Prüfbericht-Nr.: *Test report no.:*	**CN2136HM 001**	**Auftrags-Nr.:** *Order no.*:	**168297654**	Seite 1 von 2 *Page 1 of 2*
Kunden-Referenz-Nr.: *Client reference no.:*	**N/A**	**Auftragsdatum:** *Order date:*	2021-01-04	
Auftraggeber: *Client:*	**Ring LLC** 1523 26th St, Santa Monica, CA 90404, USA			
Prüfgegenstand: *Test item:*	Wall Light Solar			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	5D22E5			
Auftrags-Inhalt: *Order content*:	FCC and IC approval			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 March 2019			
Wareneingangsdatum: *Date of sample receipt:*	2021-01-06	Please refer to photo documents		
Prüfmuster-Nr.: *Test sample no:*	A002936974 001-002			
Prüfzeitraum: *Testing period:*	2021-01-17 – 2020-01-22			
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shenzhen) Co., Ltd. Testing Center			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.			
Wareneingangsdatum: *Date of sample receipt:*	2021-01-15			

geprüft von: *tested by:*		**genehmigt von:** *authorized by:*	
Datum: *Date:* 2021-03-11		**Ausstellungsdatum:** *Issue date:* 2021-03-11	
Stellung */ Position:*	Project Manager	**Stellung** */ Position:*	Technical Certifier

Sonstiges */ Other:*

FCC ID: 2AEUPRBWS001, IC: 20271-RBWS001 , HVIN: 5D22E5, PMN: Wall Light Solar, FVIN:1.7.16-56.
Note: The Radiated Spurious Emission above 1GHz and Radiated band edge of BLE function are evaluated in this report. All other tests refer to test report CN20GLWF 001

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Test Summary

5.1.1 Radiated Spurious Emission

RESULT: *Pass*

Contents

1 General Remarks

1.1 Complementary Materials

N/A

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd. Testing Center
362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Registration No.: 694916
ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
Signal Analyzer	R&S	FSV 40	101439	2021-08-10
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2021-08-10
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Amplifier	R&S	SCU-18F	180070	2021-08-10
Amplifier	R&S	SCU40A	100475	2021-09-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2021-09-02
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table

Item		**Extended Uncertainty**
Radiated Emission (30-1000MHz)	Field strength (dBµV/m)	4.27dB
Radiated Emission (above 1000MHz)	Field strength (dBµV/m)	4.46dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached in this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT (equipment under test) is a Battery Flood Light which supports LoRa DTS, LoRa FHSS, FSK FHSS and BLE functions operated at 902-928MHz and 2400-2483.5MHz respectively. For the further information, refer to the user's manual.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Wall Light Solar
Type Designation	5D22E5
FCC ID	2AEUPRBWS001
IC	20271-RBWS001
HVIN	5D22E5
FVIN	1.7.16-56
PMN	Wall Light Solar
Rated voltage for Lamp	DC 3.7V(2 x 18650 Li-ion battery)
USB input	DC 5V, 1A

Technical Specification BLE	
Operating Frequency band	2402 – 2480 MHz
Bluetooth Core Version	Bluetooth Low Energy 4.2
Channel separation	2MHz
Extreme Temperature Range	-20℃ ~ 50℃
Modulation	GFSK
Antenna Type	Internal Antenna
Antenna Gain(dBi)	2.5
Channel	0~39

Technical Specification LoRa DTS 500kHz 902.5-926.5MHz	
Operating Frequency band	902 – 928 MHz
Extreme Temperature Range	-20℃ ~ 50℃
Bandwidth(kHz)	500
Modulation	LoRa DTS
Antenna Type	Internal Antenna
Antenna Gain(dBi)	2.9
Channel Separation (kHz)	800
Channel Number	31
Channel (MHz)	902.5, 903.3, 904.1, 904.9, 905.7, 906.5, 907.3, 908.1, 908.9, 909.7, 910.5, 911.3, 912.1, 912.9, 913.7, 914.5, 915.3, 916.1, 916.9, 917.7, 918.5, 919.3, 920.1, 920.9, 921.7, 922.5, 923.3, 924.1, 924.9, 925.7, 926.5

Technical Specification LoRa FHSS 902.2-927.8MHz	
Operating Frequency band	902 – 928 MHz
Extreme Temperature Range	-20℃ ~ 50℃
Modulation	LoRa FHSS
Antenna Type	Internal Antenna
Antenna Gain(dBi)	2.9
Channel Separation (kHz)	200
Channel Number	129
Bandwidth (kHz)	125
Hopping channel(MHz)	902.2-927.8

Technical Specification	FSK150Kbps FHSS	FSK 50Kbps FHSS	FSK 250Kbps FHSS
Operating Frequency band	902 – 928 MHz		
Extreme Temperature Range	-20℃ ~ 50℃		
Modulation	FSK FHSS		
Antenna Type	Internal Antenna		
Antenna Gain(dBi)	2.9		
Channel Separation (kHz)	400	200	500
Channel Number	64	129	51
Data Rate (Kbps)	150	50	250
Hopping Channel(MHz)	902.4~927.6	902.2~927.8	902.5~927.5

3.3 Independent Operation Modes

The basic operation modes are:

A. On, BLE transmitting mode

1) Low Channel
2) Middle Channel
3) High Channel

B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- Schematics
- Technical Description
- FCC/IC Label and Location Info
- Photo Document
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

Table 3: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.
notebook	Lenovo	T420

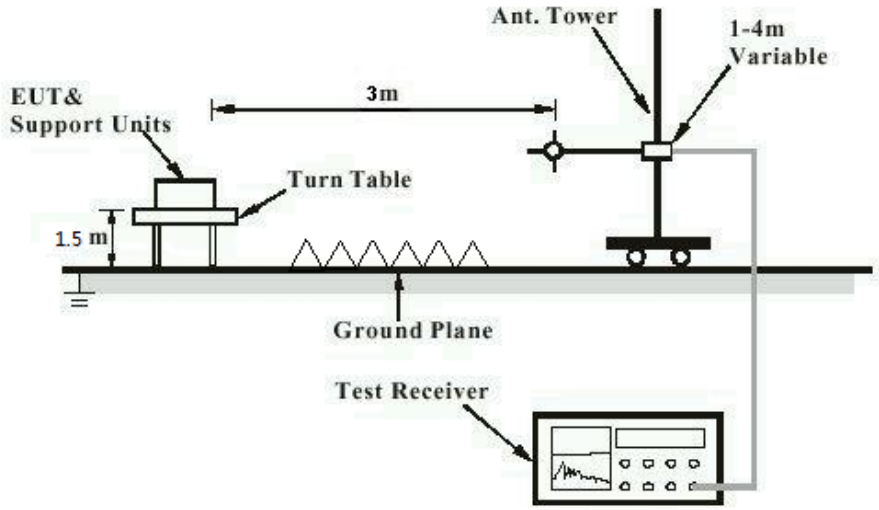
4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



