

FCC Ra	adio Test Report
FC	CC ID: TE7A6
This report concerns (check one):	⊠Original Grant □Class I Change □Class II Change
Test Model: ArcheSeries Model: ArcheApplicant: TP-LiAddress: BuildScier	200 Wireless MU-MIMO Gigabit Router er A6
Date of Receipt: Aug.Date of Test: Oct.Issued Date: Nov.Tested by: BTL	08, 2018 ~ Oct. 23, 2018 20, 2018
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	Certificate #5123.02



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.

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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.





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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Nov. 20, 2018



1. CERTIFICATION

Equipment : Brand Name : Test Model : Series Model :	Årcher A6
	TP-Link Technologies Co., Ltd.
	TP-Link Technologies Co., Ltd.
Address :	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park,Shennan Rd, Nanshan, Shenzhen,China
Date of Test :	Oct. 08, 2018 ~ Oct. 23, 2018
Test Sample :	Engineering Sample No.: D180807213 for conducted, D180807212 for radiated.
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-2-1808C223) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO-17025 quality assessment standard and technical standard(s).

Test result included in this report is only for the RLAN 5G 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	Judgment	Remark	
15.207	AC Power Line Conducted Emissions	PASS		
15.407(a)	Spectrum Bandwidth PASS			
15.407(a)	Maximum 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 ~ 30 MHz	2.32

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9 kHz~30 MHz	V	3.79
		9 kHz~30 MHz	Н	3.57
		30 MHz~200 MHz	V	3.82
		30 MHz~200 MHz	H	3.60
DG-CB03	CISPR	200 MHz~1,000 MHz	V	3.86
DG-CB03		200 MHz~1,000 MHz	H	3.94
		1 GHz~18 GHz	V	3.12
		1 GHz~18 GHz	Н	3.68
		18 GHz~40 GHz	V	4.15
		18 GHz~40 GHz	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 Wireless MU-MIMO Giga	bit Router			
	-				
Brand Name	тр-шпк	tp-link			
Test Model	Archer A6				
Series Model	Archer C6				
Model Difference(s)	Only differ in model name.				
	Operation Frequency	UNII-1:5150MHz ~ 5250MHz UNII-3:5725MHz ~ 5850MHz			
	Modulation Technology	OFDM			
Product Description	Bit Rate of Transmitter	1350 Mbps			
	Output Power (Max.)for UNII-1	802.11a: 24.57dBm 802.11n(20 M): 24.44dBm 802.11n(40 M): 24.55dBm 802.11ac(20 M): 24.46dBm 802.11ac(40 M): 24.36dBm 802.11ac(80 M): 16.94dBm			
	Output Power (Max.)for UNII-3	802.11a: 25.09dBm 802.11n(20 M): 24.77dBm 802.11n(40 M): 24.31dBm 802.11ac(20 M): 24.75dBm 802.11ac(40 M): 24.59dBm 802.11ac(80 M): 24.94dBm			
Power Source	DC voltage supplied from AC/DC adapter. Brand/ Model: tp-link/ T120100-2B1				
Power Rating	I/P: 100-240V~ 50/60Hz 0.3A	D/P: 12V 1A			



Note:

STL

- 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(20 MHz) 802.11ac(20 MHz)			(40 MHz) (40 MHz)	802.11ac	(80 MHz)
UNII-1		UN	II-1	UN	II-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(20 MHz) 802.11ac(20 MHz)		802.11n(40 MHz) 802.11ac(40 MHz)		802.11ac(80 MHz)	
UNII-3		UN	II-3	UN	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.	Brand	P/N	Antenna Type	Connector	Gain(dBi)
1	TP-LINK °	3101501992	Dipole	I-PEX	4.95
2	TP-LINK °	3101502128	Dipole	I-PEX	4.95

Note:

(1) This EUT supports MIMO 2X2, any transmit signals are correlated with each other, so Directional gain = G_{ANT} +10log(N)dBi, that is Directional gain=4.95+10log(2)dBi=7.96; So, the UNII-1, UNII-3 output power limit is 30-7.96+6=28.04. The UNII-1 power density limit is 17-7.96+6=15.04, the UNII-3 power density limit is 30-7.96+6=28.04.

4. The worst case for 2TX as follow:

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

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 AC20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)
Mode 6	TX AC80 Mode / CH42 (UNII-1)
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 8	TX N20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 9	TX N40 Mode / CH151,CH159 (UNII-3)
Mode 10	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 11	TX AC40 Mode / CH151,CH159 (UNII-3)
Mode 12	TX AC80 Mode / CH155 (UNII-3)
Mode 13	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 AC20 Mode / CH36, CH40, CH48 (UNII-1)	
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)	
Mode 6	TX AC80 Mode / CH42 (UNII-1)	
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)	
Mode 8	TX N20 Mode / CH149,CH157,CH165 (UNII-3)	
Mode 9	TX N40 Mode / CH151,CH159 (UNII-3)	
Mode 10	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)	
Mode 11	TX AC40 Mode / CH151,CH159 (UNII-3)	
Mode 12	TX AC80 Mode / CH155 (UNII-3)	

Note:

(1) For radiated 30 MHz to 1000 MHz test, the 802.11a mode is found to be the worst case and recorded.



3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

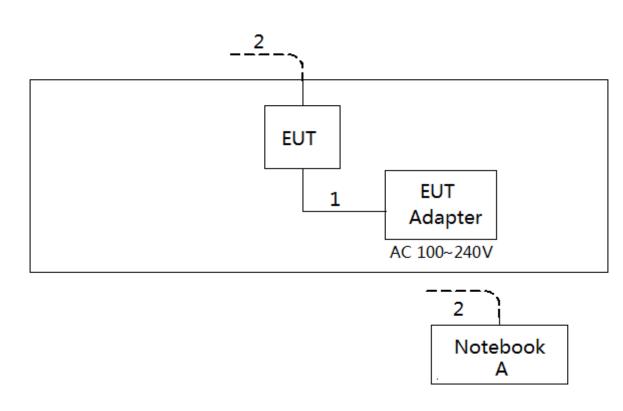
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final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

	UNII-1	1	
Test Software Version	QRCT		
Frequency (MHz)	5180	5200	5240
A Mode	20.5	22	22
N20 Mode	21	22	22
AC20 Mode	21	22	22
Frequency (MHz)	5190	5230	
N40 Mode	15.5	21.5	
AC40 Mode	15.5	21.5	
Frequency (MHz)	5210		
AC80 Mode	14		

	UNII-3		
Test Software Version	QRCT		
Frequency (MHz)	5745	5785	5825
A Mode	24	24	23
N20 Mode	24	24	23
AC20 Mode	24	24	23
Frequency (MHz)	5755	5795	
N40 Mode	23	24	
AC40 Mode	23	24	
Frequency (MHz)	5775		
AC80 Mode	23		



3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



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	Lenovo	G410	N/A	N/A

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



4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

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

	Conducted Limit (dBµV)		
Frequency of Emission (MHz)	Quasi-peak	Average	
0.15 -0.50	66to 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 test result calculated as following:
 - Measurement Value = Reading Level + Correct Factor Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 - Margin Level = Measurement Value Limit Value

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

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 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.

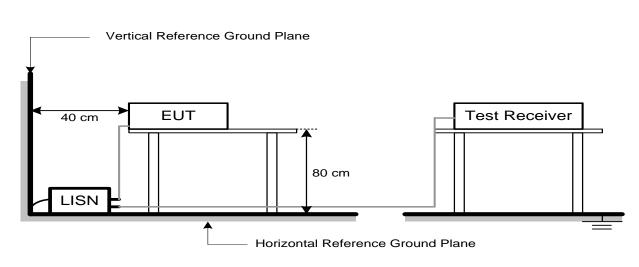
4.1.3 DEVIATION FROM TEST STANDARD

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 150 kHz to 30 MHz.



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	FIDD Limit (dDm)	Equivalent Field Strength
(MHz)	EIRP Limit (dBm)	at 3m (dBµV/m)
5150-5250	-27	68.3
5725-5850	-27(Note 2)	68.3
	10(Note 2)	105.3
	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

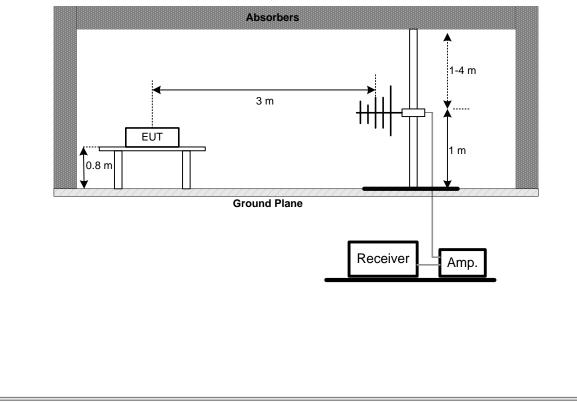
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance 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 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item -EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

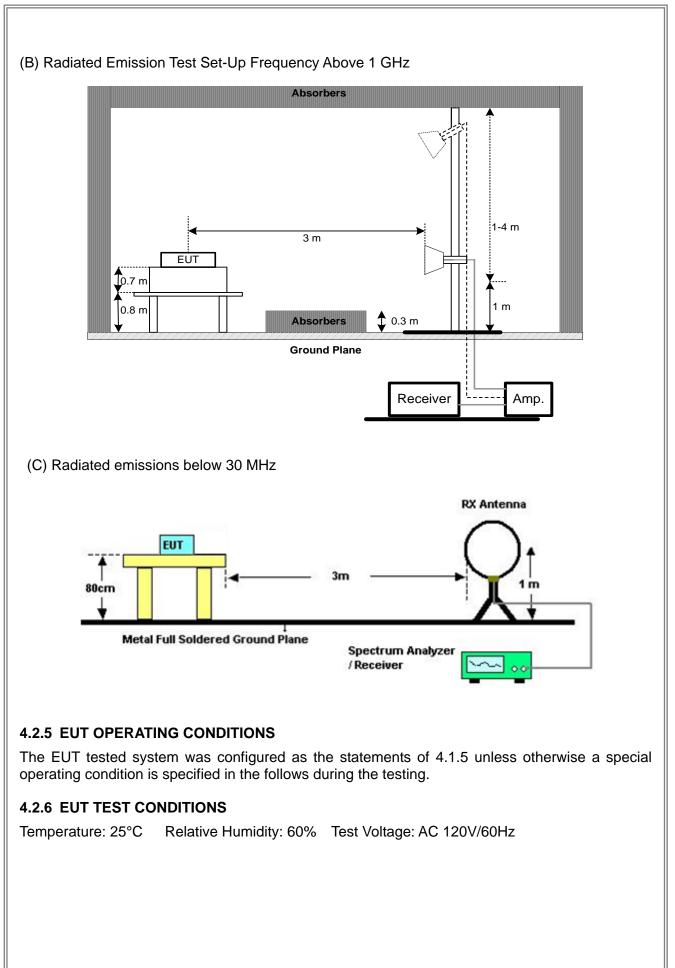
4.2.4 TEST SETUP

(A)Radiated Emission Test Set-Up Frequency 30 MHz-1000 MHz











4.2.7 TEST RESULTS (9 kHz TO 30 MHz)

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 (30 MHz 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. SPECTRUM BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result		
	26 dB Bandwidth	5150-5250	PASS		
Bandwidth	Minimum 500kHz 6 dB 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	> 26 dB Bandwidth
	300 kHz(Bandwidth 20 MHz)
RBW	1 MHz(Bandwidth 40 MHz and 80 MHz)
	1 MHz(Bandwidth 20 MHz)
VBW	3 MHz(Bandwidth 40 MHz and 80 MHz)
Span Frequency	6 dB Bandwidth
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

c. Measured the spectrum width with power higher than 26 dB 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: 24°C Relative Humidity: 60% Test

Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Appendix E.

6. MAXIMUM OUTPUT POWER

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Limit	Frequency Range (MHz)	Result	
	Fixed:1 Watt (30 dBm)	5150-5250	PASS	
Maximum Output Power	Mobile and portable: 250 mW (24 dBm)	5150-5250	PASS	
	1 Watt (30 dBm)	5725-5850	PASS	

Note:

1. For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26dB Bandwidth in megahertz.

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

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



6.1.2 DEVIATION FROM STANDARD No deviation. 6.1.3 TEST SETUP SPECTRUM EUT ANALYZER 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: 24°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		
David a construction	Other then Mobile and portable: 17 dBm/MHz	5150-5250	PASS		
Power Spectral Density	Mobile and portable:11 dBm/MHz	5150-5250	PASS		
	30 dBm/500kHz	5725-5850	PASS		

7.1.1 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 Fraguanay	Encompass the entire emissions bandwidth (EBW) of the
Span Frequency	signal
RBW	= 1 MHz.
VBW	≥ 3 MHz.
Detector	RMS
Trace average	100 trace
Sweep Time	Auto

Note:

- 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 1 MHz and VBW at 3 MHz if the spectrum analyzer does not have 500 kHz RBW.
- The value measured with RBW=1 MHz is to be added with 10log(500 kHz/1 MHz) which is -3 dB. For example, if the measured value is +10dBm using RBW=1 MHz (that is +10 dBm/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: 24°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 (MHz)					
Frequency Stability Specified in the user's manual		5150-5250	PASS		
		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.

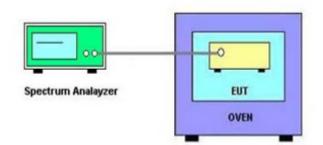
8.1.2 DEVIATION FROM STANDARD

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.

Test Voltage: AC 120V/60Hz

8.1.5 EUT TEST CONDITIONS

Temperature: 24°C Relative Humidity: 60%

8.1.6 TEST RESULTS

Please refer to the Appendix I.



9. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	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	Mar. 23, 2019	

	Radiated Emission Measurement-9 kHz TO 30 MHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Loop Antenna	EM	EM-6876-1	230	Feb. 07, 2019	
2	Cable	N/A	RG 213/U	C-102	Jun. 01, 2019	
3	EMI Test Receiver	R&S	ESCI	100382	Mar. 11, 2019	
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	

	Radiated Emission Measurement-30 MHz TO 1000 MHz					
Item	Item Kind of Equipment Manufacturer		Type No.	Serial No.	Calibrated until	
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 11, 2019	
2	Amplifier	HP	8447D	2944A09673	Aug. 11, 2019	
3	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019	
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 25, 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	



	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	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2019	
3	Amplifier	Agilent	8449B	3008A02274	Mar. 11, 2019	
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019	
5	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019	
6	Controller	СТ	SC100	N/A	N/A	
7	Controller	MF	MF-7802	MF780208416	N/A	
8	Cable	mitron	B10-01-01-12M	18072744	Jul. 30, 2019	
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
10	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019	

	Spectrum Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019	

Maximum Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

	Frequency Stability Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019
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



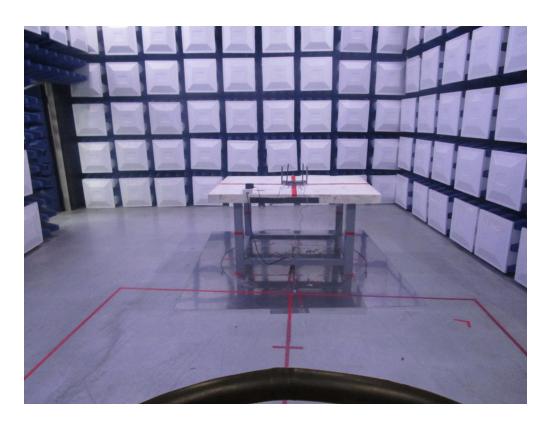




Radiated Measurement Photos

9 kHz to 30 MHz





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Radiated Measurement Photos

30 MHz to 1000 MHz





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Radiated Measurement Photos

Above 1000 MHz





Report No.: BTL-FCCP-2-1808C223

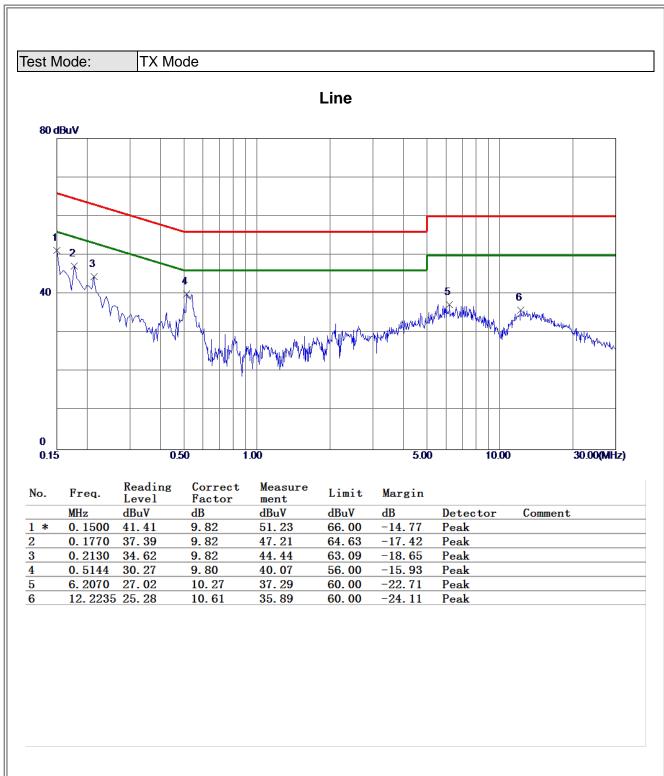
Page 34 of 276 Report Version: R00



APPENDIX A - CONDUCTED EMISSION

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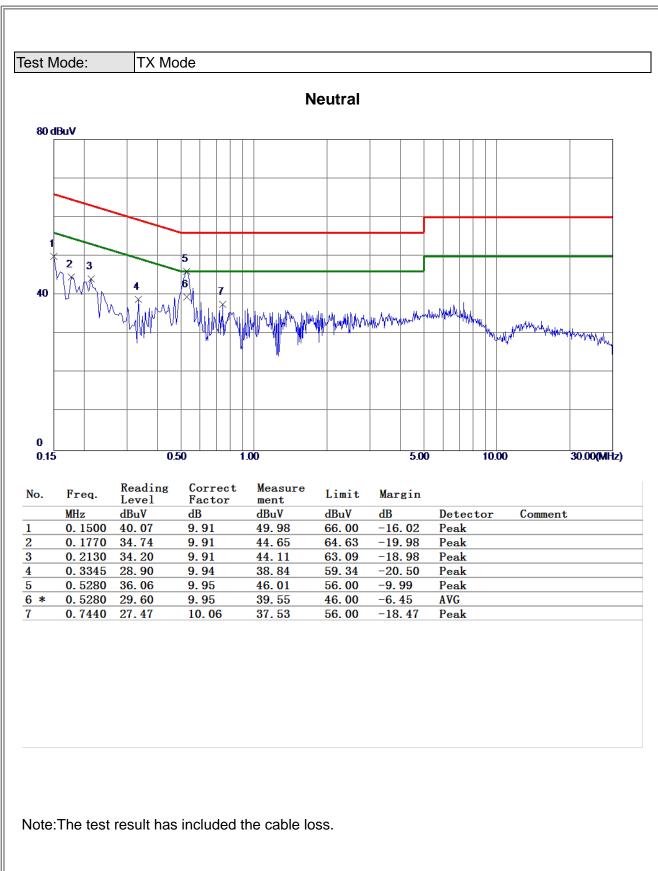




Note:The test result has included the cable loss.

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





Test Mode: TX Mode Ant 0° dBuV/m 160.0 150 140 130 120 110 100 90 80 70 mon with the way when the the section 60 50 40 30 20 10 0.0 (MHz) 0.150 0.009 Reading Correct Measure-Limit Margin No. Mk. Freq. Level Factor ment MHz dBuV dB dBuV/m dBuV/m dB Detector Comment 0.0198 35.70 20.05 55.75 121.67 -65.92 AVG 1 2 0.0400 32.80 19.69 52.49 115.56 -63.07 AVG AVG 3 * 0.0591 31.30 19.35 50.65 112.17 -61.52





Test Mode: TX Mode Ant 0° 160.0 dBu∀/m 150 140 130 120 110 100 90 80 70 60 A. 50 X 40 30 20 10 0.0 30.000 0.150 0.5 (MHz) 5 Reading Correct Measure-Limit Margin No. Mk. Freq. Level Factor ment MHz dBuV dB dBuV/m dBuV/m dB Detector Comment 17.12 0.2162 26.20 43.32 100.91 -57.59 AVG 1 2 * 2.2968 -17.80 QP 34.80 16.94 51.74 69.54 3.7395 24.70 15.95 40.65 69.54 -28.89 QP 3

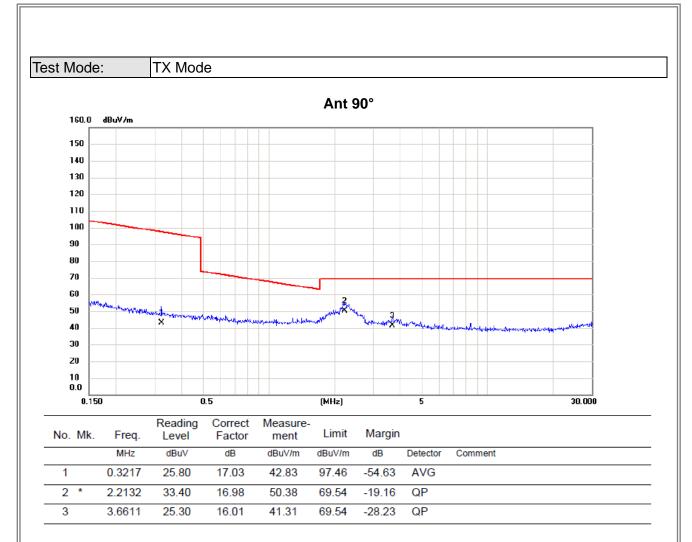




Test Mode: TX Mode Ant 90° 160.0 dBuV/m 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0.0 0.150 0.009 (MHz) Reading Correct Measure-Limit Margin No. Mk. Freq. Level Factor ment MHz dBuV dB dBuV/m dBuV/m dB Detector Comment AVG 0.0220 33.50 53.49 120.76 -67.27 1 19.99 2 0.0365 27.60 19.75 47.35 116.36 -69.01 AVG 3 * 0.0600 28.90 19.33 48.23 112.04 -63.81 AVG





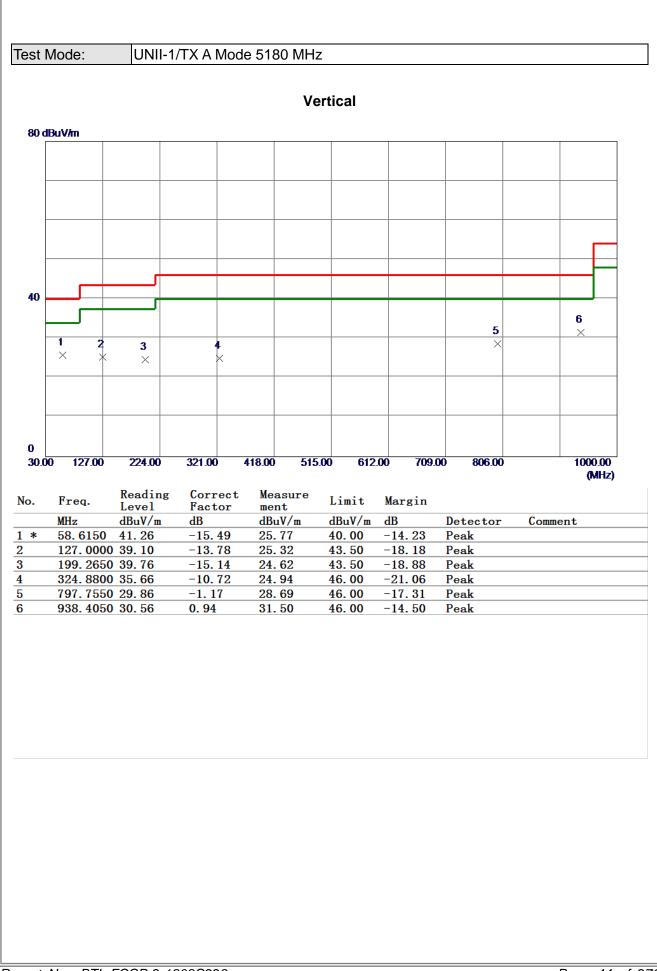




APPENDIX C - RADIATED EMISSION (30 MHZ TO 1000 MHZ)

