Testing Laboratory 1190

AS/NZS EMI TEST REPORT

Equipment	:	USB 3.0 Mini Dock HDMI & VGA Dual Display / Gigabit Ethernet / USB HUB
Brand Name	:	J5create
Model Name	:	JUD380, JUD323B, JUD323S, JCD380
Applicant	:	KAIJET TECHNOLOGY INTERNATIONAL CORPORATION 8F., No.109, Zhongcheng Rd., Tucheng Dist., New Taipei City 236, Taiwan, R.O.C.
Manufacturer	:	Magic Control Technology Corporation 10F., No.123, Zhongcheng Rd., Tucheng Dist., New Taipei City 236, Taiwan R.O.C.
Standard	:	AS/NZS CISPR 32:2015 Class B

The product was received on Aug. 27, 2019, and testing was started from Aug. 29, 2019 and completed on Sep. 03, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in AS/NZS CISPR 32:2015 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.

William Li

Approved by: William Li

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
AI982050-01	01	Initial issue of report	Oct. 07, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
4.1	A.3	Conducted Emissions of Powerline	PASS	Under limit 7.88 dB at 0.56 MHz
4.2	A.3	Conducted Emissions of telecommunication Ports	PASS	Under limit 22.02 dB at 7.73 MHz
5.1	A.2	Radiated Emissions below 1GHz	PASS	Under limit 3.73 dB at 34.670 MHz
5.2	A.2	Radiated Emissions above 1GHz	PASS	Under limit 4.66 dB at 2.935 GHz
Note : From Sporton Project No.:AI982050				

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:
None

Reviewed by: Mark Ma

Report Producer: Michelle Tsai

1. General Description of Equipment under Test

1.1. Basic Description of Equipment under Test

Equipment : USB 3.0 Mini Dock HDMI & VGA Dual Display / Gigabit Ethernet / USB HUB
Model No. : JUD380, JUD323B, JUD323S, JCD380
Power Supply Type : From Host System
The maximum operating frequency : 500 MHz

1.2. Feature of Equipment under Test

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.3. Table for Multiple Listing

Model Name	Interface	Description
JUD380	USB Type-A Interface	The difference of models is in sales marketing.
JUD323B		
JUD323S		
JCD380	USB Type-C Interface	-

Note: The information from manufacturer.

2. Test Configuration of Equipment under Test

2.1. Details of EUT Test Modes

From the above models, Model: JUD380, JCD380 was selected as representative model for the test and its data was recorded in this report. The equipment under test were performed the following test modes:

Test Items	Description of test modes
Conducted Emission	Mode 1. JCD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps Mode 2. JUD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps cause “mode 1” generated the worst test result; it was reported as final data.
ISN	Mode 1. JCD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps Mode 2. JUD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps cause “mode 1” generated the worst test result; it was reported as final data.
Radiated Emissions <below 1GHz>	Mode 1. JCD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps Mode 2. JUD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps cause “mode 1” generated the worst test result; it was reported as final data.
Radiated Emissions <above 1GHz>	Mode 1. JCD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps Mode 2. JUD380 HDMI+D-SUB:2048*1152 60Hz,LAN:1Gbps cause “mode 1” generated the worst test result; it was reported as final data.

2.2. Description of Test System

Conducted emission and radiated emission below 1GHz

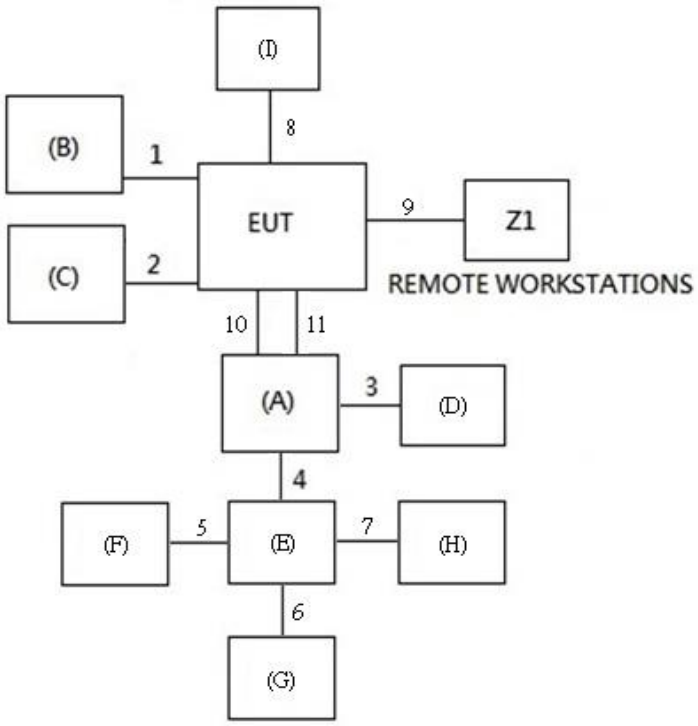
No.	Peripheral	Manufacturer	Model Number	FCC ID	Remarks
For Local					
A	Notebook	Dell	P54G	DoC	-
B	LCD Monitor	Dell	U2173HMt	DoC	-
C	LCD Monitor	ASUS	PB27U	DoC	-
D	Notebook Adapter	Dell	LA45NM131	N/A	-
E	USB HUB	Generic	UH-314BP	N/A	-
F	iPod Nano	Apple	A1137	DoC	-
G	Printer	Fuji Xerox	Phaser 3121	DoC	-
H	Mouse	ASUS	MOBTUO	DoC	-
I	HDD*2	WD	WDBACW0010HBK-SESN	DoC	-
For Remote					
Z	Notebook	DELL	E5520	DoC	-

Radiated emission above 1GHz

No.	Peripheral	Manufacturer	Model Number	FCC ID	Remarks
For Local					
A	Notebook	Dell	P54G	DoC	-
B	LCD Monitor	Dell	U2173HMt	DoC	-
C	LCD Monitor	ASUS	PB287	DoC	-
D	Notebook Adapter	Dell	LA45NM131	N/A	-
E	USB HUB	DigiFusion	U3H04C	N/A	-
F	iPod Nano	Apple	A1137	DoC	-
G	Printer	EPSON	C61	N/A	-
H	Mouse	Microsoft	1113	DoC	-
I	HDD*2	WD	WDBF JK0020HBK-SESN	DoC	-
For Remote					
Z	Notebook	DELL	E5520	DoC	-

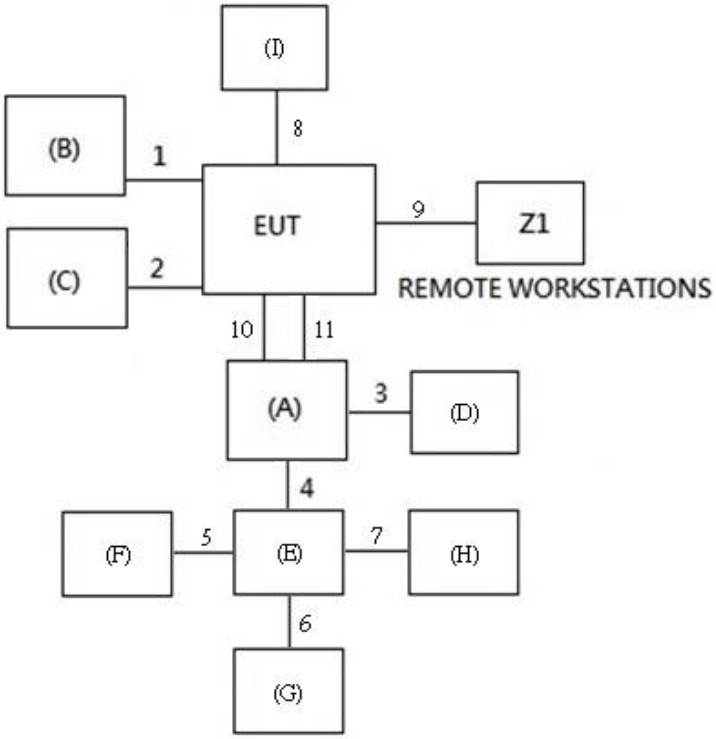
2.3. Connection Diagram of Test System

Test Setup Diagram - Conducted emission and radiated emission below 1GHz



No.	Types of Cables	Shielding on Cable	Length (m)	Remarks
1	D-SUB Cable	D-Shielded	1.8	-
2	HDMI Cable	D-Shielded	1.8	-
3	DC Cable	B-Shielded	2.0	-
4	USB Cable	D-Shielded	1.0	-
5	USB Cable	D-Shielded	1.0	-
6	USB Cable	D-Shielded	1.8	-
7	USB Cable	AL-F-Shielded	1.8	-
8	USB Cables *2	D-Shielded	1.0	-
9	RJ45 Cable	Non-Shielded	20.0	Remote
10	TYPE C Cable	D-Shielded	0.2	EUT
11	Micro USB Cable	Non-Shielded	1.0	-

Test Setup Diagram - Radiated emission above 1GHz



No.	Types of Cables	Shielding on Cable	Length (m)	Remarks
1	D-SUB Cable	D-Shielded	1.5	-
2	HDMI Cable	D-Shielded	1.8	-
3	DC Cable	B-Shielded	2.0	-
4	USB Cable	D-Shielded	0.3	-
5	USB Cable	D-Shielded	1.0	-
6	USB Cable	D-Shielded	1.8	-
7	USB Cable	AL-F-Shielded	1.8	-
8	USB Cables*2	D-Shielded	1.2	-
9	RJ45 Cable	Non-Shielded	20.0	Remote
10	Type C Cable	D-Shielded	0.2	EUT
11	Micro USB Cable	D-Shielded	1.5	-

2.4. Test Manner

During the test, the program under Win 10(local) & Win 7(remote) was executed:

- Turn on the power of all equipment.
- The Notebook executed "1729MPEG4" to keep displaying the Standard television color bar signal (ITU-R BT 1729) via EUT.
- The Notebook opened "Word" to send "H" messages to the printer, and then the printer prints them on the paper.
- The Notebook executed "WINTHRAX" to send signal messages to the HDD and reads and writes the message via EUT.
- The Notebook executed "WINTHRAX" to send signal messages to the iPod Nano and reads and writes the message via USB HUB.
- The Notebook executed "Media player.exe" to play audio by Monitor speaker via EUT.
- The Notebook executed "ping.exe" to link with the remote Notebook to maintain the connection via EUT.

< For ISN Test >

- The remote Notebook executed "Tfgen" to traffic packet data generated software and operates at maximum rate to link with the EUT by RJ45 cable.

