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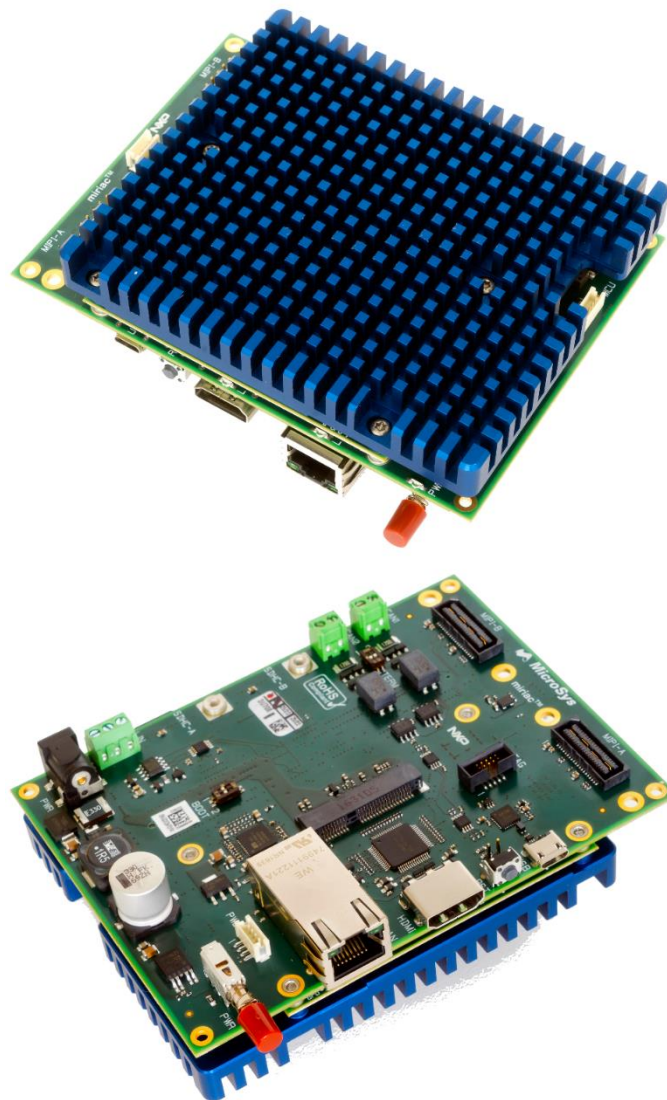
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MicroSys

Creating Embedded Systems

miriac SBC-S32V

User Manual

V 1.1

Table of Contents

1 General Notes

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1.5   Symbols, Conventions and Abbreviations

1.5.1   Symbols

Throughout this document, the following symbols will be used:

DANGER	Information marked with this symbol MUST be obeyed to avoid the risk of severe injury, health danger, or major destruction of the unit and its environment
ATTENTION	Information marked with this symbol MUST be obeyed to avoid the risk of possible injury, permanent damage or malfunction of the unit.
NOTE	Information marked with this symbol gives important hints upon details of this manual, or in order to get the best use out of the product and its features.

Table 1 Symbols

1.5.2   Conventions

Symbol	explanation
#	denotes a low active signal
←	denotes the signal flow in the shown direction
→	denotes the signal flow in the shown direction
↔	denotes the signal flow in both directions
→	denotes the signal flow in the shown direction with additional logic / additional ICs in the signal path
I/O	denotes a bidirectional pin
Input	denotes an input pin
matched	denotes the according signal to be routed impedance controlled and length matched
Output	denotes an output pin
Pin 1	refers to the numeric pin of a component package
Pin a1	refers to the array position of a pin within a component package
XXX-	denotes the negative signal of a differential pair
XXX+	denotes the positive signal of a differential pair
XXX	denotes an optional not mounted or fitted part

Table 2 Conventions

2   Introduction

Thank you for choosing the MicroSys SBC-S32V Single Board Computer system. This manual should help you to get the best performance and details out all of its features.

2.1   Safety and Handling Precautions

DANGER	**ALWAYS use the correct type and polarity of the power supply!** **DO NOT exceed the rated maximum values for the power supply! This may result in severe permanent damage to the unit, as well as possible serious injury.** **ALWAYS keep the unit dry, clean and free of foreign objects. Otherwise, irreparable damage may occur.**
ATTENTION	**Parts of the unit may become hot during operation. Take care not to touch any parts of the circuitry during operation to avoid burns, and operate the unit in a well-ventilated location. Provide an appropriate cooling solution as required.**
ATTENTION	**ALWAYS take care of ESD-safe handling!** **Many pins on external connectors are directly connected to the CPU or other ESD sensitive devices.** **Make or break ANY connections ONLY while the unit is switched OFF.** **Otherwise, permanent damage to the unit may occur, which is not covered by warranty.**
NOTE	**There is no separate SHIELD connection.** **All the metal sheaths of shielded connectors are connected to GND.** **Also, all mounting holes of the carrier board are connected to GND.** **The module's mounting holes are <u>not</u> connected to GND** **Take this into account when handling and mounting the unit.**

Table 3 Safety and Handling Precautions

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2.2 Short Description

The SBC-S32V is a small computer system consisting of

■ the MPX-S32V module, based on NXP's S32V234 vision processing MPU

■ the CRX-S32V carrier board.