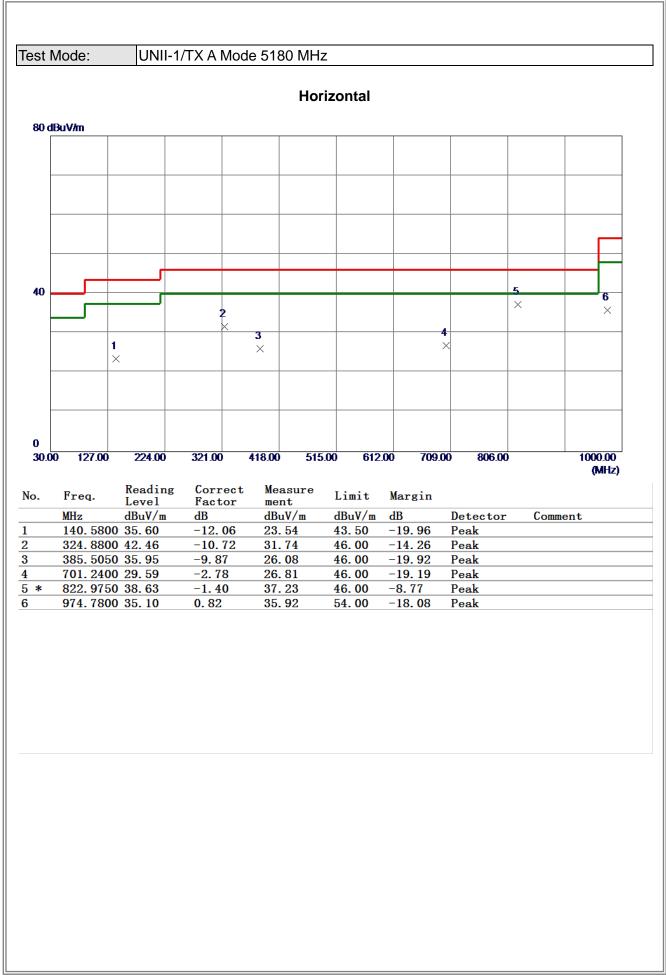






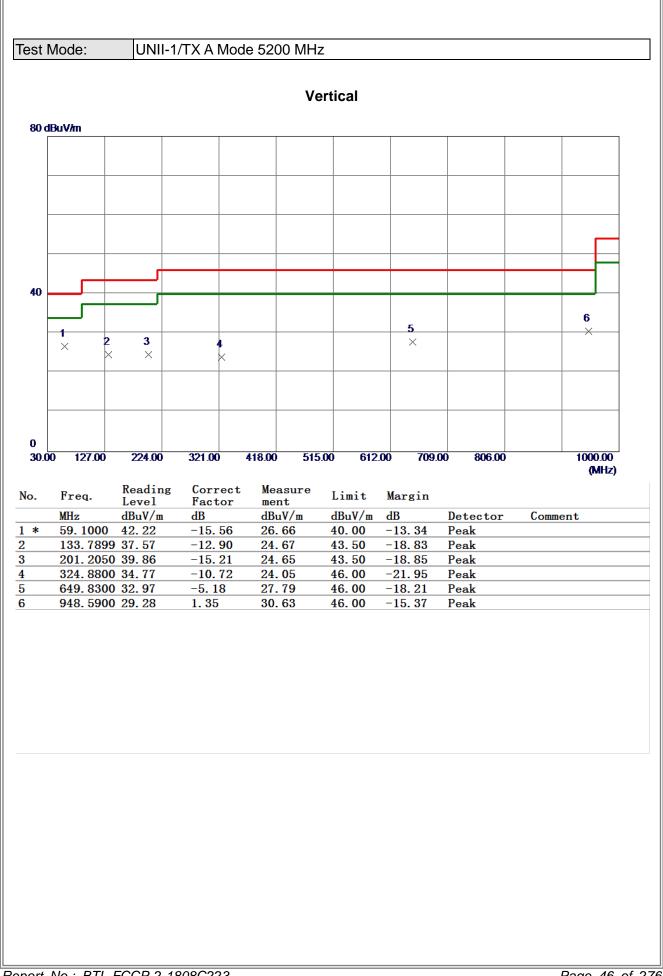






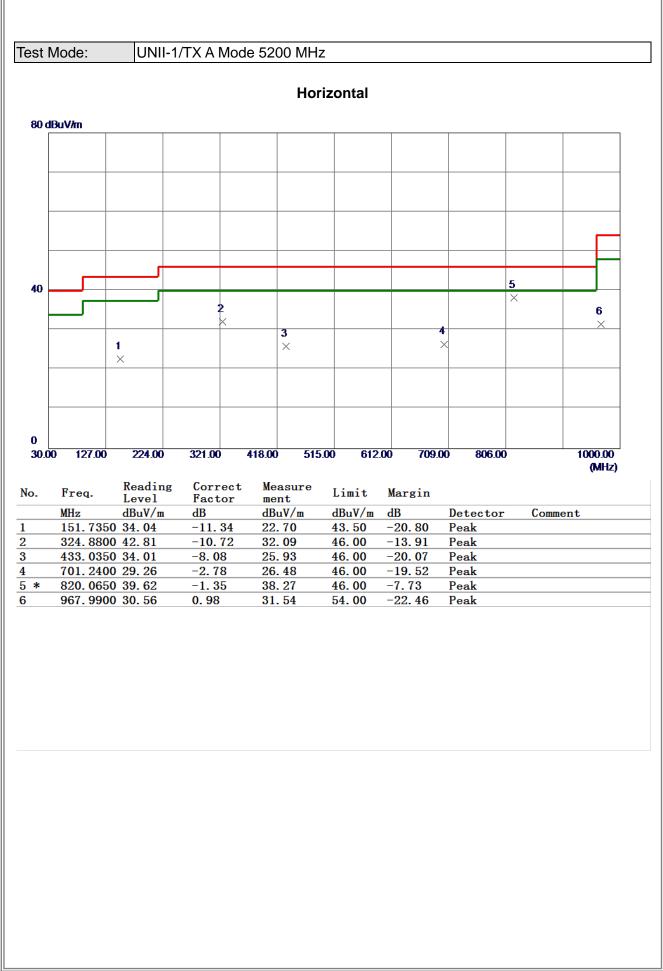






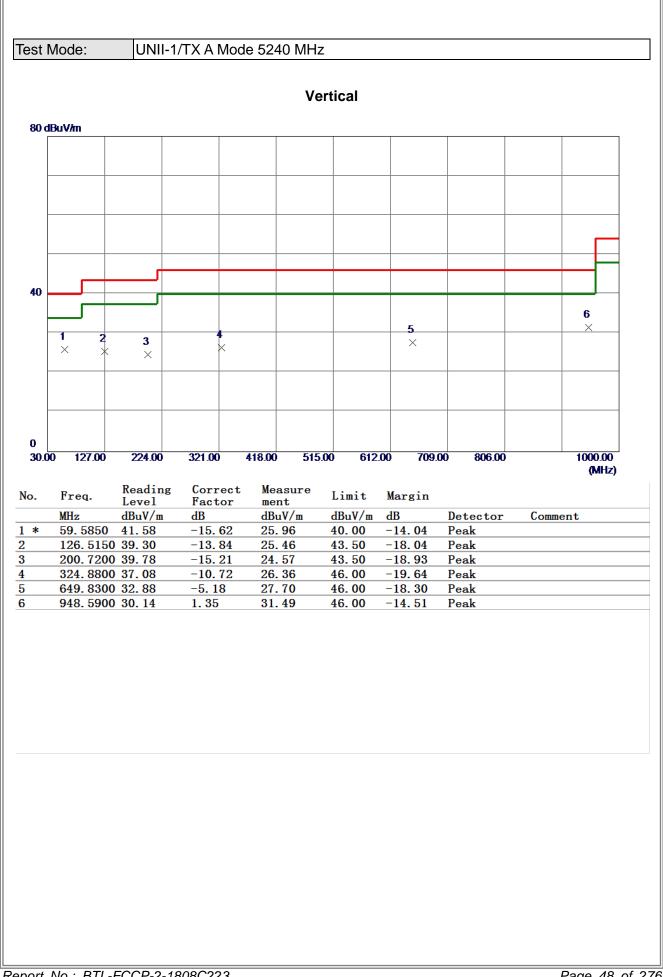






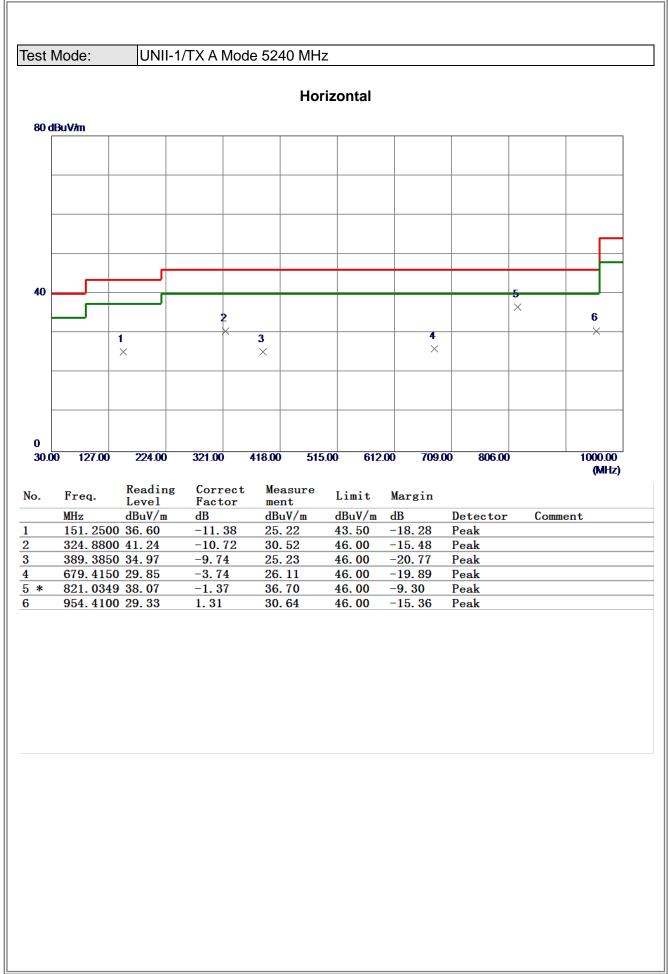






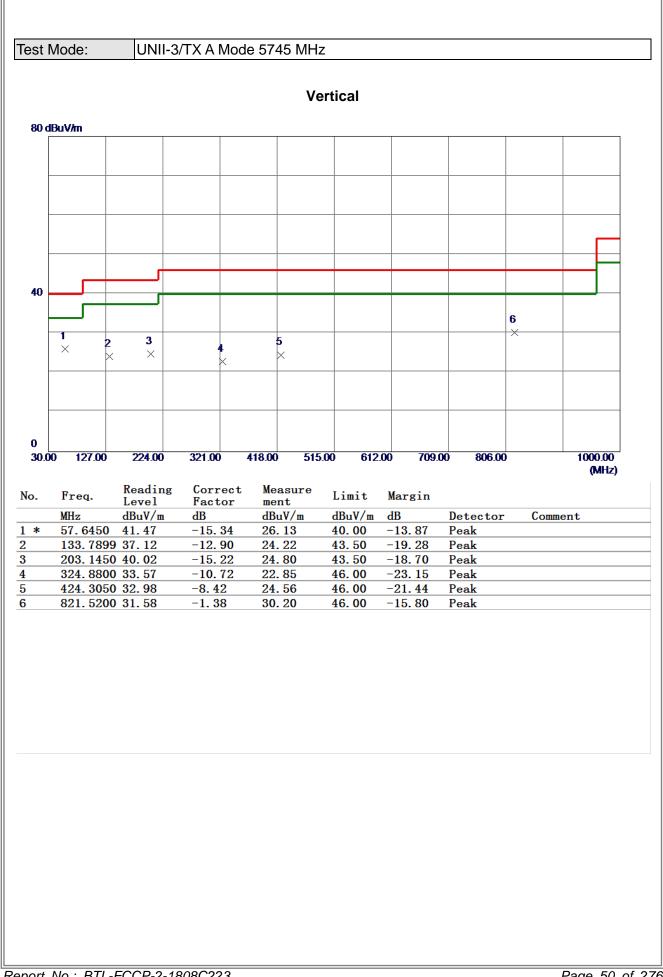






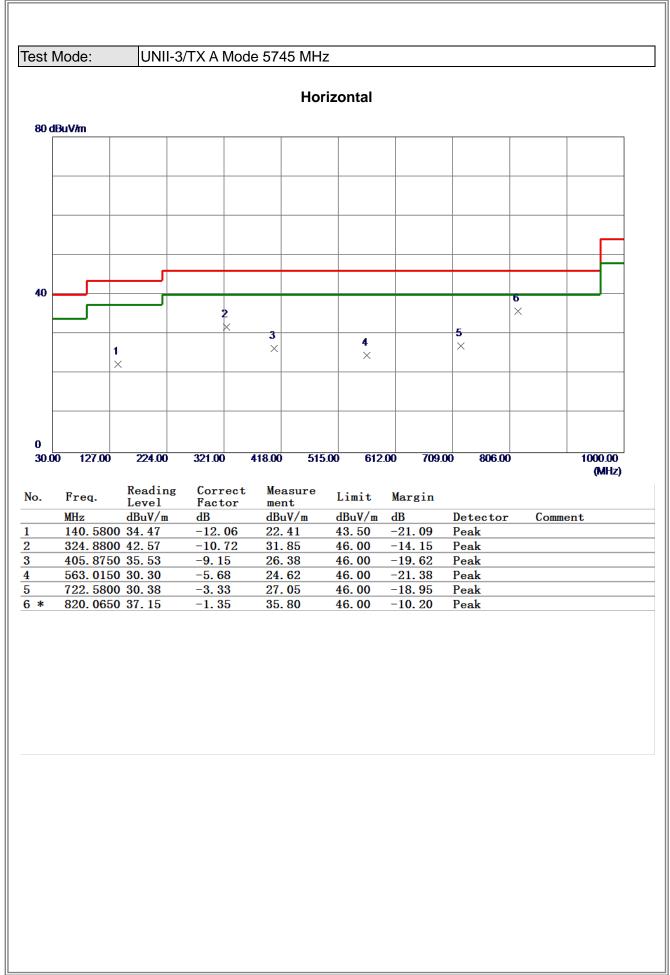






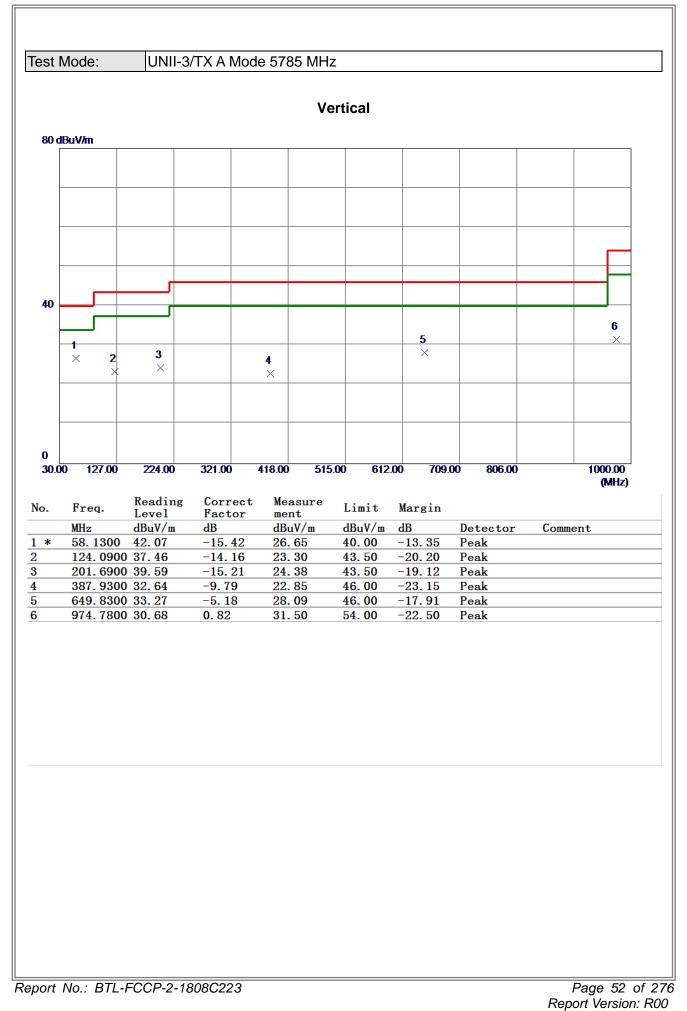






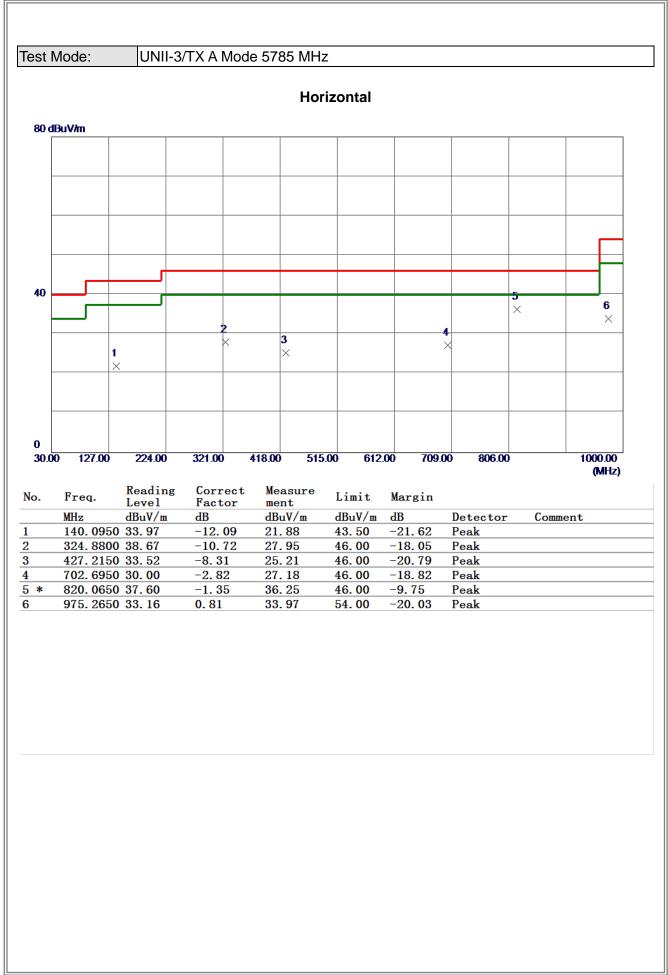






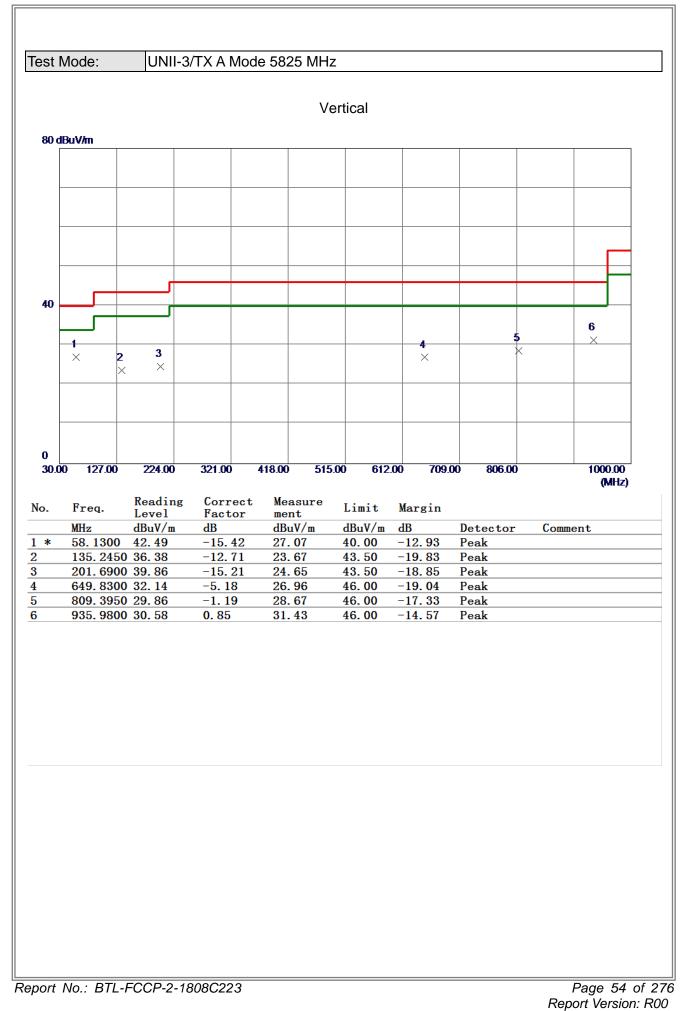






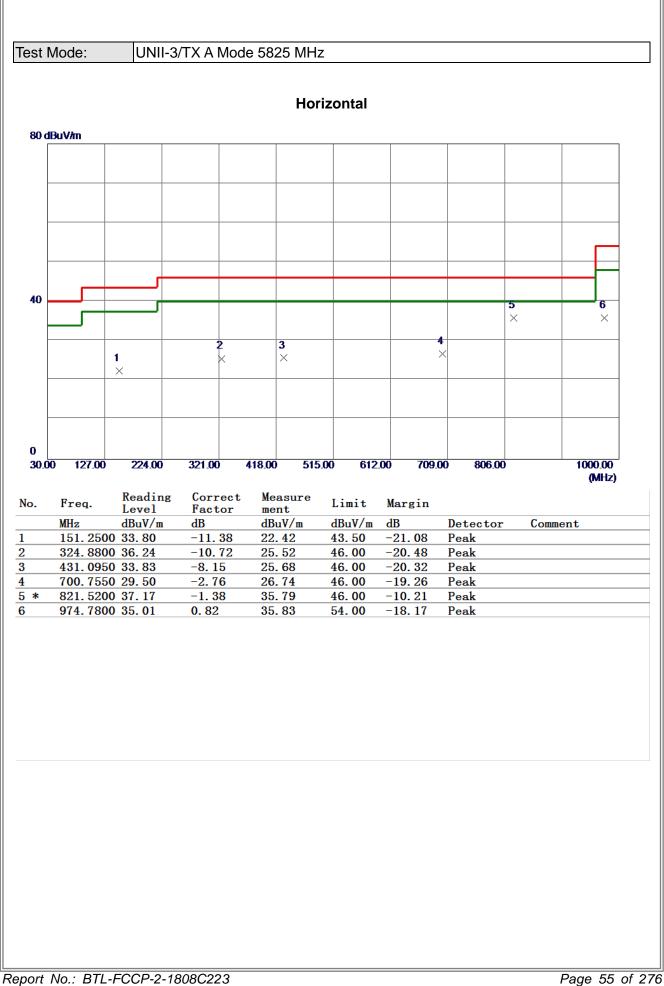










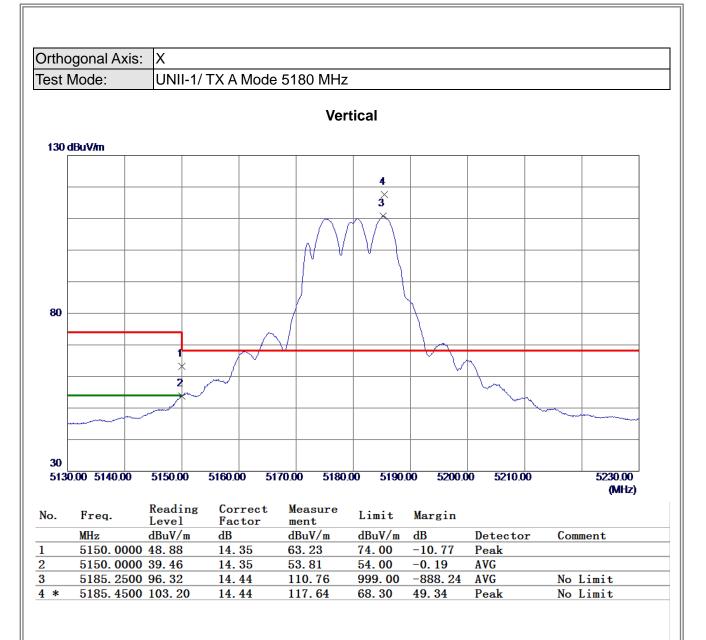




APPENDIX D - RADIATED EMISSION (ABOVE 1000 MHZ)

