Resource Identifier: 100330

Revision 1.1

Communicate Without Compromise

BluSDR-6 Hardware Guide

Commercial in Confidence

0. Preface

0.1 About this Document

This document contains relevant information required to identify, install and control the equipment or system.

Since the available functions can be licensed and depend on the specific implementation, not all the functions and or applications contained in this document may be relevant or applicable to the system you will be working with.

The actual presentation may differ from those in this document due to hardware or software changes.

0.2 Notice about this Publication

While every attempt is made to maintain the accuracy of the information in this product manual, it is subject to change without notice.

Performance specifications are included for guidance. All particulars are given in good faith, actual performance may vary.

0.3 Copyright

0.4 Related Documents

All DTC documents can be downloaded from WatchDox, see *Section 8.1*.

- IP Mesh Radio Software User Guide

0.5 Document History

This is a controlled document, written and produced by the DTC Technical Publications team. Changes are recorded in the table below.

Revision	Date	Author	Summary of Changes
1.0	23/08/2023	IR	First release
1.1	07/03/2024	IR	Image improvements. Updated variants, licenses, and accessories.

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1. Product Overview

1.1 Product Family

The BluSDR™-6 family includes several hardware formats and configurations which are based around the core PCB or boxed versions, see variants in *Section 2.5*.

Figure 1-1 BluSDR-6 PCB Version

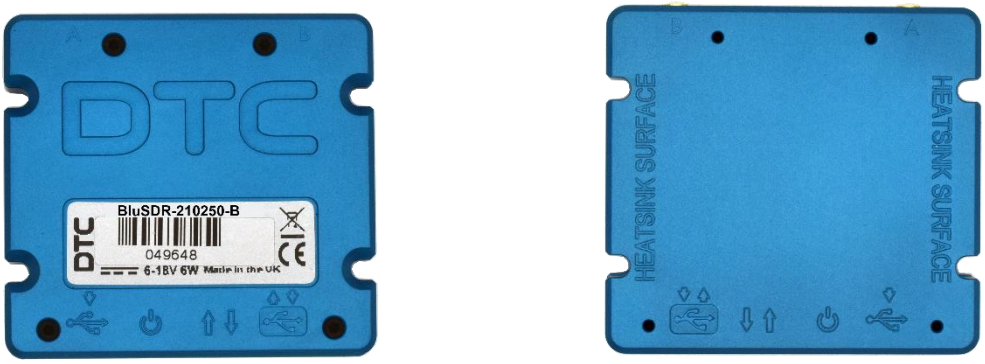


Figure 1-2 BluSDR-6 Boxed Version

1.2 Description

As part of the DTC BluSDR™ family of products, BluSDR™-6 is designed specifically for size and weight critical UxV applications and is particularly suitable for small drone platforms operating in short range applications up to 6km in range.

Based around DTC's SOL8SDR (software defined radio) architecture and offering up to full 2x200mW output power (frequency dependent), BluSDR™-6 includes MANET IP Mesh capability to allow up to 144 nodes in a self-healing network using DTC's industry leading MeshUltra-X™ waveform.

With two USB interfaces capable of supporting USB cameras and headsets as well as Wi-Fi, cellular and Ethernet dongles, BluSDR™-6 can also be connected to a range of host devices using RNDIS Ethernet over USB connectivity.

1.3 Basic Specifications

DC Input	6V to 18V reverse polarity protected
Power consumption	3W typical (2x100mW) 4W typical (2x200mW)
Temperature range	-20°C to +50°C with additional cooling
Dimensions (core PCB)	56mm x 48mm x 7.7mm (L/LS band) 50mm x 45mm x 7.7mm (S band)
Weight (core PCB)	26g approx. (L/LS band) 24g approx. (S band)
Dimensions (boxed)	56mm x 54mm x 11mm (L/LS band) 50mm x 54mm x 11mm (S band)
Weight (boxed)	62g approx. (L/LS band) 60g approx. (S band)

Note: Detailed technical specifications are given in the product datasheet. Please contact DTC for latest specifications.

1.4 Approval Notices

1.4.1 EMC/Safety and CE Marking

The boxed equipment has been designed to meet and has been tested against harmonized EMC and safety standards. The CE mark is indicated on all product labels.

The CE Declaration of Conformity as well as the technical file are available on request.

2. Product Package

2.1 Overview

Carefully open the packaging and verify that all the parts have been included, as ordered. Retain the packing materials for storage.

The part numbers are useful for identification and if you need to order a new part. The part number codes mean:

- CA – cable assembly
- SA – sub assembly
- AP – assembly part

Note: If you do not have all the parts or are not happy with the condition of your delivered product, please contact DTC. See *Section 8.2*.

2.2 Parts List

These items will be in the package for variants with cables but can be purchased as accessories for no cable variants.

Part Number	Description
Primary unit	BluSDR-6 module
CA3740	5-way JST to USB A socket cable
CA3742	5-way JST to USB micro socket cable
CA3903 x 2	MMCX to SMA plug cable 200mm
CA4004	4-way Molex to 2-way Micro-Fit power cable
CA4017	2-way Micro-Fit to banana plugs power cable
MW4083 x 2 (PCB only)	Gasket seal

2.3 Accessory Options

If you have purchased any of these items, they will also be in the package.

Part Number	Description
AP007377	USB A to micro USB B cable
CA3752	SMA jack to MMCX plug cable 100mm
CA3983	5-way JST to USB Ethernet adaptor
CA4005	2-way Micro-Fit to 7.4V slimline battery
CA4006	2-way Micro-Fit to 8.4V 1.3A battery charger
CA4016	2-way Micro-Fit to 12V 2A DC mains adapter
SA4525	Heat sink clamp
D740-OEM	USB V2.0 to 10/100 Ethernet converter
SOL8SDR-M-CACLAMP-50	Cable clamp for 50mm length boxed BluSDR-6
SOL8SDR-M-CACLAMP-56	Cable clamp for 56mm length boxed BluSDR-6

2.4 Licensing Options

Some product functions are enabled by licenses. The license for your product can be viewed in the control software.

Part Number	Description
Silver (base license)	Multi Mesh, SIMO Mesh, MIMO Mesh, Ultra-Low Bandwidth, DES Encryption, Streaming, Recording
BluSDR-IAS	Interference Avoidance Scheme
#BluSDR-P2MP	Point-to-Multipoint System
*AES128	AES 128-Bit Encryption
*AES256	AES 256-Bit and AES 128-Bit Encryption

Enables split frequency TX/RX operation for special applications. Contact DTC for more information.

* Accredited to FIPS140-2 for MeshUltra™ waveforms

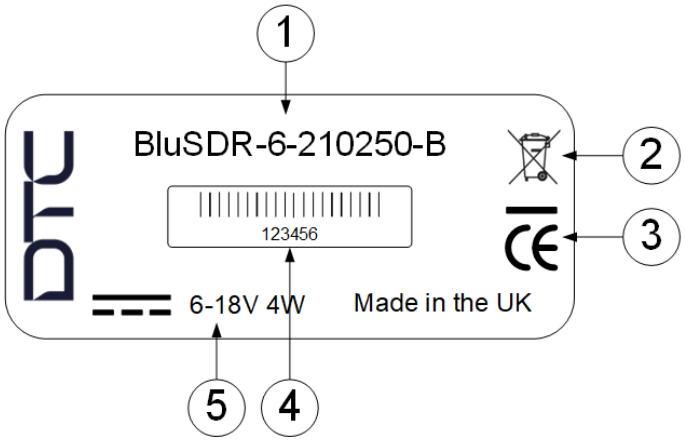
2.5 Variants

This part number will identify the product; it is also on the label of boxed variants.

