card always to the corresponding COM satellite connector of the CPU board only.

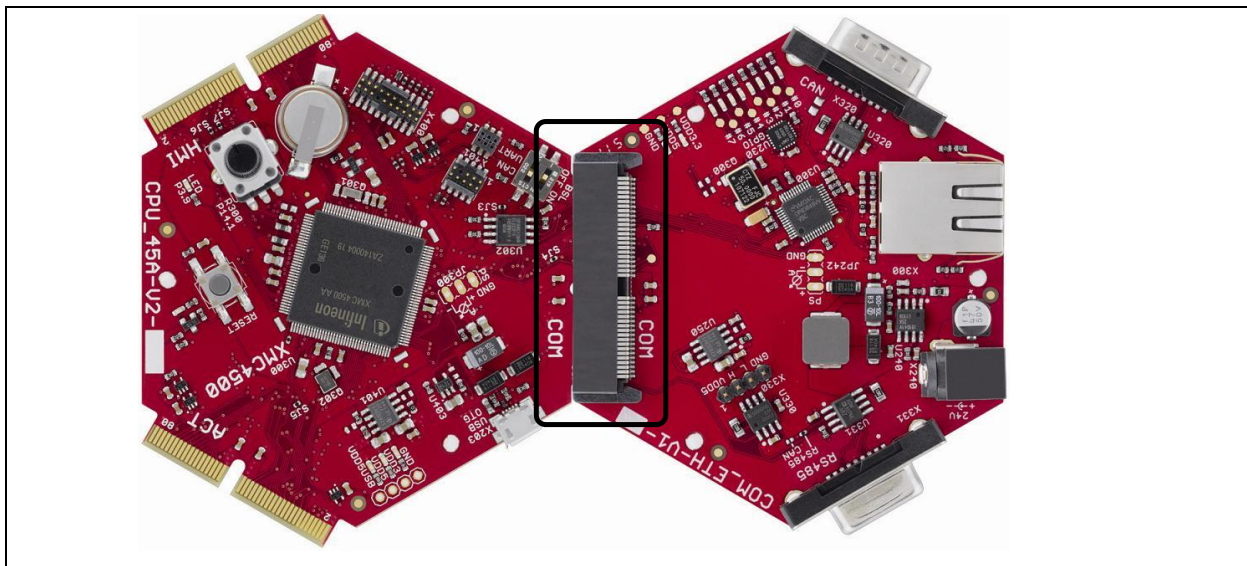


Figure 8 COM Satellite Connector

The signal mapping details of the COM satellite connector and the corresponding CPU function are provided in Figure 9