5 Test Results

5.1.1 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

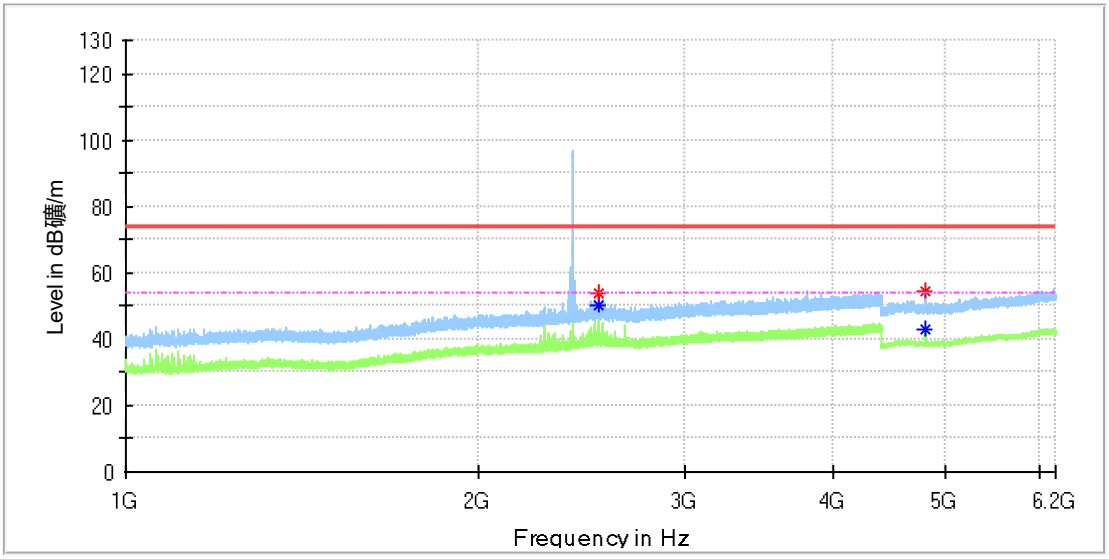
Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 6 & Table 7
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2021-01-17 ~ 2021-01-19
Input voltage	:	DC 3.7V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23 ℃
Relative humidity	:	49 %
Atmospheric pressure	:	101 kPa

Remark:
During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions. After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation shown in the test set-up photos.

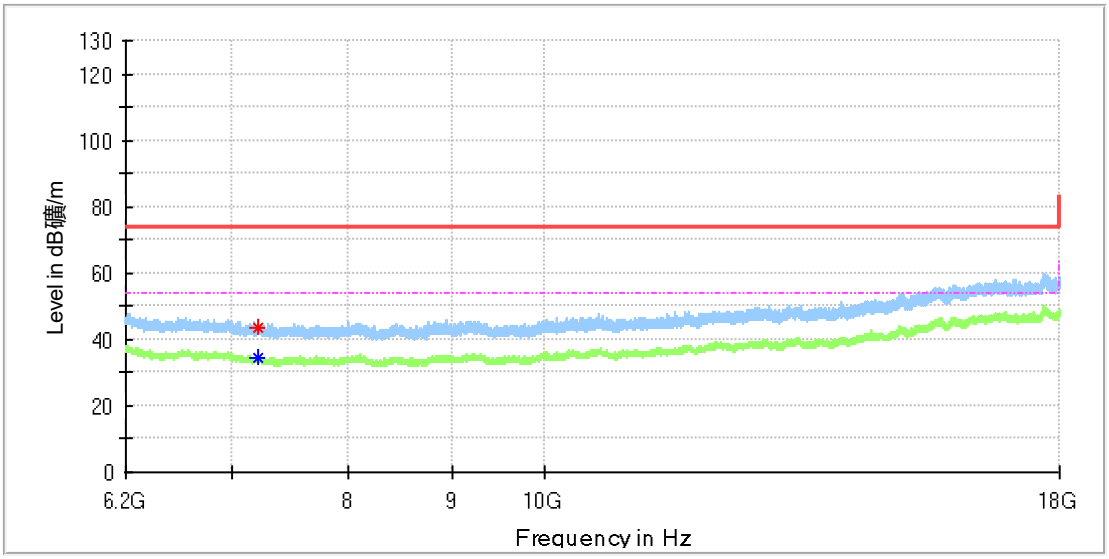
Mode A.1
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2530.000000	53.70	---	74.00	20.30	100.0	H	166.0	7.5
2530.000000	---	50.23	54.00	3.77	100.0	H	166.0	7.5
4803.000000	---	42.75	54.00	11.25	100.0	H	268.0	11.8
4804.000000	54.13	---	74.00	19.87	100.0	H	281.0	11.8

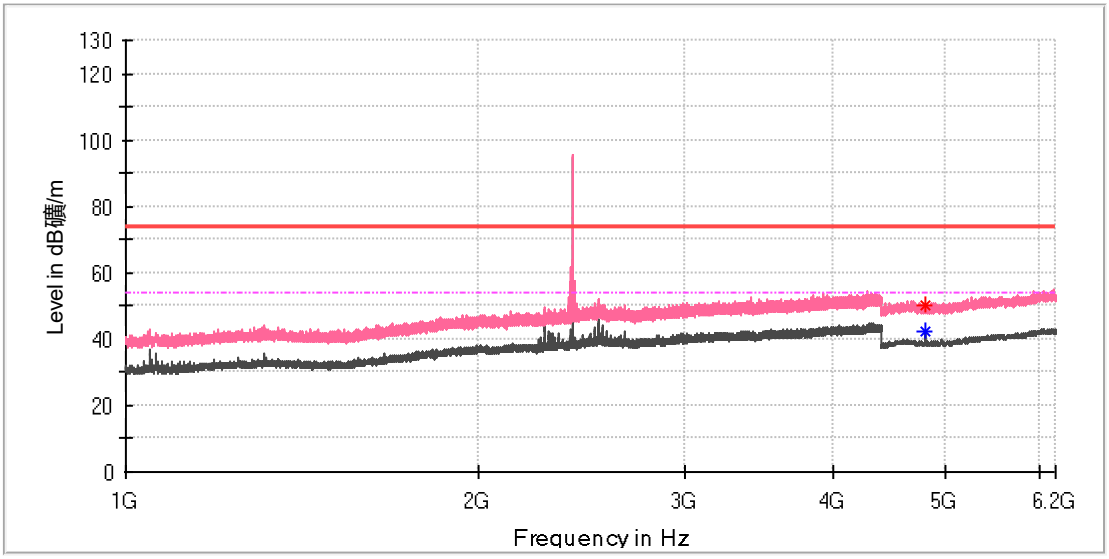
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7203.000000	43.46	---	74.00	30.54	100.0	H	180.0	8.8
7206.441667	---	34.60	54.00	19.40	100.0	H	180.0	8.8

