

Design Review Board

Official Agenda



AGENDA

DESIGN REVIEW BOARD – URBAN DESIGN PANEL AGENDA

Regular Meeting

July 2nd, 2020

4:00 PM

Webex Virtual Meeting

Public meetings will be hosted virtually online and can be accessed at greenvillesc.gov/meeting using the password meetnow. Instructions to access the meeting, and information regarding a remote viewing location, are included at the end of this notice.

A remote meeting viewing location has been set up at the Greenville Civic Center at 1 Exposition Drive in Room 102.

1. Call to Order
2. Roll Call
3. Welcome and Opening Remarks from the Chair
4. Approval of Minutes – June 4th, 2020
5. Call for Public Notice Affidavit from Applicants
6. Acceptance of Agenda
7. Conflict of Interest Statement
8. Call for Public Comment
9. Old Business (public hearing)
 - A. None
10. New Business (public hearing)

A. CA 19-674

Application by Kimley-Horn for a CERTIFICATE OF APPROPRIATENESS for small-cell wireless facility utility pole designs.

Documents:

CA 19-674 AGENDA PACKET - VERIZON-CITY OF GREENVILLE DRB
APPLICATION- URBAN...PDF

11. Other Business (Not a Public Hearing)

A. None

12. Advice and Comment (Not a Public Hearing)

A. None

13. Informal Review (Not a Public Hearing)

A. None

14. Adjournment

You are invited to review documents relating to these applications before the public hearing. Application materials are posted online at <http://www.greenvillesc.gov/drb>. You may contact the Planning Office at (864) 467-4476 for more information. Application materials are subject to change.

You will have the opportunity to voice your comments at the public hearing. Each speaker is limited to 3 minutes. Repetitive statements should be avoided; individuals sharing similar concerns are encouraged to appoint a spokesperson to represent their group. Alternatively, you may submit written comments to: Planning & Development Office, PO Box 2207, Greenville, SC 29602, by fax at (864) 467-4510, or by email at planning@greenvillesc.gov.

Written comments must be received by 2PM Monday before the hearing in order to be given adequate time for consideration by the Board before the hearing. Comments received after 2PM Monday will be provided to the Board at the hearing. Please reference the application number and include your name and address on all correspondence. All comments will be made part of the public record.

In some cases the applicant may be required, as part of the application process, to hold a neighborhood meeting before the application is heard by the Board. Property owners within 500' of the application site would then be notified by mail. A property owner that directly abuts the proposed project or owners of 20% of parcels within 500' may also request a meeting. Contact the Planning and Development Office for further instructions.'

Webex Meeting Instructions

Steps for Online Access

1. Visit greenvillesc.gov/meeting. You can also go to greenvillesc.gov and click on ONLINE MEETING.
2. Join Event: Design Review Board Meeting – Urban Panel 7/2/2020

Enter your: First Name
Enter your: Last Name

Enter your: Email Address
Enter the event password: meetnow
Click: Join Now

Steps for Phone Access

1. Dial: +1-415-655-0002
2. Enter Access Code: 129-027-5665

Remote Viewing Location

A remote meeting viewing location has been set up at the Greenville Civic Center at 1 Exposition Drive in Room 102.

The City seeks input from citizens while adhering to public health and safety guidelines. All attendees at the remote viewing location will be subject to a temperature screening with a touch-less forehead thermometer. Anyone with a temperature reading above 100 degrees Fahrenheit will not be admitted. Attendees will be required to wear a covering over their mouth and nose, unless it violates a religious tenant or belief or causes difficulty breathing.

Procedure for Public Comment during Meeting

1. The Design Review Board Chair will read through each agenda item and call for a list of names who wish to speak during public comment. The public shall communicate directly with the Planning Staff Liaison if they wish to speak on the specific agenda item.
2. The Planning Staff Liaison will take a list of names, which will be called in order at the time of the specific agenda item, to provide public comment.
3. The Planning Staff Liaison will communicate directly with the public during the public portion of each item to provide comments on the specific agenda item.
4. Each member of the public shall provide their comments when their name is called by the Planning Staff Liaison.
5. Each member of the public will have 3 minutes to speak on the specific agenda item. When speaking: Begin by clearly stating your name and address for the record. Please spell your name if it is prone to be misspelled. The 3-minute timer will start after you provide this information. Please do not repeat information already presented by someone else and avoid off-topic statements. Those who wish to share similar concerns are encouraged to appoint a spokesperson to speak on behalf of the group. Direct all comments and questions to the chairperson, who will respond or direct the question to the appropriate party for response.
6. The Planning Staff Liaison will continue through the list of names until all members of the public who wished to speak on the specific agenda item have had an opportunity.
7. Once all names are called and public comment provided, the public portion for that specific agenda item will be closed.



**Planning Staff Report to
Design Review Board - Urban
June 26, 2020**
for the July 2, 2020 Public Hearing

Docket Number: CA 19-674
Applicant: Kimley-Horn
Property Owner: City of Greenville
Property Location: MULTIPLE
Tax Map Number: City of Greenville Right-of-Way
Zoning: C-4, Central Business District
Proposal: **CERTIFICATE OF APPROPRIATENESS FOR NEW WIRELESS INFRASTRUCTURE**
Staff Recommendation: Approval with Conditions

Applicable Sections of the City of Greenville Code of Ordinances:

Sec. 19-4.3.2(G) – Wireless Communications Facility

Staff Analysis:

Kimley-Horn, a planning and engineering design firm, on behalf of Verizon Wireless, proposes to install new small-cell wireless facility poles within public rights-of-way. Wireless communications facilities located within the downtown area shall be of a design approved by the Design Review Board – Urban Panel. The applicant is seeking design approval for two (2) types of new poles:

1. Wood pole
2. Metal pole

Small-cell wireless technology within Greenville is regulated under *Section 19-4.3(G) – Wireless Communications Facility*. Per the Land Management Ordinance, each wireless facility within the right-of-way shall be approved by the Division of Public Works through an individual node site license.

NOTE: *The applicant has not submitted an application for a node site license or a comprehensive list of downtown/neighborhood locations for the new small-cell nodes. With this application, the applicant seeks approval for the two pole designs only and will seek individual node site licenses at a later date.*

Section 19-4.3.2(G)(5) permits new wireless communications facilities within public rights-of-way in the form of new utility poles, provided the other applicable provisions of section 19-

4.3.2(G) are satisfied along with all ordinances and regulations governing public rights-of-way management. If new facilities are proposed, they may be approved provided that there are existing utility poles in the immediate vicinity and that the size and design of the new pole is similar in size and design to existing poles in the same right-of-way.

In the review of design proposals, the DRB may apply any standard that would normally be applied in the design review. However, Section 19-4.3.2(G)(5) also provides guidance to standards for the design of wireless facilities, discussed below.

All elements of the wireless communications facility, including the pole to which it is attached, must be consistent with the overall design and character of both the neighborhood and location in which it is placed. The wireless facility must also demonstrate consistency with any publically-available planned improvements to those neighborhoods. When proposed in a right-of-way, the wireless communications facility must be consistent with both the corridor conditions and context in which it is placed, and any publically-available planned corridor improvements. Facilities are to be as unobtrusive as possible. Where a new pole is permitted in the public right-of-way, it must either be a stealth facility (as a facility that does not look like a wireless facility) or a new utility pole, provided that there are existing utility poles in the immediate vicinity. If a new utility pole is proposed, the size and design of the new pole must be similar in size and design to existing poles in the same right-of-way.

The City Engineering Office maintains a Small-Cell Wireless Facilities Design Catalogue which contains previously-approved small-cell facility designs. The Catalogue states that these approved designs may be appropriate for comparable locations. Alternatively, an applicant may submit additional details for approval and inclusion in the catalogue. The two approved designs in the current Catalogue ('ConcealFab' and 'Valmont') feature black stealth poles with cobra-head lamps.

Wood Pole

The proposed wood pole design features a pole-top omni antenna and radio component and a side-mounted radio box toward the base of the pole. The applicant has indicated that total pole height (including the antenna) will be approximately 33 ft., which seems consistent with the height of existing poles in the area.

Previously-approved designs for wood pole-top antennas have featured a concealed shroud at top of pole rather than exposed omni-antennas. To be consistent with previous decisions made by the DRB, staff recommends that the antennas and radios be placed inside a shroud at the top of the pole rather than being exposed. The shroud should be the diameter of the pole, and should cover connectors to the pole. Further, staff recommends that the wood poles only be approved for rights-of-way in which there are existing wood utility poles along the same block face.

Equipment cabinets associated with the antennas must either be underground or must be a slim design that is about the width of the pole.

It appears that the current design proposal conforms to this proposed staff condition.

Metal Pole

The applicant has submitted several variations for a metal pole design. One design features a full-coverage black shroud toward the top of the pole, while the other features a pole-top omni antenna and radio component. The applicant has also presented an accessory decorative lamp component for the metal poles. The applicant has indicated that total pole height (including the antenna) will be approximately 33 ft.

Staff is not supportive of the proposed decorative lamp design because different areas of the central business district feature different decorative lamp designs (e.g. West End Commercial District). Staff finds that, with the exception of the cobra-head lamps, the proposed black slim pole, without the decorative lamps, is similar in appearance to those designs contained within the Catalogue as well as designs previously-approved in the downtown area. The applicant has indicated that their preference is to not include the lamps, as it would require detailed coordination with the electric company.

With application of the proposed conditions above, the Board could approve one or both pole designs proposed. Staff recommends the slimmer metal pole conforms more closely with stealth designs used elsewhere.

Other Considerations

While approval of the proposed pole designs herein does not mean that the City will approve all future node applications that use this design, it is important to understand that approval of a generic pole design may effectively mean that structures of similar designs could be placed in applicable rights-of-way by both Verizon and other companies.

Further, once an application is approved, federal law may permit expansion of the design as of right, unless: (a) the design is a stealth facility and the change would defeat the goal of concealment; (b) the change would be inconsistent with specific aesthetic requirements, unless those aesthetic requirements prevent an increase in the height of the pole or antennas, or prevent the addition of cabinets to the pole. Because of this, if a design is approved, it may be important to specify the factors important to the approval. For example, if a design, proposed today, is approved because it is stealth, the approval action by the DRB should make that clear for the record.

Summary

The Land Management Ordinance states that new utility poles that feature wireless communications facilities shall be of a similar size and design to existing poles in the same right-of-way. Staff is of the opinion that the proposed wood pole and metal pole design (without the decorative lamps) designs are of a similar and compatible design to those found within the Small-Cell Wireless Facilities Design Catalogue and those previously-approved within the downtown area.

Therefore, staff recommends **approval** of the small-cell wireless facility pole designs to be added to the Small-Cell Wireless Facilities Design Catalogue **with at least the following conditions:**

1. The wood pole design shall feature a concealed antenna shroud of the same diameter as the wood pole for omni technology antennae and similarly suitable shroud proposal for future technology currently unspecified. Submit to staff a revised wood pole design

depicting the applicable shroud solution at the top of the pole rather than exposed antennas/radios; and

2. The wood pole design shall only be permitted for use in rights-of-way where there are existing wood utility pole along the same block face; and
3. Equipment cabinets should be about the width of the pole (so that from the opposite side they are only partially visible); and
4. Metal poles shall be of a slim design and feature the full concealed shroud design; and
5. The decorative lamps are not approved for the metal poles; and
6. Colorations should match the pole for the wood pole, and the stealth facilities should be colored the same as street lights along the same corridor; and
7. No elements are permitted that are not shown on the design (e.g., lighting, noise-generating equipment); and
8. This is a design approval only. All specific locations must be authorized by an individual node site license issued upon a showing of compliance with the LMO, the right-of-way management ordinance, and the terms of the Verizon Franchise Agreement dated November 25, 2019.

Note: Final approval of the small-cell upgrades are subject to site-specific node licenses jointly reviewed and issued by the administrator and the city engineer administratively.

Design Guidelines for the Central Business District

PUB 12. – Utilities

12.5 – Mitigate the impact of surface-mounted utilities in the pedestrian realm by siting them in softscape areas, screening them with vegetation and avoiding areas where tree roots are located.

Land Management Ordinance

Section 19-4.3.2(G) – Wireless Communications Facility

(1) *General* requirements. All wireless communications facilities shall comply with the following general requirements in addition to other applicable provisions of this subsection 19-4.3.2(G):

[***]

(e) Lighting and signage.

(i) Lighting. Wireless communications facilities shall not be lighted unless required by the Federal Communications Commission (FCC) or the Federal Aviation Administration (FAA).

(ii) Signage. Except for signage that may be approved as a concealment element, signs located at or upon wireless communications facilities or installed by or on behalf of the entity that owns or uses the wireless communications facility shall be limited to

ownership and contact information, FCC antenna registration number (if required) and any other information as required by government regulation. Commercial advertising is strictly prohibited.

(f) Site usage.

[***]

(ii) Where stealth facilities are not feasible, base station and accessory equipment shall be located, designed, and/or screened to blend with the existing natural, or built surroundings to reduce the visual impacts as much as technically feasible, and to be compatible with neighboring land uses and the character of the community.

[***]

(iv) The wireless communications facility shall not produce noise that would interfere with the peaceable enjoyment of adjoining properties.

(v) The equipment installed as part of any wireless communications facility shall be minimized, so that the wireless communications facility is as unobtrusive as technically feasible.

(vi) The elements of the wireless communications facility, and any support structure to which it is affixed must be consistent with the overall design and character of the neighborhood and locations in which it is placed, and with publically-available planned improvements to those neighborhoods. For facilities in the rights-of-way, the wireless communications facility, and any support structure to which it is to be affixed, must be consistent with the corridor in which it is placed, and publically-available planned corridor improvements.

[...]

(4) Building, utility pole and light pole mounted wireless communications facilities.

- a) Stealth facilities permitted. Base stations that are stealth facilities may be placed inside any existing building or other existing structures (other than off-premises signs) provided that the placement does not alter the physical dimensions of the structure. Portions of base stations that are stealth facilities may be attached to the side of any building or other existing structures, other than a single-family residential units and off-premises signs. However, installation is not permitted where it would adversely affect a historically significant or environmentally sensitive structure or area, and is only permitted where other elements of the wireless communications facility can be appropriately concealed by placing those elements on the rooftop, within the building, underground, or by some other means that conceals them from view. Antennas must be located at least 20 feet above ground level, and may not extend into any rights-of-way except as part of approved signage

[...]

- (5) *Special rules for placement within the public rights-of-way.* In addition to the above requirements, the following rules apply to wireless communications facilities located within the public rights-of-way.

