

FCC Radio Test Report					
FCC ID: V7TMESH5					
This report concerns (check one): ⊠Original Grant ⊡Class I Change ⊡Class II Change					
Project No.: 1806C125Equipment: AC1200 Whole Home Mesh WiFi SystemModel Name: Mesh5Applicant: SHENZHEN TENDA TECHNOLOGY CO.,LTD.Address: 6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052					
Date of Receipt : Jun. 21, 2018 Date of Test : Jun. 25, 2018 ~ Jul. 09, 2018 Issued Date : Jul. 17, 2018 Tested by : BTL Inc.					
Testing Engineer : <u>Jiven</u> Jiong (Jivey Jiang)					
Technical Manager : <u>David Mao</u> (David Mao)					
Authorized Signatory : <u>Seeven Lu</u> (Steven Lu)					
BTL INC. No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. TEL: +86-769-8318-3000 FAX: +86-769-8319-6000					



Declaration

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

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

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

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

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

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

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

Limitation

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





Table of Contents Pa	ige
1. CERTIFICATION	6
2 . SUMMARY OF TEST RESULTS	7
2.1 TEST FACILITY	8
2.2 MEASUREMENT UNCERTAINTY	8
3 . GENERAL INFORMATION	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF TEST MODES	13
3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING	14
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	16
3.5 DESCRIPTION OF SUPPORT UNITS	16
4. EMC EMISSION TEST	17
4.1 CONDUCTED EMISSION MEASUREMENT	17
4.1.1 POWER LINE CONDUCTED EMISSION	17
4.1.2 TEST PROCEDURE	17
4.1.3 DEVIATION FROM TEST STANDARD 4.1.4 TEST SETUP	17 18
4.1.5 EUT OPERATING CONDITIONS	18
4.1.6 EUT TEST CONDITIONS	18
4.1.7 TEST RESULTS	18
4.2 RADIATED EMISSION MEASUREMENT	19
4.2.1 RADIATED EMISSION LIMITS	19
4.2.2 TEST PROCEDURE 4.2.3 DEVIATION FROM TEST STANDARD	20 20
4.2.4 TEST SETUP	20 21
4.2.5 EUT OPERATING CONDITIONS	22
4.2.6 EUT TEST CONDITIONS	22
4.2.7 TEST RESULTS (9K TO 30MHz)	22
4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz)	22
4.2.9 TEST RESULTS (ABOVE 1000 MHz)	22
5.26dB SPECTRUM BANDWIDTH	23
5.1 APPLIED PROCEDURES / LIMIT	23
5.1.1 TEST PROCEDURE 5.1.2 DEVIATION FROM STANDARD	23 23
5.1.2 DEVIATION FROM STANDARD 5.1.3 TEST SETUP	23 23
5.1.4 EUT OPERATION CONDITIONS	23
5.1.5 EUT TEST CONDITIONS	24
5.1.6 TEST RESULTS	24
6 . MAXIMUM CONDUCTED OUTPUT POWER	25





Table of Contents	Page
6.1 APPLIED PROCEDURES / LIMIT 6.1.1 TEST PROCEDURE	25 25
6.1.2 DEVIATION FROM STANDARD	26
6.1.3 TEST SETUP	26
6.1.4 EUT OPERATION CONDITIONS	26
6.1.5 EUT TEST CONDITIONS	26
6.1.6 TEST RESULTS	26
7 . POWER SPECTRAL DENSITY TEST	27
7.1 APPLIED PROCEDURES / LIMIT	27
7.1.1 TEST PROCEDURE	27
7.1.2 DEVIATION FROM STANDARD	28
7.1.3 TEST SETUP	28
7.1.4 EUT OPERATION CONDITIONS 7.1.5 EUT TEST CONDITIONS	28 28
7.1.6 TEST RESULTS	28
8 . FREQUENCY STABILITY MEASUREMENT	29
8.1 APPLIED PROCEDURES / LIMIT	29
8.1.1 TEST PROCEDURE	29
8.1.2 DEVIATION FROM STANDARD	29
8.1.3 TEST SETUP 8.1.4 EUT OPERATION CONDITIONS	30 30
8.1.5 EUT TEST CONDITIONS	30
8.1.6 TEST RESULTS	30
9. MEASUREMENT INSTRUMENTS LIST	31
10 . EUT TEST PHOTOS	33
APPENDIX A - CONDUCTED EMISSION	40
APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)	45
APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)	54
APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)	79
APPENDIX E - BANDWIDTH	156
APPENDIX F - MAXIMUM OUTPUT POWER	181
APPENDIX G - POWER SPECTRAL DENSITY	195
APPENDIX H - FREQUENCY STABILITY	252



REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-2-1806C125	Original Issue.	Jul. 16, 2018
MDG1807017	Change the applicant and manufacturer.	Jul. 17, 2018



1. CERTIFICATION

Brand Name :	
Model Name :	Mesh5
Applicant :	SHENZHEN TENDA TECHNOLOGY CO.,LTD.
Manufacturer :	SHENZHEN TENDA TECHNOLOGY CO., LTD.
Address :	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District,
	Shenzhen, China. 518052
Date of Test :	Jun. 25, 2018 ~ Jul. 09, 2018
Test Sample :	Engineering Sample No.:D180605171
Standard(s) :	FCC Part15, Subpart E(15.407) / ANSI C63.10-2013

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

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1806C125) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP according to the ISO-17025 quality assessment standard and technical standard(s).

Test results included in this report is only for the WIFI 5GHz UNII-1 and UNII-3 part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart E(15.407)					
Standard(s) Section	Test Item	Remark			
15.207	AC Power Line Conducted Emissions	PASS			
15.407(a)	26dB Spectrum Bandwidth	PASS			
15.407(a)	Maximum Conducted Output Power	PASS			
15.407(a)	Power Spectral Density	PASS			
15.407(a)	Radiated Emissions	PASS			
15.407(b)	Band Edge Emissions	PASS			
15.407(g)	Frequency Stability	PASS			
15.203	Antenna Requirements	PASS			

NOTE:

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



2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. BTL's test firm number for FCC: 854385 BTL's designation number for FCC: CN5020

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) k=1.96 or k=2(which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).

The BTL measurement uncertainty as below table:

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150 KHz ~ 30MHz	2.32

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9kHz~30MHz	V	3.79
		9kHz~30MHz	Н	3.57
		30MHz ~ 200MHz	V	3.82
	03 CISPR	30MHz ~ 200MHz	Н	3.60
		200MHz ~ 1,000MHz	V	3.86
DG-CB03 CISPI		200MHz ~ 1,000MHz	Н	3.94
		1GHz~18GHz	V	3.12
		1GHz~18GHz	Н	3.68
		18GHz~40GHz	V	4.15
		18GHz~40GHz	Н	4.14

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



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	AC1200 Whole Home Mesh WiFi System				
Brand Name	Tenda				
Model Name	Mesh5				
Model Different	N/A	N/A			
Product Description	Operation Frequency	UNII-1: 5150-5250MHz UNII-3: 5725-5850MHz			
	Modulation Type	OFDM			
	Bit Rate of Transmitter	1200Mbps			
Power Source	DC voltage supplied from AC/DC adapter. #1 Model:BN071-A12012U #2 Model:BN036-A12012U				
Power Rating	#1 I/P:100-240V~50/60Hz 0.4A O/P:12V === 1.0A #2 I/P:100-240V~50/60Hz 0.4A O/P:12V === 1.0A				
Output Power	Output Power (Max.)for UNII-1	802.11a: 26.51dBm 802.11n (20M): 28.07dBm 802.11n (40M): 28.25dBm 802.11ac (80M): 22.42dBm			
-Non Beamforming	Output Power (Max.)for UNII-3	802.11a: 25.66dBm 802.11n (20M): 26.73dBm 802.11n (40M): 28.61dBm 802.11ac (80M): 26.64dBm			
Output Power	Output Power (Max.)for UNII-1	802.11n (20M): 22.42dBm 802.11n (40M): 23.72dBm 802.11ac (80M): 22.06dBm			
-Beamforming	Output Power (Max.)for UNII-3	802.11n (20M): 25.82dBm 802.11n (40M): 26.63dBm 802.11ac (80M): 26.28dBm			





Note:

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

2. Channel List:

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

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





3. Antenna Specification:

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	IPEX	3
2	N/A	N/A	PCB	IPEX	3

Note:

The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R), all transmit signals are completely correlated, then,

for non-beamforming function,

Direction gain = G_{ANT} +10log(N)dBi=3+10log(2), that is Directional gain=6.01.

So, for UNII-1,

the out power limit is 30-6.01+6=29.99,

the power density limit is 17-6.01+6=16.99.

for UNII-3,

the out power limit is 30-6.01+6=29.99,

the power density limit is 30-6.01+6=29.99.

for beamforming function,

Beamforming Gain=3 dBi, Directional gain=6.01.

So,for UNII-1,

the out power limit is 30-6.01-3+6=26.99,

the power density limit is 17-6.01-3+6=13.99.

for UNII-3,

the out power limit is 30-6.01-3+6=26.99, the power density limit is 30-6.01-3+6=26.99.



4. **Operating Mode** 1TX 2TX TX Mode 802.11a V (ANT 1) -802.11n (20MHz) V (ANT 1+ANT 2) -802.11n (40MHz) V (ANT 1+ANT 2) -V (ANT 1+ANT 2) 802.11ac (80MHz) -

ANT 1 for 1TX was found to be the worst case and recorded



3.2 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)
Mode 4	TX AC80 Mode / CH42 (UNII-1)
Mode 5	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 6	TX N20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 7	TX N40 Mode / CH151,CH159 (UNII-3)
Mode 8	TX AC80 Mode / CH155 (UNII-3)
Mode 9	TX Mode

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

For Conducted Test			
Final Test Mode	Description		
Mode 13 TX Mode			

For Radiated Test		
Final Test Mode	Description	
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)	
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)	
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)	
Mode 4	TX AC80 Mode / CH42 (UNII-1)	
Mode 5	TX A Mode / CH149,CH157,CH165 (UNII-3)	
Mode 6	TX N20 Mode / CH149,CH157,CH165 (UNII-3)	
Mode 7	TX N40 Mode / CH151,CH159 (UNII-3)	
Mode 8	TX AC80 Mode / CH155 (UNII-3)	

Note:

(1) For radiated below 1GHz test, the 802.11a mode is found to be the worst case and recorded.



3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product

UNII-1				
Test Software Version	MP_TEST			
Frequency (MHz)	5180	5200	5240	
A Mode	40	55	55	
N20 Mode	39/38	45/41	45/41	
Frequency (MHz)	5190	5230		
N40 Mode	31/31	45/45		
Frequency (MHz)	5210			
AC80 Mode	29/29			

Non Beamforming

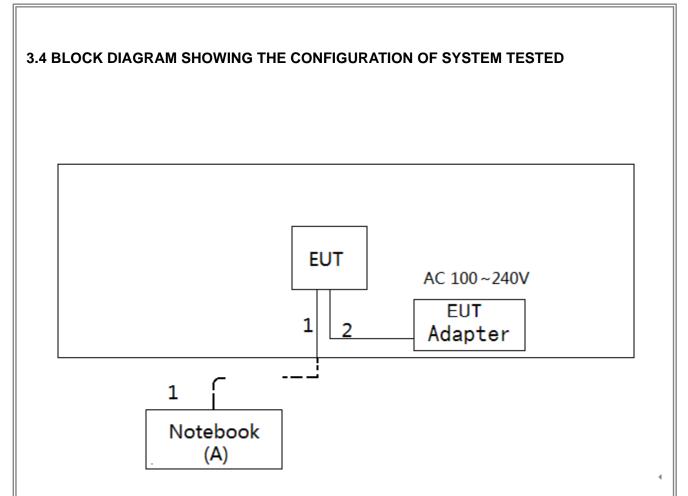
UNII-3				
Test Software Version	MP_TEST			
Frequency (MHz)	5745	5785	5825	
A Mode	50	48	42	
N20 Mode	37/37	37/37	36/36	
Frequency (MHz)	5755	5795		
N40 Mode	45/45	47/47		
Frequency (MHz)	5775			
AC80 Mode	40/40			

Beamforming

UNII-1			
Test Software Version	MP_TEST		
Frequency (MHz)	5180	5200	5240
N20 Mode	30/30	30/30	30/30
Frequency (MHz)	5190	5230	
N40 Mode	31/31	35/35	
Frequency (MHz)	5210		
AC80 Mode	29/29		

UNII-3			
Test Software Version	MP_TEST		
Frequency (MHz)	5745	5785	5825
N20 Mode	37/37	37/37	36/36
Frequency (MHz)	5755	5795	
N40 Mode	41/41	42/42	
Frequency (MHz)	5775		
AC80 Mode	40/40		





3.5 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
А	NOTEBOOK	DELL	INSPIRON 1420	N/A	JX193A01SDC2

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	10m	RJ45
2	NO	NO	1.2m	DC Cable

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

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.

4.1.2 TEST PROCEDURE

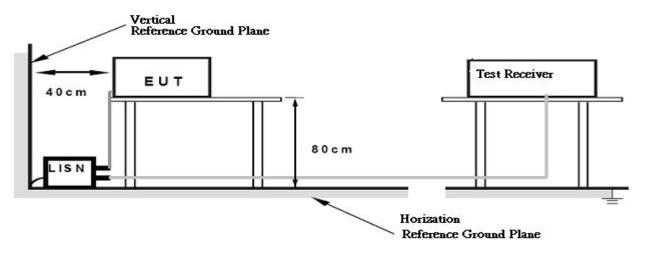
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.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

4.1.3 DEVIATION FROM TEST STANDARD

No deviation



4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

The EUT was programmed to be in continuously transmitting/TX Mode mode.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 53% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Appendix A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of "Note... If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150kHz to 30MHz.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

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.

Frequencies	Field Strength	Measurement Distance
(MHz)	(micorvolts/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

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBµV/m)
5150-5250	-27	68.3
5250-5350	-27	68.3
5470-5725	-27	68.3
	-27(Note 2)	68.3
E70E E9E0	10(Note 2)	105.3
5725-5850	15.6(Note 2)	110.9
	27(Note 2)	122.3

Note:

1. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength: $E = \frac{1000000\sqrt{30P}}{1000000\sqrt{30P}}$

 $-\mu$ V/m, where P is the eirp (Watts)

2. According to FCC 16-24, All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below theband edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above orbelow the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.



4.2.2 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 1GHz)
- 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 1GHz)
- 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 1GHz.
- 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 1GHz)
- 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 1GHz)
- i. For the actual test configuration, please refer to the related Item -EUT Test Photos.

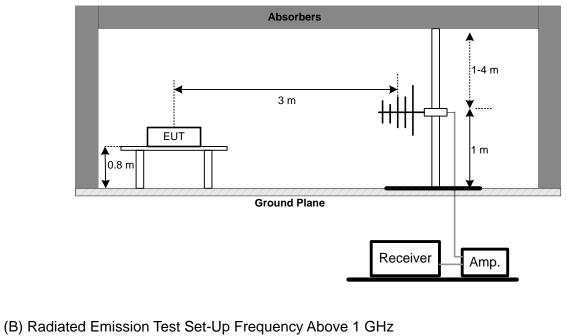
4.2.3 DEVIATION FROM TEST STANDARD

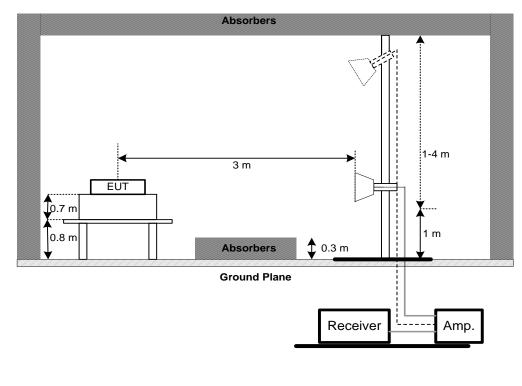
No deviation



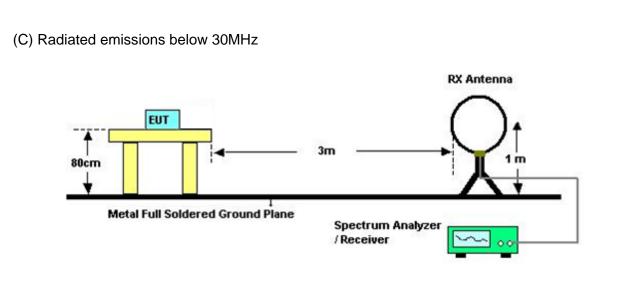
4.2.4 TEST SETUP











4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

4.2.7 TEST RESULTS (9K TO 30MHz)

Please refer to the Appendix B

Remark:

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

4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz)

Please refer to the Appendix C.

4.2.9 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. 26dB SPECTRUM BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Frequency Range (MHz)	Result		
	26 dB Bandwidth	5150-5250	PASS	
Bandwidth	Minimum 500kHz 6dB Bandwidth	5725-5850	PASS	

5.1.1 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 Parameters	Setting
	Attenuation	Auto
Span Frequency > 26dB Bandwidth		> 26dB Bandwidth
	RBW	300 kHz(Bandwidth 20MHz)
	RBW	1MHz(Bandwidth 40MHz and 80MHz)
	VBW	1MHz(Bandwidth 20MHz)
	VBVV	3MHz(Bandwidth 40MHz and 80MHz)
	Detector	Peak
Trace Max Hold		Max Hold
	Sweep Time	Auto

c. Measured the spectrum width with power higher than 26dB below carrier

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

EUT	SPECTRUM	
	ANALYZER	

5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.





5.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Appendix E.



6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Limit	Frequency Range (MHz)		
	Fixed:1 Watt (30dBm)			
Conducted Output	Mobile and portable: 5150-5250		PASS	
Power	250mW (24dBm)			
	1 Watt (30dBm)	5725-5850	PASS	
Note: The maximum e.i.r.p at anyelevation angle above 30 degrees as measured from the				

horizon must not exceed 125mW(21dBm)

6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b. Used spectrum analyzer band power measurement function.

c. Spectrum Parameter	Setting
Attenuation	Auto
Spon Fraguanay	Encompass the entire emissions bandwidth (EBW) of the
Span Frequency	signal
RBW	= 1MHz.
VBW	≥ 3MHz.
Sweep points	≥2 x span / RBW
Detector	RMS
Trace	Trace average at least 100 traces in power
	averaging(rms) mode.
Sweep Time	auto

d. Test was performed in accordance with method of KDB 789033 D02.



6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Appendix F.

7. POWER SPECTRAL DENSITY TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result		
Power Spectral Density			PASS		
	30dBm/500kHz	5725-5850	PASS		

7.1.1TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b.	Spectrum Parameter	Setting
	Attenuation	Auto
	Spon Fraguenov	Encompass the entire emissions bandwidth (EBW) of the
	Span Frequency	signal
	RBW	= 1MHz.
	VBW	≥ 3MHz.
	Detector	RMS
	Trace average	100 trace
	Sweep Time	Auto

Note:

- 1. For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v01r02, section II.F.5., it is acceptable to set RBW at 1MHz and VBW at 3MHz if the spectrum analyzer does not have 500kHz RBW.
- The value measured with RBW=1MHz is to be added with 10log(500kHz/1MHz) which is -3dB. For example, if the measured value is +10dBm using RBW=1MHz (that is +10dBm/MHz), then the converted value will be +7dBm/500kHz.



7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP

	·
EUT	SPECTRUM
	ANALYZER

7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

7.1.6 TEST RESULTS Please refer to the Appendix H.



8. FREQUENCY STABILITY MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item Limit Frequency Range Result				
Energy on an Otability	Specified in the	5150-5250	PASS	
Frequency Stability	user's manual	5725-5850	PASS	

8.1.1 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 Parameter	Setting
	Attenuation	Auto
	Span Frequency	Entire absence of modulation emissions bandwidth
	RBW	10 kHz
	VBW	10 kHz
	Sweep Time	Auto

- c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
- d. User manual temperature is 0°C~40°C.

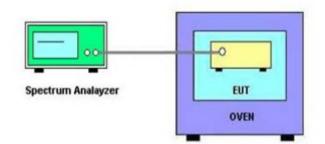
8.1.2 DEVIATION FROM STANDARD

No deviation.





8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS Please refer to the Appendix I.



9. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement					
Item Kind of Equipment Manufacturer Type		Type No.	Serial No.	Calibrated until		
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 11, 2019	
2	LISN	EMCO	3816/2	52765	Mar. 11, 2019	
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 11, 2019	
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 11, 2019	
5 Measurement Software Farad		EZ-EMC Ver.NB-03A1-01	N/A	N/A		
6	Cable	N/A	RG223	12m	Oct. 19, 2018	

	Radiated Emission Measurement - Below 1GHz					
Item Kind of Equipment Manufacturer Type N		Type No.	Serial No.	Calibrated until		
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 11, 2019	
2	Amplifier	HP	8447D	2944A09673	Oct. 19, 2018	
3	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018	
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	Jun. 30, 2019	
5	Controller	СТ	SC100	N/A	N/A	
6	Controller	MF	MF-7802	MF780208416	N/A	
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
8	Antenna	EM	EM-6876-1	230	Feb. 07, 2019	

	Radiated Emission Measurement - Above 1GHz					
Item		Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
	1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 11, 2019
2	2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2019
3	3	Amplifier	Agilent	8449B	3008A02274	Mar. 11, 2019
4	4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019
Ę	5	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018
6	6	Controller	СТ	SC100	N/A	N/A
7	7	Controller	MF	MF-7802	MF780208416	N/A
8	8	Cable	emci	EMC104-SM-SM-1 2000(12m)	N/A	Jun. 26, 2019
ę	9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A



	Spectrum Bandwidth Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Maximum Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

	Frequency Stability Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018
2	Precision Oven Tester	Bell	BTH-50C	20170306001	Mar. 11, 2019

