

FCC Part 15C Test Report

FCC ID: 2AWPB-MC7108

Product Name:	720P Wireles Monitor Camera System
Trademark:	Haloview
Model Name :	MC7108 MC5111, MC5111P, MC5111R, MC5111 Plus, MC5111R Plus, RD5, RD5-MINI, RD5 Plus, RD5R Plus, MC5111 Ultimate, MC5111R Ultimate, MC7109, MC7109P, MC7109R, MC7109-Ultimate, MC7109R Ultimate, MC7109 Plus, MC7109R Plus, RD7, RD7-MINI, RD7-MAX, RD7 Plus, RD7R Plus, RD7-Ultimate, RD7R Ultimate
Prepared For :	SHENZHEN BAOSHIJIE TECHNOLOGY CO.,LTD
Address :	Sinopine Technopark, Yuanshan Industrial Park B, Gongming, Guangming New District, Shenzhen, Guangdong Province, China
Prepared By :	Shenzhen BCTC Testing Co., Ltd.
Address :	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	May 11, 2020 to Jun. 10, 2020
Date of Report :	Jun. 10, 2020
Report No.:	BCTC2004002317E

TEST RESULT CERTIFICATION

Applicant's name SHENZHEN BAOSHIJIE TECHNOLOGY CO.,LTD
Address Sinopine Technopark, Yuanshan Industrial Park B, Gongming,
Guangming New District, Shenzhen, Guangdong Province, China
Manufacture's Name..... SHENZHEN SINOPINE TECHNOLOGY CO.,LTD
Address Sinopine Technopark, Yuanshan Industrial Park B, Gongming,
Guangming New District, Shenzhen, Guangdong Province, China
Product description
Product name 720P Wireles Monitor Camera System
Trademark Haloview
Model and/or type MC7108
reference MC5111, MC5111P, MC5111R, MC5111 Plus, MC5111R Plus,
RD5, RD5-MINI, RD5 Plus, RD5R Plus, MC5111 Ultimate,
MC5111R Ultimate, MC7109, MC7109P, MC7109R,
MC7109-Ultimate, MC7109R Ultimate, MC7109 Plus,
MC7109R Plus, RD7, RD7-MINI, RD7-MAX, RD7 Plus, RD7R
Plus, RD7-Ultimate, RD7R Ultimate
Standards FCC Part15.247
ANSI C63.10:2013
KDB 558074 D01 15.247 Meas Guidance v05r02

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of BCTC, this document may be altered or revised by BCTC, personal only, and shall be noted in the revision of the document.

Prepared by(Engineer): Willem Wang

Reviewer(Supervisor): Eric Yang

Approved(Manager): Zero Zhou

Willem Wang
Eric Yang
Zero Zhou


Table of Contents

	Page
1 . SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
2 . GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	8
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	9
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	9
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	10
3 . EMC EMISSION TEST	12
3.1 CONDUCTED EMISSION MEASUREMENT	12
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	12
3.1.2 TEST PROCEDURE	12
3.1.3 DEVIATION FROM TEST STANDARD	12
3.1.4 TEST SETUP	13
3.1.5 EUT OPERATING CONDITIONS	13
3.1.6 TEST RESULTS	13
3.1.8 RADIATED EMISSION LIMITS	14
3.1.9 TEST PROCEDURE	15
3.1.10 DEVIATION FROM TEST STANDARD	15
3.1.11 TEST SETUP	15
3.1.12 EUT OPERATING CONDITIONS	16
3.1.13 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)	17
3.1.14 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)	18
3.1.15 TEST RESULTS (1GHZ~25GHZ)	20
3.3 RADIATED BAND EMISSION MEASUREMENT	21
3.3.1 TEST REQUIREMENT:	21
3.3.2 TEST PROCEDURE	21
3.3.3 DEVIATION FROM TEST STANDARD	22
3.3.4 TEST SETUP	22
3.3.5 EUT OPERATING CONDITIONS	22
4 . POWER SPECTRAL DENSITY TEST	24
4.1 APPLIED PROCEDURES / LIMIT	24
4.1.1 TEST PROCEDURE	24
4.1.2 DEVIATION FROM STANDARD	24

Table of Contents

	Page
4.1.3 TEST SETUP	24
4.1.4 EUT OPERATION CONDITIONS	24
4.1.5 TEST RESULTS	25
5 . BANDWIDTH TEST	27
5.1 APPLIED PROCEDURES / LIMIT	27
5.1.1 TEST PROCEDURE	27
5.1.2 DEVIATION FROM STANDARD	27
5.1.3 TEST SETUP	27
5.1.4 EUT OPERATION CONDITIONS	27
5.1.5 TEST RESULTS	28
6 . PEAK OUTPUT POWER TEST	30
6.1 APPLIED PROCEDURES/LIMIT	30
6.1.1 TEST PROCEDURE	30
6.1.2 DEVIATION FROM STANDARD	30
6.1.3 TEST SETUP	30
6.1.4 EUT OPERATION CONDITIONS	30
6.1.5 TEST RESULTS	31
7 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	32
7.1 APPLICABLE STANDARD	32
7.2 TEST PROCEDURE	32
7.3 DEVIATION FROM STANDARD	32
7.4 TEST SETUP	32
7.5 EUT OPERATION CONDITIONS	32
7.6 TEST RESULTS	32
8 . DUTY CYCLE OF TEST SIGNAL	35
8.1 STANDARD REQUIREMENT	35
8.2 FORMULA:	35
9 . ANTENNA REQUIREMENT	36
9.1 STANDARD REQUIREMENT	36
9.2 EUT ANTENNA	36
10 . EUT TEST PHOTO	37
11 . EUT PHOTO	38

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (d)	Radiated Spurious Emission	PASS	
15.247 (e)	Power Spectral Density	PASS	
15.205	Restricted Band of Operation	PASS	
15.247 (d)	Band Edge (Out of Band Emissions)	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.

Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

1.2 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 %.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
3	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
4	Conducted Adjacent channel power	U=1.38dB
5	Conducted output power uncertainty Above 1G	U=1.576dB
6	Conducted output power uncertainty below 1G	U=1.28dB
7	humidity uncertainty	U=5.3%
8	Temperature uncertainty	U=0.59 °C

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	720P Wireles Monitor Camera System	
Trade Name	Haloview	
Model Name	MC7108 MC5111, MC5111P, MC5111R, MC5111 Plus, MC5111R Plus, RD5, RD5-MINI, RD5 Plus, RD5R Plus, MC5111 Ultimate, MC5111R Ultimate, MC7109, MC7109P, MC7109R, MC7109-Ultimate, MC7109R Ultimate, MC7109 Plus, MC7109R Plus, RD7, RD7-MINI, RD7-MAX, RD7 Plus, RD7R Plus, RD7-Ultimate, RD7R Ultimate	
Model Difference	All the model are the same circuit and RF module, except model names.	
Product Description	Operation Frequency:	2417~2462 MHz
	Modulation Type:	DSSS
	Number Of Channel	10 CH
	Antenna Designation:	Please see Note 3.
Channel List	Please refer to the Note 2.	
Ratings	DC10-32V	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

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

2.

