

# FCC Radio Test Report

# FCC ID: TE7X20V2

This report concerns: Original Grant

Project No.	: 2004C022
Equipment	: AX1800 Whole Home Mesh Wi-Fi 6 System
Brand Name	: tp-link
Test Model	: Deco X20
Series Model	: Deco X25
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	: Apr. 07, 2020
Date of Test	: Apr. 09, 2020 ~ Jun. 11, 2020
Issued Date	: Jun. 29, 2020
Report Version	: R00
Test Sample	: Engineering Sample No.: DG2020040754 for conducted,
	DG2020040755 for radiated.
Standard(s)	: FCC Part15, Subpart C (15.247) ANSI C63.10-2013 FCC 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.

hella Theng epared by : Chella Zhèng

Chan Ma

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	Page
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	12
2.3 PARAMETERS OF TEST SOFTWARE	14
2.4 DUTY CYCLE	15
2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	17
2.6 SUPPORT UNITS	17
3 . AC POWER LINE CONDUCTED EMISSIONS TEST	18
3.1 LIMIT	18
3.2 TEST PROCEDURE	18
3.3 DEVIATION FROM TEST STANDARD	18
3.4 TEST SETUP	19
3.5 EUT OPERATION CONDITIONS	19
3.6 TEST RESULTS	19
4 . RADIATED EMISSIONS TEST	20
4.1 LIMIT	20
4.2 TEST PROCEDURE	21
4.3 DEVIATION FROM TEST STANDARD	21
4.4 TEST SETUP	22
4.5 EUT OPERATION CONDITIONS	23
4.6 TEST RESULTS - 9 KHZ TO 30 MHZ	23
4.7 TEST RESULTS - 30 MHZ TO 1000 MHZ	23
4.8 TEST RESULTS - ABOVE 1000 MHZ	23
5 . BANDWIDTH TEST	24
5.1 LIMIT	24
5.2 TEST PROCEDURE	24
5.3 DEVIATION FROM STANDARD	24



Table of Contents	Page
5.4 TEST SETUP	24
5.5 EUT OPERATION CONDITIONS	24
5.6 TEST RESULTS	24
6 . MAXIMUM AVERAGE OUTPUT POWER TEST	25
6.1 LIMIT	25
6.2 TEST PROCEDURE	25
6.3 DEVIATION FROM STANDARD	25
6.4 TEST SETUP	25
6.5 EUT OPERATION CONDITIONS	25
6.6 TEST RESULTS	25
7 . CONDUCTED SPURIOUS EMISSIONS	26
7.1 LIMIT	26
7.2 TEST PROCEDURE	26
7.3 DEVIATION FROM STANDARD	26
7.4 TEST SETUP	26
7.5 EUT OPERATION CONDITIONS	26
7.6 TEST RESULTS	26
8 . POWER SPECTRAL DENSITY TEST	27
8.1 LIMIT	27
8.2 TEST PROCEDURE	27
8.3 DEVIATION FROM STANDARD	27
8.4 TEST SETUP	27
8.5 EUT OPERATION CONDITIONS	27
8.6 TEST RESULTS	27
9 . MEASUREMENT INSTRUMENTS LIST	28
10 . EUT TEST PHOTO	30
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	34
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	37
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	42
APPENDIX D - RADIATED EMISSION- ABOVE 1000 MHZ	45
APPENDIX E - BANDWIDTH	166
APPENDIX F - MAXIMUM AVERAGE OUTPUT POWER	173



Table of Contents	Page
APPENDIX G - CONDUCTED SPURIOUS EMISSIONS	180
APPENDIX H - POWER SPECTRAL DENSITY	193



# **REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Jun. 29, 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 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
		30MHz ~ 200MHz	V	4.88
	CISPR	30MHz ~ 200MHz		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

#### C. Other Measurement:

Parameter	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	55%	AC 120V/60Hz	Sheldon Ou
Radiated Emissions-9K-30MHz	25°C	60%	AC 120V/60Hz	Sheldon Ou
Radiated Emissions-30 MHz to 1GHz	24°C	68%	AC 120V/60Hz	Sheldon Ou
Radiated Emissions-Above 1000 MHz	25°C	60%	AC 120V/60Hz	Sheldon Ou
Bandwidth	26°C	48%	AC 120V/60Hz	Hayden Chen
Maximum Average Output Power	26°C	48%	AC 120V/60Hz	Laughing Zhang
Conducted Spurious Emissions	26°C	48%	AC 120V/60Hz	Hayden Chen
Power Spectral Density	26°C	48%	AC 120V/60Hz	Hayden Chen

# 2. GENERAL INFORMATION

#### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	AX1800 Whole Home Mesh Wi-Fi 6 System			
Brand Name	tp-link			
Test Model	Deco X20			
Series Model	Deco X25			
Model Difference(s)	Only differ in model name and the shell cover design.			
Power Source	DC voltage supplied from AC adapter. Model: T120120-2B4			
Power Rating	I/P: 100-240V ~50/60Hz, 0.4A O/P: 12V === 1.2A			
Operation Frequency	2412 MHz ~ 2462 MHz			
Modulation Type	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM IEEE 802.11ax: OFDMA			
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 300 Mbps IEEE 802.11ax: up to 573.6 Mbps			
Maximum Average Output Power	IEEE 802.11b: 28.11 dBm (0.6471 W) IEEE 802.11g: 28.06 dBm (0.6397 W) IEEE 802.11n (HT20): 27.92 dBm (0.6194 W) IEEE 802.11n (HT40): 23.28 dBm (0.2128 W) IEEE 802.11ax (HEW20): 28.00 dBm (0.6310 W) IEEE 802.11ax (HEW40): 22.25 dBm (0.1679 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), IEEE 802.11ax (HEW20)							
CH03 - CH09 for IEEE 802.11n (HT40), IEEE 802.11ax (HEW40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		



#### 3. Antenna Specification:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	<b>TP-LINK°</b>	N/A	Dipole	I-PEX	1.93
2	TP-LINK	N/A	Dipole	I-PEX	1.94

Note:

This EUT supports CDD, and antenna gains are not equal, so Directional gain= $10\log[(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2/N]dBi=10\log[(10^{1.93/20}+10^{1.94/20})^2/2]=4.95dB.$ 

### 4. Table for Antenna Configuration:

Operating Mode TX Mode	2TX
802.11b	V (Ant. 1 + Ant. 2)
802.11g	V (Ant. 1 + Ant. 2)
IEEE 802.11n (HT20)	V (Ant. 1 + Ant. 2)
IEEE 802.11n (HT40)	V (Ant. 1 + Ant. 2)
IEEE 802.11ax (HEW20)	V (Ant. 1 + Ant. 2)
IEEE 802.11ax (HEW40)	V (Ant. 1 + Ant. 2)

## 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 AX-20 MHz Mode Channel 01/06/11	
Mode 6	TX AX-40 MHz Mode Channel 03/06/09	
Mode 7	TX B Mode Channel 11	
Mode 8	TX B Mode Channel 01/02/06/10/11	
Mode 9	TX G Mode Channel 01/02/06/10/11	
Mode 10	TX N-20 MHz Mode Channel 01/02/06/10/11	
Mode 11	TX N-40 MHz Mode Channel 03/04/06/08/09	
Mode 12	TX AX-20 MHz Mode Channel 01/02/06/10/11	
Mode 13	TX AX-40 MHz Mode Channel 03/04/06/08/09	

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 7	TX B Mode Channel 11	

	Radiated emissions test - Below 1GHz
Final Test Mode	Description
Mode 7	TX B Mode Channel 11



Radiated emissions test- Above 1GHz		
Final Test Mode	Description	
Mode 8	TX B Mode Channel 01/02/06/10/11	
Mode 9	TX G Mode Channel 01/02/06/10/11	
Mode 10	TX N-20 MHz Mode Channel 01/02/06/10/11	
Mode 11	TX N-40 MHz Mode Channel 03/04/06/08/09	
Mode 12	TX AX-20 MHz Mode Channel 01/02/06/10/11	
Mode 13	TX AX-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	
Mode 5	TX AX-20 MHz Mode Channel 01/06/11	
Mode 6	TX AX-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.
- (5) 802.11ax full RU mode was evaluated and measured inside report.

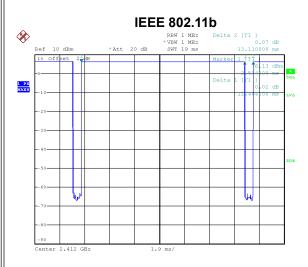
#### 2.3 PARAMETERS OF TEST SOFTWARE

Test Software	а	ccessMTool_REL_3_0_0_	6
Frequency (MHz)	2412	2437	2462
IEEE 802.11b	93	94	94
IEEE 802.11g	78	97	75
IEEE 802.11n (HT20)	71	98	70
IEEE 802.11ax (HEW20)	68	97	65
Frequency (MHz)	2422	2437	2452
IEEE 802.11n (HT40)	66	78	61
IEEE 802.11ax (HEW40)	62	73	61



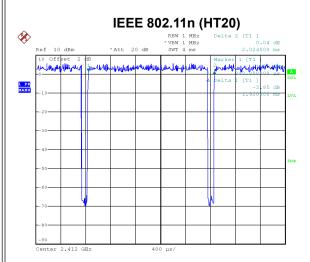
# 2.4 DUTY CYCLE

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.



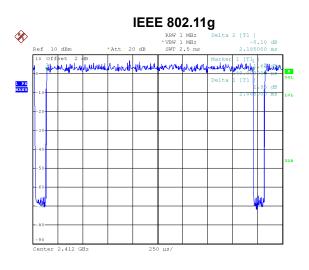
Date: 13.APR.2020 17:22:49

Duty cycle = 12.464 ms / 13.110 ms = 95.07% Duty Factor = 10 log(1/Duty cycle) = 0.22



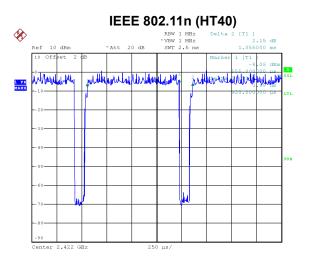
Date: 13.APR.2020 17:23:37

Duty cycle = 1.920 ms / 2.024 ms = 94.86% Duty Factor = 10 log(1/Duty cycle) = 0.23



Date: 13.APR.2020 17:23:13

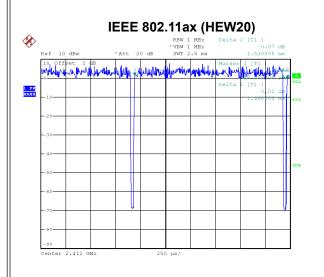
Duty cycle = 2.065 ms / 2.185 ms = 94.51% Duty Factor = 10 log(1/Duty cycle) = 0.25

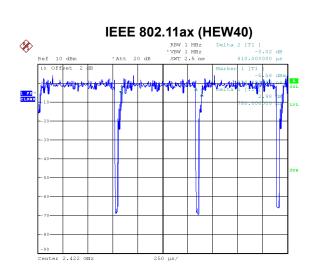


Date: 13.APR.2020 17:24:20

Duty cycle = 0.920 ms / 1.055 ms = 87.20% Duty Factor = 10 log(1/Duty cycle) = 0.59







Date: 13.APR.2020 17:24:45

Duty cycle = 1.490 ms / 1.530 ms = 97.39% Duty Factor = 10 log(1/Duty cycle) = 0.12 Date: 13.APR.2020 17:24:59

Duty cycle = 0.750 ms / 0.810 ms = 92.59%Duty Factor =  $10 \log(1/\text{Duty cycle}) = 0.33$ 

NOTE:

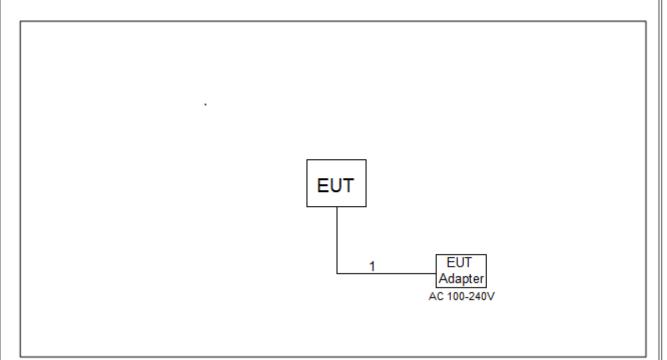
For IEEE 802.11b, IEEE 802.11g, IEEE 802.11n (HT20) and IEEE 802.11ax (HEW20): For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).

For IEEE 802.11n (HT40) and IEEE 802.11ax (HEW40):

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%).



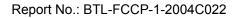
#### 2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



## 2.6 SUPPORT UNITS

	ltem	Equipment	Brand	Model No.	Series No.
	-	-	-	-	-

ltem	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.2m





# 3. AC POWER LINE CONDUCTED EMISSIONS TEST

#### 3.1 LIMIT

Frequency of Emission (MHz)	Limit (dBµV)		
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

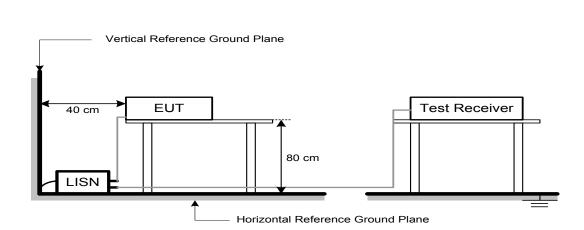
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.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

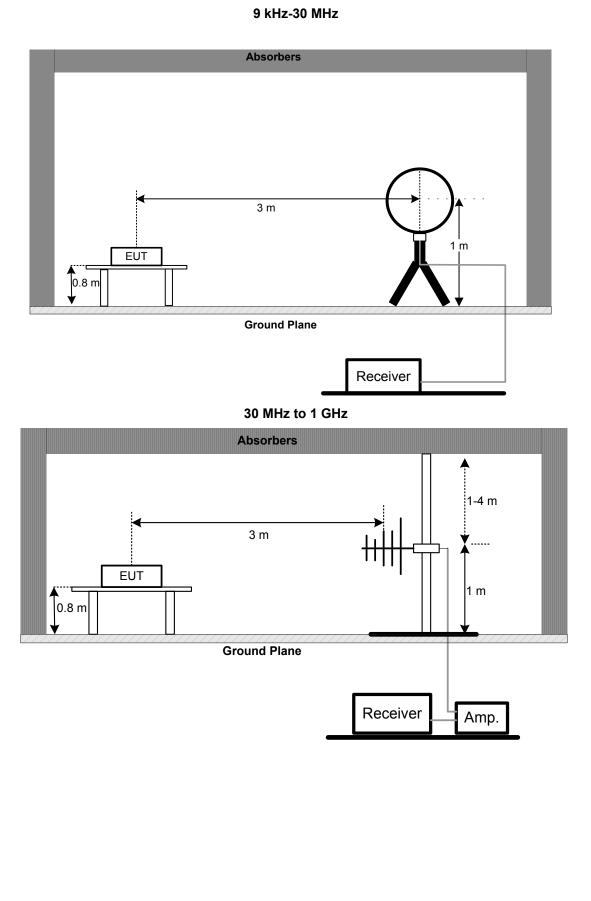
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance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



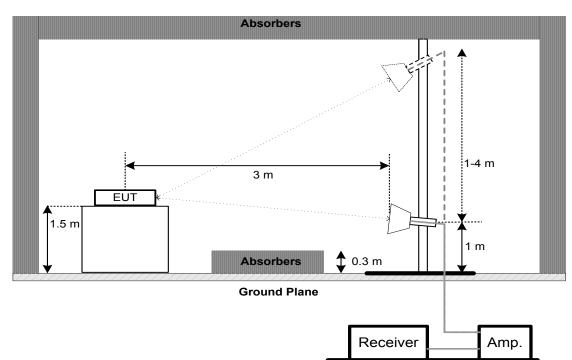
# 4.4 TEST SETUP





# **3**...





#### 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(a)(2)	6 dB Bandwidth	Minimum 500 kHz			
	15.247(d)(Z)	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/AX-20 Mode: RBW= 300 KHz, VBW=1 MHz, Sweep time = 2.5 ms. For 99% Emission Bandwidth N-40/AX-40 Mode: RBW= 1 MHz, VBW=3 MHz, 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



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 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 and FCC KDB 662911 D01 v02r01 Multiple Transmitter Output.

#### 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.

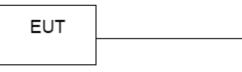
#### 7.2 TEST PROCEDURE

- 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

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	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		

	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		

	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	Aug. 03, 2020		
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		

	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	Jun. 23, 2020	
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	Aug. 03, 2020	
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	



	Bandwidth & Antenna Conducted Spurious Emissions & Power Spectral Density								
Item	Kind of Equipment	Serial No.	Calibrated until						
1	Spectrum Analyzer R&S		FSP40	100185	Aug. 03, 2020				
	Maximum Average Output Power								
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.





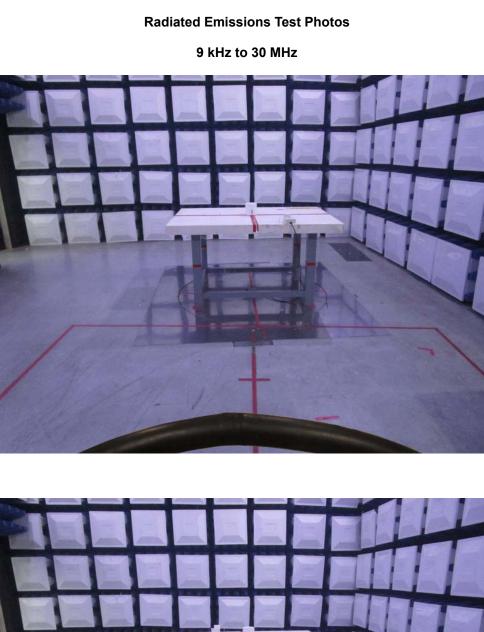
# 10. EUT TEST PHOTO











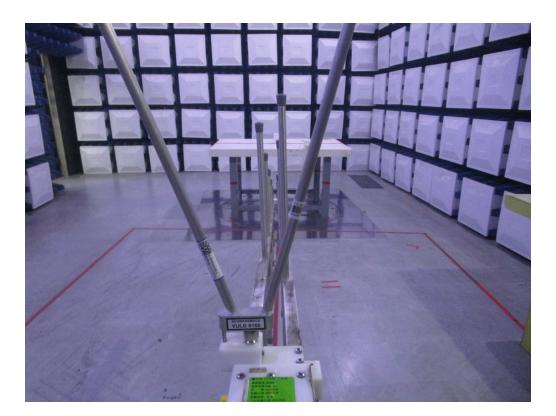




**Radiated Emissions Test Photos** 

30 MHz to 1 GHz







**Radiated Emissions Test Photos** 

Above 1 GHz

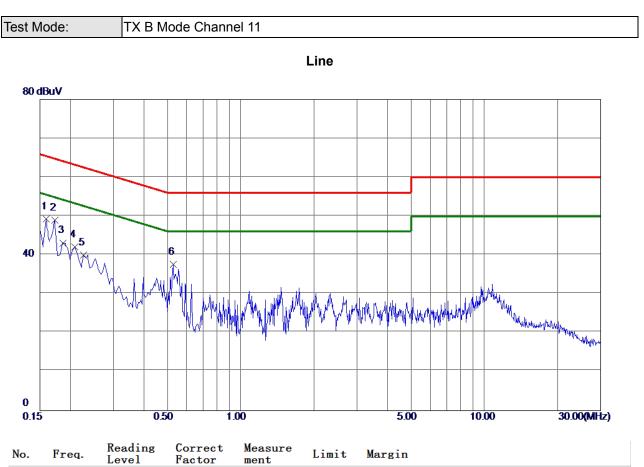






# **APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**



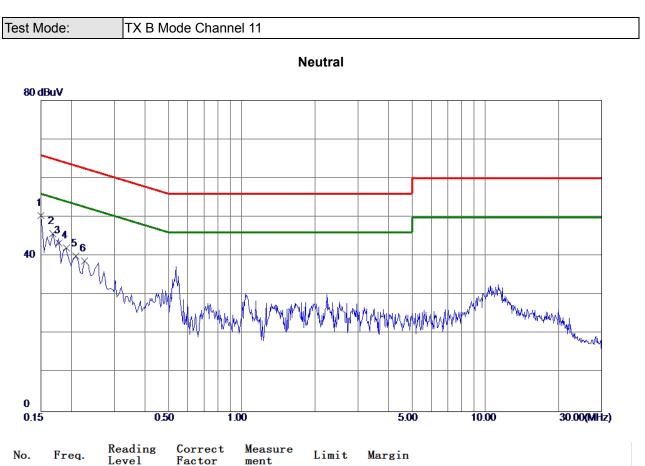


No.	freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1590	39.51	9.74	49.25	<b>65.52</b>	-16.27	Peak	
2 *	0.1725	39.16	9.83	48.99	64.84	-15.85	Peak	
3	0.1860	33.25	9.87	43.12	64.21	-21.09	Peak	
4	0.2085	32.19	9.90	42.09	63.26	-21.17	Peak	
5	0.2265	30.11	9.89	40.00	<b>62.58</b>	-22.58	Peak	
6	0.5280	27.60	9.95	37.55	56. 00	-18.45	Peak	

**REMARKS**:

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





No.	Freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1500	40.62	9.74	50.36	66.00	-15.64	Peak	
2	0.1680	35.86	9.88	45.74	65.06	-19.32	Peak	
3	0.1777	33.48	9.93	43.41	<b>64.59</b>	-21.18	Peak	
4	0.1905	32.07	9.97	42.04	64.01	-21.97	Peak	
5	0.2085	29.97	10.00	39.97	63.26	-23. 29	Peak	
6	0.2265	28.71	9.99	38.70	62.58	-23.88	Peak	

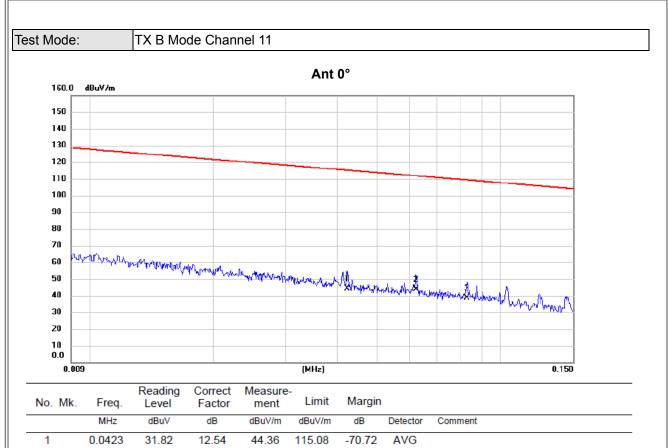
REMARKS:

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



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





AVG

AVG

-67.87

-70.71

**REMARKS**:

2

3

\*

0.0622

0.0827

31.46

26.00

12.40

12.54

43.86

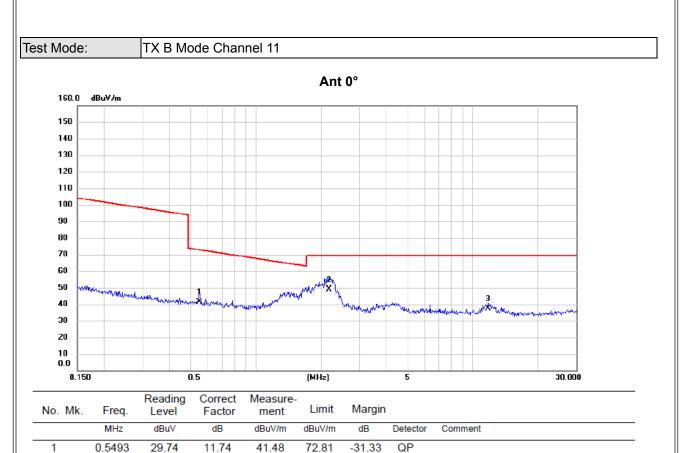
38.54

111.73

109.25

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





2 \*

3

2.1668

11.8070

37.94

26.41

10.92

10.89

48.86

37.30

69.54

69.54

-20.68

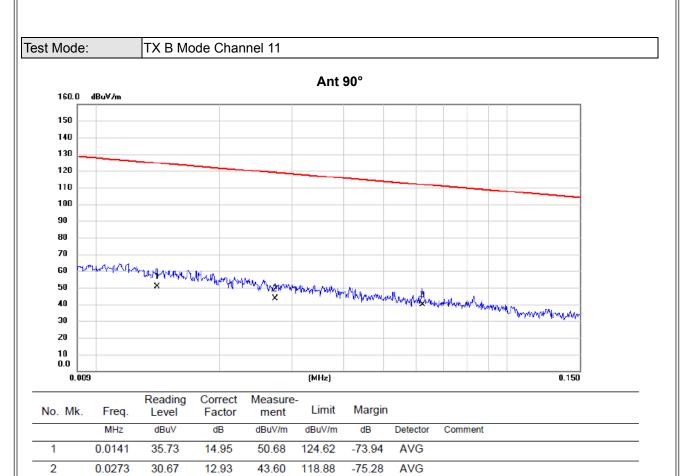
-32.24

QP

QP

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





3 \*

0.0622

27.24

12.40

39.64

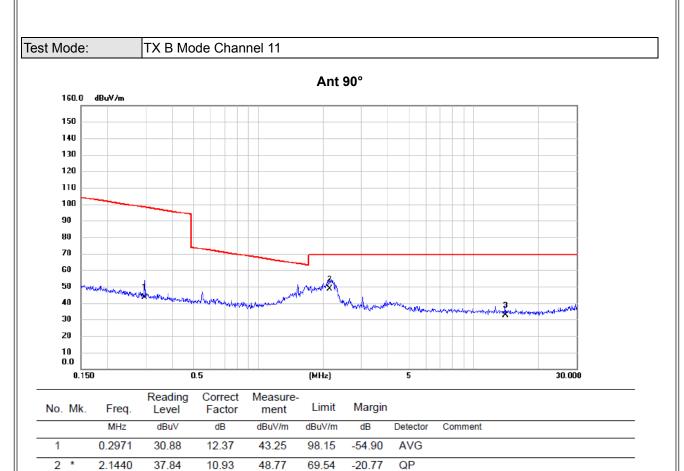
111.73

-72.09

AVG

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





32.59

69.54

-36.95

QP

10.95

**REMARKS**:

3

13.9886

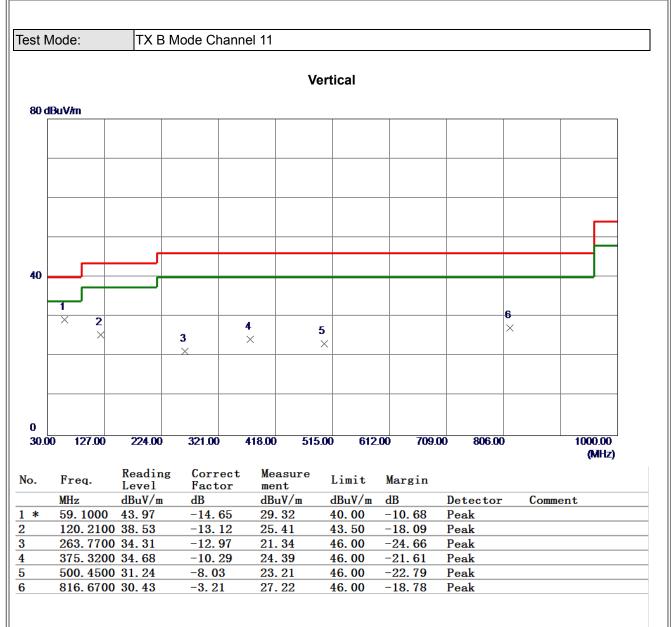
21.64

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



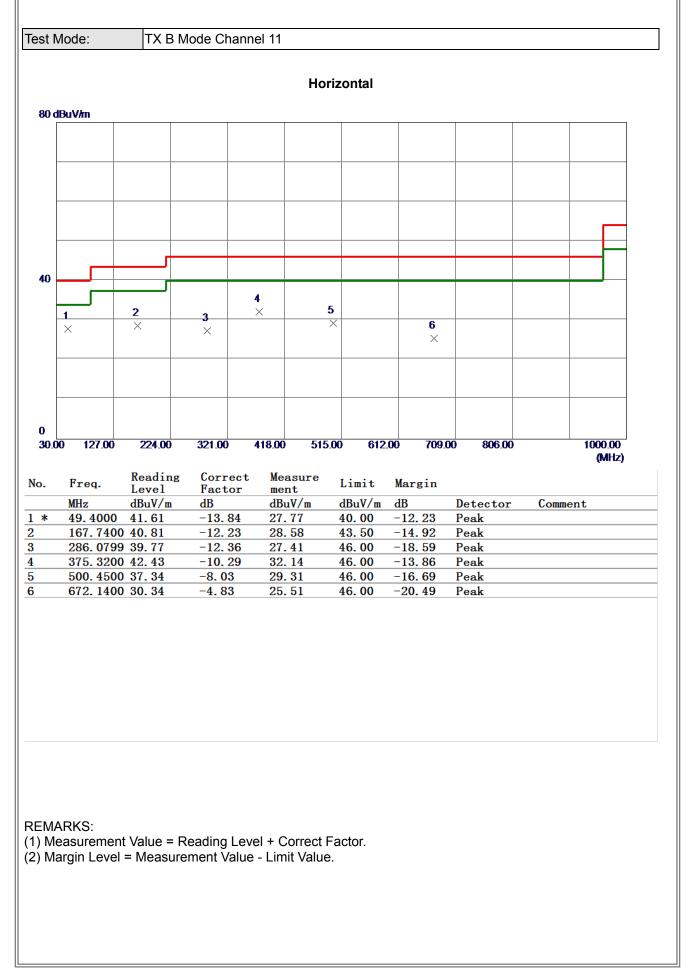
## APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ





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

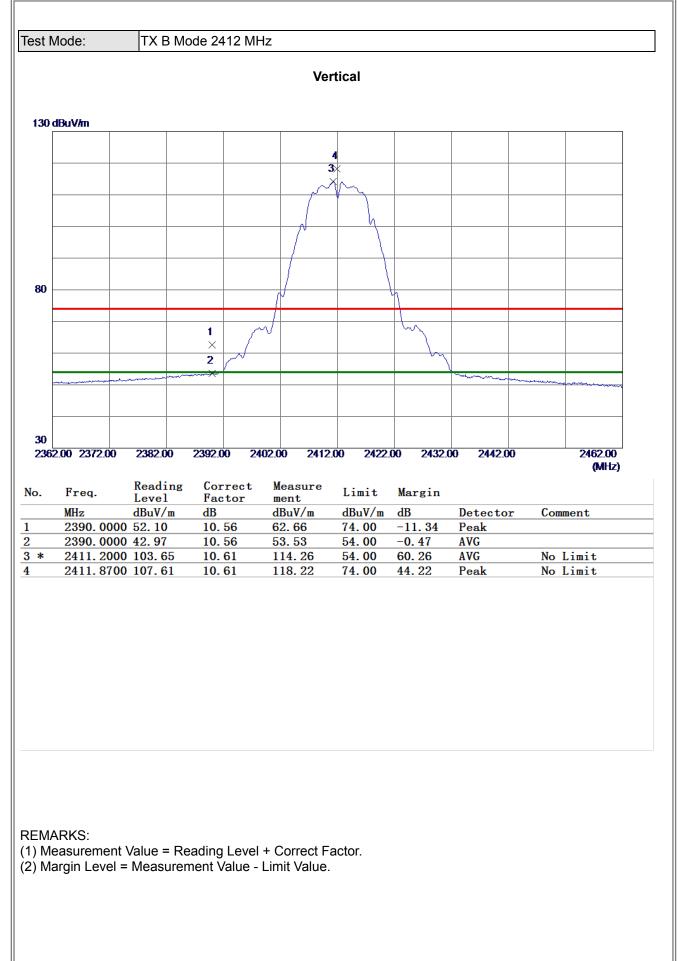




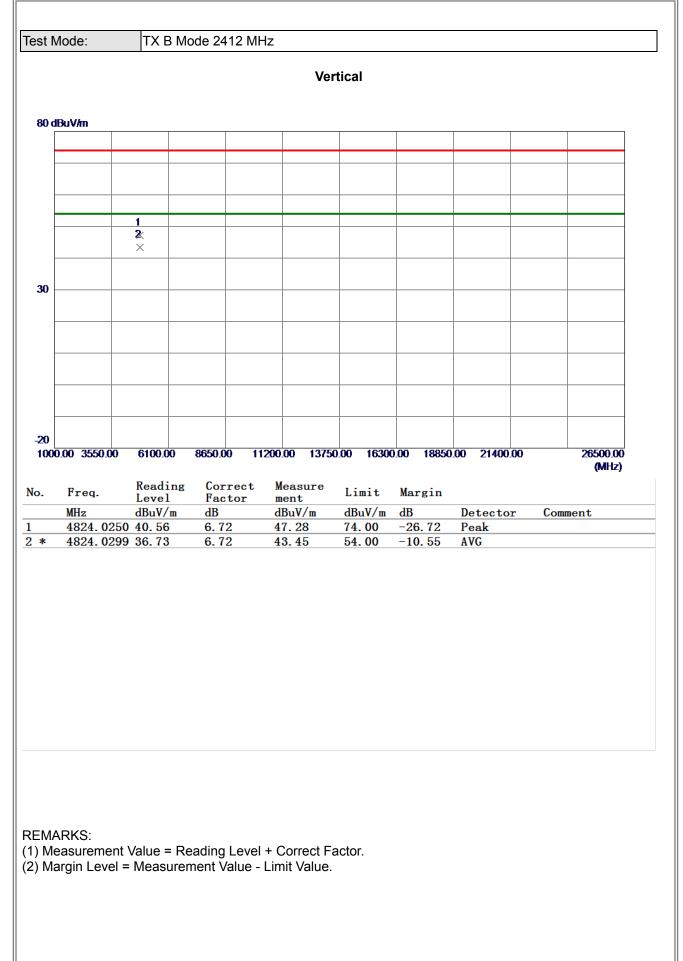


## **APPENDIX D - RADIATED EMISSION- ABOVE 1000 MHZ**

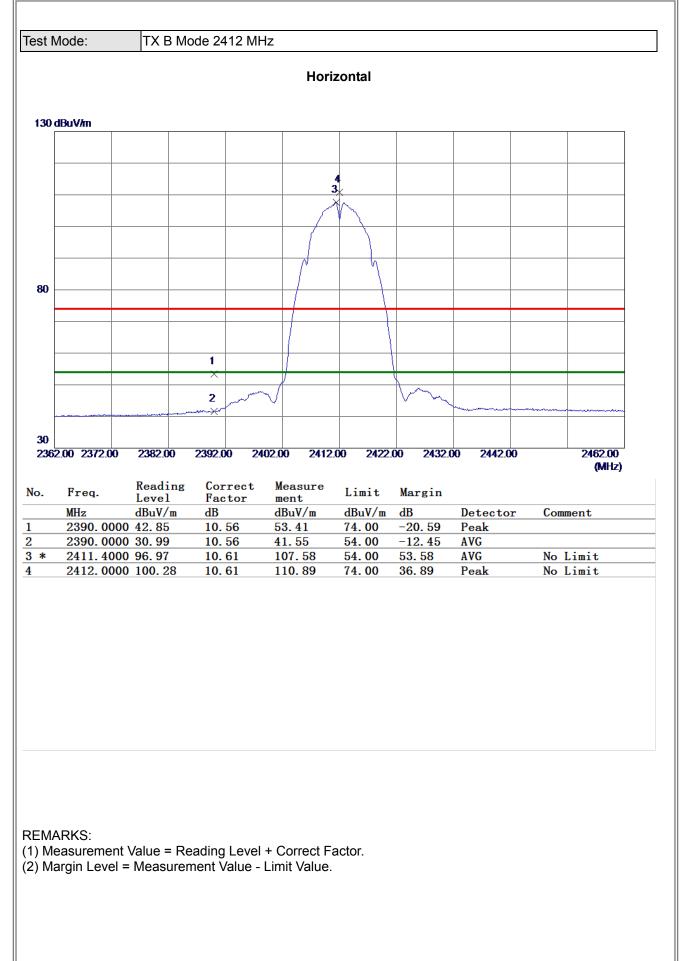




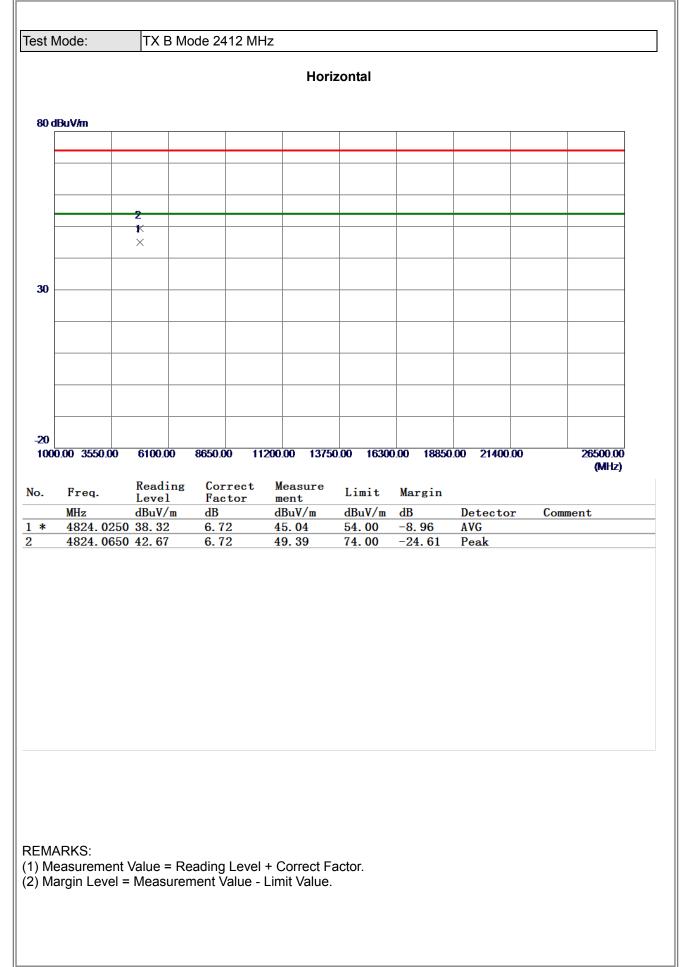




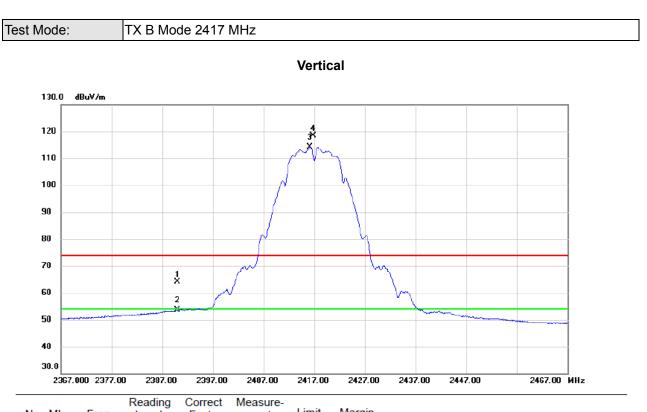








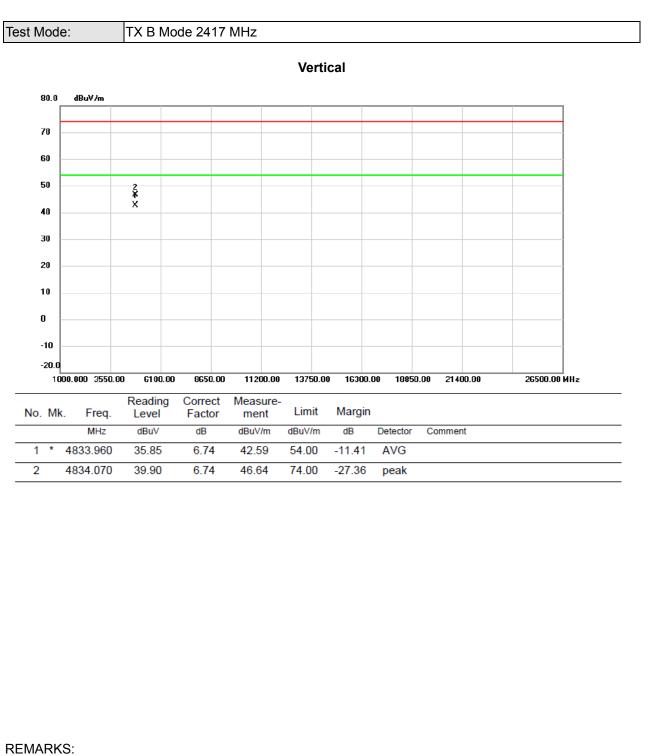




No.	Mk.	Freq.	Level		ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	53.49	10.56	64.05	74.00	-9.95	peak	
2		2390.000	43.17	10.56	53.73	54.00	-0.27	AVG	
3	*	2416.200	103.63	10.62	114.25	54.00	60.25	AVG	No Limit
4	Х	2416.810	107.73	10.62	118.35	74.00	44.35	peak	No Limit

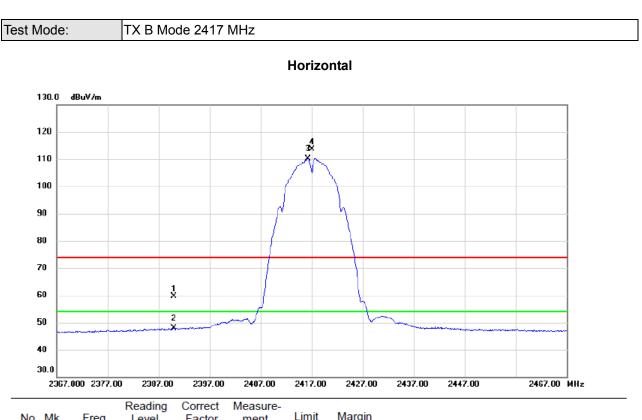
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.





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

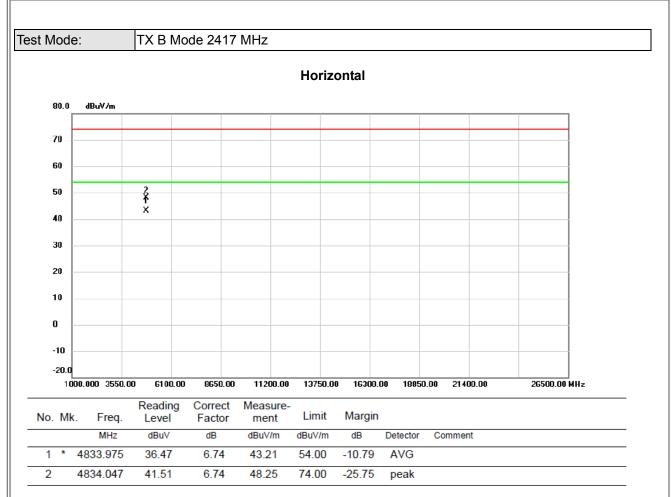




No.	Mk.	Freq.	Level		ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	49.23	10.50	59.73	74.00	-14.27	peak	
2		2390.000	37.47	10.50	47.97	54.00	-6.03	AVG	
3	*	2416.250	99.68	10.57	110.25	54.00	56.25	AVG	No Limit
4	Х	2417.050	103.03	10.57	113.60	74.00	39.60	peak	No Limit

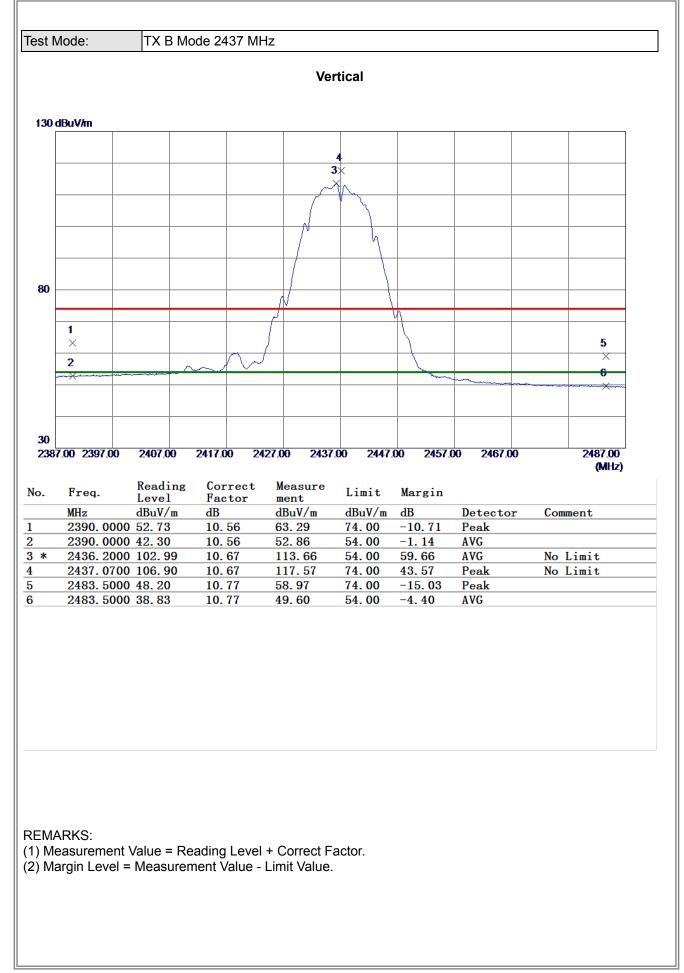
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



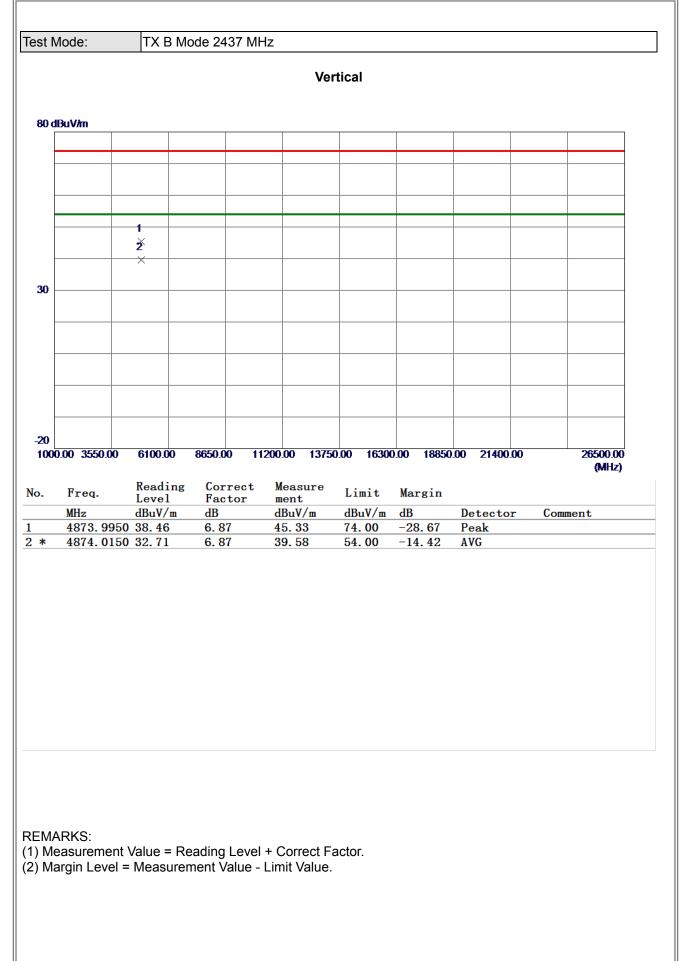


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

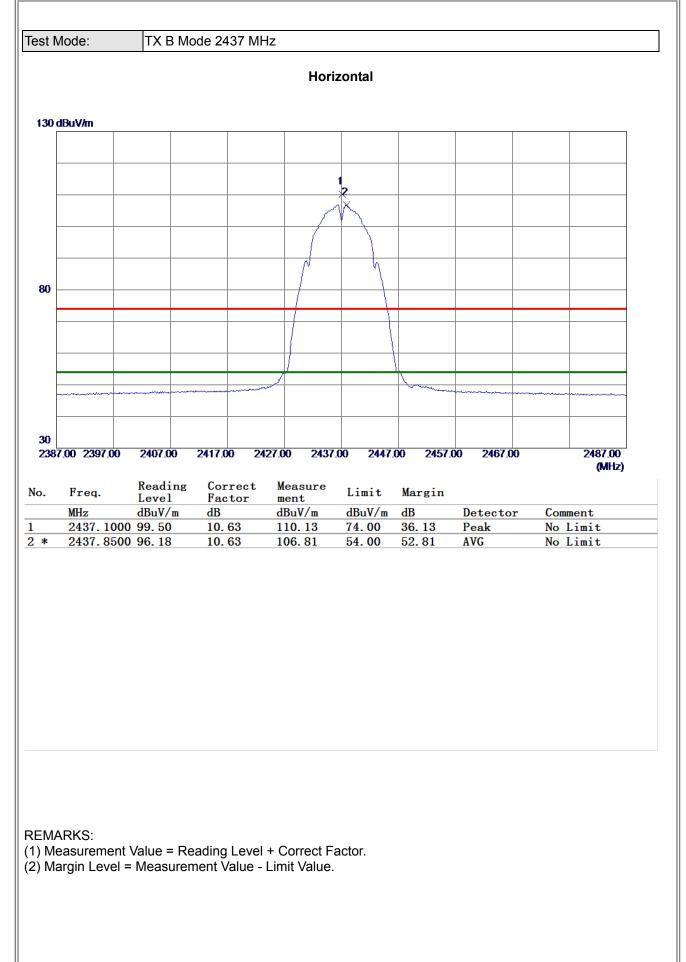




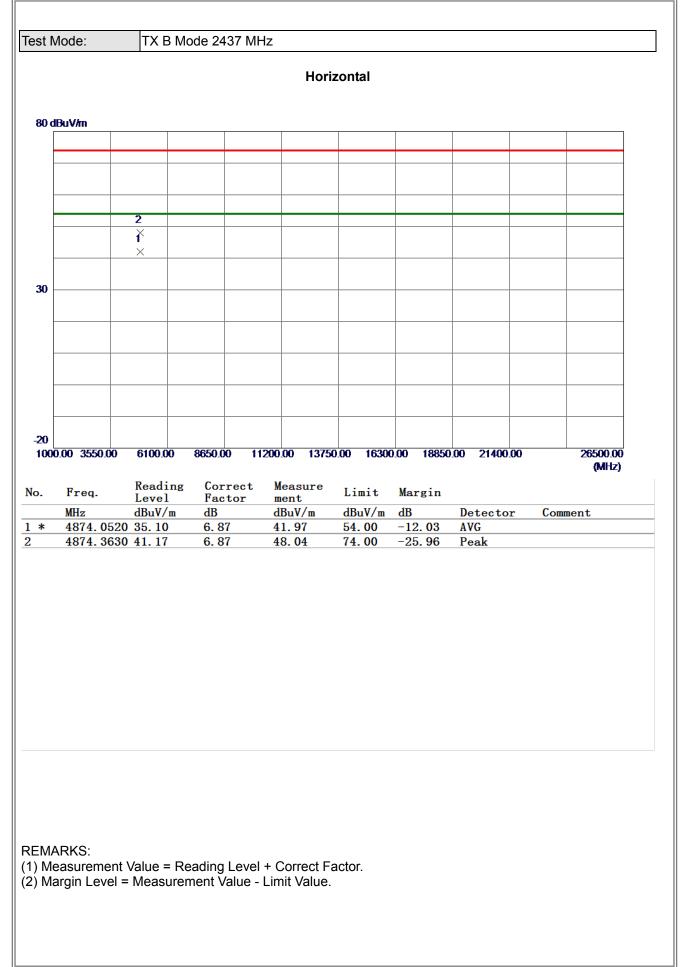




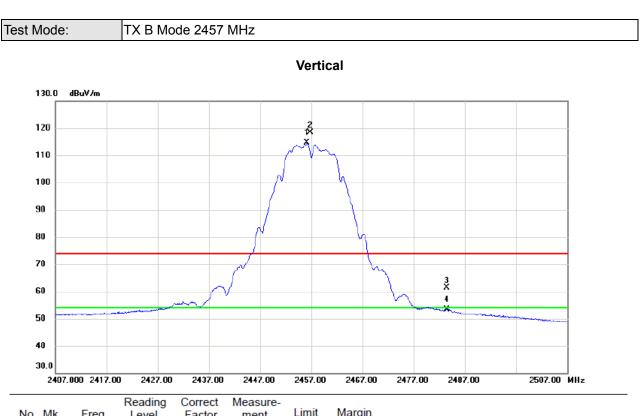












No. Mk	. Freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2456.190	103.87	10.71	114.58	54.00	60.58	AVG	No Limit
2 X	2456.810	107.73	10.71	118.44	74.00	44.44	peak	No Limit
3	2483.500	50.71	10.77	61.48	74.00	-12.52	peak	
4	2483.500	42.62	10.77	53.39	54.00	-0.61	AVG	

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

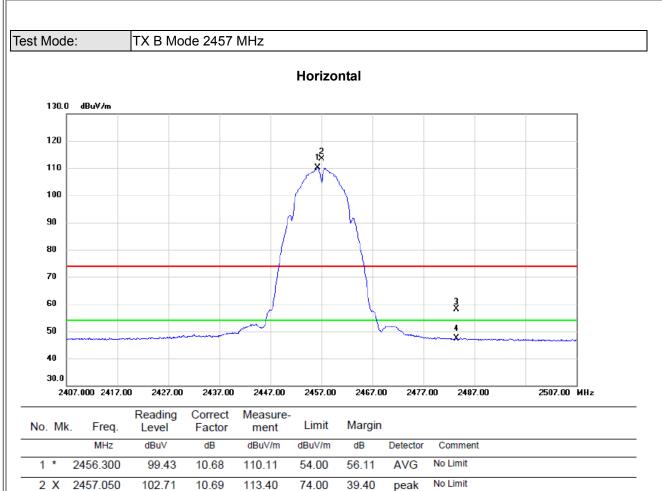




(1) Measurement Value = Reading Level + Correct Factor.

