ERICSSON

Radio Dot Description

Description

7/1551-FGB 101 0308/1 Uen L1A

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Contents

1 Product Overview

The Radio Dot (RD) is a low-power radio transmitter.

The purpose of the RD is to produce radio waves for indoor broadband coverage.

The RD uses the signal and power interface from the Indoor Radio Unit (IRU) over the Radio Dot Interface (RDI). Up to eight RDs can be connected to a single Indoor Radio Unit (IRU). The IRU can be housed in standard rack mounted RBS units.

The Radio Dot types available are:

— RD 2242: Single Band Radio Dot

— RD 2243: Single Band Radio Dot (same form-factor as Dual Band RD)

— RD 2253: Single Band Radio Dot (with external antenna ports)

— RD 4442: Dual Band Radio Dot

— RD 4453: Dual Band Radio Dot (with external antenna ports)

The RD is a part of a Radio Dot System (RDS). A typical RDS installation is shown in Figure 1.

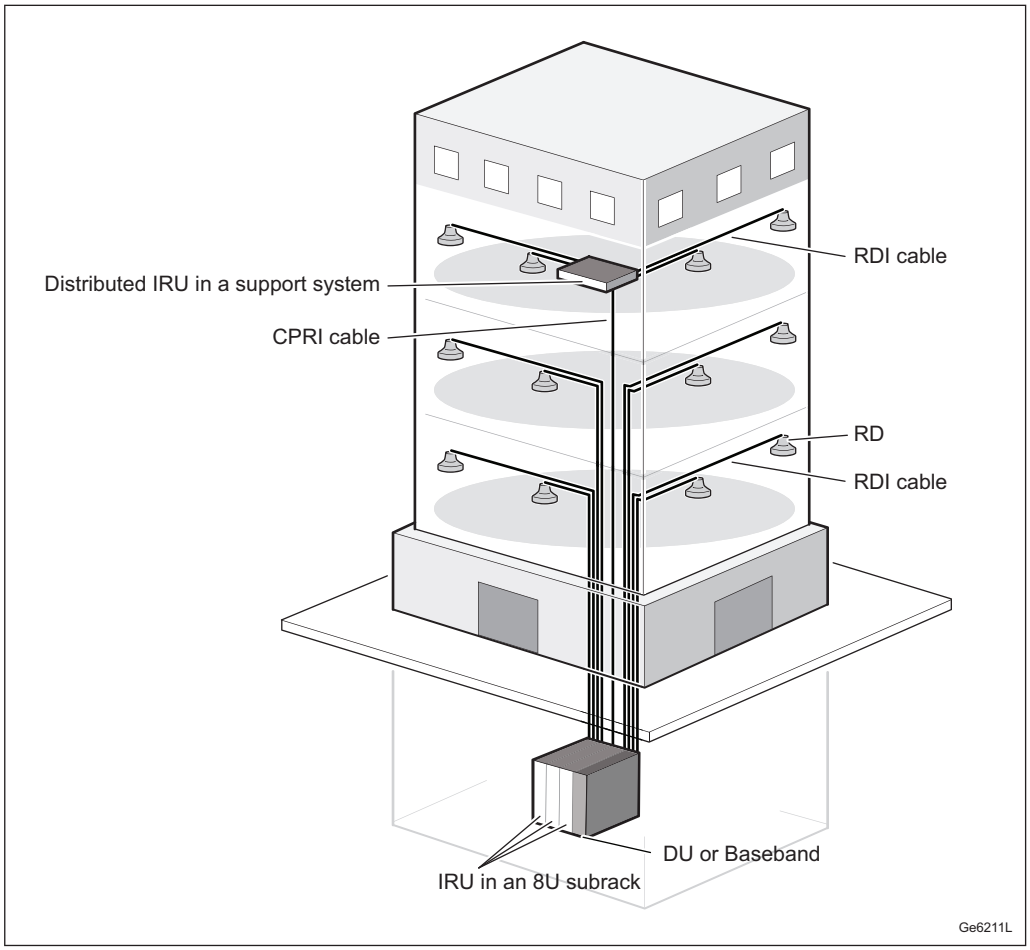


Figure 1 Radio Dot System

For more information about Radio Dot installation, refer to Install Radio Dot.

For more information about RDS, refer to Radio Dot System Description.

For more information about IRUs, refer to Indoor Radio Unit Description.

For information about IRU placement in the RBS cabinet, refer to RBS Description.

For more information about RDI, refer to RDI Cabling Guidelines.

For information on deployment configurations, refer to RDS Configuration Options.

1.1 RD 2242 Main Features

The RD 2242 is a Single Band Radio Dot that supports the following bands:

- Band 1
- Band 2
- Band 3
- Band 4
- Band 5
- Band 7
- Band 13
- Band 17
- Band 40A
- Band 40

Note: Some Radio Dots are specific to European, Asian or American markets.

The RD has the following main features:

- Two antennas, which are MIMO configurable
- Frequency conversion functionality
- Amplifying functionality
- Configuration, supervision and alarming functionality
- Uses a single RDI cable for power and signal transmission
- Output power: 2x17 dBm

1.2 RD 2243 Main Features

The RD 2243 is a Single Band Radio Dot that has the same dimensions as the RD 4442. It is available for the following bands:

- Band 1
- Band 3
- Band 7
- Band 8

— Band 25

— Band 38A

— Band 40A

— Band 40T

— Band 41

— Band 66A

The RD 2243 has the following features:

— 256-QAM Downlink and 64-QAM Uplink

— LTE FDD - 2 carriers of 5, 10, 15, 20 MHz bandwidths (B1, B3, B7, B25 and B66A versions)

— LTE FDD - 2 carriers of 5 or 10 MHz bandwidths (B8 version only)

— LTE TDD - 2 carriers of 5, 10, 15, 20 MHz in full band or 5 MHz sub-bands (B38A, B40A, B40T, and B41 versions only)

— WCDMA - 4 carriers maximum of 5 MHz (B1, B8, B25 and Band66A versions)

— Output power:

  — 2x17 dBm (B1, B3, B7, B8, B25 and B66A versions)

  — 2x21 dBm (B38A, B40A, B40T, and B41 versions)

— 2x2 MIMO

— Two TX/RX branches

— Total Instantaneous Bandwidth (IBW) of 40 MHz per band (except B8 which is 35 MHz)

1.3 RD 2253 Main Features

Attention!

The radio dot with internal antennas is the Ericsson main recommended deployment solution, providing fastest deployment, best network supervision and highest performance.

The RD 2253 is a Single Band Radio Dot, similar to RD 2243, but has external antenna connectors instead of internal antennas. External antenna connectors

allow the use of site specific antennas on Radio Dots to provide different coverage patterns in areas such as elevator shafts and long corridors. The RD 2253 is available in the following configuration:

— RD 2253 B40A, which supports Band 40A

The RD 2253 has the following features:

— 256-QAM Downlink and 64-QAM Uplink

— LTE TDD - 2 carriers of 5, 10, 15, 20 MHz in full band or 5 MHz sub-bands

— Output power: 2x21 dBm

— 2x2 MIMO

— Two TX/RX branches

— IBW: 40 MHz per band

1.3.1 RD 2253 Limitations

The following limitations must be considered when deploying the RD 2253:

— The RD 2253 must be used in specific use cases only, such as elevator shafts and long hallways. In these scenarios, the possibility of triggering the AGC is lower and the risk of reduced coverage is minimized. For more information, see Locations for RDs with External Antennas on page 14.

— There is no detection or fault monitoring of the antenna connection. If the antenna is not connected or if the cable breaks, there is no detection by the RD.

— The connector used on the external antenna must be a male SubMiniature version A (SMA).

— There is no delay compensation for the external cabling or antenna.

1.4 RD 4442 Main Features

The Dual Band Radio Dot RD 4442 is similar to the Single Band Radio Dot, but it can support two frequency bands in one Radio Dot using one CAT Cable. The RD 4442 has the following advantages:

— Halves the number of radio dots that are physically planned, cabled and installed.

— Halves the antenna tax that some building owners impose on RDS deployments.

— Enables multi-operator deployments where operators can share the physical Radio Dots that are deployed and enables different cost sharing approaches.

— Lower power consumption per radio branch.

— Improves radio characteristics, such as DL power accuracy.

The RD 4442 supports:

— 256-QAM Downlink and 64-QAM Uplink.

— Depending on the model, one of the following band combinations simultaneously:

  — B1 and B3

  — B1 and B7

  — B3 and B7

  — B25 and B66A

  — B30 and B30

  — B40A and B3

  — B48 and B48

— Any mix of 5 MHz 3G carriers and 5, 10 , 15, 20 MHz LTE configurations (except for B30 that is limited to 1 carrier of 5 MHz or 10 MHz)

— LTE FDD - 2 carriers of 5, 10, 15, 20 MHz per band (except for B30 that is limited to 1 carrier of 5 MHz or 10 MHz)

— LTE TDD - 2 carriers of 5, 10, 15, 20 MHz per band (B40A and B48 bands)

— WCDMA - 4 carriers per band (B1, B25, and B66A bands)

— The output DL power of either:

  — 4x17 dBm (2x2 branches) for the following models:

  — • B1 and B3

    • B1 and B7

    • B3 and B7

    • B25 and B66A

    • B30 and B30

    • B48 and B48

  — 2x21 dBm and 2x17 dBm for the following model:

- B40A and B3

  For this model, the B3 band output DL power is 2x17 dBm and the B40A output DL power is 2x21 dBm.

