

# **FCC Radio Test Report**

# FCC ID: TE7KC115

This report concerns: Original Grant

Project No.	: 1910C002
Equipment	: Kasa Spot Pan Tilt, 24/7 Recording
Brand Name	: tp-link
Test Model	: KC115
Series Model	: N/A
Applicant	: TP-Link Technologies Co., Ltd.
Address	: Building 24(floors1,3,4,5) and 28(floors1-4) Central Science and
	Technology Park, Shennan Rd, Nanshan, Shenzhen, China
Manufacturer	: TP-Link Technologies Co., Ltd.
Address	: Building 24(floors1,3,4,5) and 28(floors1-4) Central Science and
	Technology Park, Shennan Rd, Nanshan, Shenzhen, China
Date of Receipt	: Oct. 11, 2019
Date of Test	: Oct. 17, 2019 ~ Nov. 05, 2019
Issued Date	: Nov. 15, 2019
<b>Report Version</b>	: R00
Test Sample	: Engineering Sample No.: DG2019093074 for conducted,
	DG2019093070 for radiated.
Standard(s)	: FCC Part15, Subpart C (15.247)
	ANSI C63.10-2013
	KDB 558074 D01 15.247 Meas Guidance v05r02

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

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#### 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.



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# **REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Nov. 15, 2019

# **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 Average 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	2.60

#### B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9kHz ~ 30MHz	V	3.79
		9kHz ~ 30MHz	Н	3.57
	CISPR	30MHz ~ 200MHz	V	4.88
		30MHz ~ 200MHz	Н	4.14
DG-CB03		200MHz ~ 1,000MHz	V	4.62
DG-CB03		200MHz ~ 1,000MHz	Н	4.80
		1GHz ~ 6GHz	I	4.58
		6GHz ~ 18GHz	I	5.18
		18GHz ~ 26.5GHz	I	3.62
		26.5GHz ~ 40GHz	-	4.00

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	<b>25</b> °C	53%	AC 120V/60Hz	Laughing Zhang
Radiated Emissions-9K-30MHz	<b>25</b> °C	60%	AC 120V/60Hz	Laughing Zhang
Radiated Emissions-30 MHz to 1GHz	<b>24</b> °C	68%	AC 120V/60Hz	Laughing Zhang
Radiated Emissions-Above 1000 MHz	<b>26</b> °C	65%	AC 120V/60Hz	Laughing Zhang
Bandwidth	<b>24.8</b> ℃	55%	AC 120V/60Hz	Jonas Chen
Maximum average output power	<b>24.8</b> ℃	55%	AC 120V/60Hz	Jonas Chen
Conducted Spurious Emissions	<b>24.8</b> °C	55%	AC 120V/60Hz	Jonas Chen
Power Spectral Density	<b>24.8</b> °C	55%	AC 120V/60Hz	Jonas Chen

# 2. GENERAL INFORMATION

#### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Kasa Spot Pan Tilt, 24/7 Recording
Brand Name	tp-link
Test Model	KC115
Series Model	N/A
Model Difference(s)	N/A
Power Source	DC Voltage supplied from AC/DC adapter. Model: NBS05B050100VUU
Power Rating	I/P: 100-240V~ 50/60Hz 0.2A O/P: 5V 1A
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 Average Output Power	IEEE 802.11b: 19.98 dBm (0.0995 W) IEEE 802.11g: 19.27 dBm (0.0845 W) IEEE 802.11n (HT20): 18.40 dBm (0.0692 W) IEEE 802.11n (HT40): 18.60 dBm (0.0725 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) Channel (MHz)						Frequency (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	<b>TP-LINK</b> °	N/A	PIFA	N/A	2.97

## 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 B Mode Channel 11
Mode 6	TX B Mode Channel 01/02/06/10/11
Mode 7	TX G Mode Channel 01/02/06/10/11
Mode 8	TX N-20 MHz Mode Channel 01/02/06/10/11
Mode 9	TX N-40 MHz Mode Channel 03/04/06/08/09

Following mode(s) as (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 B Mode Channel 11	

Radiated emissions test - Below 1GHz	
Final Test Mode:	Description
Mode 5	TX B Mode Channel 11

Radiated emissions test- Above 1GHz	
Final Test Mode: Description	
Mode 6	TX B Mode Channel 01/02/06/10/11
Mode 7	TX G Mode Channel 01/02/06/10/11
Mode 8	TX N-20 MHz Mode Channel 01/02/06/10/11
Mode 9	TX N-40 MHz Mode Channel 03/04/06/08/09



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	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 802.11b Channel 11 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.

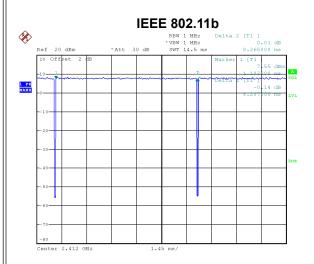
#### 2.3 PARAMETERS OF TEST SOFTWARE

Test Software	MP_Kit_RTL11n_8188FTV_USB_v1.25		
Frequency (MHz)	2412	2437	2462
IEEE 802.11b	35	33	35
IEEE 802.11g	43	43	44
IEEE 802.11n (HT20)	42	41	42
Frequency (MHz)	2422	2437	2452
IEEE 802.11n (HT40)	42	42	42

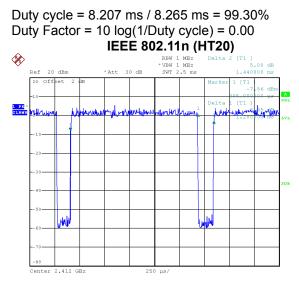


## 2.4 DUTY CYCLE

If duty cycle is  $\geq$  98 %, duty factor is not required. If duty cycle is < 98 %, duty factor shall be considered. The output power = measured power + duty factor.

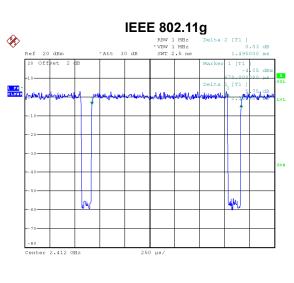


Date: 18.0CT.2019 14:37:39

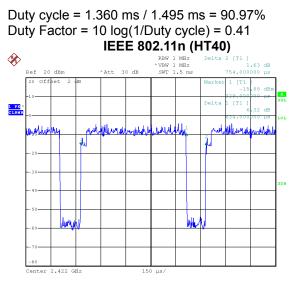


Date: 18.0CT.2019 14:42:22

Duty cycle = 1.280 ms / 1.440 ms = 88.89% Duty Factor = 10 log(1/Duty cycle) = 0.51



Date: 18.0CT.2019 14:38:23



Date: 18.0CT.2019 14:45:35

Duty cycle = 0.634 ms / 0.754 ms = 84.08% Duty Factor = 10 log(1/Duty cycle) = 0.75

#### NOTE:

For IEEE 802.11g and IEEE 802.11n (HT20):

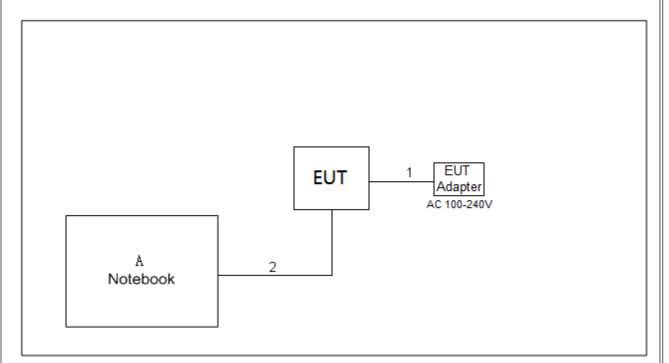
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).

#### For IEEE 802.11n (HT40):

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 2 kHz (Duty cycle < 98%).







### 2.6 SUPPORT UNITS

Equipment	Brand	Model No.	Series No.
Notebook	Dell	Inspiron 15-7559	N/A
Cable Type	Shielded Type	Ferrite Core	Length
DC Cable	NO	NO	0.7m
USB Cable	NO	NO	3.0m
	Notebook Cable Type DC Cable	Notebook     Dell       Cable Type     Shielded Type       DC Cable     NO	Notebook     Dell     Inspiron 15-7559       Cable Type     Shielded Type     Ferrite Core       DC Cable     NO     NO

# 3. AC POWER LINE CONDUCTED EMISSIONS TEST

#### 3.1 LIMIT

Frequency of Emission (MUT)	Limit (d	BμV)
Frequency of Emission (MHz)	Quasi-peak	Average
0.15 - 0.50	66 to 56*	56 to 46*
0.50 - 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

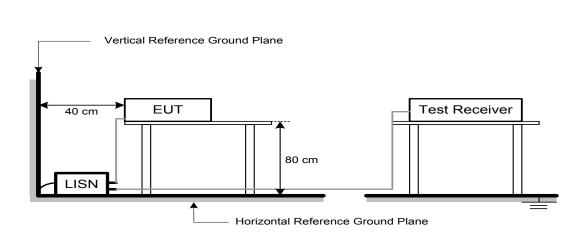
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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)

	(dBuV/n	n at 3 m)	
	Frequency (MHz)	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

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

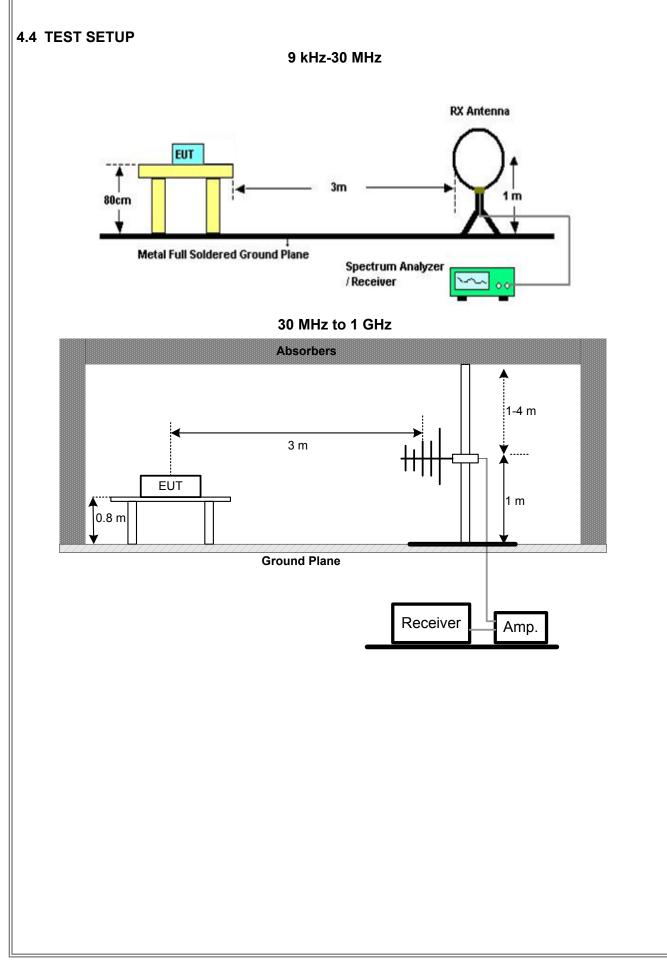
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance 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)
- h. 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

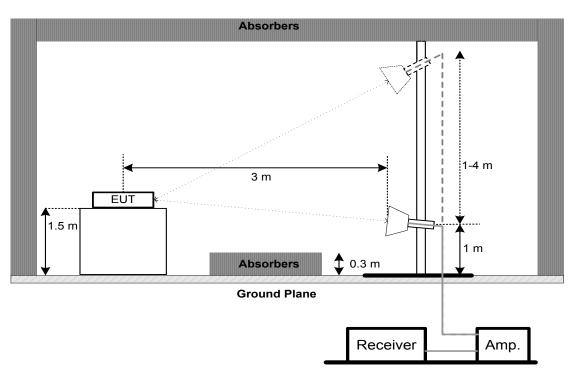






# **BIL**





### 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				
45.047(-)(0)	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. For 6dB Bandwidth Spectrum setting: RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.
   For 99% OBW Spectrum Setting: For B,G,N20 mode: RBW= 300KHz, VBW=1MHz, For N40 mode: RBW= 1MHz, VBW=3MHz, Sweep time = 2.5 ms.
- 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



#### 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 AVERAGE OUTPUT POWER TEST

#### 6.1 LIMIT

FCC Part15, Subpart C (15.247)				
Section Test Item Limit				
15.247(b)(3) Maximum Average 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 11.9.2.3.1 of ANSI C63.10-2013.

#### 6.3 DEVIATION FROM STANDARD

No deviation.

#### 6.4 TEST SETUP

EUT	Power Meter

#### 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(0)	Power Spectral Density	8 dBm			
15.247(e)	Power Spectral Density	(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

EUT	SPECTRUM
	ANALYZER
	•

#### **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	Mar. 10, 2020	
2	LISN	EMCO	3816/2	52765	Mar. 10, 2020	
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	May. 19, 2020	
4	50Ω Terminator	SHX	TF5-3	15041305	Mar. 10, 2020	
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
6	Cable	N/A	RG223	12m	Mar. 12, 2020	

	Radiated Emissions - 9 kHz to 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Loop Antenna	EM	EM-6876-1	230	Jan. 15, 2020	
2	Cable	N/A	RG 213/U	C-102	May 31, 2020	
3	EMI Test Receiver	R&S	ESCI	100895	Mar. 10, 2020	
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	

	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, 2020	
2*	Amplifier	HP	8447D	2944A09673	Aug. 11, 2021	
3	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020	
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 24, 2020	
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	

	Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 09, 2020	
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 23, 2020	
3	Amplifier	Agilent	8449B	3008A02333	Mar. 10, 2020	
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 10, 2020	
5	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020	
6	Controller	СТ	SC100	N/A	N/A	
7	Controller	MF	MF-7802	MF780208416	N/A	
8	Cable	mitron	B10-01-01-12M	18072744	Jun. 29, 2020	
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	



Bandwidth & Antenna Conducted Spurious Emissions & Power Spectral Density					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020
		Maximum	<b>Average Output Po</b>	wer	
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Peak Power Analyzer	Keysight	8990B	MY51000506	Aug. 03, 2020
2	Wideband power sensor	Keysight	N1923A	MY58310004	Aug. 03, 2020

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

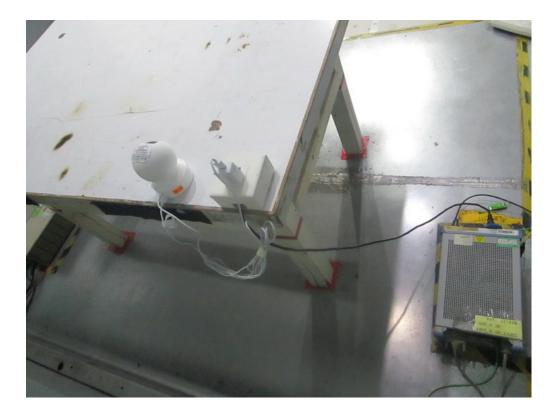
"\*" calibration period of equipment list is three year.

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



#### 10. EUT TEST PHOTO AC Power Line Conducted Emissions Test Photos

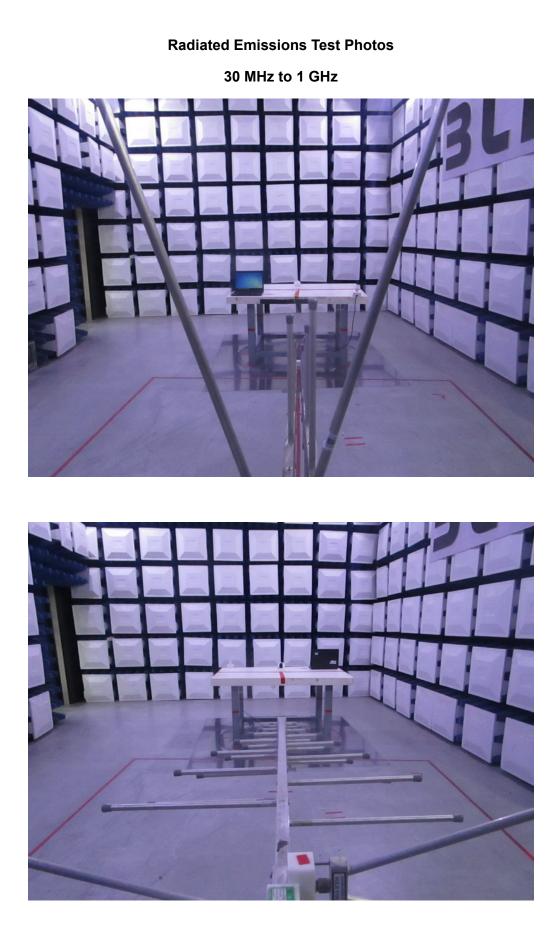




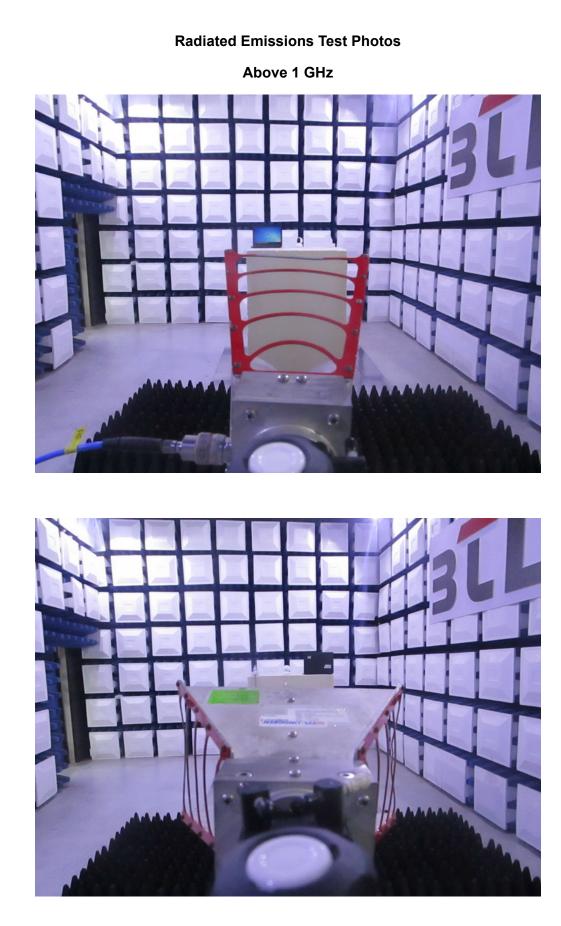
# **B**L



# **B**L



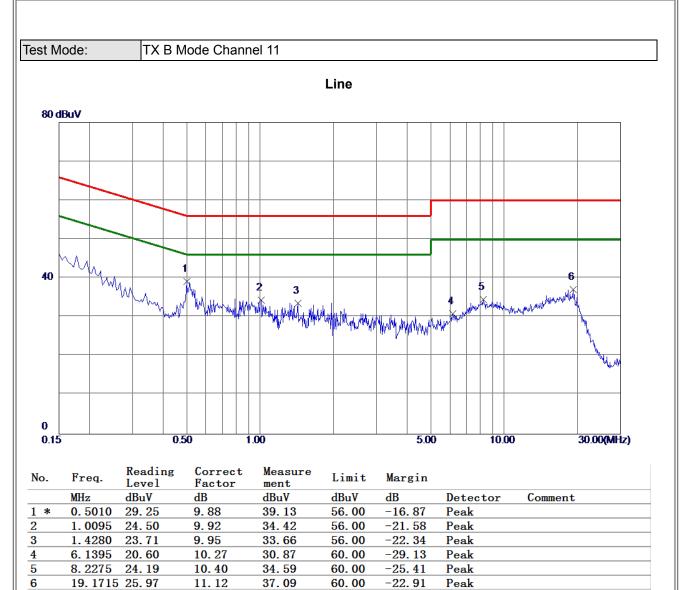






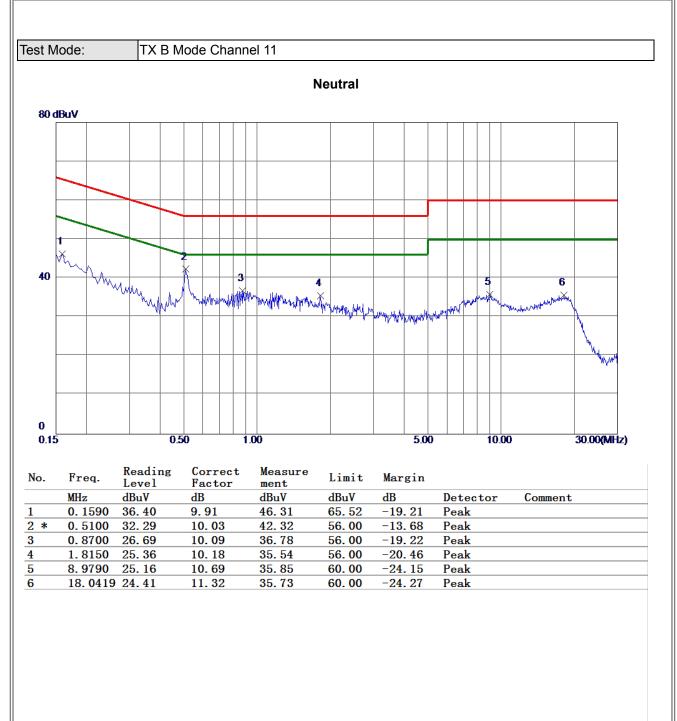
# **APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**





