SOLiD O-RU
O-LRU_CBRSM2
(CBRS RU for 2x2 MIMO)

Installation & User Manual
V1.0.2

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1 Preface

This manual provides instructions on installing SOLiD O-LRU_CBRSM2 products and connecting the corresponding power and interface cables.

This document describes the specifications of O-LRU_CBRSM2, an indoor Radio Unit (RU), and its use in 4G/5G network.

The document provides information that is useful to network operators during the installation, operation, and management cycles. It includes information such as the radio unit functions, hardware configuration, ports, and LED information.

Some hardware configurations are not supported by all the software releases or approved for all the markets

1.1 Relevance

This manual applies to the following O-LRU_CBRSM2 models.

#	Model Name	ANT. Type	Description
1	O-LRU_CBRSM2	Internal	Single Band O-RU, 10GbE, CBRS (3550 – 3700MHz) 2T2R, Internal Antenna, PoE or DC

1.2 Conventions in this Document

To enhance readability, this document follows specific conventions. Keeping these in mind while reading will aid in understanding and completing tasks more easily.

1.2.1. Symbols

Symbol	Description
	Provides additional information.
	Provides information or instructions that you should follow to avoid service failure or damage to equipment.
	Provides information or instructions that you should follow to avoid personal injury or fatality.

1.2.2. Bold Arial

Indicates something that you can select in a page by clicking a mouse button, such as menus, menu commands, icons or buttons.

1.2.3. Century Gothic

Indicates something that you cannot select in a page by clicking a mouse button, such as window titles, columns or labels.

1.2.4. Personal and Product Safety

This product safety information includes European directives, which you must follow. If these do not apply in your country, please follow similar directives that do apply in your country.

1.2.4.1. Electrical

The product is classified as Safe Extra Low Voltage (SELV) equipment.

All structural parts are grounded and all input and outputs have built-in isolation from the network. All input and output ports that connect to external power sources are designed to meet relevant national safety requirements.

The product contains hazardous energy levels as defined by IEC/EN/UL/CSA 62368 or 60950. Care must be taken when maintaining this equipment as injury to personnel or damage to the equipment could result from mistakes. Maintenance should only be carried out by trained and competent engineers who are familiar with the relevant procedures and instructions.

1.2.4.2. Lasers

The product is fitted with optical modules rated as Class 1 radiation-emitting devices under IEC/EN 60825-1. During installation, operation, and maintenance, never look into the end of an optical fiber directly or by reflection either with the naked eye or through an optical instrument. Do not operate equipment with exposed fiber connectors-cover these with fiber cables or blanking caps. Do not remove equipment covers during operation unless requested to do so in the documentation. Carry out normal safety precautions when trimming fibers during installation.

1.2.4.3. Manual Handling

Care should be taken when handling equipment. Give due consideration to the weight of the equipment, the physical capability of the individual(s) handling the equipment, and movements such as twisting, bending and stooping, which could lead to skeletal and muscular injuries.

1.2.4.4. Installation

Installation must be carried out by trained and competent engineers only. All relevant safety measures should be taken to ensure equipment is not connected to live power and transmission sources during installation. Equipment must be correctly installed to meet the relevant safety standards and approval conditions.

Each power feed to the unit requires a separate fused feed from the provided power supply. The cable between the power distribution point and the installed equipment must have a minimum cross-sectional area of 2.5 mm^2/14 AWG.

The intra-building POE ports of the equipment must be shielded and grounded at both ends.

External lightning protection should be used which limit exposure to the requirements of GR-1089 CORE i.07, table 4-2, test 19 for Antenna Ports.

1.2.4.5. Maintenance

Maintenance must only be carried out by a suitably trained and competent technician. All safety instructions must be carefully observed at all times. Equipment covers should not be removed while live power and transmission is connected unless in a controlled environment by trained technicians.

1.2.4.6. Fire

To protect against potential fire due to current overload, the equipment is fused.

1.2.4.7. Environment

The product must be operated in an environment with the specified relative humidity and ambient temperature ranges.

Keep all liquids away from the equipment as accidental spillage can cause severe damage.

1.2.4.8. Cooling

Natural convention cooling.

1.2.4.9. Anti-Static Precautions

The circuit boards and other modules in the product are sensitive to and easily damaged by static electricity. If any card or sub-assembly is removed from the unit, the following anti-static precautions must be observed at all times:

- Service personnel must wear anti-static wrist straps.
- Circuit boards and sub-assemblies must be placed on ground conductive mats or in conductive bags.
- All tools must be discharged to ground before use.
- The anti-static wrist strap and cord must be checked at regular intervals for their suitability for use.

1.2.4.10. Grounding

O-LRU_CBRSM2 does not need to be grounded.

O-LRU_CBRSM2 is suitable for installation as part of the Common Bonding Network (CBN), an Isolated Bonding Net-work (IBN), or both.

1.2.4.11. Power Supply Connection

Power connections and installation of associated wiring must be carried out by a suitably qualified technician.

Only devices that comply with all relevant national safety requirements should be connected to the unit’s power supply inlets. Other usage will invalidate any approval given to this equipment.

Connection of this equipment to devices that are not marked with all relevant national safety requirements may produce hazardous conditions on the network.

When the power supply is obtained by a rectifier/safety isolation transformer, the supply must meet the requirements of IEC/EN/UL/CSA 62368 or 60950 providing double/reinforced insulation between hazardous voltages and SELV/TNV circuits.

Any battery must be separated from hazardous voltages by reinforced insulation.

The battery return of the terminals is an Isolated DC return. The RTN of the O-LRU_CBRSM2 is not connected to Ground.

1.2.4.12. Indirect Connection

Before indirectly connecting any equipment to another device through a shared power supply, ALWAYS seek advice from a competent engineer.

Devices that are not marked according to the relevant national safety standards may produce hazardous conditions on the network.

1.2.4.13. California USA Only

This Perchlorate warning applies only to primary CR (Manganese Dioxide) Lithium coin cells in the product sold or distributed ONLY in California USA.

'Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate.'

1.2.4.14. FCC Statement

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

1.3 Equipment Markings

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Hot surface warning

Allow to cool before servicing.

Do not touch before cooling.

Notice! Be careful not to touch due to high temperature.

The system must be installed in a restricted area, and make sure the work is done by personnel properly trained for the job.

Protective earth

O-LRU_CBRSM2 should be grounded.

2 Introduction

This chapter provides an overview of the procedures required for SOLiD O-LRU_CBRSM2 installation. It contains sections that include procedures to perform prior to installation, during system installation, while connecting cables, and when confirming the installation status.

The following figure depicts the system installation procedure.

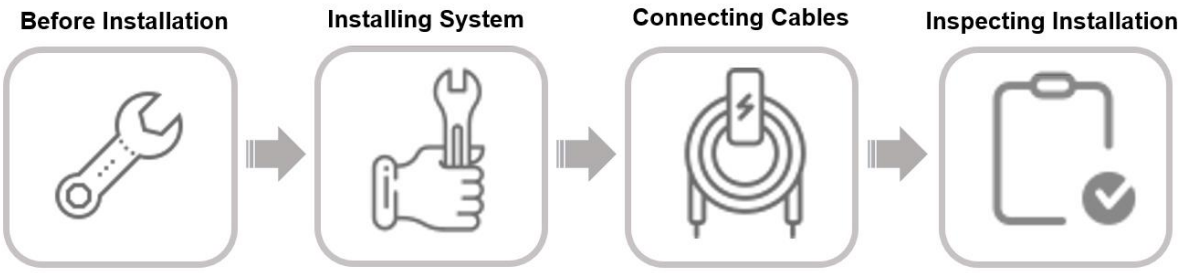


Figure 2-1 Installation Procedure

This document is divided into the following chapters. This section provides a brief overview of the information covered in each chapter.

Section	Title	Description
Chapter 2	**Introduction**	This chapter describes the introduction of the installation procedure.
Chapter 3	**Before Installation**	This chapter introduces the O-LRU_CBRSM2 and describes the items that should be understood before installation.
Chapter 4	**Installing System**	This chapter describes the procedures to install the O-LRU_CBRSM2.
Chapter 5	**Connecting Cables**	This chapter describes the procedures to connect the cables to the installed O-LRU_CBRSM2.
Chapter 6	**Inspecting Installation**	This chapter describes the procedures for inspecting the installation status after the O-LRU_CBRSM2 installation and cabling is complete.
Appendix A	**Acronyms**	This appendix spells out the acronyms used in this manual.
Appendix B	**Cleaning the Optical Connector**	This appendix describes the procedure of cleaning the optical connector and cleaning tool.
Appendix C	**Standard Torque**	This appendix provides the standard torque when assembling the fasteners.

O-LRU_CBRSM2 is a remote RF device supporting NR services and is installed at a considerable distance from the DU.

The indoor RU having RF chains of 2Tx/2Rx per band is an integrated RF module consisting of a transceiver, power amplifier, and filter in an indoor-type unit. It supports a natural air cooling method. The indoor RU has integrated RF antenna inside housing.

The main functions of the Indoor RU are up-down converting, digital/analog converting, filtering and amplifying the signals which are transmitted from Base Band Modems and received from Antennas.

The indoor RU is a remote RF device that is optimized for indoor installation

3 Before Installation

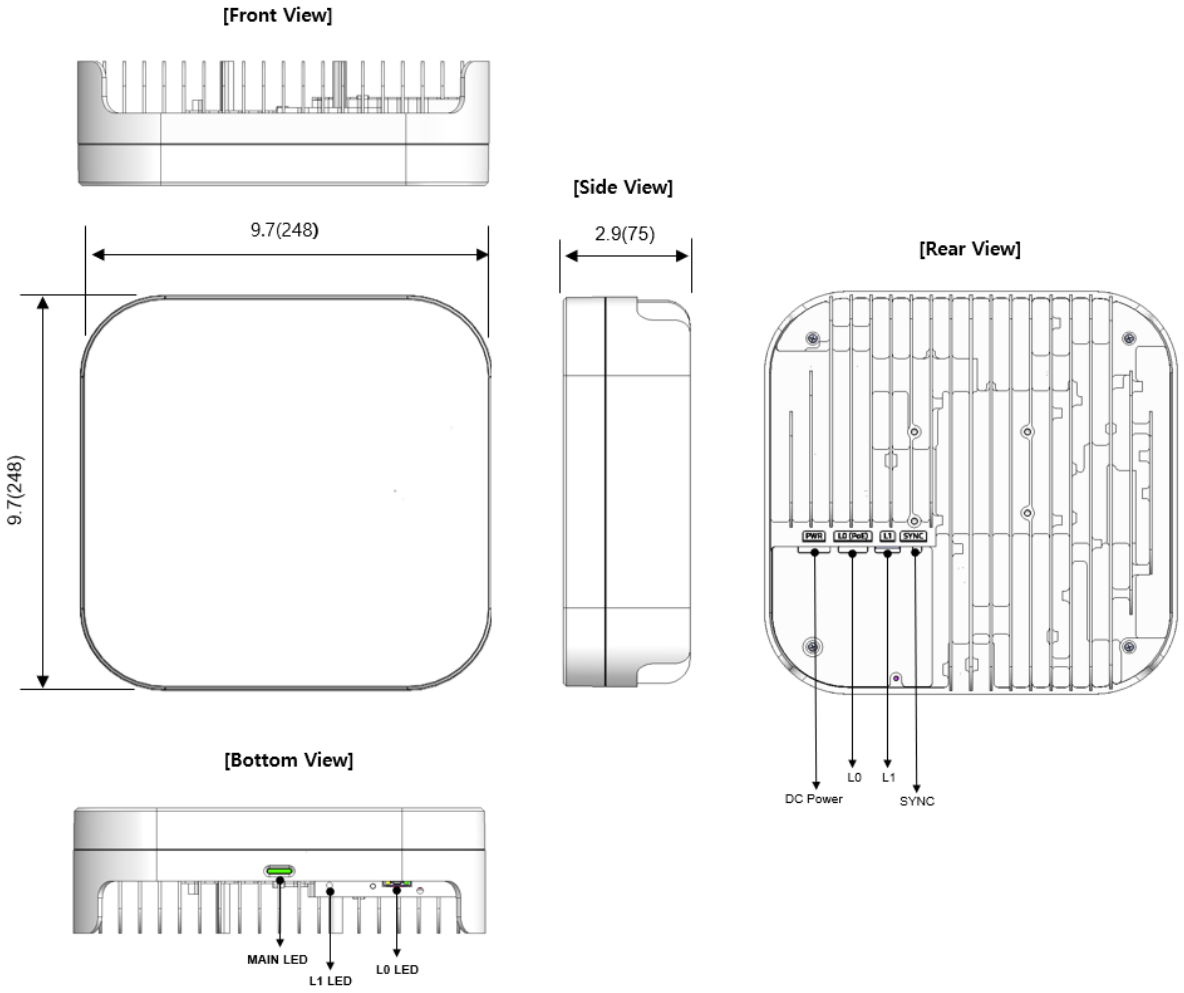
This chapter provides a view of the O-LRU_CBRSM2 including details about the external interface. It also provides safety instructions and the installation tools required for installing the system.

