FCC RADIO TEST REPORT

FCC ID	:	HED-ML60MDSB
Equipment	:	Metrolinq 60GHz Module
Brand Name	:	IgniteNet
Model Name	:	RDO-60-FB-USBB-8
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.
Standard	:	47 CFR FCC Part 15.255

The product was received on Mar. 31, 2018, and testing was started from Mar. 31, 2018 and completed on Jul. 04, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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Appendix A. Test Photos

Photographs of EUT v01

History of this test report

Report No.	Version	Description	Issued Date
FR5N2614-19	01	Initial issue of report	Jul. 05, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	FCC 15.255(d)	Occupied Bandwidth	PASS	-
3.2	FCC 15.255(b)(1)	EIRP Power	PASS	-
3.3	FCC 15.255(d)	Peak Conducted Power	PASS	-
3.4	FCC 15.255(c)	Transmitter Spurious Emissions	PASS	-
3.5	FCC 15.255(a),(g)	Operation Restriction and Group Installation	PASS	-

Reviewed by: Sam Chen

Report Producer: Wendy Pan

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information	
Frequency Range	57-71 GHz
The Channel Plan(s)	Channel 1: 58.32 GHz Channel 2: 60.48 GHz Channel 3: 62.64 GHz Channel 4: 64.80 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	Model Name	Antenna Type	Connector	Gain (dBi)
1	Accton	123400001485A	Dish Ant.	N/A	42
2	Accton	123400001486A	Dish Ant.	N/A	38

Note: Because Ant. 1 and Ant. 2 are the same type antennas, only the higher gain antenna “Ant.1” was tested.

1.2 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. Changing the module approval to full modular approval from limited modular approval. 2. Remove the console port (Location: J1) 3. Remove the component C29,C30,C31,C32, R42,R43,R44,R45,R46,R47,R48,R49. 4. Change the location for component C29,C30,C31,C32 to U8 from U3. 5. Add the component C87,C88,C89. 6. Add the component U18,U19 for LED function. 7. Add two antennas with the same type and same gain. The antenna information please section 1.1.3.	**Channel 3 generated the worst case from original, thus only test channel 3 for below items:** 1. Transmitter Spurious Emissions (below 1 GHz) 2. Transmitter Spurious Emissions (1 GHz-40 GHz) 3. Transmitter Spurious Emissions (above 40 GHz)
8. Adding the operating frequency 64.8GHz.	1. Occupied Bandwidth 2. EIRP Power 3. Peak Conducted Power 4. Transmitter Spurious Emissions (1 GHz-40 GHz) 5. Transmitter Spurious Emissions (above 40 GHz)
9. Updating the equipment name to Metrolinq 60GHz Module from Metrolinq 60 GHz Module. 10. Updating the manufacturer name and address to “Accton Technology Corporation” and “No. 1, Creation Rd. III, Science-based Industrial Park Hsin Chu 30077, Taiwan R.O.C.”	Do not affect the test results.

1.2.1 EUT Power Type

EUT Power Type	From host system

1.2.2 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

1.2.3 User Condition

Intended Operation
☐ Indoor
☒ Outdoor

1.2.4 Duty Cycle

Duty Cycle	Duty Cycle Factor
99.52 %	0.02

1.3 Accessories

Accessories
Reflection board of antenna*1
USB cable*1, shielded, 0.7m

1.4 Support Equipment

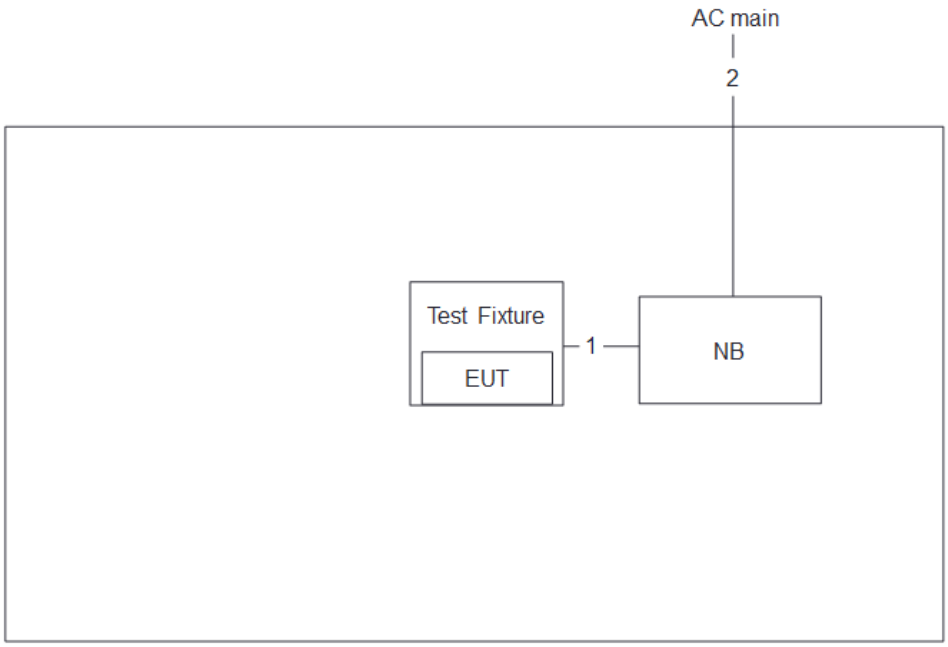
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	NB	DELL	E4300	N/A
2	Test fixture	Accton	OAP920920	N/A

