

Equipment:Model Name:Applicant:	411C236 GPON ONU G-240W-B Alcatel-Lucent Shanghai Bell Co. Ltd. GB602, 388 Ningqiao Road Pudong, Shanghai
Date of Test :   Issued Date :	Nov. 24, 2014 Nov. 24, 2014 ~ Dec. 19, 2014 Dec. 22, 2014 3TL Inc.
Testing Engineer	: David Mao (David Mao)
Technical Manager	:(Leo Hung)
Authorized Signator	$\frown$ 1



#### 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 the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A**.

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#### **REPORT ISSUED HISTORY**

Issued No.	Description	Issued Date
BTL-FCCP-2-1411C236	Original Issue.	Dec. 22, 2014



#### **1. CERTIFICATION**

Equipment : GPON ONU	
Brand Name : Alcatel-Lucent	
Model Name: G-240W-B	
Applicant : Alcatel-Lucent Shanghai Bell Co. Ltd.	
Manufacturer: Alcatel-Lucent Shanghai Bell Co. Ltd.	
Address : 6B602, 388 Ningqiao Road Pudong, Shanghai	
Factory : 1. Taicang T&W Electronics Co.,Ltd.	
2. Shenzhen Gongjin Electronics Co.,Ltd.	
Address : 1. Jiangnan Road 89,Ludu Town,Taicang,Jiangsu 215412,P.R.China	
2. No 2&3 Buildings, Mingwei Factory Area, Songgang Road West, No. A	
Building, 1#Songgang Road Songgang Sub-District, Shenzhen, Guangdong,	
518105, P.R. China	
Date of Test : Nov. 24, 2014 ~ Dec. 19, 2014	
Test Sample : ENGINEERING SAMPLE	
Standard (a) FCC Part15, Subpart E(15.407) / ANSI C63.4: 2009	
Standard(s) : FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.	

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-2-1411C236) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

#### 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart E				
Standard(s) Section FCC	Test Item Judgment		Remark	
15.207	AC Power Line Conducted Emissions	PASS		
15.407(a)	26dB Spectrum Bandwidth	PASS		
15.407(a)	Maximum Conducted Output Power	PASS		
15.407(a)	Power Spectral Density	PASS		
15.407(a)	Radiated Emissions	PASS		
15.407(b)	Band Edge Emissions	PASS		
15.407(g)	Frequency Stability	PASS		
15.203	Antenna Requirements	PASS		

#### NOTE:

(1)" N/A" denotes test is not applicable in this test report.

(2) FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

#### 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. 523792 BTL's test firm number for FCC: 319330

#### 2.2 MEASUREMENT UNCERTAINTY

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

#### A. Conducted Measurement:

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

#### B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U <sup>,</sup> ( B)	NOTE
		9KHz~30MHz	V	3.79	
		9KHz~30MHz	Н	3.57	
		30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	Н	3.60	
DG-CB03	CISPR	200MHz ~ 1,000MHz	V	3.86	
DG-CB03 CISFR	200MHz ~ 1,000MHz	Н	3.94		
	1GHz~18GHz	V	3.12		
		1GHz~18GHz	Н	3.68	
		18GHz~40GHz	V	4.15	
		18GHz~40GHz	Н	4.14	

#### **3. GENERAL INFORMATION**

#### 3.1 GENERAL DESCRIPTION OF EUT

Equipment	GPON ONU			
Brand Name	Alcatel-Lucent			
Model Name	G-240W-B			
Mode Different	Please refer to note 5 on page 12			
	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	300Mbps		
Product Description	Output Power (Max.)for UNII-1	802.11a: 20.41 dBm 802.11n (20M): 23.53 dBm 802.11n (40M): 23.46 dBm 802.11ac (20M): 23.48 dBm 802.11ac (40M): 22.32 dBm 802.11ac (80M): 17.73 dBm		
	Output Power (Max.)for UNII-2A	802.11a: 19.56 dBm 802.11n (20M): 22.54 dBm 802.11n (40M): 23.19 dBm 802.11ac (20M): 23.01 dBm 802.11ac (40M): 21.93 dBm 802.11ac (80M): 18.14 dBm		
	Output Power (Max.)for UNII-2C	802.11a: 18.07 dBm 802.11n (20M): 20.43 dBm 802.11n (40M): 22.60 dBm 802.11ac (20M): 20.39 dBm 802.11ac (40M): 21.35 dBm 802.11ac (80M): 23.55 dBm		
	Output Power (Max.)for UNII-3	802.11a: 18.91 dBm 802.11n (20M): 23.32 dBm 802.11n (40M): 23.33 dBm 802.11ac (20M): 23.41 dBm 802.11ac (40M): 23.62 dBm 802.11ac (80M): 18.15 dBm		
Power Source	#1 DC voltage supplied from AC Adapter. Brand/ Model: Mass Power/WHF-1200300VA #2 Supplied form UPS. Brand/ Model: CyberPower/DTC36U12V3-G			
Power Rating	#1 I/P: AC 100-240V 50/60Hz, 1.0A O/P: DC 12.0V 3.0A #2 I/P: AC 100-240V 50/60Hz, 1.0A O/P: DC 12.0V 36W			

Note:

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

#### 2. Channel List:

802.11a 802.11n 20MHz 802.11ac 20MHz		802.11n 40MHz 802.11ac 40MHz		802.11ac 80MHz	
UNI	I-1	UNII-1		UN	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				

802.11a 802.11n 20MHz 802.11ac 20MHz		802.11n 40MHz 802.11ac 40MHz		802.11ac 80MHz	
UNII	-2A	UNII-2A		UNI	I-2A
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

802. 802.11n 802.11ac	20MHz	802 112C 40MHZ		802.11ac 80MHz	
UNII	-2C	UNI	I-2C	UNII-2C	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	102	5510	106	5530
104	5520	110	5550	122	5610
108	5540	118	5590		
112	5560	126	5630		
116	5580	134	5670		
132	5660				
136	5680				
140	5700				

802. 802.11n 802.11ac	20MHz	802.11n 40MHz 802.11ac 40MHz		802.11ac 80MHz	
UNI	I-3	UN	II-3	UN	II-3
Channel	Frequency (MHz)	Chann I	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				



3. Antenna Specification:

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
4	Airgain	N5x20B	Embedded	N/A	2.90	5GHz
5	Airgain	N5x20B	Embedded	N/A	2.90	5GHz
6	Airgain	N5x20B	Embedded	N/A	2.90	5GHz
7	Airgain	N5x20B	Embedded	N/A	2.90	5GHz

Note:

- (1) The EUT incorporates a MIMO function. Physically, the EUT provides four completed four transmitters and four receivers (4T4R). All transmit signals are completely uncorrelated, then, Direction gain =  $G_{ANT}$ , that is Directional gain=2.90.
- (2) ANT 4 was the worst case for 1TX.