3.1 System View & External Interface

This section shows the O-LRU_CBRSM2 view and its external interface.

Model Name	Description
O-LRU_CBRSM2	Single Band O-RU, 10GbE, CBRS (3550 – 3700MHz) 2T2R, Internal Antenna, PoE or DC

The following figure depicts the physical structure of O-LRU_CBRSM2.



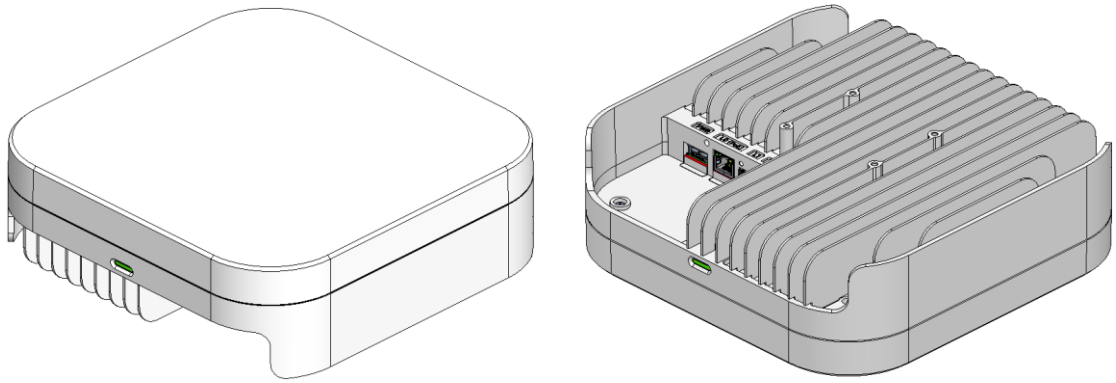


Figure 3-1 View

3.2 Specifications

This section lists the key specifications for each SOLiD O-LRU_CBRSM2.

Part #	ANT. Type	Description
O-LRU_CBRSM2	Internal	Single Band O-RU, 10GbE, CBRS (3550 – 3700MHz) 2T2R, Internal Antenna, PoE or DC

- These values are hardware capabilities and are subject to change depending on the applied software package.
- These values can be changed by ±5 % according to variations in equipment.

3.2.1. Key Specifications

The following table outlines the key specifications of the O-LRU_CBRSM2:

Parameter	Specifications
RAT	LTE and 5G NR with TDD
Operating Frequency Range	[B48/n48] CBRS 3550 – 3700MHz for Tx / Rx
IBW	150MHz
OBW	100MHz
Carrier Bandwidth	5/10/15/20/30/40/50/60/80/100MHz
Number of CC	5
MIMO (TRX)	2T2R
Conductive Power	Conducted 24dBm/Band (21dBm/Path/Band)
Output Power	≤ 21dBm @ Antenna Port
TDD config/frame structure	Any TDD pattern, Any Configuration

Optical Ports	• L0: RJ-45, 2.5/5/10GBase-T with PoE • L1: SFP+, 10GbE
Input Voltage	PoE (802.3bt), DC Power: -48V DC
Power Consumption	Typical 65W, Max 71W
Cooling Method	Natural Convection
Dimension (W x H x D)	250 × 250 × 75 mm
Weight	Under 3.3kg
Operating Temperature	• -20 – +50°C without solar load (Wall Mount) • -20 – +40°C without solar load (Ceiling Mount)
Operating Humidity	5% - 90% RH, condensing not to exceed 30 g/m3 absolute humidity.
Installation	Wall / Ceiling
Ingress Protection Rating	IP40 (IEC 60529)
EMC	FCC Part 15 Class B
Safety	UL 62368-1
RF	FCC Tile 47 CFR Part 2, 98
Color Code	White, RAL 9016
a) Supported carrier combination including channel bandwidth is strongly dependent on applied DU PKG. b) To support max distance (100 meters) with PoE, RHU20 with CAT6A cable (23AWG or thicker) connection is required.	

Table 3-1 Key specifications

3.3 Functional Description

The indoor RU is not a standalone device; it operates by interfacing with the DU. The RU is highly flexible in its installation and helps with the setup of a network in a variety of configurations depending on the installation location and operation method.

In case of the downlink path, the indoor RU performs eCPRI processing for the baseband signals received from the DU. The baseband signal recovered from eCPRI packets is changed into an analog signal through the Digital to Analog Converter (DAC). The frequency of the analog signals is up converted by the modulator and then the signals are amplified into RF signals with greater power by the power amplifier. The amplified signals are sent to the antenna through the filter part.

In the uplink path of the indoor RU, the RF signals received through the filter part are amplified with low noise in the Low Noise Amplifier (LNA) and their frequency is then down-converted through the demodulator. The down converted frequency signals are converted to baseband signals through the Analog to Digital Converter (ADC). The signals converted into baseband are changed to eCPRI packets and transmitted to the DU.

A Radio Unit (RU) consists of a digital block that supports connection to a DU with a 7-2x functional split and a radio block that transmits and receives the Radio Frequency (RF) signals. The digital block consists of a main processor and a low-PHY functional block. The radio block consists of a DAC/ADC, Radio Frequency integrated (RFIC), and an integrated 2T/2R antenna.

3.4 Block Diagram

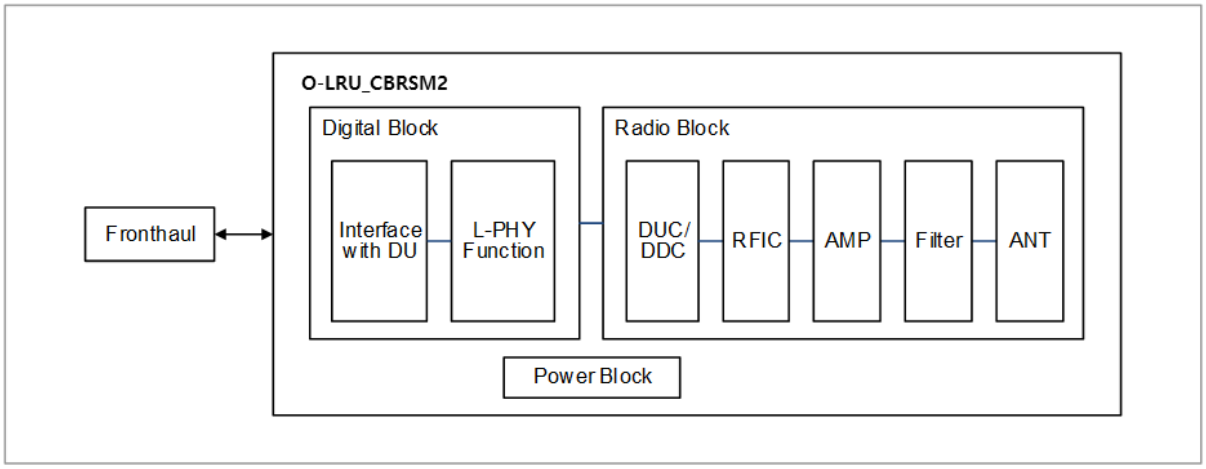


Figure 3-2 Block Diagram

The O-LRU_CBRSM2 consists of a digital block, a radio block, and a power block with PoE sup-port. The main functions of the O-LRU_CBRSM2 are displayed in the following table:

Model Name	Block	Function
O-LRU_CBRSM2	Digital Block	• Fronthaul interface with DU • Function split option 7-2x Cat.A C/U-Plane function • M-Plane function • S-Plane (IEEE1588v2, SyncE) function
	Radio Block	• Frequency : B48 • 2T2R integrated Antenna • RF signal transmission: conducted 21dBm/path/band, 24 dBm/total • Up/Down RF conversion • Performs the LNA function • Amplifies the RF signal level • Suppresses the out-of-band spurious emissions
	Power Block	• PoE PD function (802.3bt type4 based) • DC-to-DC conversion

Table 3-2 Block Information

3.5 Clock

The O-LRU_CBRSM2 supports IEEE1588v2/SyncE synchronization.
The O-LRU_CBRSM2 receives the synchronization signal from IEEE1588v2/SyncE. After receiving the signal, the O-LRU_CBRSM2 generates and distributes the clock for internal devices.

3.6 Port Information

The following table outlines the port information for O-LRU_CBRSM2

Port Name	Connector Type	Description
PWR	2 Pin Connector (TE 1982295-2)	• DC Input (Reserved for future usage)
L0 (PoE)	RJ-45	• 10G Base-T eCPRI interface • PoE PD based on 802.3bt type4
L1	SFP+ cage	• 10G
LED	LED PIPE	• O-LRU_CBRSM2 system status display

Table 3-3 Port Information

3.7 LED Information

Status		Description
●	Solid Red	• Shutdown or Disabled condition with major alarm (All-path failure)
◐	Blinking Red	• Shutdown or disabled condition with major alarm • (Partial-path Failure) • Priority: Major alarm has a high priority • Blinking period: 600 ms, Blinking ratio: 50 % • (Cf.300 ms OFF, 300 ms ON)
●	Solid Amber	• Minor alarm condition (All-path failure)
◐	Blinking Amber	• Minor alarm condition (Partial -path failure) • Blinking period: 600 ms, Blinking ratio: 50 % • (Cf.300 ms OFF, 300 ms ON)
●	Solid Green	• TX off status (system command) • TX off means all path off
◐	Blinking Green	• Normal Operation
○	LED off	• Power Off (No Power input)

Table 3-4 LED Information

3.8 Cautions for Installation

The O-LRU_CBRSM2 uses a natural convection cooling method without using a fan.

3.9 Carriers and conducted Power Configurations

Carriers	Tech	OBW(MHz)	Total channel power per path (mW)	Total channel power per unit (mW)
1C	LTE/NR	5	20	40
1C	LTE/NR	10	40	80
1C	LTE/NR	15	60	120
1C	LTE/NR	20	80	160
1C	LTE/NR	30	120	240
1C	LTE/NR	40M or More	125	250
2C	LTE/NR	10	40	80
2C	LTE/NR	15	60	120
2C	LTE/NR	20	80	160
2C	LTE/NR	25	100	200
2C	LTE/NR	30	120	240
2C	LTE/NR	35M or More	125	250
3C	LTE/NR	15	60	120
3C	LTE/NR	20	80	160
3C	LTE/NR	25	100	200

Carriers	Tech	OBW(MHz)	Total channel power per path (mW)	Total channel power per unit (mW)
3C	LTE/NR	30	120	240
3C	LTE/NR	35M or More	125	250
4C	LTE/NR	20	80	160
4C	LTE/NR	25	100	200
4C	LTE/NR	30	120	240
4C	LTE/NR	35M or More	125	250
5C	LTE/NR	25	100	200
5C	LTE/NR	30	120	240
5C	LTE/NR	35M or More	125	250

Table 3-5 Carriers and conducted Power Configurations

3.10 RF Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, this equipment should be installed and operated with minimum distance **24 cm (9.45 inches)** between the antenna and your body during normal operation.

