



FCC Radio Test Report	
FCC ID: 2AFG6-RK3399	
This report concerns (check one): ⊠Original Grant	hange
Project No.: 1703C059Equipment: Android ModuleModel Name: RK3399Applicant: Guangzhou Shirui Electronics Co.,LtdAddress: 192 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou,Guangdong,China	
Date of Receipt : Mar. 08, 2017   Date of Test : Mar. 08, 2017 ~ Apr. 20, 2017   Issued Date : Apr. 21, 2017   Tested by : BTL Inc.	
Testing Engineer : Shawn Xiao)	
Technical Manager : David Mao	
(David Mao) Authorized Signatory :	
<b>BTL INC.</b> No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan,	
Guangdong, China. TEL: +86-769-8318-3000 FAX: +86-769-8319-6000	1
ort No : BTL_ECCP_4_1703C059	1 of 220



#### 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.

**BTL**'s report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL**'s authorized 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.

#### 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	Page
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	11
3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING	13
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TES	TED 15
3.5 DESCRIPTION OF SUPPORT UNITS	15
4. EMC EMISSION TEST	16
4.1 CONDUCTED EMISSION MEASUREMENT	16
4.1.1 POWER LINE CONDUCTED EMISSION 4.1.2 TEST PROCEDURE	16 16
4.1.3 DEVIATION FROM TEST STANDARD	16
4.1.4 TEST SETUP	17
4.1.5 EUT OPERATING CONDITIONS 4.1.6 EUT TEST CONDITIONS	17 17
4.1.7 TEST RESULTS	17
4.2 RADIATED EMISSION MEASUREMENT	18
4.2.1 RADIATED EMISSION LIMITS	18
4.2.2 TEST PROCEDURE 4.2.3 DEVIATION FROM TEST STANDARD	19 19
4.2.4 TEST SETUP	20
4.2.5 EUT OPERATING CONDITIONS	21
	21
4.2.7 TEST RESULTS (9K TO 30MHz) 4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz)	21 21
4.2.9 TEST RESULTS (ABOVE 1000 MHz)	21
5 . 26dB SPECTRUM BANDWIDTH	22
5.1 APPLIED PROCEDURES / LIMIT	22
5.1.1 TEST PROCEDURE	22
5.1.2 DEVIATION FROM STANDARD 5.1.3 TEST SETUP	22 22
5.1.4 EUT OPERATION CONDITIONS	22
5.1.5 EUT TEST CONDITIONS	23
5.1.6 TEST RESULTS	23
6 . MAXIMUM CONDUCTED OUTPUT POWER	24





Table of Contents	Page
6.1 APPLIED PROCEDURES / LIMIT 6.1.1 TEST PROCEDURE	24 24
6.1.2 DEVIATION FROM STANDARD 6.1.3 TEST SETUP	25 25
6.1.4 EUT OPERATION CONDITIONS	25
6.1.5 EUT TEST CONDITIONS	25
6.1.6 TEST RESULTS	25
7 . POWER SPECTRAL DENSITY TEST	26
7.1 APPLIED PROCEDURES / LIMIT	26
8.1.1 TEST PROCEDURE	26
7.1.1 DEVIATION FROM STANDARD 7.1.2 TEST SETUP	27 27
7.1.3 EUT OPERATION CONDITIONS	27
7.1.4 EUT TEST CONDITIONS	27
7.1.5 TEST RESULTS	27
8 . FREQUENCY STABILITY MEASUREMENT	28
8.1 APPLIED PROCEDURES / LIMIT	28
8.1.1 TEST PROCEDURE	28
8.1.2 DEVIATION FROM STANDARD 8.1.3 TEST SETUP	28 29
8.1.4 EUT OPERATION CONDITIONS	29
8.1.5 EUT TEST CONDITIONS	29
8.1.6 TEST RESULTS	29
9 . MEASUREMENT INSTRUMENTS LIST	30
10 . EUT TEST PHOTOS	32
ATTACHMENT A - CONDUCTED EMISSION	36
ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)	39
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)	44
ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	57
ATTACHMENT E - BANDWIDTH	176
ATTACHMENT F - MAXIMUM OUTPUT POWER	199
ATTACHMENT H - POWER SPECTRAL DENSITY	204
ATTACHMENT H - FREQUENCY STABILITY	227



## **REPORT ISSUED HISTORY**

Issued No.	Description	Issued Date
BTL-FCCP-1-1703C059	Original Issue.	Apr. 21, 2017



# **1. CERTIFICATION**

Equipment :	Android Module
Brand Name :	SEEWO
Model Name :	RK3399
Applicant :	Guangzhou Shirui Electronics Co.,Ltd
Manufacturer :	Guangzhou Shirui Electronics Co.,Ltd
Address :	192 Kezhu Road, Scientech Park, Guangzhou Economic & Technology
	Development District, Guangzhou, Guangdong, China
Date of Test :	Mar. 09, 2017 ~ Apr. 20, 2017
Test Sample :	Engineering Sample
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-4-1703C059) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

# 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)	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: 319330

#### 2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{cispr}$  requirement.

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150 KHz ~ 30MHz	1.94

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
		30MHz ~ 200MHz	Н	3.60
	G-CB03 CISPR	200MHz ~ 1,000MHz	V	3.86
DG-CB03		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	Android Module		
Brand Name	SEEWO		
Model Name	RK3399		
Mode Different	N/A		
Droduct Depaription	Operation Frequency	UNII-1: 5150-5250MHz UNII-3: 5725-5850MHz	
Product Description	Modulation Type	OFDM	
	Bit Rate of Transmitter	150Mbps	
Power Source	DC voltage supplied from AC/DC	adapter.(Support Unit)	
Power Rating	12/19V 1.5A		
	Output Power (Max.)for UNII-1	802.11a: 14.37dBm 802.11n (20M): 14.59dBm 802.11n (40M): 10.54dBm 802.11ac (20M): 12.17dBm 802.11ac (40M): 10.58dBm 802.11ac (80M): 10.64dBm	
Output Power	Output Power (Max.)for UNII-3	802.11a: 12.79dBm 802.11n (20M): 12.71dBm 802.11n (40M): 11.00dBm 802.11ac (20M): 11.61dBm 802.11ac (40M): 10.63dBm 802.11ac (80M): 10.25dBm	





#### Note:

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

UNII-1		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						

UNII-3		UNII-3 UNII-3		UNII-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)	Note
1	N/A	N/A	Dipole	N/A	4.03	N/A

# 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 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	RFtest			
Frequency (MHz)	5180	5200	5240	
A Mode	58	65	61	
Frequency (MHz)	5180	5200	5240	
N20 Mode	57	66	61	
Frequency (MHz)	5190	5230		
N40 Mode	52	59		

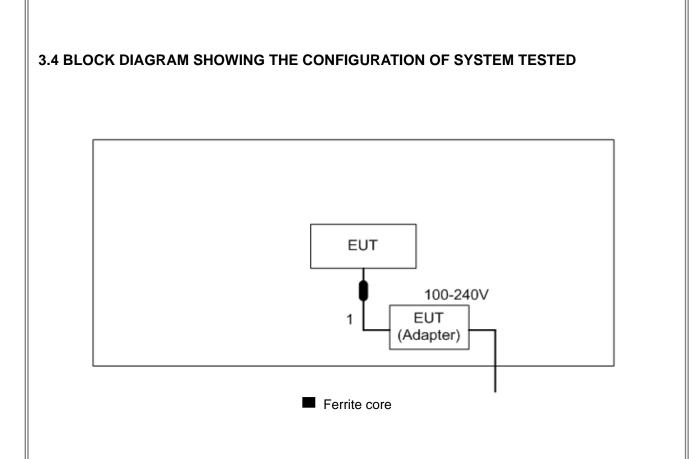
UNII-1				
Test Software Version	RFtest			
Frequency (MHz)	5180	5200	5240	
AC20 Mode	57	65	61	
Frequency (MHz)	5190	5230		
AC40 Mode	52	59		
Frequency (MHz)	5210			
AC80 Mode	60			



UNII-3				
Test Software Version	RFtest			
Frequency (MHz)	5745	5785	5825	
A Mode	64	64	61	
Frequency (MHz)	5745	5785	5825	
N20 Mode	64	64	63	
Frequency (MHz)	5755	5795		
N40 Mode	61	60		

UNII-3				
Test Software Version		RFtest		
Frequency (MHz)	5745	5785	5825	
AC20 Mode	64	64	61	
Frequency (MHz)	5755	5795		
AC40 Mode	61	61		
Frequency (MHz)	5775			
AC80 Mode	60			





#### **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.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	YES	1.5 m	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

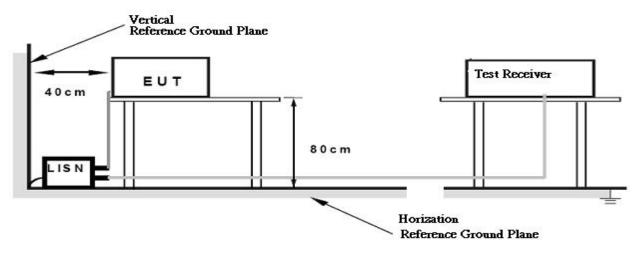
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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: 24°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

#### 4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of <sup>ℂ</sup>Note<sub>□</sub>. 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.

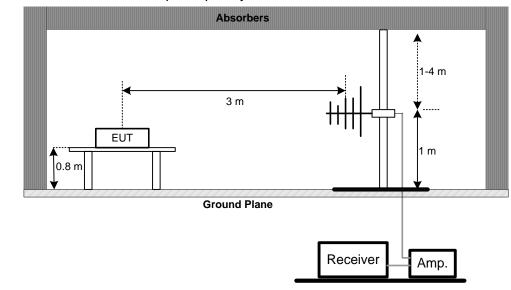
#### 4.2.3 DEVIATION FROM TEST STANDARD

No deviation

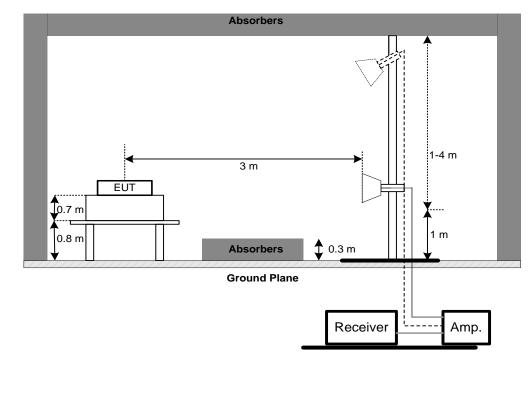


# 4.2.4 TEST SETUP

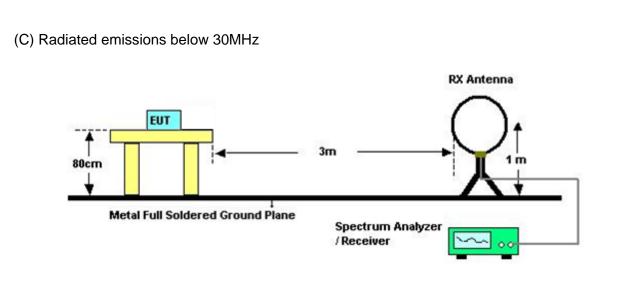




# (B) Radiated Emission Test Set-Up Frequency Above 1 GHz







#### 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 Attachment 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 Attachment C.

#### 4.2.9 TEST RESULTS (ABOVE 1000 MHz)

Please refer to the Attachment 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 Limit Frequency Range (MHz) Result				
	26 dB Bandwidth	5150-5250	PASS	
Bandwidth	Minimum 500kHz 6dB	5725-5850	PASS	
	Bandwidth	5725-5650	1 400	

#### 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
	RBW	300 kHz(Bandwidth 20MHz)
	NBW	1MHz(Bandwidth 40MHz and 80MHz)
	VBW	1MHz(Bandwidth 20MHz)
	VBW	3MHz(Bandwidth 40MHz and 80MHz)
	Detector Peak	
Trace Max Hold		Max Hold
Sweep Time Auto		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 Attachment E.



# 6. MAXIMUM CONDUCTED OUTPUT POWER

## 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Test Item Limit Frequency Range (MHz) Result				
	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 power meter and antenna output port as show in the block diagram below,

b.

Spectrum Parameter	Setting
Attenuation	Auto
	Encompass the entire emissions bandwidth (EBW) of the
Span Frequency	signal
RBW	= 1MHz.
VBW	≥ 3MHz.
Detector	RMS
Trace	Max Hold
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

EUT	Power Meter

#### 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 Attachment F.

# 7. POWER SPECTRAL DENSITY TEST

#### 7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Frequency Range (MHz)	Result	
Power Spectral Density			PASS
	30dBm/500kHz	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
	Shan Eraquanay	Encompass the entire emissions bandwidth (EBW) of the
	Span Frequency	signal
	RBW	= 1MHz.
	VBW	≥ 3MHz.
	Detector	RMS
	Trace average	100 trace
Sweep Time Auto		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.



## 7.1.1 DEVIATION FROM STANDARD

No deviation.

#### 7.1.2 TEST SETUP

EUT	SPECTRUM
	ANALYZER

# 7.1.3 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.

#### 7.1.4 EUT TEST CONDITIONS

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

7.1.5 TEST RESULTS Please refer to the Attachment H.

# 8. FREQUENCY STABILITY MEASUREMENT

## 8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item Limit Frequency Range Result (MHz)			
Francisco estate ilitera	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.

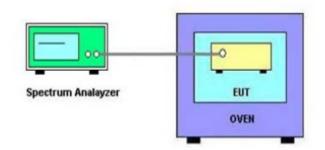
#### 8.1.2 DEVIATION FROM STANDARD

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 Attachment I.



# 9. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement				
Item Kind of Equipment Manufacturer		Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 26, 2018
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 26, 2018
3	EMI Test Receiver	R&S	ESR3	101862	Sep. 04, 2017
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Sep. 04, 2017
5	Cable	N/A	RG400 12m	N/A	Mar. 09, 2018
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1 -01	N/A	N/A

	Radiated Emission Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 26, 2018
2	Amplifier	HP	8447D	2944A09673	Oct. 20, 2017
3	Receiver	Agilent	N9038A	MY5213003 9	Sep. 04, 2017
4	Cable	emci	LMR-400(30MH z-1GHz)(8m+5m )	N/A	Jun. 27, 2017
5	Controller	СТ	SC100	N/A	N/A
6	Controller	MF	MF-7802	MF78020841 6	N/A
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Amplifier	Agilent	8449B	3008A02274	Mar. 09, 2018
9	Receiver	Agilent	N9038A	MY5213003 9	Sep. 04, 2017
10	Antenna	EM	EM-6876-1	230	Jul. 08, 2017
11	Controller	СТ	SC100	N/A	N/A
12	Controller	MF	MF-7802	MF78020841 6	N/A
13	Cable	emci	EMC104-SM-S M-12000(12m)	N/A	Jul. 06, 2017
14	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2017
15	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017
16	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 26, 2018
17	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	Sep. 04, 2017

	Maximum Conducted Output Power Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	ANRITSU	ML2495A	1128009	Mar. 26, 2018
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	Mar. 26, 2018

	Power Spectral Density Measurement				
Ite	m Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Sep. 04, 2017

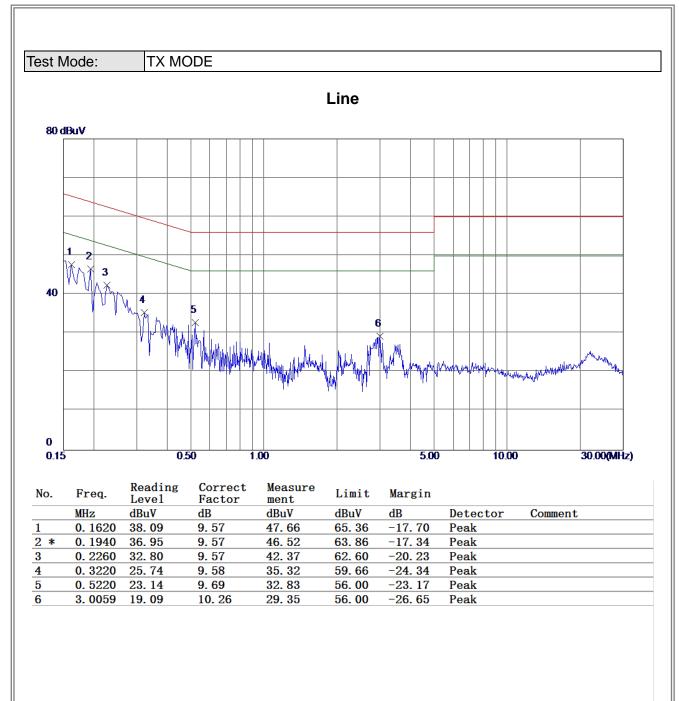
Remark: "N/A" denotes no model name, serial no. or calibration specified. All calibration period of equipment list is one year.



# **ATTACHMENT A - CONDUCTED EMISSION**

# ЗĨL

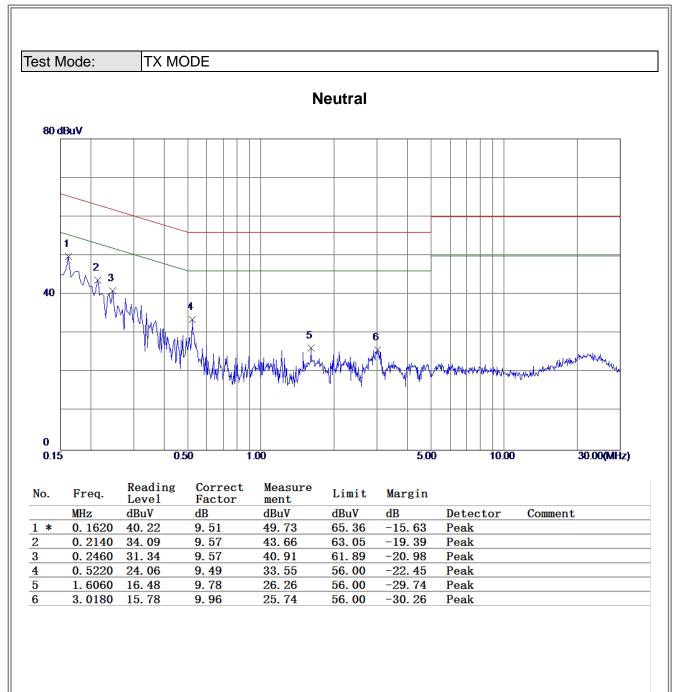




Note : The test result has included the cable loss.

# ЗĨL





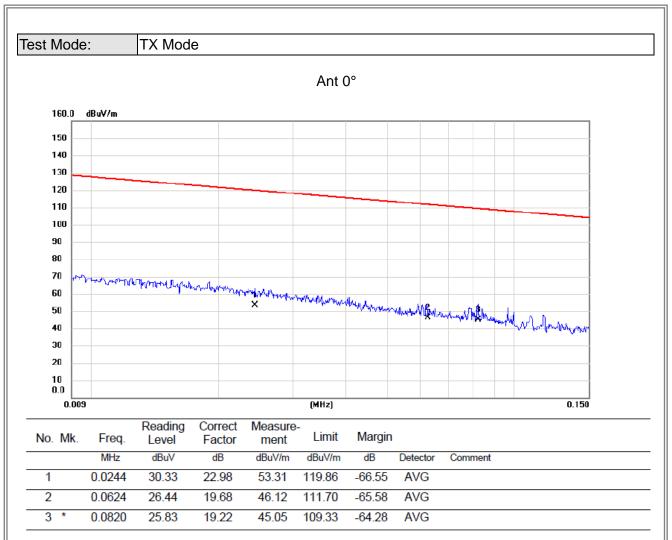
Note : The test result has included the cable loss.



# ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)

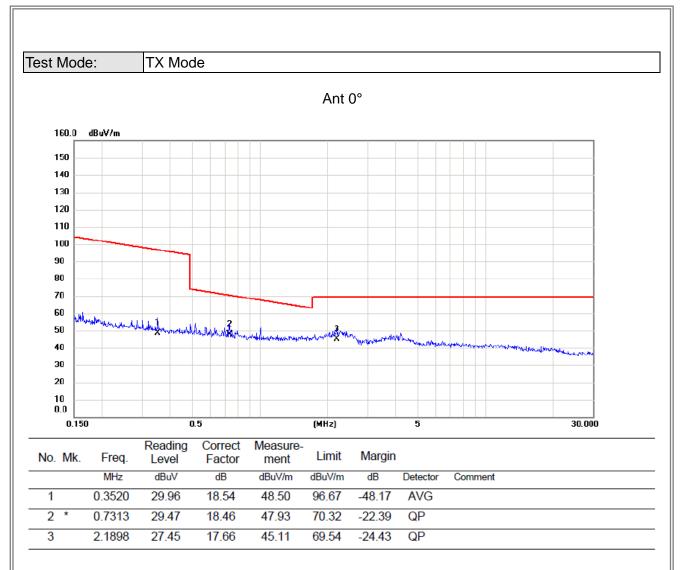






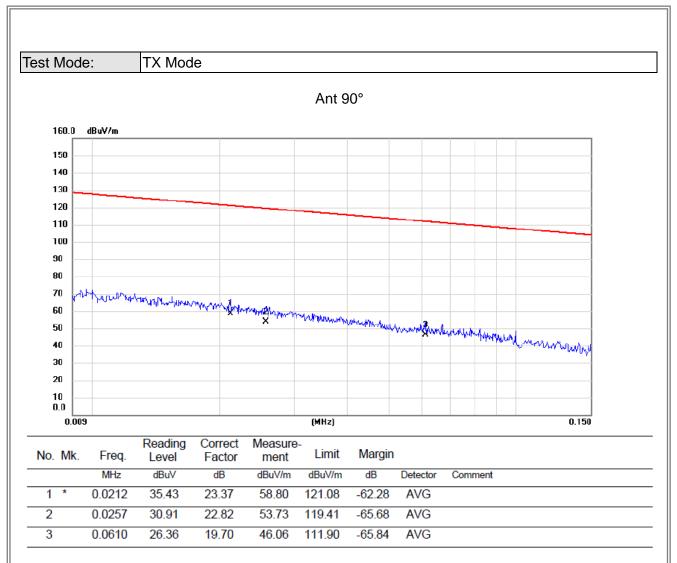
# ЗĨL





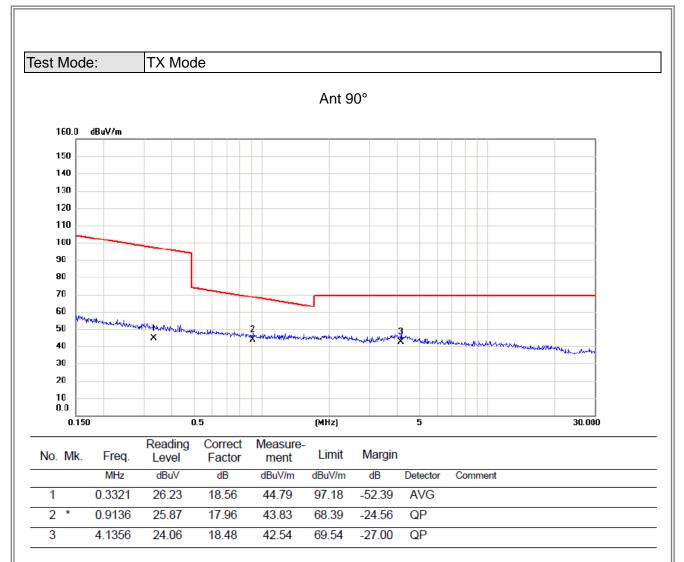
# ЗĨL





# зīг



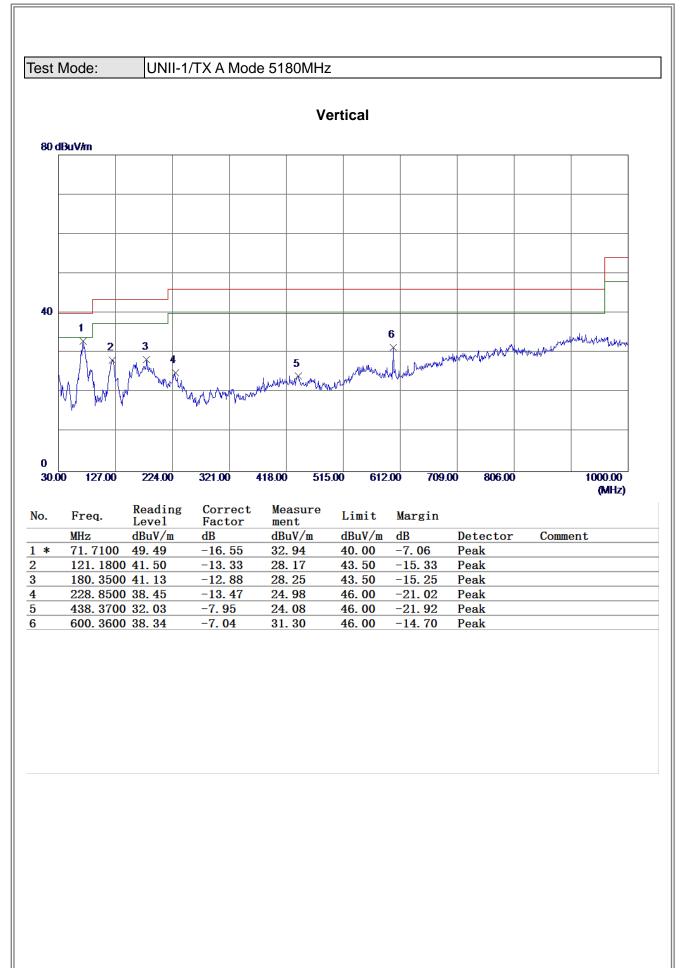




### ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)

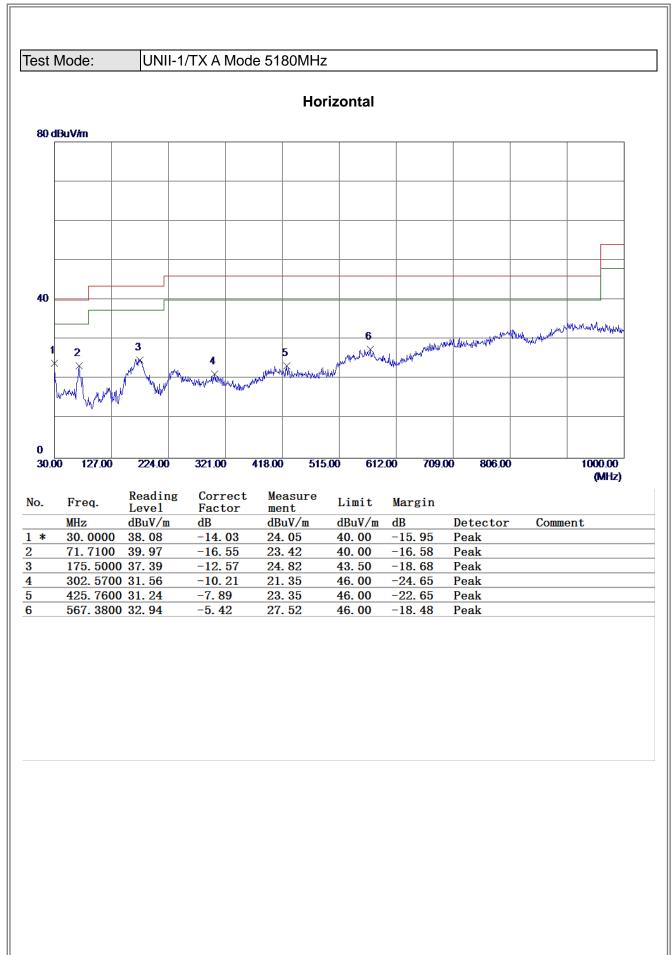






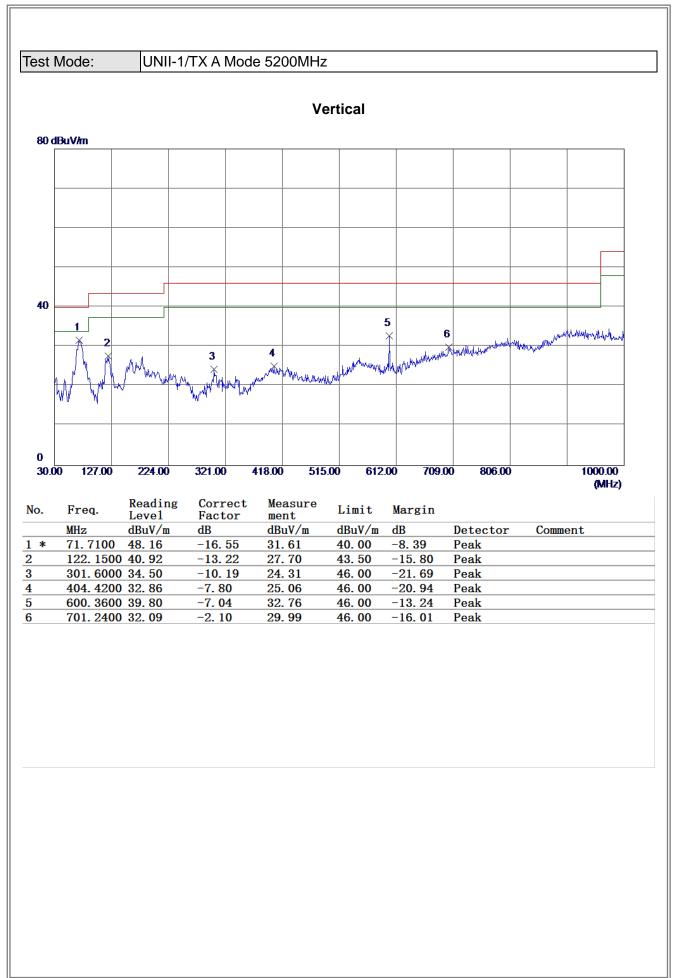






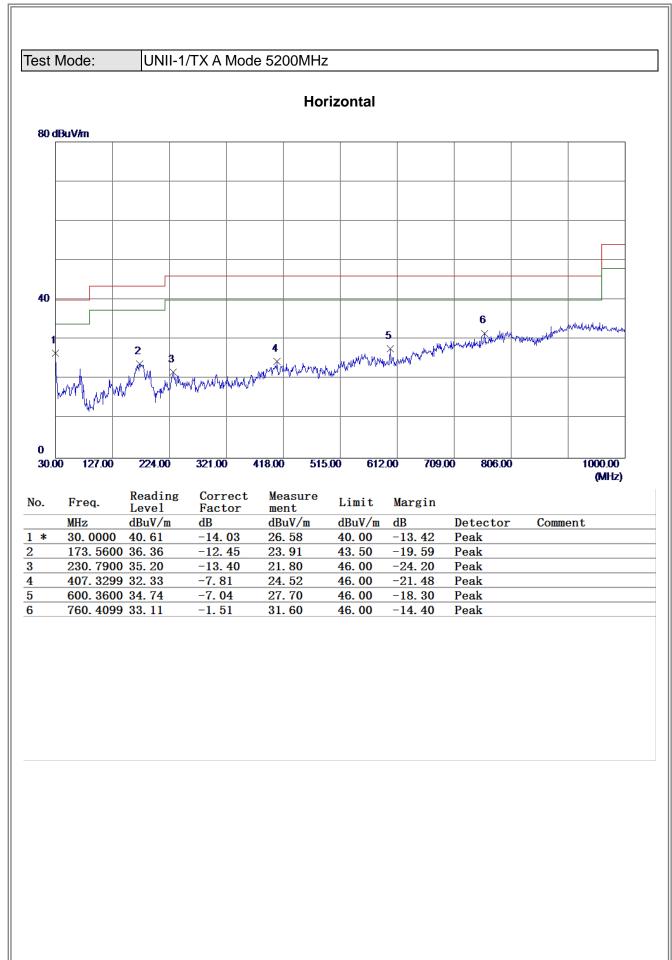






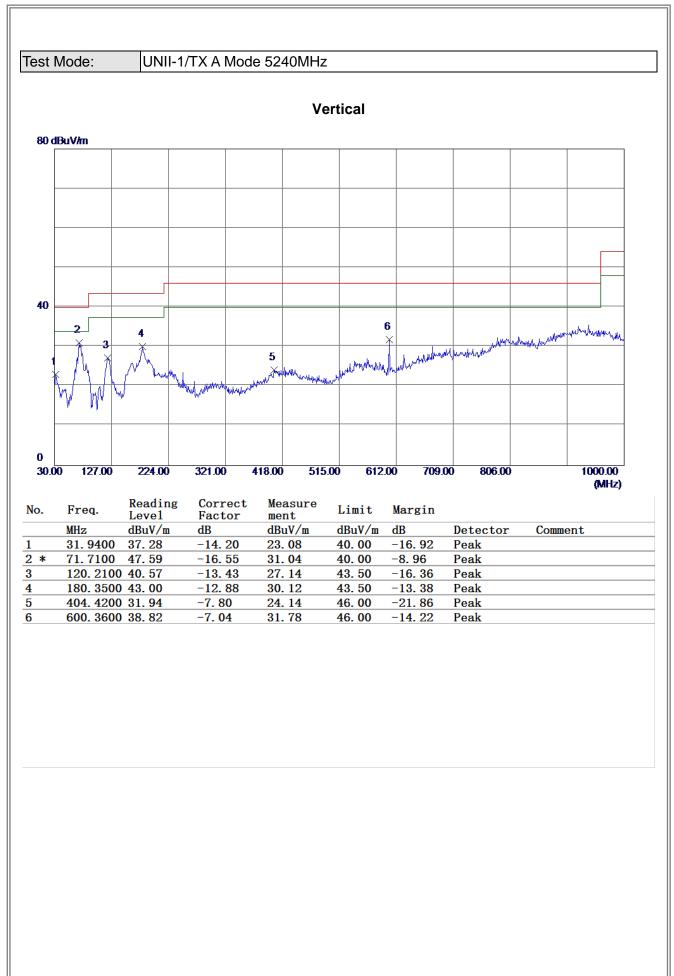






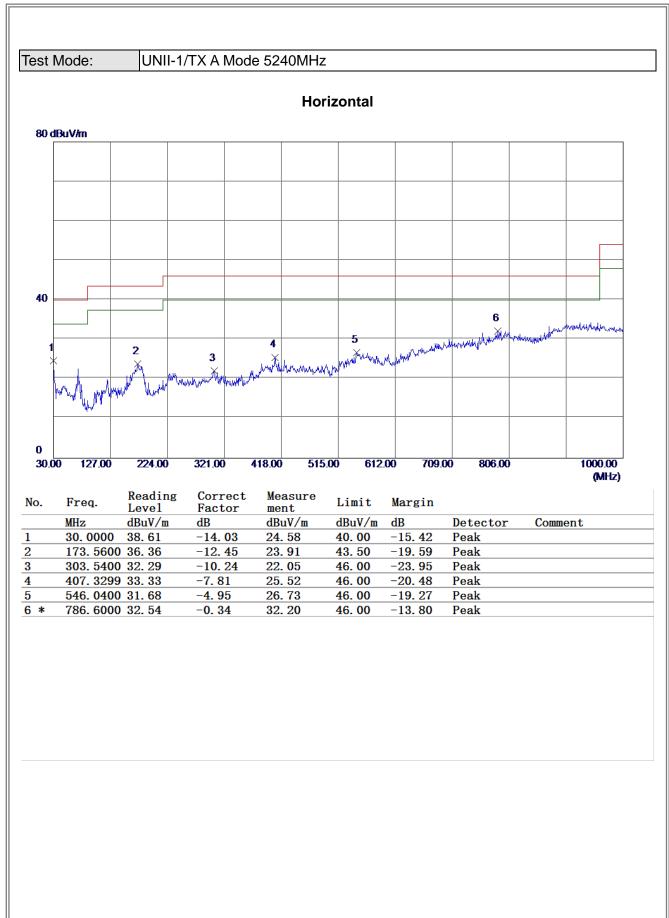






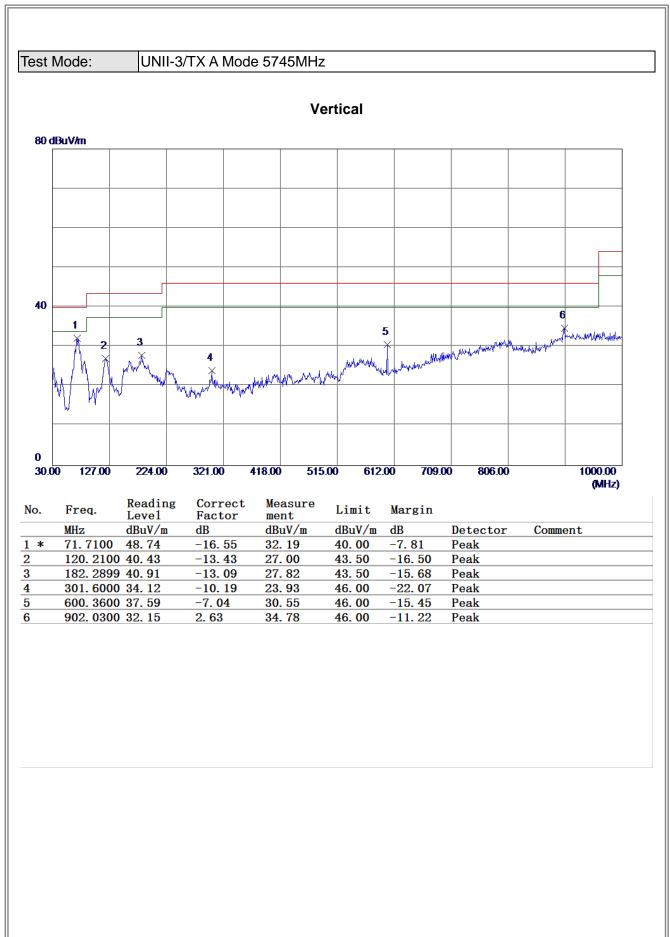






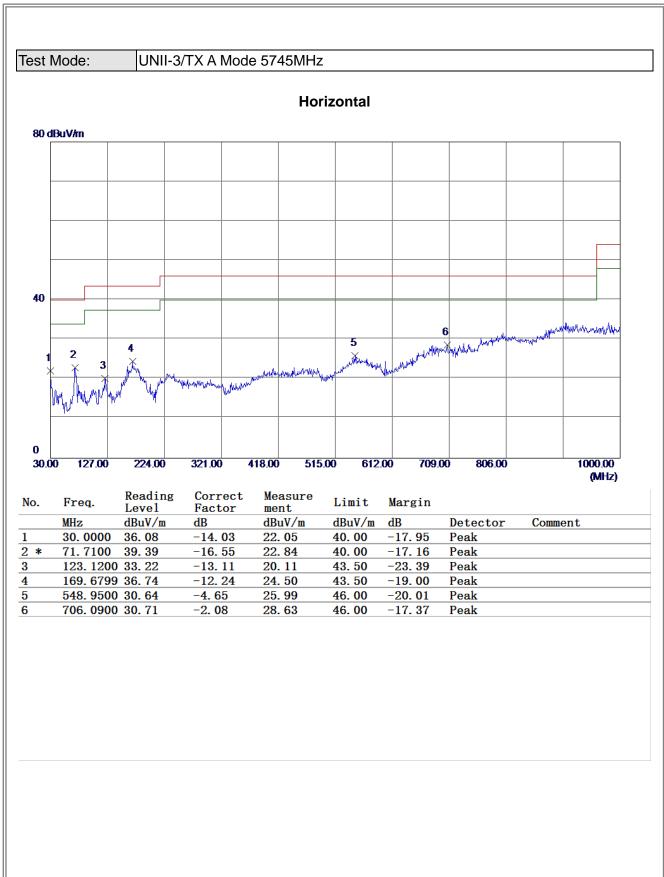






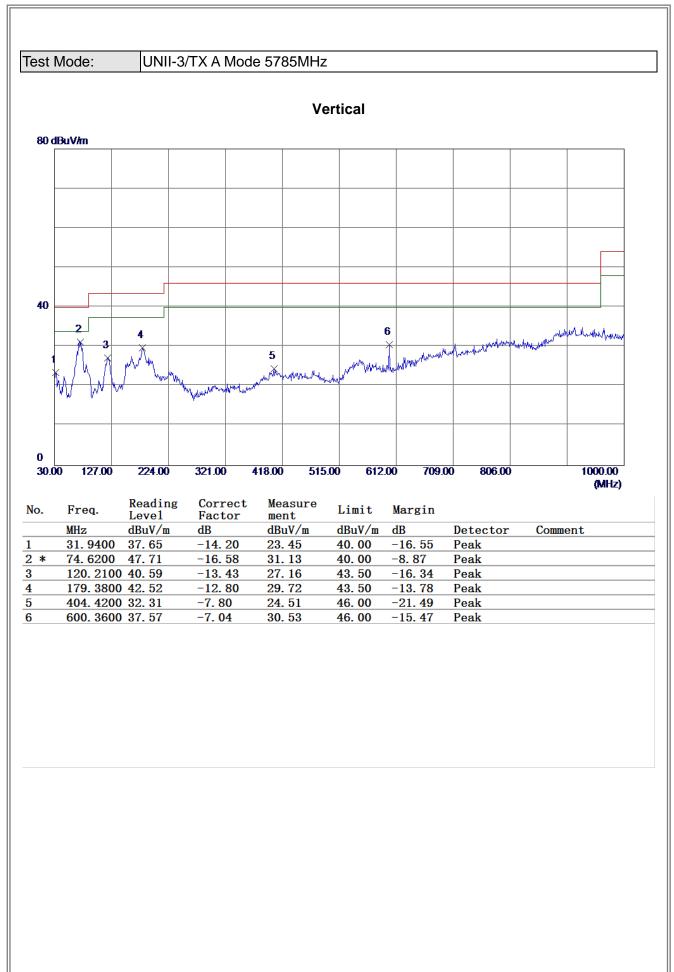






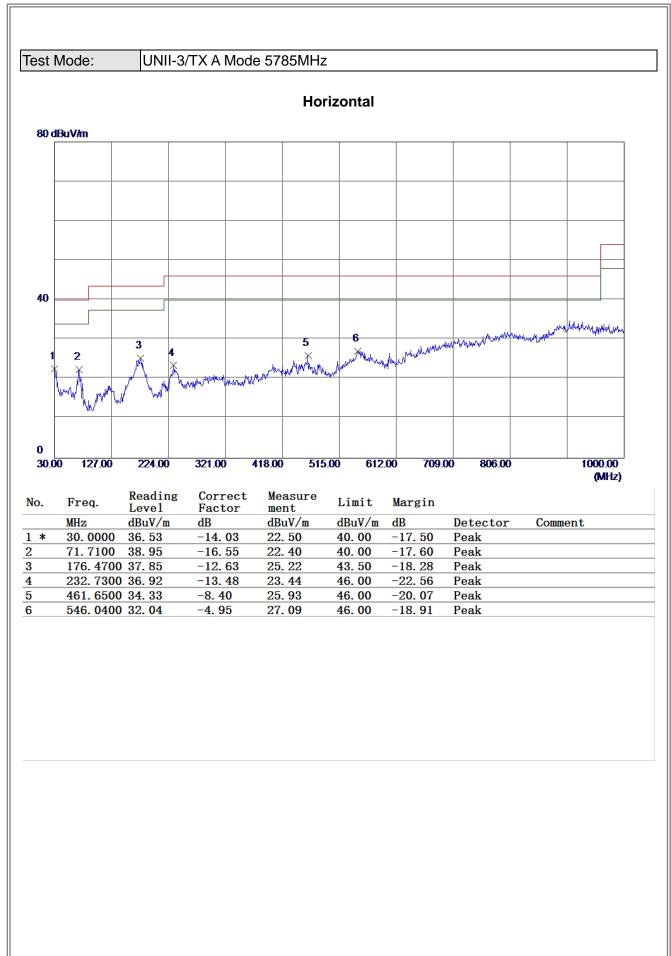






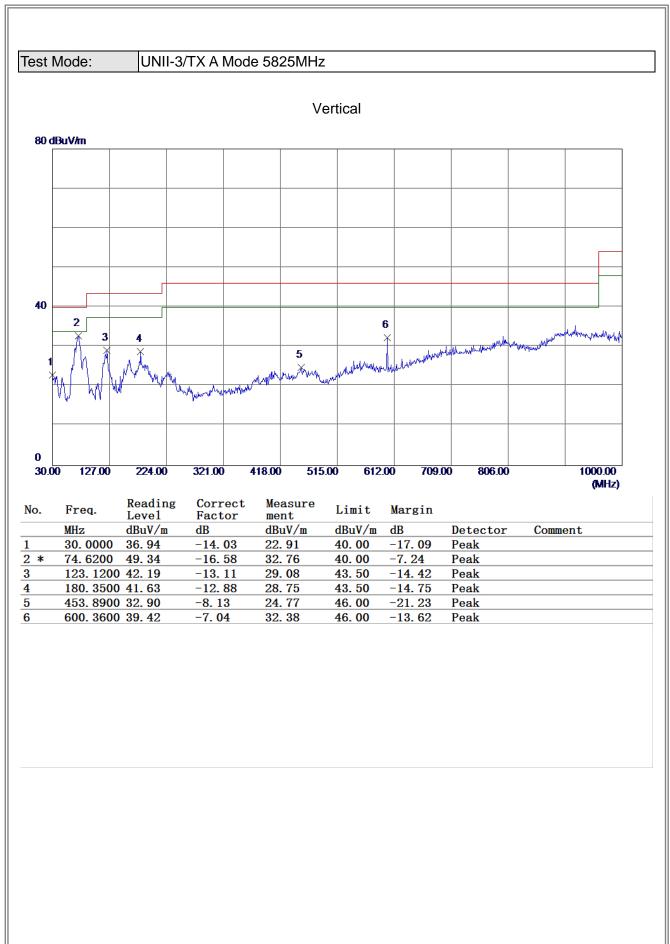






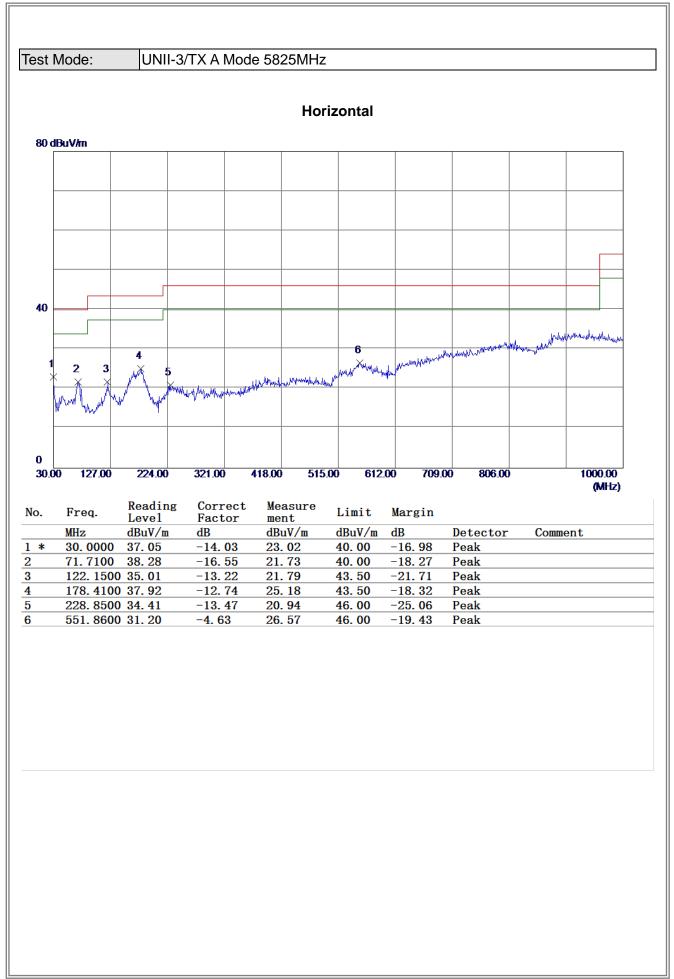










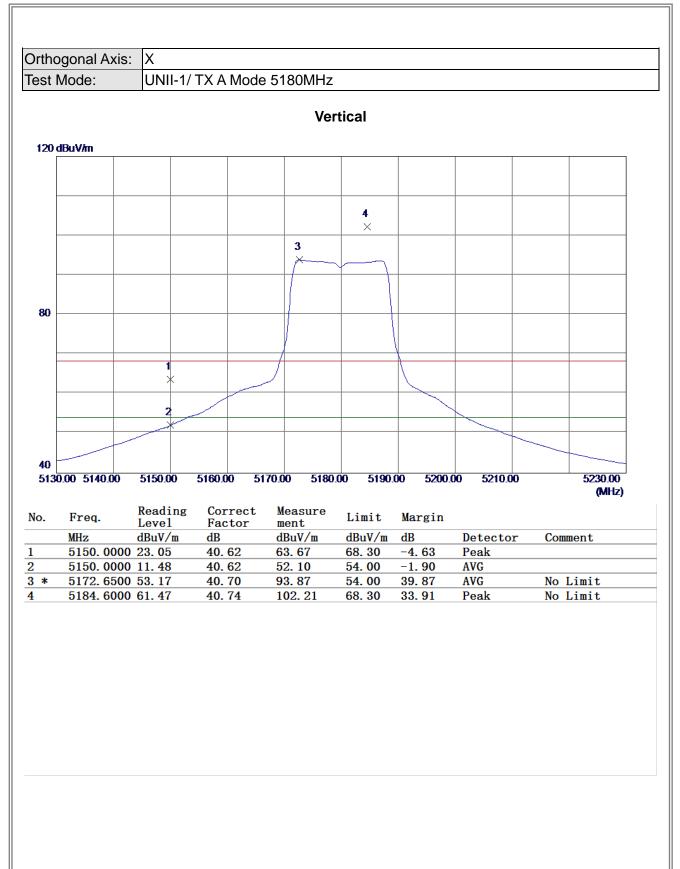




#### ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

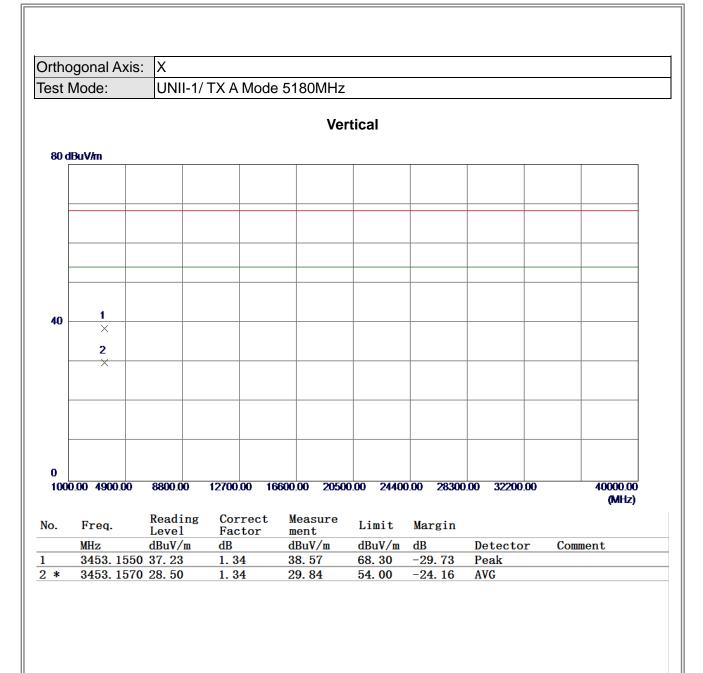