4.	Operating Mode TX Mode	1TX	4TX
	802.11a	V (ANT 4)	-
	802.11n (20MHz)	-	V (ANT 4+ ANT 5+ANT 6+ANT 7)
	802.11n (40MHz)	-	V (ANT 4+ ANT 5+ANT 6+ANT 7)
	802.11ac (20MHz)	-	V (ANT 4+ ANT 5+ANT 6+ANT 7)
	802.11ac (40MHz)	-	V (ANT 4+ ANT 5+ANT 6+ANT 7)
	802.11ac (80MHz)	-	V (ANT 4+ ANT 5+ANT 6+ANT 7)

5.

	KIT Part Number	EMA Part Number
	3FE56636AAAA	3FE56756BAAA
G-240W-B	3FE56636BAAA	3FE56756AABA
	3FE56636CAAA	3FE56756AABA
	3FE56636CBAA	3FE56756ABBA

#### 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 Test Mode	Description		
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)		
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)		
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)		
Mode 4	TX AC20 Mode / CH36, CH40, CH48 (UNII-1)		
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)		
Mode 6	TX AC80 Mode / CH42 (UNII-1)		
Mode 7	TX A Mode / CH52, CH60, CH64 (UNII-2A)		
Mode 8	TX N20 Mode / CH52, CH60, CH64 (UNII-2A)		
Mode 9	TX N40 Mode / CH54, CH62 (UNII-2A)		
Mode 10	TX AC20 Mode / CH52, CH60, CH64 (UNII-2A)		
Mode 11	TX AC40 Mode / CH54, CH62 (UNII-2A)		
Mode 12	TX AC80 Mode / CH58 (UNII-2A)		
Mode 13	TX A Mode / CH100, CH116, CH140 (UNII-2C)		
Mode 14	TX N20 Mode / CH100, CH116, CH140 (UNII-2C)		
Mode 15	TX N40 Mode / CH102, CH110, CH134 (UNII-2C)		
Mode 16	TX AC20 Mode / CH100, CH116, CH140 (UNII-2C)		
Mode 17	TX AC40 Mode / CH102, CH110, CH134 (UNII-2C)		
Mode 18	TX AC80 Mode / CH106, CH122 (UNII-2C)		
Mode 19	TX A Mode / CH149,CH157,CH165 (UNII-3)		
Mode 20	TX N20 Mode / CH149,CH157,CH165 (UNII-3)		
Mode 21	TX N40 Mode / CH151,CH159 (UNII-3)		
Mode 22	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)		
Mode 23	TX AC40 Mode / CH151,CH159 (UNII-3)		
Mode 24	TX AC80 Mode / CH155 (UNII-3)		
Mode 25	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		

For Conducted Test			
Final Test Mode Description			
Mode 25 TX Mode			



	For Radiated Test				
Final Test Mode	Description				
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)				
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)				
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)				
Mode 4	TX AC20 Mode / CH36, CH40, CH48 (UNII-1)				
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)				
Mode 6	TX AC80 Mode / CH42 (UNII-1)				
Mode 7	TX A Mode / CH52, CH60, CH64 (UNII-2A)				
Mode 8	TX N20 Mode / CH52, CH60, CH64 (UNII-2A)				
Mode 9	TX N40 Mode / CH54, CH62 (UNII-2A)				
Mode 10	TX AC20 Mode / CH52, CH60, CH64 (UNII-2A)				
Mode 11	TX AC40 Mode / CH54, CH62 (UNII-2A)				
Mode 12	TX AC80 Mode / CH58 (UNII-2A)				
Mode 13	TX A Mode / CH100, CH116, CH140 (UNII-2C)				
Mode 14	TX N20 Mode / CH100, CH116, CH140 (UNII-2C)				
Mode 15	TX N40 Mode / CH102, CH110, CH134 (UNII-2C)				
Mode 16	TX AC20 Mode / CH100, CH116, CH140 (UNII-2C)				
Mode 17	TX AC40 Mode / CH102, CH110, CH134 (UNII-2C)				
Mode 18	TX AC80 Mode / CH106, CH122 (UNII-2C)				
Mode 19	TX A Mode / CH149,CH157,CH165 (UNII-3)				
Mode 20	TX N20 Mode / CH149,CH157,CH165 (UNII-3)				
Mode 21	TX N40 Mode / CH151,CH159 (UNII-3)				
Mode 22	TX AC20 Mode / CH149,CH157,CH165 (UNII-3)				
Mode 23	TX AC40 Mode / CH151,CH159 (UNII-3)				
Mode 24	TX AC80 Mode / CH155 (UNII-3)				

Note: For Radiated Below 1G test, the 802.11a mode is found to be the worst case and recorded.

#### 3.3 TABLE OF PARAMETERS OF TEXT 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	N/A			
Frequency (MHz)	5180	5200	5240	
A Mode	17	22	22	
N20 Mode	16	20	21	
Frequency (MHz)	5190	5230		
N40 Mode	14	20		

UNII-2A				
Test Software Version	N/A			
Frequency (MHz)	5260	5300	5320	
A Mode	22	22	20	
N20 Mode	19	19	18	
Frequency (MHz)	5270	5310		
N40 Mode	20	15		

UNII-2C				
Test Software Version		N/A		
Frequency (MHz)	5500	5580	5700	
A Mode	20	21	17	
N20 Mode	16	14	13	
Frequency (MHz)	5510	5550	5670	
N40 Mode	16	18	18	

UNII-3				
Test Software Version	N/A			
Frequency (MHz)	5745	5785	5825	
A Mode	16	18	16	
N20 Mode	12	18	15	
Frequency (MHz)	5755	5795		
N40 Mode	10	17		

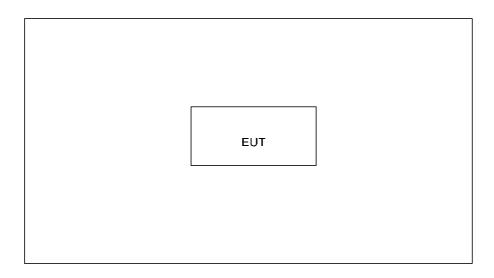
UNII-1					
Test Software Version	N/A				
Frequency (MHz)	5180	5200	5240		
AC20 Mode	16	21	21		
Frequency (MHz)	5190	5230			
AC40 Mode	14	20			
Frequency (MHz)	5210				
AC80 Mode	13				

UNII-2A					
Test Software Version	N/A				
Frequency (MHz)	5260	5300	5320		
AC20 Mode	18	19	18		
Frequency (MHz)	5270	5310			
AC40 Mode	20	14			
Frequency (MHz)	5290				
AC80 Mode	14				

