



FCC Radio Test Report

FCC ID: PJZ2428Z1

This report concerns: Original Grant

: GE 4 PORT WiFi Gateway, **GPON 4 Port WiFi Gateway**

: DASAN Zhone Solutions, Inc.

: (1) ZNID-GE-2428B1

: (1) ZNID-GE-2426B1

: 1612C280D

Project No. Equipment

Test Model Series Model

Applicant Address

Date of Receipt

Date of Test Issued Date Tested by

: Dec. 28, 2016 Nov. 13, 2018 : Dec. 28, 2016 ~ Apr. 14, 2017 : Jul. 01, 2019 : BTL Inc.

(2) ZNID-GPON-2428B1, ZNID-GPON-2426B1

: 7195 Oakport Street Oakland, CA 94621 USA

Testing Engineer

Vinceñt Tan)

Technical Manager

Authorized Signatory

Ethan Ma)

BTL INC

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. FAX: +86-769-8319-6000 TEL: +86-769-8318-3000





Declaration

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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.





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REPORT ISSUED HISTORY			
Report Version	Description	Issued Date	
R00	Original Issue.	Jul. 01, 2019	





1. GENERAL SUMMARY

Test Model : (1) ZNID-GE-2428B1
Series Model :(1) ZNID-GE-2426B1 (2) ZNID-GPON-2428B1, ZNID-GPON-2426B1Applicant:DASAN Zhone Solutions, Inc.Manufacturer :DASAN Zhone Solutions, Inc.Address:7195 Oakport Street Oakland, CA 94621 USADate of Test:Dec. 28, 2016 ~ Apr. 19, 2017Test Sample:Engineering Sample No.: D190100606Standard(s):FCC Part15, Subpart E(15.407) ANSI C63.10-2013FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01FCC 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.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1612C280D) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

Test results included in this report are only for the RLAN 5 GHz UNII-1 and UNII-3 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	Test Result	Judgement	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 Conducted 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(4)			
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 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.
- (3) For UNII-1 this device was functioned as a \Box
 - Access point device Client device
- (4) This is a copy report to the test report (BTL-FCCP-2-1612C280).
- Compared with test report,
- 1. Changed the model name which does not affect the test results.
- 2. Changed to the product are following:
 - 1) All connectors insulators are changed from 90 degrees to 180 degrees.
 - 2) Two-way PA and one-way power supply are added for
 - 2.4G module.
 - 3) Inductance is replaced for the DC/DC power supply part.
 - 4) The location of nand-flash is modified for layout part.

No any changes are made for 5G module, thus only the worst case of radiation emission above 1GHz is re-evaluated for 5G and the test data is found to be consistent with the original data.

3. Added an adapter(Model:S24B72-120A200-0K), so the radiated emissions below 1GHz have verified. It was found that the original data was the worst case.

So all the test data were not to be updated, the rest are kept the same.





2.1 TEST FACILITY

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

2.2 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	150 KHz ~ 30 MHz	2.32

B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)													
		9 kHz~30 MHz	V	3.79													
		9 kHz~30 MHz	Н	3.57													
		30 MHz~200 MHz	V	3.82													
	CISPR	CISPR												30 MHz~200 MHz	Н	3.60	
DG-CB03														CIEDD			
DG-CB03			200 MHz~1,000 MHz	Н	3.94												
				1 GHz~18 GHz	V	3.12											
																1 GHz~18 GHz	Н
			18 GHz~40 GHz	V	4.15												
		18 GHz~40 GHz	Н	4.14													

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





3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	GE 4 PORT WiFi Gateway, GPON 4 Port WiFi Gateway				
Brand Name	DZS				
Test Model	(1) ZNID-GE-2428B1				
Series Model	(1) ZNID-GE-2426B1 (2) ZNID-GPON-2428B1, ZNID-G	PON-2426B1			
Model Difference(s)	Only differ in model name.				
Power Source	DC Voltage supplied from AC/DC adapter. 1# Model: SOY-1200200US 2# Model: S24B72-120A200-C4 3# Model: S24B72-120A200-0K Only differ in plug.				
Power Rating	1# I/P: 100-240V~ 50/60Hz 0.6A 2# I/P: 100-240V~ 50/60Hz Max (3# I/P: 100-240V~ 50/60Hz Max (0.8A O/P: 12V===2A 0.8A O/P: 12V===2A			
	Operation Frequency	UNII-1: 5150-5250MHz UNII-3: 5725-5850MHz			
	Modulation Type	OFDM			
	Bit Rate of Transmitter	1300Mbps			
	Output Power (Max.)for UNII-1 _Non Beamforming	802.11a: 26.59dBm 802.11n (20M): 26.90dBm 802.11n (40M): 26.47dBm 802.11ac (20M): 26.62dBm 802.11ac (40M): 26.69dBm 802.11ac (80M): 23.15dBm			
Product Description	Output Power (Max.)for UNII-3 _Non Beamforming	802.11a: 24.81dBm 802.11n (20M): 26.89dBm 802.11n (40M): 26.56dBm 802.11ac (20M): 26.75dBm 802.11ac (40M): 26.71dBm 802.11ac (80M): 26.14dBm			
	Output Power (Max.)for UNII-1 _Beamforming	802.11n (20M): 27.03dBm 802.11n (40M): 26.99dBm 802.11ac (20M): 25.24dBm 802.11ac (40M): 26.70dBm 802.11ac (80M): 26.74dBm			
	Output Power (Max.)for UNII-3 _Beamforming	802.11n (20M): 27.03dBm 802.11n (40M): 27.00dBm 802.11ac (20M): 26.93dBm 802.11ac (40M): 26.69dBm 802.11ac (80M): 26.78dBm			

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 802.11n (20M) 802.11ac (20M)		802.11n (40M) 802.11ac (40M)		802.11ac (80M)	
UNI	UNII-1		UNII-1		II-1
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

IEEE 802.11a 802.11n (20M) 802.11ac (20M)		802.11n (40M) 802.11ac (40M)		802.11ac (80M)	
UNI	UNII-3		UNII-3		II-3
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

3. Antenna Specification:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	IPEX	4
2	N/A	N/A	PCB	IPEX	4
3	N/A	N/A	PCB	IPEX	4

Note:

(1) For Non Beamforming:

This EUT supports MIMO 3X3, any transmit signals are correlated with each other, so Directional gain = GANT+10log(N)dBi, that is Directional gain= 4+10log(3)dBi=8.77; So, the UNII-1,UNII-3 output power limit is 30-8.77+6=27.23. The UNII-1 power density limit is 17-8.77+6=14.23, the UNII-3 power density limit is 30-8.77+6=27.23.

(2) For Beamforming:

This EUT supports MIMO 3X3, any transmit signals are correlated with each other, so Directional gain = GANT+10log(NANT/Nss)dBi, The NSS=1, that is Directional gain= 4+10log(3/1)dBi=8.77; So, the UNII-1,UNII-3 output power limit is 30-8.77+6=27.23. The UNII-1 power density limit is 17-8.77+6=14.23, the UNII-3 power density limit is 30-8.77+6=27.23.

When Directional antenna gain is larger than 6dBi, for every 1 dBi increase in gain, the power limit and power density limt is reduced by 1 dBm.



4. Table for Antenna Configuration:

Operating Mode TX Mode	1TX	ЗТХ
802.11a	V (Ant. 1)	-
802.11n (20MHz)	-	V (Ant. 1 + Ant. 2 + Ant. 3)
802.11n (40MHz)	-	V (Ant. 1 + Ant. 2 + Ant. 3)
802.11ac (20MHz)	-	V (Ant. 1 + Ant. 2 + Ant. 3)
802.11ac (40MHz)	-	V (Ant. 1 + Ant. 2 + Ant. 3)
802.11ac (80MHz)	-	V (Ant. 1 + Ant. 2 + Ant. 3)



3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)
Mode 4	TX AC20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)
Mode 6	TX AC80 Mode / CH42 (UNII-1)
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)
Mode 8	TX N20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 9	TX N40 Mode / CH151,CH159 (UNII-3)
Mode 10	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)
Mode 11	TX AC40 Mode / CH151,CH159 (UNII-3)
Mode 12	TX AC80 Mode / CH155 (UNII-3)
Mode 13	TX Mode

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

For Conducted Test		
Final Test Mode	Description	
Mode 13	TX Mode	





For Radiated Test		
Final Test Mode	Description	
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)	
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)	
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)	
Mode 4	TX AC20 Mode / CH36, CH40, CH48 (UNII-1)	
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)	
Mode 6	TX AC80 Mode / CH42 (UNII-1)	
Mode 7	TX A Mode / CH149,CH157,CH165 (UNII-3)	
Mode 8	TX N20 Mode / CH149,CH157,CH165 (UNII-3)	
Mode 9	TX N40 Mode / CH151,CH159 (UNII-3)	
Mode 10	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)	
Mode 11	TX AC40 Mode / CH151,CH159 (UNII-3)	
Mode 12	TX AC80 Mode / CH155 (UNII-3)	

Note:

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

(2) All adapters had been pre-test and in this report only recorded the worst case.



3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

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

UNII-1			
Test Software Version		MTool_2.0.1.1	
Frequency (MHz)	5180	5200	5240
A Mode	96	96	96
N20 Mode	79	82	82
AC20 Mode	78	84	84
Frequency (MHz)	5190	5230	
N40 Mode	70	83	
AC40 Mode	86	86	
Frequency (MHz)	5210		
AC80 Mode	65		

Non Beamforming

UNII-3			
Test Software Version		MTool_2.0.1.1	
Frequency (MHz)	5745	5785	5825
A Mode	96	96	96
N20 Mode	90	86	87
AC20 Mode	89	89	87
Frequency (MHz)	5755	5795	
N40 Mode	84	84	
AC40 Mode	92	92	
Frequency (MHz)	5775		
AC80 Mode	80		

Beamforming

UNII-1			
Test Software Version	MTool_2.0.1.1		
Frequency (MHz)	5180	5200	5240
N20 Mode	80	80	79
AC20 Mode	76	75	73
Frequency (MHz)	5190	5230	
N40 Mode	83	83	
AC40 Mode	84	84	
Frequency (MHz)	5210		
AC80 Mode	84		

UNII-3			
Test Software Version	MTool_2.0.1.1		
Frequency (MHz)	5745	5785	5825
N20 Mode	84	84	84
AC20 Mode	84	84	84
Frequency (MHz)	5755	5795	
N40 Mode	89	89	
AC40 Mode	90	90	
Frequency (MHz)	5775		
AC80 Mode	90		



3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.5m

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 *
0.5 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.1.2 TEST PROCEDURE

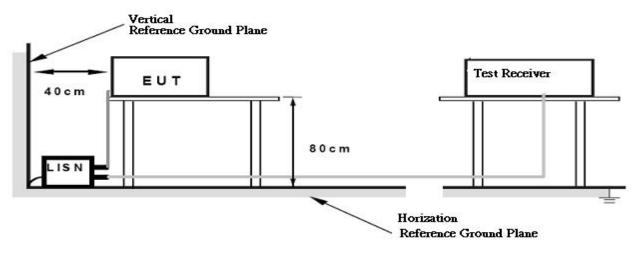
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.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

4.1.3 DEVIATION FROM TEST STANDARD

No deviation



4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

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

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

4.1.6 EUT TEST CONDITIONS

Temperature: 24°C Relative Humidity: 60% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the 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.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

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

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

Frequencies	EIDD Limit (dPm)	Equivalent Field Strength
(MHz)	EIRP Limit (dBm)	at 3m (dBµV/m)
5150-5250	-27	68.3
5250-5350	-27	68.3
5470-5725	-27	68.3
	-27(Note 2)	68.3
5725-5850	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: $E = \frac{1000000\sqrt{30P}}{1000000\sqrt{30P}}$

-µV/m, where P is the eirp (Watts) 3

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.



