

FCC Radio Test Report			
FCC ID: M82-AIM10W			
This report concerns (check one): ⊠Original Grant			
Project No.: 1710083Equipment: ComputerTest Model: AIM 10WSeries Model: AIM 10WXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Date of Receipt : Nov. 13, 2017 Date of Test : Nov. 13, 2017 ~ Feb. 27, 2018 Issued Date : Mar. 01, 2018 Tested by : BTL Inc.			
Testing Engineer : <u>Kenji Lin</u> (Kenji Lin)			
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Limitation

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





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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-4-1710083	Original Issue.	Mar. 01, 2018



1. CERTIFICATION

Equipment : Brand Name : Test Model : Series Model :	ADVANTECH
	character , blank or "-".)
Applicant :	Advantech Co., Ltd.
Manufacturer :	Advantech Co., Ltd.
Address :	No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 11491, Taiwan, R.O.C.
Factory :	N/A
Address :	N/A
Date of Test :	Nov. 13, 2017 ~ Feb. 27, 2018
	Production Unit
Standard(s) :	FCC Part15, Subpart E(15.407) / ANSI C63.10-2013

The above equipment has been tested and found in 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-4-1710083) 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 result included in this report is only for the 5GHz RLAN part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart E(15.407)			
Standard(s) Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.407(a)	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	
15.407(c)	Automatically Discontinue Transmission	PASS	NOTE (2)

NOTE:

- (1)" N/A" denotes test is not applicable in this test report.
- (2) During no any information transmission, the EUT can automatically discontinue transmission and becom standby mode for power saving.
 The EUT can detect the controlling signal of ACK message transmitting from remote

The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Conducted emission Test:

C05: (VCCI RN: C-4742; FCC RN:965108; FCC DN:TW1082) No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Below 1 GHz):

CB15: (FCC RN:674415; FCC DN:TW0659)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Above 1 GHz):

CB15: (FCC RN:674415; FCC DN:TW0659) No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

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 Ucispr 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 emission test:

Test Site	Method	Measurement Frequency Range	U,(dB)
C05	CISPR	150 kHz ~ 30MHz	2.68

B. Radiated emission test:

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15	CISPR	9kHz ~ 150kHz	2.82
(3m)	CIOPK	150kHz ~ 30MHz	2.58

Test Site	Method	Measurement Frequency Range		U,(dB)
		30MHz ~ 200MHz	V	4.20
CB15	CISPR	30MHz ~ 200MHz	Н	3.64
(3m)	CIOPK	200MHz ~ 1,000MHz	V	4.56
		200MHz ~ 1,000MHz	Н	3.90

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
		1GHz ~ 6GHz	V	4.46
CB15	CISPR	1GHz ~ 6GHz	Н	4.40
(3m)	CISPR	6GHz ~ 18GHz	V	3.88
		6GHz ~ 18GHz	Н	4.00

Test Site	Method	Measurement Frequency Range	U,(dB)
CB15	CISPR	18 ~ 26.5 GHz	4.62
(1m)	CIOPK	26.5 ~ 40 GHz	5.12



Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) - 150 kHz - 30 MHz: 3.6 dB Radiated Disturbance (electric field strength on an open area test site or alternative test site) - 30 MHz - 1000 MHz: 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR} .

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	Computer			
Brand Name	ADVANTECH			
Test Model	AIM 10W	AIM 10W		
Series Model		AIM 10WXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
Model Difference	The market distribution is differen	t only.		
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	866.7Mbps		
	Output Power (Max.)for UNII-1 (2TX)	802.11a: 15.35dBm 802.11n (20M): 14.36dBm 802.11ac (80M): 12.02dBm		
	Output Power (Max.)for UNII-2A (2TX)	802.11a: 15.08dBm 802.11n (20M): 14.22dBm 802.11ac (80M): 12.74dBm		
Output Power	Output Power (Max.)for UNII-2C (2TX)	802.11a: 15.38dBm 802.11n (20M): 14.51dBm 802.11ac (80M): 12.42dBm		
	Output Power (Max.)for UNII-3 (2TX)	802.11a: 15.01dBm 802.11n (20M): 14.04dBm 802.11ac (80M): 11.54dBm		
Power Source	DC Voltage supplied from AC/DC	DC Voltage supplied from AC/DC adapter.		
Power Rating	I/P: AC 100-240V~, 1.5A, 50~60H O/P: DC 19V3.42A	I/P: AC 100-240V~, 1.5A, 50~60Hz, 1.5A O/P: DC 19V3.42A		
Products Covered	1 * AC Adapter: TAMURA / XEW1934N 2* Dock: 1) Desk Docking: ADVANTECH/AIM-OFD-0000 2) VESA Docking: ADVANTECH/AIM-DOC-0001			





Note:

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

UNI	I-1	UNII-1					
Channel	Frequency (MHz)	Channel	Frequency (MHz)				
36	5180	42	5210				
40	5200						
44	5220						
48	5240						

UNI	-2A	UNII-2A	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	58	5290
56	5280		
60	5300		
64	5320		

UNII	-2C	UNII-2C		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	
100	5500	106	5530	
104	5520	122	5610	
108	5540			
112	5560			
116	5580			
132	5660			
136	5680			
140	5700			

UNI	I-3	UNII-3		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	
149	5745	155	5775	
153	5765			
157	5785			
165	5825			





3. Antenna Specification:

Aı	nt.	Brand	Model	Туре	Connector	Frequency Range (MHz)	Gain w/ Cable loss (dBi) (peak)	Gain w/o Cable Loss (dBi) (peak)	Cable Loss (dBi) (peak)							
			150		FA I-pex	2400-2500	0.65	1.32	0.67							
	MAIN		IEC 6036B0207601 WA-F-LB-02-113	PIFA		5150-5350	-0.69	0.32	1.01							
IVI <i>F</i>		INPAQ				5470-5725	-0.16	0.88	1.04							
			WA-1-LD-02-113			5725-5850	-0.04	1.05	1.09							
			150	207501 PIFA I-pex		2400-2500	-1.9	-1.68	0.22							
	λ		IEC										5150-5350	-0.05	0.28	0.33
AU	~	INPAQ	INPAQ 6036B0207501 WA-F-LB-03-080-		i-pex	5470-5725	-0.3	0.04	0.34							
			WA-1 -LD-00-000-			5725-5850	0.2	0.56	0.36							

Note:

The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R) and employs Cyclic Delay Diversity (CDD). In CDD mode,

5180 MHz to 5240 MHz : For power spectral density: Directional gain = 10*log{[10^(G1/20)+10^(G2/20)+...+10^(Gn/20)]^2/NANT} = 2.44 dBi < 6dBi.

For conducted power: For N_{ANT} = 2 < 5, Direction gain (dBi) = G_{ANT} + 0 = -0.05 + 0 = -0.05 The Direction gain is less than 6, so conducted power limits will not be reduced. 5260 MHz to 5320 MHz : For power spectral density: Directional gain = 10*log{[10^(G1/20)+10^(G2/20)+...+10^(Gn/20)]^2/NANT} = 2.52 dBi < 6dBi.

For conducted power: For $N_{ANT} = 2 < 5$, Direction gain (dBi) = $G_{ANT} + 0 = -0.29 + 0 = -0.29$ The Direction gain is less than 6, so conducted power limits will not be reduced. 5500 MHz to 5700 MHz : For power spectral density: Directional gain = $10*\log\{[10^{(G1/20)}+10^{(G2/20)}+...+10^{(Gn/20)}]^{2}/NANT\} = 1.49 dBi < 6dBi.$

For conducted power: For NANT = 2 < 5, Direction gain (dBi) = GANT + 0 = 0.3 + 0 = 0.3 The Direction gain is less than 6, so conducted power limits will not be reduced. 5745 MHz to 5825 MHz : For power spectral density: Directional gain = $10*\log\{[10^{(G1/20)+10^{(G2/20)+...+10^{(Gn/20)}]^2/NANT\} = 3.06 \text{ dBi} < 6\text{dBi}.$ For conducted power: For N_{ANT} = 2 < 5, Direction gain (dBi) = G_{ANT} + 0 = 0.13 + 0 = 0.13 The Direction gain is less than 6, so conducted power limits will not be reduced.



Operating Mode	
	2TX
TX Mode	
802.11a	V (ANT 1+ANT 2)
802.11n(20MHz)	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 AC80 Mode / CH42 (UNII-1)
Mode 4	TX A Mode / CH52, CH60, CH64 (UNII-2A)
Mode 5	TX N20 Mode / CH52, CH60, CH64 (UNII-2A)
Mode 6	TX AC80 Mode / CH58 (UNII-2A)
Mode 7	TX A Mode / CH100, CH116, CH140 (UNII-2C)
Mode 8	TX N20 Mode / CH100, CH116, CH140 (UNII-2C)
Mode 9	TX AC80 Mode / CH106, CH122 (UNII-2C)
Mode 10	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 11	TX N20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 12	TX AC80 Mode / CH155 (UNII-3)
Mode 13	TX Mode

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

For Conducted Test		
Final Test Mode	Description	
Mode 13	TX Mode	





For Radiated Test			
Final Test Mode Description			
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)		
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)		
Mode 3	TX AC80 Mode / CH42 (UNII-1)		
Mode 4	TX A Mode / CH52, CH60, CH64 (UNII-2A)		
Mode 5	TX N20 Mode / CH52, CH60, CH64 (UNII-2A)		
Mode 6	TX AC80 Mode / CH58 (UNII-2A)		
Mode 7	TX A Mode / CH100, CH116, CH140 (UNII-2C)		
Mode 8	TX N20 Mode / CH100, CH116, CH140 (UNII-2C)		
Mode 9	TX AC80 Mode / CH106, CH122 (UNII-2C)		
Mode 10	TX A Mode / CH149,CH157,CH165 (UNII-3)		
Mode 11	TX N20 Mode / CH149,CH157,CH165 (UNII-3)		
Mode 12	TX AC80 Mode / CH155 (UNII-3)		

Note:

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



3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

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

UNII-1 - 2TX					
Test Software Version	DOC				
Frequency (MHz)	5180	5200	5240		
A Mode	12	12	12		
Frequency (MHz)	5180	5200	5240		
N20 Mode	11	11	11		

UNII-2A - 2TX					
Test Software Version	DOC				
Frequency (MHz)	5260 5300 5320				
A Mode	12	12	12		
Frequency (MHz)	5260	5300	5320		
N20 Mode	11	11	11		

UNII-2C - 2TX					
Test Software Version	DOC				
Frequency (MHz)	5500	5580	5700		
A Mode	14	14	14		
Frequency (MHz)	5500	5580	5700		
N20 Mode	13	13	14		



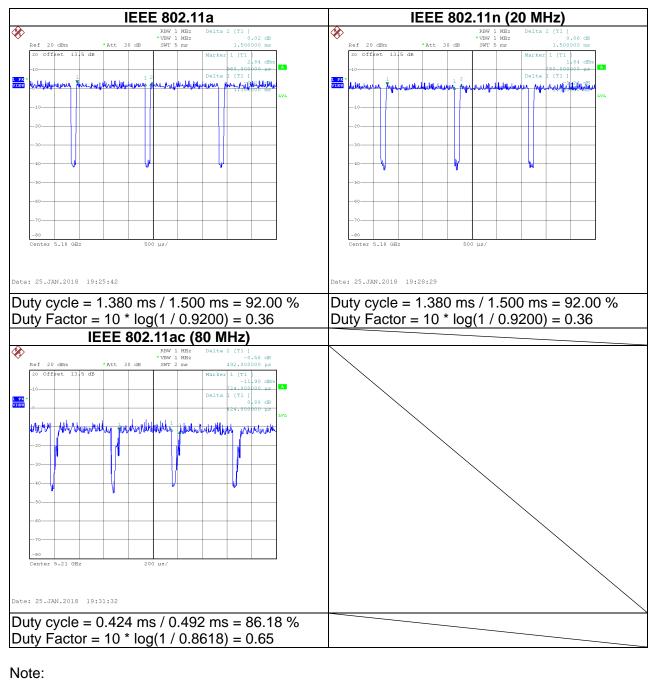
	UNII-3 - 2T	TX	
Test Software Version		DOC	
Frequency (MHz)	5745	5785	5825
A Mode	15	15	15
Frequency (MHz)	5745	5785	5825
N20 Mode	14	14	15
	UNII-1 - 2T	-x	
Test Software Version		DOC	
Frequency (MHz)	5210		
AC80 Mode	8		
	UNII-2A - 2	ТХ	
Test Software Version		DOC	
Frequency (MHz)	5290		
AC80 Mode	10		
	UNII-2C - 2	ТХ	
Test Software Version		DOC	
Frequency (MHz)	5530	5610	
AC80 Mode	11	11	
	UNII-3 - 2T	-x	
Test Software Version		DOC	
Frequency (MHz)	5775		





3.4 DUTY CYCLE

If duty cycle is \geq 98 %, duty factor is not required. If duty cycle is < 98 %, duty factor shall be considered.



For IEEE 802.11a and IEEE 802.11n (20 MHz):

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 802.11ac (80 MHz):

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%).



3.5 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	YES	NO	1.7m	Power 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.

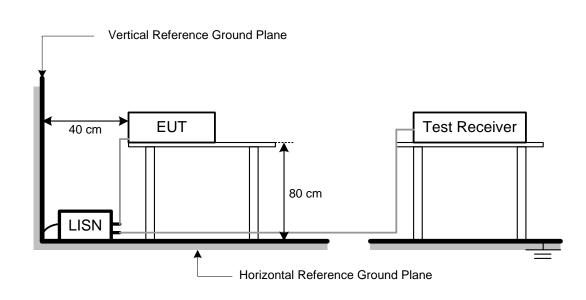
4.1.3 DEVIATION FROM TEST STANDARD

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: 55% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Appendix A.

