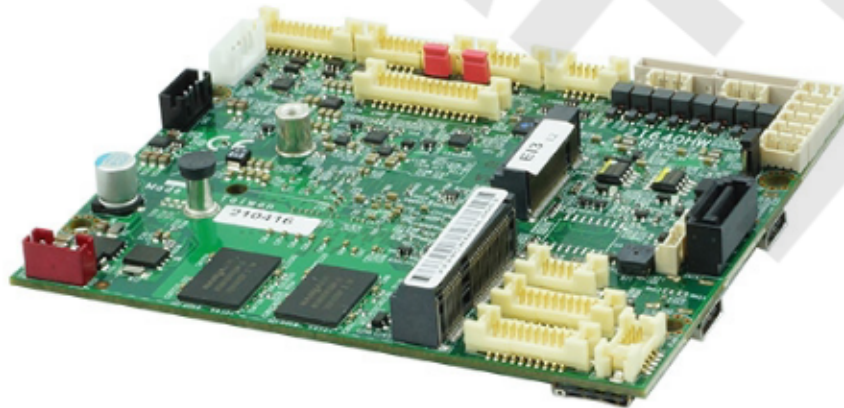


SBC25-C466

2.5" Single Board Computer with
Intel® Atom™ x6413E Processor,
Dual 2.5 Gbit Ethernet, LPDDR4 RAM

Product Manual



Revision History

Document Version	Last Updated Date	Brief Description of Change
v1.0	9/19/2022	Initial release

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1. Before You Begin

Review the warnings in this section and the best practice recommendations (see “Best Practices” on page 30) when using and handling the WINSYSTEMS SBC25-C466. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SBC25-C466 before proceeding.



FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE SBC25-C466 AND VOID YOUR WARRANTY.

1.1 Warnings

Only qualified personnel should configure and install the SBC25-C466. While observing best practices, pay particular attention to the following:



Avoid electrostatic discharge (ESD)

Only handle the circuit board and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.

2. Introduction

This manual provides configuration and usage information for the SBC25-C466. If you still have questions, contact Technical Support at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

Refer to the WINSYSTEMS website at <http://www.winsystems.com/product/sbc25-c466/> for other accessories (including cable drawings and pinouts) that can be used with your SBC25-C466.

3. Functionality

WINSYSTEMS' SBC25-C466 single board computer packs an impressive feature set into a small form factor 2.5" SBC (4" x 3.5"). The SBC is based on the Intel® Atom™ x6413E processor and is a perfect choice for applications requiring low power and Intel performance in a small form factor package with industrial connectors and I/O.

The SBC25-C466 provides 8 GB of LPDDR4 SDRAM soldered down to the board with a data transfer rate of 3200 MHz.

Considering the small size of the SBC25-C466, it is packed with I/O features often lacking from larger single board computers. It includes dual 2.5 Gbit Ethernet controllers based on the Intel i225V family with Wake On Lan and PXE capabilities, providing connectivity and control for network devices. Five USB 2.0 and one USB 3.2 Gen 1 (type-C) ports provide additional functionality and expansion options. Also on-board are three RS-232 ports and one multi-protocol RS-232/422/485 serial port.

Expansion options for the SBC25-C466 includes one full size PCIe Mini Card, one M.2 B Key 2242/3042, and six USB ports. The PCIe Mini Card slot supports PCIe and USB interfaces while the M.2 slot supports SATA and USB interfaces.

The compact all-in-one SBC25-C466 single board computer is fully compatible with industry standards featuring technical enhancements for industrial applications and high reliability. It can run Microsoft's Windows 10 IoT Enterprise, Linux, and real-time operating systems (RTOS).

The SBC25-C466 from WinSystems is a very compact, PC compatible single board computer which is a perfect fit for applications in UAV, energy, medical diagnostics, and industrial control.

4. Features

The SBC25-C466 provides the following features:

Single Board Computer

- Intel Atom (formerly Elkhart Lake) x6413E series processor
- Quad Core x6413e 1.5 GHz (3.00 GHz)

Operating Systems (compatibility)

- Windows 10 Pro, Windows 10 IoT Enterprise
- Linux
- Real-time operating systems (RTOS)

Memory

- Up to 8 GB soldered down LPDDR4 system RAM

BIOS

- Insyde UEFI BIOS

Video Interfaces

- HDMI
- 48-bit, 2 channel
- eDP

Ethernet

- 2x Intel i225V 2.5 Gbps Ethernet controllers

Storage

- 1x SATA port
- 1x M.2 B key with SATA support

Serial Interface

- 1x RS-232/422/485 serial ports
- 3x RS-232 serial ports

USB

- 5x USB 2.0
- 1x USB 3.2 Gen 1 (type C)

Digital Input/Output

- Four hardware digital inputs
- Four hardware digital outputs

Bus Expansion

- 1 x mPCIe Mini Card slot with PCIe and USB interface
- 1x M.2 B key 2242/3042 slot with SATA, and USB 3.2 Gen 1, USB 2.0

Audio

- Realtek ALC888S
- Amplifier: TPA2012D2RTJ (2.1 W/4 Ω)

Power

- On board DC +9V to +36V wide range power supply

Industrial Operating Temperature

- -20 to +70°C (-4 to +158°F)

Form Factor

- Pico-ITX form factor 102 x 88 mm (4.02 x 3.46 in.)

