

# **FCC Radio Test Report**

# FCC ID: 2ABZM-IUAPACL

This report concerns: Original Grant

Project No.	:	2005C192
Equipment	:	802.11ac Dual-Band Access Point
Brand Name	:	IP-COM
Test Model	:	iUAP-AC-LITE
Series Model	:	N/A
Applicant	:	SHENZHEN IP-COM NETWORKS CO.,LTD.
Address	:	Room 101, Unit A, First Floor, Tower E3, No. 1001, Zhongshanyuan
		Road, Nanshan District, Shenzhen, China. 518052
Manufacturer	:	SHENZHEN IP-COM NETWORKS CO.,LTD.
Address	:	Room 101, Unit A, First Floor, Tower E3, No. 1001, Zhongshanyuan
		Road, Nanshan District, Shenzhen, China. 518052
Date of Receipt	:	May 29, 2020
Date of Test	:	Jun. 02, 2020 ~ Jul. 11, 2020
Issued Date	:	Jul. 17, 2020
<b>Report Version</b>	:	R00
Test Sample	:	Engineering Sample No.: DG20200529161
Standard(s)	:	FCC Part15, Subpart E(15.407) ANSI C63.10-2013 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 FCC KDB 662911 D01 Multiple Transmitter Output v02r01

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

nimon Ling Prepared by : Simon Ling

Schan Ma

Approved by : Ethan Ma



Certificate #5123.02

Add: No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. Tel: +86-769-8318-3000 Web: www.newbtl.com



#### Declaration

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

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

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, A2LA, or any agency of the U.S. Government.

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

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

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

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

#### Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective. Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.





Table of Contents	Page
REPORT ISSUED HISTORY	6
1 . SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	9
2 . GENERAL INFORMATION	10
2.1 GENERAL DESCRIPTION OF EUT	10
2.2 TEST MODES	13
2.3 PARAMETERS OF TEST SOFTWARE	16
2.4 DUTY CYCLE	18
2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	20
2.6 SUPPORT UNITS	20
3 . AC POWER LINE CONDUCTED EMISSIONS TEST	21
3.1 LIMIT	21
3.2 TEST PROCEDURE	21
3.3 DEVIATION FROM TEST STANDARD	21
3.4 TEST SETUP	22
3.5 EUT OPERATION CONDITIONS	22
3.6 TEST RESULTS	22
4 . RADIATED EMISSIONS TEST	23
4.1 LIMIT	23
4.2 TEST PROCEDURE	24
4.3 DEVIATION FROM TEST STANDARD	24
4.4 TEST SETUP	25
4.5 EUT OPERATION CONDITIONS	26
4.6 TEST RESULTS - 9 KHZ to 30 MHZ	26
4.7 TEST RESULTS - 30 MHz TO 1000 MHz	26
4.8 TEST RESULTS - ABOVE 1000 MHz	26
5 . BANDWIDTH TEST	27
5.1 LIMIT	27
5.2 TEST PROCEDURE	27
5.3 DEVIATION FROM STANDARD	27



Table of Contents	Page
5.4 TEST SETUP	28
5.5 EUT OPERATION CONDITIONS	28
5.6 TEST RESULTS	28
6 . MAXIMUM OUTPUT POWER TEST	29
6.1 LIMIT	29
6.2 TEST PROCEDURE	29
6.3 DEVIATION FROM STANDARD	29
6.4 TEST SETUP	29
6.5 EUT OPERATION CONDITIONS	29
6.6 TEST RESULTS	29
7 . POWER SPECTRAL DENSITY TEST	30
7.1 LIMIT	30
7.2 TEST PROCEDURE	30
7.3 DEVIATION FROM STANDARD	31
7.4 TEST SETUP	31
7.5 EUT OPERATION CONDITIONS	31
7.6 TEST RESULTS	31
8 . FREQUENCY STABILITY MEASUREMENT	32
8.1 LIMIT	32
8.2 TEST PROCEDURE	32
8.3 DEVIATION FROM STANDARD	32
8.4 TEST SETUP	32
8.5 EUT OPERATION CONDITIONS	32
8.6 TEST RESULTS	32
9 . MEASUREMENT INSTRUMENTS LIST	33
10 . EUT TEST PHOTOS	35
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	39
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	44
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1 GHZ	49
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ	52
APPENDIX E - BANDWIDTH	127
APPENDIX F - MAXIMUM OUTPUT POWER	136





Table of Contents	Page
APPENDIX G - POWER SPECTRAL DENSITY APPENDIX H - FREQUENCY STABILITY	159 169



# **REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Jul. 17, 2020



## **1. SUMMARY OF TEST RESULTS**

Test procedures according to the technical standard(s):

FCC Part15, Subpart E(15.407)						
Standard(s) Section	Test Item	Test Result	Judgment	Remark		
15.207 15.407(b)	AC Power Line Conducted Emissions	APPENDIX A	PASS			
15.407(b) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS			
15.407(a) 15.407(e)	Spectrum Bandwidth	APPENDIX E	PASS			
15.407(a)	Maximum Output Power	APPENDIX F	PASS			
15.407(a)	Power Spectral Density	APPENDIX G	PASS			
15.407(g)	Frequency Stability	APPENDIX H	PASS			
15.203	Antenna Requirements		PASS	NOTE (2)		
15.407(c)	Automatically Discontinue Transmission		PASS	NOTE (3)		

Note:

- (1) "N/A" denotes test is not applicable in this test report.
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.
- (3) During no any information transmission, the EUT can automatically discontinue transmission and become standby mode for power saving. the EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.
   (4) Each Hull Athie device and verify whether it shall resend or discontinue transmission.
- (4) For UNII-1 this device was functioned as a ⊠ Access point device □ Client device



#### **1.1 TEST FACILITY**

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. BTL's Test Firm Registration Number for FCC: 357015 BTL's Designation Number for FCC: CN1240

#### **1.2 MEASUREMENT UNCERTAINTY**

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)) The BTL measurement uncertainty as below table:

A. AC power line conducted emissions test:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.60

B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
	CISPR	9kHz ~ 30MHz	V	3.79
		9kHz ~ 30MHz	Н	3.57
		30MHz ~ 200MHz		4.88
		30MHz ~ 200MHz	Н	4.14
DG-CB03		200MHz ~ 1,000MHz	V	4.62
DG-CB03		200MHz ~ 1,000MHz	Н	4.80
		1GHz ~ 6GHz	-	4.58
		6GHz ~ 18GHz	-	5.18
		18GHz ~ 26.5GHz	-	3.62
		26.5GHz ~ 40GHz	-	4.00

#### C. Other Measurement:

Parameter	Uncertainty
Spectrum Bandwidth	±3.8 %
Maximum Output Power	±0.95 dB
Power Spectral Density	±0.86 dB
Frequency Stability	±0.16 dB
Temperature	±0.08 °C
Time	±0.58 %
Supply voltages	±0.3 %

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

# **1.3 TEST ENVIRONMENT CONDITIONS**

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	25°C	55%	AC 120V/60Hz AC 240V/50Hz	
Radiated Emissions-9K-30MHz	25°C	60%	AC 120V/60Hz	Kwok Guo
Radiated Emissions-30 MHz to 1GHz	25°C	60%	AC 120V/60Hz	Kwok Guo
Radiated Emissions-Above 1000 MHz	24°C	60%	AC 120V/60Hz	Kwok Guo
Spectrum Bandwidth	25°C	55%	DC 24V	Hayden Chen
Maximum Output Power	25°C	55%	DC 24V	Laughing Zhang
Power Spectral Density	25°C	55%	DC 24V	Hayden Chen
Frequency Stability	Normal & Extreme	55%	Normal & Extreme	Hayden



# 2. GENERAL INFORMATION

# 2.1 GENERAL DESCRIPTION OF EUT

Fauinmont	202 11 op Duol Dand Appage Daint
Equipment	802.11ac Dual-Band Access Point
Brand Name	IP-COM
Test Model	iUAP-AC-LITE
Series Model	N/A
Model Difference(s)	N/A
Power Source	Supplied from PoE adapter.
	Model: BN060-P12024
Power Rating	I/P: 100-240V~ 50/60Hz 0.3A O/P: 24V === 0.5A
Operation Frequency Bands	UNII-1: 5150 MHz ~ 5250 MHz
,	UNII-3: 5725 MHz ~ 5850 MHz
Modulation Type	OFDM
Bit Rate of Transmitter	Up to 866.7 Mbps
	IEEE 802.11a: 27.47 dBm (0.5585 W)
	IEEE 802.11n (HT20): 26.49 dBm (0.4457 W)
Maximum Output Power	IEEE 802.11n (HT40): 28.37 dBm (0.6871 W)
_UNII-1 Non Beamforming	IEEE 802.11ac (VHT20): 28.33 dBm (0.6808 W)
	IEEE 802.11ac (VHT40): 28.53 dBm (0.7129 W)
	IEEE 802.11ac (VHT80): 23.28 dBm (0.2128 W)
	IEEE 802.11a: 27.60 dBm (0.5754 W)
	IEEE 802.11n (HT20): 27.95 dBm (0.6237 W)
Maximum Output Power	IEEE 802.11n (HT40): 28.05 dBm (0.6383 W)
_UNII-3 Non Beamforming	IEEE 802.11ac (VHT20): 27.96 dBm (0.6252 W)
	IEEE 802.11ac (VHT40): 28.07 dBm (0.6412 W)
	IEEE 802.11ac (VHT80): 26.72 dBm (0.4699 W)
	IEEE 802.11n (HT20): 26.40 dBm (0.4365 W)
Maximum Output Power	IEEE 802.11n (HT40): 27.95 dBm (0.6237 W)
UNII-1 Beamforming	IEEE 802.11ac (VHT20): 28.24 dBm (0.6668 W)
	IEEE 802.11ac (VHT40): 28.03 dBm (0.6353 W)
	IEEE 802.11ac (VHT80): 23.21 dBm (0.2094 W)
	IEEE 802.11n (HT20): 27.81 dBm (0.6039 W)
Maximum Output Dowar	IEEE 802.11n (HT40): 27.70 dBm (0.5888 W)
Maximum Output Power	IEEE 802.11ac (VHT20): 27.89 dBm (0.6152 W)
_UNII-3 Beamforming	IEEE 802.11ac (VHT40): 27.78 dBm (0.5998 W)
	IEEE 802.11ac (VHT80): 26.63 dBm (0.4603 W)

Note:

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

#### 2. Channel List:

IEEE 802.11a IEEE 802.11n (HT20) IEEE 802.11ac (VHT20)		IEEE 802.11n (HT40) IEEE 802.11ac (VHT40)		IEEE 802.11ac (VHT80)	
UNI	I-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				



IEEE 802.11a IEEE 802.11n (HT20) IEEE 802.11ac (VHT20)			11n (HT40) Iac (VHT40)	) IEEE 802.11ac (VHT80	
UNII-3		UN	II-3	UN	II-3
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

#### 3. Antenna Specification:

Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
N/A	N/A	PIFA	N/A	4.7	UNII-1
N/A	N/A	PIFA	N/A	4.7	UNII-1
N/A	N/A	PIFA	N/A	5	UNII-3
N/A	N/A	PIFA	N/A	4.5	UNII-3
	N/A N/A N/A	N/A N/A N/A N/A N/A N/A	N/AN/APIFAN/AN/APIFAN/AN/APIFA	N/AN/APIFAN/AN/AN/APIFAN/AN/AN/APIFAN/A	N/AN/APIFAN/A4.7N/AN/APIFAN/A4.7N/AN/APIFAN/A5

Note:

1) This EUT supports CDD, and all antennas have the same gain for UNII-1, all antenna gains are not equal for UNII-3. So,

 a) For UNII-1, Directional gain = G<sub>ANT</sub>+Array Gain: For Output Power measurements, Array Gain = 0 dB (N<sub>ANT</sub> ≤ 4), so the Directional gain=4.7. For power spectral density measurements, N<sub>ANT</sub> = 2, N<sub>SS</sub> = 1. Then Directional gain = G<sub>ANT</sub> + Array Gain = G<sub>ANT</sub> + 10 log (N<sub>ANT</sub>/N<sub>SS</sub>) dB =4.7+10log(2/1)dBi=7.71. So the power spectral density limit is 17-(7.71-6)=15.29.

=4.7+10log(2/1)dBi=7.71. So the power spectral density limit is 17-(7.71-6)=15.29. b) For UNII-3, Directional gain=10log[ $(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2$ /N]dBi: The Directional gain=10log[ $(10^{5/20}+10^{4.5/20})^2$ /N]dBi=7.76. So the output power limit is 30-(7.76-6)=28.24, the power spectral density limit is 30-(7.76-6)=28.24.

2) Beamforming Gain: 3dB.

- a) For UNII-1: The Directional gain=3+4.7=7.70dB. So the output power limit is 30-(7.70-6)=28.30.
- b) For UNII-3: The Directional gain=3+5=8.00dB. So the output power limit is 30-(8.00-6)=28.00.



# 4. Table for Antenna Configuration: For Non Beamforming:

For	Non	Beam	formi

Operating Mode TX Mode	1TX	2TX
IEEE 802.11a	V (ANT 1)	-
IEEE 802.11n (HT20)	-	V (ANT 1 + ANT 2)
IEEE 802.11n (HT40)	-	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT20)	-	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT40)	-	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT80)	-	V (ANT 1 + ANT 2)

#### For Beamforming:

Operating Mode TX Mode	2TX
IEEE 802.11n (HT20)	V (ANT 1 + ANT 2)
IEEE 802.11n (HT40)	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT20)	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT40)	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT80)	V (ANT 1 + ANT 2)

# 2.2 TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX N (HT20) Mode / CH36, CH40, CH48 (UNII-1)
Mode 3	TX N (HT40) Mode / CH38, CH46 (UNII-1)
Mode 4	TX AC (VHT20) Mode / CH36, CH40, CH48 (UNII-1)
Mode 5	TX AC (VHT40) Mode / CH38, CH46 (UNII-1)
Mode 6	TX AC (VHT80) Mode / CH42 (UNII-1)
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 8	TX N (HT20) Mode / CH149,CH157,CH165 (UNII-3)
Mode 9	TX N (HT40) Mode / CH151,CH159 (UNII-3)
Mode 10	TX AC (VHT20) Mode / CH149,CH157,CH165 (UNII-3)
Mode 11	TX AC (VHT40) Mode / CH151,CH159 (UNII-3)
Mode 12	TX AC (VHT80) Mode / CH155 (UNII-3)
Mode 13	TX AC (VHT40) Mode / CH46 (UNII-1)

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test		
Final Test Mode	Description	
Mode 13	TX AC (VHT40) Mode / CH46 (UNII-1)	

Radiated emissions test - Below 1GHz	
Final Test Mode Description	
Mode 13	TX AC (VHT40) Mode / CH46 (UNII-1)

Radiated emissions test - Above 1GHz_Non Beamforming		
Final Test Mode	Description	
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)	
Mode 4	TX AC (VHT20) Mode / CH36, CH40, CH48 (UNII-1)	
Mode 5	TX AC (VHT40) Mode / CH38, CH46 (UNII-1)	
Mode 6	TX AC (VHT80) Mode / CH42 (UNII-1)	
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)	
Mode 10	TX AC (VHT20) Mode / CH149,CH157,CH165 (UNII-3)	
Mode 11	TX AC (VHT40) Mode / CH151,CH159 (UNII-3)	
Mode 12	TX AC (VHT80) Mode / CH155 (UNII-3)	



Output Power test_Non Beamforming		
Final Test Mode	Description	
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)	
Mode 2	TX N (HT20) Mode / CH36, CH40, CH48 (UNII-1)	
Mode 3	TX N (HT40) Mode / CH38, CH46 (UNII-1)	
Mode 4	TX AC (VHT20) Mode / CH36, CH40, CH48 (UNII-1)	
Mode 5	TX AC (VHT40) Mode / CH38, CH46 (UNII-1)	
Mode 6	TX AC (VHT80) Mode / CH42 (UNII-1)	
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)	
Mode 8	TX N (HT20) Mode / CH149,CH157,CH165 (UNII-3)	
Mode 9	TX N (HT40) Mode / CH151,CH159 (UNII-3)	
Mode 10	TX AC (VHT20) Mode / CH149,CH157,CH165 (UNII-3)	
Mode 11	TX AC (VHT40) Mode / CH151,CH159 (UNII-3)	
Mode 12	TX AC (VHT80) Mode / CH155 (UNII-3)	

Output Power test_Beamforming		
Final Test Mode	Description	
Mode 2	TX N (HT20) Mode / CH36, CH40, CH48 (UNII-1)	
Mode 3	TX N (HT40) Mode / CH38, CH46 (UNII-1)	
Mode 4	TX AC (VHT20) Mode / CH36, CH40, CH48 (UNII-1)	
Mode 5	TX AC (VHT40) Mode / CH38, CH46 (UNII-1)	
Mode 6	TX AC (VHT80) Mode / CH42 (UNII-1)	
Mode 8	TX N (HT20) Mode / CH149,CH157,CH165 (UNII-3)	
Mode 9	TX N (HT40) Mode / CH151,CH159 (UNII-3)	
Mode 10	TX AC (VHT20) Mode / CH149,CH157,CH165 (UNII-3)	
Mode 11	TX AC (VHT40) Mode / CH151,CH159 (UNII-3)	
Mode 12	TX AC (VHT80) Mode / CH155 (UNII-3)	



Other Conducted test_Non Beamforming		
Final Test Mode	Description	
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)	
Mode 4	TX AC (VHT20) Mode / CH36, CH40, CH48 (UNII-1)	
Mode 5	TX AC (VHT40) Mode / CH38, CH46 (UNII-1)	
Mode 6	TX AC (VHT80) Mode / CH42 (UNII-1)	
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)	
Mode 10	TX AC (VHT20) Mode / CH149,CH157,CH165 (UNII-3)	
Mode 11	TX AC (VHT40) Mode / CH151,CH159 (UNII-3)	
Mode 12	TX AC (VHT80) Mode / CH155 (UNII-3)	

Note:

- (1) For radiated emission below 1 GHz test, the IEEE 802.11ac40 channel 46 is found to be the worst case and recorded.
- (2) For radiated emission above 1 GHz test, 1GHz~26.5GHz and 26.5GHz~40GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.
- (3) The measurements for RF Output Power were tested, the Non Beamforming and Beamforming are recorded in the report. The worst case was Non Beamforming and only worst case were documented for other test items.
- (4) The measurements for Power were tested, the worst case were IEEE 802.11a mode, IEEE 802.11ac(VHT20) mode, IEEE 802.11ac(VHT40) mode, IEEE 802.11ac(VHT80) mode, only the worst case were documented for other test items.
- (5) For radiated emissions, the TX WLAN 2.4G N20 Mode 2437MHz + WLAN 5G AC40 Mode 5230MHz was found the worst case of simultaneous transmission and recorded.

# 2.3 PARAMETERS OF TEST SOFTWARE

Non Beamforming			
	UNII-1		
Test Software		cart	
Test Frequency (MHz)	5180	5200	5240
IEEE 802.11a	26.5	28	28
IEEE 802.11n (HT20)	23	22.5	22
IEEE 802.11ac (VHT20)	23	22.5	22
Test Frequency (MHz)	5190	5230	
IEEE 802.11n (HT40)	25	23.5	
IEEE 802.11ac (VHT40)	17.5	23.5	
Test Frequency (MHz)	5210		
IEEE 802.11ac (VHT80)	15		
	UNII-3		
Test Software		cart	
Test Frequency (MHz)	5745	5785	5825
IEEE 802.11a	29	29	29
IEEE 802.11n (HT20)	24.5	24.5	24.5
IEEE 802.11ac (VHT20)	25	25	25
Test Frequency (MHz)	5755	5795	
IEEE 802.11n (HT40)	23.5	24	
IEEE 802.11ac (VHT40)	23	23	
Test Frequency (MHz)	5775		
IEEE 802.11ac (VHT80)	15		



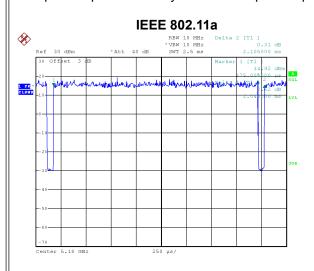
Beamforming			
	UNII-1		
Test Software		cart	
Test Frequency (MHz)	5180	5200	5240
IEEE 802.11n (HT20)	23	22.5	22
IEEE 802.11ac (VHT20)	23	22.5	22
Test Frequency (MHz)	5190	5230	
IEEE 802.11n (HT40)	23.5	23.5	
IEEE 802.11ac (VHT40)	17.5	23	
Test Frequency (MHz)	5210		
IEEE 802.11ac (VHT80)	15		

UNII-3 - 2TX			
Test Software		cart	
Test Frequency (MHz)	5745	5785	5825
IEEE 802.11n (HT20)	24.5	24.5	24.5
IEEE 802.11ac (VHT20)	25	25	25
Test Frequency (MHz)	5755	5795	
IEEE 802.11n (HT40)	23.5	24	
IEEE 802.11ac (VHT40)	22.5	23	
Test Frequency (MHz)	5775		
IEEE 802.11ac (VHT80)	15		



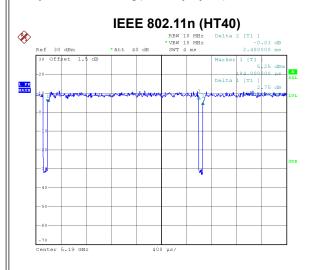
# 2.4 DUTY CYCLE

If duty cycle is  $\geq$  98 %, duty factor is not required. If duty cycle is < 98 %, duty factor shall be considered. The output power = measured power + duty factor. The power spectral density = measured power spectral density + duty factor.



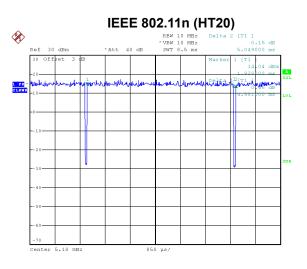
Date: 13.JUN.2020 13:17:57

Duty cycle = 2.040 ms / 2.105 ms = 96.91% Duty Factor = 10 log(1 / Duty cycle) = 0.14



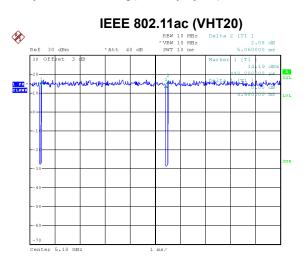
Date: 13.JUN.2020 18:12:02

Duty cycle = 2.416 ms / 2.480 ms = 97.42% Duty Factor = 10 log(1 / Duty cycle) = 0.11



Date: 13.JUN.2020 13:18:37

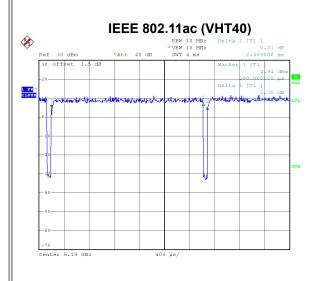
Duty cycle = 4.981 ms / 5.049 ms = 98.65% Duty Factor = 10 log(1 / Duty cycle) = 0.00

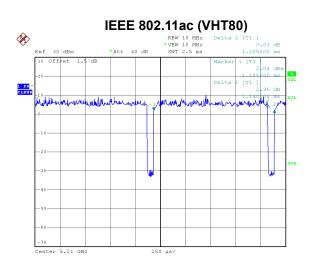


Date: 13.JUN.2020 13:19:10

Duty cycle = 4.980 ms / 5.060 ms = 98.42% Duty Factor = 10 log(1 / Duty cycle) = 0.00

# <u>3ĩL</u>





Date: 13.JUN.2020 18:12:31

Duty cycle = 2.424 ms / 2.488 ms = 97.43% Duty Factor = 10 log(1 / Duty cycle) = 0.11 Date: 13.JUN.2020 18:13:46

Duty cycle = 1.140 ms / 1.185 ms = 96.20% Duty Factor = 10 log(1 / Duty cycle) = 0.17

#### NOTE:

For IEEE 802.11a, IEEE 802.11n (HT20) and IEEE 802.11ac (VHT20):

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).

For IEEE 802.11n (HT40) and IEEE 802.11ac (VHT40):

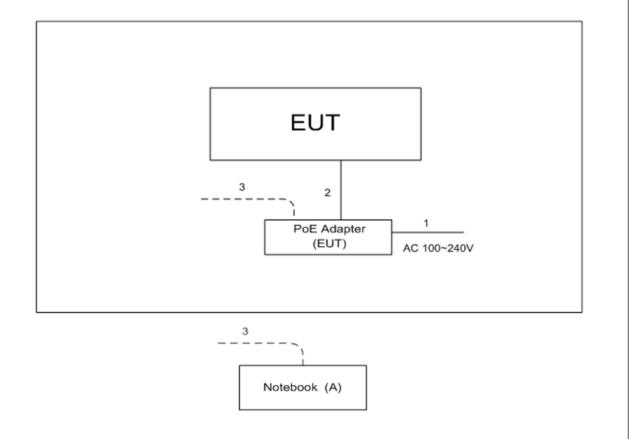
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 2 kHz (Duty cycle < 98%).

For IEEE 802.11ac (VHT80):

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 kHz (Duty cycle < 98%).







## 2.6 SUPPORT UNITS

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
А	Notebook	Dell	DCSM	G7K832X

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	AC Cable	NO	NO	1m
2	RJ45 Cable	NO	NO	1m
3	RJ45 Cable	NO	NO	10m



# 3. AC POWER LINE CONDUCTED EMISSIONS TEST

#### 3.1 LIMIT

Frequency	Limit (dBµV)	
(MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

NOTE:

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

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

The following table is the setting of the receiver

Receiver Parameter	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

#### 3.2 TEST PROCEDURE

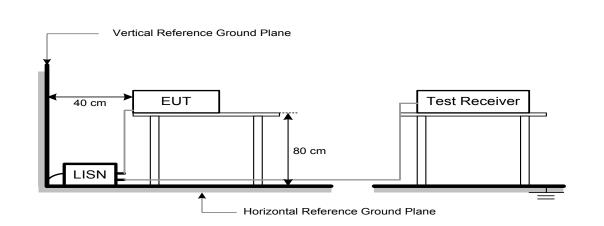
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.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

#### 3.3 DEVIATION FROM TEST STANDARD

No deviation



# 3.4 TEST SETUP



# 3.5 EUT OPERATION CONDITIONS

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.

#### 3.6 TEST RESULTS

Please refer to the APPENDIX A.