Part Number	Description
BluSDR-6-120170	BluSDR-6 2x100mW Core PCB, 1.20-1.70GHz
BluSDR-6-120170-NC	BluSDR-6 2x100mW Core PCB (no cables), 1.20-1.70GHz
BluSDR-6-120170-B	BluSDR-6 2x100mW Boxed, 1.20-1.70GHz
BluSDR-6-120170-B-NC	BluSDR-6 2x100mW Boxed (no cables), 1.20-1.70GHz
BluSDR-6-167235	BluSDR-6 2x200mW Core PCB, 1.67-2.35GHz
BluSDR-6-167235-NC	BluSDR-6 2x200mW Core PCB (no cables), 1.67-2.35GHz
BluSDR-6-167235-B	BluSDR-6 2x200mW Boxed, 1.67-2.35GHz
BluSDR-6-167235-B-NC	BluSDR-6 2x200mW Boxed (no cables) 2x200mW, 1.67-2.35GHz
BluSDR-6-210250	BluSDR-6 2x200mW Core PCB, 2.10-2.50GHz
BluSDR-6-210250-NC	BluSDR-6 2x200mW Core PCB (no cables), 2.10-2.50GHz
BluSDR-6-210250-B	BluSDR-6 2x200mW Boxed, 2.10-2.50GHz
BluSDR-6-210250-B-NC	BluSDR-6 2x200mW Boxed (no cables), 2.10-2.50GHz
BluSDR-6-420520	BluSDR-6 2x100mW Core PCB, 4.20-5.20GHz
BluSDR-6-420520-NC	BluSDR-6 2x100mW Core PCB (no cables), 4.20-5.20GHz
BluSDR-6-420520-B	BluSDR-6 2x100mW Boxed, 4.20-5.20GHz
BluSDR-6-420520-B-NC	BluSDR-6 2x100mW Boxed (no cables), 4.20-5.20GHz

2.6 Labelling

Boxed variants will carry a product label.



No.	Description
1	Part number – this is the variant explained above.
2	This symbol indicates that the unit should be disposed of in accordance with the WEEE Directive.
3	The CE mark certifies that a product has met EU consumer safety, health and environmental requirements.
4	A barcoded, six-digit serial number. This may be required during a support call.
5	Power requirements.

3. Hardware (Core PCB)

3.1 Mechanical Dimensions

3.1.1 BluSDR-6-120170/167235/420520

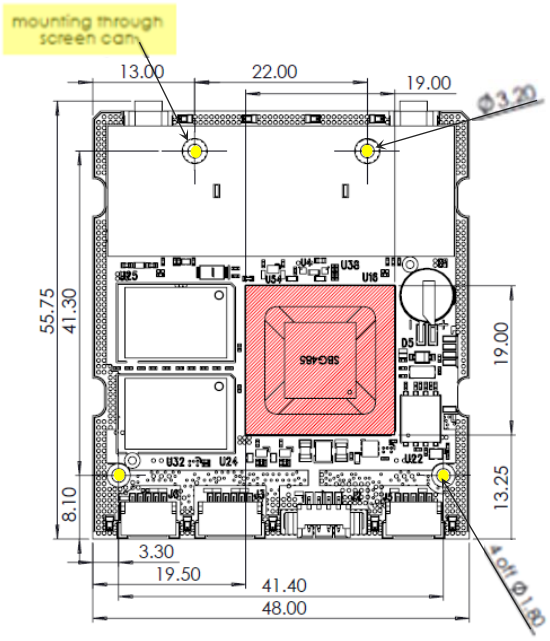


Figure 3-1: Top View

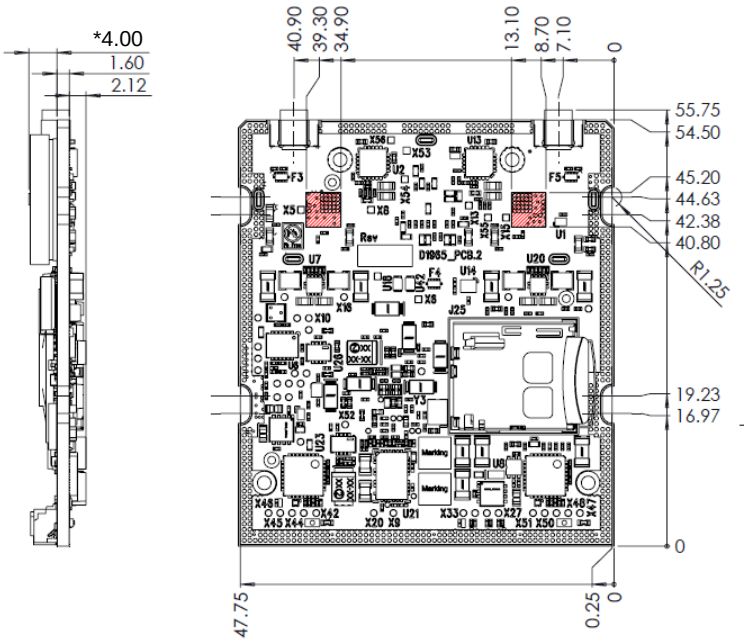


Figure 3-2: Side View and Bottom View

Note: *RF can height dimensions are typical. Tolerances may apply due to manufacturing process.

3.1.2 BluSDR-6-210250

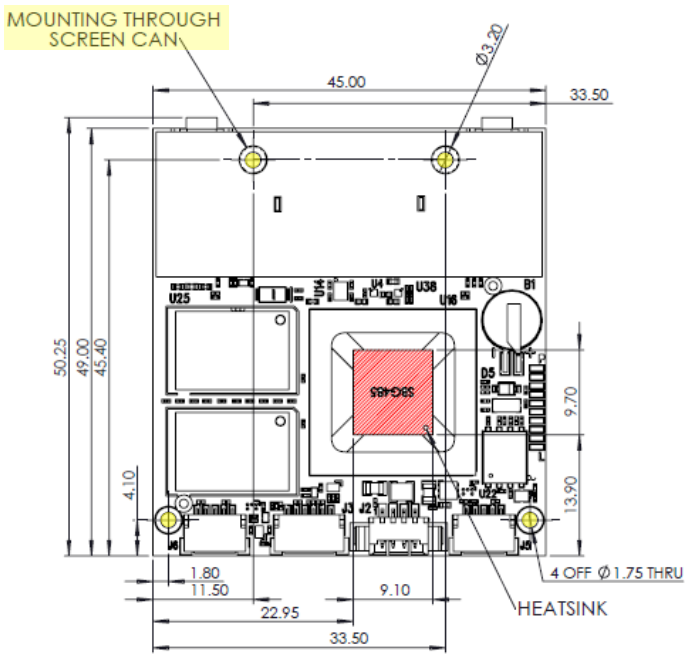


Figure 3-3: Top View

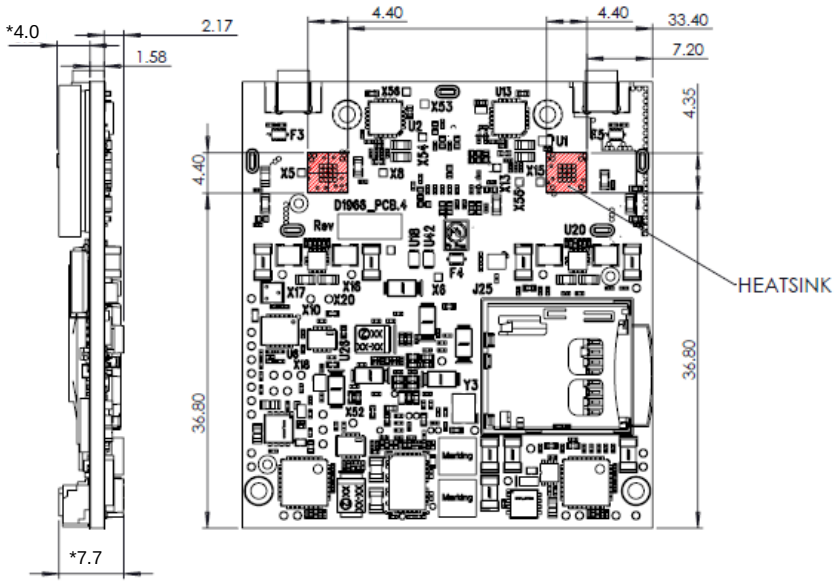


Figure 3-4: Side View and Bottom View

Note: *RF can height dimensions are typical. Tolerances may apply due to manufacturing process.

3.2 Mounting

The BluSDR-6 can be mounted to a fixture using the four mounting holes, highlighted yellow in *Figure 3-1* and *Figure 3-3*. The maximum screw diameter is 1.6mm.

DTC supply the BluSDR-6 with two mounting gaskets (MW4083) which can be used to provide a seal for RF emissions (please read *Section 3.4*) when assembled to an enclosure with a mounting boss.

