EMC

TEST REPORT

Report No. : **171000226TWN-001**
Model No. : **HURESAC-3XE-C**
Issued Date : **Dec. 08, 2017**

Applicant: **Johnson Health Tech. Co., Ltd.**
No. 999, Sec. 2, Dongda Rd., Daya Dist., Taichung City 428, Taiwan, R.O.C.

Test Method/ Standard: **47 CFR FCC Part 15.225**

Test Site: **960839**

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

Testing Laboratory
0597

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Title Group Leader

Revision History

Report No.	Issue Date	Revision Summary
171000226TWN-001	Dec. 08, 2017	Original report

Table of Contents

1. 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 Satiability	15.225 (e)	Pass
In band Radiated Emissions	15.225(b),15.225(c)	Pass
Out of band Radiated Emissions	15.225(d)	Pass
AC Power Line Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass

2. General Information

2.1 Identification of the EUT

Product:	Console for Exercise Machine
Model No:	HURESAC-3XE-C
Operating Frequency:	13.56 MHz
Access scheme:	ASK
Rated Power:	DC 12 V from adapter
Power Cord:	3C × 18AWG × 2 meter unshielded cable
Sample Received:	Oct. 19, 2017
Sample condition:	Workable
Test Date(s):	Nov. 15, 2017 ~ Dec. 12, 2017

Note 1: The test report only allows to be revised within three years from its original issued date unless further standard or the requirement was noticed.
Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.
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2.2 Description of EUT

The EUT transmit 13.56MHz signal continuously while we power on the EUT.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

2.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Type	: Loop Antenna
Connector Type	: I-PEX

2.4 Adapter information

The EUT will be supplied with a power supply from below list:

No.	Model no.	Specification
Adapter	LSE0107A1240	I/P: 100-240V~, 50/60Hz, 1A O/P: 12Vdc, 3.33A

3. Fundamental emission

3.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.225 (a)	

3.2 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.

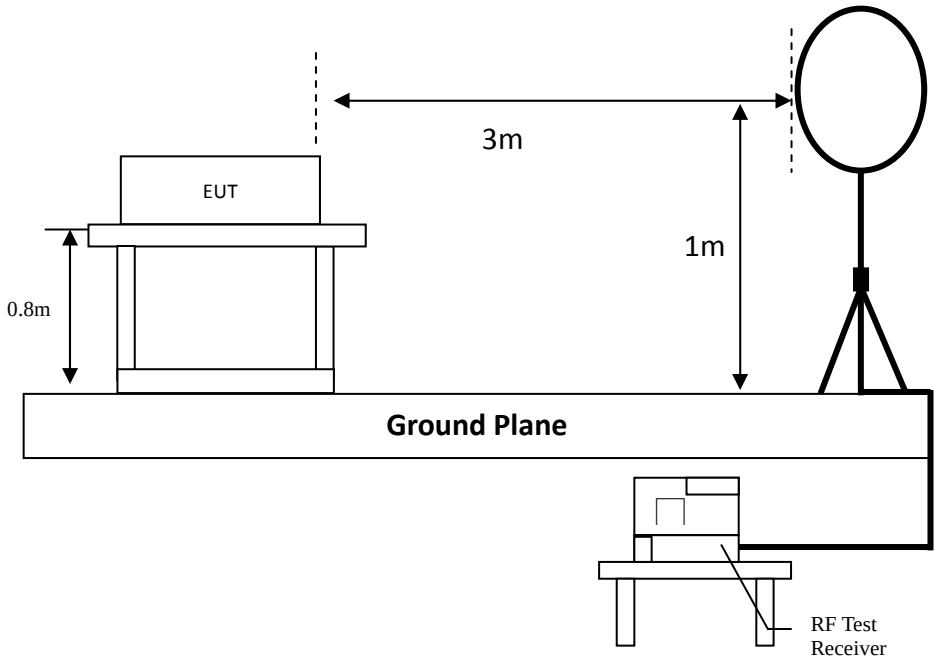
3.3 Measuring instrument setting

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

3.4 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.