Users must follow the specific operating instructions for satisfying RF exposure compliance.

3.11 Cautions for Installation

This section describes the safety instructions that must be observed while installing the system.

3.11.1. Before Installing

Before installing, you should ensure that the following guidelines are followed:

- Post warning signs in areas where high-voltage cables are installed.
- Post ‘off limit’ signs in areas where accidents are most expected.
- With guardrails or fences, block open areas such as connecting parts, roof, and scaffold.
- The system power must be cut off before installing.

- Keep a safe distance between the base station antenna and people.
- For wall installations to be in compliance with FCC RF Exposure guidelines, install the base station with proper distance (24 cm) between bottom of the base station and people.
- For the protection of the public from exposure to radio frequency electromagnetic field, do not co-locate nor operate in conjunction with any other antenna or transmitter.

3.11.2. While Installing

While installing, you should ensure that the following guidelines are followed:

- Be careful not to damage or to scratch the boards mounted on the system and the cables among the boards when the system is transported or installed.

- Ensure the power switch of power supply is OFF when installing the system. Installing the system with power switch ON can cause system damage or fatal human injury when the cables

are not correctly connected.

- Ensure that worker wears protection gloves and goggles to prevent damage from debris while drilling holes in a wall or ceiling.
- Do not wear accessories such as watches and rings to prevent electrical shock.

- Prevent contaminants from entering unused ports by covering them with a cap.
- To prevent contaminants, outdoor air, and moisture from entering the cable inlet (including cable gland and conduit), finish it as follows:
  - Unused inlet
  - Use the hole finishing materials including cap and rubber packing.
  - Cable-installed inlet
  - After cable installation, block any space in the inlet with tape, compressed sponge, rubber packing, and silicon.

3.11.3. After Installing

After installing, you should ensure that the following guidelines are followed:

Remove any debris produced during the work and clean up the installation site.

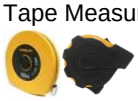
SFPs and cables used in the system have laser beams that emit light. Be careful with handling as exposure to laser beams can cause serious damage to the eyes.

- Ensure that worker does not damage installed cables while cleaning the rack.
- While cleaning the power supply device, take safety precautions and ensure that the device does not come in contact with foreign objects that may cause power failure.

3.12 Installation Tools

The basic tools required for installation are listed in the following table. The additional tools required for each site should be identified and arranged during a site survey before starting the installation.

No.	Name	Specification	Purpose of use
1	Torque Driver 	No.0~+ No.3 (M2.6-M6 '+' Driver) 0.07-4.34 lbf * ft (1.0~60 Kgf * cm)	For fastening the M3-M6 screw
2	Screw Driver Bit	'+', No. 2	For fastening the M3, M4 screw
3	Screw Driver 	'+', No. 2	For loosening the M3, M4 screw
4	Torque Wrench 	Apply a torque range: 20-90 lbf·in	For tightening the M5 Hex. Bolt (Steel band fixing Hex. bolt)
5	Torque Wrench Spanner Head 	Apply Hex. Head: 8 mm (for 20-90 lbf·in)	For tightening the M5 Hex. Bolt (Steel band fixing Hex. bolt)

No.	Name	Specification	Purpose of use
6	Spanner 	8 mm	For loosening the M5 Hex. bolt
7	Ratchet Wrench 	10 × 13/17 × 19 (4 in 1)	For fastening Hex. bolt
8	Tape Measure 	16.4 ft (5M)	Tape measure for length measurement
9	Power Extension Cable 	98.42 ft (30M)	Basic tool
10	Horizontal Ruler 	Spirit level 11.8 in (300 mm)	For horizontality and verticality
11	Hammer Drill 	Normal	Drilling
12	Concrete Drill Bit 	0.12-0.20 in (3-6 mm)	Drilling for Φ 6 plastic anchor
13	Vacuum Cleaner 	Normal	For removing dust during the drilling work
14	Industrial Scissor 	Basic Tool	Cutting
15	Knife 	Basic Tool	Cutting
16	Electric drill 	Normal	For fastening the M3, M4 tapping screw
17	Crimping Tool and Die 	20 AWG-12 AWG (0.75-4mm^2) TE 539635-1, 539743-2 or the use of tools of the same specification	Pressure terminal for crimping
18	Wire Stripper 	Apply cable thickness: 1.5-6.2 in. (4-16 mm)	Cable sheath for removal
19	Nipper	Basic Tool	For cutting the cable

No.	Name	Specification	Purpose of use
			
20	Heating Gun 	50-300 °C	Shrinking the heat shrink tube
21	Optical Connector Cleaner 	For LC Connector	For optical connector cleaning
22	Multi tester 	Digital Pocket Tester	To check the voltage and current measurements when cable disconnection is suspected
23	Fiber Optical Test Set 	Wave length: 1310 nm, 1550 nm (single mode) 850 nm, 1310 nm (multi-mode)	Optical level check
24	ESD Gloves 	Normal	Electrostatic Protection
25	Heat Protection Gloves 	Normal	Heat Protection

Table 3-6 Basic Installation Tools

The required installation tools can vary depending on the site conditions. In addition to the basic tools, a protractor, ladder, safety equipment, and cleaning tools should also be arranged considering the site conditions.

4 Installing System

This chapter provides instructions for installing SOLiD O-LRU_CBRSM2, which remains consistent across band types (Single Band or Dual Band) and product models. Please be aware that the actual product may vary in color and shape compared to the product image depicted in the corresponding chapter.

4.1 Transporting and Unpacking

This section describes how to transport the equipment to the installation site and provides the procedure to unpack the cabinets and other components.

4.1.1. Bringing in Items

The following precautions must be taken while transporting the items:

- When transporting the system,
  - ✓ Firmly fix the system to the vehicle or means of transportation to prevent damage from a vibration or shock.
  - ✓ While transporting the system, ensure that the system is not damaged by physical impacts, dust, and static electricity.
  - ✓ To prevent accidents, use a lift or cart to carry the system.
  - ✓ If the system is required to be transported by people, ensure that there are enough people to carry it safely.
- Before transporting the system, secure storage space for the system and remove obstacles in advance.

4.1.2. Unpacking Items

To unpack the equipment, ensure the following:

- The equipment should be packed until it reaches the installation site.
- The equipment is classified in accordance with each job specification and are stored at a place that does not interfere with working.
- The unpacked systems should be installed immediately. If immediate installation of the systems is not planned, the systems should be stored in the installation place temporarily.
- The external packing should only be unpacked leaving the internal packing in packed state.
- The internal packing should be unpacked after each system is placed at its installation location.
- The by-products (packaging waste) should be disposed in accordance with waste management rules. Do not recycle the by-products.

4.2 System Arrangement

A minimum clearance must be secured around the O-LRU_CBRSM2, in each direction for installation and maintenance.

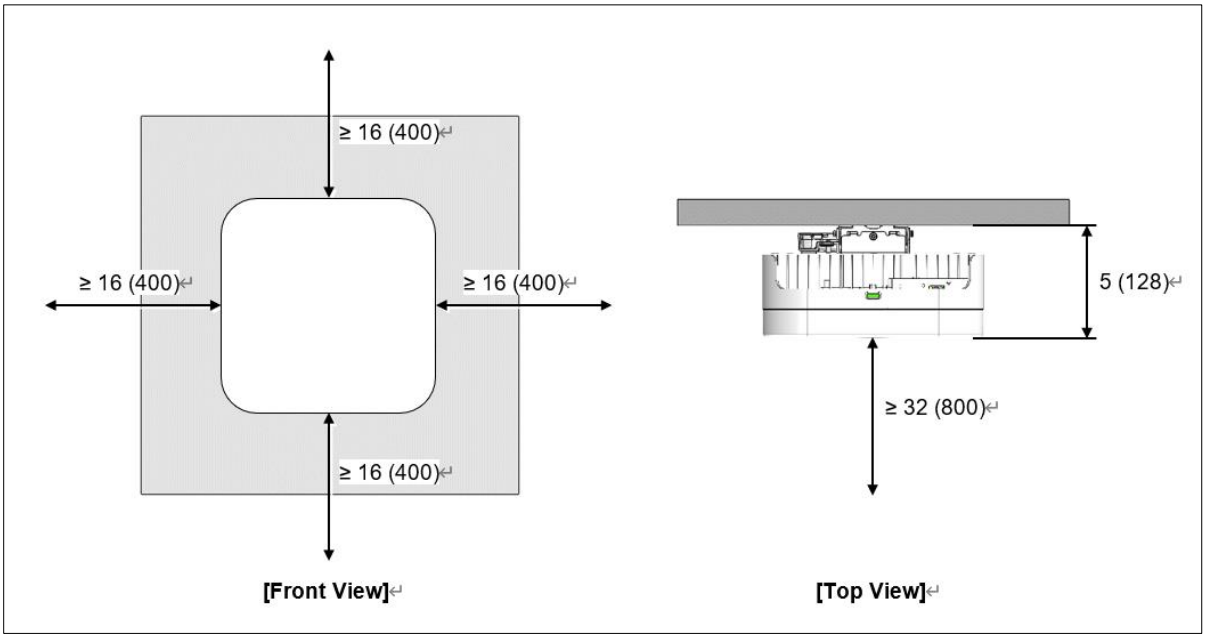


Figure 4-1 Arrangement_Wall and Ceiling Type Installation

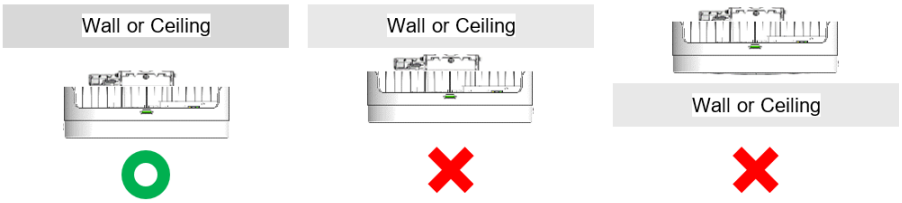
4.3 Fixing

This section provides general guidelines for mounting the system.

4.3.1.1. Fixing Wall or Ceiling Type

This section describes the procedures for a wall or ceiling type installation.

- The ceiling or wall on which the O-LRU_CBRSM2 is installed should be able to withstand a load of four times the weight of the O-LRU_CBRSM2 (including all the components) without damage.
- When installing the O-LRU_CBRSM2, the entire product, including the bracket, should be installed protruding outside the ceiling and wall.
- (Need to secure 33mm gap between the heat radiating fin and wall.)



Making for Wall or Ceiling Mounting

To mark on a Wall or Ceiling, do the following:

1. Ensure you have the items described in the following table.

Category	Description
Working Tools	• Tape Measure • Permanent Maker • Level

Table 4-1 Tools for Marking

To mount the system on a wall, perform the leveling test by referring to System Leveling. Check the positions that are marked as horizontal or vertical before drilling. If the result displays that they are not horizontal or vertical, modify the marking positions.

When the position where the system will be placed is determined, place the system on that position and then mark the positions where anchor bolts will be fixed. This reduces the marking error range.

2. Place a mount bracket on the fixing location, Check the level status using a level and adjust the level of mount bracket.
3. If the level status is normal, mark the anchor bolt holes on a wall (or ceiling).

