

FCC Radio Test Report

FCC ID: ZVAOH00025

This report concerns: Original Grant

Project No.	:	2010C054
Equipment	:	Shine Bathroom Assistant
Brand Name	:	SHINE
Test Model	:	SHINE-BA-01
Series Model	:	N/A
Applicant	:	TCL Technoly Electronics (Huizhou) Co., Ltd
Address	:	Section 37, Zhongkai High-tech development Zone, Huizhou City,
		Guangdong Province, China 516006
Manufacturer	:	Shine Bathroom Technologies, Inc.
Address	:	1222 State Street, Santa Barbara, CA 93101
Factory	:	TCL Technoly Electronics (Huizhou) Co., Ltd
Address	:	Section 37, Zhongkai High-tech development Zone, Huizhou City,
		Guangdong Province, China 516006
Date of Receipt	:	Oct. 19, 2020
Date of Test	:	Oct. 20, 2020 ~ Nov. 02, 2020
Issued Date	:	Nov. 18, 2020
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG20201020102 for conducted,
		DG20201020103 for radiated.
Standard(s)	:	FCC Part15, Subpart C (15.247)
		ANSI C63.10-2013 FCC KDB 558074 D01 15.247 Meas Guidance v05r02
		TOC RDD 550074 DUT 15.247 IVIEAS GUIUAILE V05102

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

Welly zhou Prepared by : Welly Zhou

Phan 1

Approved by : Ethan Ma



Certificate #5123.02

Add: No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. Tel: +86-769-8318-3000 Web: www.newbtl.com



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, A2LA, 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/IEC 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 which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and 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. Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.



Table of Contents

REPORT ISSUED HISTORY	6
1 . SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	9
2 . GENERAL INFORMATION	10
2.1 GENERAL DESCRIPTION OF EUT	10
2.2 DESCRIPTION OF TEST MODES	11
2.3 PARAMETERS OF TEST SOFTWARE	12
2.4 DUTY CYCLE	13
2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	14
2.6 SUPPORT UNITS	15
3 . AC POWER LINE CONDUCTED EMISSIONS TEST	16
3.1 LIMIT	16
3.2 TEST PROCEDURE	16
3.3 DEVIATION FROM TEST STANDARD	16
3.4 TEST SETUP	17
3.5 EUT OPERATION CONDITIONS	17
3.6 TEST RESULTS	17
4 . RADIATED EMISSIONS TEST	18
4.1 LIMIT	18
4.2 TEST PROCEDURE	19
4.3 DEVIATION FROM TEST STANDARD	19
4.4 TEST SETUP	20
4.5 EUT OPERATION CONDITIONS	21
4.6 TEST RESULTS - 9 KHZ TO 30 MHZ	21
4.7 TEST RESULTS - 30 MHZ TO 1000 MHZ	21
4.8 TEST RESULTS - ABOVE 1000 MHZ	21
5 . BANDWIDTH TEST	22
5.1 LIMIT	22
5.2 TEST PROCEDURE	22
5.3 DEVIATION FROM STANDARD	22



Table of Contents	Page
5.4 TEST SETUP	22
5.5 EUT OPERATION CONDITIONS	22
5.6 TEST RESULTS	22
6 . MAXIMUM OUTPUT POWER TEST	23
6.1 LIMIT	23
6.2 TEST PROCEDURE	23
6.3 DEVIATION FROM STANDARD	23
6.4 TEST SETUP	23
6.5 EUT OPERATION CONDITIONS	23
6.6 TEST RESULTS	23
7 . CONDUCTED SPURIOUS EMISSIONS	24
7.1 LIMIT	24
7.2 TEST PROCEDURE	24
7.3 DEVIATION FROM STANDARD	24
7.4 TEST SETUP	24
7.5 EUT OPERATION CONDITIONS	24
7.6 TEST RESULTS	24
8 . POWER SPECTRAL DENSITY TEST	25
8.1 LIMIT	25
8.2 TEST PROCEDURE	25
8.3 DEVIATION FROM STANDARD	25
8.4 TEST SETUP	25
8.5 EUT OPERATION CONDITIONS	25
8.6 TEST RESULTS	25
9 . MEASUREMENT INSTRUMENTS LIST	26
10 . EUT TEST PHOTO	28
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	32
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	35
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	40
APPENDIX D - RADIATED EMISSION- ABOVE 1000 MHZ	43
APPENDIX E - BANDWIDTH	92
APPENDIX F - MAXIMUM OUTPUT POWER	97



Table of Contents	Page
APPENDIX G - CONDUCTED SPURIOUS EMISSIONS APPENDIX H - POWER SPECTRAL DENSITY	99 104



REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Nov. 18, 2020

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart C (15.247)						
Standard(s) Section	Test Item	Test Result	Judgment	Remark		
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS			
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS			
15.247(a)(2)	Bandwidth	APPENDIX E	PASS			
15.247(b)(3)	Maximum Output Power	APPENDIX F	PASS			
15.247(d)	Conducted Spurious Emissions	APPENDIX G	PASS			
15.247(e)	Power Spectral Density	APPENDIX H	PASS			
15.203	Antenna Requirement		PASS	Note(2)		

Note:

- (1) "N/A" denotes test is not applicable in this test report.
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.



1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. BTL's Test Firm Registration Number for FCC: 357015 BTL's Designation Number for FCC: CN1240

1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)) The BTL measurement uncertainty as below table:

A. AC power line conducted emissions test:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.68

B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9kHz ~ 30MHz	-	3.02
		30MHz ~ 200MHz	V	4.26
DG-CB03	CISPR	30MHz ~ 200MHz	Н	3.38
		200MHz ~ 1,000MHz	V	3.98
		200MHz ~ 1,000MHz	Н	3.94
		1GHz ~ 6GHz	-	3.96
		6GHz ~ 18GHz	-	5.24
		18GHz ~ 26.5GHz	-	3.62
		26.5GHz ~ 40GHz	-	4.00

C. Other Measurement:

Test Item	Uncertainty
Bandwidth	±3.8 %
Maximum Output Power	±0.95 dB
Conducted Spurious Emission	±2.71 dB
Power Spectral Density	±0.86 dB
Temperature	±0.08 °C
Time	±0.58 %
Supply voltages	±0.3 %

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	25°C	53%	AC 120V/60Hz	Hand Huang
Radiated Emissions-9K-30MHz	25°C	60%	DC 5V	Kwok Guo
Radiated Emissions-30 MHz to 1GHz	26°C	52%	DC 5V	Kwok Guo
Radiated Emissions-Above 1000 MHz	26°C	52%	DC 5V	Kwok Guo
Bandwidth	25°C	56%	DC 5V	Jesse Wang
Maximum output power	25°C	56%	DC 5V	Hand Huang
Conducted Spurious Emissions	25°C	56%	DC 5V	Jesse Wang
Power Spectral Density	25°C	56%	DC 5V	Jesse Wang

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Shine Bathroom Assistant
Brand Name	SHINE
Test Model	SHINE-BA-01
Series Model	N/A
Model Difference(s)	N/A
Power Source	1# DC voltage supplied from external power supply.2# Supplied from battery. Model: 651001
Power Rating	1# DC 5V 2# DC 7.3V, 2500mAh 18.25Wh
Operation Frequency	2412 MHz ~ 2462 MHz
Modulation Type	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM
Bit Rate of Transmitter	IEEE 802.11b: 11/5.5/2/1 Mbps IEEE 802.11g: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 150 Mbps
Maximum Output Power	IEEE 802.11b: 20.17 dBm (0.1040 W) IEEE 802.11g: 22.35 dBm (0.1718 W) IEEE 802.11n (HT20): 22.11 dBm (0.1626 W) IEEE 802.11n (HT40): 22.03 dBm (0.1596 W)

Note:

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

2. Channel List:

CH01 - CH11 for IEEE 802.11b, IEEE 802.11g, IEEE 802.11n (HT20) CH03 - CH09 for IEEE 802.11n (HT40)							
Channel Frequency (MHz) Channel Frequency (MHz) Channel Frequency (MHz) Channel (MHz) Channel (MHz)							
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

3. Antenna Specification:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	3.7

2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX B Mode Channel 01/06/11
Mode 2 TX G Mode Channel 01/06/11	
Mode 3 TX N-20 MHz Mode Channel 01/06/11	
Mode 4 TX N-40 MHz Mode Channel 03/06/09	
Mode 5 TX G Mode Channel 01	

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test			
Final Test Mode	Description		
Mode 5	TX G Mode Channel 01		

Radiated emissions test - Below 1GHz			
Final Test Mode	Description		
Mode 5 TX G Mode Channel 01			

Radiated emissions test- Above 1GHz			
Final Test Mode Description			
Mode 1	TX B Mode Channel 01/06/11		
Mode 2	2 TX G Mode Channel 01/06/11		
Mode 3	TX N-20 MHz Mode Channel 01/06/11		
Mode 4	TX N-40 MHz Mode Channel 03/06/09		

Conducted test			
Final Test Mode Description			
Mode 1 TX B Mode Channel 01/06/11			
Mode 2 TX G Mode Channel 01/06/11			
Mode 3	Mode 3 TX N-20 MHz Mode Channel 01/06/11		
Mode 4 TX N-40 MHz Mode Channel 03/06/09			

NOTE:

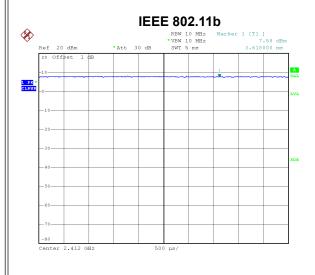
- (1) The measurements are performed at the high, middle, low available channels.
- (2) All the bit rate of transmitter have been tested and found the lowest rate is found to be the worst case and recorded.
- (3) For radiated emission below 1 GHz test, the IEEE 802.11g Channel 01 is found to be the worst case and recorded.
- (4) For radiated emission above 1 GHz test, 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

2.3 PARAMETERS OF TEST SOFTWARE

Test Software	ESP_RF_test_tool_v2.5		
Frequency (MHz)	2412 2437 2462		
IEEE 802.11b	16	14	11
IEEE 802.11g	14	12	9
IEEE 802.11n (HT20)	9	6	5
Frequency (MHz)	2422	2437	2452
IEEE 802.11n (HT40)	9	7	5

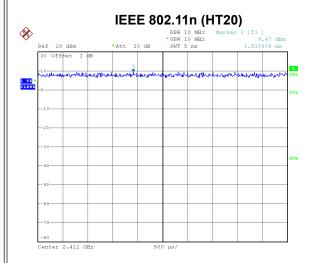
BIL

2.4 DUTY CYCLE



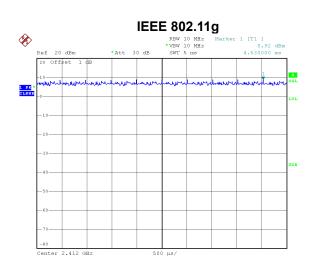
Date: 2.NOV.2020 12:55:25

Duty cycle = 0.000 ms / 0.000 ms = 0.00% Duty Factor = 10 log(1/Duty cycle) = 0.00



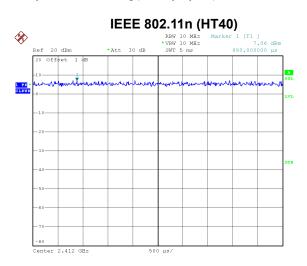
Date: 2.NOV.2020 13:01:09

Duty cycle = 0.000 ms / 0.000 ms = 0.00% Duty Factor = 10 log(1/Duty cycle) = 0.00



Date: 2.NOV.2020 13:00:25

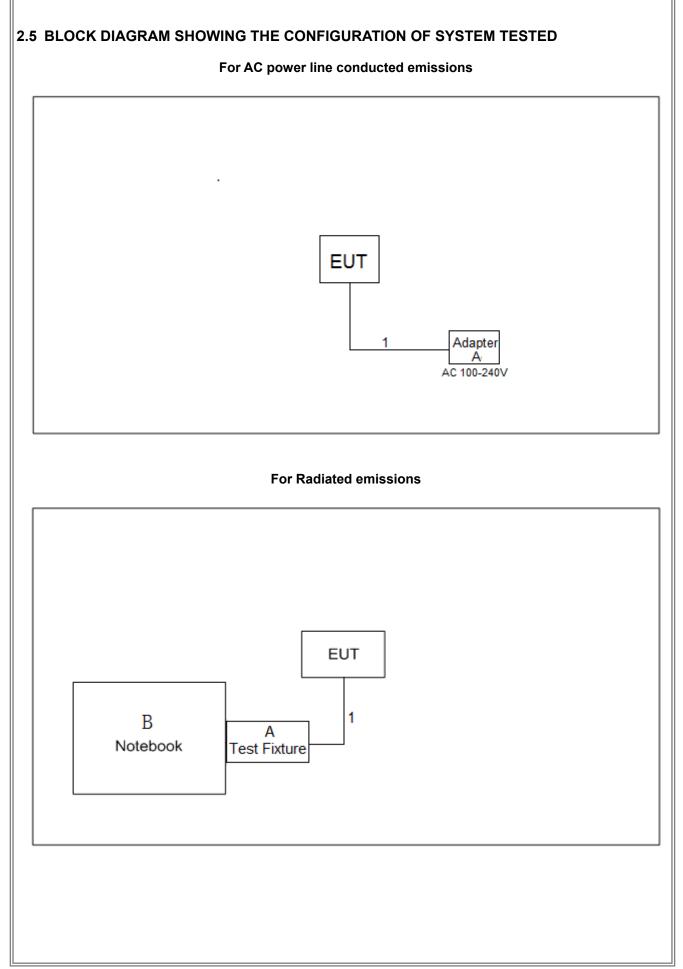
Duty cycle = 0.000 ms / 0.000 ms = 0.00% Duty Factor = 10 log(1/Duty cycle) = 0.00



Date: 2.NOV.2020 13:02:03

Duty cycle = 0.000 ms / 0.000 ms = 0.00% Duty Factor = 10 log(1/Duty cycle) = 0.00





2.6 SUPPORT UNITS

For AC power line conducted emissions

Item	Equipment	Brand	Model No.	Series No.
A	Adapter	huawei	N/A	N/A
Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1m

For Radiated emissions

Item	Equipment	Brand	Model No.	Series No.
А	Test Fixture	N/A	N/A	N/A
В	Notebook	Dell	Inspiron 15-7559	N/A

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	Data Cable	NO	NO	0.8m



3. AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

Fraguency of Emission (MHz)	Limit (dBµV)		
Frequency of Emission (MHz)	Quasi-peak	Average	
0.15 - 0.5	66 to 56*	56 to 46*	
0.5 - 5.0	56	46	
5.0 - 30.0	60	50	

NOTE:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting	
Attenuation	10 dB	
Start Frequency	0.15 MHz	
Stop Frequency	30 MHz	
IF Bandwidth	9 kHz	

3.2 TEST PROCEDURE

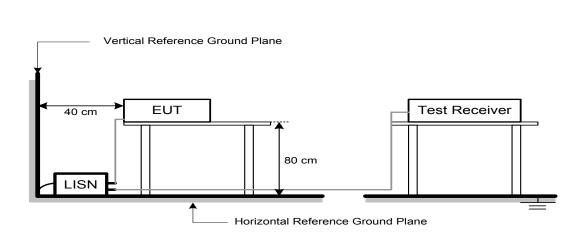
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

3.3 DEVIATION FROM TEST STANDARD

No deviation



3.4 TEST SETUP



3.5 EUT OPERATION CONDITIONS

EUT was programmed to be in continuously transmitting mode.

3.6 TEST RESULTS

Please refer to the APPENDIX A.



4. RADIATED EMISSIONS TEST

4.1 LIMIT

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.

LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(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
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	(dBuV/m at 3 m)		
	Peak	Average	
	Above 1000	74	54

NOTE:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW	1 MHz / 3 MHz for Peak,
(Emission in restricted band)	1 MHz / 1/T for Average

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

4.2 TEST PROCEDURE

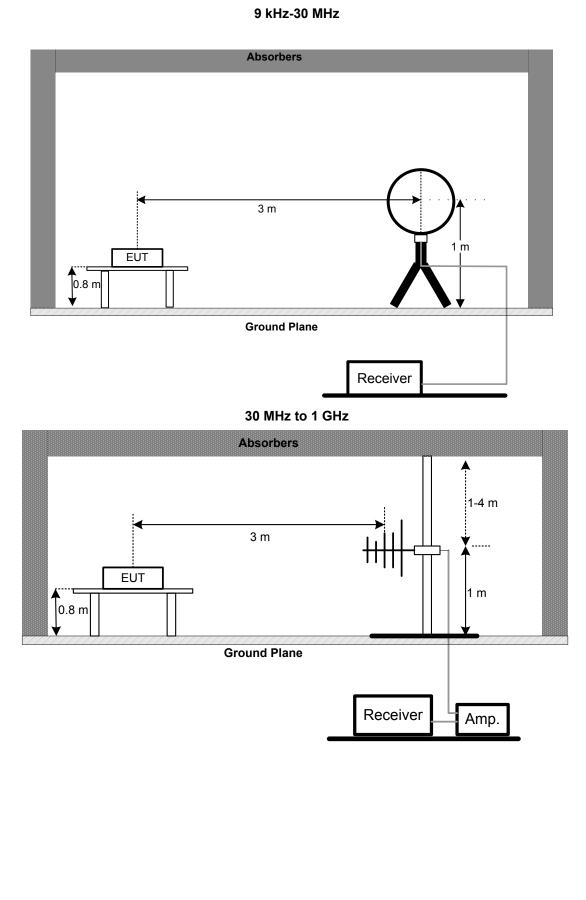
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1 GHz)
- c. 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.
- d. 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).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. 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.
- g. 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 1 GHz)
- 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 1 GHz)
- i. For the actual test configuration, please refer to the related Item -EUT Test Photos.

