Testing Laboratory 1190

FCC RADIO TEST REPORT

FCC ID	:	2AMP5K60I
Equipment	:	60 GHz Indoor Distribution System
Brand Name	:	Kwikbit
Model Name	:	K60i
Applicant	:	Kwikbit Inc. 7801 E. Bush Lake Rd Suite 300 Minneapolis Minnesota United States 55439
Manufacturer	:	Kwikbit Inc. 7801 E. Bush Lake Rd Suite 300 Minneapolis Minnesota United States 55439
Standard	:	47 CFR FCC Part 15.255

The product was received on Apr. 24, 2019, and testing was started from May 06, 2019 and completed on May 21, 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, 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 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

History of this test report

Report No.	Version	Description	Issued Date
FR942349	01	Initial issue of report	Jun. 04, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	FCC 15.207	AC Power Conducted Emissions	PASS	-
0	FCC 15.255(e)	Occupied Bandwidth	PASS	-
3.3	FCC 15.255(c)	EIRP Power	PASS	-
3.4	FCC 15.255(c)	Peak Conducted Power	PASS	-
3.5	FCC 15.255(d)	Transmitter Spurious Emissions	PASS	-
3.6	FCC 15.255(f)	Frequency Stability	PASS	-
3.7	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: Sam Chen

Report Producer: Viola Huang

1 General Description

1.1 Information

1.1.1 The Channel Plan(s)

Frequency Range	57-71 GHz
The Channel Plan(s)	58.32GHz 60.48GHz 62.64GHz

1.1.2 Modulation

IEEE 802.11ad Modulation Scheme

MCS Index	Modulation	Code rate	Data rate (Mbit/s)
0	π/2-BPSK	1/2	27.5
1	π/2-BPSK	1/2	385
2	π/2-BPSK	1/2	770
3	π/2-BPSK	5/8	962.5
4	π/2-BPSK	3/4	1155
5	π/2-BPSK	13/16	1251.25
6	π/2-QPSK	1/2	1540
7	π/2-QPSK	5/8	1925
8	π/2-QPSK	3/4	2310
Can the transmitter operate un-modulated:			☒ Yes ☐ No

1.1.3 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	WNC	XEAG-V01	Integrated beamforming antenna	Murata	21.9

Note: The above information was declared by manufacturer.

1.1.4 Power Levels

Applicable power levels	☐ Conducted ☒ EIRP	
Frequency (GHz)	setting: (dBm)	
	AV Power	Peak Power
60.48	31.54	40.45

1.1.5 Operating Conditions

Operating Conditions				
☐ -20 °C to +50 °C				
☐ 0 °C to +40 °C				
☒ Other: 0 °C to +50 °C				
EUT Power Type	From adapter			
Supply Voltage	☒ AC	State AC voltage	120	V
Supply Voltage	☐ DC	State DC voltage		V

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
☐ Outdoor (except outdoor fixed Point to Point)
☐ Outdoor fixed Point to Point

Note: The above information was declared by manufacturer.

1.1.8 Duty Cycle

Duty Cycle	Duty Cycle Factor
100	0

1.2 Accessories

Accessories				
Equipment Name	**Brand Name**	**Model Name**	**Rating**	**Remark**
Adapter	MW	OWA-60U-48	INPUT: 100-240V ~,1.2A, 50/60Hz OUTPUT: +48V, 1.25A	AC power cable, non-shielded, 1.5m DC power cable, non-shielded, 0.3m
Other				
DC power cable*1, non-shielded, 1.8m				
Wall-mounted rack *1				

1.3 Support Equipment

For AC power conducted emissions test:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	LAN1 NB	DELL	E6430	N/A
B	LAN2 NB	DELL	E6430	N/A
C	LAN3 NB	DELL	E6430	N/A
D	LAN4 NB	DELL	E6430	N/A
E	PoE fixture	N/A	N/A	N/A
F	PoE fixture	N/A	N/A	N/A
G	Device	Kwikbit	K60i	2AMP5K60I
H	30W resistance	N/A	N/A	N/A
I	15W resistance	N/A	N/A	N/A

For Transmitter Spurious Emissions below 1 GHz:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	NB	DELL	E4300	N/A
B	NB	DELL	E4300	N/A
C	NB	DELL	E4300	N/A
D	PoE fixture	N/A	N/A	N/A
E	15W resistance	N/A	N/A	N/A
F	PoE fixture	N/A	N/A	N/A
G	30W resistance	N/A	N/A	N/A
H	Device	Kwikbit	K60i	2AMP5K60I

For Transmitter Spurious Emissions above 1 GHz and other tests:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	NB	DELL	E6430	N/A

1.4 EUT Operation during Test

For CTX Mode:

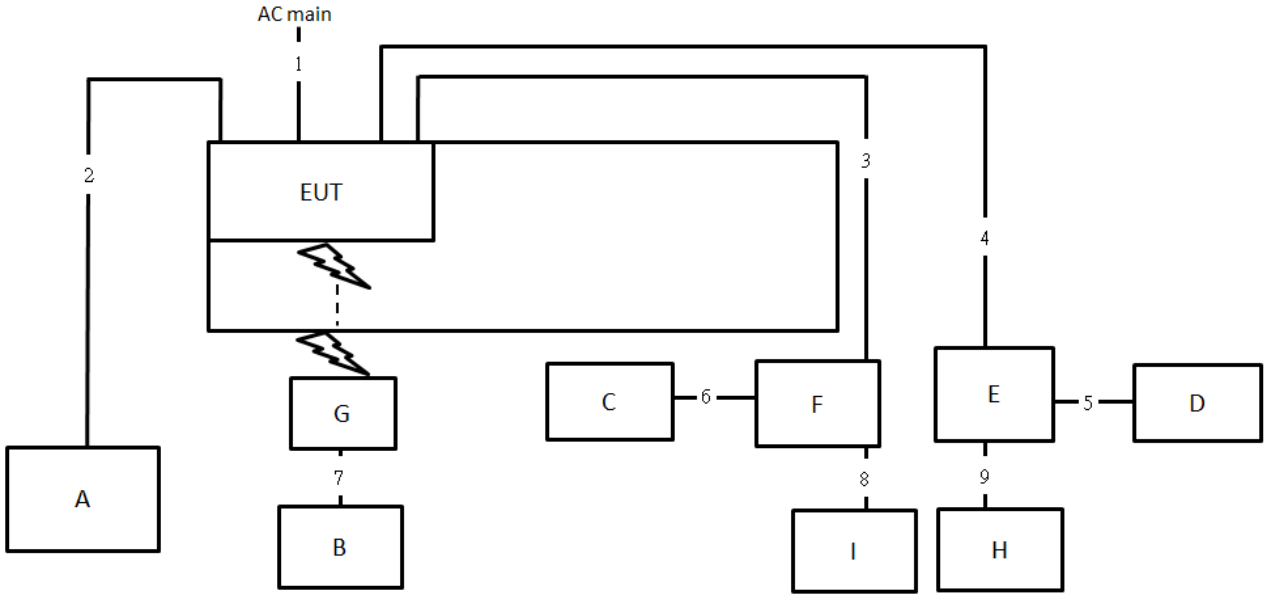
The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