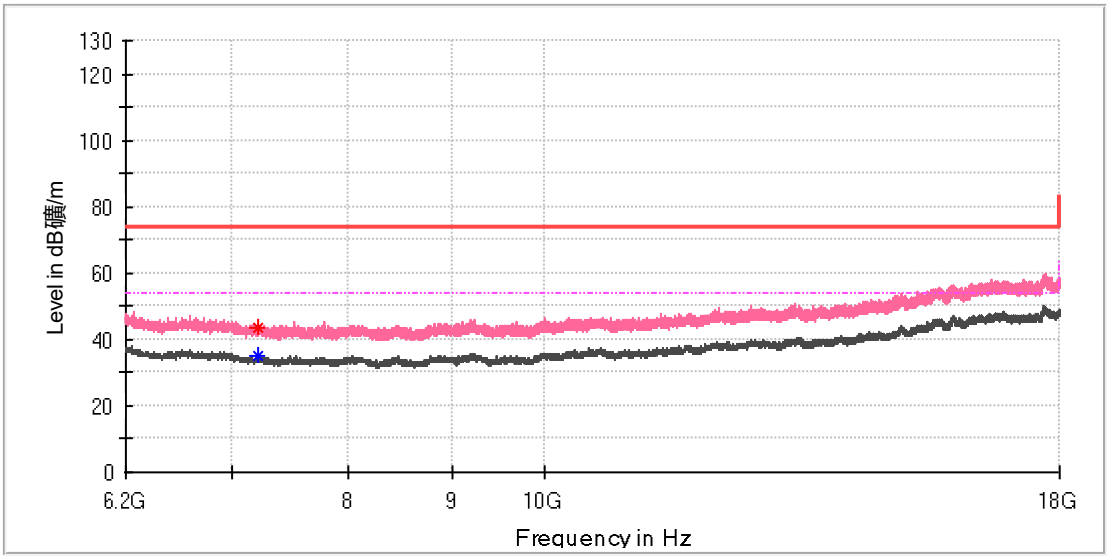
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4802.500000	50.32	---	74.00	23.68	100.0	V	58.0	11.8
4804.000000	---	42.14	54.00	11.86	100.0	V	199.0	11.8

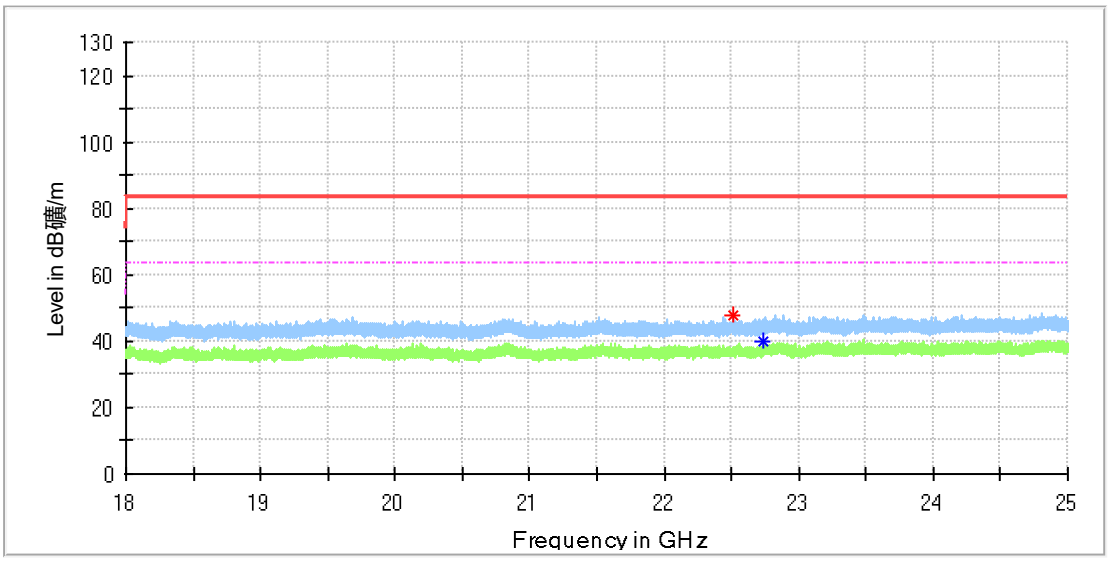
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7206.441667	43.82	---	74.00	30.18	100.0	V	106.0	8.8
7206.441667	---	34.94	54.00	19.06	100.0	V	106.0	8.8

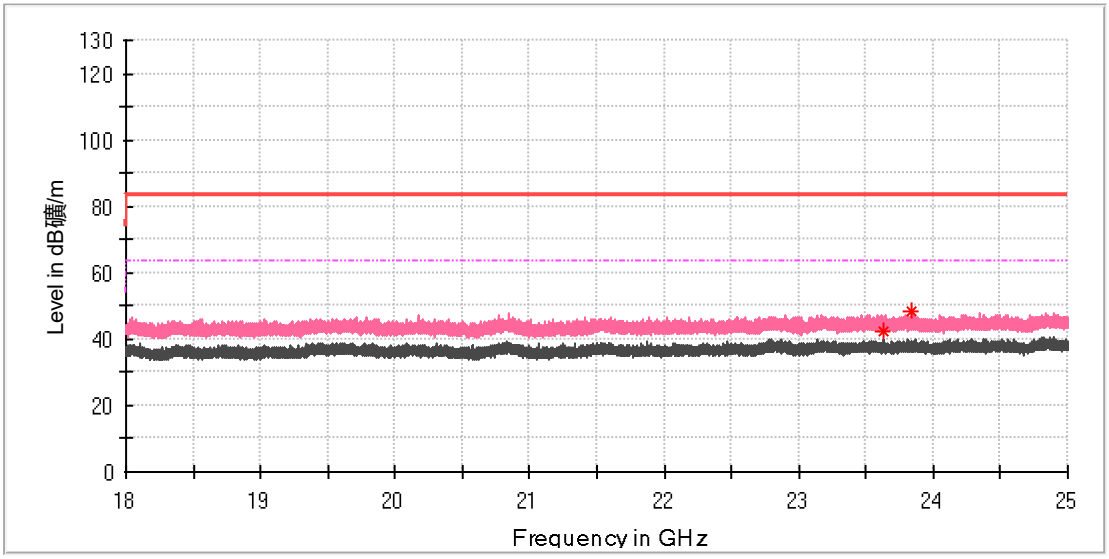
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
22518.281250	47.60	---	83.50	35.90	100.0	H	219.0	-11.0
22740.968750	---	40.07	63.50	23.43	100.0	H	0.0	-10.9