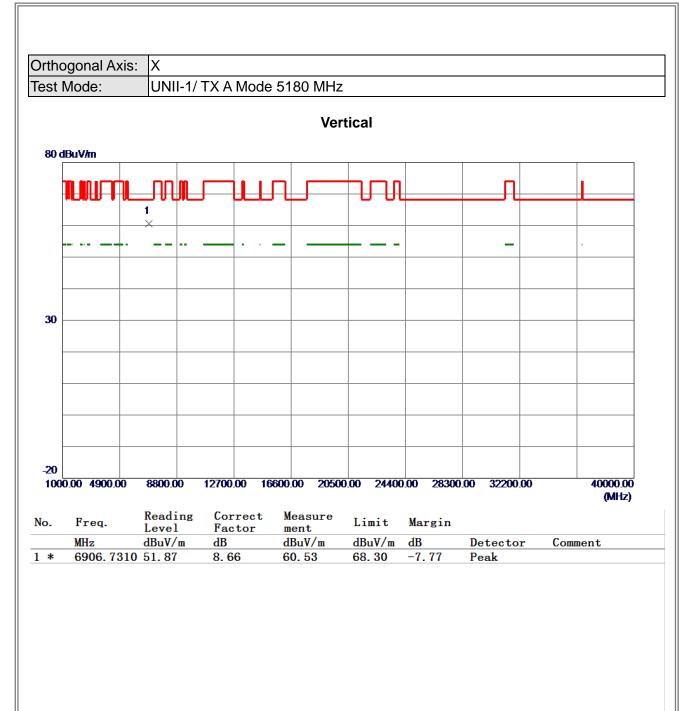






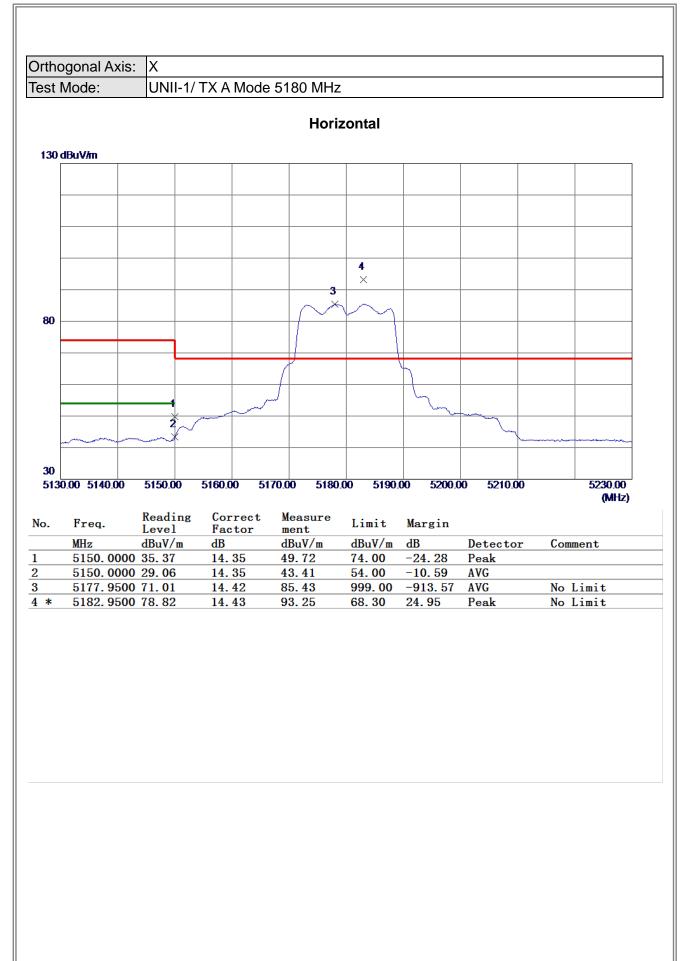






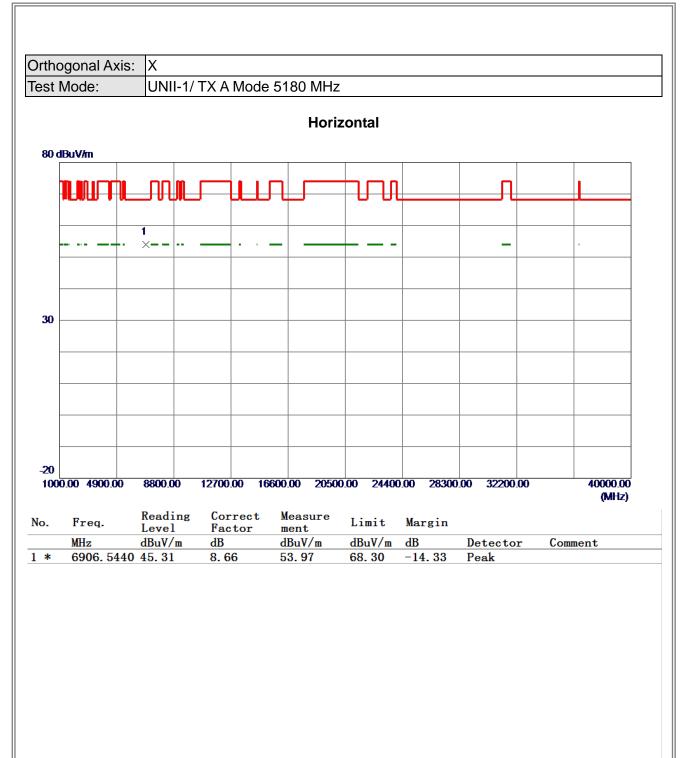






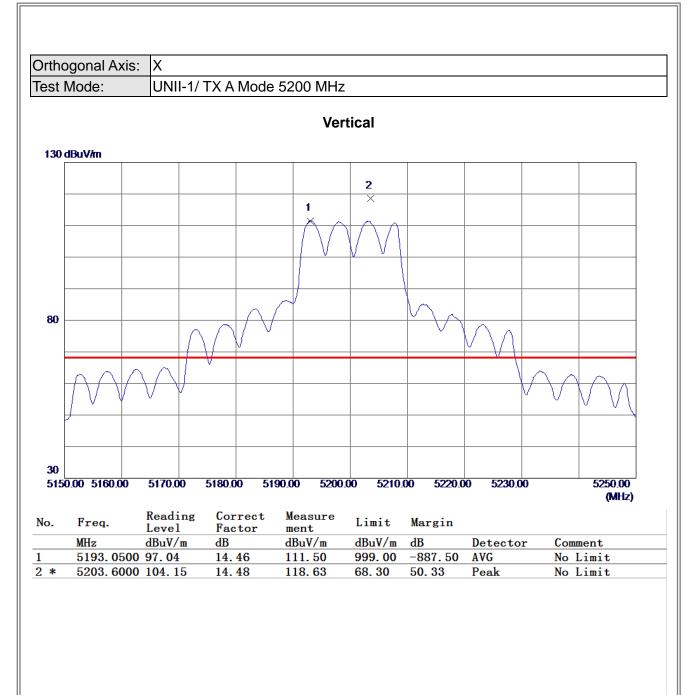






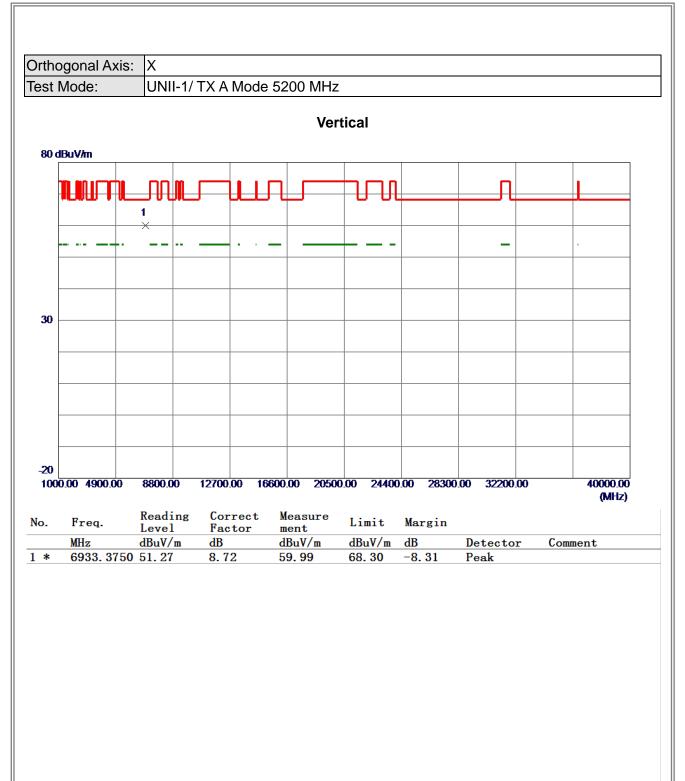






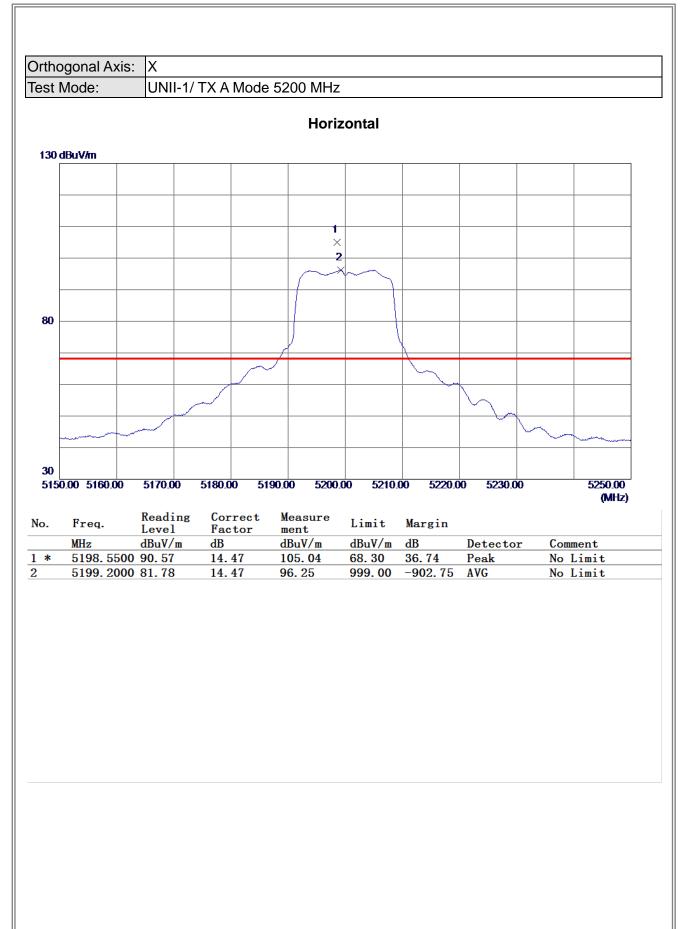






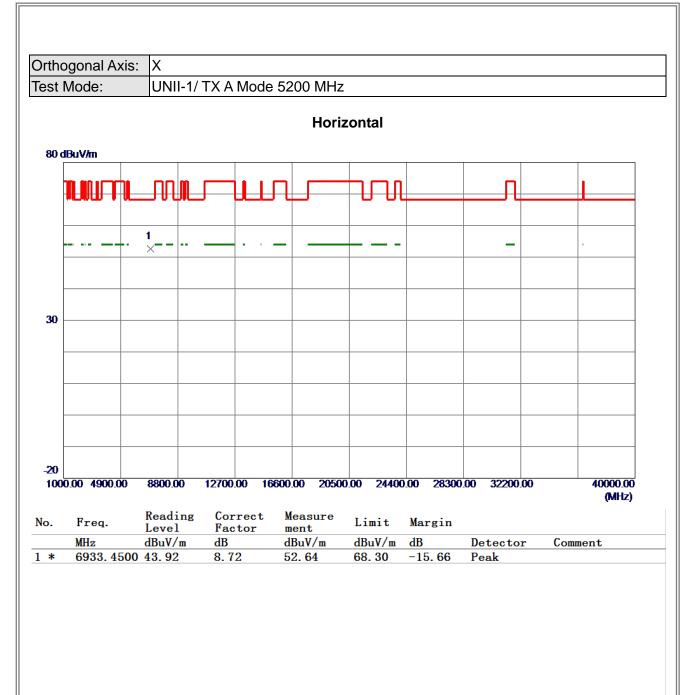






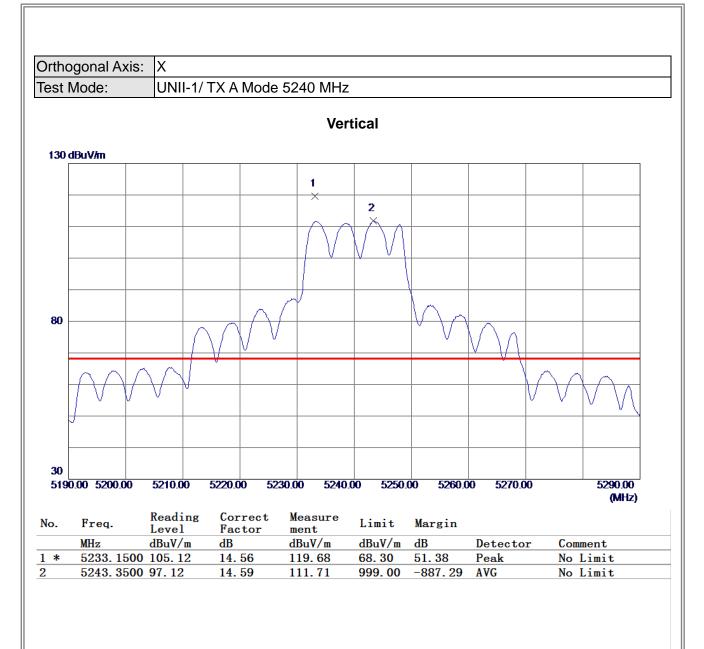






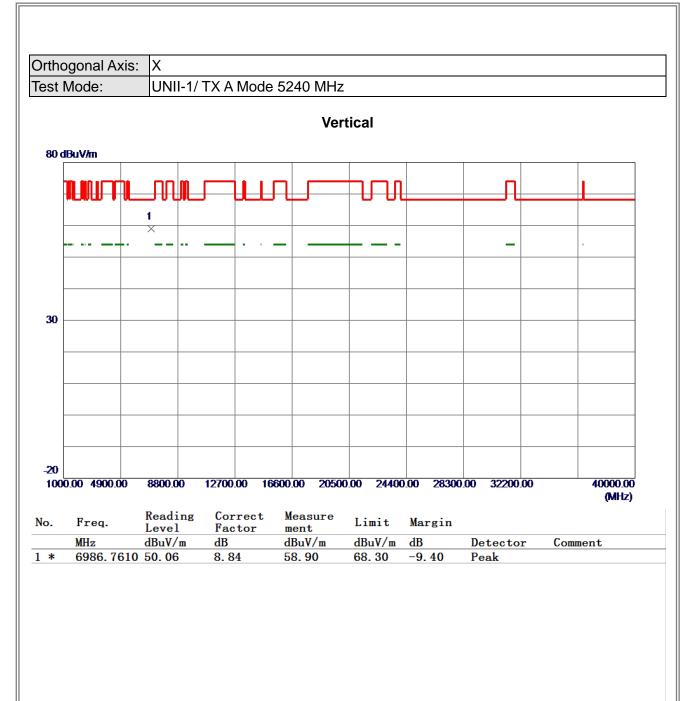






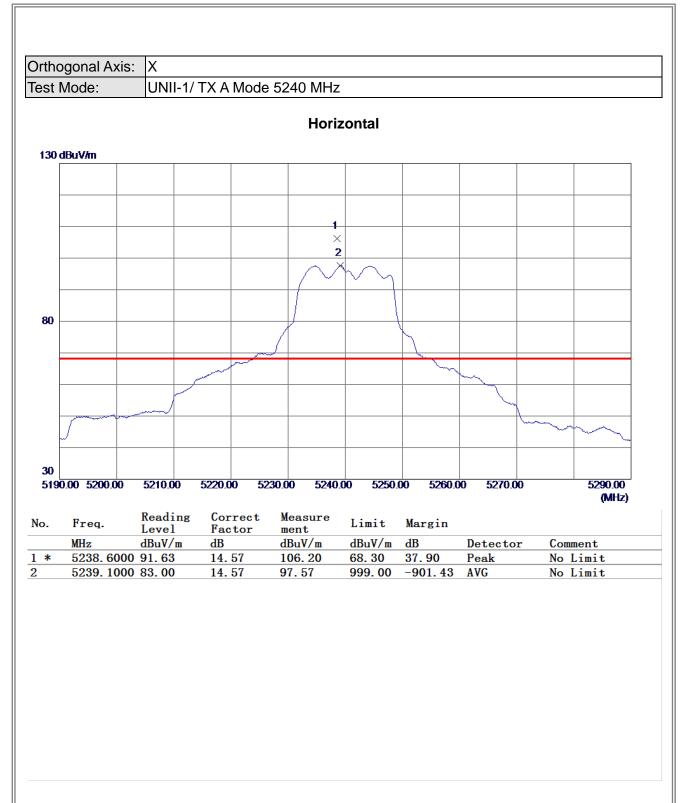






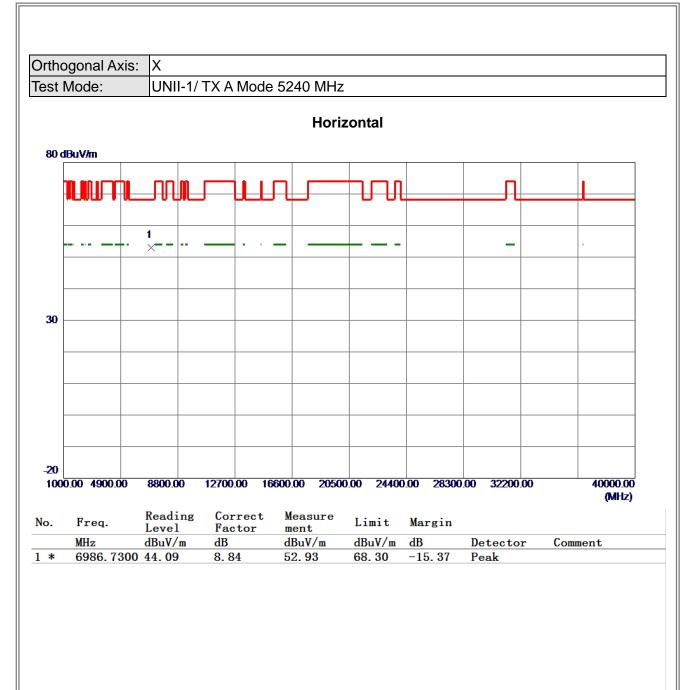






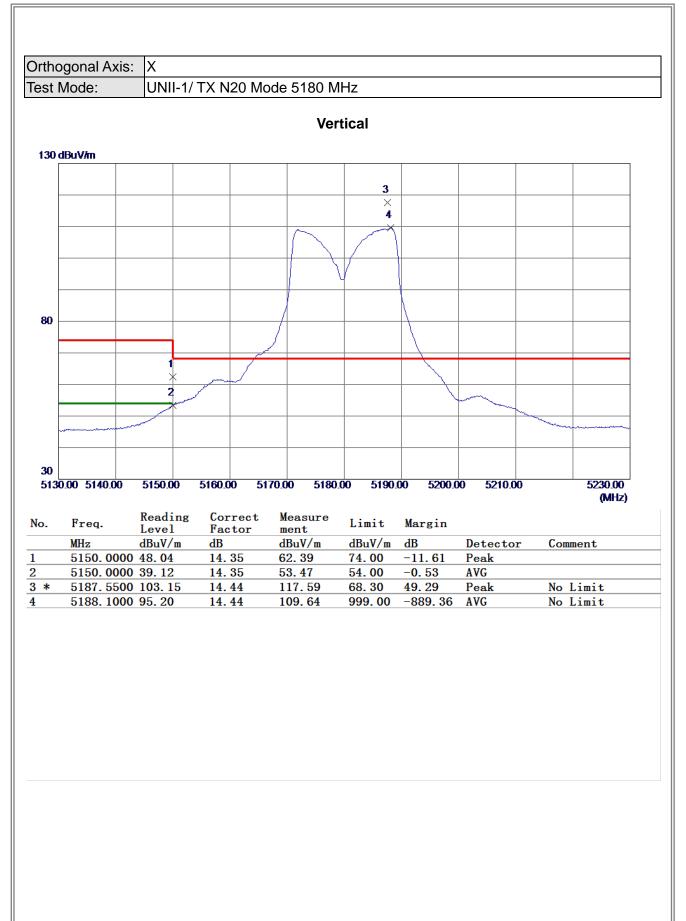






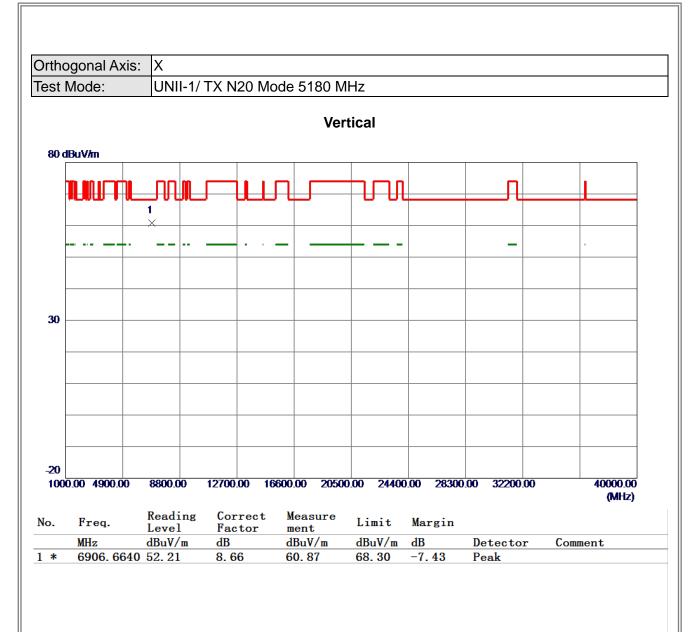






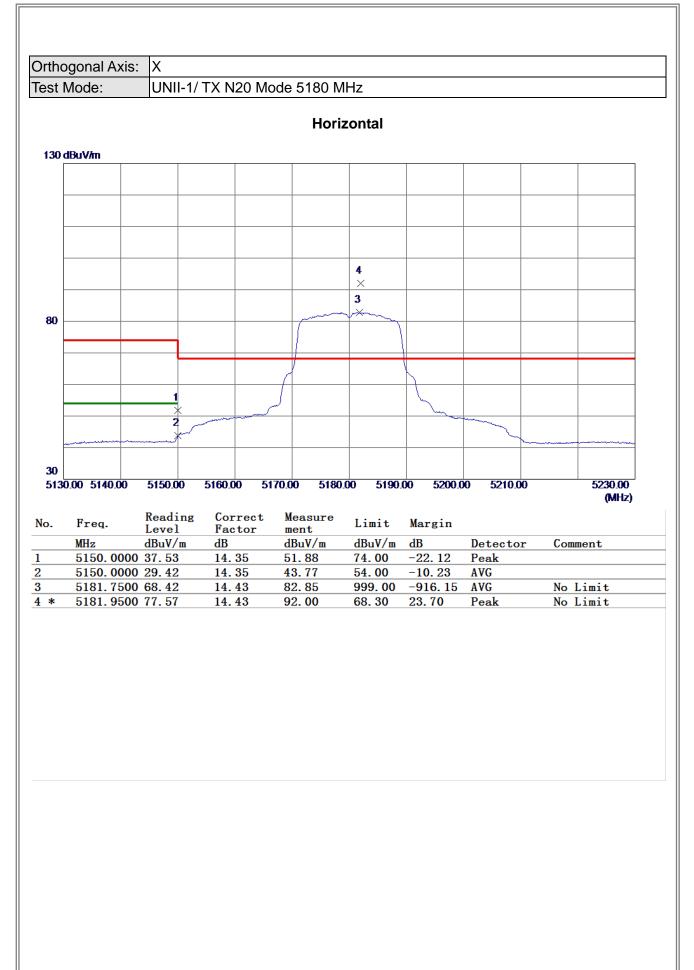






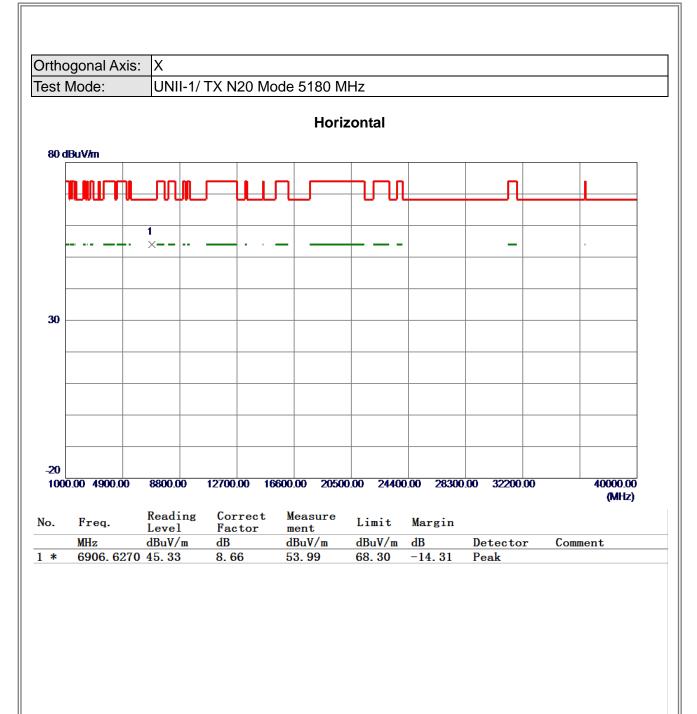






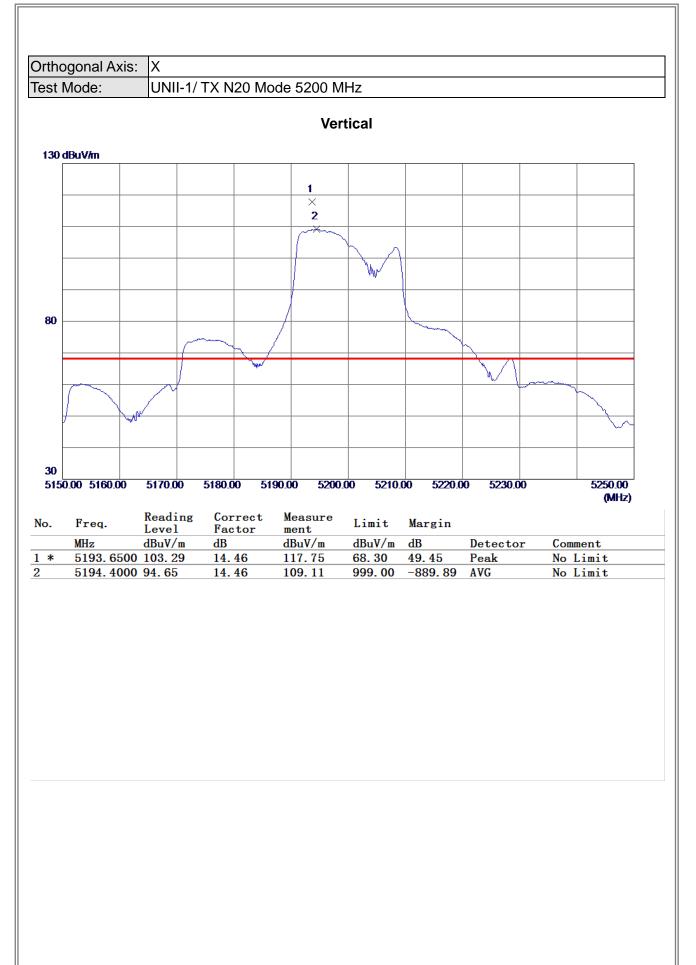






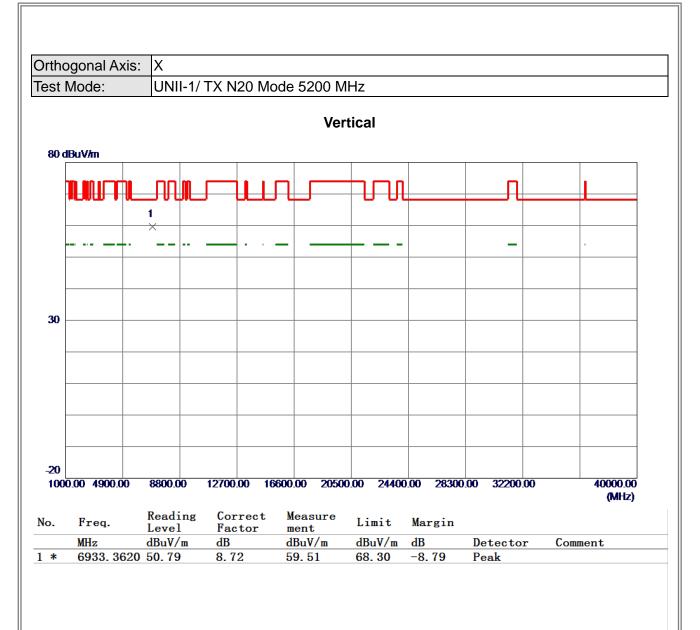






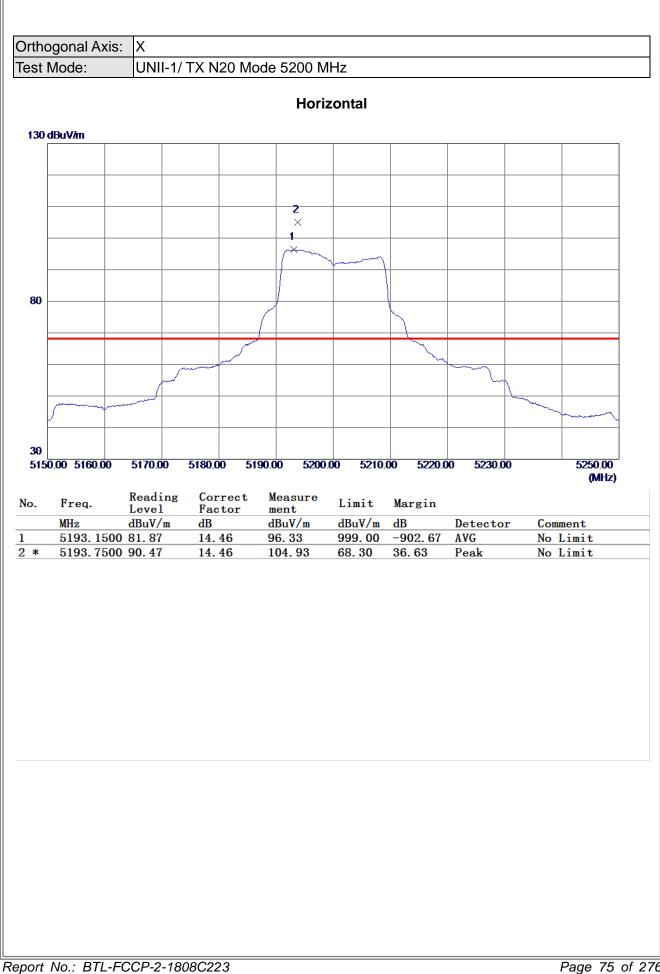






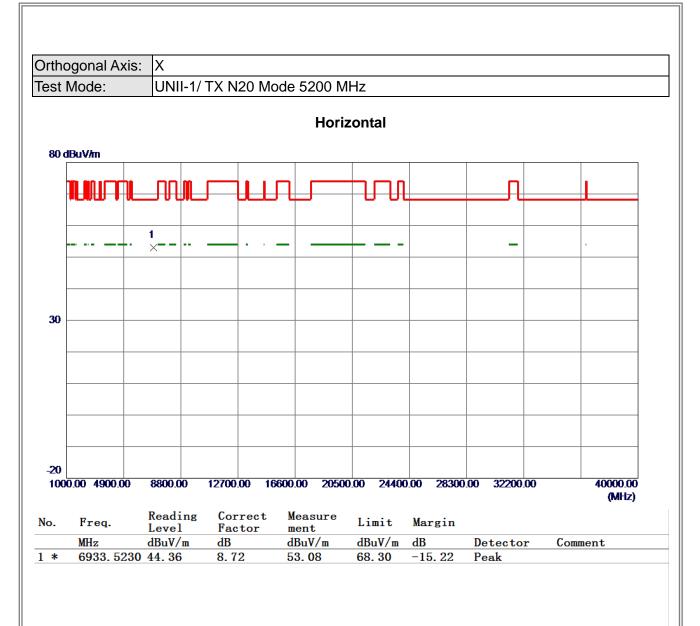






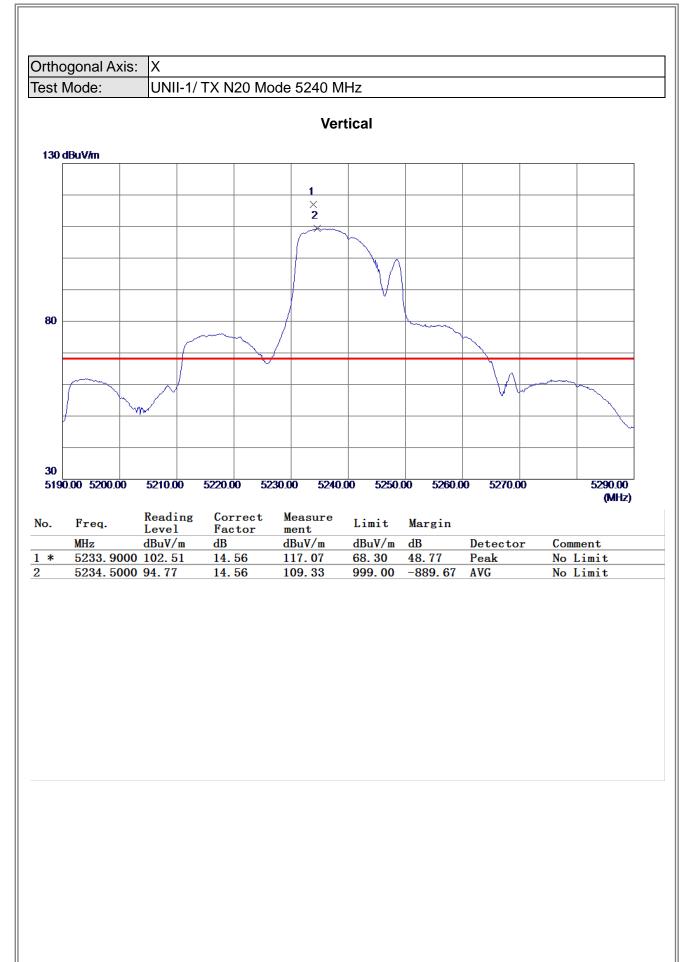






