



# FCC RADIO TEST REPORT

**FCC ID** : SWX-UBB  
**Equipment** : UniFi Building Bridge  
**Brand Name** : UBIQUITI  
**Model Name** : UBB  
**Applicant** : Ubiquiti Inc.  
685 Third Avenue, New York, New York 10017 USA  
**Manufacturer** : Ubiquiti Inc.  
685 Third Avenue, New York, New York 10017 USA  
**Standard** : 47 CFR FCC Part 15.255

The product was received on Nov. 20, 2019, and testing was started from Nov. 22, 2019 and completed on Dec. 04, 2019. 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, FCC KDB 414788 D01 v01r01 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: Sam Chen

**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



TEL : 886-3-656-9065  
FAX : 886-3-656-9085  
Report Temp.late No.: CB-A9\_2 Ver1.0



## Summary of Test Result

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

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Cliff Chang**

**Report Producer: Vicky Huang**



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

RF General Information	
Frequency Range	57-71 GHz
The Channel Plan(s)	Bandwidth: 2.16 GHz Channel 1: 58.32 GHz Channel 2: 60.48 GHz Channel 3: 62.64 GHz Channel 4: 64.80 GHz Channel 4.5: 65.88 GHz  Bandwidth: 1.08 GHz Channel 1: 58.32 GHz Channel 2: 59.40 GHz Channel 3: 60.48 GHz Channel 4: 61.56 GHz Channel 5: 62.64 GHz Channel 6: 63.72 GHz Channel 7: 64.80 GHz Channel 8: 65.88 GHz
Modulation	$\pi/2$ -BPSK, $\pi/2$ -QPSK, $\pi/2$ -16QAM

### 1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	PRA710-B2	Integral	N/A	17.2

Note: The above information was declared by manufacturer.

### 1.1.3 Modulation

#### IEEE 802.11ad Modulation Scheme

MCS Index	Modulation	Code rate	Data rate (Mbit/s)
0	$\pi$ /-2BPSK	1/2	27.5
1	$\pi$ /-2BPSK	1/2	385
2	$\pi$ /-2BPSK	1/2	770
3	$\pi$ /-2BPSK	5/8	962.5
4	$\pi$ /-2BPSK	3/4	1155
5	$\pi$ /-2BPSK	13/16	1251.25
6	$\pi$ /-2QPSK	1/2	1540
7	$\pi$ /-2QPSK	5/8	1925
8	$\pi$ /-2QPSK	3/4	2310
9	$\pi$ /-2QPSK	13/16	2502.5
10	$\pi$ /2-16QAM	1/2	3080
11	$\pi$ /2-16QAM	5/8	3850
12	$\pi$ /2-16QAM	3/4	4620
12.1	$\pi$ /2-16QAM	13/16	5005
Can the transmitter operate un-modulated:		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

### 1.1.4 Operating Conditions

Operating Conditions			
<input checked="" type="checkbox"/> -40 °C to +70 °C			
<input type="checkbox"/> 0 °C to +40 °C			
<input type="checkbox"/> Other:			
EUT Power Type	From PoE		
Supply Voltage	<input type="checkbox"/> AC	State AC voltage	V
Supply Voltage	<input checked="" type="checkbox"/> DC	State DC voltage	48 V

### 1.1.5 Equipment Use Condition

Equipment Use Condition
<input type="checkbox"/> Fixed field disturbance sensors at 61-61.5GHz
<input type="checkbox"/> Except fixed field disturbance sensors at 61-61.5GHz
<input checked="" type="checkbox"/> Except fixed field disturbance sensors

**1.1.6 User Condition**

Intended Operation
<input type="checkbox"/> Indoor
<input checked="" type="checkbox"/> Outdoor (except outdoor fixed Point to Point)
<input checked="" type="checkbox"/> Outdoor fixed Point to Point

Note: The above information was declared by manufacturer.

**1.1.7 Duty Cycle**

Duty Cycle		Duty Cycle Factor
The transmitter is intended for	100 %	10

**1.1.8 Table for Class II Change**

This product is an extension of original one reported under Sporton project number: FR951623-06

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

Modifications	Performance Checking
Adding Channel 4.5 (65.88 GHz) for bandwidth 2.16GHz. (Please refer to section 1.1.1 for detail channel list.)	1. Occupied Bandwidth 2. EIRP Power 3. Peak Conducted Power 4. Transmitter Spurious Emissions 5. Frequency Stability



## 1.2 Applicable 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"

## 1.3 Testing Location

Testing Location				
<input type="checkbox"/>	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
<input checked="" type="checkbox"/>	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 Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH06-CB	Stim Sung	24.5~25.1°C / 51~58%	Nov. 22, 2019~Dec. 04, 2019
RF Conducted	TH03-CB	Lucas Huang	24.5~25.1°C / 51~58%	Nov. 22, 2019

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**

<b>Test Channel Frequencies Configuration</b>	
<b>Channel 4.5 (GHz)</b>	65.88

### **2.2 Conformance Tests and Related Test Frequencies**

<b>Test Item</b>	<b>Test Frequencies (GHz)</b>
Occupied Bandwidth	65.88
EIRP Power	65.88
Peak Conducted Power	65.88
Transmitter Spurious Emissions (below 1 GHz)	65.88
Transmitter Spurious Emissions (1 GHz-40 GHz)	65.88
Transmitter Spurious Emissions (above 40 GHz)	65.88
Frequency Stability	65.88

The following test modes were performed for all tests:

#### **For Transmitter Spurious Emissions (below 1 GHz) test:**

The EUT was performed at Y axis and Z axis position for Transmitter Spurious Emissions (above 1 GHz) test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.

#### **For Transmitter Spurious Emissions (above 1 GHz) test:**

The EUT was performed at Y axis and Z axis position, and the worst case was found at Y axis. So the measurement will follow this same test configuration.

### **2.3 EUT Operation during Test**

During the test, "Telnet (v6.1.7600)" under WIN 7 was executed the test program to control the EUT continuously transmit RF signal.



