

FCC and IC Test report for parts 22 and 27, subparts § 22.359 and § 27.53

(Transmitter spurious emissions only)

Product name : Luminaire controller
Applicant : Flashnet SA
FCC ID : XMR2021BG770AGL

Test report No. : P000191762 01 Ver 1.00

Laboratory information

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Documentation

The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 10 years at Telefication Netherlands.

Testing Location

Test Site	Kiwa Telefication BV
Test Site location	Wilmersdorf 50 7327 AC Apeldoorn The Netherlands Tel. +31 88998 3393
Test Site FCC	NL0001
CABID	NL0001

Revision History

Version	Date	Remarks	By
v0.50	18-07-2022	First draft	PS
v1.00	06-09-2022	Final version	KK

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Summary of Test results

FCC	Description	Section in report	Verdict
22.359 (a) 27.53 (h) (1)	Radiated spurious emissions	3.1	Pass

1 General Description

1.1 Applicant

Client name: Flashnet SA
Address: Fundatura Harmanului 4A
Zip code: 500240 Brasov Romania
Telephone: 004 0735 206 031
E-mail: mihaly.aniko@flasshnet.ro
Contact name: Ms Aniko MIHALY

1.2 Manufacturer

Manufacturer name: Flashnet SA
Address: Fundatura Harmanului 4A
Zip code: 500240 Brasov Romania
Telephone: 004 0735 206 031
E-mail: mihaly.aniko@flasshnet.ro
Contact name: Ms Aniko MIHALY

1.3 Tested Equipment Under Test (EUT)

Product name: Luminaire controller
Brand name: inteliLIGHT
FCC ID: XMR2021BG770AGL
Product type: Lighting controller
Model(s): FRE-220-NEMA-NB1-M1-G
Batch and/or serial No. 0001
Software version: 4226
Hardware version: V4
Date of receipt: 06-07-2022
Tests started: 06-07-2022
Testing ended: 22-07-2022

1.4 Product specifications of Equipment under test

Frequency bands:	LTE Cat M1: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/B66 LTE Cat NB1: B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/B25/B28/B66
Antenna type	FPC (Flexible Printed Circuit)
Antenna gain	1.5 dBi (1730 MHz); 1.2 dBi (830 MHz)
Type of modulation:	OFDM (64 QAM)
Emission designator	1M12G7D (NBIoT); 1M11G7D (LTE)

1.5 Environmental conditions

Test date	07-07-2022	22-07-2022
Ambient temperature	22.4°C	20.9°C
Humidity	44.8%	59.9%

1.6 Measurement standards

- ANSI C63.26:2015
- ANSI C63.4:2014

1.7 Applicable standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 22 Subpart C §22.359 (a)
- FCC Part 27 Subpart C §27.53 (h) (1)

1.8 Observation and remarks

The EUT has an FCC certified RF module embedded in it, namely Quectel BG770A-GL with FCC ID XMR2021BG770AGL, so only radiated spurious emissions are tested.
Tests are performed on a representative selection of operating frequency bands.

1.9 Conclusions

The sample of the product showed **NO NON-COMPLIANCES** to the specifications stated in paragraph 1.7 of this report.

The results of the test as stated in this report, are exclusively applicable to the product items as identified in this report. Telefication accepts no responsibility for any properties of product items in this test report, which are not supported by the tests as specified in paragraph 1.7 "*Applicable standards*".

All conducted tests are performed by:

Name : ing P.A. Suringa

Review of test methods and report by:

Name : Roy van Barneveld

The above conclusions have been verified by the following signatory:

Date : 09-09-2022

Name : ing. R. van Barneveld

Function : Test Engineer

Signature :

A handwritten signature in blue ink, consisting of a stylized 'R' followed by a horizontal line.