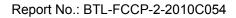
4.3 DEVIATION FROM TEST STANDARD

No deviation

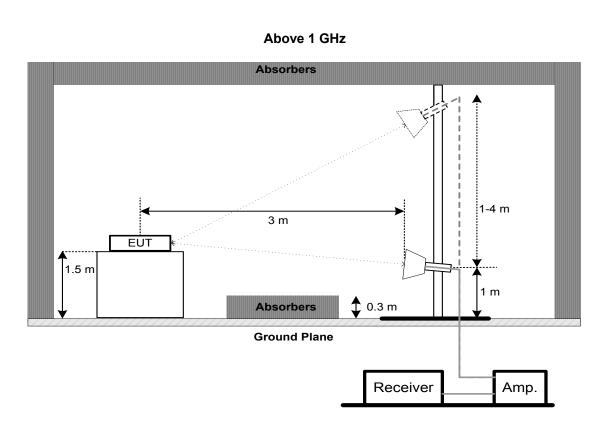


4.4 TEST SETUP





3โL



4.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULTS - 9 KHZ TO 30 MHZ

Please refer to the APPENDIX B

Remark:

- (1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.7 TEST RESULTS - 30 MHZ TO 1000 MHZ

Please refer to the APPENDIX C.

4.8 TEST RESULTS - ABOVE 1000 MHZ

Please refer to the APPENDIX D.

Remark:

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



5. BANDWIDTH TEST

5.1 LIMIT

FCC Part15, Subpart C (15.247)					
Section	Test Item Limit				
15.247(2)(2)	6 dB Bandwidth	Minimum 500 kHz			
15.247(a)(2)	99% Emission Bandwidth	-			

5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting:

For 6 dB Bandwidth : RBW= 100 kHz, VBW=300 kHz, Sweep time = auto.

For 99% Emission Bandwidth B/G/N-20 Mode: RBW= 300 KHz, VBW=1 MHz, Sweep time = 2.5 ms. For 99% Emission Bandwidth N-40 Mode: RBW= 1 MHz, VBW=3 MHz, Sweep time = 2.5 ms.

- For 99% Emission Bandwidth N-40 Mode: RBW= 1 MHz, VBW=3 MHz, Sweep time = 2.5 m
- c. The bandwidth was performed in accordance with method 11.8.1 of ANSI C63.10-2013.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



SPECTRUM ANALYZER

5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6 TEST RESULTS

Please refer to the APPENDIX E.



6. MAXIMUM OUTPUT POWER TEST

6.1 LIMIT

FCC Part15, Subpart C (15.247)				
Section Test Item Limit				
15.247(b)(3)	Maximum Output Power	1 Watt or 30dBm		

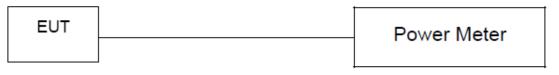
6.2 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- b. The maximum conducted output power was performed in accordance with method 11.9.1.3 of ANSI C63.10-2013.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6 TEST RESULTS

Please refer to the APPENDIX F.



7. CONDUCTED SPURIOUS EMISSIONS

7.1 LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

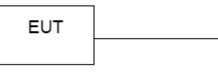
7.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100 kHz, VBW=300 kHz, Sweep time = Auto.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



SPECTRUM ANALYZER

7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6 TEST RESULTS

Please refer to the APPENDIX G.



8. POWER SPECTRAL DENSITY TEST

8.1 LIMIT

FCC Part15, Subpart C (15.247)					
Section Test Item Limit					
15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)			

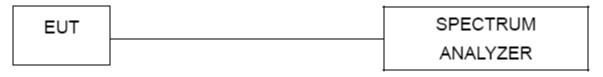
8.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=3 kHz, VBW=10 kHz, Sweep time = Auto.
- c. The Power Spectral Density was performed in accordance with method 11.10.2 of ANSI C63.10-2013.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.6 TEST RESULTS

Please refer to the APPENDIX H.

9. MEASUREMENT INSTRUMENTS LIST

	AC Power Line Conducted Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	EMI Test Receiver	R&S	ESCI	100382	Feb. 28, 2021	
2	LISN	EMCO	3816/2	52765	Mar. 01, 2021	
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Feb. 28, 2021	
4	50Ω Terminator	SHX	TF5-3	15041305	Mar. 01, 2021	
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
6	Cable	N/A	RG223	12m	Mar. 10, 2021	
7	643 Shield Room	ETS	6*4*3m	N/A	N/A	

	Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Antenna	EM	EM-6876-1	230	Apr. 16, 2021	
2	Cable	N/A	RG 213/U	N/A	May 29, 2021	
3	EMI Test Receiver	R&S	ESCI	100895	Feb. 28, 2021	
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
5	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021	

	Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 09, 2021	
2*	Amplifier	HP	8447D	2944A09673	Aug. 11, 2021	
3	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021	
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 22, 2021	
5	Controller	СТ	SC100	N/A	N/A	
6	Controller	MF	MF-7802	MF780208416	N/A	
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
8	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021	

	Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Double Ridged Guide Antenna	ETS	3115	75789	May 12, 2021	
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jul. 07, 2021	
3	Amplifier	Agilent	8449B	3008A02333	Mar. 01, 2021	
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 07, 2021	
5	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021	
6	Controller	СТ	SC100	N/A	N/A	
7	Controller	MF	MF-7802	MF780208416	N/A	
8	Cable	N/A	EMC104-SM-SM-6 000	N/A	May 09, 2021	
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
10	Filter	STI	STI15-9912	N/A	Jul. 25, 2021	
11	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021	

Feb. 11, 2021

N/A

VAS1214NL

N/A



3

4

sensor

Attenuator

RF Cable

	Bandwidth & Conducted Spurious Emissions & Power Spectral Density					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 25, 2021	
2	RF Cable	Tongkaichuan	N/A	N/A	N/A	
3	DC Block	Mini	N/A	N/A	N/A	
		Maxir	num Output Power			
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Peak Power Analyzer	Keysight	8990B	MY51000506	Aug. 07, 2021	
2	Wideband power	Keysight	N1923A	MY58310004	Jul. 25, 2021	

6SM3502

N/A

Remark: "N/A" denotes no model name, serial no. or calibration specified.

"*" calibration period of equipment list is three year.

WOKEN

Tongkaichuan

Except * item, all calibration period of equipment list is one year.



AC Power Line Conducted Emissions Test Photos



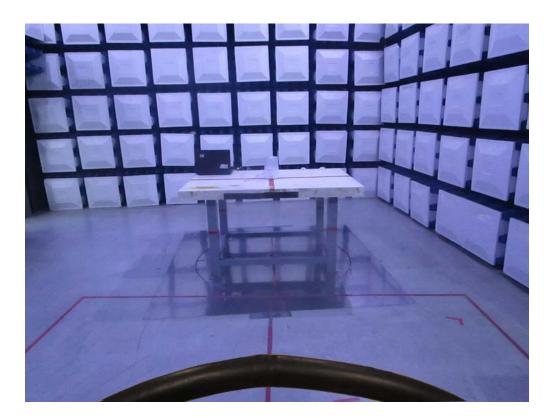




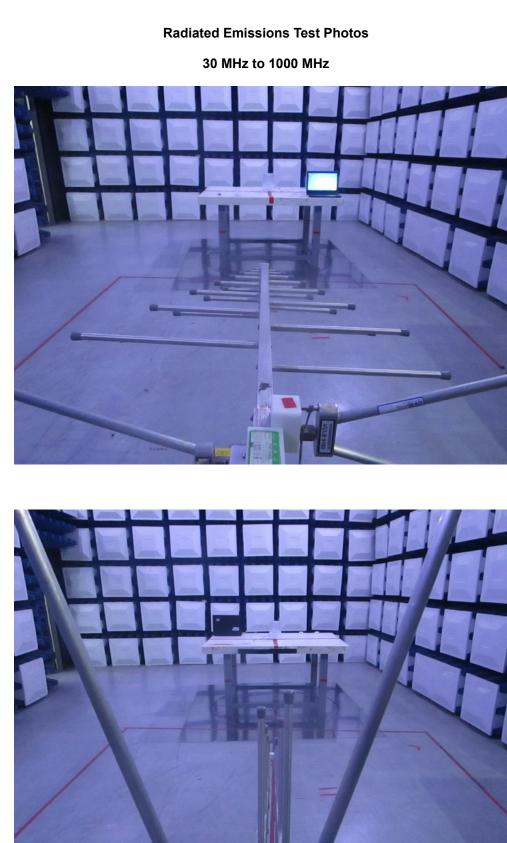
Radiated Emissions Test Photos

9 kHz to 30 MHz

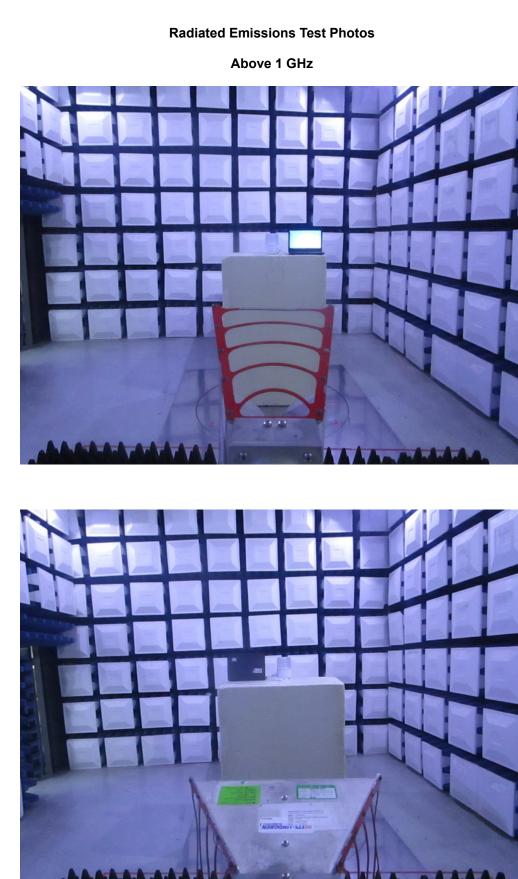








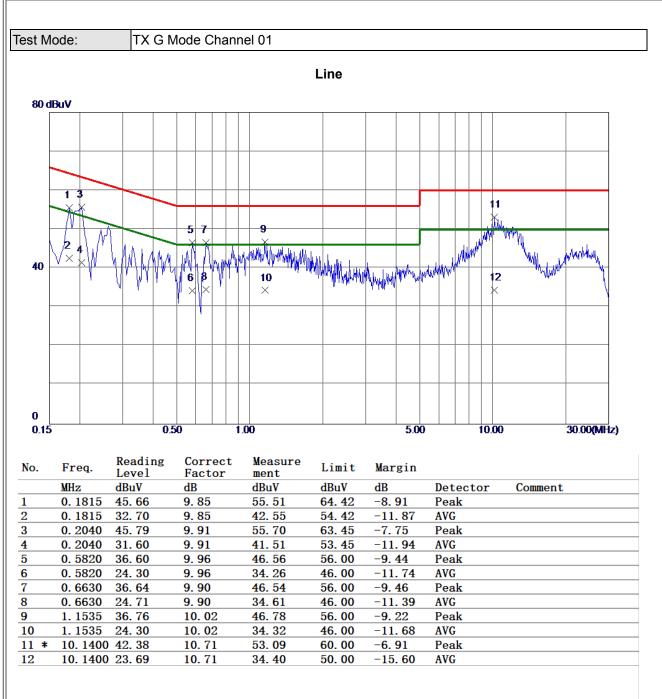






APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

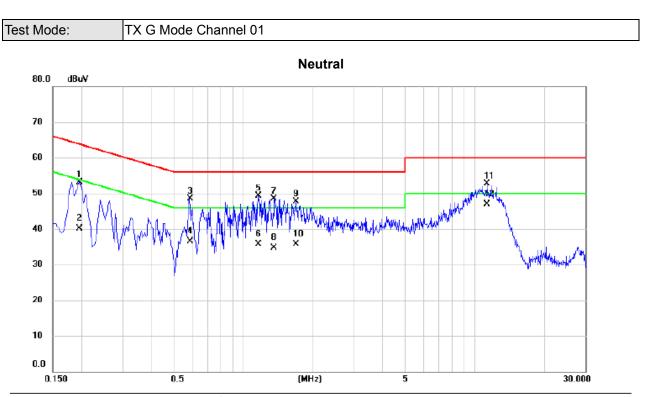




REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





No. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.195	43.21	9.99	53.20	63.82	-10.62	peak	
2	0.195	30.10	9.99	40.09	53.82	-13.73	AVG	
3	0.587	38.36	10.18	48.54	56.00	-7.46	peak	
4	0.587	26.30	10.18	36.48	46.00	-9.52	AVG	
5	1.163	38.92	10.32	49.24	56.00	-6.76	peak	
6	1.163	25.40	10.32	35.72	46.00	-10.28	AVG	
7	1.356	38.14	10.34	48.48	56.00	-7.52	peak	
8	1.356	24.30	10.34	34.64	46.00	-11.36	AVG	
9	1.685	37.24	10.39	47.63	56.00	-8.37	peak	
10	1.685	25.40	10.39	35.79	46.00	-10.21	AVG	
11	11.265	41.72	11.08	52.80	60.00	-7.20	peak	
12 *	11.265	35.80	11.08	46.88	50.00	-3.12	AVG	

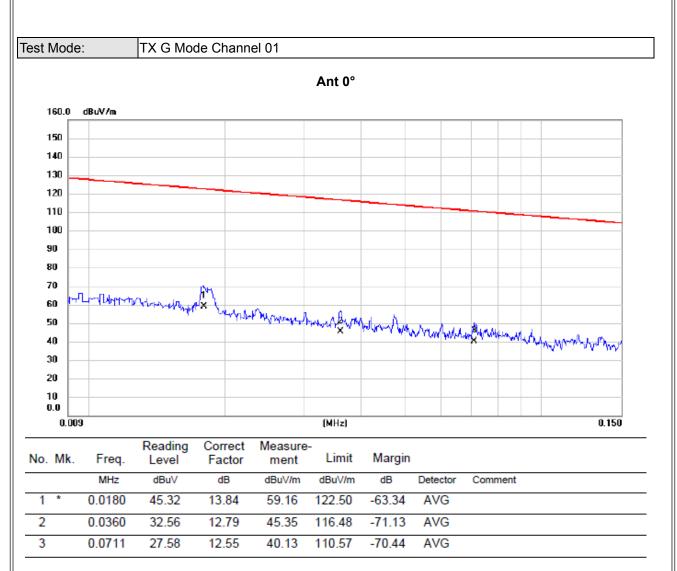
REMARKS:

- Measurement Value = Reading Level + Correct Factor.
 Margin Level = Measurement Value Limit Value.



APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ

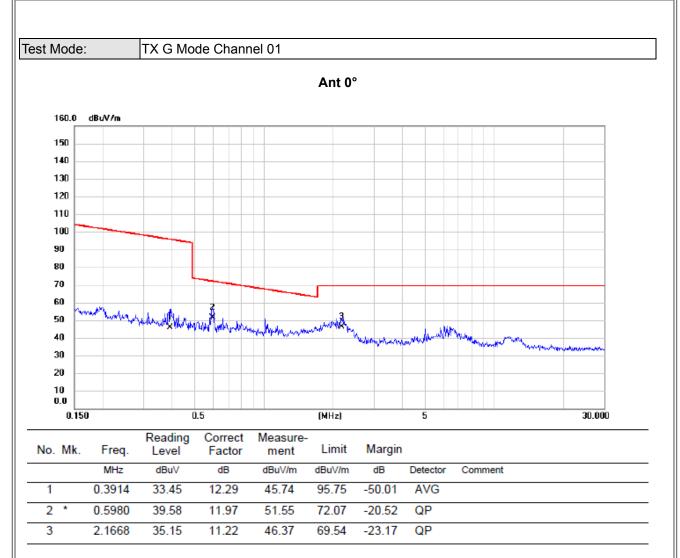




REMARKS:

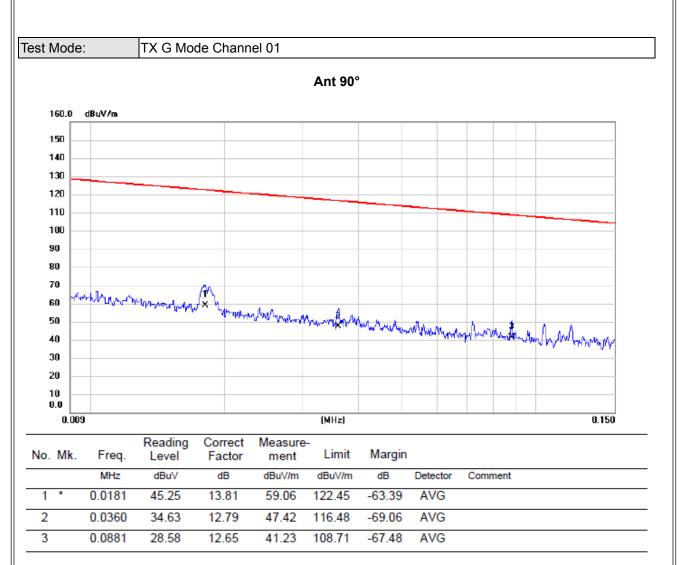
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





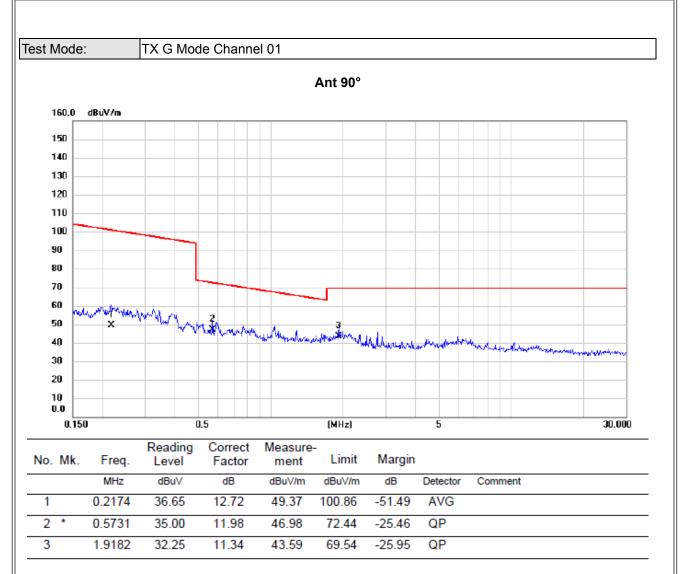
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