1.5 EUT Operation during Test

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

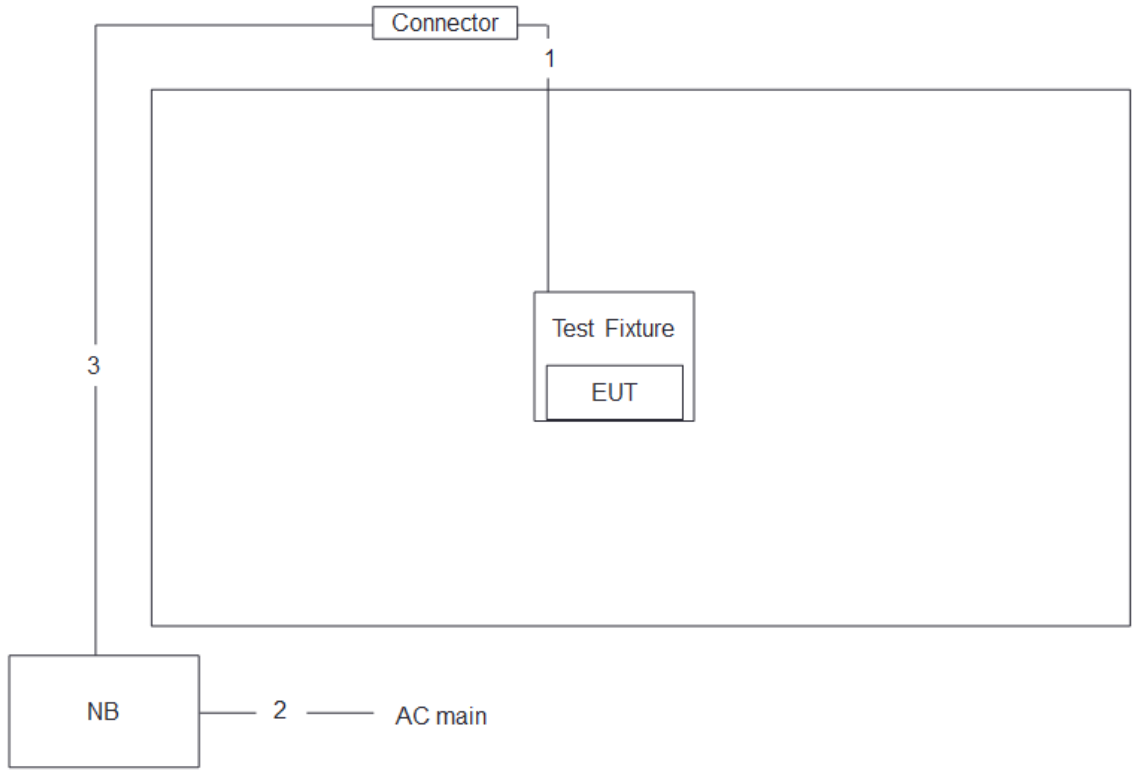
1.6 Test Setup Diagram

Test Setup Diagram - Transmitter Spurious Emissions < 40GHz



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

Test Setup Diagram - Transmitter Spurious Emissions > 40GHz



Item	Connection	Shielded	Length
1	USB Cable	Yes	0.7m
2	Power Cable	No	2.6m
3	USB Cable	Yes	10m

1.7 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”

1.8 Testing Location

Testing Location			
☐	HWA YA	ADD :	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, 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			

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

2 Test Configuration of Equipment under Test

2.1 Test Channel Frequencies

Test Channel Frequencies Configuration	
Channel 1	58.32
Channel 2	60.48
Channel 3	62.64
Channel 4	64.80

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz)
Occupied Bandwidth	64.80
EIRP Power	64.80
Peak Conducted Power	64.80
Transmitter Spurious Emissions (below 1 GHz)	62.64
Transmitter Spurious Emissions (1 GHz-40 GHz)	62.64, 64.80
Transmitter Spurious Emissions (above 40 GHz)	62.64, 64.80

Note: The EUT can only be used in Y axis.