# 4. RADIATED EMISSIONS TEST

#### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

#### For WLAN 2.4GHz:

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

#### For WLAN 5GHz:

Frequency	EIRP Limit	Equivalent Field Strength at 3m
(MHz)	(dBm/MHz)	(dBµV/m)
5150-5250	-27	68.3
	-27 NOTE (2)	68.3
5725-5850	10 NOTE (2)	105.3
	15.6 NOTE (2)	110.9
	27 NOTE (2)	122.3

NOTE:

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

$$E = ----$$

2

μV/m, where P is the eirp (Watts)

- (2) According to 15.407(b)(4)(i), all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at 5 MHz above or below the band edge.
- (3) The limit for radiated test was performed according to FCC PART 15C & FCC PART 15E.





# 4.2 TEST PROCEDURE

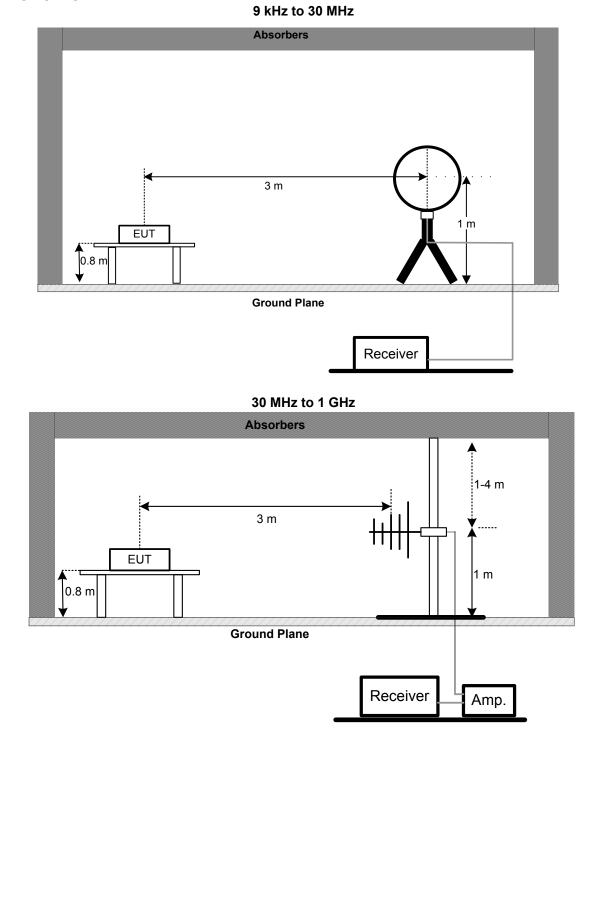
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

# 4.3 DEVIATION FROM TEST STANDARD

No deviation

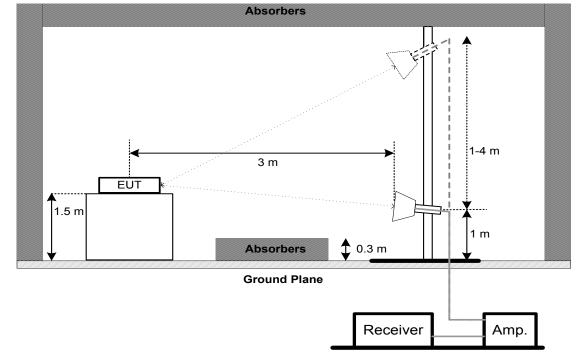


# 4.4 TEST SETUP









# 4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

## 4.6 TEST RESULTS - 9 KHZ to 30 MHZ

Please refer to the APPENDIX B

Remark:

- (1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

## 4.7 TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

## 4.8 TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX D.

Remark:

(1) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.



# 5. BANDWIDTH TEST

#### 5.1 LIMIT

FCC Part15, Subpart E (15.407)			
Section	Test Item	Limit	Frequency Range (MHz)
15.407(a)	26 dB Bandwidth	-	5150-5250
15.407(e)	6 dB Bandwidth	Minimum 500 kHz	5725-5850

#### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below
- b. Spectrum Setting:
  - For UNII-1:

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

For UNII-3:

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	6 dB Bandwidth
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

c. Measured the spectrum width with power higher than 26 dB / 6 dB below carrier

## 5.3 DEVIATION FROM STANDARD

No deviation.



# 5.4 TEST SETUP



# 5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

## 5.6 TEST RESULTS

Please refer to the APPENDIX E.



# 6. MAXIMUM OUTPUT POWER TEST

#### 6.1 LIMIT

FCC Part15, Subpart E (15.407)					
Section Test Item Limit Frequency Range (MHz)					
15.407(a)	Output Power	AP device: 1 Watt (30 dBm) Client device: 250 mW (24 dBm)	5150-5250		
		1 Watt (30dBm)	5725-5850		

#### Note:

a. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 6.2 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- b. Test test was performed in accordance with method of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

#### 6.3 DEVIATION FROM STANDARD

No deviation.

#### 6.4 TEST SETUP



#### 6.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 6.6 TEST RESULTS

Please refer to the APPENDIX F.



# 7. POWER SPECTRAL DENSITY TEST

#### 7.1 LIMIT

FCC Part15, Subpart E (15.407)					
Section Test Item Limit Frequency Ra					
15.407(a)	Power Spectral Density	AP device: 17 dBm/MHz Client device: 11 dBm/MHz	5150-5250		
		30 dBm/500 kHz	5725-5850		

# 7.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: For UNII-1

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

#### For UNII-3:

Setting
Auto
Encompass the entire emissions bandwidth (EBW) of the signal
100 kHz.
300 kHz.
RMS
100 trace
Auto

Note:

- 1. For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v02r01, section II.F.5., it is acceptable to set RBW at 100kHz and VBW at 300kHz if the spectrum analyzer does not have 500 kHz RBW.
- The value measured with RBW=100kHz is to be added with 10log(500 kHz/100kHz) which is +7 dB.
   For example, if the measured value is +10dBm using RBW=100kHz (that is +10 dBm/MHz), then the converted value will be +17dBm/500kHz.



## 7.3 DEVIATION FROM STANDARD

No deviation.

#### 7.4 TEST SETUP



# 7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

## 7.6 TEST RESULTS

Please refer to the APPENDIX G.



# 8. FREQUENCY STABILITY MEASUREMENT

#### 8.1 LIMIT

FCC Part15, Subpart E (15.407)					
Section	Test Item	Limit	Frequency Range (MHz)		
15.407(g)	Frequency Stability	An emission is maintained within the band of operation under all	5150-5250		
15.407(g)	Frequency Stability	conditions of normal operation as specified in the users manual.	5725-5850		

# 8.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting:

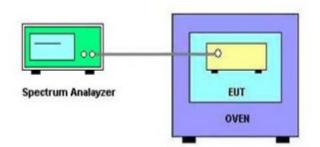
Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	10 kHz
VBW	10 kHz
Sweep Time	Auto

- 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.

#### 8.3 DEVIATION FROM STANDARD

No deviation.

#### 8.4 TEST SETUP



## 8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 8.6 TEST RESULTS

Please refer to the APPENDIX H.



# 9. MEASUREMENT INSTRUMENTS LIST

	AC Power Line Conducted Emissions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	EMI Test Receiver	R&S	ESCI	100382	Feb. 28, 2021	
2	LISN	EMCO	3816/2	52765	Mar. 01, 2021	
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Feb. 28, 2021	
4	50Ω Terminator	SHX	TF5-3	15041305	Mar. 01, 2021	
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	
6	Cable	N/A	RG223	12m	Mar. 10, 2021	

	Radiated Emissions - 9 kHz to 30 MHz						
Item	Item Kind of Equipment Manufacturer Type No. Serial No. Calibrated unti						
1	Antenna	EM	EM-6876-1	230	Apr. 16, 2021		
2	Cable	N/A	RG 213/U	N/A	May 29, 2021		
3	EMI Test Receiver	R&S	ESCI	100895	Feb. 28, 2021		
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A		

	Radiated Emissions - 30 MHz to 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 09, 2021	
2*	Amplifier	HP	8447D	2944A09673	Aug. 11, 2021	
3	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020	
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 22, 2021	
5	Controller	СТ	SC100	N/A	N/A	
6	Controller	MF	MF-7802	MF780208416	N/A	
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	

	Radiated Emissions - Above 1 GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Double Ridged Guide Antenna	ETS	3115	75789	May 12, 2021	
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jul. 07, 2021	
3	Amplifier	Agilent	8449B	3008A02333	Mar. 01, 2021	
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 07, 2021	
5	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020	
6	Controller	СТ	SC100	N/A	N/A	
7	Controller	MF	MF-7802	MF780208416	N/A	
8	Cable	N/A	EMC104-SM-SM-6 000	N/A	May 09, 2021	
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	



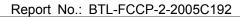
Bandwidth & Power Spectral Density					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020
		Maxin	num Output Power		
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Peak Power Analyzer	Keysight	8990B	MY51000506	Aug. 03, 2020
2	Wideband power sensor	Keysight	N1923A	MY58310004	Aug. 03, 2020

	Frequency Stability					
I	Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
	1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020
	2	Const Temp. & Humidity Chamber	CEPREI	CEEC-M64T-40	15-008	Feb. 28, 2021

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

"\*" calibration period of equipment list is three year.

Except \* item, all calibration period of equipment list is one year.





# **10. EUT TEST PHOTOS**

#### AC Power Line Conducted Emissions Test Photos

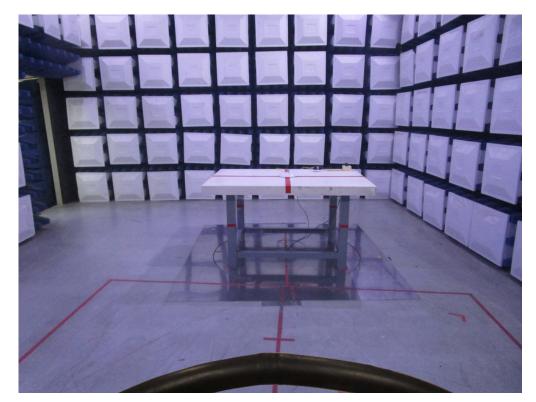


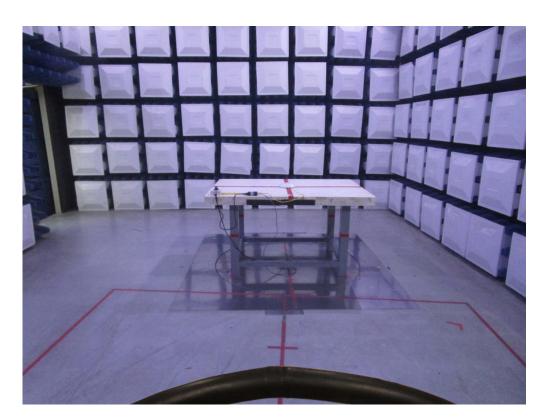






9 kHz to 30 MHz

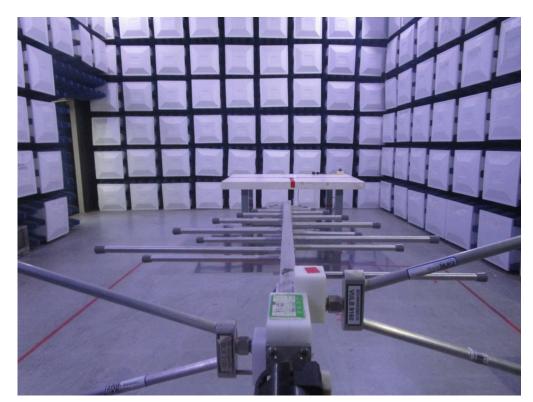






Radiated Emissions Test Photos

30 MHz to 1 GHz







**Radiated Emissions Test Photos** 

Above 1 GHz

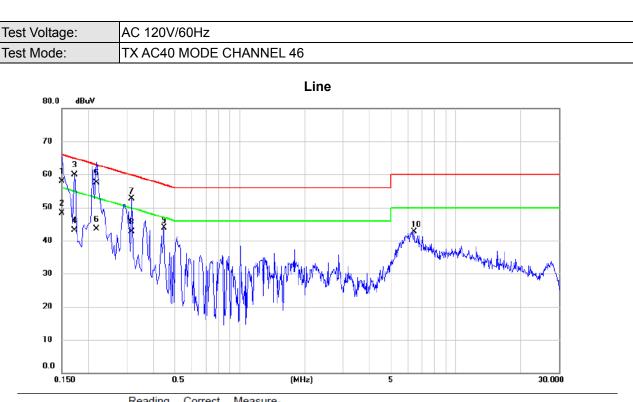






# **APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**

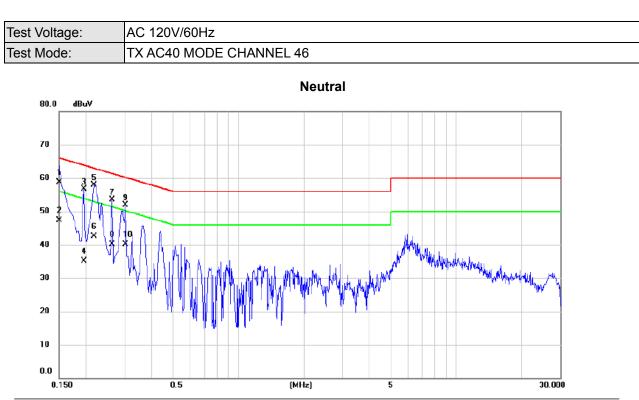




No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.150	48.26	9.67	57.93	66.00	-8.07	QP	
2	0.150	38.60	9.67	48.27	56.00	-7.73	AVG	
3 *	0.172	50.09	9.83	59.92	64.84	-4.92	QP	
4	0.172	33.26	9.83	43.09	54.84	-11.75	AVG	
5	0.217	47.70	9.90	57.60	62.91	-5.31	QP	
6	0.217	33.70	9.90	43.60	52.91	-9.31	AVG	
7	0.317	42.83	9.89	52.72	59.80	-7.08	peak	
8	0.317	32.90	9.89	42.79	49.80	-7.01	AVG	
9	0.447	33.92	9.93	43.85	56.93	-13.08	peak	
10	6.391	32.23	10.44	42.67	60.00	-17.33	peak	

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.
- (3) The test result has included the cable loss.





No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.150	48.98	9.74	58.72	66.00	-7.28	QP	
2	0.150	37.50	9.74	47.24	56.00	-8.76	AVG	
3	0.195	46.64	9.99	56.63	63.82	-7.19	peak	
4	0.195	25.10	9.99	35.09	53.82	-18.73	AVG	
5 *	0.217	47.85	10.00	57.85	62.91	-5.06	peak	
6	0.217	32.50	10.00	42.50	52.91	-10.41	AVG	
7	0.263	43.45	9.99	53.44	61.35	-7.91	peak	
8	0.263	30.12	9.99	40.11	51.35	-11.24	AVG	
9	0.303	41.83	10.02	51.85	60.16	-8.31	peak	
10	0.303	30.10	10.02	40.12	50.16	-10.04	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.
- (3) The test result has included the cable loss.





No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.195	45.60	9.90	55.50	63.82	-8.32	QP	
2	0.195	32.50	9.90	42.40	53.82	-11.42	AVG	
3 *	0.222	46.26	9.89	56.15	62.74	-6.59	peak	
4	0.222	35.20	9.89	45.09	52.74	-7.65	AVG	
5	0.344	38.12	9.91	48.03	59.12	-11.09	peak	
6	0.344	19.60	9.91	29.51	49.12	-19.61	AVG	
7	0.555	35.27	9.96	45.23	56.00	-10.77	peak	
8	0.555	21.30	9.96	31.26	46.00	-14.74	AVG	
9	1.190	33.30	10.02	43.32	56.00	-12.68	peak	
10	5.870	40.74	10.39	51.13	60.00	-8.87	peak	
11	5.870	21.50	10.39	31.89	50.00	-18.11	AVG	

- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.
- (3) The test result has included the cable loss.





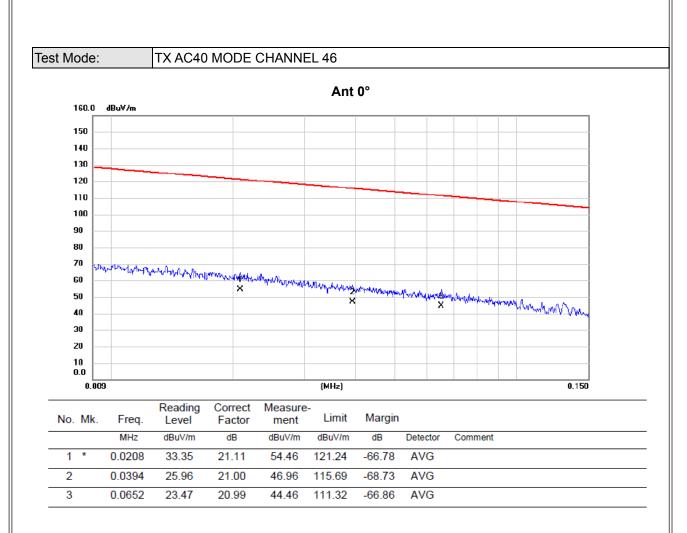
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.195	46.96	9.99	56.95	63.82	-6.87	peak	
2	0.195	30.90	9.99	40.89	53.82	-12.93	AVG	
3	0.213	42.32	10.00	52.32	63.09	-10.77	peak	
4	0.213	28.60	10.00	38.60	53.09	-14.49	AVG	
5	0.263	40.51	9.99	50.50	61.35	-10.85	peak	
6 *	0.263	35.20	9.99	45.19	51.35	-6.16	AVG	
7	0.438	33.75	10.11	43.86	57.10	-13.24	peak	
8	1.091	30.60	10.31	40.91	56.00	-15.09	peak	
9	6.486	35.80	10.78	46.58	60.00	-13.42	peak	

- (1) Measurement Value = Reading Level + Correct Factor.
  (2) Margin Level = Measurement Value Limit Value.
  (3) The test result has included the cable loss.



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

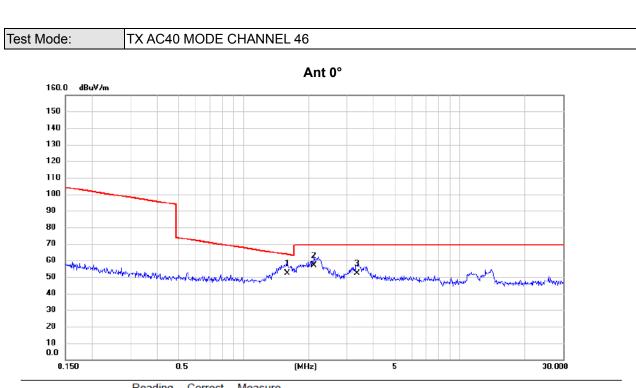




(1) Measurement Value = Reading Level + Correct Factor.

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

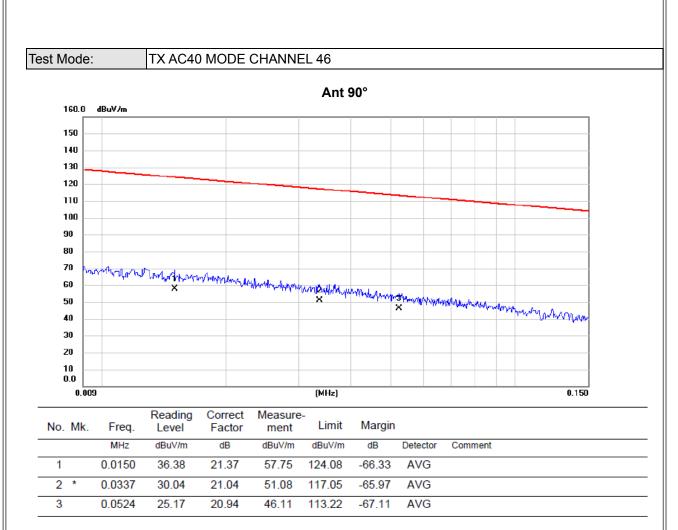




	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
-			MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
-	1	*	1.5935	30.41	21.73	52.14	63.56	-11.42	QP	
-	2		2.1213	35.29	21.83	57.12	69.54	-12.42	QP	
-	3		3.3458	30.16	21.87	52.03	69.54	-17.51	QP	

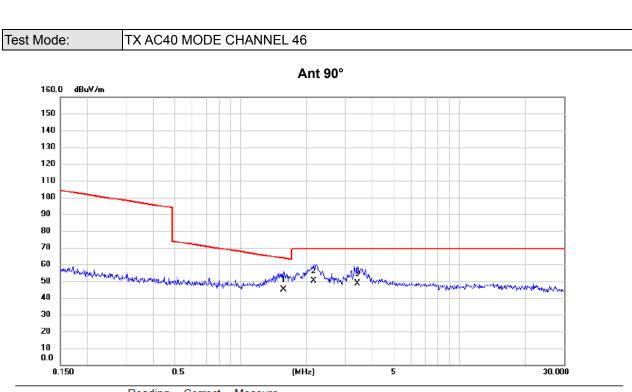
Measurement Value = Reading Level + Correct Factor.
 Margin Level = Measurement Value - Limit Value.





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





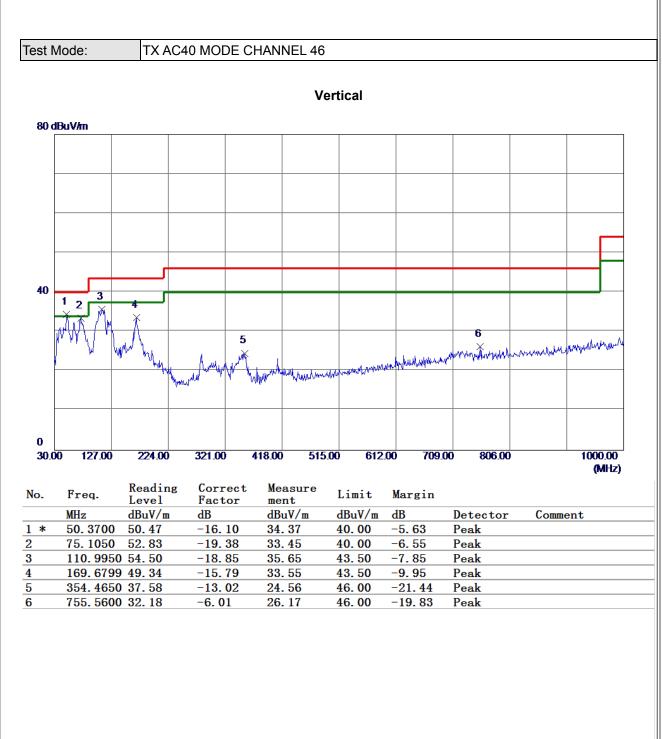
No.	Mk.	Freq.			Measure- ment		Margin		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	1.5766	23.28	21.73	45.01	63.65	-18.64	QP	
2		2.1552	28.53	21.84	50.37	69.54	-19.17	QP	
3		3.4174	26.89	21.86	48.75	69.54	-20.79	QP	

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



## **APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1 GHZ**





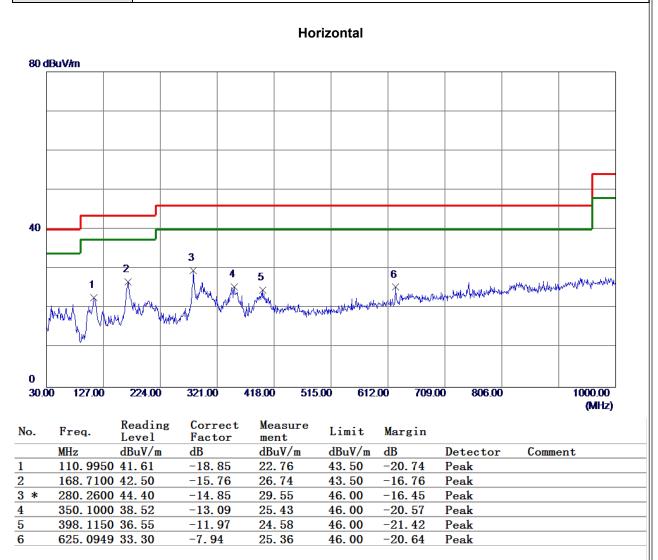
(1) Measurement Value = Reading Level + Correct Factor.

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



Test Mode:

#### TX AC40 MODE CHANNEL 46



**REMARKS**:

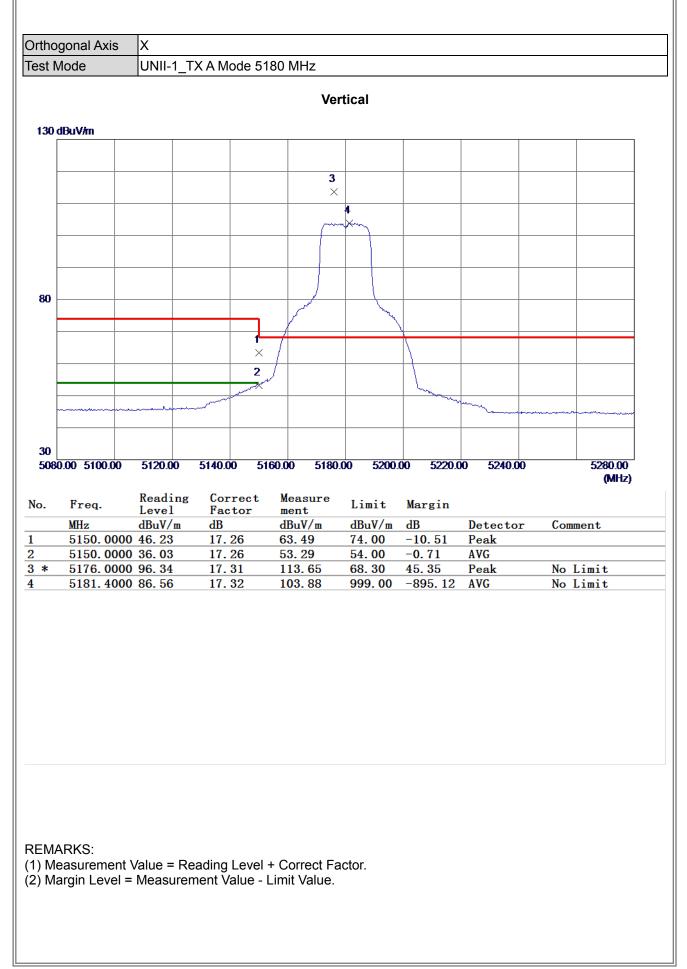
(1) Measurement Value = Reading Level + Correct Factor.

