FCC RADIO TEST REPORT

FCC ID	:	MSQZ01QD
Equipment	:	ASUS Phone(Mobile Phone)
Brand Name	:	ASUS
Model Name	:	ASUS_Z01QD
Applicant	:	ASUSTeK COMPUTER INC. 4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN
Manufacturer	:	Arima Communications (Jiangsu) Co., LTD No.168,Jiao Tong North Road,Wu Jiang, Su Zhou,Jiang Su,PRC.
Standard	:	47 CFR FCC Part 15.255

The product was received on Jul. 03, 2018, and testing was started from Jul. 07, 2018 and completed on Nov. 27, 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, 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: Cliff Chang

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

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR852405-01	01	Initial issue of report	Aug. 08, 2018
FR852405-01	02	Downgrading the power, so retest the EIRP Power and Peak Conducted Power.	Dec. 07, 2018

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	-
3.2	FCC 15.255(d)	Occupied Bandwidth	PASS	-
3.3	FCC 15.255(b)(1)	EIRP Power	PASS	-
3.4	FCC 15.255(d)	Peak Conducted Power	PASS	-
3.5	FCC 15.255(c)	Transmitter Spurious Emissions	PASS	-
3.6	FCC 15.255(e)	Frequency Stability	PASS	-
3.7	FCC 15.255(a),(g)	Operation Restriction and Group Installation	PASS	-

Reviewed by: Cliff Chang

Report Producer: Cindy Peng

1 General Description

1.1 Information

1.1.1 The Channel Plan(s)

Frequency Range	57-66 GHz
The Channel Plan(s)	
Channel 1: 58.32 GHz	
Channel 2: 60.48 GHz	
Channel 3: 62.64 GHz	

1.1.2 Antenna Information

Antenna Information	
☐ Equipment placed on the market without antennas	
☒ Integral antenna	
Integral antenna gain	1.93 dBi for Front of EUT
	7.23 dBi for Back of EUT
	☐ Temporary RF connector provided
	☒ No temporary RF connector provided
☐ External antenna (dedicated antennas)	
	☐ Single power level with corresponding antenna(s)
	☐ Multiple power settings and corresponding antenna(s)

There are two 60GHz radios and it supports TX/RX diversity function.

1.1.3 Power Levels

Test Mode: Mode 1

Worst Power Levels			
Applicable power levels	☐ Conducted ☒ EIRP		
Antenna gain	1.93 dBi		
Frequency (GHz)	Highest setting (P_{high}): (dBm)		
	Modulation	AV Power	Peak Power
58.32	8	7.23	19.20

Test Mode: Mode 2

Worst Power Levels			
Applicable power levels	☐ Conducted ☒ EIRP		
Antenna gain	7.23 dBi		
Frequency (GHz)	Highest setting (P_{high}): (dBm)		
	Modulation	AV Power	Peak Power
58.32	8	10.67	20.44

1.1.4 Extreme Operating

The Extreme Operating Temperature Range that Apply to the Equipment			
☐ -20 °C to +50 °C			
☐ 0 °C to +40 °C			
☒ Other: -10 °C to +55 °C			
EUT Power Type	From host system or battery		
Supply Voltage	☐ AC	State AC voltage	V
Supply Voltage	☒ DC	State DC voltage 5	V

1.1.5 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

1.1.6 User Condition

Intended Operation
☒ Indoor
☐ Outdoor

1.2 Additional Information Provided by the Submitter

1.2.1 Modulation

Modulation	
MCS0~MCS11	
Can the transmitter operate un-modulated:	☒ Yes ☐ No

1.2.2 Duty Cycle

Test Mode: Mode 1

Duty Cycle		Duty Cycle Factor
The transmitter is intended for	100 %	0.00

Test Mode: Mode 2

Duty Cycle		Duty Cycle Factor
The transmitter is intended for	100 %	0.00

1.3 Accessories

Accessories				
No.	**Equipment Name**	**Brand Name**	**Model Name**	**Rating**
1	Power Adapter	PI	AD2130320	Input: 100-240Vac, 50/60Hz, 0.8A Output: 5Vdc, 3A / 9Vdc, 3A / 12Vdc, 2.5A / 3.3-5.9Vdc, 3A / 3.3-11Vdc, 3A
2	Li-ion Battery	SMP	C11P1801	3.85Vdc, 15.4Wh
Equipment Name				
3	Earphone: Non-shielded, 0.84m			
4	USB Cable: Non-shielded, 1.15m			

1.4 Support Equipment

For AC Power Conducted Emissions Test Item:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E6430	DoC

For Other Test Items:

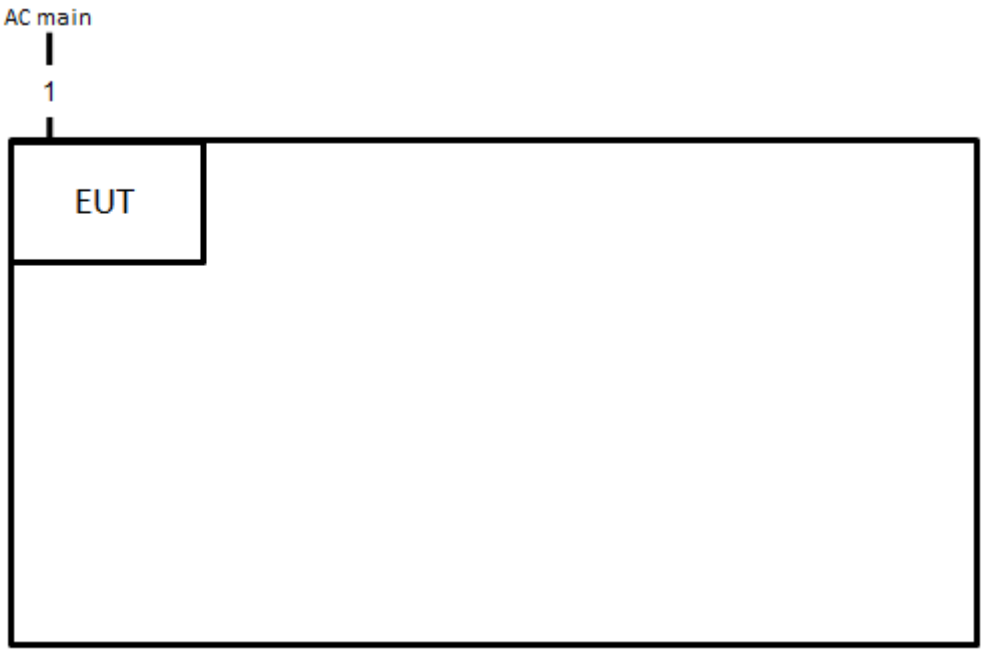
Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E4300	N/A

1.5 EUT Operation during Test

During the test, executed the test program to control the EUT continuously transmit/receive RF signal.

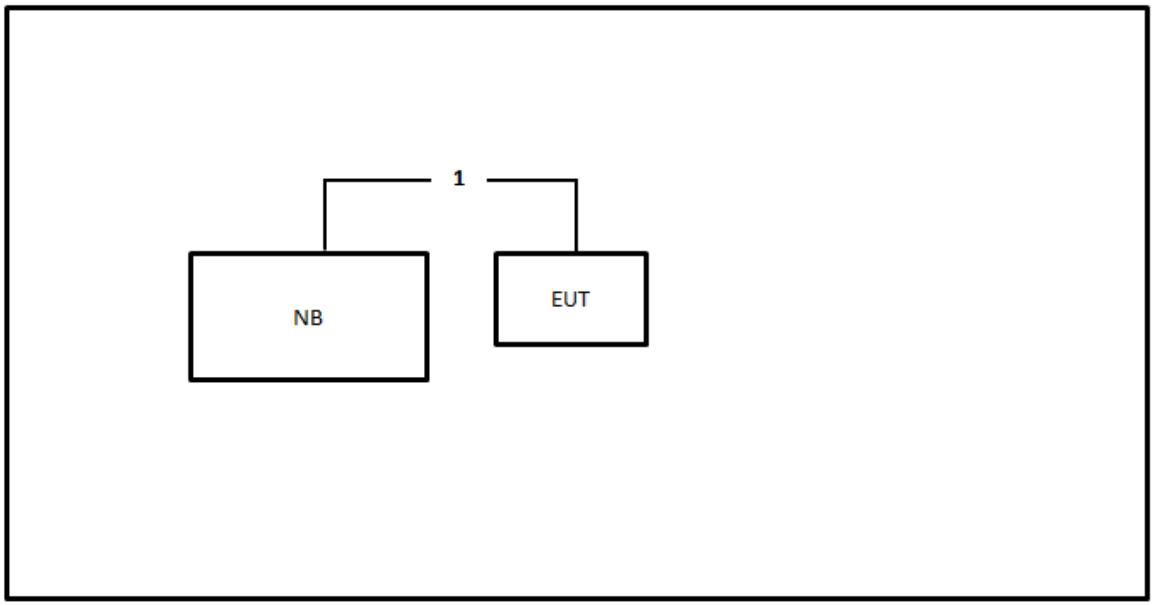
1.6 Test Setup Diagram

Test Setup Diagram - AC Power Conducted Emissions



Item	Connection	Shielded	Length
1	USB Cable	No	1.15m

Test Setup Diagram - Transmitter Spurious Emissions



Item	Connection	Shielded	Length
1	USB Cable	No	1.15m

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.				
CO02-CB		03CH01-CB		TH01-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

Low Channel (GHz)	Middle Channel (GHz)	High Channel (GHz)
58.32	60.48	62.64

2.2 Conformance Tests and Related Test Frequencies

Test Item	Test Frequencies (GHz)
AC Power Conducted Emissions	58.32
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)	58.32
Transmitter Spurious Emissions (1 GHz-40 GHz)	58.32, 60.48, 62.64
Transmitter Spurious Emissions (above 40 GHz)	58.32, 60.48, 62.64
Frequency Stability	Un-Modulation

Test Mode:

For AC Power Conducted Emissions:

Test Mode 1: 60GHz radio (Front of EUT)+Supplied power by NB

Test Mode 2: 60GHz radio (Front of EUT)+Supplied power by Adapter

Mode 2 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode.

Test Mode 3: 60GHz radio (Back of EUT)+Supplied power by Adapter

Mode 2 is worst test result, and the test result of those two modes are selected to record in the test report.

For Transmitter Spurious Emissions (below 1 GHz):

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

Test Mode 1: EUT in Y axis-60GHz radio (Front of EUT)+Supplied power by NB

Test Mode 2: EUT in Y axis-60GHz radio (Front of EUT)+Supplied power by Adapter

Mode 1 has been evaluated to be the worst case between Mode 1~2, thus measurement for Mode 3 will follow this same test mode.

Test Mode 3: EUT in Y axis-60GHz radio (Back of EUT)+Supplied power by NB

Mode 3 is worst test result, and the test result of those two modes are selected to record in the test report.

For Transmitter Spurious Emissions (1 GHz-40 GHz)

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

There are two modes of EUT, one is supplied power by NB, the other is supplied power by Adapter for Transmitter Spurious Emissions below 1GHz test, and the worst case was found supplied power by NB. So the measurement will follow this same test configuration.