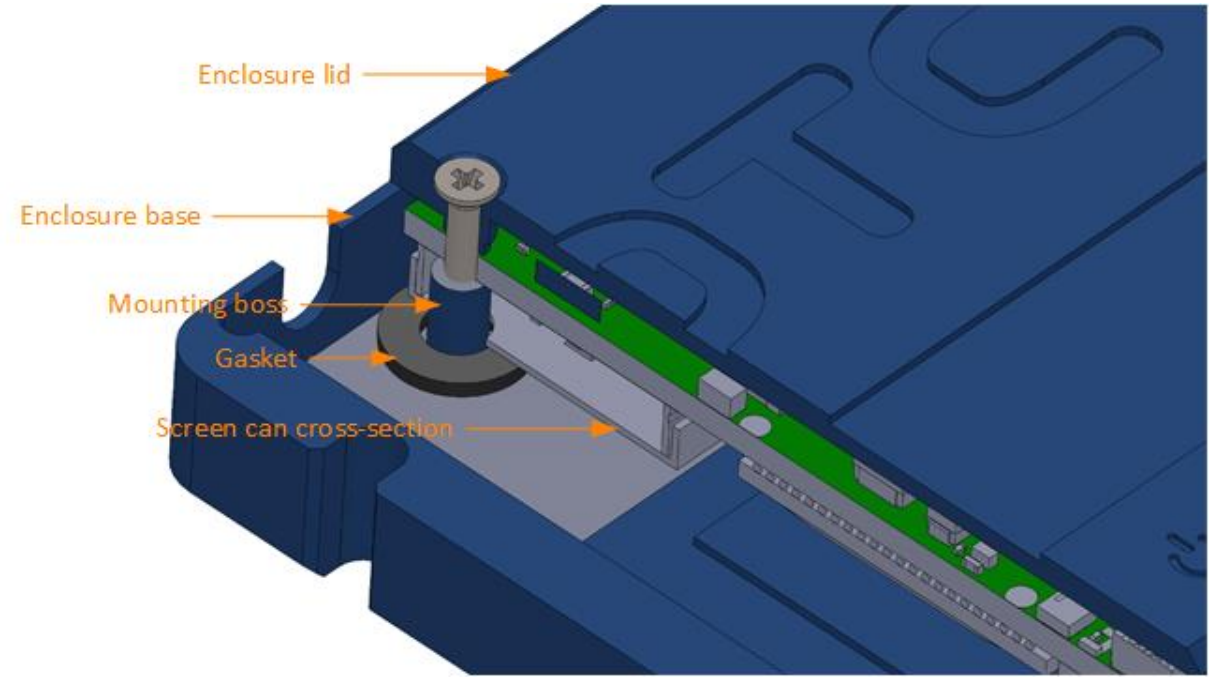


Figure 3-5 Example Enclosure Cross-Section with Gasket

Note: If the D196x is secured without using the gaskets, copper tape can be used to provide an RF seal.

3.3 Thermal Considerations

Thermal dissipation is required to ensure that critical components do not exceed their temperature specification.

To enable this, thermal gap pad should be applied to the PCB as an interface to a heat sink. The locations that require heat sinking are indicated in red and described below:

- FPGA device U16 on the top side of the PCB, see *Figure 3-1* and *Figure 3-3*
- RF copper plane on the bottom side of the PCB (read caution below), see *Figure 3-2* and *Figure 3-4*

CAUTION: It is essential that contact from the heat sink does not exceed the copper plane profile to avoid the risk of damage or shorting to nearby components.

3.4 EMC and Radiated Sensitivity

Electromagnetic Compatibility (EMC) is the interaction of electrical and electronic equipment with its electromagnetic environment, and with other equipment.

All electronic products are subject to the EMC regulations for the geographical region of operation. Please ensure the application of this product is compliant with the applicable requirements.

For optimum EMC and radiated sensitivity, it is highly recommended that the unit is enclosed in a metal housing to minimise the effects of electromagnetic interference. Please contact DTC for support, if required.

Note: Frequencies below S-band are particularly sensitive to EMI. Therefore, DTC have incorporated a copper track on the perimeter of the PCB to help facilitate the integration of these variants. See *Figure 3-1* and *Figure 3-2*.

4. Hardware (Boxed)

4.1 Mechanical Dimensions

The BluSDR-6-B housing for frequencies other than S-band have additional EMC protection and are a slightly larger length.

Note: Measurements are in mm; tolerances of ±0.1mm apply to all dimensions.

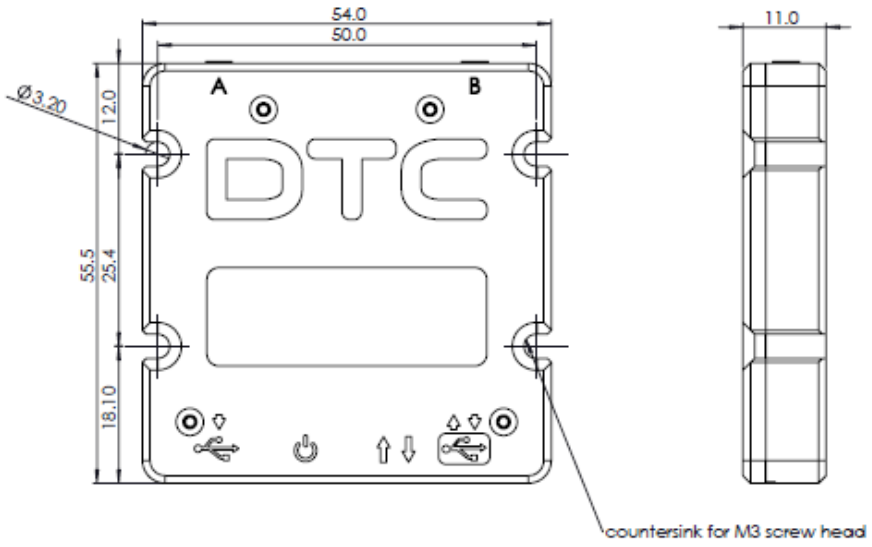


Figure 4-1: BluSDR-6-120170/167235/420520-B

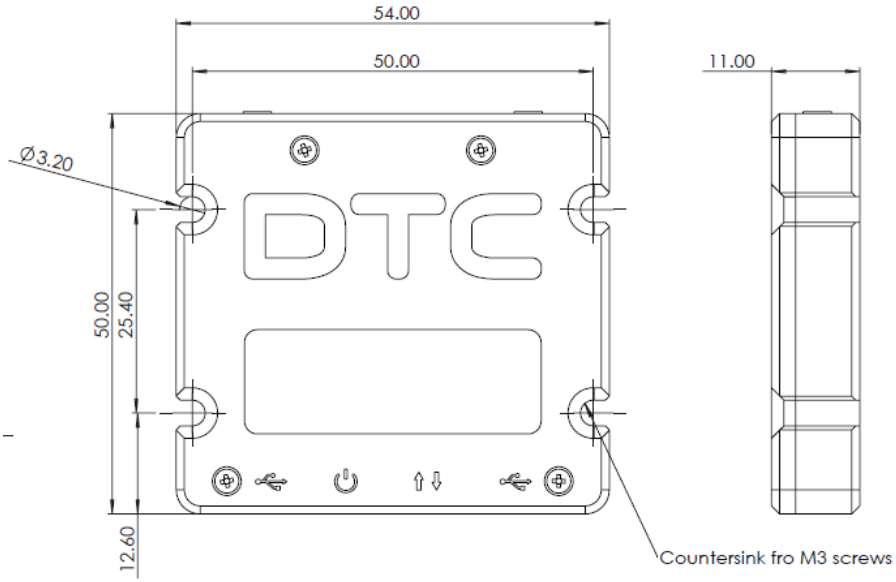


Figure 4-2: BluSDR-6-210250-B

4.2 Mounting

The BluSDR-6-B can be mounted to a heatsink using the mounting holes indicated in *Figure 4-3* using 3mm screws. The recommended surface to apply heatsinking is indicated on the metalwork.