It targets both

■ evaluation of the MPX-S32V SOM

■ direct usage as an industrial ADAS computing solution

This document provides you an overview on the system devices, connectors and functions, and how to take the first steps on the initial setup.

2.3 Shipping List

The SBC-S32V EvalKit package contains the following items:

■ The SBC-S32V system, mounted with cooling solution

■ Power Supply 12V DC stabilized / 2 A

■ Micro-SD-Card with U-Boot and root file system

3 Quick Start Guide

3.1 Prerequisites

> ⚠️ **ATTENTION**
>
> **Always make sure to handle the SBC-S32V unit ESD-safe! Otherwise, the unit may suffer permanent damage.**
>
> **However, do not place the unit directly flat on a metal surface, as this may result in short circuits and damage to the board.**

At first time operation unpack the unit and make sure that is clean and free of visible damage or foreign objects.

3.1.1 Minimum Requirements

To operate the board, you will at least need the following items:

- an adequate power supply, delivering 12V DC (stabilized) / 2 A min.
- an USB cable (type A – micro B) adapted to connector USB
- a serial terminal, such as a PC with an USB port running a terminal Software (e.g. TeraTerm, HyperTerminal, putty, Kermit...), or else a hardware serial console. **Choose the following parameters:**
    - (a) **115200 Bd**
    - (b) **8 Data bits**
    - (c) **No parity**
    - (d) **1 Stop Bit**

3.1.2 Recommended Items

The following items are not absolutely necessary, but strongly recommended for practical operation and development purposes:

- Network connection via LAN port (RJ45) to your local network installation
- TFTP server available for downloading within the network
  (Hint: may run on the same PC as the serial Terminal)
- SD card as mass storage and/or boot media

3.2 Board Preparation and Power-Up

■ Make sure the switch BOOT, located on the CRX-S32V carrier board, is set properly in order to select the correct boot source and board configuration. For more details see chapter 5.3 Boot Mode Switch

Figure 1 BOOT Switch
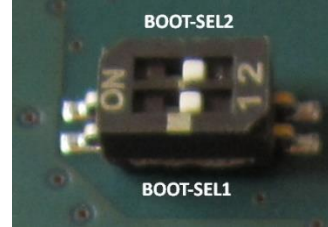
■ Make sure the switch BMD, located on the MPX-S32V module, is set properly in order to select the correct boot source. For more details see chapter **5.2 Boot Mode Configuration**

Figure 2: BMD Switch
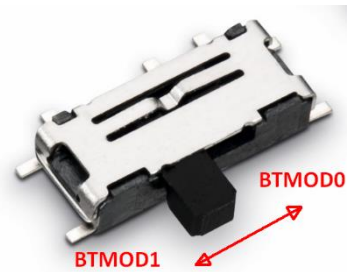
■ Make sure the switch GPU, located on the MPX-S32V module, is set properly in order to select the correct GPU supply For more details see chapter **6.5 Switches**

Figure 3: GPU Switch

■ The board comes preconfigured to boot correctly via SD-Card on arrival.
■ Connect the micro USB cable to USB.
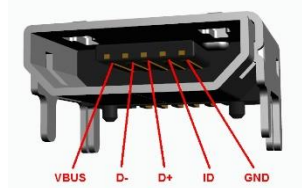
Figure 4 USB Connector

■ Connect other peripherals as far as intended.

■ Make sure the power switch PWR is in off position (released)

Figure 5 Power Switch Off
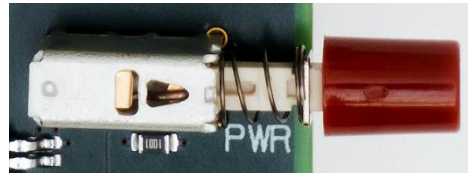
■ Connect the 12V power line to the PWRA connector

Figure 6 Power Jack

■ Switch on the power by switch PWR

Figure 7 Power Switch ON

ATTENTION
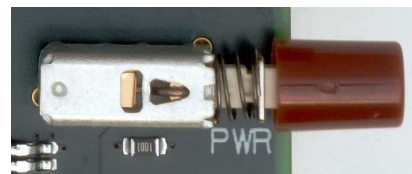
After Power-On, the green LED on the carrier should light up.
IF NOT, DISCONNECT THE UNIT IMMEDIATELY FROM THE POWER SOURCE AND CHECK FOR FAULTS!

3.3   Operation

3.3.1   U-Boot Startup

When power is supplied the system will start.

On startup, U-Boot will come up similar to the following:

The exact output may vary, depending on U-Boot and MPX-S32V module versions in use.

NOTE

```
U-Boot 2016.01 (Aug 04 2017 - 09:06:53 +0200)

CPU:   NXP S32V234 at 1000 MHz
Reset cause: unknown reset
Board: mpxs32v234-R2
I2C:   ready
DRAM:  2 GiB
All (4) cores are up.
MMC:   FSL_SDHC: 0
In:    serial
Out:   serial
Err:   serial
Net:   FEC
=>
```

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4 System Description

This section describes all parts of the SBC-S32V system.