For Other Test Items:

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

Test Mode 1: EUT in Y-60GHz radio (Front of EUT)

Test Mode 2: EUT in Y-60GHz radio (Back of EUT)

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

Test Mode: Mode 1

Far Field (m)				
Test Frequency (GHz)	**L (m)**	**Lambda (m)**	**d(Far Field) (m)**	**d(Far Field) (cm)**
62.64	0.02	0.0047893	0.167	16.70

Test Mode: Mode 2

Far Field (m)				
Test Frequency (GHz)	**L (m)**	**Lambda (m)**	**d(Far Field) (m)**	**d(Far Field) (cm)**
62.64	0.02	0.0047893	0.167	16.70

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

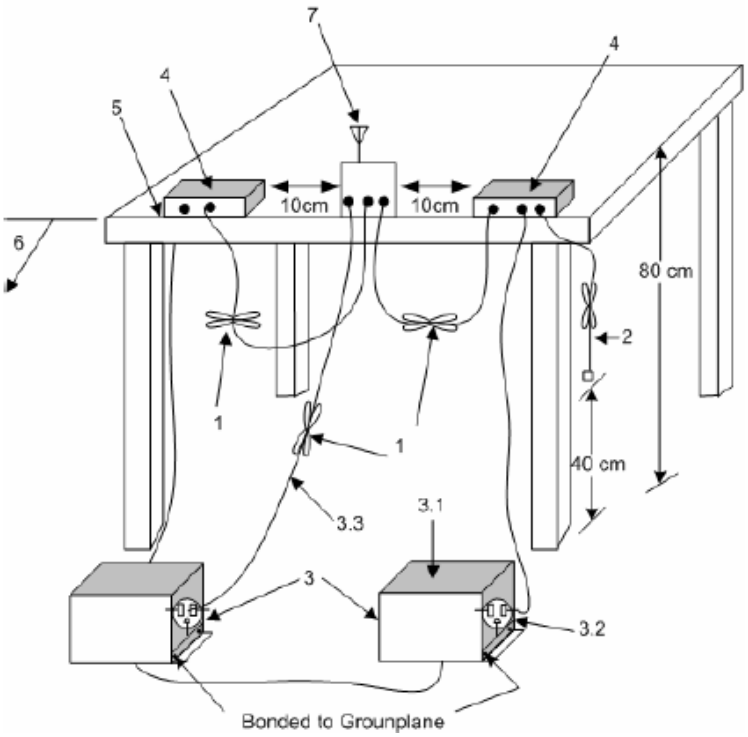
Refer a measuring instruments list in this test report.

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.

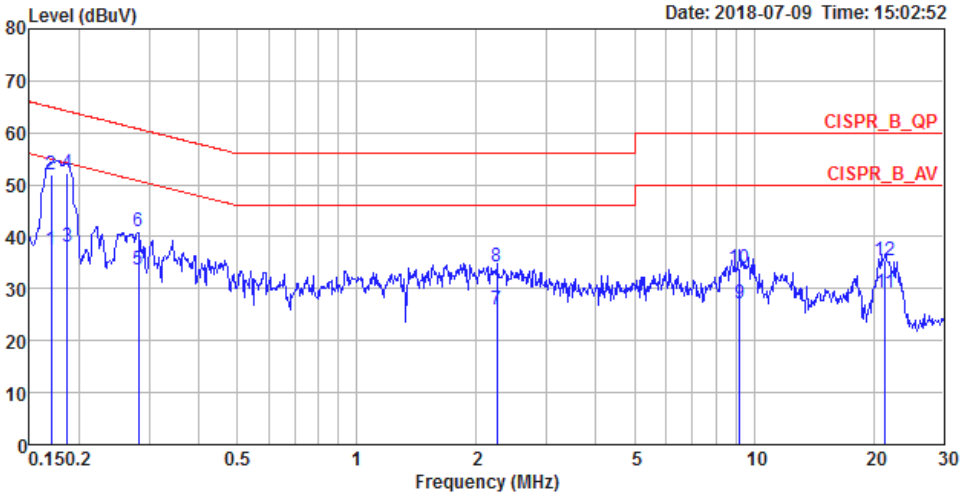
3.1.5 Test Result of AC Power Conducted Emissions

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.

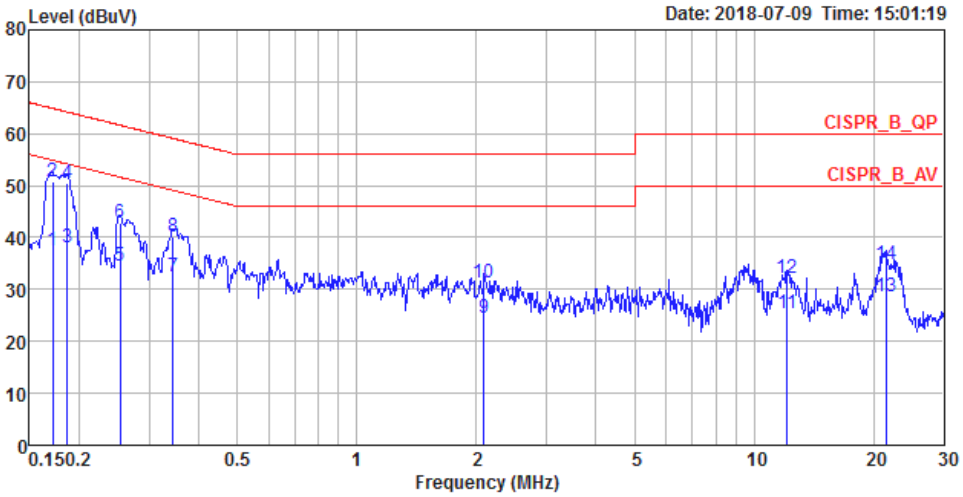
NOTE 2: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit, see ANSI C63.4, clause 10.1.8.1.

Temp	23°C	Humidity	60%
Test Engineer	Ryo Fan	Phase	Line
Test Mode	Mode 2		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1703	37.45	-17.49	54.94	27.48	9.96	0.01	Average	LINE
2	0.1703	51.99	-12.95	64.94	42.02	9.96	0.01	QP	LINE
3	0.1864	38.05	-16.15	54.20	28.11	9.93	0.01	Average	LINE
4	0.1864	52.18	-12.02	64.20	42.24	9.93	0.01	QP	LINE
5	0.2818	33.58	-17.18	50.76	23.67	9.89	0.02	Average	LINE
6	0.2818	40.97	-19.79	60.76	31.06	9.89	0.02	QP	LINE
7	2.2486	25.95	-20.05	46.00	15.90	10.00	0.05	Average	LINE
8	2.2486	34.13	-21.87	56.00	24.08	10.00	0.05	QP	LINE
9	9.2043	27.09	-22.91	50.00	16.98	10.04	0.07	Average	LINE
10	9.2043	34.07	-25.93	60.00	23.96	10.04	0.07	QP	LINE
11	21.3725	29.12	-20.88	50.00	18.75	10.23	0.14	Average	LINE
12	21.3725	35.28	-24.72	60.00	24.91	10.23	0.14	QP	LINE

Temp	23°C	Humidity	60%
Test Engineer	Ryo Fan	Phase	Neutral
Test Mode	Mode 2		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1712	37.36	-17.54	54.90	27.35	10.00	0.01	Average	NEUTRAL
2	0.1712	50.78	-14.12	64.90	40.77	10.00	0.01	QP	NEUTRAL
3	0.1864	38.10	-16.10	54.20	28.11	9.98	0.01	Average	NEUTRAL
4	0.1864	50.44	-13.76	64.20	40.45	9.98	0.01	QP	NEUTRAL
5	0.2535	34.62	-17.02	51.64	24.65	9.95	0.02	Average	NEUTRAL
6	0.2535	42.67	-18.97	61.64	32.70	9.95	0.02	QP	NEUTRAL
7	0.3446	32.53	-16.56	49.09	22.57	9.94	0.02	Average	NEUTRAL
8	0.3446	40.21	-18.88	59.09	30.25	9.94	0.02	QP	NEUTRAL
9	2.0879	24.56	-21.44	46.00	14.55	9.96	0.05	Average	NEUTRAL
10	2.0879	31.43	-24.57	56.00	21.42	9.96	0.05	QP	NEUTRAL
11	12.1240	25.27	-24.73	50.00	15.01	10.18	0.08	Average	NEUTRAL
12	12.1240	32.24	-27.76	60.00	21.98	10.18	0.08	QP	NEUTRAL
13	21.4860	28.76	-21.24	50.00	18.33	10.29	0.14	Average	NEUTRAL
14	21.4860	34.93	-25.07	60.00	24.50	10.29	0.14	QP	NEUTRAL

3.2 Occupied Bandwidth

3.2.1 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.

3.2.2 Measuring Instruments

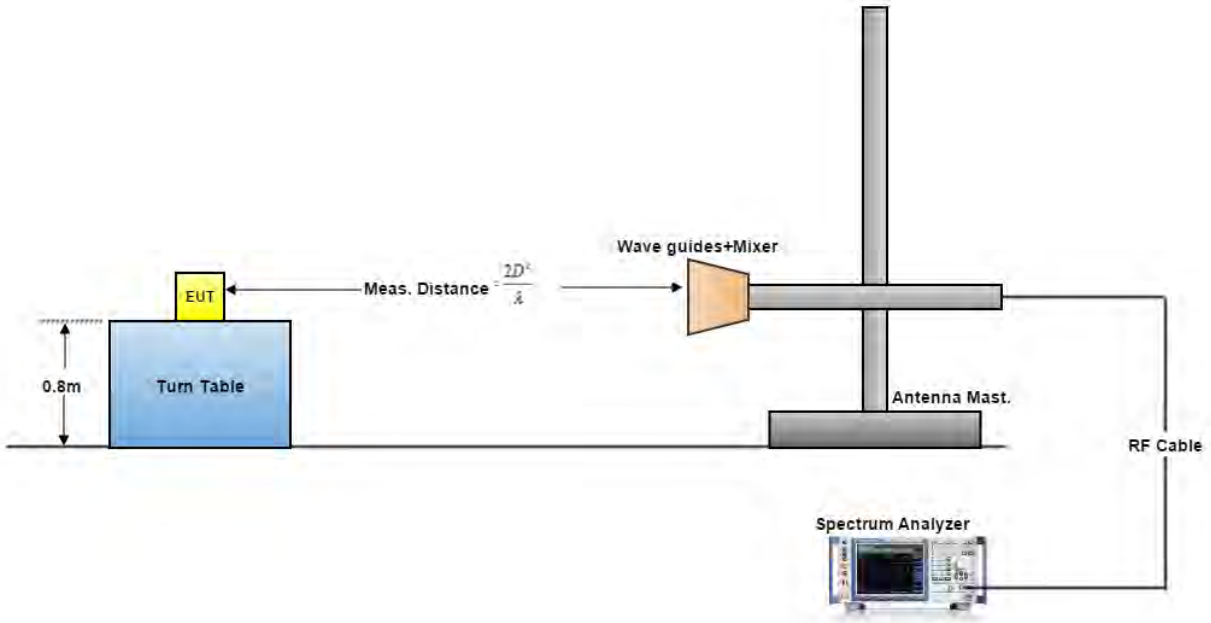
Refer a measuring instruments list in this test report.

