FCC RADIO TEST REPORT

FCC ID	:	2AMP5K60C
Equipment	:	60 GHz Outdoor Distribution System
Brand Name	:	Kwikbit
Model Name	:	K60c
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 Oct. 27, 2020, and testing was started from Nov. 17, 2020 and completed on Jan. 28, 2021. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 47 CFR FCC Part 15.255 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. 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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History of this test report

Report No.	Version	Description	Issued Date
FR0O1617	01	Initial issue of report	Feb. 08, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.207	AC Power Conducted Emissions	PASS	-
3.2	15.255(e)	Occupied Bandwidth	PASS	-
3.3	15.255(c)	EIRP Power	PASS	-
3.4	15.255(c)	Peak Conducted Power	PASS	-
3.5	15.255(d)	Transmitter Spurious Emissions	PASS	-
3.6	15.255(f)	Frequency Stability	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: Wendy Pan

1 General Description

1.1 Information

1.1.1 The Channel Plan(s)

Frequency Range	57-71 GHz
The Channel Plan(s)	Channel 1: 58.32 GHz Channel 2: 60.48 GHz Channel 3: 62.64 GHz

1.1.2 Modulation

IEEE 802.11ad Modulation Scheme

MCS Index	Modulation	Code rate	Data rate (Mbit/s)
1	π/2-BPSK	1/2	310
2	π/2-BPSK	1/2	620
3	π/2-BPSK	5/8	775
4	π/2-BPSK	3/4	930
5	π/2-BPSK	13/16	1007
6	π/2-QPSK	1/2	1240
7	π/2-QPSK	5/8	1550
8	π/2-QPSK	3/4	1860

1.1.3 Antenna Information

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

Note: The above information was declared by manufacturer.

1.1.4 Operating Conditions

Operating Conditions					
☐ -20 °C to +50 °C					
☐ 0 °C to +40 °C					
☒ Other: -30 ~ 55					
EUT Power Type	From PoE				
Test Software Version	QCART (Version3.0.298.0)				
Supply Voltage	☒ AC	State AC voltage	110	V	
Supply Voltage	☐ DC	State DC voltage		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 (except outdoor fixed Point to Point)
☐ Outdoor fixed Point to Point

Note: The above information was declared by manufacturer.

1.1.7 Duty Cycle

Duty Cycle	Duty Cycle Factor (dB)
100	0

1.2 Applicable Standards

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

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

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 414788 D01 v01r01

1.3 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, Ln. 724, Bo’ai St., Zhubei City, Hsinchu County 302, Taiwan (R.O.C.)
		TEL :	886-3-656-9065 FAX : 886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
AC Conduction	CO01-CB	Ryo Fan	23~24 / 59~62	Jan. 28, 2021
Radiated< 1GHz	03CH04-CB	Eason Chen	22.1-23.2 / 56-58	Nov. 17, 2020 ~ Jan. 26, 2021
Radiated 1-40GHz	03CH03-CB	Nyle Chang	22.4-24.6 / 45-48	Jan. 16, 2021
Radiated (Other test items)	03CH03-CB	Nyle Chang	22.4-24.6 / 45-48	Dec. 16, 2020
RF Radiated	TH03-CB	Jay Luo	21.2-23.1 / 56-60	Dec. 17, 2020

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 Parameters of Test Software Setting

Channel Plan (GHz)	Setting
58.32	1
60.48	1
62.64	1

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

Note: The EUT can only use Y axis position.

2.3 EUT Operation during Test

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

2.4 Accessories

Accessories			
Equipment Name	**Brand Name**	**Model Name**	**Rating**
PoE	RISUNIC	RP019-4800250USG	Input: 100-240V ~ 50/60Hz, 0.5A Max Output: 48V, 0.25A

2.5 Support Equipment

For AC Conduction:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	LAN NB	DELL	E6430	N/A
B	Device NB	DELL	E6430	N/A
C	Device	Kwikbit	K60c+	2AMP5K60C2

For Radiated below 1GHz:

Support Equipment				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
A	Notebook	DELL	E4300	N/A
B	Notebook	DELL	E4300	N/A
C	Device	Kwikbit	K60c+	2AMP5K60C2

For Radiated above 1GHz and Frequency Stability:

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

2.6 Far Field Boundary Calculations

The far-field boundary is given as:

far field = (2 * L^2) /**λ**

where:

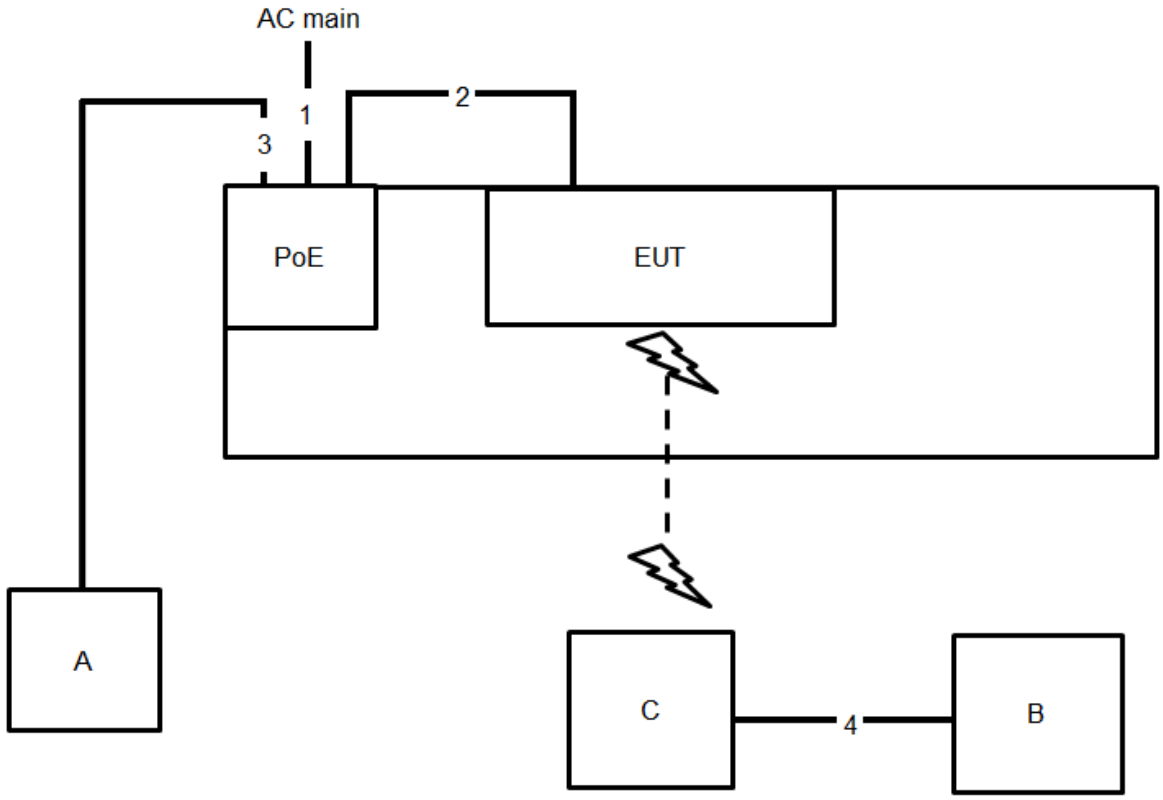
L = Largest Antenna Dimension, including the reflector, in meters