3.5 Test diagram



3.6 Test result

Polarity (circle)	Frequency (MHz)	Detection value	factor (dB/m)	Reading (dBμV)	value (dBμV/m)	Limit @ 3m (dBμV/m)	Tolerance (dB)
Plane	13.56	QP	21.03	48.39	69.42	124.00	-54.58

13.56MHz , Limit= 84dBuV +40 dB (decade) = 124 dB

4. 20 dB Bandwidth

4.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.215	

4.2 Limit for 20 dB bandwidth

None

4.3 Measuring instrument setting

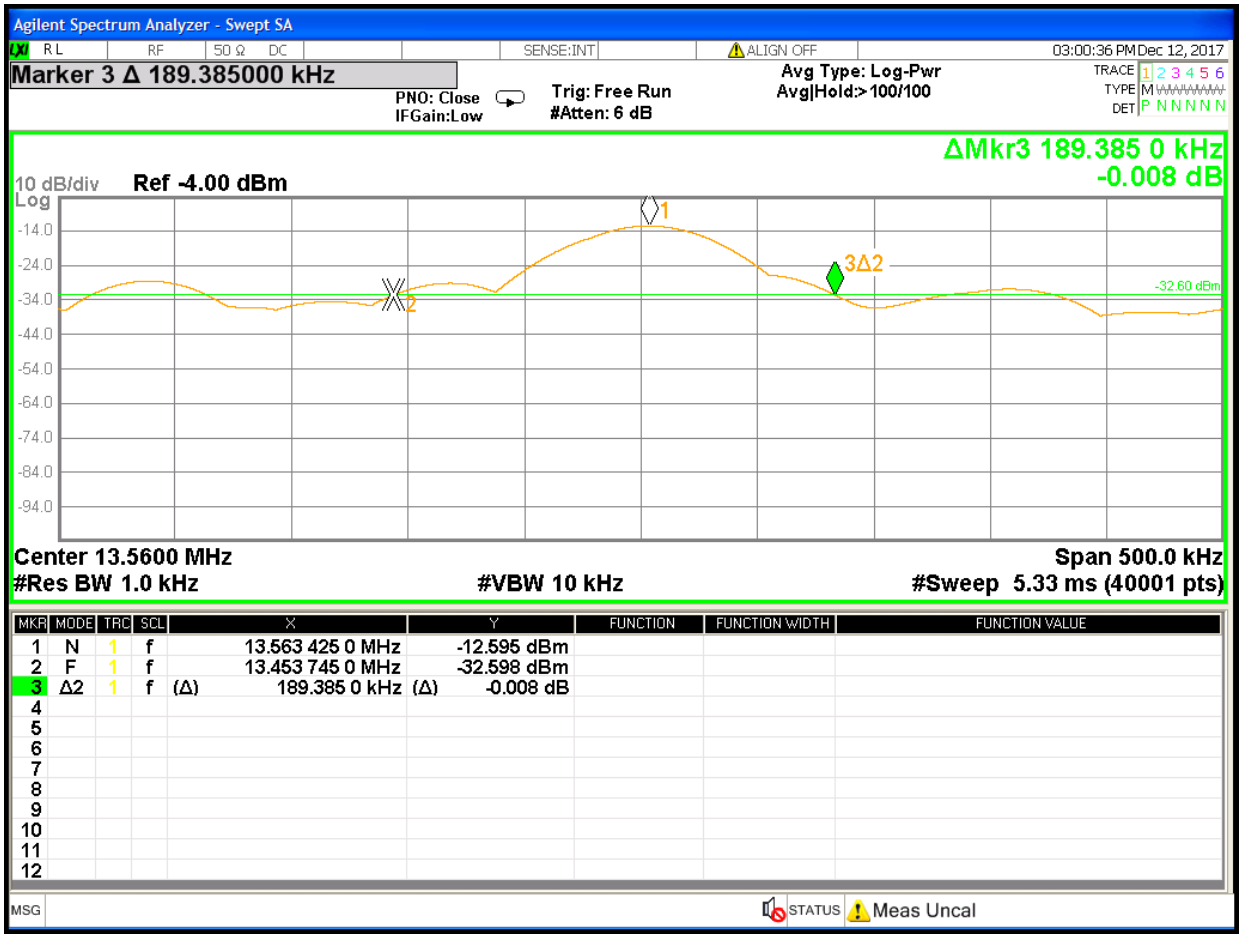
Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	1kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	≧ 1.2 times the 20 dB bandwidth
Attenuation	Auto

4.4 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.