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	21℃	**Humidity**	57%
Test Engineer	Lucas Huang		

Test Mode: Mode 1

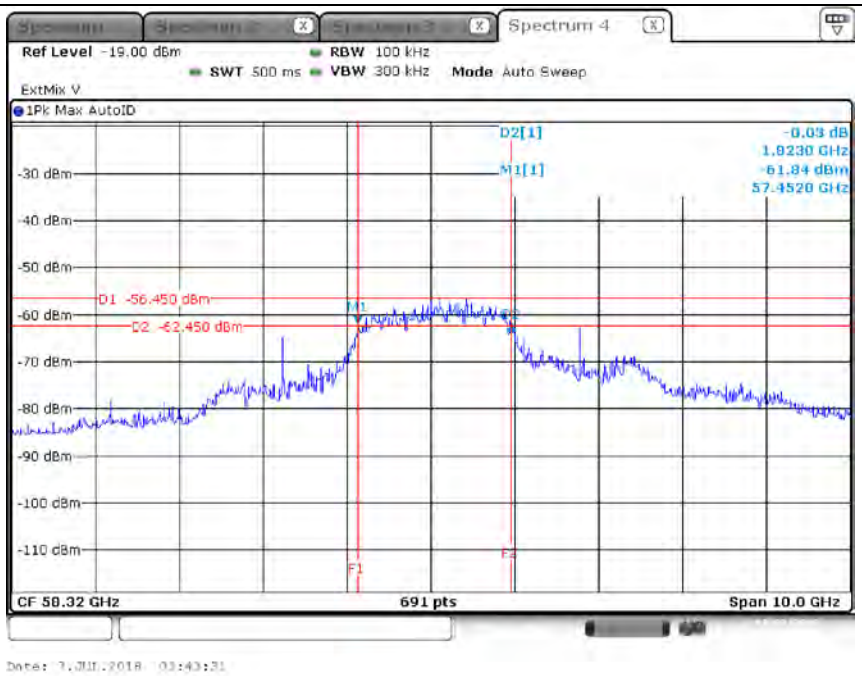
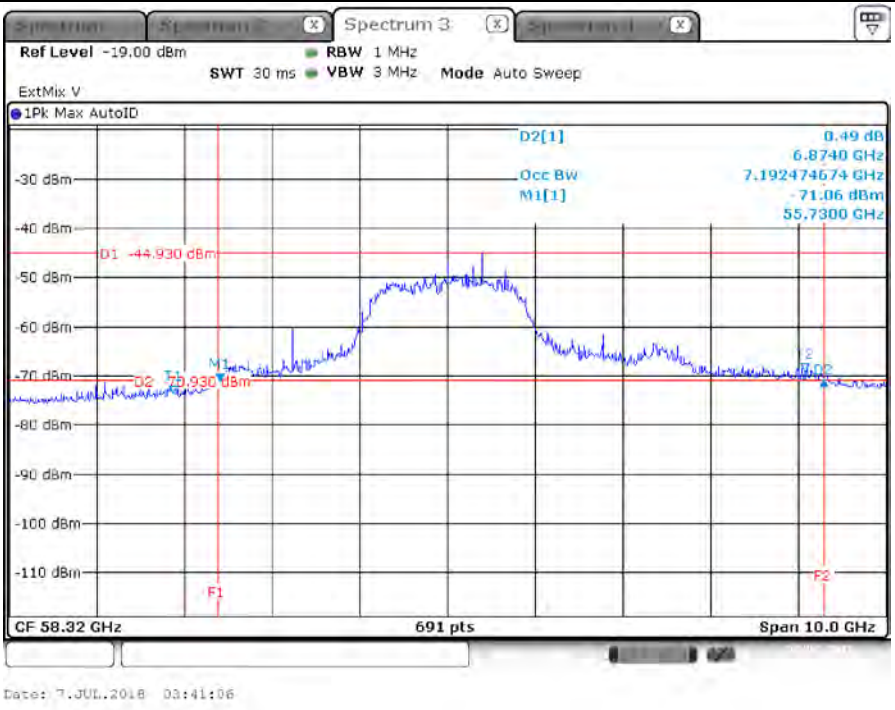
Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)
58.32	1823.00	7192.47	6874.00	N/A
60.48	1722.00	5311.14	6454.00	N/A
62.64	1809.00	5571.63	6946.00	N/A

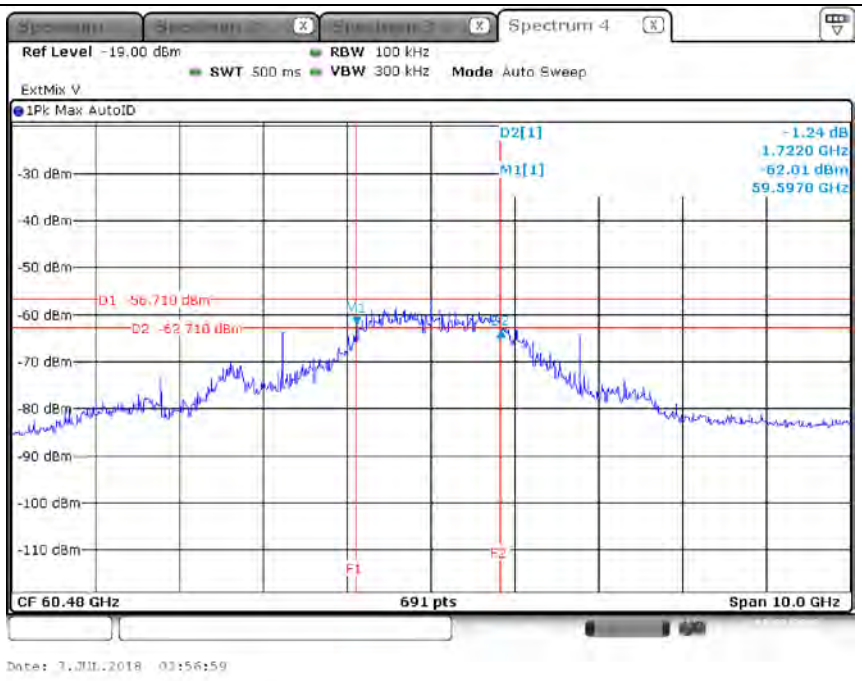
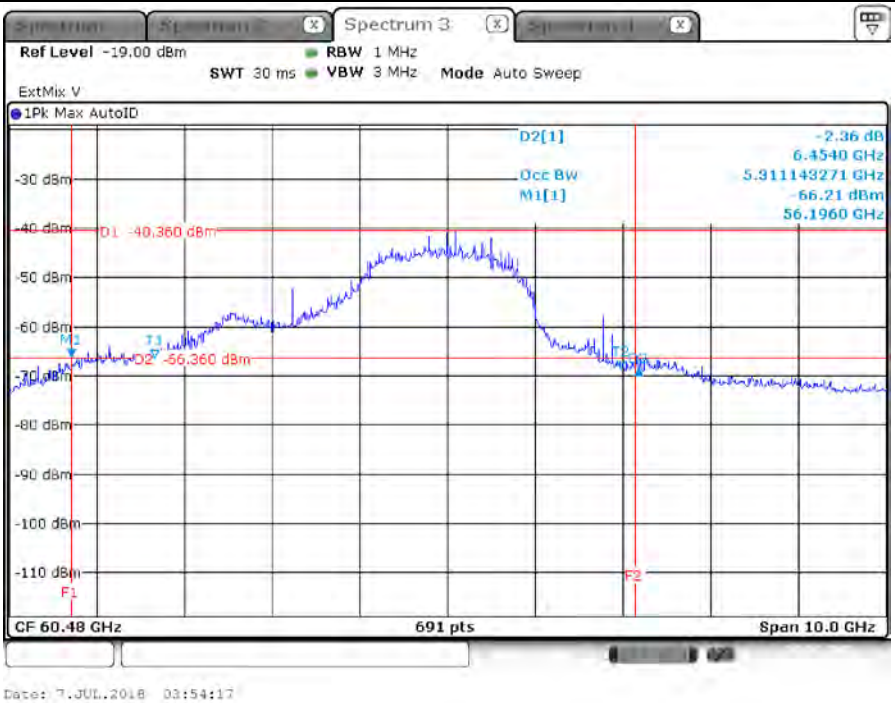
Test Mode: Mode 2

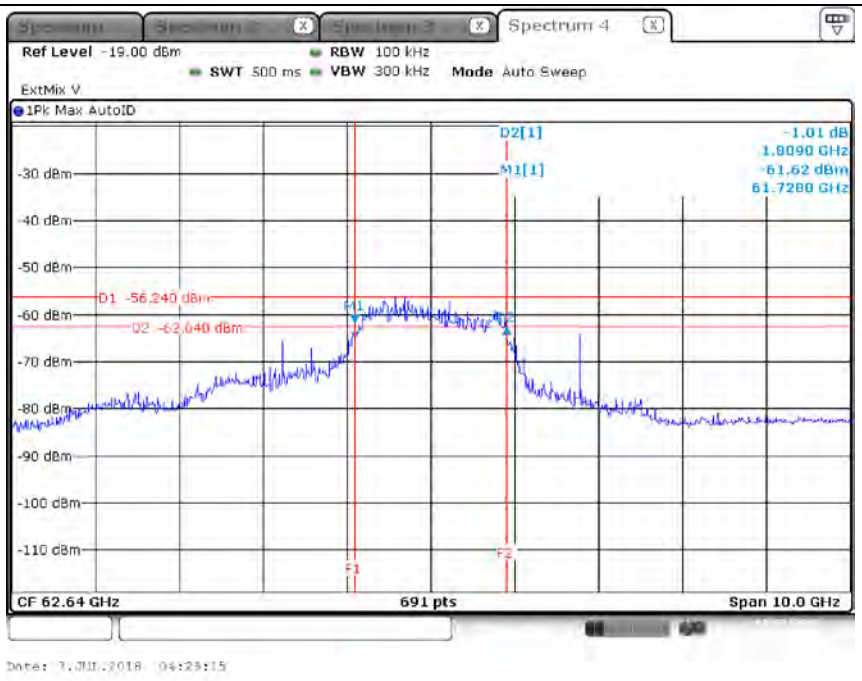
Test Freq. (GHz)	6 dBc Bandwidth (MHz)	Occupied Bandwidth (MHz)	26 dBc Bandwidth (MHz)	Limit (MHz)
58.32	1447.00	5528.22	4761.00	N/A
60.48	1664.00	6859.62	6310.00	N/A
62.64	1346.00	5094.06	5326.00	N/A

