

FCC Transmit Simultaneously Test Report

FCC ID: T58DL4480V1R

This report concerns (check one): ☒ Original Grant ☐ Class I Change ☐ Class II Change

Project No. : 1711145
Equipment : SuperVector VDSL2 AC1200 Dual Band Gigabit IAD
Test Model : DL4480V1
Series Model : N/A
Applicant : NETIS SYSTEMS CO., LTD
Address : Building 6, Baolong Plant, Able Technology Park,
No.2 of Baolong 4th Road, Baolong Steet, Baolong
Community, Longgang District, Shenzhen, China

Date of Receipt : Dec. 08, 2017
Date of Test : Dec. 08, 2017 ~ Jun. 13, 2018
Issued Date : Jun. 13, 2018
Tested by : BTL Inc.

Testing Engineer : Kay Wu
(Kay Wu)
Technical Manager : James Chiu
(James Chiu)
Authorized Signatory : Andy Chiu
(Andy Chiu)

B T L I N C .

No.18, Ln. 171, Sec. 2, Jiuzong Rd.,
Neihu Dist., Taipei City, Taiwan (R.O.C.)
TEL:+886-2-2657-3299 FAX: +886-2-2657-3331



Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Table of Contents	Page
1 . CERTIFICATION	5
2 . SUMMARY OF TEST RESULTS	6
2.1 TEST FACILITY	7
2.2 MEASUREMENT UNCERTAINTY	7
3 . GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF TEST MODES	10
3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
3.4 DESCRIPTION OF SUPPORT UNITS	11
4 . EMC EMISSION TEST	12
4.1 RADIATED EMISSION MEASUREMENT	12
4.1.1 RADIATED EMISSION LIMITS	12
4.1.2 TEST PROCEDURE	13
4.1.3 DEVIATION FROM TEST STANDARD	13
4.1.4 TEST SETUP	14
4.1.5 EUT OPERATING CONDITIONS	15
4.1.6 EUT TEST CONDITIONS	15
4.1.7 TEST RESULTS	15
5 . MEASUREMENT INSTRUMENTS LIST	16
6 . EUT TEST PHOTO	17
APPENDIX A – RADIATED EMISSION (CO-LOCATION)	18

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-3-1711145	Original Issue.	Jun. 13, 2018

1. CERTIFICATION

Equipment : SuperVector VDSL2 AC1200 Dual Band Gigabit IAD
Brand Name : netis
Test Model : DL4480V1
Series Model : N/A
Applicant : NETIS SYSTEMS CO., LTD
Manufacturer : Shenzhen Netcore Industrial Ltd.
Address : Building 6, Baolong Plant, Able Technology Park, No.2 of Baolong 4th Road,
Baolong Steet, Baolong Community, Longgang District, Shenzhen, China
Factory : N/A
Address : N/A
Date of Test : Dec. 08, 2017 ~ Jun. 13, 2018
Test Sample : Engineering Sample
Standard(s) : FCC Part15, Subpart C (15.247)
ANSI C63.10-2013

The above equipment has been tested and found in compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-3-1711145) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

Test results included in this report is only for Transmit Simultaneously part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15, Subpart C (15.247)			
Standard(s) Section	Test Item	Judgement	Remark
15.247(d) 15.209	Radiated emission	PASS	-----

Note:

(1) "N/A" denotes test is not applicable in this test report

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Radiated emission Test (Above 1 GHz):

CB15: (VCCI RN: G-20020; FCC RN:674415; FCC DN:TW0659; ISED Assigned Code:20088-5)
No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

A. Radiated emission test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
CB15 (3m)	CISPR	1GHz ~ 6GHz	V	4.46
		1GHz ~ 6GHz	H	4.40
		6GHz ~ 18GHz	V	3.88
		6GHz ~ 18GHz	H	4.00

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15 (1m)	CISPR	18 ~ 26.5 GHz	4.62
		26.5 ~ 40 GHz	5.12

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	SuperVector VDSL2 AC1200 Dual Band Gigabit IAD	
Brand Name	netis	
Test Model	DL4480V1	
Series Model	N/A	
Model Difference	N/A	
Product Description (WLAN)	Operation Frequency	2412~2462 MHz
	Modulation Technology	802.11b:DSSS 802.11g:OFDM 802.11n:OFDM
	Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n up to 300 Mbps
Product Description (RLAN)	Operation Frequency	UNII-1: 5150-5250MHz UNII-3: 5725-5850MHz
	Modulation Type	OFDM
	Bit Rate of Transmitter	866.7Mbps
Power Source	DC Voltage supplied from AC/DC adapter.	
Power Rating	I/P: AC 100-240V~50/60Hz, 0.8A O/P: DC 12V---1.5A	
Products Covered	1 * Adapter: Shenzhen Topow Electronics Co.,Ltd. / TPA158K18120-EU	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. WLAN Channel List:

CH01 – CH11 for 802.11b, 802.11g, 802.11n(20MHz) CH03 – CH09 for 802.11n(40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

RLAN Channel List:

802.11a 802.11n 20MHz		802.11n 40MHz		802.11ac 80MHz	
UNII-1		UNII-1		UNII-1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

802.11a 802.11n 20MHz		802.11n 40MHz		802.11ac 80MHz	
UNII-3		UNII-3		UNII-3	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

3. Table for Filed Antenna:

For WLAN:

Ant.	Brand	Test Model	Antenna Type	Connector	Gain (dBi)
1		RFECA3216060A3T	Chip	N/A	2
2		RFECA3216060A3T	Chip	N/A	2

For RLAN:

Ant.	Brand	Test Model	Antenna Type	Connector	Gain (dBi)
1		RFECA3216060K1T	Chip	N/A	2.8
2		RFECA3216060K1T	Chip	N/A	2.8

