



	C Radio Test Report
FC	C ID: RWO-RZ090166
This report concerns (checl	k one): ⊠Original Grant
Project No. Equipment Model Name Applicant Address	: RZ09-0166
Date of Receipt Date of Test Issued Date Tested by	: Jul. 28, 2016 ~ Aug. 22, 2016
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# **REPORT ISSUED HISTORY**

Issued No.	Description	Issued Date
BTL-FCCP-4-1607C289	Original Issue.	Aug. 23, 2016



# **1. CERTIFICATION**

Equipment : Brand Name : Model Name : Applicant : Manufacturer : Address :	RAZER RZ09-0166 Razer Inc.
	RAZER TECHNOLOGY AND DEVELOPMENT (SHENZHEN) CO., LTD East Wing, 3rd Floor, Block 2, Phase 1 of Vision Shenzhen Business Park Keji
Date of Test	South Road, Hi-Tech Industrial Park, Shenzhen 518057, China Jul. 28, 2016 ~ Aug. 22, 2016
	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-4-1607C289) 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).

Test results included in this report is only for the 5G WIFI part.



# 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart E					
Standard(s) Section     Test Item     Judgment     Red					
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	H	3.60
	DG-CB03 CISPR	200MHz ~ 1,000MHz	V	3.86
DG-CB03		200MHz ~ 1,000MHz	H	3.94
			1GHz~18GHz	V
		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	Notebook			
Brand Name	RAZER			
Model Name	RZ09-0166	RZ09-0166		
Mode Different	N/A			
Product Description	Operation Frequency	UNII-1: 5150-5250MHz UNII-2A: 5250-5350MHz UNII-2C: 5470-5725MHz UNII-3: 5725-5850MHz		
	Modulation Type	OFDM		
	Bit Rate of Transmitter	866Mbps		
Output Power	Output Power (Max.)for UNII-1	802.11a: 19.11dBm 802.11n (20M): 19.12dBm 802.11n (40M): 18.57dBm 802.11ac (20M): 19.27dBm 802.11ac (40M): 18.27dBm 802.11ac (80M): 16.68dBm		
	Output Power (Max.)for UNII-2A	802.11a: 18.94dBm 802.11n (20M): 18.80dBm 802.11n (40M): 18.03dBm 802.11ac (20M): 18.39dBm 802.11ac (40M): 17.96dBm 802.11ac (80M): 16.18dBm		
	Output Power (Max.)for UNII-2C	802.11a: 19.09dBm 802.11n (20M): 19.31dBm 802.11n (40M): 18.62dBm 802.11ac (20M): 19.19dBm 802.11ac (40M): 18.51dBm 802.11ac (80M): 16.38dBm		
	Output Power (Max.)for UNII-3	802.11a: 19.18dBm 802.11n (20M): 19.19dBm 802.11n (40M): 18.49dBm 802.11ac (20M): 19.20dBm 802.11ac (40M): 18.43dBm 802.11ac (80M): 16.28dBm		
Power Source	<ul> <li>#1 DC voltage supplied from AC/DC adapter. Brand/Model: Razer / RC30-0166</li> <li>#2 Supplied from battery. Model:F1</li> </ul>			
Power Rating	#1 I/P:100-240Vac,3.4A O/P:19Vdc,13.16A #2 11.4Vdc,8700mA			



#### Note:

**BIL** 

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

# 2. Channel List:

UN	UNII-1		UNII-1		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				

UNII	-2A	UNII-2A		UNII-2A	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

UNII	-2C	UNI	I-2C	UNI	-2C	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	
100	5500	102	5510	106	5530	
104	5520	110	5550	122	5610	
108	5540	118	5590			
112	5560	126	5630			
116	5580	134	5670			
132	5660					
136	5680					
140	5700					

UNI	UNII-3 UNII-3		II-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.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Band
		INPAQ				0.26	UNII-1
	1		WA-F-LB-02-083	Internal ID	IPEX	0.48	UNII-2A
	1 TECHNOLOGY CO.LTD	WA-F-LD-02-003	Internal		0.78	UNII-2C	
		CO.LID				0.17	UNII-3
						0.23	UNII-1
	2 TECHN	INPAQ TECHNOLOGY		Internal	IPEX	0.36	UNII-2A
		CO.LTD	WA-F-LB-01-038		IPEA	0.24	UNII-2C
		CO.LID				0.07	UNII-3

#### 4.

Operating Mode	0.7.1/
TX Mode	2TX
802.11a	V (ANT 1+ANT 2)
802.11n (20MHz)	V (ANT 1+ANT 2)
802.11n (40MHz)	V (ANT 1+ANT 2)
802.11ac (20MHz)	V (ANT 1+ANT 2)
802.11ac (40MHz)	V (ANT 1+ANT 2)
802.11ac (80MHz)	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 / CH52, CH60, CH64 (UNII-2A)
Mode 8	TX N20 Mode / CH52, CH60, CH64 (UNII-2A)
Mode 9	TX N40 Mode / CH54, CH62 (UNII-2A)
Mode 10	TX AC20 Mode / CH52, CH60, CH64 (UNII-2A)
Mode 11	TX AC40 Mode / CH54, CH62 (UNII-2A)
Mode 12	TX AC80 Mode / CH58 (UNII-2A)
Mode 13	TX A Mode / CH100, CH116, CH140 (UNII-2C)
Mode 14	TX N20 Mode / CH100, CH116, CH140 (UNII-2C)
Mode 15	TX N40 Mode / CH102, CH110, CH134 (UNII-2C)
Mode 16	TX AC20 Mode / CH100, CH116, CH140 (UNII-2C)
Mode 17	TX AC40 Mode / CH102, CH110, CH134 (UNII-2C)
Mode 18	TX AC80 Mode / CH106, CH122 (UNII-2C)
Mode 19	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 20	TX N20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 21	TX N40 Mode / CH151,CH159 (UNII-3)
Mode 22	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 23	TX AC40 Mode / CH151,CH159 (UNII-3)
Mode 24	TX AC80 Mode / CH155 (UNII-3)
Mode 25	TX Mode

For Conducted Test				
Final Test Mode	Final Test Mode Description			
Mode 25 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 / CH52, CH60, CH64 (UNII-2A)				
Mode 8	TX N20 Mode / CH52, CH60, CH64 (UNII-2A)				
Mode 9	TX N40 Mode / CH54, CH62 (UNII-2A)				
Mode 10	TX AC20 Mode / CH52, CH60, CH64 (UNII-2A)				
Mode 11	TX AC40 Mode / CH54, CH62 (UNII-2A)				
Mode 12	TX AC80 Mode / CH58 (UNII-2A)				
Mode 13	TX A Mode / CH100, CH116, CH140 (UNII-2C)				
Mode 14	TX N20 Mode / CH100, CH116, CH140 (UNII-2C)				
Mode 15	TX N40 Mode / CH102, CH110, CH134 (UNII-2C)				
Mode 16	TX AC20 Mode / CH100, CH116, CH140 (UNII-2C)				
Mode 17	TX AC40 Mode / CH102, CH110, CH134 (UNII-2C)				
Mode 18	TX AC80 Mode / CH106, CH122 (UNII-2C)				
Mode 19	TX A Mode / CH149,CH157,CH165 (UNII-3)				
Mode 20	TX N20 Mode / CH149,CH157,CH165 (UNII-3)				
Mode 21	TX N40 Mode / CH151,CH159 (UNII-3)				
Mode 22	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)				
Mode 23	TX AC40 Mode / CH151,CH159 (UNII-3)				
Mode 24	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		QCARCT				
Frequency (MHz)	5180	5200	5240			
A Mode	14	14	14			
Frequency (MHz)	5180	5200	5240			
N20 Mode	14	14	14			
Frequency (MHz)	5190	5230				
N40 Mode	13	13				

UNII-2A				
Test Software Version	QCARCT			
Frequency (MHz)	5260	5300	5320	
A Mode	14	14	15	
Frequency (MHz)	5260	5300	5320	
N20 Mode	15	15	15	
Frequency (MHz)	5270	5310		
N40 Mode	13	13		

UNII-2C					
Test Software Version		QCARCT			
Frequency (MHz)	5500	5580	5700		
A Mode	13	13	13		
Frequency (MHz)	5500	5580	5700		
N20 Mode	14	13	13		
Frequency (MHz)	5510	5550	5670		
N40 Mode	13	12	12		



	UNII-3		
Test Software Version	QCARCT		
Frequency (MHz)	5745	5785	5825
A Mode	13	14	14
Frequency (MHz)	5745	5785	5825
N20 Mode	13	14	14
Frequency (MHz)	5755	5795	
N40 Mode	12	12	
Test Software Version		QCARCT	
	UNII-1		
Frequency (MHz)	5180	5200	5240
AC20 Mode	16	16	16
Frequency (MHz)	5190	5230	
AC40 Mode	15	16	
Frequency (MHz)	5210		
AC80 Mode	14		
	UNII-2A		
Test Software Version	QCARCT		
Frequency (MHz)	5260	5300	5320

Test Software Version		QCARCT	
Frequency (MHz)	5260	5300	5320
AC20 Mode	16	15	16
Frequency (MHz)	5270	5310	
AC40 Mode	16	13	
Frequency (MHz)	5290		
AC80 Mode	14		

UNII-2C			
Test Software Version		QCARCT	
Frequency (MHz)	5500	5580	5700
AC20 Mode	15	15	15
Frequency (MHz)	5510	5550	5670
AC40 Mode	13	15	15
Frequency (MHz)	5530	5610	
AC80 Mode	14	13	

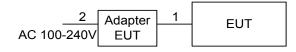




	UNII-3		
Test Software Version		QCARCT	
Frequency (MHz)	5745	5785	5825
AC20 Mode	15	16	16
Frequency (MHz)	5755	5795	
AC40 Mode	15	15	
Frequency (MHz)	5775		
AC80 Mode	13		



# 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.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.8m	DC Cable
2	NO	NO	1m	AC Cable



# 4. EMC EMISSION TEST

#### 4.1 CONDUCTED EMISSION MEASUREMENT

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

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

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

#### 4.1.2 TEST PROCEDURE

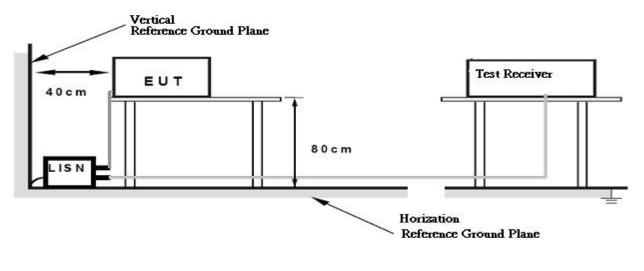
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation



# 4.1.4 TEST SETUP



# 4.1.5 EUT OPERATING CONDITIONS

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

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

#### 4.1.6 EUT TEST CONDITIONS

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

#### 4.1.7 TEST RESULTS

Please refer to the 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

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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

Note:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

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
5725 5950	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  $1000000\sqrt{30P}$ 

field strength:  $E = \frac{1}{3} \mu V/m$ , 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

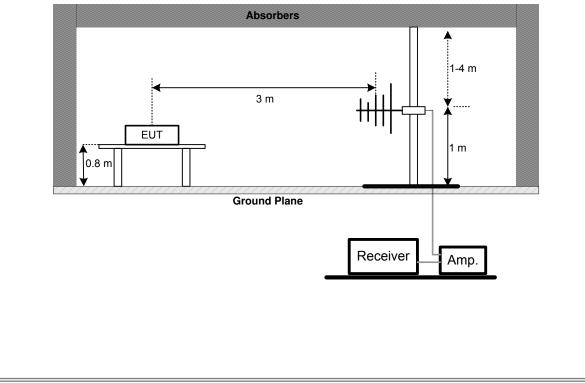
- a. The measuring distance of at 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance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

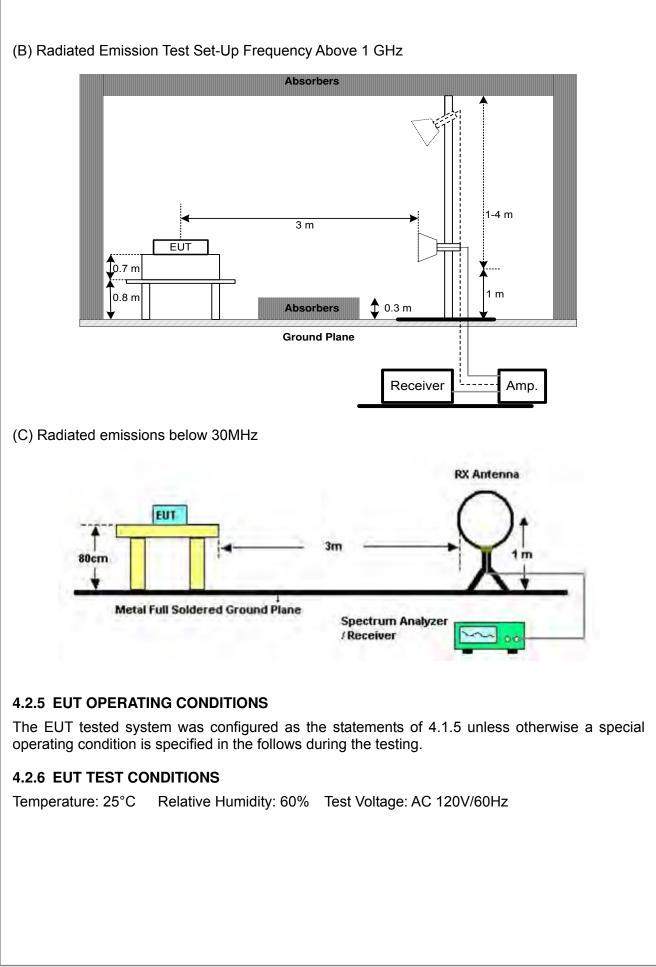
# 4.2.4 TEST SETUP

(A)Radiated Emission Test Set-Up Frequency Below 1GHz











# 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.

Remark:

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120kHz ; SPA setting in RBW=120kHz, VBW =120kHz, Swp. Time = 0.3 sec./MHz ∘
- (2) All readings are Peak unless otherwise stated QP in column of <code>『Note』</code>. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform  $\circ$
- (3) Measuring frequency range from 30MHz to 1000MHz  $\circ$
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table  $\circ$

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

Please refer to the Attachment D.

Remark:

- (1) Spectrum Setting: 30MHz 1000MHz , RBW= 100kHz, VBW=100kHz, Sweep time = 200 ms. 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
- (2) All readings are Peak unless otherwise stated AV in column of **"**Note **"** . Peak denotes that the Peak reading compliance with the AV Limits and then AV Mode measurement didn't perform.
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission  $\circ$
- (4) Data of measurement within this frequency range shown "\*" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axes: "X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand
- (7) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.
- (8) 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		
	26 dB Bandwidth	5250-5350	PASS		
Bandwidth	26 dB Bandwidth	5470-5725	PASS		
	Minimum 500kHz 6dB	5725-5850	PASS		
	Bandwidth	5725-5650	FA00		

#### 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
	VBW	1000 kHz
	Detector	Peak
	Trace	Max Hold
	Sweep Time	Auto

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

# 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

#### 5.1.4 EUT OPERATION CONDITIONS

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





## 5.1.5 EUT TEST CONDITIONS

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

# 5.1.6 TEST RESULTS

Please refer to the Attachment E.



# 6. MAXIMUM CONDUCTED OUTPUT POWER

## 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Limit	Frequency Range (MHz)	Result
	Fixed:1 Watt (30dBm)		
	Mobile and portable:	5150-5250	PASS
Conducted Output	250mW (24dBm)		
Power	250mW (24dBm)	5250-5350	PASS
	250mW (24dBm)	5470-5725	PASS
	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
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the
opantrequency	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. ANTENNA CONDUCTED SPURIOUS EMISSION

# 7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result		
	-27dBm/MHz	5150-5250	PASS		
	-27dBm/MHz	5250-5350	PASS		
Antenna conducted Spurious Emission	-27dBm/MHz	5470-5725	PASS		
	Below -17dBm/MHz within 10MHz of band edge, below -27dBm/MHz beyond 10MHz of the band edge	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
	RBW	1000kHz
	VBW	1000kHz
	Trace	Max Hold
	Sweep Time	Auto

# 7.1.2 DEVIATION FROM STANDARD

No deviation.

# 7.1.3 TEST SETUP



# 7.1.4 EUT OPERATION CONDITIONS

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

# 7.1.5 EUT TEST CONDITIONS

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

#### 7.1.6 TEST RESULTS

Please refer to the Attachment G.

# 8. POWER SPECTRAL DENSITY TEST

# 8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result		
Power Spectral	Other then Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz	ortable:17dBm/MHz 5150-5250 F			
Density	11dBm/MHz	5250-5350	PASS		
	11dBm/MHz	5470-5725	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 Eraguanay	Encompass the entire emissions bandwidth (EBW) of the
	Span Frequency	signal
	RBW	= 1MHz.
	VBW	≥ 3MHz.
	Detector	RMS
Trace average		100 trace
	Sweep Time	Auto

Note:

- 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.



# 8.1.1 DEVIATION FROM STANDARD

No deviation.

#### 8.1.2 TEST SETUP

	·
EUT	SPECTRUM
	ANALYZER

#### 8.1.3 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.

#### 8.1.4 EUT TEST CONDITIONS

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

8.1.5 TEST RESULTS Please refer to the Attachment H.



# 9. FREQUENCY STABILITY MEASUREMENT

## 9.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result		
		5150-5250	PASS		
	Specified in the user's manual	5250-5350	PASS		
Frequency Stability		5470-5725	PASS		
		5725-5850	PASS		

#### 9.1.1 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.

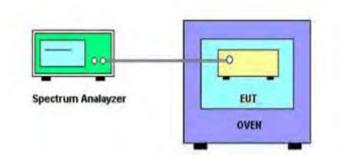
d. User manual temperature is 0°C~40°C.

# 9.1.2 DEVIATION FROM STANDARD

No deviation.



# 9.1.3 TEST SETUP



# 9.1.4 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.

#### 9.1.5 EUT TEST CONDITIONS

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

9.1.6 TEST RESULTS Please refer to the Attachment I.



# **10. MEASUREMENT INSTRUMENTS LIST**

	Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	LISN	EMCO	3816/2	0052765	Mar. 27, 2017	
2	LISN	R&S	ENV216	101447	Mar. 27, 2017	
3	Test Cable	emci	RG223(9KHz-30 MHz)	C_17	Mar. 10, 2017	
4	EMI Test Receiver	R&S	ESCI	100382	Mar. 27, 2017	
5	50Ω Terminator	SHX	TF2-3G-A	08122901	Mar. 27, 2017	
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. 27, 2017
2	Amplifier	HP	8447D	2944A09673	Nov. 09, 2016
3	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
4	Test Cable	emci	LMR-400(30MH z-1GHz)	C-01	Jun. 26, 2017
5	Control	СТ	SC100	N/A	N/A
6	Position Control	MF	MF-7802	MF780208416	N/A
7	Antenna	ETS	3115	00075789	Mar. 27, 2017
8	Amplifier	Agilent	8449B	3008A02274	Nov. 01, 2016
9	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016
10	Test Cable	emci	EMC104-SM-S M-10000(1GHz - 26.5GHz)	C-68	Jun. 26, 2017
11	Controller	СТ	SC100	N/A	N/A
12	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2017
13	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 27, 2017
14	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 07, 2016
15	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	FSP 40	100185	Oct. 11, 2016

	Maximum Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	P-series Power meter	Agilent	N1911A	MY45100473	Oct. 26, 2016	
2	Wireband Power sensor	Agilent	N1921A	MY51100041	Oct. 26, 2016	

	Antenna Conducted Spurious Emission Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016		

	Power Spectral Density Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016		

	Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016	
2	Precision Oven Tester	HOLINK	H-T-1F-D	BA03101701	May 22, 2017	

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

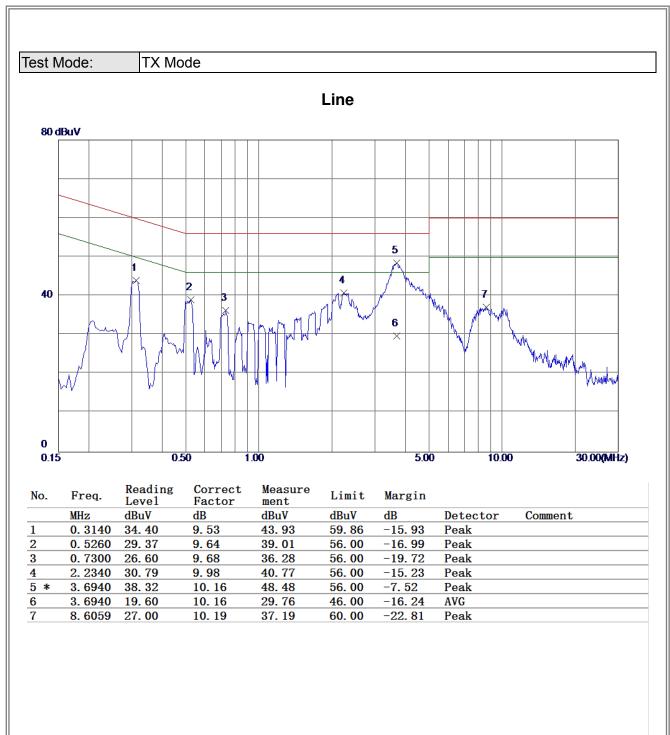
All calibration period of equipment list is one year.