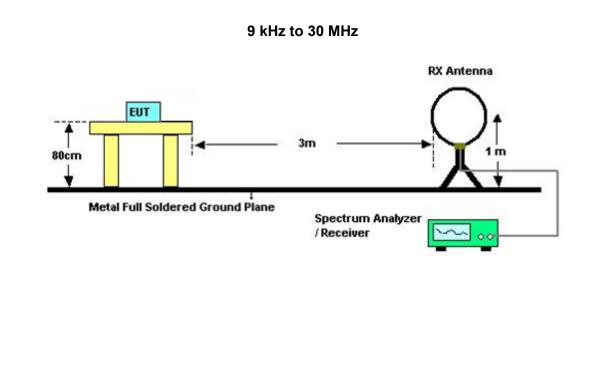
4.2.2 TEST PROCEDURE

- 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

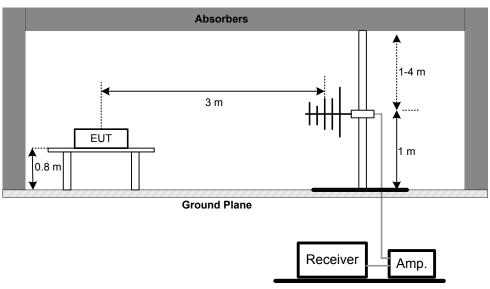
4.2.4 TEST SETUP



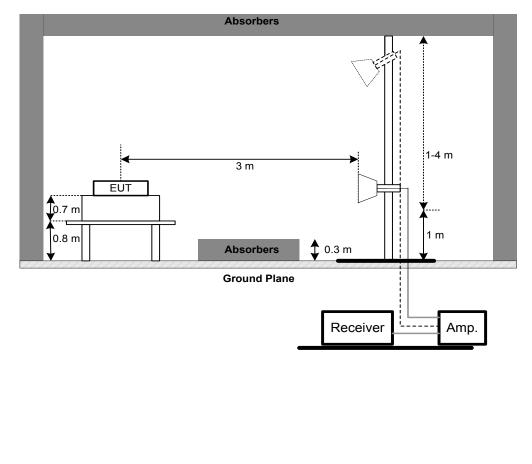




30 MHz to 1 GHz



Above 1GHz







4.2.5 EUT OPERATING CONDITIONS

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

4.2.6 EUT TEST CONDITIONS

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

4.2.7 TEST RESULTS (9KHz 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 (30 MHz TO 1000 MHz)

Please refer to the Appendix C.

4.2.9 TEST RESULTS (ABOVE 1000 MHz)

Please refer to the Appendix D.

Remark:

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



5. 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	
Danuwiuun	Minimum 500kHz 6dB Bandwidth	5725-5850	PASS	

5.1.1 TEST PROCEDURE

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

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

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

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

5.1.4 EUT OPERATION CONDITIONS

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

5.1.5 EUT TEST CONDITIONS

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

5.1.6 TEST RESULTS

Please refer to the Appendix E.



6. MAXIMUM CONDUCTED OUTPUT POWER

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item Limit Frequency Range (MHz)			Result	
	Fixed:1 Watt (30dBm)			
Conducted Output	Mobile and portable:	5150-5250	PASS	
Power	250mW (24dBm)			
	1 Watt (30dBm)	5725-5850	PASS	
Note: The maximum e.i.r.p at anyelevation angle above 30 degrees as measured from the				
horizon must not exceed 125mW(21dBm)				

6.1.1 TEST PROCEDURE

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

b.

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

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





6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP

EUT	Power Meter

6.1.4 EUT OPERATION CONDITIONS

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

6.1.5 EUT TEST CONDITIONS

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

6.1.6 TEST RESULTS

Please refer to the Appendix F.

7. POWER SPECTRAL DENSITY TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Frequency Range (MHz)	Result	
Power Spectral Density	Other then Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz	5150-5250	PASS
	30dBm/500kHz	5725-5850	PASS

8.1.1 TEST PROCEDURE

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

b.	Spectrum Parameter	Setting
	Attenuation	Auto
	Span Frequency	Encompass the entire emissions bandwidth (EBW) of the
	Spall 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

EUT	SPECTRUM
	ANALYZER

7.1.3 EUT OPERATION CONDITIONS

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

7.1.4 EUT TEST CONDITIONS

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

7.1.5 TEST RESULTS

Please refer to the Appendix G.



8. FREQUENCY STABILITY MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E			
Test Item	Result		
Frequency Stability	5150-5250	PASS	
	5725-5850	PASS	

8.1.1 TEST PROCEDURE

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

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

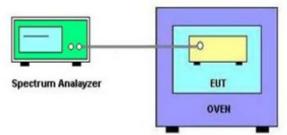
c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

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

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

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

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 H.



9. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	LISN	EMCO	3816/2	0052765	Mar. 26, 2018	
2	LISN	R&S	ENV216	101447	Mar. 26, 2018	
3	Test Cable	emci	RG223(9KHz-30 MHz)	C_17	Mar. 09, 2018	
4	EMI Test Receiver	R&S	ESCI	100382	Mar. 26, 2018	
5	50Ω Terminator	SHX	TF2-3G-A	08122901	Mar. 26, 2018	
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	

	Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 26, 2018	
2	Amplifier	HP	8447D	2944A09673	Feb. 22, 2018	
3	Receiver	AGILENT	N9038A	MY52130039	Jun. 23, 2017	
4	Test Cable	emci	LMR-400(30MH z-1GHz)	C-01	Jun. 26, 2017	
5	Control	СТ	SC100	N/A	N/A	
6	Position Control	MF	MF-7802	MF780208416	N/A	
7	Antenna	ETS	3115	00075789	Mar. 26, 2018	
8	Amplifier	Agilent	8449B	3008A02274	Feb. 22, 2018	
9	Receiver	AGILENT	N9038A	MY52130039	Jun. 23, 2017	
10	Test Cable	emci	EMC104-SM-S M-10000(1GHz -26.5GHz)	C-68	Jun. 26, 2017	
11	Controller	СТ	SC100	N/A	N/A	
12	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Apr. 23, 2017	
13	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 26, 2018	
14	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 06, 2017	
15	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	



Spectrum Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Sep. 04, 2017

Maximum Conducted Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	P-series Power meter	Agilent	N1911A	MY45100473	Sep. 04, 2017
2	Wireband Power sensor	Agilent	N1921A	MY51100041	Sep. 04, 2017

	Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP 40	100185	Sep. 04, 2017	

	Frequency Stability Measurement				
Item	N Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Sep. 04, 2017
2	Precision Oven Tester	HOLINK	H-T-1F-D	BA03101701	May 22, 2017

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

All calibration period of equipment list is one year.





10. EUT TEST PHOTOS

Conducted Measurement Photos

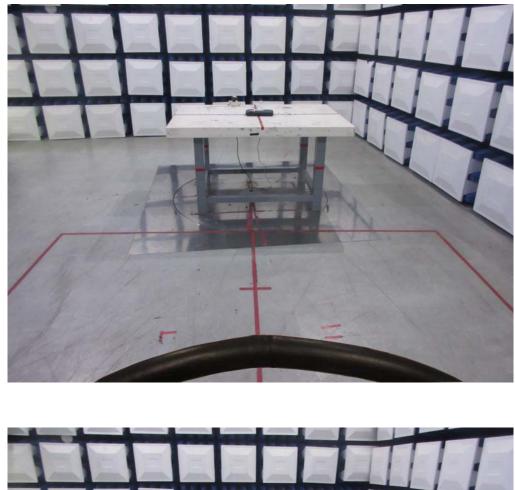






Radiated Emission Test Photos

9kHz to 30MHz





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Radiated Emission Test Photos