- a) Applications for placement of wireless communications facilities must be submitted to the division of public works, to the attention of the city engineer and such applications may be decided administratively. If the city engineer determines that the installation complies with the requirements of any required franchise, and this ordinance, and has been appropriately designed for the existing and publically-available planned design of the corridor in which it is placed; or where applicant shows that denial would result in an effective prohibition within the meaning of 47 U.S.C. § 332(c)(7), or otherwise violates applicable law such that the City is required to issue a permit for placement, the application may be preliminarily approved, subject to appeal, and otherwise preliminarily denied or approved subject to conditions. Preliminary decisions become final unless appealed to the zoning board of appeals.
- b) Preliminary decisions adverse to the applicant may be appealed to the zoning board of appeals within five business days of a preliminary decision, and in any case where there is a claim that denial will result in an effective prohibition within the meaning of 47 U.S.C. § 332(c)(7), or otherwise violates applicable law such that the City is required to issue a permit for placement, the zoning board of appeals shall hear and determine the matter, applying standards and following procedures that would be followed in issuing a special exception.
- c) Approval shall be by way of an individual, site-specific node site license jointly issued by the administrator and the city engineer (or their designees). Denials shall be in writing, based upon substantial evidence in a written record.
- d) With respect to any location within the central business district or a preservation overlay district with residential character, wireless communications facilities shall be of a design approved by the design review board.
- e) Wireless communications facilities shall not be located above-ground in any location where the lines of the incumbent local exchange carrier are underground, unless co-located on an existing structure or an existing structure is removed and replaced with a new structure which is substantially similar in size and appearance to the structure that is being replaced.
- f) Placement of wireless communications facilities in the public rights-of-way shall not result in an increase in the number of support structures located in the public rights-of-way as of the date of enactment of this ordinance with the exception of those towers permitted under section 19-4.3.2(G)(2) or new utility poles. Provided, in the case of the latter, there must be existing utility poles in the same right-of-way in the immediate vicinity and the applicant must demonstrate that co-location upon said existing utility poles is not feasible or would require a modification such that an additional utility pole would be less intrusive or safer. If an additional utility pole is permitted under this provision, it shall be similar in size and design to existing poles in the same right-of-way and in the immediate vicinity, and spaced appropriately to minimize intrusiveness and to avoid creating undue hazard to persons or property; and
- g) Where above ground facilities are permitted under this section 19-4.3.2(G)(4)(e) and/or (f) and the above-ground facilities of the incumbent local exchange carrier are subsequently placed underground, all wireless communications facilities in the same right-of-way, in the same area shall be placed underground at the sole expense of the owner.

- h) Placement of wireless communications facilities or support structures for wireless communications facilities, or any modification thereto, is not permitted where the city engineer determines that, due to insufficient capacity, safety, reliability, or engineering concerns, existing infrastructure is not adequate to support the same; or the placements or modifications will unduly interfere with other uses of the rights-of-way, or require construction that will be unduly disruptive.



**APPLICATION FOR
CERTIFICATE OF APPROPRIATENESS
URBAN DESIGN PANEL**

Contact Planning & Development:
(864) 467-4476

Office Use Only:

Application# _____ Fees Paid _____
Date Received _____ Accepted By _____
Date Complete _____ App Deny Conditions _____

APPLICANT/OWNER INFORMATION

*Indicates Required Field

APPLICANT

PROPERTY OWNER

*Name:	Joshua Godwin	Verizon Wireless (Tuan Hoang)
*Title:	Small Cell Project Manager	Engineer - RE/Regulatory
*Address:	10700 Sikes Place Suite 360 Charlotte, NC	8921 Research Dr. Charlotte, NC
*Phone:	980-202-6515	704-510-6120
*Email:	jagodwin@tepgroup.net	tuan.hoang@verizonwireless.com

PROPERTY INFORMATION

*STREET ADDRESS City of Greenville & SCDOT Public Right-of-Way _____

*TAX MAP #(S) City of Greenville & SCDOT Public Right-of-Way _____

*SPECIAL DISTRICT C-4, C-2, RDV, O-D, R-M2, & PD _____

DESCRIPTION OF REQUEST

To include scope of project and justification or response to specific guidelines and special conditions.

Verizon Wireless would like to install Small Wireless Facility utility poles within the City of Greenville and SCDOT Public Right of Ways. The attached shows the design options Verizon is proposing for approval within the City of Greenville. The Utility poles will consist of an Omni Antenna, Low-Band radios underneath the Omni Antenna, Radio Shroud, Power meter and disconnect, conduit and an in-ground fiber hand-hole beside the pole.



**APPLICATION FOR
CERTIFICATE OF APPROPRIATENESS
URBAN DESIGN PANEL**

Contact Planning & Development:
(864) 467-4476

Office Use Only:

Application# _____ Fees Paid _____
Date Received _____ Accepted By _____
Date Complete _____ App Deny Conditions _____

APPLICANT/OWNER INFORMATION

*Indicates Required Field

APPLICANT

PROPERTY OWNER

*Name:	Ryan Doolittle	
*Title:	Small Cell Project Manager	
*Address:	421 Fayetteville Street, 7th Floor, Raleigh, NC 27601	
*Phone:	919-677-2000	
*Email:	ryan.doolittle@kimley-horn.com	

PROPERTY INFORMATION

*STREET ADDRESS _____

*TAX MAP #(S) _____

*SPECIAL DISTRICT _____

DESCRIPTION OF REQUEST

To include scope of project and justification or response to specific guidelines and special conditions.

INSTRUCTIONS

1. Preliminary meeting with staff is required prior to application submittal.
2. All applications and fees (made payable to the City of Greenville) for Certificate of Appropriateness must be received by the Planning & Development office no later than 2:00 p.m. on the date reflected on the attached schedule.
 - A. URBAN DESIGN PANEL Site plan review \$300.00
 Architectural review \$300.00
 - B. SIGNS \$150.00
 - C. APPLICATION FOR STAFF REVIEW
 Major (all site development activity, roof gardens, decks or accessory structures; or any project that requires consultation with a member of the DRB). \$100.00
 Minor (color change; replacement of windows/doors; additions, deletions or replacement of awnings; re-roofing; and projects that do not involve structural alterations, increase/decrease in window/door area or removal of architectural features). \$ 50.00
 - D. INFORMAL REVIEW
 - E. MODIFICATION TO AN APPROVED PROJECT
 Major (requires review by DRB) ½ original fee
 Minor (requires review by staff) \$ 50.00
 - F. REVISIONS (multiple required revisions may be subject to additional fees).
3. The staff will review the application for “sufficiency” pursuant to Section 19-2.2.6, Determination of Sufficiency and will contact the applicant to correct any deficiencies, which must be corrected prior to placing the application on the Design Review Board agenda.
4. If the application requires review by the Urban Design Panel, public hearing signs must be posted on the subject property at least 15 days (but not more than 18 days) prior to the scheduled hearing date.
5. You must attach one (1) complete set of scaled drawings of the property at an appropriate scale such as 1”=20’ or ¼” = 1’, etc. Although construction drawings are not required, applicants for final approval should be able to provide construction drawings at the Design Review Board’s (DRB) request. The Board may request additional information at any time to fully understand the proposal. Items submitted to the Board become the property of the City and will not be returned.

SITE PLAN REVIEW

- Site Plan Drawings (indicating footprint of existing buildings, proposed building, proposed exterior elements, demolition of existing site features, floor plan, proposed exterior equipment, etc.).
- Massing Studies and Images (images shall be high resolution and should depict adjacent building, proposed building massing from various viewpoints, initial architectural details, photos of surroundings to review context, etc.).
- Model (physical or digital model that includes the surrounding context with massing only, no texture or articulation is required). ***The contextual model for the DRB boundary can be downloaded here: <https://greenvillesc.sharefile.com/d-s4197849a61943358>, and is provided as a .skp file. Data is updated monthly.***

ARCHITECTURAL REVIEW

- Elevation Drawings of all Exterior Sides (indicate proposed materials, existing grade and proposed grade, proposed mechanical equipment, outdoor lighting fixtures, landscape drawings, design and location of signage, removal of existing building elements, addition to existing building, a streetscape elevation of building adjacent to and across the street from the site, including the proposed building).
- Sections (include vertical dimensions in feet, building sections where significant changes occur in building volume, wall section for review of material relationships).
- Detail Drawings (include material and methods of each type of construction affecting the exterior appearance of the structure, samples, brochures and photographs of all exterior finishes, windows, fixtures, lighting and signage).
- Renderings (include perspective drawings, including views from pedestrian and public realm).
- Model (physical or digital model that includes the surrounding context and should include accurate scale, architectural detail to the extent that it describes the design intent, proposed textures and proposed signage).

For more detail on these submittal requirements, please refer to the **Greenville Downtown Design Guidelines**, adopted May 2017.

Please verify that all required information is reflected on the plan(s). Please submit one (1) paper copy and one (1) electronic version of the plan(s).

6. Please read carefully:

The applicant and property owner affirm that all information submitted with this application, including any/all supplemental information, is true and correct to the best of their knowledge and they have provided full disclosure of the relevant facts.

In addition, the applicant affirms that the applicant or someone acting on the applicant's behalf has made a reasonable effort to determine whether a deed or other document places one or more restrictions on the property that preclude or impede the intended use and has found no record of such a restriction.

If the Planning & Development office, by separate inquiry, determines that such a restriction exists, it shall notify the applicant. If the applicant does not withdraw or modify the application in a timely manner or act to have the restriction terminated or waived, the Planning & Development office will indicate in its report to the Design Review Board that granting the requested change would not likely result in the benefit the applicant seeks.

7. To that end, the applicant hereby affirms that the tract or parcel of land subject of the attached application **is** ___ or **is not** ___ restricted by any recorded covenant that is contrary to, conflicts with or prohibits the requested activity.

*Signatures	
Applicant	Joshua Godwin 
Date	8/29/2019 6/12/2020
Property Owner/Authorized Agent	Tuan D Hoang
Date	8/29/2019
Public Hearing Information	
Public Hearing Signs	



34.85561161, -82.39697747

412 N MAIN STREET
GREENVILLE, SC 29601

BLACK METAL POLE

Zoning District: C-4





SMC DT GVLEXP Node 2

34.8539336, -82.40229696

DUNCAN STREET
GREENVILLE, SC 29601

WOOD POLE

Zoning District: C-4



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



SMC DT GVL EXP Node 3

34.85069634, -82.40279384

W MCBEE AVE/S ACADEMY ST
GREENVILLE, SC 29601

BLACK METAL POLE

Zoning District: C-4



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.

34.8476865, -82.39880204

**FALLS STREET
GREENVILLE, SC 29601**

BLACK METAL POLE



Zoning District: C-4



34.8479217, -82.403347

RIVER STREET
GREENVILLE, SC 29601

BLACK METAL POLE



Zoning District: C-4





SMC DT GVL SOUTH Node 2

34.83849166, -82.40626904

AUGUSTA STREET
GREENVILLE, SC 29605

WOOD POLE

Zoning District: C-4 & C-2



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.

34.848732, -82.406698

WESTFIELD STREET
GREENVILLE, SC 29607

WOOD POLE



Zoning District: RDV & C-4 & O-D





34.846039, -82.407676

WARDLAW STREET
GREENVILLE, SC 29609

WOOD POLE

Zoning District: C-4



34.843267, -82.412129

PERRY AVE / RHETT STREET
GREENVILLE, SC 29601

WOOD POLE



Zoning District: R-M2 & C-4





34.84298, -82.40752

S MAIN STREET
GREENVILLE, SC 29601

BLACK METAL POLE

Zoning District: C-4





GVL SOUTH NODE 3

34.8370131, -82.4007543

**PEARL AVENUE
GREENVILLE, SC 29601**

WOOD POLE



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



GVL SOUTH NODE 3

34.8370131, -82.4007543

**PEARL AVENUE
GREENVILLE, SC 29601**

WOOD POLE

Zoning District: PD



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



**GVL SOUTH NODE 3
EXISTING VIEW ACROSS STREET**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.

**GVL SOUTH NODE 3
VIEW ACROSS STREET**



**POLE-TOP OMNI
ANTENNA**

**ADVANCED
TECHNOLOGY
(FUTURE)**

**LAA/CBRS
RADIOS**







**GVL SOUTH NODE 3
VIEW WITH TRAFFIC**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.





**GVL SOUTH NODE 3
VIEW AGAINST TRAFFIC**

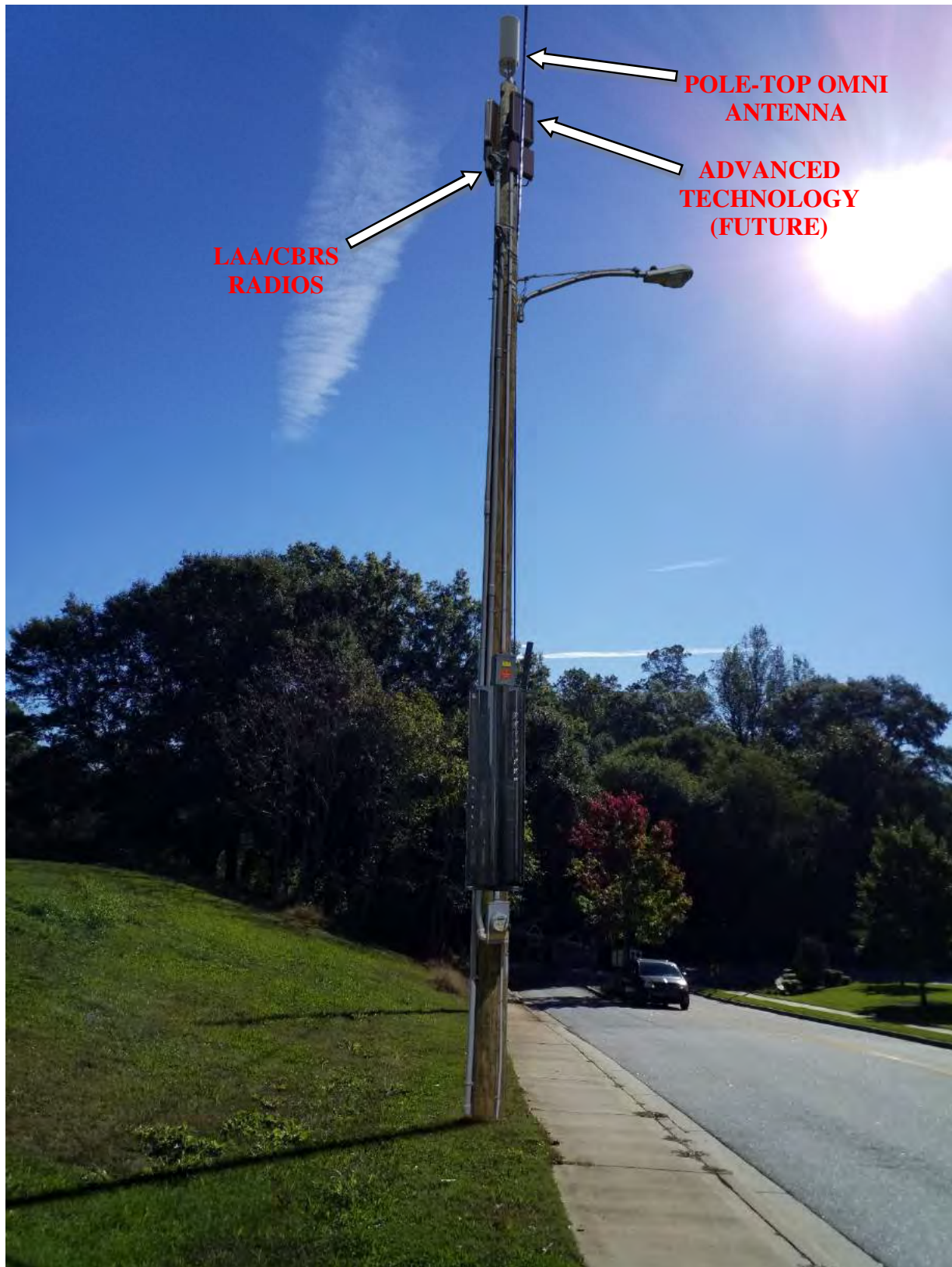


PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



GVL EXP NODE 4

34.8476865, -82.39880204

**FALLS STREET
GREENVILLE, SC 29601**

METAL POLE



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



GVL EXP NODE 4

34.8476865, -82.39880204

**FALLS STREET
GREENVILLE, SC 29601**

METAL POLE

Zoning District: C4



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



**GVL EXP NODE 4
EXISTING VIEW ACROSS STREET**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.





**GVL EXP NODE 4
VIEW ACROSS STREET**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



**GVL EXP NODE 4
VIEW ACROSS STREET**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.





**GVL EXP NODE 4
VIEW WITH TRAFFIC**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



**GVL EXP NODE 4
VIEW WITH TRAFFIC**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



**GVL EXP NODE 4
VIEW WITH TRAFFIC**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.







**GVL EXP NODE 4
VIEW AGAINST TRAFFIC**



PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.