4.1 Block Diagram CRX-S32V Carrier
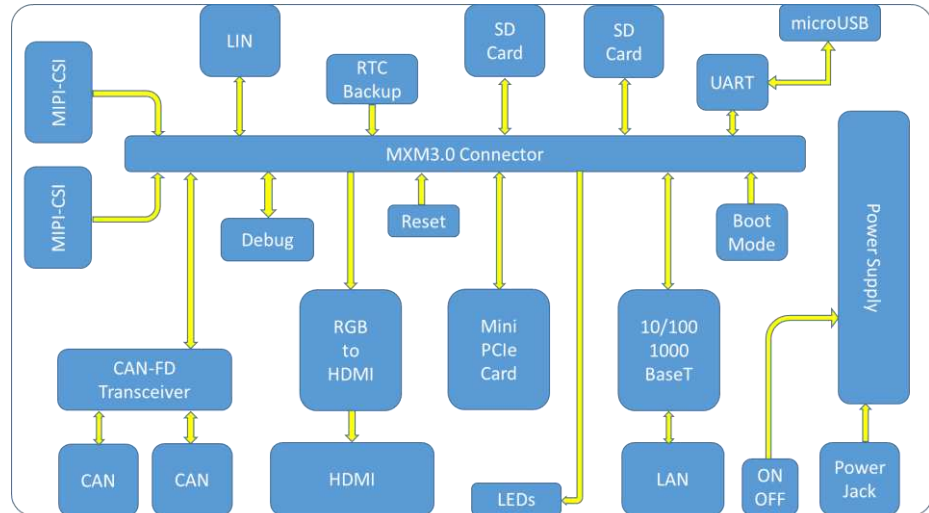
4.2 Block Diagram MPX-S32V Module

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4.3   Feature Overview

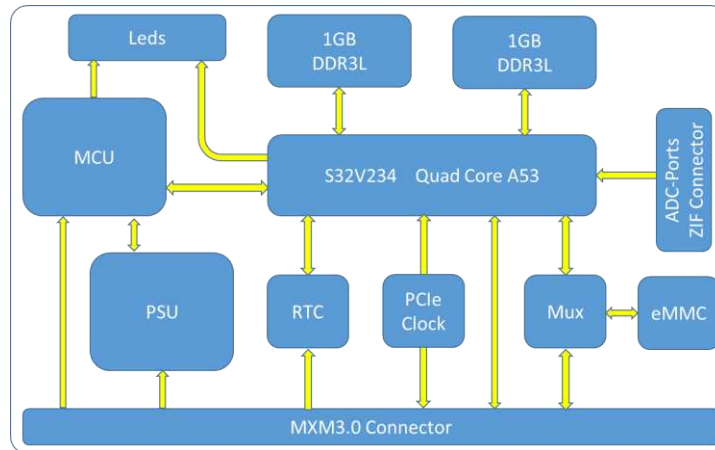| Feature	Type	Description
CPU	NXP S32V234	CoreClock 1GHz Quad-Cortex®-A53 Single-Cortex®-M4
SDRAM	Dual 32-bit DDR3L interface	2 x up to 1GByte up to 1066MT/s
Mass Storage	8-bit eMMC	16 GByte
PCI Express	miniPCIe Slot	Rev.2.0 5Gbps Lane x1 RC/EP 100MHz Clock Source I2C support
Removable Media	eSDHC-I / (eSDHC-II)	micro SD card holders 4bit support
Ethernet	RGMII	KSZ9031RN Phy 10/100/1000 BaseT Link/ Activity Leds
Grahics Output	TFP410	HDMI Type A DDC support
Video Input	MIPI-CSI-A	5V/12V supply 4 Lanes + Clock 27MHz Ref Clock Mounting Holes
	MIPI-CSI-B	5V/12V supply 4 Lanes + Clock 27MHz Ref Clock Mounting Holes
Serial Interfaces	UART0	USB to serial Converter USB-powered micro USB Type B
	UART1	LIN 2.1 interface MC33662BLEF
CAN Interface	CAN-FD-1	TJA1051 120R Termination CML Filter ESD Protection
	CAN-FD-2	TJA1051 120R Termination CML Filter ESD Protection
RTC	Time/Date	PCF85263A 2032 coin cell backup
Board Control	S9KEAZN64A	Voltage supervision Reset logic Boot configuration Status led
Board Switches	Modul Switches	RCON/Serial Select GPU Power Off

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Feature	Type	Description
	Carrier Switches	Power On/Off Reset Button Boot Mode 1 Boot Mode 2 CAN1 Termination On/Off CAN2 Termination On/Off
Board Connectors	Modul Connectors	ADC Channel 0-7
		MCU Programming Port
	Carrier Connectors	12V Power Input 5V/12V Aux Power Out 5V/12V Fan Power Out 314 pin MXM Connector microSD-A microSD-B (not mounted) miniPCIe microUSB RJ45 LAN HDMI Out MIPI-A MIPI-B CAN-A CAN-B LIN Interface JTAG
Indicators	Module Leds	MCU Status Reset Status User GPIO1 User GPIO2
	Carrier Leds	12V Power Indicator User Led 1 User Led 2
Debug	JTAG	10 pin Header
Power Management	System On/Off	Pushbutton Switch
	Input Voltage	12V DC
	Input Current	typical. <1A, no loads
	Supply Polarity	Reverse voltage protected
	Overvoltage	TVS protected
	Input Fuse	3A PPTC type
	Module POL regulators	1.0V, max 10A 1.35V, max.6A 1.8V, max 3A 3.3V, max 3A
	Carrier POL regulators	1.5V,max.3A 3.3V, max 3A 5.0V, max 3A
	RTC Backup	2032 coin cell
Shielding	Connector Shield	connected to Ground
	ESD Discharge	connected to Ground
Mechanics	Dimension	93x126mm