30MHz to 1000MHz





Report No.: BTL-FCCP-2-1612C280D



Radiated Emission Test Photos

Above 1000MHz





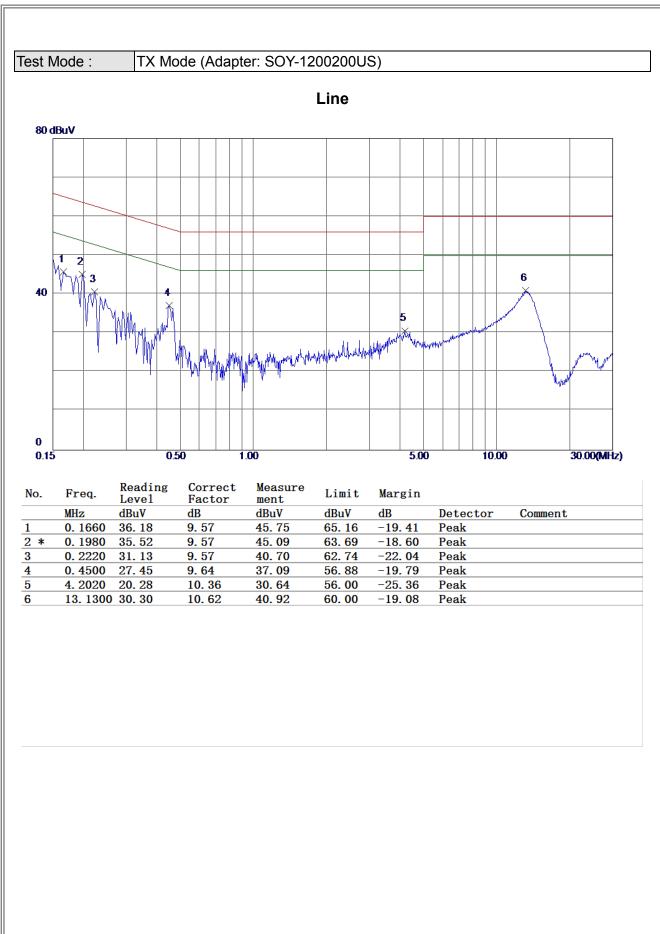
Report No.: BTL-FCCP-2-1612C280D



APPENDIX A - CONDUCTED EMISSION

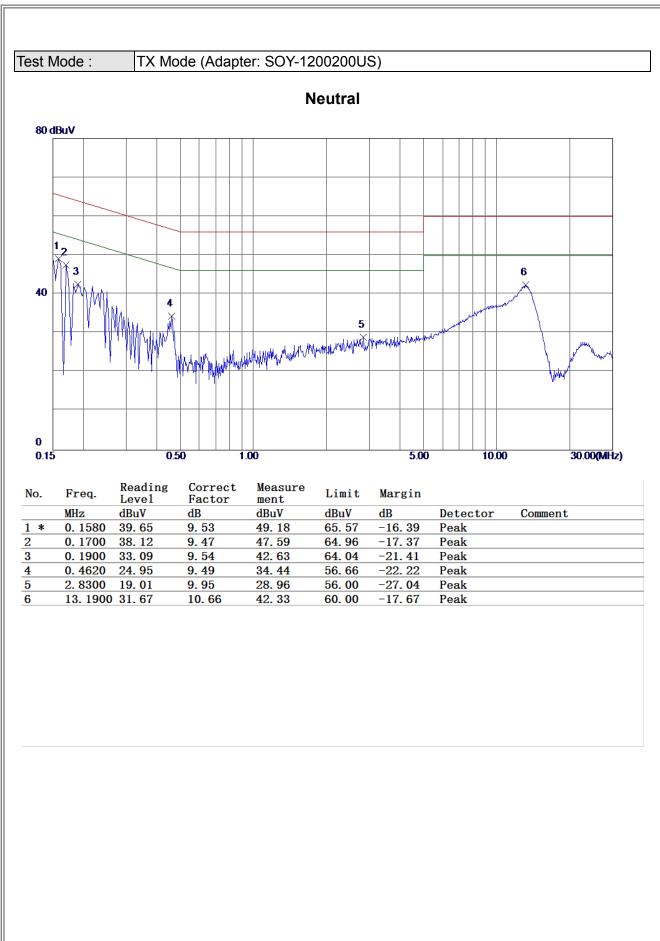






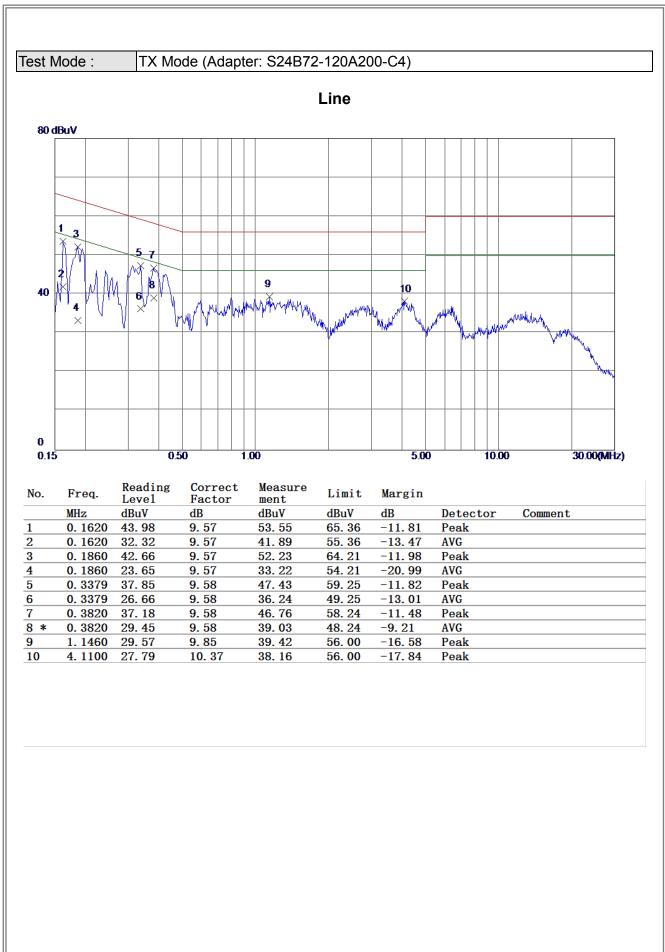






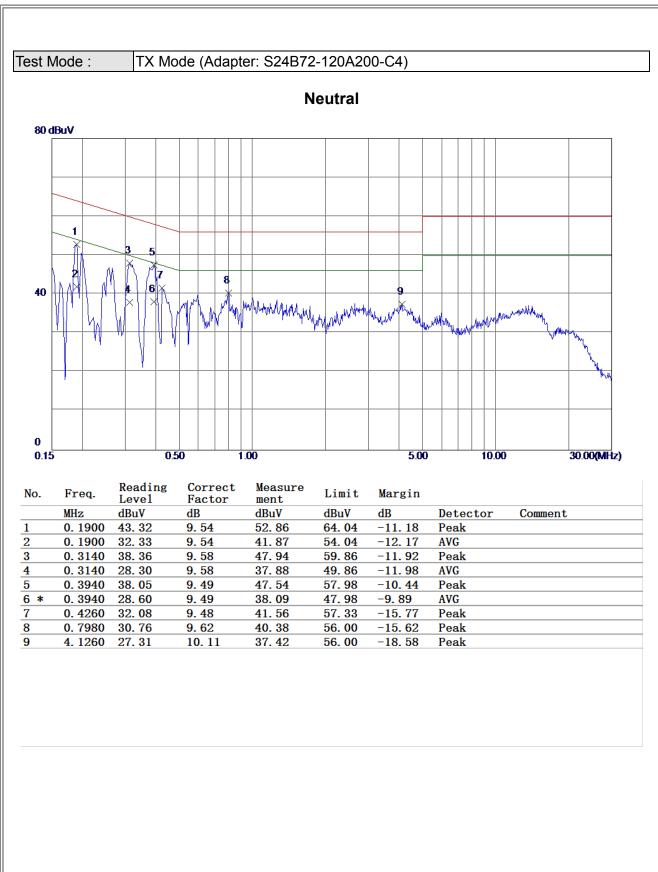










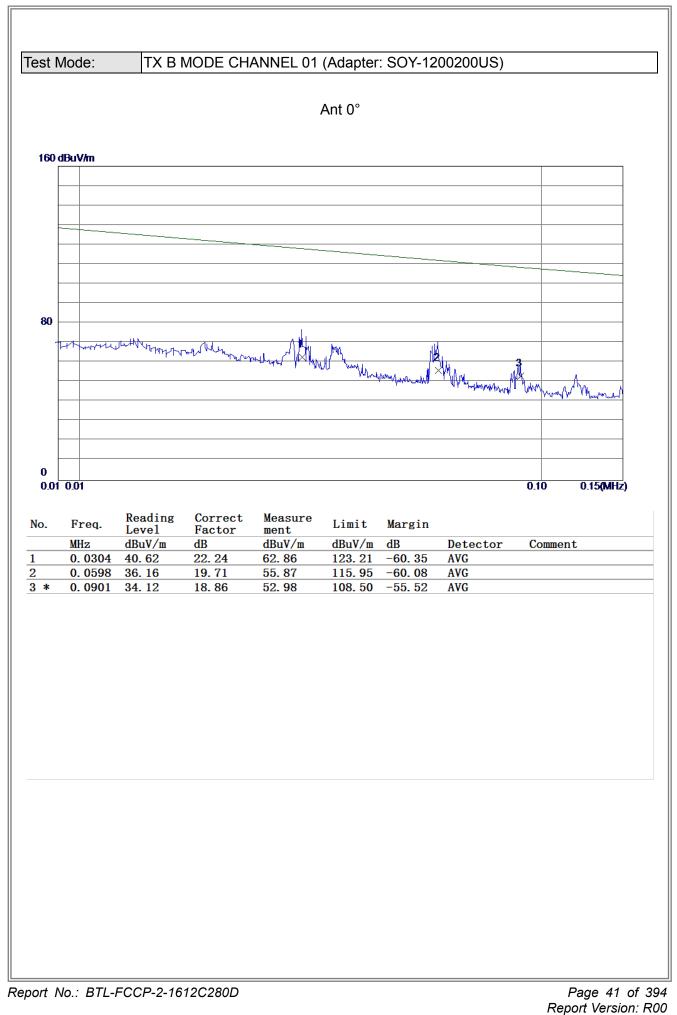




APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)