CPU_45A V2 function >>	COM	Connector pins >>	CPU_45A V2 function >>
GND	1	GND	GND
U1C1_SCLKOUT	2	qSPI_D0	U1C1_SCLKOUT
U1C1_SEL00	3	qSPI_D1	U1C1_SEL00
U1C1_SEL01	4	qSPI_D2	U1C1_SEL01
nc	5	qSPI_D3	nc
nc	6	RSVD	nc
ETH_RXD1A	7	RSVD	ETH_RXD1A
ETH_RXD0A	8	ETH_RMII	ETH_RXD0A
ETH_MDO	9	ETH_RMII	ETH_MDO
ETH_MDC	10	ETH_RMII	ETH_MDC
ETH_TX_EN	11	ETH_RMII	ETH_TX_EN
nc	12	ETH_RMII	nc
P3.10	13	GND	P3.10
U0C0_DOUT1	14	RSVD	U0C0_DOUT1
U0C0_DX0A	15	ASC_TXD	U0C0_DX0A
CCU81_OUT12	16	ASC_RXD	CCU81_OUT12
U0C1_SEL00	17	CAN_TXD	U0C1_SEL00
nc	18	CAN_RXD	nc
U1C1_SCLKOUT	19	SPI_MTSR	U1C1_SCLKOUT
U1C1_SEL00	20	SPI_MSTR	U1C1_SEL00
U1C1_SEL01	21	SPI_CS0	U1C1_SEL01
U1C1_SEL02	22	SPI_CS1	U1C1_SEL02
U1C1_SEL03	23	SPI_CS2	U1C1_SEL03
U1C1_SEL04	24	I2C_SDA	U1C1_SEL04
U1C1_SEL05	25	I2C_SCL	U1C1_SEL05
U1C1_SEL06	26	GPIO	U1C1_SEL06
U1C1_SEL07	27	RESET	U1C1_SEL07
U1C1_SEL08	28	RESET	U1C1_SEL08
U1C1_SEL09	29	RESET	U1C1_SEL09
U1C1_SEL10	30	RESET	U1C1_SEL10
U1C1_SEL11	31	RESET	U1C1_SEL11
U1C1_SEL12	32	RESET	U1C1_SEL12
U1C1_SEL13	33	RESET	U1C1_SEL13
U1C1_SEL14	34	RESET	U1C1_SEL14
U1C1_SEL15	35	RESET	U1C1_SEL15
U1C1_SEL16	36	RESET	U1C1_SEL16
U1C1_SEL17	37	RESET	U1C1_SEL17
U1C1_SEL18	38	RESET	U1C1_SEL18
U1C1_SEL19	39	RESET	U1C1_SEL19
U1C1_SEL20	40	RESET	U1C1_SEL20
U1C1_SEL21	41	RESET	U1C1_SEL21
U1C1_SEL22	42	RESET	U1C1_SEL22
U1C1_SEL23	43	RESET	U1C1_SEL23
U1C1_SEL24	44	RESET	U1C1_SEL24
U1C1_SEL25	45	RESET	U1C1_SEL25
U1C1_SEL26	46	RESET	U1C1_SEL26
U1C1_SEL27	47	RESET	U1C1_SEL27
U1C1_SEL28	48	RESET	U1C1_SEL28
U1C1_SEL29	49	RESET	U1C1_SEL29
U1C1_SEL30	50	RESET	U1C1_SEL30
U1C1_SEL31	51	RESET	U1C1_SEL31
U1C1_SEL32	52	RESET	U1C1_SEL32
U1C1_SEL33	53	RESET	U1C1_SEL33
U1C1_SEL34	54	RESET	U1C1_SEL34
U1C1_SEL35	55	RESET	U1C1_SEL35
U1C1_SEL36	56	RESET	U1C1_SEL36
U1C1_SEL37	57	RESET	U1C1_SEL37
U1C1_SEL38	58	RESET	U1C1_SEL38
U1C1_SEL39	59	RESET	U1C1_SEL39
U1C1_SEL40	60	RESET	U1C1_SEL40
U1C1_SEL41	61	RESET	U1C1_SEL41
U1C1_SEL42	62	RESET	U1C1_SEL42
U1C1_SEL43	63	RESET	U1C1_SEL43
U1C1_SEL44	64	RESET	U1C1_SEL44
U1C1_SEL45	65	RESET	U1C1_SEL45
U1C1_SEL46	66	RESET	U1C1_SEL46
U1C1_SEL47	67	RESET	U1C1_SEL47
U1C1_SEL48	68	RESET	U1C1_SEL48
U1C1_SEL49	69	RESET	U1C1_SEL49
U1C1_SEL50	70	RESET	U1C1_SEL50
U1C1_SEL51	71	RESET	U1C1_SEL51
U1C1_SEL52	72	RESET	U1C1_SEL52
U1C1_SEL53	73	RESET	U1C1_SEL53
U1C1_SEL54	74	RESET	U1C1_SEL54
U1C1_SEL55	75	RESET	U1C1_SEL55
U1C1_SEL56	76	RESET	U1C1_SEL56
U1C1_SEL57	77	RESET	U1C1_SEL57
U1C1_SEL58	78	RESET	U1C1_SEL58
U1C1_SEL59	79	RESET	U1C1_SEL59
U1C1_SEL60	80	RESET	U1C1_SEL60
U1C1_SEL61	81	RESET	U1C1_SEL61
U1C1_SEL62	82	RESET	U1C1_SEL62
U1C1_SEL63	83	RESET	U1C1_SEL63
U1C1_SEL64	84	RESET	U1C1_SEL64
U1C1_SEL65	85	RESET	U1C1_SEL65
U1C1_SEL66	86	RESET	U1C1_SEL66
U1C1_SEL67	87	RESET	U1C1_SEL67
U1C1_SEL68	88	RESET	U1C1_SEL68
U1C1_SEL69	89	RESET	U1C1_SEL69
U1C1_SEL70	90	RESET	U1C1_SEL70
U1C1_SEL71	91	RESET	U1C1_SEL71
U1C1_SEL72	92	RESET	U1C1_SEL72
U1C1_SEL73	93	RESET	U1C1_SEL73
U1C1_SEL74	94	RESET	U1C1_SEL74
U1C1_SEL75	95	RESET	U1C1_SEL75
U1C1_SEL76	96	RESET	U1C1_SEL76
U1C1_SEL77	97	RESET	U1C1_SEL77
U1C1_SEL78	98	RESET	U1C1_SEL78
U1C1_SEL79	99	RESET	U1C1_SEL79
U1C1_SEL80	100	RESET	U1C1_SEL80

