

Johnson Health Tech. Co., Ltd.

TEST REPORT

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Radio Spectrum TEST REPORT

Applicant:	Johnson Health Tech. Co., Ltd. No. 999, Sec. 2, Dongda Rd., Daya Dist Taichung City 428, Taiwan
Product:	Massager Chair
Model No.:	MC-J6950
Brand Name:	SYNCA
FCC ID:	TN7MCJ6950
Test Method/ Standard:	47 CFR FCC Part 15.225
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan



Prepared and Checked by:



Mark Chang
Engineer

Approved by:



Durant Wei
Engineer

Revision History

Report No.	Issue Date	Revision Summary
200100421TWN-001	Feb. 21, 2020	Original report

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Summary of Test Data

Test Requirement	Applicable Rule (Section 15.225)	Result
Fundamental Emission	15.225 (a)	Pass
20 dB Bandwidth	15.215	Pass
Frequency Satisfiability	15.225 (e)	Pass
Out of band Radiated Emissions	15.225(d)	Pass
AC Power Line Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information**1.1 Identification of the EUT**

Product:	Massager Chair
Model No.:	MC-J6950
Operating Frequency:	13.56 MHz
Access scheme:	ASK
Rated Power:	100-240Vac, 50/60Hz, 150W
Power Cord:	N/A
Sample receiving date:	Jan. 17, 2020
Sample condition:	Workable
Test Date(s):	Jan. 20, 2020 ~ Feb. 17, 2020

1.2 Antenna description

Antenna Type : Printed Antenna

Connector Type : Fixed

1.3 Operation mode

The EUT was supplied with 120Vac, 60Hz.

TX mode: The EUT transmit 13.56MHz continuously while we power on the EUT.

2. Fundamental emission

2.1 Operating environment

Temperature:	24	°C
Relative Humidity:	51	%
Requirement & Test method	15.225 (a)	

2.2 Limit for Fundamental emission

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 uV/m(83.99 dBuV/m) at 30 meters.

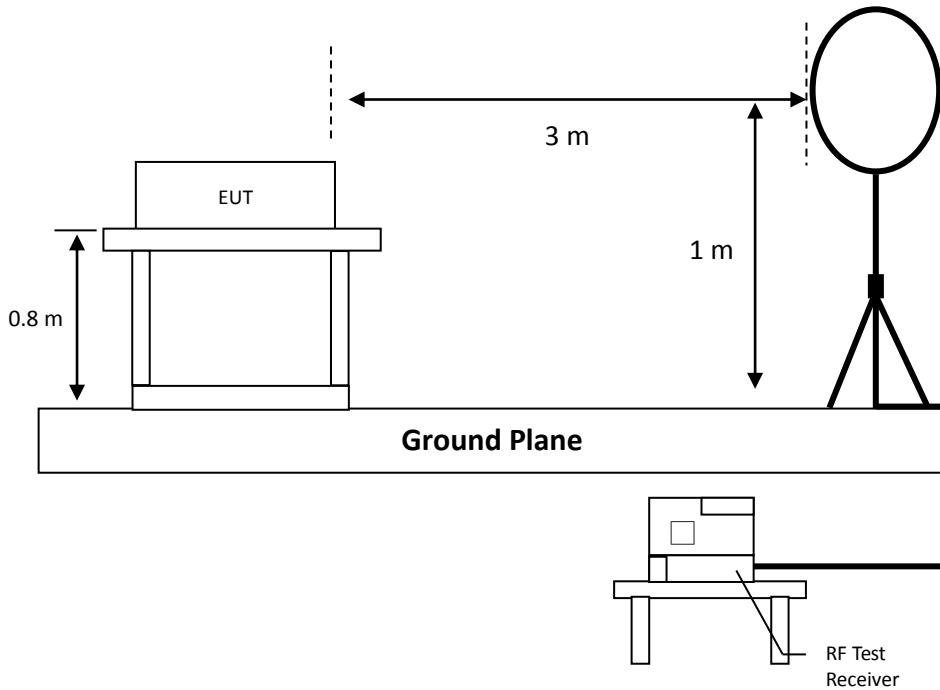
2.3 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	Setting
Detector	QP
RBW	10 kHz
Sweep	Auto couple
Trace	Max hold
Span	900 kHz
Attenuation	Auto

2.4 Test procedure

1. Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
3. The height of the receiving antenna was one meter above ground to find the maximum emission field strength of the both plane and coaxial polarity
4. Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.

2.5 Test diagram



2.6 Test result

Fundamental		Parallel				
Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
13.56	QP	20.97	44.62	65.59	124.00	-58.41

 Limit= 84dB μ V +40 dB μ V (decade) = 124 dB μ V

Fundamental		Perpendicular				
Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
13.56	QP	20.97	47.49	68.46	124.00	-55.54

 Limit= 84dB μ V +40 dB μ V (decade) = 124 dB μ V

Fundamental		Ground-parallel				
Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
13.56	QP	20.97	43.58	64.55	124.00	-59.45

 Limit= 84dB μ V +40 dB μ V (decade) = 124 dB μ V

3. 20 dB Bandwidth

3.1 Operating environment

Temperature:	22	°C
Relative Humidity:	54	%
Requirement & Test method	15.215	

3.2 Limit for 20 dB bandwidth

None

3.3 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	Setting
Detector	Peak
RBW	20kHz
VBW	62kHz
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	\geq 1.2 times the 20 dB bandwidth
Attenuation	Auto

