DONALD L. HAES, JR., CHP

Radiation Safety Specialist

PO Box 198, Hampstead, NH 03841 617-680-6262 Email: donald_haes_chp@comcast.net

August 27, 2025

RE: Installation of an AT&T Mobility omnidirectional cannister antenna and associated equipment, comprising a "Small Cell" (SC) PWS facility, to be mounted on an existing utility pole in South Hamilton, MA.

PURPOSE

I have reviewed the information pertinent to the proposed installation. To determine regulatory compliance, theoretical calculations of maximal radio-frequency (RF) fields have been prepared for the proposed site. The physical condition is that AT&T Mobility proposes to install an antenna along with remote radio head units on an existing utility pole in South Hamilton, MA (See Figure 2 map for location).

This report considers the contributions of the proposed AT&T Mobility PWS transmitters operating at their proposed FCC licensed capacities. The calculated values of RF fields are presented as a percentage of current Maximum Permissible Exposures (%MPE) as adopted by the Federal Communications Commission (FCC),[i,ii] and those established by the Massachusetts Department of Public Health (MDPH).[iii]

SUMMARY

Theoretical RF field calculations data indicate the summation of the proposed AT&T Mobility PWS contributions at the proposed Small Cell facility in South Hamilton, MA, would be within the established RF exposure guidelines; see Figure 4. This includes all publicly accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Massachusetts Department of Public Health regulations regarding PWS facilities, and the FCC's guidelines for RF exposure.

Based on the results of the theoretical RF fields I have calculated; it is my expert opinion that the proposed Small Cell facility would comply with all regulatory guidelines for RF exposure with the proposed AT&T Mobility antenna and transmitter installations.

Note: The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site; **AT&T SC PWS facility mounted on an existing utility pole in South Hamilton, MA**. Utilization of these analyses, conclusions, and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

EXPOSURE LIMITS AND GUIDELINES

RF exposure guidelines enforced by the FCC were established by the Institute of Electrical and Electronics Engineers (IEEE)[iv] and the National Council on Radiation Protection and Measurement (NCRP).[v] The RF exposure guidelines are listed for RF workers and members of the public. The applicable FCC RF exposure guidelines for the public are listed in Table 1 and depicted in Figure 1. All listed values are intended to be averaged over any contiguous 30-minute period. NOTE: The values for the public assume 24 hours/day exposure, seven days a week. Also note the values for "workers" are five times the values for members of the public, albeit averaged over six minutes.

Table 1: Maximum Permissible Exposure (MPE) Values in Public Areas

Frequency Bands	Electric Fields	Magnetic Fields	Equivalent Power Density
0.3 – 1.34 MHz	614 (V/m)	1.63 (A/m)	(100) mW/cm^2
1.34 - 30 MHz	824/f (V/m)	2.19/f (A/m)	(100) mW/cm^2
30 - 300 MHz	27.5 (V/m)	0.073 (A/m)	0.2 mW/cm^2
300 - 1500 MHz	--	--	f / 1500 mW/cm^2
1500 - 100,000 MHz	--	--	1.0 mW/cm^2

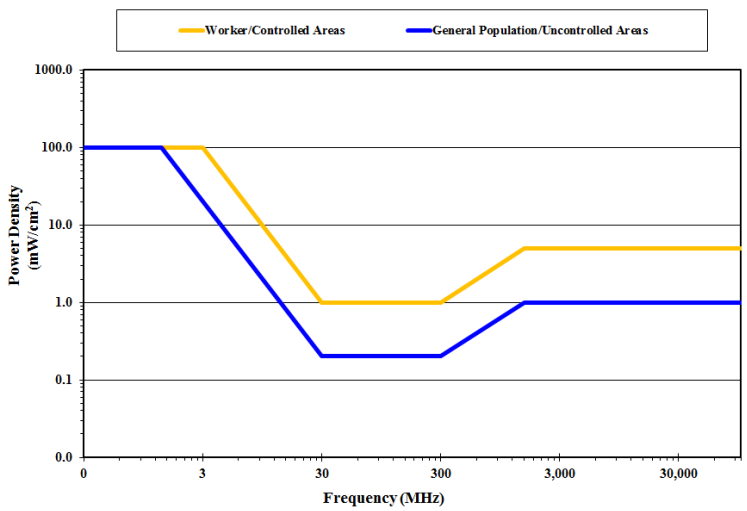


Figure 1: FCC Limits for Maximum Permissible Exposure (MPE)

NOTE: FCC "5% Rule" – When the exposure limits are exceeded in an accessible area due to the emissions from multiple fixed RF sources, actions necessary to bring the area into compliance are the shared responsibility of all licensees whose RF sources produce, at the area in question, levels that exceed 5% of the applicable exposure limit proportional to power. [vi]

ANTENNA INSTALLATION LOCATION

The location of the proposed utility pole which would host an AT&T Mobility SC PWS facility is shown below in Figure 2. See Figure 3a for a picture of the proposed utility pole.