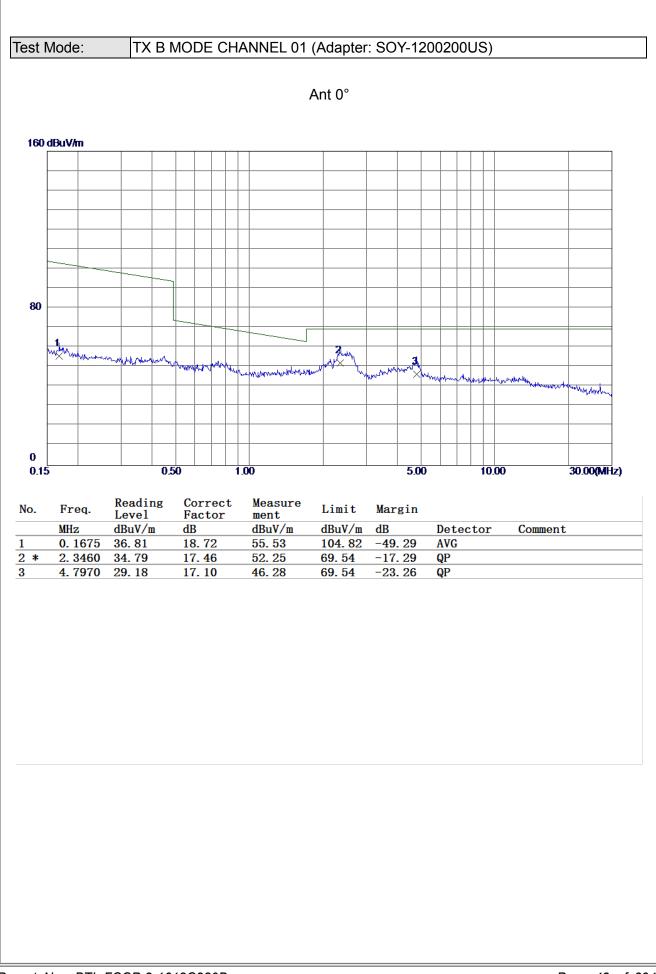






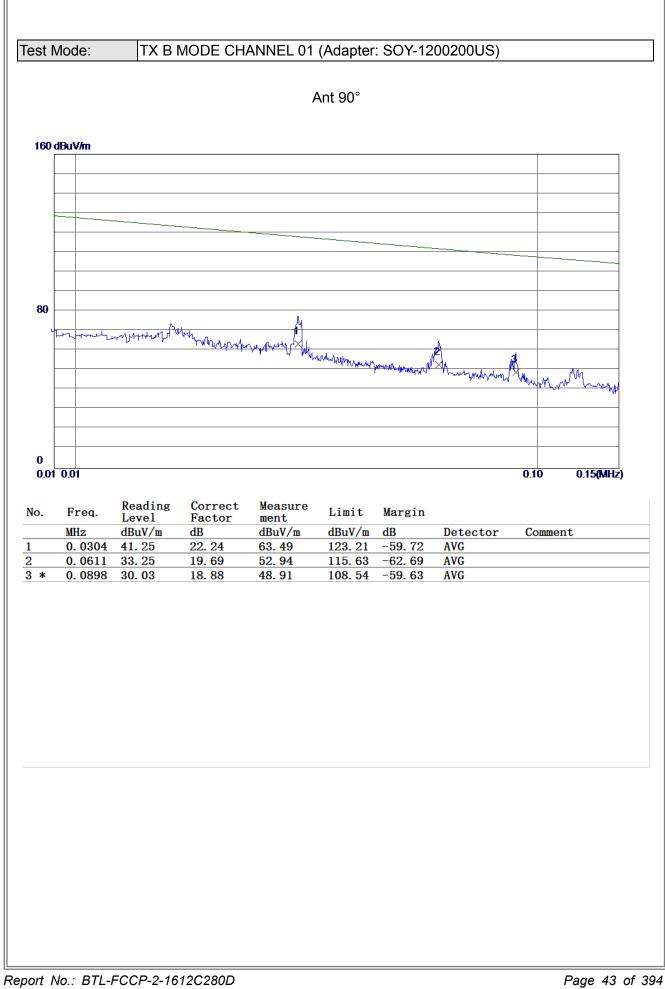






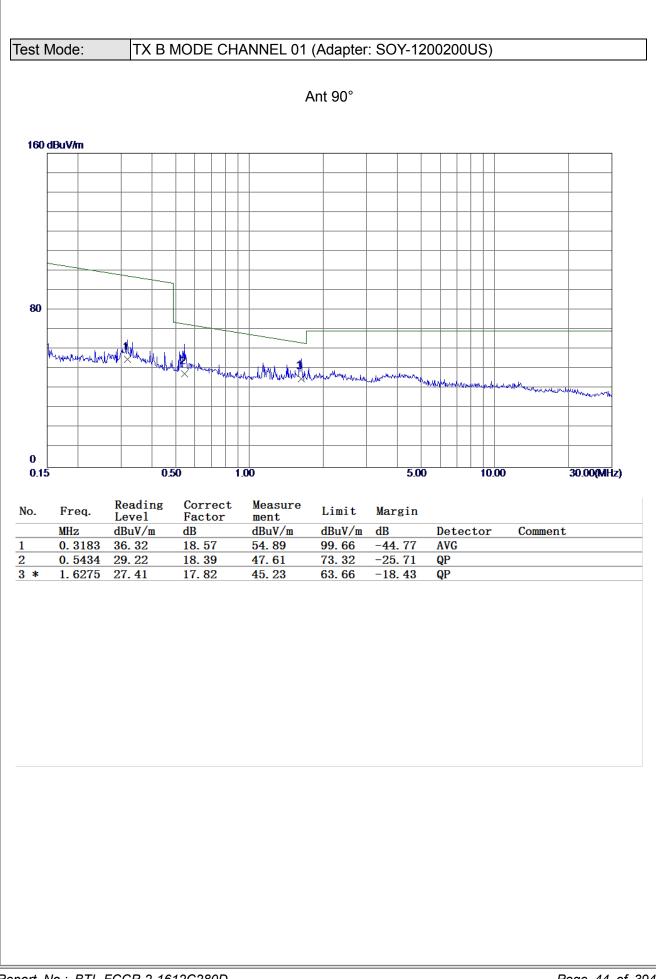






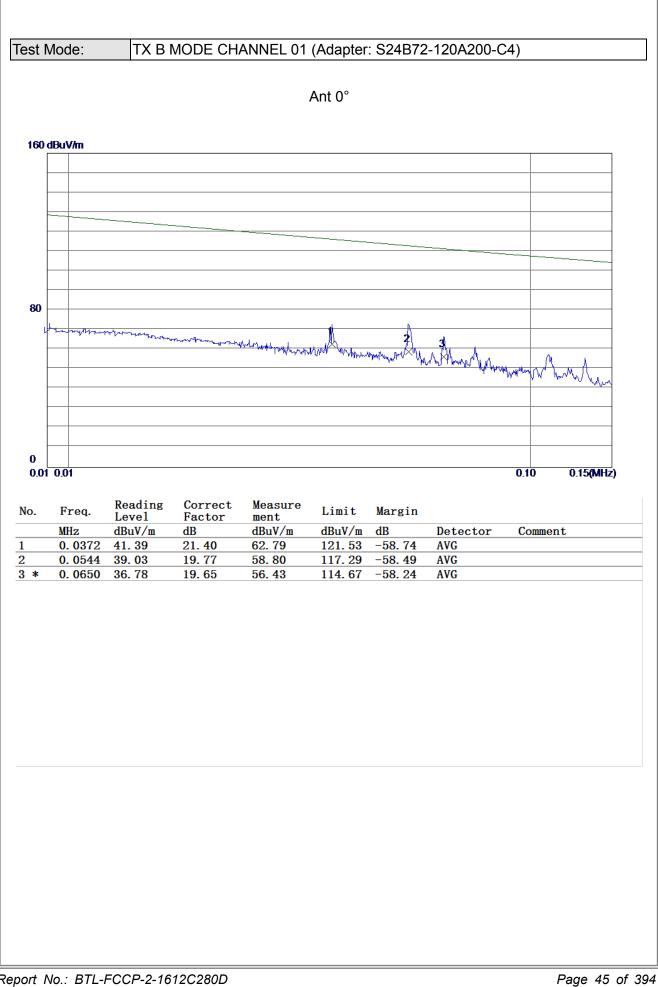






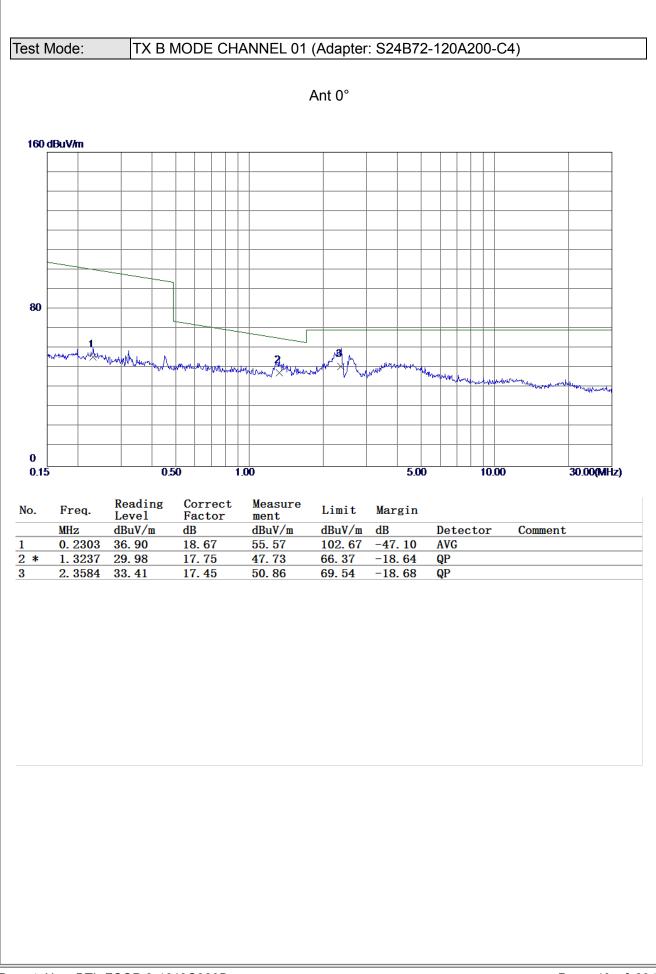






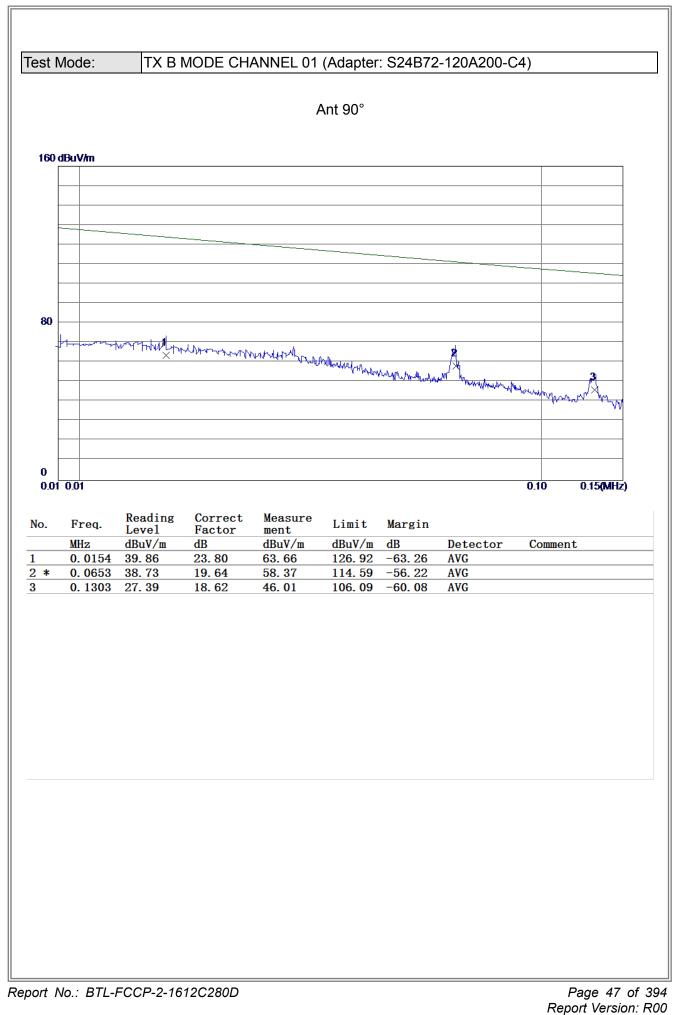






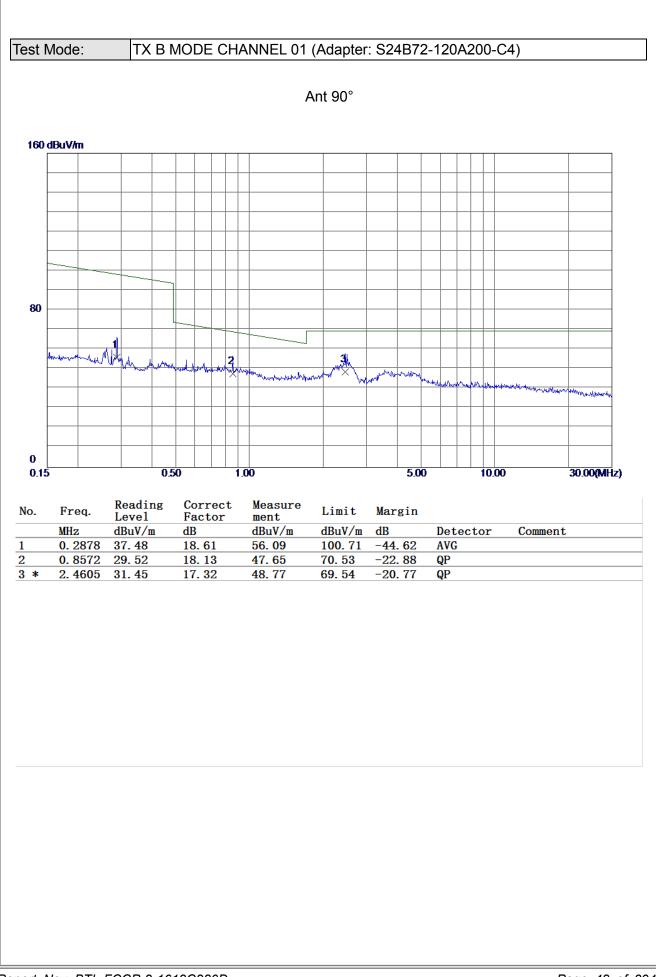










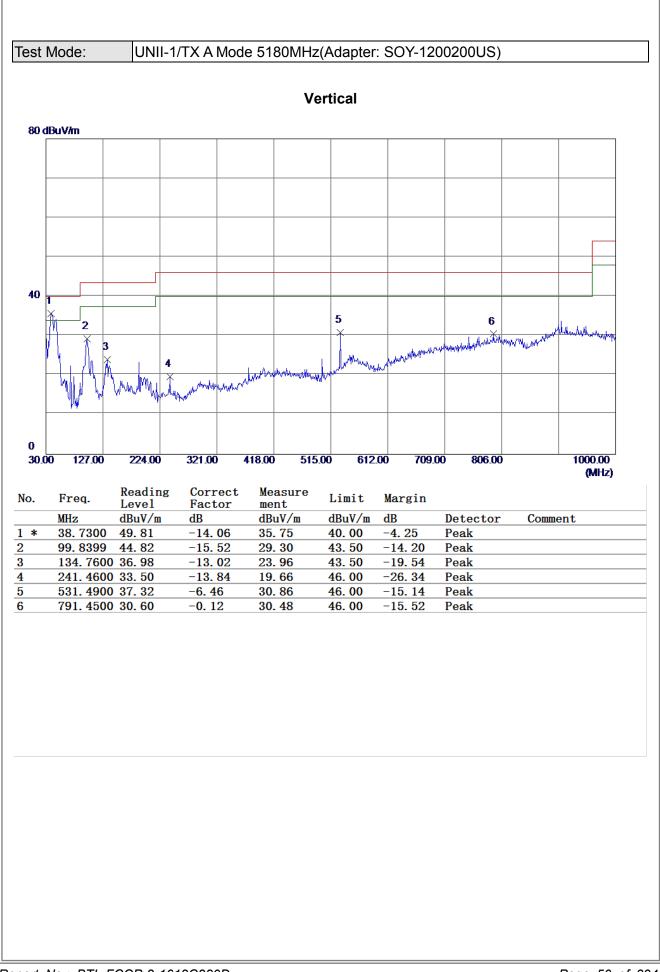




APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)