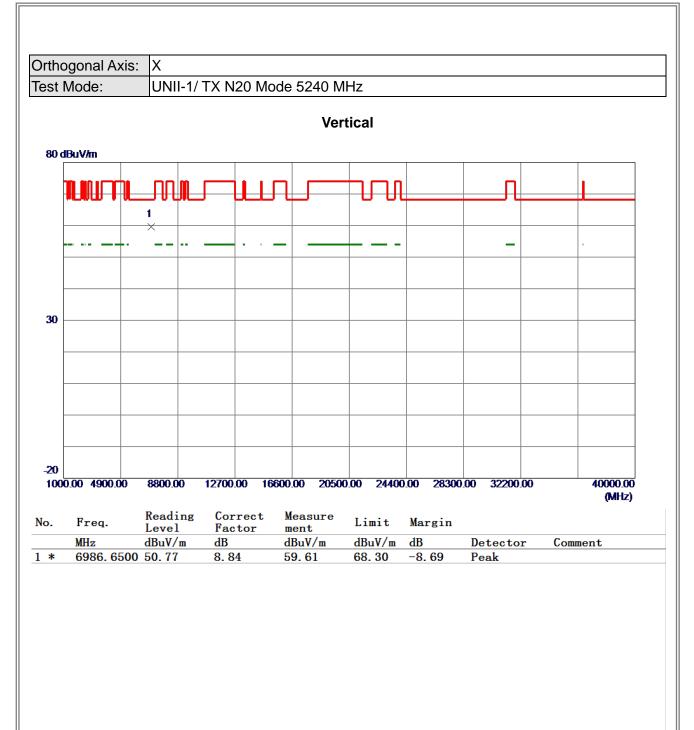






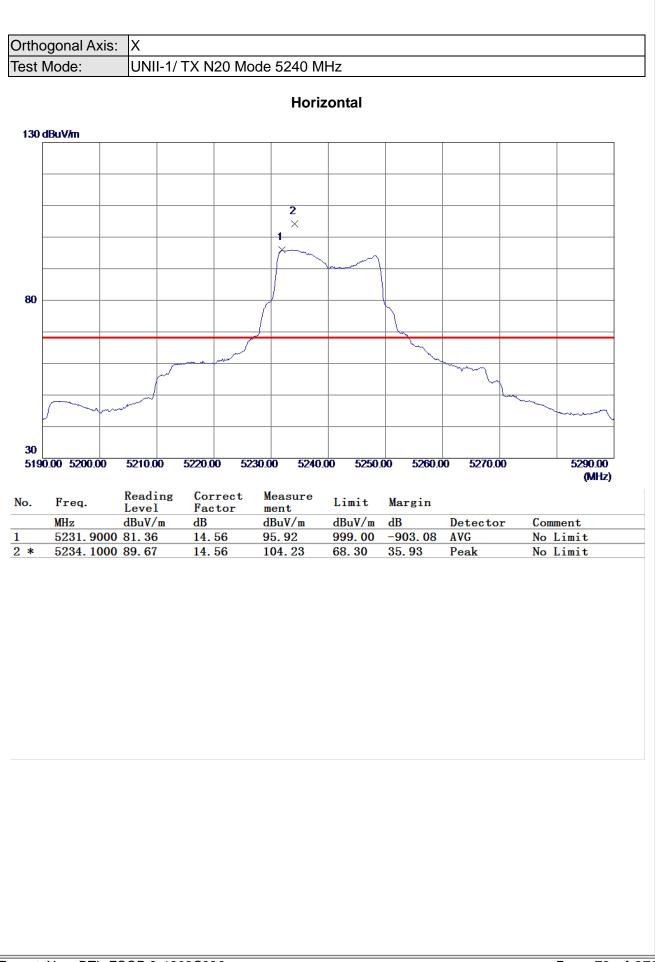






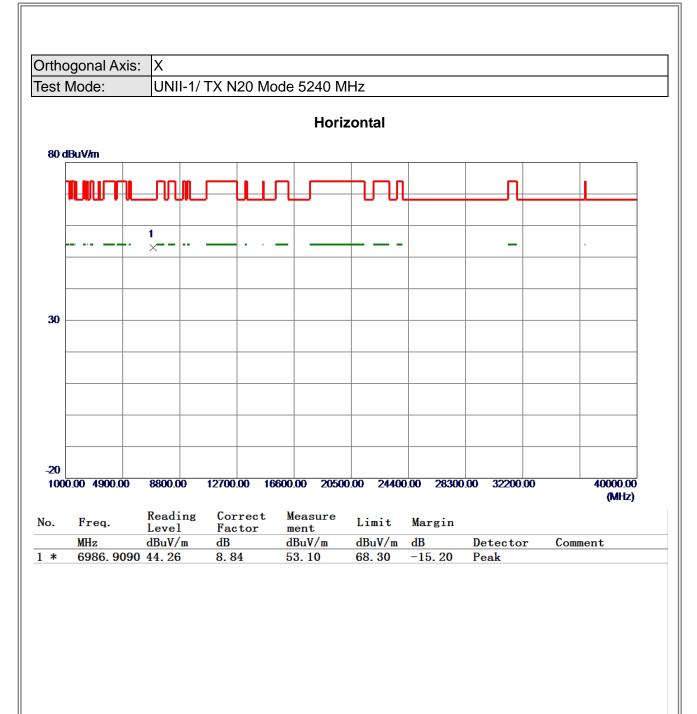






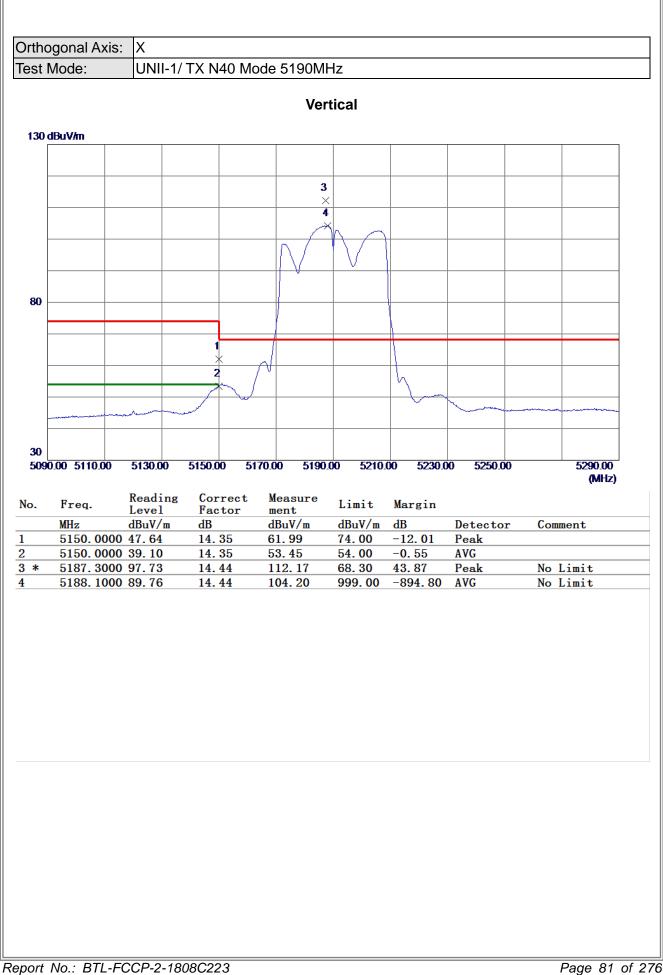






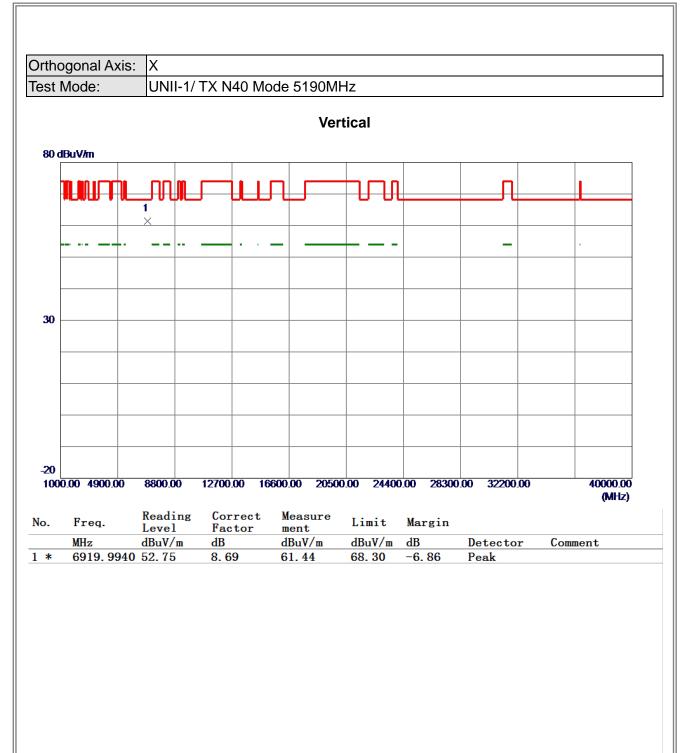






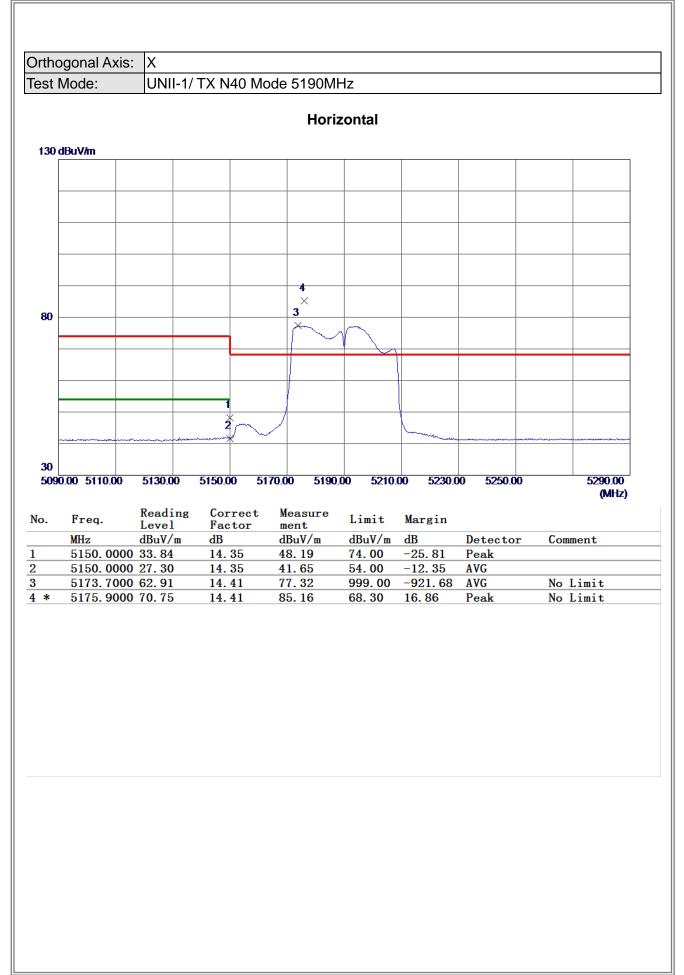






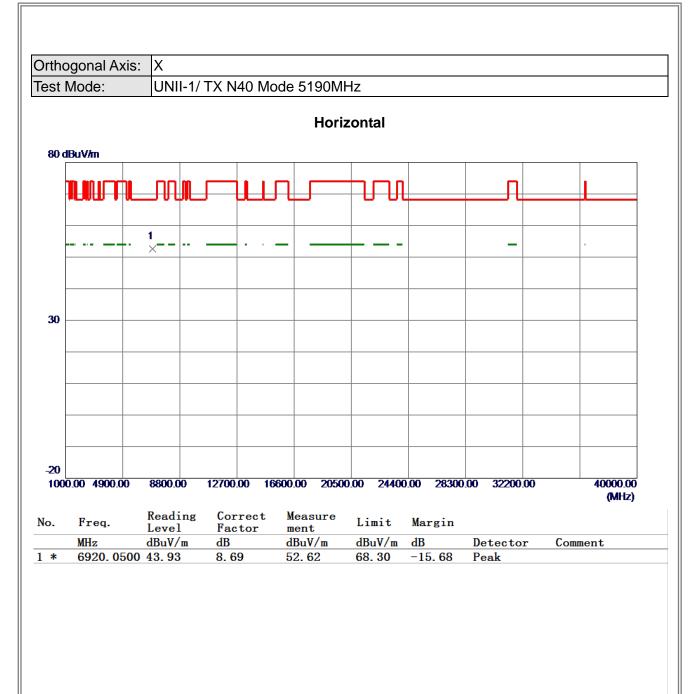






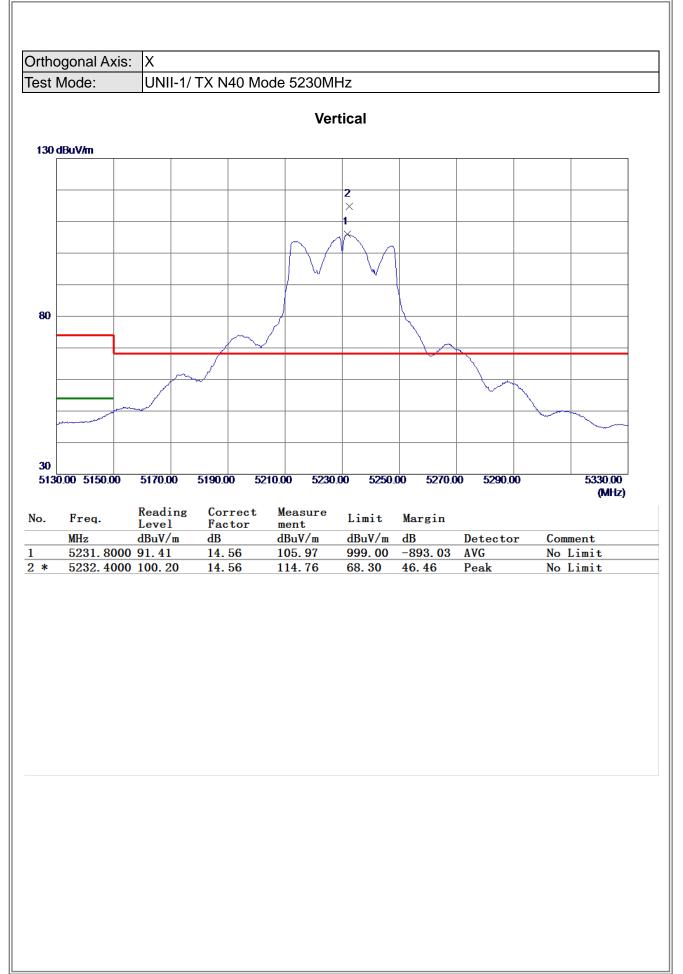






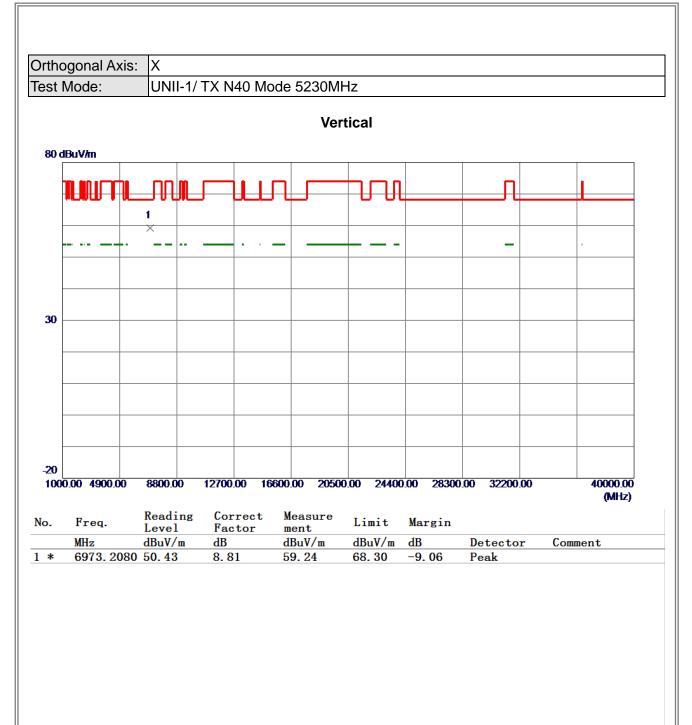






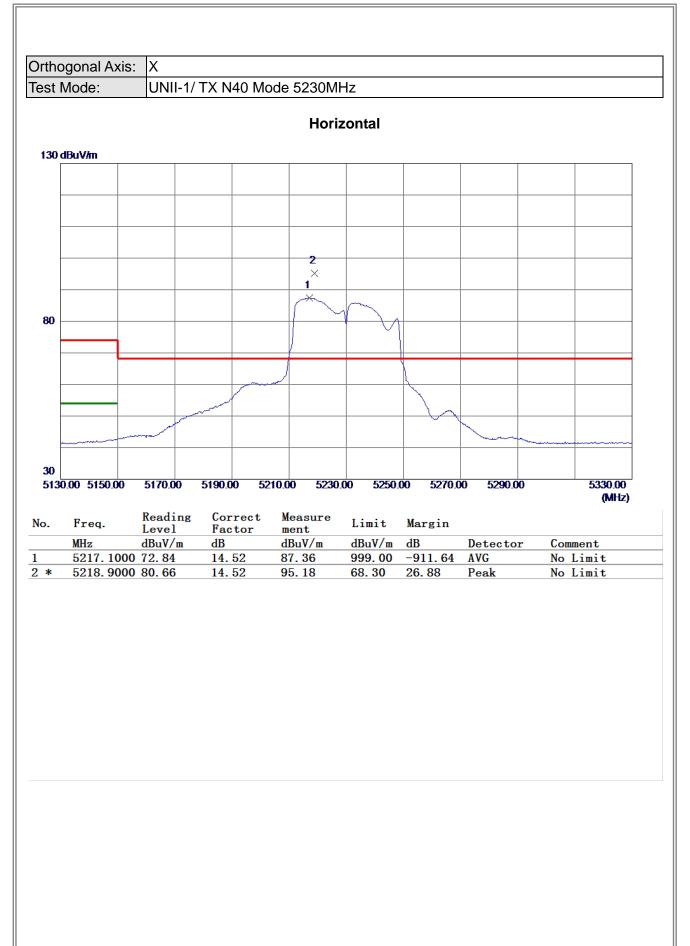






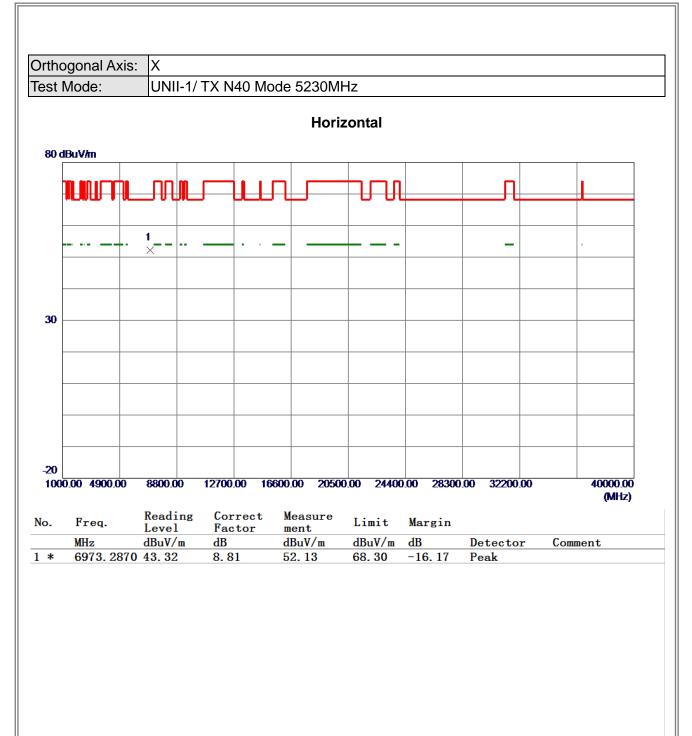






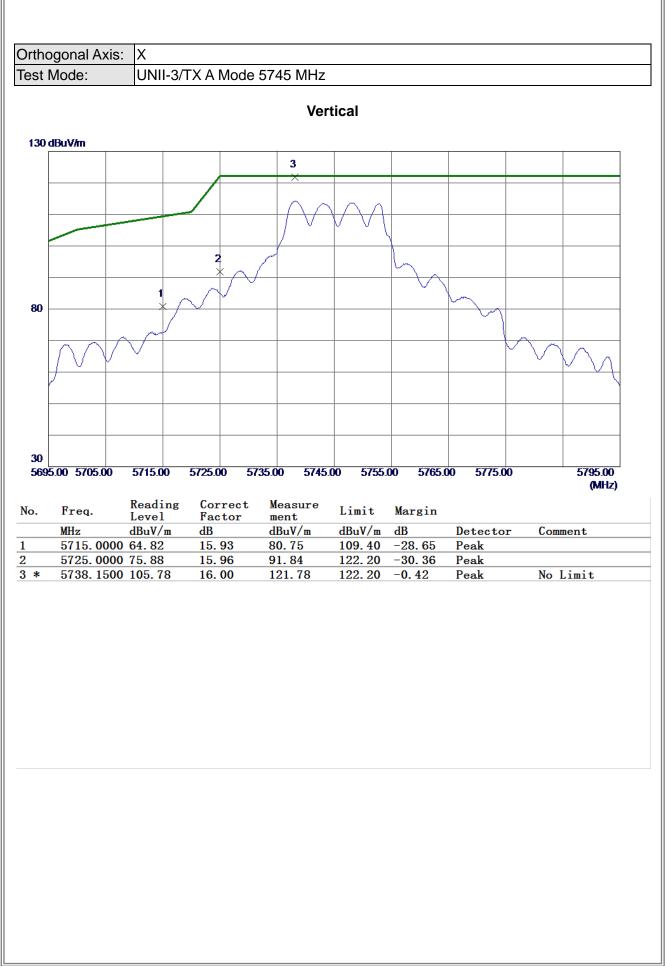






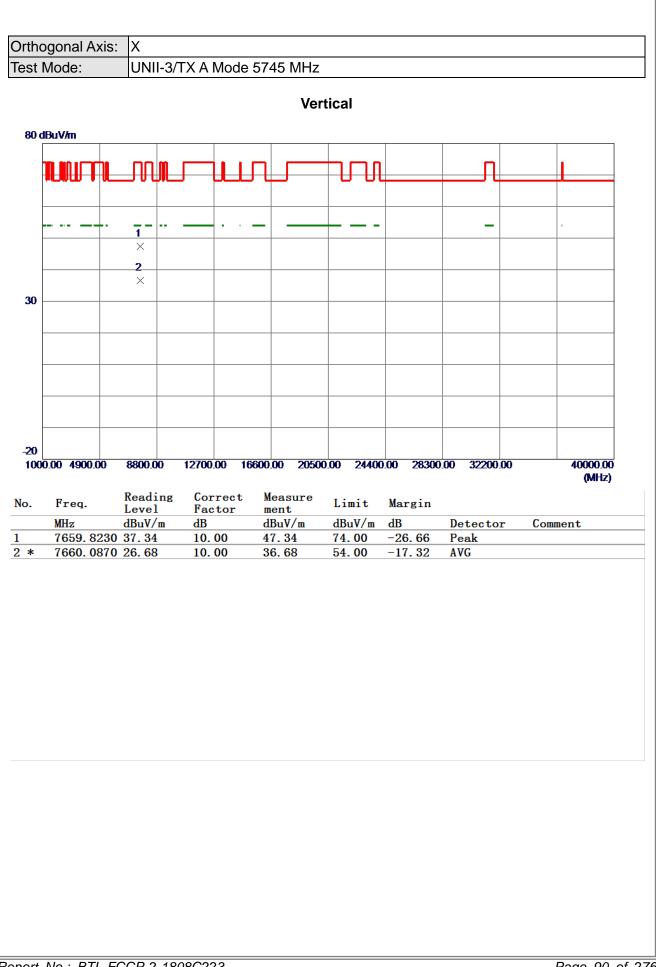






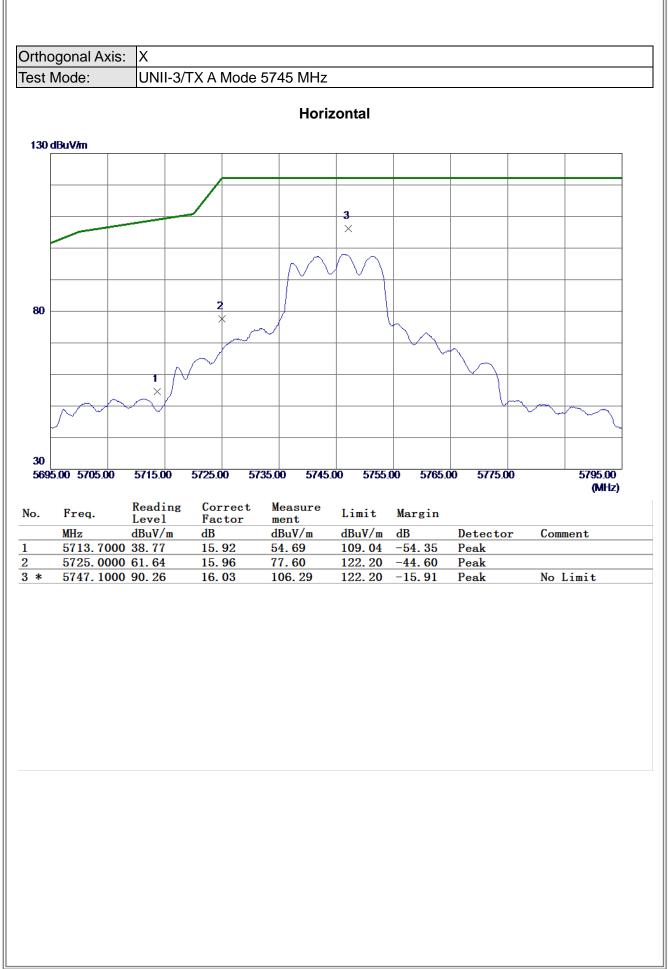






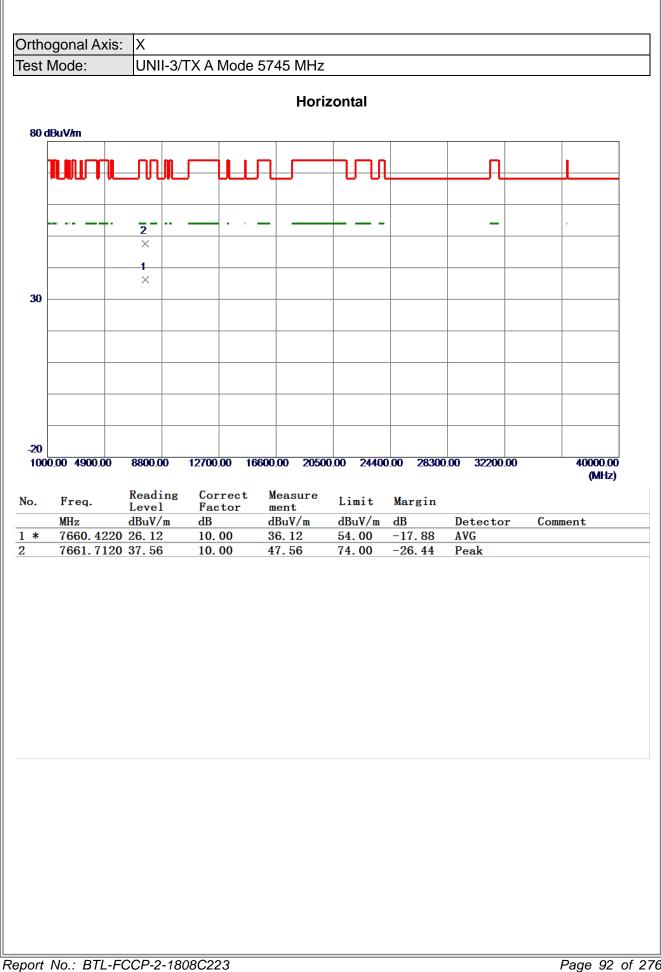






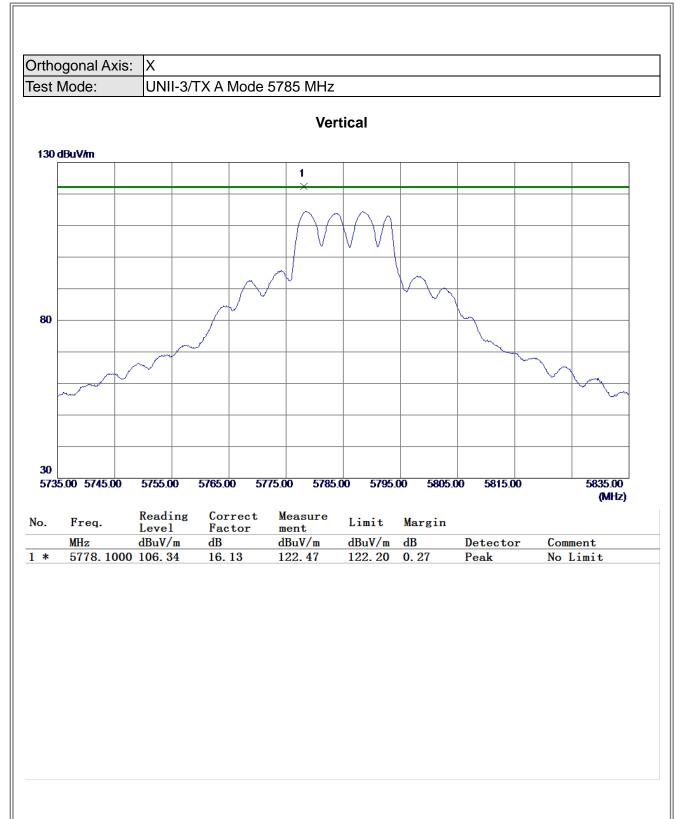






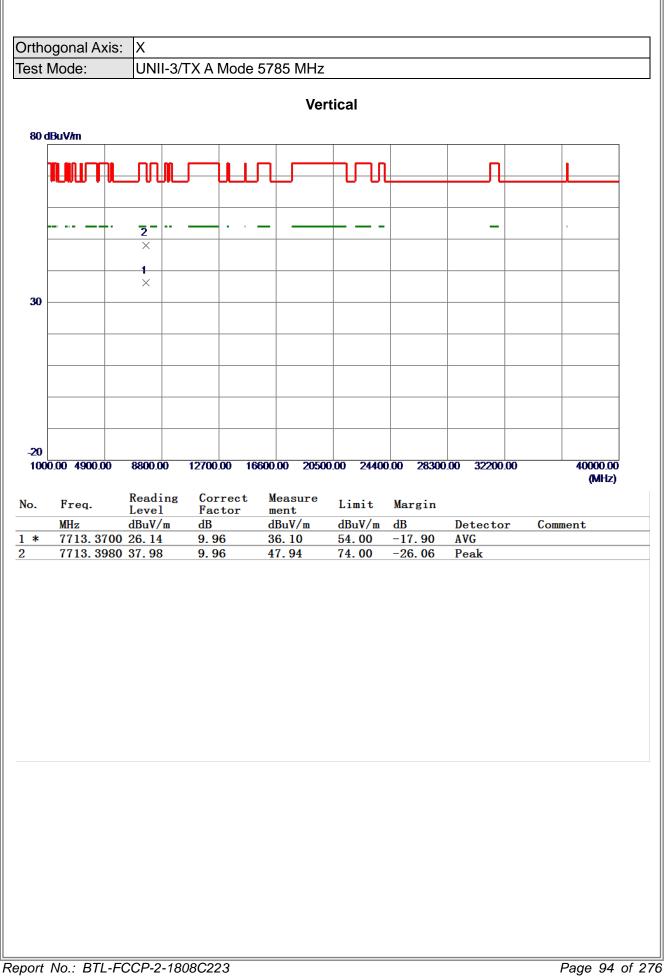






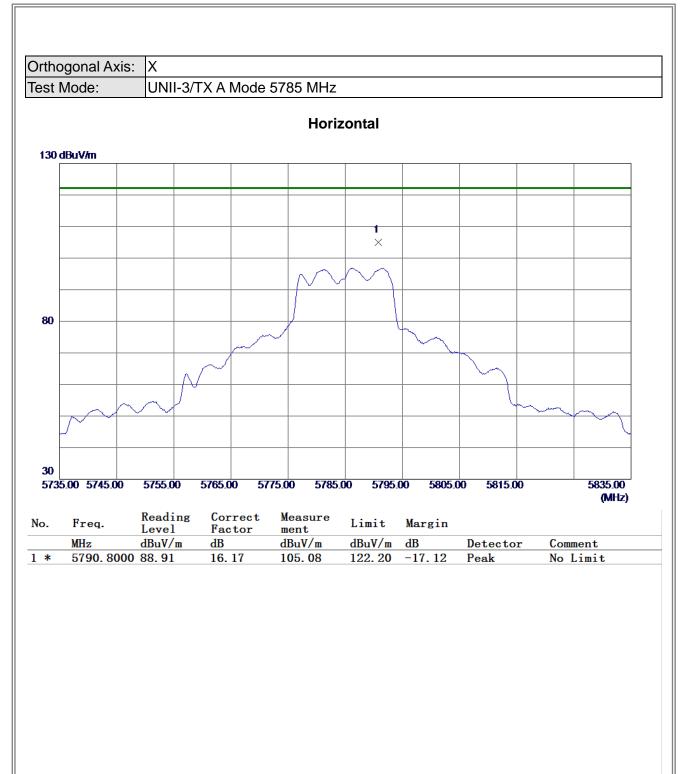






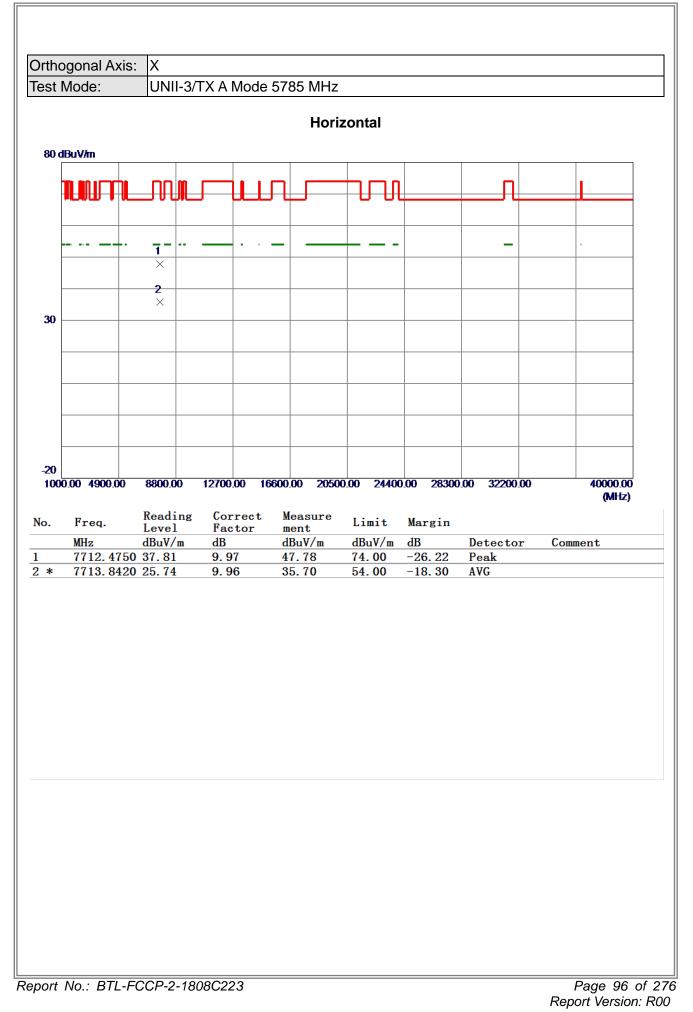