3.2.5.1 Bandwidth Plots

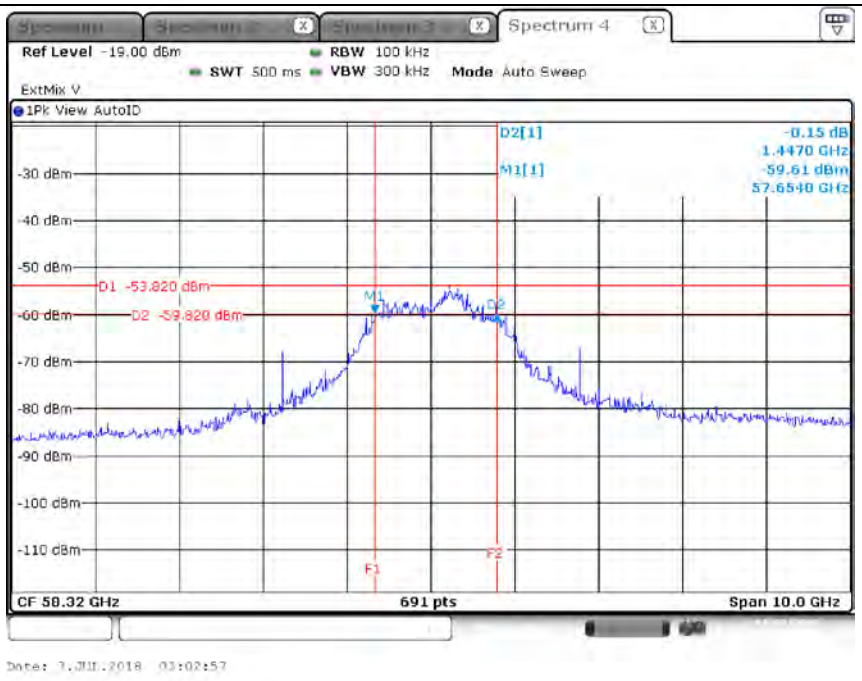
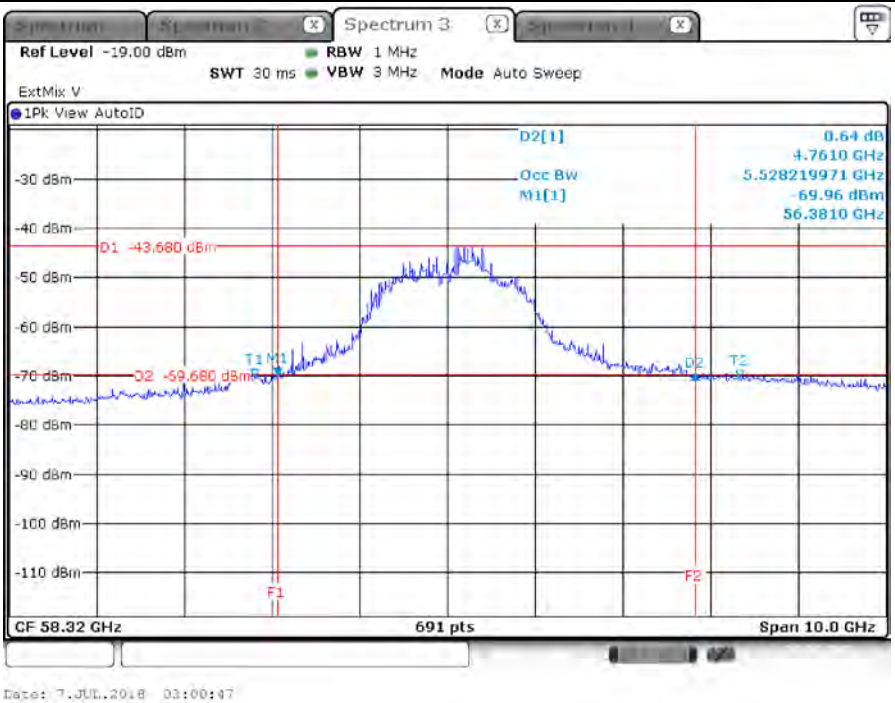
Test Mode: Mode 1

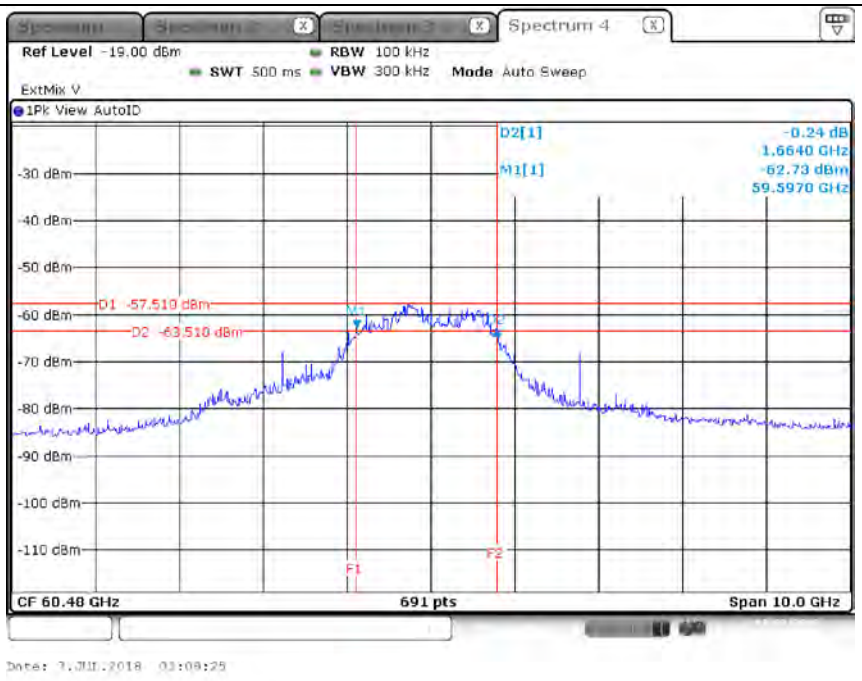
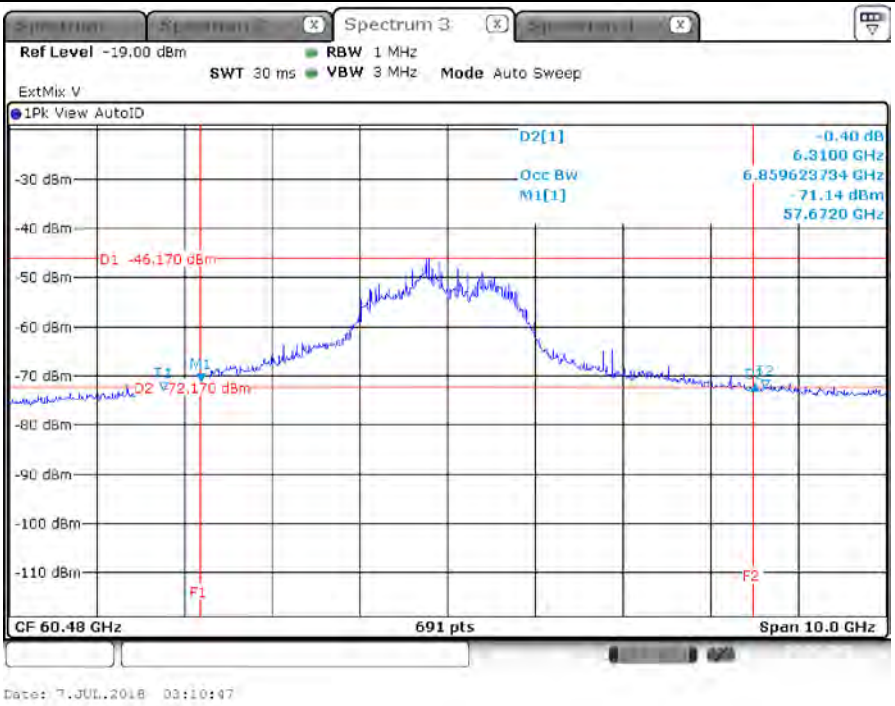
Test Frequency: 58.32 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


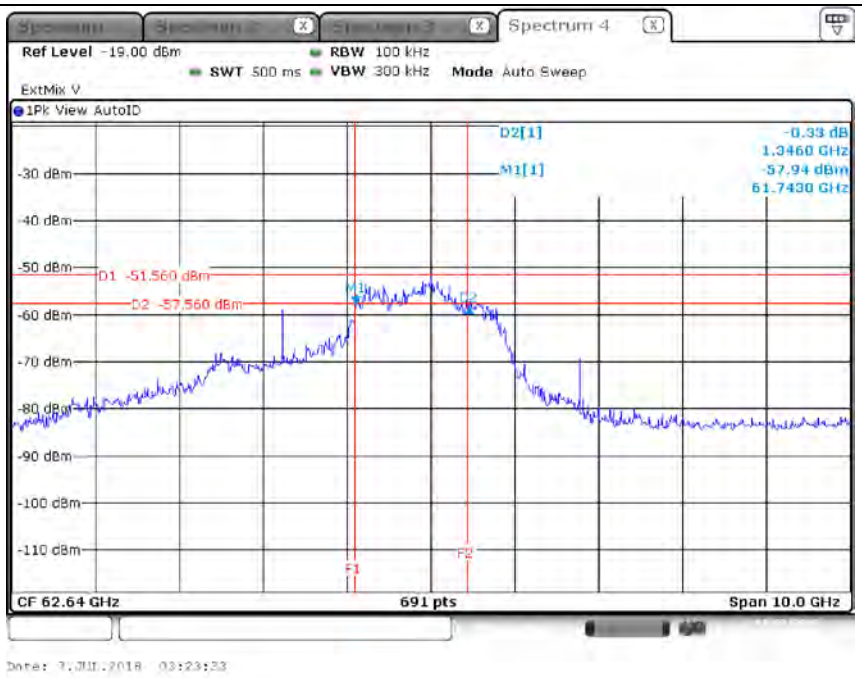
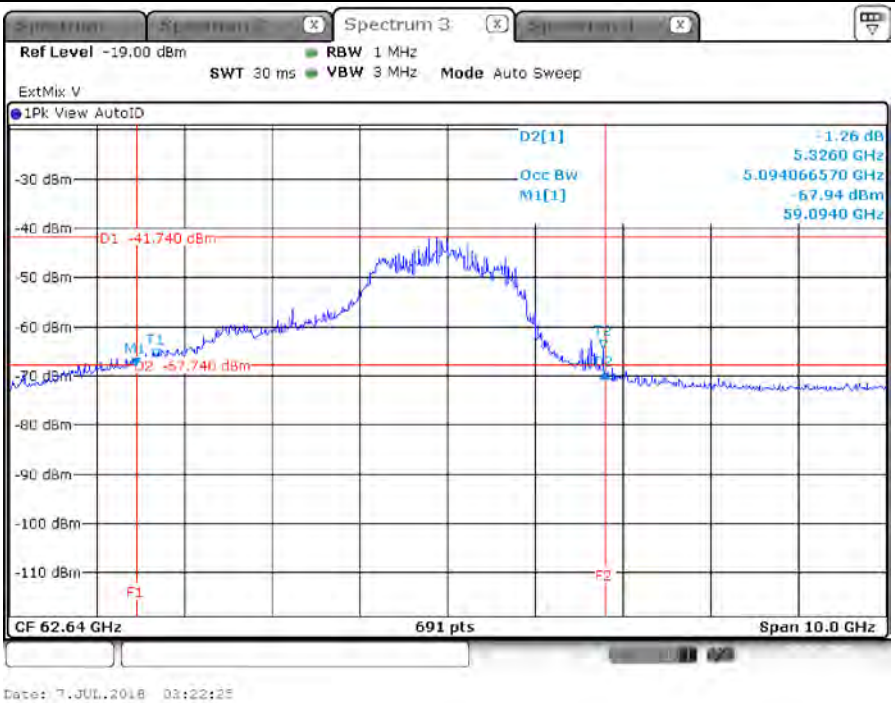
Test Frequency: 60.48 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


Test Frequency: 62.64 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


Test Mode: Mode 2

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 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)