## 2.4 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
PoE	UBIQUITI	GP-V480-032G	INPUT: 100-240V ~ 50/60MHz, Max 0.5A OUTPUT: 48V, 0.32A

## 2.5 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	NB	DELL	E4300	N/A

## 2.6 Far Field Boundary Calculations

The far-field boundary is given as:

$$\text{far field} = (2 * L^2) / \lambda$$

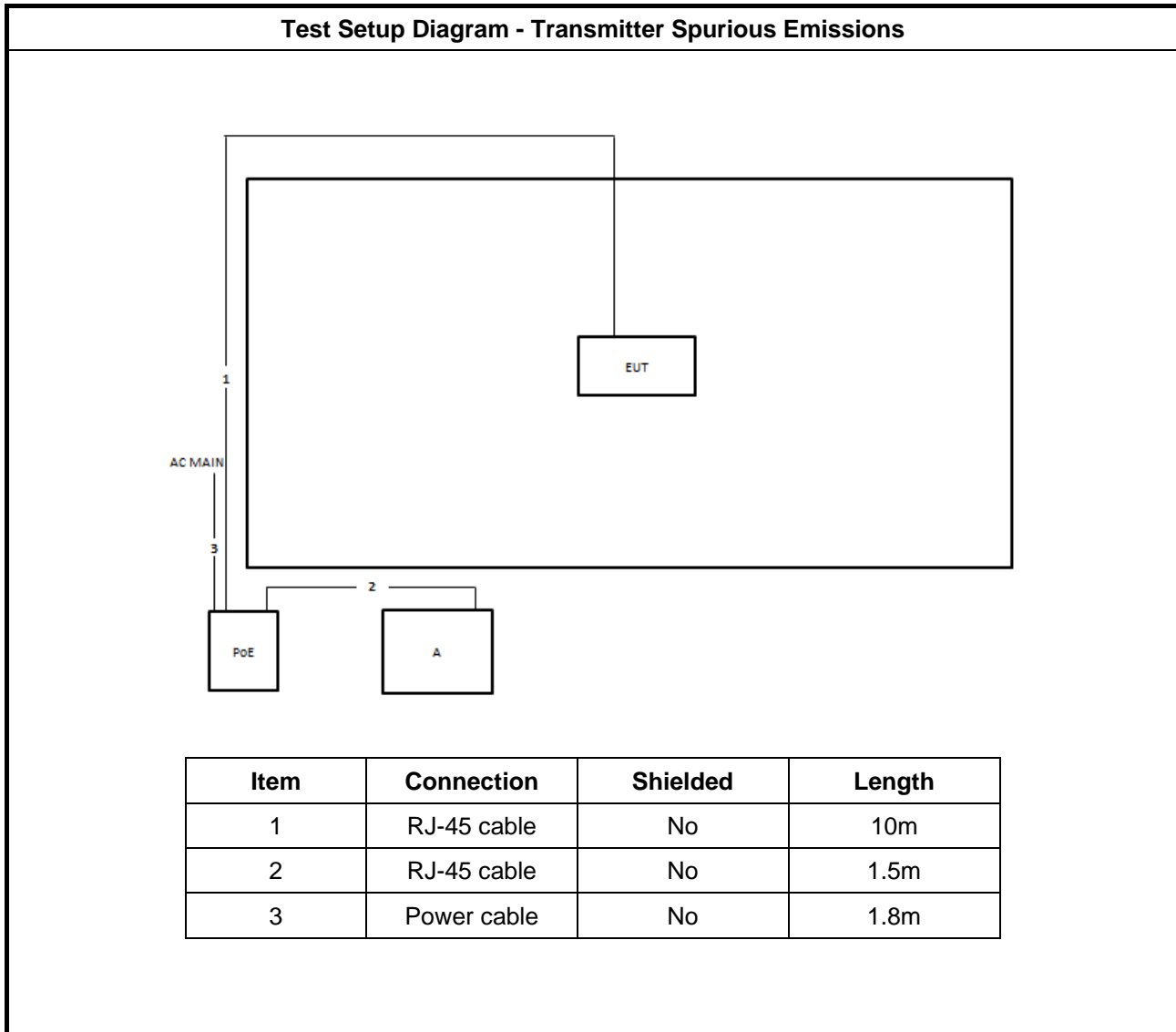
where:

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

$\lambda$  = wavelength in meters

Far Field (m)				
Frequency (GHz)	L (m)	Lambda (m)	d(Far Field) (m)	d(Far Field) (cm)
65.88	0.02	0.0045537	0.176	17.57

## 2.7 Test Setup Diagram





### 3 Transmitter Test Result

#### 3.1 Occupied Bandwidth

##### 3.1.1 Limit of Occupied Bandwidth

<b>6dBc Bandwidth</b> (see Note 1)	None
<b>99% Occupied Bandwidth</b> (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.	

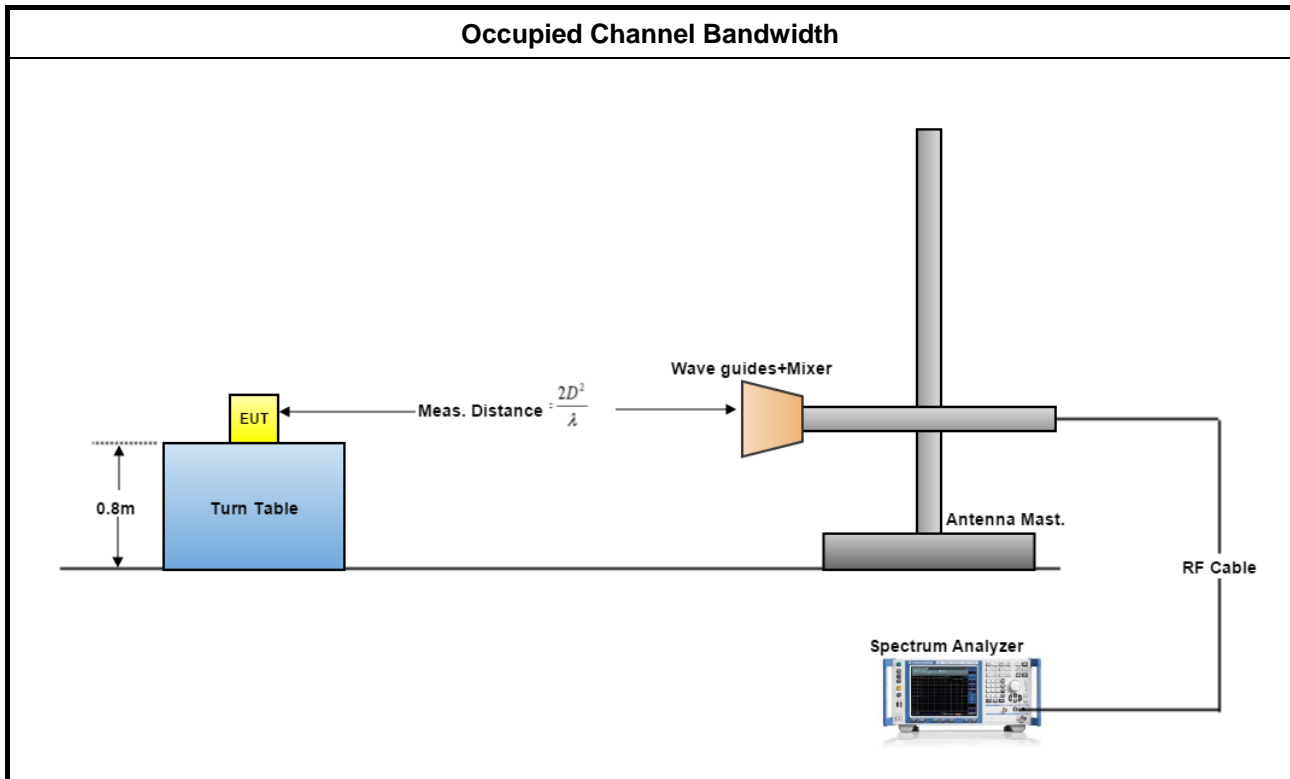
##### 3.1.2 Measuring Instruments

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.

