TEST REPORT

Application No.:	HKEM2010001058AT
Applicant:	VTECH TELECOMMUNICATIONS LTD
Address of Applicant:	23/F.,BLOCK 1, TAI PING INDUSTRIAL CENTRE,NO. 57 TING KOK ROAD,TAI PO, N.T.,Hong Kong
Equipment Under Test (EUT):	
EUT Name:	2.4G WIFI Video Baby monitor
Model No.:	RM5754 BU; RM5754HD BU; RM5754-2HD BU; RM5754-aHD BU; RM5854 BU; RM5854HD BU; RM5854-aHD BU; VM813HD BU; VM813-1bHD BU; VM813-abHD BU; RM7754 BU; RM7754HD BU ;RM7754-2HD BU; RM7754-aHD BU; RM7854 BU; RM7854HD BU; RM7854-2HD BU; RM7854-aHD BU; VM816HD BU; VM816-1bHD BU; VM816-abHD BU
Additional Model:	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
FCC ID:	EW780-1924-00
IC:	1135B-80192400
HVIN:	35-400255BU
Standard(s) :	CFR 47 FCC Part 15, Subpart C, 2019 RSS-247 Issue 2: May 2017 RSS-Gen: Issue 5 Amdt 2019
Date of Receipt:	2019-10-25 2020-11-04
Date of Test:	2019-10-25 to 2019-11-07 (for original report HKEM1910000102501) 2020-11-05 to 2020-11-26 (for new report HKEM201000105802)
Date of Issue:	2019-11-13 (for original report HKEM1910000102501) 2020-11-30 (for new report HKEM201000105802)
Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards specified above.

Law Man Kit
EMC Manager

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2019-11-13		*Original*
01		2020-11-30		*C2PC Change*

Authorized for issue by:				
				
		Leo Xu /Project Engineer		Date: 2020-11-30
				
		Law Man Kit /Reviewer		Date: 2020-11-30

2 Test Summary

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Disturbance at AC Power Line (150kHz-30MHz)	CFR 47 FCCPart 15, Subpart C 15.207	ANSI C63.10: 2013 Section 6.2	47 CFR FCC Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.2.3	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.2	RSS-Gen Section 8.8	Pass
Conducted Peak Output Power	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.9.1	RSS-247 Section 5.4(d)	Pass
Spurious Emissions	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.11	RSS-247 Section 5.5	Pass
Radiated Emissions which fall in the restricted bands	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.4&6.5&6.6	RSS-247 Section Section 3.3 & RSS-Gen Section 8.10	Pass

Note: Frequency stability requested in RSS GEN Section 8.1.1 has been complied since the result of band edge can demonstrate.

Declaration of EUT Family Grouping:

Item no:

RM5754 BU; RM5754HD BU; RM5754-2HD BU; RM5754-aHD BU; RM5854 BU; RM5854HD BU; RM5854-aHD BU; VM813HD BU; VM813-1bHD BU; VM813-abHD BU; RM7754 BU; RM7754HD BU; RM7754-2HD BU; RM7754-aHD BU; RM7854 BU; RM7854HD BU; RM7854-2HD BU; RM7854-aHD BU; VM816HD BU; VM816-1bHD BU; VM816-abHD BU

a=any alphanumeric character or blank is presenting number of baby unit.

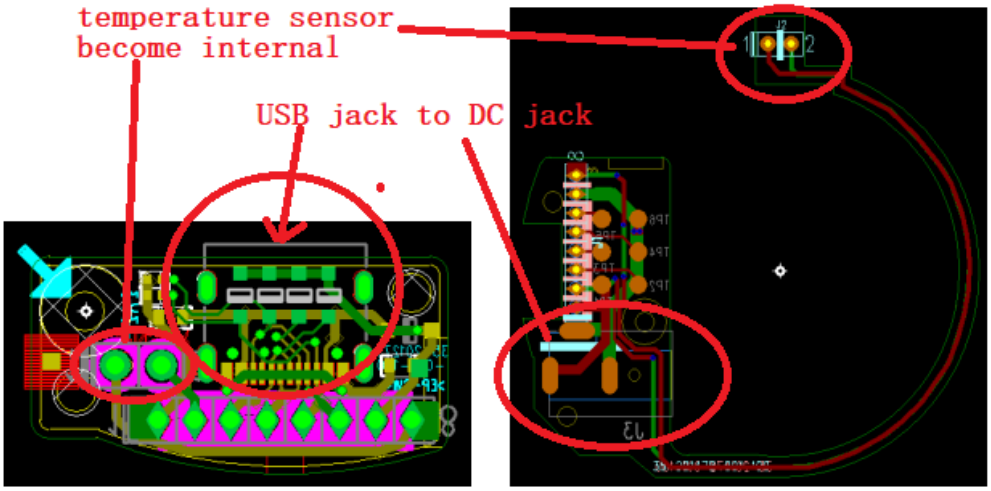
b= any alphanumeric character or blank is presenting color option