Remark:

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



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

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

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

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 field strength: $E = \frac{1000000\sqrt{30P}}{1000000\sqrt{30P}}$

µV/m, where P is the eirp (Watts)

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



4.2.2 TEST PROCEDURE

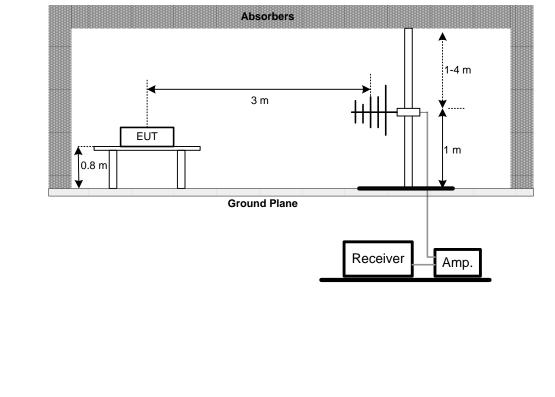
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance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

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

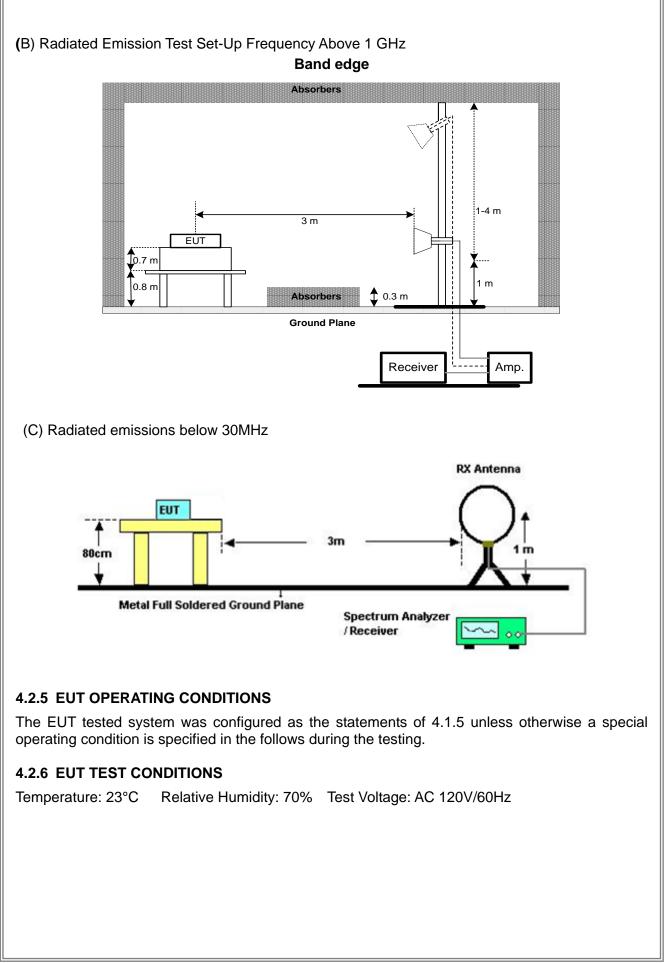
4.2.4 TEST SETUP

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











4.2.7 TEST RESULTS (9K TO 30MHz)

Please refer to the Appendix B

Remark:

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

4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz)

Please refer to the Appendix C.

4.2.9 TEST RESULTS (ABOVE 1000 MHz)

Please refer to the Appendix D.

Remark:

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



5. 26dB SPECTRUM BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

	FCC Part15, Subpart E				
Test Item	Limit	Frequency Range (MHz)	Result		
Bandwidth	26 dB Bandwidth	5150-5250	PASS		
	26 dB Bandwidth	5250-5350	PASS		
	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(Bandwidth 20MHz)
		1MHz(Bandwidth 40MHz and 80MHz)
	VBW	1MHz(Bandwidth 20MHz)
	VBW	3MHz(Bandwidth 40MHz and 80MHz)
	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: 23°C Relative Humidity: 70% Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Appendix E.



6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Limit	Frequency Range (MHz)	Result	
Conducted Output	Fixed:1 Watt (30dBm)			
	Mobile and portable:	5150-5250	PASS	
	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
opantilequency	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: 23°C Relative Humidity: 70% Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Appendix F.



7. POWER SPECTRAL DENSITY TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result		
Power Spectral	Other then Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz	5150-5250	PASS		
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,

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

Note:

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





7.1.1 DEVIATION FROM STANDARD

No deviation.

7.1.2 TEST SETUP



7.1.3 EUT OPERATION CONDITIONS

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

7.1.4 EUT TEST CONDITIONS

Temperature: 23°C Relative Humidity: 70% Test Voltage: AC 120V/60Hz

7.1.5 TEST RESULTS

Please refer to the Appendix H.



8. FREQUENCY STABILITY MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E					
Test Item	Limit Frequency Range (MHz)		Result		
	5150-5	5150-5250	PASS		
	Specified in the	5250-5350	PASS		
Frequency Stability	user's manual	5470-5725	PASS		
		5725-5850	PASS		

8.1.1 TEST PROCEDURE

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

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

c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

d. User manual temperature is -20°C~50°C.

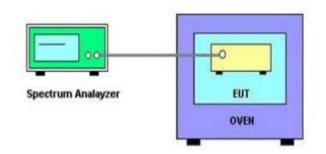
8.1.2 DEVIATION FROM STANDARD

No deviation.





8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

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

8.1.5 EUT TEST CONDITIONS

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

8.1.6 TEST RESULTS

Please refer to the Appendix I.



9. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Jan. 24, 2019
2	Test Cable	TIMES	CFD300-NL	C02	Jun. 13, 2019
3	EMI Test Receiver	R&S	ESR7	101433	Dec. 07, 2019
4	Measurement Software	EZ	EZ_EMC (Version NB-03A)	N/A	N/A

	Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Preamplifier	EMCI	012645B	980267	Feb. 28, 2018	
2	Preamplifier	EMCI	EMC02325	980217	Dec. 27, 2019	
3	Preamplifier	EMCI	EMC2654045	980030	Feb. 13, 2019	
4	Test Cable	EMCI	EMC104-SM-S M-8000	8m	Jan. 03, 2019	
5	Test Cable	EMCI	EMC104-SM-S M-800	150207	Jan. 03, 2019	
6	Test Cable	EMCI	EEMC104-SM-S M-3000	151205	Jan. 03, 2019	
7	MXE EMI Receiver	Agilent	N9038A	MY55420127	Jan. 08, 2019	
8	Signal Analyzer	Agilent	N9010A	MY52220990	Feb. 21, 2019	
9	Loop Ant	EMCO	6502	42960	Nov. 23, 2018	
10	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	Feb. 28, 2018	
11	Horm Ant	Schwarzbeck	BBHA 9170	187	Dec. 05, 2019	
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-548	Jan. 15, 2019	
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0623	Jan. 15, 2019	



Spectrum Bandwidth Measurement						
I	tem	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
	1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

	Maximum Conducted Output Power Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018
2	Power Meter	Anritsu	ML2495A	1128008	Aug. 16, 2018
3	Power Sensor	Anritsu	MA2411B	1126001	Aug. 16, 2018

Power Spectral Density Measurement						
	Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
	1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

Frequency Stability Measurement						
	Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
	1	Spectrum Analyzer	R&S	R&S/FSP30	100854	May 25, 2018

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

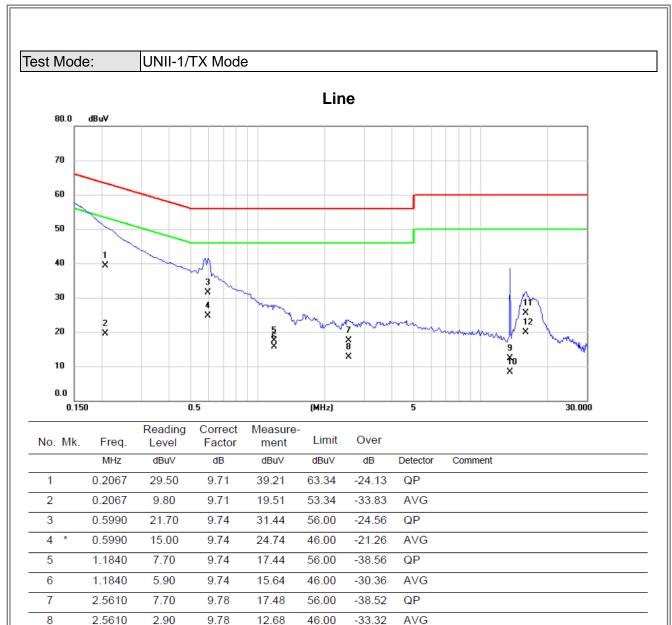
All calibration period of equipment list is one year.



APPENDIX A - CONDUCTED EMISSION







Note : The test result has	s included the cable loss.

9.98

9.98

9.98

9.98

12.28

8.28

25.58

19.98

60.00

50.00

60.00

50.00

-47.72

-41.72

-34.42

-30.02

QP

AVG

QP

AVG

2.30

-1.70

15.60

10.00

9

10

11

12

13.5500

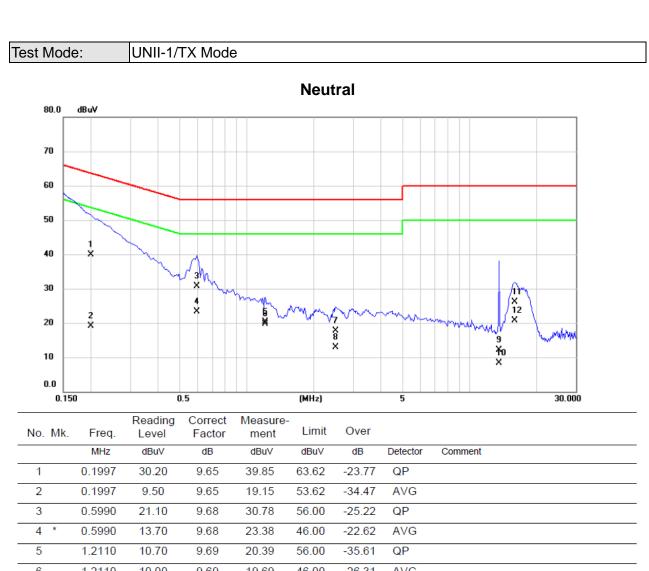
13.5500

15.9000

15.9000







5	1.2110	10.70	9.69	20.39	56.00	-35.61	QP
6	1.2110	10.00	9.69	19.69	46.00	-26.31	AVG
7	2.5070	8.00	9.72	17.72	56.00	-38.28	QP
8	2.5070	3.20	9.72	12.92	46.00	-33.08	AVG
9	13.5500	2.20	9.98	12.18	60.00	-47.82	QP
10	13.5500	-1.60	9.98	8.38	50.00	-41.62	AVG
11	15.9000	16.10	9.99	26.09	60.00	-33.91	QP
12	15.9000	10.80	9.99	20.79	50.00	-29.21	AVG



8

9

10

11

12

1.7150

13.5500

13.5500

15.9000

15.9000

3.00

2.40

-1.70

15.60

9.90

Note : The test result has included the cable loss.

9.76

9.98

9.98

9.98

9.98

12.76

12.38

8.28

25.58

19.88

46.00

60.00

50.00

60.00

50.00

-33.24

-47.62

-41.72

-34.42

-30.12

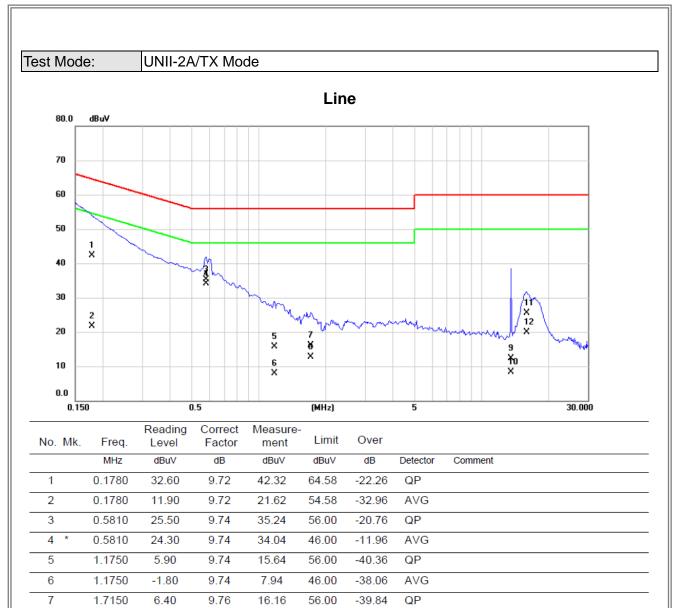
AVG

QP AVG

QP

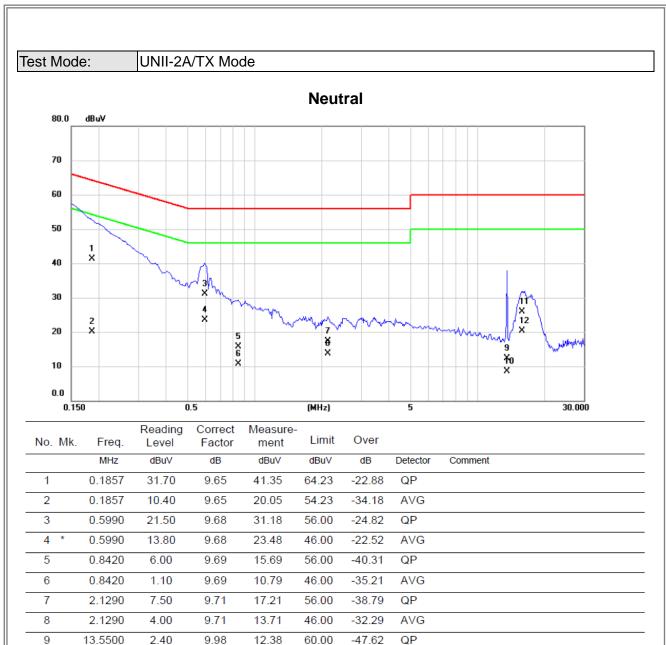
AVG











AVG

QP

AVG

-41.52

-34.01

	12	15.8000	10.40	9.99	20.39	50.00	-29.61	
Note : The test result has included the cable loss.								