— Total Instantaneous Bandwidth (IBW) of 2x40 MHz (except for B30 that is 2x10 MHz)

— Inter-band carrier aggregation.

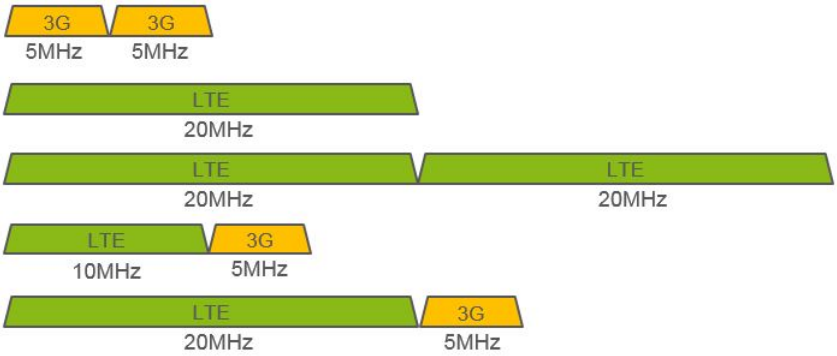
— Mixed mode WCDMA B1 and LTE B3 or B7 from a single RD 4442, depending on model.

— Mixed mode WCDMA or LTE B25 and WCDMA or LTE B66A depending on model.

— Mixed mode LTE B1 and WCDMA B1, depending on model.

— Carrier aggregation LTE B1 and LTE B3 or B7, or LTE B40A and LTE B3, or LTE B25 and LTE B66A from a single RD 4442, depending on model.

The following figure is an example of the possible carrier arrangements:



For information on installing the Dual Band Radio Dot, refer to Install Radio Dot.

The Dual Band Radio Dot requires a dual IRU configuration with a Y-Splitter. For information on connecting the Y-Splitter and IRU patch cabling for Y-Splitter configurations, refer to Y-Splitter Guidelines.

1.4.1 RD 4442 Limitations

The following limitations must be considered when deploying the RD 4442:

— The IRU cannot connect to a Dual Band RD 4442 and a Single Band RD 2242 at the same time. The software performs a compatibility check and generates a configuration mismatch alarm if the capabilities of the dots are not the same. The IRU can connect to an RD 2243 B1, B3, B7, B25, B40A or B66A and the same band side of an RD 4442.

— The two sides of an RD 4442 cannot connect to the same IRU.

— When connecting the RD 4442 to the IRU, the Y-splitter must be used.

— The cable lengths from the two IRUs to the Y-splitter must be the same.

— The two sides of the RD 4442 cannot be connected to the same port number of two separate IRUs. Refer to the Y-splitter guidelines in Y-Splitter Guidelines, 11/1553-FGB 101 0308/1.

— All carriers provisioned in the same half of the RD 4442 must be contiguous.

— For multicarrier setup, the 20 MHz carrier must be placed at the edge of the carrier combination. The 15 MHz carriers must be placed at the edge of the carrier combination. The exception is 5+15+5.

— Each band is assigned to a specific port on the Y-Splitter. Refer to the Y-Splitter Guidelines for the table on port assignment on a band basis.

For further information on RD 4442 Deployment Configurations, refer to RDS Configuration Options, 1/1551-FGB 101 0308/1.

1.5 RD 4453 Main Features

Attention!

The radio dot with internal antennas is the Ericsson main recommended deployment solution, providing fastest deployment, best network supervision and highest performance.

The RD 4453 is a Dual Band Radio Dot, similar to RD 4442, but has external antenna connectors instead of internal antennas. External antenna connectors allow the use of site specific antennas on Radio Dots to provide different coverage patterns in areas such as elevator shafts and long corridors. The RD 4453 is available in the following configuration:

— RD 4453 B1B3, which supports Band 1 and Band 3

The RD 4453 supports:

— 256-QAM Downlink and 64-QAM Uplink.

— Both B1 and B3 bands simultaneously.

— Any mix of 5 MHz 3G carriers and 5, 10 , 15, 20 MHz LTE configurations.

— LTE FDD - 2 carriers of 5, 10, 15, 20 MHz per band

— WCDMA - 4 carriers per band

— Output DL power: 4x17 dBm (2x2 branches).

— IBW: 2x40 MHz

— Inter-band carrier aggregation

— Mixed mode WCDMA B1 and LTE B3 from a single RD 4453.

— Mixed mode LTE B1 and WCDMA B1, and carrier aggregation LTE B1 and LTE B3 from a single RD 4453.

Figure 3 Dualband External Antennas Side 1 (RF1A,RF1B)

Figure 4 Dualband External Antennas Side 2 (RF2A,RF2B)

For information about which band resides on which side, refer to Visual Indicator Sides According to Bands table.

1.5.1 RD 4453 Limitations

The following limitations must be considered when deploying the RD 4453:

— The RD 4453 must be used in specific use cases only, such as elevator shafts and long hallways. In these scenarios, the possibility of triggering the AGC is

lower and the risk of reduced coverage is minimized. For more information on the location for RDs with external antennas, see Locations for RDs with External Antennas on page 14.

— There is no detection or fault monitoring of the antenna connection. If an antenna is not connected or if the cable breaks, there is no detection by the RD.

— There is no delay compensation for the external cabling or antenna.

— The connector used on the external antenna must be a male SubMiniature version A (SMA).

— The IRU cannot connect to an RD 4453 and an RD 2242 at the same time. The software performs a compatibility check and generates a configuration mismatch alarm if the capabilities of the dots are not the same. The IRU can connect to an RD 2243 B1 or B3 and the same band side of an RD 4453.

— The two sides of an RD 4453 cannot connect to the same IRU.

— When connecting the RD 4453 to the IRU, the Y-splitter must be used.

— The cable lengths from the two IRUs to the Y-splitter must be the same.

— The two sides of the RD 4453 cannot be connected to the same port number of two separate IRUs. Refer to the Y-splitter guidelines in Y-Splitter Guidelines, 11/1553-FGB 101 0308/1.

— All carriers provisioned in the same half of the RD 4453 must be contiguous.

— For multicarrier setup, the 20 MHz carrier must be placed at the edge of the carrier combination. The 15 MHz carriers must be placed at the edge of the carrier combination. The exception is 5+15+5.

— Each band is assigned to a specific port on the Y-Splitter. Refer to the Y-Splitter Guidelines for the table on port assignment on a band basis.

2 Technical Data

This section describes the physical characteristics, installation recommendations, environmental data, and the power supply of the RD 2242, RD 2243, RD 2253, RD 4442, and RD 4453.

2.1 Specifications

RD Frequencies are listed in Table 1 and RD specifications are listed in Table 4. The RD dimensions are shown in Figure 5 and Table 9.

Table 1 Frequency Overview Single Band Radio Dots

Band	RAT	Uplink Frequency (MHz)	Downlink Frequency (MHz)	IBW (MHz)	RD 2242	RD 2243
B1	L,W	1920-1980	2110-2170	40	x	x
B2	L,W	1850-1910	1930-1990	40	x	
B3	L	1710-1785	1805-1880	40	x	x
B4	L,W	1710-1755	2110-2155	40	x	
B5	L,W	824-849	869-894	25	x	
B7	L	2500-2570	2620-2690	40	x (1)	x
B8	L,W	880-915	925-960	35		x
B13	L	777-787	746-756	10	x	
B17	L	704-715	734-745	11	x	
B25	L,W	1850-1915	1930-1995	40		x
B38A	L	2575-2615	2575-2615	40		x
B40	L	2300-2395	2300-2395	40	x	
B40A	L	2320-2370	2320-2370	40		x
B40T	L	2300-2395	2300-2395	40		x
B41	L	2496-2690	2496-2690	40		x
B66A	L,W	1710-1780	2110-2180	40		x

(1) RD 2242 B7 CE approved for LTE carrier bandwidths 10 MHz to 20 MHz, does not support LTE 5 MHz configuration.

Table 2 Frequency Overview Dual Band Radio Dots

Band	RAT	Uplink Frequency (MHz)	Downlink Frequency (MHz)	RD 4442 B1/B3	RD 4442 B1/B7	RD 4442 B3/B7	RD 4442 B40A/B3	RD 4442 B25/ B66A	RD 4442 B48/B48	RD 4442 B30/B30
B1	L,W	1920-1980	2110-2170	x	x					
B3	L	1710-1785	1805-1880	x		x	x			
B7	L	2500-2570	2620-2690		x	x				
B25	L,W	1850-1915	1930-1995					x		
B30	L	2305-2315	2350-2360							x

Band	RAT	Uplink Frequency (MHz)	Downlink Frequency (MHz)	RD 4442 B1/B3	RD 4442 B1/B7	RD 4442 B3/B7	RD 4442 B40A/B3	RD 4442 B25/ B66A	RD 4442 B48/B48	RD 4442 B30/B30
B40A	L	2320-2370	2320-2370				x			
B48	L	3550-3700	3550-3700						x	
B66A	L,W	1710-1780	2110-2180					x		

Table 3 Frequency Overview Radio Dots with External Antennas

Band	RAT	Uplink Frequency (MHz)	Downlink Frequency (MHz)	RD 2253 B40A	RD 4453 B1B3
B1	L,W	1920-1980	2110-2170		x
B3	L	1710-1785	1805-1880		x
B40A	L	2320-2370	2320-2370	x	

Note: The RDS supports 1-2 LTE carriers (4 carriers for B48, 1 carrier only for B30), 1-4 WCDMA carriers, and 2-6 mixed mode carriers.

