

FCC PART 15B

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No. 5 GaoPeng Road, Hi-Tech Zone, Chengdu, Sichuan 610045, China

FCC ID: 2AAGEVTM-TCVM

Report Type: Original Report	Product Type: M2M Gateway
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Report Number: R2SC131023050-00E	
Report Date: 2014-02-11	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Chengdu Vantron Technology, Ltd.*'s product, model number: *VT-M2M-TC VM (FCC ID: 2AAGEVTM2M-TCVM)* (the "EUT") in this report was a *M2M Gateway*, which was measured approximately: 19.1cm (L) x 10.1 cm (W) x 5.2 cm (H), rated input voltage: DC 12V.

** All measurement and test data in this report was gathered from production sample serial number: 131023050 (Assigned by BACL.Dongguan). The EUT was received on 2013-10-29.*

Objective

This report is prepared on behalf of *Chengdu Vantron Technology, Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC Part 15B, Class B.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: *2AAGEVTM2M-TCVM*.
FCC Part 15C DSS submissions with FCC ID: *2AAGEVTM2M-TCVM*.
FCC Part 22H&24E PCB submissions with FCC ID: *2AAGEVTM2M-TCVM*.
FCC Part 15E NII submissions with FCC ID: *2AAGEVTM2M-TCVM*.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).



The current scope of accreditations can be found at <http://ts.nist.gov/standards/scopes/5000690.htm>

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user). The highest operating frequency is 1600 MHz.

EUT Exercise Software

No software was used.

Equipment Modifications

No modification was made to the EUT.

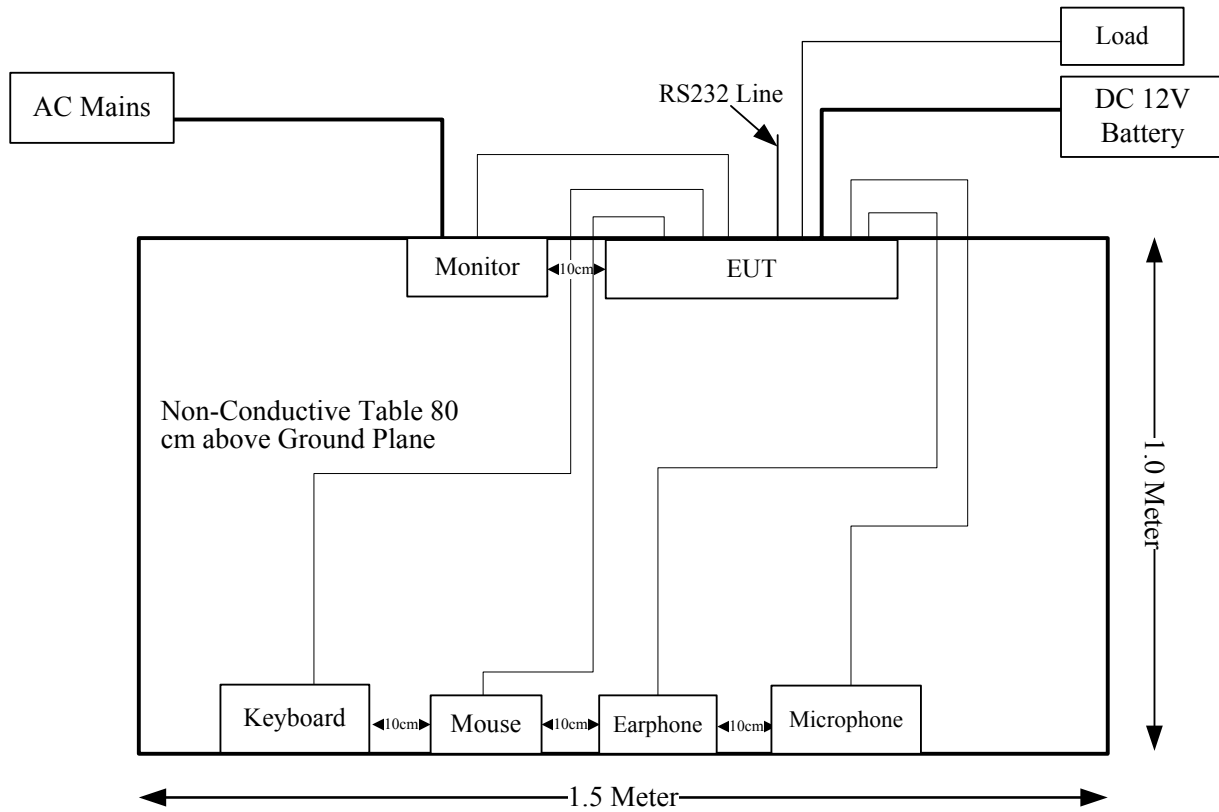
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Dell	Monitor	U3011t	CN-OPH5NY-74445-16T-290L
Keenion	Microphone	KM-206	N/A
Keenion	Earphone	KDM-911	N/A
DELL	Keyboard	SK-8115	CN-0J4628-71616-52H-0RT6
DELL	Mouse	MO56UOA	F0Y02P7Y