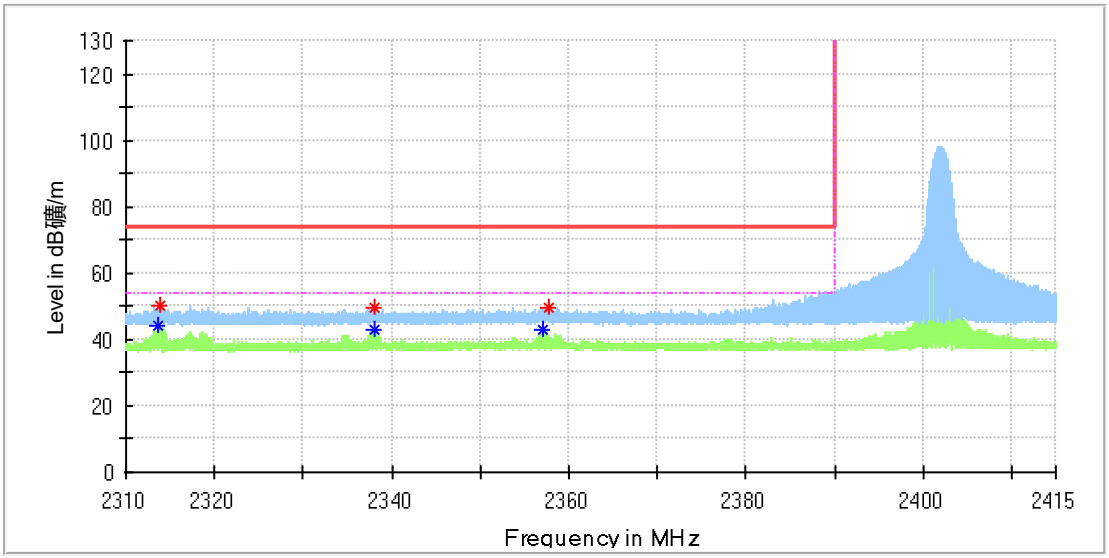
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
23629.093750	42.13	---	83.50	41.37	100.0	V	239.0	-10.3
23835.156250	48.44	---	83.50	35.06	100.0	V	310.0	-10.1

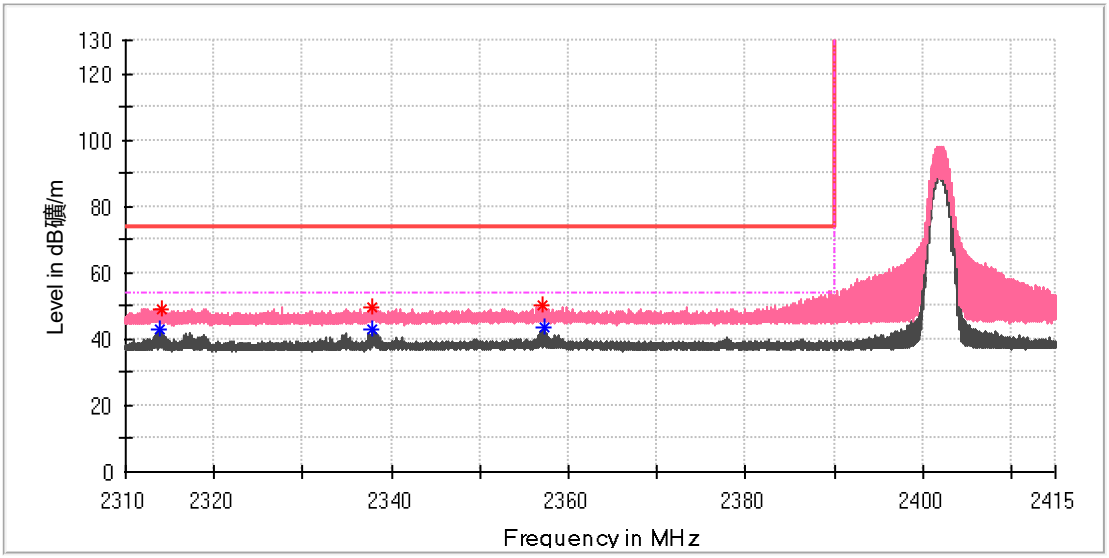
Mode A.1
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2313.575250	---	43.90	54.00	10.10	100.0	H	173.0	6.5
2313.795750	50.37	---	74.00	23.63	100.0	H	173.0	6.5
2338.098000	---	42.91	54.00	11.09	100.0	H	173.0	6.8
2338.113750	49.64	---	74.00	24.36	100.0	H	173.0	6.8
2357.003250	---	43.20	54.00	10.81	100.0	H	160.0	6.9
2357.659500	49.57	---	74.00	24.43	100.0	H	173.0	6.9

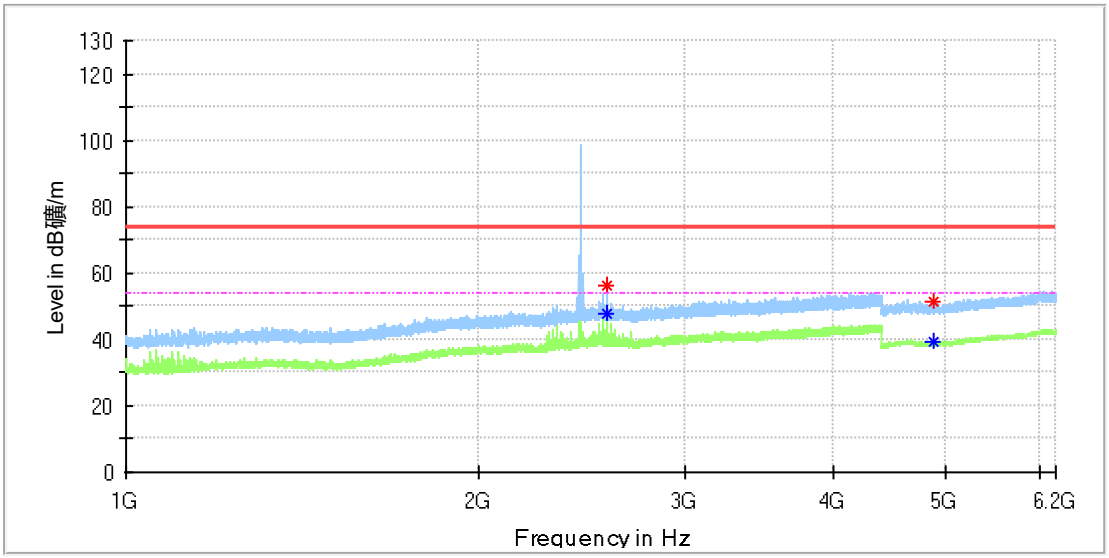
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2313.906000	---	43.14	54.00	10.86	100.0	V	277.0	6.5
2314.116000	49.27	---	74.00	24.73	100.0	V	277.0	6.5
2337.804000	49.66	---	74.00	24.34	100.0	V	32.0	6.8
2337.882750	---	43.03	54.00	10.97	100.0	V	289.0	6.8
2356.971750	50.23	---	74.00	23.77	100.0	V	289.0	6.9
2357.187000	---	43.26	54.00	10.74	100.0	V	289.0	6.9

