FCC Radio Test Report

Equipment	: Metrolinq 60 GHz Module
Brand Name	: IgniteNet
Model No.	: RDO-60-FB-USBB-18
FCC ID	: HED-ML60MDSB
Standard	: 47 CFR FCC Part 15.255
Applicant	: Accton Technology Corporation No. 1, Creation Rd. III, Science-based Industrial Park Hsin Chu 30077, Taiwan R.O.C.
Manufacturer	: Accton Technology Corporation No. 1, Creation Rd. III, Science-based Industrial Park Hsin Chu 30077, Taiwan R.O.C.
Submission Type	: Class II Change

The product sample received on Mar. 04, 2016 and completely tested on Aug. 17, 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013, 47 CFR FCC Part 15.255 and Millimeter Wave Test Procedures and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Sam Chen
SPORTON INTERNATIONAL INC.

Testing Laboratory
1190

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Summary of Test Result

Standard Requirements and Conformance Test Specifications				
Report Clause	**Ref. Std. Clause**	**Description**	**Result**	**Remark**
3.1	FCC 15.255(e)	Occupied Bandwidth	Complied	-
3.2	FCC 15.255(b)(1)	EIRP Power	Complied	-
3.3	FCC 15.255(e)	Peak Conducted Power	Complied	-
3.4	FCC 15.255(c)	Transmitter Spurious Emissions	Complied	-
3.5	FCC 15.255(f)	Frequency Stability	Complied	-
3.6	FCC 15.255(a),(h)	Operation Restriction and Group Installation	Complied	-

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5N2614-10	Rev. 01	Initial issue of report	Sep. 09, 2016

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information	
Frequency Range	57-64 GHz
The Channel Plan(s)	Channel 1: 58.32 GHz Channel 2: 60.48 GHz Channel 3: 62.64 GHz

1.1.2 Table of Modulation

MCS index	Modulation	N_{CBPS}	Repetition	Code rate	Data rate (Mbps)
1	π/2-BPSK	1	2	1/2	385
2	π/2-BPSK	1	1	1/2	770
3	π/2-BPSK	1	1	5/8	962.5
4	π/2-BPSK	1	1	3/4	1155
5	π/2-BPSK	1	1	13/16	1251.25
6	π/2-QPSK	2	1	1/2	1540
7	π/2-QPSK	2	1	5/8	1925
8	π/2-QPSK	2	1	3/4	2310
9	π/2-QPSK	2	1	13/16	2502.5
10	π/2-16QAM	4	1	1/2	3080
11	π/2-16QAM	4	1	5/8	3850
12	π/2-16QAM	4	1	3/4	4620

1.1.3 Antenna Information

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	Accton	120300000202A	Dish Ant.	N/A	26

1.1.4 EUT Power Type

EUT Power Type	From host system

1.1.5 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR5N2614-02

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding a model no.: ML-60-30-18 2. Adding an antenna (P/N: 120300000202A) for model no.: ML-60-30-18 use.	1. Occupied Bandwidth 2. EIRP Power 3. Peak Conducted Power 4. Transmitter Spurious Emissions 5. Frequency Stability 6. Operation Restriction and Group Installation
3. Changing the Manufacturer and Manufacturer address to “Accton Technology Corporation / No. 1, Creation Rd. III, Science-based Industrial Park Hsin Chu 30077, Taiwan R.O.C.” from “Joy Technology (Shen Zhen) Co. Ltd / HengKeng Ind., Shangpai, Shangwu, Aiqun Rd., Shiyan Town, Shenzhen 518108 China”	It’s no need to re-test.

Note: Changing the module approval to full modular approval from limited modular approval.

1.1.6 Equipment Use Condition

Equipment Use Condition
☐ Fixed field disturbance sensors at 61-61.5GHz
☐ Except fixed field disturbance sensors at 61-61.5GHz
☒ Except fixed field disturbance sensors

1.1.7 User Condition

Intended Operation
☐ Indoor only
☒ Outdoor only

1.1.8 Duty Cycle

Duty Cycle			Duty Cycle Factor
The transmitter is intended for	**Low Channel**	99.52%	0.02
	Middle Channel	99.52%	0.02
	High Channel	99.52%	0.02

1.2 Accessories

Accessories
USB cable*1, shielded, 0.7m

1.3 Support Equipment

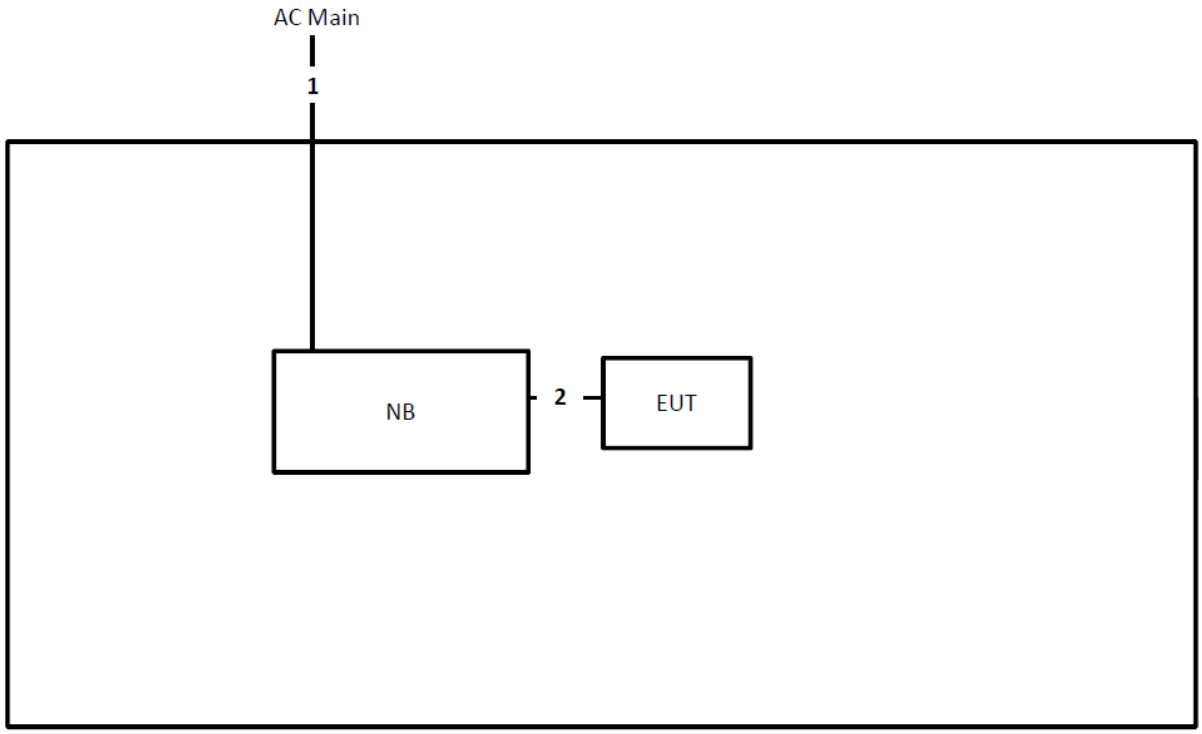
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	NB	DELL	E4300	DoC

1.4 EUT Operation during Test

During the test, “Tera Term 4.75” under WIN 7 was executed the test program to control the EUT continuously transmit RF signal.

1.5 Test Setup Diagram

Test Setup Diagram - Transmitter Spurious Emissions below 1 GHz + above 1 GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	0.7m

1.6 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15.255
- ANSI C63.10-2013 Section 9. “Procedures for testing millimeter-wave systems”

1.7 Testing Location

Testing Location			
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973	
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085	
Test Site No.			
03CH01-CB		TH01-CB	

2 Test Configuration of Equipment under Test

2.1 Test Channel Frequencies

Test Channel Frequencies Configuration	
Low Channel (GHz)	58.32
Middle Channel (GHz)	60.48
High Channel (GHz)	62.64

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz)
Occupied Bandwidth	58.32, 60.48, 62.64
EIRP Power	58.32, 60.48, 62.64
Peak Conducted Power	58.32, 60.48, 62.64
Transmitter Spurious Emissions (below 1 GHz)	CTX
Transmitter Spurious Emissions (1 GHz-40 GHz)	58.32, 60.48, 62.64
Transmitter Spurious Emissions (above 40 GHz)	58.32, 60.48, 62.64
Frequency Stability	Un-Modulation

2.3 Far Field Boundary Calculations

The far-field boundary is given as:

far field = (2 * L^2) / λ

where:

L = Largest Antenna Dimension, including the reflector, in meters

λ = wavelength in meters

Far Field (m)				
Frequency (GHz)	**L (m)**	**Lambda (m)**	**d(Far Field) (m)**	**d(Far Field) (cm)**
58.32	0.04	0.0051440	0.622	62.21
60.48	0.04	0.0049603	0.645	64.51
62.64	0.04	0.0047893	0.668	66.82

3 Transmitter Test Result

3.1 Occupied Bandwidth

3.1.1 Limit of Occupied Bandwidth

6dBc Bandwidth (see Note 1)	None
26dBc Bandwidth	None
99% Occupied Bandwidth (see Note 2)	None

NOTE 1: The 6dBc bandwidth is the frequency bandwidth of the signal power at the -6 dBc points when measured with a 100 kHz resolution bandwidth. These measurements shall also be performed at normal test conditions.