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

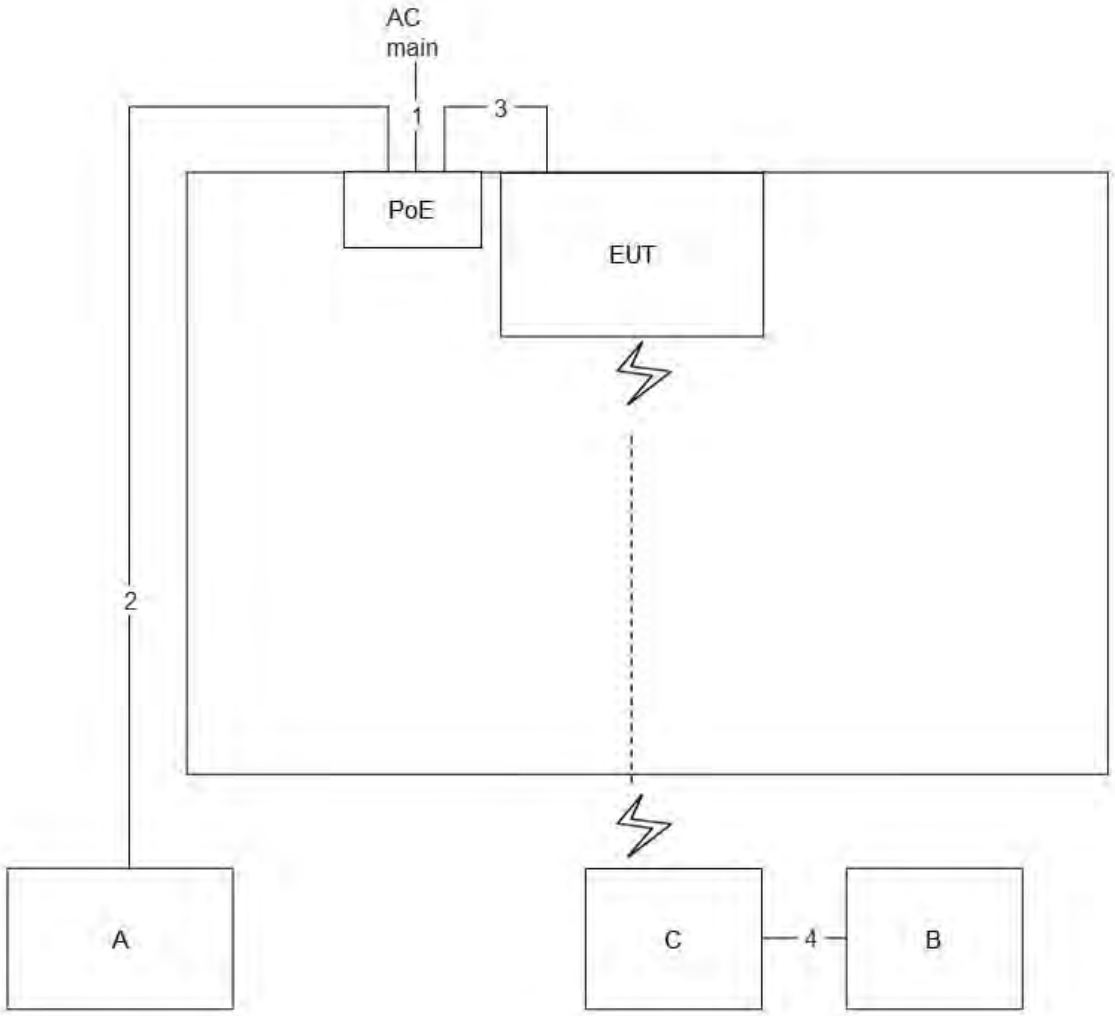
2.7 Test Setup Diagram

Test Setup Diagram - AC Power Conducted Emissions



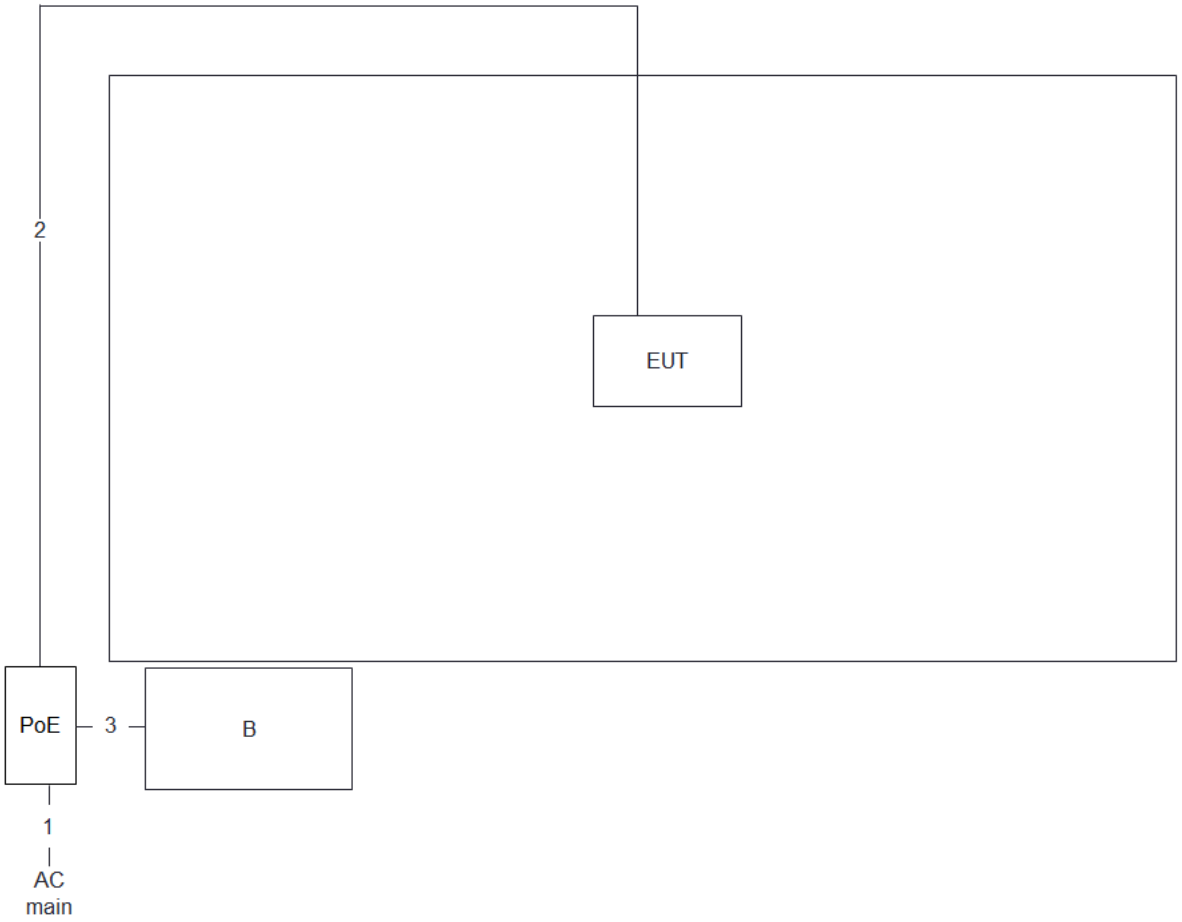
Item	Connection	Shielded	Length
1	Power cable	No	0.8m
2	RJ-45 cable	No	1.5m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	1.5m

Test Setup Diagram - Transmitter Spurious Emissions below 1 GHz



Item	Connection	Shielded	Length
1	Power cable	No	1.8m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m
4	RJ-45 cable	No	1.5m

Test Setup Diagram - Transmitter Spurious Emissions above 1 GHz



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m

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

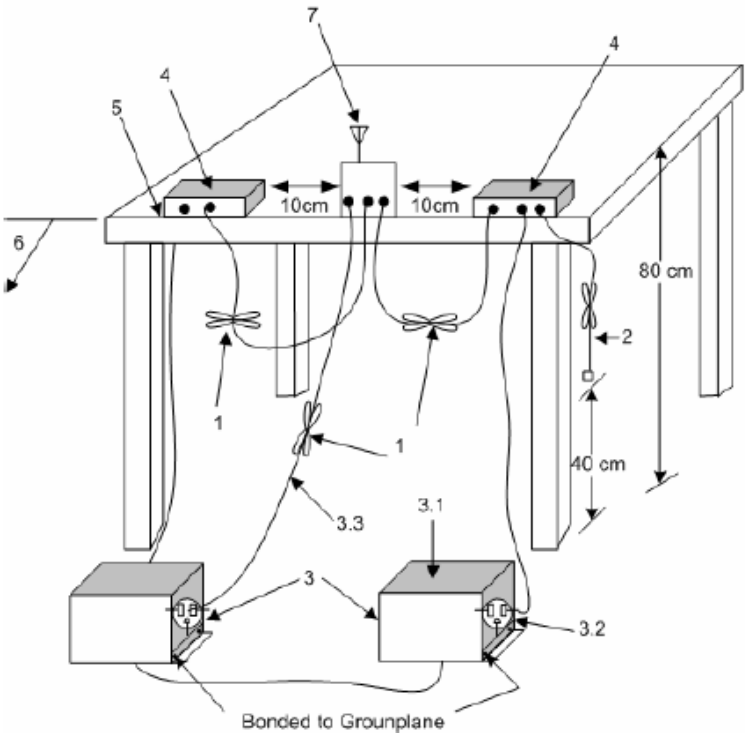
Refer a measuring instruments list in this test report.

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 Measurement Results Calculation

The measured Level is calculated using:

a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level

b. Margin = -Limit + Level

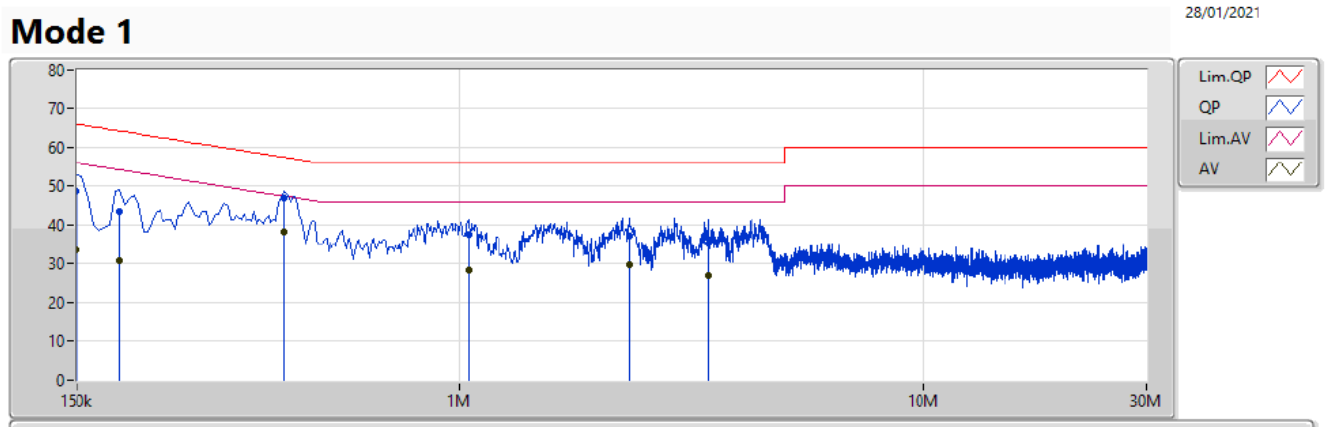
3.1.6 Test Result of AC Power Conducted Emissions

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.

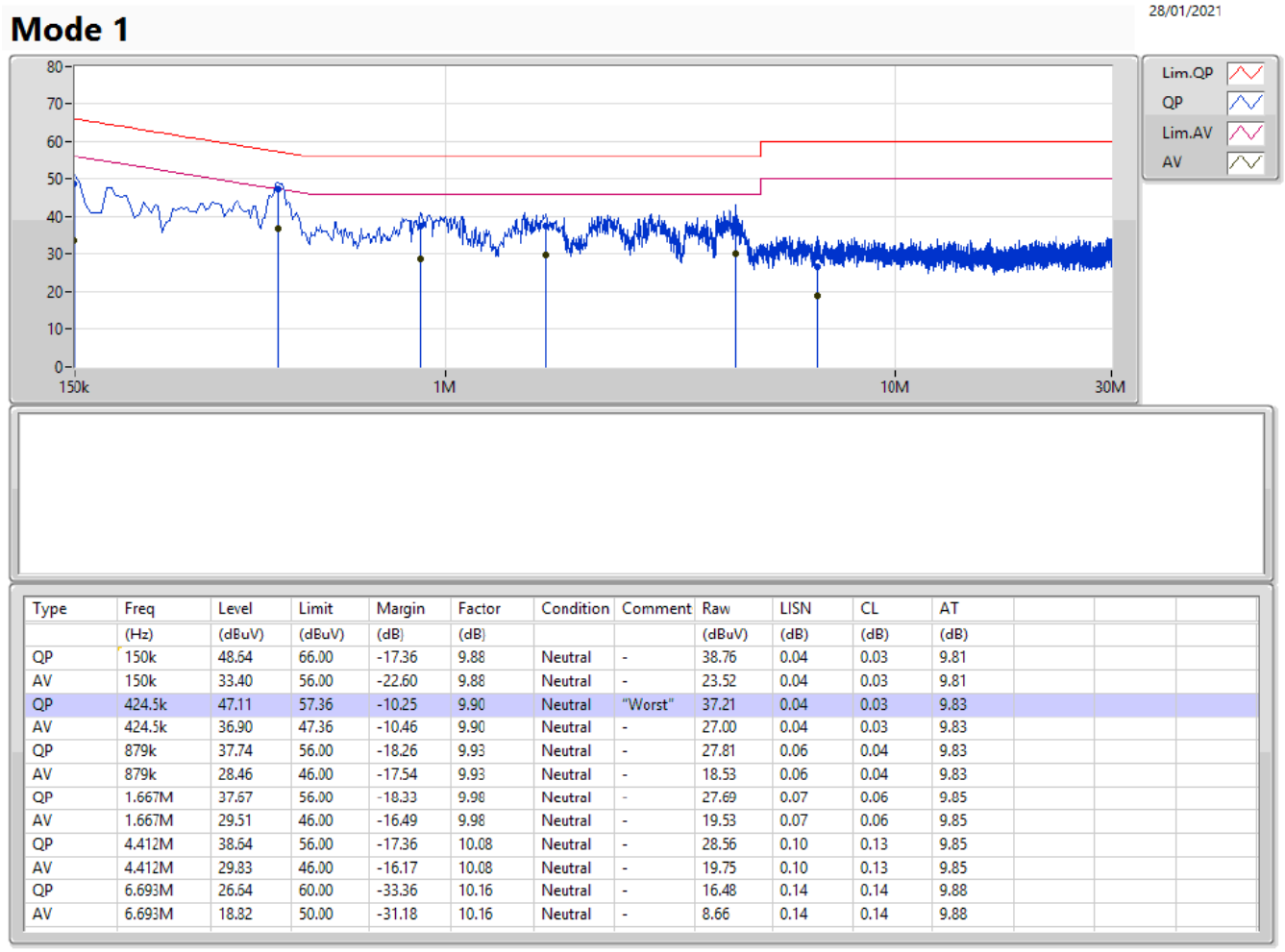
NOTE 2: “>20dB” means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit, see ANSI C63.4, clause 10.1.8.1.

Phase	Line	Configuration	Normal Link



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	48.56	66.00	-17.44	9.89	Line	-	38.67	0.05	0.03	9.81
AV	150k	33.39	56.00	-22.61	9.89	Line	-	23.50	0.05	0.03	9.81
QP	186k	43.42	64.20	-20.78	9.89	Line	-	33.53	0.04	0.03	9.82
AV	186k	30.59	54.20	-23.61	9.89	Line	-	20.70	0.04	0.03	9.82
QP	420k	46.96	57.45	-10.49	9.90	Line	-	37.06	0.04	0.03	9.83
AV	420k	38.25	47.45	-9.20	9.90	Line	"Worst"	28.35	0.04	0.03	9.83
QP	1.046M	37.65	56.00	-18.35	9.92	Line	-	27.73	0.05	0.04	9.83
AV	1.046M	28.33	46.00	-17.67	9.92	Line	-	18.41	0.05	0.04	9.83
QP	2.319M	37.38	56.00	-18.62	10.01	Line	-	27.37	0.07	0.08	9.86
AV	2.319M	29.73	46.00	-16.27	10.01	Line	-	19.72	0.07	0.08	9.86
QP	3.426M	35.08	56.00	-20.92	10.04	Line	-	25.04	0.08	0.12	9.84
AV	3.426M	26.77	46.00	-19.23	10.04	Line	-	16.73	0.08	0.12	9.84

Phase	Neutral	Configuration	Normal Link



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	150k	48.64	66.00	-17.36	9.88	Neutral	-	38.76	0.04	0.03	9.81
AV	150k	33.40	56.00	-22.60	9.88	Neutral	-	23.52	0.04	0.03	9.81
QP	424.5k	47.11	57.36	-10.25	9.90	Neutral	"Worst"	37.21	0.04	0.03	9.83
AV	424.5k	36.90	47.36	-10.46	9.90	Neutral	-	27.00	0.04	0.03	9.83
QP	879k	37.74	56.00	-18.26	9.93	Neutral	-	27.81	0.06	0.04	9.83
AV	879k	28.46	46.00	-17.54	9.93	Neutral	-	18.53	0.06	0.04	9.83
QP	1.667M	37.67	56.00	-18.33	9.98	Neutral	-	27.69	0.07	0.06	9.85
AV	1.667M	29.51	46.00	-16.49	9.98	Neutral	-	19.53	0.07	0.06	9.85
QP	4.412M	38.64	56.00	-17.36	10.08	Neutral	-	28.56	0.10	0.13	9.85
AV	4.412M	29.83	46.00	-16.17	10.08	Neutral	-	19.75	0.10	0.13	9.85
QP	6.693M	26.54	60.00	-33.36	10.16	Neutral	-	16.48	0.14	0.14	9.88
AV	6.693M	18.82	50.00	-31.18	10.16	Neutral	-	8.66	0.14	0.14	9.88