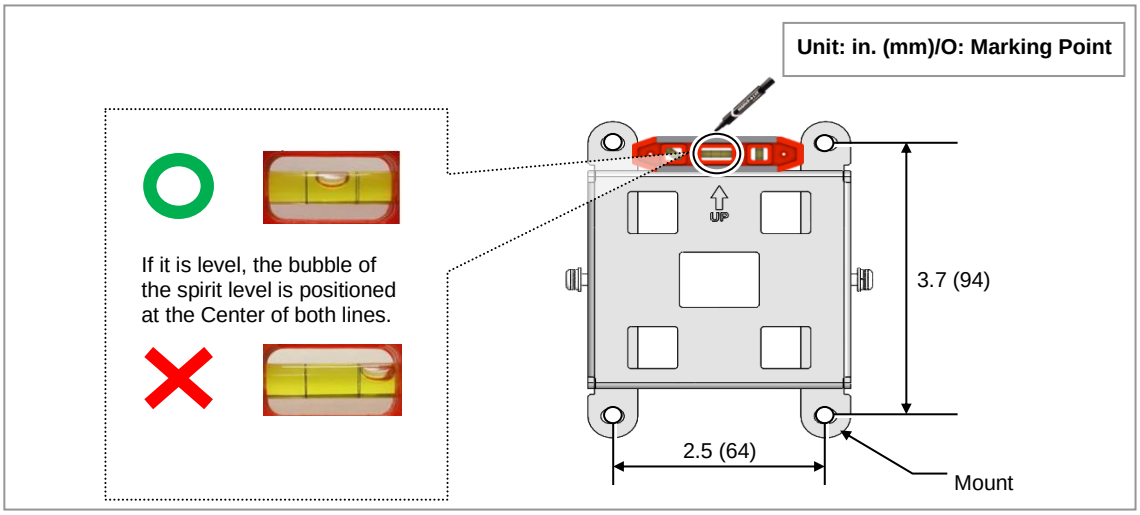


Figure 4-2 Marking

While fixing the wall mount bracket front, you must perform level test for the bracket, as only small adjustments can be made after installation. (Only wall type)

Drilling and Anchoring

This section provides information about drilling and anchoring for fixing the O-LRU_CBRSM2.

Prerequisites

Before proceeding with the drilling and anchoring process, ensure that the items described in the following table are available.

Category	Description	
Parts	M6 × L30 Plastic Anchor	4 EA
Working Tools	• Hammer Drill • Concrete Drill Bit (6 mm) • Vacuum Cleaner	

Table 4-2 Parts and Tools for Drilling and Anchoring

Category	Anchor Bolt	Drill Bits	Hole Depth
System (Wall and Ceiling Type)	M6	0.2 in. (6 mm)	1.4 in. (35 mm)

Category	Anchor Bolt	Drill Bits	Hole Depth
	[Anchor Hole Cross Section] [O] [X] 1.4 in. (35 mm) * Remove the debris from the drilled hole.	0.2 in. (6 mm)	

Table 4-3 Anchor Bolt Drill Bits and Hole Depth

To drill an anchor hole, do the following:

1. Drill anchor holes at marked points. Additionally, remove dust from the holes using a cleaner.
2. Fix plastic anchor to the drilled hole.

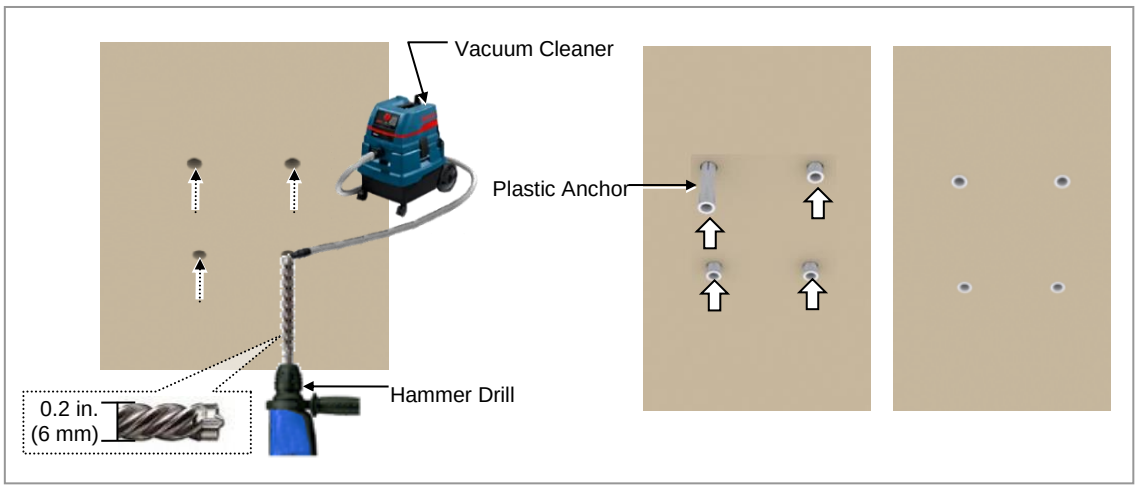


Figure 4-3 Drilling Example

Fixing O-LRU_CBRSM2-Fixed Mount

To fix the wall and ceiling type mount bracket, do the following:

1. Ensure that the items described in the following table are available:

Category	Description		
Parts	Mount Bracket		1 EA
	Fastener	M4 × L30 (Screw)	4 EA
Recommended Torque Value	M4 Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

Table 4-4 Parts and Tools for Fixing Mount Bracket on the Wall and Ceiling

2. Place the mount bracket along with the fixed plastic anchors and fix it using fasteners.

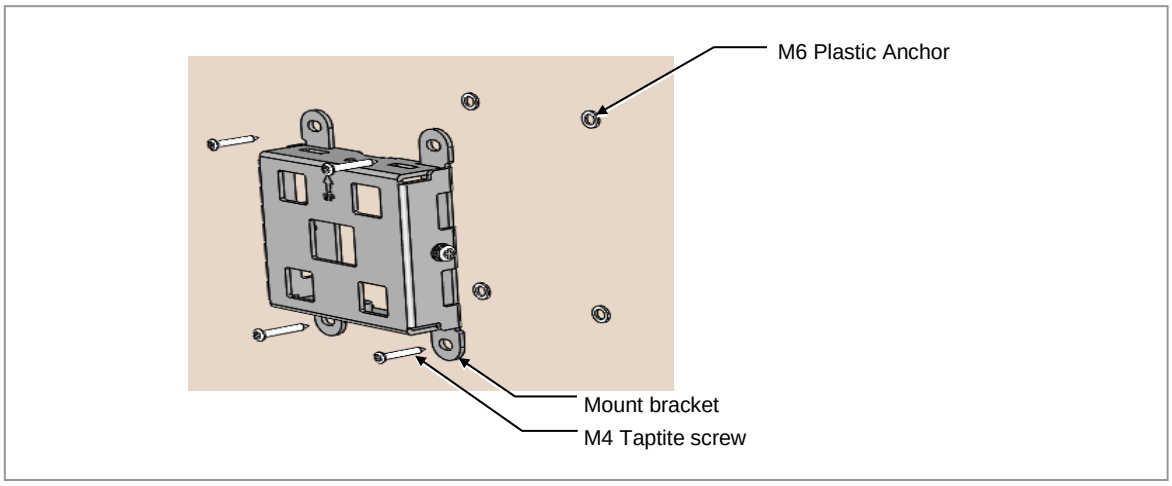


Figure 4-4 Fixing Mount Bracket

To fix the O-LRU_CBRSM2, do the following:

1. Ensure that the items described in the following table are available.

Category	Description	
Parts	M4 × L16 Screw (Attached to the bracket)	2 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

Table 4-5 Parts and Tools for Fixing O-LRU_CBRSM2 on the Wall and Ceiling

2. Place the unit bracket groove on the fasteners of the mount bracket.

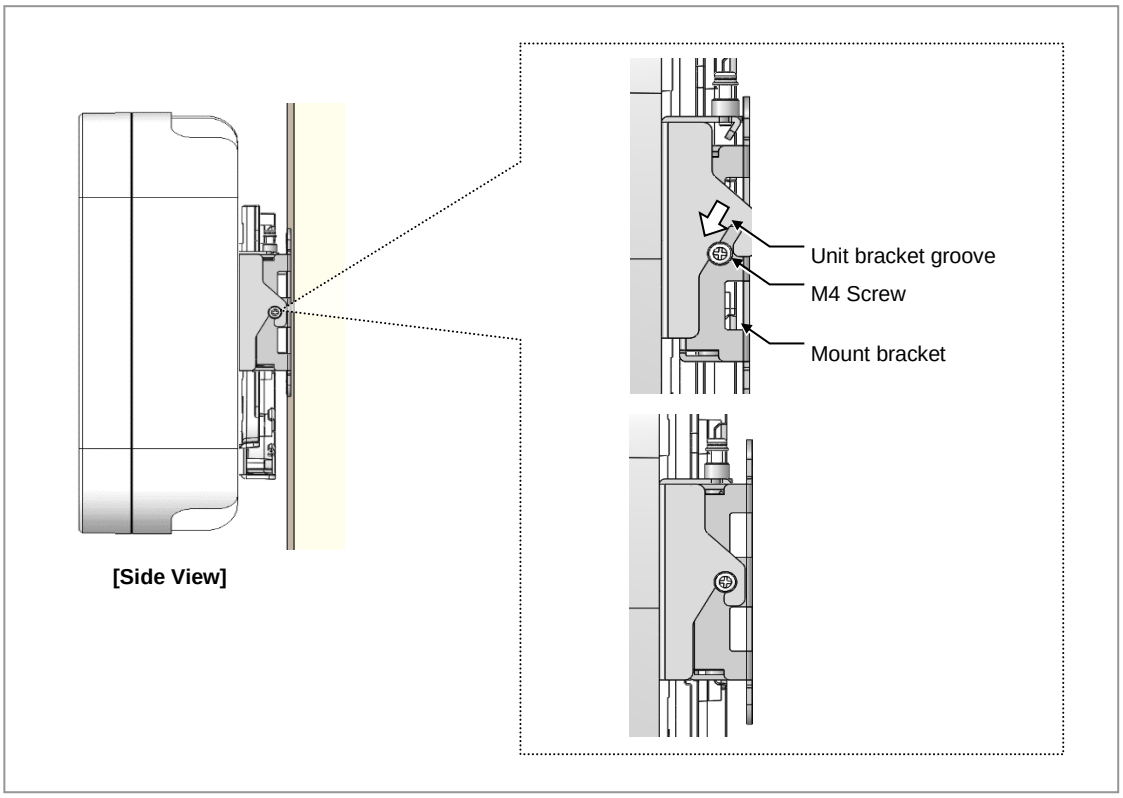


Figure 4-5 Fixing_Wall and Ceiling Type (1)

3. Fix the three points of fasteners of the bracket.

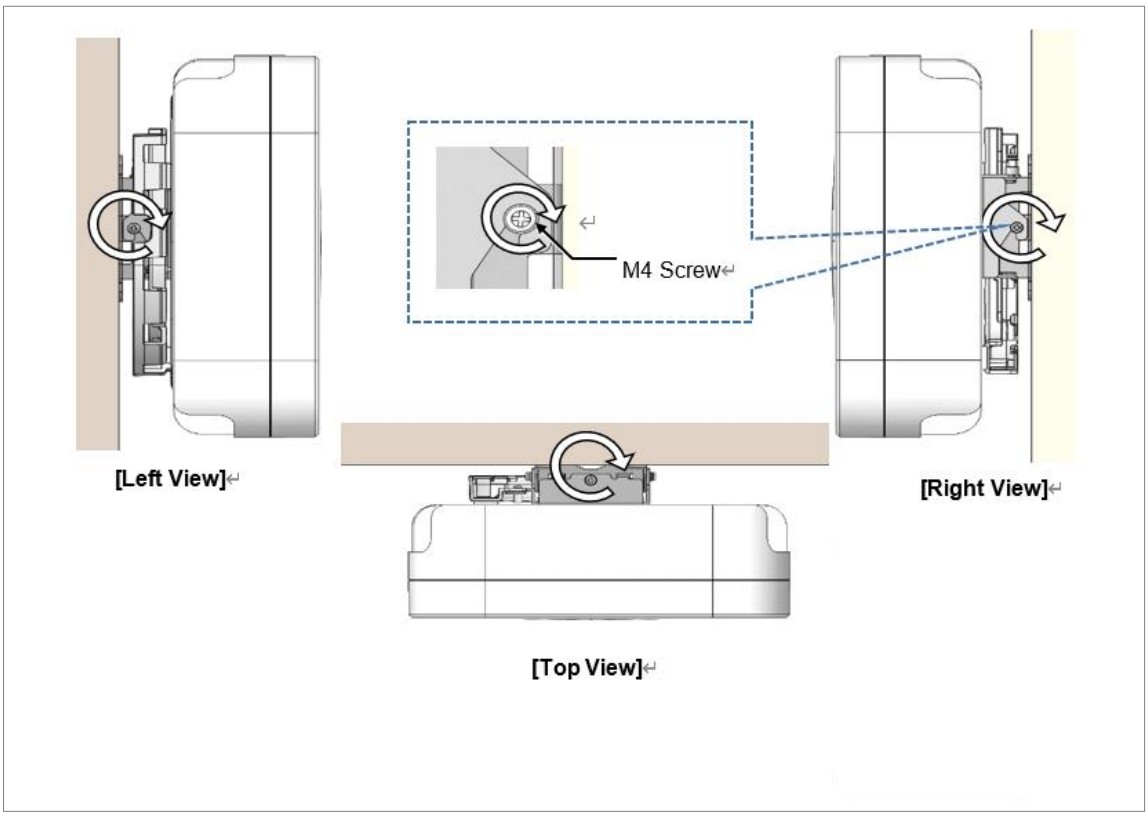


Figure 4-6 Fixing_Wall and Ceiling Type (2)