9.98

9.99

8.48

25.99

50.00

60.00

-1.50

16.00

10

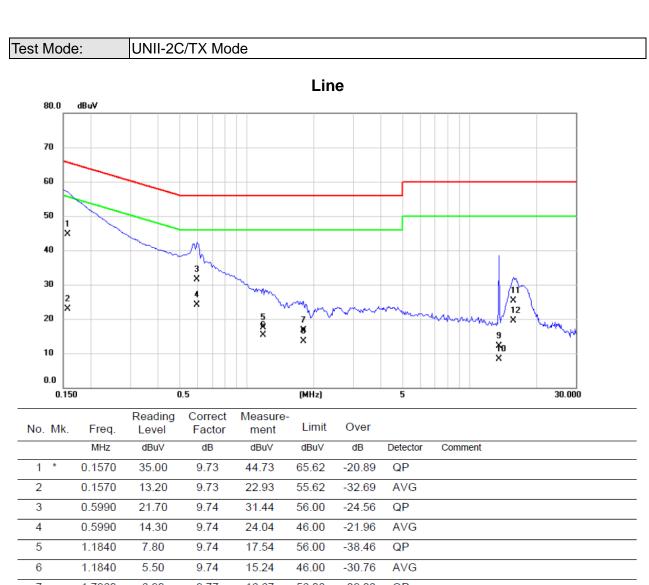
11

13.5500

15.8000



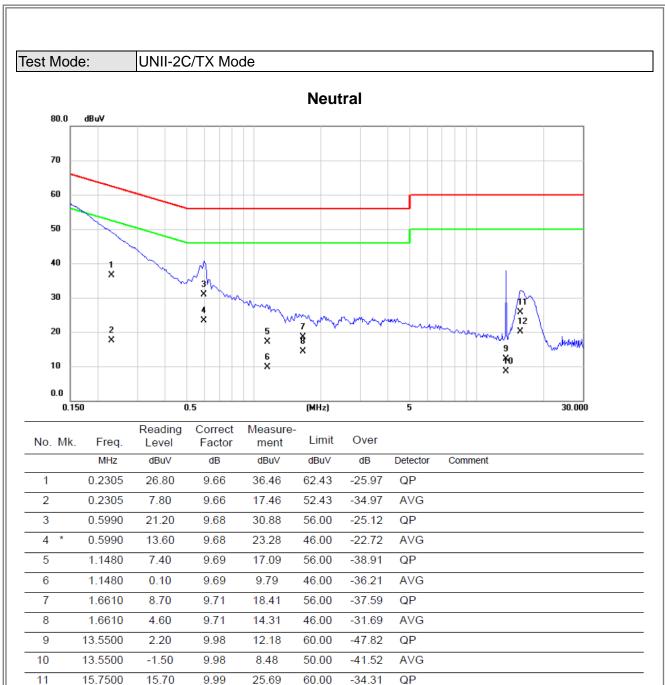




	0.1570	55.00	3.75	44.75	05.02	-20.03	
2	0.1570	13.20	9.73	22.93	55.62	-32.69	AVG
3	0.5990	21.70	9.74	31.44	56.00	-24.56	QP
4	0.5990	14.30	9.74	24.04	46.00	-21.96	AVG
5	1.1840	7.80	9.74	17.54	56.00	-38.46	QP
6	1.1840	5.50	9.74	15.24	46.00	-30.76	AVG
7	1.7960	6.90	9.77	16.67	56.00	-39.33	QP
8	1.7960	3.70	9.77	13.47	46.00	-32.53	AVG
9	13.5500	2.20	9.98	12.18	60.00	-47.82	QP
10	13.5500	-1.70	9.98	8.28	50.00	-41.72	AVG
11	15.7500	15.30	9.98	25.28	60.00	-34.72	QP
12	15.7500	9.50	9.98	19.48	50.00	-30.52	AVG







9.99

20.09

50.00

-29.91

AVG

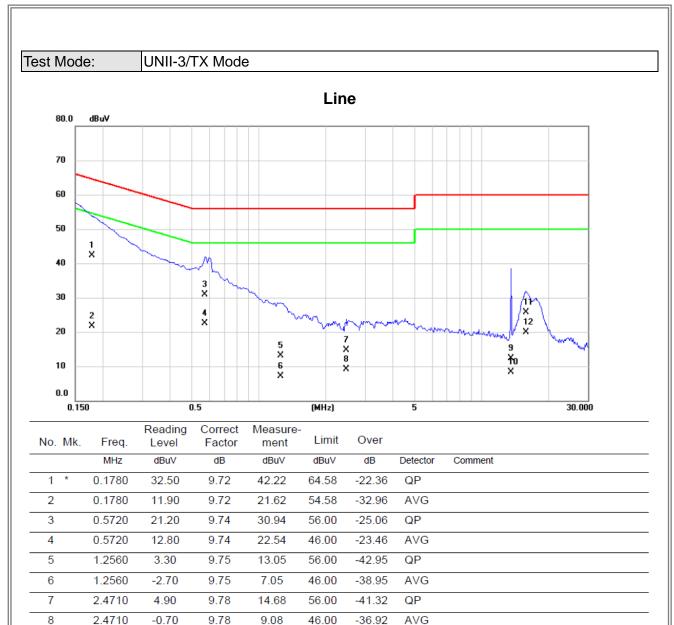
10.10

15.7500

12







-	11	15.8500	15.70	9.98	25.68	60.00	-34.32	QP
_	12	15.8500	9.90	9.98	19.88	50.00	-30.12	AVG

9.98

9.98

12.28

8.28

60.00

50.00

-47.72

-41.72

QP

AVG

Note : The test result has included the cable loss.

2.30

-1.70

9

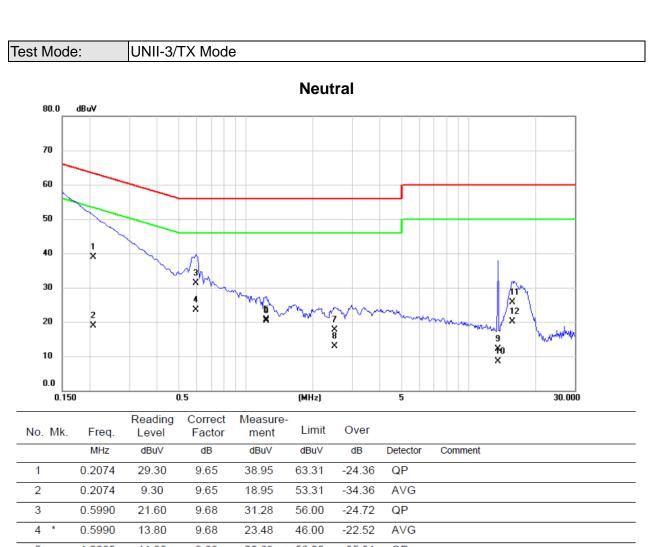
10

13.5500

13.5500



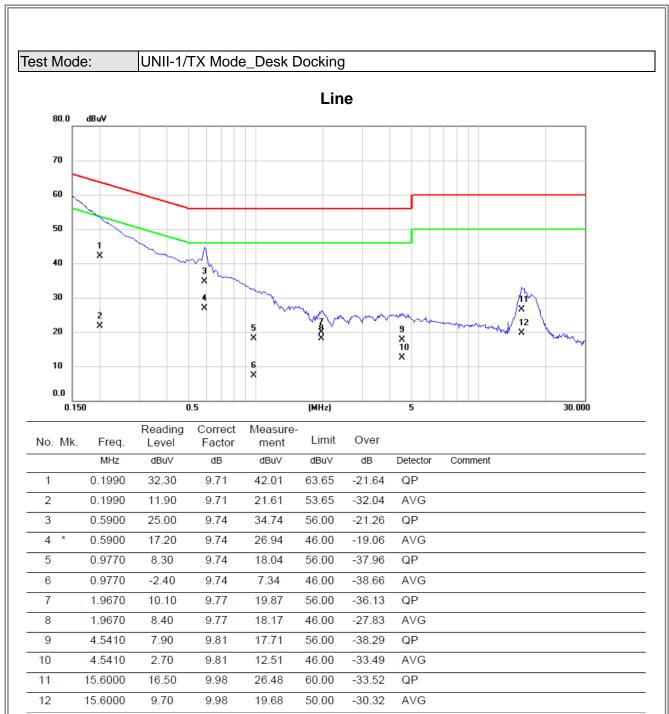




	4 *	0.5990	13.80	9.68	23.48	46.00	-22.52	AVG
_	5	1.2380	11.00	9.69	20.69	56.00	-35.31	QP
	6	1.2380	10.60	9.69	20.29	46.00	-25.71	AVG
	7	2.5070	7.90	9.72	17.62	56.00	-38.38	QP
	8	2.5070	3.10	9.72	12.82	46.00	-33.18	AVG
	9	13.5500	2.20	9.98	12.18	60.00	-47.82	QP
	10	13.5500	-1.50	9.98	8.48	50.00	-41.52	AVG
	11	15.7500	15.70	9.99	25.69	60.00	-34.31	QP
	12	15.7500	10.10	9.99	20.09	50.00	-29.91	AVG