Table 4 RD 2242 Specifications

Description	Value
Maximum nominal output power	2 × 50 mW
Weight (bracket excluded)	265 g
Color	Gray and white

Table 5 RD 2243 Specifications

Description	Value
Maximum nominal output power	2 x 50 mW (B1, B3, B7, B8, B25, and B66A) 2 x 125 mW (B38A, B40A, B40T, and B41)
Weight (bracket excluded)	388 g
Color	Off-White

Table 6 RD 2253 Specifications

Description	Value
Maximum nominal output power	2 x 125 mW
Weight (bracket excluded)	381 g
Color	Off-White

Table 7 RD 4442 Specifications

Description	Value
Maximum nominal output power	With MIMO: 4 x 50 mW (all models except the B40A/B3) For the B40A/B3 model only:

Description	Value
	—2 x 50 mW (B3) —2 x 125 mW (B40A)
Weight (bracket excluded)	424 g
Color	Off-White

Table 8 RD 4453 Specifications

Description	Value
Maximum nominal output power	With MIMO: 4 x 50 mW
Weight (bracket excluded)	422 g
Color	Off-White

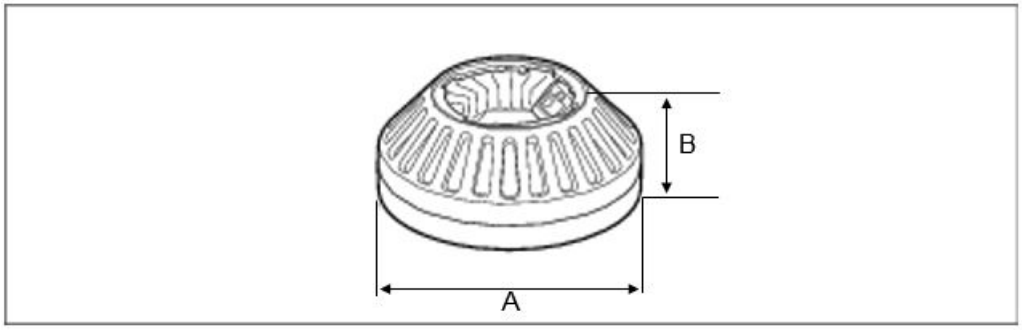


Figure 5 RD Dimensions

Table 9 RD Dimensions

RD Variant	Position	Dimension (mm)
RD 2242	A	109
	B	50
RD 2243 RD 4442 RD 2253 RD 4453	A	140
	B	52

Table 10 RD Ambient Operating Temperature

RD Variant	Ambient Operating Temperature
RD 2242 RD 2243 RD 4442 RD 2253 RD 4453	+5 to +40°C The maximum ambient operating temperature is +35°C if the Radio Dot is wall mounted or housed in a Radio Dot Enclosure. The Radio Dot may continue to operate with reduced capacity when the maximum ambient temperature is exceeded. Follow all restrictions for installation in Installation Restrictions on page 14. For detailed installation instructions, refer to Install Radio Dot, 165/1531-FGB 101 0308/1.

2.2 Installation Restrictions

To achieve reliable operation and maximum performance, an appropriate installation location must be chosen.

2.2.1 Mounting Requirements

RDs are designed for installation in ceiling panels, on hard ceilings such as concrete surfaces, on pipes, rails, and similar. Restrictions for installation are described in sections Locations to Avoid on page 14, Ceiling Distance Requirements on page 15, Ceiling Restrictions in the United States on page 15 and Minimum Mounting Distances on page 17. For detailed information about installing the RD, refer to Install Radio Dot.

Attention!

Before installing the RD using the standard ceiling mounting brackets, verify that the structural integrity of the tile material can support the unit weight (388 g for RD 2243, 381 g for RD 2253, 424 g for RD 4442, 422 g for RD 4453) plus the weight of the mounting bracket (46 g for short socket or 100 g for tall socket).

2.2.2 Locations for RDs with External Antennas

The main concern of a high gain antenna on an RD is the possible reduction of coverage provided by other RDs on the IRU. The uplink AGC is triggered because of the higher input levels caused by the greater gain specified on the external antenna. A UE in close proximity to a high gain external antenna raises the dynamic range, and causes a decrease in signal strength on RDs with internal antennas on the IRU.

External antennas on RDs must be used in specific use cases only, such as elevator shafts and long hallways. In these scenarios, the possibility of triggering the AGC is lower and the risk of reduced coverage is minimized.

2.2.3 Locations to Avoid

To ensure smooth performance, avoid installing the RD in a potential microclimate location, for example, places with unventilated lofts, with heat traps, or where the product is exposed to direct sunlight through windows. Avoid installing the equipment under skylight windows without proper ventilation.

Metal objects in the near field of the RD antenna main lobe can cause reflections and generate passive intermodulation interference (PIM) which may reduce RF performance. Do not install RDs with metal objects nearer than 1 m in front or 0.2 m beside them. PIM can also be generated through partial contact of metal. For

optimal performance, keep the RD a minimum of 0.5 m away from items such as fire sprinklers and metal chains.

For information about requirements for ceiling distances, see Ceiling Distance Requirements on page 15. For information about ceiling restrictions in the United States, see Ceiling Restrictions in the United States on page 15. For information about minimum mounting distance to other objects or walls, see Minimum Mounting Distances on page 17.

2.2.4 Ceiling Distance Requirements

The distance, (A) in Figure 6, between the lower ceiling bottom and the lowest part of the upper ceiling, for example, a cable rack, must be at least 110 mm. This is to ensure a minimum amount of air around the RD for the cooling function to work properly.

Note: The mounting socket opening must not be covered or capsulated in any way.

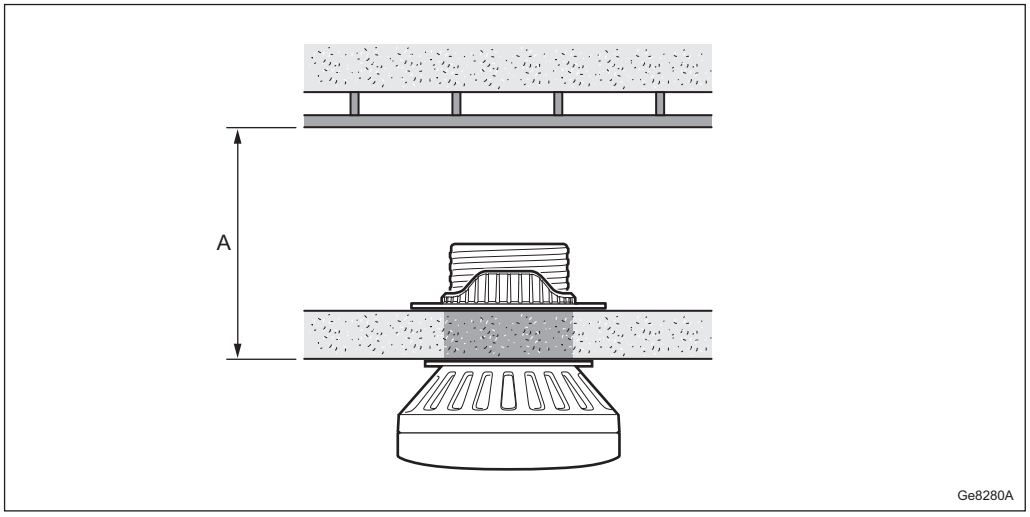


Figure 6 Ceiling Distance

2.2.5 Ceiling Restrictions in the United States

For installation in the United States (US) there are restrictions depending on how the airspace above the inner ceiling is used. There are three different rating of ceiling space, as follows:

- ☐ Inner ceiling space not used as plenum (that is, not used for ventilation purpose)
- ☐ Air-handling space (plenum)
- ☐ Fire-rated plenum

The RD is NOT suitable for installation in fire-rated plenum.

2.2.5.1 Inner Ceiling Space Not Used as Plenum

The airspace above the inner ceiling is defined as Inner Ceiling Space where the air volume is not a part of the ventilation system. The ventilation system is in the enclosed ducts, see Figure 7

For the air volume outside of the ventilation ducts there is no specific safety requirements in US.