Fixing O-LRU_CBRSM2-Tilt Mount

To fix wall and ceiling type tilted mount bracket, do the following:

1. Ensure that the items described in the following table are available:

Category	Description		
Parts	Tilted Mount Bracket		1 EA
	Fastener	M4 × L30 (Screw)	4 EA
Recommended Torque Value	M4 Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

Table 4-6 Parts and Tools for Fixing Mount Bracket on the Wall and Ceiling

2. Place the tilted mount bracket along with the fixed plastic anchors and fix it using fasteners.

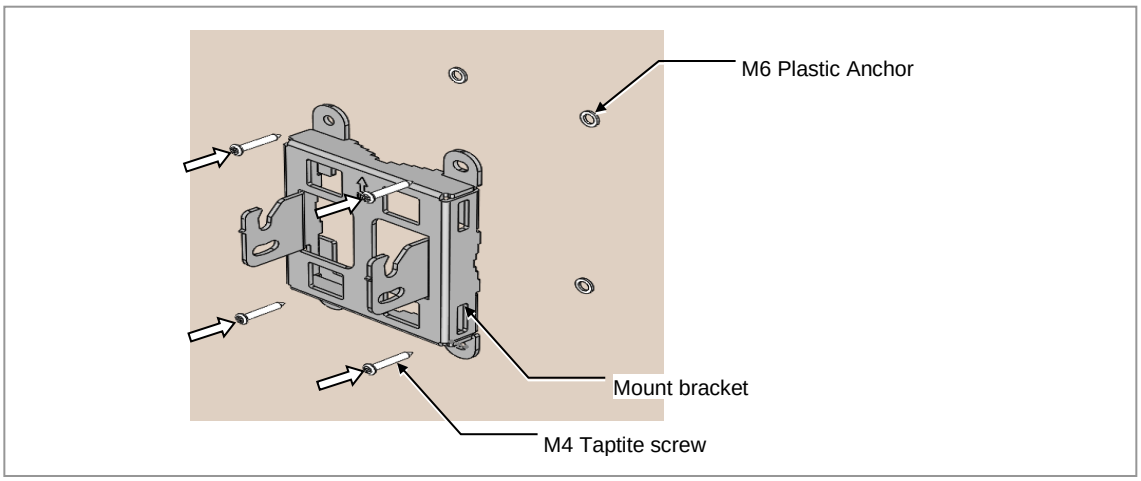


Figure 4-7 Fixing Tilted Mount Bracket

To fix the O-LRU_CBRSM2, do the following:

1. Ensure that the items described in the following table are available.

Category	Description	
Parts	M5 × L14 Screw (Attached to the bracket)	8 EA
Recommended Torque Value	M5 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

Table 4-7 Parts and Tools for Fixing O-LRU_CBRSM2 on the Wall and Ceiling

2. Place the tilted unit bracket groove on the fasteners of the tilted mount bracket.

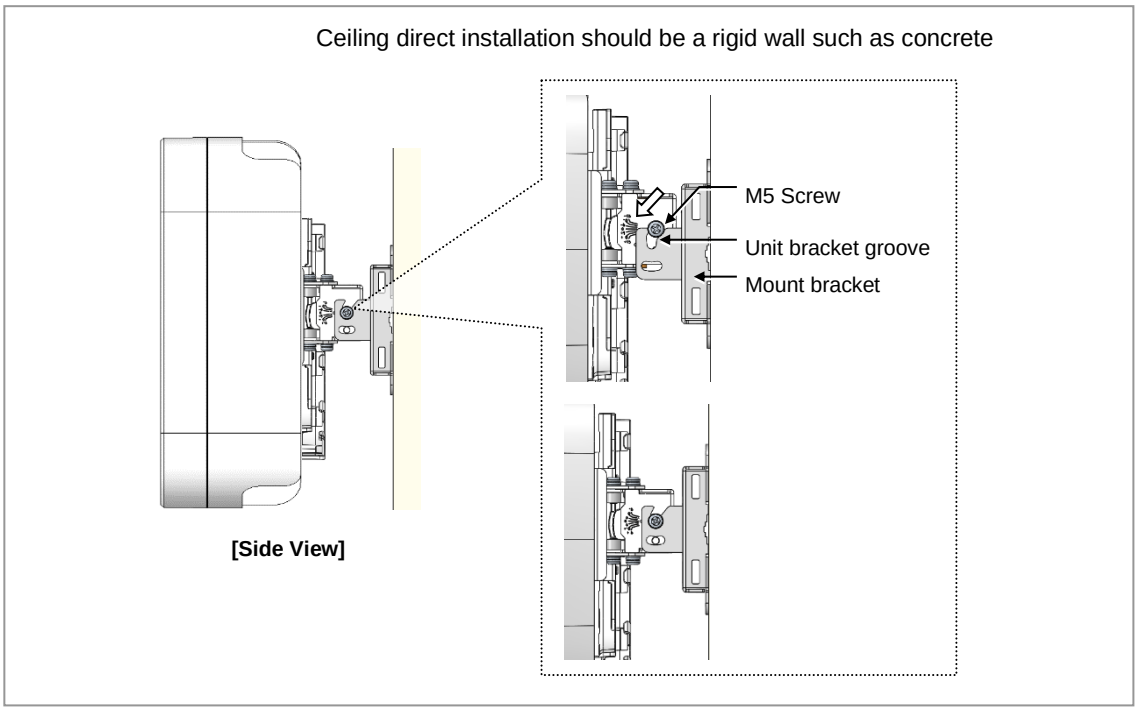


Figure 4-8 Fixing_Wall and Ceiling Type (1)

3. Fix the three points of fasteners of the bracket.

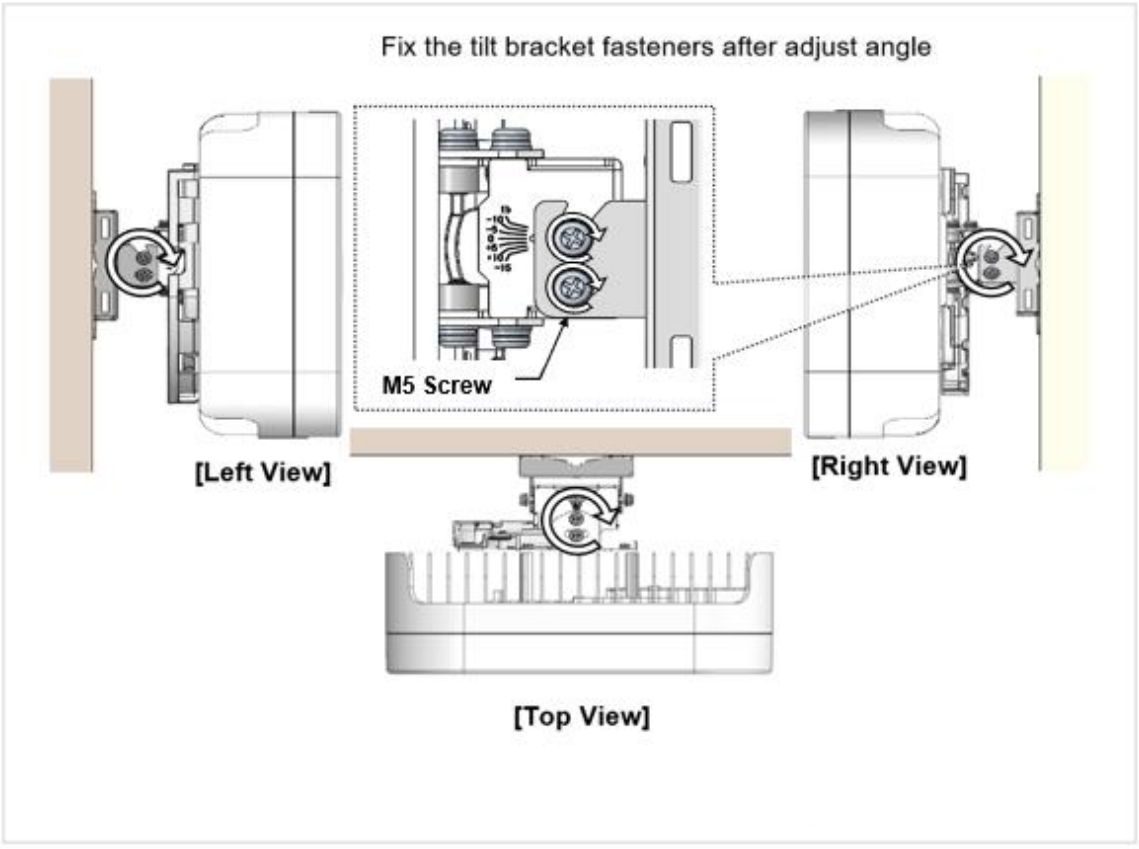


Figure 4-9 Fixing_Wall and Ceiling Type (2)

4.3.1.2. Fixing Ceiling Tile Type

This section describes the procedures for a ceiling tile installation. There are two ways to install the O-LRU_CBRSM2 on a ceiling tile, one using a fixed bracket and one using a tilted bracket.

Drilling for Ceiling Tile

This section provides information about drilling and anchoring for fixing the O-LRU_CBRSM2.