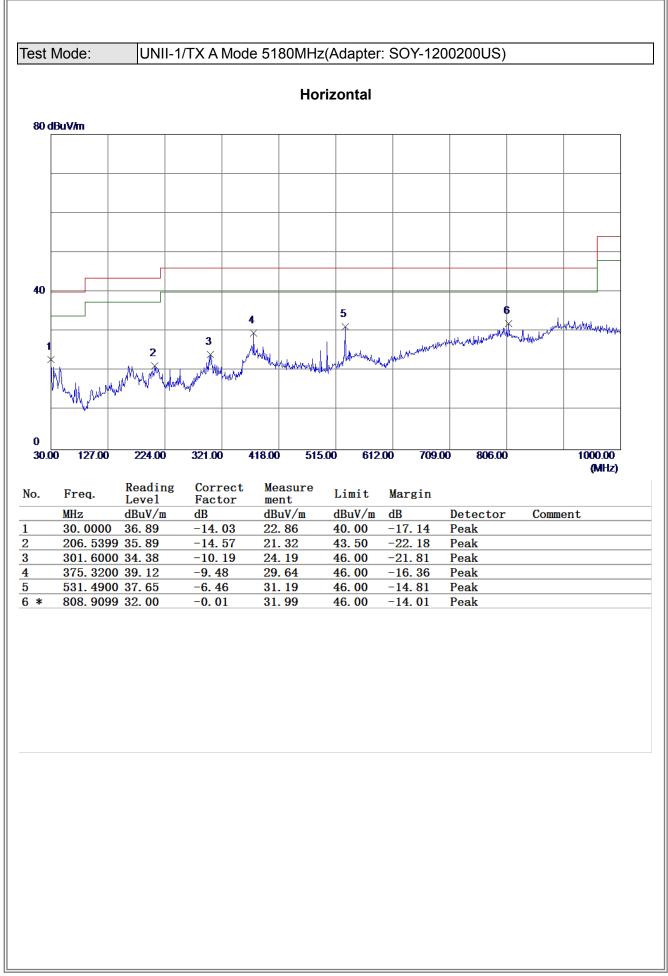






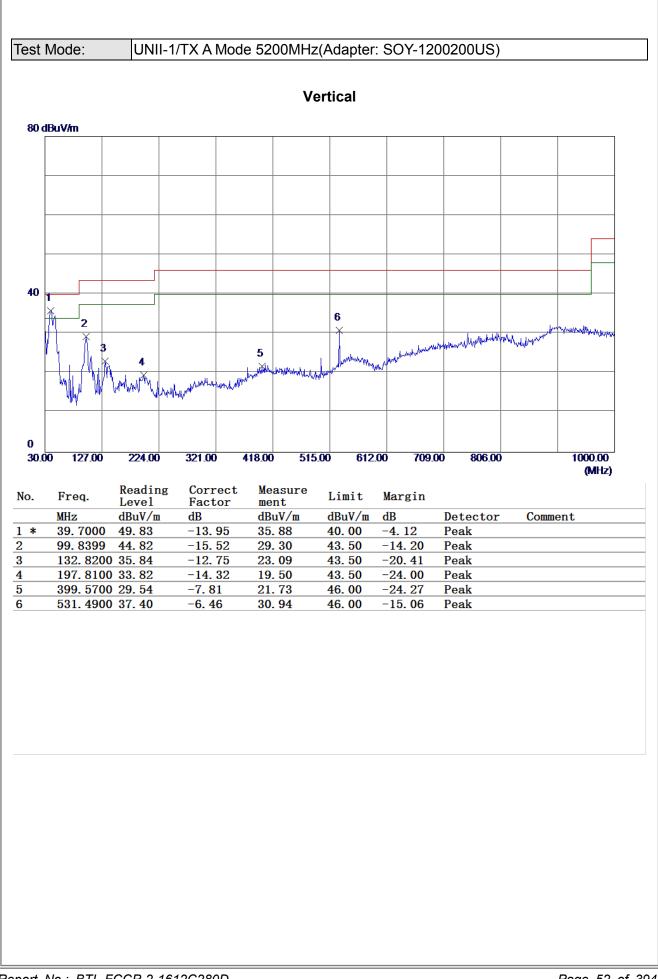






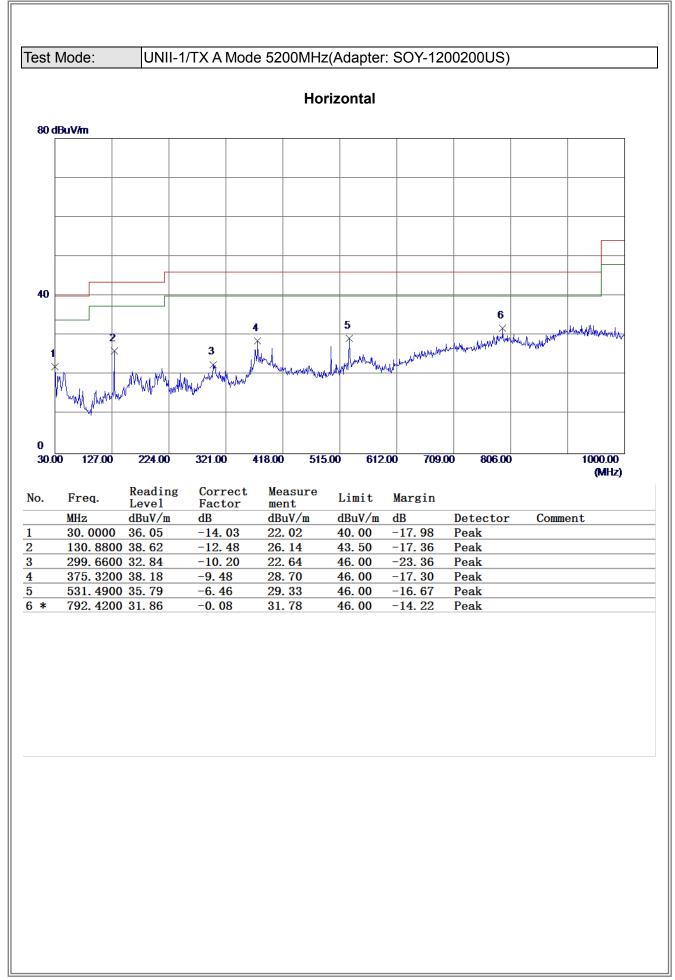












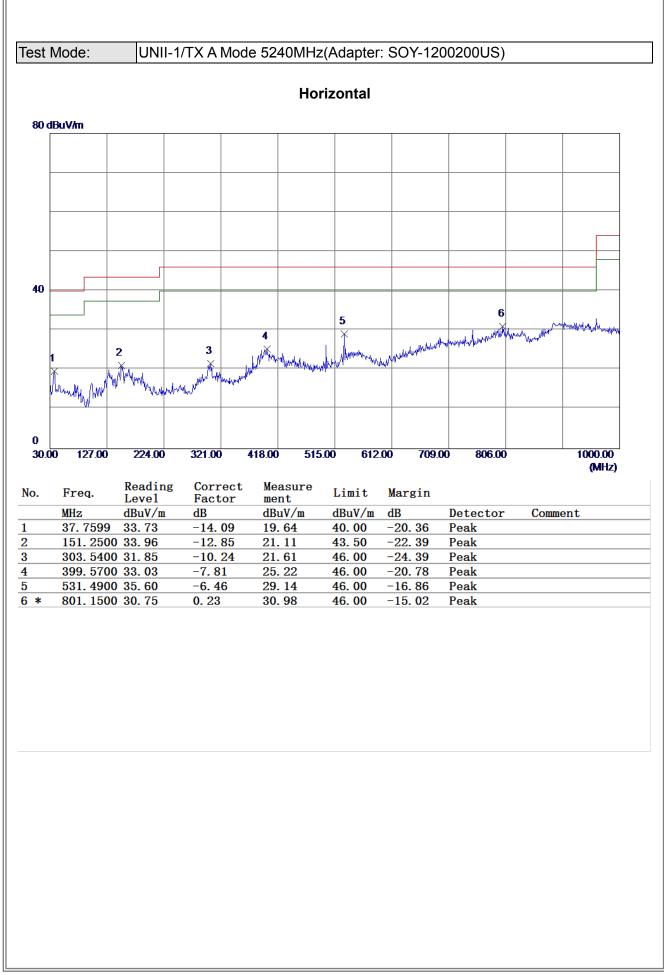












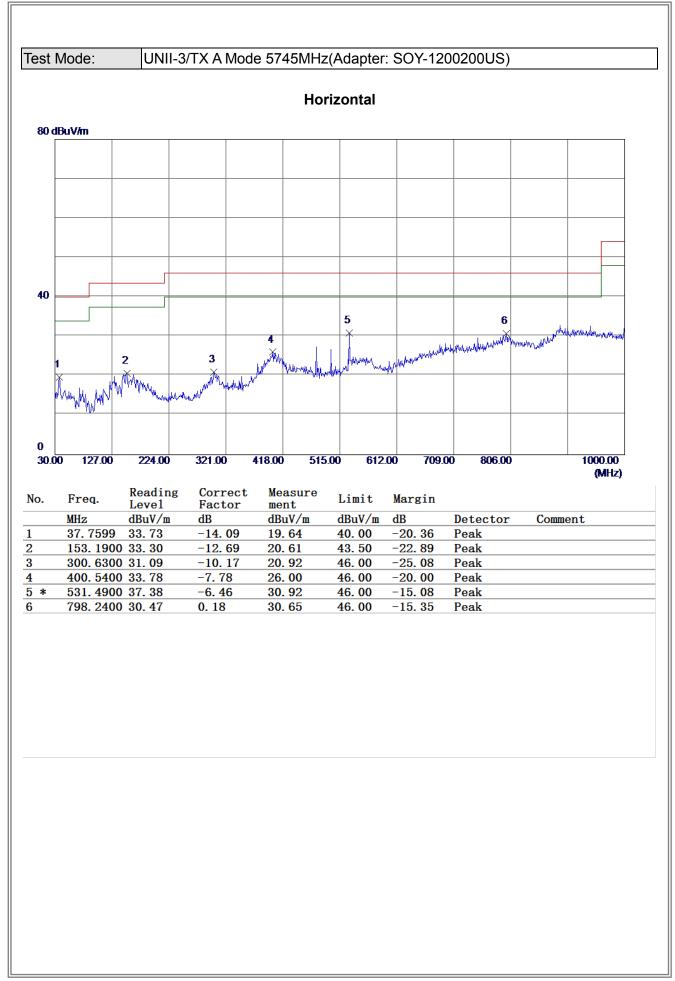