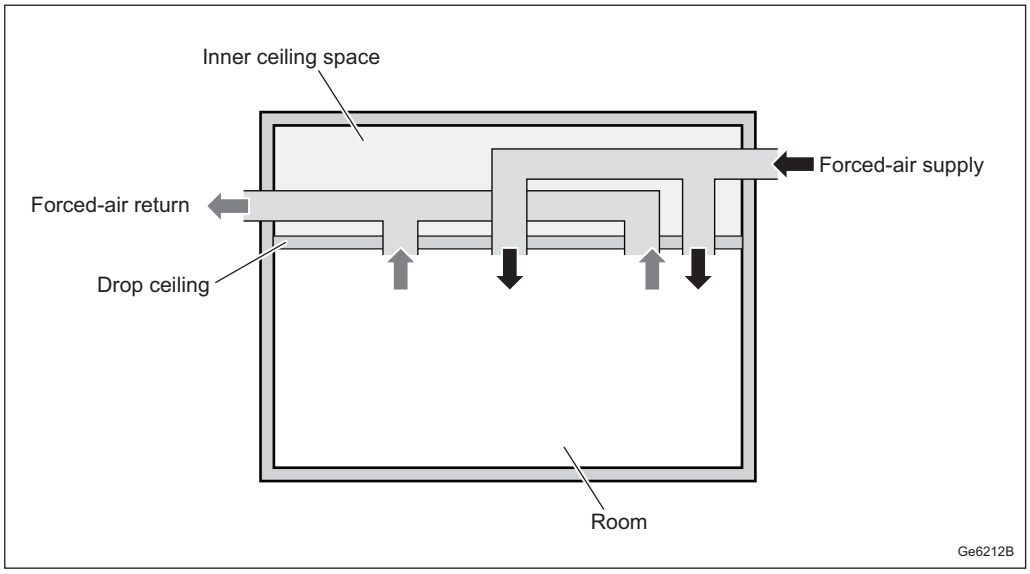


Figure 7 Inner Ceiling Space Not Used as Plenum

2.2.5.2 Air-Handling Space (Plenum)

Air-Handling Space (Plenum) is defined as the air volume above the inner ceiling where the air volume is part of a ventilation system. Ventilation ducts deliver fresh air into the room with return air entering the Air-Handling Space from the room, see Figure 8.

The following special installation requirements apply for Air-Handling Space (Plenum):

- ☐ All installed electrical equipment and their accessories must fulfill safety test requirements according to UL 2043
- ☐ Cables used in Plenum must be rated for use in Plenum

Note: For installation in ceiling with air-handling space a visual inspection and approval from an accredited National Electric Code Inspector is needed.

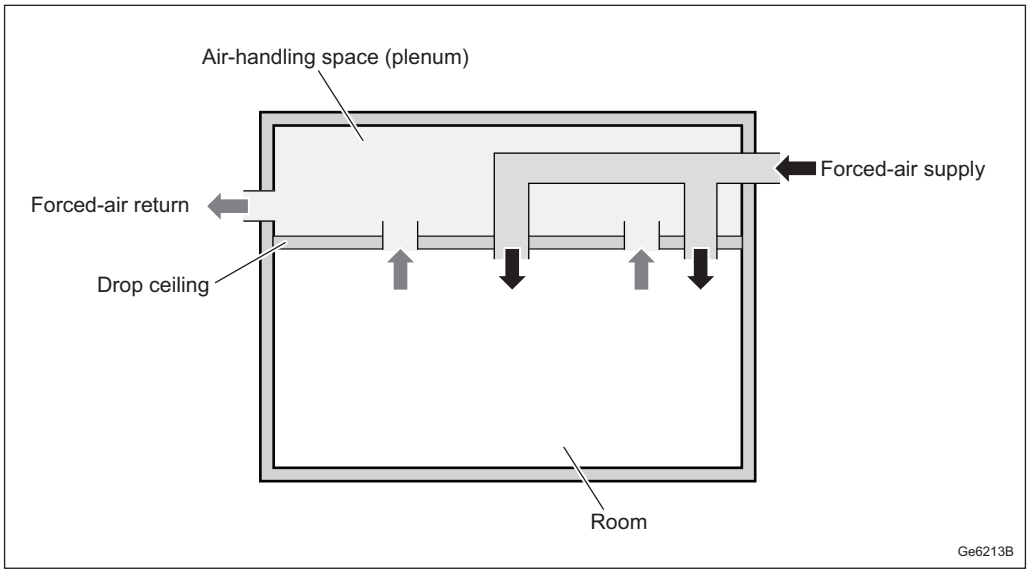


Figure 8 Ceiling Space Used as Air-Handling Space

2.2.6 Minimum Mounting Distances

This section describes recommended minimum mounting distances, for example, to walls, other RDs, other antennas, and metal objects, to minimize radio disturbances and to obtain optimal operational performance.

2.2.6.1 Distance to Walls and Other Objects

Referring to Figure 9 and to Table 11:

— To minimize interfering reflections the RD must be installed at a distance (A) of at least 0.2 m from obstructing objects, for example, a wall, in directions which are not intended to be covered by the RD.

— In directions that are intended to be covered by the RD, install the RD at a distance (B) of at least 1 m from obstructing objects like pillars, lamps, and so on, to minimize signal blockage.

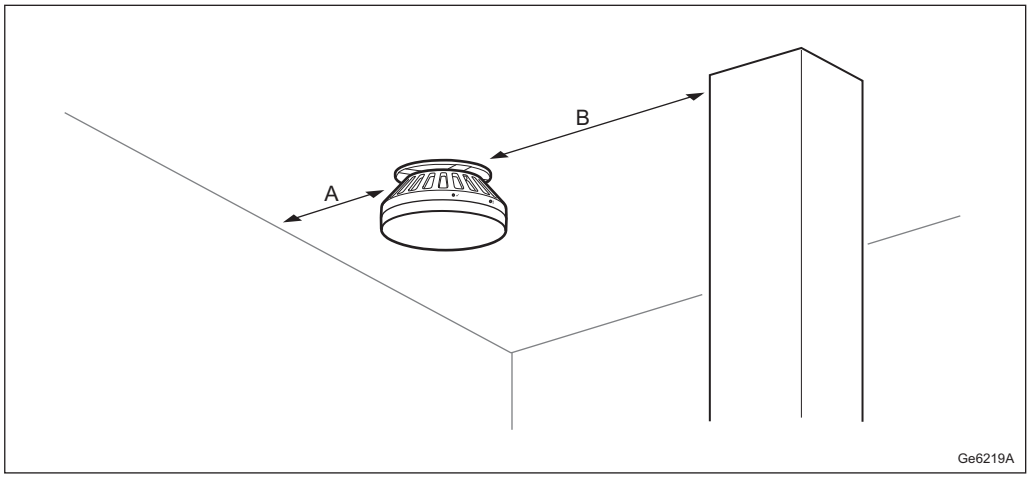


Figure 9 Minimum Mounting Distance To Walls and Other Objects

Table 11 Minimum Distance To Walls and To Other Objects

Signal Directions	Minimum Distance To Object, Any Orientation
Directions NOT intended to be covered by the RD (A)	0.2 m
Directions intended to be covered by the RD (B)	1.0 m

When mounting the RD on a wall, the top of the bracket must be at a distance (A) of at least 20 cm from the ceiling (see Figure 10).

Note: The maximum ambient operating temperature is +35°C if the Radio Dot is wall mounted or housed in a Radio Dot Enclosure.

The Radio Dot may continue to operate with reduced capacity when the maximum ambient temperature is exceeded. Follow all restrictions for installation in Installation Restrictions on page 14. For detailed installation instructions, refer to Install Radio Dot, 165/1531-FGB 101 0308/1.

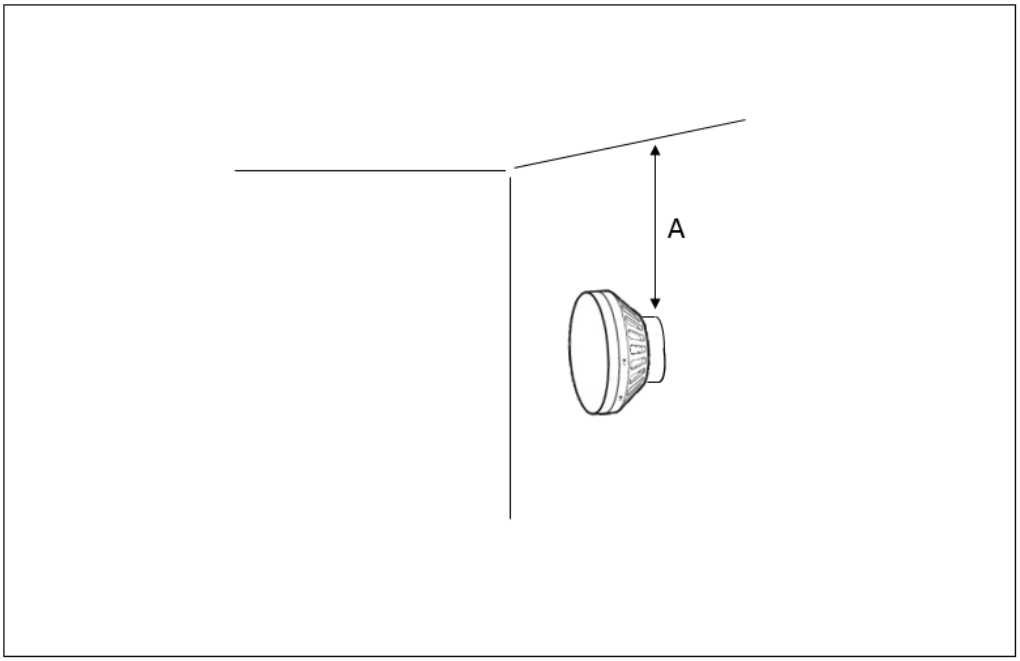


Figure 10 Minimum Mounting Distance to Ceilings

2.2.6.2 Distance To Other RDs

To minimize radio disturbances, the minimum distance (A) between RDs of different frequency bands is 0.03 m (see Figure 11 and Table 12). The distance between RDs is measured from the lower inner edge of one RD to the lower inner edge of the other RD.