Figure 2: Location of Proposed Utility Pole to Host
An AT&T Mobility SC PWS facility within South Hamilton, MA
(Picture courtesy Google Earth©2025 and may not represent current conditions)

OBSERVATIONS IN CONSIDERATION WITH FCC RULES §1.1307(B) & §1.1310

Will it be physically possible to stand next to or touch any omnidirectional antenna and/or stand in front of a directional antenna?
NO; access to the utility pole will be restricted, and the site will adhere to established RF safety guidelines regarding the transmitting antenna, including the appropriate signage.

PROPOSED SITE TOPOGRAPHICAL CONDITIONS

A topographical mapping tool was used to exam the elevation profiles in the North to South and West to East azimuths at the utility pole location (See Figures 3b and 3c, respectively). Any deviation in height along the azimuth from the ground elevation was factored mathematically into any calculations involving height above ground.

Figure 3a: Proposed Utility Pole in South Hamilton, MA
AT&T Site CRAN_RCTB_00073_665
(Picture courtesy Google Earth©2025 and may not represent current conditions)

Figure 3b: USGS Elevation Profile Along the North to South Azimuth
AT&T Site CRAN_RCTB_00073_665
(Picture courtesy Google Earth©2025 and may not represent current conditions)

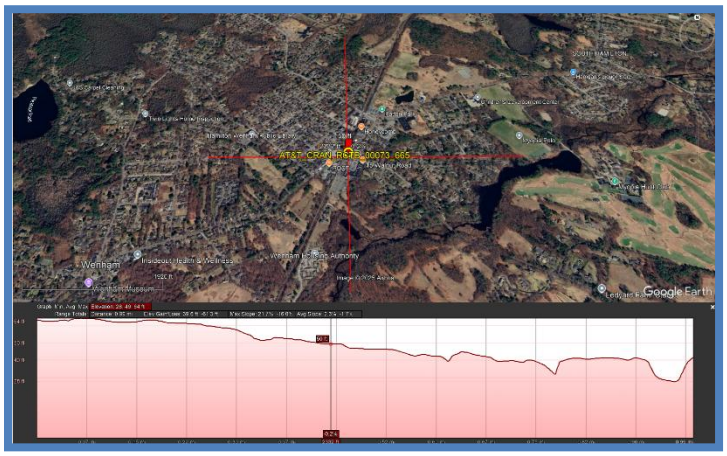


Figure 3c: USGS Elevation Profile Along the West to East Azimuth
AT&T Site CRAN_RCTB_00073_665
(Picture courtesy Google Earth©2025 and may not represent current conditions)

ANTENNA & TRANSMITTER PARAMETERS

The transmitter and antenna data and supporting parameters for the proposed AT&T "Small Cell" Site (See Figure 2) in South Hamilton, MA are contained in Table 2. See **Appendix A** for Remote Radio Head Unit (RRH or RRU) specifications and **Appendix B** for specifications & patterns of energy for the proposed omni-directional cannister antenna.

Table 2: Transmitter and Antenna Data and Supporting Parameters for
Proposed AT&T "Small Cell" Site in South Hamilton, MA

Remote Radio Head Unit (RRH or RRU)			**Antenna Specifications**			
Model FCC Band	Frequency (MHz)†/ Technology	# Tx X Output Power (watts)‡	Number Manufacturer/ Model	Gain (dBi)	**ERP** (watts)⁂	Centerline Height ('AGL)
CRAN_RCTB_00073_665						
RRUS-4490 B12A	729-745 LTE / PCS	4 X 60	Galtronics / GQ2418-06941	3.0	292	29'6"
RRUS-4890 B2	1930-1945 LTE / PCS	4 X 60		8.9	1136	
RRUS-4890 B25	2100-2200 AWS	4 X 60		8.9	1136	

Table Notes

† Transmitter (Tx) Frequency: Central transmit frequency used to account for multiple channels.
‡ Maximum rated output power (per channel).
⁂ **ERP**: ERP It is equal to the input power to the antenna multiplied by the gain of the antenna.