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2417	04	2432	07	2447	10	2462
02	2422	05	2437	08	2452		
03	2427	06	2442	09	2457		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
1	N/A	N/A	External antenna	3	

2.2 DESCRIPTION OF TEST MODES

Pretest Mode	Description
Mode 1	CH1
Mode 2	CH6
Mode 3	CH10
Mode 4	Link Mode

Radiated Emission	
Final Test Mode	Description
Mode 4	Link Mode

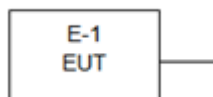
For Radiated Emission	
Final Test Mode	Description
Mode 1	CH1
Mode 2	CH6
Mode 3	CH10
Mode 4	Link Mode

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

No.	Device Type	Brand	Model	Series No.	Data Cable
E-1	720P Wireles Monitor Camera System	Haloview	MC7108	N/A	EUT

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	Jun. 13, 2019	Jun. 12, 2020
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	Jun. 13, 2019	Jun. 12, 2020
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	VULB9163-942	Jun. 22, 2019	Jun. 21, 2020
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1541	Jun. 22, 2019	Jun. 21, 2020
5	Horn Antenna (18GHz-40GHz)	SCHWARZBECK	BBHA9170	822	Jun. 22, 2019	Jun. 21, 2020
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	Jun. 25, 2019	Jun. 24, 2020
7	Amplifier (0.5GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	Jun. 25, 2019	Jun. 24, 2020
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	Jun. 17, 2019	Jun. 16, 2020
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	Jul. 02, 2019	Jul. 01, 2020
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	Jun. 25, 2019	Jun. 24, 2020
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	Jun. 25, 2019	Jun. 24, 2020
13	Power Metter	Keysight	E4419B	\	Jun. 17, 2019	Jun. 16, 2020
14	Power Sensor (AV)	Keysight	E9 300A	\	Jun. 17, 2019	Jun. 16, 2020
15	Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	Jun. 13, 2019	Jun. 12, 2020
16	Spectrum Analyzer 9kHz-40GHz	Aglient	FSP40	100363	Jun. 13, 2019	Jun. 12, 2020
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESR3	102075	Jun. 13, 2019	Jun. 12, 2020
2	LISN	SCHWARZBECK	NSLK8127	8127739	Jun. 13, 2019	Jun. 12, 2020
3	LISN	R&S	ENV216	101375	Jun. 13, 2019	Jun. 12, 2020
4	RF cables	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
5	Software	Frad	EZ-EMC	EMC-CON 3A1	\	\

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

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

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

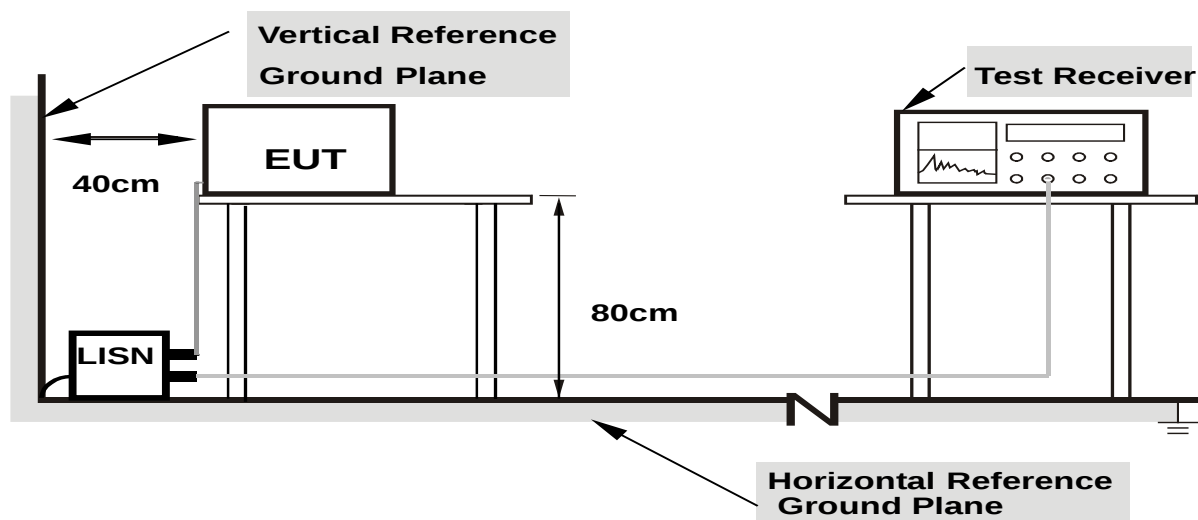
3.1.2 TEST PROCEDURE

- 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.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

NOTE: This EUT is powered by the DC 10-32V only, this test item is not applicable.

3.1.6 TEST RESULTS

NOTE: This EUT is powered by the DC 10-32V only, this test item is not applicable.

3.1.7 RADIATED EMISSION MEASUREMENT

3.1.8 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.1.9 TEST PROCEDURE

Below 1GHz test procedure as below:

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

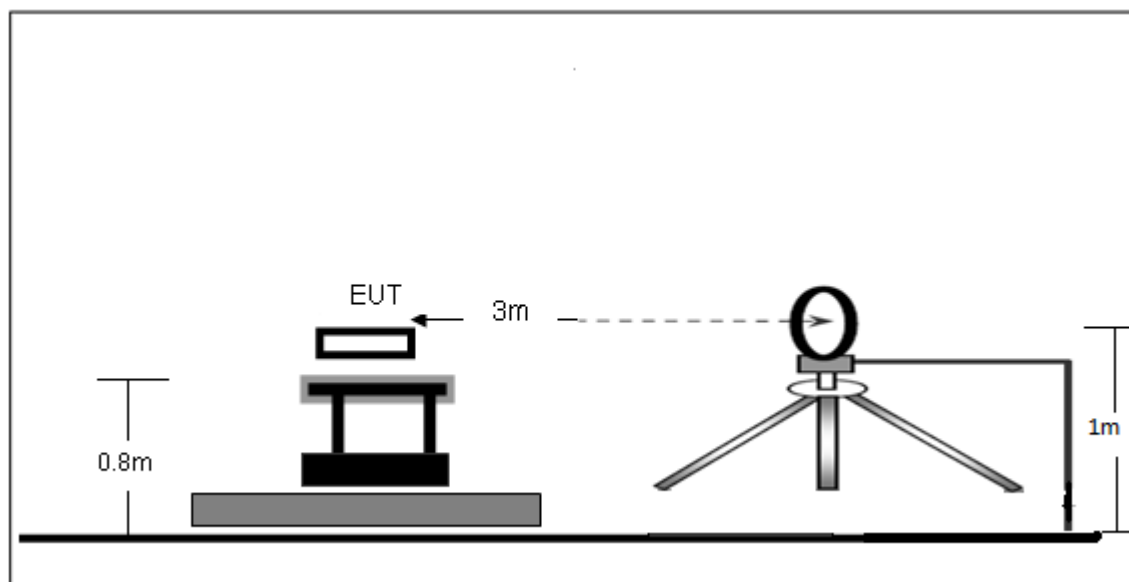
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.1.10 DEVIATION FROM TEST STANDARD