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





10. EUT TEST PHOTOS

Conducted Measurement Photos

Adapter:BN036-A12012U





Report No.: BTL-FCCP-2-1806C125

Page 33 of 254



Conducted Measurement Photos

Adapter:BN071-A12012U





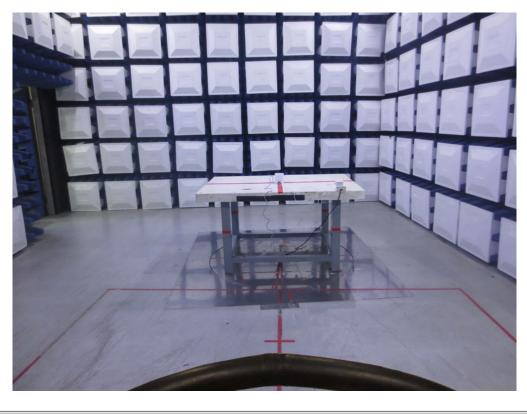


Radiated Measurement Photos

9kHz to 30MHz

Adapter:BN036-A12012U





Report No.: BTL-FCCP-2-1806C125

Page 35 of 254

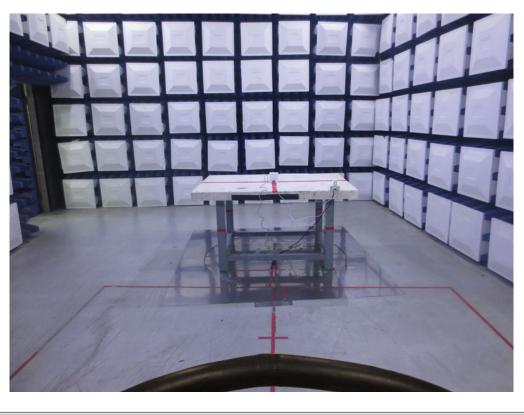


Radiated Measurement Photos

9kHz to 30MHz

Adapter:BN071-A12012U





Report No.: BTL-FCCP-2-1806C125

Page 36 of 254



Radiated Measurement Photos

30MHz to 1000MHz

Adapter:BN036-A12012U







Radiated Measurement Photos

30MHz to 1000MHz

Adapter:BN071-A12012U





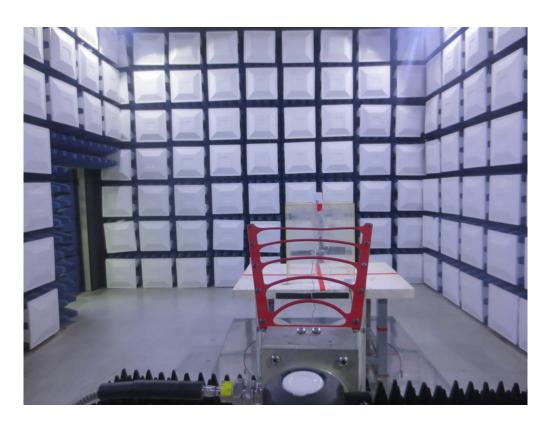
Report No.: BTL-FCCP-2-1806C125



Radiated Measurement Photos

Above 1000MHz

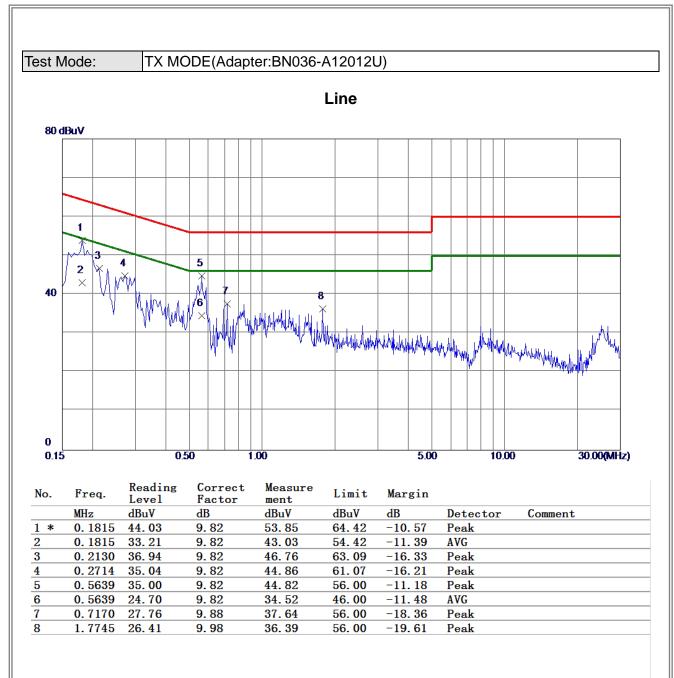




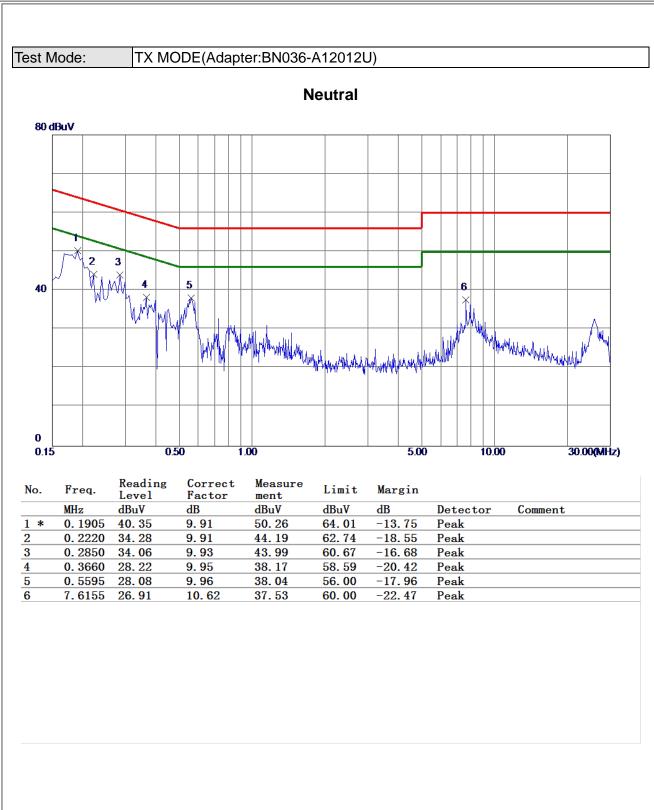


APPENDIX A - CONDUCTED EMISSION

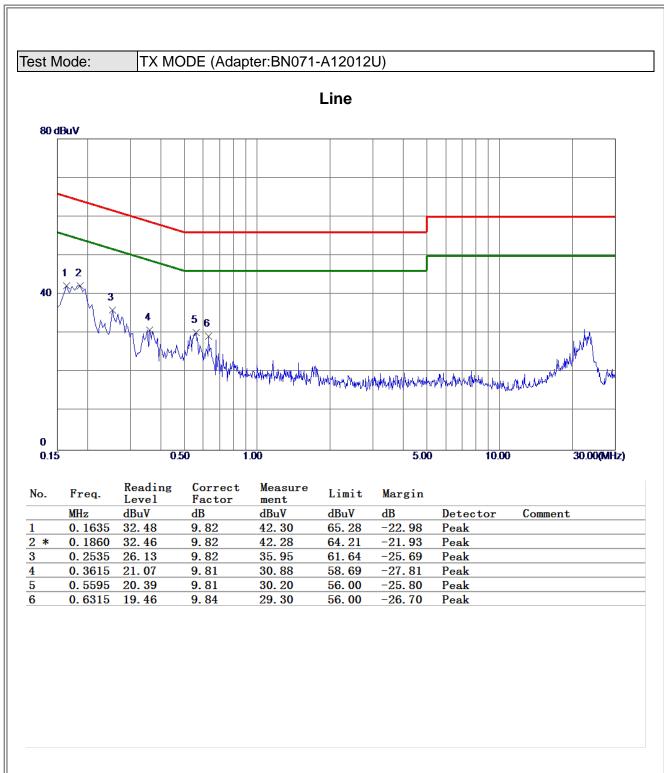




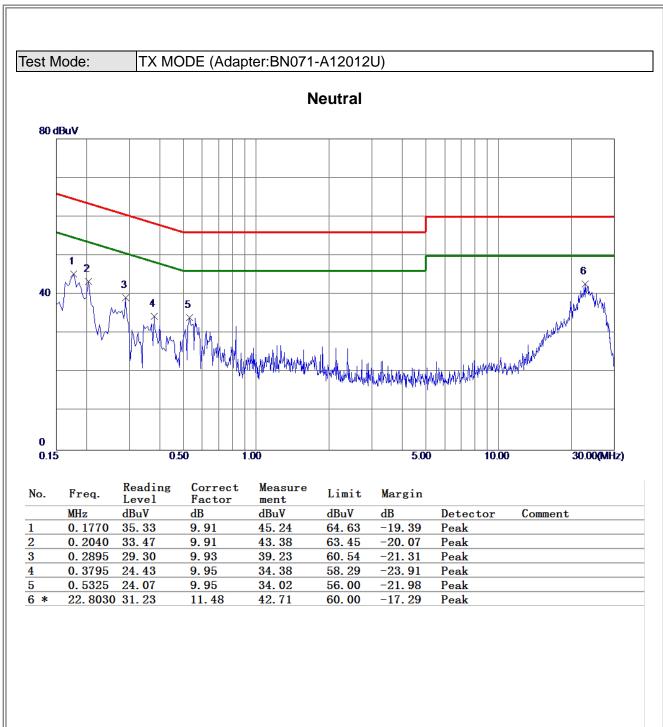










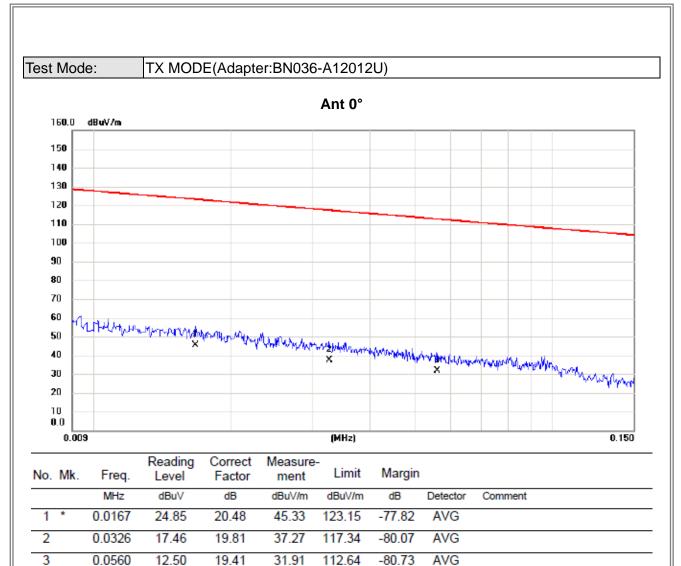




APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)

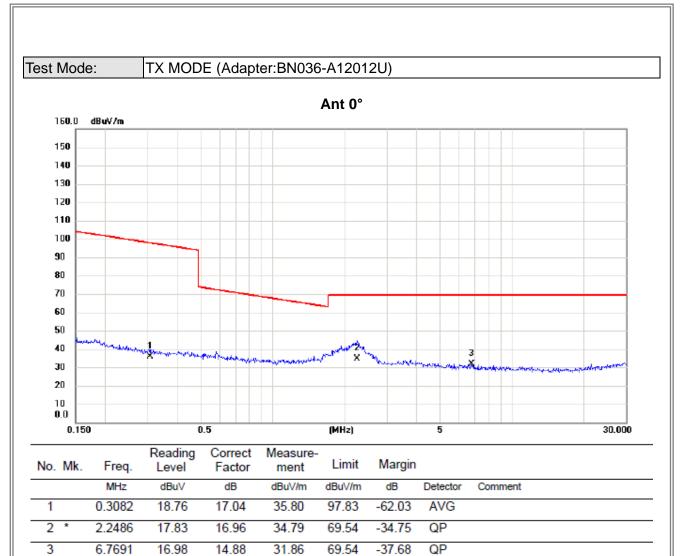






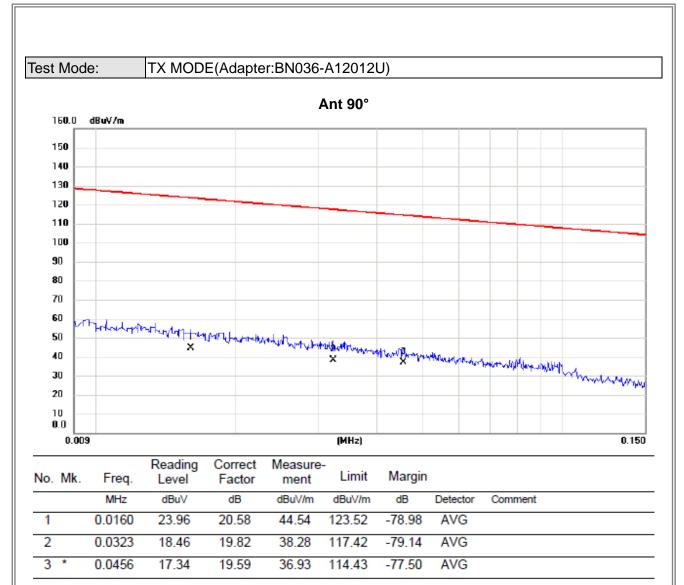






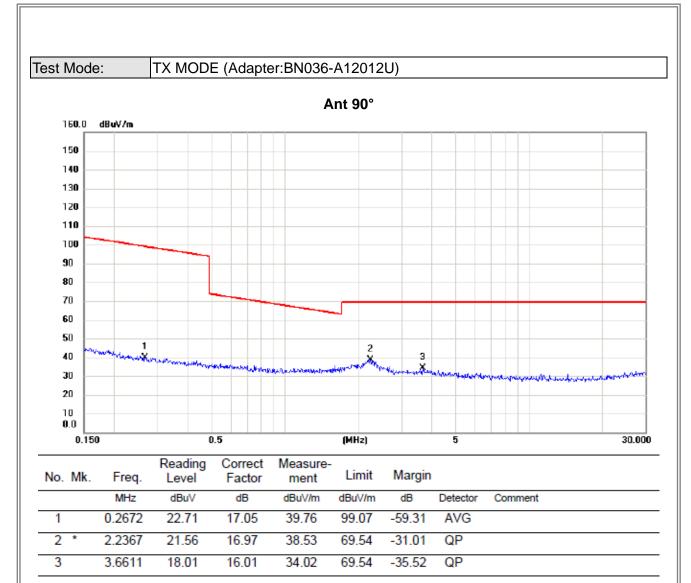






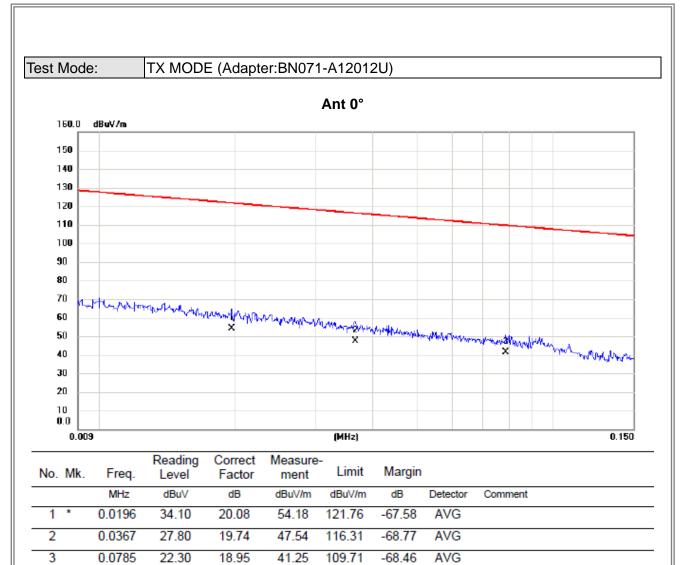




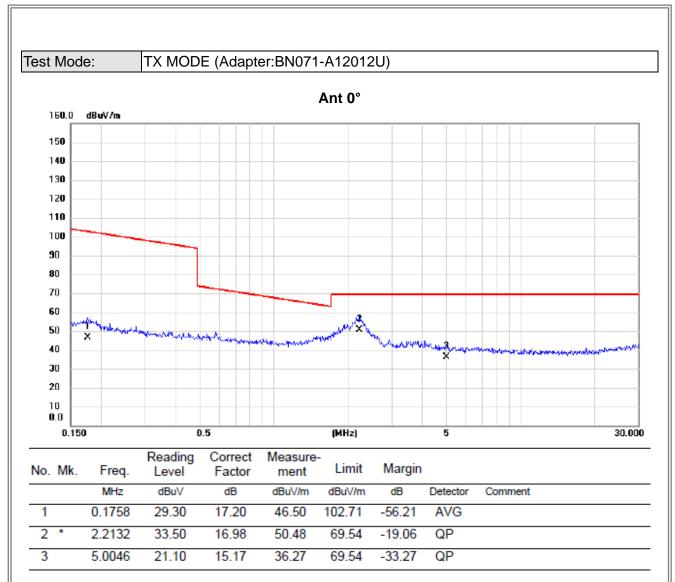






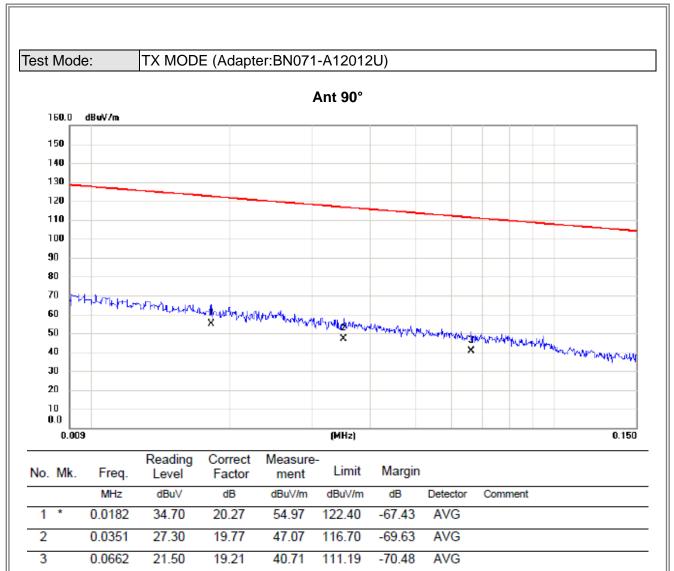






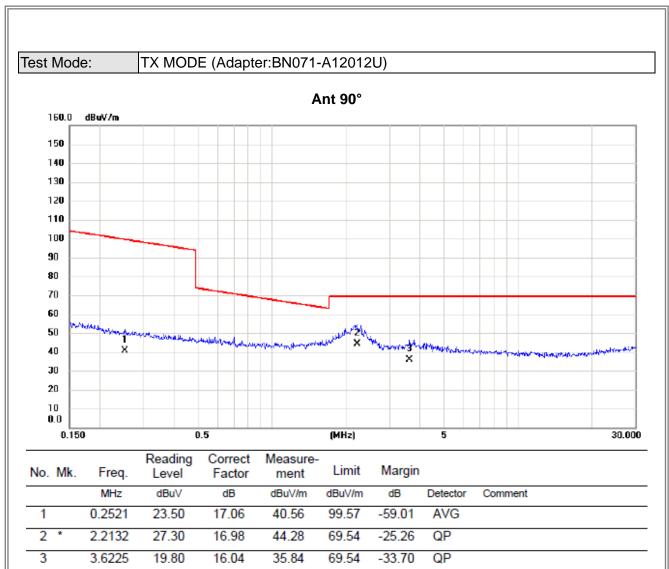






ЗĨL





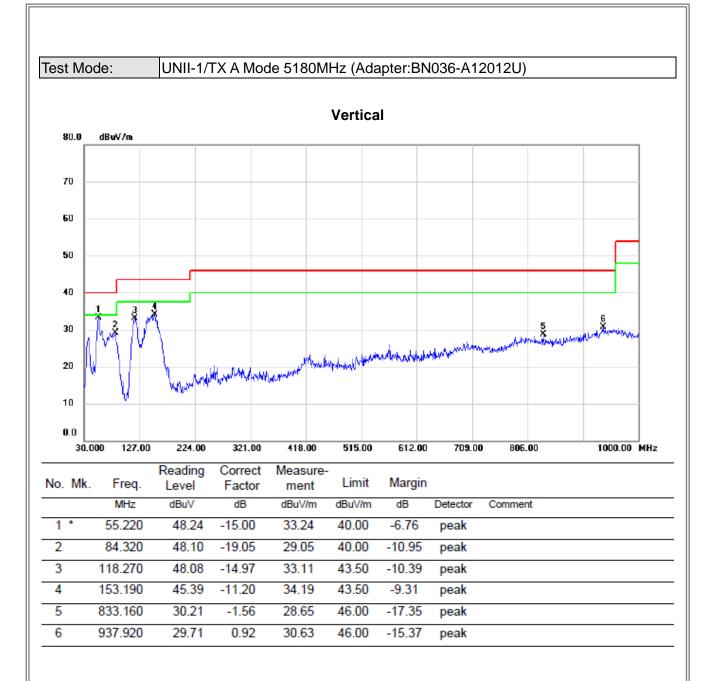




APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)