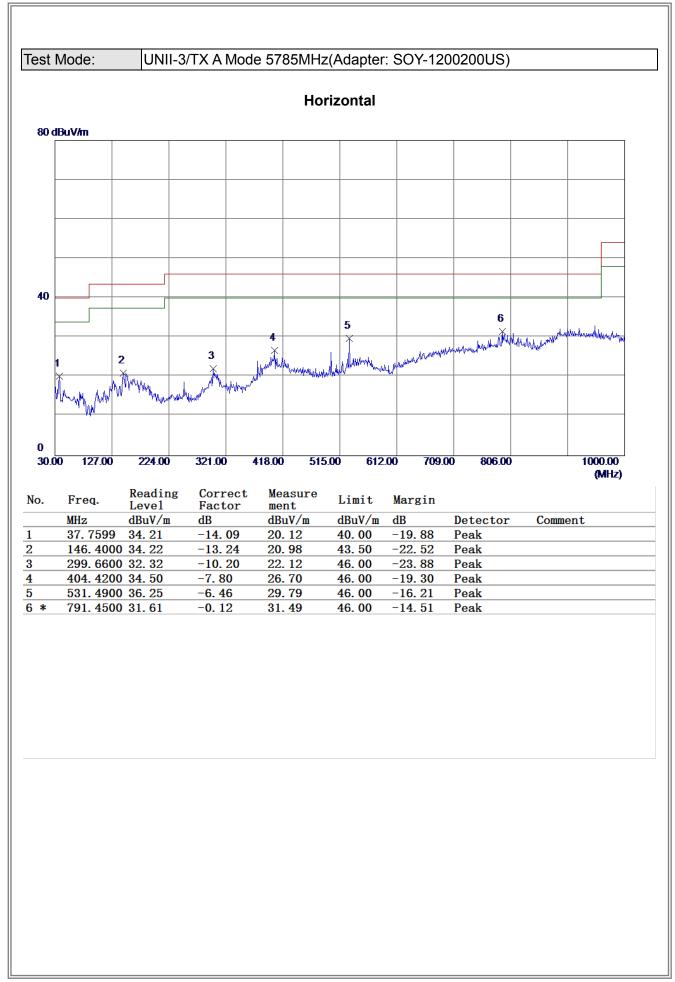






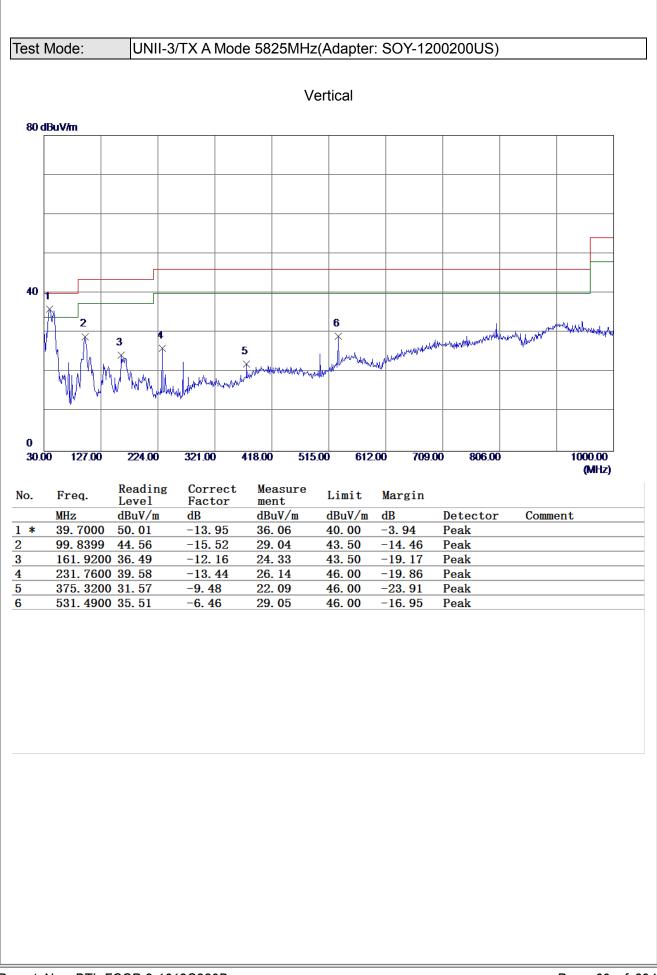






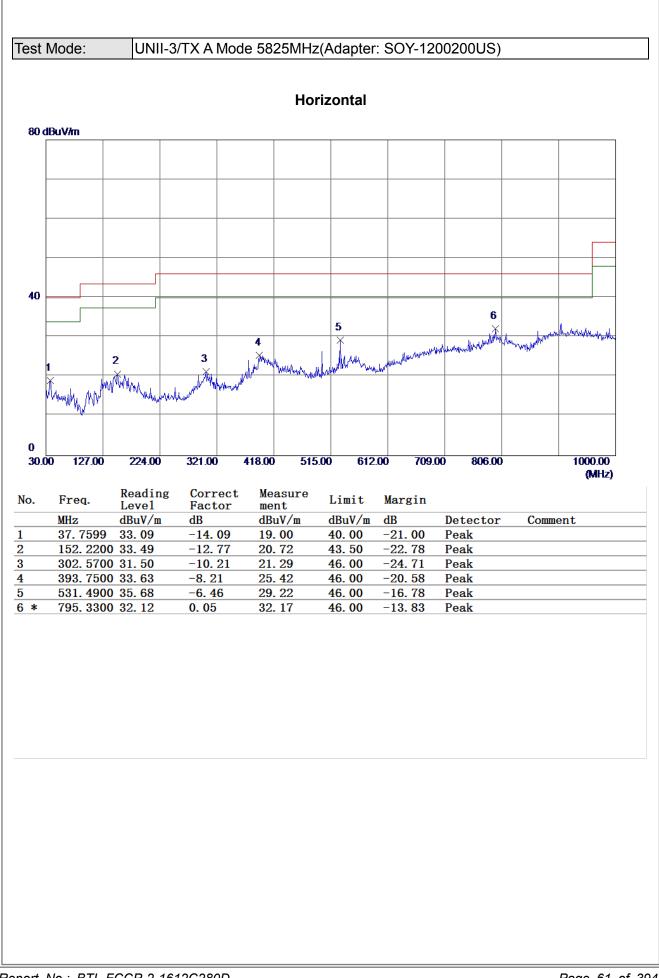






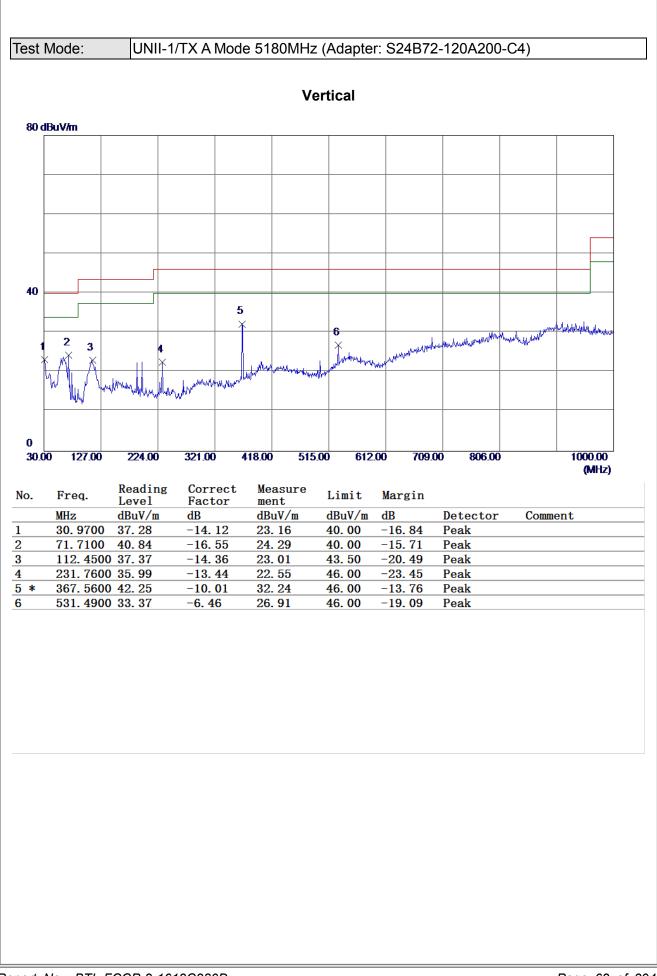






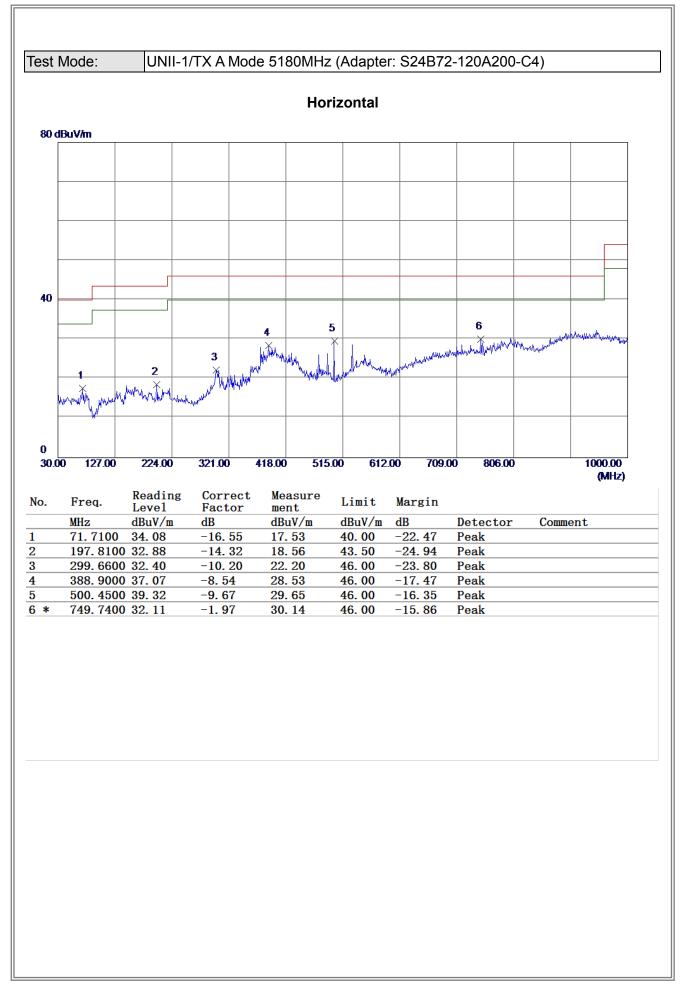