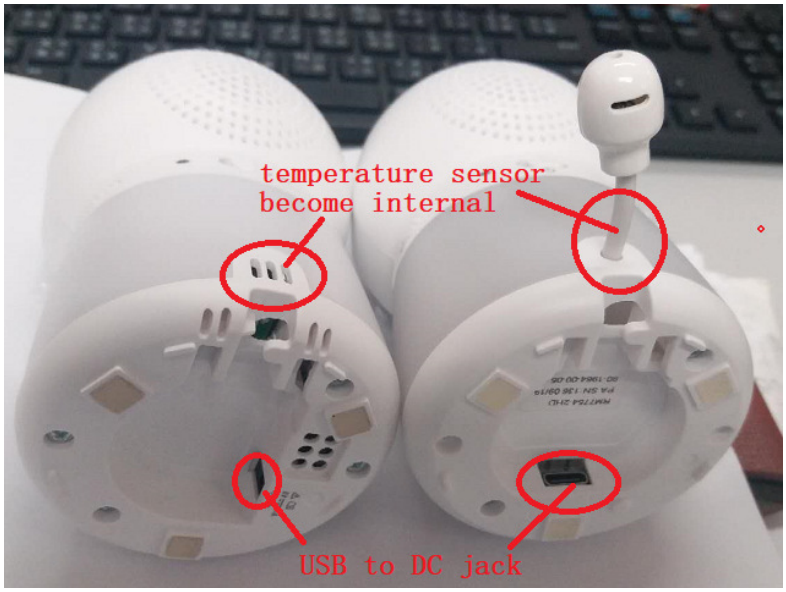
According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to the circuit design, PCB layout, electrical components used, internal wiring and functions. The differences are only the model/item No, color and decorations.

Therefore, only the model RM7754HD BU was tested in this report.

Note: According to the cover letter for C2PC (Class II permissive changes) from the applicant, the change are as below based on previous test reports HKEM1910000102501 issued on 2019-11-13.

1. External appearance is slightly changed
2. Power PCB changed from USB type C to DC jack
3. Temperature sensor changed from external to internal
4. VTPL adaptor VT05EUS05100 change from type C to DC jack
5. remove adaptor Ten Pao S005CAU0500100





According to the changes above, just partial sensor and Power PCB layout interface were change, Hence, Conducted Disturbance at AC Power Line; Conducted Peak Output Power and Radiated Emission were re-tested in this report, all other test result were referred to previous report HKEM1910000102501 issued on 2019-11-13.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Adaptor Model : VT05EUS05100 Input: AC 100 V - 240 V, 50/60, 0.15 A Output: DC 5.0 V, 1 A
Test voltage:	AC 120 V
Cable:	180 cm unshielded 2-wire DC cable
Antenna Gain:	1 dBi
Antenna Type:	Dipole Antenna
Channel Spacing:	5MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Data rate:	802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11 Mbps 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54 802.11n: 6.5Mbps, 13Mbps, 19.5Mbps, 26Mbps, 39Mbps, 52Mbps, 58.5Mbps, 65Mbps
Number of Channels:	802.11b/g/n(HT20):11
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
Tested Channels:	2412MHz, 2442MHz, 2462MHz
Series number:	A1
Hardware Version:	V001
Software Version:	V0008
	Remark: Power level setting was not adjustable and fixed default through SW Version.

Frequency List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2412**	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	**7**	**2442**	**11**	**2462**
4	2427	8	2447		

Remark: 1. Testing Channels are highlighted in **bold**.

4.2 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by client

Description	Manufacturer	Model No.	SN/Certificate NO
Test Software	MicroRidge System	Version 3.0.0.108	N/A

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook (EMC4)	Dell	P75F	N/A

4.3 Measurement Uncertainty

RF

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 10^{-8}
2	Duty cycle	± 0.37%
3	Occupied Bandwidth	± 3%
4	RF conducted power (30MHz-40GHz)	1.5dB
5	RF power density	1.5dB
6	Conducted Spurious emissions	1.5dB
7	RF Radiated power	4.9dB (below 1GHz)
		4.9dB (above 1GHz)
8	Radiated Spurious emission test	4.9dB (below 1GHz)
		4.9dB (above 1GHz)
9	Temperature test	± 1℃
10	Humidity test	± 3%
11	Supply voltages	± 1.5%
12	Time	± 3%

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

According to decision rule based on Clause 4.2 of CISPR 16-4-2, the EUT complied with the standards specified above.

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **HOKLAS (Lab Code: 009)**

SGS HONG KONGLimited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2017 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **IAS Accreditation (Lab Code: TL-187)**

SGS HONG KONGLimited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS HONG KONG Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS HONG KONG Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Conducted Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2020/08/31	2021/08/30
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2020/08/31	2021/08/30
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2020/08/31	2021/08/30
OSP	Rohde & Schwarz	OSP-B157W8	E242	2020/08/31	2021/08/30
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2020/08/31	2021/08/30
WMS32 Test Software	R&S	Version 10	N/A	--	--

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2020/08/31	2021/08/30
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	TE10	2020/5/11	2021/5/10
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	E028	2020/10/23	2021/10/22
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2020/08/09	2021/08/08
Coaxial Cable	SGS	N/A	E167	2020/07/20	2021/07/19
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2020/05/18	2021/05/18
TRILOG Super Broadb. Test Antenna, (25) 30-1000MHz	Schwarzbeck	9168-1110	E311	2020/02/13	2022/02/12
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	--	--
Turntable with Controller	ChamPro	EM1000	E238	--	--
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2020/08/09	2021/08/08

