

ClearFog PRO



User Manual

TABLE OF CONTENTS

1	Overview.....	4
1.1	GENERAL INFORMATION.....	4
1.2	SUMMARY OF FEATURES.....	4
1.3	Block Diagram.....	5
2	Main Hardware Components.....	6
3	Connector Layout.....	7
3.1	Certified Cables.....	8
4	Installation and Switching On.....	9
4.1	Unpacking your SolidRun ClearFog Pro.....	9
4.2	Power.....	9
4.3	SD card with operating system and boot select.....	9
4.4	MicroUSB connectivity (UART to microUSB).....	10
4.5	LEDs.....	10
4.6	Clock options.....	10
4.7	SIM card slot.....	11
4.8	Additional Required Components.....	11
5	Operational Data.....	12
5.1	OPERATING VOLTAGE.....	12
5.2	ENVIRONMENTAL DATA.....	12
6	Mechanical Drawings and Dimensions.....	13
7	WARRANTY TERMS AND CONDITIONS.....	14
8	LEGAL NOTICE.....	15
9	REGULATORY.....	16
9.1	SAFETY NOTICE.....	16
9.2	SAFETY SYMBOLS NOTES AND INFORMATION.....	16
9.3	UNPACKING.....	17
9.4	STORAGE, SERVICE, CLEANING AND CARING FOR THE PRODUCT.....	17
9.5	OPERATION.....	18
9.6	AC/DC ADAPTER OR POWER SUPPLY - ELECTRICAL SAFETY.....	19
9.7	ELECTRONIC EMISSION NOTICES.....	20
10	CONTACT INFORMATION AND RESOURCES.....	22

1 REVISIONS AND NOTES

Date	Owner	Revision	Notes
01 Aug 2017	Matthew Dunbar	1.0	

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Verify that you have the most current version of this document from www.solid-run.com

2 OVERVIEW

2.1 GENERAL INFORMATION

The SolidRun ClearFog Pro is a high performance platform featuring SolidRun's SOM (A388 SOM). ClearFog Pro provides a foundation for building various applications and tailors well to a wide range of target markets requiring high performance processing power, connectivity & storage interfaces. The ClearFog Pro ensures compact dimensions and low power consumption, utilizing an ARM Cortex A9 Dual core CPU.

SolidRun ClearFog Pro carrier board components:

- A388 based SOM for the SolidRun ClearFog Pro
- ClearFog Pro Carrier Board
- Heat sink
- Power adapter - 110V/220V US or EU plug (optional)
- Enclosure (optional)
- Micro SD card (optional)
- Officially released distributions
 - Open WRT
 - Yocto

Please contact SolidRun support for further information: support@solid-run.com.

2.2 SUMMARY OF FEATURES

Customizable configurations of the ClearFog PRO:

- Marvell ARMADA 38x series SoC Dual ARM® Cortex™-A9 Core at 1.6 GHz (1.6 GHz commercial / 1.3 GHz Industrial)
- 1 GB DDR3 RAM (optional up to 2GB RAM)
- 4 MB NOR Flash [storage memory / boot]
- MicroSD based storage (Can be upgraded with an on-board eMMC)
- M.2 slot (key type M) supporting 2242 SSD modules.
- Two slots supporting either Mini PCIe or mSATA SSD modules
- SIM Card slot (functions in conjunction with Mini PCIe based cellular modem)
- 10/100/1000 Mbps Ethernet WAN port
- SFP Port
- Five switched 10/100/1000 Mbps Ethernet LAN ports
- One USB 3.0 host port
- Telephony/Audio Header supporting PSTN and analog audio modules
- mikroBUS header supporting serial interfaces such as SPI, UART, etc.
- One MicroUSB supporting Serial communication for development purposes using FTDI 230X IC – Please see more details in our wiki pages at <http://wiki.solid-run.com>
- JTAG Interface for low level development and debug
- Power over Ethernet (PoE Expansion Header - for optional module development)
- Real Time Clock (RTC) with backup battery
- Wide range power supply 9-32V
- Push button connected to a GPIO.
- LEDs:
 - One power indicator
 - One pair of LEDs for each RJ45
 - Link / Activity indicator
 - 1000 vs. 10/100 indicator