UNII-2C					
Test Software Version	N/A				
Frequency (MHz)	5500	5580	5700		
AC20 Mode	17	14	12		
Frequency (MHz)	5510	5550	5670		
AC40 Mode	16	18	18		
Frequency (MHz)	5530	5610			
AC80 Mode	15	20			

UNII-3					
Test Software Version	N/A				
Frequency (MHz)	5745	5785	5825		
AC20 Mode	10	18	15		
Frequency (MHz)	5755	5795			
AC40 Mode	10	17			
Frequency (MHz)	5775				
AC80 Mode	10				

#### 3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



#### 3.5 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
-	-	-	-	-	-	

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	

#### 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

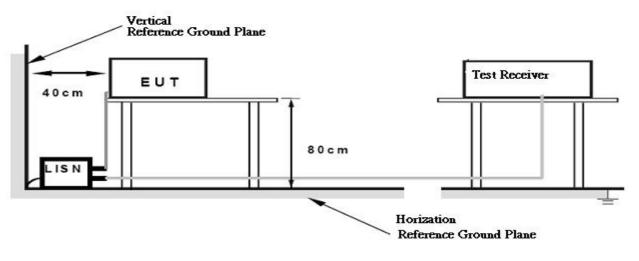
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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

### **B**TL

#### 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 Attachment 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

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

Note:

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

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

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBµV/m)
5150-5250	-27	68.3
5250-5350	-27	68.3
5470-5725	-27	68.3
5725 5950	-27 (beyond 10MHz of the band edge)	68.3
5725-5850	-17 (within 10 MHz of band edge)	78.3

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:  $E = \frac{1000000\sqrt{30P}}{3} \mu V/m$ , where P is the eirp (Watts)



#### 4.2.2 TEST PROCEDURE

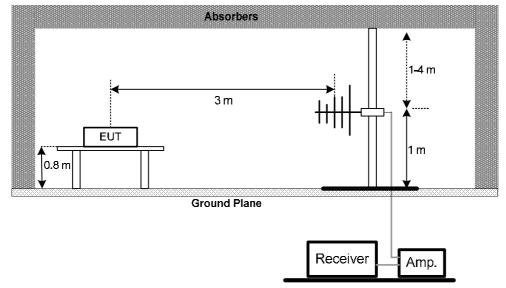
- a. The measuring distance of at 3m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; 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. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

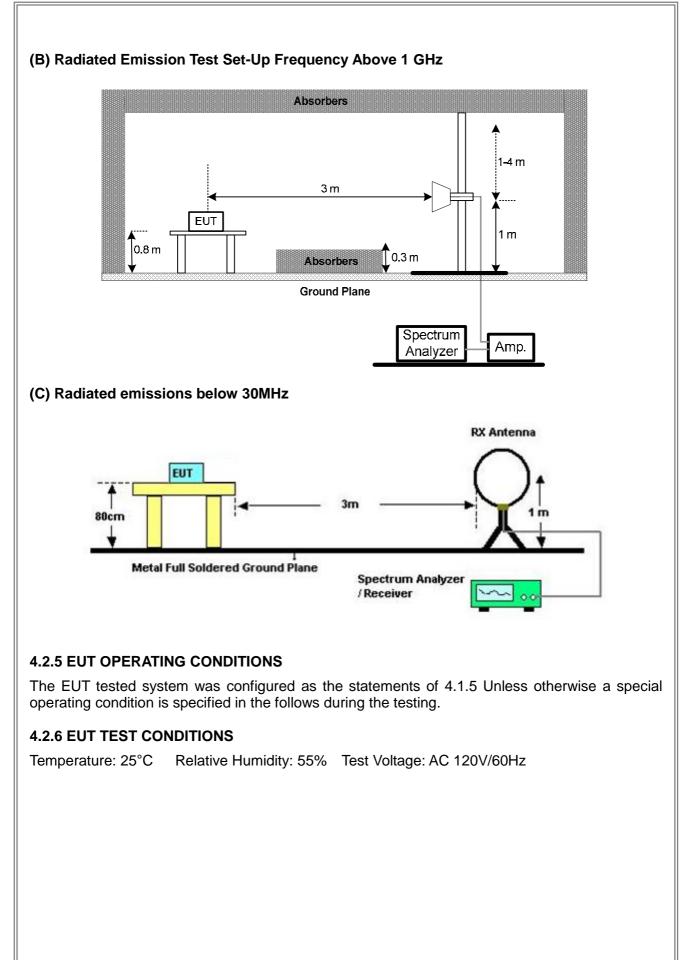
#### 4.2.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.4 TEST SETUP

#### (A) Radiated Emission Test Set-Up Frequency30 - 1000MHz







#### 4.2.7 TEST RESULTS (9K TO 30MHz)

Please refer to the Attachment B

Remark:

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

#### 4.2.8 TEST RESULTS (BETWEEN 30 TO 1000 MHz)

Please refer to the Attachment C.

Remark:

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz.
- (2) All readings are Peak unless otherwise stated QP in column of <sup>[7]</sup>Note <sup>[]</sup>. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

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

Please refer to the Attachment D.

Remark:

- (1) Spectrum Setting: 30MHz 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time = Auto
- (2) All readings are Peak unless otherwise stated AV in column of 『Note』. Peak denotes that the Peak reading compliance with the AV Limits and then AV Mode measurement didn't perform.
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown "\*" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axes:
   "X" denotes Laid on Table ; "Y" denotes Vertical Stand ; "Z" denotes Side Stand
- (7) During the measurements above 1GHz it is taken care of that the EUT is always within the 3dB cone of radiation BW of the used antenna.
- (8) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.

#### 5. 26dB SPECTRUM BANDWIDTH

#### 5.1 APPLIED PROCEDURES / LIMIT

	FCC Part15, Subpart E					
Test Item	Limit	Frequency Range (MHz)	Result			
	26 dB Bandwidth	5150-5250	PASS			
		5250-5350	PASS			
Bandwidth		5470-5725	PASS			
	Minimum 500KHz 6dB		PASS			
	Bandwidth	5725-5850	PA33			

#### 5.1.1 TEST PROCEDURE

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

b.	Spectrum Parameters	Setting
	Attenuation	Auto
	Span Frequency	> 26dB Bandwidth
	RBW	300 kHz
	VBW	1000 kHz
	Detector	Peak
	Trace	Max Hold
	Sweep Time	Auto

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

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

#### 5.1.4 EUT OPERATION CONDITIONS

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

#### 5.1.5 EUT TEST CONDITIONS

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

#### 5.1.6 TEST RESULTS

Please refer to the Attachment E.

#### 6. MAXIMUM CONDUCTED OUTPUT POWER

#### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Limit	Result		
	Fixed:1 Watt (30dBm)			
Conducted Output Power	Mobile and portable:	5150-5250	PASS	
	250mW (24dBm)			
	250mW (24dBm)	5250-5350	PASS	
		5470-5725	PASS	
	1 Watt (30dBm)	5725-5850	PASS	

#### 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
opant requency	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: 55% Test Voltage: AC 120V/60Hz

#### 6.1.6 TEST RESULTS

Please refer to the Attachment F.