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

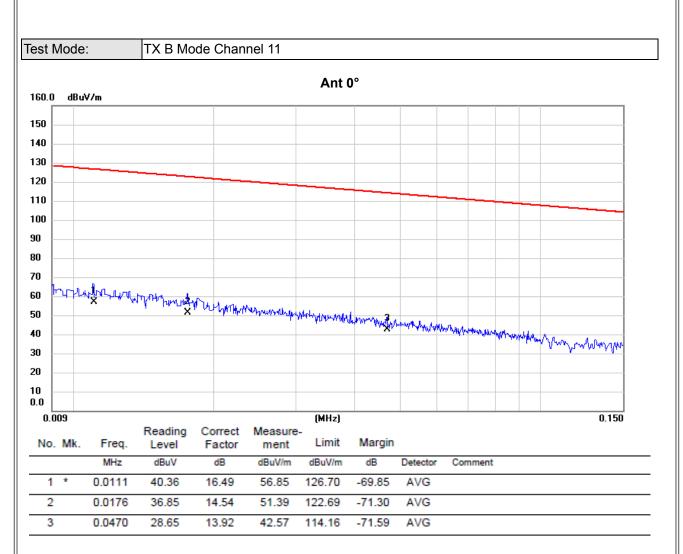




- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

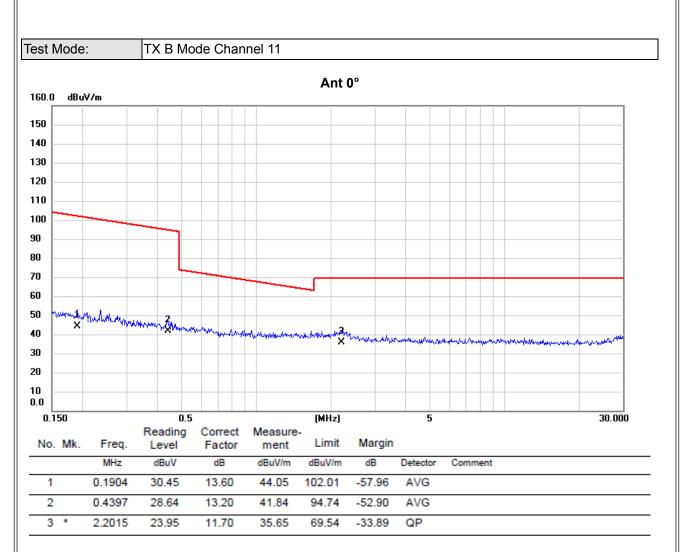
# **APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ**





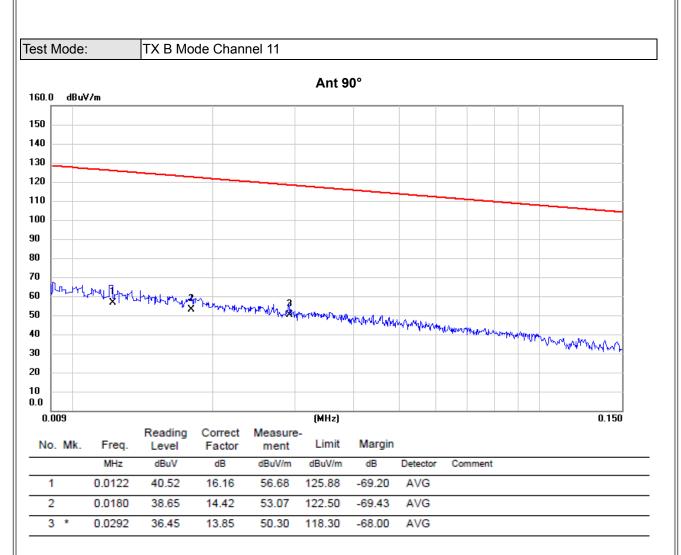
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





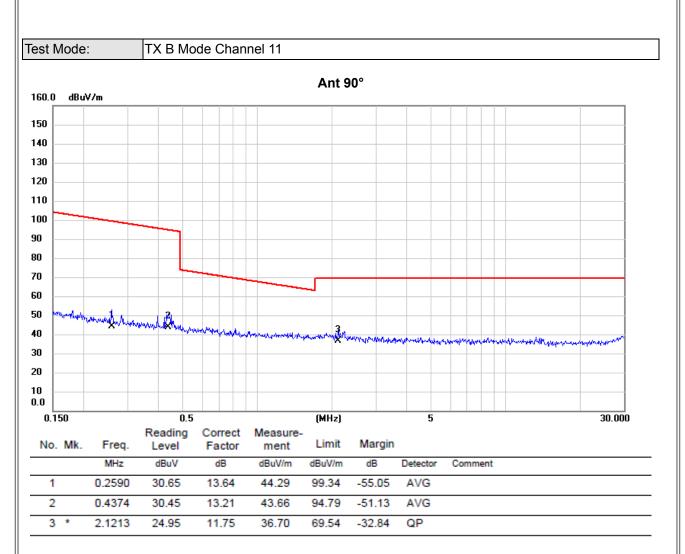
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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



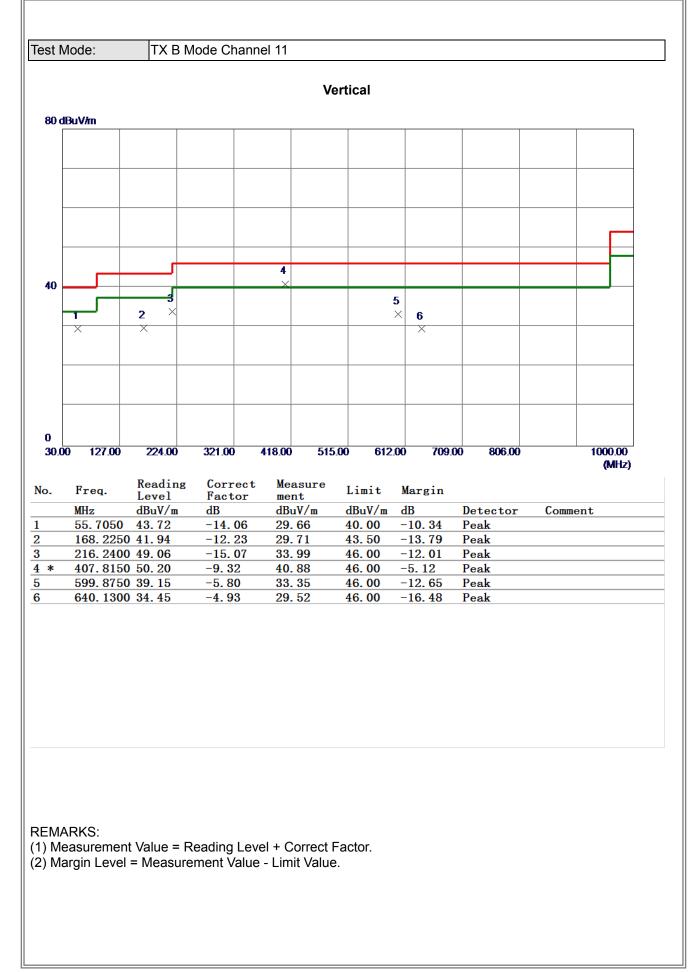


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

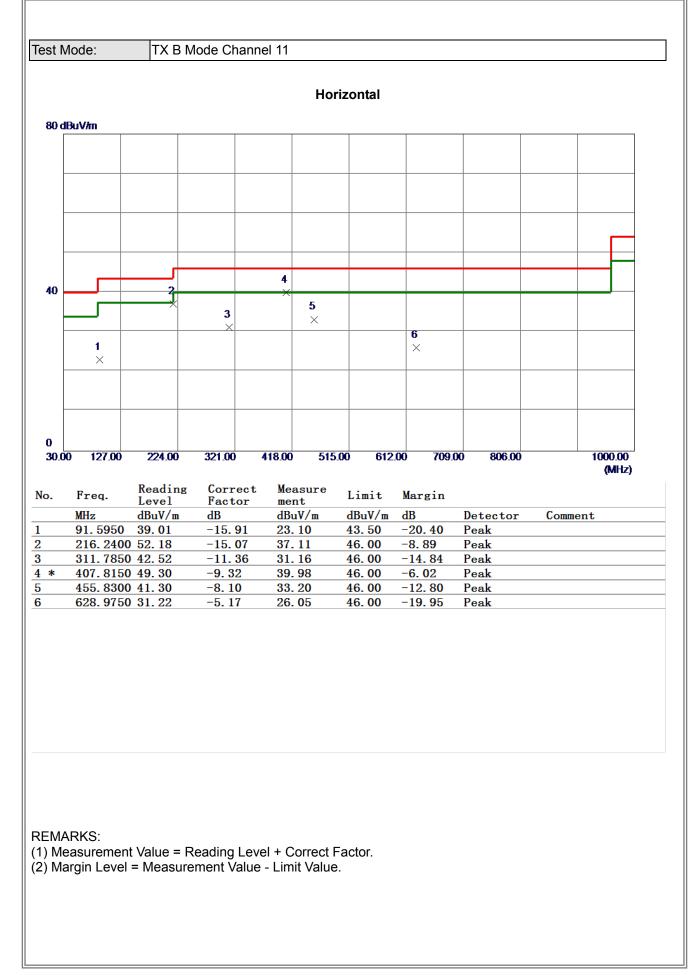


## APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ



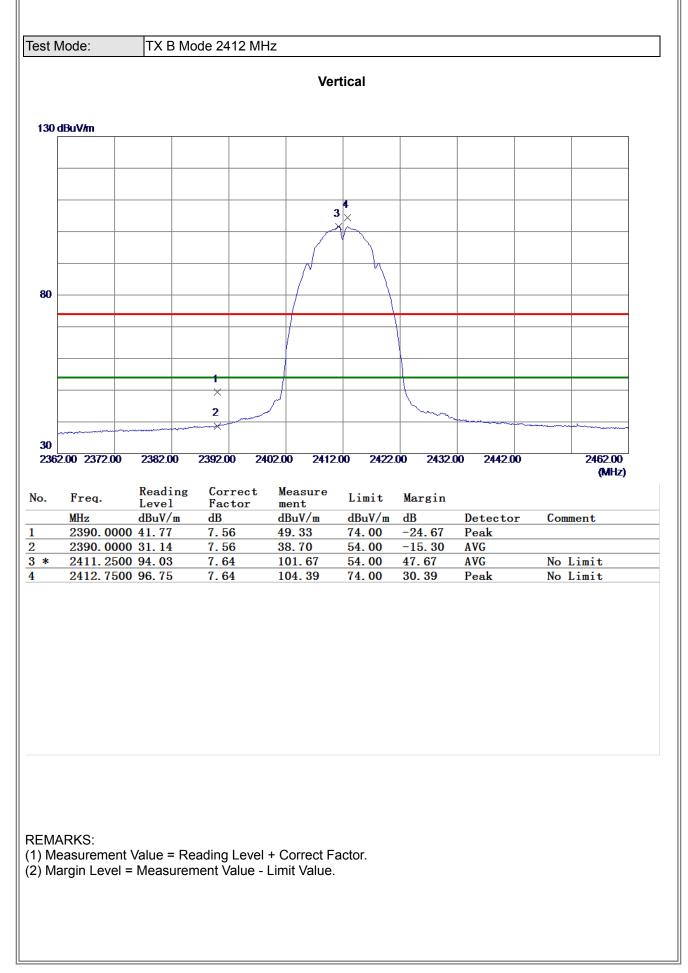




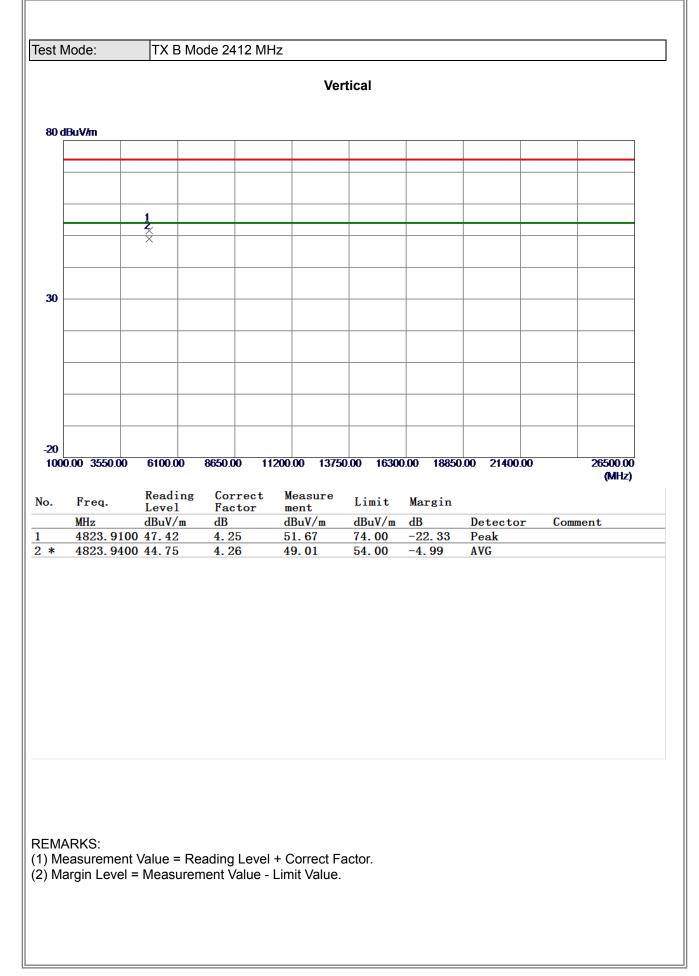


## **APPENDIX D - RADIATED EMISSION- ABOVE 1000 MHZ**

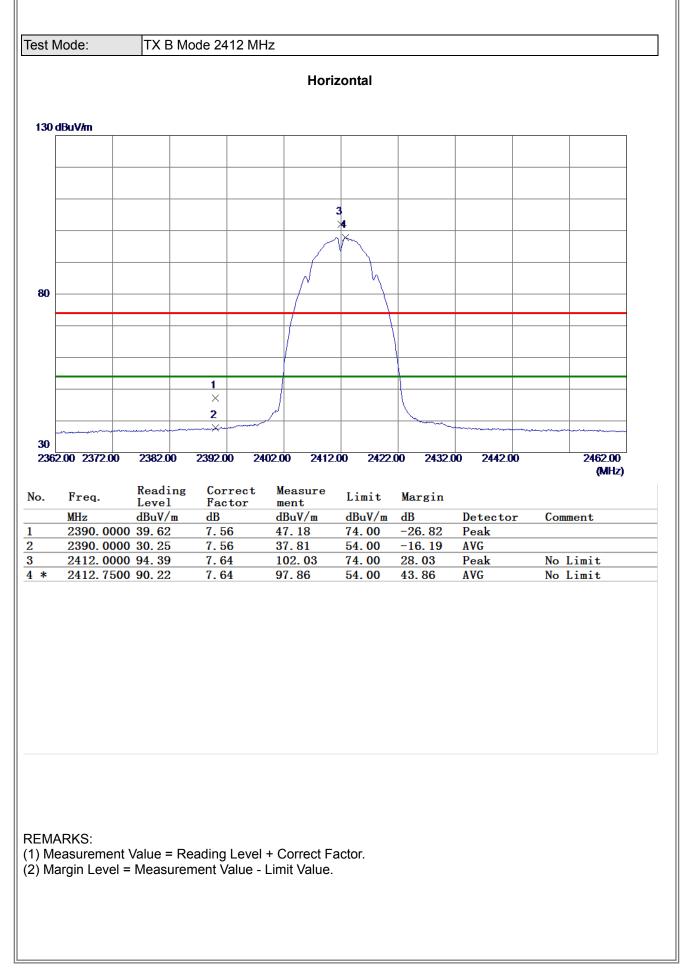




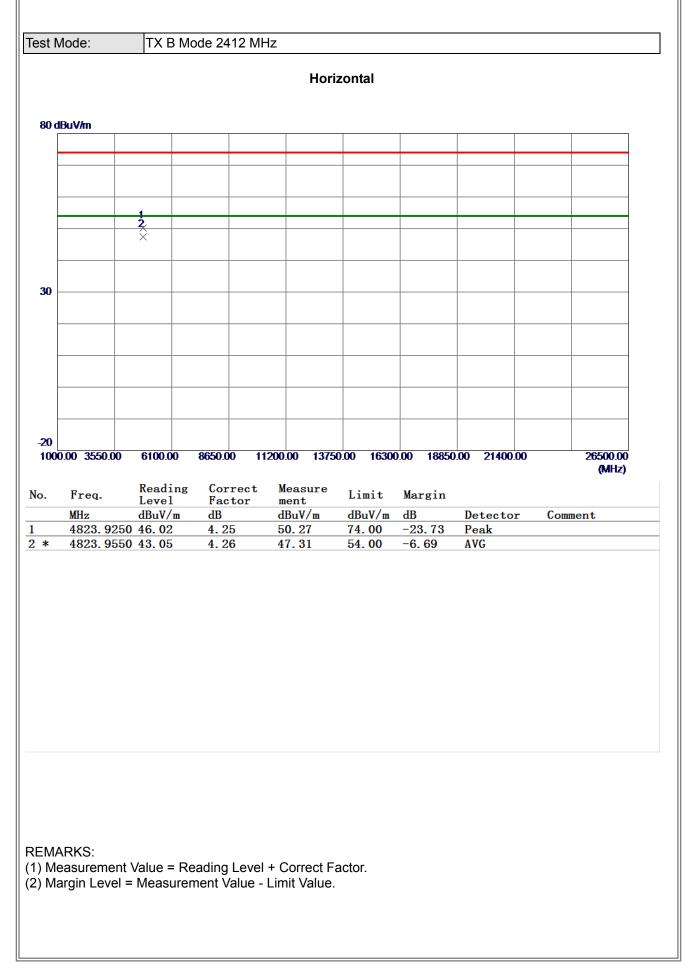




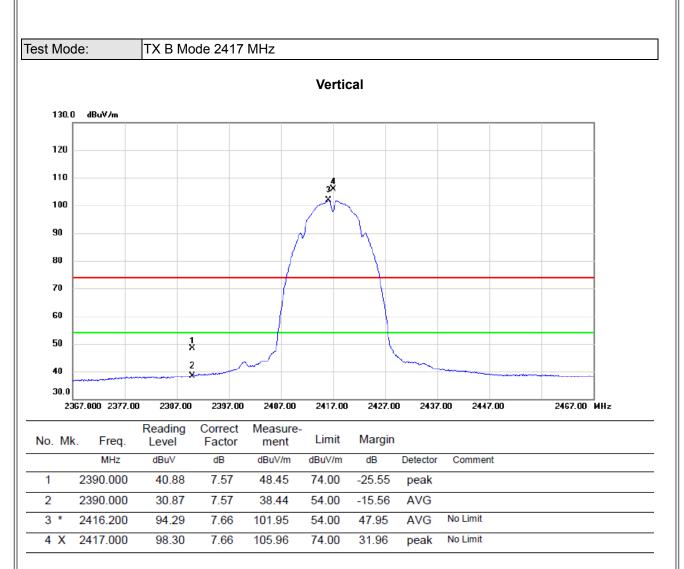












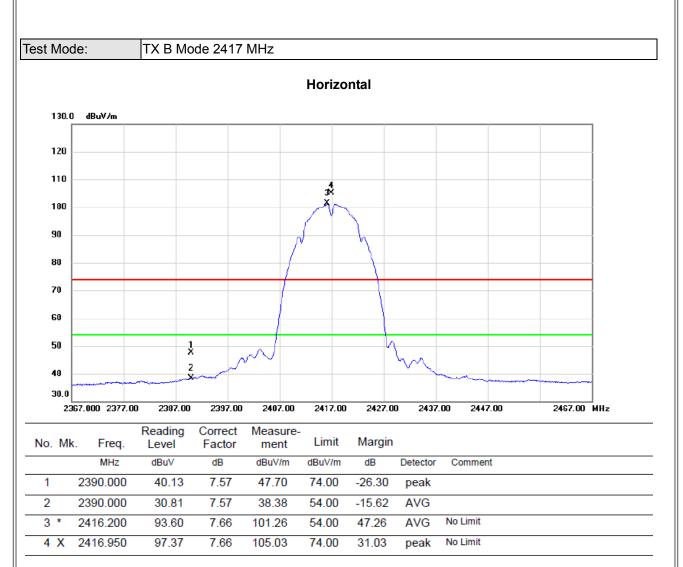
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





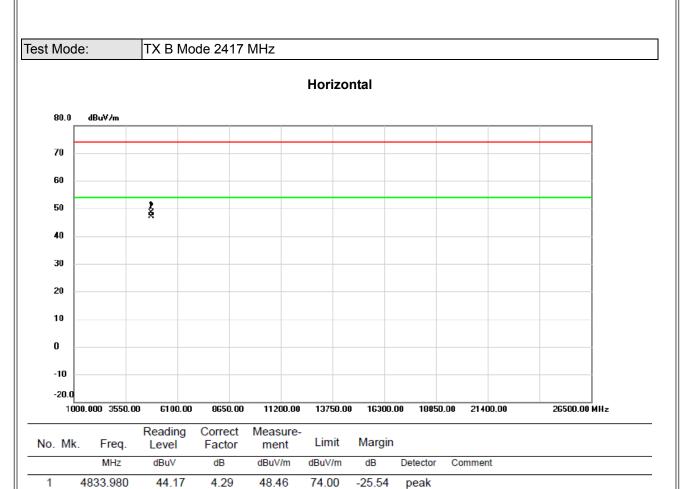
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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