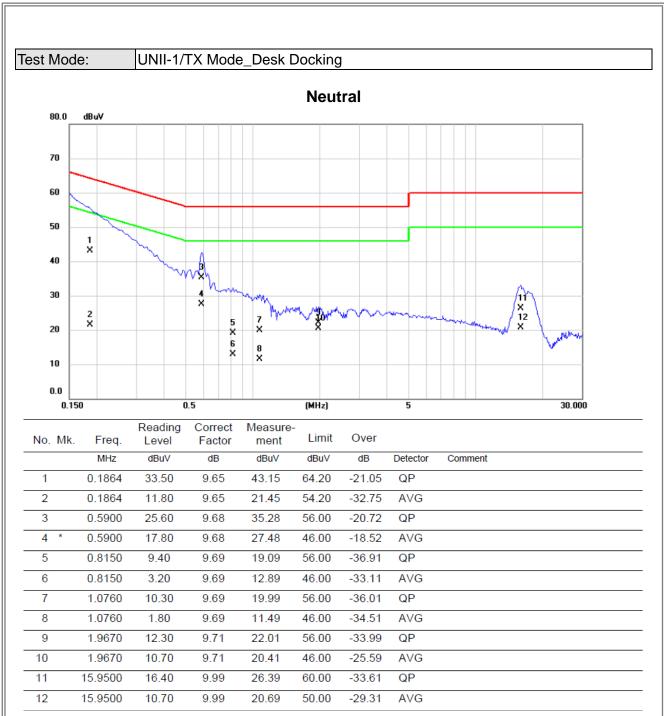






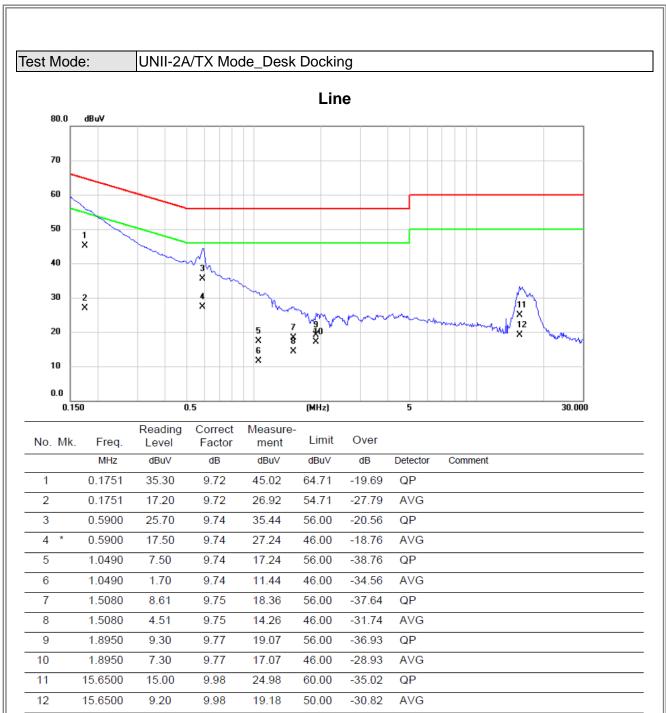






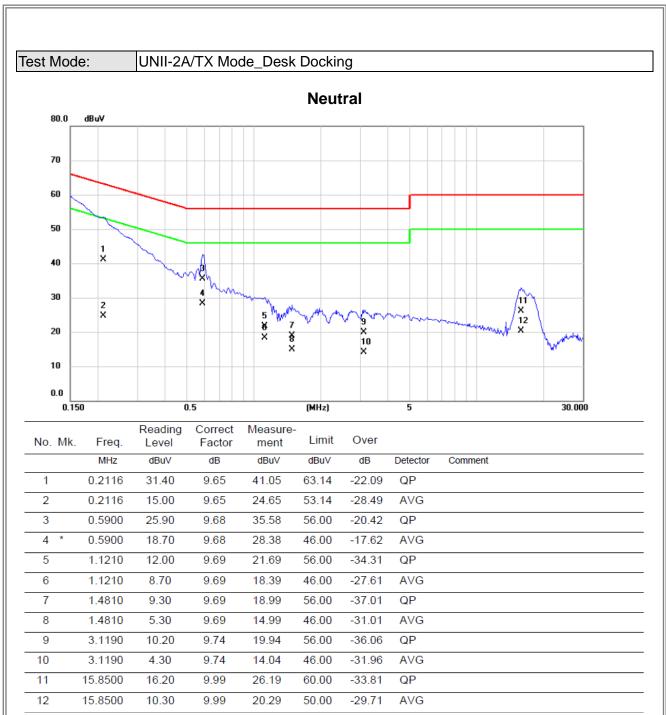






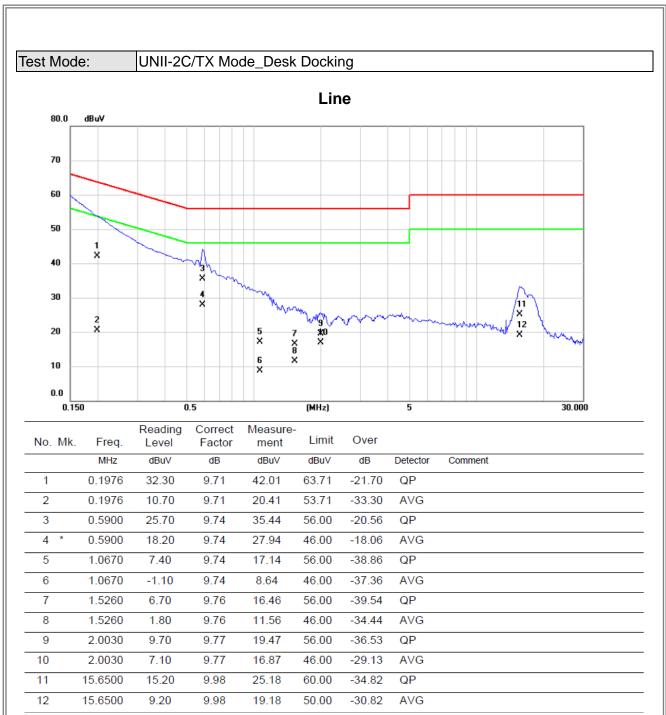






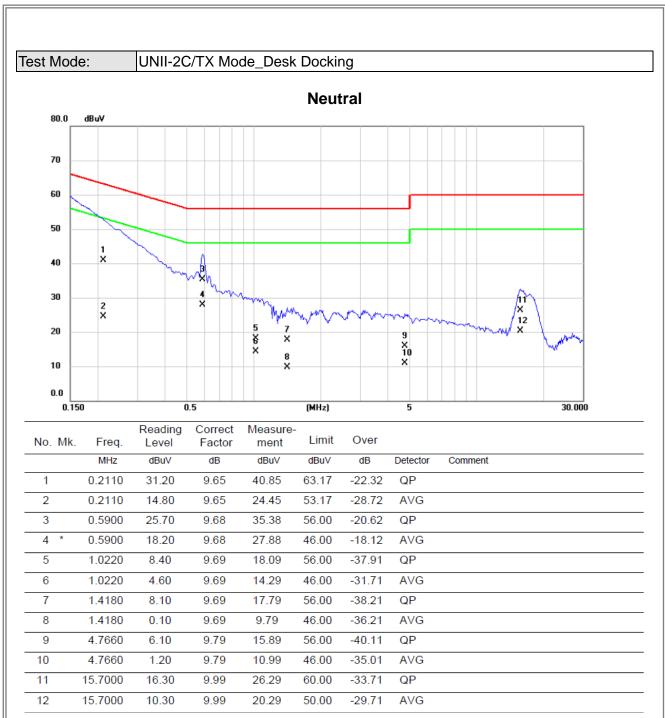






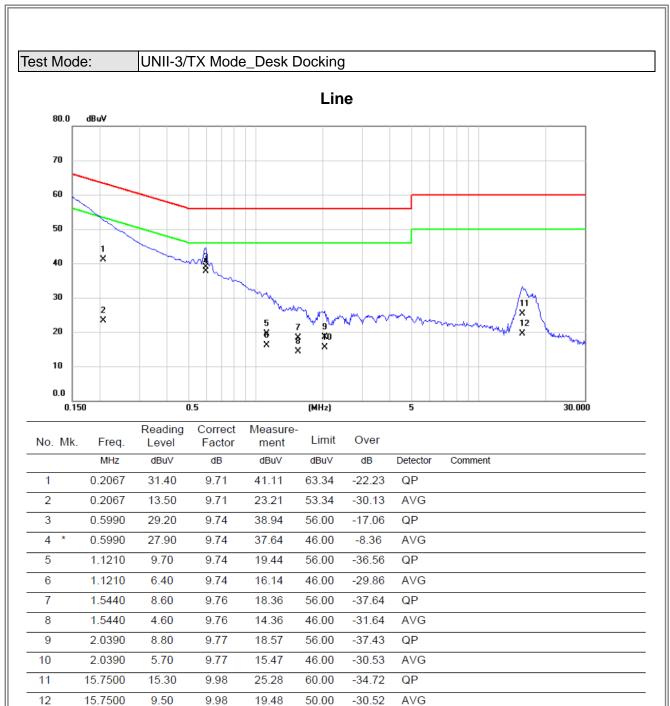






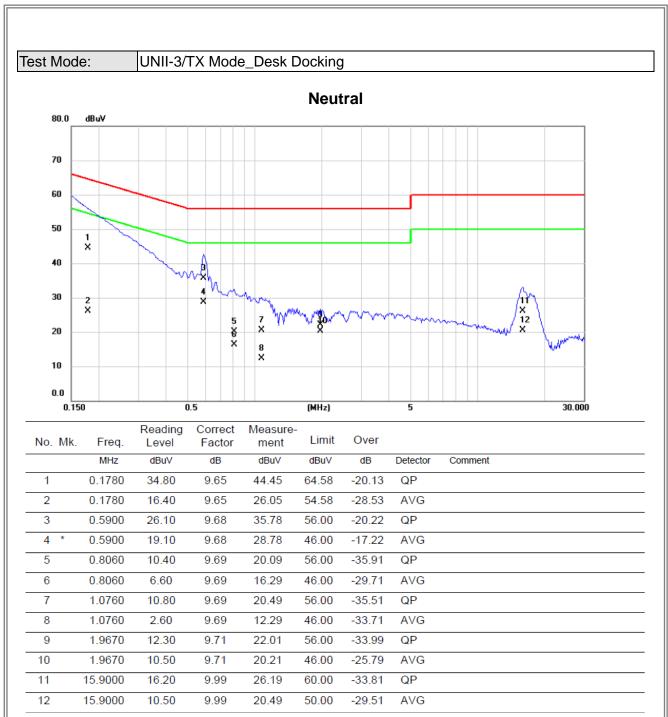






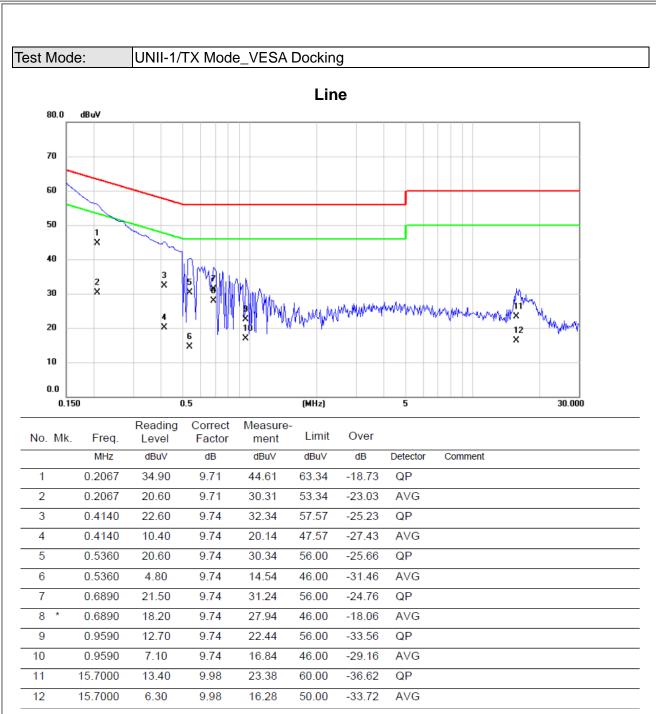






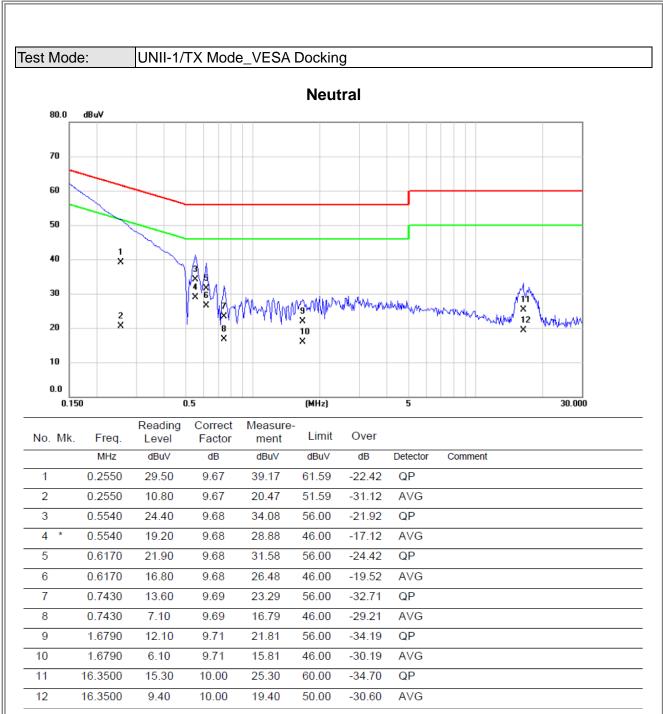






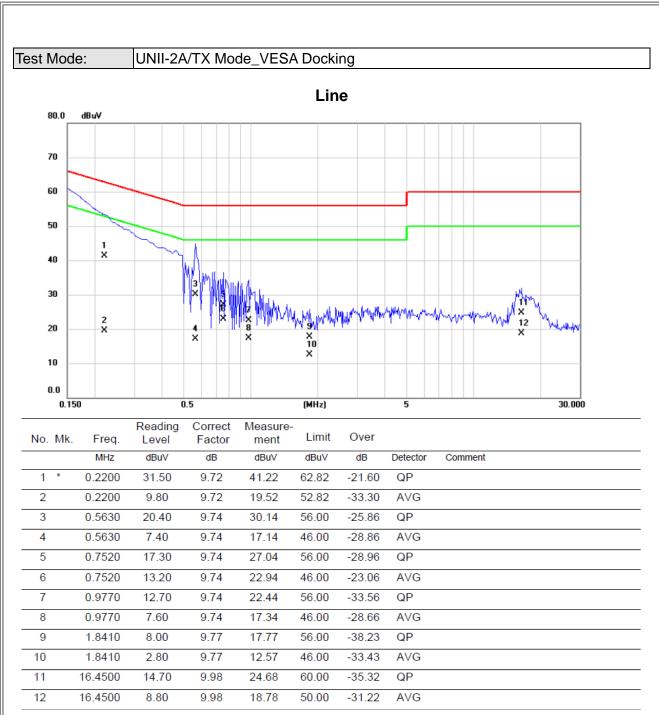






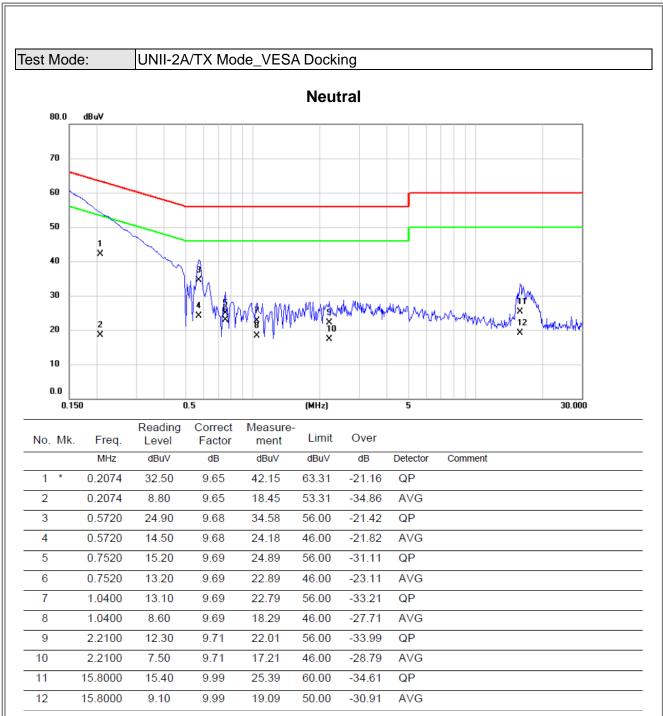






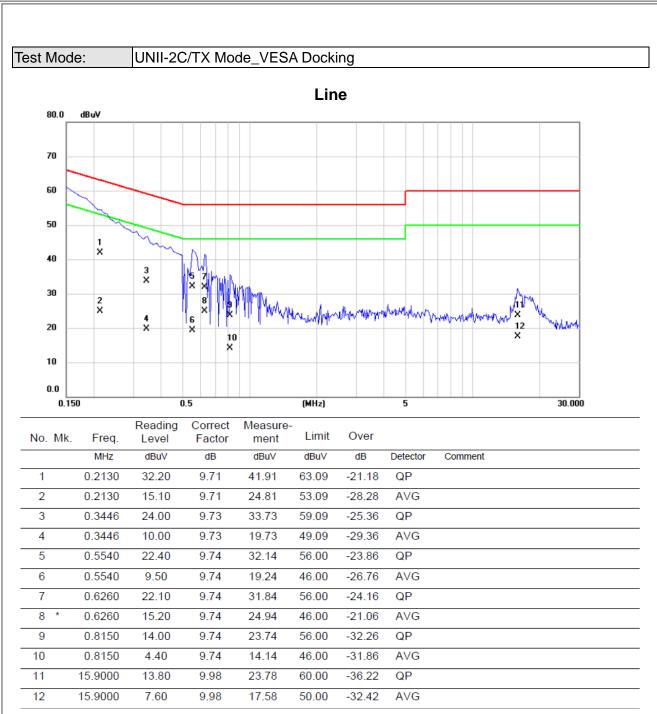






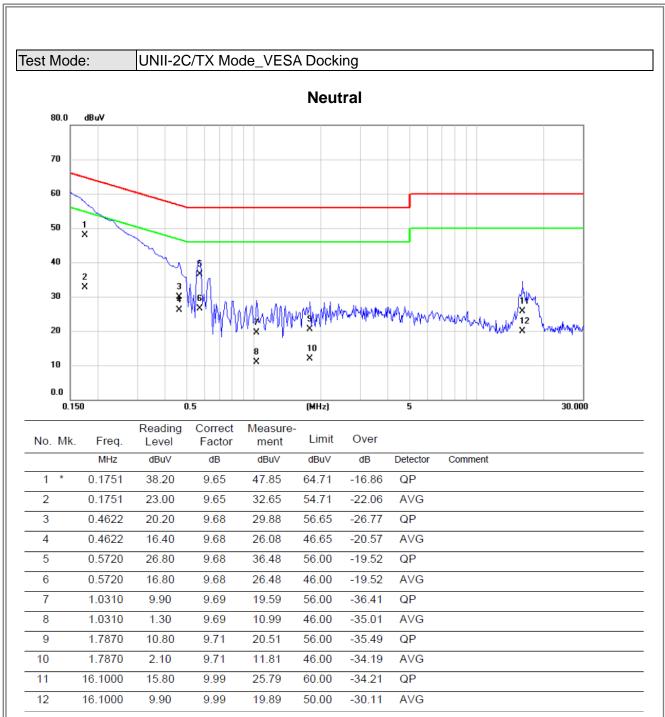






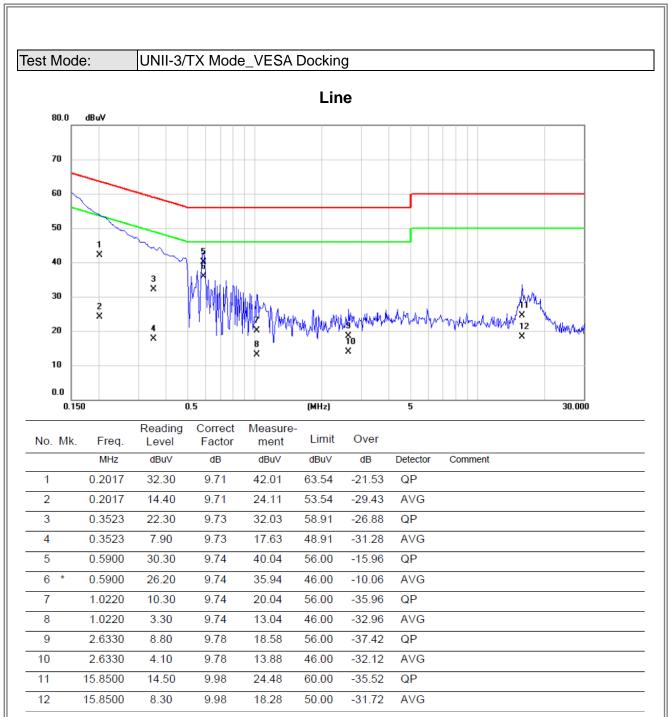






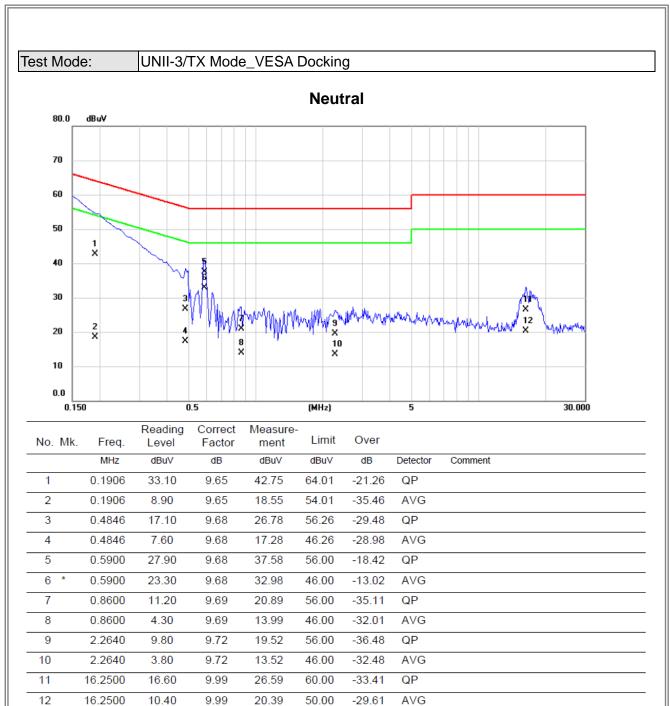










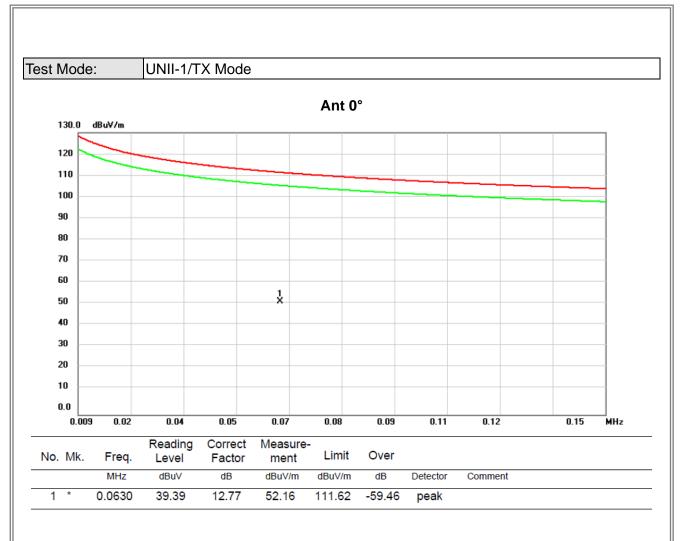




APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)