THEORETICAL RF FIELD CALCULATIONS METHODOLOGY- GROUND LEVELS

These calculations are based on what are called "worst-case" estimates. That is, the estimates assume 100% use of all transmitters simultaneously. Any deviation in height along the azimuths from the ground elevation was factored mathematically into calculations involving height above ground. However, the curvature of the Earth was neglected.

The calculations are based on the following information:

1. Effective Radiated Power (ERP) (See Table 2 and Appendix A data).
2. Antenna height (centerline, above ground level (AGL)).
   Trigonometry was used to calculate the resultant "RANGE" and antenna depression angle.
3. Antenna vertical energy patterns; the source of the negative gain (G) values. See Appendix B.
   Most antennas, even so-called "omni-directional" antennas, are designed to focus the RF signal, resulting in "patterns" of signal loss and gain. Antenna vertical energy patterns display the loss of signal strength relative to the direction of propagation due to elevation angle changes.

The magnitude of the RF field (the power density (S)) from an isotropic RF source is calculated making use of the power density formula as outlined in FCC's OET Bulletin 65, Edition 97-01: [vii]

$$S = \frac{P \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:
P → Power to antenna (watts)
G → Gain of antenna
R → Distance (range) from antenna source to point of intersection with the ground (feet)
$R^2 = (\text{Height})^2 + (\text{Horizontal distance})^2$

Since: P · G = EIRP (Effective Isotropic Radiated Power), and for the situation of off-axis power density calculations, apply the negative elevation gain (G^E) value from the vertical energy patterns with the following formula:

$$S = \frac{EIRP \cdot G^E}{4 \cdot \pi \cdot R^2}$$

Ground reflections may add in-phase with the direct wave, and essentially double the electric field intensity. Because power density is proportional to the *square* of the electric field, the power density <u>may</u> quadruple, that is, increase by a factor of four (4). Since ERP is routinely used, convert ERP into EIRP by multiplying by the factor of 1.64 (the gain of a ½-wave dipole relative to an isotropic radiator).

$$S = \frac{4 \cdot (ERP \cdot 1.64) \cdot G^E}{4 \cdot \pi \cdot R^2} = \frac{ERP \cdot 1.64 \cdot G^E}{\pi \cdot R^2} = \frac{0.522 \cdot ERP \cdot G^E}{R^2}$$

To calculate the % MPE, use the formula:

$$\% \text{ MPE} = \frac{S}{MPE} \cdot 100$$

Note that any loss along the <u>horizontal</u> direction was neglected, which means the results would be the maximum values in any direction. The resultant values are thus conservative in that they over predict actual resultant power densities. The data used to prepare the theoretical RF field calculations are outlined in Table 2.

RESULTS

The results of the %MPE calculations for the summation of the proposed AT&T Mobility RF emissions are depicted in Figure 4 as plotted against linear distance from the base of the host utility pole in South Hamilton, MA. The values have been calculated for a height of six feet above ground level in accordance with regulatory rationale. Any deviation from ground level height along the azimuth representing the "worst case" ground height differential was considered, and plotted.