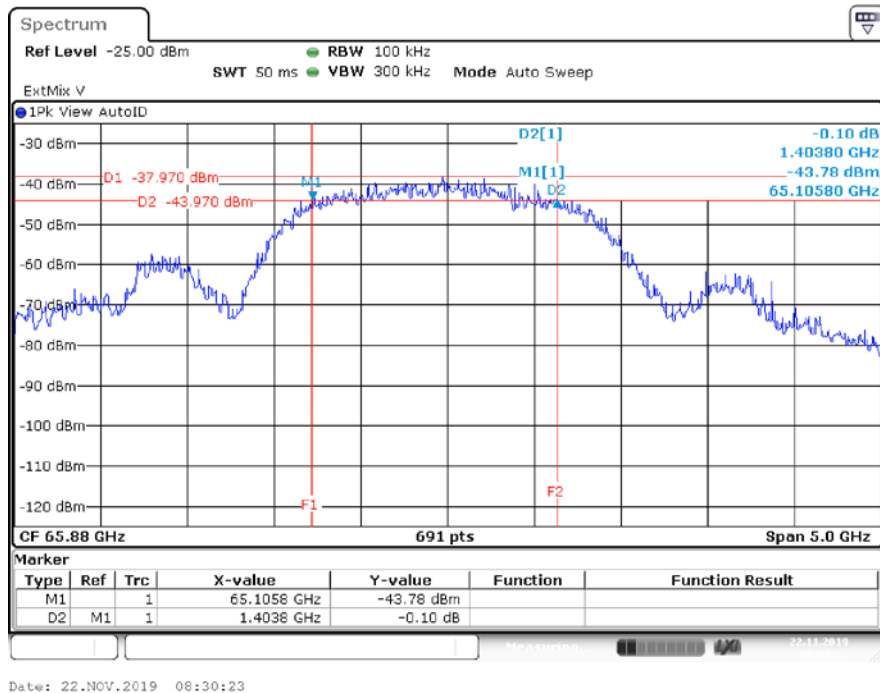
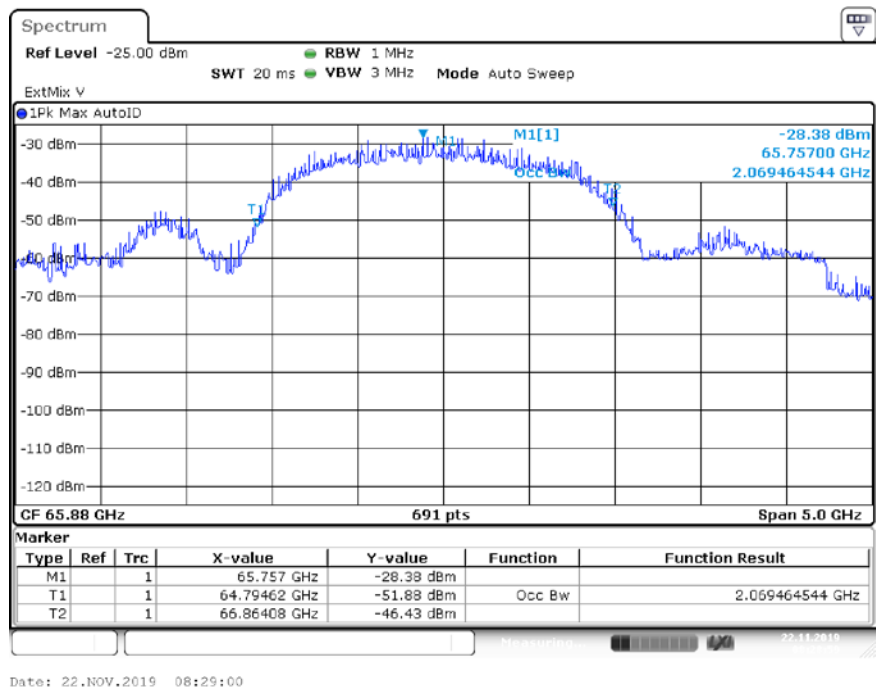
### 3.1.4 Test Setup



**3.1.5 Test Result of Occupied Bandwidth**

<b>Test Conditions</b>	see ANSI C63.10, clause 5.11
<b>Test Setup</b>	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.	

<b>Test Results</b>			
<b>Test Freq. (GHz)</b>	<b>6 dBc Bandwidth (MHz)</b>	<b>99% Occupied Bandwidth (MHz)</b>	<b>Limit (MHz)</b>
65.88	1403.8000	2069.4645	N/A

**3.1.5.1 Bandwidth Plots****Test Frequency: 65.88 GHz****6 dBc Bandwidth****Occupied Bandwidth&26 dBc Bandwidth**



## **3.2 EIRP Power**

### **3.2.1 Limit of EIRP Power**

<b>EIRP Power Limit</b>		
<b>Use Condition</b>	<b>EIRP Average Power</b>	<b>EIRP Peak Power</b>
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 outdoor fixed Point to Point	40 dBm	43 dBm
Outdoor fixed Point to Point	82 dBm	85 dBm
Note: For fixed point-to-point transmitters located outdoors, the average power of any emission shall not exceed 82 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi. The peak power of any emission shall not exceed 85 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi.		