2 Test configuration of the Equipment Under Test

2.1 Test mode

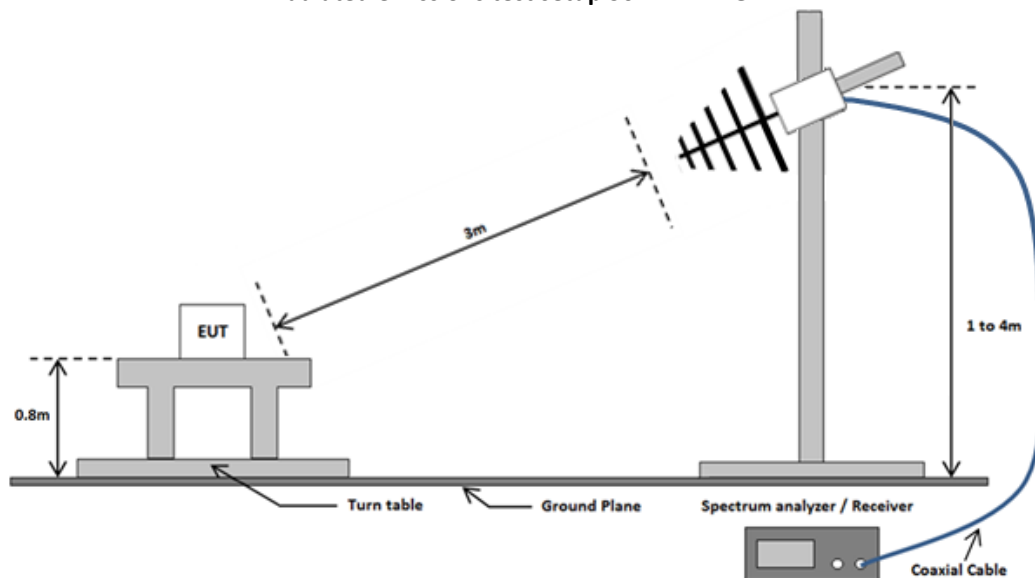
The equipment is configured to transmit continuously.

Tested channels/bands

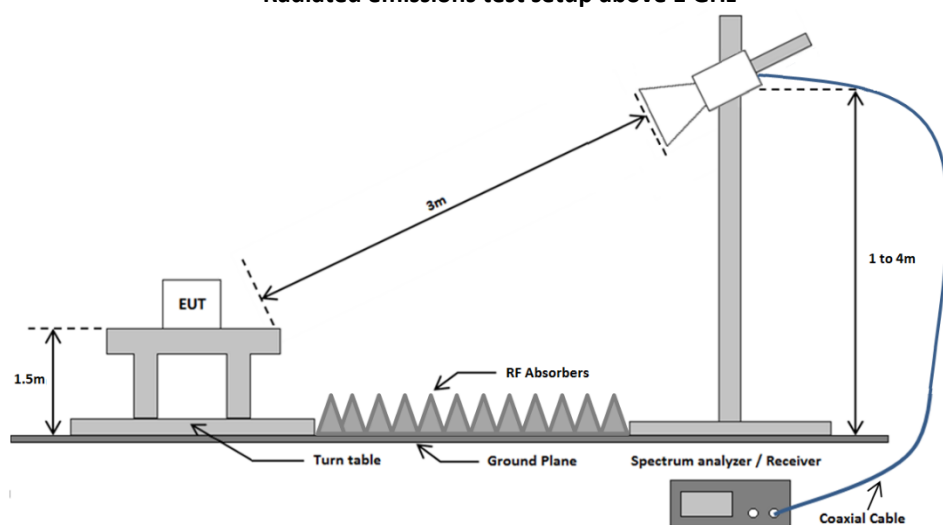
Technology	Band	Uplink Frequency range (MHz)	Tested channel (MHz)
LTE	5	835 - 845	836.5
NB-IoT	B4	1710 - 1755	1732.5

2.2 Test setups

Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



2.3 Equipment used in the test configuration

Description	Manufacturer	Model	ID	Used at Par.	Cal date	Due Cal date
Spectrum analyzer	Rohde & Schwarz	FSP40	TE 11125	3.1	2022/03	2023/03
Measurement receiver	Rohde & Schwarz	ESR7	TE 01220	3.1	2022/02	2023/01
Biconical antenna	Schwarzbeck	VHA9103	114436	3.1	2021/03	2026/03
Logper antenna	EMCO	3147	114385	3.1	2021/02	2021/02
Horn antenna	EMCO	3115	TE 00531	3.1	2021/01	2024/01
Preamplifier	μComp	MCNA-40-001080	TE 11175	3.1	NA	NA
Semi-Anechoic room	ETS Lindgren	SAR	114624	3.1	NA	NA
Test software	DARE	Radimation Version 2021.1.9	--	3.1, 3.2	--	--
AC source	Chroma	612601	TE02001	3.2	2022/01	2023/03

2.4 Sample calculations

All formulas for data conversions and conversion factors are reported in chapter 4 of this test report.

3 Test results

3.1 Radiated spurious emissions

3.1.1 Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB

Absolute limit calculation:

P = 23 dBm = 0.2 W

$$\text{limit} = 23 \text{ dBm} - [43 + 10 * \log_{10}(0.2)] \text{ dB} = -13 \text{ dBm}$$

3.1.2 Measurement instruments

The measurement instruments are listed in chapter 2.3 of this report.

3.1.3 Test setup

The test setup is as shown in chapter 2.2 of this report.