2.3 BLOCK DIAGRAM

The SolidRun ClearFog Pro Single Board Computer block diagram displays all relevant elements of the full SBC. For further details please visit www.solid-run.com and wiki.solid-run.com:

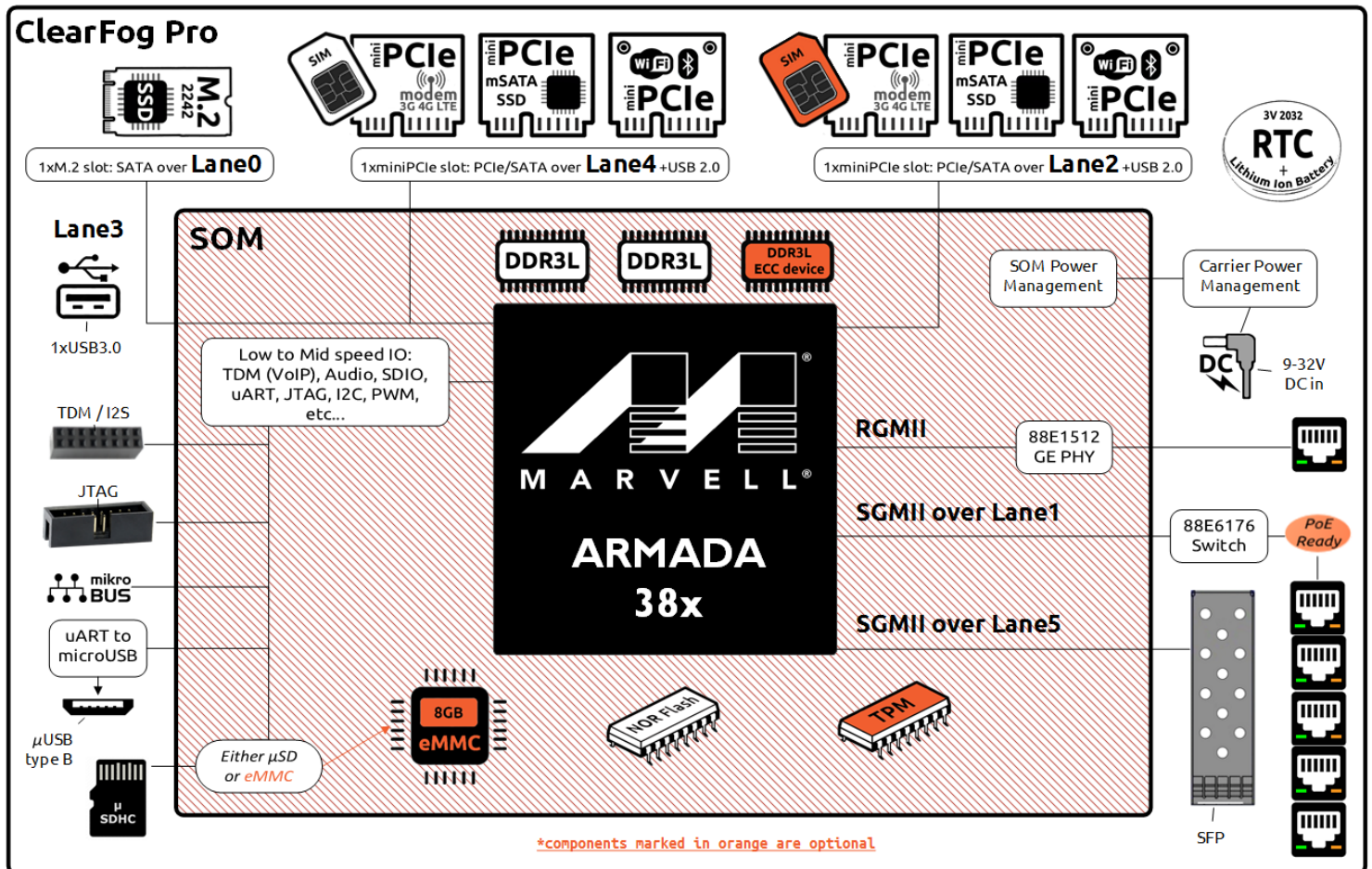


Figure 1 SolidRun ClearFog Pro Block Diagram

3 MAIN HARDWARE COMPONENTS

This chapter highlights the location of the main hardware components and interfaces of the SolidRun ClearFog Pro, including the A388 SOM:

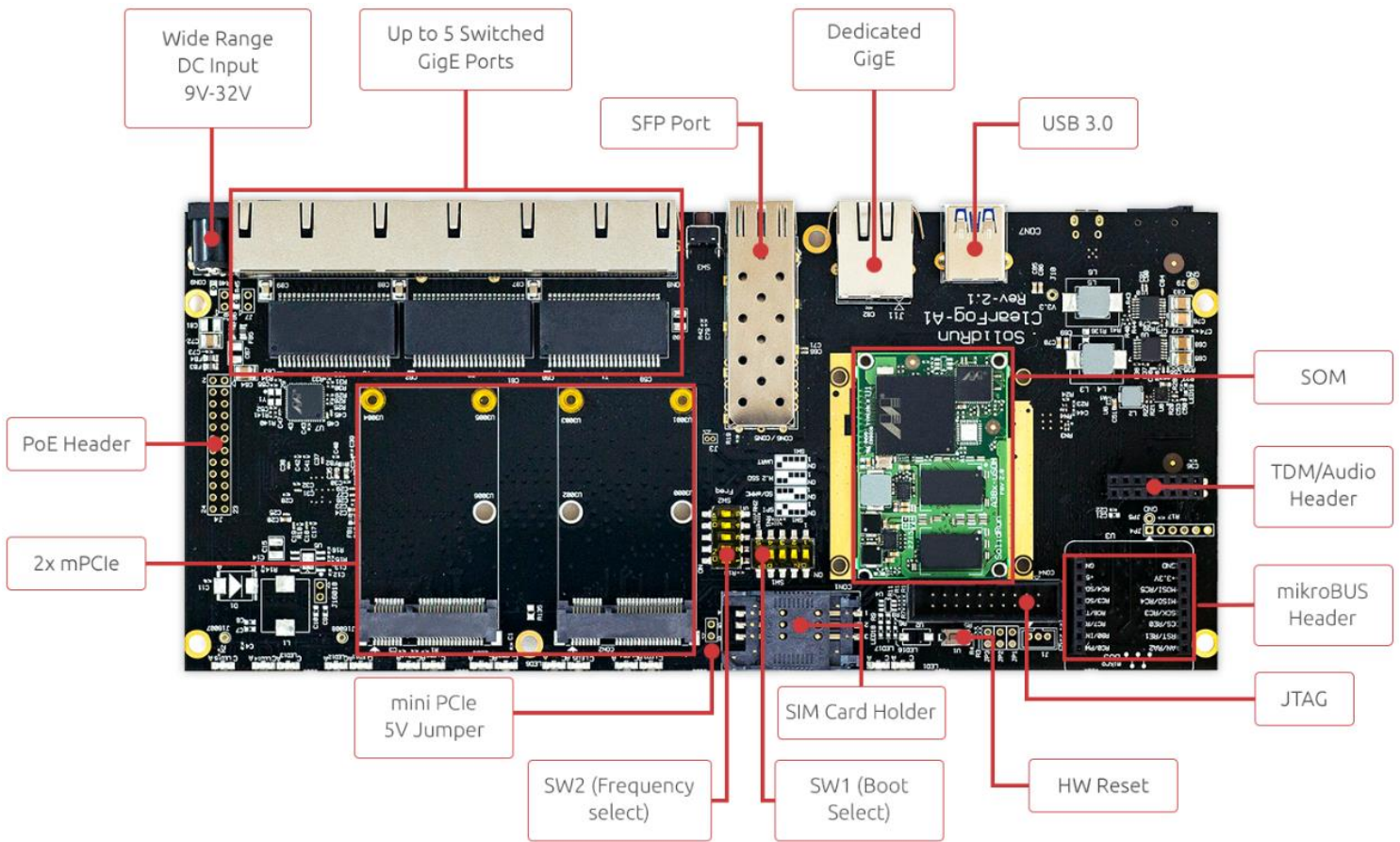


Figure 2 SolidRun ClearFog Pro Top View

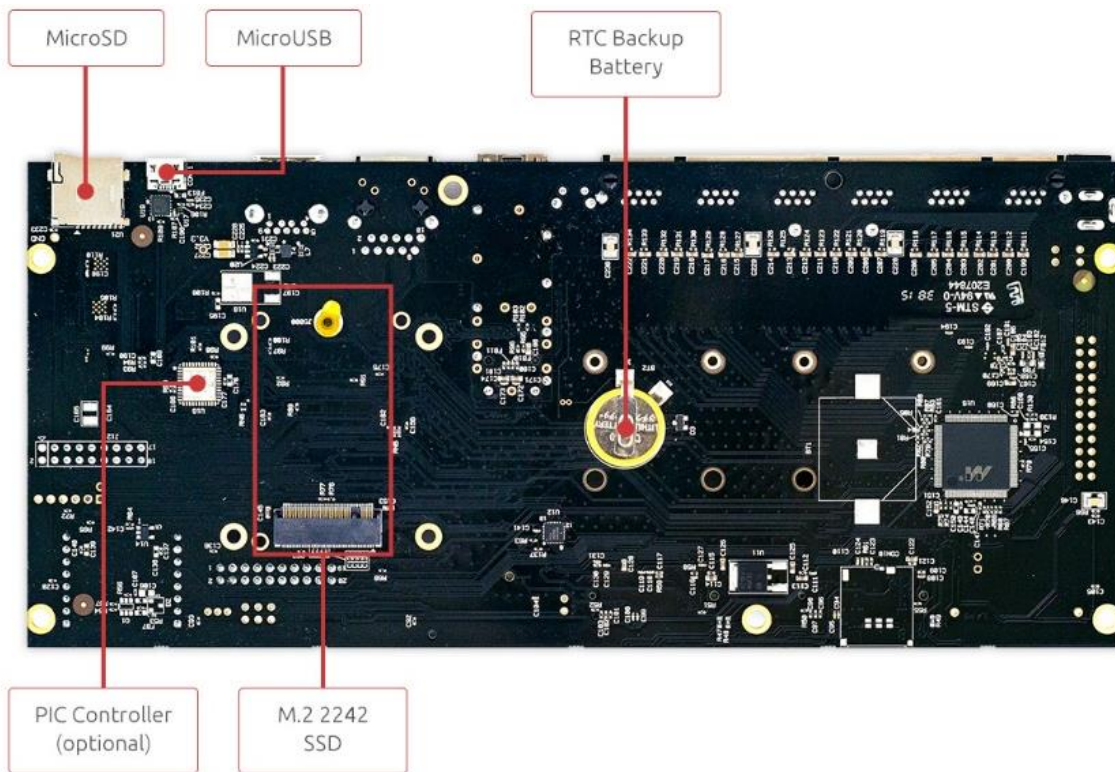


Figure 3 SolidRun ClearFog Pro Bottom View

4 CONNECTOR LAYOUT

SolidRun's ClearFog PRO has standard interfaces. The non-standard interfaces are listed below:

1. mikroBUS Header
2. TDM Telephony Audio Header
3. Power over Ethernet (PoE Expansion Header - for optional module development)
 - Please refer to the previous chapter for specific locations on the board.

The schematics by components can be found SolidRun's [wiki](#) pages, please look for the file under the product documentation tab.

4.1 CERTIFIED CABLES

The following is a list of industry-standard cables, sorted by type, with the necessary compliance requirements that have been proven to work well with the Clearfog product family.

These examples are the cables which SolidRun uses for testing, and should provide enough information to source products from your preferred cable vendor.

- Ethernet cable: Monoprice 24AWG Cat6A 500MHz STP
- USB Cable: SuperSpeed USB 3.0 Type A Male to Female Extension Cable in Black
- SFP connector: GigaLite GE-GB-P1RT-E SFP module with Monoprice 24AWG Cat6A 500MHz STP cable

5 INSTALLATION AND SWITCHING ON

This chapter explains the SolidRun ClearFog Pro packaging, how to prepare it for initial use and in what manner to power it on in its default state. Please note that this section references the diagrams in chapter 2.