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode

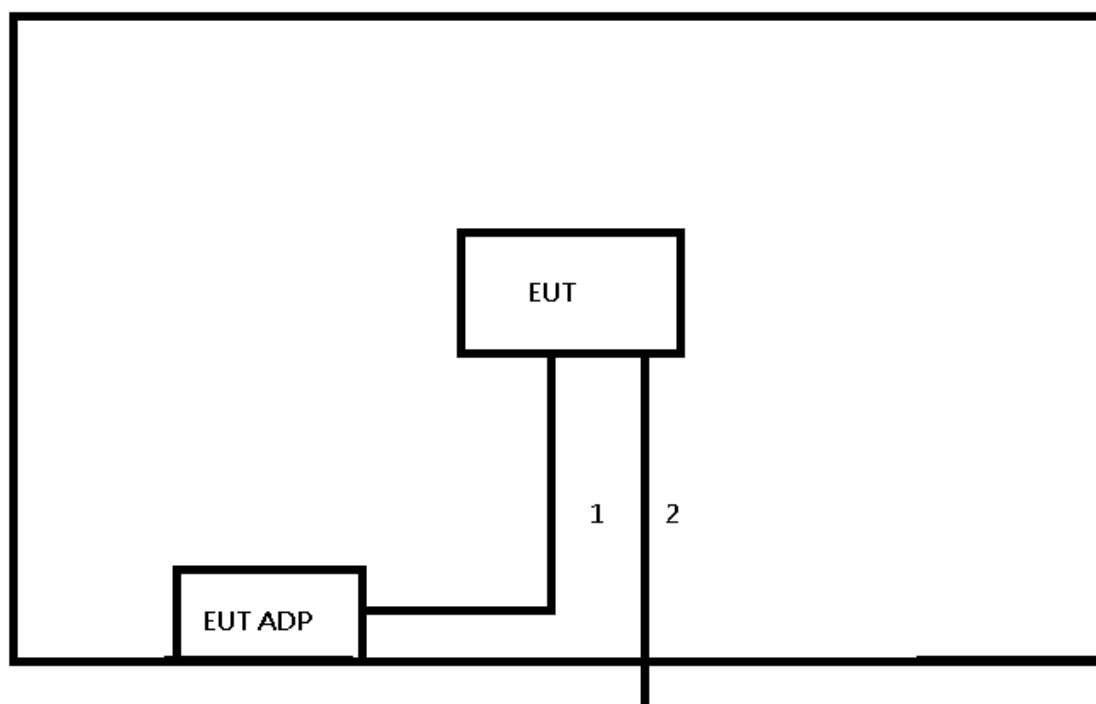
The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX Mode

Note:

- (1) The measurements are performed at the high, middle, low available channels.

3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.5m	Power cable
2	NO	NO	5.0m	RJ45 cable

4. EMC EMISSION TEST

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 RADIATED EMISSION LIMITS (Frequency Range 9KHz -1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m) (at 3 m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Spectrum Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz ~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz ~110KHz for QP detector
Start ~ Stop Frequency	110KHz ~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz ~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.1.2 TEST PROCEDURE

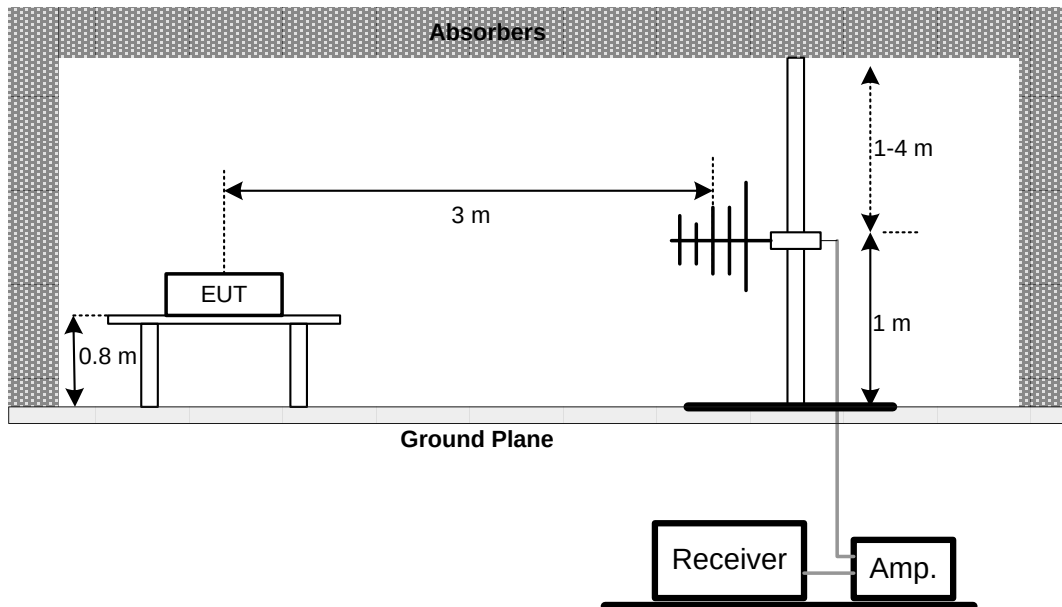
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 m above the ground at a 3 m semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 m semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