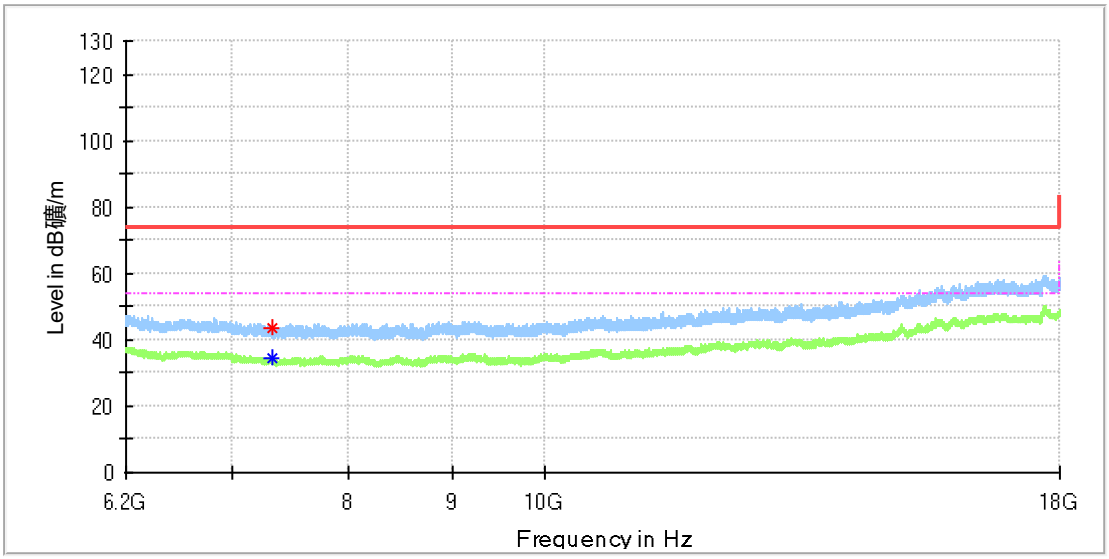
Mode A.2
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2568.080000	56.04	---	74.00	17.96	100.0	H	177.0	7.5
2568.250000	---	47.61	54.00	6.39	100.0	H	209.0	7.5
4879.500000	51.36	---	74.00	22.64	100.0	H	2.0	11.8
4880.000000	---	39.29	54.00	14.71	100.0	H	328.0	11.8

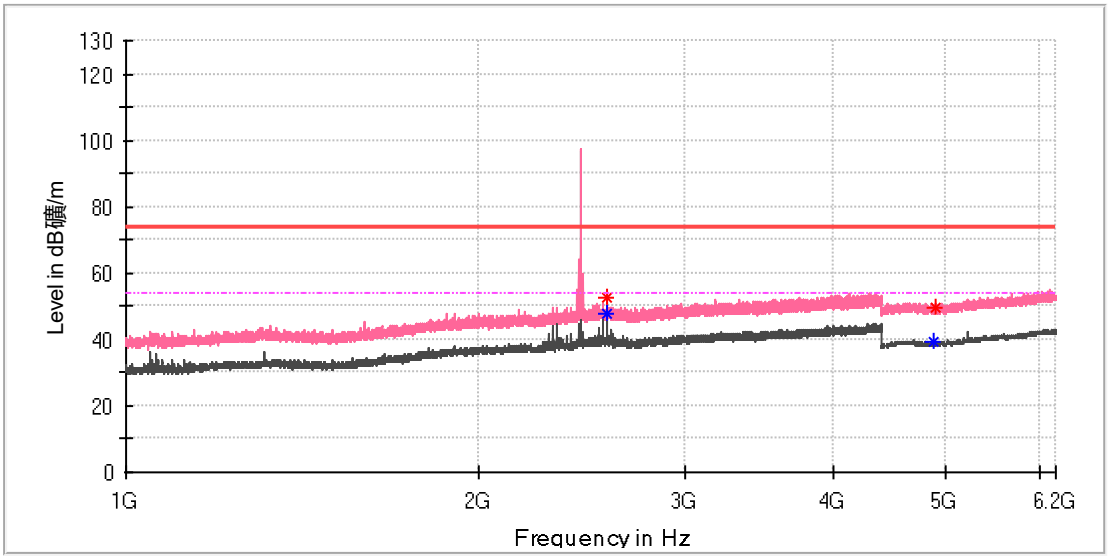
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7326.408333	---	34.60	54.00	19.40	100.0	H	336.0	8.1
7328.375000	43.40	---	74.00	30.60	100.0	H	322.0	8.1

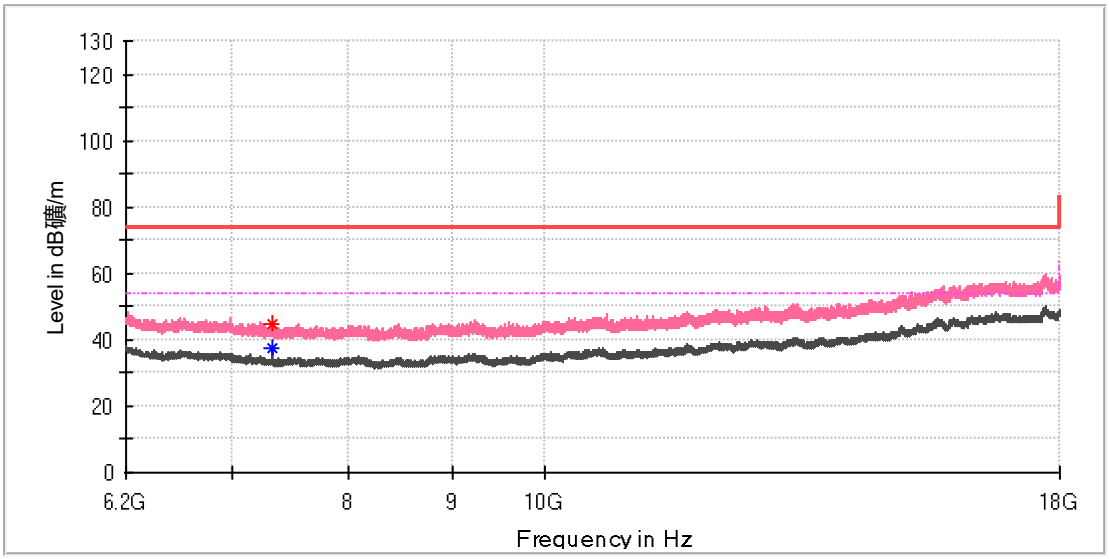
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2567.910000	---	47.73	54.00	6.27	100.0	V	119.0	7.5
2568.080000	52.74	---	74.00	21.26	100.0	V	296.0	7.5
4880.000000	---	39.24	54.00	14.76	100.0	V	16.0	11.8
4888.500000	49.88	---	74.00	24.12	100.0	V	77.0	11.8

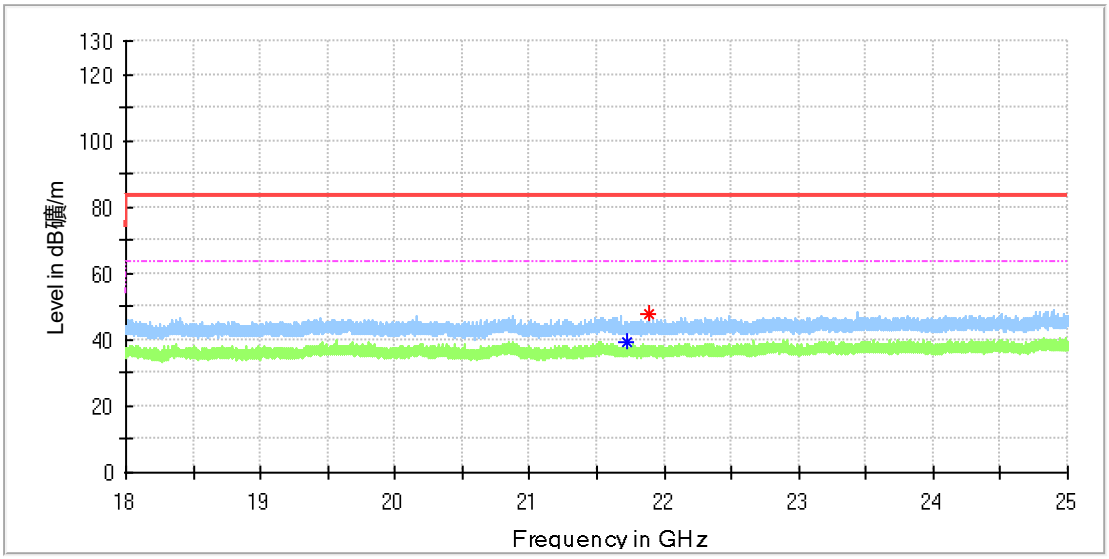
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7320.016667	---	37.35	54.00	16.65	100.0	V	26.0	8.2
7322.966667	44.58	---	74.00	29.42	100.0	V	26.0	8.2

