

Compliance Report

Horizon Compact Human Exposure to Radio Frequency Electromagnetic Fields

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Approvals

This document has been read and approved by the following departments responsible for its implementation

Systems Engineering

Date

PLM

Date

Project Management

Date

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Table of Contents

1.	REVISION HISTORY	4
2.	RELAVENT DOCUMENTS	5
3.	INTRODUCTION	6
4.	COMPLIANCE BOUNDARIES	6
4.1	... EXAMPLE CALCULATION	8
5.	SECTION OF MANUAL DEALING WITH RF SAFETY	9

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1. REVISION HISTORY

Rev.	Date	Author	Changes
1.0	15 Feb, 2011	D. Hindson	Initial Development

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2. RELAVENT DOCUMENTS

- [1] EN 50384, “Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems with basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 MHz – 40 GHz) – Occupational”, August 2002.
- [2]] EN 50385, “Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems with basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 MHz – 40 GHz) – General Public”, August 2002.
- [3] EN 50383, “Basic standard for the calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz – 40 GHz), August 2002.
- [4] International Commission on Non-Ionizing Radiation Protection (1998), Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). Health Physics 74, 494-522.
- [5] Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), Official Journal L 197 of 30 July 1999.
- [6] Horizon Compact Product Manual - Release 1.04.05 - Volume 1 - 83-000027-01-01-11

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3. INTRODUCTION

This document describes the compliance of the Horizon Compact family of point-to-point radios to the restrictions related to occupational and general public exposure to radio frequency electromagnetic fields based on [1] and [2].

4. COMPLIANCE BOUNDARIES

The Horizon Compact (HC) family of point-to-point radio products are designed to operate with parabolic antennas ranging from 30 cm to 3m in diameter. The HC radio mounts directly to the parabolic antenna. Table ### Provides the part numbers and maximum transmit powers of the HC radios. The compliance boundaries were determined for reference levels defined in [4] and [5] of 50 and 10 W/m² for occupational and the general public respectively. The method of calculation was that of [3] using the cylindrical wave model (§8.3.4). For all of the HC radios the compliance boundaries fall within the reactive near field of the attached antenna. The calculated distances at which the reference level power flux densities are met are provided in Table 1. The calculations were performed with a transmit power 1 dB higher than the maximum transmit power shown in Table 1 to account for manufacturing tolerances.

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Table 1 Compliance Boundaries

Horizon Compact Description	Part Numbers	Maximum Transmit Power (dBm)	Compliance Boundary Distance (D) General Public (m)	Compliance Boundary Distance (D) Occupational (m)
38 GHz	CHHP38B## CLHP38B##	21	1.64	0.33
32 GHz	CHHP32B## CLHP32B##	24	2.76	0.55
28 GHz	CHHP28B## CLHP28B##	25	3.04	0.61
26 GHz	CHHP26B## CLHP26B##	27	4.48	0.90
23 GHz HP	CHHP23B## CLHP23B##	27	3.96	0.79
23 GHz SP	CHSP23B## CLSP23B##	17	0.40	0.08
18 GHz HP	CHHP18B## CLHP18B##	27	3.10	0.62
18 GHz SP	CHSP18B## CLSP18B##	17	0.31	0.06
15 GHz	CHHP15B## CLHP15B##	27	2.58	0.52
13 GHz	CHHP13B## CLHP13B##	27	2.24	0.45
11 GHz	CHHP11B## CLHP11B##	27	1.89	0.38
10.5 GHz	CHHP10B1# CLHP10B1#	27	1.81	0.36
U8 GHz	CHHPU8B## CLHPU8B##	30	2.92	0.58
L8 GHz	CHHPL8B## CLHPL8B##	30	2.75	0.55
H7 GHz	CHHPH7B## CLHPH7B##	30	2.68	0.54
U7 GHz	CHHPU7B## CLHPU7B##	30	2.68	0.54
L7 GHz	CHHPL7B## CLHPL7B##	30	2.40	0.48
U6 GHz	CHHPU6B## CLHPU6B##	30	2.34	0.47
L6 GHz	CHHPL6B## CLHPL6B##	32	3.27	0.65