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)**
64.80	0.35	0.0046296	52.920	5292.00

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

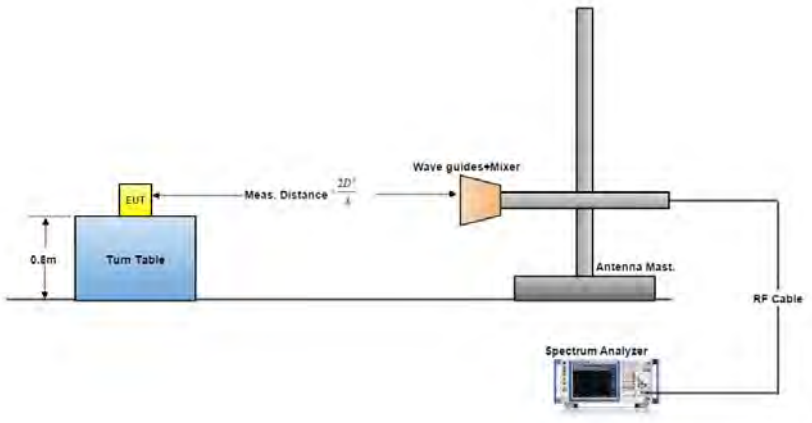
Refer a measuring instruments list in this test report.

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

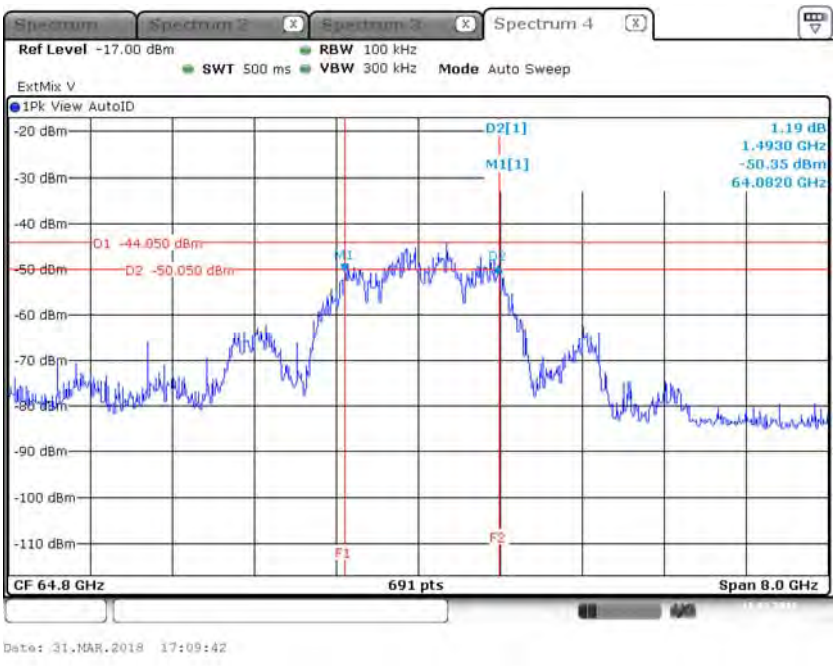
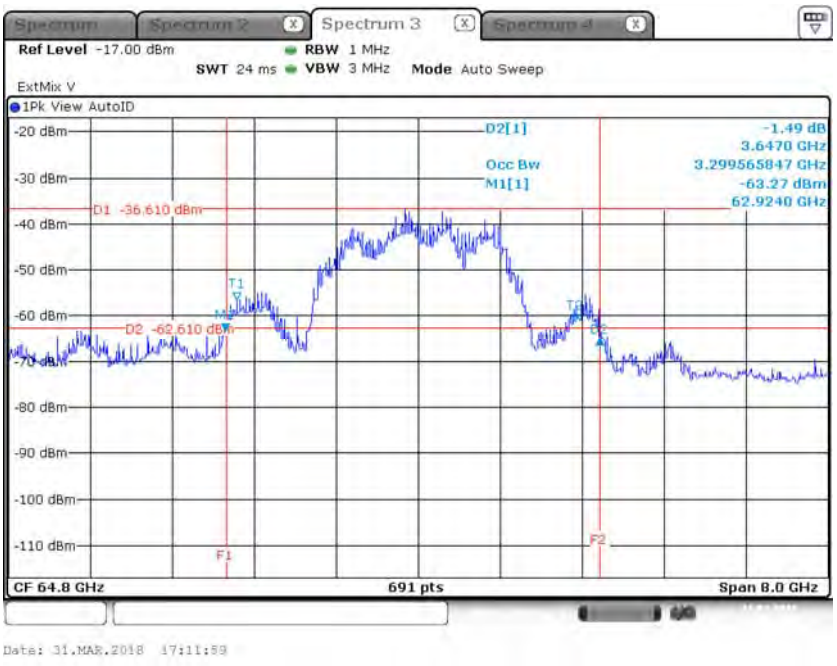
Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 6.9.2
NOTE: If equipment having different transmit operating modes (see test report clause 1.1.2), the measurements are uninfluenced by different transmit operating modes, may not need to be repeated for all the operating 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	22℃	**Humidity**	54%
Test Engineer	Lucas Huang		