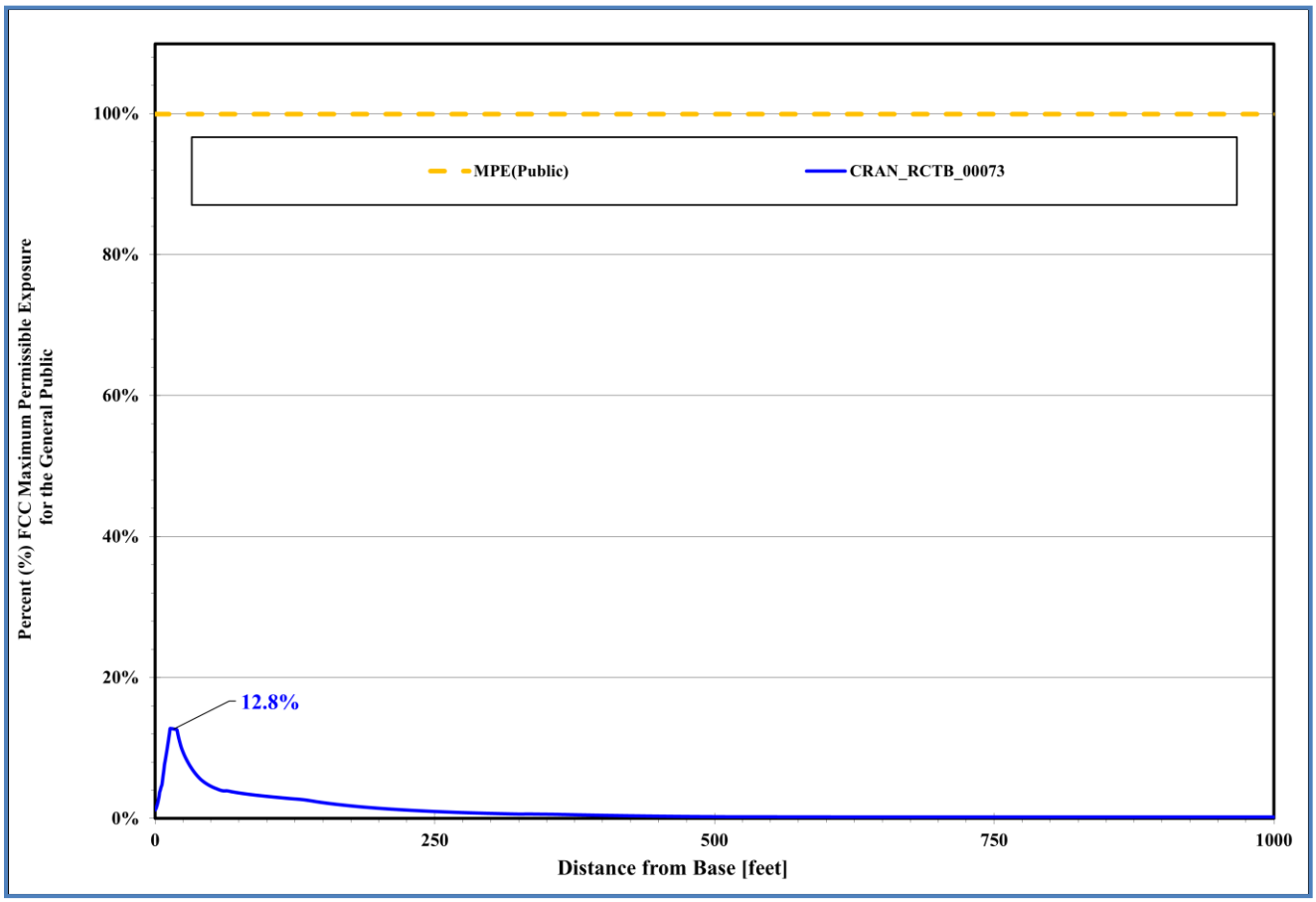


Figure 4: Theoretical Cumulative Percent MPE - vs. - Distance
Maximum PWS RF Emissions in ANY Direction
AT&T Mobility Site # CRAN_RCTB_00073_665 in South Hamilton, MA

CONCLUSION

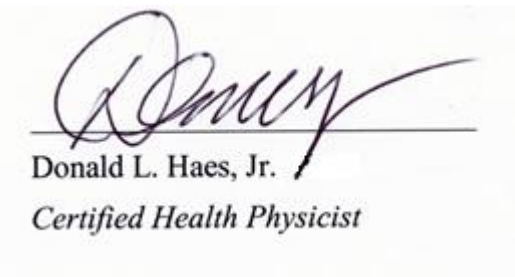
Theoretical RF field calculations data indicate the summation of the proposed AT&T Mobility PWS contributions at the proposed Small Cell facility in South Hamilton, MA, would be within the established RF exposure guidelines; see Figure 4. This includes all publicly accessible areas, and the surrounding neighborhood in general. The results support compliance with the pertinent sections of the Massachusetts Department of Public Health regulations regarding PWS facilities, and the FCC's guidelines for RF exposure.

The number and duration of calls passing through PWS facilities cannot be accurately predicted. Thus, to estimate the highest RF fields possible from operation of these installations, the maximal amount of usage was considered. Even in this so-called "worst-case," the resultant increase in RF field levels is far below established levels considered safe.

Based on the results of the theoretical RF fields I have calculated; it is my expert opinion that the proposed Small Cell facility would comply with all regulatory guidelines for RF exposure with the proposed AT&T Mobility antenna and transmitter installations.

Feel free to contact me if you have any questions.

Sincerely,



Donald L. Haes, Jr.
Certified Health Physicist

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Radiation Safety Specialist

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STATEMENT OF CERTIFICATION

1. I certify to the best of my knowledge and belief that the statements of fact contained in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions, and conclusions.

3. I have no present or prospective interest in the property that is the subject of this report, and I have no personal interest or bias with respect to the parties involved.

4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

5. This assignment was not based on a requested minimum environmental energy level or specific power density.

6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.

8. My analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the *American Board of Health Physics* (ABHP) statements of standards of professional responsibility for Certified Health Physicists.