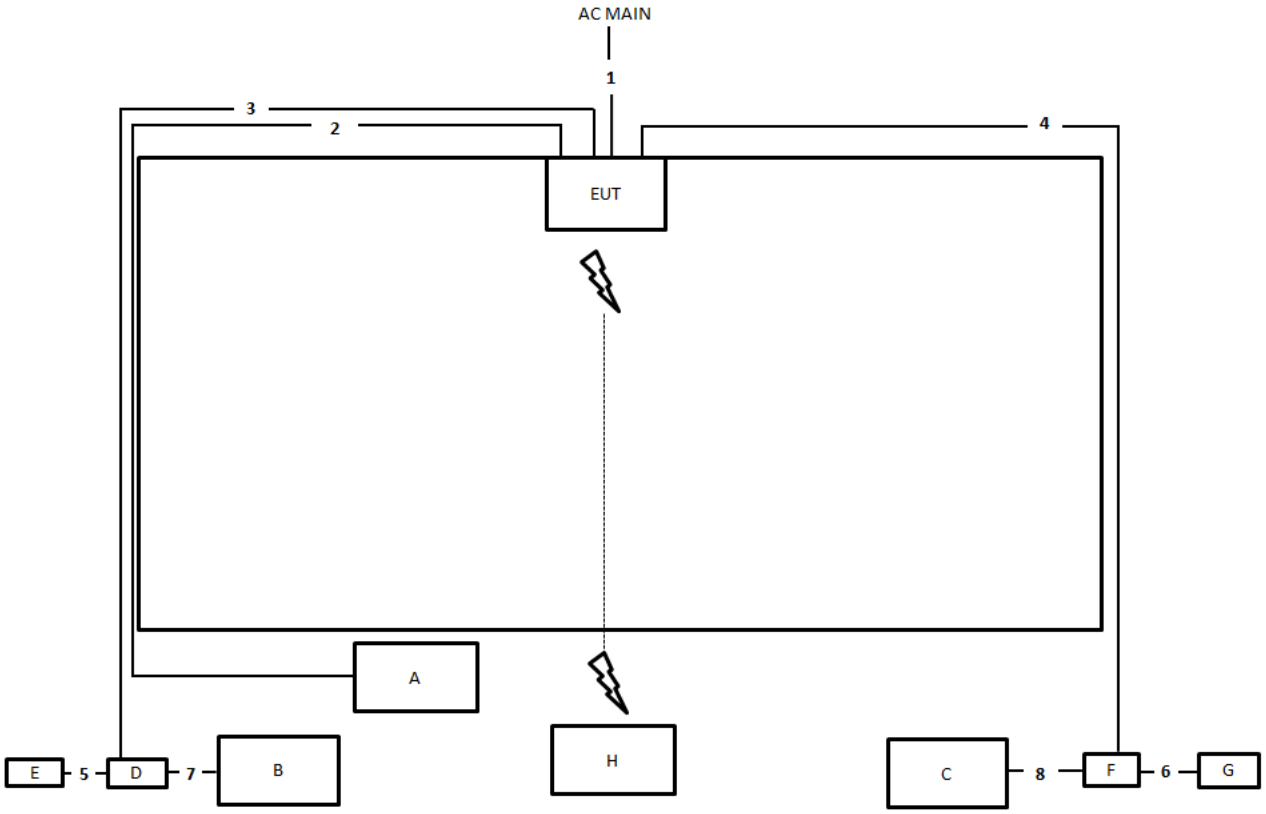
1.5 Test Setup Diagram

Test Setup Diagram - AC Power Conducted Emissions



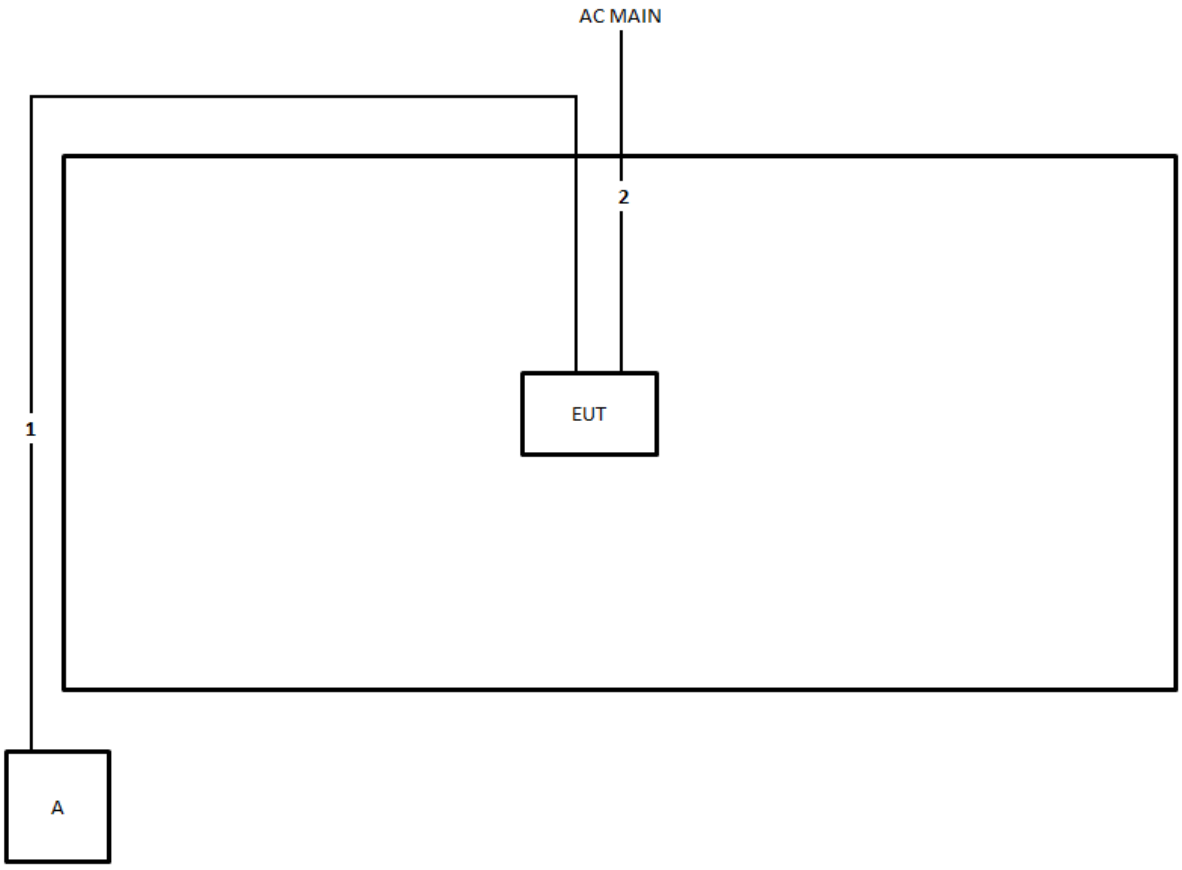
Item	Connection	Shielded	Length
1	Power cable	No	3.8m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	RJ-45 cable	No	3m
6	RJ-45 cable	No	3m
7	RJ-45 cable	No	3m
8	RJ-45 cable	No	3m
9	RJ-45 cable	No	3m

Test Setup Diagram - Transmitter Spurious Emissions below 1 GHz



Item	Connection	Shielded	Length
1	Power cable	No	3.8m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	Line cable	No	0.4m
6	Line cable	No	0.4m
7	RJ-45 cable	No	1.5m
8	RJ-45 cable	No	1.5m

Test Setup Diagram - Transmitter Spurious Emissions above 1 GHz



Item	Connection	Shielded	Length
1	RJ-45 cable	No	10m
2	Power cable	No	3.8m

1.6 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”

1.7 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.			
CO02-CB		03CH01-CB	TH01-CB

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086B with Industry Canada.

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)
AC Power Conducted Emissions	Random Frequency
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)	Random Frequency
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	60.48

The following table is a list of the test modes shown in this test report.

AC power conducted emissions tes and Transmitter Spurious Emissions below 1 GHz	
Test Mode	**Description**
1	Normal Link - EUT + Power adapter + DC power cable

Note: The EUT only uses 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)**
58.32	0.03	0.0051440	0.350	34.99
60.48	0.03	0.0049603	0.363	36.29
62.64	0.03	0.0047893	0.376	37.58

3 Transmitter Test Result

3.1 AC Power Conducted Emissions

3.1.1 Limit of AC Power Conducted Emissions

AC Power Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

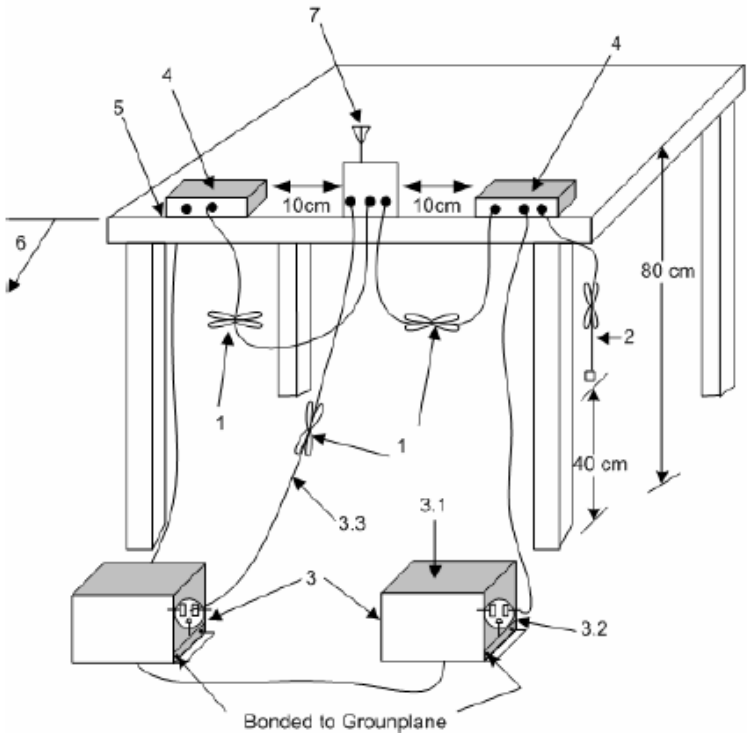
Refer a measuring instruments list in this test report.