3. General Information of Test

3.1. Test Facilities

Test Site：SPORTON INTERNATIONAL INC.		
☒	HUA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-318-0055
☒	DONG HU	ADD : No. 3, Ln. 238, Kangle St., Neihu Dist., Taipei City, Taiwan (R.O.C.) TEL : 886-2-2631-5551 FAX : 886-2-2631-9740
☐	LIN KOU	ADD : No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan (R.O.C.) TEL : 886-2-2601-1640 FAX : 886-2-2601-1695

Test Items	Test Site No.	Test Engineer	Test Environment		Test Date	Remark
			temp °C	humidity %		
Powerline Conducted Emissions	CO01-NH	Willy Lee	24.5~24.9	52.5~52.8	29/Aug/2019	-
Telecommunication Port Conducted Emissions	CO01-NH	Willy Lee	24.5~24.9	52.5~52.8	29/Aug/2019	-
Radiated Emissions (below 1GHz)	OS03-NH	Louis Lin	28.1~28.2	52.1~52.4	01/Sep/2019	-
Radiated Emissions (above 1GHz)	03CH04-HY	Alan Chen	28.5~28.6	60~61	03/Sep/2019	-

3.2. Test Standards

Test items	Test Standards and Test Procedures
Radiated and Conducted Emissions	Australian Standard AS/NZS CISPR 32 Class B

3.3. Test Voltage/Frequencies

Power Supply Type	Voltage/Frequencies
AC Power Supply	240V / 50Hz

3.4. Test Distance and Frequency Range Investigated

Test Items	Frequency Range	Remark
Powerline Conducted Emissions	150 kHz to 30 MHz	-
Telecommunication Port Conducted Emissions	150 kHz to 30 MHz	-
Radiated Emissions (below 1GHz)	30 MHz to 1,000 MHz	Measurement distance is 10 m.
Radiated Emissions (above 1GHz)	1,000 MHz to 6,000 MHz	Measurement distance is 3 m.

3.5. Operating Condition

- Full system.

4. Conducted Emissions Measurement

The EUT is which satisfies the Class B disturbance limits.

4.1. Conducted Emissions at Powerline

4.1.1. Limit

conducted emissions from the AC mains power ports of Class A equipment			
Frequency range MHz	**Coupling device**	**Detector type / bandwidth**	**Class A limits dB(μV)**
0,15 – 0,5	AMN	Quasi-peak / 9 kHz	79
0,50 – 30			73
0,15 – 0,5	AMN	Average / 9 kHz	66
0,50 – 30			60

conducted emissions from the AC mains power ports of Class B equipment			
Frequency range MHz	**Coupling device**	**Detector type / bandwidth**	**Class B limits dB(μV)**
0,15 – 0,5	AMN	Quasi-peak / 9 kHz	66 - 56
0,5 – 5			56
5 – 30			60
0,15 – 0,5	AMN	Average / 9 kHz	56 - 46
0,5 – 5			46
5 – 30			50
Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.			

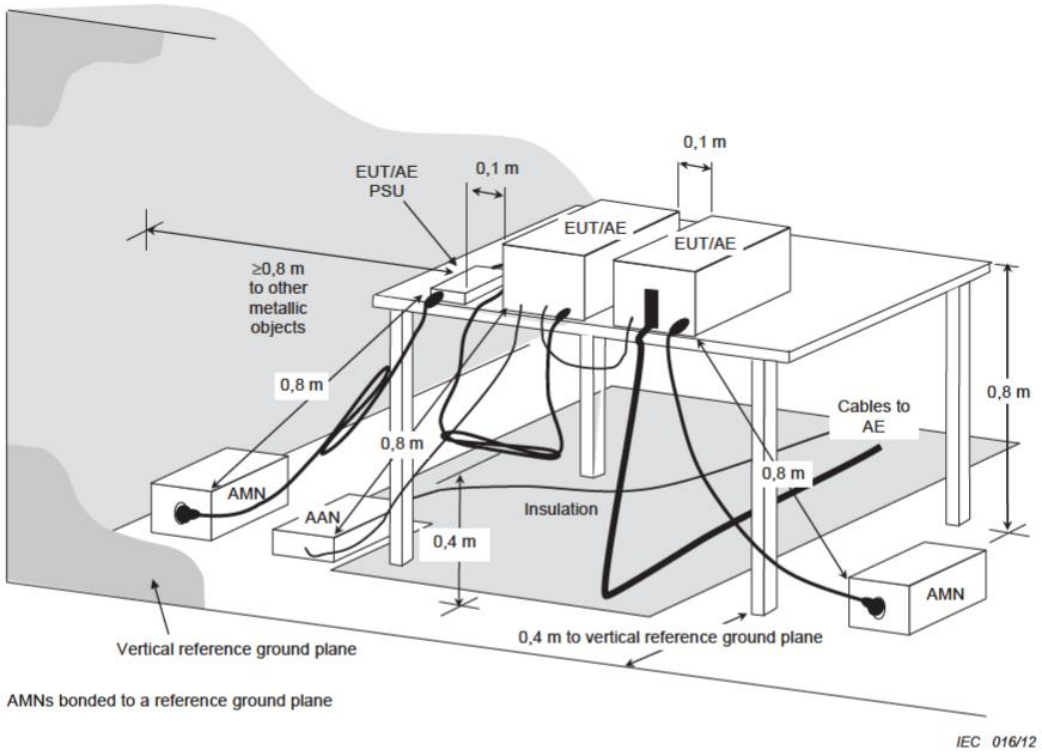
4.1.2. Test Procedures

a). The EUT was warmed up for 15 minutes before testing started.
b). The EUT was placed on a desk 0.8 meter height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meter from any other grounded conducting surface.
c). Connect EUT to the power mains through a line impedance stabilization network (LISN).
d). All the support units are connect to the other LISN.
e). The LISN provides 50 ohm, coupling impedance for the measuring instrument.
f). The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
g). Both sides of AC line were checked for maximum conducted interference.
h). The frequency range from 150 kHz to 30 MHz was searched.
i). Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
j). All emissions not reported here are more than 10 dB below the prescribed limit.

4.1.3. Measurement Results Calculation

The measurand Level is calculated using:
Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level
For example at 0.3 MHz if the LISN Factor is 10.48 dB, the cable loss is 0.10 dB, the measured voltage is 36.39 dBμV, the signal strength would be calculated:
Corrected Reading (dBμV) = 10.48 dB + 0.10 dB + 36.39 dBμV = 46.97 dBμV

4.1.4. Typical Test Setup Layout

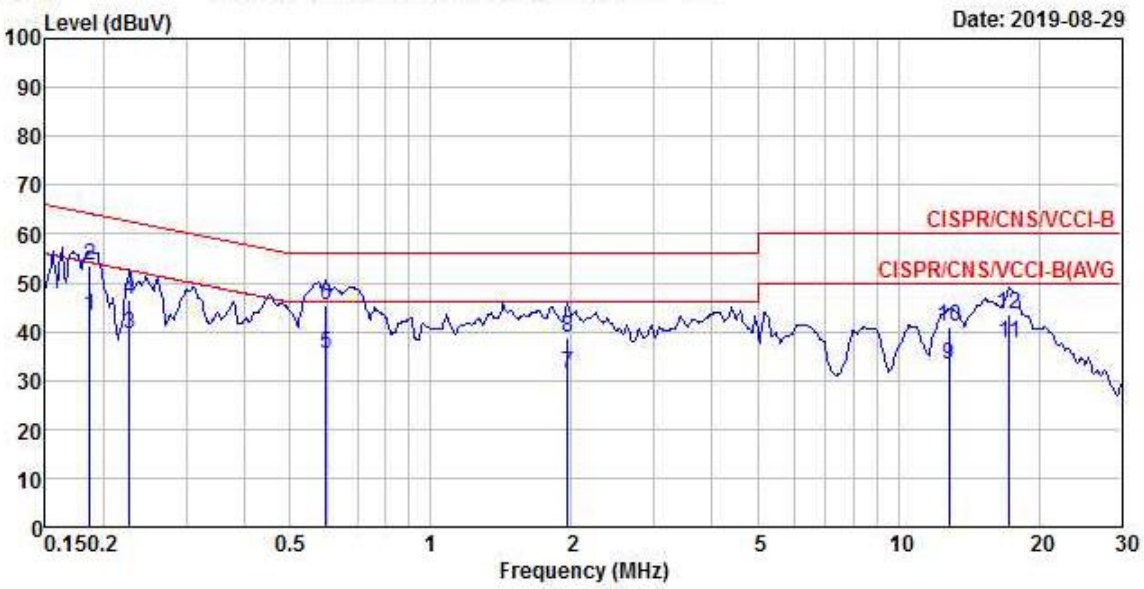


a). AMN is 80 cm from the EUT and at least 80 cm from other units and other metal planes.
b). EUT is connected to one artificial mains network (AMN)
c). All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
d). Rear of EUT to be flushed with rear of table top.
e). Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
f). If cables, which hang closer than 40 cm to the horizontal metal ground plane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
g). Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
h). Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.

4.1.5. Test Result

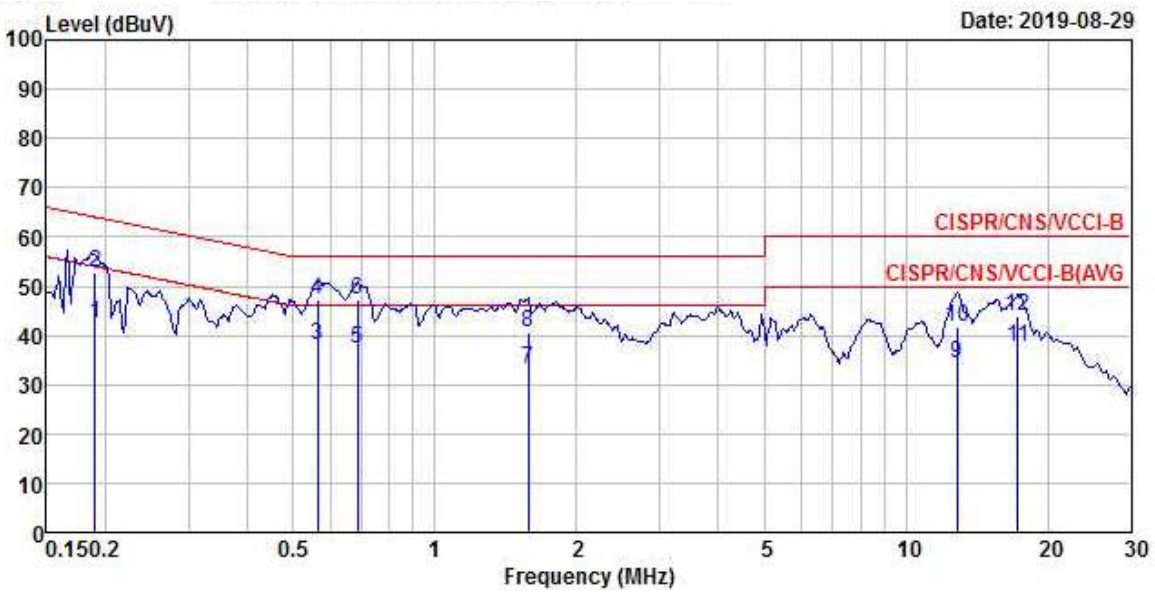
Test Mode	Mode 1		
Test Frequency	0.15 MHz ~ 30 MHz	Test Voltage	AC 240V / 50Hz
■ The test was passed at the minimum margin that marked by the frame in the following data			