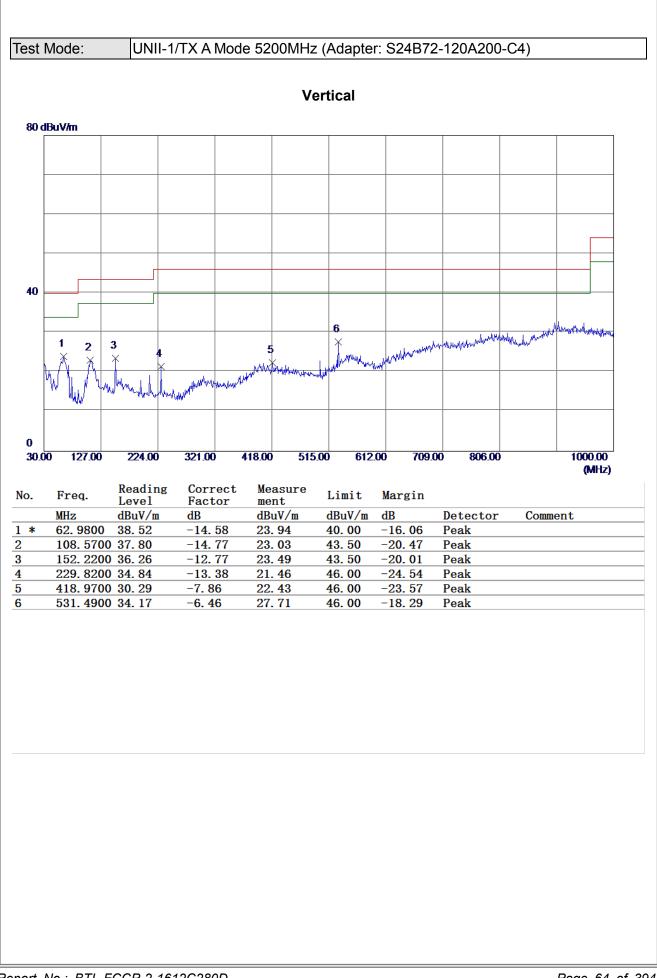






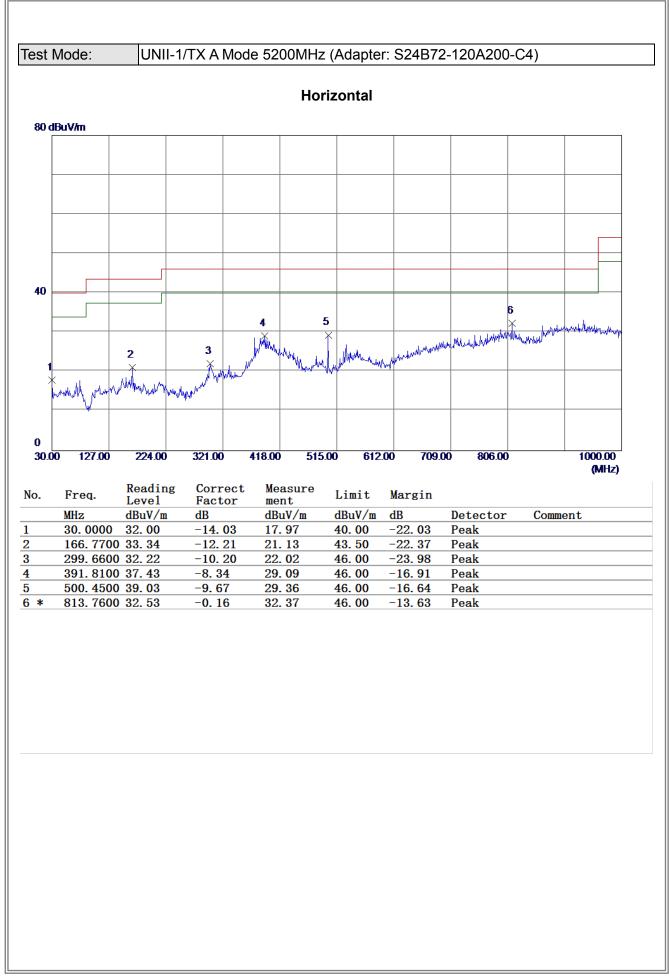












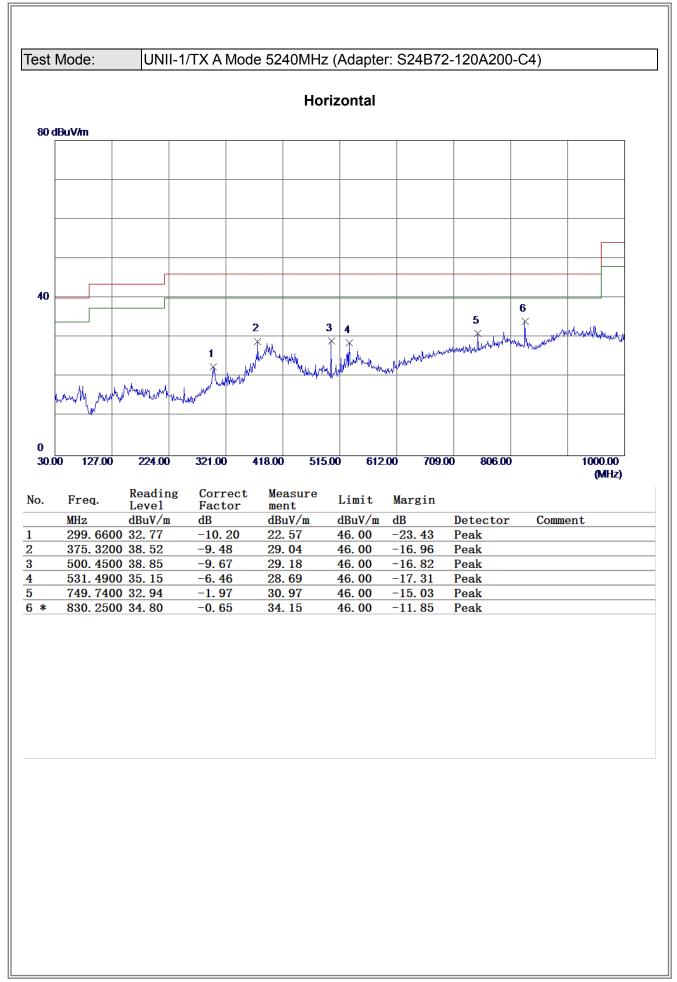






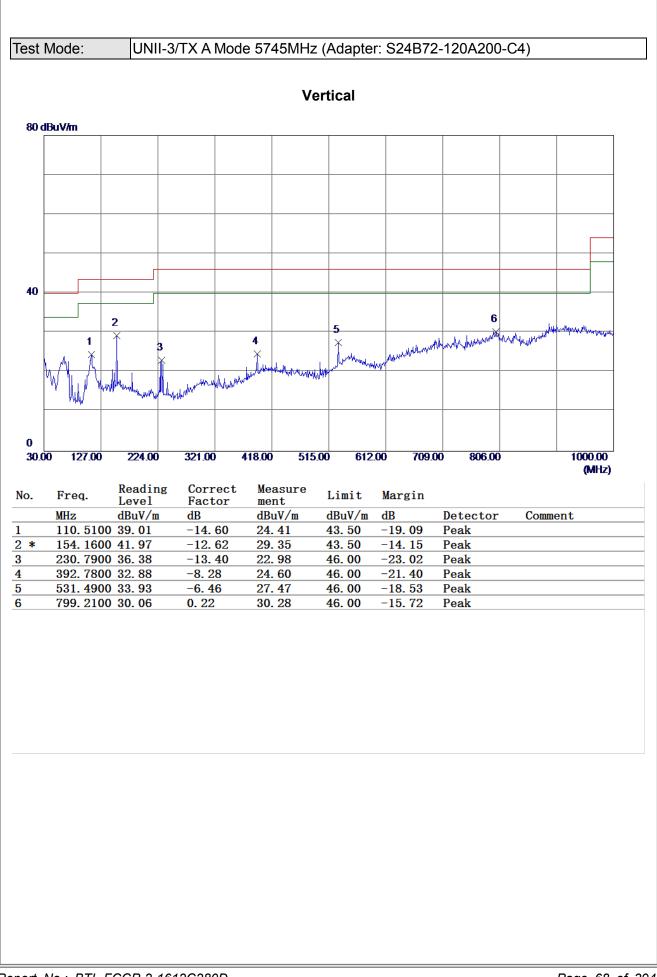






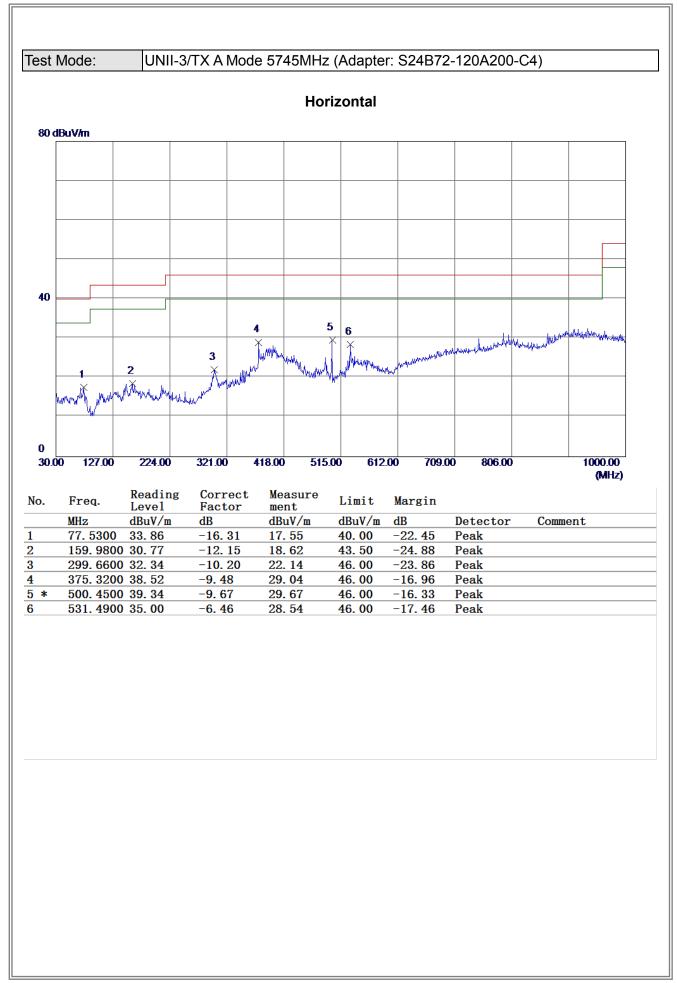