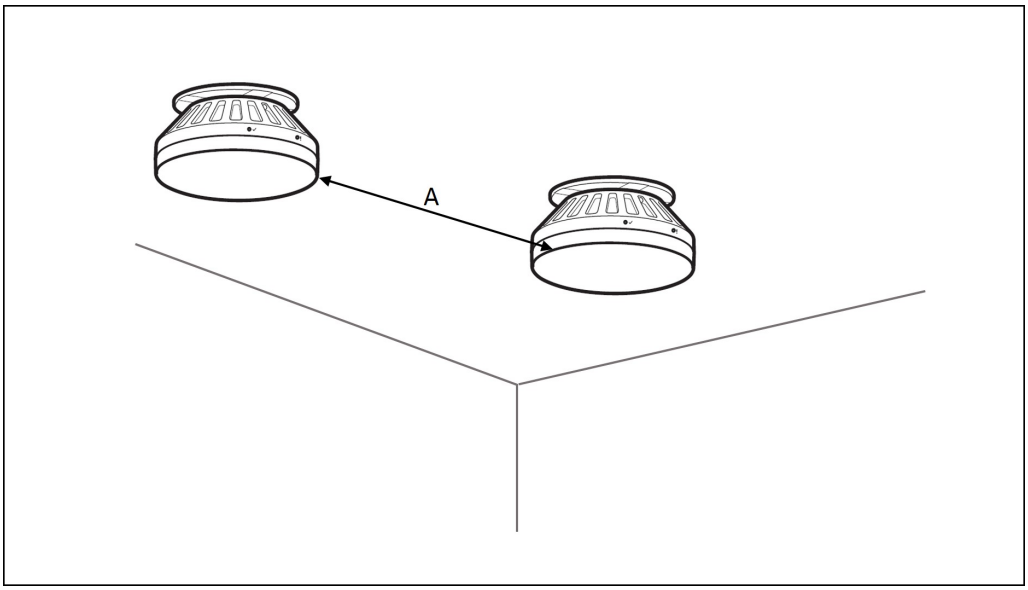


Figure 11 Minimum Distance To Other RDs

Table 12 Minimum Distance To Other RDs

Distance To	Minimum Distance, Any Orientation
Other RDs (A)	0.03 m (3 cm)

Note: The separation distance mentioned above does not apply to RDs that are part of the same 4x4 MIMO configuration. For the 4x4 MIMO separation, see Distance to Other RDs in 4x4 MIMO.

Different RDs in a Radio Dot System with the same frequency band must be professionally installed by authorized personnel to obtain spatial separation and non-co-location.

2.2.6.3 Distance to Other RDs in 4x4 MIMO

In a Distributed 4x4 MIMO configuration, the RDs can be up to 25 m apart. However, indoor channel conditions can be inconsistent from site to site and achieving a higher-order rank is very complex. As such, for an optimum Distributed 4x4 MIMO installation, it is recommended to use Ericsson Indoor Planner release 18 and up to determine RD locations. For more information, refer to Ericsson Indoor Planner, 1/1553-CXP 902 9186.

For an optimum Co-Located 4x4 MIMO installation, the distance between two paired RDs must be 2-6 wavelengths (about 30-90 cm), edge-to-edge, to operate at 2 GHz. Refer to the following table for the recommended distance based on the frequency band:

Table 13 Recommended Minimum and Maximum Inter-RD Distances for 4x4 MIMO

Model	UL (MHz)	DL (MHz)	IBW (MHz)	DL Wavelength (cm)[1]	Minimum (cm)[2]	Maximum (cm)[3]
B1	1920-1980	2110-2170	40	13.8-14.2	28	85
B2	1850-1910	1930-1990	40	15.0-15.5	30	93
B3	1710-1785	1805-1880	40	16.0-16.6	32	100
B4	1710-1755	2110-2155	40	13.9-14.2	28	85
B5	824-849	869-894	25	33.6-34.5	67	207
B7	2500-2570	2620-2690	40	11.1-11.5	22	69
B8	880-915	925-960	35	31.2-32.4	62.5	187.5
B13	777-787	746-756	10	39.7-40.2	79	241
B17	704-715	734-745	11	40.2-40.9	81	245
B25	1850-1915	1930-1995	40	15.0-15.5	30	93
B30	2305-2315	2350-2360	10	12.7-13.0	25.4	78
B38A	2575-2615	2575-2615	40	11.5-11.6	23	70
B40	2300-2395	2300-2395	40	12.5-13.0	25	78
B41	2496-2690	2496-2690	40	11.1-12.0	22	72
B48	3550-3700	3550-3700	40	8.1-8.4	16	49

Model	UL (MHz)	DL (MHz)	IBW (MHz)	DL Wavelength (cm)(1)	Minimum (cm)(2)	Maximum (cm)(3)
B66A	1710-1780	2110-2180	40	13.8-14.2	27	85

(1) DL wavelength = speed of light times inverse of DL frequency.

(2) This is the recommended minimum inter-RD distance (edge-to-edge) for an RD-pair (2 wavelengths).

(3) This is the recommended maximum inter-RD distance (edge-to-edge) for an RD-pair (6 wavelengths).

2.2.6.4 Distance To Other System Antennas

The minimum distance (A) that is required between the RD and other antennas, to minimize radio disturbances, is shown in Figure 12 and is given in Table 14.

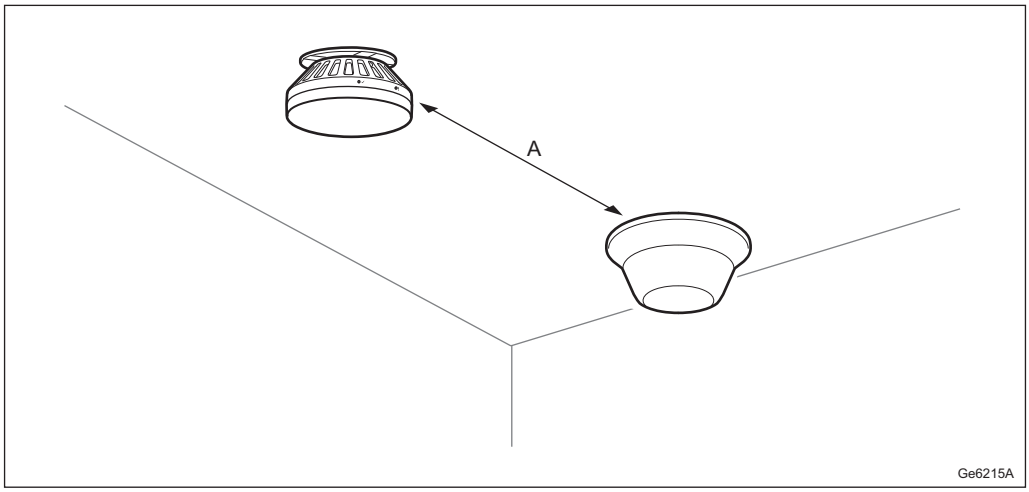


Figure 12 Minimum Mounting Distance To Other Antennas

Table 14 Minimum Mounting Distance To Other Antennas

Equipment	Minimum Distance (A), Any Orientation(1)
3GPP RBS LA (Pico) Systems fulfilling 3GPP co-locate requirement option(2)	0.2 m
Ericsson WiFi AP unit(3)	0.2 m
Generic WiFi AP unit	2 m
Other indoor system (assuming low output power and low gain antenna)	5 m

(1) In some specific system and operating band combinations, additional limitations apply.

(2) Also Distributed Antenna Systems (DAS) fulfilling the 3GPP co-locate requirements.

(3) B40 must have a 2 m distance to Ericsson WiFi AP units.

2.2.6.5 Minimum Safe Operating Range

This section refers to the minimum distance between people and a Radio Dot.

This product must be installed so that the general public does not have access to the volume specified by the compliance boundary. For information about compliance boundaries for this product, including different radio access and antenna configurations, refer to Radio Frequency Electromagnetic Exposure.

For additional information on Electro-Magnetic Field (EMF) emissions from the Radio Dot, see section RF Electromagnetic Exposure on page 24.

2.3 Environmental Characteristics

This section contains RD operating environment data.

The RD is designed for office environment use according to environmental requirements based on ETSI 3.1.

ETSI Class 3.1 is valid for weather protected locations as follows:

- Temperature-controlled – normal living or working areas, for example, living rooms, rooms for general use (theaters, restaurants)
- Offices, shops
- Workshops for electronic assemblies and other electro-technical products
- Telecommunication centers, data centers, and computer halls
- Storage rooms for valuable and sensitive products

For transportation and storage requirements, see Transportation and Storage.

2.3.1 Operating Environment

The following is a list of values for the RD normal operating environment. The RD is designed for an office environment installation.

Temperature	+5 through +40°C (+35°C if wall mounted) The Radio Dot may continue to operate with reduced capacity when the maximum ambient temperature is exceeded. Follow all restrictions for installation in Installation Restrictions on page 14. For detailed installation

	instructions, refer to Install Radio Dot, 165/1531-FGB 101 0308/1.
Relative humidity	5 through 85%
Absolute humidity	1 through 25 g/m^3
Maximum temperature change	0.5°C/min

2.3.2 Heat Dissipation

The RD is convection cooled and designed for indoor installation.

