

Test Report

Product Name	Thin Client
Model No.	Chromebox 5
FCC ID	MSQ-CN67QI15

Applicant	ASUSTeK Computer, Inc
Address	1F, No. 15, Lide Rd, Beitou, Taipei, 112 Taiwan

Date of Receipt	Nov. 08, 2022
Issued Date	Apr. 20, 2023
Report No.	22B0348R-RFUSV06S-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report



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Applicant	ASUSTeK Computer, Inc
Address	1F, No. 15, Lide Rd, Beitou, Taipei, 112 Taiwan
Manufacturer	ASUSTeK COMPUTER INC.
Model No.	Chromebox 5
FCC ID	MSQ-CN67QI15
EUT Rated Voltage	AC 100-240V / 50-60Hz
EUT Test Voltage	AC 120V / 60Hz
Trade Name	ASUS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By

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Ida Tung

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Tested By

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Bill Lin

(Senior Engineer / Bill Lin)

Approved By

:

Jack Hsu

(Senior Engineer / Jack Hsu)

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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 22B0348R-Product Photos

Revision History

Report No.	Version	Description	Issued Date
22B0348R-RFUSV06S-A	V1.0	Initial issue of report.	Apr. 20, 2023

1. General Information

1.1. EUT Description

Product Name	Thin Client
Trade Name	ASUS
Model No.	Chromebox 5
FCC ID	MSQ-CN67QI15
Frequency Range	111 kHz < f < 170 kHz
Type of Modulation	ASK
Type of antenna	Coil

Note:

1. The EUT is a Thin Client with a built-in 111 kHz < f < 170 kHz WPC transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.209.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1	Transmit
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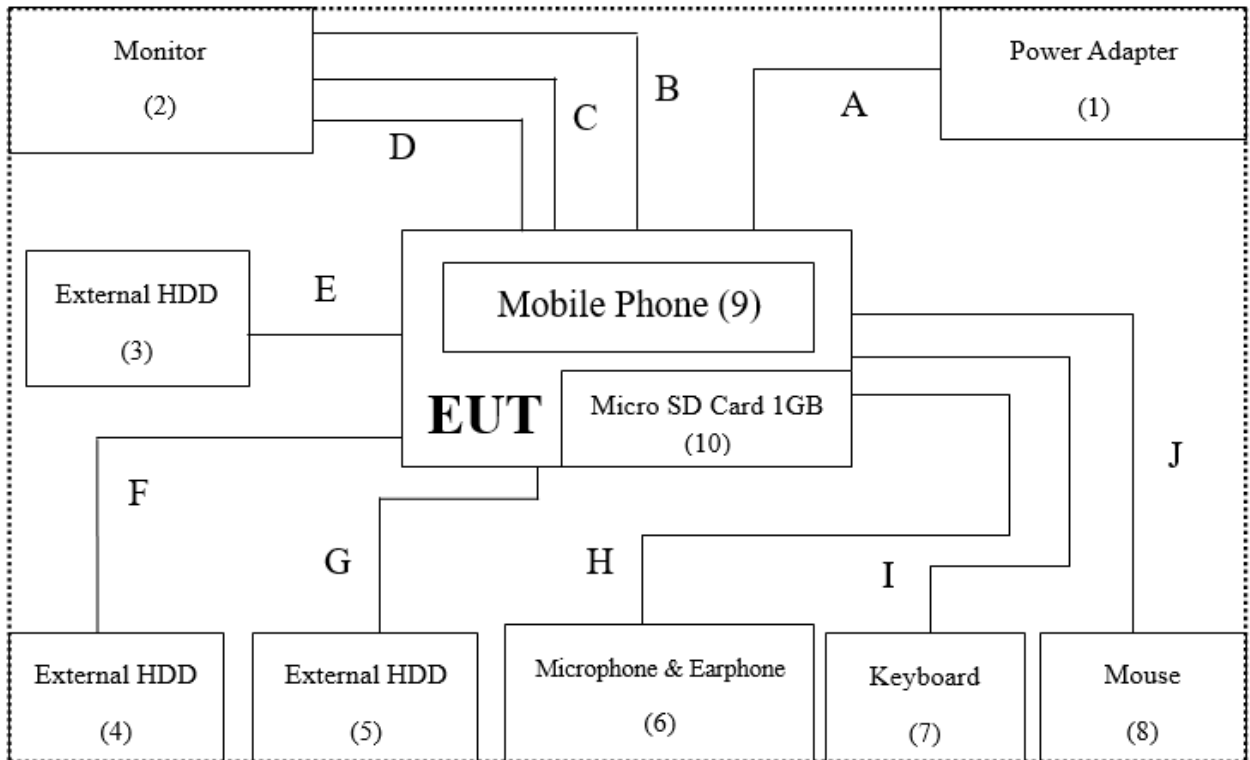
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Power Adapter	DELTA	ADP-150CH B	N/A	N/A
2 Monitor	DELL	P2314Ht	CN-0G9D5T-74445 -620-295S	Non-shielded, 1.8m
3 External HDD	Transcend	TS1TSJ25MC	F30467-0003	N/A
4 External HDD	Transcend	TS1TSJ25H3B	F21786-0125	N/A
5 External HDD	Transcend	TS1TSJ25H3B	F21786-0005	N/A
6 Microphone & Earphone	Verbatim	C09024VB	N/A	N/A
7 Keyboard	Logitech	K120	N/A	N/A
8 Mouse	Logitech	U0026	N/A	N/A
9 Mobile Phone	SONY	H8296	43027566	N/A
10 Micro SD Card 1GB	SanDisk	SanDisk 1GB	0801002841D2N	N/A