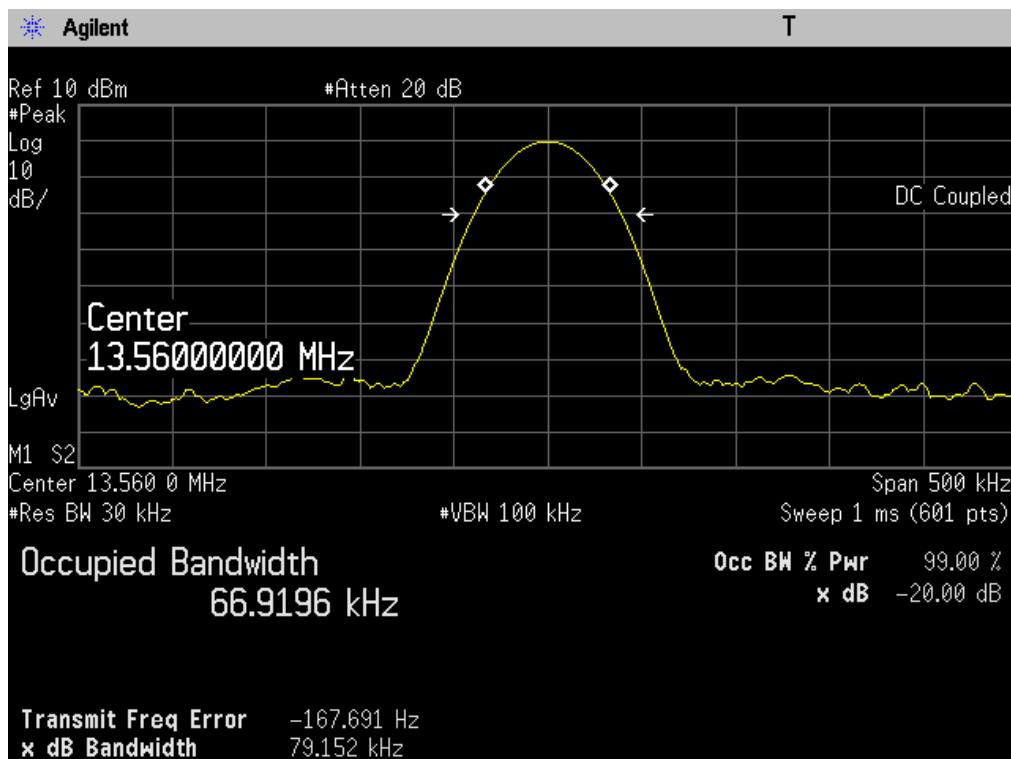
3.4 Test procedure

The 20 dB bandwidth was measured by spectrum analyzer connected to a receive antenna placed near the test sample while it is transmitting.

3.5 Test results**Single TX**

Mode	Frequency (MHz)	20dB Occupied Bandwidth (kHz)
NFC	13.56	79.152

20dB Bandwidth @ NFC 13.56MHz



4. Frequency Satisfiability

4.1 Operating environment

Temperature:	-20~50	°C
Relative Humidity:	54	%
Requirement & Test method	15.225(e)	

4.2 Limit for Frequency Satisfiability

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.3 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	Setting
Detector	Peak
RBW	1kHz
VBW	1kHz
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	Sufficient to see the complete emission BW
Attenuation	Auto

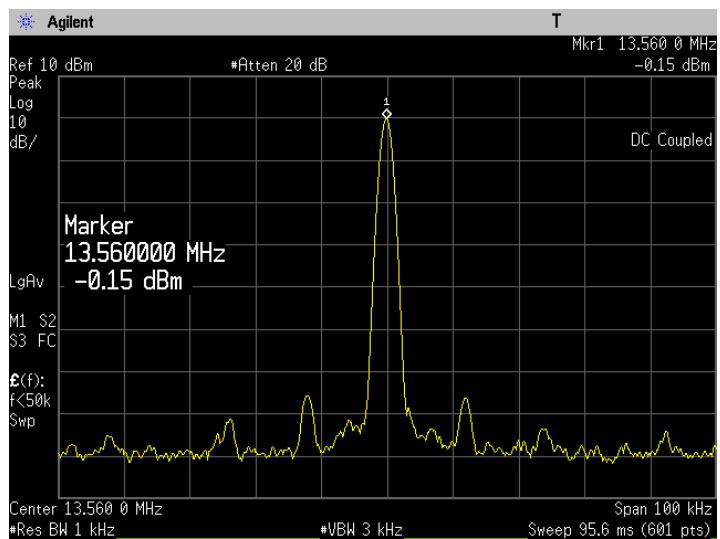
4.4 Test procedure

Turn the EUT on, and couple its output to a frequency counter or other frequency-measuring device of sufficient accuracy, considering the frequency tolerance with which the EUT shall comply.

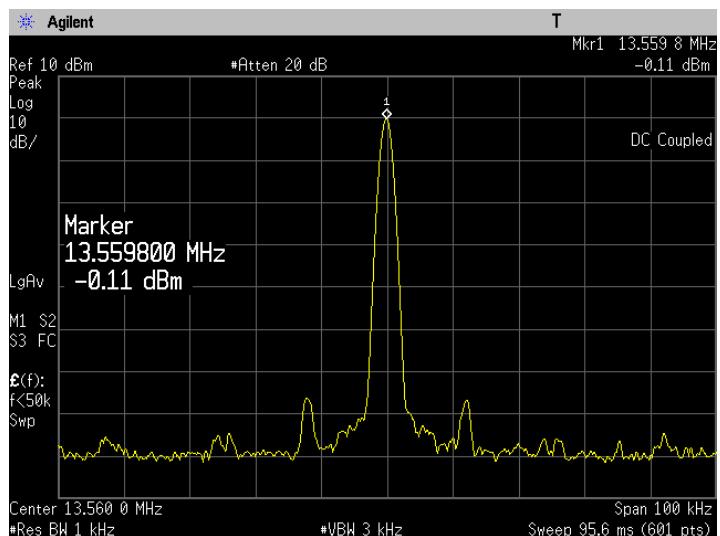
4.5 Test result

Temperature	Measuring Frequency (MHz)	Voltage	Comparison Frequency	Difference (MHz)	Difference (%)	Limit (%)	Result
-20	13.55980	120Vac	13.56	-0.000200	-0.001475%	±0.01	Pass
-10	13.55970	120Vac	13.56	-0.000300	-0.002212%	±0.01	Pass
0	13.56000	120Vac	13.56	0.000000	0.000000%	±0.01	Pass
10	13.56000	120Vac	13.56	0.000000	0.000000%	±0.01	Pass
20	13.56000	120Vac	13.56	0.000000	0.000000%	±0.01	Pass
30	13.55980	120Vac	13.56	-0.000200	-0.001475%	±0.01	Pass
40	13.55980	120Vac	13.56	-0.000200	-0.001475%	±0.01	Pass
50	13.56000	120Vac	13.56	0.000000	0.000000%	±0.01	Pass
20	13.55980	102Vac	13.56	-0.000200	-0.001475%	±0.01	Pass
	13.56000	120Vac	13.56	0.000000	0.000000%	±0.01	Pass
	13.55980	138Vac	13.56	-0.000200	-0.001475%	±0.01	Pass