3.1.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clause 6.2.

3.1.4 Test Setup

AC Power Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.

3.1—All other equipment powered from additional LISN(s).

3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.

3.3—LISN at least 80 cm from nearest part of EUT chassis.

4—Non-EUT components of EUT system being tested.

5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.

6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Test Result of AC Power Conducted Emissions

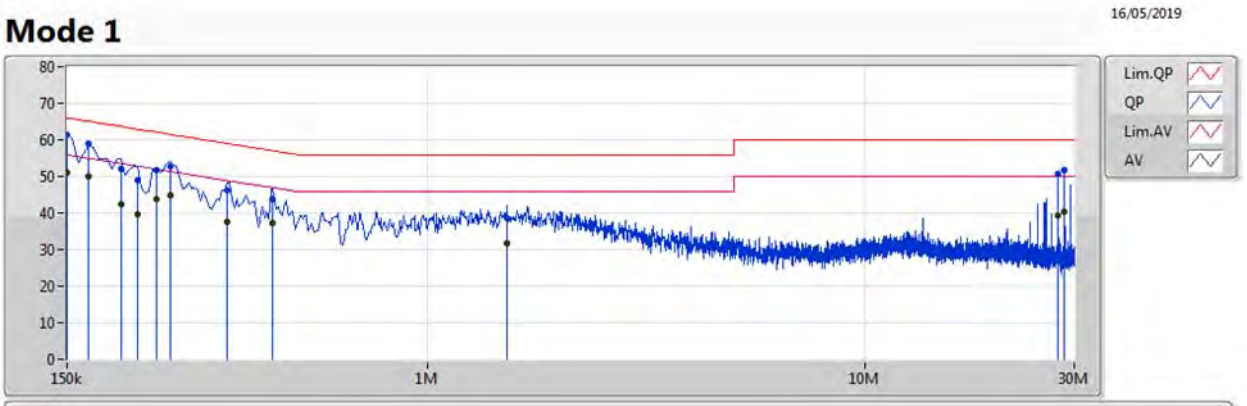
Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 6.2.3

NOTE 1: 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. 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 5.12 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.

NOTE 2: “>20dB” means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit, see ANSI C63.4, clause 10.1.8.1.

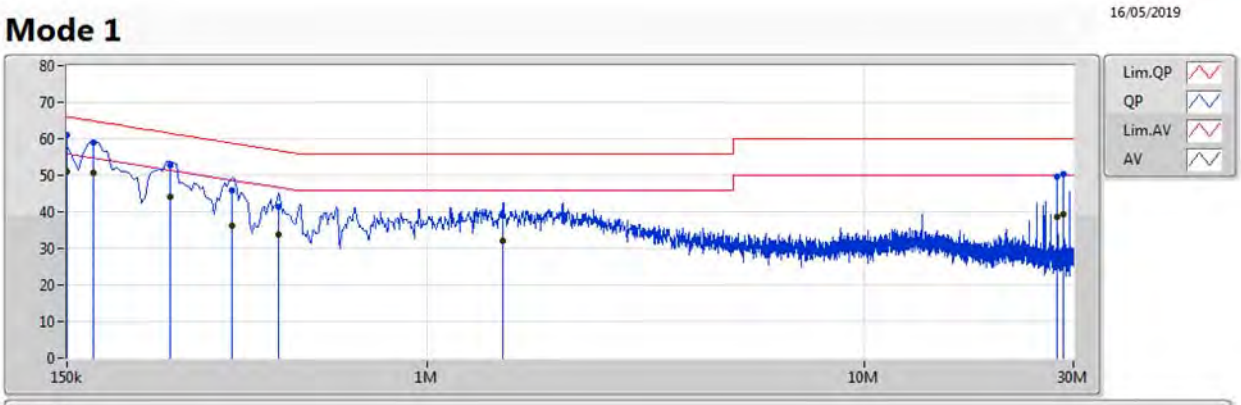
Temp	25.6~26.1°C	Humidity	45.3~45.6%
Test Engineer	Rick Yeh	Phase	Line
Configuration	Normal Link		

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	AF	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	61.34	66.00	-4.66	10.17	Line	"Worst"	51.17	0.05	0.02	10.10
AV	150k	51.13	56.00	-4.87	10.17	Line	-	40.96	0.05	0.02	10.10
QP	168k	58.91	65.06	-6.15	10.17	Line	-	48.74	0.05	0.02	10.10
AV	168k	50.07	55.06	-4.99	10.17	Line	-	39.90	0.05	0.02	10.10
QP	199.5k	52.21	63.63	-11.42	10.17	Line	-	42.04	0.05	0.02	10.10
AV	199.5k	42.32	53.63	-11.31	10.17	Line	-	32.15	0.05	0.02	10.10
QP	217.5k	48.98	62.92	-13.94	10.17	Line	-	38.81	0.05	0.02	10.10
AV	217.5k	39.79	52.92	-13.13	10.17	Line	-	29.62	0.05	0.02	10.10
QP	240k	51.65	62.10	-10.45	10.17	Line	-	41.48	0.05	0.02	10.10
AV	240k	43.80	52.10	-8.30	10.17	Line	-	33.63	0.05	0.02	10.10
QP	258k	52.91	61.49	-8.58	10.17	Line	-	42.74	0.05	0.02	10.10
AV	258k	44.75	51.49	-6.74	10.17	Line	-	34.58	0.05	0.02	10.10
QP	348k	46.04	59.00	-12.96	10.18	Line	-	35.86	0.06	0.02	10.10
AV	348k	37.73	49.00	-11.27	10.18	Line	-	27.55	0.06	0.02	10.10
QP	442.5k	43.85	57.01	-13.16	10.18	Line	-	33.67	0.06	0.02	10.10
AV	442.5k	37.31	47.01	-9.70	10.18	Line	-	27.13	0.06	0.02	10.10
QP	1.518M	38.54	56.00	-17.46	10.22	Line	-	28.32	0.08	0.04	10.10
AV	1.518M	31.64	46.00	-14.36	10.22	Line	-	21.42	0.08	0.04	10.10
QP	27.565M	50.61	60.00	-9.39	10.71	Line	-	39.90	0.36	0.22	10.10
AV	27.565M	39.31	50.00	-10.69	10.71	Line	-	28.60	0.36	0.22	10.10
QP	28.516M	51.88	60.00	-8.12	10.73	Line	-	41.15	0.37	0.23	10.10
AV	28.516M	40.40	50.00	-9.60	10.73	Line	-	29.67	0.37	0.23	10.10

Temp	25.6~26.1°C	Humidity	45.3~45.6%
Test Engineer	Rick Yeh	Phase	Neutral
Configuration	Normal Link		



NO : R8
EUT : K60i
Power : 120V
Mode : normal link adapter供電 + DC cable延長線
Memo : LISN 201811-NEUTRAL

Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	AF	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	61.06	66.00	-4.94	10.15	Neutral	-	50.91	0.03	0.02	10.10
AV	150k	51.06	56.00	-4.94	10.15	Neutral	-	40.91	0.03	0.02	10.10
QP	172.5k	58.87	64.83	-5.96	10.15	Neutral	-	48.72	0.03	0.02	10.10
AV	172.5k	50.66	54.83	-4.17	10.15	Neutral	"Worst"	40.51	0.03	0.02	10.10
QP	258k	52.59	61.49	-8.90	10.15	Neutral	-	42.44	0.03	0.02	10.10
AV	258k	44.28	51.49	-7.21	10.15	Neutral	-	34.13	0.03	0.02	10.10
QP	357k	45.94	58.79	-12.85	10.16	Neutral	-	35.78	0.04	0.02	10.10
AV	357k	36.37	48.79	-12.42	10.16	Neutral	-	26.21	0.04	0.02	10.10
QP	456k	41.24	56.76	-15.52	10.16	Neutral	-	31.08	0.04	0.02	10.10
AV	456k	33.71	46.76	-13.05	10.16	Neutral	-	23.55	0.04	0.02	10.10
QP	1.491M	38.80	56.00	-17.20	10.19	Neutral	-	28.61	0.05	0.04	10.10
AV	1.491M	31.98	46.00	-14.02	10.19	Neutral	-	21.79	0.05	0.04	10.10
QP	27.563M	49.68	60.00	-10.32	10.65	Neutral	-	39.03	0.30	0.22	10.10
AV	27.563M	38.47	50.00	-11.53	10.65	Neutral	-	27.82	0.30	0.22	10.10
QP	28.514M	50.34	60.00	-9.66	10.67	Neutral	-	39.67	0.31	0.23	10.10
AV	28.514M	39.40	50.00	-10.60	10.67	Neutral	-	28.73	0.31	0.23	10.10

3.2 Occupied Bandwidth

3.2.1 Limit of Occupied Bandwidth

6dBc Bandwidth (see Note 1)	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.