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

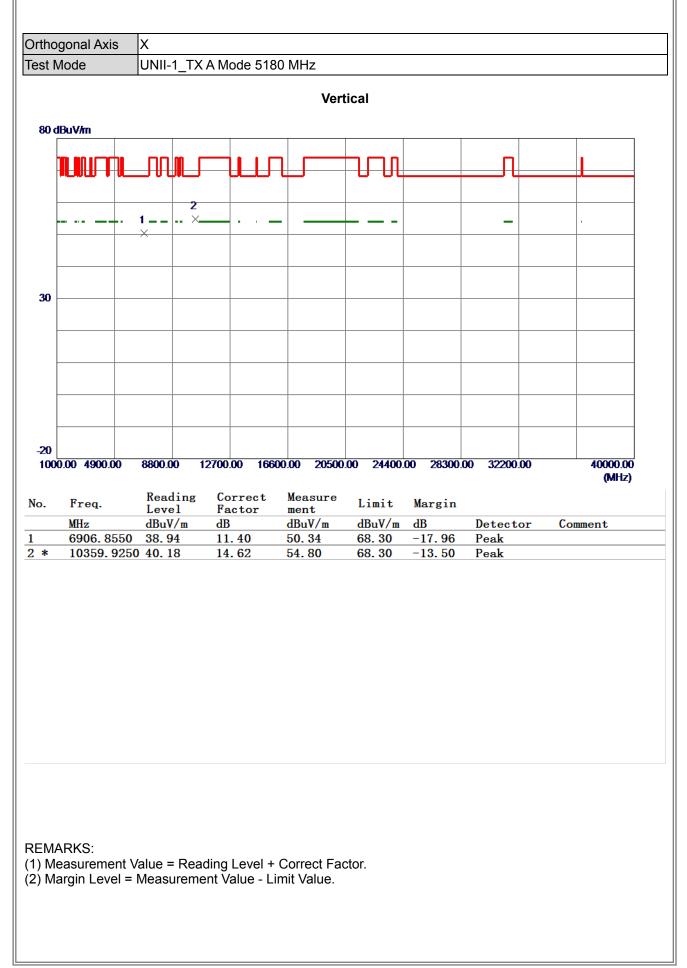


### **APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ**

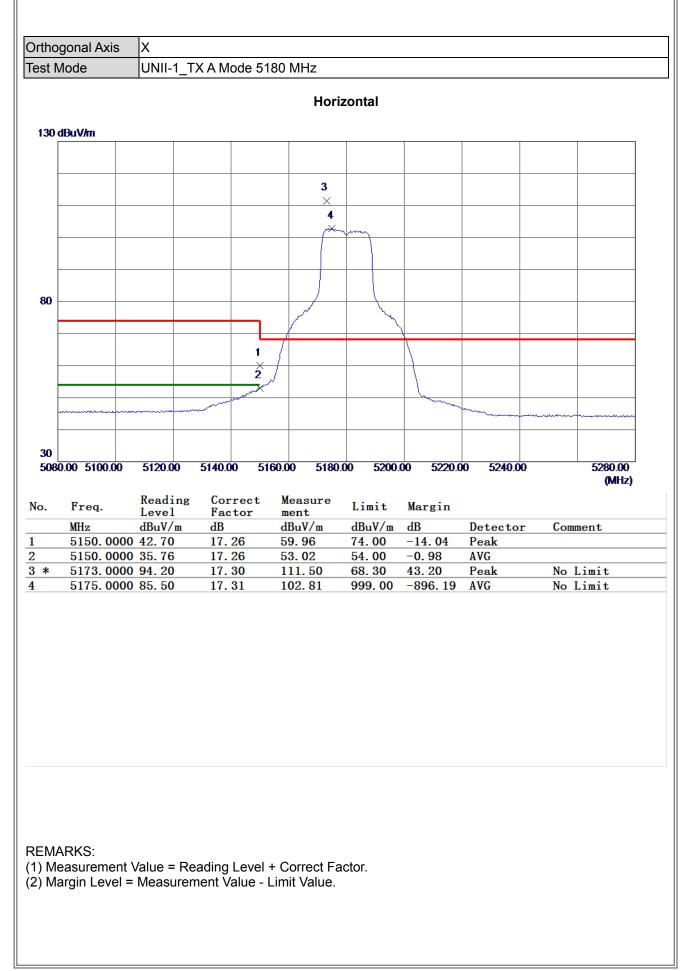




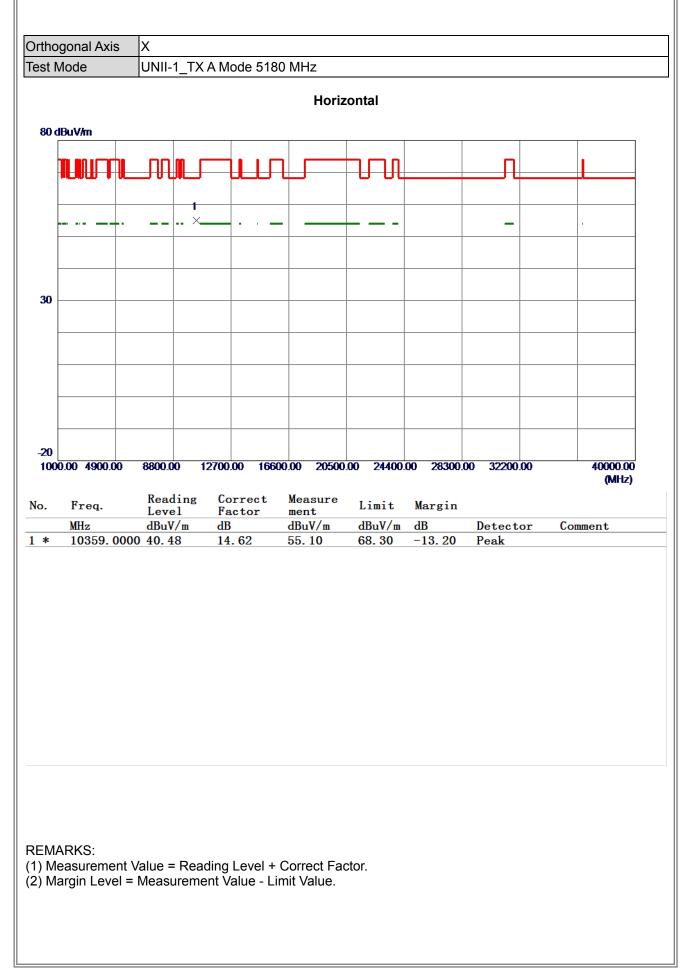




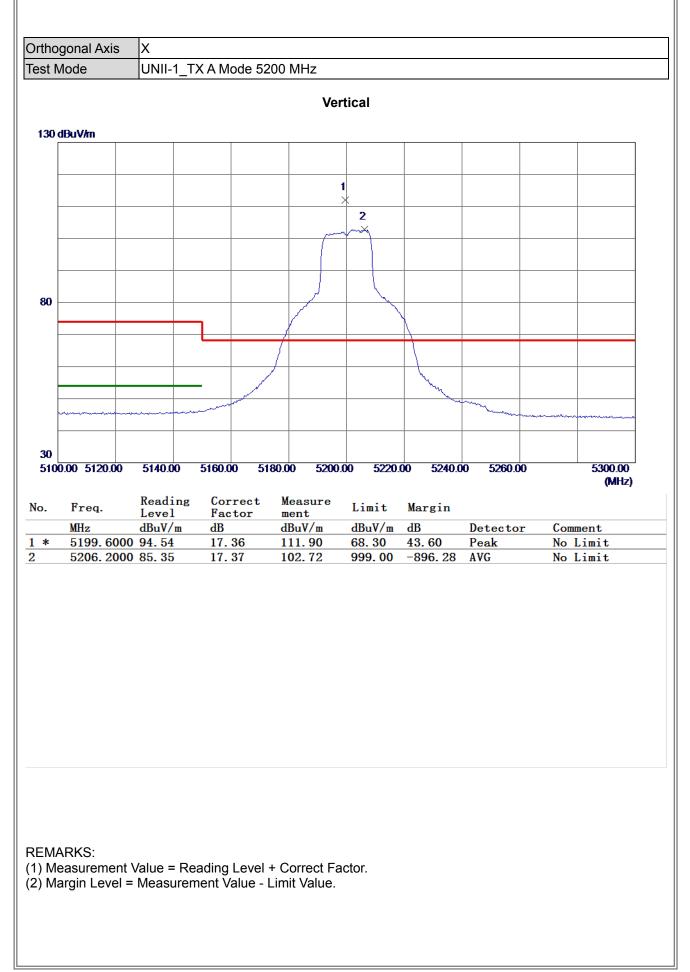




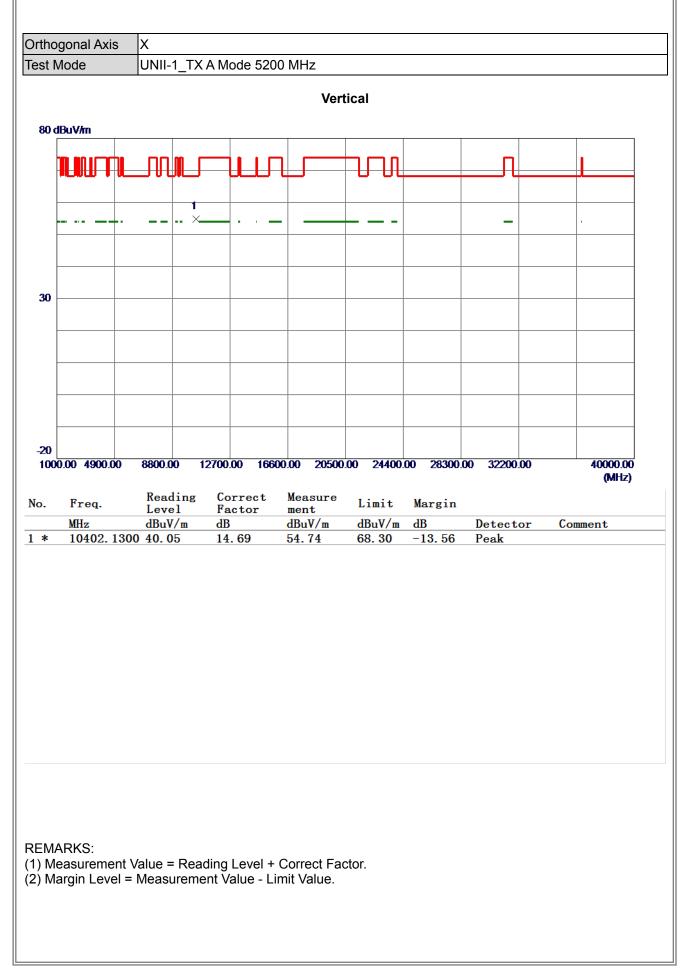




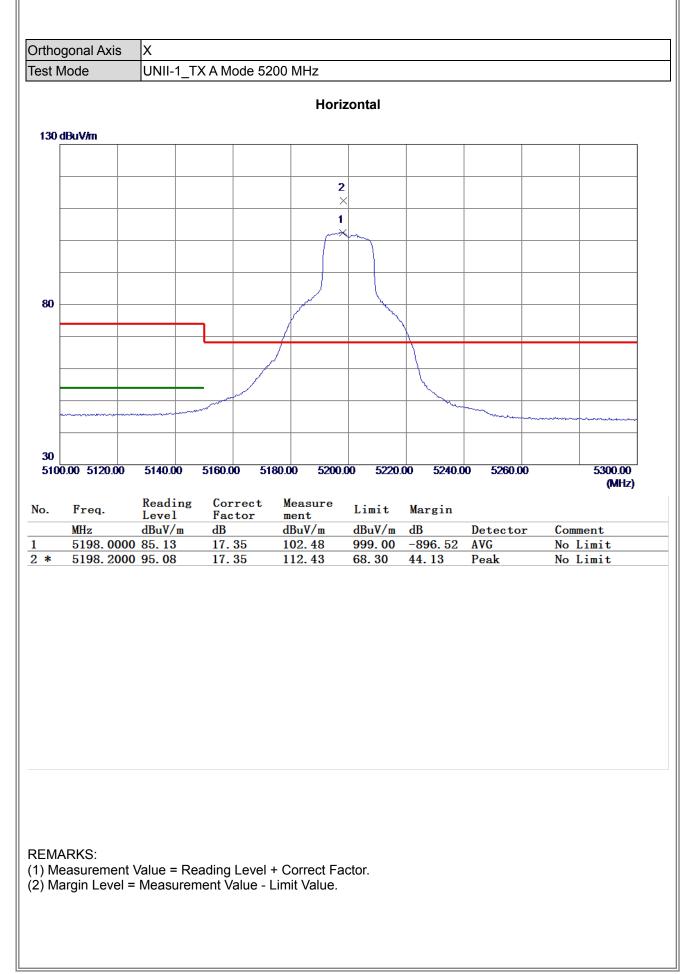




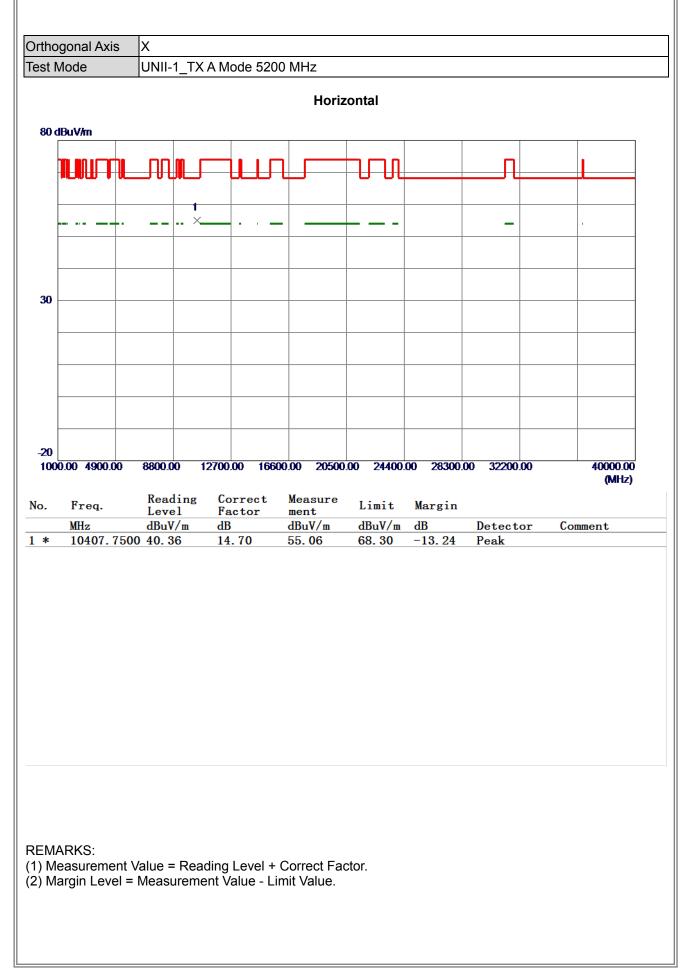




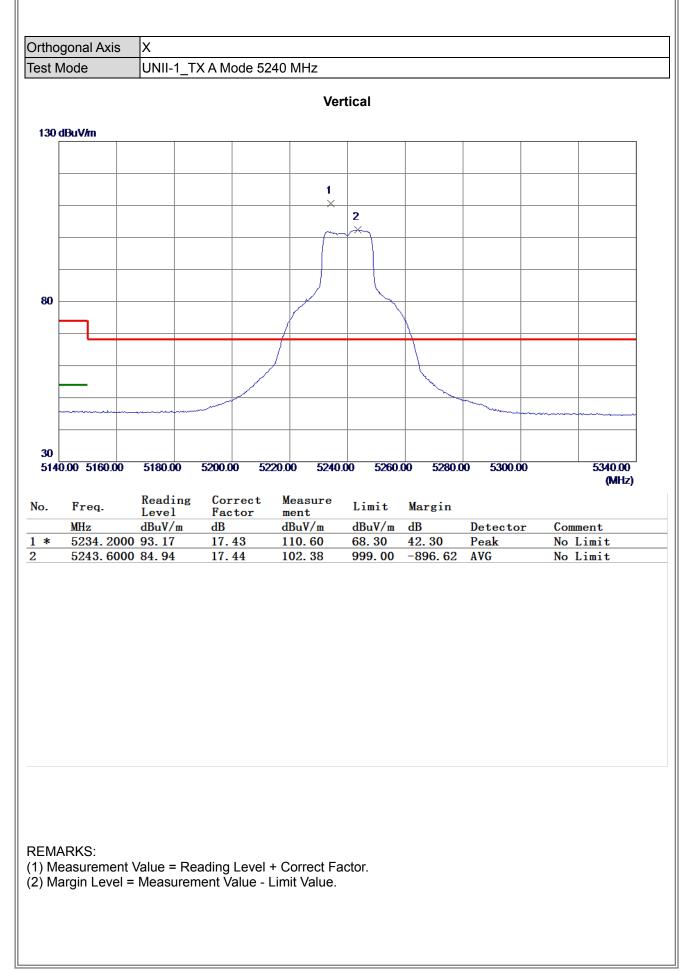




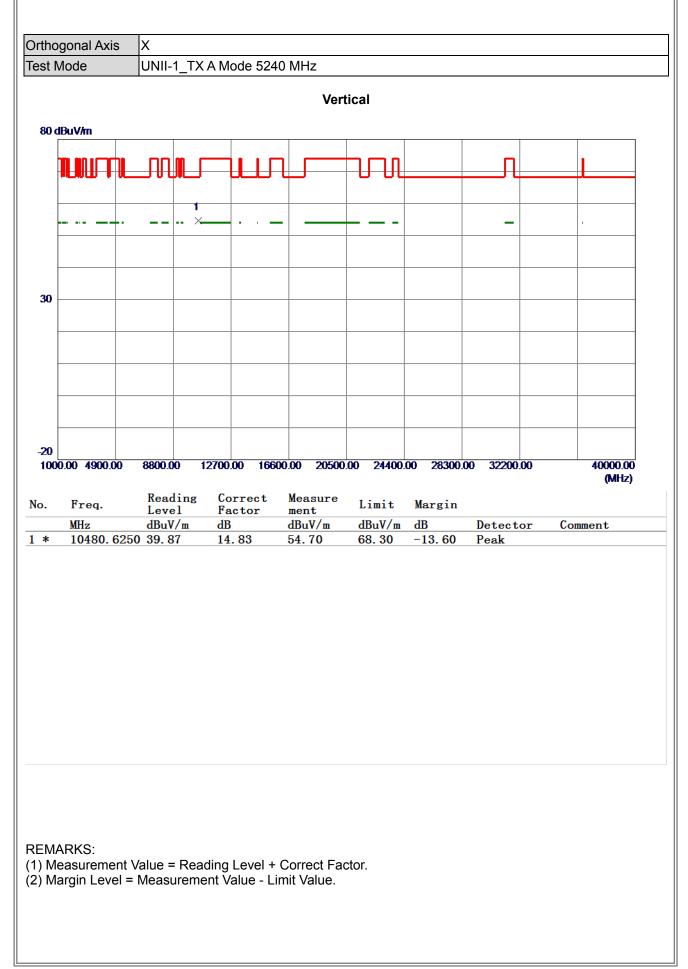




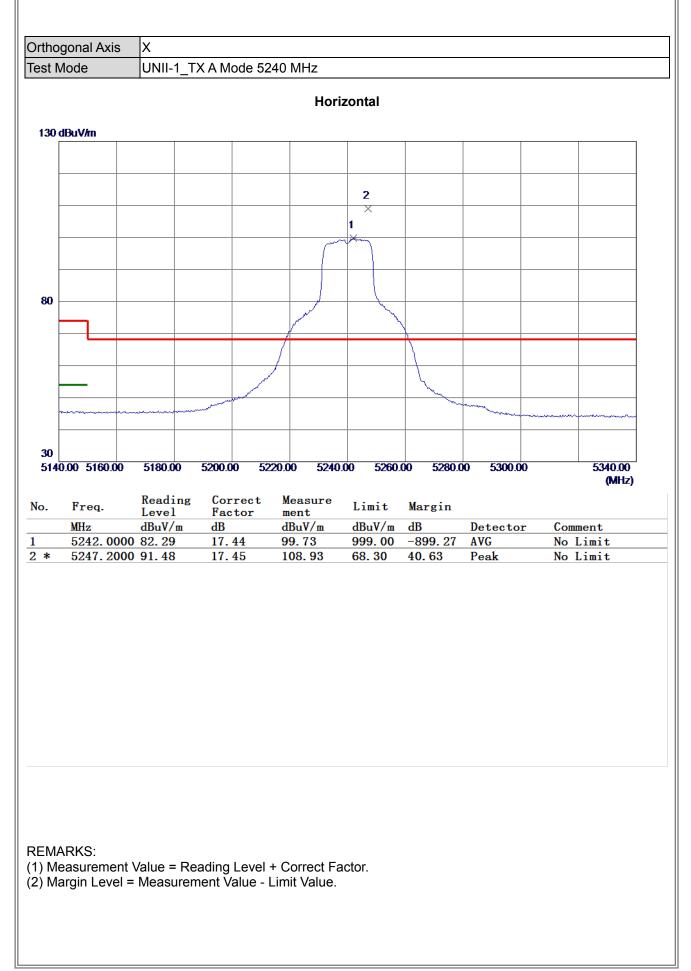




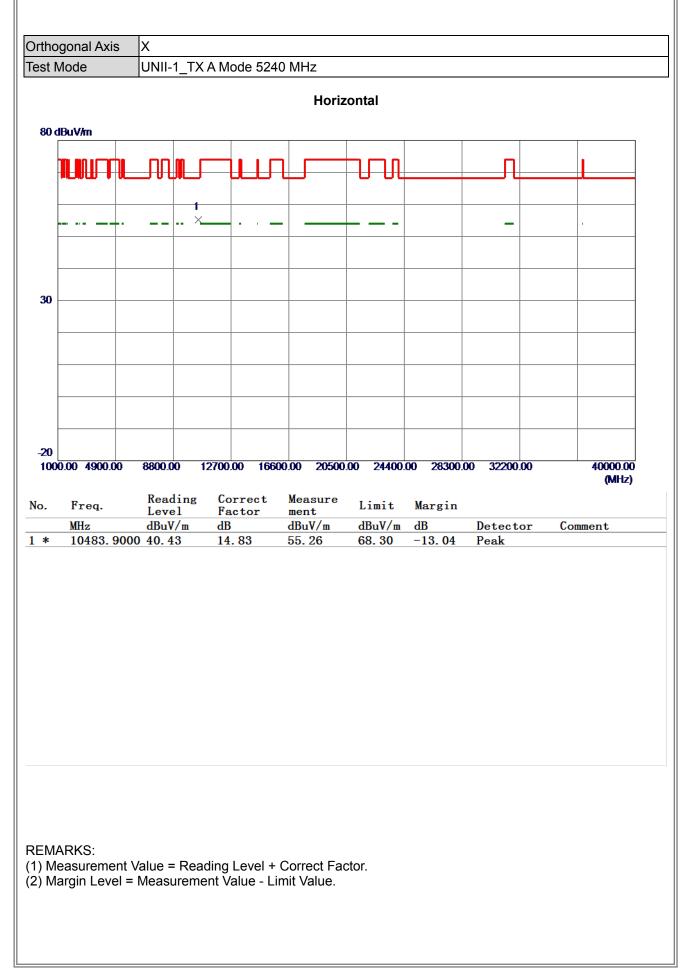




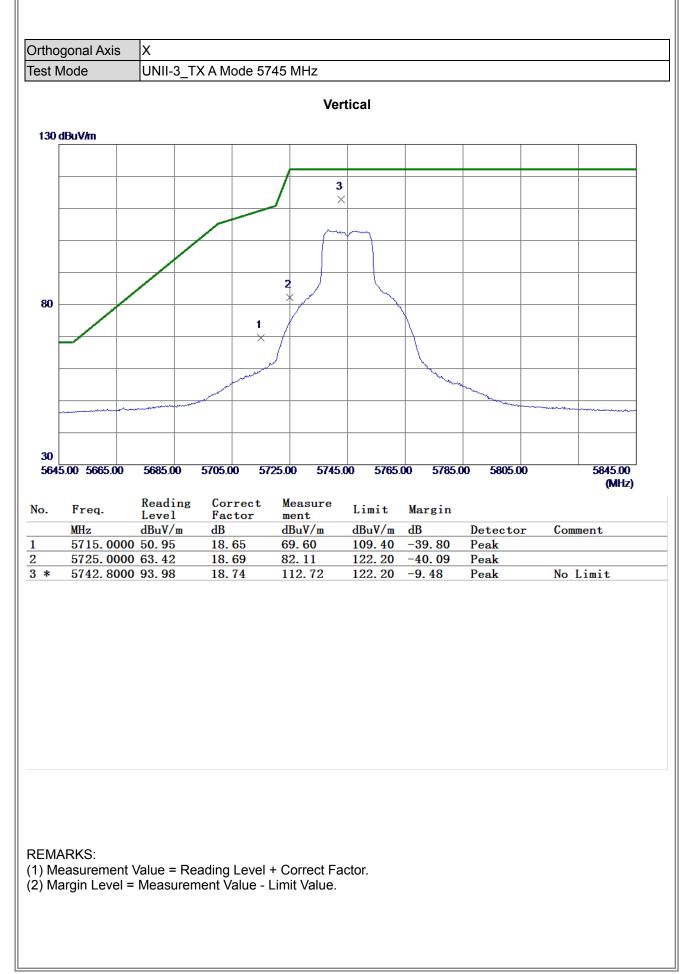




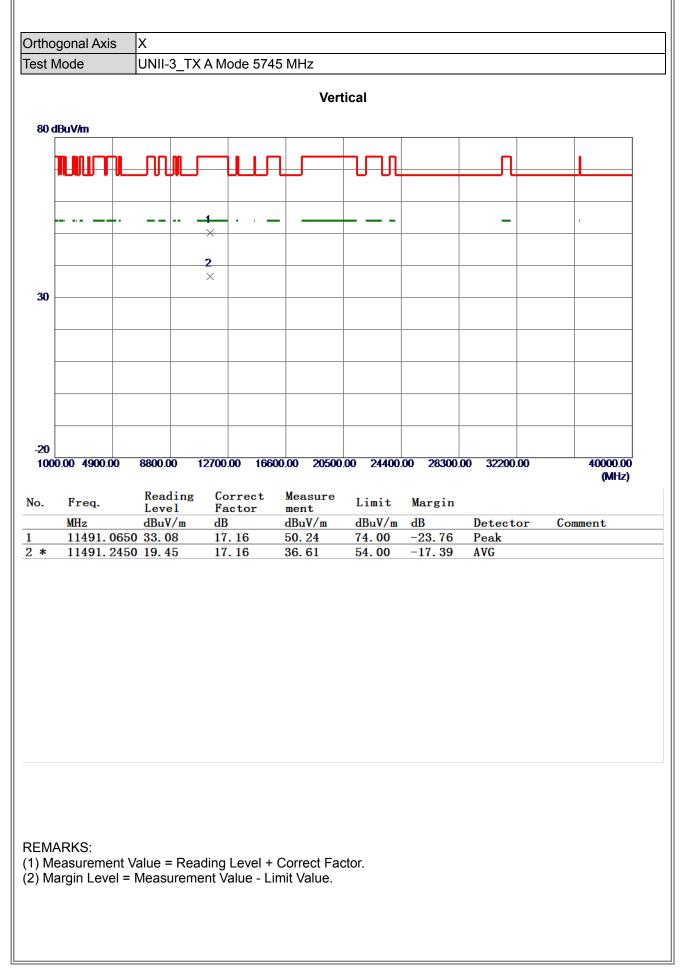




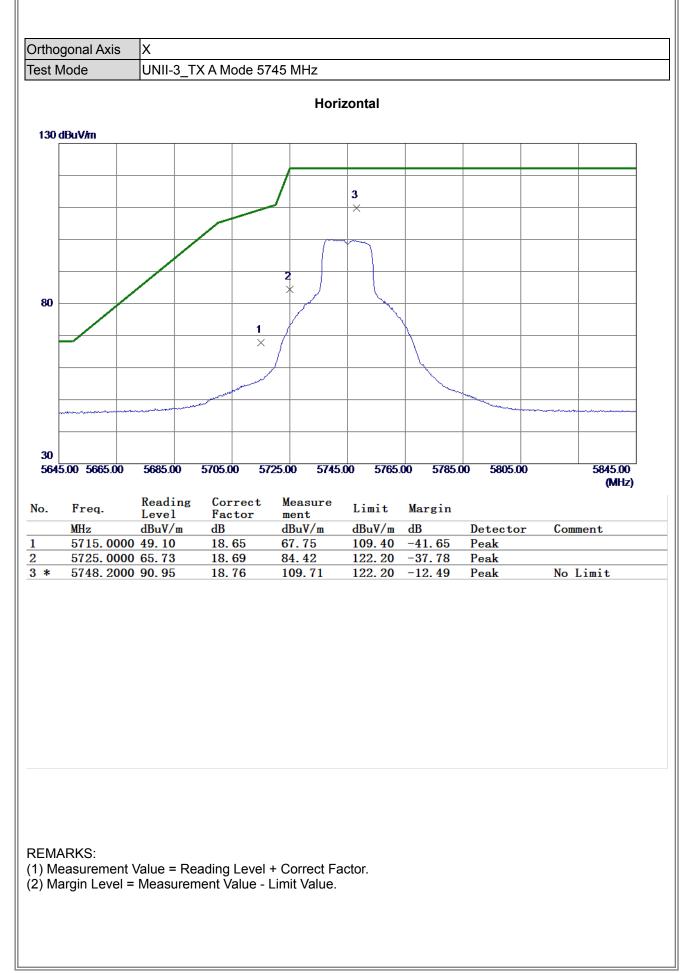




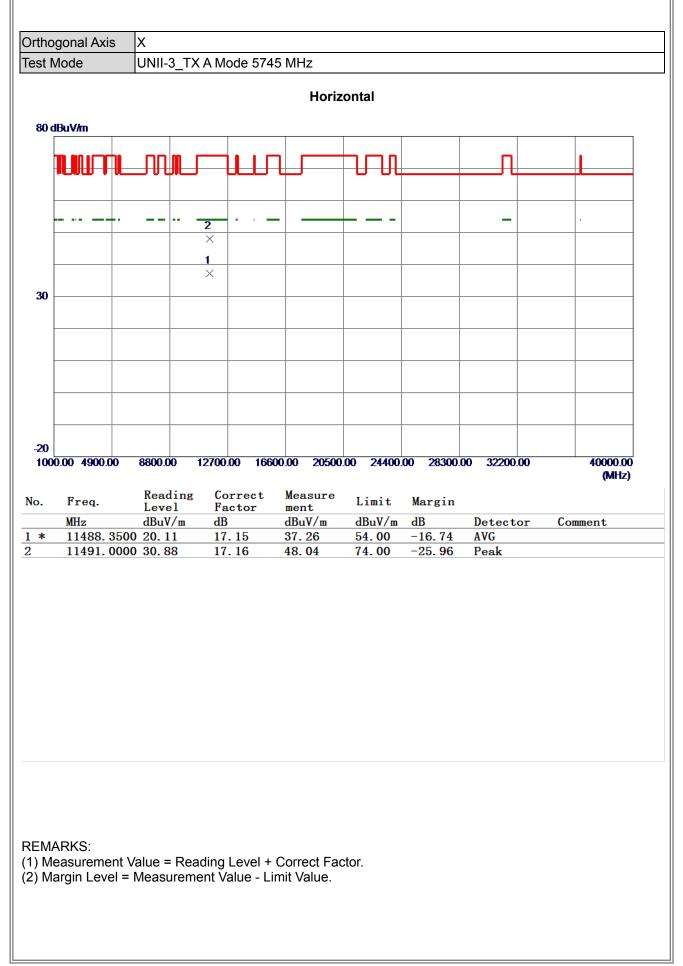




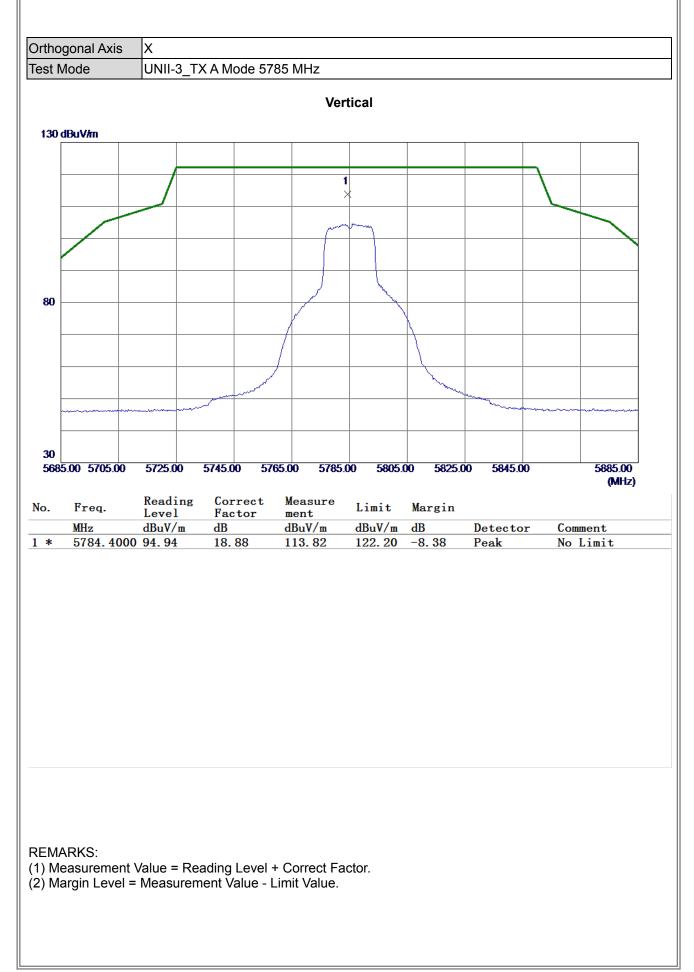




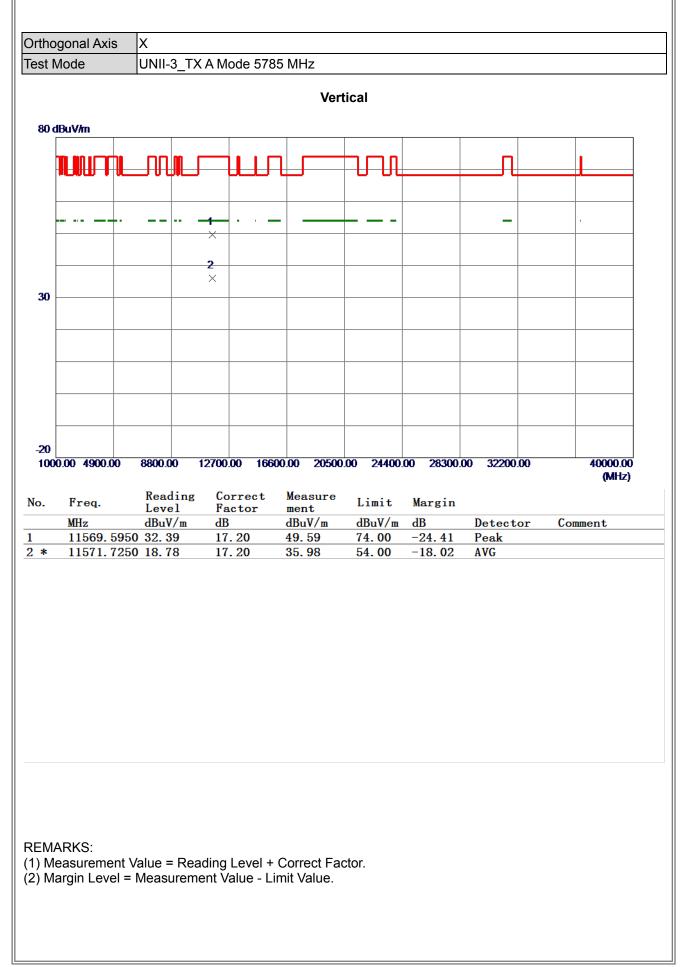




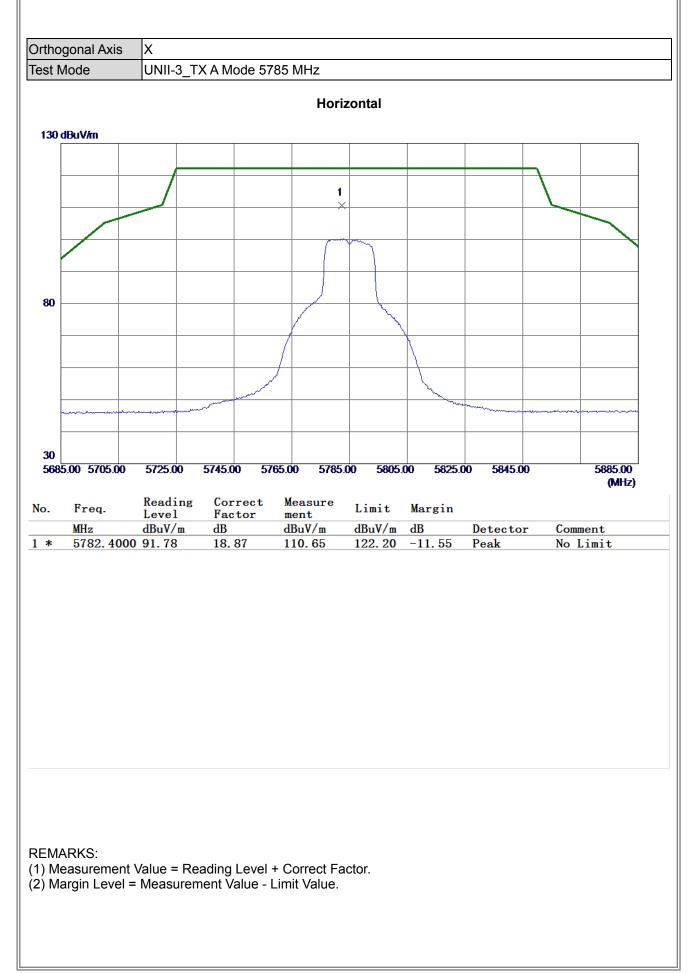




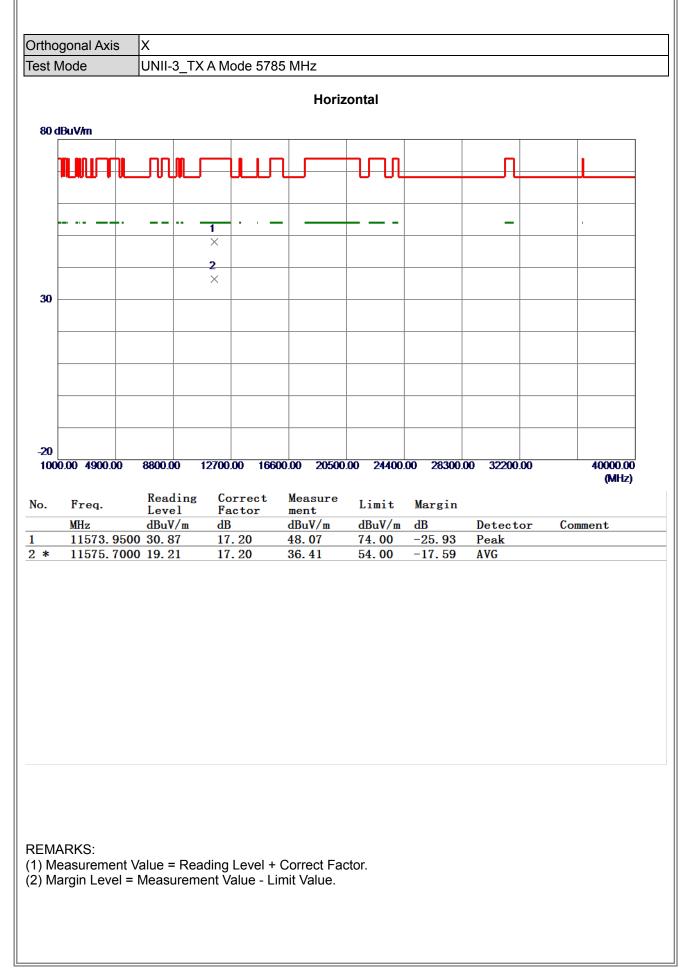




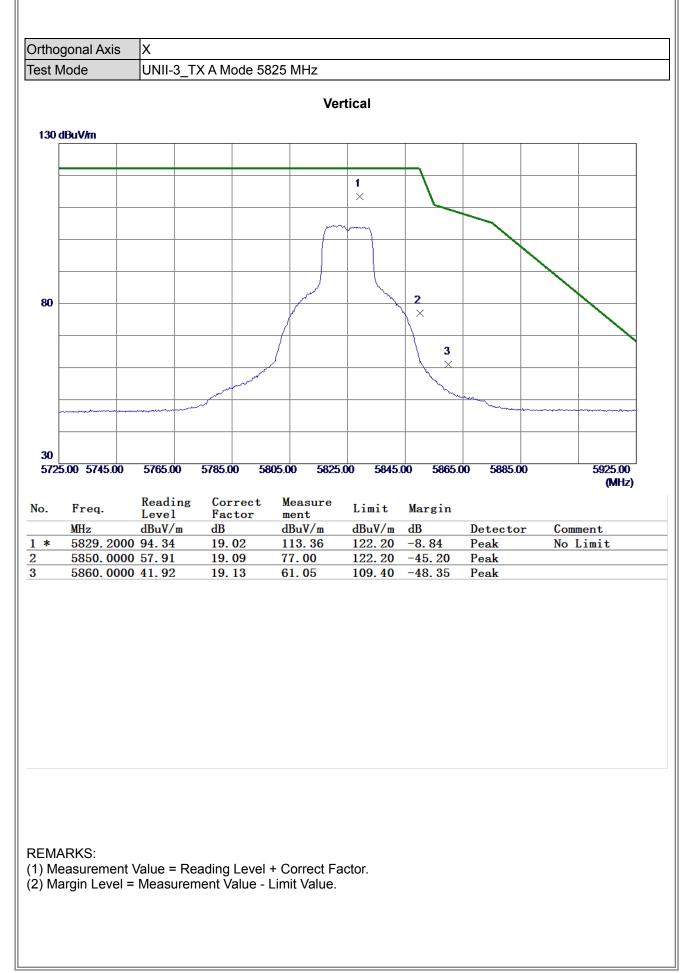




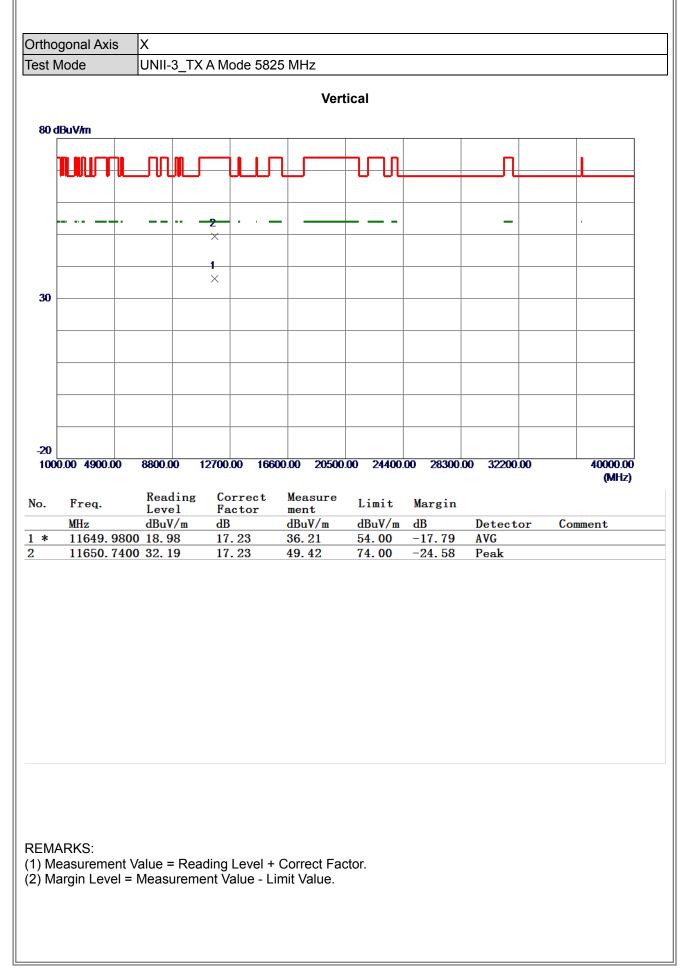