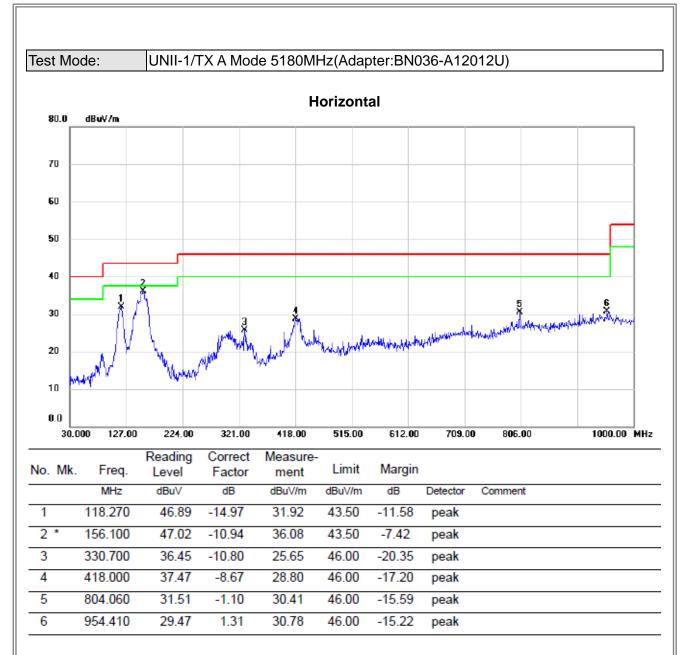






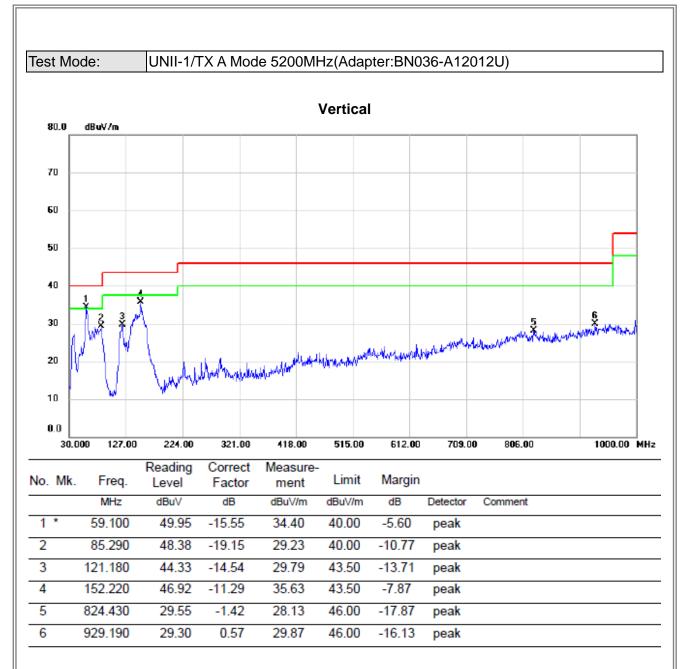






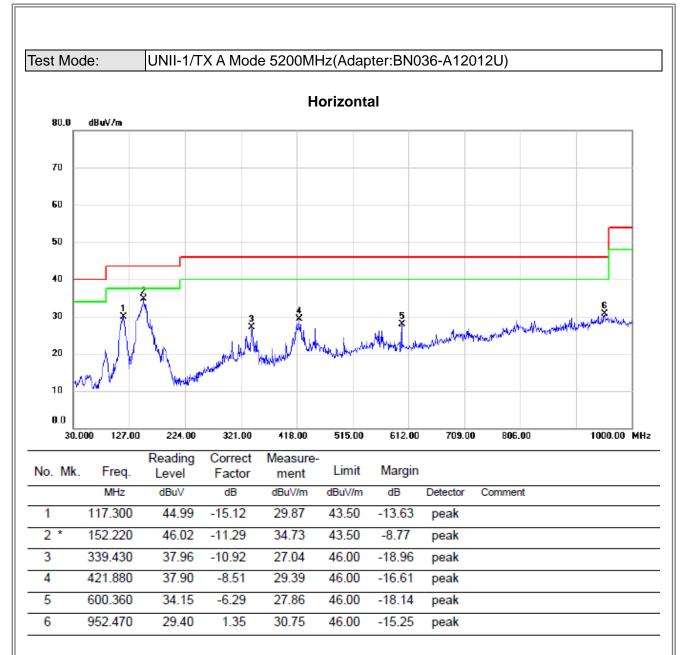






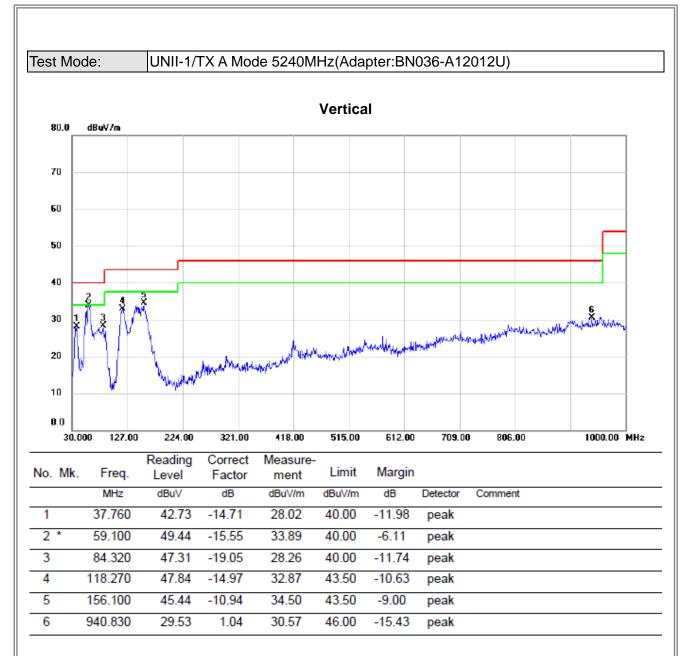






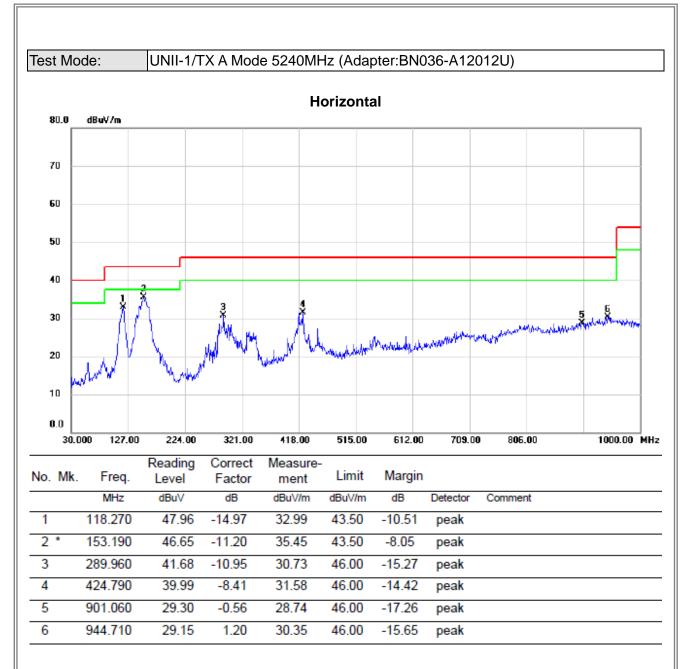






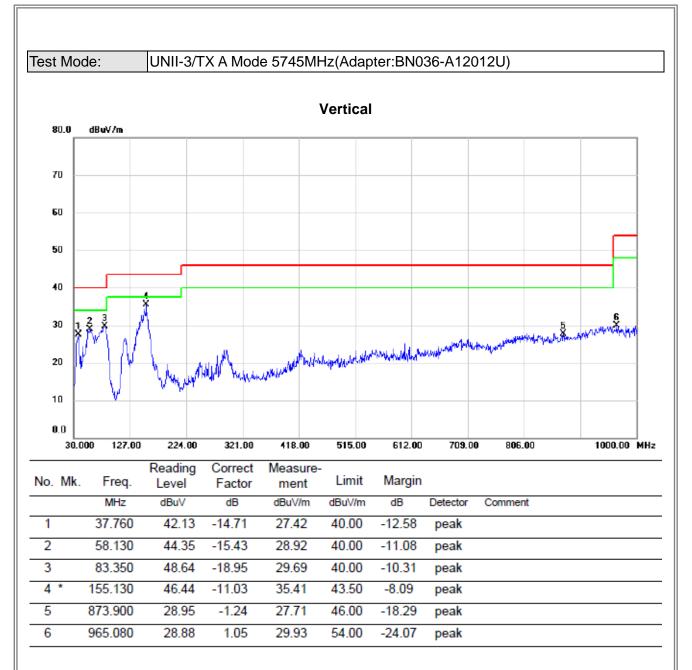






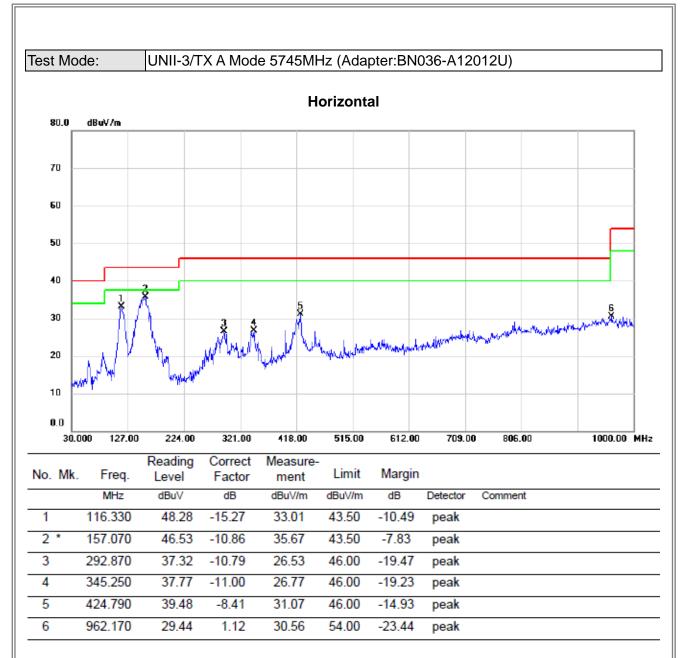






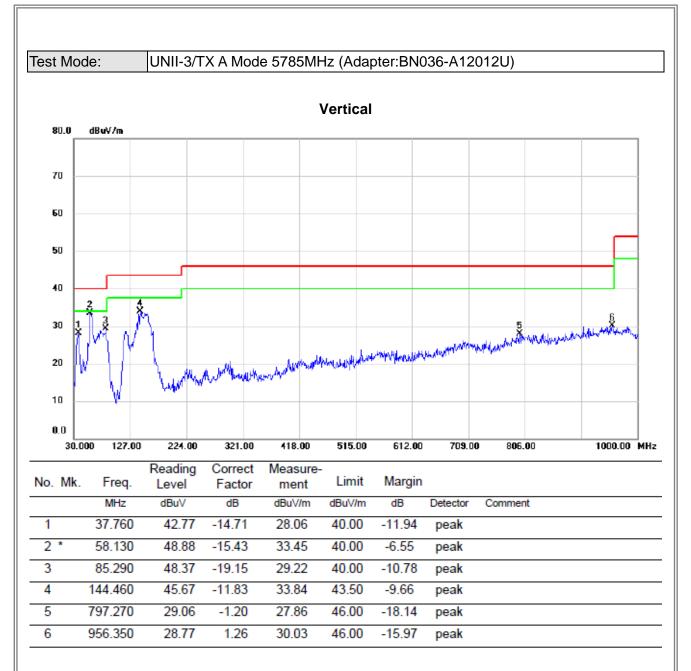






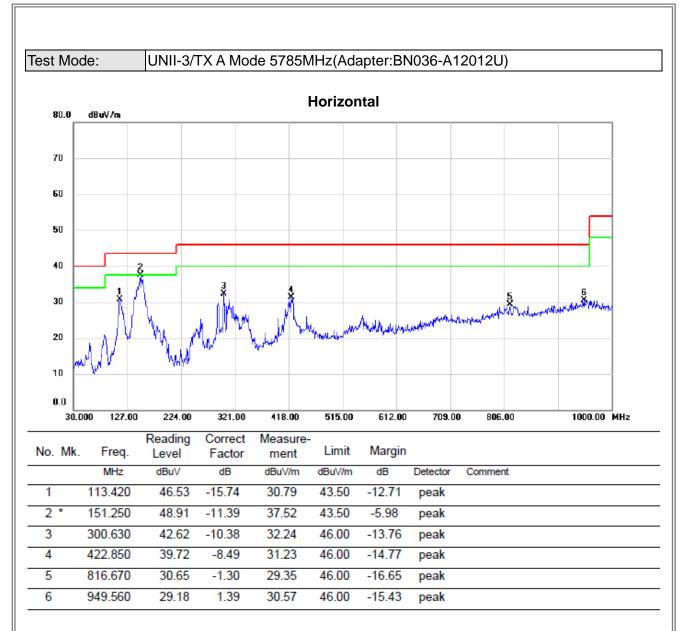






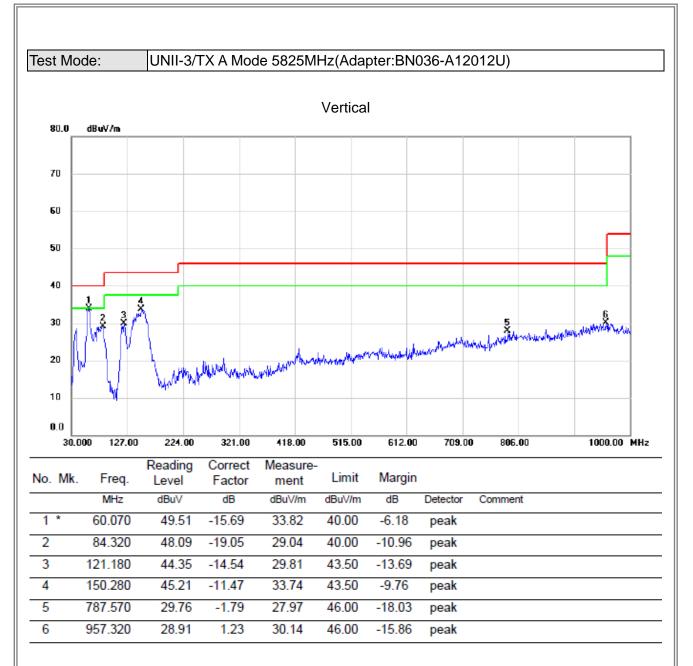






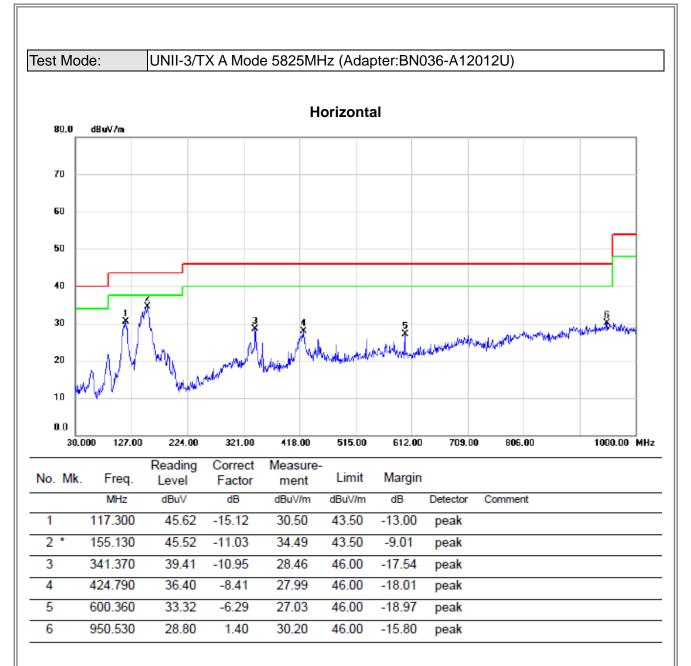






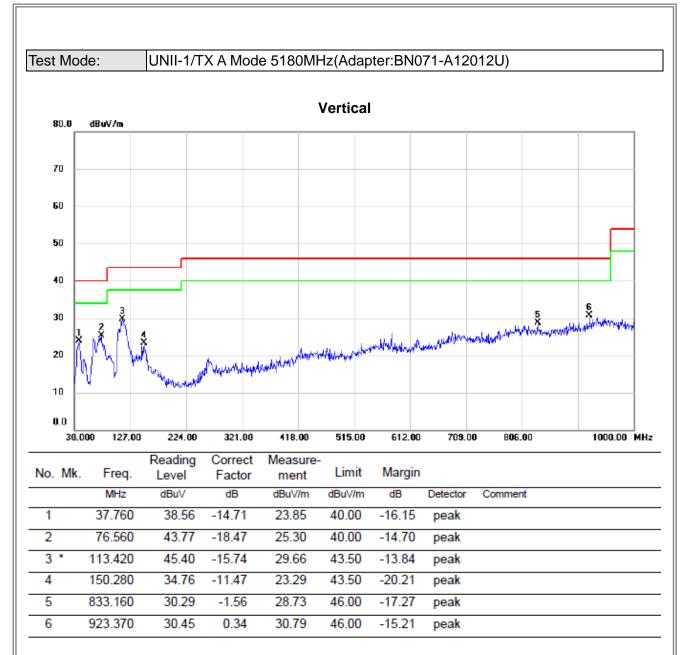






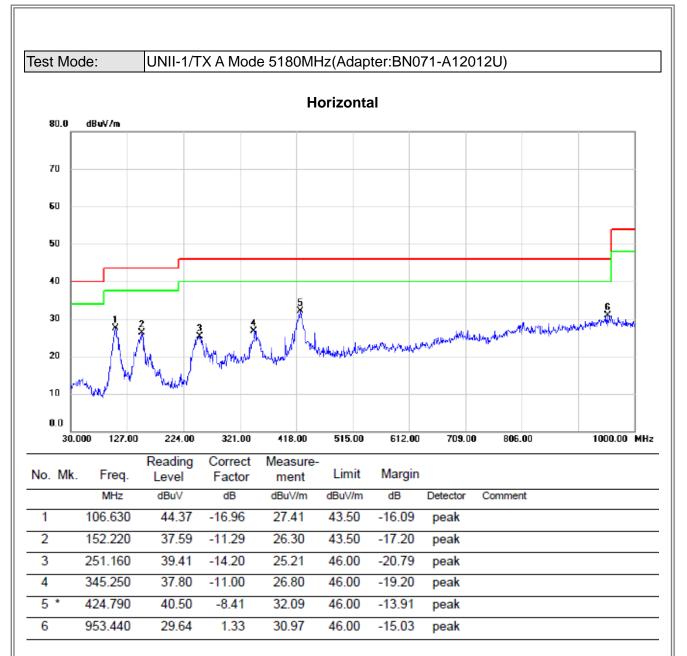






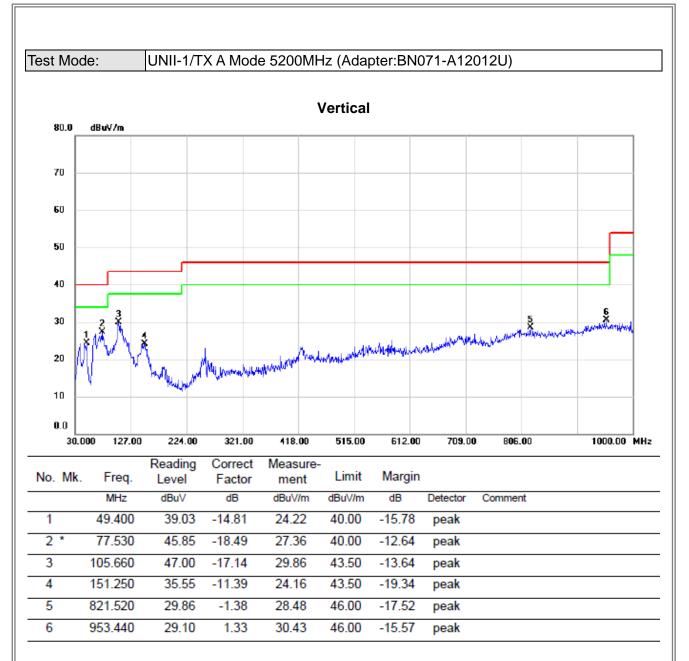






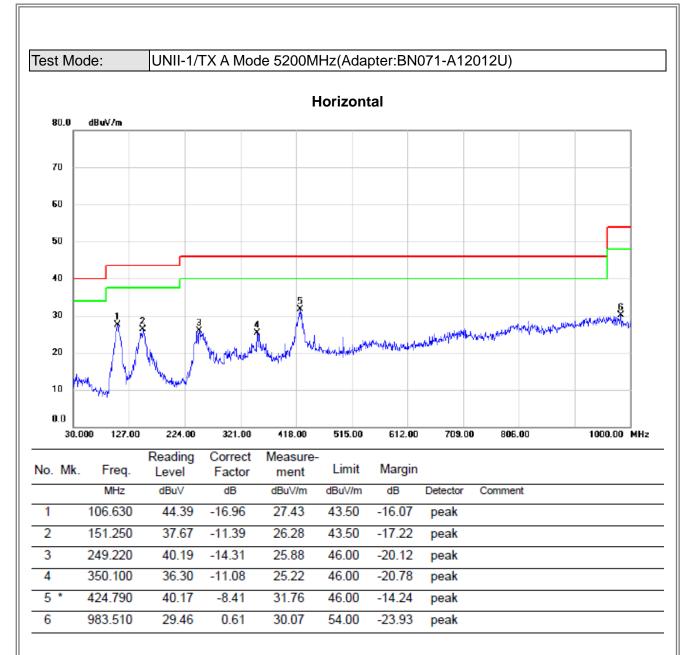






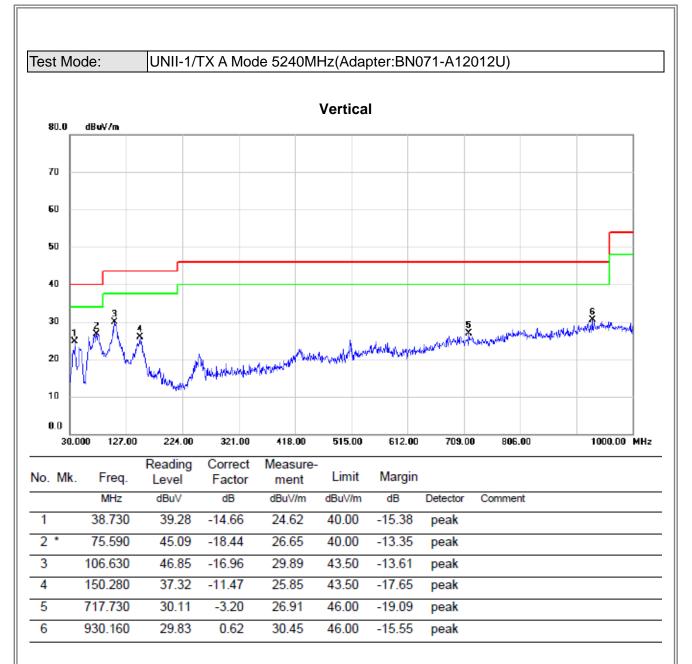






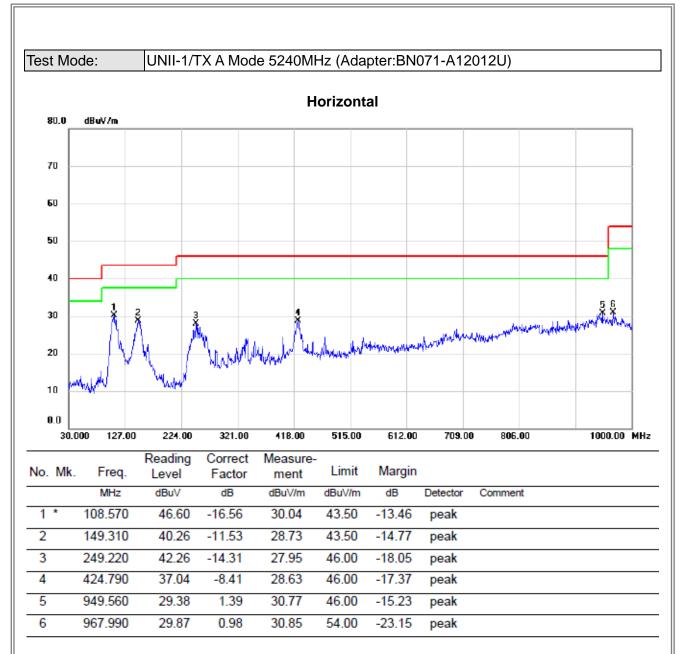






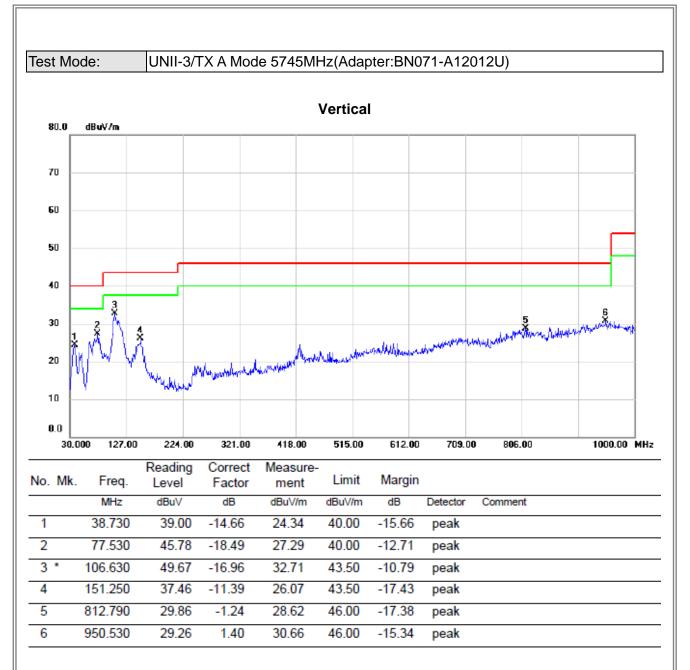