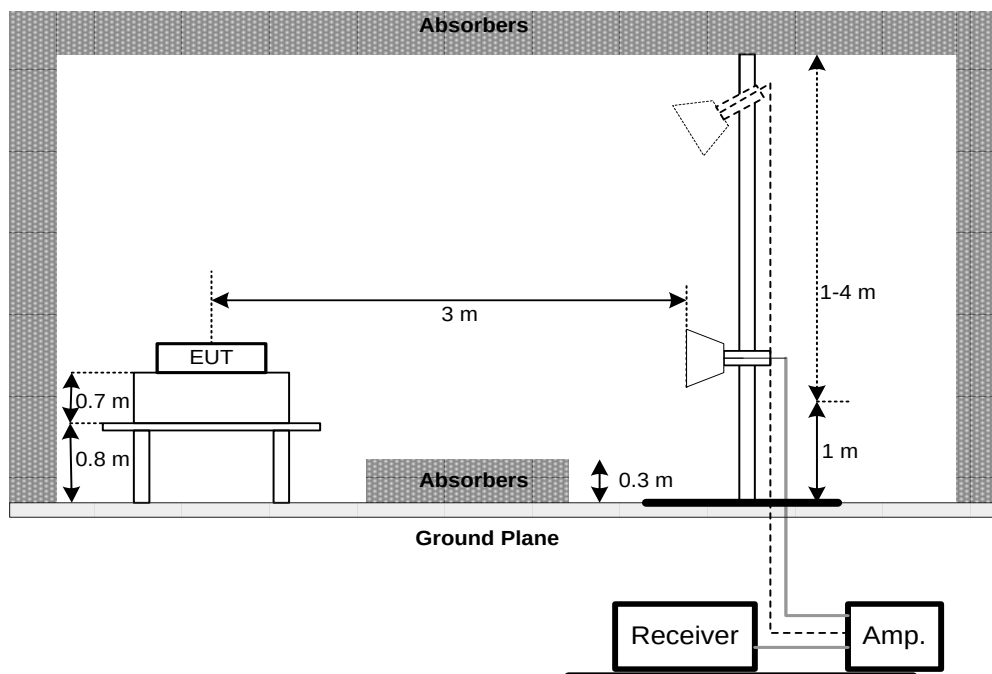
No deviation

4.1.4 TEST SETUP

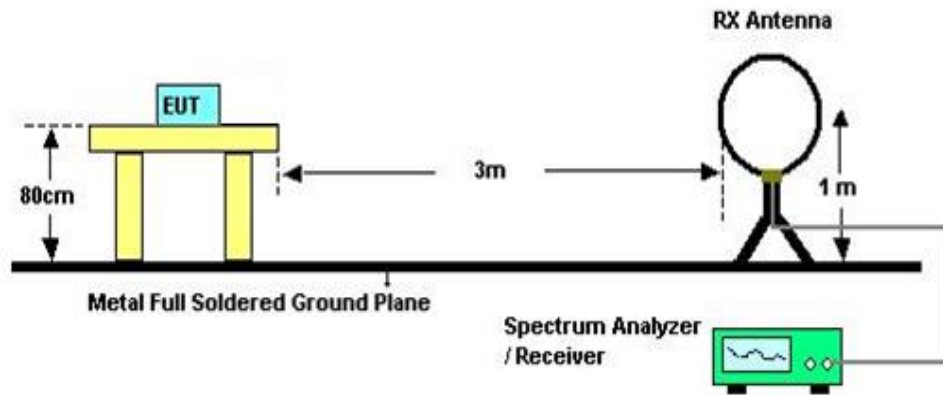
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For Radiated Emissions Below 30MHz



4.1.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.1.6 EUT TEST CONDITIONS

Temperature: 23°C Relative Humidity: 45% Test Voltage: AC 120V/60Hz

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.1.7 TEST RESULTS

Please refer to the Appendix A.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

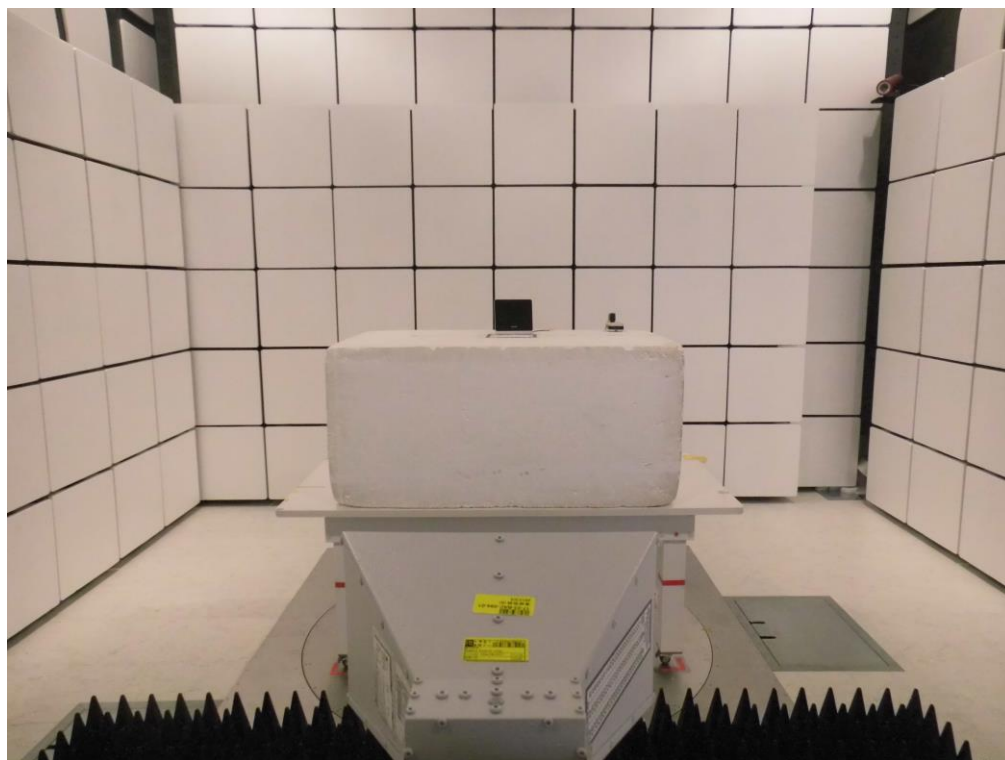
5. MEASUREMENT INSTRUMENTS LIST

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Preamplifier	EMCI	012645B	980267	Feb. 28, 2018
2	Preamplifier	EMCI	EMC02325	980217	Dec. 27, 2019
3	Preamplifier	EMCI	EMC2654045	980030	Feb. 13, 2019
4	Test Cable	EMCI	EMC104-SM-S M-8000	8m	Jan. 03, 2019
5	Test Cable	EMCI	EMC104-SM-S M-800	150207	Jan. 03, 2019
6	Test Cable	EMCI	EEMC104-SM-S M-3000	151205	Jan. 03, 2019
7	MXE EMI Receiver	Agilent	N9038A	MY55420127	Jan. 08, 2019
8	Signal Analyzer	Agilent	N9010A	MY52220990	Feb. 21, 2019
9	Loop Ant	EMCO	6502	42960	Nov. 23, 2018
10	Horn Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	Feb. 28, 2018
11	Horn Ant	Schwarzbeck	BBHA 9170	187	Dec. 05, 2019
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-548	Jan. 15, 2019
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0623	Jan. 15, 2019

