VCCI Test Report

Project No.	:	2311T005
Equipment	:	Micro SD Card
Model Name	:	Industrial Micro SD R1-M, Industrial Micro SDHC R1-M, Industrial Micro SDXC R1-M, Industrial Micro SD R1-SL, Industrial Micro SDHC R1-SL, Industrial MicroSDXC R1-SL, Industrial Micro SDHC MSD-WORM, Industrial Micro SDXC MSD-WORM
Applicant	:	Apacer Technology Inc.
Address	:	1F., No.32, Zhongcheng Rd., Tucheng Dist., New Taipei City 236, Taiwan R.O.C.

Date of Receipt	:	2019/4/23
Date of Test	:	2019/4/23 ~ 2019/4/26
Issued Date	:	2023/11/13
Tested by	:	BTL Inc.

Prepared by : Joe Chang, Engineer

Approved by : Josh Lin, Manager

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-VCCI-1-2311T005	R00	Original Report.	2023/11/13	Valid

1. CERTIFICATION

Applicant	Apacer Technology Inc.
Address of Applicant	1F., No.32, Zhongcheng Rd., Tucheng Dist., New Taipei City 236, Taiwan R.O.C.
Equipment	Micro SD Card
Brand Name	EmBestor Technology Inc.
Model Name	Industrial Micro SD R1-M, Industrial Micro SDHC R1-M, Industrial Micro SDXC R1-M, Industrial Micro SD R1-SL, Industrial Micro SDHC R1-SL, Industrial Micro SDXC R1-SL, Industrial Micro SDHC MSD-WORM, Industrial Micro SDXC MSD-WORM
Model Difference	Differ in market area.
Classification of EUT	Class B
OEM Brand/Model Name	N/A
Power Source	Supplied from host system.
Power Rating	EUT I/P: DC 5V
Products Covered	N/A
Statement of Conformity	The EUT is found to conform to VCCI Class B limits

The above equipment has been tested and found in compliance with the requirement of the relative standards by BTL Inc. EMC Test Department
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-VCCI-1-2311T005) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

The test results presented in this report relate only to the specific object tested.
This test report shall not be reproducted except in full.
Note:
(1) In this report, all the test results refer to BTL-VCCI-1-1511T233B report due to the device is identical to the referencing report and, after evaluated, no need to re-test.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission					
Standard(s)	Test Item		Limit	Judgment	Remark
VCCI-TECHNICAL REQUIREMENTS (VCCI-CISPR 32: 2016) CISPR 32:2015+COR1:2016	Radiated emissions up to 1 GHz		Class B	PASS	------
	Radiated emissions above 1 GHz		Class B	PASS	NOTE (2)
	Radiated emissions from FM receivers		------	N/A	NOTE (1) NOTE (3)
	Conducted emissions AC mains power port		Class B	PASS	------
	Asymmetric mode conducted emissions	AAN	------	N/A	NOTE (1) NOTE (4)
		Current Probe	------	N/A	
		CVP	------	N/A	
	Conducted differential voltage emissions		------	N/A	NOTE (1) NOTE (5)

NOTE:

(1) ”N/A” denotes test is not applicable in this test report.

(2) The EUT’s max operating frequency is 208 MHz which exceeds 108 MHz, so the test will be performed.

(3) If the EUT has FM function the test will be performed.

(4)

Cable Type	Number of pairs	Measurement type	Procedures
Balanced Unscreened	1 (2 wire) ;2 (4 wire); 3 (6 wire) ;4 (8 wire)	Voltage	AAN
Balanced Unscreened	See a)	Voltage and Current	CP+CVP
Screened or Coaxial	n/a	Voltage	AAN
Screened or Coaxial	n/a	Voltage or Current	CP or CVP
Unbalanced cables	n/a	Voltage and Current	CP+CVP

Ports connected to cables with more than 4 balanced pairs or where the port is unable to function correctly when connected through an AAN.

(5) If the EUT has tuner port the test will be performed.

Test Conditions:

Environment Conditions:

Test Item	Temperature	Humidity
Radiated emissions up to 1 GHz	26°C	52%
Radiated emissions above 1 GHz	26°C	60%
Radiated emissions from FM receivers	-	-
Conducted emissions AC mains power port	25°C	53%
Asymmetric mode conducted emissions	-	-
Conducted differential voltage emissions	-	-

Measurement Distance:

up to 1 GHz	above 1 GHz
10 m	-

Miscellaneous:
None

2.1 TEST FACILITY

Test Lab. Member Number: 672

Facility No. Registered to VCCI	Test Item
C-20022	VCCI Registration Number for Conducted emissions AC mains power port
-	VCCI Registration Number for Asymmetric mode conducted emissions
R-20013	VCCI Registration Number for Radiated Emissions up to 1 GHz
G-20029	VCCI Registration Number for Radiated Emissions above 1GHz

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95**%.
The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

A. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	Ant.	U,(dB)
OS02 (10m)	CISPR	30MHz ~ 200MHz	V	3.84
		30MHz ~ 200MHz	H	3.34
		200MHz ~ 1,000MHz	V	3.74
		200MHz ~ 1,000MHz	H	3.06

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
CB19 (3m)	CISPR	1GHz ~ 6GHz	V	4.56
		1GHz ~ 6GHz	H	4.44
		6GHz ~ 18GHz	V	4.06
		6GHz ~ 18GHz	H	4.00

B. Conducted emissions AC mains power port test:

Test Site	Method	Measurement Frequency Range	U,(dB)
C03	CISPR	150 kHz ~ 30MHz	2.30

Note: unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.
Our calculated Measurement Instrumentation Uncertainty is shown in the tables above.
These are our U_{lab} values in CISPR 16-4-2 terminology.
Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) - 150 kHz - 30 MHz: 3.6 dB
Radiated Disturbance (electric field strength on an open area test site or alternative test site) - 30 MHz - 1000 MHz: 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR}.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

The EUT is a Micro SD Card, More details of EUT technical specification, please refer to the user's manual.

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Micro SD card R/W (#1)
Mode 2	Micro SD card R/W (#2)

Radiated emission test	
Final Test Mode	Description
Mode 1	Micro SD card R/W (#1)

Conducted emissions AC mains power port test	
Final Test Mode	Description
Mode 1	Micro SD card R/W (#1)

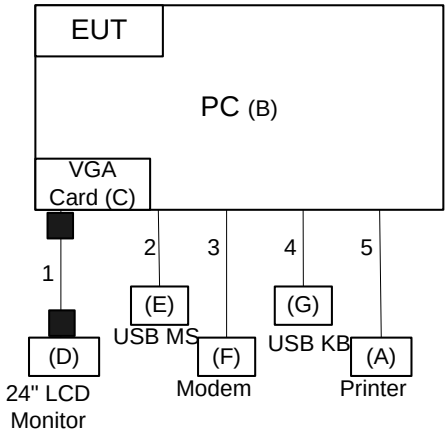
3.3 EUT OPERATION CONDITIONS

The PC exercise program (BurninTEST V8.0 and Color Bar(ITU-R BT 471-1)) used during radiated and/or conducted emissions measurement was designed to exercise the various system components in a manner similar to a typical use.