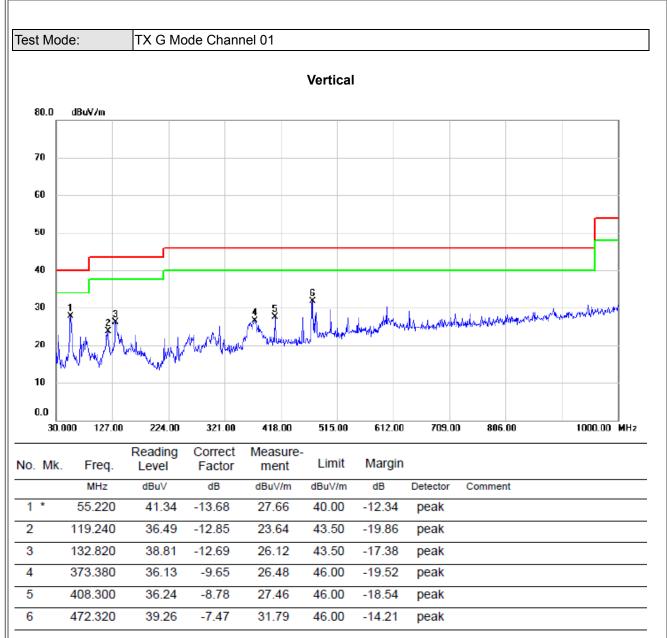


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



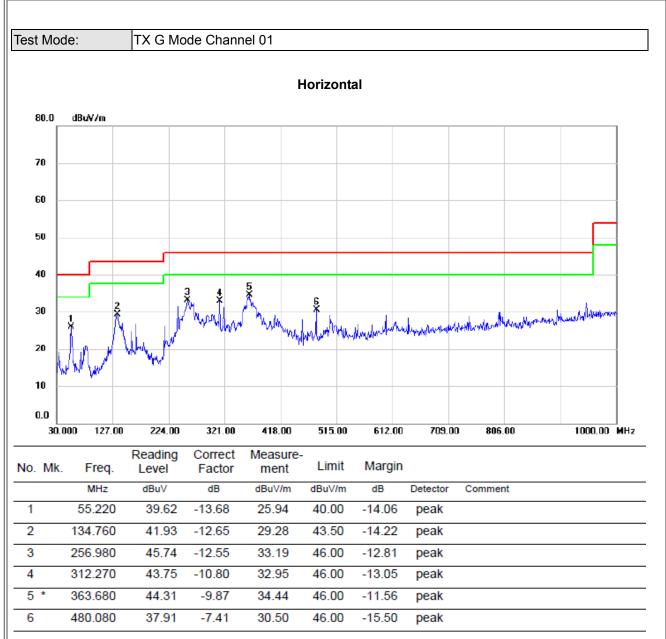
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



