FCC PART 15.247

TEST REPORT

For

GEN3 Mobility LLC

110 110th Avenue NE, Suite 520, Bellevue, WA 98004 USA

FCC ID: 2AZM4-ELV1003

Report Type:	**Product Type:**
Original Report	Electric Scooter

Report Number: ATC210420-12621E-RF

Report Date: 2021-04-22

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Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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TABLE OF CONTENTS

GENERAL INFORMATION **3**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 3
OBJECTIVE 3
TEST METHODOLOGY 3
MEASUREMENT UNCERTAINTY 4
SYSTEM TEST CONFIGURATION **5**
DESCRIPTION OF TEST CONFIGURATION 5
EQUIPMENT MODIFICATIONS 5
EUT EXERCISE SOFTWARE 5
DUTY CYCLE 5
SUPPORT EQUIPMENT LIST AND DETAILS 6
EXTERNAL I/O CABLE 6
BLOCK DIAGRAM OF TEST SETUP 6
SUMMARY OF TEST RESULTS **7**
TEST EQUIPMENT LIST **8**
FCC §15.247 (i), §1.1307 (b) (1) & §2.1093 – RF EXPOSURE **9**
FCC §15.203 - ANTENNA REQUIREMENT **10**
APPLICABLE STANDARD 10
ANTENNA CONNECTOR CONSTRUCTION 10
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS **11**
APPLICABLE STANDARD 11
EUT SETUP 11
EMI TEST RECEIVER SETUP 11
TEST PROCEDURE 11
TRANSD FACTOR & MARGIN CALCULATION 12
TEST DATA 12
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS **15**
APPLICABLE STANDARD 15
EUT SETUP 15
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 16
TEST PROCEDURE 16
FACTOR & MARGIN CALCULATION 16
TEST DATA 16

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Electric Scooter
Trade	GEN3, GEN3
Tested Model	ELV1003
Frequency Range	BLE: 2402-2480MHz
Maximum Conducted Peak Output Power	2.99dBm
Modulation Technique	BLE: GFSK
Antenna Specification*	PCB Antenna: 0dBi(provided by the applicant)
Voltage Range	DC 42V from adapter or DC 37V from battery.
Date of Test	2021-04-06 to 2021-04-12
Sample serial number	ATC210420-12621E-RF-S1(Assigned by ATC)
Received date	2021-03-25
Sample/EUT Status	Good condition
Adapter information	Model: XSL88-4200200 INPUT: 100-240V, 50/60Hz, 2.0A Max OUTPUT: 42.0V, 2.0A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
AC Power Lines Conducted Emissions		*2.72dB*
Emissions, Radiated	30MHz - 1GHz	*4.28dB*
	1GHz- 18GHz	*4.98dB*
	18GHz- 26.5GHz	*5.06dB*

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A-2.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

EUT was tested with Channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

"EMI-TOOL 1.8.1"software was used during test and power level is 5dBm.

Duty cycle

This device contains a same Bluetooth LE module as product model of ELV-1004, which certified with FCC ID: 2AZM4-ELV1004. The data please refer to the Report: RTZ210319001-00A.

Support Equipment List and Details

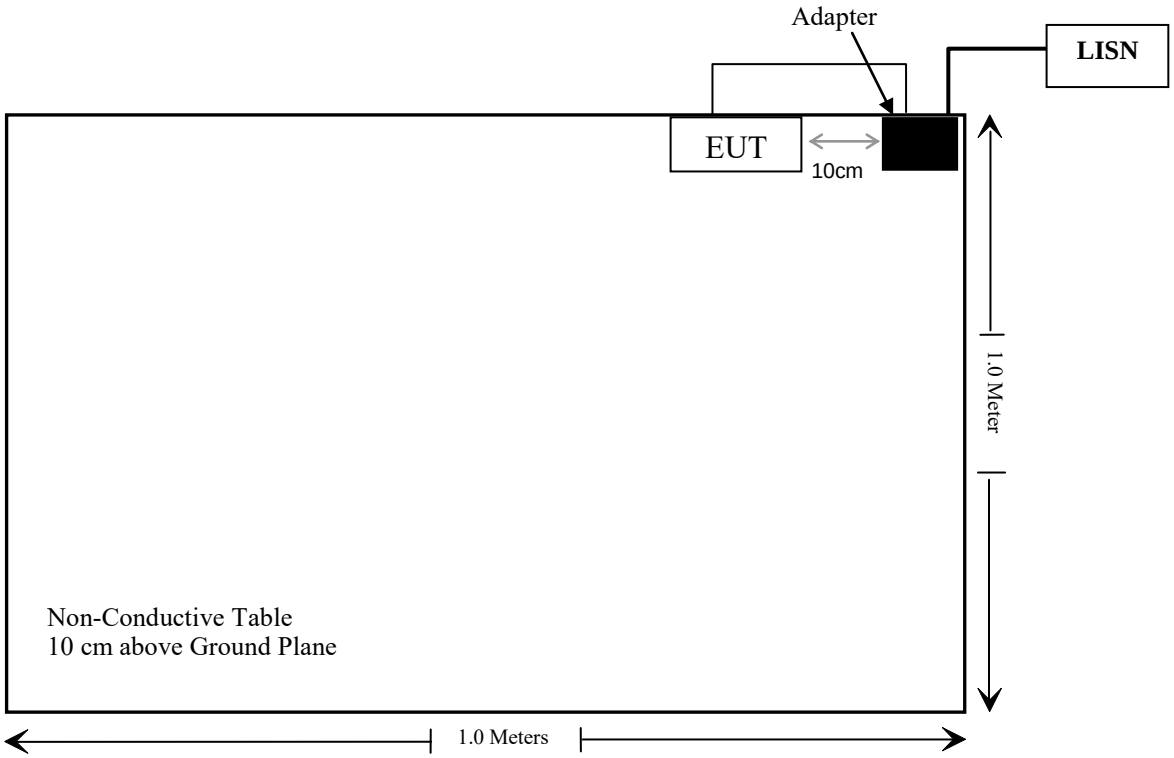
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding Detachable DC Cable	1.5	Adapter	EUT