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

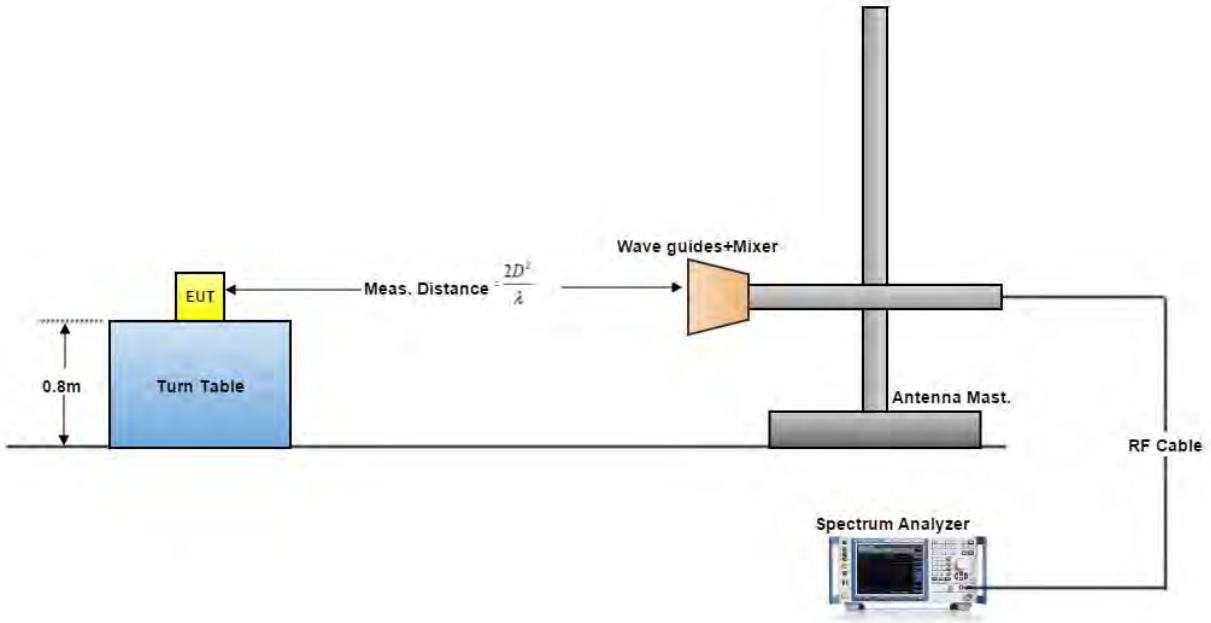
Refer a measuring instruments list in this test report.

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



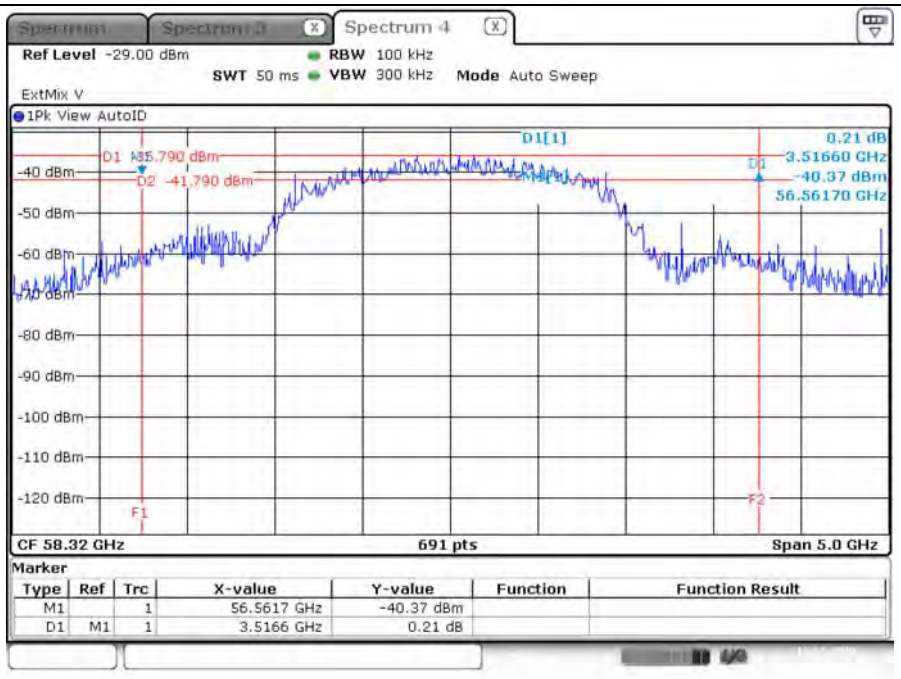
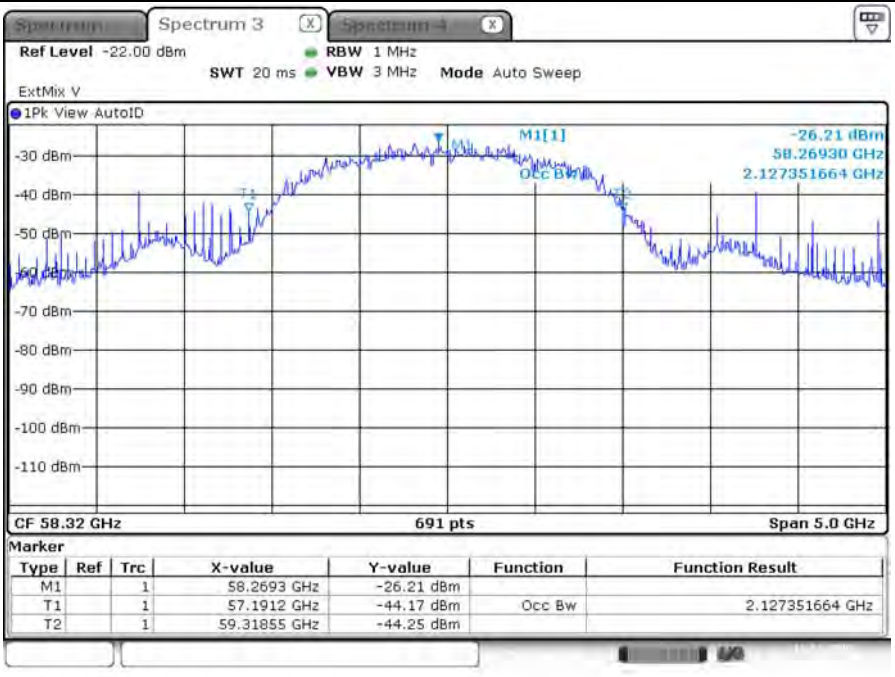
3.2.5 Test Result of Occupied Bandwidth

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.

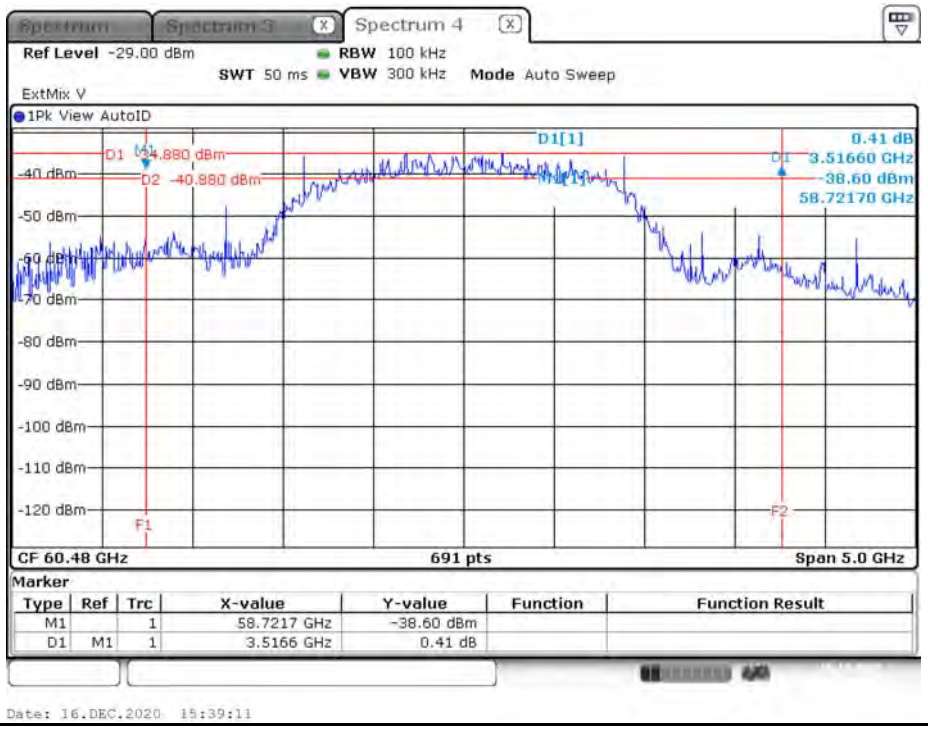
Test Results			
Test Freq. (GHz)	**6 dBc Bandwidth (MHz)**	**99% Occupied Bandwidth (MHz)**	**Limit (MHz)**
58.32	3516.6	2127.35	N/A
60.48	3516.6	2481.91	N/A
62.64	2641.10	3147.61	N/A

3.2.5.1 Bandwidth Plots

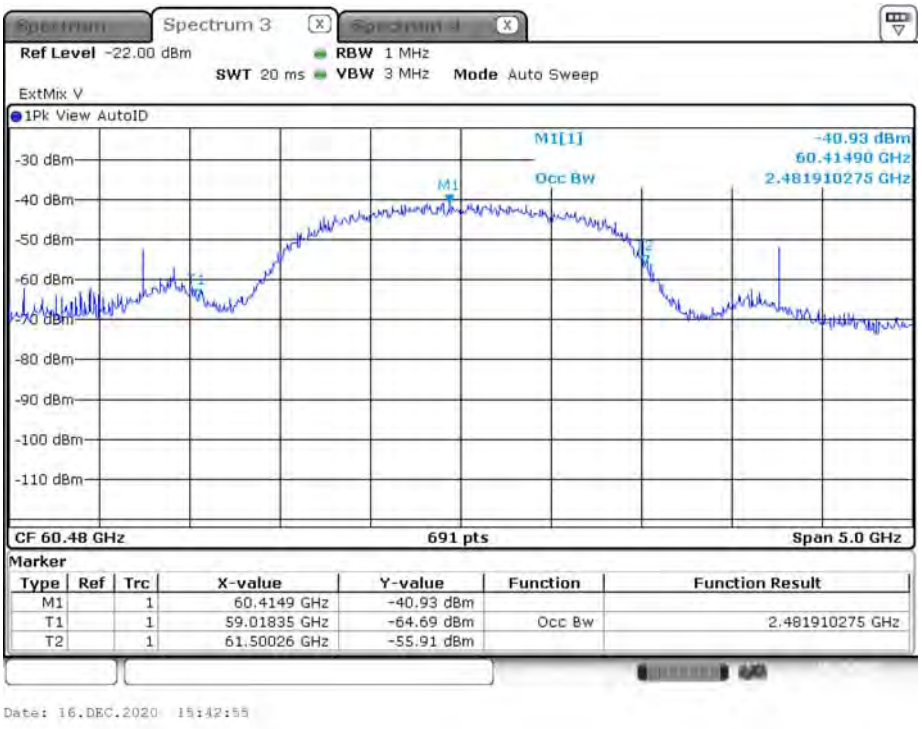
Test Frequency: 58.32 GHz
6 dBc Bandwidth