Primary Clock Frequencies of Internal Source

Primary Clock Frequencies	208 MHz

3.4 TESTED CONFIGURATION DIAGRAM



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Remarks
A	Printer	HP	SNPRH-1504	N/A	Furnished by test lab
B	PC	DELL	OptiPlex 790 MT	64NJVBX	Furnished by test lab
C	VGA Card	Gigabyte	GTX 550 Ti	122951008613	Furnished by test lab
D	24” LCD Monitor	DELL	U2410f	CN-OJ257M-72872-09J-067L	Furnished by test lab
E	USB Mouse	DELL	MOCZUL	CN-049TWY-PRC00-79E-01HA	Furnished by test lab
F	Modem	ACEEX	DM-1414V	8041708	Furnished by test lab
G	USB K/B	DELL	KB216t	CN-0W33XP-L0300-797-05TY-A03	Furnished by test lab

Item	Description	Shielded Type	Ferrite Core	Length	Remarks
1	VGA Cable	YES	YES	1.7m	Furnished by test lab
2	USB Cable	YES	NO	1.7m	Furnished by test lab
3	RS232 Cable	YES	NO	1.7m	Furnished by test lab
4	USB Cable	YES	NO	1.7m	Furnished by test lab
5	USB Cable	YES	NO	1.7m	Furnished by test lab

4. EMC EMISSION TEST

4.1 RADIATED EMISSION

4.1.1 LIMITS

Class A equipment up to 1000MHz

Table clause	Frequency MHz	Measurement		Class A limit dB(uV/m)
		Distance m	Detector type/bandwidth	OATS/SAC
A2.1	30-230	10	Quasi peak / 120 kHz	40
	230-1000			47
A2.2	30-230	3		50
	230-1000			57

Class A equipment above 1000MHz

Table clause	Frequency MHz	Measurement		Class A limit dB(uV/m)
		Distance m	Detector type/bandwidth	FSOATS
A3.1	1000-3000	3	Average / 1 MHz	56
	3000-6000			60
A3.2	1000-3000		Peak / 1 MHz	76
	3000-6000			80

Class B equipment up to 1000MHz

Table clause	Frequency MHz	Measurement		Class B limit dB(uV/m)
		Distance m	Detector type/bandwidth	OATS/SAC
A4.1	30-230	10	Quasi peak / 120 kHz	30
	230-1000			37
A4.2	30-230	3		40
	230-1000			47

Class B equipment above 1000MHz

Table clause	Frequency MHz	Measurement		Class B limit dB(uV/m)
		Distance m	Detector type/bandwidth	FSOATS
A5.1	1000-3000	3	Average / 1 MHz	50
	3000-6000			54
A5.2	1000-3000		Peak / 1 MHz	70
	3000-6000			74

Notes:

(1) The limit for radiated test was performed according to as following: CISPR 32

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value

Required highest frequency for radiated measurement

Highest internal frequency (F_x) MHz	Highest measured frequency MHz
F_x ≦108	1000
108＜F_x ≦500	2000
500＜ F_x ≦1□00	5000
F_x ＞1000	5th up to a maximum 6 GHz,

Note for FM and TV broadcast receiver, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

4.1.2 TEST PROCEDURE

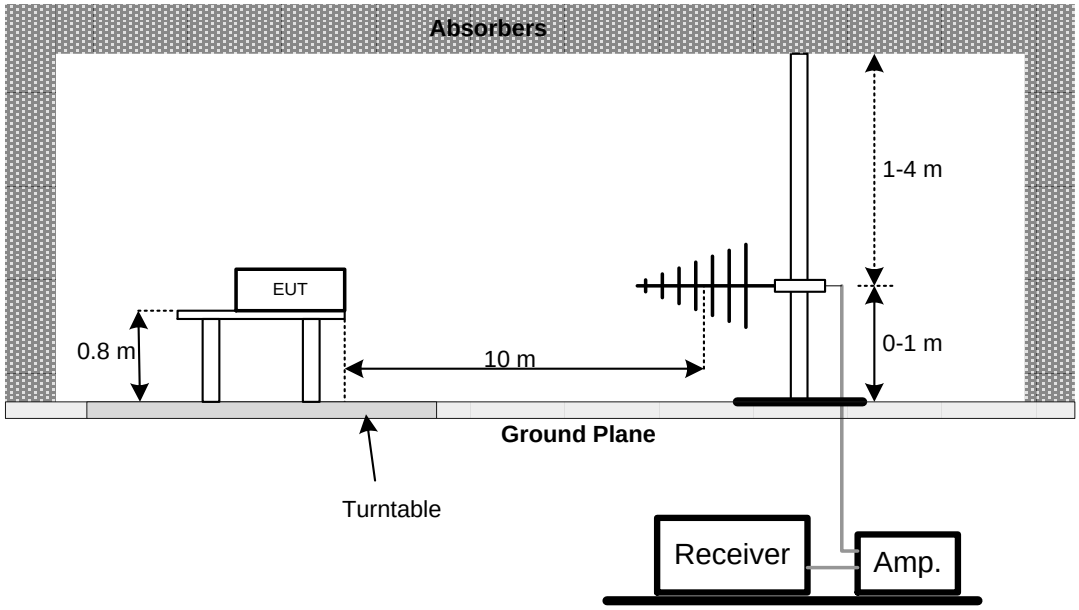
a. The measuring distance of 10 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 m above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation (up to 1 GHz).
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. Cables connecting to AE located outside the measurement area shall drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. The thickness of the insulation shall not be more than 150 mm. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer’s recommendation
d. The height of the equipment or of the substitution antenna shall be 0.8 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading.
f. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
g. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
h. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (up to 1GHz)
i. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
j. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

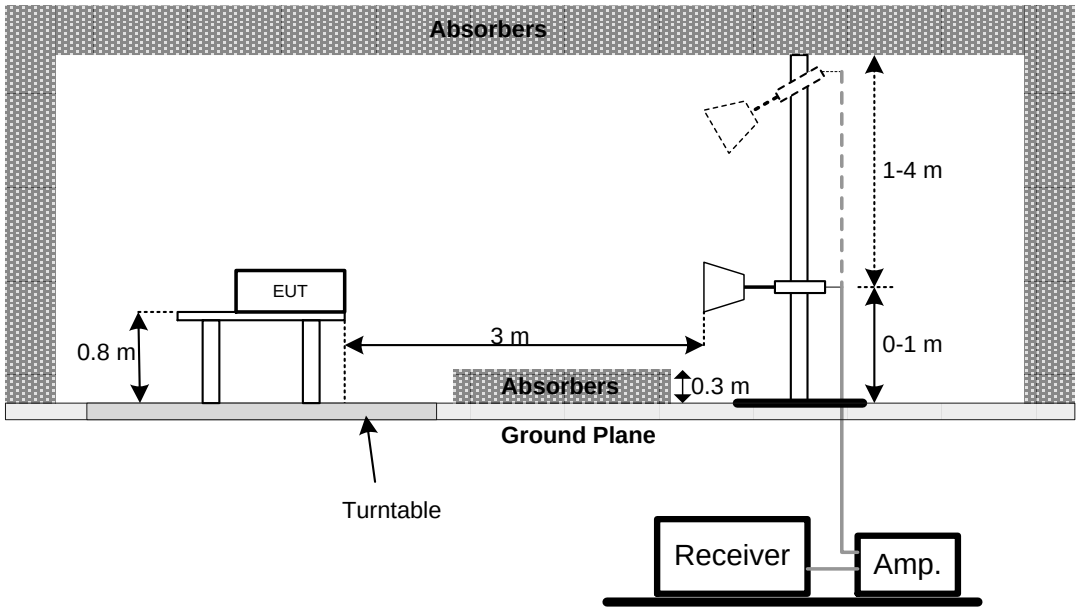
No deviation

4.1.4 TEST SETUP

UP TO 1 GHZ

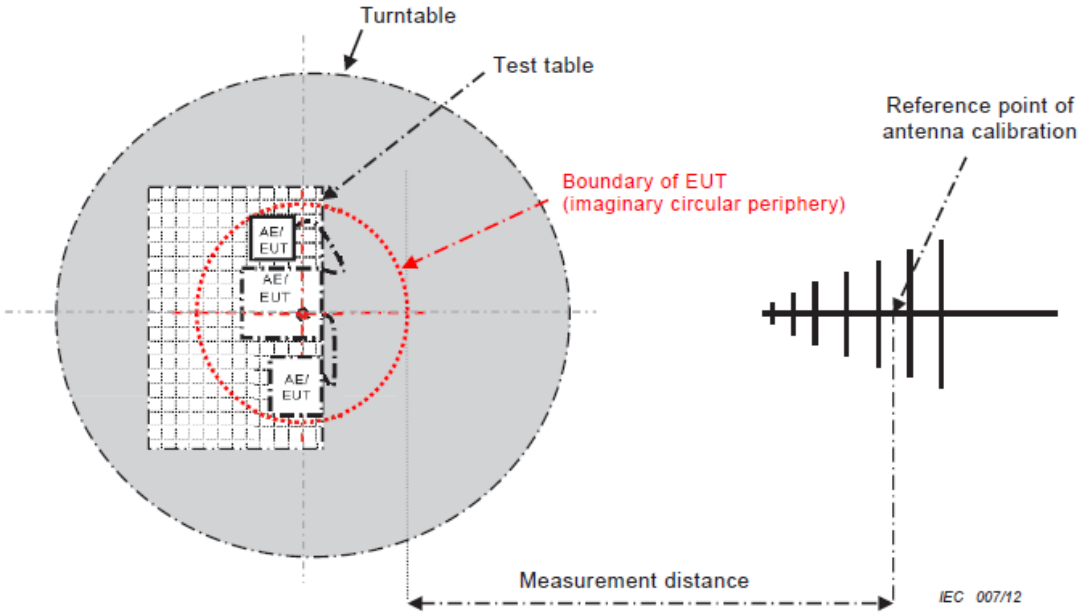


4.1.5TEST SETUP (ABOVE 1 GHZ)



Note: The antenna can be moved between 1 to 4 meters above the ground.