4.5 Test results

20dB Bandwidth @ NFC Mode



5. Frequency Satiability

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.225(e)	

5.2 Limit for Frequency Satiability

The frequency tolerance of the carrier signal shall be maintained within ±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.

5.3 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

5.4 Test procedure

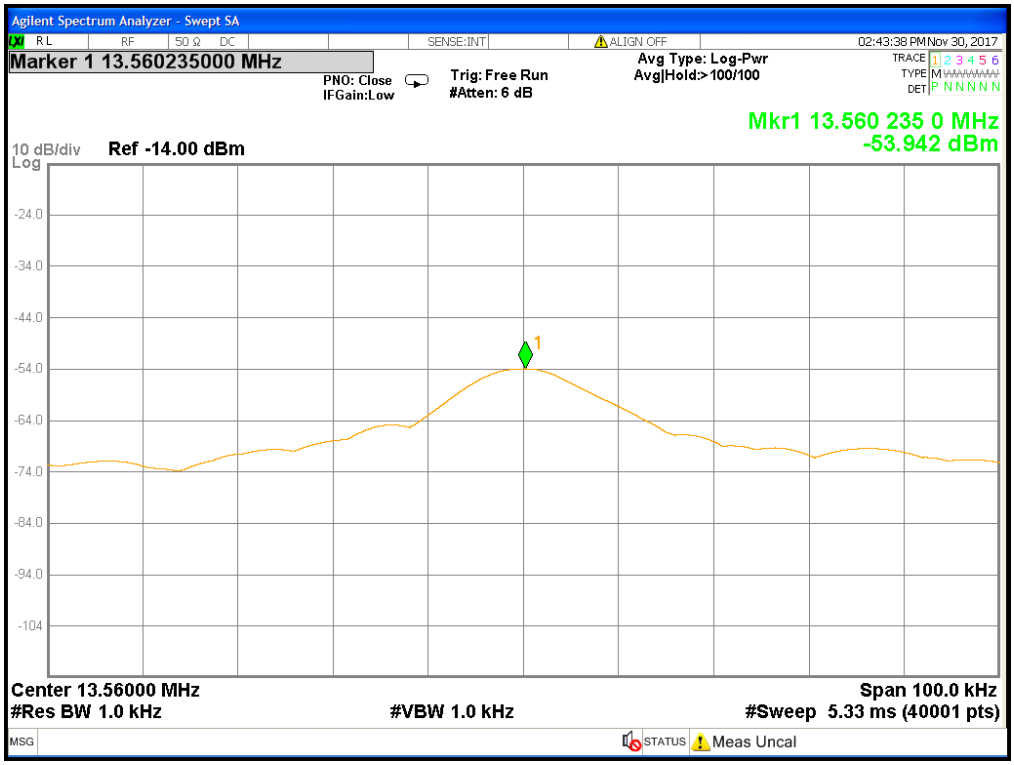
Turn the EUT on, and couple its output to a frequency counter or other frequency-measuring device of sufficient accuracy, considering the frequency tolerance with which the EUT shall comply.