3.2.2 Measuring Instruments

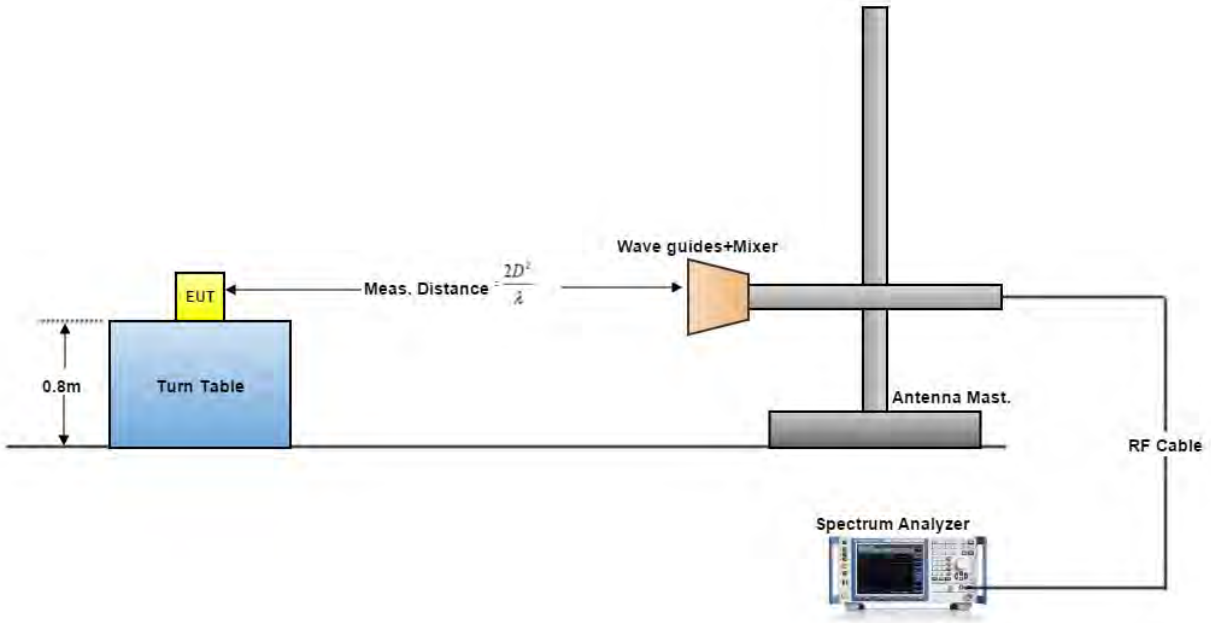
Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

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

3.2.4 Test Setup

Occupied Channel Bandwidth



3.2.5 Test Result of Occupied Bandwidth

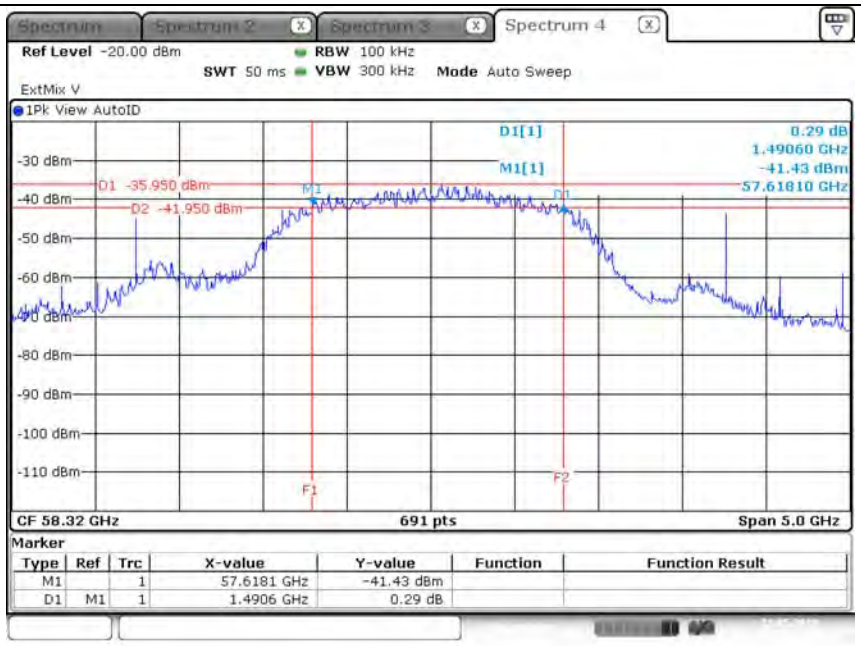
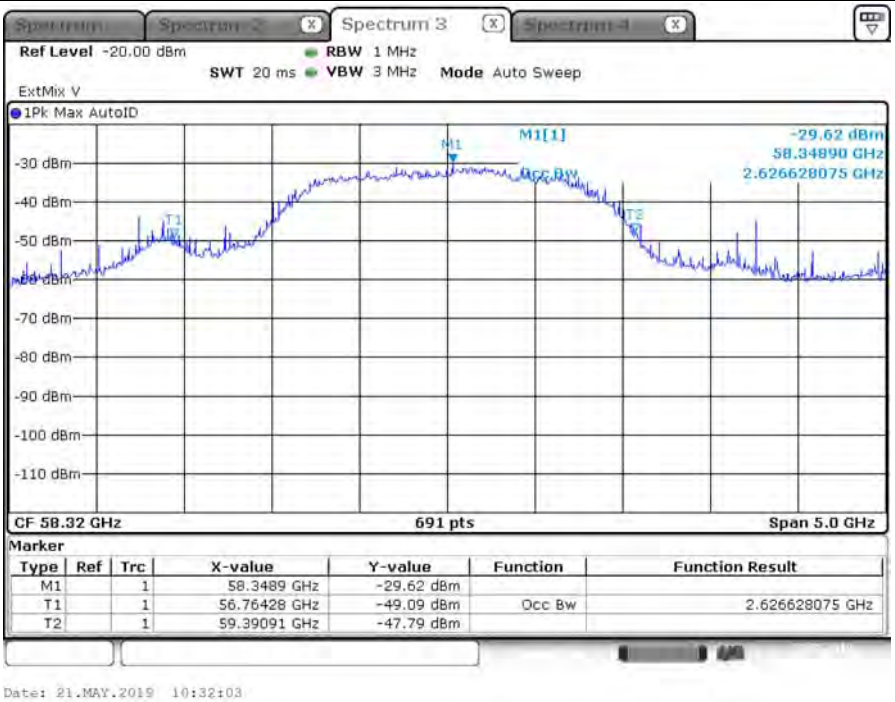
Test Conditions	see ANSI C63.10, clause 5.11
Test Setup	see ANSI C63.10, clause 6.9.2
NOTE: If equipment having different transmit operating modes (see test report clause 1.1.2), the measurements are uninfluenced by different transmit operating modes, may not need to be repeated for all the operating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