4.1.6 MEASUREMENT DISTANCE



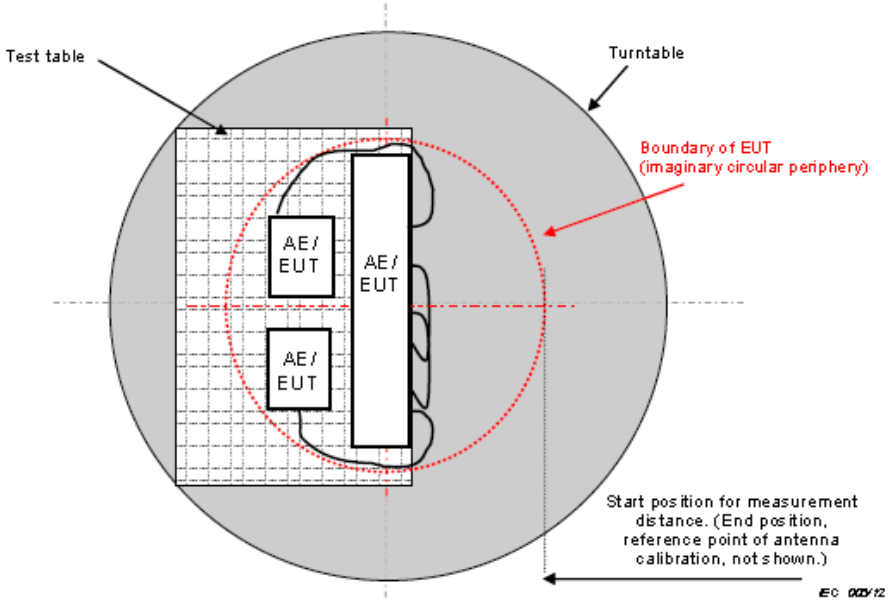


Figure C.2 – Boundary of EUT, Local AE and associated cabling

4.1.7 TEST RESULTS (UP TO 1 GHZ)

Please refer to the Attachment A.

Remark:

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
(2) If the peak scan value lower limit more than 10dB, then this signal data does not show in table.

4.1.8 TEST RESULTS (ABOVE 1 GHZ)

Please refer to the Attachment B.

Remark:

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading Compliance with the QP Limits and then QP Mode measurement didn't perform.
(2) For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.

4.2 RADIATED EMISSIONS FROM FM RECEIVERS MEASUREMENT

4.2.1 LIMITS

Table clause	Frequency MHz	Measurement		Class B limit dB(uV/m)	
		Distance m	Detector type/bandwidth	Fundamental OATS/SAC	Harmonics OATS/SAC
A6.1	30-230	10	Quasi peak / 120 kHz	50	42
	230-300				42
	300-1000				46
A6.2	30-230	3		60	52
	230-300				52
	300-1000				56

NOTE:

(1) Emission level (dBuV/m) = 20log Emission level (uV/m).

(2) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

4.2.2 TEST PROCEDURE

a. The measuring distance of 3 m shall be used for measurements at frequency up to 1GHz.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. The initial step in collecting conducted emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

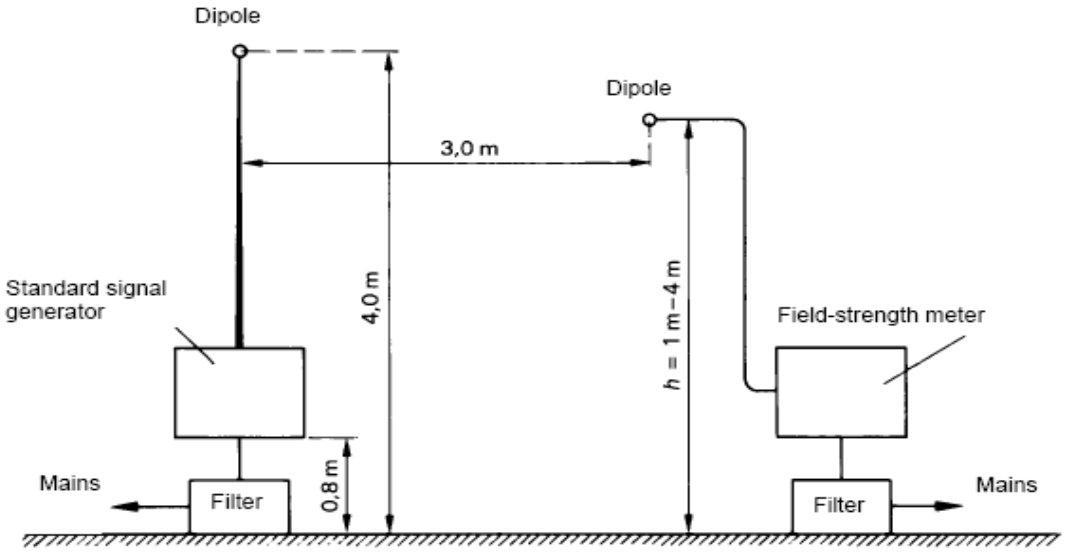
Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

4.2.4 TEST SETUP



4.2.5 TEST RESULTS

Please refer to the Attachment C.

Remark:

(1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz,SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz.

(2) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(3) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

4.3 CONDUCTED EMISSION MEASUREMENT AT AC MAINS POWER PORTS

4.3.1 LIMITS

Requirements for conducted emissions from AC mains power ports of Class A equipment

Table clause	Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class A Limits (dB(μV))
A9.1	0.15 - 0.5	AMN	Quasi Peak / 9 kHz	79
	0.5 - 30			73
A9.2	0.15 - 0.5	AMN	Average / 9 kHz	66
	0.5 - 30			60

Requirements for conducted emissions from AC mains power ports of Class B equipment

Table clause	Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class B Limits (dB(μV))
A10.1	0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66-56
	0.5 - 5			56
	5 - 30			60
A10.2	0.15 - 0.5	AMN	Average / 9 kHz	56-46
	0.5 - 5			46
	5 - 30			50

NOTE:

(1) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value – Limit Value

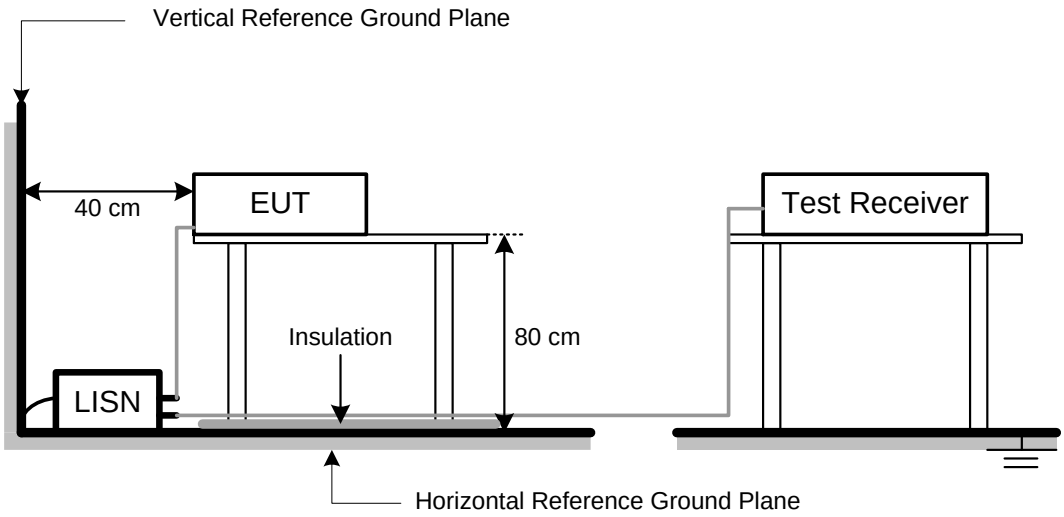
4.3.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. 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 to 40 cm long.
c. I/O cables that are not connected to a peripheral 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.
d. Cables connecting to AE located outside the measurement area shall drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. The thickness of the insulation shall not be more than 150 mm. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer’s recommendation
e. LISN at least 80 cm from nearest part of EUT chassis.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.3.3 DEVIATION FROM TEST STANDARD

No deviation

4.3.4 TEST SETUP



4.3.5 TEST RESULTS

Please refer to the Attachment D.