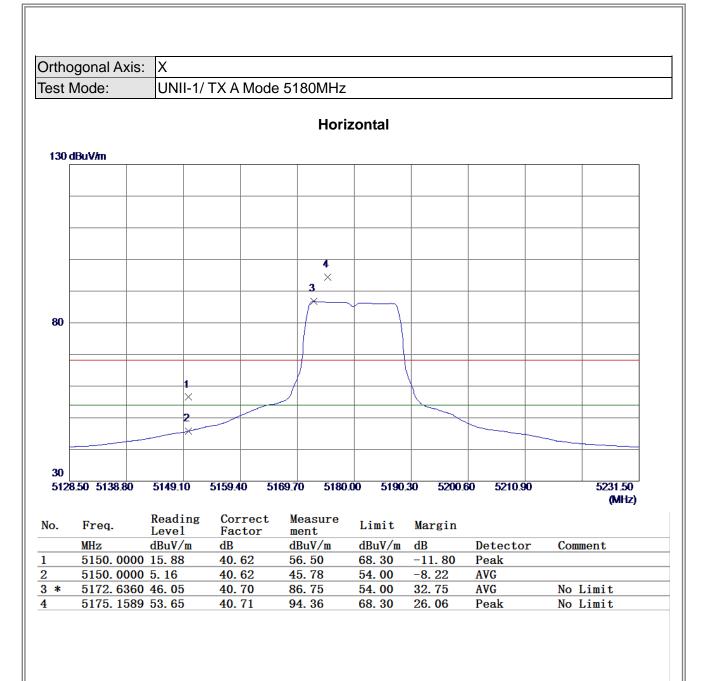






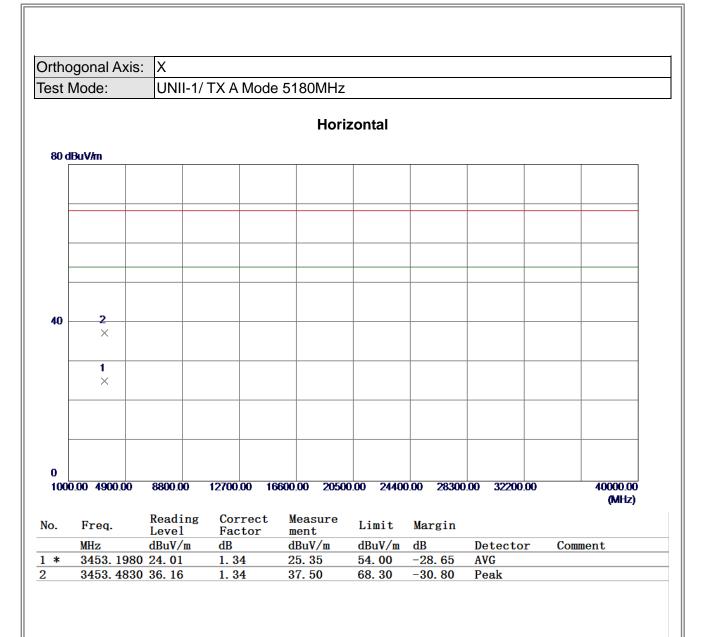






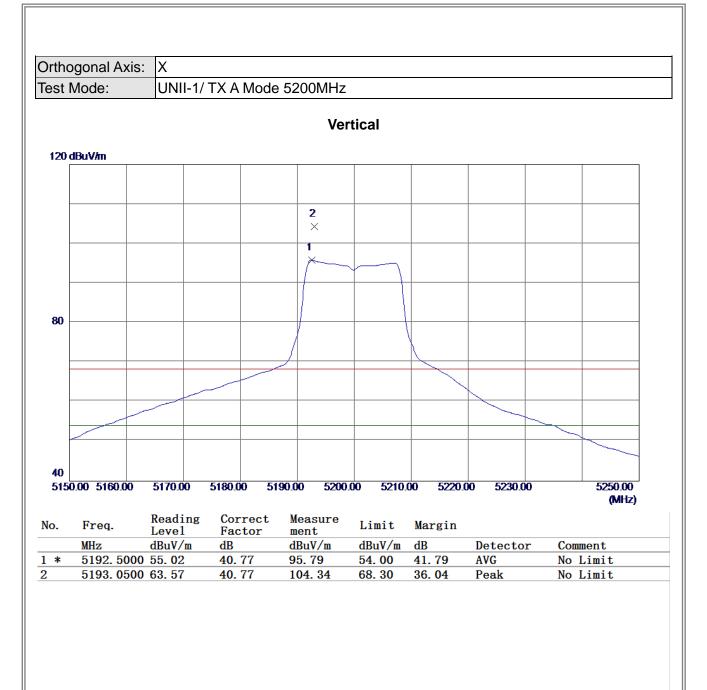






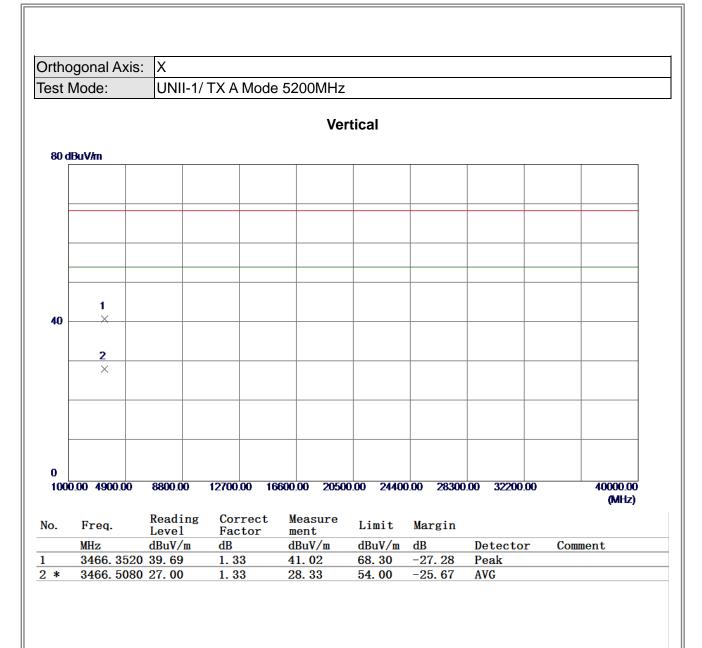






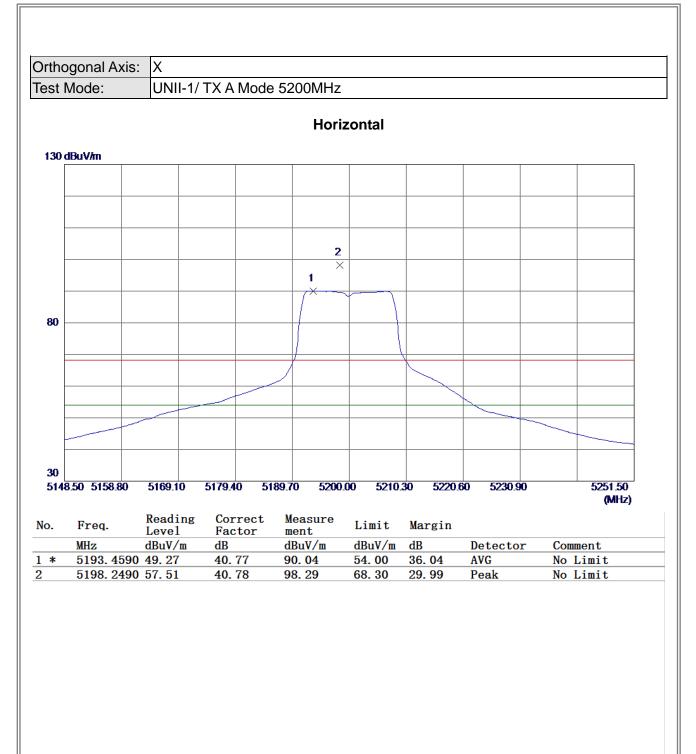






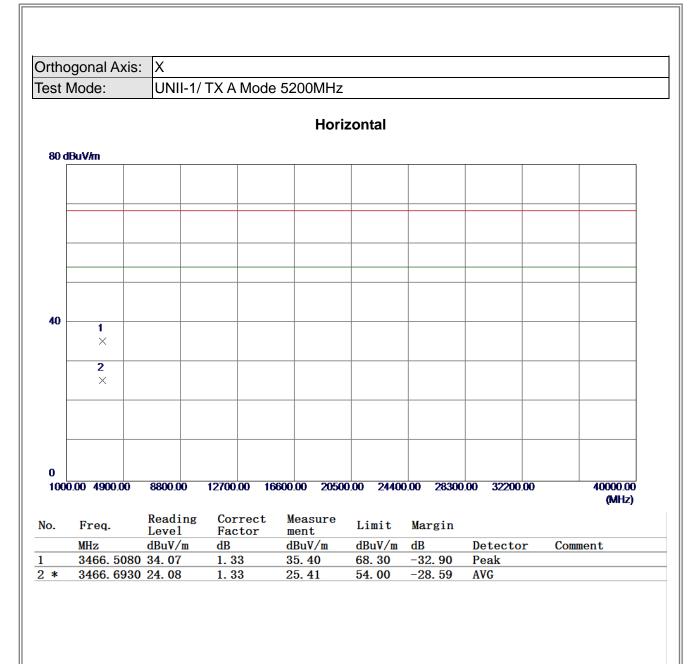






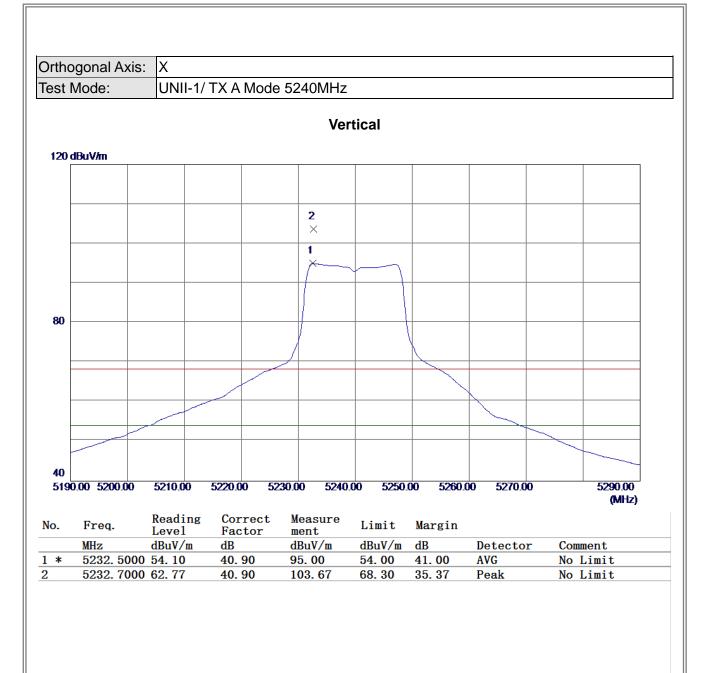






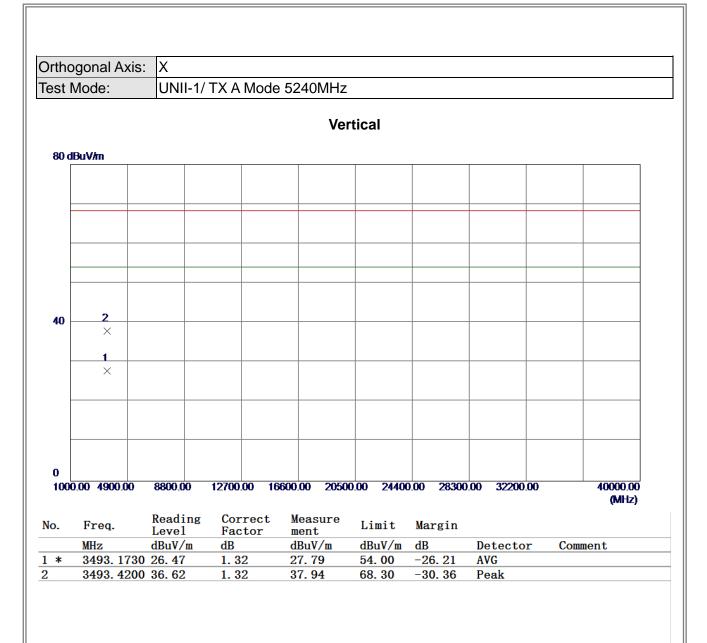






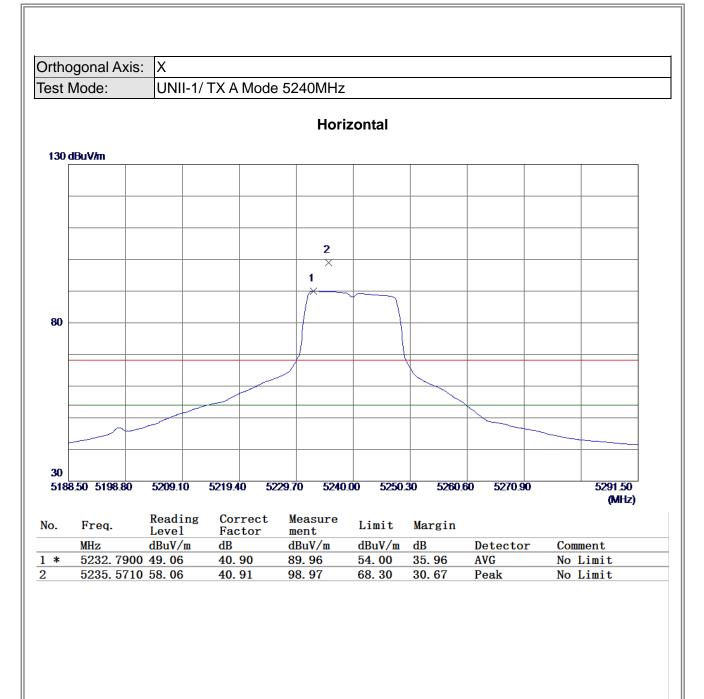






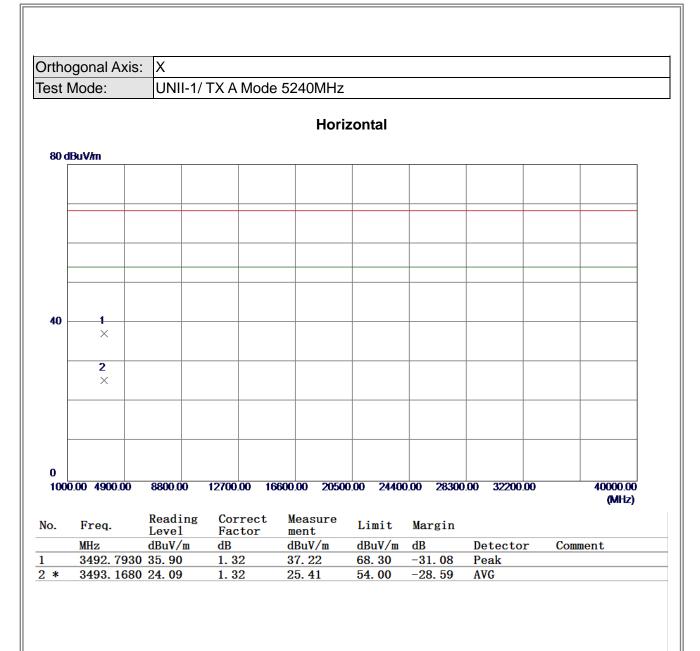






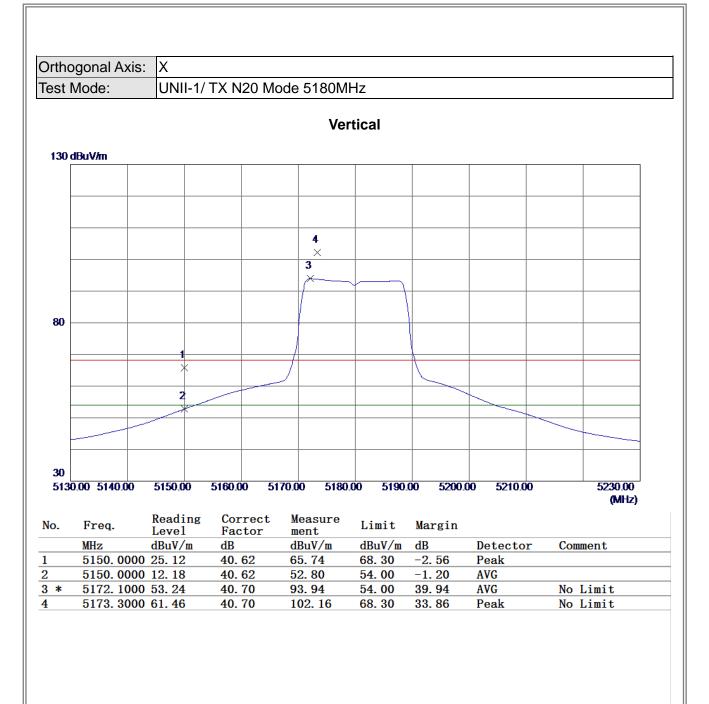






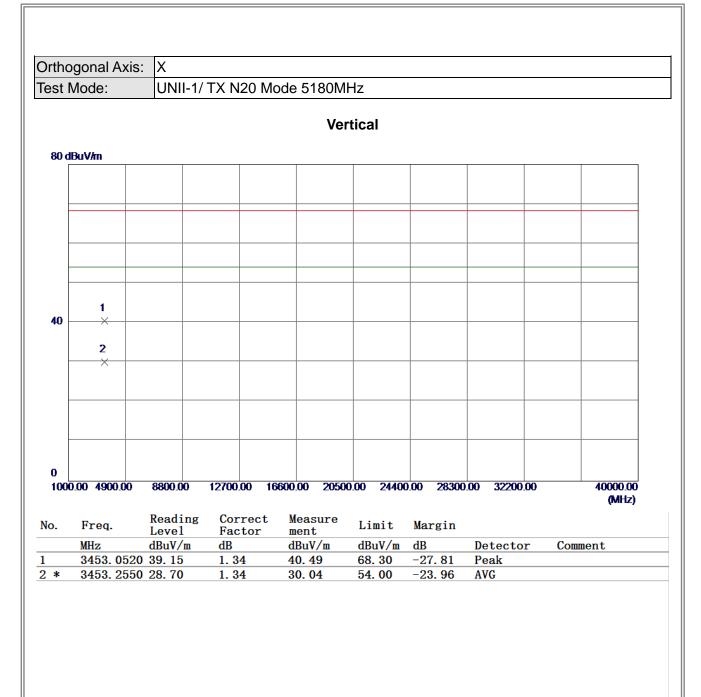






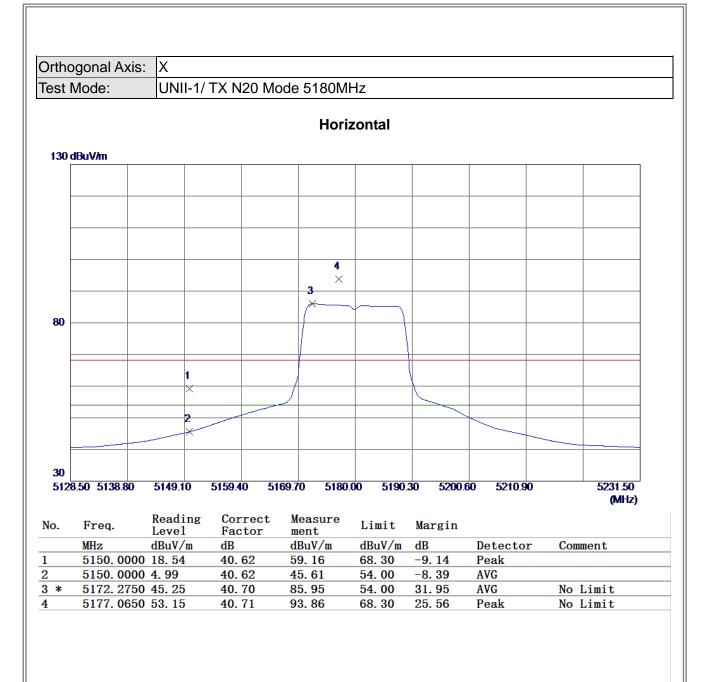






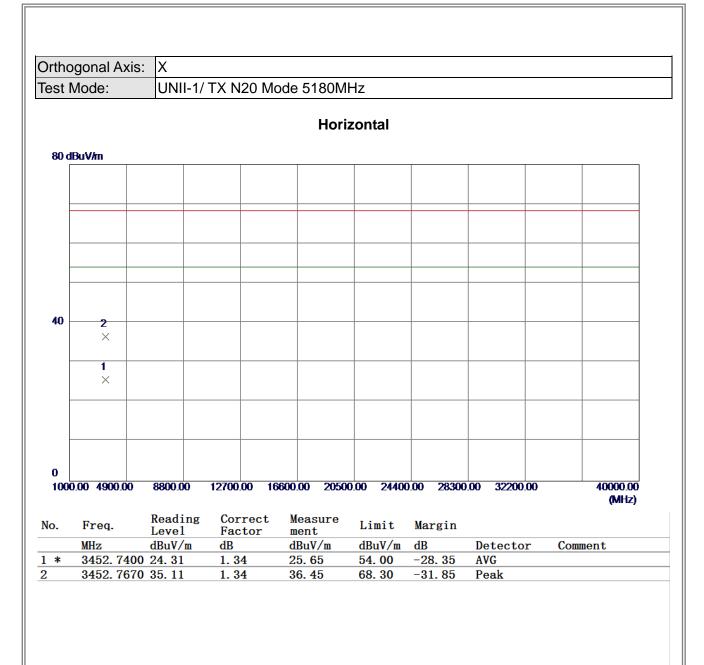






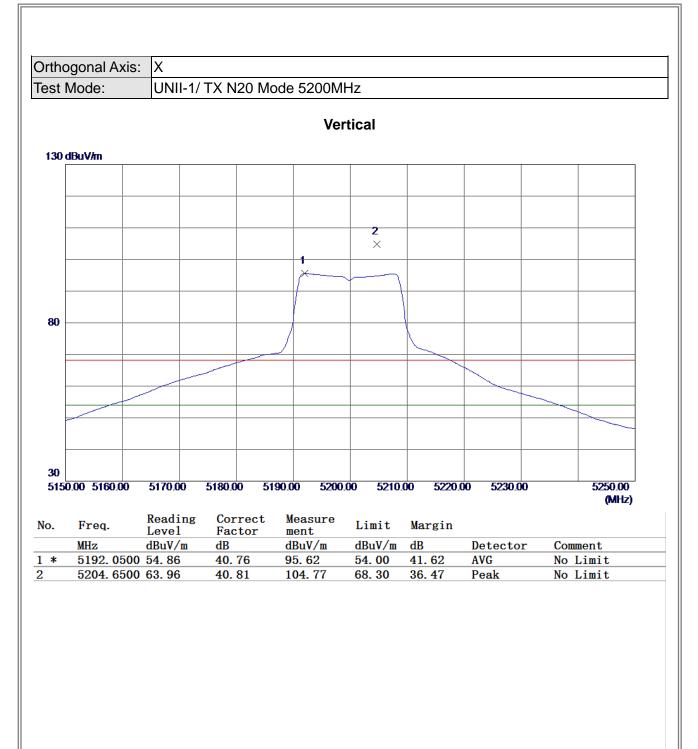






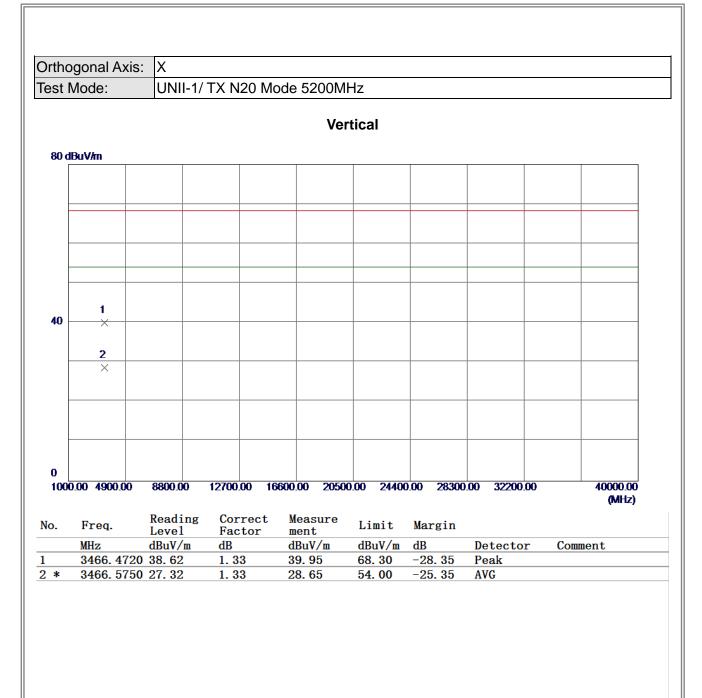






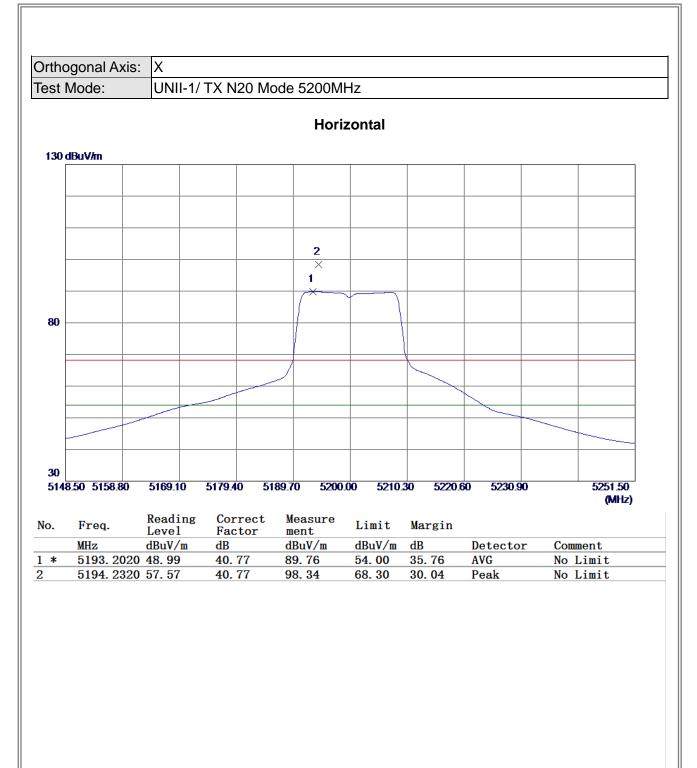






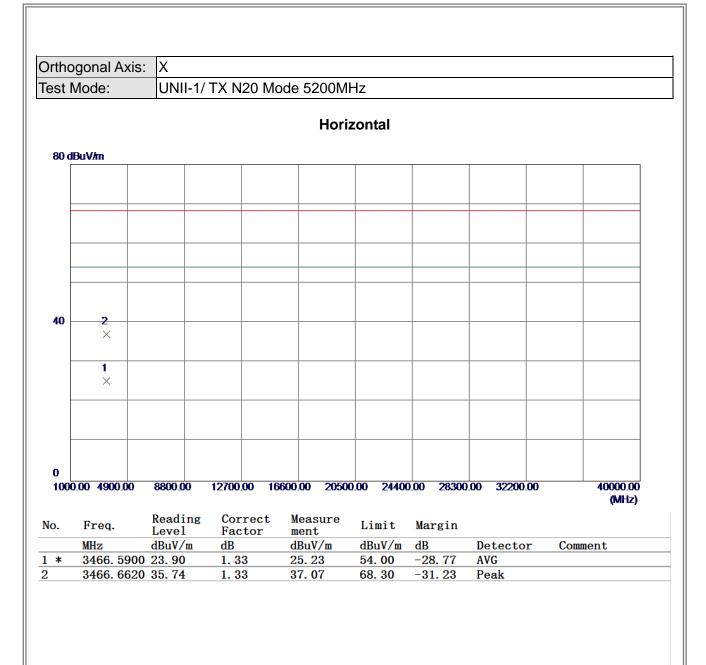






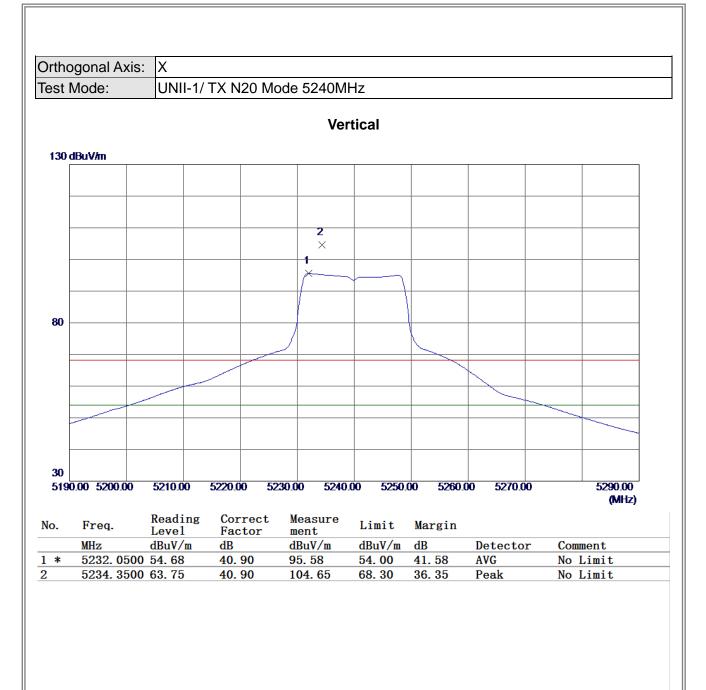






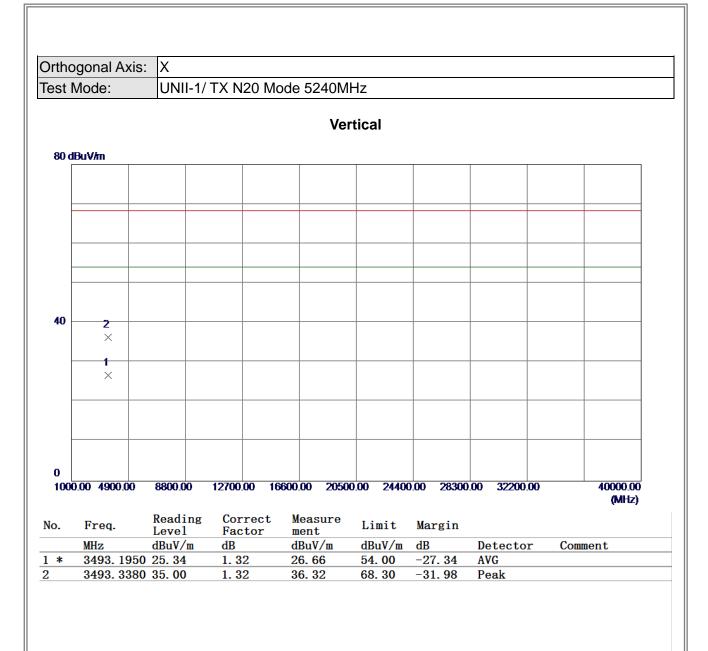






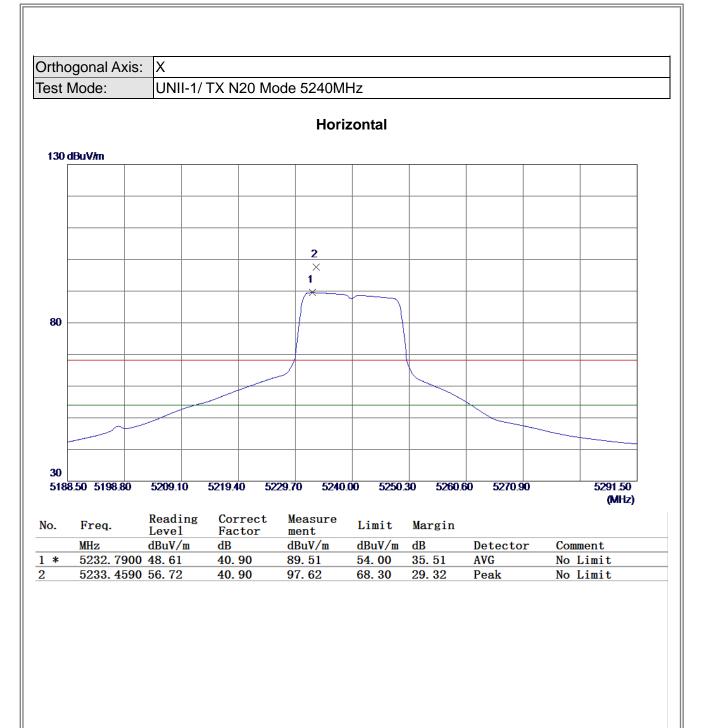






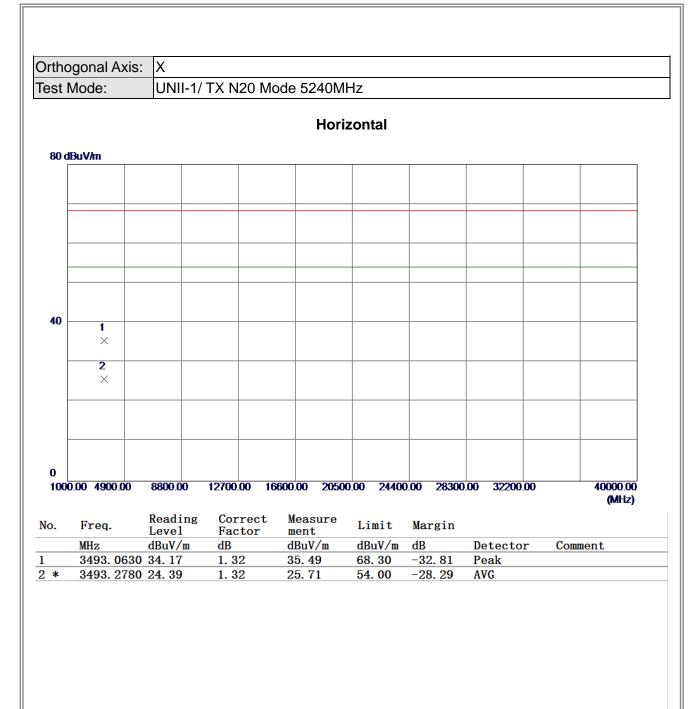