Touch Function

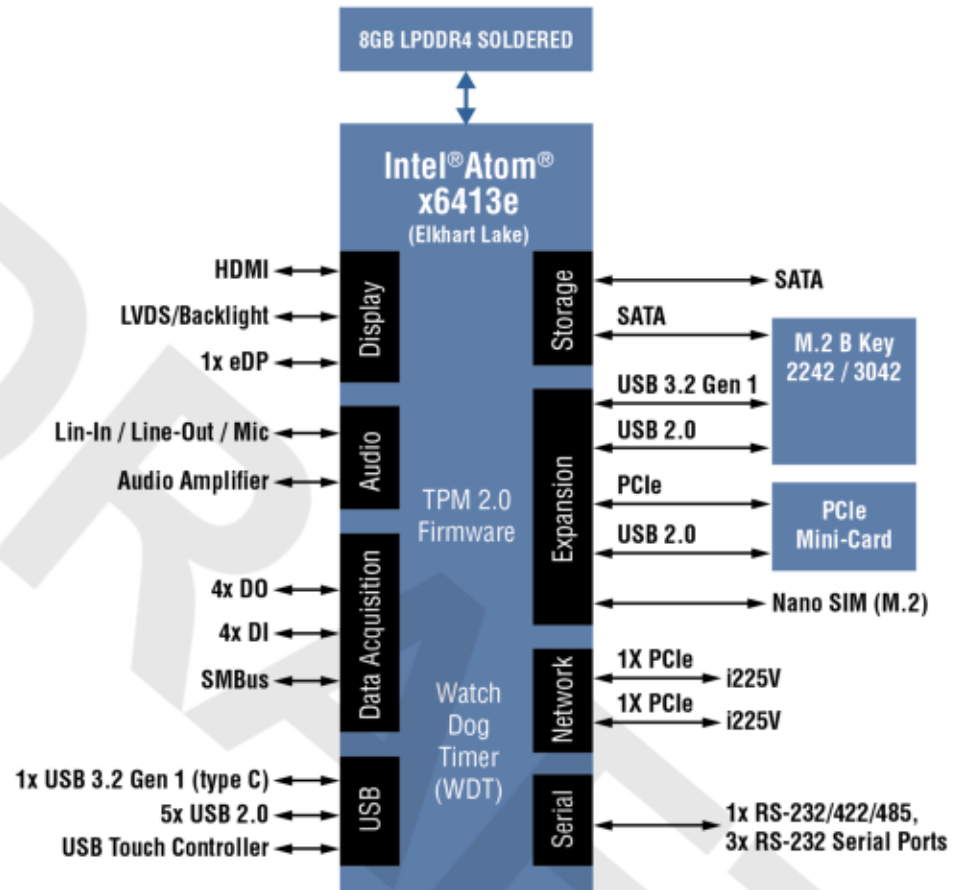
- USB touchscreen interface

Additional Features

- Performance for industrial IoT applications
- Connectivity and I/O for embedded systems
- Optimized for small form factor designs
- Watchdog timer, 0~255 sec programmable

5. General Operation

5.1 System Block Diagram



The SBC25-C466 features the Intel Atom (Elkhart Lake) dual core or quad core system on chip (SOC). Its robust design, small size, and extended operational temperature make it ideal for use in industrial IoT applications and embedded systems for industrial controls, transportation, Mil/COTS, and energy markets.

The soldered down memory provided enables up to 4 GB of DDR3L RAM. SATA support is provided along with mSATA support through the full and half-size Mini Card slots.

The VGA and LVDS display interfaces support simultaneous video output. There are a total of four USB 2.0 ports and one USB 3.1 Gen 1 connector which supports an additional USB 2.0 port. There are four RS232 serial channels.

There are four hardware digital inputs and four hardware digital outputs. The digital inputs have a 10 k Ω pull up resistor to +5V by default.

Other features include beep tones for error notification, a watchdog timer supported RTC with optional battery back up, and audio amplifier.

The SBC is software-compatible with Windows 10, Windows 10 IoT Enterprise, Windows 10 IoT Core, Linux, and some real-time operating systems.

Drivers are available from the WINSYSTEMS website.

6. Specifications

The SBC25-C466 adheres to the following specifications and requirements.

Table 1: SBC25-C466 specifications

Electrical	
V _{CC}	Wide range voltage input +9 to 36VDC
Models	SBC25-C466-6413-8-0
Processor	Quad-Core Intel x6413e at 1.5 GHz (3.00 GHz burst)
Mechanical	
Dimensions	2.5" SBC form factor 102 x 88 mm (4.02 x 3.46 in.)
Weight	TBD
PCB thickness	0.063 in. (1.6 mm)
Environmental	
Temperature ^a	-20 to +70°C (-4 to +158°F)
Humidity (RH)	5% to 95% non-condensing
Mean time between failure (MTBF) ^b	TBD
RoHS compliant	Yes
Operating Systems	
Runs Windows 10 Pro, Windows 10 IoT Enterprise, Linux, real-time operating systems (RTOS).	

a. Requires airflow.

b. A MTBF measurement is based on a statistical sample and is not intended to predict any one specific unit's reliability; thus MTBF is not, and should not be construed as, a warranty measurement.

7. Configuration

This section describes the SBC25-C466 components and configuration.