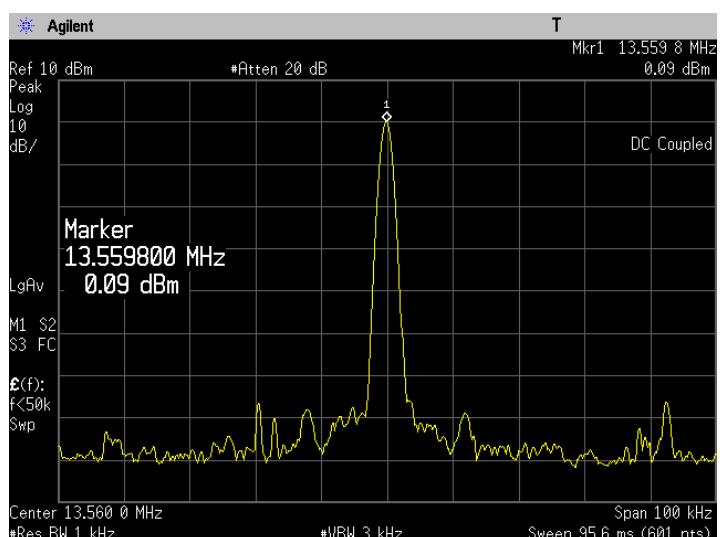
20°C 120Vac



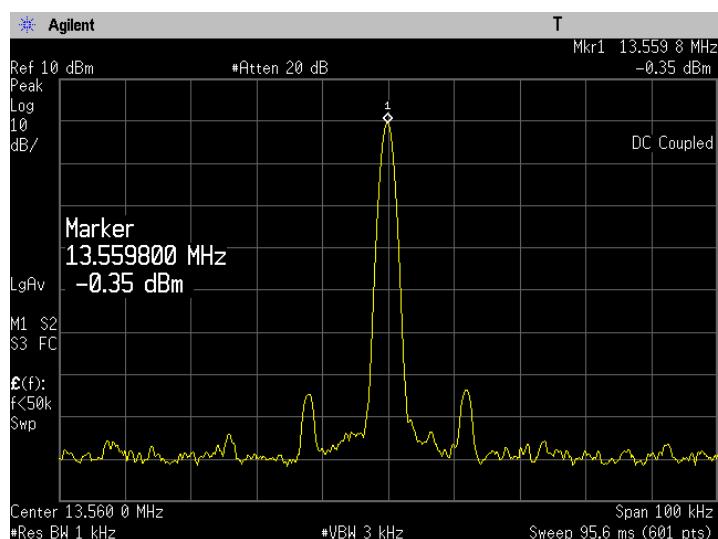
20°C 102Vac



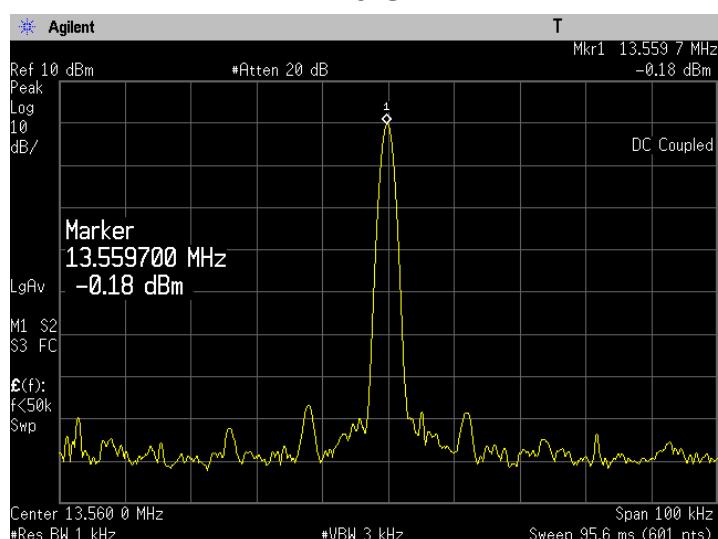
20°C 138Vac



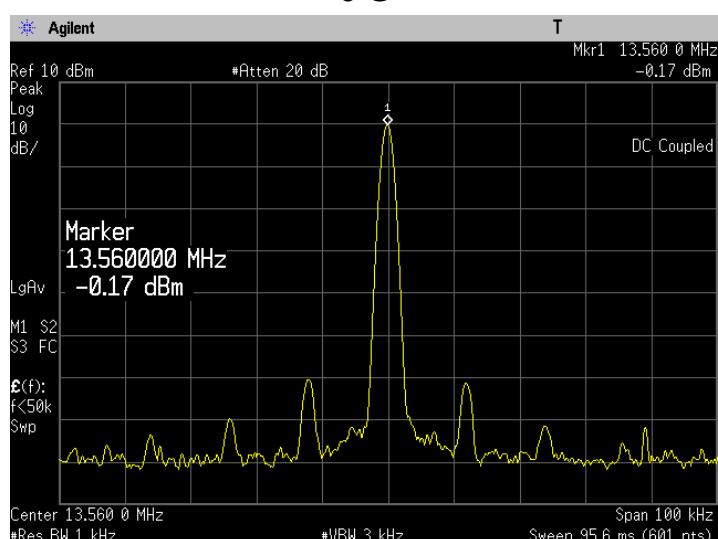
-20°C



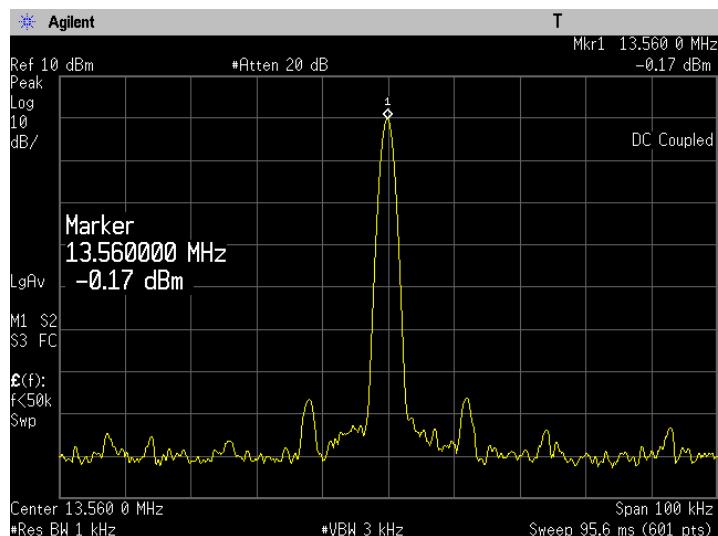
-10°C



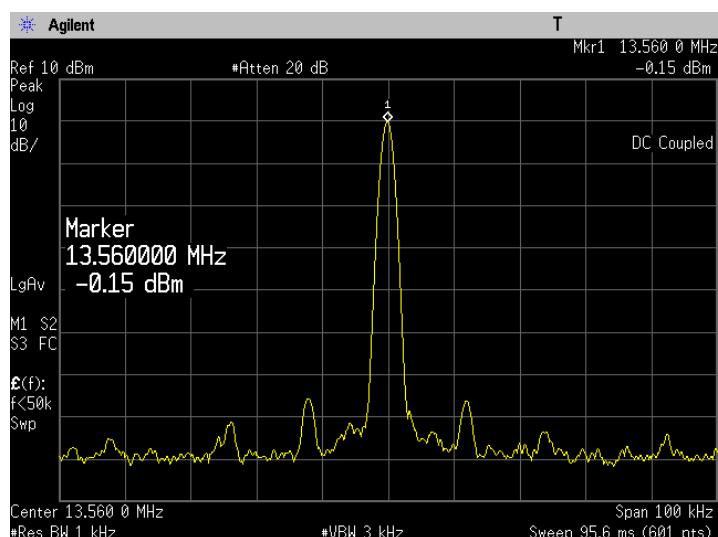
0°C



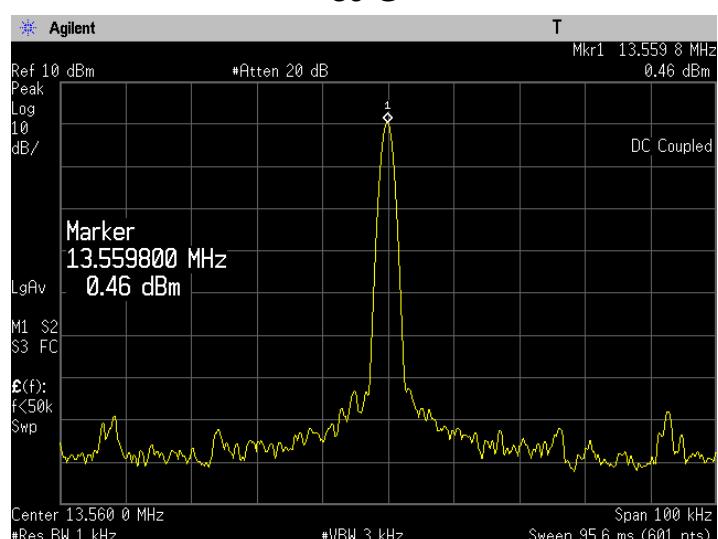
10°C



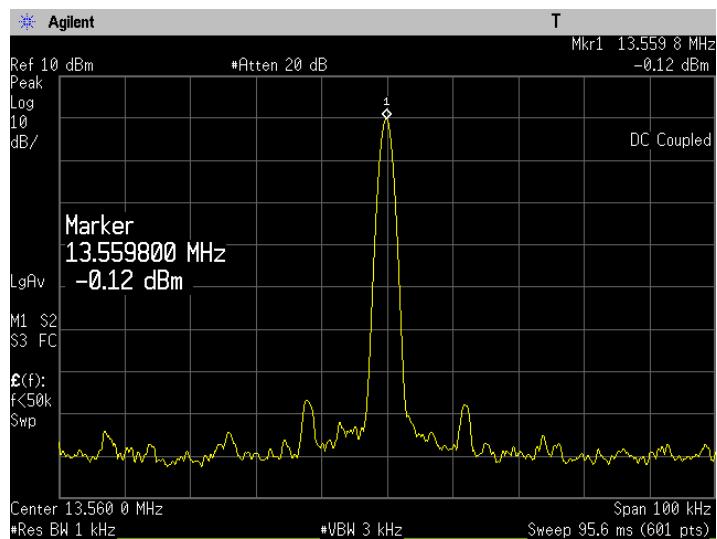
20°C