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	No	No	10m	EUT RJ45 Port	Internet
DC Power Cable	No	No	5m	EUT	Battery
Antenna	No	No	5.1m	EUT	Antenna
VGA Cable	Yes	Yes	1.8m	EUT VGA Port	Monitor
Audio Cable	No	No	1.5m	EUT Earphone Port	Earphone
Audio Cable	No	No	1.5m	EUT Microphone Port	Microphone
Keyboard Line	Yes	No	2.0	EUT	Keyboard
Mouse Line	Yes	No	1.8	EUT	Mouse

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Not Applicable*
§15.109	Radiated Emissions	Compliance

* EUT is used in vehicle and not connected to public ac mains.

FCC §15.109 - RADIATED EMISSIONS

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

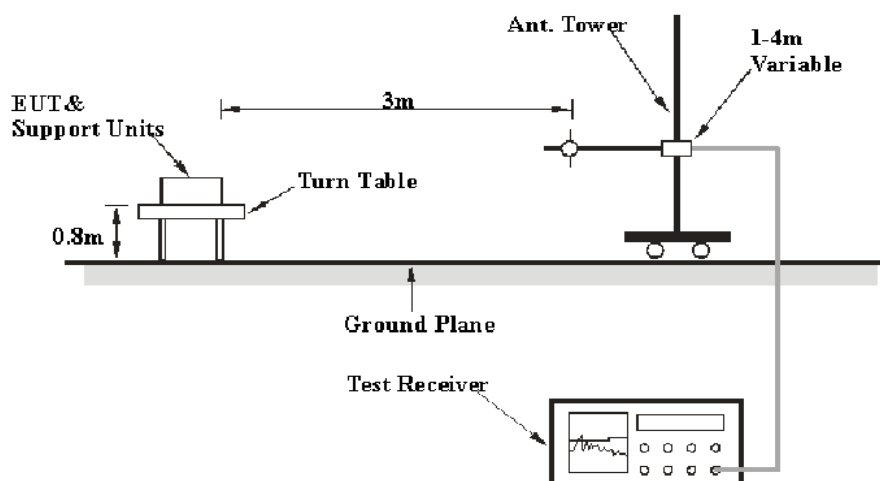
6G~18GHz: 5.23 dB

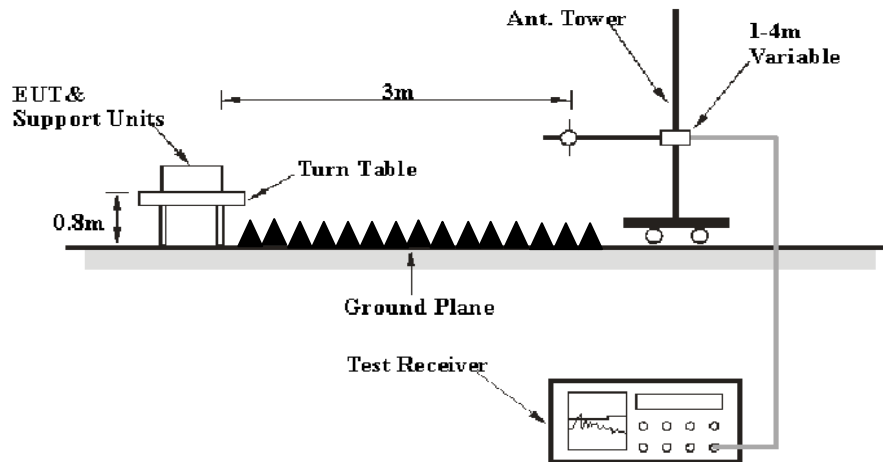
Table 2 – Values of U_{cispr}

Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15.109, Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The EUT was connected to a DC12 V battery.