2 \*

4833.980

42.75

4.29

47.04

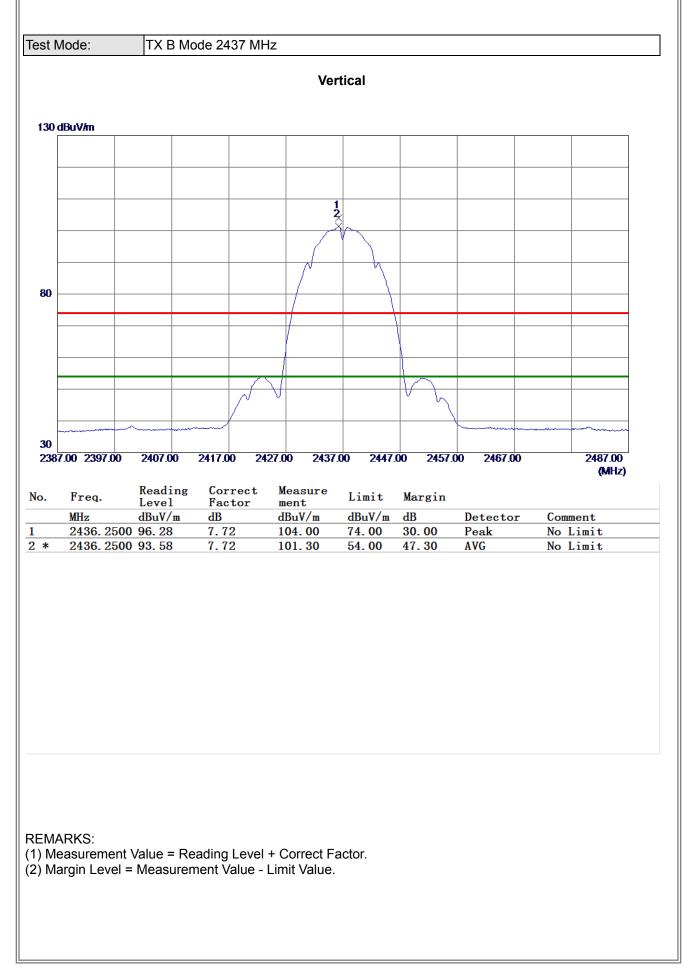
54.00

-6.96

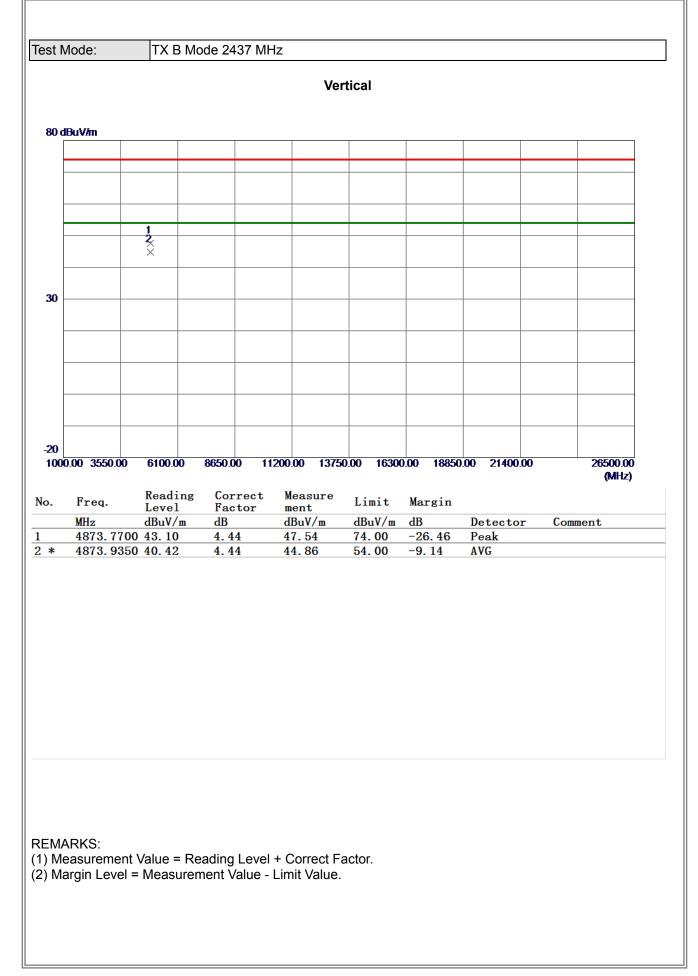
AVG

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

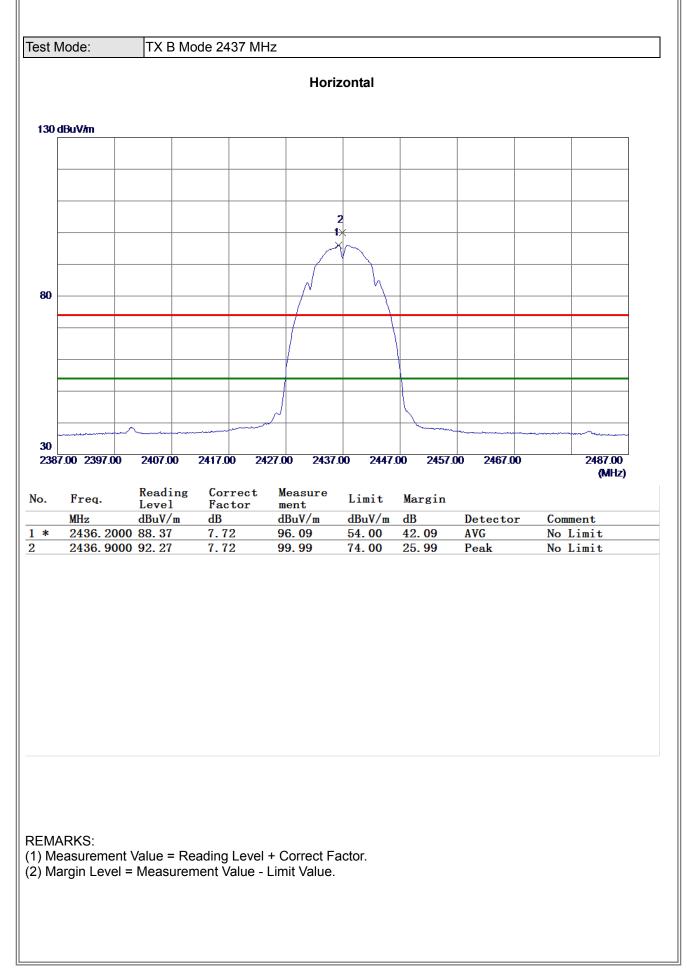




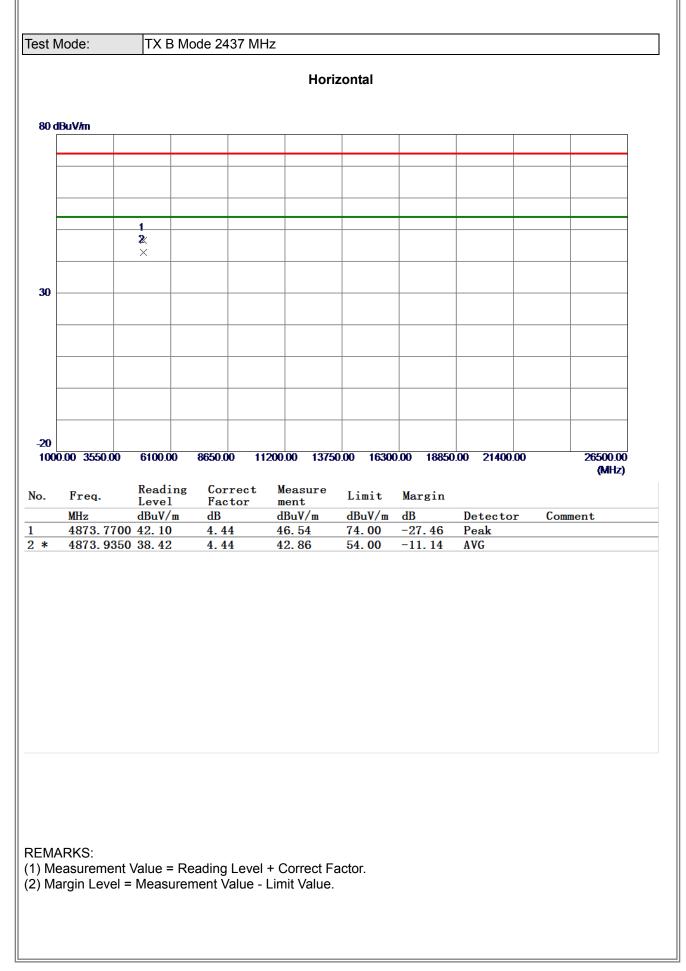




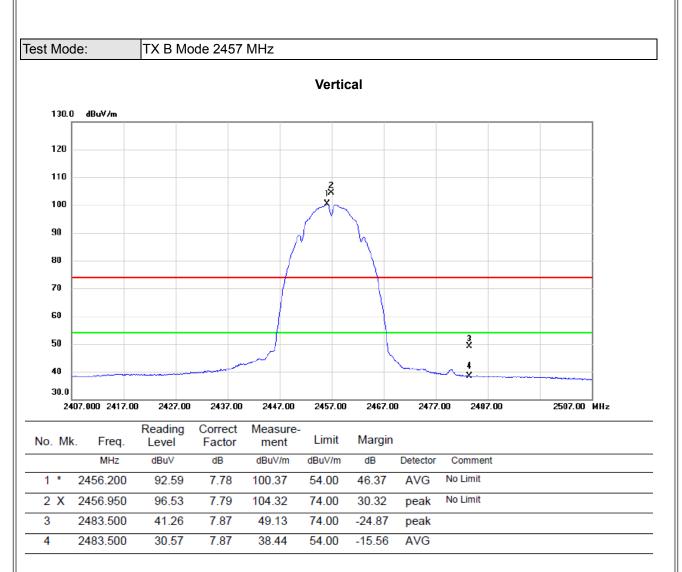






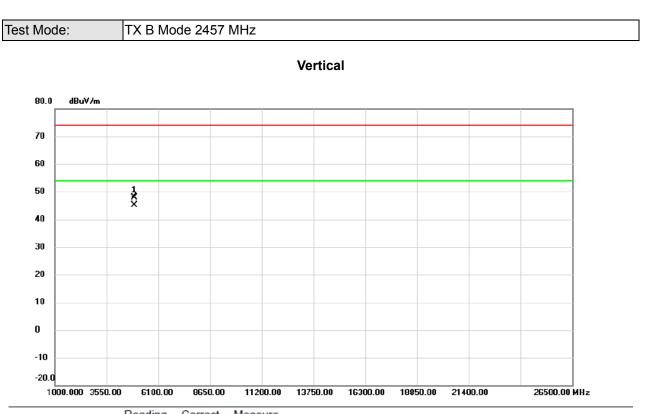






- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

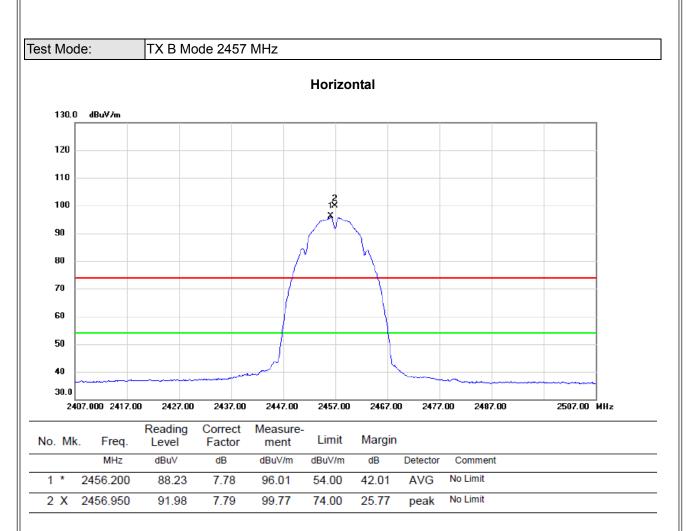




	No.	Mk.	Freq.	Reading Level		Measure- ment		Margin		
-			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
-	1	4	913.700	43.23	4.58	47.81	74.00	-26.19	peak	
_	2	* 4	913.980	40.66	4.58	45.24	54.00	-8.76	AVG	

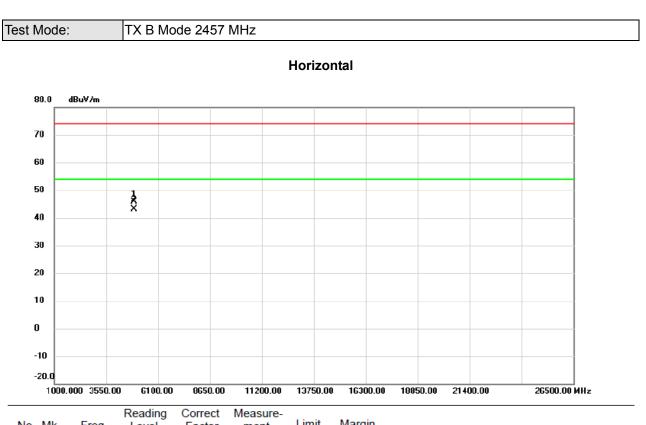
- (1) Measurement Value = Reading Level + Correct Factor.
  (2) Margin Level = Measurement Value Limit Value.





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

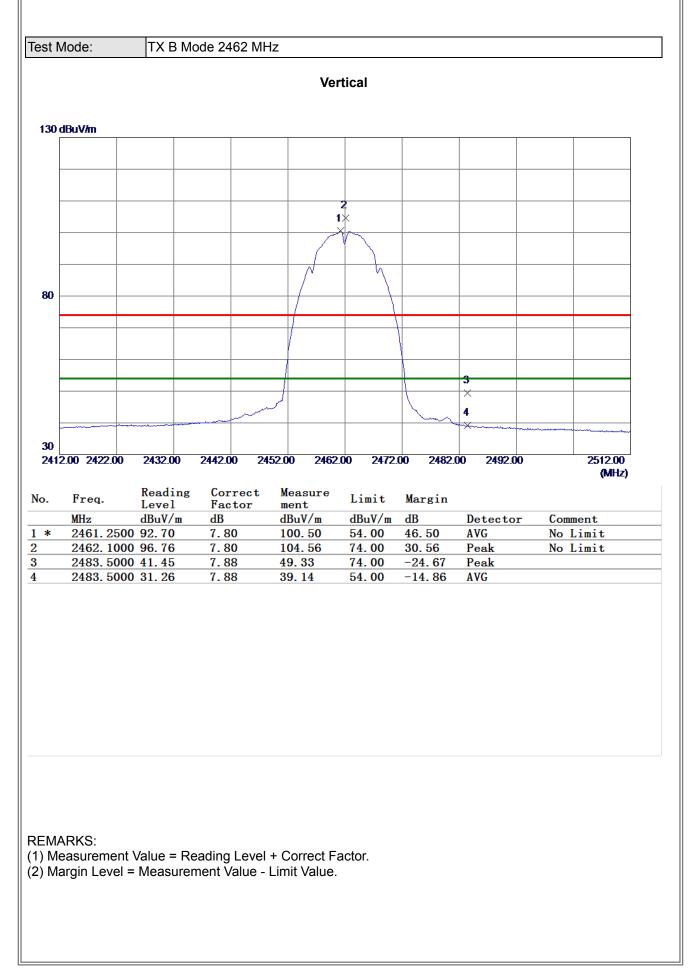




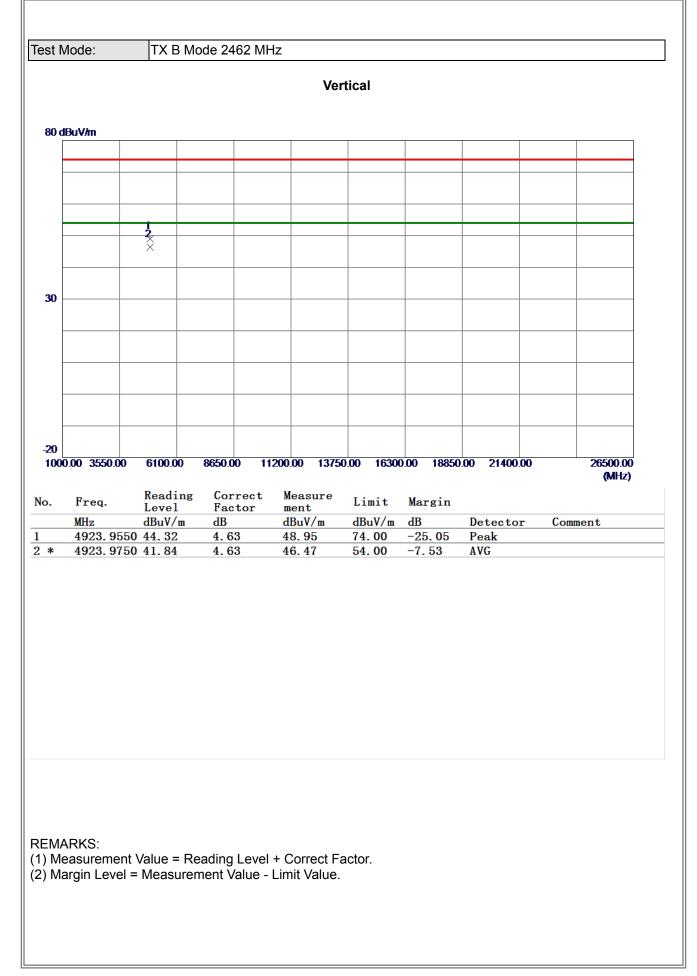
	No. N	۸k.	Freq.	Level	Factor	ment	Limit	Margin		
-			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
	1	49	913.700	41.23	4.58	45.81	74.00	-28.19	peak	
	2 *	49	913.980	38.66	4.58	43.24	54.00	-10.76	AVG	