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

### **3.2.2 Measuring Instruments**

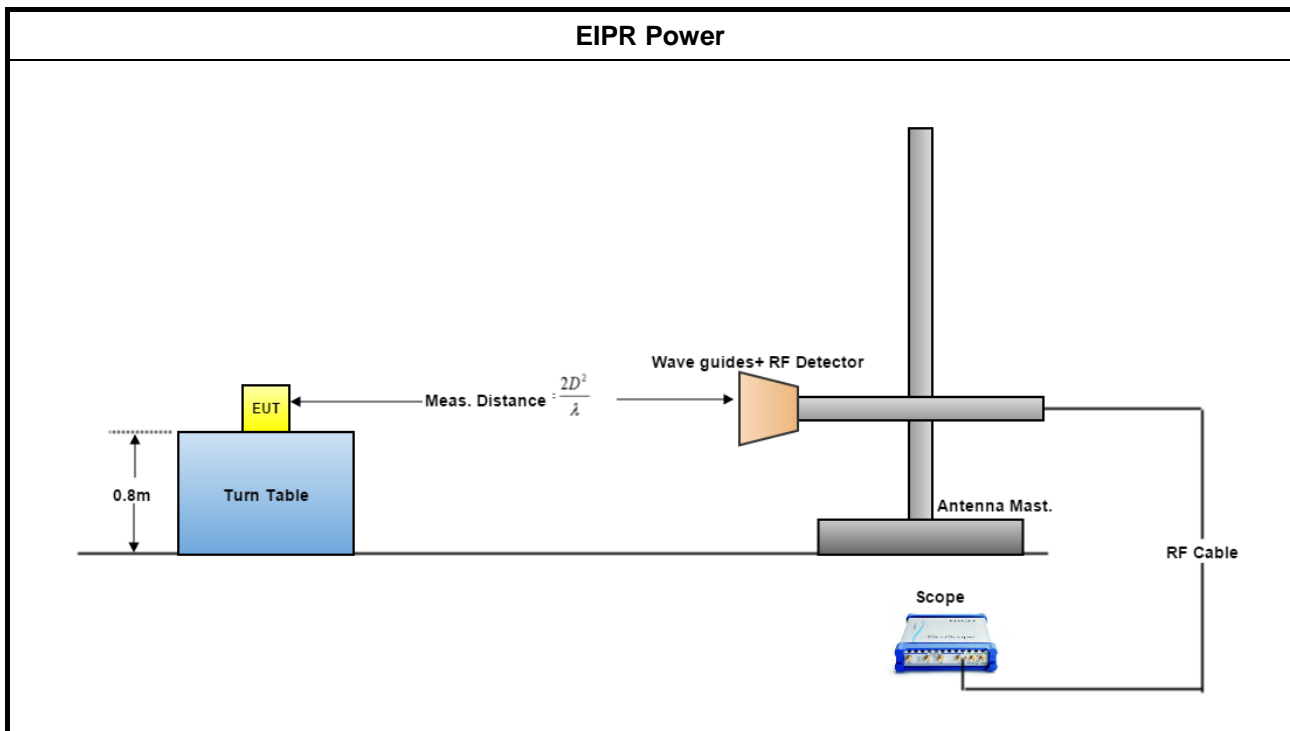
Refer a measuring instruments list in this test report.

### **3.2.3 Test Procedures**

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



### 3.2.4 Test Setup



### 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**

Test Distance				0.5 m							
Test Results											
Test Freq. (GHz)	Rx Gain (dBi)	DSO (mV)		Power Measured (dBm)		E <sub>Meas</sub> (dBuV/m)		EIRP (dBm)		EIRP Limit (dBm) (note 1)	
		Peak	AV	Peak	AV	Peak	AV	Peak	AV	Peak	AV
65.88	23.6	344.31	56.70	-6.99	-16.73	143.04	133.30	32.22	22.58	43	40
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 – 20log(λ) + 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 (c) 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(c)	
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

<b>Test Conditions</b>	see ANSI C63.10, clause 5.11 & clause 9
<b>Test Setup</b>	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**

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)
65.88	32.22	17.2	15.02	31.784	1403.80	500.00
<p>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.</p> <p>NOTE 2: For the 6dBc bandwidth, see test report clause 3.1.5.</p> <p>NOTE 3: For the applicable limit, see FCC 15.255(c)</p> <p>NOTE 4: For radiated emission measurements, calculate conducted transmitter output power P(cond)(dBm)</p> <p><math>P(\text{cond}) = \text{EIRP} - G(\text{dBi})</math></p> <p>where:</p> <p>G(dBi) is gain of EUT antenna.</p>						



### **3.4 Transmitter Spurious Emissions**

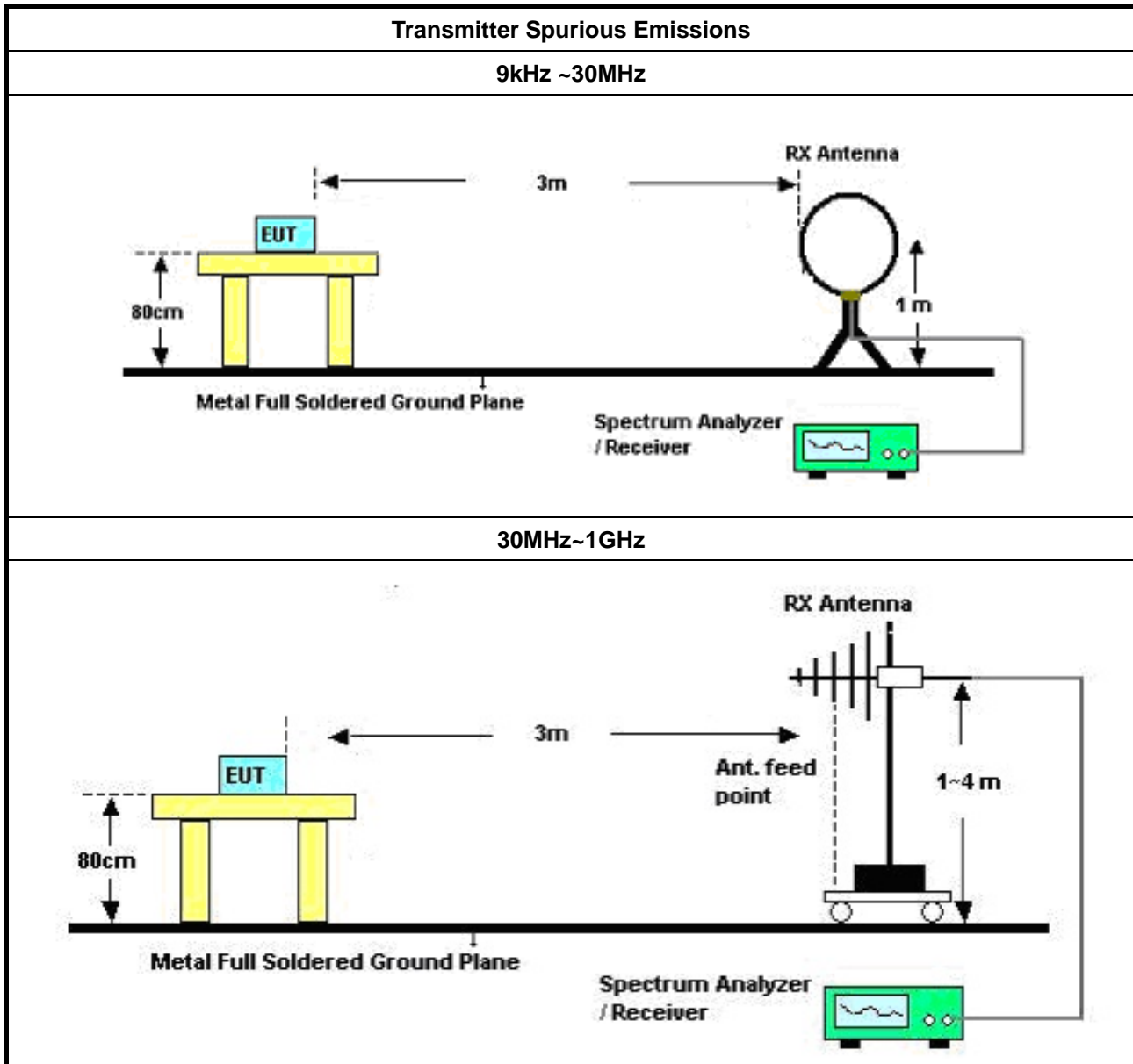
#### **3.4.1 Limit of Transmitter Spurious Emissions**