5.5 Test result

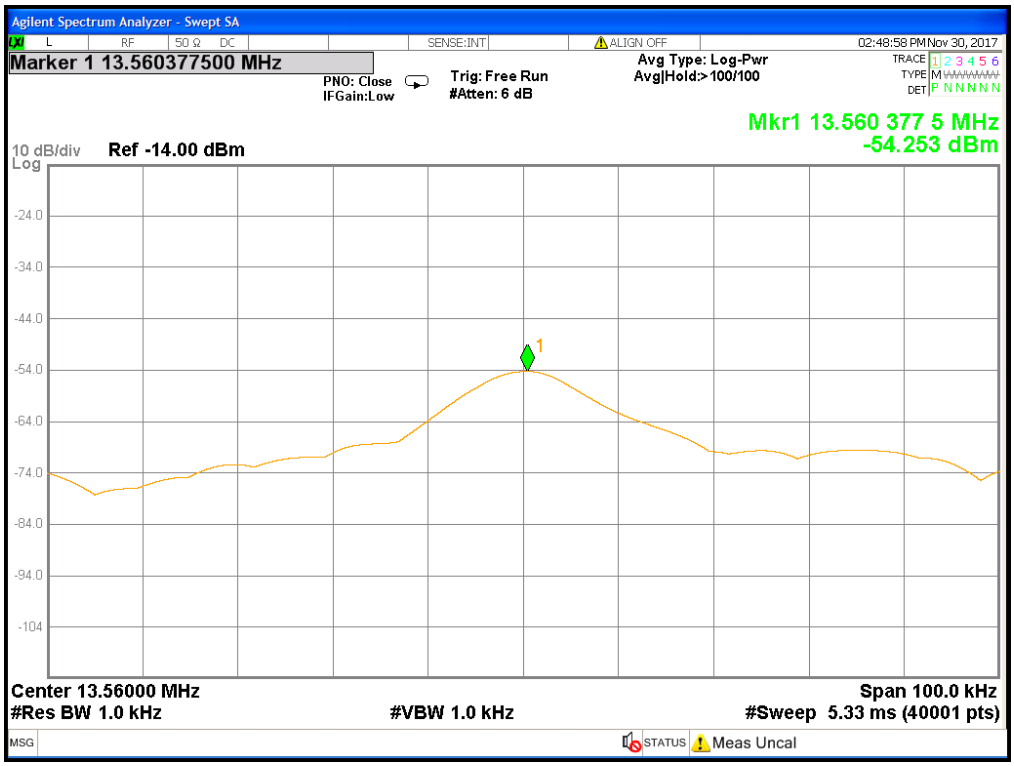
Temperature	Measuring frequency (MHz)	Voltage	Comparison frequency	Difference (MHz)	Difference (%)	Limit (%)	Result
-20	13.560235	120Vac	13.56	0.000235	0.001733%	±0.01	Pass
-10	13.560378	120Vac	13.56	0.000377	0.002784%	±0.01	Pass
0	13.560398	120Vac	13.56	0.000398	0.002931%	±0.01	Pass
10	13.559075	120Vac	13.56	-0.000925	-0.006822%	±0.01	Pass
20	13.560358	120Vac	13.56	0.000357	0.002636%	±0.01	Pass
30	13.559653	120Vac	13.56	-0.000348	-0.002563%	±0.01	Pass
40	13.559763	120Vac	13.56	-0.000238	-0.001751%	±0.01	Pass
50	13.559525	120Vac	13.56	-0.000475	-0.003503%	±0.01	Pass

20	13.559738	102Vac	13.56	-0.000262	-0.001936%	±0.01	Pass
	13.560358	120Vac	13.56	0.000357	0.002636%	±0.01	Pass
	13.559583	138Vac	13.56	-0.000418	-0.003079%	±0.01	Pass