Figure 4-3 Mounting Holes

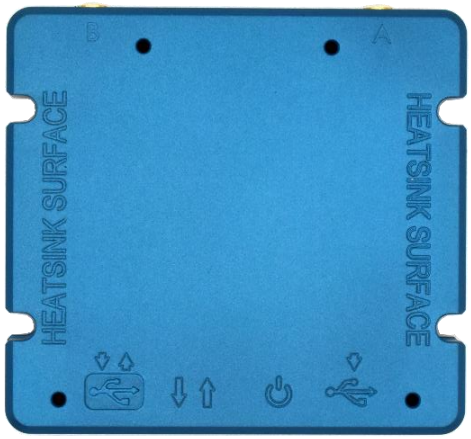
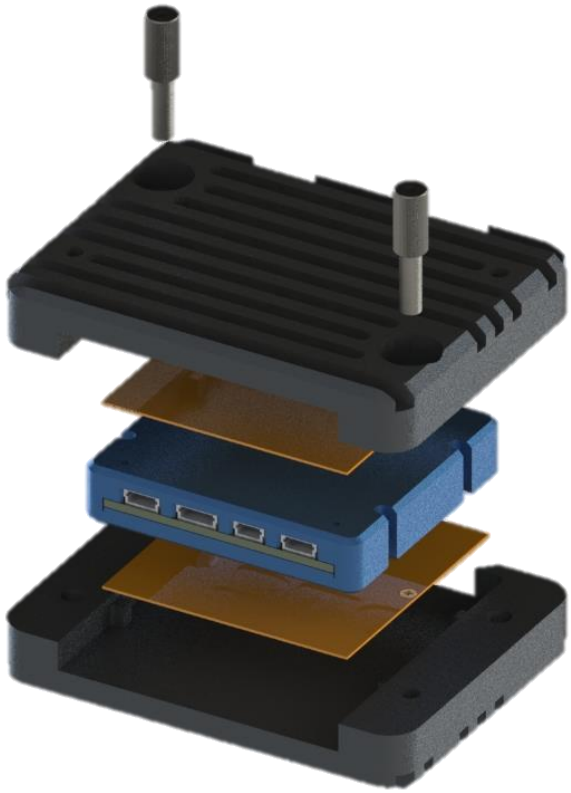


Figure 4-4 Heatsink Face

4.3 Thermal Considerations

Thermal dissipation may be required to ensure that critical internal components do not exceed their temperature specification.

To enable this, an optional heat sink clamp (SA4525) can be used where additional heatsinking is required.



The supplied gap pad is essential for heat transfer but also to ensure the BluSDR-6-B is held in place between the plates. Place the gap pad centrally at the top and bottom.

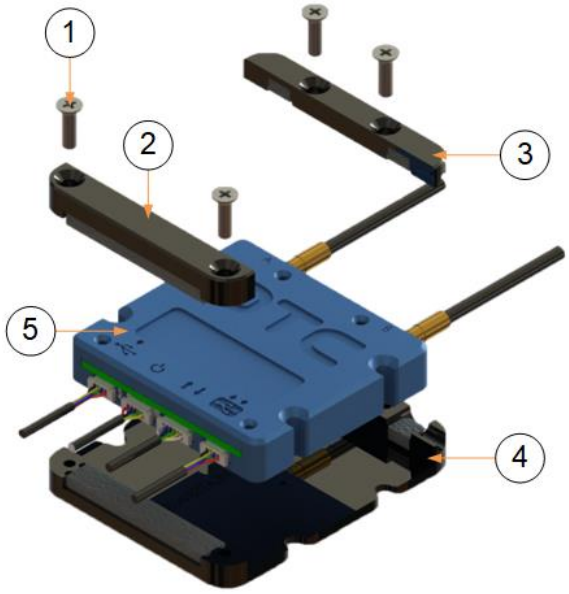
The BluSDR-6-B can be orientated either up or down, but the cables must be routed out of the large aperture of the heat spreader plates.

The assembly is secured using the two screws to finger-tight torque.

4.4 Cable Clamp Assembly

DTC offer cable clamp accessories to protect cables from damage and accidental removal. The clamps come in two sizes to match the frequency variant dimensions of the BluSDR-6-B, see *Section 2.3*.

Assembly of the BluSDR-6-B to the clamp is illustrated below.



Mount the BluSDR-6-B to the base as illustrated and secure with the clamps and screws.

Item	Part No.	Notes
1	AP006756 x 4	M3 x10mm torx countersunk screws.
2	MW4348	Input/output cable clamp.
3	MW4347	RF cable clamp.
4	MW4345 or MW4346	Cable clamp base. MW4345 is for 50mm; MW4346 is for 56mm.
5	BluSDR-6-B	BluSDR-6-B Module. Ensure all cables have been attached to the BluSDR-6-B before assembling the clamps.

5. Interfaces

5.1 Interface Locations

Note: Interface locations on the PCB variants will be annotated on the board.

5.2 J1/J24 – RF A/B

RF B – J1, RF A – J24

MMCX micro-miniature jack (female) Telegartner J01341A0081Y

An antenna must be fitted before you enable the RF output.

Note: Please read *Section 7.2* for an antenna selection and integration guide.

5.3 J2 – Power In

4-way 1.25mm Molex Picoblade 532610471

Note: Reverse polarity protected.

Note: The input power supply should ramp from 0V to operating voltage in less than 100ms in a single clean transition.

Pin	Function
1	6-18V (12V nominal)
2	6-18V (12V nominal)
3	0V
4	0V

CAUTION: Long cable runs and hot plugging will induce transient voltage spikes which may exceed the input voltage limit. Transient voltage protection may need to be considered where this is possible to occur.

5.4 J3 – GPIO and Power Out

6-way 1mm JST SM06B-SRSS-TB

Pin	Function
1	GPIO0 (LED RED)
2	GPIO1 (LED GREEN)
3	0V
4	GPIO2
5	GPIO3 (3V3 OUT)
6	0V

GPIO Power

- **GPIO (0-2)** – 3.3V logic with 0.8V logic low threshold and 2.0V logic high. 100Ω series resistance with 10kΩ pullup to 3.3V.
  - **GPIO0** powers up as output 1 (2.4V to 3.3V)
  - **GPIO1** powers up as output 0 (0V to 0.8V)
  - **GPIO2** powers up as input pulled to 1 (3V3, nominally an input for a panic button)
- **GPIO3** – 3.0-3.3V switched power output with 0.4A current limit. Reverse power protection diode fitted.

GPIO Serial Data

When GPIO RS232 is selected as a data mode or source in the WUI, GPIO1 and GPIO2 are configured as low voltage serial TX and RX lines respectively.

Note: The voltage levels specified above will still apply.

When GPIO RS232 is selected as a GPS source in Mesh application, GPIO2 is configured as a low voltage serial RX line only.

Note: In the WUI **Triggers** page, the GPIO RS232 lines can be set to **RX Only** which configures GPIO2 and leaves GPIO1 in its default condition. This may be useful for example to attach LEDs to GPIO0 and GPIO1 (see below), and a GPS receiver to GPIO2.

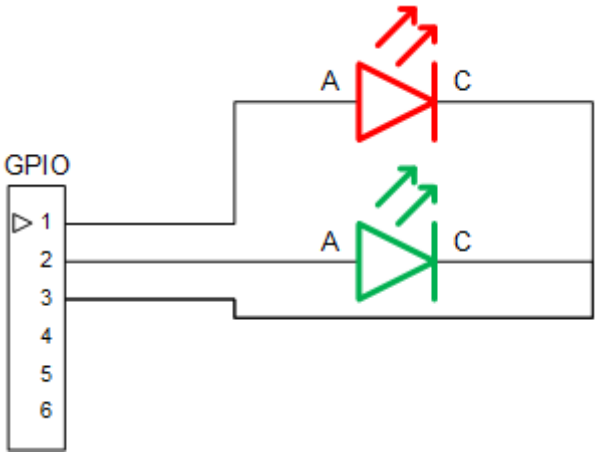
LED Wiring

LEDs may be connected to the GPIO connector to indicate status:

Red = unit booted up and no Mesh link

Green = RF on and good Mesh link >8dB

The following diagram illustrates example connections for a red and green LED to the GPIO connector. LED brightness can be controlled in the WUI interface **Presets>Unit Settings** page or reduced by adding a resistor in series with the LED anode (A) connection.



5.5 J5/J6 – USB1/2

USB 1 – J5, USB 2 – J6

5-way 1mm JST SM05B-SRSS-TB

Pin	Signal
1	VBUS +5V/1A
2	DATA-
3	DATA+
4	ID
5	0V

USB connectivity can be used for:

- USB to Ethernet adaptors
- 4G or Wi-Fi dongles
- USB to serial adaptors for data transfer
- Microsoft RNDIS support to create a virtual Ethernet port (USB2 only)

USB1 is non-configurable and will always be a host port.

USB2 is configurable as a host or peripheral port; auto USB mode can also be applied which will default to peripheral with no connection. Configure as a peripheral when RNDIS is required, installation instructions are provided in the *IP Mesh Radio Software User Guide*.

CAUTION: Host USB connections generate 5V power and must not be plugged directly into a PC USB port. When USB2 is configured as a peripheral port it can be plugged directly into a PC USB port.

If only one USB port is available for both data transfer and serial control, the data port can be configured to switch between the two modes.