Remark

(1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz,SPA setting in RBW=10KHz,VBW =10KHz, Swp. Time = 0.3 sec./MHz. Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10KHz,VBW=10KHz, Swp. Time =0.3 sec./MHz.

(2) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a " * " marked in AVG Mode column of Interference Voltage Measured.

4.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

4.4.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class A equipment

Table clause	Frequency range MHz	Coupling device	Detector type / Bandwidth	Class A voltage limits dB(μV)	Class A current limits dB(μA)
A11.1	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	
A11.2	0.15 – 0.5	CVP and current probe	Quasi Peak / 9 kHz	97 – 87	53 – 43
	0.5 – 30			87	43
	0.15 – 0.5	CVP and current probe	Average / 9 kHz	84 – 74	40 – 30
	0.5 – 30			74	30
A11.3	0.15 – 0.5	Current probe	Quasi Peak / 9 kHz	n/a	53 – 43
	0.5 – 30				43
	0.15 – 0.5	Current probe	Average / 9 kHz		40 – 30
	0.5 – 30				30

Requirements for asymmetric mode conducted emissions from Class B equipment

Table clause	Frequency range MHz	Coupling device	Detector type / Bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
A12.1	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	
A12.2	0.15 – 0.5	CVP and current probe	Quasi Peak / 9 kHz	84 – 74	40 – 30
	0.5 – 30			74	30
	0.15 – 0.5	CVP and current probe	Average / 9 kHz	74 – 64	30 – 20
	0.5 – 30			64	20
A12.3	0.15 – 0.5	Current probe	Quasi Peak / 9 kHz	n/a	40 – 30
	0.5 – 30				30
	0.15 – 0.5	Current probe	Average / 9 kHz		30 – 20
	0.5 – 30				20

NOTE:

(1) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value – Limit Value

4.4.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. 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 to 40 cm long.

c. I/O cables that are not connected to a peripheral 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.

d. Cables connecting to AE located outside the measurement area shall drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. The thickness of the insulation shall not be more than 150 mm. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer's recommendation

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

f. **AAN, CP or CVP** at least 80 cm from nearest part of EUT chassis.

NOTE:

g The communication function of EUT was executed and AAN was connected between EUT and associated equipment and the AAN was connected directly to reference ground plane.
Measure the voltage at the measurement port of the AAN
Correct the measured voltage by adding the AAN voltage division factor
Compare the corrected voltage with the limit**(For AAN)**

h Measure the current with a current probe and compare to the current limit**(For CP)**

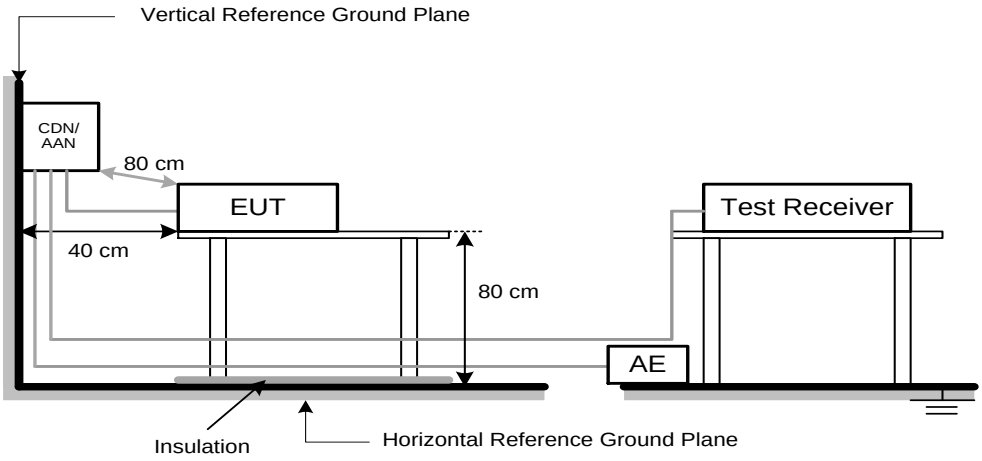
i. The current shall be measured with the current probe and the results compared with the current limits.
The voltage measured shall be corrected at each frequency of interest as follows:
- if the current margin with respect to the current limit is ≤6 dB, the actual current margin shall be subtracted from the measured voltage;
-if the current margin with respect to the current limit is >6 dB, 6 dB shall be subtracted from the measured voltage.
The adjusted voltage shall be compared with the applicable voltage limit.
Both the measured current and the corrected voltage shall be below the applicable current and voltage limits at all frequencies for the EUT to be deemed compliant with this publication.**(For CVP)**

4.4.3 DEVIATION FROM TEST STANDARD

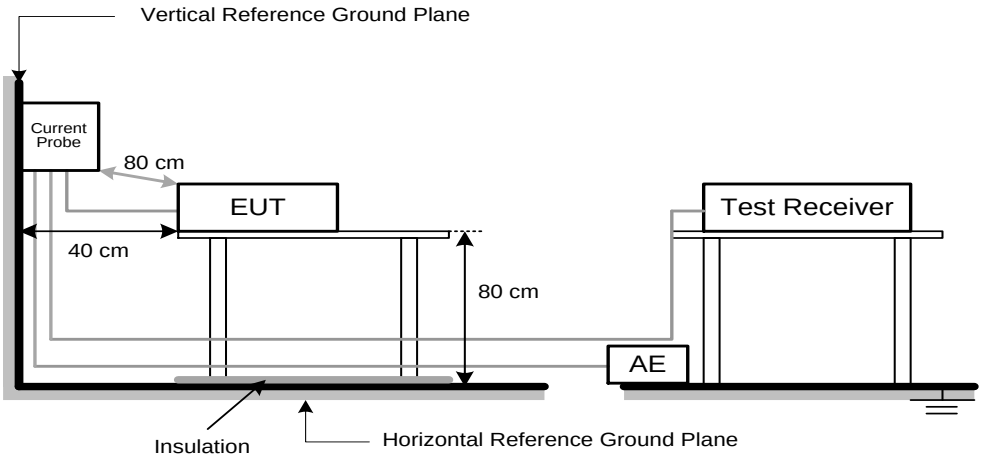
No deviation

4.4.4 TEST SETUP

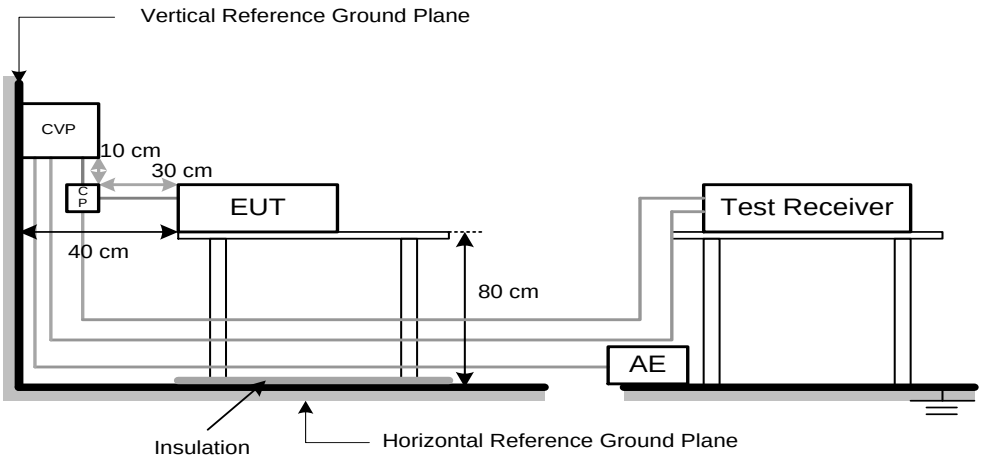
a) Cable Type: Balanced Unscreened, Screened or Coaxial



b) Cable Type: Screened or Coaxial



c) Cable Type: Balanced Unscreened, Unbalanced



4.4.5 TEST RESULTS

Please refer to the Attachment E.