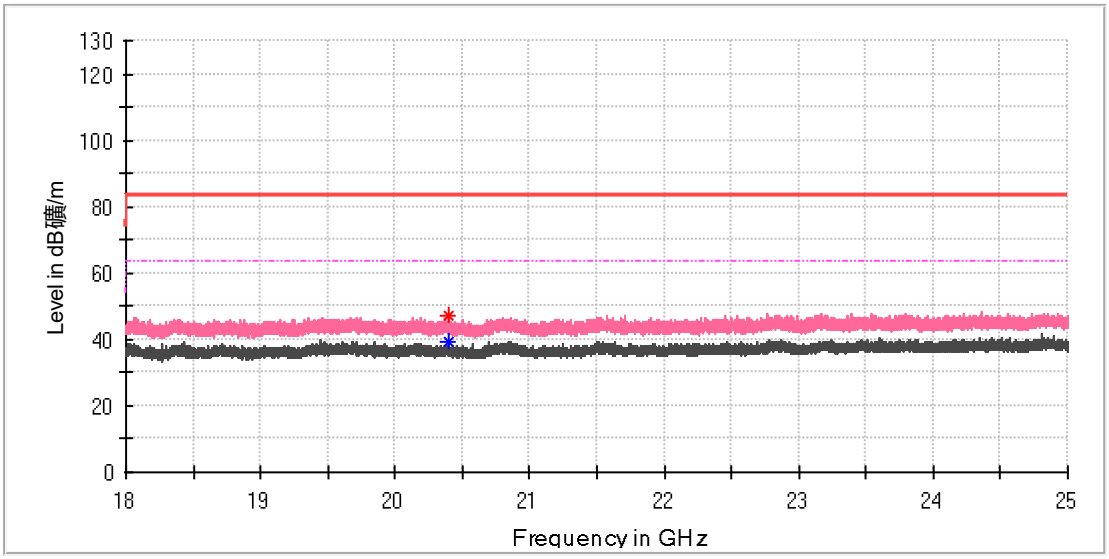
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
21730.562500	---	39.12	63.50	24.38	100.0	H	69.0	-11.5
21889.593750	47.67	---	83.50	35.83	100.0	H	216.0	-11.4

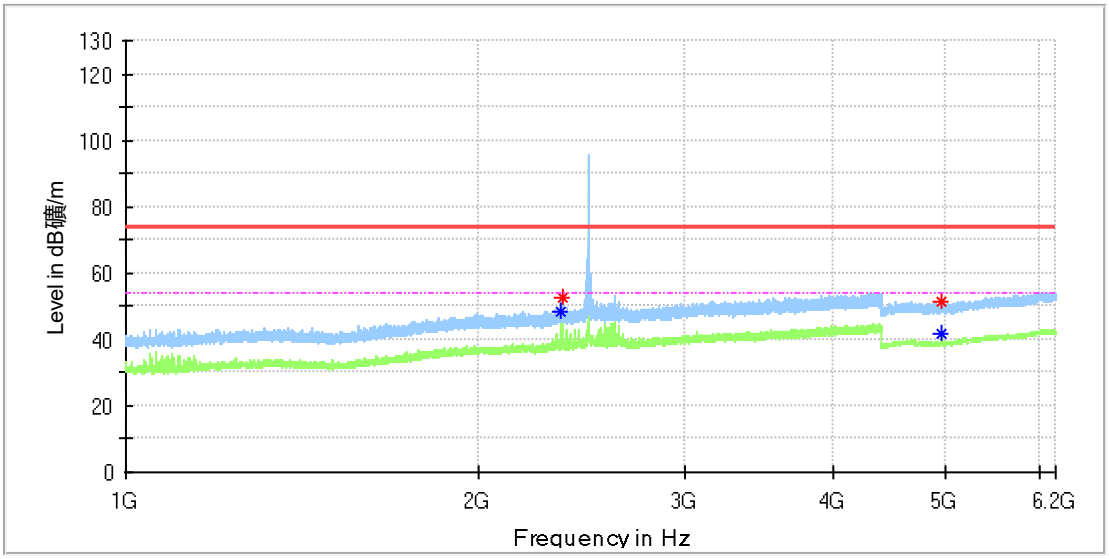
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20391.593750	---	39.07	63.50	24.43	100.0	V	45.0	-12.7
20397.718750	46.96	---	83.50	36.54	100.0	V	247.0	-12.7

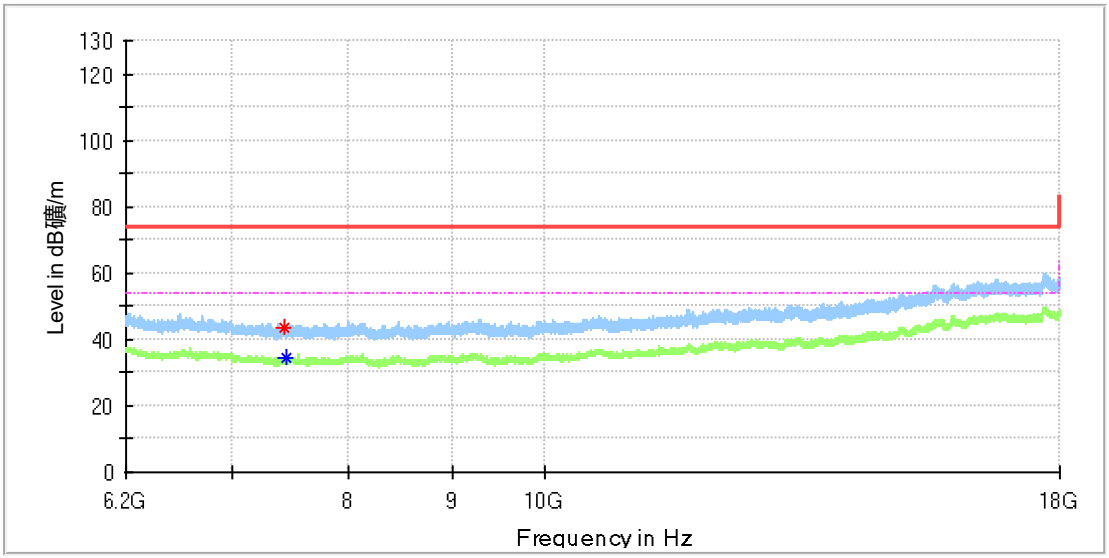
Mode: A3
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2351.840000	---	48.36	54.00	5.64	100.0	H	160.0	6.9
2352.010000	52.85	---	74.00	21.15	100.0	H	160.0	6.9
4959.000000	---	41.70	54.00	12.30	100.0	H	260.0	11.8
4960.500000	51.33	---	74.00	22.67	100.0	H	196.0	11.8