Test Results

Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)
64.80	1493.00	3299.57	3647.00	N/A

3.1.5.1 Bandwidth Plots

Test Frequency: 64.80 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


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 within the frequency band 61-61.5GHz	40 dBm	43 dBm
Fixed field disturbance sensors at outside of the band 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

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

3.2.2 Measuring Instruments

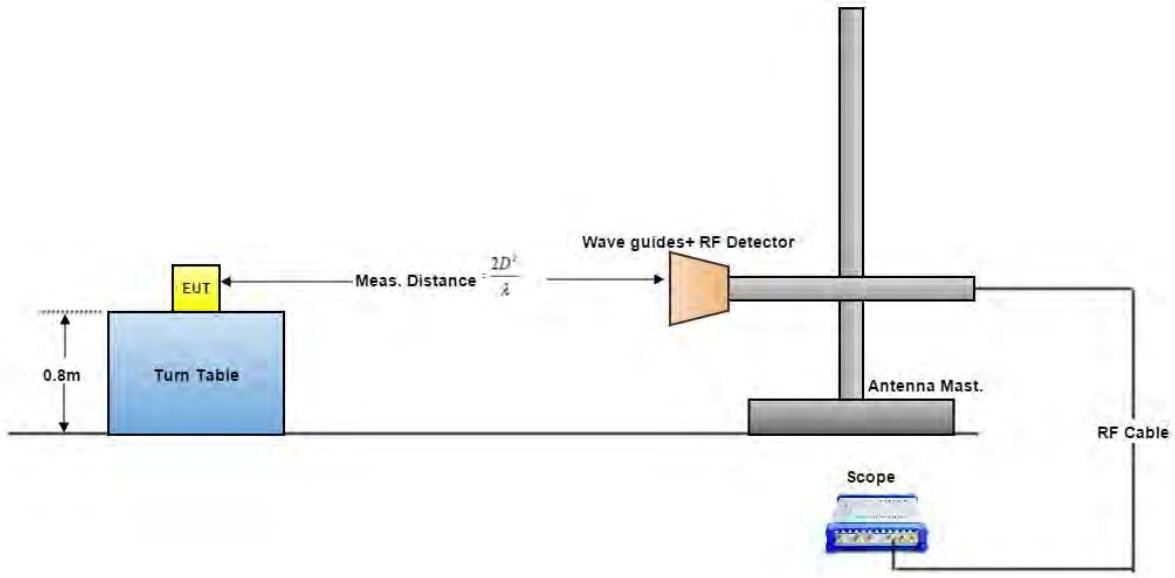
Refer a measuring instruments list in this test report.

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	22℃	Humidity	54%
Test Engineer	Lucas Huang	Test Distance	55m
Test Date	Mar. 31, 2018 ~ Apr. 03, 2018		

Test Results

Test Freq. (GHz)	Rx Gain (dBi)	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
64.80	23	2.310	0.262	-28.94	-42.82	121.55	107.67	51.66	37.78	67	64

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)

NOTE 2: The comparison method which replaces EUT with a signal generator is used to find the correct conversion factor between “DSO(mV)” & “Power Measured(dBm)”.

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	22℃		Humidity	54%		
Test Engineer	Lucas Huang					
Test Date	Mar. 31, 2018 ~ Apr. 03, 2018					
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)
64.80	51.66	42	9.66	9.239	1493.00	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