**GVL EXP NODE 4
VIEW AGAINST TRAFFIC**



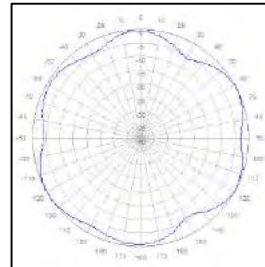
PHOTO RENDERING BY TOWER ENGINEERING PROFESSIONALS, INC.

CX16OMI236-1C

NWAV™ X-Pol OMNI Antenna | 16-Port | 2.98 cu. ft | 360°

16-Port 2 ft 360° Antenna with RET-controlled from 1695–2700 MHz**(4) 698–960 MHz & (4) 1695–2700 MHz & (4) 3550–3700 MHz & (4) 5150–5925 MHz**

- X-Pol, small cell, Hex-Port antenna
- Suitable for pole or building mount
- 4x4 MIMO low-band, 4x4 MIMO for each of AWS/PCS/CBRS/LAA
- Internal beam combining
- Dependent RET control for 1695–2700 MHz frequencies
- Suitable for LTE/UMTS/CDMA/GSM technologies
- Cost-effective solution for neutral host locations



Omni Clover



Electrical specification (min./max.)	Ports 1,2,3,4		Ports 5,6,7,8				
Frequency bands, MHz	698–798	824–960	1695–1880	1850–1990	1920–2180	2300–2500	2500–2700
Polarization	± 45°		± 45°				
Average gain over all tilts, dBi	3.5	3.5	9.0	9.2	9.9	10.1	9.9
Horizontal beamwidth (HBW), degrees ¹	360°		360°				
Vertical beamwidth, (VBW), degrees ¹	80°	65°	15.4°	14.4°	13.5°	12.0°	11.0°
Electrical downtilt (EDT) range, degrees	0° (FET)		2-8° (RET)				
X polar isolation, P2P, dB ¹	25	25	25	25	25	25	25
Maximum VSWR/return loss, dB	1.5:1/ -14.0		1.5:1/ -14.0				
Max PIM (3rd order 2x20 W carrier dBc)	-153		-153				
Maximum input power per port, watts	250		125				
Total Max Composite Power, watts	900						

Electrical specification (minimum/maximum)	Ports 9,10,11,12	Ports 13,14, 15,16				
Frequency bands, MHz	3550–3700	5150–5250	5250–5350	5470–5725	5725–5850	5850–5925
Polarization	± 45°	± 45°				
Average gain over all tilts, dBi	5.0	5.5	5.7	5.5	5.5	5.6
Horizontal beamwidth (HBW), degrees ¹	360°					
Vertical beamwidth (VBW), degrees ¹	28°	24°	24°	20°	14°	18°
Electrical downtilt (EDT) range, degrees	0° (FET)					
X polar isolation, P2P, dB ¹	25	25				
Max VSWR/return loss, dB	1.5:1/ -14.0	1.5:1/ -14.0				
PIM	N/A					
Maximum input power port	10	.5	0.125	.125	0.5	0.5

¹ Typical value over frequency and tilt

*USL at 5150-5925 MHz < -15dB at > 30° above horizon

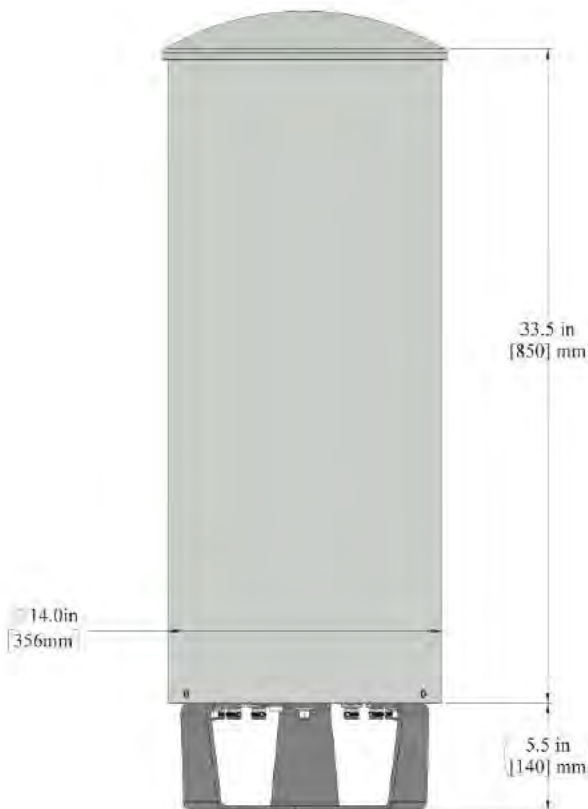
CX16OMI236-1C

NWAV™ X-Pol OMNI Antenna | 16-Port | 2.98 cu. ft | 360°

Mechanical specifications

Dimensions height/diameter, inches (mm)	35.4/14 (947/355)
Volume (cubic feet)	2.98
No. of RF input ports, connector type and location	16 x 4.3-10 female, bottom
RF connector torque	96 lbf-in (10.85 N m or 8 lbf-ft)
Net antenna weight, lb (kg)	35 (15.9)
Rated wind survival speed, mph (km/h)	150 (241)
Frontal wind loading @ 160 km/h, lbf (N)	58.7 (261.2)
Equivalent flat plate @100 mph and Cd=2, sq. ft	1.17

Front view



Bottom view



Ordering information

Antenna model	Description
CX16OMI236-1C	2F X-Pol 16P OMNI 360°, HB 2-8° RET, 4.3-10
Mounting bracket options	See small cell mounting bracket options http://info.jmawireless.com/ret-antenna-matrix

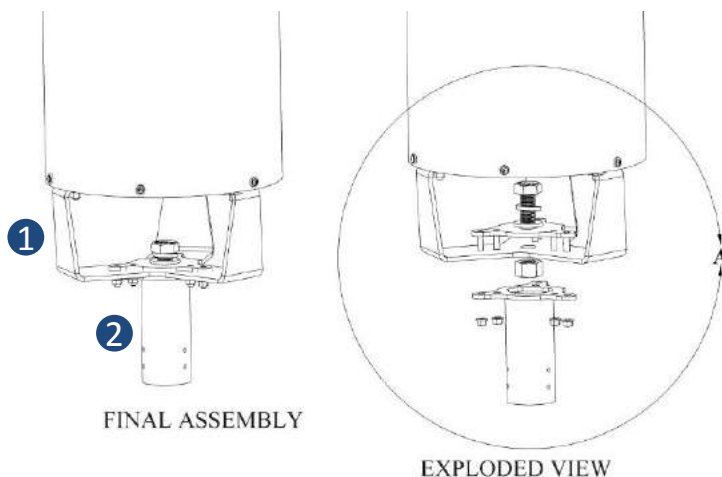
CX16OMI236-1C

NWAV™ X-Pol OMNI Antenna | 16-Port | 2.98 cu. ft | 360°

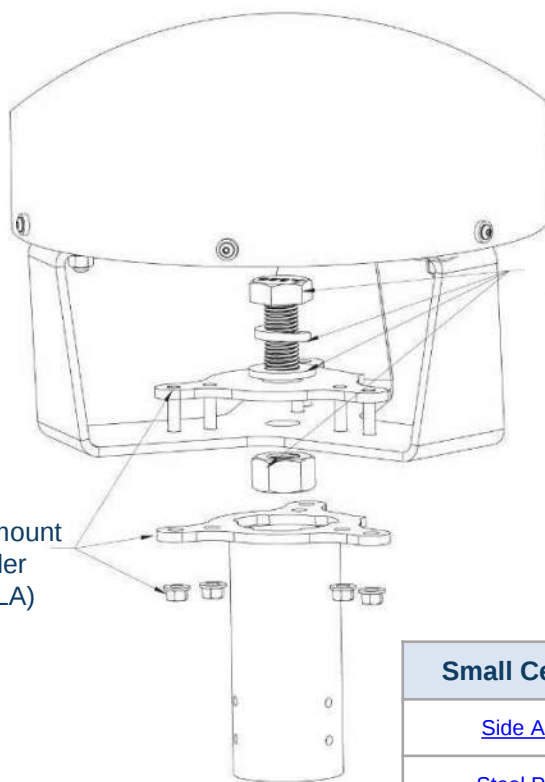
Notes on cylinder brackets:

- All CX* antennas come with the bottom mount bracket (marked as ①) factory installed (all factory testing is done with bracket attached)
- Hardware is included with each antenna to connect bottom bracket to different mounting systems
- JMA cylinder brackets are compatible with bottom mount via universal antenna mount sleeve (marked as ②) included with JMA cylinder mounting systems.

Example bracket configuration



Mounting details



Included with antenna:
7/8" bolt, washer, nut
(Torque to 202 lbf-ft)

Sold separately:

Universal antenna mount
sleeve for JMA cylinder
brackets (SC-BKT-SLA)

Small Cell solutions and mounting systems

Side Arm Mounting System	SC-BKT-SA-(color)
Steel Pole Mounting System	SC-BKT-SLA-(color)
Wide Diameter Pole	SC-BKT-WTPE-(color)
Rooftop Ballasted Mounting System	SC-BKT-RTB-(color)

CX16OMI236-1C

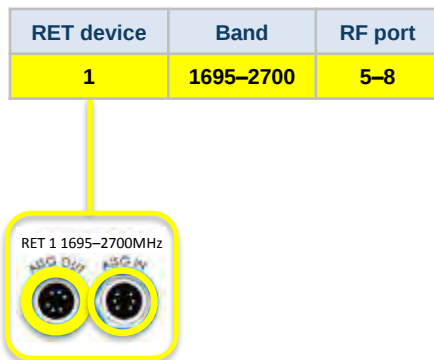
NWAV™ X-Pol OMNI Antenna | 16-Port | 2.98 cu. ft | 360°

Remote electrical tilt (RET 1000) information

RET location	Integrated into antenna
RET interface connector type	8-pin AISG connector per IEC 60130-9 (Hand tight only)
RET Connector torque	Min. .5 Nm to max 1.0 Nm (hand pressure & finger tight connector)
RET interface connector quantity	2 pairs of AISG male/female connectors
RET interface connector location	Bottom of the antenna
Total No. of internal RETs high bands	1
RET input operating voltage, vdc	10–30
RET max power consumption, idle state, W	≤ 2.0
RET max power consumption, normal operating conditions, W	≤ 13.0
RET communication protocol	AISG 2.0/ 3GPP

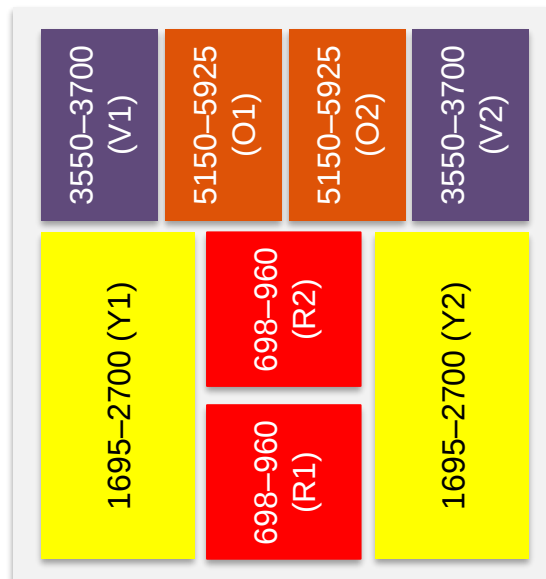
RET topology

A single RET device controls all 3 sectors via the designated external AISG connector as shown below



Array topology

Array ID	Band	RF Port
R1	698–960	1–2
R2	698–960	3–4
Y1	1695–2700	5–6
Y2	1695–2700	7–8
V1	3550–3700	9–10
V2	3550–3700	11–12
V3	5150–5925	13–14
V4	5150–5925	15–16



Radio Description

Radio 8843



Description

Copyright

© Ericsson AB 2018. All rights reserved. No part of this document may be reproduced in any form without the written permission of the copyright owner.

Disclaimer

The contents of this document are subject to revision without notice due to continued progress in methodology, design and manufacturing. Ericsson shall have no liability for any error or damage of any kind resulting from the use of this document.

Trademark List

All trademarks mentioned herein are the property of their respective owners. These are shown in the document *Trademark Information*.



Contents

1	Introduction	1
1.1	Warranty Seal	1
2	Product Overview	2
2.1	Main Features	3
3	Technical Data	5
3.1	Installation Recommendations	6
3.2	Installation Alternatives	8
3.3	Space Requirements	9
3.4	Acoustic Noise	12
3.5	Environmental Characteristics	13
3.6	Power Characteristics	14
3.7	System Characteristics	16
4	Hardware Architecture	17
4.1	Radio Overview	17
4.2	Optical Indicators and Buttons	18
5	Connection Interfaces	20
5.1	Antenna Interface	21
5.2	Grounding Interface	22
5.3	–48 V DC Power Supply Interface	22
5.4	Maintenance Button	23
5.5	Optical Indicators	23
5.6	Ext Alarm Interface	23
5.7	ALD Ctrl Interface	23
5.8	Interface for Optical Cable to Main Unit	23
6	Standards and Regulations	25
6.1	Regulatory Approval	25
6.2	Other Standards and Regulations	26





1 Introduction

1.1 Warranty Seal

The product is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson must not be broken or removed, as it otherwise voids warranty.



2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

An optic cable connects the radio to the Radio System main unit or an expanded macro Radio System. The radios can be connected in a star configuration or in a cascade configuration with optical cable links. An overview of different radio installations is shown in [Figure 1](#).