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (1)& §2.1093	RF EXPOSURE	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliance*
§15.247(b)(3)	Maximum Conducted Output Power	Compliance*
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance*
§15.247(e)	Power Spectral Density	Compliance*

Note:
Compliance*: This device contains a same Bluetooth LE module as product model of ELV-1004, which certified with FCC ID: 2AZM4-ELV1004. The data please refer to the Report: RTZ210319001-00A.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	Test Receiver	ESPI3	100396	2020/12/24	2021/12/23
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	100815	2020/12/25	2021/12/24
Anritsu Corp	50Ω Coaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-2m	No.2	2020/12/25	2021/12/24
Radiated Emissions Test					
Rohde&Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2020/07/08	2021/07/07
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/04	2023/01/03
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9170	9170-359	2020/01/05	2023/01/04
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/28	2021/11/27
RF Coaxial Cable	Unknown	N-5m	No.3	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-5m	No.4	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-1m	No.5	2020/12/25	2021/12/24
RF Coaxial Cable	Unknown	N-1m	No.6	2020/12/25	2021/12/24

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i), §1.1307 (b) (1) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Test Result:

For worst case:

Mode	Frequency (MHz)	Maximum Tune-up power		Calculated Distance (mm)	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
		(dBm)	(mW)				
BLE	2480	3	2.00	5	0.6	3.0	Yes

Result: No Standalone SAR test is required

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one internal antenna arrangement which was permanently attached and the antenna gain is 0dBi, fulfill the requirement of this section. Please refer to the product photos.

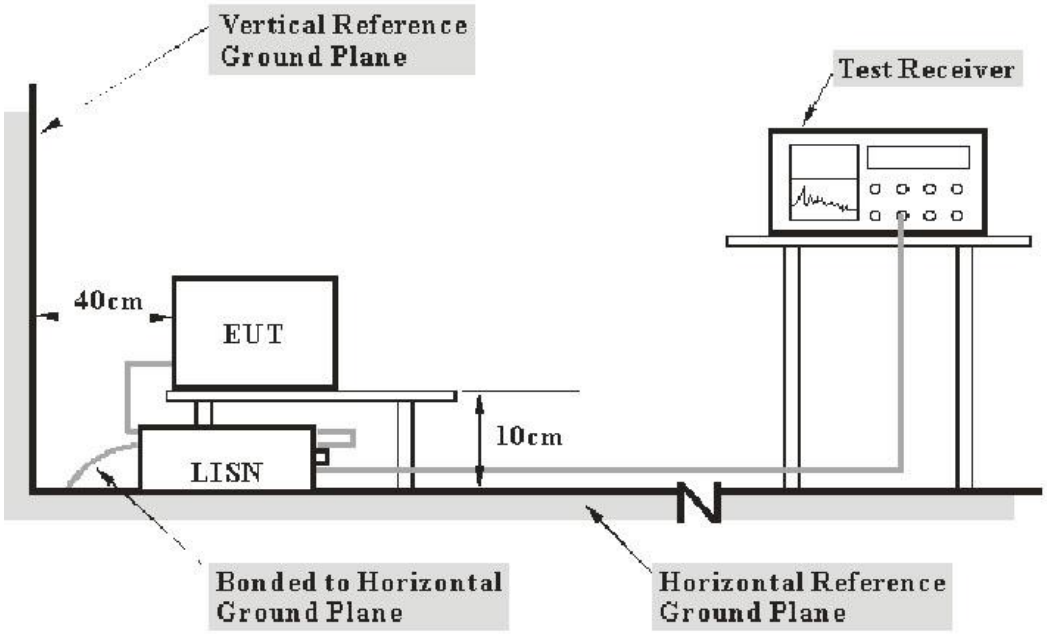
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 10 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

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

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Transd Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Transd Factor = LISN VDF + Cable Loss