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.19	43.06	-11.14	54.20	32.76	10.20	0.10	Average
2	0.19	53.49	-10.71	64.20	43.19	10.20	0.10	QP
3	0.23	39.43	-13.14	52.57	29.13	10.20	0.10	Average
4	0.23	46.48	-16.09	62.57	36.18	10.20	0.10	QP
5 @	0.60	35.55	-10.45	46.00	25.25	10.20	0.10	Average
6	0.60	45.40	-10.60	56.00	35.10	10.20	0.10	QP
7	1.96	31.53	-14.47	46.00	21.11	10.22	0.20	Average
8	1.96	38.73	-17.27	56.00	28.31	10.22	0.20	QP
9	12.85	33.25	-16.75	50.00	22.57	10.42	0.26	Average
10	12.85	40.78	-19.22	60.00	30.10	10.42	0.26	QP
11	17.29	37.53	-12.47	50.00	26.67	10.51	0.35	Average
12	17.29	43.71	-16.29	60.00	32.85	10.51	0.35	QP

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.19	42.56	-11.46	54.02	32.30	10.16	0.10	Average
2	0.19	52.83	-11.19	64.02	42.57	10.16	0.10	QP
3 @	0.56	38.12	-7.88	46.00	27.87	10.15	0.10	Average
4	0.56	47.33	-8.67	56.00	37.08	10.15	0.10	QP
5	0.69	37.39	-8.61	46.00	27.13	10.16	0.10	Average
6	0.69	47.16	-8.84	56.00	36.90	10.16	0.10	QP
7	1.58	33.24	-12.76	46.00	22.90	10.17	0.17	Average
8	1.58	40.75	-15.25	56.00	30.41	10.17	0.17	QP
9	12.85	34.29	-15.71	50.00	23.60	10.43	0.26	Average
10	12.85	41.75	-18.25	60.00	31.06	10.43	0.26	QP
11	17.29	37.78	-12.22	50.00	26.88	10.55	0.35	Average
12	17.29	43.80	-16.20	60.00	32.90	10.55	0.35	QP

4.2. Conducted Emissions at Telecommunication Ports

4.2.1. Limit

asymmetric mode conducted emissions from Class A equipment				
Frequency range MHz	**Coupling device**	**Detector type / bandwidth**	**Class A voltage limits dB(μV)**	**Class A current limits dB(μA)**
0,15 – 0,5	AAN	Quasi-peak / 9 kHz	97 – 87	n/a
0,5 – 30			87	
0,15 – 0,5	AAN	Average / 9 kHz	84 – 74	
0,5 – 30			74	
NOTE: Applicable to 1. wired network ports; 2. optical fibre ports with metallic shield or tension members; 3. antenna ports.				

asymmetric mode conducted emissions from Class B equipment				
Frequency range MHz	**Coupling device**	**Detector type / bandwidth**	**Class B voltage limits dB(μV)**	**Class B current limits dB(μA)**
0,15 – 0,5	AAN	Quasi-peak / 9 kHz	84 – 74	n/a
0,5 – 30			74	
0,15 – 0,5	AAN	Average / 9 kHz	74 – 64	
0,5 – 30			64	
NOTE: Applicable to 1. wired network ports; 2. optical fibre ports with metallic shield or tension members; 3. broadcast receiver tuner ports; 4. antenna ports.				

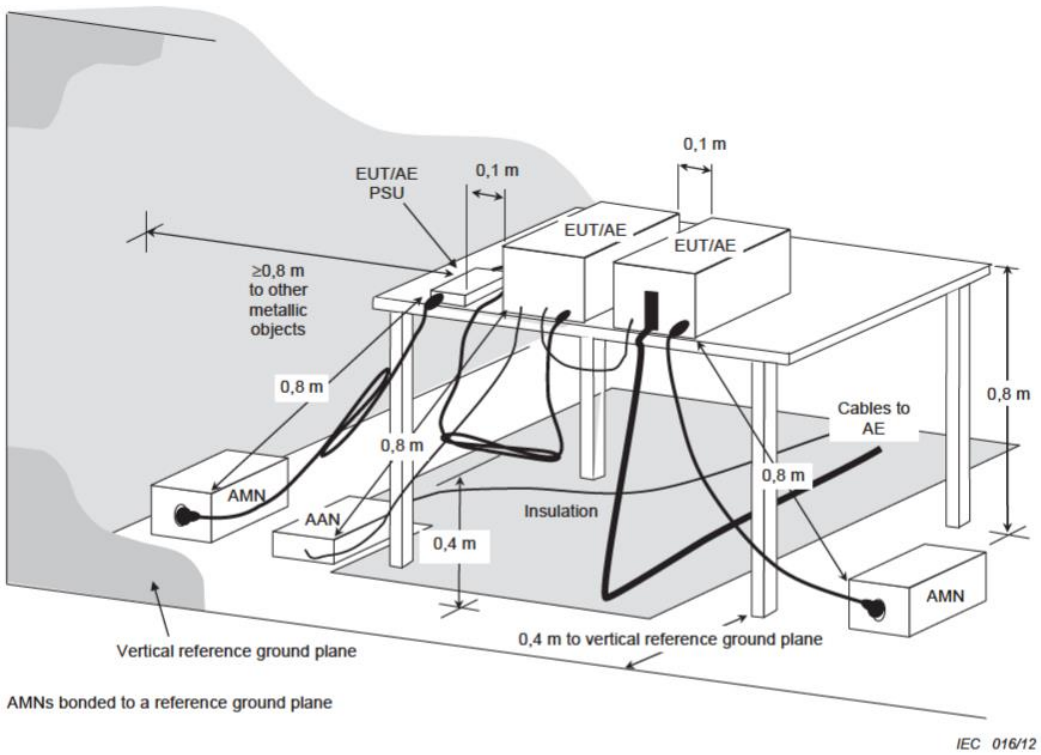
4.2.2. Test Procedures

a). The EUT was warmed up for 15 minutes before testing started.
b). The EUT was placed on a desk 0.8 meter height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meter from any other grounded conducting surface.
c). Connect EUT to the power mains through a line impedance stabilization network (LISN).
d). Connect Telecommunication port to ISN (Impedance Stabilization Network).
e). All the support units are connect to the other LISN.
f). The LISN provides 50 ohm, coupling impedance for the measuring instrument.
g). The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
h). Both sides of AC line were checked for maximum conducted interference.
i). The frequency range from 150 kHz to 30 MHz was searched.
j). Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
k). All emissions not reported here are more than 10 dB below the prescribed limit.

4.2.3. Measurement Results Calculation

The measurand Level is calculated using:
Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level
For example at 1.98 MHz if the LISN Factor is 9.60 dB, the cable loss is 0.20 dB, the measured voltage is 55.24 dBμV, the signal strength would be calculated:
Corrected Reading (dBμV) = 9.60 dB + 0.20 dB + 55.24 dBμV = 65.04 dBμV
Note: The LISN factor represents the factor of the coupling device (ex. AAN.).

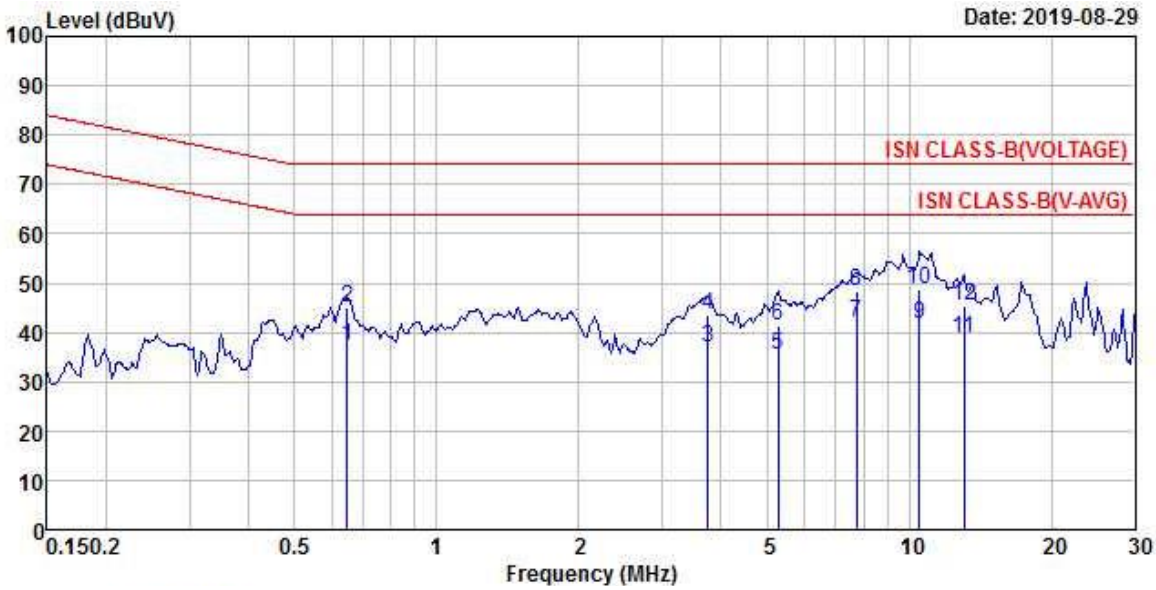
4.2.4. Typical Test Setup Layout



a). AMN is 80 cm from the EUT and at least 80 cm from other units and other metal planes.
b). EUT is connected to one artificial mains network (AMN)
c). All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
d). Rear of EUT to be flushed with rear of table top.
e). Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
f). If cables, which hang closer than 40 cm to the horizontal metal ground plane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
g). Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
h). Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.
i). Arrange the EUT, local AE and associated cabling, measure the voltage at the measurement port of the AAN.

4.2.5. Test Result

Test Mode	Mode 1		
Test Frequency	0.15 MHz ~ 30 MHz	Test Voltage	AC 240V / 50Hz
■ The test was passed at the minimum margin that marked by the frame in the following data			



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.65	37.35	-26.65	64.00	27.65	9.60	0.10	Average
2	0.65	45.00	-29.00	74.00	35.30	9.60	0.10	QP
3	3.76	37.00	-27.00	64.00	27.34	9.46	0.20	Average
4	3.76	43.42	-30.58	74.00	33.76	9.46	0.20	QP
5	5.28	35.31	-28.69	64.00	25.66	9.45	0.20	Average
6	5.28	41.26	-32.74	74.00	31.61	9.45	0.20	QP
7 @	7.73	41.98	-22.02	64.00	32.33	9.45	0.20	Average
8	7.73	48.40	-25.60	74.00	38.75	9.45	0.20	QP
9	10.51	41.80	-22.20	64.00	32.13	9.46	0.21	Average
10	10.51	48.58	-25.42	74.00	38.91	9.46	0.21	QP
11	13.06	38.86	-25.14	64.00	29.07	9.52	0.27	Average
12	13.06	45.24	-28.76	74.00	35.45	9.52	0.27	QP

5. Radiated Emission

The EUT is which satisfies the Class B disturbance limits.