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

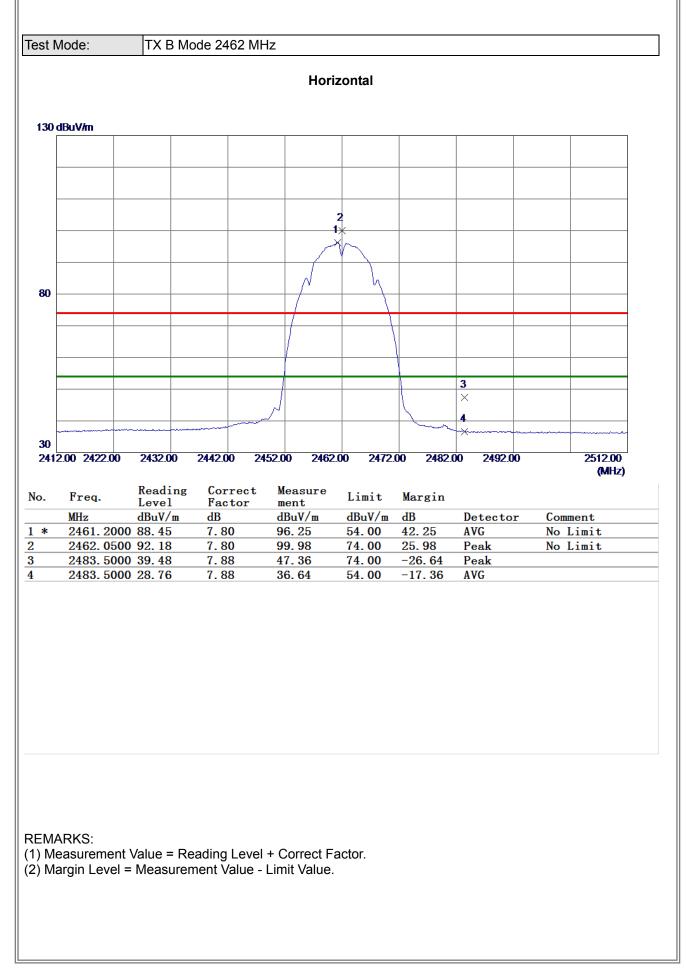




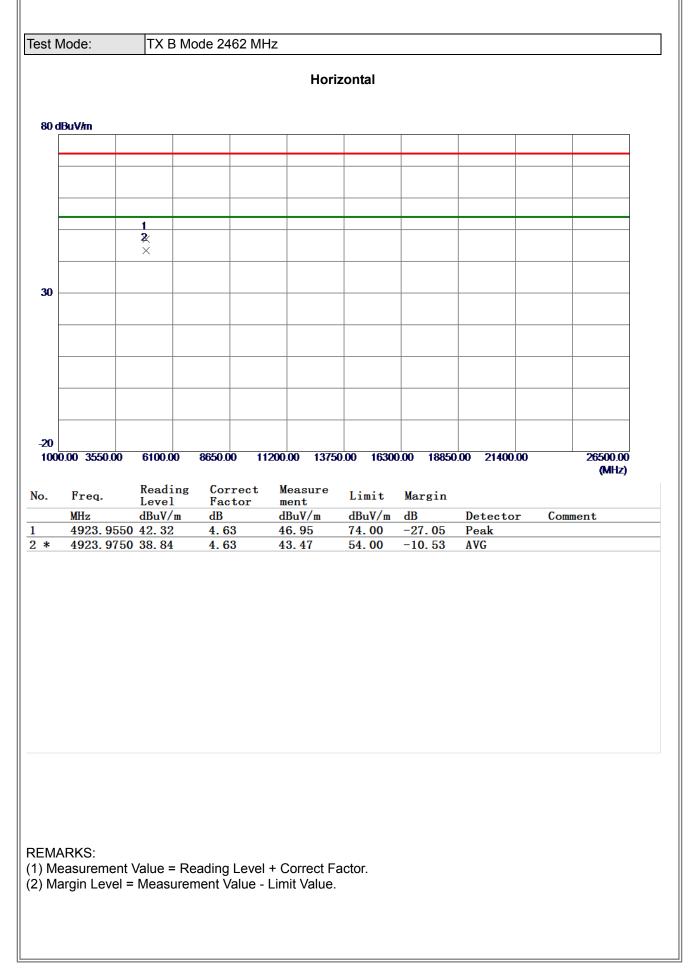




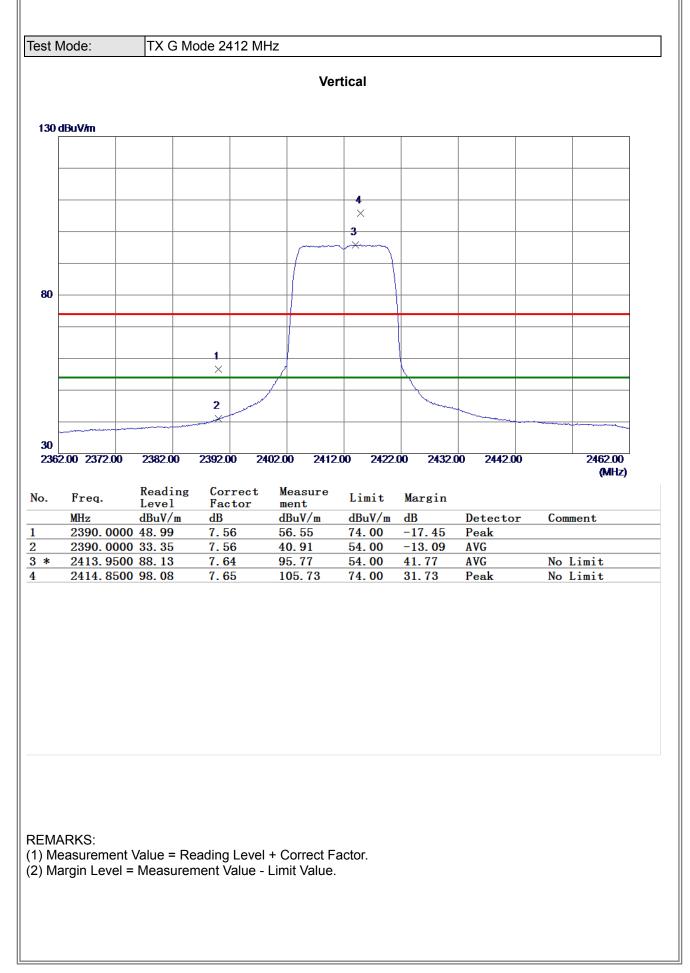




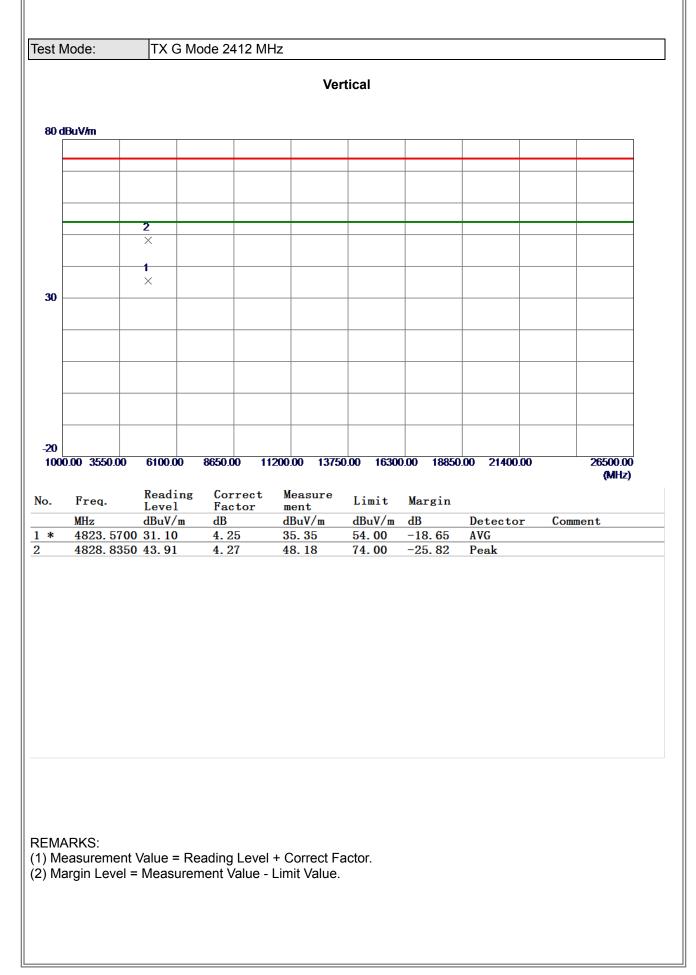




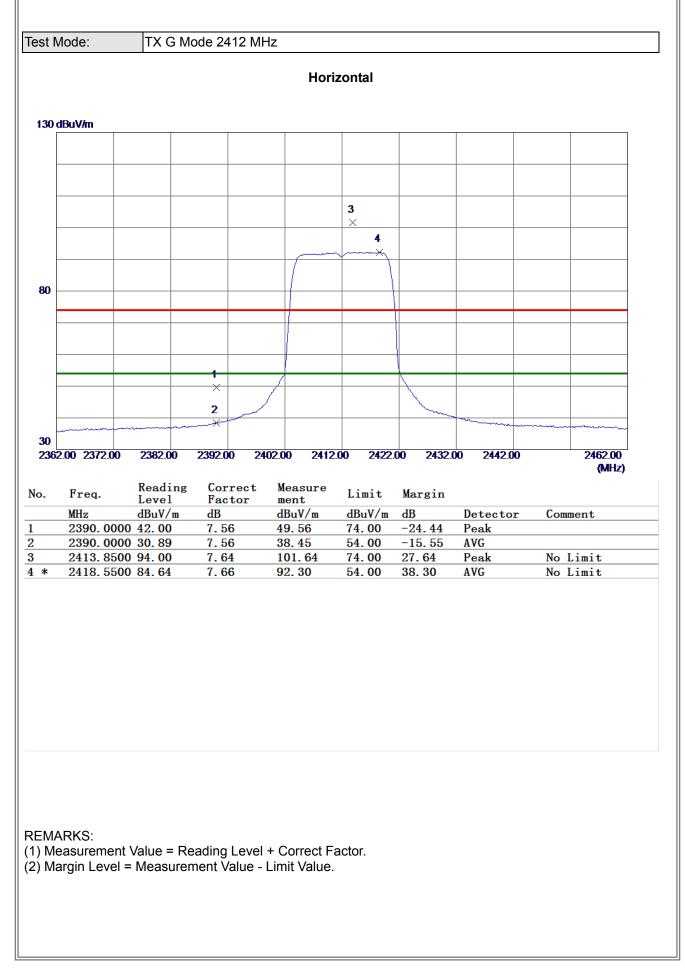




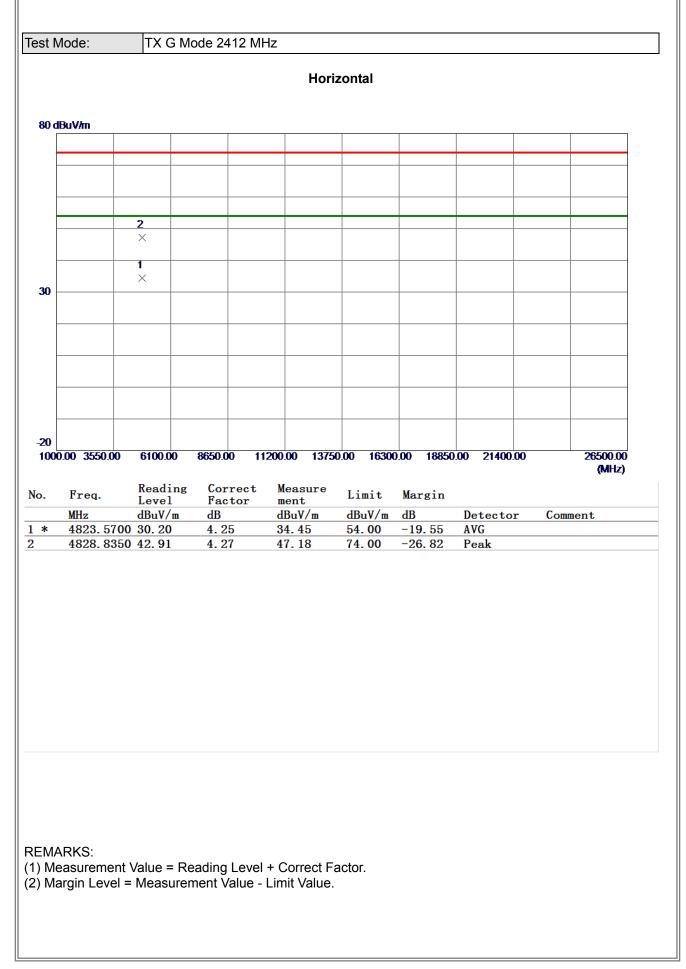




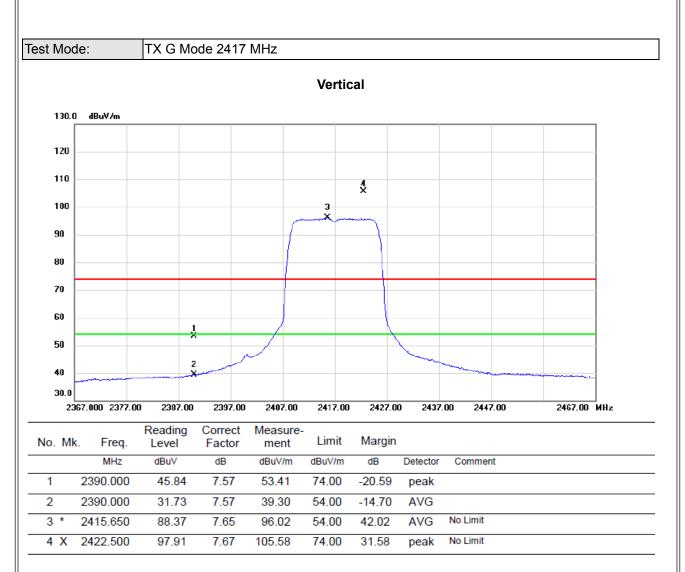






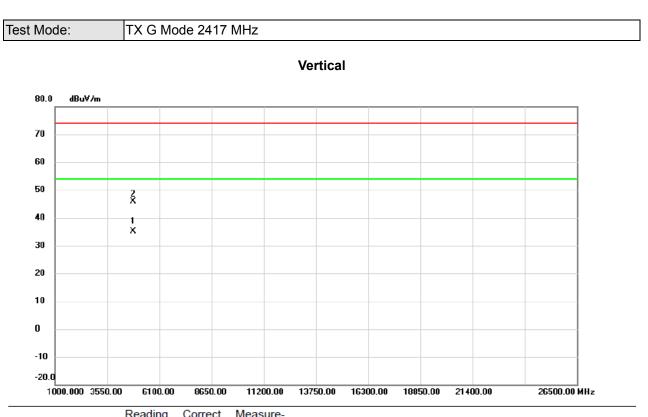






- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

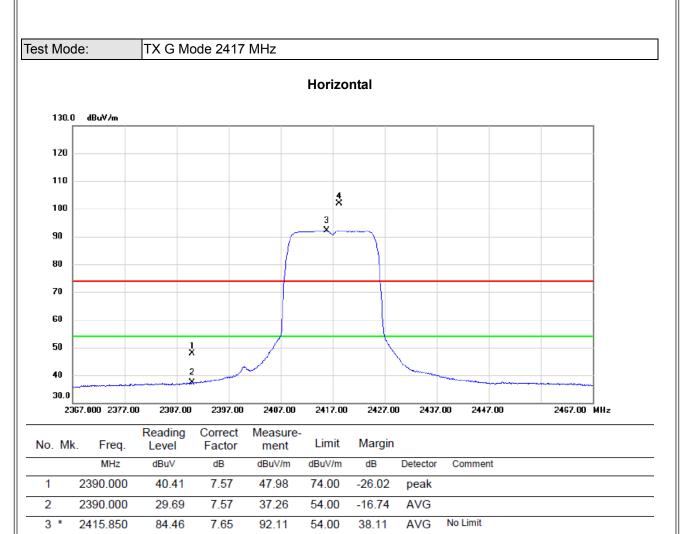




	No. M	k. Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
-	1 *	4829.025	30.88	4.28	35.16	54.00	-18.84	AVG	
	2	4834.955	41.67	4.30	45.97	74.00	-28.03	peak	

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





peak

No Limit

27.88

**REMARKS**:

4 X

2418.250

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

94.22

7.66

101.88

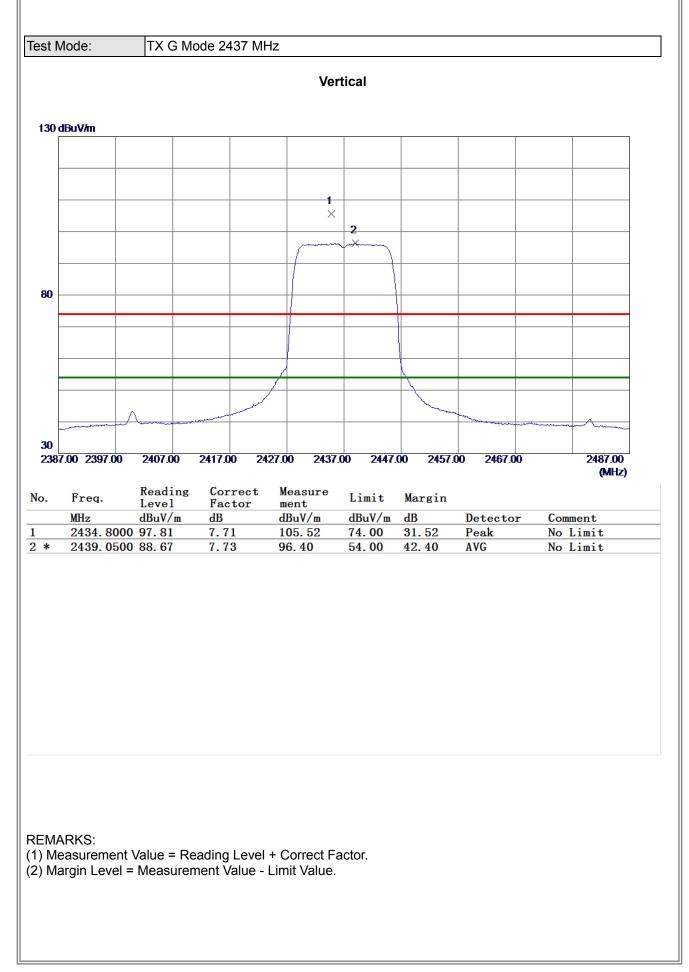
74.00



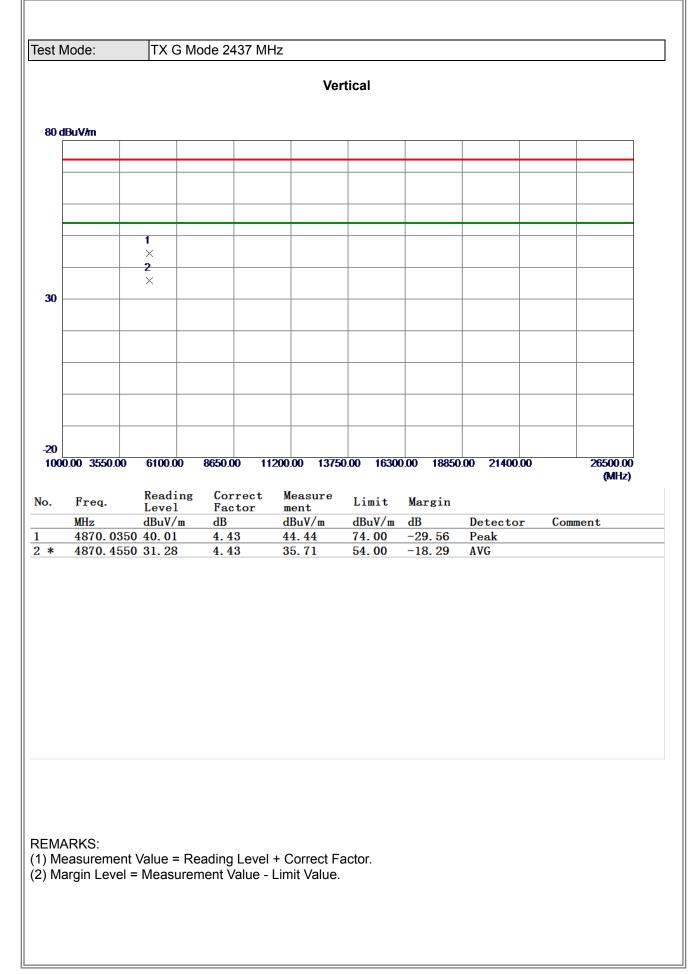


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- (2) Margin Level = Measurement Value Limit Value.

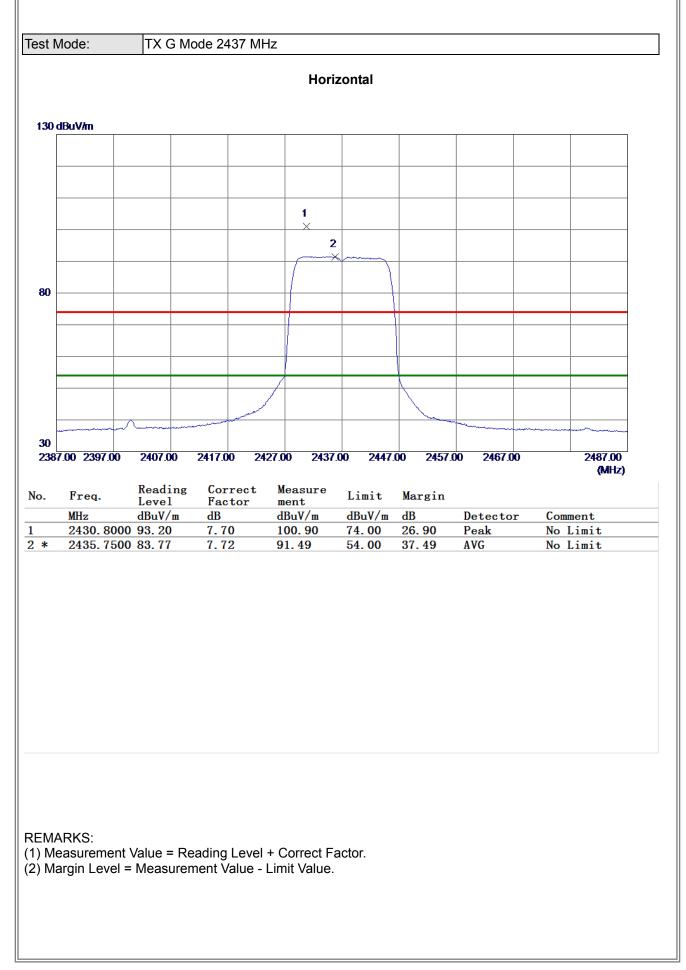




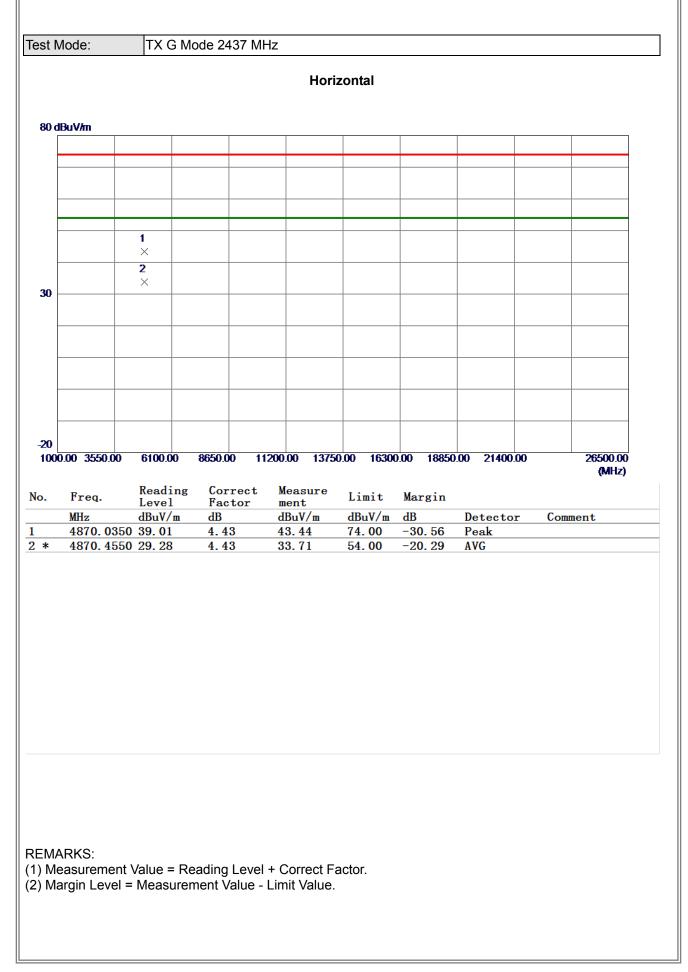




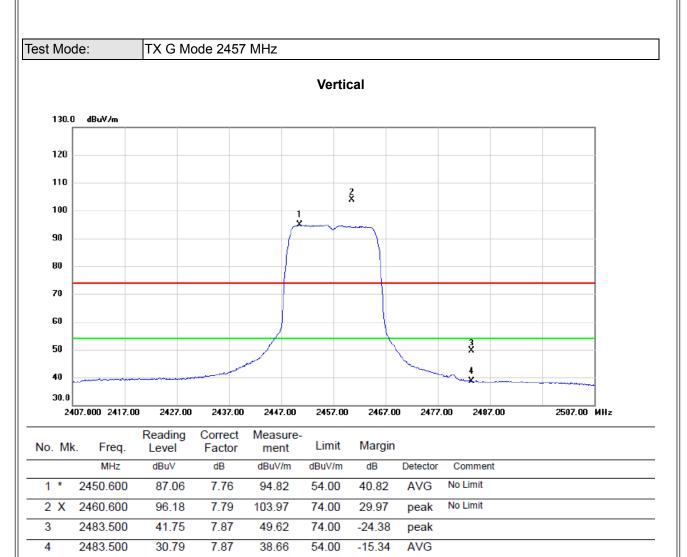






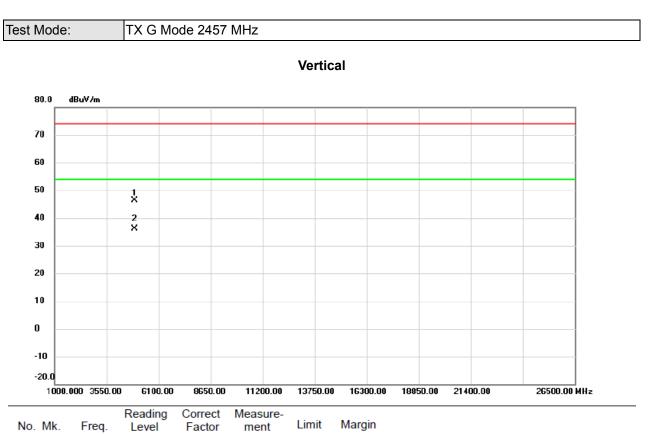






- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

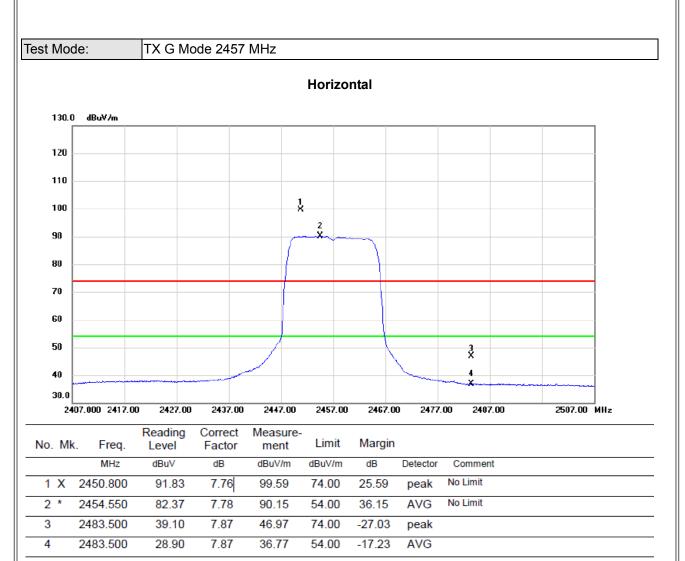




No.	Mk.	Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	49	910.480	41.80	4.58	46.38	74.00	-27.62	peak	
2 '	* 49	918.295	31.49	4.61	36.10	54.00	-17.90	AVG	