NOTE 2: The 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth when resolution bandwidth should be approximately 1 % to 5 % of the occupied bandwidth (OBW). These measurements shall also be performed at normal test conditions.

3.1.2 Measuring Instruments

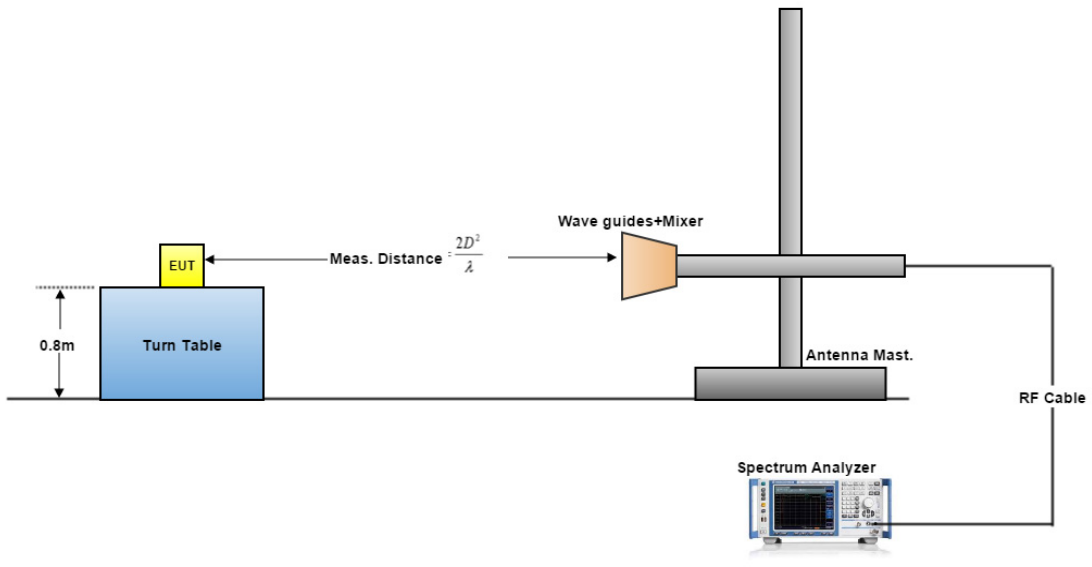
Refer a measuring instruments list in this test report.

3.1.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 6.9.2.

3.1.4 Test Setup

Occupied Channel Bandwidth



3.1.5 Test Result of Occupied Bandwidth

Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 6.9.2

NOTE: If equipment having different transmit operating modes (see test report clause 1.1.2), the measurements are uninfluenced by different transmit operating modes, may not need to be repeated for all the operating modes. Similar, if the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.11 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing. Refer as ANSI C63.10, clause 15, observe and record with plotted graphs or photographs the worst-case (i.e., widest) occupied bandwidth produced by these different modulation sources.

Temp	24℃	**Humidity**	53%
Test Engineer	John Tong		

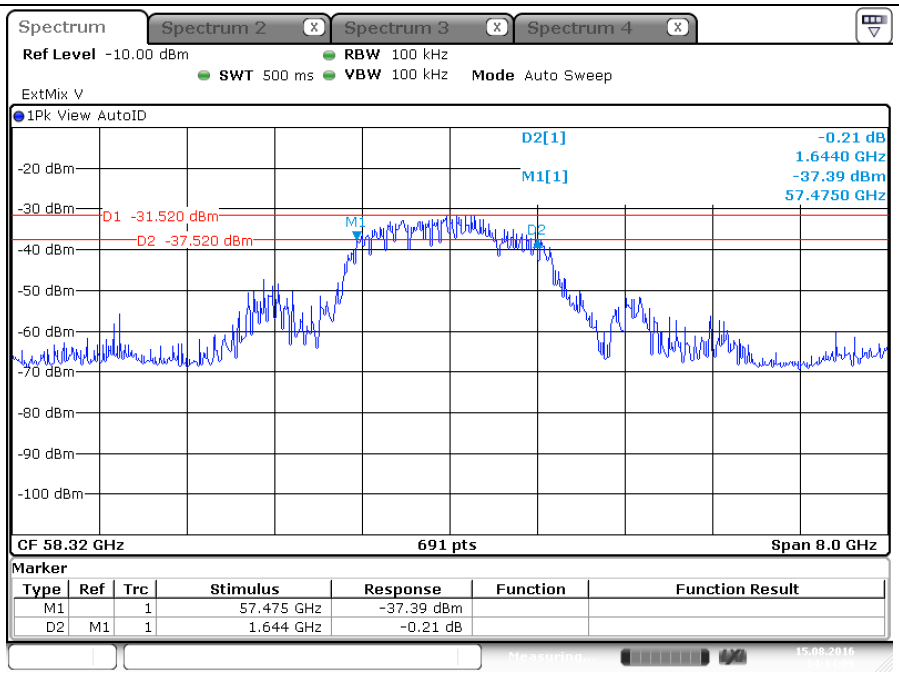
Test Results

Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)
58.32	1644.00	3125.90	4036.00	N/A
60.48	1783.00	1979.74	2234.00	N/A
62.64	1575.00	1991.32	2211.00	N/A