7.1 Component Layout

7.1.1 Top View

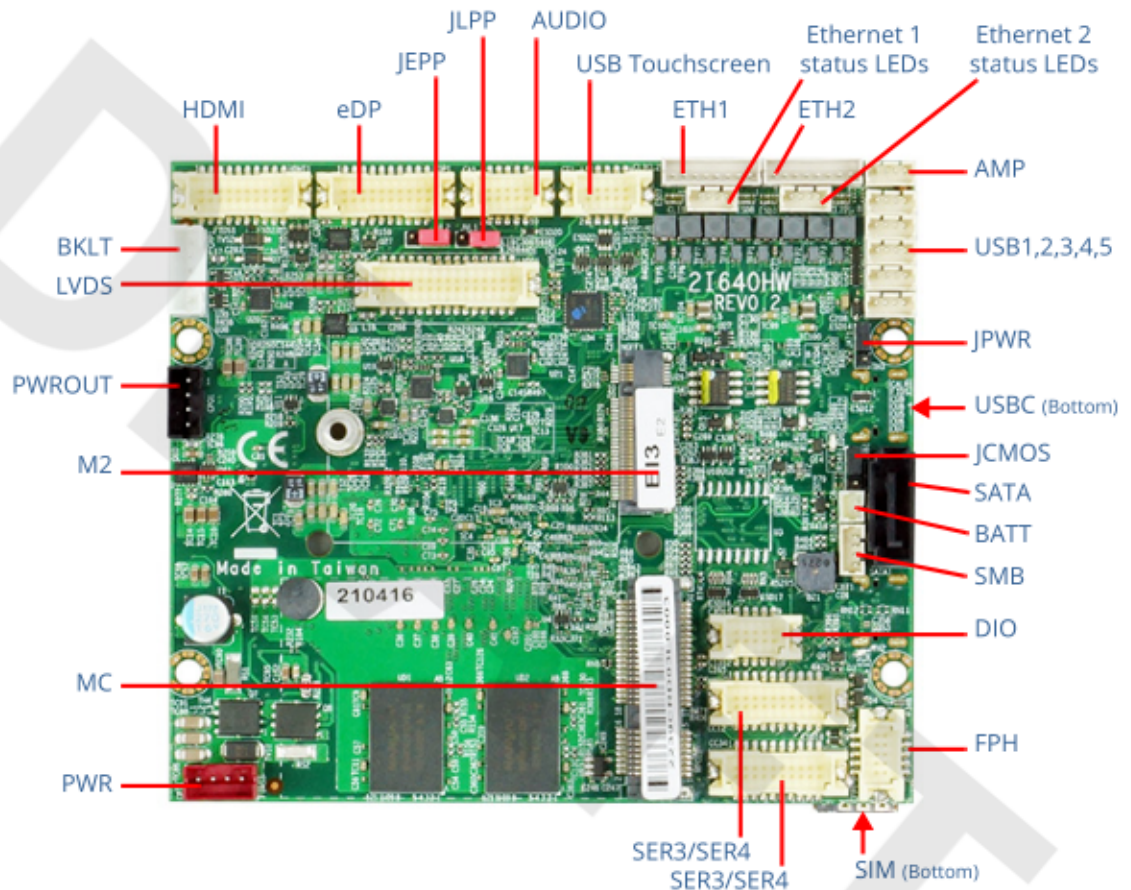


Table 2: Board components

Item	Description	Reference
Configuration Jumpers and LEDs		
JCMOS	CMOS data clear	page 12
JPWR	Power in always	page 12
JLPP	LCD panel power select	page 12
JEPP	eDP panel power select	page 13
LEDE1, LEDE2	Ethernet 1, 2 status LEDs	page 27
Power		
PWR	Power input	page 14
PWROUT	Power output +5V/+12V DC	page 21
BKLT	LVDS backlight power	page 22
BATT	CMOS battery input	page 15
Storage		
M2	M.2 Socket 3, with B key, type 2242/3042 SATA support	page 16
SATA	Serial ATA interface	page 27
Video and Audio		
HDMI	HDMI	page 26
LVDS	LVDS video output	page 22
eDP	Embedded DisplayPort (eDP)	page 27
AUDIO	Audio I/O	page 23
AMP	Audio amplifier	page 20
System I/O		
FPH	Front panel header	page 21
ETH1, ETH2	Ethernet 1 and 2 headers	page 27
USBC	USB 3.2 Gen 1 (type C)	page 22
USB1-USB5	USB 2.0 header	page 22
TOUCH	USB touchscreen	page 22
SER1, 2	Serial RS-232/422/485 port 1 and Serial RS-232 port 2	page 23
SER3, 4	Serial RS-232 ports 3, 4	page 25
DIO	4x digital input/4x digital output	page 26
SMB	SMBus	page 26
M2	M.2 Socket 3, with B key, type 2242/3042 SATA support	page 16
MC	Mini PCIe connector	page 27
SIM	SIM	

7.2 Jumpers

7.2.1 JCMOS - CMOS Data Clear

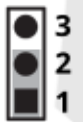
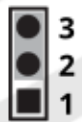
Jumpers can be used to reset the BIOS CMOS settings to the factory default. Enable/disable the clear CMOS function hardware circuit, by placing or removing the jumper from JCMOS as needed.

To reset the BIOS CMOS configuration to the factory default settings:

1. Remove power from the SBC25-C466.
2. Find JCMOS.
3. Remove jumpers from pins 1-2.
4. Install jumpers on pins 2-3 and wait five seconds.
5. Replace jumpers back on pins 1-2.

NOTE Do not clear the CMOS except in these circumstances: 1) Troubleshooting; 2) Forgotten password; 3) You fail over-clocking system.



Layout and Pin Reference

	3 2 1		3 2 1
*Normal		Clear	
Pin	Description		
*1-2	Normal set		
2-3	CMOS data clear		

7.2.2 JPWR - Power in always

Power in always on function.



Layout and Pin Reference

	3 2 1		3 2 1
+5V		*+3.3V	
Pin	Description		
1-2	Disable (default)		
*2-3	Enable		

7.2.3 JLPP - LCD Panel Power Select

Select the appropriate VCC setting using this jumper.



Layout and Pin Reference

 +5V	 *+3.3V
Pin	Description
1-2	+5V
*2-3	+3.3V

7.2.4 JEPP - eDP Panel Power Select

Select the appropriate VCC setting using this jumper.