#### 7. ANTENNA CONDUCTED SPURIOUS EMISSION

#### 7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Limit	Frequency Range (MHz)	Result	
Antenna conducted		5150-5250	PASS	
	-27dBm/MHz	5250-5350	PASS	
		5470-5725	PASS	
Spurious Emission	Below -17dBm/MHz within 10MHz of band edge, below -27dBm/MHz beyond 10MHz of the band edge	5725-5850	PASS	

#### 7.1.1 TEST PROCEDURE

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

b.	Spectrum Parameter	Setting
	Attenuation	Auto
	RBW	1000kHz
	VBW	1000kHz
	Trace	Max Hold
	Sweep Time	Auto

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



#### 7.1.4 EUT OPERATION CONDITIONS

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

#### 7.1.5 EUT TEST CONDITIONS

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

#### 7.1.6 TEST RESULTS Please refer to the Attachment G.

#### 8. POWER SPECTRAL DENSITY TEST

#### 8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart E				
Test Item	Limit	Frequency Range (MHz)	Result	
Power Spectral	Other then Mobile and portable:17dBm/MHz Mobile and portable:11dBm/MHz	5150-5250	PASS	
Density	11dBm/MHz	5250-5350	PASS	
		5470-5725	PASS	
	30dBm/500KHz	5725-5850	PASS	

#### 8.1.1 TEST PROCEDURE

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

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

Note:

- 1. For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v01, section II.F.5., it is acceptable to set RBW at 1MHz and VBW at 3MHz if the spectrum analyzer does not have 500kHz RBW.
- The value measured with RBW=1MHz is to be added with 10log(500kHz/1MHz) which is -3dB. For example, if the measured value is +10dBm using RBW=1MHz (that is +10dBm/MHz), then the converted value will be +7dBm/500kHz.



#### 8.1.1 DEVIATION FROM STANDARD

No deviation.

#### 8.1.2 TEST SETUP

EUT	SPECTRUM
	ANALYZER

#### 8.1.3 EUT OPERATION CONDITIONS

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

#### 8.1.4 EUT TEST CONDITIONS

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

8.1.5 TEST RESULTS Please refer to the Attachment H.

#### 9. FREQUENCY STABILITY MEASUREMENT

#### 9.1 APPLIED PROCEDURES / LIMIT

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

#### 9.1.1 TEST PROCEDURE

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

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

- c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
- d. User manual temperature is 0°C~50°C.

#### 9.1.2 DEVIATION FROM STANDARD

No deviation.



## 9.1.3 TEST SETUP

#### 9.1.4 EUT OPERATION CONDITIONS

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

#### 9.1.5 EUT TEST CONDITIONS

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

9.1.6 TEST RESULTS Please refer to the Attachment I.

#### **10. MEASUREMENT INSTRUMENTS LIST**

	Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	LISN	EMCO	3816/2	00052765	Mar. 29, 2015	
2	LISN	R&S	ENV216	100087	Mar. 29, 2015	
3	Test Cable	N/A	C_17	N/A	Mar. 14, 2015	
4	EMI TEST RECEIVER	R&S	ESCS30	826547/022	Mar. 29, 2015	
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 29, 2015	
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. 29, 2015	
2	Amplifier	HP	8447D	2944A09673	Mar. 29, 2015	
3	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015	
4	Test Cable	N/A	C-01_CB03	N/A	Jul. 01, 2015	
5	Controller	СТ	SC100	N/A	N/A	
6	Antenna	ETS	3115	00075789	Mar. 29, 2015	
7	Amplifier	Agilent	8449B	3008A02274	Mar. 29, 2015	
8	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015	
9	Test Cable	HUBER+SUHNER	C-48	N/A	Apr. 30, 2015	
10	Controller	СТ	SC100	N/A	N/A	
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Feb. 22, 2015	
12	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Feb. 22, 2015	
13	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Mar. 29, 2015	
14	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	Nov. 02, 2015

	Maximum Conducted Output Power Measurement				
Iten	N Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	ANRITSU	ML2495A	1128009	May. 29, 2015
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	May. 29, 2015

	Antenna Conducted Spurious Emission Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

	Frequency Stability Measurement				
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015
2	Precision Oven Tester	HOLINK	H-T-1F-D	BA03101701	May. 24, 2015