Figure 9 Satellite Connector Type COM

3 Production Data

3.1 Schematics

This chapter contains the schematics for the Ethernet/CAN/RS485 Interface Card:

- Satellite Connector, IO Expander, Power
- Ethernet, CAN, RS485

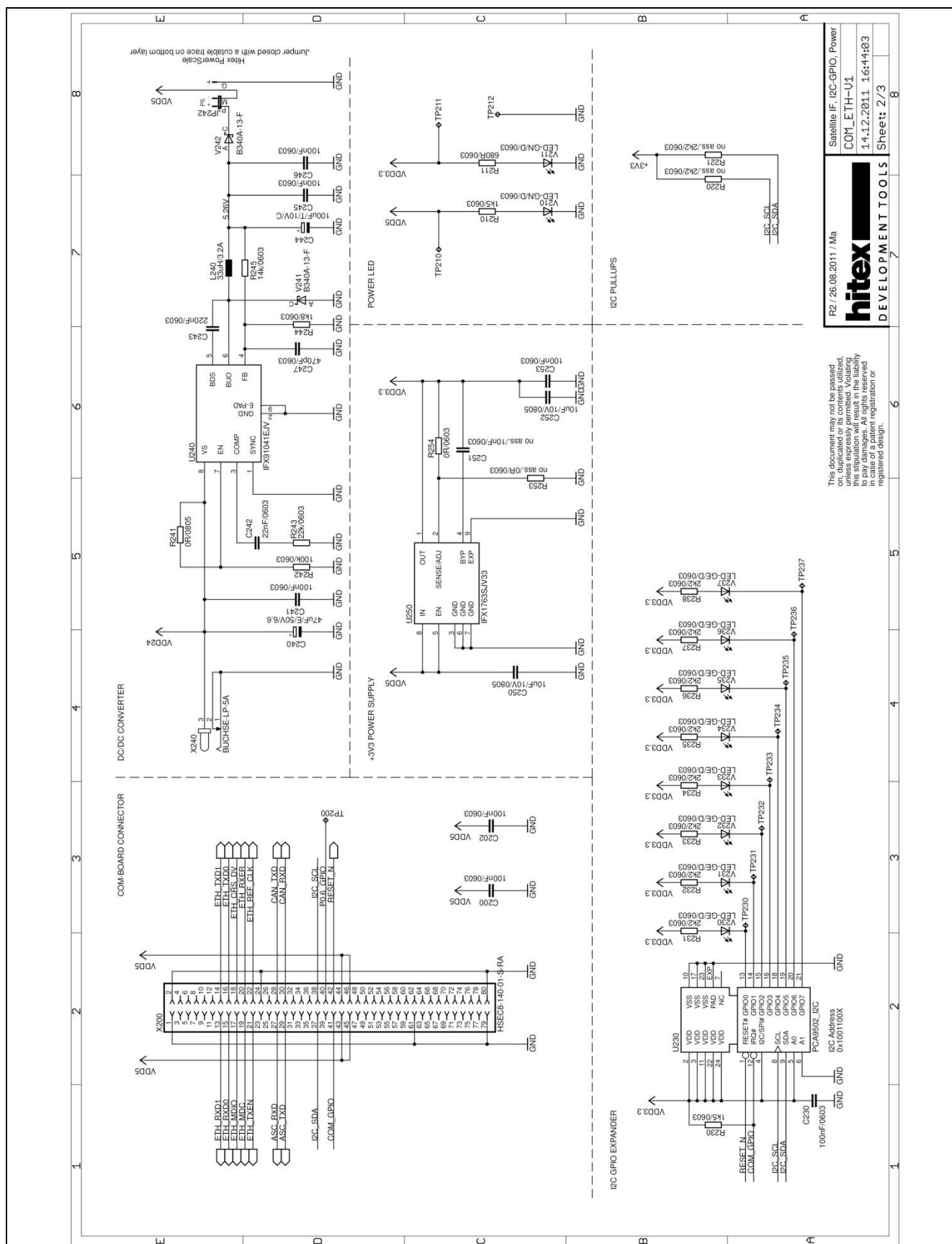


Figure 10 Satellite Connector, I2C-GPIO, Power

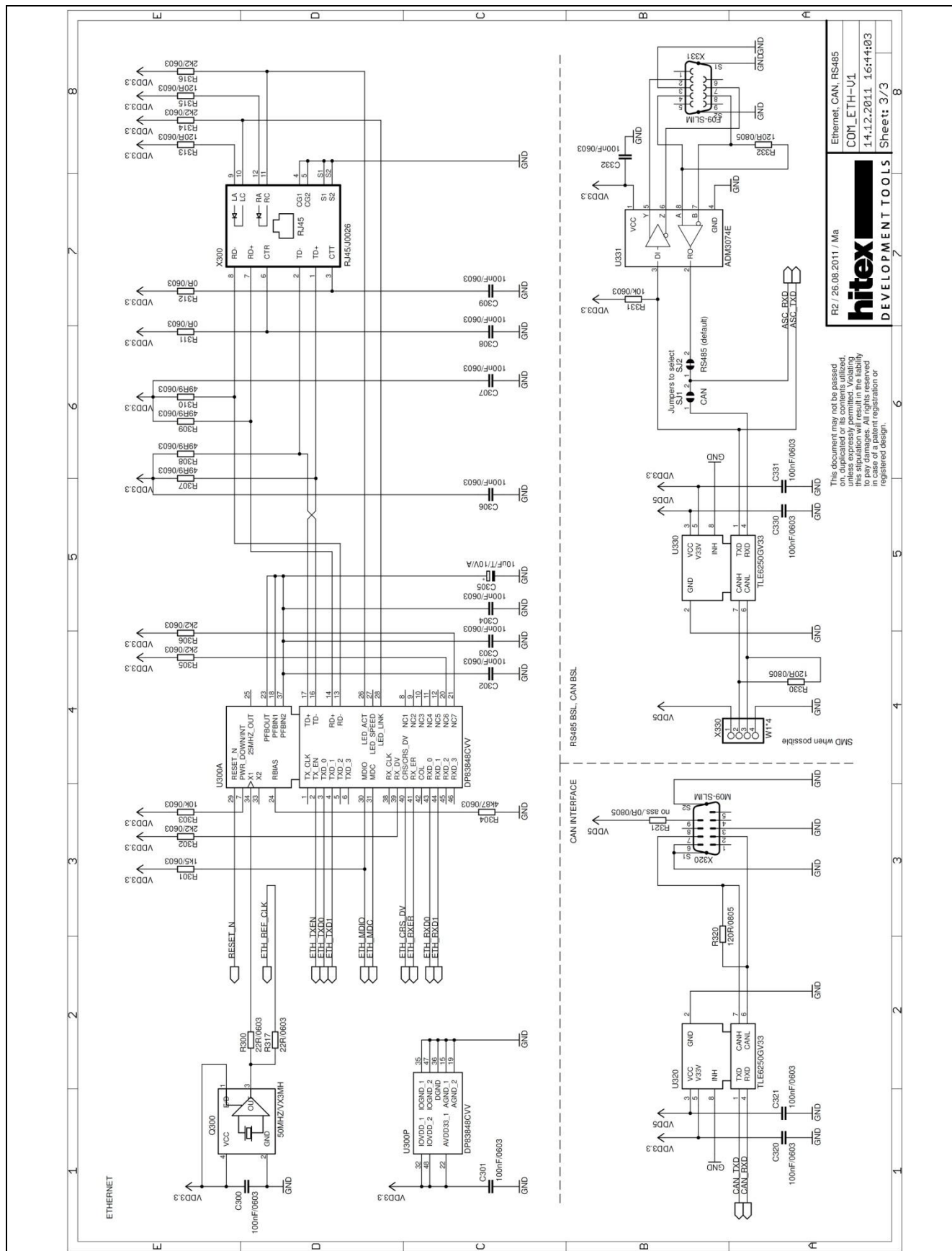


Figure 11 Ethernet, CAN, RS485

3.2 Layout and Geometry

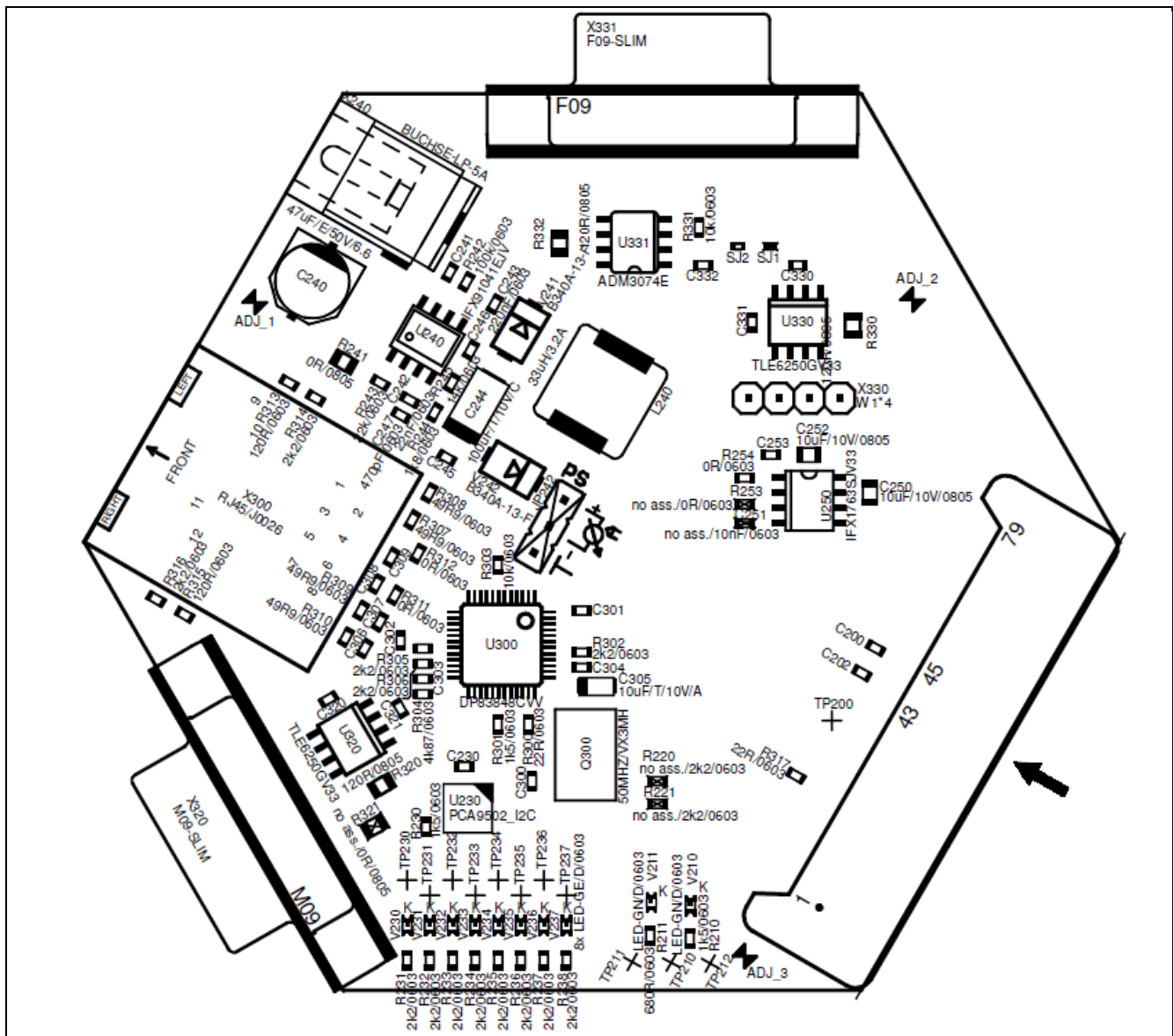


Figure 12 Ethernet/CAN/RS485 Interfaces Card Layout

3.3 Bill of Material

Table 13 Ethernet/CAN/RS485 Interfaces Card BOM

Sl. No.	Qty	Value	Device	Reference Designator
1	1	0R/0402	Resistor	SJ2
2	3	0R/0603	Resistor	R254, R311, R312
3	1	0R/0805	Resistor	R241
4	3	1k5/0603	Resistor	R210, R230, R301
5	1	1k8/0603	Resistor	R244