Remark

(1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz,SPA setting in RBW=10KHz,VBW =10KHz, Swp. Time = 0.3 sec./MHz. Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10KHz,VBW=10KHz, Swp. Time =0.3 sec./MHz.

(2) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading is under 3dB of QP Limits and then QP Mode measurement didn't perform. Or else, QP should be performed

4.5 CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS FROM CLASS B EQUIPMENT

4.5.1 LIMITS

Table clause	Frequency range MHz	Detector type / bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A13.1	30-950	For frequencies ≤1 GHz Quasi Peak / 120 kHz	46	46	46	See a)
	950-2150		46	54	54	
A13.2	950-2150		46	54	54	See b)
A13.3	30-300		46	54	50	See c)
	300-1000				52	
A13.4	30-300	For frequencies ≥1 GHz Peak /1 MHz	46	66	59	See d)
	300-1000				52	
A13.5	30-950		46	76	46	See e)
	950-2150			n/a	54	

a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.
b) Tuner units (not the LNB) for satellite signal reception.
c) Frequency modulation audio receivers and PC tuner cards.
d) Frequency modulation car radios.
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

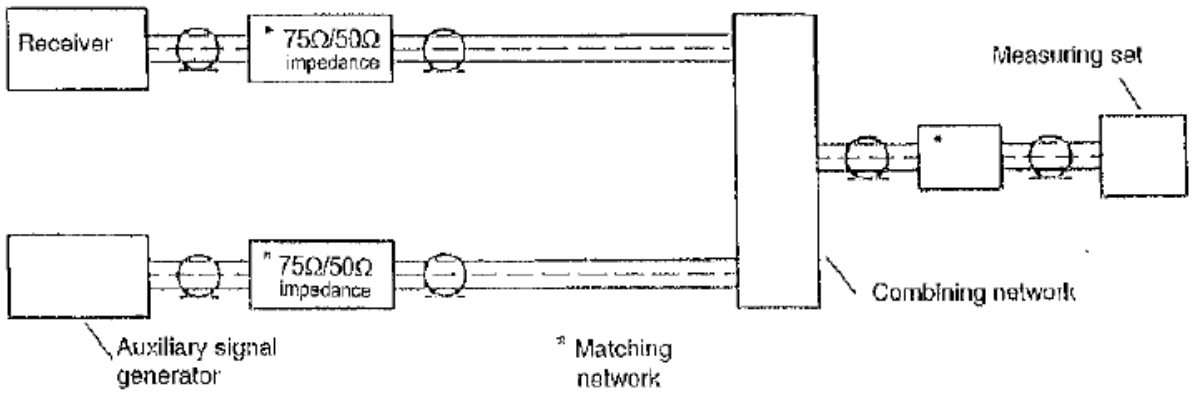
4.5.2 TEST PROCEDURE

a. The antenna terminals of the EUT and the auxiliary signal generator are connected to the measuring receiver by means of coaxial cables and a resistive combining network having a minimum attenuation of 6dB.
b. The output level of the auxiliary signal generator would be set to give 70dB (V) at the antenna input of the EUT on 75 impedance. The signal would be an unmodulated carrier.
c. The measuring receiver is tuned to the test frequency and the disturbance level is measured, taking into account the attenuation between the receiver antenna terminal and the measuring receiver input.
d. The test shall then be repeated with EUT switched off, to check that the measured disturbance voltage is not due to the auxiliary generator.
e. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to CISPR 32 on conducted differential voltage emissions measurement.
f. Conducted emissions were invested over the frequency range from 30MHz to2150MHz using a receiver bandwidth of 120kHz.

4.5.3 DEVIATION FROM TEST STANDARD

No deviation

4.5.4 TEST SETUP



4.5.5 TEST RESULTS

Please refer to the Attachment F.

5. MEASUREMENT INSTRUMENTS LIST

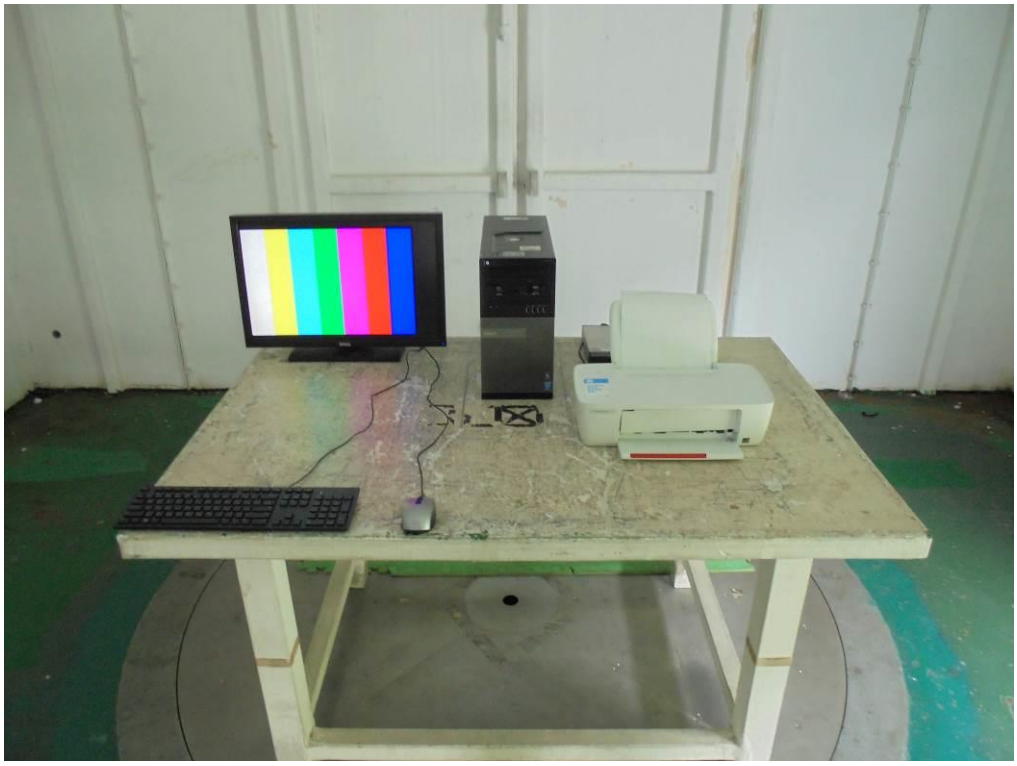
Radiated emissions up to 1 GHz test					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3176	2019/9/26
2	Pre-Amplifier	Anritsu	MH648A	M98457	2019/10/30
3	Test Cable	TIMES	LMR-400	10M-OS01	2019/12/7
4	Test Cable	EMCI	EMCCFD400-NM-NM-25000	171103	2019/12/7
5	EMI Test Receiver	R&S	ESCI	100080	2019/5/23
6	Measurement Software	Farad	EZ_EMC (Ver. NB-03A1-01)	N/A	N/A
7	Horn Ant	SCHWARZBECK	BBHA 9120	9120-1783	2019/6/12
8	Pre-Amplifier	EMCI	EMC012645SE	980410	2020/4/7
9	Test Cable	EMCI	EMC104-SM-SM-2000	170201	2020/4/7
10	Test Cable	EMCI	EMC104-SM-SM-8000	170339	2020/4/7
11	Test Cable	EMCI	EMC104-SM-SM-1000	170337	2020/4/7
12	Spectrum Analyzer	Agilent	N9020A	MY51160196	2019/9/11
13	Measurement Software	Farad	EZ_EMC (Ver. NB-03A1-01)	N/A	N/A