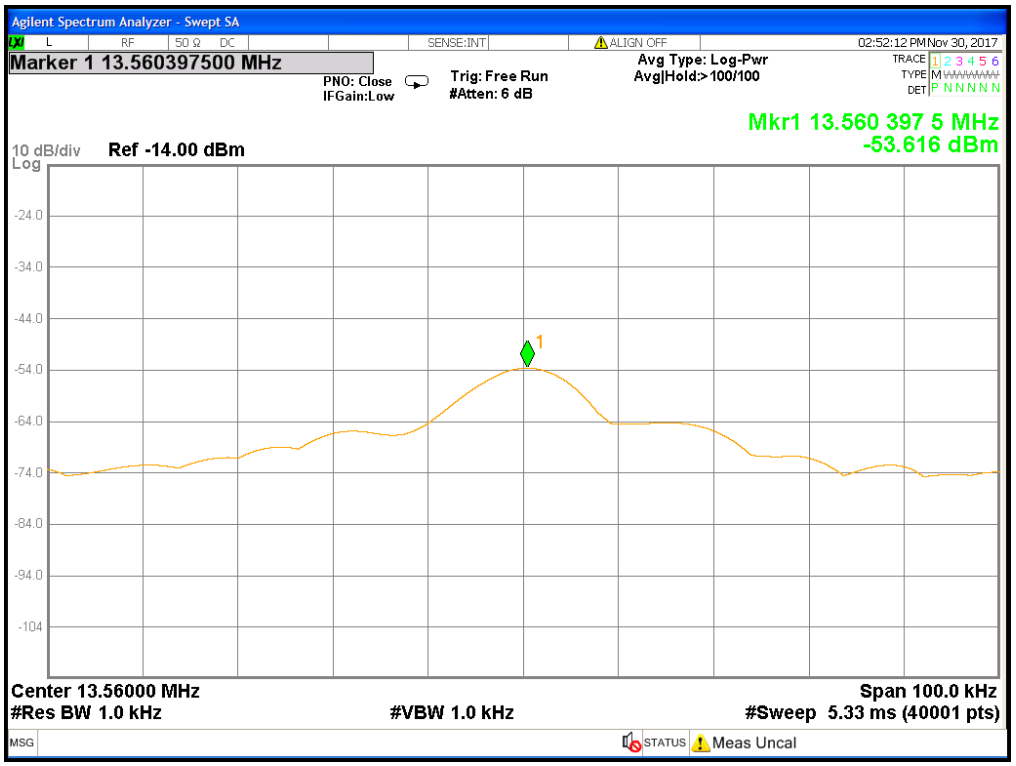
-20℃


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω DC
SENSE:INT
ALIGN OFF
02:43:38 PM Nov 30, 2017
Marker 1 13.560235000 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 13.560 235 0 MHz
-53.942 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
MSG
STATUS
Meas Uncal