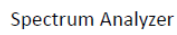
Frequency Range	Limit
Radiated emissions below 40 GHz	FCC 15.209
Radiated emissions above 40 GHz – 200GHz	90 pW/cm <sup>2</sup> @ 3 m (Equivalent EIRP 102 µW, -9.91dBm)
NOTE 1: For the applicable limit, see FCC 15.255(d)	
NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission.	

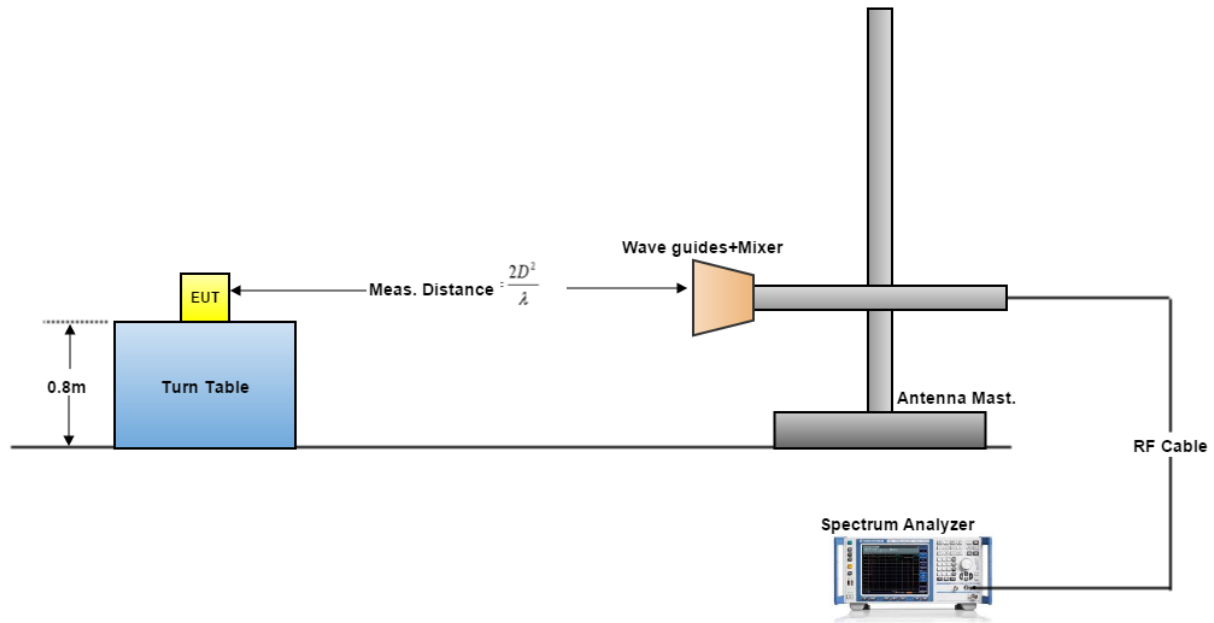
#### **3.4.2 Test Procedures**

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

### 3.4.3 Test Setup





**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 =  $20 \log (\text{spec. distance [3 m]} / \text{measurement distance [N m]})$  (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.





### **3.4.5 Measurement Results Calculation**

The measured Level is calculated using:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

#### **3.4.5.1 Test Result of Transmitter Spurious Emissions (Below 30MHz)**

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

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

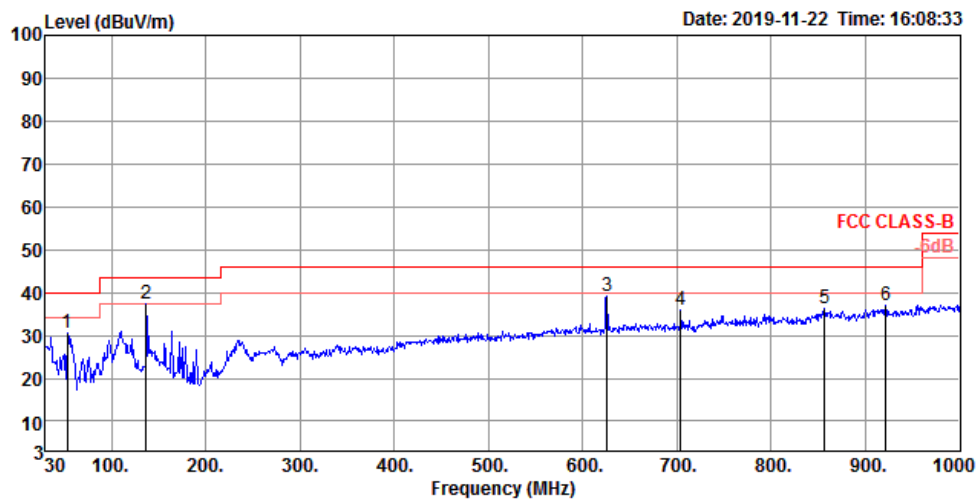
The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10 harmonic or 40 GHz, whichever is appropriate.