Occupied Bandwidth&26 dBc Bandwidth


Test Frequency: 60.48 GHz

6 dBc Bandwidth

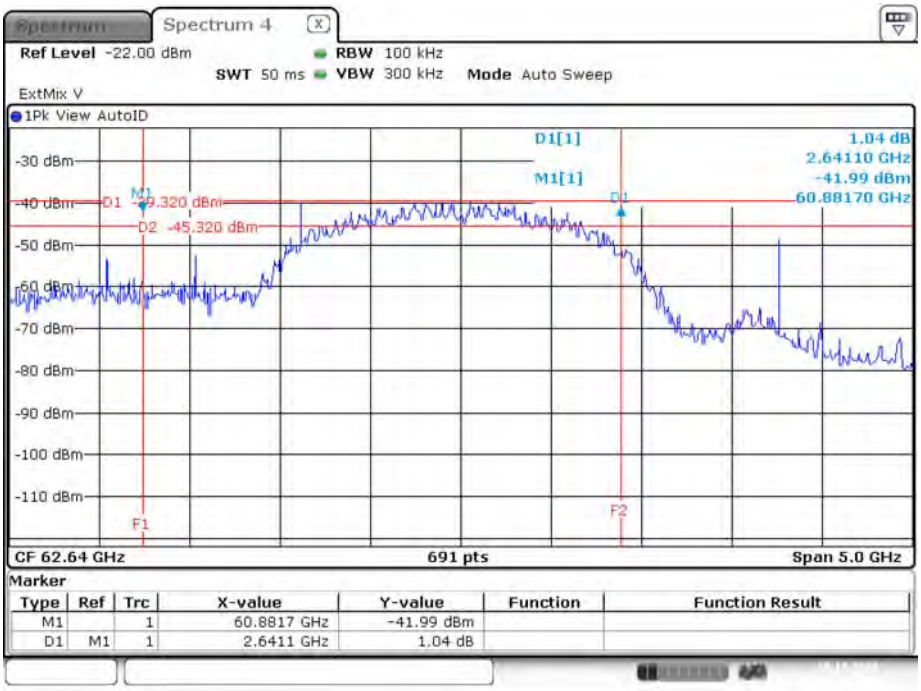


Occupied Bandwidth&26 dBc Bandwidth

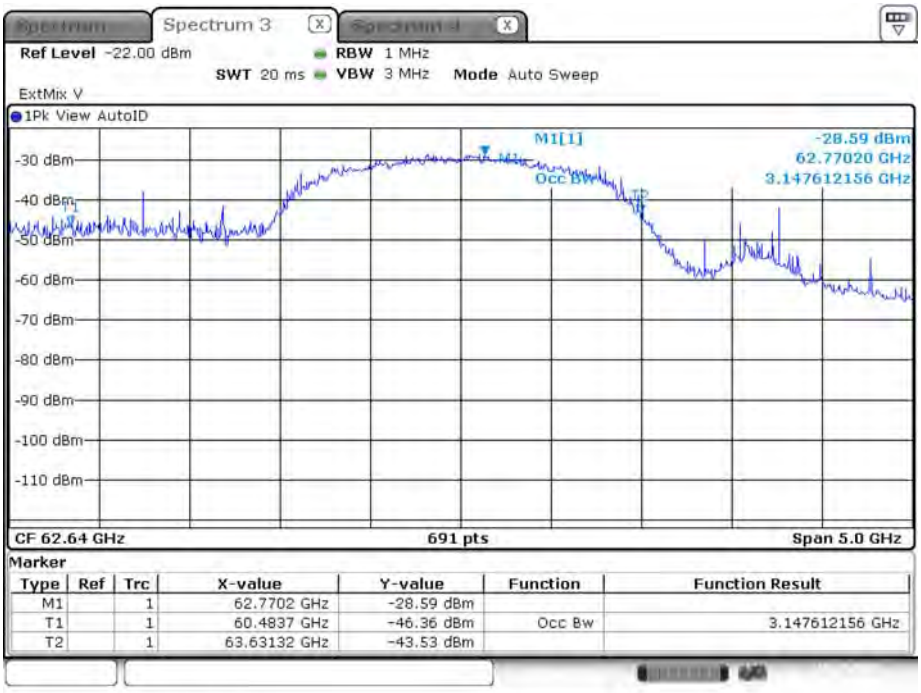


Test Frequency: 62.64 GHz

6 dBc Bandwidth



Occupied Bandwidth



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 15.255 (c)

3.3.2 Measuring Instruments

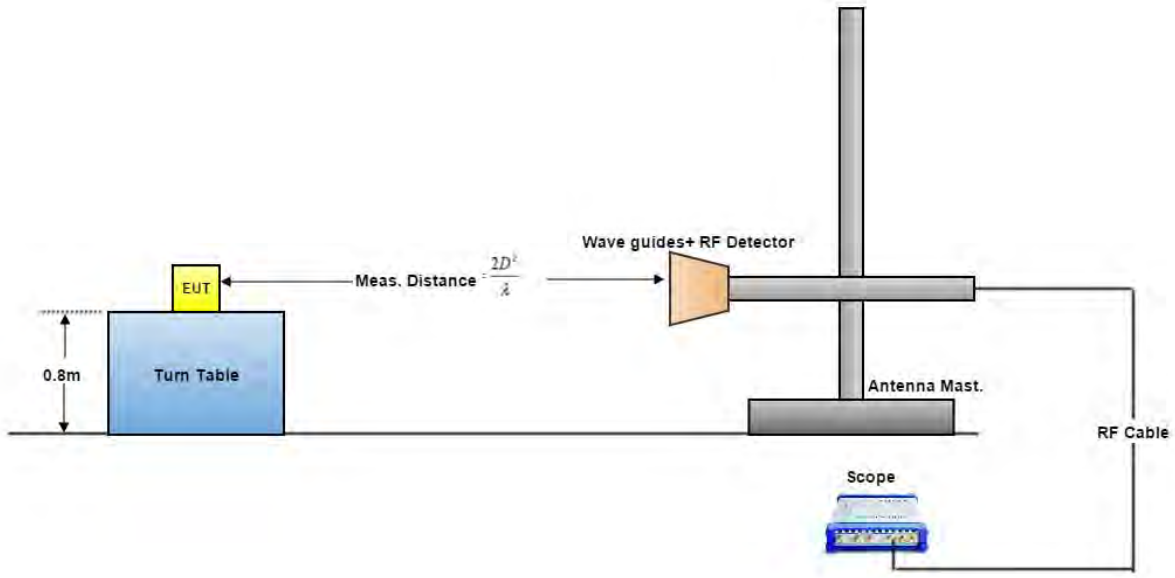
Refer a measuring instruments list in this test report.

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

Test Distance		0.5 m									
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	40.28	38.52	-2.98	-3.24	145.99	145.73	35.17	34.91	43	40
60.48	23.6	34.52	30.38	-3.84	-4.48	145.45	144.81	34.63	33.99	43	40
62.64	23.6	24.55	21.07	-5.55	-6.31	144.04	143.28	33.22	32.46	43	40

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

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

E = 126.8 – 20log(λ) + P – G

where:

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

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

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

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

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

where:

EIRP : is the equivalent isotopically radiated power, in dBm

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

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

NOTE 1: For the applicable limit, see 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			
Use Condition	**6dBc Bandwidth**	**Occupied Bandwidth**	**Peak Conducted Power (note 1)**
Fixed field disturbance sensors at within the frequency band 61-61.5GHz	> 100MHz	≤500MHz	500mW
	≤ 100MHz		500mW x (BW/100) (see note 2)
Fixed field disturbance sensors at outside of the band 61-61.5GHz and within 57 -71 GHz	> 100MHz	N/A	500mW
	≤ 100MHz		500mW x (BW/100) (see note 2)
Except fixed field disturbance sensors at 61-61.5GHz	N/A	> 500MHz	-10 dBm
Except outdoor fixed Point to Point,	> 100MHz	-	500mW
Outdoor fixed Point to Point	≤ 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

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	35.17	21.9	13.27	21.249	3516.60	500.00
60.48	34.63	21.9	12.73	18.747	3516.60	500.00
62.64	33.22	21.9	11.32	13.564	2641.10	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

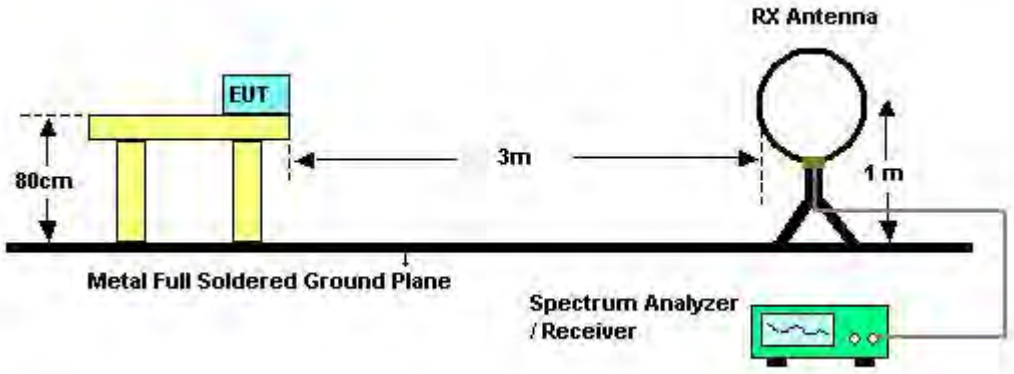
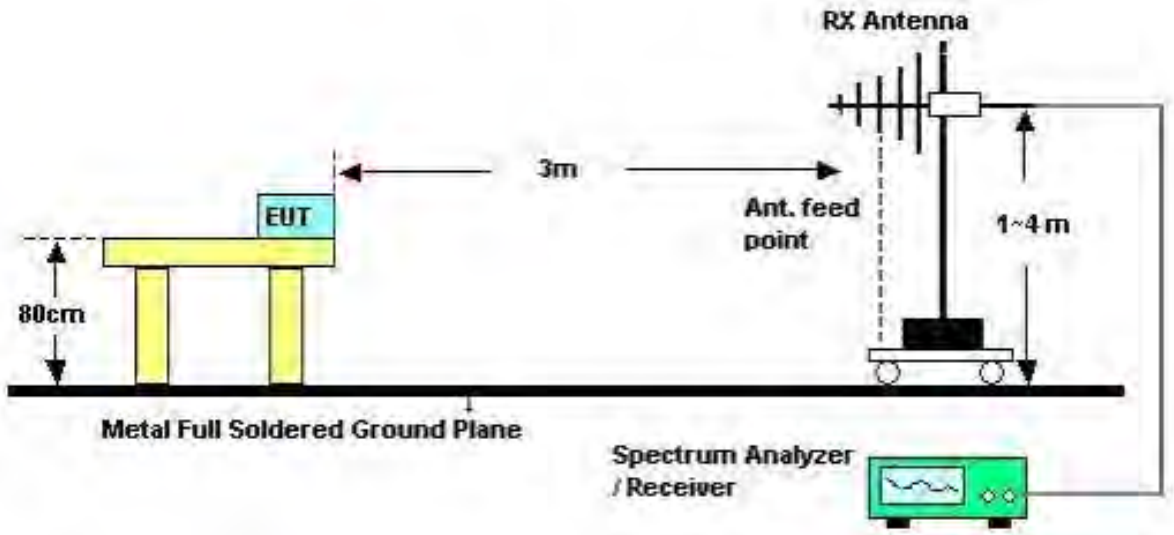
3.5.1 Limit of Transmitter Spurious Emissions

Frequency Range	Limit
Radiated emissions below 40 GHz	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 15.255(d)	
NOTE 2: Spurious emissions shall not exceed the level of the fundamental emission.	