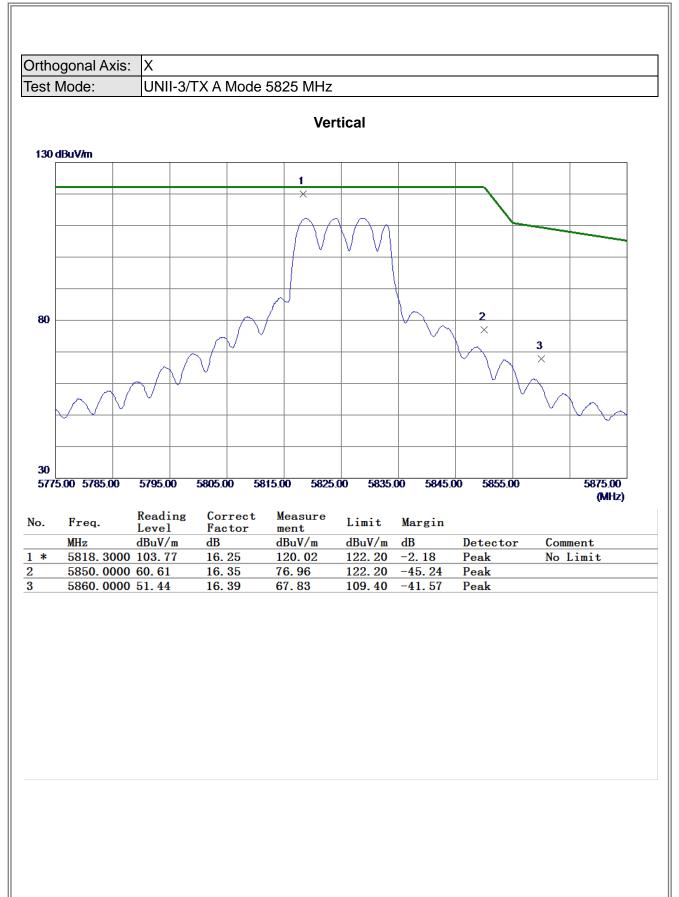






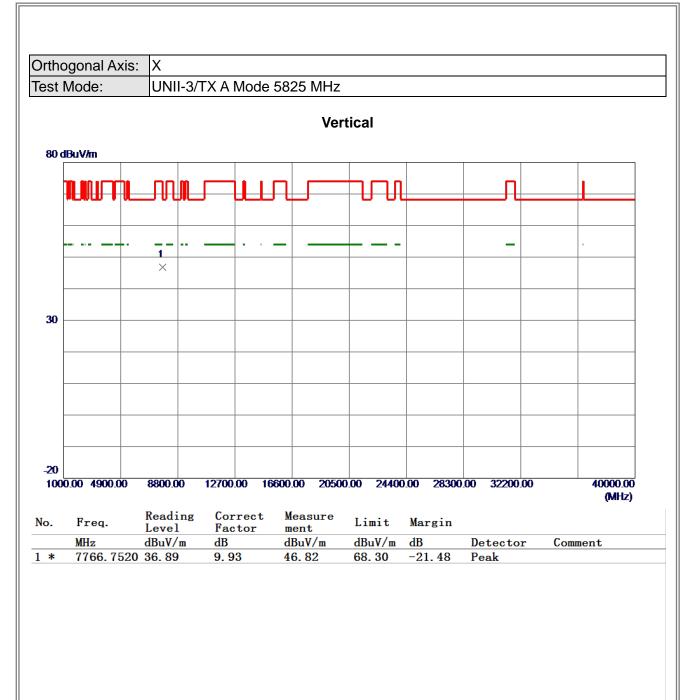






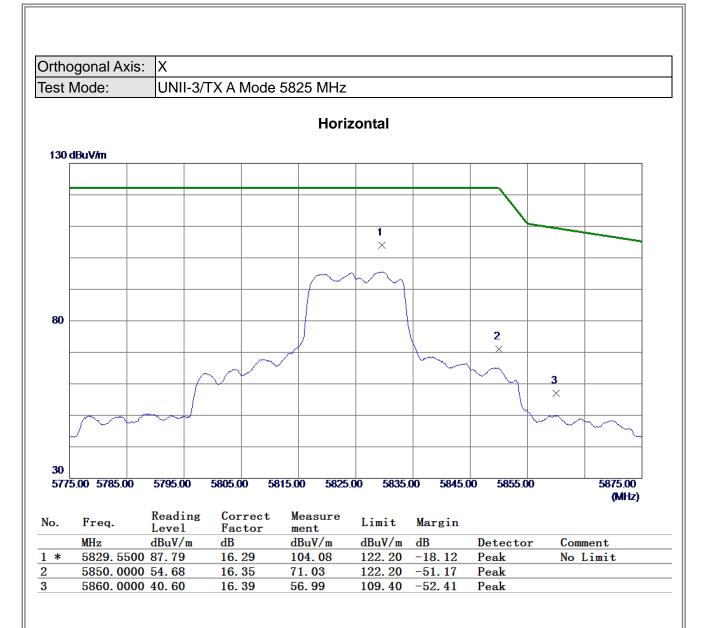






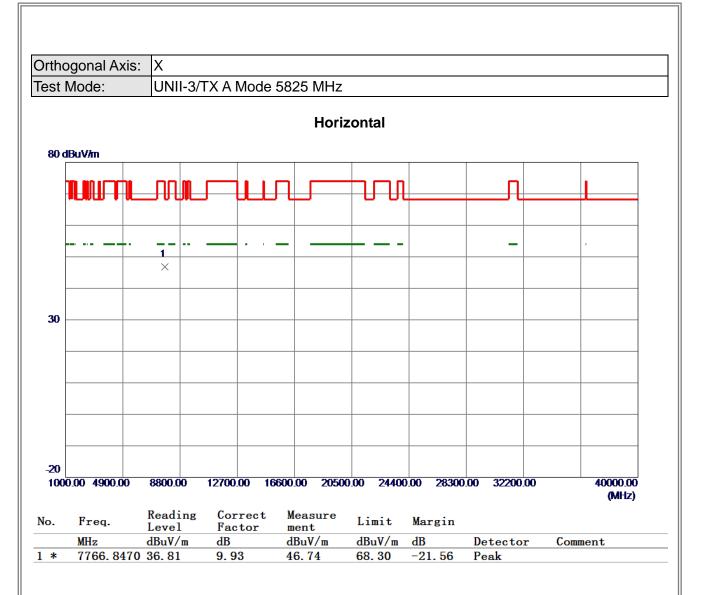






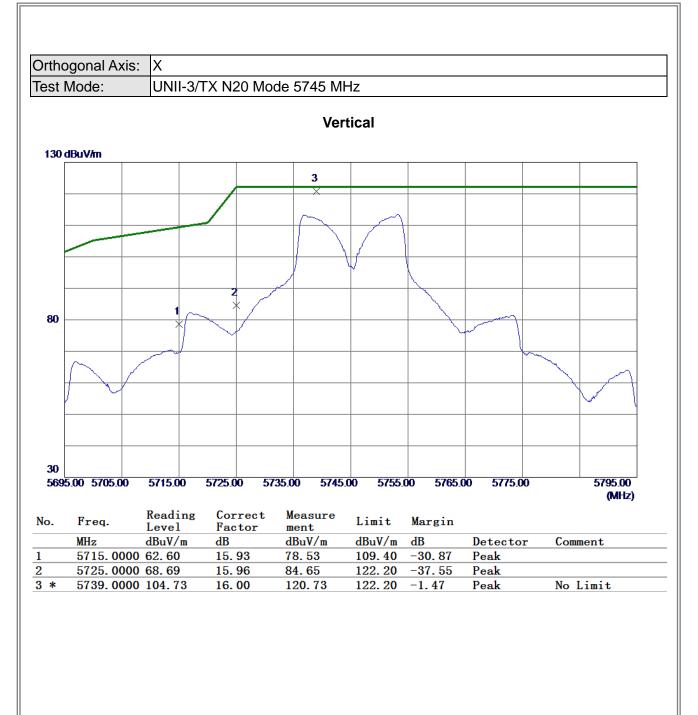






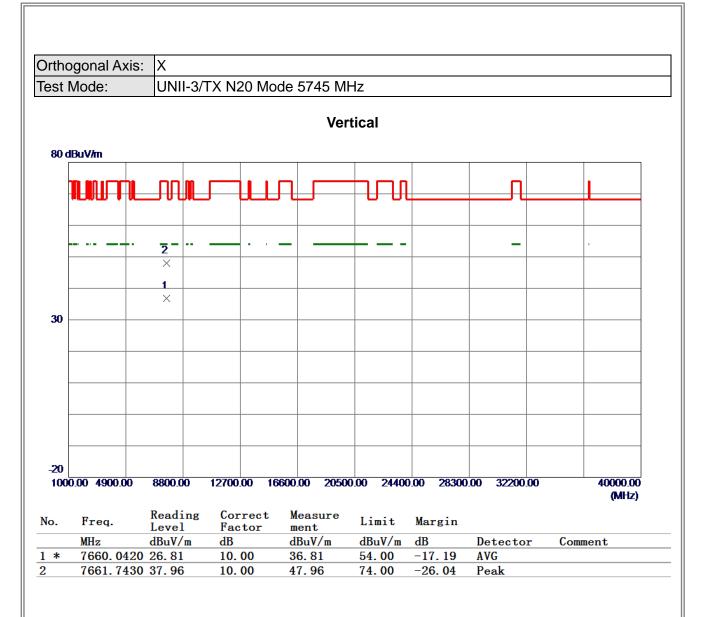






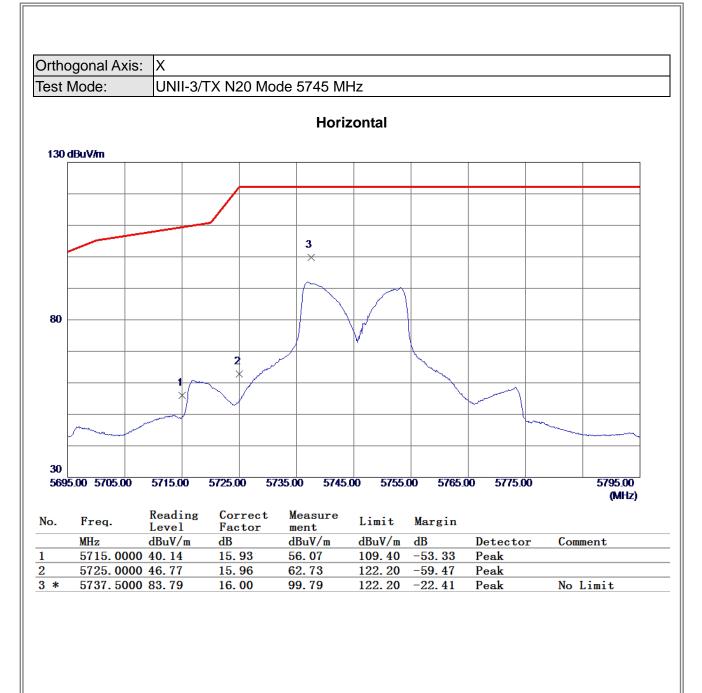












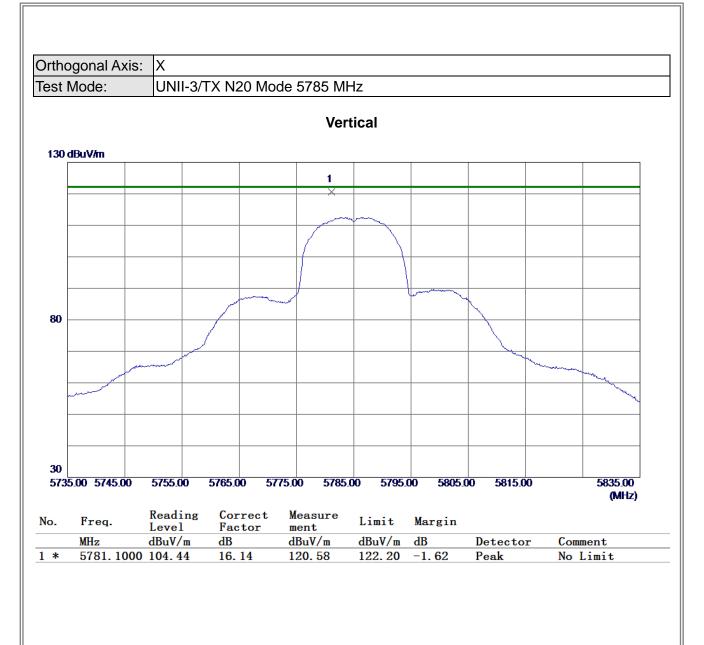






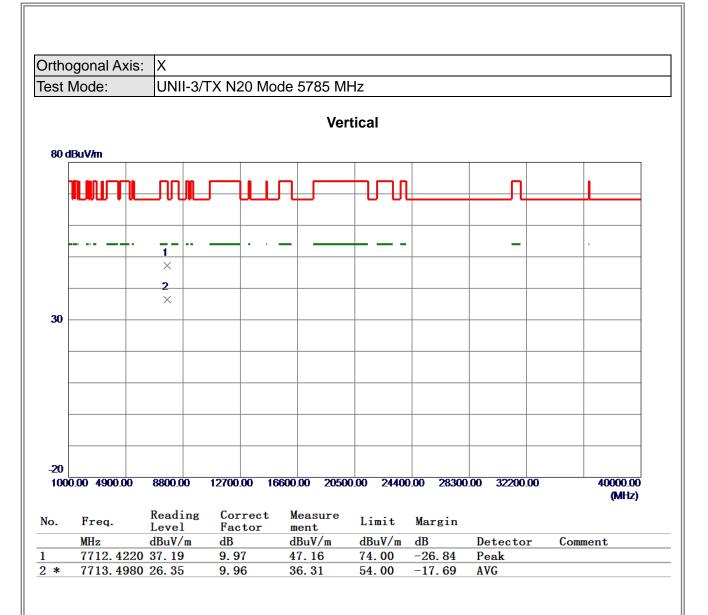






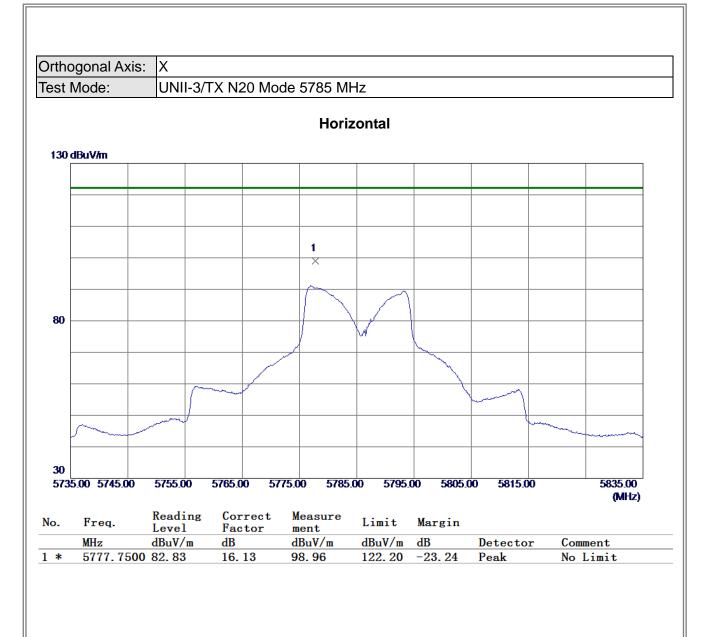






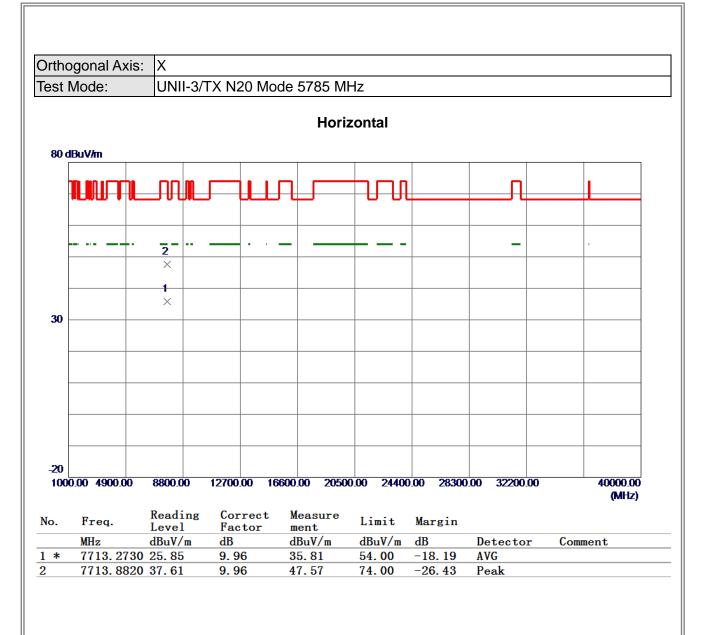






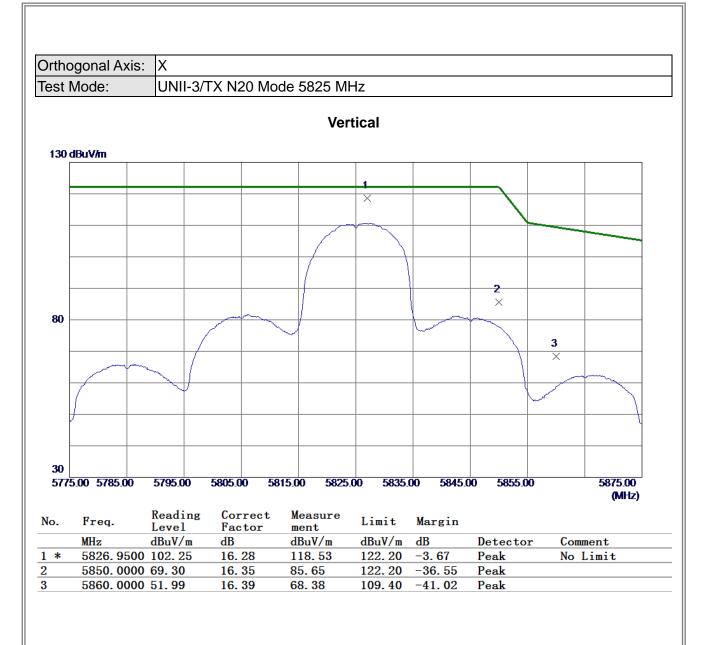






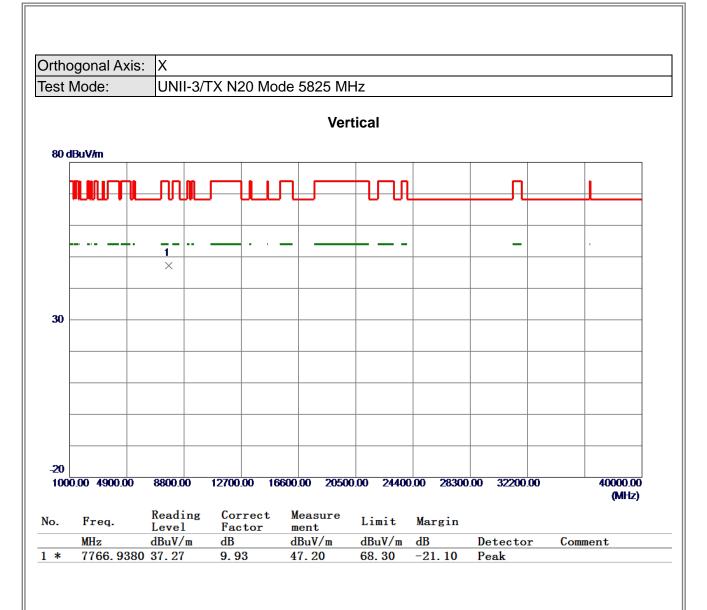






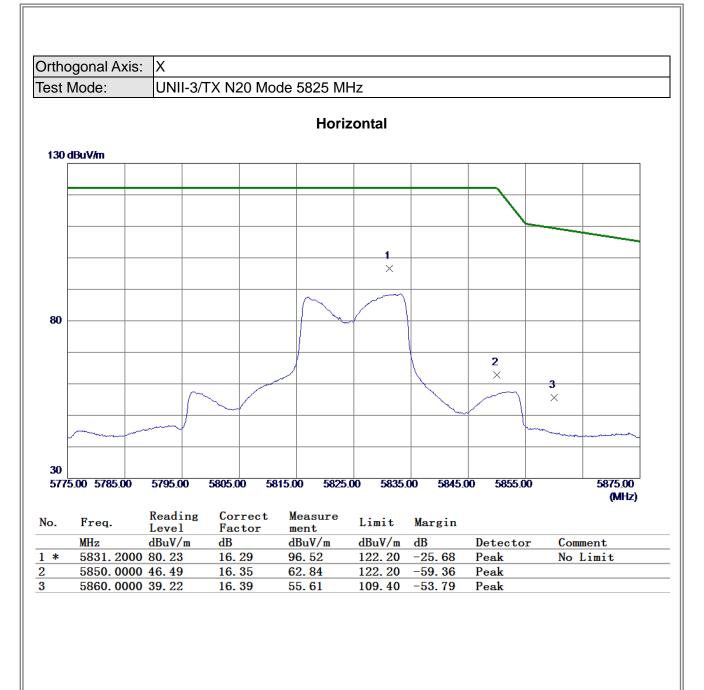






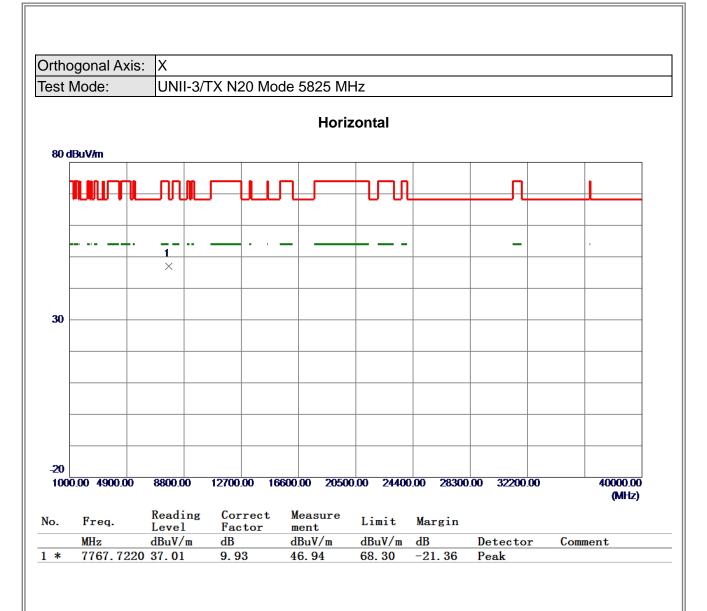






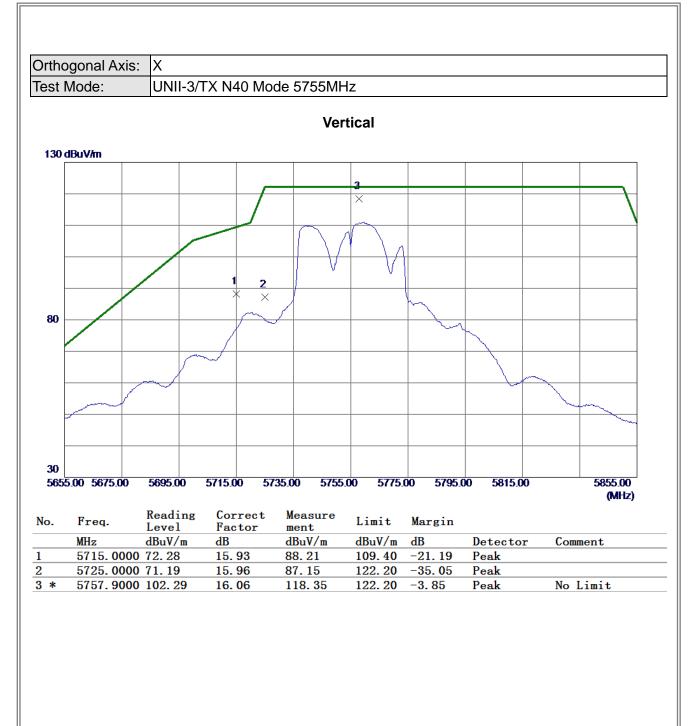






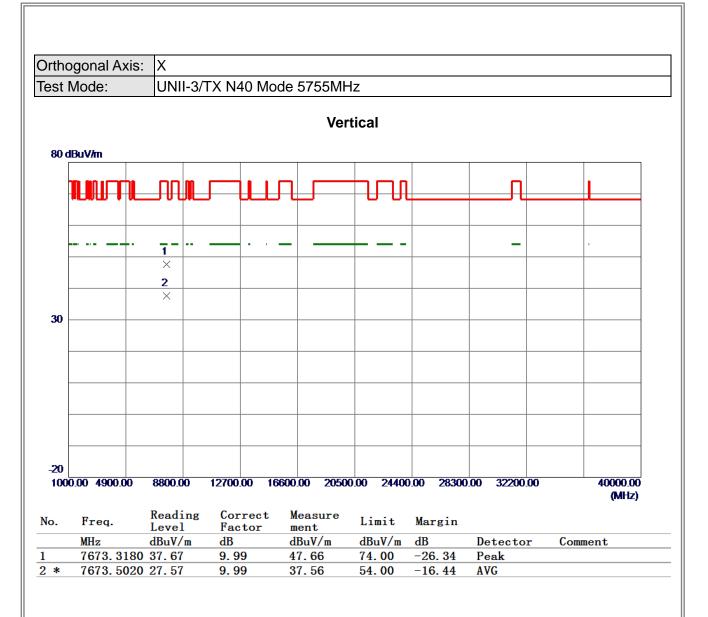






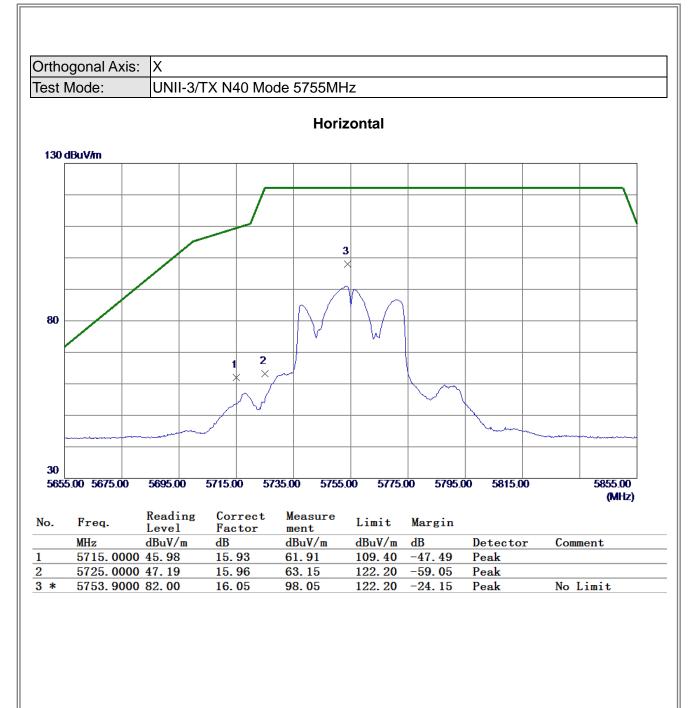






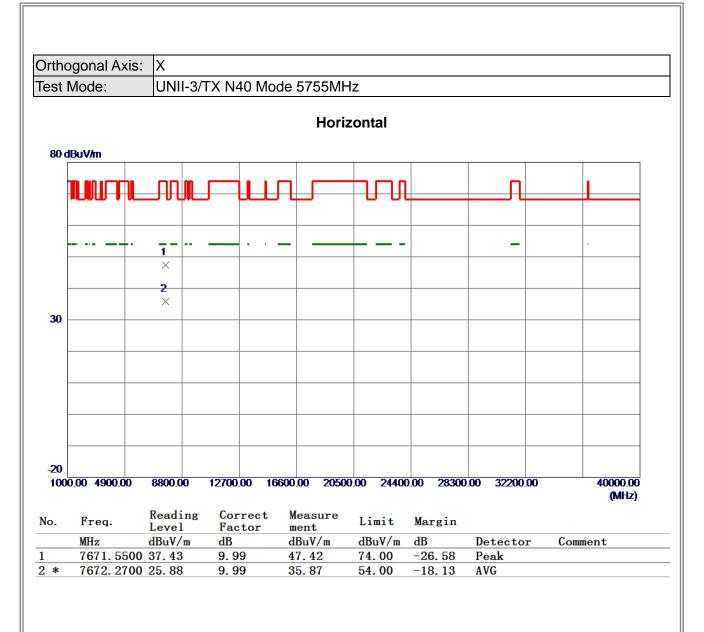






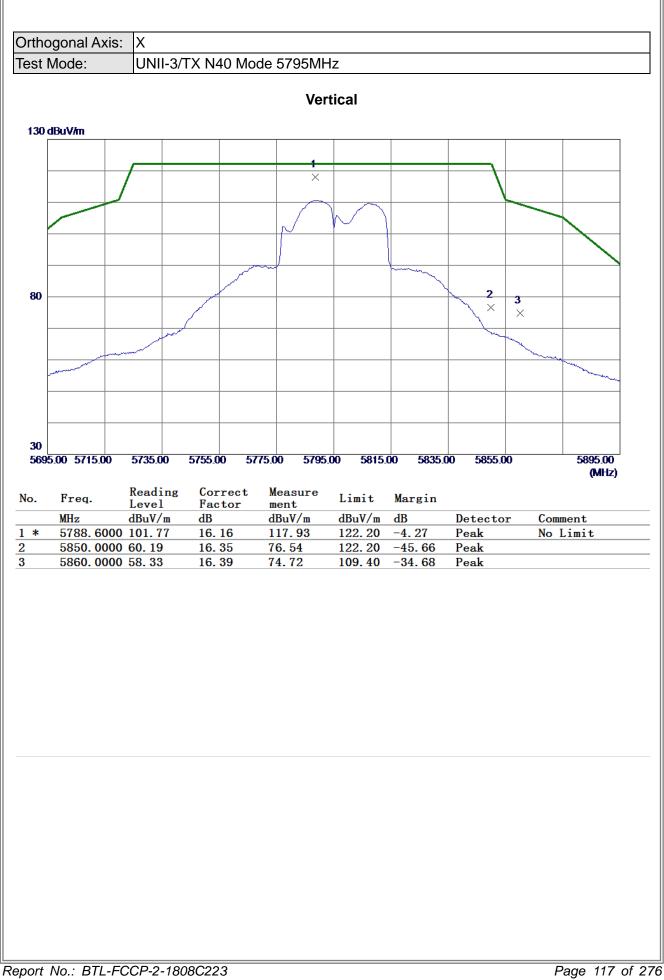