### 3.4.5.2 Test Result of Transmitter Spurious Emissions

Test Range	30 MHz – 1000 MHz	Test Distance	3 m
Test Configuration	CTX		

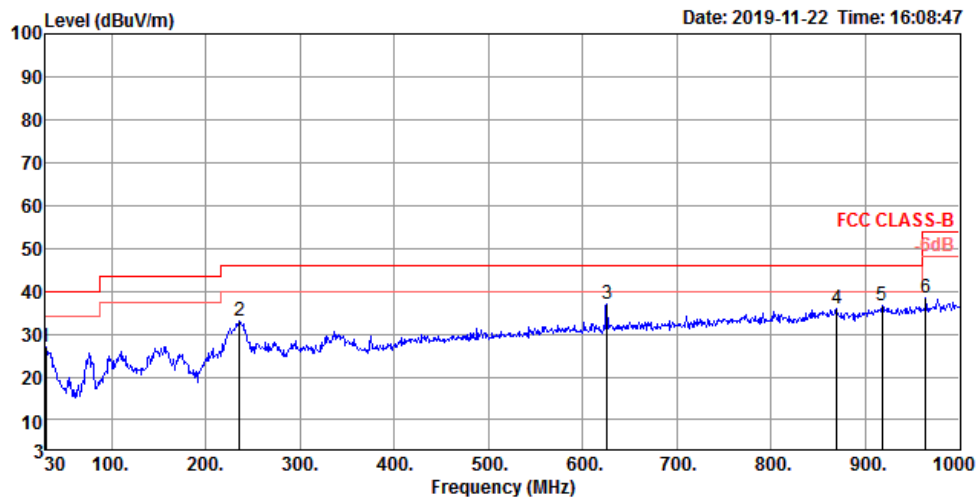
Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	53.28	30.52	40.00	-9.48	48.83	1.36	13.00	32.67	150	360	Peak VERTICAL
2	136.70	37.20	43.50	-6.30	50.10	2.20	17.34	32.44	100	80	Peak VERTICAL
3	625.58	39.25	46.00	-6.75	42.12	4.96	24.55	32.38	100	183	Peak VERTICAL
4	704.15	35.96	46.00	-10.04	38.31	5.29	24.74	32.38	200	262	Peak VERTICAL
5	856.44	36.39	46.00	-9.61	36.20	5.87	26.04	31.72	125	111	Peak VERTICAL
6	921.43	36.98	46.00	-9.02	36.15	6.12	26.30	31.59	150	62	Peak VERTICAL



Horizontal



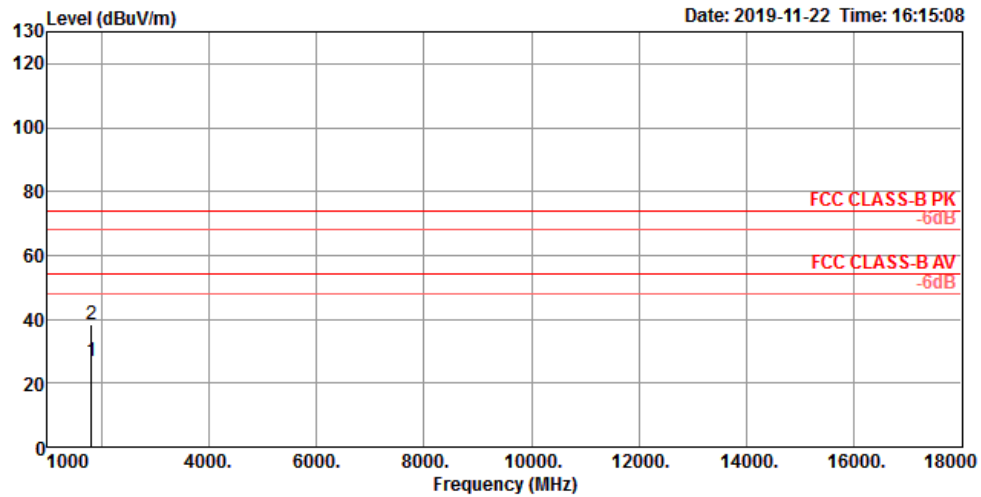
	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	cm	deg	
1	30.00	27.11	40.00	-12.89	34.22	1.01	24.23	32.35	150	358	Peak HORIZONTAL
2	235.64	33.03	46.00	-12.97	45.85	2.91	16.64	32.37	150	103	Peak HORIZONTAL
3	625.58	37.17	46.00	-8.83	40.04	4.96	24.55	32.38	125	144	Peak HORIZONTAL
4	870.02	35.97	46.00	-10.03	35.68	5.91	26.11	31.73	200	93	Peak HORIZONTAL
5	917.55	36.66	46.00	-9.34	35.90	6.10	26.29	31.63	200	132	Peak HORIZONTAL
6	964.11	38.38	54.00	-15.62	36.66	6.32	26.61	31.21	150	250	Peak HORIZONTAL

Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



<b>Test Range</b>	1 GHz – 18 GHz	<b>Test Distance</b>	3 m
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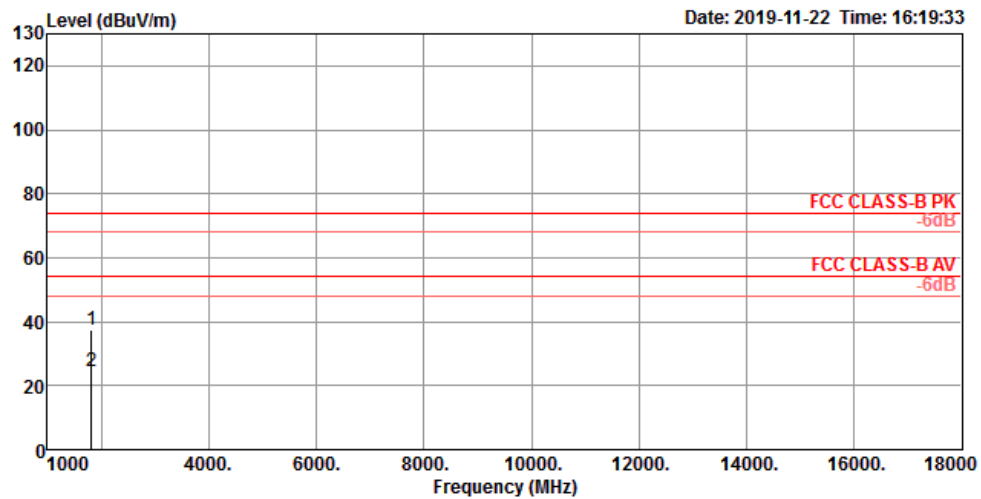
Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1812.28	26.90	54.00	-27.10	32.50	2.94	25.23	33.77	100	129	Average	VERTICAL
2	1812.76	38.50	74.00	-35.50	44.10	2.94	25.23	33.77	100	129	Peak	VERTICAL