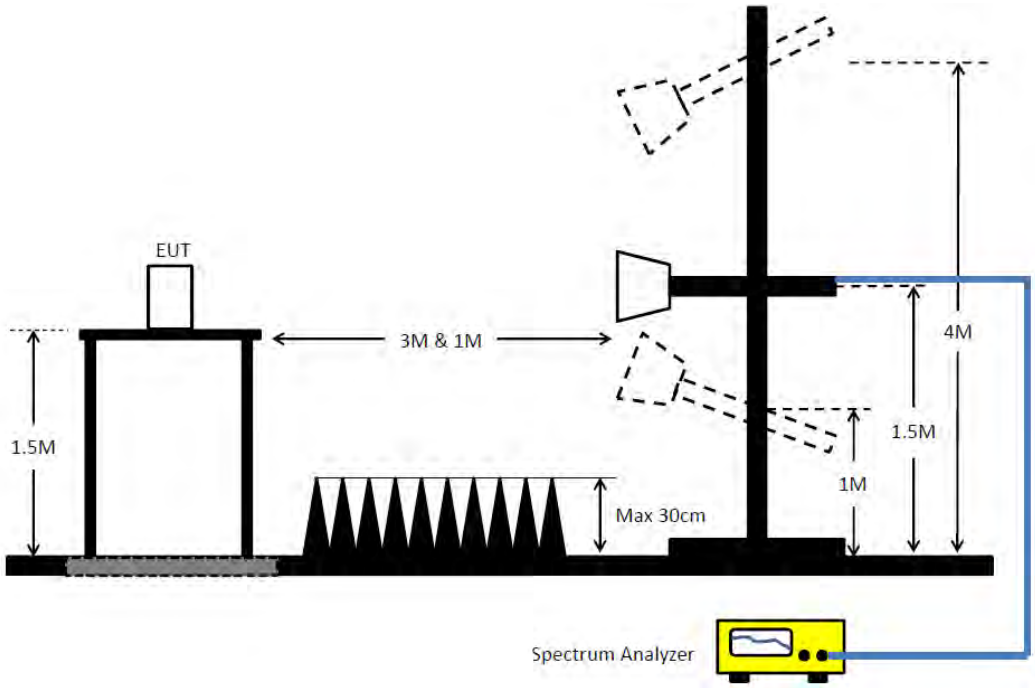
3.5.2 Test Procedures

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

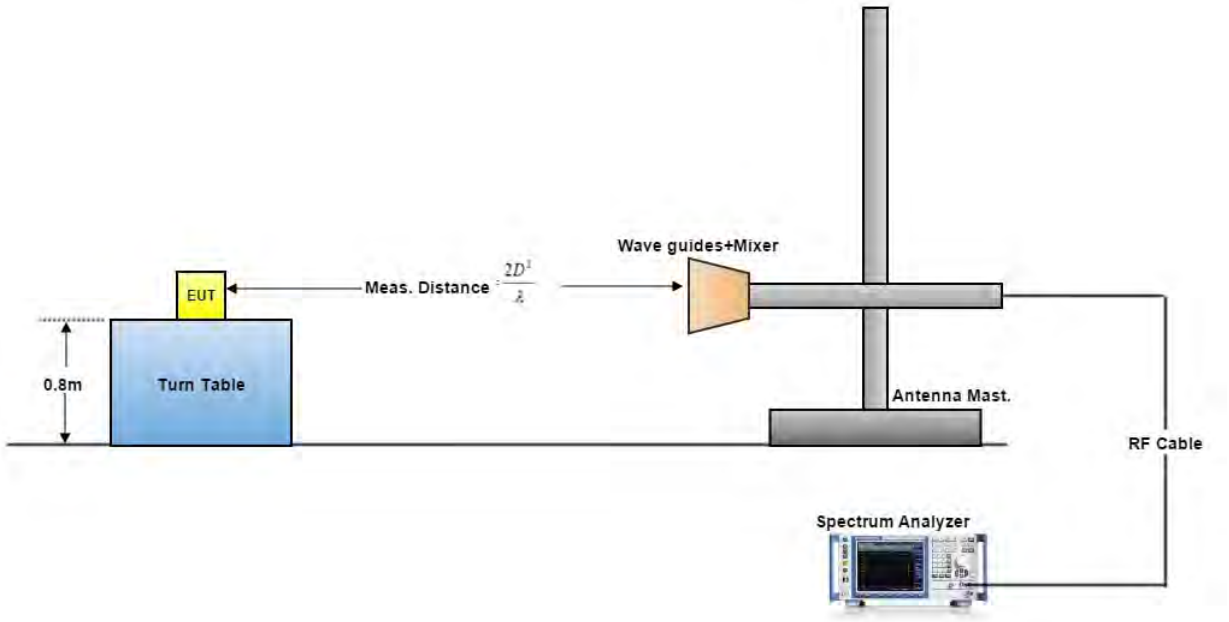
3.5.3 Test Setup

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 Measurement Results Calculation

The measured Level is calculated using:

For below 40GHz

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

For above 40GHz

EIRP = Meas. Level - RX Antenna Gain + 20*log(4*Pi(3.14159)*D/(300/(Frequency*1000)))

3.5.5 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.	

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

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

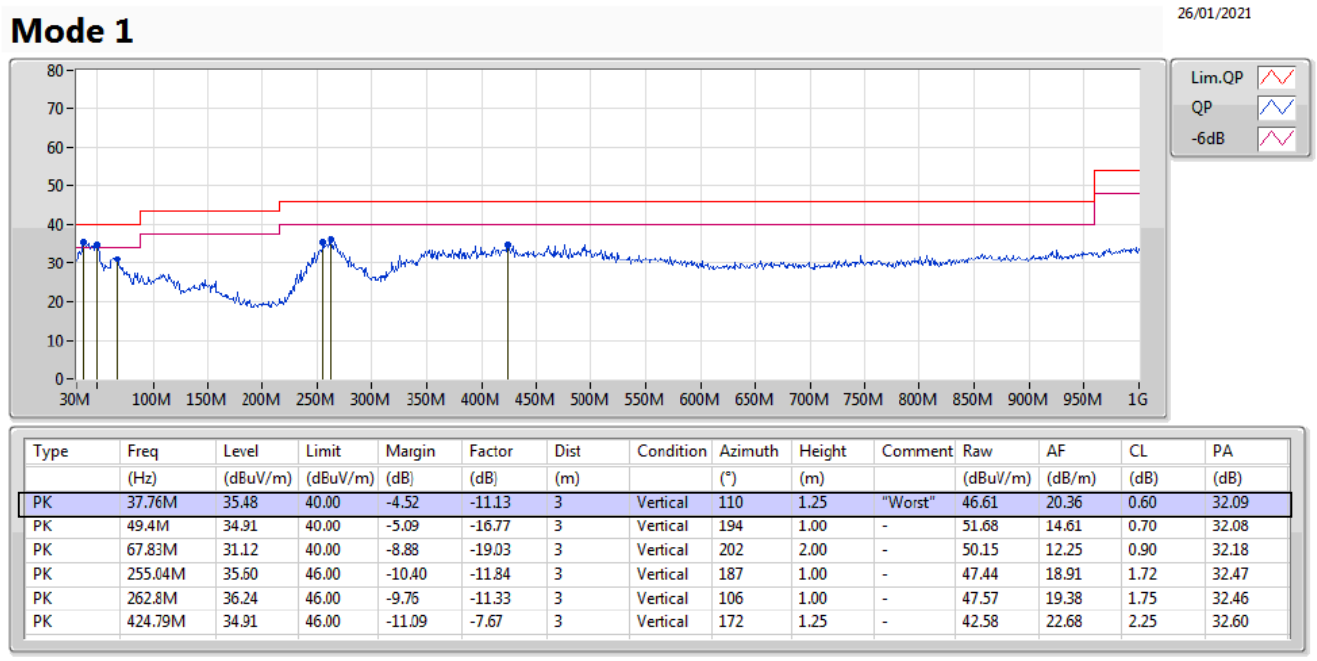
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

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

3.5.5.2 Test Result of Transmitter Spurious Emissions

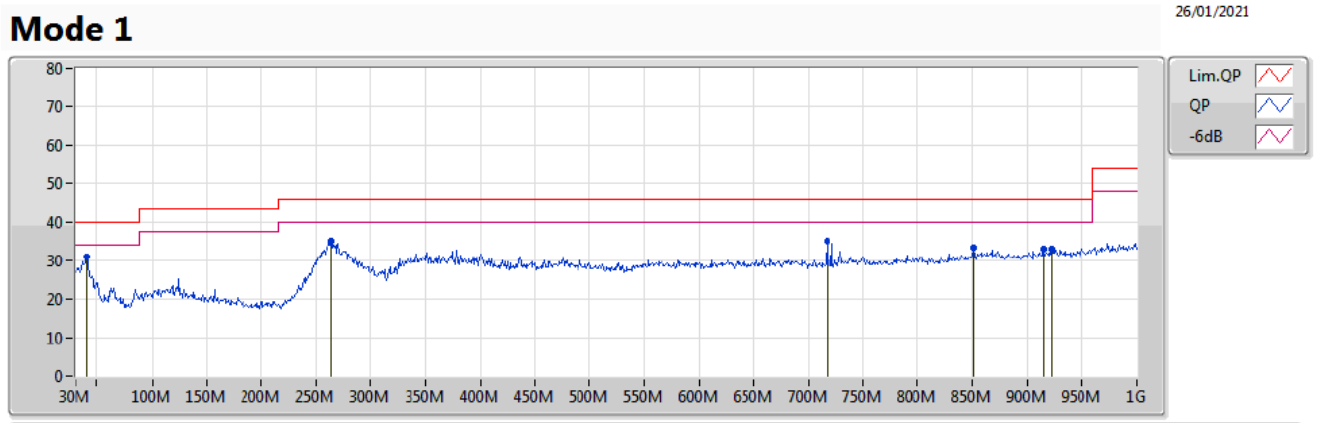
Test Range	30 MHz – 1000 MHz	Test Distance	3 m
Test Configuration	Normal Link		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
PK	37.76M	35.48	40.00	-4.52	-11.13	3	Vertical	110	1.25	"Worst"	46.61	20.36	0.60	32.09
PK	49.4M	34.91	40.00	-5.09	-16.77	3	Vertical	194	1.00	-	51.68	14.61	0.70	32.08
PK	67.83M	31.12	40.00	-8.88	-19.03	3	Vertical	202	2.00	-	50.15	12.25	0.90	32.18
PK	255.04M	35.60	46.00	-10.40	-11.84	3	Vertical	187	1.00	-	47.44	18.91	1.72	32.47
PK	262.8M	36.24	46.00	-9.76	-11.33	3	Vertical	106	1.00	-	47.57	19.38	1.75	32.46
PK	424.79M	34.91	46.00	-11.09	-7.67	3	Vertical	172	1.25	-	42.58	22.68	2.25	32.60

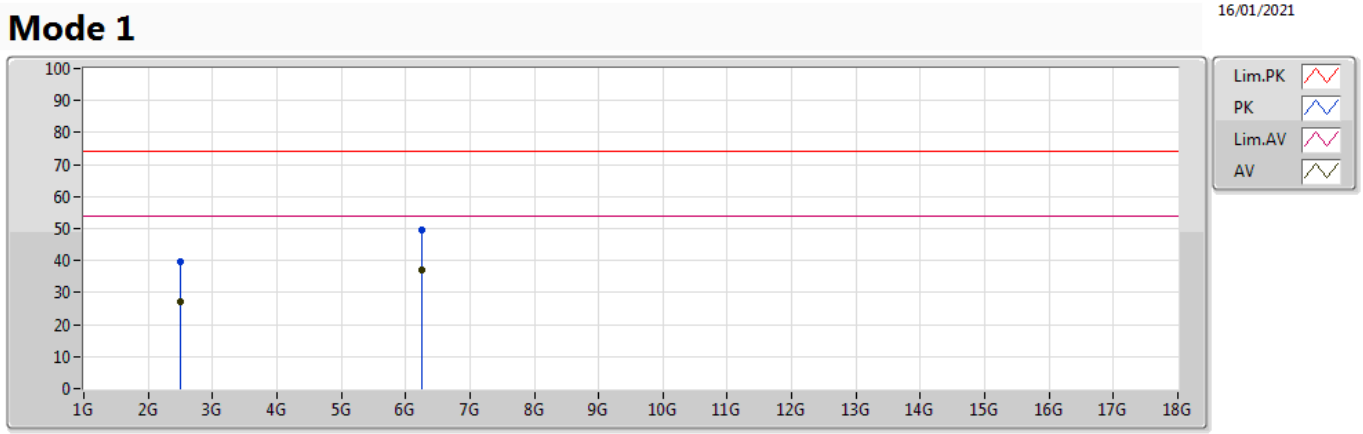
Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV/m)	(dB/m)	(dB)	(dB)
PK	40.67M	31.18	40.00	-8.82	-12.71	3	Horizontal	257	1.50	"Worst"	43.89	18.74	0.61	32.06
PK	264.74M	35.22	46.00	-10.78	-11.45	3	Horizontal	89	1.00	-	46.67	19.25	1.76	32.46
PK	716.76M	35.08	46.00	-10.92	-5.62	3	Horizontal	0	1.00	-	40.70	24.93	2.93	33.48
PK	850.62M	33.56	46.00	-12.44	-3.60	3	Horizontal	179	3.00	-	37.16	26.07	3.20	32.87
PK	914.64M	33.18	46.00	-12.82	-3.05	3	Horizontal	17	1.50	-	36.23	26.16	3.36	32.57
PK	922.4M	33.18	46.00	-12.82	-2.67	3	Horizontal	304	1.00	-	35.85	26.41	3.39	32.47