Coaxial Cable	SGS	N/A	E167	2020/07/20	2021/07/19
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2020/05/18	2021/05/18
Spectrum Analyzer 9kHz - 30GHz	Rohde & Schwarz	FSP30	E204	2020/05/11	2021/05/10
Horn Antenna 1 - 18GHz	Schwarzbeck	BBHA9120D	E211	2020/01/29	2022/01/29
Preamplifier 33dB, 1 - 18GHz	Schwarzbeck	BBV9718	E214	2020/04/14	2021/04/12
Highpass Filter 3.5-26.5GHz	Wainwright	WHNX3.5/26.5G-6SS	E205	2019/04/24	2021/04/23
Band Reject Filter 2.4-2.5GHz	Wainwright	WRCJV 2400/2500-2100	E206	2019/04/24	2021/04/23
RF cable SMA to SMA 10000mm	HUBER+SUHNER	SF104-26.5/2*11SMA 45	E207-1	2020/09/21	2021/09/20
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	--	--
Turntable with Controller	ChamPro	EM1000	E238	--	--
EMC32 Test Software	R&S	Version 10	N/A	--	--

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2020/09/12	2021/09/11
Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2020/09/12	2021/09/11
Barometer with digital thermometer	SATO	7612-00	E218	2020/04/23	2021/04/22
Conditional Chamber	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2020/08/31	2021/08/30

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

FCC Part 15 Subpart C Section 15.247 & 15.203

RSS-Gen Section 8.3

6.1.2 Conclusion

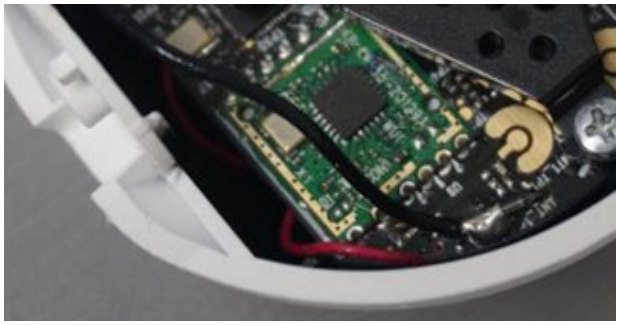
Standard Requirement:

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1 dBi.

Photo of antenna refer to Appendix – Internal photo.



7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207, RSS-Gen Section 8.8

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

7.1.1 E.U.T. Operation

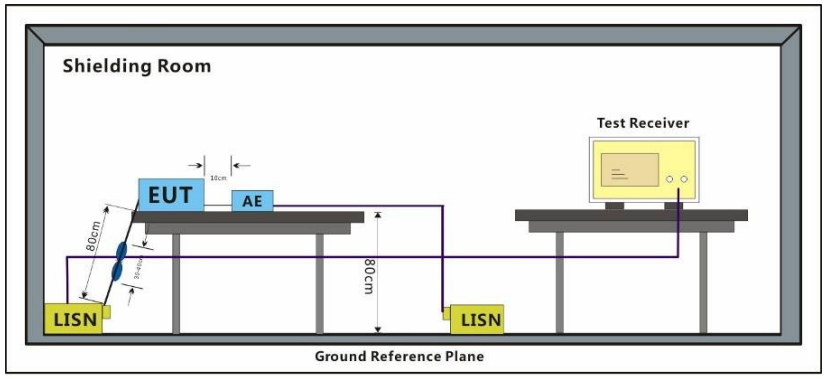
Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20)..11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

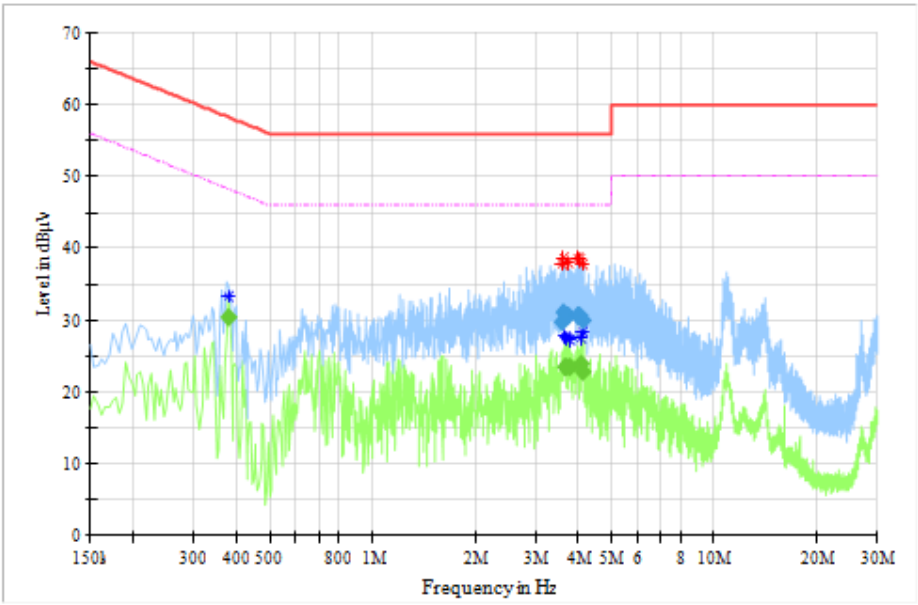
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