3.3.2 Measuring Instruments

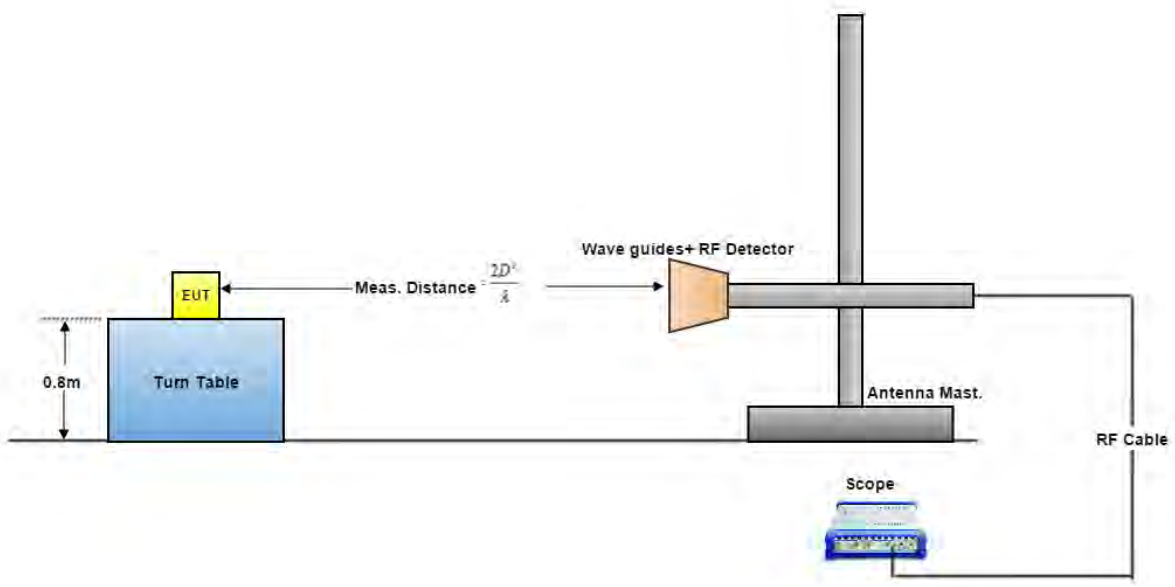
Refer a measuring instruments list in this test report.

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	21℃	**Humidity**	57%
Test Engineer	Lucas Huang	**Test Distance**	1 m
Test Date	Nov. 27, 2018		

Test Mode: Mode 1

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	8.10	1.95	-25.57	-37.54	124.00	112.03	19.20	7.23	43	40
60.48	23	6.21	1.56	-27.88	-38.44	122.01	111.45	17.21	6.65	43	40
62.64	23	6.56	1.63	-29.82	-39.51	120.37	110.68	15.57	5.88	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 (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)”.

Test Mode: Mode 2

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	3.30	0.53	-26.36	-36.63	123.21	112.94	18.41	8.14	43	40
60.48	23	5.70	0.77	-24.65	-34.42	125.24	115.47	20.44	10.67	43	40
62.64	23	2.70	0.45	-27.37	-37.37	122.82	112.82	18.02	8.02	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 (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)”.

3.4 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(d) 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	21℃	Humidity	57%
Test Engineer	Lucas Huang		
Test Date	Nov. 27, 2018		

Test Mode: Mode 1

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	19.20	1.93	17.27	53.382	1823.00	500.00
60.48	15.57	1.93	13.64	23.145	1722.00	500.00
62.64	28.09	1.93	26.16	413.486	1809.00	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 3.2.5.
NOTE 3: For the applicable limit, see FCC 15.255(d)
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.

Test Mode: Mode 2

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	18.41	7.23	11.18	13.134	1447.00	500.00
60.48	18.02	7.23	10.79	12.008	1664.00	500.00
62.64	28.09	7.23	20.86	122.028	1346.00	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 3.2.5.
NOTE 3: For the applicable limit, see FCC 15.255(d)
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(c) NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission.	

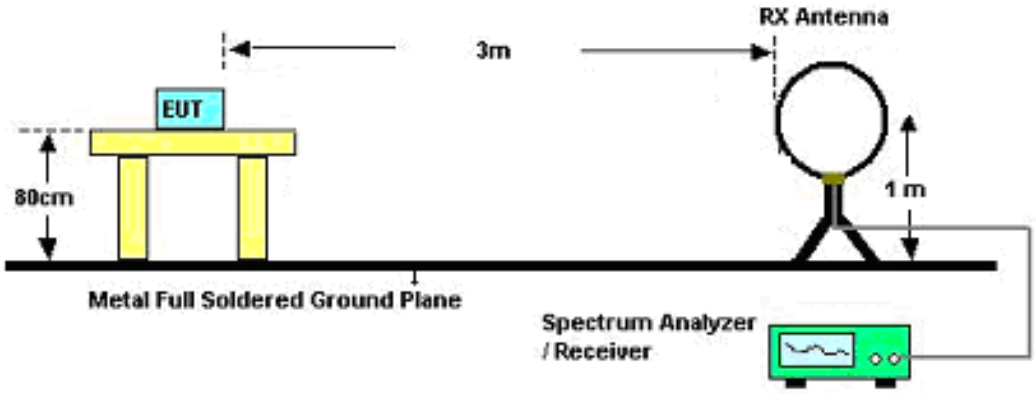
3.5.2 Test Procedures

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

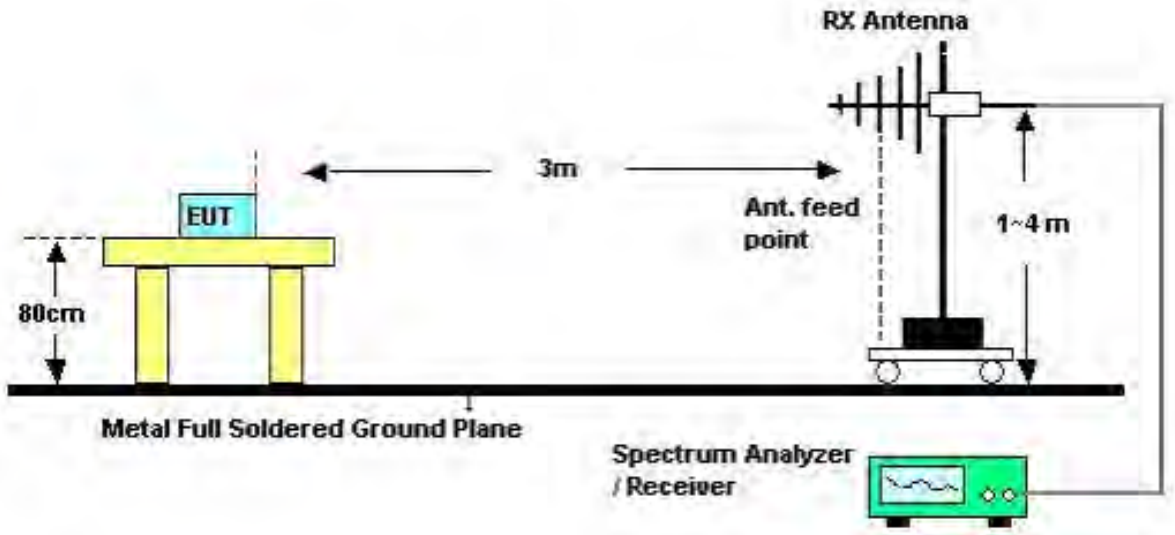
3.5.3 Test Setup

Transmitter Spurious Emissions

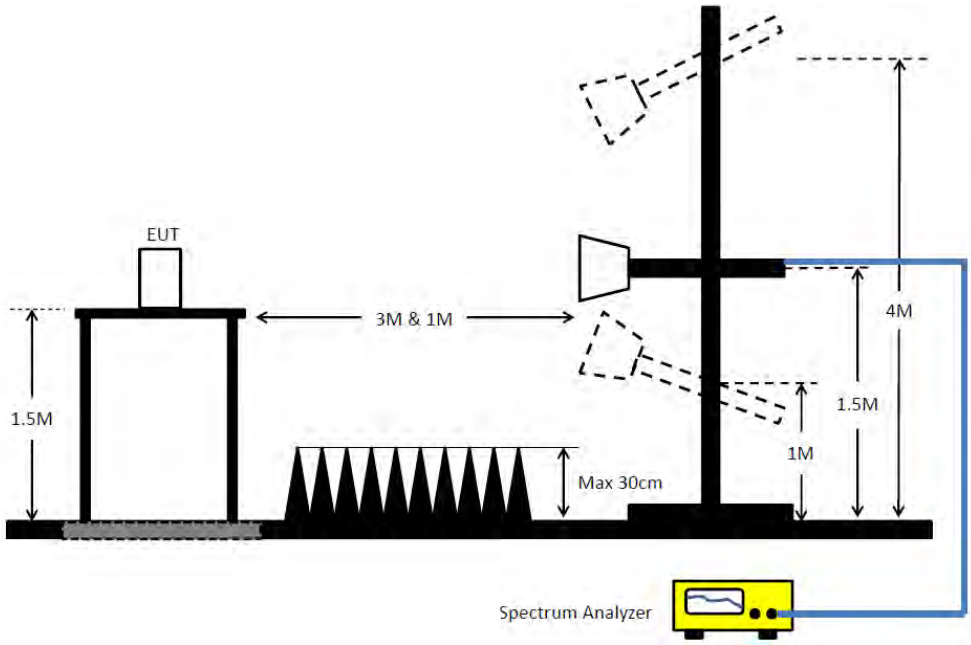
9kHz ~30MHz



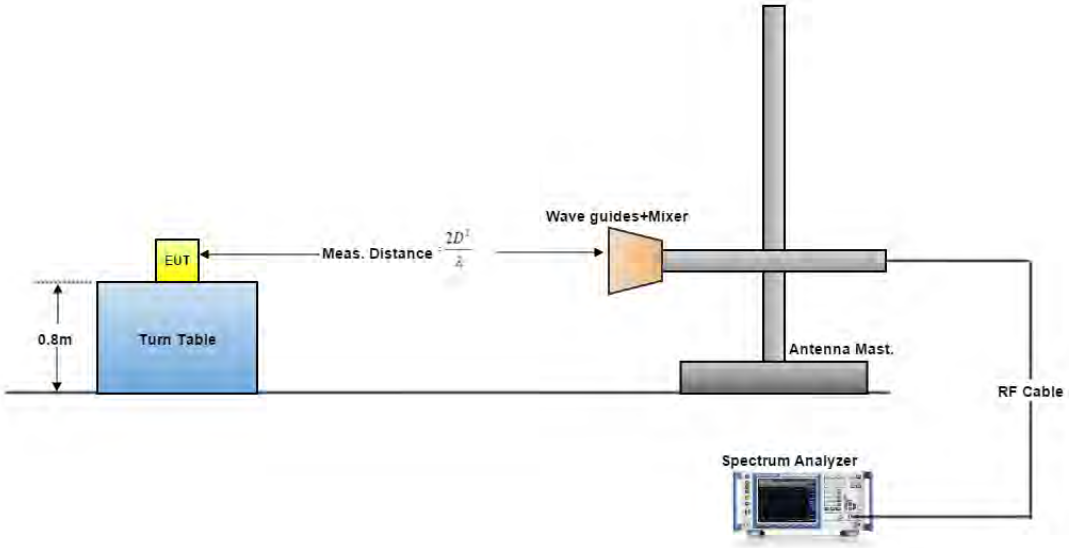
30MHz~1GHz



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)