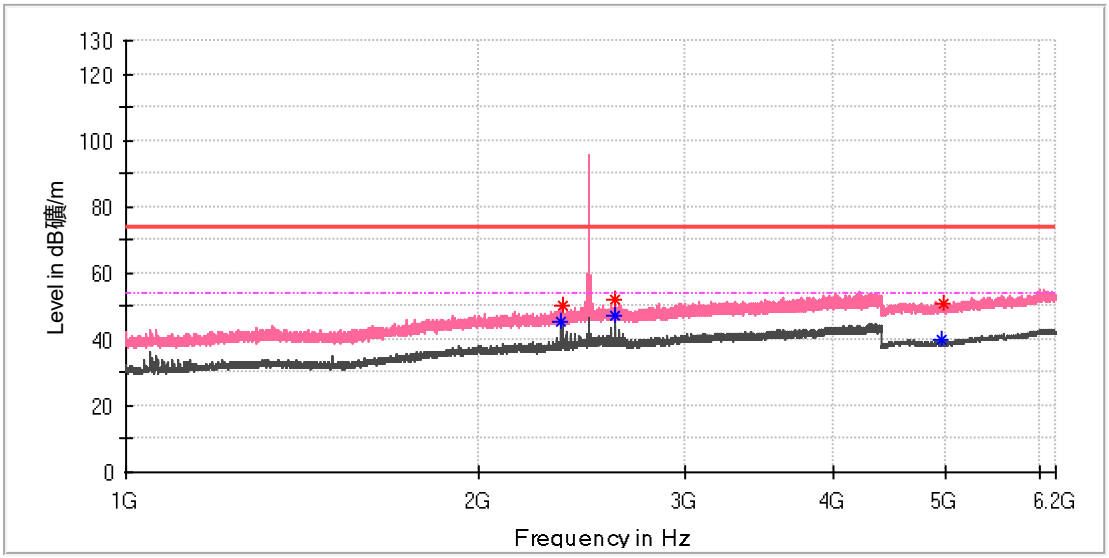
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7436.050000	43.72	---	74.00	30.28	100.0	H	29.0	8.4
7446.375000	---	34.64	54.00	19.36	100.0	H	57.0	8.5

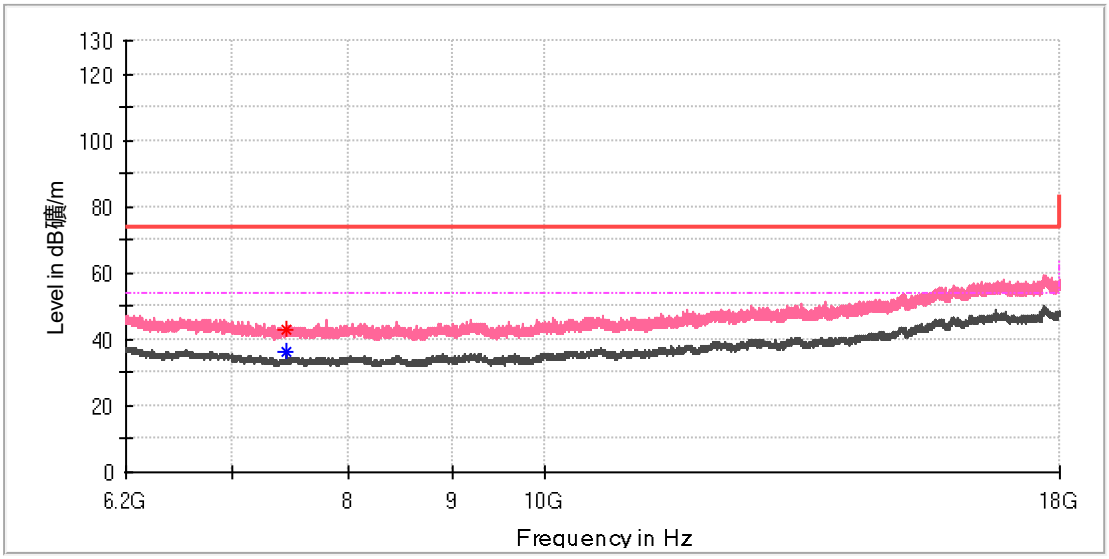
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2351.840000	---	45.45	54.00	8.55	100.0	V	302.0	6.9
2352.350000	50.26	---	74.00	23.74	100.0	V	52.0	6.9
2607.860000	---	47.34	54.00	6.66	100.0	V	86.0	7.4
2608.030000	51.75	---	74.00	22.25	100.0	V	277.0	7.4
4959.500000	---	40.16	54.00	13.84	100.0	V	46.0	11.8
4965.500000	51.06	---	74.00	22.94	100.0	V	105.0	11.8

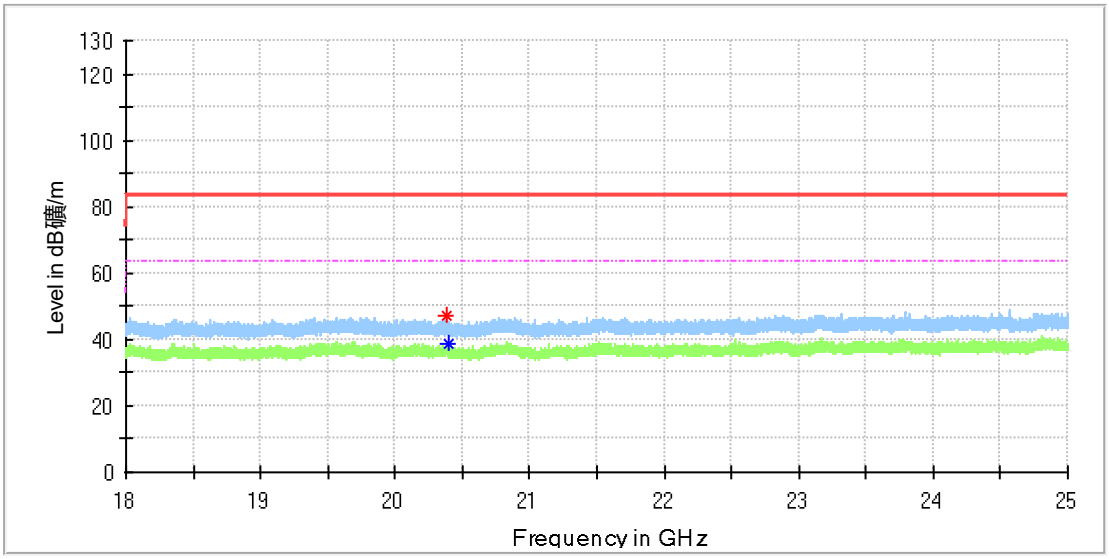
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.983333	---	36.23	54.00	17.77	100.0	V	288.0	8.4
7442.933333	43.12	---	74.00	30.88	100.0	V	303.0	8.4