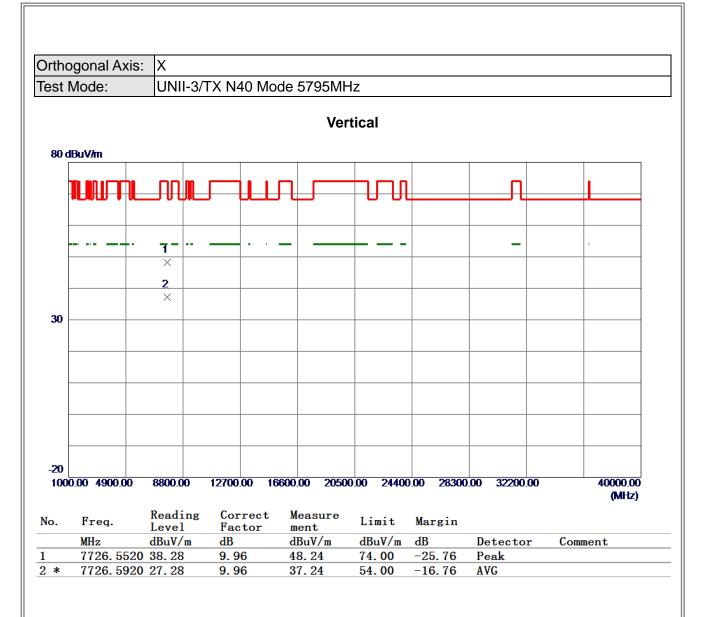






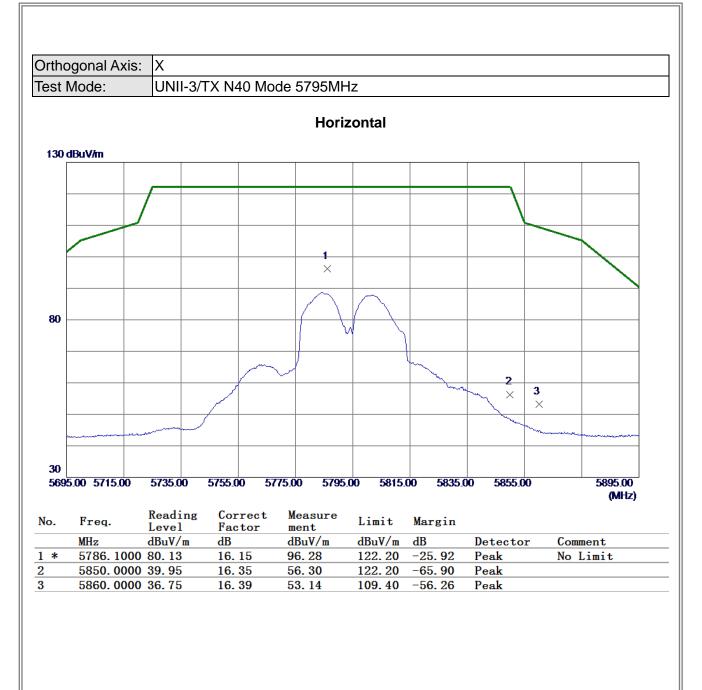






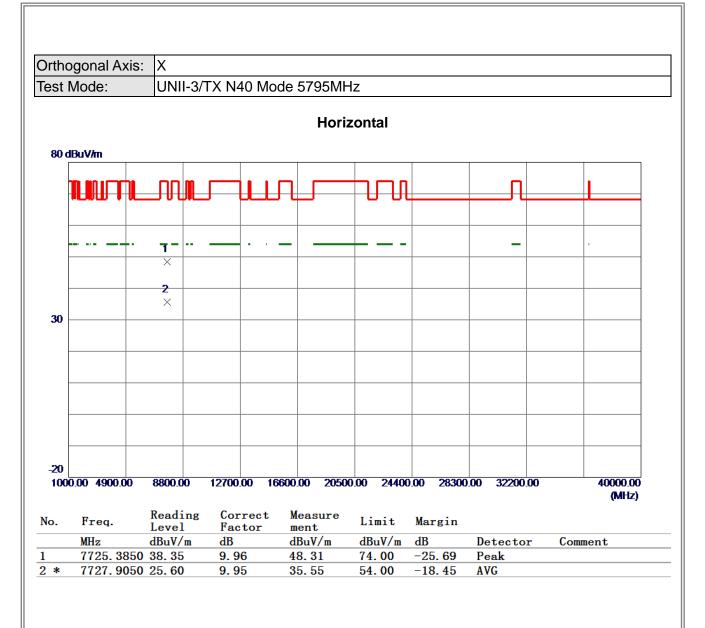






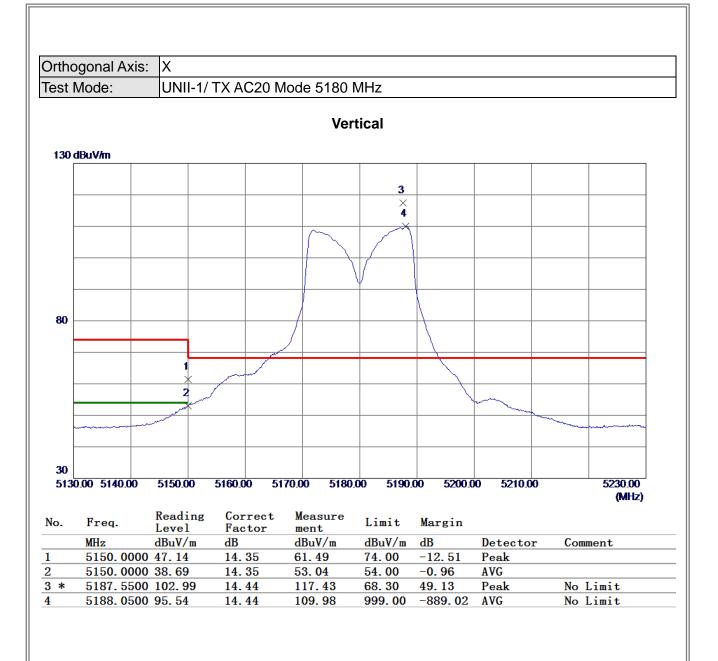






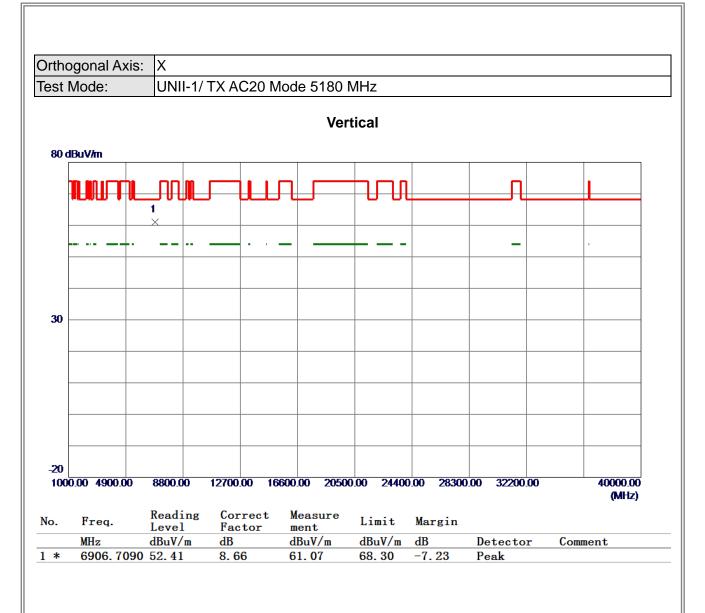






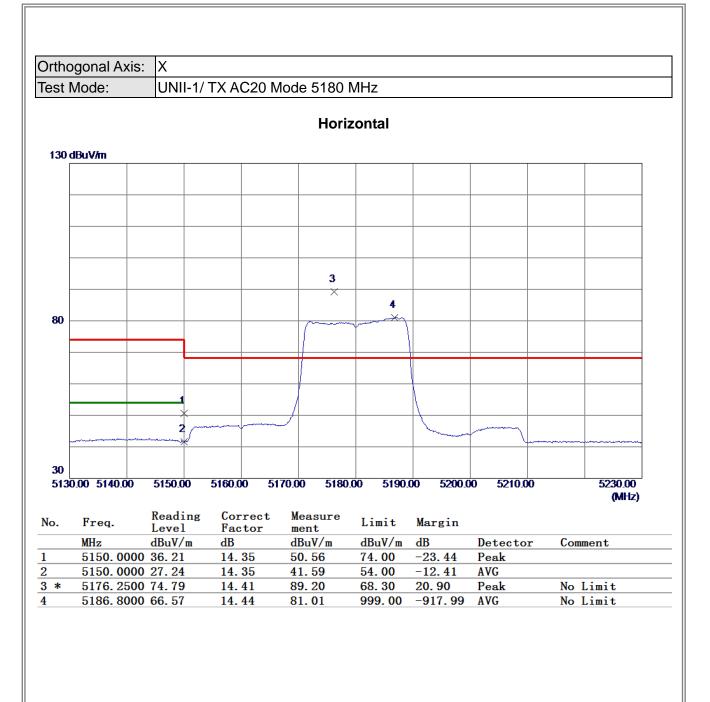






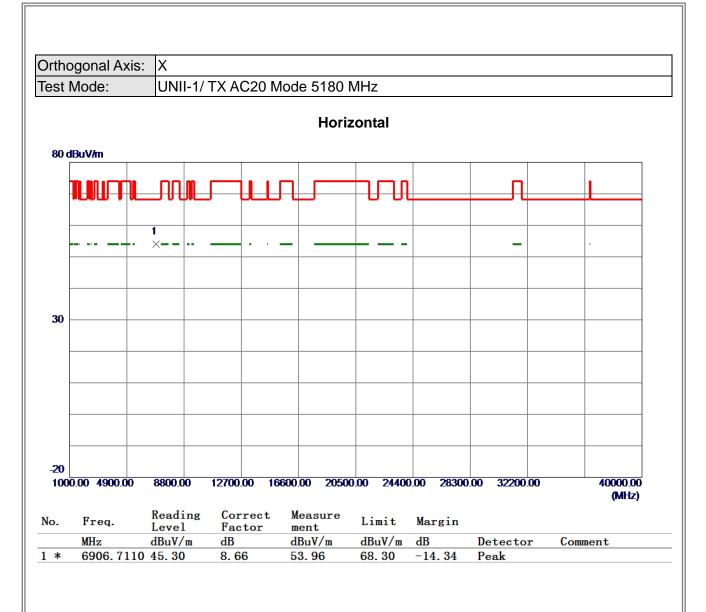






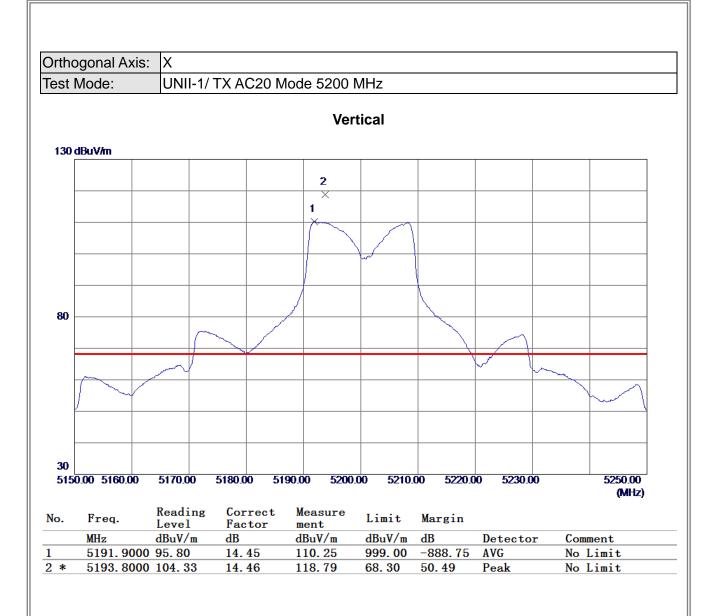






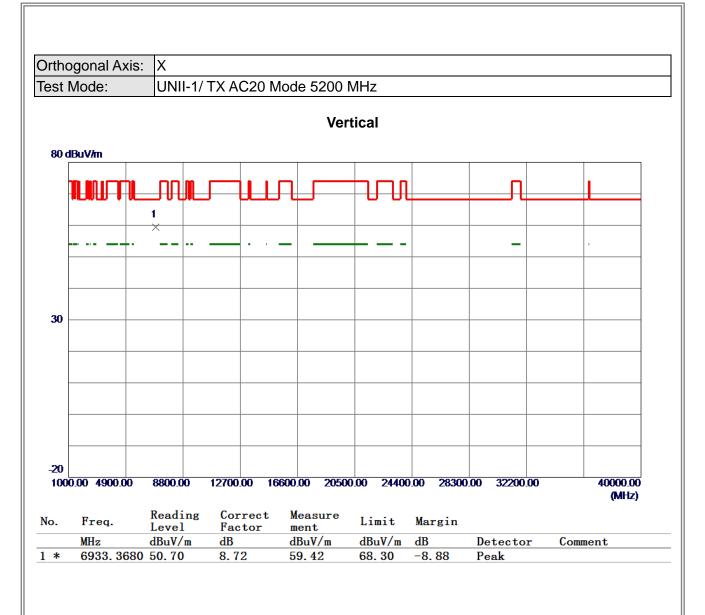






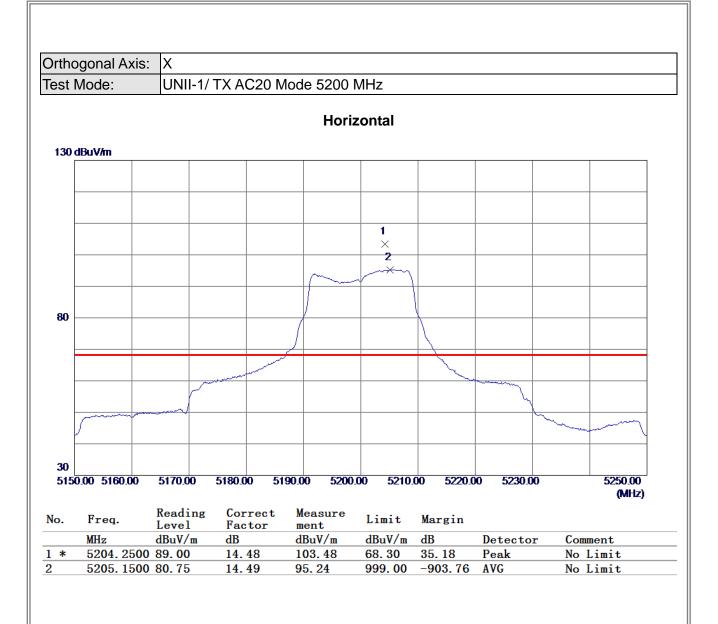






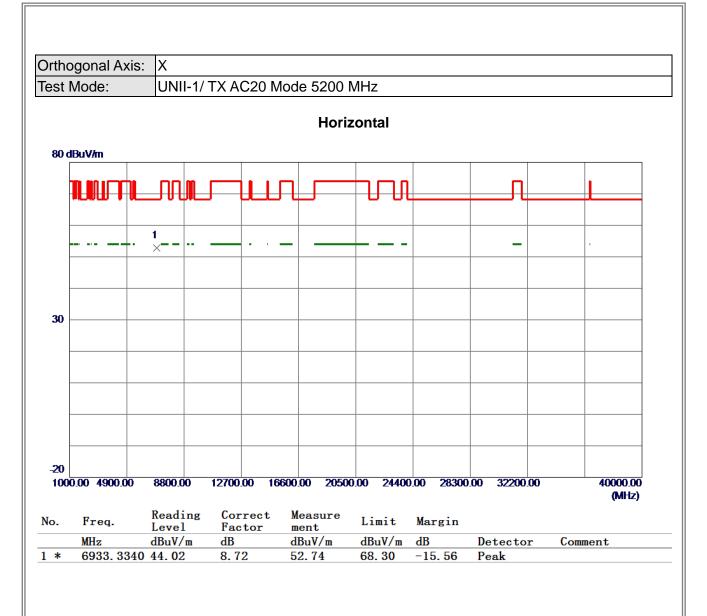






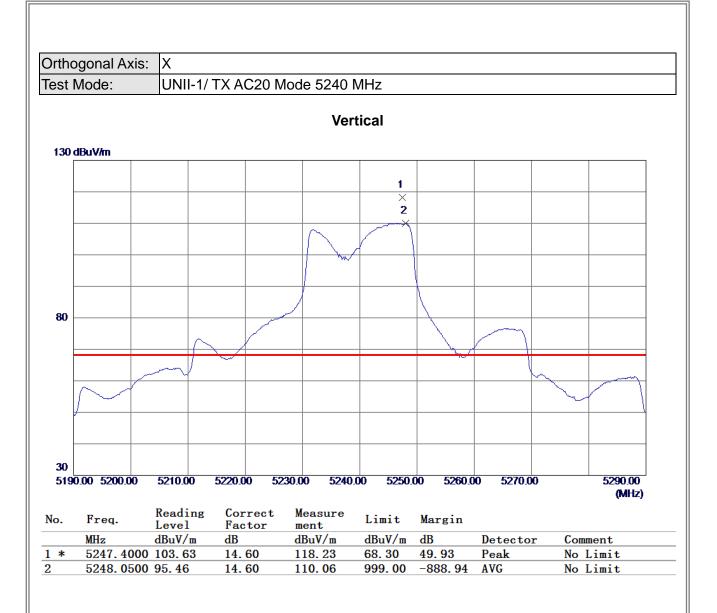






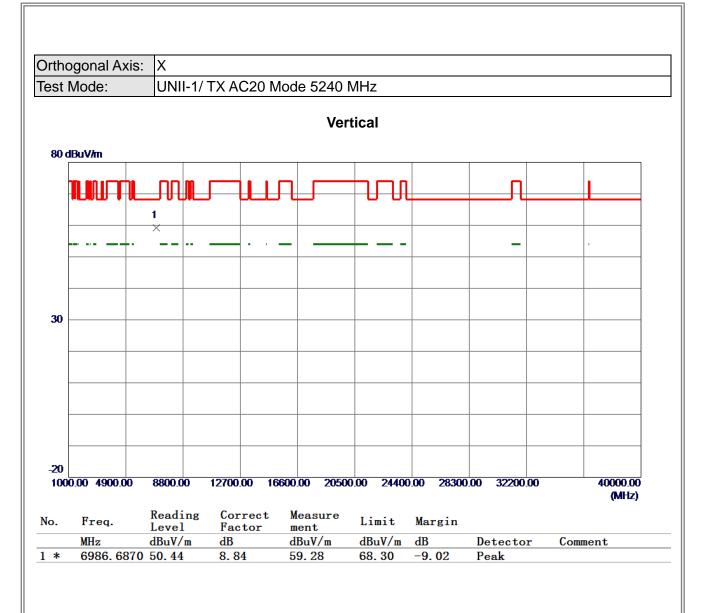






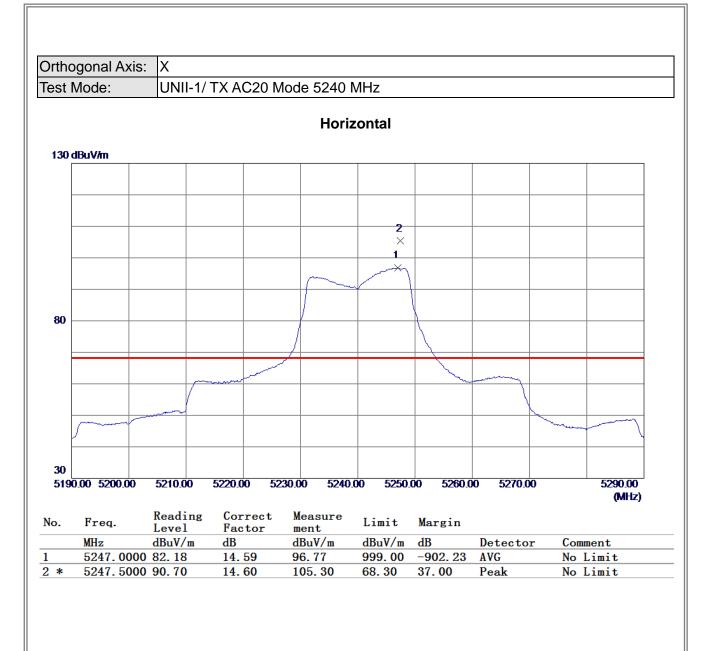






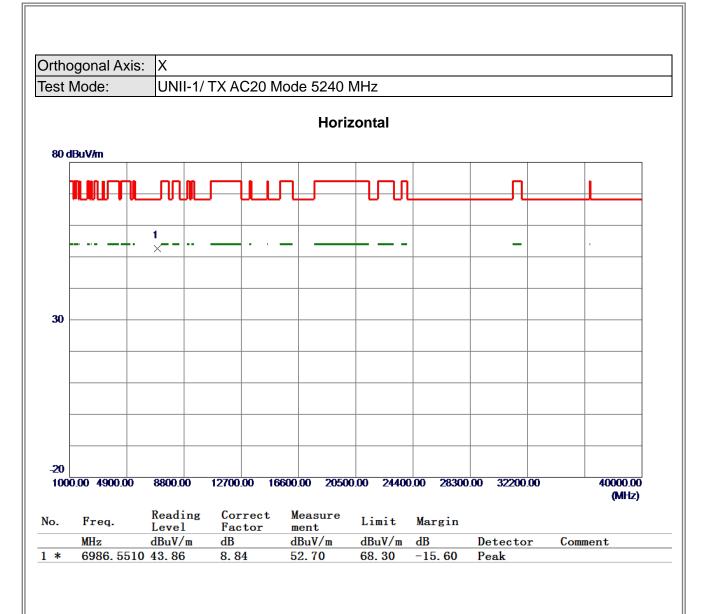






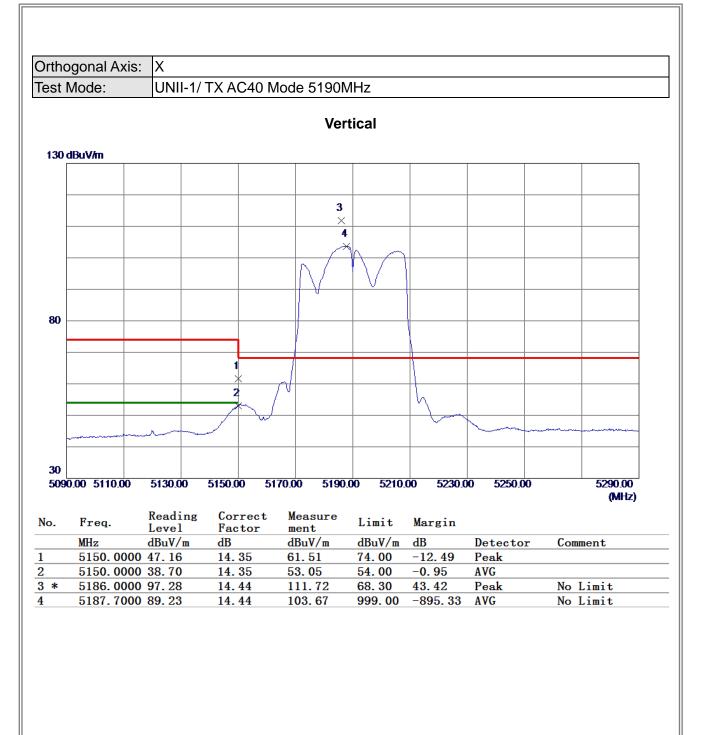






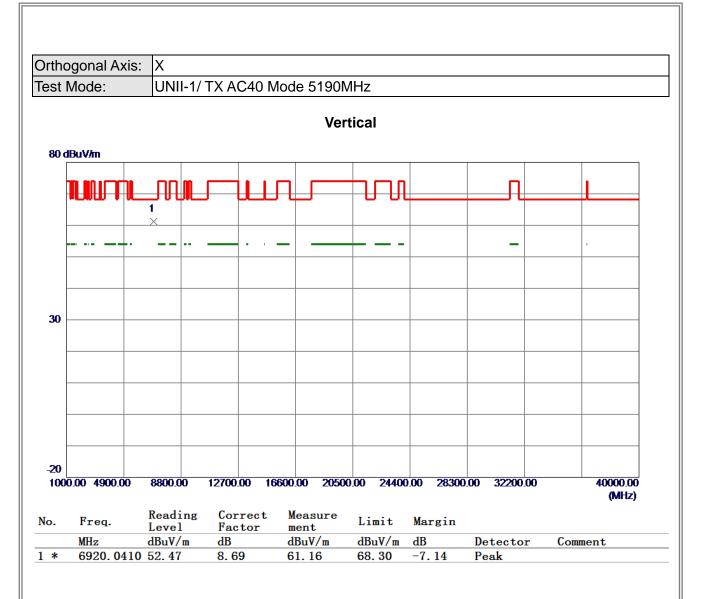






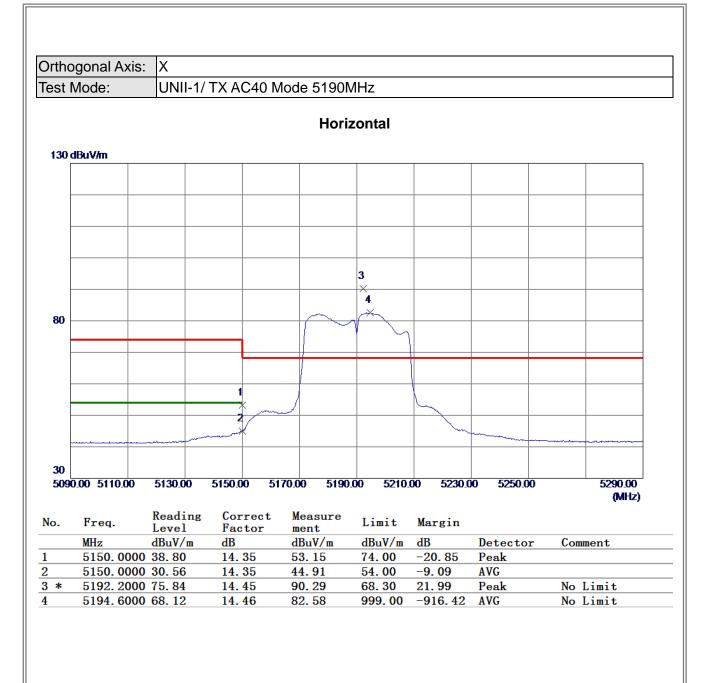






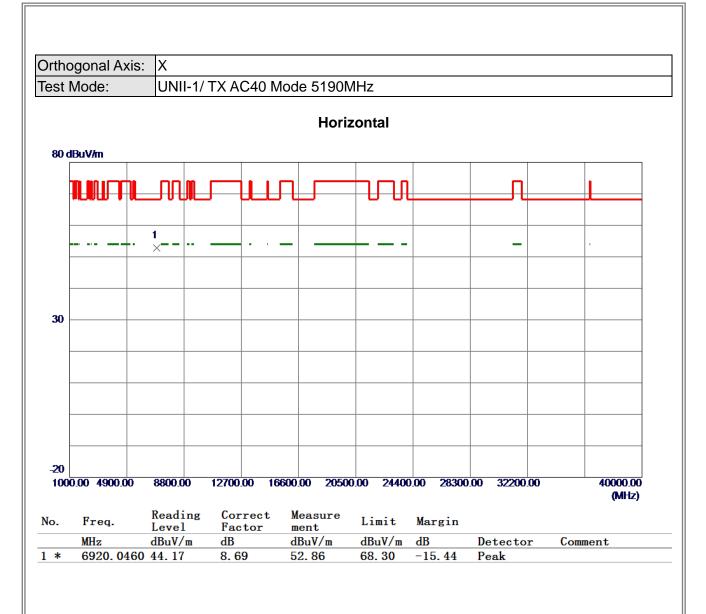






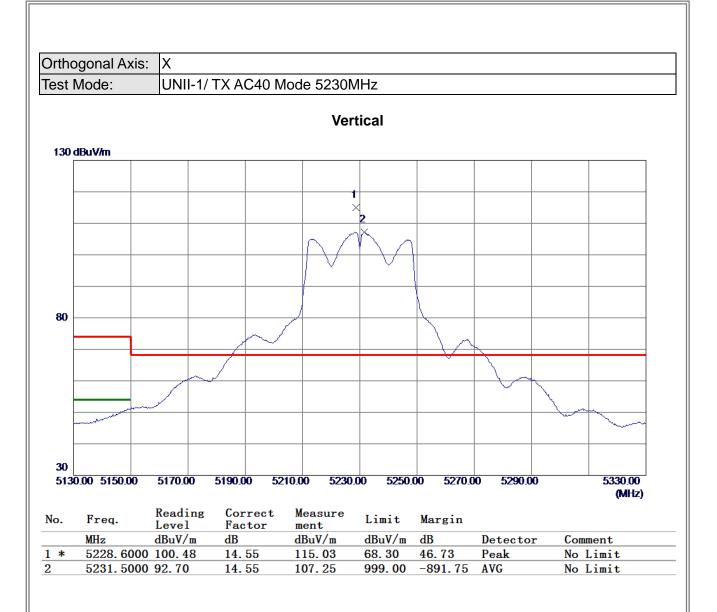