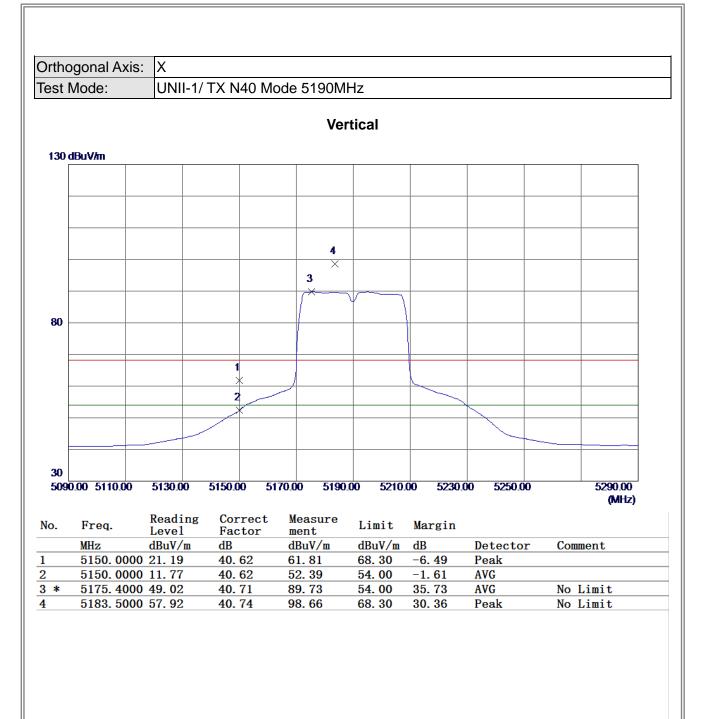






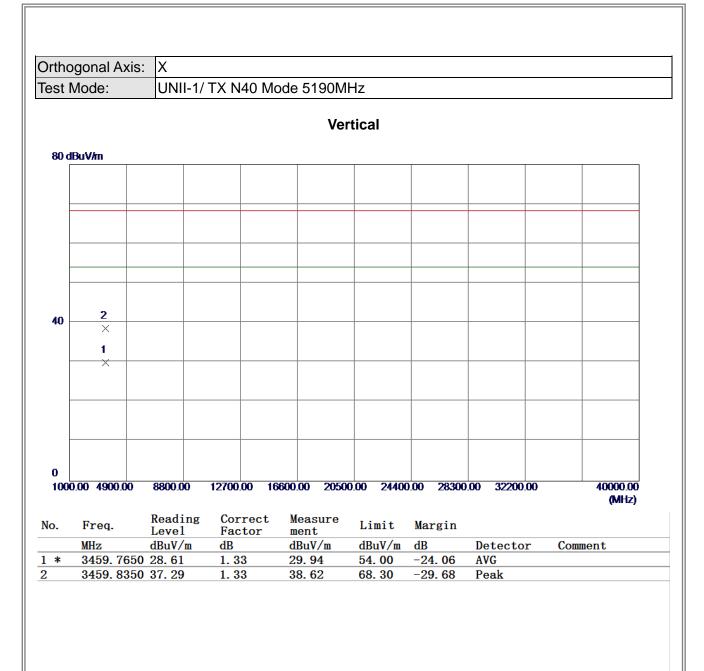






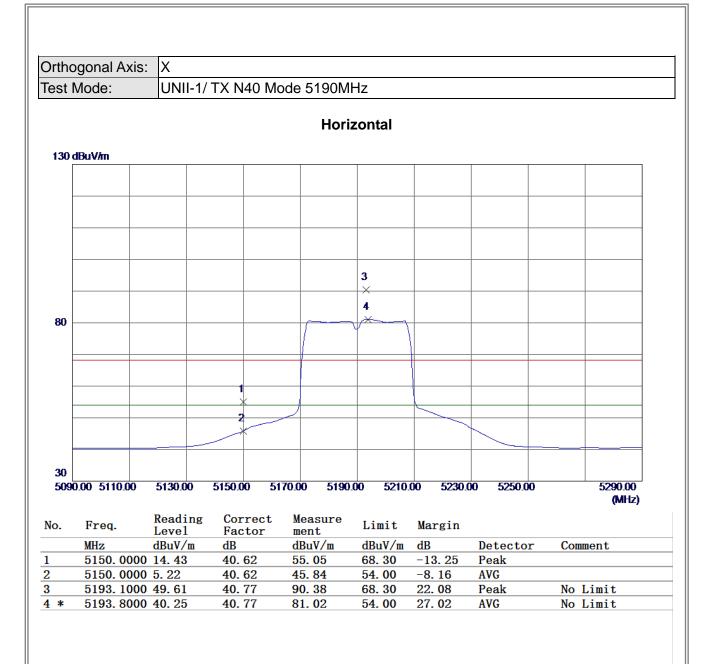






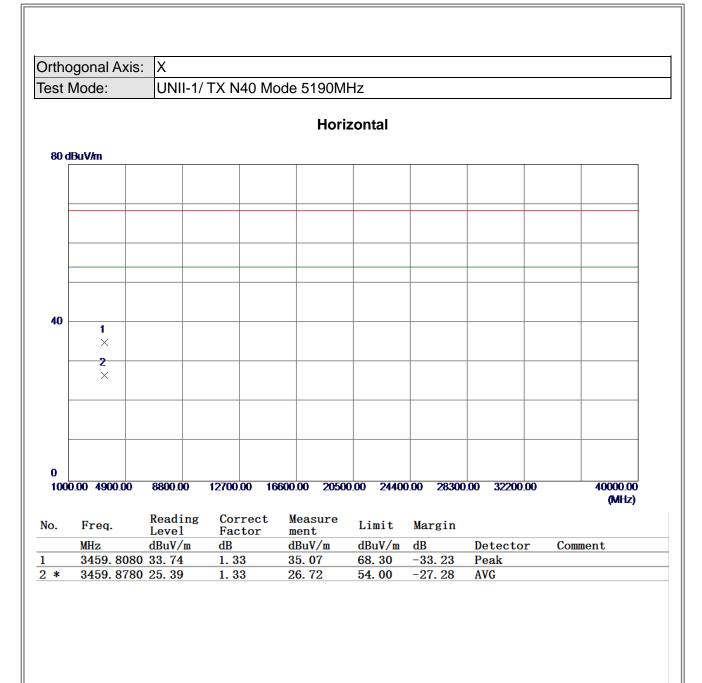






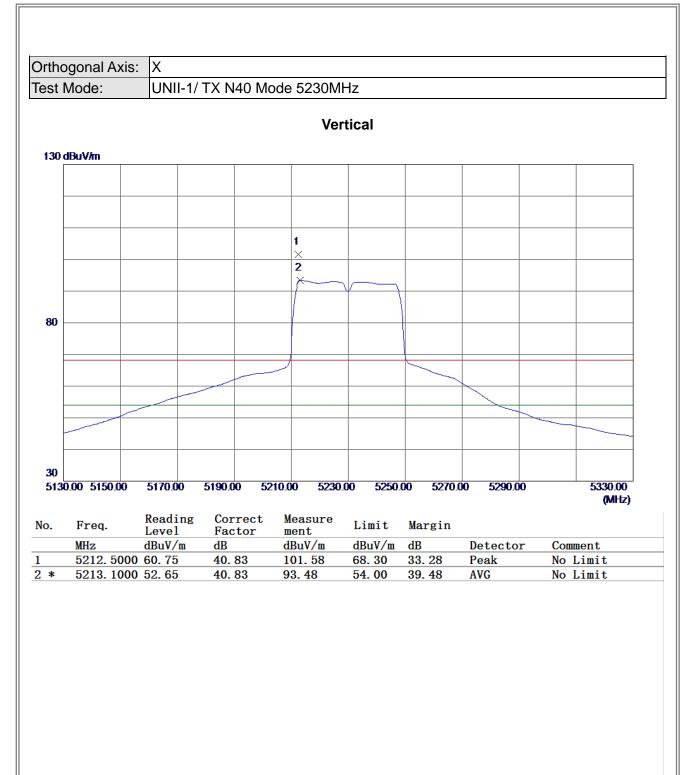






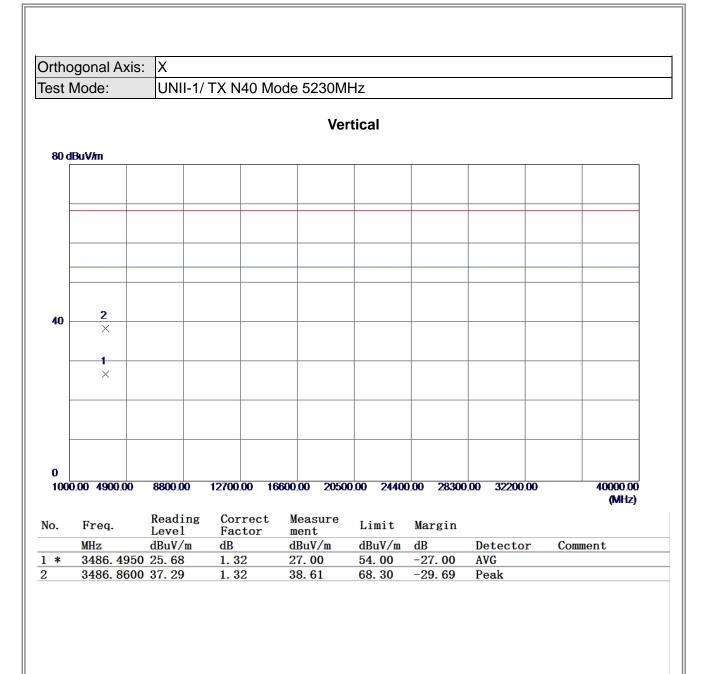






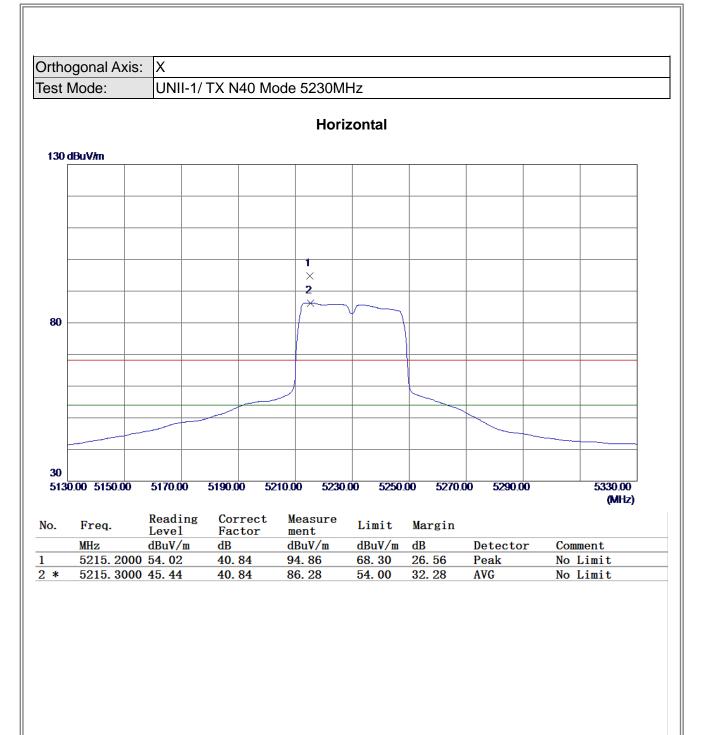






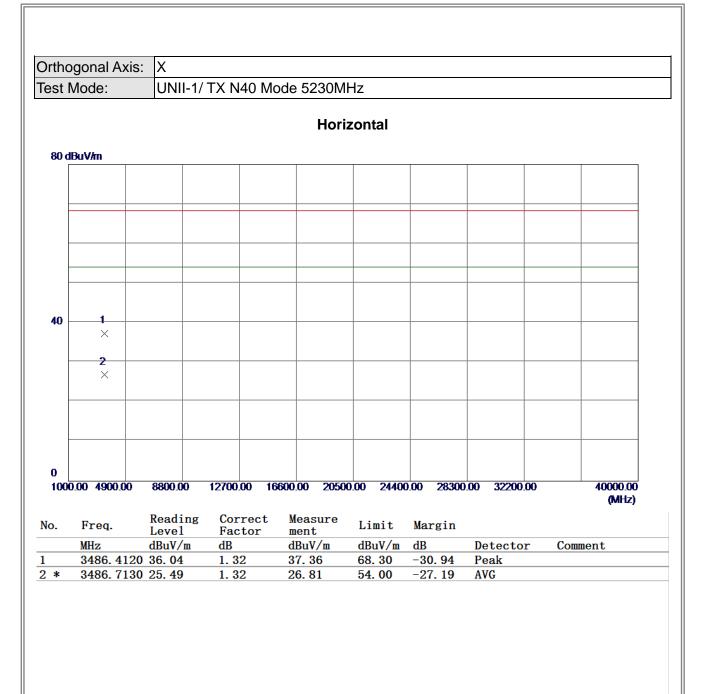






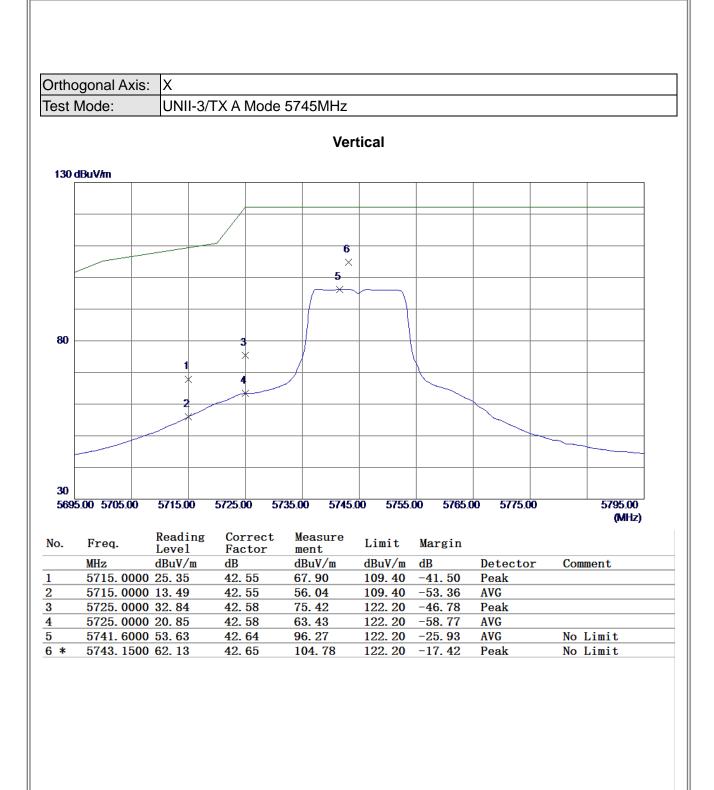






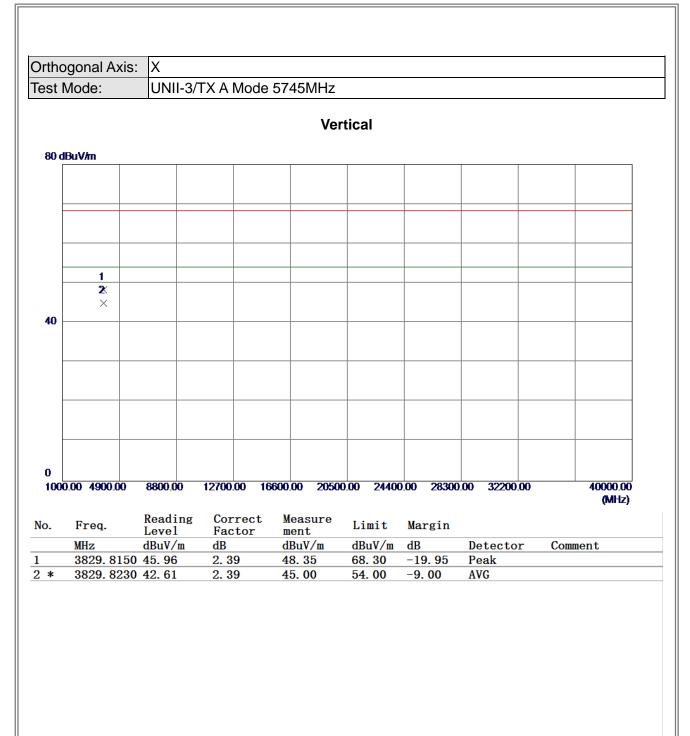






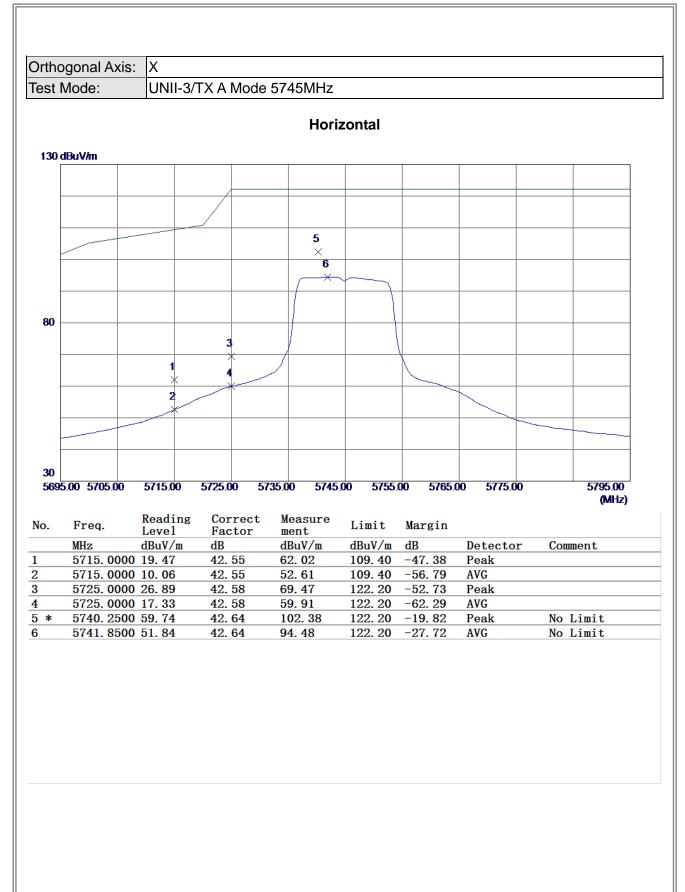






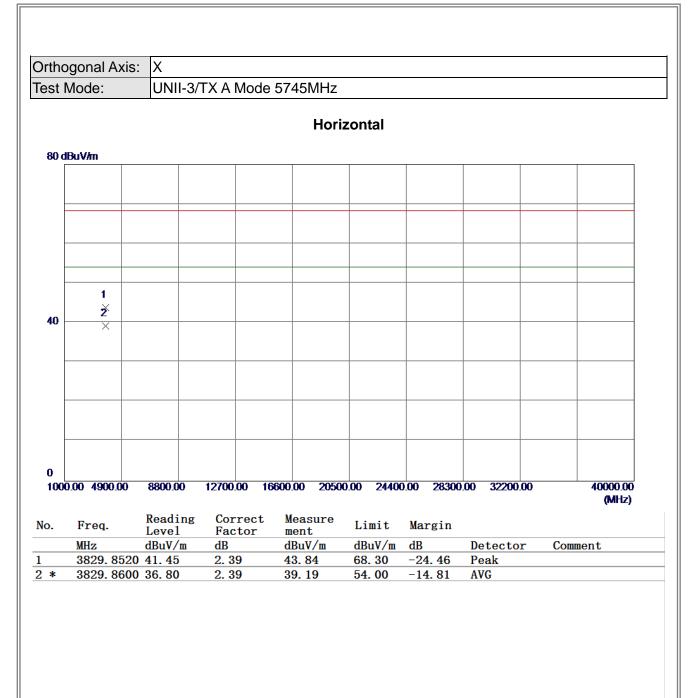






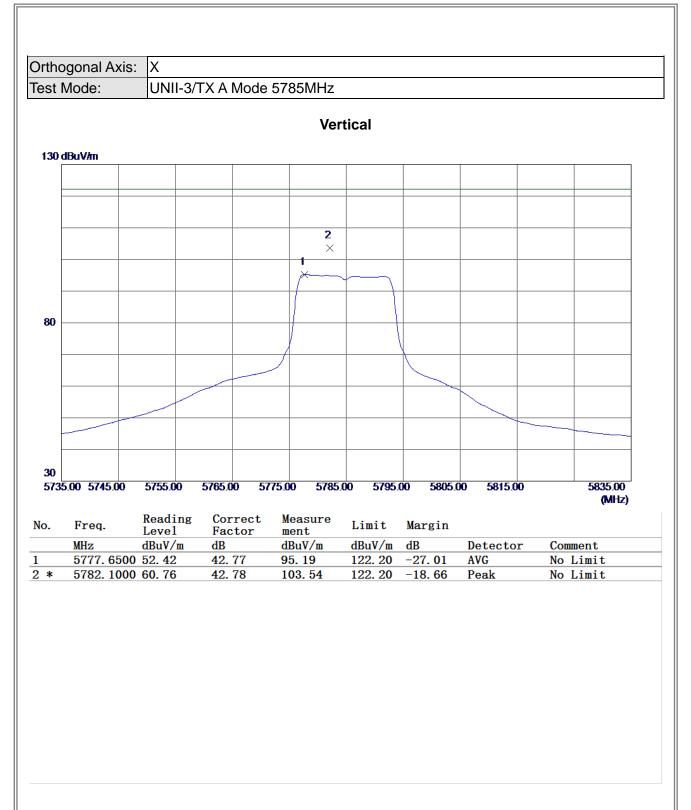






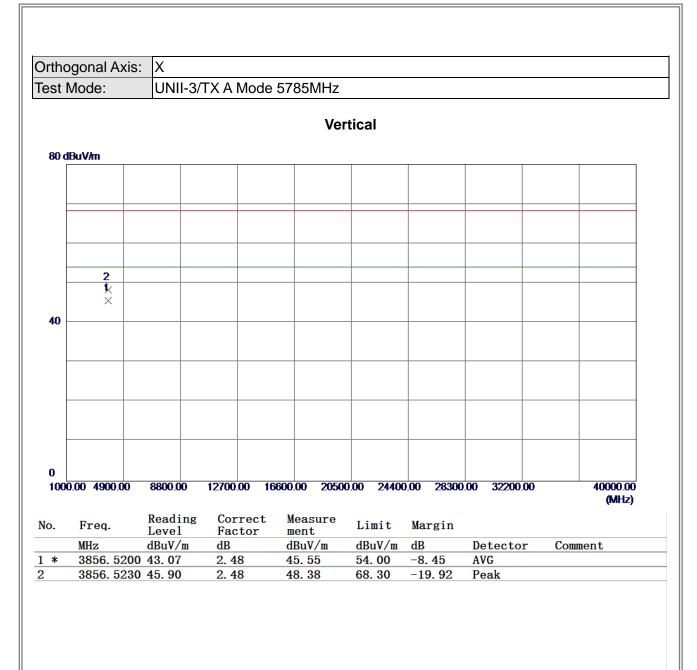






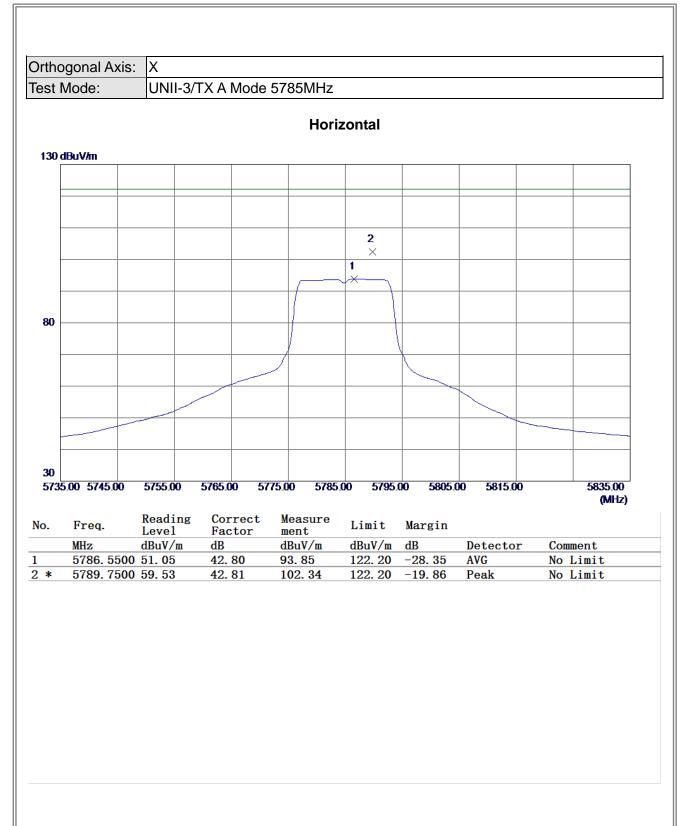






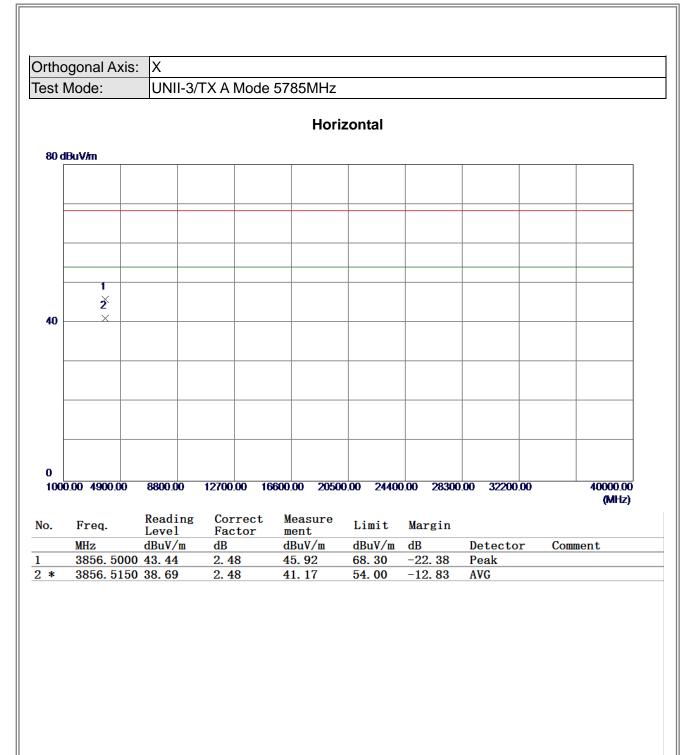






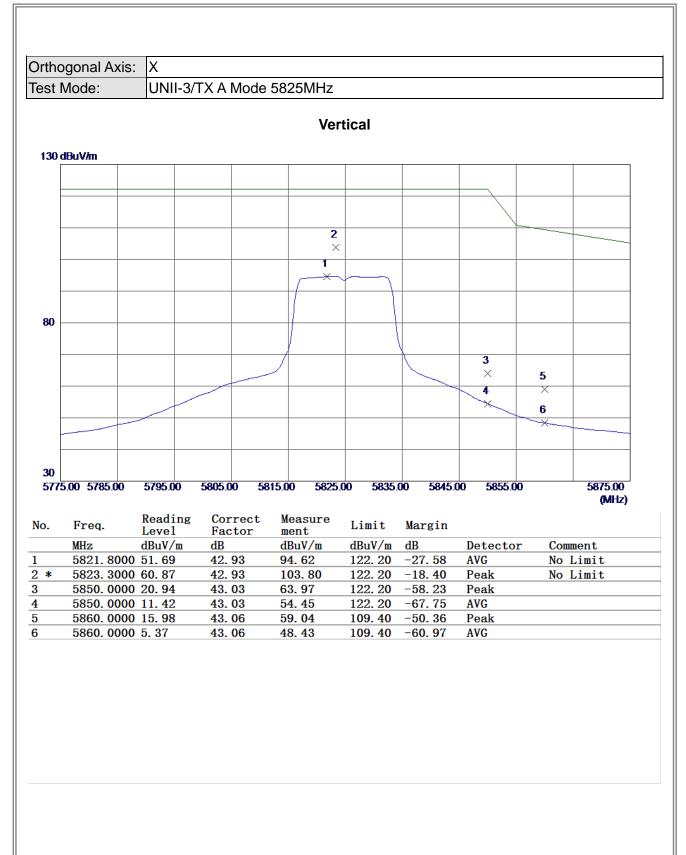






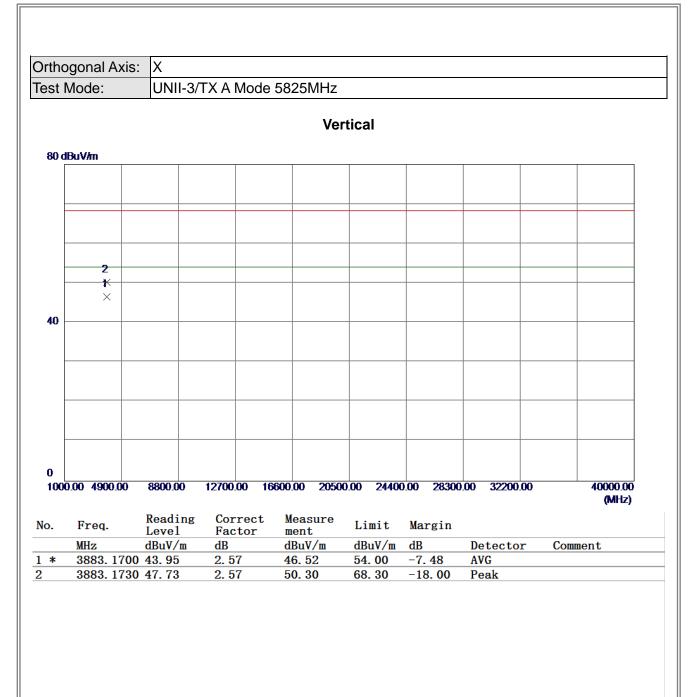






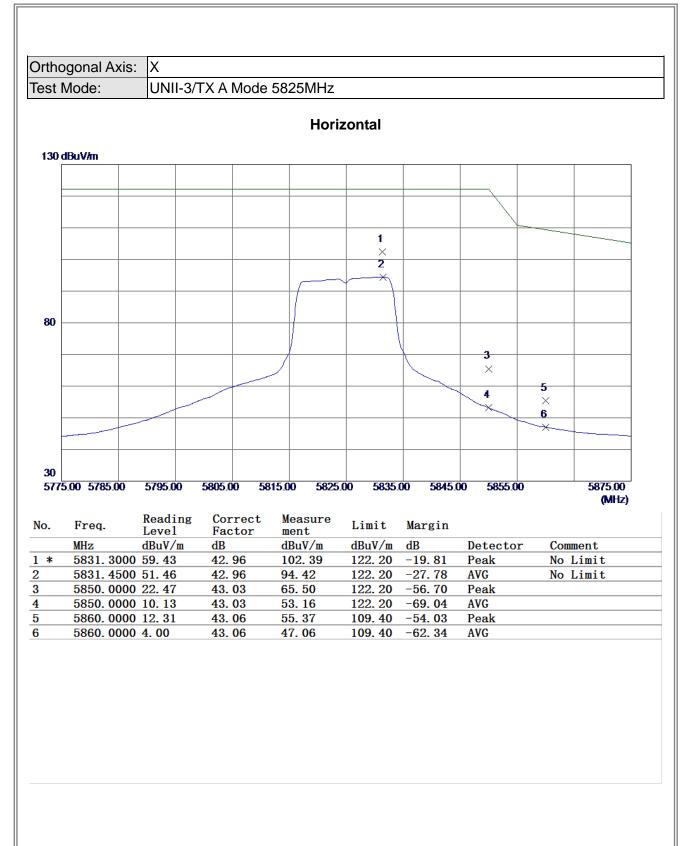






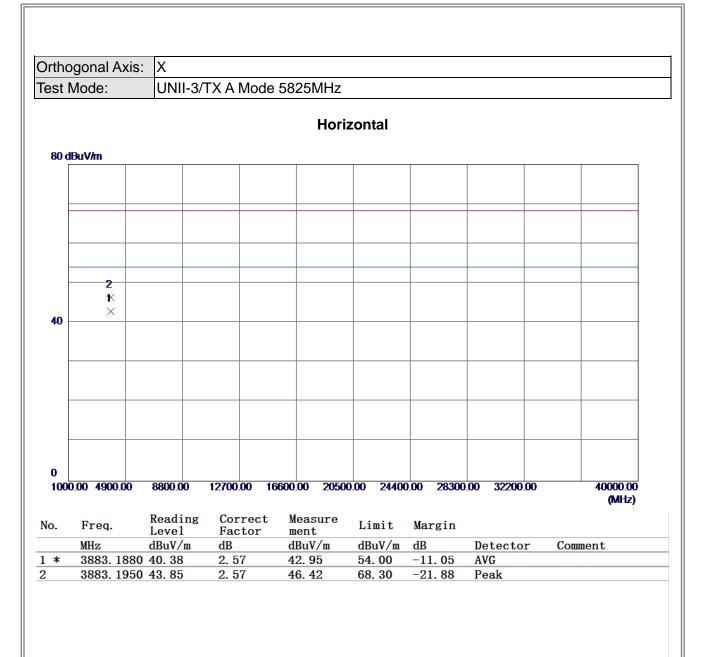






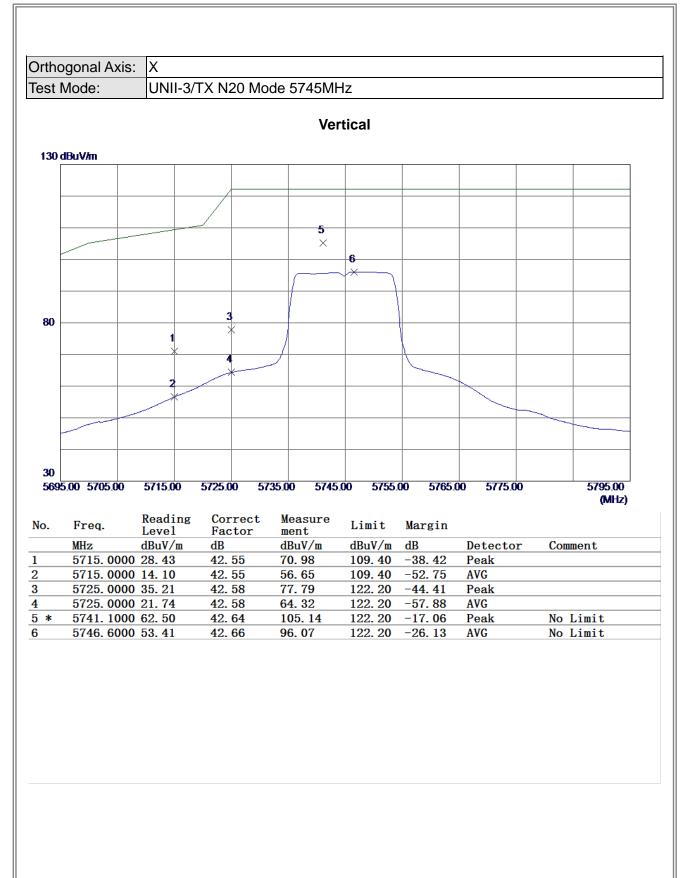