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





3

4

2483.500

2483.500

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

47.49

36.65

10.76

10.76

58.25

47.41

74.00

54.00

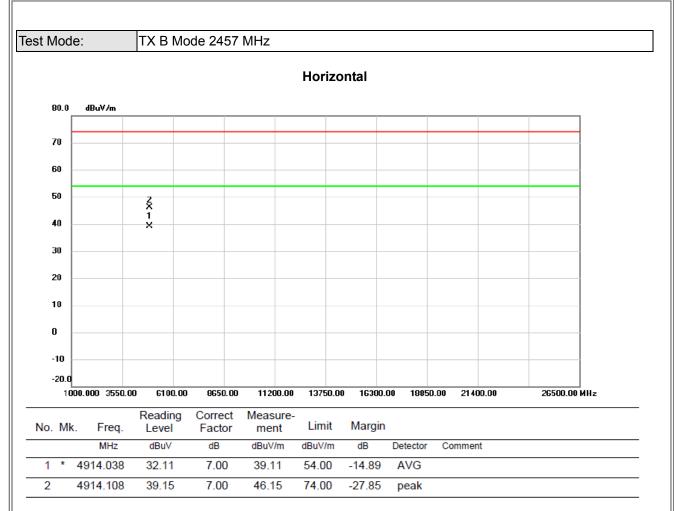
-15.75

-6.59

peak

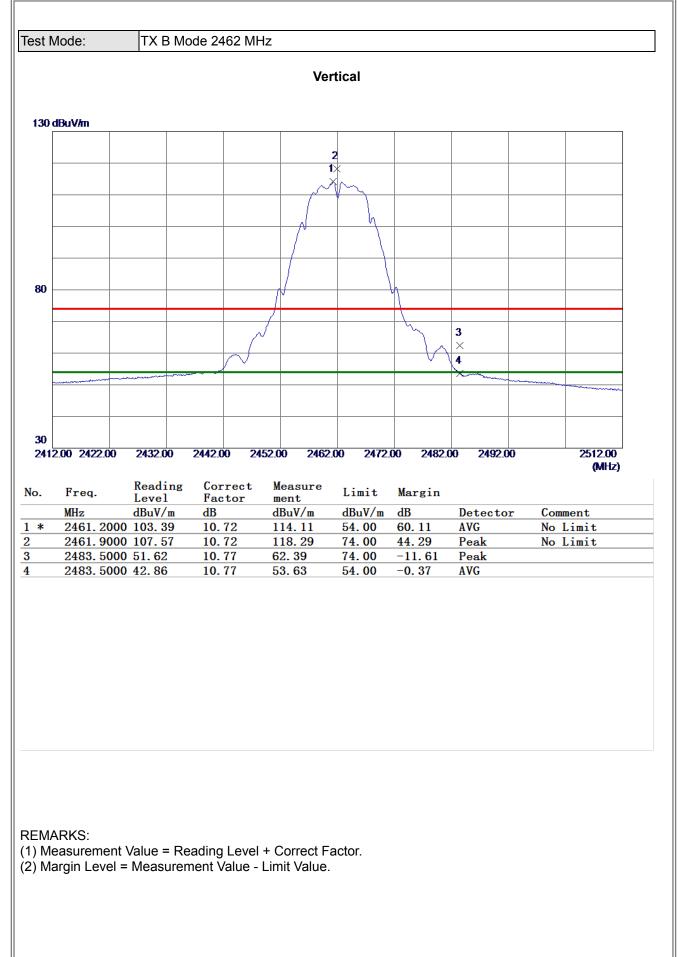
AVG



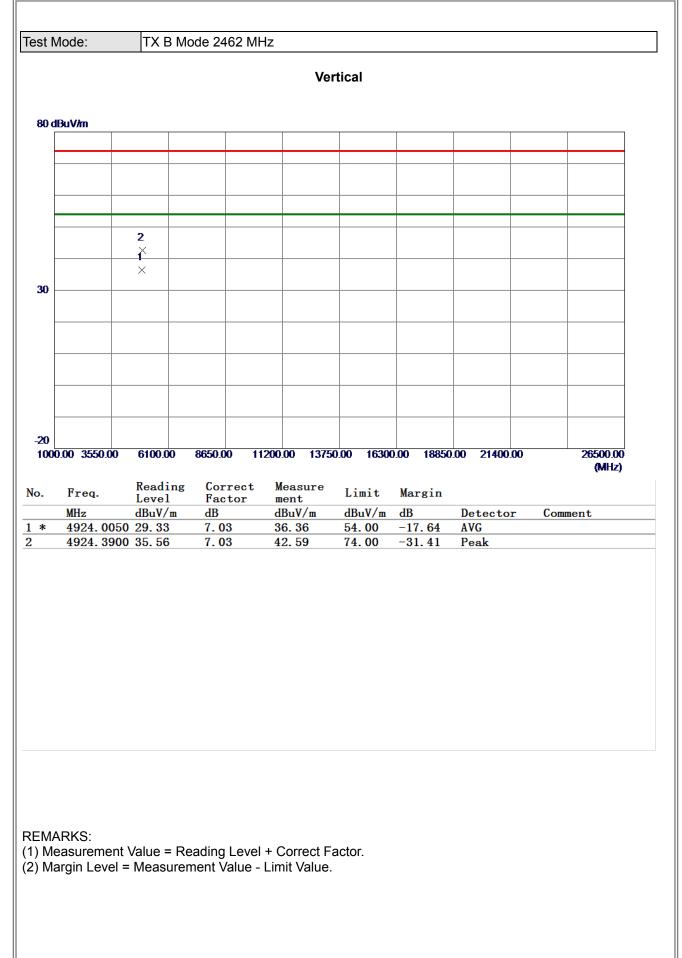


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

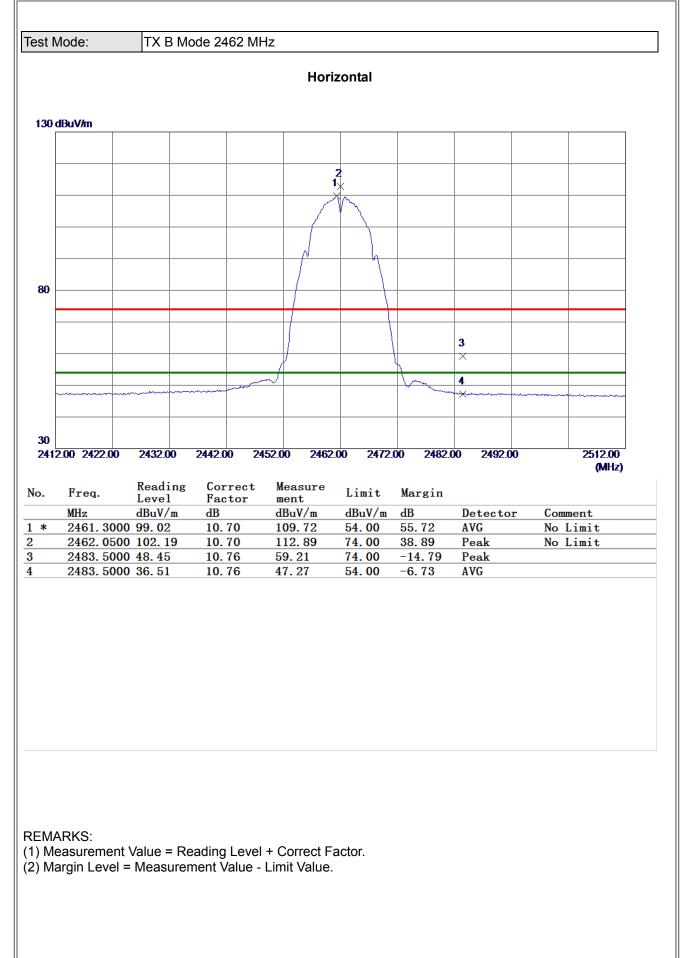








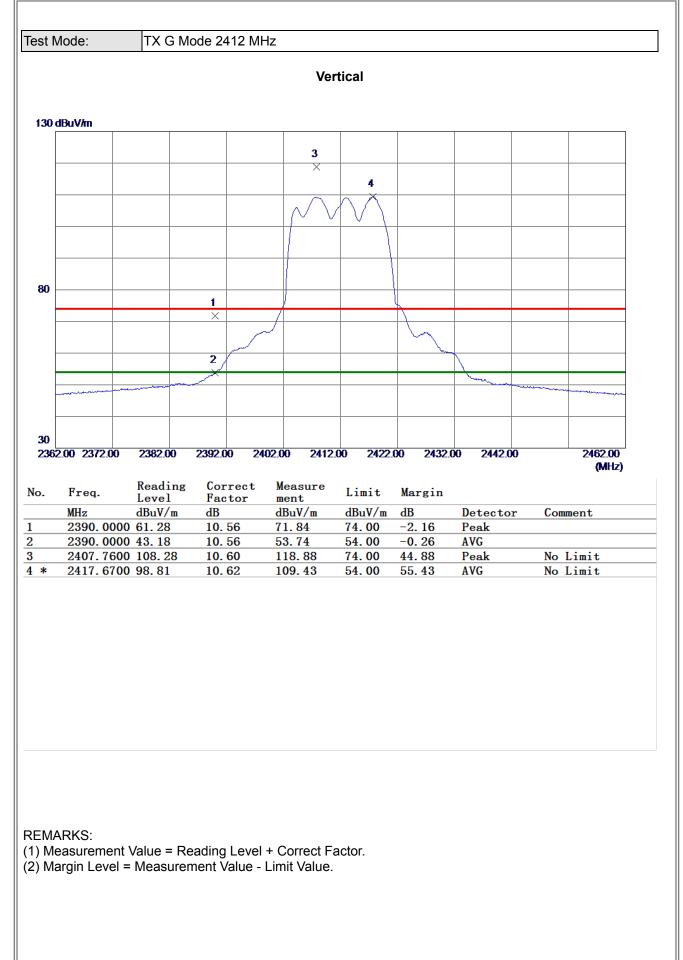




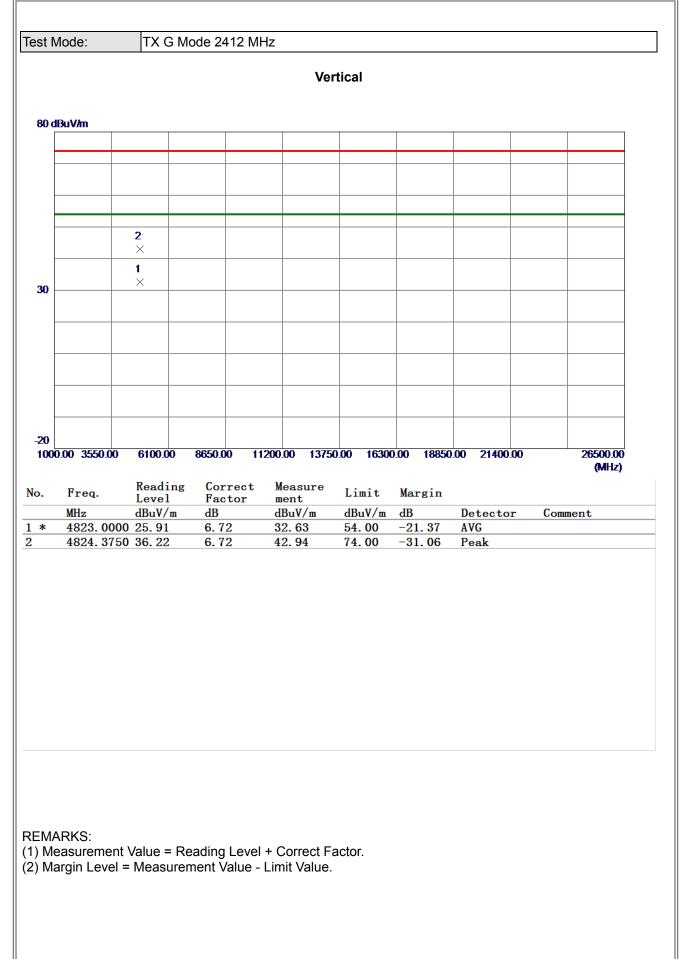


		Mode 2462		orizontal				
80 dBuV/m								
	<b>2</b> ×							
	1							
	×							
0								
-20 1000.00 35	50.00 6100.00	0 8650.00	11200.00 13	750.00 1630	0.00 18850	0.00 21400.	00	26500.00
1000.00 55				130300 1050	0.00 1000	21400		(MHz)
o. Freq	A. Readin Level	ng Corre Facto	ct Measure r ment	' Limit	Margin			
MHz * 4924	dBuV/1 . 0630 31. 35		dBuV/m 38.38	dBuV/m 54.00	dB -15.62	Detecto AVG	r Com	ment
	. 1320 39. 17	7.03	46.20	74.00	-27.80	Peak		

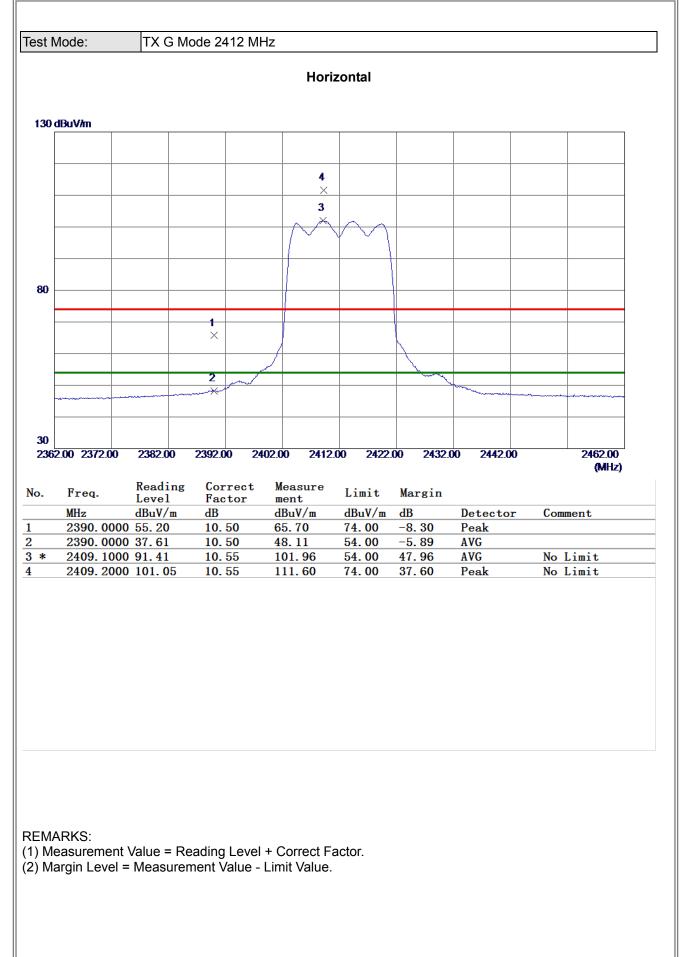




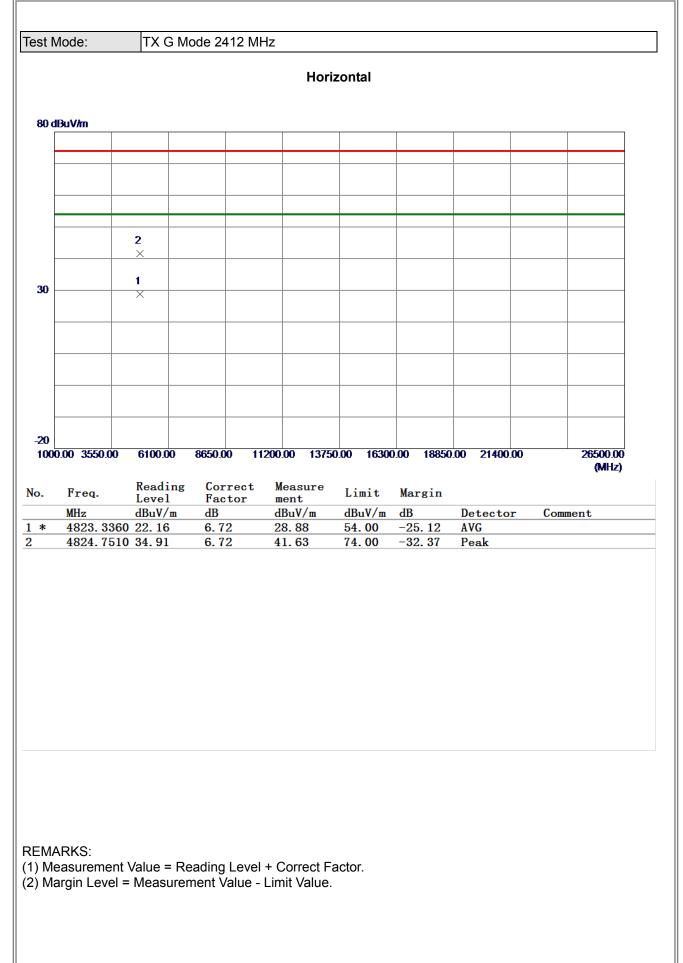




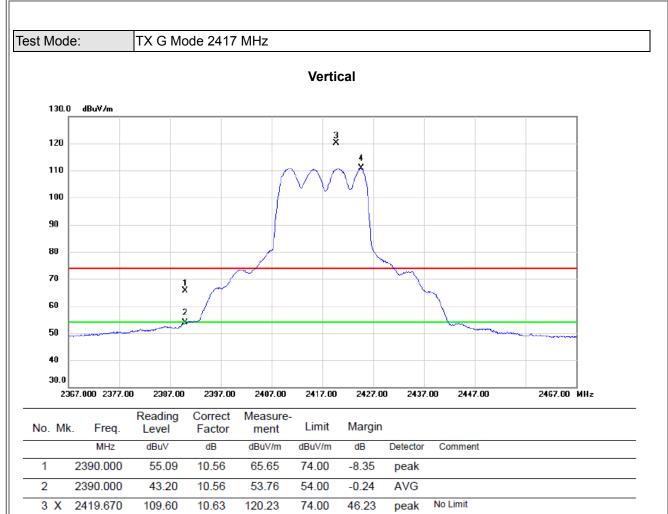












4 \*

2424.720

100.27

10.64

110.91

54.00

56.91

AVG

No Limit

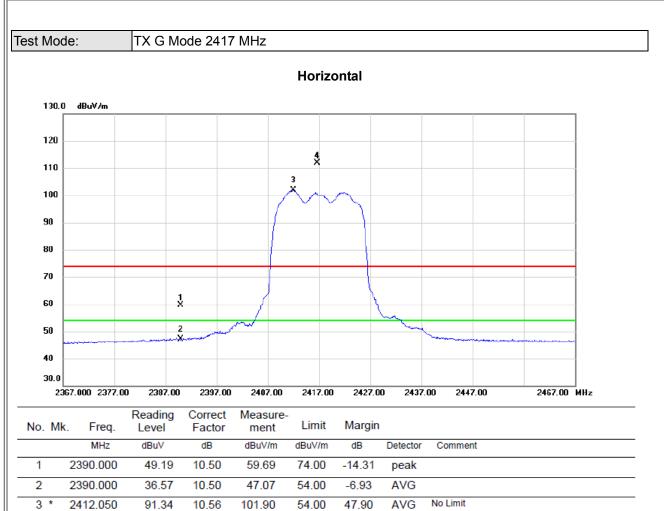
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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





4 X 2416.700

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

101.27

10.57

111.84

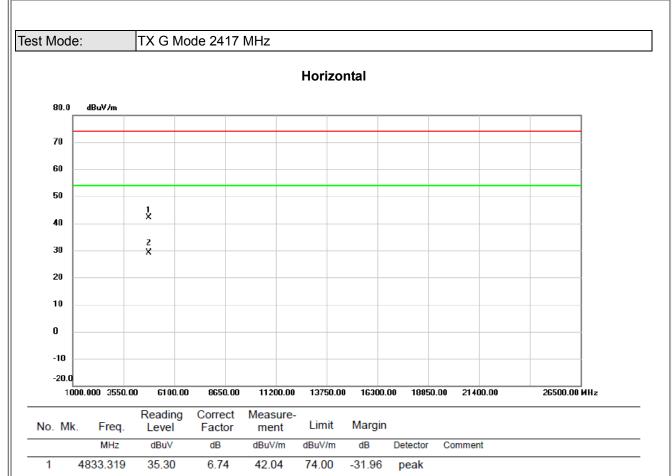
74.00

37.84

No Limit

peak





2 \* 4834.346

22.46

6.75

29.21

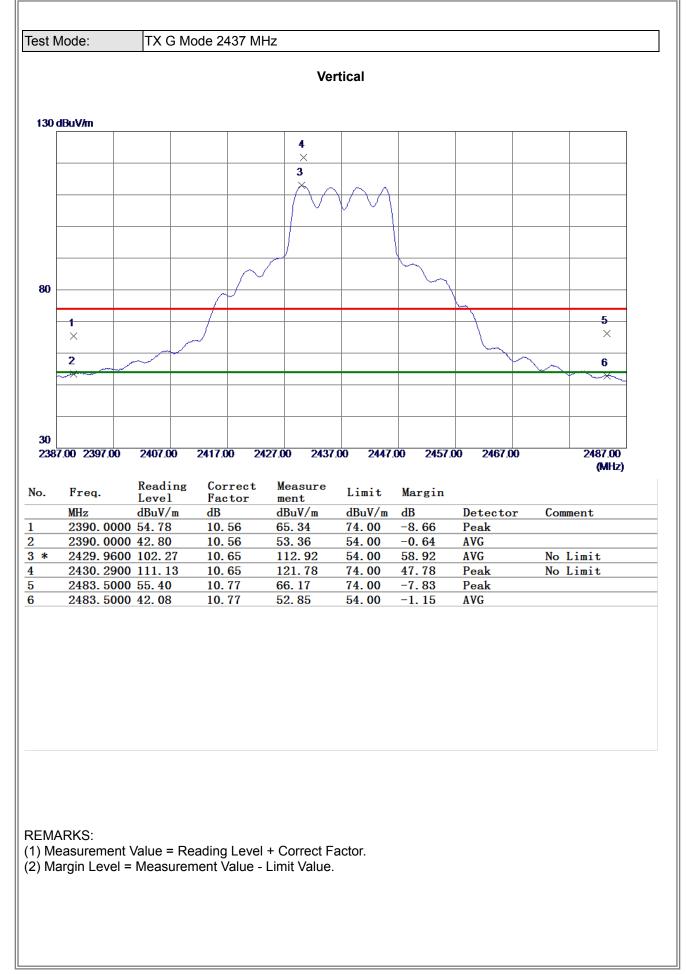
54.00

-24.79

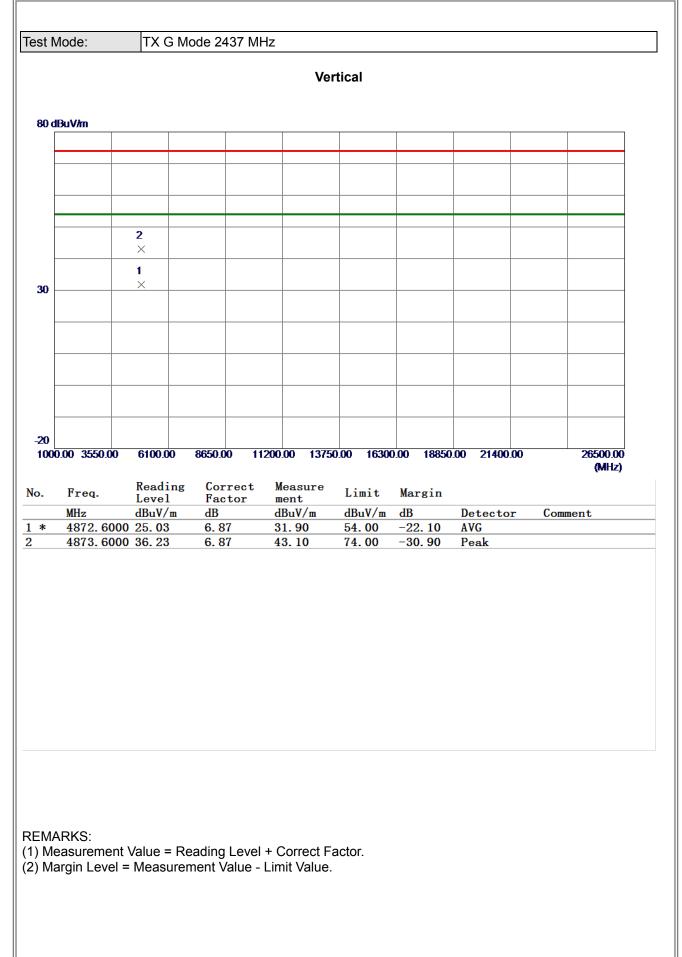
AVG

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

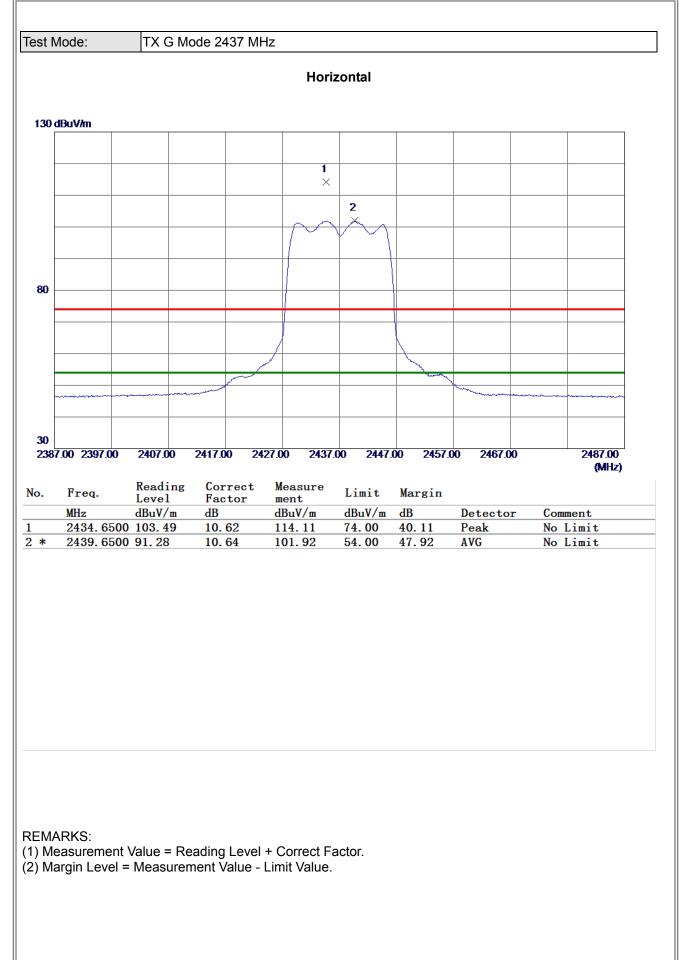




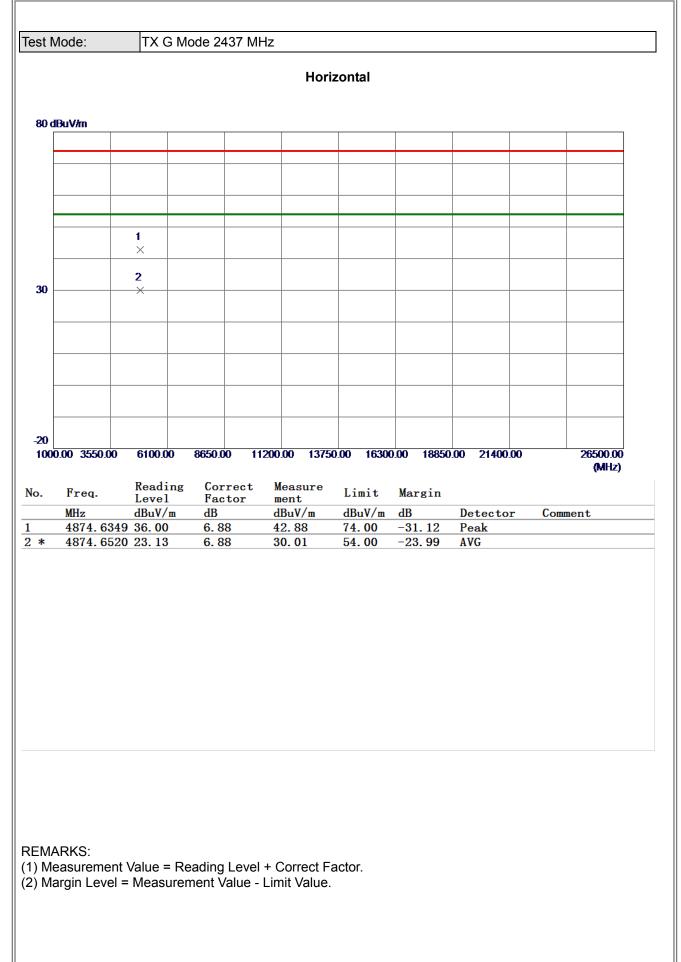




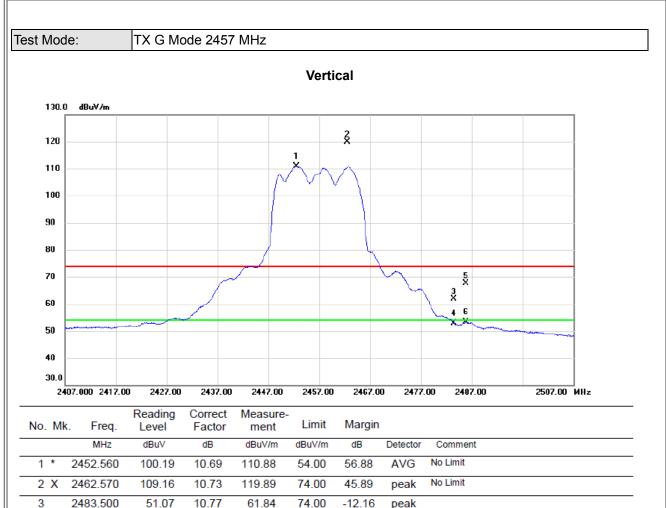












4

5

6

2483.500

2485.800

2485.800

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

42.22

56.74

42.48

10.77

10.78

10.78

52.99

67.52

53.26

54.00

74.00

54.00

-1.01

-6.48

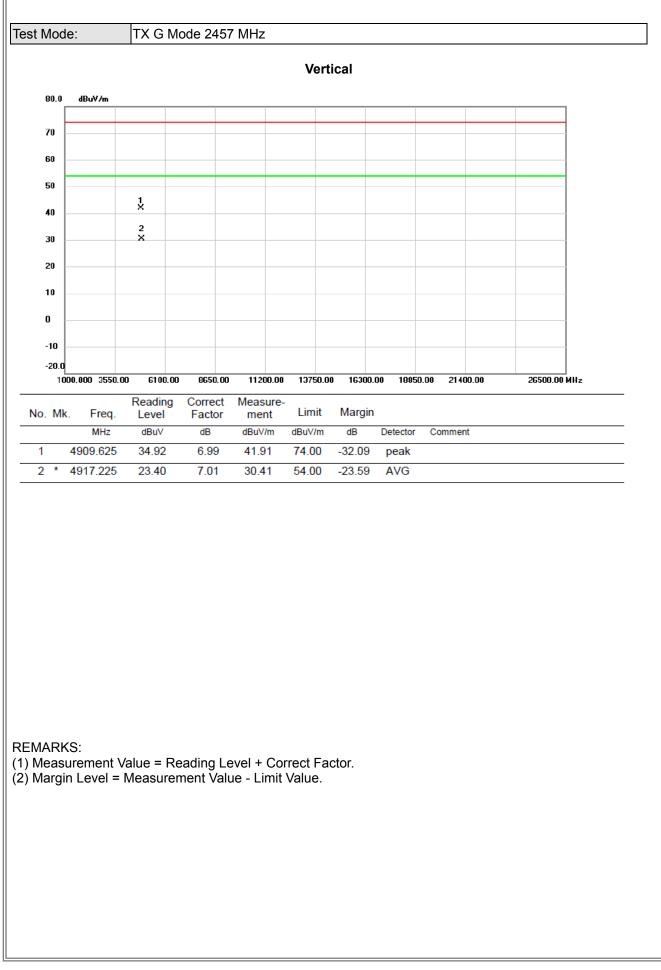
-0.74

AVG

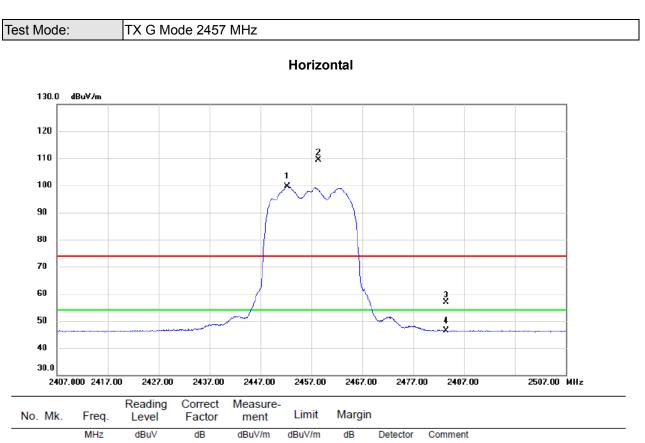
peak

AVG





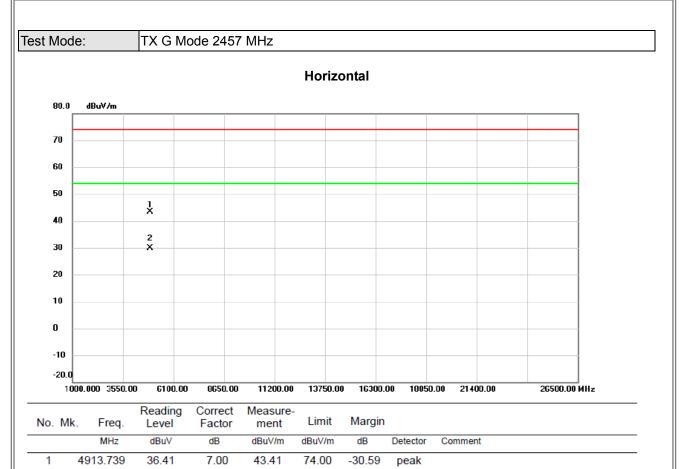




	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
 1 *	2452.300	88.98	10.67	99.65	54.00	45.65	AVG	No Limit
 2 X	2458.400	98.67	10.69	109.36	74.00	35.36	peak	No Limit
 3	2483.500	46.22	10.76	56.98	74.00	-17.02	peak	
 4	2483.500	35.53	10.76	46.29	54.00	-7.71	AVG	