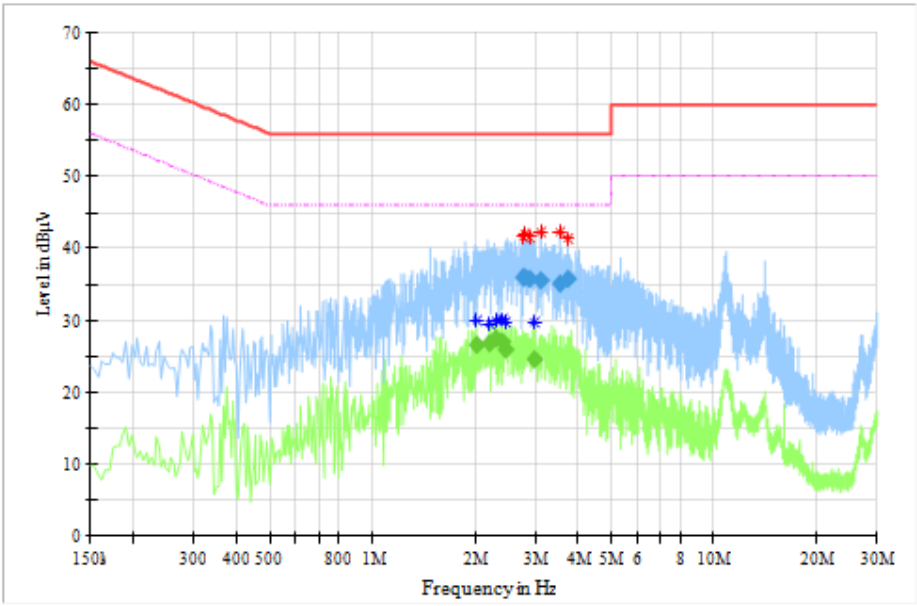
Remark: LISN=Read Level+ Cable Loss+ LISN Factor

Adaptor Model: VT05EUS05100
Mode:a;
Line: Live Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.378000	---	30.38	48.32	17.94	10.1	Pass
3.594000	29.74	---	56.00	26.26	10.2	Pass
3.622000	31.06	---	56.00	24.94	10.3	Pass
3.666000	---	23.48	46.00	22.52	10.3	Pass
3.706000	---	23.58	46.00	22.42	10.3	Pass
3.718000	30.71	---	56.00	25.29	10.3	Pass
3.762000	---	23.50	46.00	22.50	10.3	Pass
3.982000	30.70	---	56.00	25.30	10.3	Pass
4.014000	30.58	---	56.00	25.42	10.3	Pass
4.066000	---	23.88	46.00	22.12	10.3	Pass
4.118000	29.96	---	56.00	26.04	10.3	Pass
4.122000	---	22.92	46.00	23.08	10.3	Pass

Mode:a;
Line: Neutral Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
2.014000	---	26.63	46.00	19.37	10.4	Pass
2.198000	---	26.74	46.00	19.26	10.4	Pass
2.294000	---	27.40	46.00	18.60	10.4	Pass
2.390000	---	27.17	46.00	18.83	10.4	Pass
2.442000	---	25.97	46.00	20.03	10.4	Pass
2.750000	36.03	---	56.00	19.97	10.5	Pass
2.786000	35.90	---	56.00	20.10	10.5	Pass
2.870000	35.76	---	56.00	20.24	10.5	Pass
2.994000	---	24.63	46.00	21.37	10.5	Pass
3.126000	35.60	---	56.00	20.40	10.5	Pass
3.554000	35.03	---	56.00	20.97	10.5	Pass
3.742000	35.83	---	56.00	20.17	10.5	Pass

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247:2019(b)(1) & 15.247(b)(3), RSS-247 Section 5.4(b)