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

Margin = Limit – level
Level= reading level+ Transd Factor

Test Data

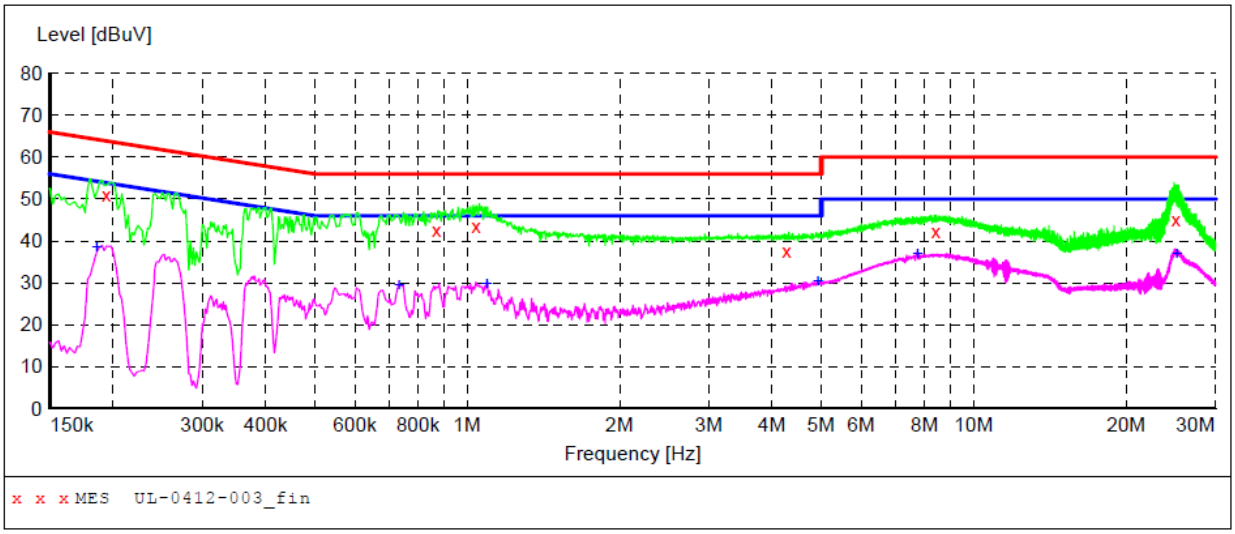
Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-04-12.

EUT operation mode: Transmitting (Worst case as below)

AC 120V/60 Hz, Line



MEASUREMENT RESULT: "UL-0412-003_fin"

4/12/2021 4:42PM

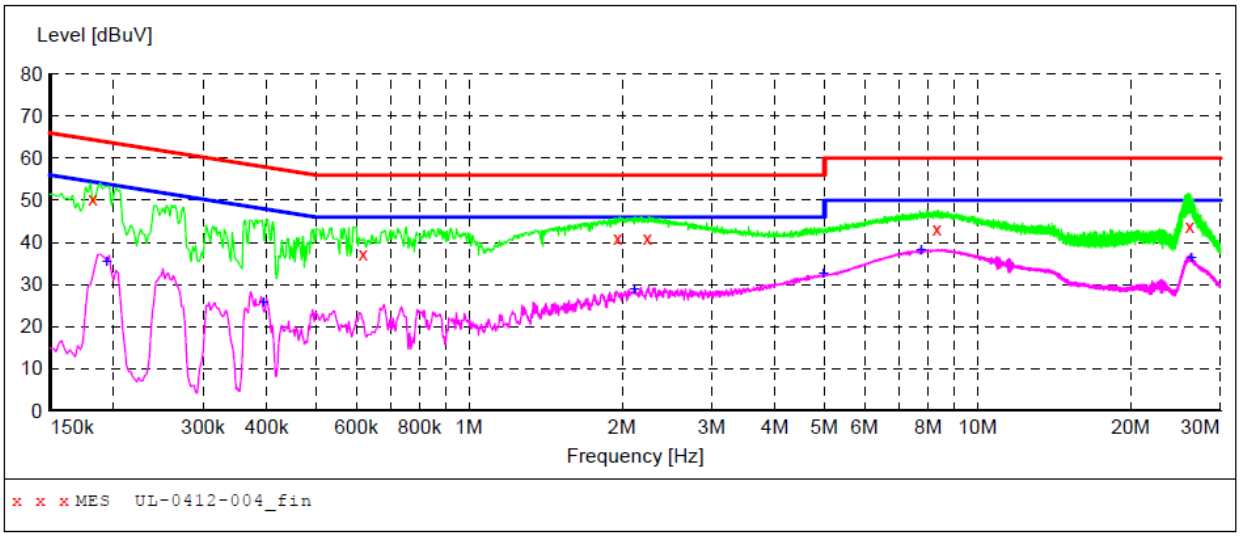
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.194000	50.90	10.1	64	13.1	QP	L1	GND
0.870000	42.60	10.1	56	13.4	QP	L1	GND
1.042000	43.60	10.1	56	12.4	QP	L1	GND
4.274000	37.60	10.1	56	18.4	QP	L1	GND
8.410000	42.10	10.2	60	17.9	QP	L1	GND
25.074000	45.00	10.3	60	15.0	QP	L1	GND

MEASUREMENT RESULT: "UL-0412-003_fin2"

4/12/2021 4:42PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.186000	38.60	10.1	54	15.4	AV	L1	GND
0.734000	29.60	10.1	46	16.4	AV	L1	GND
1.094000	29.90	10.1	46	16.1	AV	L1	GND
4.934000	30.50	10.1	46	15.5	AV	L1	GND
7.750000	37.10	10.2	50	12.9	AV	L1	GND
25.182000	37.10	10.3	50	12.9	AV	L1	GND