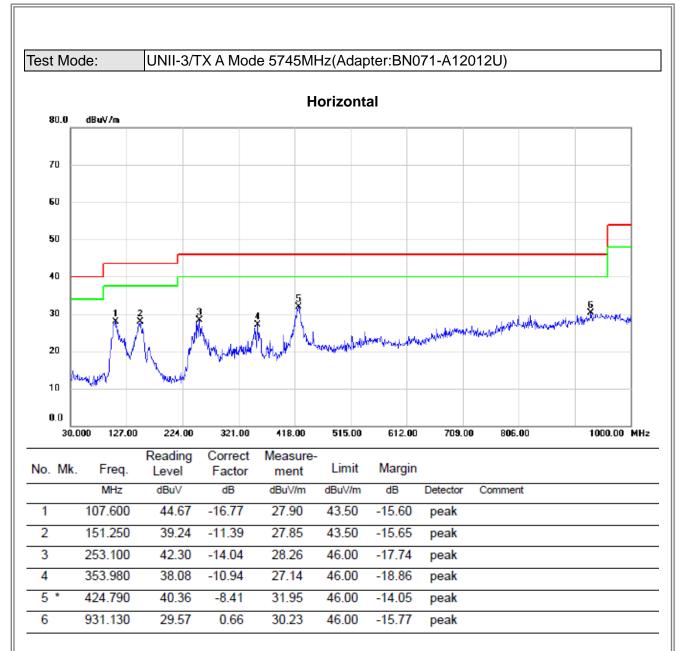






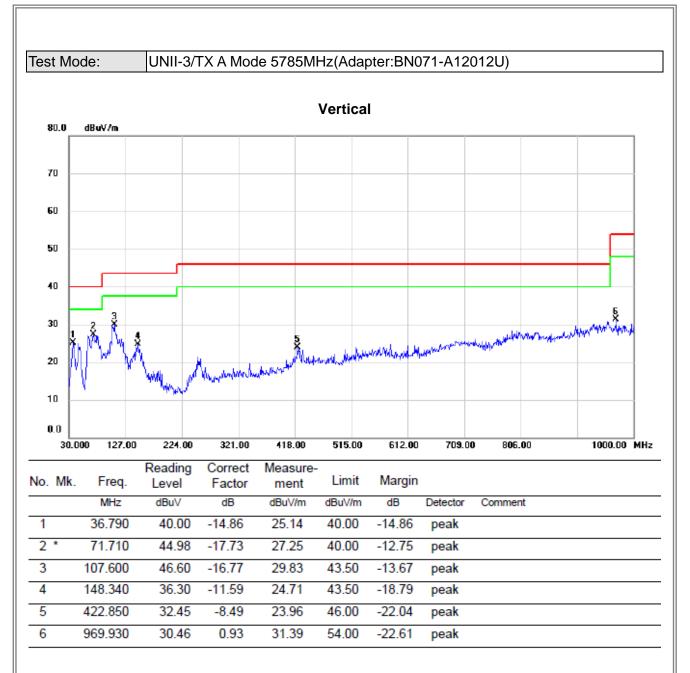






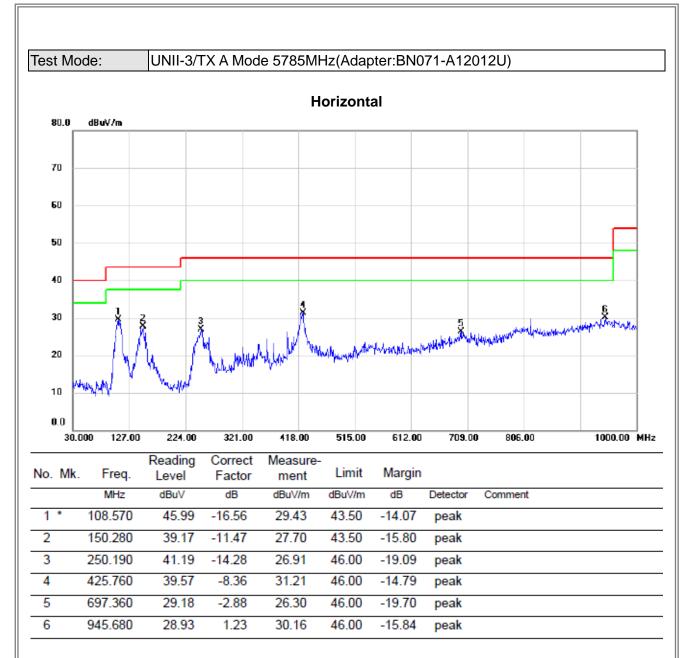






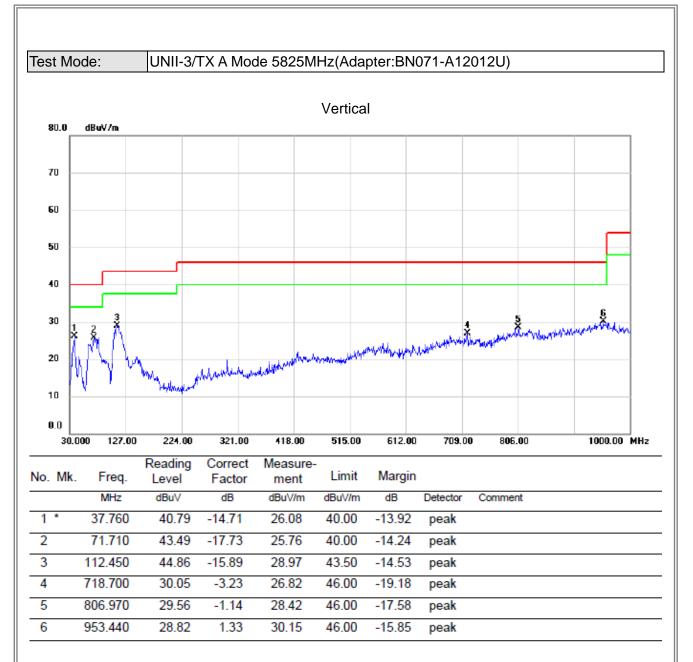






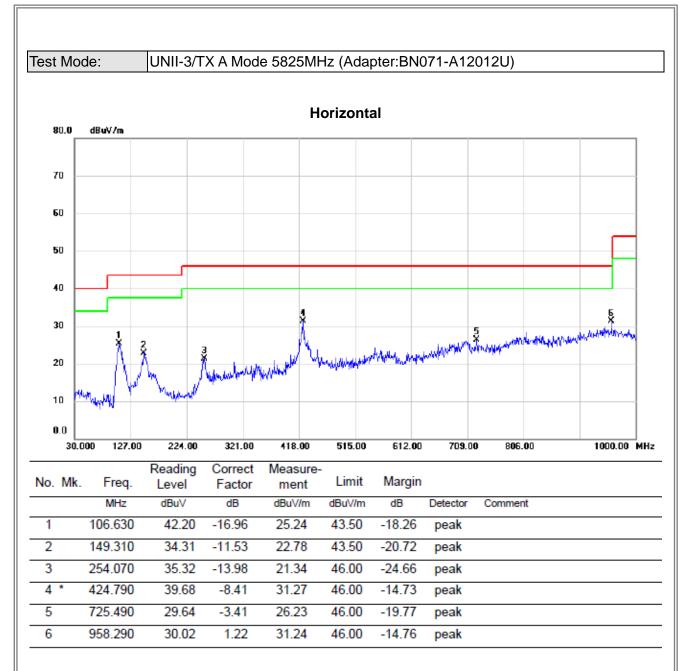










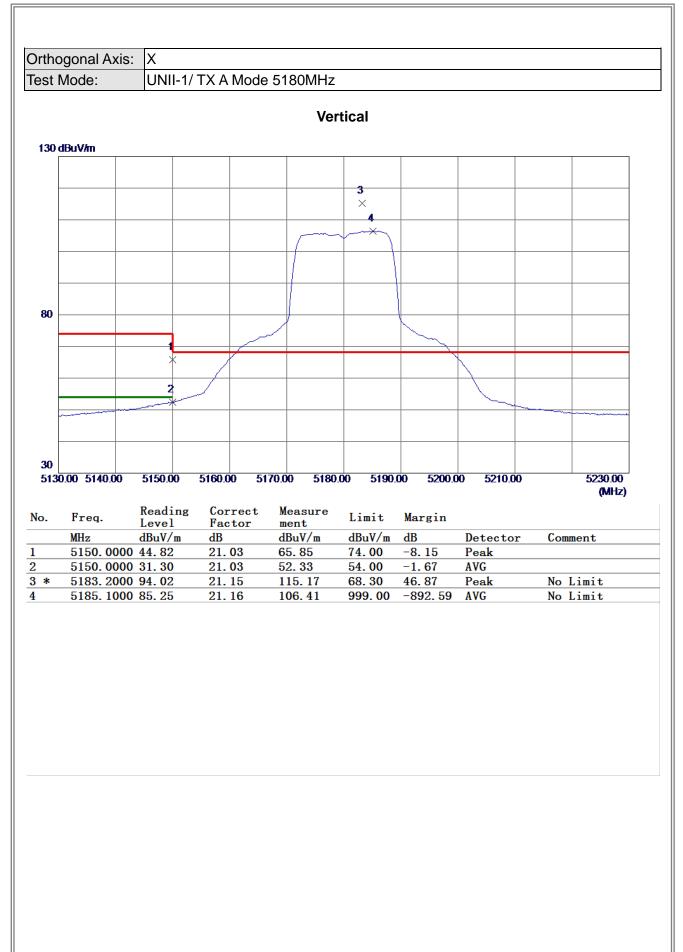




APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

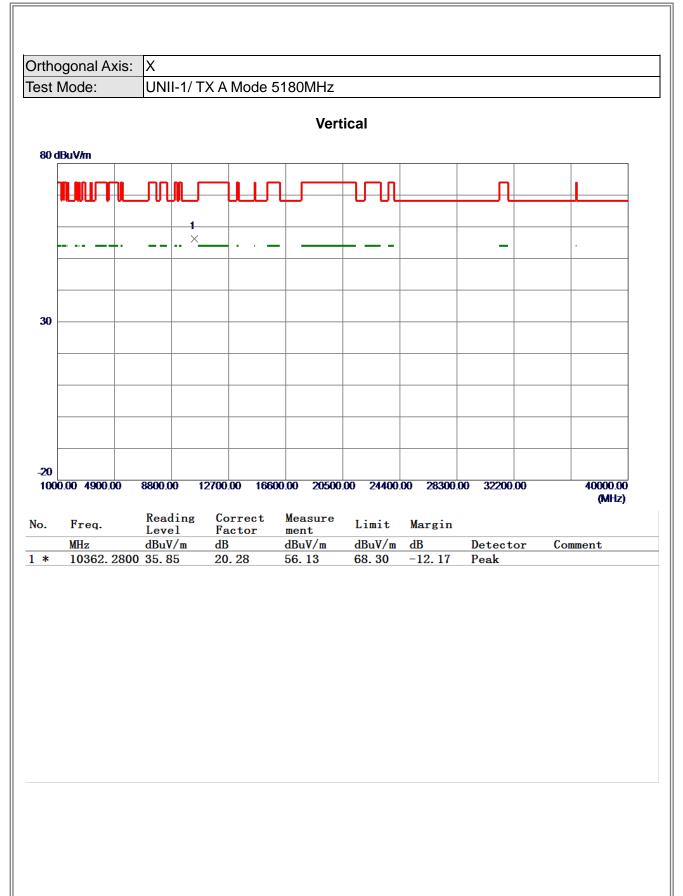






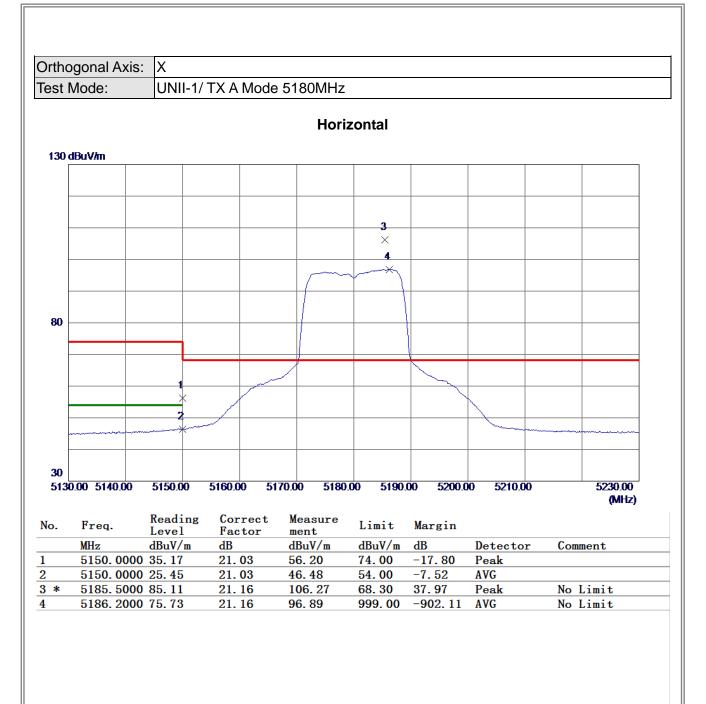






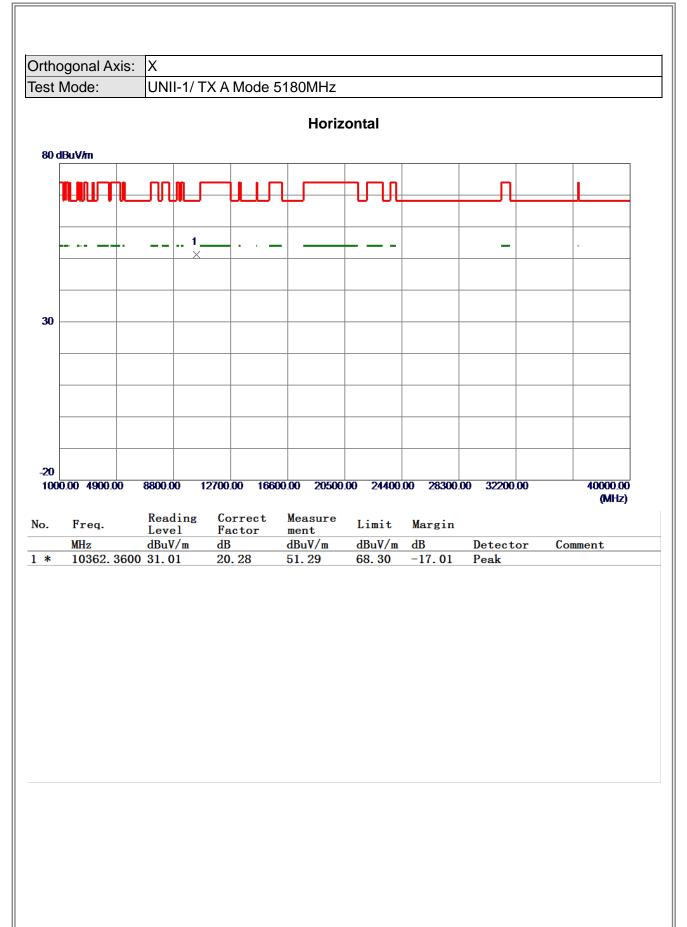






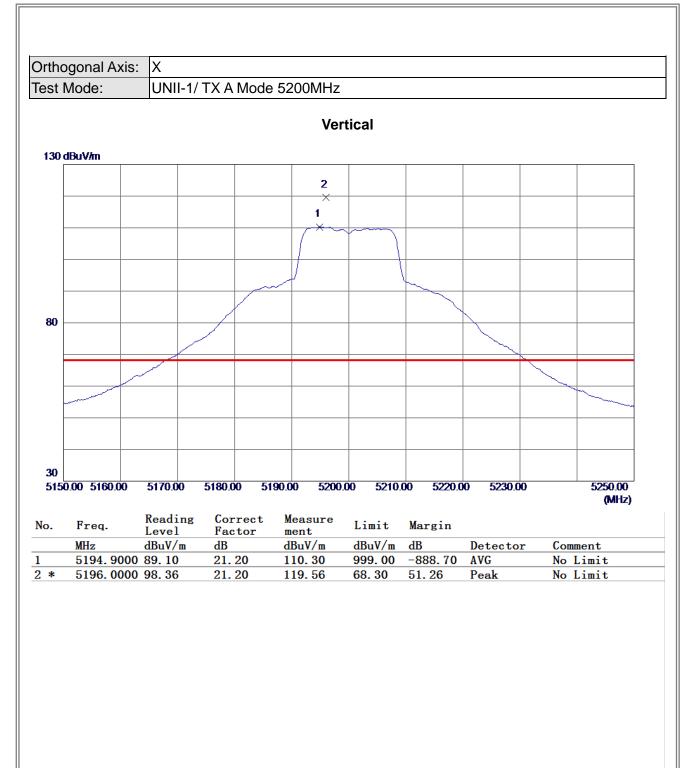






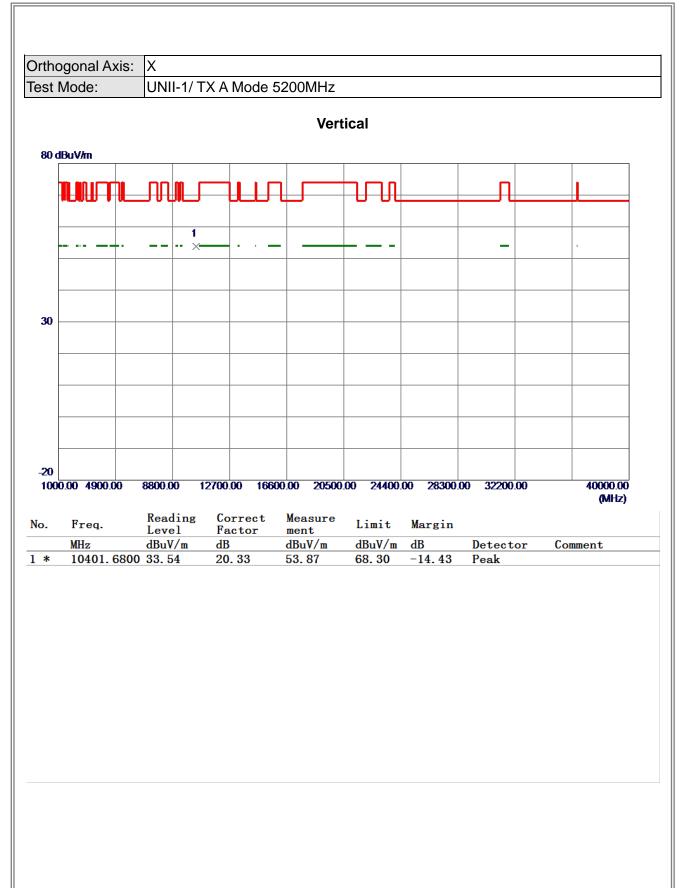






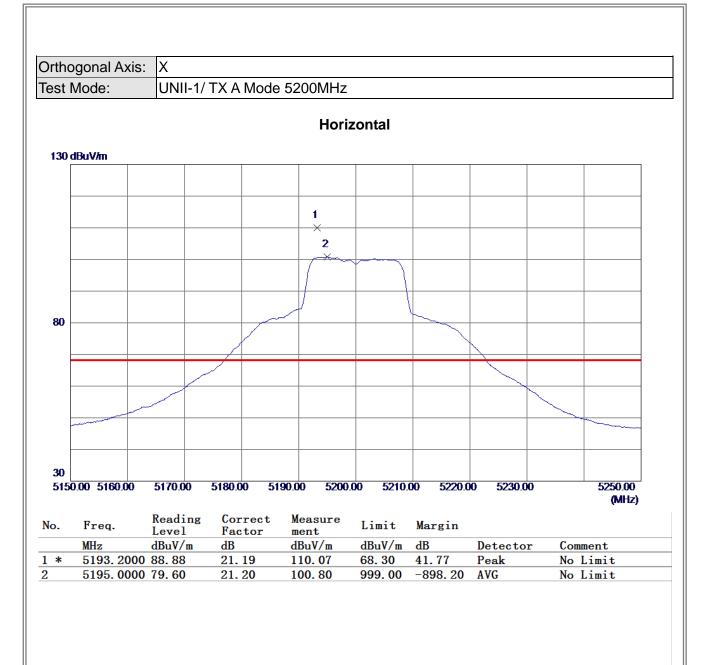






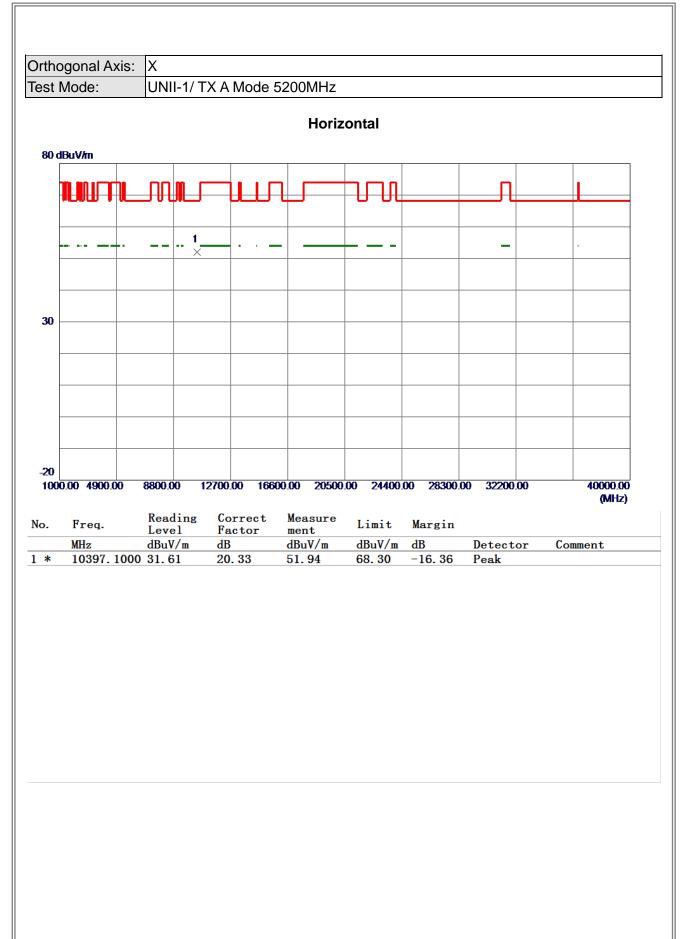






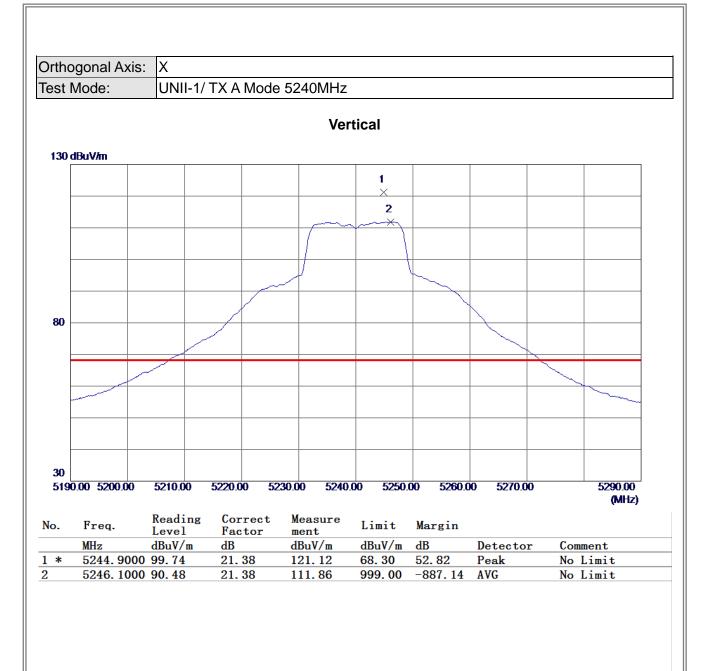






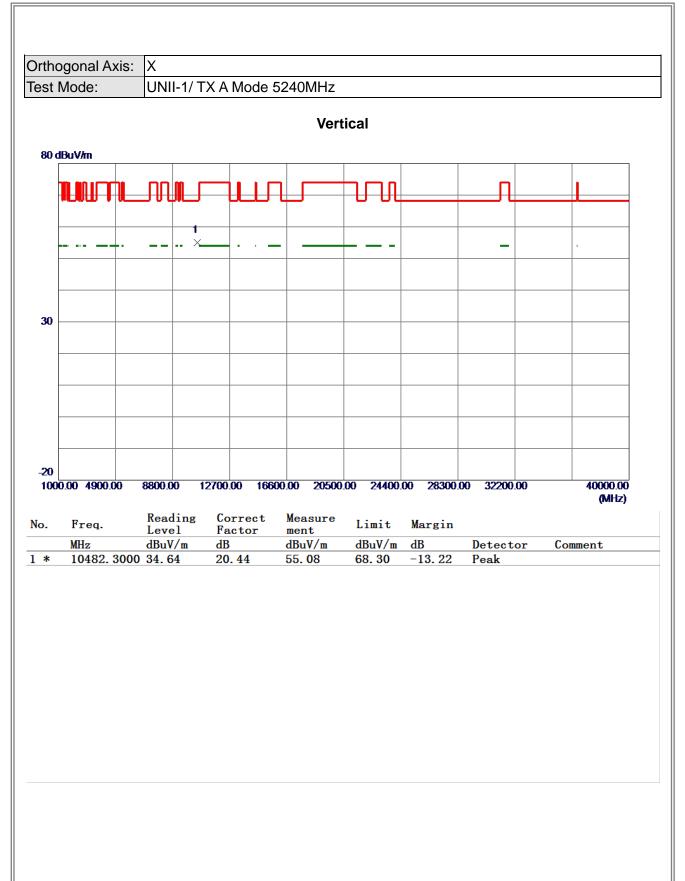






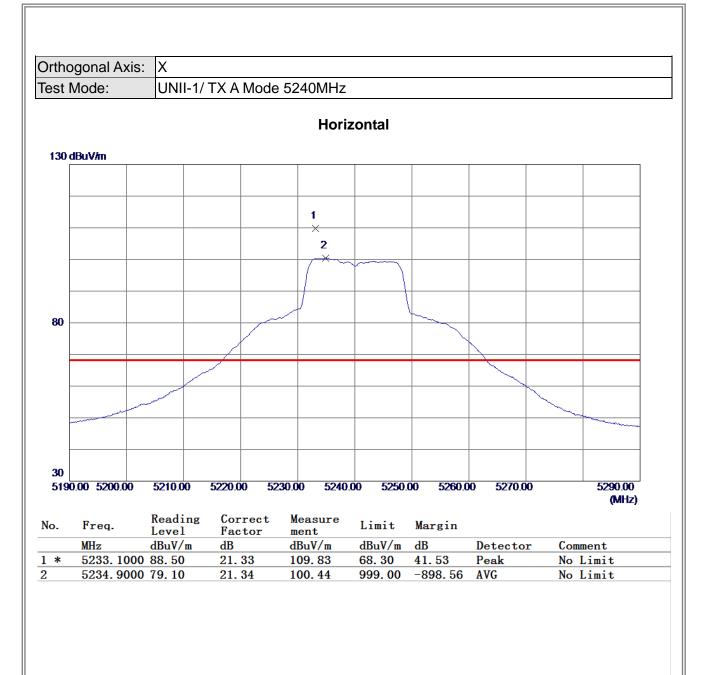