Test Method: ANSI C63.10 (2013) Section 7.8.5

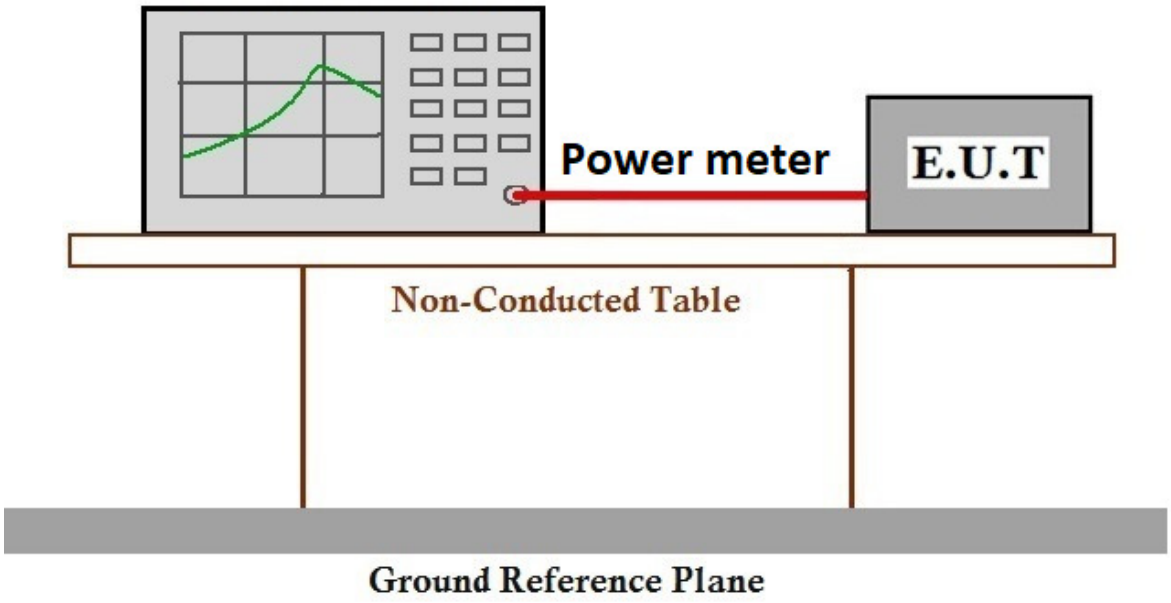
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.3 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d), Section 3.3 & RSS-Gen Section 8.9

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

7.3.1 E.U.T. Operation

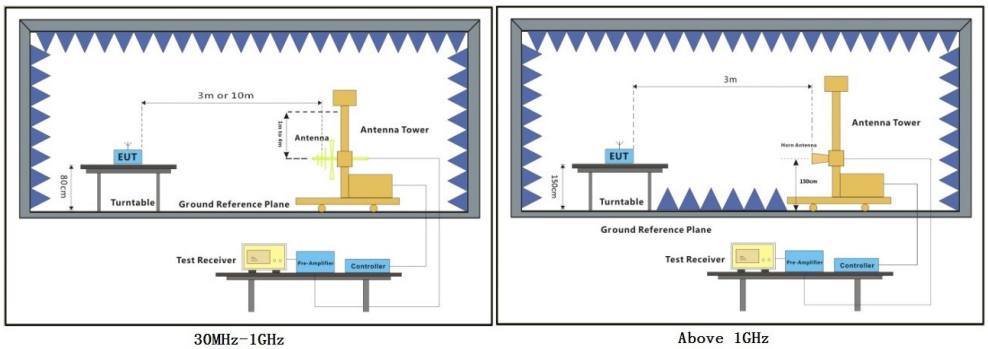
Operating Environment:

Temperature: 23.1 °C Humidity: 51.4 % RH :

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



30MHz-1GHz Above 1GHz

7.3.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Only the data of worst case is recorded in the report.

Mode: 802.11b

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
2390.000	V	52.9	/	74.0	54.0	Pass
2483.500	V	53.4	/	74.0	54.0	Pass

Mode: 802.11g

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
2390.000	V	59.8	49.8	74.0	54.0	Pass
2483.500	V	69.6	52.4	74.0	54.0	Pass

Mode: 802.11n20

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
2390.000	V	62.1	52.3	74.0	54.0	Pass
2483.500	V	71.2	52.5	74.0	54.0	Pass

7.4 Radiated Spurious Emissions

Test Requirement Section 3.3 & RSS-Gen Section 8.9
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

7.4.1 E.U.T. Operation

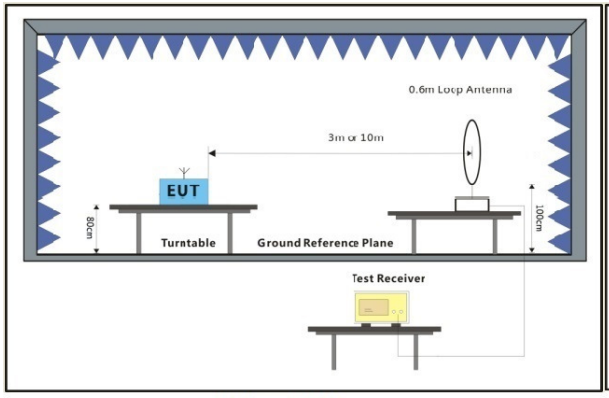
Operating Environment:

Temperature: 22.3 °C Humidity: 52.3 % RH :

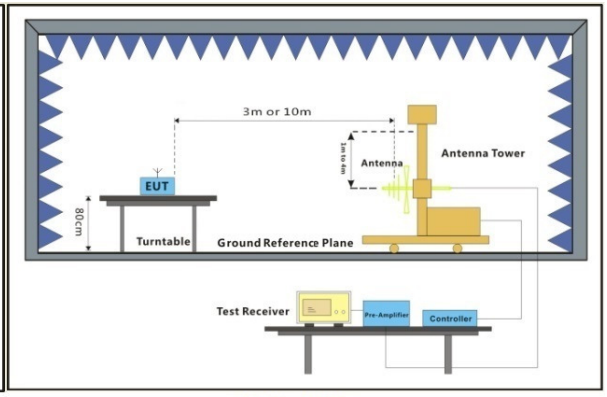
Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