AC 120V/60 Hz, Neutral



MEASUREMENT RESULT: "UL-0412-004_fin"

4/12/2021 4:58PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.182000	50.30	10.1	64	13.7	QP	N	GND
0.618000	37.30	10.1	56	18.7	QP	N	GND
1.958000	41.10	10.1	56	14.9	QP	N	GND
2.242000	41.00	10.1	56	15.0	QP	N	GND
8.314000	43.10	10.2	60	16.9	QP	N	GND
26.126000	43.90	10.3	60	16.1	QP	N	GND

MEASUREMENT RESULT: "UL-0412-004_fin2"

4/12/2021 4:58PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.194000	35.40	10.1	54	18.6	AV	N	GND
0.394000	25.60	10.1	48	22.4	AV	N	GND
2.114000	28.80	10.1	46	17.2	AV	N	GND
4.974000	32.60	10.1	46	13.4	AV	N	GND
7.762000	38.20	10.2	50	11.8	AV	N	GND
26.366000	36.20	10.3	50	13.8	AV	N	GND

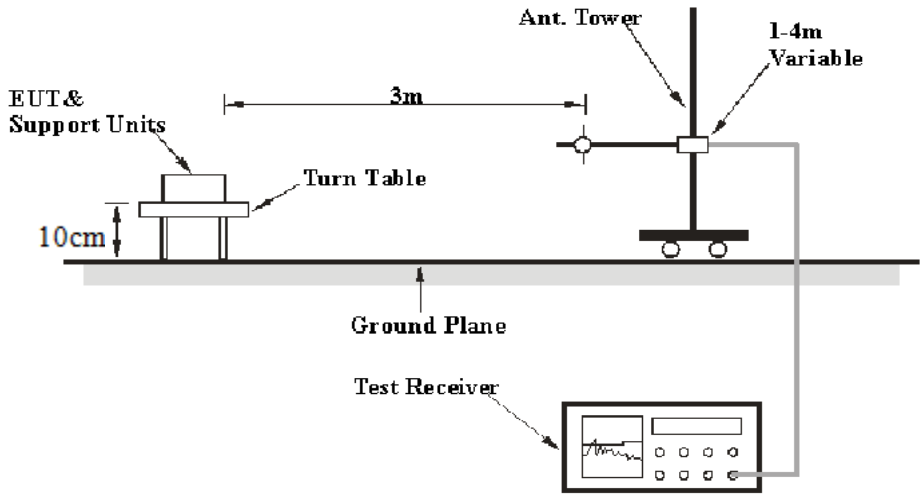
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

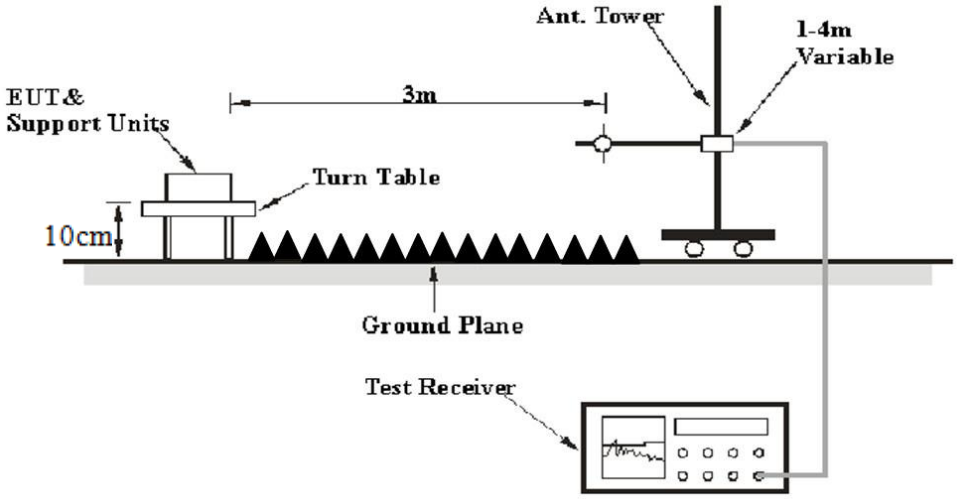
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Factor & Margin Calculation

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

Factor = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Result-Limit
Result = Reading + Factor

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-04-12 for below 1GHz and on 2021-04-08 for above 1GHz.