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

#### **11. EUT TEST PHOTO**

**Conducted Measurement Photos** 





#### Radiated Measurement Photos

9KHz to 30MHz





### Radiated Measurement Photos

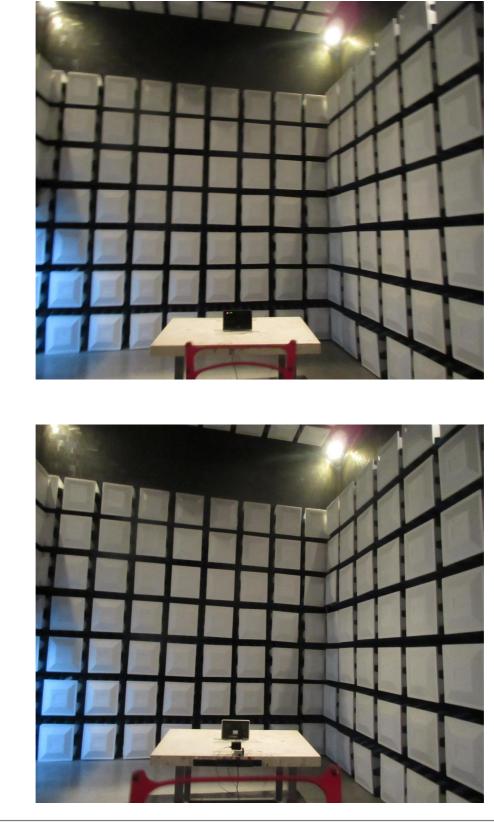
30MHz to 1000MHz





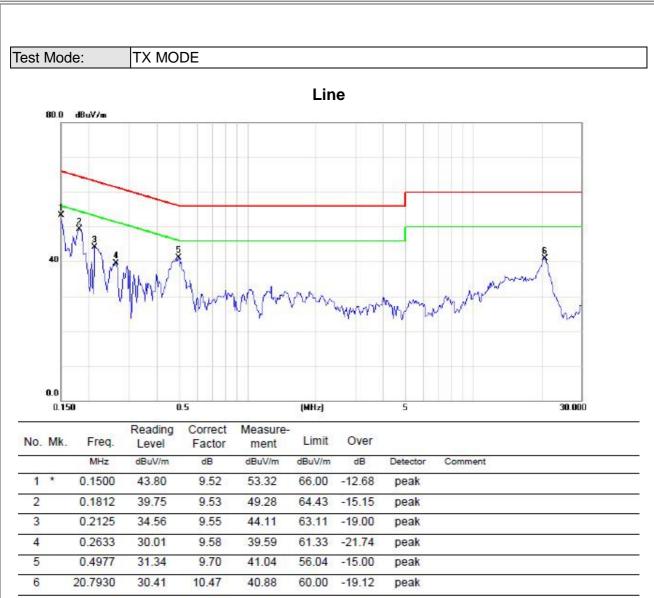
### **Radiated Measurement Photos**

Above 1000MHz



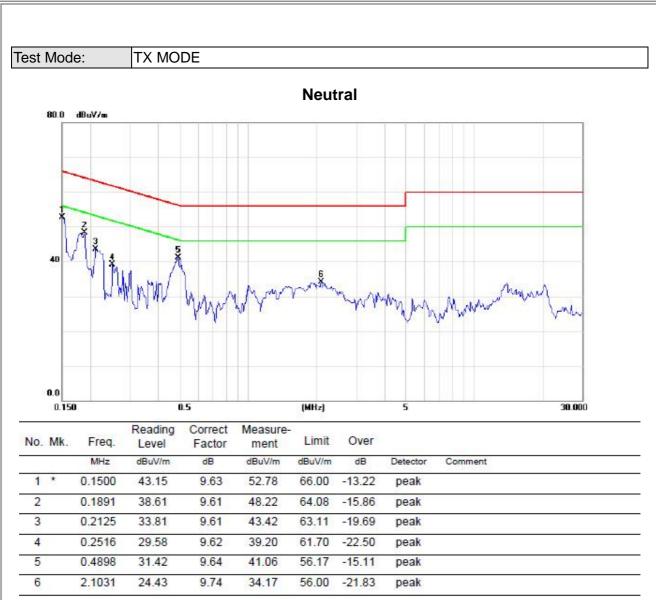
### **ATTACHMENT A - CONDUCTED EMISSION**





Note : The test result has included the cable loss.





Note : The test result has included the cable loss.

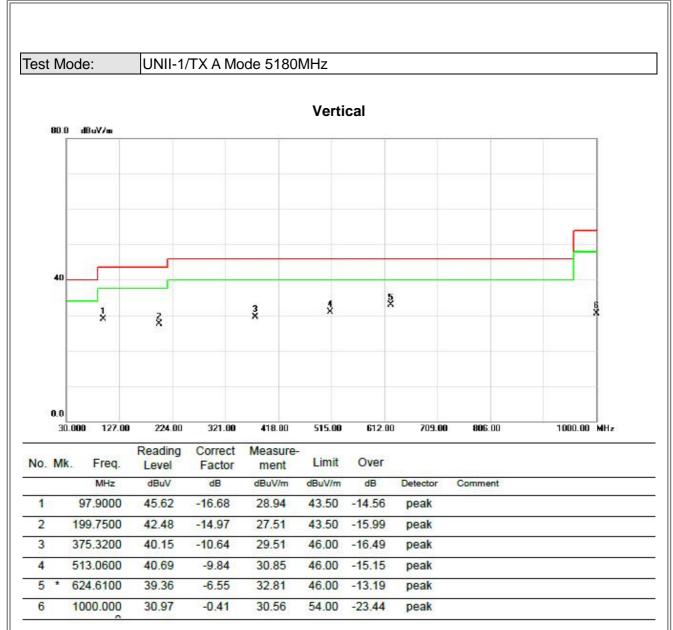
# ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)



Test Mode: TX MODE							
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit(QP) (dBuV/m)	Margin (dB)	Note
0.0093	0°	13.17	24.98	38.15	108.28	-70.13	AVG
0.0093	0°	14.25	24.98	39.23	128.28	-89.05	PK
0.0122	0°	6.71	24.79	31.50	105.88	-74.37	AVG
0.0124	0°	7.29	24.79	32.08	125.88	-93.79	PK
0.0253	0°	3.58	23.96	27.54	99.54	-72.00	AVG
0.0254	0°	5.14	23.96	29.10	119.54	-90.44	PK
0.0312	0°	1.23	23.59	24.82	97.72	-72.90	AVG
0.0314	0°	3.16	23.59	26.75	117.72	-90.97	PK
0.5881	0°	29.43	20.08	49.51	72.22	-22.70	QP
1.7543	0°	21.37	19.52	40.89	69.54	-28.65	QP
Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit(QP) (dBuV/m)	Margin (dB)	Note
0.0092	90°	13.26	24.30	37.56	128.32	-90.76	AVG
0.0092	90°	14.34	24.30	38.64	148.32	-109.68	PK
0.0245	90°	6.77	24.02	30.79	119.82	-89.04	AVG
0.0246	90°	8.43	24.02	32.45	139.82	-107.38	PK
0.0310	90°	3.36	23.60	26.96	117.78	-90.81	AVG
0.0312	90°	5.21	23.60	28.81	137.78	-108.96	PK
0.0436	90°	0.83	22.81	23.64	114.81	-91.18	AVG
0.0438	90°	3.04	22.81	25.85	134.81	-108.97	PK
0.4927	90°	30.56	19.82	50.38	73.75	-23.38	QP
1.7172	90°	21.43	19.53	40.96	69.54	-28.58	QP