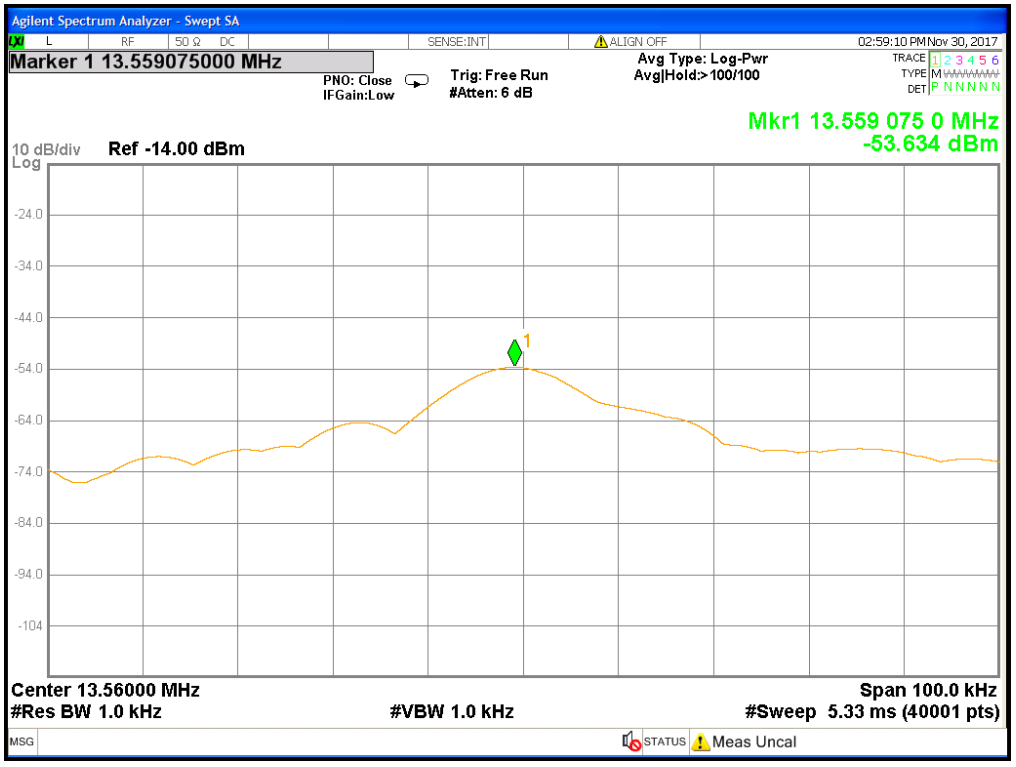
-10℃


Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω DC
SENSE:INT
ALIGN OFF
02:48:58 PM Nov 30, 2017
Marker 1 13.560377500 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 13.560 377 5 MHz
-54.253 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
MSG
STATUS
Meas Uncal

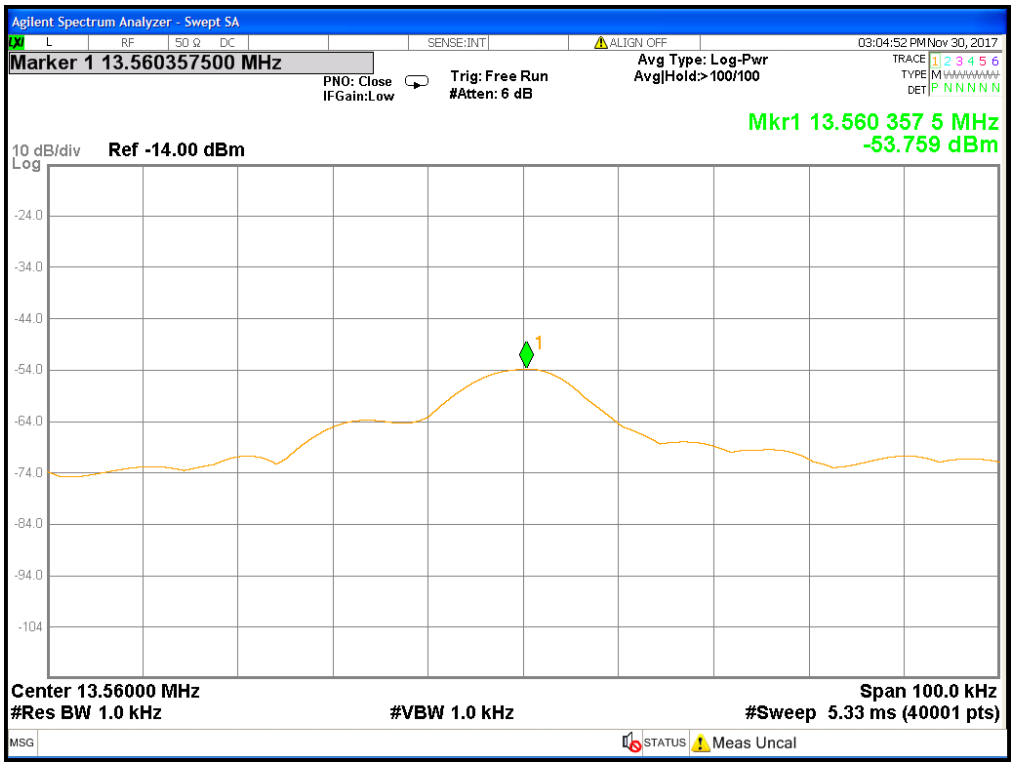
0℃


Agilent Spectrum Analyzer - Swept SA
Marker 1 13.560397500 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
02:52:12 PM Nov 30, 2017
Mkr1 13.560 397 5 MHz
-53.616 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
Meas Uncal