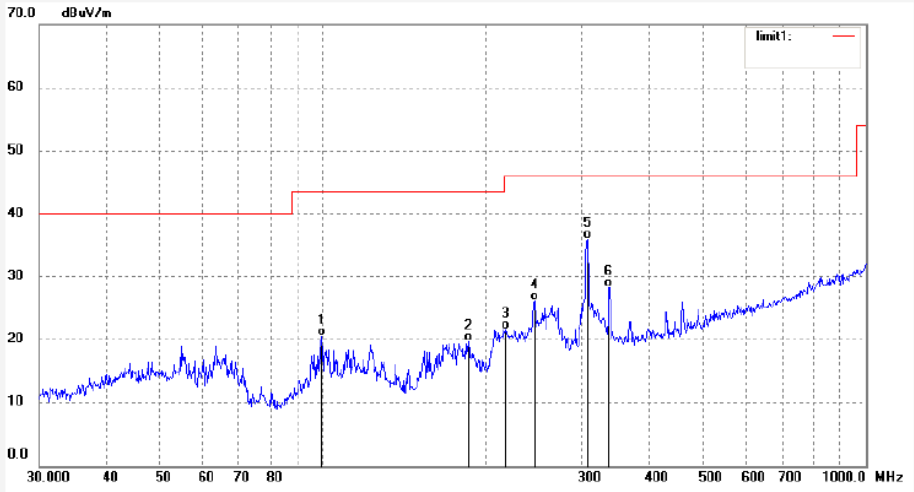
EUT operation mode: Transmitting
***18~25GHz**: The test values lower than the limits of 20dB or in the noise floor level, the test data were not recorded in the report.*

BLE:

30 MHz~1 GHz(Worst case):

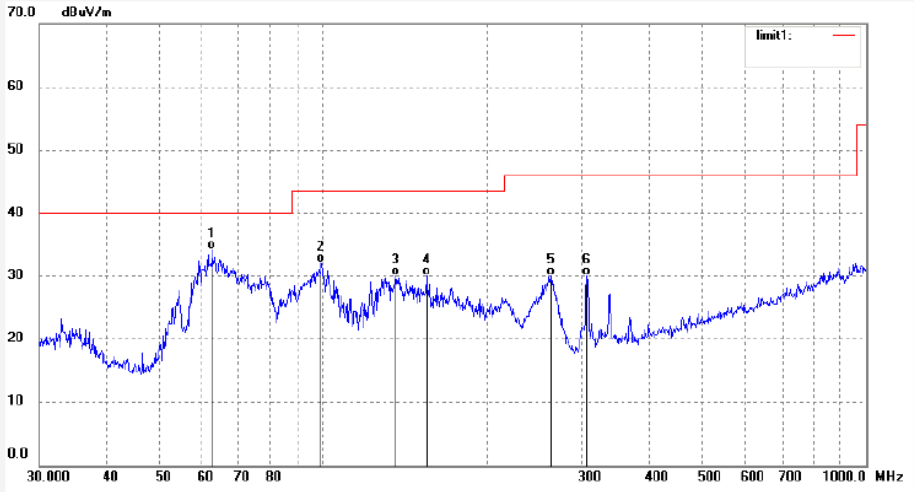
TX 2402MHz:

Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	99.5281	32.53	-11.94	20.59	43.50	-22.91	QP			
2	185.1379	31.33	-11.69	19.64	43.50	-23.86	QP			
3	217.5443	32.48	-10.90	21.58	46.00	-24.42	QP			
4	245.0900	36.37	-10.14	26.23	46.00	-19.77	QP			
5	306.7537	44.44	-8.43	36.01	46.00	-9.99	QP			
6	337.2155	35.49	-7.24	28.25	46.00	-17.75	QP			

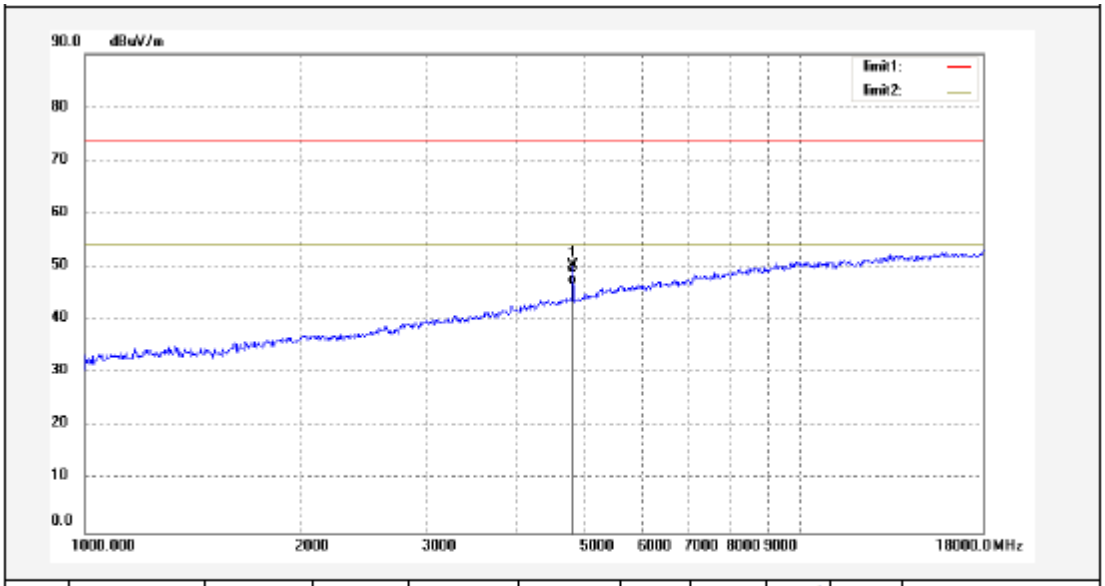
Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.4314	47.75	-13.47	34.28	40.00	-5.72	QP			
2	99.1797	44.21	-12.06	32.15	43.50	-11.35	QP			
3	135.9822	43.21	-13.22	29.99	43.50	-13.51	QP			
4	154.8204	44.06	-14.11	29.95	43.50	-13.55	QP			
5	262.8955	39.96	-9.92	30.04	46.00	-15.96	QP			
6	305.6800	38.51	-8.48	30.03	46.00	-15.97	QP			