Table 15 RD Heat Dissipation

RD Variant	Maximum Heat Dissipation
RD 2242	15 W
RD 2243	15 W
RD 2253	15 W
RD 4442	20 W
RD 4453	20 W

2.3.3 Vibration

The RD operates reliably during seismic activity as specified by test method IEC 60 068-2-57 Ff.

The following is a list of values of the RD resistibility to vibrations when mounted:

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	VERTEQ II

The RD operates reliably during random vibration as specified by test method IEC 60 068-2-64 Fh method 1.

Random vibration, normal operation	0.04 m^2/s^3
Random vibration, safe operation	0.15 m^2/s^3
Random vibration, non-destruction operation	0.2 m^2/s^3

The RD operates reliably during shock as specified by test method IEC 60 068-2-27 Ea.

Peak acceleration	50 m/s^2
Duration	11 ms

2.3.4 Materials

All Ericsson products fulfill the legal and market requirements regarding the following:

— Material declaration

— Materials' fire resistance, components, wires, and cables

— Recycling

— Restricted and banned material use.

2.3.5 Acoustic Noise

The Radio Dots do not generate acoustic noise.

2.4 System Characteristics

This section describes the system characteristics of the RD.

2.4.1 RF Electromagnetic Exposure

This product contains a low-power radio transmitter that emits Radio Frequency (RF) Electromagnetic Fields (EMF) during operation. Limits on exposure to RF EMF are specified in international safety guidelines that are developed by organizations such as International Commission on Non-Ionizing Radiation Protection (ICNIRP) and The Institute of Electrical and Electronics Engineers (IEEE). These limits have been adopted in standards and regulations applicable to radio communication products.

There are installation requirements that must be followed for this product to comply with the limitations on RF EMF exposure to the general public that are applicable within the European Union (EU Recommendation 1999/519/EC), the US (FCC CFR title 47, part 1.1310), and other markets. The product has been tested in accordance with the relevant technical standards and procedures specified by CENELEC, IEEE, ITU, and the FCC to determine RF EMF limit compliance distances and boundaries. A compliance boundary is the volume around the product (or antenna connected to the product) outside of which the exposure is below the applicable limits. The compliance boundary is described as a cylinder.

This product must be installed so that the general public does not have access to the volume specified by the compliance boundary. For information about

compliance boundaries for this product, including different radio access and antenna configurations, refer to Radio Frequency Electromagnetic Exposure.

For general information on RF EMF exposure from the RBS 6000 family of products, refer to Radio Frequency Electromagnetic Fields.

3 Hardware Architecture

This section describes the RD hardware components and the different types of brackets that can be used. This section also describes the external antenna connectors on the RD 2253 and RD 4453.

3.1 RD Components

The RD components are shown in Figure 13 and are listed in Table 16.

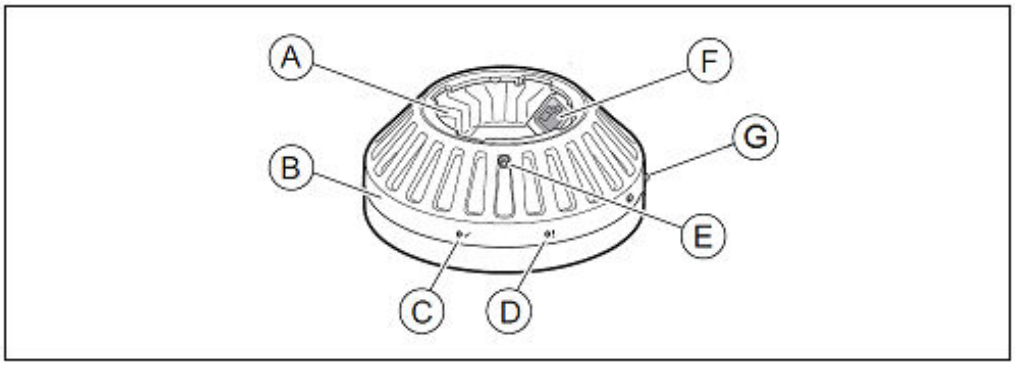


Figure 13 The RD Components

Table 16 The RD Components

Position	Component
A	Cooling flanges
B	Housing
C(1)	Optical indicator (green)
D(1)	Optical indicator (red)
E	Locking screw
F	RDI interface (RJ45)
G(2)	External Antenna Connector

(1) RD 4442 has two sets of optical indicators; one on each side of the RD. RD 4453 also has two sets. For more information, see Optical Indicators on page 36.

(2) Applicable only to the RD 2253 and RD 4453. The RD 2253 has one set of two external antenna connectors. The RD 4453 has two sets of two external antenna connectors; one on each side of the RD. For more information, see External Antenna Connectors on page 27.

3.2 External Antenna Connectors

The RD 2253 and RD 4453 have external antenna connectors instead of internal antennas. These external antenna connectors allow the use of site specific antennas on RDs to provide different coverage patterns in areas such as elevator shafts and long corridors. The RD 2253 has one set of two antenna connectors. The RD 4453 has two sets of antenna connectors; one on each side of the RD.

If the site specific antenna has an N-type connector, Ericsson recommends using an adapter cable to connect to the RD as an adapter is too heavy.

Ensure the antennas are installed correctly. There is no detection or fault monitoring of the antenna connection. If the antenna is not connected, or if the cable breaks, there is no detection by the RD.

Also, there is no delay compensation for the external cabling or antenna.

3.3 RD Brackets

In this section different types of brackets are described.

3.3.1 Brackets for Ceiling Panels

This section describes brackets for mounting in ceiling panels.

Standard Mounting Bracket, Short Socket, Model SXK 125 2817/1

This is the standard mounting bracket for ceiling panels, using a short socket. It is used for up to 22 mm thick ceiling panels. The bracket is shown in Figure 14 and its dimensions are listed in Table 17.

Note: SXK 125 2817/1 replaces SXK 125 2371/1.

SXK 125 2817/1 is only available in 4-packs as NTB 101 609/1.

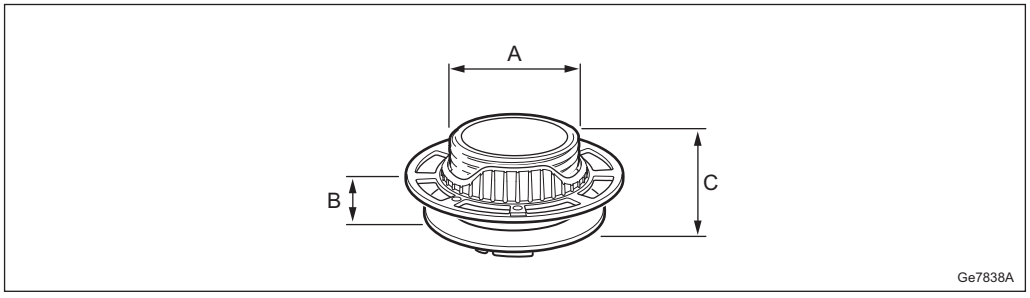


Figure 14 Standard Mounting Bracket for Ceiling Panels, Short Socket, Model SXK 125 2817/1

Table 17 Standard Mounting Bracket for Ceiling Panels, Short Socket, Model SXK 125 2817/1

Position	Dimensions (mm)
A	58
B	1-22
C	43

Mounting Bracket, Tall Socket, Model SXK 125 2859/1

This section describes a mounting bracket for ceiling panels, using a tall socket, model SXK 125 2859/1. It is used for up to 55 mm thick ceiling panels. The bracket is shown in Figure 15 and its dimensions are listed in Table 18.

Note: SXK 125 2859/1 is only available in 4-packs as NTB 101 610/1.

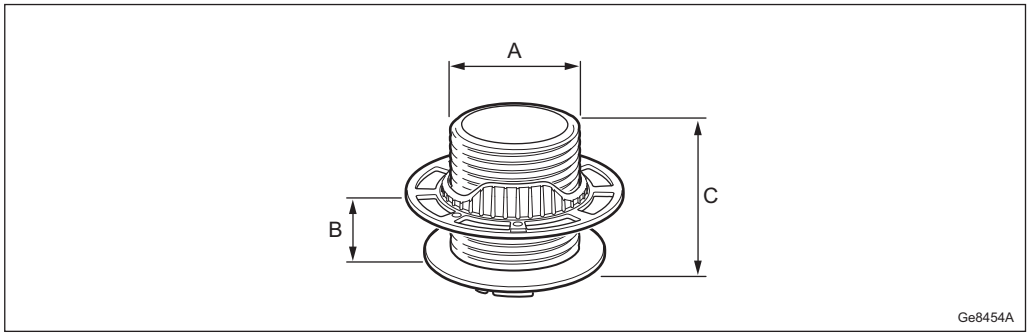


Figure 15 Mounting Bracket for Ceiling Panels, Tall Socket, Model SXK 125 2859/1

Table 18 Mounting Bracket for Ceiling Panels, Tall Socket, Model SXK 125 2859/1

Position	Dimensions (mm)
A	60
B	1-55
C	67

Mounting Bracket, Tall Socket, Model SXK 125 2371/1

This section describes a bracket for ceiling panels, using a tall socket. It is used for up to 40 mm thick ceiling panels. The bracket is shown in Figure 16 and its dimensions are listed in Table 19.