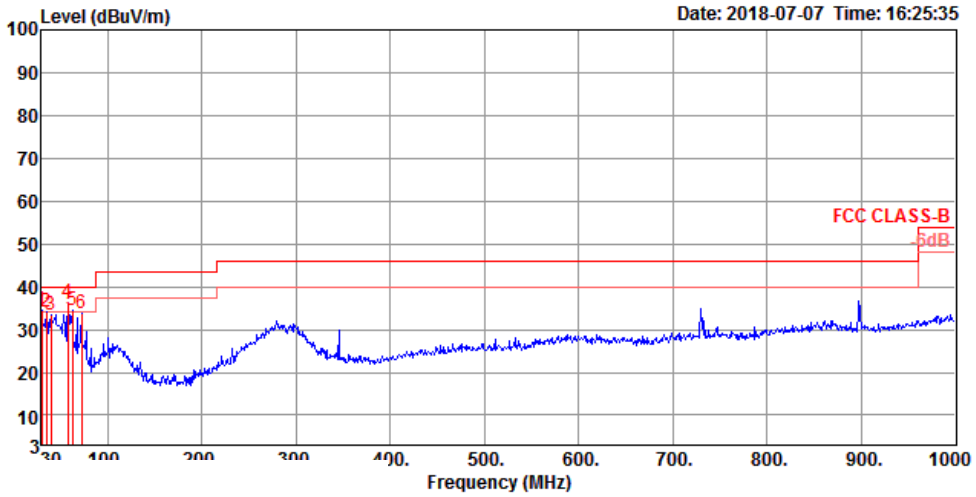
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

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 (30 MHz – 1000 MHz)

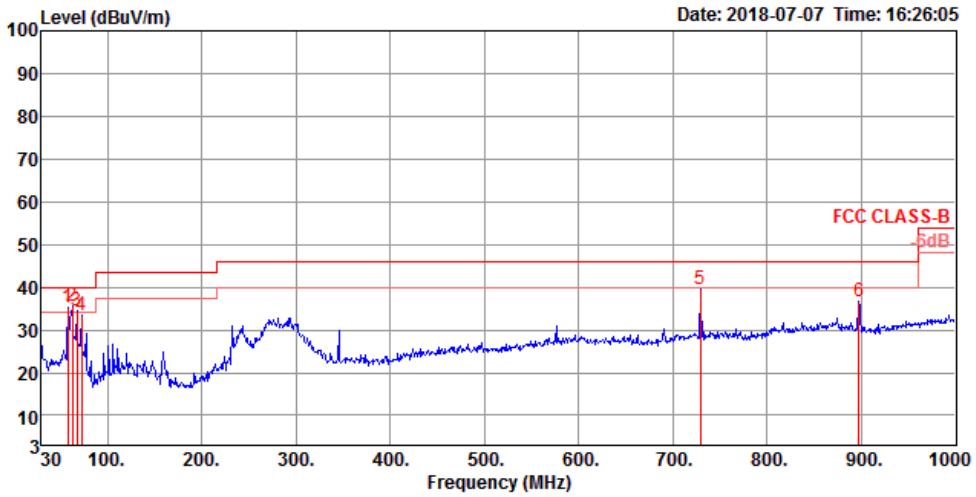
Temp	21°C	**Humidity**	57%
Test Engineer	Lucas Huang	**Test Distance**	3 m
Test Range	30 MHz – 1000 MHz	**Test Mode**	Mode 3

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	34.47	40.00	-5.53	41.74	0.87	24.29	32.43	100	214	Peak	VERTICAL
2	34.85	34.02	40.00	-5.98	43.72	0.96	21.77	32.43	100	214	Peak	VERTICAL
3	39.70	33.60	40.00	-6.40	45.95	1.05	19.03	32.43	125	199	Peak	VERTICAL
4	58.13	36.29	40.00	-3.71	54.97	1.27	12.46	32.41	100	135	Peak	VERTICAL
5	62.98	34.67	40.00	-5.33	53.57	1.32	12.19	32.41	250	2	Peak	VERTICAL
6	72.68	33.64	40.00	-6.36	52.35	1.42	12.27	32.40	150	260	Peak	VERTICAL

Horizontal



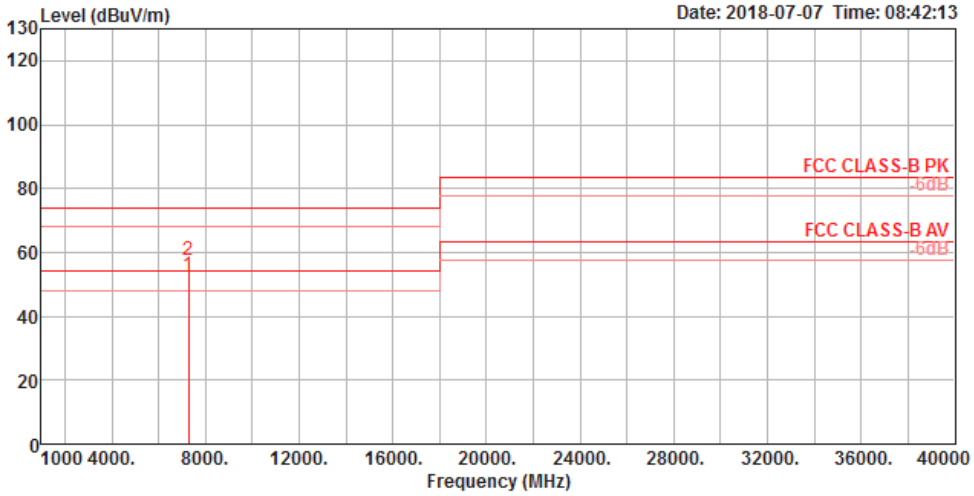
	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	58.13	35.04	40.00	-4.96	53.72	1.27	12.46	32.41	250	77	Peak	HORIZONTAL
2	62.98	35.40	40.00	-4.60	54.30	1.32	12.19	32.41	250	90	Peak	HORIZONTAL
3	67.83	34.32	40.00	-5.68	53.15	1.37	12.20	32.40	200	80	Peak	HORIZONTAL
4	72.68	33.34	40.00	-6.66	52.05	1.42	12.27	32.40	250	62	Peak	HORIZONTAL
5	729.37	39.35	46.00	-6.65	41.49	4.81	25.32	32.27	200	0	Peak	HORIZONTAL
6	897.18	36.53	46.00	-9.47	36.07	5.40	26.68	31.62	150	334	Peak	HORIZONTAL

3.5.4.3 Test Result of Transmitter Spurious Emissions

Test Mode: Mode 1

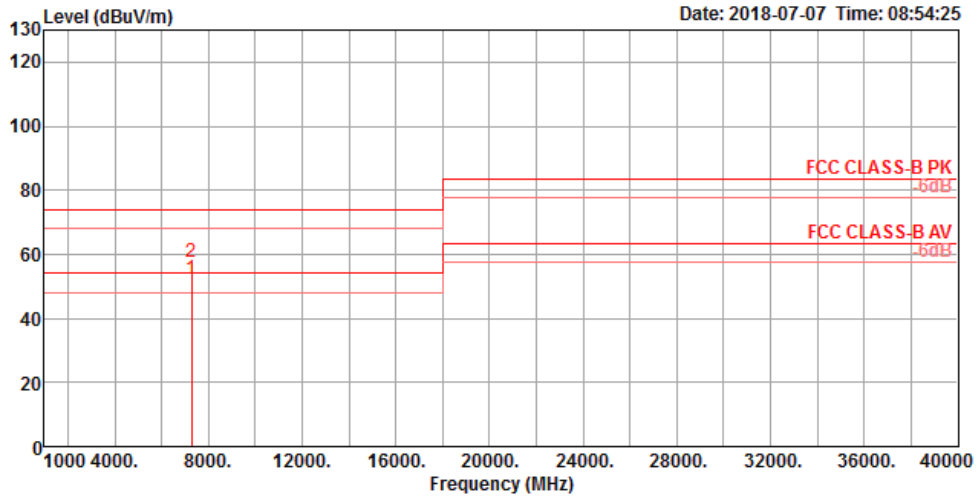
Temp	21°C	**Humidity**	57%
Test Engineer	Lucas Huang	**Test Distance**	3 m
Test Range	1 GHz – 40 GHz	**Test Freq. (GHz)**	58.32

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	7290.00	52.74	54.00	-1.26	41.02	8.77	36.00	33.05	210	8	Average	VERTICAL
2	7290.00	57.54	74.00	-16.46	45.82	8.77	36.00	33.05	210	8	Peak	VERTICAL

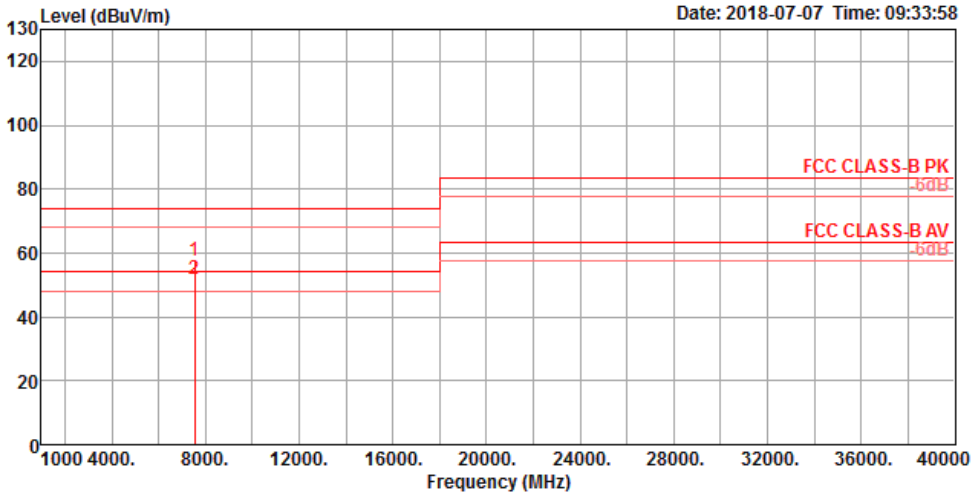
Horizontal



	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	7290.00	52.19	54.00	-1.81	40.47	8.77	36.00	33.05	164	18	Average	HORIZONTAL
2	7290.13	57.77	74.00	-16.23	46.05	8.77	36.00	33.05	164	18	Peak	HORIZONTAL

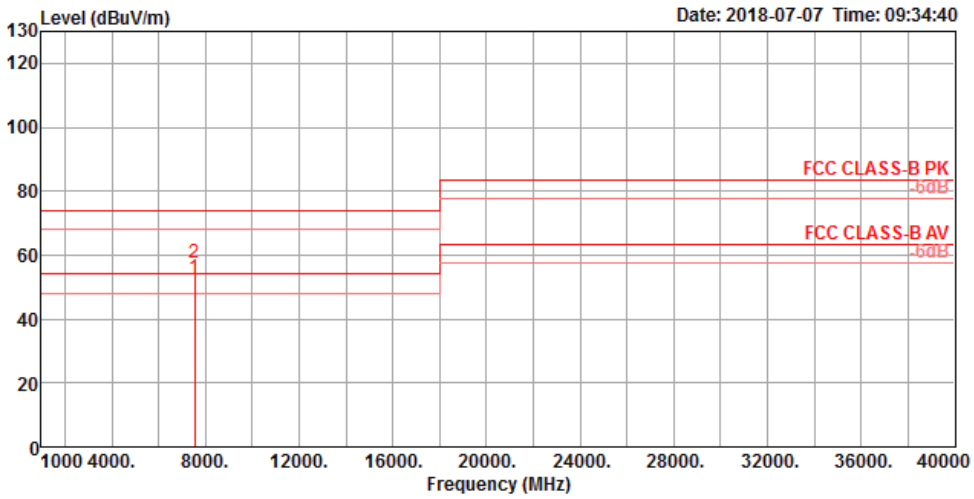
Temp	21°C	Humidity	57%
Test Engineer	Lucas Huang	Test Distance	3 m
Test Range	1 GHz – 40 GHz	Test Freq. (GHz)	60.48