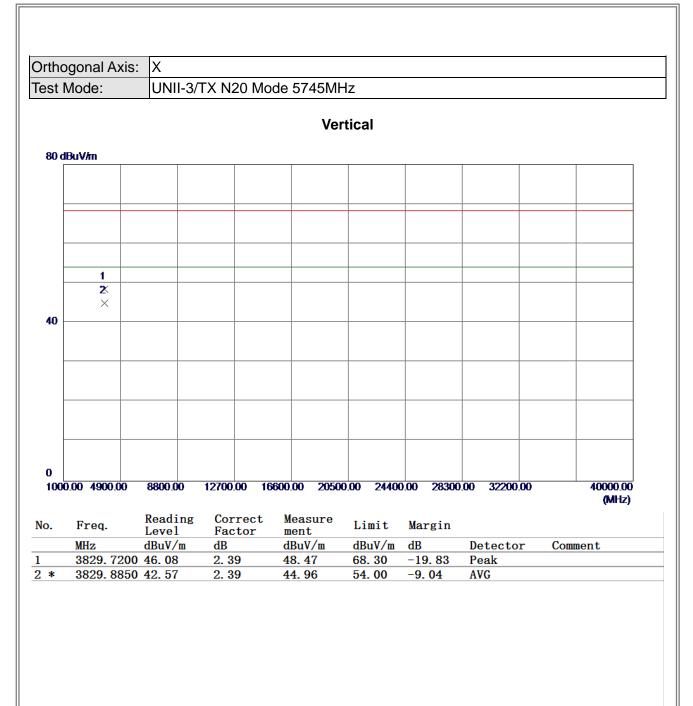






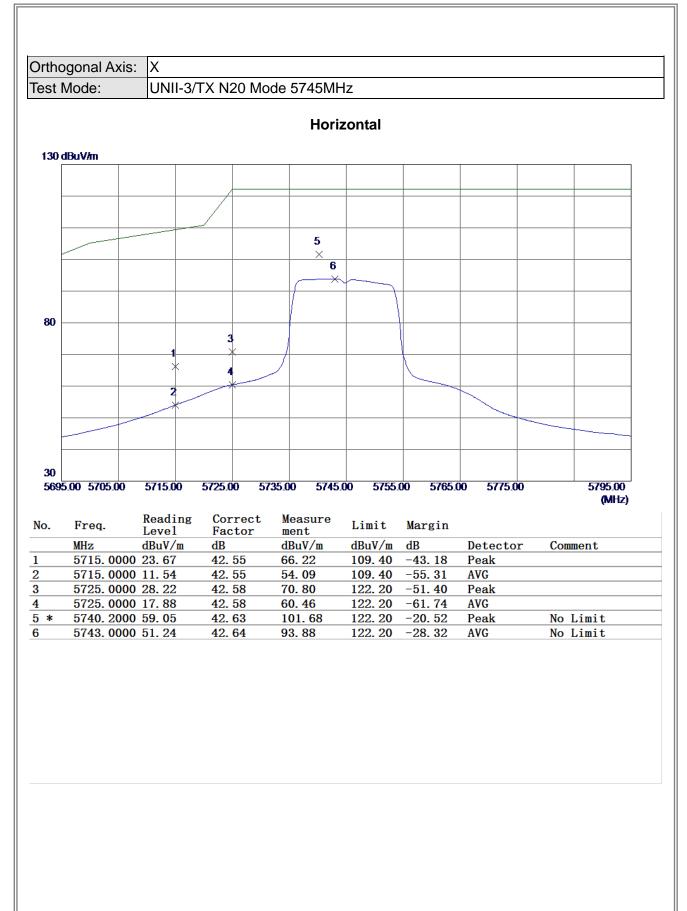






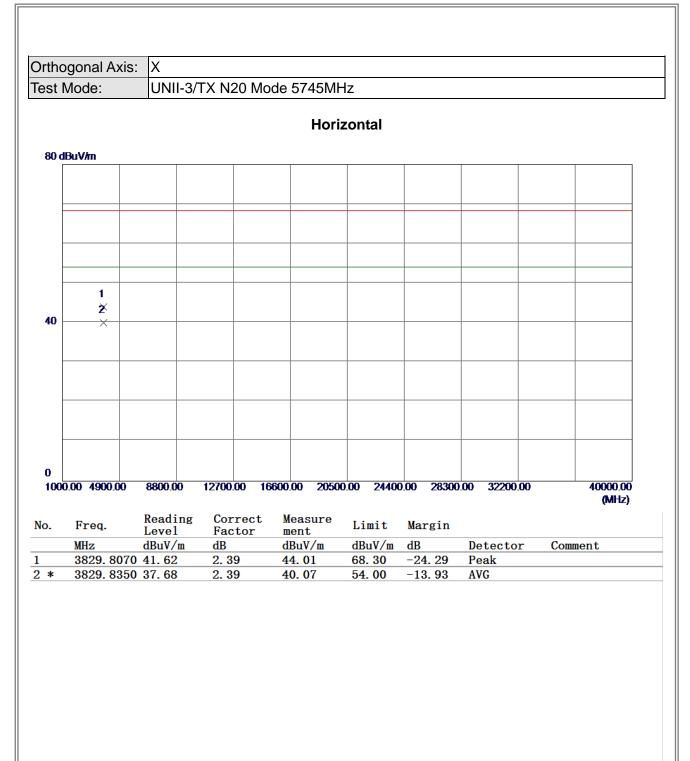






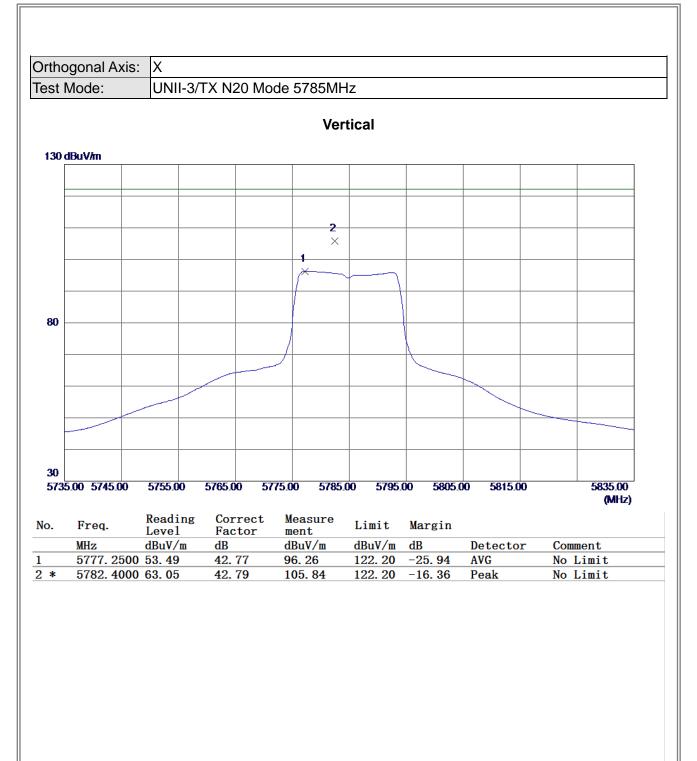






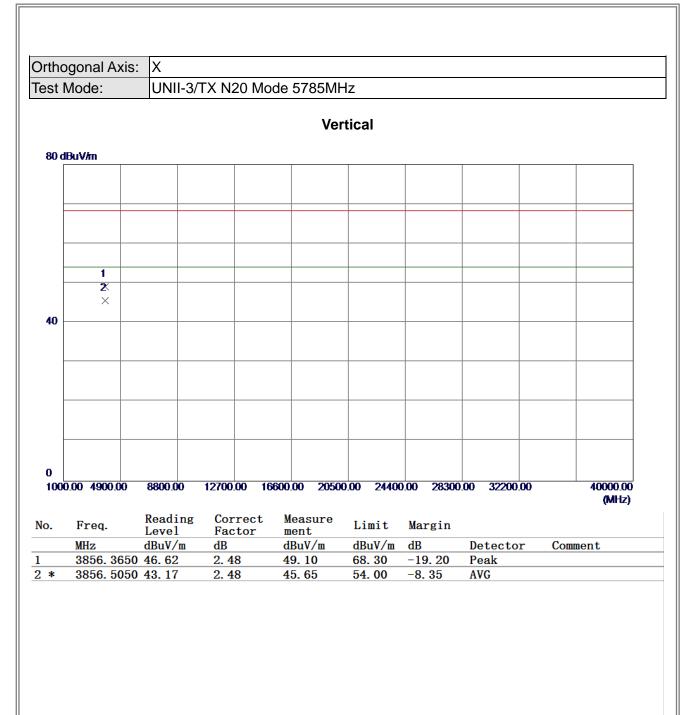






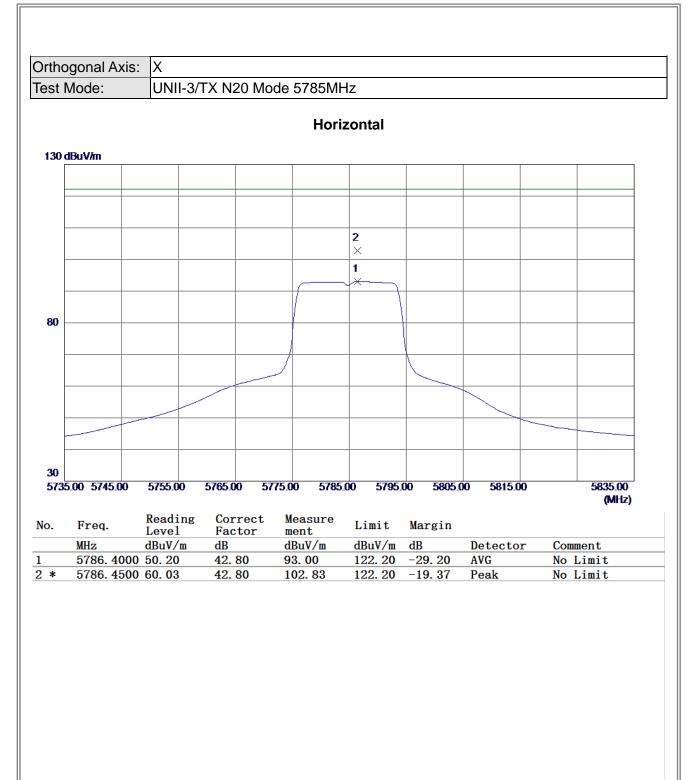






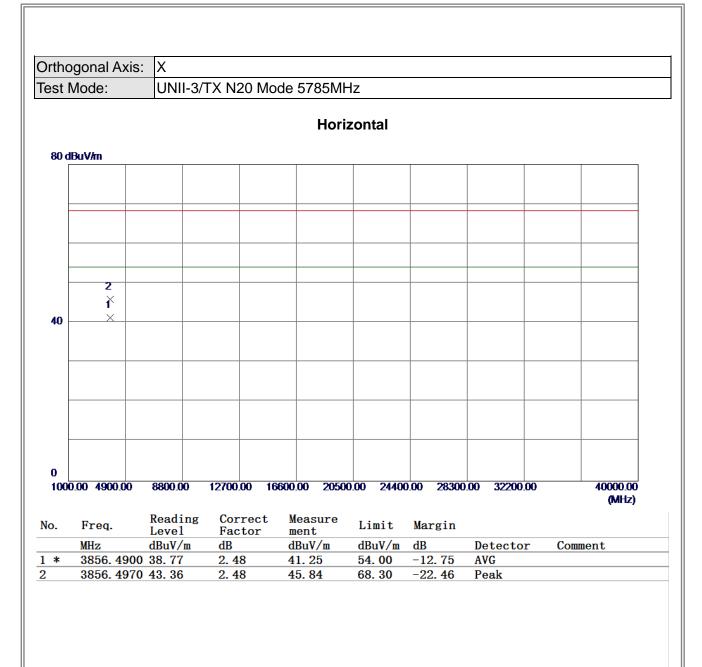






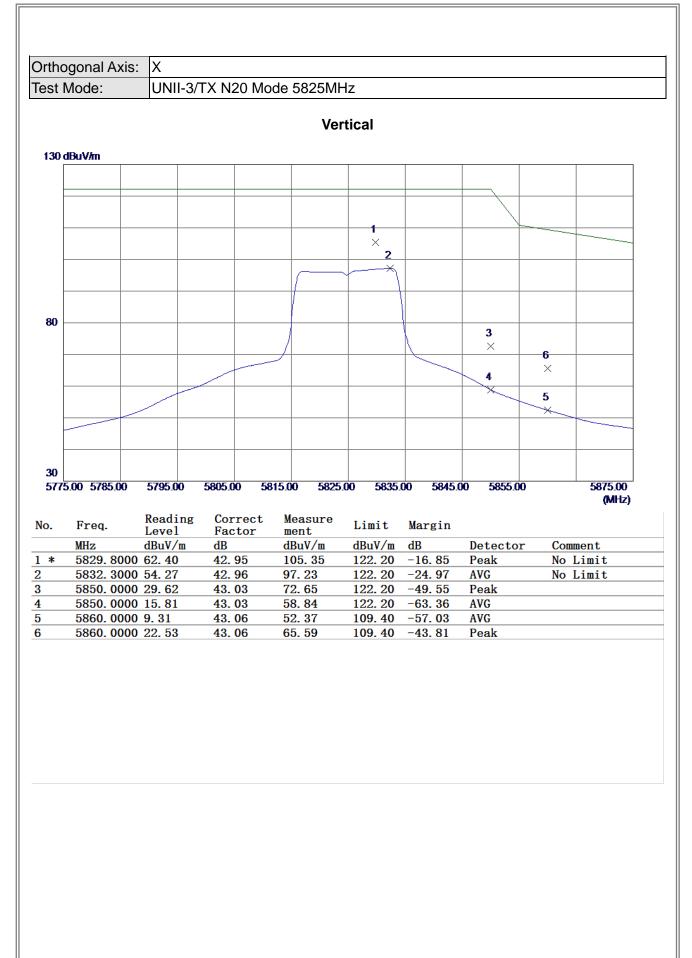






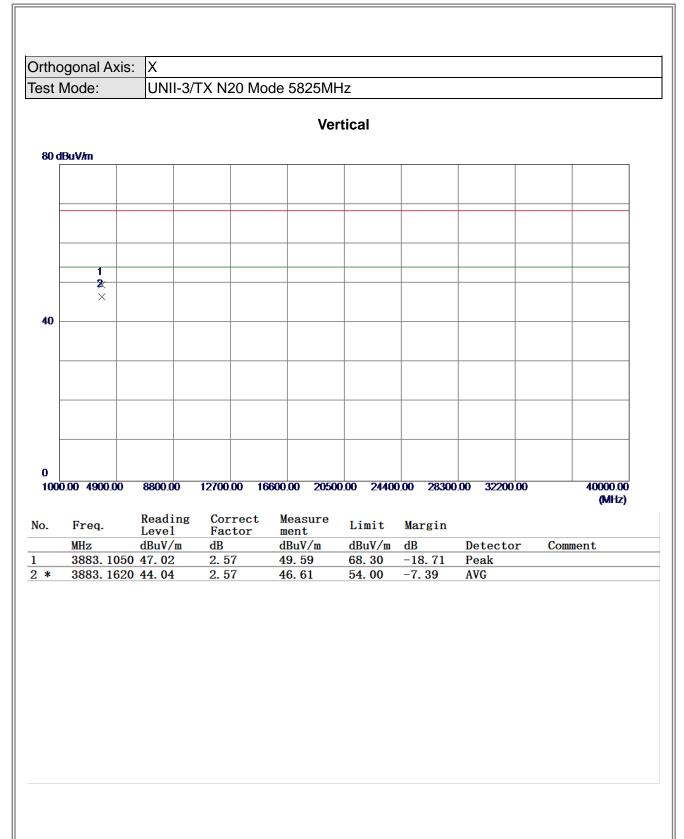






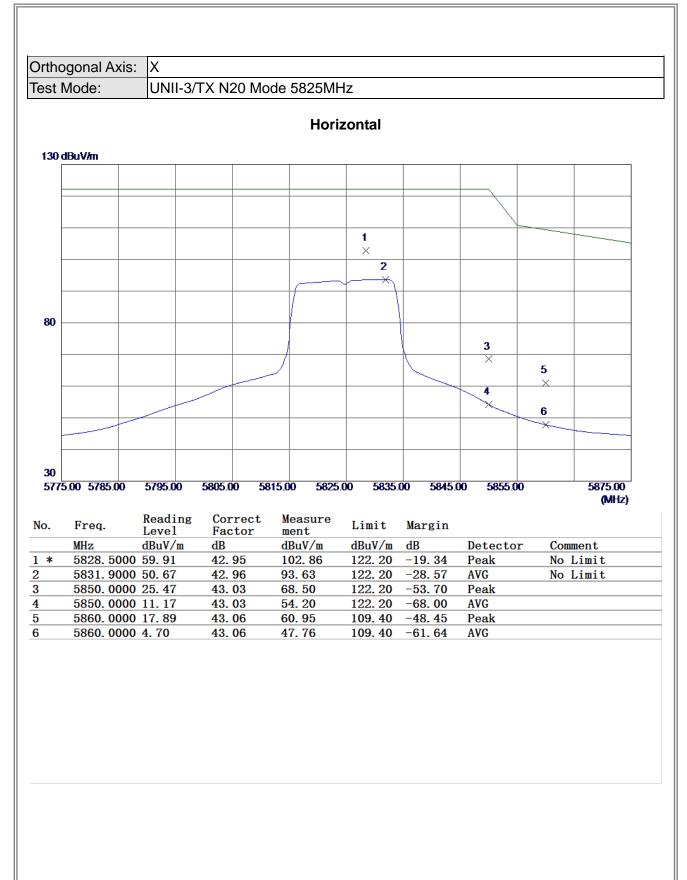






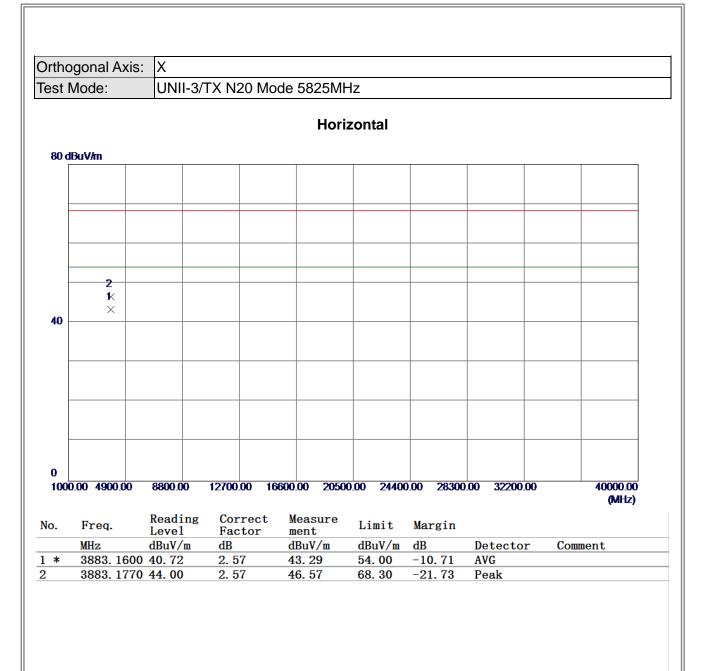






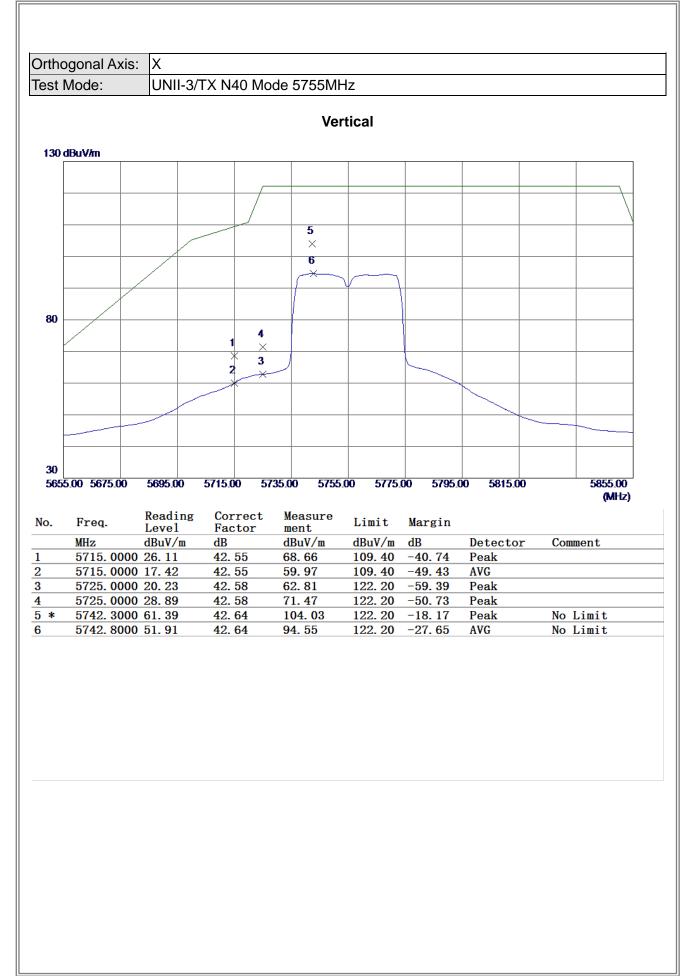






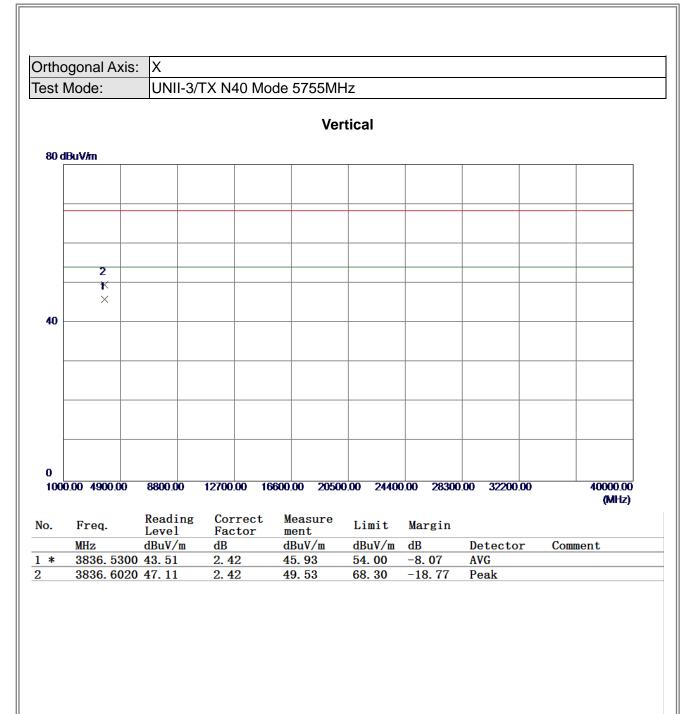






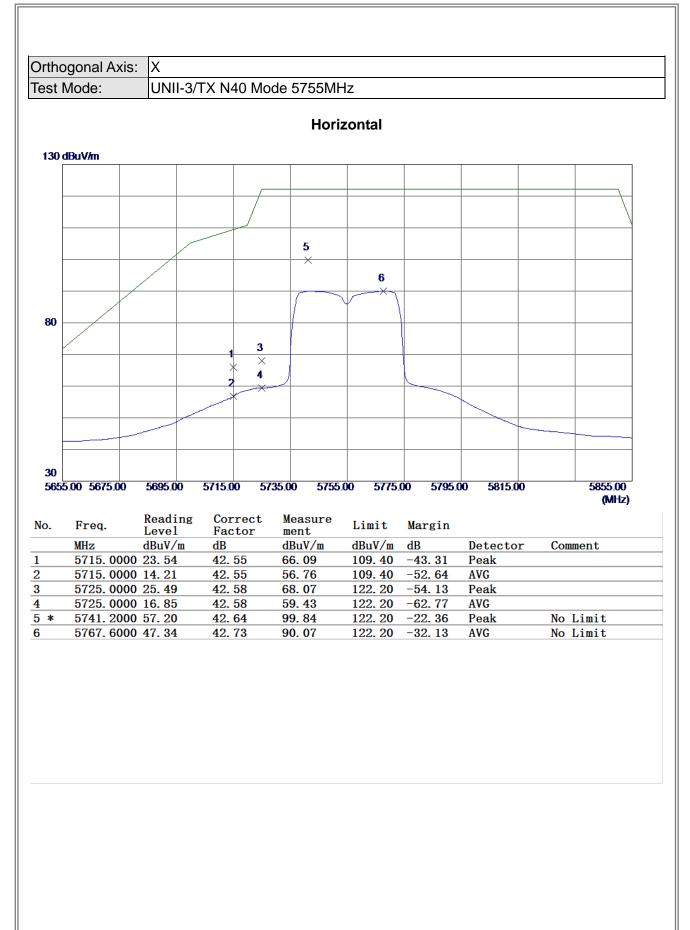






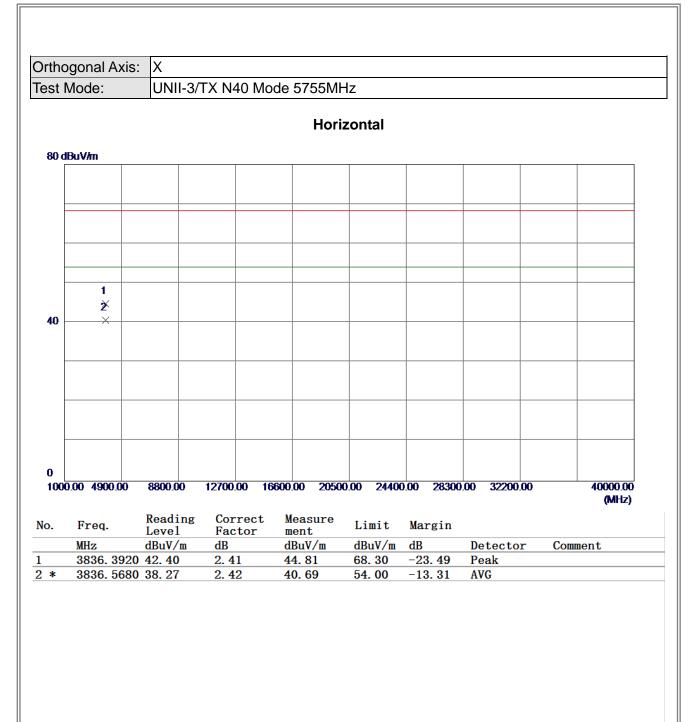






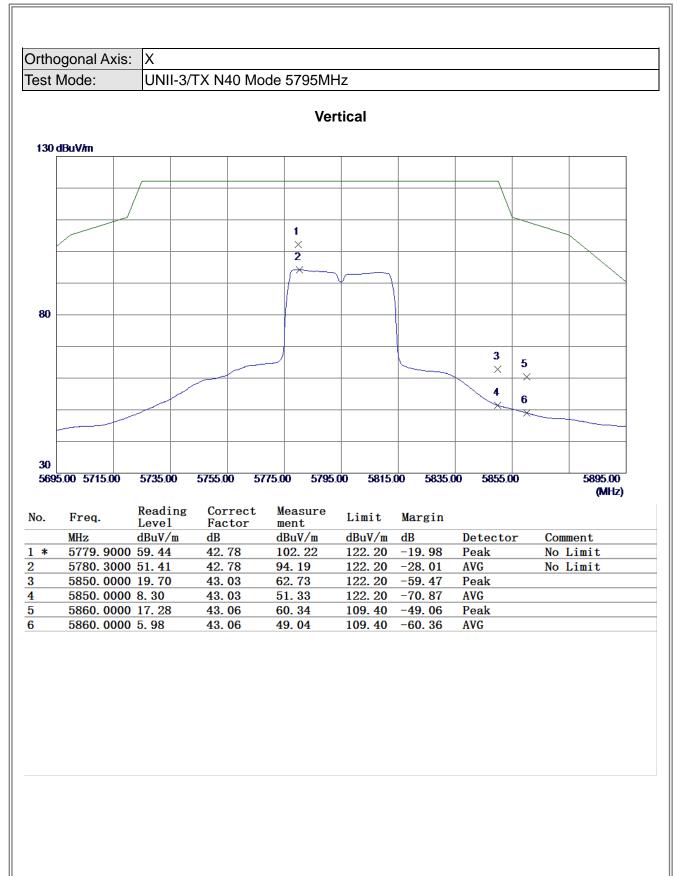






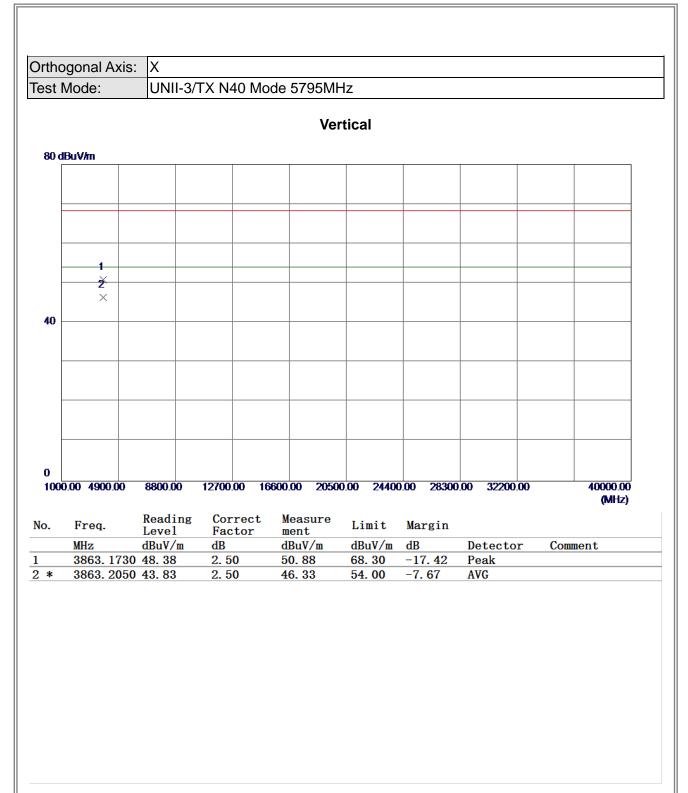






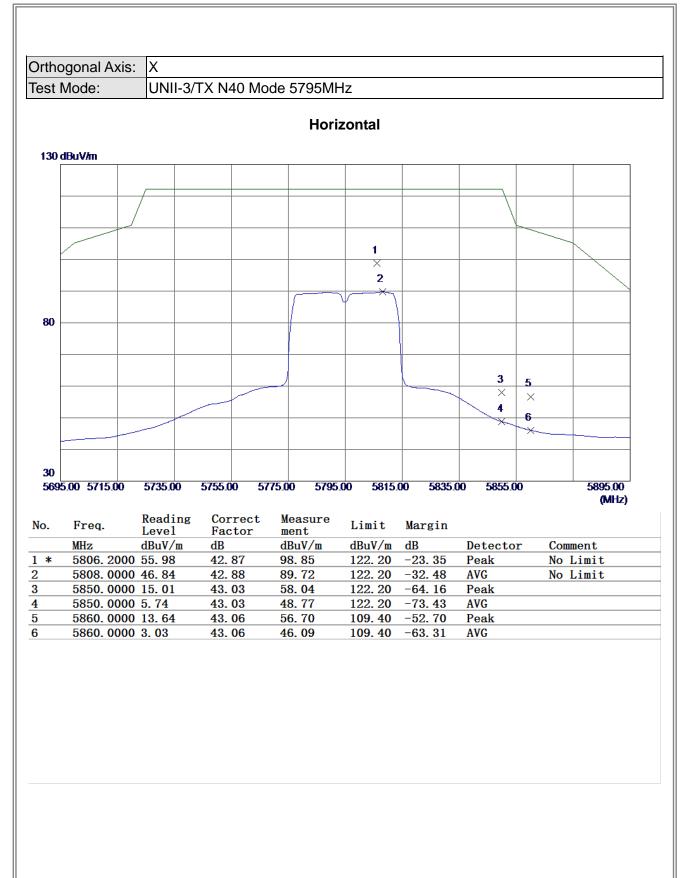






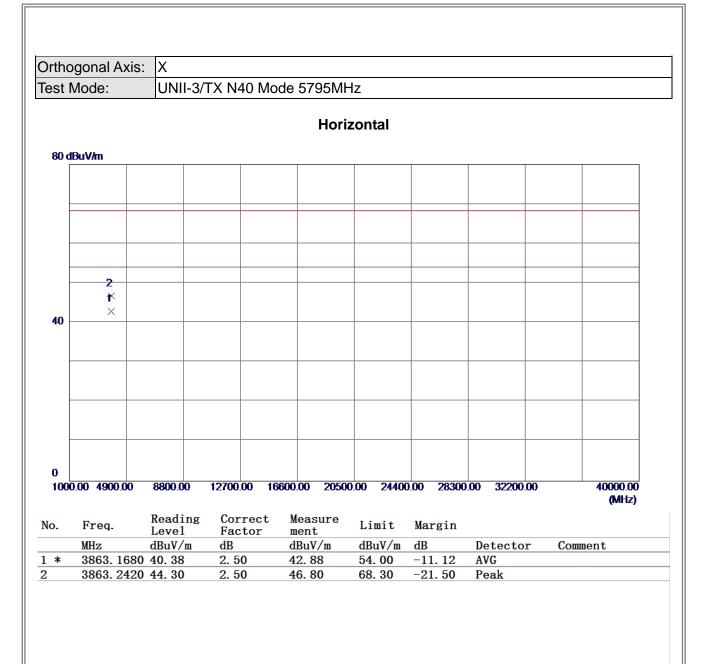






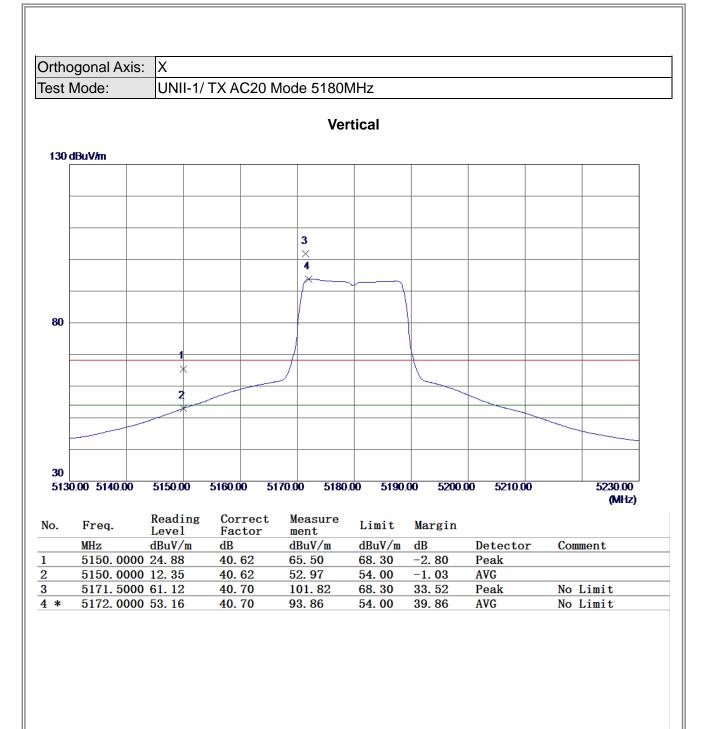






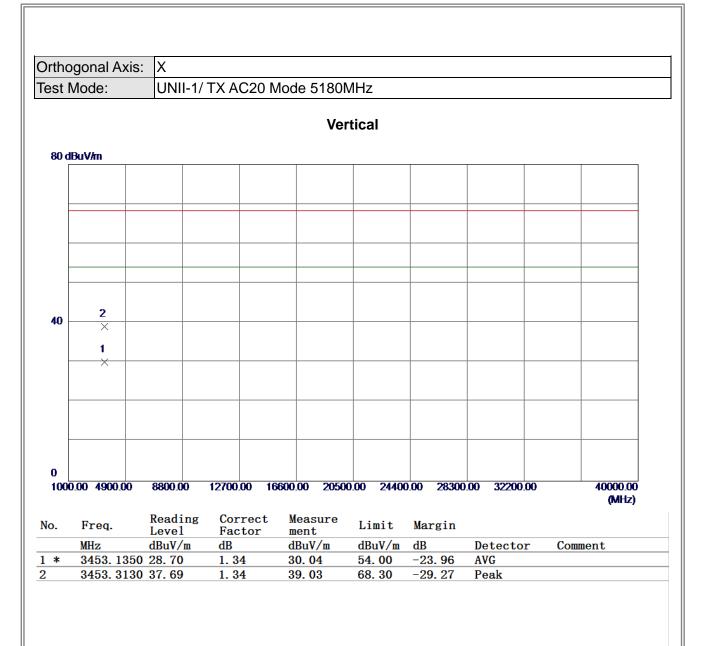






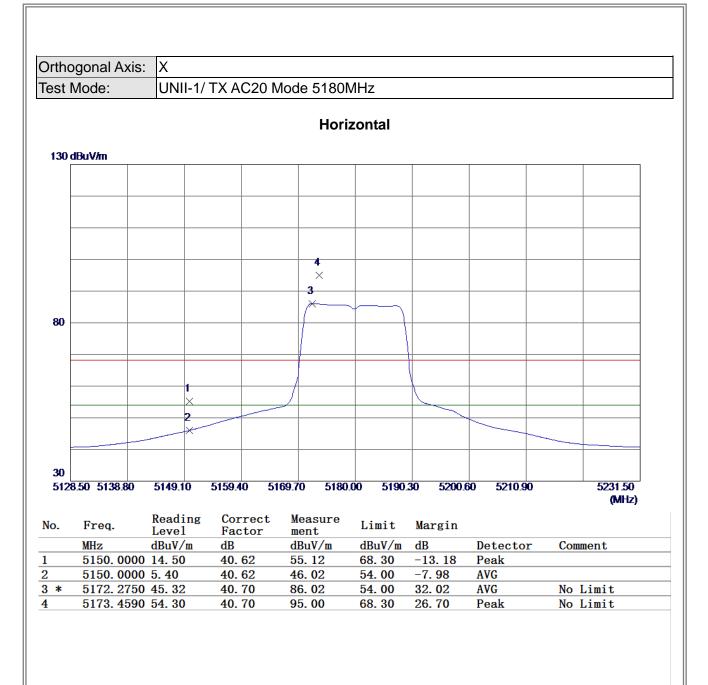