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





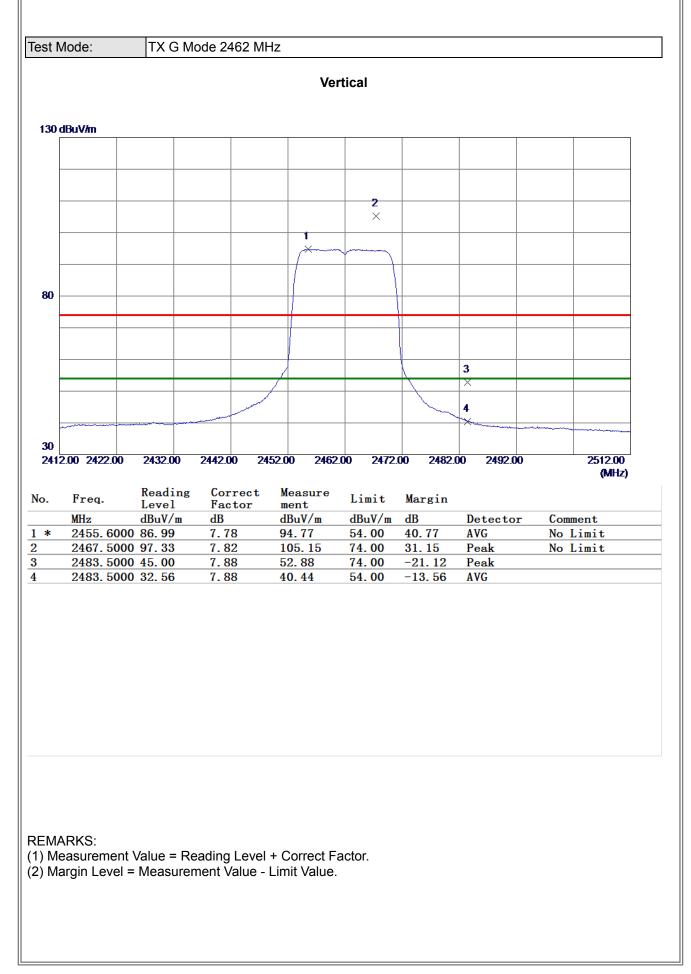
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- (2) Margin Level = Measurement Value Limit Value.