5.1 UNPACKING YOUR SOLIDRUN CLEARFOG PRO

The package contains:

- ClearFog Pro Board
- A388 SOM
- Heat Sink
- Power adapter - 110V/220V US or EU plug (optional)
- Blank SD card, 8GB (optional) / eMMC (optional)
- Aluminum Enclosure (optional)
- User Manual

5.2 POWER

A suitable external power supply must be connected to the DC power socket, which has the dimensions 5.5mm x 2.1 mm cylindrical barrel connector. The power supply must be in the range of 9-32VDC. Recommended values are: 12VDC/2.5A

Please note that the DC jack must have positive polarity in the center pin:

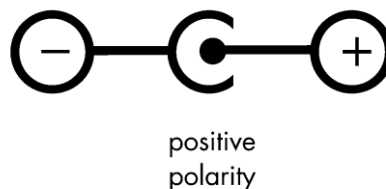


Figure 4 DC Barrel Socket Polarity

5.3 SD CARD WITH OPERATING SYSTEM AND BOOT SELECT

You will need to download an operating system for the ClearFog Pro and flash it into a blank SD card in order to use the system. You can download official release distributions and find flashing instructions at <https://www.solid-run.com/downloads/>. In addition, there are also several community-released distributions available. Once downloaded and flashed, the SD card with the flashed OS image must be inserted into the MicroSD slot on the ClearFog Pro. Before powering up the board for the first time, it is recommended to select the boot media. In order to configure the boot media to MicroSD, please set the S1 switch to match the second option from the following graphic (SD/eMMC):

	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
SPI	Off	Off	Off	On	Off
SD/eMMC	Off	Off	On	On	On
M.2 SSD	On	On	On	Off	Off
UART	On	On	On	On	Off

Table 1 Boot Selection Table

For additional insights on operating system, please visit the [Downloads](#) section of our [home page](#). Additional extensive resources are available in the [Support](#) section of our Wiki.

5.4 MICROUSB CONNECTIVITY (UART TO MICROUSB)

The ClearFog Pro Single Board Computer has an FTDI 230x UART to USB bridge allowing convenient connection to the device console. This configuration is typically used by developers for debugging purposes (e.g. kernel or drivers). Such serial console connection is of USB-to-UART type. The connection speed should be set to 115200 bps. Further information is displayed on our wiki page with tags [#UART](#) & [#serial](#) & [#console](#).

5.5 LEDs

There are multiple LEDs on the ClearFog Pro. These are indicating for example power on, connection and port activity. For further details, please refer to our wiki.solid-run.com pages.

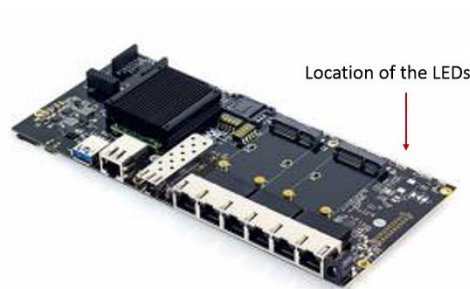


Figure 5 Location of LEDs on the ClearFog

5.6 CLOCK OPTIONS

For frequency configuration the ClearFog Pro utilizes a dip switch. The default setting is the off-position for all 5 switches as in the picture here:

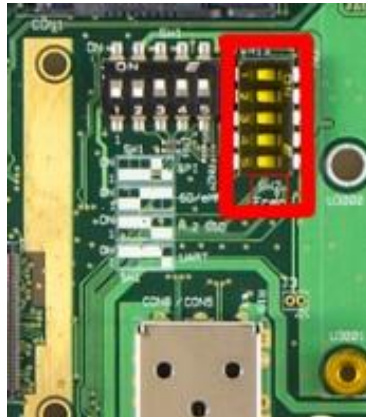


Figure 6 ClearFog Pro frequency configuration dip switch

Please refer to wiki.solid-run.com for the various frequencies settings.

5.7 SIM CARD SLOT

It is possible to utilize a Cellular connection by inserting a SIM card into the SIM card slot. Please observe that a GSM Cellular modem needs to be installed utilizing the mini PCIe connection in order to exploit the cellular connection.

Please note: If you your ClearFog Pro has dual SIM card slots, an additional cellular modem will need to be installed in the mini PCIe connection in order to utelize the 2nd SIM connection.