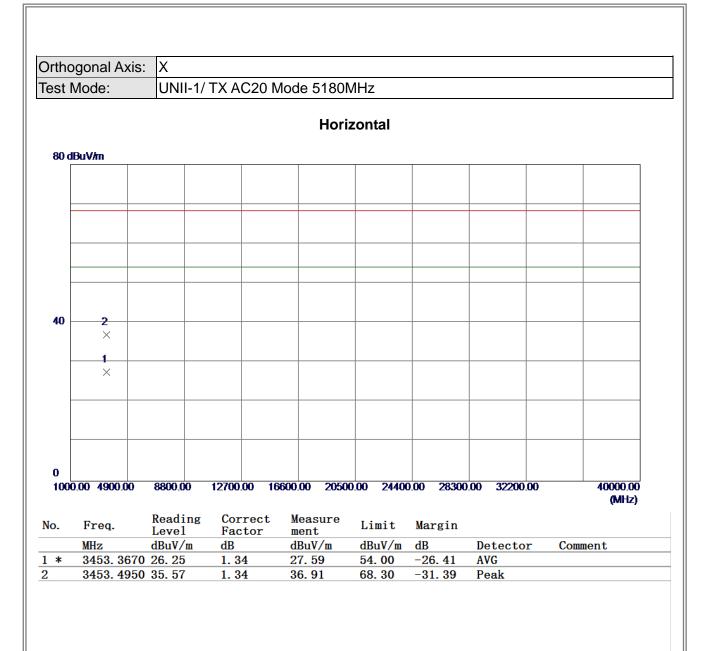






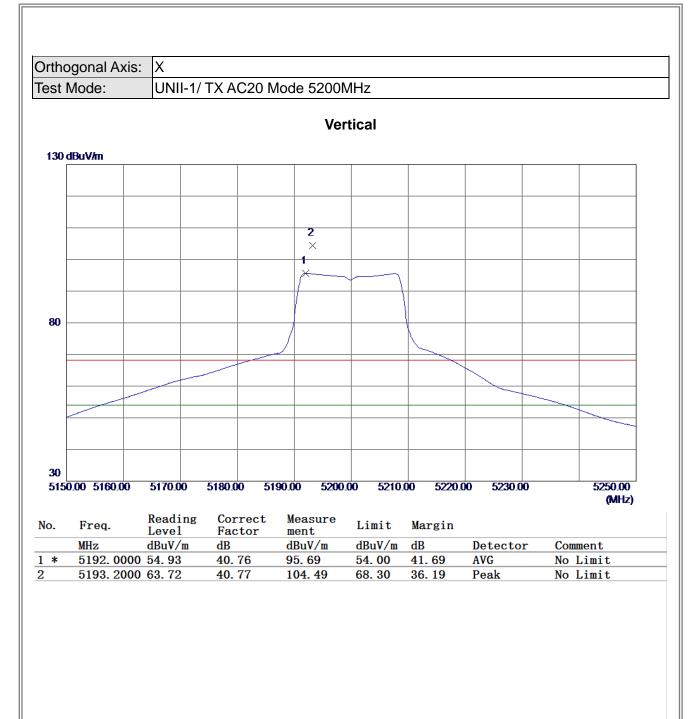






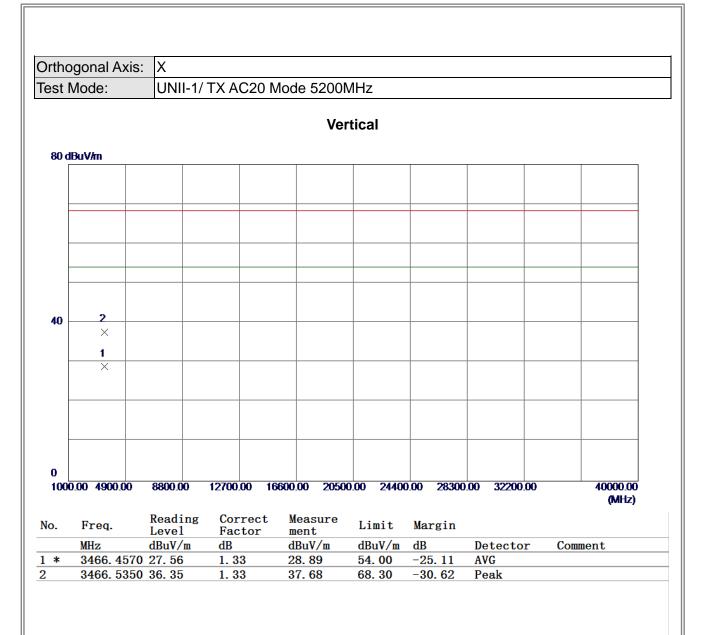






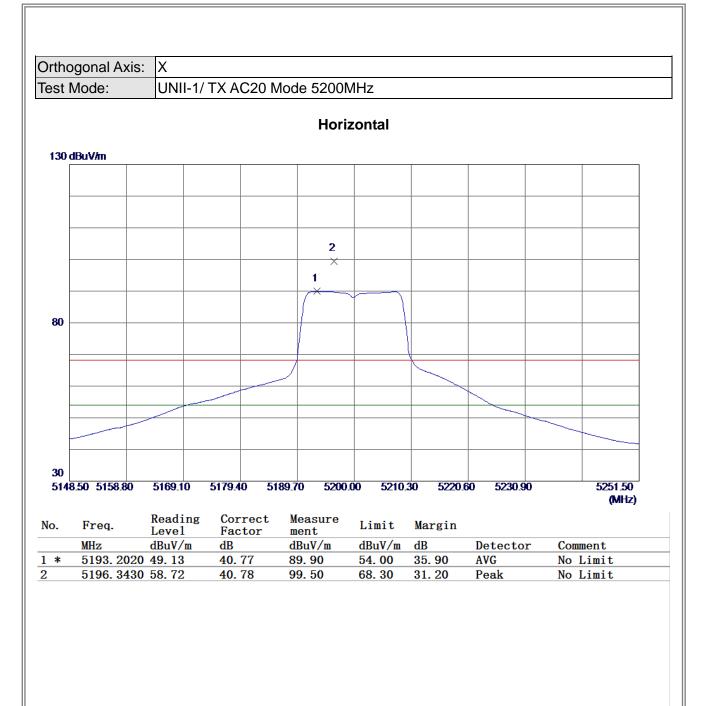






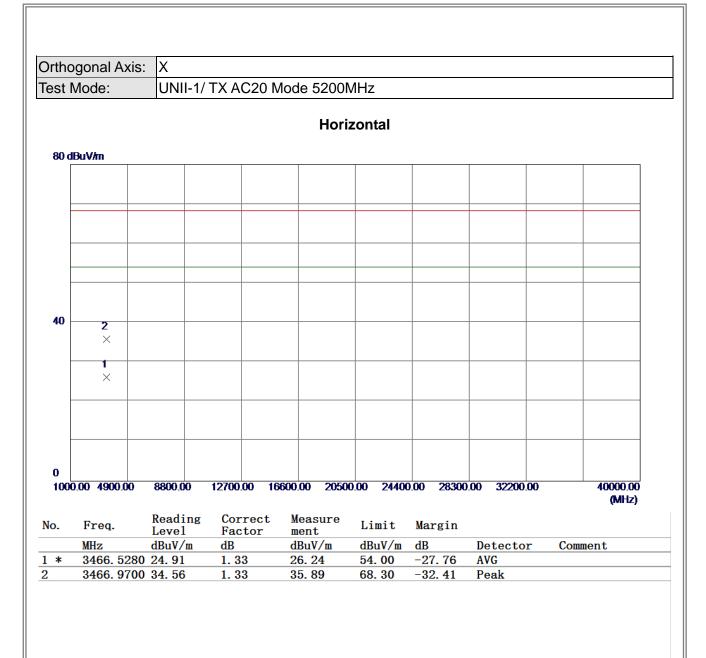






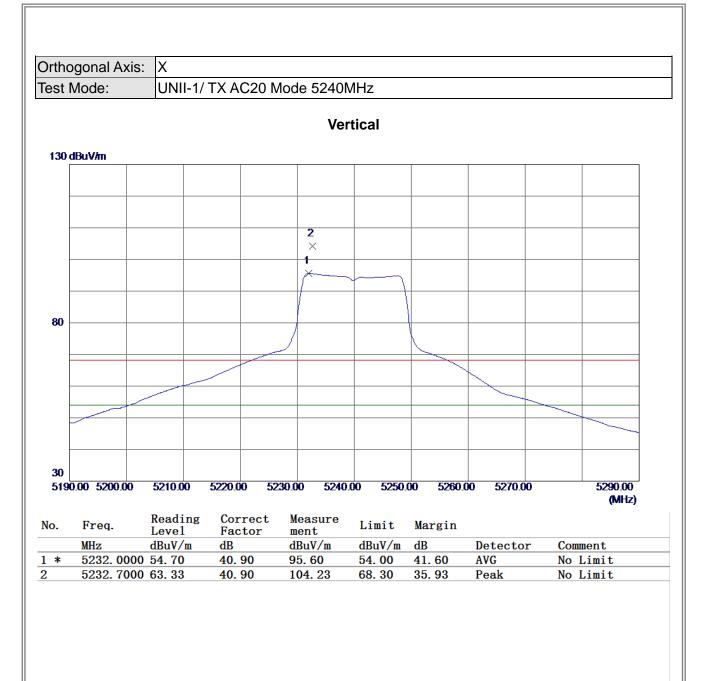






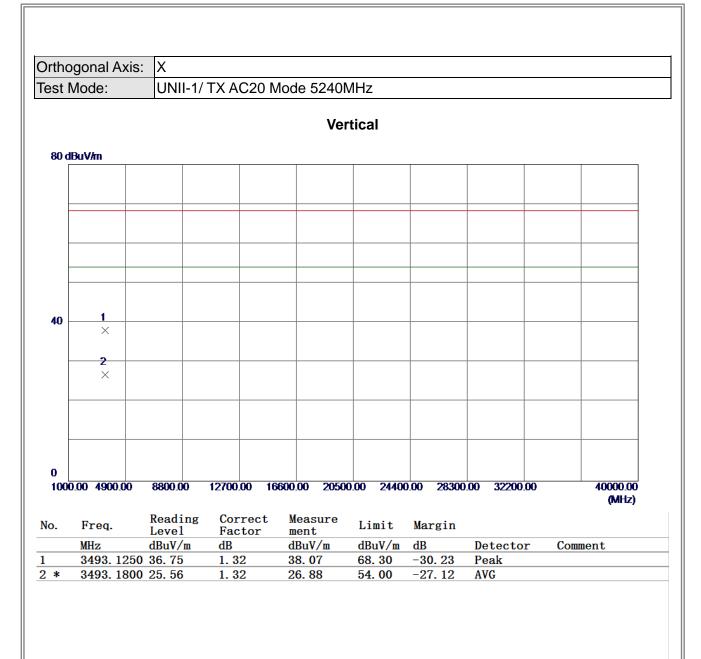






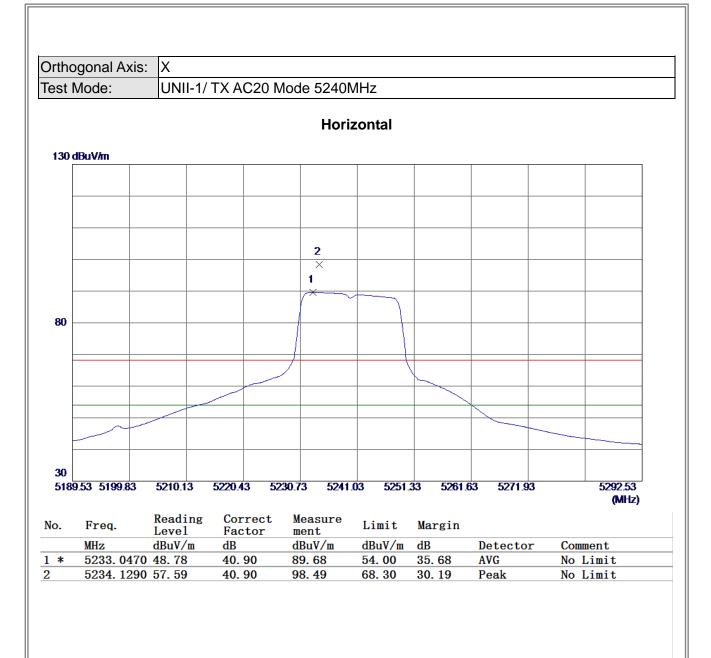






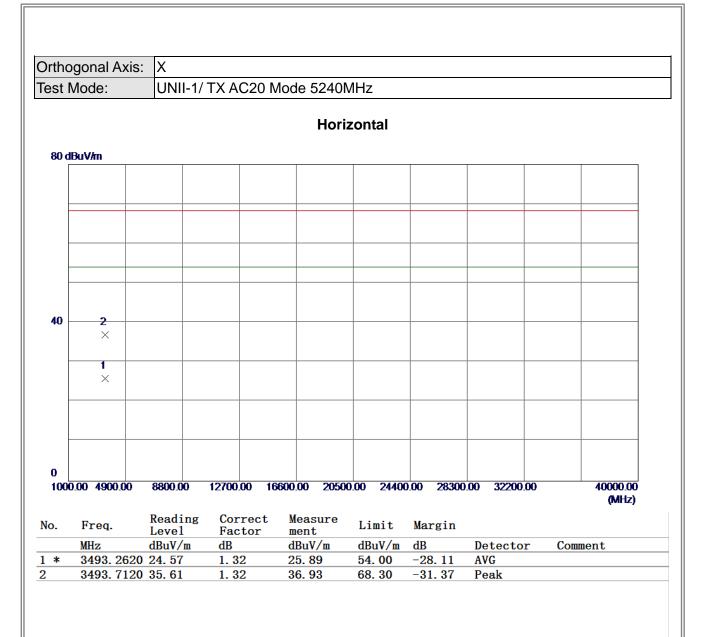






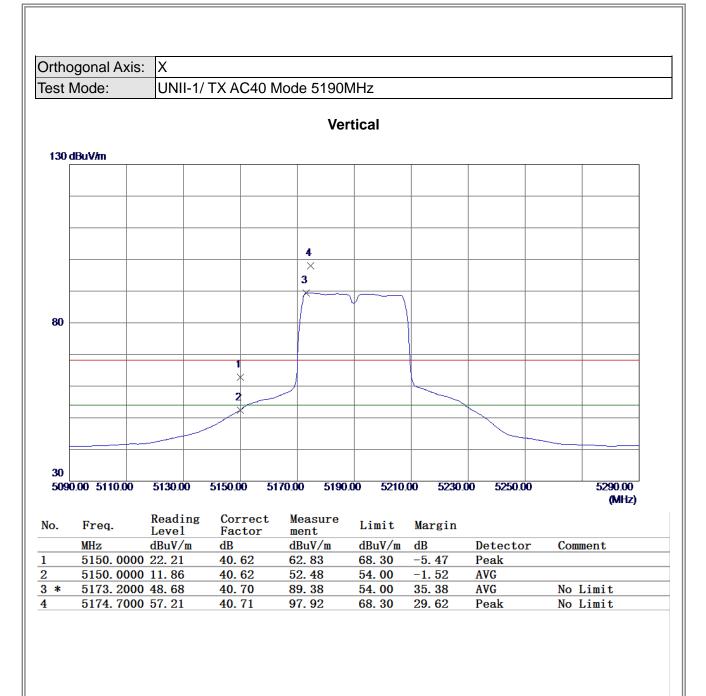






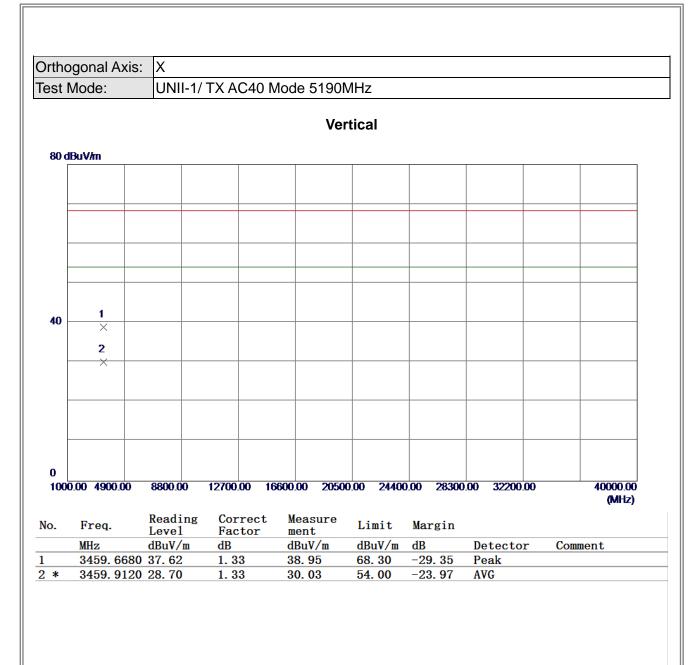






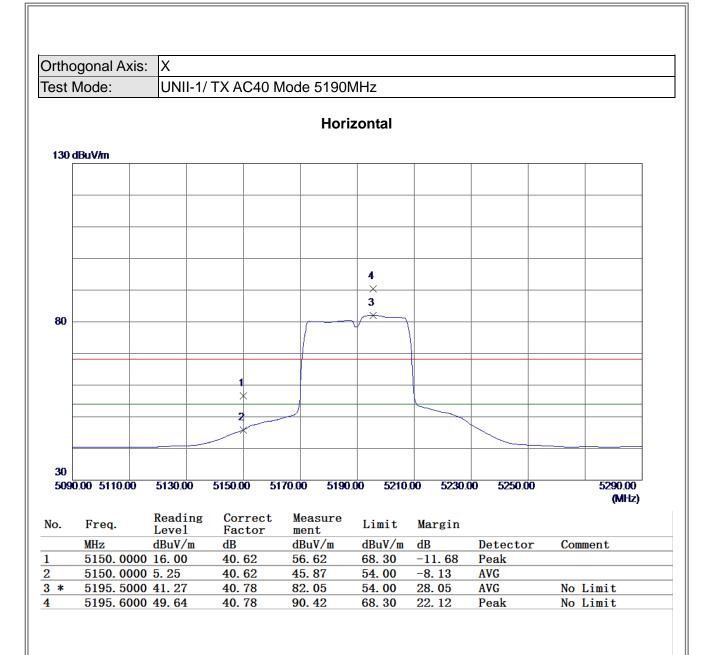






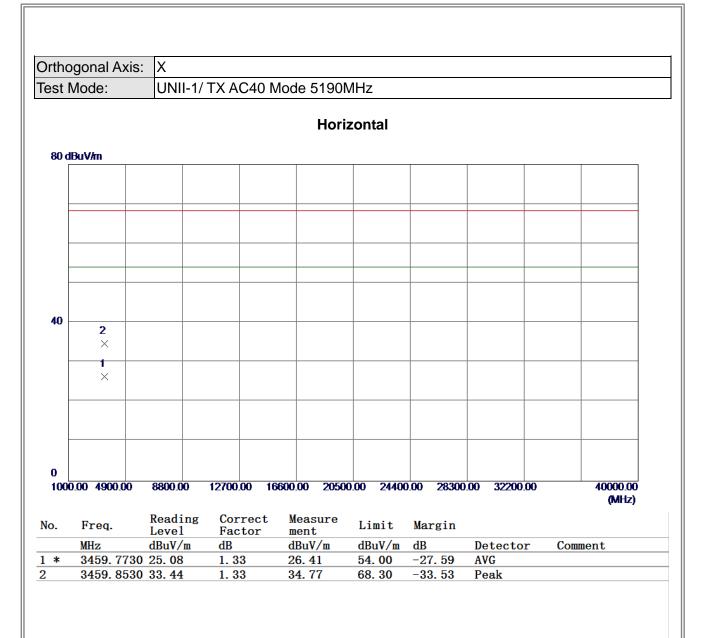






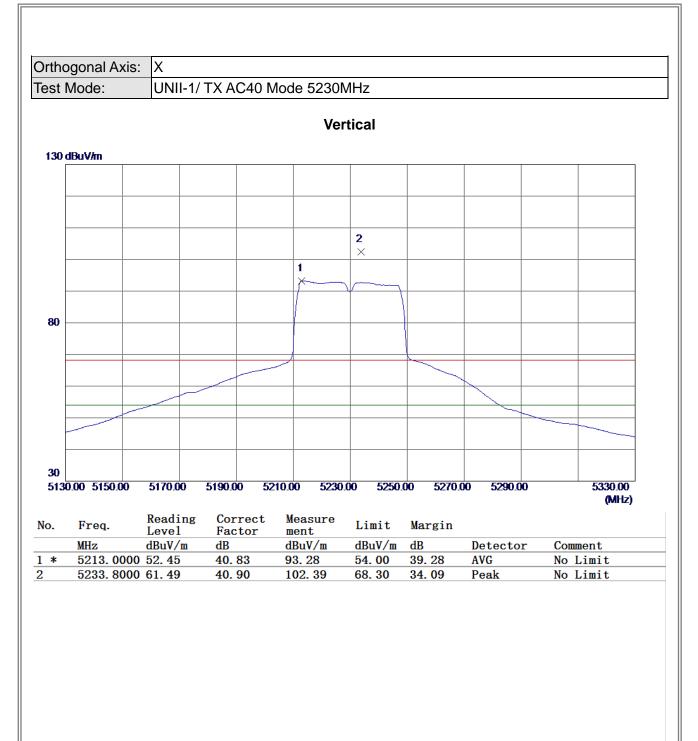






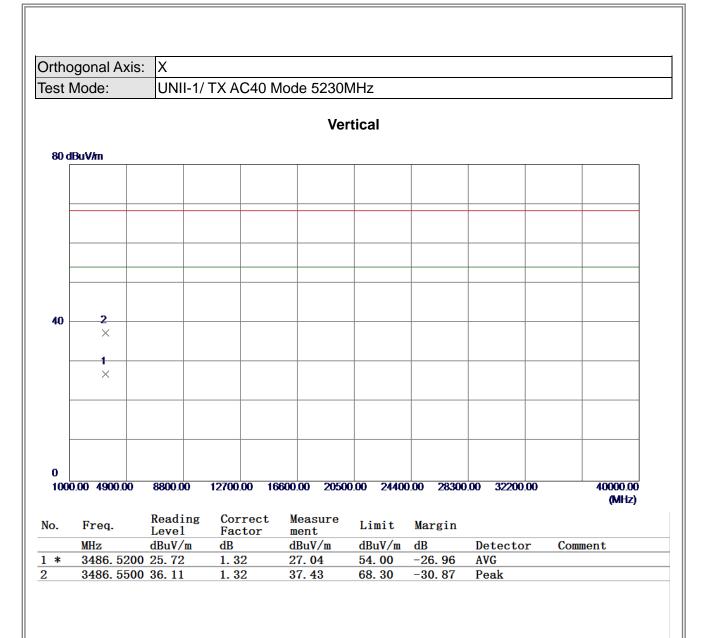






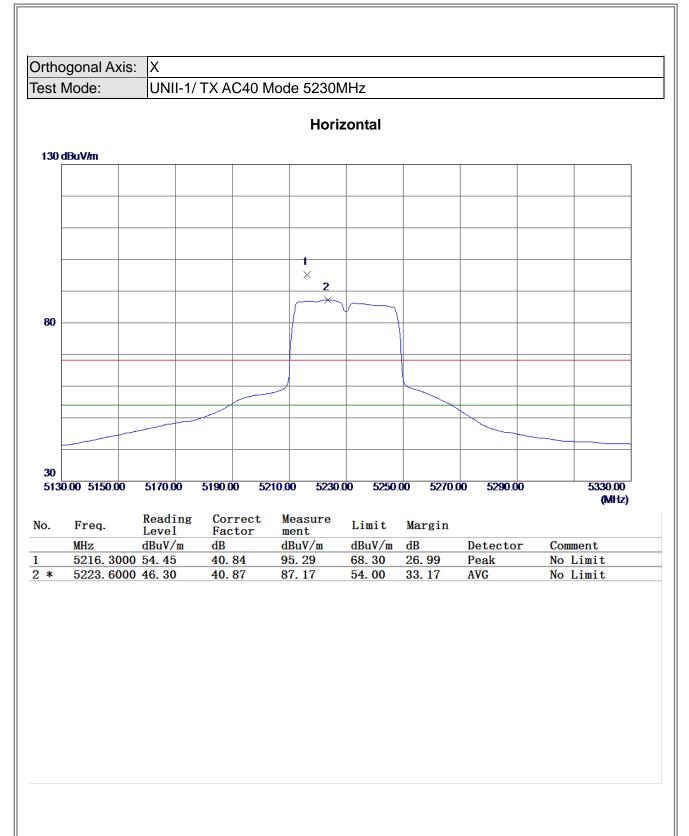






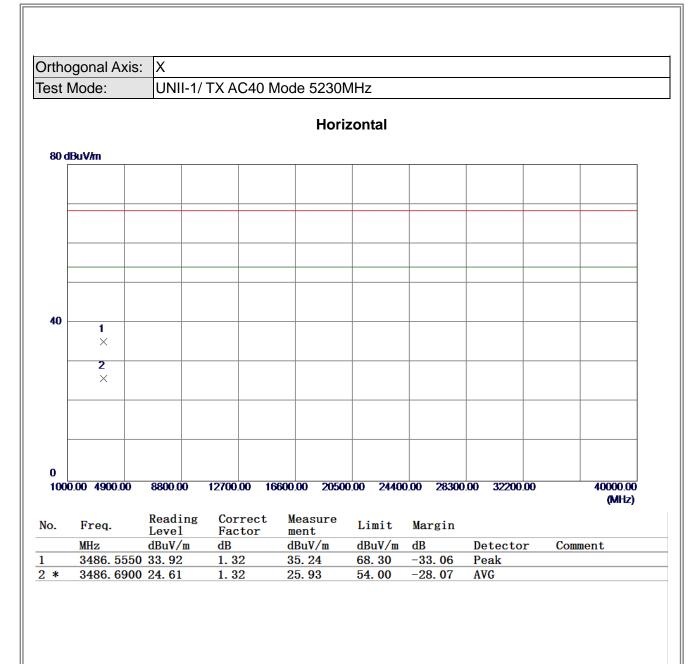






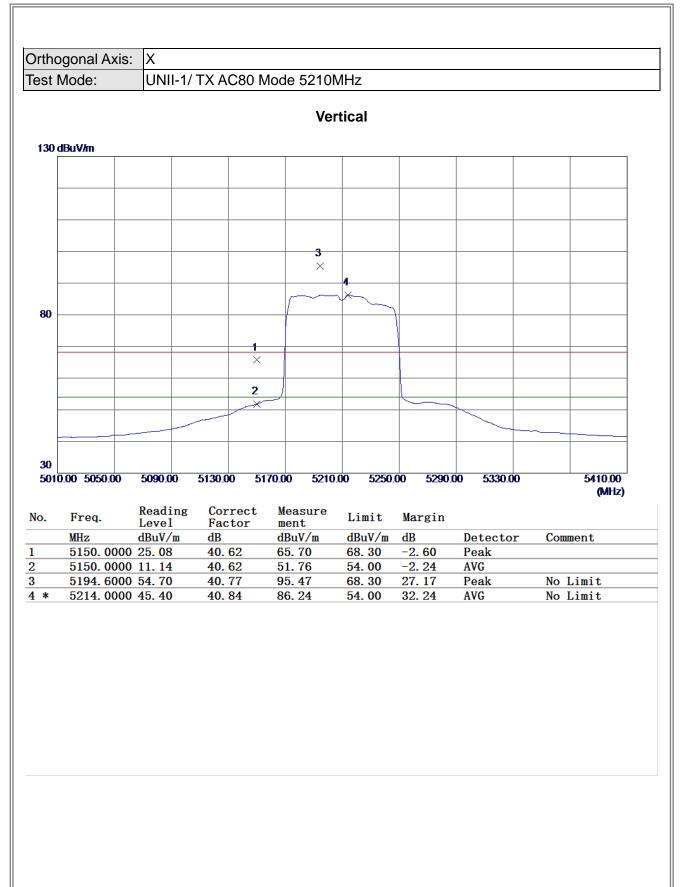






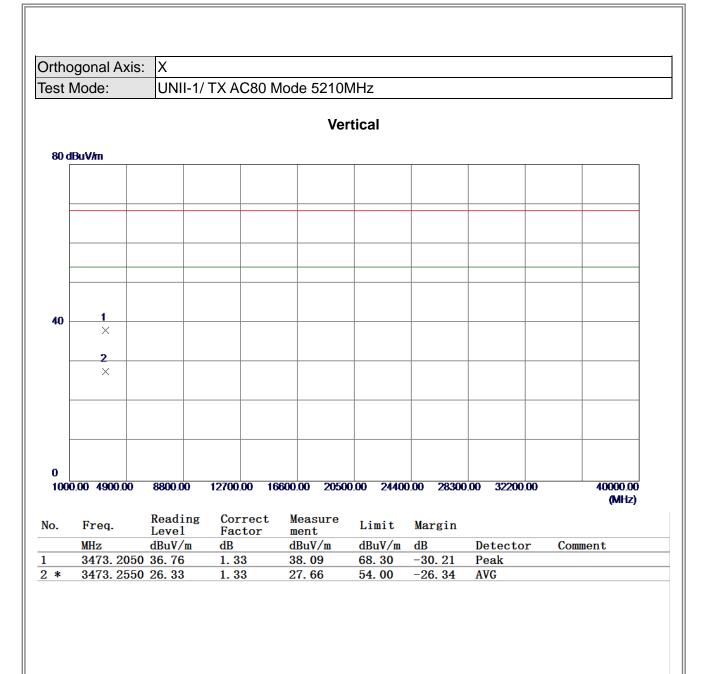






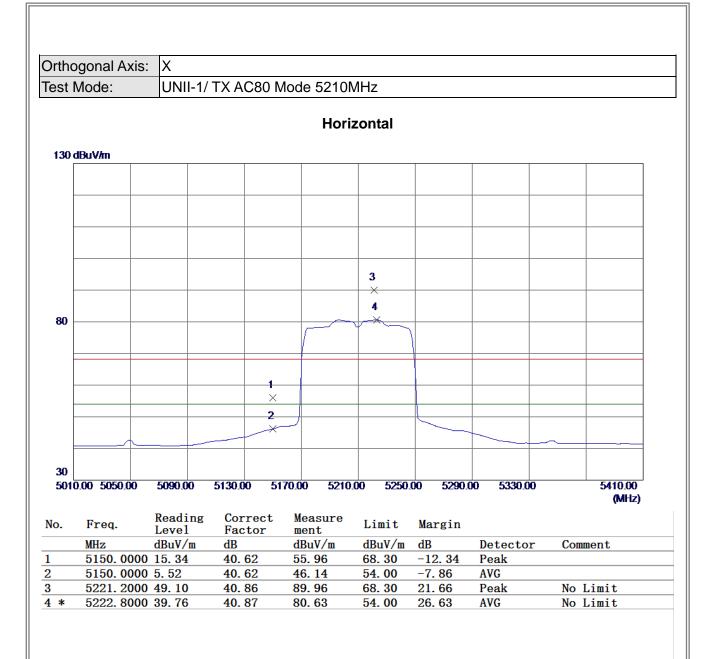






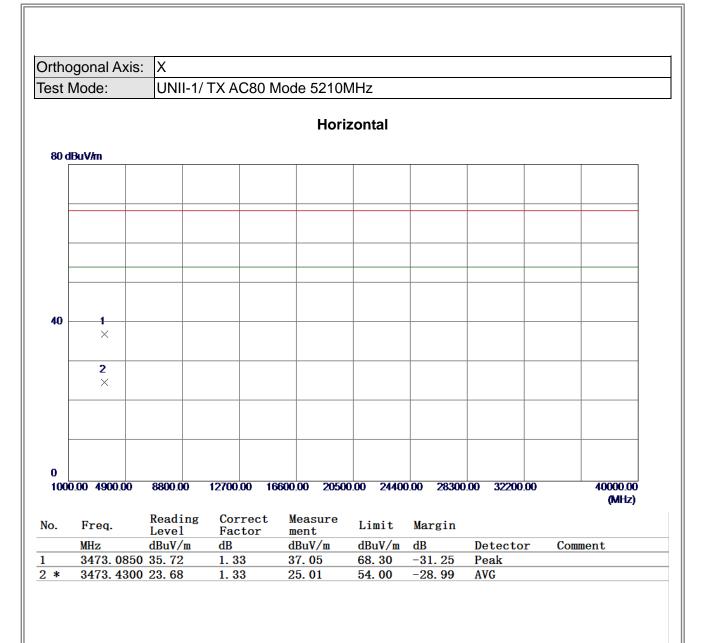