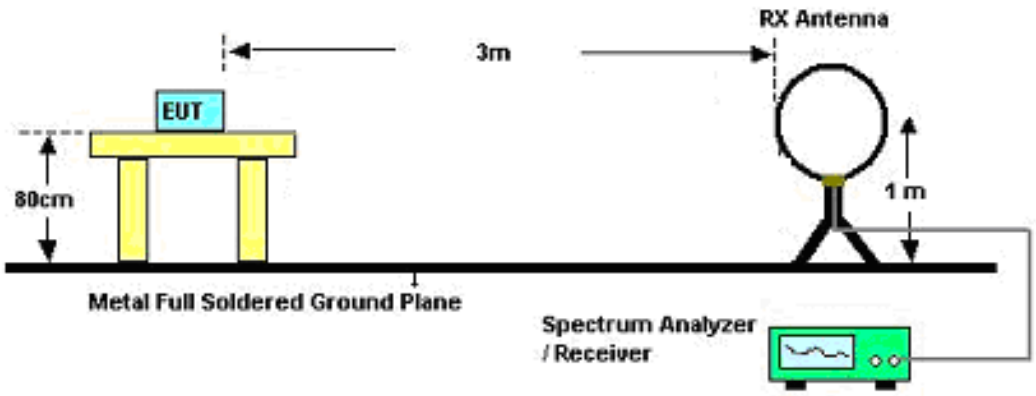
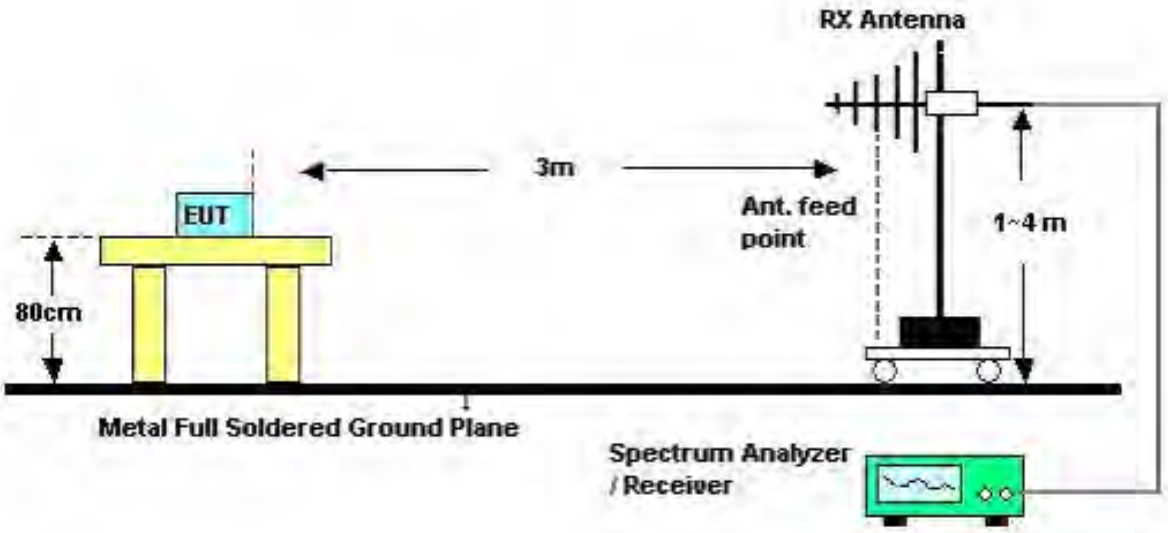
3.4.1 Limit of Transmitter Spurious Emissions

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.	