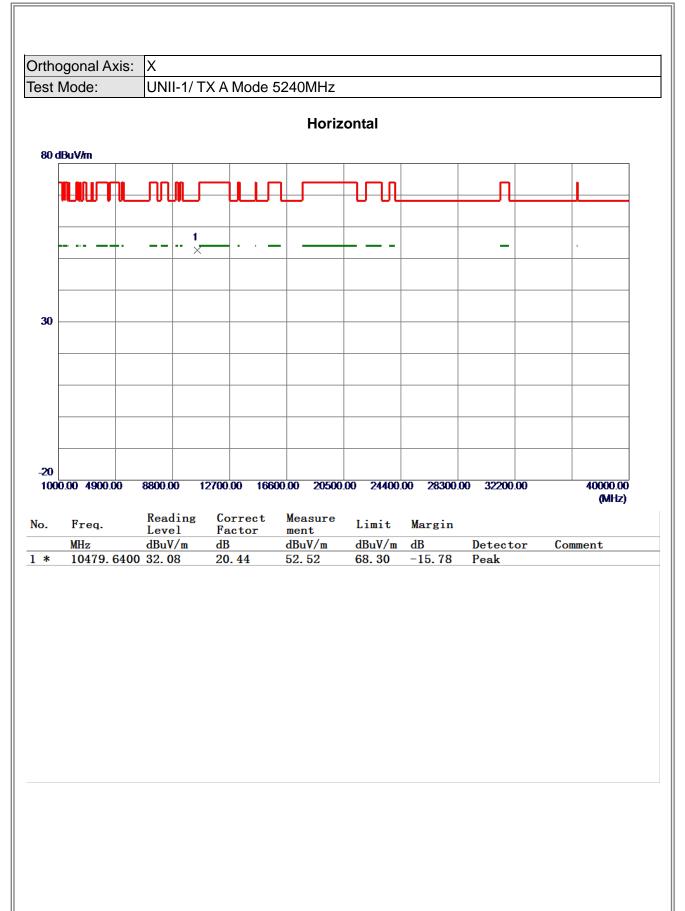






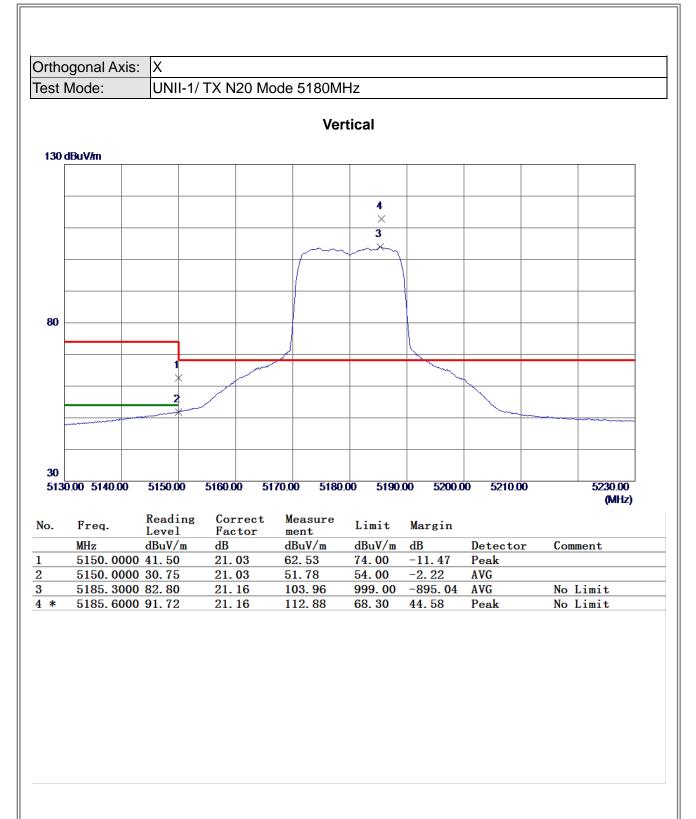






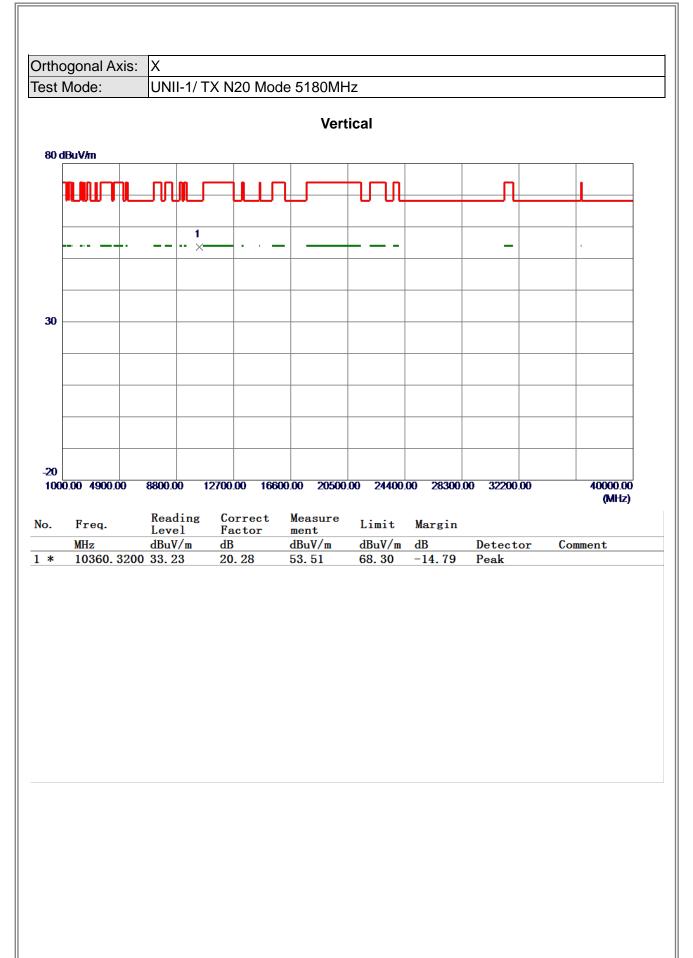






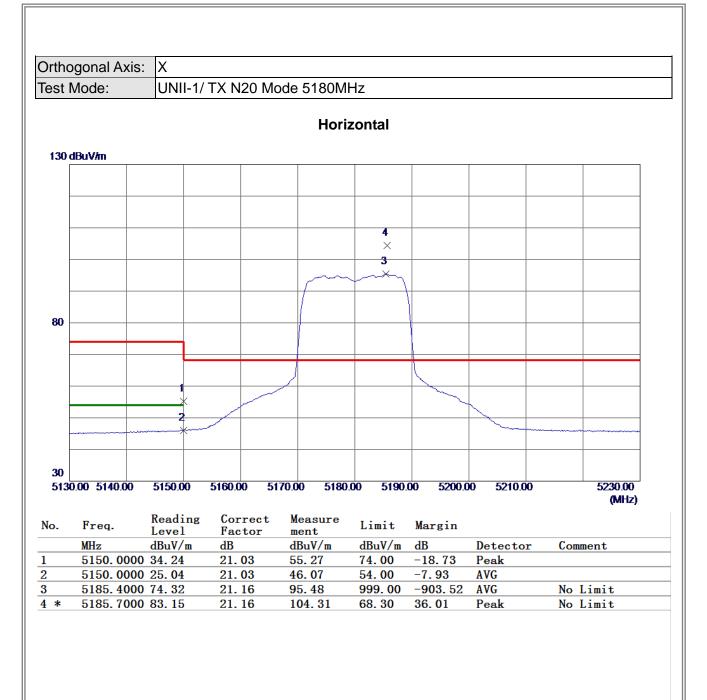






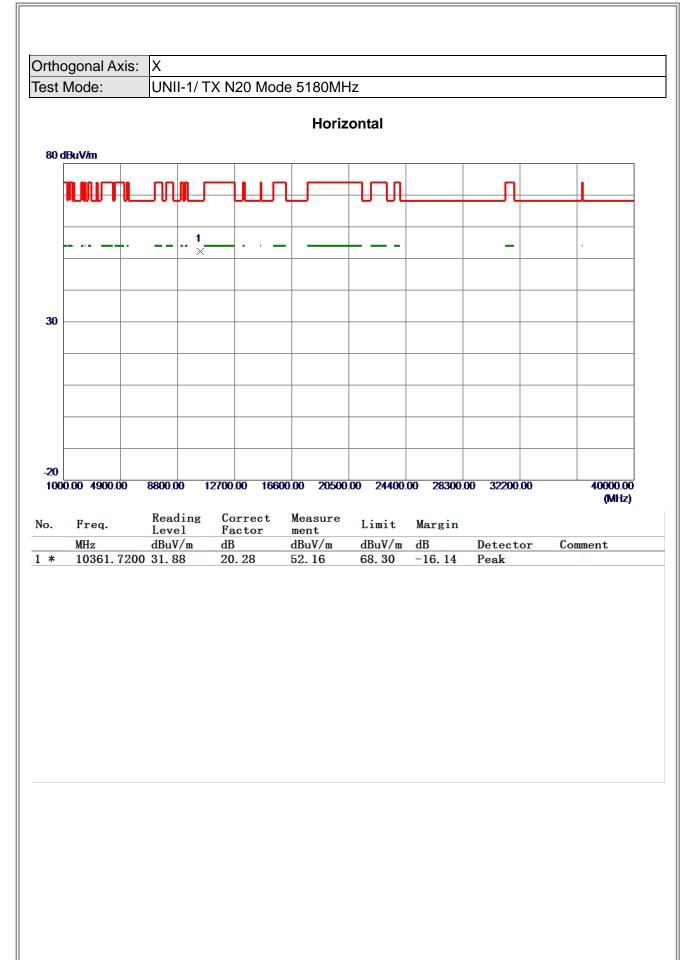






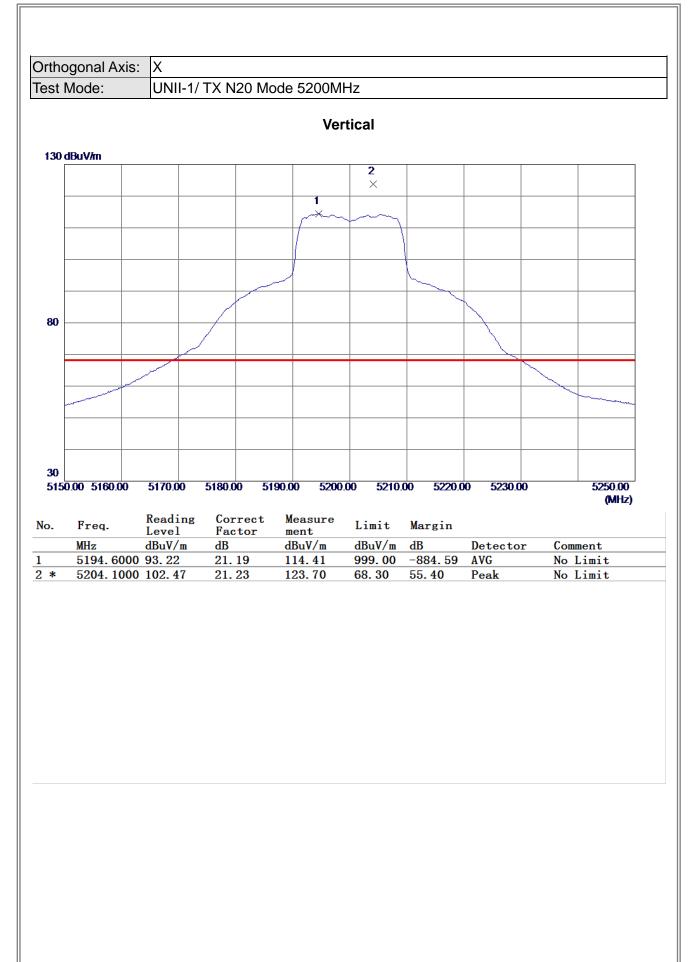






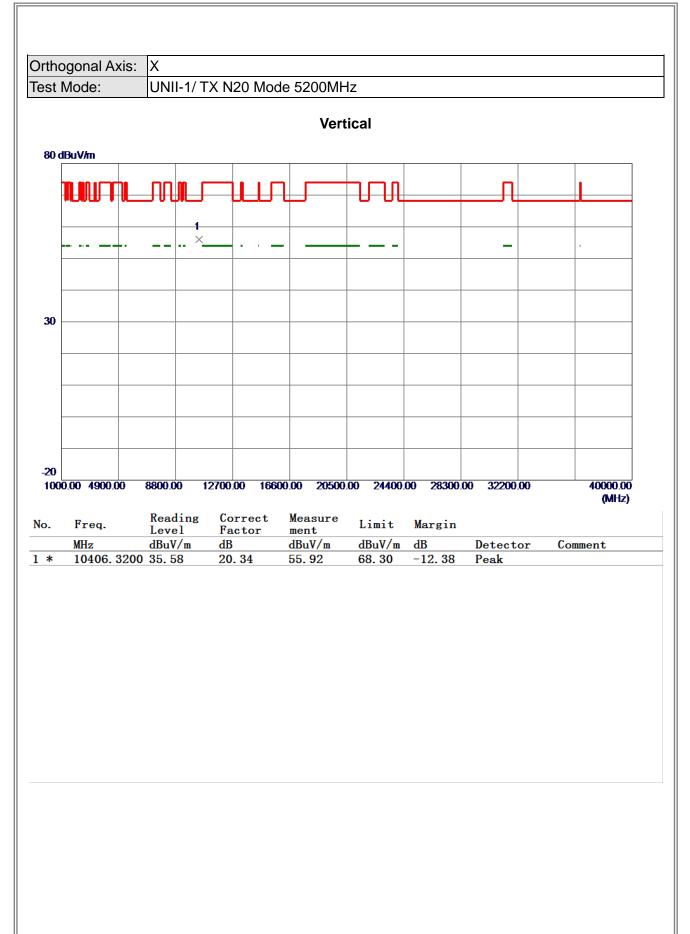






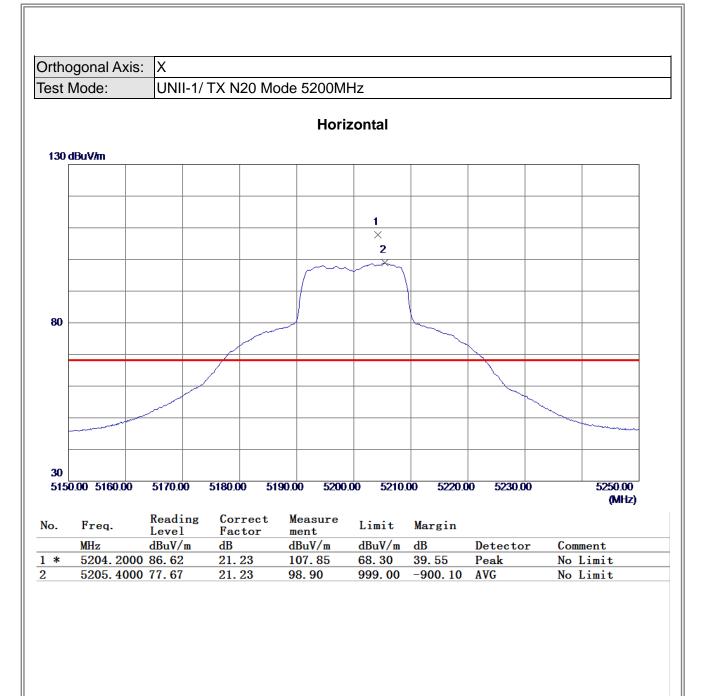






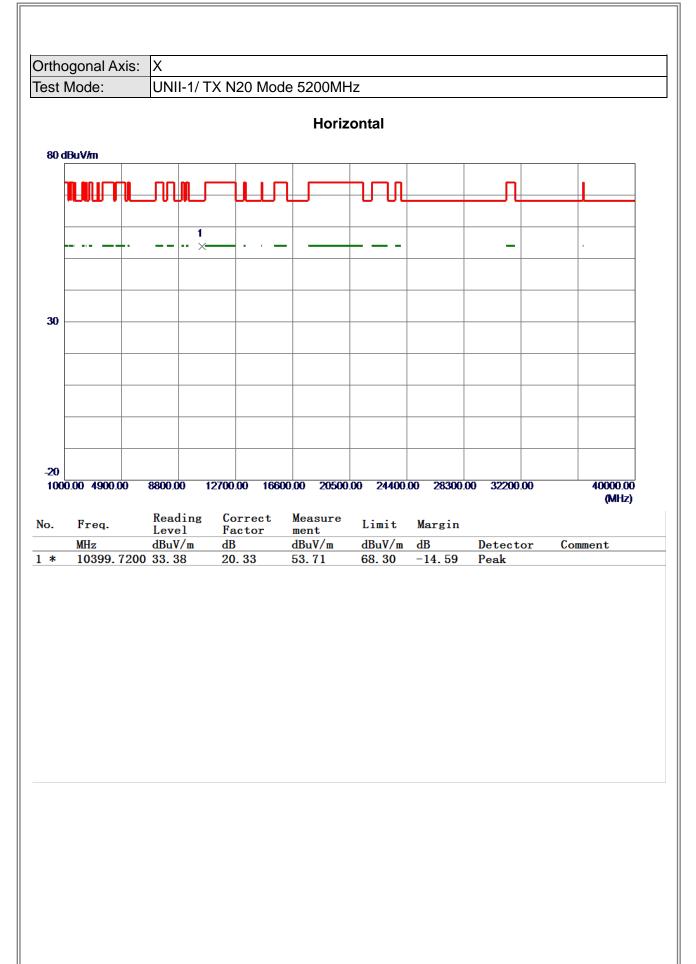






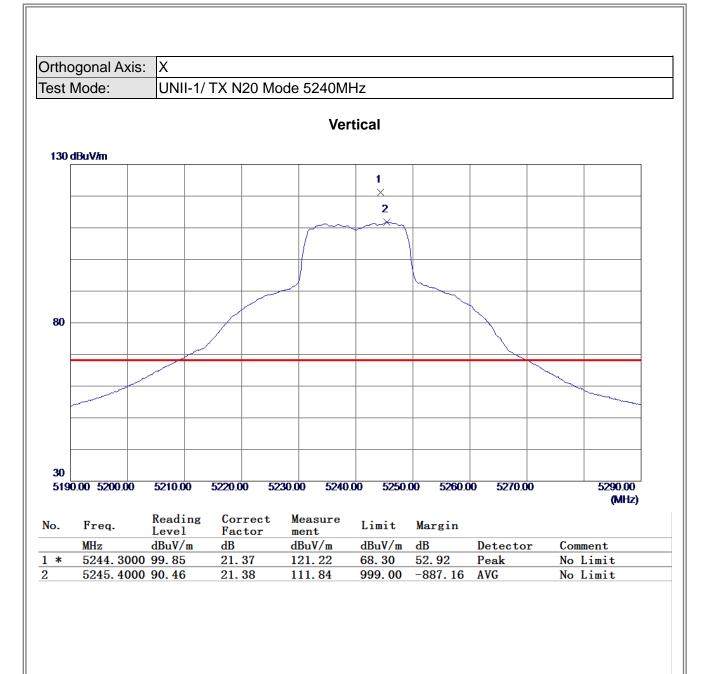






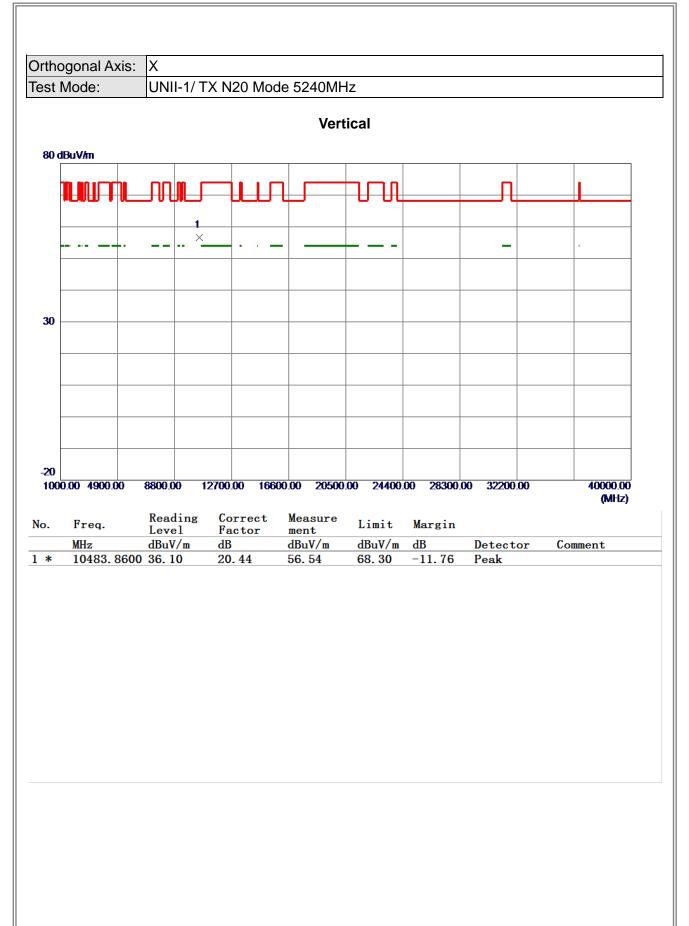






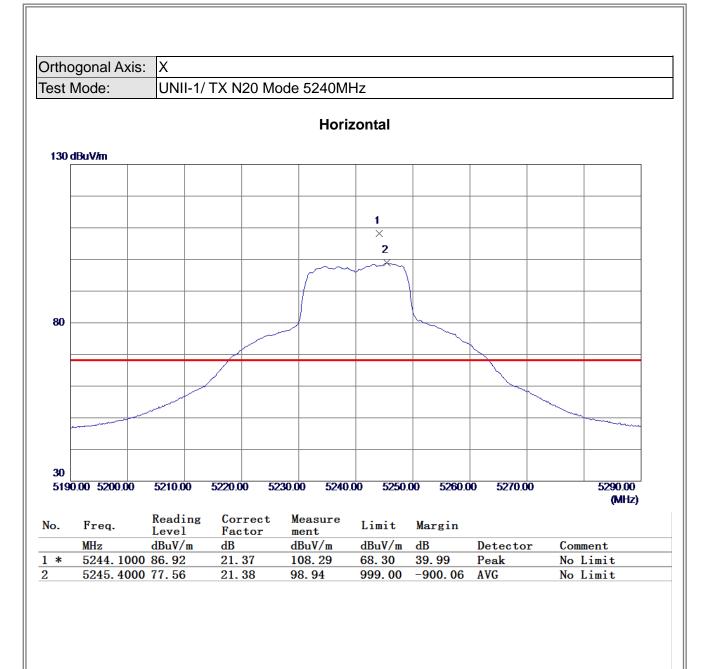






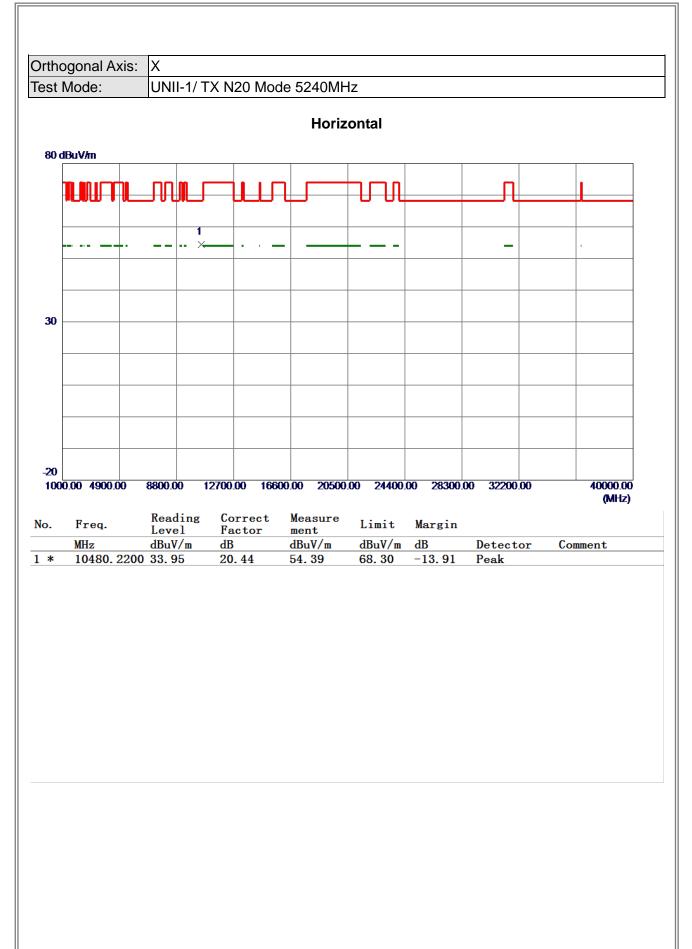






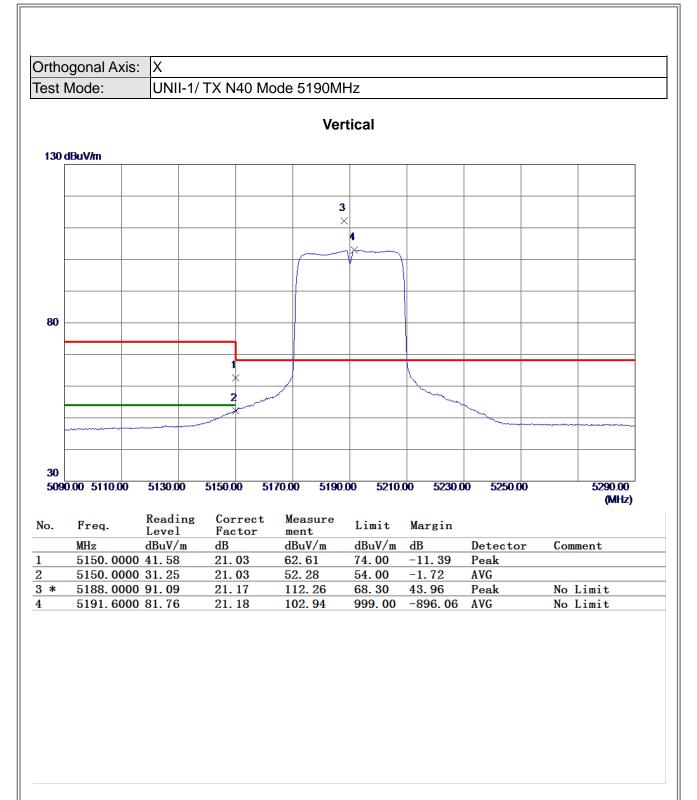






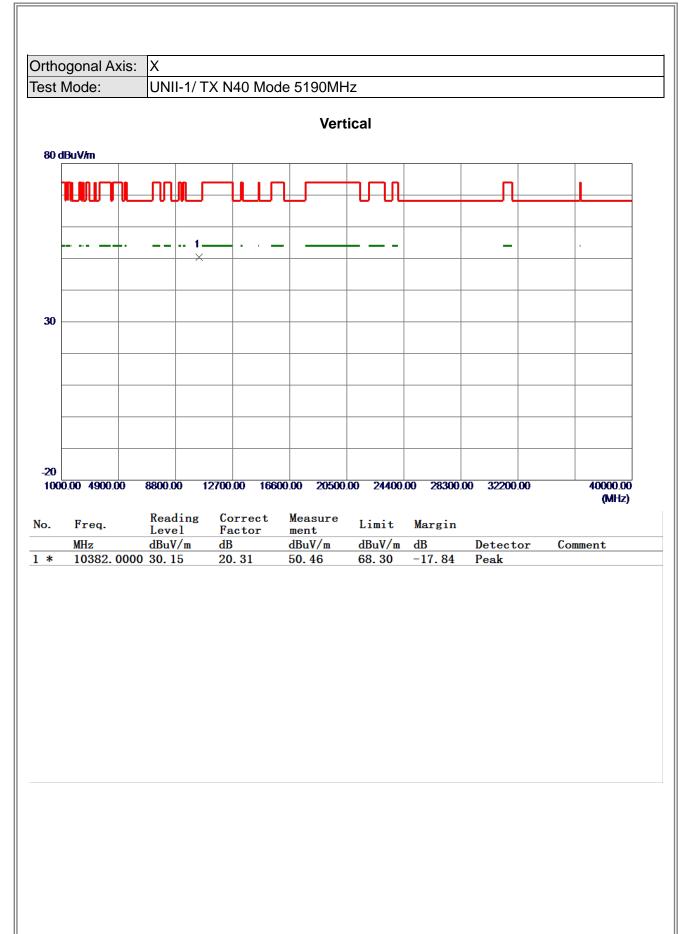






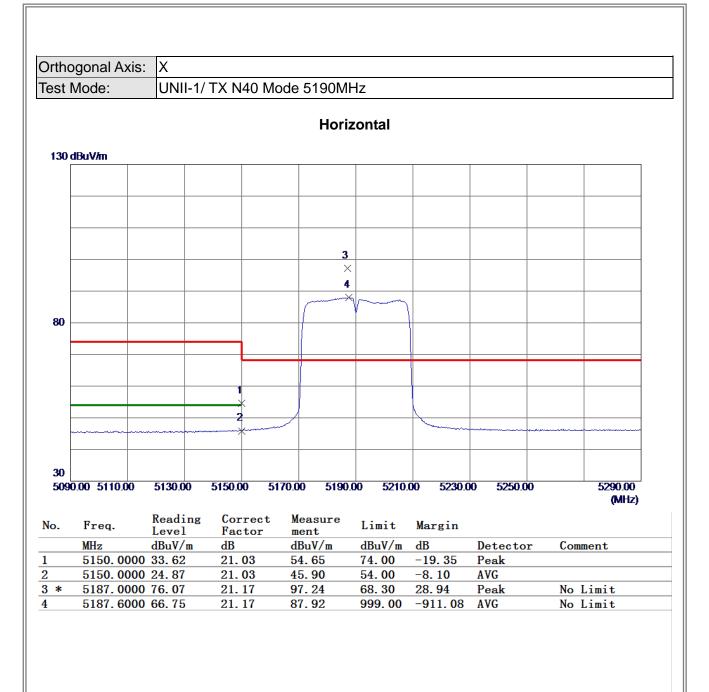






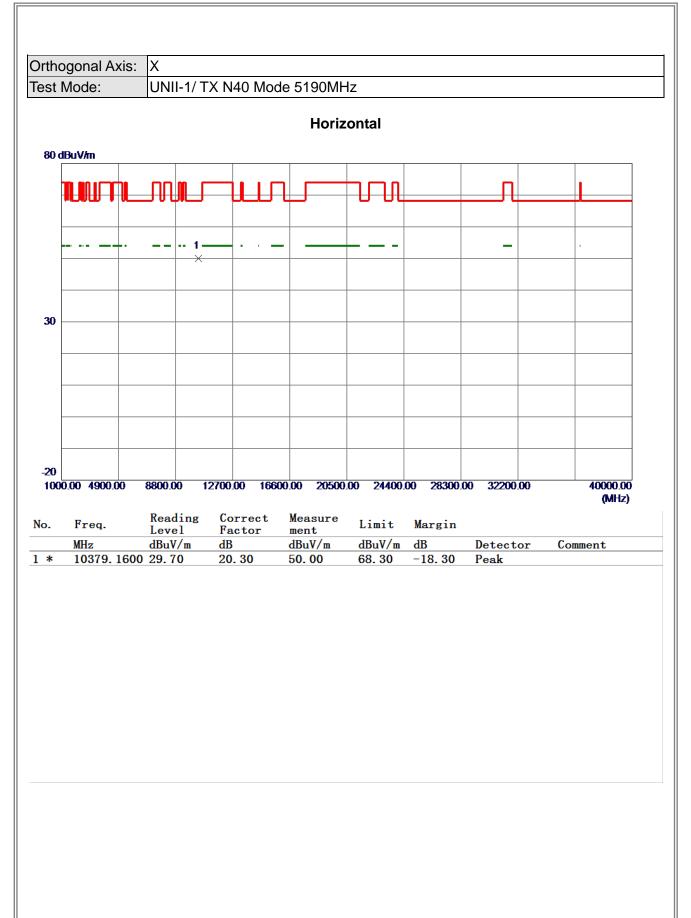






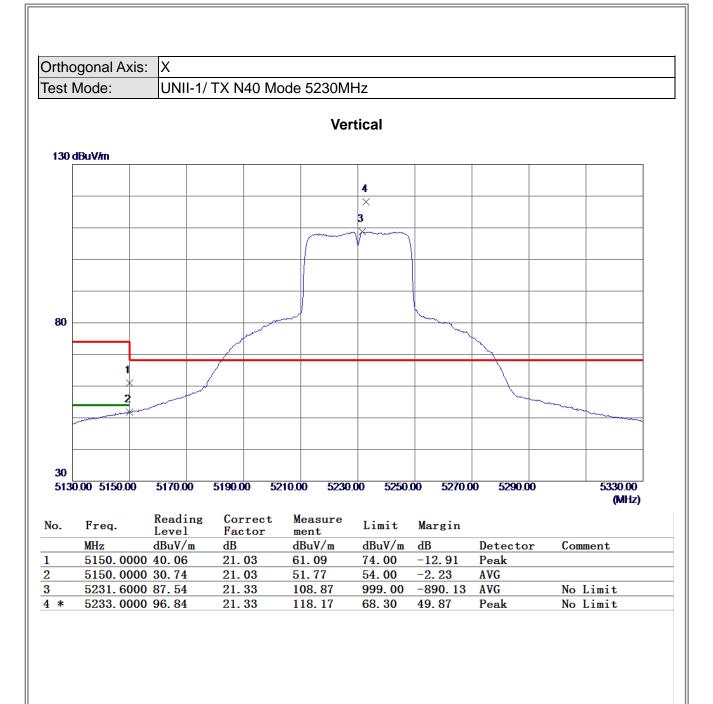