Remark: "N/A" denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

6. EUT TEST PHOTO

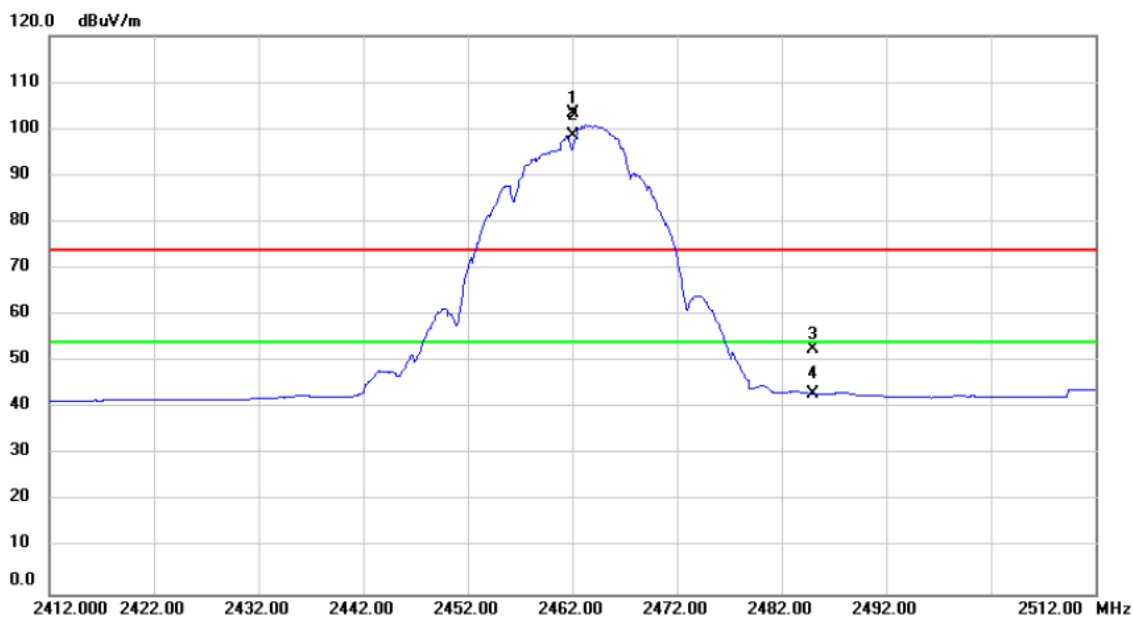
Radiated Measurement Photos



APPENDIX A – RADIATED EMISSION (Co-location)

Test Mode : TX B MODE 2462 MHz & TX A Mode 5240 MHz

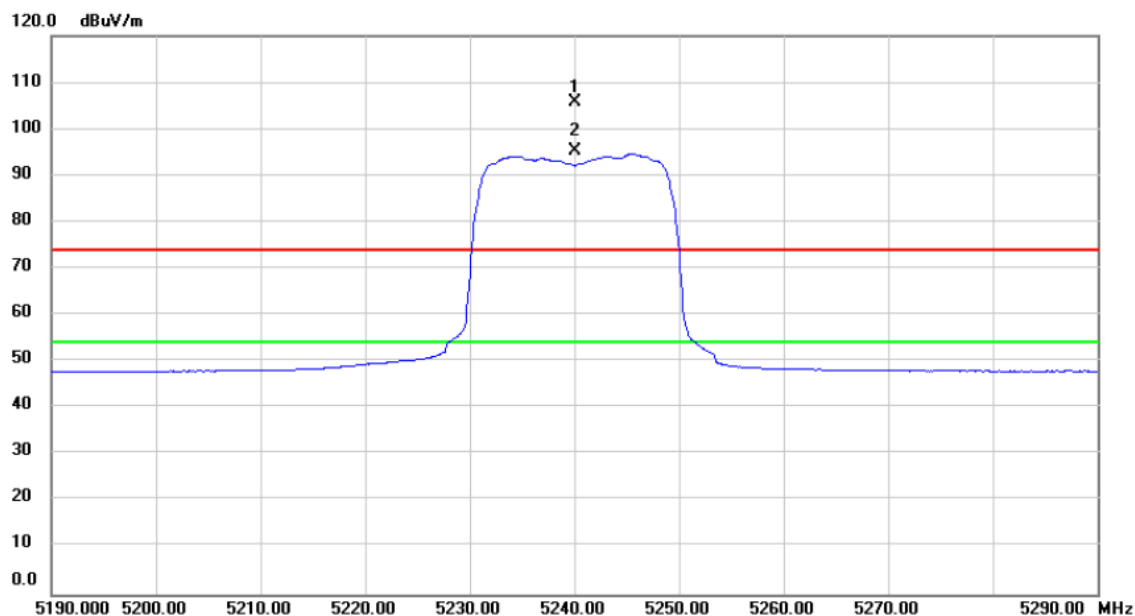
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2462.000	72.17	31.33	103.50	74.00	29.50	peak	No Limit
2	*	2462.000	67.37	31.33	98.70	54.00	44.70	A/VG	No Limit
3		2484.982	21.21	31.42	52.63	74.00	-21.37	peak	
4		2484.982	11.71	31.42	43.13	54.00	-10.87	A/VG	

Test Mode : TX B MODE 2462 MHz & TX A Mode 5240 MHz

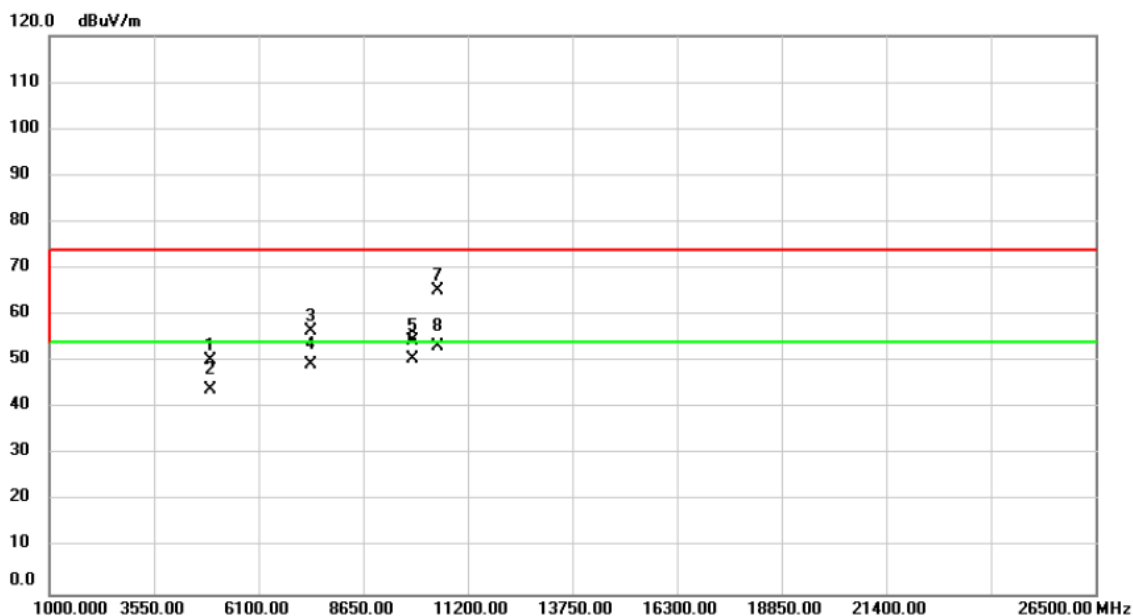
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	5240.000	68.21	37.64	105.85	74.00	31.85	peak	No Limit
2	*	5240.000	57.68	37.64	95.32	54.00	41.32	AVG	No Limit