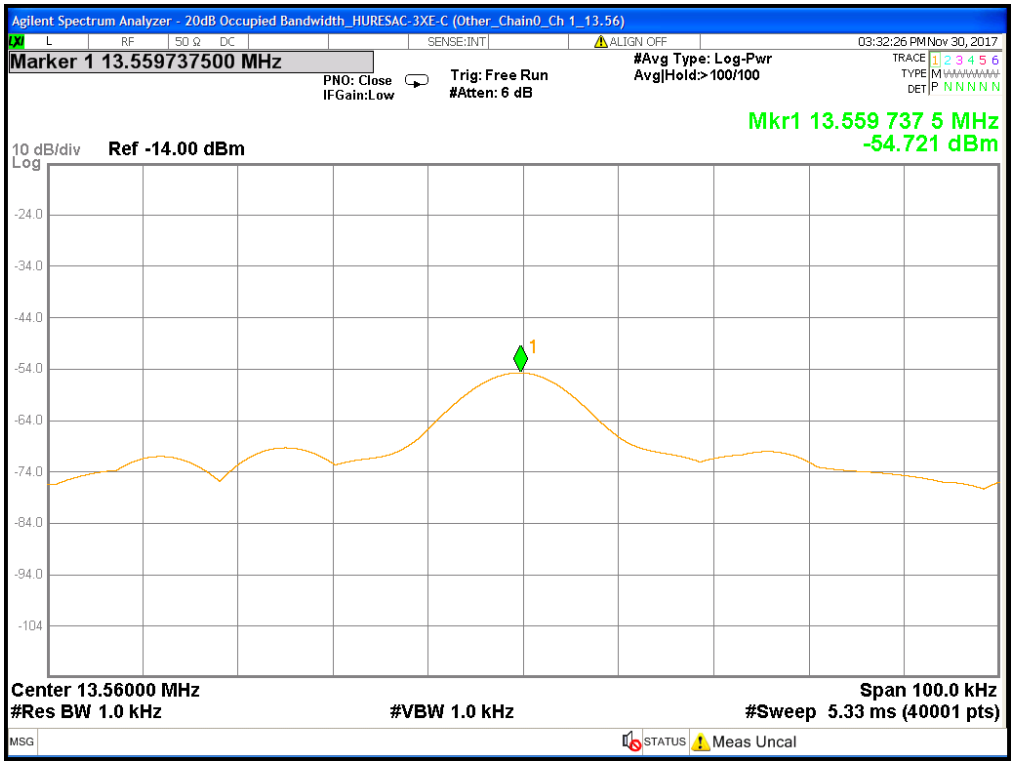
10℃


Agilent Spectrum Analyzer - Swept SA
Marker 1 13.559075000 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
02:59:10 PM Nov 30, 2017
Mkr1 13.559 075 0 MHz
-53.634 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
Meas Uncal