Date: August 27, 2025

Donald L. Haes, Jr.

Certified Health Physicist

DONALD L. HAES, JR., CHP

Radiation Safety Specialist

PO Box 198, Hampstead, NH 03841 617-680-6262 Email: donald_haes_chp@comcast.net

SUMMARY OF QUALIFICATIONS

- **Academic Training -**
  - Graduated from Chelmsford High School, Chelmsford, MA; June 1973.
  - Completed Naval Nuclear Power School, 6-12/1976.
  - Completed Naval Nuclear Reactor Plant Mechanical Operator and Engineering Laboratory Technician (ELT) schools and qualifications, Prototype Training Unit, Knolls Atomic Power Laboratory, Windsor, Connecticut, 1-9/1977.
  - Graduated Magna Cum Laude from University of Lowell with a Bachelor of Science Degree in *Radiological Health Physics*; 5/1987.
  - Graduated from University of Lowell with a Master of Science Degree in *Radiological Sciences and Protection*; 5/1988.

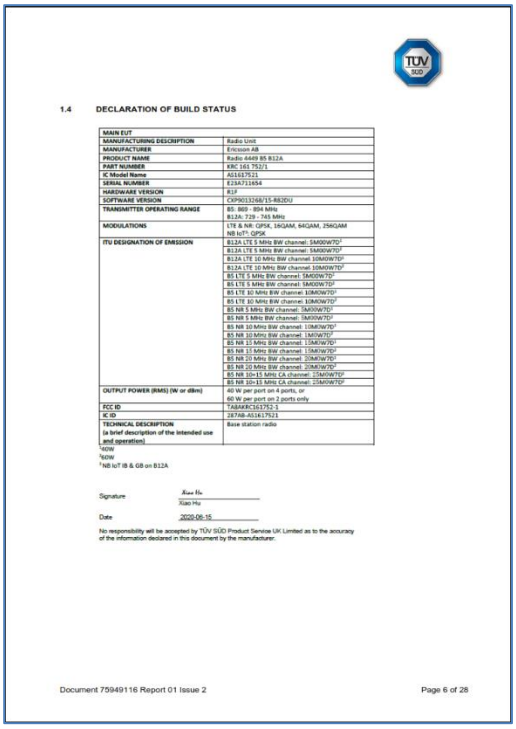
- **Certification -**
  - Board Certified by the American Board of Health Physics 1994; renewed 1998, 2002, 2006, 2010, 2014, 2018, and 2022. Expiration 12/31/2026.
  - Board Certified by the Board of Laser Safety 2008; renewed 2011, 2014, 2017, 2020, 2023. Expiration 12/31/2026.

- **Employment History -**
  - Consulting Health Physicist; Ionizing/Nonionizing Radiation, 1988 - present.
  - Radiation, RF and Laser Safety Officer; BAE Systems, 2005–2018 (retired).
  - Assistant Radiation Safety Officer; MIT, 1988 – 2005 (retired).
  - Radiopharmaceutical Production Supervisor - DuPont/NEN, 1981 – 1988 (retired).
  - United States Navy; Nuclear Power Qualifications, 1975 – 1981 (Honorably Discharged).

- **Professional Societies -**
  - Health Physics Society [HPS].
  - American Academy of Health Physics [AAHP]
  - Institute of Electrical and Electronics Engineers [IEEE];
  - International Committee on Electromagnetic Safety [ICES] (ANSI C95 series).
  - Laser Institute of America [LIA].
  - Board of Laser Safety [BLS].
  - American National Standards Institute Accredited Standards Committee [ASC Z136].
  - Committee on Man and Radiation [COMAR].