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	7560.11	57.40	74.00	-16.60	45.29	8.85	36.58	33.32	172	297	Peak	VERTICAL
2	7560.14	51.83	54.00	-2.17	39.72	8.85	36.58	33.32	172	297	Average	VERTICAL

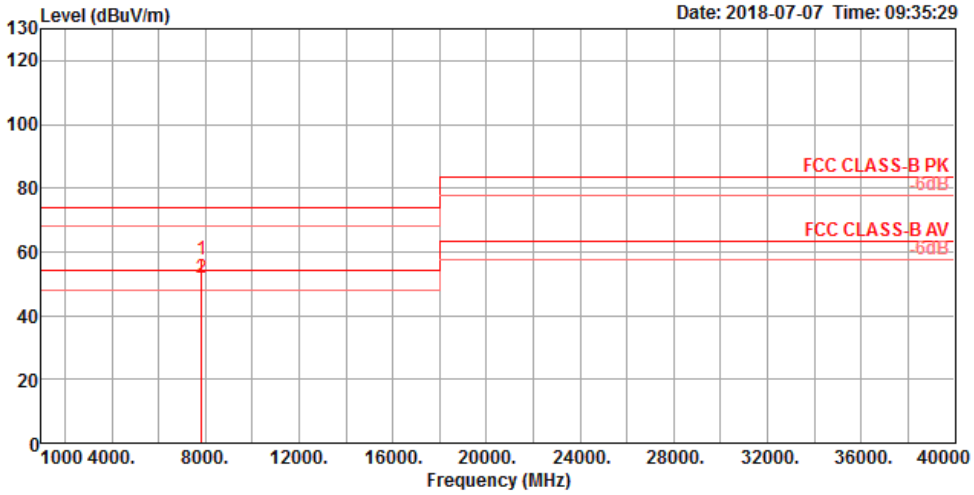
Horizontal



	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	7559.63	52.54	54.00	-1.46	40.43	8.85	36.58	33.32	152	6	Average	HORIZONTAL
2	7559.99	57.43	74.00	-16.57	45.32	8.85	36.58	33.32	152	6	Peak	HORIZONTAL

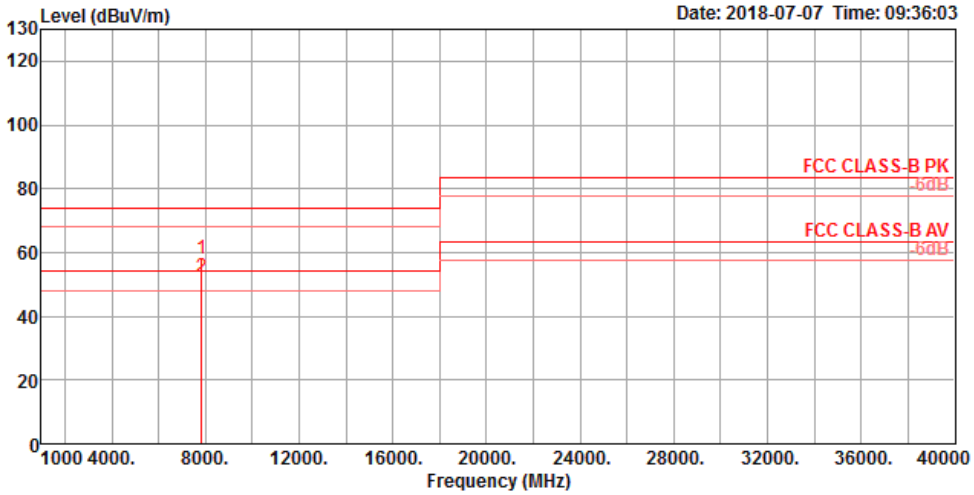
Temp	21°C	Humidity	57%
Test Engineer	Lucas Huang	Test Distance	3 m
Test Range	1 GHz – 40 GHz	Test Freq. (GHz)	62.64

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	7829.61	57.69	74.00	-16.31	45.21	9.09	36.91	33.52	153	273	Peak	VERTICAL
2	7829.62	51.84	54.00	-2.16	39.36	9.09	36.91	33.52	153	273	Average	VERTICAL

Horizontal

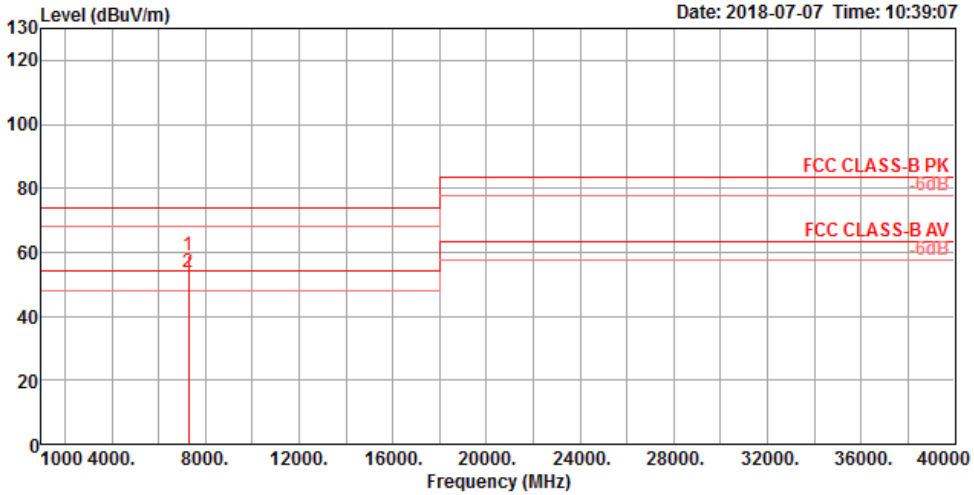


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	7829.70	57.82	74.00	-16.18	45.34	9.09	36.91	33.52	150	274	Peak	HORIZONTAL
2	7829.70	52.50	54.00	-1.50	40.02	9.09	36.91	33.52	150	274	Average	HORIZONTAL

Test Mode: Mode 2

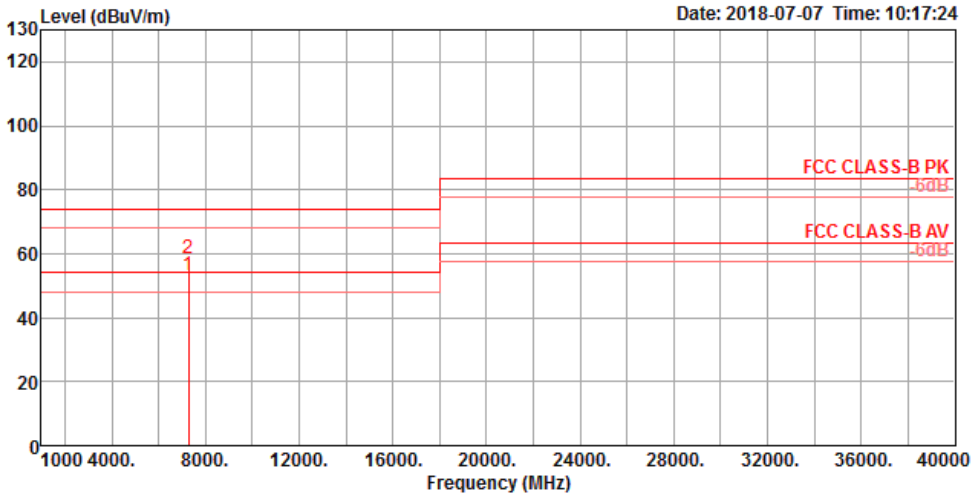
Temp	21°C	**Humidity**	57%
Test Engineer	Lucas Huang	**Test Distance**	3 m
Test Range	1 GHz – 40 GHz	**Test Freq. (GHz)**	58.32

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	7289.96	59.16	74.00	-14.84	47.44	8.77	36.00	33.05	211	236	Peak	VERTICAL
2	7290.00	53.85	54.00	-0.15	42.13	8.77	36.00	33.05	211	236	Average	VERTICAL

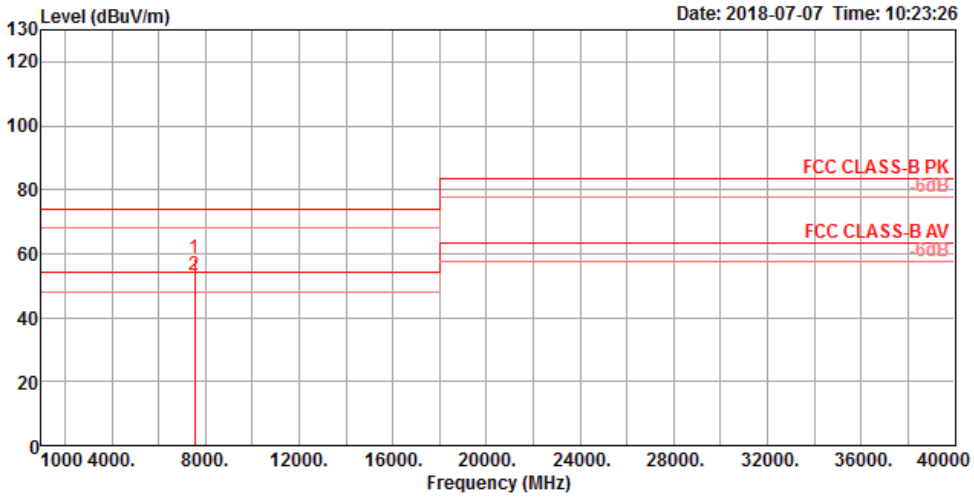
Horizontal



	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	7289.99	53.39	54.00	-0.61	41.67	8.77	36.00	33.05	221	174	Average	HORIZONTAL
2	7290.01	58.32	74.00	-15.68	46.60	8.77	36.00	33.05	221	174	Peak	HORIZONTAL