3.1.5.1 Bandwidth Plots

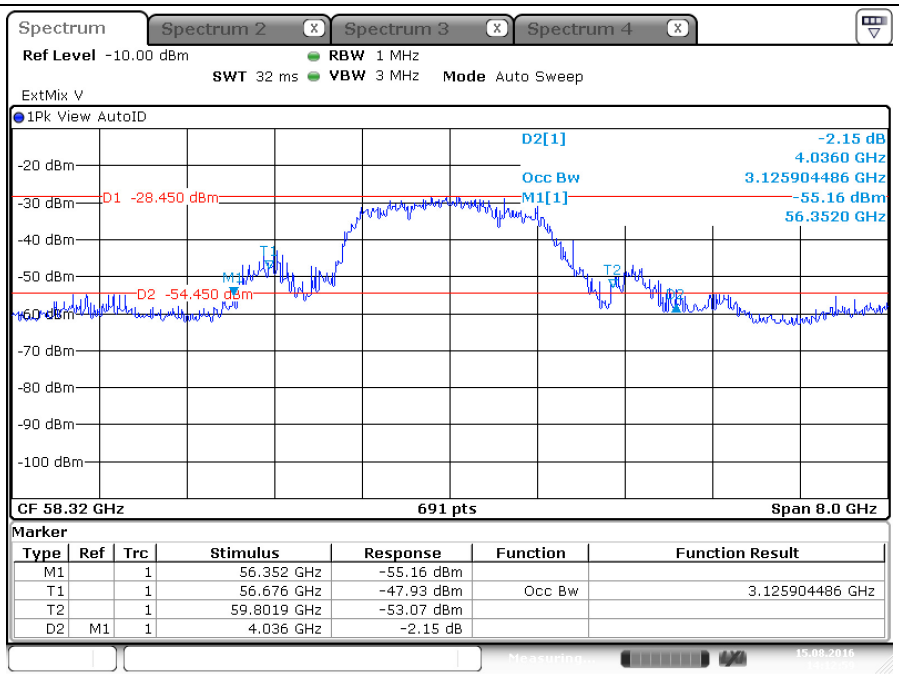
Test Frequency: 58.32 GHz

6 dBc Bandwidth



Date: 15.AUG.2016 14:14:06

Occupied Bandwidth&26 dBc Bandwidth



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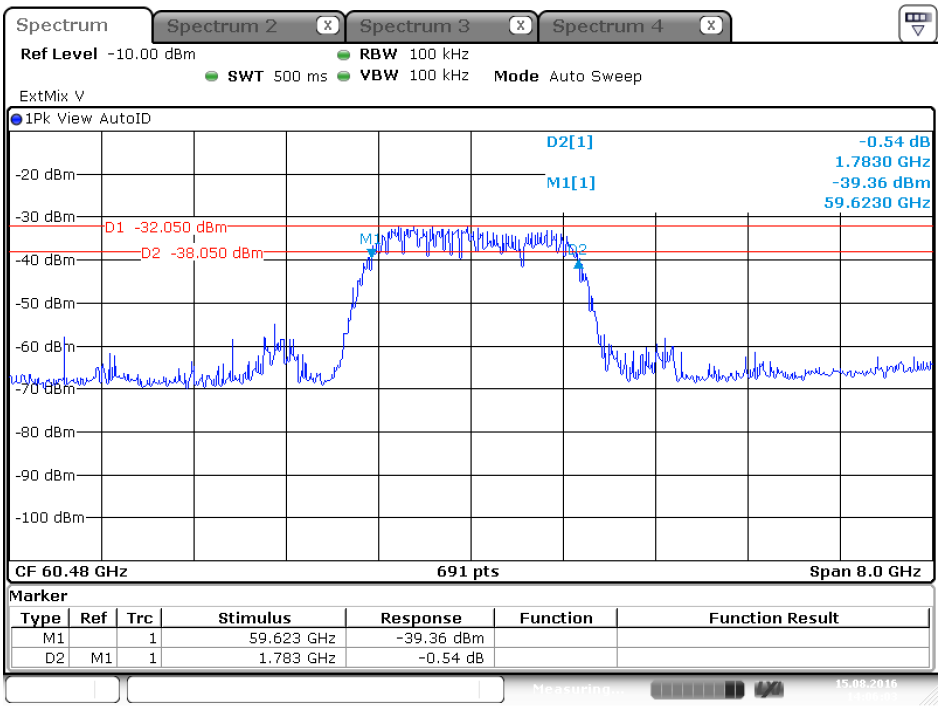
Test Frequency: 60.48 GHz

6 dBc Bandwidth



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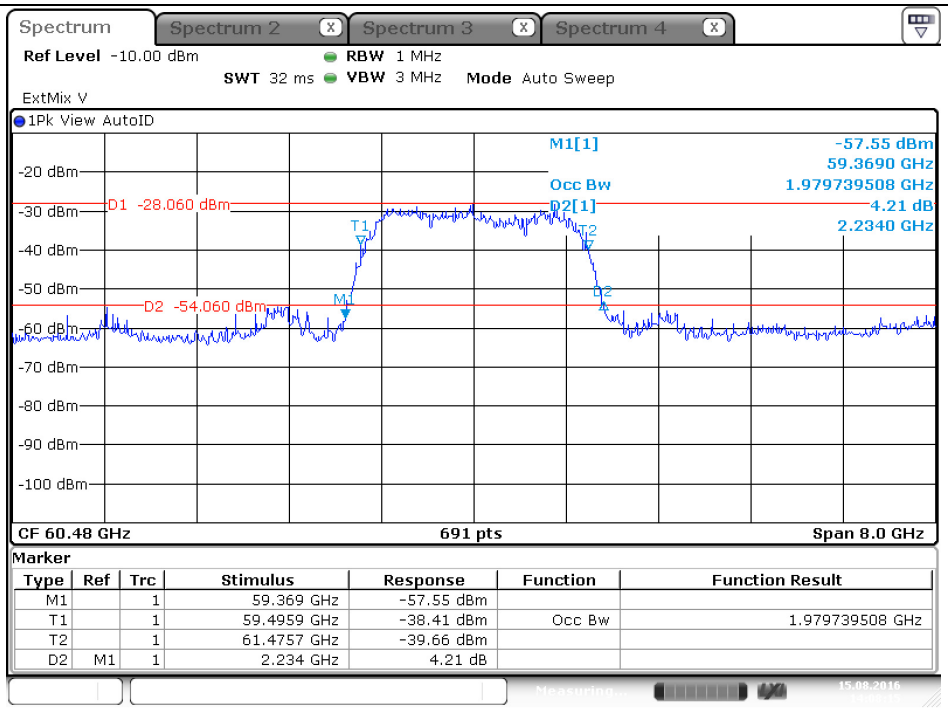
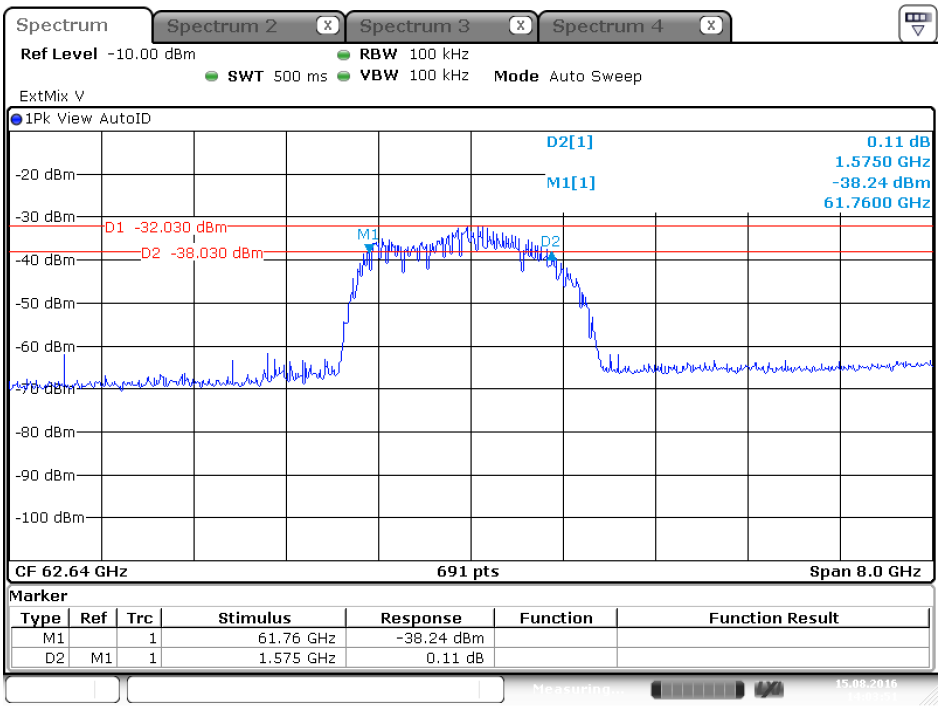
Occupied Bandwidth&26 dBc Bandwidth



Date: 15.AUG.2016 14:08:15

Test Frequency: 62.64 GHz

6 dBc Bandwidth



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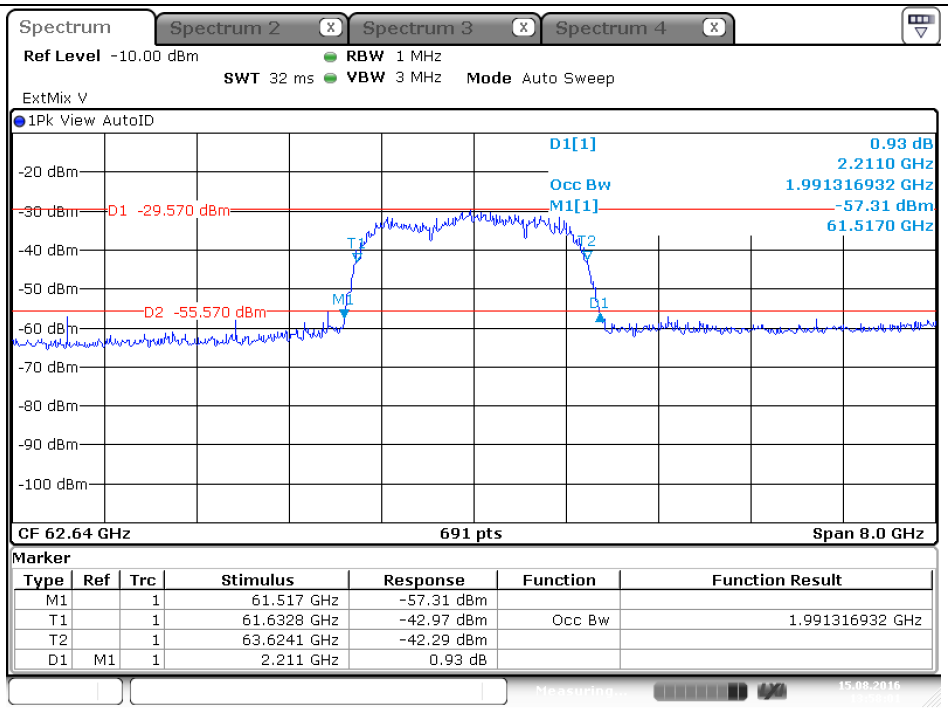
Occupied Bandwidth&26 dBc Bandwidth



Date: 15.AUG.2016 13:58:01

3.2 EIRP Power

3.2.1 Limit of EIRP Power

EIRP Power Limit		
Use Condition	**EIRP Average Power**	**EIRP Peak Power**
Fixed field disturbance sensors at 61-61.5GHz	10 dBm	13 dBm
Except fixed field disturbance sensors at 61-61.5GHz	N/A	10 dBm
Except fixed field disturbance sensors(indoor)	40 dBm	43 dBm
Except fixed field disturbance sensors(outdoor)	82 dBm	85 dBm

Note1: For outdoor device minus 2 dB for every dB that the antenna gain is less than 51 dBi.