Cable Type	Cable Description
A Power Cable	Non-shielded, 1.8m
B Display Cable	Shielded, 1.8m
C HDMI Cable	Shielded, 1.8m
D HDMI Cable	Shielded, 1.8m
E USB Cable	Shielded, 0.5m
F USB Cable	Shielded, 0.5m
G USB Cable	Shielded, 0.5m
H Microphone & Earphone Cable	Non-shielded, 1.2m
I USB Cable	Non-shielded, 1.5m
J USB Cable	Non-shielded, 1.8m

1.3. Configuration of tested System



1.4. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.3.
- (2) Put the Mobile on the EUT and confirm that the Mobile starts charging.
- (3) Start the continuous transmitter.
- (4) Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	20.5 °C
	Humidity (%RH)	10~90 %	58.3 %

USA : FCC Registration Number: TW0033
Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan
Performed Location : No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan,
R.O.C.
Phone Number : +886-3-275-7255
Fax Number : +886-3-327-8031
Email Address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conduction Measurements /HY-SR01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	EMI Test Receiver	R&S	ESR7	101601	2022/06/23	2023/06/22
V	Two-Line V-Network	R&S	ENV216	101306	2022/05/23	2023/05/22
V	Two-Line V-Network	R&S	ENV216	101307	2022/07/04	2023/07/03
V	Coaxial Cable	SUHNER	RG400_BNC	RF001	2022/05/24	2023/05/23

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: E3 210616 dekra V9.

For Radiated measurements /HY-CB03

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
	Loop Antenna	AMETEK	HLA6121	56736	2022/05/14	2023/05/13
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2023/08/10
	Horn Antenna	RF SPIN	DRH18-E	210508A18ES	2022/06/08	2023/06/07
	Horn Antenna	Com-Power	AH-840	101087	2022/06/16	2023/06/15
V	Pre-Amplifier	SGH	SGH0301-9	20211007-10	2023/01/10	2024/01/09
	Pre-Amplifier	SGH	PRAMP118	20200701	2023/01/10	2024/01/09
	Pre-Amplifier	EMCI	EMC05820SE	980310	2023/01/10	2024/01/09
	Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
	Coaxial Cable	EMCI	EMC102-KM-K M-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-K M-7000	170242		
	Filter	MICRO TRONICS	BRM50702	G251	2023/01/05	2024/01/04
	Filter	MICRO TRONICS	BRM50716	G188	2023/01/05	2024/01/04
V	EMI Test Receiver	R&S	ESR3	102793	2022/12/05	2023/12/04
V	Spectrum Analyzer	R&S	FSV3044	101114	2023/02/16	2024/02/15
V	Coaxial Cable	SGH	SGH18	2021005-1	2023/01/10	2024/01/09
	Coaxial Cable	SGH	SGH18	202108-4		
	Coaxial Cable	SGH	SGH18	GD20110223-1		
	Coaxial Cable	SGH	HA800	GD20110222-3		

Note:

1. Bi-Log Antenna is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: E3 210616 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