EMI Test Receiver Setup

According to FCC 15.33 requirements, the system was measured from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The data was recorded in Quasi-peak detection mode for 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI TEST RECEIVER	ESCI	100224	2013-5-6	2014-5-5
Sunol Sciences	Antenna	JB3	A060611-1	2011-9-6	2014-9-5
HP	AMPLIFIER	8447E	2434A02181	N/A	N/A
R&S	Spectrum analyzer	FSEM	DE31388	2013-5-7	2014-5-6
ETS-Lindgren	horn antenna	3115	000 527 35	2012-9-6	2015-9-5
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	N/A	N/A
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109, Class B, with the worst margin reading of:

2.50 dB at 375.3200 MHz in the Vertical polarization

Test Data

Environmental Conditions

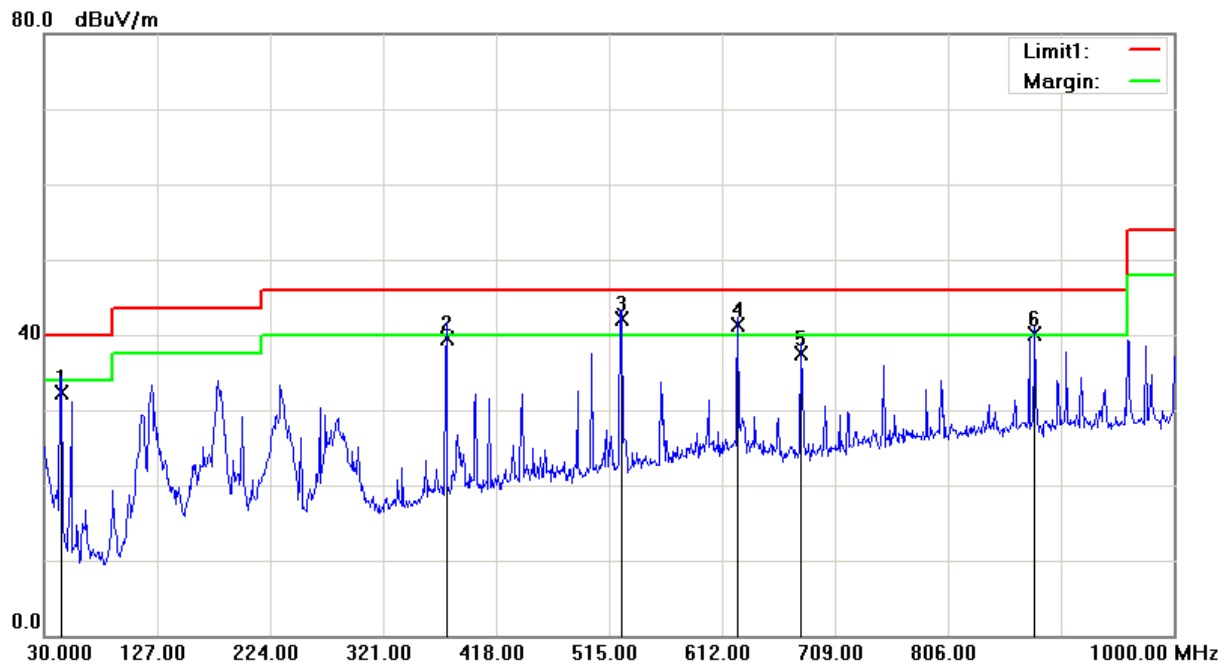
Temperature:	19.4 °C
Relative Humidity:	58 %
ATM Pressure:	101.5 kPa

The testing was performed by Ares Liu on 2014-02-10.