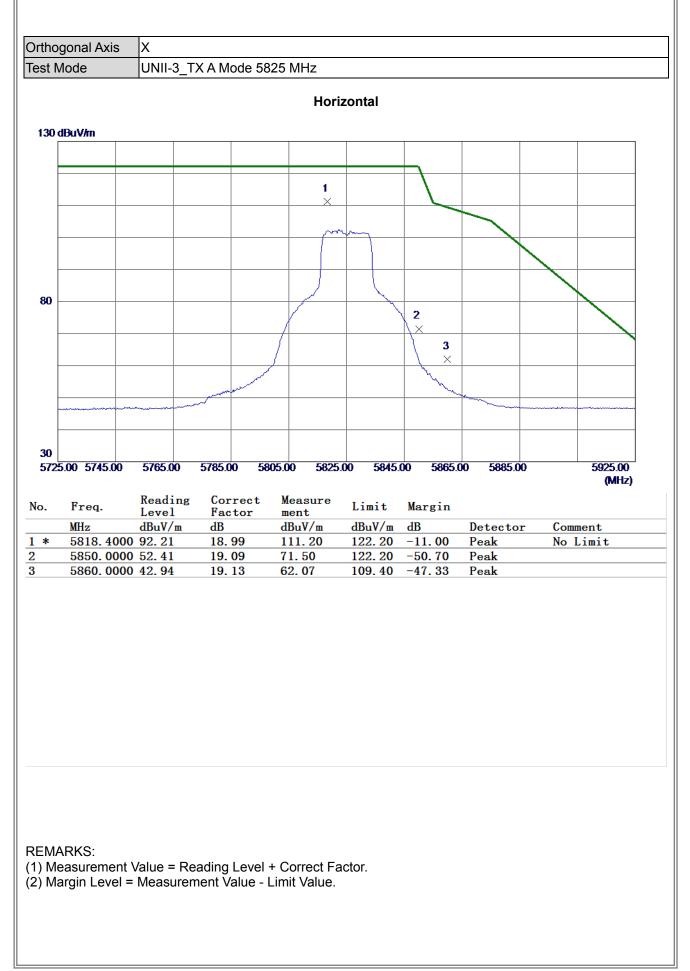




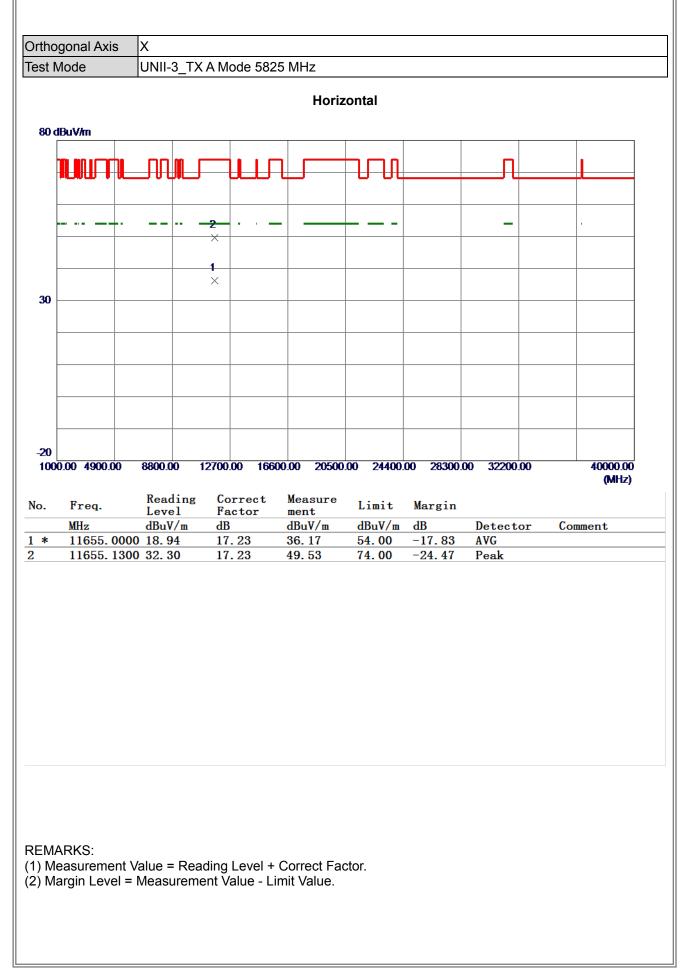




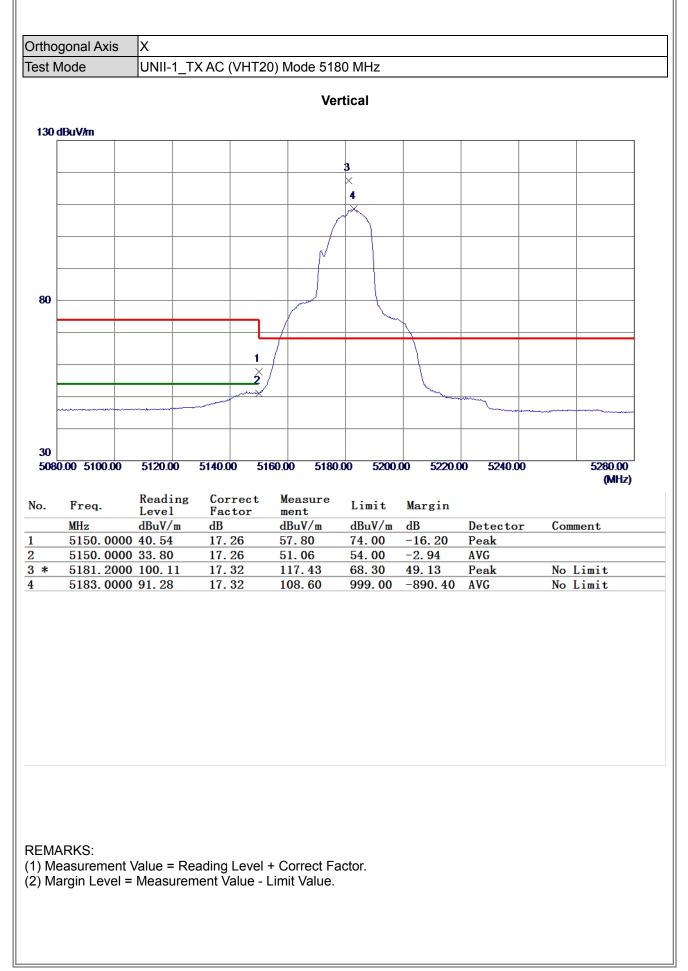




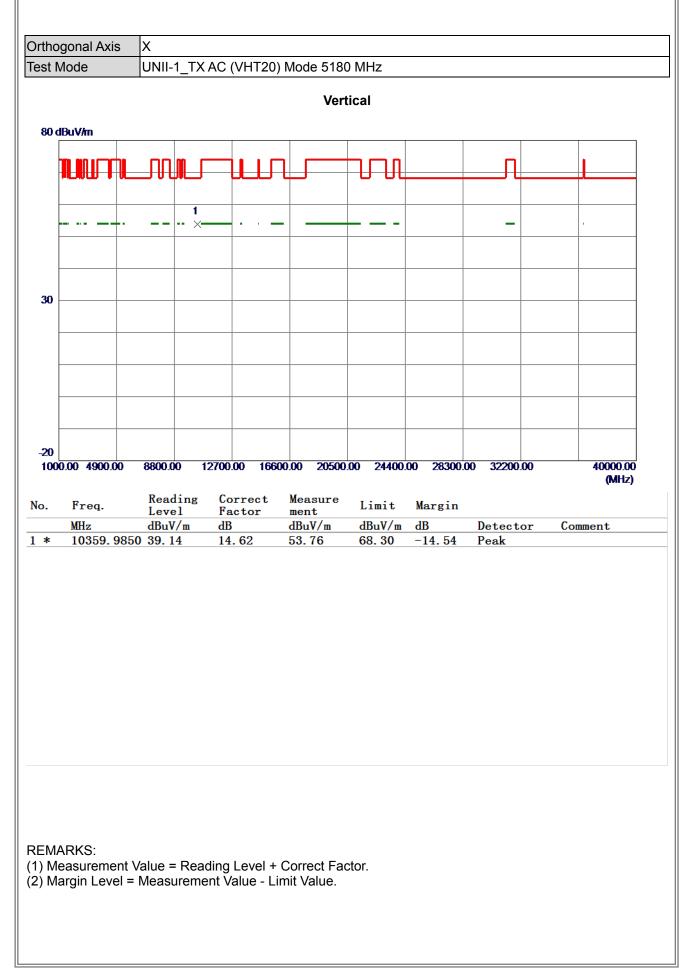




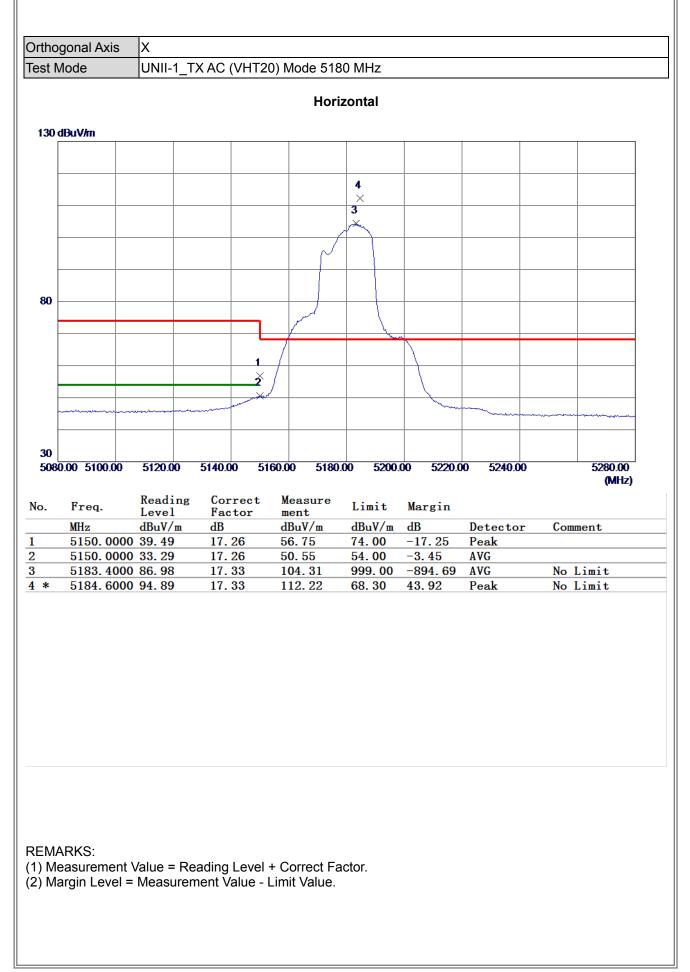




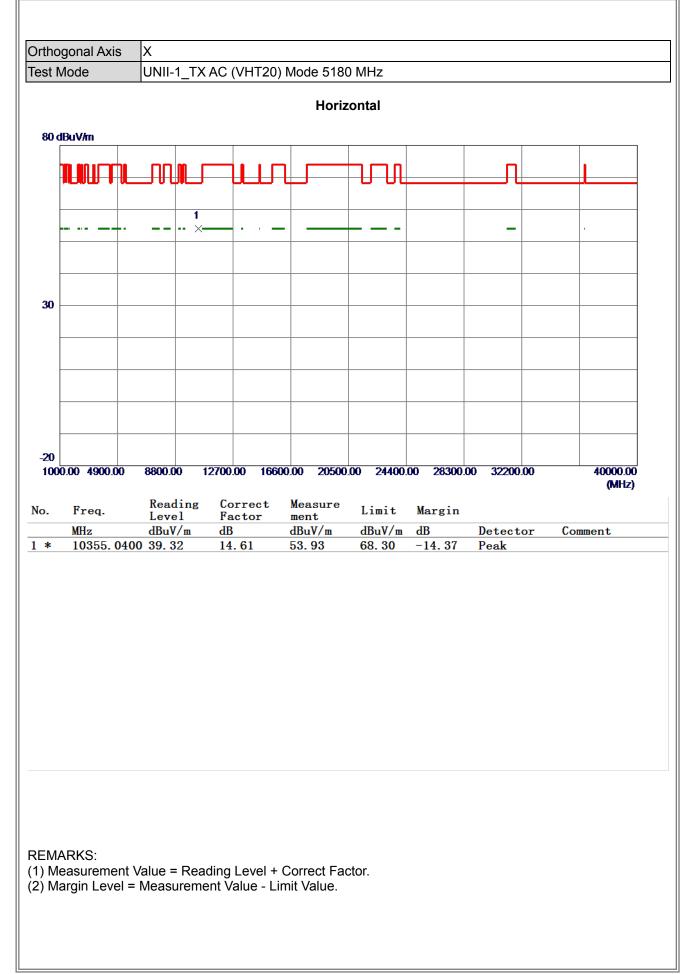




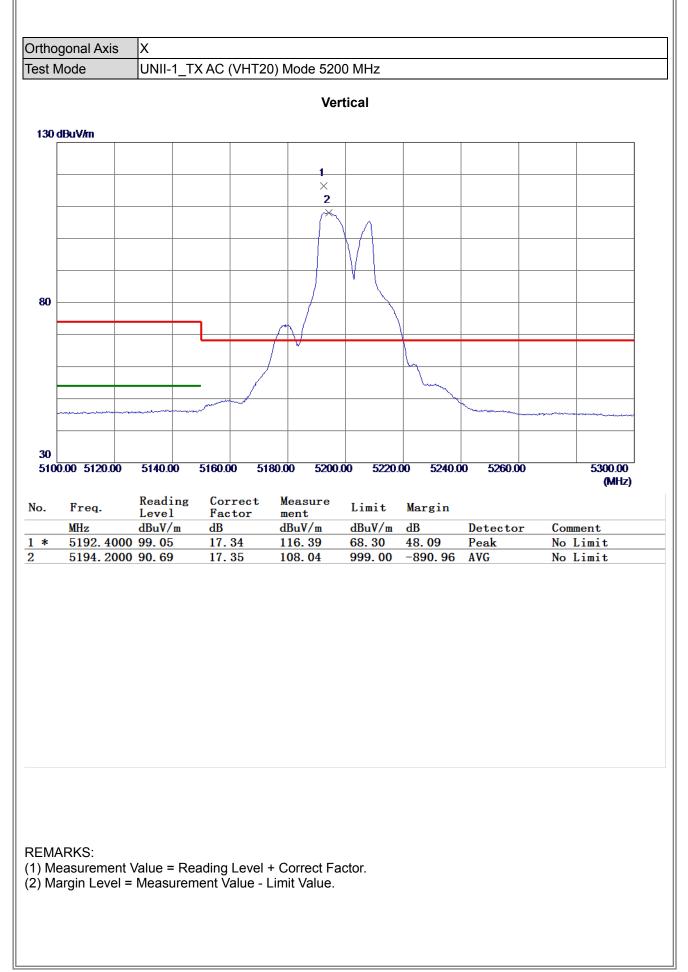




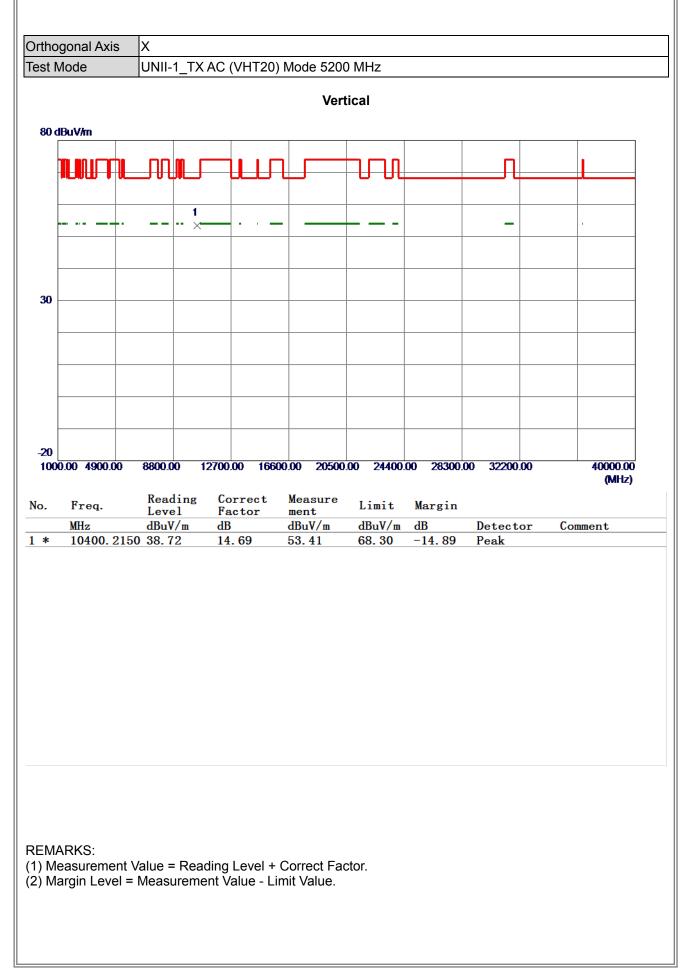




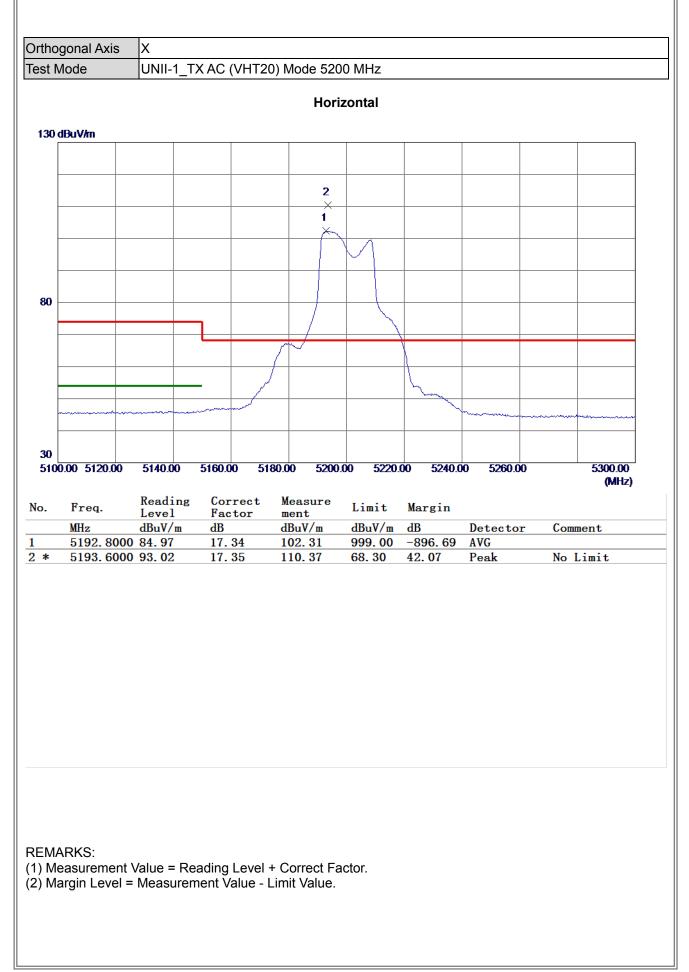




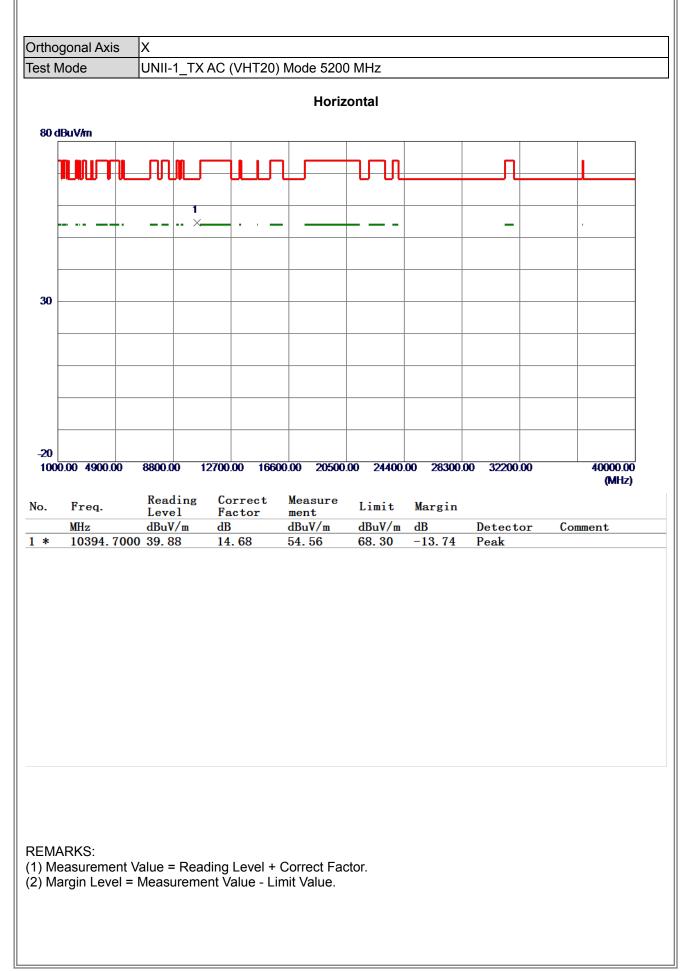




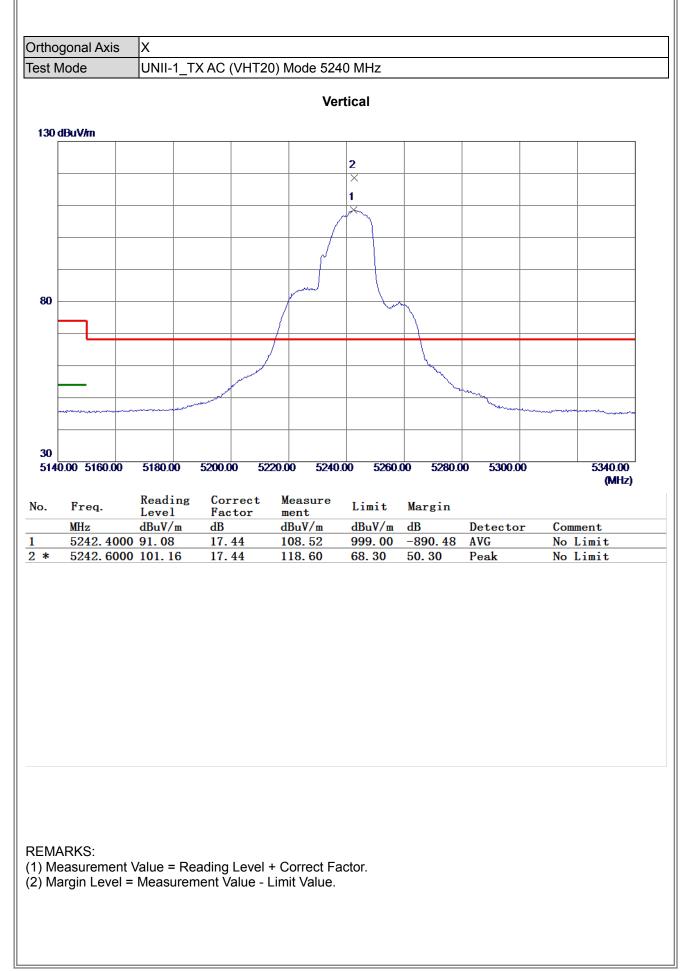




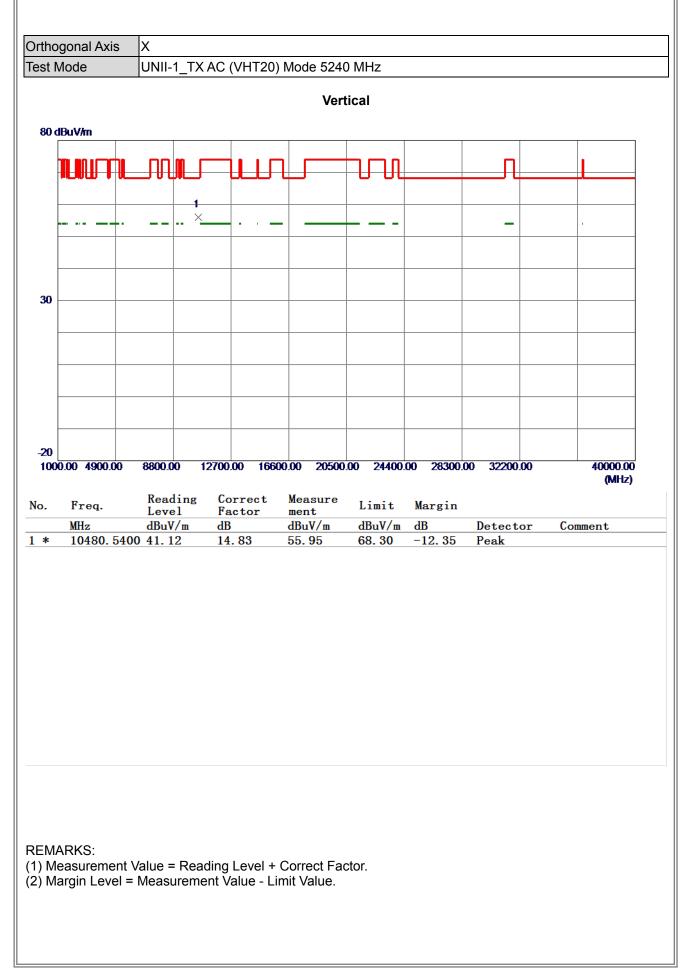




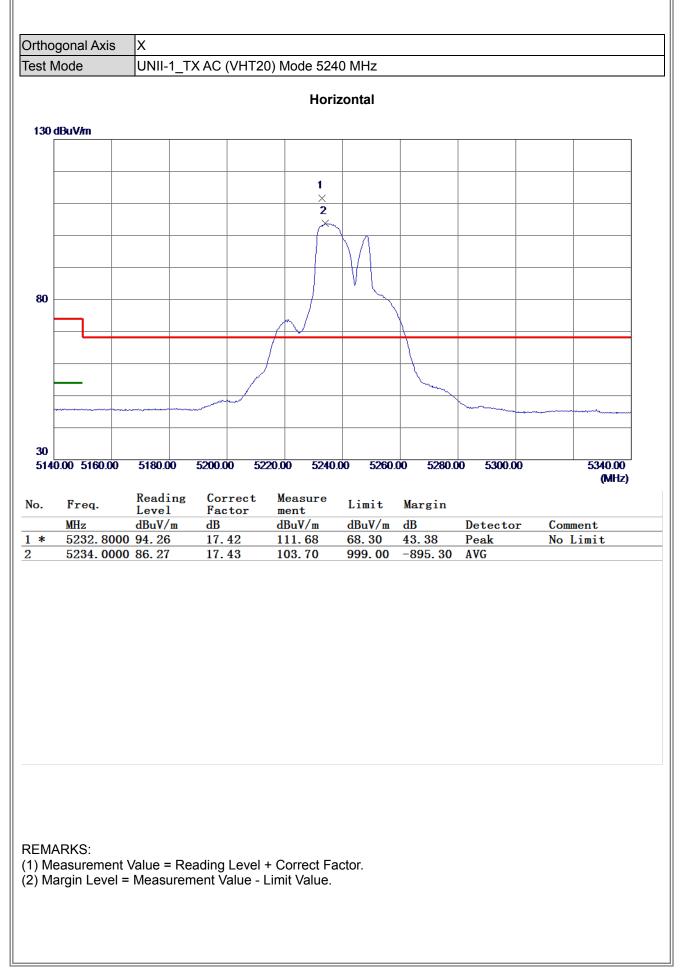




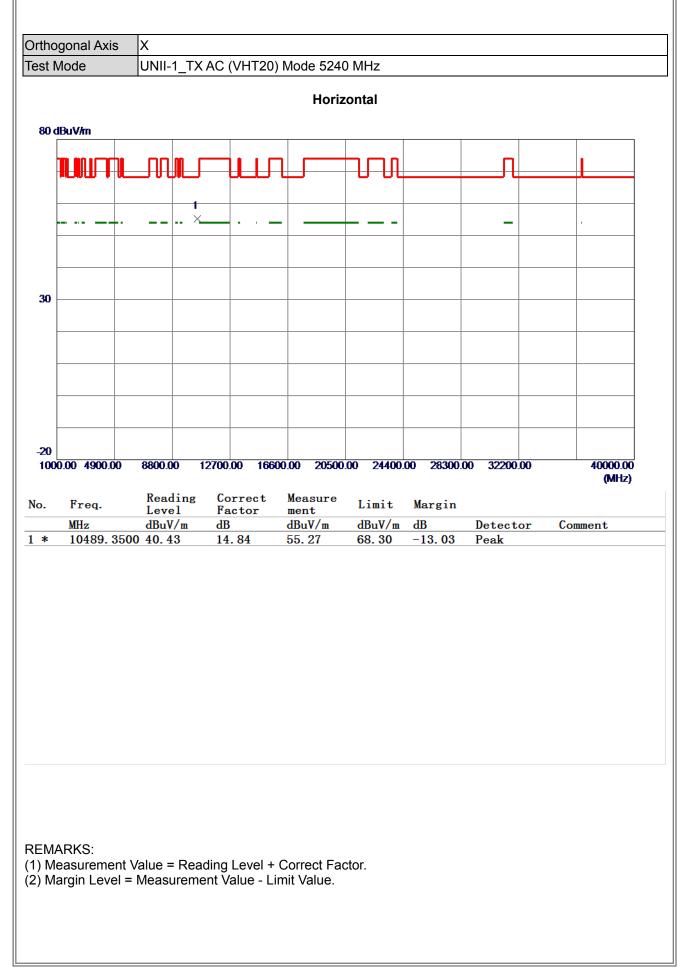




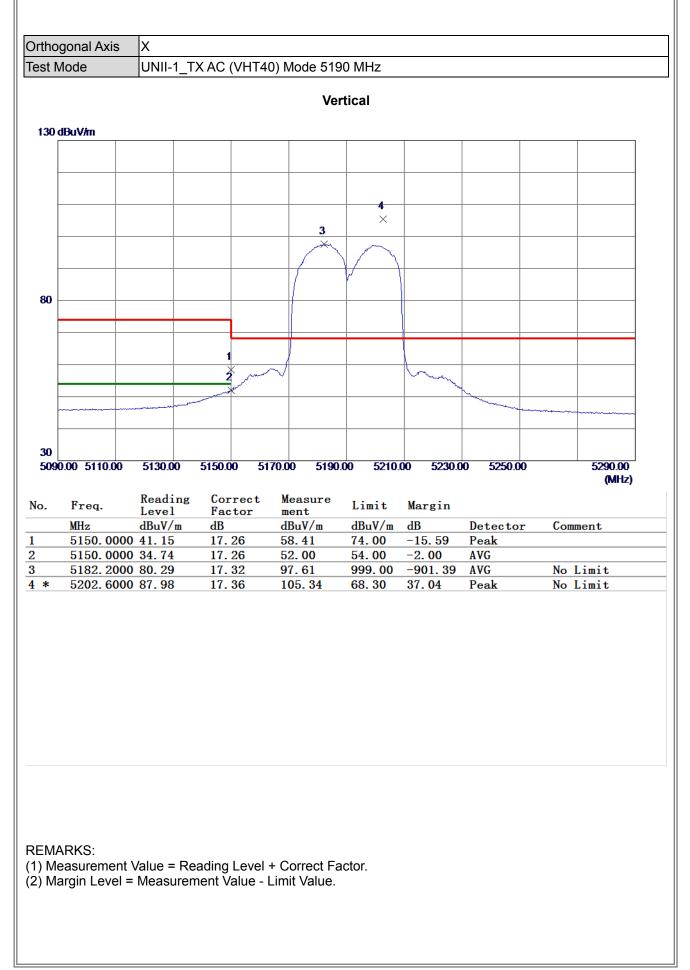




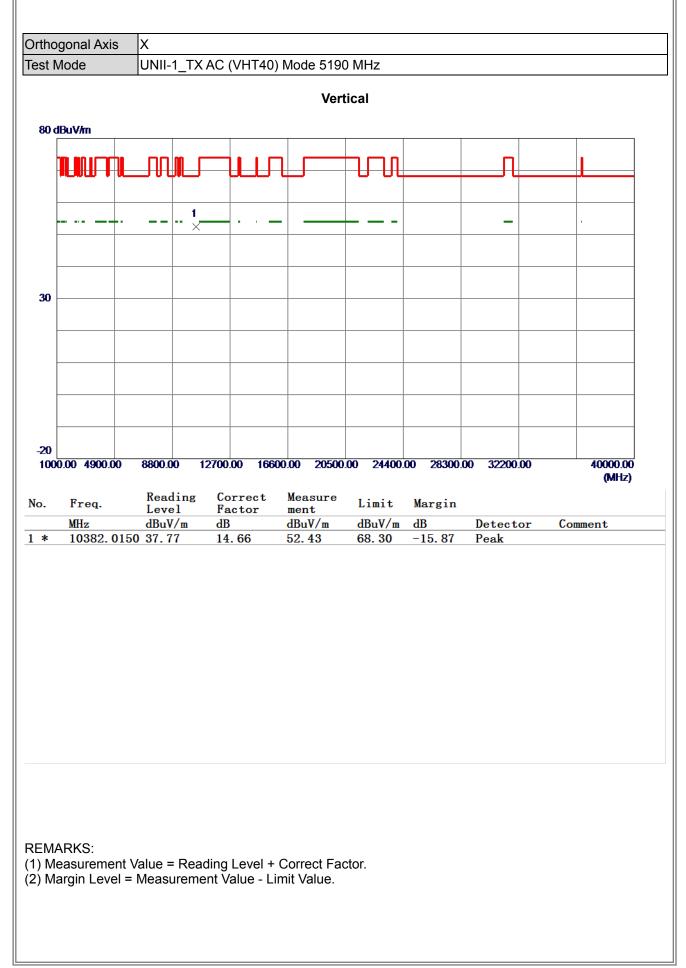




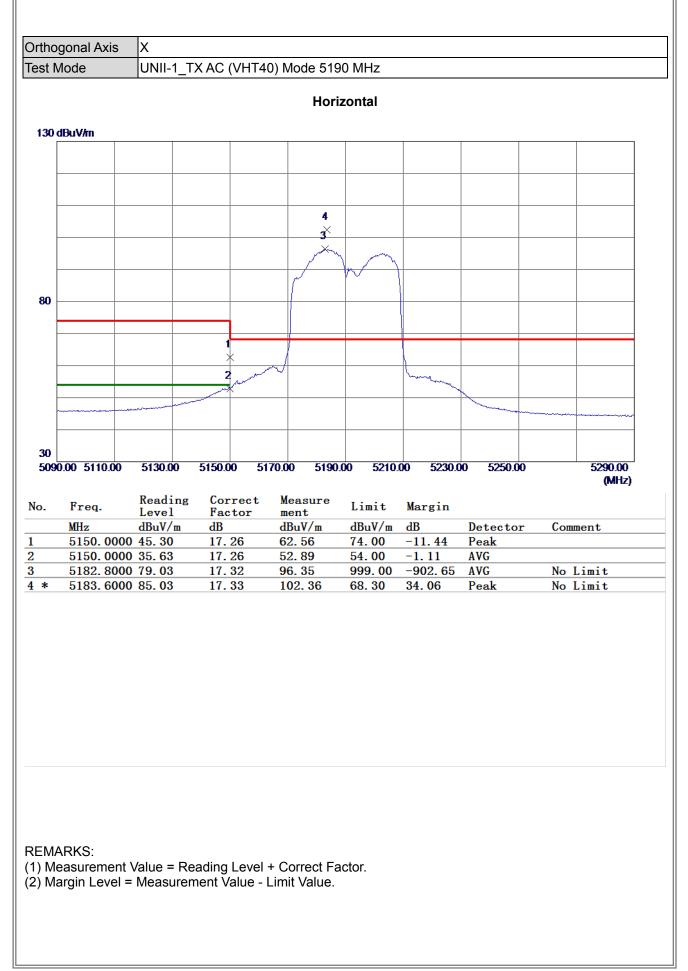




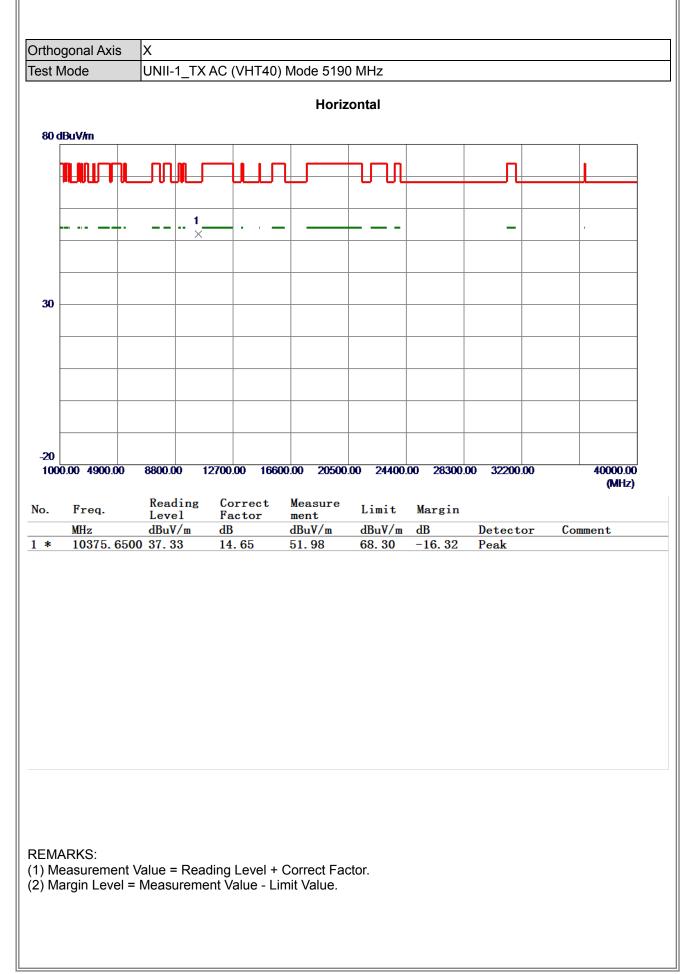




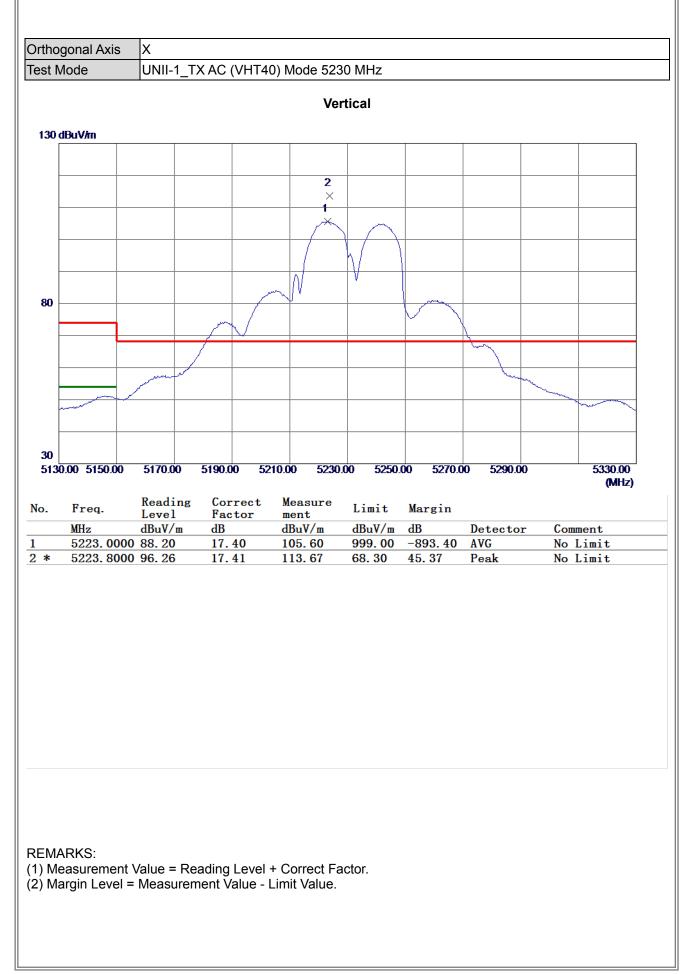




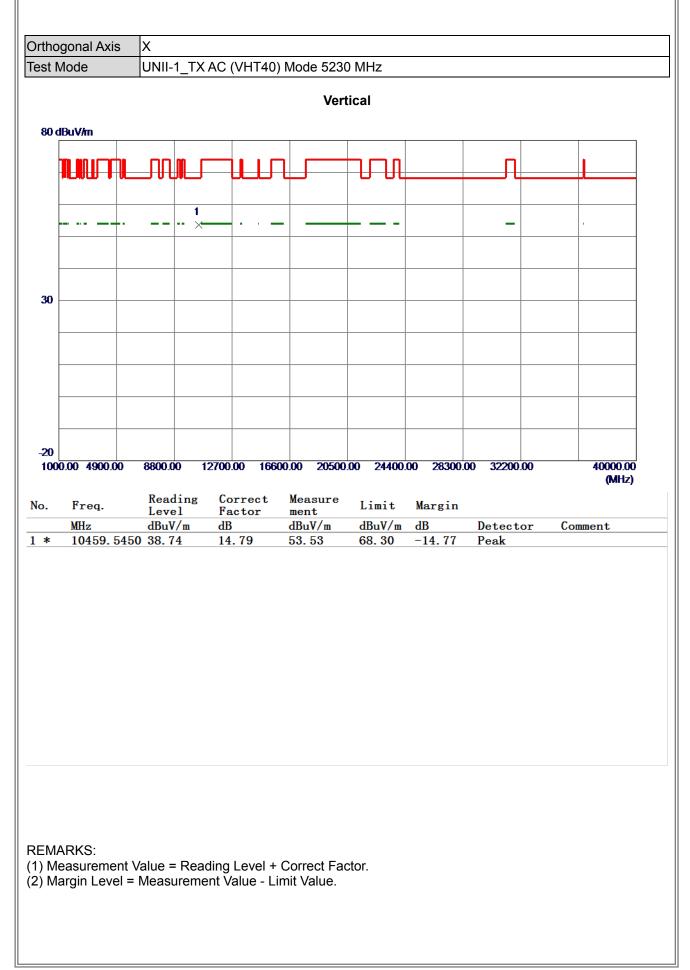




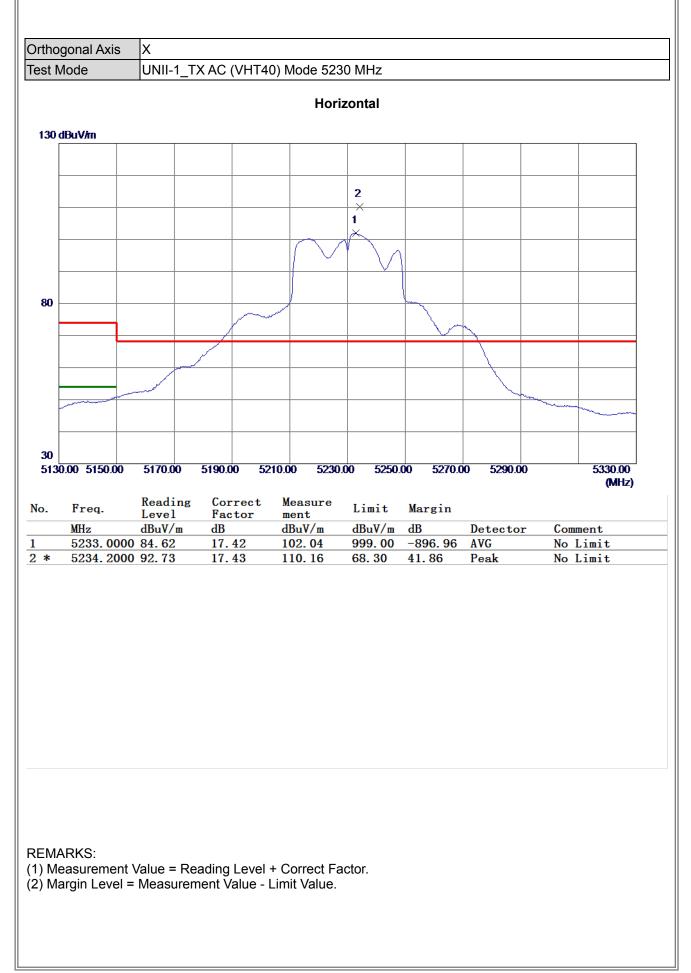




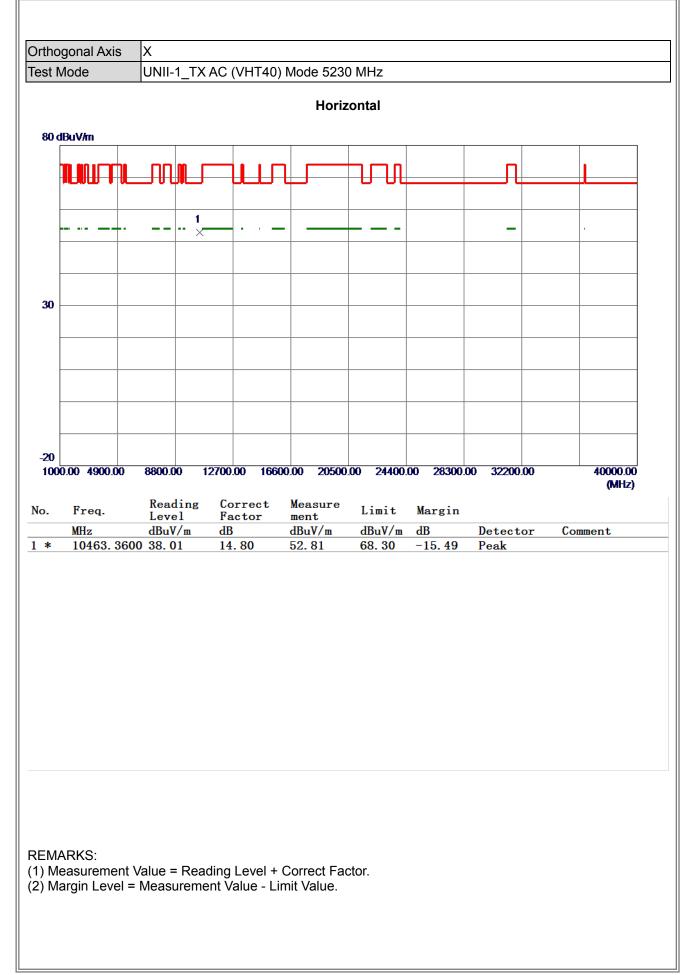




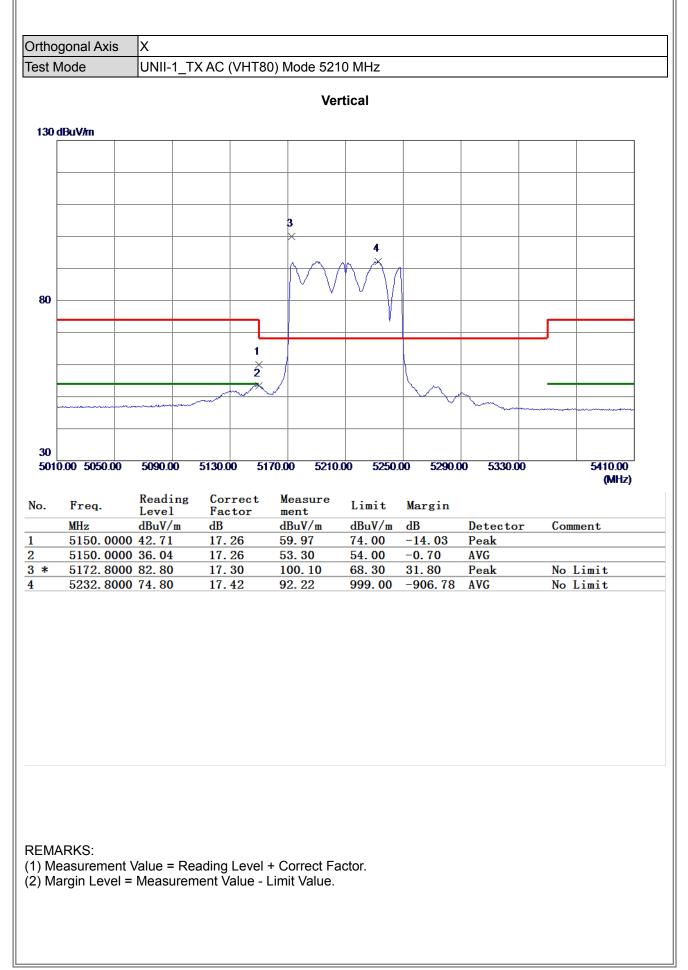