# **ATTACHMENT A - CONDUCTED EMISSION**

# ЗĨL

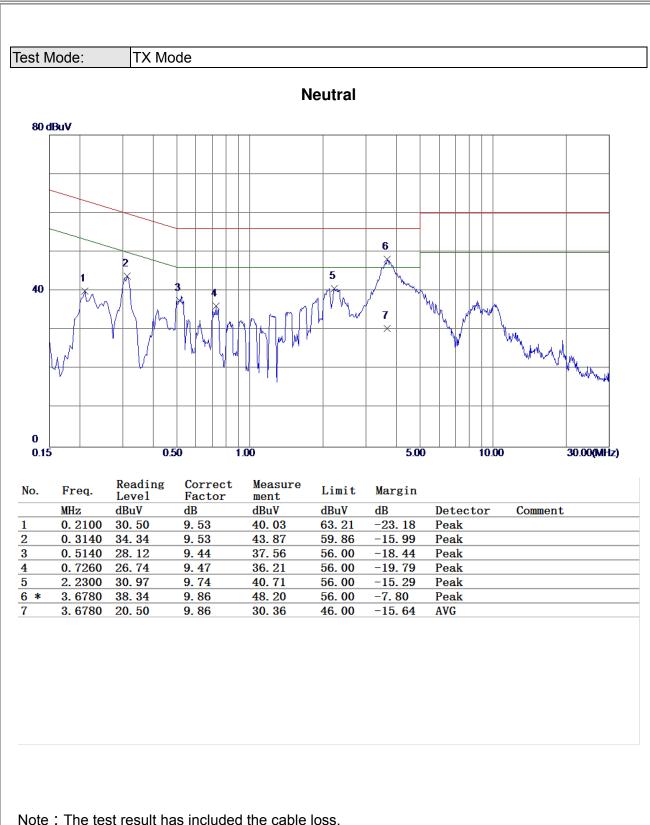




Note : The test result has included the cable loss.

# **B**TL





Note: The test result has included the cable loss.



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



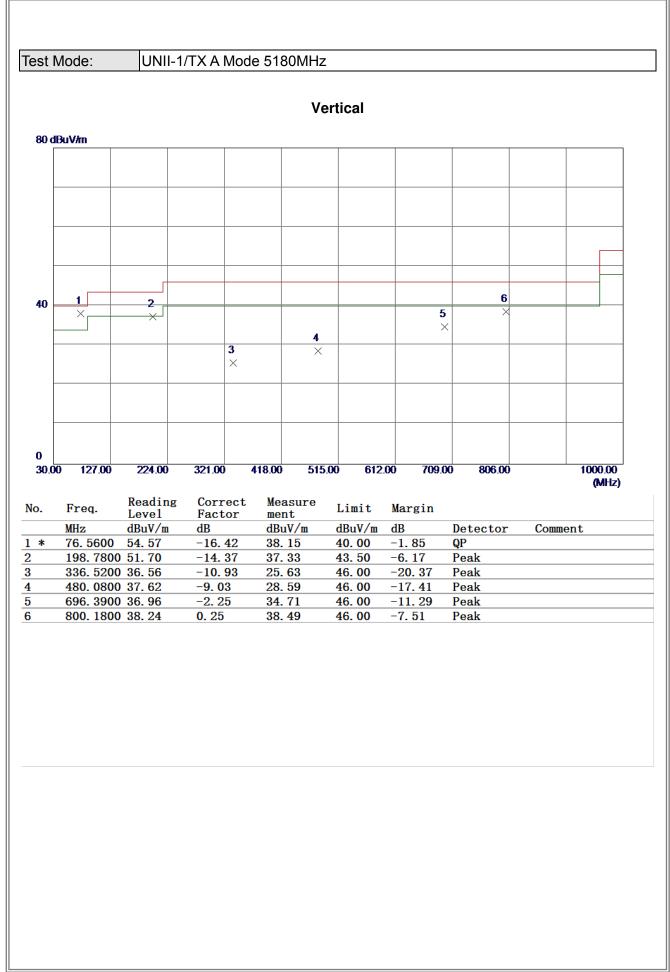
Test Mode:	TX I	Vode					
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.009	0°	13.41	24.9967	38.4067	128.5194	-90.1127	AVG
0.009	0°	14.28	24.9967	39.2767	148.5194	-109.2427	PEAK
0.0257	0°	6.73	23.9390	30.6690	119.4056	-88.7366	AVG
0.0257	0°	8.12	23.9390	32.0590	139.4056	-107.3466	PEAK
0.0331	0°	3.17	23.4703	26.6403	117.2077	-90.5673	AVG
0.0331	0°	5.58	23.4703	29.0503	137.2077	-108.1573	PEAK
0.0568	0°	1.16	22.2640	23.4240	112.5173	-89.0933	AVG
0.0568	0°	2.53	22.2640	24.7940	132.5173	-107.7233	PEAK
0.5112	0°	19.36	19.8358	39.1958	73.4324	-34.2366	QP
1.953	0°	23.71	19.5047	43.2147	69.5400	-26.3253	QP
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0124	90°	13.16	24.3000	37.4600	125.7358	-88.2758	AVG
0.0124	90°	14.89	24.3000	39.1900	145.7358	-106.5458	PEAK
0.0233	90°	7.28	24.0910	31.3710	120.2571	-88.8861	AVG
0.0233	90°	8.94	24.0910	33.0310	140.2571	-107.2261	PEAK
0.0464	90°	5.23	22.6280	27.8580	114.2739	-86.4159	AVG
0.0464	90°	6.19	22.6280	28.8180	134.2739	-105.4559	PEAK
0.0537	90°	1.54	22.3260	23.8660	113.0047	-89.1387	AVG
0.0537	90°	2.86	22.3260	25.1860	133.0047	-107.8187	PEAK
0.6226	90°	22.17	20.1923	42.3623	71.7200	-29.3577	QP
2.0578	90°	24.56	19.4653	44.0253	69.5400	-25.5147	QP