Conducted Emission at AC Mains Power Ports					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101339	2020/2/27
2	Test Cable	EMCI	EMCCFD300-BM-BMR-6000	170714	2019/8/7
3	EMI Test Receiver	R&S	ESR	101854	2019/12/24
4	50Ω BNC TYPE Terminal	EMCI	N/A	13	2019/6/11
5	Measurement Software	Farad	EZ_EMC (Ver. NB-03A1-01)	N/A	N/A

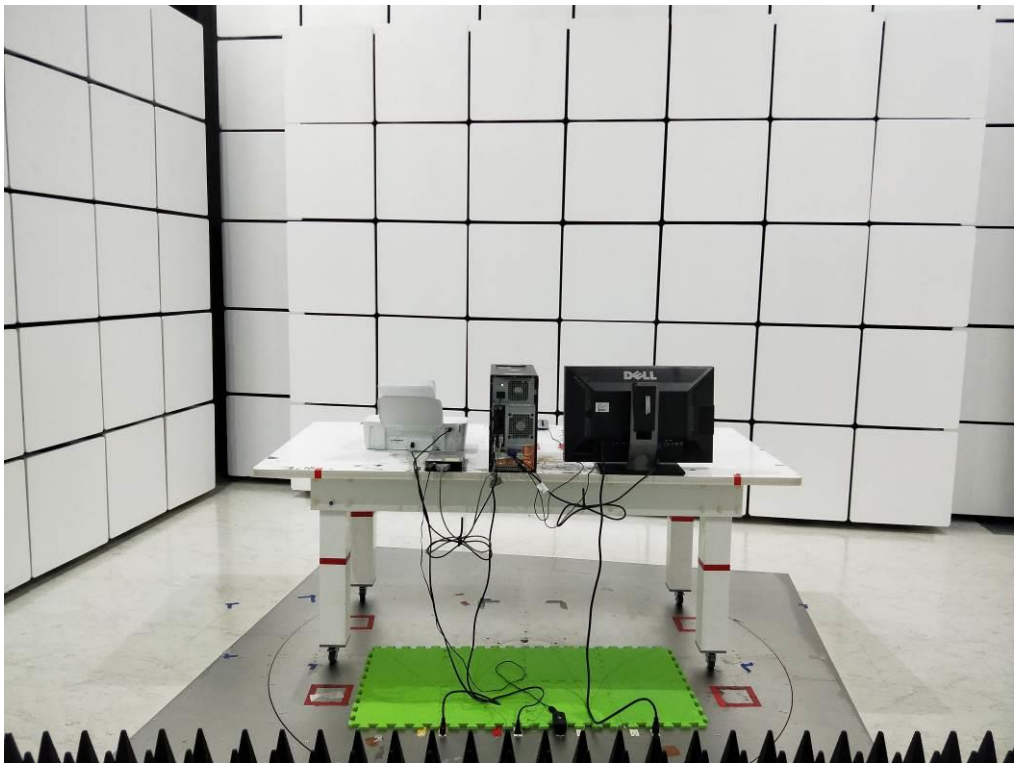
Remark: “N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

6. EUT TEST PHOTO

Radiated emission up to 1 GHz test photos



Radiated emission above 1 GHz test photos

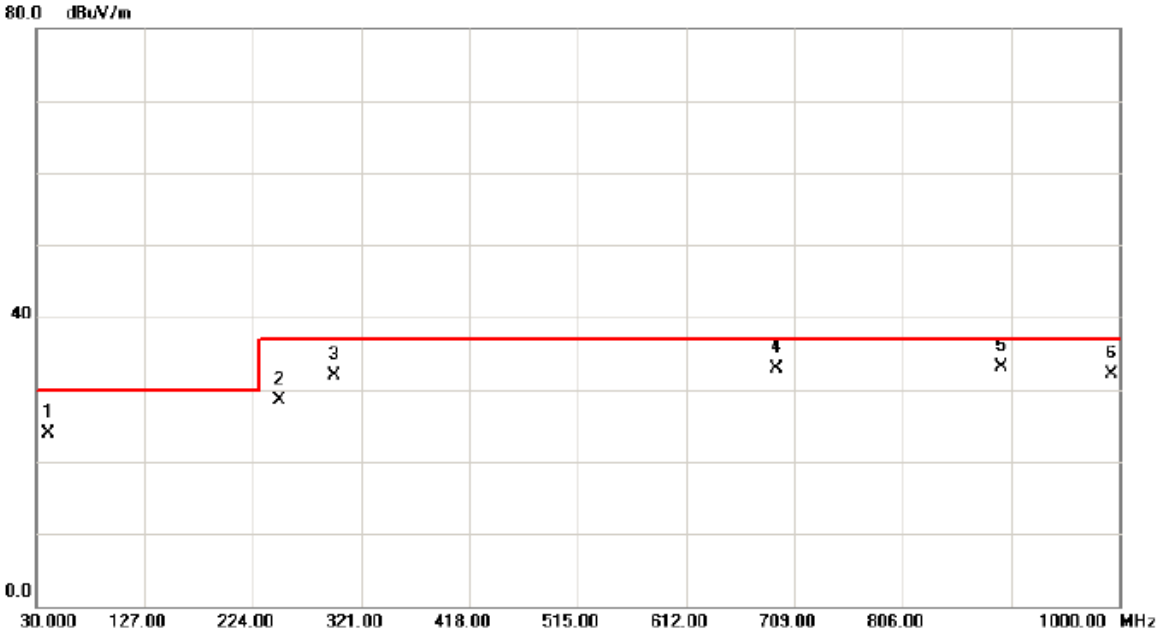


Conducted emission at the AC mains power port Measurement Photos

ATTACHMENT A - RADIATED EMISSION (UP TO 1GHZ)

Test Voltage :	AC 100V/50Hz
Test Mode :	Mode 1

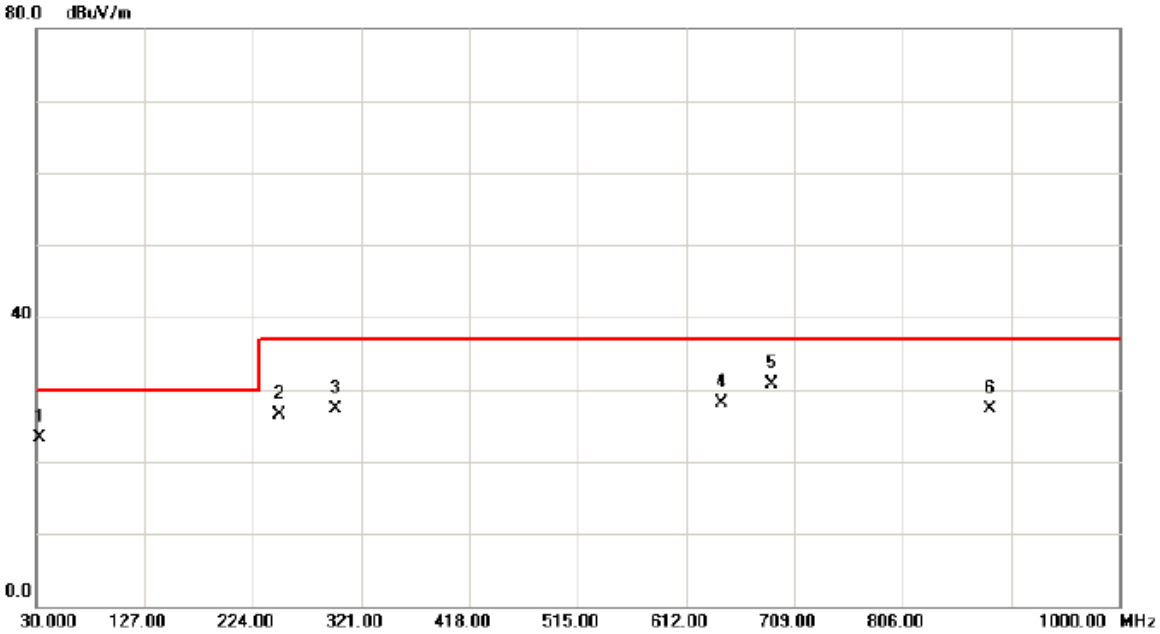
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		39.7500	28.91	-4.98	23.93	30.00	-6.07	QP	100	169	
2		247.3600	32.36	-3.81	28.55	37.00	-8.45	QP	100	281	
3		295.8300	34.32	-2.48	31.84	37.00	-5.16	QP	100	153	
4		691.6500	27.96	4.98	32.94	37.00	-4.06	QP	100	316	
5	*	893.3200	25.53	7.57	33.10	37.00	-3.90	QP	100	105	
6		992.3500	22.58	9.52	32.10	37.00	-4.90	QP	100	76	