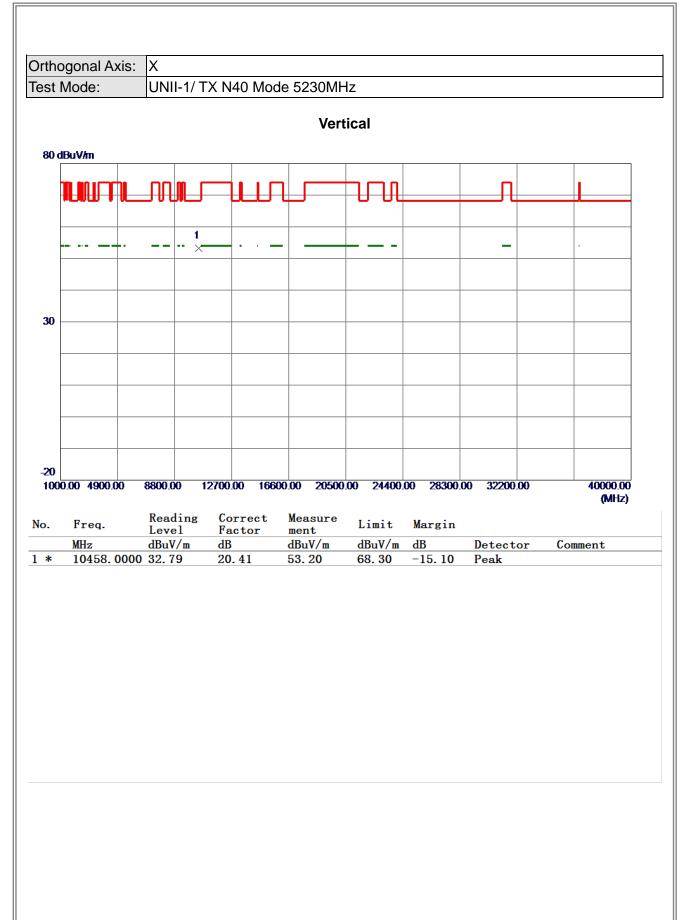






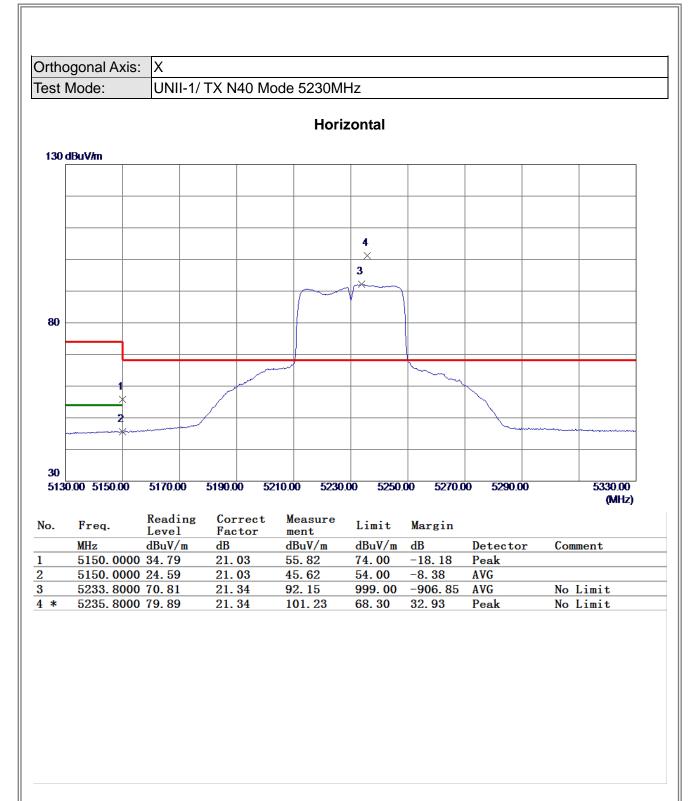






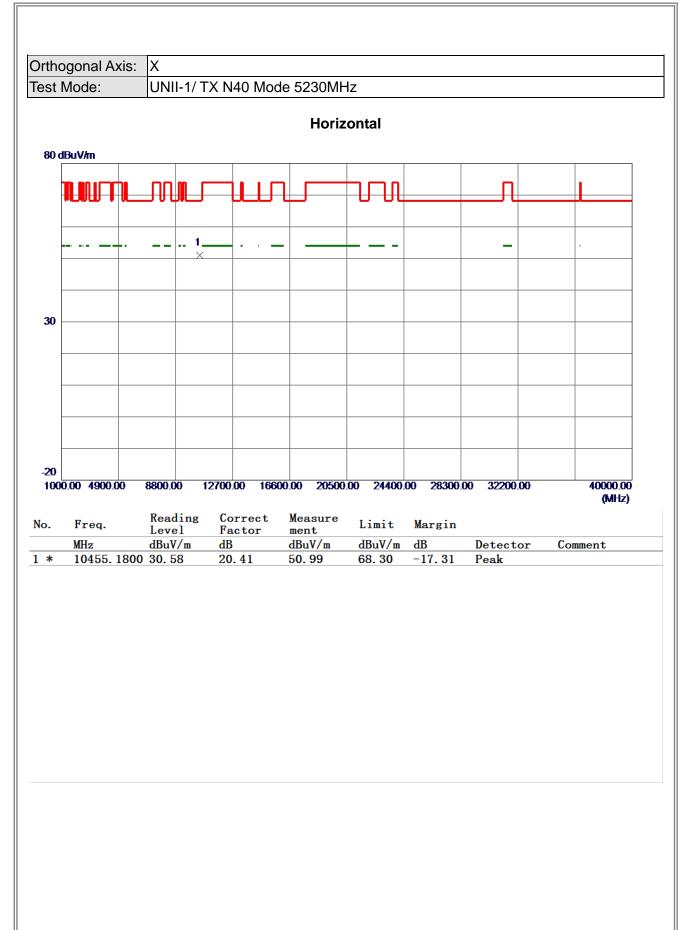






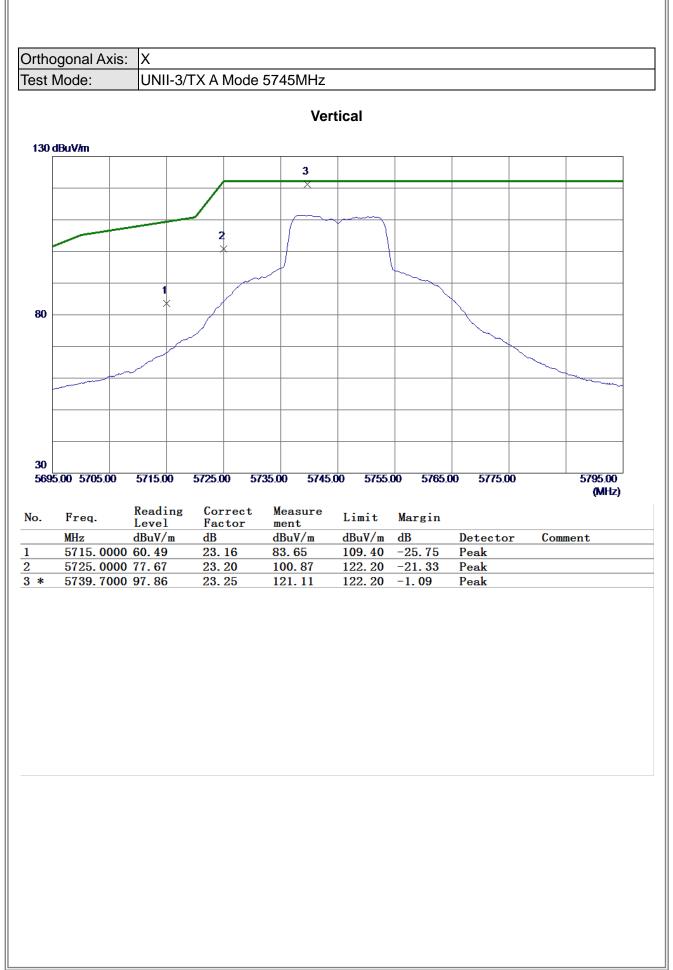






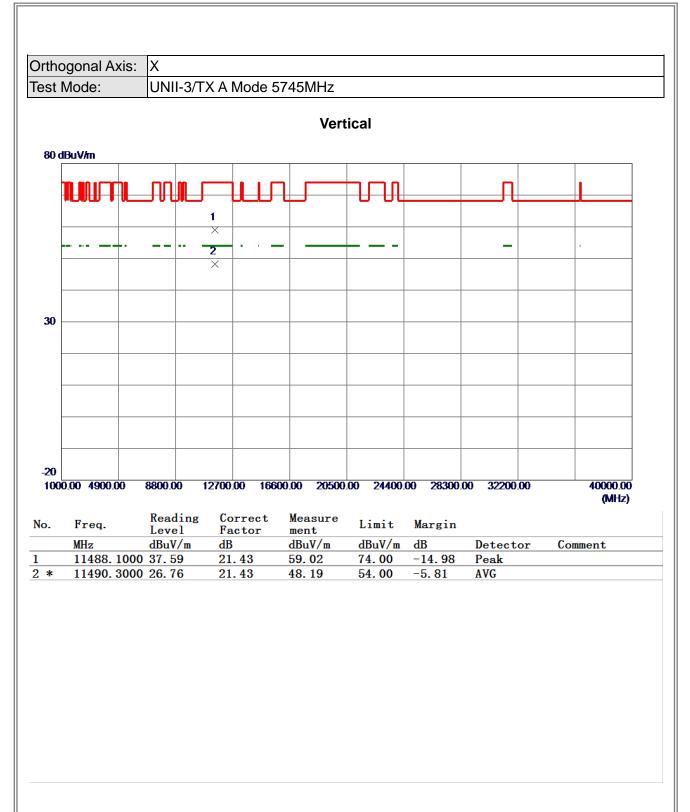






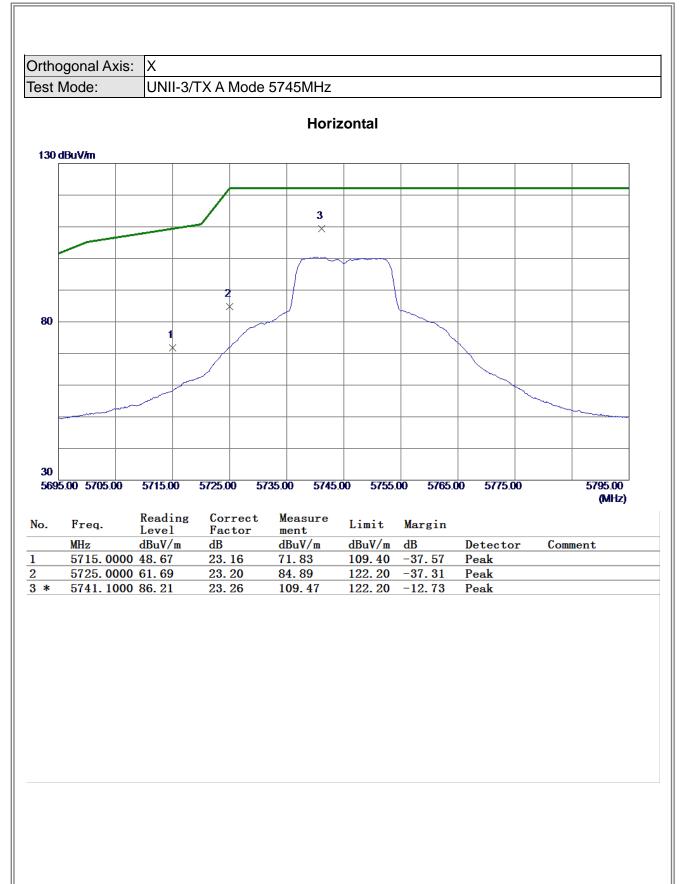












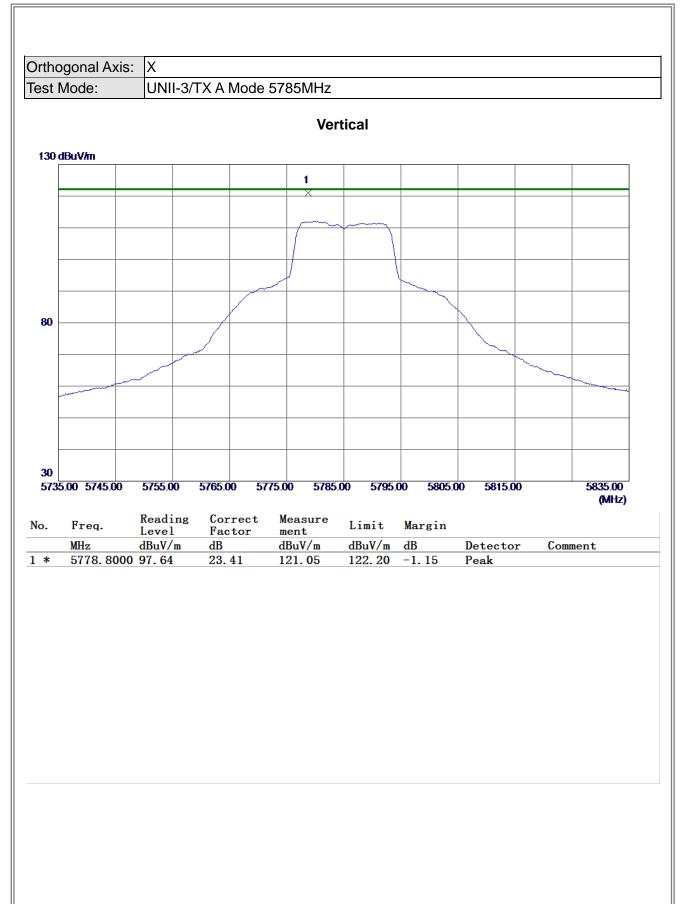






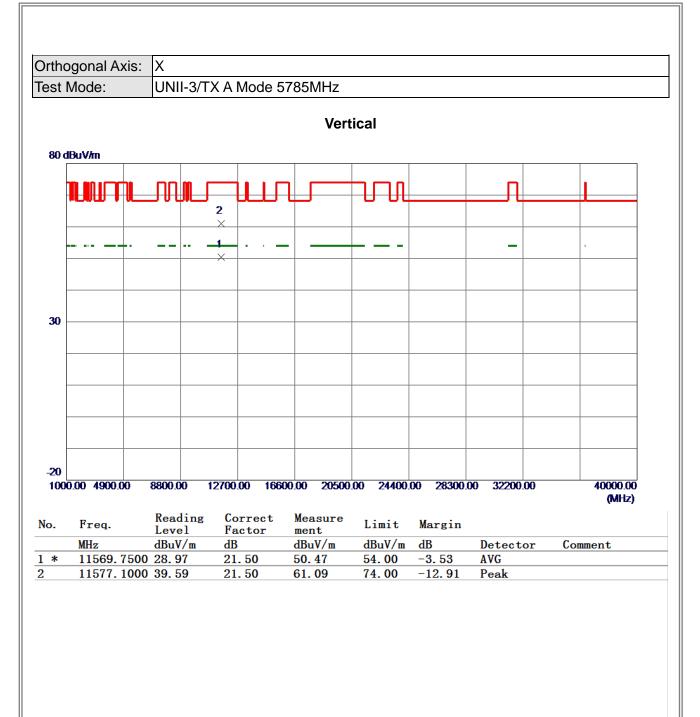






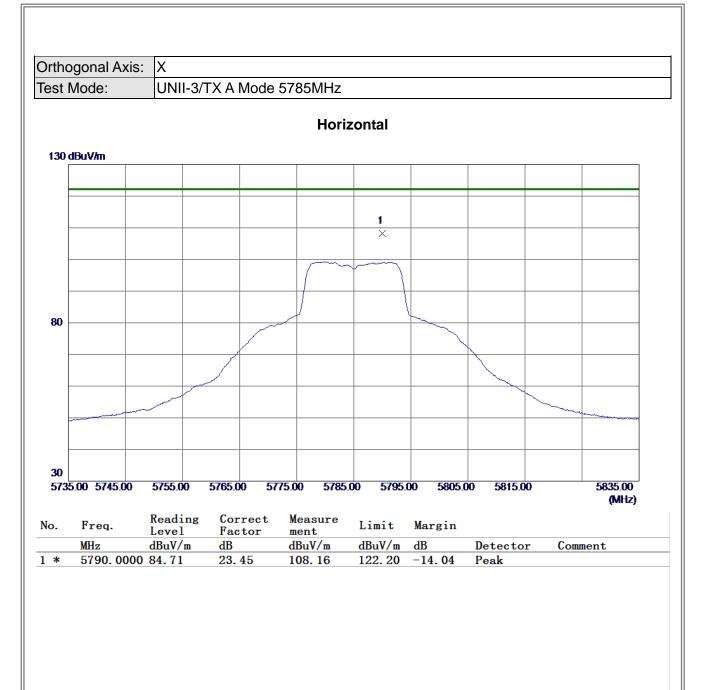






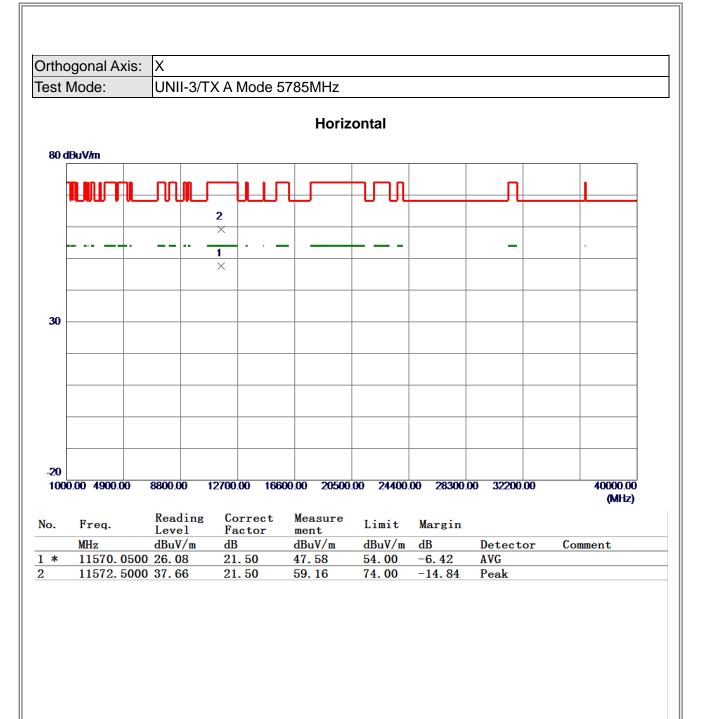






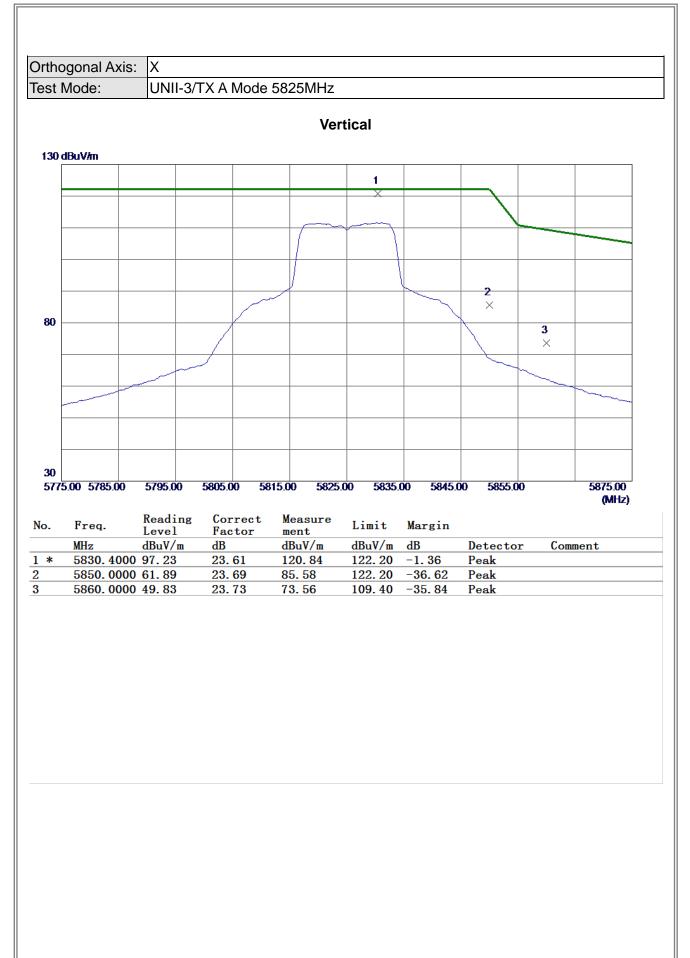






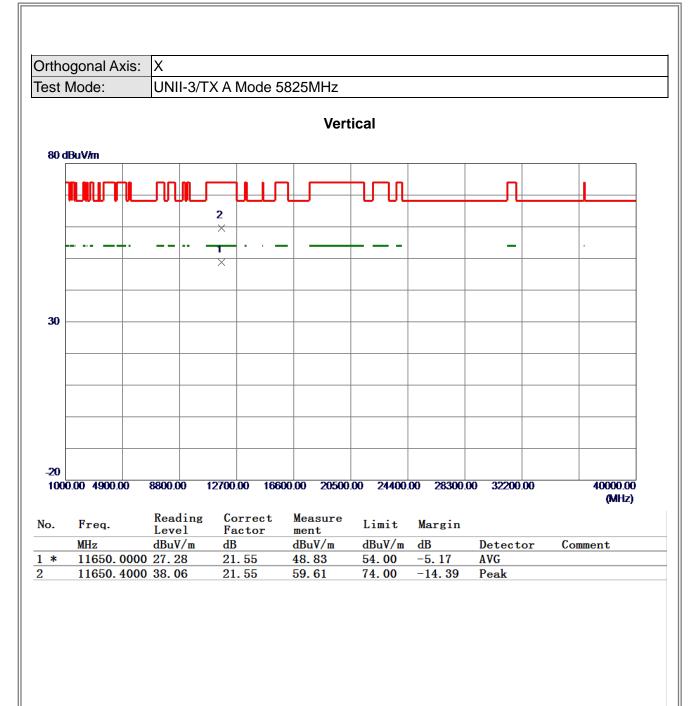






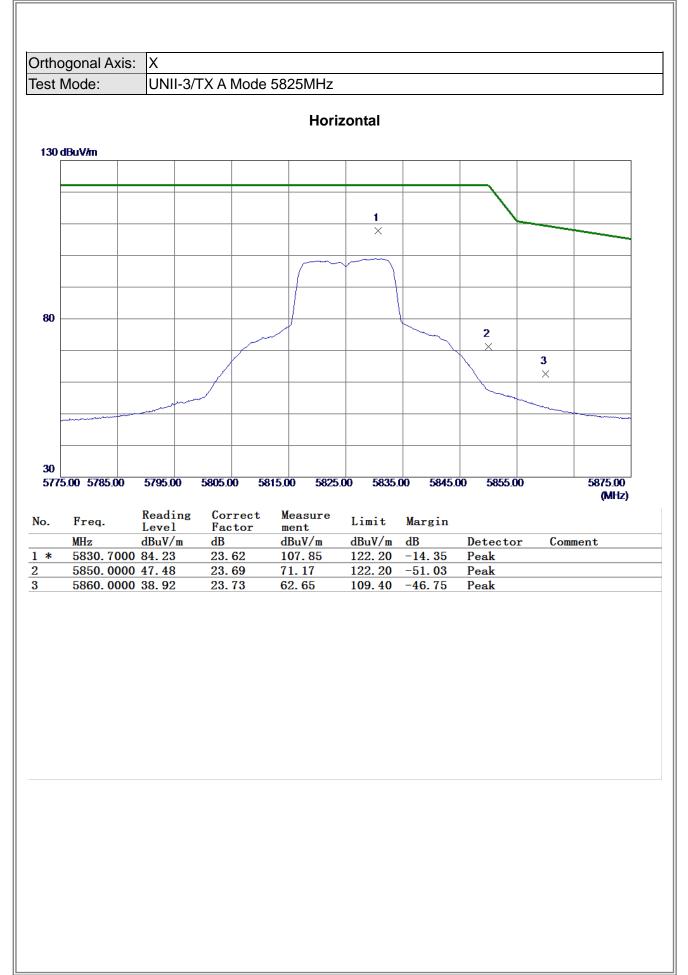






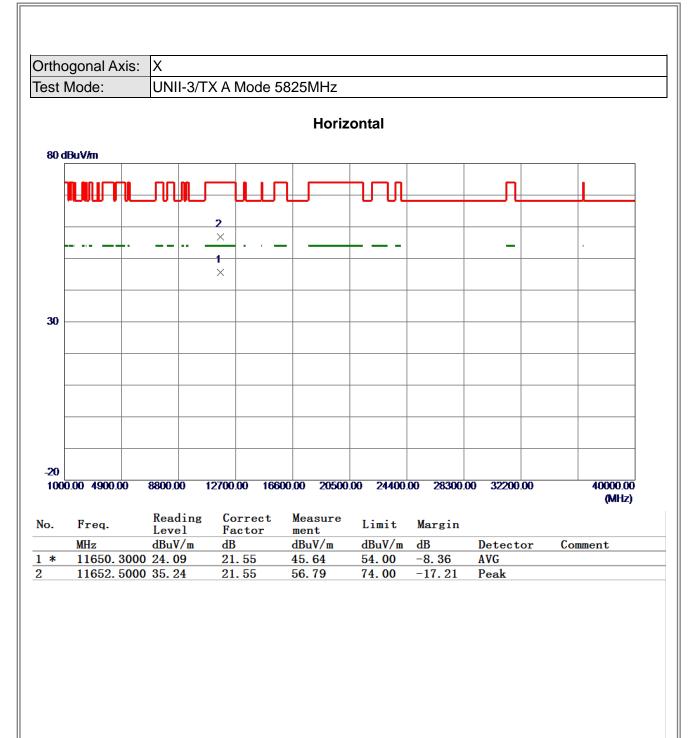






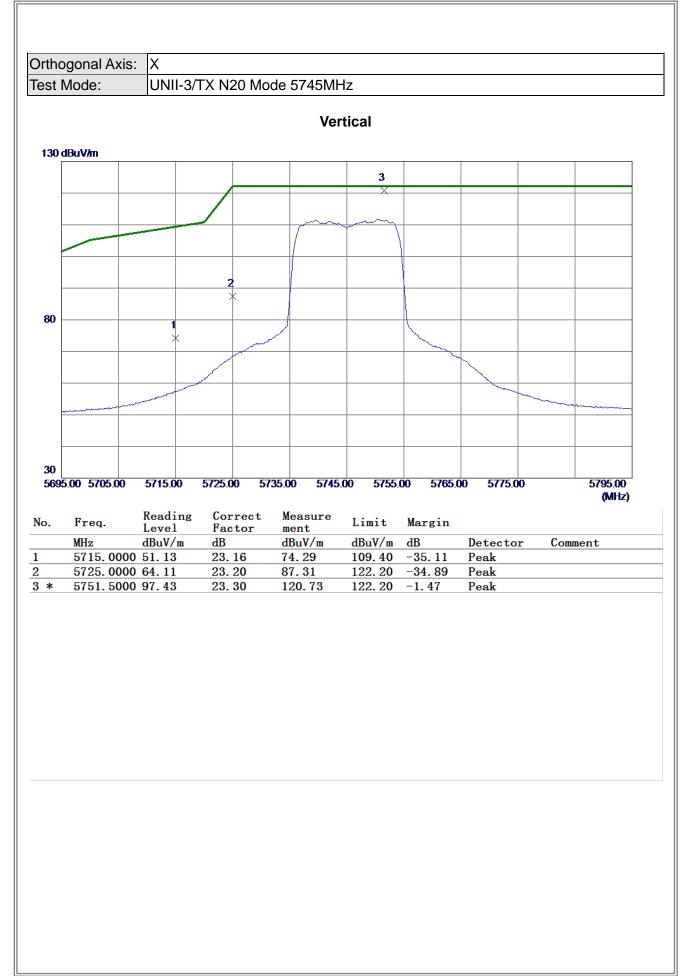






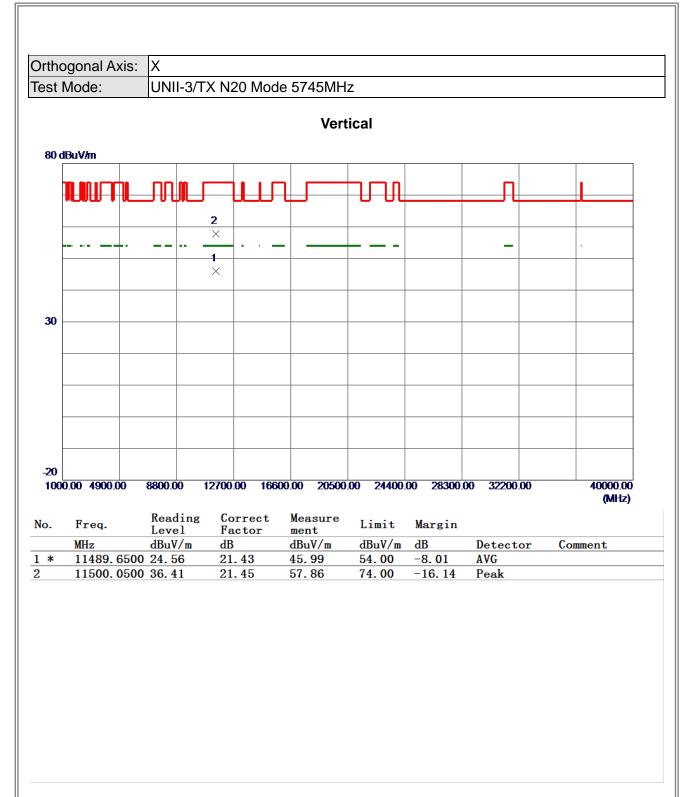






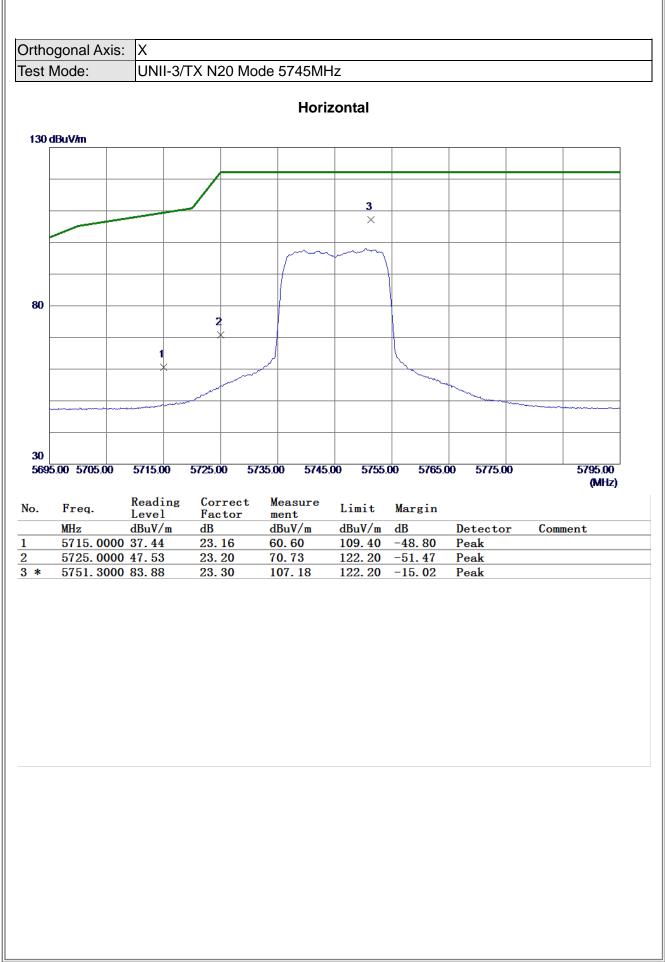