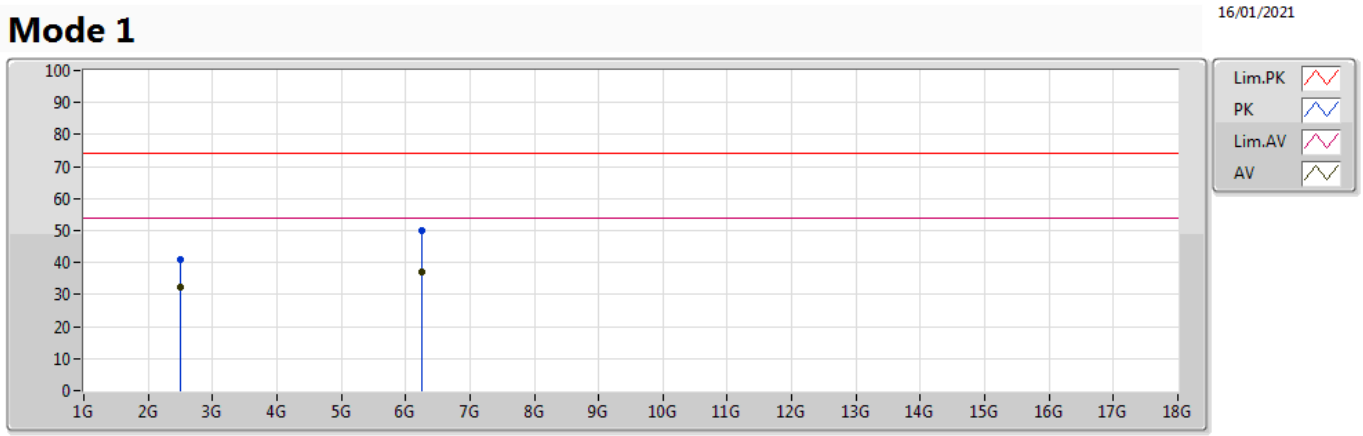
Test Range	1 GHz – 18 GHz	Test Distance	3 m
Test Freq. (GHz)	58.32		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.49764G	39.66	74.00	-34.34	-1.53	3	Vertical	47	1.69	-	41.19	28.49	4.75	34.77
AV	2.49509G	27.12	54.00	-26.88	-1.56	3	Vertical	47	1.69	-	28.68	28.47	4.74	34.77
PK	6.25728G	49.65	74.00	-24.35	6.93	3	Vertical	190	2.46	-	42.72	34.71	7.16	34.94
AV	6.2538G	36.95	54.00	-17.05	6.92	3	Vertical	190	2.46	-	30.03	34.71	7.15	34.94

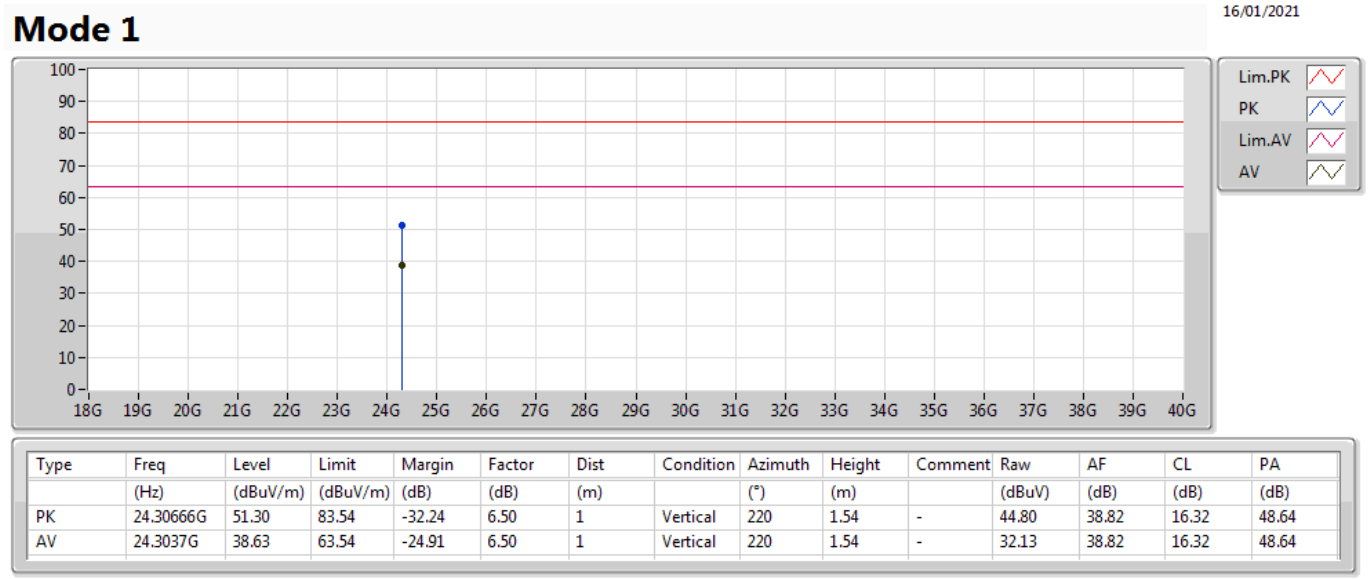
Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.50054G	40.86	74.00	-33.14	-1.52	3	Horizontal	197	2.11	-	42.38	28.50	4.75	34.77
AV	2.50046G	32.28	54.00	-21.72	-1.52	3	Horizontal	197	2.11	-	33.80	28.50	4.75	34.77
PK	6.25568G	49.82	74.00	-24.18	6.93	3	Horizontal	283	2.67	-	42.89	34.71	7.16	34.94
AV	6.25626G	36.97	54.00	-17.03	6.93	3	Horizontal	283	2.67	-	30.04	34.71	7.16	34.94

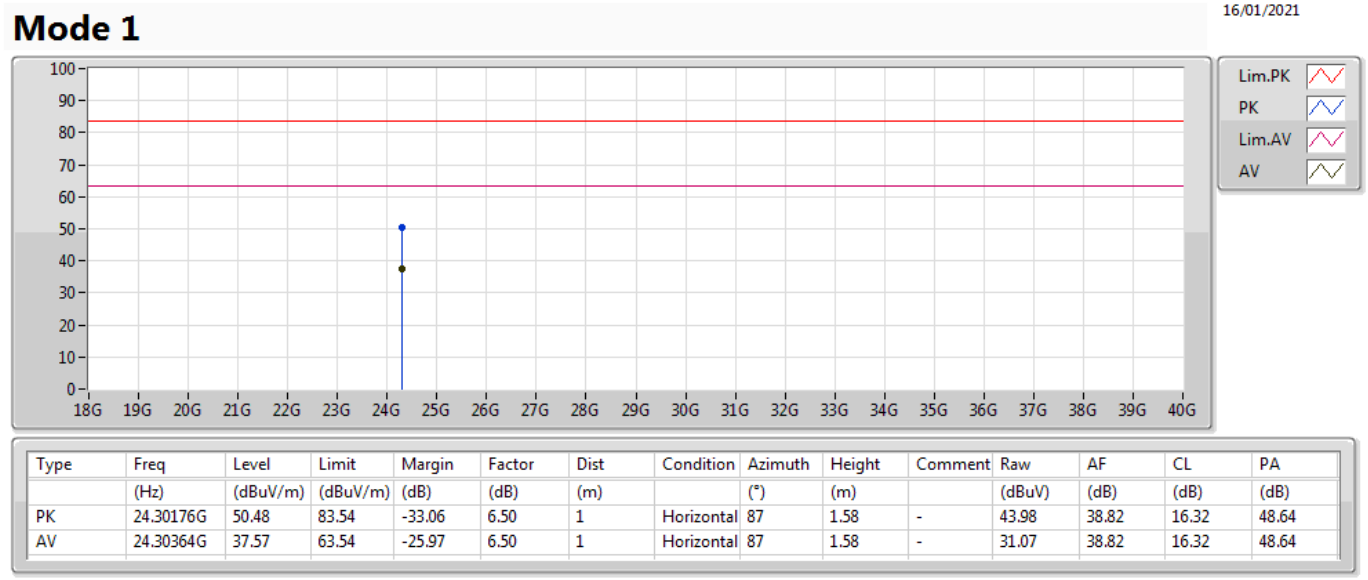
Test Range	18 GHz – 40 GHz	Test Distance	1 m
Test Freq. (GHz)	58.32		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	24.30666G	51.30	83.54	-32.24	6.50	1	Vertical	220	1.54	-	44.80	38.82	16.32	48.64
AV	24.3037G	38.63	63.54	-24.91	6.50	1	Vertical	220	1.54	-	32.13	38.82	16.32	48.64

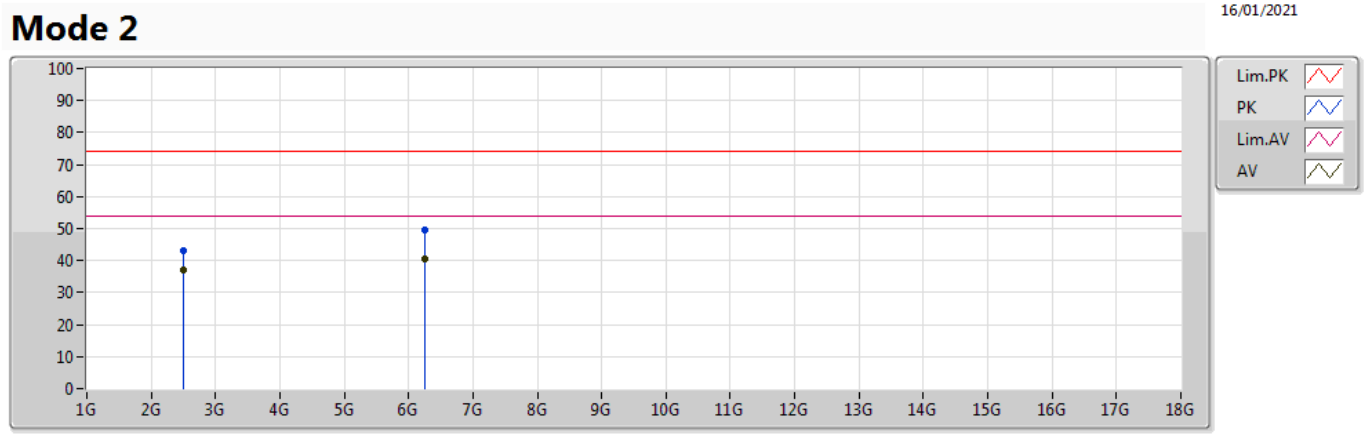
Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	24.30176G	50.48	83.54	-33.06	6.50	1	Horizontal	87	1.58	-	43.98	38.82	16.32	48.64
AV	24.30364G	37.57	63.54	-25.97	6.50	1	Horizontal	87	1.58	-	31.07	38.82	16.32	48.64

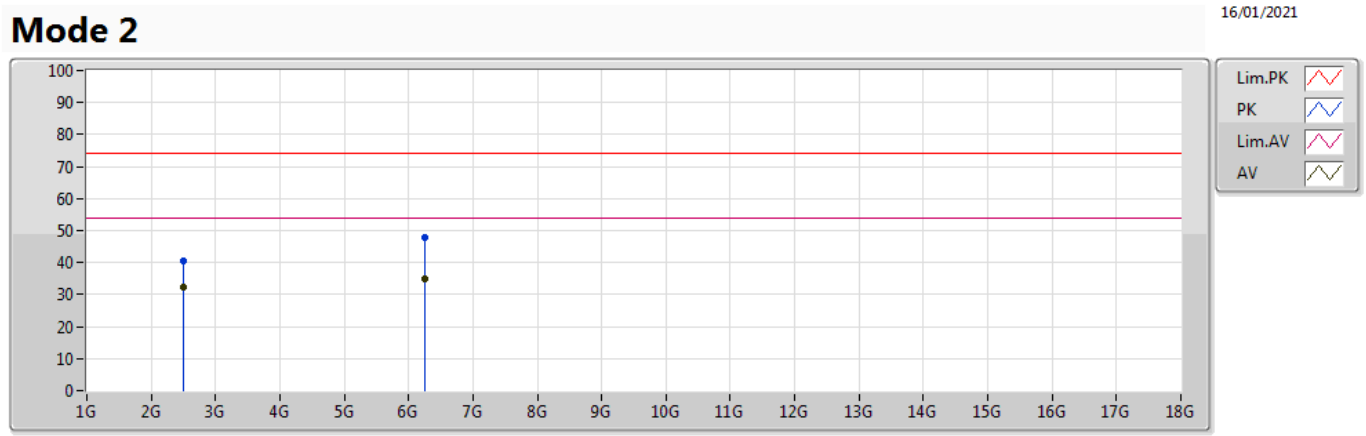
Test Range	1 GHz – 18 GHz	Test Distance	3 m
Test Freq. (GHz)	60.48		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.50058G	43.29	74.00	-30.71	-1.52	3	Vertical	152	1.07	-	44.81	28.50	4.75	34.77
AV	2.50046G	37.01	54.00	-16.99	-1.52	3	Vertical	152	1.07	-	38.53	28.50	4.75	34.77
PK	6.25116G	49.70	74.00	-24.30	6.91	3	Vertical	353	2.93	-	42.79	34.70	7.15	34.94
AV	6.25105G	40.43	54.00	-13.57	6.91	3	Vertical	353	2.93	-	33.52	34.70	7.15	34.94