5.8 ADDITIONAL REQUIRED COMPONENTS

The components listed here are needed in order to begin using the ClearFog Pro Single Board Computer:

- SD card with flashed OS (officially released distributions and flashing instructions can be downloaded from <https://www.solid-run.com/downloads/>)
- Suitable Power Adapter as explained in section 4.2 of this manual.

6 OPERATIONAL DATA

The following tables provide details on operational values:

6.1 OPERATING VOLTAGE

Item	Minimum	Maximum	Unit
Mains/ Power Supply	9.00	32.00	V DC
Current rating	2	5	A

6.2 ENVIRONMENTAL DATA

Item	Minimum	Maximum
Ambient Temperature Range for enclosed	0°C	+40°C
Ambient Temperature Range* for Commercial PCBA**	0°C	+70°C
Ambient Temperature Range* for Industrial PCBA**	-40°C	+85°C***
Humidity (non-condensing)	10	90%

Note: Environmental data ranges are based solely on the ClearFog Pro components. The customer needs to consider specific thermal and mechanical design for a final product, including but not limited to housing, taking into account specific operational and environmental conditions.

*Armada 38x SoC has a maximum die temperature of 115°C regardless of ambient temperature and temperature ratings.

**PCBA refers to assembled PCB boards without enclosure.

*****Safety Note:** Please observe that the supplied RTC has a maximum temperature range of +70°C. In order to utilize the full industrial temperature range, the supplied RTC will need to be upgraded.

7 MECHANICAL DRAWINGS AND DIMENSIONS

For product design purposes, this chapter provides the SolidRun ClearFog Pro dimensions and component positions on both sides of the board:

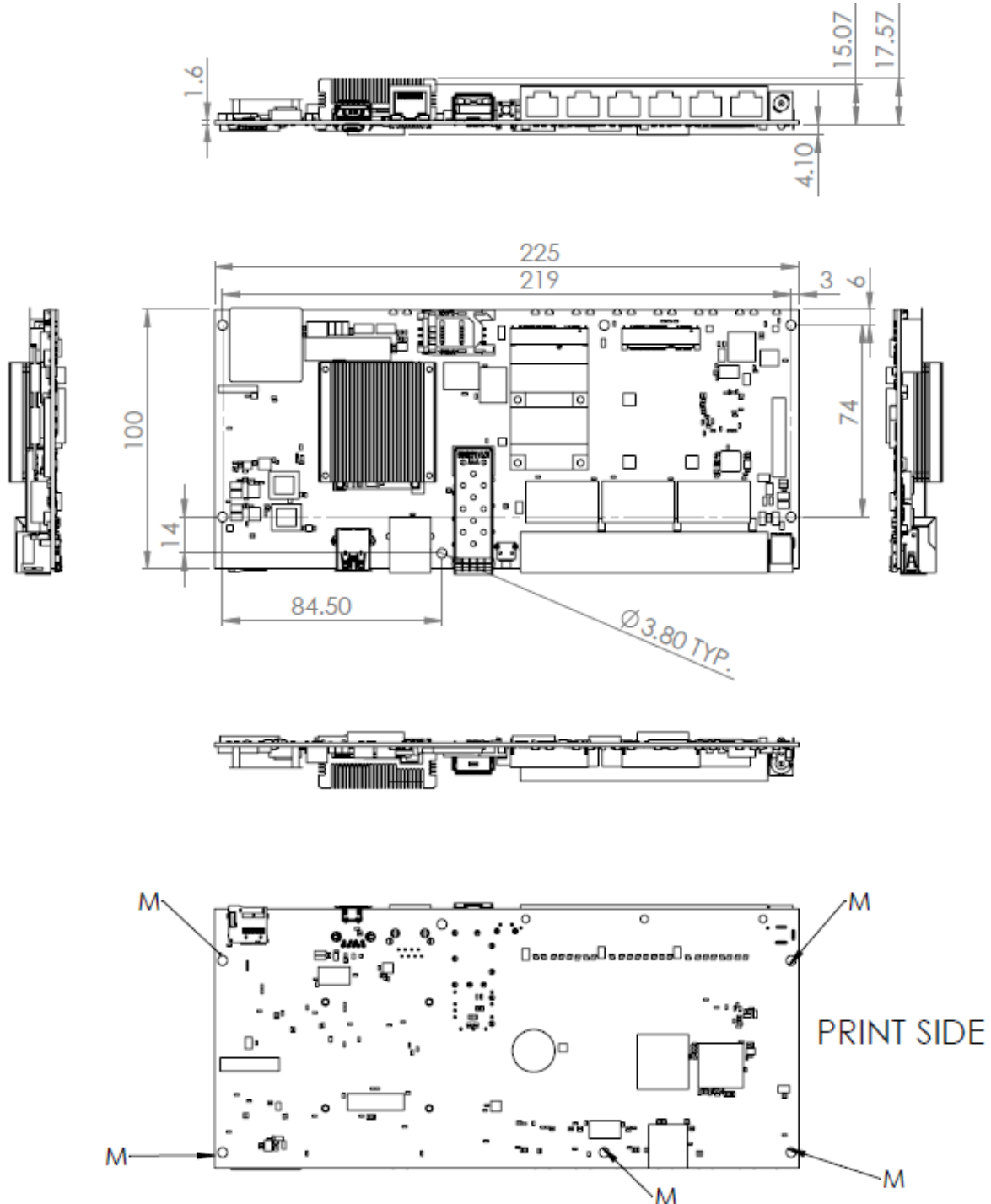


Figure 7 ClearFog Pro Mechanical Drawings & Dimensions

CAD files are available for download at wiki.solid-run.com

8 WARRANTY TERMS AND CONDITIONS

SolidRun guarantees its hardware products against defects in workmanship and material for a period of one (1) year from the date of shipment. Under warranty, the customer's sole remedy and SolidRun's sole liability shall be, at SolidRun's sole discretion, to either repair or replace the defective hardware product at no charge.

This warranty is void if the hardware product has been altered or damaged by an accident, misuse or abuse.

For additional information on warranty and related topics like RMA, please visit www.solid-run.com.

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9 LEGAL NOTICE

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10 REGULATORY

This chapter provides regulatory and compliance information about SolidRun's ClearFog Pro.

Certification-related information

Product name: **ClearFog Pro**

10.1 SAFETY NOTICE

Before you begin using this product, please read the following safety information.

Attention to these warnings will help prevent personal injuries and damage to the products.

It is your responsibility to use the product in an appropriate manner. This product is designed for use solely indoor environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage.

You are responsible if the product is used for any intention other than its designated purpose or in disregard of SolidRun instructions. SolidRun shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits.

10.2 SAFETY SYMBOLS NOTES AND INFORMATION

Throughout this manual, look for the symbols below that highlight safety related information.



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Indicates the possibility of incorrect operation which can result in damage to the product. The word ATTENTION may be used synonymously



Indicates that information related to safety or system proper information is provided.

10.3 UNPACKING

⚠ CAUTION

Never turn on or connect to power any equipment when there is evidence of mechanical damage, fire, exposure to water, or structural damage.

10.4 STORAGE, SERVICE, CLEANING AND CARING FOR THE PRODUCT

⚠ CAUTION

When not in use, avoid placing or storing the product in the following places or under the following conditions:

- Ambient temperature above 40°C
- Exposed to direct sunlight
- Humid or exposed to dust

⚠ WARNING

This product does not contain any user replicable or serviceable parts.

Do not take apart or attempt to service the product yourself.

Never remove the cover or any part of the housing of the product

The internal battery is not user replicable.

In the event of an equipment malfunction, all repairs must be performed either by SolidRun or by an authorized agent. It is the customer responsibility to report the need for service to SolidRun or to one of the authorized agents. For service information, contact SolidRun customer support.

Be careful not subject the product to strong impact.

If the product was subjected to a strong impact and/or falling over check carefully for any damage to the product. If such damage is observed the use of the product must be stopped immediately.

10.5 OPERATION

The product may be operated only under the operating conditions as specified by SolidRun.

When the product is used for an extended period of time, and/or at high ambient temperature and/or exposed to direct sunlight it is normal for the product body to feel warm.

⚠ CAUTION

Avoid overheating the product.

The product's ventilation should not be obstructed or blocked. If proper ventilation is not provided it can result in battery overheating or explosion of the battery resulting fire, burns or other injuries.