Note2: For the applicable limit, see FCC 15.255 (b)

3.2.2 Measuring Instruments

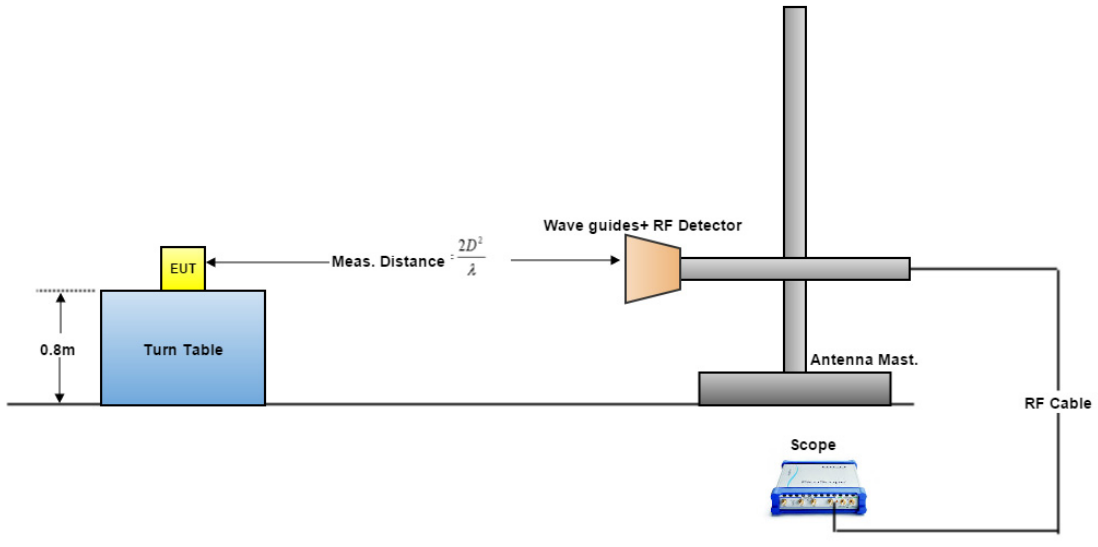
Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013 clause 9.3 & 9.5.

3.2.4 Test Setup

EIPR Power



3.2.5 Test Result of EIRP Power

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.11
NOTE: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.11 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worst case combination to be used for the conformance testing.	

3.2.5.1 Test Result of EIRP Power

Temp	24℃	Humidity	53%
Test Engineer	John Tong	Test Distance	0.7 m
Test Date	Aug. 12, 2016 ~ Aug. 15, 2016		

Test Results

Test Freq. (GHz)	DSO (mV)		Power Measured (dBm)		E_{Meas} (dBuV/m)		EIRP (dBm)		EIRP Limit (dBm) (note 1)	
	Peak	AV	Peak	AV	Peak	AV	Peak	AV	Peak	AV
58.32	130.54	33.54	-7.02	-16.02	142.55	133.55	34.76	25.76	35	32
60.48	129.77	27.62	-7.29	-16.74	142.60	133.15	34.80	25.35	35	32
62.64	126.79	26.24	-7.58	-16.91	142.61	133.28	34.82	25.49	35	32

The measured power level is converted to EIRP using the Friis equation:

For radiated emissions, calculate the field strength (E) in dBμV/meter.

$E = 126.8 – 20\log(\lambda) + P - G$

where:

E : is the field strength of the emission at the measurement distance, in dBμV/m

P : is the power measured at the output of the test antenna, in dBm

λ : is the wavelength of the emission under investigation [300/fMHz], in m

G : is the gain of the test antenna, in dBi For radiated emissions, calculate the EIRP (dBm). If the measurement was performed in the far field, calculate the EIRP.

EIRP = E-meas +20log(d-meas)-104.7

where:

EIRP : is the equivalent isotopically radiated power, in dBm

E-meas. : is the field strength of the emission at the measurement distance, in dBμV/m

d-meas. : is the measurement distance, in m

NOTE 1: For the applicable limit, see FCC 15.255 (b)

3.3 Peak Conducted Power

3.3.1 Limit of Peak Conducted Power

Peak Conducted Power Limit	
6dBc Bandwidth	**Peak Conducted Power (note 1)**
> 100MHz	500mW
≤ 100MHz	500mW x (BW/100) (see note 2)
NOTE 1: For the applicable limit, see FCC 15.255(e) NOTE 2: BW= 6dB bandwidth (measured at RBW 100kHz)	

3.3.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clause 9.5

3.3.4 Test Result of Peak Conducted Power

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.11
NOTE: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.11 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worst case combination to be used for the conformance testing.	

3.3.4.1 Peak Conducted Power

Temp	24℃	Humidity	53%
Test Engineer	John Tong		
Test Date	Aug. 12, 2016 ~ Aug. 15, 2016		

Test Results

Test Freq. (GHz)	EIRP (dBm)	Max. Ant. Gain (dBi)	Peak Power (dBm) (note1)	Peak Power (mW)	6dBc BW (MHz) (note2)	Peak Power Limit (mW) (note3)
58.32	34.76	26	8.76	7.509	1644.00	500.00
60.48	34.80	26	8.80	7.589	1783.00	500.00
62.64	34.82	26	8.82	7.615	1575.00	500.00

NOTE 1: Because EUT used for the integral antenna without temporary RF connector provided. Therefore peak conducted power is equal to EIRP power subtract the antenna gain.

NOTE 2: For the 6dBc bandwidth, see test report clause 3.1.5.

NOTE 3: For the applicable limit, see FCC 15.255(e)

NOTE 4: For radiated emission measurements, calculate conducted transmitter output power P(cond)(dBm)

P(cond) = EIRP - G(dBi)

where:

G(dBi) is gain of EUT antenna.

3.4 Transmitter Spurious Emissions

3.4.1 Limit of Transmitter Spurious Emissions

Frequency Range	Limit
Radiated emissions below 40 GHz	FCC 15.209
Radiated emissions above 40 GHz – 200GHz	90 pW/cm^2 @ 3 m (Equivalent EIRP 102 μW, -9.91dBm)
NOTE 1: For the applicable limit, see FCC 15.255(c) NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission. NOTE 3: publicly-accessible coordination channel, whose purpose is to coordinate operation between diverse transmitters with a view towards reducing the probability of interference throughout the 57-64 GHz band, are permitted in the 57-57.05 GHz band. The development of standards for this channel shall be performed pursuant to authorizations issued under part 5 of this chapter.	

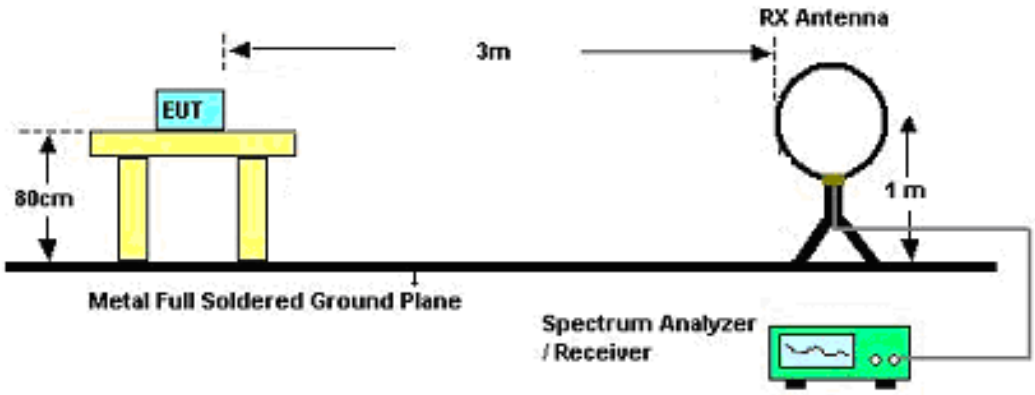
3.4.2 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clause 9.12