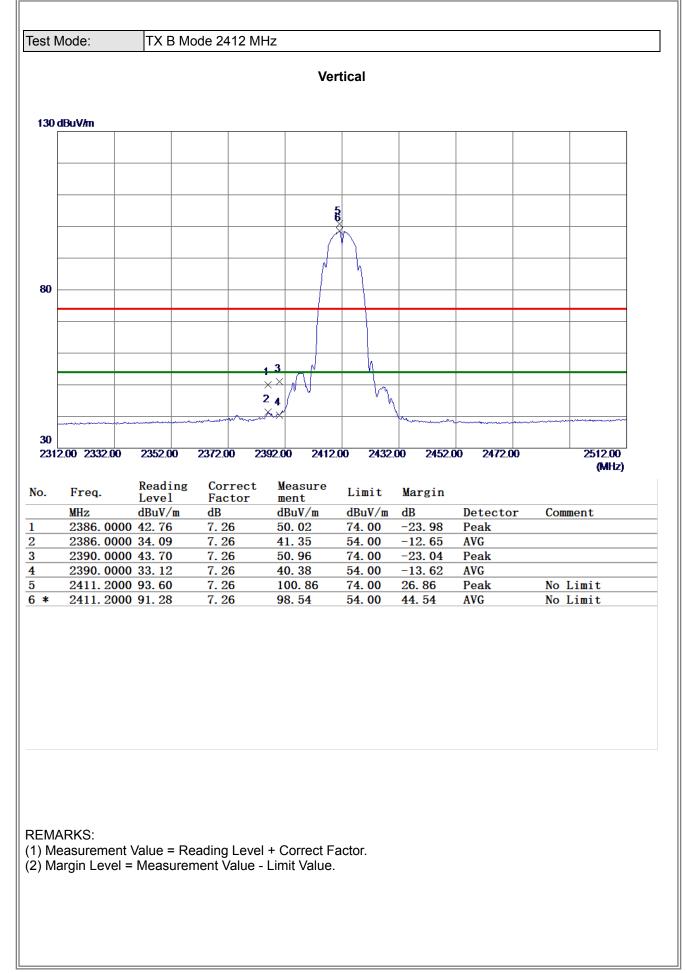


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

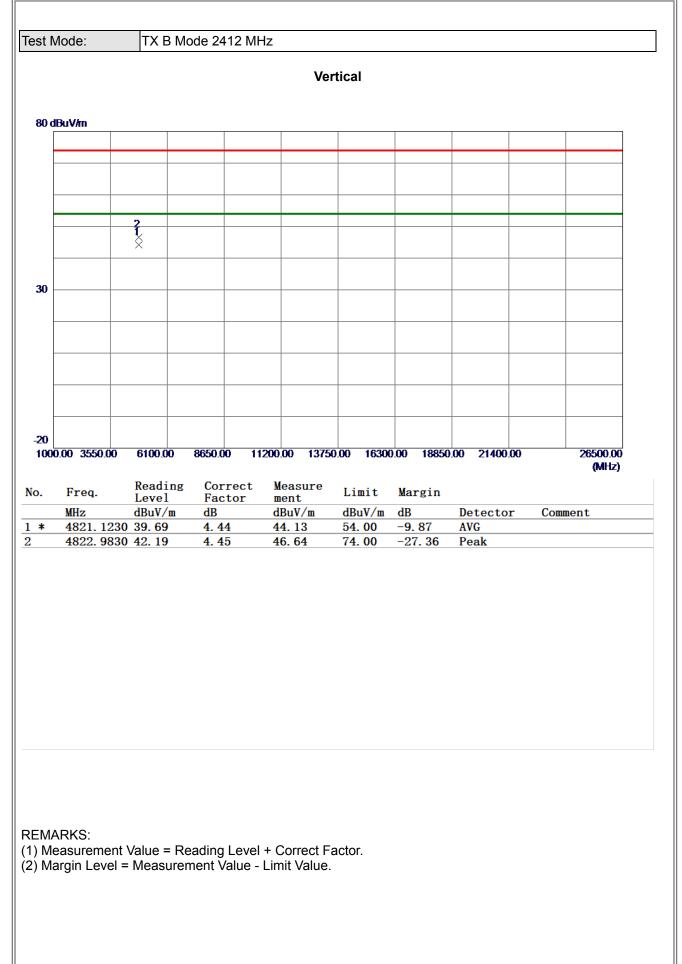


APPENDIX D - RADIATED EMISSION- ABOVE 1000 MHZ

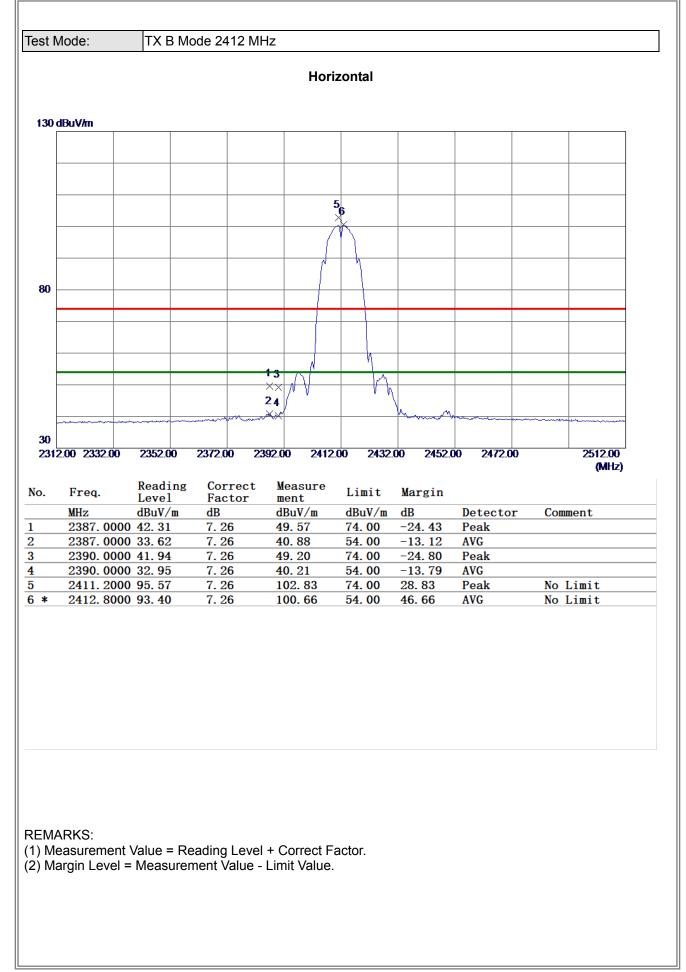




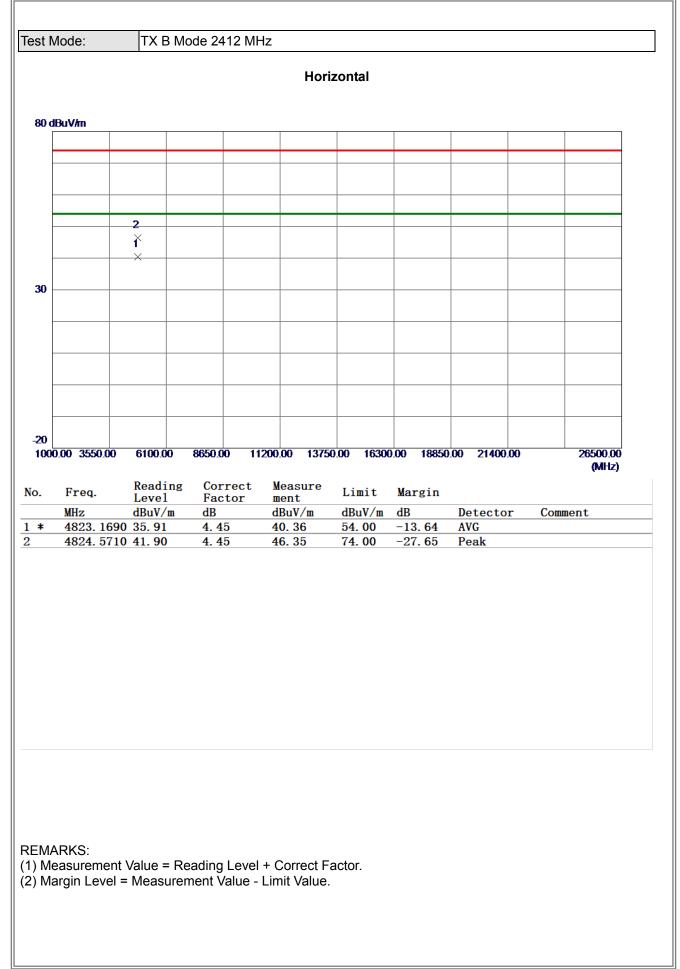




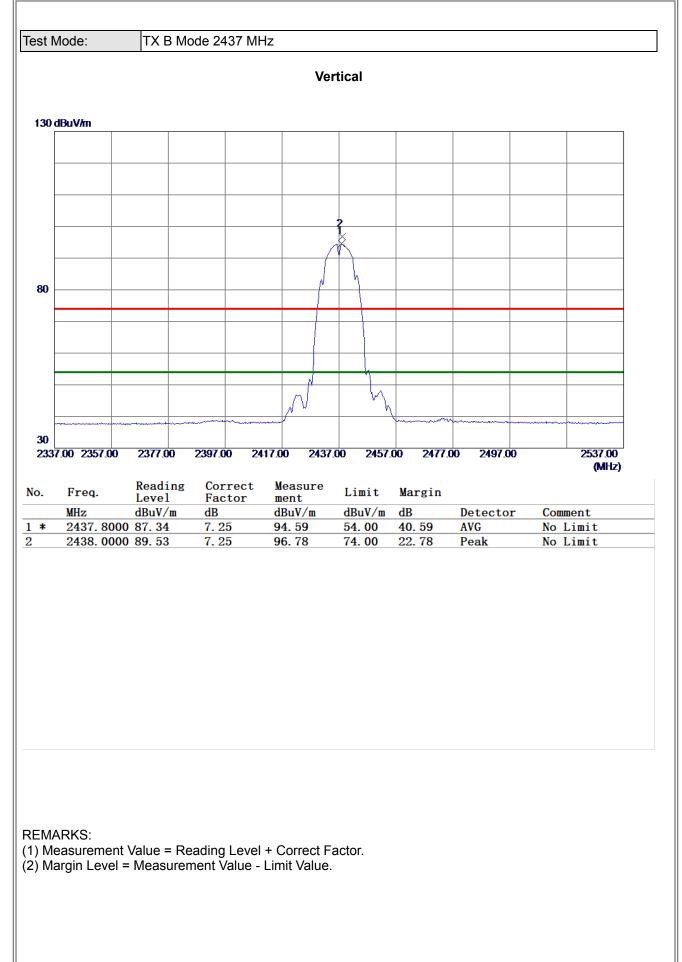




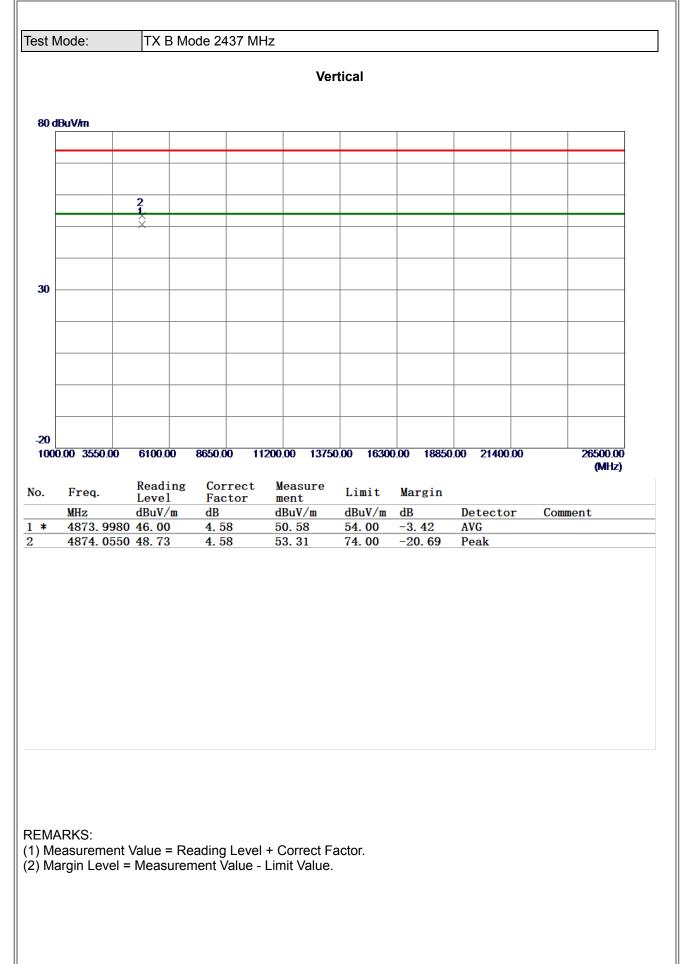




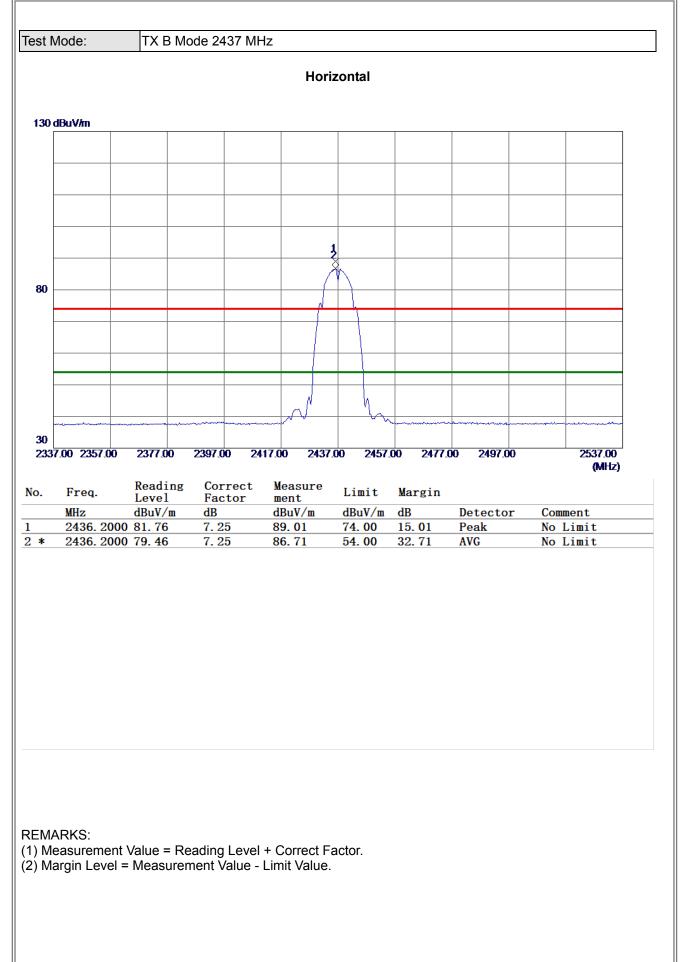




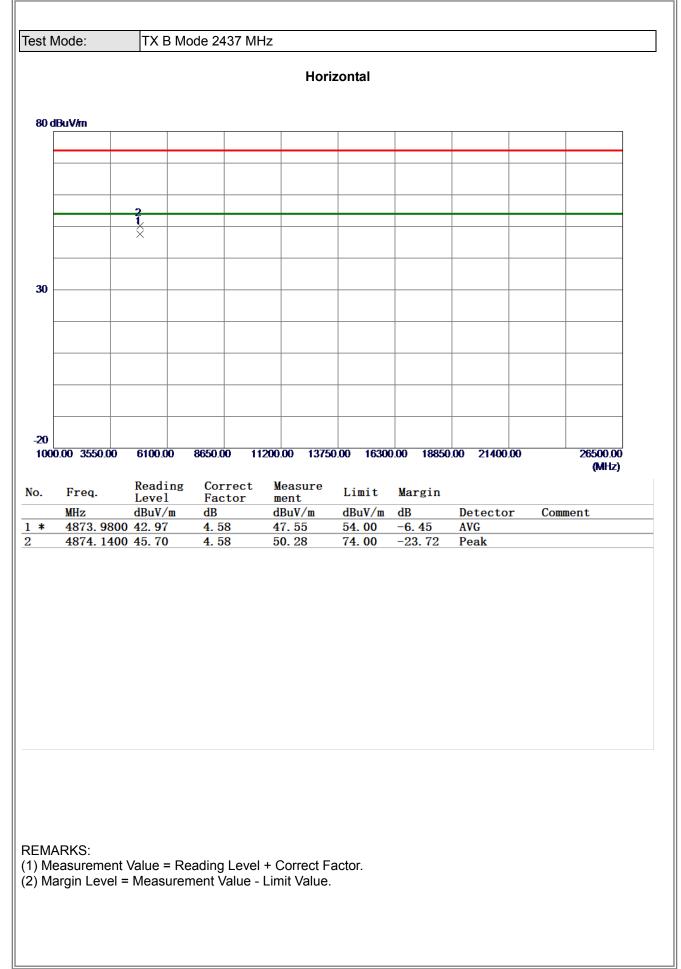




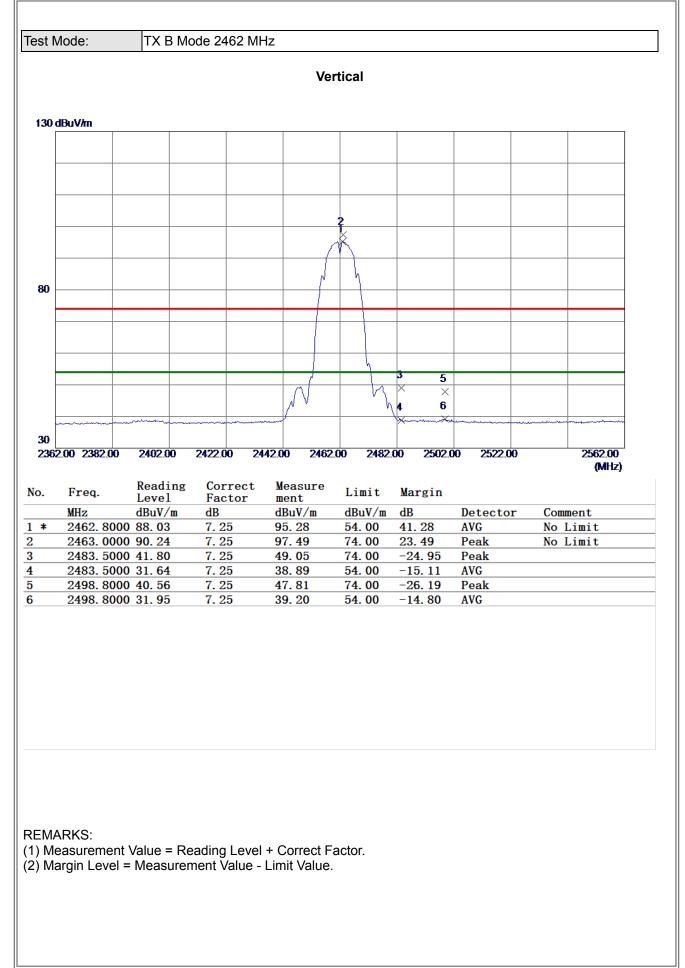




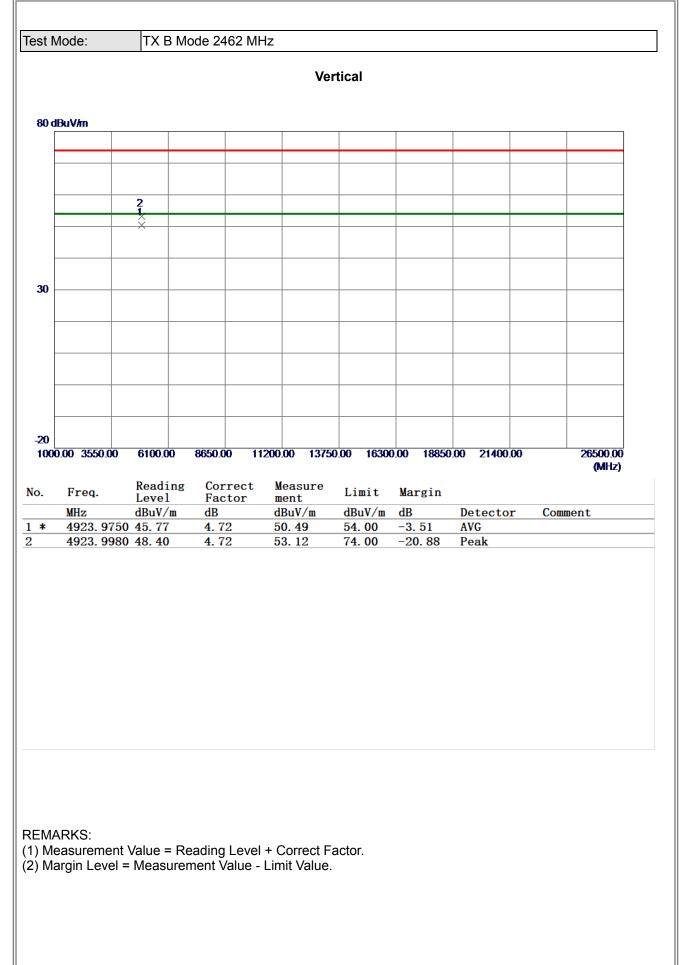




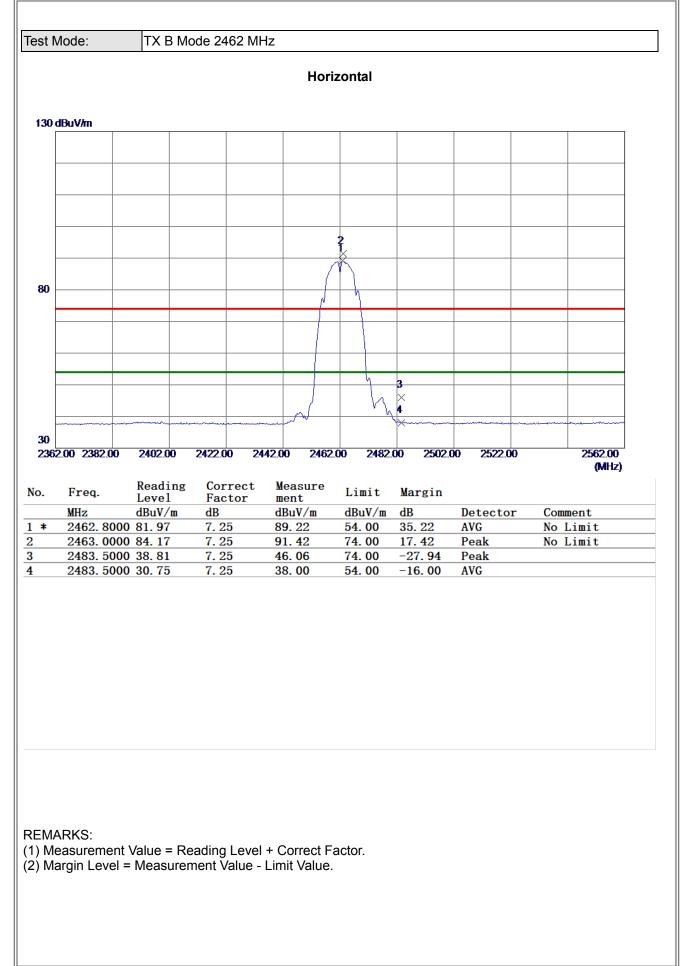




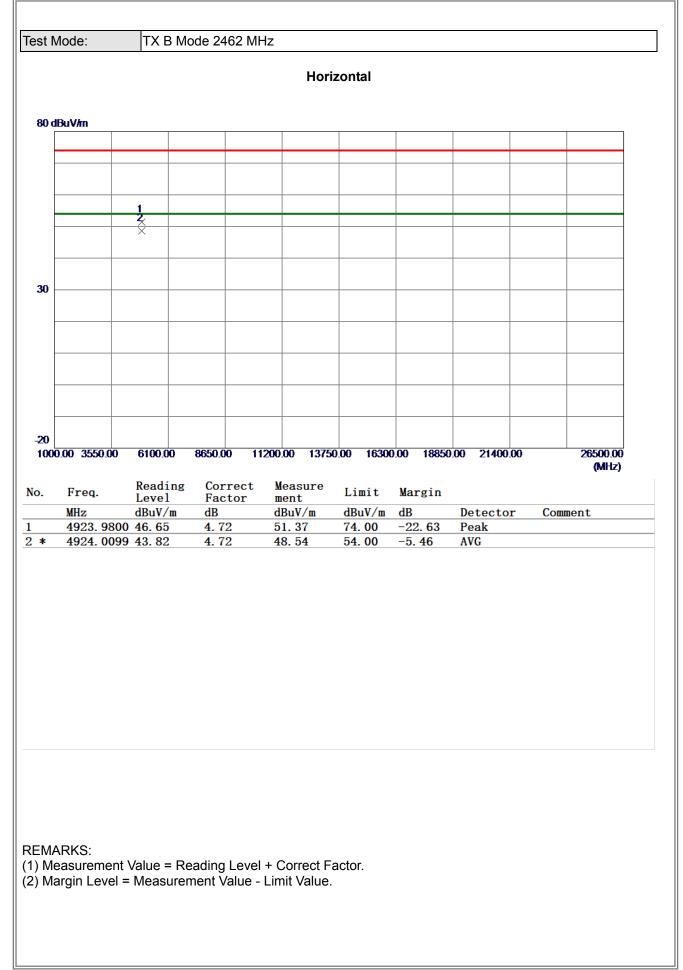




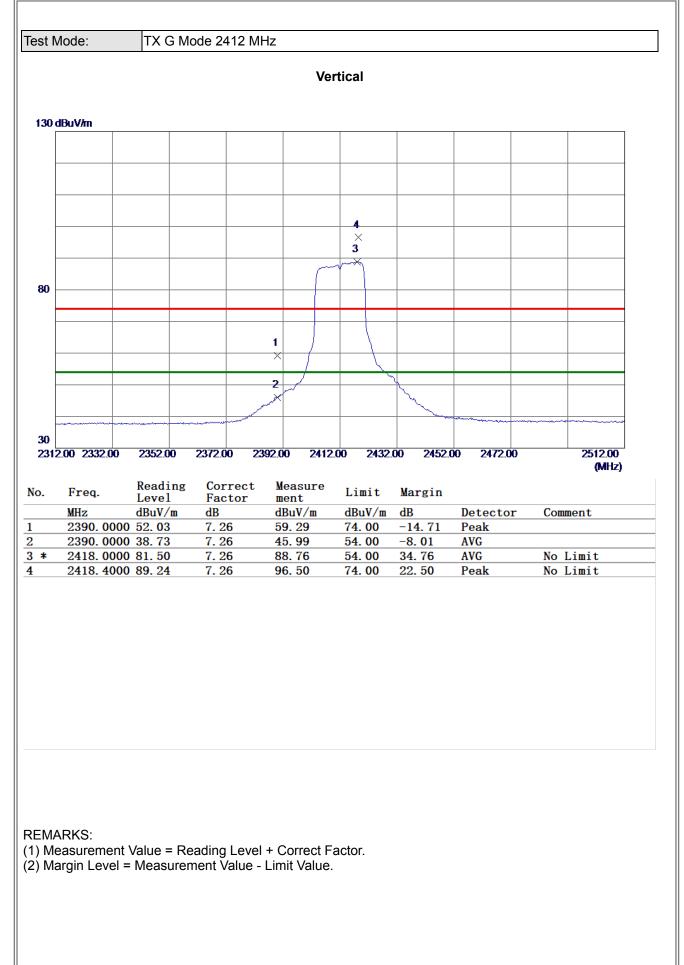




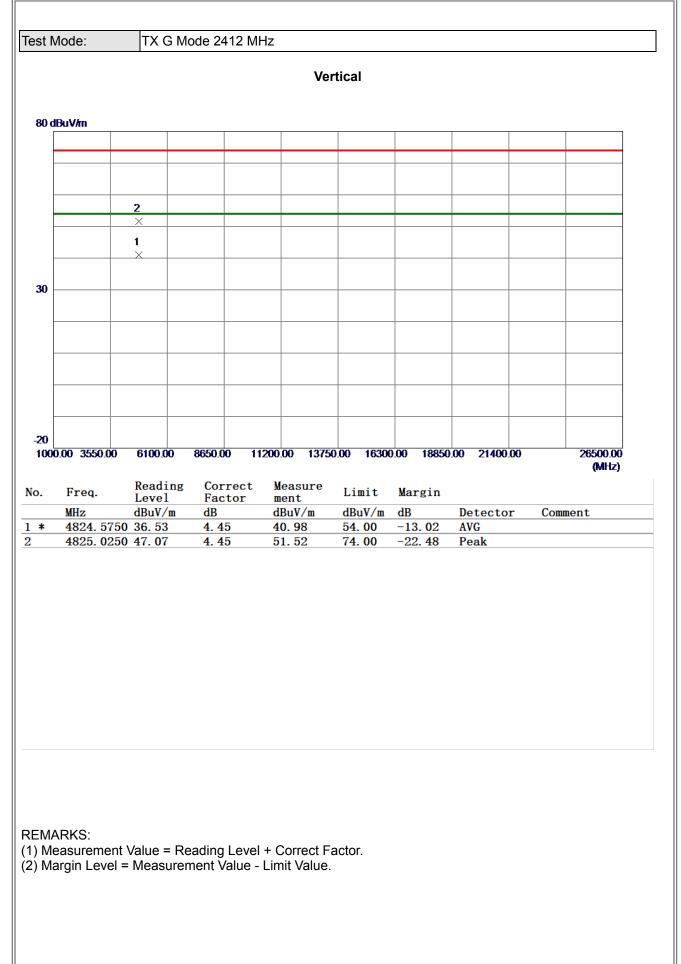




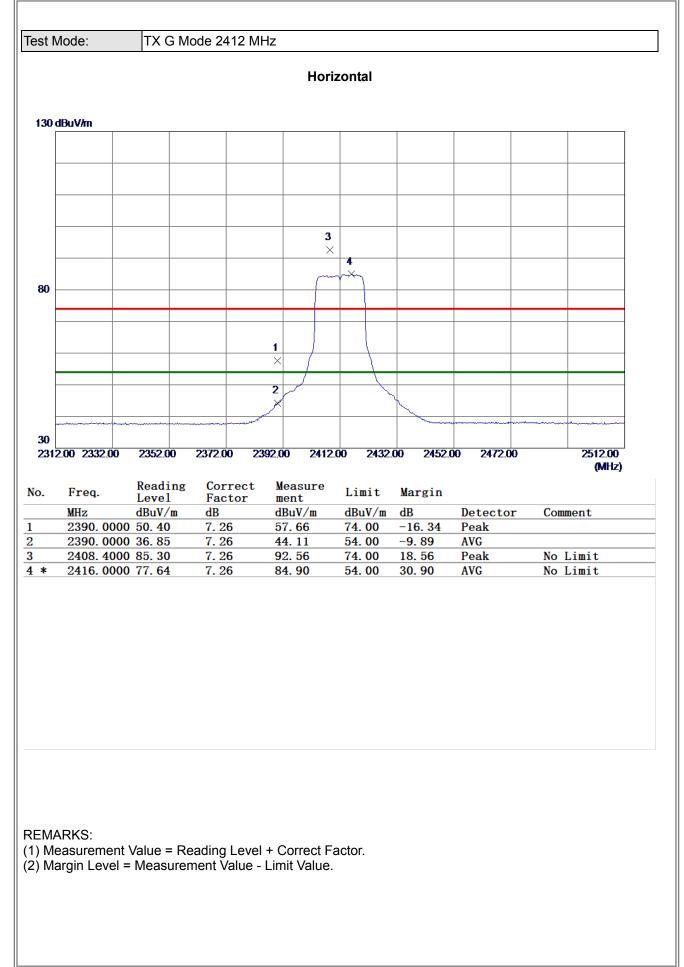




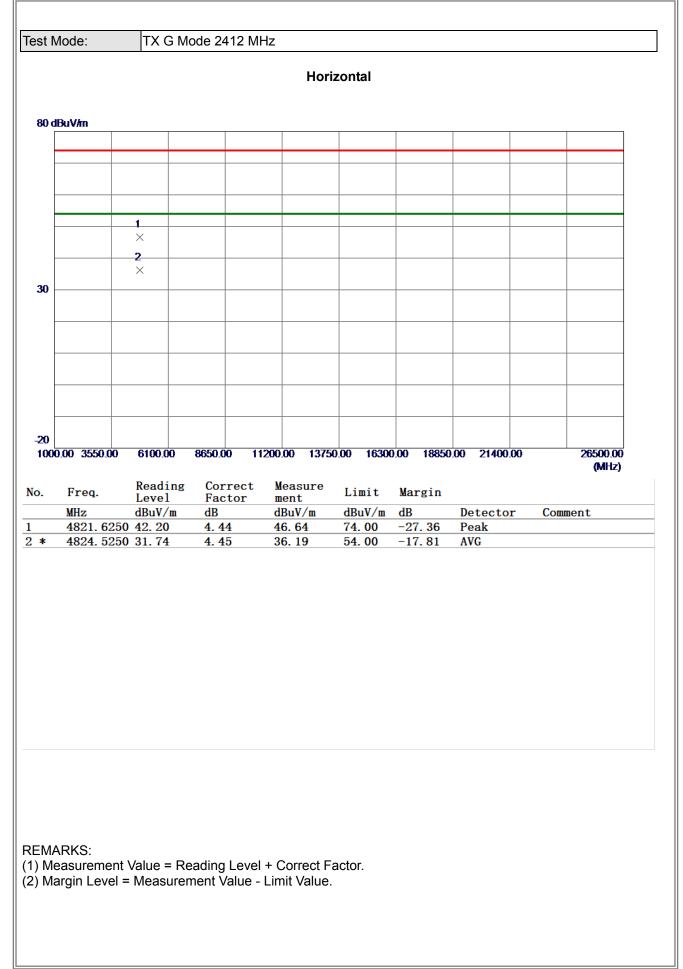




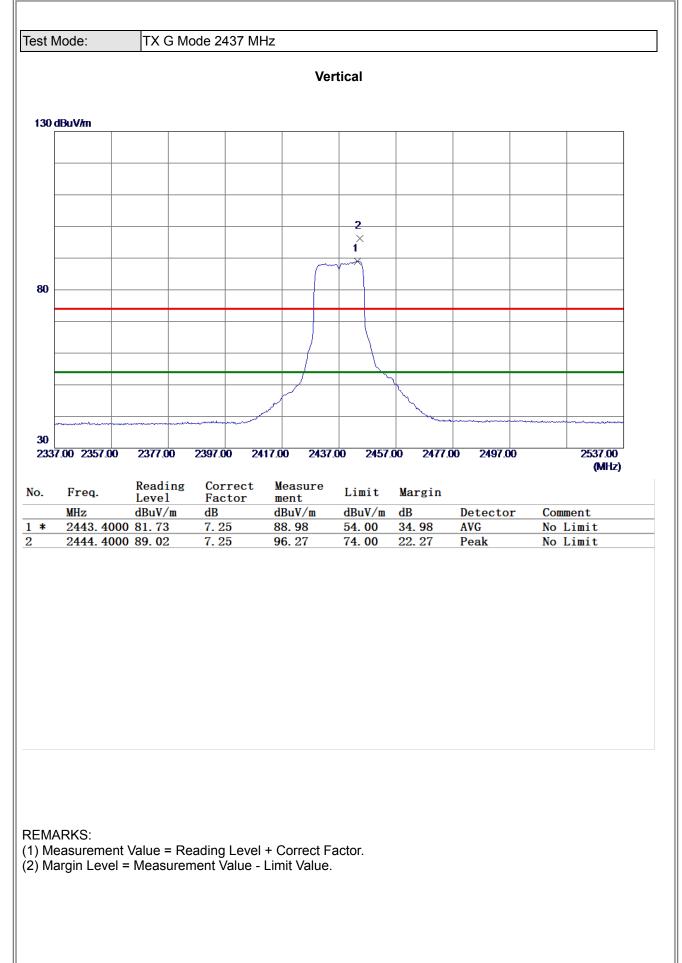




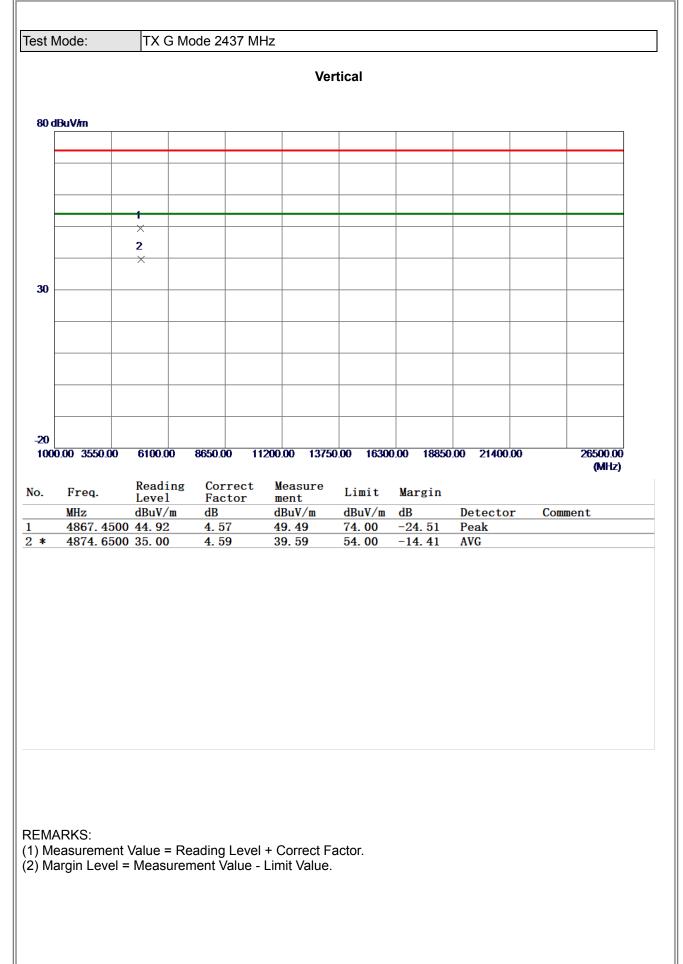




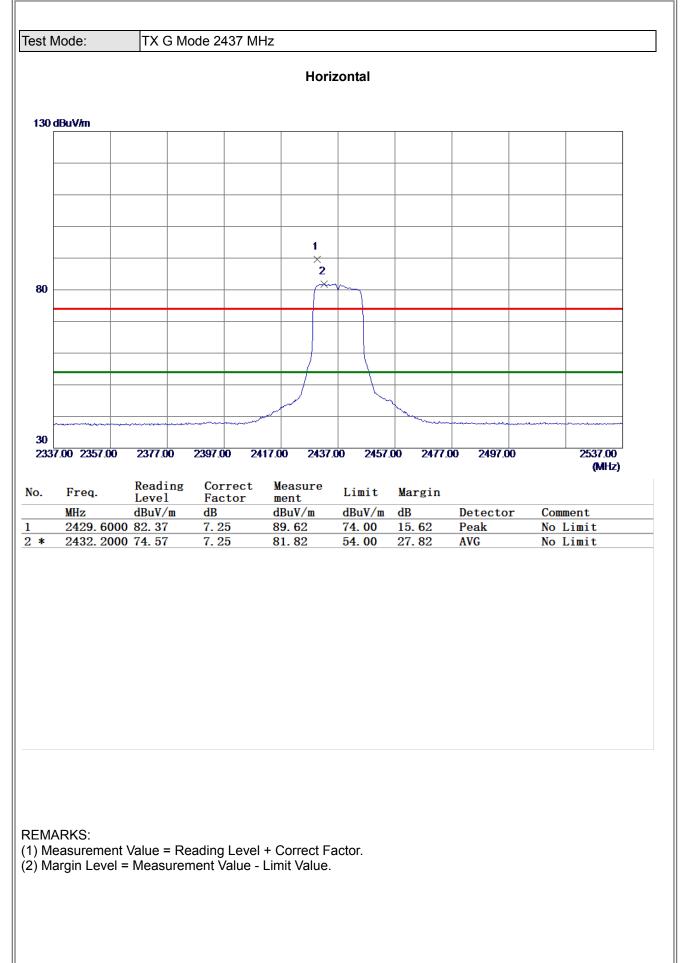




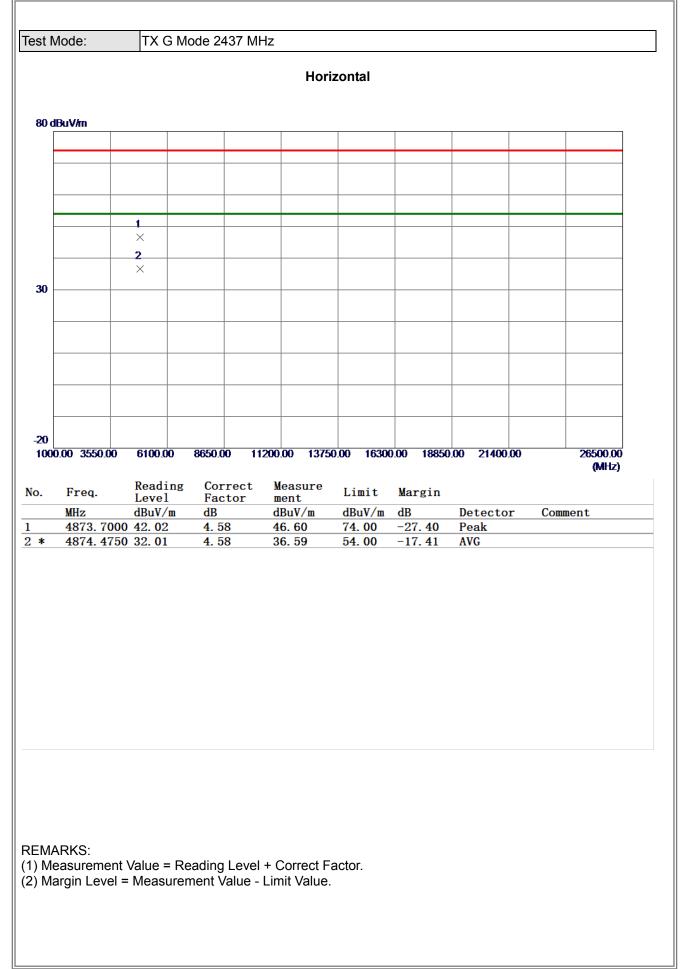




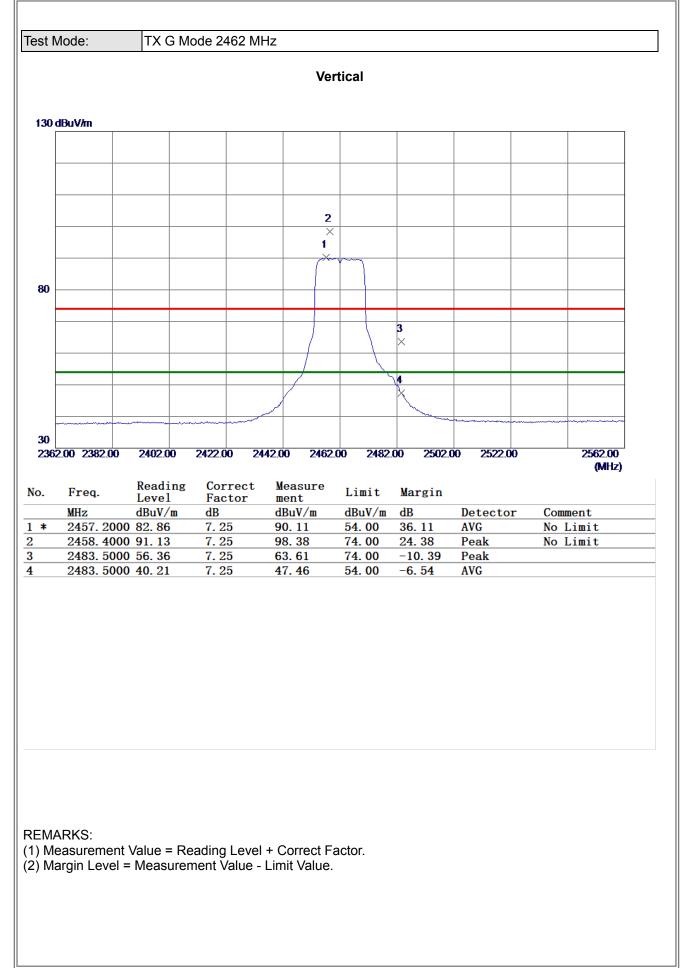




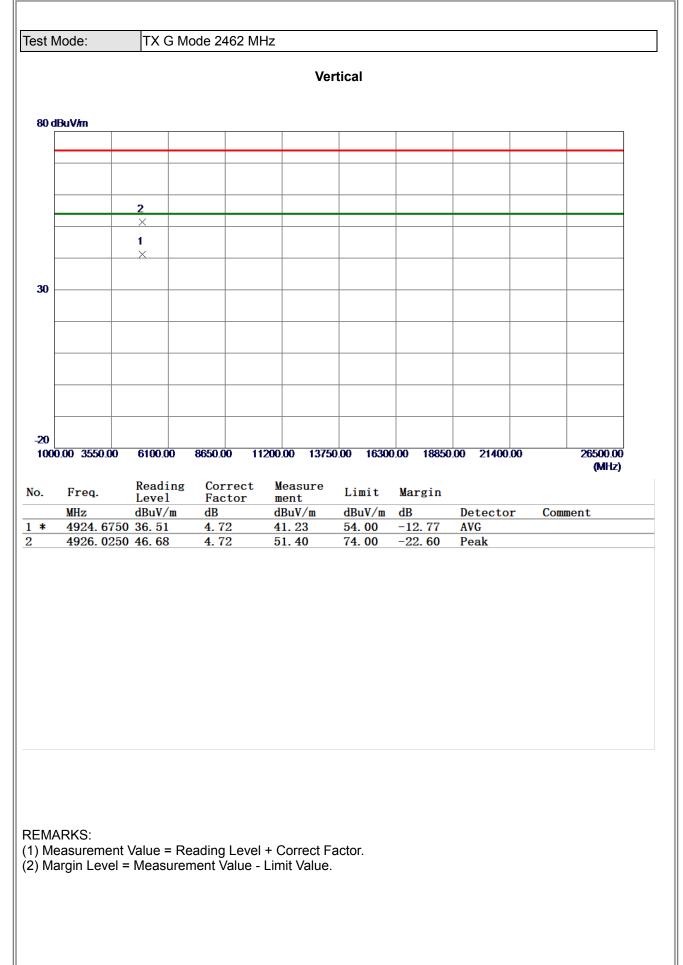




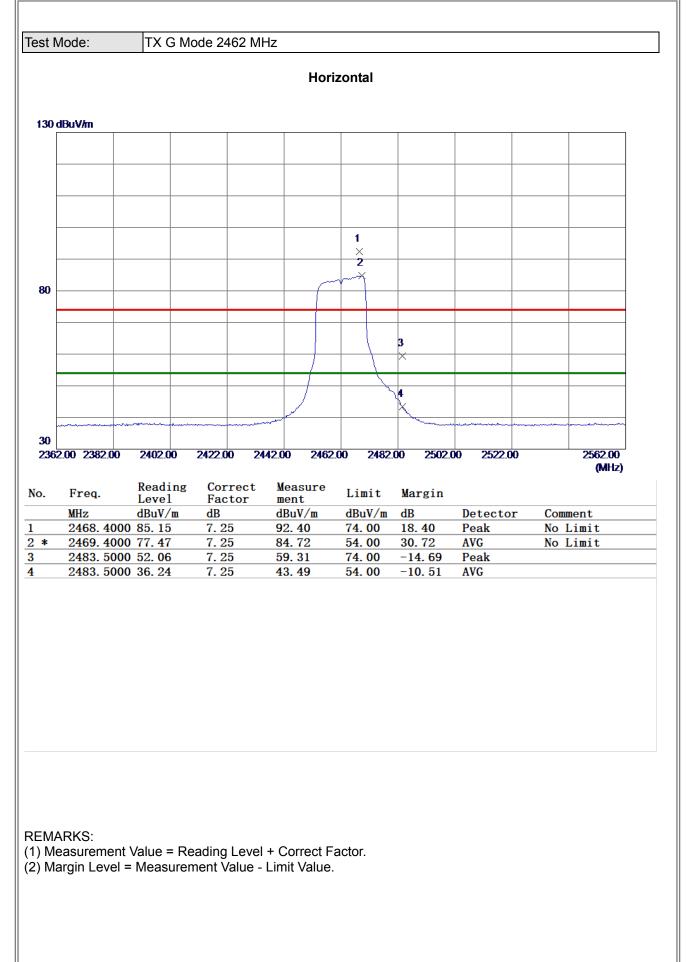




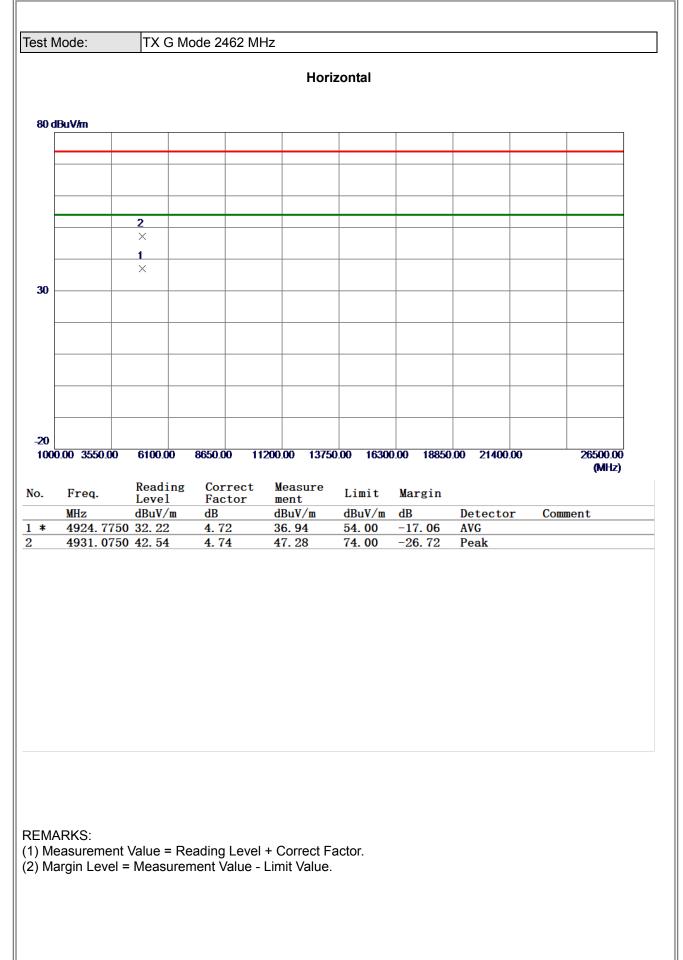




