

Document Type	Technical Report
Project	Liberator-V100 and Liberator-V1000
Date	26 March 2014
Author	Clem Fisher
Title	Human Safety Assessment against FCC OET Bulletin 65
Classification	Sub10 Confidential

Abstract

This report contains the results of evaluating the Liberator product range against the requirements of FCC OET Bulletin 65 and recommends minimum separation distances from the product to the general public in all installations.

The recommendations of this analysis are included in the User Manual for the products.

Revision History

Version	Date	Author	Description
00V01	26 March 2014	Clem Fisher	First Draft

Contents

1	Scope.....	4
2	Reference Documents	4
3	Applicable Limits.....	4
4	Results of Analysis	5
5	Recommendation	5

1 Scope

This report contains the results of evaluating the Liberator product range against the requirements of FCC OET Bulletin 65 and recommends minimum separation distances from the product to the general public in all installations

2 Reference Documents

There are regulations defining limits for exposure of the general public to non-ionising radiation which are produced by radio transmitters. This is called RF Exposure

The documents applicable here are :

- [1] US Code of Federal Regulations, in particular the policies, guidelines and requirements in Part 1 of Title 47 of the CFR. See (www.fcc.gov)
- [2] Guidelines and recommendations for evaluating compliance contained in FCC Bulletin 65
- [3] ICNIRP Guidelines for Limiting Exposure to Time Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz); see www.icnirp.de/
- [4] Safety Code 6 on the Health Canada Website www.hc-sc.gc.ca/

3 Applicable Limits

The limits to be applied depend on the operating frequency of the transmitter

All the reference documents agree that exposure limits for the general public in the band around 60GHz are that the applicable limit should be the RF Power Density level. The general population should not be exposed to a level $\geq 10\text{W/m}^2$.

Reference [2] provides a simple method of calculating the exposure level at different separation distances and this can be used to identify the minimum separation distance from the product to any member of the general public

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

Where:

RF Power Density (S) in metre

Transmitted Power (P) in Watt

Antenna Gain (G) as a linear number

Separation distance in metre

4 Results of Analysis

The power levels used below are the maximum levels recorded in the Formal Test Report to Part 15.255_TRA-015579WUS1 from TRaC Global.

Operating Mode	Antenna Gain		Maximum Power Level		Separation Distance (m) for S = 10W/m2	Recommended Separation Distance (m)
	dBi	Linear	dBm	W		
V100	38	6310	11.6	0.0145	0.85	1
V1000	38	6310	10.9	0.0123	0.79	1

At the recommended separation distance, the power density is 1.4 to 1.6 times lower than the limit.

Note

The analysis above is very conservative as it is based on point source radiation and not a practical point to point, narrow beam antenna. It should be noted that the full antenna gain of 38dBi is not achieved until the separation distance is 6m or more

5 Recommendation

Sub10 Systems recommends (in its User Guide) that a minimum separation distance of 1m (from the equipment to the general public) should be ensured in all installations