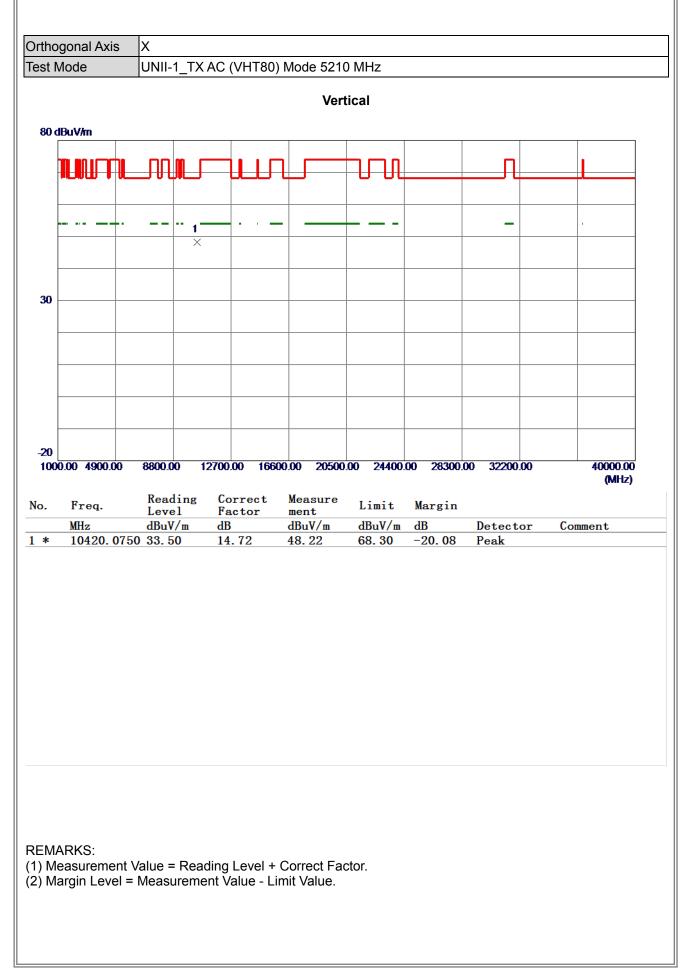




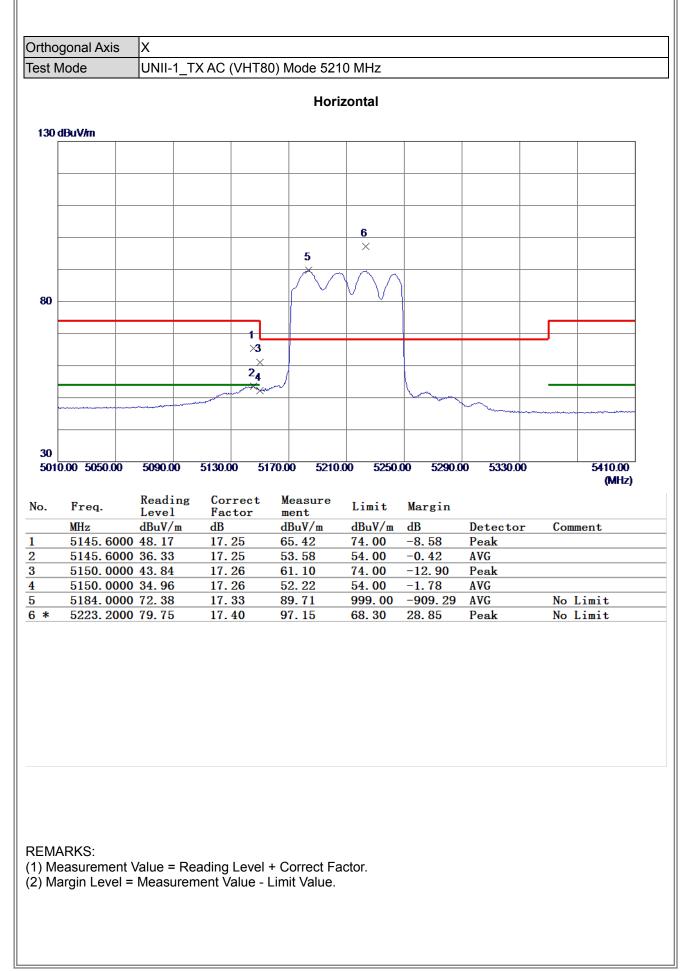




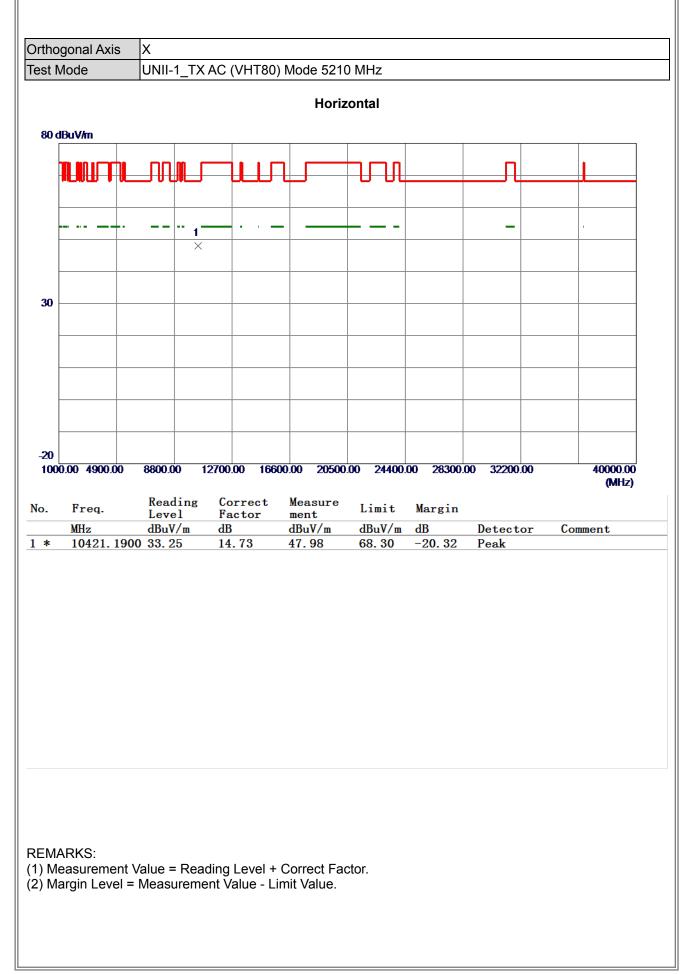




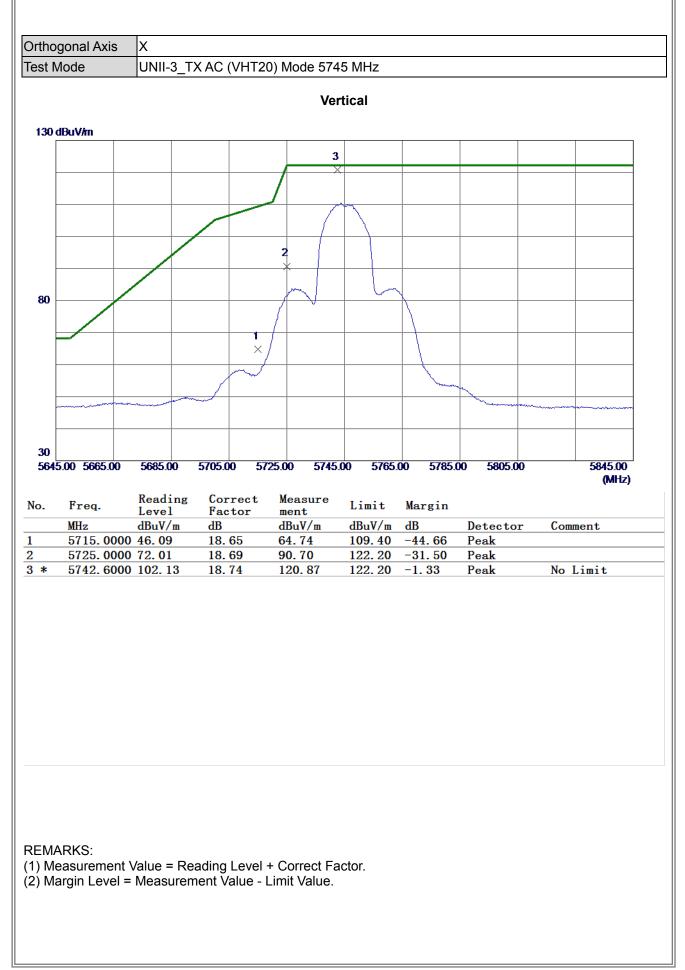




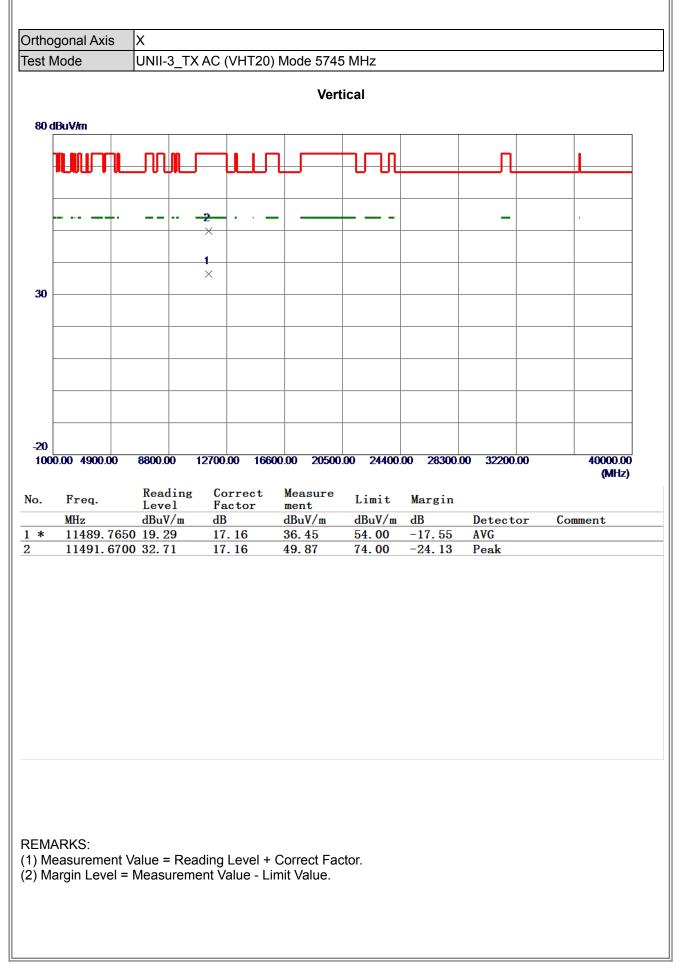




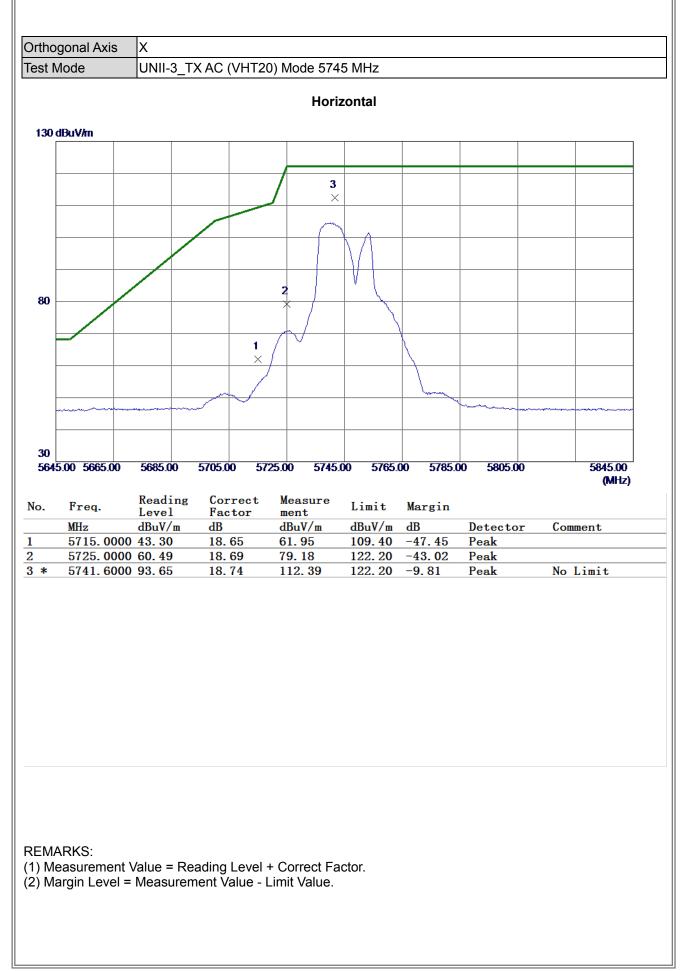




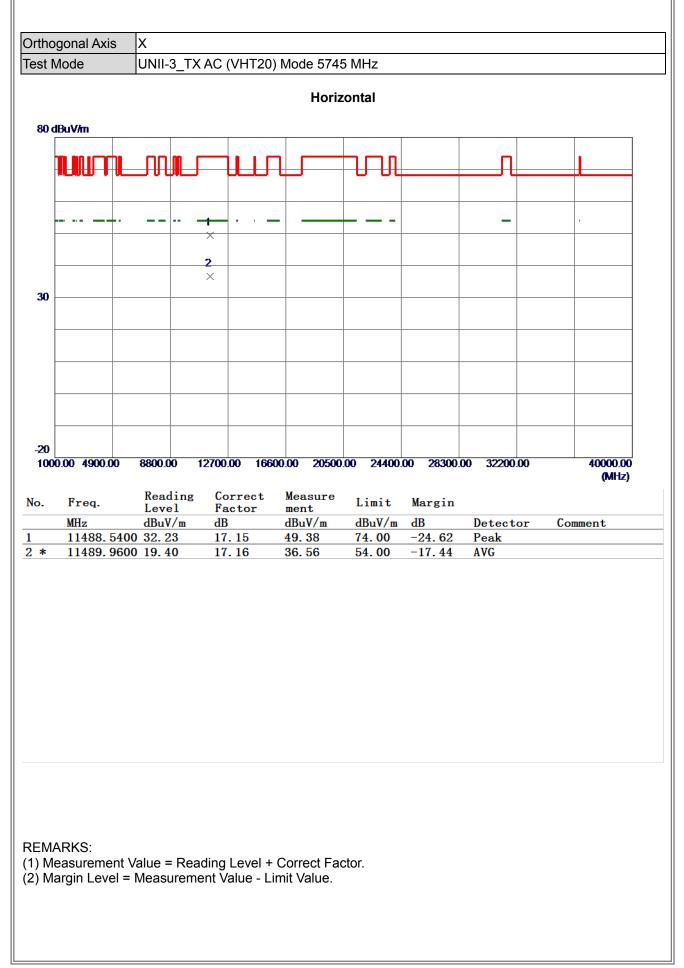




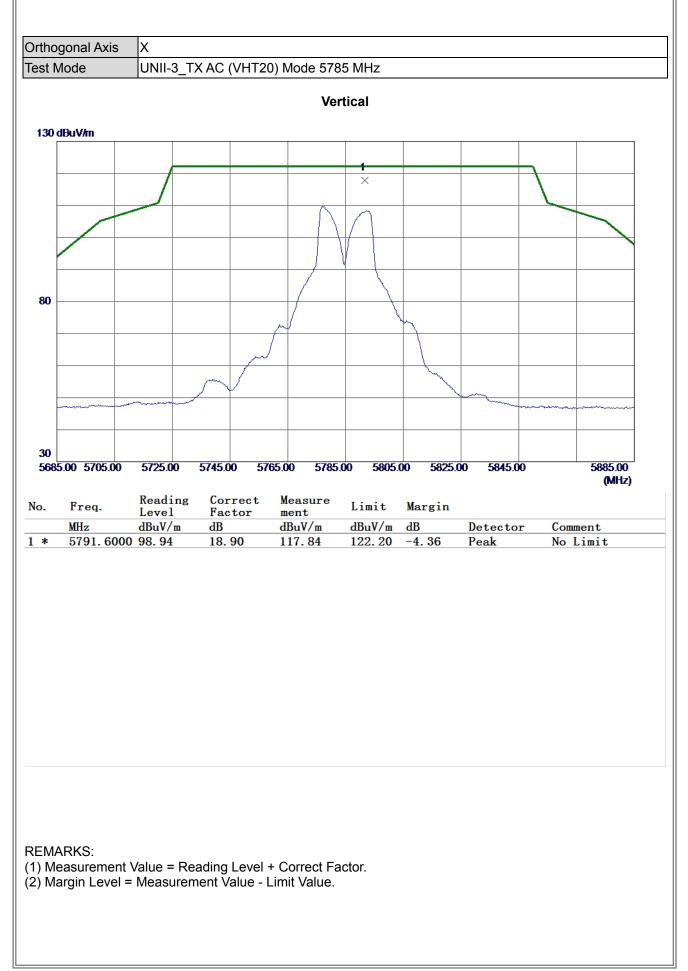




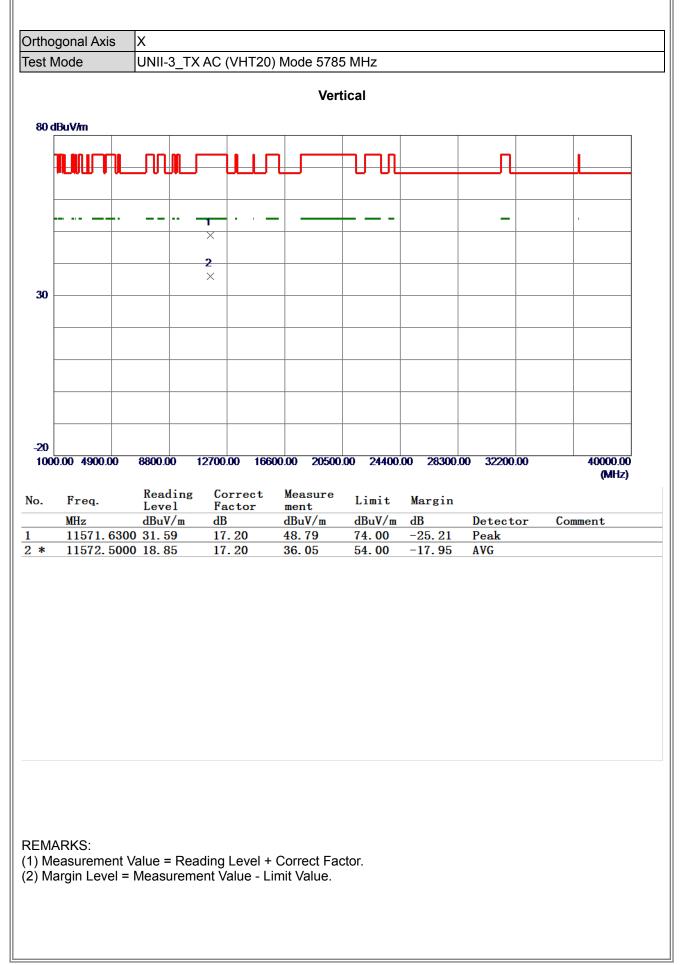




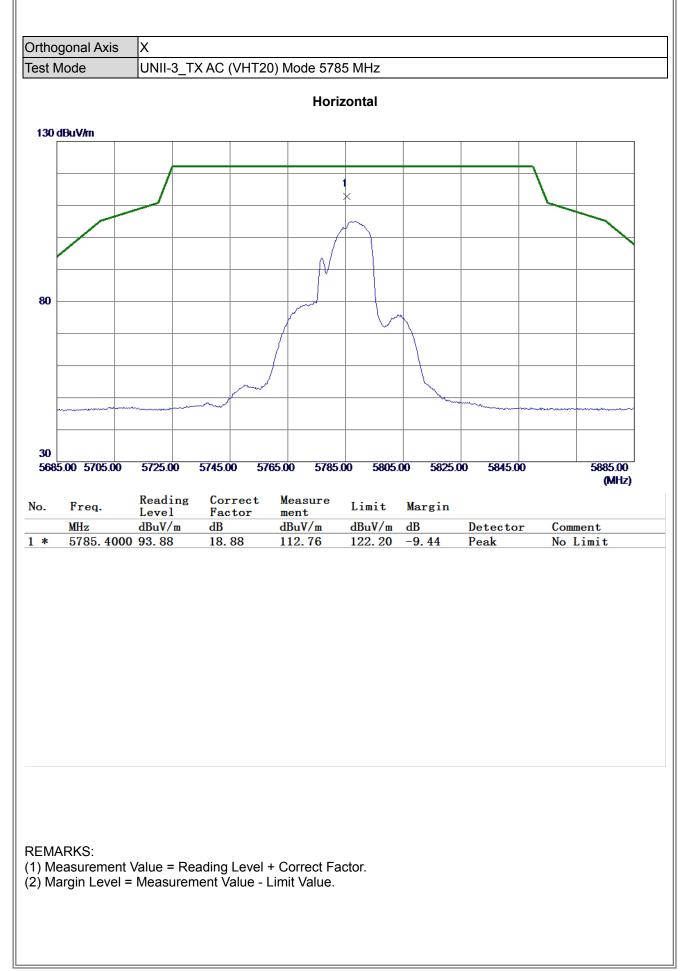




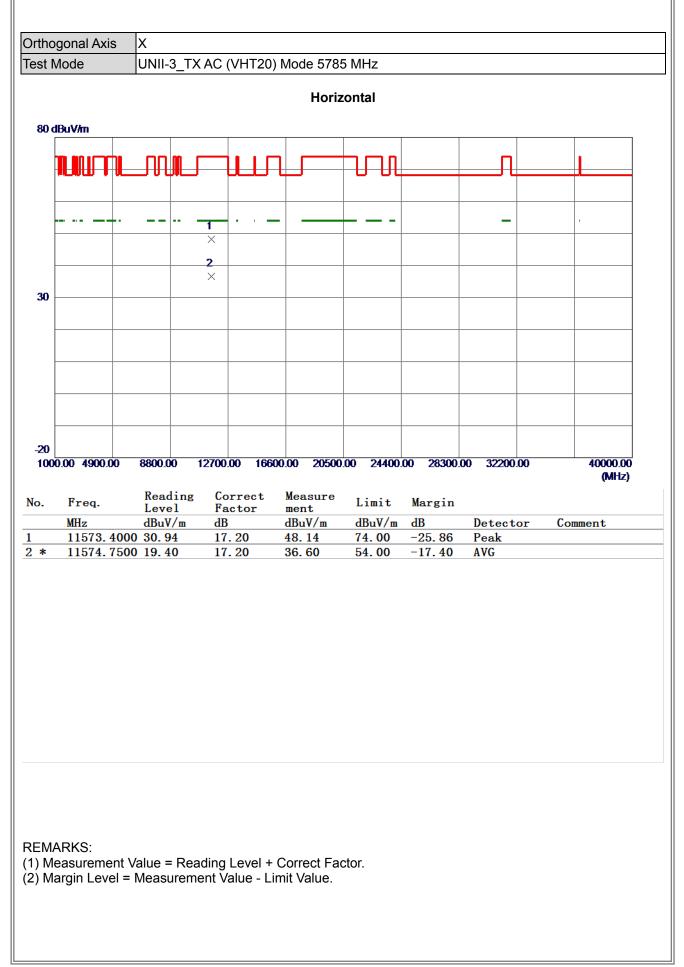




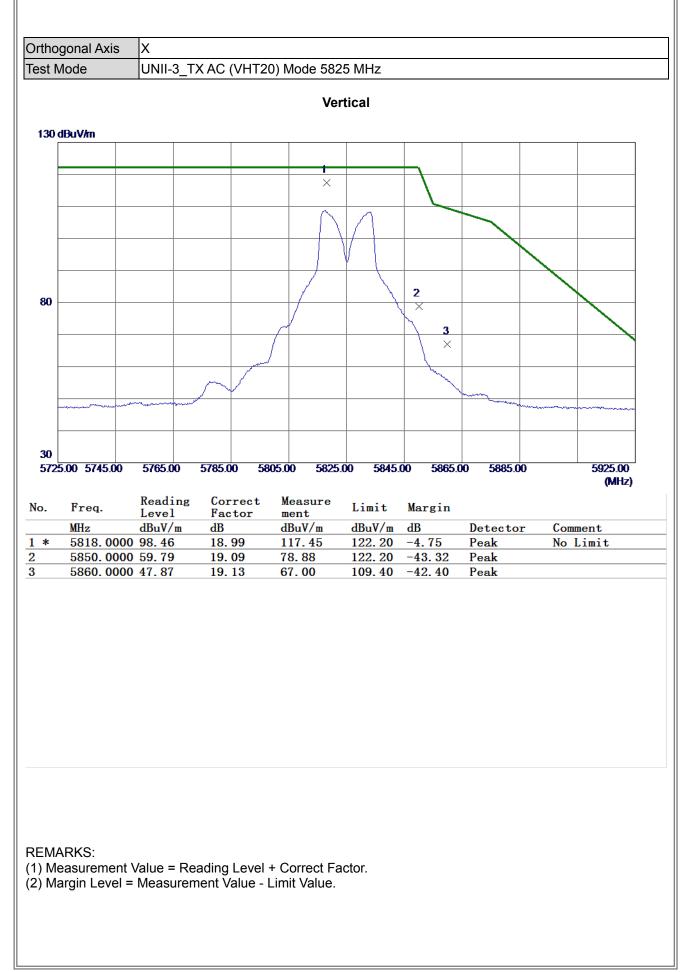




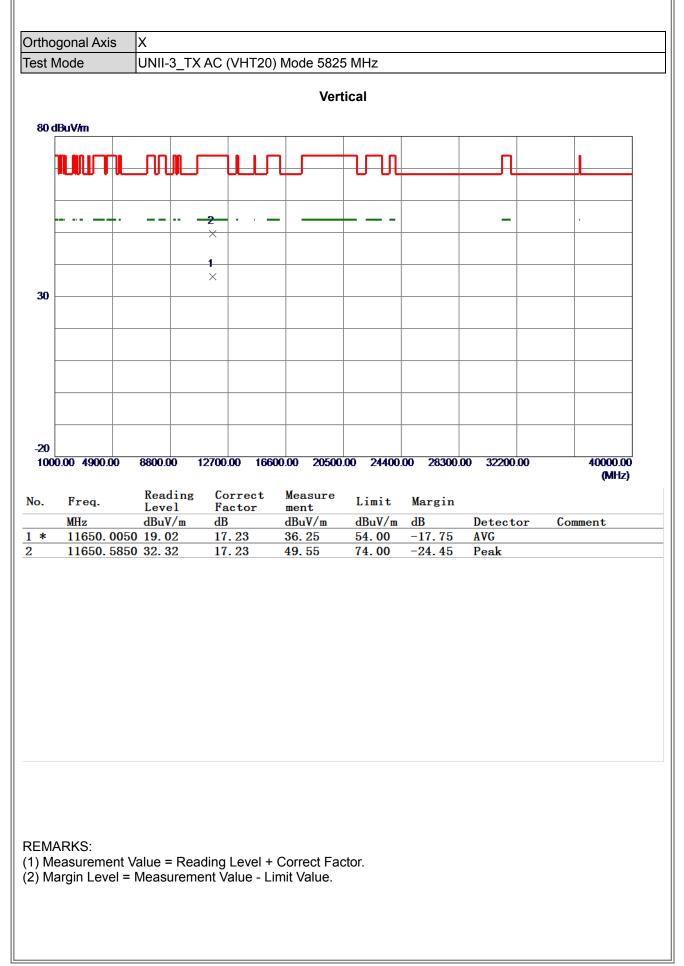




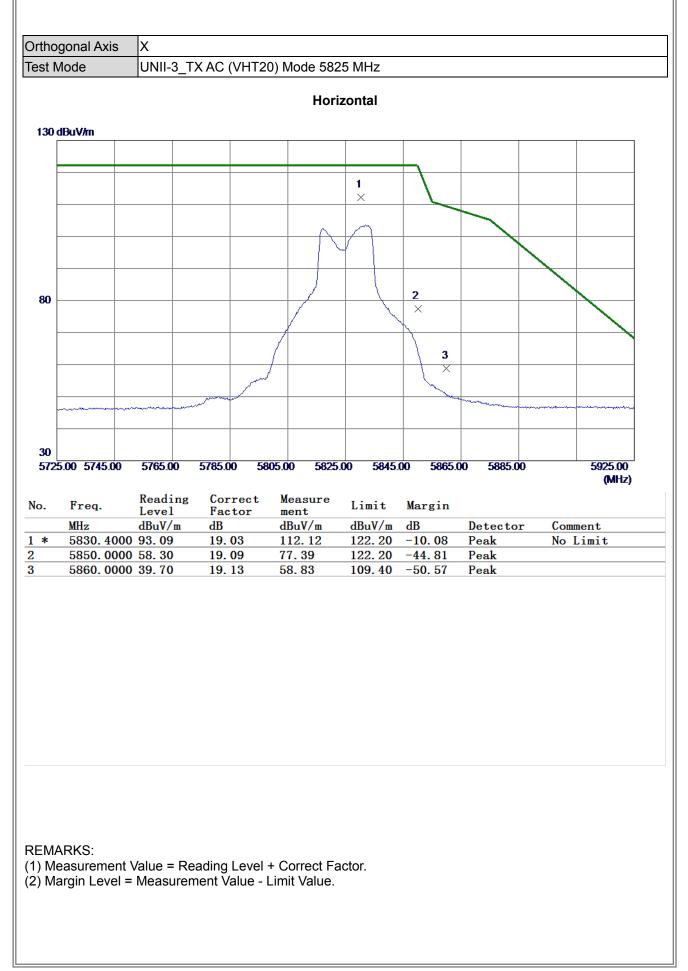




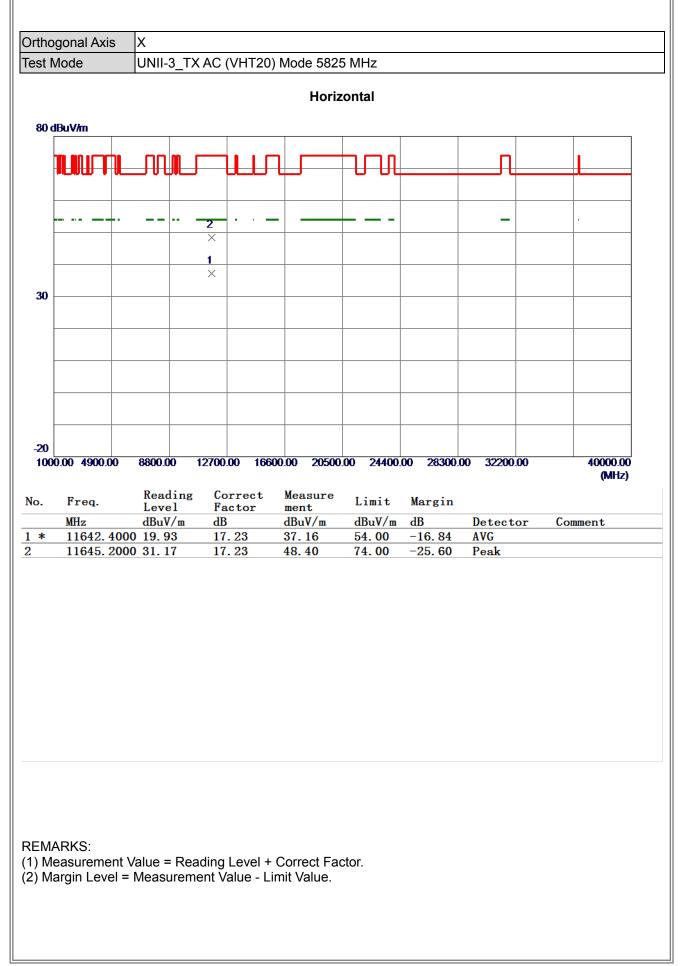




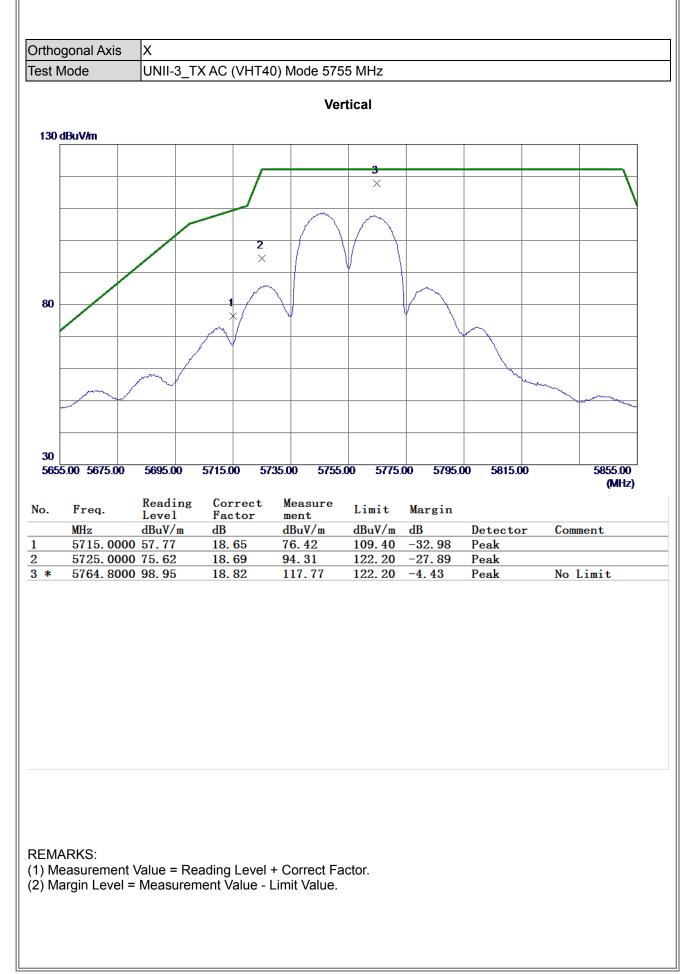




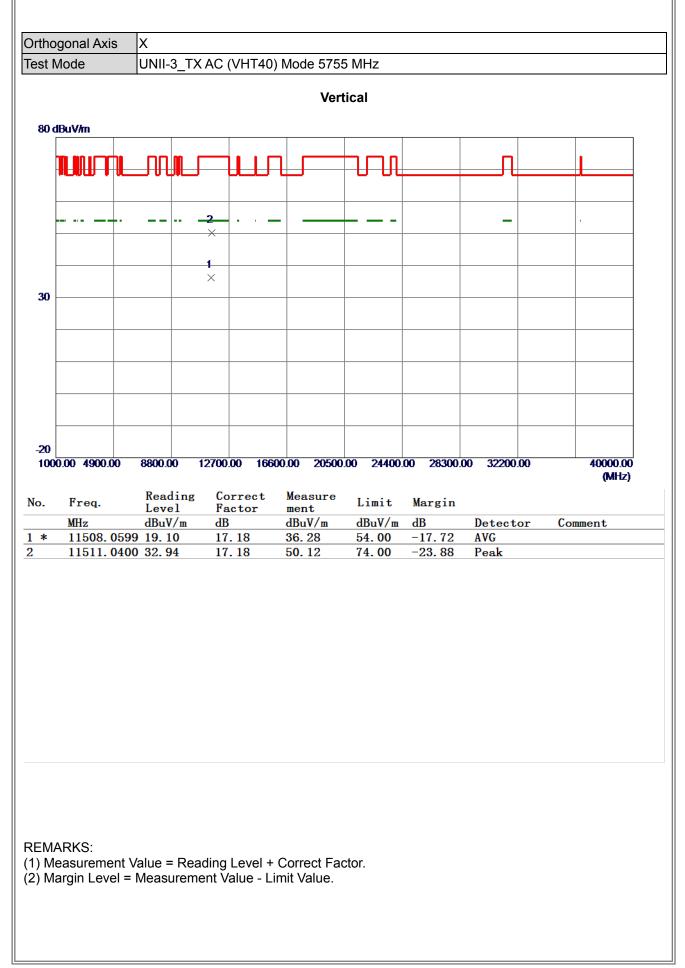




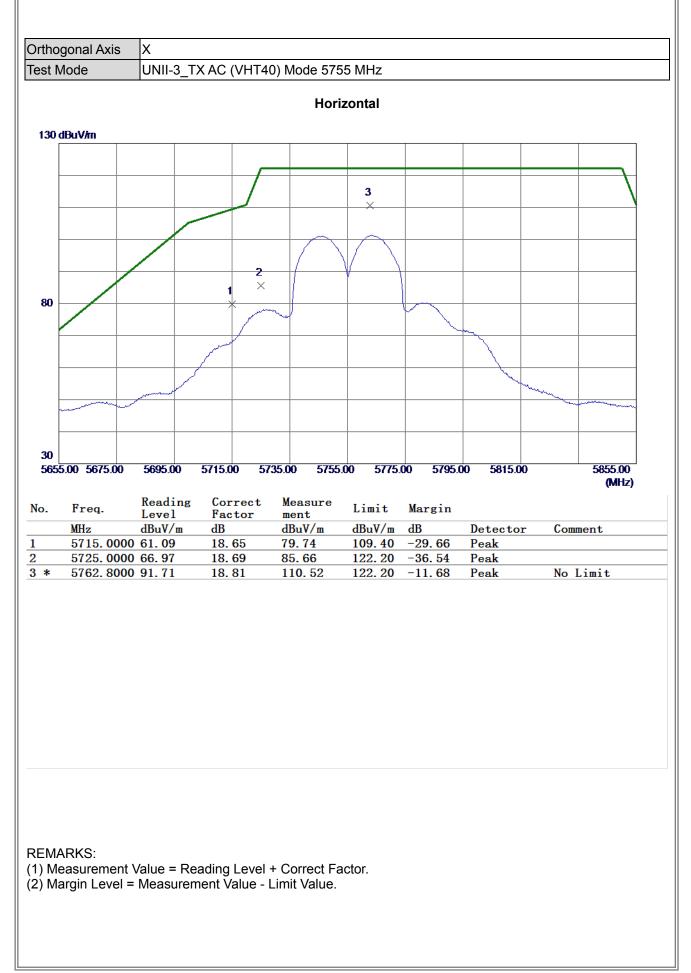




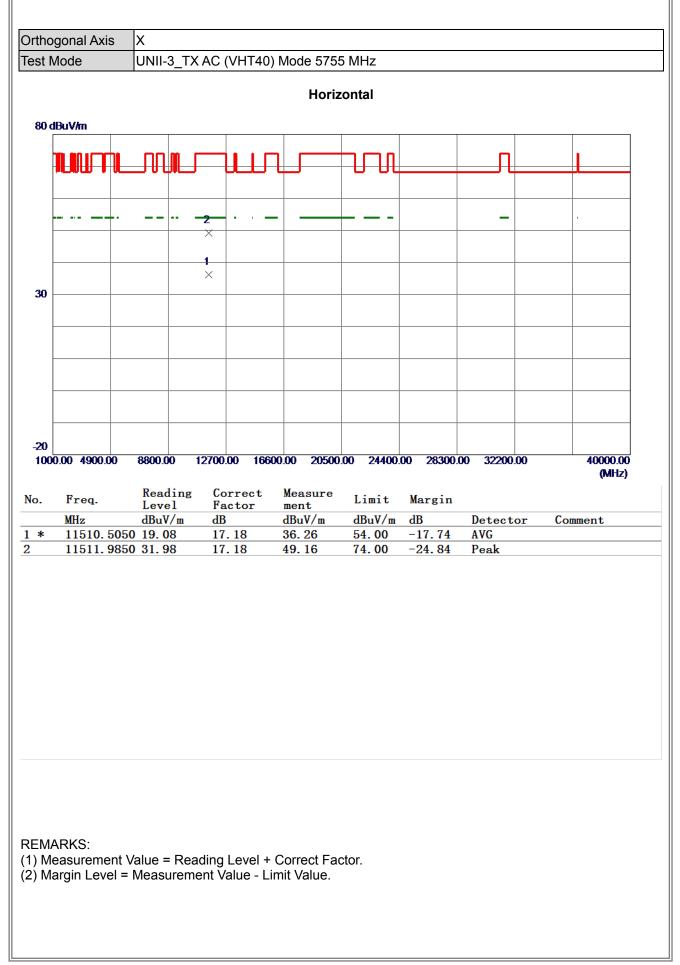




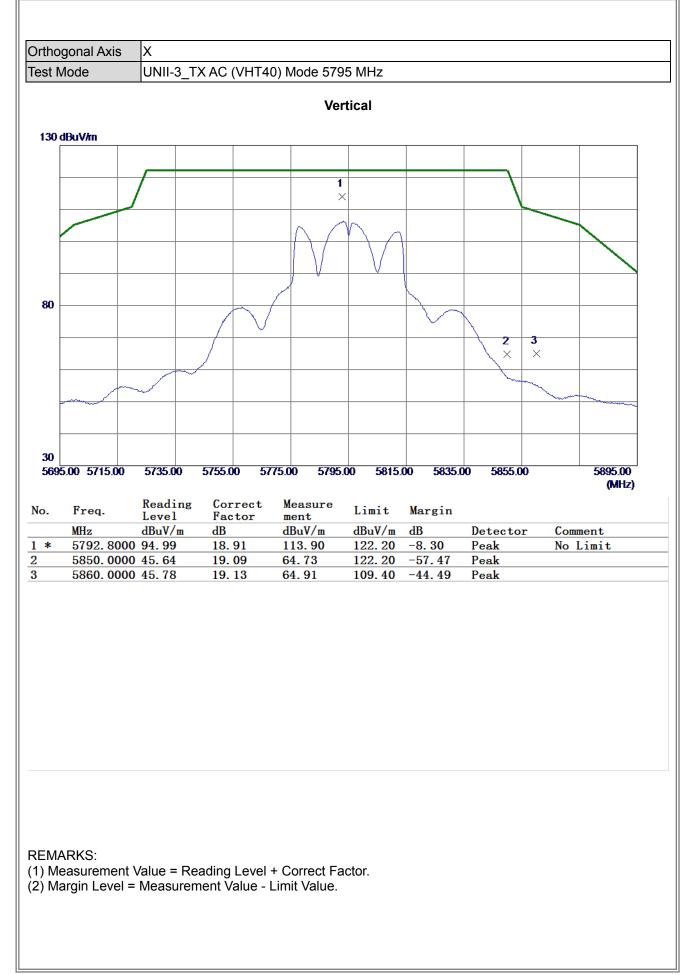




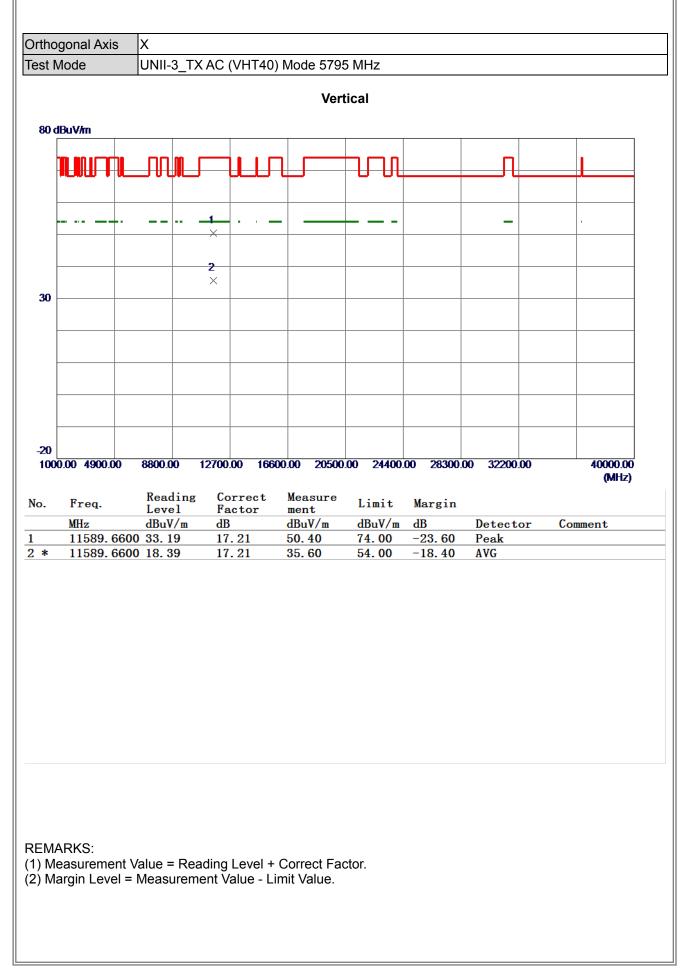




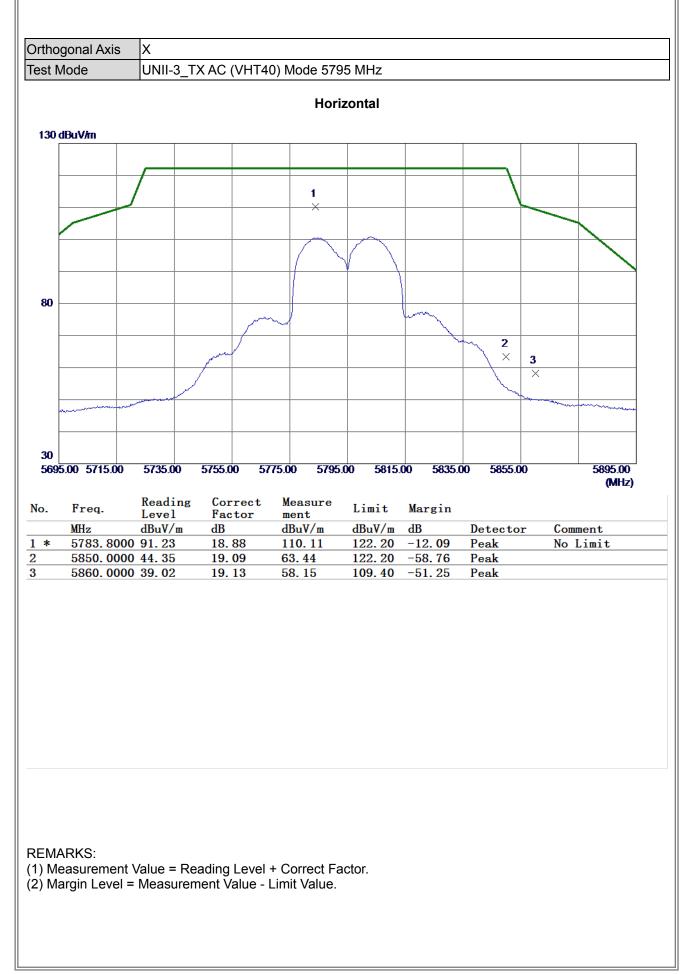




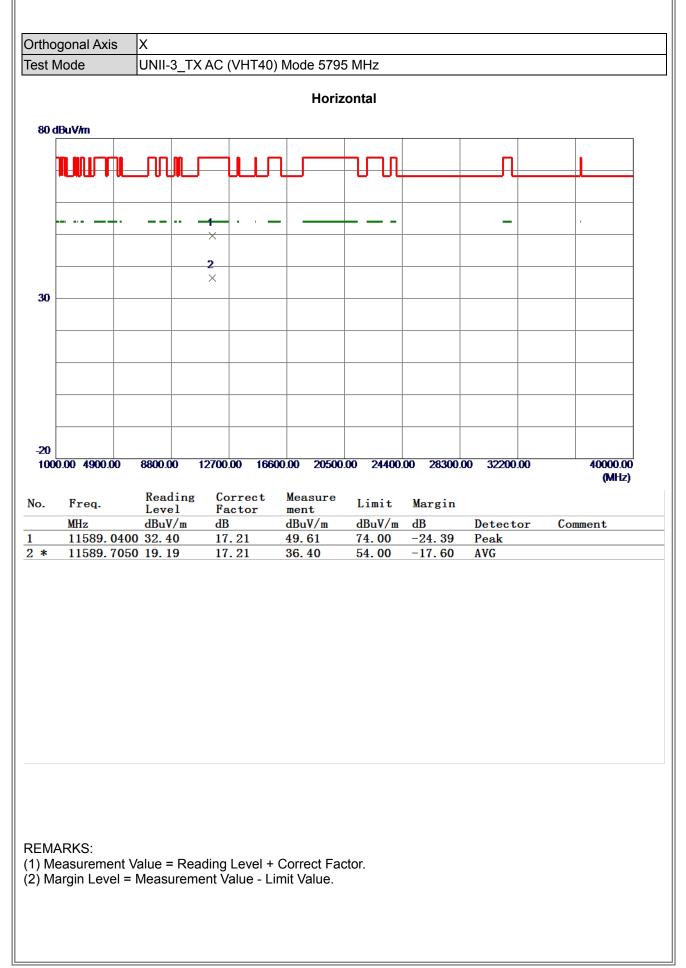