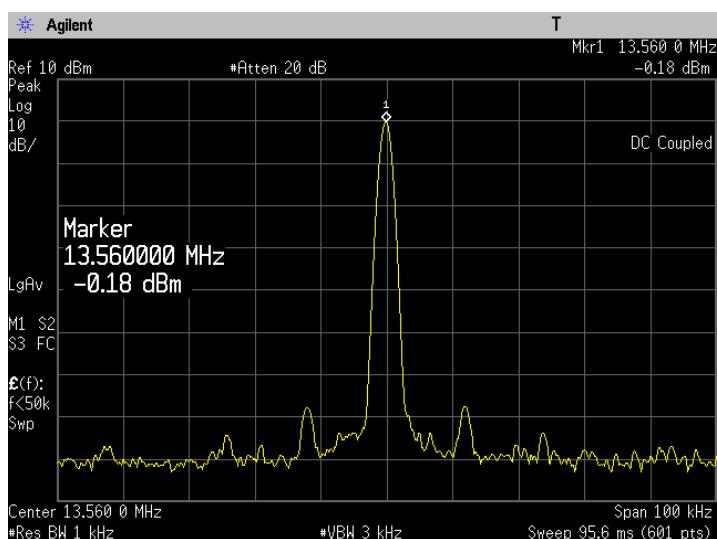
30°C



40°C



50°C



5. Out of band Radiated Emissions**5.1 Operating environment**

Temperature:	24	°C
Relative Humidity:	51	%
Requirement	15.225(d), 15.205, 15.209	

5.2 Limit for emission in restricted frequency bands (Radiated emission measurement)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	2400/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