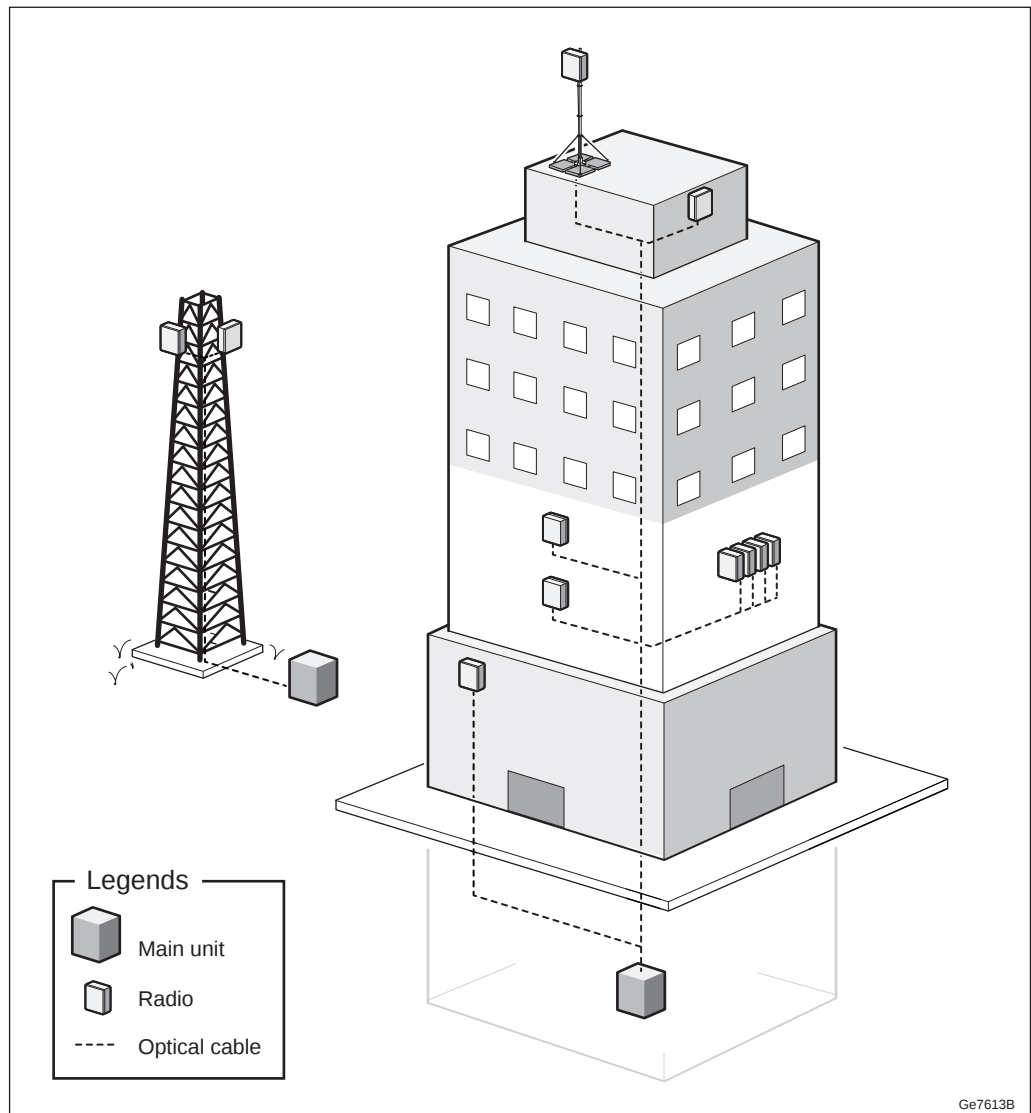


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- 2- and 3-wire power connections. For 2-wire power solutions, a DC adapter is used.
- LTE.
- Frequency Division Duplex (FDD).
- Dual band: B2 and B66A



- Duplex transmitter/receiver branches, for each frequency band (8TX/8RX).
- Up to 10.1 Gbps CPRI (optical)
- Complies with 3GPP base station classes Medium Range (MR) and Wide Area (WA). The relevant standards are listed in [Radio Standards Compliance](#) on page 26.



3 Technical Data

Table 1 Radio 8843 Technical Data

Description	Value
Maximum nominal output power ⁽¹⁾ ⁽²⁾	4×40 W (B2) + 4×40 W (B66A) or 2×60 W (B2) + 2×80 W (B66A) or 4×20 W (B2) + 4×60 W (B66A) (License key is required for total power over 4×5 W.)
Number of carriers per branch	Maximum 3 per port
Number of carriers per radio	Up to 24 per radio over both bands
Frequency ⁽³⁾	1850–1910 MHz uplink 1930–1990 MHz downlink B2
	1710–1780 MHz uplink 2110–2180 MHz downlink B66A
Dimensions	
Height	380 mm
Width	335 mm
Depth	277 mm
Weight	
Radio 8843	32.6 kg
Color	
Body	NCS S 1002-B
Front	NCS S 6502-B

(1) Detailed information about LTE licences can be found in *Manage Licenses and Hardware Activation Codes in the Radio Node libraries*.

(2) Detailed information about output power can be found in *applicable Output Power Feature Description*.

(3) Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.

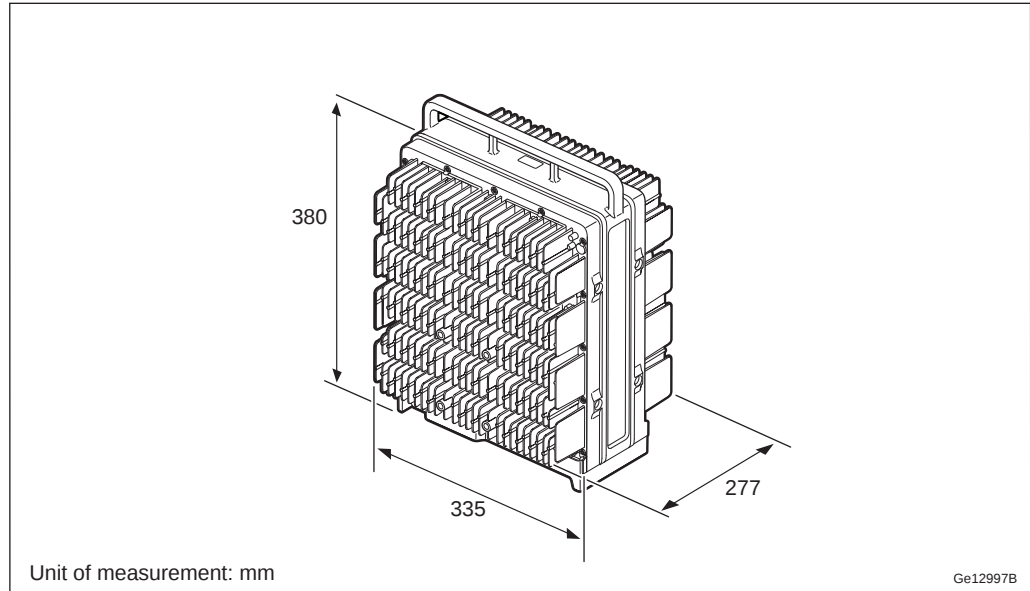


Figure 2 Radio 8843 Height, Width, and Depth

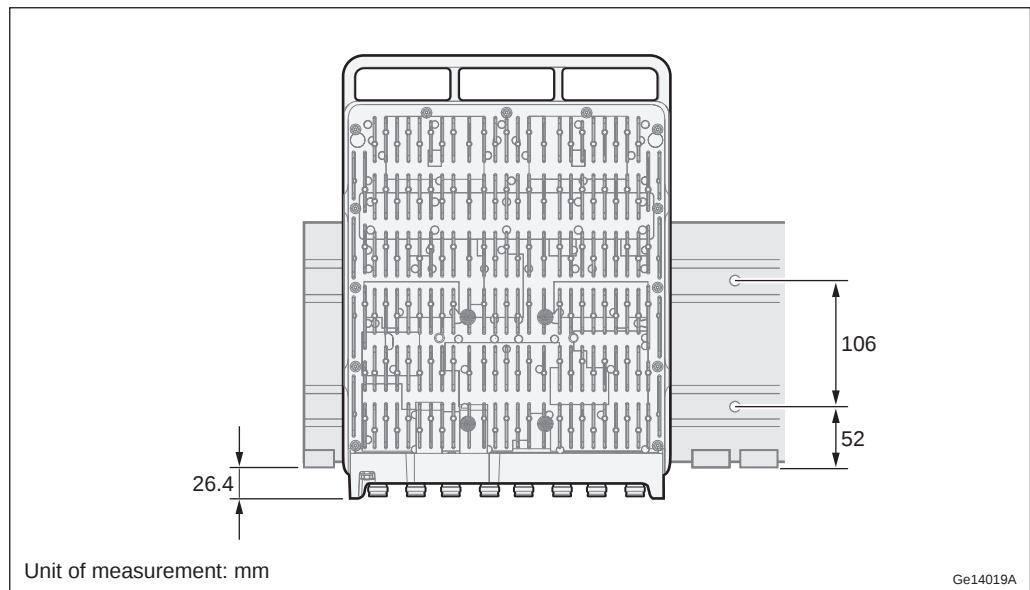


Figure 3 Radio 8843 to Rail Measurement

3.1

Installation Recommendations

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



3.1.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples for these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10° C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.

3.1.3 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.1.3.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal commercially available one or two component paints.
- Never use metallic paint or paint containing metallic particles.



- Ensure that ventilation and drainage holes are free from paint.
- Ensure proper adhesion of the paint.

3.1.3.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.2 Installation Alternatives

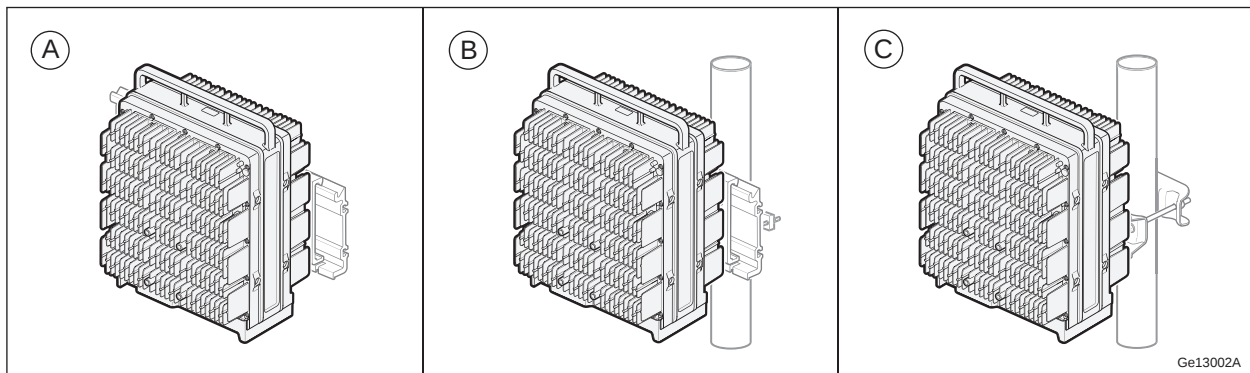


Figure 4 Installation Alternatives

Table 2 Key to Installation Alternatives

Installation Method	Description
A	Wall installation
B	Pole installation
C	Pole installation with single pole clamp

3.3 Space Requirements

3.3.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

3.3.2 Pole or Mast Installation

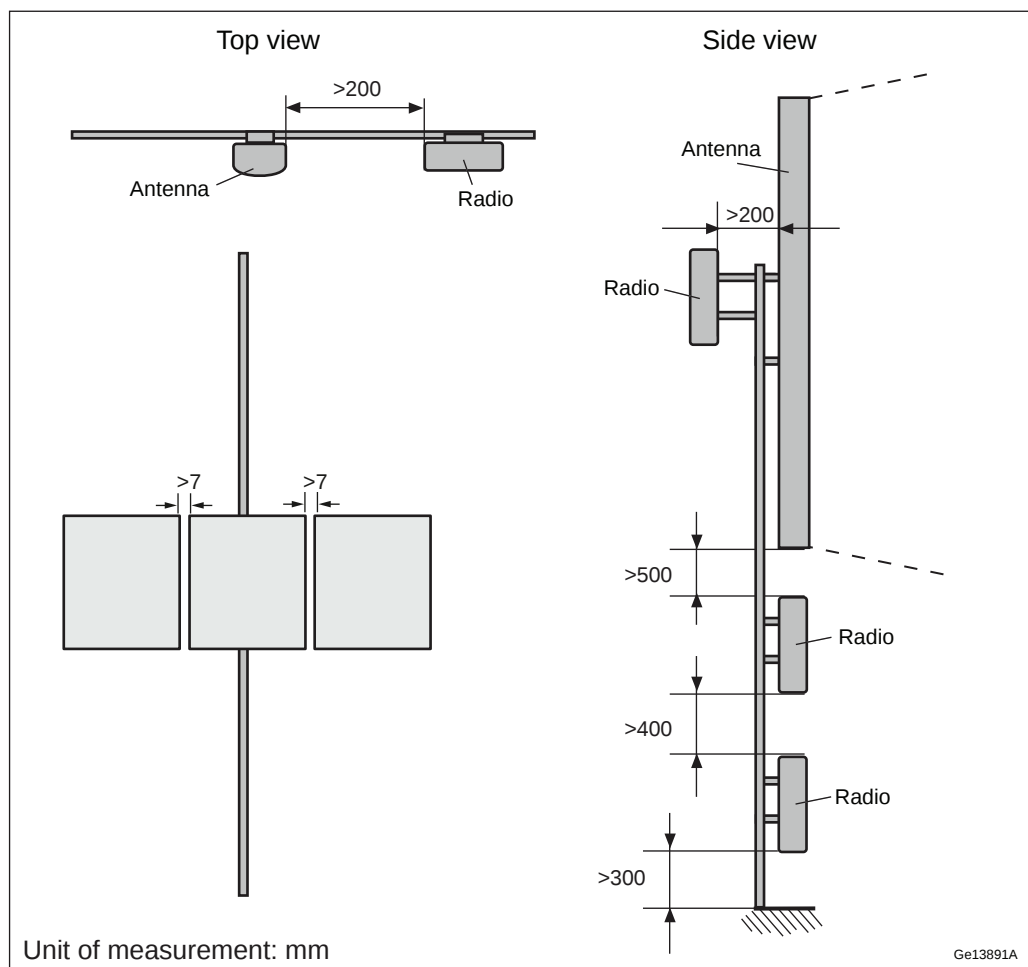


Figure 5 Radio Pole Installation Requirements



To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a single pole, or a dual pole installation. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

Note: A radio cannot be installed in the uppermost position of a pole or mast.

3.3.3 Rail Installation on Wall

This section describes the installation requirements when installing the radio on a wall.