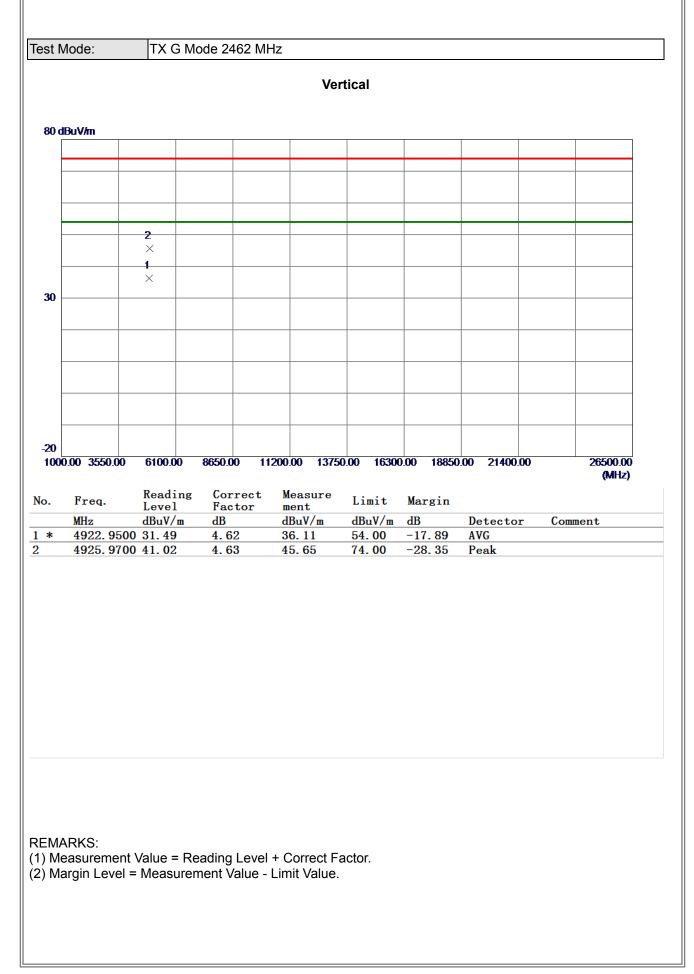


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

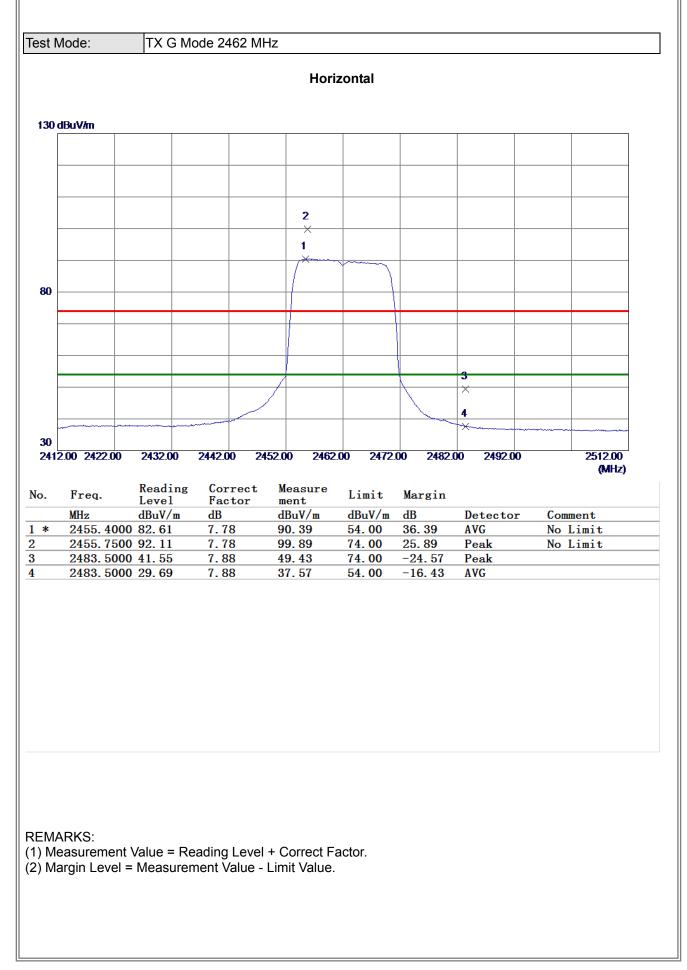




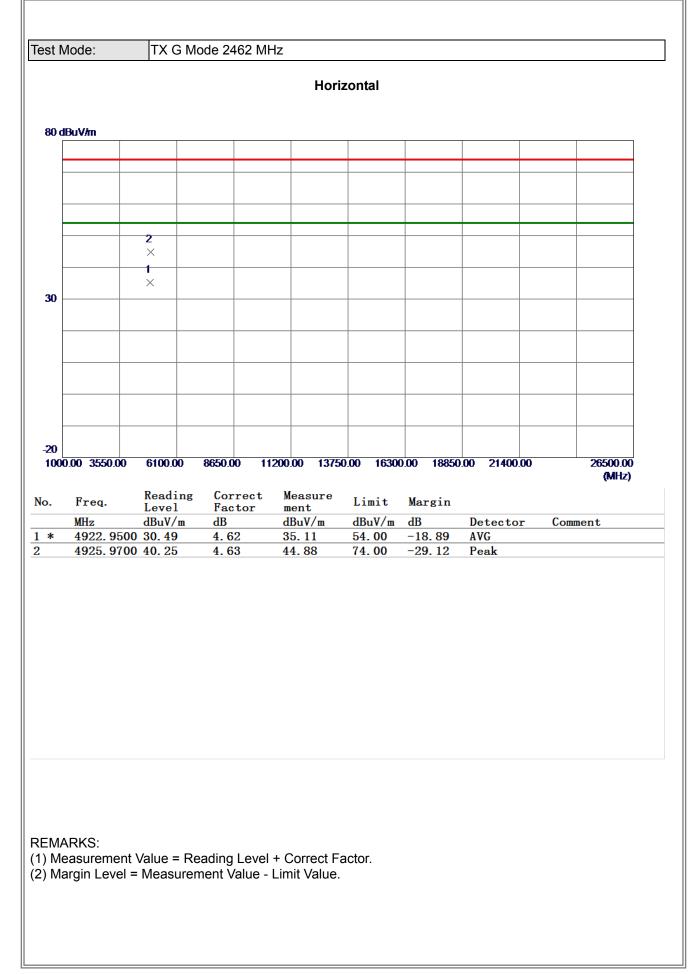




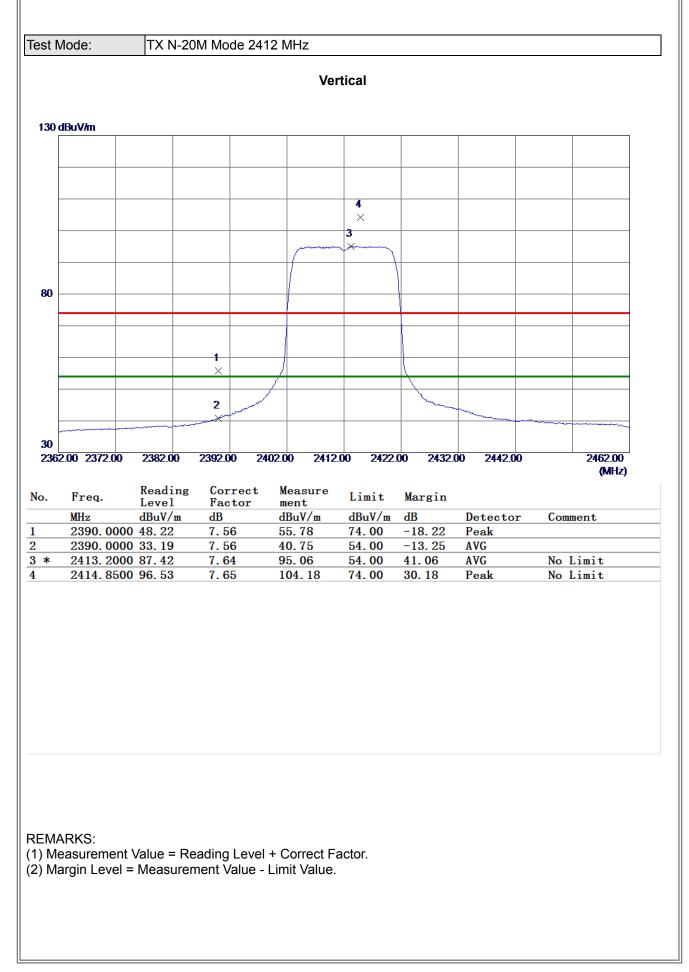




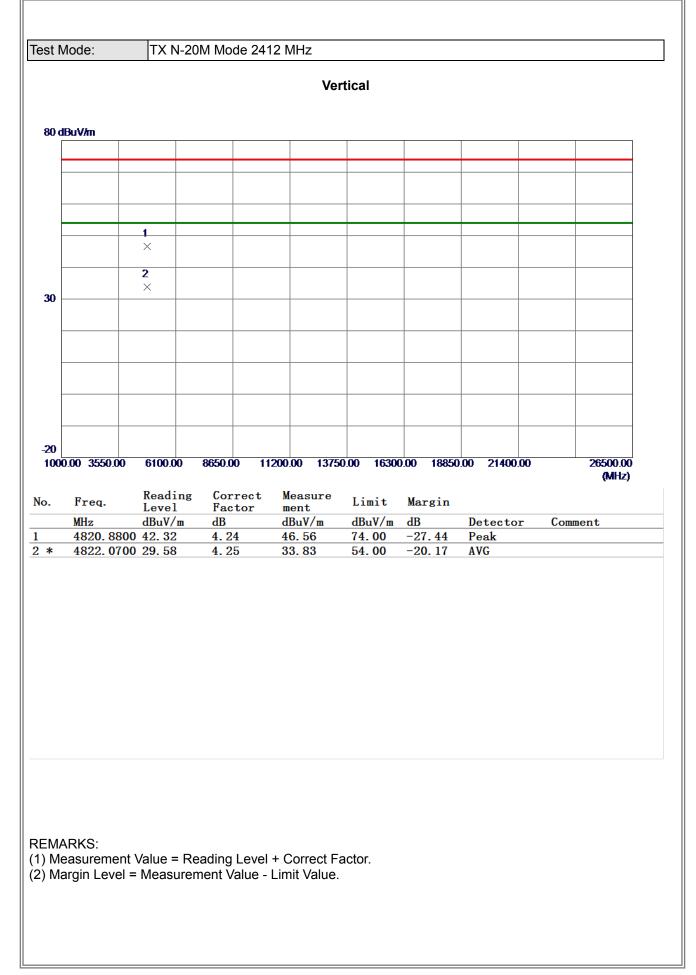




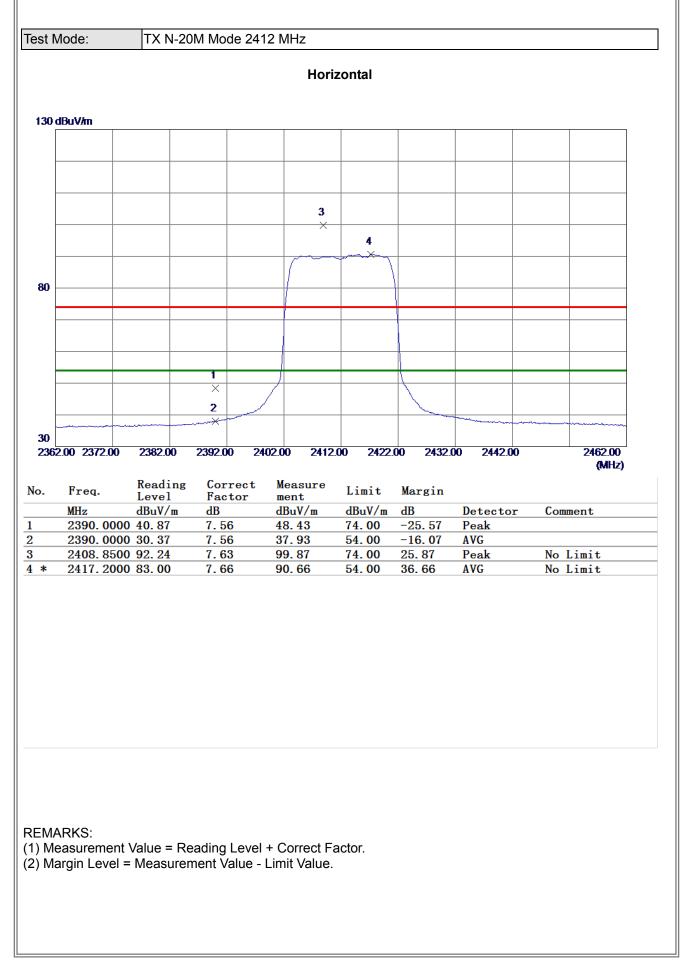




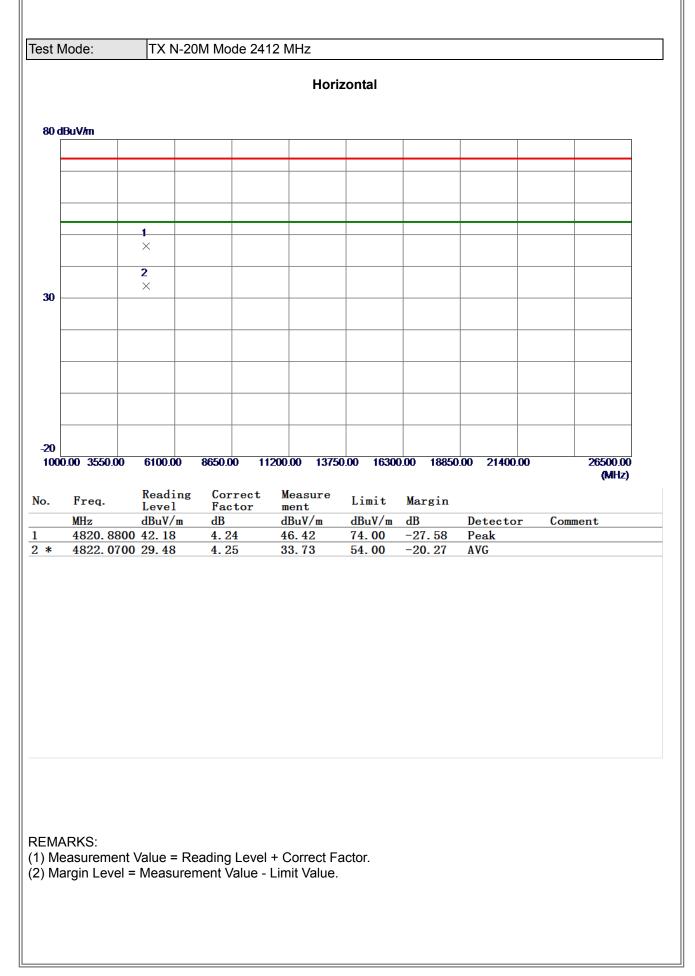




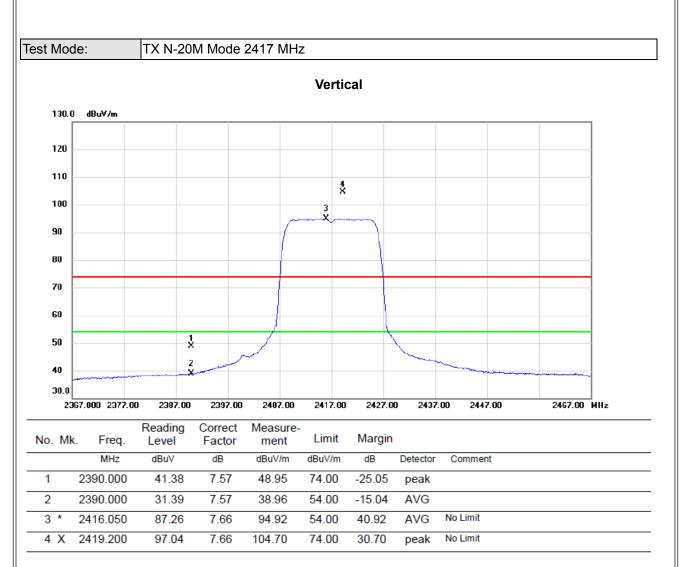






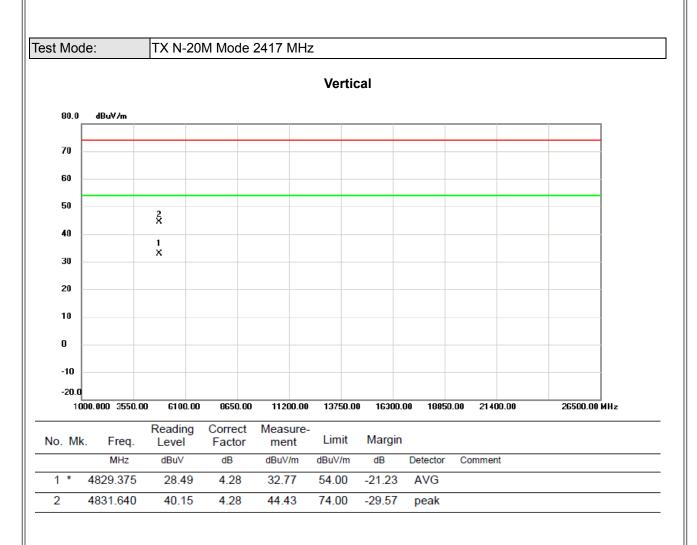






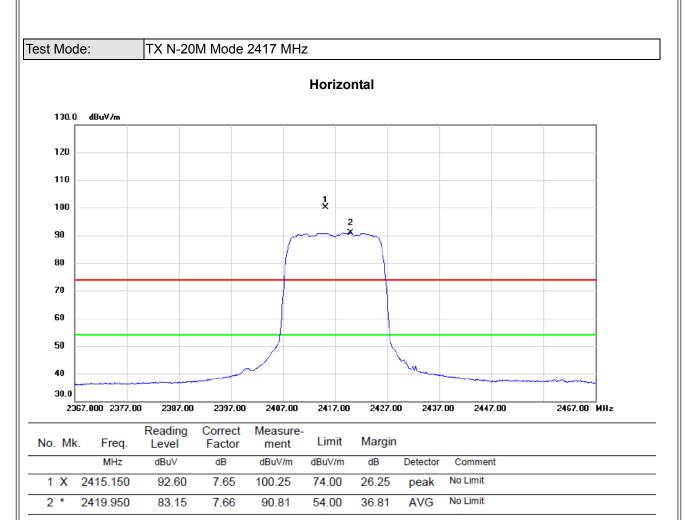
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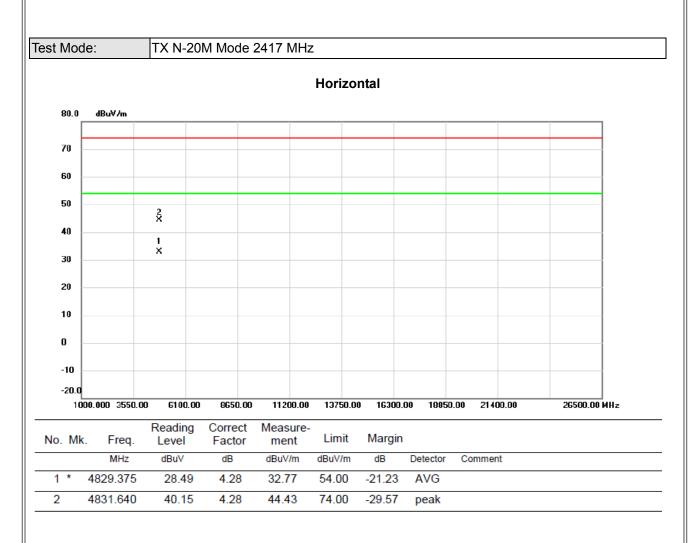
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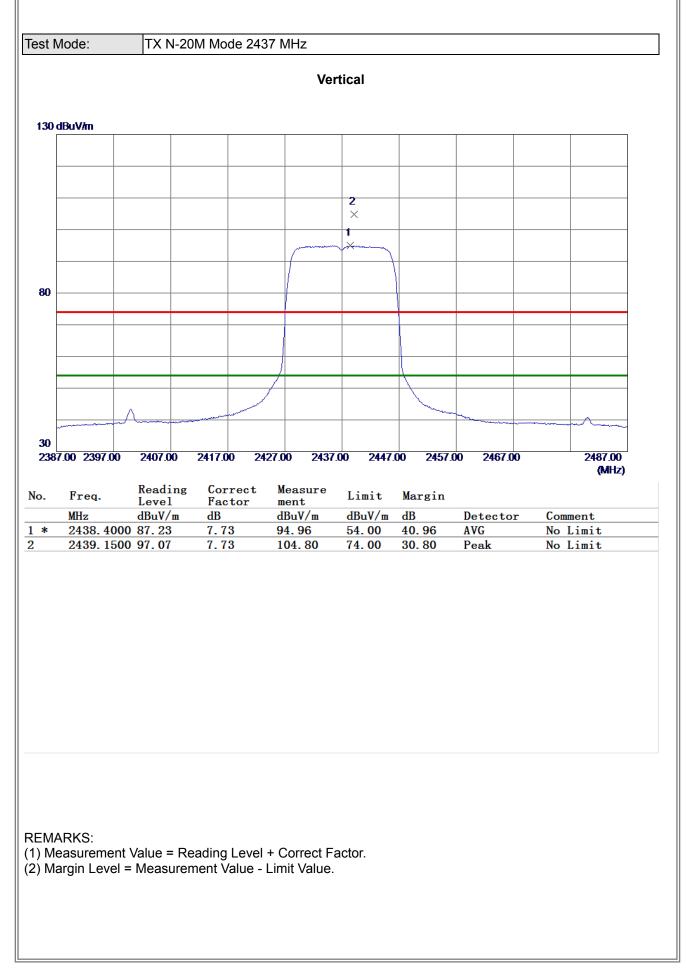
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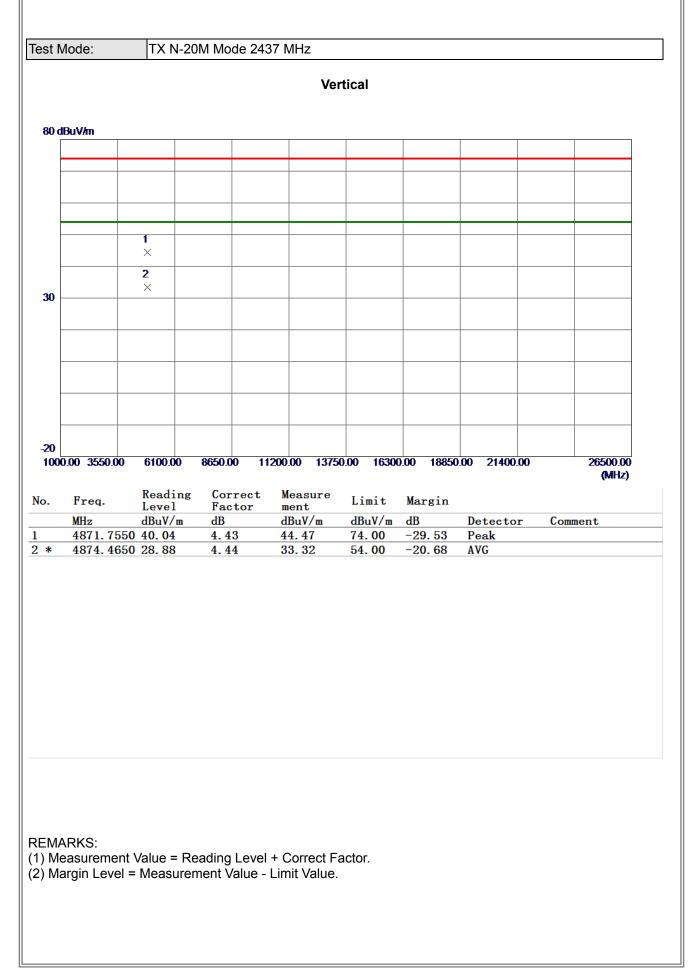


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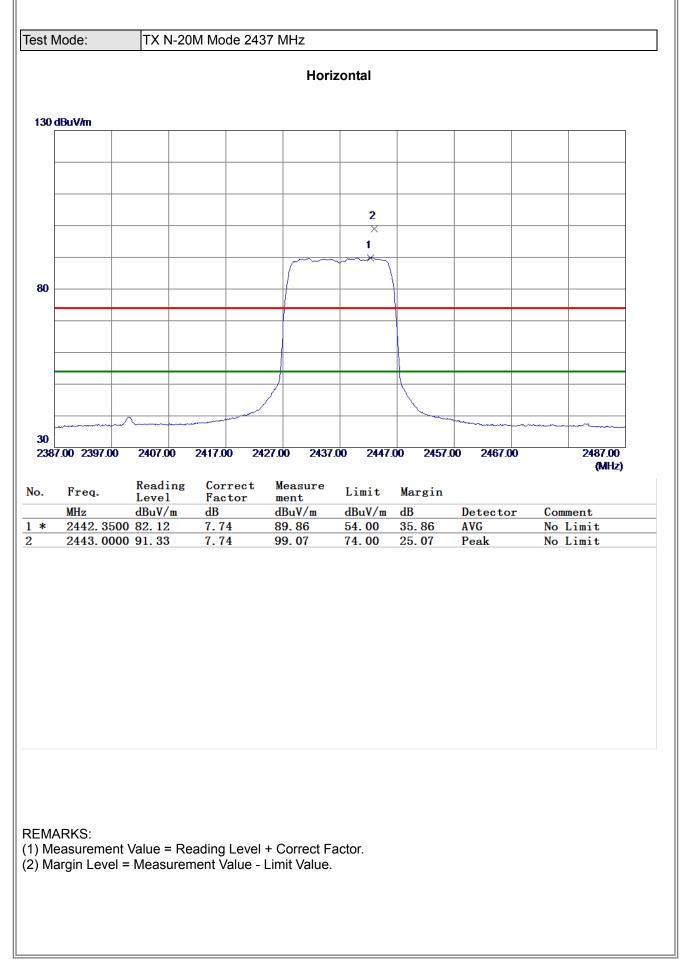




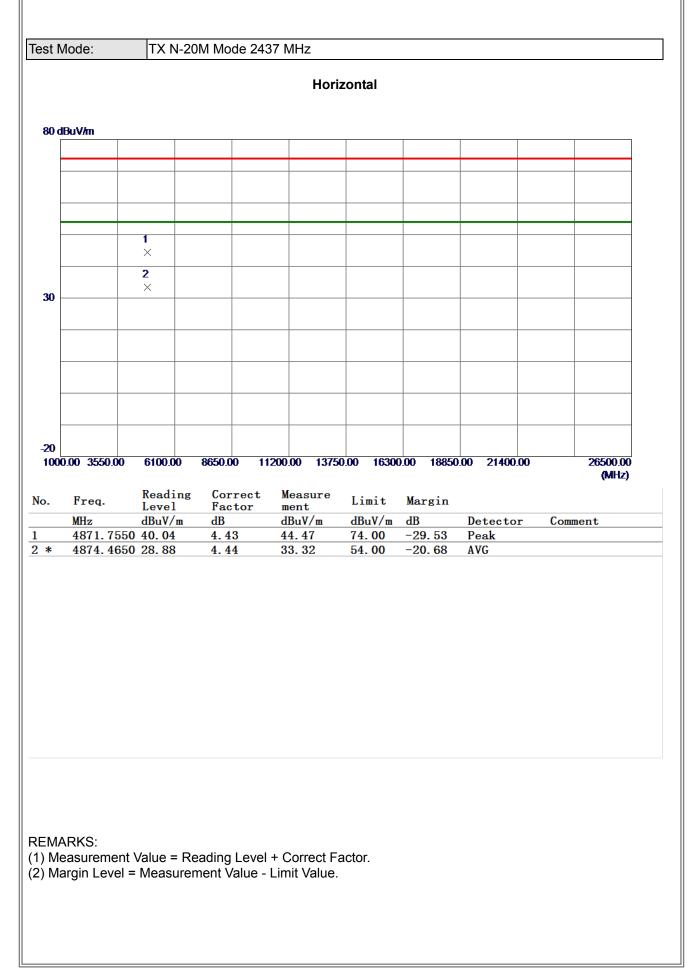




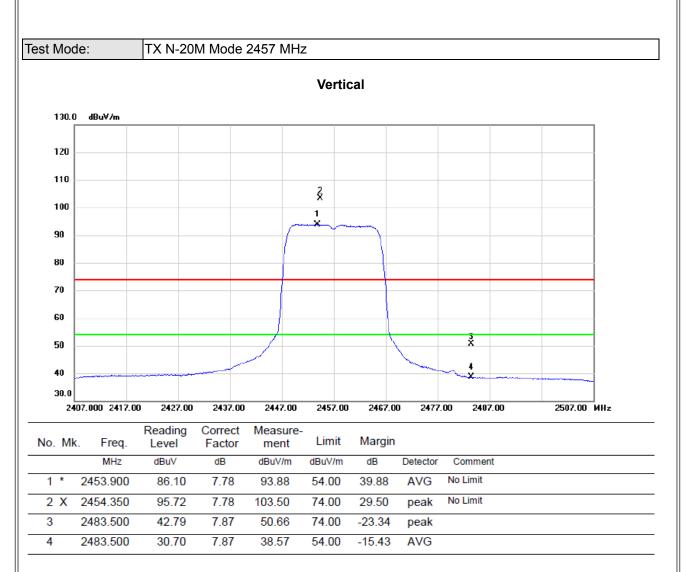






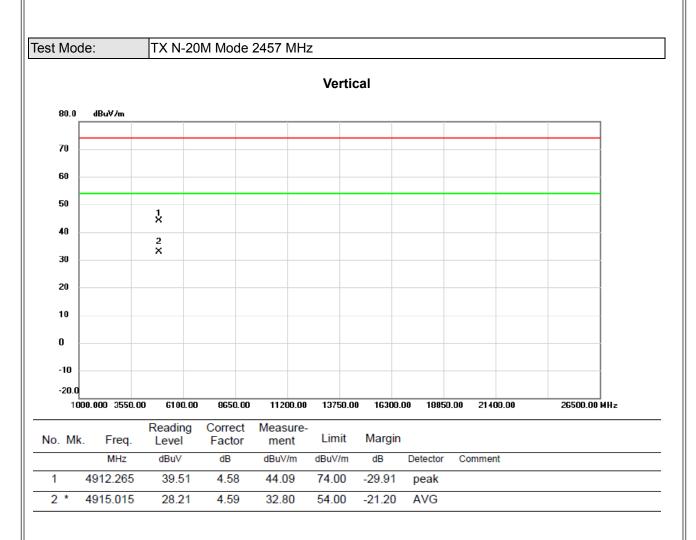






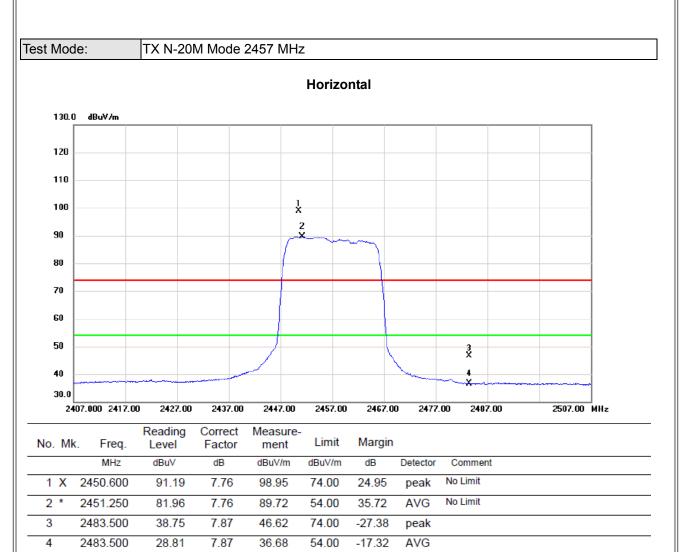
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- (2) Margin Level = Measurement Value Limit Value.





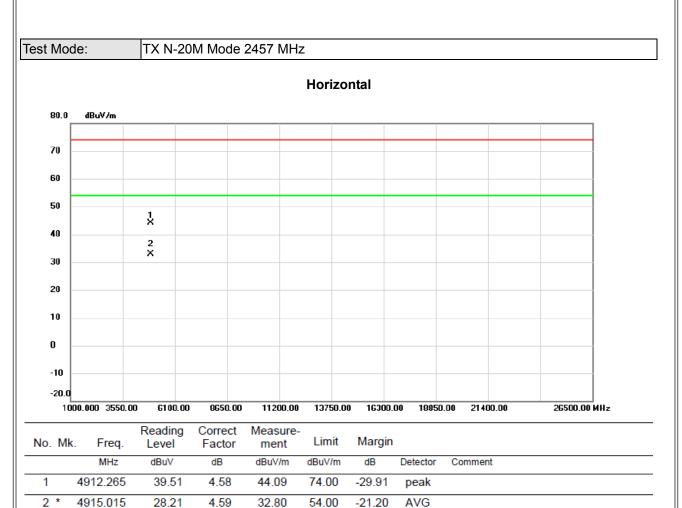
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.