5.3 Measuring instrument setting

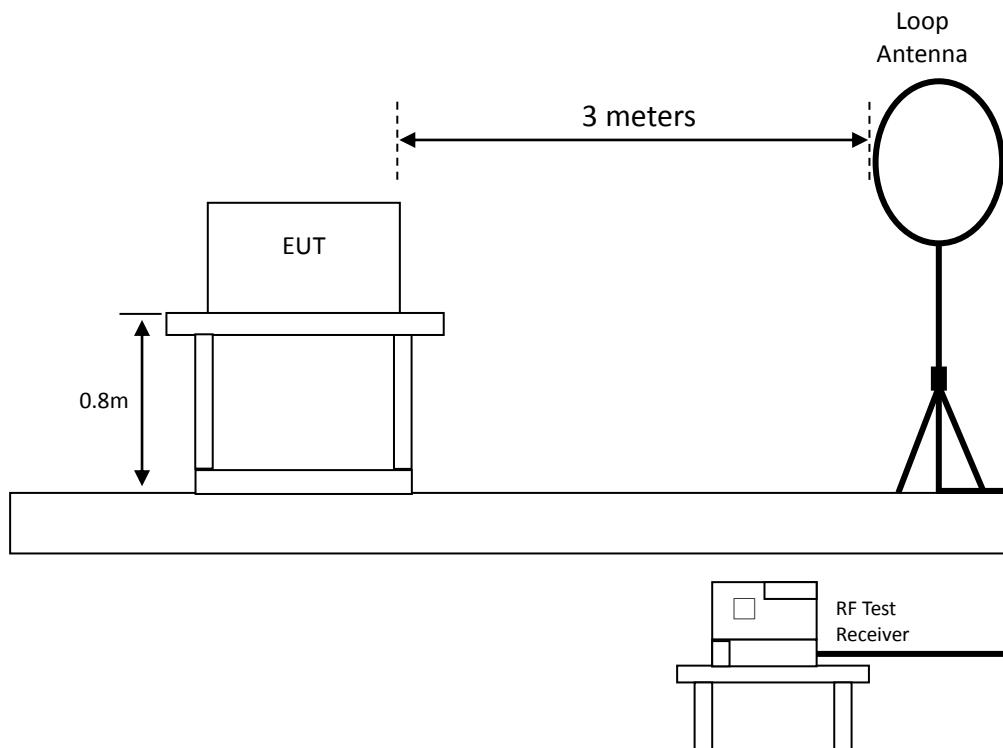
Receiver settings	
Receiver function	Setting
Detector	QP
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz
VBW	$\geq 3 \times$ RBW
Sweep	Auto couple
Attenuation	Auto

5.4 Test procedure

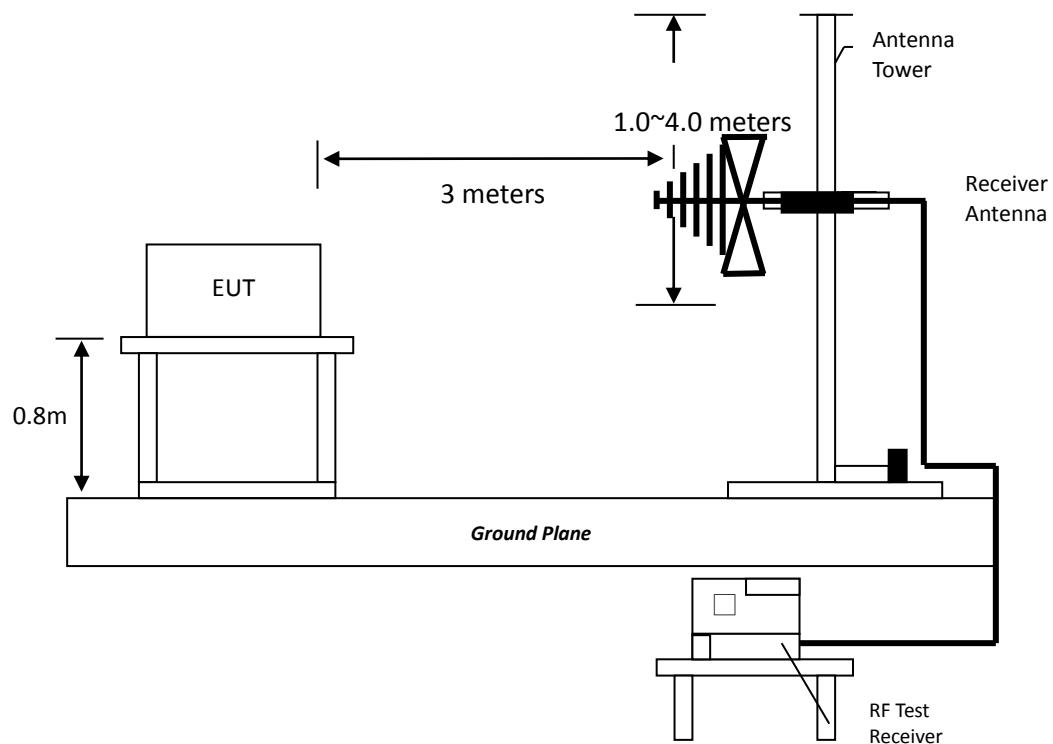
1. Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
3. The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization
4. If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.
5. Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
6. If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

5.5 Test configuration

5.5.1 Radiated emission from 9kHz to 30MHz uses Loop Antenna:



5.5.2 Radiated emission below 1GHz using Bilog Antenna



5.6 Test result**5.6.1 Measurement results: frequency range from 9 kHz to 30 MHz**

EUT : MC-J6950

Worst Case : Tx mode

Parallel

Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
0.01	AV	18.38	66.28	84.66	127.60	-42.94
0.13	AV	18.33	46.69	65.02	105.33	-40.31
0.31	AV	18.43	36.47	54.90	97.78	-42.88
1.03	QP	18.86	31.92	50.78	67.35	-16.57
2.11	QP	18.93	19.86	38.79	69.54	-30.75
2.33	QP	18.94	20.11	39.05	69.54	-30.49

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

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

Perpendicular

Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
0.01	AV	18.38	65.74	84.12	127.60	-43.48
1.03	QP	18.86	34.48	53.34	67.35	-14.01
2.17	QP	18.93	40.14	59.07	69.54	-10.47
8.59	QP	19.66	23.22	42.88	69.54	-26.66
14.82	QP	21.05	18.87	39.92	69.54	-29.62
22.20	QP	21.44	18.87	40.31	69.54	-29.23