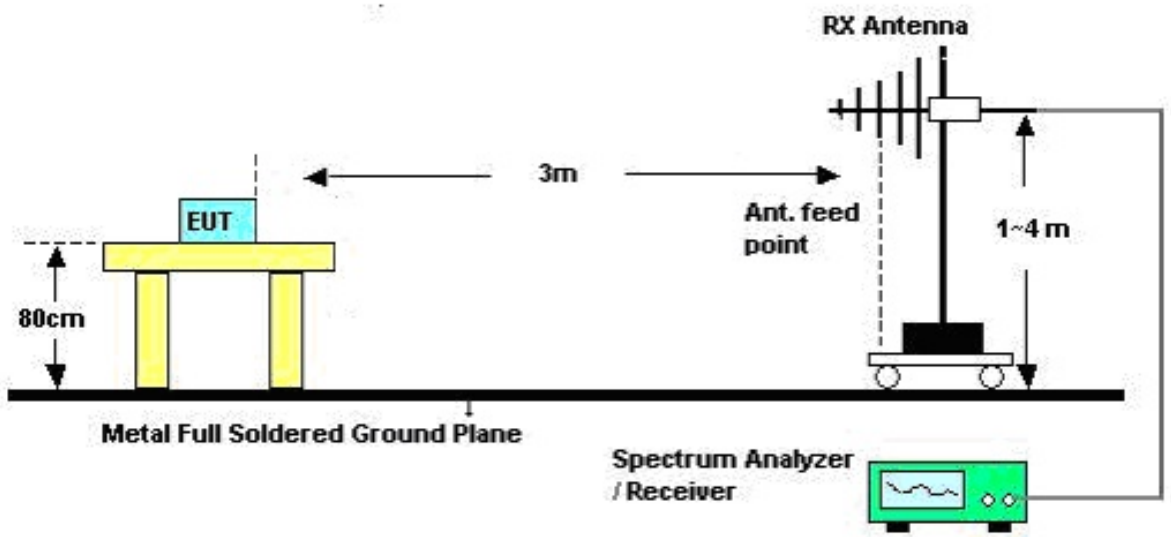
3.4.3 Test Setup

Transmitter Spurious Emissions

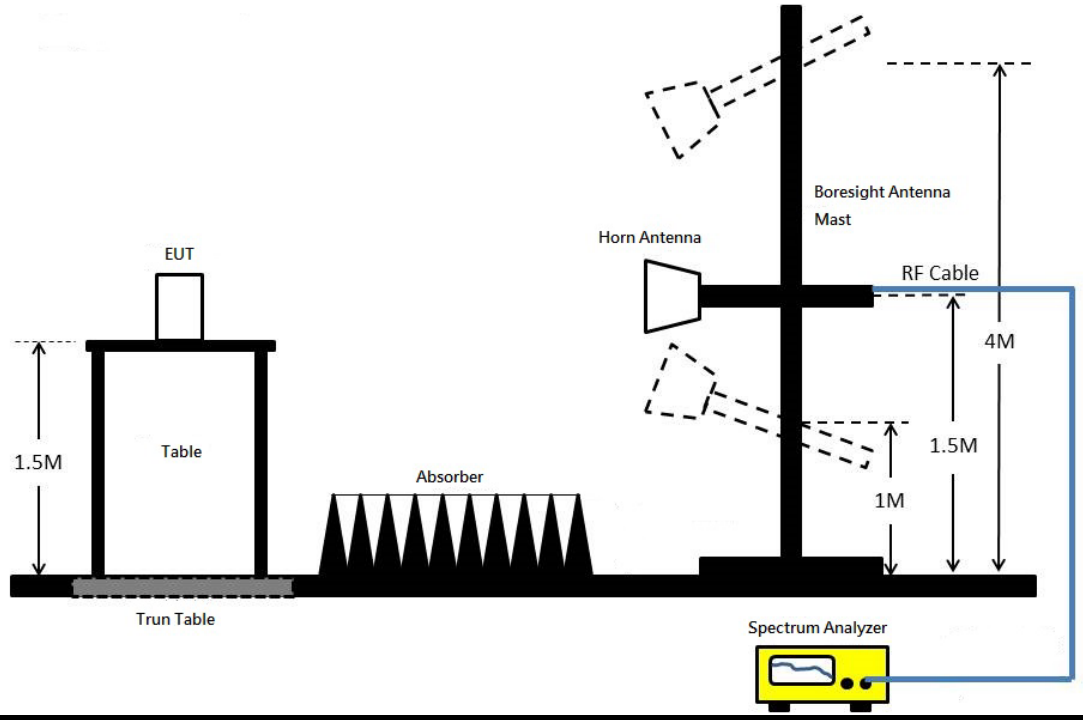
9kHz ~30MHz



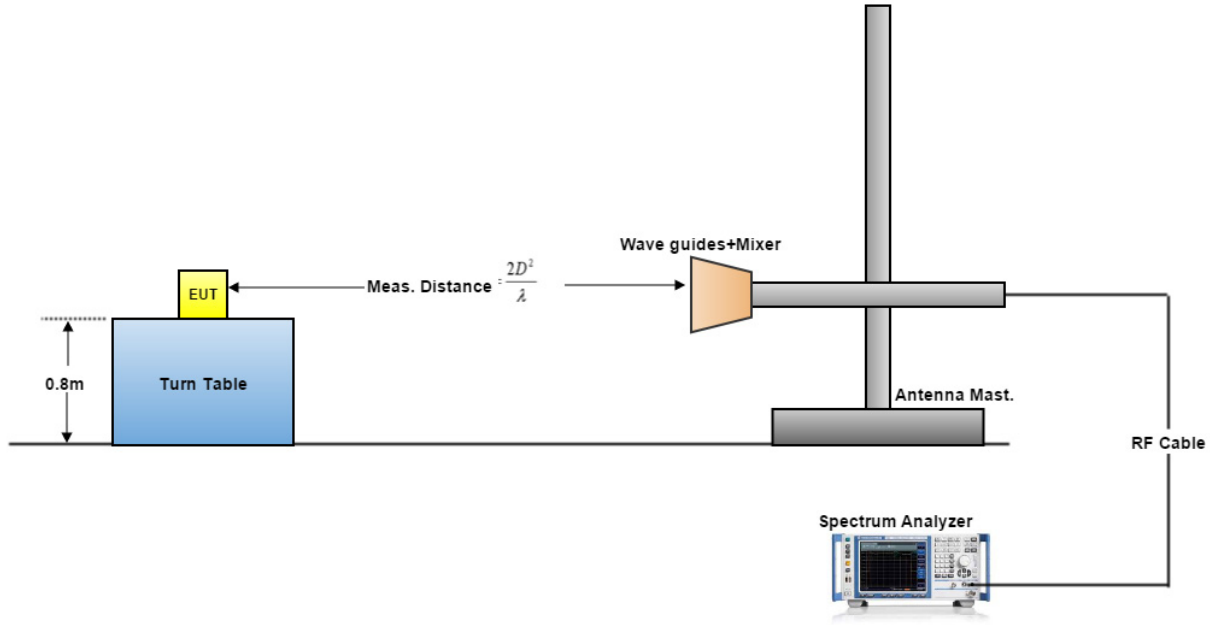
30MHz~1GHz



1GHz~40GHz



Above 40GHz



A measuring distance of at 3 m shall be used for measurements at frequencies up to 15 GHz. For frequencies above 15 GHz, any suitable measuring distance may be used. The measurement distance is chosen up to far field distance, depending on the test system noise floor for detecting spurious emission signals. Then above 15 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from spec. distance (3 m) to measurement distance. Distance extrapolation factor = 20 log (spec. distance [3 m] / measurement distance [N m]) (dB) .The measurements described in ANSI C63.10, clause 7.8.6. If the emission cannot be detected at 1 m, reduce the RBW to increase system sensitivity. Note the value. If the emission still cannot be detected, move the horn closer to the EUT, noting the distance at which a measurement is made.