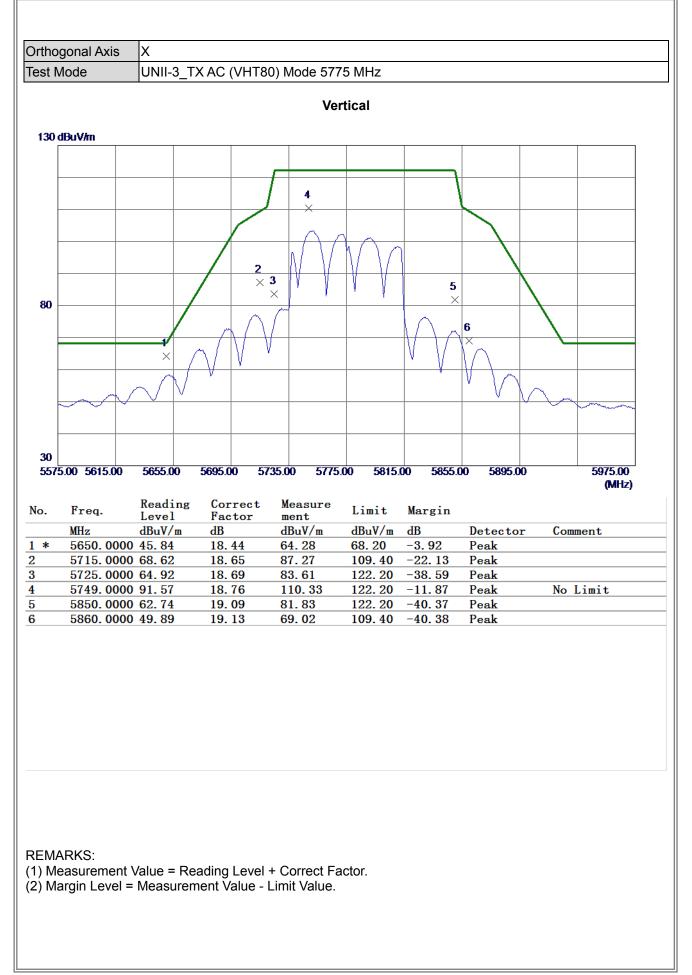




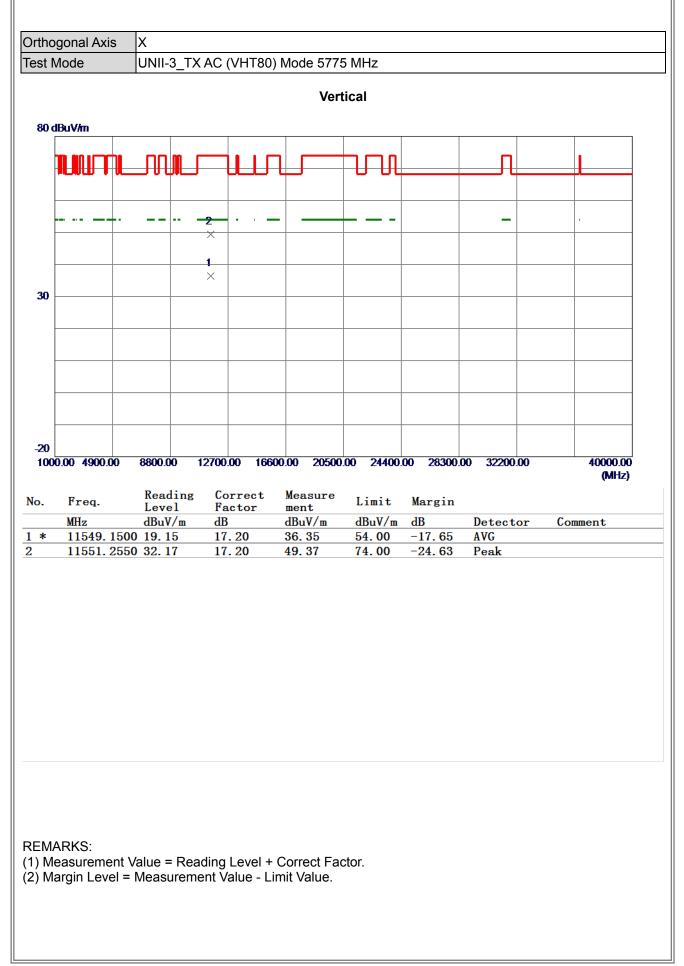




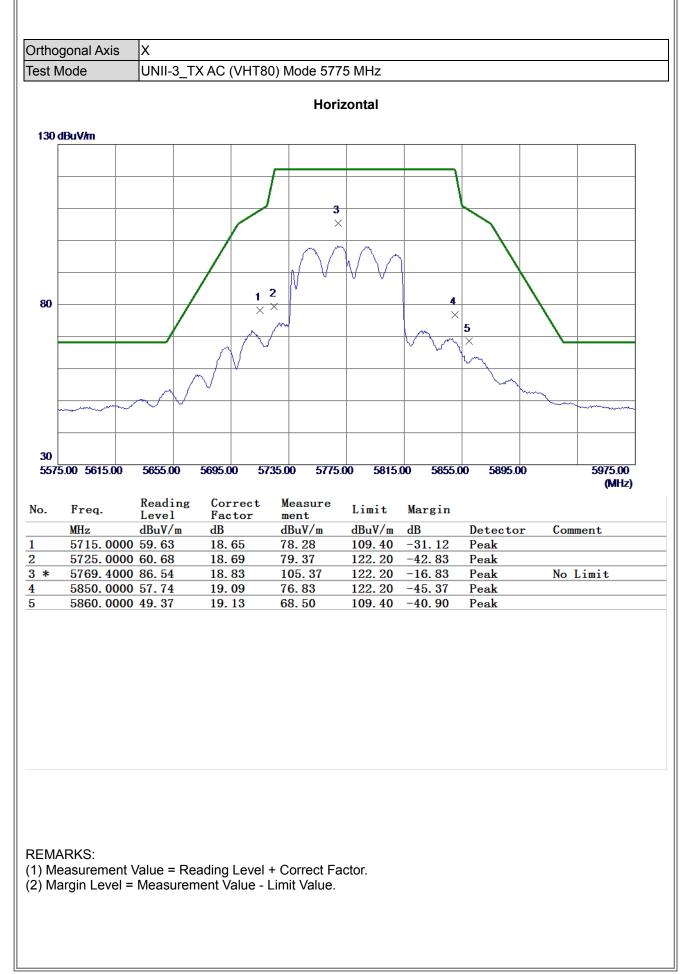




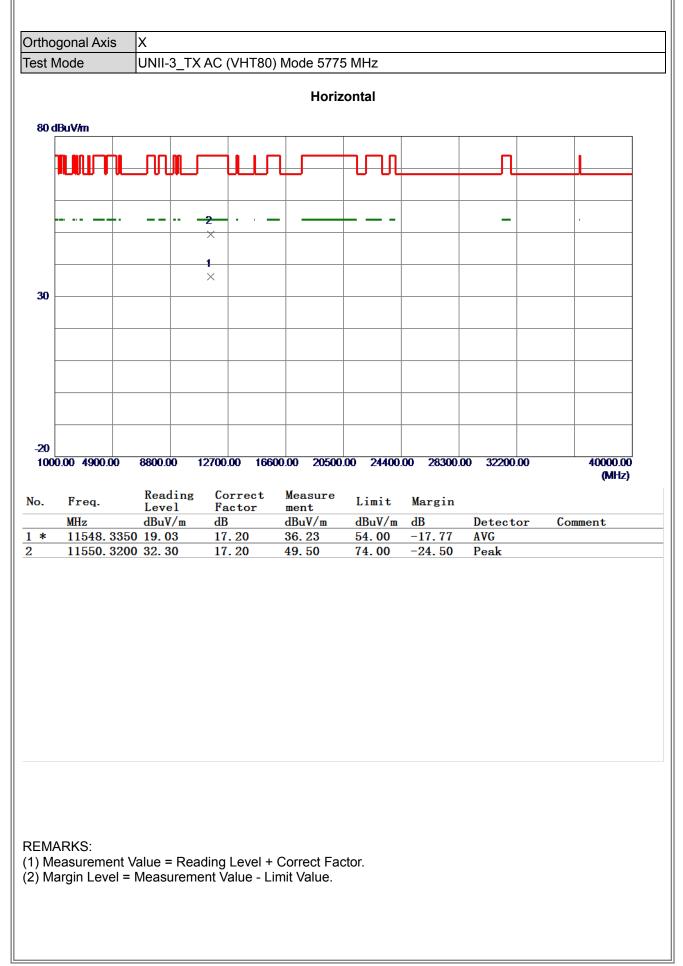




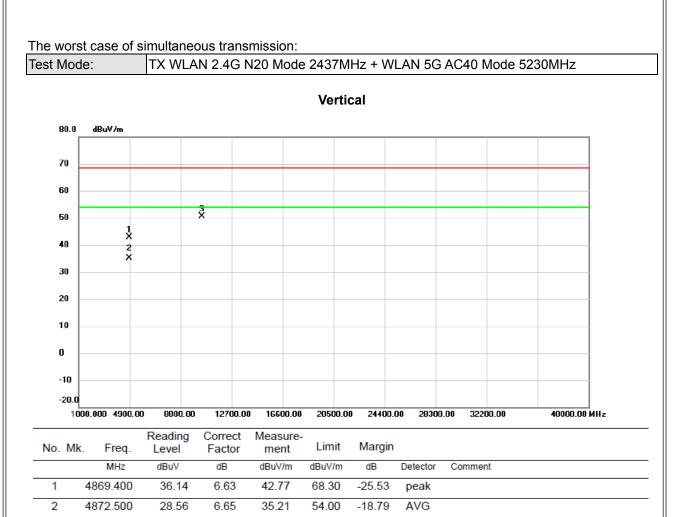












peak

-17.63

**REMARKS**:

3 \* 10459.545

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

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

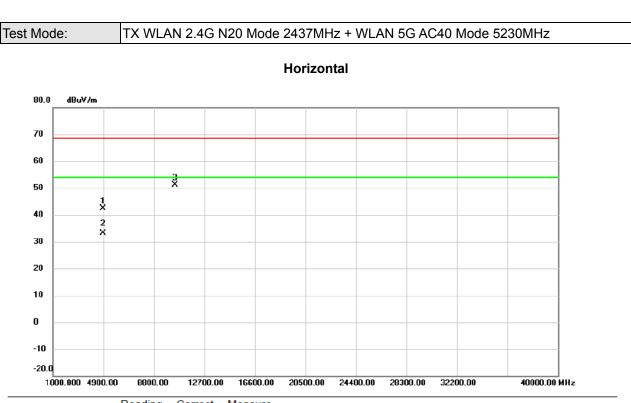
35.87

14.80

50.67

68.30





No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4875.720	35.64	6.65	42.29	68.30	-26.01	peak	
2		4875.750	26.56	6.65	33.21	54.00	-20.79	AVG	
3	* '	10463.360	36.25	14.80	51.05	68.30	-17.25	peak	

**REMARKS**:

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



# **APPENDIX E - BANDWIDTH**

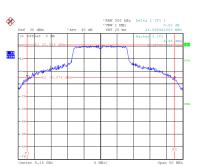


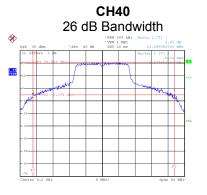
### Test Mode U

UNII-1\_TX A Mode

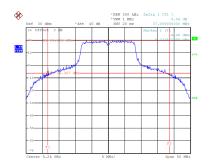
Channel	Frequency	26 dB Bandwidth	99 % Emission Bandwidth
Channel	(MHz)	(MHz)	(MHz)
36	5180	44.90	28.30
40	5200	43.10	24.60
48	5240	37.09	18.60

CH36