Test Mode : TX B MODE 2462 MHz & TX A Mode 5240 MHz

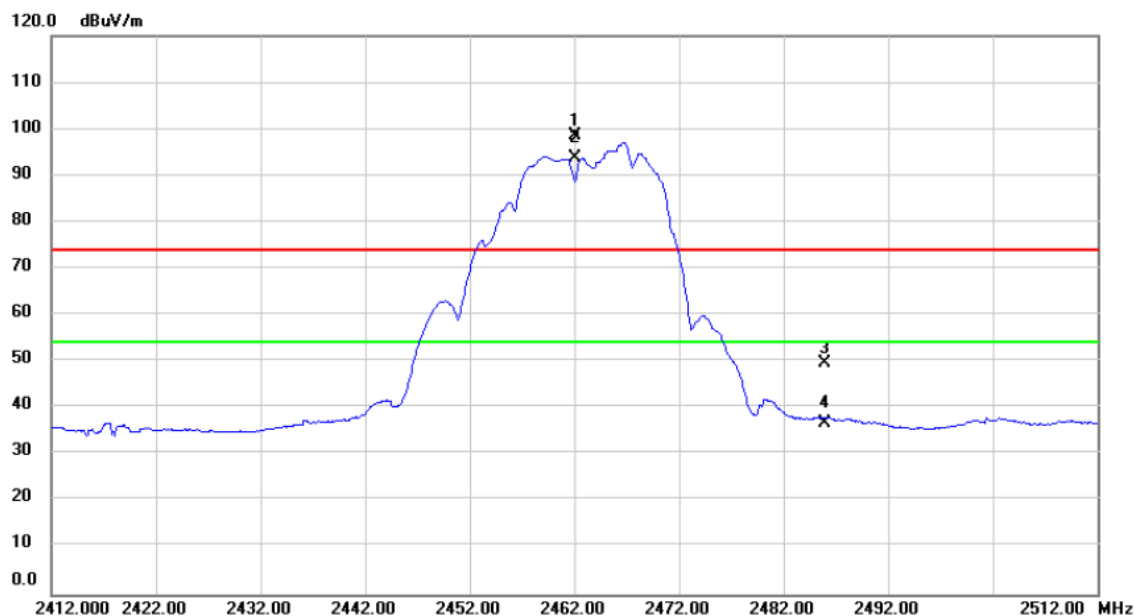
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		4924.000	61.55	-11.22	50.33	74.00	-23.67	peak	
2		4924.000	55.26	-11.22	44.04	54.00	-9.96	AVG	
3		7386.000	61.31	-4.87	56.44	74.00	-17.56	peak	
4		7386.000	54.18	-4.87	49.31	54.00	-4.69	AVG	
5		9848.000	53.21	1.27	54.48	74.00	-19.52	peak	
6		9848.000	49.34	1.27	50.61	54.00	-3.39	AVG	
7		10480.00	63.27	1.96	65.23	74.00	-8.77	peak	
8	*	10480.00	51.19	1.96	53.15	54.00	-0.85	AVG	

Test Mode : TX B MODE 2462 MHz & TX A Mode 5240 MHz

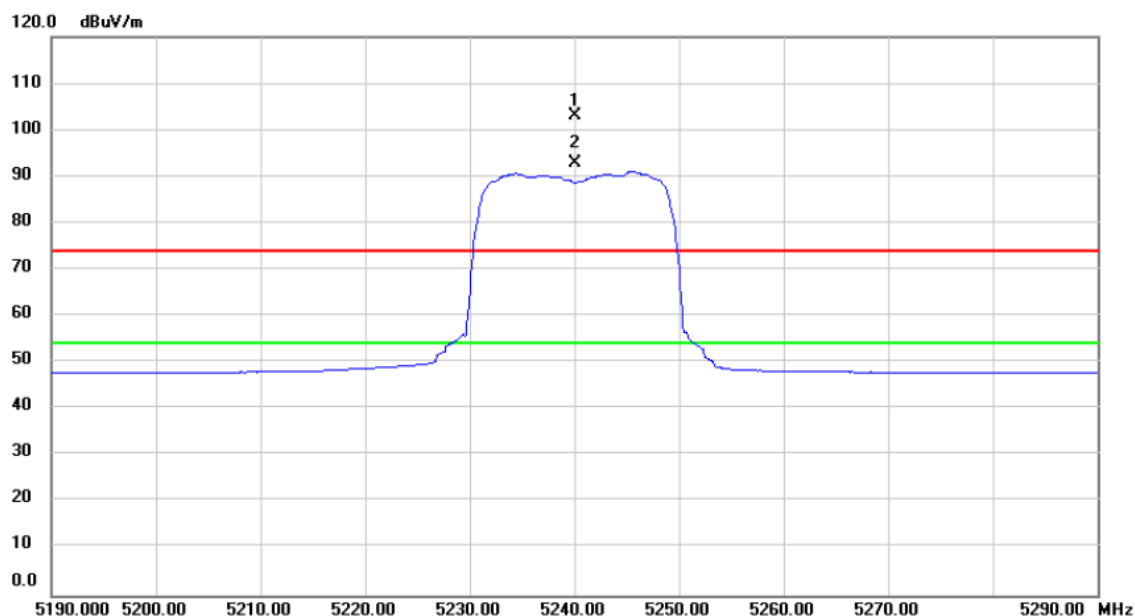
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2462.000	67.29	31.33	98.62	74.00	24.62	peak	No Limit
2	*	2462.000	62.42	31.33	93.75	54.00	39.75	AVG	No Limit
3		2485.979	18.29	31.42	49.71	74.00	-24.29	peak	
4		2485.979	5.46	31.42	36.88	54.00	-17.12	AVG	