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





2 \* 4914.386

22.80

7.00

29.80

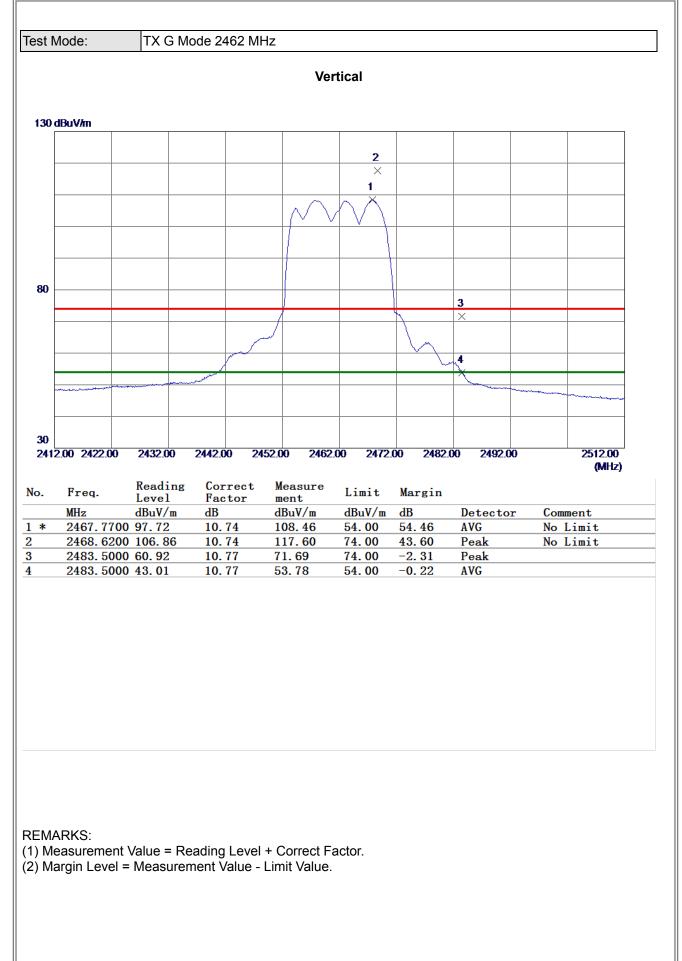
54.00

-24.20

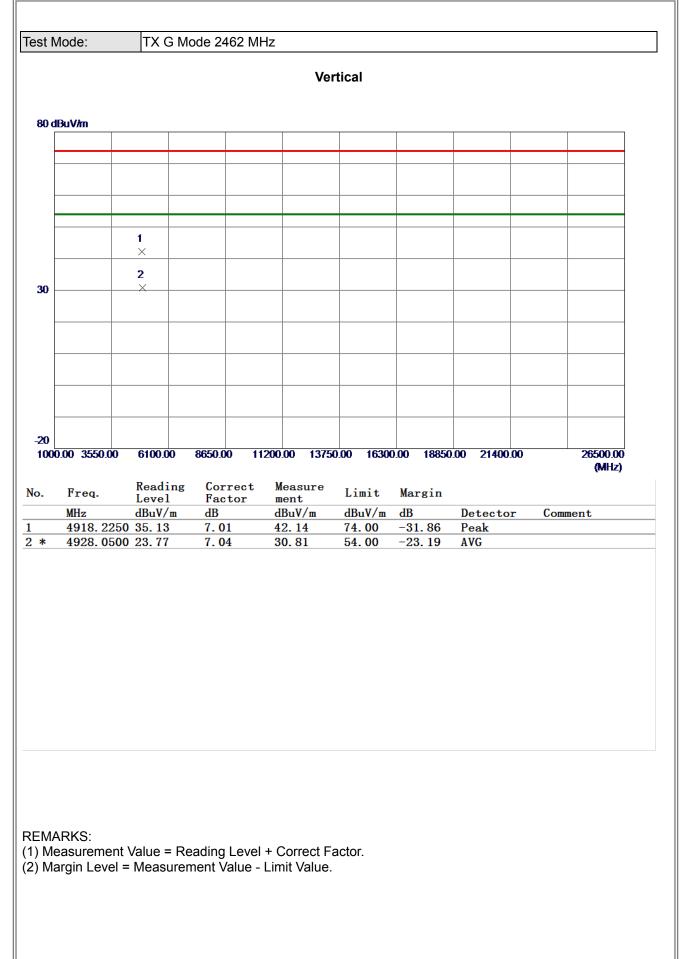
AVG

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

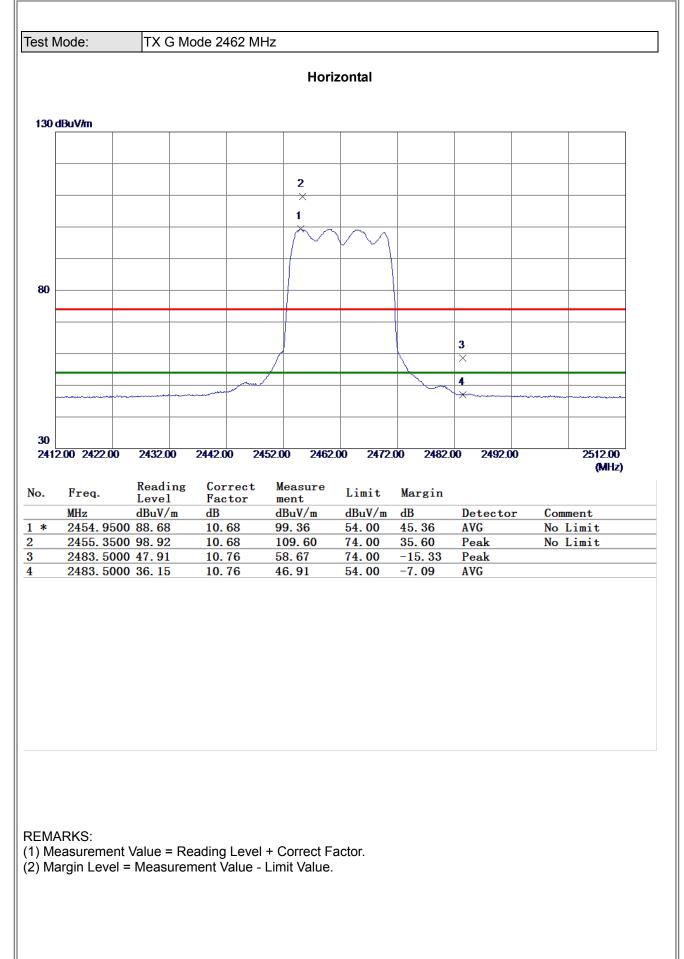




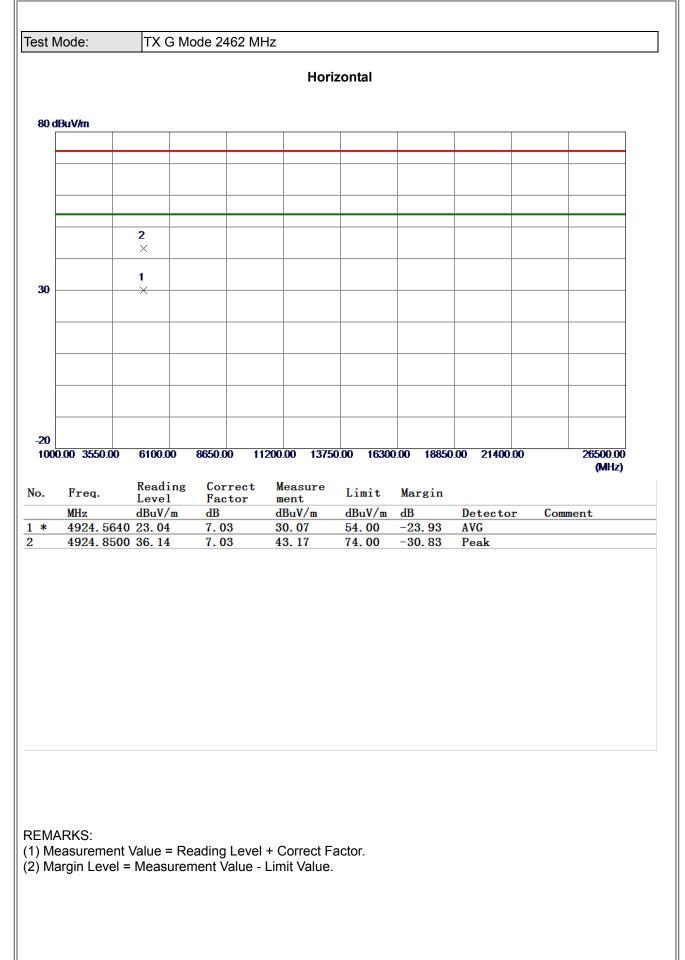




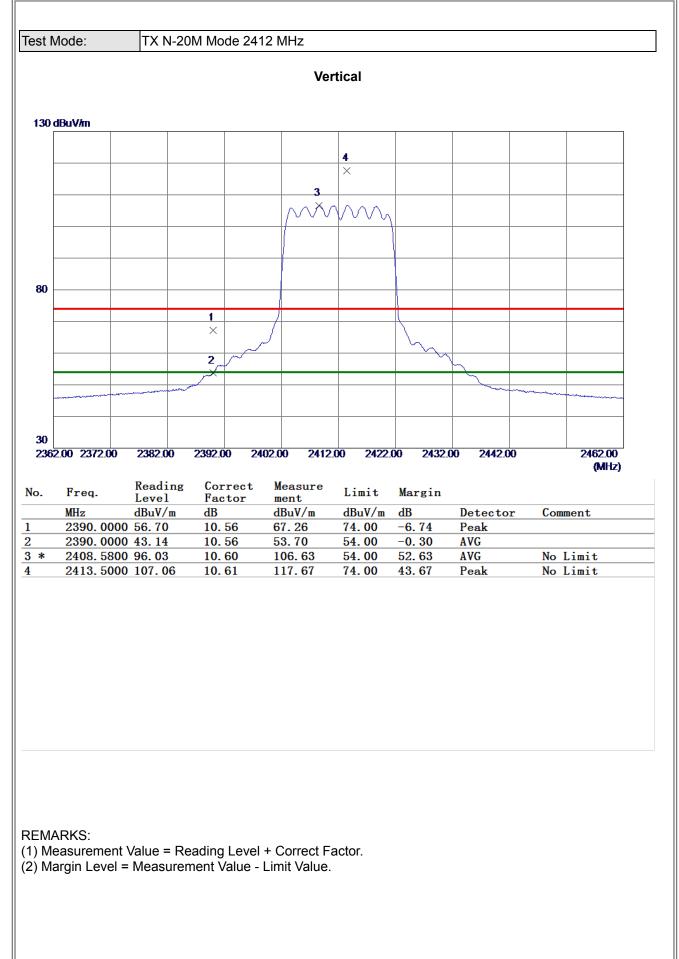




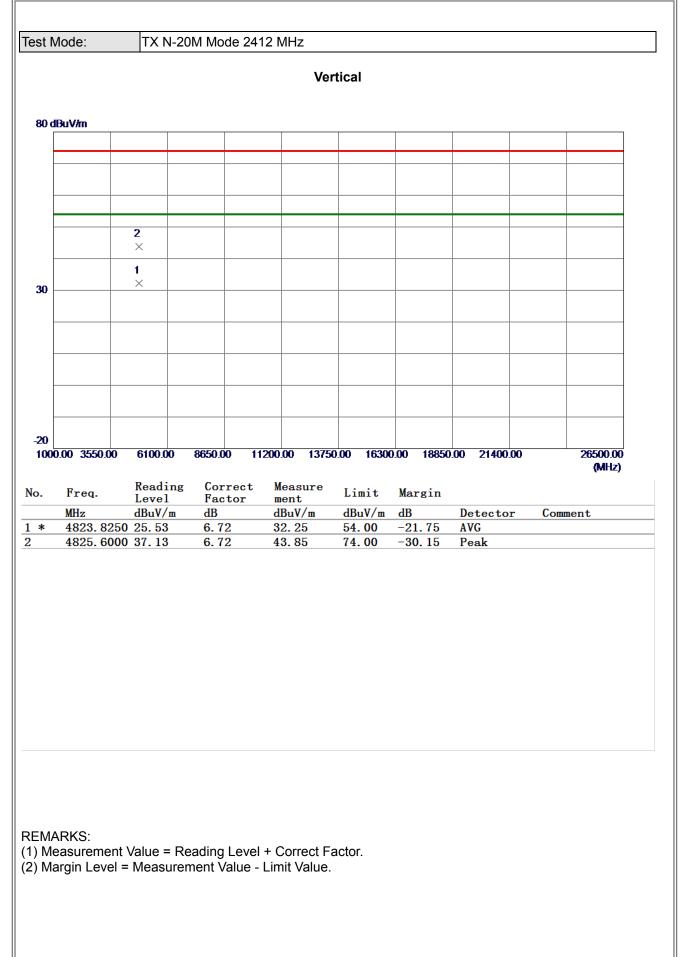




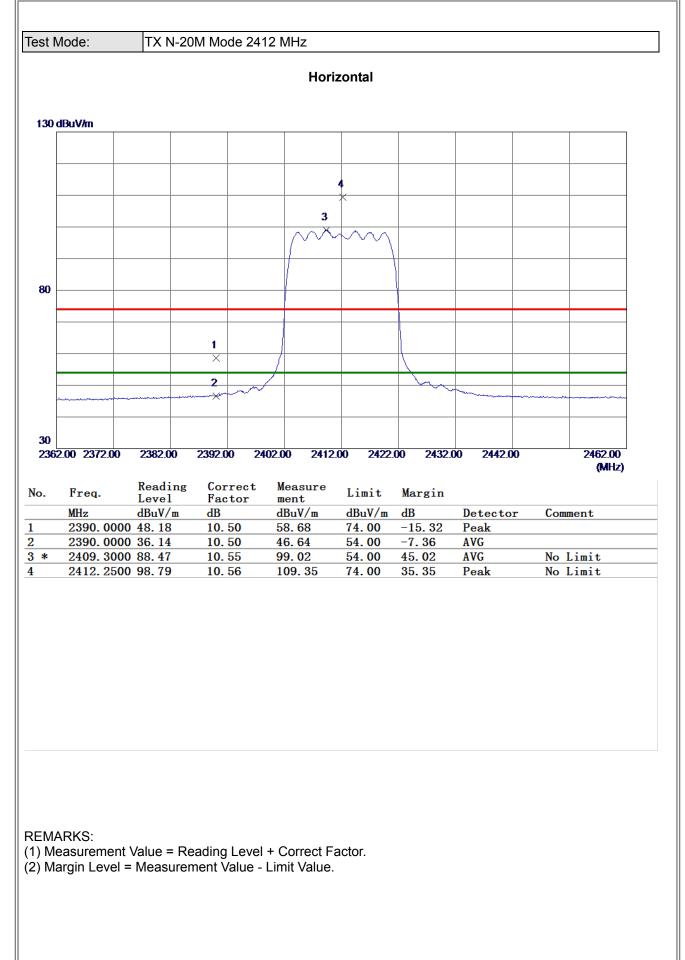




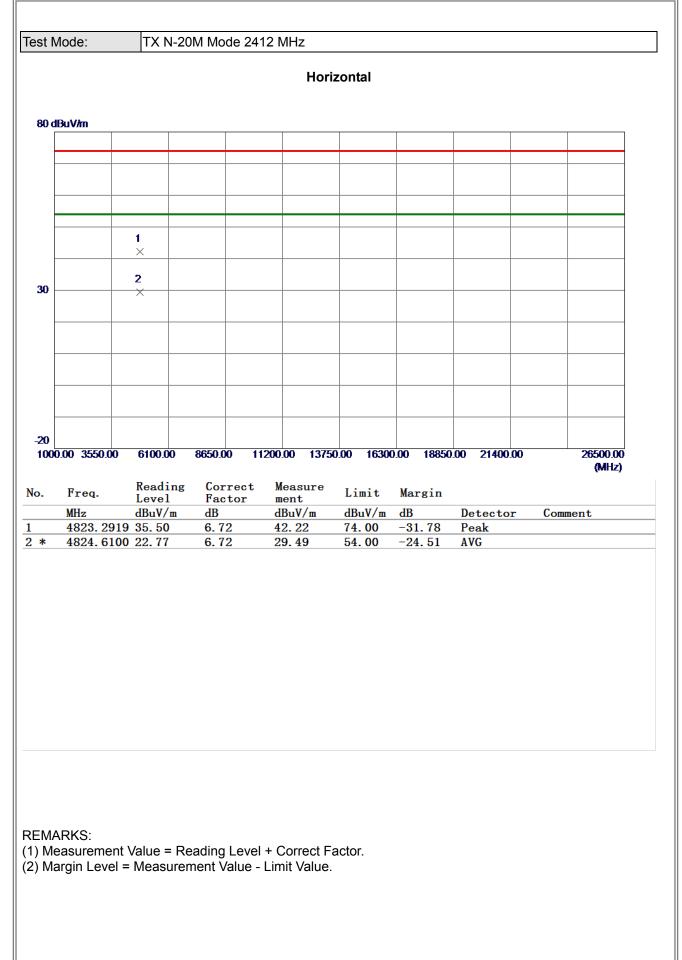




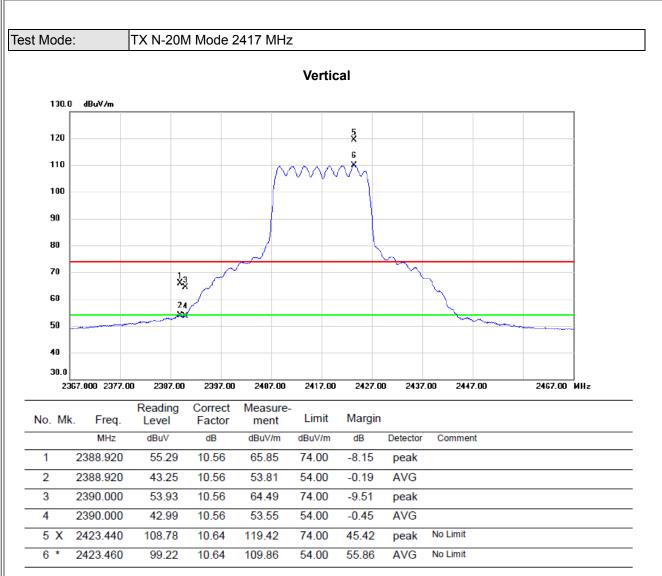






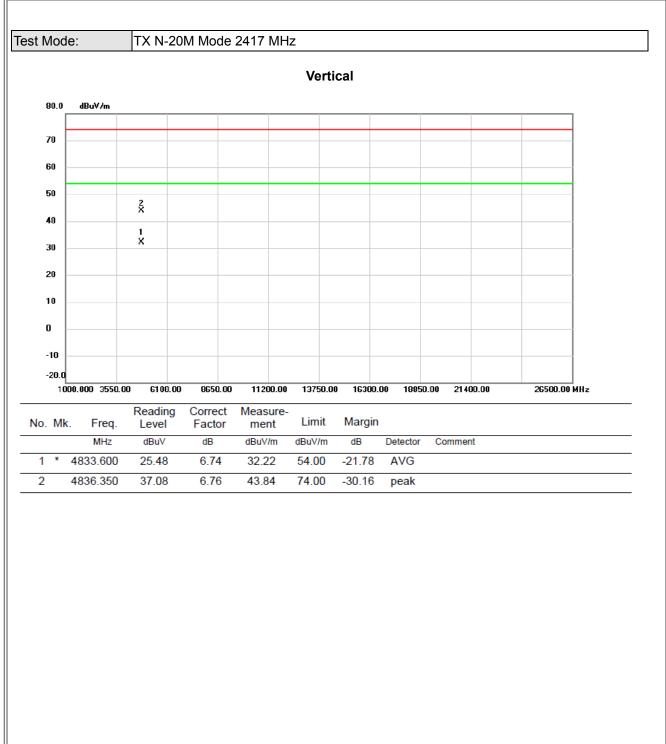






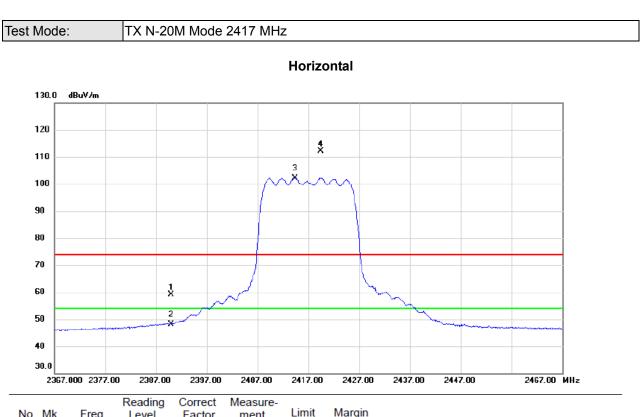
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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

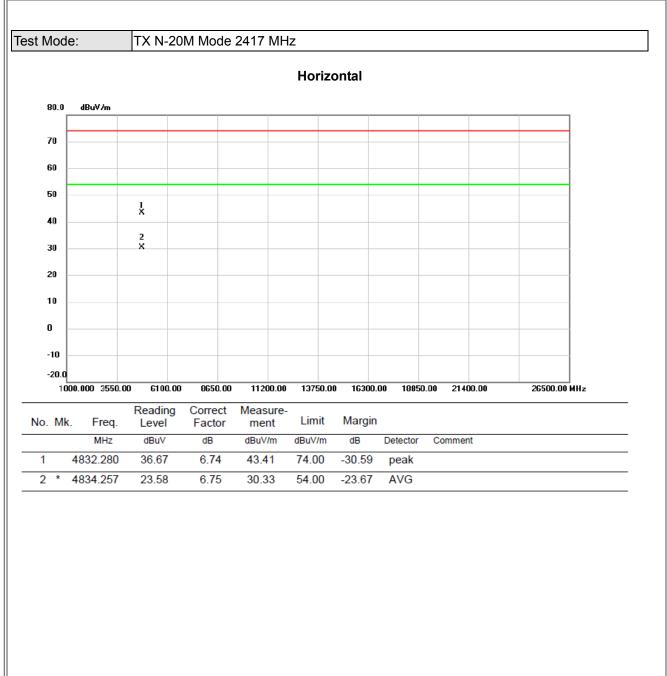




No.	Mk.	Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	1	2390.000	48.63	10.50	59.13	74.00	-14.87	peak	
2	1	2390.000	37.62	10.50	48.12	54.00	-5.88	AVG	
3	* 4	2414.350	91.67	10.56	102.23	54.00	48.23	AVG	No Limit
4	X	2419.500	101.49	10.58	112.07	74.00	38.07	peak	No Limit

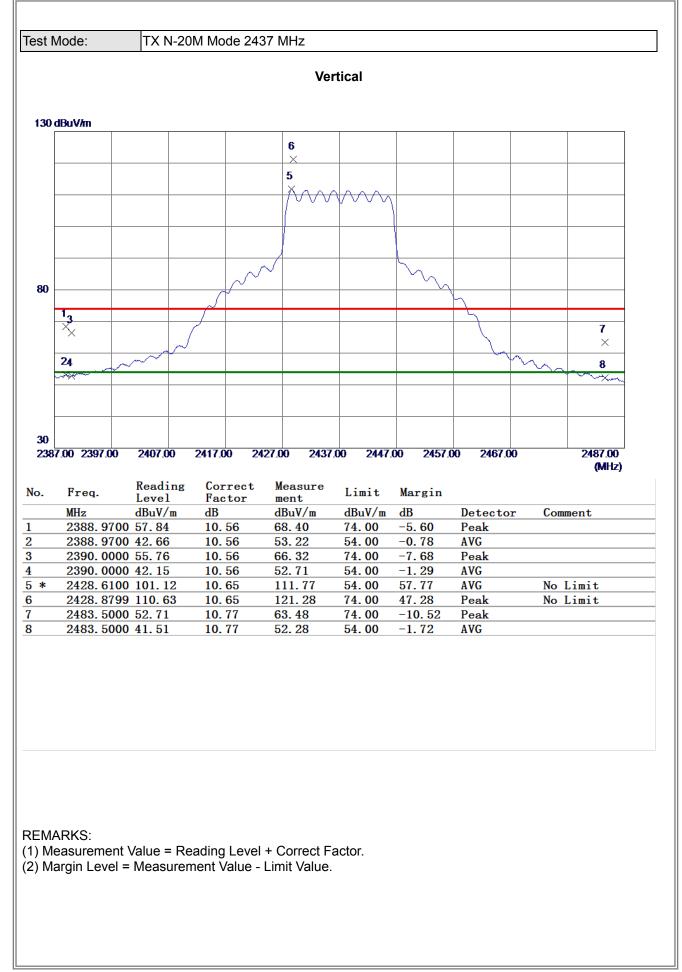
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