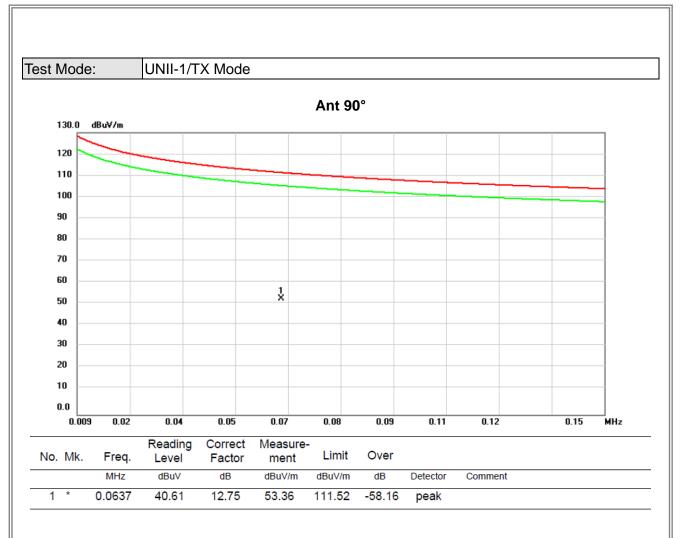






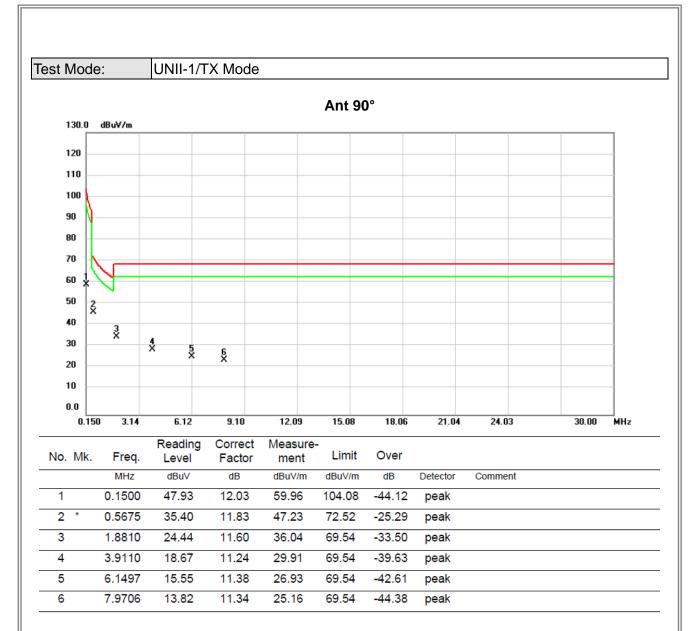






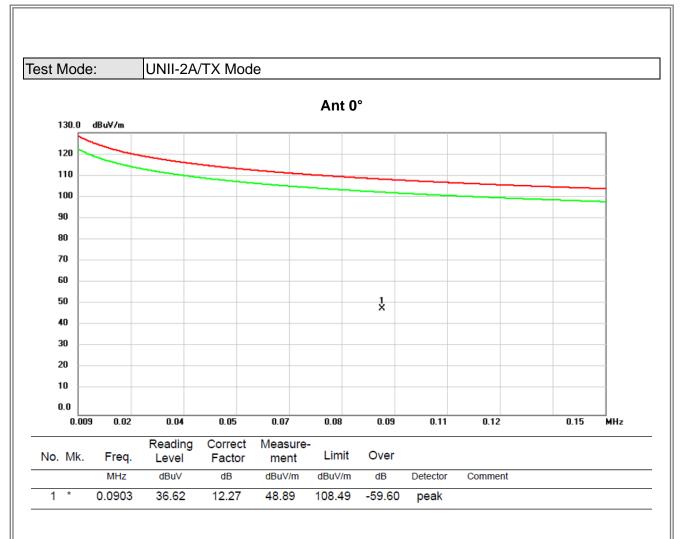












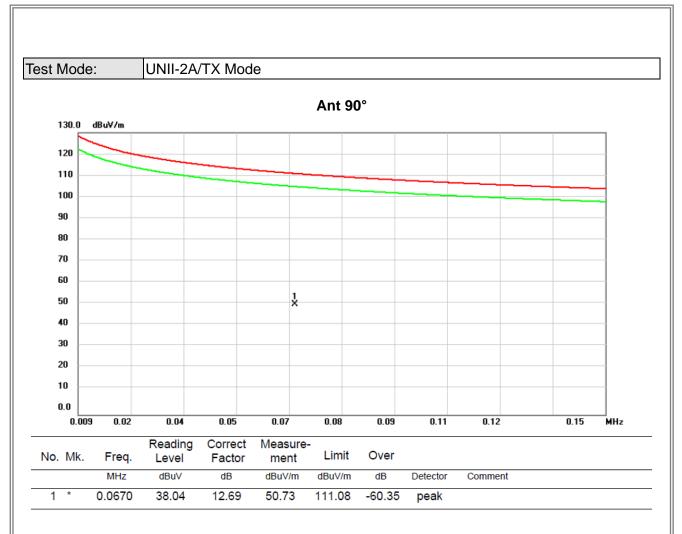












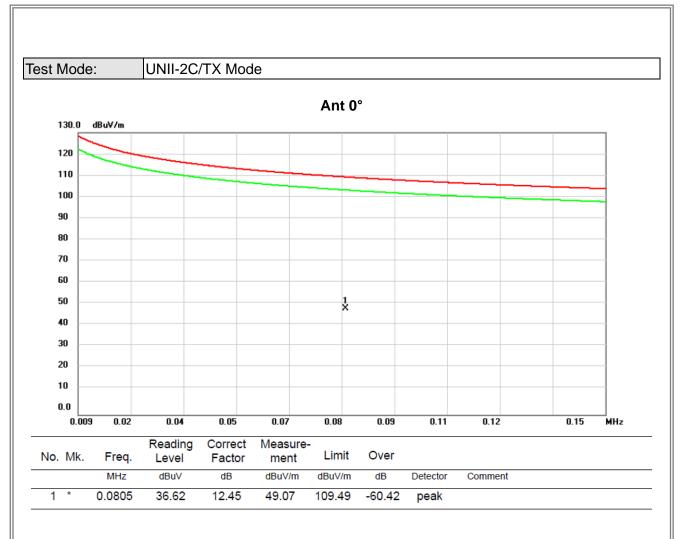












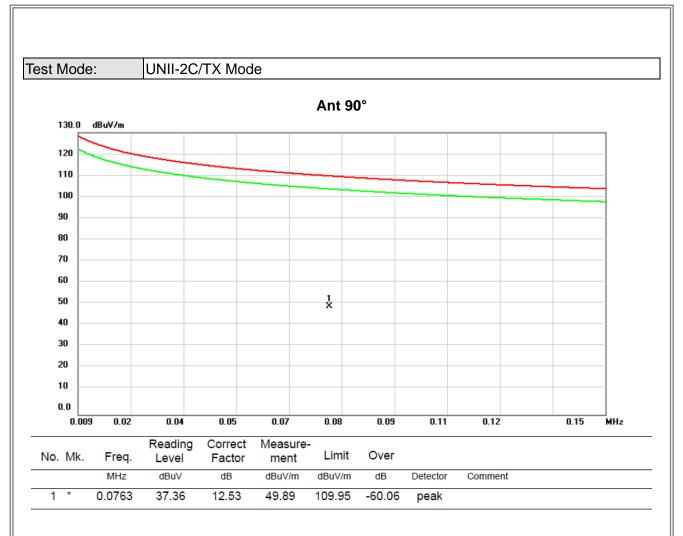






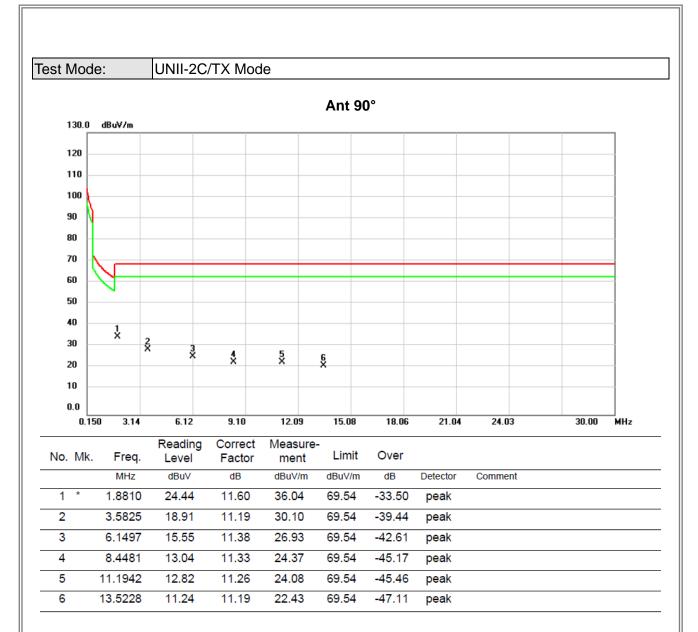






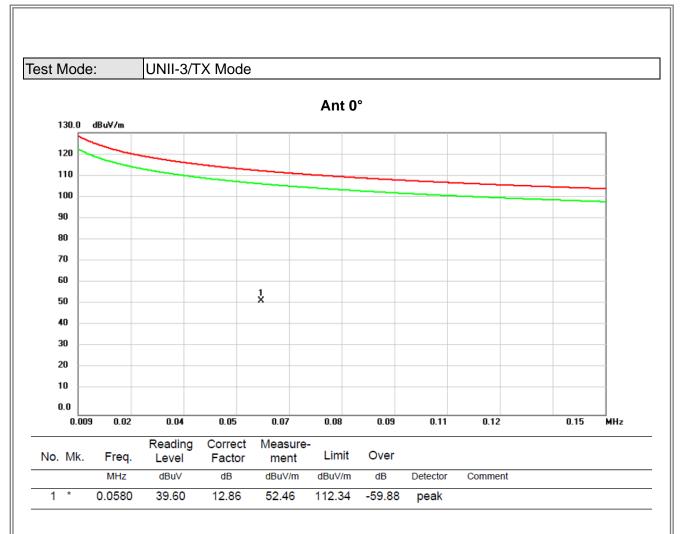






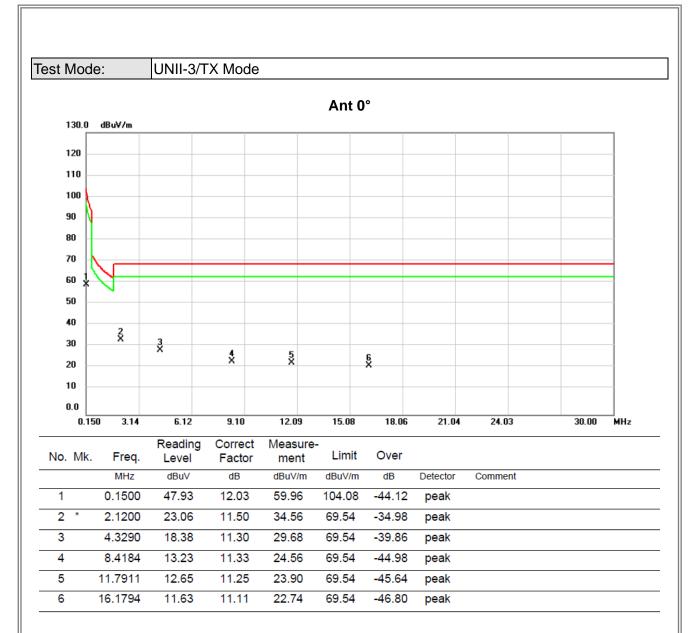






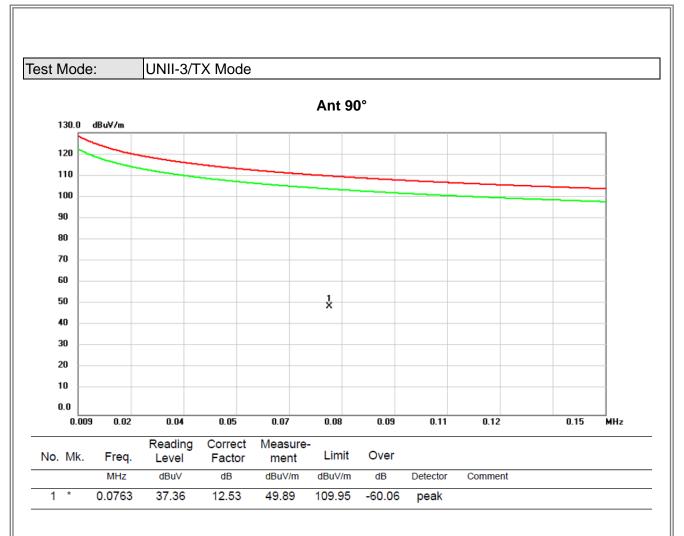






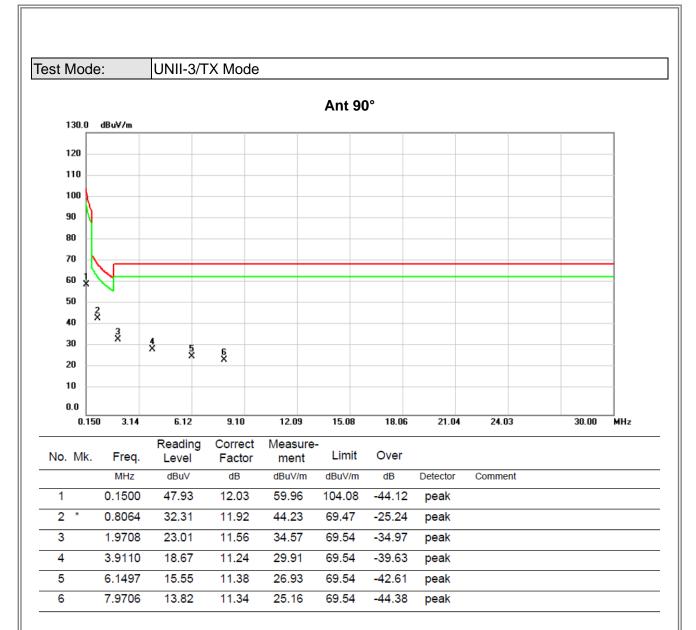