4G dongles that are currently supported:

- Verizon MiFi USB620L 4G
- E3372s-153 (pid 157d)
- E3372h-153 (pid 1f01)
- E3372-320

Wi-Fi dongles that are currently supported:

- TP-LINK AC600
- TP-LINK AC1200
- TP-LINK AC1300
- TP LINK TL-WN823N

5.6 J25 – Micro SD Card (PCB only)

Micro SD Card socket – up to 128GB

6. Software Control

6.1 Introduction

The BluSDR can be monitored and configured using a web browser application. Communications is provided by a USB to Ethernet adaptor.

The BluSDR is supplied with the Ethernet DHCP setting enabled. This means that if a device is connected to a network with a DHCP server, the IP address will be assigned to an available address.

If it is necessary to change the IP address, this can be done using DTC's Node Finder application.

6.2 Node Finder

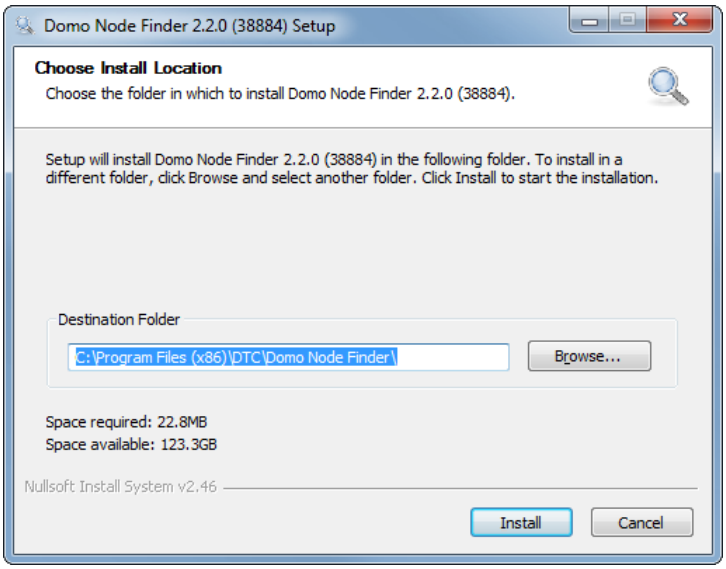
6.2.1 Introduction

Node Finder application can be used to identify all DTC device IP addresses on a network and make changes to the IP address settings if not connected to a DHCP server.

Node Finder is available from DTC's WatchDox facility, see *Section 8.1*.

6.2.2 Install Node Finder on your PC

1. Double click the **Node Finder.exe** installer. The Node Finder Setup window will open.

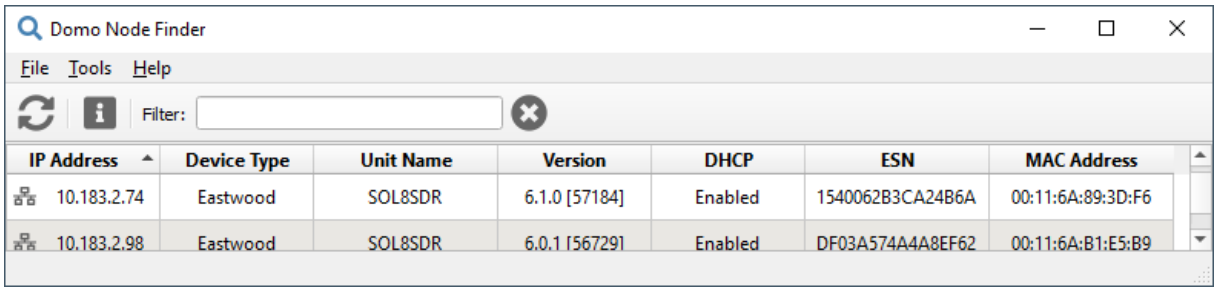


2. **Browse** to the location where you wish to install the software or leave the **Destination Folder** at default (recommended).
3. Click the **Install** button.
4. On completion, **Close** the installer. A Node Finder icon will appear on your desktop.

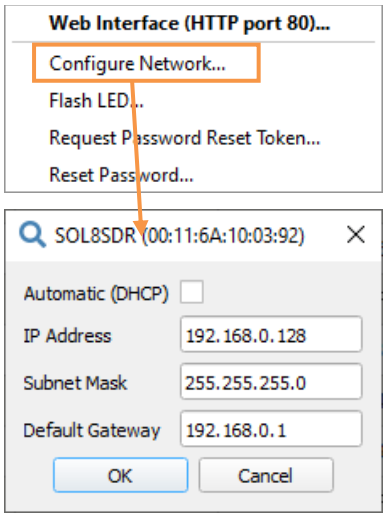
6.2.3 Establish IP Address using Node Finder

1. Power up the BluSDR and ensure there is an Ethernet connection to a network or PC.
2. Double-click the Node Finder icon from the PC desktop.
3. Find the device IP address from the Node Finder list. The device type will be *Eastwood*.

Note: If the device is not connected to a network with a DHCP server, the IP address may appear as 0.0.0.0.



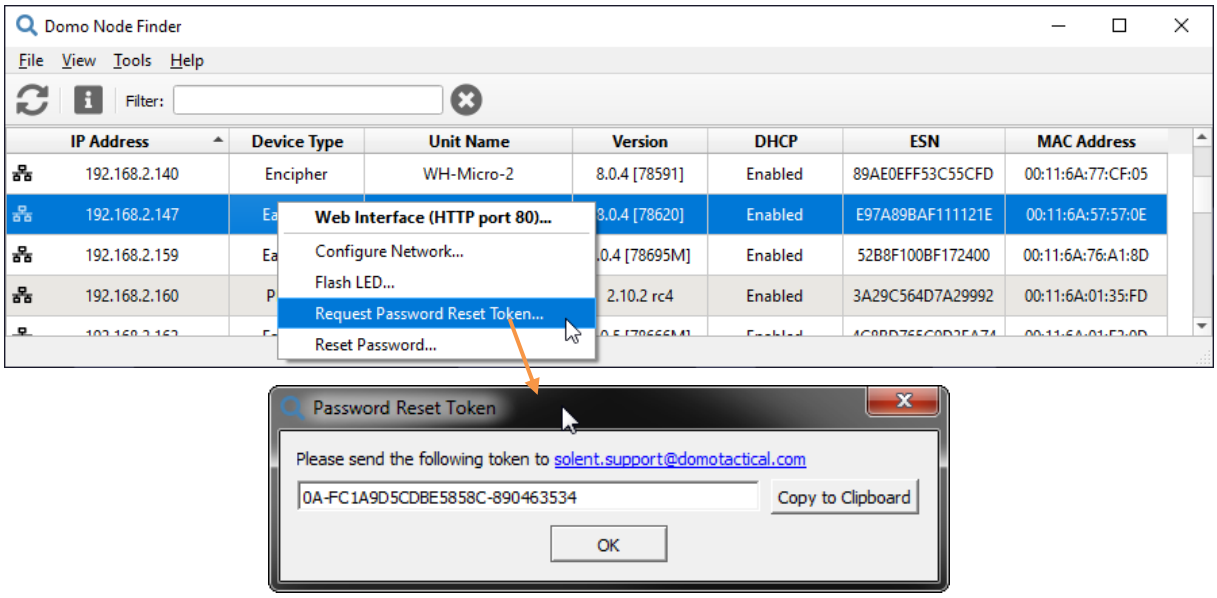
4. Right-click the IP address and select **Configure Network** to disable the DHCP setting and set a fixed IP address, if required. The IP Address should be on the same address range as the network or standalone PC, the Subnet Mask should be left at 255.255.255.0 and the Default Gateway can be that of the connected PC or router.