5.1. Radiated Emission below 1GHz

5.1.1. Limit

radiated emissions at frequencies up to 1 GHz for Class A equipment			
Frequency range MHz	**Measurement**		**Class A limits dB(μV/m)**
	Distance (m)	**Detector type / bandwidth**	**OATS/SAC**
30 – 230	10	Quasi Peak / 120 kHz	40
230 – 1000			47
30 – 230	3		50
230 – 1000			57

radiated emissions at frequencies up to 1 GHz for Class B equipment			
Frequency range MHz	**Measurement**		**Class B limits dB(μV/m)**
	Distance (m)	**Detector type / bandwidth**	**OATS/SAC**
30 – 230	10	Quasi Peak / 120 kHz	30
230 – 1000			37
30 – 230	3		40
230 – 1000			47

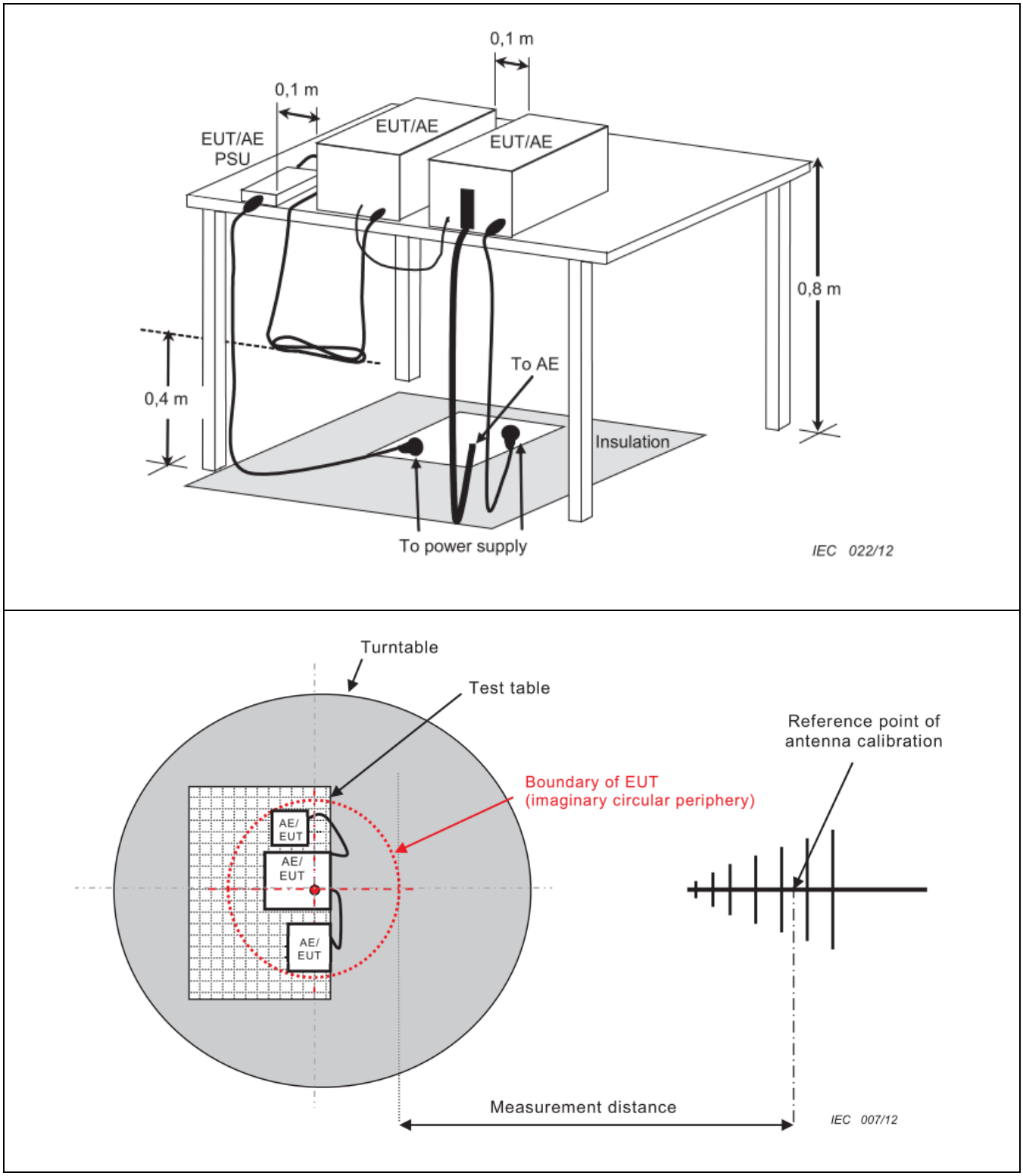
5.1.2. Test Procedures

a). The EUT was placed on a rotatable table top 0.8 meter above ground.
b). The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c). The table was rotated 360 degrees to determine the position of the highest radiation.
d). The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e). For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f). Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
g). If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h). The central point of the EUT shall be positioned at the centre of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.

5.1.3. Measurement Results Calculation

The measurand Level is calculated using:
Corrected Reading (dBμV/m) = Antenna Factor + Cable Loss + Read Level – Preamp Factor
For example at 125 MHz if the Antenna Factor is 17.24 dB/m, the cable loss is 1.20 dB, the measured voltage is 35.80 dBμV and the Preamp Factor is 27.18 dB, the signal strength would be calculated:
Corrected Reading (dBμV/m) = 17.24 dB/m + 1.20 dB + 35.80 dBμV - 27.18 dB = 27.06 dBμV/m
Note: If a hybrid antenna is used, the antenna factor shell be the sum of the Antenna Factor + Attenuator Factor.

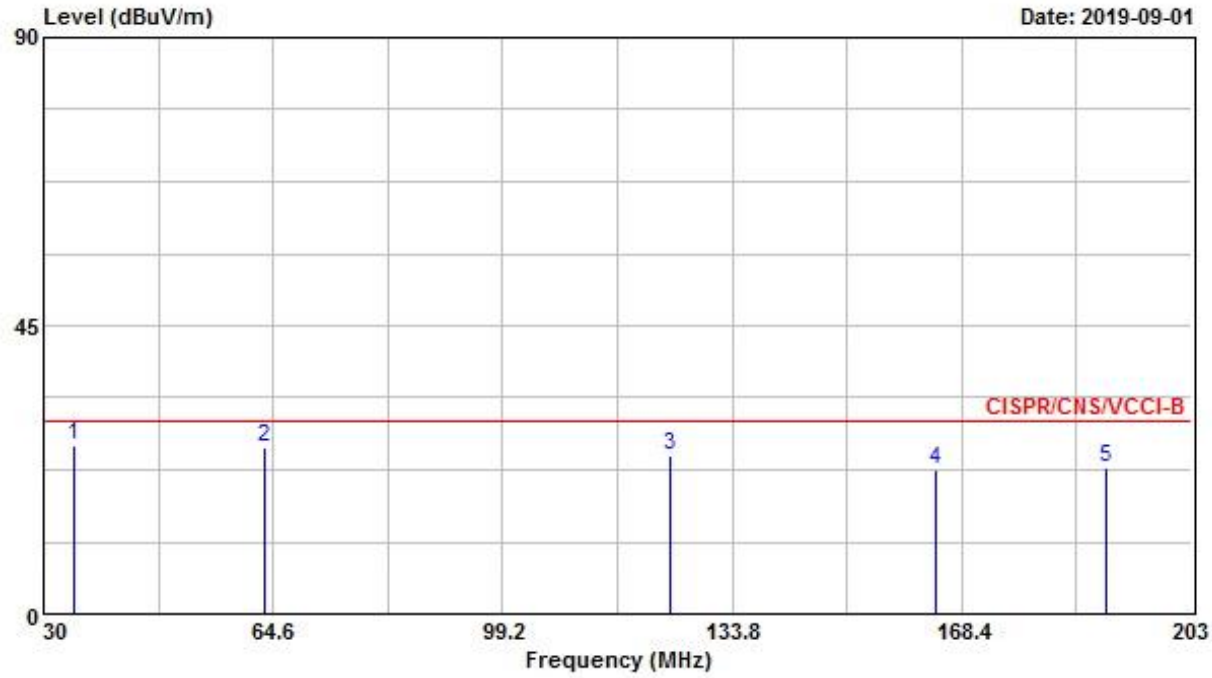
5.1.4. Typical Test Setup Layout



5.1.5. Test Result

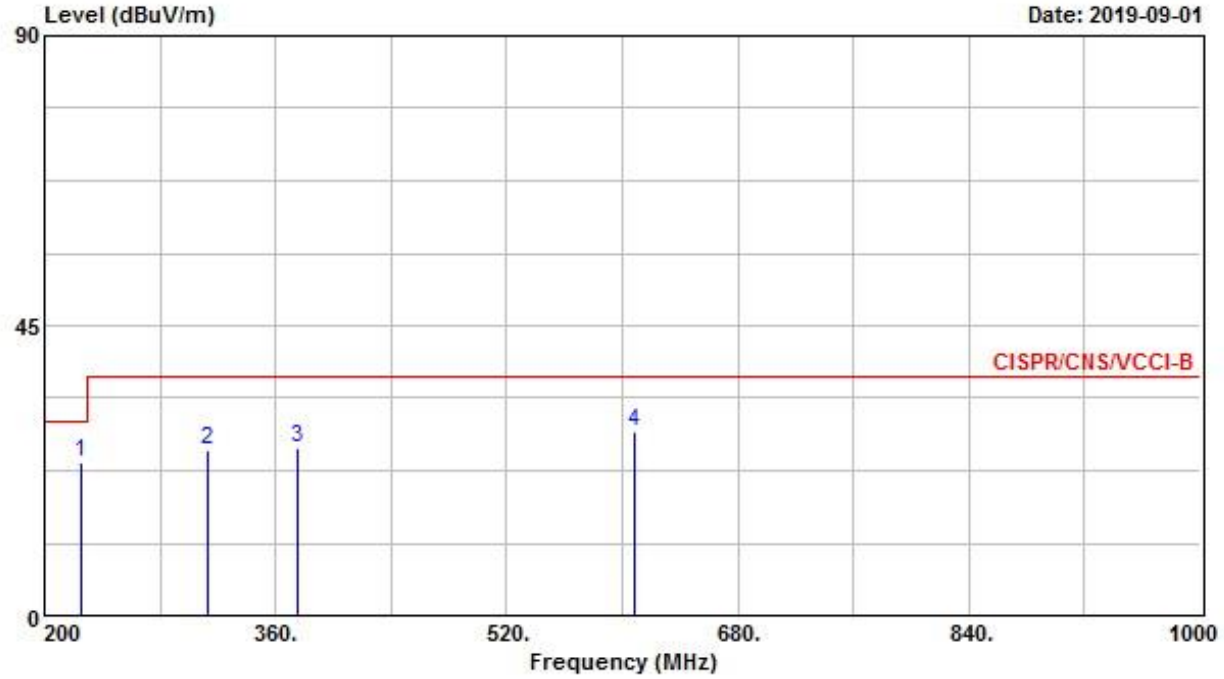
Test mode	Mode 1		
Test frequency	30 MHz ~ 1000 MHz	Test Voltage	AC 240V / 50Hz
■ The test was passed at the minimum margin that marked by the frame in the following data			