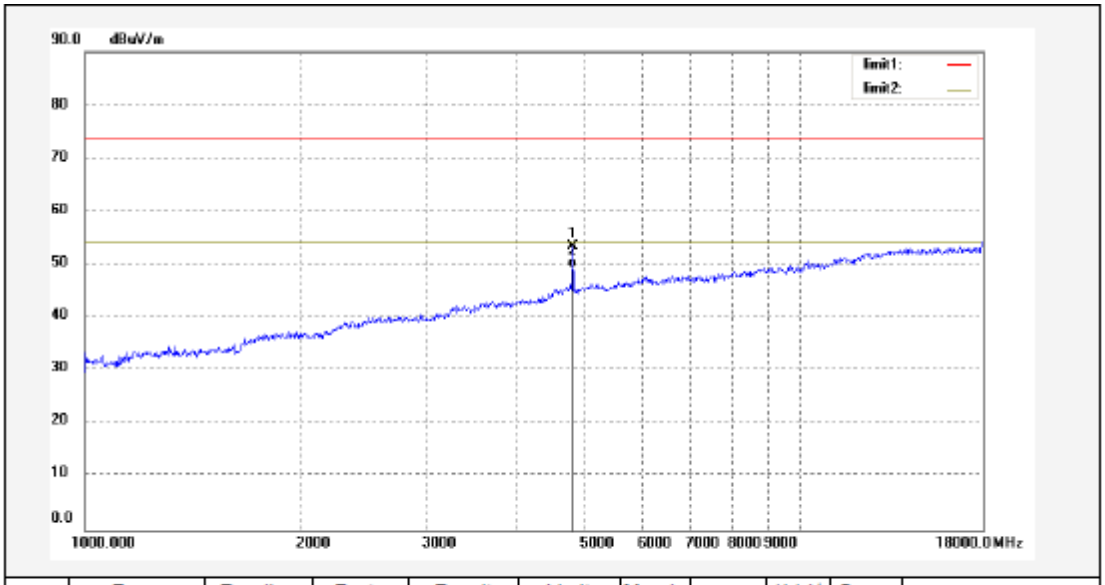
Above 1 GHz:

2402MHz
Horizontal



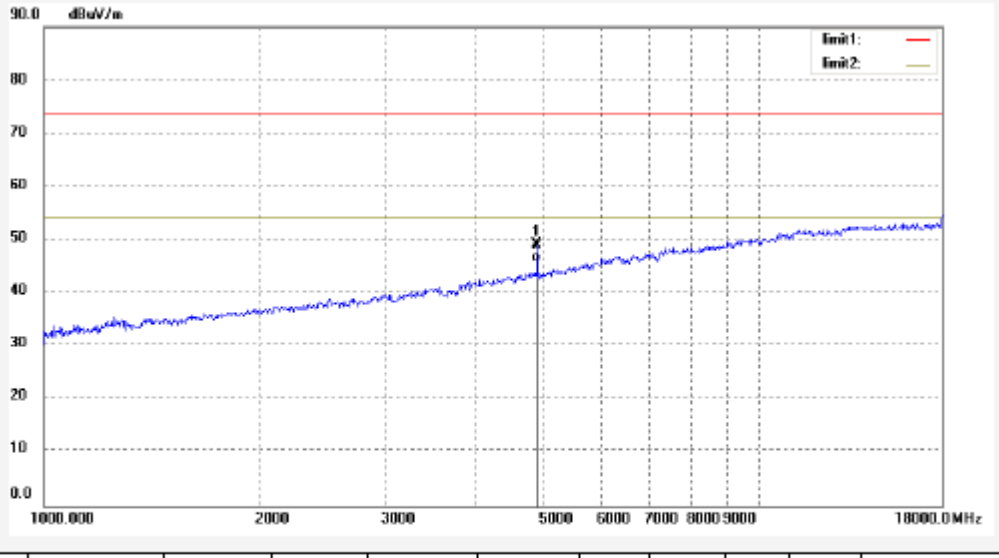
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4804.110	47.58	2.81	50.39	74.00	-23.61	peak			
2	4804.110	43.79	2.81	46.60	54.00	-7.40	AVG			