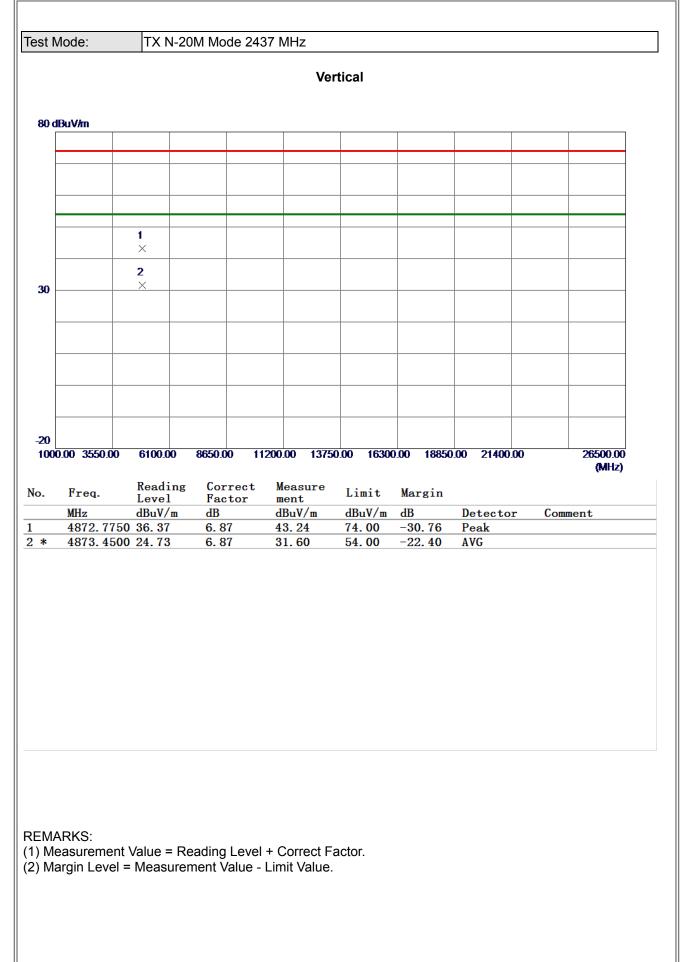


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

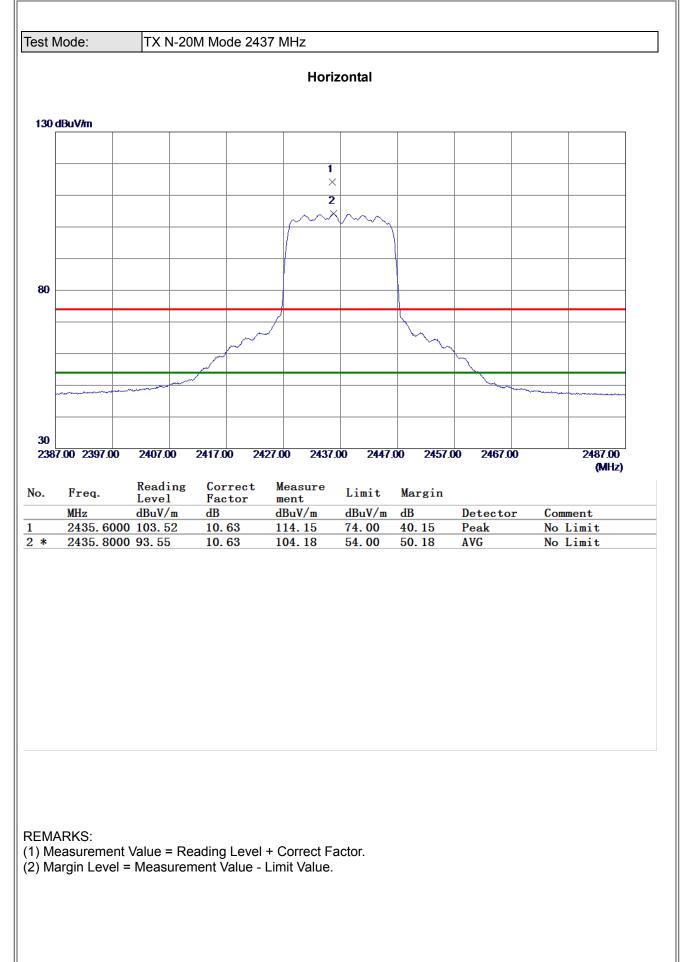




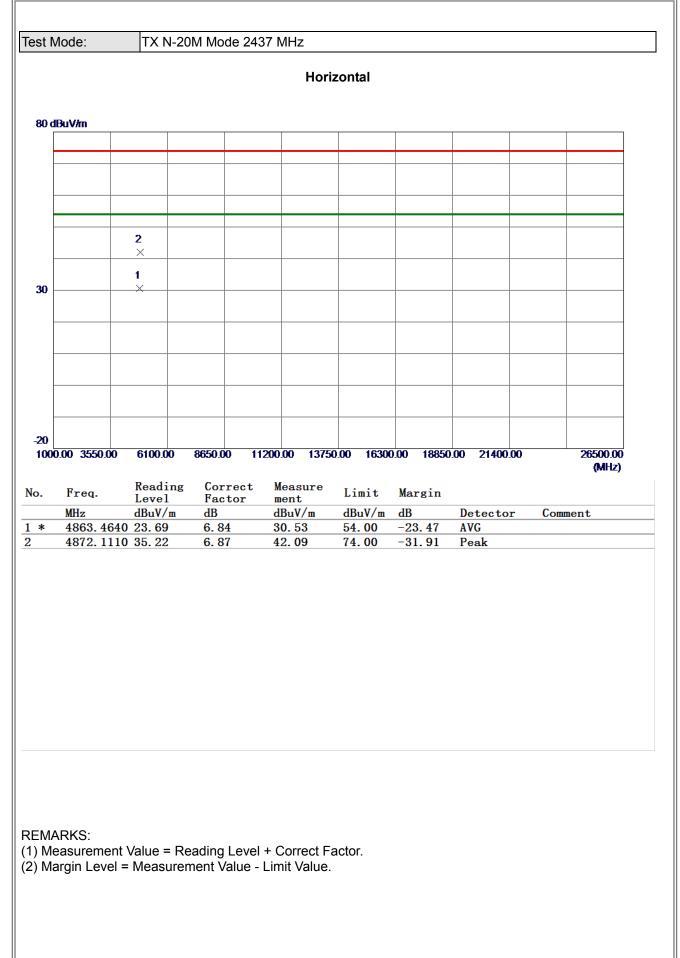




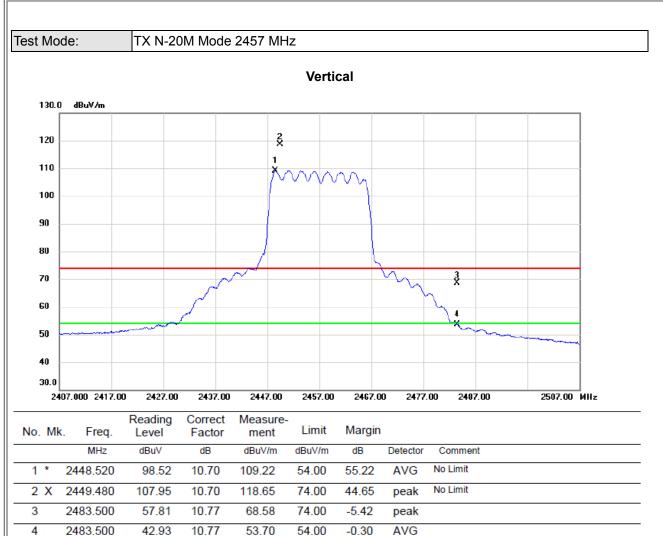






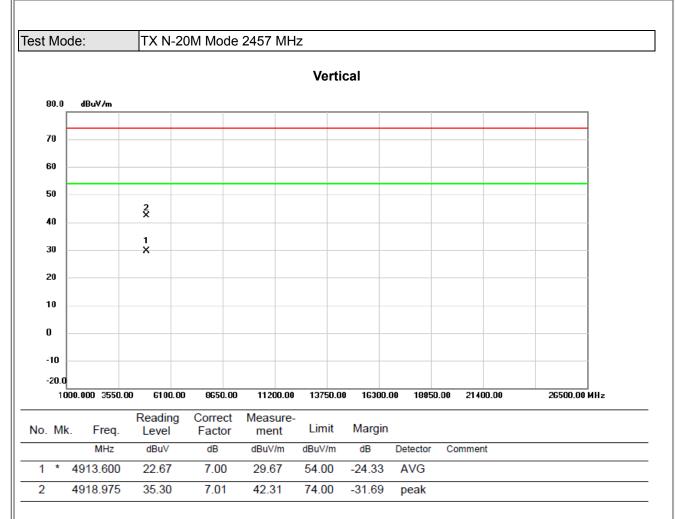






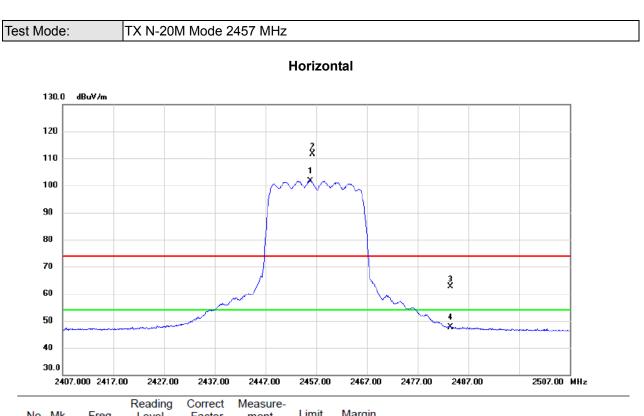
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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

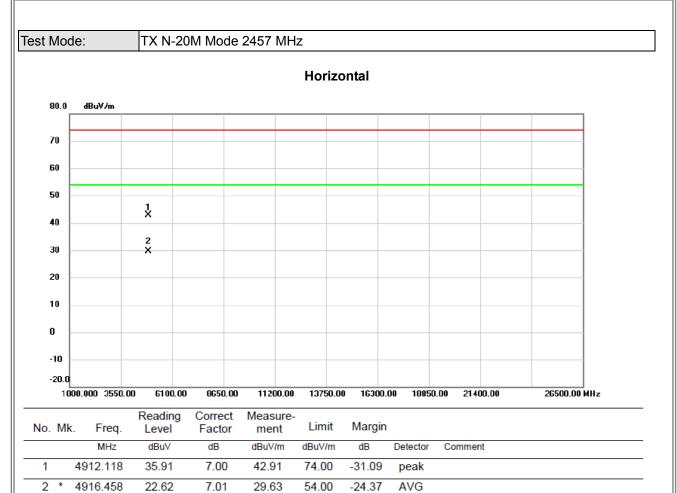




No. Mk	. Freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2455.800	91.04	10.68	101.72	54.00	47.72	AVG	No Limit
2 X	2456.250	101.05	10.68	111.73	74.00	37.73	peak	No Limit
3	2483.500	51.83	10.76	62.59	74.00	-11.41	peak	
4	2483.500	36.95	10.76	47.71	54.00	-6.29	AVG	

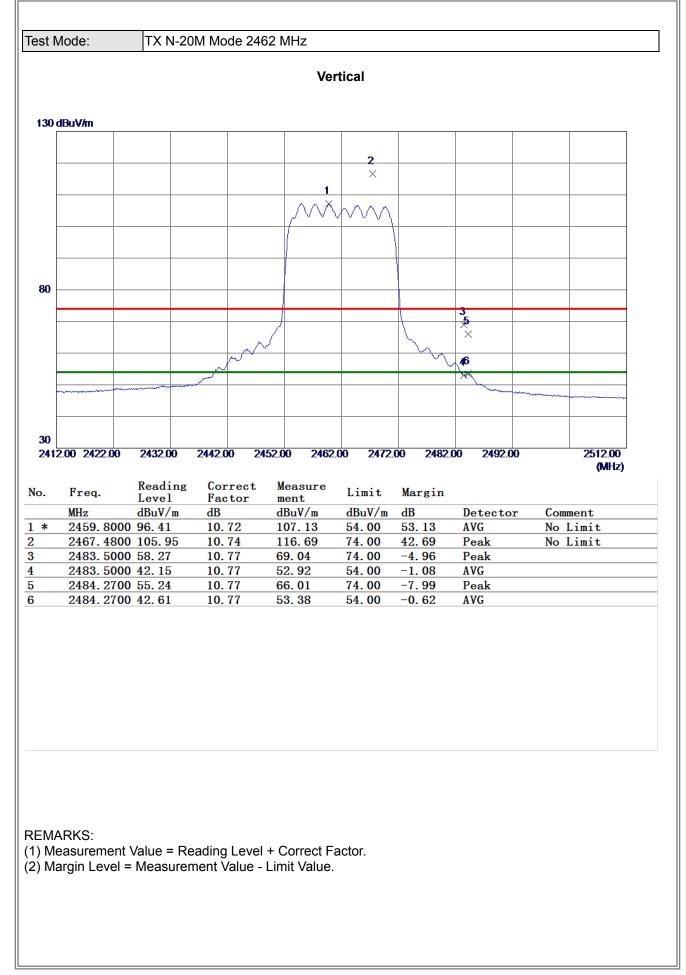
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



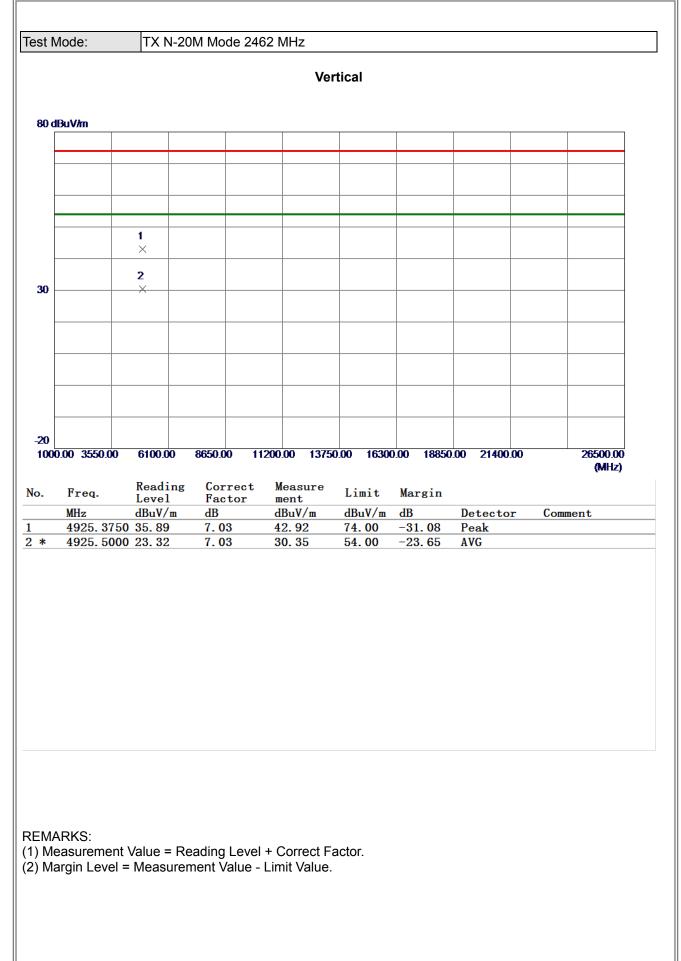


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

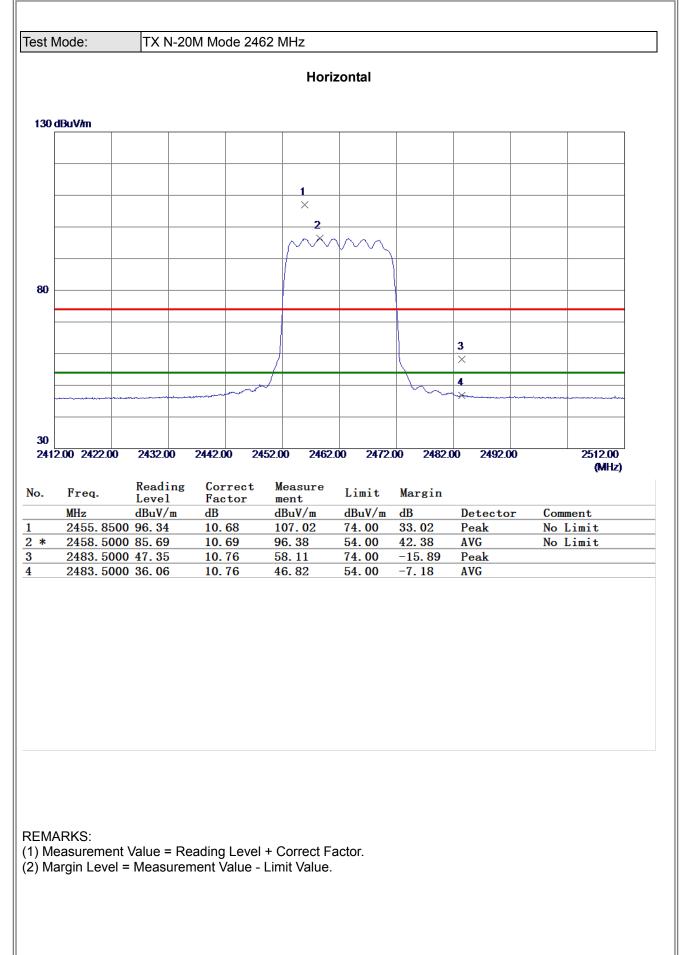




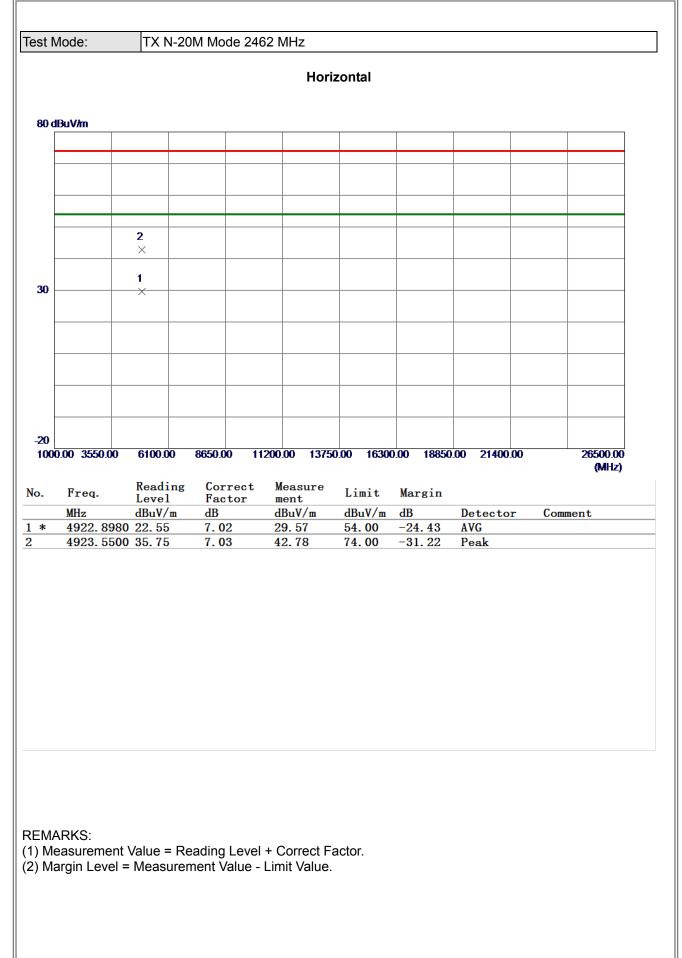




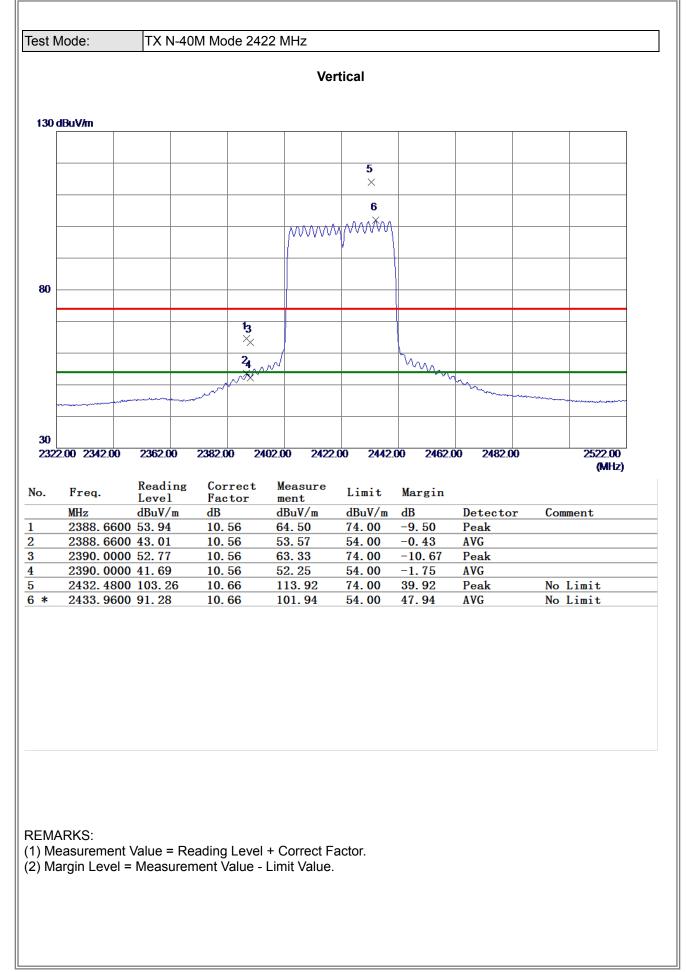




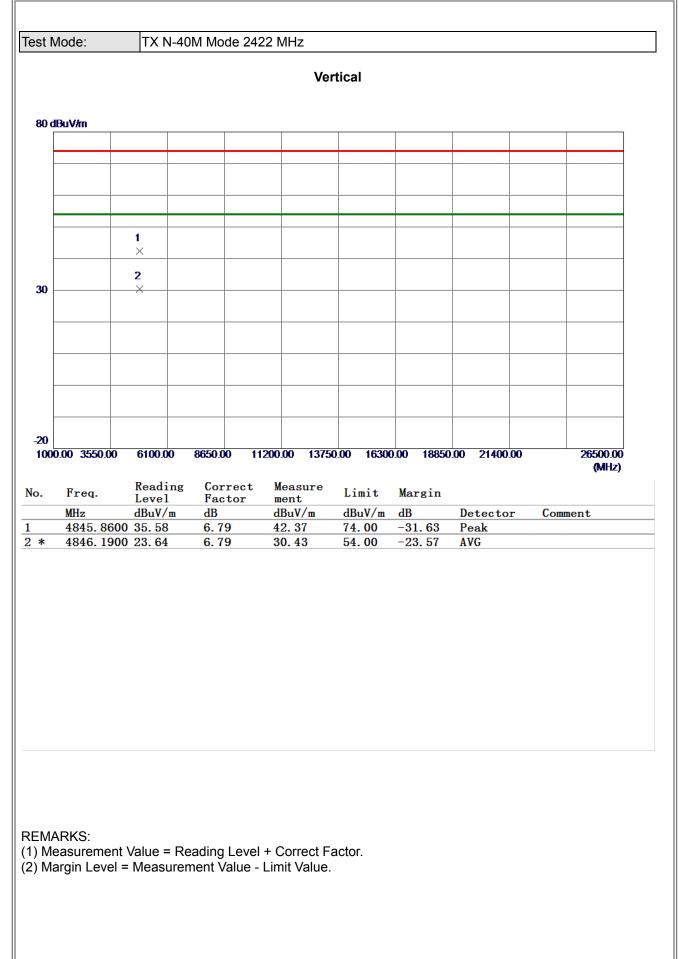




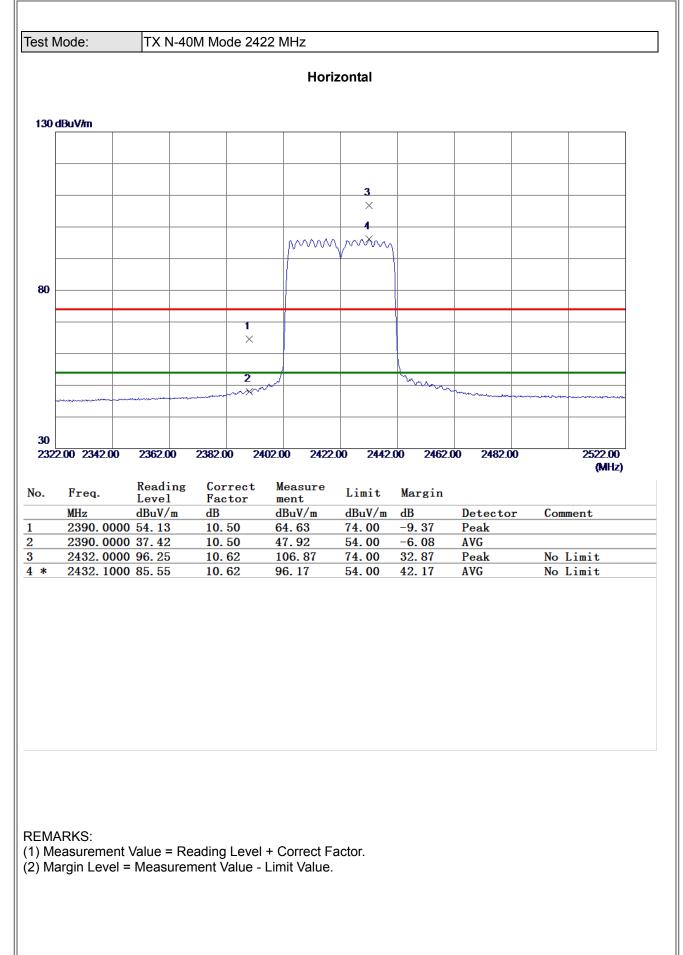




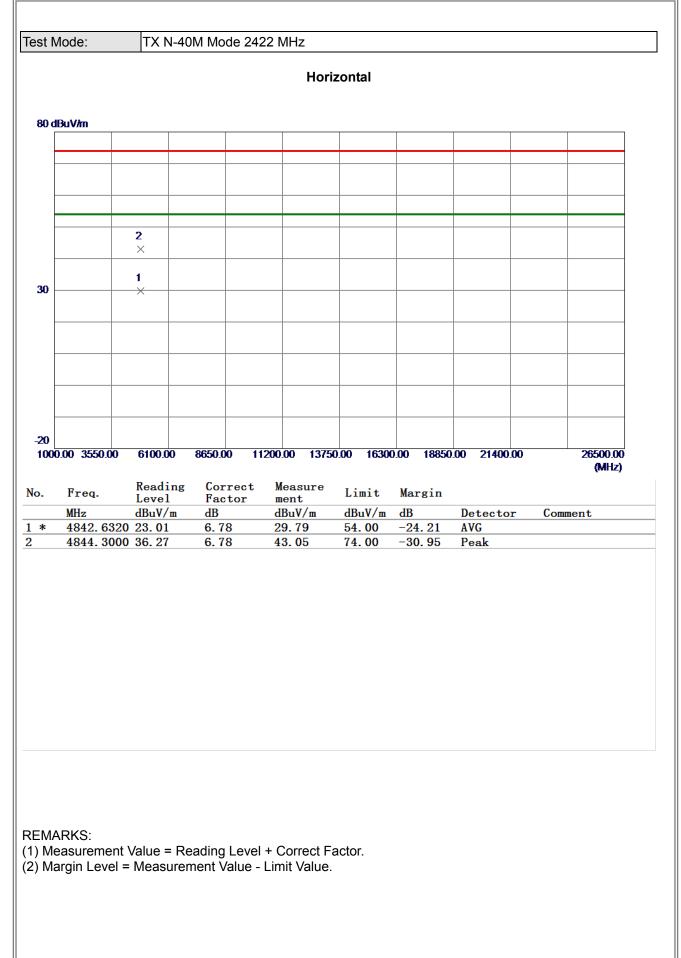




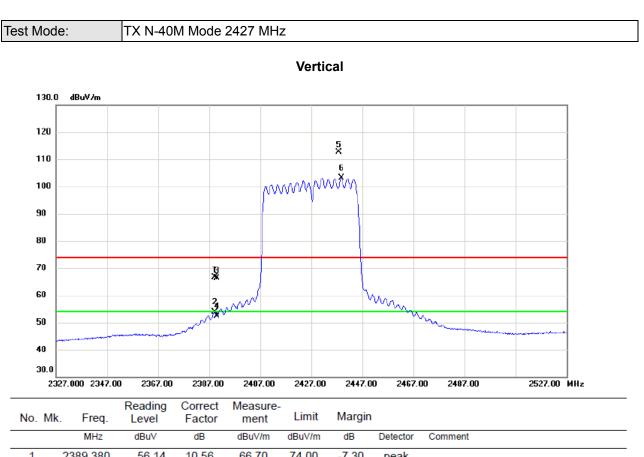








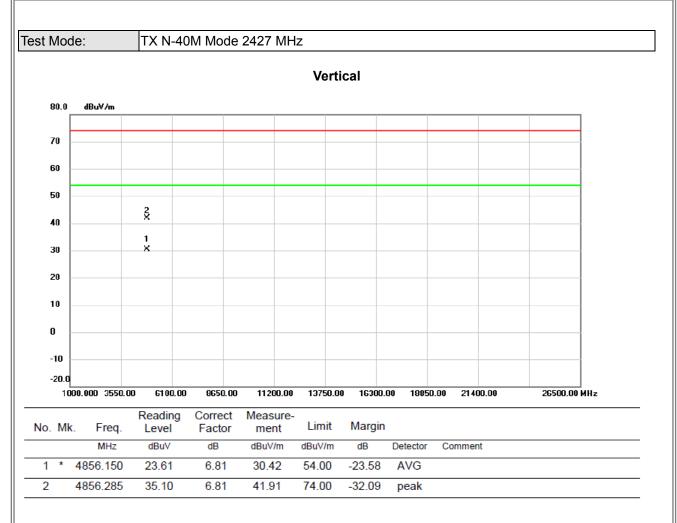




_		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
_	1	2389.380	56.14	10.56	66.70	74.00	-7.30	peak	
_	2	2389.380	43.21	10.56	53.77	54.00	-0.23	AVG	
	3	2390.000	55.89	10.56	66.45	74.00	-7.55	peak	
	4	2390.000	41.85	10.56	52.41	54.00	-1.59	AVG	
	5 X	2437.760	101.90	10.67	112.57	74.00	38.57	peak	No Limit
_	6 *	2438.920	92.42	10.67	103.09	54.00	49.09	AVG	No Limit

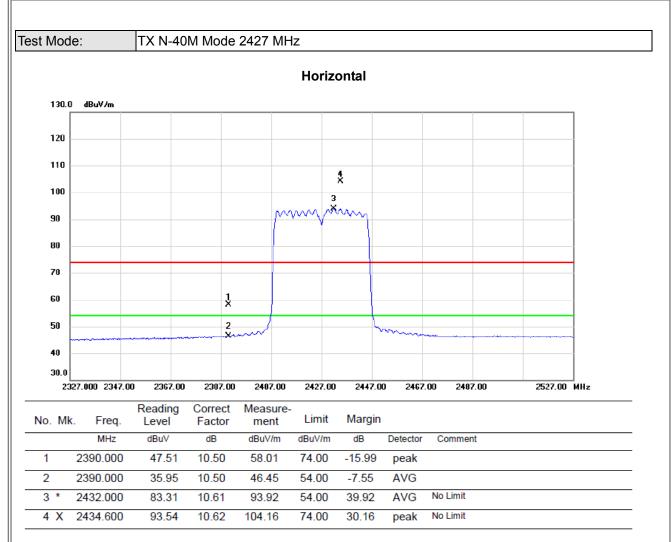
- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.