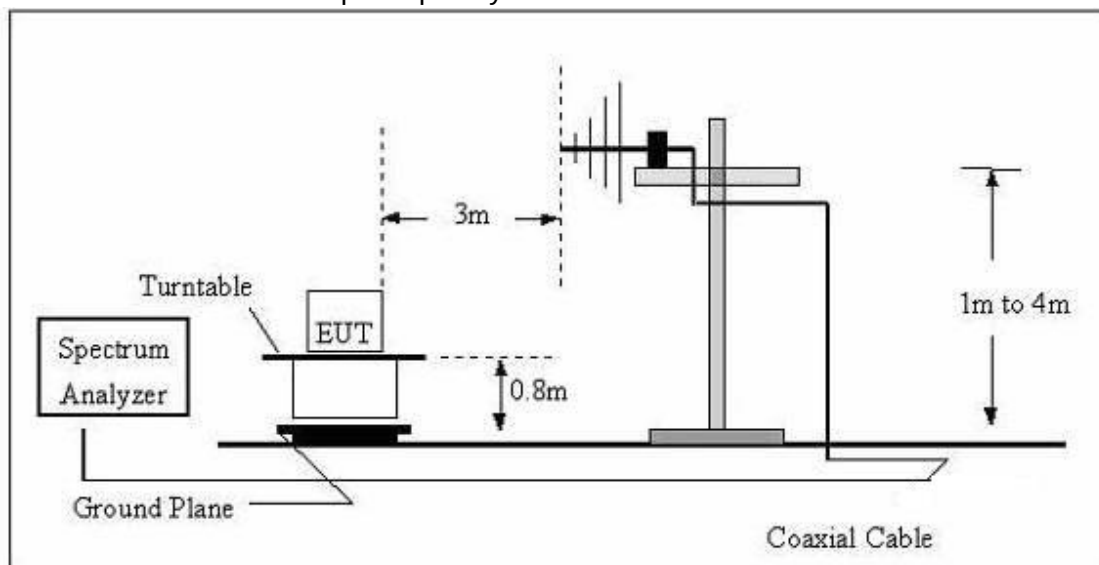
No deviation

3.1.11 TEST SETUP

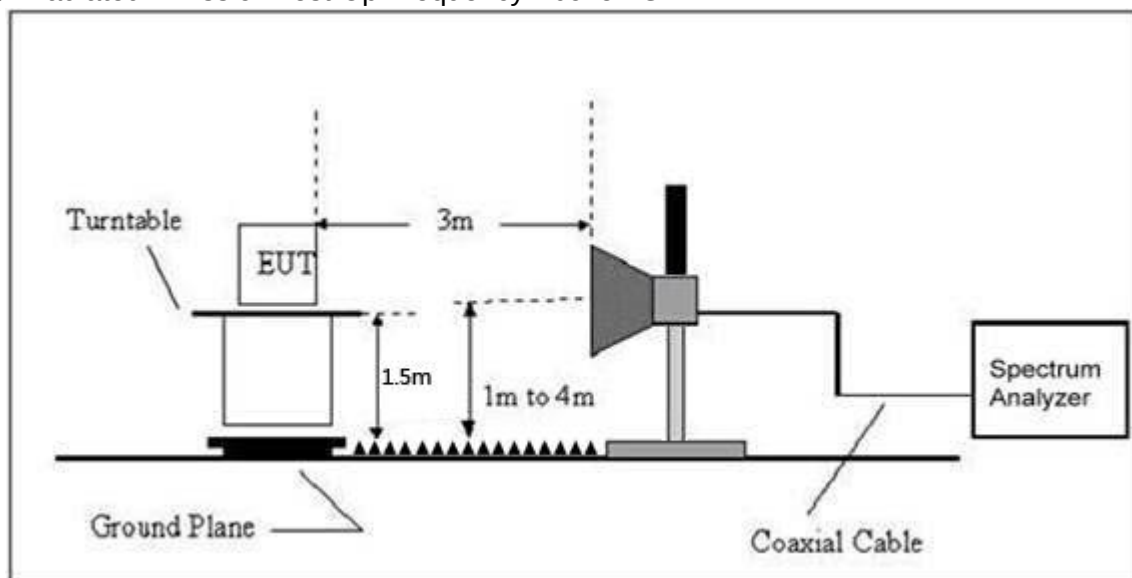
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.1.12 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.13 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Test Voltage :	DC 12V
Test Mode :	Mode 4	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