Test Mode :	TX B MODE 2462 MHz & TX A Mode 5240 MHz
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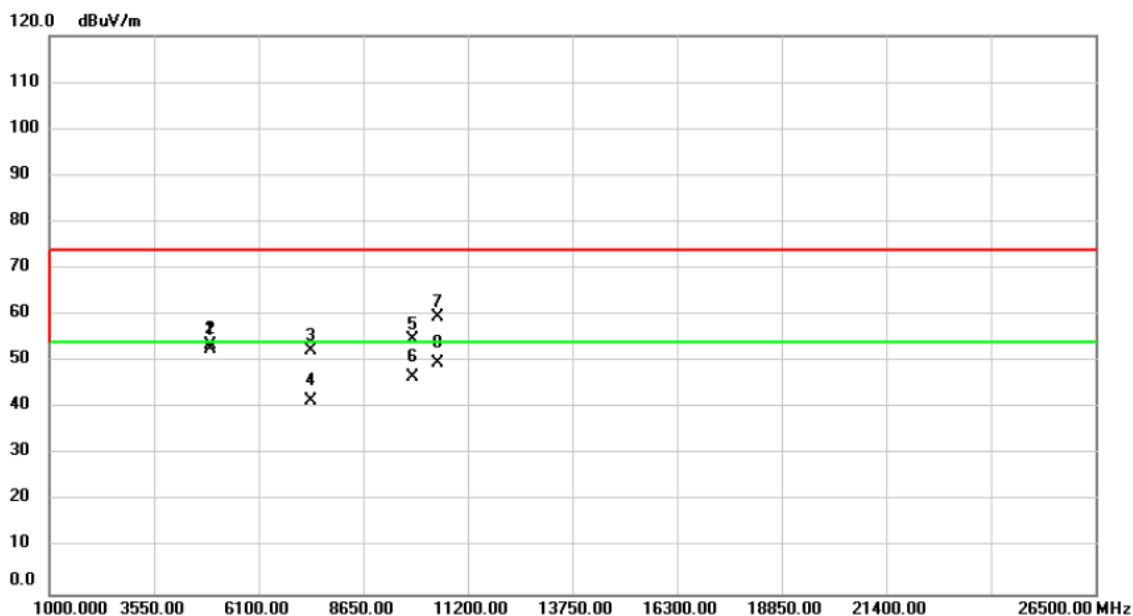
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	5240.000	65.45	37.64	103.09	74.00	29.09	peak	No Limit
2	*	5240.000	55.23	37.64	92.87	54.00	38.87	AVG	No Limit

Test Mode :	TX B MODE 2462 MHz & TX A Mode 5240 MHz
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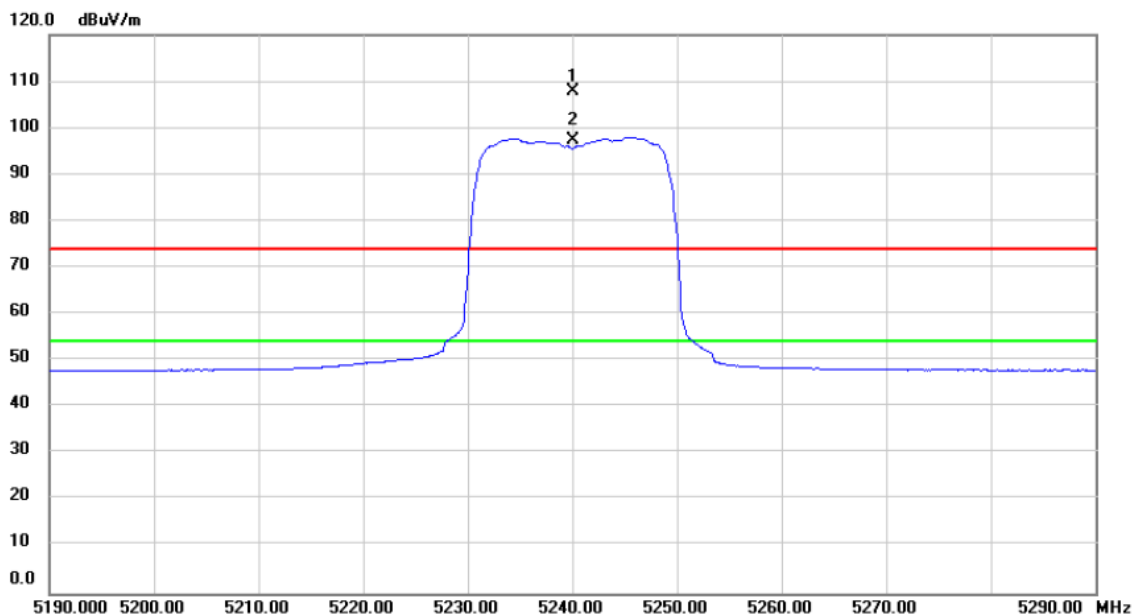
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	64.79	-11.22	53.57	74.00	-20.43	peak	
2	*	4924.000	63.82	-11.22	52.60	54.00	-1.40	AVG	
3		7386.000	57.26	-4.87	52.39	74.00	-21.61	peak	
4		7386.000	46.53	-4.87	41.66	54.00	-12.34	AVG	
5		9848.000	53.47	1.27	54.74	74.00	-19.26	peak	
6		9848.000	45.26	1.27	46.53	54.00	-7.47	AVG	
7		10480.00	57.69	1.96	59.65	74.00	-14.35	peak	
8		10480.00	47.69	1.96	49.65	54.00	-4.35	AVG	