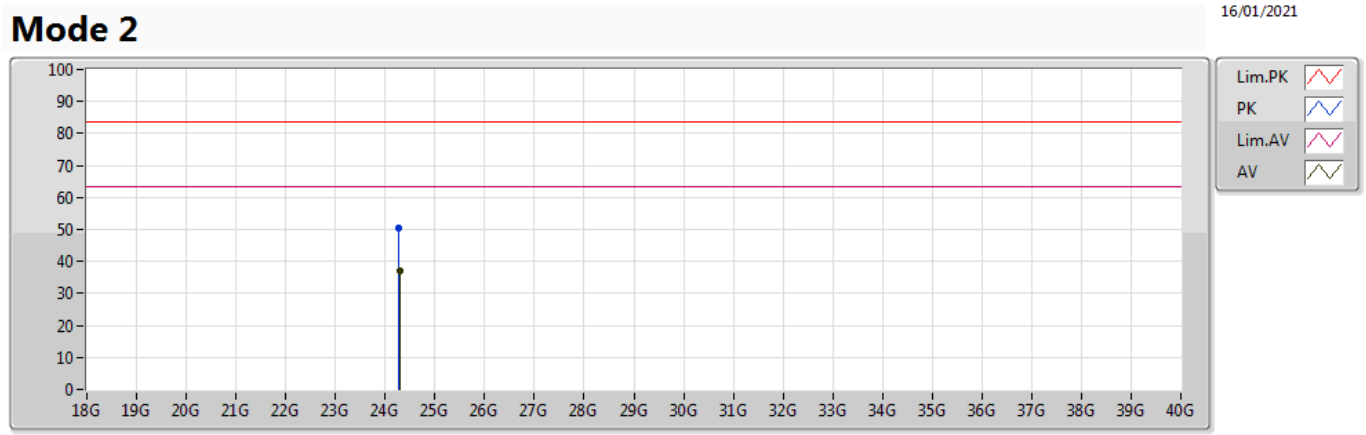
Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.50048G	40.37	74.00	-33.63	-1.52	3	Horizontal	196	2.12	-	41.89	28.50	4.75	34.77
AV	2.5005G	32.25	54.00	-21.75	-1.52	3	Horizontal	196	2.12	-	33.77	28.50	4.75	34.77
PK	6.24356G	47.97	74.00	-26.03	6.95	3	Horizontal	226	2.28	-	41.02	34.74	7.14	34.93
AV	6.25138G	35.10	54.00	-18.90	6.91	3	Horizontal	226	2.28	-	28.19	34.70	7.15	34.94

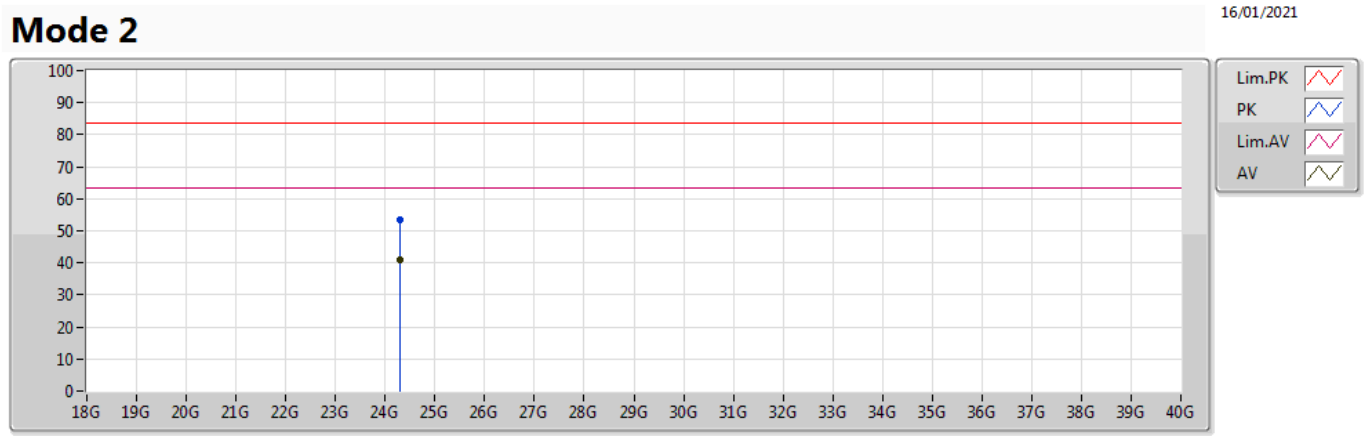
Test Range	18 GHz – 40 GHz	Test Distance	1 m
Test Freq. (GHz)	60.48		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	24.27735G	50.45	83.54	-33.09	6.50	1	Vertical	38	1.57	-	43.95	38.83	16.31	48.64
AV	24.30375G	36.86	63.54	-26.68	6.50	1	Vertical	38	1.57	-	30.36	38.82	16.32	48.64

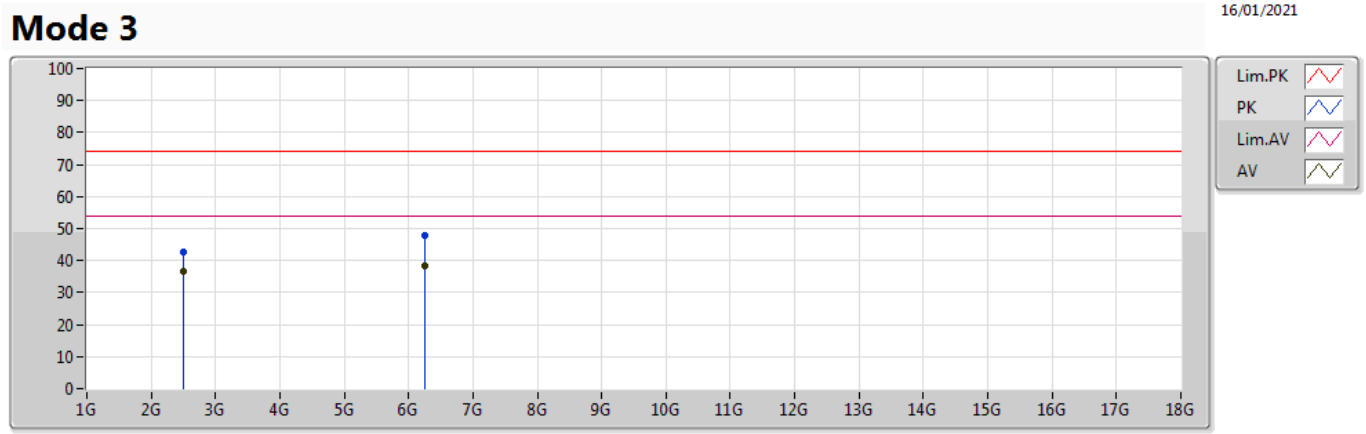
Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	24.30196G	53.37	83.54	-30.17	6.50	1	Horizontal	326	1.55	-	46.87	38.82	16.32	48.64
AV	24.29952G	41.01	63.54	-22.53	6.49	1	Horizontal	326	1.55	-	34.52	38.82	16.31	48.64

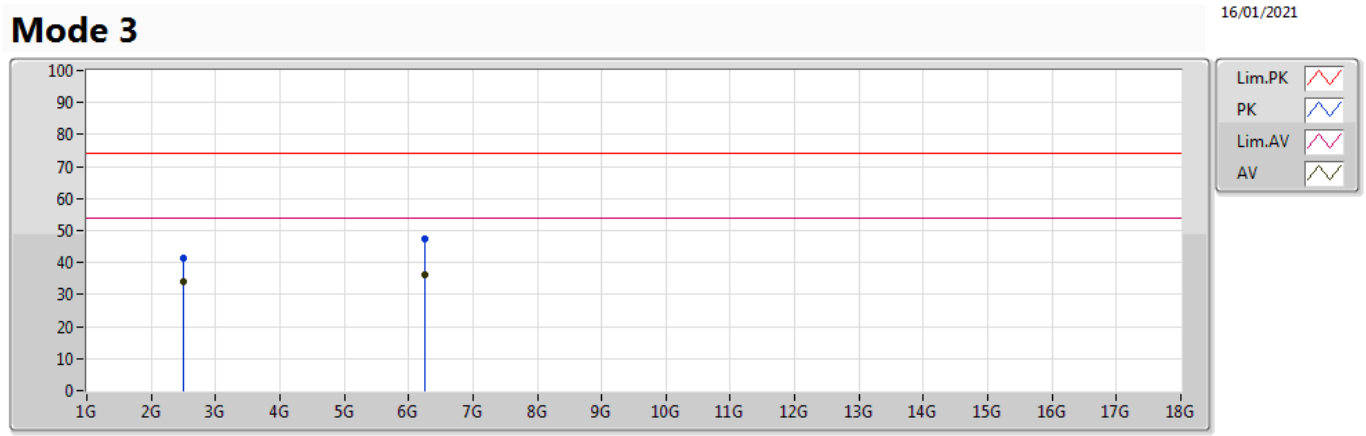
Test Range	1 GHz – 18 GHz	Test Distance	3 m
Test Freq. (GHz)	62.64		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.5002G	42.51	74.00	-31.49	-1.52	3	Vertical	148	1.06	-	44.03	28.50	4.75	34.77
AV	2.50042G	36.50	54.00	-17.50	-1.52	3	Vertical	148	1.06	-	38.02	28.50	4.75	34.77
AV	6.251G	38.40	54.00	-15.60	6.91	3	Vertical	0	1.80	-	31.49	34.70	7.15	34.94
PK	6.25094G	47.76	74.00	-26.24	6.91	3	Vertical	0	1.80	-	40.85	34.70	7.15	34.94

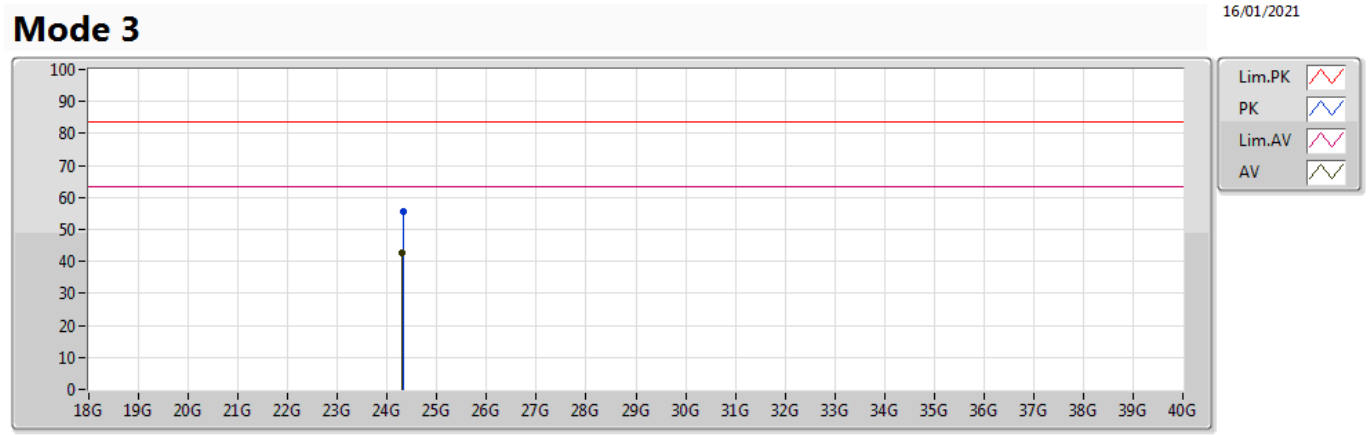
Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	2.50046G	41.49	74.00	-32.51	-1.52	3	Horizontal	161	1.66	-	43.01	28.50	4.75	34.77
AV	2.50044G	34.16	54.00	-19.84	-1.52	3	Horizontal	161	1.66	-	35.68	28.50	4.75	34.77
PK	6.24854G	47.53	74.00	-26.47	6.93	3	Horizontal	355	1.77	-	40.60	34.71	7.15	34.93
AV	6.25112G	36.10	54.00	-17.90	6.91	3	Horizontal	355	1.77	-	29.19	34.70	7.15	34.94