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

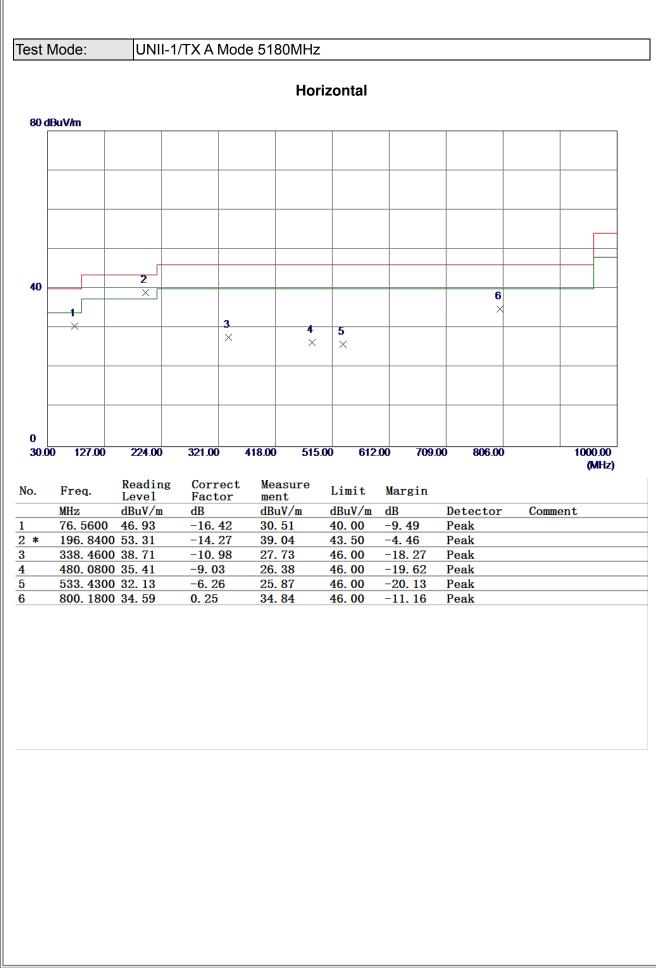






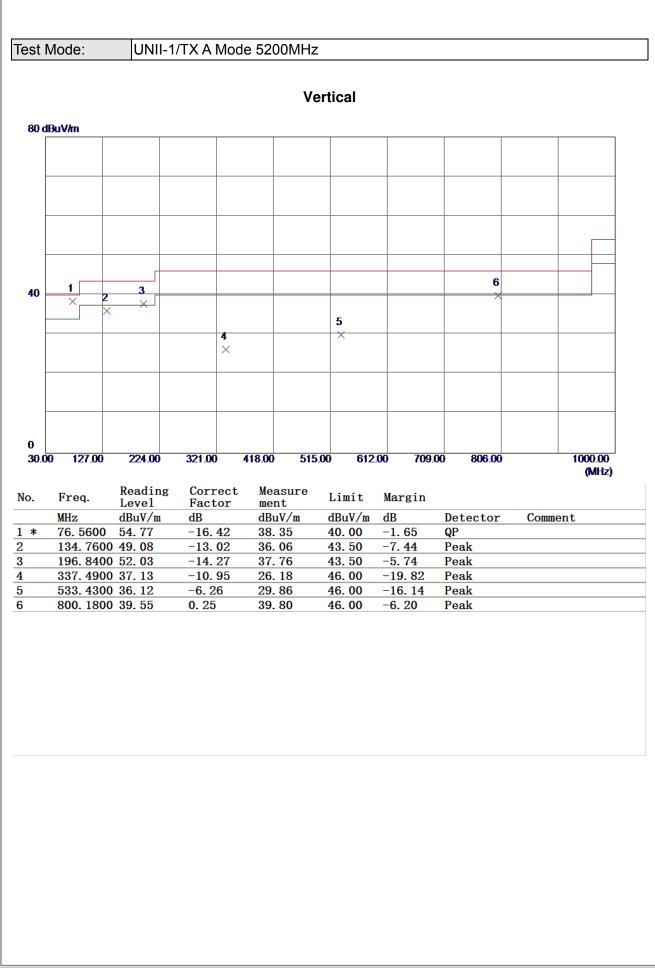






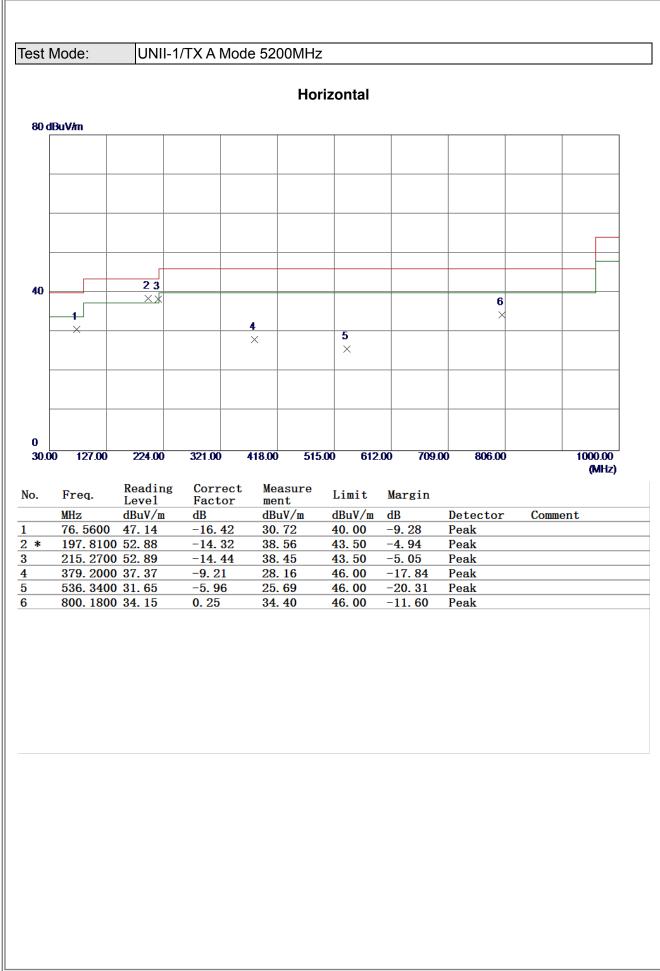






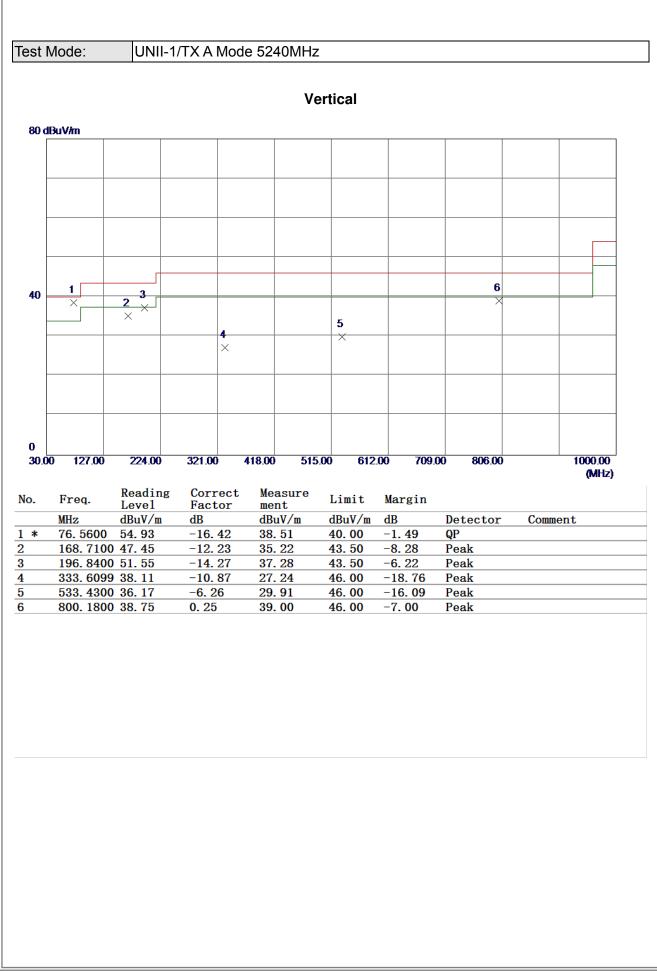






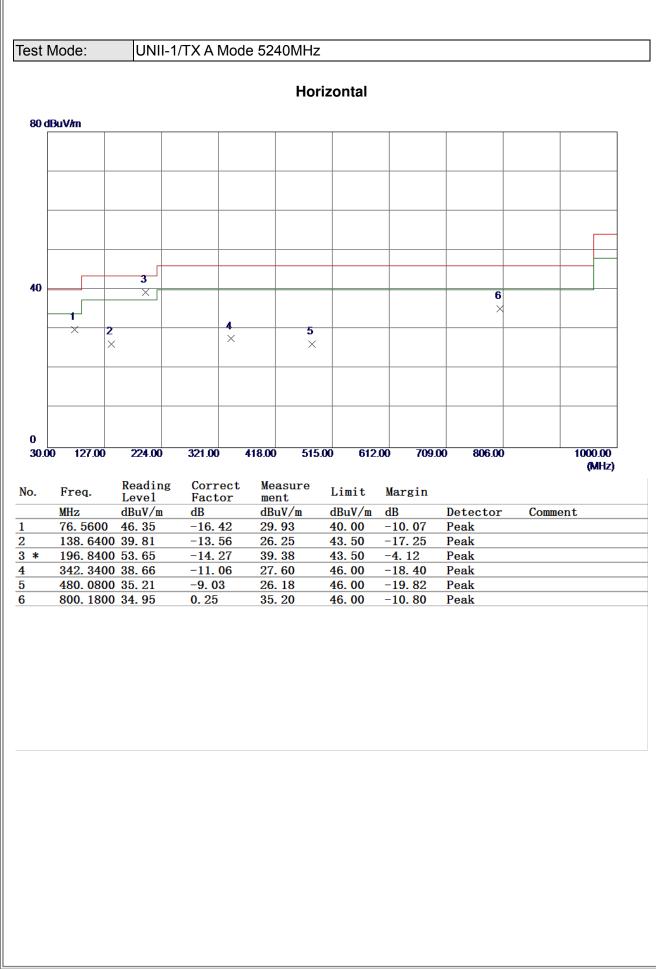






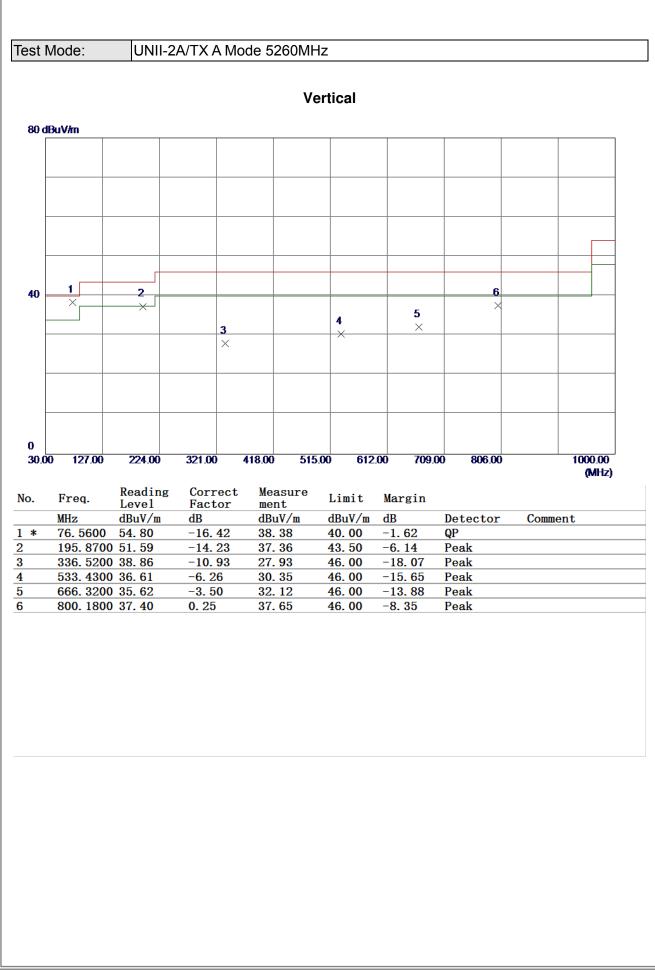






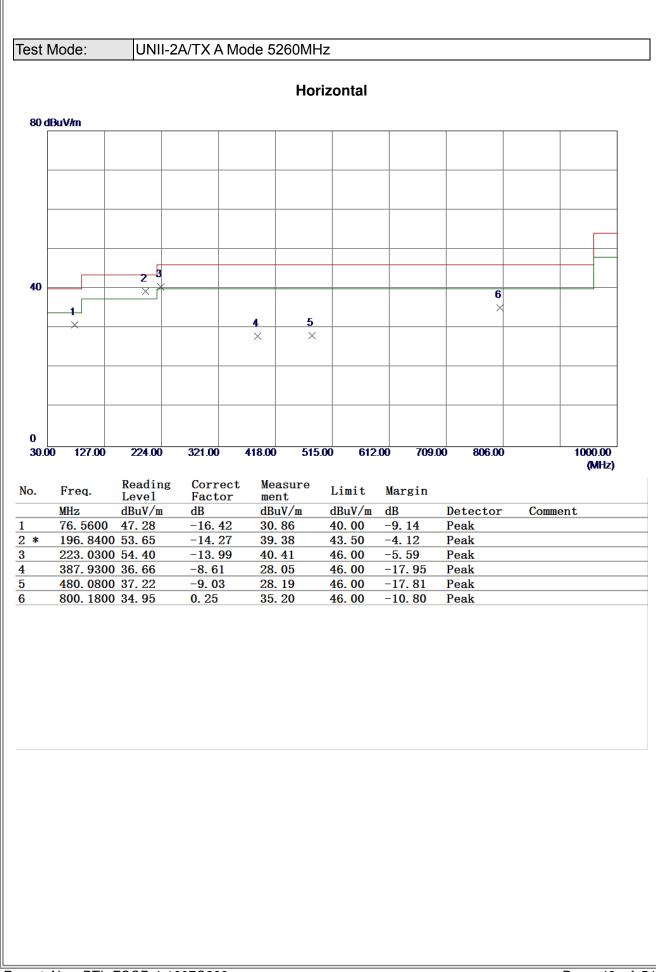






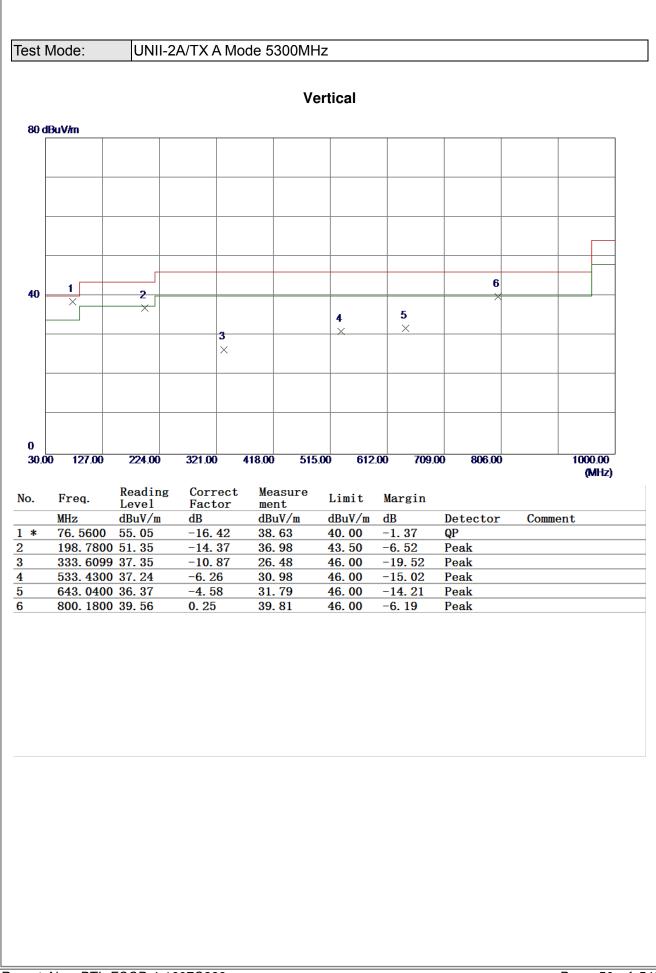






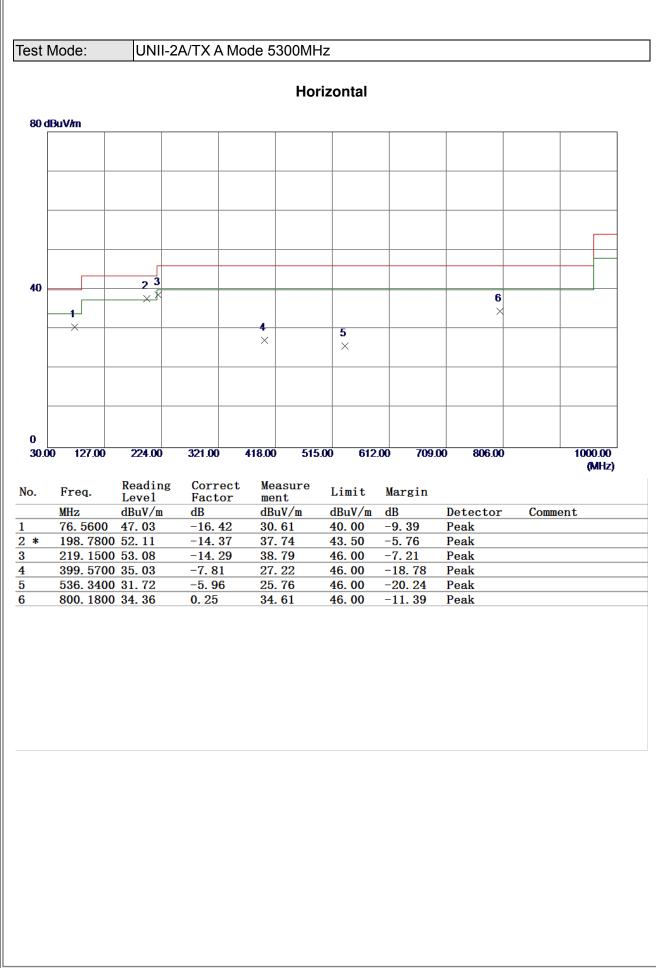




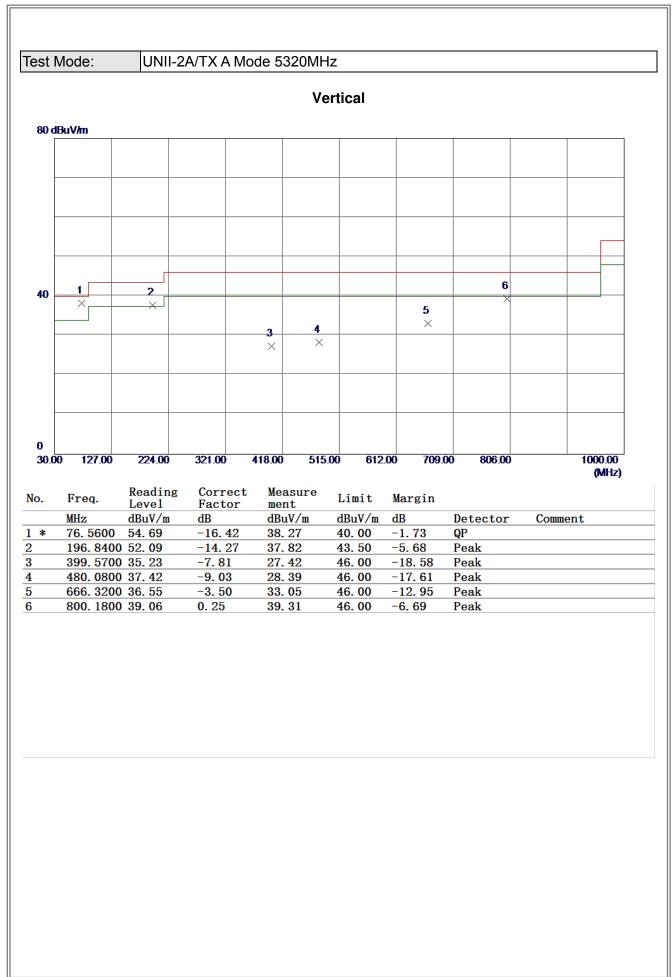






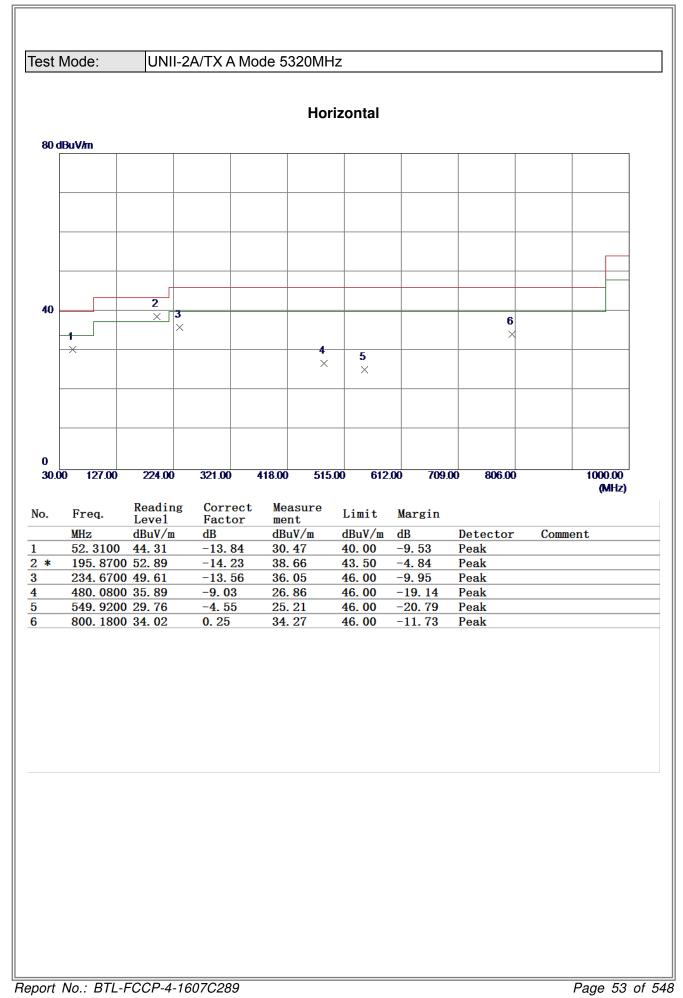






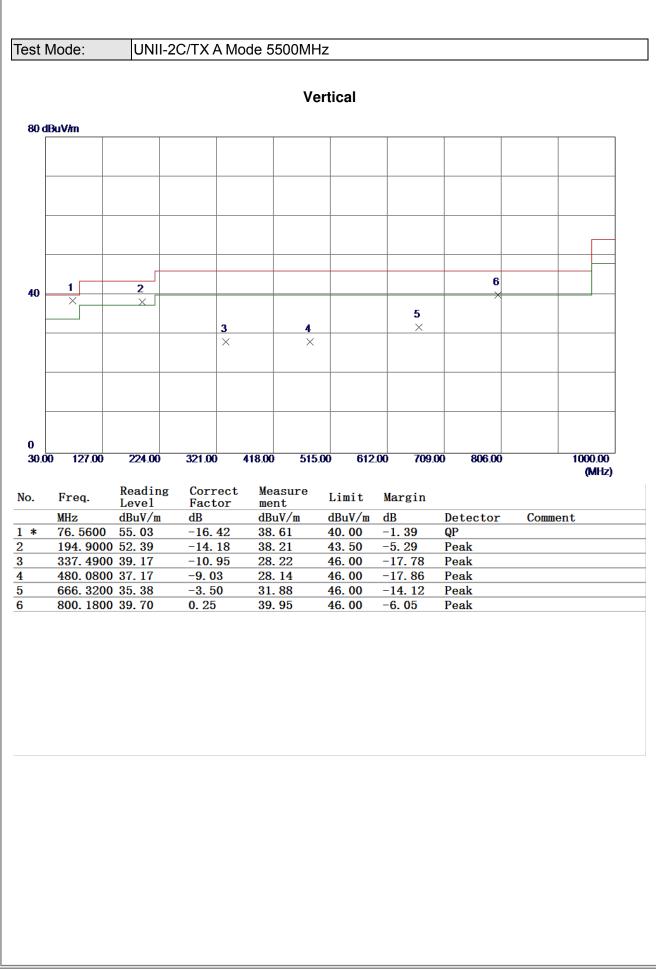






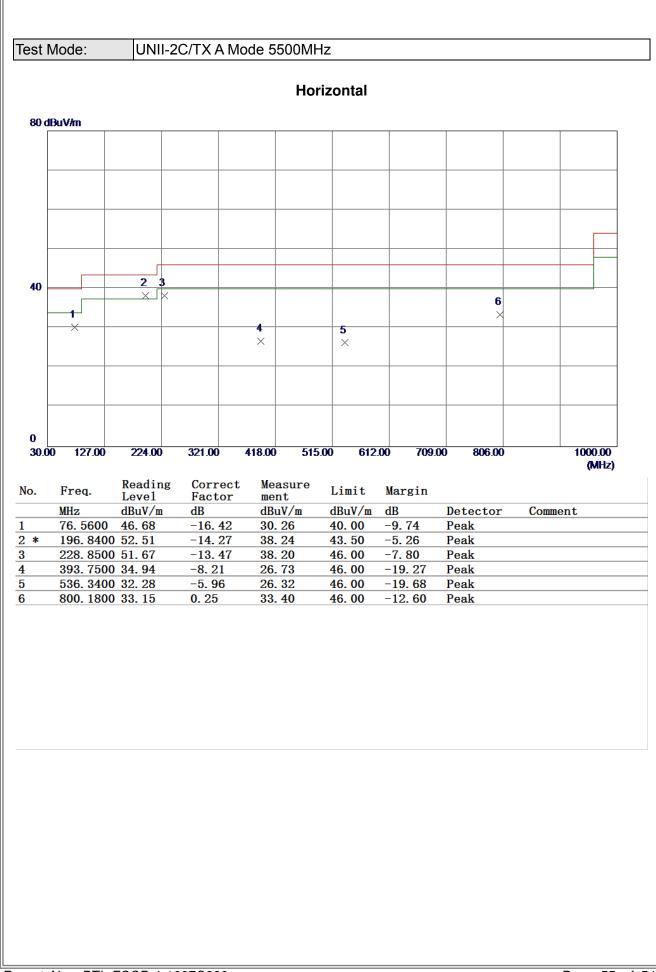