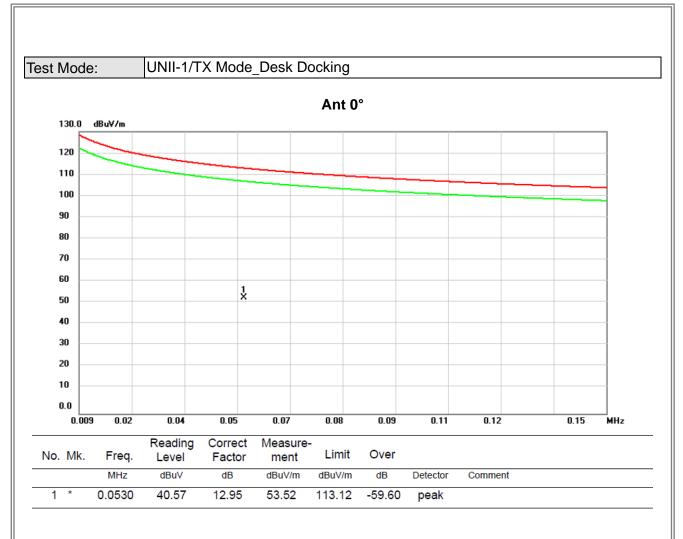






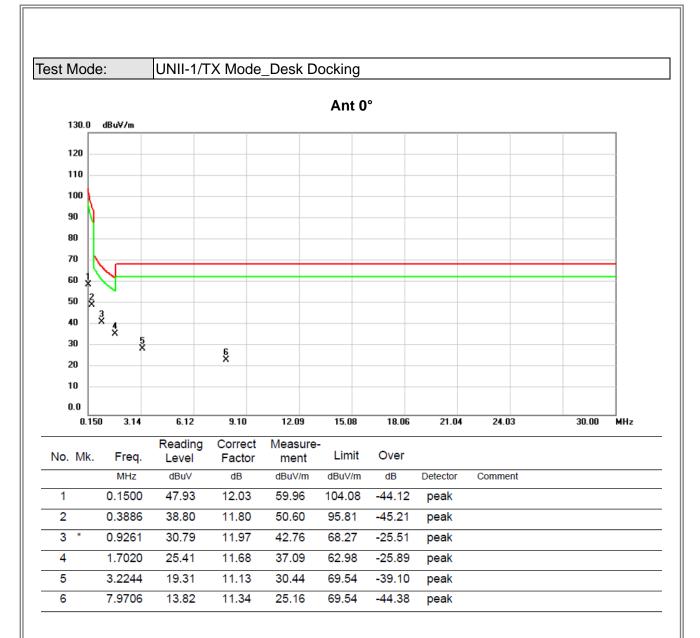






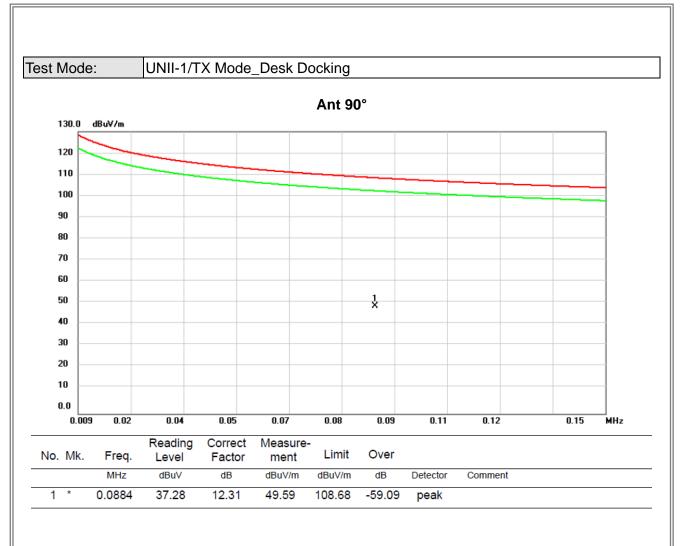






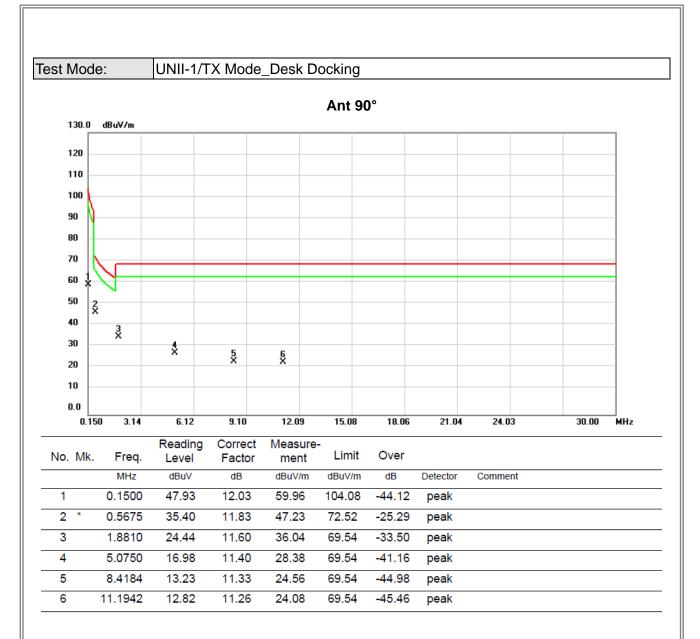






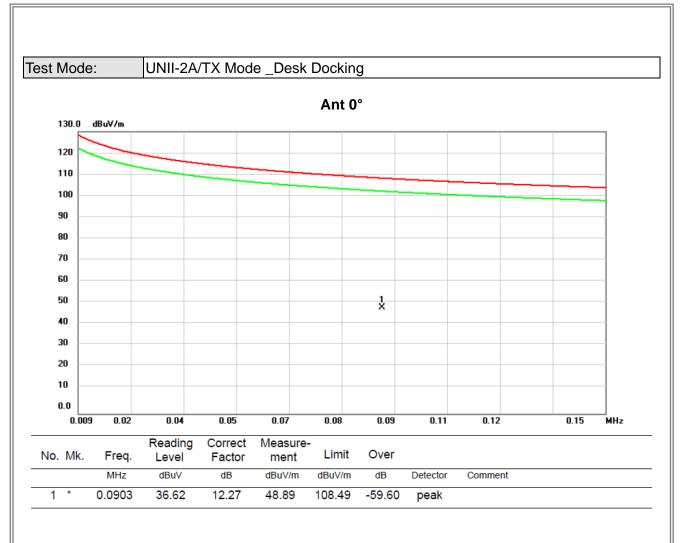






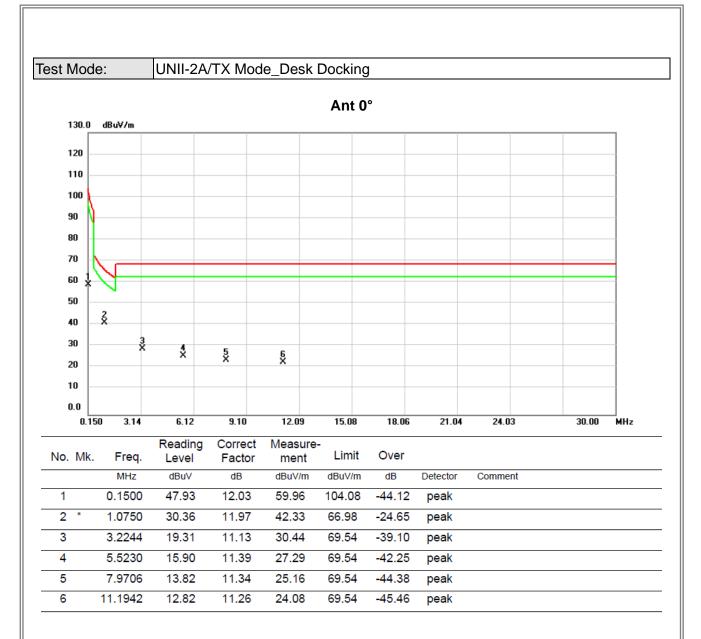






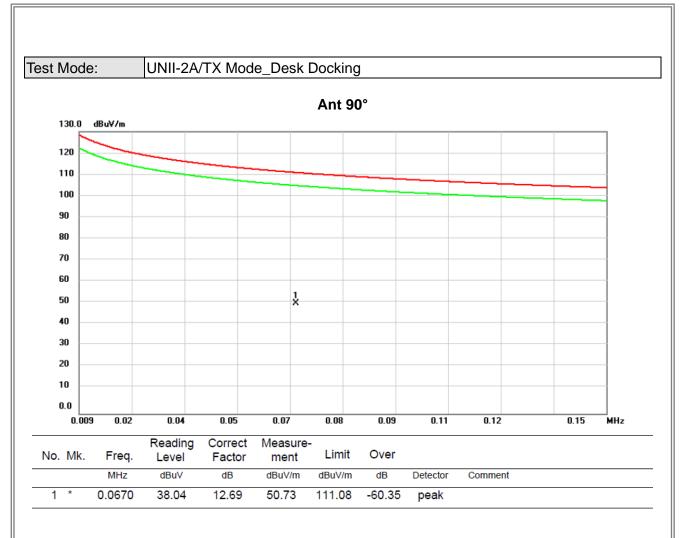






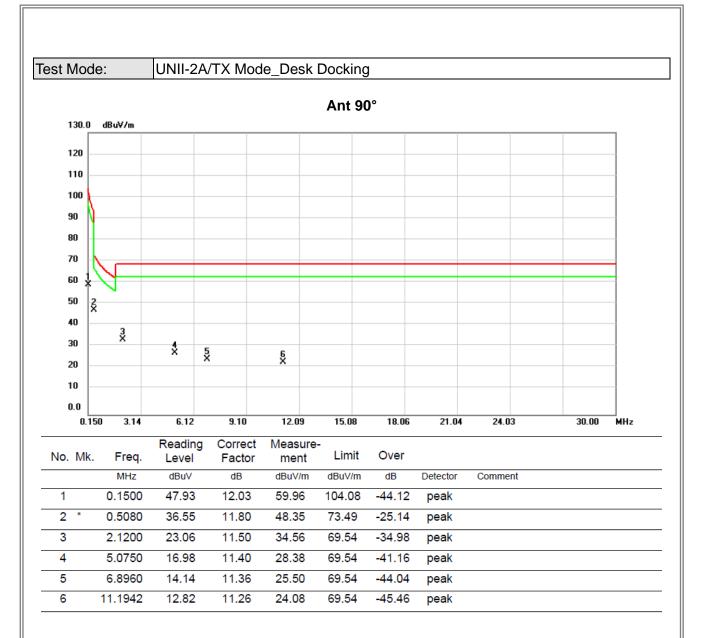






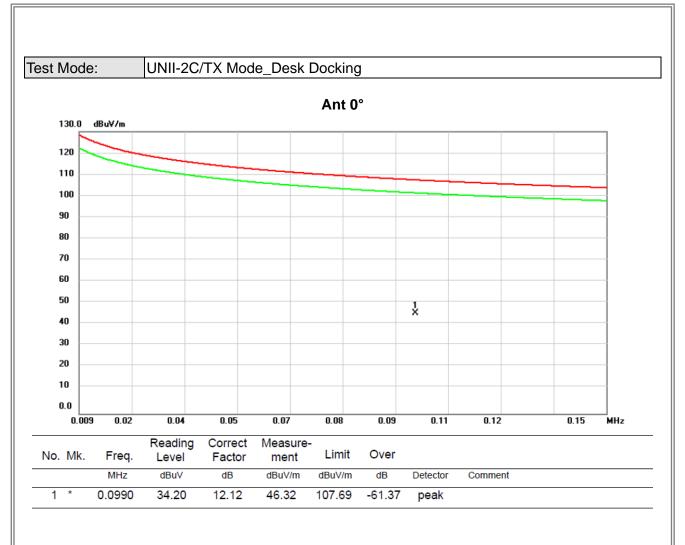






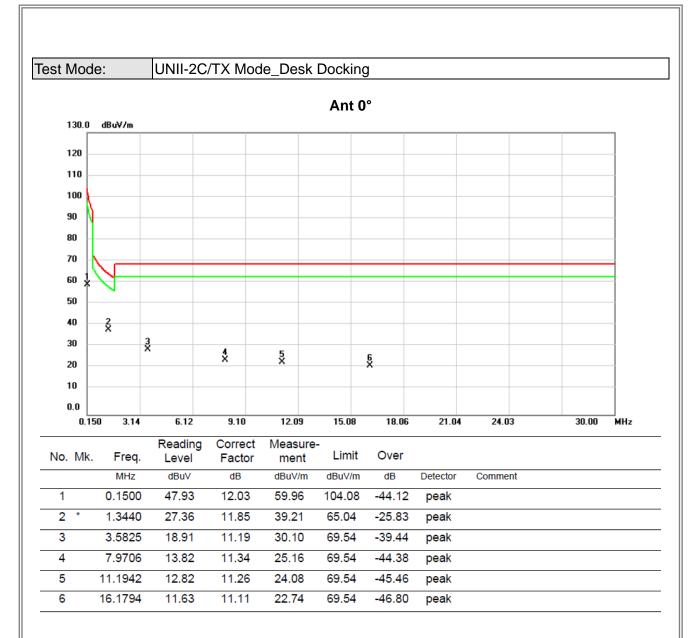






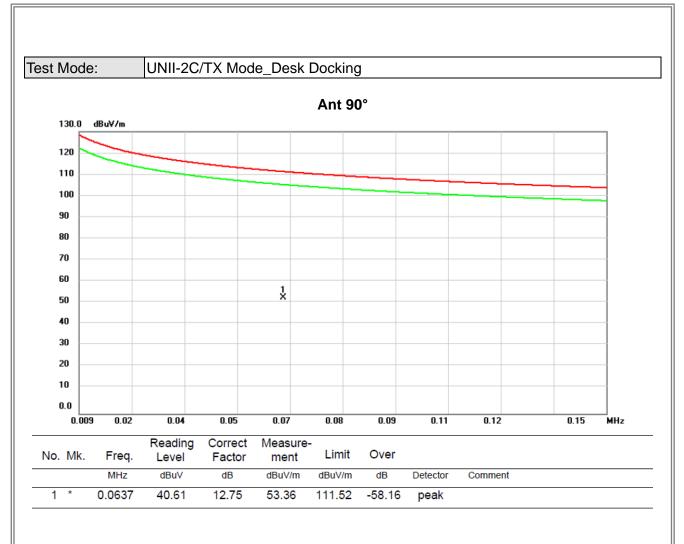