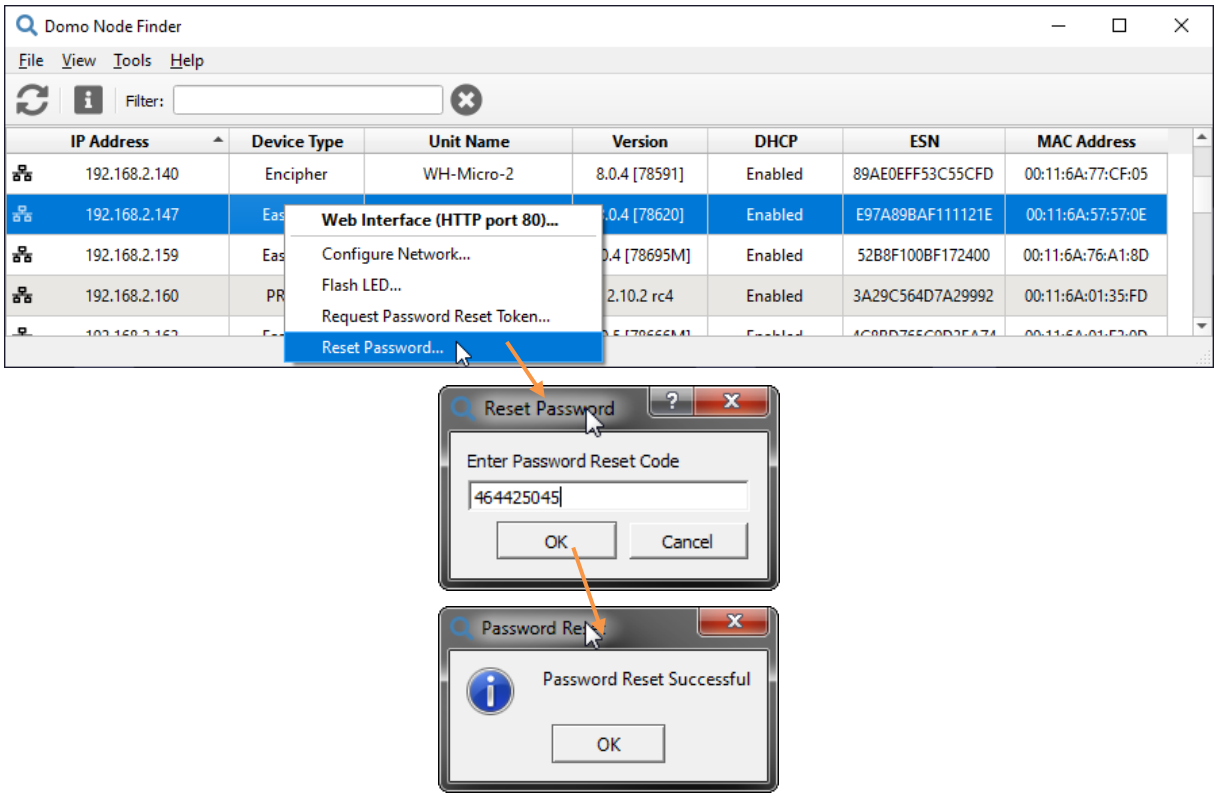
6.2.4 Password Reset

Users may set a password for web browser access security. If the password is forgotten and the user is locked out, Node Finder provides a means to reset the password.

1. Right-click on the device in Node Finder and select **Request Password Reset Token**.



2. If you click the link a pre-filled email will be generated to send to Technical Support. A code will be returned which needs to be entered in Node Finder **Reset Password** dialogue box.



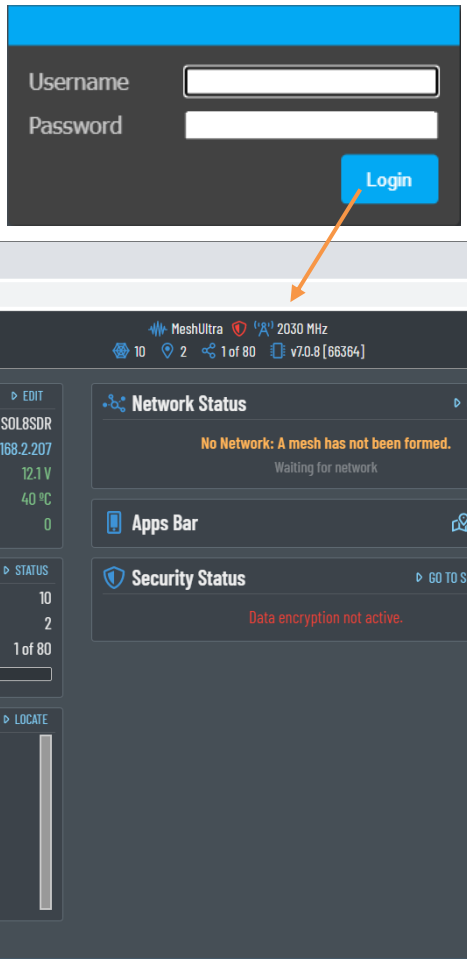
3. On successful reset, the web browser application will be unlocked to the default password (Eastwood).

Note: You can only enter an incorrect reset code five times before a new token will need to be generated.

6.3 Open Web User Interface

The WUI can be accessed from Node Finder by double-clicking on the IP address.

When authentication is required, the Username should be left blank, and the Password is **Eastwood**.



6.4 Software Guides

You will need to refer to *IP Mesh Radio User Guide* for detailed web user interface operation. This document can be found in DTC's Watchdox facility, see *Section 8.1 for details*.

6.5 JSON Data

To support the web interface an HTTP protocol has been implemented for use by third party software.

The HTTP interface uses its own JSON based protocol for reading data from the unit. Due to the large amount of data available, much of the status information is only available via the HTTP interface.

For full details of the protocols used and a complete list of commands, refer to DTC's *IP Mesh Radio JSON Integration Guide*. This document can be found in DTC's Watchdox facility, see *Section 8.1 for details*.

7. Appendix A – Reference Material

7.1 How to Configure a PC IP Address

The following guide will tell you how to configure a PC or laptop IP address so that it matches the IP address range of the unit you are connected to. This is important because if they don't match, you will not be able to communicate with your device.

The IP address range given in this example is a good one to use if you are unsure.

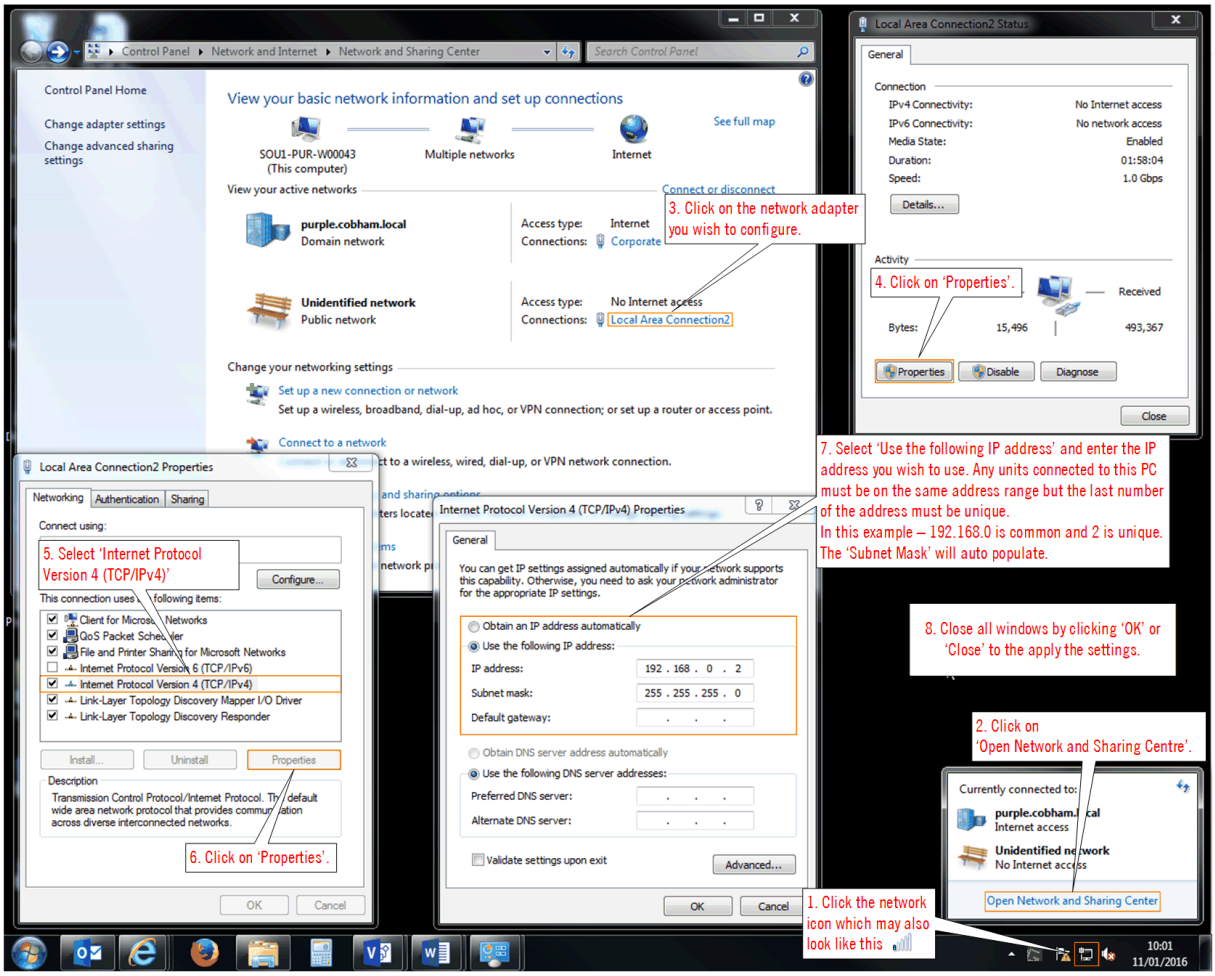


Figure 7-1 How to configure a PC IP address

7.2 Antenna Guide

With the right integration, an operator can change a marginal RF link into a reliable link.