Before installing the O-LRU_CBRSM2, do the following:

1. Open one of the four surrounding locations. Open at least one place.

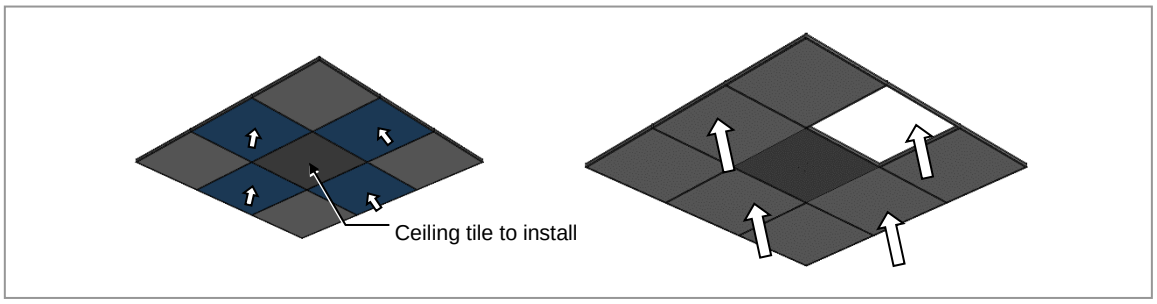


Figure 4-10 Ceiling

2. Put the Ceiling Mount Kit on the tile and adjust it. (600-765 mm (24”-30”) ceiling tile with T(M) Bar)

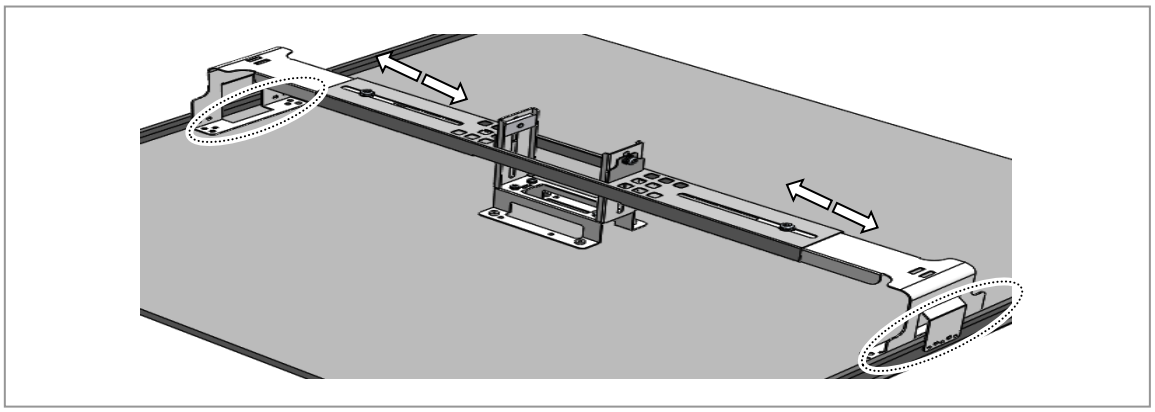


Figure 4-11 Ceiling Mount Kit

3. Drill anchor holes at marked points.

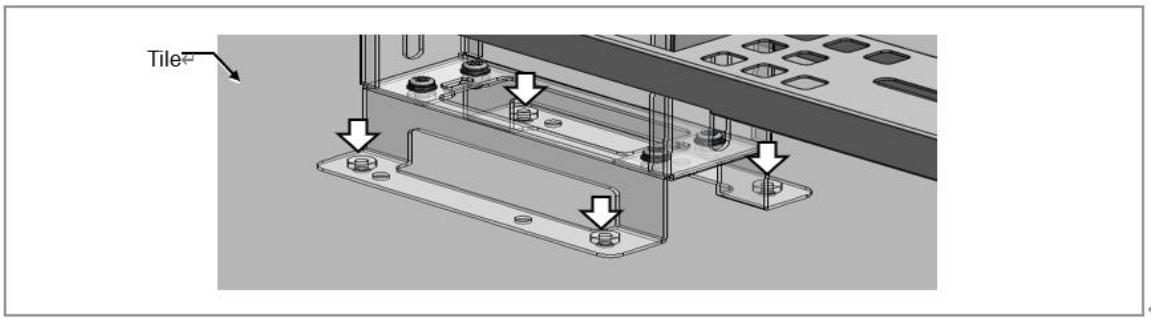


Figure 4-12 Drilling Anchor Holes

Category	Anchor Bolt	Drill Bits	Hole Depth
System (Ceiling Tile)	M4	0.2 in. (5 mm)	Thru

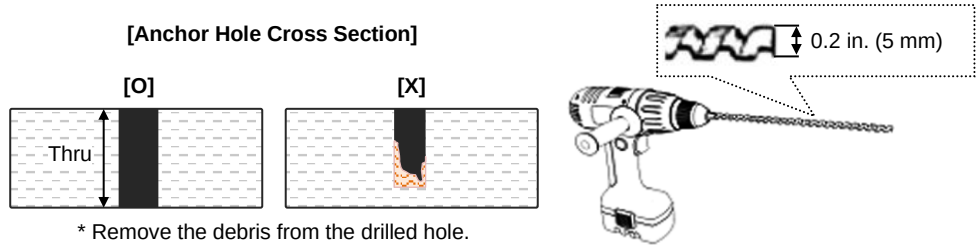


Table 4-8 Anchor Bolt Drill Bits and Hole Depth

To drill an anchor hole, do the following:

1. Drill anchor holes at marked points. Additionally, remove dust from the holes using a cleaner. Fix plastic anchor to the drilled hole.

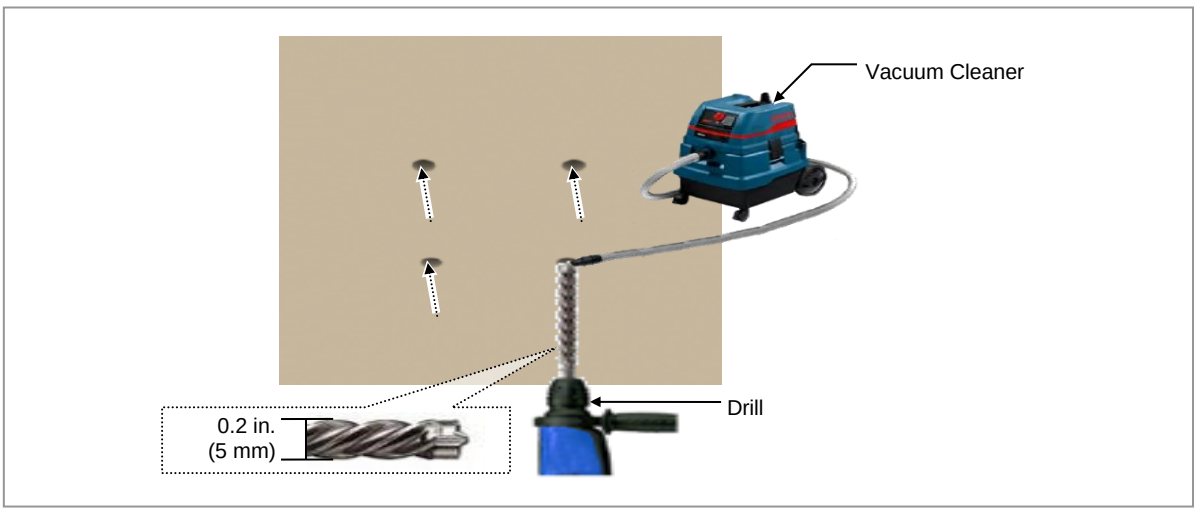


Figure 4-13 Drilling Example

Fixing Mount Bracket

This section describes the process to the fix mount bracket for ceiling tile.

Prerequisites

Before proceeding with fixing the mount bracket, ensure that the items described in the following table are available:

Category	Description		
Parts	Mount Bracket		1 EA
	Fastener	M4 × L30	4 EA
Recommended Torque Value	M4 Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

Table 4-9 Parts and Tools for Fixing Mount Bracket on the Wall and Ceiling

To fix mount bracket _ Ceiling Tile, do the following:

1. Place the mount bracket along with the fixed plastic anchors and fix it using fasteners.

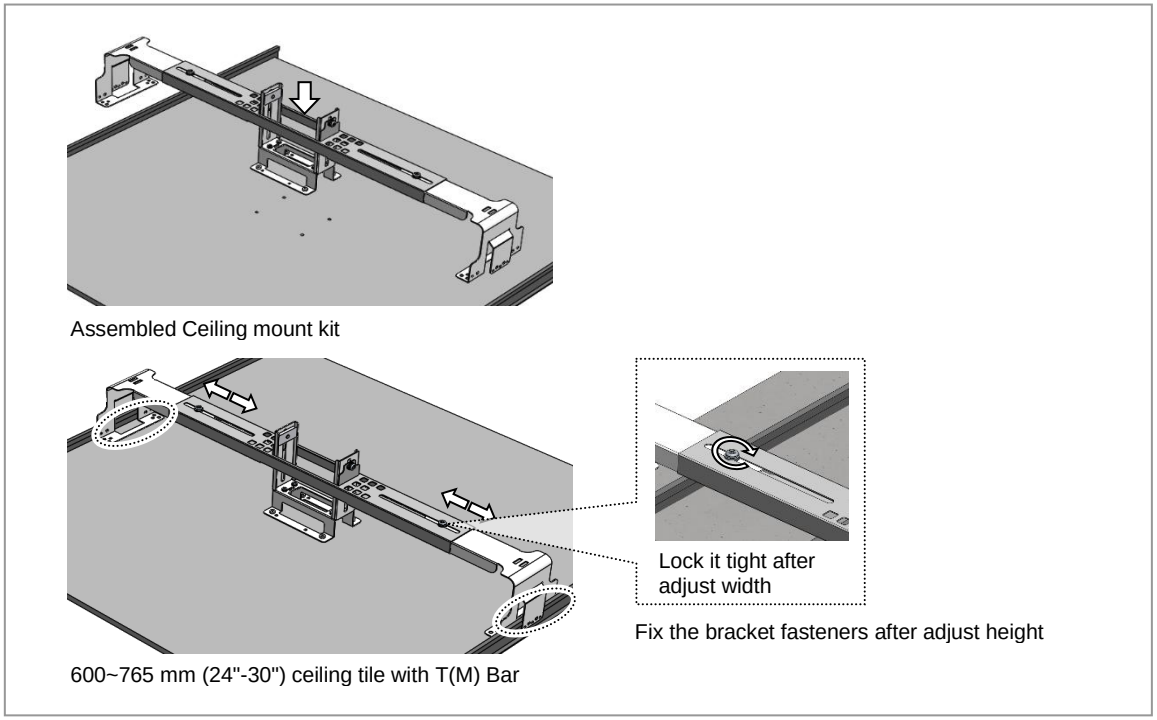


Figure 4-14 Fixing Ceiling Mount Kit Assembly

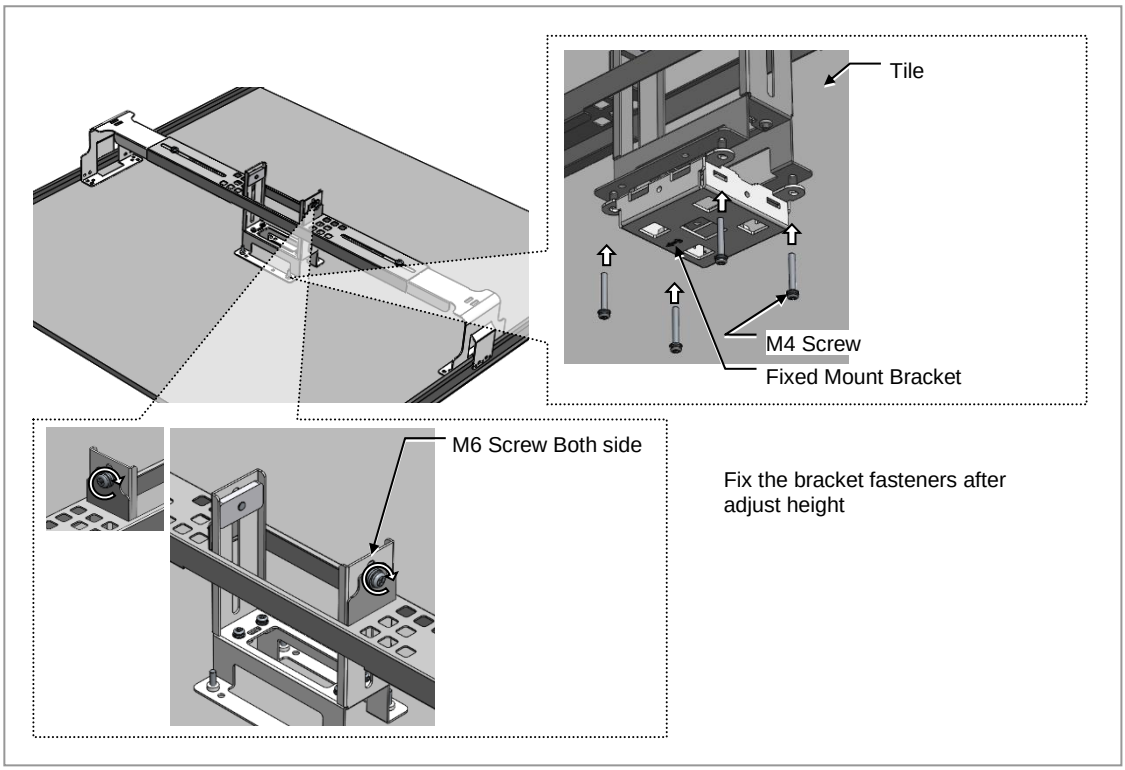


Figure 4-15 Fixing Fixed Ceiling Mount Bracket Assembly

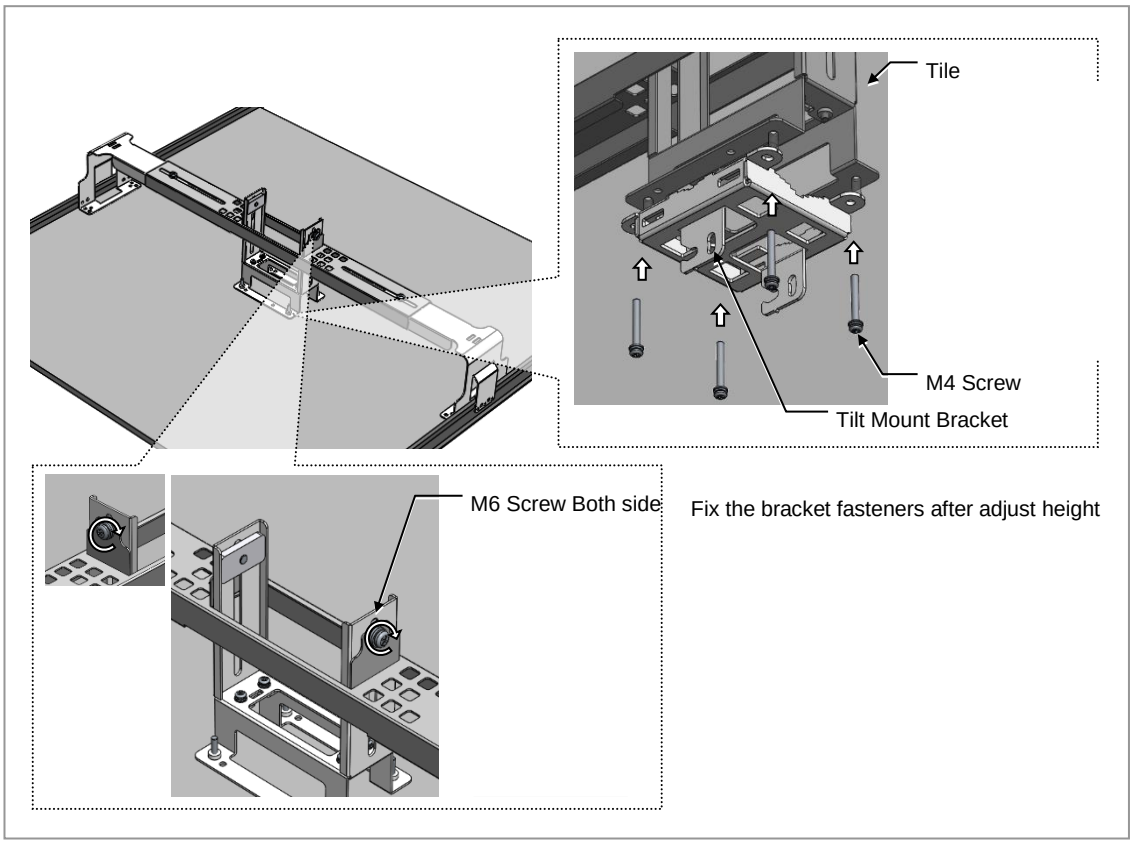


Figure 4-16 Fixing Tilted Ceiling Mount Bracket Assembly

Fixing O-LRU_CBRSM2

This section describes the process to fix the O-LRU_CBRSM2 on the ceiling tile.

Prerequisites

Before proceeding with fixing the O-LRU_CBRSM2, ensure that the items described in the following table are available:

Category	Description	
Parts	M4 × L16 Screw (Attached to the bracket)	2 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

Table 4-10 Parts and Tools for Fixing O-LRU_CBRSM2 on the Ceiling Tile

To fix the O-LRU_CBRSM2, do the following:

1. Place the unit bracket groove on the fasteners of the mount bracket.
2. Fix the points of fasteners of the bracket.

Fixing Ceiling Mount Kit Assembly to Building Structure

This section describes the process to fix the ceiling mount kit assembly to the building structure.

Prerequisites

Before proceeding with fixing the ceiling mount kit assembly, ensure that the items described in the following table are available:

Category	Description	
Parts	M4 × L15 (Screw)	4 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

Table 4-11 Parts and Tools for Fixing Ceiling Mount Kit Assembly to Building Structure

To fix the Ceiling Mount Kit Assembly, do the following:

1. Place the unit bracket groove on the fasteners of the mount bracket.
2. Fix the points of fasteners of the bracket.

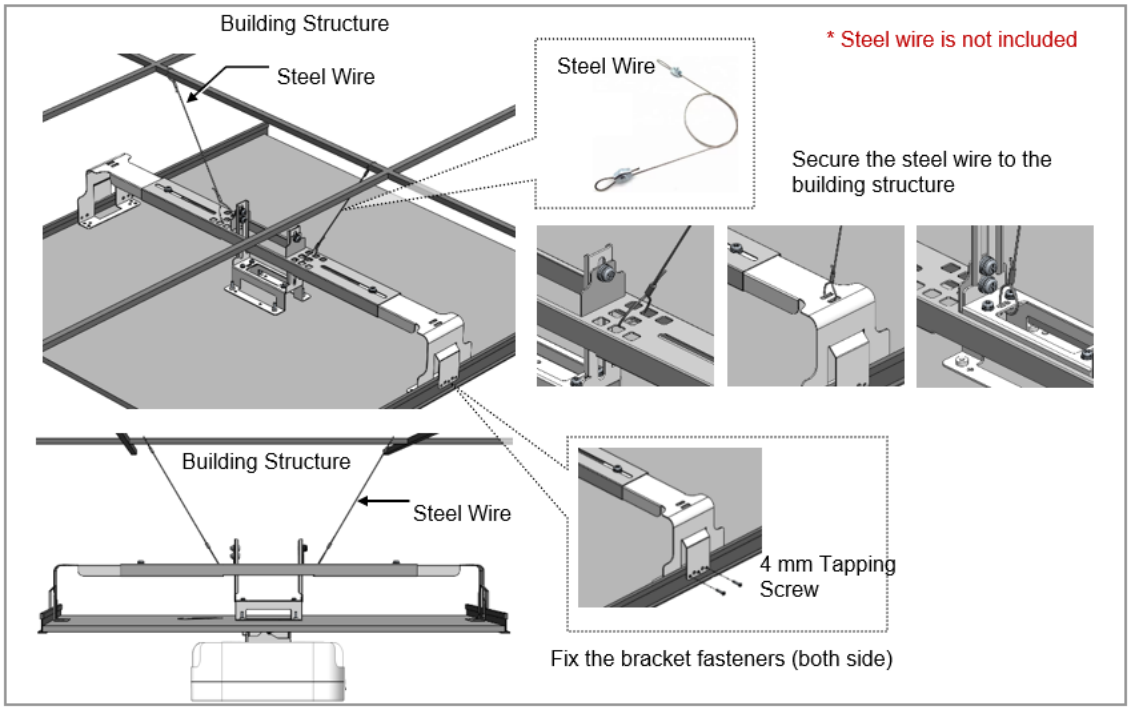


Figure 4-17 Fixing Ceiling Mount Kit Assembly to Building Structure

5 Connecting Cables

This chapter provides instructions for the cabling method for O-LRU_CBRSM2, which remains consistent across band types (Single Band or Dual Band) and product models. Please be aware that the actual product may vary in color and shape compared to the product image depicted in the corresponding chapter.

5.1 Cabling Procedure

5.1.1. Cable Path Inspection

When installing a cable that connects between the DU and the SOLiD O-LRU_CBRSM2 within the system, the cable path, length, and cable installation method must be inspected.

While inspecting the cabling path, you should ensure that the following guidelines are followed:

- A minimum cable length must be selected, so that it does not affect the cable installation and maintenance.
- The cable must be placed in a location where it will not be damaged by external factors, such as power line, flooding, and footpaths.
- In the areas where the cable may be damaged by external factors, ensure that measures are taken to prevent damage to the cable, such as cable tray, ducts, and flexible pipe.

5.1.2. Cable Cutting

Measure the exact distance after carefully checking the route, and cut the cable using a cutting tool.

While cutting the cable, you should ensure that the following guidelines are followed:

- Cut the cable to the length mentioned in the *Cable Path Inspection* step.
- Use a cable cutting tool specific to the cable.
- Cut the cable at right angles.
- Be careful to keep the cable away from any moisture, iron, lead, dust or other foreign material when cutting.
- Remove any foreign material attached to the cable using solvent and a brush.

5.1.3. Cable Installation

This procedure involves laying the cable along the cabling path to the target connector of the system or an auxiliary device after cable path inspection and cable cutting steps are completed.

While installing a cable, you should ensure that the following guidelines are followed:

- Ensure the cable is not damaged.
- If the cable is damaged, cut out the damaged section or replace the cable before installing.
- Lay the cable so that it is not tangled. Pay attention when installing a cable from a horizontal section to a vertical section to ensure not to reverse the upper and lower lines of the cable.
- Always use the maximum curvature radius possible with the minimum curvature radius specification.
- If the cabling is required to be protected, use a PVC channel, spiral sleeve, flexible conduit, or cable tray.

- Install the DC power cable and the data transmission cable away from the AC power cable to prevent electromagnetic induction.
- Be careful when removing cables located by heatsink and wear protective gloves.
- The RF should be turned off while maintenance and wait for few minutes before touching the unit. This is to further reduce any surface temperature hazard to personnel when performing maintenance.

The following table outlines the recommended minimum allowed cable bend radius of different types of cables.

No	Type	Allowed Cable Bend Radius	
1	Power Cable	Installed: 8 × OD	During Installation: 12 × OD
2	Optical Cable	Installed:10 × OD	During Installation: 20 × OD

Table 5-1 Recommended Minimum Allowed Cable Bending Radius

If the manufacturer specifies the allowed cable bending radius, comply with the specified bending radius.

OD: Outer Diameter

5.1.4. Connector Attachment

This process involves assembling a connector to an installed cable or to a device on the site.

To attach the connector, ensure the following:

- Ensure that the operator is fully aware of the connector assembly method before assembling the connector. Assemble the connector in accordance with its pin map.
- Each connector has a latch to prevent its core positions from being changed.
- Check the corresponding grooves before connecting the connector to another connector.
- Use a heat shrink tube at the connector connection for cables that are installed outdoor, such as feeder lines. It prevents water leakage and corrosion of the part exposed to the outer environment.
- Connect each cable of the connector assembly in a straight line.
- Be careful while connecting the cable to prevent from contact failure at the connector connection due to tension.

5.1.5. Cable Binding

This process involves fixing and arranging an installed cable using binding thread, cable ties, binding wire, and ram clamps.

To bend the cable, ensure the following:

- Ensure not to damage the cable during binding.
- Use appropriate cable binding materials according to the target location (indoor or outdoor) and the type of the cable (power supply cable, optical cable, or feeder line).
- Ensure the cutting sections of the cable tie and the binding line are not exposed to the outside. This may cause damage to the cables or personal injury.
- Cut off the remaining cable thread by leaving about 50 mm of extra length to prevent the knot from easily getting untied.
- If there is a possibility of contact-failure to occur in the connector connection due to tension, bind

the cable at the closest location to the connector.

5.1.6. Identification Tag Attachment

This process involves attaching a marker cable tie, a nameplate, and a label to both ends of a cable (connections to a connector) to identify the use of the cable and the cabling path.