Horizontal



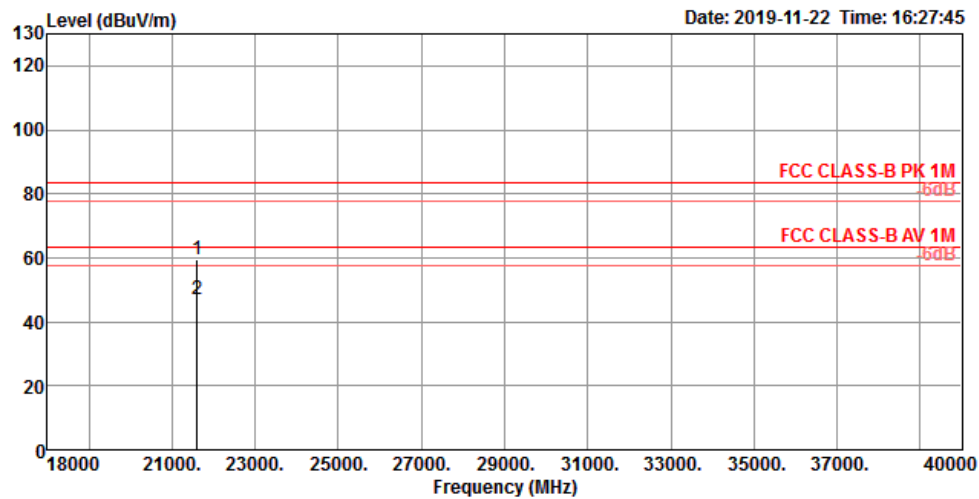
	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos		
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	cm	deg	Remark
1	1811.96	37.41	74.00	-36.59	43.01	2.94	25.23	33.77	100	155	Peak
2	1812.21	24.31	54.00	-29.69	29.91	2.94	25.23	33.77	100	155	Average

Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



<b>Test Range</b>	18 GHz – 40 GHz	<b>Test Distance</b>	1 m
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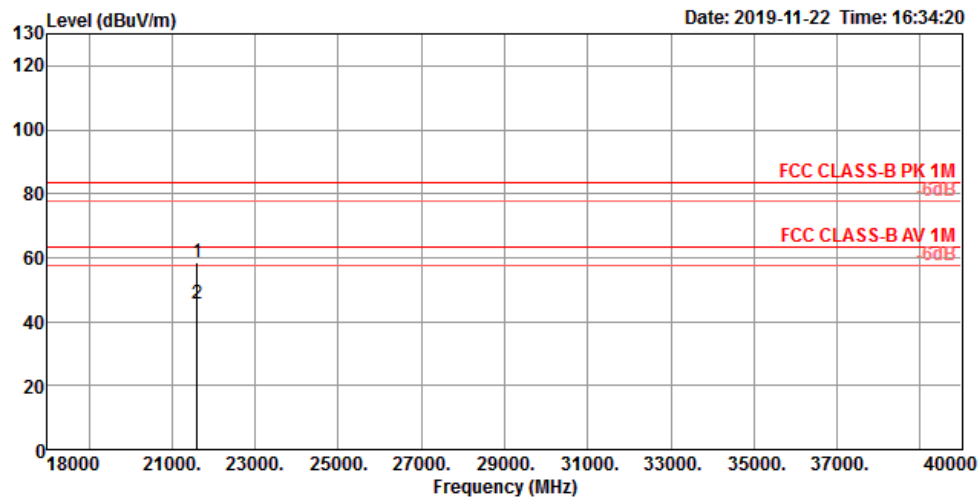
Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	21596.94	59.46	83.54	-24.08	56.32	15.15	37.64	49.65	150	65	Peak	VERTICAL
2	21597.30	47.02	63.54	-16.52	43.88	15.15	37.64	49.65	150	65	Average	VERTICAL



Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	21591.69	58.60	83.54	-24.94	55.46	15.15	37.64	49.65	150	130 Peak	HORIZONTAL
2	21599.46	45.57	63.54	-17.97	42.43	15.15	37.64	49.65	150	130 Average	HORIZONTAL

Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



<b>Test Range</b>	40GHz – 200GHz
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<b>Test Frequency (GHz)</b>	<b>Rx Antenna Gain (dBi)</b>	<b>Measurement Distance (m)</b>	<b>Read Worse Frequency (GHz)</b>	<b>Read Level (dBm)</b>
65.88	23.6	0.50	71.66	-60.61
<b>EIRP (dBm)</b>	<b>Specification Distance (m)</b>	<b>Power Density (pW/cm^2)</b>	<b>Limit (pW/cm^2)</b>	<b>Test Result</b>
-20.68	3	7.5553	90.00	PASS

Note:

$EIRP = Prx - Grx + \text{Free Space Path Loss} = Prx - Grx + 20\log(4\pi d / \lambda)^2$