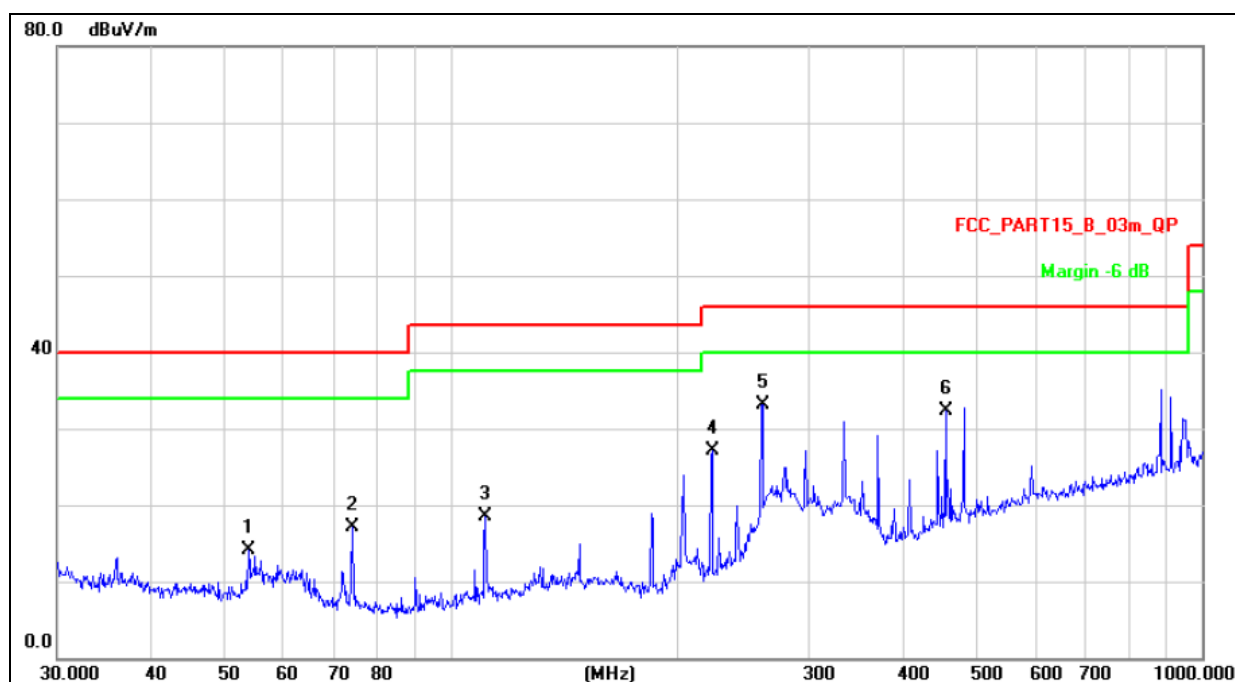
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

3.1.14 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Horizontal
Test Voltage :	DC 12V	Test Mode :	Mode 4

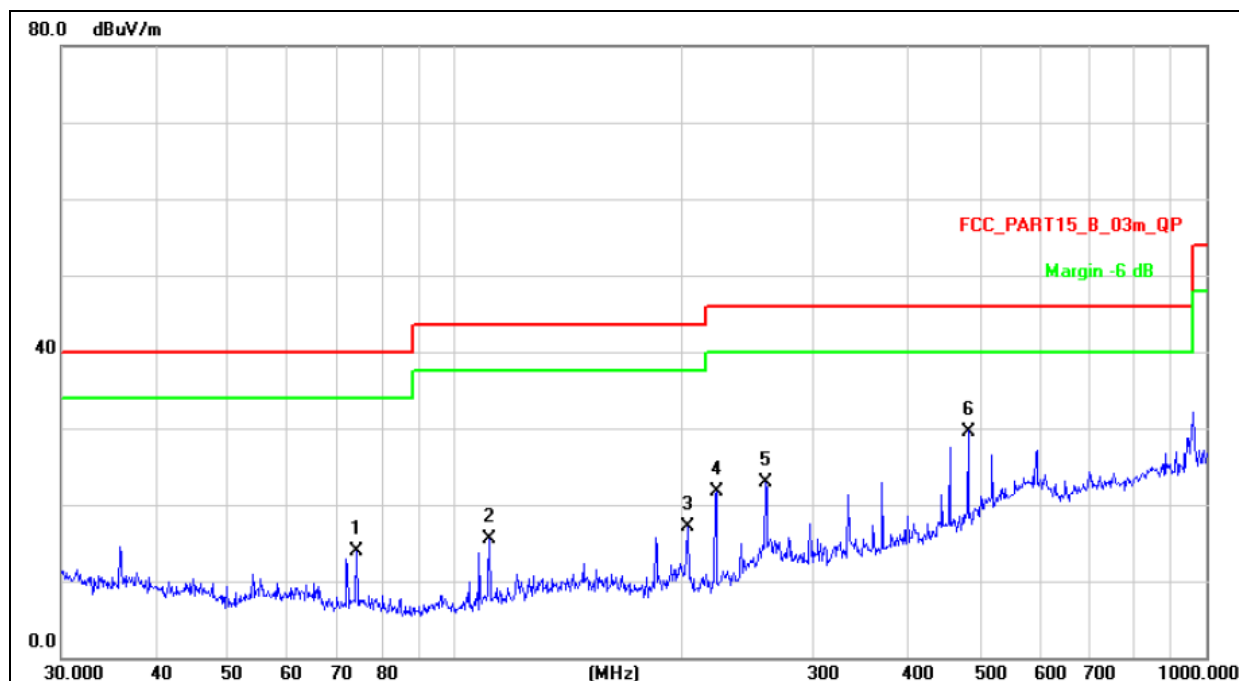


Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		53.8818	25.86	-11.82	14.04	40.00	-25.96	QP
2		74.1351	30.50	-13.37	17.13	40.00	-22.87	QP
3		111.3468	30.69	-12.24	18.45	43.50	-25.05	QP
4		222.9502	37.67	-10.58	27.09	46.00	-18.91	QP
5	*	260.1444	41.98	-8.85	33.13	46.00	-12.87	QP
6		455.9058	35.32	-2.94	32.38	46.00	-13.62	QP

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Polarization :	Vertical
Test Voltage :	DC 12V	Test Mode :	Mode 4



Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		74.1351	27.32	-13.37	13.95	40.00	-26.05	QP
2		111.3468	27.74	-12.24	15.50	43.50	-28.00	QP
3		204.2377	28.90	-11.74	17.16	43.50	-26.34	QP
4		222.9502	32.38	-10.58	21.80	46.00	-24.20	QP
5		259.2338	31.75	-8.84	22.91	46.00	-23.09	QP
6	*	482.2156	31.99	-2.39	29.60	46.00	-16.40	QP

Remark:

Test all the modes and only worst case was reported. The worst mode is 802.11b, Low Channel