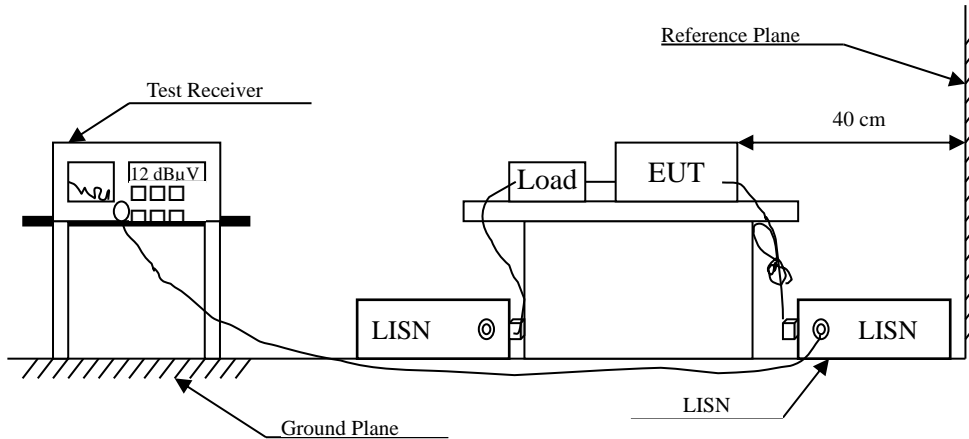
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Conducted Emission	± 3.42 dB	
Radiated Emission	Under 1 GHz ± 4.05 dB	Above 1 GHz ± 3.73 dB

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB μ V) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50 - 5.0	56	46
5.0 - 30	60	50