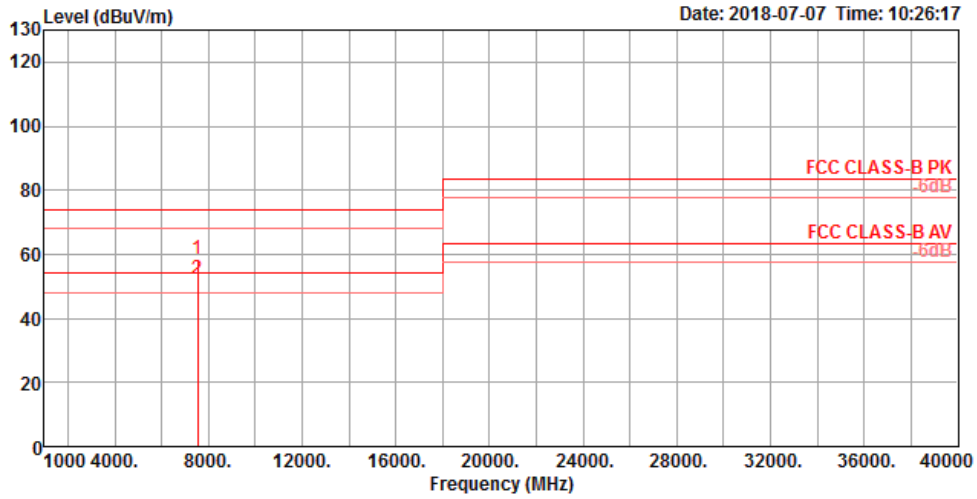
Temp	21°C	Humidity	57%
Test Engineer	Lucas Huang	Test Distance	3 m
Test Range	1 GHz – 40 GHz	Test Freq. (GHz)	60.48

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	7559.92	58.57	74.00	-15.43	46.46	8.85	36.58	33.32	221	163	Peak	VERTICAL
2	7559.98	53.29	54.00	-0.71	41.18	8.85	36.58	33.32	221	163	Average	VERTICAL

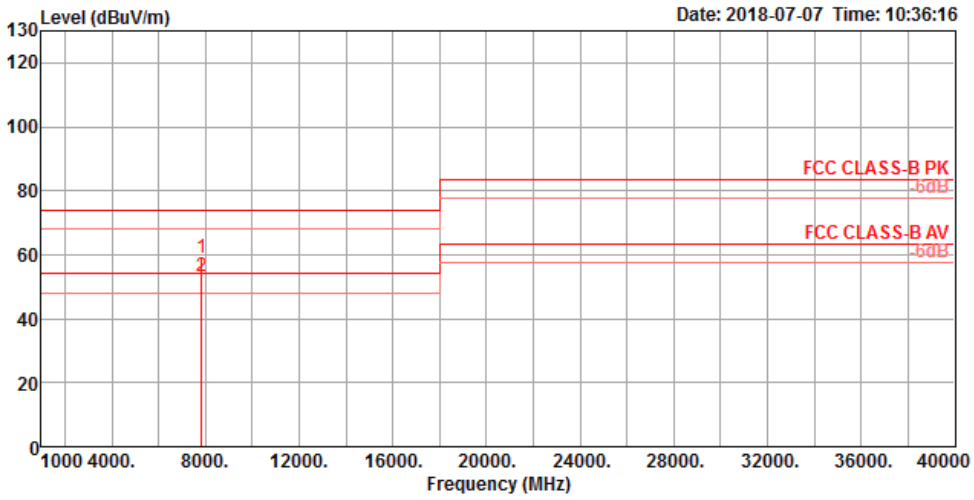
Horizontal



	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	7559.98	58.44	74.00	-15.56	46.33	8.85	36.58	33.32	193	207	Peak	HORIZONTAL
2	7559.99	52.23	54.00	-1.77	40.12	8.85	36.58	33.32	193	207	Average	HORIZONTAL

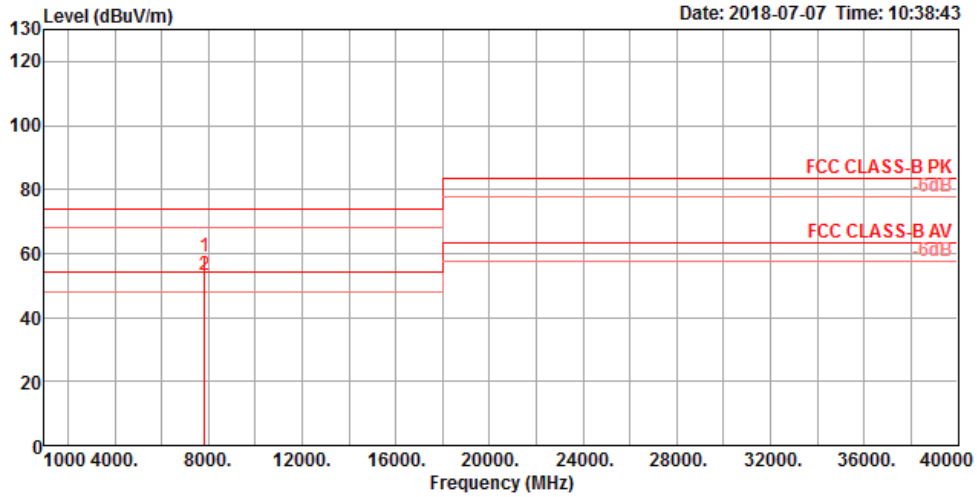
Temp	21°C	Humidity	57%
Test Engineer	Lucas Huang	Test Distance	3 m
Test Range	1 GHz – 40 GHz	Test Freq. (GHz)	62.64

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	7829.98	59.03	74.00	-14.97	46.55	9.09	36.91	33.52	150	212	Peak	VERTICAL
2	7829.99	53.47	54.00	-0.53	40.99	9.09	36.91	33.52	150	212	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	7829.96	59.04	74.00	-14.96	46.56	9.09	36.91	33.52	185	159	Peak	HORIZONTAL
2	7830.00	53.21	54.00	-0.79	40.73	9.09	36.91	33.52	185	159	Average	HORIZONTAL

Temp	21°C	Humidity	57%
Test Engineer	Lucas Huang	Test Date	Jul. 07, 2018~Jul. 10, 2018
Test Range	40GHz – 200GHz		

Test Mode: Mode 1

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
58.32	23	1	41.23	-92.25
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-50.50	3	0.0079	90.00	PASS

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23	1	41.57	-91.90
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-50.08	3	0.0087	90.00	PASS

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23	1	42.54	-91.96
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-49.94	3	0.0090	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

Test Mode: Mode 2

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
58.32	23	1	42.09	-92.14
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-50.21	3	0.0084	90.00	PASS

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
60.48	23	1	41.53	-91.88
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-50.07	3	0.0087	90.00	PASS

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
62.64	23	1	41.19	-92.09
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-50.35	3	0.0082	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(e) 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

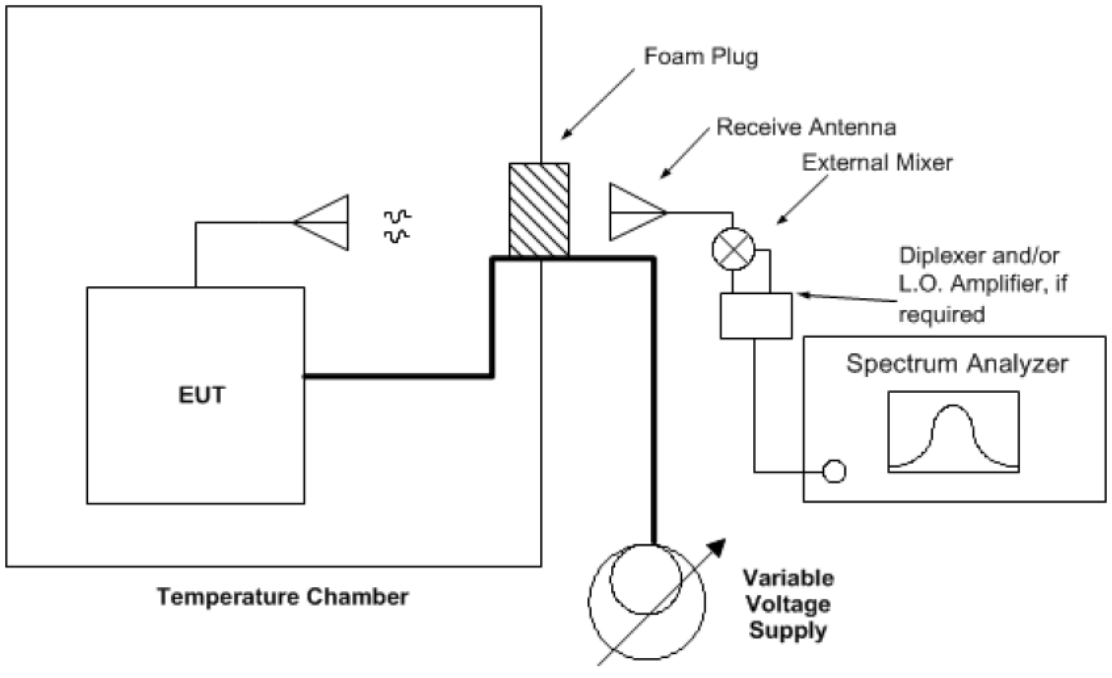
Refer a measuring instruments list in this test report.

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	21℃	**Humidity**	57%
Test Engineer	Lucas Huang	**Test Date**	Jul. 07, 2018~Jul. 10, 2018

Test Mode: Mode 1

Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-10	60480.066	66	within band
0	60480.078	-66	within band
10	60480.134	-10	within band
20	60480.144	Reference	within band
30	60480.156	12	within band
40	60480.178	34	within band
50	60480.199	43	within band
55	60480.199	21	within band
NOTE: The manufacturer's specified temperature range of -10 to 55°C.			

Test Mode: Mode 2

Test Temperature (°C)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
-10	60480.066	66	within band
0	60481.785	123	within band
10	60481.693	31	within band
20	60481.662	Reference	within band
30	60481.668	6	within band
40	60481.624	-38	within band
50	60481.631	-37	within band
55	60481.61	-14	within band
NOTE: The manufacturer's specified temperature range of -10 to 55°C.			

3.6.5.2 Frequency Stability When Varying Supply Voltage

Frequency Stability When Varying Supply Voltage			
Temp	21℃	**Humidity**	57%
Test Engineer	Lucas Huang	**Test Date**	Jul. 07, 2018~Jul. 10, 2018

Test Mode: Mode 1

Test Voltage: (Vdc)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
4.25	60480.145	12	within band
5	60480.133	Reference	within band
5.75	60480.123	-10	within band

Test Mode: Mode 2

Test Voltage: (Vdc)	Measured Frequency (MHz)	Delta Frequency (kHz)	Limit (±kHz)
4.25	60481.663	1	within band
5	60481.662	Reference	within band
5.75	60481.639	-23	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 (g))

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. EUT is a wireless video area network (WVAN) for the connection of consumer electronic (CE) audio and video devices.

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. 24, 2017	Nov. 23, 2018	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 13, 2017	Nov. 12, 2018	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Jan. 17, 2018	Jan. 16, 2019	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Nov. 10, 2017	Nov. 09, 2018	Conduction (CO02-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
Pulse Limiter	Schwarzbeck	VTSD 9561F-N	00378	9kHz ~ 30MHz	Mar. 21, 2018	Mar. 20, 2019	Conduction (CO02-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	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 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. 04, 2018	Jul. 03, 2019	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
Spectrum anal yzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 03, 2018	Oct. 02, 2019	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)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
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	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. 11, 2017	Oct. 10, 2018	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	Oct. 11, 2017	Oct. 10, 2018	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)
RF Cable-high	Woken	High Cable-40G#2	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	Jul. 27, 2018	Jul. 26, 2019	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2018	Mar. 15, 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)
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)
Pico Scope	Pico	Pico Scope 6402C	CX372/002	N/A	Jul. 13, 2018	Jul. 12, 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)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
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)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 01, 2018	May 31, 2019	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)	3.2 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%