3.1.15 TEST RESULTS (1GHZ~25GHZ)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2417MHz									
V	4834.00	51.13	35.91	8.11	29.36	52.69	74.00	-21.31	PK
V	4834.00	43.59	35.91	8.11	29.36	45.15	54.00	-8.85	AV
V	7251.00	52.08	35.66	9.63	34.21	60.26	74.00	-13.74	PK
V	7251.00	40.83	35.66	9.63	34.21	49.01	54.00	-4.99	AV
H	4834.00	50.35	35.91	8.11	29.36	51.91	74.00	-22.09	PK
H	4834.00	43.99	35.91	8.11	29.36	45.55	54.00	-8.45	AV
H	7251.00	51.00	35.66	9.63	34.21	59.18	74.00	-14.82	PK
H	7251.00	40.40	35.66	9.63	34.21	48.58	54.00	-5.42	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2442MHz									
V	4884.00	51.90	35.89	8.23	29.47	53.71	74.00	-20.29	Pk
V	4884.00	43.68	35.89	8.23	29.47	45.49	54.00	-8.51	AV
V	7326.00	51.09	35.65	9.66	34.33	59.43	74.00	-14.57	Pk
V	7326.00	40.09	35.65	9.66	34.33	48.43	54.00	-5.57	AV
H	4884.00	51.16	35.89	8.23	29.47	52.97	74.00	-21.03	Pk
H	4884.00	43.29	35.89	8.23	29.47	45.10	54.00	-8.90	AV
H	7326.00	50.25	35.65	9.66	34.33	58.59	74.00	-15.41	Pk
H	7326.00	40.19	35.65	9.66	34.33	48.53	54.00	-5.47	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel: 2462MHz									
V	4924.00	53.97	35.83	8.32	29.51	55.97	74.00	-18.03	PK
V	4924.00	43.14	35.83	8.32	29.51	45.14	54.00	-8.86	AV
V	7386.00	48.73	35.72	9.71	34.62	57.34	74.00	-16.66	PK
V	7386.00	40.11	35.72	9.71	34.62	48.72	54.00	-5.28	AV
H	4924.00	54.95	35.83	8.32	29.51	56.95	74.00	-17.05	PK
H	4924.00	43.94	35.83	8.32	29.51	45.94	54.00	-8.06	AV
H	7386.00	51.68	35.72	9.71	34.62	60.29	74.00	-13.71	PK
H	7386.00	40.08	35.72	9.71	34.62	48.69	54.00	-5.31	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,

Margin= Emission Level - Limit

2. If peak below the average limit, the average emission was no test.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

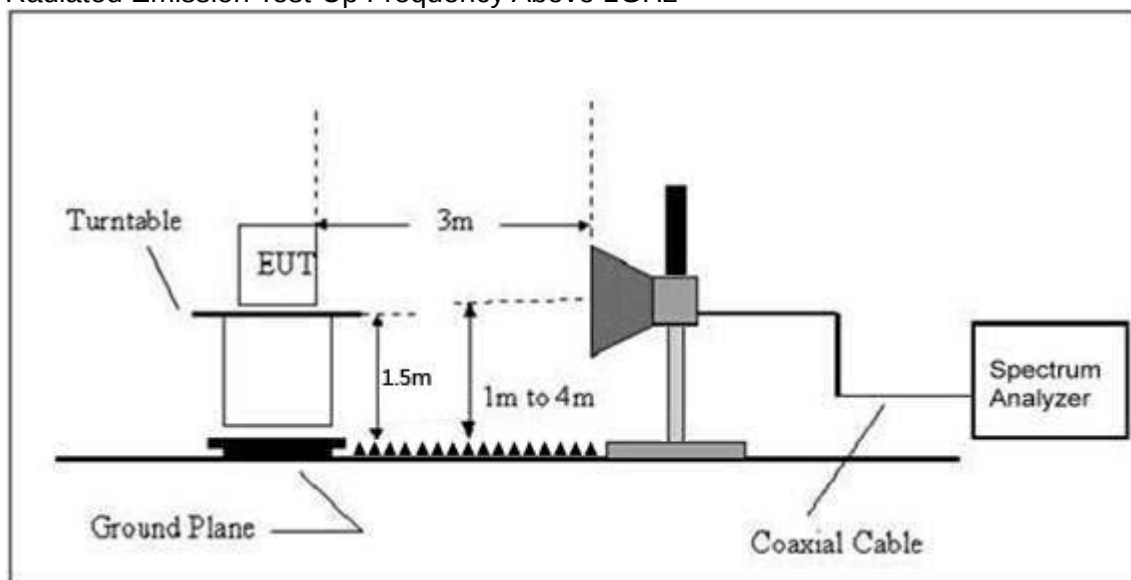
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULT

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission evel (dBuV/m)	Limits (dBuV/m)		Result
							PK	□PK	AV	
DSSS	Low Channel 2417MHz									
	H	2390.00	60.25	38.06	7.42	20.15	49.76	74.00	54.00	PASS
	H	2400.00	57.39	38.06	7.42	20.15	46.90	74.00	54.00	PASS
	V	2390.00	62.43	38.06	7.42	20.15	51.94	74.00	54.00	PASS
	V	2400.00	59.92	38.06	7.42	20.15	49.43	74.00	54.00	PASS
	High Channel 2462MHz									
	H	2483.50	60.41	38.17	7.45	20.54	50.23	74.00	54.00	PASS
	H	2500.00	60.27	38.17	7.45	20.54	50.09	74.00	54.00	PASS
	V	2483.50	58.81	38.20	7.45	20.54	48.60	74.00	54.00	PASS
	V	2500.00	58.48	38.20	7.45	20.54	48.27	74.00	54.00	PASS
Remark:										
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit										
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.										
* is stand for AV measured.										

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

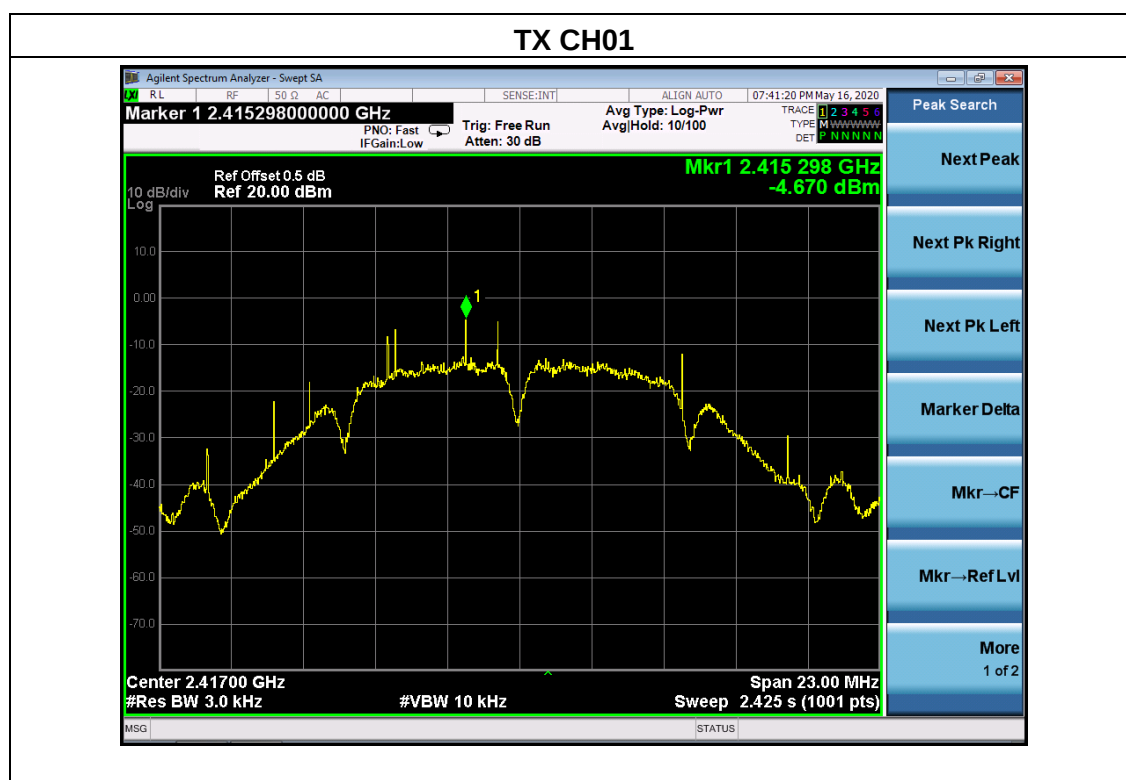
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