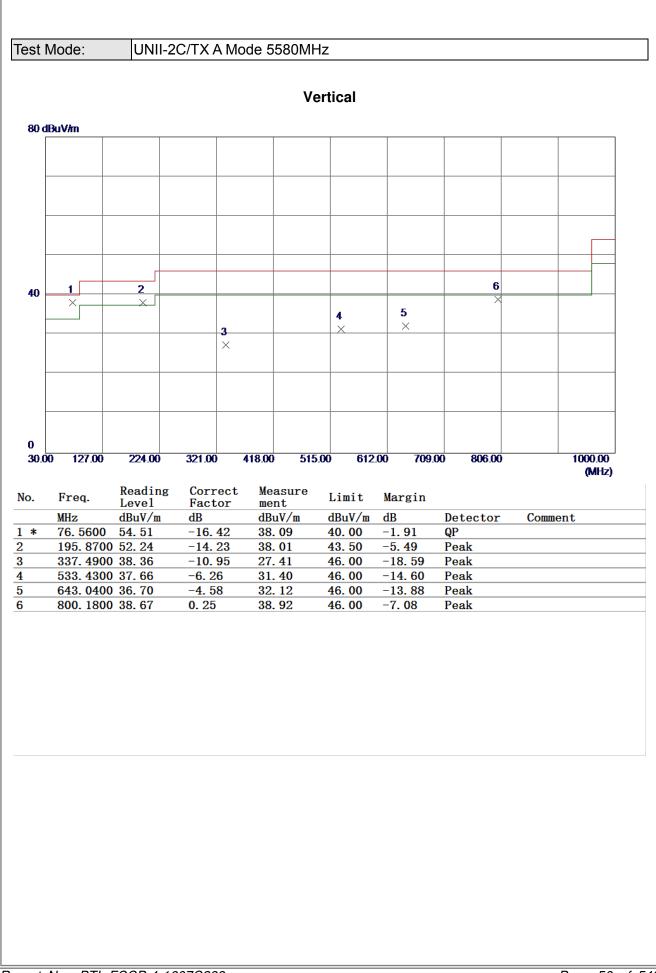






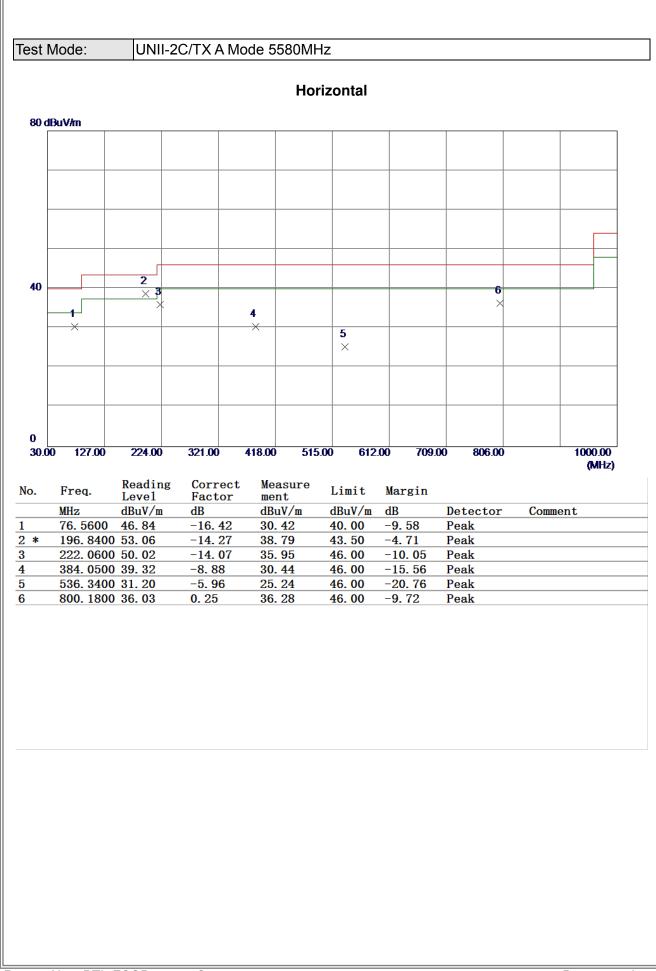






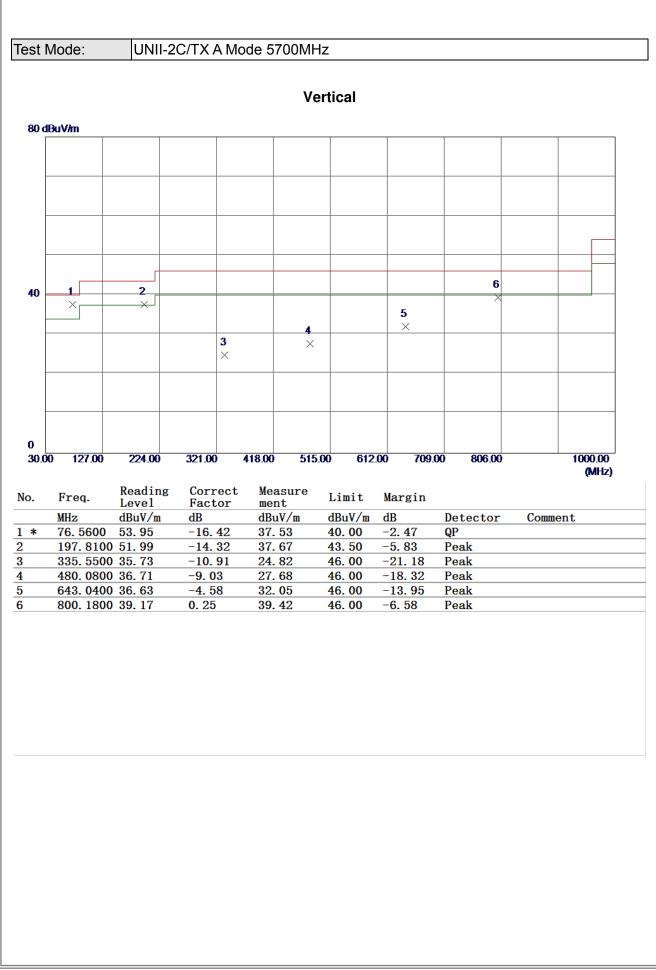






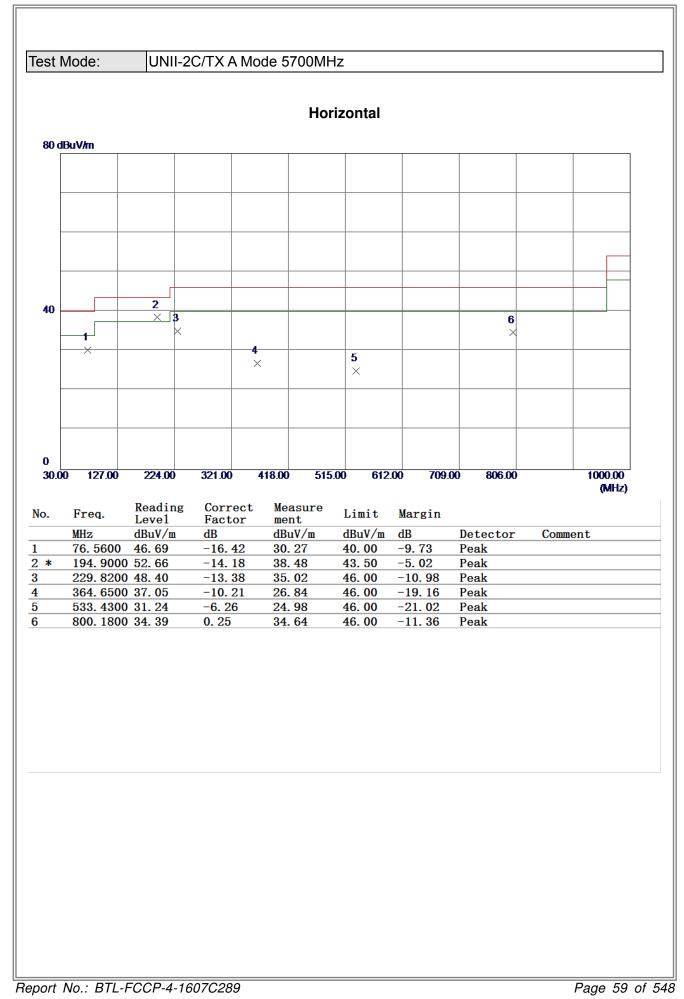






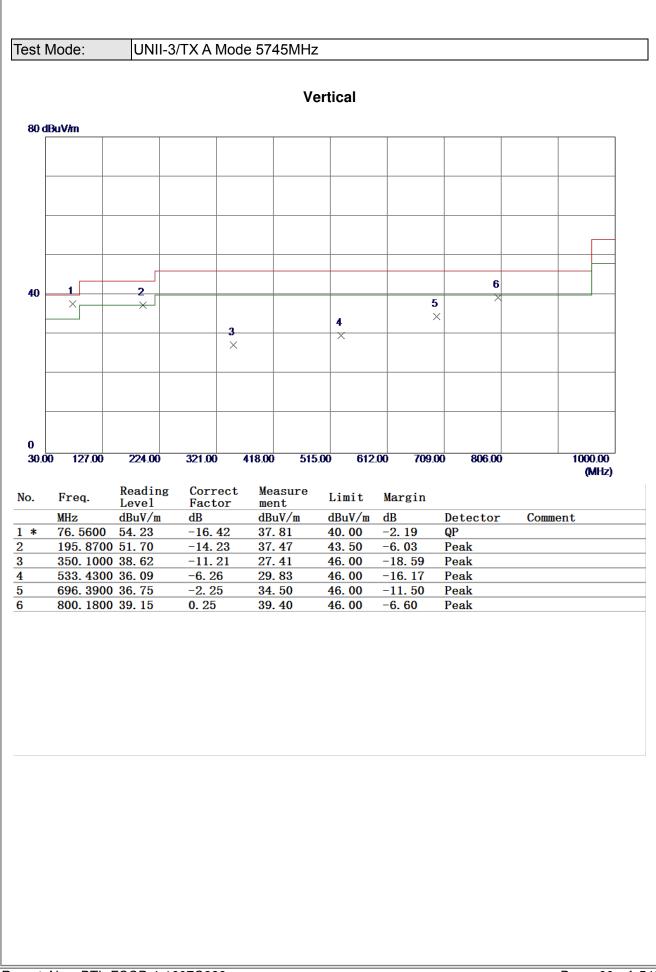






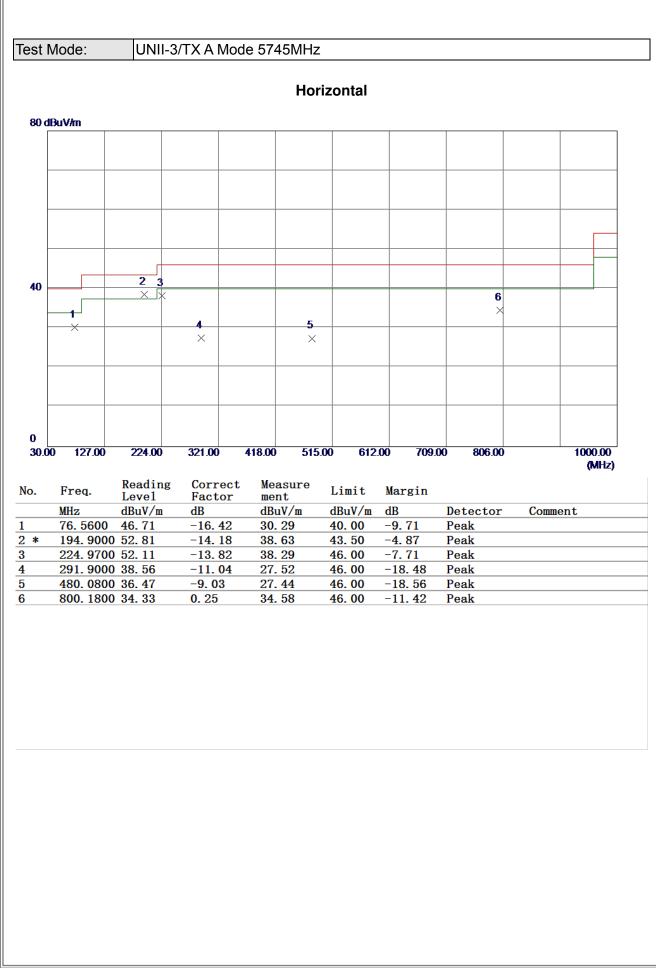






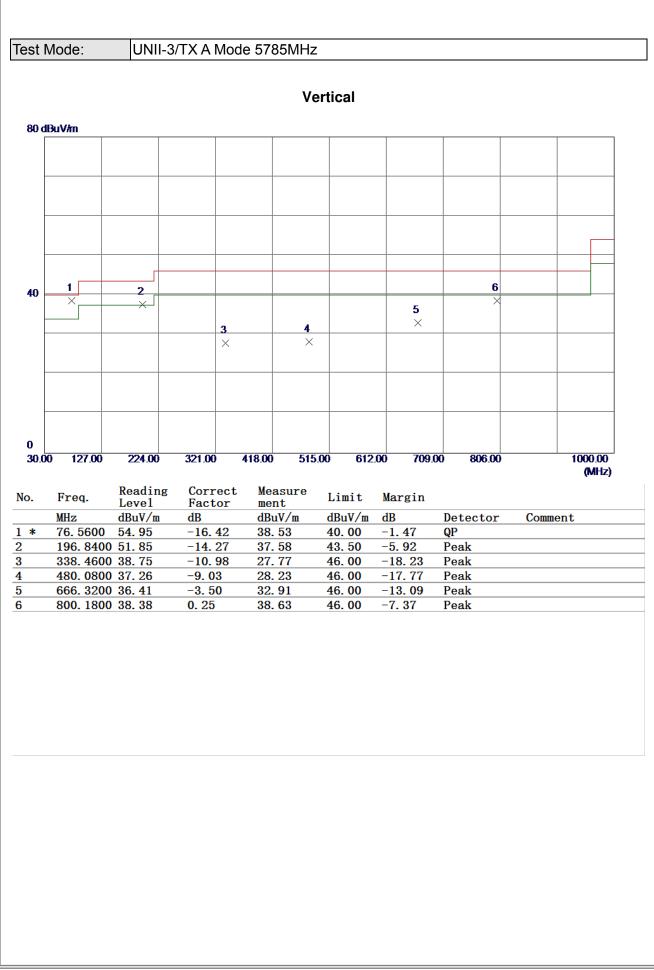






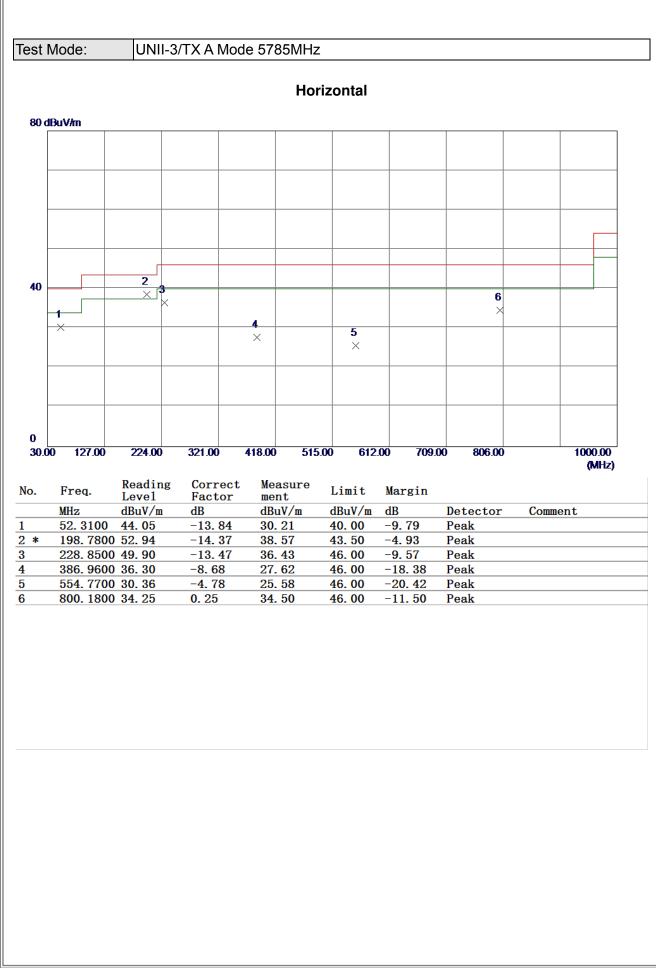






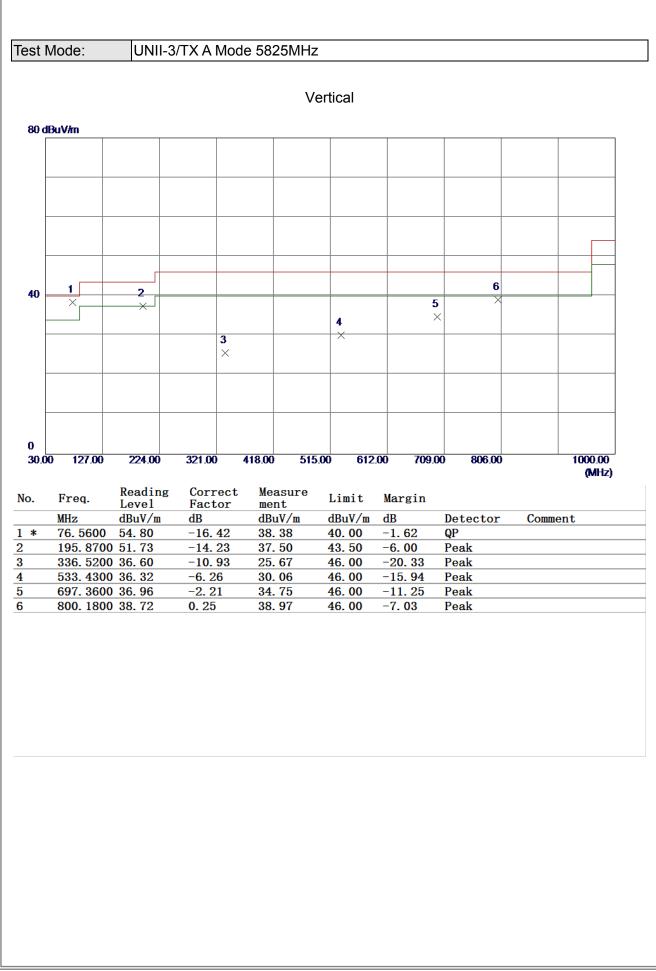






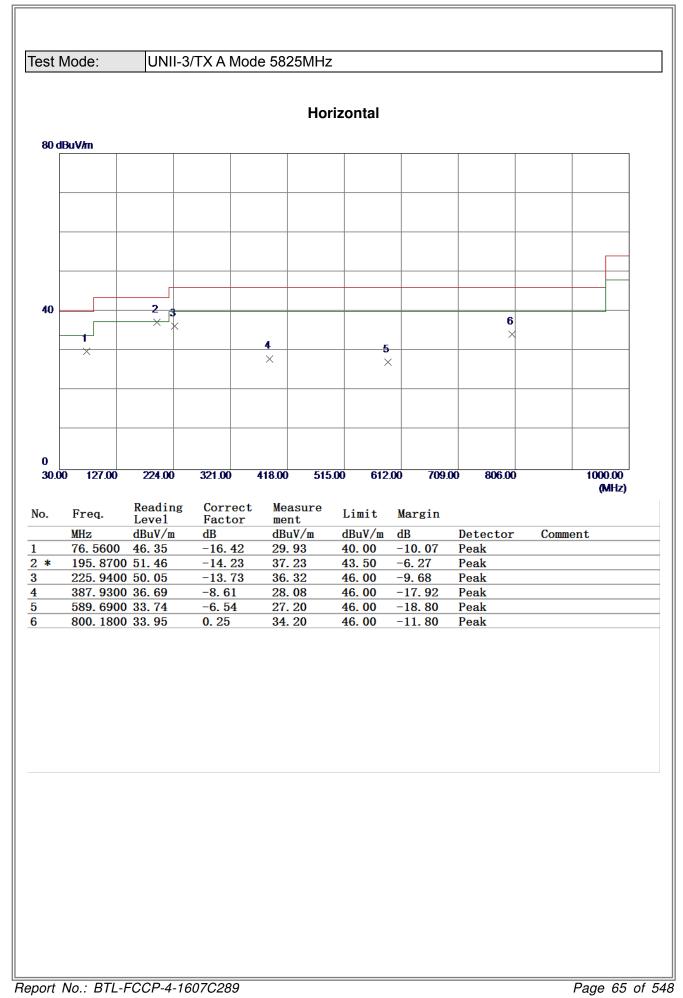










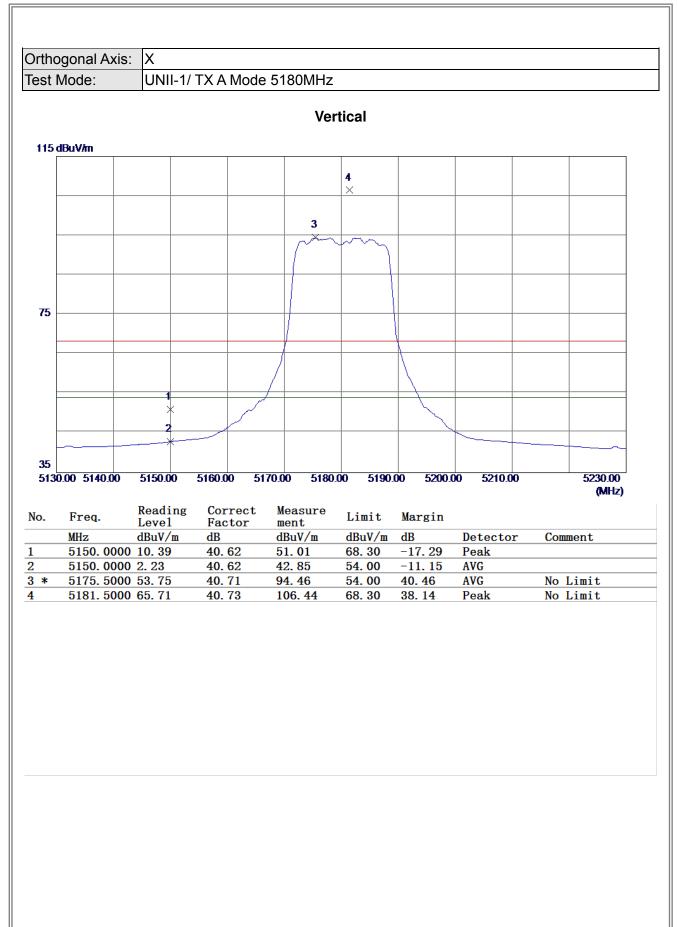




#### ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

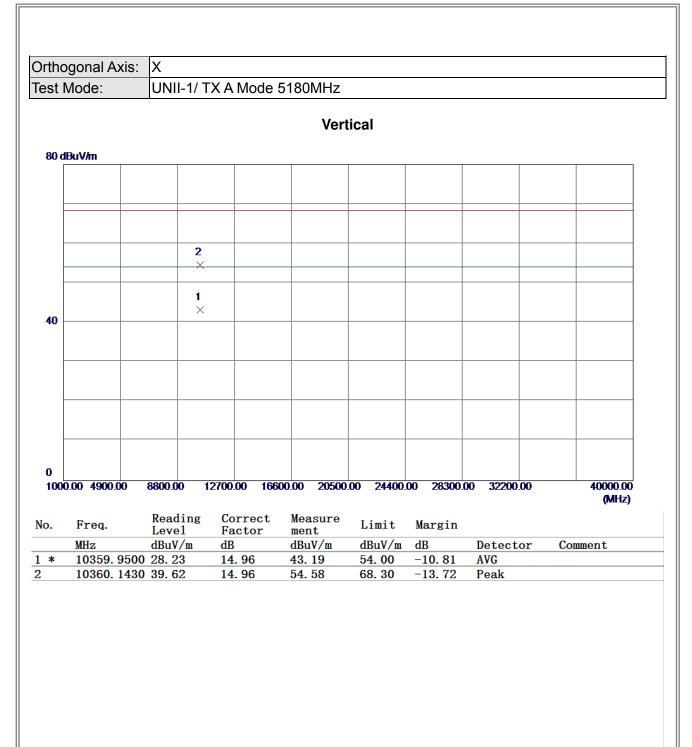






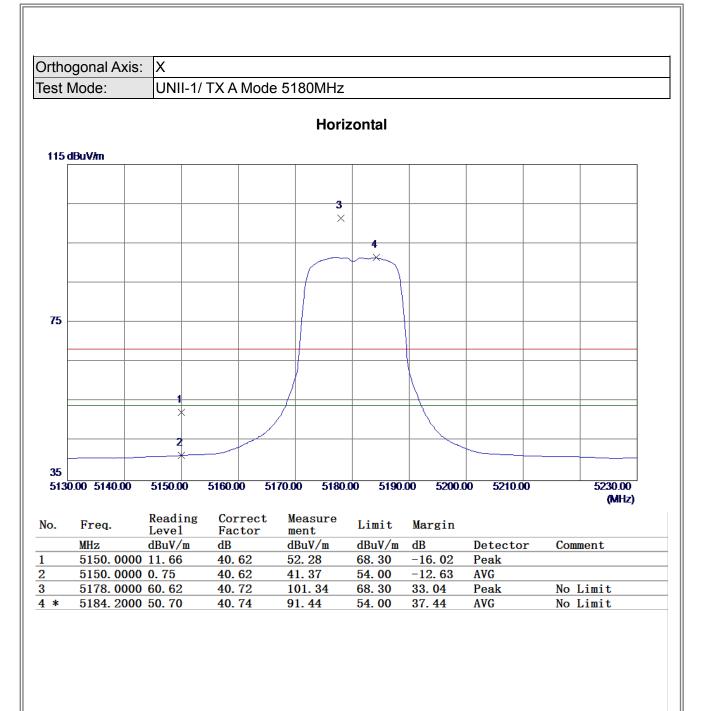






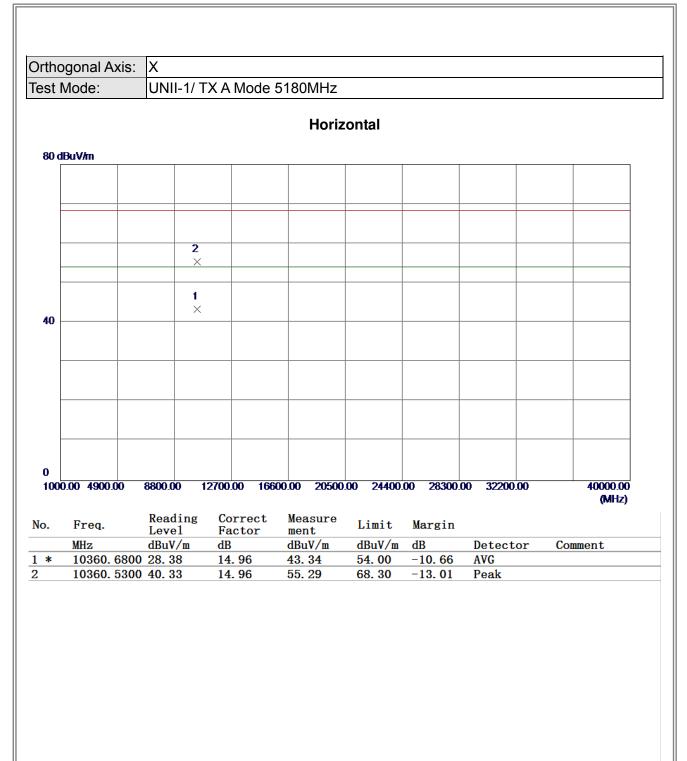