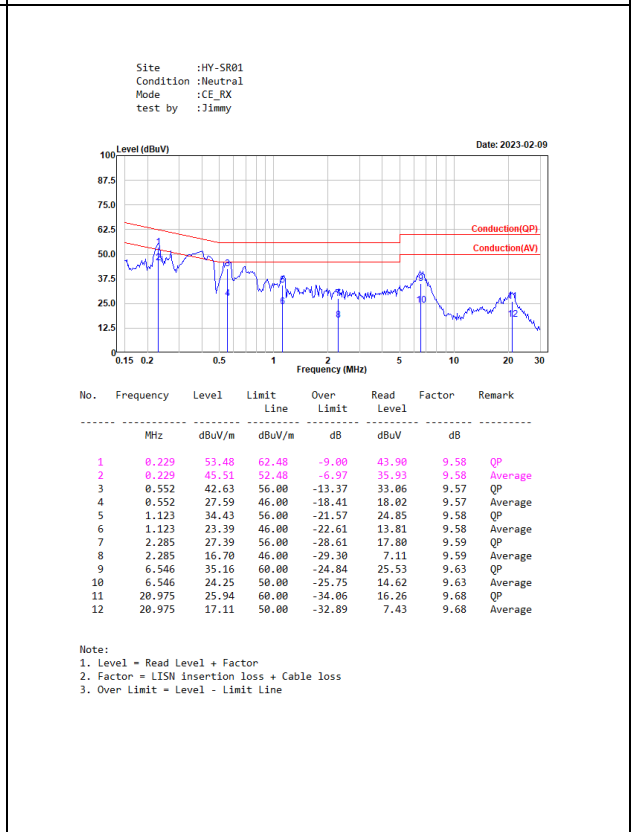
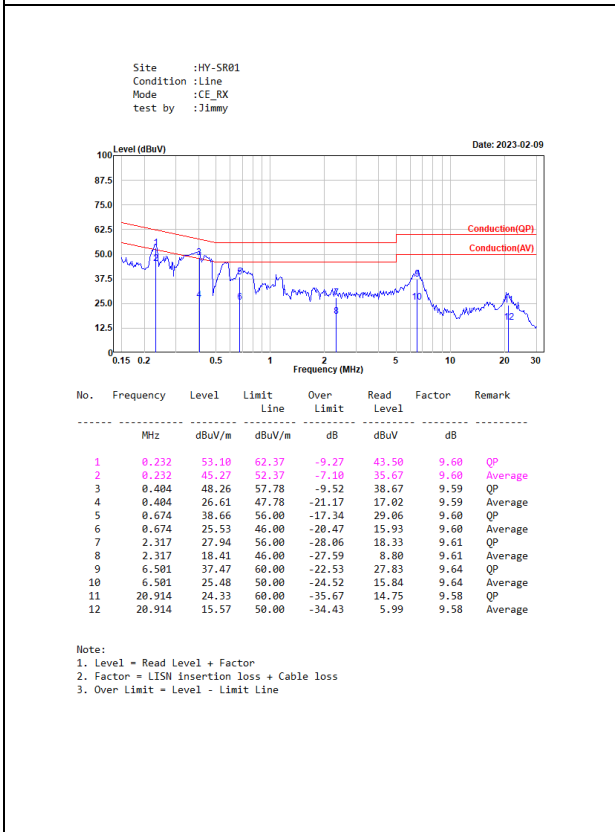
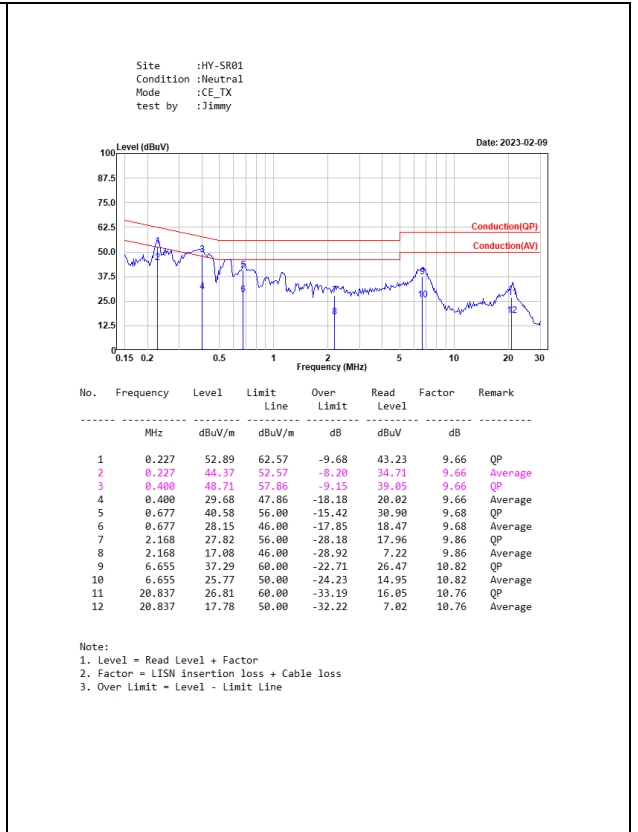
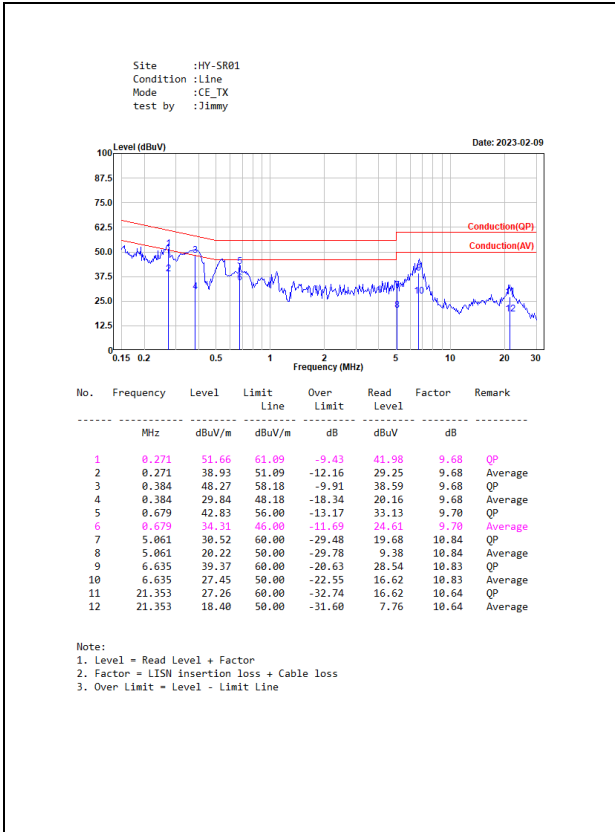
2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm /50 uH coupling impedance with 50 ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