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

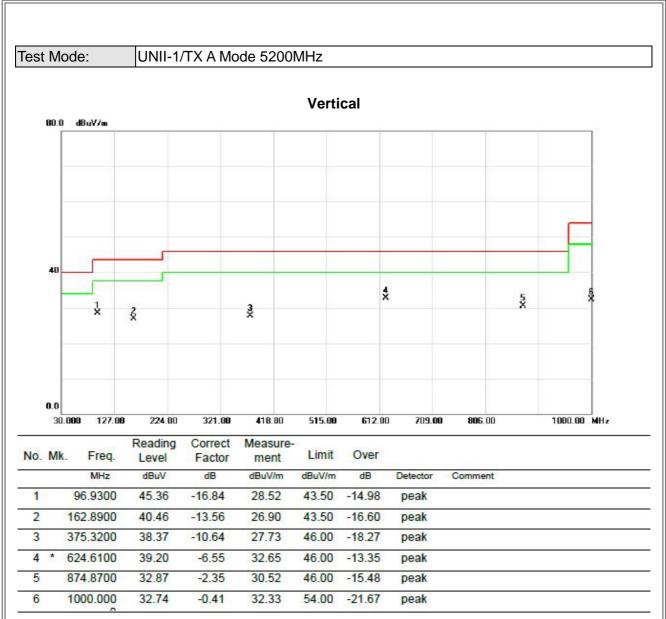








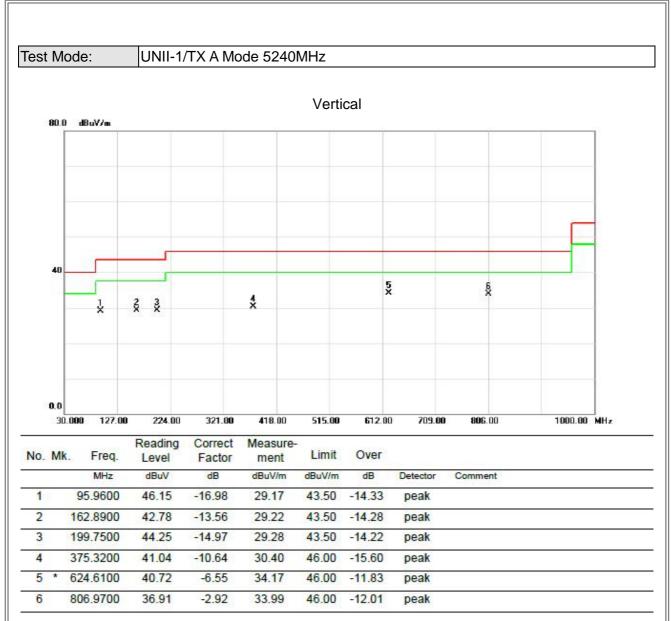




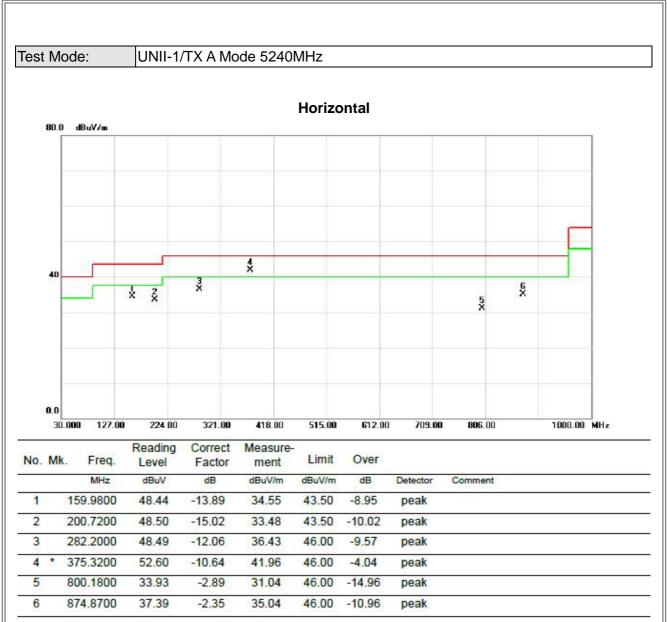




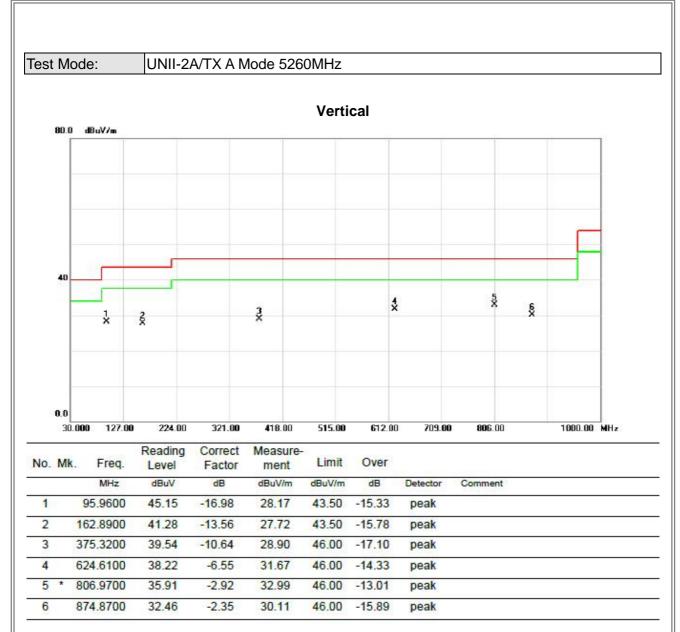




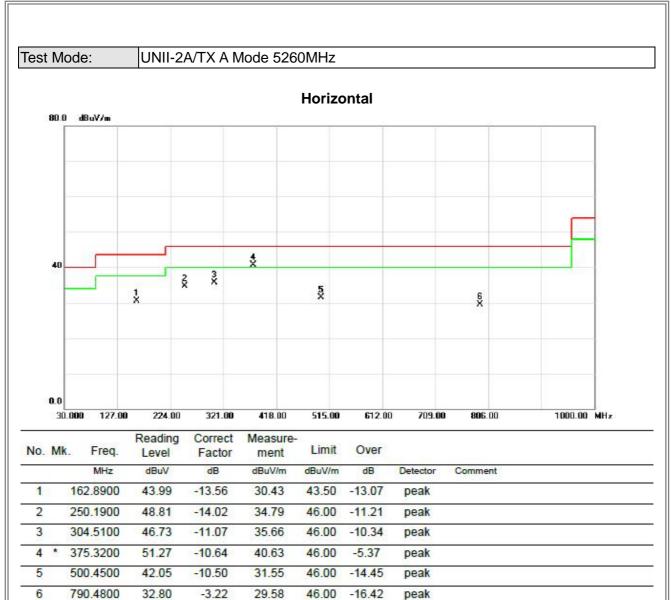