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

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

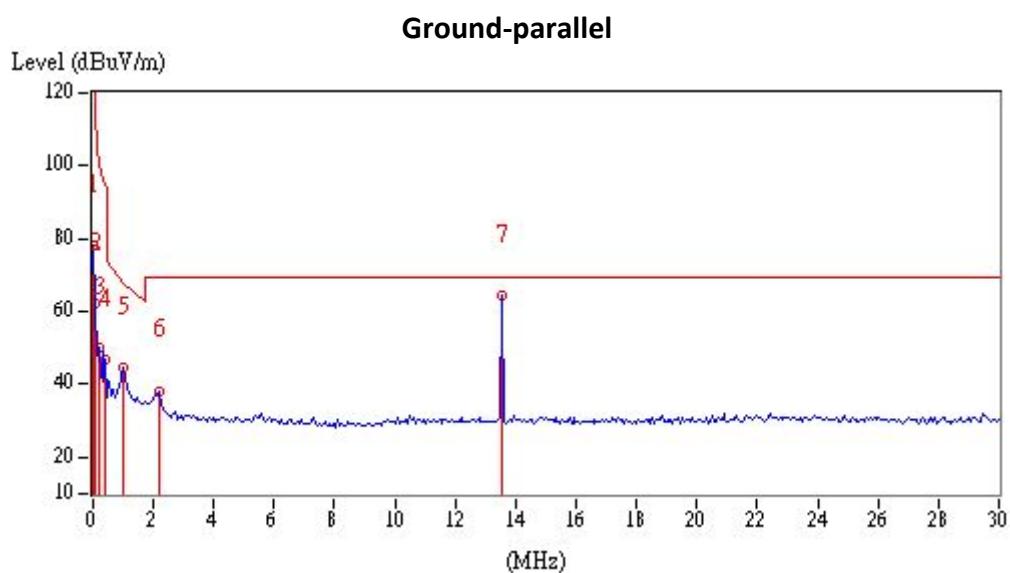
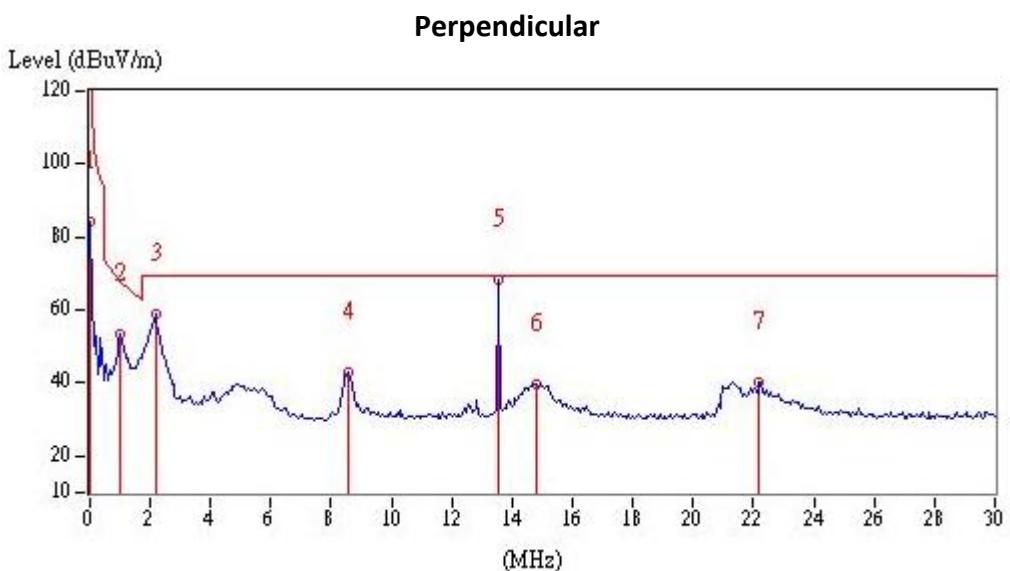
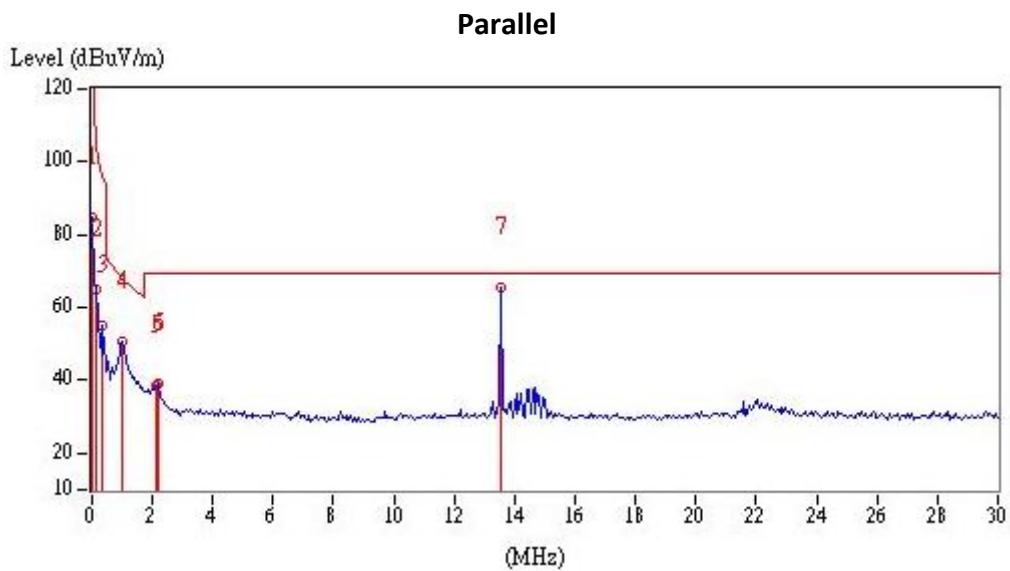
Ground-parallel

Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
0.01	AV	18.38	59.91	78.29	127.60	-49.31
0.07	AV	18.55	43.59	62.14	110.70	-48.56
0.19	AV	18.36	31.55	49.91	102.03	-52.12
0.43	AV	18.49	28.19	46.68	94.93	-48.25
1.03	QP	18.86	25.72	44.58	67.35	-22.77
2.17	QP	18.93	19.39	38.32	69.54	-31.22

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

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



5.6.2 Measurement results: frequency range from 30 MHz to 1GHz

EUT : MC-J6950

Worst Case : Tx mode

Ant. Pol. (H/V)	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
Vertical	41.34	QP	19.94	18.76	38.70	40.00	-1.30
Vertical	51.06	QP	20.50	17.50	38.00	40.00	-2.00
Vertical	53.76	QP	20.37	17.33	37.70	40.00	-2.30
Vertical	60.78	QP	19.94	16.98	36.92	40.00	-3.08
Vertical	78.06	QP	16.56	19.10	35.66	40.00	-4.34
Vertical	108.30	QP	16.77	17.31	34.08	43.50	-9.42