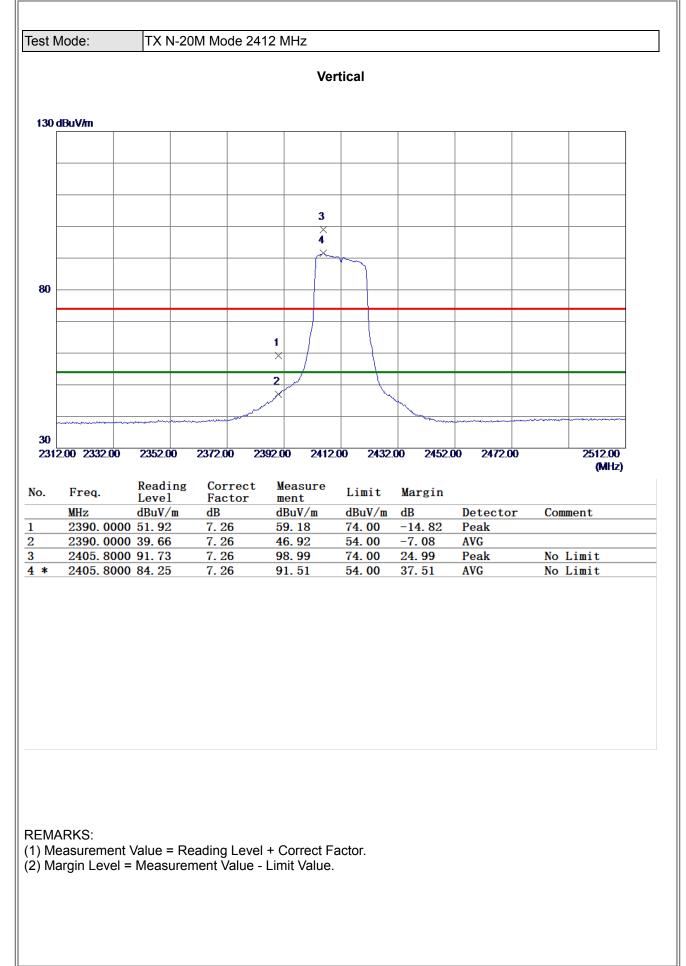




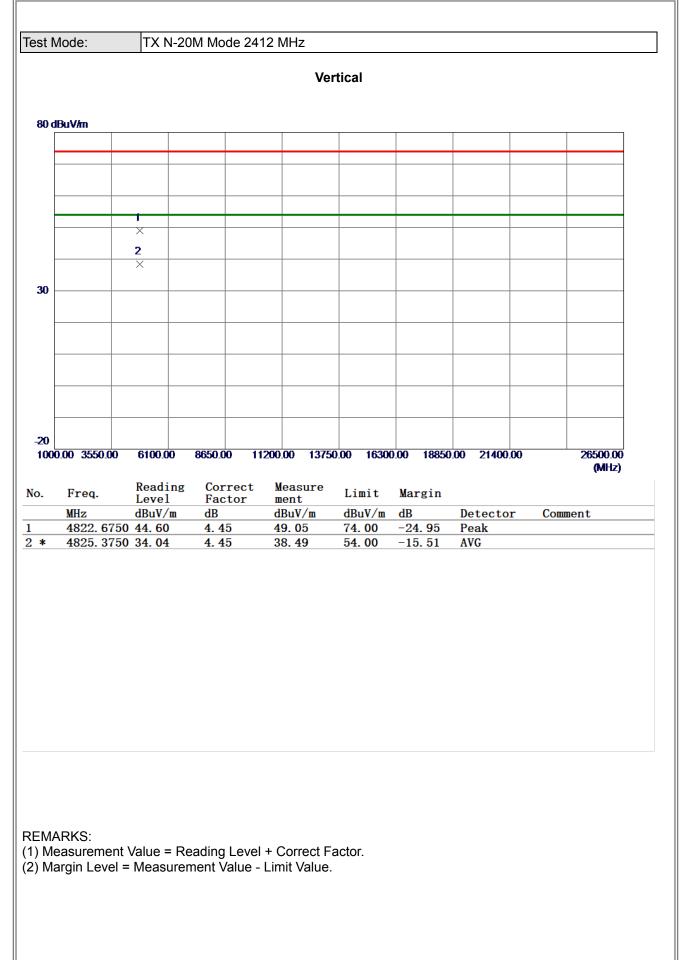




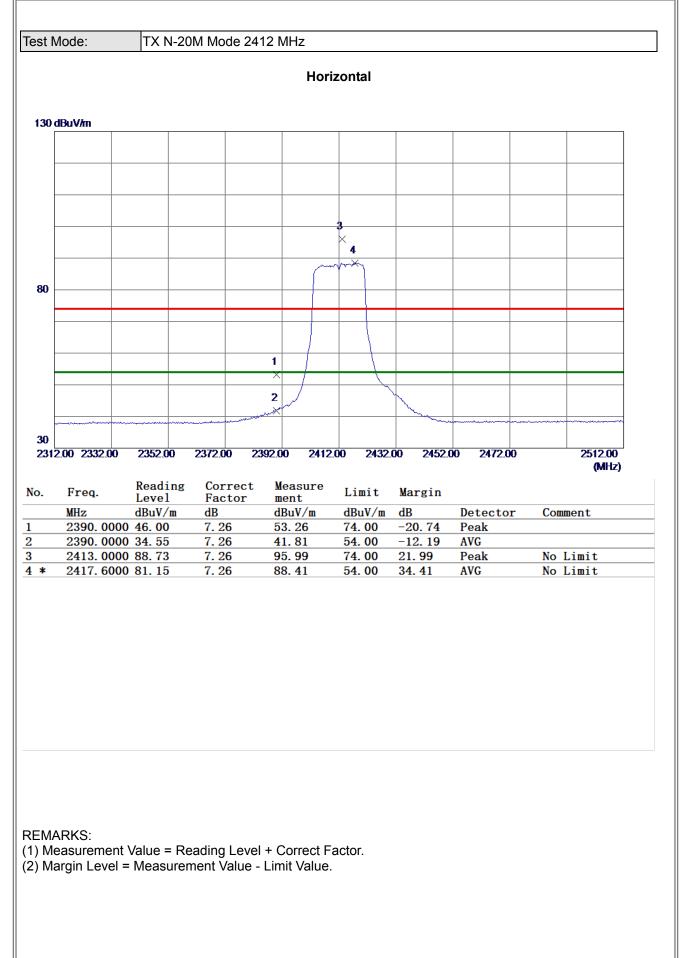




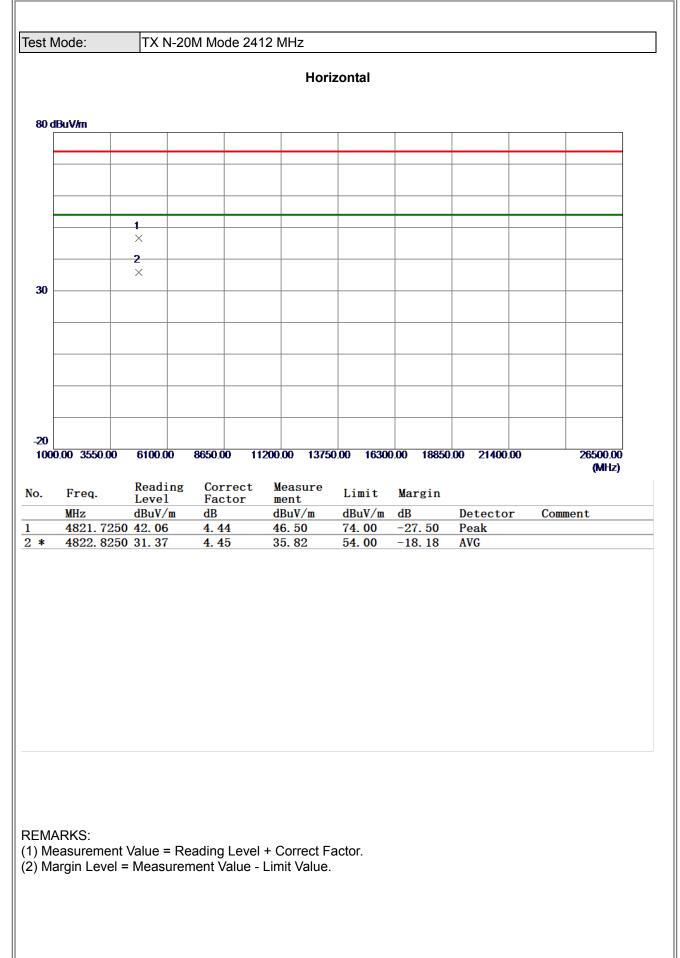




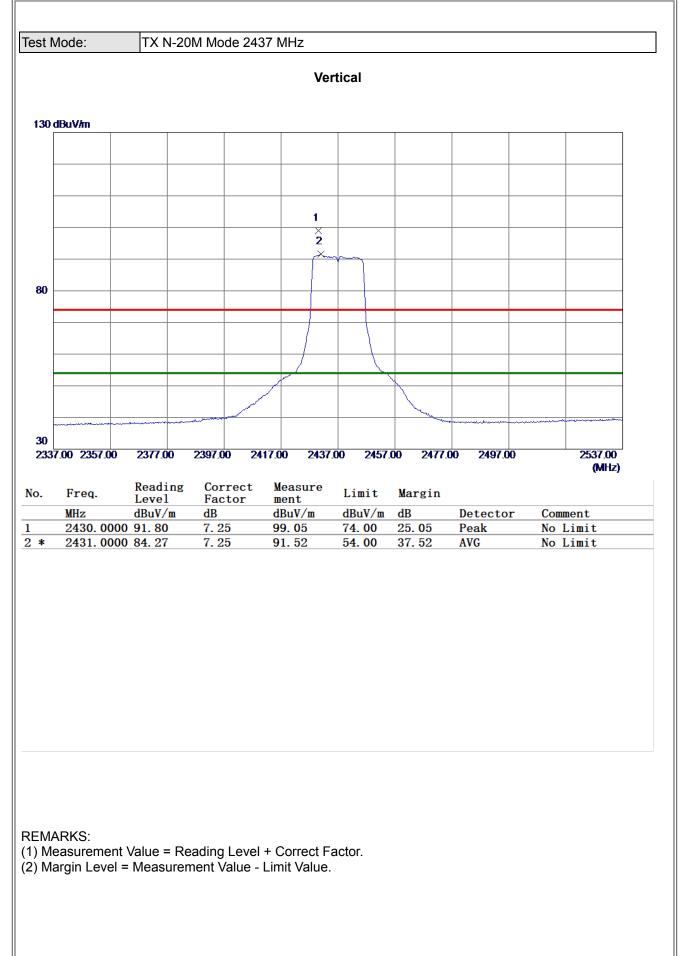




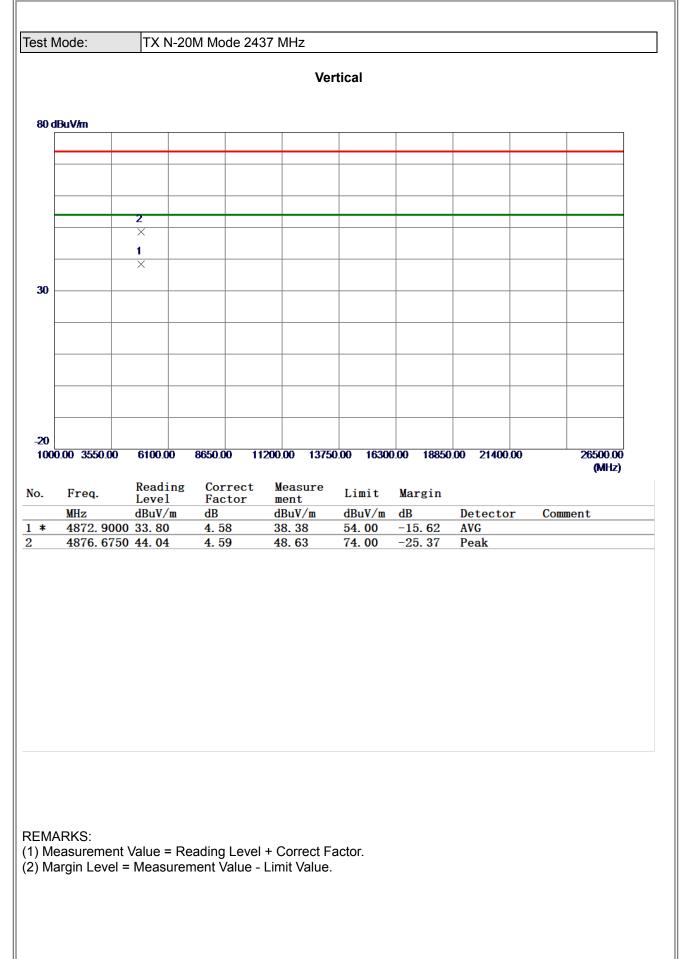




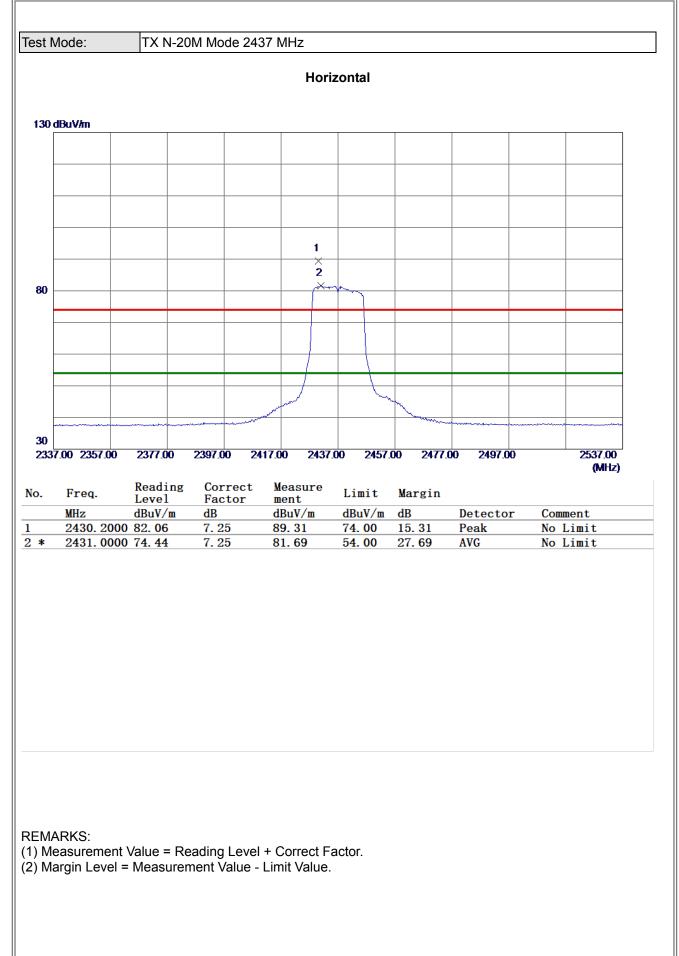




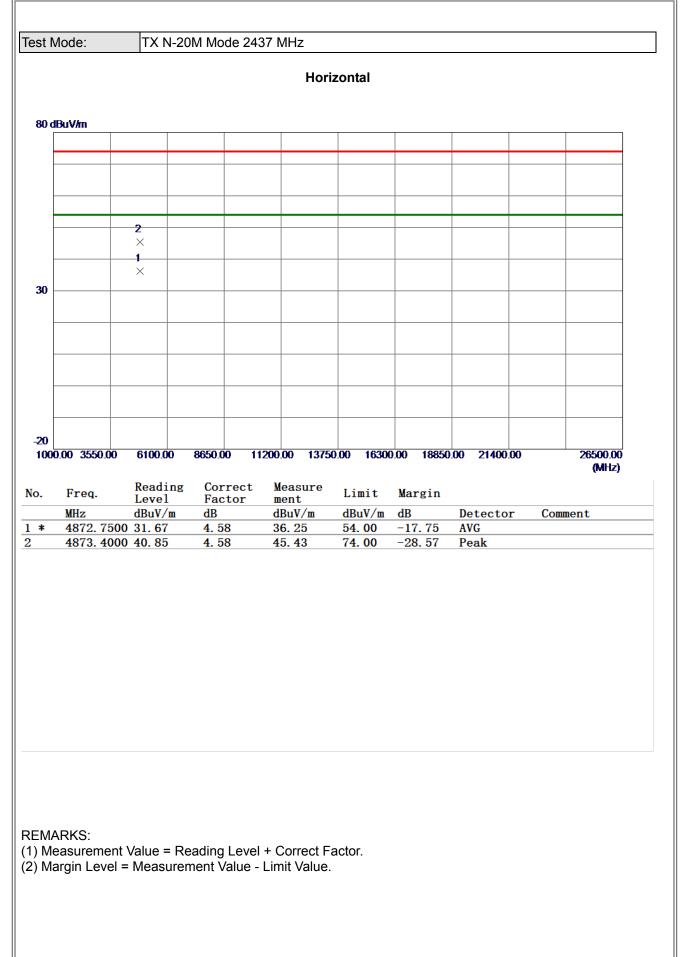




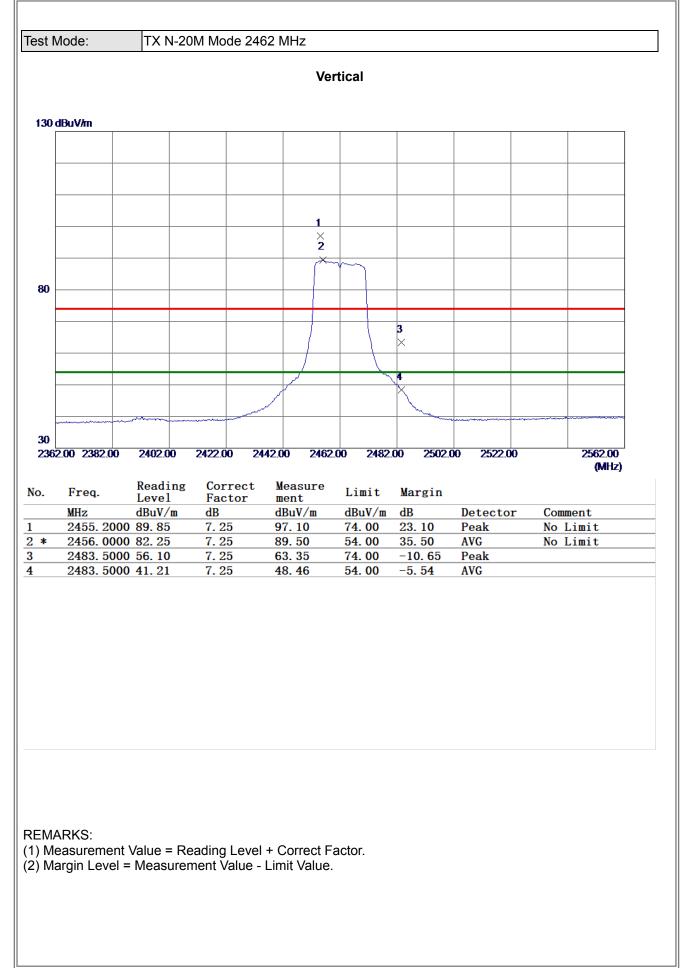




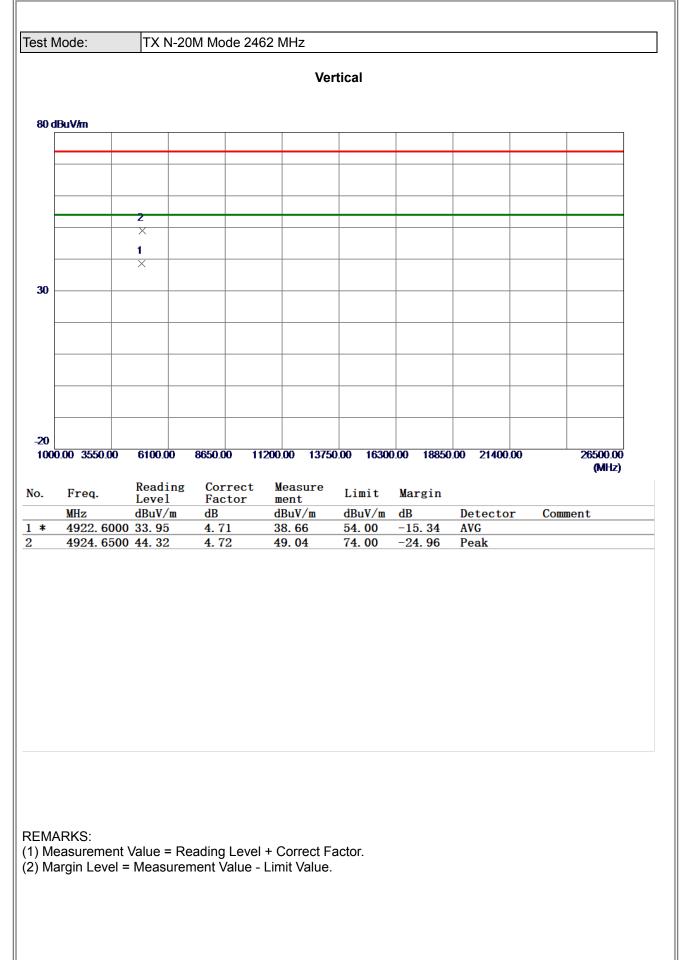




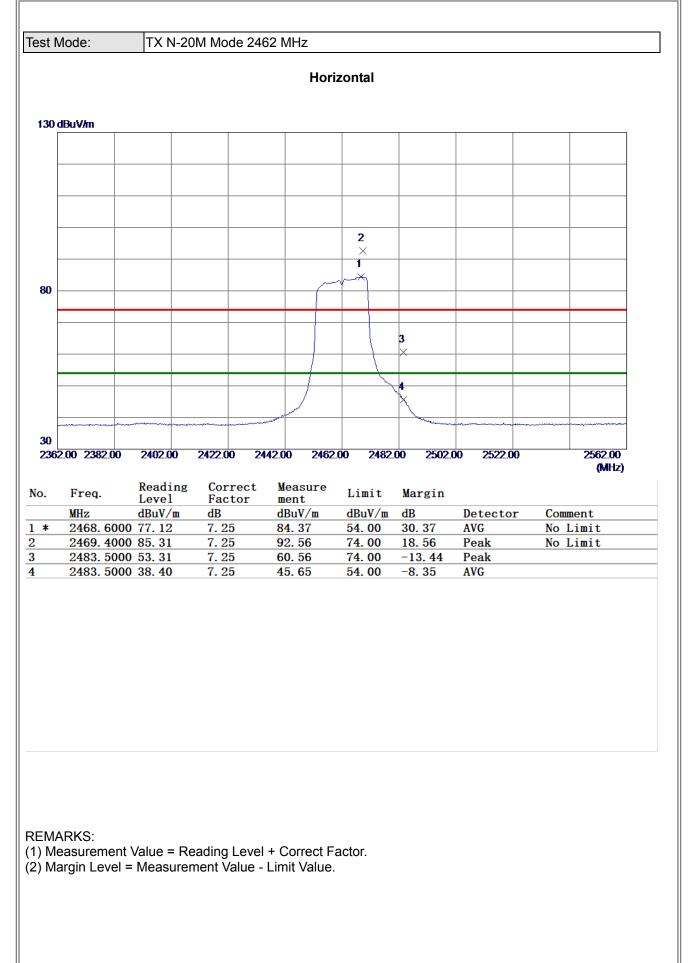




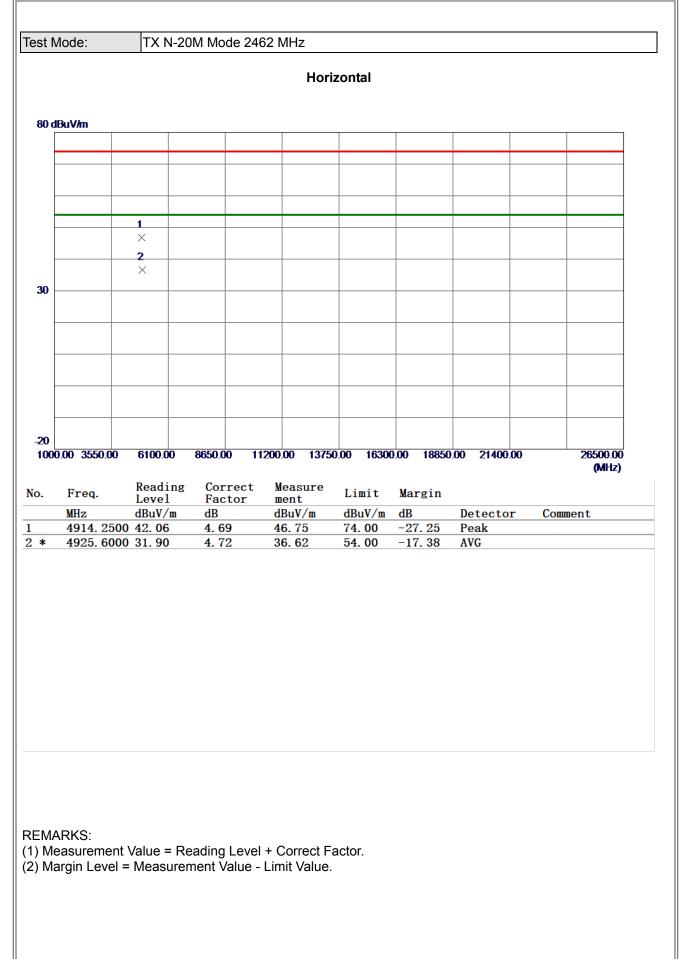




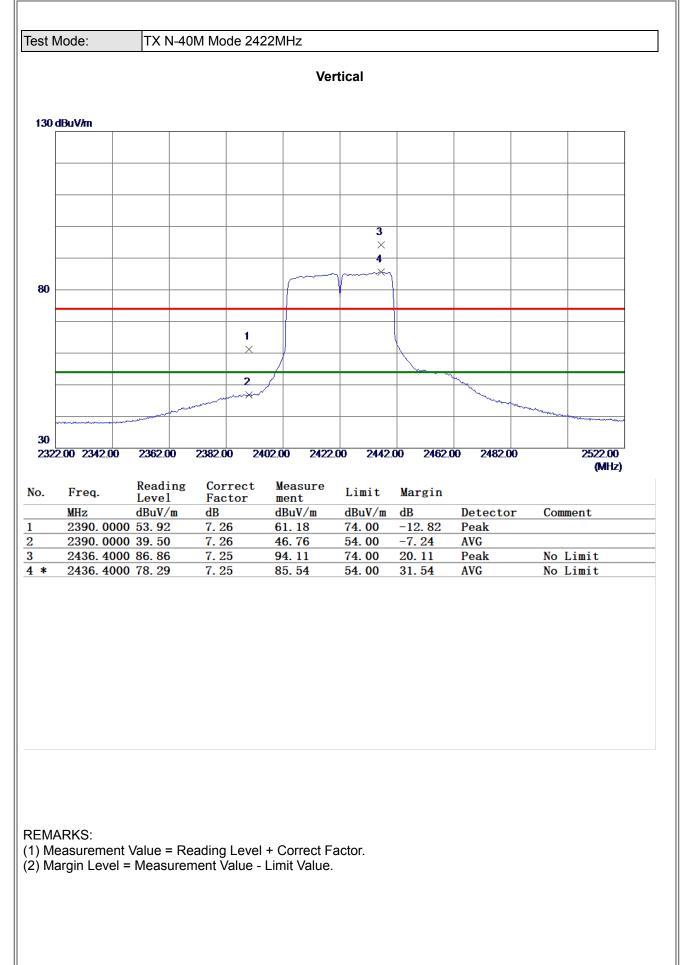




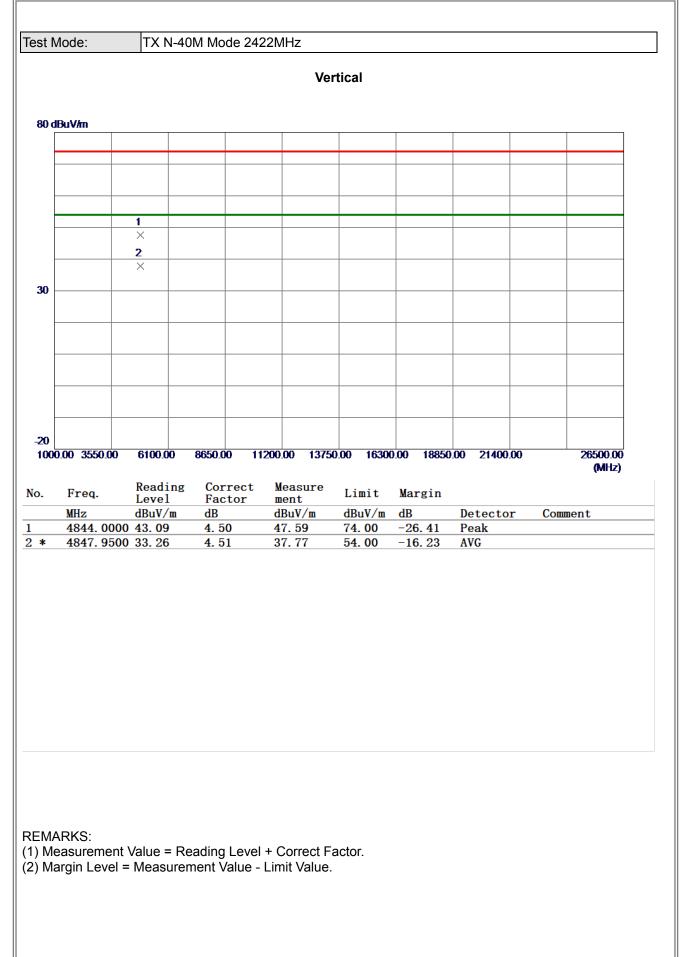




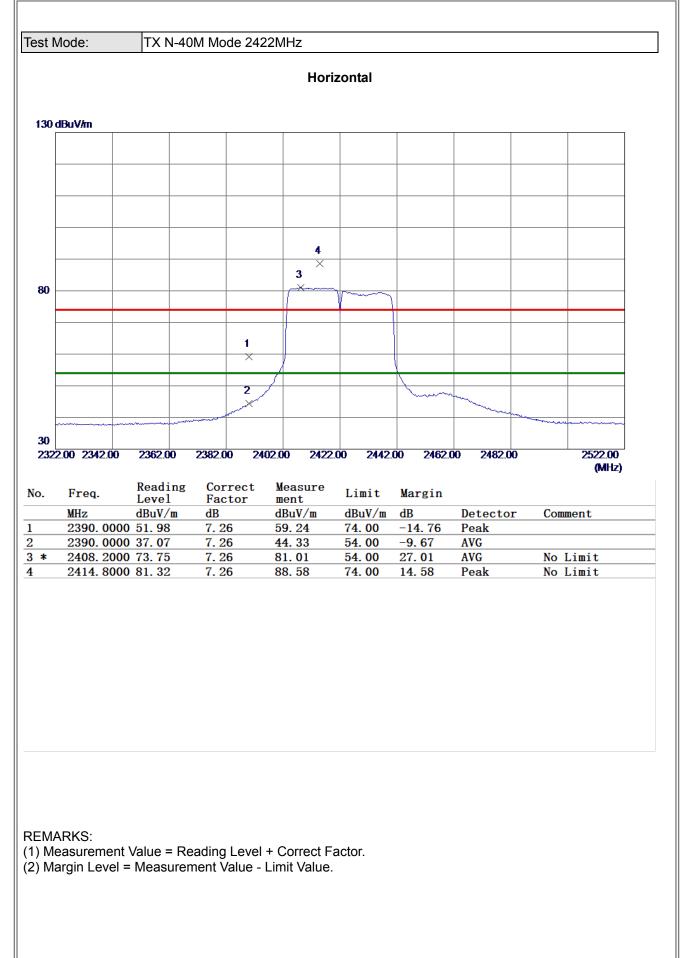




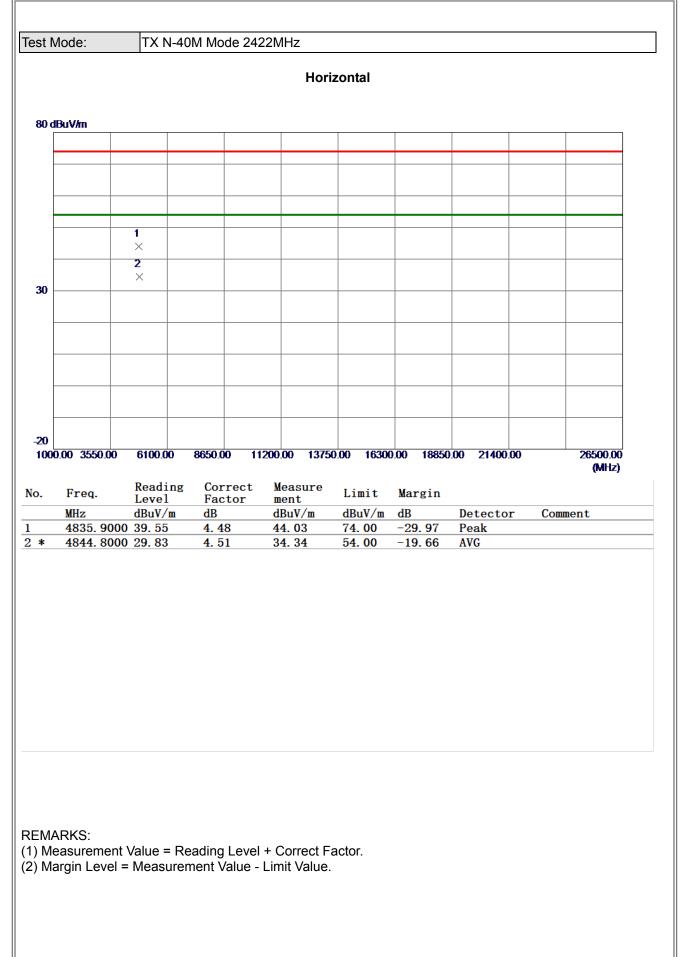




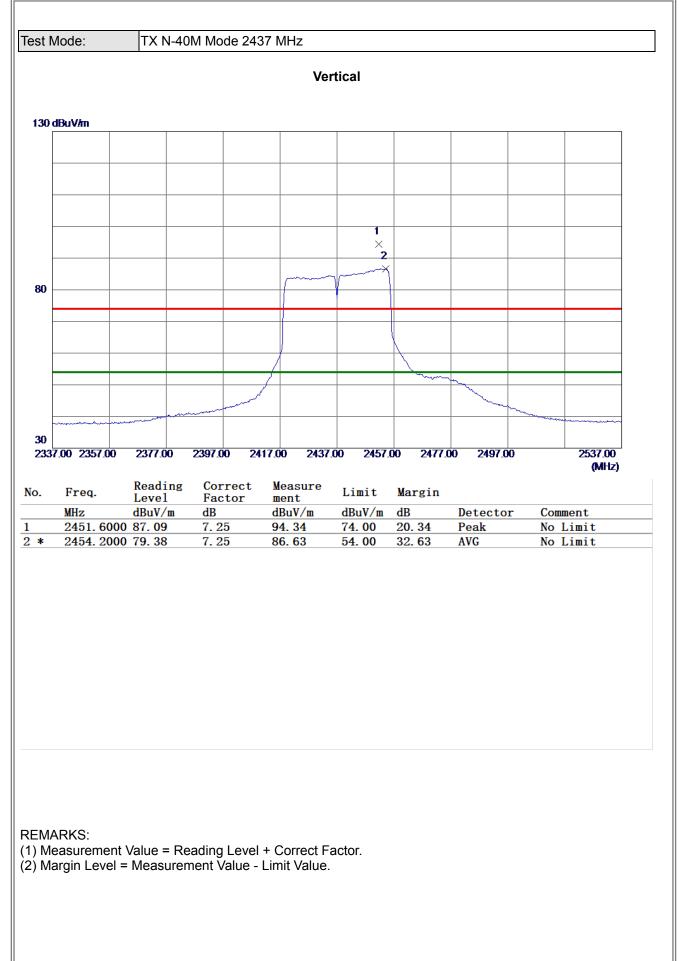




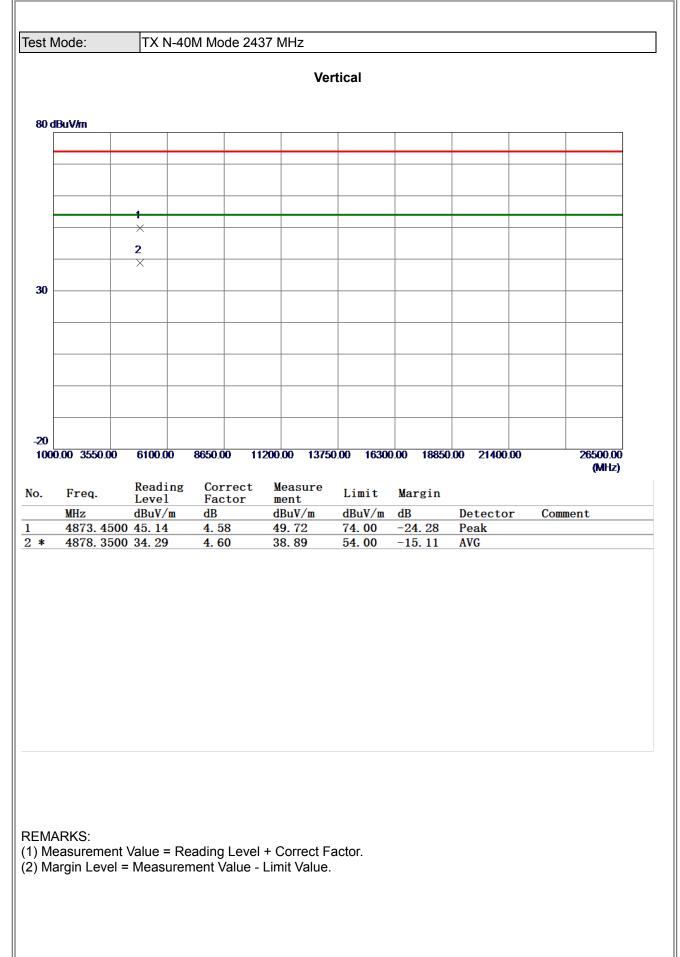




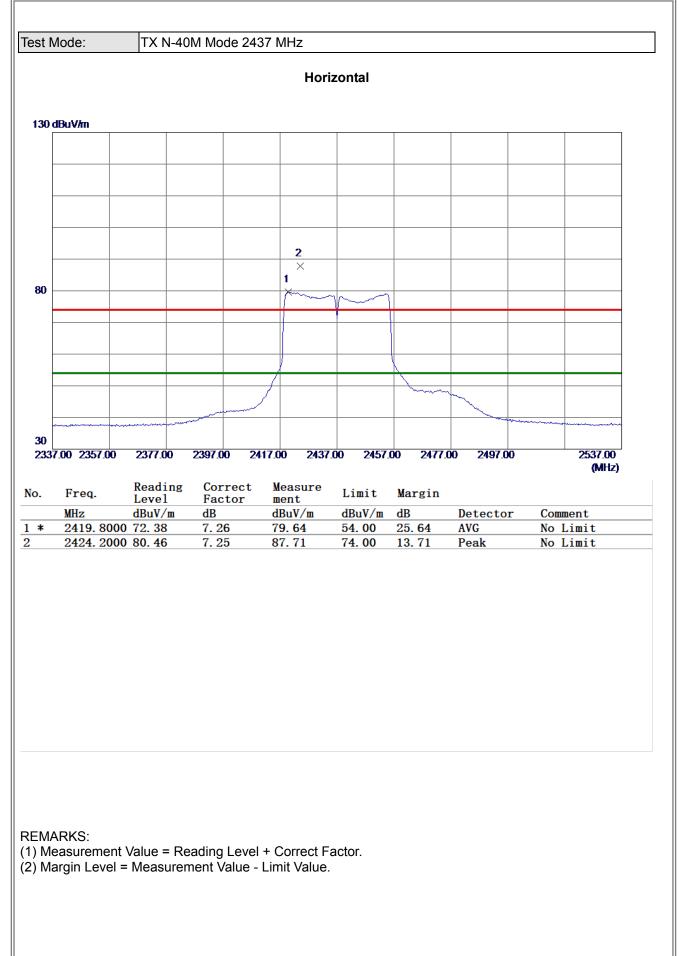




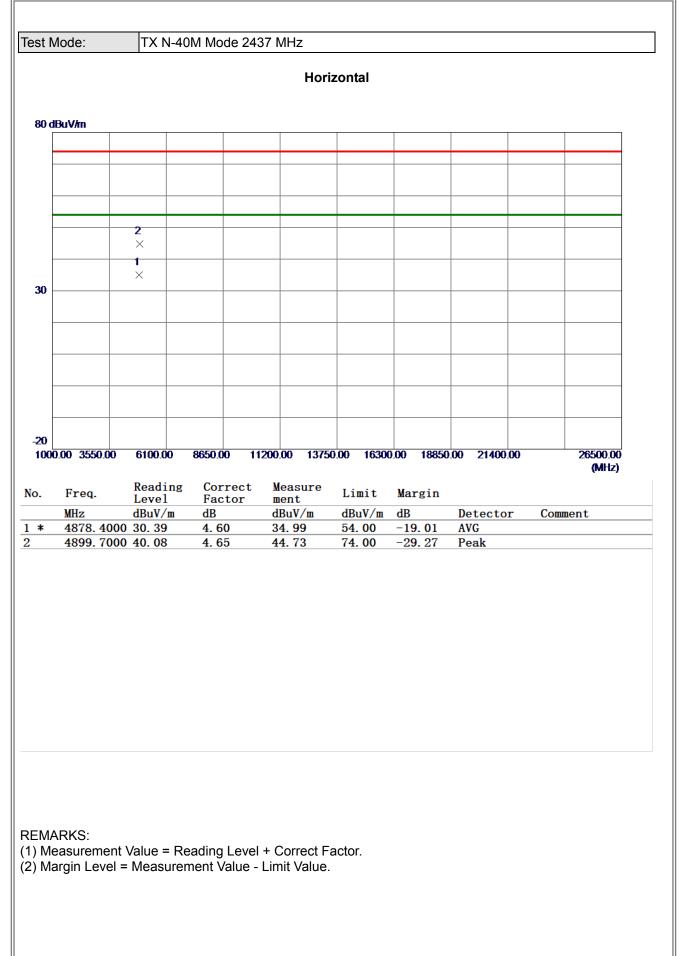




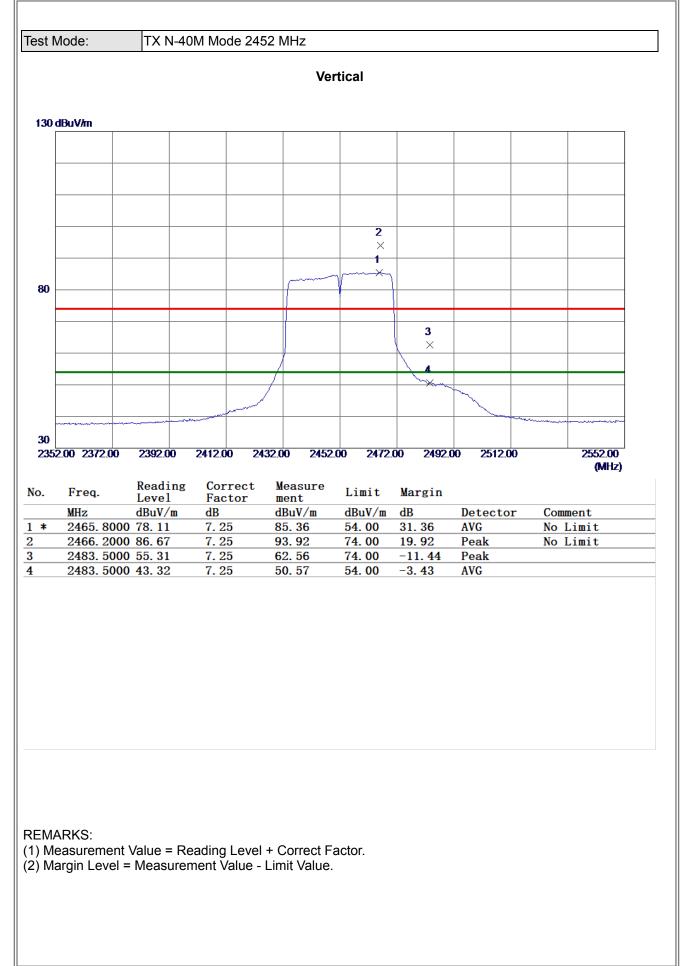




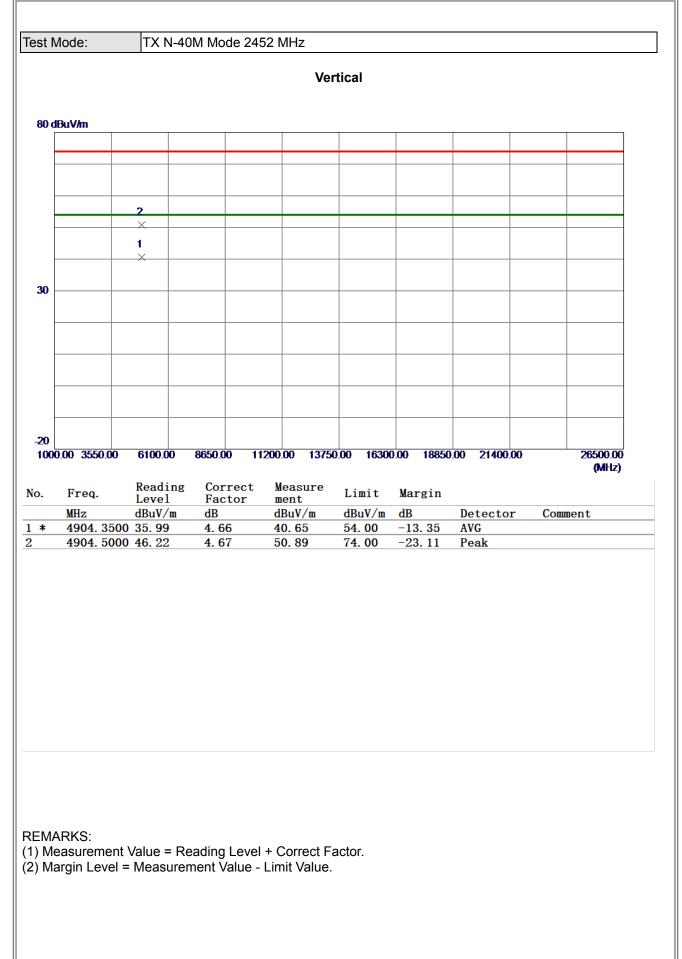




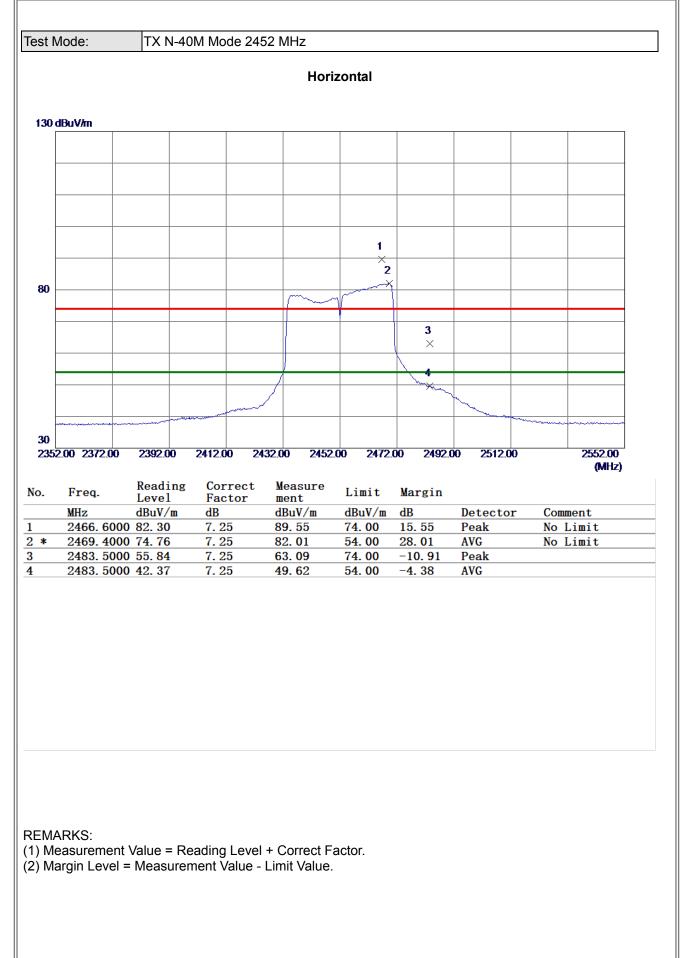




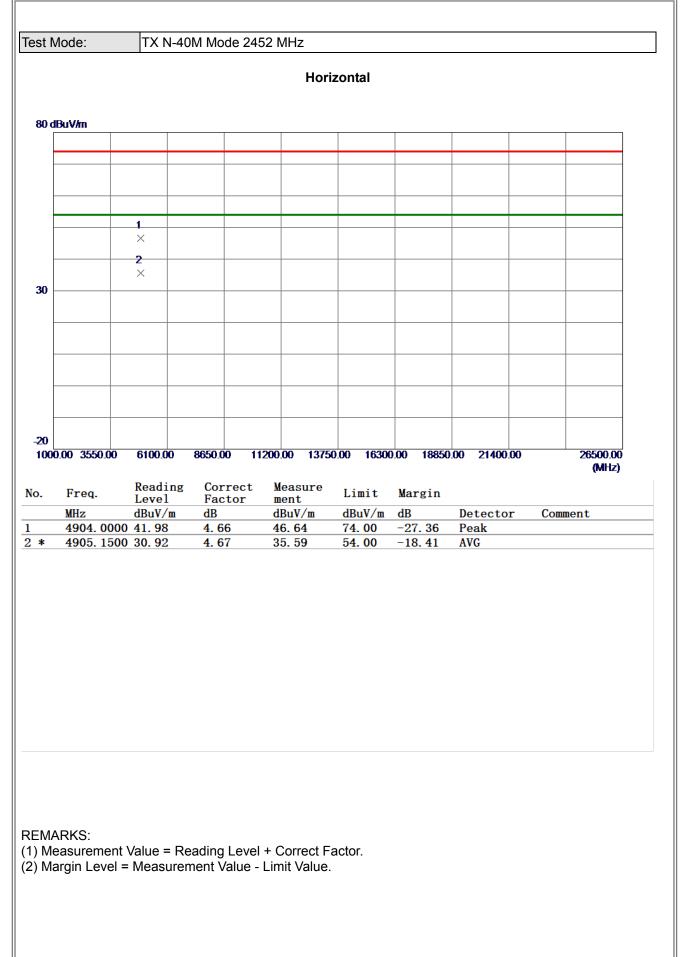










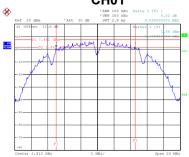


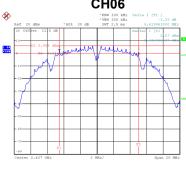


APPENDIX E - BANDWIDTH