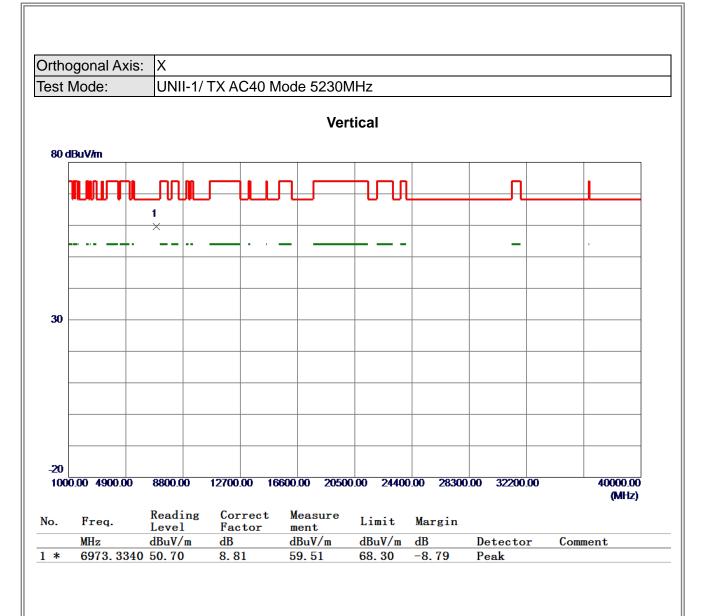






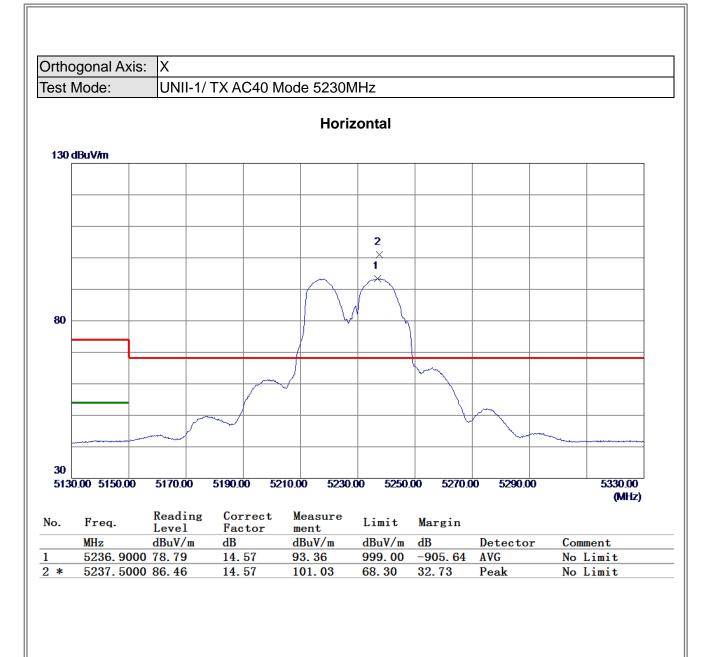






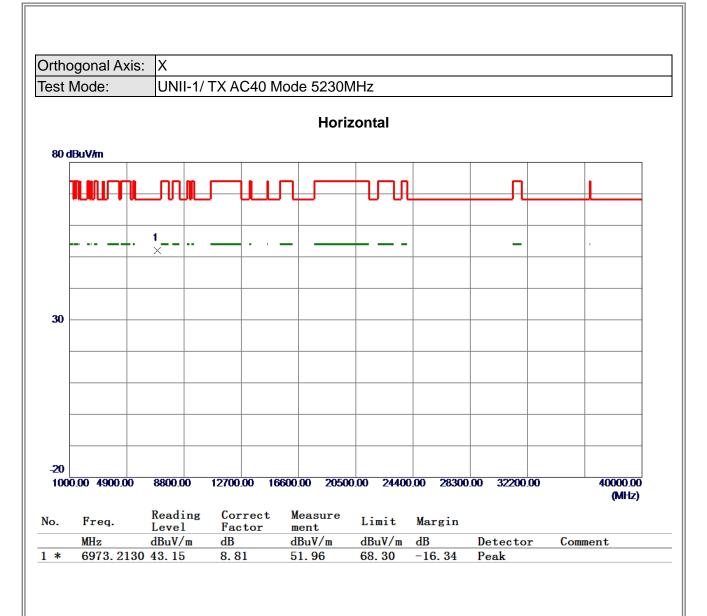






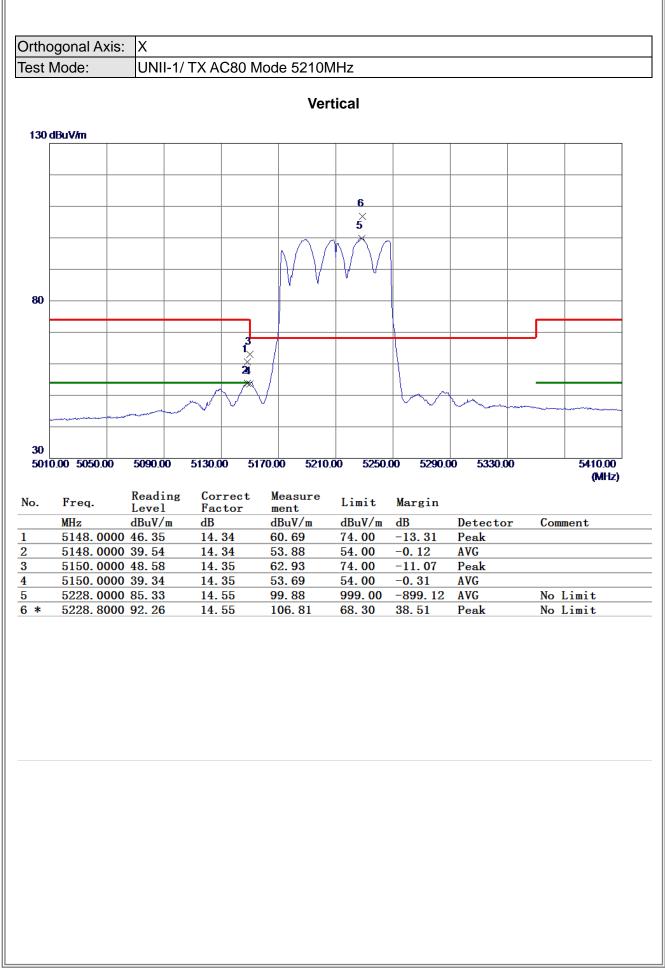






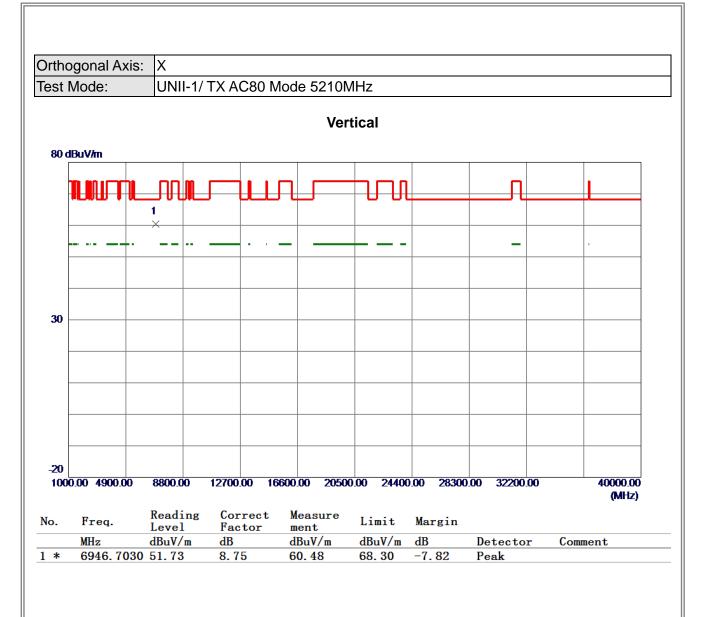






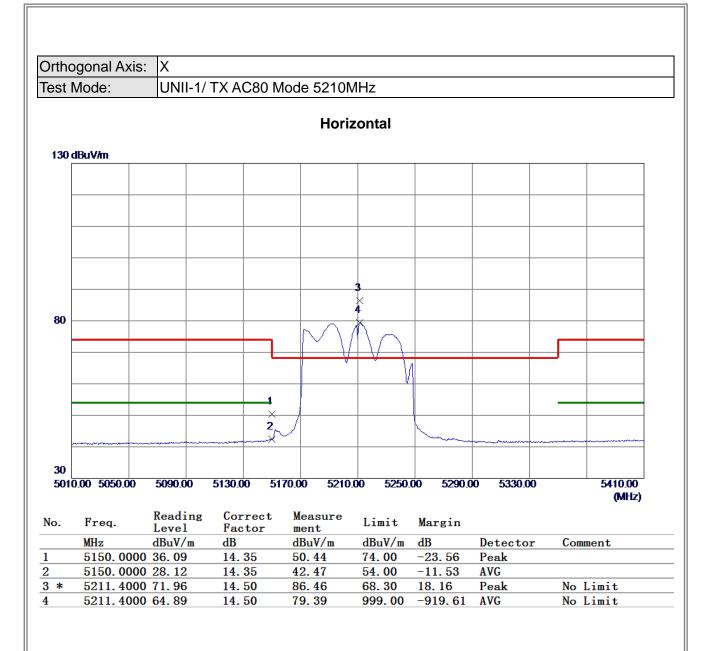






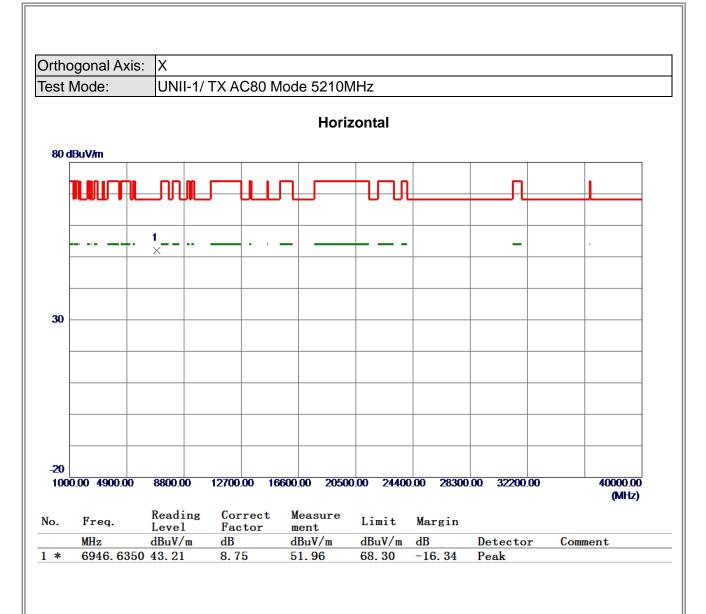












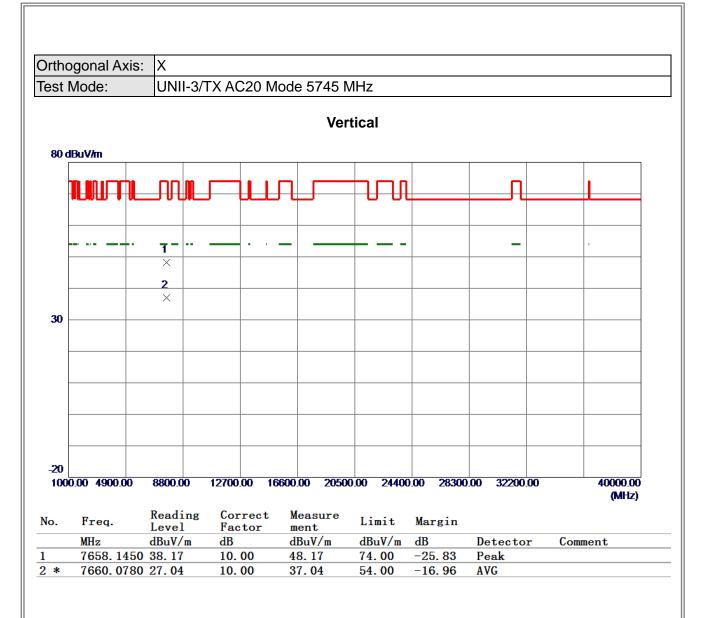






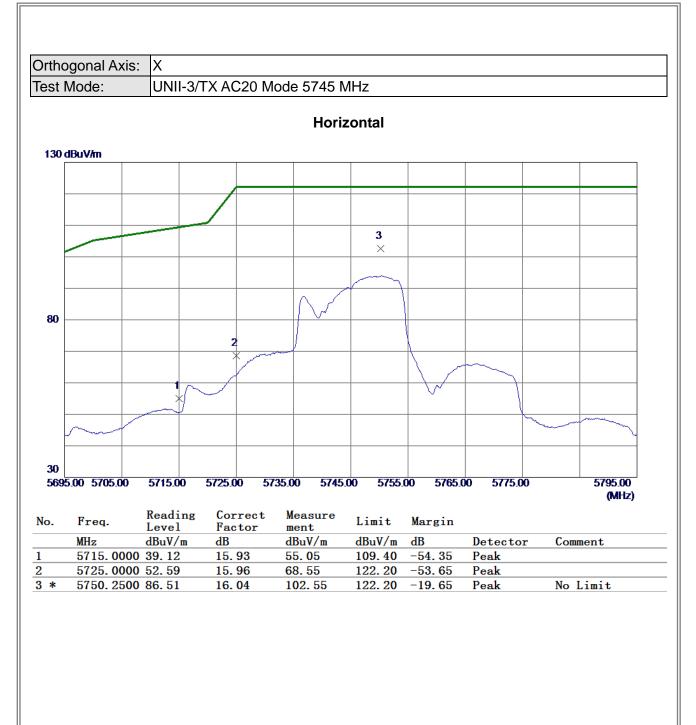






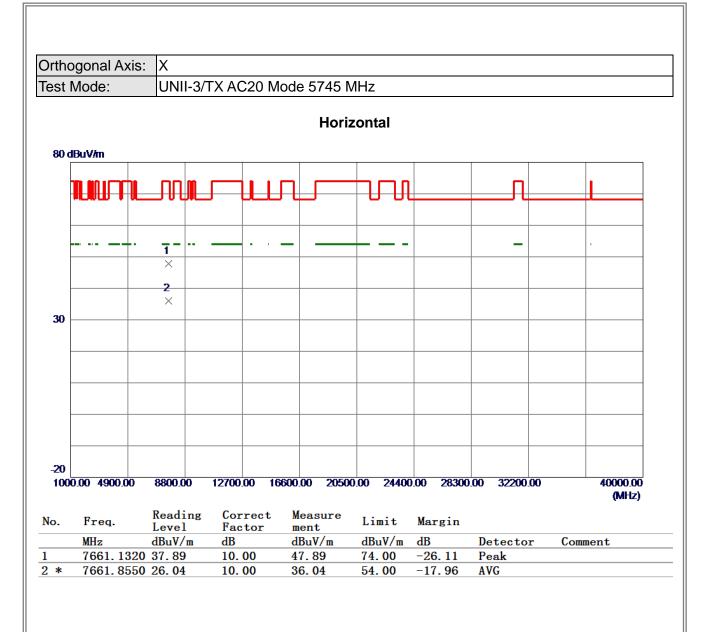






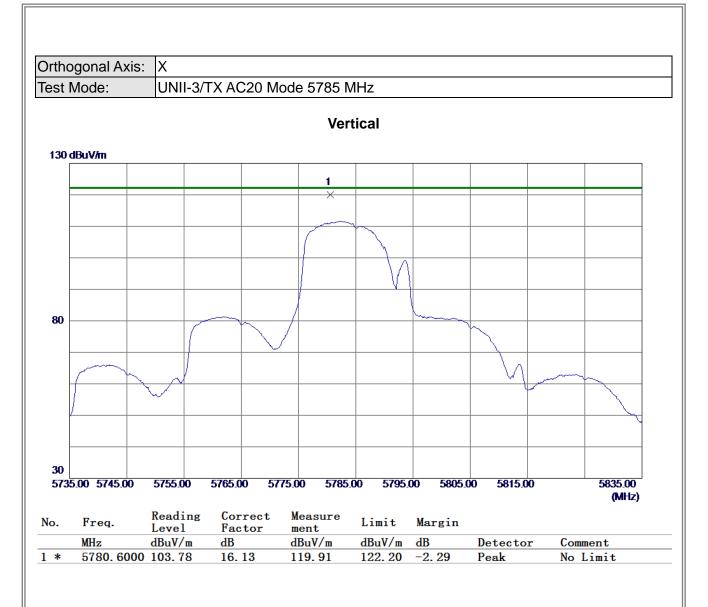






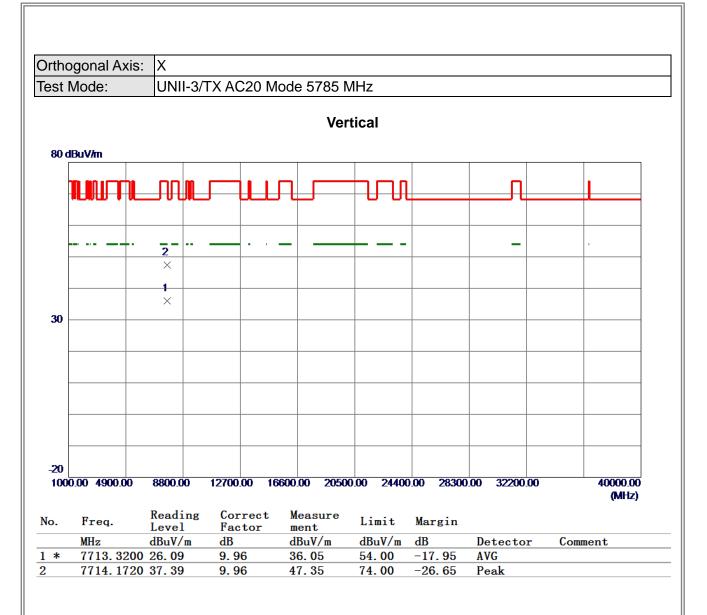






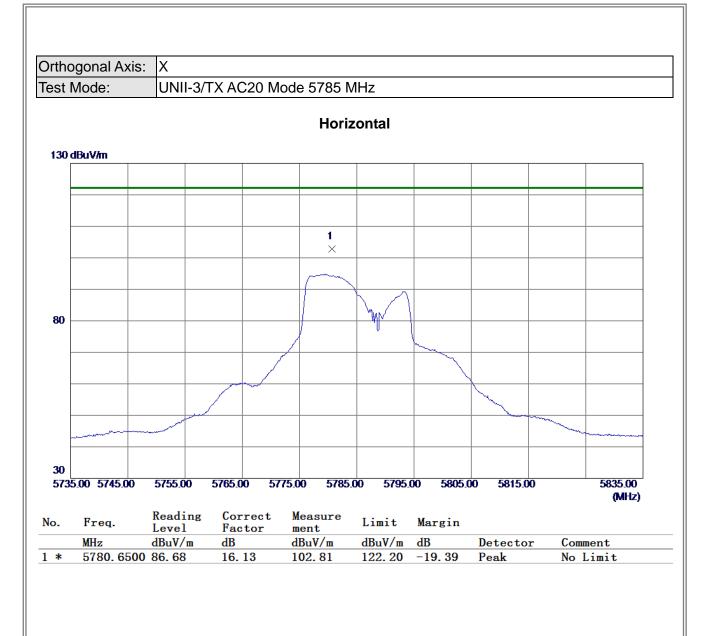






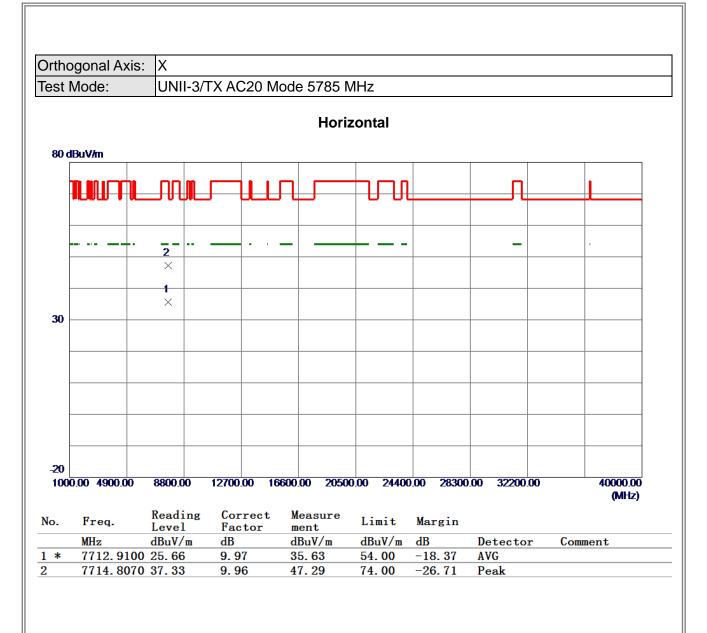






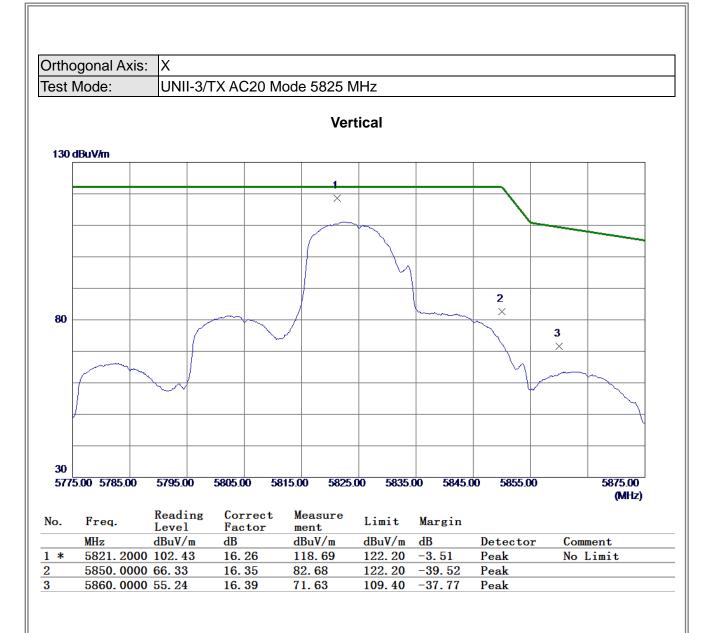






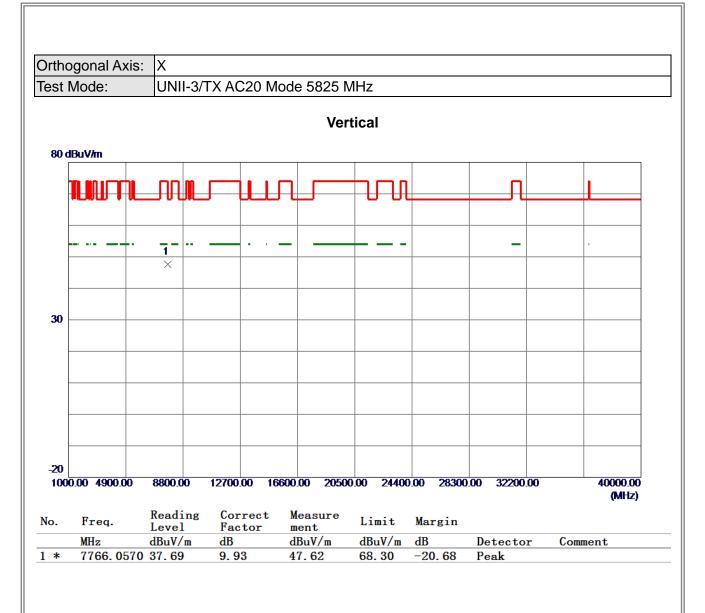






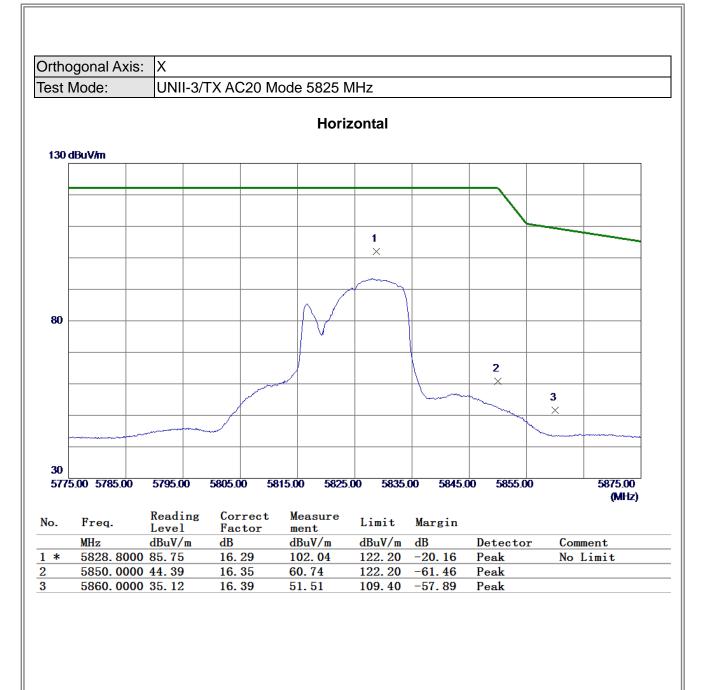






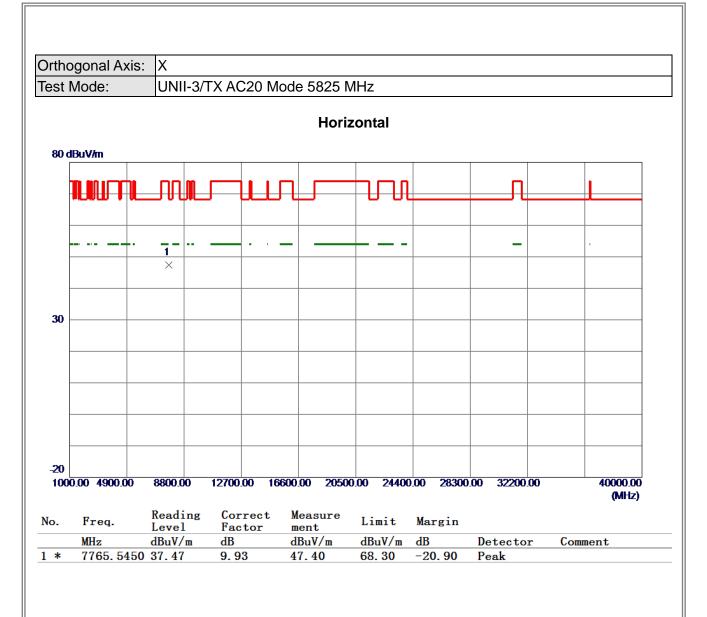






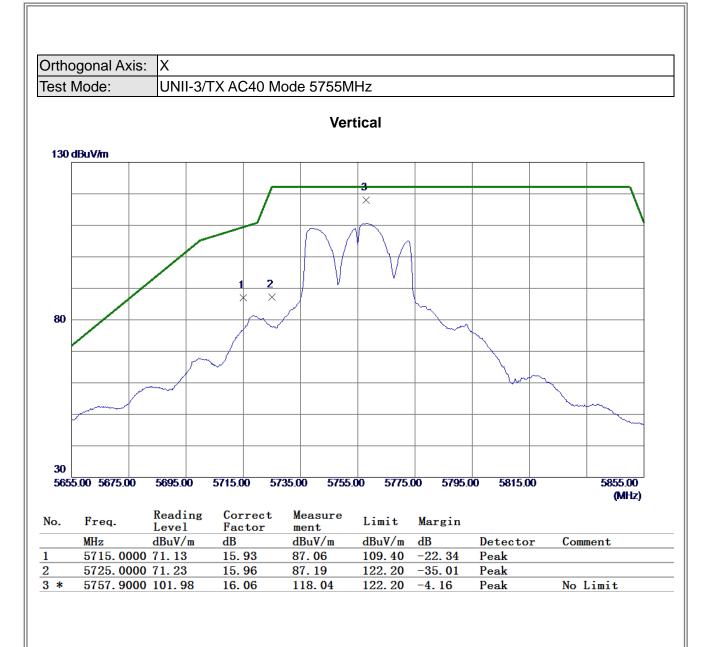