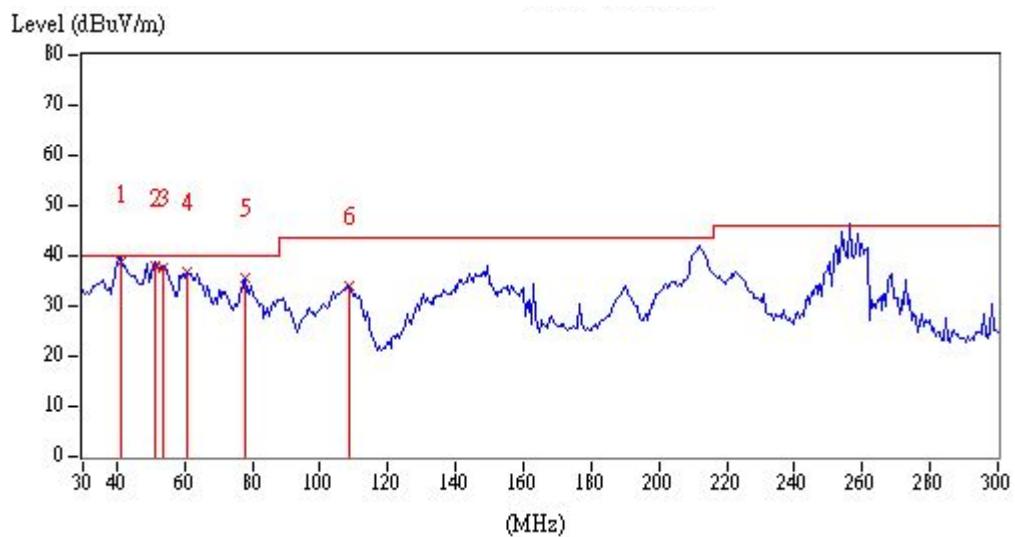
Ant. Pol. (H/V)	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
Horizontal	50.52	QP	20.53	9.13	29.66	40.00	-10.34
Horizontal	71.04	QP	18.08	16.65	34.73	40.00	-5.27
Horizontal	73.74	QP	17.50	17.44	34.94	40.00	-5.06
Horizontal	80.22	QP	16.11	15.43	31.54	40.00	-8.46
Horizontal	106.14	QP	16.41	12.61	29.02	43.50	-14.48
Horizontal	127.74	QP	18.60	7.99	26.59	43.50	-16.91

Remark:

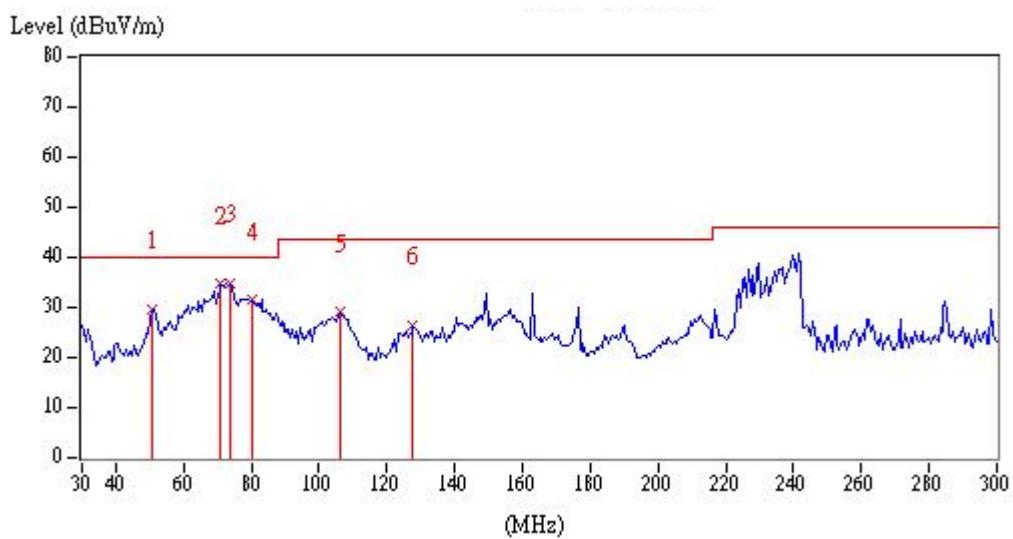
1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

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

Vertical



Horizontal



6. AC Power Line Conducted Emission

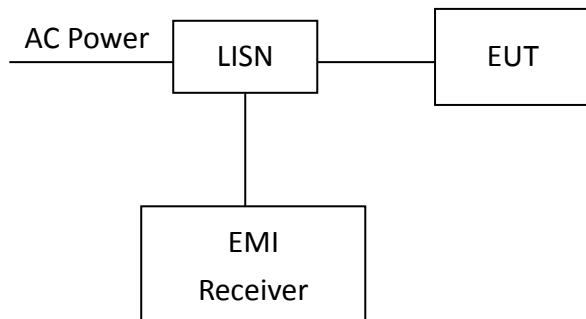
6.1 Measuring instrument setting

Receiver Function	Setting
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

6.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
Step 2	Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
Step 3	All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
Step 4	The frequency range from 150 kHz to 30MHz was searched.
Step 5	Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
Step 6	The measurement has to be done between each power line and ground at the power terminal.

6.3 Test Diagram



6.4 Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56	56 – 46
0.50~5.00	56	46
5.00~30.0	60	50

6.5 Operating Environment Condition

Temperature (°C) :	21
Relative Humidity (%) :	60
Atmospheric Pressure (hPa) :	1010
Test Date :	2020/01/20