3.1.4 Test procedure

30 MHz to 26.5 GHz: According to ANSI C63.26-2015, section 5.5

30 MHz to 1 GHz: IRN 026 – Method 1

1 GHz to 18 GHz: IRN 026 – Method 2

3.1.5 Measurement Uncertainty

Frequency range	Polarization	Uncertainty
30 – 200 MHz	Horizontal	±4.5 dB
	Vertical	±5.4 dB
200 -1000 MHz	Horizontal	±3.6 dB
	Vertical	±4.6 dB
1 – 18 GHz	Horizontal	±5.7 dB
	Vertical	±5.7 dB

3.1.6 Results of the radiated spurious emissions measurement

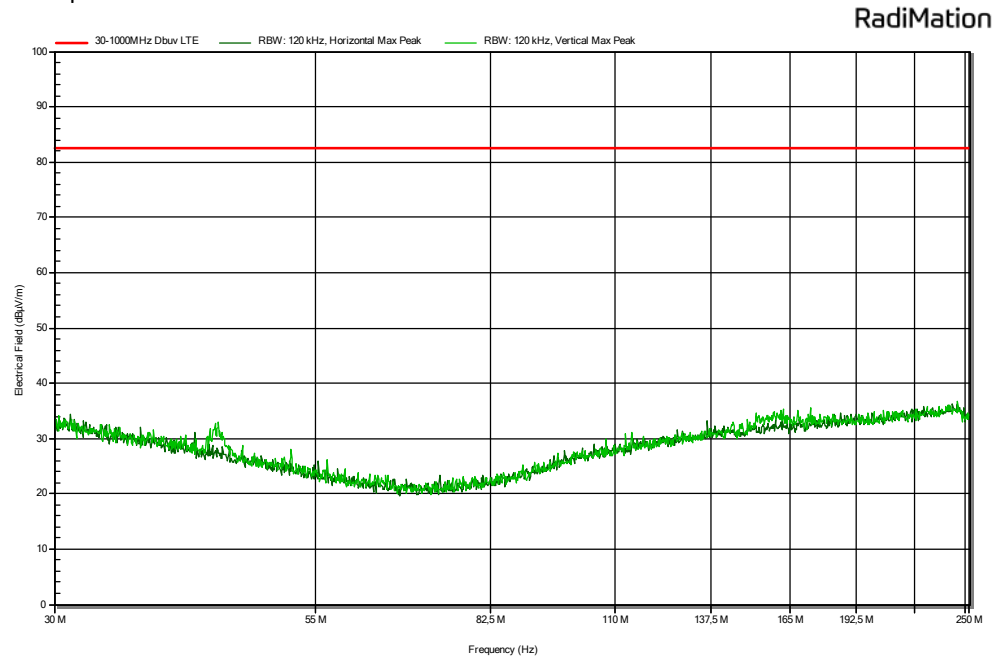
See next pages.