Vertical



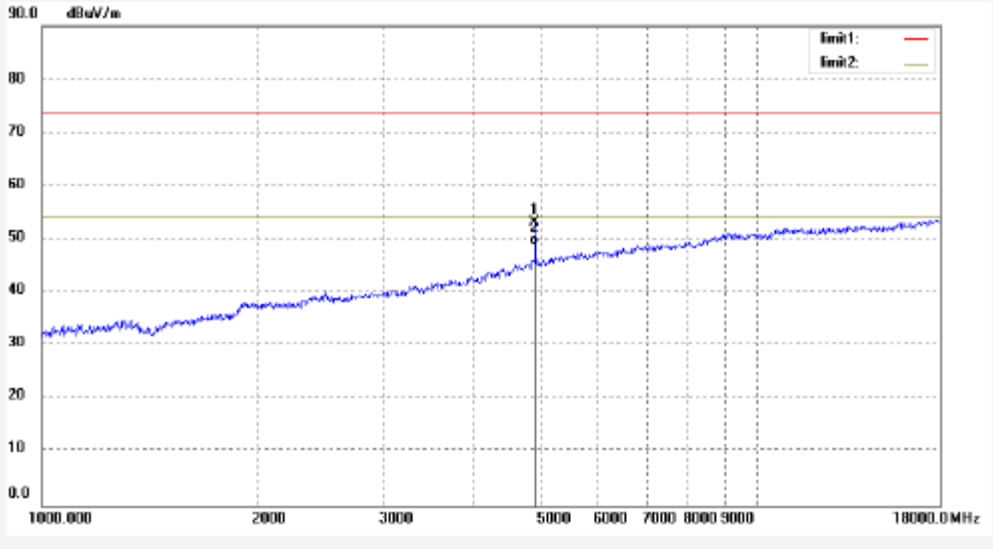
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4804.110	50.58	2.81	53.39	74.00	-20.61	peak			
2	4804.110	46.52	2.81	49.33	54.00	-4.67	AVG			

2440MHz
Horizontal



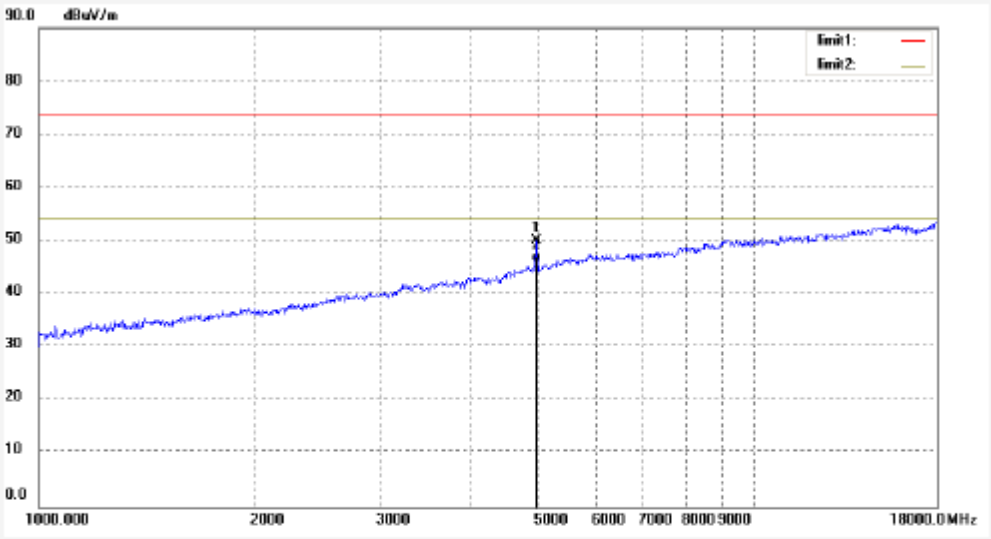
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4888.151	46.03	3.06	49.09	74.00	-24.91	peak			
2	4888.151	42.74	3.06	45.80	54.00	-8.20	AVG			

Vertical



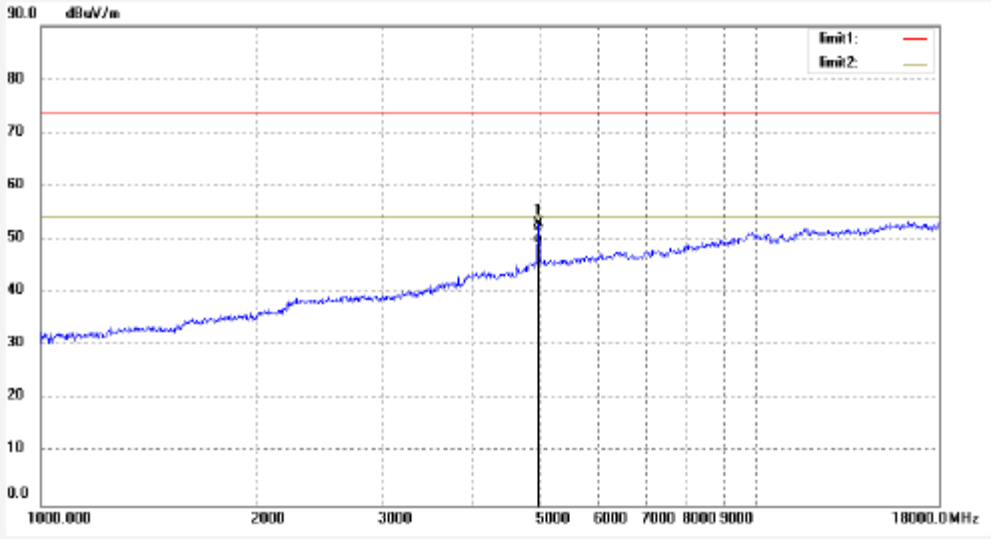
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4888.151	50.07	3.06	53.13	74.00	-20.87	peak			
2	4888.151	45.87	3.06	48.93	54.00	-5.07	AVG			