Test mode: Operating

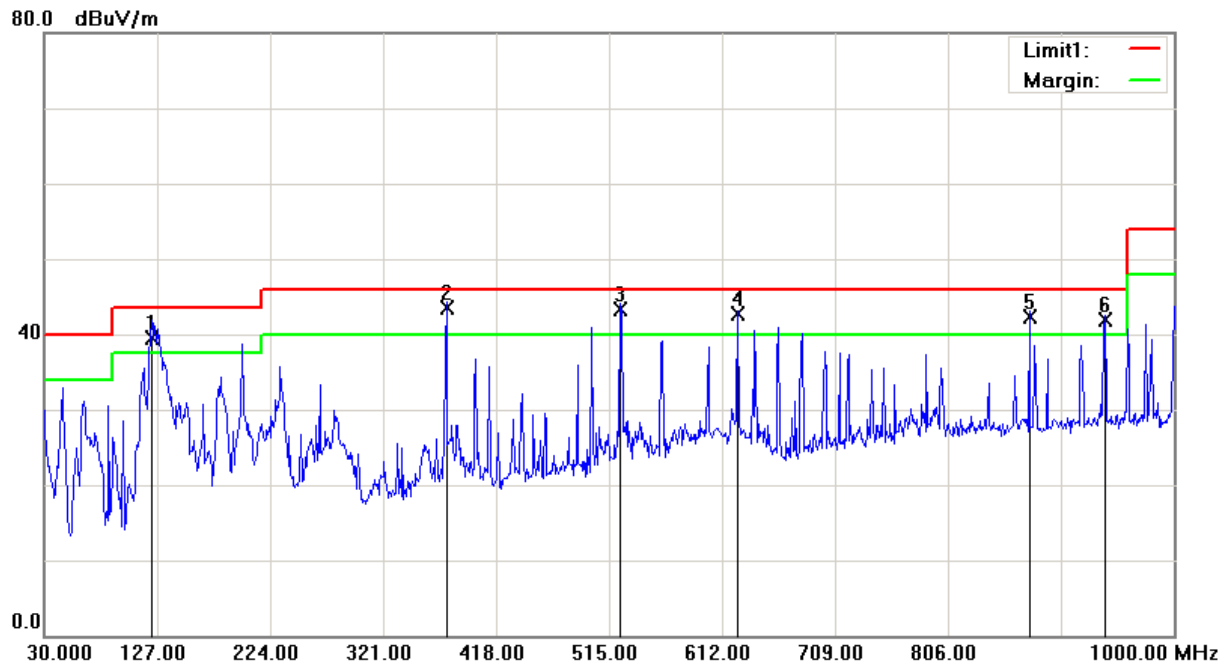
1) Below 1 GHz:

Horizontal:



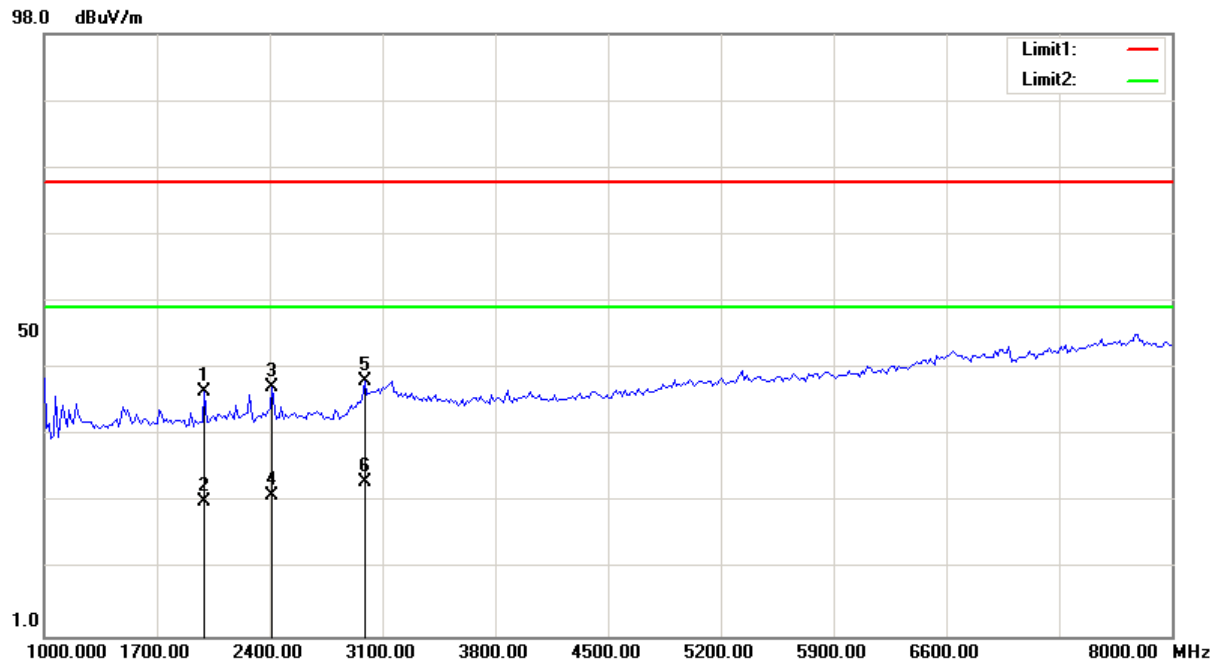
Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
44.5500	41.77	QP	-9.37	32.40	40.00	7.60
375.3200	43.31	QP	-3.81	39.50	46.00	6.50
525.6700	43.18	QP	-1.08	42.10	46.00	3.90*
625.5800	41.05	QP	0.35	41.40	46.00	4.60*
679.9000	36.72	QP	0.88	37.60	46.00	8.40
880.6900	36.60	QP	3.60	40.20	46.00	5.80*

*Within measurement uncertainty!