Test Mode : TX N20 MODE 5240 MHz & TX B MODE 2462 MHz

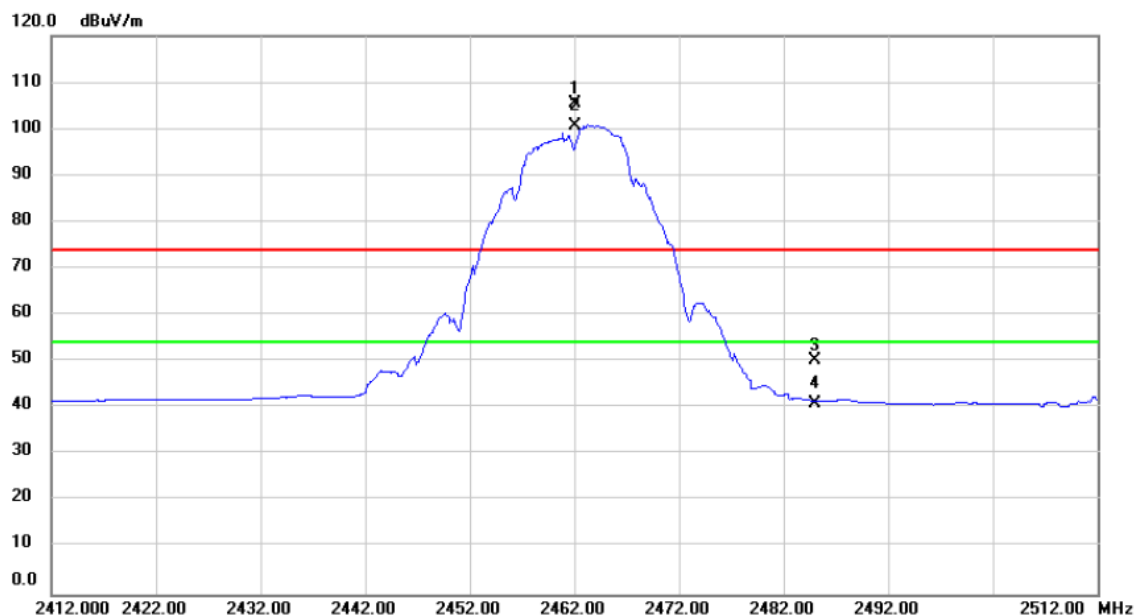
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	5240.000	70.11	37.64	107.75	74.00	33.75	peak	No Limit
2	*	5240.000	59.64	37.64	97.28	54.00	43.28	A/VG	No Limit

Test Mode : TX N20 MODE 5240 MHz & TX B MODE 2462 MHz

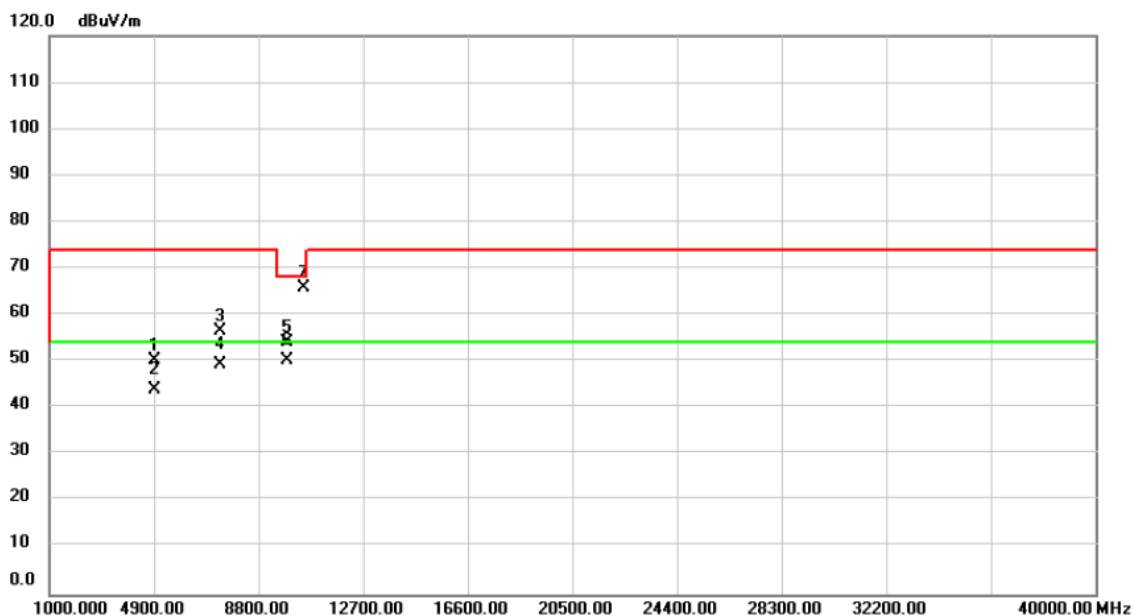
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2462.000	74.27	31.33	105.60	74.00	31.60	peak	No Limit
2	*	2462.000	69.27	31.33	100.60	54.00	46.60	AVG	No Limit
3		2484.982	18.71	31.42	50.13	74.00	-23.87	peak	
4		2484.982	9.64	31.42	41.06	54.00	-12.94	AVG	

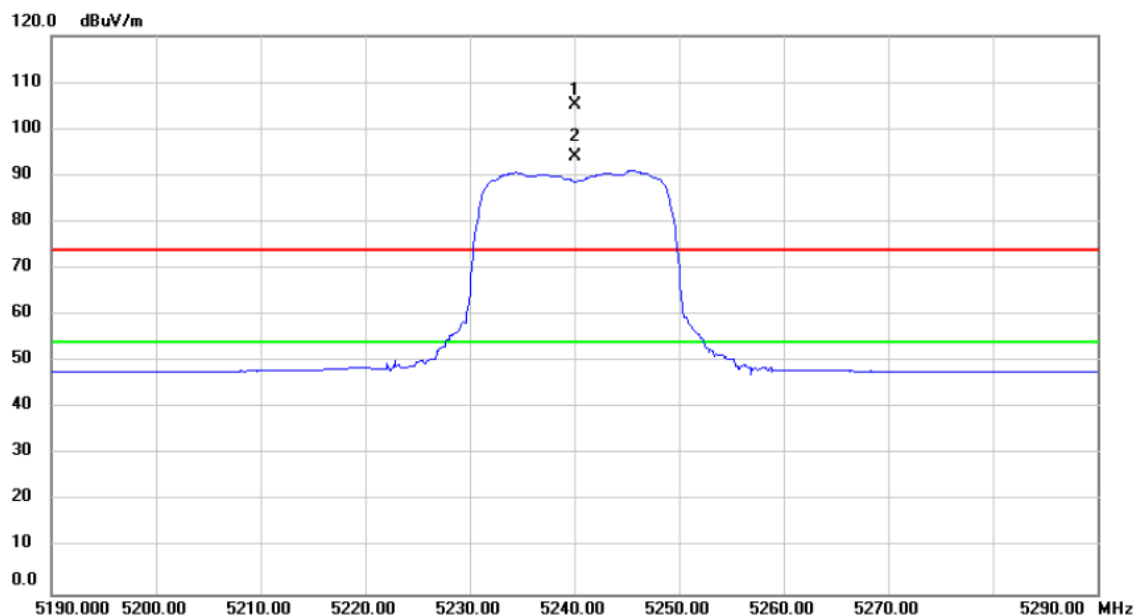
Test Mode : TX N20 MODE 5240 MHz & TX B MODE 2462 MHz