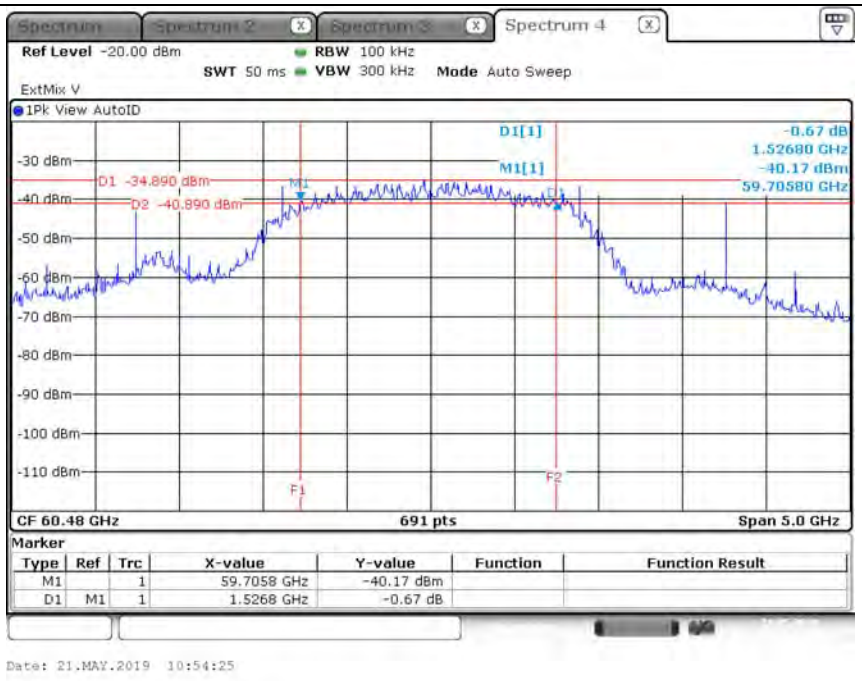
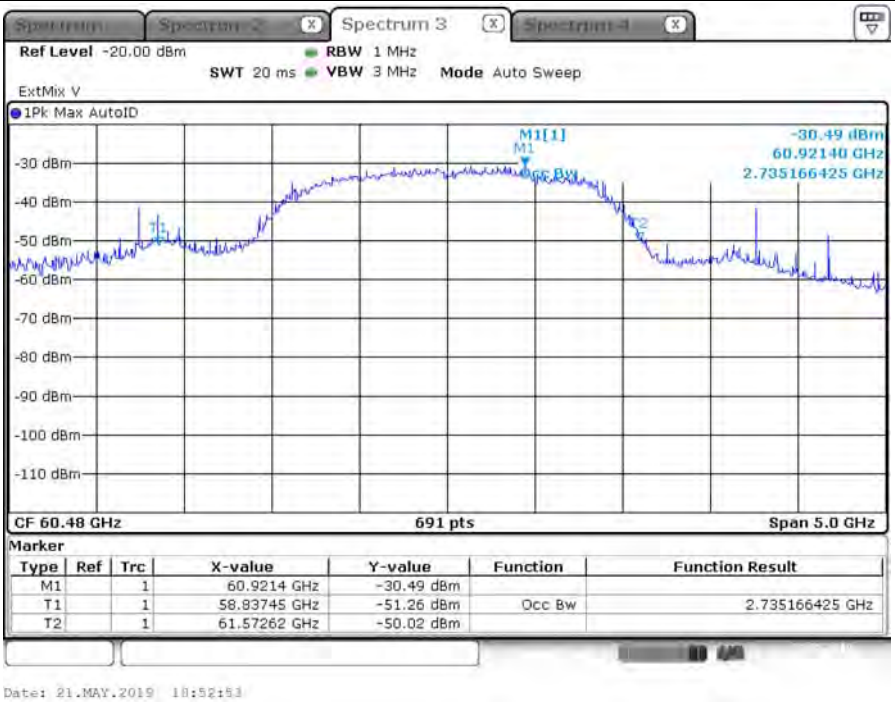
Temp	22~24℃	**Humidity**	50~60%
Test Engineer	KJ Chang		

Test Results

Test Freq. (GHz)	6 dBc Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)
58.32	1490.6	2626.628	N/A
60.48	1526.8	2735.166	N/A
62.64	1512.3	3327.213	N/A

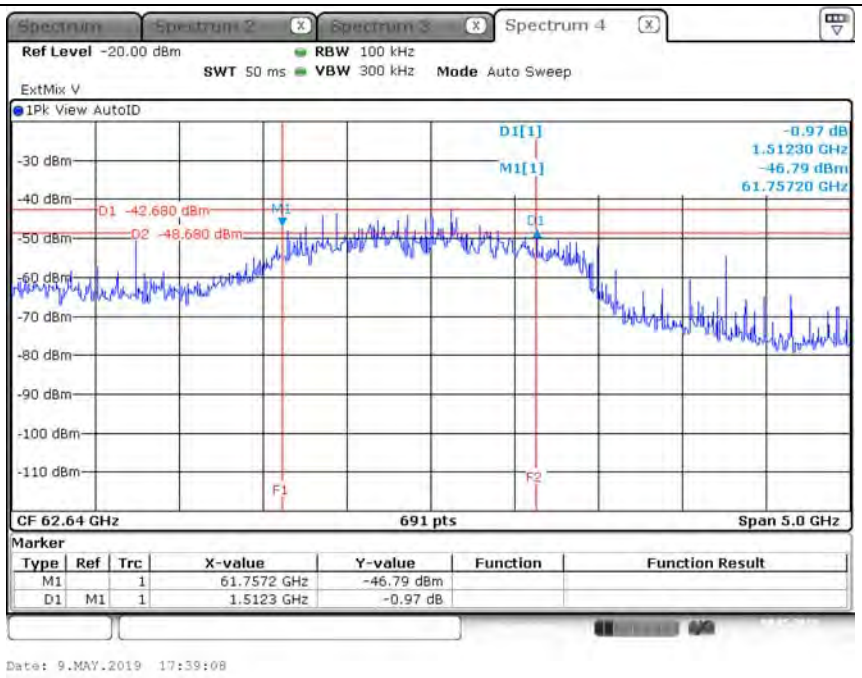
3.2.5.1 Bandwidth Plots

Test Frequency: 58.32 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


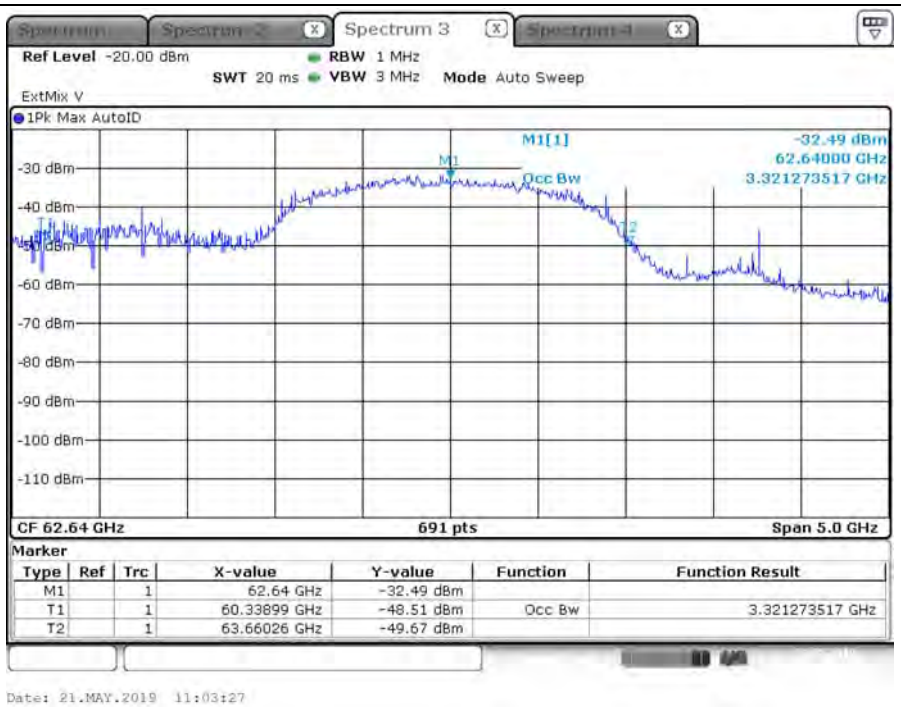
Test Frequency: 60.48 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


Test Frequency: 62.64 GHz

6 dBc Bandwidth



Occupied Bandwidth&26 dBc Bandwidth



3.3 EIRP Power

3.3.1 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 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)

3.3.2 Measuring Instruments

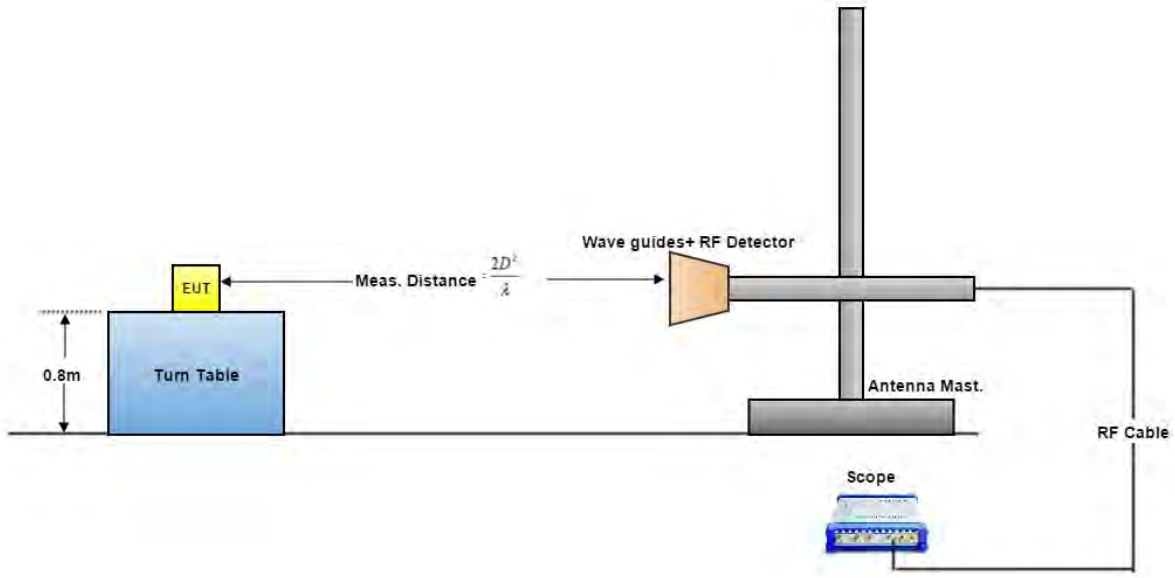
Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

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

3.3.4 Test Setup

EIPR Power



3.3.5 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.