7.2.1 Antenna Selection

Antenna selection is usually a trade-off of desired outcomes. These are some parameters that are worth considering when selecting an antenna.

Note: DTC can provide a wide choice of antenna options, please contact for support.

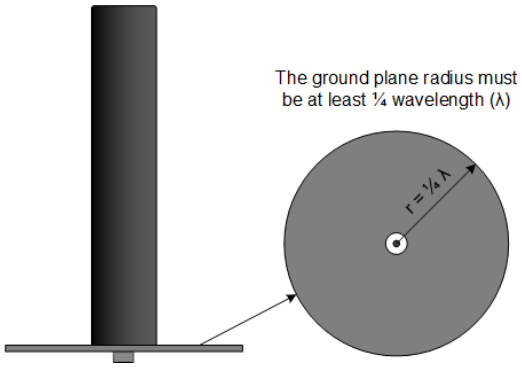
- **Radiation Pattern** is the direction of radio waves emitted from an antenna. **Omni** antennas radiate power in all directions perpendicular to the axis. **Directional** antennas radiate power in one direction.
- **Frequency Range** in MHz or GHz is the frequency band over which the antenna is designed to deliver optimum performance. Ideally, the antenna should cover the whole frequency band of the radio, if this is not possible then it must at least cover the intended frequencies of operation.
- **Gain** is how well an antenna can convert electrical power to radio waves, or vice versa. Typically, this is measured in **dBi**.
- **VSWR** stands for voltage standing wave ratio and is a measure of impedance matching, where mismatch causes reflected power from the antenna. A good VSWR would be less than 2:1.
- **Connector Interface** – antennas are ideally connected directly. If cables are required, they should be low loss and kept as short as practicable.

7.2.2 Integration Guidelines

The following guidelines may help improve RF link quality in a radio installation.

- A **ground plane** is a conducting surface that acts as part of the antenna to direct RF signals toward the antenna which will enhance reception. Although many antennas do not require a ground plane, a ground plane is advisable for integrations of monopole antennas, particularly when operating in frequencies at, or below L-band. For any integration, consider a ground plane as part of the installation if conditions allow. Often a metal enclosure or bulkhead will provide an excellent ground plane.

Frequency	Ground plane radius (approx.)
320MHz	223mm
470MHz	152mm
1000MHz	71mm
1500MHz	48mm
2000MHz	36mm



- Some integrations, particularly those on unmanned vehicles, are built of conducting material such as metal or carbon fibre. It is essential to ensure that antennas are not mounted such that they are close to any conductive surfaces (excluding ground planes as described above) to avoid antenna detuning and interference from reflections. Antennas should be mounted as independently as possible and ideally have clear visual line-of-sight to the transmitting/receiving device.
- Antenna **polarisation** is effectively the plane in which radio waves vibrate. Antennas with a particular polarisation are most effective at receiving signals from the same polarisation. Ensure that linearly polarised antennas (vertical/horizontal) are mounted in the same plane.
- The addition of cables and adaptors will introduce some loss in RF power. Ideally mount antennas as close to the device as possible using high quality low loss cable.

- **Impedance matching** is designing source and load impedances to minimise signal reflection and maximize power transfer. Most RF systems (and all DTC radios) are designed for 50Ω impedance, therefore, ensure all interconnecting cables and connectors are rated at 50Ω.
- **RF filters** can be used in-line with the antenna to exclude or pass certain frequencies in environments which have a high level of RF interference. DTC can supply a wide choice of filters, please contact your account manager to find out what options we have for your application.

7.2.3 Examples

The following examples are given for guidance only.

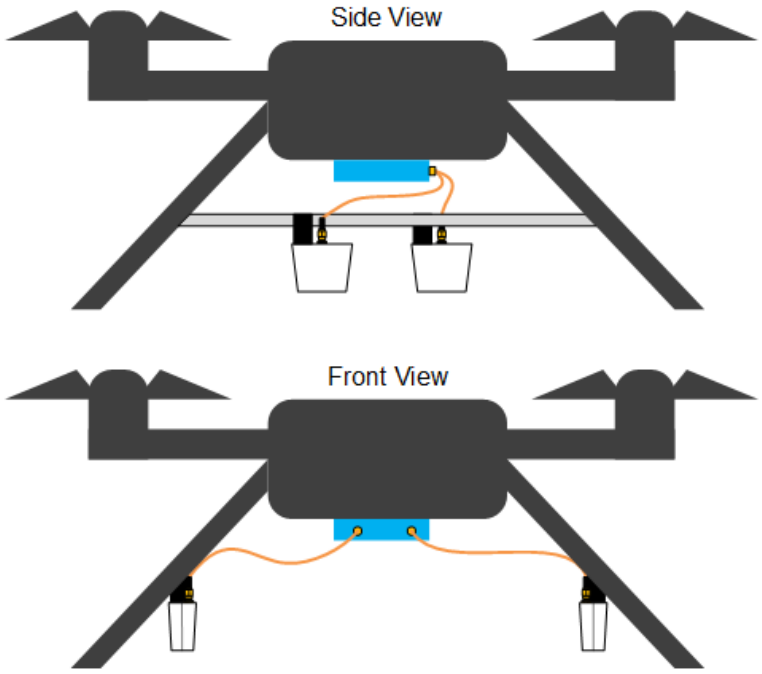
Unmanned Aerial Vehicle (UAV)

Antennas should be mounted to rails by clamps and connected to the radio by high quality, low loss cables. Do not mount antennas such that they run parallel/close to a conducting surface such as the metal or carbon fibre of the UAV fuselage.

Position antennas on the underside of the UAV to allow best possible radiation to the ground radio.

Note: Ensure a ground plane has been fitted for antennas that require one, see guideline note in *Section 7.2.2*.

The illustration below shows blade antennas which are advantageous for aerodynamic properties.