3.4.4 Test Result of Transmitter Spurious Emissions

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.12 、9.13
NOTE: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	

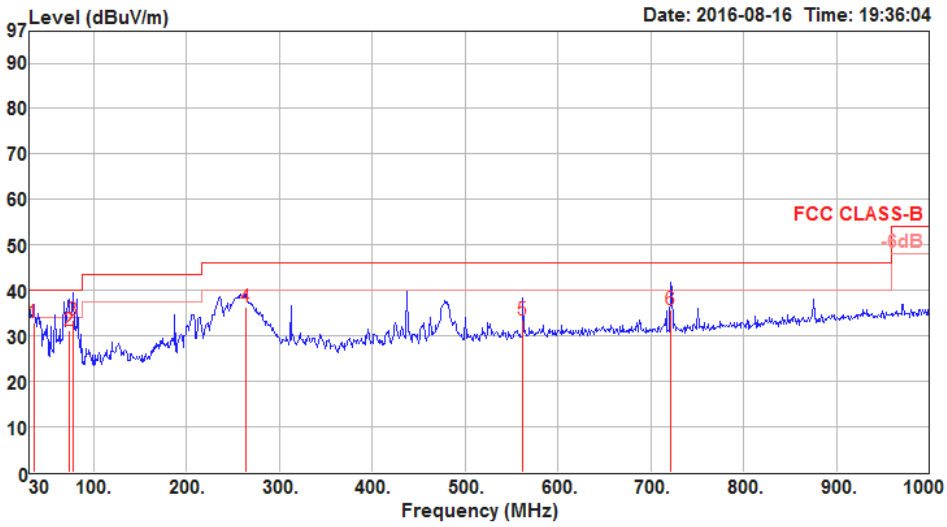
3.4.4.1 Test Result of Transmitter Spurious Emissions (Below 30MHz)

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

3.4.4.2 Test Result of Transmitter Spurious Emissions

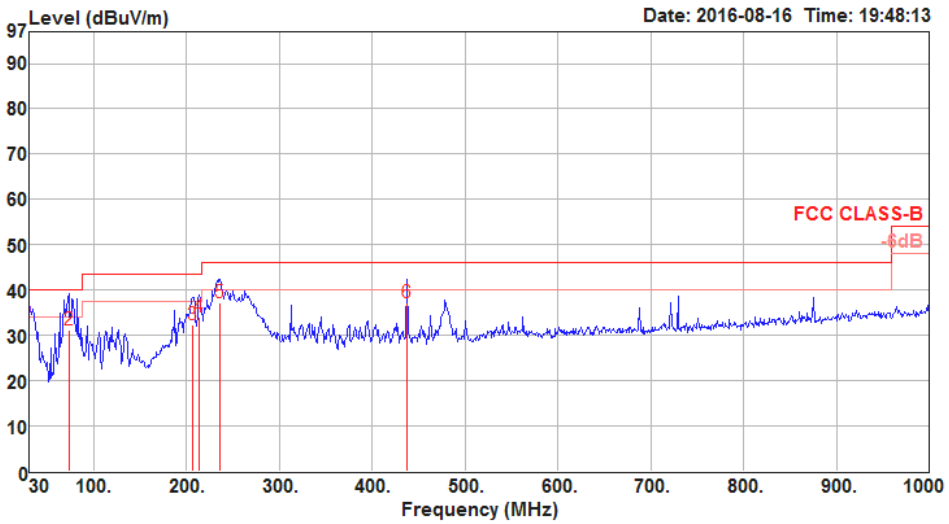
Temp	24°C	**Humidity**	53%
Test Engineer	John Tong	**Test Distance**	3 m
Test Range	30 MHz – 1000 MHz	**Test Configuration**	CTX
Test Freq.	Channel 1: 58.32 GHz		

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	34.85	32.98	40.00	-7.02	37.46	1.24	22.76	28.48	164	213	QP	VERTICAL
2	72.68	31.20	40.00	-8.80	45.44	1.46	12.66	28.36	157	334	QP	VERTICAL
3	77.53	33.41	40.00	-6.59	47.10	1.50	13.16	28.35	138	248	QP	VERTICAL
4	263.77	36.31	46.00	-9.69	42.21	2.02	19.68	27.60	168	238	QP	VERTICAL
5	562.53	33.43	46.00	-12.57	34.70	2.74	24.78	28.79	143	318	QP	VERTICAL
6	721.61	35.66	46.00	-10.34	35.27	3.19	25.78	28.58	169	248	QP	VERTICAL

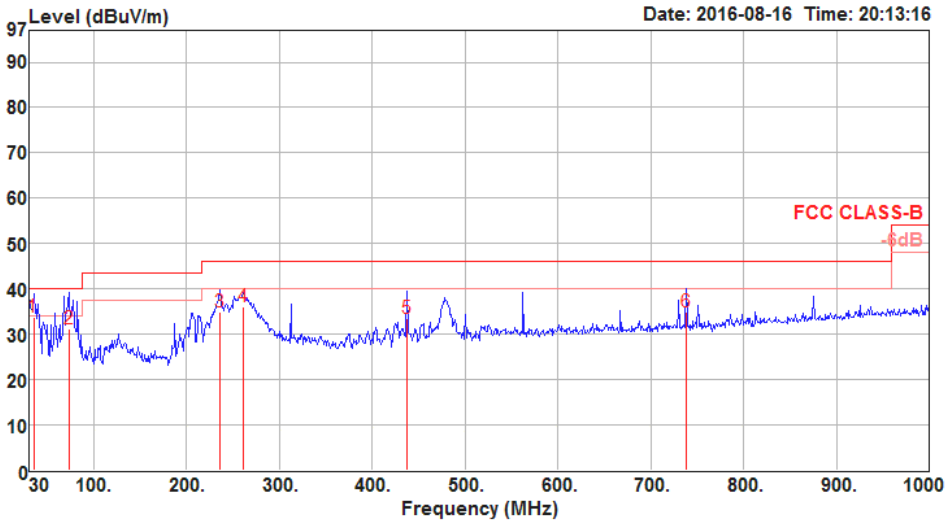
Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	32.41	40.00	-7.59	34.18	1.22	25.50	28.49	138	248	QP	HORIZONTAL
2	72.68	31.13	40.00	-8.87	45.37	1.46	12.66	28.36	158	267	QP	HORIZONTAL
3	206.54	32.28	43.50	-11.22	41.83	1.88	16.32	27.75	164	243	QP	HORIZONTAL
4	213.33	34.00	43.50	-9.50	43.43	1.89	16.41	27.73	142	312	QP	HORIZONTAL
5	235.64	37.35	46.00	-8.65	45.50	1.94	17.58	27.67	167	332	QP	HORIZONTAL
6	437.40	37.26	46.00	-8.74	40.55	2.45	22.75	28.49	152	338	QP	HORIZONTAL

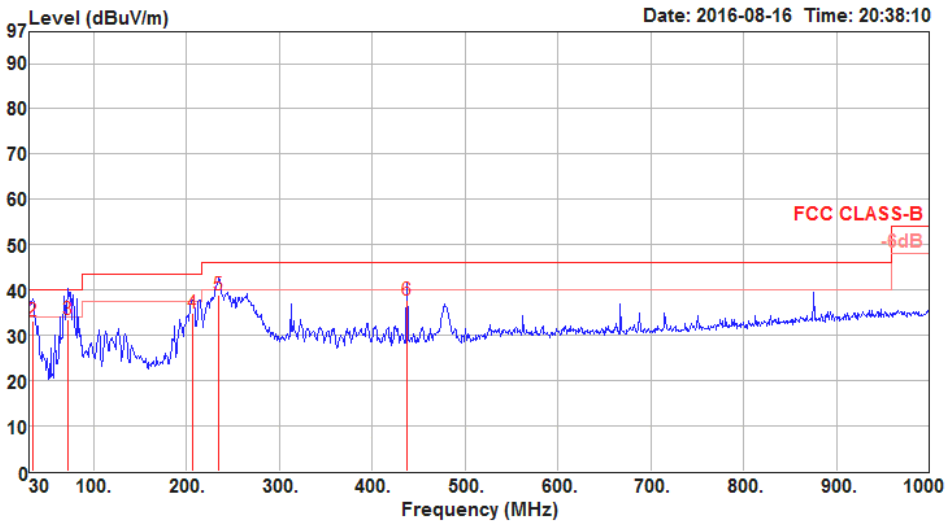
Temp	24°C	Humidity	53%
Test Engineer	John Tong	Test Distance	3 m
Test Range	30 MHz – 1000 MHz	Test Configuration	CTX
Test Freq.	Channel 2: 60.48 GHz		

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	34.85	33.89	40.00	-6.11	38.37	1.24	22.76	28.48	128	228	QP	VERTICAL
2	72.68	31.10	40.00	-8.90	45.34	1.46	12.66	28.36	139	208	QP	VERTICAL
3	235.64	34.82	46.00	-11.18	42.97	1.94	17.58	27.67	149	248	QP	VERTICAL
4	260.86	36.08	46.00	-9.92	41.83	2.01	19.85	27.61	167	234	QP	VERTICAL
5	437.40	33.43	46.00	-12.57	36.72	2.45	22.75	28.49	143	264	QP	VERTICAL
6	738.10	34.95	46.00	-11.05	34.39	3.20	25.90	28.54	157	284	QP	VERTICAL