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Feature	Type	Description
	Module Mounting	4 Mountig Holes, 2.5mm Ø all electrically floating
	Carrier Mounting	4 Mountig Spacers, M2.5 2 Holes electrically floating 2 Holes electrically grounded
	miniPCIe Mounting	2 Mounting Spacers, M2.5 all electrically grounded
	MIPI-A Mounting	2 Mounting Holes, 3.2mm Ø all electrically grounded
	MIPI-B Mounting	2 Mounting Holes, 3.2mm Ø all electrically grounded

4.4   Mechanical Dimensions

4.4.1   MPX-S32V Module

The following drawing shows the mechanical outline of the MPX-S32V module that is plugged in the CRX-S32V carrier board.

NOTE

This drawing is not to scale.

NOTE
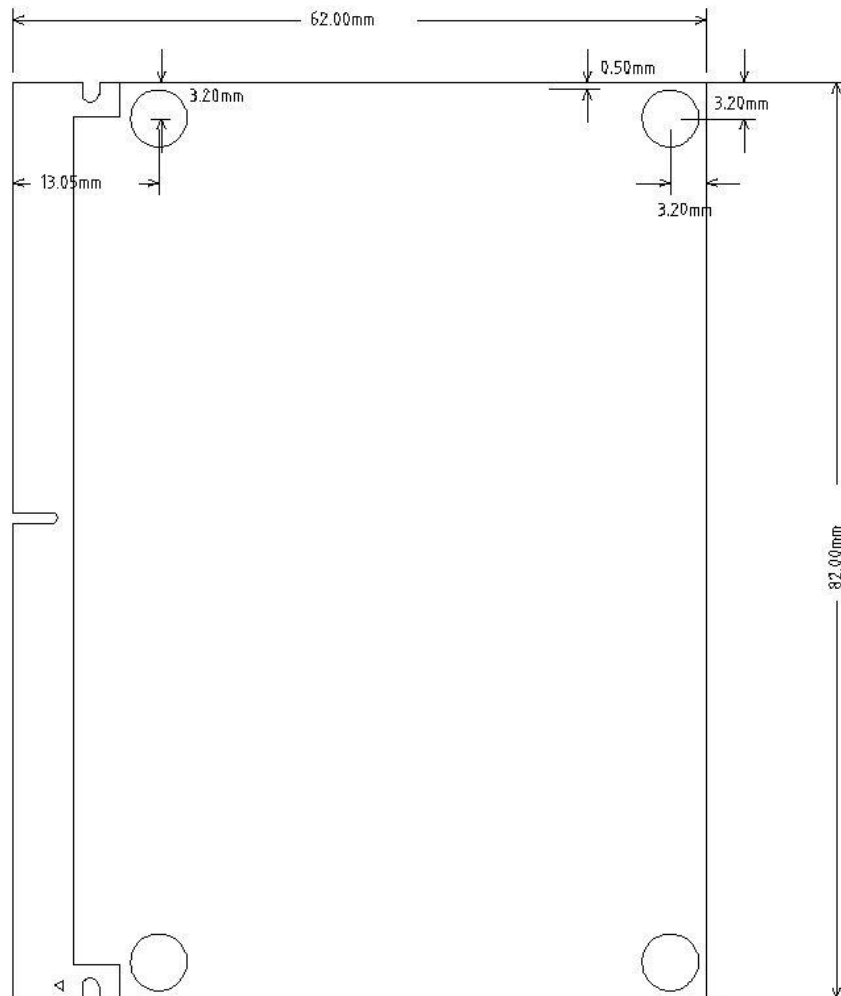
For 3D data files please contact MicroSys.

Figure 8 Mechanical Dimensions

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4.4.2 CRX-S32V Carrier

The following drawing shows the mechanical outline of the SBC-S32V assembly.