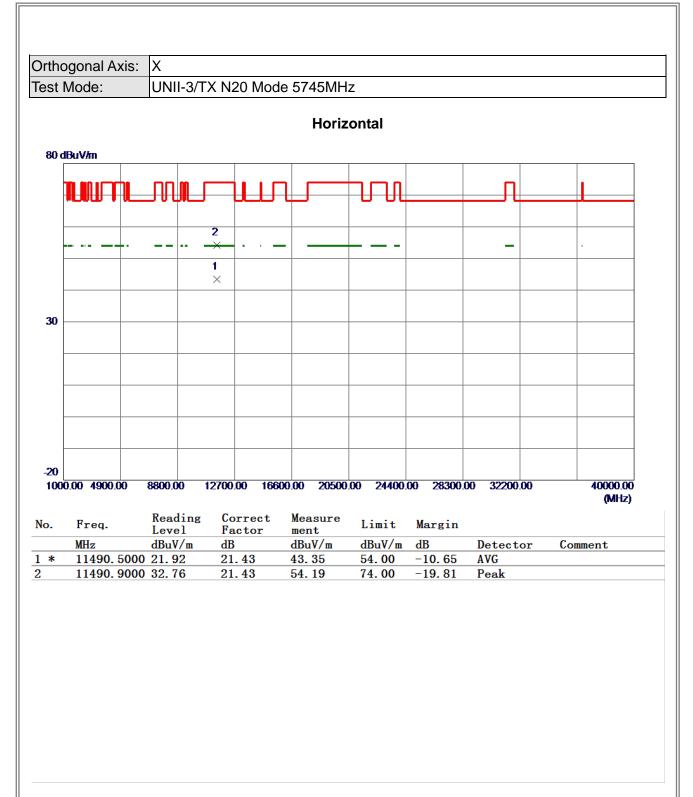






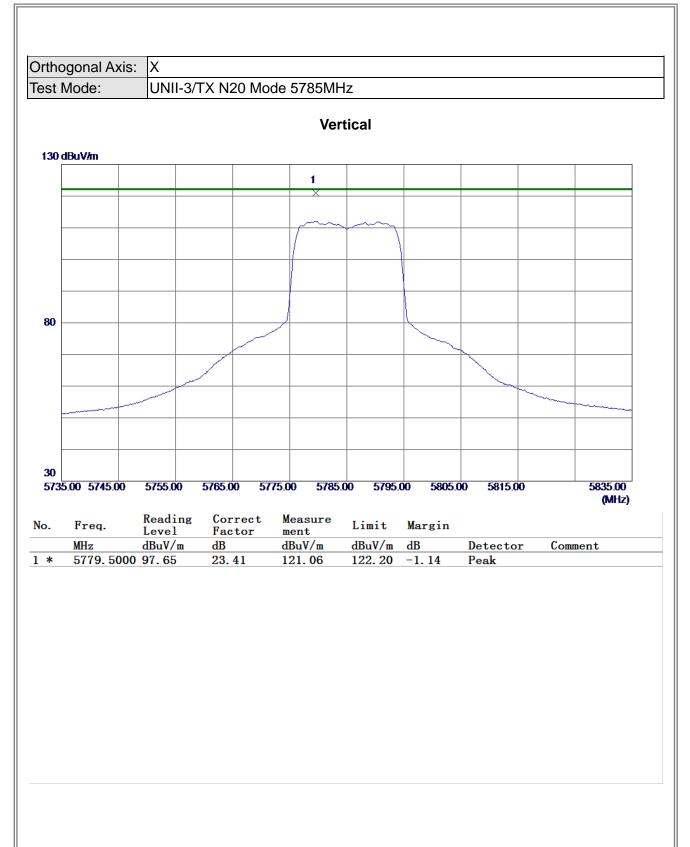






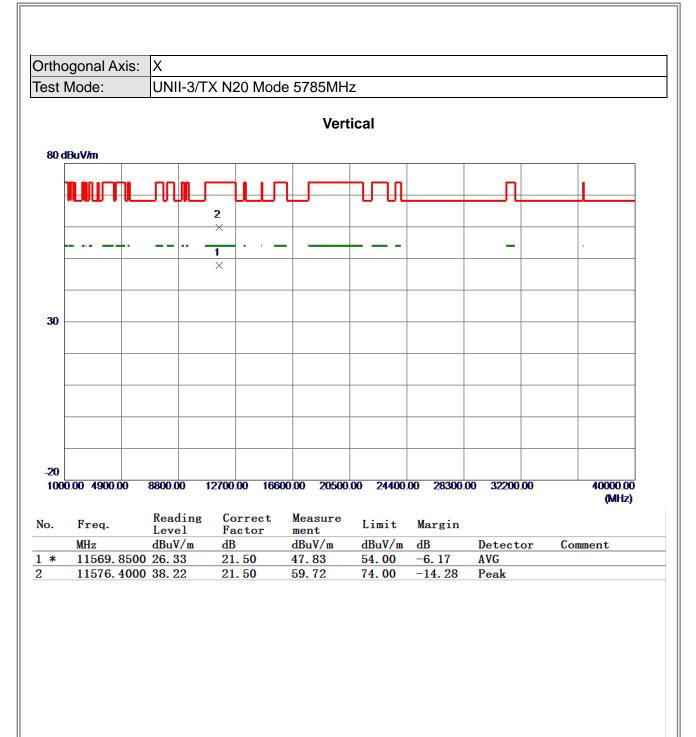






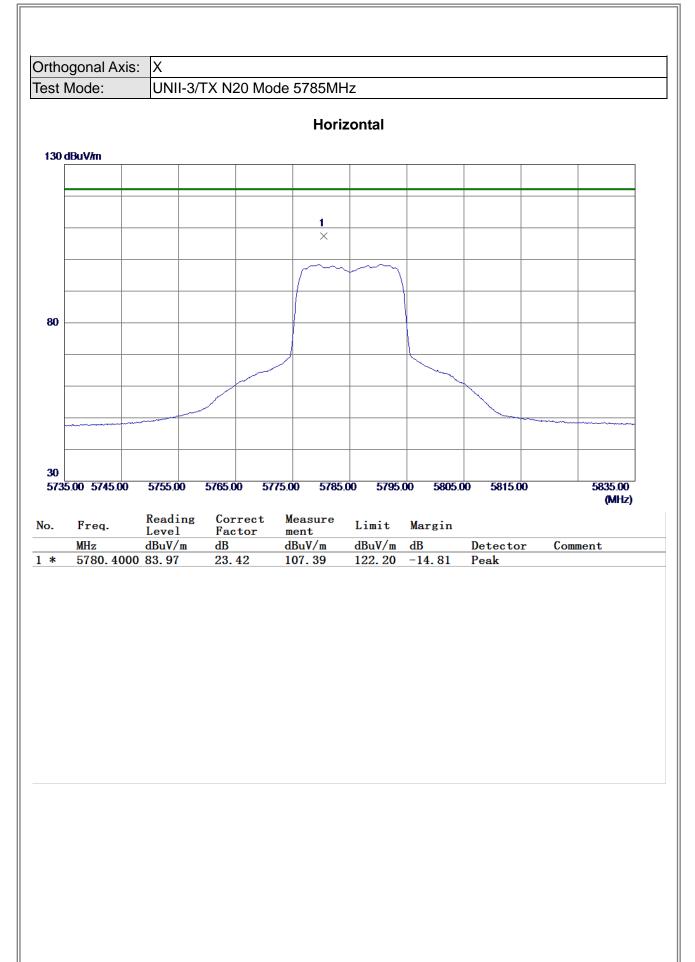






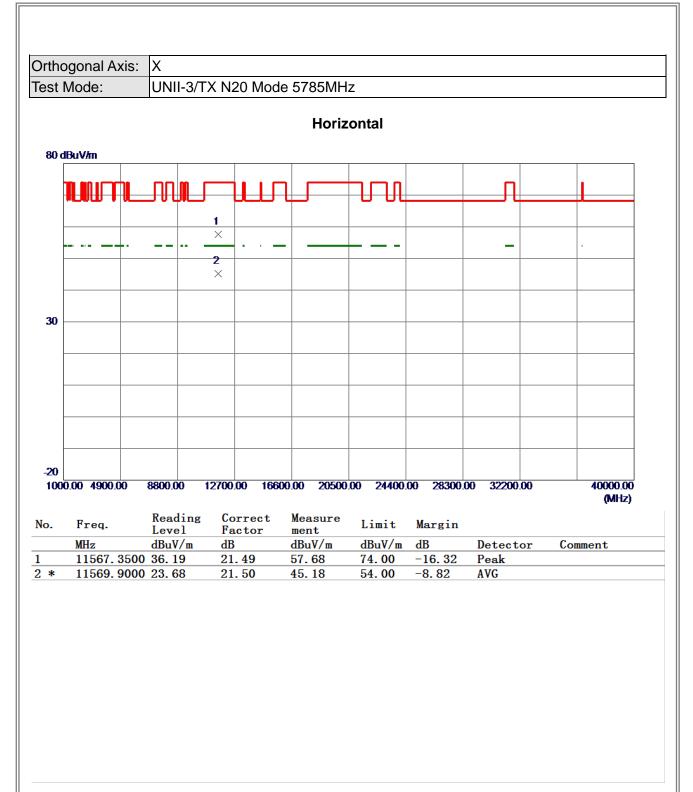






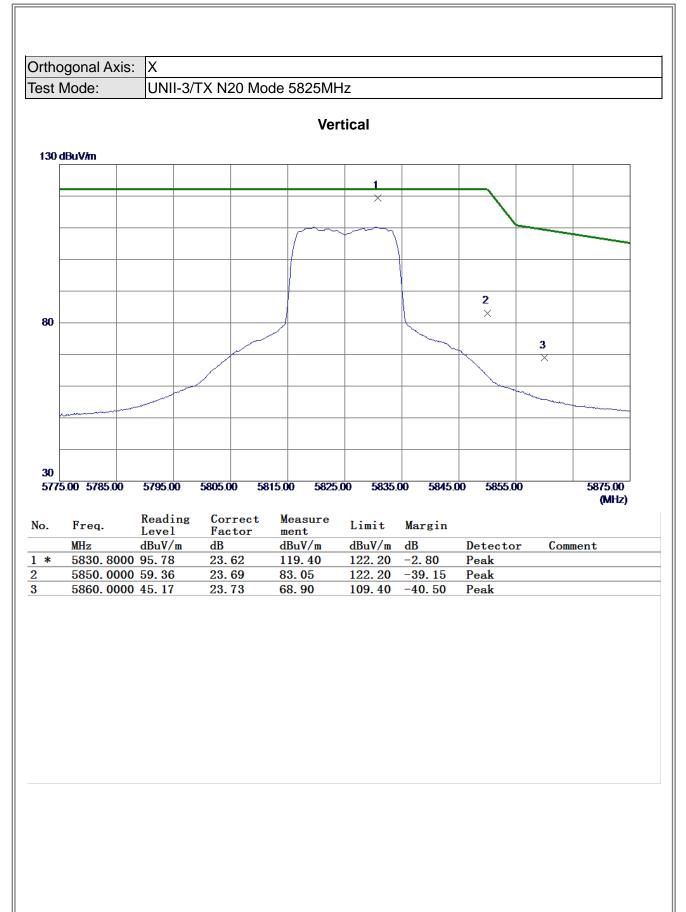






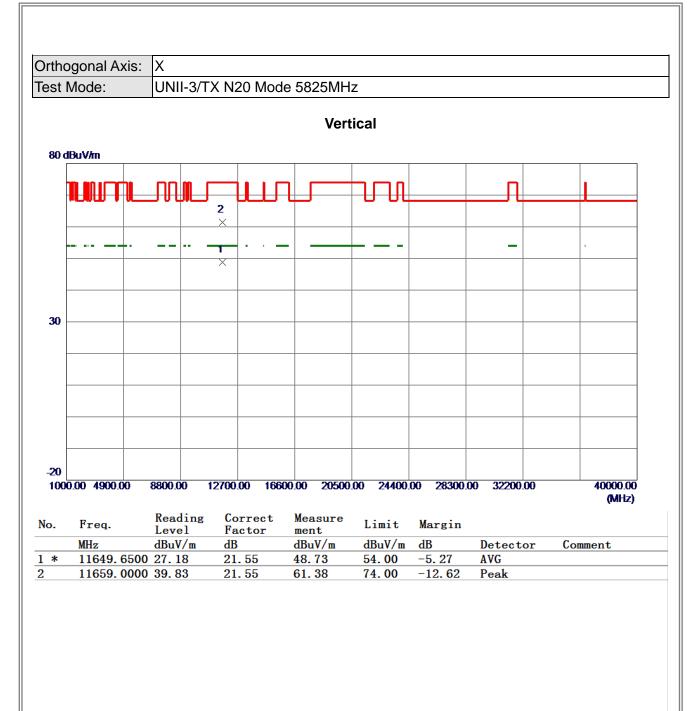






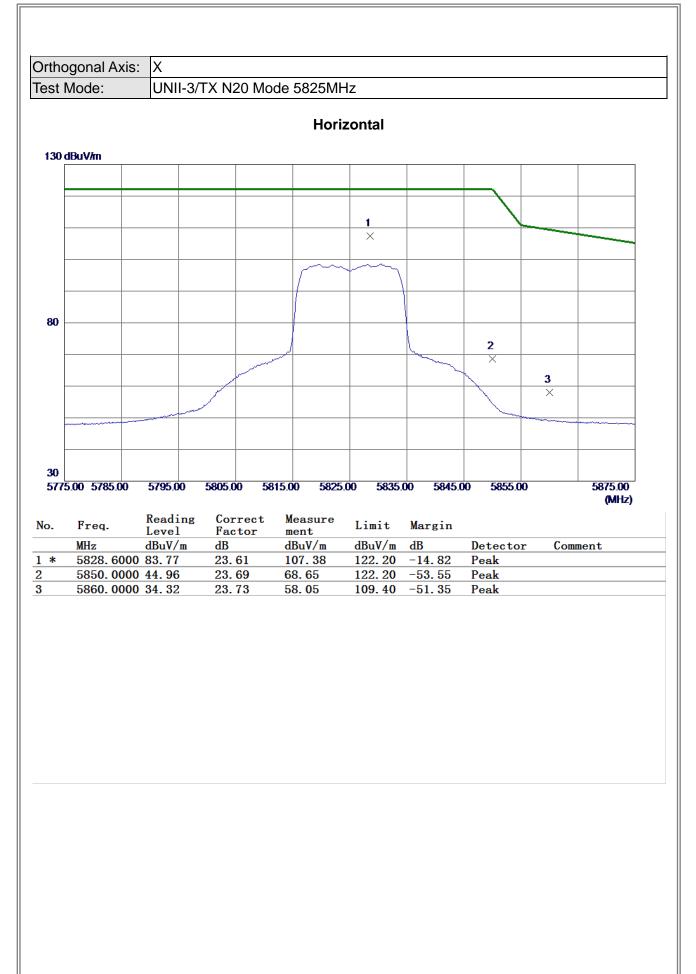






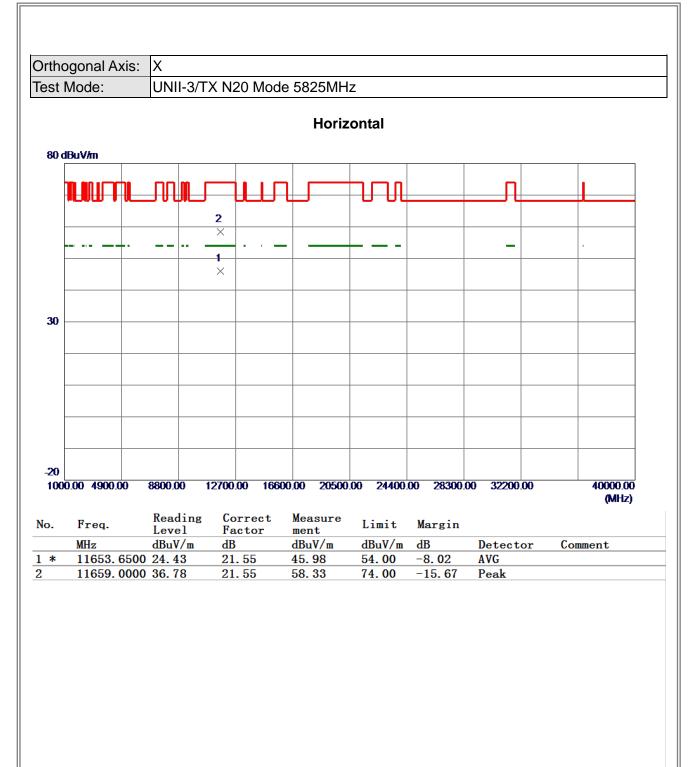






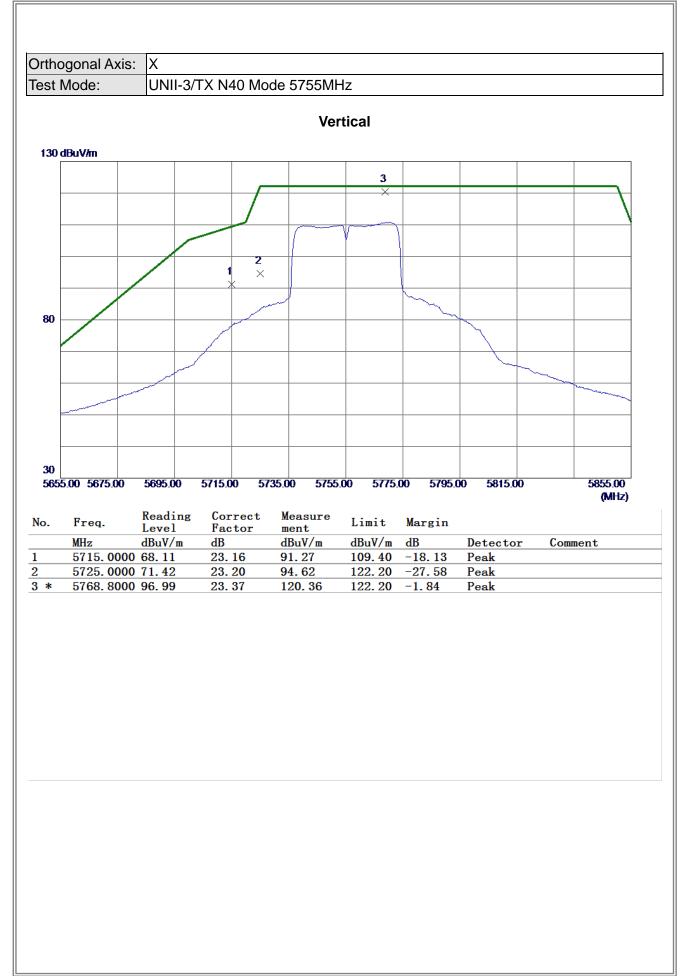






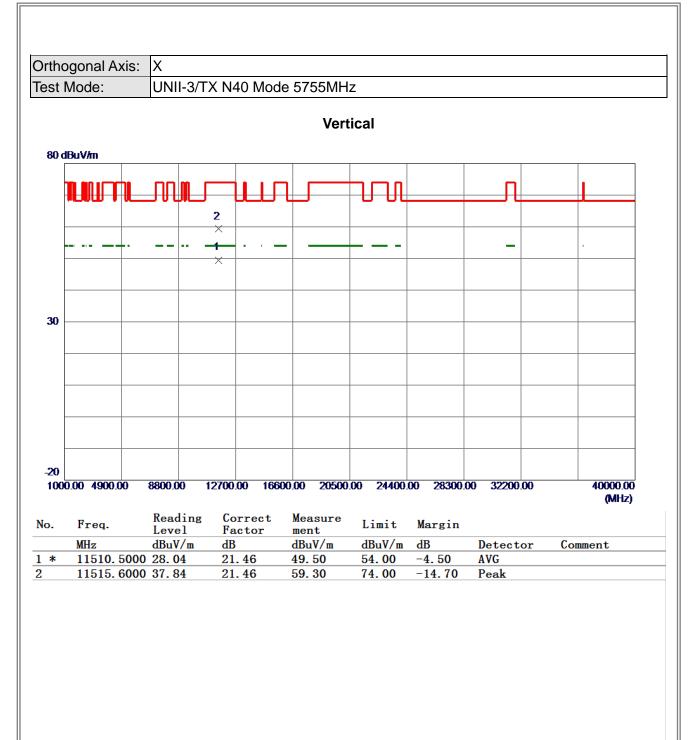






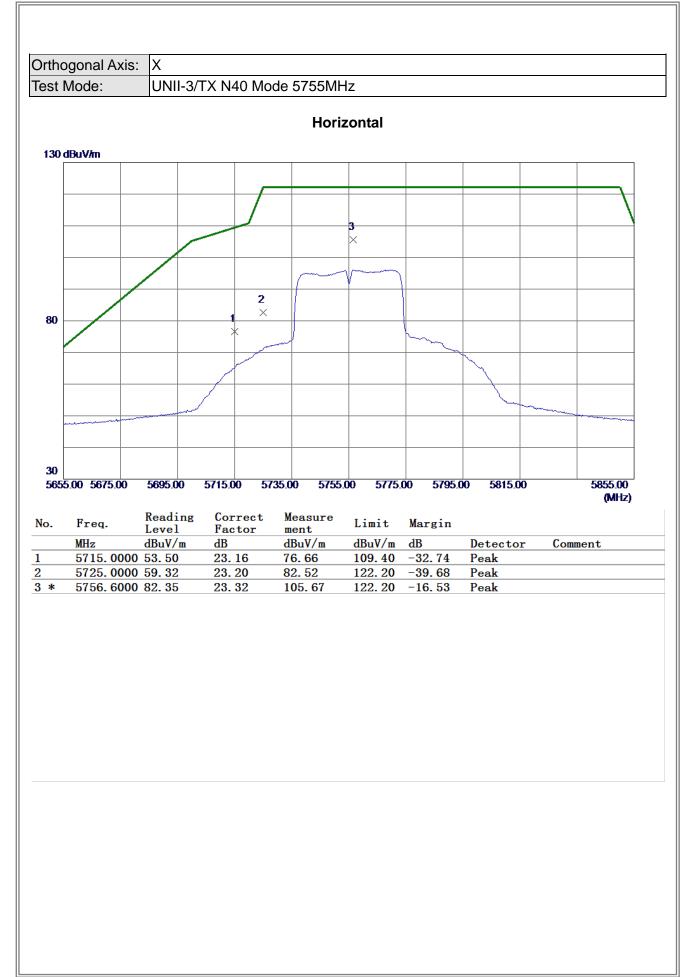






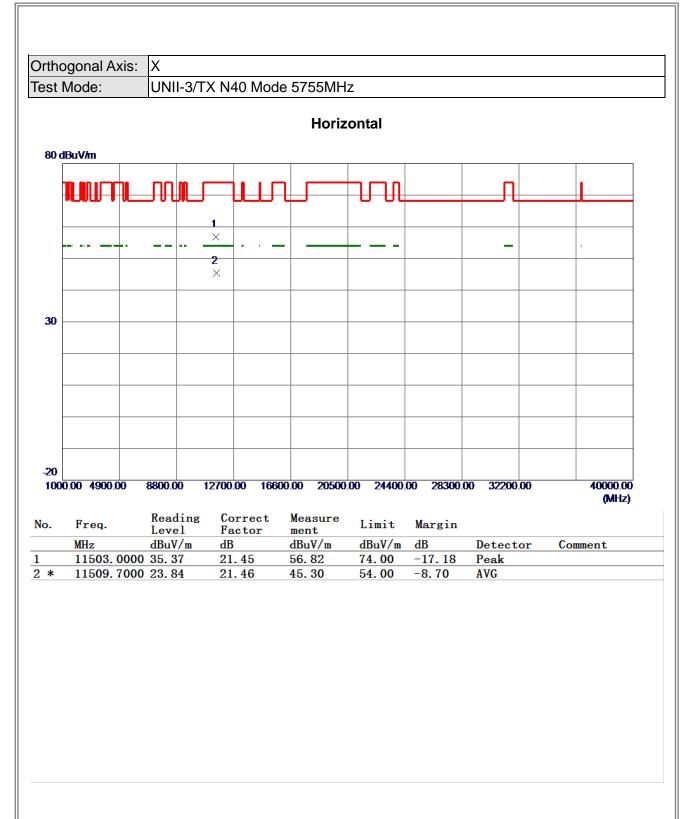






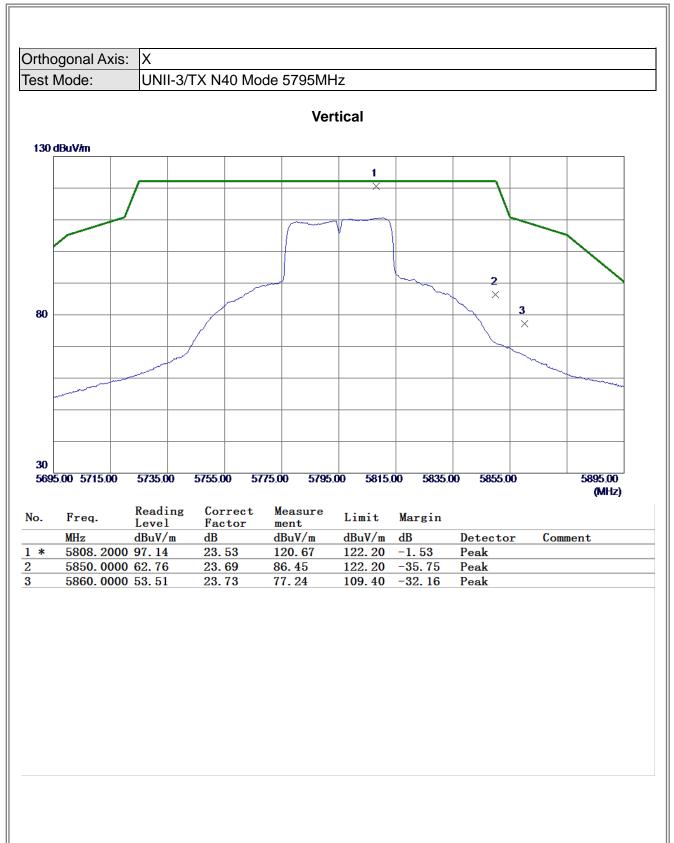






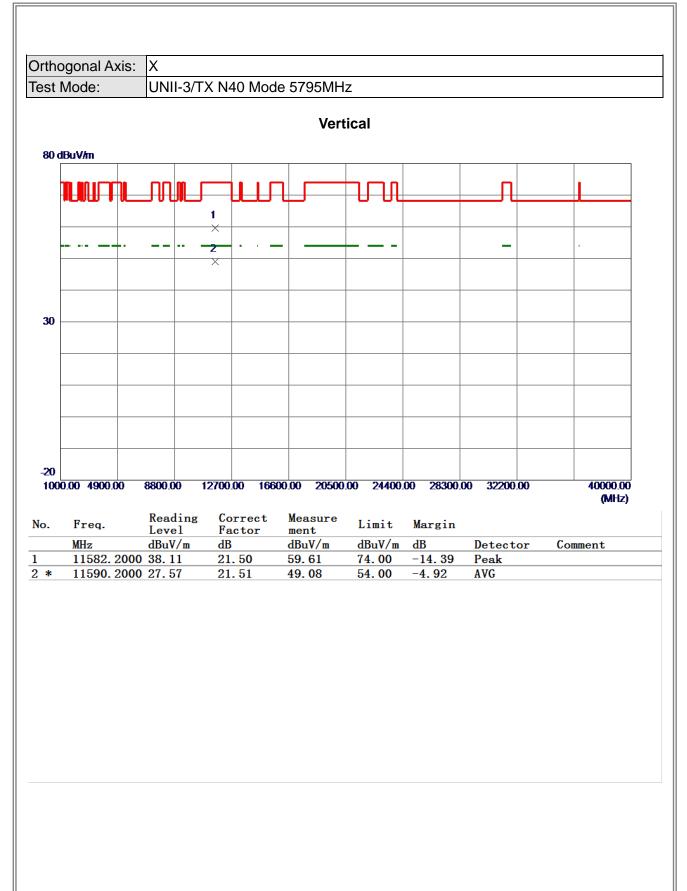






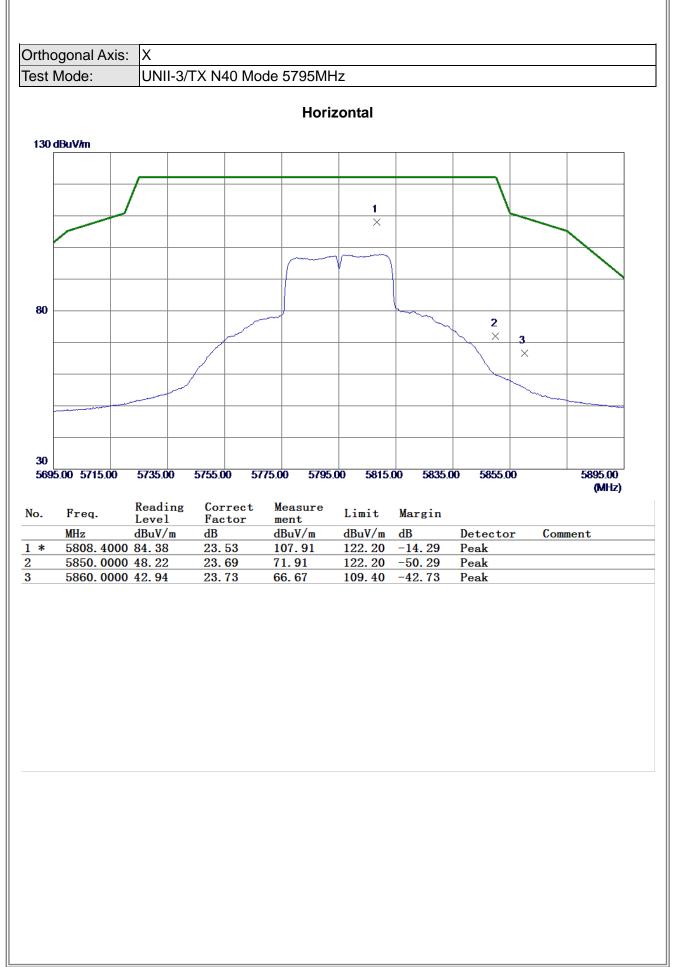






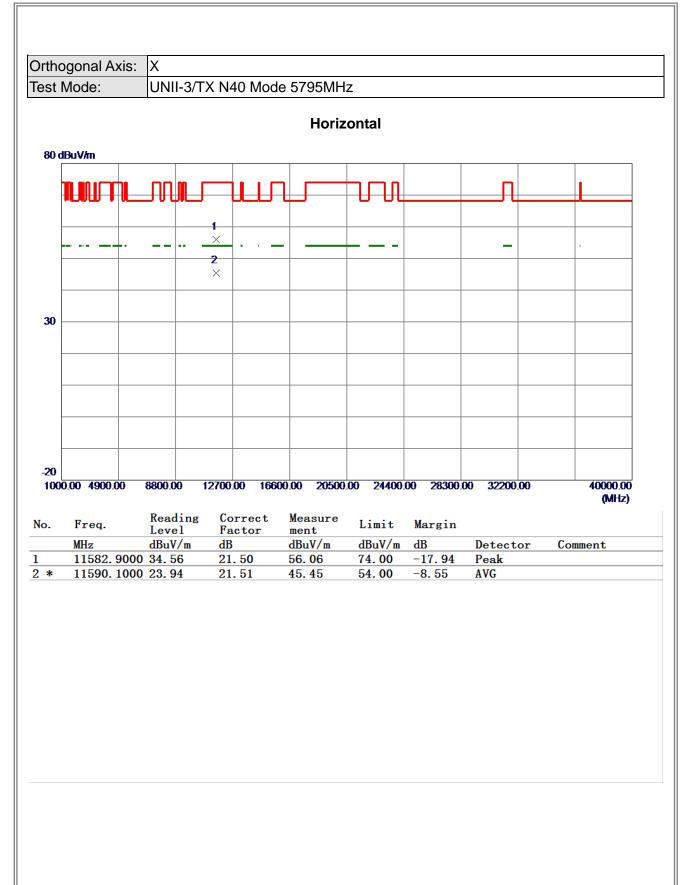






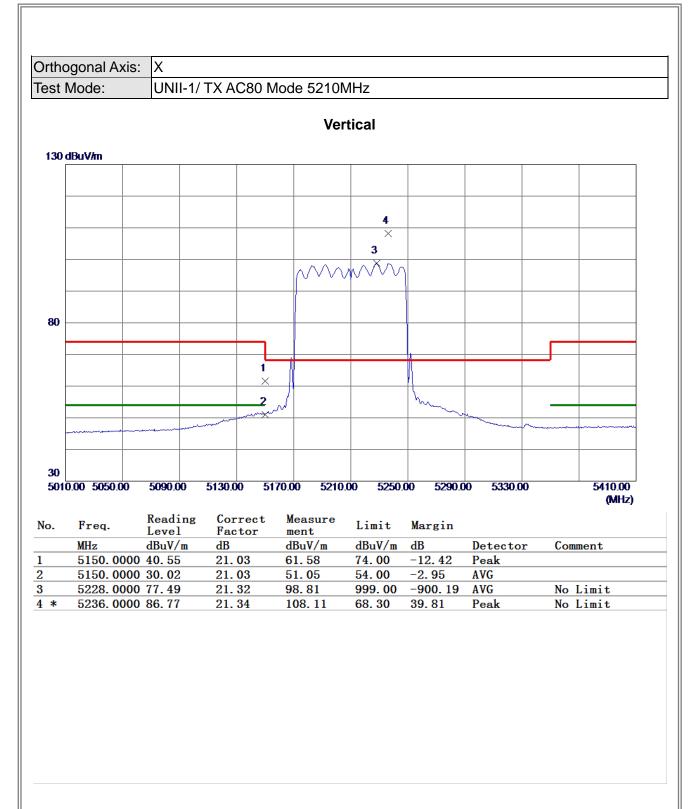