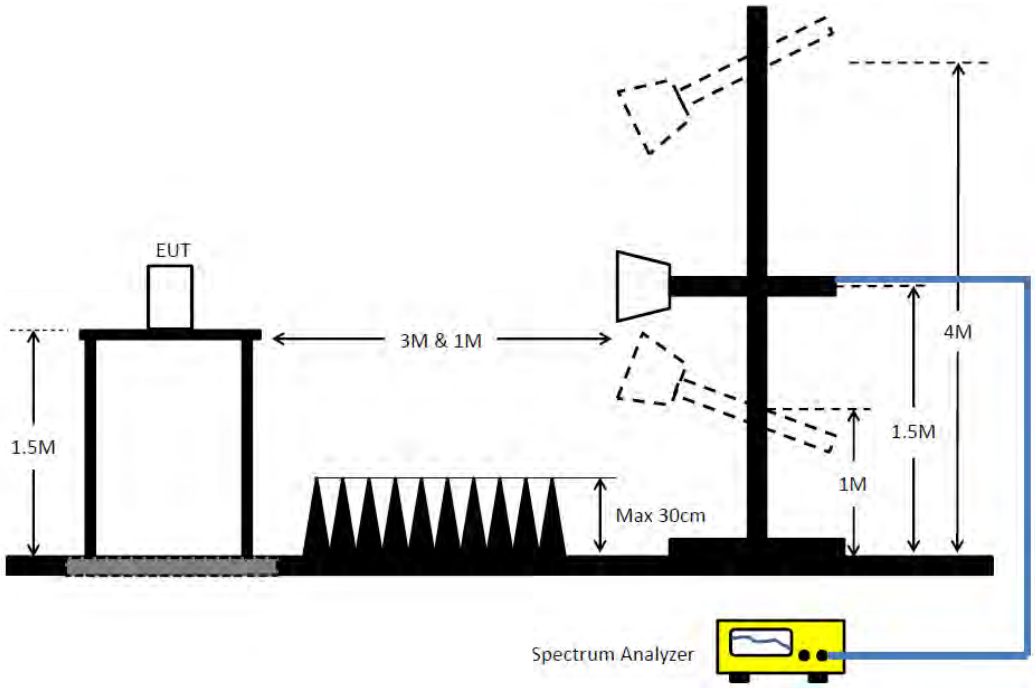
3.4.2 Test Procedures

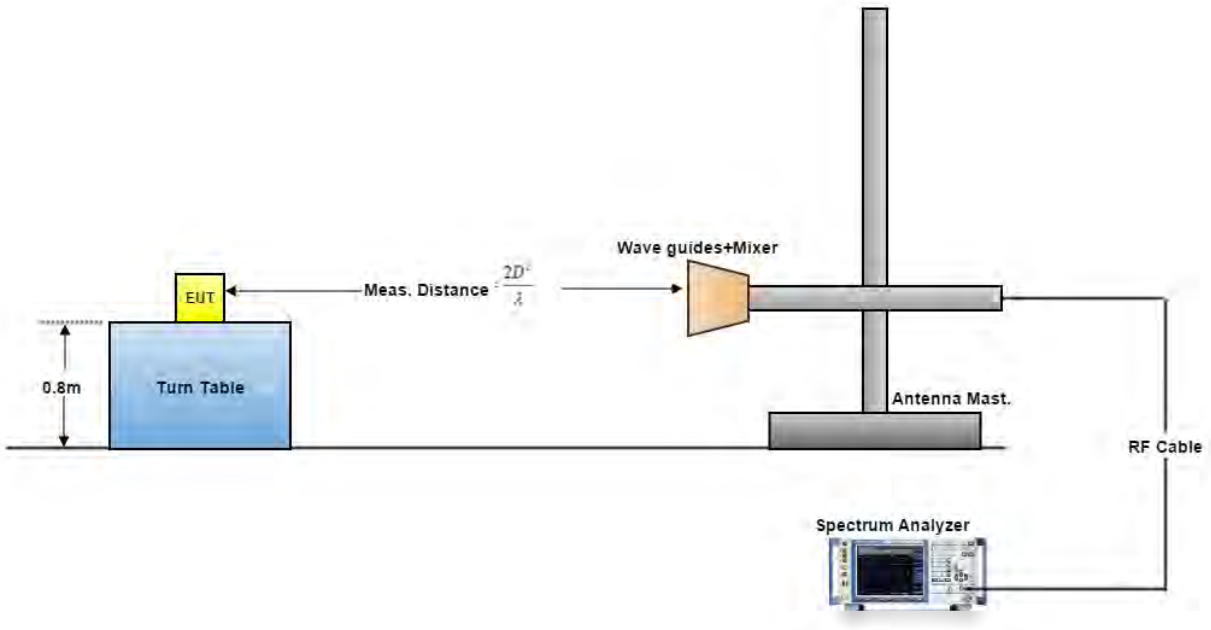
Method of measurement: Refer as ANSI C63.10-2013, clause 9.12

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)

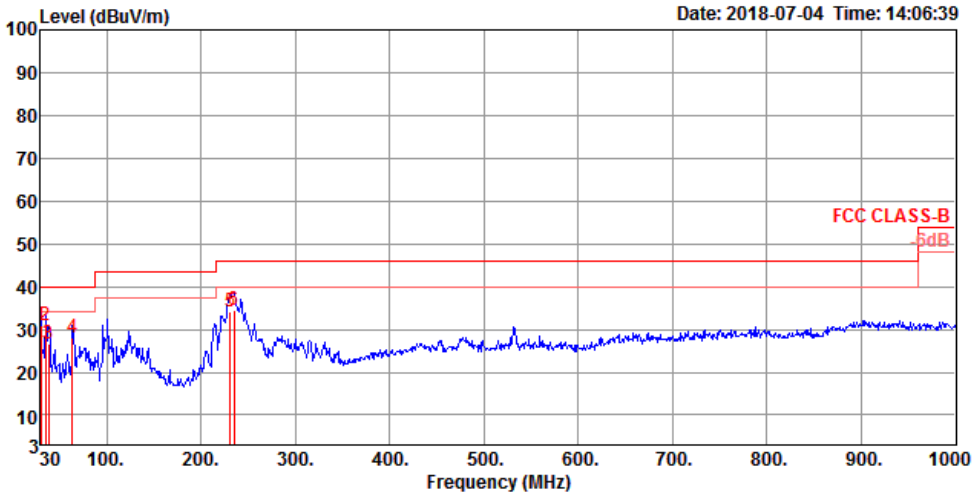
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10 harmonic or 40 GHz, whichever is appropriate.