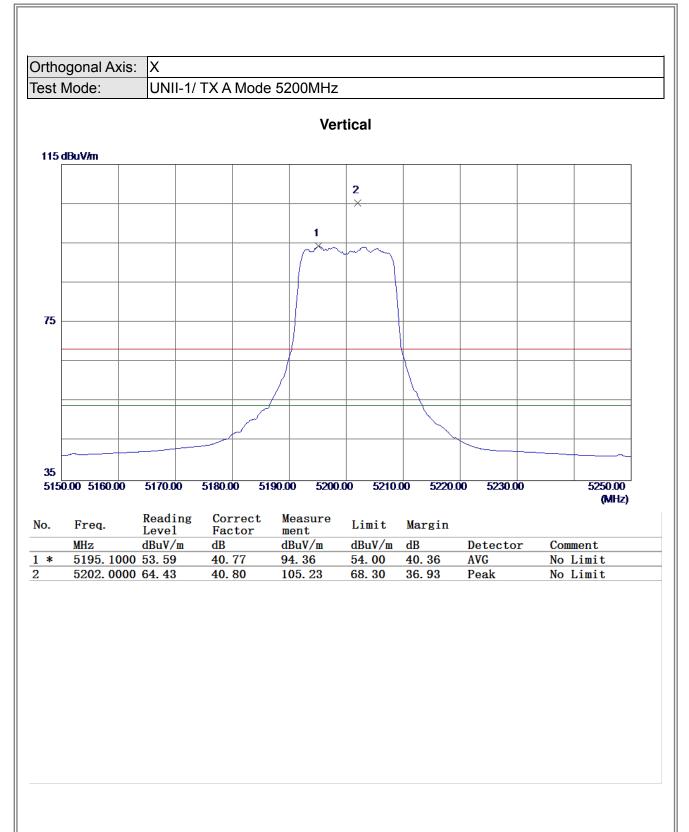






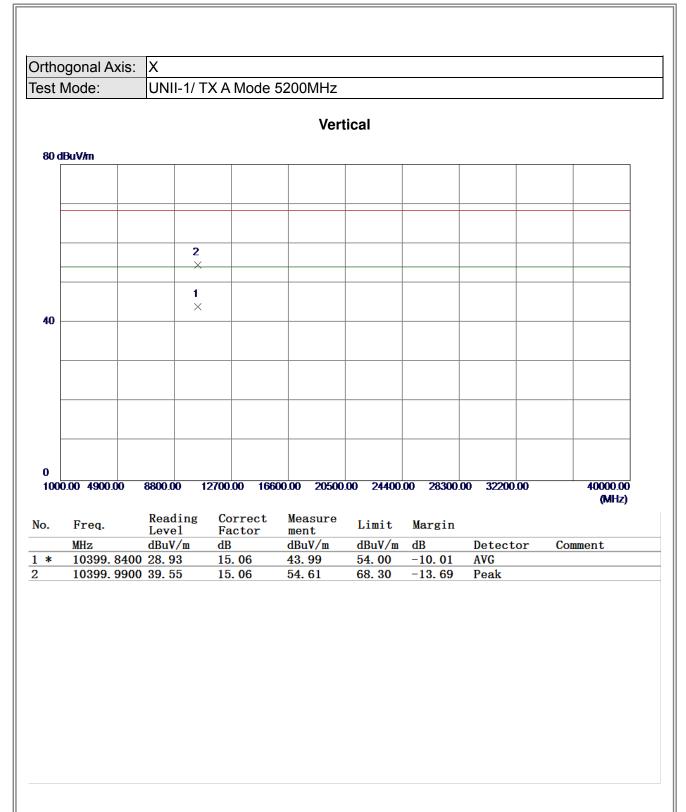






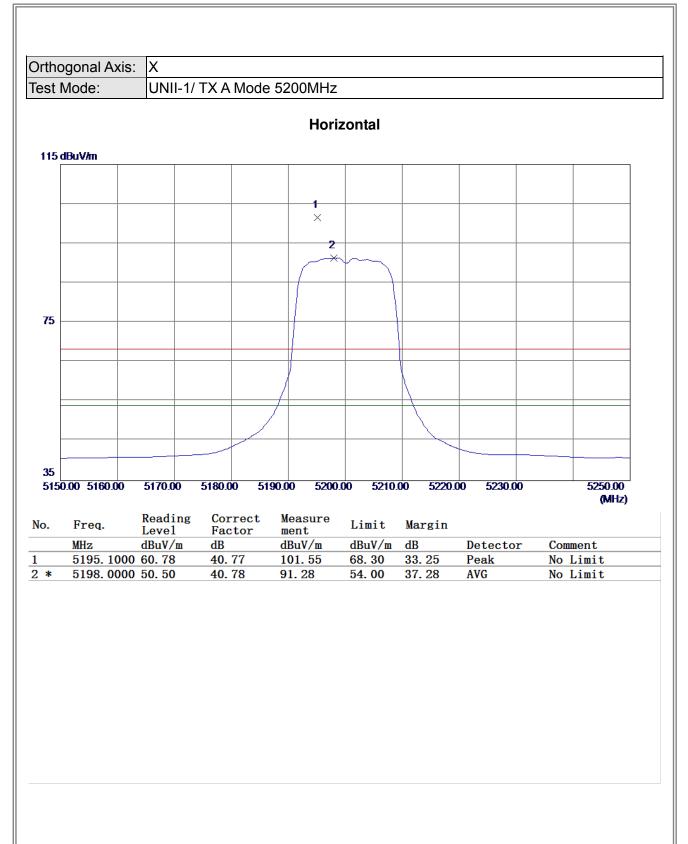






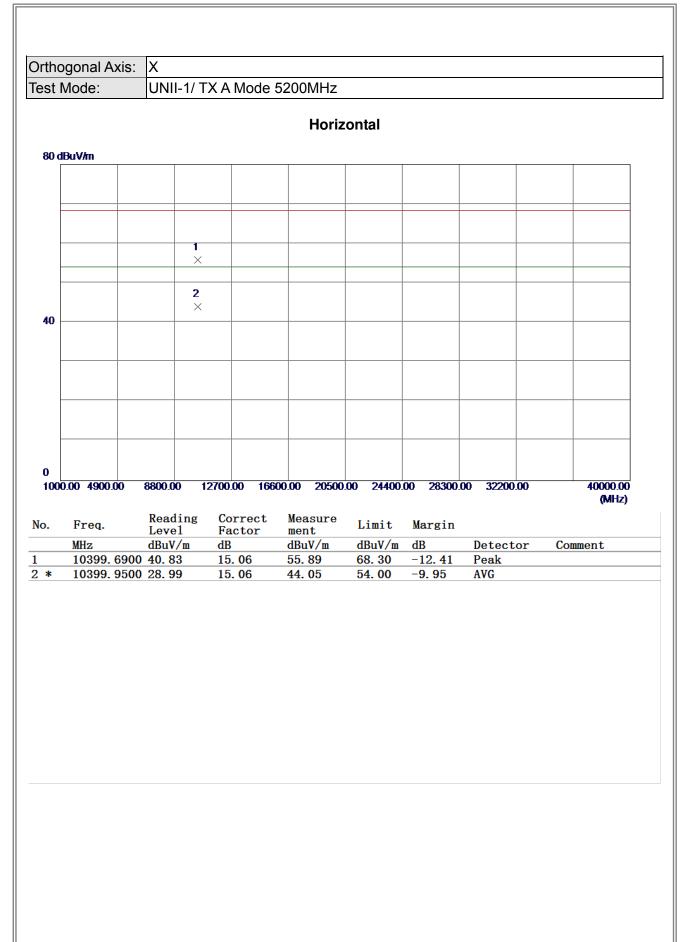






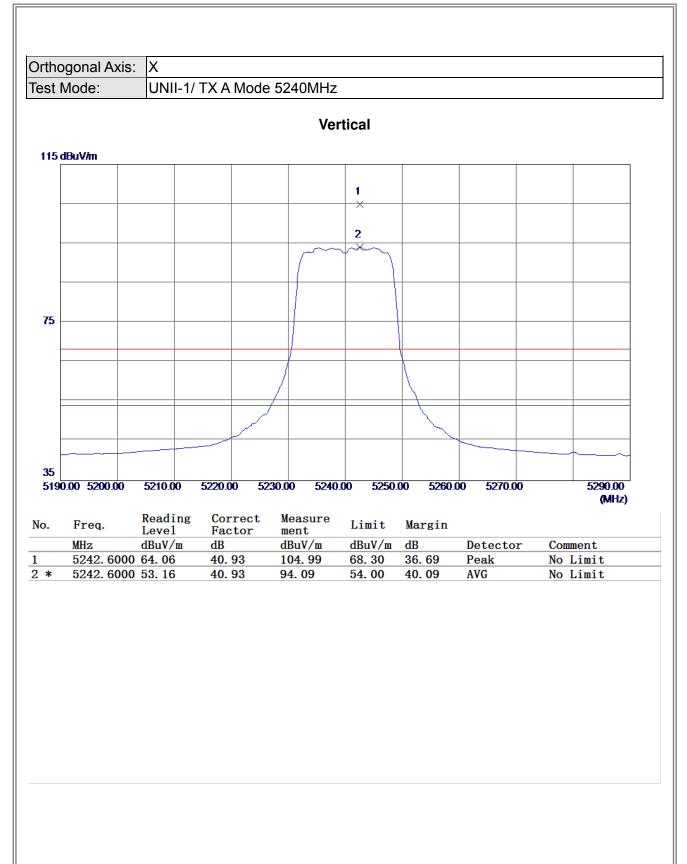






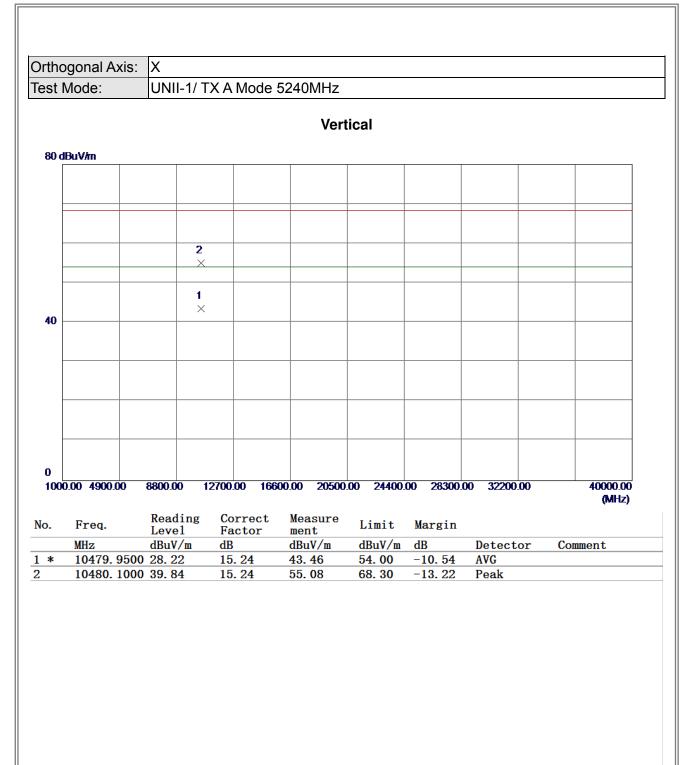






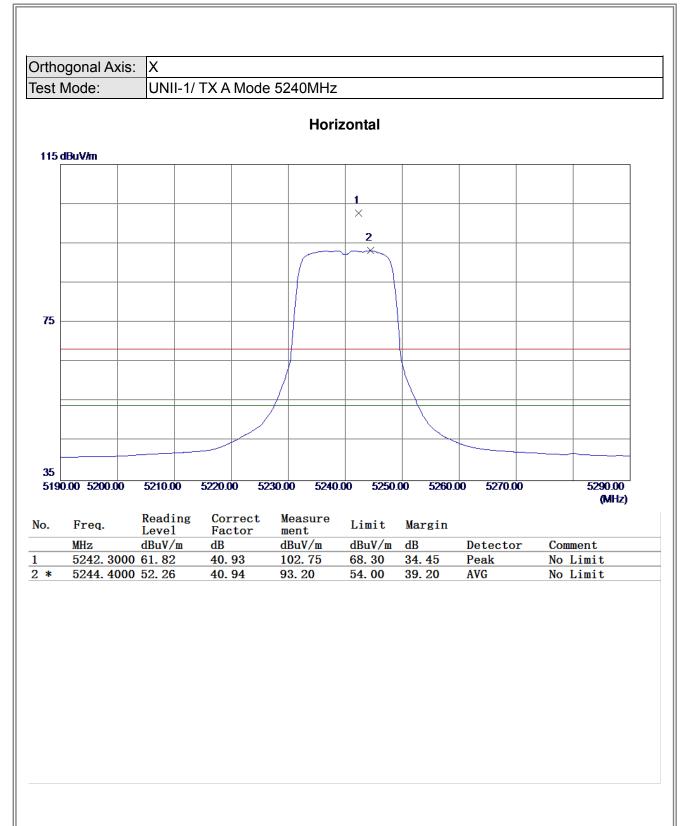






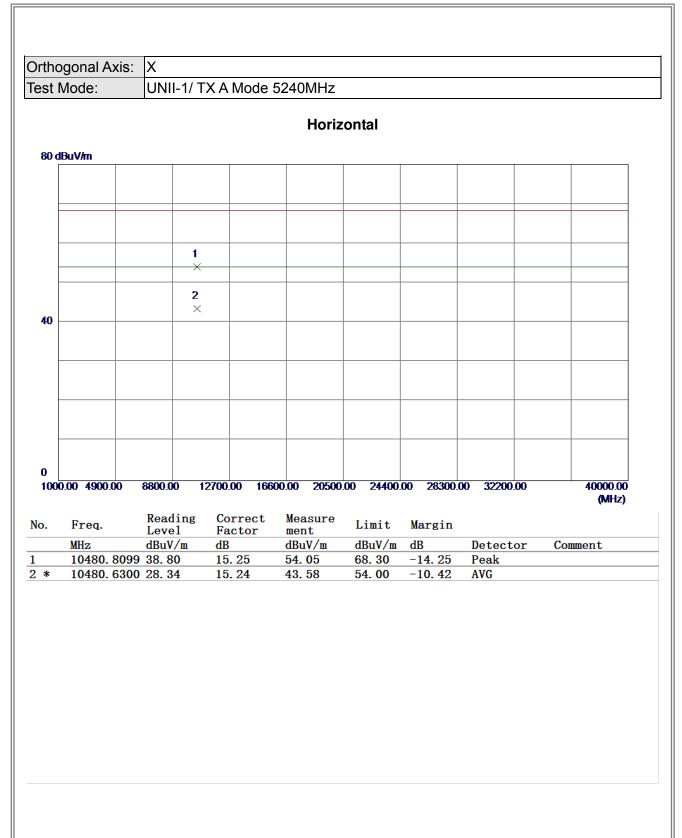






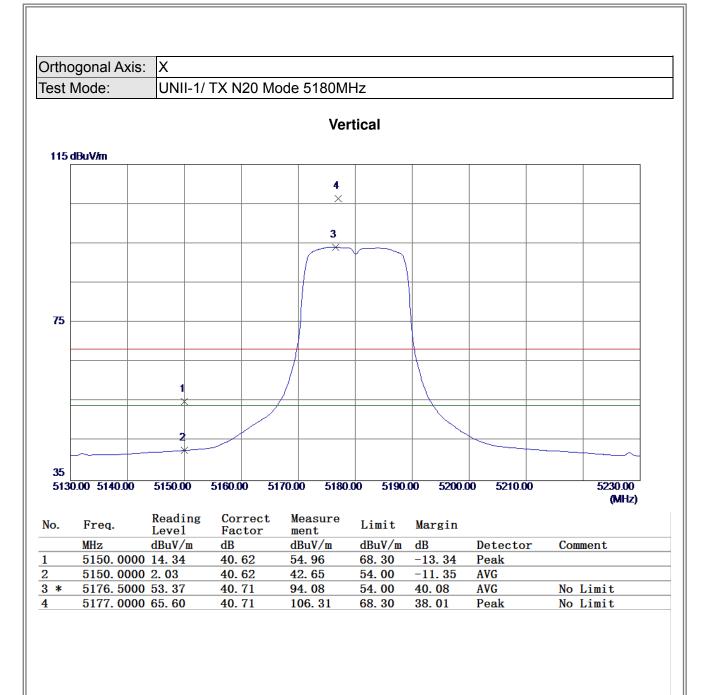






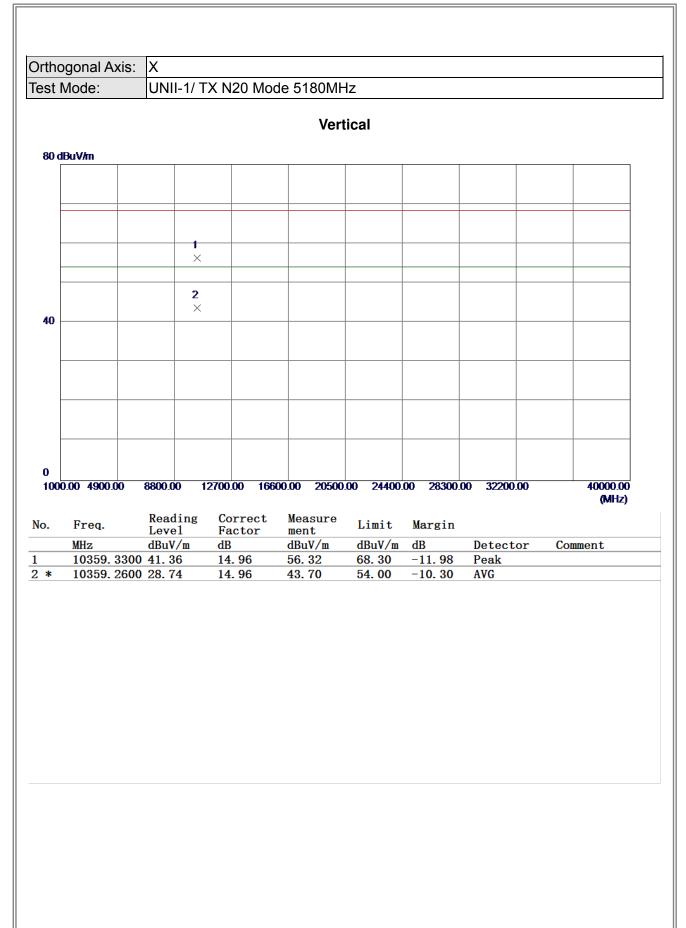






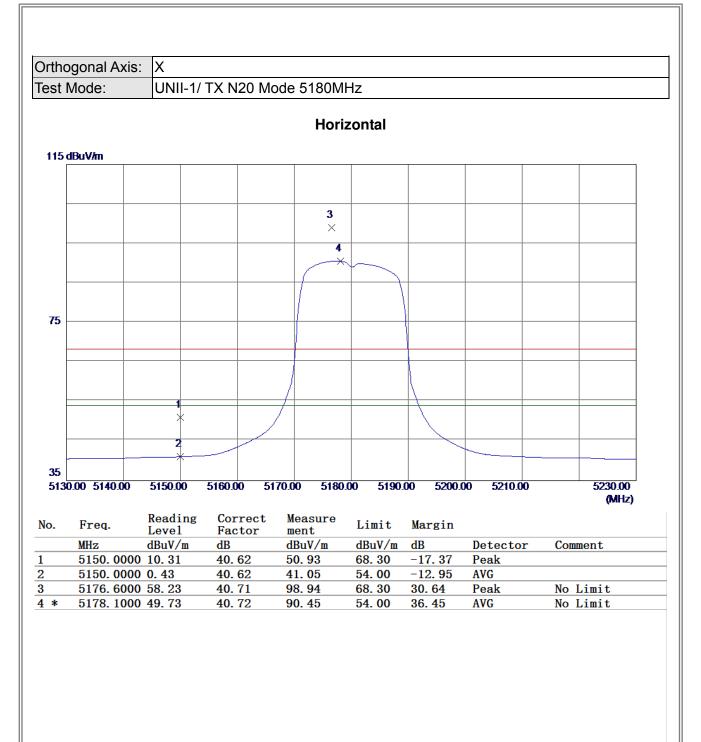






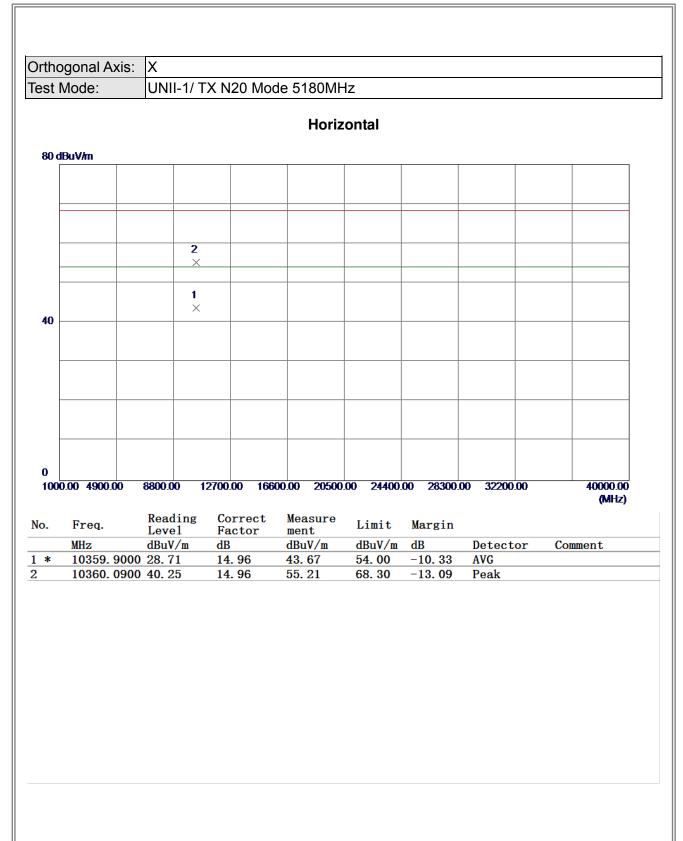






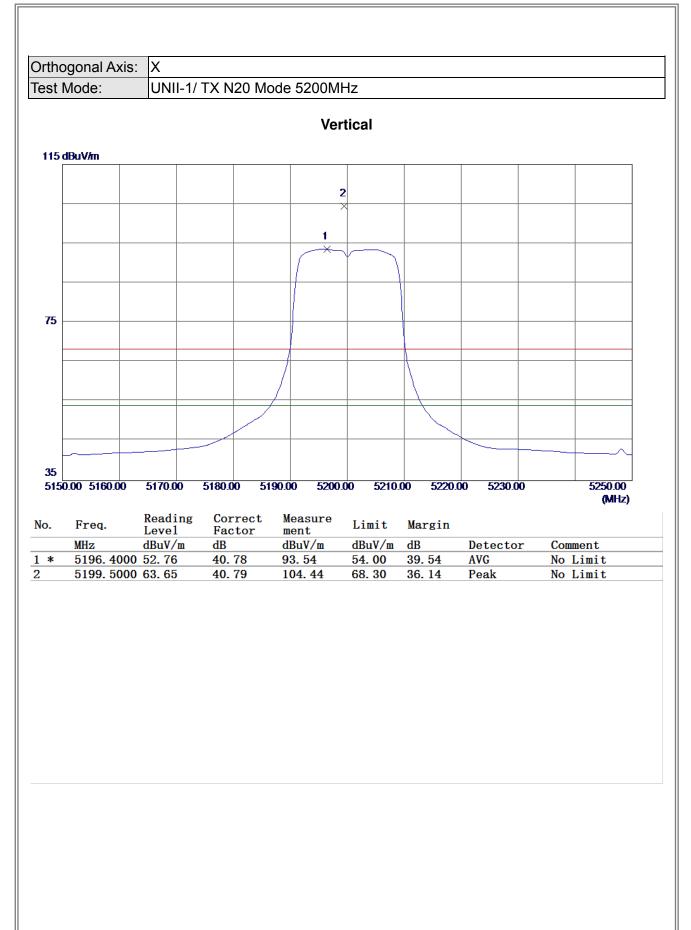






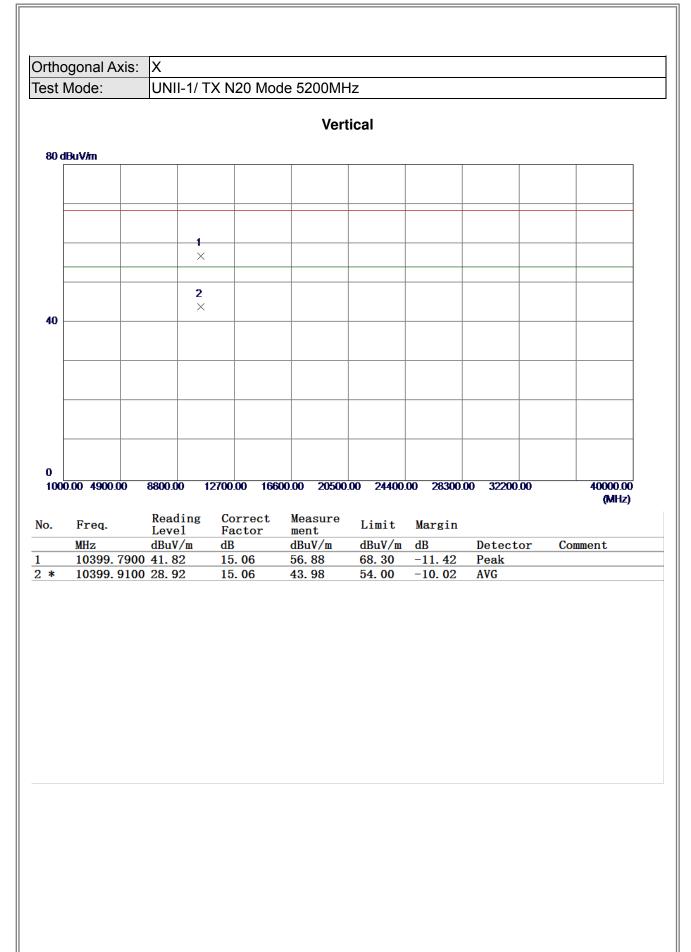