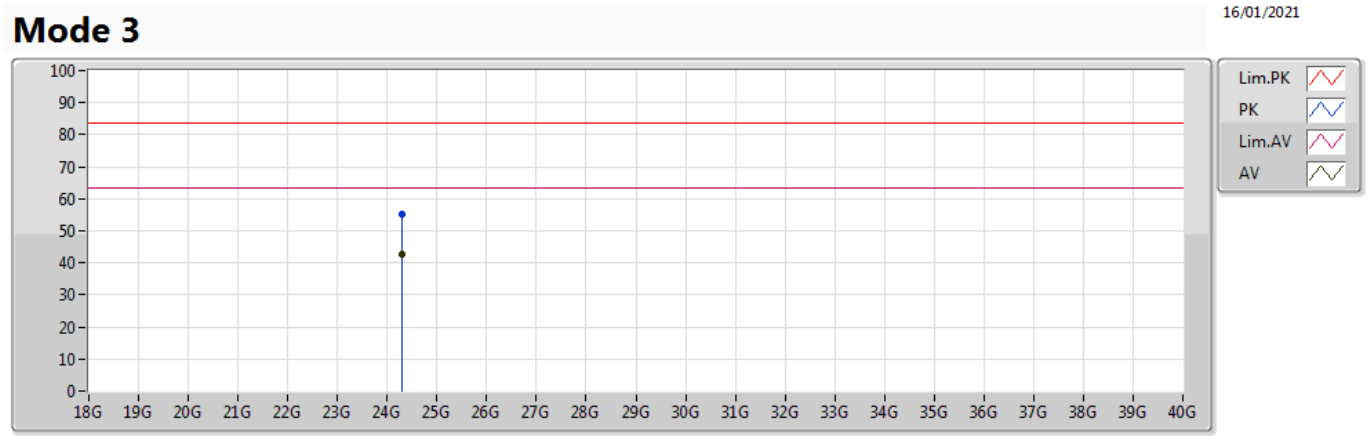
Test Range	18 GHz – 40 GHz	Test Distance	1 m
Test Freq. (GHz)	62.64		

Vertical



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	24.3191G	55.49	83.54	-28.05	6.49	1	Vertical	227	1.60	-	49.00	38.81	16.32	48.64
AV	24.3038G	42.88	63.54	-20.66	6.50	1	Vertical	227	1.60	-	36.38	38.82	16.32	48.64

Horizontal



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	24.30894G	55.18	83.54	-28.36	6.49	1	Horizontal	341	1.58	-	48.69	38.81	16.32	48.64
AV	24.30366G	42.56	63.54	-20.98	6.50	1	Horizontal	341	1.58	-	36.06	38.82	16.32	48.64

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	-54.55
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-16.68	3	18.9969	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	50.51	-78.63
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-41.74	3	0.0592	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	56.69	-66.73
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-28.84	3	1.1553	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 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

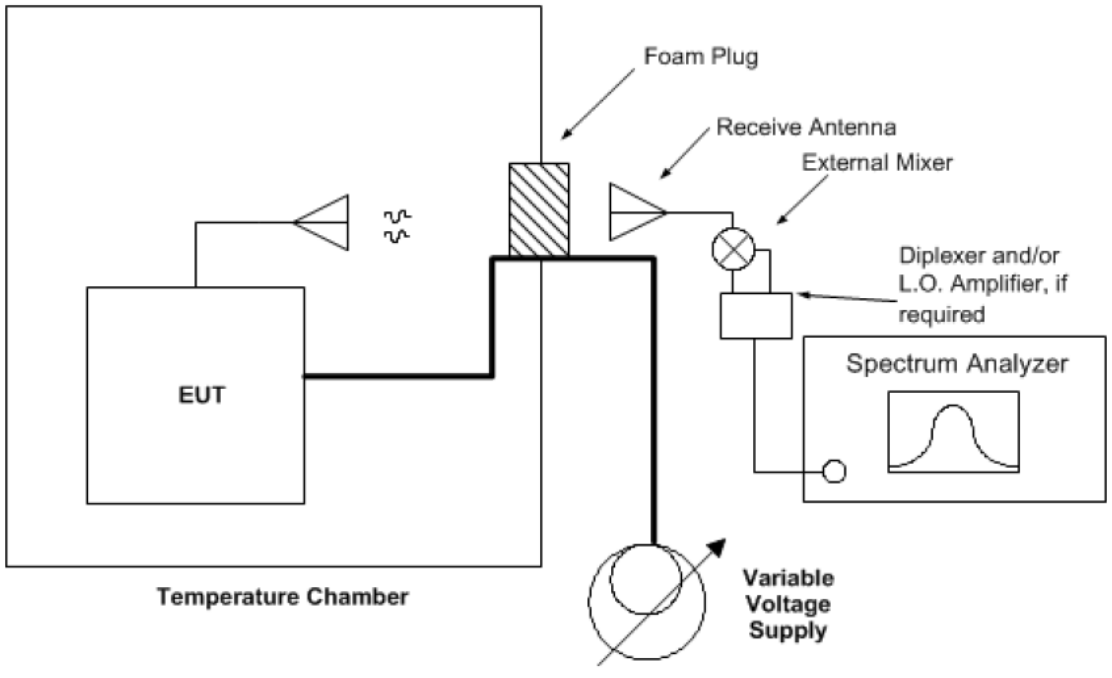
Refer a measuring instruments list in this test report.

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			
Test Results			
Test Temp.erature (°C)	**Measured Frequency (MHz)**	**Delta Frequency (kHz)**	**Limit (±kHz)**
-30	60332.39	73085	Within band
-20	60322.54	63235	Within band
-10	60308.66	49355	Within band
0	60288.12	28815	Within band
10	60272.38	13075	Within band
20	60259.31	Reference	Within band
30	60296.82	37515	Within band
40	60354.63	95325	Within band
55	60460.47	201160	Within band
NOTE: The manufacturer's specified temperature range of -30 to 55°C.			

3.6.5.2 Frequency Stability When Varying Supply Voltage

Frequency Stability When Varying Supply Voltage			
Test Results			
Test Voltage: (Vac)	**Measured Frequency (MHz)**	**Delta Frequency (kHz)**	**Limit (±kHz)**
93.5	60259.17	-133	Within band
110	60259.31	Reference	Within band
126.5	60259.55	248	Within band

4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Feb. 26, 2020	Feb. 25, 2021	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50 -16-2	04083	150kHz ~ 100MHz	Jan. 06, 2021	Jan. 05, 2022	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Feb. 25, 2020	Feb. 24, 2021	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Jan. 31, 2020	Jan. 30, 2021	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 20, 2020	May 19, 2021	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Apr. 13, 2020	Apr. 12, 2021	Conduction (CO01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH04-CB	30 MHz ~ 1 GHz	Aug. 08, 2020	Aug. 07, 2021	Radiation (03CH04-CB)
BILOG ANTENNA with 6 dB attenuator	Schaffner & EMCI	CBL6112B & N-6-06	22021&AT-N060 7	30MHz ~ 1GHz	Oct. 11, 2020	Oct. 10, 2021	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	310N	187291	0.1MHz ~ 1GHz	Mar. 19, 2020	Mar. 18, 2021	Radiation (03CH04-CB)
Pre-Amplifier	Agilent	310N	187291	0.1MHz ~ 1GHz	Nov. 05, 2020	Nov. 04, 2021	Radiation (03CH04-CB)
Pre-Amplifier	EMCI	EMC330N	980391	20MHz ~ 3GHz	May 21, 2020	May 20, 2021	Radiation (03CH04-CB)
Spectrum Analyzer	R&S	FSP40	100142	9kHz~40GHz	Dec. 18, 2019	Dec. 17, 2020	Radiation (03CH04-CB)
Signal Analyzer	R&S	FSV40	101904	9kHz ~ 40GHz	May 12, 2020	May 11, 2021	Radiation (03CH04-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 13, 2020	May 12, 2021	Radiation (03CH04-CB)
RF Cable-low	Woken	RG402	Low Cable-03+67	30MHz – 1GHz	Nov. 05, 2020	Nov. 04, 2021	Radiation (03CH04-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH04-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH03-CB	1GHz ~18GHz 3m	May 28, 2020	May 27, 2021	Radiation (03CH03-CB)
Horn Antenna	ETS‧Lindgren	3115	6821	750MHz~18GHz	Jan. 20, 2020	Jan. 19, 2021	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2020	Jul. 20, 2021	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Jul. 03, 2020	Jun. 02, 2021	Radiation (03CH03-CB)

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 08, 2020	Jul. 07, 2021	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 09, 2020	Jun. 08, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-20+29	1GHz ~ 18GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-29	1GHz ~ 18GHz	Oct. 05, 2020	Oct. 04, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 16, 2020	Jul. 15, 2021	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 16, 2020	Jul. 15, 2021	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH03-CB)
Mixer	OML	M19HWA	U91113-1	40 ~ 60 GHz	Nov. 02, 2020	Nov. 01, 2021	Radiation (03CH03-CB)
Mixer	OML	M15HWA	V91113-1	50 ~ 75 GHz	Nov. 13, 2020	Nov. 12, 2021	Radiation (03CH03-CB)
Mixer	OML	M12HWA	E91113-1	60 ~ 90 GHz	Nov. 14, 2020	Nov. 13, 2021	Radiation (03CH03-CB)
Mixer	OML	M08HWA	F91113-1	90 ~ 140 GHz	Nov. 02, 2020	Nov. 01, 2021	Radiation (03CH03-CB)
Mixer	OML	M05HW/A	G91113-1	140 ~ 220 GHz	Nov. 02, 2020	Nov. 01, 2021	Radiation (03CH03-CB)
Detector	Millitech	DET-15-RPFW0	#A18185(074)	50 ~ 75 GHz	Apr. 02, 2020	Apr. 01, 2022	Radiation (03CH03-CB)
PC Oscilloscope	PICO TECH	6402C	CX372/002	N/A	Jul. 10, 2020	Jul. 09, 2021	Radiation (03CH03-CB)
Standard Horn Antenna	Custom Microwave	M19RH	U91113-A	40 ~ 60 GHz	N.C.R	N.C.R	Radiation (03CH03-CB)
Standard Horn Antenna	Custom Microwave	M15RH	V91113-A	50 ~ 75 GHz	N.C.R	N.C.R	Radiation (03CH03-CB)
Standard Horn Antenna	Custom Microwave	M12RH	E91113-A	60 ~ 90 GHz	N.C.R	N.C.R	Radiation (03CH03-CB)
Standard Horn Antenna	Custom Microwave	M08RH	F91113-A	90 ~ 140 GHz	N.C.R	N.C.R	Radiation (03CH03-CB)
Standard Horn Antenna	Custom Microwave	M05RH	G91113-A	140 ~ 220 GHz	N.C.R	N.C.R	Radiation (03CH03-CB)
Signal Analyzer	R&S	FSV40	101903	9kHz ~ 40GHz	May 14, 2020	May 13, 2021	Radiation (TH03-CB)
Temp. and Humidity Chamber	Gaint Force	GTH-408-40-CP-AR	MAA1410-011	-40~100 degree	Sep. 09, 2020	Sep. 08, 2021	Radiation (TH03-CB)

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

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 (9kHz ~ 30MHz)	3.8 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.0 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.9 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 60GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (60GHz ~ 90GHz)	4.5 dB	Confidence levels of 95%
Radiated Emission (90GHz ~ 200GHz)	5.3 dB	Confidence levels of 95%
Temperature	1.9°C	Confidence levels of 95%