3.1.7 Plots of the Radiated Spurious Emissions Measurement

LTE band 5

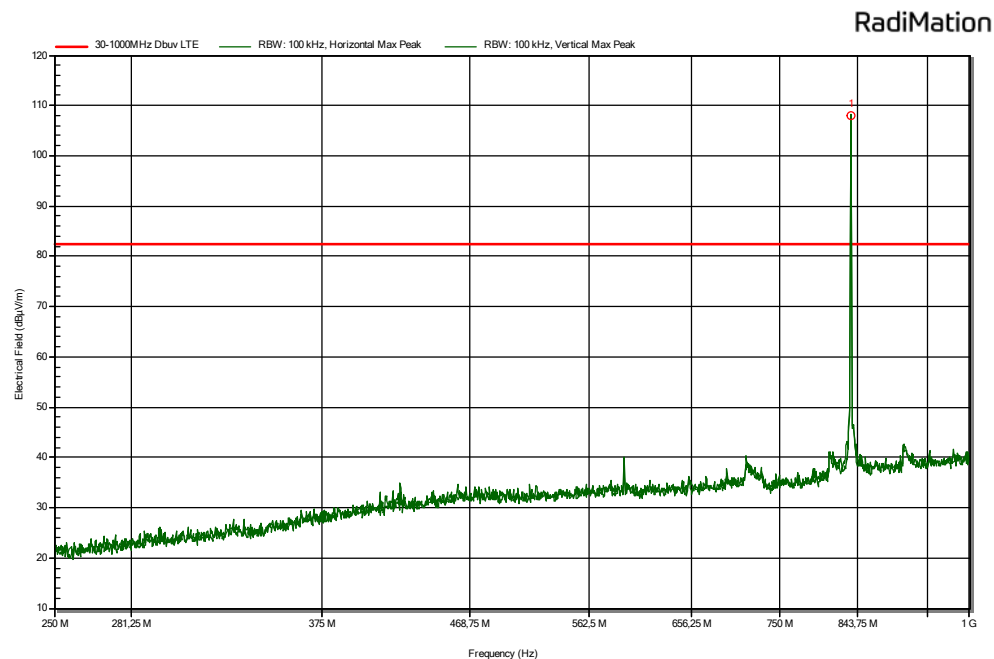
30 – 250 MHz

Both polarizations



250 -1000 MHz

Both polarizations

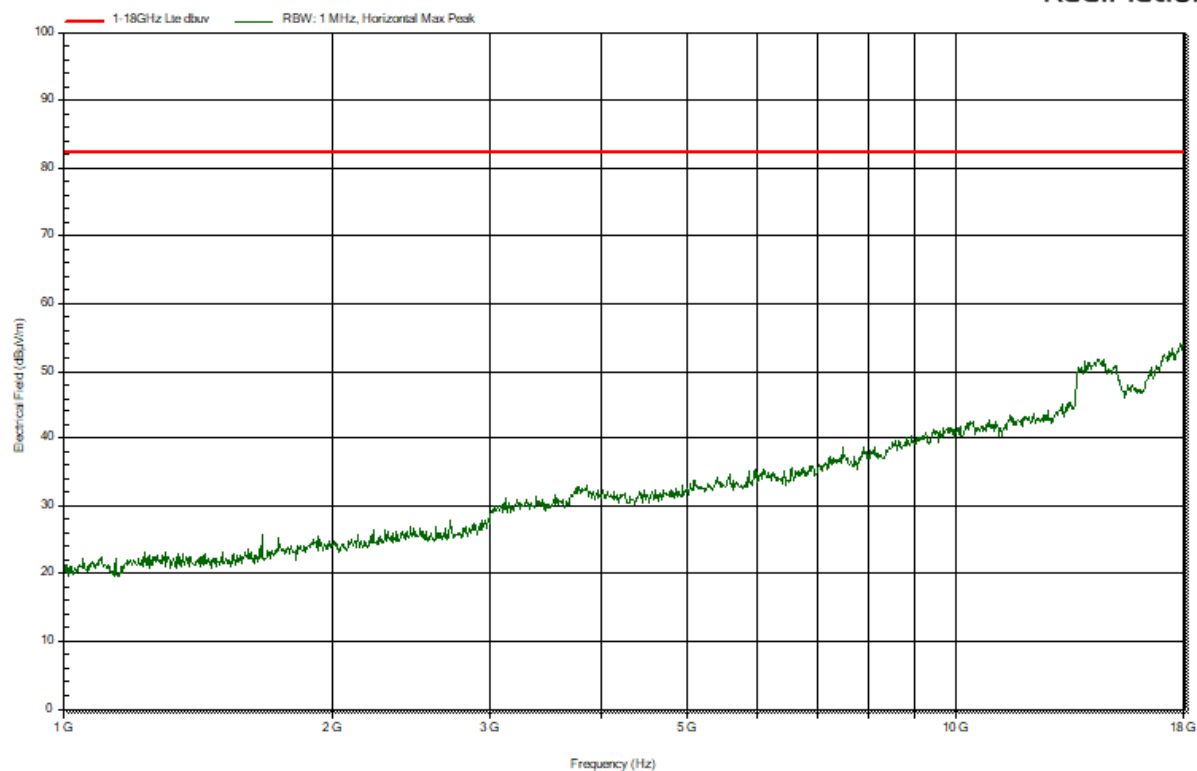


Frequency	Peak	Peak Limit	Height	Polarization
835,225 MHz	108,1 dBμV/m	82,2 dBμV/m	1 m	Vertical