Vertical



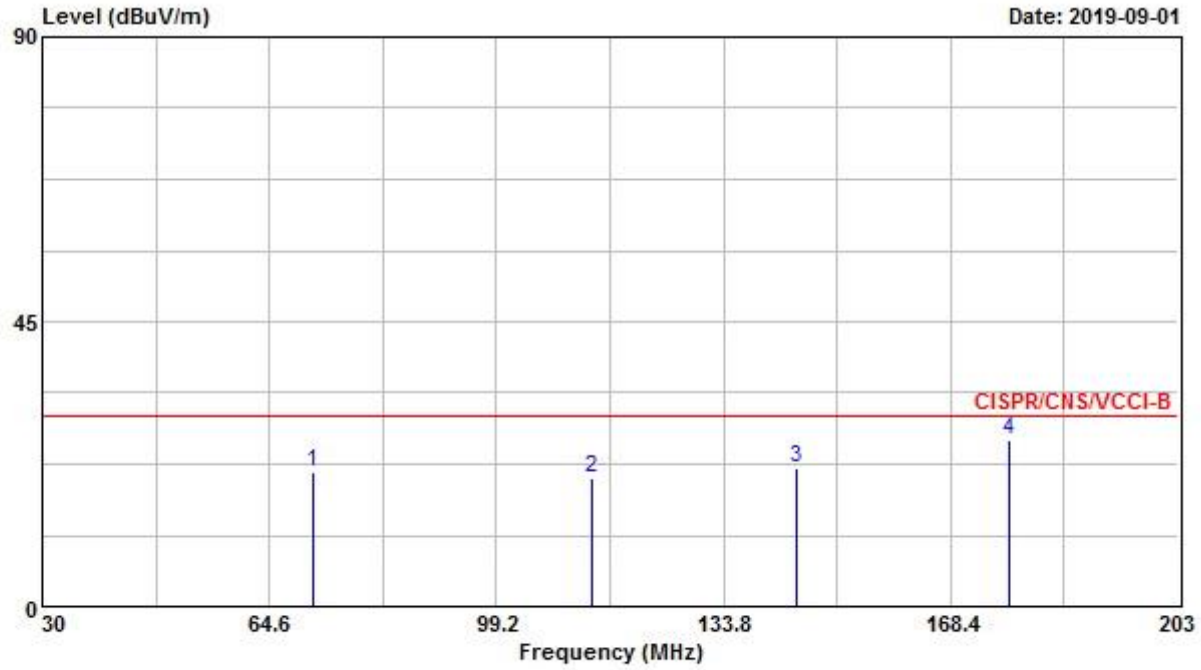
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	34.670	26.27	-3.73	30.00	33.20	20.49	1.01	28.43	QP	100	186
2 @	63.390	26.10	-3.90	30.00	41.47	11.64	1.37	28.38	Peak	---	---
3	124.460	24.82	-5.18	30.00	33.35	17.76	1.93	28.22	Peak	---	---
4	164.590	22.47	-7.53	30.00	33.09	15.15	2.29	28.06	Peak	---	---
5	190.200	22.69	-7.31	30.00	33.74	14.37	2.55	27.97	Peak	---	---

Vertical



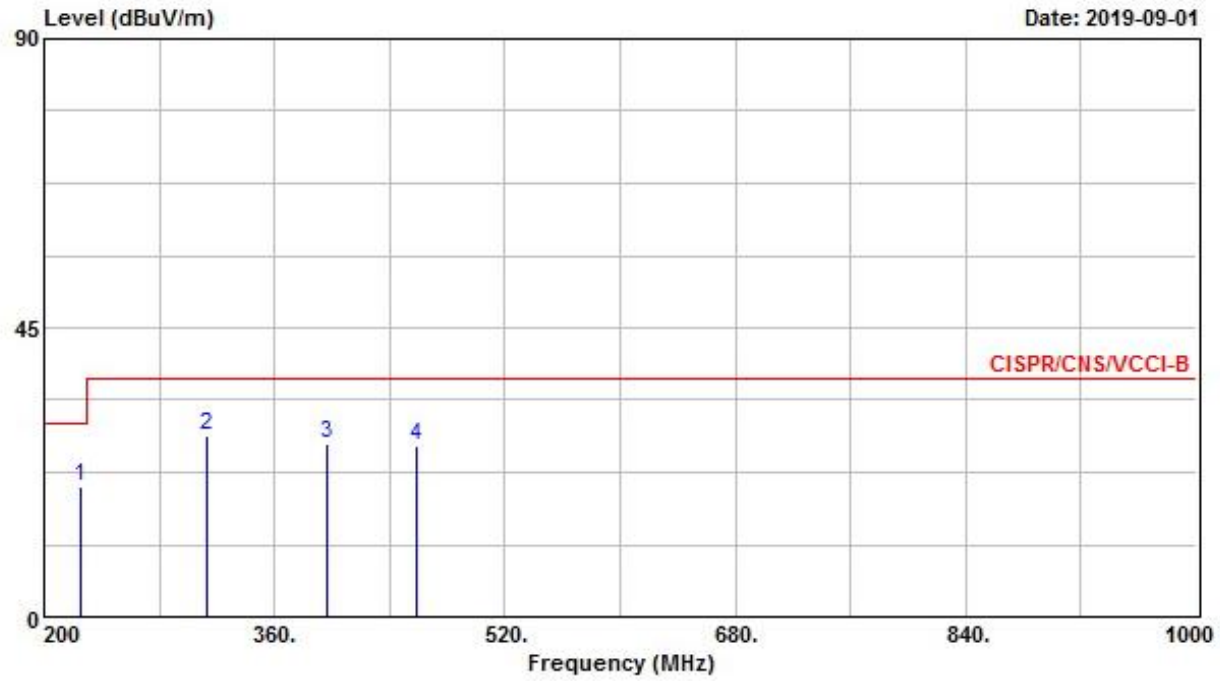
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	224.800	23.62	-6.38	30.00	33.35	15.34	2.83	27.90	Peak	---	---
2	313.600	25.82	-11.18	37.00	31.48	18.91	3.33	27.90	Peak	---	---
3	375.200	25.92	-11.08	37.00	30.38	20.21	3.67	28.34	Peak	---	---
4	608.800	28.55	-8.45	37.00	28.78	23.98	4.99	29.20	Peak	---	---

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	71.350	21.35	-8.65	30.00	36.55	11.67	1.50	28.37	Peak	---	---
2	113.730	20.34	-9.66	30.00	29.32	17.45	1.83	28.26	Peak	---	---
3	144.870	21.74	-8.26	30.00	31.56	16.21	2.11	28.14	Peak	---	---
4 @	177.400	26.21	-3.79	30.00	37.13	14.67	2.42	28.01	Peak	---	---

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	225.600	20.34	-9.66	30.00	29.97	15.43	2.84	27.90	Peak	---	---
2	313.600	28.06	-8.94	37.00	33.72	18.91	3.33	27.90	Peak	---	---
3	396.800	27.04	-9.96	37.00	30.70	21.02	3.81	28.49	Peak	---	---
4	458.400	26.56	-10.44	37.00	28.96	22.23	4.20	28.83	Peak	---	---

5.2. Radiated Emission above 1GHz

5.2.1. Limit

radiated emissions at frequencies above 1 GHz for Class A equipment			
Frequency range MHz	**Measurement**		**Class A limits dB(μV/m)**
	Distance (m)	**Detector type / bandwidth**	**SAC**
1000 – 3000	3	Average / 1 MHz	56
3000 – 6000			60
1000 – 3000		Peak / 1 MHz	76
3000 – 6000			80

radiated emissions at frequencies above 1 GHz for Class B equipment			
Frequency range MHz	**Measurement**		**Class B limits dB(μV/m)**
	Distance (m)	**Detector type / bandwidth**	**SAC**
1000 – 3000	3	Average / 1 MHz	50
3000 – 6000			54
1000 – 3000		Peak / 1 MHz	70
3000 – 6000			74

Required highest frequency for radiated measurement	
Highest internal frequency (F_x)	**Highest measured frequency**
$F_x \leq 108$ MHz	1 GHz
108 MHz < $F_x \leq 500$ MHz	2 GHz
500 MHz < $F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	5 x F_x up to a maximum of 6 GHz

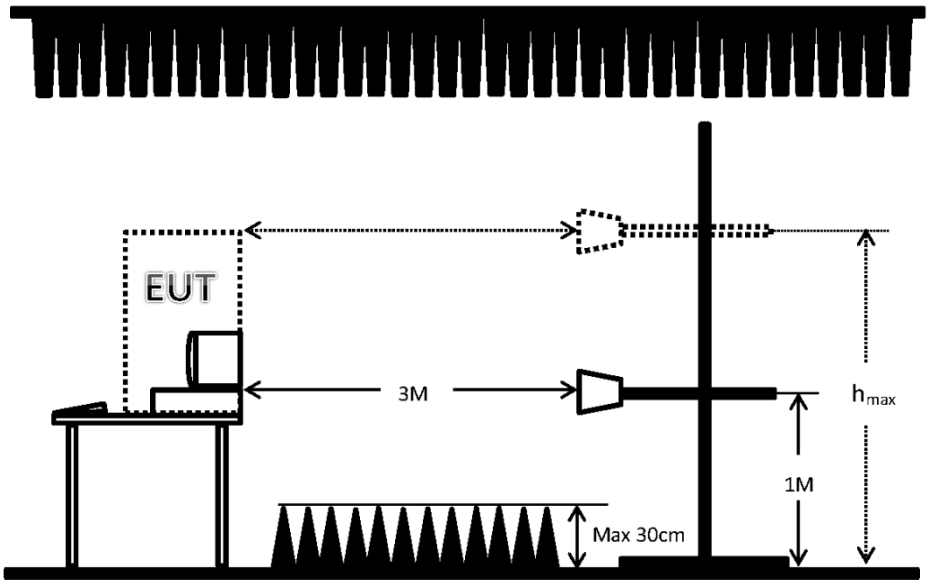
5.2.2. Test Procedures

a). Same test set up as below 1GHz radiated testing.
b). The EUT was set 3 meter from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c). There should be absorber placed between the EUT and Antenna and its located size should let the test site meet CISPR16-1-4 requirement.
d). The table was rotated 360 degrees to determine the position of the highest radiation.
e). The measured using a test-receiver system with both a peak and CISPR average detector.
f). Set the DRG Horn Antenna at 1M height, then run the turn table to get the maximum noise reading from Horizontal and Vertical polarity separately.t the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
g). When EUT locating on the turn-table, and its height is over 172cm (Antenna's 3dB beam width of 6GHz is 27∘), the DRG Horn Antenna must be raised up and descended down, then turning around the turn-table to get the maximum noise reading of the Horizontal and Vertical polarity separately. Note the maximum raise up height is same as the top of EUT.
h). If emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
i). The central point of the EUT shall be positioned at the centre of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.