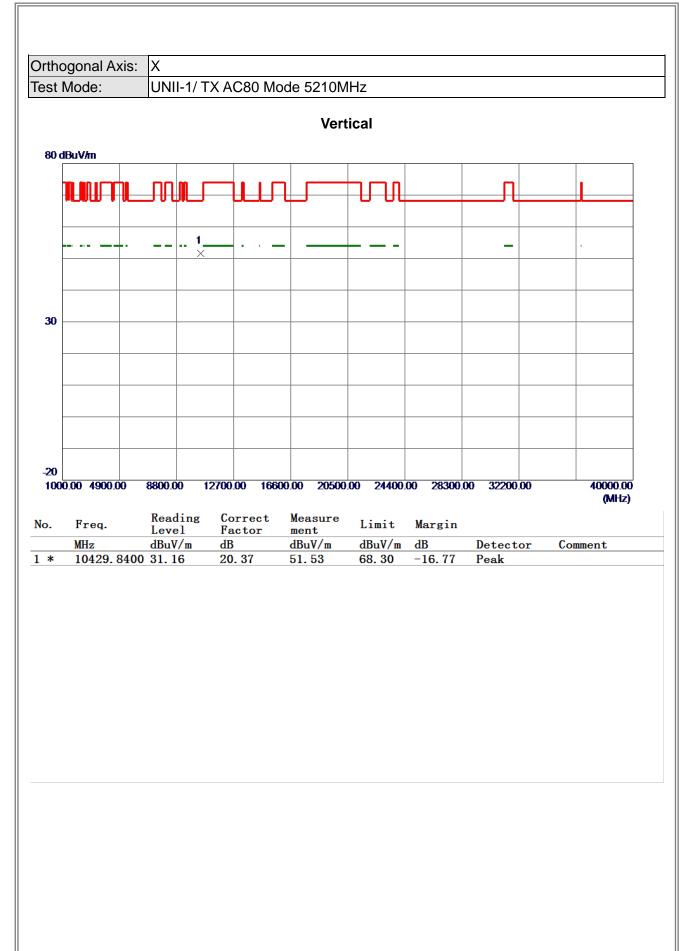






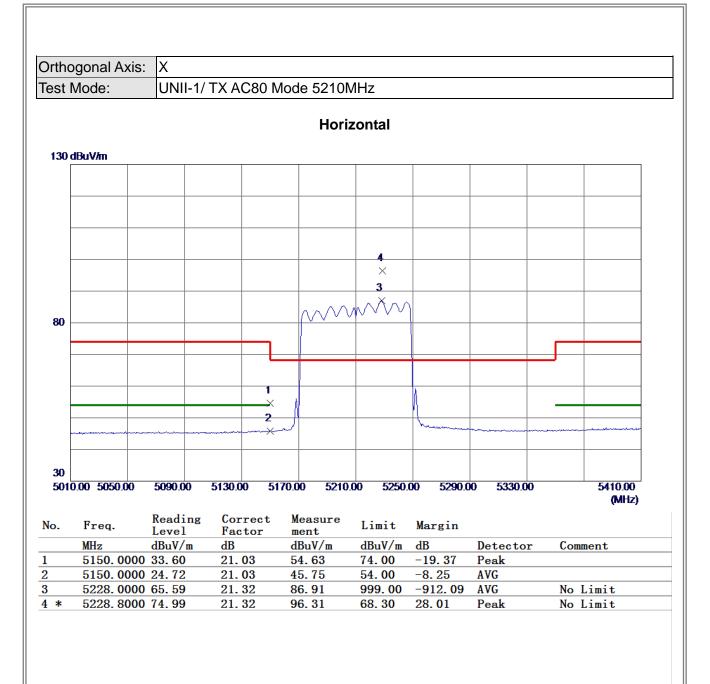












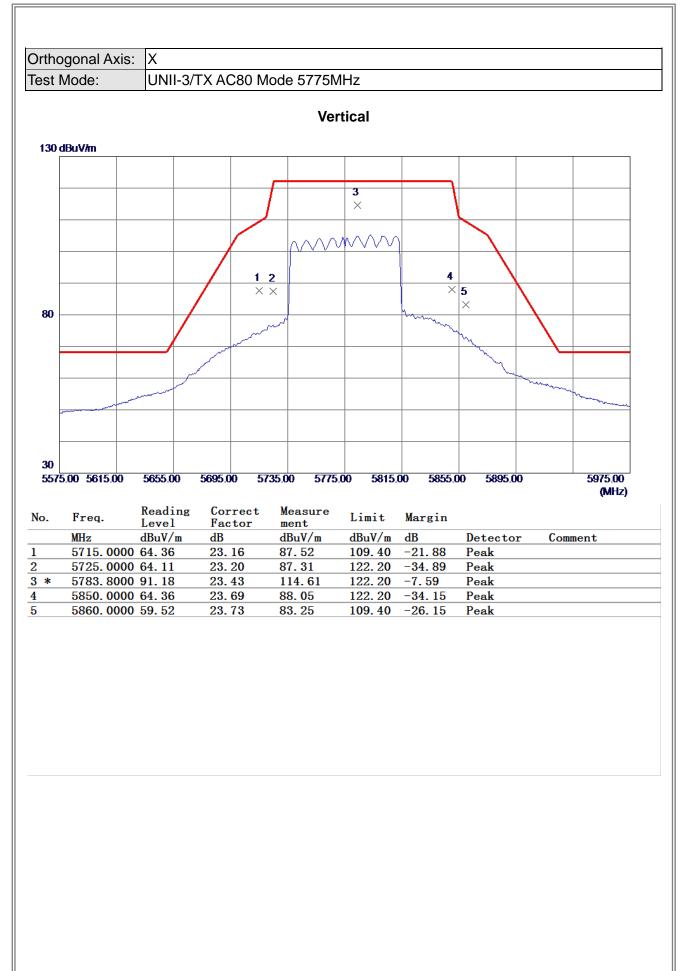






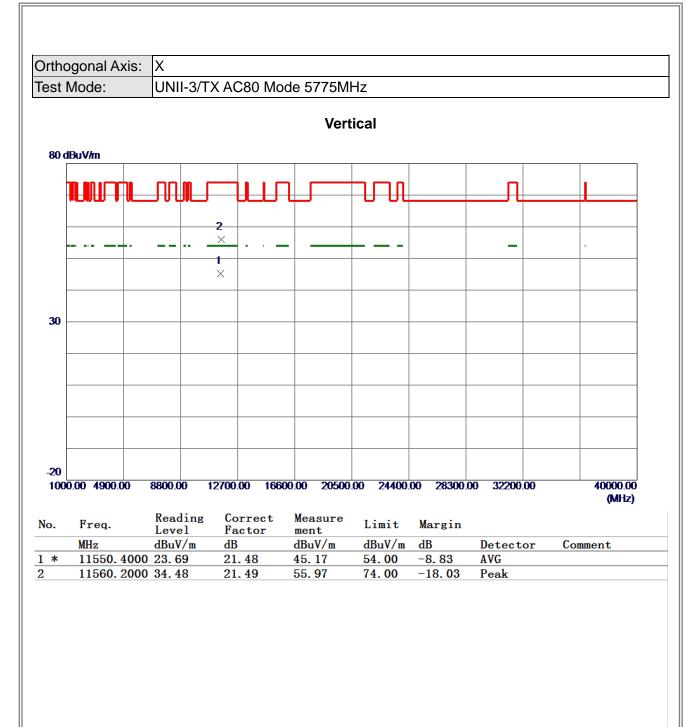






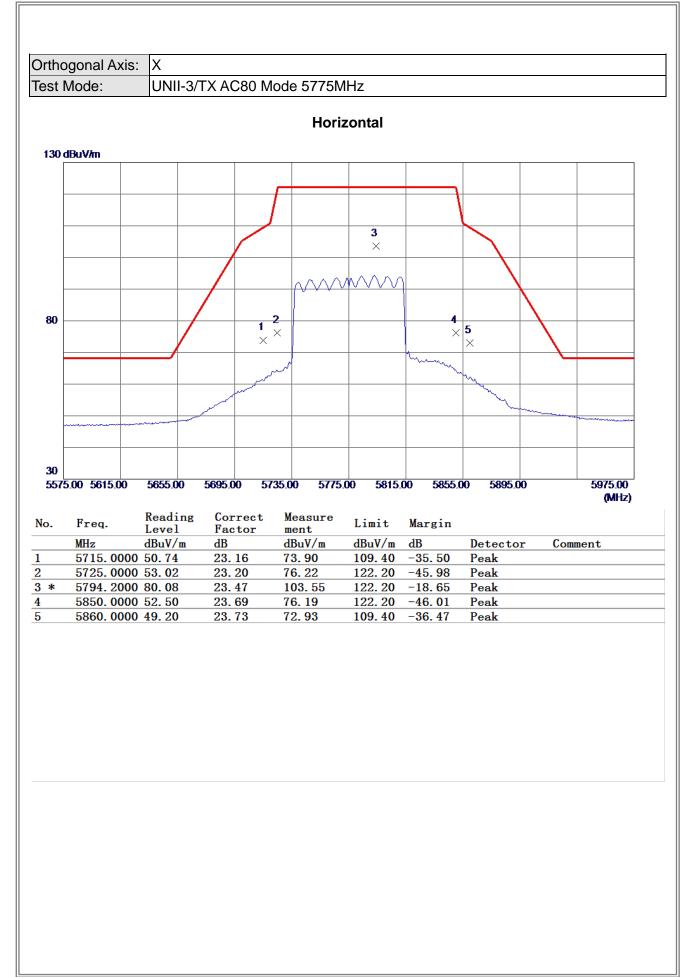






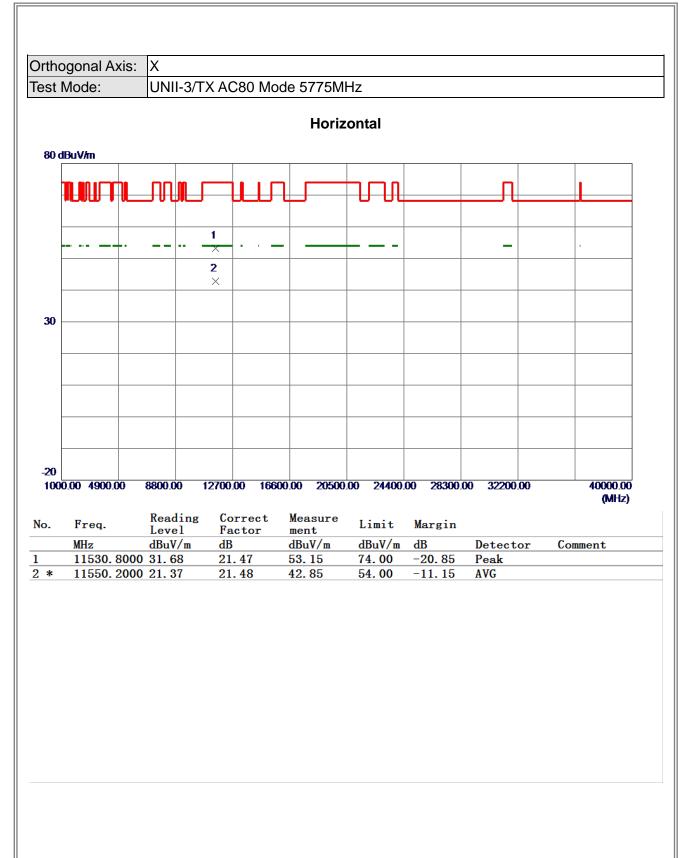




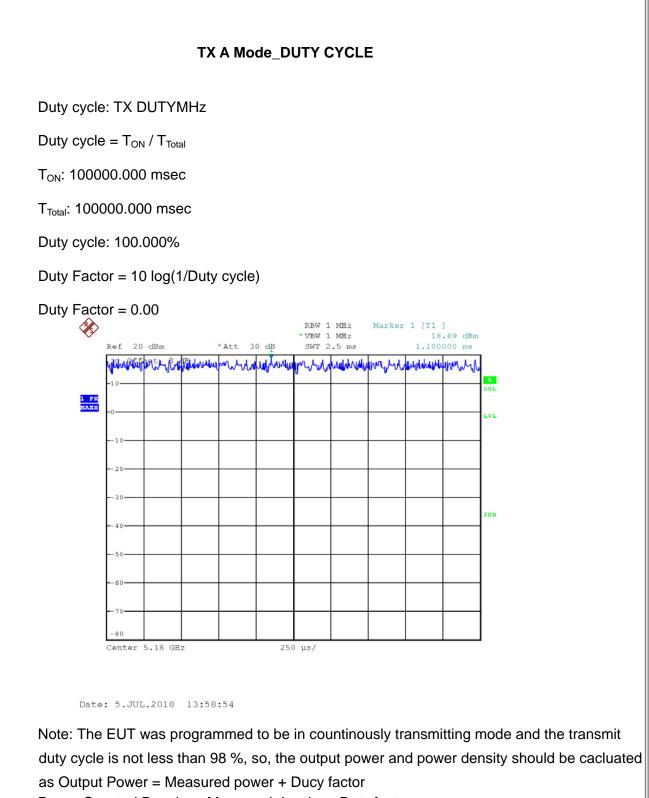






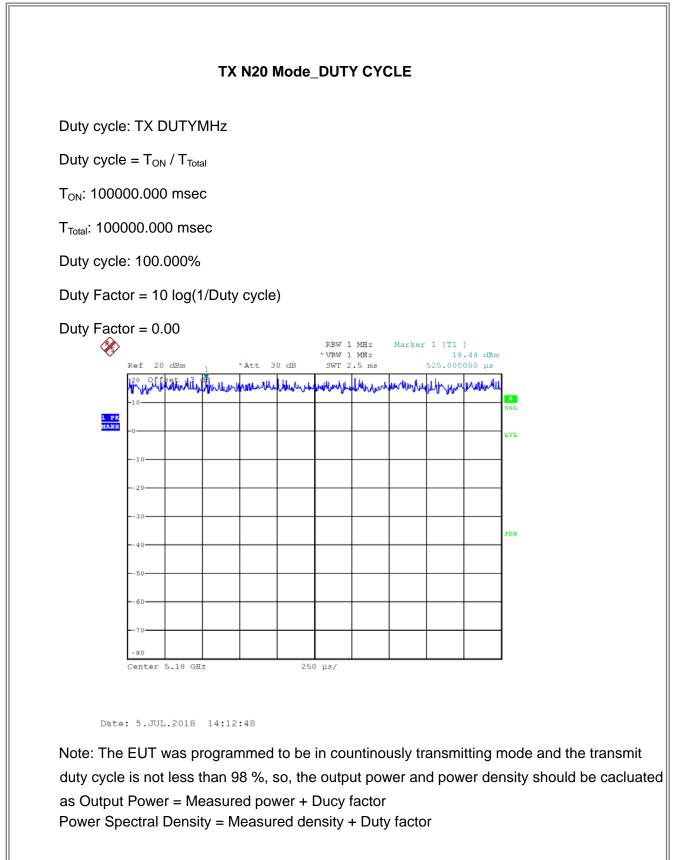




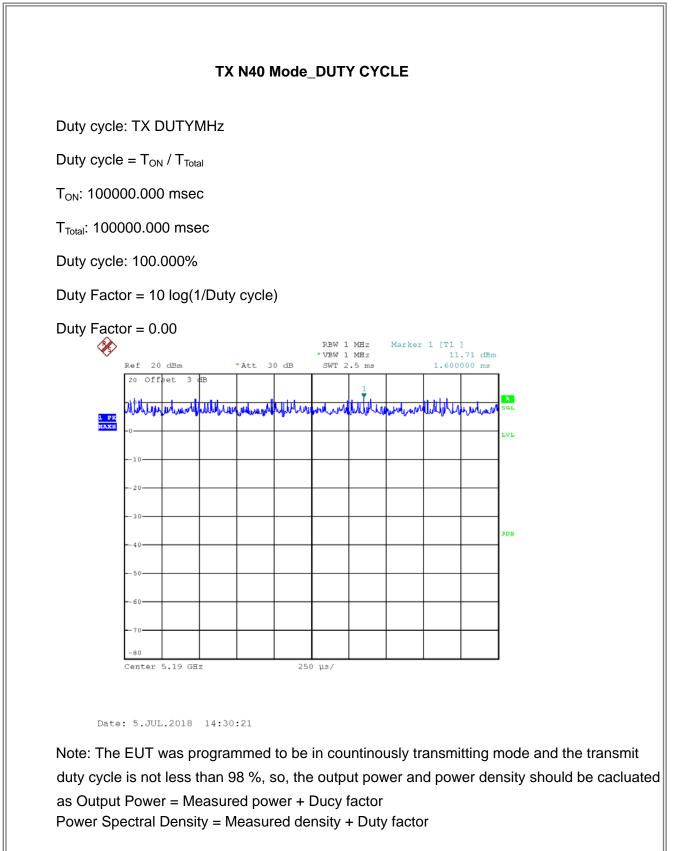


Power Spectral Density = Measured density + Duty factor

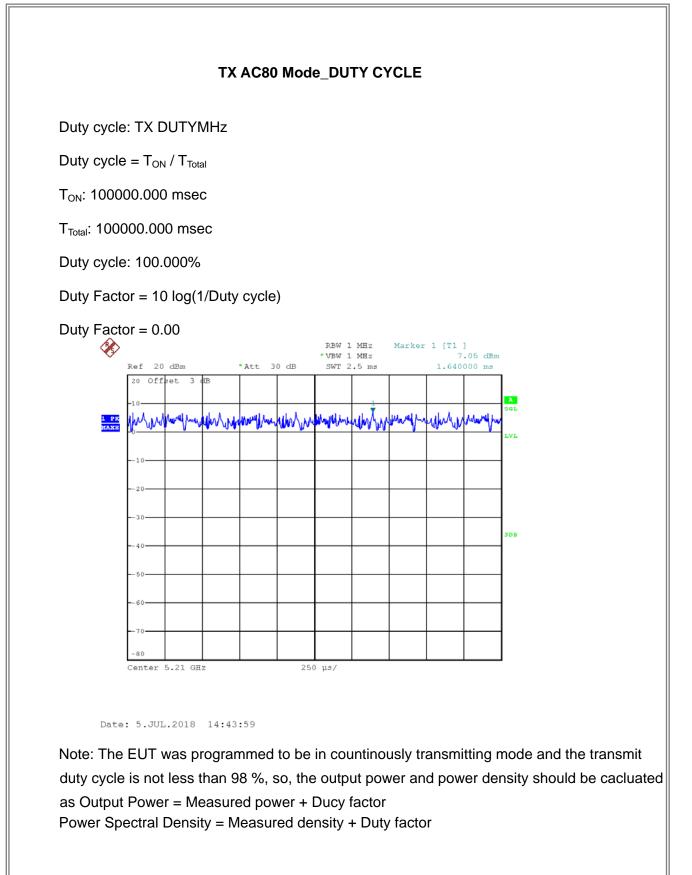














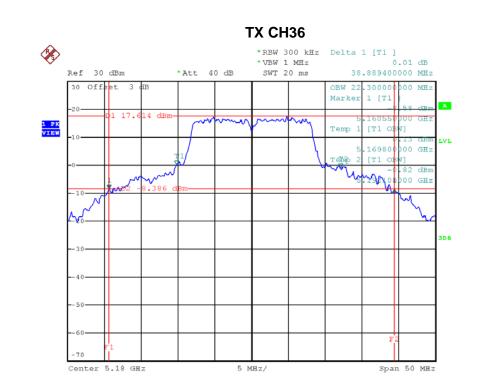
APPENDIX E - BANDWIDTH



Non Beamforming

Test Mode: UNII-1/TX A Mode_CH36/CH40/CH48

Channel	Frequency	26dB Bandwidth	99% Occupied Bandwidth
	(MHz)	(MHz)	(MHz)
CH36	5180	38.89	22.30
CH40	5200	43.59	30.80
CH48	5240	43.60	31.30



Date: 5.JUL.2018 13:59:15