NOTE **This drawing is not to scale.**

NOTE **For 3D data files please contact MicroSys.**
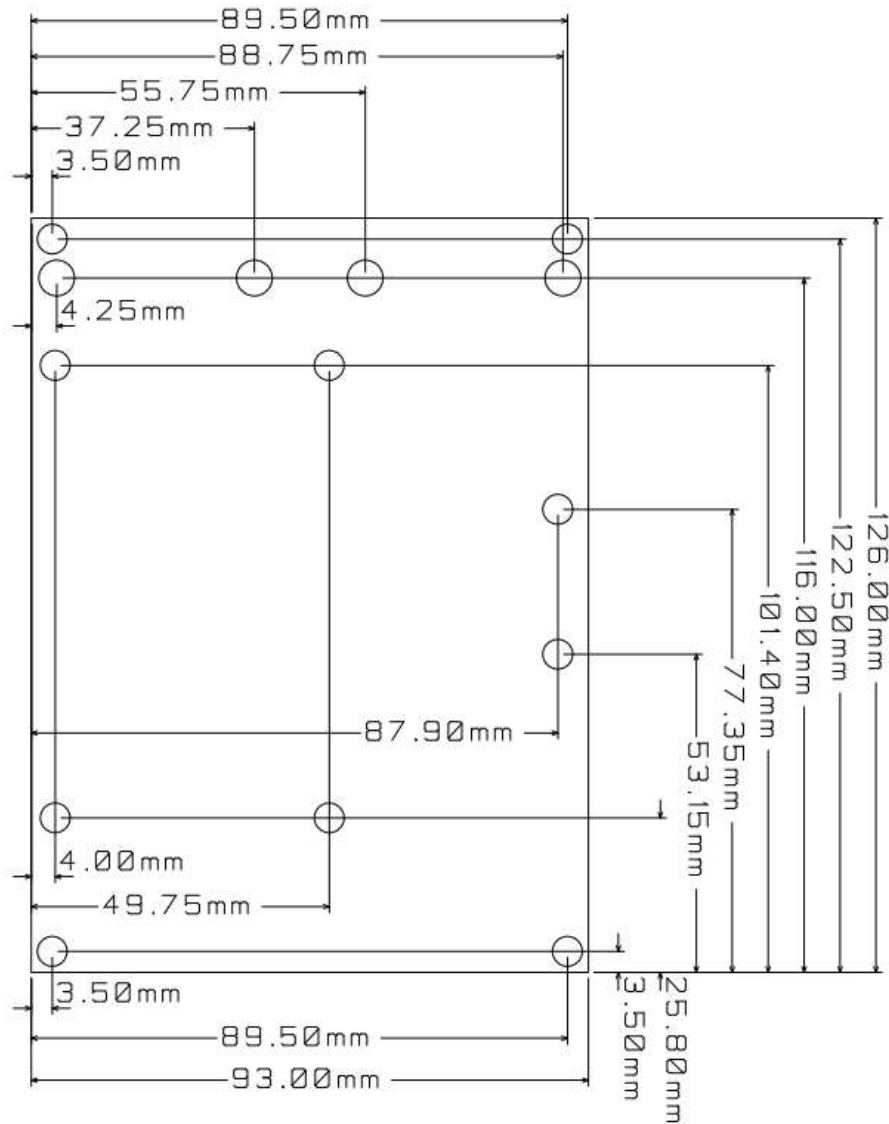
4.5   Carrier Board Layout – Module Side
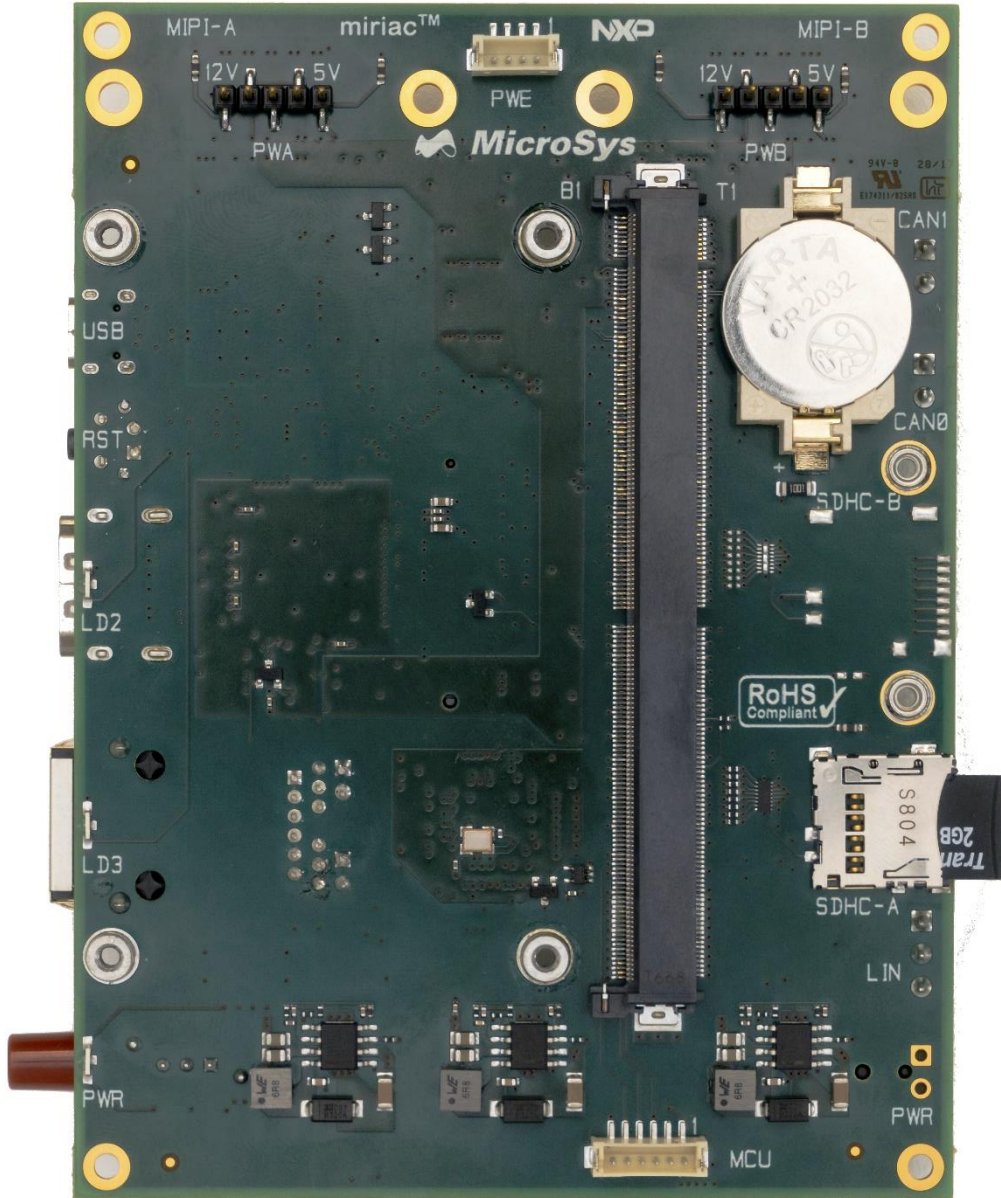