Layout and Pin Reference

 +5V	 *+3.3V
Pin	Description
1-2	+5V
*2-3	+3.3V

7.2.5 LEDE1, LEDE2 - Ethernet 1, 2 Status LEDs

1x4 pin (1.25 mm) connector

Layout and Pin Reference

 pin 1	
Pin	Description
1	VCC
2	Speed 10M
3	Speed 100M
4	Speed 1000M

LED1/LED2 - 10/100/1000 Ethernet LED

Speed		10 Mbps			100 Mbps			1000 Mbps		
Indicate	Side	Back		Front	Back		Front	Back		Front
	LED	Link	ACT	ACT	Link	ACT	ACT	Link	ACT	ACT
LAN light		Orange	Orange	Orange	Green	Orange	Orange	Red	Orange	Orange

Connector Information

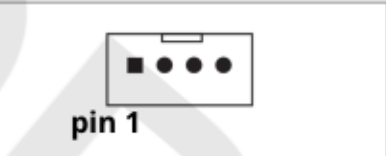
- Molex 53047-0410

Matching Connectors (cable housing)

- Molex 51021-0400

7.3 Connectors**7.3.1 PWR - Power Input****Layout and Pin Reference**

DC 9V~36V 1x4 pin (2.0 mm) connector



Pin	Description
2,3	DC-IN (12V)
1,4	GND

Connector Information


- JST B4B-PH-K-S

Matching Connector (cable housing)

- JST PHR-4

7.3.2 PWROUT - Power output +5V/+12V DC

+5V/+12V DC voltage output, 4 pin (2.0 mm) connector

Layout and Pin Reference


Pin	Description
1	+5V
2	GND
3	GND
4	+12V

Connector Information


- JST B4B-PH-K-S

Matching Connector (cable housing)

- JST PHR-4

7.3.3 BKLT - LVDS Backlight Power

Backlight power 5-pin (2.0 mm) connector

Layout and Pin Reference


Pin	Description
1	+12V
2	GND
3	PWM dimming
4	ENBKL (3.3V)
5	ENBKL (5V)

Note: Pin 3 back light dimming controls, provided 200 Hz / 275 Hz / 380Hz / 20 kHz / 25 kHz / 100 Hz and adjust PWM duty cycle by software program.

Connector Information


- JST B5B-PH-K-S

Matching Connectors (cable housing)

- JST PHR-5

7.3.4 BATT - CMOS Battery Input

External battery 1x2 pin (1.25 mm) connector

Layout and Pin Reference


Pin	Description
1	GND
2	+3V

Connector Information

- Molex 053047-0210

Matching Connector (cable housing)

- Molex 51021-0200

7.3.5 M2 - M.2 Socket 3, with B Key, Type 2242/3042 SATA Support

The M.2 expansion socket provides support for B key, 2242/3042 form factor modules.

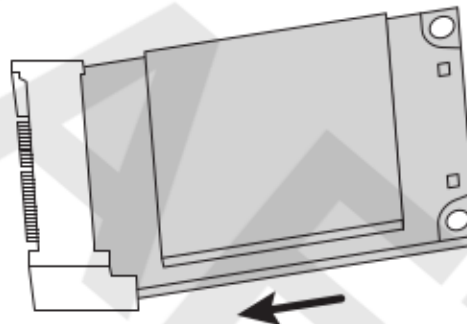
The M.2, B key interface provides PCIe Gen 2 x2, 1x SATA channel, 1x USB 2.0, and 1x USB 3.2 Gen 1.

B key modules typically support M.2 SSDs.

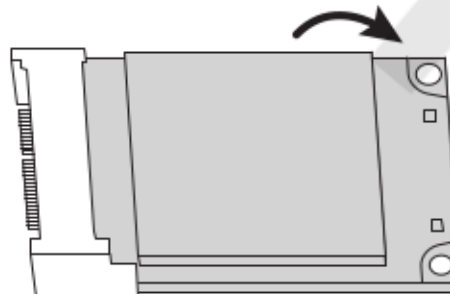
NOTE Use the same procedure to install an M.2 mini card.

To install a mPCIe mini card into MC:

1. Insert the mPCIe mini card.



2. Push the free end of the card toward the circuit board and then secure it with the supplied screw.



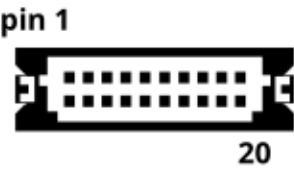
7.3.6 SATA1 - Serial ATA Interface

SATA1 provides a serial ATA 6 Gbps 7-pin connector for interfacing with hard disk drives and solid state disk drives.

7.3.7 HDMI - HDMI Video Output

2x5 pin (1.25 mm) connector

Layout and Pin Reference



Pin	Description	Pin	Description
1	TMDS DATA2-	2	NC
3	TMDS DATA2+	4	NC
5	TMDS DATA1-	6	GND
7	TMDS DATA1+	8	GND
9	TMDS DATA0-	10	GND
11	TMDS DATA0+	12	GND
13	TMDS CLK-	14	+5V
15	TMDS CLK+	16	+5V
17	DDC CLOCK	18	+5V
19	DDC DATA	20	Hot plug detect

Connector Information

- HIROSE DF13-20DP-1.25V


Matching Connectors (cable housing)