Note: This model can no longer be ordered and is replaced by SXK 125 2859/1 in 4-packs as NTB 101 610/1.

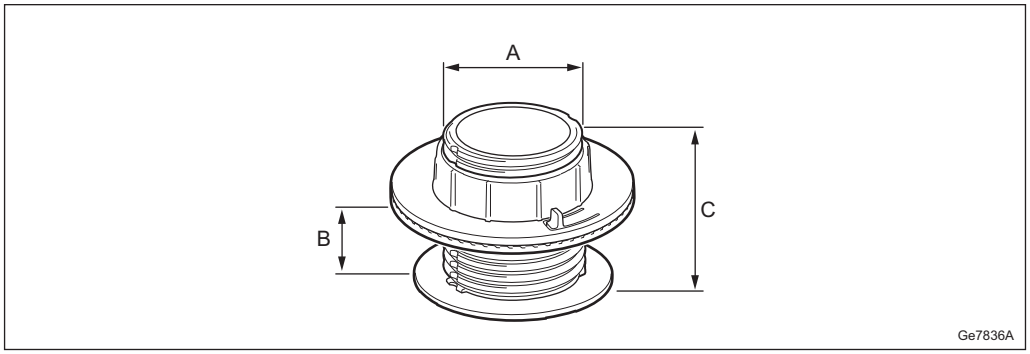


Figure 16 Mounting Bracket for Ceiling Panels, Tall Socket, Model SXK 125 2371/1

Table 19 Mounting Bracket for Ceiling Panels, Tall Socket, Model SXK 125 2371/1

Position	Dimensions (mm)
A	60
B	1-40
C	65

3.3.2 Bracket for Hard Surfaces, Pipes and Rails

This section describes a bracket for installation on hard surfaces, such as concrete ceilings, on pipes, rails, and similar. This bracket is available in two colors, white and grey. The bracket, Model SEF 901 313/1 is grey and the model SEF 901 313/2 is white. The bracket is shown in Figure 17 and its dimensions are listed in Table 20.

Other!

Both brackets types are only available in 4-packs:

— SEF 901 313/1 (grey) is ordered as NTB101 608/1

— SEF 901 313/2 (white) is ordered as NTB101 608/2

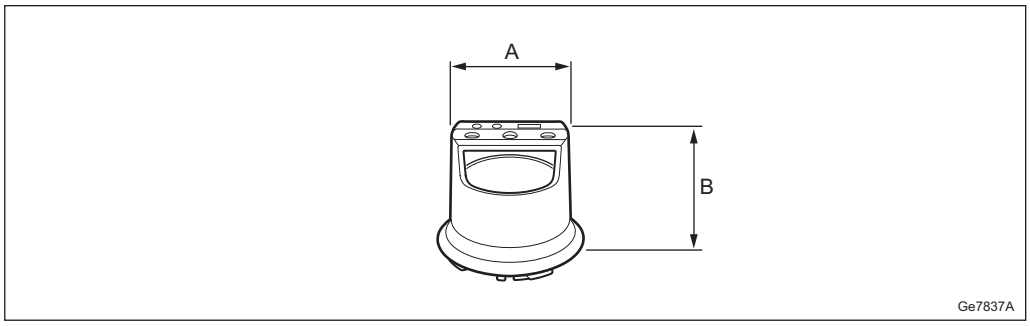


Figure 17 Bracket for Hard Surfaces, Pipes and Rails, Model SEF 901 313/1 and Model SEF 901 313/2

Table 20 Bracket for Hard Surfaces, Pipes and Rails, Model SEF 901 313/1 and Model SEF 901 313/2

Position	Dimensions (mm)
A	53
B	57

3.3.2.1 Bracket Extender for Concrete/Pipe/Rail Brackets

The bracket extender provides an additional thermal margin to the standard Concrete/Pipe/Rail brackets.

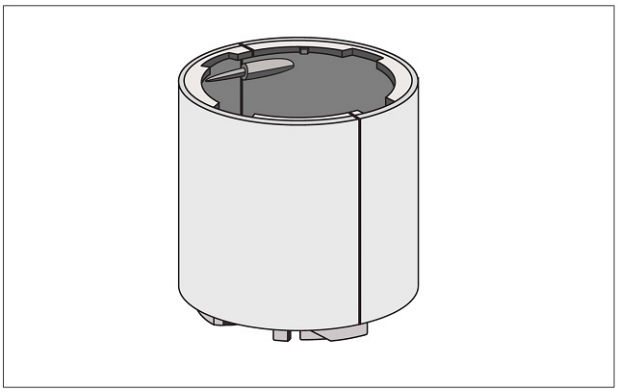


Figure 18 Bracket Extender Model SEF 901 351/1

Bracket Extender SEF 901 351/1 is only available in white, and can only be ordered in kits containing 4 units.

Table 21 Extender Bracket Specifications

Description	Value
Model Number	SEF 901 351/1
Kit Order Code	NTB 101 0616/1
Height	66.04 mm
Diameter	65.5 mm
Weight	46 g

The Bracket Extender is attached to the RD standard concrete/pipe/rail mounting bracket, and the RD is then attached to the Bracket Extender.

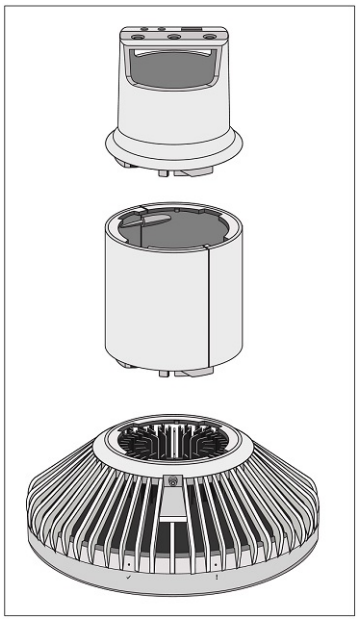


Figure 19 Bracket Extender with Ceiling Mount and RD

3.3.3 Bracket for Wall Mounting

This section describes the bracket for installation on a wall surface. The bracket model SEF 901 335/1 is a white wall mounting bracket as shown in Figure 20. .

Note: The SEF 901 335/1 can only be ordered as a 4-pack kit as NTB 101 0031/1.

The dimensions are listed in Figure 21

Note: The maximum ambient operating temperature is +35°C if the Radio Dot is wall mounted or housed in a Radio Dot Enclosure.

The Radio Dot may continue to operate with reduced capacity when the maximum ambient temperature is exceeded. Follow all restrictions for installation in Installation Restrictions on page 14. For detailed installation instructions, refer to Install Radio Dot, 165/1531-FGB 101 0308/1.

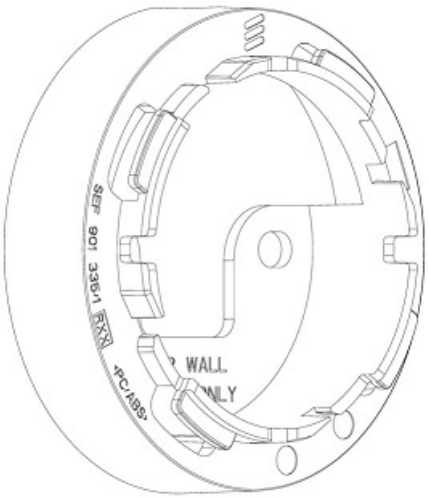


Figure 20 RD Wall Mounting Bracket

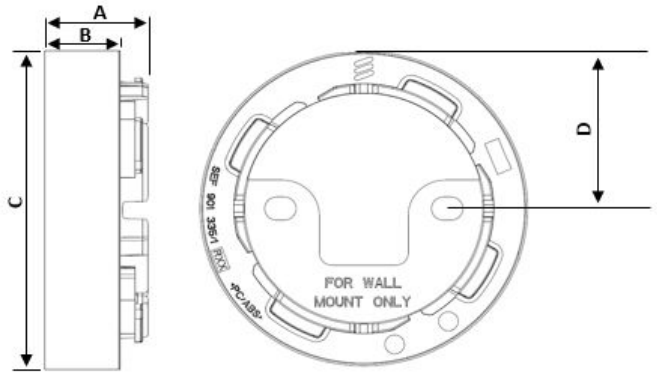


Figure 21 RD Wall Mounting Bracket Dimensions

Table 22 RD Wall Mounting Bracket Dimensions

Position	Dimension (mm)
A	20.5
B	15
C	66
D	33

3.4 Radio Dot Enclosure

The Radio Dot Enclosure is a housing that can host two or three radio dots. This item is useful as a cosmetic enclosure to hide radio dots from view or to host multiple RDs in the same enclosure to perform Co-located or Distributed MIMO.

Note: The maximum ambient operating temperature is +35°C if the Radio Dot is wall mounted or housed in a Radio Dot Enclosure.

The Radio Dot may continue to operate with reduced capacity when the maximum ambient temperature is exceeded. Follow all restrictions for installation in Installation Restrictions on page 14. For detailed installation instructions, refer to Install Radio Dot, 165/1531-FGB 101 0308/1.