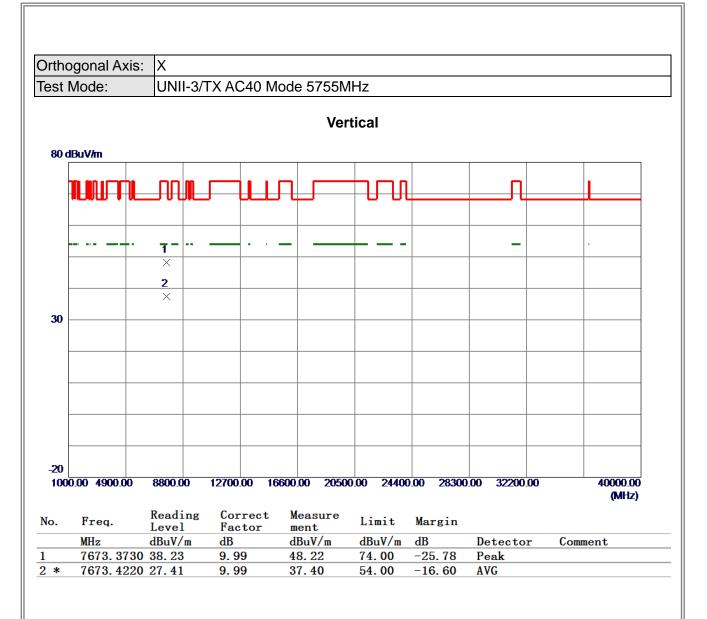






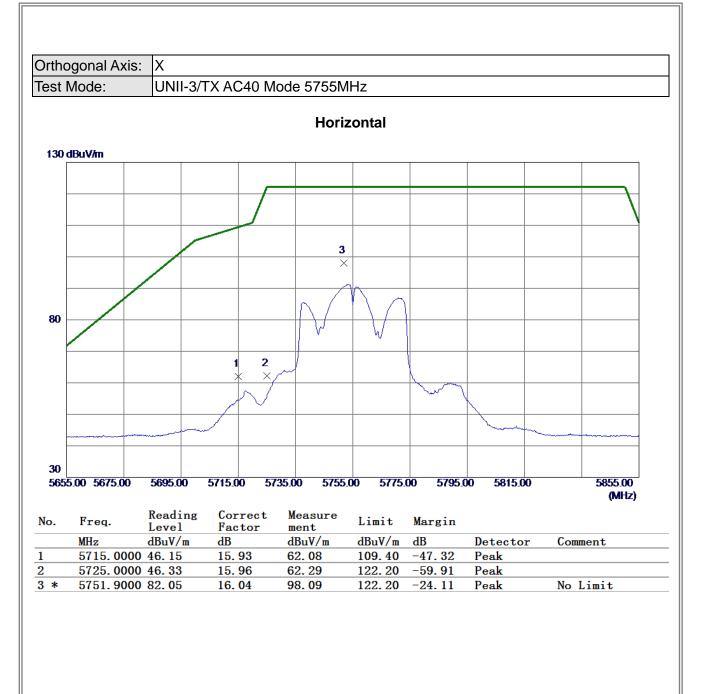






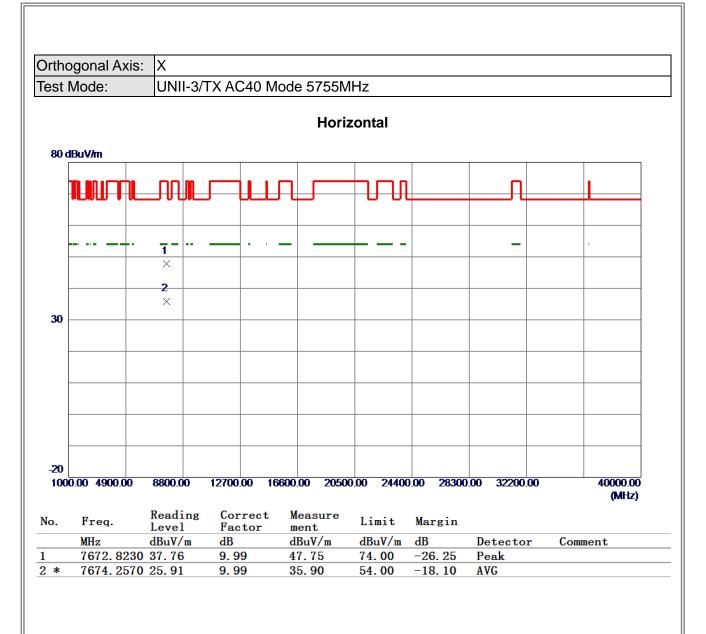






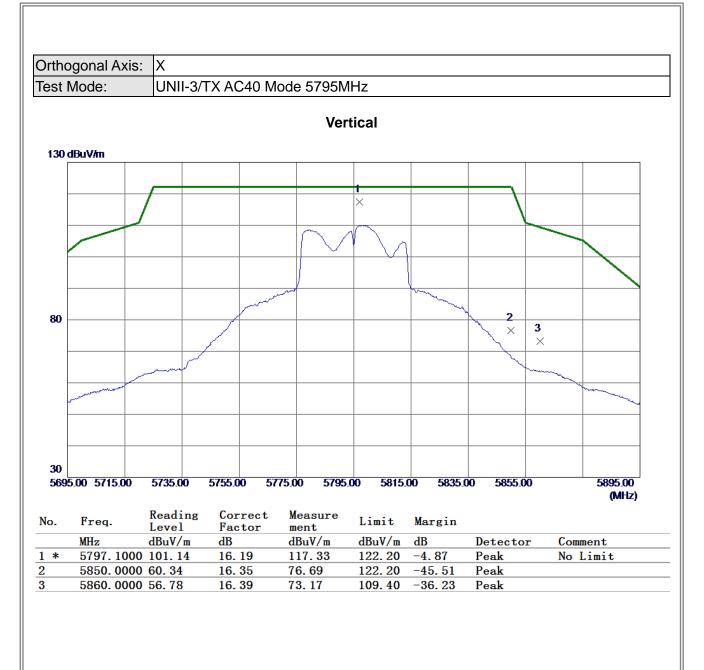






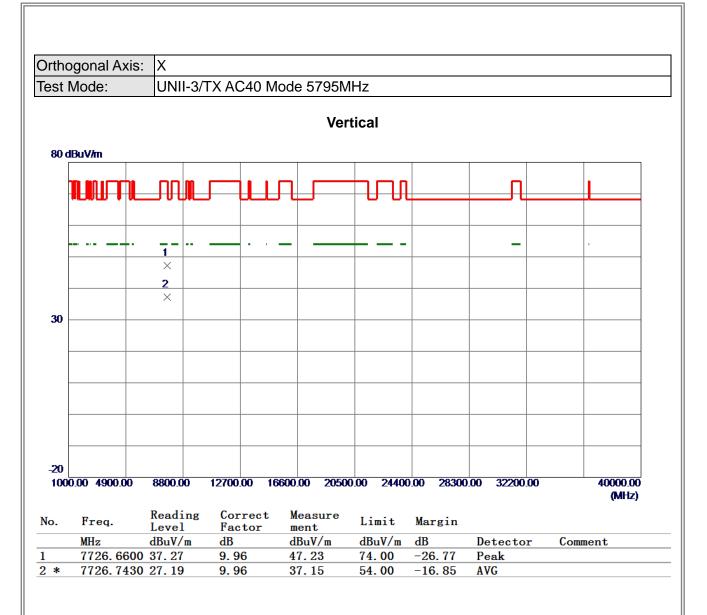






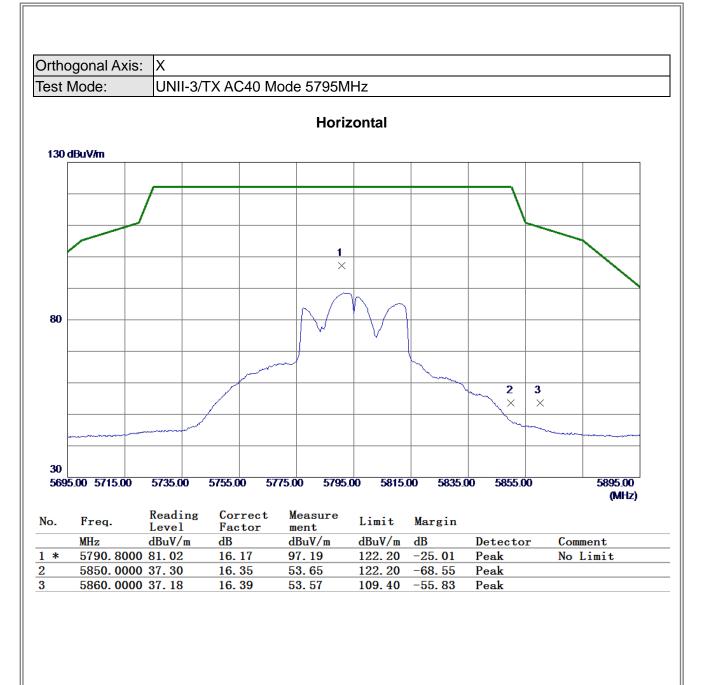






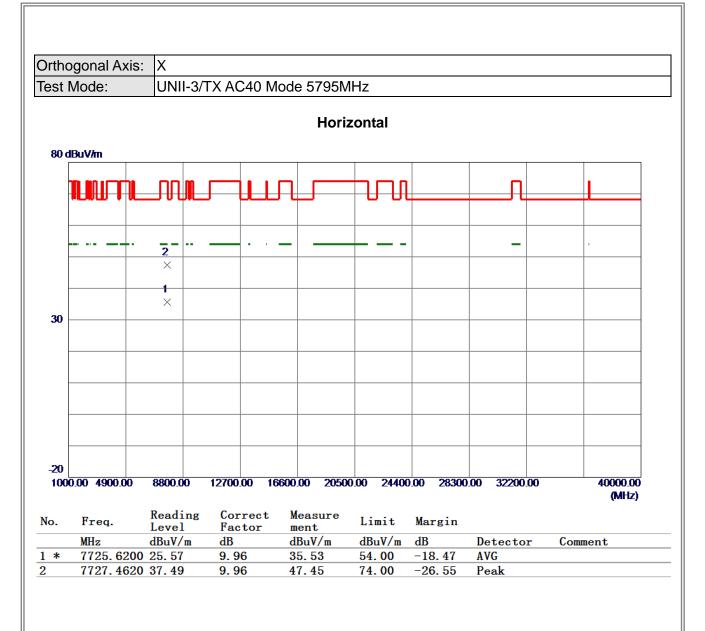






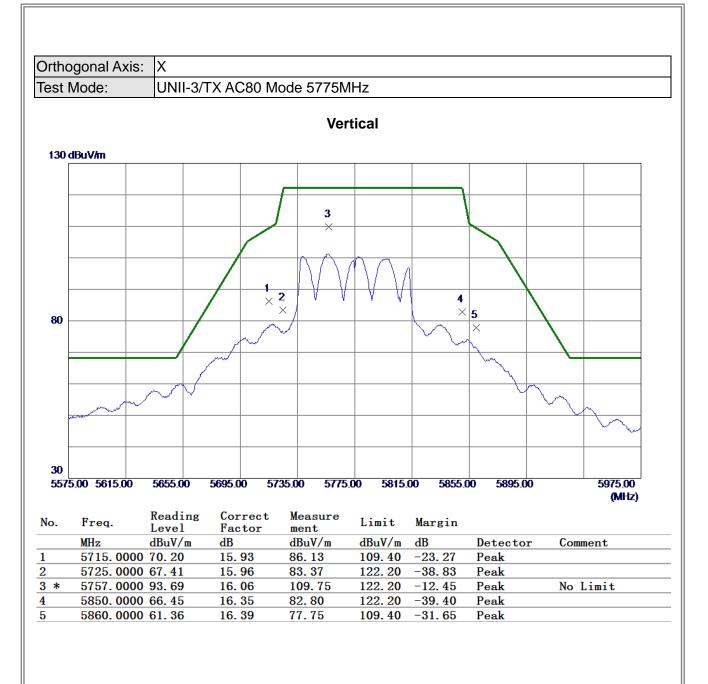






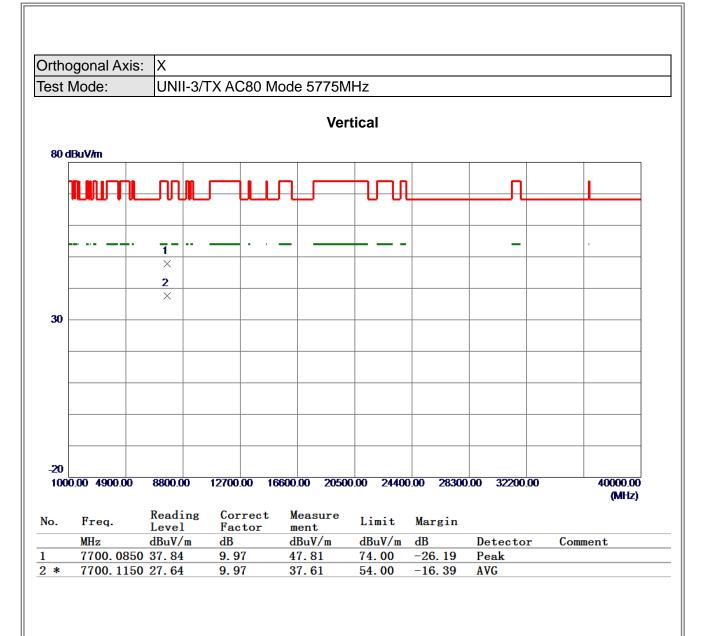






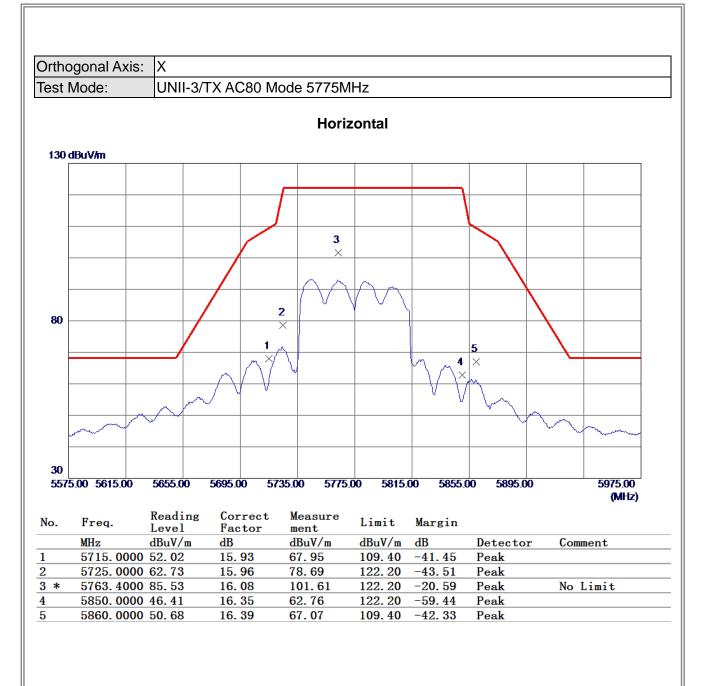






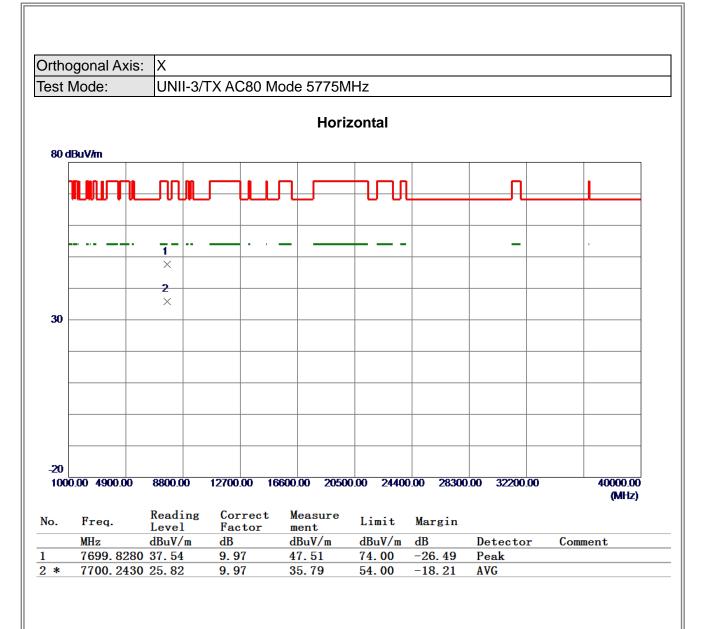




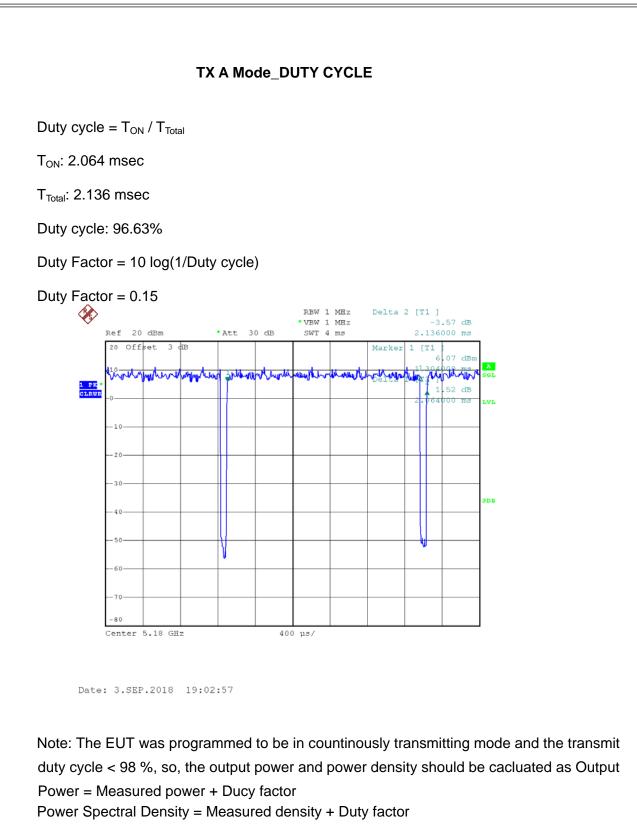




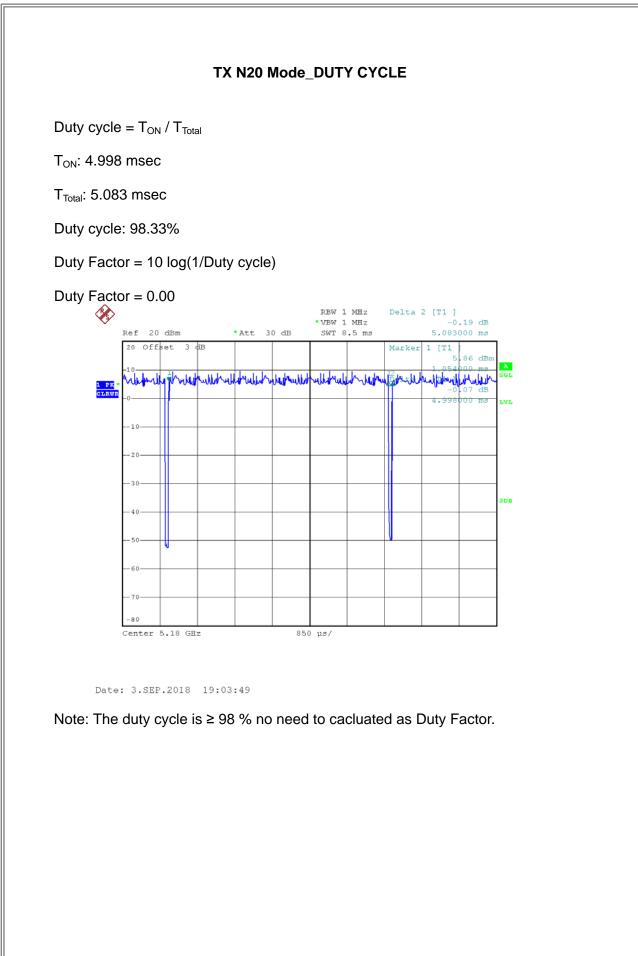




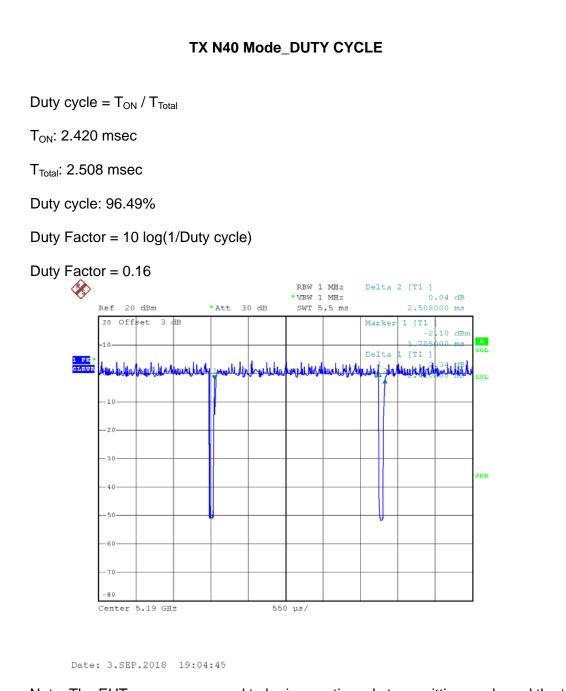












Note: The EUT was programmed to be in countinously transmitting mode and the transmit duty cycle < 98 %, so, the output power and power density should be cacluated as Output Power = Measured power + Ducy factor Power Spectral Density = Measured density + Duty factor