3.3.3.1

Radio Installation on Outdoor Wall

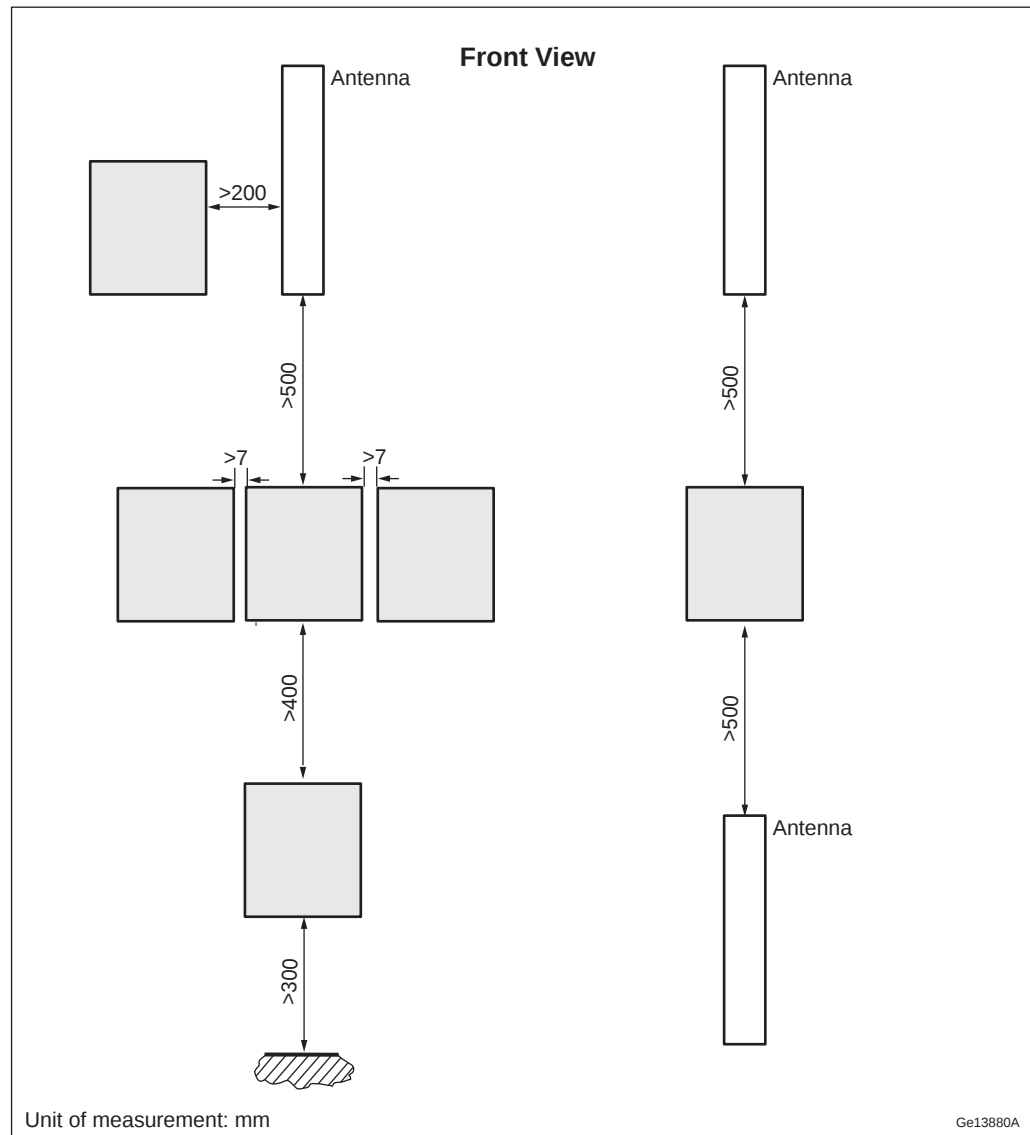


Figure 6 Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

3.3.3.2 Radio Installation on Indoor Wall

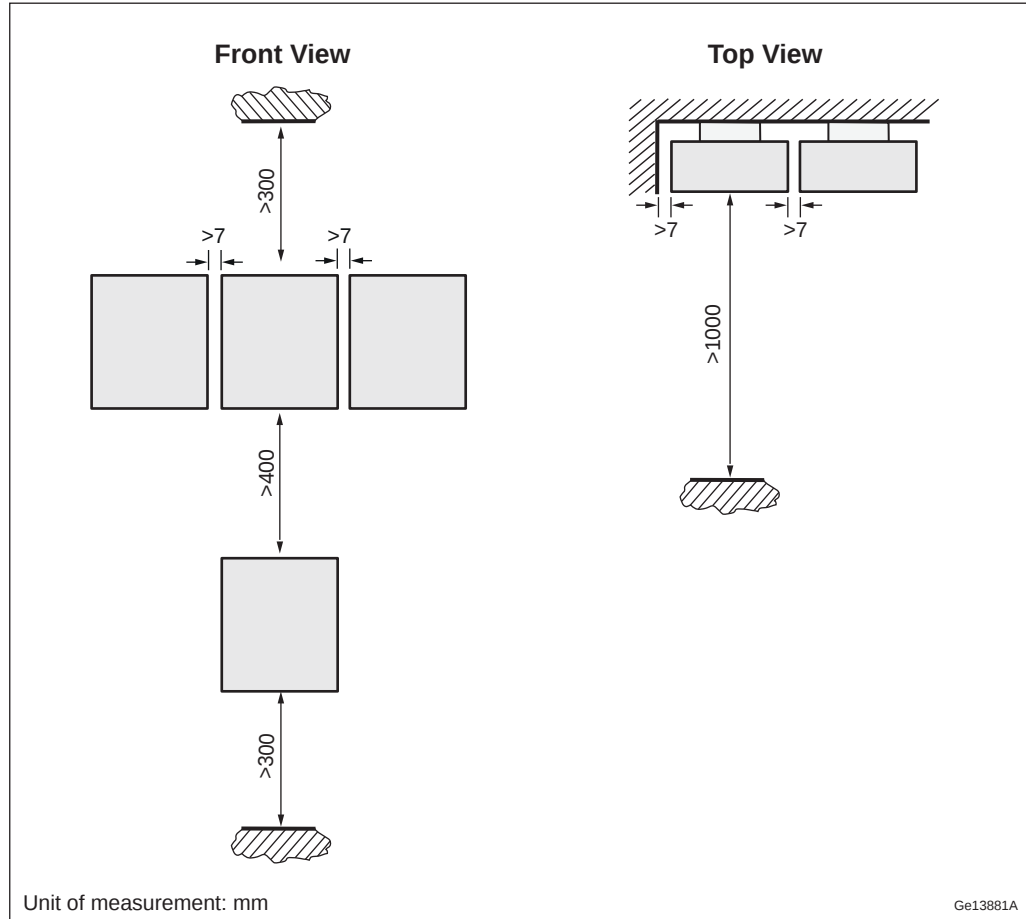


Figure 7 Radio Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space between radios installed side by side on the rail.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

3.4 Acoustic Noise

Table 3 Sound Power Level

Temperature (°C)	Radio 8843 Sound Power Level (dBA)
< +25	45



Temperature (°C)	Radio 8843 Sound Power Level (dBA)
+30	45
+40	53
+45	55
+55	59

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature ⁽¹⁾	−40 to +55 °C
Solar radiation	≤ 1,120 W/m ²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m ³
Maximum temperature change	1.0°C/min
Maximum wind load at 50 m/s (pole installed single case)	260 N (front)

(1) Depending on installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation.

Avoid indoor installation in a room without adequate ventilation and cooling.

Table 4 Radio Heat Dissipation

Unit	Output Power	Maximum Heat Dissipation
Radio 8843	4×40 W (B2) + 4×40 W (B66A)	1.2 kW
	2×60 W (B2) + 2×80 W (B66A)	1.1 kW
	4×20 W (B2) + 4×60 W (B66A)	1.2 kW



3.5.3 Vibration

This section describes the radio tolerance to vibrations. The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS) 50 m/s² within 2–5 Hz for DR=2%

Frequency range 1–35 Hz

Time history signal Veriteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh

Random vibration, normal operation 0.3 m²/s³

3.5.4 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

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is –48 V DC. The radio has two DC plugs.

Table 5 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Operating voltage range ⁽¹⁾	–40 to –58.5 V DC



Conditions	Values and Ranges
Non-destructive range	0 to -60 V DC

(1) The operating voltage range refers to the voltage at the radio power input port.

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation. The radio is designed for 3-wire power connections. For 2-wire power solutions, a DC adapter is used.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) Surge Protection Device (SPD) to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating could be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 6 External Radio Fuse and Circuit Breaker Recommendations per DC Input

Unit (DC Powered)	Output Power	Minimum Fuse Rating ⁽¹⁾	Fuse Rating Recommended for Reliable Operation ⁽²⁾	Maximum Allowed Fuse Rating ⁽³⁾
Radio 8843	4×40 W (B2) + 4×40 W (B66A)	26 A	28 A	32 A
	2×60 W (B2) + 2×80 W (B66A)	26 A	28 A	32 A
	4×20 W (B2) + 4×60 W (B66A)	26 A	28 A	32 A

(1) The radio is designed for 3-wire power connections. For 2-wire power solutions, a DC adapter is used. These fuse ratings can only be used if it is acceptable that fuses trip because of lightning or network transients.

(2) The recommended fuse rating takes into account that external fuses are not to trip because of lightning or network transients.

(3) The absolute maximum fuse class in accordance with radio design restrictions.

Note: If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules in [-48 V DC Power Supply Interface](#) on page 22 are to be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met.



3.6.2 AC Power Characteristics

The radio installation accepts 100–250 V AC when used together with an optional PSU. For more information about the PSU, refer to *PSU Description*.

3.6.3 Power Consumption

For information on power consumption, refer to *Power Consumption Calculations*.

3.7 System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1 RF Electromagnetic Exposure

For general information about Radio Frequency (RF) Electromagnetic Fields (EMF), refer to *Radio Frequency Electromagnetic Fields*.

For information about radio access specific compliance boundaries for electromagnetic exposure, refer to *Radio Frequency Electromagnetic Exposure*.

3.7.2 Software

Information on software dependencies can be found in *Radio Software Support*.

3.7.3 Radio Configurations

For information about available radio configurations, refer to *RBS Configurations*.

4 Hardware Architecture

For a description of the supported radio configurations, refer to *RBS Configurations*.

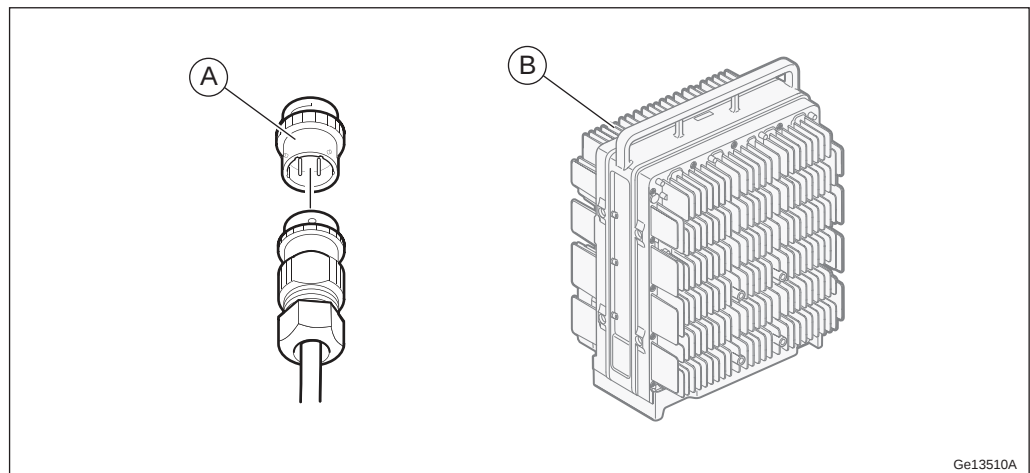


Figure 8 DC Adapter and Radio Components

Table 7 Key to DC Adapter and Radio Components

Position	Component
A	DC adapter for 2-wire connector
B	Radio

4.1 Radio Overview

The radio contains most of the radio processing hardware. The following sections describe the components inside the radio.

4.1.1 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion



- RF modulation and demodulation
- Optical cable interface termination
- Two receivers for RX diversity
- RET modem (the antenna system communication link)

4.1.2 PA

The Multi Carrier Power Amplifier (MCPA) is the linear power amplifier for the RF carriers. The radio has eight MCPAs, one for each RF port.

4.1.3 FU

The Filter Unit (FU) consists of band-pass filters.

In the radio, the FU also provides the following:

- Power and supervision for the TMA, or the RIU
- Voltage Standing Wave Ratio (VSWR) supervision

4.1.4 DC SPD

The DC SPD board protects the DC power input from lightning currents.

4.1.5 ALD (RET) SPD

An SPD provides overvoltage or overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD

An SPD provides overvoltage or overcurrent protection for the external alarm ports.

4.2 Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status. The radio optical indicators are located under the maintenance cover. The fan unit optical indicators are located under a cover.

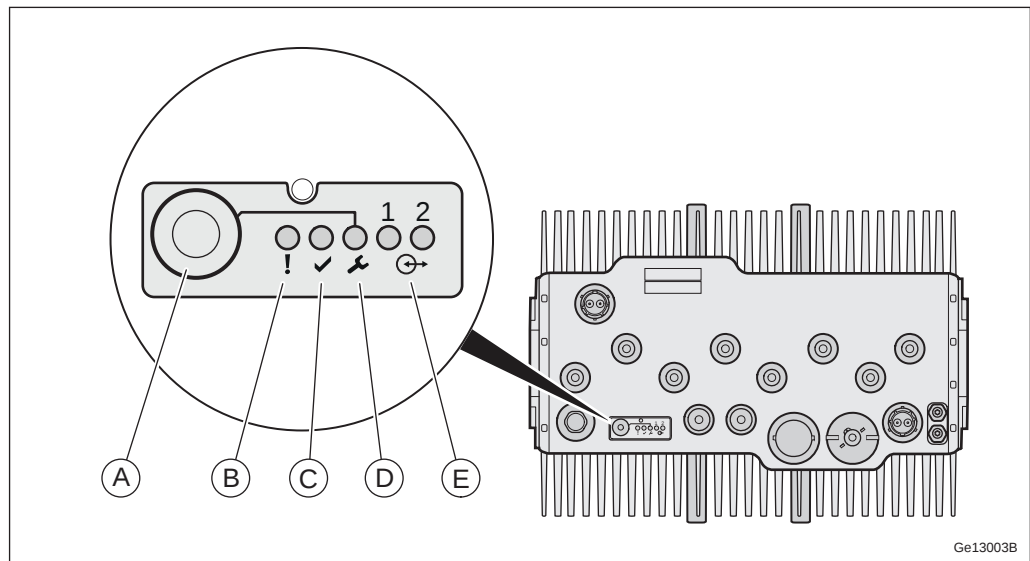


Figure 9 Radio Optical Indicators and Buttons for Radio 8843

Table 8 Description of Radio Optical Indicators and Buttons

Position	Name	Marking
A	Maintenance button	–
B	Fault	!
C	Operational	✓
D	Maintenance	⚙
E	Interface 1 Interface 2	⊕→

For more information about the behavior of the optical indicators and the maintenance button, refer to *Indicators, Buttons, and Switches*.



5 Connection Interfaces

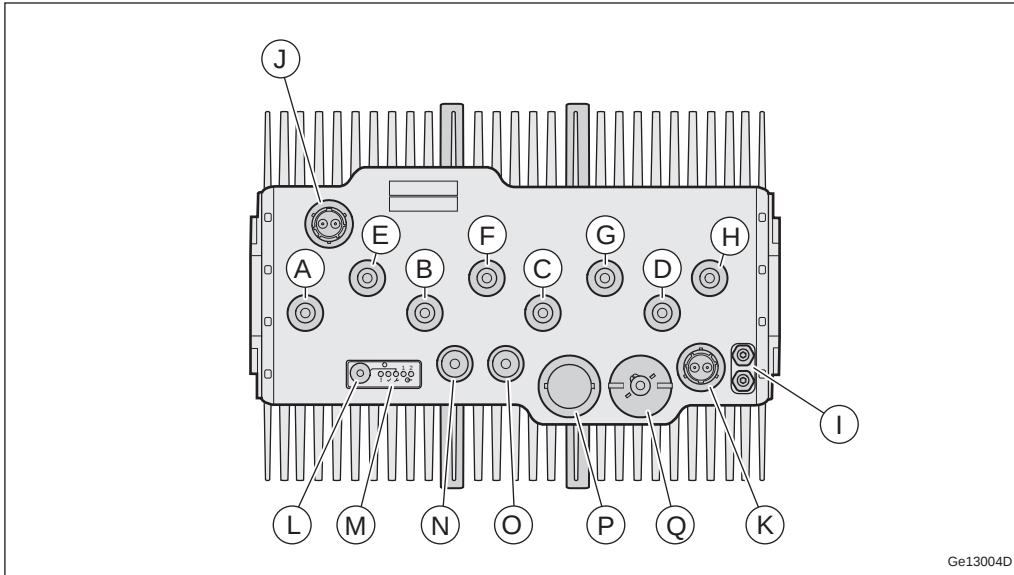
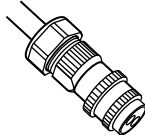
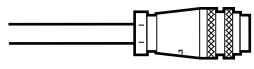
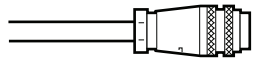
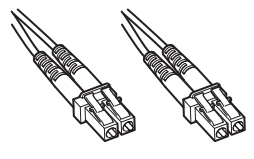
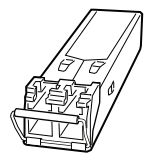


Figure 10 Radio 8843 Connection Interfaces

Table 9 Radio Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Antenna A ⁽¹⁾	A	4.3-10 Plus	
B	Antenna B	B		
C	Antenna C	C		
D	Antenna D	D		
E	Antenna E ⁽¹⁾	E		
F	Antenna F	F		
G	Antenna G	G		
H	Antenna H	H		
I	Grounding		2 x M6 bolt	



Position	Description	Marking	Connector Types	Cable Types
J	-48 V DC power supply	-48 V	Power connector	
K	-48 V DC power supply	-48 V		
L	Maintenance button	—	—	—
M	Optical indicators	! , ✓ , 🔧 ⊕ 1, ⊕ 2	—	—
N	External alarm and fan unit power supply and control	⚡ 🔔	Mini-DIN connector, 14 pin	
O	ALD (used for a RET unit for example)	ALD		
P	Optical cable 1	⊕ 1	LC (On SFP) with support for FullAXS	 
Q	Optical cable 2	⊕ 2		

(1) Antenna A and E can be used for connecting RET or TMA.