APPENDIX A

SPECIFIC REMOTE RADIO HEAD UNITS



1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Unit
MANUFACTURER	Ericsson AB
PRODUCT NAME	Radio 4449 B5 B12A
PART NUMBER	KRC 161 752/1
IC Model Name	AI1617521
SERIAL NUMBER	E23A711654
HARDWARE VERSION	R1F
SOFTWARE VERSION	CXP9013268/15-R8J0U
TRANSMITTER OPERATING RANGE	B5: 869 - 894 MHz B12A: 729 - 745 MHz
MODULATIONS	LTE & NR: QPSK, 16QAM, 64QAM, 256QAM NB IoT[1]: QPSK
ITU DESIGNATION OF EMISSION	B12A LTE 5 MHz BW channel: 5M00W7D[2] B12A LTE 5 MHz BW channel: 5M00W7D[2] B12A LTE 10 MHz BW channel 10M0W7D[2] B12A LTE 10 MHz BW channel 10M0W7D[2] B5 LTE 5 MHz BW channel: 5M00W7D[2] B5 LTE 5 MHz BW channel: 5M00W7D[2] B5 LTE 10 MHz BW channel: 10M0W7D[2] B5 LTE 10 MHz BW channel: 10M0W7D[2] B5 NR 5 MHz BW channel: 5M00W7D[2] B5 NR 5 MHz BW channel: 5M00W7D[2] B5 NR 10 MHz BW channel: 10M0W7D[2] B5 NR 10 MHz BW channel: 10M0W7D[2] B5 NR 15 MHz BW channel: 15M0W7D[2] B5 NR 15 MHz BW channel: 15M0W7D[2] B5 NR 20 MHz BW channel: 20M0W7D[2] B5 NR 20 MHz BW channel: 20M0W7D[2] B5 NR 10+15 MHz CA channel: 25M0W7D[2] B5 NR 10+15 MHz CA channel: 25M0W7D[2]
OUTPUT POWER (RMS) (W or dBm)	40 W per port on 4 ports, or 60 W per port on 2 ports only
FCC ID	TA8ARC161752-1
IC ID	287AB-AI1617521
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Base station radio

[1]60W
[2]60W
[1] NB IoT IB & GB on B12A

Signature: Xiao Hu
Xiao Hu

Date: 2020-06-15

No responsibility will be accepted by TÜV SÜD Product Service UK Limited as to the accuracy of the information declared in this document by the manufacturer.

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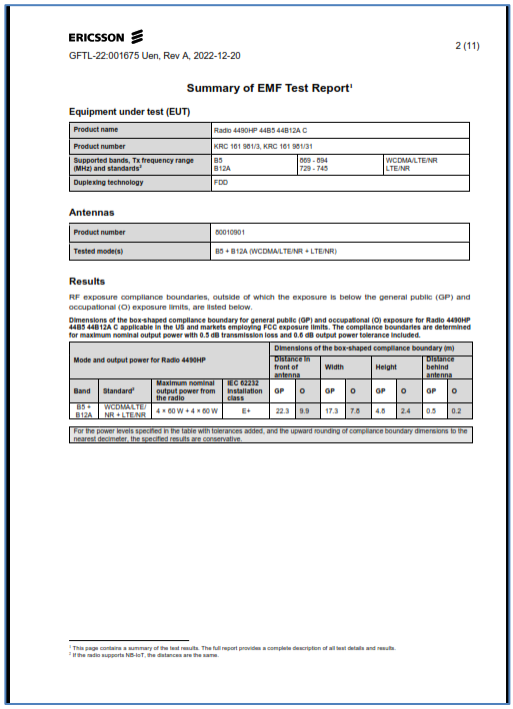
Ericsson Model 4449 RRH B5 & B12



ERICSSON
GFTL-22:001675 Uen, Rev A, 2022-12-20 2 (11)

Summary of EMF Test Report[1]

Equipment under test (EUT)

Product name	Radio 4490HP 44B5 44B12A C		
Product number	KRC 161 951/3, KRC 161 951/31		
Supported bands, Tx frequency range (MHz) and standards[2]	B5 B12A	869 - 894 729 - 745	WCDMA/LTE/NR LTE/NR
Duplexing technology	FDD		

Antennas

Product number	50010901
Tested mode(s)	B5 + B12A (WCDMA/LTE/NR + LTE/NR)

Results

RF exposure compliance boundaries, outside of which the exposure is below the general public (GP) and occupational (O) exposure limits, are listed below.

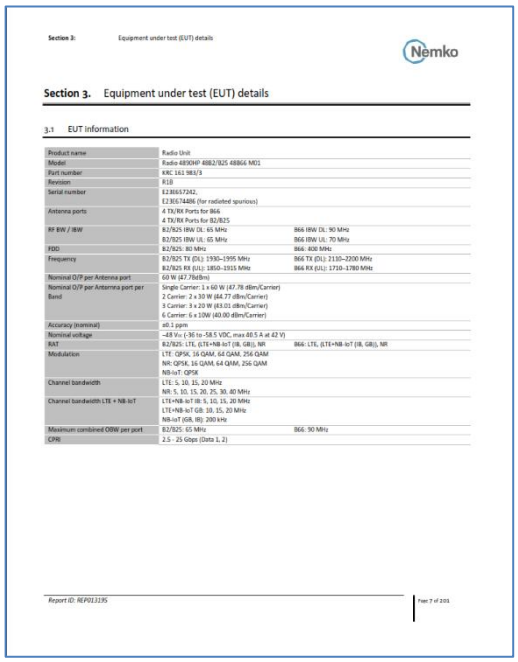
Dimensions of the box-shaped compliance boundary for general public (GP) and occupational (O) exposure for Radio 4490HP 44B5 44B12A C applicable in the US and markets employing FCC exposure limits. The compliance boundaries are determined for maximum nominal output power with 0.5 dB transmission loss and 0.6 dB output power tolerance included.