Figure 22 Radio Dot Enclosures

The Radio Dot Enclosure is available in two options:

— 2 Radio Dot enclosure - Product Number SDD5131065/1

— 3 Radio Dot Enclosure - Product Number SDD5131066/1

Note: When using the Radio Dot Enclosure, it is mandatory to use one of the following mounting brackets for each RD:

— Standard Mounting Bracket, Short Socket, Model SXK 125 2817/1 (only available in 4-packs as NTB 101 609/1)

— Standard Mounting Bracket, Tall Socket, Model SXK 125 2859/1 (only available in 4-packs as NTB 101 610/1)

The Radio Dot Enclosure is fabricated with the same material as existing Radio Dots and is tested against RF and flammability requirements. The enclosure has no impact on RF or fire rating.

For information on how to install the RD Enclosure refer to Install Radio Dot, 46/1531-LZA 701 6001/1.

3.4.1 Radio Dot Enclosure Dimensions

The Radio Dot Enclosure requires standard ceiling mounting brackets as mentioned above for ventilation purpose. For that reason, holes have to be created in the ceiling in order to mount the bracket and the enclosure. The figure below shows the dimensions of the enclosure and the placement of holes.

Note: The following figure is only a reference to the dimensions of the enclosures and is not to scale. Therefore it is not to be used as a template for drilling or piercing the ceiling.

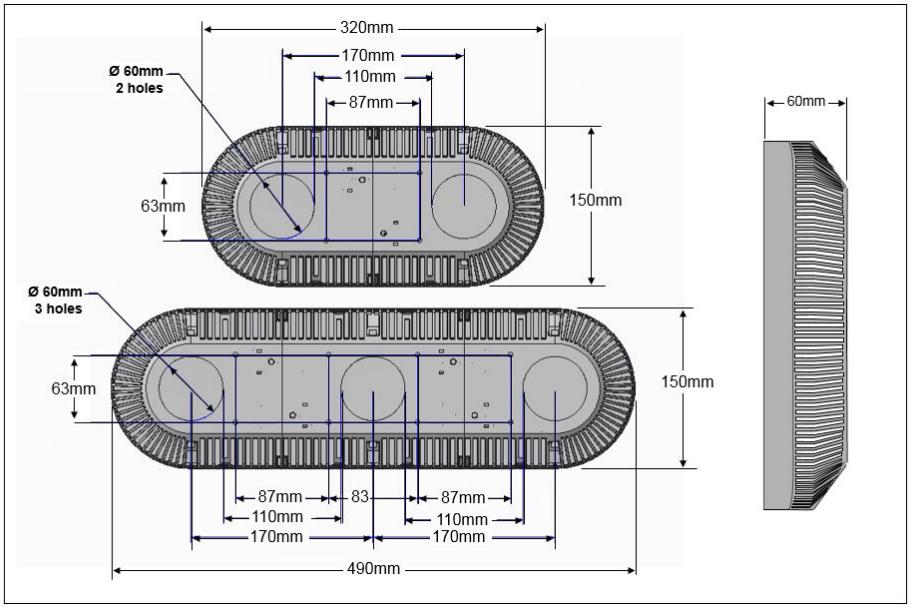


Figure 23 Radio Dot Enclosures Dimensions

4 Connection Interfaces

The RD is connected to the RDI cable network using an RJ45 connection, see reference (F) in Figure 13.

4.1 Optical Indicators

The RD is equipped with optical indicators that show the system status.

On the single band RD (RD 2242, RD 2243, and RD 2253), there is one Operational Indicator (green LED) and one Fault Indicator (red LED) on the RD.

On the dual band RD (RD 4442 and RD 4453), there are two sets of optical indicators; one on each side of the RD. The following table identifies which side reflects the status of the specific bands.

Table 23 Visual Indicator Sides According to Bands

Dualband Band Option	Side 1	Side 2
B1/B3	B1	B3
B1/B7	B1	B7
B3/B7	B3	B7
B25/B66A	B25	B66A
B30/B30	B30	B30
B40A/B3	B40A	B3
B48/B48	B48	B48

An example of the two sets of optical indicators on the RD 4442 is displayed in the following figures:

Figure 24 RD 4442 Optical Indicators - Side 1

Figure 25 RD 4442 Optical Indicators - Side 2

Table 24 describes how to interpret the RD optical indicators.

Table 24 RD Optical Indicators

Marking	Indicator	Color	Mode	Indicates
!	Fault	Red	Off	No fault detected in RD
			On	Fault detected in RD
✔	Operational	Green	Off	RD not operational
			On	RD operational
			Blink (0,5 Hz)	Dependent resource missing (for example during software loading)

5 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity.

Note: The content of this section does not apply to the RD 4442 B40A/B3. The RD 4442 B40A/B3 has regulatory approval in China.

Declaration of Conformity

"*Hereby, Ericsson AB, declares that this product is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EC and 2011/65/EU.*"

5.1 Regulatory Approval

The product complies with the following market requirement:

— EC (European Community) market requirements, Radio Equipment Directive

2014/53/EC

— Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).

— North American market requirements.

— Products containing Radio Equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

5.1.1 Environmental Standards Compliance

The RD complies with the following environmental standard:

Europe

— EN 50 581 (RoHS)

5.1.2 Safety Standards Compliance

In accordance with market requirements, the product complies with the following product safety standards and directives:

Table 25 Safety Standards Compliance

Safety Standards Compliance		RD 2242	RD 2243	RD 4442
International	IEC 60 215	x		
	IEC 60 950-1.ED2 with amendment A1	x		
	IEC 62 368-1 ED2		x	x
Europe	EN 50 385	x		
	EN 60 215	x		
	EN 60 950-1 ED2 with amendment A1	x		
	EN 62 368-1 ED2		x	x
North America	CSA-C22.2 No. 60950-1-07 with amendment A1	x		
	FCC CFR 47 Part 1.1310	x	x	x
	Health Canada Safety Code 6	x	x	x
	UL 60950-1	x		
	UL 2043	x	x	x
	UL 62368-1		x	x
	CSA C22.2 No. 62368-1		x	x

Table 26 Safety Standards Compliance (RD 2253, RD 4453)

Safety Standards Compliance		RD 2253	RD 4453
International	IEC 60 215		
	IEC 60 950-1.ED2 with amendment A1		
	IEC 62 368-1 ED2	x	x
Europe	EN 50 385		
	EN 60 215		
	EN 60 950-1 ED2 with amendment A1		
	EN 62 368-1 ED2	x	x
North America	CSA-C22.2 No. 60950-1-07 with amendment A1		
	FCC CFR 47 Part 1.1310		
	Health Canada Safety Code 6		
	UL 60950-1		
	UL 2043		
	UL 62368-1		
	CSA C22.2 No. 62368-1		

5.1.3 EMC Standards Compliance

The product complies with the following Electromagnetic Compatibility (EMC) standards:

Table 27 EMC Standards Compliance

EMC Standards Compliance		RD 2242	RD 2243	RD 4442
International	3GPP TS37.113	x	x	x
Europe	ETSI EN 301 489-1	x	x	x
	ETSI EN 301 489-50	x	x	x
North America	FCC CFR 47 Part 15 B	x	x	x

Table 28 EMC Standards Compliance (RD 2253, RD 4453)

EMC Standards Compliance		RD 2253	RD 4453
International	3GPP TS37.113	x	x
Europe	ETSI EN 301 489-1	x	x
	ETSI EN 301 489-50	x	x

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operations is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

5.1.4 Radio Standards Compliance

The product complies with the following radio standards:

International

Table 29 Radio Standards Compliance

Radio Standards Compliance		RD 2242	RD 2243	RD 4442
International	3GPP TS37.141	x	x	x
Europe	ETSI EN 301 908-1	x	x	x
	ETSI EN 301 908-18	x	x	x
North America	FCC CFR 47 Part 2 (USA)	x	x	x
	FCC CFR 47 Part 22, 24, 27 and 90 (USA frequency dependent)	x	x	x
	FCC CFR 47 Part 96 (USA frequency dependent)			x
	IC RSS-130, 132, 133, 139 and 199 (Canada frequency dependent)	x	x	x
	IC RSS-Gen (Canada)	x	x	x

Table 30 Radio Standards Compliance (RD 2253, RD 4453)

Radio Standards Compliance		RD 2253	RD 4453
International	3GPP TS37.141	x	x
Europe	ETSI EN 301 908-1	x	x
	ETSI EN 301 908-18	x	x
North America	FCC CFR 47 Part 2 (USA)		
	FCC CFR 47 Part 22, 24, 27 and 90 (USA frequency dependent)		
	IC RSS-130, 132, 133, 139 and 199 (Canada frequency dependent)		
	IC RSS-Gen (Canada)		

5.1.5 Marking

To show compliance with legal requirements the product is marked with the following labels:

Europe

— CE mark

North America

— usETL/cETL

5.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

5.2.1 Spare Parts

This RD complies with the Ericsson Serviceability and Spare Parts Strategy.

5.2.2 Surface Quality

The surface quality of the RD is in accordance with Ericsson standard class A3.

5.2.3 Warranty/Security Label

The RD shall be equipped with warranty/security label that ensures any unauthorized intrusion is visible.

5.2.4 Vandal Resistance

The RD has a lock that prevents from tampering or unauthorized removal of the RD without using tools.