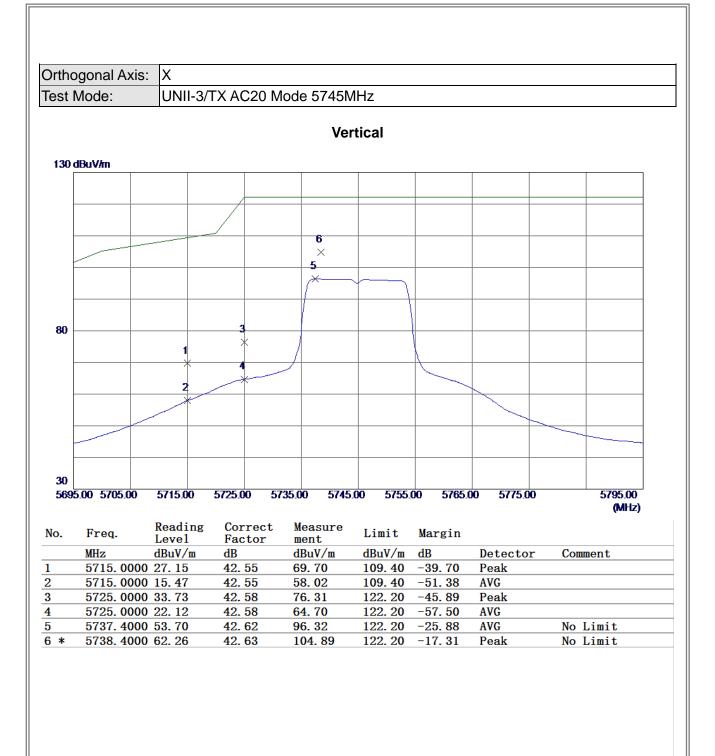






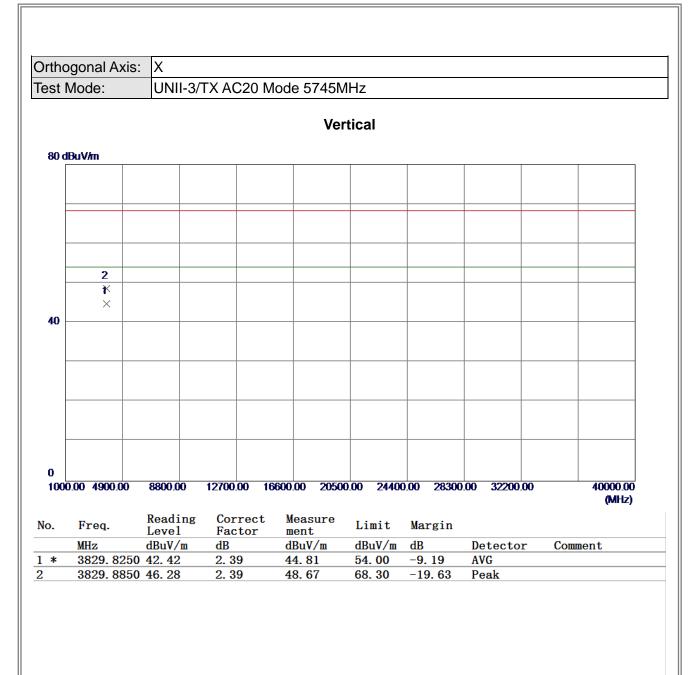






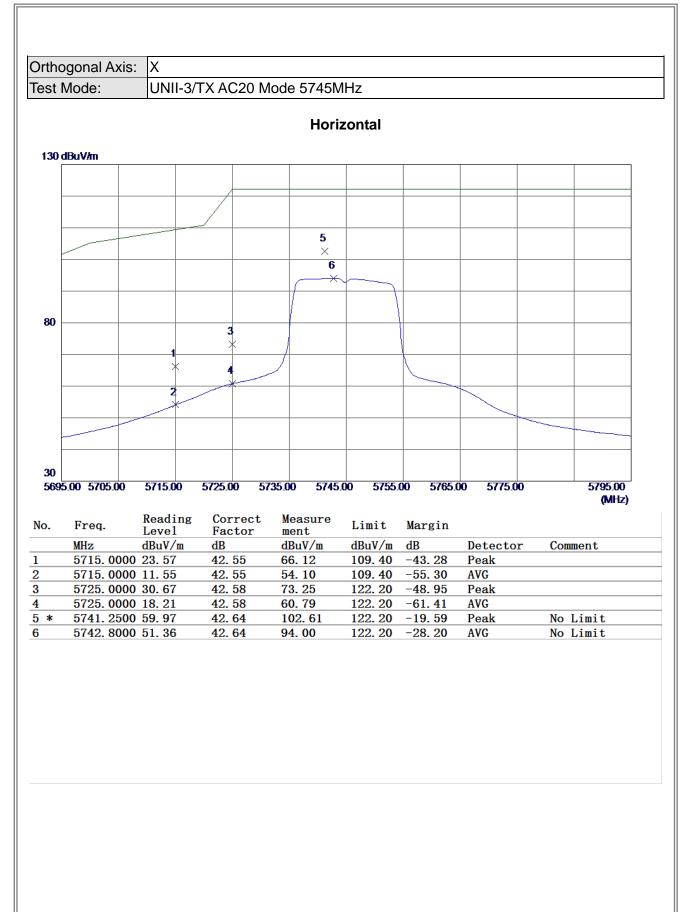






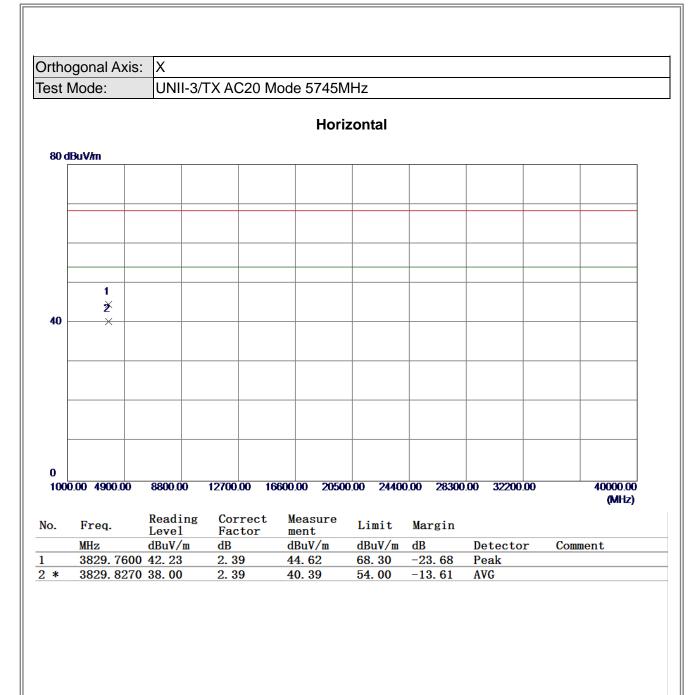






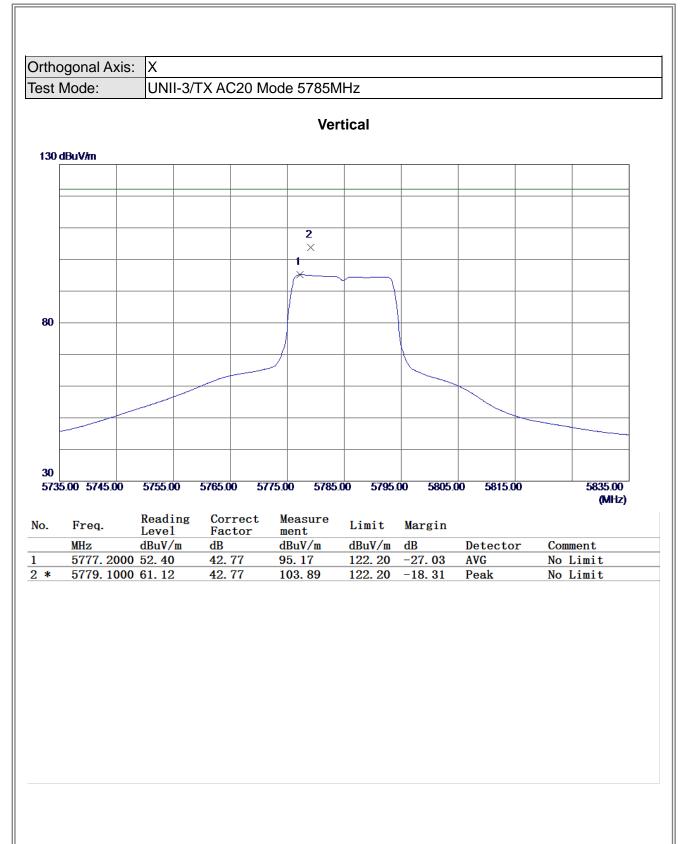






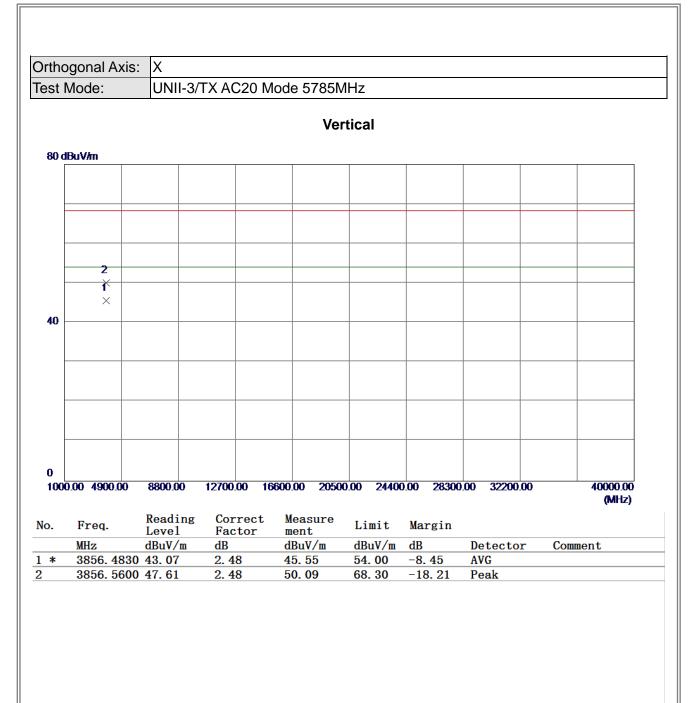






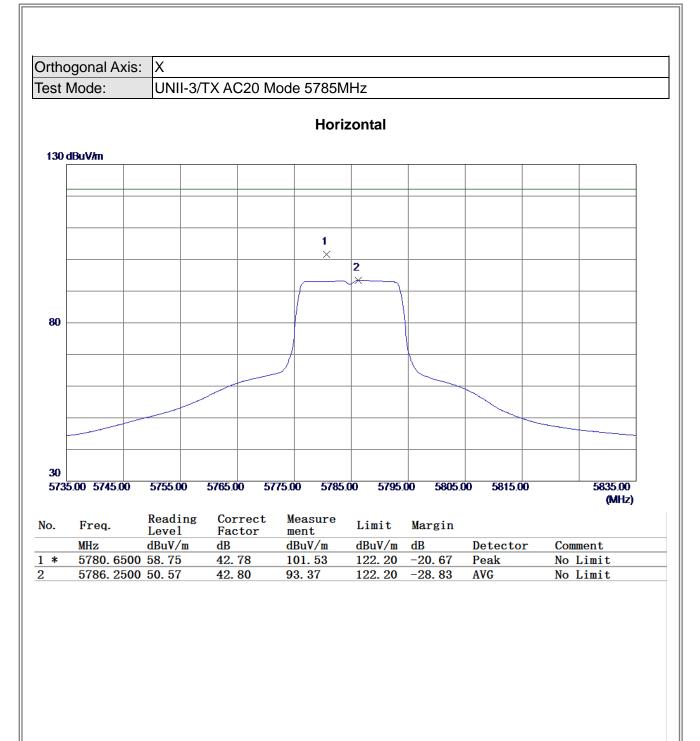






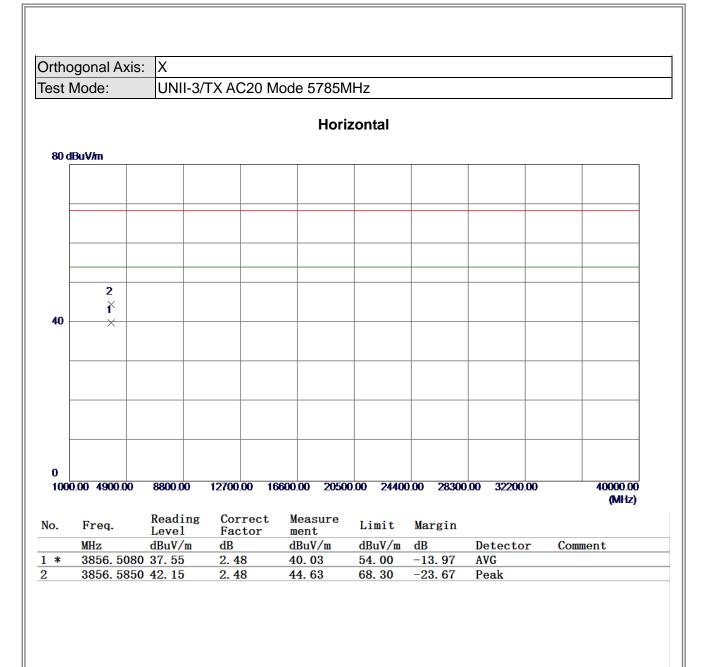






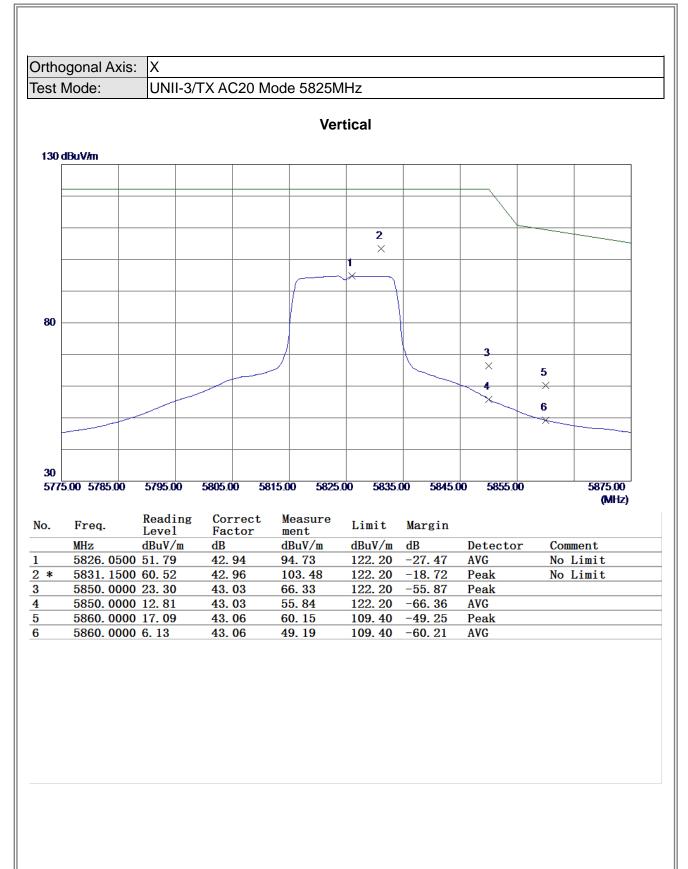






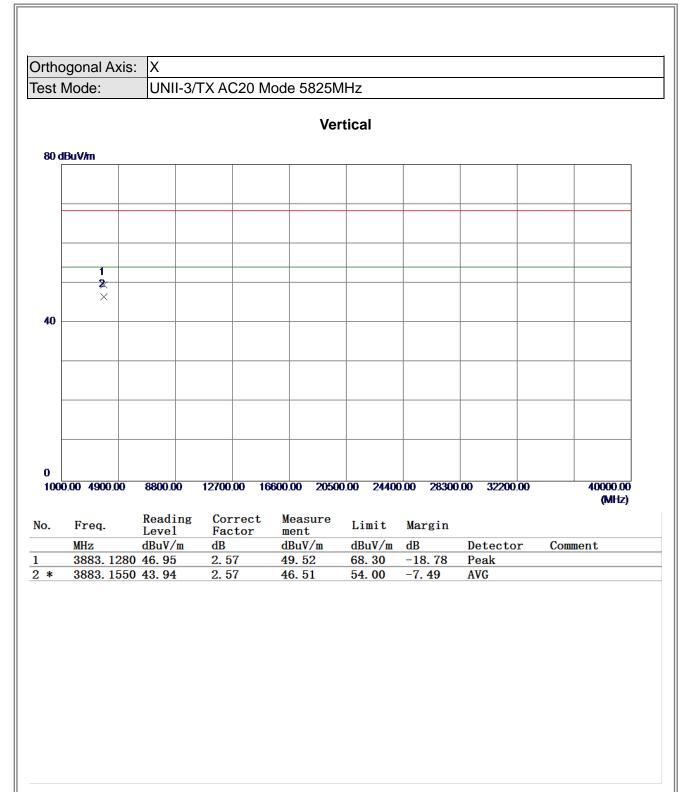






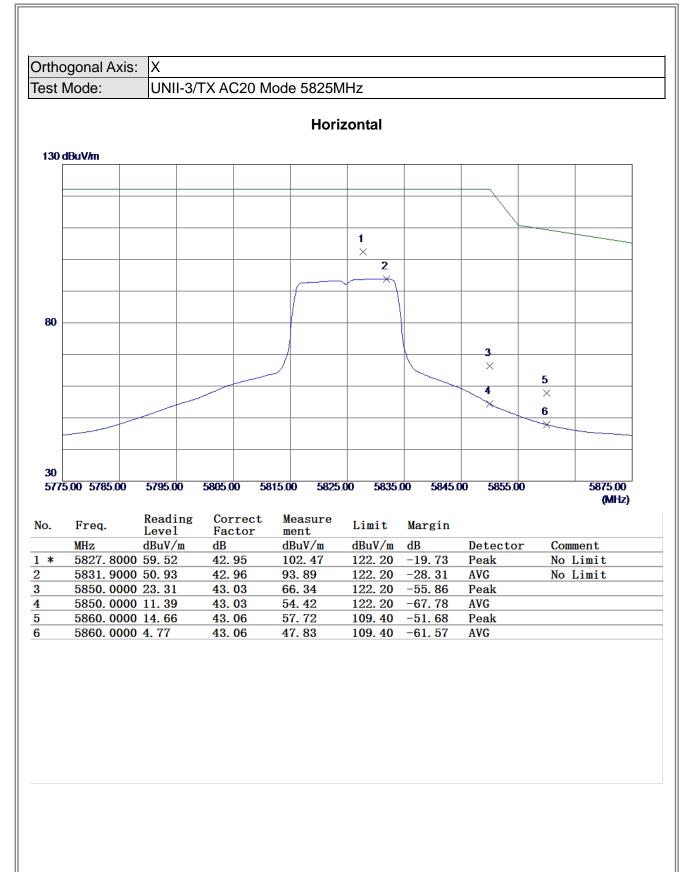






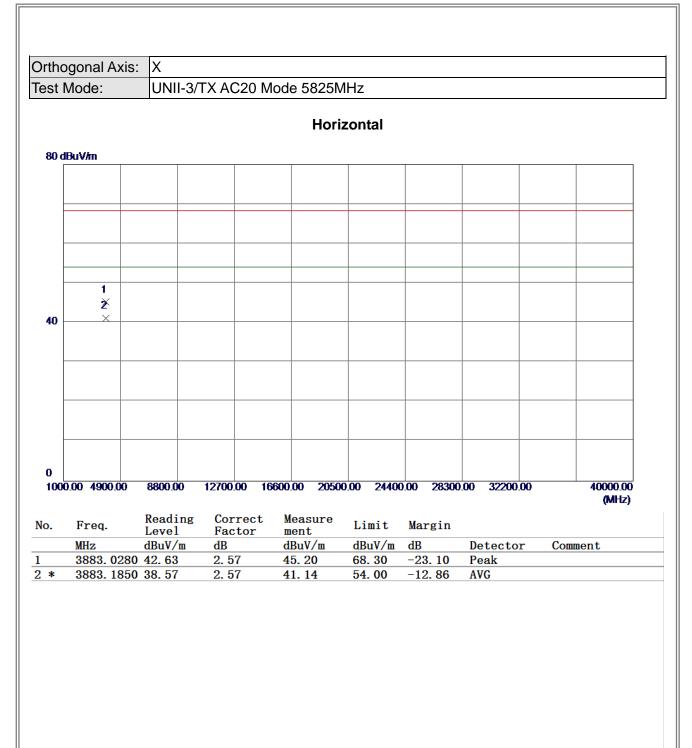






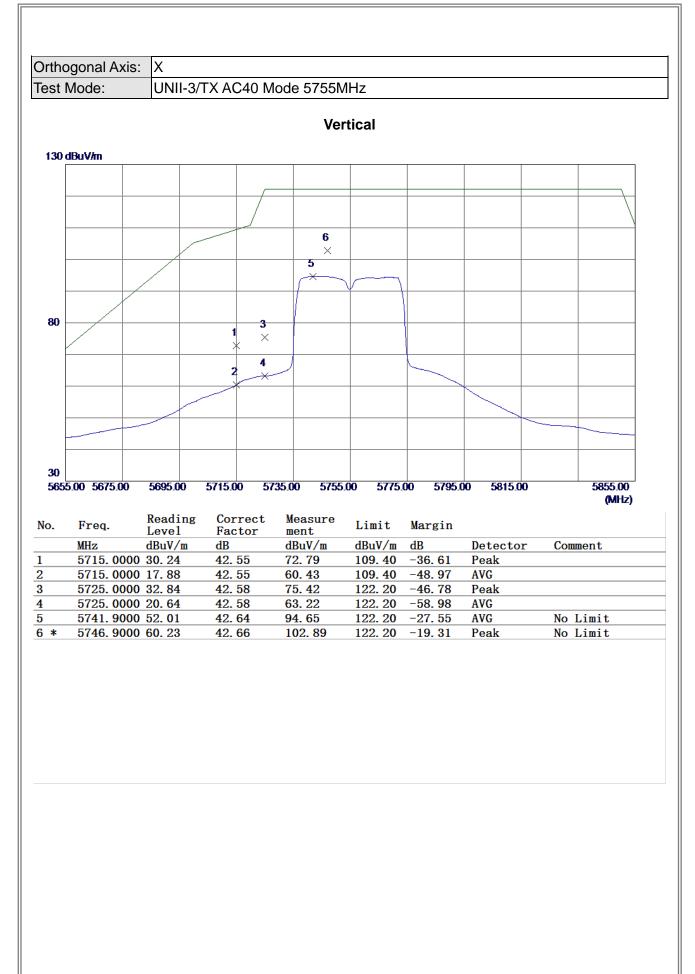






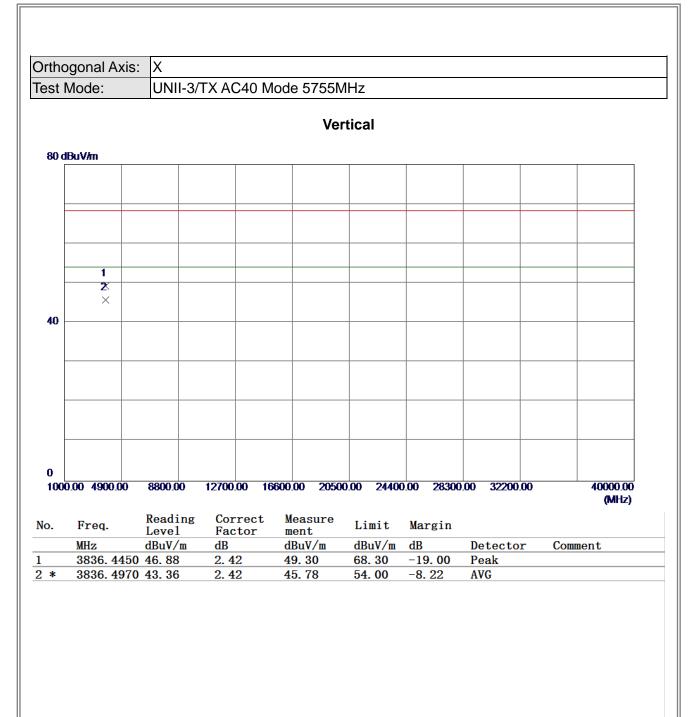






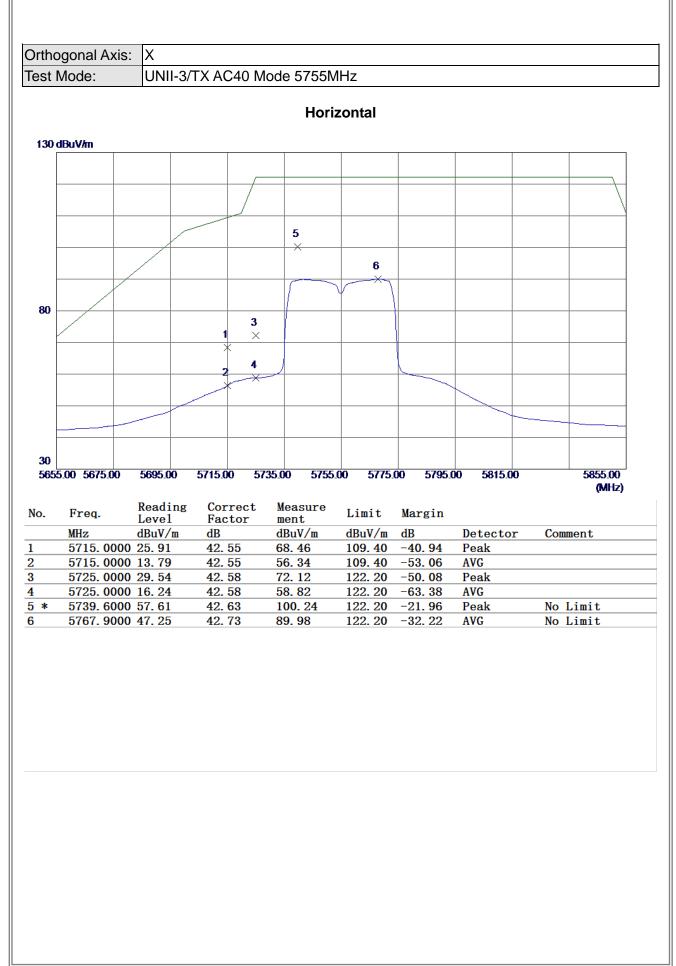






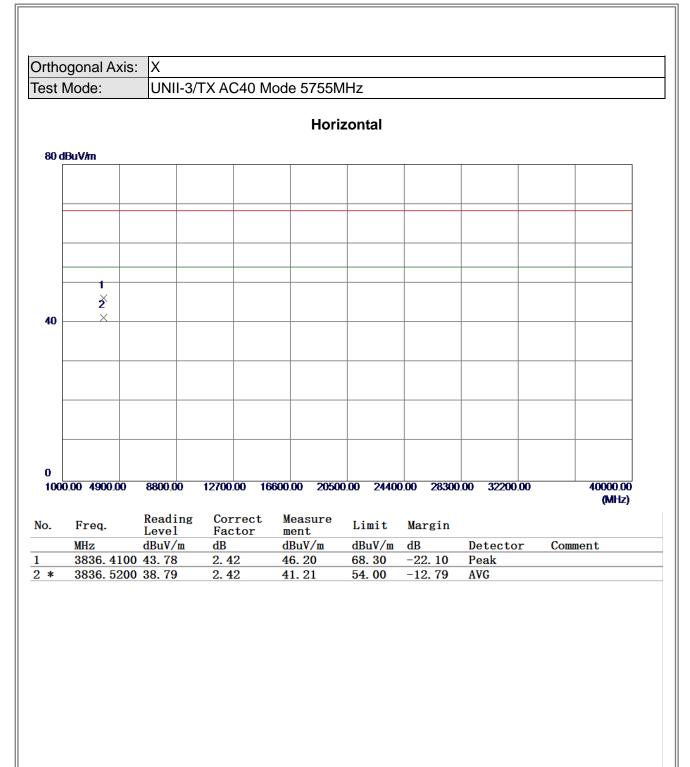






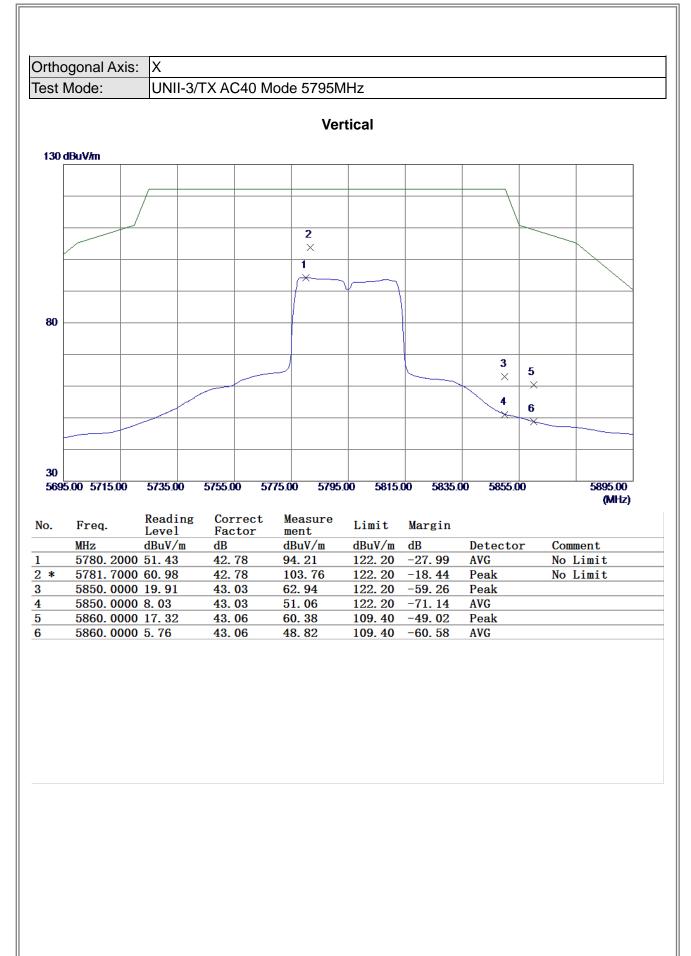






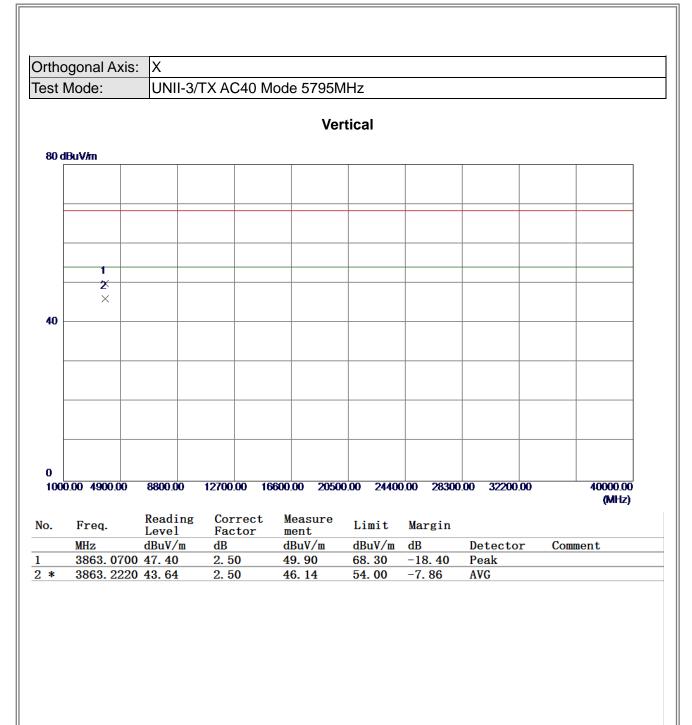






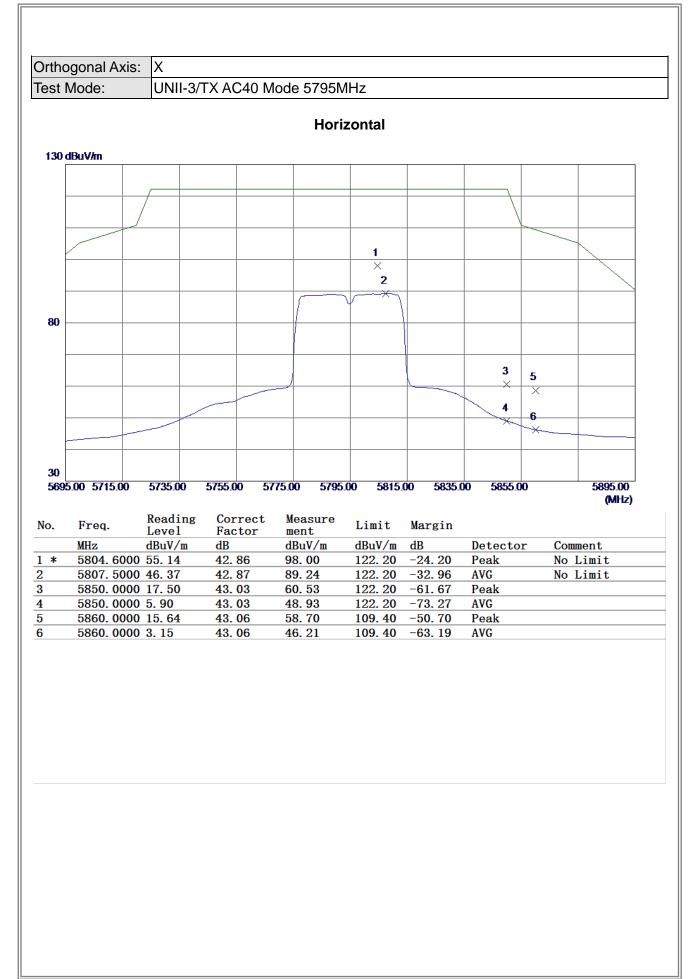






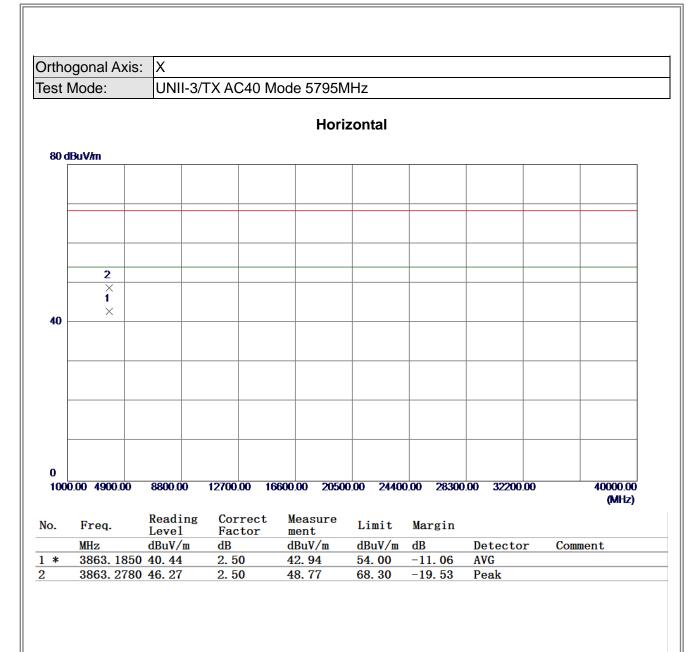






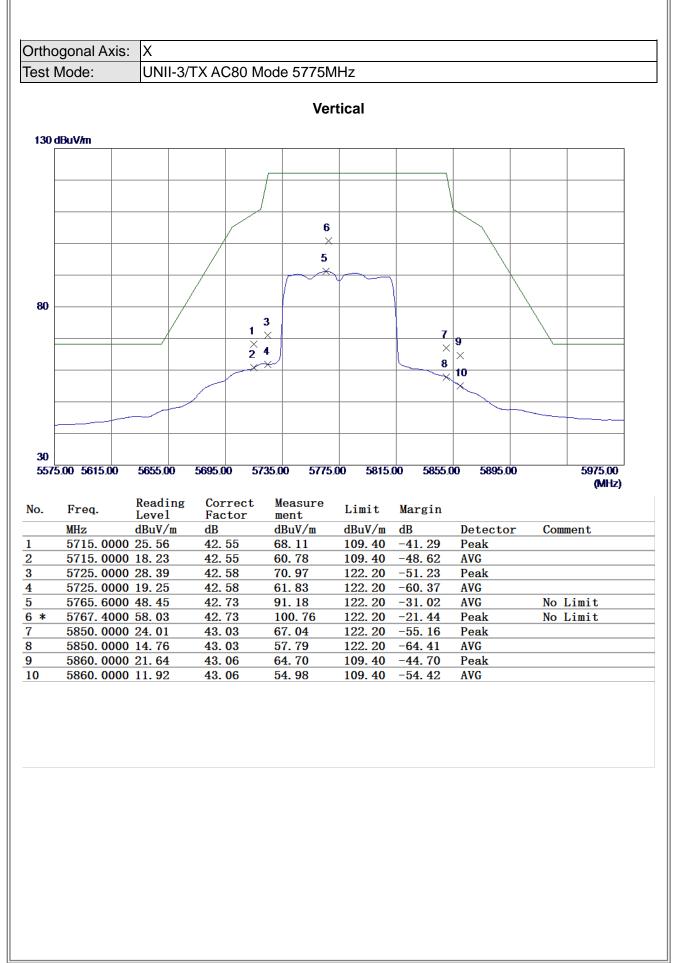






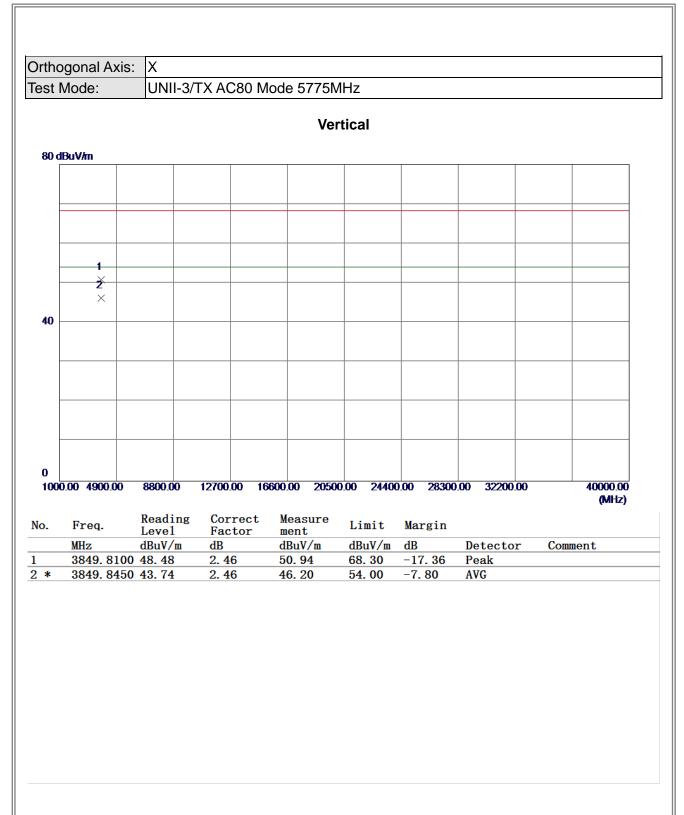