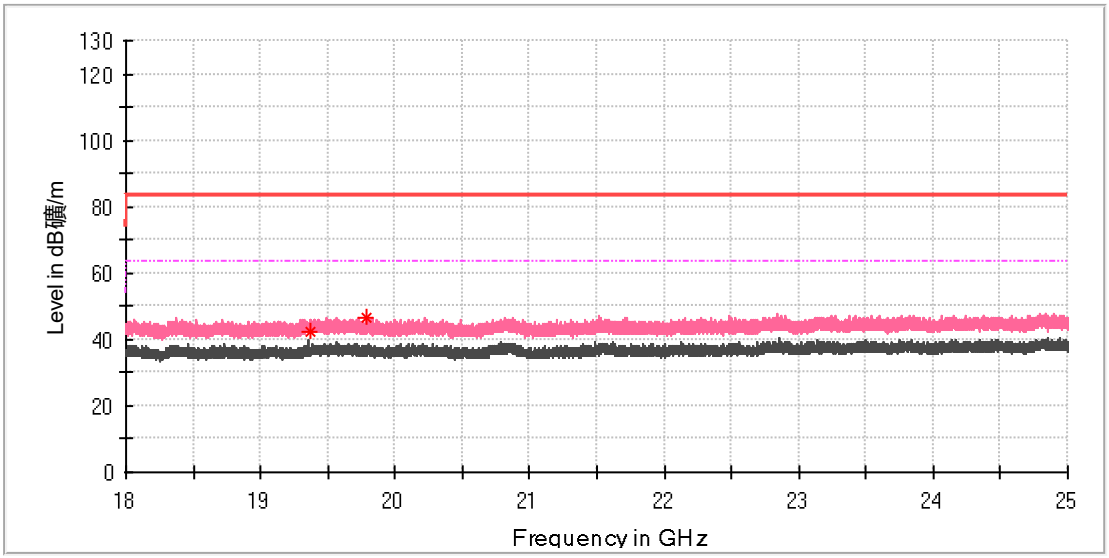
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20376.062500	47.11	---	83.50	36.39	100.0	H	61.0	-12.7
20392.250000	---	38.83	63.50	24.67	100.0	H	73.0	-12.7

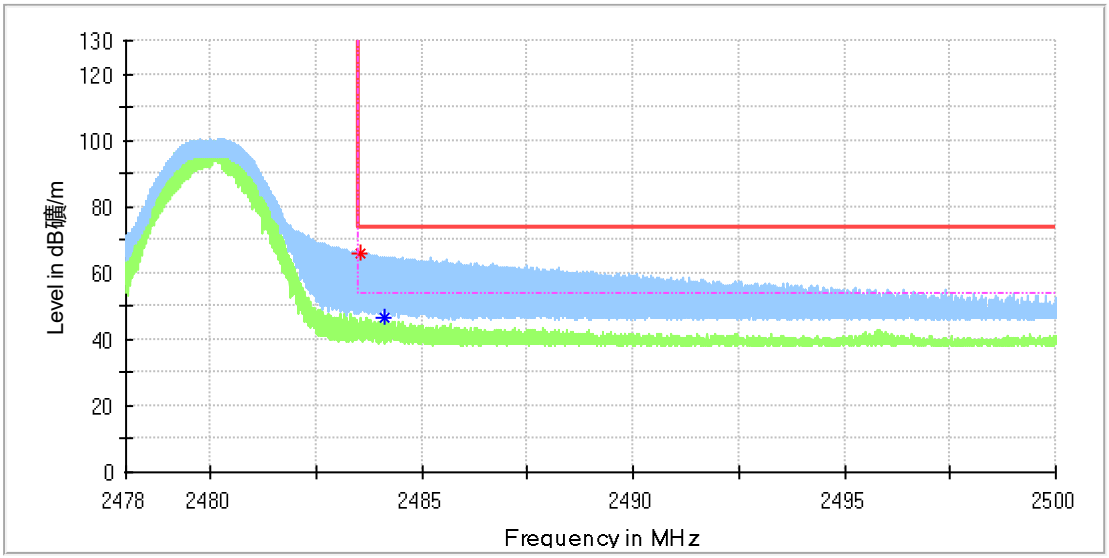
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19366.093750	42.12	---	83.50	41.38	100.0	V	359.0	-13.1
19791.125000	46.75	---	83.50	36.75	100.0	V	249.0	-13.0

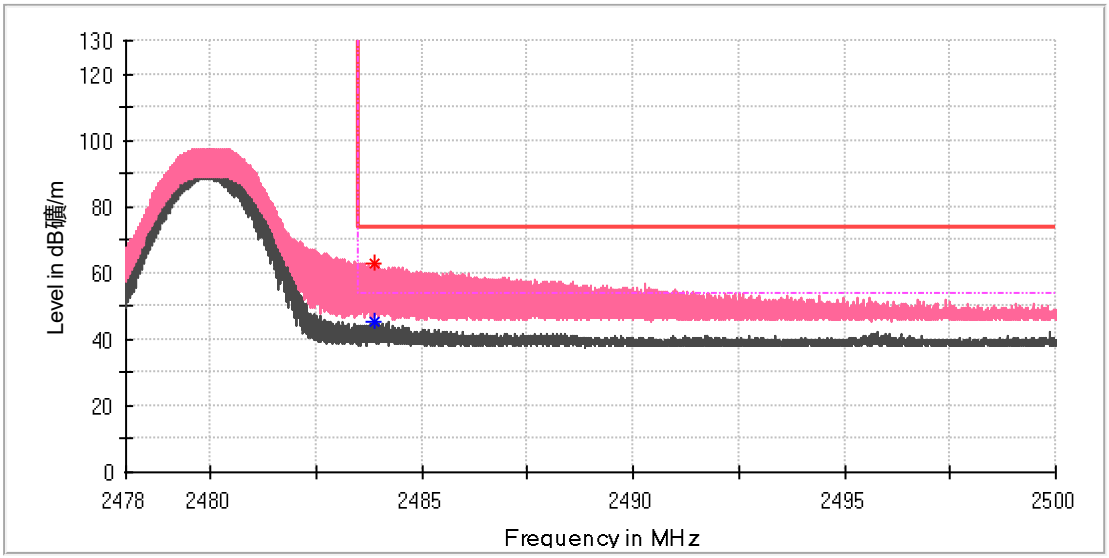
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.541800	66.05	---	74.00	7.95	100.0	H	177.0	7.4
2484.119300	---	46.44	54.00	7.56	100.0	H	177.0	7.4

Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.898200	---	45.22	54.00	8.78	100.0	V	91.0	7.4
2483.898200	62.63	---	74.00	11.37	100.0	V	91.0	7.4

6 List of Tables