5.2.3. Measurement Results Calculation

The measurand Level is calculated using:
Corrected Reading (dBμV/m) = Raw(Read Level)+AF(Antenna Factor)+CL(Cable Loss)-PA(Preamp Factor)
For example at 1980 MHz if the Antenna Factor is 26.19 dB/m, the cable loss is 4.08 dB, the measured voltage is 51.30 dBμV and the Preamp Factor is 33.34 dB, the signal strength would be calculated:
Corrected Reading (dBμV/m) = 51.30 dBμV + 26.19 dB/m + 4.08 dB + - 33.34 dB = 48.23 dBμV/m

5.2.4. Typical Test Setup Layout

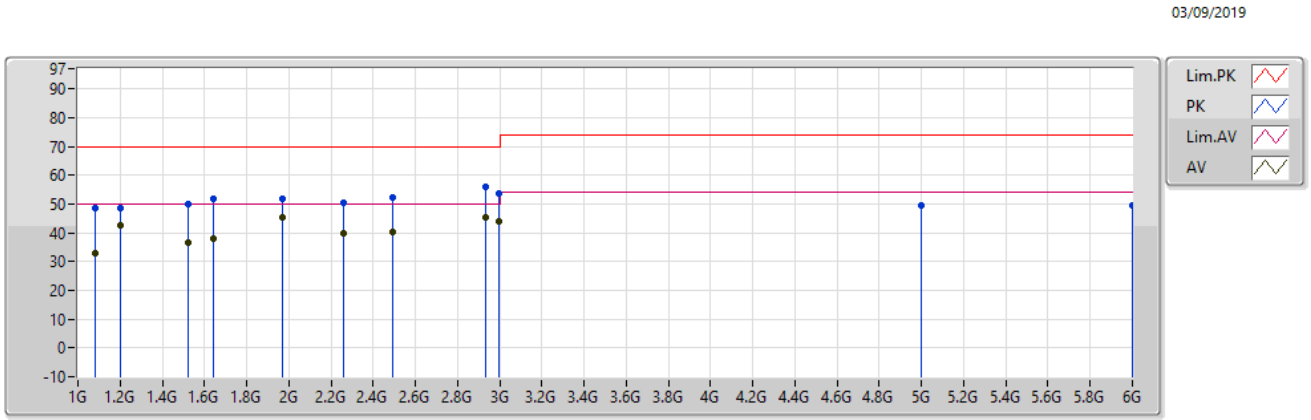


Remark: When EUT's height is over 172cm, h_{max} = top of EUT

5.2.5. Test Result

Test mode	Mode 1		
Test frequency	1 GHz ~ 6 GHz	Test Voltage	AC 240V / 50Hz
■ The test was passed at the minimum margin that marked by the frame in the following data			

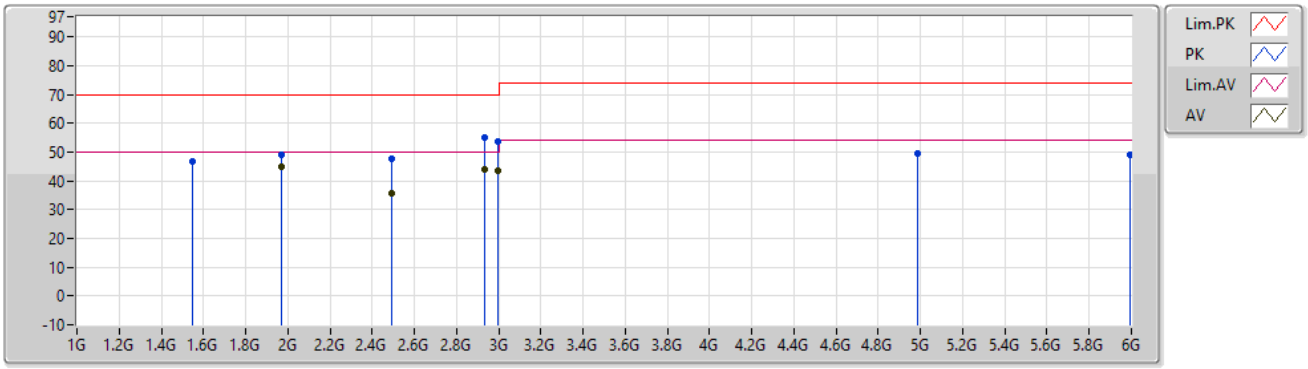
Vertical



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	1.085G	48.70	70.00	-21.30	-6.60	3	Vertical	208	1	-	55.30	24.94	2.49	34.03
AV	1.085G	32.76	50.00	-17.24	-6.60	3	Vertical	208	1	-	39.36	24.94	2.49	34.03
PK	1.2G	48.75	70.00	-21.25	-5.75	3	Vertical	196	1	-	54.50	25.50	2.63	33.88
AV	1.2G	42.80	50.00	-7.20	-5.75	3	Vertical	196	1	-	48.55	25.50	2.63	33.88
PK	1.525G	49.94	70.00	-20.06	-4.77	3	Vertical	211	1	-	54.71	25.77	2.95	33.49
AV	1.525G	36.43	50.00	-13.57	-4.77	3	Vertical	211	1	-	41.20	25.77	2.95	33.49
PK	1.64G	52.03	70.00	-17.97	-5.12	3	Vertical	240	1	-	57.15	25.32	3.04	33.48
AV	1.64G	37.91	50.00	-12.09	-5.12	3	Vertical	240	1	-	43.03	25.32	3.04	33.48
PK	1.97G	51.74	70.00	-18.26	-3.88	3	Vertical	250	1	-	55.62	26.19	3.38	33.45
AV	1.97G	45.33	50.00	-4.67	-3.88	3	Vertical	250	1	-	49.21	26.19	3.38	33.45
PK	2.26G	50.26	70.00	-19.74	-1.88	3	Vertical	200	1	-	52.14	28.04	3.63	33.55
AV	2.26G	39.88	50.00	-10.12	-1.88	3	Vertical	200	1	-	41.76	28.04	3.63	33.55
PK	2.49G	52.27	70.00	-17.73	-2.40	3	Vertical	180	1	-	54.67	27.42	3.83	33.65
AV	2.49G	40.37	50.00	-9.63	-2.40	3	Vertical	180	1	-	42.77	27.42	3.83	33.65
PK	2.935G	56.10	70.00	-13.90	-1.16	3	Vertical	136	1	-	57.26	28.47	4.29	33.92
AV	2.935G	45.34	50.00	-4.66	-1.16	3	Vertical	136	1	"Worst"	46.50	28.47	4.29	33.92
PK	2.995G	53.52	70.00	-16.48	-1.01	3	Vertical	268	1	-	54.53	28.59	4.35	33.95
AV	2.995G	44.10	50.00	-5.90	-1.01	3	Vertical	268	1	-	45.11	28.59	4.35	33.95
PK	5G	49.31	74.00	-24.69	3.12	3	Vertical	-	-	-	46.19	31.60	5.42	33.90
PK	6G	49.62	74.00	-24.38	4.53	3	Vertical	-	-	-	45.09	32.60	5.88	33.95

Horizontal

03/09/2019



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	1.545G	46.66	70.00	-23.34	-4.86	3	Horizontal	-	-	-	51.52	25.67	2.96	33.49
PK	1.97G	49.24	70.00	-20.76	-3.88	3	Horizontal	230	1	-	53.12	26.19	3.38	33.45
AV	1.97G	45.02	50.00	-4.98	-3.88	3	Horizontal	230	1	"Worst"	48.90	26.19	3.38	33.45
PK	2.495G	47.49	70.00	-22.51	-2.40	3	Horizontal	210	1	-	49.89	27.41	3.84	33.65
AV	2.495G	35.70	50.00	-14.30	-2.40	3	Horizontal	210	1	-	38.10	27.41	3.84	33.65
PK	2.935G	54.86	70.00	-15.14	-1.16	3	Horizontal	240	1	-	56.02	28.47	4.29	33.92
AV	2.935G	44.05	50.00	-5.95	-1.16	3	Horizontal	240	1	-	45.21	28.47	4.29	33.92
PK	2.995G	53.42	70.00	-16.58	-1.01	3	Horizontal	185	1	-	54.43	28.59	4.35	33.95
AV	2.995G	43.66	50.00	-6.34	-1.01	3	Horizontal	185	1	-	44.67	28.59	4.35	33.95
PK	4.985G	49.36	74.00	-24.64	3.05	3	Horizontal	-	-	-	46.31	31.54	5.41	33.90
PK	5.995G	48.85	74.00	-25.15	4.52	3	Horizontal	-	-	-	44.33	32.59	5.88	33.95

6. Uncertainty of Test Site

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

6.1. Emission Test Measurement Uncertainty

Test Items	Test Site No.	U_{LAB}
Conducted Emissions	CO01-NH	2.7 dB
Radiated Emissions below 1GHz	OS03-NH	5.9 dB
Radiated Emissions above 1GHz	03CH04-HY	6.47 dB

7. List of Measuring Equipment Used

Conducted Emission - Test Date: 29/Aug/2019

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Receiver	R&S	ESR3	102318	9K Hz – 3.6 GHz	30/Jul/2019	Conduction (CO01-NH)
LISN	SCHAFFNER	NNB41	06/10024	9kHz - 30MHz	02/Jan/2019	Conduction (CO01-NH)
LISN	ROLF HEINE	NNB-2/16Z	99079	9kHz - 30MHz	21/Jan/2019	Conduction (CO01-NH)
Power Filter	CORCOM	MR12030	N/A	30A*2	NCR	Conduction (CO01-NH)
RF Cable-CON	Suhner Switzerland	RG223/U	CB004	9kHz - 30MHz	27/Dec/2018	Conduction (CO01-NH)
software	Audix	E3	6.12160806	-	NCR	Conduction (CO01-NH)
Impedance Stabilization Network	TESEQ GMBH	ISN T800	26105	150kHz - 30MHz	12/Nov/2018	Conduction (CO01-NH)

Note: Calibration Interval of instruments listed above is one year. NCR: No Calibration Request.