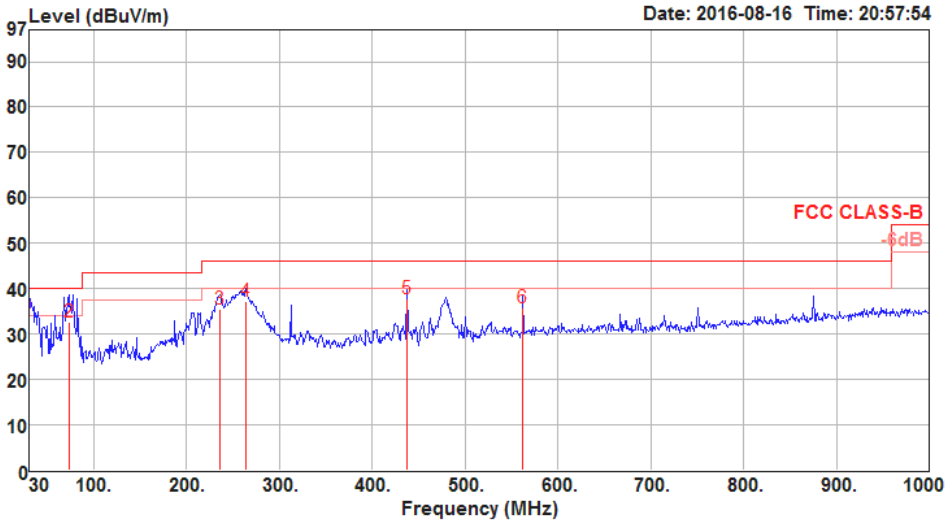
Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	33.52	40.00	-6.48	35.29	1.22	25.50	28.49	148	257	QP	HORIZONTAL
2	33.88	33.17	40.00	-6.83	37.14	1.24	23.27	28.48	134	269	QP	HORIZONTAL
3	71.71	33.40	40.00	-6.60	47.74	1.45	12.58	28.37	151	234	QP	HORIZONTAL
4	206.54	34.83	43.50	-8.67	44.38	1.88	16.32	27.75	134	357	QP	HORIZONTAL
5	234.67	39.00	46.00	-7.00	47.24	1.94	17.50	27.68	158	248	QP	HORIZONTAL
6	437.40	37.64	46.00	-8.36	40.93	2.45	22.75	28.49	128	338	QP	HORIZONTAL

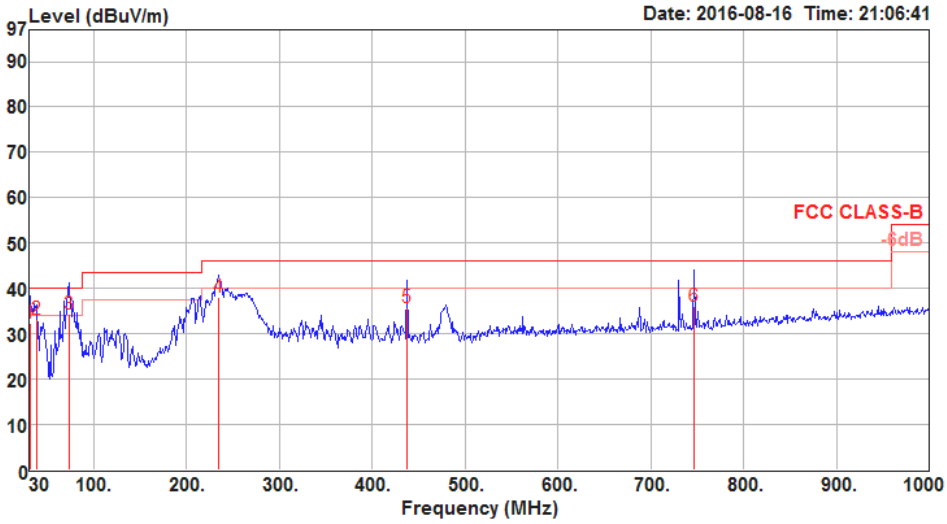
Temp	24°C	Humidity	53%
Test Engineer	John Tong	Test Distance	3 m
Test Range	30 MHz – 1000 MHz	Test Configuration	CTX
Test Freq.	Channel 3: 62.64 GHz		

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.00	33.19	40.00	-6.81	34.96	1.22	25.50	28.49	167	224	QP	VERTICAL
2	72.68	32.72	40.00	-7.28	46.96	1.46	12.66	28.36	162	234	QP	VERTICAL
3	235.64	35.62	46.00	-10.38	43.77	1.94	17.58	27.67	157	331	QP	VERTICAL
4	263.77	37.14	46.00	-8.86	43.04	2.02	19.68	27.60	154	243	QP	VERTICAL
5	437.40	37.76	46.00	-8.24	41.05	2.45	22.75	28.49	162	312	QP	VERTICAL
6	562.53	35.72	46.00	-10.28	36.99	2.74	24.78	28.79	158	333	QP	VERTICAL

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	30.97	32.31	40.00	-7.69	34.65	1.22	24.93	28.49	124	243	QP	HORIZONTAL
2	37.76	33.34	40.00	-6.66	39.47	1.27	21.08	28.48	138	248	QP	HORIZONTAL
3	72.68	34.35	40.00	-5.65	48.59	1.46	12.66	28.36	128	316	QP	HORIZONTAL
4	233.70	38.02	46.00	-7.98	46.43	1.94	17.33	27.68	134	264	QP	HORIZONTAL
5	437.40	35.67	46.00	-10.33	38.96	2.45	22.75	28.49	138	284	QP	HORIZONTAL
6	746.83	36.12	46.00	-9.88	35.44	3.22	25.98	28.52	146	349	QP	HORIZONTAL

Temp	24°C	Humidity	53%
Test Engineer	John Tong	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Configuration	CTX
Test Freq.	Channel 1: 58.32 GHz	Test Date	Aug. 17, 2016

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1390.56	31.26	54.00	-22.74	37.05	3.67	34.61	25.15	VERTICAL	45	111	Average
2	1390.97	41.62	74.00	-32.38	47.41	3.67	34.61	25.15	VERTICAL	45	111	Peak

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1390.25	30.35	54.00	-23.65	36.14	3.67	34.61	25.15	HORIZONTAL	254	121	Average
2	1391.36	38.56	74.00	-35.44	44.35	3.67	34.61	25.15	HORIZONTAL	254	121	Peak

Temp	24°C	Humidity	53%
Test Engineer	John Tong	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Configuration	CTX
Test Freq.	Channel 2: 60.48 GHz	Test Date	Aug. 17, 2016

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1099.46	34.91	74.00	-39.09	42.84	3.25	35.87	24.69	VERTICAL	324	107	Peak
2	1100.72	30.17	54.00	-23.83	38.10	3.25	35.87	24.69	VERTICAL	324	107	Average

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1099.64	29.99	54.00	-24.01	37.92	3.25	35.87	24.69	HORIZONTAL	241	110	Average
2	1100.00	37.24	74.00	-36.76	45.17	3.25	35.87	24.69	HORIZONTAL	241	110	Peak

Temp	24°C	Humidity	53%
Test Engineer	John Tong	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Configuration	CTX
Test Freq.	Channel 3: 62.64 GHz	Test Date	Aug. 17, 2016

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1302.38	37.60	74.00	-36.40	44.00	3.54	34.96	25.02	VERTICAL	153	117	Peak
2	1304.00	30.17	54.00	-23.83	36.56	3.54	34.96	25.03	VERTICAL	153	117	Average

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	1302.38	29.45	54.00	-24.55	35.85	3.54	34.96	25.02	HORIZONTAL	187	105	Average
2	1303.96	37.24	74.00	-36.76	43.63	3.54	34.96	25.03	HORIZONTAL	187	105	Peak

Temp	23°C	Humidity	60%
Test Engineer	Steven Liang	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Configuration	CTX
Test Freq.	Channel 1: 58.32 GHz	Test Date	Aug. 17, 2016

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	18542.42	48.76	83.54	-34.78	54.65	8.50	52.31	37.92	VERTICAL	129	154	Peak
2	18559.50	37.41	63.54	-26.13	43.33	8.50	52.31	37.89	VERTICAL	129	154	Average

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	18551.86	37.90	63.54	-25.64	43.82	8.50	52.31	37.89	HORIZONTAL	137	152	Average
2	18563.88	48.35	83.54	-35.19	54.28	8.51	52.31	37.87	HORIZONTAL	137	152	Peak

Temp	23°C	Humidity	60%
Test Engineer	Steven Liang	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Configuration	CTX
Test Freq.	Channel 2: 60.48 GHz	Test Date	Aug. 17, 2016

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	21155.94	52.24	83.54	-31.30	57.40	8.81	51.72	37.75	VERTICAL	149	157	Peak
2	21158.65	38.72	63.54	-24.82	43.88	8.81	51.72	37.75	VERTICAL	149	157	Average