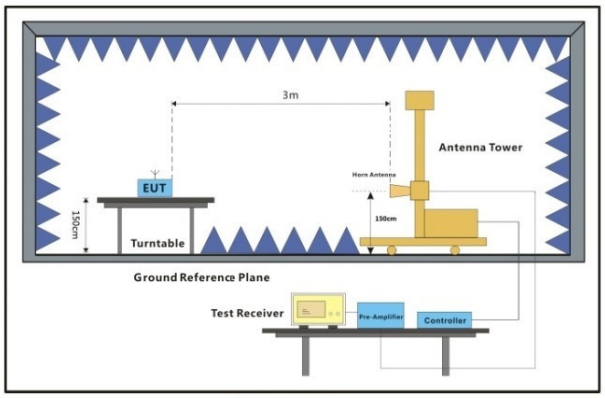
7.4.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.4.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

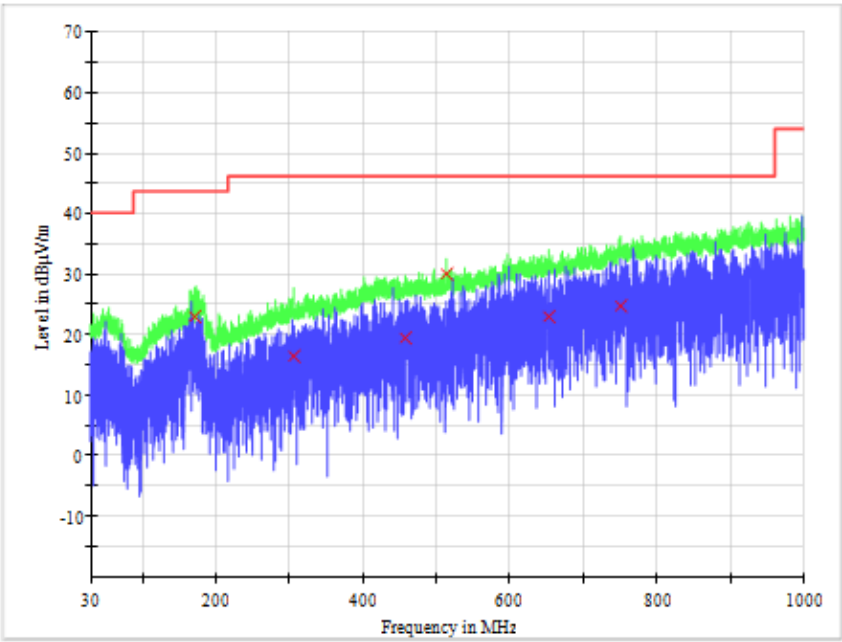
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

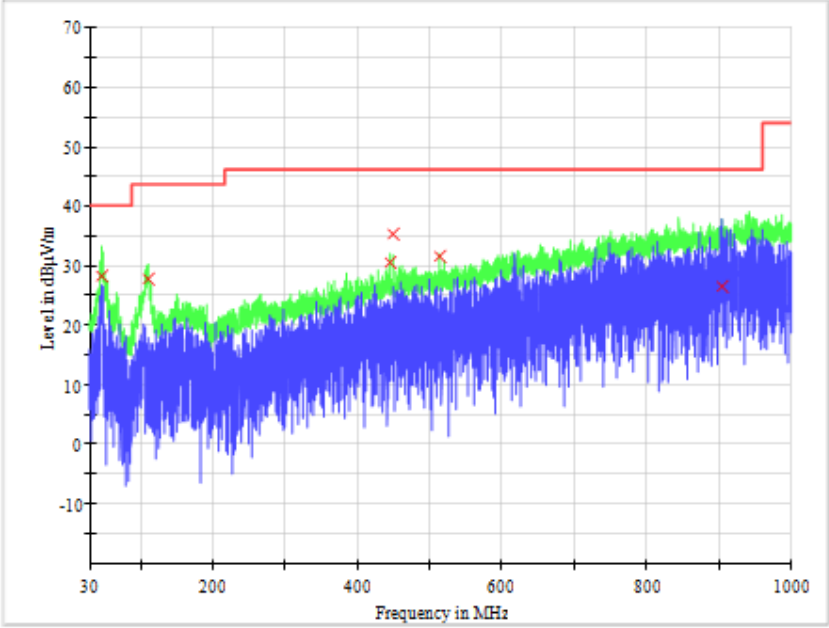
Radiated emission below 1GHz

Horizontal (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
172.243571	23.1	H	13.9	20.4	43.5	Pass
306.242143	16.4	H	15.0	29.6	46.0	Pass
458.255000	19.6	H	18.9	26.4	46.0	Pass
514.307143	30.0	H	20.0	16.0	46.0	Pass
653.225000	22.9	H	22.6	23.1	46.0	Pass
751.472143	24.7	H	24.6	21.3	46.0	Pass