Test Mode	TX B Mode			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2412	9.59	500	Complies
06	2437	9.62	500	Complies
11	2462	10.03	500	Complies
C	H01	CH06	C	H11





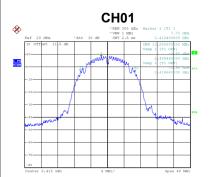


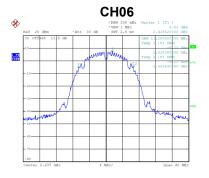
Date: 29.0CT.2020 09:28:34

Date: 29.0CT.2020 09:30:13

Date: 29.0CT.2020 09:31:54

Channel	Frequency (MHz)	99 % Emission Bandwidth (MHz)	Result
01	2412	13.20	Complies
06	2437	13.28	Complies
11	2462	13.20	Complies







Date: 29.0CT.2020 09:28:40

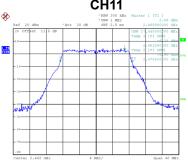
Date: 29.0CT.2020 09:30:20

Date: 29.0CT.2020 09:32:01



est Mode	TX G Mode			
Channel Frequency (MHz)		6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01 2412		16.38	500	Complies
06	2437	16.36	500	Complies
11	2462	16.42	500	Complies
Act 30 cB *Act 30 cB 10 0 CE 115 cB 11 10 0 CE 11 cB 11 11 0 CE 11 11 12 0 CE 11 11 13 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11 14 0 CE 11 11 15 0 CE 11 11	EHO1.	CFUCO CONTRACTOR OF CONTRACTOR OF CONTRACTO	1:11:1	
Channel	Frequency (MHz)	99 % Emission	n Bandwidth (MHz)	Result
01	2412	1	17.36	Complies
06	2437	17.52		Complies
11	2462	17.44		Complies