5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. RF cables connect the radio to the antenna.

Table 10 Radio Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type
4.3-10 Plus, insert-receiver type	50 Ω coaxial	4.3-10 type



Table 11 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
A  (Antenna A)	TX/RX
B  (Antenna B)	TX/RX
C  (Antenna C)	TX/RX
D  (Antenna D)	TX/RX
E  (Antenna E)	TX/RX
F  (Antenna F)	TX/RX
G  (Antenna G)	TX/RX
H  (Antenna H)	TX/RX

Antenna A and Antenna E can be used for connecting RET or TMA.

When configured for 2×60W (B2) + 2×80W (B66A), the following ports are used.

Table 12 2×60W + 2×80W Configuration

Radio Connectors	Configured Band
Antenna A	B2
Antenna D	
Antenna E	B66A
Antenna H	

5.2 Grounding Interface

The radio must be grounded to protect it from overvoltage and lightning strikes. The grounding interface on the radio accepts an M6 dual cable lug on a coated cable.

For more information about grounding principles, refer to *Grounding Guidelines for RBS Sites*.

5.3 –48 V DC Power Supply Interface

Note: This product has two power connectors. Both power cables must be connected.



The –48 V DC power connector for incoming power accepts cables with various cross-sectional areas, depending on the cable length and the radio maximum power consumption. For more information on –48 V DC power cable dimensions, refer to *Main-Remote Installation Products Overview*.

The power cable conductor has a wire for the 0 V DC conductor, and a wire for the –48 V DC conductor. The color codes are market-dependent for both wires.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding interface in the power supply equipment, otherwise the radio overvoltage and lightning protection does not function properly.

5.4 Maintenance Button

The maintenance button is at the left of the  symbol.

More information about the maintenance button can be found in *Indicators, Buttons, and Switches*.

5.5 Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in *Indicators, Buttons, and Switches*.

5.6 Ext Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.7 ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the radio for antenna system communication.

5.8 Interface for Optical Cable to Main Unit

The  1 and  2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. A Small Form-factor Pluggable (SFP)+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).



Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC/EN 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, refer to *SFP Module Selector Guide* and *Main-Remote Installation Products Overview* for more information.



6 Standards and Regulations

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

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- North American market requirements.

6.1.1 Safety Standards Compliance

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

North America

- UL 62368-1
- CSA-C22.2 No. 62328-1

6.1.1.1 Outdoor Specific Requirements

The Radio complies with the following outdoor specific requirements:

North America

- UL 50E
- UL 60950-22
- CAN/CSA-C22.2 No. 60950-22

6.1.2 EMC Standards Compliance

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



North America

- FCC CFR 47 Part 15 B

6.1.3 Radio Standards Compliance

The Radio System complies with the following radio standards:

North America

- FCC CFR 47 Part: 2, 22, 24, 27, 30, 90 (US Band/Frequency Specific)

6.1.4 Marking

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

North America

- cETLus
- FCC CFR 47 Part 15 Statement
- FCC ID

6.2 Other Standards and Regulations

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

6.2.1 Spare Parts

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

6.2.2 Surface Quality

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

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

Radio Description

Radio 4449



Description

Copyright

© Ericsson AB 2018. All rights reserved. No part of this document may be reproduced in any form without the written permission of the copyright owner.

Disclaimer

The contents of this document are subject to revision without notice due to continued progress in methodology, design and manufacturing. Ericsson shall have no liability for any error or damage of any kind resulting from the use of this document.

Trademark List

All trademarks mentioned herein are the property of their respective owners. These are shown in the document *Trademark Information*.



Contents

1	Introduction	1
1.1	Warranty Seal	1
2	Product Overview	2
2.1	Main Features	3
3	Technical Data	5
3.1	Installation Recommendations	6
3.2	Space Requirements	8
3.3	Acoustic Noise	12
3.4	Environmental Characteristics	13
3.5	Power Characteristics	14
3.6	System Characteristics	15
4	Hardware Architecture	17
4.1	Radio Overview	17
4.2	Optical Indicators and Buttons	18
5	Connection Interfaces	20
5.1	Antenna Interface	21
5.2	Maintenance Button	22
5.3	Optical Indicators	22
5.4	Interface for Optical Cable to Main Unit	22
5.5	–48 V DC Power Supply Interface	22
5.6	Grounding Interface	23
5.7	Ext Alarm Interface	23
5.8	ALD Ctrl Interface	23
6	Standards and Regulations	24
6.1	Regulatory Approval	24
6.2	Other Standards and Regulations	26





1 Introduction

1.1 Warranty Seal

The unit is equipped with two warranty seal stickers.

Note: Seals that have been implemented by Ericsson shall not be broken or removed, as it otherwise voids warranty.



2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets.

An optical cable connects the radio to the Radio System main unit or an expanded macro Radio System. The radios can be connected in a star configuration or in a cascade configuration with optical cable links.

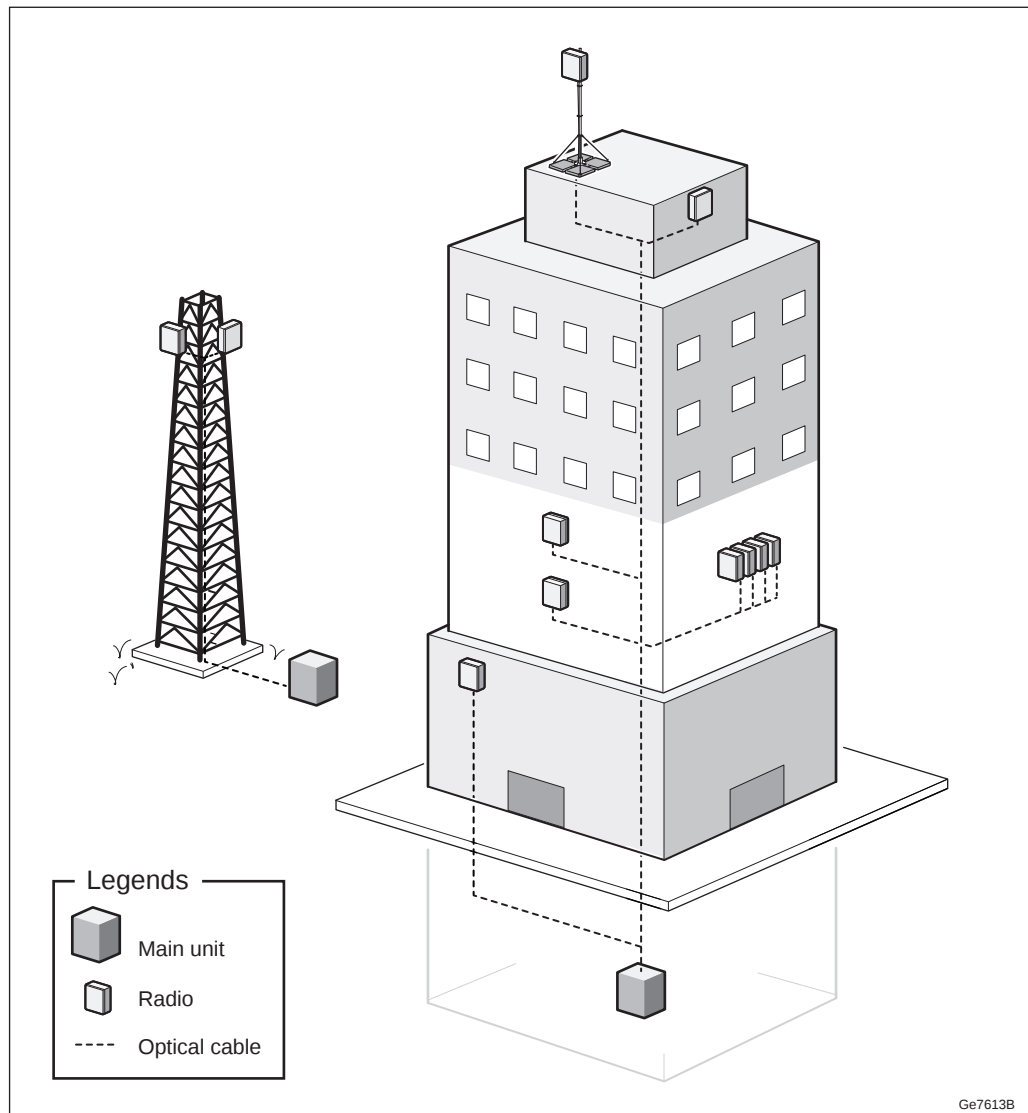


Figure 1 Radio Installations

2.1 Main Features

The following are the main features of the radio:

- 2- and 3-wire power connections. For 2-wire power solutions, DC adapters are used.
- Dual-band
- Both frequency bands available on each antenna port
- Long Term Evolution (LTE).



- Frequency Division Duplex (FDD).
- Duplex transmitter/receiver (4TX/4RX, 2TX/4RX and 2TX/2RX) branches.
- Up to 10.1 Gbit/s CPRI (optical)
- Complies with 3GPP base station class Wide Area (WA); relevant standards are listed in [Radio Standards Compliance](#) on page 25.



3 Technical Data

Table 1 Radio 4449 Technical Data

Description	Value
Maximum nominal output power ⁽¹⁾ ⁽²⁾	B5: 4×40 W, B13: 4×40 W B5: 2×60 W, B13: 2×60 W (License key is required for total output power over 2×10 W.)
Number of carriers per branch	B5: Up to three carriers B13: Up to one carrier
Number of carriers per radio	Up to 16 carriers
Frequency ⁽³⁾	824–849 MHz uplink 869–894 MHz downlink B5 for LTE
	777–787 MHz uplink 746–756 MHz downlink B13 for LTE
Dimensions	
Height	455 mm
Width	335 mm
Depth	240 mm
Weight	
Radio 4449	32 kg
Color	
Body	NCS S 1002-B
Front	NCS S 6502-B

(1) Detailed information about LTE licences can be found in *License Management* or *Manage Licenses*.

(2) Detailed information about output power can be found in *applicable Output Power User Guide*.

(3) Information about Instantaneous Bandwidth (IBW) can be found in *RBS Configurations*.

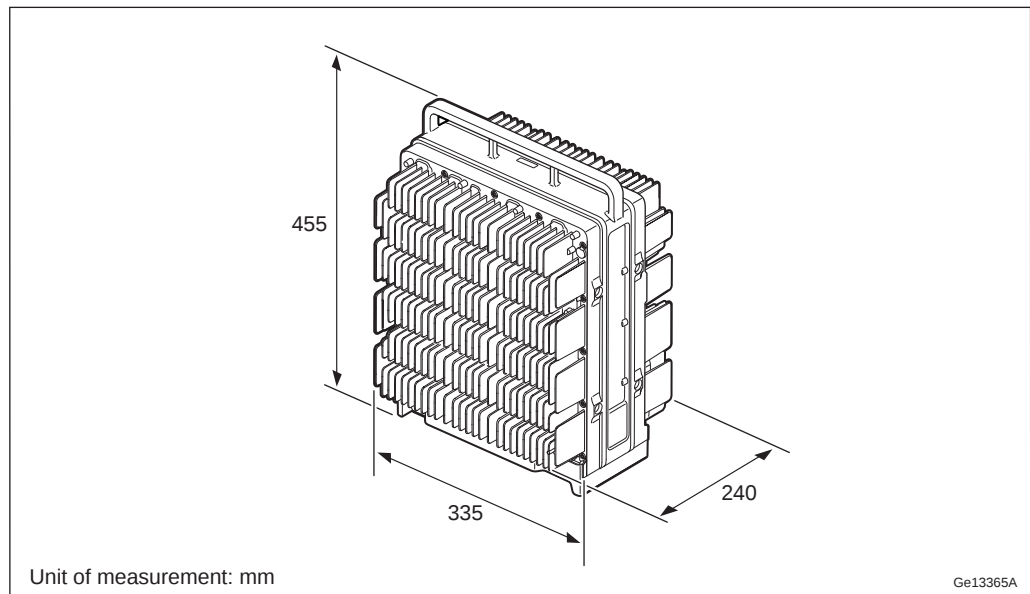


Figure 2 Radio 4449 Height, Width, and Depth

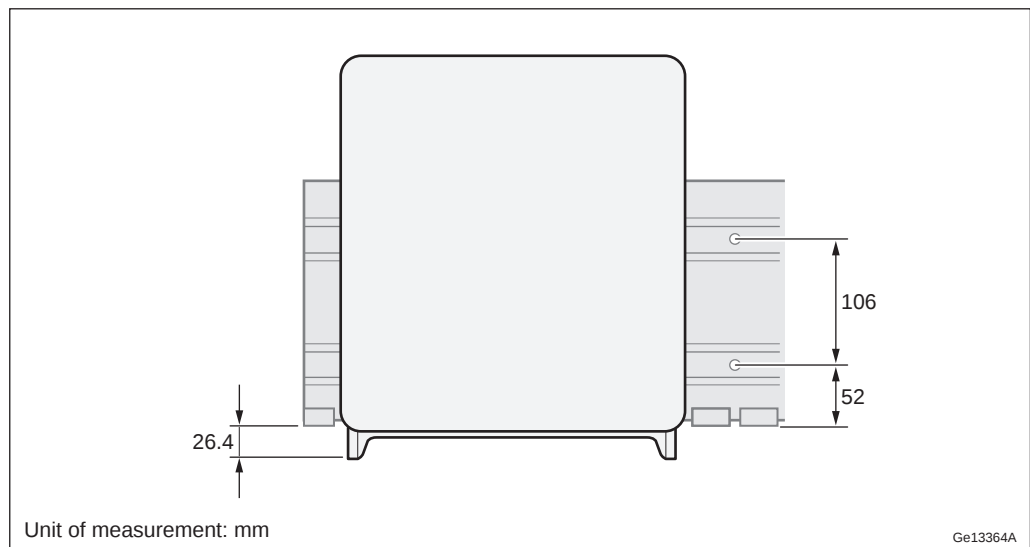


Figure 3 Radio 4449 to rail measurement

3.1

Installation Recommendations

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

3.1.1

Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6.



This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.1.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples for these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to 10° C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation system.
- Near the exhaust of the chimney.
- Opposite large surfaces made of glass or new concrete.

3.1.3 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.1.3.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.
- The plastic surfaces and the plastic covers are suited for painting with normal commercially available one or two component paints.
- Never use metallic paint or paint containing metallic particles.
- Ensure that ventilation and drainage holes are free from paint.
- Ensure proper adhesion of the paint.