1 – 18 GHz

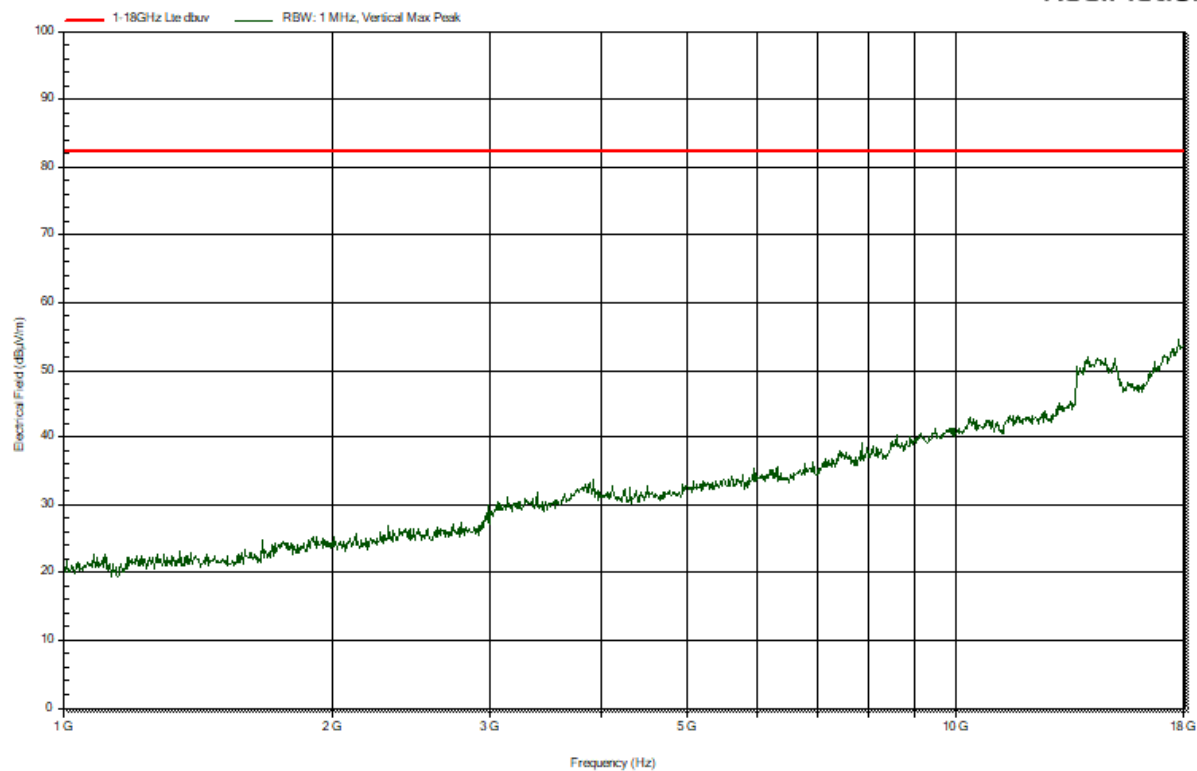
Horizontal polarization

RadiMation



Vertical polarization

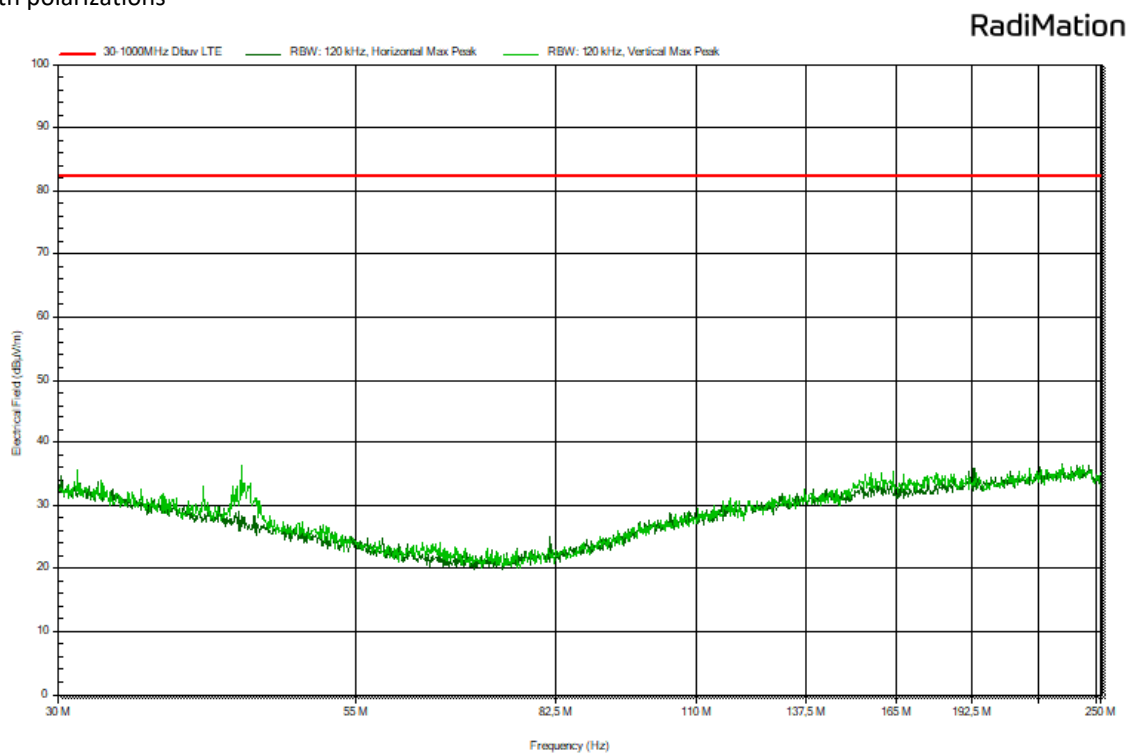
RadiMation



NB-IoT band 4

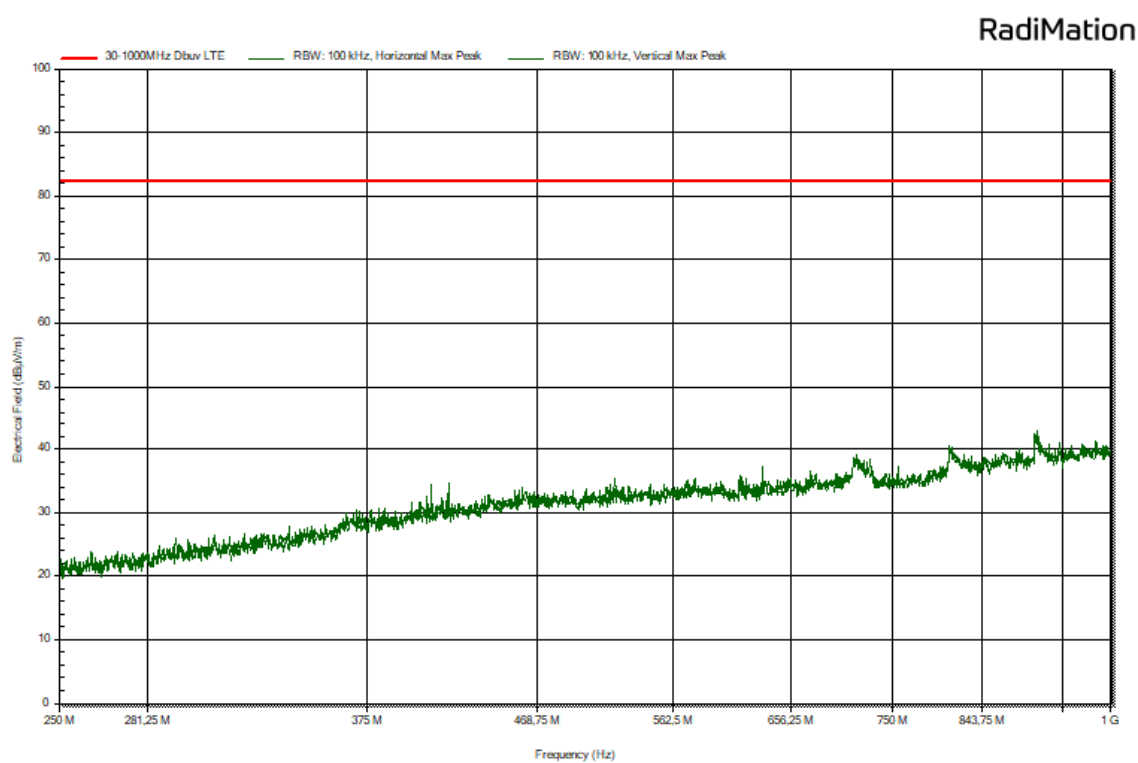
30 -250 MHz

Both polarizations



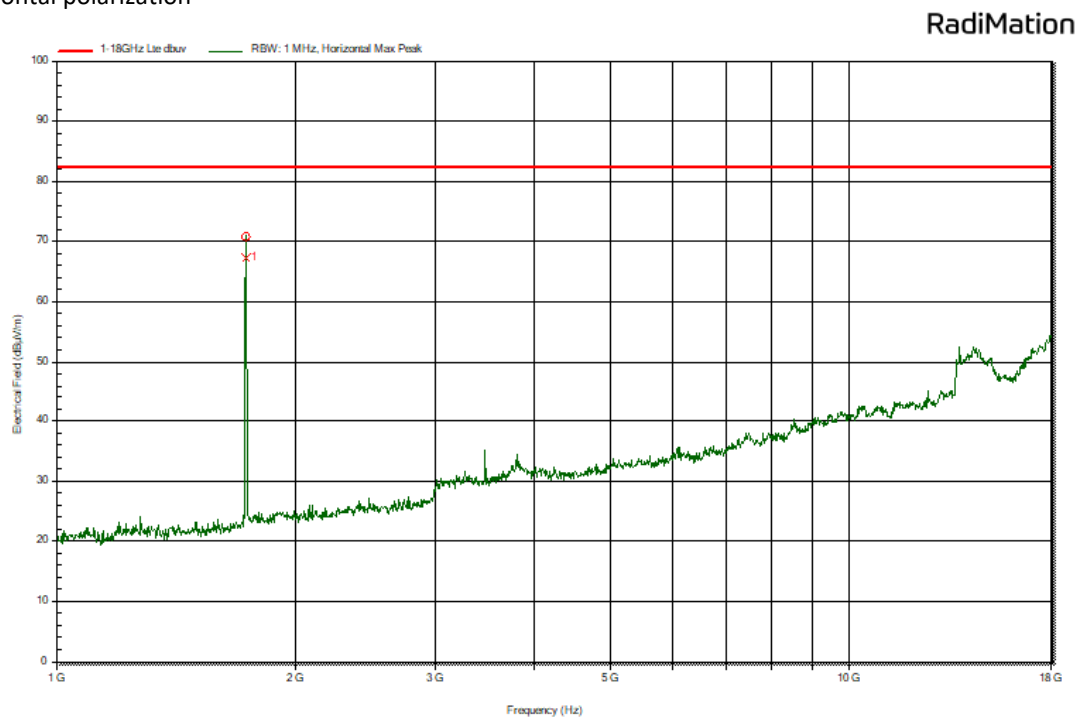
250 – 1000 MHz

Both polarizations