Test Voltage :	AC 100V/50Hz
Test Mode :	Mode 1

Polarization: Horizontal

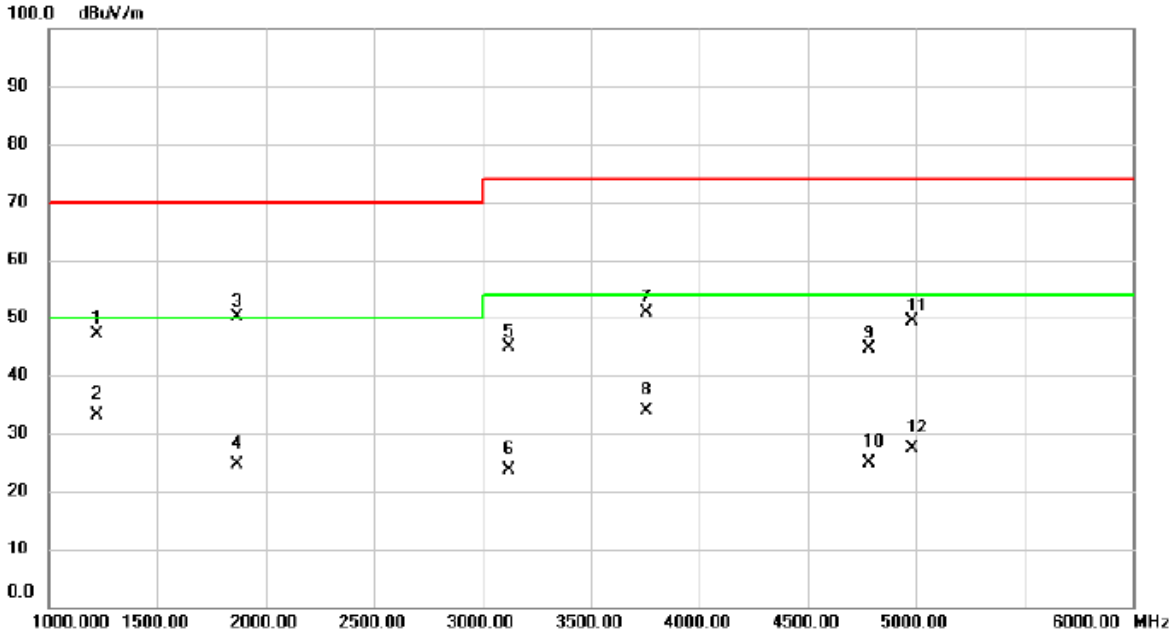


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.9500	28.82	-5.59	23.23	30.00	-6.77	QP	400	178	
2		247.3200	30.41	-3.81	26.60	37.00	-10.40	QP	400	105	
3		297.7700	29.79	-2.42	27.37	37.00	-9.63	QP	400	329	
4		643.0500	23.95	4.14	28.09	37.00	-8.91	QP	400	193	
5	*	687.6900	25.76	4.92	30.68	37.00	-6.32	QP	400	256	
6		883.6500	19.81	7.44	27.25	37.00	-9.75	QP	400	86	

ATTACHMENT B - RADIATED EMISSION (ABOVE 1GHZ)

Test Voltage :	AC 100V/50Hz
Test Mode :	Mode 1

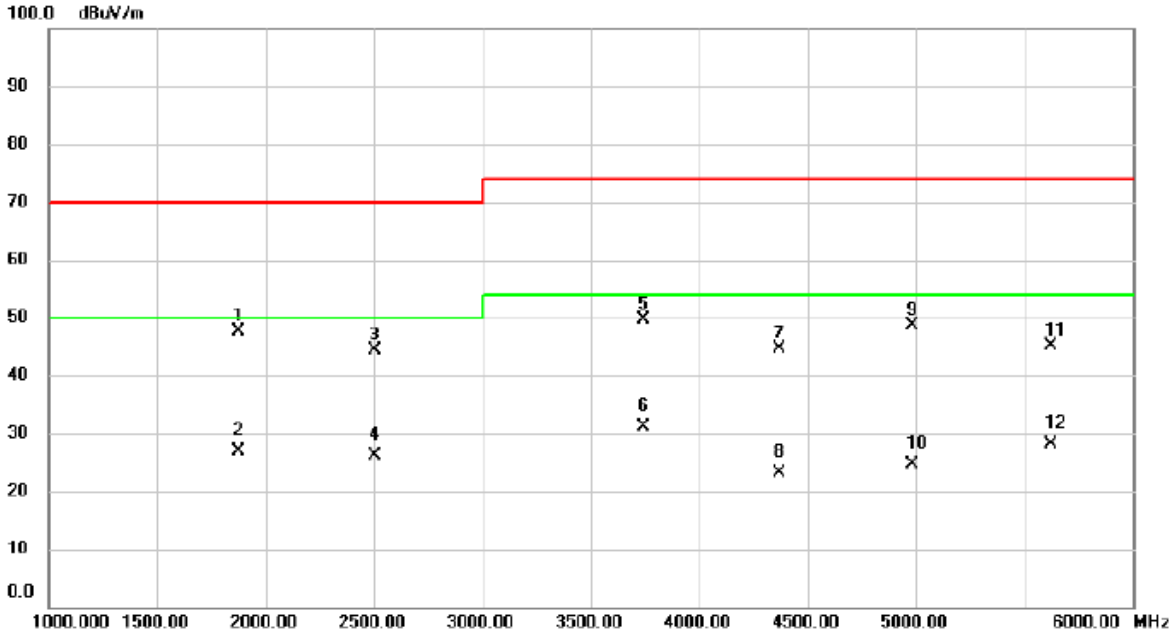
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		1220.000	68.20	-21.19	47.01	70.00	-22.99	peak	100	15	
2	*	1220.000	54.42	-21.19	33.23	50.00	-16.77	AVG	100	15	
3		1870.000	68.92	-18.80	50.12	70.00	-19.88	peak	100	350	
4		1870.000	43.39	-18.80	24.59	50.00	-25.41	AVG	100	350	
5		3120.000	59.62	-14.83	44.79	74.00	-29.21	peak	100	360	
6		3120.000	38.56	-14.83	23.73	54.00	-30.27	AVG	100	360	
7		3755.000	64.40	-13.61	50.79	74.00	-23.21	peak	100	120	
8		3755.000	47.58	-13.61	33.97	54.00	-20.03	AVG	100	120	
9		4785.000	55.37	-10.82	44.55	74.00	-29.45	peak	100	301	
10		4785.000	35.73	-10.82	24.91	54.00	-29.09	AVG	100	301	
11		4985.000	59.99	-10.53	49.46	74.00	-24.54	peak	100	203	
12		4985.000	37.84	-10.53	27.31	54.00	-26.69	AVG	100	203	

Test Voltage :	AC 100V/50Hz
Test Mode :	Mode 1

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	1875.000	66.50	-18.80	47.70	70.00	-22.30	peak	100	80	
2		1875.000	45.65	-18.80	26.85	50.00	-23.15	AVG	100	80	
3		2505.000	60.74	-16.42	44.32	70.00	-25.68	peak	100	301	
4		2505.000	42.65	-16.42	26.23	50.00	-23.77	AVG	100	301	
5		3745.000	63.38	-13.64	49.74	74.00	-24.26	peak	100	163	
6		3745.000	44.75	-13.64	31.11	54.00	-22.89	AVG	100	163	
7		4370.000	56.13	-11.62	44.51	74.00	-29.49	peak	100	21	
8		4370.000	34.65	-11.62	23.03	54.00	-30.97	AVG	100	21	
9		4980.000	59.24	-10.54	48.70	74.00	-25.30	peak	100	360	
10		4980.000	35.12	-10.54	24.58	54.00	-29.42	AVG	100	360	
11		5620.000	55.30	-10.22	45.08	74.00	-28.92	peak	100	36	
12		5620.000	38.34	-10.22	28.12	54.00	-25.88	AVG	100	36	