2480MHz
Horizontal



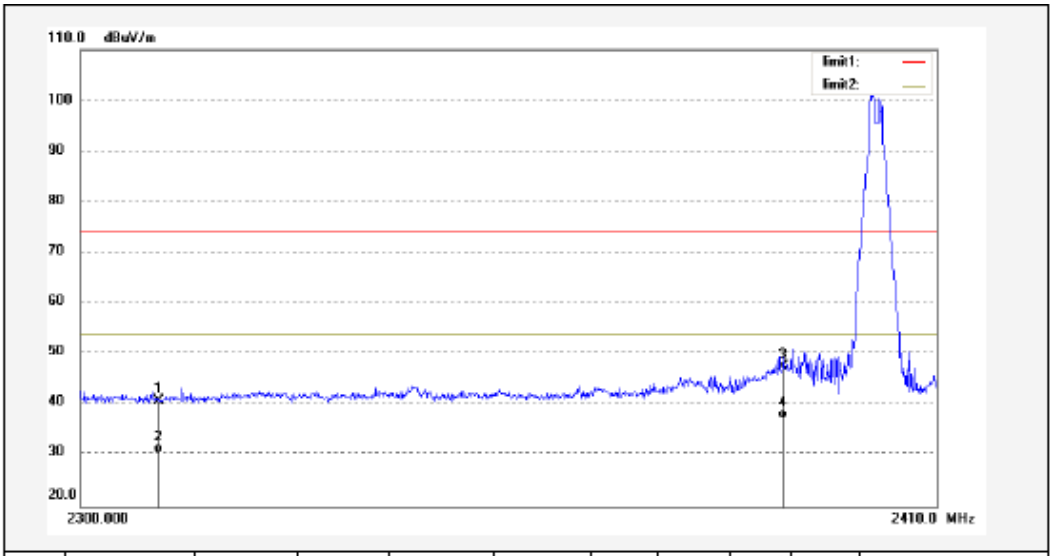
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4959.307	46.72	3.28	50.00	74.00	-24.00	peak			
2	4959.307	42.65	3.28	45.93	54.00	-8.07	AVG			

Vertical



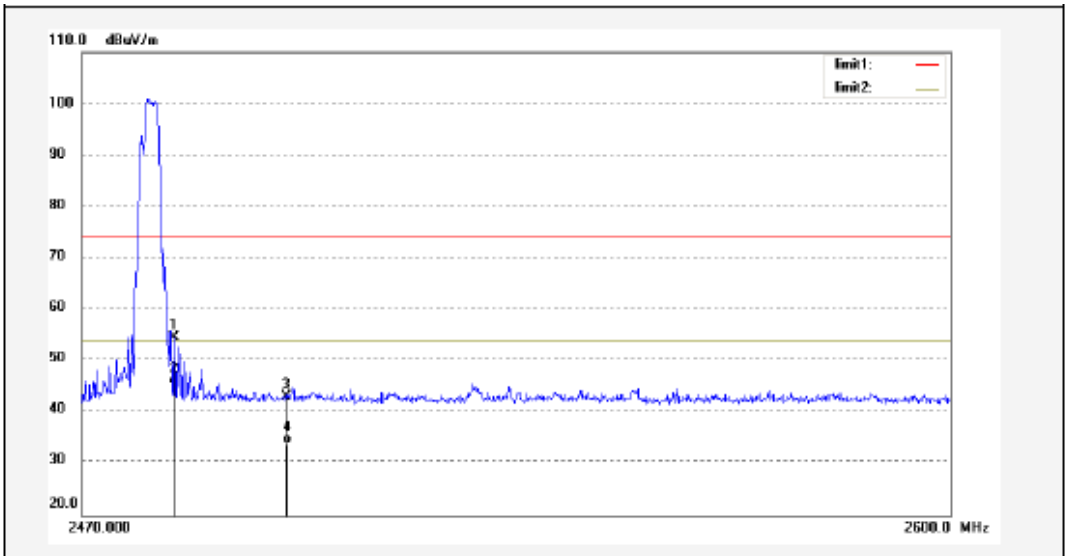
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4959.307	49.63	3.28	52.91	74.00	-21.09	peak			
2	4959.307	45.78	3.28	49.06	54.00	-4.94	AVG			

Band Edge, Left Side



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	47.59	-6.84	40.75	74.00	-33.25	peak			
2	2310.000	37.21	-6.84	30.37	54.00	-23.63	AVG			
3	2390.000	53.91	-6.44	47.47	74.00	-26.53	peak			
4	2390.000	43.76	-6.44	37.32	54.00	-16.68	AVG			

Band Edge, Right Side



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	60.52	-5.96	54.56	74.00	-19.44	peak			
2	2483.500	51.21	-5.96	45.25	54.00	-8.75	AVG			
3	2500.000	48.86	-5.88	42.98	74.00	-31.02	peak			
4	2500.000	39.73	-5.88	33.85	54.00	-20.15	AVG			

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