3.1.3.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.
- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.
- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.
- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.2 Space Requirements

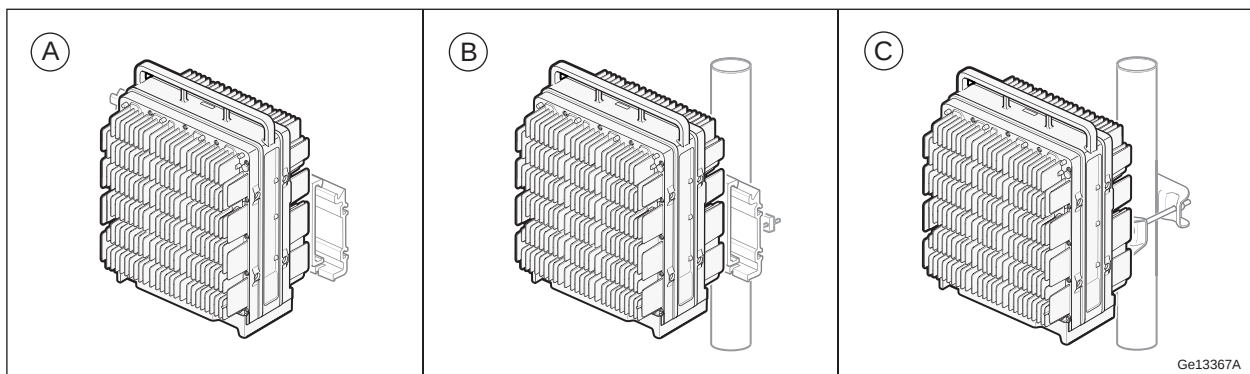


Figure 4 Installation Alternatives

Table 2 Key to Installation Alternatives

Installation Method	Description
A	Wall installation
B	Pole installation
C	Pole installation with single pole clamp

3.2.1 Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area.



Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of its own antenna, or antennas belonging to other services or operators using the same site.

3.2.2 Pole or Mast Installation

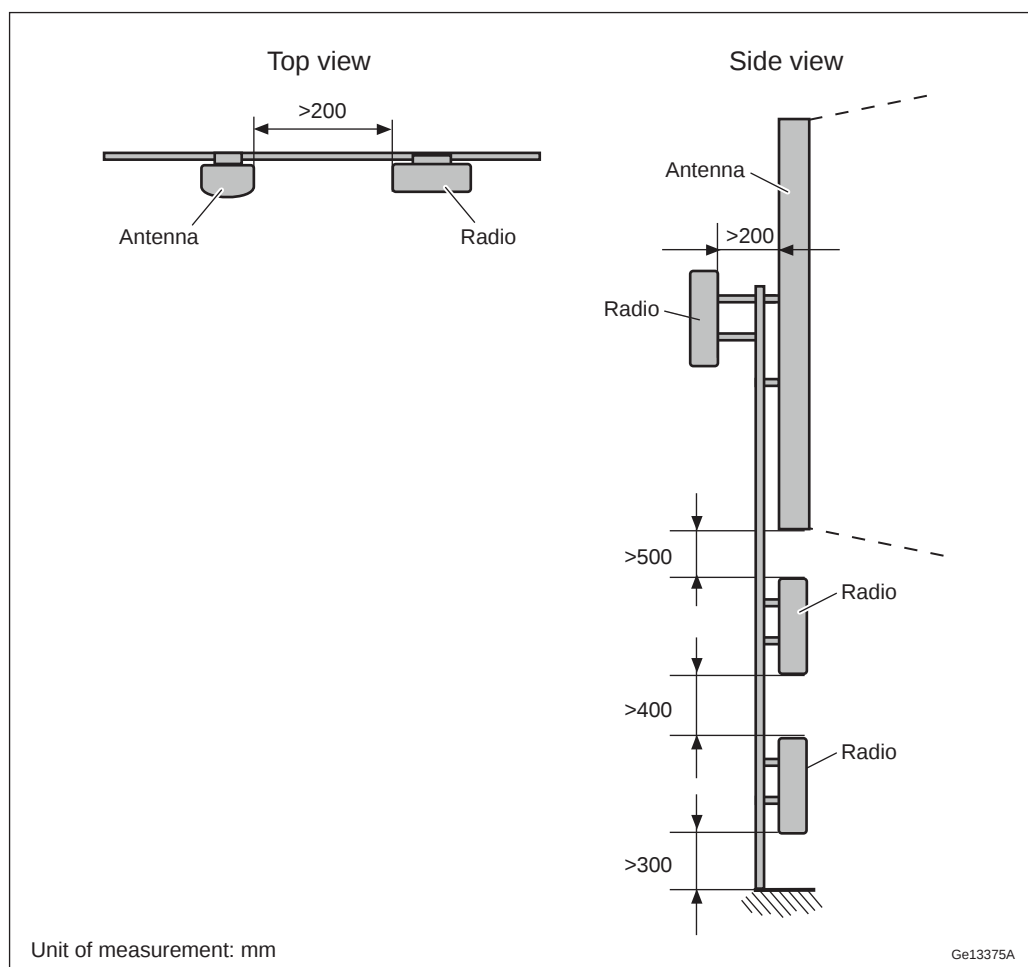


Figure 5 Radio Pole Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a single pole, or a dual pole installation. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.



Allow for a minimum of 40 mm free space between radios installed side by side on the rail.

Note: A radio cannot be installed in the uppermost position of a pole or mast.

3.2.3 Rail Installation on Wall

This section describes the installation requirements when installing the radio on a wall.



3.2.3.1

Radio Installation on Outdoor Wall

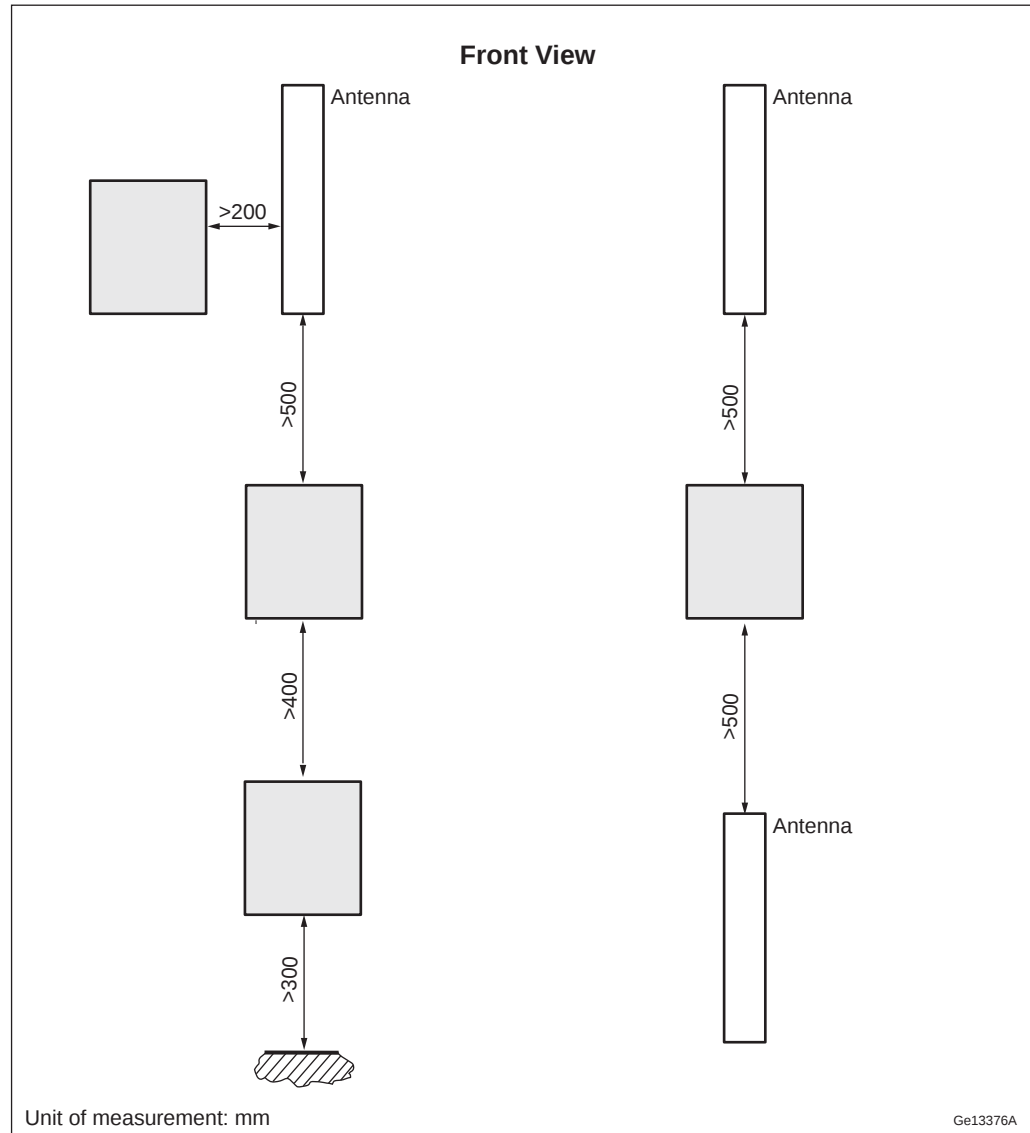


Figure 6 Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail.

3.2.3.2 Radio Installation on Indoor Wall

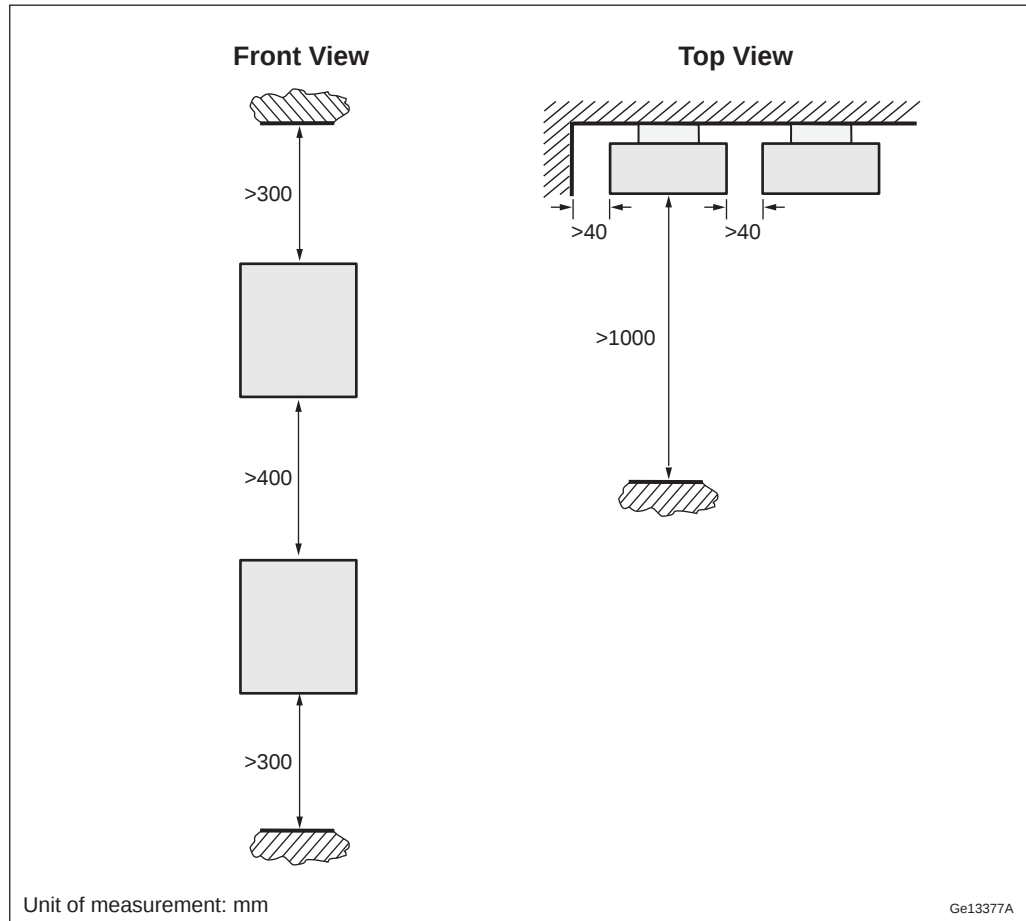


Figure 7 Radio Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. The minimum distance from the top of the radio to the ceiling and the bottom of the radio to the floor is 300 mm.

Allow for a minimum of 40 mm free space between radios installed side by side on the rail.

3.3 Acoustic Noise

The radio may emit low levels of acoustic noise when operating on low capacity in LTE.



3.4 Environmental Characteristics

This section contains operating environment data for the radio.

3.4.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature ⁽¹⁾	–40 to +55 °C
Solar radiation	≤ 1,120 W/m ²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m ³
Maximum temperature change	1.0°C/min
Maximum wind load at 50 m/s (pole installed single case)	260 N (front)

(1) Depending on installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

3.4.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation. Indoor installation in a room without adequate ventilation and cooling must be avoided.

Table 3 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (kW)
Radio 4449	4×40 W, 2×60 W	1.12

3.4.3 Vibration

This section describes the radio tolerance to vibrations. The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS) 50 m/s² within 2–5 Hz for DR=2%

Frequency range 1–35 Hz

Time history signal Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh



Random vibration, normal operation $0.3 \text{ m}^2/\text{s}^3$

3.4.4 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

3.5 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.5.1 DC Power Characteristics

The power supply voltage for the radio is –48 V DC.

Table 4 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	–48 V DC
Operating voltage range ⁽¹⁾	–38.0 to –58.5 V DC
Non-destructive range	0 to –60 V DC

(1) The operating voltage range refers to the voltage at the radio power input port.

The radio is designed for 3-wire power connections. For 2-wire power solutions, DC adapters are used.

The radio has two power connectors. Both power connections must be connected and operational for the radio to operate.

Fuse and Circuit Breaker Recommendations

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.



The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) Surge Protection Device (SPD) to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse rating could be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 5 External Radio Fuse and Circuit Breaker Recommendations

Unit (DC Powered)	Output Power (W)	Minimum Fuse Rating ⁽¹⁾ (A) per power feed	Fuse Rating Recommended for Reliable Operation ⁽²⁾ (A) per power feed	Maximum Allowed Fuse Rating ⁽³⁾ (A) per power feed
Radio 4449	4×40 W, 2×60 W	20	25	32

(1) These fuse ratings can only be used if it is acceptable that fuses trip because of lightning or network transients.

(2) The recommended fuse rating takes into account that external fuses are not to trip because of lightning or network transients.

(3) The absolute maximum fuse class in accordance with radio design restrictions.

Note: If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules in [-48 V DC Power Supply Interface](#) on page 22 are to be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met.

3.5.2 AC Power Characteristics

The radio installation accepts 100–250 V AC when used together with an optional PSU. For more information about the PSU, refer to *PSU Description*.

3.5.3 Power Consumption

For information about power consumption, refer to *Power Consumption Guideline for RBS 6000*.

3.6 System Characteristics

This section describes the system characteristics of the Radio System.

3.6.1 RF Electromagnetic Exposure

For general information about Radio Frequency (RF) Electromagnetic Fields (EMF), refer to *Radio Frequency Electromagnetic Fields*.



For information about radio access specific compliance boundaries for electromagnetic exposure, refer to *Radio Frequency Electromagnetic Exposure*.

3.6.2 Software

Information on software dependencies can be found in *Radio Software Support*.

3.6.3 Radio Configurations

For information about available radio configurations, refer to *RBS Configurations*.