Ref 20 dBm *Att 30 dB	- 580 300 kHz Harker 1 [71] *280 300 kHz Harker 1 [71] *280 1 MHz 4.55 dBm 3072 2.5 mo 2.413540000 dHz	CH06 ************************************		CH411 *283' 300 MH: Marker 1 (71) *VWW 1 MH: 2.66 dBm SWT 2.5 ms 2.466950000 GHz

Comparison of the formation of the



Date: 29.0CT.2020 09:34:10

Date: 29.0CT.2020 09:35:51

Date: 29.0CT.2020 09:37:56



Test Mode	TX N-20M Mode			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2412	17.58	500	Complies
06	2437	17.60	500	Complies
11	2462	17.62 500		Complies
A	VIT 2.5.5 Mai 1.7.5.9 Line 1.8.1 Mai Image: Im	CHORCE CONTRACTOR	1 (1) 2 (1) 2 (1) 2 (1) 1 (1)	************************************
Channel	Frequency (MHz)		n Bandwidth (MHz)	Result
01	2412		18.40	Complies
06	2437		18.48	Complies
11	2462		18.40	Complies
A	VM 2.4.15000000 Bits Verse 1 17.0.001 Bits	CHUC A SAN A SAN		EXAMPLE 1919 DE MAR MERET I T. 1 1917 J. 2017 J. 2017 J. 2017 DE 1917 DE MAR MERET I T. 1 1917 DE MAR MERET I T. 1 19



Test Mode	TX N-40M Mode			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
03	2422	36.40	500	Complies
06	2437	36.36	500	Complies
09	2452	36.44	500	Complies
<figure>Ender Server Server Server</figure>				
Channel	Frequency (MHz)		n Bandwidth (MHz)	Result
03	2422		38.88	Complies