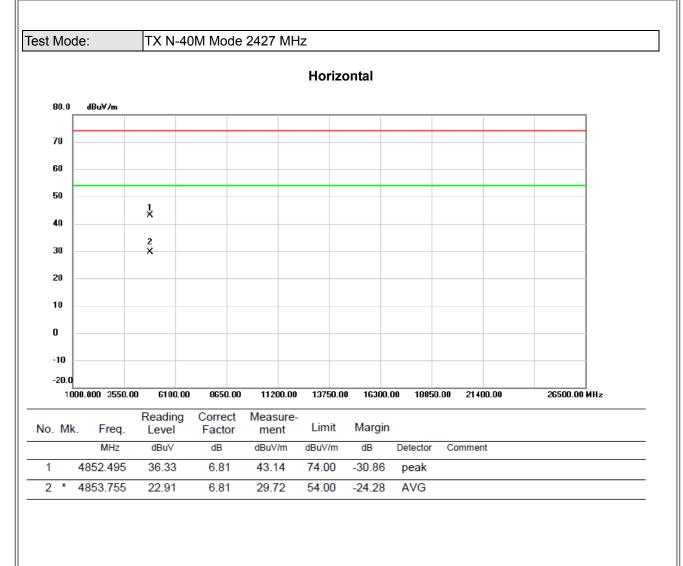
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





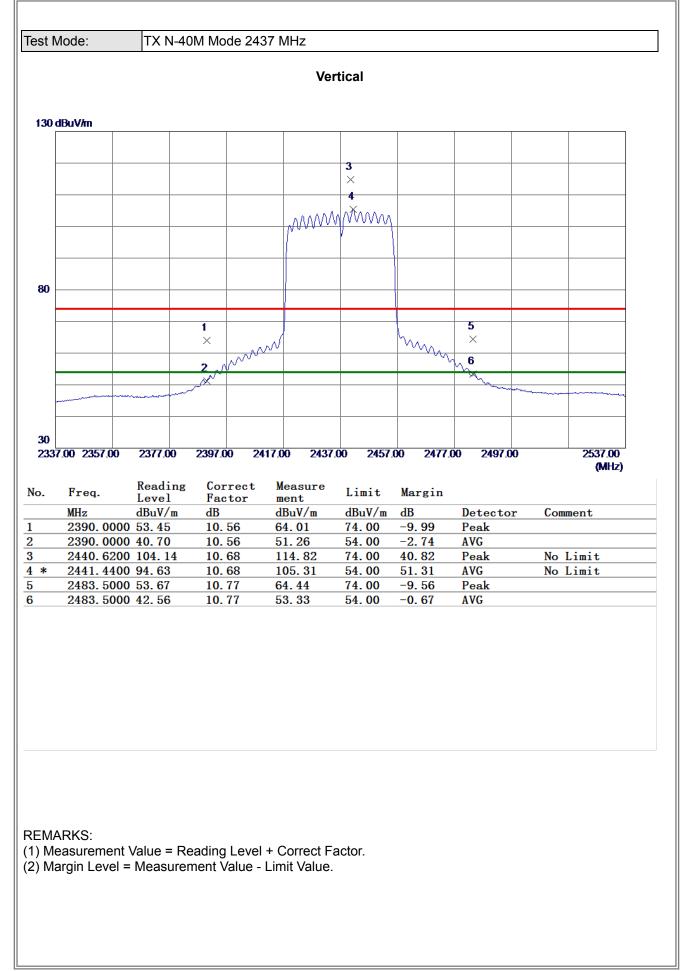
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



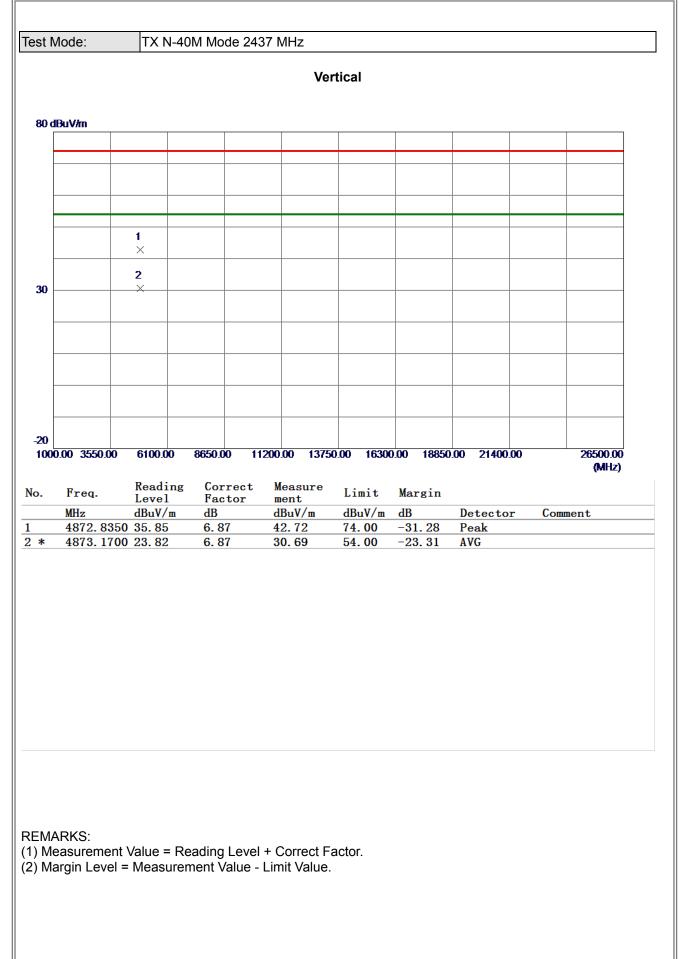


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.

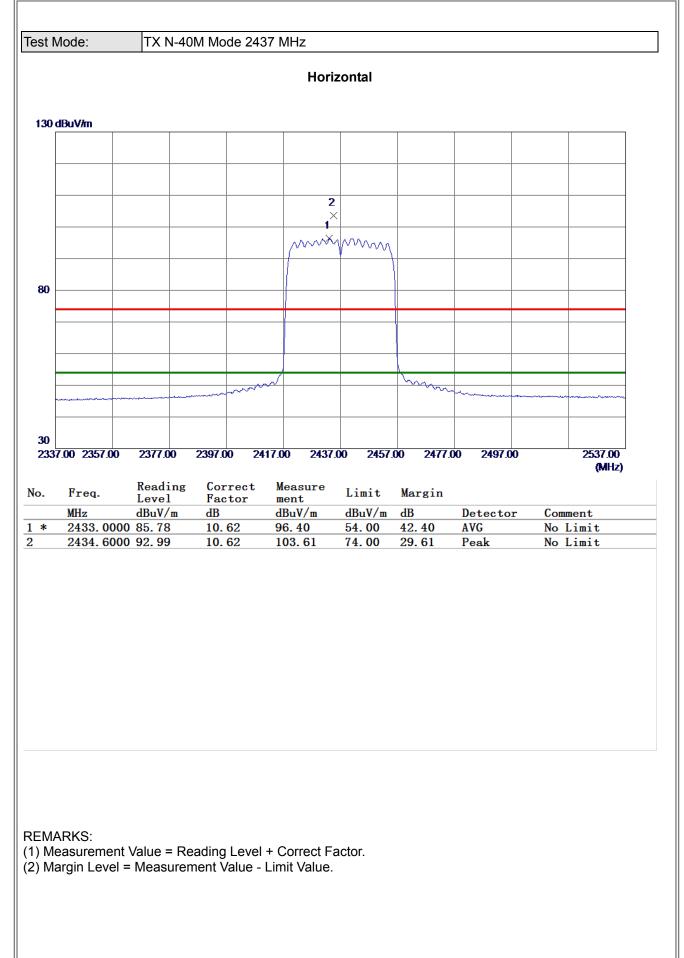




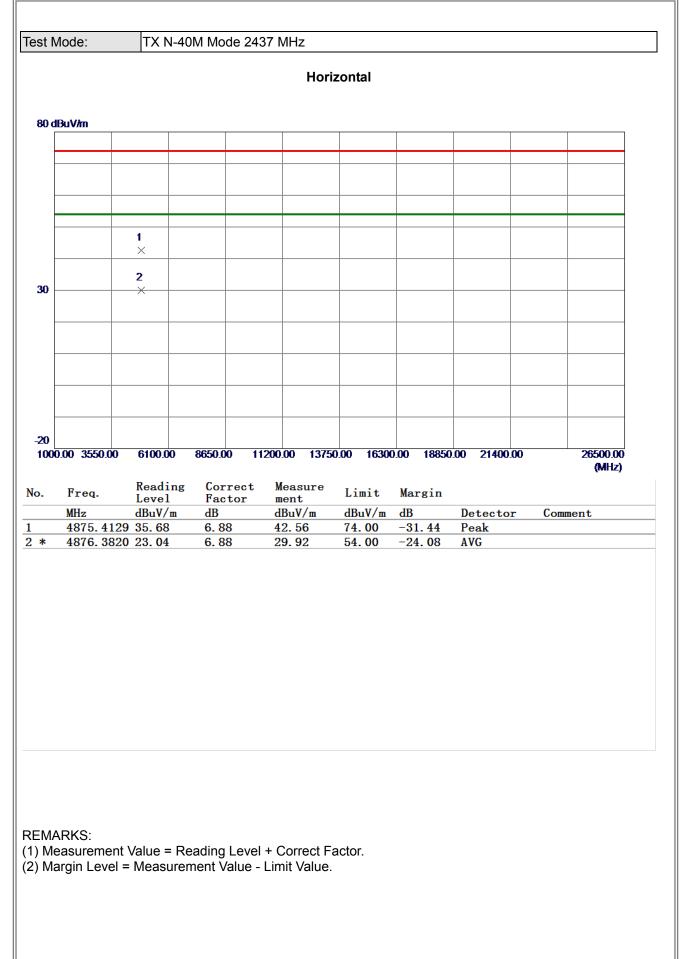




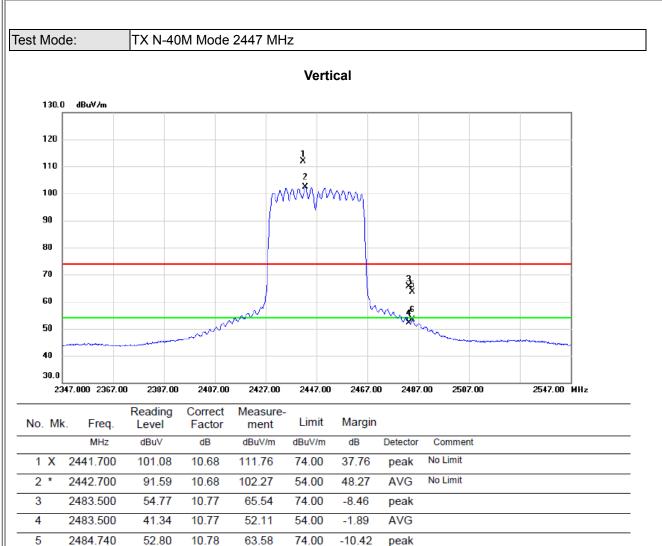












-10.42

-0.73

54.00

peak

AVG

**REMARKS:** 

5

6

2484,740

(1) Measurement Value = Reading Level + Correct Factor.

10.78

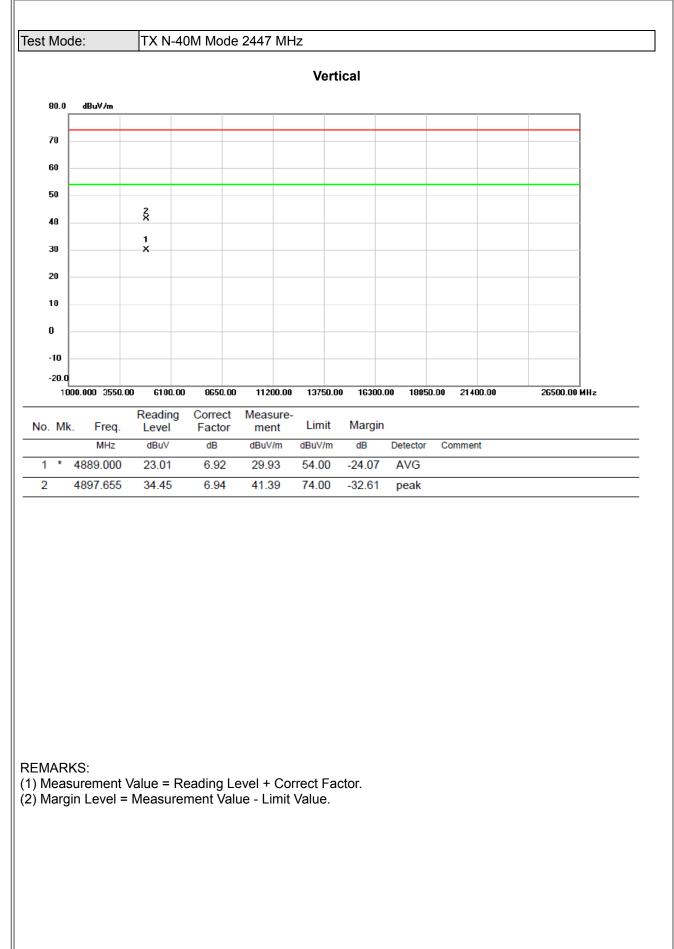
10.78

53.27

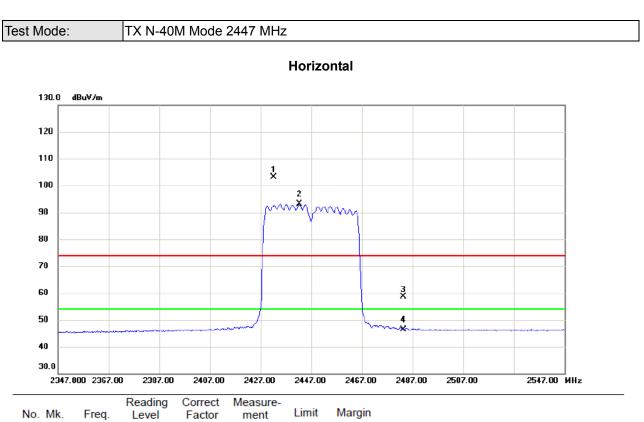
42.49

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





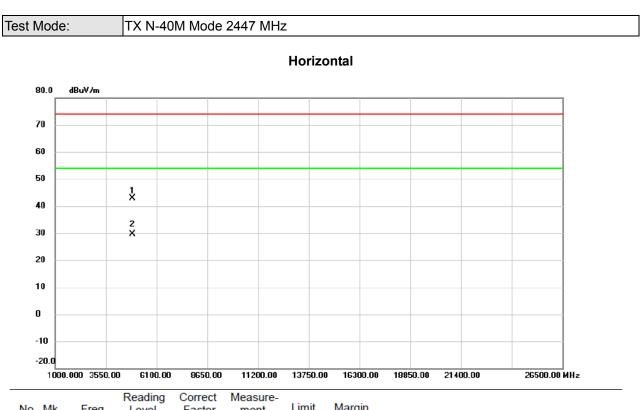




No. Mk	. Freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 X	2432.200	92.56	10.61	103.17	74.00	29.17	peak	No Limit
2 *	2442.300	82.49	10.64	93.13	54.00	39.13	AVG	No Limit
3	2483.500	47.80	10.76	58.56	74.00	-15.44	peak	
4	2483.500	35.61	10.76	46.37	54.00	-7.63	AVG	

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

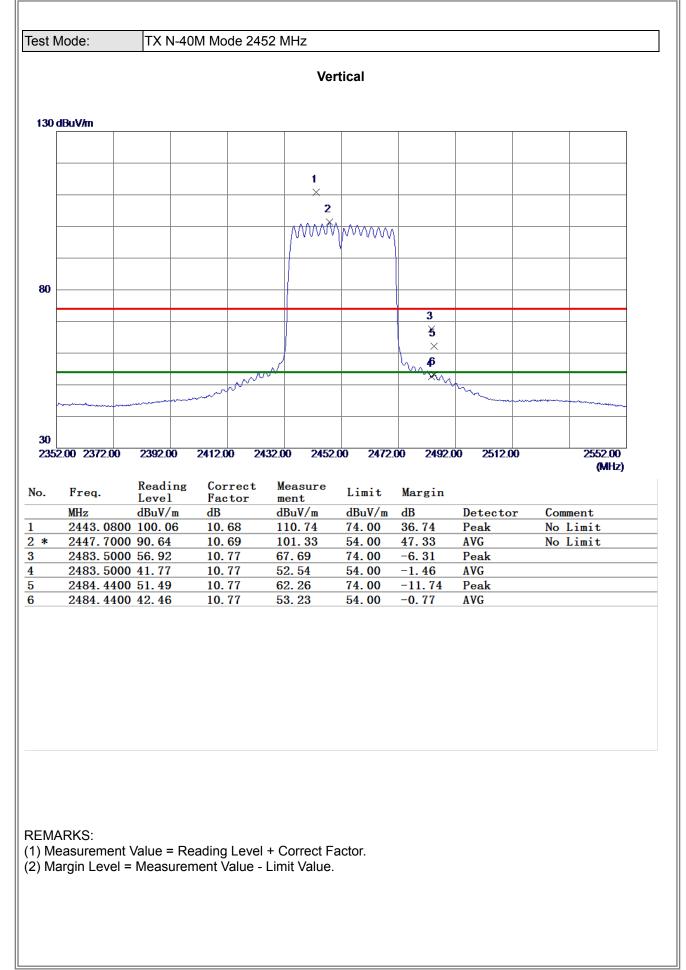




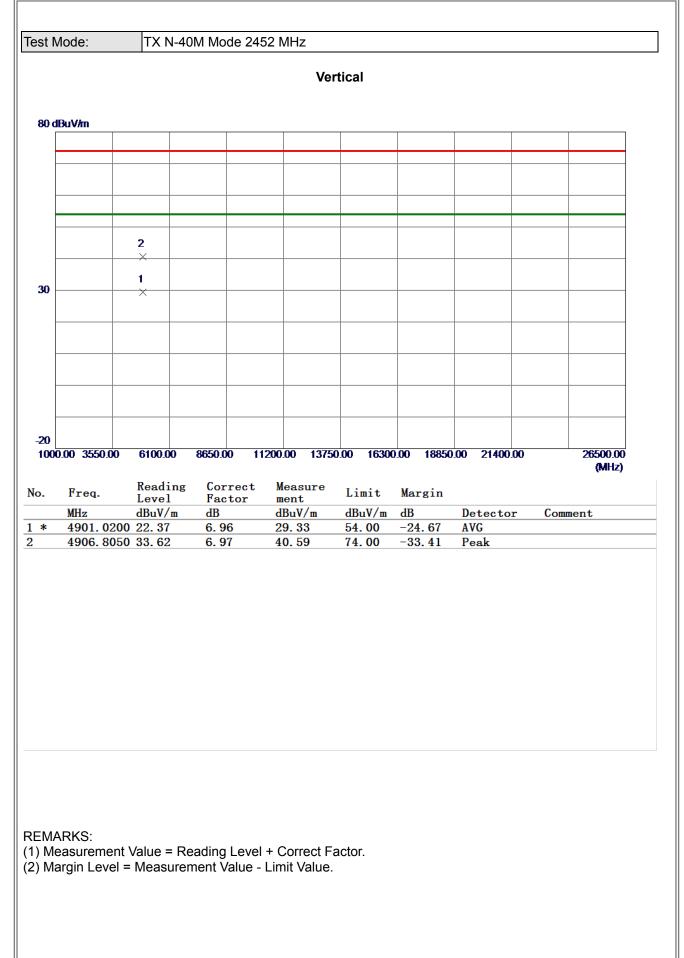
No.	Mk	. Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4894.248	35.86	6.93	42.79	74.00	-31.21	peak	
2	*	4896.170	22.75	6.93	29.68	54.00	-24.32	AVG	