Radiated Emission below 1GHz - Test Date: 01/Sep/2019

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Open Area Test Site	SPORTON	OATS-10	OS03-NH	30 MHz - 1 GHz 10m, 3m	23/Oct/2018	Radiation (OS03-NH)
Amplifier	HP	8447D	2944A08292	0.1 MHz - 1.3 GHz	04/Jul/2019	Radiation (OS03-NH)
Spectrum Analyzer	R&S	FSP7	838858/038	9 kHz – 7GHz	12/Nov/2018	Radiation (OS03-NH)
Receiver	R&S	ESCS30	838251/002	9 kHz –2.75 GHz	05/Jul/2019	Radiation (OS03-NH)
Bilog Antenna With 5dB Attenuator	CHASE	CBL6112D	25234	30 MHz - 2 GHz	27/Apr/2019	Radiation (OS03-NH)
Turn Table	EMCO	2080	9805-2065	0 - 360 degree	NCR	Radiation (OS03-NH)
Antenna Mast	EMCO	2075	9804-2151	1 m - 4 m	NCR	Radiation (OS03-NH)
RF Cable-R10m	HSCN	RG213U	2X11N	30 MHz - 1 GHz	22/Jul/2019	Radiation (OS03-NH)
Software	Audix	E3	Ver.4	-	NCR	Radiation (OS03-NH)

Note: Calibration Interval of instruments listed above is one year. NCR: No Calibration Request.

Radiated Emission above 1GHz - Test Date: 03/Sep/2019

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Test Receiver	R&S	ESU-26	100422	20Hz ~ 26.5GHz	25/Oct/2018	24/Oct/2019	Radiation (03CH04-HY)
Turn Table	Chaintek	3000	MF7802056	0 ~ 360 degree	NCR	NCR	Radiation (03CH04-HY)
Antenna Mast	MF	MF-7802	MF780208163	1 m ~ 4 m	NCR	NCR	Radiation (03CH04-HY)
3m Semi Anechoic Chamber (Site V.S.W.R)	RIKEN	3m SAC	03CH04-HY	1 GHz ~ 18 GHz 3m	09/Mar/2019	08/Mar/2020	Radiation (03CH04-HY)
Microwave Preamplifier	Agilent	8449B	3008A02364	1GHz ~ 26.5GHz	13/Dec/2018	12/Dec/2019	Radiation (03CH04-HY)
Horn Antenna	SCHWARZBECK	BBHA9120	BBHA 9120 D-1130	1 GHz ~ 18 GHz	26/Oct/2018	25/Oct/2019	Radiation (03CH04-HY)
RF Cable-HIGH	HUBER+SUHNER	SUOFLEX 104	SN805197/4+MY39495	1 GHz ~ 26 GHz	13/Mar/2019	12/Mar/2020	Radiation (03CH04-HY)
Software	Sporton	SENSE-EMI	V5.10.5	-	NCR	NCR	Radiation (03CH04-HY)

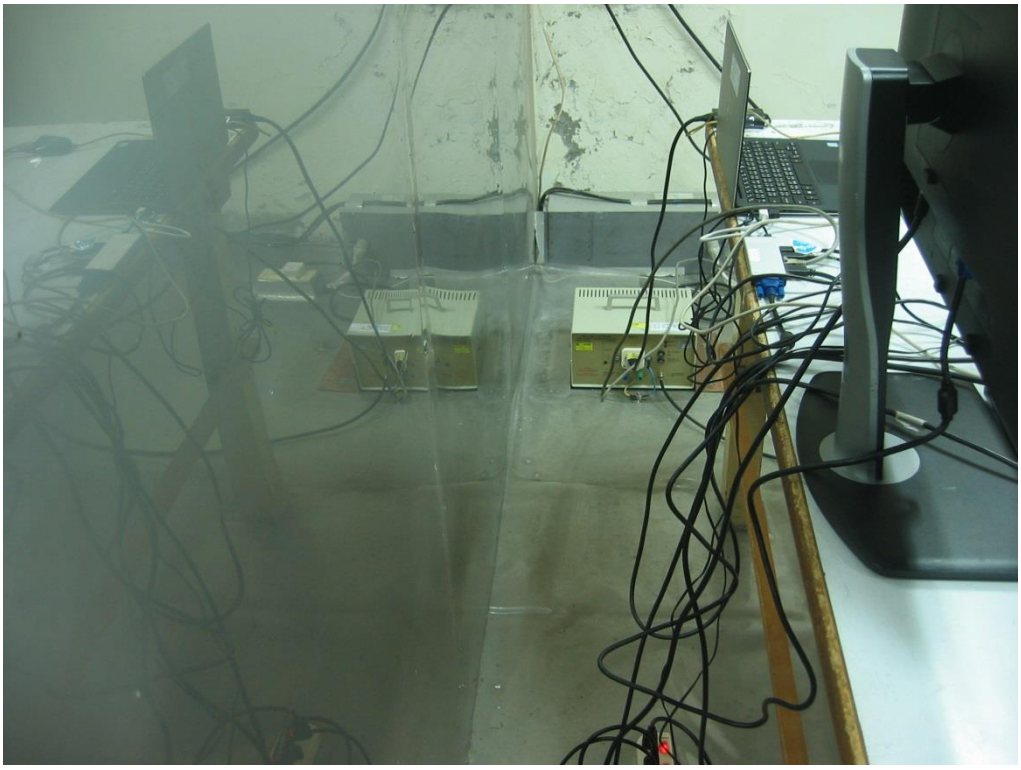
NCR: No Calibration Request.

Appendix A. Test Photos

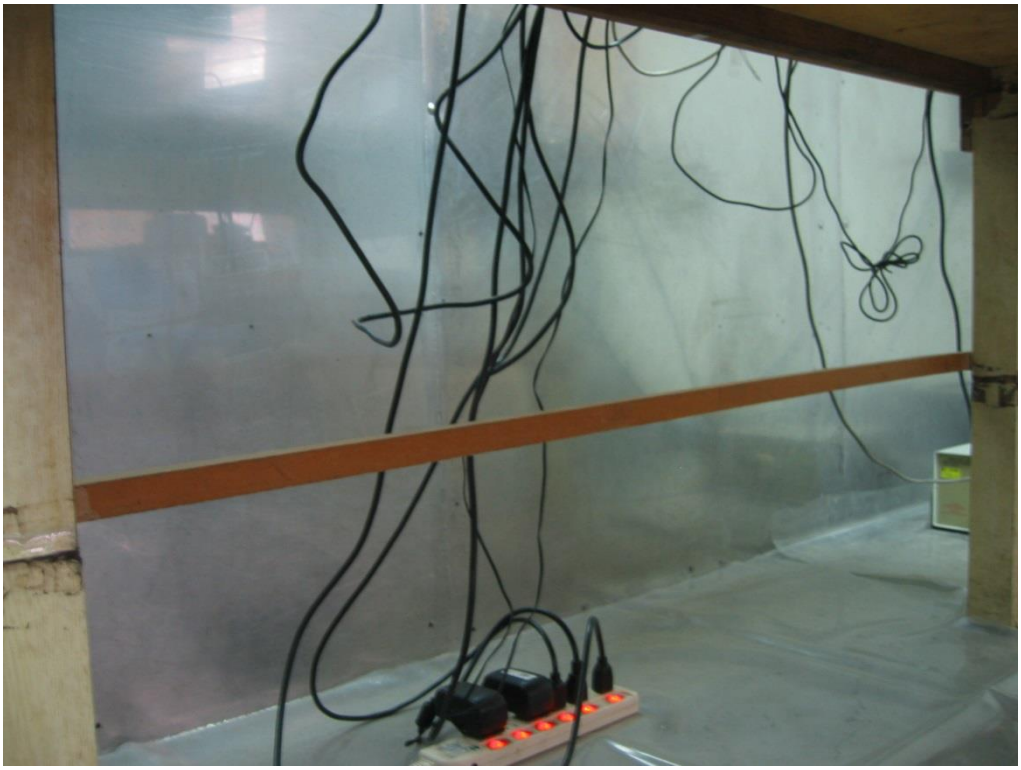
1. Photographs of Conducted Emissions Test Configuration