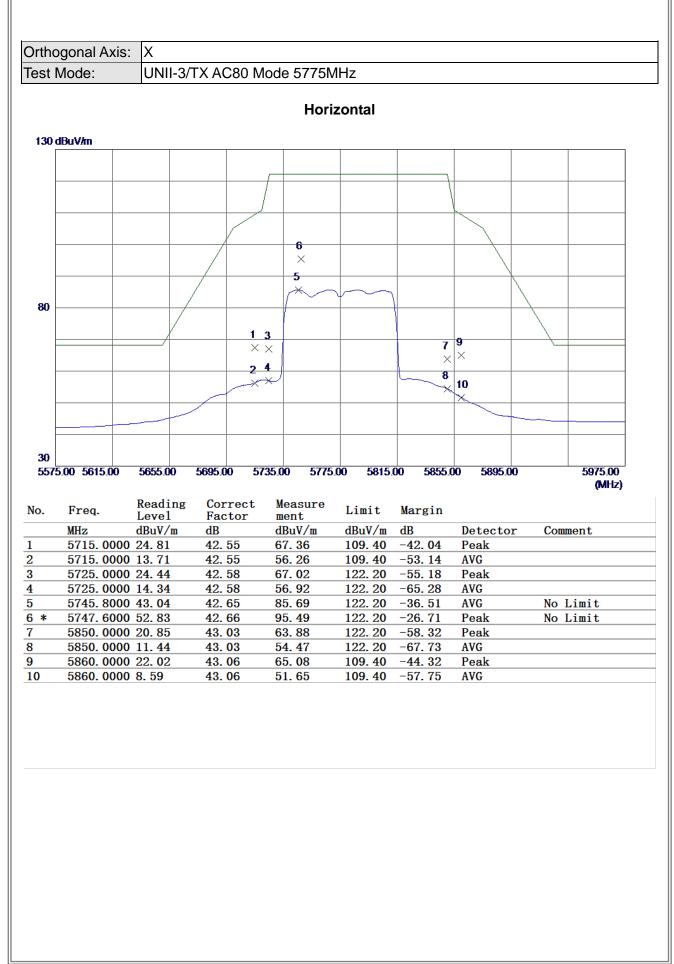






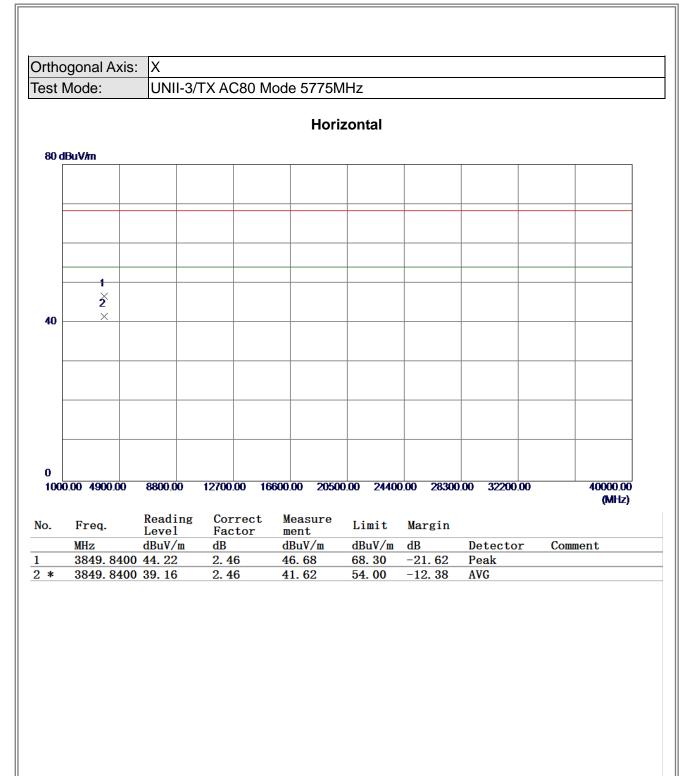




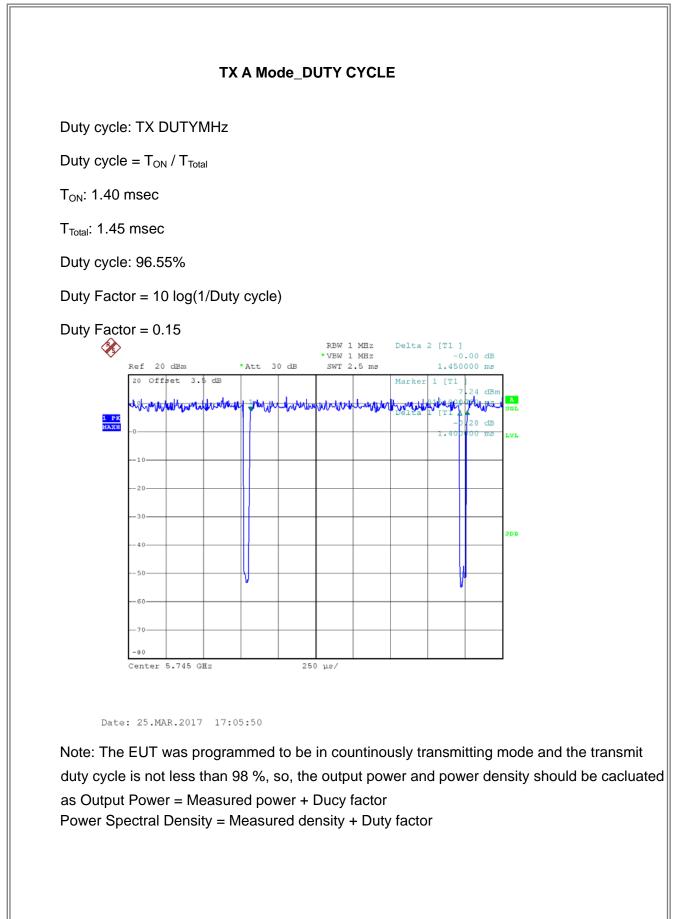




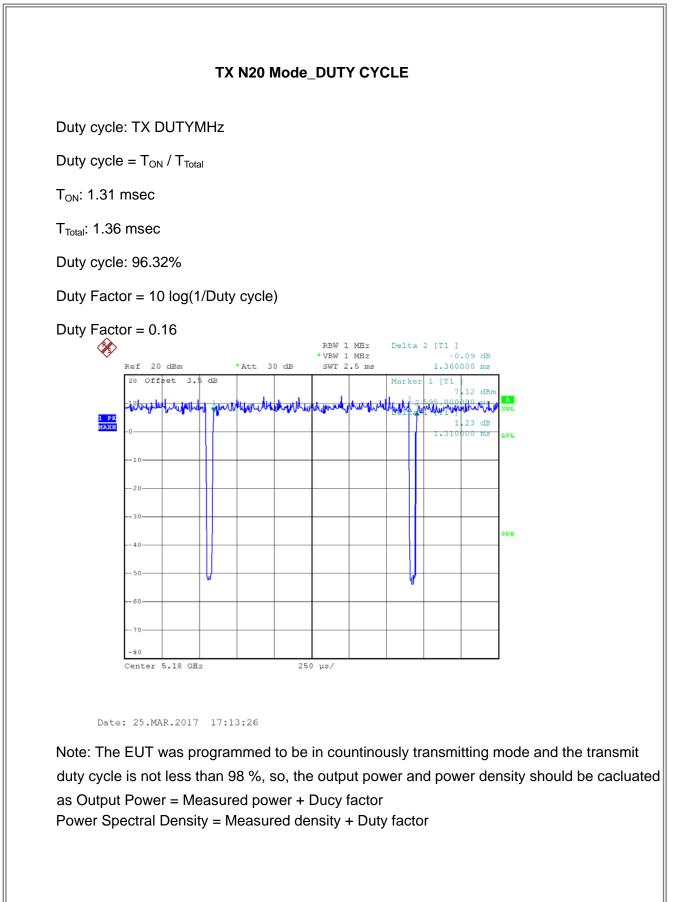




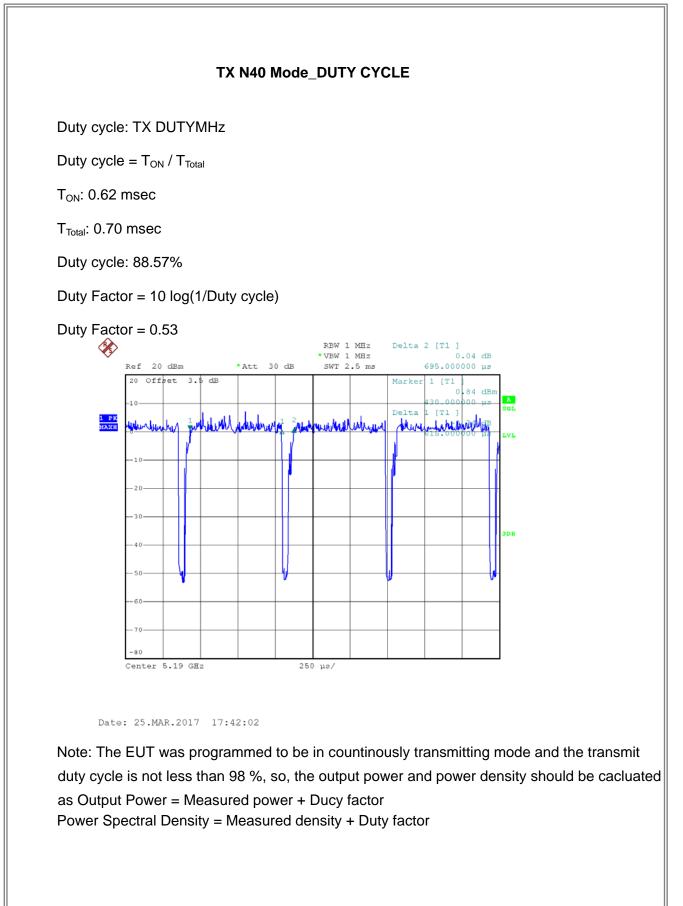




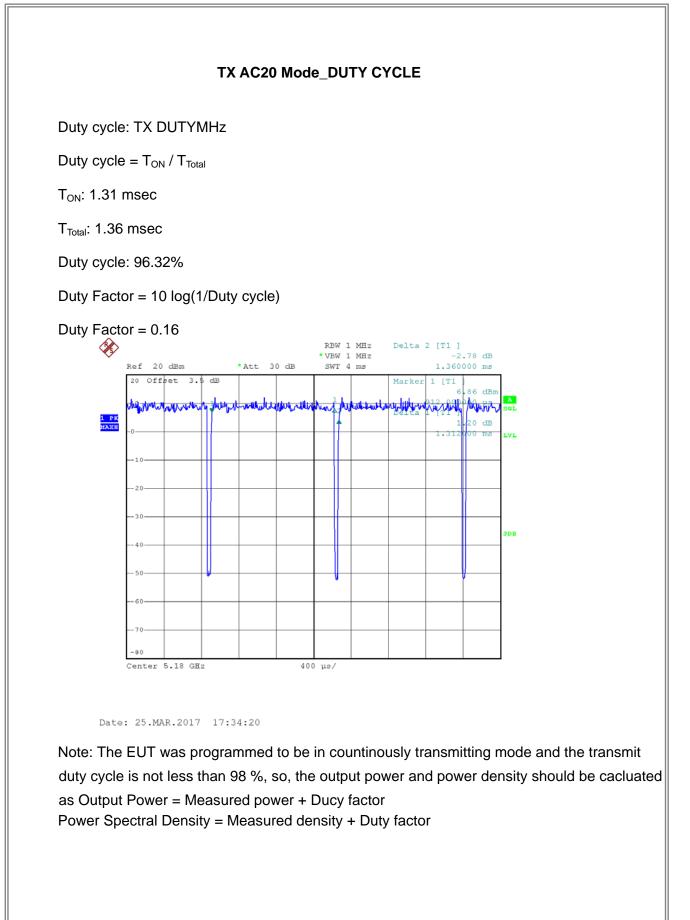




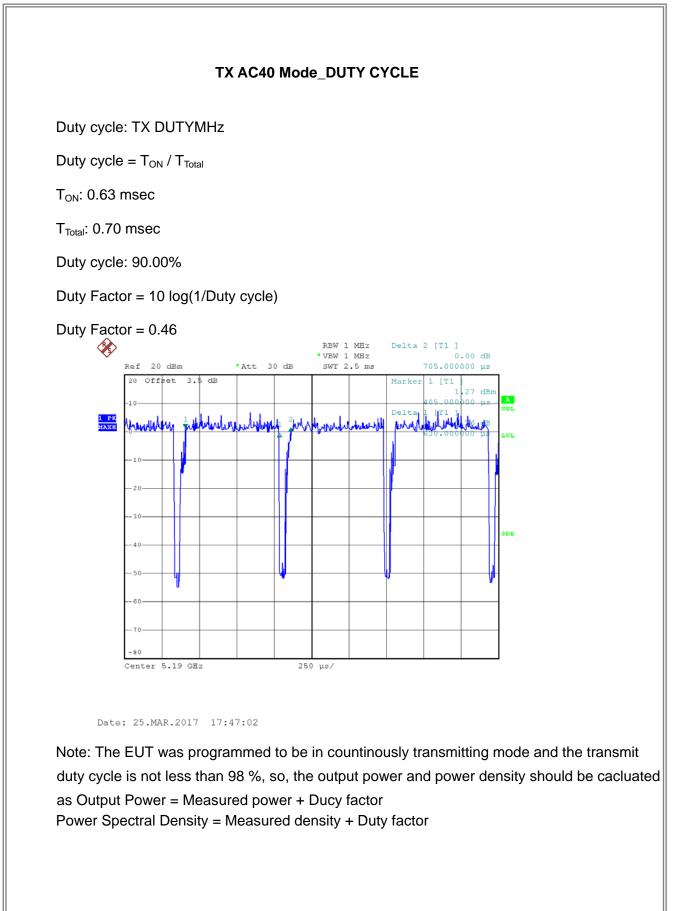




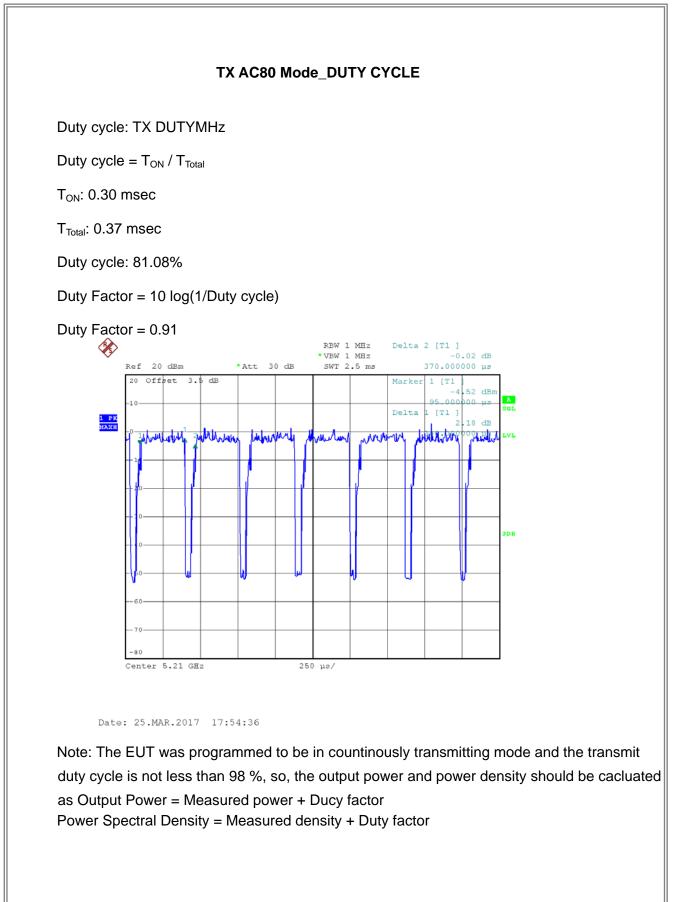












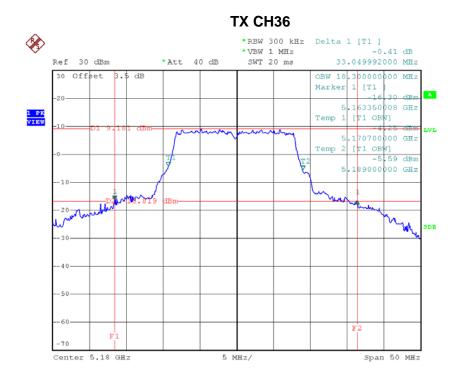


## **ATTACHMENT E - BANDWIDTH**



## Test Mode: UNII-1/TX A Mode\_CH36/CH40/CH48

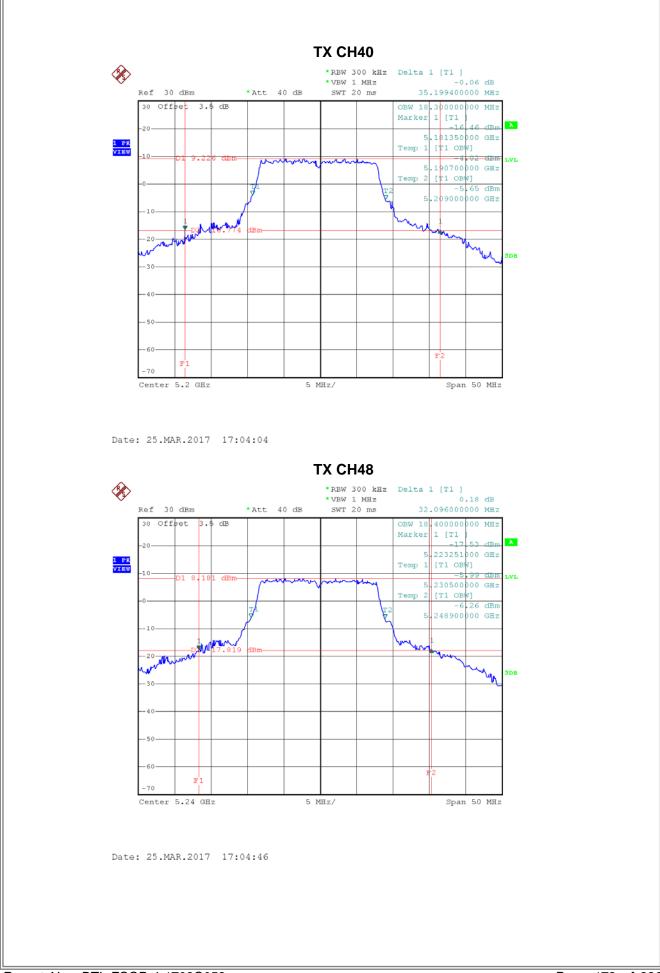
Channel	Frequency	26dB Bandwidth	99% Occupied Bandwidth
	(MHz)	(MHz)	(MHz)
CH36	5180	33.05	18.30
CH40	5200	35.20	18.30
CH48	5240	32.10	18.40



Date: 25.MAR.2017 17:03:07

## **3**TL

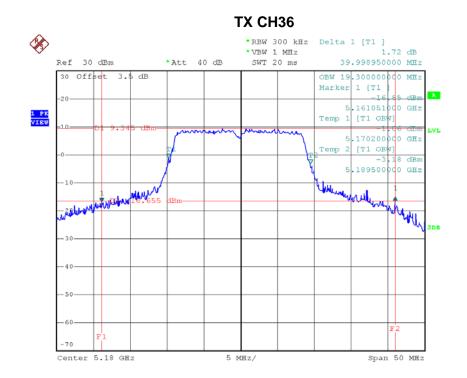






## Test Mode: UNII-1/TX N20 Mode\_CH36/CH40/CH48

Channel	Frequency	26dB Bandwidth	99% Occupied Bandwidth
	(MHz)	(MHz)	(MHz)
CH36	5180	40.00	19.30
CH40	5200	41.40	19.50
CH48	5240	40.55	19.50



Date: 25.MAR.2017 17:13:12