- HIROSE DF13-20DS-1.25C

7.3.8 LVDS - LVDS Video Output

LVDS 2x15 pin (1.25 mm) connector

Layout and Pin Reference

Pin	Description	Pin	Description
			
1	PWM dimming	2	+5V
3	+LCD (5V or 3.3V)	4	+LCD (5V or 3.3V)
5	Channel-1-DATA3+	6	Channel-0-DATA3+
7	Channel-1-DATA3-	8	Channel-0-DATA3-
9	Channel-0-DATA2+	10	Channel-0-CLK+
11	Channel-0-DATA2-	12	Channel-0-CLK-
13	GND	14	GND
15	Channel-0-DATA1+	16	Channel-0-DATA0+
17	Channel-0-DATA1-	18	Channel-0-DATA0-
19	GND	20	GND
21	+LCD (5V or 3.3V)	22	+LCD (5V or 3.3V)
23	Channel-1-DATA2+	24	Channel-1-CLK+
25	Channel-1-DATA2-	26	Channel-1-CLK-
27	Channel-1-DATA1+	28	Channel-1-DATA0+
29	Channel-1-DATA1-	30	Channel-1-DATA0-
Notes:			
1. LVDS interface supports two LVDS channels at 18/24 bits.			
2. JLPP: LVDS panel +5V/+3.3V (default) voltage select.			
3. LVDS PIN 1 for panel backlight dimming control.			
4. Pin 1 back light dimming control. Provided 200 Hz / 275 Hz / 380 Hz / 20 kHz / 25 kHz / 100 Hz and adjust PWM duty cycle by software program.			

Connector Information

- HIROSE DF13-30DP-1.25V

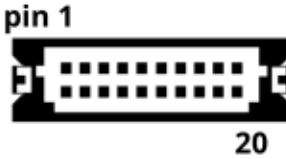
Matching Connectors (cable housing)

- HIROSE DF13-30DS-1.25C

7.3.9 eDP - Embedded DisplayPort (eDP)

2x10 pin (1.25 mm) connector

Layout and Pin Reference

			
Pin	Description	Pin	Description
1	Lane-0-DATA-	2	+12V
3	Lane-0-DATA+	4	+12V
5	Lane-1-DATA-	6	GND
7	Lane-1-DATA+	8	GND
9	Backlight enable	10	GND
11	PWM dimming	12	GND
13	I ² C data	14	+LCD (5V or 3.3V)
15	I ² C clock	16	+LCD (5V or 3.3V)
17	eDP Aux+	18	+LCD (5V or 3.3V)
19	eDP Aux-	20	EDP_HPDP

Notes:

1. The eDP interface supports 2 lanes.
2. JEPP: eDP panel +5V/ +3.3V (default) voltage select.
3. PIN9 for panel backlight enable is +3.3V level.

Connector Information

- Hirose DF13-20DP-1.25V

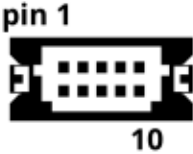
Matching Connectors (cable housing)

- Hirose DF13-20DS-1.25C

7.3.10 AUDIO - Audio I/O

Line-out/line-in/mic-in/SPDIF-out 2x5 pin (1.25 mm) connector

Layout and Pin Reference

			
Pin	Description	Pin	Description
1	Line-out-R	2	MIC-IN
3	Line-in-R	4	GND
5	GND	6	SPDIF-OUT
7	Line-in-L	8	+5V
9	Line-out-L	10	MIC-IN

Connector Information

- HIROSE DF13-10DP-1.25V


Matching Connectors (cable housing)

- HIROSE DF13-10DS-1.25C

7.3.11 AMP - Audio Amplifier

Amplifier line-out right/left channel 4-pin (1.25 mm) connector

Layout and Pin Reference

	
Pin	Description
1	Left+
2	Left-
3	Right+
4	Right-

Connector Information

- Molex 53047-0410

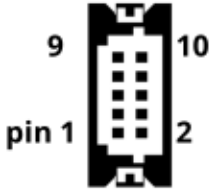
Matching Connectors (cable housing)

- Molex 51021-0400

7.3.12 FPH - Front Panel Header

Front panel header 2x5 pin (1.25 mm) connector

Layout and Pin Reference



Pin	Description	Pin	Description
1	Power button pin	2	Power button GND
3	Reset pin	4	Reset GND
5	Power LED-	6	Power LED+
7	HDD LED-	8	HDD LED+
9	LAN LED-	10	LAN LED+

Connector Information

- HIROSE DF13-10DP-1.25V

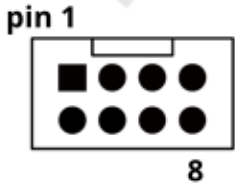
Matching Connectors (cable housing)

- HIROSE DF13-10DS-1.25C

7.3.13 ETH1/ETH2 - Ethernet 1 and 2 Headers

2x4 pin (2.0 mm) connector

Layout and Pin Reference



Pin	Description	Pin	Description
1	TR0-/TX-	2	TR0+/TX+
3	TR2+/NC	4	TR1+/RX-
5	TR1-/RX+	6	TR2-/NC-
7	TR3-/NC	8	TR3+/NC

Connector Information

- JST B8B-PHDSS

Matching Connectors (cable housing)

- JST PHDR-08VS0

7.3.14 USBC - USB 3.2 Gen 1 - Type C (Bottom)


One USB 3.2 Gen 1 (5 Gbps) port is supported with a Type-C onboard connector.

7.3.15 USB1-USB5 - USB 2.0 Headers

1x4 pin (1.25 mm) connector

Layout and Pin Reference

USB1, 2, 3, 4, 6: USB 2.0 port 1x4 pin (1.25 mm) connector



Pin	Description
1	+5V
2	DATA-
3	DATA+
4	GND

Note: USB6 signals share with the Touch interface if Touch upstream is using USB interface.

Connector Information

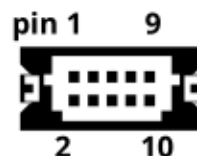
- Molex 53047-0410

Matching Connectors (cable housing)

- Molex 51021-0400

7.3.16 TOUCH - USB Touchscreen

Touchscreen device 2x5 pin (1.25 mm) connector

Layout and Pin Reference

8-wire type pin define

Pin	Description	Pin	Description
1	Bottom	2	Bottom sense
3	Top sense	4	Top
5	Right	6	Right sense
7	Left	8	Left sense
9	GND	10	NC

Note: To configure for 8-wire touch setup, short pins 3 and 4 together.