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

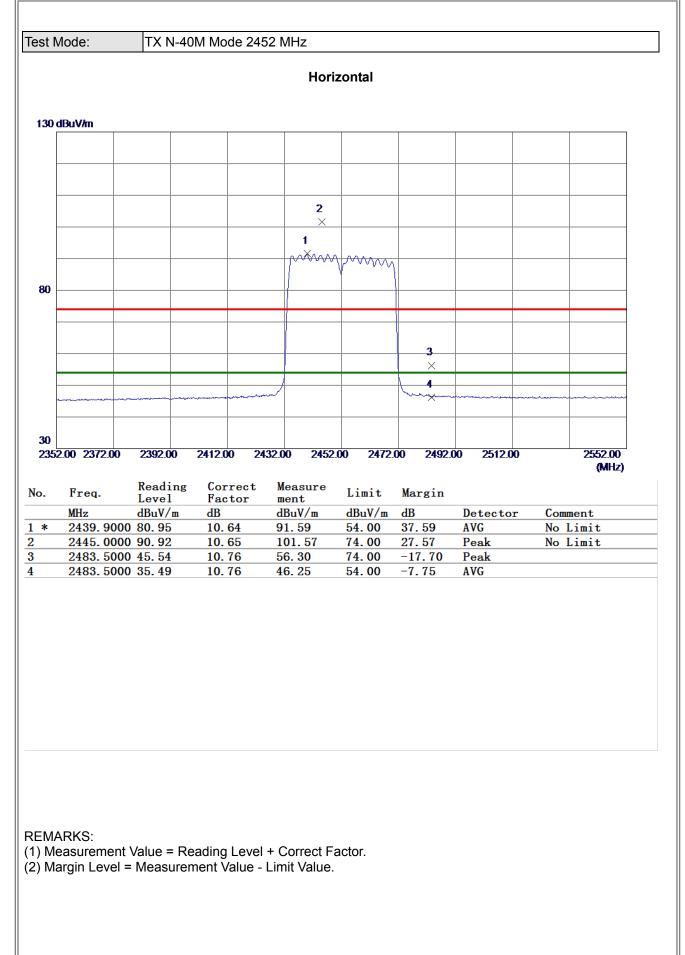




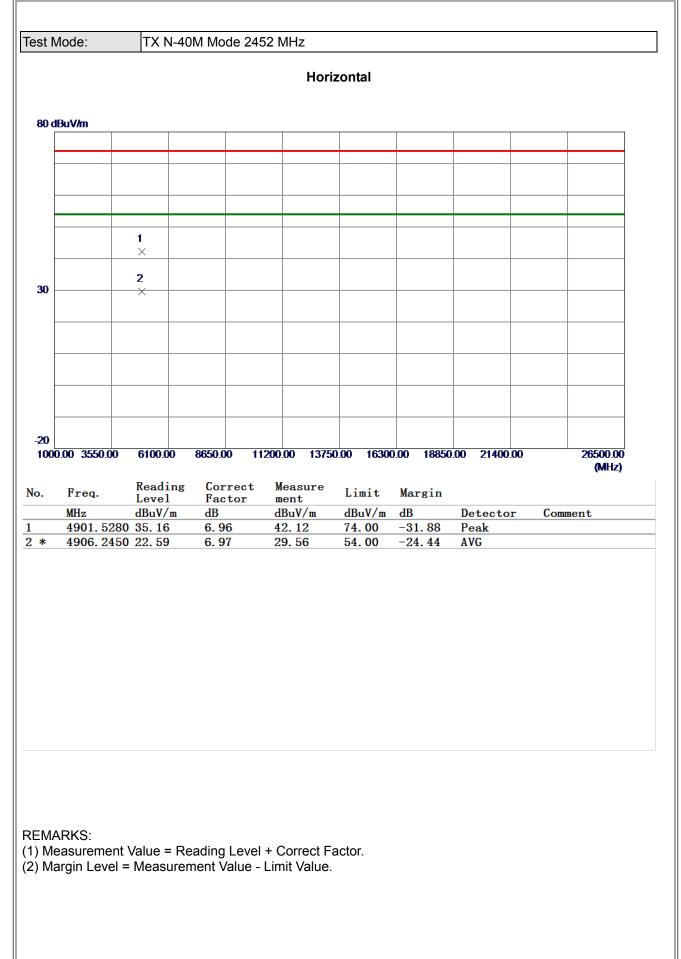




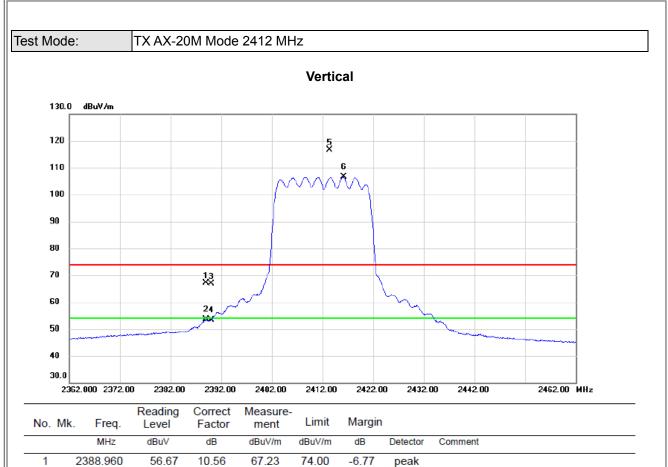












2388.960

2390.000

2390.000

2413.380

2416.160

2

3

4

5 X

6 \*

42.95

56.33

42.93

106.02

95.89

10.56

10.56

10.56

10.61

10.62

53.51

66.89

53.49

116.63

106.51

54.00

74.00

54.00

74.00

54.00

-0.49

-7.11

-0.51

42.63

52.51

AVG

peak

AVG

peak

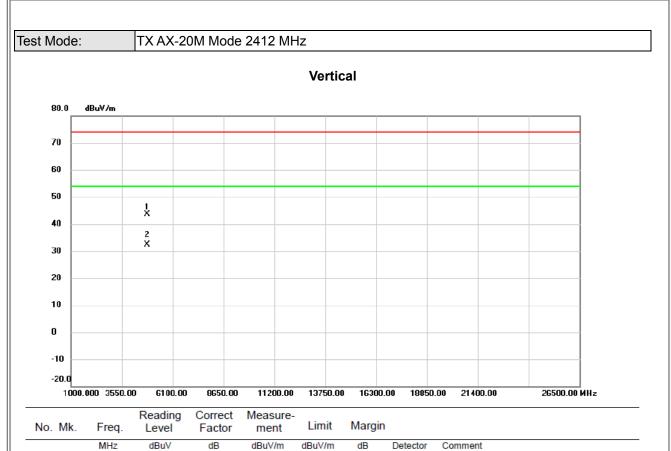
AVG

No Limit

No Limit

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





4823.535

4823.570

1

2 \*

37.01

25.66

6.72

6.72

43.73

32.38

74.00

54.00

-30.27

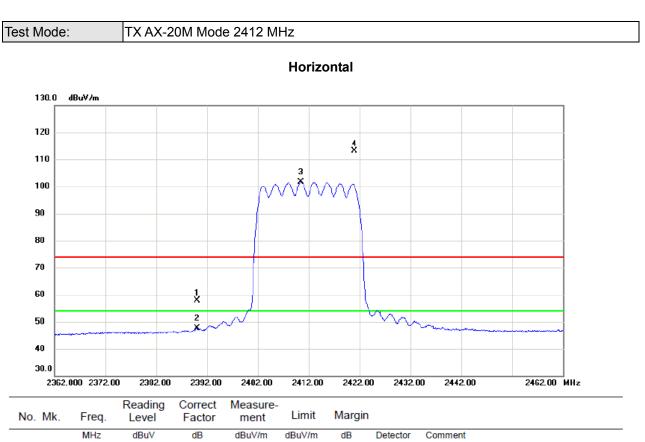
-21.62

peak

AVG

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

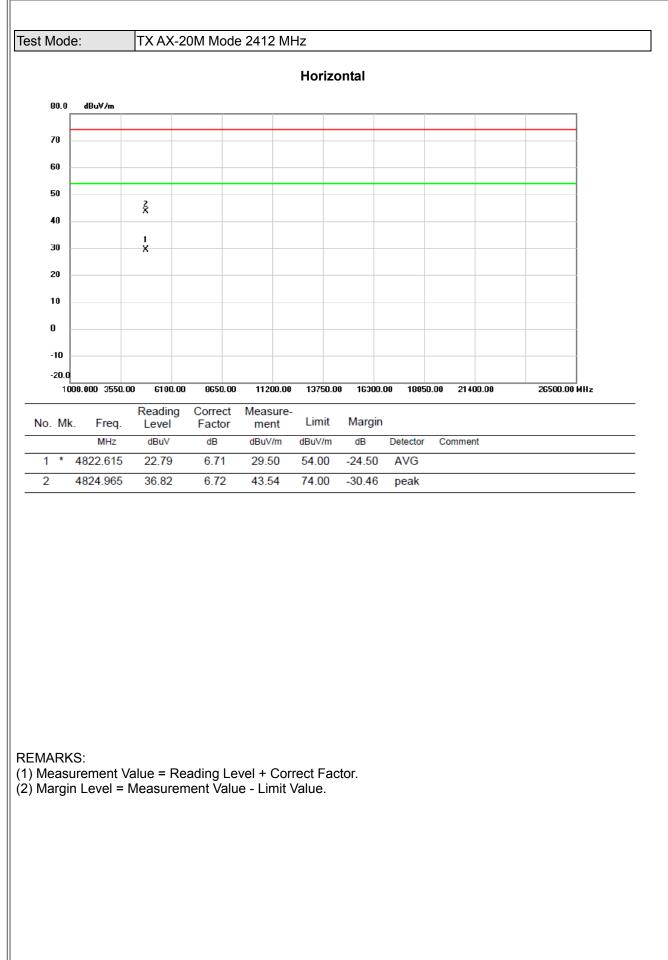




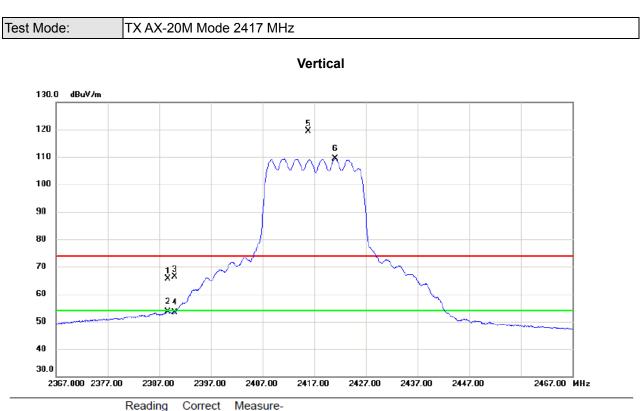
 10. N	VIN.	Fleq.	Level	Factor	ment	Linu	margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	23	90.000	47.29	10.50	57.79	74.00	-16.21	peak	
 2	23	90.000	37.18	10.50	47.68	54.00	-6.32	AVG	
 3 *	24	10.400	90.98	10.55	101.53	54.00	47.53	AVG	No Limit
4 X	24	21.000	102.65	10.59	113.24	74.00	39.24	peak	No Limit

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





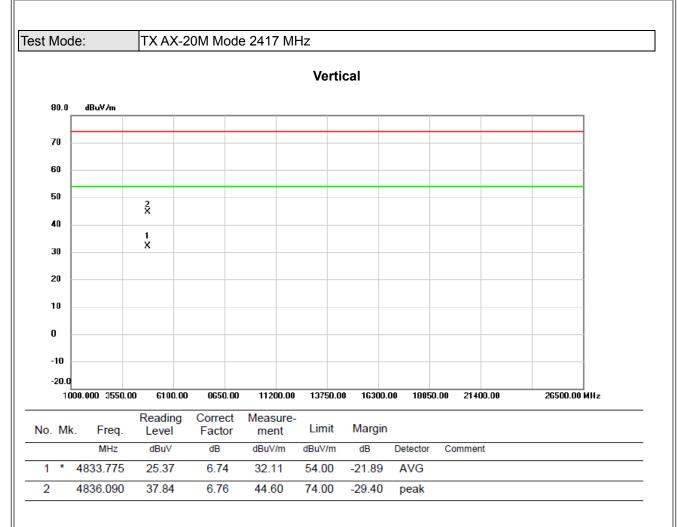




MHz         dBuV         dB         dBuV/m         dBuV/m         dB         Detector         Comment           1         2388.680         55.03         10.56         65.59         74.00         -8.41         peak           2         2388.680         43.06         10.56         53.62         54.00         -0.38         AVG           3         2390.000         55.79         10.56         66.35         74.00         -7.65         peak           4         2390.000         42.77         10.56         53.33         54.00         -0.67         AVG           5         X         2415.850         108.68         10.62         119.30         74.00         45.30         peak         No Limit           6         *         2421.110         98.69         10.63         109.32         54.00         55.32         AVG         No Limit	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
2       2388.680       43.06       10.56       53.62       54.00       -0.38       AVG         3       2390.000       55.79       10.56       66.35       74.00       -7.65       peak         4       2390.000       42.77       10.56       53.33       54.00       -0.67       AVG         5 X       2415.850       108.68       10.62       119.30       74.00       45.30       peak       No Limit			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
3       2390.000       55.79       10.56       66.35       74.00       -7.65       peak         4       2390.000       42.77       10.56       53.33       54.00       -0.67       AVG         5       X       2415.850       108.68       10.62       119.30       74.00       45.30       peak       No Limit	1		2388.680	55.03	10.56	65.59	74.00	-8.41	peak	
4       2390.000       42.77       10.56       53.33       54.00       -0.67       AVG         5       X       2415.850       108.68       10.62       119.30       74.00       45.30       peak       No Limit	2		2388.680	43.06	10.56	53.62	54.00	-0.38	AVG	
5 X 2415.850 108.68 10.62 119.30 74.00 45.30 peak No Limit	3		2390.000	55.79	10.56	66.35	74.00	-7.65	peak	
0 X 2410.000 100.00 10.02 110.00 14.00 40.00 peak as and	4		2390.000	42.77	10.56	53.33	54.00	-0.67	AVG	
6 * 2421.110 98.69 10.63 109.32 54.00 55.32 AVG No Limit	5	Х	2415.850	108.68	10.62	119.30	74.00	45.30	peak	No Limit
	6	*	2421.110	98.69	10.63	109.32	54.00	55.32	AVG	No Limit

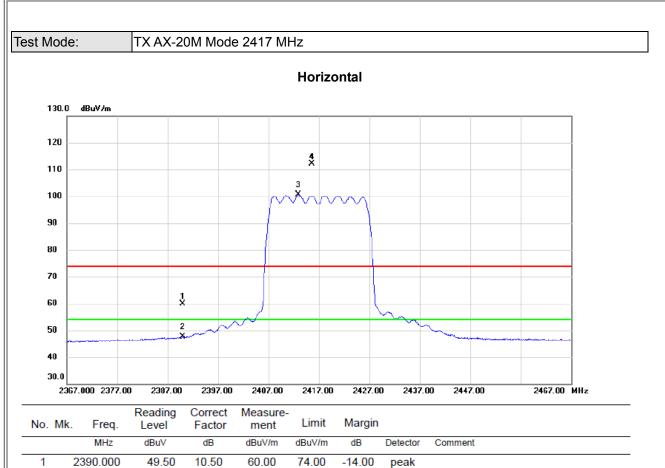
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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





REMARKS	:
---------	---

2

3 \*

4 X

2390.000

2412.950

2415.650

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

37.06

89.96

101.56

10.50

10.56

10.56

47.56

100.52

112.12

54.00

54.00

74.00

-6.44

46.52

38.12

AVG

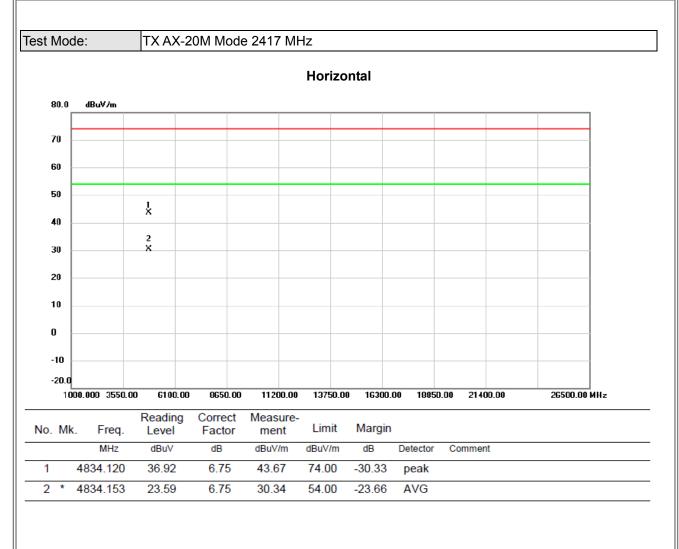
AVG

peak

No Limit

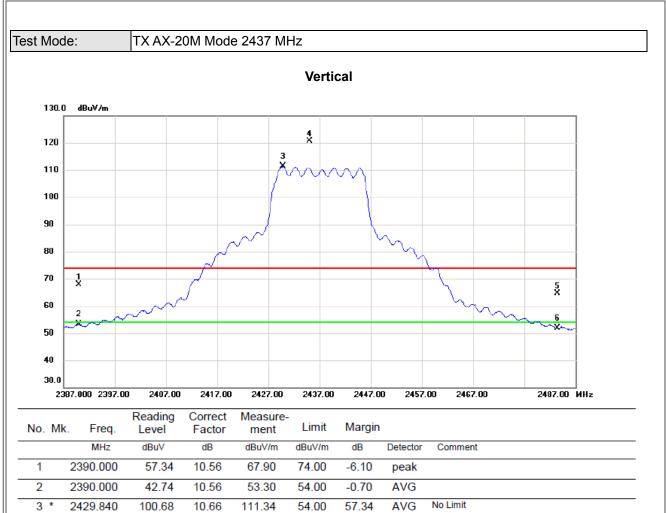
No Limit





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





No Limit

peak

peak AVG

REMARKS:

4 X

5

6

2435.070

2483.500

2483.500

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

109.86

53.81

40.99

10.66

10.77

10.77

120.52

64.58

51.76

74.00

74.00

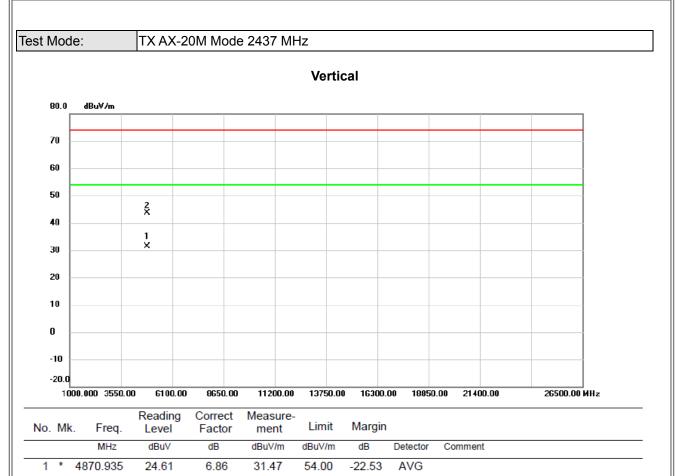
54.00

46.52

-9.42

-2.24





4873.570

2

36.78

43.65

74.00

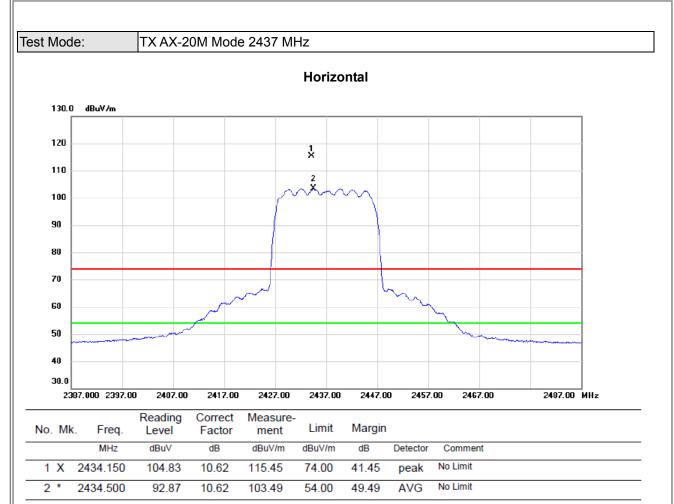
-30.35

peak

6.87

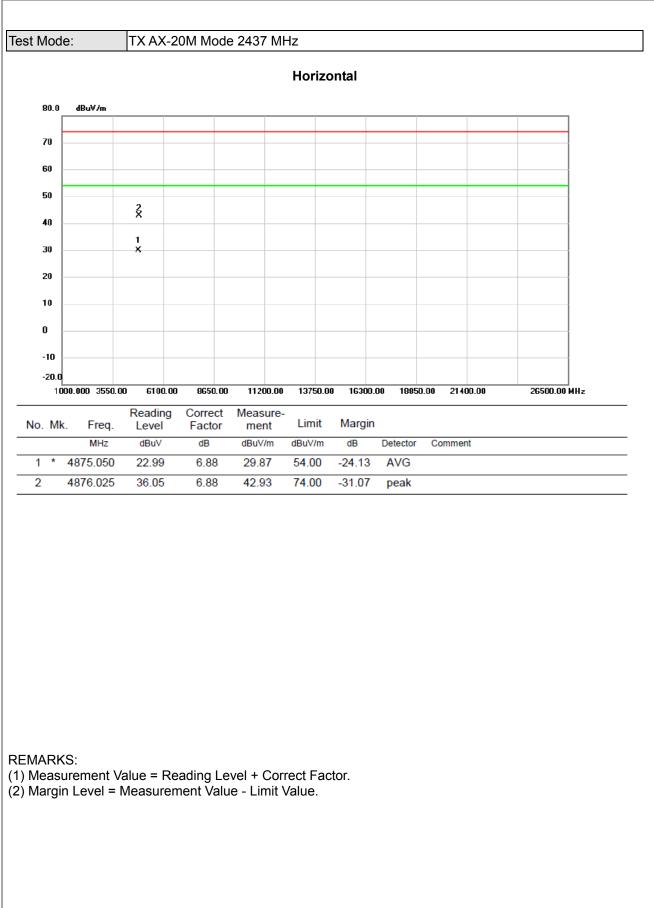
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



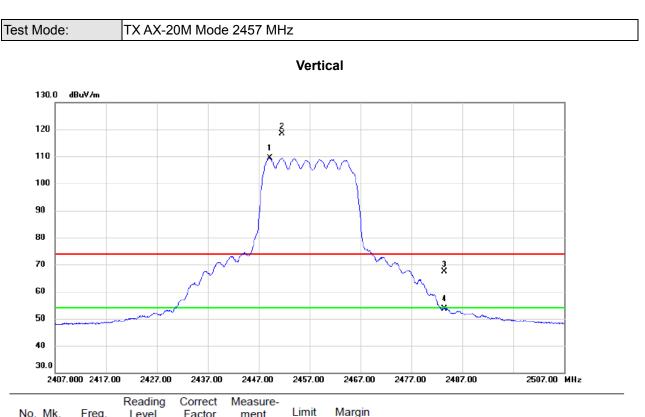


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





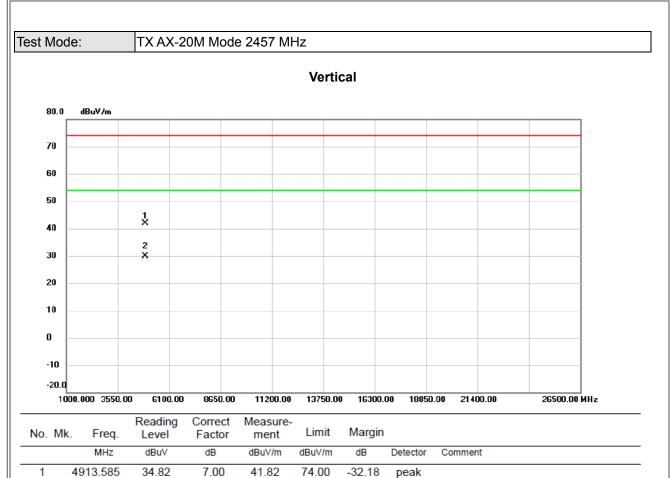




No. Mł	c. Freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2449.170	98.61	10.70	109.31	54.00	55.31	AVG	No Limit
2 X	2451.650	107.79	10.69	118.48	74.00	44.48	peak	No Limit
3	2483.500	56.55	10.77	67.32	74.00	-6.68	peak	
4	2483.500	42.98	10.77	53.75	54.00	-0.25	AVG	

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





-24.16

54.00

AVG

**REMARKS**:

2 \*

4917.980

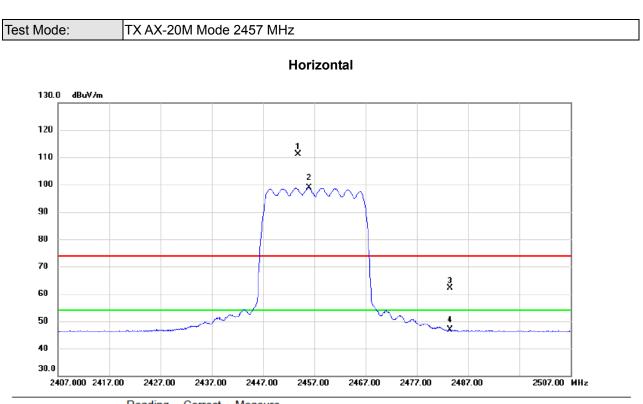
22.83

7.01

29.84

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

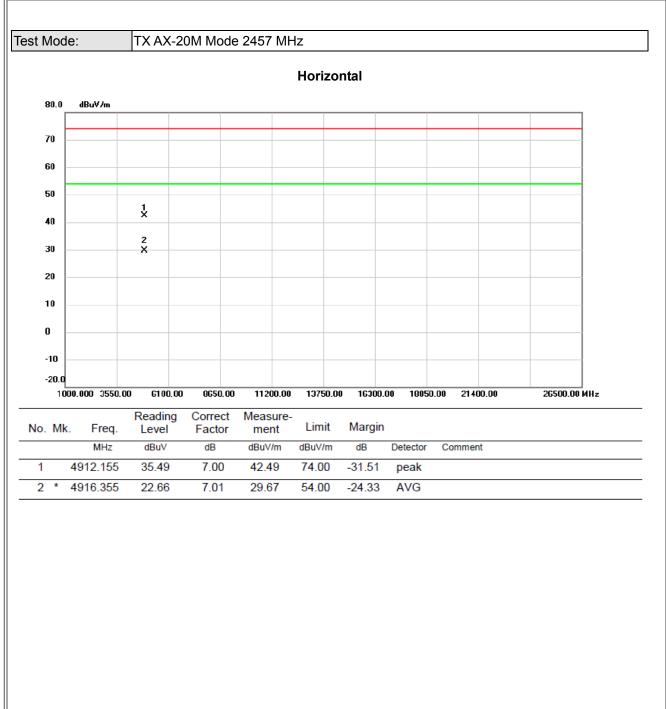




	No. M	κ.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
-	1 X	24	453.850	100.37	10.68	111.05	74.00	37.05	peak	No Limit
-	2 *	24	455.950	88.24	10.68	98.92	54.00	44.92	AVG	No Limit
	3	24	483.500	51.28	10.76	62.04	74.00	-11.96	peak	
-	4	24	483.500	36.18	10.76	46.94	54.00	-7.06	AVG	

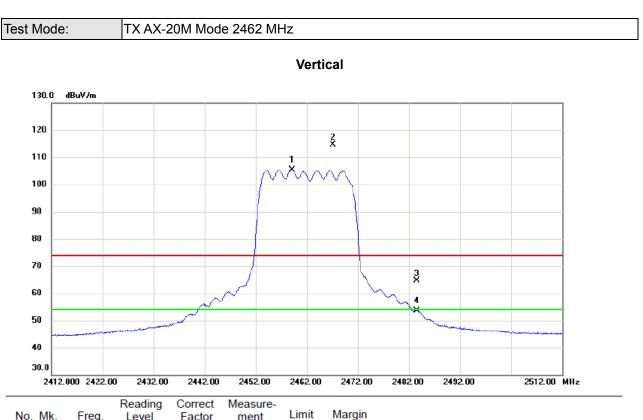
- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.





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

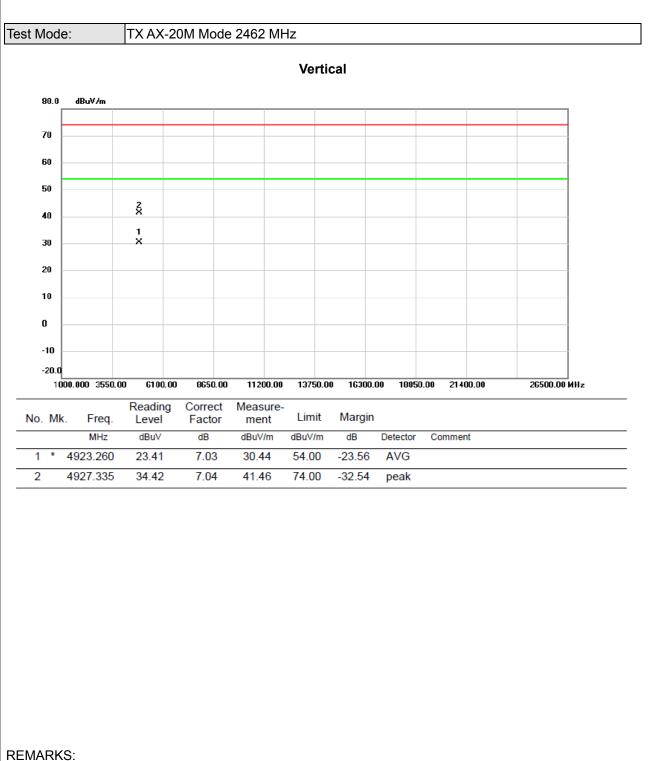




No. N	/k.	Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	245	9.170	94.79	10.71	105.50	54.00	51.50	AVG	No Limit
2 X	246	7.130	103.91	10.74	114.65	74.00	40.65	peak	No Limit
3	248	3.500	53.75	10.77	64.52	74.00	-9.48	peak	
4	248	3.500	42.80	10.77	53.57	54.00	-0.43	AVG	

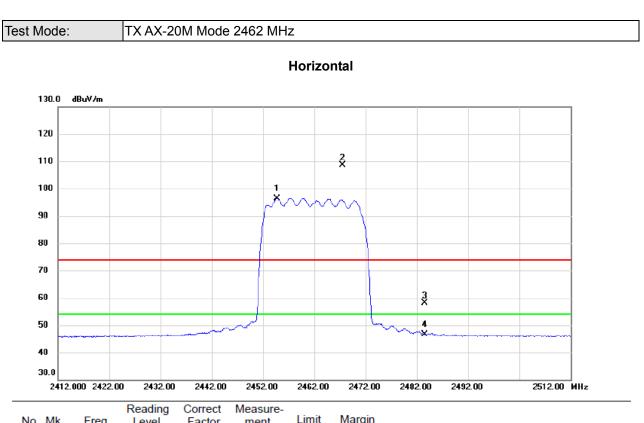
- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.