3.4.4.2 Test Result of Transmitter Spurious Emissions

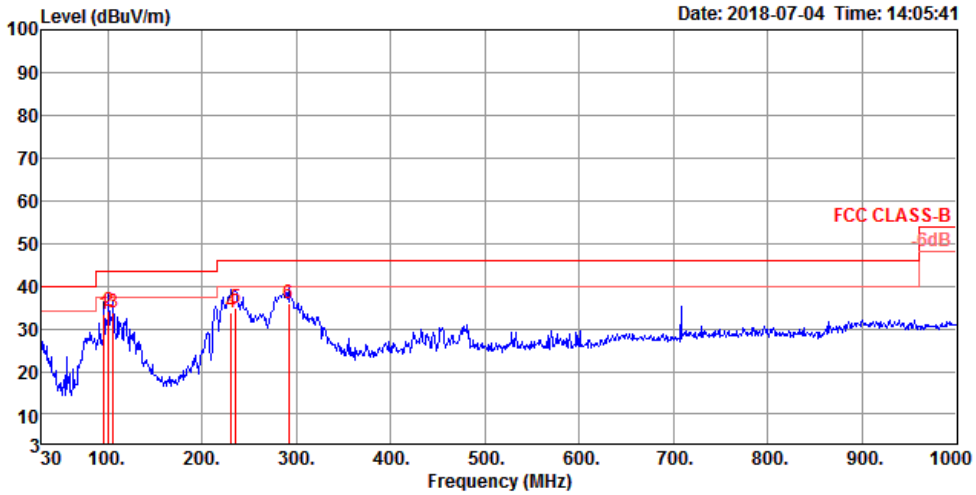
Temp	22°C	**Humidity**	54%
Test Engineer	Lucas Huang	**Test Distance**	3 m
Test Range	30 MHz – 1000 MHz	**Test Frequencies**	62.64 GHz
Test Configuration	CTX		

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	31.06	40.00	-8.94	36.79	0.00	25.70	31.43	100	216	QP	VERTICAL
2	34.85	30.78	40.00	-9.22	39.48	0.00	22.87	31.57	100	255	QP	VERTICAL
3	38.73	26.54	40.00	-13.46	37.67	0.00	20.51	31.64	200	107	QP	VERTICAL
4	63.95	28.18	40.00	-11.82	47.41	0.00	12.60	31.83	200	75	QP	VERTICAL
5	230.79	34.04	46.00	-11.96	48.79	0.00	17.18	31.93	200	0	QP	VERTICAL
6	234.67	34.32	46.00	-11.68	48.65	0.00	17.60	31.93	200	0	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	95.96	33.54	43.50	-9.96	49.00	0.00	16.40	31.86	300	30	QP	HORIZONTAL
2	100.81	34.27	43.50	-9.23	48.92	0.00	17.22	31.87	300	172	QP	HORIZONTAL
3	105.66	33.83	43.50	-9.67	47.97	0.00	17.73	31.87	200	161	QP	HORIZONTAL
4	230.79	33.75	46.00	-12.25	48.50	0.00	17.18	31.93	125	198	QP	HORIZONTAL
5	235.64	34.95	46.00	-11.05	49.20	0.00	17.68	31.93	125	99	QP	HORIZONTAL
6	291.90	35.87	46.00	-10.13	48.23	0.00	19.64	32.00	125	126	QP	HORIZONTAL

Temp	22°C	**Humidity**	54%
Test Engineer	Ekko Hsieh	**Test Distance**	3 m
Test Range	1 GHz – 18 GHz	**Test Frequencies**	62.64 GHz
Test Date	Apr. 03, 2018	**Test Configuration**	CTX

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	1596.04	48.54	74.00	-25.46	52.44	5.58	25.53	35.01	164	192	Peak	VERTICAL
2	1597.29	37.85	54.00	-16.15	41.75	5.58	25.53	35.01	164	192	Average	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	1597.71	37.90	54.00	-16.10	41.80	5.58	25.53	35.01	159	216	Average	HORIZONTAL
2	1598.03	48.85	74.00	-25.15	52.75	5.58	25.53	35.01	159	216	Peak	HORIZONTAL

Temp	22°C	Humidity	54%
Test Engineer	Ekko Hsieh	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Frequencies	62.64 GHz
Test Date	Apr. 03, 2018	Test Configuration	CTX