Vertical



Test Mode : TX N20 MODE 5240 MHz & TX B MODE 2462 MHz

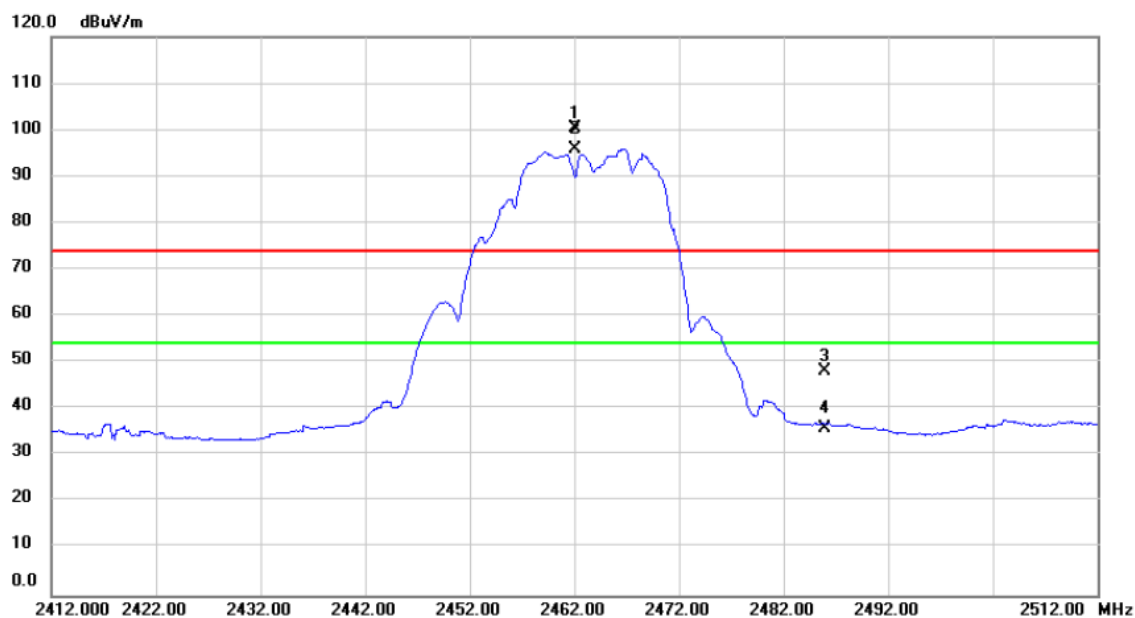
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	5240.000	67.45	37.64	105.09	74.00	31.09	peak	No Limit
2	*	5240.000	56.53	37.64	94.17	54.00	40.17	AVG	No Limit

Test Mode : TX N20 MODE 5240 MHz & TX B MODE 2462 MHz

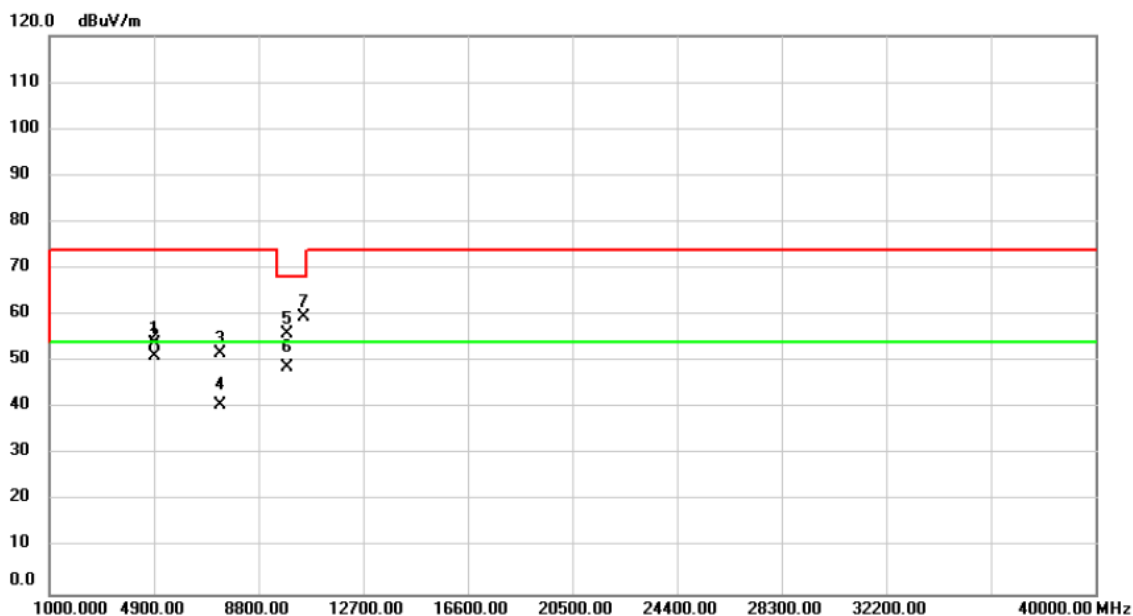
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2462.000	68.89	31.33	100.22	74.00	26.22	peak	No Limit
2	*	2462.000	64.52	31.33	95.85	54.00	41.85	AVG	No Limit
3		2485.979	16.69	31.42	48.11	74.00	-25.89	peak	
4		2485.979	4.46	31.42	35.88	54.00	-18.12	AVG	

Test Mode :	TX N20 MODE 5240 MHz & TX B MODE 2462 MHz
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Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		4924.000	65.29	-11.37	53.92	74.00	-20.08	peak	
2	*	4924.000	62.42	-11.37	51.05	54.00	-2.95	AVG	
3		7386.000	56.46	-4.72	51.74	74.00	-22.26	peak	
4		7386.000	45.23	-4.72	40.51	54.00	-13.49	AVG	
5		9848.000	55.27	0.81	56.08	68.20	-12.12	peak	
6		9848.000	48.06	0.81	48.87	54.00	-5.13	AVG	
7		10480.00	57.89	1.69	59.58	68.20	-8.62	peak	