Front View

Side View

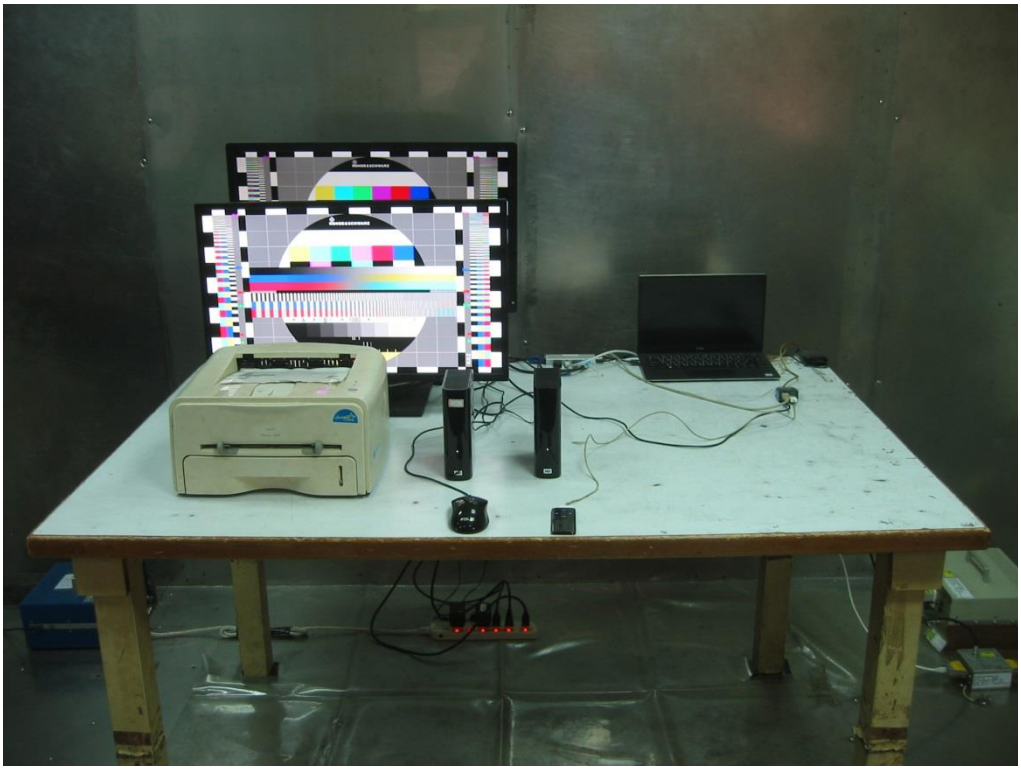


Under Table View

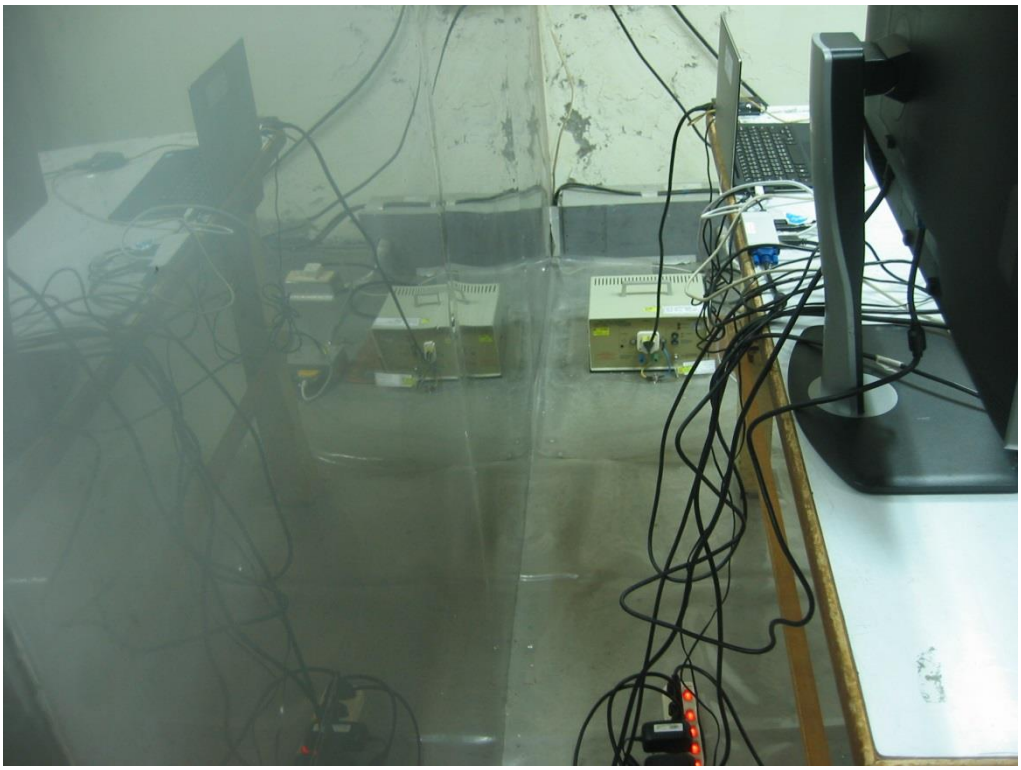


2. Photographs of Telecommunication Emissions Test Configuration

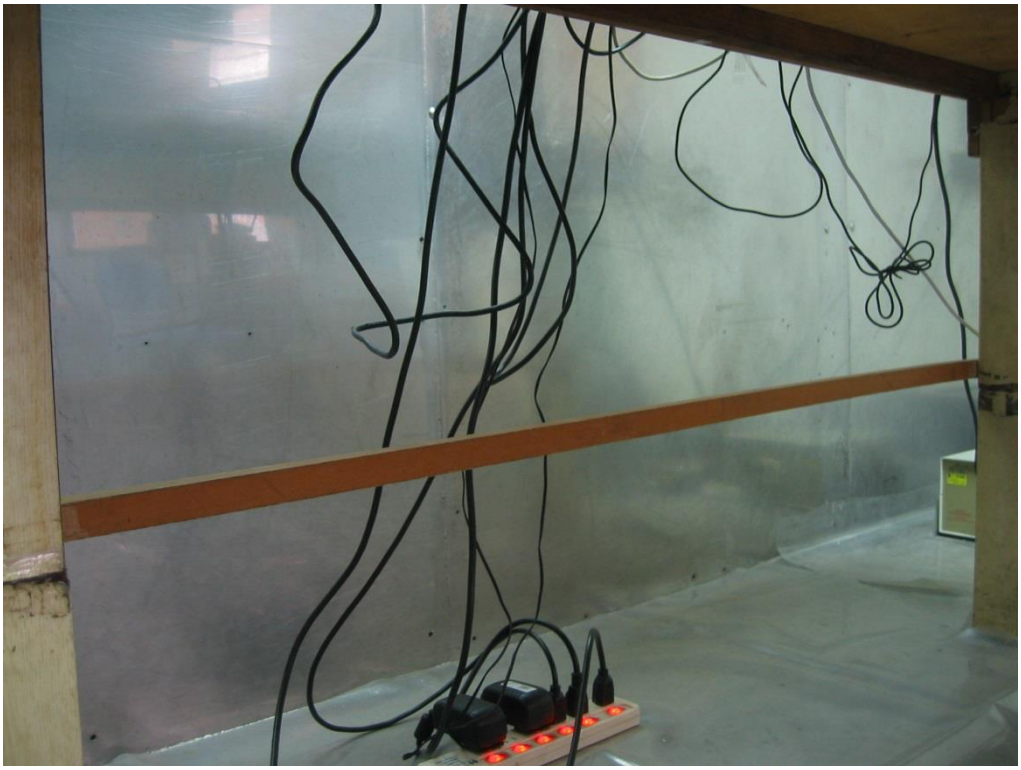
Front View



Side View



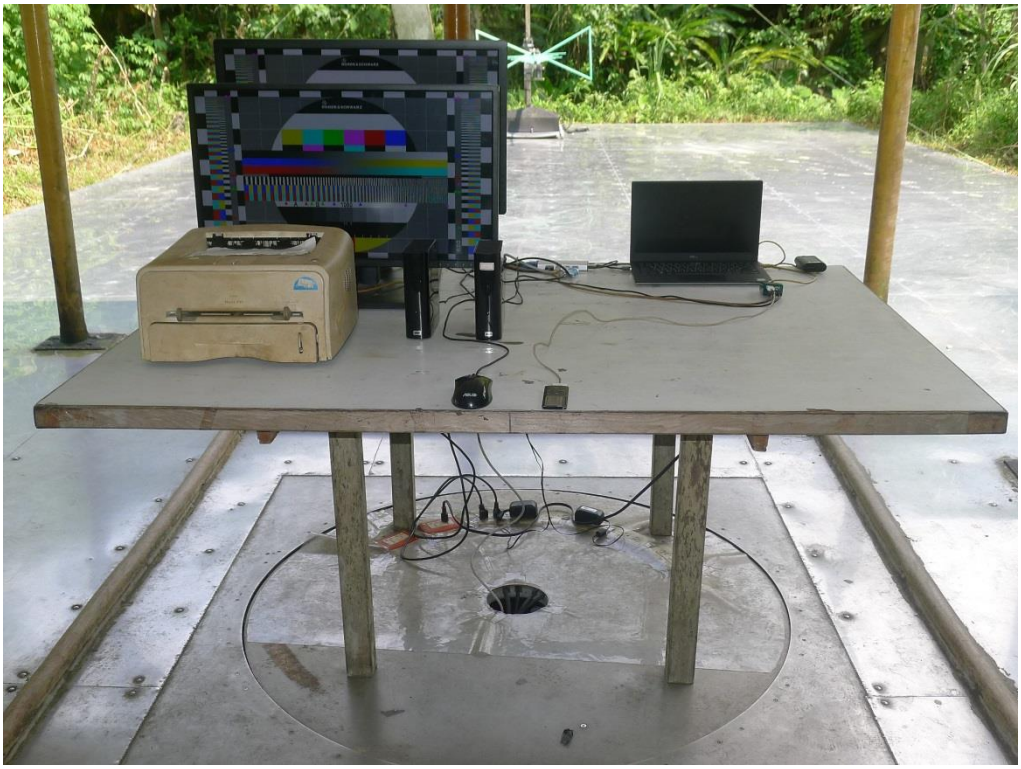
Under Table View



3. Photographs of Radiated Emissions Test Configuration

For radiated emissions below 1GHz

Front View

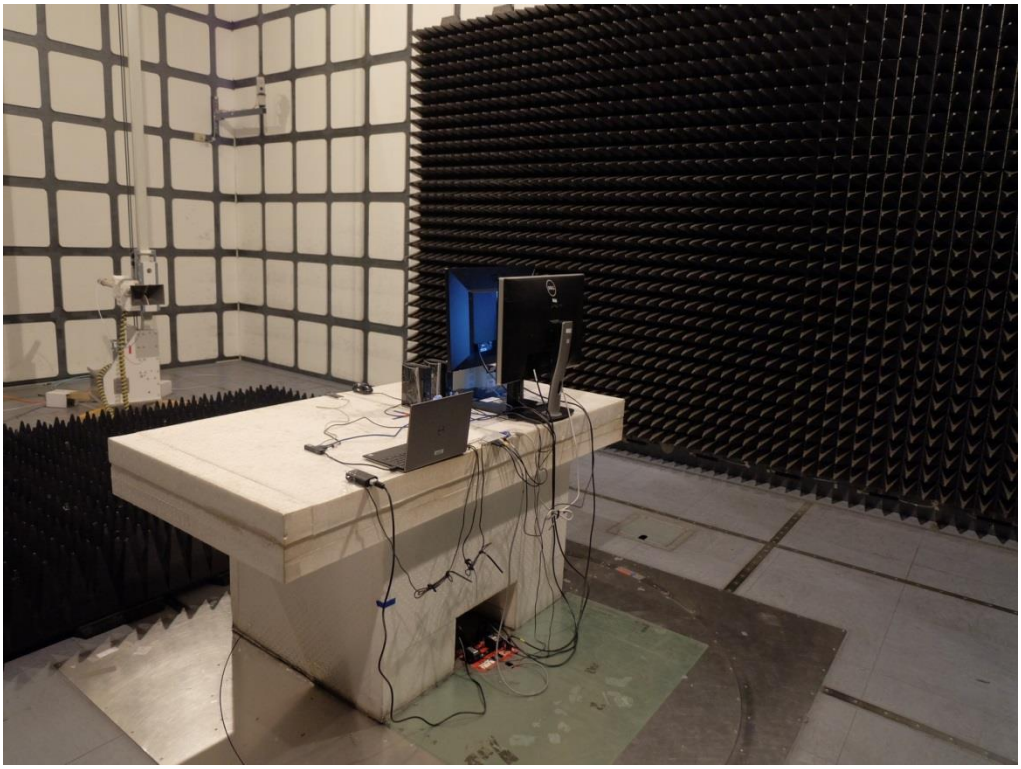


Rear View

For radiated emissions above 1GHz

Front View

Rear View



THE END