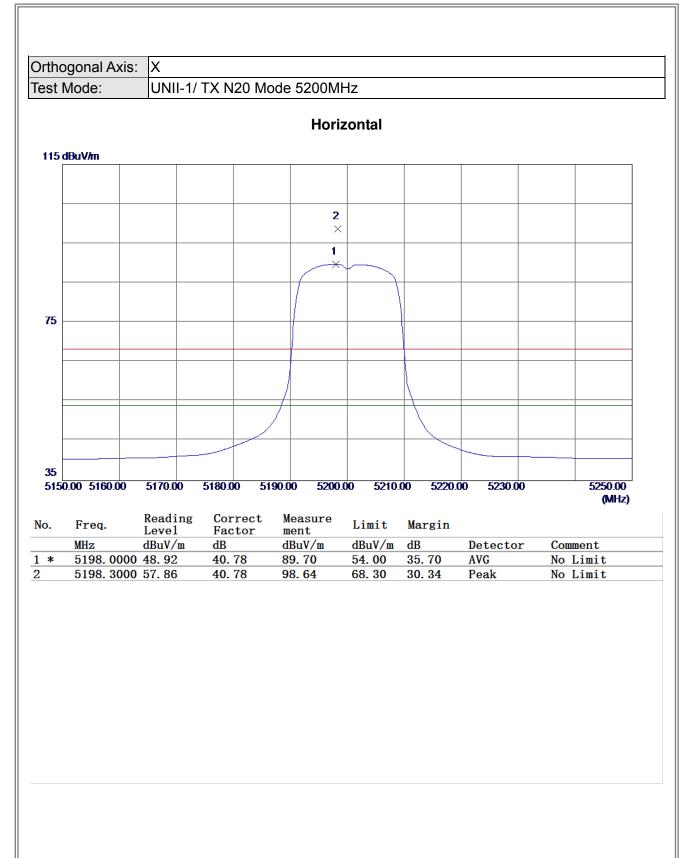






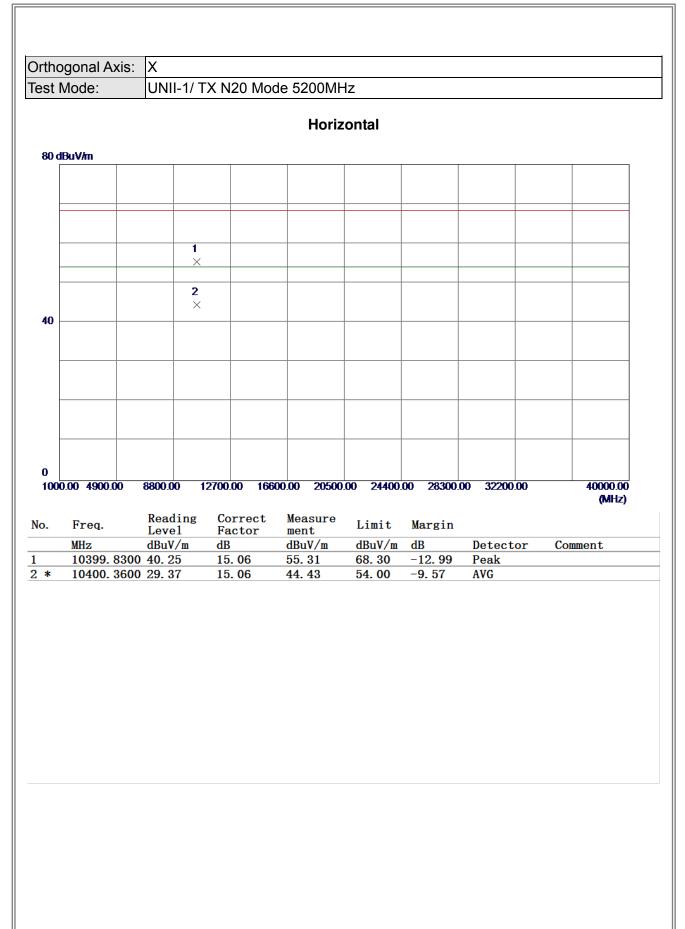






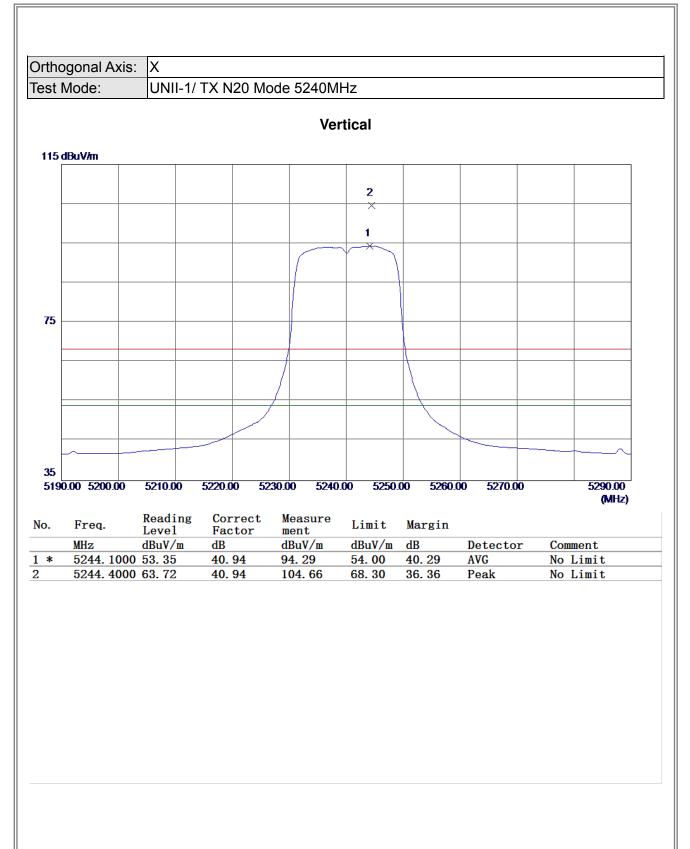






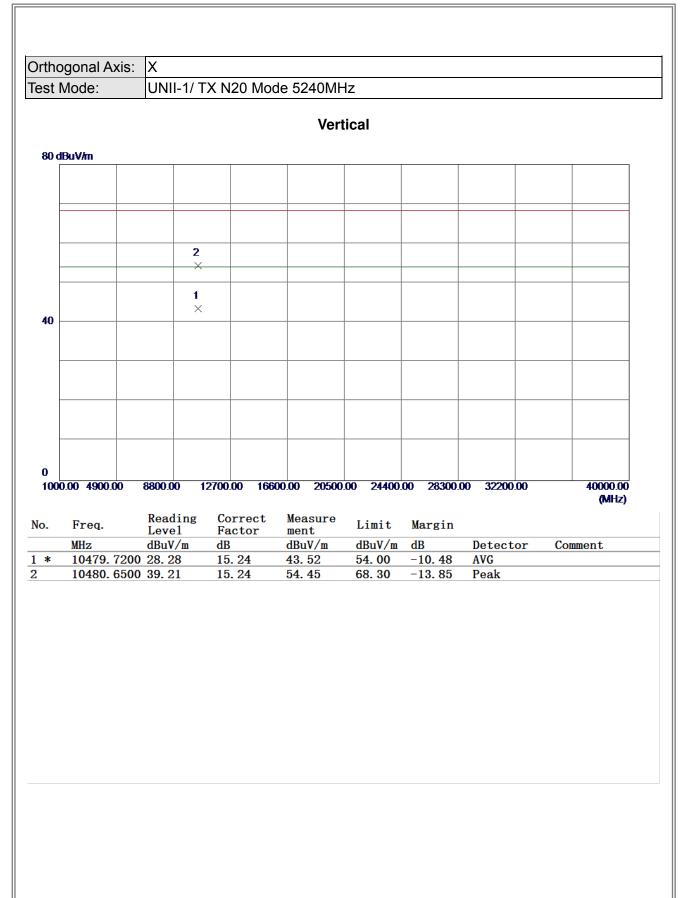






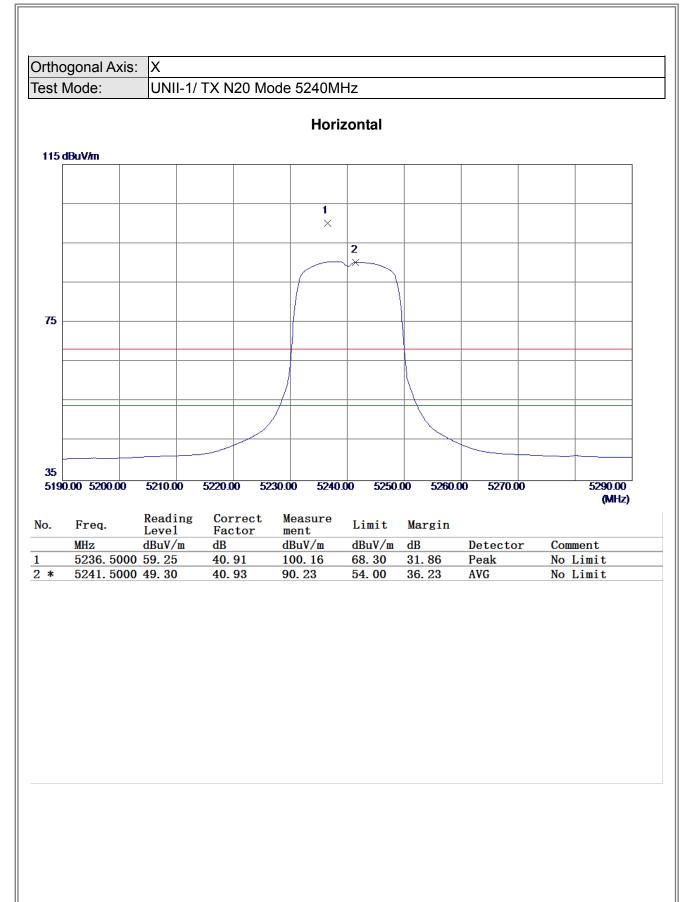






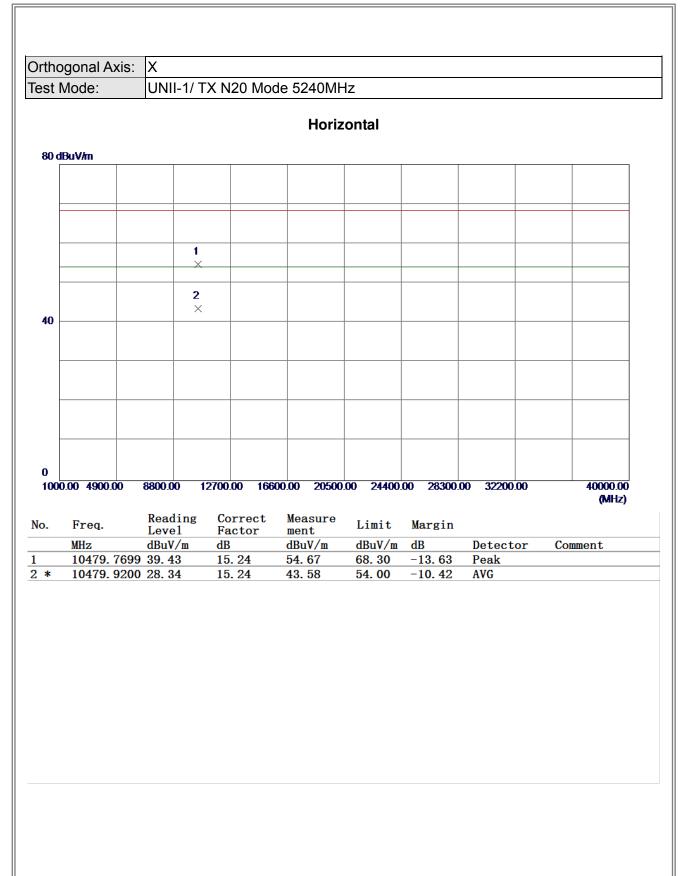






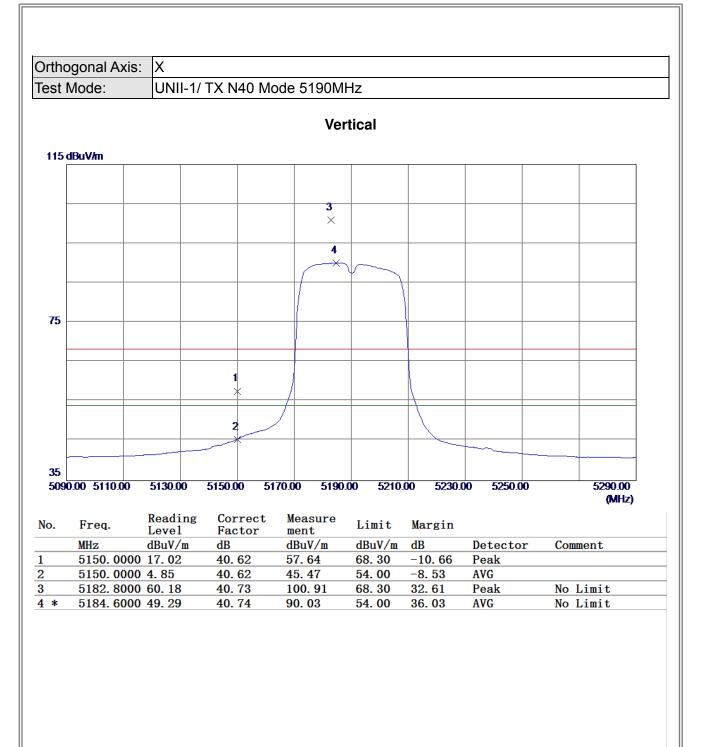






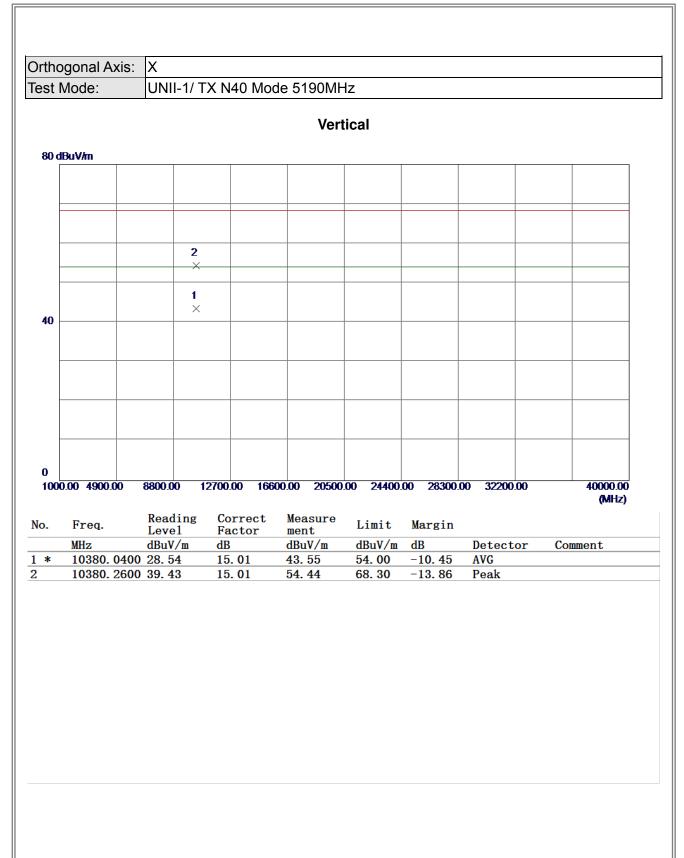






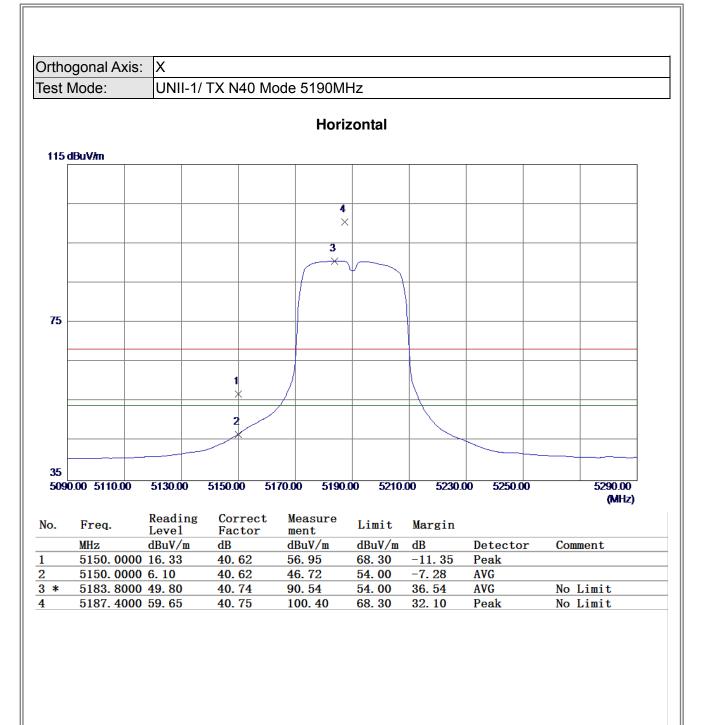






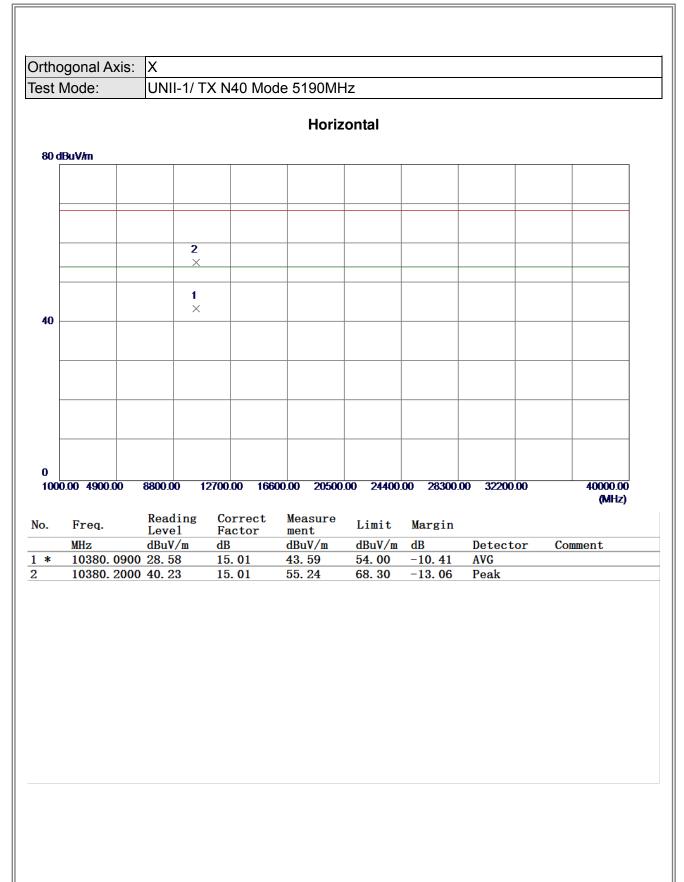






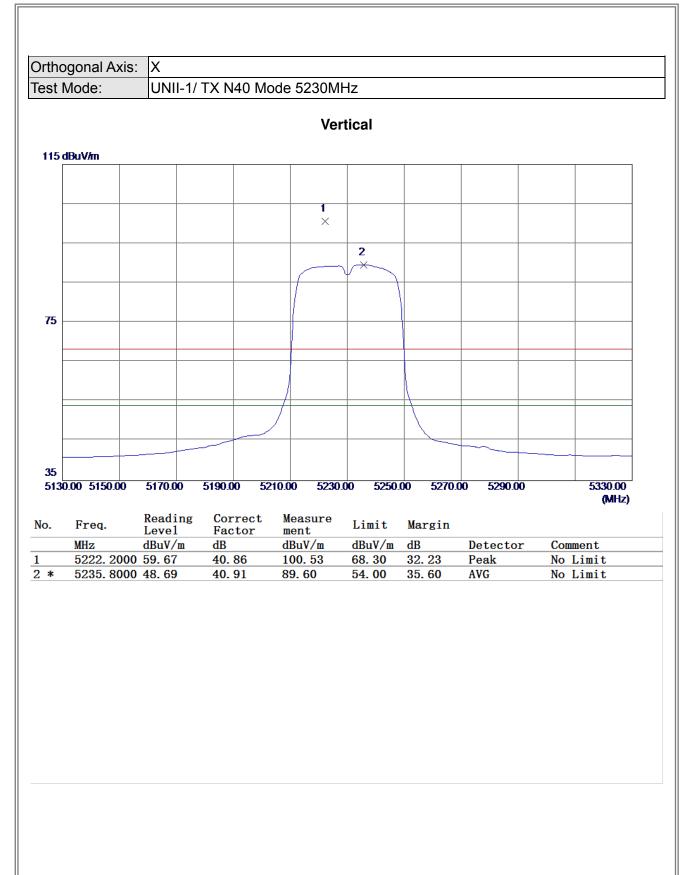






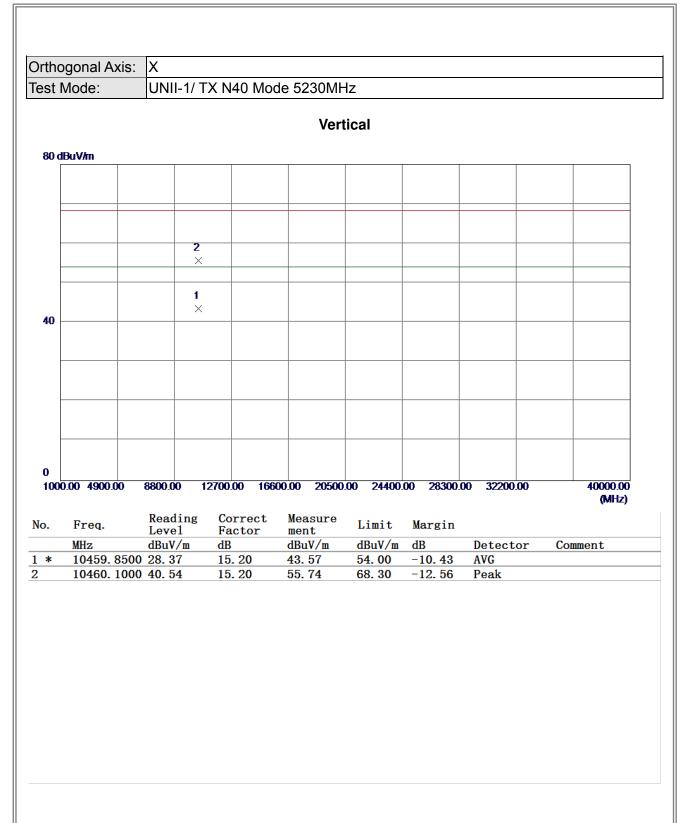






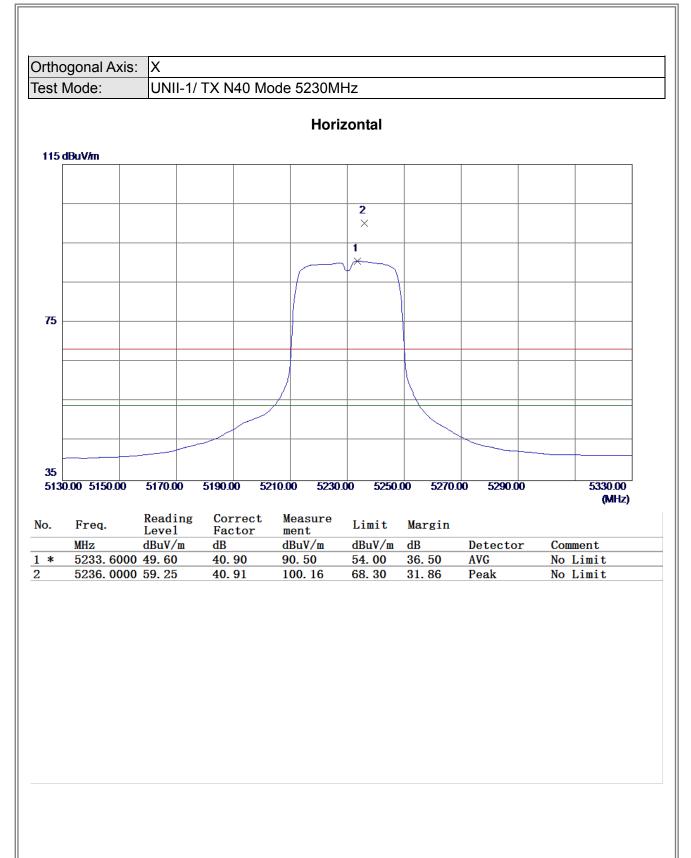






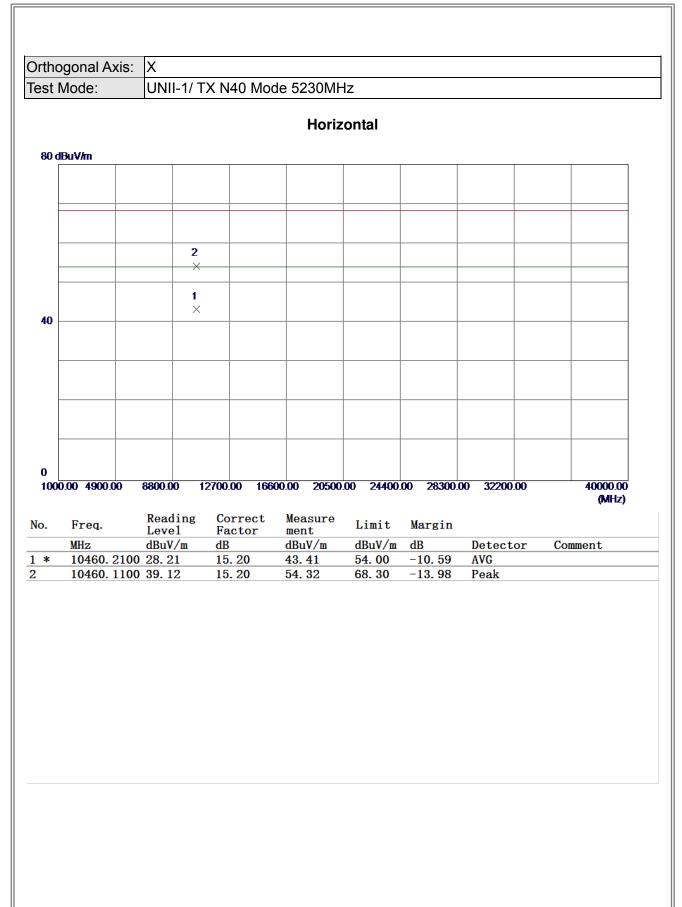






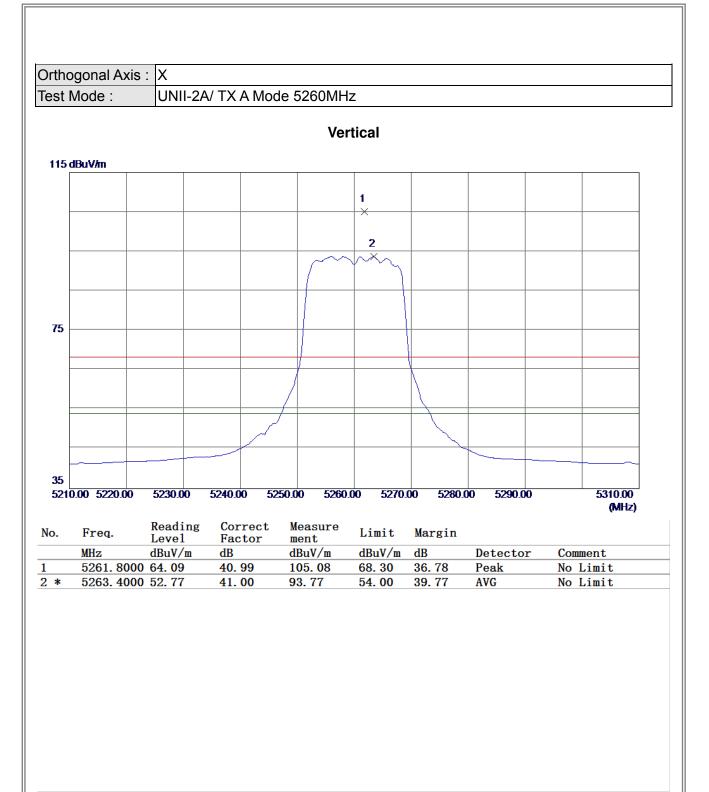