Mode and output power for Radio 4490HP				Dimensions of the box-shaped compliance boundary (m)							
				Distance in front of antenna		Width		Height		Distance behind antenna	
Band	Standard[2]	Maximum nominal output power from the radio	IEC 62232 installation class	GP	O	GP	O	GP	O	GP	O
B5 + B12A	WCDMA/LTE/NR + LTE/NR	4 × 60 W + 4 × 60 W	E+	22.3	9.9	17.3	7.6	4.8	2.4	0.5	0.2

For the power levels specified in the table with tolerances added, and the upward rounding of compliance boundary dimensions to the nearest decimeter, the specified results are conservative.

[1] This page contains a summary of the test results. The full report provides a complete description of all test details and results.
[2] If the radio supports NB-IoT, the distances are the same.

Ericsson Model 4490 RRH B5 & B12A



Section 3: Equipment under test (EUT) details

Nemko

Section 3. Equipment under test (EUT) details

3.1 EUT information

Product name	Radio Unit	
Model	Radio 4890HP 4882/825 4886G M01	
Part number	KRC 161 982/3	
Revision	R1B	
Serial number	E23E67242, E23E67486 (for radiated spurious)	
Antenna ports	4 TX/RX Ports for B66 4 TX/RX Ports for B2/B25	
RF BW / IBW	B2/B25 IBW DL: 65 MHz B2/B25 IBW UL: 65 MHz	B66 IBW DL: 90 MHz B66 IBW UL: 70 MHz
FDD	B2/B25: 80 MHz	B66: 400 MHz
Frequency	B2/B25 TX (DL): 1930–1995 MHz B2/B25 RX (UL): 1850–1915 MHz	B66 TX (DL): 2110–2200 MHz B66 RX (UL): 1710–1780 MHz
Nominal O/P per Antenna port	60 W (47.78dBm)	
Nominal O/P per Antenna port per Band	Single Carrier: 1 x 60 W (47.78 dBm/Carrier) 2 Carrier: 2 x 30 W (44.77 dBm/Carrier) 3 Carrier: 3 x 20 W (43.01 dBm/Carrier) 6 Carrier: 6 x 10W (40.00 dBm/Carrier)	
Accuracy (nominal)	±0.1 ppm	
Nominal voltage	−48 Vₙ (−36 to −58.5 VDC, max 40.5 A at 42 V)	
RAT	B2/B25: LTE, (LTE+NB-IoT (IB, GB)), NR	B66: LTE, (LTE+NB-IoT (IB, GB)), NR
Modulation	LTE : QPSK, 16 QAM, 64 QAM, 256 QAM NR: QPSK, 16 QAM, 64 QAM, 256 QAM NB-IoT: QPSK	
Channel bandwidth	LTE: 5, 10, 15, 20 MHz NR: 5, 10, 15, 20, 25, 30, 40 MHz	
Channel bandwidth LTE + NB-IoT	LTE+NB-IoT IB: 5, 10, 15, 20 MHz LTE+NB-IoT GB: 10, 15, 20 MHz NB-IoT (GB, IB): 200 kHz	
Maximum combined OBW per port	B2/B25: 65 MHz	B66: 90 MHz
CPRI	2.5 - 25 Gbps (Data 1, 2)	

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Ericsson Model 4890 RRH B25 & B66

APPENDIX B
ANTENNA SPECIFICATIONS & ENERGY PATTERNS

GALTRONICS / GQ2418-06941

GALTRONICS
WE'RE MAKING WAVES™

2' 18-Port Quasi-Omni Pattern Canister Antenna [698-896, 1695-2690, 3400-3800 and 5150-5925 MHz]

GQ2418-06941

Description:

- Quasi-Omni Canister Antenna for Outdoor DAS and Small Cells
- 4x ports for Low Band 698-896 MHz
- 8x ports for AWS/PCS/WCS Band 1695-2690 MHz
- 4x ports for CBRS Band 3400-3800 MHz
- 2x ports for U-NII Band 5150-5925 MHz*