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





54.00

-21.20

AVG

**REMARKS**:

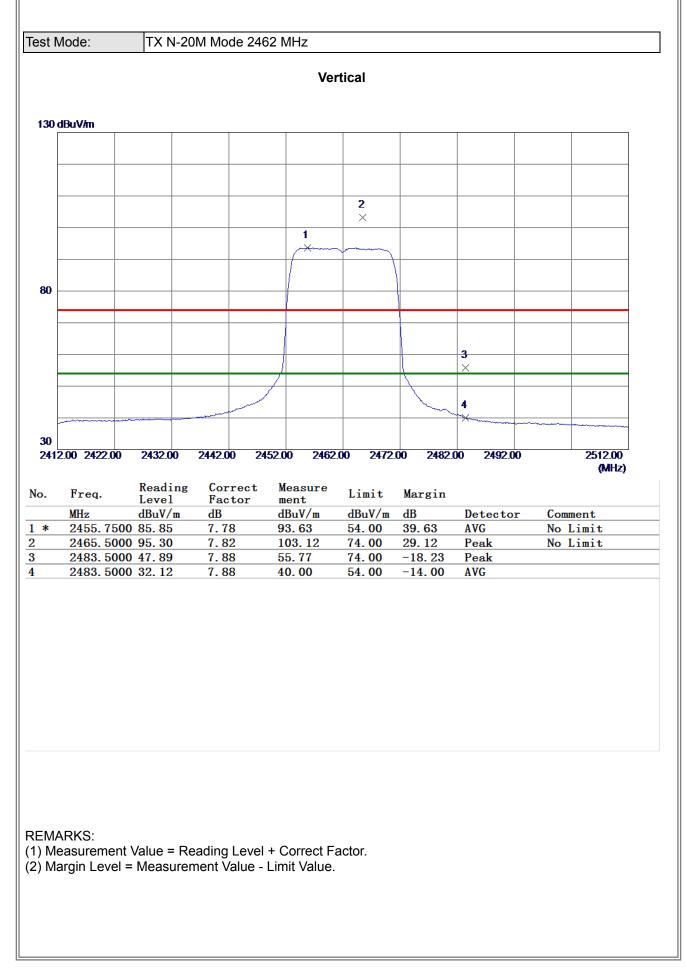
2 \*

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

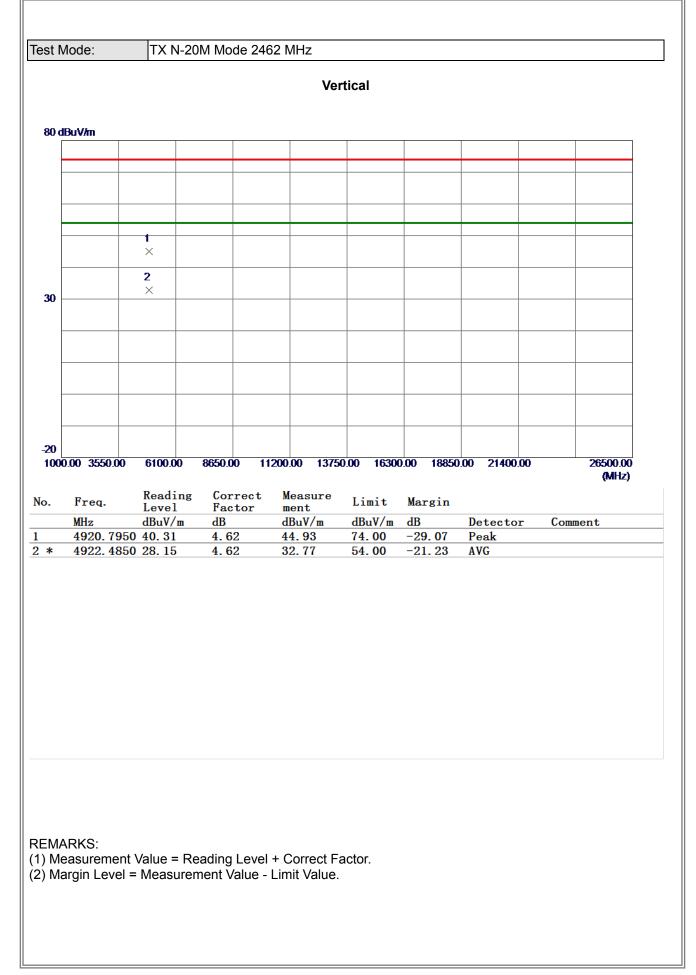
28.21

4.59

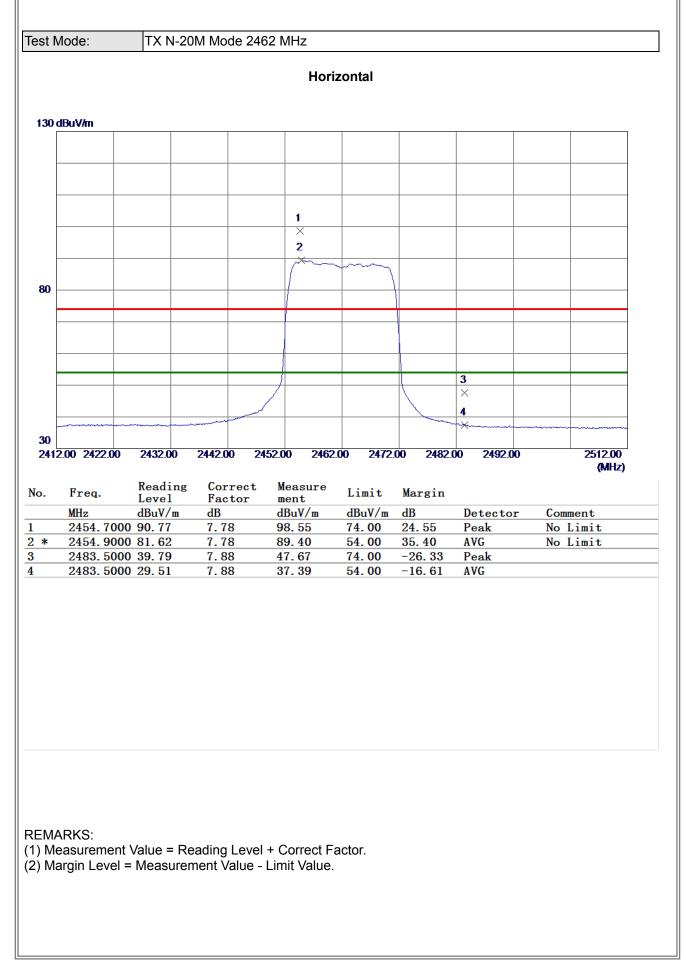




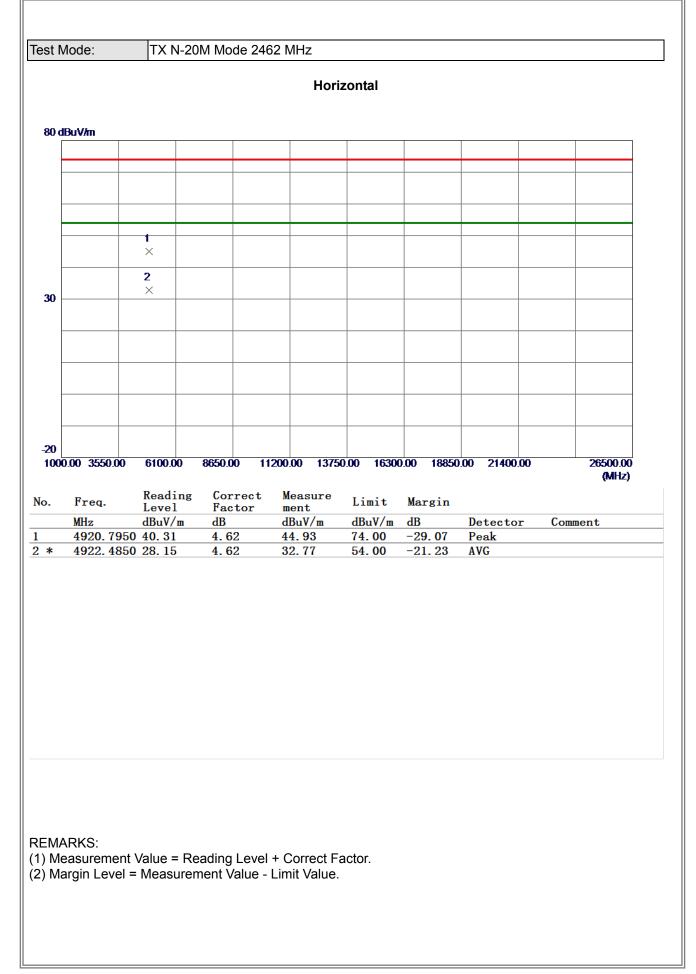




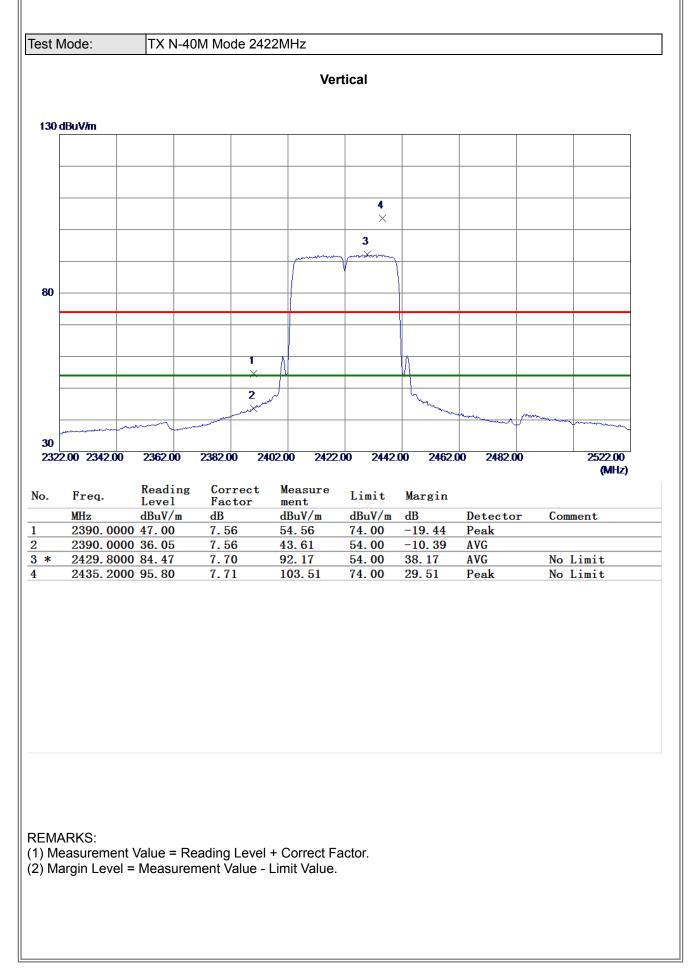




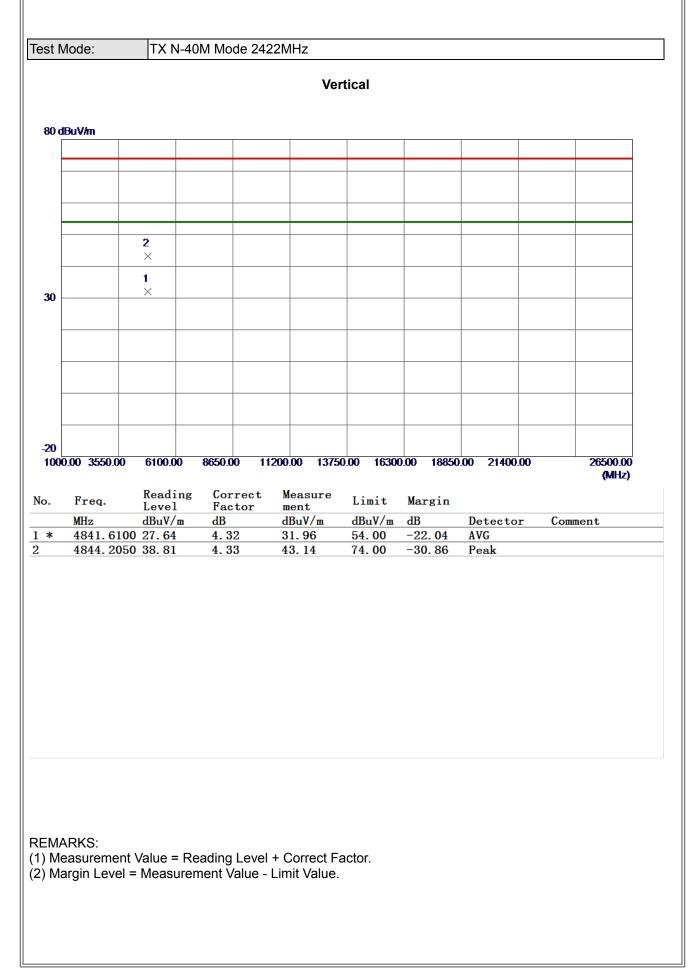




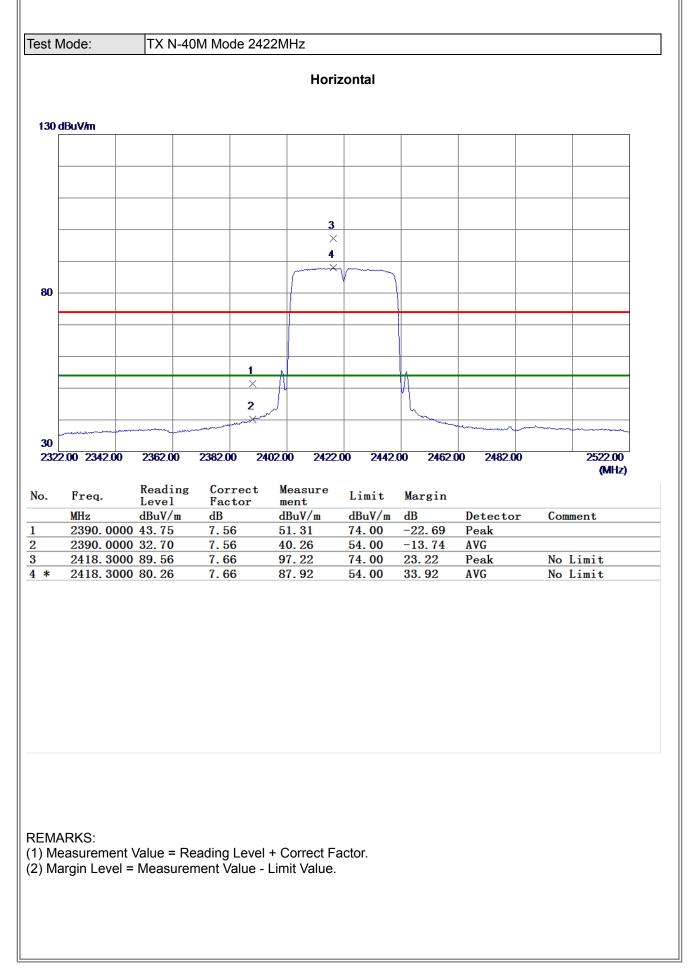




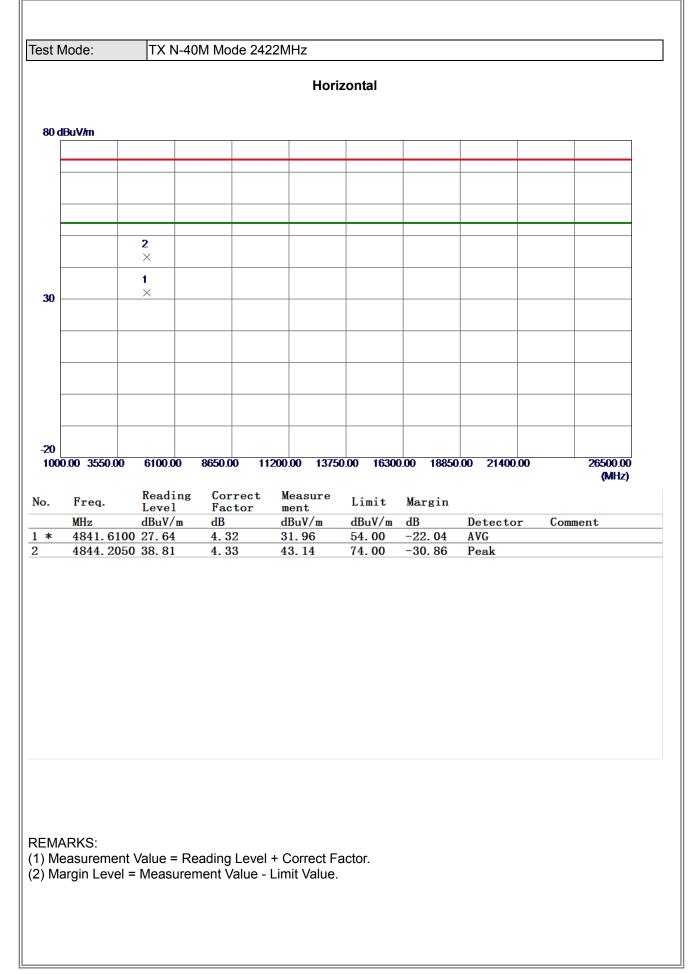




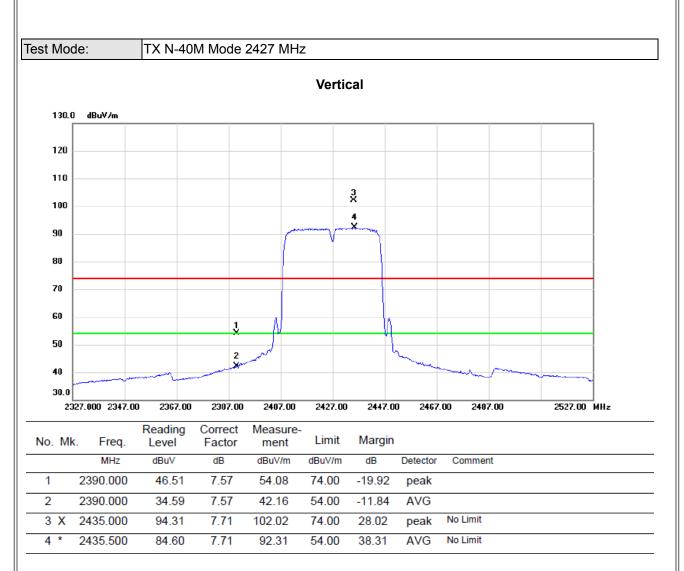






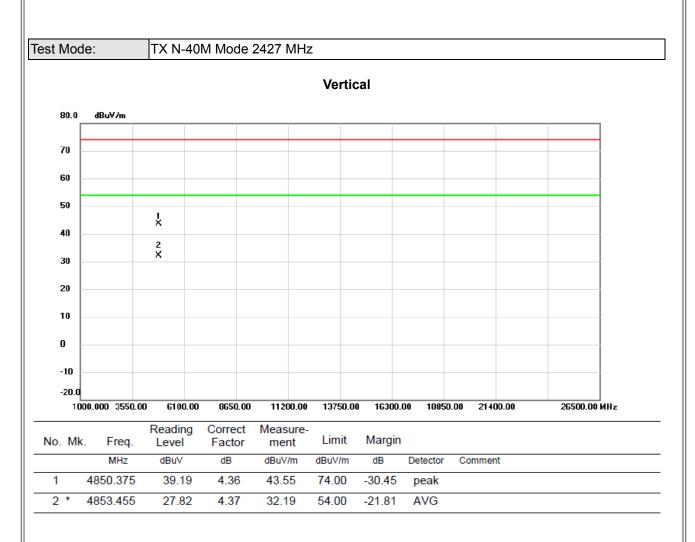






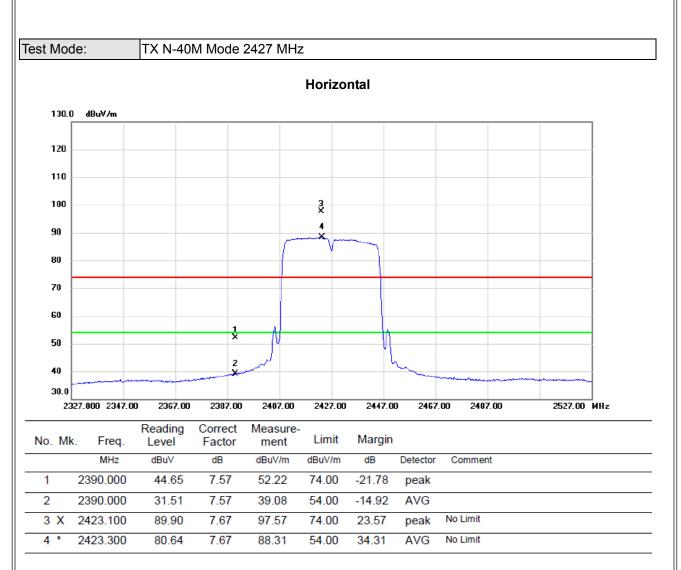
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





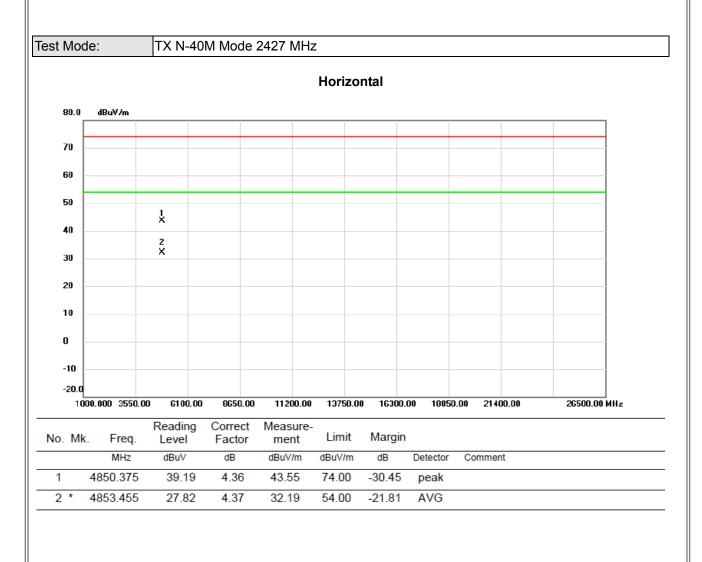
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





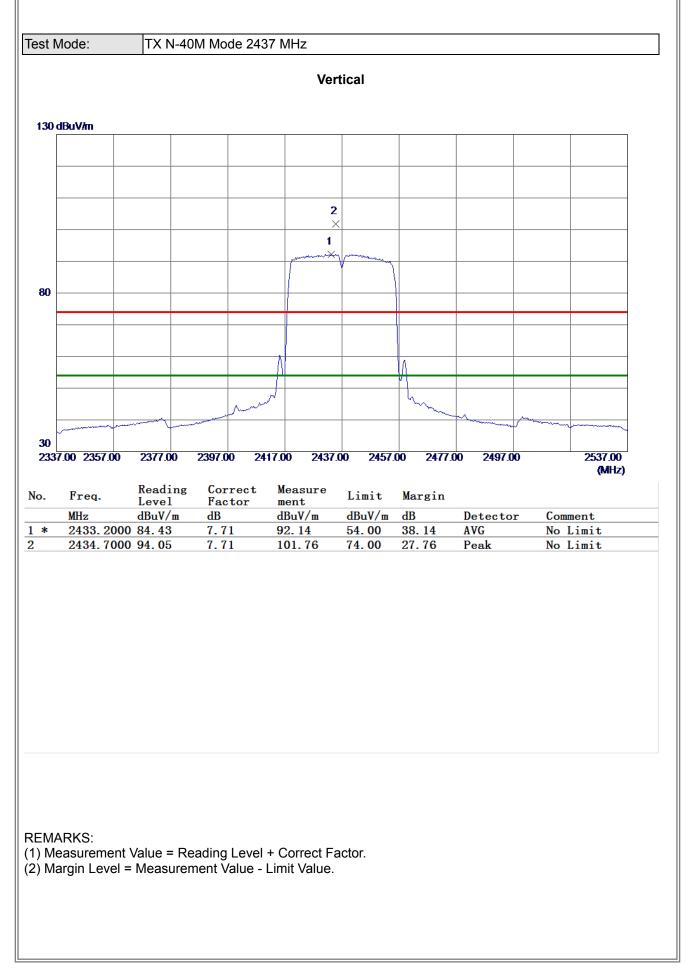
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