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

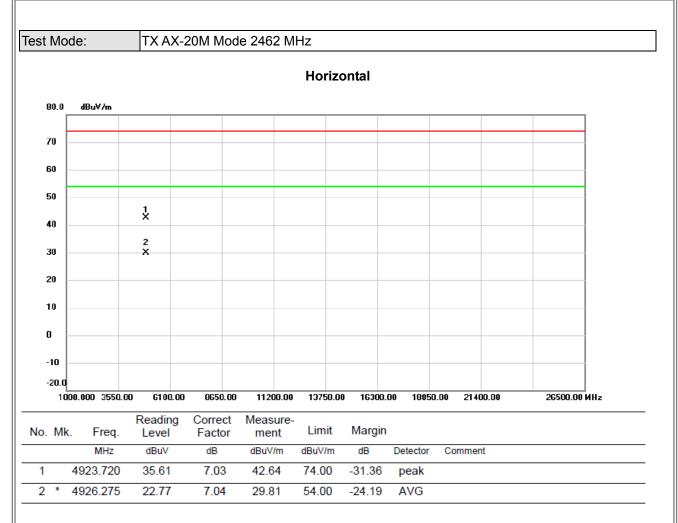




	No. M	K. Freq.	Level	Factor	ment	Limit	Margin		
-		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
-	1 *	2454.700	85.80	10.68	96.48	54.00	42.48	AVG	No Limit
	2 X	2467.500	98.03	10.72	108.75	74.00	34.75	peak	No Limit
	3	2483.500	47.36	10.76	58.12	74.00	-15.88	peak	
-	4	2483.500	35.90	10.76	46.66	54.00	-7.34	AVG	

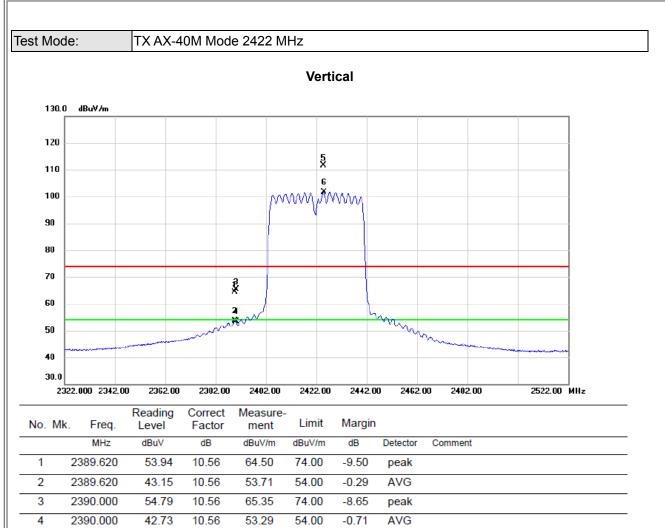
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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





74.00

54.00

37.57

47.70

No Limit

No Limit

peak

AVG

**REMARKS**:

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

100.93

91.06

10.64

10.64

111.57

101.70

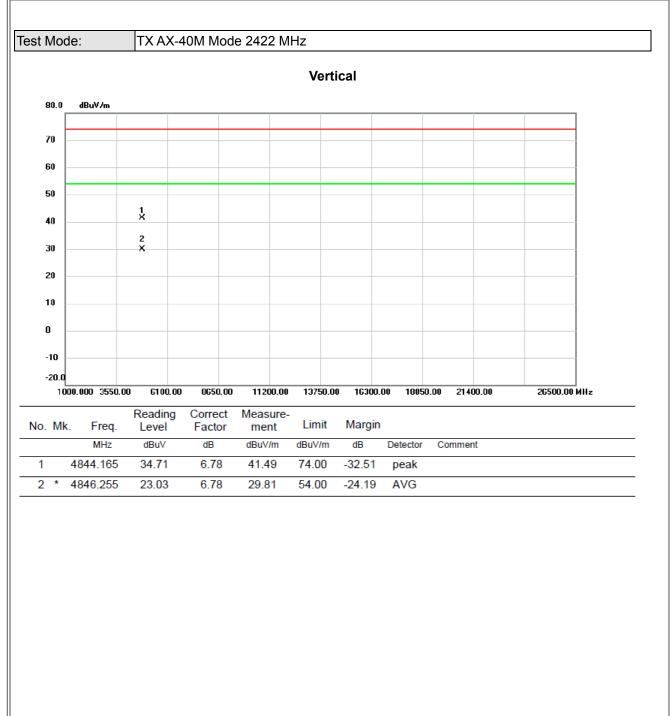
2424.760

2424.960

5 X

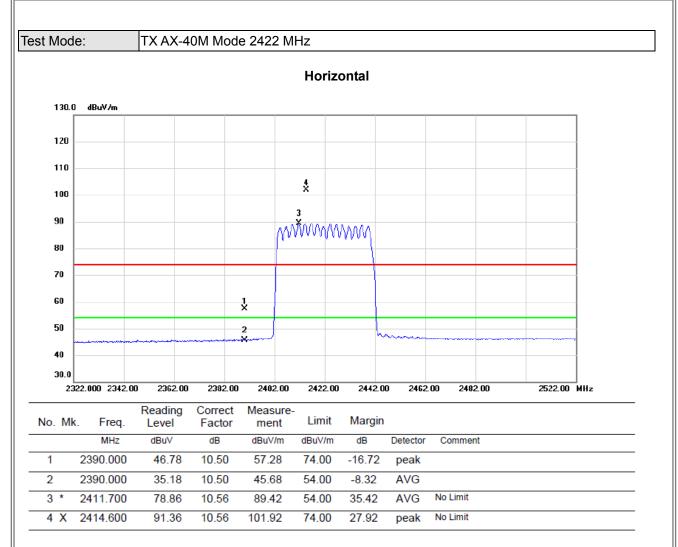
6 \*





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





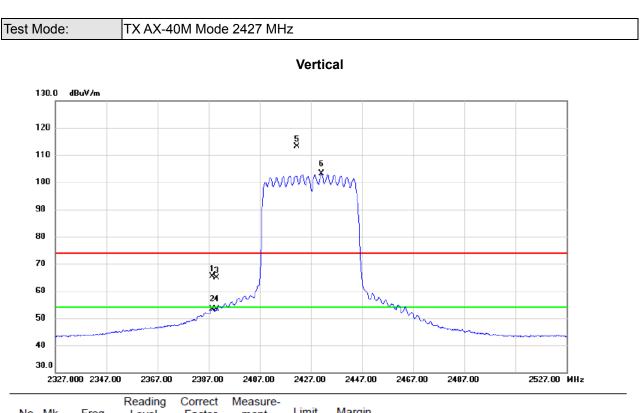
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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

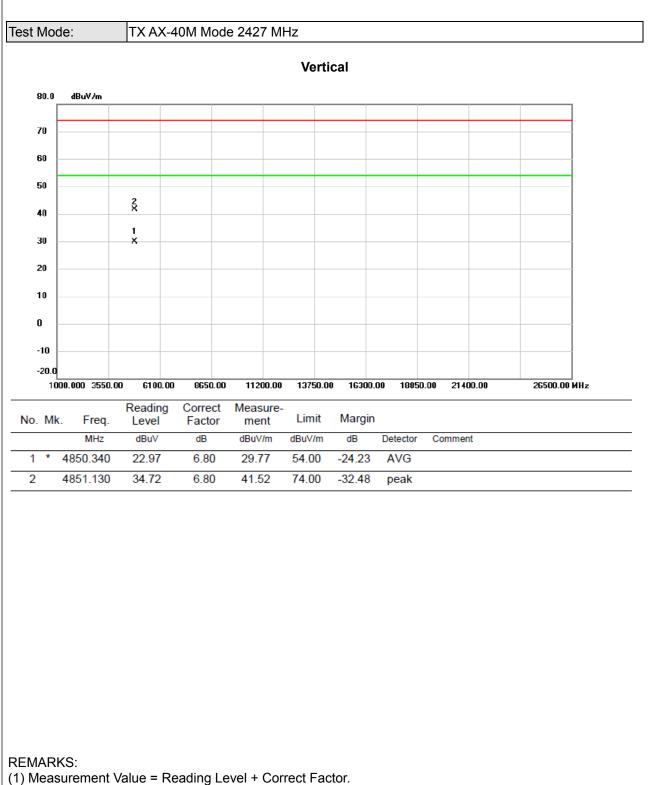




No.	Mk.	Freq.	Level	Factor	measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2388.360	54.76	10.56	65.32	74.00	-8.68	peak	
2		2388.360	42.86	10.56	53.42	54.00	-0.58	AVG	
3		2390.000	54.30	10.56	64.86	74.00	-9.14	peak	
4		2390.000	42.79	10.56	53.35	54.00	-0.65	AVG	
5	Х	2421.420	102.53	10.63	113.16	74.00	39.16	peak	No Limit
6	*	2431.220	92.39	10.65	103.04	54.00	49.04	AVG	No Limit

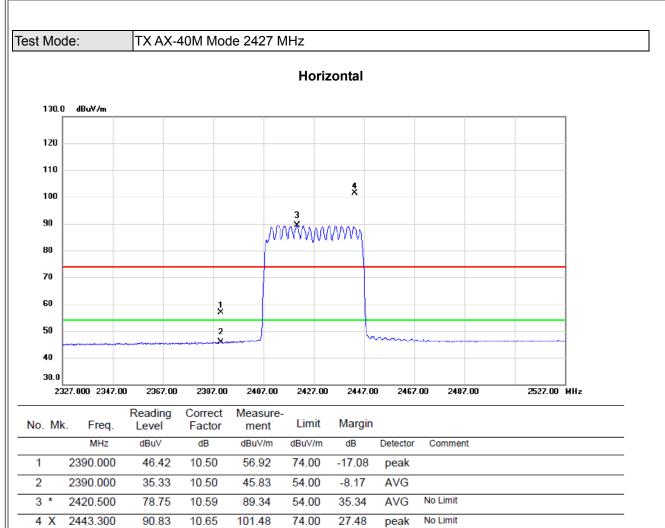
- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.





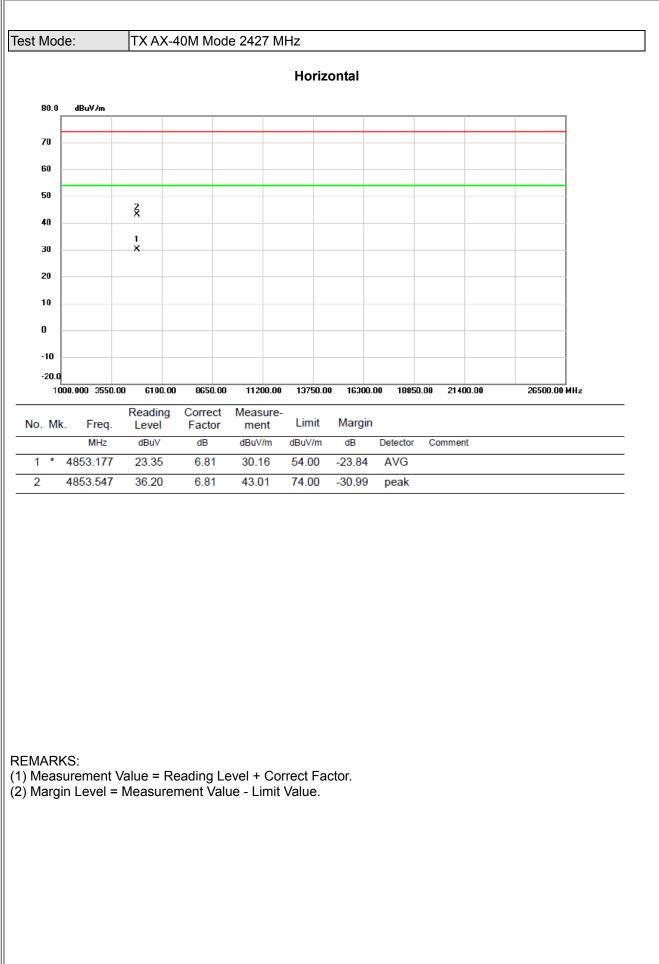
(2) Margin Level = Measurement Value - Limit Value.



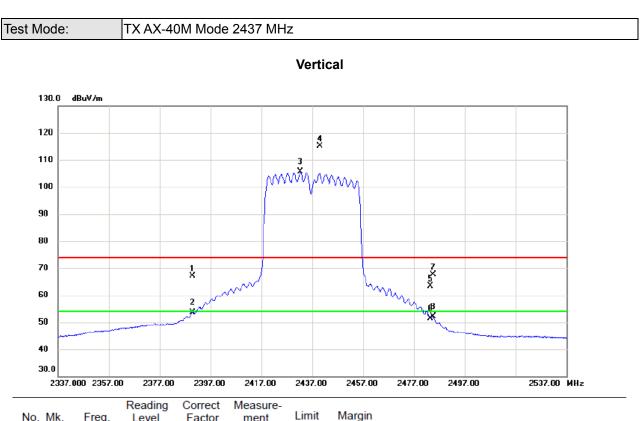


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





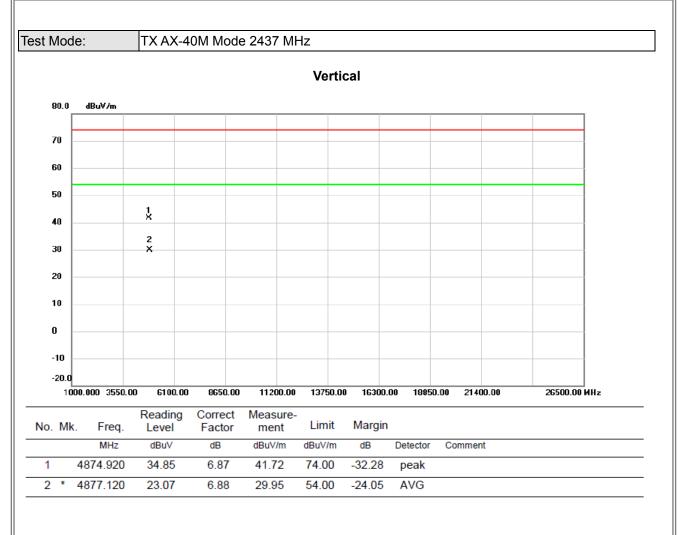




No.	Mk	. Freq.	Level	Factor	ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	56.48	10.56	67.04	74.00	-6.96	peak	
2		2390.000	43.15	10.56	53.71	54.00	-0.29	AVG	
3	*	2432.360	94.95	10.65	105.60	54.00	51.60	AVG	No Limit
4	Х	2439.960	104.41	10.67	115.08	74.00	41.08	peak	No Limit
5		2483.500	52.57	10.77	63.34	74.00	-10.66	peak	
6		2483.500	40.68	10.77	51.45	54.00	-2.55	AVG	
7		2484.500	56.86	10.78	67.64	74.00	-6.36	peak	
8		2484.500	41.25	10.78	52.03	54.00	-1.97	AVG	

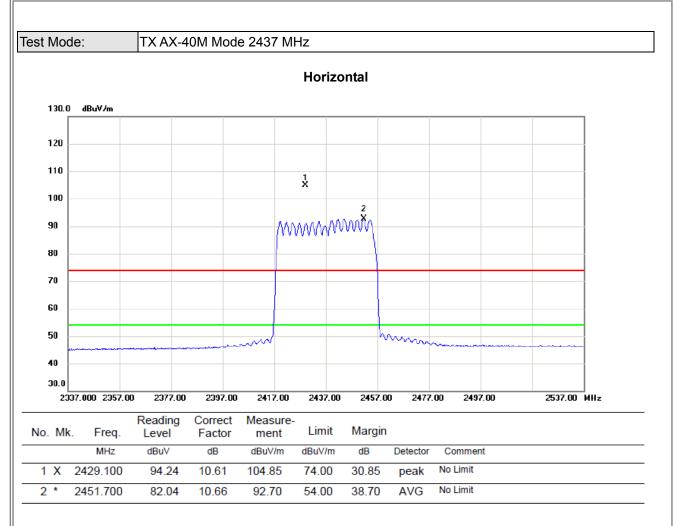
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.





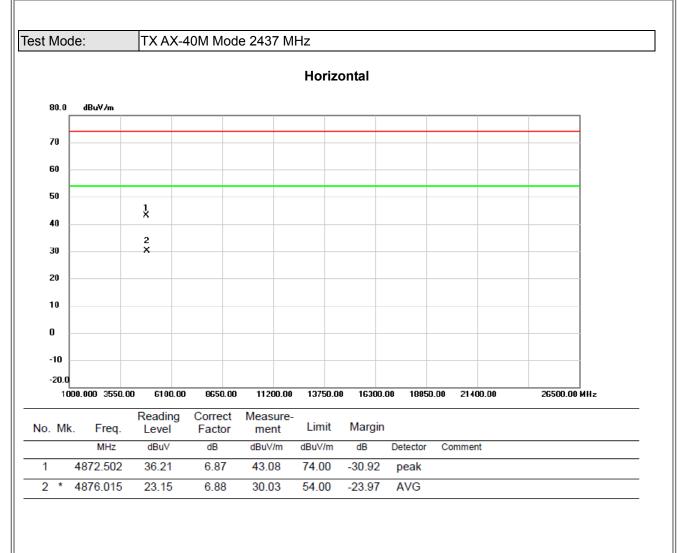
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





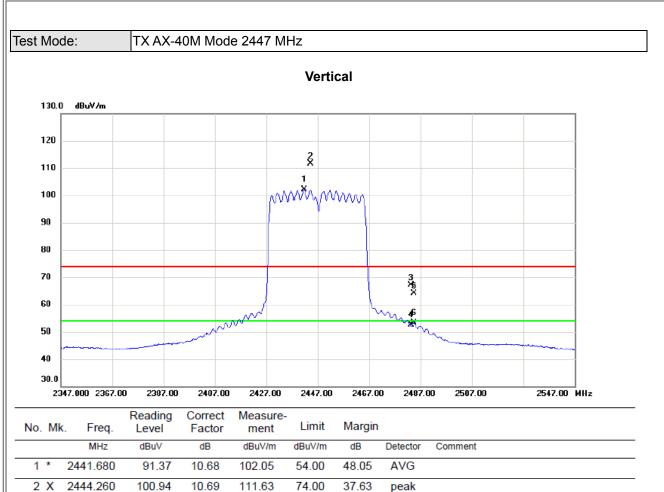
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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





74.00

54.00

74.00

54.00

-6.85

-1.39

-9.99

-0.64

67.15

52.61

64.01

53,36

No Limit

peak

AVG

peak

AVG

REMARKS:

3

4

5

6

2483.500

2483.500

2484.440

2484.440

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

56.38

41.84

53.23

42.58

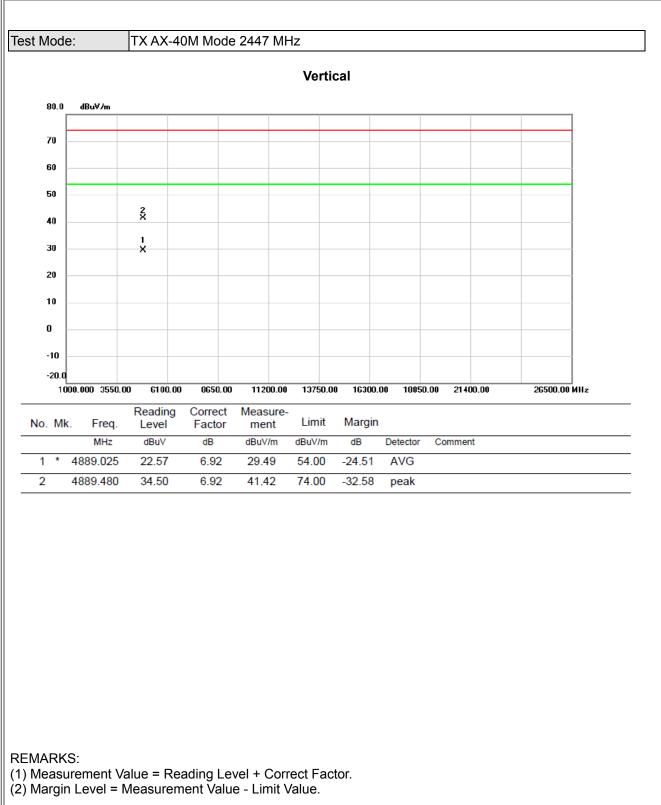
10.77

10.77

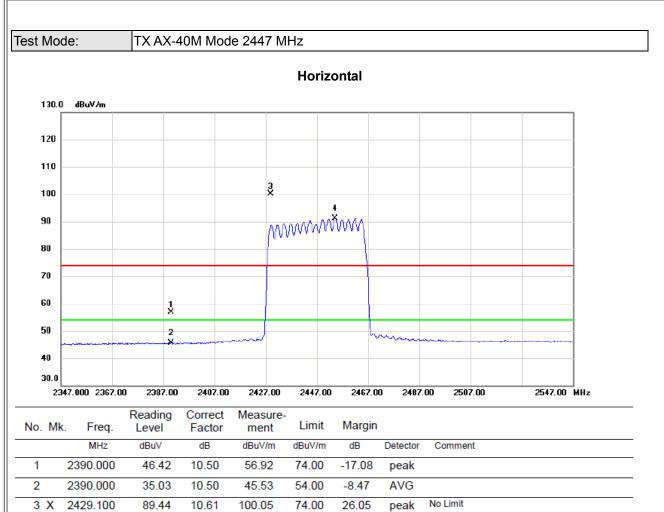
10.78

10.78









2454.100

4 \*

80.51

10.68

91.19

54.00

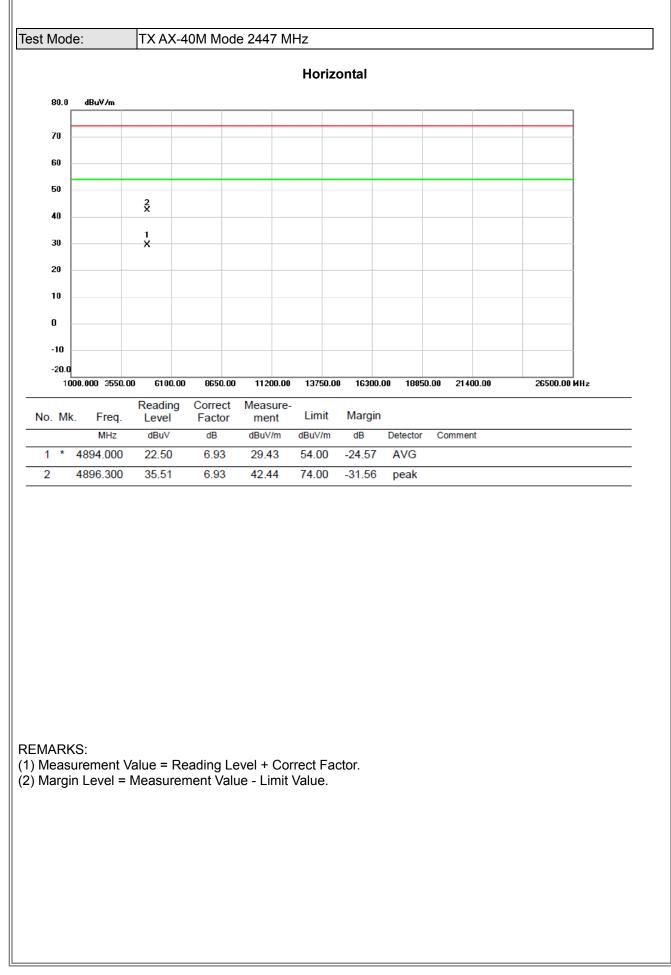
37.19

AVG

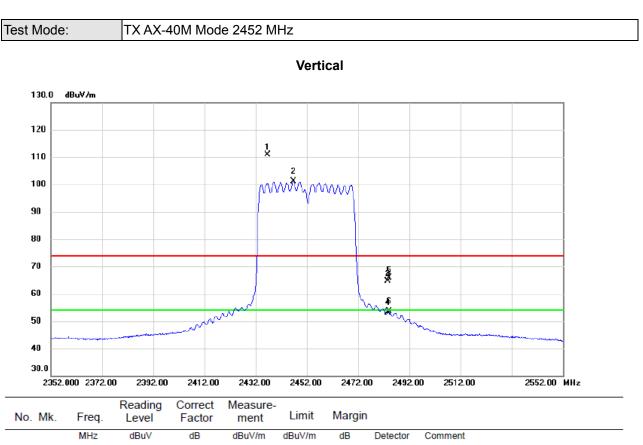
No Limit

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





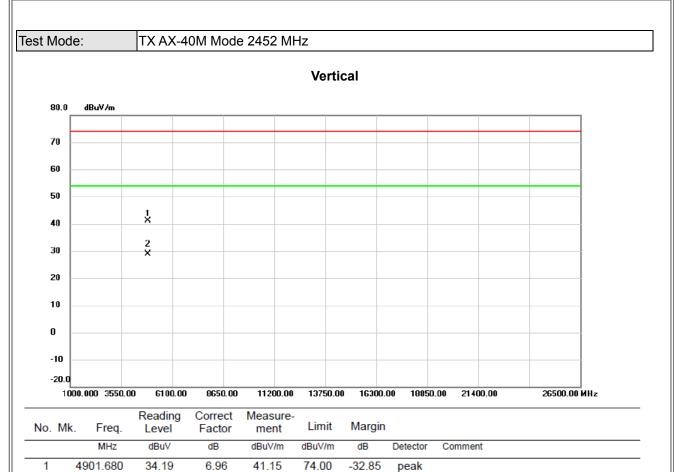




							-		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
	1 X	2436.780	100.22	10.67	110.89	74.00	36.89	peak	No Limit
	2 *	2446.720	90.42	10.69	101.11	54.00	47.11	AVG	No Limit
	3	2483.500	53.87	10.77	64.64	74.00	-9.36	peak	
	4	2483.500	42.30	10.77	53.07	54.00	-0.93	AVG	
	5	2484.020	55.14	10.77	65.91	74.00	-8.09	peak	
	6	2484.020	42.95	10.77	53.72	54.00	-0.28	AVG	
_									

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





2 \*

4903.780

21.82

6.97

28.79

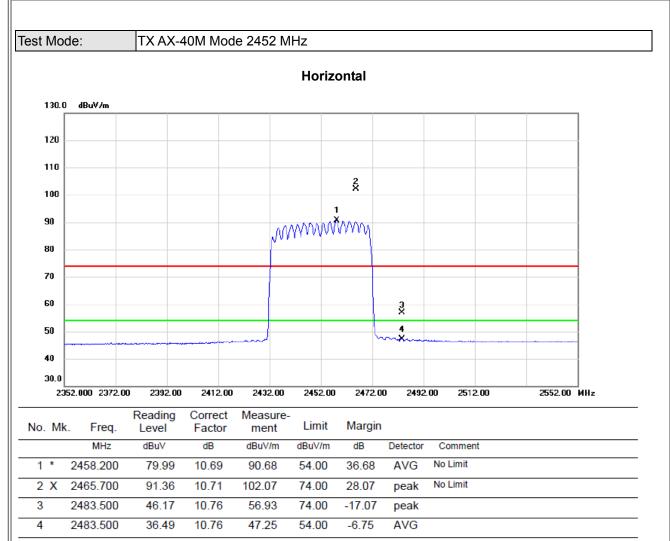
54.00

-25.21

AVG

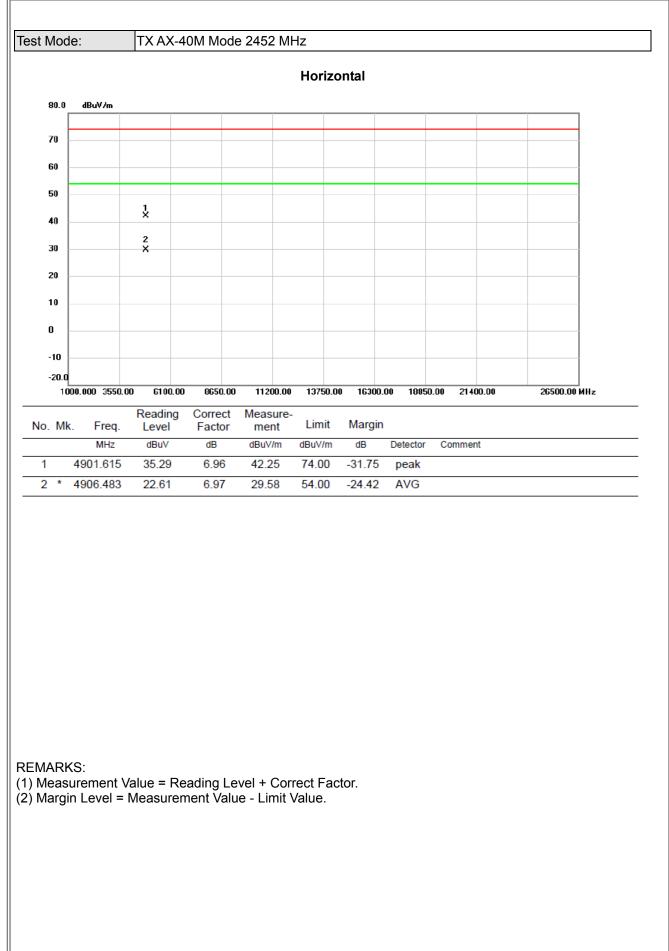
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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



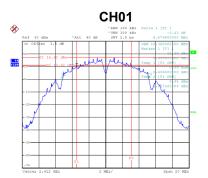


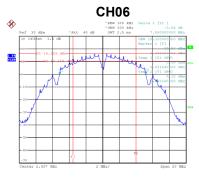


## **APPENDIX E - BANDWIDTH**



Test Mode	TX B Mode								
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result					
01	2412	6.58	500	Complies					
06	2437	7.58	500	Complies					
11	2462	7.10	500	Complies					







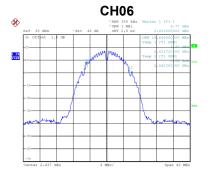
Date: 30.APR.2020 14:42:22

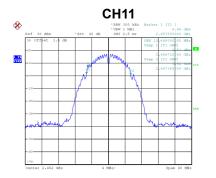
Date: 30.APR.2020 14:44:12

Date: 30.APR.2020 14:46:14

Channel	Frequency (MHz)	99 % Emission Bandwidth (MHz)	Result
01	2412	10.64	Complies
06	2437	10.64	Complies
11	2462	10.64	Complies







Date: 30.APR.2020 15:12:33

Date: 30.APR.2020 15:12:52

Date: 30.APR.2020 15:13:09

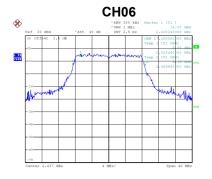


Test Mode	TX G Mode			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2412	16.44	500	Complies
06	2437	16.38	500	Complies
11	2462	16.44	500	Complies
*13 74 75 74 75 76 76 76 76 76 76 76 76 76 76	10.4.239         2000         1000	• VBW 300 kHz	1 (12)     10 (12)     1	************************************
Channel	Frequency (MHz)	99 % Emissio	n Bandwidth (MHz)	Result
01	2412		17.20	Complies



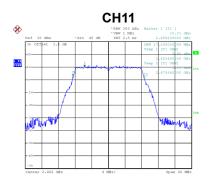
2437

2462



17.20

17.20



Complies

Complies

Date: 30.APR.2020 15:13:36

06

11

Date: 30.APR.2020 15:13:58

Date: 30.APR.2020 15:14:25