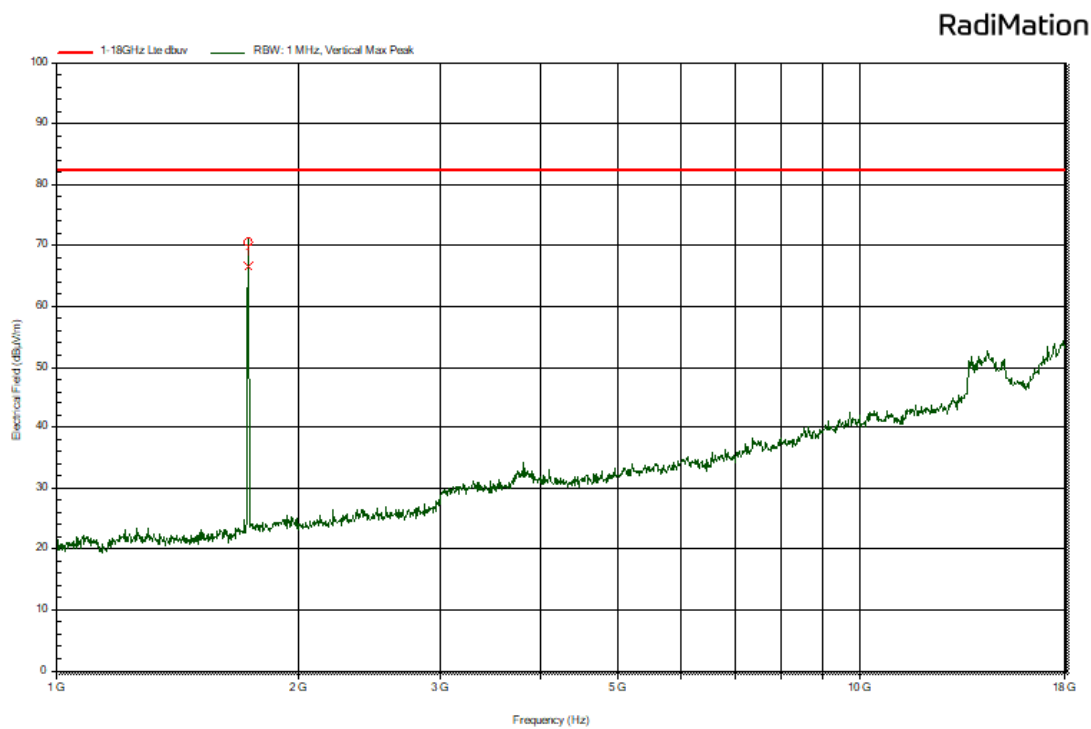


1 – 18 GHz

Horizontal polarization



Vertical polarization



Frequency	Peak	Peak Limit	Height	Polarization
1.731 GHz	70,6 dBμV/m	82,2 dBμV/m	1 m	Vertical

4 Sample calculations

All formulas for data conversions and conversion factors are reported in this chapter.

Conducted emission Measurement (see chapter 3.9):

$$U_{\text{lisn}} (\text{dB}\mu\text{V}) = U (\text{dB}\mu\text{V}) + \text{Corr. (dB)}$$

Where:

U = Measuring receiver voltage

LISN insertion loss = Voltage division factor of LISN

Corr. = sum of single correction factors of used LISN, cables and pulse limiter.

Linear interpolation will be used for frequencies in between the values in the table.