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	21140.36	51.56	83.54	-31.98	56.73	8.81	51.71	37.73	HORIZONTAL	107	151	Peak
2	21148.40	37.86	63.54	-25.68	43.02	8.81	51.72	37.75	HORIZONTAL	107	151	Average

Temp	23°C	Humidity	60%
Test Engineer	Steven Liang	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Configuration	CTX
Test Freq.	Channel 3: 62.64 GHz	Test Date	Aug. 17, 2016

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	20691.85	37.64	63.54	-25.90	43.06	8.73	51.87	37.72	VERTICAL	124	156	Average
2	20694.66	50.99	83.54	-32.55	56.41	8.73	51.87	37.72	VERTICAL	124	156	Peak

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	20683.12	51.24	83.54	-32.30	56.68	8.72	51.89	37.73	HORIZONTAL	223	155	Peak
2	20690.56	37.45	63.54	-26.09	42.89	8.72	51.89	37.73	HORIZONTAL	223	155	Average

Temp	24°C	Humidity	53%
Test Engineer	John Tong	Test Date	Aug. 12, 2016 ~ Aug. 15, 2016
Test Range	40GHz – 200GHz		

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
58.32	16.00	0.70	40.19	-74.33
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/m^2)**	**Limit (pW/cm^2)**	**Test Result**
-28.90	3	11.3804	90.00	Complied

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	16.00	0.70	40.18	-76.32
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/m^2)**	**Limit (pW/cm^2)**	**Test Result**
-30.90	3	7.1935	90.00	Complied

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	16.00	0.70	41.07	-76.16
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/m^2)**	**Limit (pW/cm^2)**	**Test Result**
-30.55	3	7.7985	90.00	Complied

3.5 Frequency Stability

3.5.1 Limit of Frequency Stability

Frequency Stability	Limit
Refer as FCC 15.255(f) and ANSI C63.10-2013, clause 9.14	within the frequency bands
Note: These measurements shall also be performed at normal and extreme test conditions.	

3.5.2 Measuring Instruments

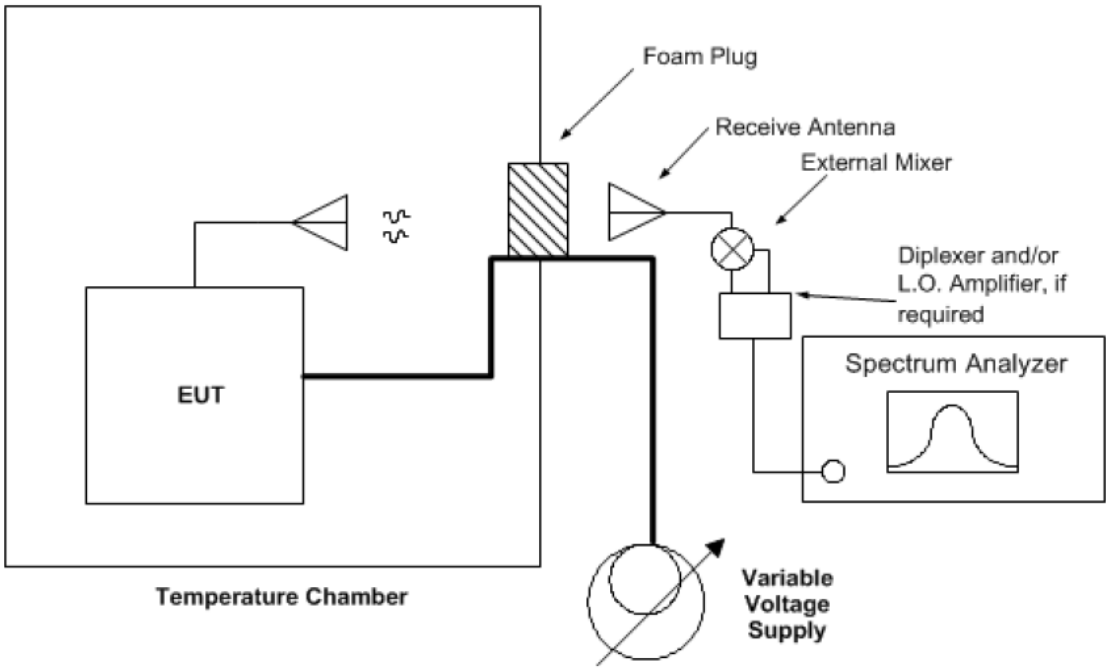
Refer a measuring instruments list in this test report.

3.5.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 9.14.

3.5.4 Test Setup

Frequency Stability



3.5.5 Test Result of Frequency Stability

Test Conditions	see ANSI C63.10, clause 5.11 & clause 9
Test Setup	see ANSI C63.10, clause 9.14
NOTE: If equipment having different channel plan and nominal channel bandwidth modes (see test report clause 1.1.1), the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	

3.5.5.1 Frequency Stability with Respect to Ambient Temperature

Frequency Stability with Respect to Ambient Temperature			
Temp	24℃	**Humidity**	53%
Test Engineer	John Tong	**Test Date**	Aug. 12, 2016 ~ Aug. 15, 2016

Test Results

Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-40	6045.4500	-2400.000	within band
-30	6045.7750	-2075.000	within band
-20	6046.1500	-1700.000	within band
-10	6046.4750	-1375.000	within band
0	6046.5400	-1310.000	within band
10	6046.8450	-1005.000	within band
20	6047.8500	Reference	within band
30	6048.3350	485.000	within band
40	6048.8500	1000.000	within band
50	6049.2000	1350.000	within band
60	6049.7500	1900.000	within band
70	6050.1050	1770.000	within band

NOTE:

1. For the applicable limit, see FCC 15.255(f).

2. The manufacturer's specified temperature range of -40 to 70°C.

3.5.5.2 Frequency Stability When Varying Supply Voltage

Frequency Stability When Varying Supply Voltage			
Temp	24℃	**Humidity**	53%
Test Engineer	John Tong	**Test Date**	Aug. 12, 2016 ~ Aug. 15, 2016

Test Results			
Test Voltage: (Vdc)	**Measured Frequency (MHz)**	**Delta Frequency (kHz)**	**Limit (±kHz)**
4.25	6047.2250	-625.000	within band
5	6047.8500	Reference	within band
5.75	6048.1500	300.000	within band
NOTE: For the applicable limit, see FCC 15.255(f).			

3.6 Operation Restriction and Group Installation

3.6.1 Limit of Operation Restriction and Group Installation

Item	Limit
Operation Restriction	Operation is not permitted for the following products: ♦ Equipment used on aircraft or satellites. (Refer as FCC 15.255 (a)) ♦ Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation. (Refer as FCC 15.255 (a))
Group Installation	Operation is not permitted for the following products: ♦ External phase-locking (Refer as FCC 15.255 (h))

3.6.2 Result of Operation Restriction

Manufacturer declares that EUT will not been used on aircraft or satellites. Then user manual will include a statement to caution EUT is not permitted for used on aircraft or satellites. EUT is a wireless video area network (WVAN) for the connection of consumer electronic (CE) audio and video devices.

3.6.3 Result of Group Installation

The frequency, amplitude and phase of the transmit signal are set within the EUT. There are no external phase-locking inputs or any other means of combining two or more units together to realize a beam-forming array.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Radiation (03CH01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 25, 2016	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 15, 2016	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 18, 2016	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 13, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 15, 2016	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 16, 2016	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-l0-7	N/A	N/A	Radiation (03CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Sep. 09, 2015*	Radiation (03CH01-CB)
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Sep. 14, 2015*	Radiation (03CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Sep. 17, 2015*	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Sep. 21, 2015*	Radiation (03CH01-CB)
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	Sep. 24, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO19R	U91113-A	40 ~ 60 GHz	Sep. 09, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO15R	V91113-A	50 ~ 75 GHz	Sep. 14, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO12R	E91113-A	60 ~ 90 GHz	Sep. 17, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO08R	F91113-A	90 ~ 140 GHz	Sep. 21, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO05R	G91113-A	140 ~ 220 GHz	Sep. 24, 2015*	Radiation (03CH01-CB)
Pico Scope	Pico	Pico Scope 6402C	CX372/002	N/A	Jul. 06, 2016	Radiation (03CH01-CB)
*Detector	Millitech	DET-15-RPFW0	#A16473(038)	50 ~ 75 GHz	Dec. 29, 2015*	Radiation (03CH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2016	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.
"*" Calibration Interval of instruments listed above is two years.
NCR means Non-Calibration required.

5 Measurement Uncertainty

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 220GHz)	4.7 dB	Confidence levels of 95%
Temperature	0.7°C	Confidence levels of 95%