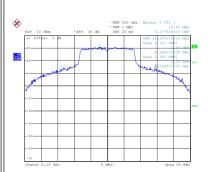




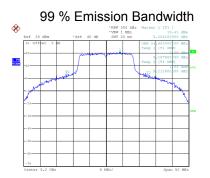
CH48



Date: 22.JUN.2020 17:33:38

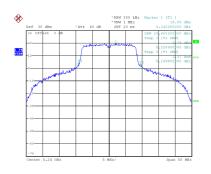


Date: 22.JUN.2020 17:37:52



Date: 22.JUN.2020 20:24:44

Date: 22.JUN.2020 20:24:30



Date: 22.JUN.2020 17:33:28

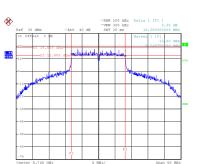
#### Date: 22.JUN.2020 17:37:42

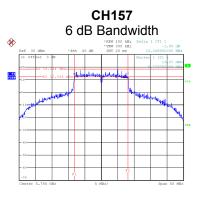
Page 128 of 171



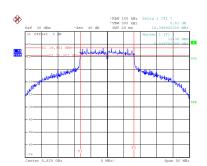
#### Test Mode UNII-3\_TX A Mode 6 dB Bandwidth Min. 6 dB Bandwidth 99 % Emission Frequency Channel Result Limit (kHz) (MHz) (MHz) Bandwidth (MHz) 149 16.35 500 Complies 5745 28.10 157 5785 16.35 28.90 500 Complies 16.40 29.10 500 Complies 165 5825

### CH149

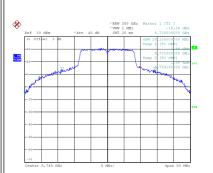




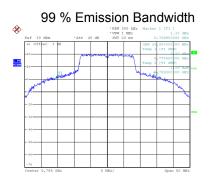
### CH165

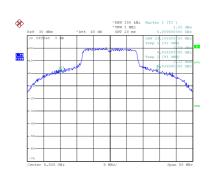


Date: 22.JUN.2020 17:46:09



Date: 22.JUN.2020 17:47:07





Date: 22.JUN.2020 17:45:47

#### Date: 22.JUN.2020 17:46:43

Date: 22.JUN.2020 17:47:42

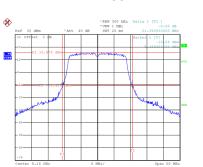