Note: Power Spectral Density(dBm)=Reading+Cable Loss

4.1.5 TEST RESULTS

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V
Test Mode :	DSSS Mode		

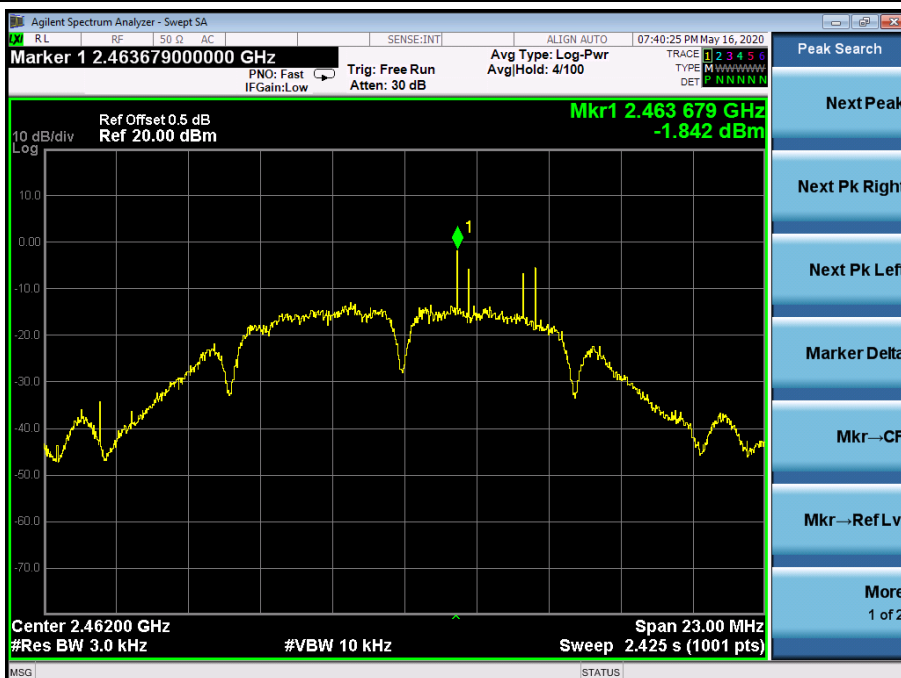
Frequency	Power Spectral Density(dBm/3k Hz)	Limit (dBm/3kHz)	Result
2417 MHz	-4.670	8	PASS
2442 MHz	-5.077	8	PASS
2462 MHz	-1.842	8	PASS



TX CH06



TX CH11



5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



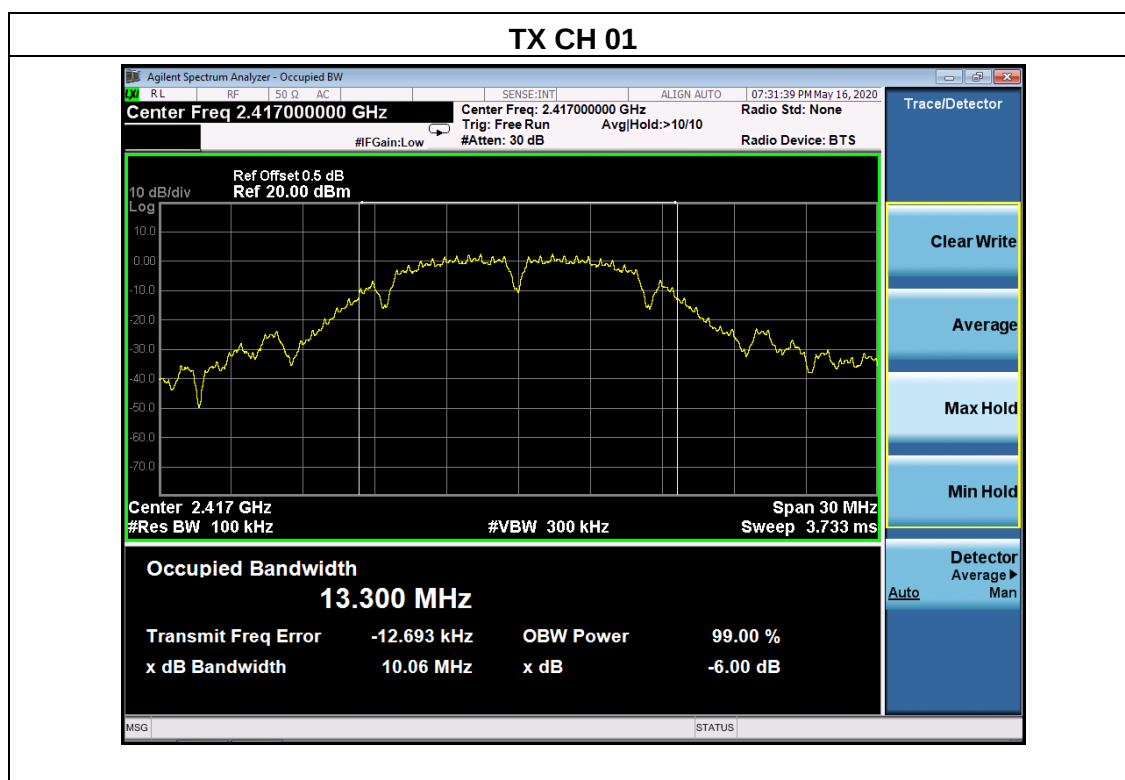
5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