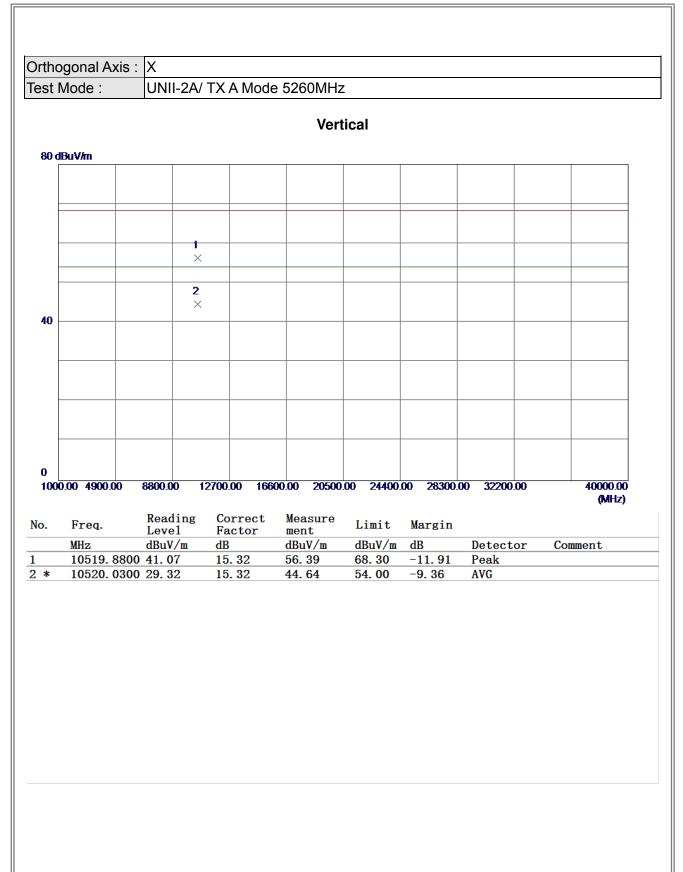






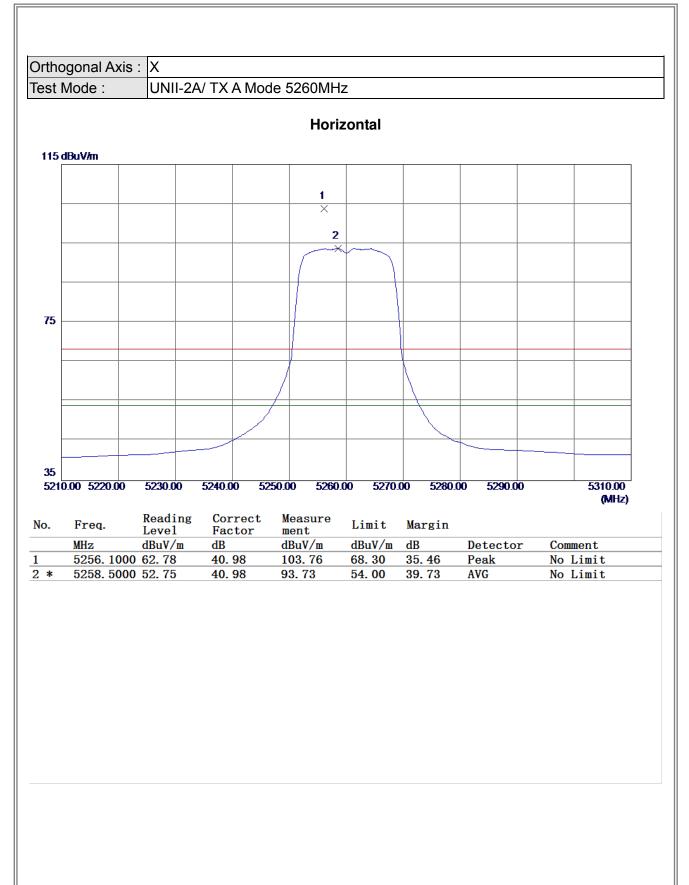






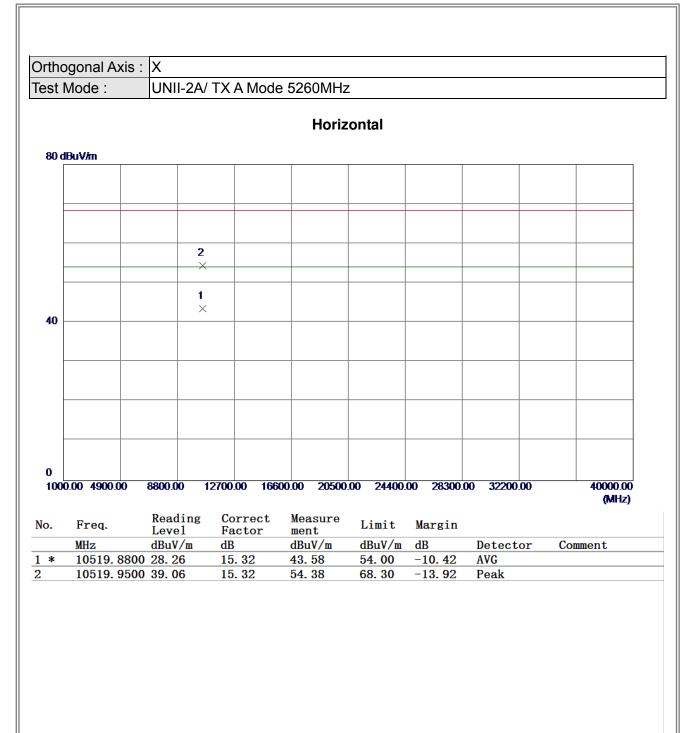






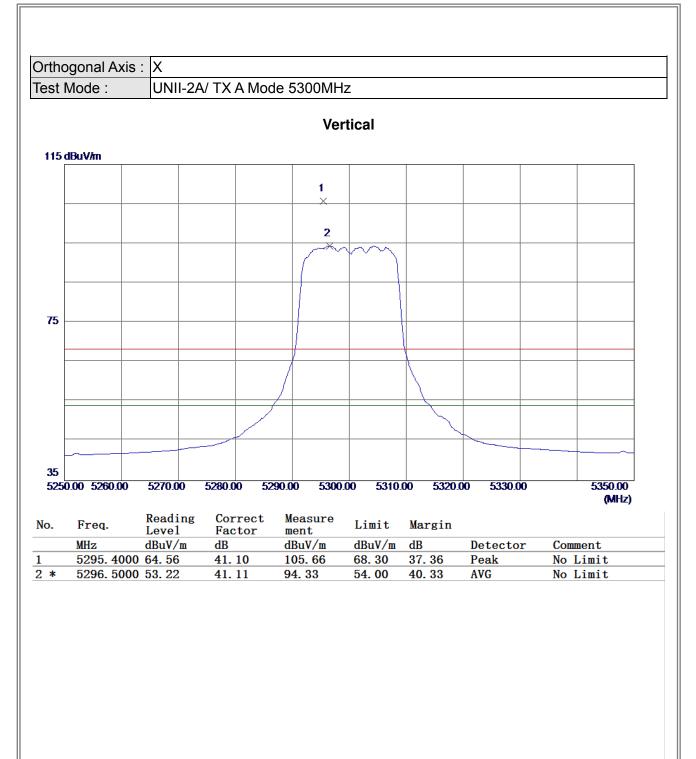






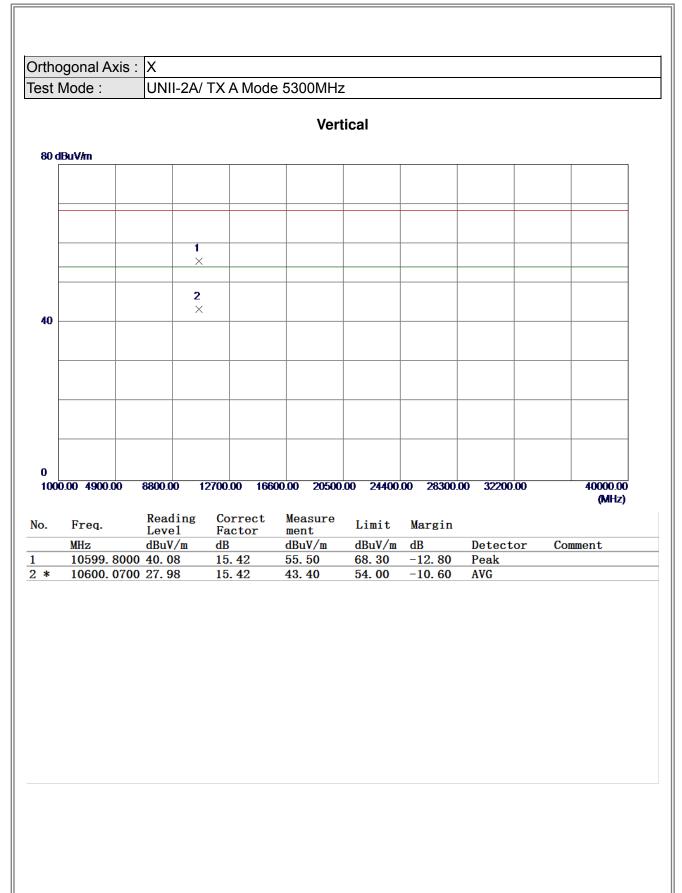






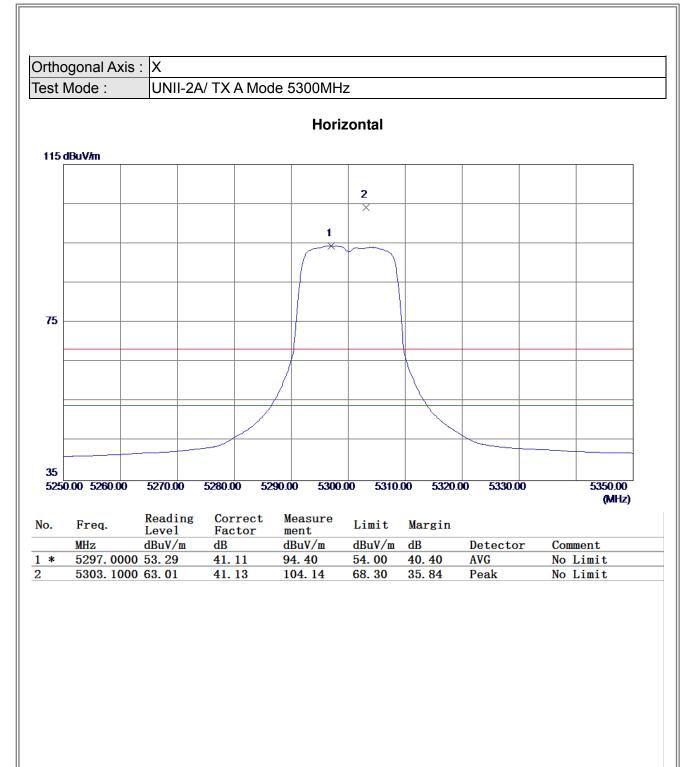






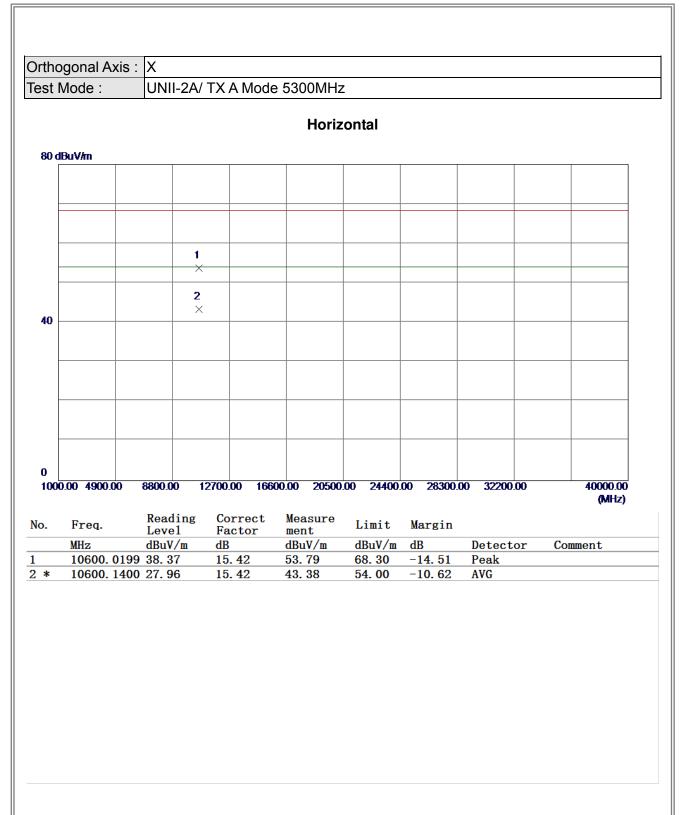






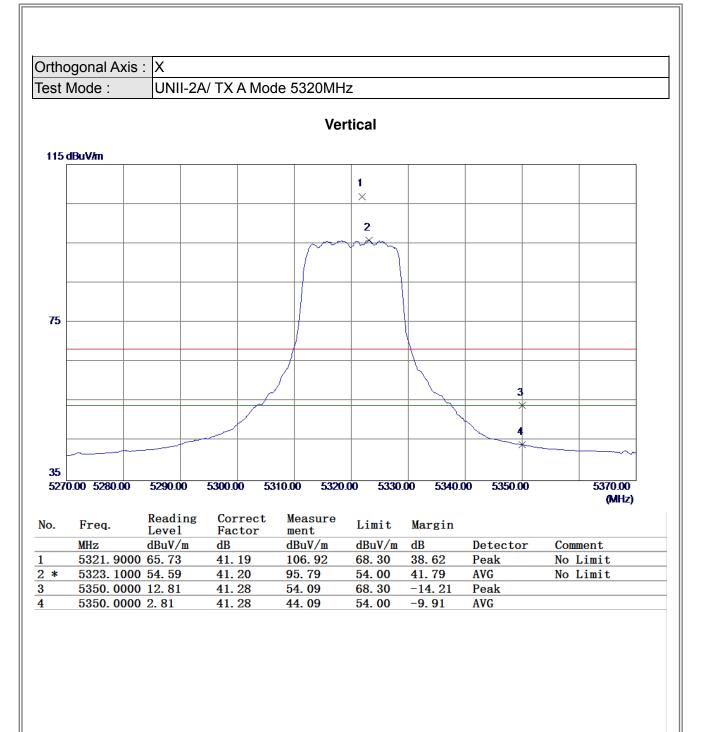






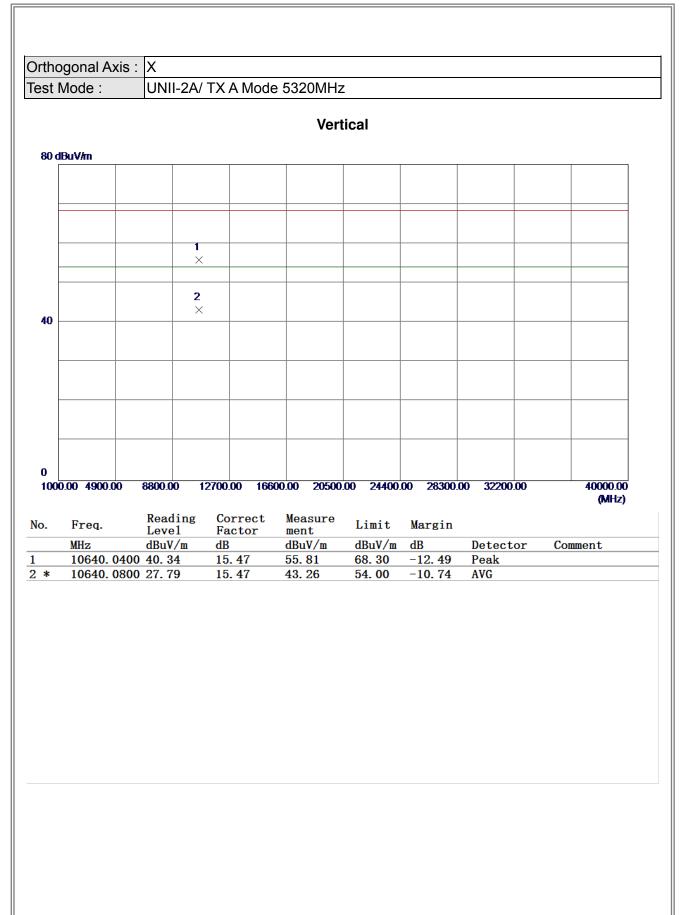






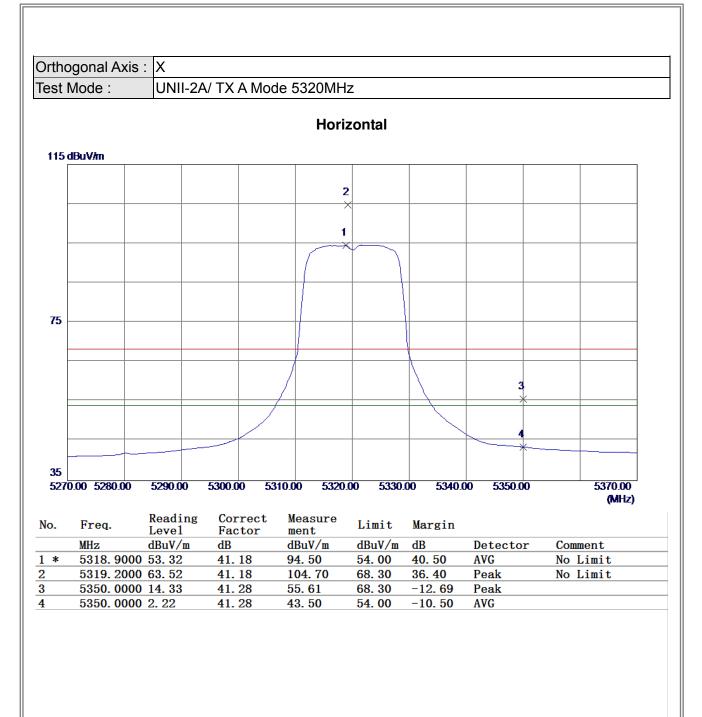






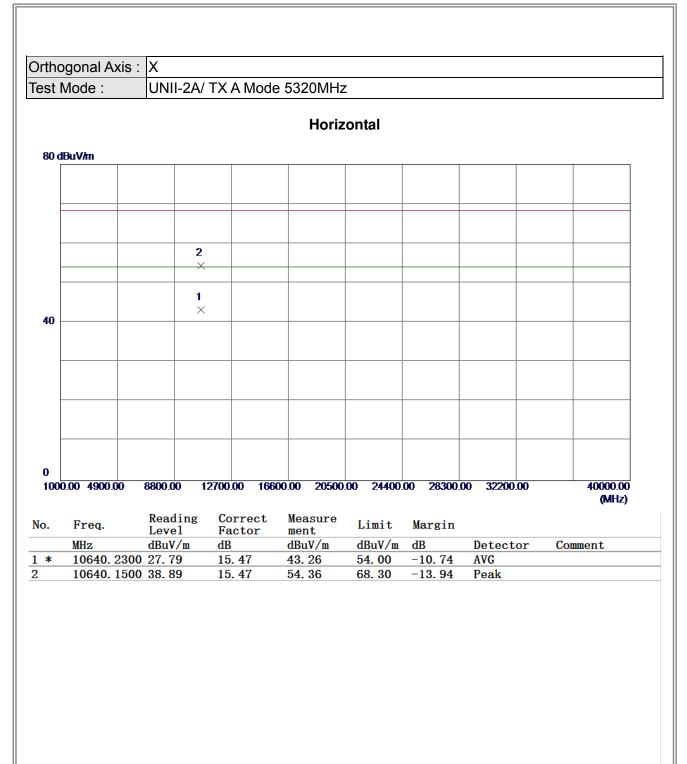






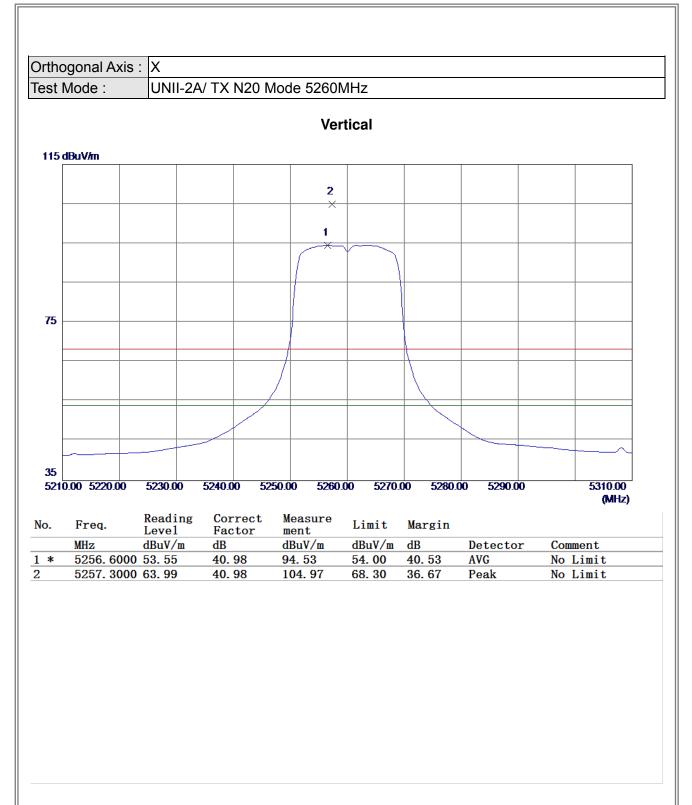






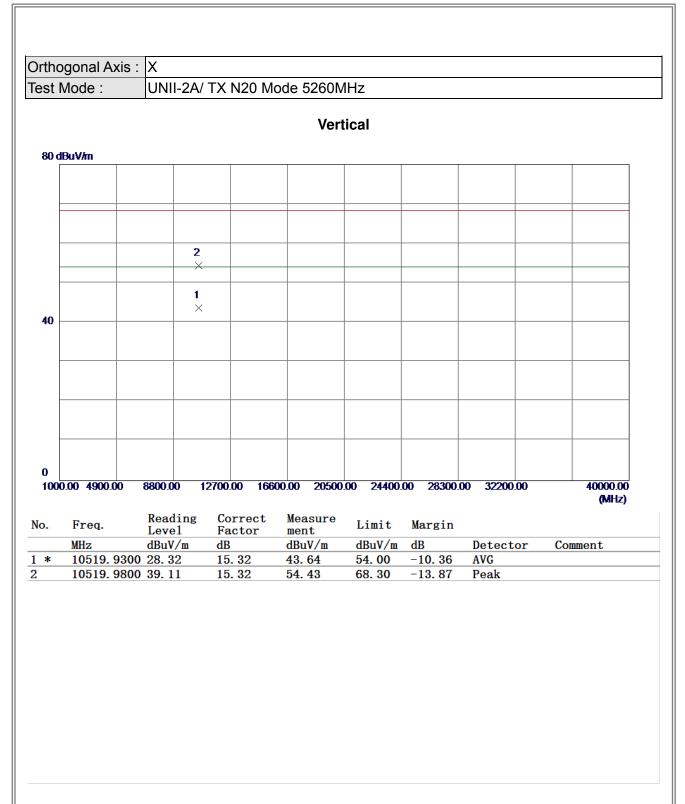






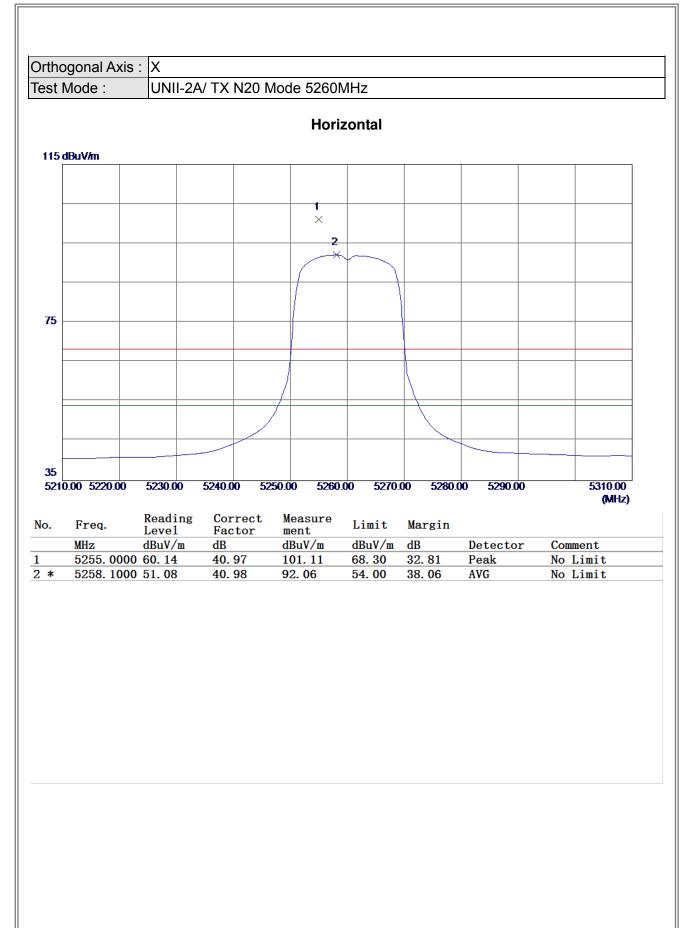