Which

$Prx = \text{Read Level.}$

$Grx = \text{Rx Antenna Gain.}$

A distance factor is offset and the formula is  $20\log(D1/D2)$

Which

$D1 = \text{Specification Distance}$

$D2 = \text{Measurement Distance}$



### 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.	

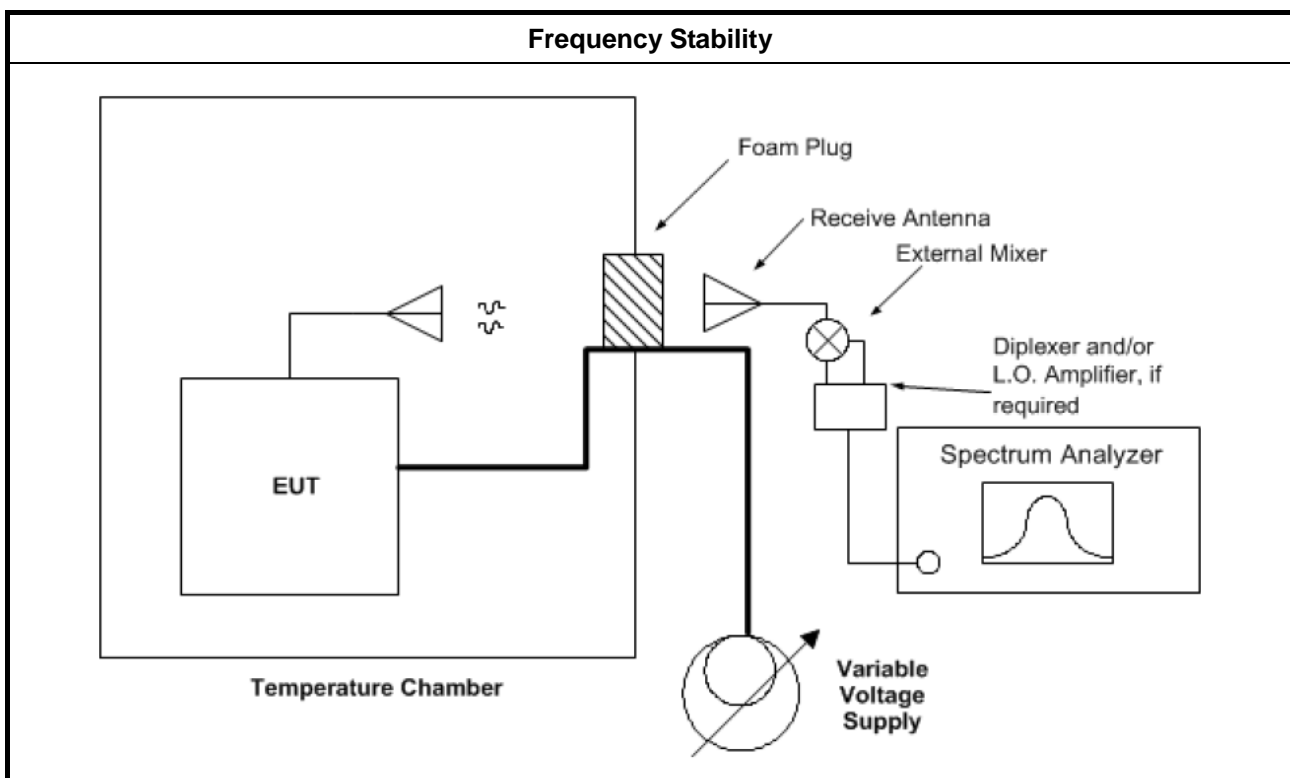
#### 3.5.2 Measuring Instruments

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





### 3.5.5 Test Result of Frequency Stability

<b>Test Conditions</b>	see ANSI C63.10, clause 5.11 & clause 9
<b>Test Setup</b>	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			
Test Results			
Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-40	65880.5544	13.30	within band
-30	65880.5741	33.00	within band
-20	65880.7574	216.30	within band
-10	65880.7561	215.00	within band
0	65880.7855	244.40	within band
10	65880.5761	35.00	within band
20	65880.5411	Reference	within band
30	65880.5477	6.60	within band
40	65880.6974	156.30	within band
50	65880.5874	46.30	within band
60	65880.58922	48.12	within band
70	65880.5151	-26.00	within band
NOTE: 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			
Test Results			
Test Voltage: (Vdc)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
40.8	65880.5744	3.00	within band
48	65880.5714	Reference	within band
55.2	65880.5544	-17.00	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: <ul style="list-style-type: none"><li>♦ Equipment used on aircraft or satellites. (Refer as FCC 15.255 (a))</li><li>♦ Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation. (Refer as FCC 15.255 (a))</li></ul>
Group Installation	Operation is not permitted for the following products: <ul style="list-style-type: none"><li>♦ External phase-locking (Refer as FCC 15.255 (h))</li></ul>

#### **3.6.2 Result of Operation Restriction**

Manufacturer declares that EUT will not be used on aircraft or satellites. Then user manual will include a statement to caution EUT is not permitted for use 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	Calibration Due Date	Remark
Bilog Antenna with 6 dB attenuator	TESEQ & EMC	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Aug. 03, 2019	Aug. 02, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1292	1GHz~18GHz	Jul. 17, 2019	Jul. 16, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 12, 2019	Jun. 11, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	May 07, 2019	May 06, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	May 08, 2019	May 07, 2020	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 21, 2019	Oct. 20, 2020	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH06-CB)
RF Cable-low	HUBER+SUHNER	RG402	Low Cable-05+24	30MHz~1GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05	1GHz~18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05+24	1GHz~18GHz	Oct. 07, 2019	Oct. 06, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH06-CB)
Mixer	OML	M19HWA	U91113-1	40 ~ 60 GHz	Apr. 04, 2019	Apr. 03, 2020	Radiation (03CH06-CB)
Mixer	OML	M15HWA	V91113-1	50 ~ 75 GHz	Apr. 04, 2019	Apr. 03, 2020	Radiation (03CH06-CB)
Mixer	OML	M12HWA	E91113-1	60 ~ 90 GHz	Apr. 04, 2019	Apr. 03, 2020	Radiation (03CH06-CB)
Mixer	OML	M08HWA	F91113-1	90 ~ 140 GHz	Apr. 04, 2019	Apr. 03, 2020	Radiation (03CH06-CB)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	Apr. 04, 2019	Apr. 03, 2020	Radiation (03CH06-CB)
Detector	Millitech	DET-15-RPF W0	#A18185(074)	50 ~ 75 GHz	Jan. 29, 2018*	Jan. 29, 2020	Radiation (03CH06-CB)
Pico Scope	Pico	Pico Scope 6402C	CX372/002	N/A	Jul. 07, 2019	Jul. 06, 2020	Radiation (03CH06-CB)
Standard Horn Antenna	Custom Microwave	M19RH	U91113-A	40 ~ 60 GHz	N.C.R	N.C.R	Radiation (03CH06-CB)
Standard Horn Antenna	Custom Microwave	M15RH	V91113-A	50 ~ 75 GHz	N.C.R	N.C.R	Radiation (03CH06-CB)
Standard Horn Antenna	Custom Microwave	M12RH	E91113-A	60 ~ 90 GHz	N.C.R	N.C.R	Radiation (03CH06-CB)
Standard Horn Antenna	Custom Microwave	M08RH	F91113-A	90 ~ 140 GHz	N.C.R	N.C.R	Radiation (03CH06-CB)
Standard Horn Antenna	Custom Microwave	M05RH	G91113-A	140 ~ 220 GHz	N.C.R	N.C.R	Radiation (03CH06-CB)
Temp. and Humidity Chamber	Gaint Force	GTH-408-40-CP-AR	MAA1410-011	-40~100 degree	Sep. 12, 2019	Sep. 11, 2020	Conducted (TH03-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)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 60GHz)	4.6 dB	Confidence levels of 95%
Radiated Emission (60GHz ~ 90GHz)	5.1 dB	Confidence levels of 95%
Radiated Emission (90GHz ~ 200GHz)	5.6 dB	Confidence levels of 95%
Temperature	1°C	Confidence levels of 95%