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
46.143571	28.3	V	14.1	11.7	40.0	Pass
110.232857	27.8	V	10.9	15.7	43.5	Pass
445.506429	30.6	V	18.6	15.5	46.0	Pass
450.010000	35.4	V	18.7	10.6	46.0	Pass
514.307143	31.5	V	20.0	14.5	46.0	Pass
904.316429	26.5	V	26.1	19.5	46.0	Pass

Above 1GHz

802.11b

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1349.875	H	44.0	24.6	74.0	54.0	Pass
3521.870	V	45.0	31.3	74.0	54.0	Pass
4924.000	H	53.5	41.3	74.0	54.0	Pass
7469.000	H	57.9	43.5	74.0	54.0	Pass
10422.000	H	60.5	47.3	74.0	54.0	Pass
12003.000	H	61.6	47.6	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1935.250	H	37.4	24.4	74.0	54.0	Pass
3755.125	H	44.7	31.7	74.0	54.0	Pass
4883.500	H	51.4	43.8	74.0	54.0	Pass
8089.500	V	58.6	45.1	74.0	54.0	Pass
9376.500	V	58.3	44.9	74.0	54.0	Pass
11524.000	V	61.7	48.0	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1349.500	H	41.2	23.6	74.0	54.0	Pass
1931.500	H	42.1	26.3	74.0	54.0	Pass
4824.000	H	55.5	50.6	74.0	54.0	Pass
7528.500	V	56.9	43.4	74.0	54.0	Pass
9346.000	V	58.3	44.6	74.0	54.0	Pass
10982.500	V	61.0	48.0	74.0	54.0	Pass

802.11g
Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1349.125	H	40.9	/	74.0	54.0	Pass
1932.625	H	41.0	/	74.0	54.0	Pass
3669.250	H	45.8	/	74.0	54.0	Pass
4822.500	V	52.8	/	74.0	54.0	Pass
8112.500	V	58.0	45.1	74.0	54.0	Pass
10616.500	V	59.8	46.9	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1352.990	H	43.7	/	74.0	54.0	Pass
1928.610	H	42.2	/	74.0	54.0	Pass
4833.190	H	50.9	/	74.0	54.0	Pass
6673.440	V	51.9	/	74.0	54.0	Pass
7918.350	V	57.9	44.4	74.0	54.0	Pass
11519.540	V	61.1	48.1	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1353.690	H	44.5	/	74.0	54.0	Pass
1936.410	H	41.8	/	74.0	54.0	Pass
3120.270	H	44.8	/	74.0	54.0	Pass
4749.480	V	47.7	/	74.0	54.0	Pass
8343.600	V	56.5	43.2	74.0	54.0	Pass
10939.180	V	61.2	48.0	74.0	54.0	Pass

802.11n20
Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1349.875	H	43.2	/	74.0	54.0	Pass
1930.375	H	41.5	/	74.0	54.0	Pass
3479.500	H	45.1	/	74.0	54.0	Pass
4823.000	V	52.0	/	74.0	54.0	Pass
8093.500	V	58.7	45.2	74.0	54.0	Pass
11688.000	V	60.9	47.5	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1353.830	H	43.5	/	74.0	54.0	Pass
1935.160	H	39.6	/	74.0	54.0	Pass
3491.370	H	44.9	/	74.0	54.0	Pass
4828.750	V	51.9	/	74.0	54.0	Pass
8102.490	V	52.2	/	74.0	54.0	Pass
11699.000	V	60.1	47.7	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1353.230	H	43.4	24.6	74.0	54.0	Pass
1927.200	H	41.6	25.9	74.0	54.0	Pass
3127.760	H	47.5	32.2	74.0	54.0	Pass
4889.210	V	49.2	35.5	74.0	54.0	Pass
6630.270	V	58.4	45.1	74.0	54.0	Pass
11114.130	V	60.3	47.1	74.0	54.0	Pass