⚠ CAUTION

Avoid overheating the product.

Operating the product in ambient temperature above its specifications may cause overheating or explosion of the battery resulting fire, burns or other injuries.

⚠ DANGER

Stop using the product immediately if it emits smoke or a strange smell, or otherwise behaves abnormally.

NOTICE

Following are the required operating position and conditions:

Do not place the product on unstable surfaces

Do not place the product on elevated surface and secure it from falling from high places on passerby

Do not place the product on heat-generating surface or near heat emitting devices or direct flame. Verify that there is sufficient clearance between the product and any other device exhaust warm air

The product operating ambient range is temperature of 0-40 °C (32 to 104 °F) and Relative humidity of 10-90%. SolidRun recommends that an ambient temperature of 20 to 25 °C (68 to 77 °F) and relative humidity of 30-50% is maintained during normal operation as this will result in better performance and longer life of the equipment. Temperature must not exceed the maximum temperature specified above.

Do not expose the product to moisture or dust.

The product is not liquid-proof; therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.

Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.

10.6 AC/DC ADAPTER OR POWER SUPPLY - ELECTRICAL SAFETY

⚠ DANGER

The following information on electrical safety must be observed, failing to follow these instructions may result in electric shock, fire and/or serious personal injury or death.

Use only the adapter or power supply supplied with the product or adapter or power supply with the following specifications:

- Output voltage of 12V and current of at least 2A and not more than 5A

Prior to powering the product and plugging the adapter or power supply to the mains supply, always ensure that the nominal voltage setting on the adapter or power supply matches the nominal voltage of the AC supply network.

If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

Never use the adapter or power supply if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks that result in fire and/or injuries may occur.

Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.

Do not insert or remove the plug with wet hands.

Never remove the cover or any part of the housing of the adapter or power supply, doing so will expose circuits and components and can lead to electric shock, injuries, fire or damage to the product.

The adapter or power supply operating ambient temperature range is of 0 to 40°C / 32 to 104 °F (storage temp range: -20 to 60 °C / -04 to 140 °F) maximum operating altitude is 2000 m ASL,

Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.

The product is not liquid-proof; therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.

Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.

Prior to cleaning the product, disconnect it completely from the power supply. Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

10.7 ELECTRONIC EMISSION NOTICES

Federal Communications Commission Declaration of Conformity

The following information refers to ClearFog Pro.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party: SolidRun Ltd.

7 HaMada St

Yokne'am Illit

Israel

Support: support@solid-run.com



European Union - Compliance to the Electromagnetic Compatibility

(EMC) Directive or Radio Equipment Directive

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU (from 20 April, 2016) on the approximation of the laws of the Member States relating to electromagnetic compatibility.



SolidRun Ltd. is not responsible for any radio or television interference caused by using other than specified or recommended cables and connectors or by unauthorized changes or modifications to this equipment.

Unauthorized changes or modifications could void the user's authority to operate the equipment.

Appendix B. WEEE and recycling statements

The WEEE marking on SolidRun Ltd. products applies to countries with WEEE and e-waste regulations (for example, the European WEEE Directive.). Appliances are labeled in accordance with local regulations concerning waste electrical and electronic equipment (WEEE).

These regulations determine the framework for the return and recycling of used appliances as applicable within each geography. This label is applied to various products to indicate that the product is not to be thrown away, but rather put in the established collection systems for reclaiming these end of life products.

Users of electrical and electronic equipment (EEE) with the WEEE marking must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, and recovery of WEEE and to minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. SolidRun Ltd. electrical and electronic equipment (EEE) may contain parts and components, which at end-of-life might qualify as hazardous waste.

EEE and waste electrical and electronic equipment (WEEE) can be delivered free of charge to the place of sale or any distributor that sells electrical and electronic equipment of the same nature and function as the used EEE or WEEE.



Appendix C. Restriction of Hazardous Substances (RoHS)

European Union RoHS

This product, with included parts (cables, cords, and so on) meets the requirements of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("RoHS recast" or "RoHS 2").

11 CONTACT INFORMATION AND RESOURCES

SolidRun Ltd Headquarters

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2069201
Israel

Web page: <http://www.solid-run.com>

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Support: support@solid-run.com

Sales: sales@solid-run.com