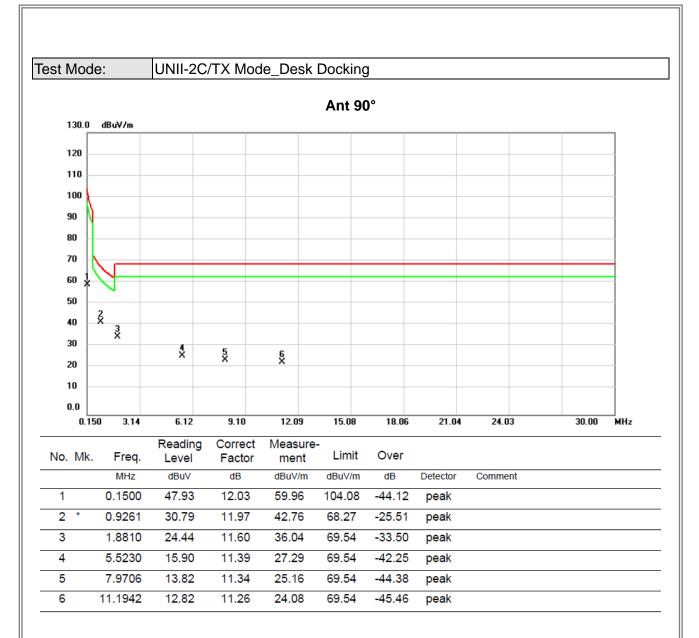






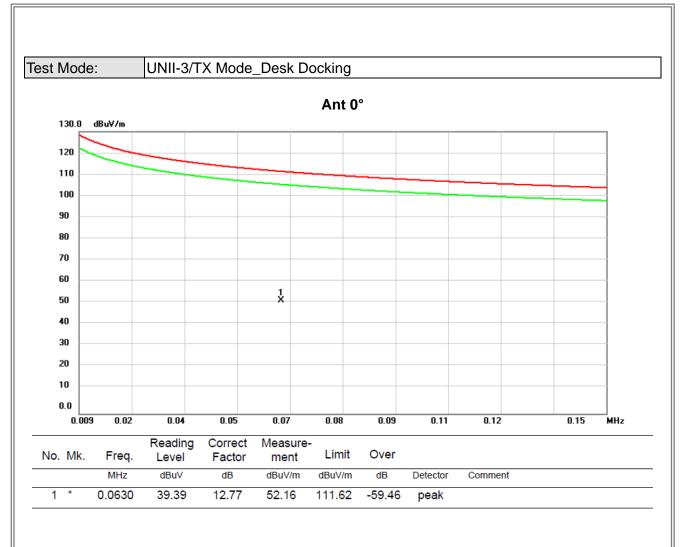






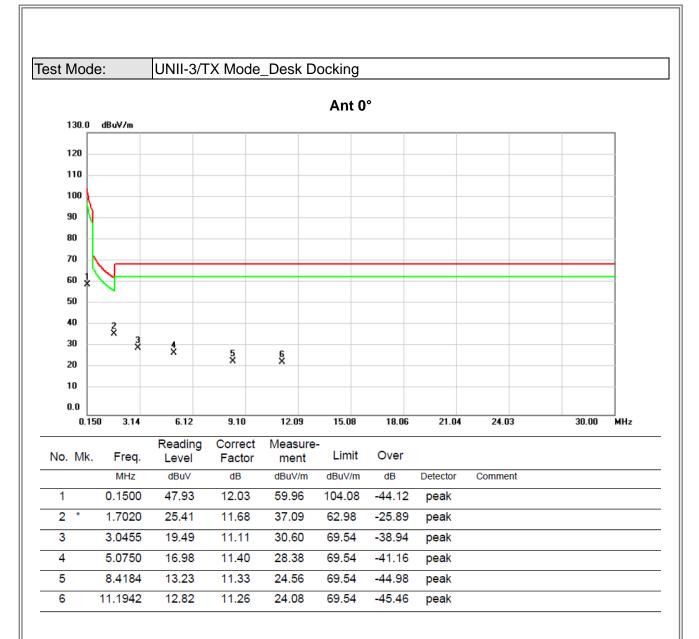






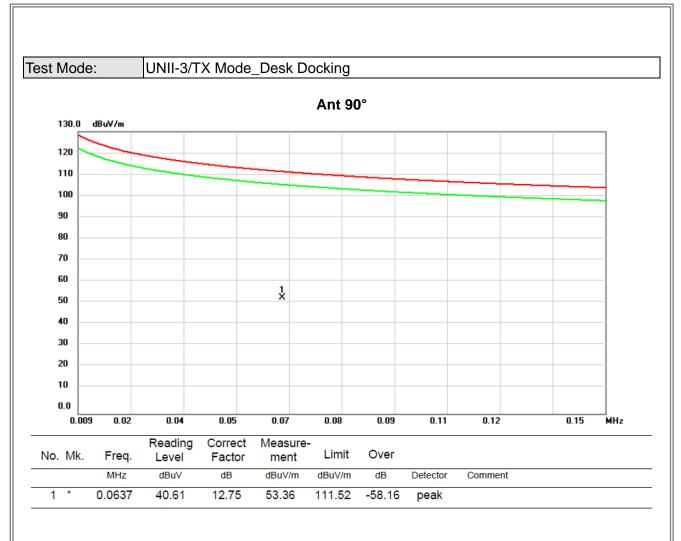






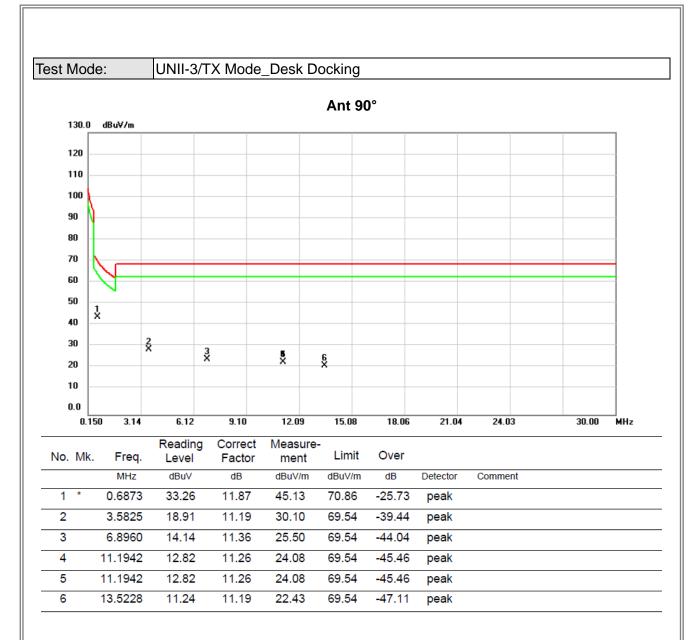






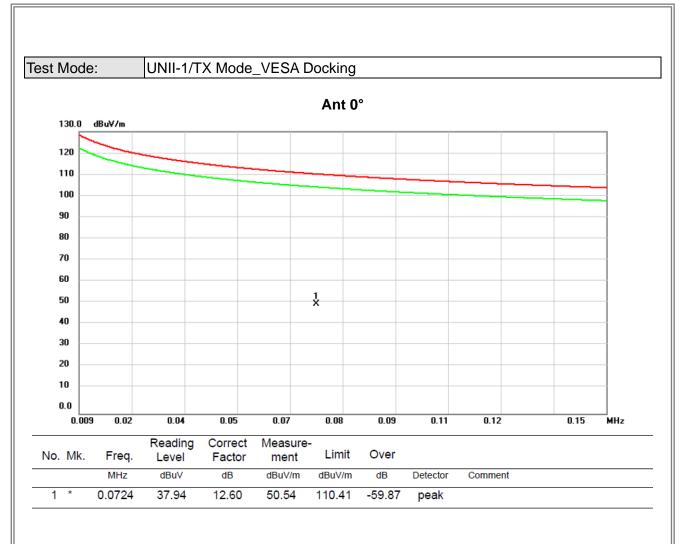






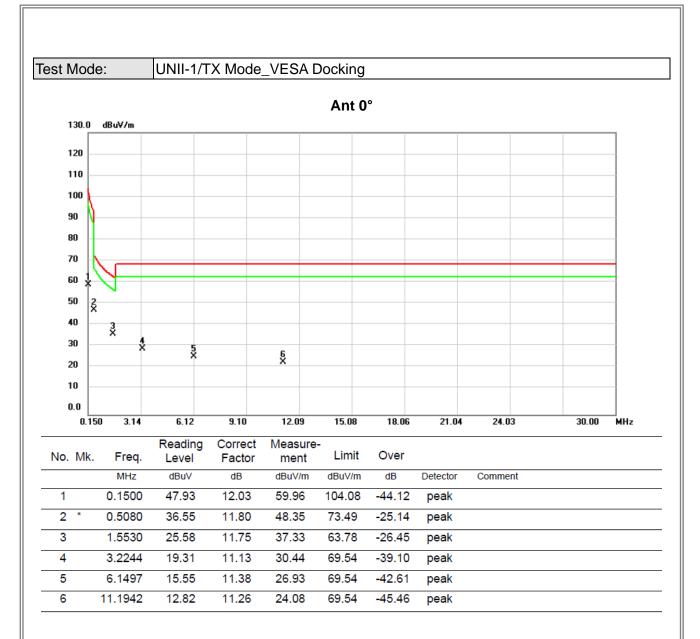






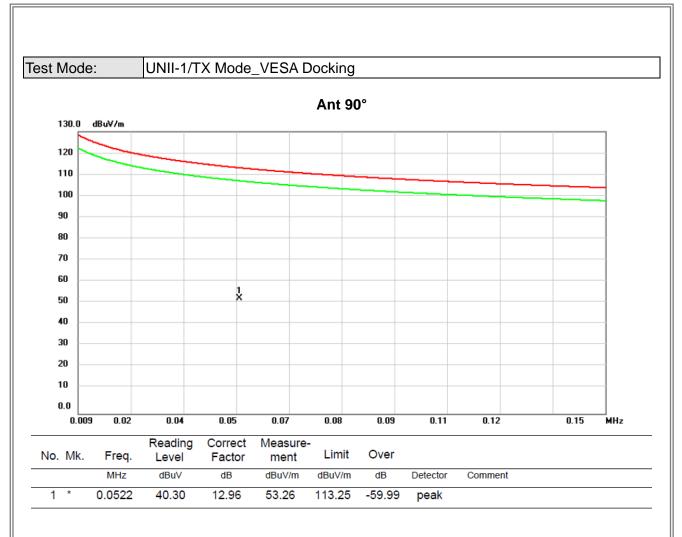






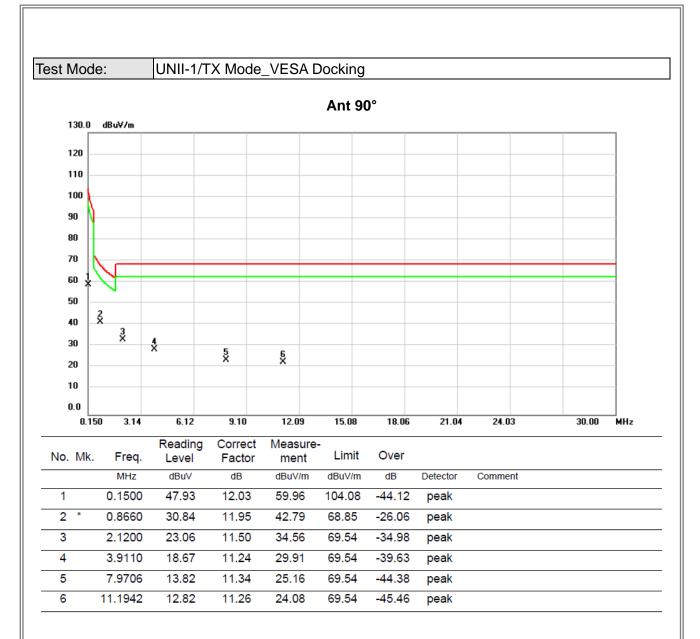






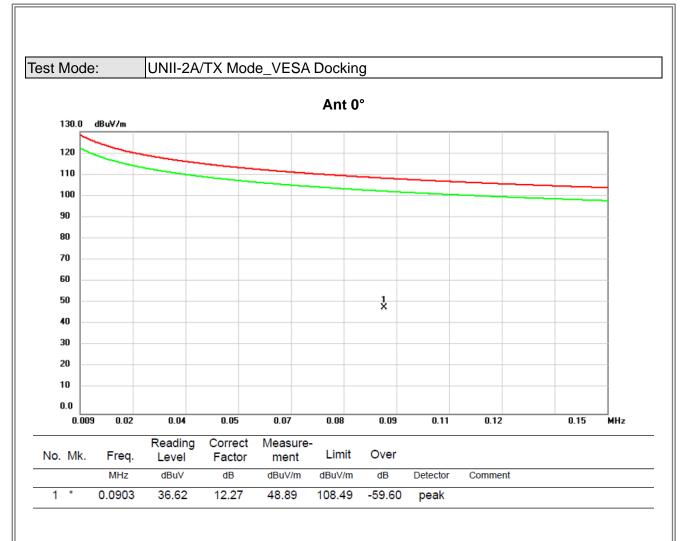






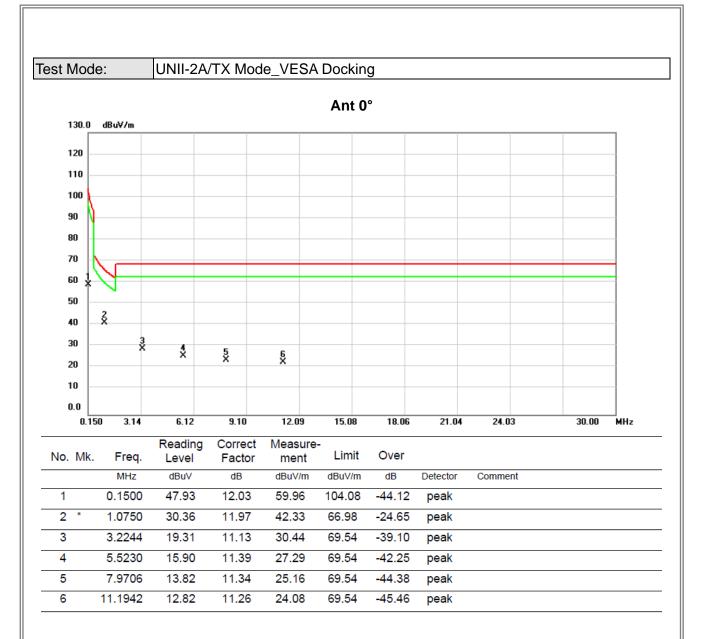