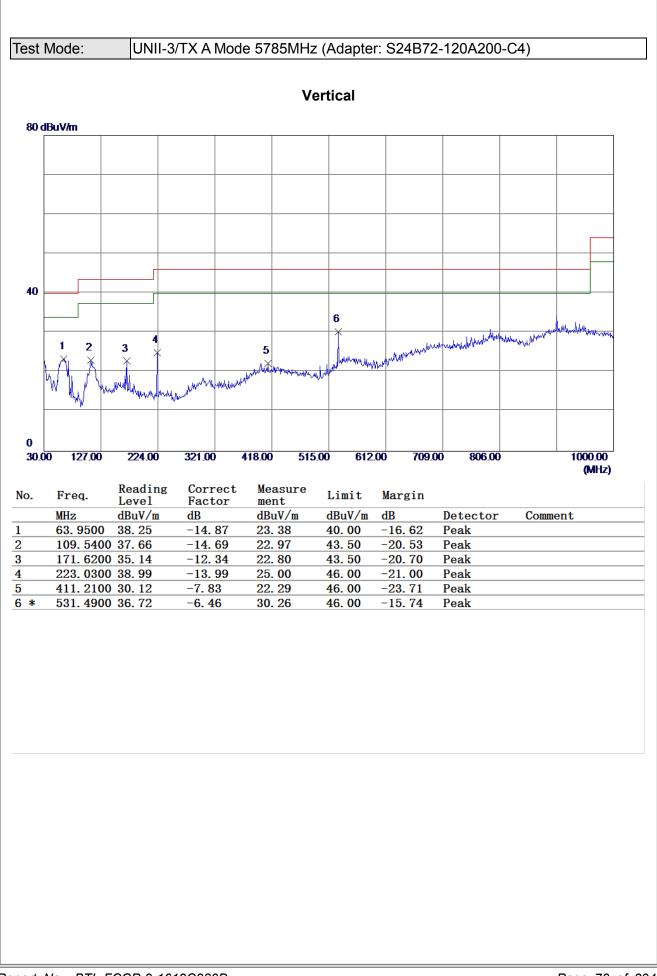






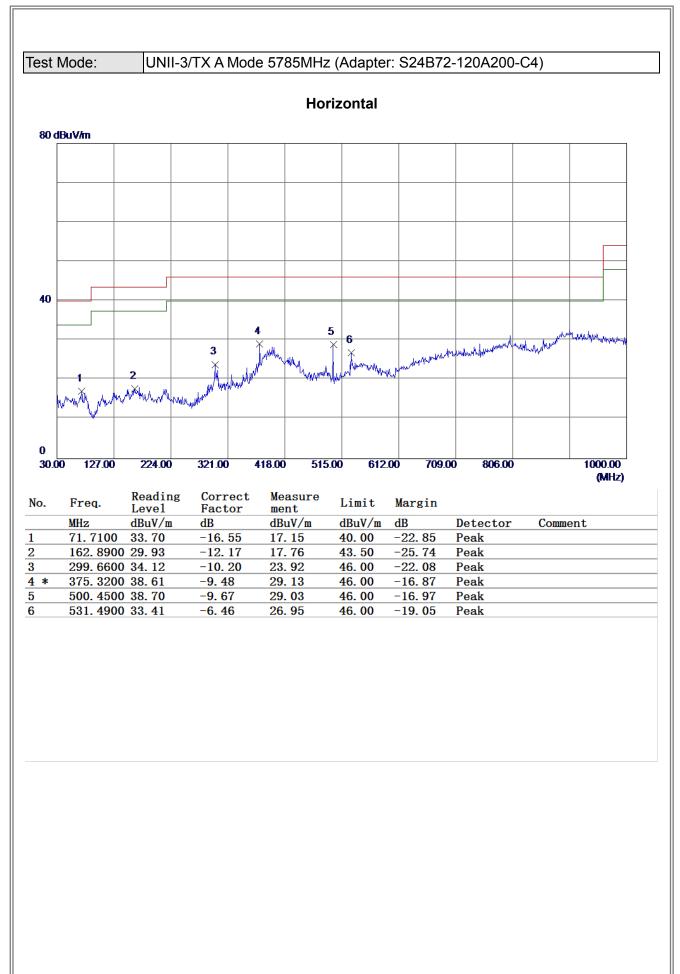












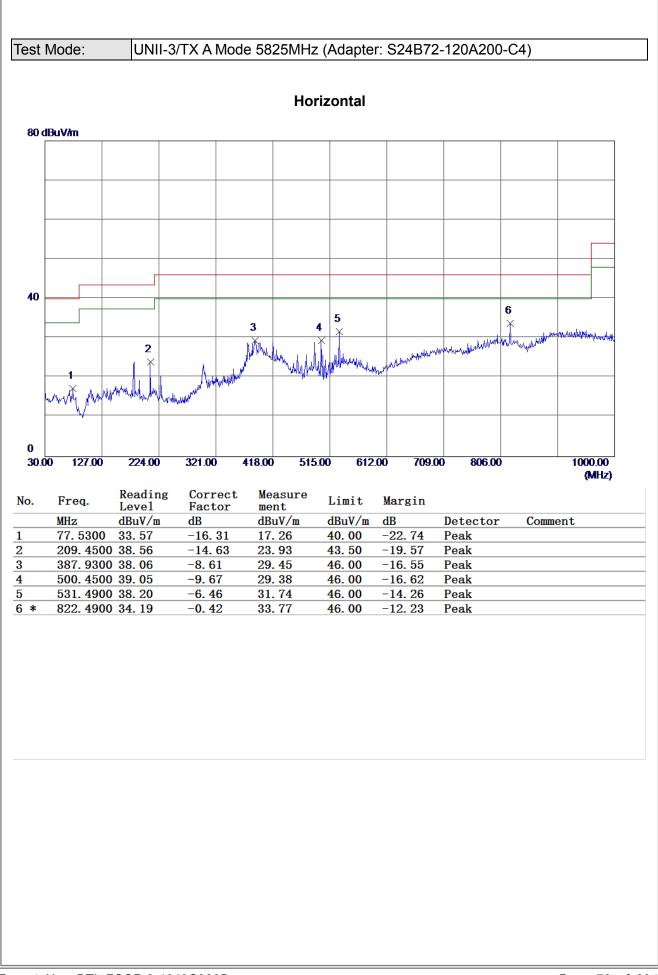














APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)

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