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	20673.79	46.15	63.54	-17.39	45.02	12.53	37.93	49.33	173	224	Average	VERTICAL
2	20674.89	58.23	83.54	-25.31	57.08	12.53	37.95	49.33	173	224	Peak	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	20672.24	45.56	63.54	-17.98	44.43	12.53	37.93	49.33	154	173	Average	HORIZONTAL
2	20674.71	59.35	83.54	-24.19	58.22	12.53	37.93	49.33	154	173	Peak	HORIZONTAL

Temp	22°C	Humidity	54%
Test Engineer	Ekko Hsieh	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Frequencies	64.80 GHz
Test Date	Apr. 03, 2018	Test Configuration	CTX

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	1597.72	46.18	74.00	-27.82	50.08	5.58	25.53	35.01	154	207	Peak	VERTICAL
2	1598.82	34.04	54.00	-19.96	37.94	5.58	25.53	35.01	154	207	Average	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	1598.41	47.39	74.00	-26.61	51.29	5.58	25.53	35.01	177	191	Peak	HORIZONTAL
2	1598.79	35.37	54.00	-18.63	39.27	5.58	25.53	35.01	177	191	Average	HORIZONTAL

Temp	22°C	Humidity	54%
Test Engineer	Ekko Hsieh	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Frequencies	64.80 GHz
Test Date	Apr. 03, 2018	Test Configuration	CTX

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	20666.11	57.30	83.54	-26.24	56.17	12.53	37.93	49.33	166	258	Peak	VERTICAL
2	20670.70	44.04	63.54	-19.50	42.91	12.53	37.93	49.33	166	258	Average	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	20668.22	43.63	63.54	-19.91	42.50	12.53	37.93	49.33	181	312	Average	HORIZONTAL
2	20668.38	56.34	83.54	-27.20	55.21	12.53	37.93	49.33	181	312	Peak	HORIZONTAL

Temp	22°C	**Humidity**	54%
Test Engineer	Lucas Huang	**Test Date**	Apr. 03, 2018
Test Range	40GHz – 200GHz		

Test Frequency (GHz)	**Rx Antenna Gain (dBi)**	**Measurement Distance (m)**	**Read Worse Frequency (GHz)**	**Read Level (dBm)**
62.64	23.00	3.00	40.57	-78.66
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-27.51	3.00	1.5681	90.00	PASS

Test Frequency (GHz)	**Rx Antenna Gain (dBi)**	**Measurement Distance (m)**	**Read Worse Frequency (GHz)**	**Read Level (dBm)**
64.80	23.00	3.00	41.22	-78.41
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-27.12	3	1.7147	90.00	PASS

Note:
EIRP = Prx – Grx + Free Space Path Loss = Prx – Grx + 20Log(4πd/ λ)2
Which
Prx = Read Level.
Grx = Rx Antenna Gain.
A distance factor is offset and the formula is 20LOG(D1/D2)
Which
D1 = Specification Distance
D2 = Measurement Distance

3.5 Operation Restriction and Group Installation

3.5.1 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 (g))

3.5.2 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.

3.5.3 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	Calibration Due Date	Remark
Loop Antenna	R&S	HFH2-Z2	100330	9kHz - 30 MHz	Nov. 13, 2017	Nov. 12, 2018	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2017	Aug. 29, 2018	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2017	May 01, 2018	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2018	May 01, 2019	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 09, 2018	Jan. 08, 2019	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Jul. 09, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100354	9kHz ~ 2.75GHz	Dec. 08, 2017	Dec. 07, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-l0-7	N/A	N/A	N/A	Radiation (03CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (03CH01-CB)
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (03CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (03CH01-CB)
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (03CH01-CB)
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	Oct. 12, 2017	Oct. 11, 2018	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Standard Horn Antenna	Custom Microwave	M19RH	U91113-A	40 ~ 60 GHz	N.C.R	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	M15RH	V91113-A	50 ~ 75 GHz	N.C.R	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	M12RH	E91113-A	60 ~ 90 GHz	N.C.R	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	M08RH	F91113-A	90 ~ 140 GHz	N.C.R	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	M05RH	G91113-A	140 ~ 220 GHz	N.C.R	N.C.R	Radiation (03CH01-CB)
Detector	Millitech	DET-15-RPFW 0	#A18185(074)	50 ~ 75 GHz	Jan. 29, 2018*	Jan. 29, 2020*	Radiation (03CH01-CB)
Pico Scope	Pico	Pico Scope 6402C	CX372/002	N/A	Jul. 26, 2017	Jul. 25, 2018	Radiation (03CH01-CB)

Note: Calibration Interval of instruments listed above is one year.

"*" Calibration Interval of instruments listed above is two years.

N.C.R. 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%