4-wire type pin define

Pin	Description	Pin	Description
1	Bottom	2	N/A
3	N/A	4	Top
5	Right	6	N/A
7	Left	8	N/A
9	GND	10	NC

Note: To configure for 4-wire touch setup, short pins 3 and 4 together.

5-wire type pin define

Pin	Description	Pin	Description
1	UR(H)	2	N/A
3	Sense	4	UL(Y)
5	LR(X)	6	N/A
7	LL(L)	8	N/A
9	GND	10	NC

Note: The Touch upstream can be changed to USB interface, but USB6 will be removed.

Connector Information

- HIROSE DF13-10DP-1.25V

Matching Connectors (cable housing)

- HIROSE DF13-10DS-1.25C

7.3.17 SER1, 2 - Serial RS-232/422/485 port 1 and Serial RS-232 port 2

2x10 pin (1.25 mm) connector

- SER1: Multi-protocol RS-232/422/485, selectable in BIOS
- SER2: RS-232 only

Layout and Pin Reference

Pin	Description	Pin	Description
SER1		SER2	
1	+5V	2	+5V
3	DCD	4	DCD
5	DSR	6	DSR
7	RXD	8	RXD
9	RTS	10	RTS
11	TXD	12	TXD
13	CTS	14	CTS
15	DTR	16	DTR
17	RI	18	RI
19	GND	20	GND

Connector Information

- HIROSE DF13-20DP-1.25V

Matching Connectors (cable housing)

- HIROSE DF13-20DS-1.25C

7.3.18 SER3, 4 - Serial RS-232

2x10 pin (1.25 mm) connector

Layout and Pin Reference

Pin	Description	Pin	Description
SER3		SER4	
1	+5V	2	+5V
3	DCD	4	DCD
5	DSR	6	DSR
7	RXD	8	RXD
9	RTS	10	RTS
11	TXD	12	TXD
13	CTS	14	CTS
15	DTR	16	DTR
17	RI	18	RI
19	GND	20	GND

Connector Information

- HIROSE DF13-20DP-1.25V

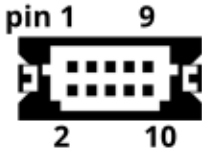
Matching Connectors (cable housing)

- HIROSE DF13-20DS-1.25C

7.3.19 DIO - 4x Digital Input/4x Digital Output

2x5 pin (1.25 mm) connector

Layout and Pin Reference

			
Pin	Description	Pin	Description
1	DI-0	2	DO-3
3	DI-1	4	DO-2
5	DI-2	6	DO-1
7	DI-3	8	DO-0
9	GND	10	+5V

Notes:

1. By default, there is a 10k Ohm pull up resistor to +5V.
2. Circuit must be isolated to control external devices.

Connector Information

- HIROSE DF13-10DP-1.25V


Matching Connectors (cable housing)

- HIROSE DF13-10DS-1.25C

7.3.20 SMB - SMBus

1x4 pin (1.25 mm) connector

Layout and Pin Reference

			
Pin	Description	Pin	Description
1	+3.3V	2	GND
3	SMB-Clock	4	SMB-Data

Connector Information

- Molex 53047-0410

Matching Connectors (cable housing)

- Molex 51021-0400

7.3.21 MC - mPCIe Socket (Mini Card)

The SBC25-C466 mPCIe socket supports a variety of peripherals as available in this format. This mPCIe socket supports PCIe and USB signals.

8. BIOS Functionality

The SBC25-C466 settings and option descriptions can be found in our supplemental *SBC25-C466 BIOS Manual*.

8.1 BIOS Update with UEFI Shell

8.1.1 Scope

The Unified Extensible Firmware Interface (EFI or UEFI for short) is a new model for the interface between operating systems and firmware. It provides a standard environment for booting an operating system and running pre-boot applications.

An optional feature of a UEFI implementation is the ability to boot the system to a built-in shell. The UEFI shell provides a command prompt and a rich set of commands that extend and enhance the UEFI BIOS's capability.

This section describes the process for updating the SBC25-C466 BIOS firmware image using the built-in UEFI shell.

8.1.2 Process

1. Insert a USB flash drive containing the BIOS update program into a USB socket on the SBC25-C466 platform.
2. Turn on the SBC25-C466 and press the **ESC** or **DEL** key during the boot process, which starts the BIOS setup utility.
3. In the BIOS setup utility, use the cursor keys to highlight the **Save & Exit** menu option.
4. Use the cursor keys to select **UEFI: Built-In EFI Shell** from the list of boot devices displayed under the **Boot Override** section.
5. Press **Enter**.

The PX1-C415 executes the built-in UEFI shell, and displays a list of attached storage devices. The USB flash drive shows up in the list; depending on other boot devices attached, it may be listed as **fs0**, **fs1**, etc.

6. From the UEFI shell command prompt, enter the following command where **N** is the number of the fs device representing the USB flash drive:

```
fsN:
```

Example: `fs1`:

The shell prompt changes to indicate that device `fsN` is now the active storage device, e.g., `fs1`:

- Execute the following command:

```
ls
```

The output of the `ls` command is similar to the display listing available with the Linux or MS-DOS list directory command. If the correct storage device was selected in step 6 above, the `ls` command should show the BIOS update program in the directory listing obtained with the `ls` command.

- Assuming the BIOS update program is named `Update.efi`, enter the following command at the shell command prompt:

```
Update.efi
```

The BIOS update program begins executing.

- When the update program completes, power cycle the platform to force the new BIOS image to load and execute.
- Verify BIOS update was successful by comparing displayed BIOS version with version specified in the BIOS update notification.