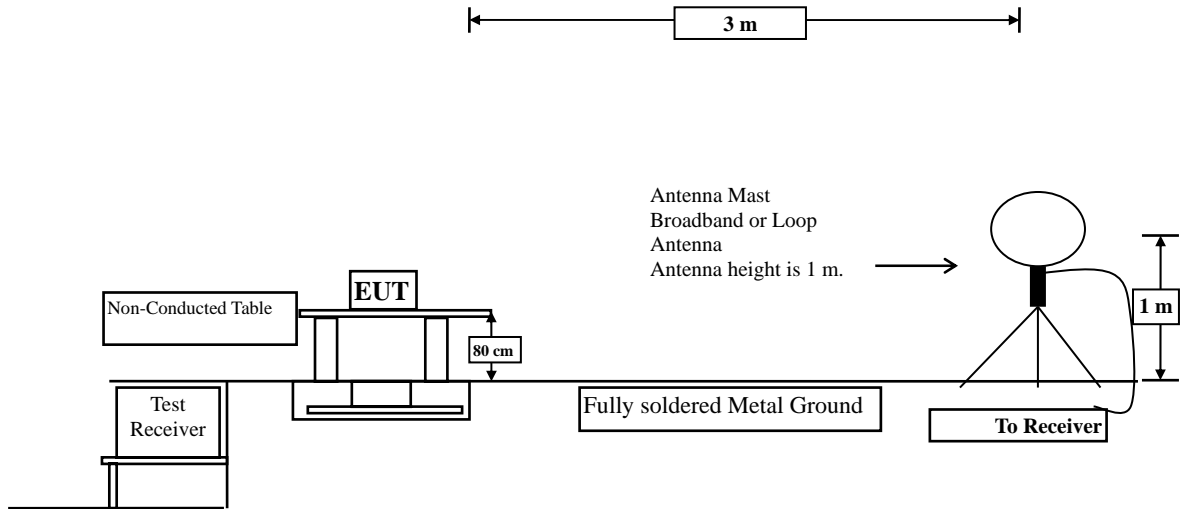
2.4. Test Result of Conducted Emission



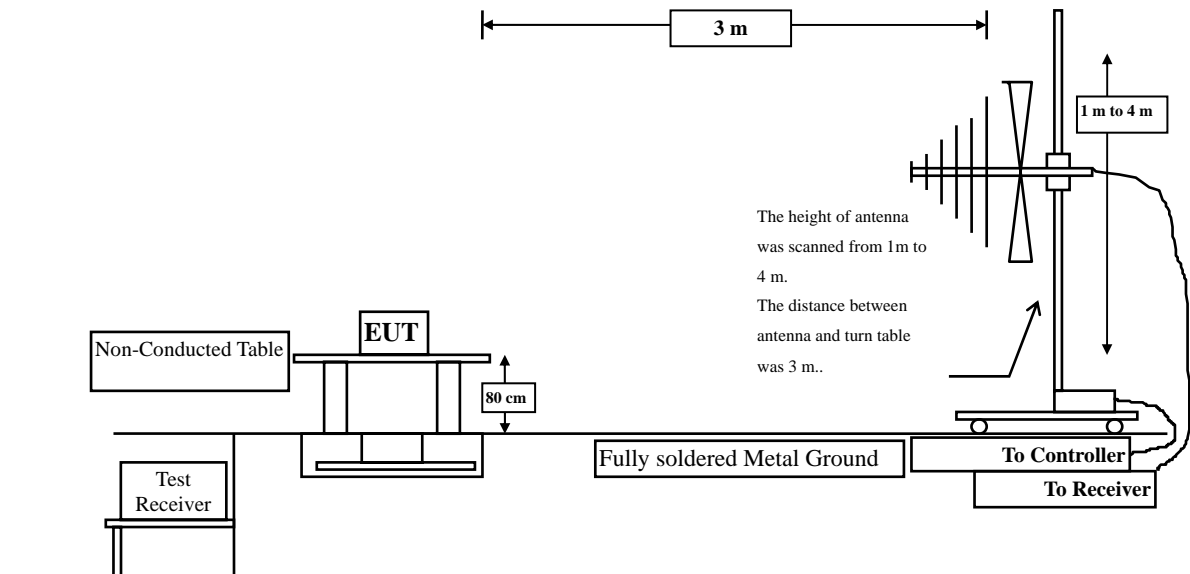
3. Radiated Emission

3.1. Test Setup

Radiated Emission Under 30 MHz



Radiated Emission Below 1 GHz



3.2. Limits

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks :
1. RF Voltage (dB μ V) = 20 log RF Voltage (uV).
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.209 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1MHz. Radiated emission measurements below 1 GHz are made using broadband Bilog antenna and above 1 GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range from 9 kHz - 10th Harmonic of fundamental was investigated.

3.4. Test Result of Radiated Emission