Date: 22.JUN.2020 17:48:04

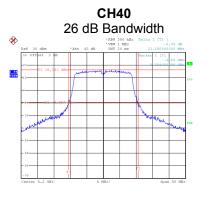


### Test Mode UNII-1\_TX AC (VHT20) Mode

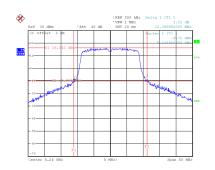
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)
36	5180	21.35	17.80
40	5200	21.15	17.80
48	5240	22.40	17.80

### CH36

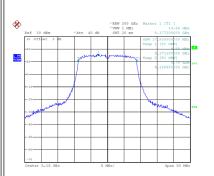




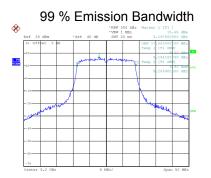
### CH48

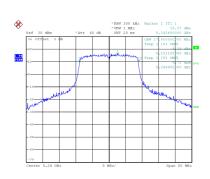


Date: 22.JUN.2020 19:11:11



Date: 22.JUN.2020 19:12:19





Date: 22.JUN.2020 19:10:51

#### Date: 22.JUN.2020 19:12:00

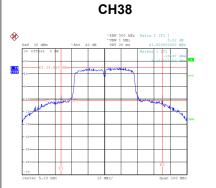
Date: 22.JUN.2020 19:14:22

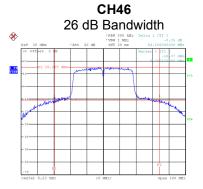
Date: 22.JUN.2020 19:14:42



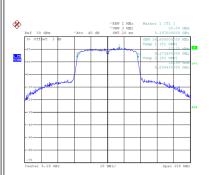
## Test Mode UNII-1\_TX AC (VHT40) Mode

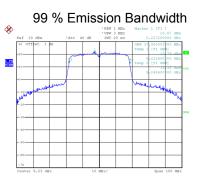
Channel	Frequency	26 dB Bandwidth	99 % Emission Bandwidth	
Channel	(MHz)	(MHz)	(MHz)	
38	5190	61.50	36.80	
46	5230	64.19	37.00	





Date: 22.JUN.2020 19:29:37





Date: 22.JUN.2020 19:29:12

Date: 22.JUN.2020 19:30:24

Date: 22.JUN.2020 19:30:51