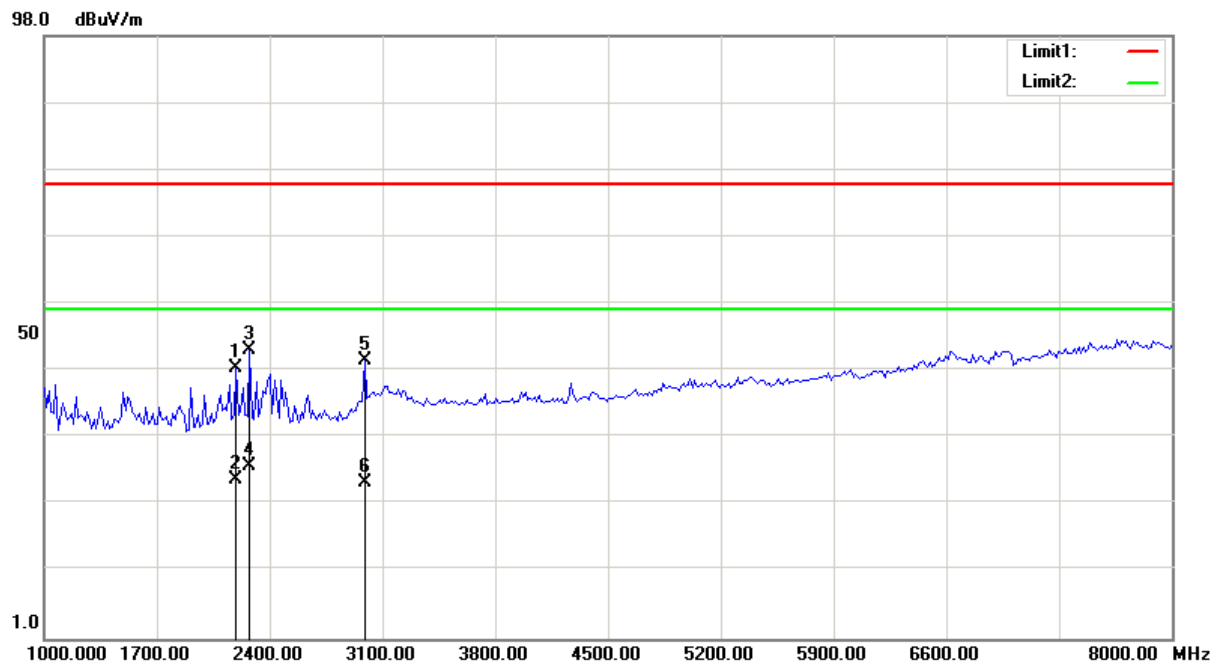
Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
122.1500	45.55	QP	-5.95	39.60	43.50	3.90*
375.3200	47.31	QP	-3.81	43.50	46.00	2.50*
524.7000	44.49	QP	-1.09	43.40	46.00	2.60*
625.5800	42.35	QP	0.35	42.70	46.00	3.30*
875.8400	38.54	QP	3.76	42.30	46.00	3.70*
940.8300	37.15	QP	4.75	41.90	46.00	4.10*

**Within measurement uncertainty!*

2) Above 1 GHz:**Horizontal:**

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1995.992	39.15	peak	1.28	40.43	74.00	33.57
1995.992	21.37	AVG	1.28	22.65	54.00	31.35
2416.834	38.18	peak	2.94	41.12	74.00	32.88
2416.834	20.63	AVG	2.94	23.57	54.00	30.43
2991.984	35.07	peak	7.05	42.12	74.00	31.88
2991.984	18.88	AVG	7.05	25.93	54.00	28.07

Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2192.385	42.51	peak	2.00	44.51	74.00	29.49
2192.385	24.55	AVG	2.00	26.55	54.00	27.45
2276.553	45.03	peak	2.33	47.36	74.00	26.64
2276.553	26.41	AVG	2.33	28.74	54.00	25.26
2991.984	38.58	peak	7.05	45.63	74.00	28.37
2991.984	19.14	AVG	7.05	26.19	54.00	27.81

***** END OF REPORT *****