3.3.5.1 Test Result of EIRP Power

Temp	22~24℃				Humidity		50~60%			
Test Engineer	KJ Chang				Test Distance		0.5 m			
Test Date	May 09, 2019 ~ May 21, 2019									
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
58.32	23.6	578.14	174.54	1.61	-7.39	150.58	141.58	39.76	30.76	43	40
60.48	23.6	596.16	186.92	1.98	-6.93	151.27	142.36	40.45	31.54	43	40
62.64	23.6	508.12	144.75	0.60	-8.92	150.19	140.67	39.37	29.85	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.

$E = 126.8 – 20\log(\lambda) + P - G$

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 (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)”.

3.4 Peak Conducted Power

3.4.1 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)	

3.4.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.4.3 Test Procedures

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

3.4.4 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.	

3.4.4.1 Peak Conducted Power

Temp	22~24℃	Humidity	50~60%
Test Engineer	KJ Chang		
Test Date	May 09, 2019 ~ May 21, 2019		

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	39.76	21.9	17.86	61.141	1490.60	500.00
60.48	40.45	21.9	18.55	71.601	1526.80	500.00
62.64	39.37	21.9	17.47	55.899	1512.30	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 3.2.5.

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

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.

3.5 Transmitter Spurious Emissions

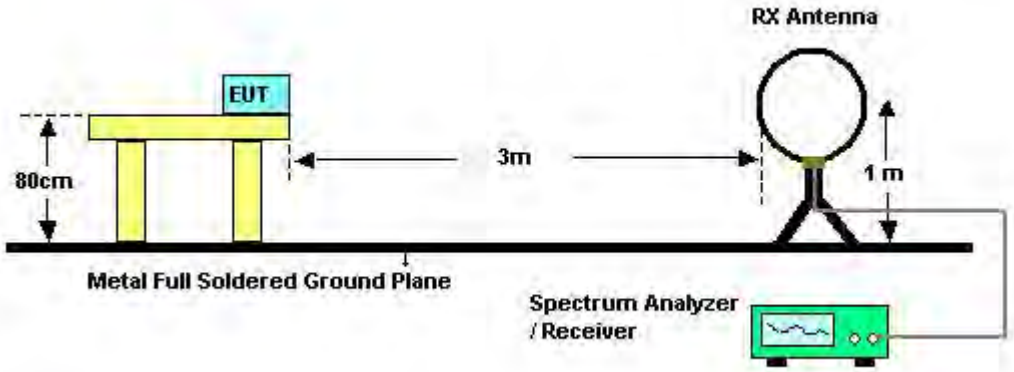
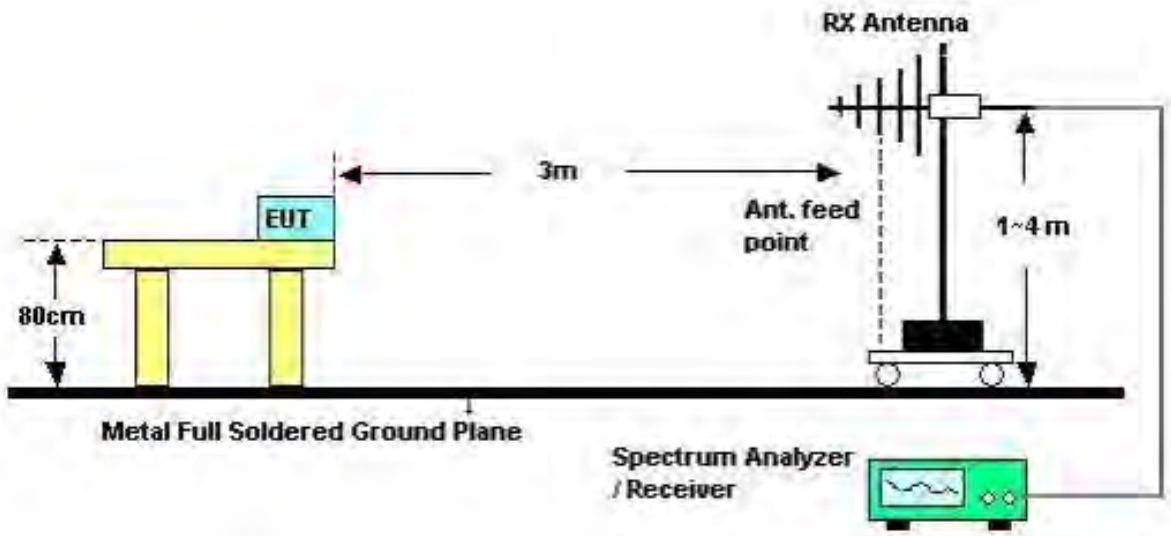
3.5.1 Limit of Transmitter Spurious Emissions

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(d)	
NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission.	