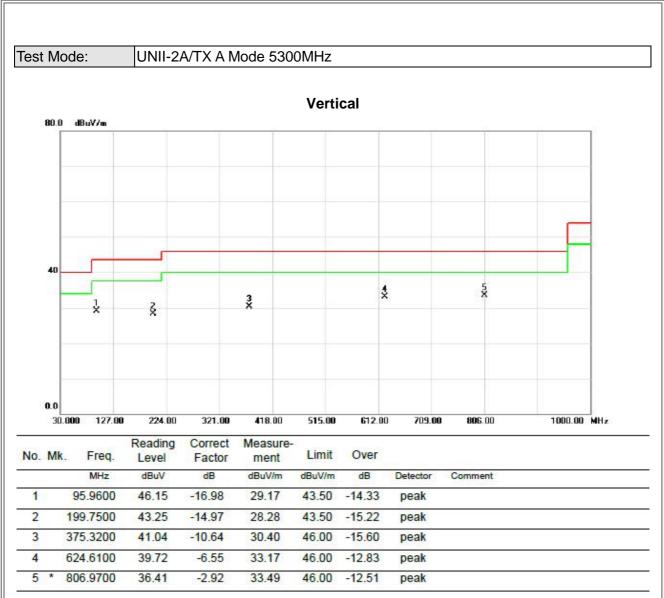












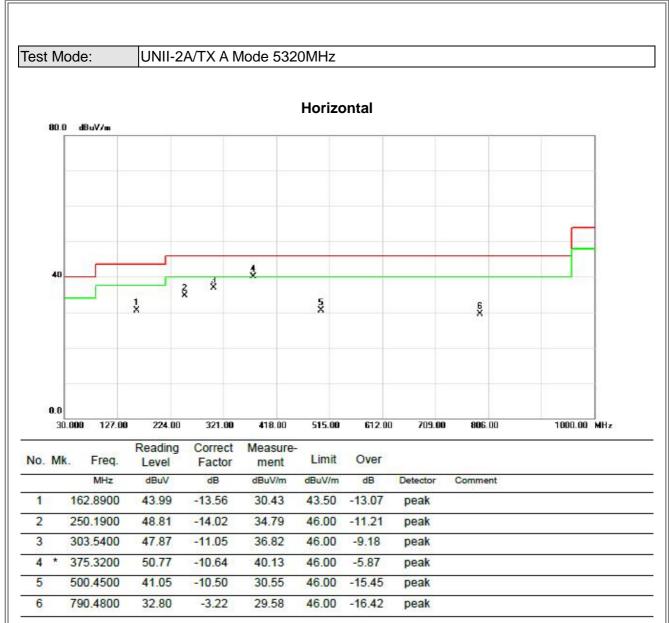




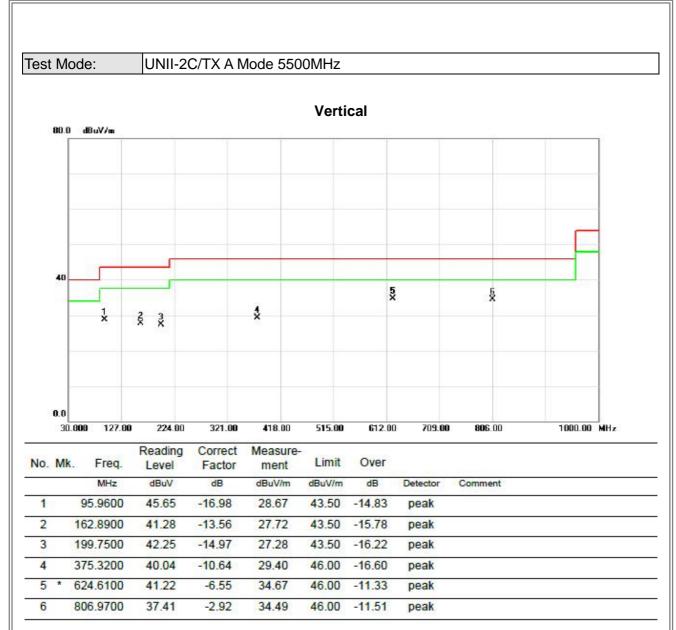




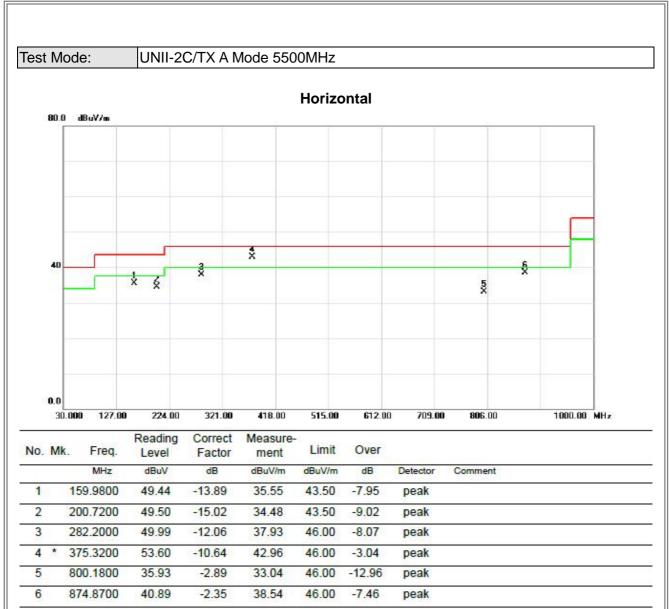




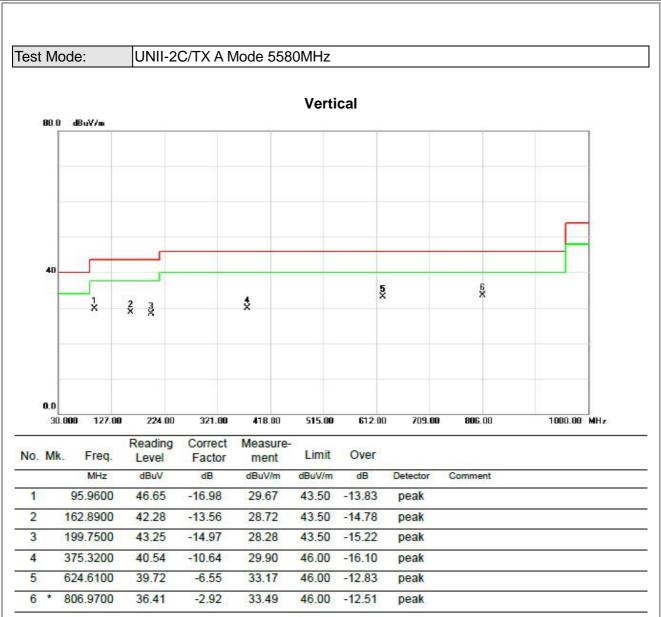




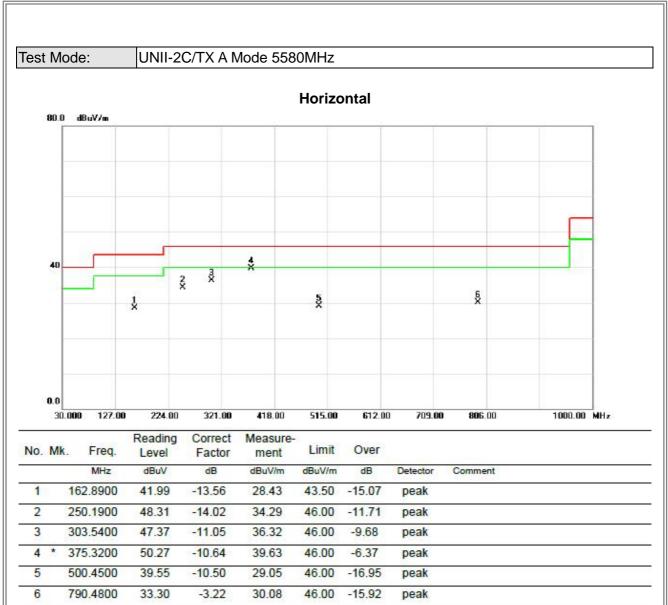