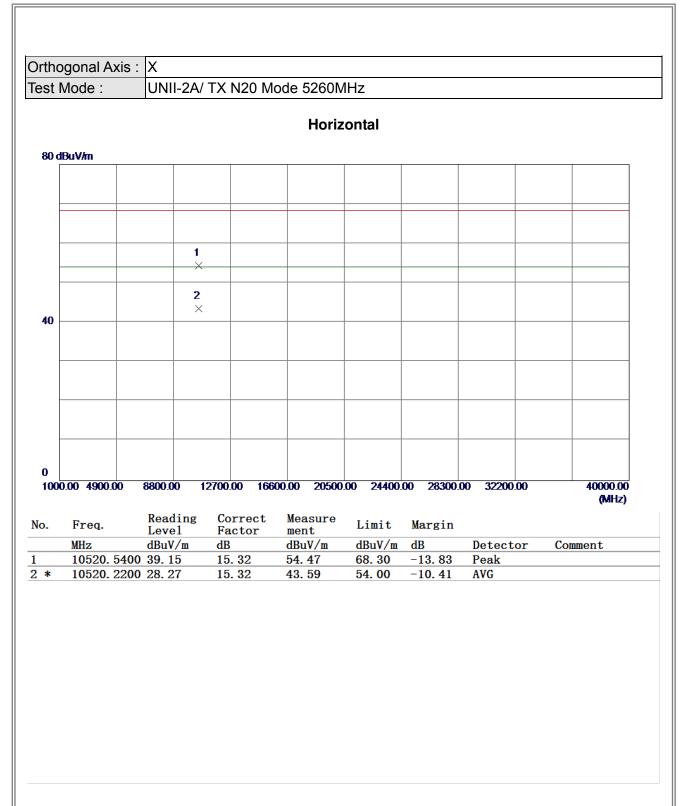






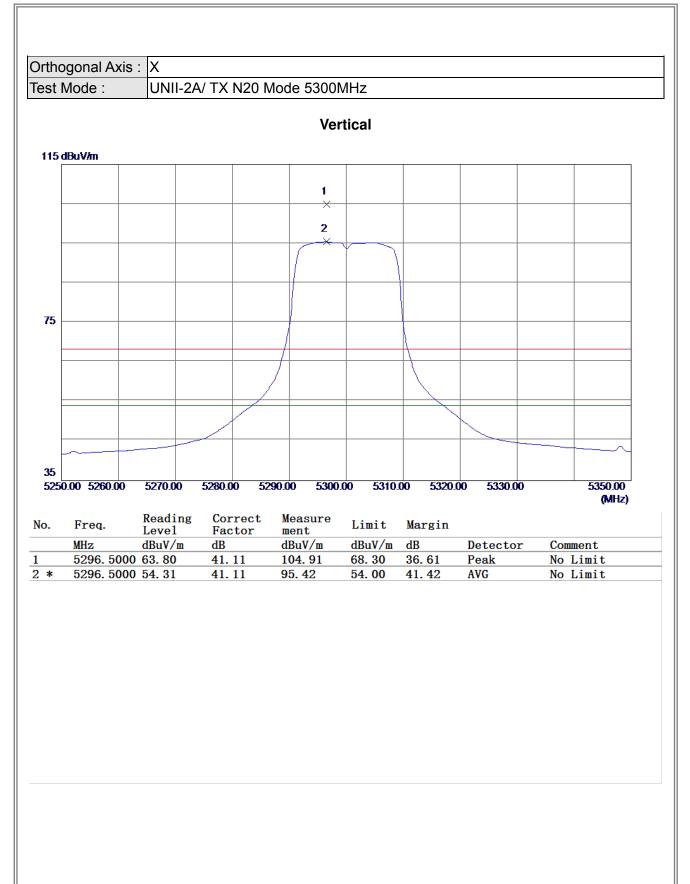






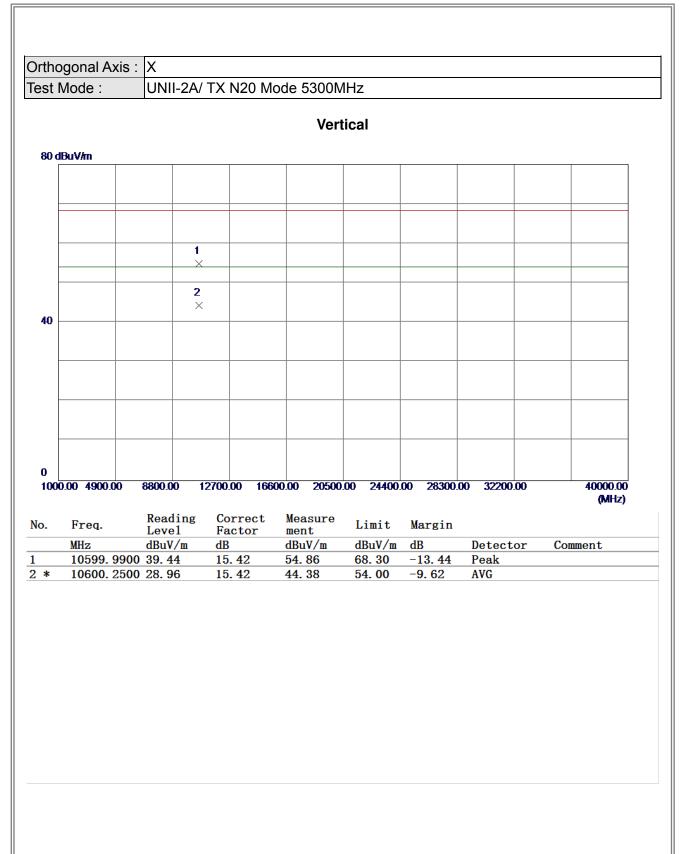






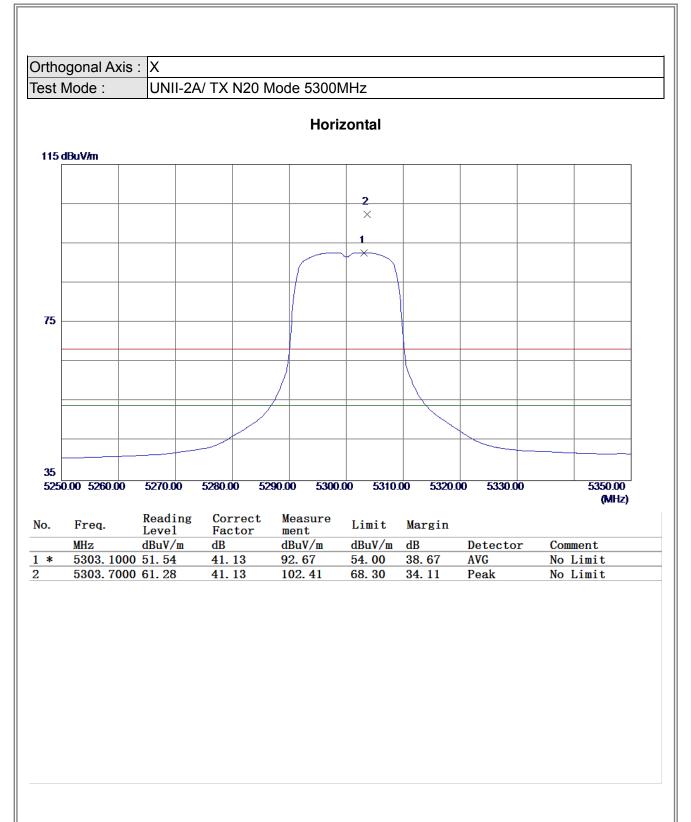
















Test Mode : UNII-2A/ TX N20 Mode 5300MHz								
				Horiz	ontal			
80 d	lBuV/m							
		1						
			<					
		2						
40			<					
D 100	0.00 4900.00	8800.00	12700.00 166	600.00 20500	.00 24400	.00 28300.	00 32200.00	40000.00
		Reading	Correct	Measure	<b>.</b> ,			(MHz)
•	Freq. MHz	Level dBuV/m	Factor dB	ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
	10599. 820	0 38.91	15.42	<b>54.33</b>	68.30	-13. 97	Peak	
*	10599. 860	0 21.90	15. 42	43. 38	54.00	-1 <b>0. 6</b> 2	AVG	