9. Accessories and Cables

9.1 Package Contents

The following items are included in the package:

- One SBC25-C466 main board
- One passive heat spreader
- One power cable adapter
- One power supply

9.2 Accessory List

WINSYSTEMS cables simplify connection to the SBC25-C466. The following table lists available items.

Table 3: Cable specifications

Part Number	Connection	Description
CBL-SET-0466-1	See "Component Layout On Page 10"	CABLE SET, 0466 PRODUCTS
CBL-HDMI-J01-06A	See "Component Layout On Page 10"	HDMI CABLE FOR C466

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the SBC25-C466 in a safe, effective manner, that does not damage the board. Read this section carefully.

Power Supply



Avoid Electrostatic Discharge (ESD)

Only handle the circuit board and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.

Power Supply Budget

Evaluate your power supply budget. It is usually good practice to budget twice the typical power requirement for all of your devices.

Zero-load Power Supply

Use a zero-load power supply whenever possible. A zero-load power supply does not require a minimum power load to regulate. If a zero-load power supply is not appropriate for your application, then verify that the single board computer's typical load is not lower than the power supply's minimum load. If the single board computer does not draw enough power to meet the power supply's minimum load, then the power supply does not regulate properly and can cause damage to the SBC25-C466.



Use Proper Power Connections (Voltage)

When verifying the voltage, measure it at the power connector on the SBC25-C466. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

The SBC25-C466 requires +9V to +36V (+/- 5%) to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.

The SBC25-C466 has a single power connector at J17. A single 9V-36V DC input and ground is required to power the board.

Power Harness

Minimize the length of the power harness. This reduces the amount of voltage drop between the power supply and the SBC25-C466.

Gauge Wire

Use the largest gauge wire that you can. Most connector manufacturers have a maximum gauge wire they recommend for their pins.

Contact Points

Some manufacturers use connectors with gold finish contacts. Gold finish contacts are used exclusively on high-speed connections. Power and lower speed peripheral connectors may use a tin finish as an alternative contact surface. It is critical that the contact material in the mating connectors is matched properly (gold to gold and tin to tin). Contact areas made with dissimilar metals can cause oxidation/corrosion, resulting in unreliable connections.

Pin Contacts

Often the pin contacts used in cabling are not given enough attention. The ideal choice for a pin contact would include a design similar to Molex or Trifurcon designs, which provide three distinct points to maximize the contact area and improve connection integrity in high shock and vibration applications.

Power Down

Make sure that power has been removed from the system before making or breaking any connections.



Power Supply OFF—Always turn off the power supply before connecting to the I/O Module. Do not hot-plug the SBC25-C466 on a host platform that is already powered.

I/O Connections OFF—Turn off all I/O connections before connecting them to the embedded computer modules or any I/O cards. Connecting hot signals can cause damage whether the embedded system is powered or not.

Mounting and Protecting the I/O Module

Placing the SBC25-C466 on mounting standoffs—Be careful when placing the SBC25-C466 on the mounting standoffs. Sliding the board around until the standoffs are visible from the top can cause component damage on the bottom of the board.

Do not bend or flex the SBC25-C466—Bending or flexing can cause irreparable damage. Embedded computer modules are especially sensitive to flexing or bending around ball grid array (BGA) devices. BGA devices are extremely rigid by design, and flexing or bending the

embedded computer module can cause the BGA to tear away from the printed circuit board.

Mounting holes—The mounting holes are plated on the top, bottom, and through the barrel of the hole, and are connected to the embedded computer module's ground plane. Traces are often routed in the inner layers right below, above, or around the mounting holes.

- Never use a drill or any other tool in an attempt to make the holes larger.
- Never use screws with oversized heads. The head could come in contact with nearby components causing a short or physical damage.
- Never use self-tapping screws; they compromise the walls of the mounting hole.
- Never use oversized screws that cut into the walls of the mounting holes.
- Always use all of the mounting holes. By using all of the mounting holes, you provide the support the embedded computer module needs to prevent bending or flexing.

Plug or unplug connectors only on fully mounted boards—Never plug or unplug connectors on a board that is not fully mounted. Many of the connectors fit rather tightly and the force needed to plug or unplug them could cause the embedded computer module to be flexed.

Avoid cutting the SBC25-C466—Never use star washers or any fastening hardware that cut into the SBC25-C466.

Avoid over-tightening of mounting hardware—Causing the area around the mounting holes to compress could damage interlayer traces around the mounting holes.

Use appropriate tools—Always use tools that are appropriate for working with small hardware. Large tools can damage components around the mounting holes.

Avoid conductive surfaces—Never allow the embedded computer module to be placed on a conductive surface. Many embedded systems use a battery to back up the clock-calendar and CMOS memory. A conductive surface such as a metal bench can short the battery causing premature failure.

Conformal Coating

Applying conformal coating to a WINSYSTEMS product does not in itself void the product warranty, if it is properly removed prior to return. Coating can change thermal characteristics and impedes our ability to test, diagnose, and repair products. Any coated product sent to WINSYSTEMS

for repair will be returned at customer expense and no service will be performed.

Operations/Product Manuals

Every single board computer has an Operations manual or Product manual.