06	2437 2452		38.72 38.72	Complies
CI *	H03 MM 1 MBz Marker 1 [7]] MM 2 MBz 2.4 Far 2.4 First	CH06	C	Complies #009 #21.51 #100

Date: 29.0CT.2020 09:47:31

Date: 29.0CT.2020 09:49:35

Date: 29.0CT.2020 09:50:57



APPENDIX F - MAXIMUM OUTPUT POWER



Test Mode	TX B Mode					
Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
01	2412	20.17	0.1040	30.00	1.0000	Complies
06	2437	19.89	0.0975	30.00	1.0000	Complies
11	2462	19.92	0.0982	30.00	1.0000	Complies
Toot Modo	TX G Mode					
Test Mode	TX G Mode					

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
01	2412	22.35	0.1718	30.00	1.0000	Complies
06	2437	22.17	0.1648	30.00	1.0000	Complies
11	2462	22.08	0.1614	30.00	1.0000	Complies

Test Mode TX N-

TX N-20M N	Node
------------	------

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
01	2412	22.11	0.1626	30.00	1.0000	Complies
06	2437	21.74	0.1493	30.00	1.0000	Complies
11	2462	21.85	0.1531	30.00	1.0000	Complies

Test Mode TX N-40M Mode

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
03	2422	22.03	0.1596	30.00	1.0000	Complies
06	2437	21.39	0.1377	30.00	1.0000	Complies
09	2452	20.48	0.1117	30.00	1.0000	Complies



APPENDIX G - CONDUCTED SPURIOUS EMISSIONS