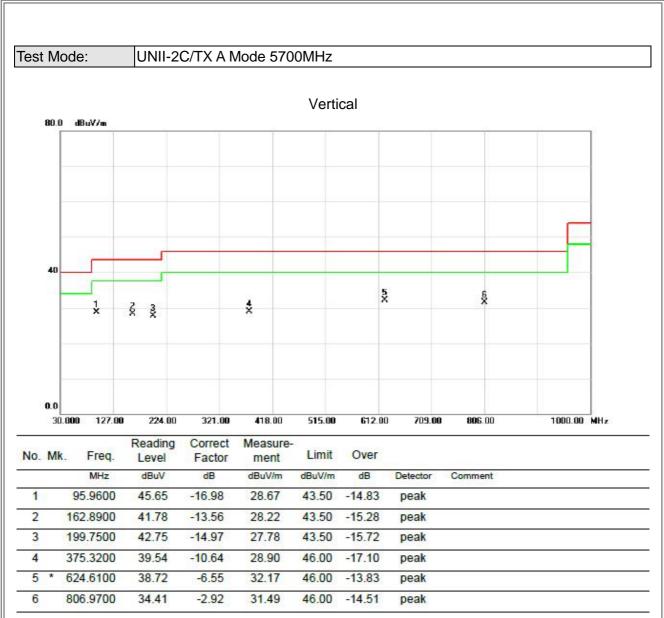




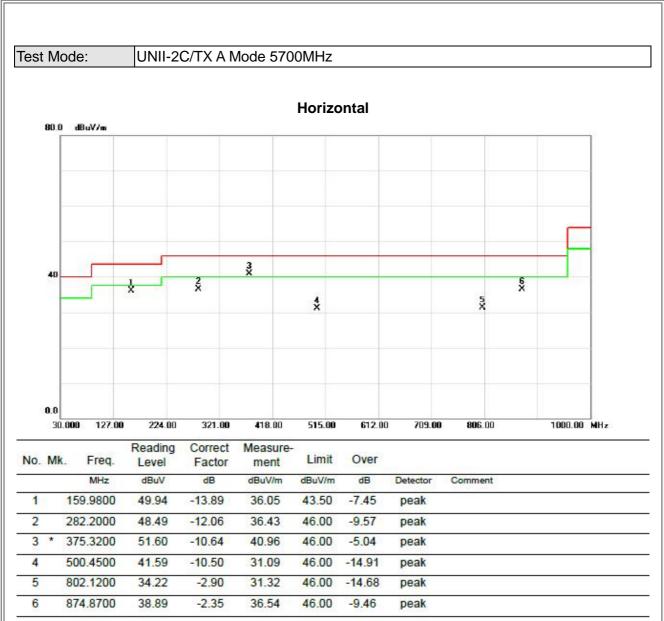




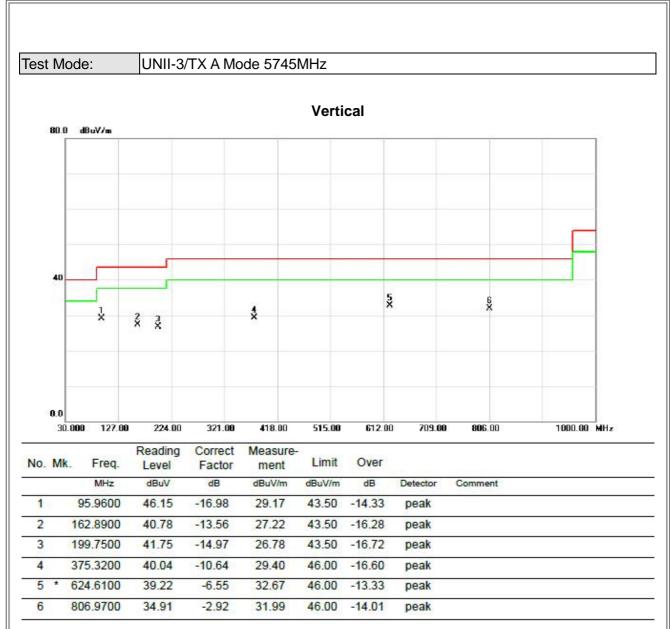
















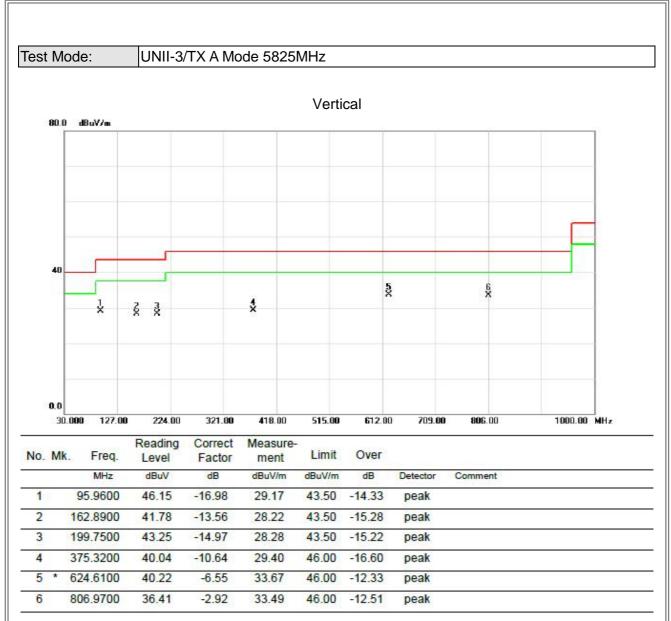




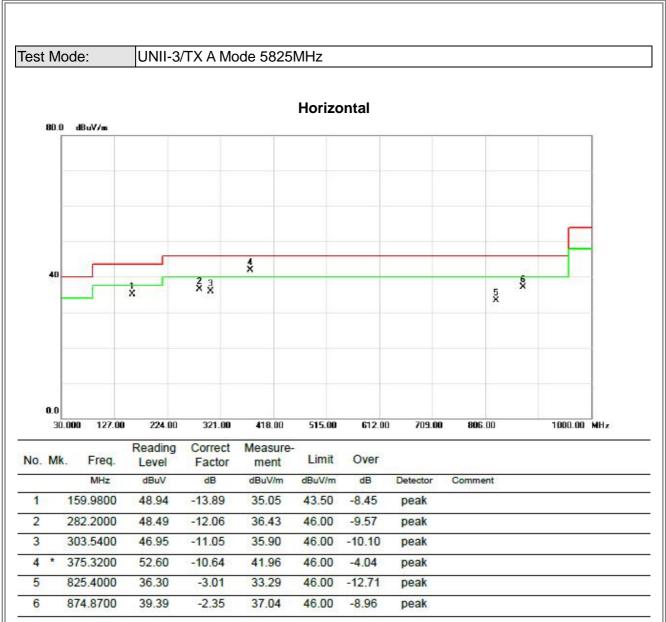












## ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)