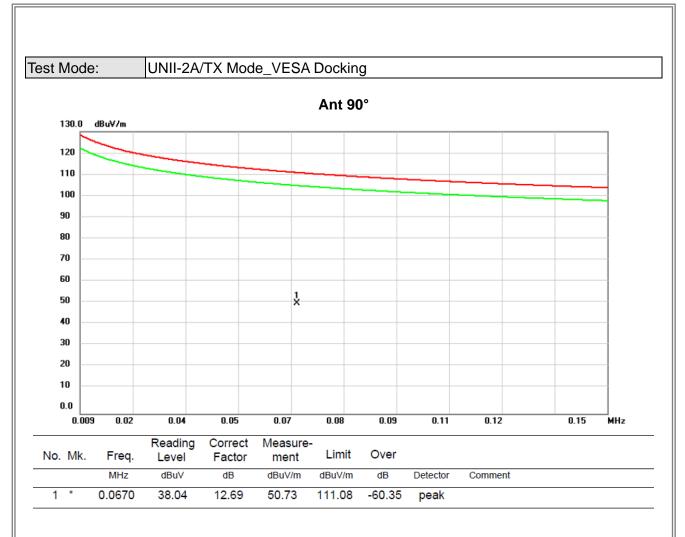






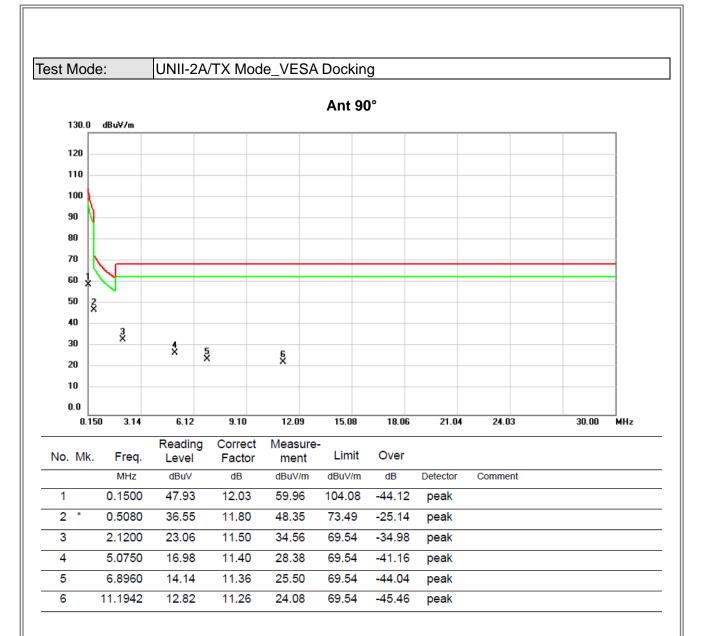






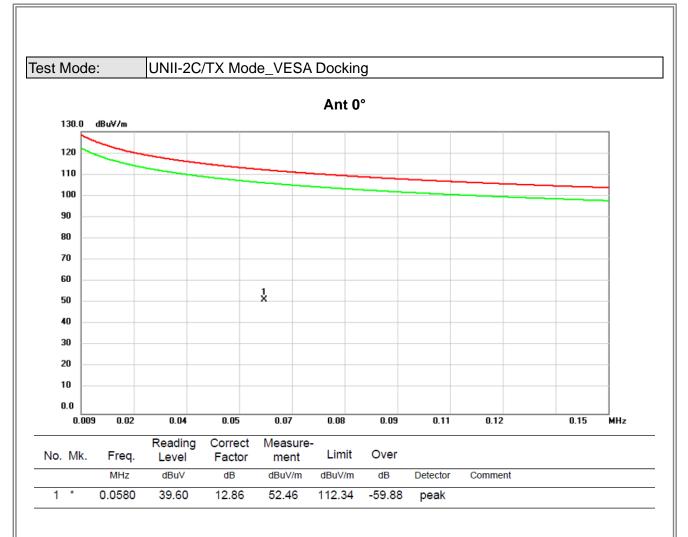






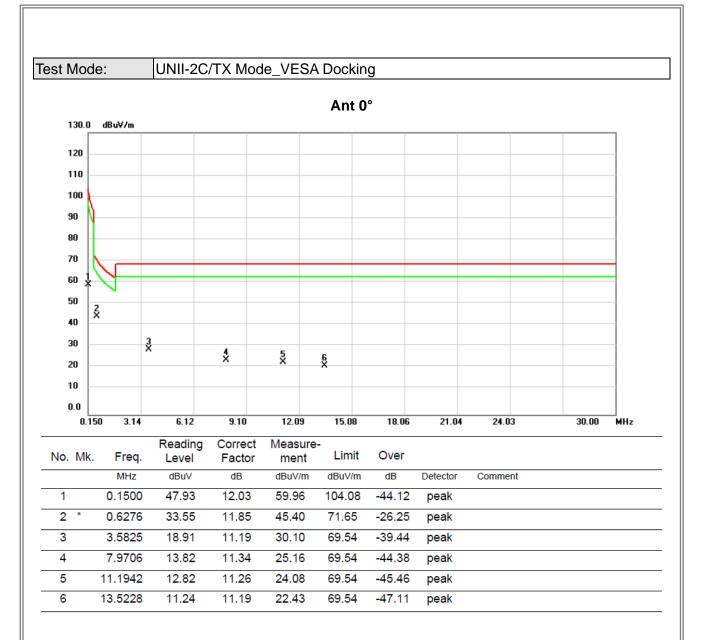






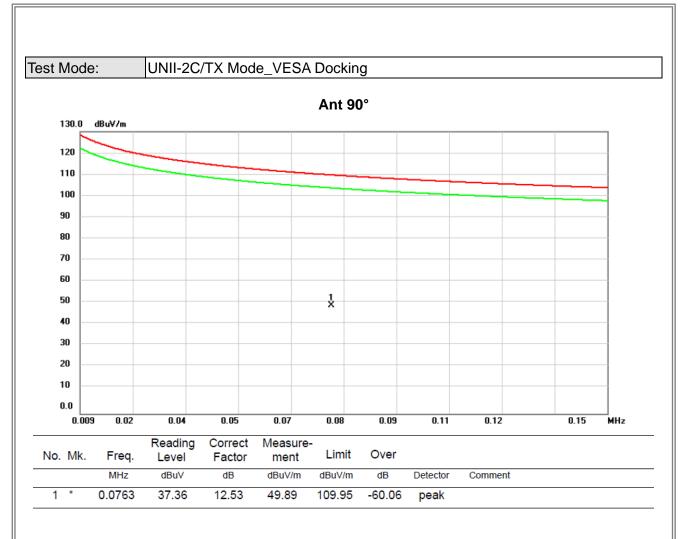






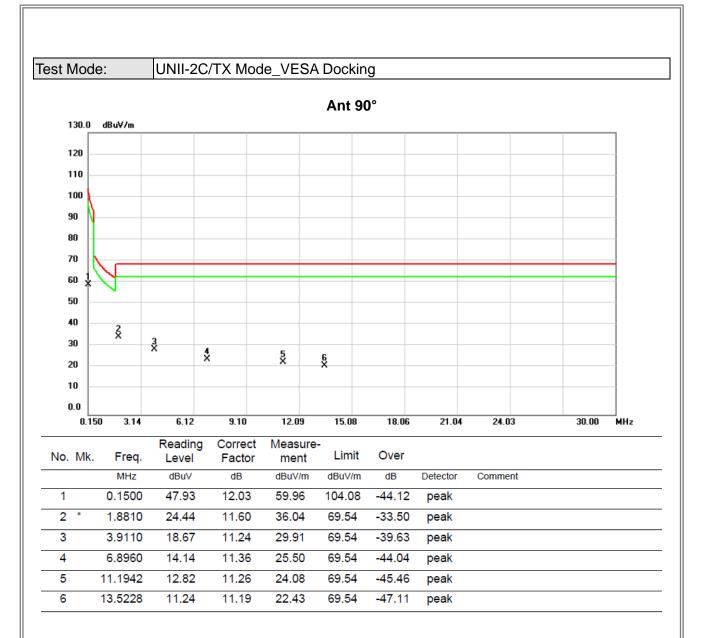






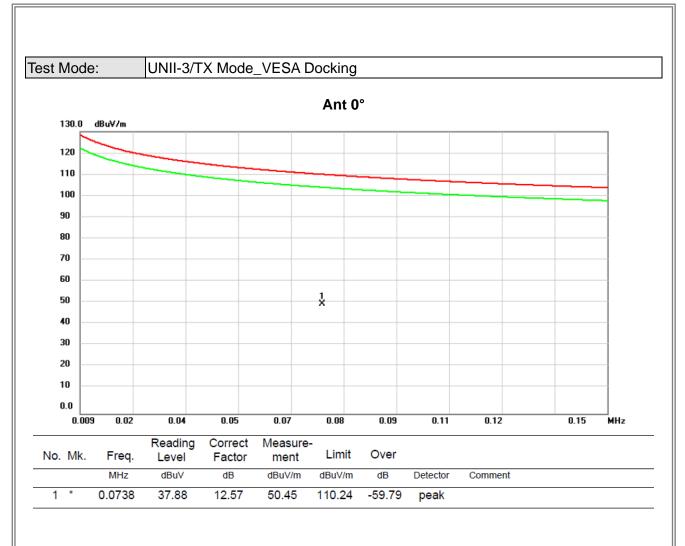






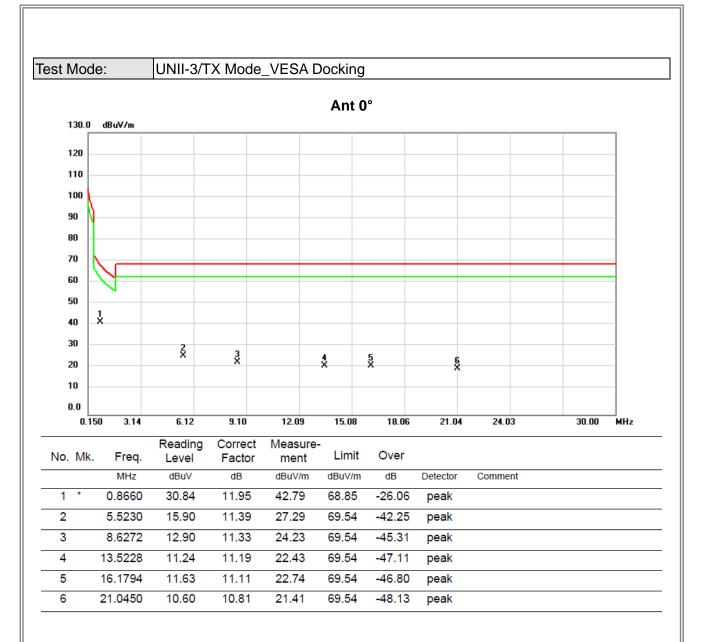






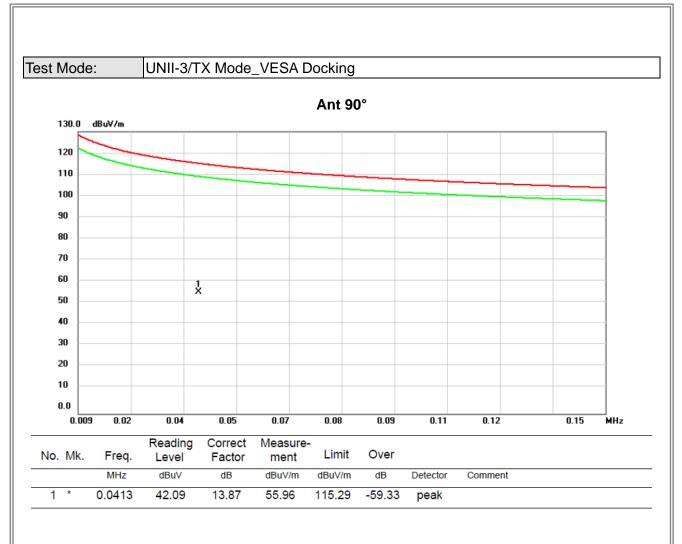






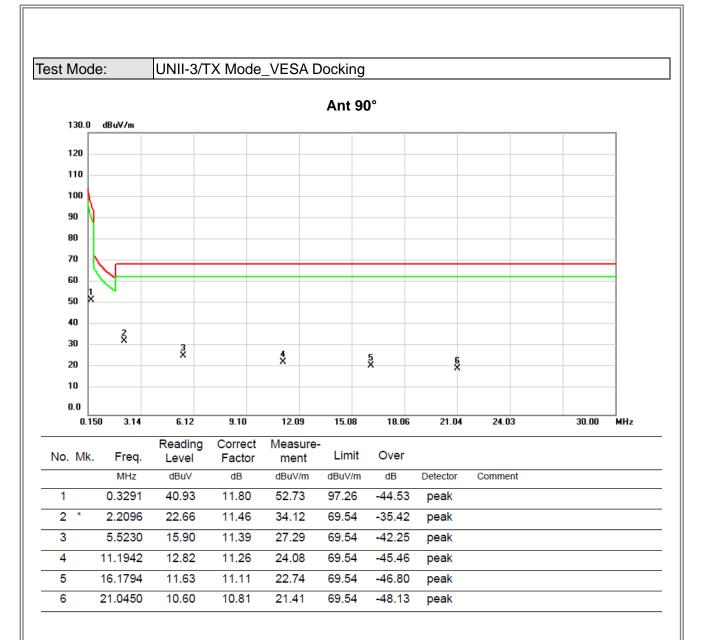














APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)