4 Hardware Architecture

For a description of the supported radio configurations, refer to *RBS Configurations*.

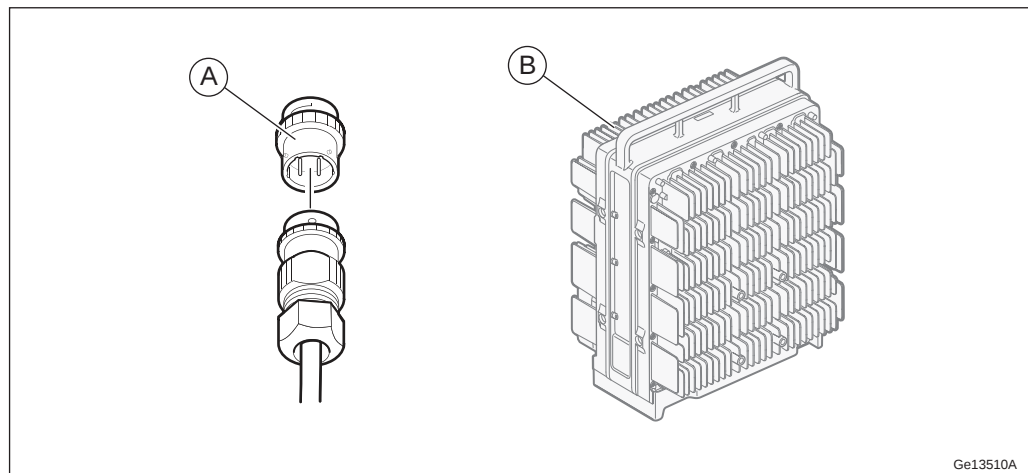


Figure 8 DC Adapter and Radio Components

Table 6 Key to DC Adapter and Radio Components

Position	Component
A	DC adapter for 2-wire connector
B	Radio

4.1 Radio Overview

The radio contains most of the radio processing hardware. The following sections describe the components inside the radio.

4.1.1 TRX

The Transmitter and Receiver (TRX) provides the following:

- Analog/Digital (A/D), Digital/Analog (D/A) conversion
- Channel filtering
- Delay and gain adjustment
- Digital predistortion



- Four receivers for RX diversity and Multiple Input Multiple Output (MIMO) operation
- Low Noise Amplifier
- Optical cable interface termination
- RET modem (the antenna system communication link)
- RF modulation and demodulation

4.1.2 PA

The Multi Carrier Power Amplifier (MCPA) is the linear power amplifier for the RF carriers. The radio has eight MCPAs, two for each RF port.

4.1.3 FU

The Filter Unit (FU) consists of low-noise amplifiers and band-pass filters.

In the radio, the FU also provides the following:

- Power and supervision for the TMA, or the RIU
- Voltage Standing Wave Ratio (VSWR) supervision

4.1.4 DC SPD

The DC SPD board protects the DC power input from lightning currents.

4.1.5 ALD (RET) SPD

An SPD provides overvoltage or overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD

An SPD provides overvoltage or overcurrent protection for the external alarm ports.

4.2 Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status. The radio optical indicators are located under the maintenance cover.

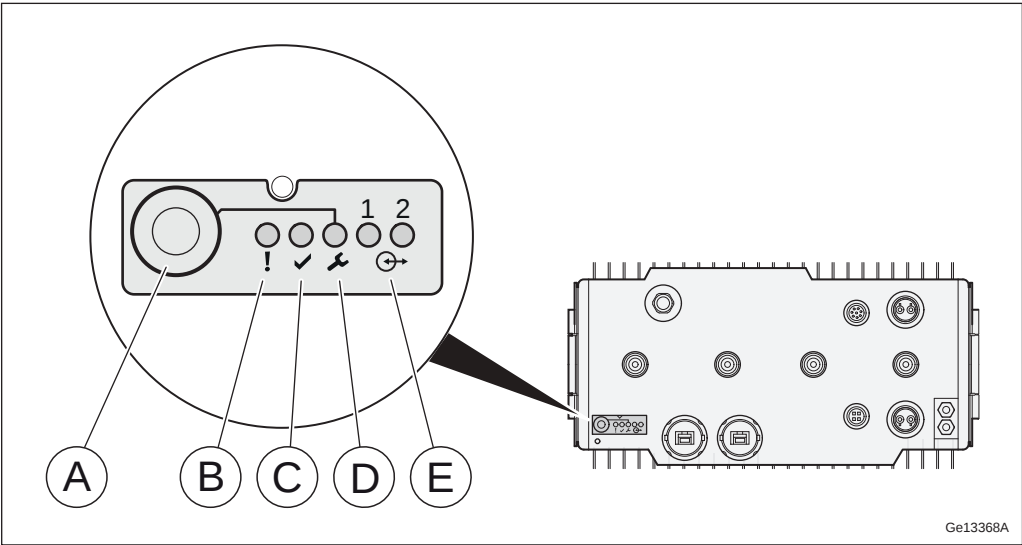


Figure 9 Radio Optical Indicators and Buttons

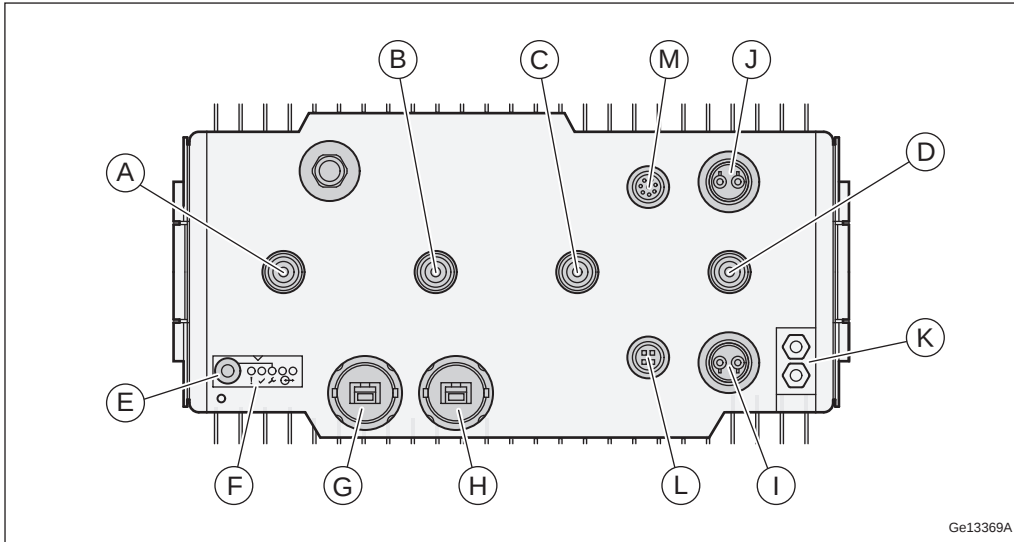
Table 7 Description of Radio Optical Indicators and Buttons

Position	Name	Marking
A	Maintenance button	–
B	Fault	!
C	Operational	✓
D	Maintenance	⚙
E	Interface 1 Interface 2	⊕→

For more information about the behavior of the optical indicators and the maintenance button, refer to *Indicators, Buttons, and Switches*.



5 Connection Interfaces

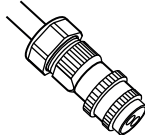
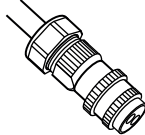
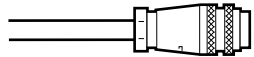
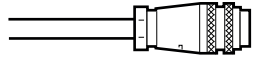


Ge13369A

Figure 10 Radio Connection Interfaces

Table 8 Description of Radio Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Antenna A	A	4.3-10 connector	
B	Antenna B	B		
C	Antenna C	C		
D	Antenna D	D		
E	Maintenance button	–	–	–
F	Optical indicators	 ⊕ 1, ⊕ 2	–	–
G	Optical cable 1	⊕ 1	LC (On SFP) with support for FullAXS	
H	Optical cable 2	⊕ 2		

Position	Description	Marking	Connector Types	Cable Types
I	-48 V DC power supply	POWER	Power connector	
J	-48 V DC power supply	POWER	Power connector	
K	Grounding		2 x M6 bolt	
L	External alarm and control		Mini-DIN connector, 14 pin	
M	ALD (used for a RET unit for example)	ALD	Mini-DIN connector, 8 pin	

5.1 Antenna Interface

The antenna interfaces provide connections for the radio to antennas. RF cables connect the radio to the antenna.

Table 9 Radio Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type
4.3-10, insert-receiver type	50 Ω coaxial	4.3-10 type

Table 10 Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
A  (Antenna A)	TX/RX, AISG, High Power
B  (Antenna B)	TX/RX
C  (Antenna C)	TX/RX, AISG



Radio Connectors	Antenna Connectors
D $\overleftrightarrow{\Delta}$ (Antenna D)	TX/RX, High Power

5.2 Maintenance Button

The maintenance button is at the left of the **!** symbol.

More information about the maintenance button can be found in *Indicators, Buttons, and Switches*.

5.3 Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in *Indicators, Buttons, and Switches*.

5.4 Interface for Optical Cable to Main Unit

The $\oplus$ 1 and $\oplus$ 2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. A Small Form-factor Pluggable (SFP)+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1) and Data 2 (optical cable 2).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:

- Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.
- Certification according to general safety requirements defined in standard IEC/EN 62368-1.
- Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, refer to *SFP Module Selector Guide* and *Main-Remote Installation Products Overview* for more information.

5.5 –48 V DC Power Supply Interface

The –48 V DC power connector for incoming power accepts cables with various cross-sectional areas, depending on the cable length and the radio



maximum power consumption. For more information on –48 V DC power cable dimensions, refer to *Main-Remote Installation Products Overview*.

The power cable conductor has a wire for the 0 V DC conductor, and a wire for the –48 V DC conductor. The color codes are market-dependent for both wires.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the grounding interface in the power supply equipment, otherwise the radio overvoltage and lightning protection does not function properly.

5.6 Grounding Interface

The radio must be grounded to protect it from overvoltage and lightning strikes. The grounding interface on the radio accepts an M6 dual cable lug on a coated cable.

For more information about grounding principles, refer to *Grounding Guidelines for RBS Sites*.

5.7 Ext Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.8 ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the radio for antenna system communication.



6 Standards and Regulations

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for Radio 4449.

6.1 Regulatory Approval

6.1.1 Safety Standards Compliance

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

International

- IEC 62368-1

Europe

- EN 50 385
- EN 62368-1

North America

- Health Canada Safety Code 6
- UL 62368-1
- CSA-C22.2 No. 62328-1

6.1.1.1 Outdoor specific requirements

The Radio complies with the following outdoor specific requirements:

International

- IEC 60 529 (IP65)
- IEC 60 950-22

**Europe**

- EN 60 529 (IP65)
- EN 60 950-22

North America

- CSA-C22.2 No. 60950-22-07
- UL 50E
- UL 60950-22

6.1.2 EMC Standards Compliance

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

International

- 3GPP TS36.113
- 3GPP TS37.113

North America

- FCC CFR 47 Part 15 B
- IC ICES-003 B

6.1.3 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS36.141
- 3GPP TS37.141
- 3GPP TS45.005



North America

- IC RSS-132, 133, 139, 130, 195, 199 (Canada Band/Frequency Specific)
- IC RSS-Gen (Canada)
- RSP-100 (Canada)
- FCC CFR 47 Part: 2, 22, 24, 27, 30, 90 (US Band/Frequency Specific)

6.1.4 Marking

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

North America

- cETLus
- FCC CFR 47 Part 15 Statement
- FCC ID
- IC ICES-003 Statement
- IC ID

6.2 Other Standards and Regulations

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

6.2.1 Spare Parts

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

6.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3 to A6 depending on product placement.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

Radio 2205

The micro Radio 2205 is part of the Ericsson Radio System portfolio. Radio 2205 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 2205 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 2205, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

The Radio 2205 support installations with integrated or external antenna systems and can by use of the versatile optical CPRI interface be connected to any of the efficient Ericsson Baseband LTE modules by use of star or cascade configurations supporting multi sector and multi band.

Radio 2205 support LTE with two duplex TX/RX branches. It is specifically designed to support LAA meaning that the maximum output power is limited to 316 mW per branch.



Below on the right side you see a picture of the Radio 2205 mounted on a lamp pole. The picture beside it shows the back part of the Radio 2205, the support system in which the wall mount and pole mount are integrated.



Technical specification for Radio 2205

FREQUENCY BANDS

Bands: 3GPP Band B46 (LAA-LTE)

HW CAPACITY

Carrier capacity LTE: Up to 60 MHz
IBW: 60 MHz
MIMO: Yes, 2T2R
Output power: Up to 2 x 316 mW

INTERFACE SPECIFICATIONS

Antenna ports: 2 x 4.3-10 (f)
CPRI: 2 x 2.5/5/10 Gbps (exchangeable SFP modules)
Optical indicators: 6
External alarms: 2
Field ground: 1

MECHANICAL SPECIFICATIONS

W x H x D: 200 mm x 200 mm x 100 mm, including mounting bracket and esthetic front cover
Weight: < 4.5 kg
Volume: 4 liter
Mounting: Rail, wall and pole mount

ELECTRICAL SPECIFICATIONS

Power Supply: -48 VDC or 100 - 250 VAC

ENVIRONMENTAL SPECIFICATIONS

Normal operating temp.: -40 °C to +55 °C (cold start at -40 °C)
Relative Humidity: 5 – 100%
Environment: Outdoor class with IP65

RADIO 2208

Radio 2208 is part of the Ericsson Radio System portfolio. Radio 2208 has best in class design, superior radio performance and power efficiency when it comes to medium range 3GPP radio products.

Radio 2208 has, by use of its small and smart dimensions, support for a wide range of mounting scenarios and has a pioneering flexibility within its product segment. With the Radio 2208, Ericsson evolves the micro radio portfolio to become even more flexible thus making it easier than ever to make small and efficient single and multi-band micro radio installations.

Radio 2208 supports installations with integrated or external antenna systems and can by use of the versatile optical CPRI interface be connected to any of the efficient Ericsson Baseband modules by use of star or cascade configurations supporting multi-sector and multi-band.

Radio 2208 supports LTE TDD with two duplex TX/RX branches supporting up to 2 x 10 W output power.



Below on the right side you see a picture of Radio 2208 mounted on a lamp pole. The picture beside it shows the back part of Radio 2208, the support system in which the wall mount and pole mount are integrated.



Technical specification for Radio 2208

FREQUENCY BANDS

Bands: 3GPP Band B41E, B48

HW CAPACITY

Carrier capacity LTE: 40MHz for B41E, 60MHz for B48

IBW: 40MHz for B41E, 60MHz for B48

MIMO: Yes, 2T2R

Output power: Up to 2 x 10 W

INTERFACE SPECIFICATIONS

Antenna ports: 2 x 4.3-10 (f)

CPRI: 2 x 2.5/5/10 Gbps (exchangeable SFP modules)

Optical indicators: 6

External alarms: 2

Field ground: 1

MECHANICAL SPECIFICATIONS

W x H x D: 200 mm x 200 mm x 100 mm, including mounting bracket and esthetic front cover

Weight: < 4.5 kg

Volume: 4 liter

Mounting: Rail, wall and pole mount

ELECTRICAL SPECIFICATIONS

Power Supply: -48 VDC or 100 - 250 VAC

ENVIRONMENTAL SPECIFICATIONS

Normal operating temp.: -40 °C to +55 °C (cold start at -40 °C)

Relative Humidity: 5 – 100%

Environment: Outdoor class with IP65