ATTACHMENT C - RADIATED EMISSION FROM FM RECEIVER MEASUREMENT

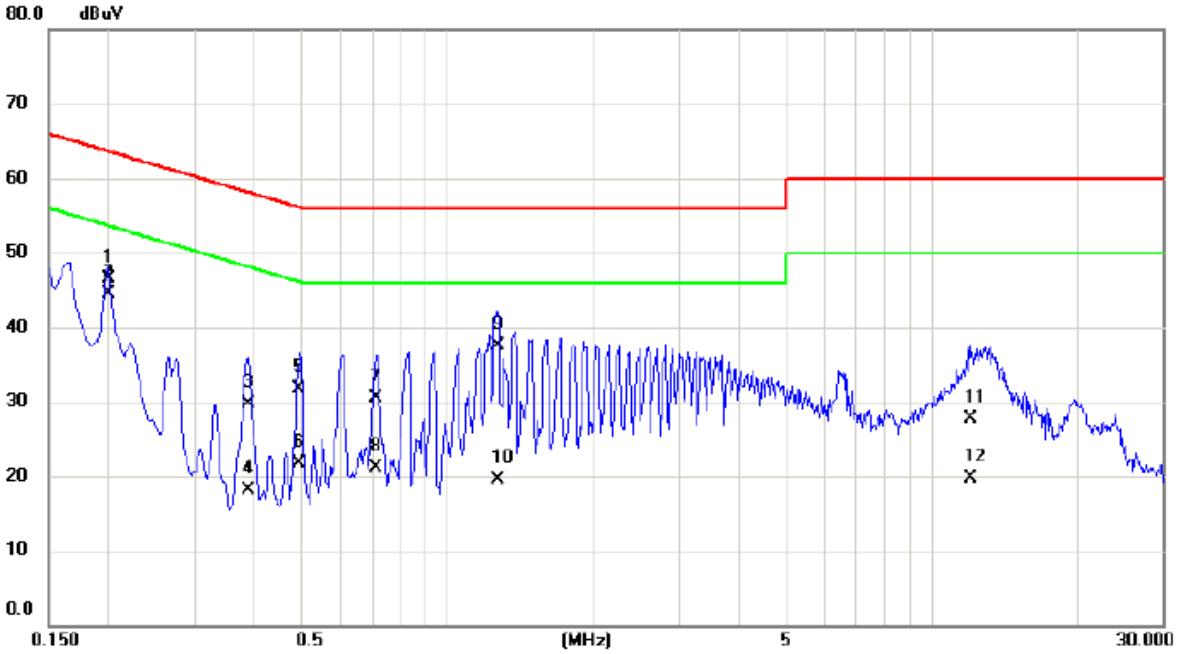
Test Mode: N/A

Note: “N/A” denotes test is not applicable to this device.

ATTACHMENT D - CONDUCTED EMISSION AT AC MAINS POWER PORTS

Test Voltage :	AC 100V/50Hz
Test Mode :	Mode 1

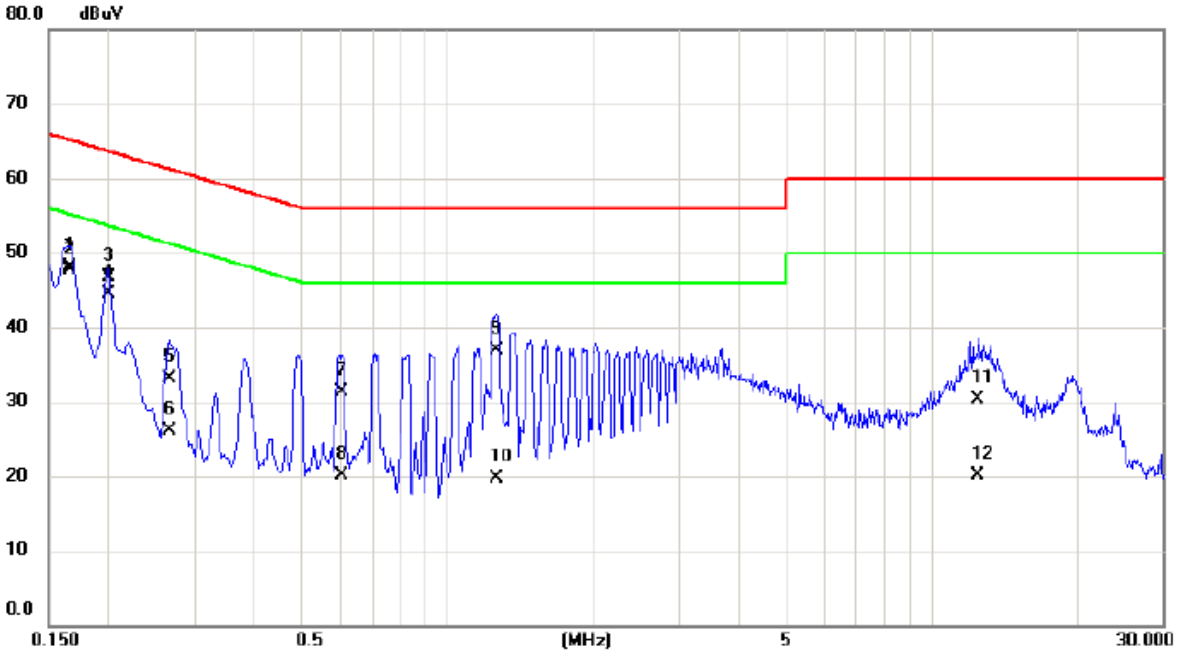
Phase: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1995	36.80	9.69	46.49	63.63	-17.14	QP	
2	*	0.1995	34.80	9.69	44.49	53.63	-9.14	AVG	
3		0.3885	20.10	9.68	29.78	58.10	-28.32	QP	
4		0.3885	8.50	9.68	18.18	48.10	-29.92	AVG	
5		0.4942	22.00	9.69	31.69	56.10	-24.41	QP	
6		0.4942	12.00	9.69	21.69	46.10	-24.41	AVG	
7		0.7125	20.90	9.70	30.60	56.00	-25.40	QP	
8		0.7125	11.40	9.70	21.10	46.00	-24.90	AVG	
9		1.2705	27.70	9.73	37.43	56.00	-18.57	QP	
10		1.2705	9.70	9.73	19.43	46.00	-26.57	AVG	
11		12.0120	17.70	9.91	27.61	60.00	-32.39	QP	
12		12.0120	9.80	9.91	19.71	50.00	-30.29	AVG	

Test Voltage :	AC 100V/50Hz
Test Mode :	Mode 1

Phase: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1658	38.40	9.69	48.09	65.17	-17.08	QP	
2	*	0.1658	38.00	9.69	47.69	55.17	-7.48	AVG	
3		0.1995	37.00	9.68	46.68	63.63	-16.95	QP	
4		0.1995	34.80	9.68	44.48	53.63	-9.15	AVG	
5		0.2670	23.40	9.68	33.08	61.21	-28.13	QP	
6		0.2670	16.40	9.68	26.08	51.21	-25.13	AVG	
7		0.6045	21.70	9.69	31.39	56.00	-24.61	QP	
8		0.6045	10.50	9.69	20.19	46.00	-25.81	AVG	
9		1.2593	27.10	9.72	36.82	56.00	-19.18	QP	
10		1.2593	10.00	9.72	19.72	46.00	-26.28	AVG	
11		12.4823	20.40	9.95	30.35	60.00	-29.65	QP	
12		12.4823	10.20	9.95	20.15	50.00	-29.85	AVG	

ATTACHMENT E - ASYMMETRIC MODE CONDUCTED EMISSIONS RESULTS

Test Mode: N/A

Note: “N/A” denotes test is not applicable to this device.

ATTACHMENT F - CONDUCTED DIFFERENTIAL VOLTAGE EMISSIONS FROM CLASS B EQUIPMENT

Test Mode: N/A

Note: “N/A” denotes test is not applicable to this device.

End of Test Report