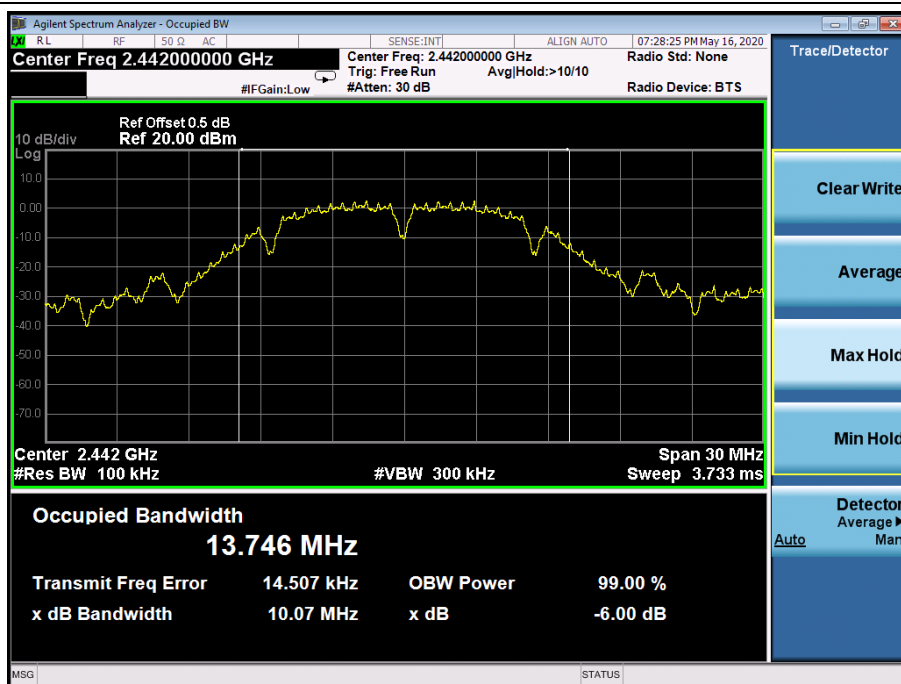
5.1.5 TEST RESULTS

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V
Test Mode :	DSSS Mode		

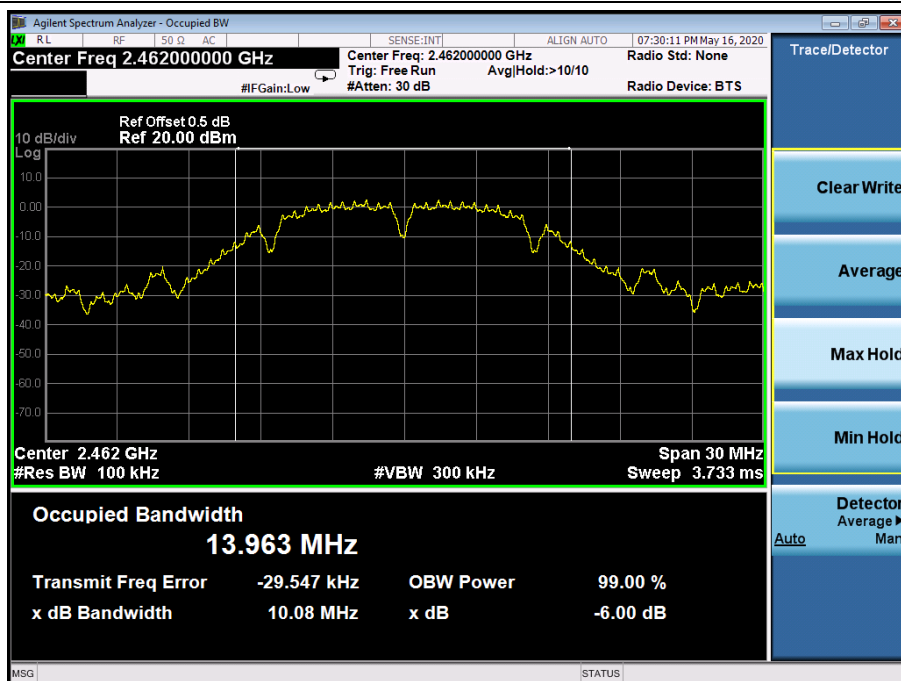
Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2417	10.06	500	Pass
2442	10.07	500	Pass
2462	10.08	500	Pass



TX CH 06



TX CH 10



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES/LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V

	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
DSSS	2417	14.06	30
	2442	14.27	30
	2462	14.62	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

7.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

7.2 TEST PROCEDURE

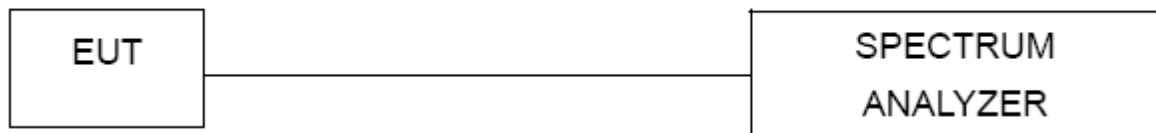
Using the following spectrum analyzer setting:

- a) Set the RBW = 100KHz.
- b) Set the VBW = 300KHz.
- c) Sweep time = auto couple.
- d) Detector function = peak.
- e) Trace mode = max hold.
- f) Allow trace to fully stabilize.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP

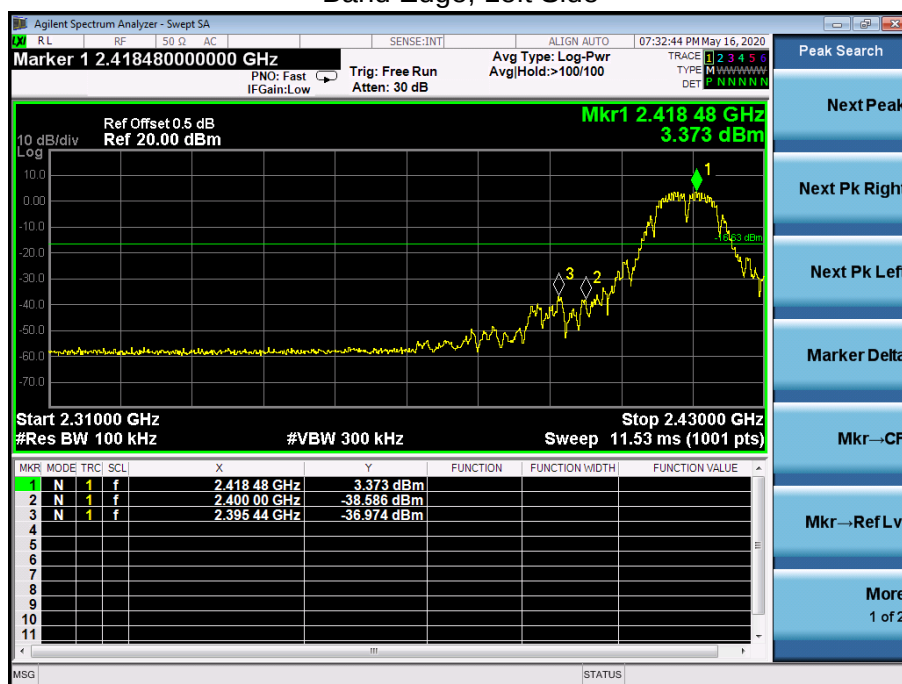


7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULTS

Band Edge, Left Side

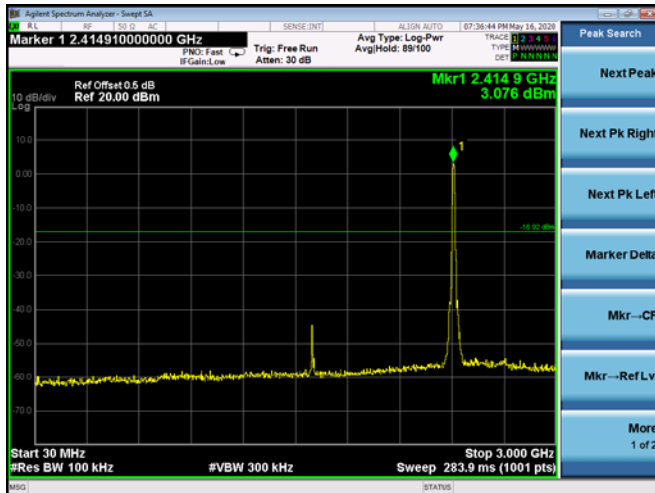


Band Edge, Right Side

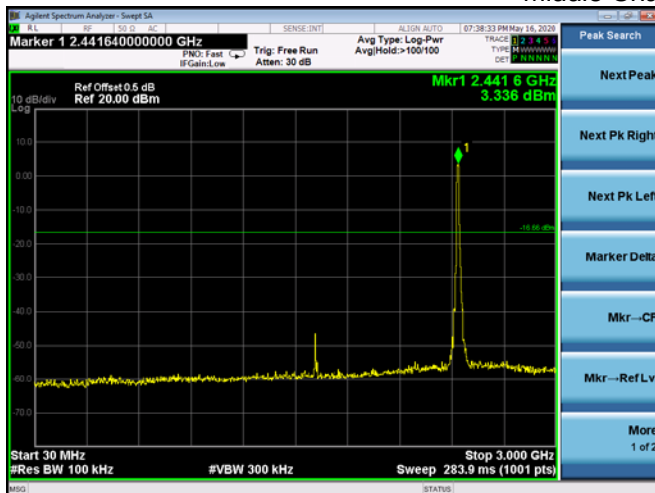


CONDUCTED EMISSION MEASUREMENT

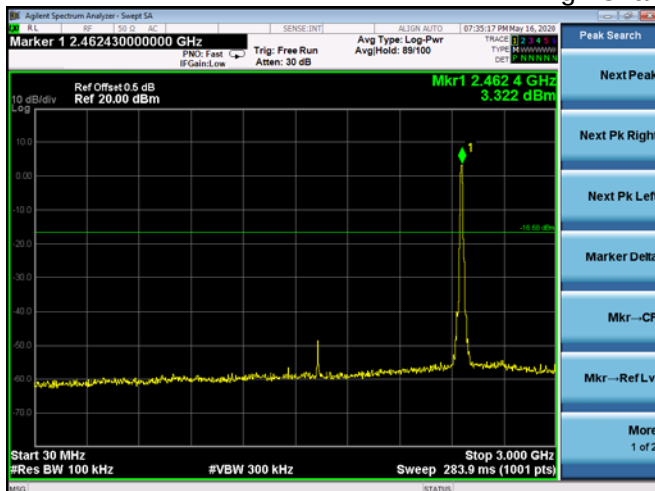
Low Channel 2417MHz



Middle Channel 2442MHz



High Channel 2462MHz



8. DUTY CYCLE OF TEST SIGNAL

8.1 STANDARD REQUIREMENT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

8.2 FORMULA:

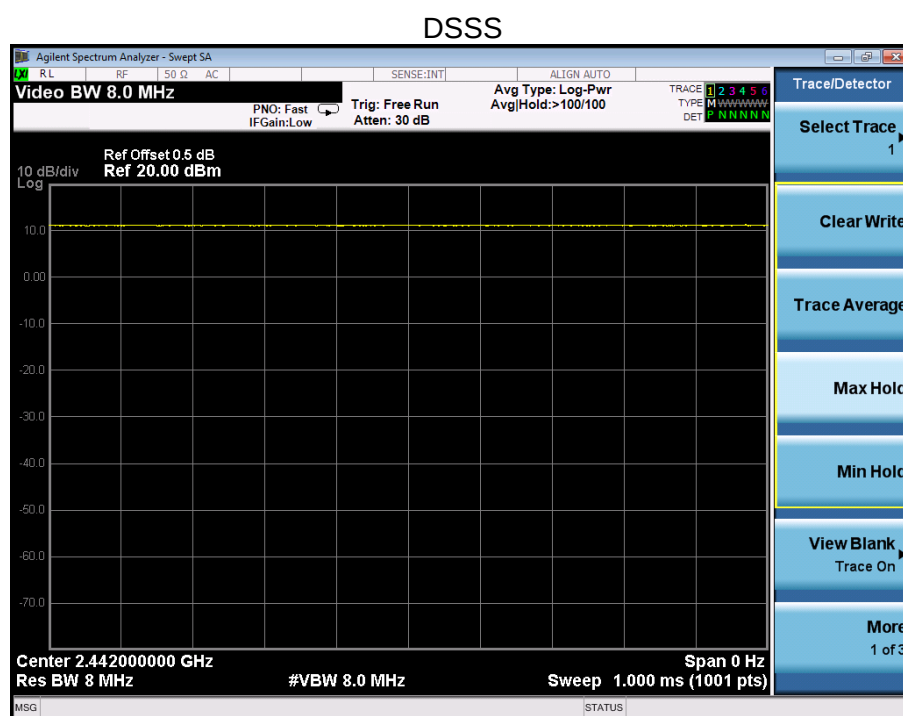
Duty Cycle = $T_{on} / (T_{on} + T_{off})$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

	Duty Cycle	Duty Fator (dB)
DSSS	1	0



9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 EUT ANTENNA

The EUT antenna is External antenna, antenna Gain 3dBi. It comply with the standard requirement. Antenna connector type is RP-SMA。

10. EUT TEST PHOTO

Radiated Measurement Photos



11. EUT PHOTO

EUT Photo 1



EUT Photo 2



EUT Photo 3



***** END OF REPORT *****