8 Photographs

Remark: Photos refer to Appendix: External Photo, Internal Phot, and Setup Photo

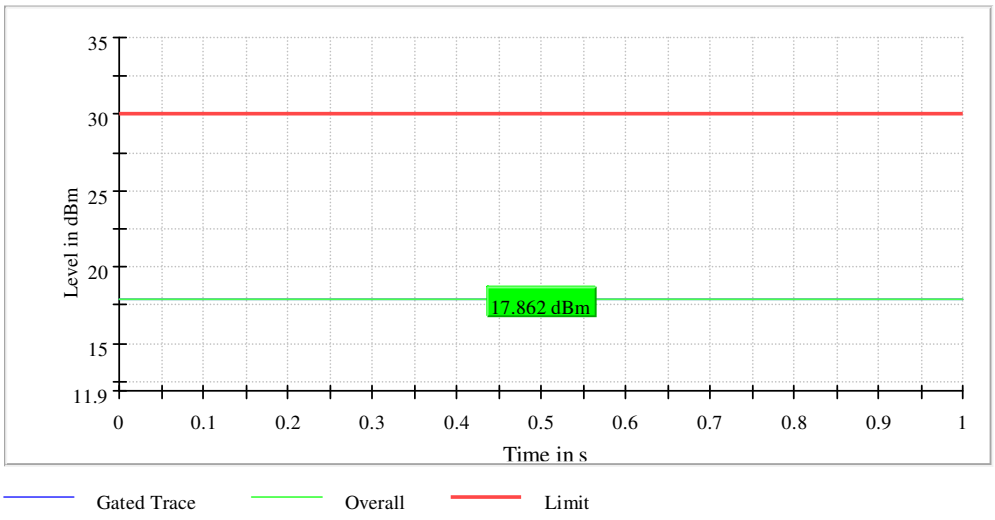
Appendix

8.1 RF output power

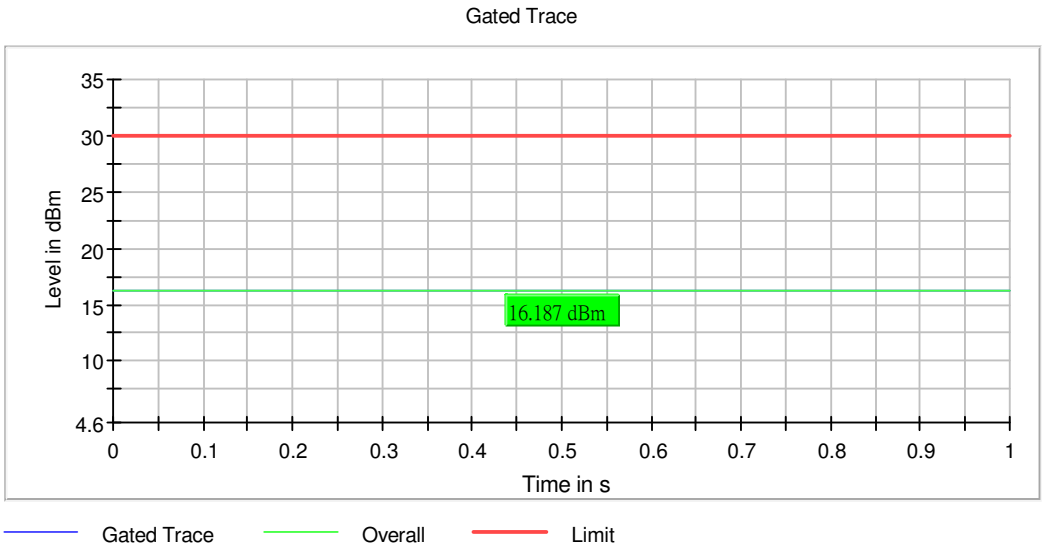
Operation Mode	DUT Frequency (MHz)	Limit Max (dBm)	Gated Level (dBm)	Result
802.11b	2412.000000	30.0	17.0	PASS
802.11b	2442.000000	30.0	17.3	PASS
802.11b	2462.000000	30.0	17.9	PASS
802.11g	2412.000000	30.0	15.7	PASS
802.11g	2442.000000	30.0	15.4	PASS
802.11g	2462.000000	30.0	16.2	PASS
802.11n20	2412.000000	30.0	15.3	PASS
802.11n20	2442.000000	30.0	15.3	PASS
802.11n20	2462.000000	30.0	15.8	PASS

Remark: Antenna gain: 1 dBi
Remark: Cable loss 0.8dB was considered and set in system configuration.
(only worst case shown)

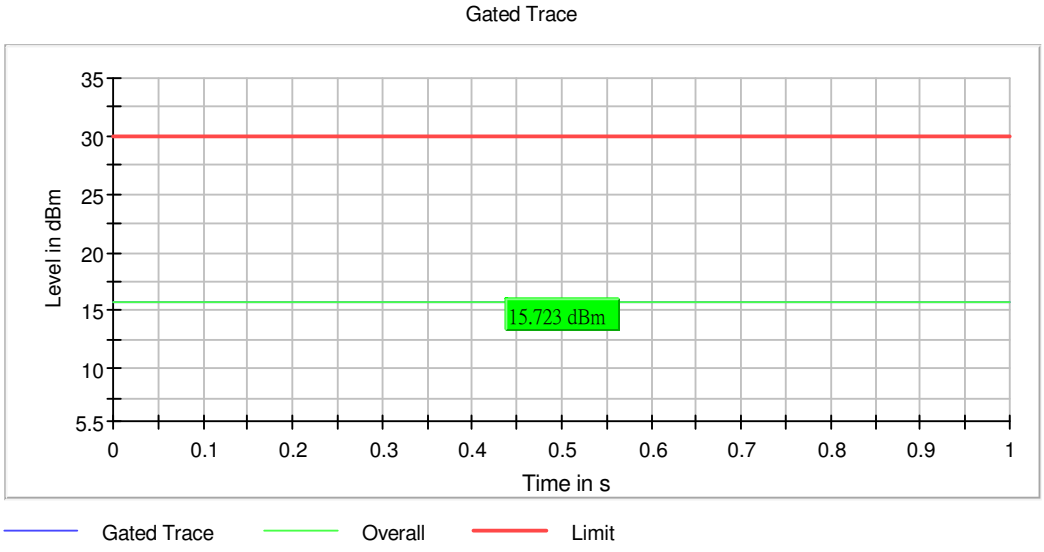
802.11b:



802.11g:



802.11n20:



- End of the Report -