Figure 9: Module Side connectors (carrier CRX-S32V)

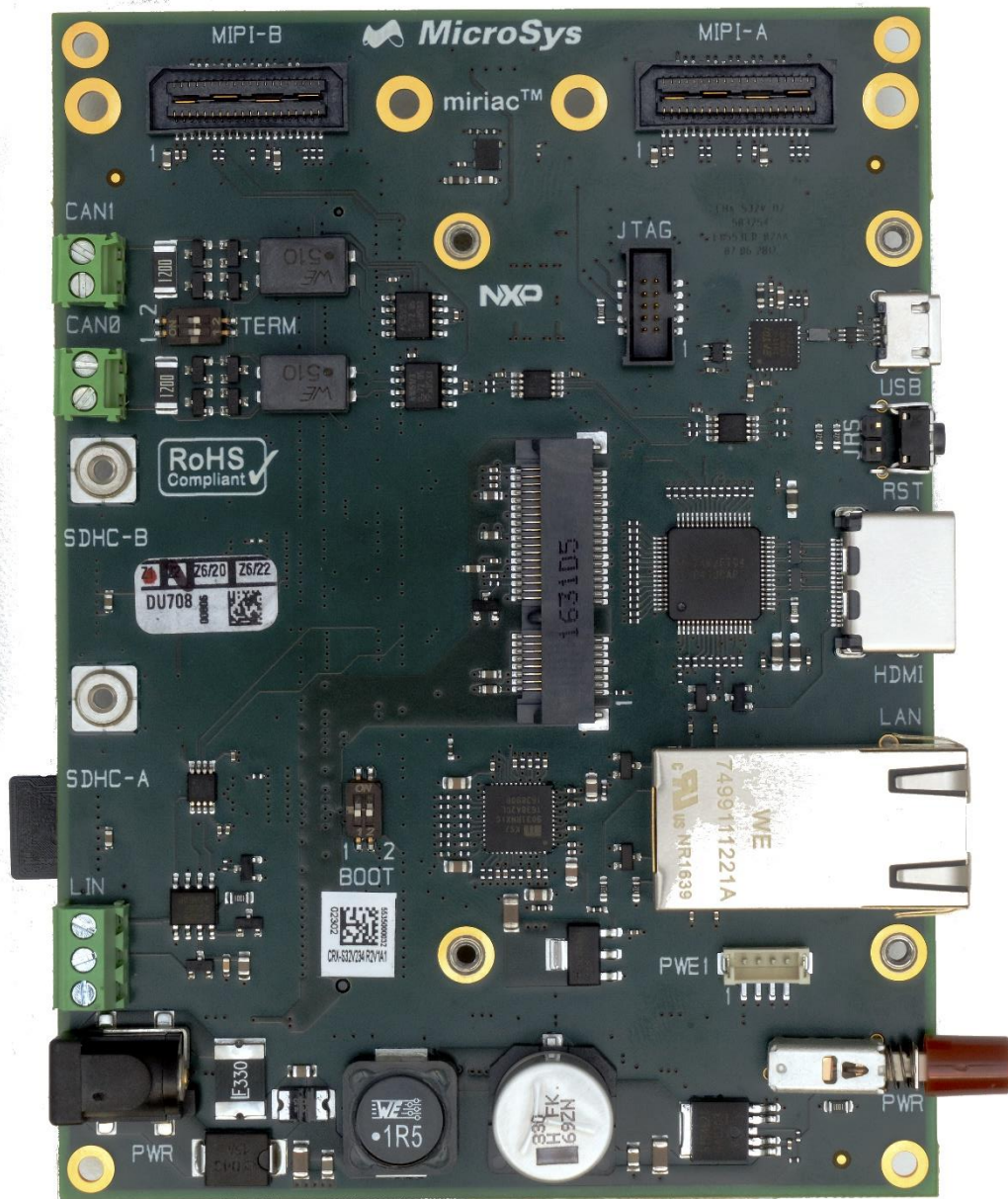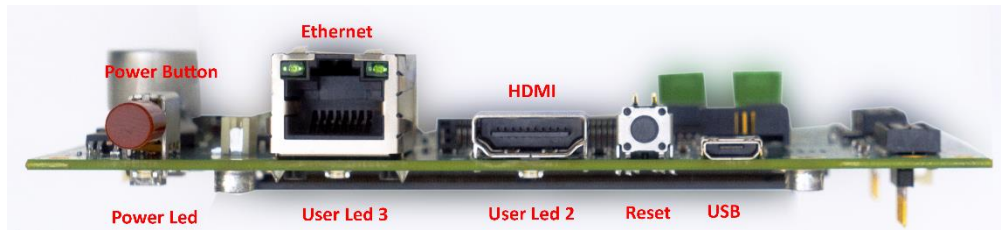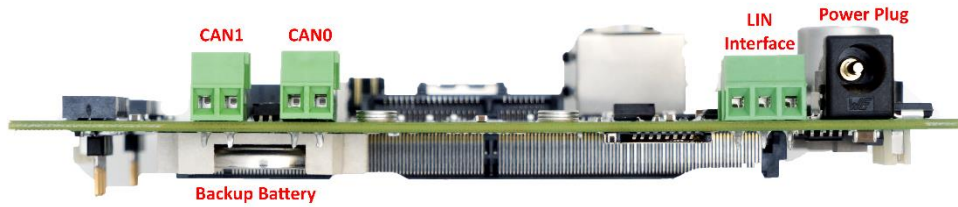# 4.6   Carrier Board Layout – Non-Module Side