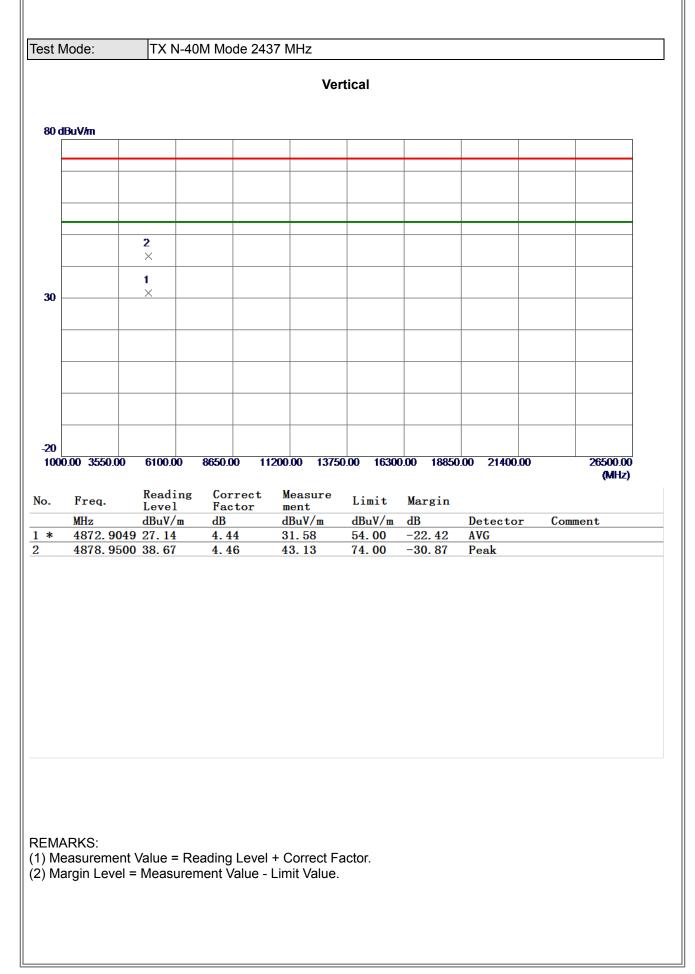


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

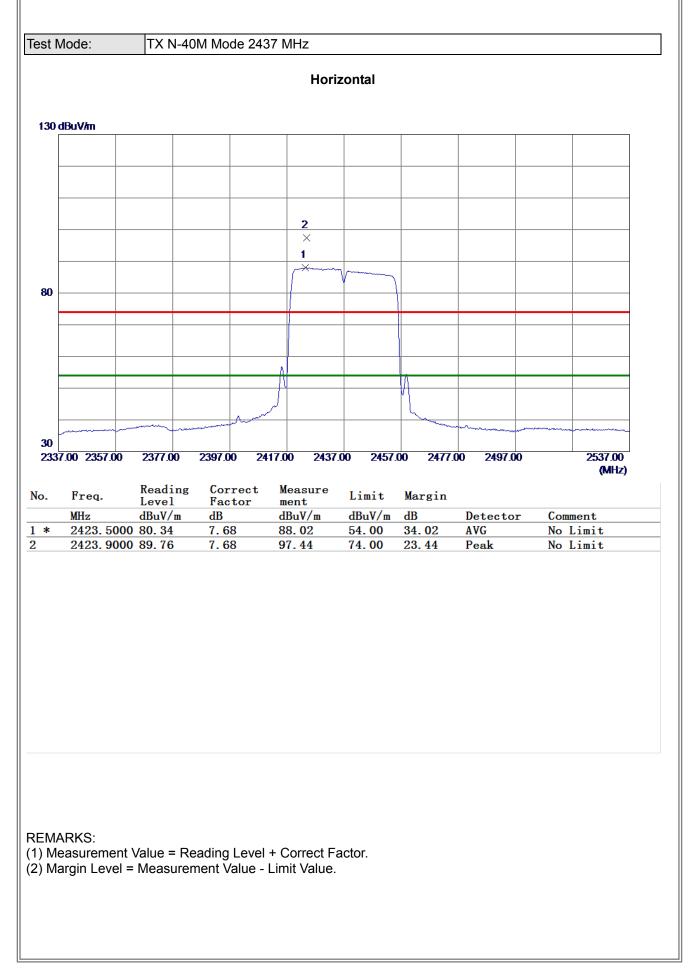




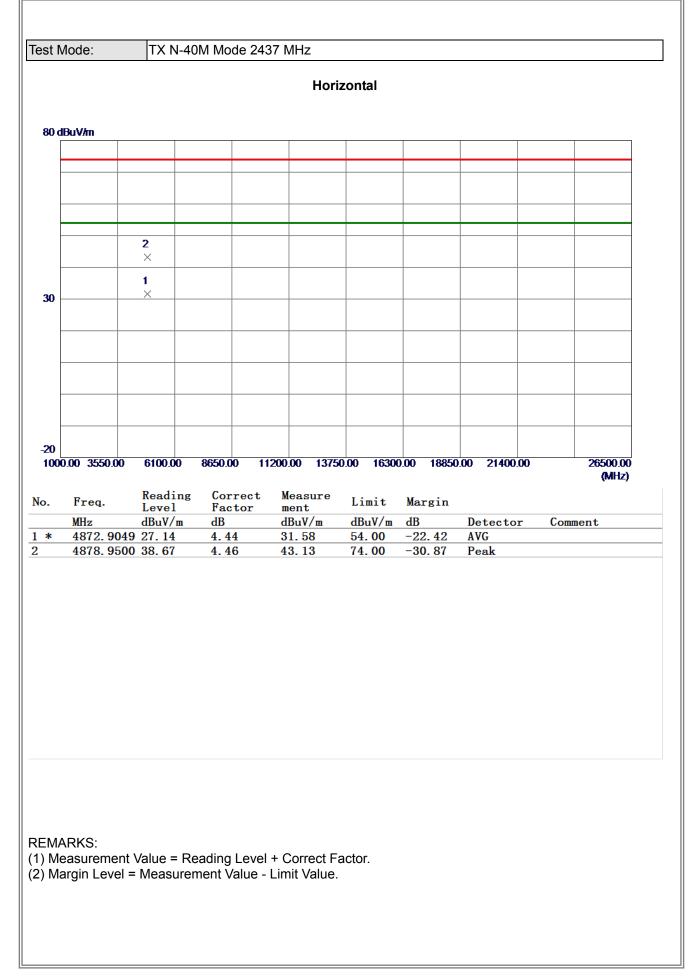




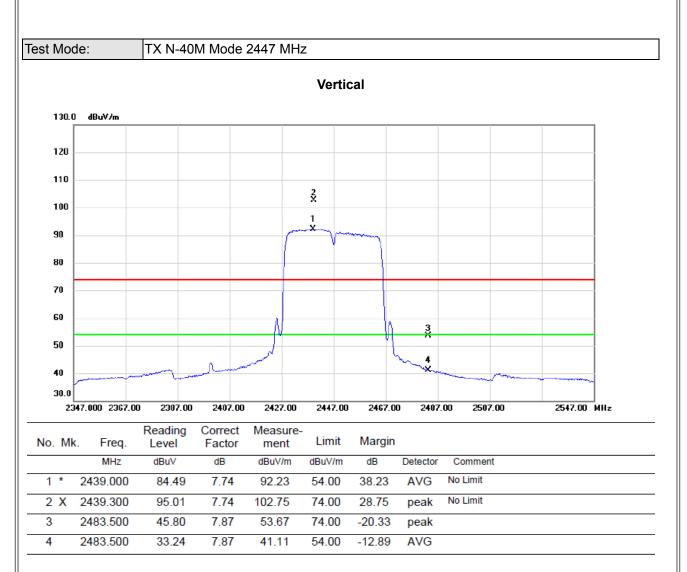






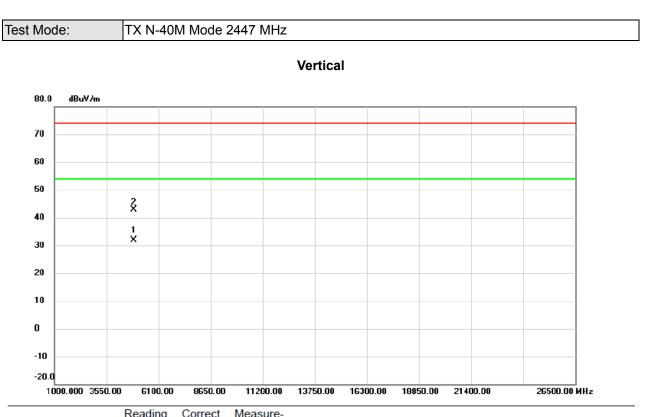






- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

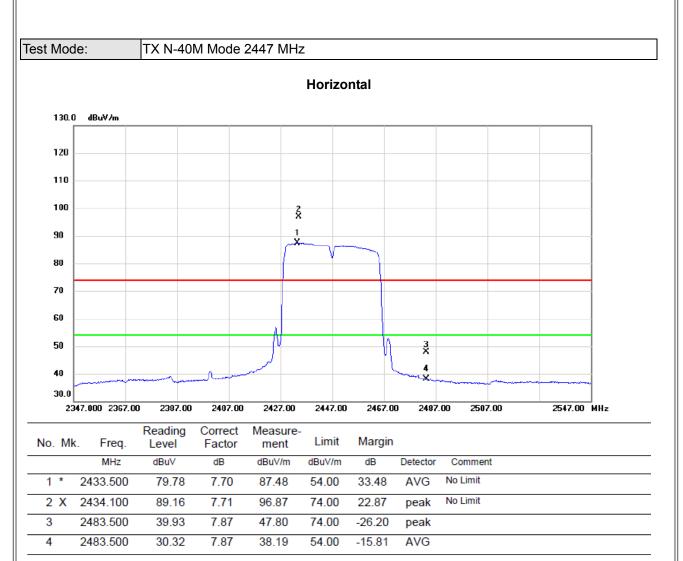




	No. I	Mk.	Freq.	Level	Factor	ment	Limit	Margin		
			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
	1 *	4	889.005	27.36	4.49	31.85	54.00	-22.15	AVG	
-	2	4	892.230	38.34	4.51	42.85	74.00	-31.15	peak	

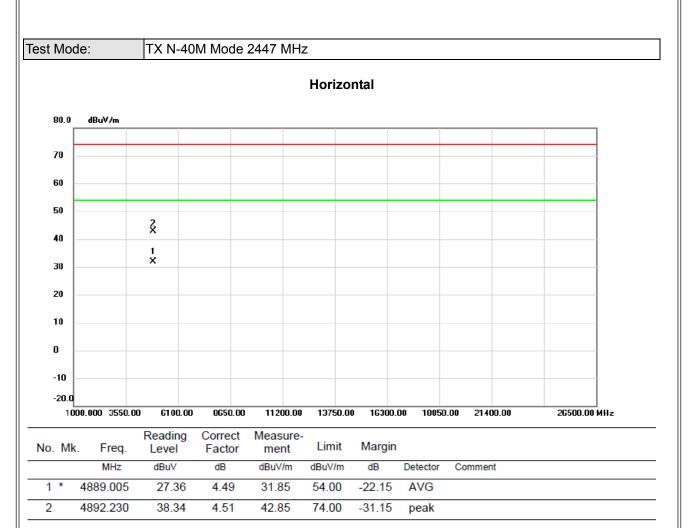
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





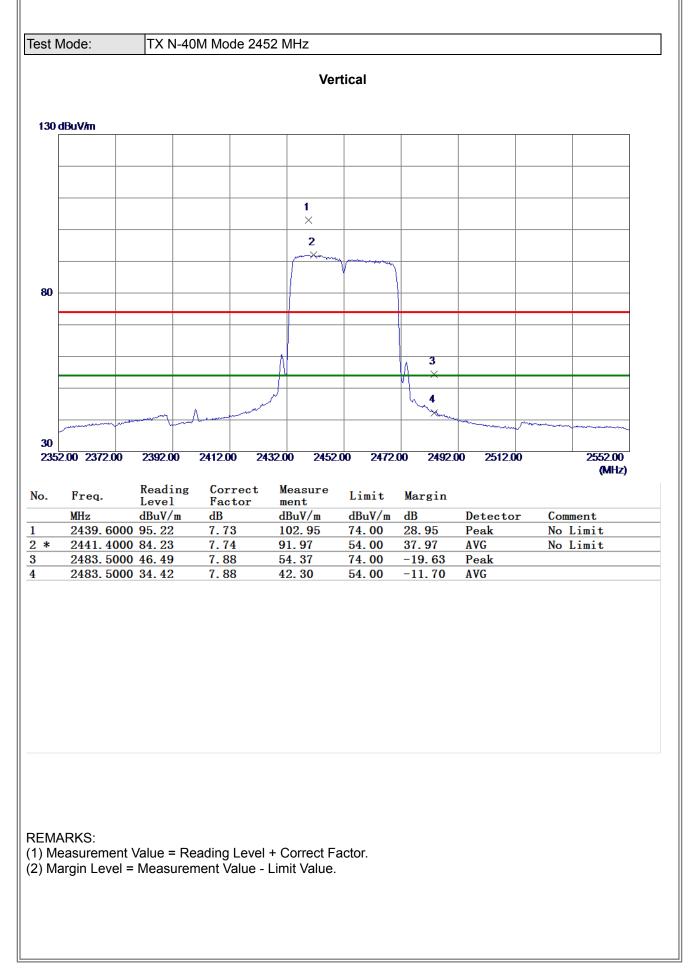
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



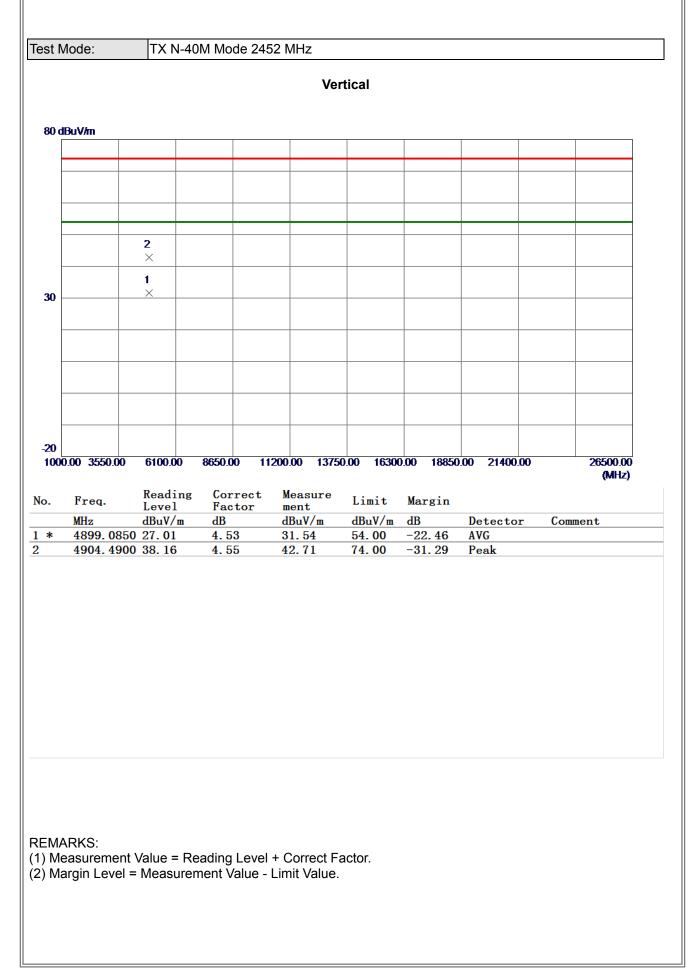


- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.

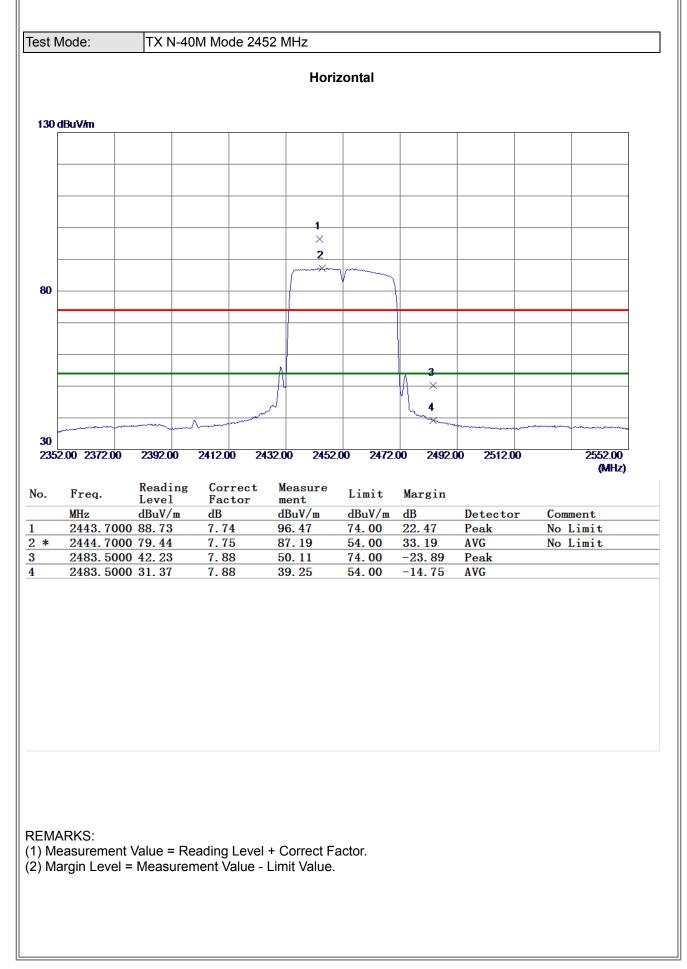




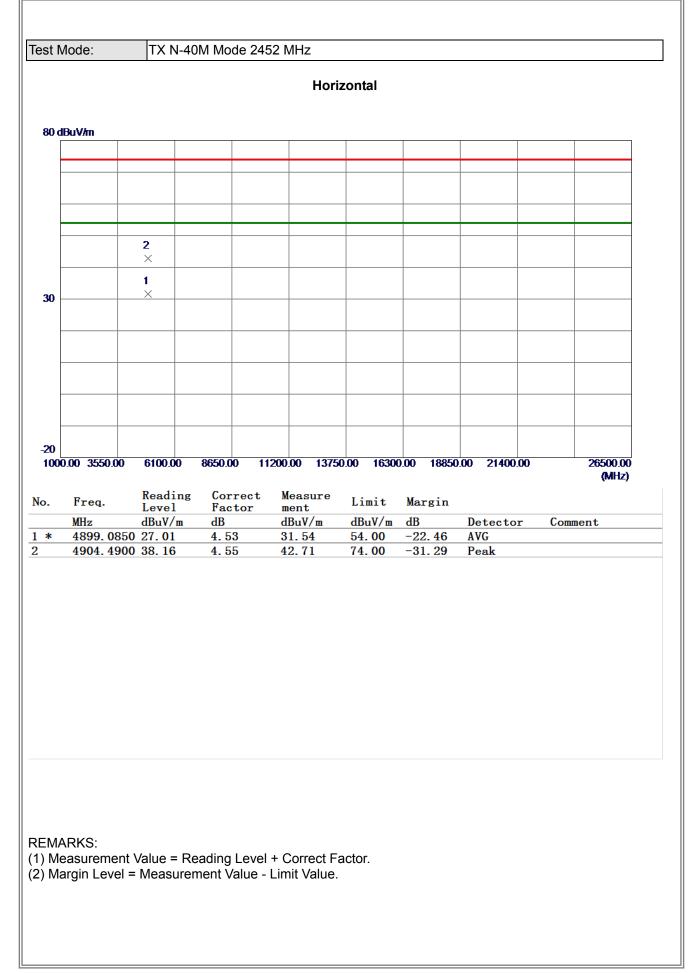














# **APPENDIX E - BANDWIDTH**



## Test Mode TX B Mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2412	8.06	500	Complies
06	2437	9.07	500	Complies
11	2462	8.57	500	Complies

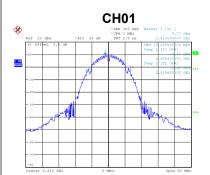




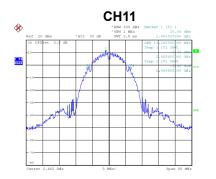


Date: 23.0CT.2019 13:54:10

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







Date: 23.0CT.2019 13:50:46

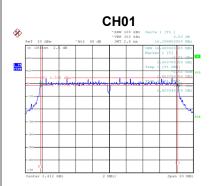
Date: 23.0CT.2019 13:46:54

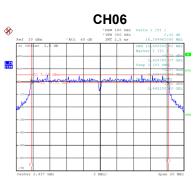
Date: 23.0CT.2019 13:47:25



Т	est Mode	TX G Mode
	000 1110 000	171 0 1110 00

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2412	16.40	500	Complies
06	2437	16.39	500	Complies
11	2462	16.40	500	Complies





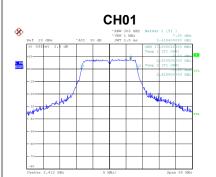


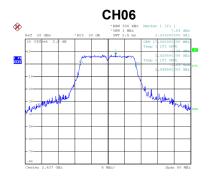
Date: 23.0CT.2019 13:58:54

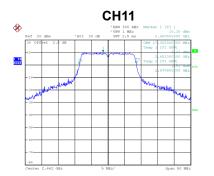
Date: 23.0CT.2019 14:00:42

:00:42

Channel	Frequency (MHz)	99 % Emission Bandwidth (MHz)	Result
01	2412	17.00	Complies
06	2437	17.00	Complies
11	2462	17.30	Complies







Date: 23.0CT.2019 14:03:17

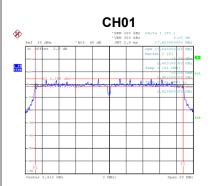
Date: 23.0CT.2019 13:59:48

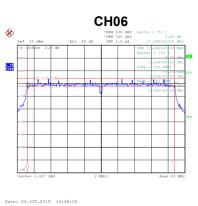
Date: 23.0CT.2019 14:00:15

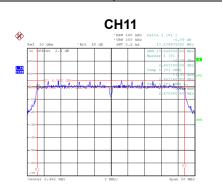


## Test Mode TX N-20M Mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2412	17.62	500	Complies
06	2437	17.59	500	Complies
11	2462	17.58	500	Complies



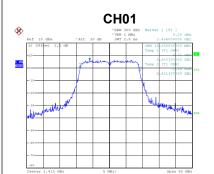


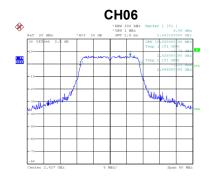


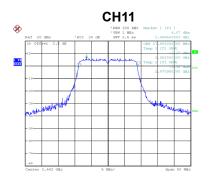
Date: 23.0CT.2019 14:08:26

Date: 23.0CT.2019 14:04:40

Channel	Frequency (MHz)	99 % Emission Bandwidth (MHz)	Result
01	2412	18.00	Complies
06	2437	18.00	Complies
11	2462	17.90	Complies







Date: 23.0CT.2019 14:04:16

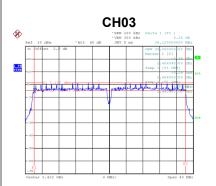
Date: 23.0CT.2019 14:07:09

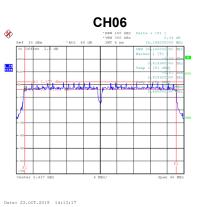
Date: 23.0CT.2019 14:07:35

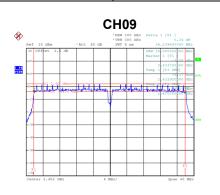


#### Test Mode TX N-40M Mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
03	2422	36.12	500	Complies
06	2437	36.20	500	Complies
09	2452	36.24	500	Complies





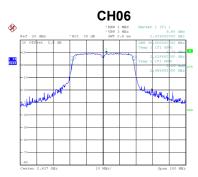


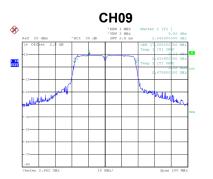
Date: 23.0CT.2019 14:10:16

nel	Frequency (MHz)	99 % Emission Bandwidth (MHz)	
	0400	27.00	

Channel	Frequency (MHz)	99 % Emission Bandwidth (MHz)	Result
03	2422	37.00	Complies
06	2437	36.80	Complies
09	2452	37.00	Complies







Date: 23.0CT.2019 14:11:59

Date: 23.0CT.2019 14:12:31

Date: 23.0CT.2019 14:15:40

Date: 23.0CT.2019 14:14:45



# **APPENDIX F - MAXIMUM AVERAGE OUTPUT POWER**



Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
01	2412	19.77	0.0948	30.00	1.0000	Complies
06	2437	19.82	0.0959	30.00	1.0000	Complies
11	2462	19.98	0.0995	30.00	1.0000	Complies
est Mode	TX G Mo	de				
Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
01	2412	19.00	0.0795	30.00	1.0000	Complies
06	2437	19.27	0.0845	30.00	1.0000	Complies
11	2462	19.04	0.0802	30.00	1.0000	Complies
est Mode	TX N-201	Average Output	Average Output	Max. Limit	Max. Limit	Result
	(MHz)	Power (dBm)	Power (W)	(dBm)	(W)	
01 06	2412	18.40	0.0692	30.00	1.0000	Complies
Un	2437	18.30	0.0676	30.00 30.00	1.0000 1.0000	Complies Complies
	2462	18.26			1.0000	Comples
11	2462	18.26	0.0670	30.00		
	2462 TX N-401		0.0670	30.00		
11 Fest Mode			Average Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
11 Fest Mode	TX N-40	M Mode Average Output	Average Output	Max. Limit	Max. Limit	Result
11 Fest Mode Channel	TX N-40I Frequency (MHz)	M Mode Average Output Power (dBm)	Average Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	



# **APPENDIX G - CONDUCTED SPURIOUS EMISSIONS**