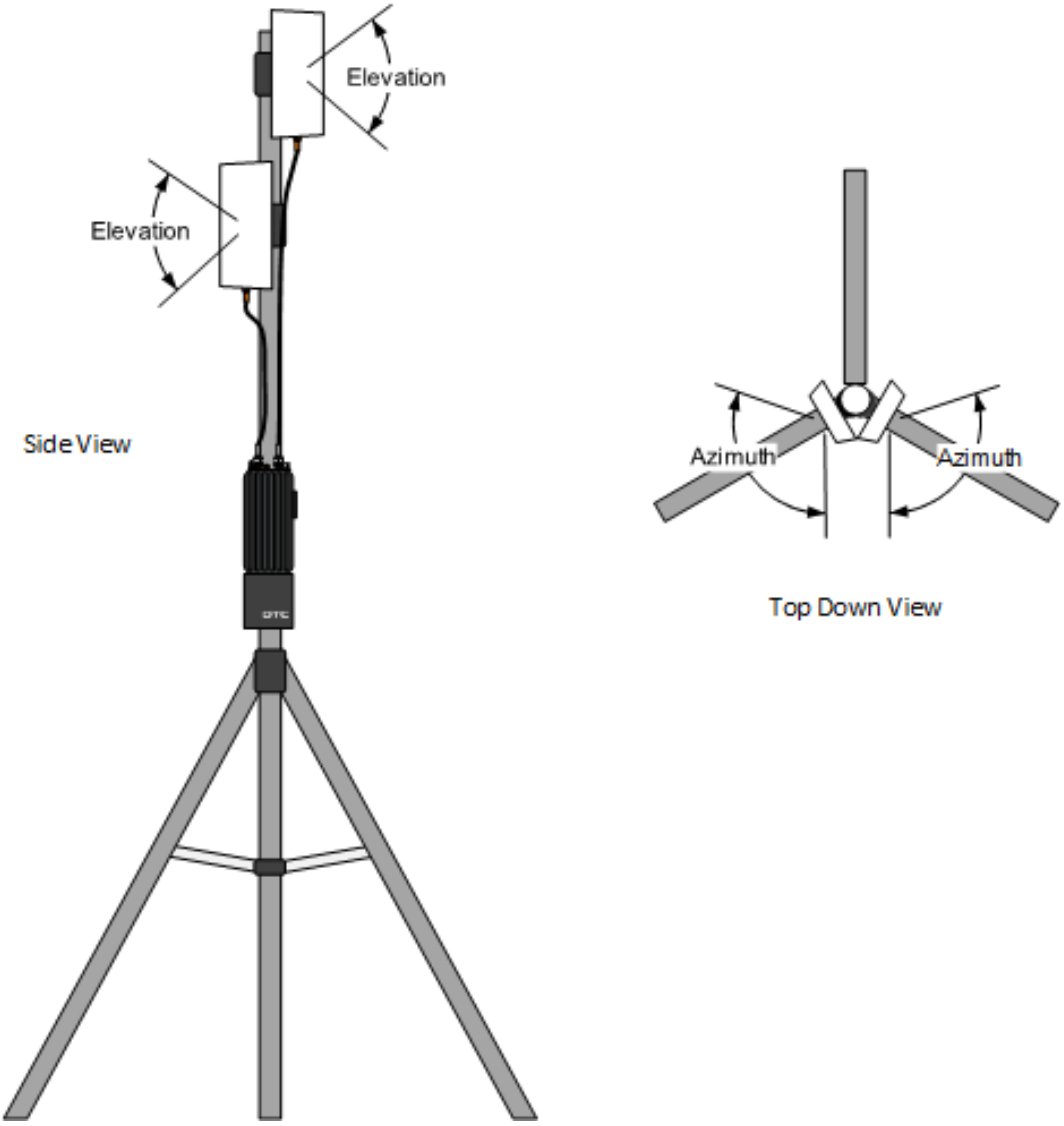


Ground Station

A ground station installation may require coverage in a specific direction; therefore, high gain directional sector antennas may be the best choice depending on the requirements.

Antennas should be mounted vertically and as high as possible. Take care to position sector antennas with consideration to the azimuth and elevation beamwidth specifications.

Note: Ensure a ground plane has been fitted for antennas that require one, see guideline note in *Section 7.2.2*.



8. Appendix B – After Sales Support

8.1 Documentation and Software

It is DTC's practise to make the majority of our latest user guides and software available to customers online, by using our WatchDox facility. To access this site, please contact your Account Manager or send a request to uk.technical.support@domotactical.com.

You will be sent a link where you can log in and create your own password followed by a confirmation email. Once you have done this, you can then log in to your account.

8.2 Contact Technical Support

The Technical Support team can be accessed by one of the following:

- **Phone US**: +1 571 563 7077
- **Phone UK**: +44 1489 884 550
- **Email US**: us.technical.support@domotactical.com (no restricted content)
- **Email ROW**: uk.technical.support@domotactical.com (no restricted content)

8.3 Using the DTC RMA Service

8.3.1 Contact DTC

If there is a problem and our technical support team have been unable to resolve the issue, email dtc.rma@domotactical.com (US) or solent.customerhub@domotactical.com (UK/ROW) to request a Return Material Authorisation (RMA) form.

Note: Alternatively, use the online form at https://www.domotactical.com/support/.

8.3.2 Complete and Return the RMA Form

Complete the RMA form with the following information and return to the customer hub:

- Name
- Address
- Unit serial number
- Date of purchase or the original invoice number
- Date of failure
- A detailed description of the problems you have encountered
- A list of the hardware/software configuration if applicable

When the hub receives the completed form, an RMA number and shipping instructions will be sent.

8.3.3 Pack the Device

Note: Before packing, remove all personal non-DTC kit or media from the device.

Use the original shipping container and packing materials, if possible.

If the original packing materials are not available, wrap the equipment with soft material (e.g., PU/PE form) then put the wrapped equipment into a hard cardboard shipping box.

8.3.4 Put the RMA Number on the Box

Clearly mark the outside of the shipping box with the RMA number. If an RMA number is not present on the shipping box, receiving will be unable to identify it and it might be returned.

8.3.5 Send the Box to DTC

Send the box using your normal shipping process.

9. Appendix C – Safety and Maintenance

Note: The following guidelines may or may not be applicable to your product. However, we would ask that you read them to assess their relevance.

9.1 Cautions and Warnings

Area	Note
Aircraft safety	Use of this equipment on board aircraft is strictly forbidden without the required testing and qualification for aircraft type. Use of radio transmitter equipment in an aircraft can endanger navigation and other systems without appropriate testing, or carry-on certification by a competent certified body.
Cables	Connecting cables should not be positioned where they are likely to become damaged or where they may present a trip hazard.
Electrostatic discharge	ESD guidelines must be followed for this electrostatic sensitive device.
Enclosures	Do not remove any factory installed screws or fastenings as this may void any warranties. There are no functions that require the user to gain access to the interior of the product. There are no user serviceable parts inside.
Environment	The equipment should not be used in hazardous or corrosive atmospheres. Users are reminded of the necessity of complying with restrictions regarding the use of radio devices in fuel depots, chemical plants and locations where explosives are stored and/or used.
Lightning strike	There is a risk of lightning strike to antennas. The equipment should not be assembled in an area at the time of lightning activity. Antennas should be adequately protected from lightning strikes.
Power supply	Ensure that the power supply arrangements are adequate to meet the stated requirements of each product. Observe all electrical safety precautions.
Risk of eye injury	Care should be taken to avoid eye contact with the antennas.
RF emissions	When using this device please ensure 20cm is maintained between your device and your body while the device is transmitting.
Thermal control system	If you operate this device in an enclosed space, you must ensure it has adequate airflow to keep it cool. If worn close to the body, care must be taken to protect the operator from excessive temperatures.
Working at height	Observe caution when locating the device at height, for example on a mast. Ensure the unit is well secured to prevent it falling and injuring personnel.

9.2 Repairs and Alterations

Attempted repairs, alterations, improper installations or connections may invalidate the warranty.

Please contact Technical Support if you suspect a faulty or defective component. See *Section 8.2*.

9.3 Caring for your Equipment

- Do not subject the unit to physical abuse, excessive shock or vibration
- Do not drop, jar or throw the unit
- Do not carry the unit by the antenna
- Avoid exposure to excessive moisture or liquids
- Do not submerse the unit unless it is designed to be submersible
- Do not expose the unit to corrosives, solvents, cleaners or mineral spirits
- Avoid exposure to excessive cold and heat
- Avoid prolonged exposure to direct sunlight
- Do not place or leave units on surfaces that are unstable
- Only use accessories intended for the specific make and model of your unit, especially batteries, chargers and power adapters.

9.4 Charging

- Use approved batteries, chargers and adapters designed specifically for your make and model unit
- Do not attempt to charge a wet unit or battery pack
- Do not charge the unit or battery pack near anything flammable
- Stabilize the battery pack to room temperature (22°C) before charging
- Do not charge units and/or battery packs on wet or unstable surfaces
- Do not leave units and/or batteries in chargers for excessive periods

9.5 Working with Lithium Batteries

- Charge only with the approved charging cable
- Batteries are to be used only for the specified purpose. Incorrect use will invalidate the warranty and may make the battery become dangerous.
- Charge in a clean, dry environment ideally at 10°C (0 to 45°C is permissible).
- Do not store or operate in direct sunlight for extended periods. Battery can be damaged by over-heating, for example if placed on the rear parcel shelf of a motor vehicle.
- Store in a cool dry environment. Storage at elevated temperatures can cause permanent loss of capacity.
- For short term storage (less than six months), store in a fully charged state.
- For extended periods of storage (more than one year), charge before storage and recharge every six to nine months.
- Always fully recharge the battery after any storage period greater than one month before use.
- Do not store the battery with the charge depleted as this can cause failure of the battery and invalidate warranty.
- Do not short circuit
- Do not immerse in water
- Do not incinerate. Cells are likely to explode if placed in a fire.
- Dispose of batteries in accordance with the regulations in place for the country of use. Batteries are normally considered separate waste and should not be allowed to enter the normal waste stream. Either return to the seller or deliver to an approved re-cycling facility.

9.6 Cleaning

- Turn off the unit and remove batteries (if applicable) before maintenance
- Use a clean, soft, damp cloth to clean the unit. A microfiber cloth is recommended.
- Do not use alcohol or cleaning solutions to clean the unit
- Do not immerse the unit in water to clean it
- If the unit becomes wet, immediately dry it with a microfiber or other lint-free cloth

9.7 Storage

- Turn off the unit and remove batteries before storage
- Store units and battery packs in a cool, dry area at room temperature (22°C)
- Do not store units and/or batteries in active chargers