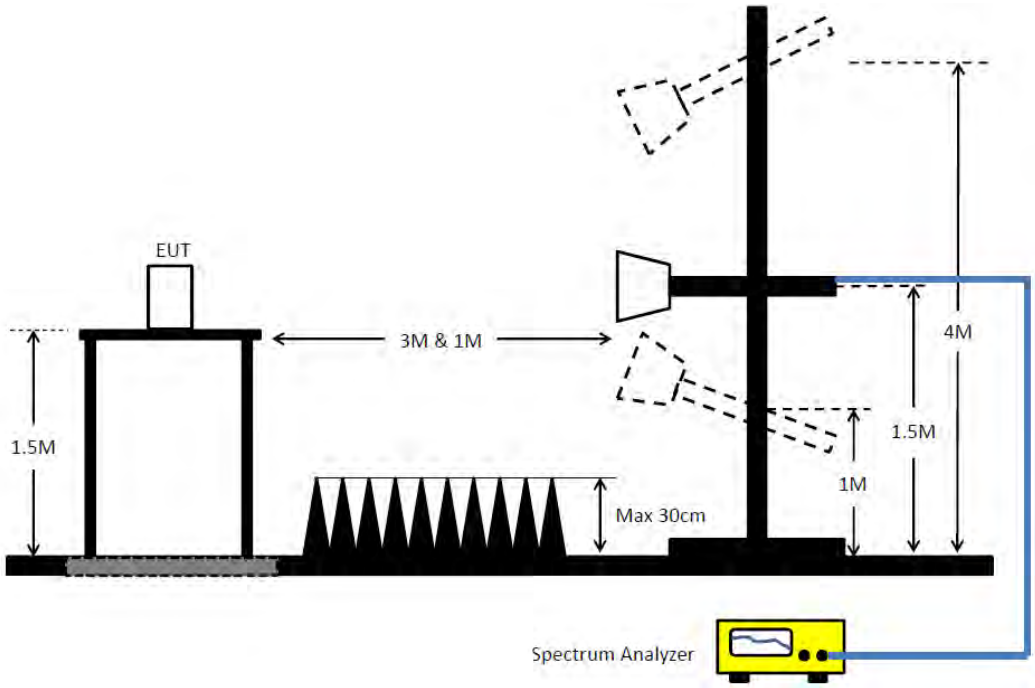
3.5.2 Test Procedures

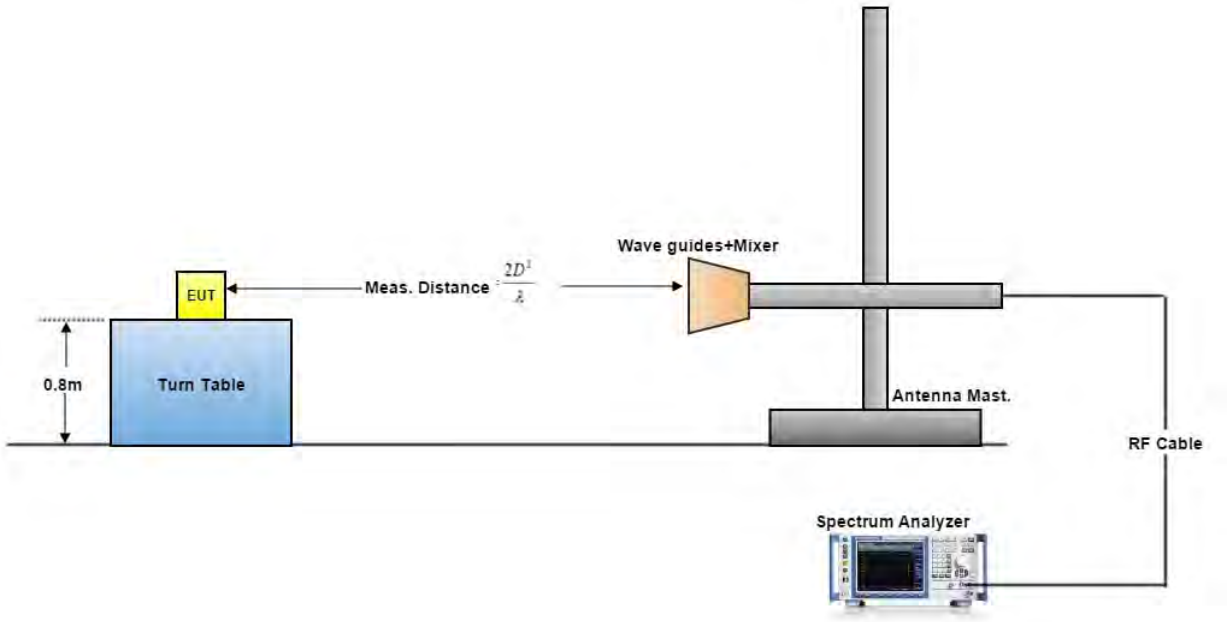
Method of measurement: Refer as ANSI C63.10-2013, clause 9.12

3.5.3 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.

3.5.4 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.	

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

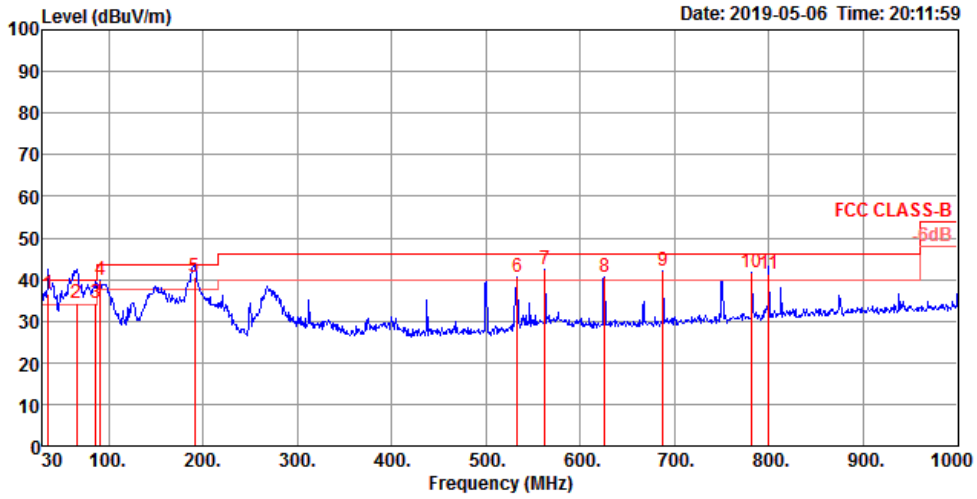
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

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.

3.5.4.2 Test Result of Transmitter Spurious Emissions

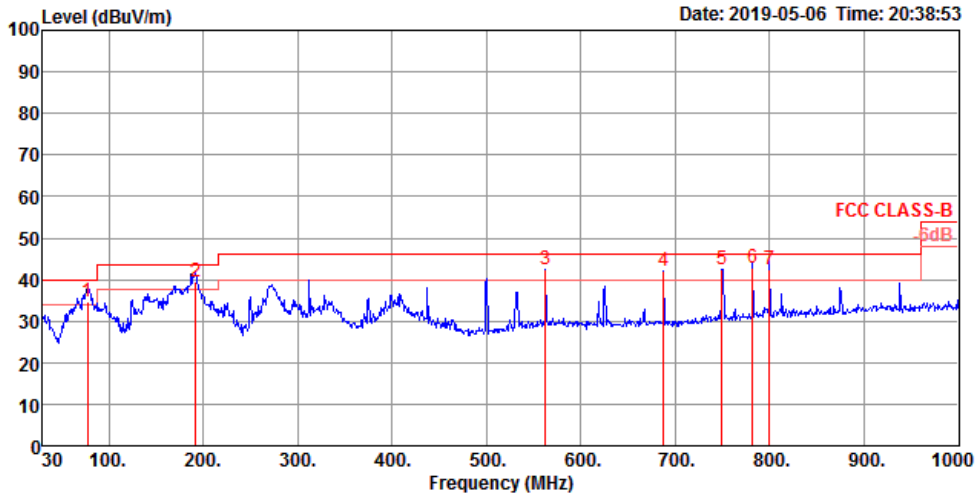
Temp	22~24°C	**Humidity**	50~60%
Test Engineer	Mason Chen	**Test Distance**	3 m
Test Range	30 MHz – 1000 MHz	**Test Configuration**	Normal Link

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	35.82	36.63	40.00	-3.37	45.20	0.77	22.25	31.59	100	334	QP	VERTICAL
2	65.89	34.48	40.00	-5.52	52.71	1.00	12.60	31.83	200	258	QP	VERTICAL
3	86.26	34.33	40.00	-5.67	50.51	1.16	14.51	31.85	125	139	QP	VERTICAL
4	91.11	39.87	43.50	-3.63	55.03	1.24	15.45	31.85	150	122	Peak	VERTICAL
5	191.02	40.41	43.50	-3.09	55.02	1.73	15.59	31.93	100	358	QP	VERTICAL
6	533.43	40.77	46.00	-5.23	45.70	3.05	24.34	32.32	100	207	Peak	VERTICAL
7	562.53	42.25	46.00	-3.75	46.80	3.15	24.67	32.37	100	212	Peak	VERTICAL
8	625.58	40.73	46.00	-5.27	44.68	3.28	25.21	32.44	100	193	Peak	VERTICAL
9	687.66	42.06	46.00	-3.94	45.56	3.41	25.58	32.49	100	220	Peak	VERTICAL
10	781.75	41.81	46.00	-4.19	44.10	3.69	26.53	32.51	100	133	Peak	VERTICAL
11	800.18	41.23	46.00	-4.77	43.32	3.71	26.70	32.50	100	360	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	77.53	34.84	40.00	-5.16	52.43	1.14	13.13	31.86	300	185	QP	HORIZONTAL
2	191.99	39.65	43.50	-3.85	54.21	1.73	15.64	31.93	200	192	QP	HORIZONTAL
3	562.53	42.45	46.00	-3.55	47.00	3.15	24.67	32.37	150	241	Peak	HORIZONTAL
4	687.66	42.00	46.00	-4.00	45.50	3.41	25.58	32.49	100	264	Peak	HORIZONTAL
5	749.74	42.47	46.00	-3.53	45.16	3.64	26.20	32.53	150	222	Peak	HORIZONTAL
6	781.75	42.76	46.00	-3.24	45.05	3.69	26.53	32.51	125	64	QP	HORIZONTAL
7	800.18	42.61	46.00	-3.39	44.70	3.71	26.70	32.50	125	175	QP	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	KJ Chang	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Freq. (GHz)	58.32
Test Date	May 21, 2019		

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	7289.97	49.32	74.00	-24.68	41.70	6.46	36.47	35.31	132	40	Peak	VERTICAL
2	7290.03	42.76	54.00	-11.24	35.14	6.46	36.47	35.31	132	40	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	7289.94	48.77	74.00	-25.23	41.15	6.46	36.47	35.31	117	288	Peak	HORIZONTAL
2	7290.03	42.32	54.00	-11.68	34.70	6.46	36.47	35.31	117	288	Average	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	KJ Chang	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Freq. (GHz)	58.32
Test Date	May 21, 2019		