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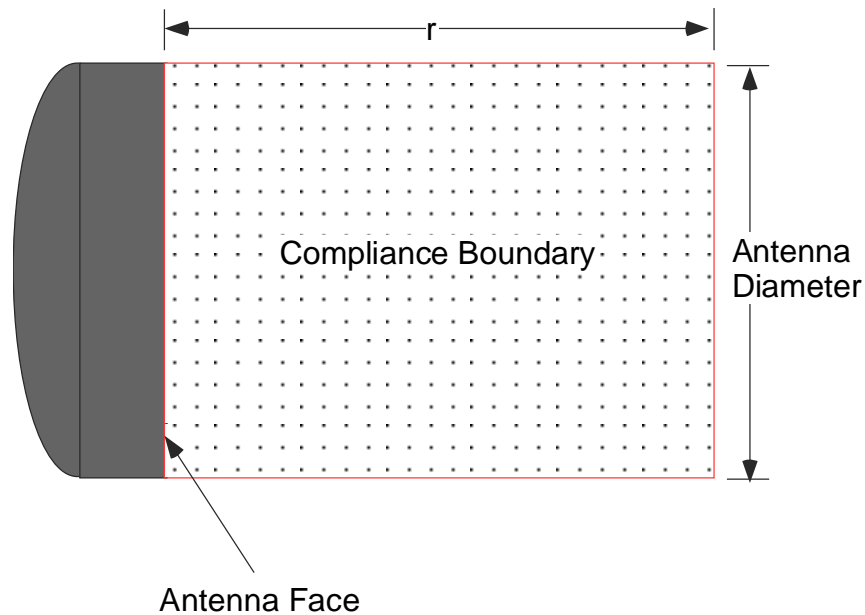


Figure 1 Compliance Boundary Definition

4.1. Example Calculation

$$S = 180 * P / (\pi D r \delta)$$

$$S = 10 \text{ W/m}^2 \text{ for the general public}$$

Assuming:

A 1m diameter parabolic antenna

A 26 GHz radio with 27 dBm transmit power and 1 dB of production margin

$$\lambda = 0.2998 / 26 = 0.0115 \text{ m}$$

1m 26 GHz parabolic antenna – 3dB beamwidth is approximated as:

$$\delta = 70 \lambda / D = 0.81^\circ$$

solving for r

$$r = 180 * 10^{((27+1)/10)} / (\pi * 1 * 0.81 * 10) = 4.48 \text{ m}$$

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5. SECTION OF MANUAL DEALING WITH RF SAFETY

Below are excerpts from the Horizon Compact manual [6] dealing with RF safety.

Safety Information for Radio Equipment

The Federal Communications Commission (FCC), with its action in ET Docket 96-8, has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC-certified equipment. DragonWave Horizon Compact meets the uncontrolled environmental limits found in OET-65, ANSI C95.1, 1991 and Health Canada Safety Code 6. Proper operation of this radio according to the instructions found in this manual or any other product manuals or user guides for the DragonWave family of products or equipment will result in user exposure that is substantially below the FCC/IC recommended limits.

1. Do not touch or move antenna(s) while the unit is transmitting or receiving.
2. Do not hold any component containing the radio in such a way that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while the unit is transmitting.
3. Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.

The design of the high-gain mast mount antennas is such that professional installation is required.

Professional Installation

DragonWave Horizon Compact devices require professional installation. It is the responsibility of the installer to be sure that all building and safety codes are met and that the installation is complete and secure.

The Horizon Compact shall be installed according to local Electrical Safety Codes.

For Canadian installations, the entire equipment installation must comply with Canadian Standard CSA 22.2, No. 60950, Safety of Information Technology Equipment. For installations in the United States, the entire equipment installation must be in accordance with Article 810 of the United States National Electrical Code.

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Radio Frequency Safety

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF fields in excess of the general population limits as defined by FCC CFR 47, Part 2.1091, Radiofrequency radiation exposure evaluation for fixed devices & Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb.

RF Radiation Safety Information

The antenna must be located such that humans will not approach within 10m of the forward transmitting direction of the antenna and 0.46m in all other directions. This distance provides additional safety margin for the product, as well as minimizing exposure to microwaves.

These calculations were done in accordance with:

1. FCC Radio Frequency Exposure Limits 1.1310
2. Health Canada Safety Code 6 / Industry Canada RSS 102
3. EMF Exposure Directive (99/519/EC)

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