Frequency (Mhz)	Voltage division LISN (db)	Insertion Loss Pulse limiter (dB)	Cable loss (dB)	Corr. (dB)
	TE 00208 SN: 892785/004 Rohde & Schwarz ESH3-Z5	TE 00756 SN: 5SM03153 Rohde & Schwarz ESH3-Z2	TE 11134	
0,15	0,09	9,87	0,02	9,98
0,2	0,1	9,87	0,03	10
0,3	0,1	9,87	0,03	10
0,5	0,1	9,87	0,08	10,05
0,7	0,12	9,87	0,25	10,24
0,8	0,12	9,87	0,25	10,24
1	0,13	9,87	0,11	10,11
2	0,16	9,87	0,15	10,18
3	0,19	9,87	0,21	10,27
5	0,26	9,88	0,21	10,35
7	0,36	9,89	0,25	10,5
8	0,39	9,89	0,25	10,53
10	0,46	9,91	0,29	10,66
15	0,77	9,93	0,34	11,04
20	0,95	9,96	0,37	11,28
25	1,12	9,99	0,43	11,54
30	1,1	10,04	0,45	11,59

Field Strength Measurement (see chapter 3.3):

$$E \text{ (dB}\mu\text{V/m)} = U \text{ (dB}\mu\text{V)} + AF \text{ (dB/m)} + \text{Corr. (dB)}$$

Where:

E = Electric field strength

U = Measuring receiver voltage

AF = Antenna factor

CL = Cable loss

Corr. = sum of single correction factors of used cable and amplifier (if applicable).

Linear interpolation will be used for frequencies in between the values in the table.

Tables shows an extract of the values.

Frequency (Mhz)	AF (dB/m)	Cable loss (dB)	Corr. (dB)
	TE 00967 Chase CBL6112A SN: 2308	Id: SAR cable	
30	18,6	0,68	19,28
100	10,7	1,15	11,85
150	10,6	1,41	12,01
200	9,3	1,63	10,93
250	12,6	1,93	14,53
300	13,3	2,12	15,42
350	14,6	2,2	16,8
400	15,5	2,29	17,79
450	16,9	2,53	19,43
500	17,5	2,67	20,17
550	18,4	2,9	21,3
600	18,8	3,02	21,82
650	19,2	3,09	22,29
700	19	3,22	22,22
750	19,8	3,56	23,36
800	19,7	3,69	23,39
900	20,4	3,81	24,21
950	20,8	3,91	24,71
1000	21,2	4,3	25,5

Frequency (Mhz)	AF (dB/m)	Gain (dB)	Cable loss (dB)	Corr. (dB)
	TE 00531 Emco 3115 SN: 9412-4377	TE 11132 Miteq JS4-18004000-30-8P-A1	TE 01315	
1000	23,6	40,4	2,0	66
1500	25,1	40,5	2,4	68
2000	27,1	40,5	2,7	70,3
2500	28,6	40,7	3,2	72,5
3000	30,5	40,7	3,2	74,4
3500	31,2	40,7	3,4	75,3
4000	32,7	40,9	4,9	78,5
4500	32,4	40,9	4,4	77,7
5000	33,2	40,7	4,6	78,5
5500	34,0	40,5	4,5	79
6000	34,6	40,0	5,2	79,8
6500	34,3	39,4	5,9	79,6
7000	35,2	38,6	5,7	79,5
7500	36,4	39,2	5,9	81,5
8000	37,0	38,9	6,3	82,2
8500	37,5	38,4	6,4	82,3
9000	38,1	37,4	6,5	82
9500	37,8	37,0	7,1	81,9
10000	38,2	36,5	7,3	82
10500	38,1	36,7	7,6	82,4
11000	38,3	36,9	8,3	83,5
11500	38,5	37,6	8,1	84,2
12000	39,1	38,3	8,4	85,8
12500	38,7	38,5	8,3	85,5
13000	39,2	38,9	9,2	87,3
13500	40,5	40,2	8,3	89
14000	41,1	40,0	8,2	89,3
14500	41,4	40,1	8,2	89,7
15000	40,2	41,4	8,3	89,9
15500	37,9	41,4	8,6	87,9
16000	37,5	42,8	9,2	89,5
16500	38,6	42,3	8,8	89,7
17000	41,1	43,1	9,4	93,6
17500	42,7	43,2	9,4	95,3
18000	44,0	44,2	9,8	98

Frequency (Mhz)	AF (dB/m)	Gain (dB)	Cable loss (dB)	Corr. (dB)
	TE 00531 Emco 3115 SN: 9412-4377	TE 11132 Miteq JS4-18004000-30-8P-A1	TE 01315	
18000	31,3	26,2	9,8	67,3
19000	31,5	26,1	9,6	67,2
20000	31,7	25,9	11	68,6
21000	31,9	24,3	10,7	66,9
22000	32,1	18,3	10,5	60,9
23000	32,2	18,9	10,8	61,9
24000	32,3	23,6	11,4	67,3
25000	32,4	24,5	11,6	68,5
26000	32,5	25,3	11,7	69,5

----- END OF REPORT -----