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	19987.94	56.93	83.54	-26.61	56.16	13.06	37.50	49.79	150	309	Peak	VERTICAL
2	19989.13	47.31	63.54	-16.23	46.54	13.06	37.50	49.79	150	309	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	19988.68	43.74	63.54	-19.80	42.97	13.06	37.50	49.79	150	64	Average	HORIZONTAL
2	19992.24	54.78	83.54	-28.76	54.01	13.06	37.50	49.79	150	64	Peak	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	Mason Chen	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Freq. (GHz)	60.48
Test Date	May 21, 2019		

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	7559.98	52.50	74.00	-21.50	44.89	6.51	36.33	35.23	100	40	Peak	VERTICAL
2	7560.02	46.31	54.00	-7.69	38.70	6.51	36.33	35.23	100	40	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	7559.97	53.12	74.00	-20.88	45.51	6.51	36.33	35.23	100	295	Peak	HORIZONTAL
2	7560.02	48.34	54.00	-5.66	40.73	6.51	36.33	35.23	100	295	Average	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	Mason Chen	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Freq. (GHz)	60.48
Test Date	May 21, 2019		

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	19988.73	43.58	63.54	-19.96	42.81	13.06	37.50	49.79	150	230	Average	VERTICAL
2	19988.84	55.77	83.54	-27.77	55.00	13.06	37.50	49.79	150	230	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	19987.81	43.60	63.54	-19.94	42.83	13.06	37.50	49.79	150	338	Average	HORIZONTAL
2	19987.97	55.91	83.54	-27.63	55.14	13.06	37.50	49.79	150	338	Peak	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	Mason Chen	Test Distance	3 m
Test Range	1 GHz – 18 GHz	Test Freq. (GHz)	62.64
Test Date	May 21, 2019		

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	7829.91	52.04	74.00	-21.96	43.76	7.07	36.45	35.24	100	336	Peak	VERTICAL
2	7830.02	43.41	54.00	-10.59	35.13	7.07	36.45	35.24	100	336	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	7829.99	51.96	74.00	-22.04	43.68	7.07	36.45	35.24	237	325	Peak	HORIZONTAL
2	7830.02	45.26	54.00	-8.74	36.98	7.07	36.45	35.24	237	325	Average	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	Mason Chen	Test Distance	1 m
Test Range	18 GHz – 40 GHz	Test Freq. (GHz)	62.64
Test Date	May 21, 2019		

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	19988.47	44.52	63.54	-19.02	43.75	13.06	37.50	49.79	150	26	Average	VERTICAL
2	19989.81	55.75	83.54	-27.79	54.98	13.06	37.50	49.79	150	26	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	19987.81	55.40	83.54	-28.14	54.63	13.06	37.50	49.79	150	152	Peak	HORIZONTAL
2	19988.60	43.60	63.54	-19.94	42.83	13.06	37.50	49.79	150	152	Average	HORIZONTAL

Temp	22~24°C	Humidity	50~60%
Test Engineer	KJ Chang	Test Date	May 09, 2019 ~ May 21, 2019
Test Range	40GHz – 200GHz		

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
58.32	23.6	0.50	56.56	-53.35
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-15.48	3	25.0419	90.00	PASS

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23.6	0.50	55.84	-60.92
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-23.16	3	4.2713	90.00	PASS

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23.6	0.50	56.86	-64.67
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-26.75	3	1.8676	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

3.6 Frequency Stability

3.6.1 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.	

3.6.2 Measuring Instruments

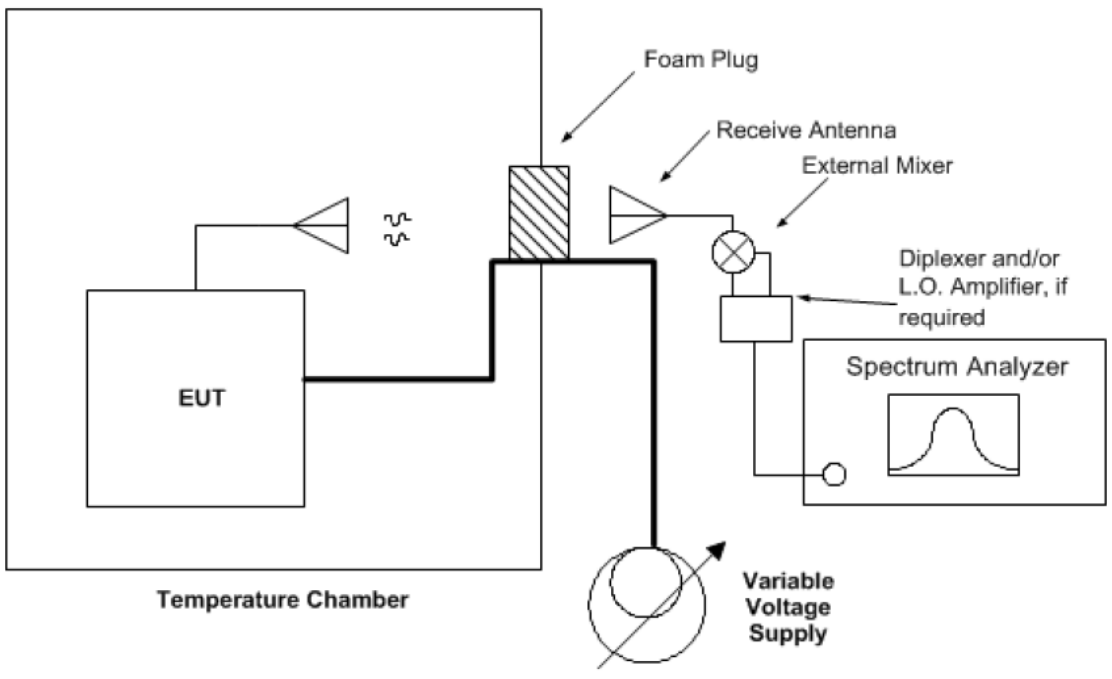
Refer a measuring instruments list in this test report.

3.6.3 Test Procedures

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

3.6.4 Test Setup

Frequency Stability



3.6.5 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.	

3.6.5.1 Frequency Stability with Respect to Ambient Temperature

Frequency Stability with Respect to Ambient Temperature			
Temp	22~24°C	**Humidity**	50~60%
Test Engineer	KJ Chang	**Test Date**	May 09, 2019 ~ May 21, 2019
Test Results			
Test Temperature (°C)	**Measured Frequency (MHz)**	**Delta Frequency (kHz)**	**Limit (±kHz)**
0	60480.546	-31	Within band
10	60480.546	-31	Within band
20	60480.577	Reference	Within band
30	60480.643	66	Within band
40	60480.684	107	Within band
50	60480.684	107	Within band
NOTE: The manufacturer's specified temperature range of 0 to 50°C.			

3.6.5.2 Frequency Stability When Varying Supply Voltage

Frequency Stability When Varying Supply Voltage			
Temp	22~24°C	**Humidity**	50~60%
Test Engineer	KJ Chang	**Test Date**	May 09, 2019 ~ May 21, 2019
Test Results			
Test Voltage: (Vdc)	**Measured Frequency (MHz)**	**Delta Frequency (kHz)**	**Limit (±kHz)**
40.8	60480.699	122	within band
48	60480.577	Reference	within band
55.2	60480.532	-45	within band

3.7 Operation Restriction and Group Installation

3.7.1 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))

3.7.2 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.

3.7.3 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
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 21, 2018	Nov. 20, 2019	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 05, 2018	Nov. 04, 2019	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Jan. 16, 2019	Jan. 15, 2020	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Nov. 06, 2018	Nov. 05, 2019	Conduction (CO02-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 27, 2018	Aug. 26, 2019	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 13, 2018	Nov. 12, 2019	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jun. 28, 2018	Jun. 27, 2019	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 01, 2019	Apr. 30, 2020	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 08, 2019	Jan. 07, 2020	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 04, 2018	Jul. 03, 2019	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Jan. 31, 2019	Jan. 30, 2020	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS	100359	9kHz ~ 2.75GHz	Jul. 03, 2018	Jul. 02, 2019	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Oct. 12, 2017*	Oct. 11, 2019*	Radiation (03CH01-CB)
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Oct. 12, 2017*	Oct. 11, 2019*	Radiation (03CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Oct. 12, 2017*	Oct. 11, 2019*	Radiation (03CH01-CB)
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Oct. 12, 2017*	Oct. 11, 2019*	Radiation (03CH01-CB)
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	Oct. 12, 2017*	Oct. 11, 2019*	Radiation (03CH01-CB)
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-RPFW0	#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. 13, 2018	Jul. 12, 2019	Radiation (03CH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-C2SP	TBN-1010206	-20~150 degree	Mar. 04. 2019	Mar. 03. 2020	Conducted (TH01-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
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
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%