Figure 10 Non-Module Side connectors (carrier CRX-S32V)

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4.7 Carrier Power Button Side View
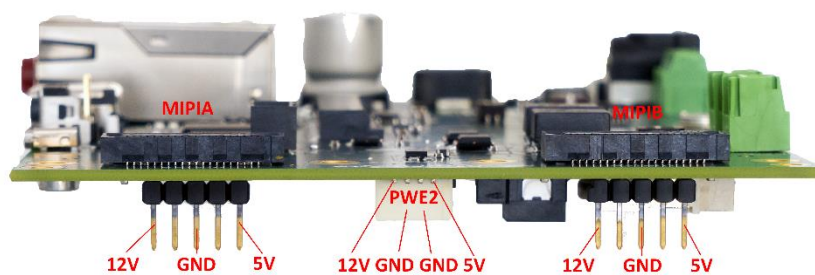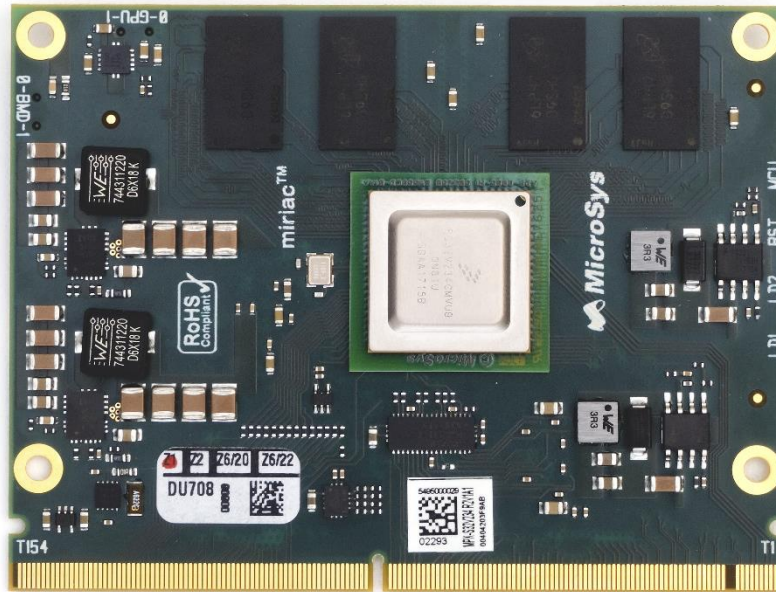

4.8 Carrier Power Plug Side View

4.9 Carrier Bottom Side View

4.10 Carrier Top Side View

4.11   Module Top Side

4.12   Module Bottom Side

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4.14 System Environment

4.14.1 Temperature Ratings

The SBC-S32V contains parts with the following ambient, junction or case temperature ratings. Due to these limits, the system function is only guaranteed, if none of them are exceeded at any time. The heatsink of the MPX-S32V requires an adequate air flow, which can be accomplished by free or forced air convection.

If an active cooling is desired, a fan can be connected to one of the power connectors PWE1 or PWE2, which provide +5.0V as well as +12V.