698-896, 1695-2690, 3400-3800 and 5150-5925 MHz
18-Port Quasi-Omni Pattern Canister Antenna

*Compliant to 789033 D02 General U-NII Test Procedures New Rules v01r04: The antenna meets current U-NII-1 requirements for gain and upper side-lobe performance. Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Sub-part E

Electrical Specifications

Frequency Band [MHz]	698-806	806-896	1695-2180	2305-2360	2496-2690	3400-3800	5150-5925
Input Connector Type	4x 4.3-10(F)		8x 4.3-10(F)			4x 4.3-10(F)	2x 4.3-10(F)
Isolation (min.)	20 dB						
VSWR (max.) /RL (min.)	1.5:1 / 14.0 dB						
Impedance	50 Ω						
Polarization	Dual slant 45° (±45°)						
Horizontal Beamwidth	Omni (360°)						
Vertical Beamwidth	87.9°	81.3°	22.2°	18.2°	16.4°	25.5°	22.0°
Gain (max.)	3.8 dBi	4.0 dBi	8.9 dBi	9.8 dBi	9.8 dBi	7.8 dBi	5.5 dBi
Gain (avg.)	3.0 dBi	3.1 dBi	7.4 dBi	8.4 dBi	8.4 dBi	7.1 dBi	4.7 dBi
Downtilt	0° Fixed						
Max Power / Port	100 Watts					50 Watts	1 Watt
PIM @ 2x43 dBm	<-153 dBc					N/A	N/A

Mechanical Specifications

Operating Temperature	-40° to 158°F (-40° to +70°C)
Antenna Weight	26.3 lbs (11.95 kg)
Antenna Diameter	16.0" (406.4 mm)
Antenna Height	24.0" (609.6 mm)
Radome Material	ASA
Radome Color	Gray, Brown and Black
Ingress Protection	Outdoor (IP65)
Wind Survival Rating	150 mph (241 km/h)

RFD#: 6941 ; Revision: R4 ; Release Date: May 06, 2020

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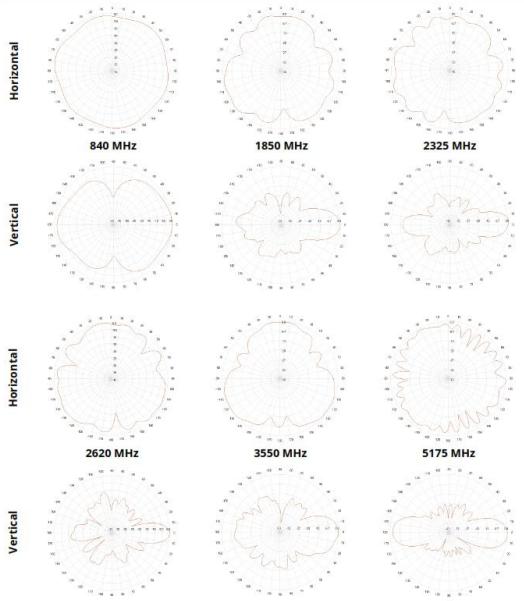
GALTRONICS
WE'RE MAKING WAVES™

2D Antenna Patterns



RFD#: 6941 ; Revision: R4 ; Release Date: May 06, 2020

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www.galtronics.com

REFERENCES

[i]. Federal Register, Federal Communications Commission Rules; *Radiofrequency radiation; environmental effects evaluation guidelines* Volume 1, No. 153, 41006-41199, August 7, 1996. (47 CFR Part 1; Federal Communications Commission).

[ii]. Telecommunications Act of 1996, 47 USC; Second Session of the 104th Congress of the United States of America, January 3, 1996.

[iii]. 105 CMR 122.000: Massachusetts Department of Public Health, *Non-Ionizing Radiation Limits for: The General Public from Non-Occupational Exposure to Electromagnetic Fields, Employees from Occupational Exposure to Electromagnetic Fields, and Exposure from Microwave Ovens*.

[iv]. IEEE C95.1-1999: Institute of Electrical and Electronics Engineers (IEEE), *Safety levels with respect to human exposure to radio frequency electromagnetic fields, from 3 kHz to 300 GHz* (Updated in 2020 as C95.1-2019/Cor 2-2020™ *Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz, Corrigenda 2*).

[v]. National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.

[vi]. Federal Register, Federal Communications Commission Rules; Vol. 85, No. 63 / Wednesday, April 1, 2020 / Rules and Regulations 18145.

[vii]. OET Bulletin 65: Federal Communications Commission Office of Engineering and Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*; Edition 97-01, August 1999.