6	13	2k2/0603	Resistor	R231, R232, R233, R234, R235, R236, R237, R238, R302, R305, R306, R314, R316
7	1	4k87/0603	Resistor	R304
8	2	10k/0603	Resistor	R303, R331
9	2	10uF/10V/0805	Capacitor	C250, C252
10	1	10uF/T/10V/A	Capacitor	C305
11	1	14k/0603	Resistor	R245
12	2	22R/0603	Resistor	R300, R317
13	1	22k/0603	Resistor	R243
14	1	22nF/0603	Capacitor	C242
15	1	33uH/3.2A	Inductor, IHLP3232DZER330M11 Vishay/Dale	L240
16	1	47uF/E/50V/6.6	Capacitor, UWT1H470MCL1GS Nichicon	C240
17	4	49R9/0603	Resistor	R307, R308, R309, R310
18	1	50MHZ/VX3MH	Crystal, 50MHz 3,3V 7x5mm	Q300
19	1	100k/0603	Resistor	R242
20	21	100nF/0603	Resistor	C200, C202, C230, C241, C245, C246, C253, C300, C301, C302, C303, C304, C306, C307, C308, C309, C320, C321, C330, C331, C332
21	1	100uF/T/10V/C	Capacitor	C244
22	2	120R/0603	Resistor	R313, R315
23	3	120R/0805	Resistor	R320, R330, R332
24	1	220nF/0603	Capacitor	C243
25	1	470pF/0603	Capacitor	C247
26	1	680R/0603	Resistor	R211
27	1	ADM3074E	IC, ADM3074EARZ Analog Devices	U331
28	2	B340A-13-F	Diode, B340A-13-F Diodes Inc.	V241, V242
29	1	BUCHSE-LP-5A	Connector RAPC722X	X240
30	1	DP83848CVV	IC DP83848CVV National Semiconductor	U300
31	1	F09-SLIM	Connector DSUB9-	X331

Table 13 Ethernet/CAN/RS485 Interfaces Card BOM

Sl. No.	Qty	Value	Device	Reference Designator
			Female	
32	1	HSEC8-140-01-S-RA	Connector HSEC8-140-01-S-RA Samtec	X200
33	1	IFX1763SJV33	IC IFX1763SJV33 Infineon Technologies	U250
34	1	IFX91041EJV	IC IFX91041EJV Infineon PSOP-8 Vvar	U240
35	8	LED-GE/D/0603	LED	V230, V231, V232, V233, V234, V235, V236, V237
36	2	LED-GN/D/0603	LED	V210, V211
37	1	M09-SLIM	Connector DSUB9-Male	X320
38	1	PCA9502	IC PCA9502BS NXP, HVQFN-24	U230
39	1	RJ45/J0026	Connector J0026D21BNL Pulse	X300
40	2	TLE6250GV33	IC TLE6250GV33 Infineon Technologies	U320, U330
41	1	W1*4	Connector Pinheader 0.1" TH	X330
42	1	no ass./0R/0603	Resistor	R253
43	1	no ass./0R/0805	Resistor	R321
44	2	no ass./2k2/0603	Resistor	R220, R221
45	1	no ass./10nF/0603	Capacitor	C251
46	1	no ass./0R/0402	SMD-Pads	SJ1
47	1	no ass.	Pinheader 0.1" TH, Hitex PowerScale	JP242
48	12	no ass.	SMD-Pads	TP200, TP210, TP211, TP212, TP230, TP231, TP232, TP233, TP234, TP235, TP236, TP237

www.infineon.com

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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