Part	Tmin	Tmax
BAT-CR2032MFR-1BL	-30°C	70°C
BAT-HOLDER-79527141	-55°C	85°C
C-0402-NP0-Series	-55°C	125°C
C-0402-X5R-Series	-55°C	85°C
C-0402-X7R-Series	-55°C	125°C
C-0603-226-X5R-Z	-55°C	85°C
C-0603-X7R-Series	-55°C	125°C
C-0805-X7R-Series	-55°C	125°C
C-1206-X7R-Series	-55°C	125°C
C-EEEFK1H331AQ	-55°C	105°C
CML-744-227	-40°C	125°C
CML-744-233-670	-40°C	85°C
D-B320A-13-F	-55°C	150°C
D-BAS70	-65°C	150°C
D-BAT54S	-55°C	125°C
D-SD2114S040S5R0	-55°C	125°C
FB-742-792-XXX	-55°C	125°C
HEADER-2.54-180-M-1X2	-40°C	125°C
HEADER-2.54-180-SM-1X5	-40°C	163°C
IC-BTS462T	-40°C	150°C
IC-DSC1001CI2-027.0000	-40°C	85°C
IC-DSC557-0344FI1	-40°C	85°C
IC-FT232RQ	-40°C	85°C
IC-IR347xMTRPBF	-40°C	125°C
IC-KSZ9031RNXIA	-40°C	85°C
IC-MAX4886ETO	-40°C	85°C
IC-MC33662BLEF	-40°C	125°C
IC-MT41K256M16HA-107-IT	-40°C	95°C
IC-MTFC16GAKAENA-4M-IT	-40°C	85°C
IC-NCV8715SQ50T2G	-40°C	125°C

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Part	Tmin	Tmax
IC-PCA9517ADP	-40°C	85°C
IC-PCF85263ATL	-40°C	85°C
IC-PS32V234CMN0VUB	-40°C	125°C
IC-REF3030AIDBZ	-40°C	125°C
IC-S9KEAZN64AMLH	-40°C	85°C
IC-SN74LVC1G04DCK	-40°C	85°C
IC-SN74LVC1G125DCK	-40°C	125°C
IC-SN74LVC244ARGYR	-40°C	125°C
IC-TFP410PAP	0°C	70°C
IC-TJA1051T	-40°C	105°C
IC-TPS22920LYZP	-40°C	85°C
IC-TPS51200DRC	-40°C	85°C
IC-TPS5433xDDAR	-40°C	150°C
IC-TPS70933DBV	-40°C	125°C
L-744-311-220	-55°C	125°C
L-744-383-56033	-40°C	85°C
L-744-383-57068	-40°C	85°C
L-744-771-001	-55°C	125°C
LD-155124xx73200	-40°C	85°C
PCB-ADP-8065-01	-40°C	85°C
PCB-CRX-S32V-01	-40°C	85°C
PCB-MPX-S32V-02	-40°C	85°C
PTC-2920L330/24	-40°C	85°C
R-0402-Serie	-55°C	155°C
R-0603-Serie	-55°C	155°C
R-0805-Serie	-55°C	155°C
R-1206-Serie	-55°C	155°C
R-2010-Serie	-55°C	155°C
RC-IP4252CZ16-8	-40°C	85°C
ST-JAE-MM70-314-310-B1-1	-40°C	85°C
ST-JST-SM06B-XSRS-ETB	-25°C	85°C
ST-SAM-QSE-020-01-F-D	-55°C	125°C
ST-SAM-SHF-105-01-L-D-SM	-55°C	125°C
ST-TYCO-2041119-1-PCIe	-55°C	85°C
ST-WE-629-105-150-521	-40°C	85°C
ST-WE-679-30x-124-022	-25°C	85°C
ST-WE-685-119-134-923	-25°C	85°C
ST-WE-687-118-140-22	-25°C	85°C
ST-WE-691-214-110-00x	-40°C	105°C
ST-WE-694-106-106-102	-40°C	85°C

Part	Tmin	Tmax
ST-WE-749-911-1221A	0°C	70°C
ST-YE-PJS-008-2130-0	-25°C	85°C
SW-CK-G003R	-10°C	60°C
SW-CK-PN12SHSA03QE	-10°C	60°C
SW-WE-416-131-160-802	-40°C	85°C
SW-WE-431-256-038-716	-40°C	85°C
SW-WE-450-404-015-514	-40°C	85°C
T-BSS138LT1	-55°C	150°C
T-FDT434P	-55°C	150°C
T-PDTA114YT	-55°C	150°C
T-PDTC123JT	-65°C	150°C
TVS-1.5SMC15AT3	-65°C	150°C
TVS-ESD7504MUTAG	-55°C	125°C
TVS-PSOT36LC	-55°C	150°C
TVS-USBLC6-2P6	-40°C	125°C
XT-FT13A-xx.00000/8-20-20/48	-40°C	85°C
XT-FT26A-32.7680/12.5-20/48	-40°C	85°C
Y-WE-977-403-0151-M25-3MM00	-55°C	125°C

4.14.2   Power Dissipation

Component	max.Temperature	Power Dissipation
CPU	Tj125° C	7W
DDR	Tc95° C	1.5W
Core Regulator	Tj125° C	1.2W
DDR Regulator	Tj125° C	0.3W
eMMC	Ta85° C	0.5W
LAN	Tj125° C	0.9W
HDMI	Ta70° C	0.9W

(j=junction, c=case, a=ambient)