While attaching the identification tag, ensure the following:

- When installing an outdoor cable, use relief engraving and coated labels to prevent markings from being erased.
- Since the form and attachment method for identification tags are different for each provider, consult with the provider before attaching the tags.

When connecting the cables, always connect the ground cable first. If a worker comes in contact with the equipment, connects a cable, or performs maintenance without connecting the ground cable, the system can be damaged or the worker can be injured due to static electricity and short circuit.

- When performing cable work for the system, proceed with the grounding work before any other work to prevent errors occurring due to static electricity and other reasons.
- After completing cable installation, unused ports should be capped.

- When installing, take care not to overlap or entangle the cables. Additionally, consider future expansion. Install the DC power cable and the data transmission cable away from the AC power cable to prevent electromagnetic induction.
- The cable installation process requires trained and experienced personnel trained in industry standard installation and field services procedures to include cable installation activities such as cable installation, securing, tying and binding.

5.1.7. Cabling Diagram

5.1.7.1. Cabling Diagram of O-LRU_CBRSM2

The following figure depicts the interfaces of the O-LRU_CBRSM2 for cable connections.

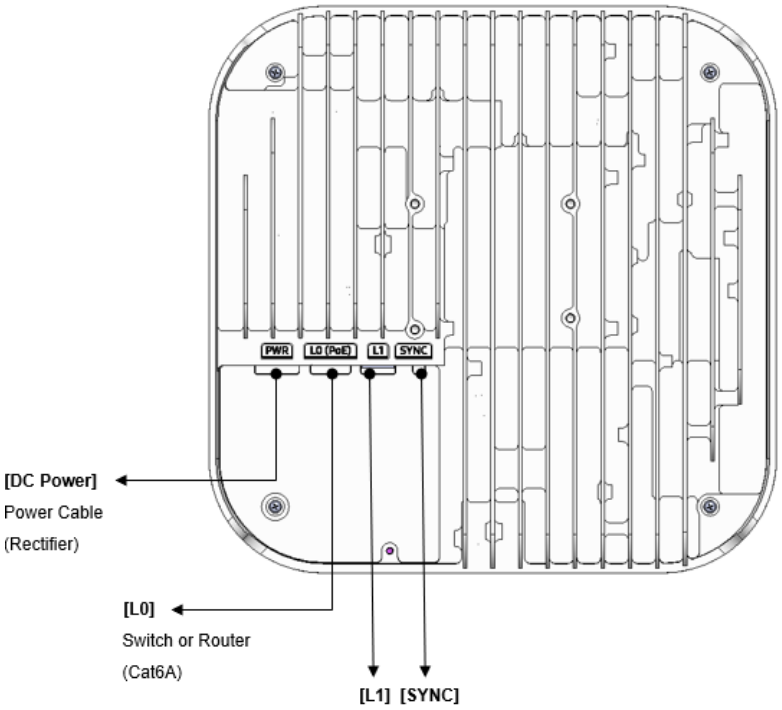


Figure 5-1 Cable Diagram

The following table lists the cables required for interconnecting O-LRU_CBRSM2.

From	To	Cable
Rectifier	PWR	1) Power Cable: 14 AWG (2.5 mm²) × 2C
Switch or Router or FHMc	L0 (PoE): RJ-45, 2.5/5/10GBase-T	2) PoE Cable: Cat6A, AWG 23 (0.25 mm²)

Table 5-2 System Connection Cable

5.1.8. Power Cabling

5.1.8.1. Connecting DC Power Cable

This section describes the process to connect the power cable.

Prerequisites

Before proceeding with the power cable connection, ensure that the items described in the following table are available:

Category	Description			
Installation Section	Rectifier to O-LRU_CBRSM2 PWR Port			
Cable	14 AWG (2.5 mm²)			
Bend Radius	Installed: 8 × OD	During Installation: 12 × OD		
Connector	Rectifier	Check specifications of rectifier output terminal per site and prepare fasteners.		
	O-LRU_CBRSM2	Pin No.	1	RTN

Category	Description			
			2	-48 V DC
Working Tools	• Cable Cutter • Wire Stripper • Crimping Tool • Heating Gun • Nipper			

Table 5-3 Parts and Tools for Connecting DC Power Cable

To connect the DC power cable, do the following:

1. Assemble the power cable and terminal.
2. Assemble the terminal according to the pin number of the connector and the color of the power cable. (Pin 1: Black/Pin 2: Red)
3. Install a DC power cable from the rectifier to the O-LRU_CBRSM2. (At this time, allow the power cable to enter the cable tray.)
4. Separate the PWR port cap from the system side.
5. Connect the power cable to the power port. (PWR port)

5.1.8.2. Connecting POE Cable

This section describes the process to connect the PoE cable.

Prerequisites

Before proceeding with the PoE cable connection, make sure that you have the equipment and items mentioned in the following table:

Category	Description	
Installation Section	FHMc to O-LRU_CBRSM2 L0(PoE) Port	
Cable	Cat6a, AWG 23 (0.25 mm^2)	
Bend Radius	Installed: 8 × OD	During Installation: 12 × OD
Connector	FHMc	R0 ~ R6 Port
	O-LRU_CBRSM2	2.5G/5G/10GBASE-T
Working Tools	• Cable Cutter • Wire Stripper • Crimping Tool • Heating Gun • Nipper	

Table 5-4 Parts and Tools for Connecting Power Cable

5.1.9. External interface Connection

This section describes the external interface cable connection.

5.1.9.1. Remove/Insert SFP

If the SFP is to be removed or inserted before connecting the cable, perform the following process:

Port quantity (Duplex) and Bail of SFP may differ from the figure.

To remove SFP, do the following:

1. Hang the hook of the optical transceiver removal tool on the bail of the SFP within the system.

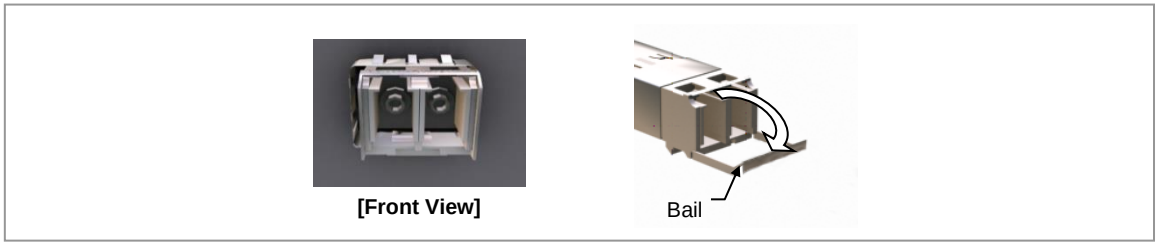


Figure 5-2 SFP Removal (1)

2. Completely remove the SFP from the SFP cage by pulling the SFP removal Tool.

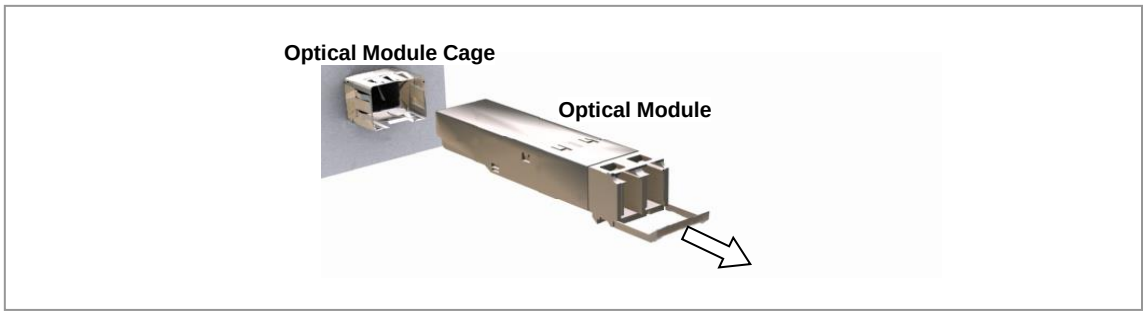


Figure 5-3 SFP Removal (2)

When removing an SFP, open the handle at approximately 90º and remove the SFP using the dedicated tool (SFP removing tool). If the SFP is detached without using a dedicated tool, the SFP may be jammed and the handle may be damaged due to insufficient opening of the handle.

To insert the SFP, do the following:

1. Push the SFP into the SFP cage within the connector.

Figure 5-4 SFP Insert

5.1.9.2. Fronthaul Cable Connection

This section describes the process to connect the fronthaul cable.

Prerequisites

Before proceeding with connecting the fronthaul cable, ensure that the items described in the following table are available:

Category	Description	
Installation Section	Switch or Router to O-LRU_CBRSM2 port	
Cable	Single Mode (Optical)	
Bending Radius	Installed: 10 × OD	During Installation: 20 × OD
Connector	Switch or Router	DLC/UPC
	O-LRU_CBRSM2	DLC/UPC
Working Tools	• Optical Connector Cleaner • SFP Tool (Jig)	
[Single-Mode]  **[Switch or Router side]** **[O-LRU_CBRSM2 side]**		

Table 5-5 Parts and Tools for connecting Fronthaul Cable

SFPs and cables used in the system have laser beams that emit light. Be careful with handling as exposure to laser beams can cause serious damage to the eyes.

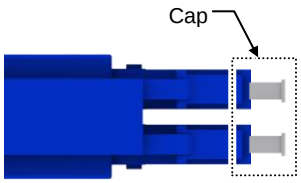
Remove the cap of the optical connector before connecting.

Before connecting the optical cable, verify that the ferrule of the connector is soiled. Be careful to keep the cutting section away from dust or foreign material.

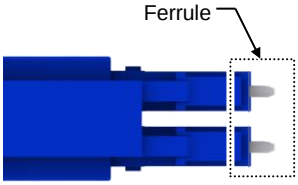
If the cable is soiled with foreign material, do not blow to remove them.

Ensure to clean the connector in accordance with the cleaning directions in Appendix B: Cleaning the Optical Connectors.

Do not touch the ferrule at the end of optical cable as it can be easily damaged.



[Before Removing Cap]



[After Removing Cap]

Before connecting the optical cable connector, the ferrule of the connecter of cable side should be cleaned first by using the optical connector cleaner. (For more details, refer to Appendix B: Cleaning the Optical Connectors.)

To connect a Fronthaul cable, do the following:

1. Connect the fronthaul cable from the switch/router to the O-LRU_CBRSM2 L0/L1port. (While connecting, allow the fronthaul cable to enter the cable tray.)
2. Separate the cap from the O-LRU_CBRSM2 side and cable side connector.
3. Connect the SFP to the O-LRU_CBRSM2 fronthaul port as depicted in the following figure.

4. Insert the DLC plug to the system side's connector.

Before connecting the backhaul cable connector, the ferrule of the connecter of cable side should be cleaned first by using the optical connector cleaner. (For more details, refer to Appendix B: Cleaning the Optical Connectors.)

6 Inspecting Installation

This chapter describes the procedures to check the installation status.

The following figure depicts the overall procedure for inspecting the installation status.

Inspection Plan

Create an inspection sheet per system and select an inspector to set an inspection schedule per site.

On-site Inspection

The onsite inspection is to perform a visual inspection or use instruments for each specification, standard, and installation status — based on the onsite inspection checklist — onsite where the system is installed.

The inspector must record the inspection result on the inspection checklist during or after field inspection.

Sharing Inspection Result and Taking Corrective Actions

The inspector shares the inspection result (the completed inspection checklist and corrective actions) with the installation operator. The installation operator takes the necessary corrective actions after reviewing the requirements.

Checking the Result of Corrective Actions

The inspector will verify that the corrective actions are properly performed and completed. If they are not sufficient, the inspector will request the installation operator to correct or complete any improperly performed corrective actions.

Sharing the Result of Corrective Actions and Preparing Preventive Plan

After all the corrective actions are completed, the inspector will share the result with the installation operator and all relevant departments. The inspector will prepare a preventive action plan to keep the same or similar problems from recurring.

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