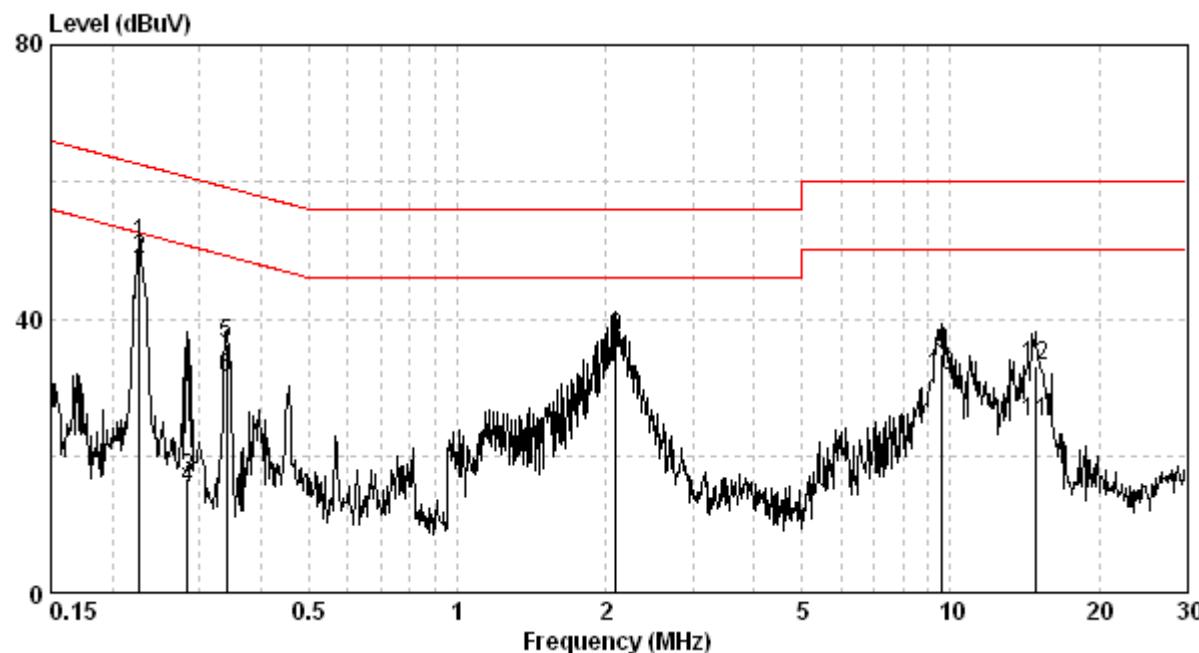
6.6 Test Results

Phase: Live Line
Model No.: MC-J6950
Test Condition: Tx mode

Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) QP	Margin (dB) AV
0.227	0.04	50.96	51.00	62.57	48.55	48.59	52.57	-11.56	-3.97
0.283	0.05	16.74	16.79	60.72	15.24	15.29	50.72	-43.93	-35.43
0.341	0.05	36.34	36.39	59.18	31.23	31.28	49.18	-22.79	-17.90
2.099	0.12	37.12	37.24	56.00	36.06	36.18	46.00	-18.76	-9.82
9.603	0.40	34.60	35.00	60.00	31.22	31.62	50.00	-25.00	-18.38
14.828	0.73	32.30	33.03	60.00	24.06	24.79	50.00	-26.97	-25.21

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral Line

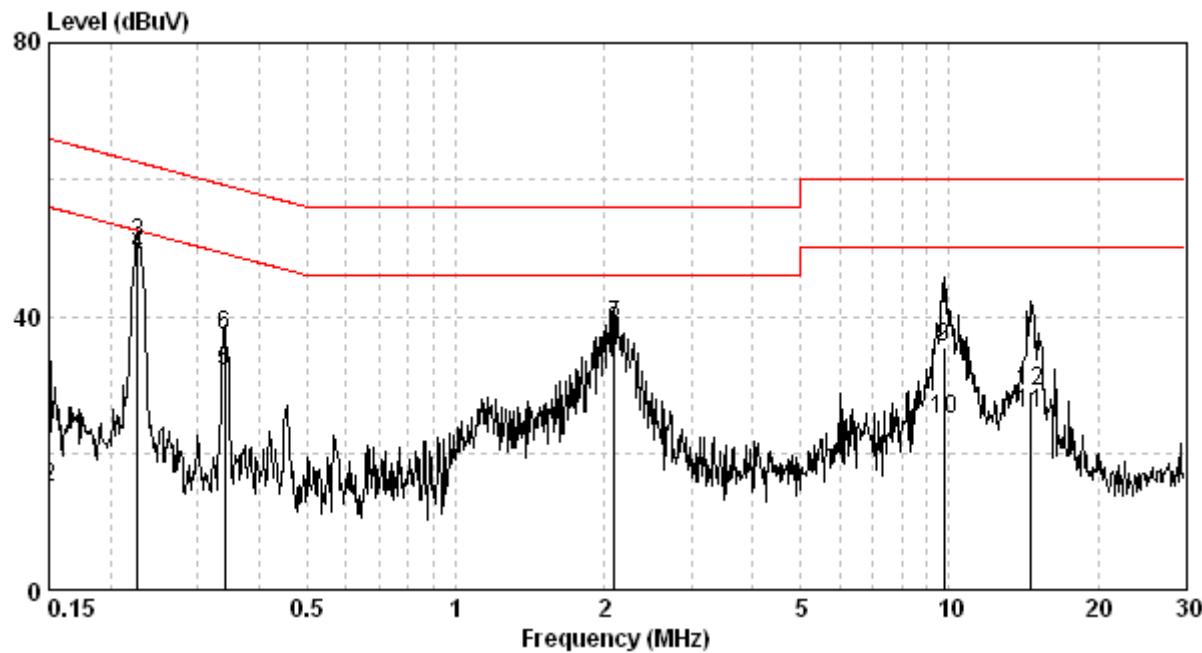
Model No.: MC-J6950

Test Condition: Tx mode

Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) QP	Margin (dB) AV
0.150	0.07	24.57	24.64	66.00	14.88	14.95	56.00	-41.36	-41.05
0.227	0.04	50.74	50.78	62.57	48.76	48.80	52.57	-11.78	-3.76
0.341	0.05	37.17	37.22	59.18	32.00	32.05	49.18	-21.96	-17.13
2.099	0.12	38.42	38.54	56.00	37.65	37.77	46.00	-17.46	-8.23
9.757	0.40	34.91	35.31	60.00	24.53	24.93	50.00	-24.69	-25.07
14.594	0.72	28.43	29.15	60.00	25.02	25.74	50.00	-30.85	-24.26

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESR-7	101232	2020/01/18	2021/01/16
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2019/08/29	2020/08/27
Signal Analyzer	Agilent	N9030A	MY51380492	2019/08/21	2020/08/19
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2019/04/19	2020/04/17
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2019/06/05	2020/06/03
Horn Antenna	SHWARZBECK	BBHA 9120 D	9120D-456	2020/01/20	2021/01/18
Power Meter	Anritsu	ML2495A	0844001	2019/10/23	2020/10/21
Power Sensor	Anritsu	MA2411B	0738452	2019/10/23	2020/10/21
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2019/08/19	2020/08/17
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2019/08/19	2020/08/17
RF Cable	SUHNER	SUCOFLEX 102	CB0006	2019/05/02	2020/04/30
Hight Pass Filter	Wainwright	WHKX3.0/18G-12SS	N/A	2019/05/30	2020/05/28
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2019/02/23	2020/02/22

Note: No Calibration Required (NCR)

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESCI	100059	2019/11/05	2020/11/03
Two-Line V-Network	R&S	ENV216	101160	2019/07/17	2020/07/15
Two-Line -V-Network	R&S	ESH3-Z5	825562/003	2019/08/27	2020/08/25
CON-3 Shielded Room	N/A	N/A	N/A	NCR	NCR
CON-3 Cable	SUHNER	SUCOFLEX 106	27222 /6	2020/01/15	2021/01/13
Test software	Audix	e3	4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

Item	Uncertainty
Fundamental emission	4.29 dB
20dB Bandwidth	7.69 %
Frequency stability	0.01118 ppm
In band Radiated Emission	1.15 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.32 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.10 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.18 dB
AC Power Line Conducted Emission	2.52 dB