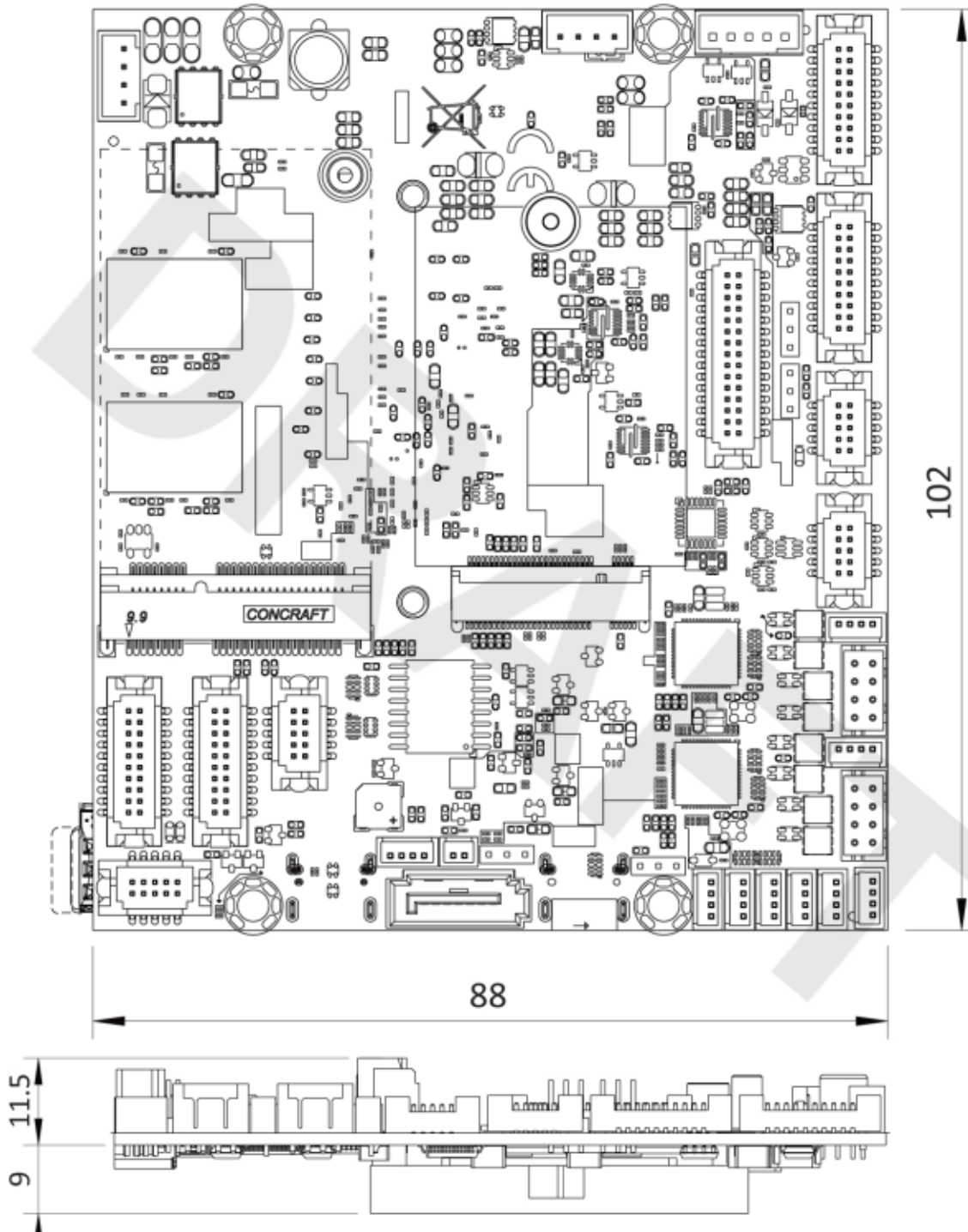
Periodic updates—Operations/Product manuals are updated often. Periodically check the WINSYSTEMS website (<http://www.winsystems.com>) for revisions.

Check pinouts—Always check the pinout and connector locations in the manual before plugging in a cable. Many I/O modules have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.

Contact an applications engineer—If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact a WINSYSTEMS Applications Engineer at +1-817-274-7553.

Appendix B. Mechanical Drawings

SBC25-C466 Mechanical Drawings



Appendix C. Warranty Information

WINSYSTEMS warrants that for a period of two (2) years from the date of shipment, any Products and Software purchased or licensed hereunder which have been developed or manufactured by WINSYSTEMS shall be free of any defects and shall perform substantially in accordance with WINSYSTEMS' specifications therefor. With respect to any Products or Software purchased or licensed hereunder which have been developed or manufactured by others, WINSYSTEMS shall transfer and assign to Customer any warranty of such manufacturer or developer held by WINSYSTEMS, provided that the warranty, if any, may be assigned. The sole obligation of WINSYSTEMS for any breach of warranty contained herein shall be, at its option, either (i) to repair or replace at its expense any materially defective Products or Software, or (ii) to take back such Products and Software and refund the Customer the purchase price and any license fees paid for the same. Customer shall pay all freight, duty, broker's fees, insurance, charges and other fees and charges for the return of any Products or Software to WINSYSTEMS under this warranty. WINSYSTEMS shall pay freight and insurance charges for any repaired or replaced Products or Software thereafter delivered to Customer within the United States. All fees and costs for shipment outside of the United States shall be paid by Customer. The foregoing warranty shall not apply to any Products or Software which have been subject to abuse, misuse, vandalism, accident, alteration, neglect, unauthorized repair or improper installation.

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THIS AGREEMENT SHALL BE GOVERNED AND CONSTRUED UNDER THE TEXAS UNIFORM COMMERCIAL CODE AND THE APPLICABLE LAWS OF THE STATE OF TEXAS. THE PARTIES ACKNOWLEDGE THAT ANY ACTION BROUGHT HEREUNDER SHALL ONLY BE BROUGHT IN A COURT OF COMPETENT JURISDICTION IN TARRANT COUNTY, TEXAS.

Warranty Service

1. To obtain service under this warranty, obtain a return authorization number. In the United States, contact the WINSYSTEMS Service Center for a return authorization number. Outside the United States, contact your local sales agent for a return authorization number.
2. You must send the product postage prepaid and insured. You must enclose the products in an anti-static bag to protect from damage by static electricity. WINSYSTEMS is not responsible for damage to the product due to static electricity.