20℃120Vac



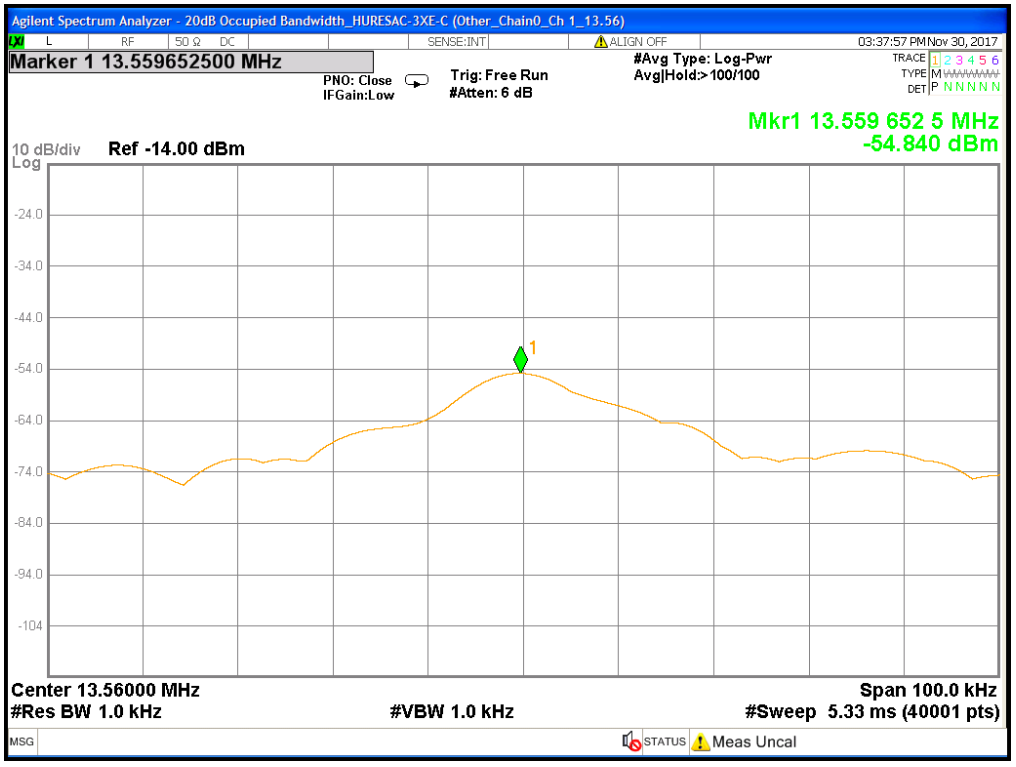
20℃102Vac



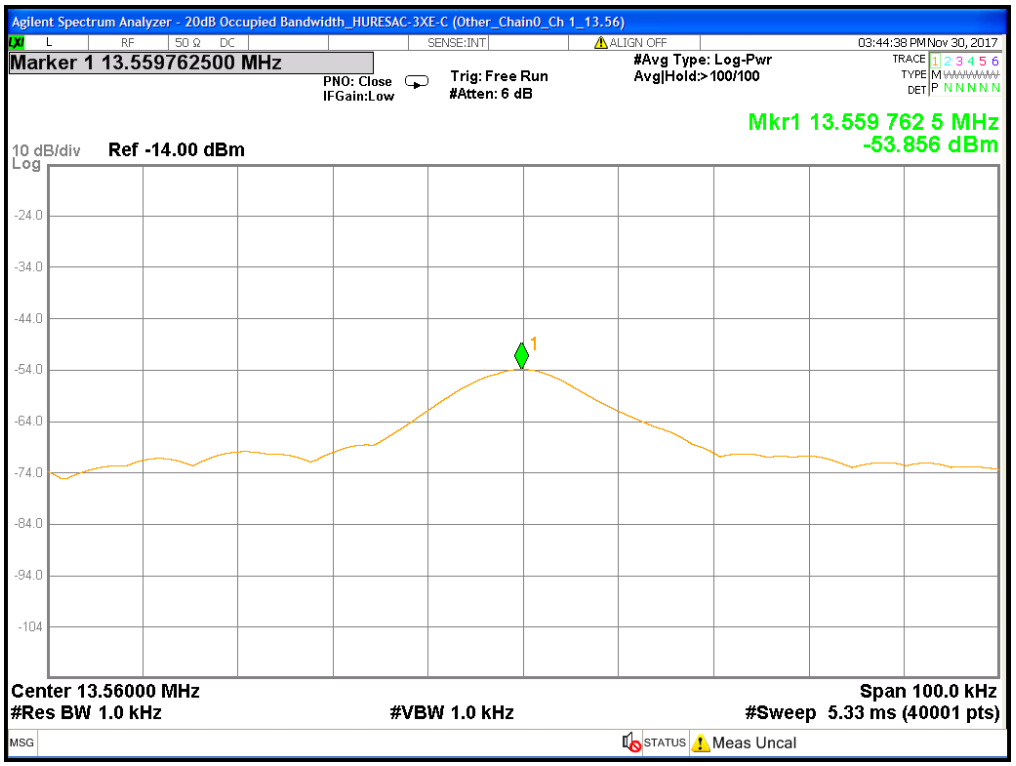
20℃138Vac


Agilent Spectrum Analyzer - 20dB Occupied Bandwidth_HURESAC-3XE-C (Other_Chain0_Ch 1_13.56)
Ref Value -14.00 dBm
PASS
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
#Avg Type: Log-Pwr
Avg|Hold:>100/100
03:31:14 PM Nov 30, 2017
Mkr1 13.559 582 5 MHz
-54.201 dBm
10 dB/div
Log
Ref -14.00 dBm
Trace 1 Pass
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
Meas Uncal

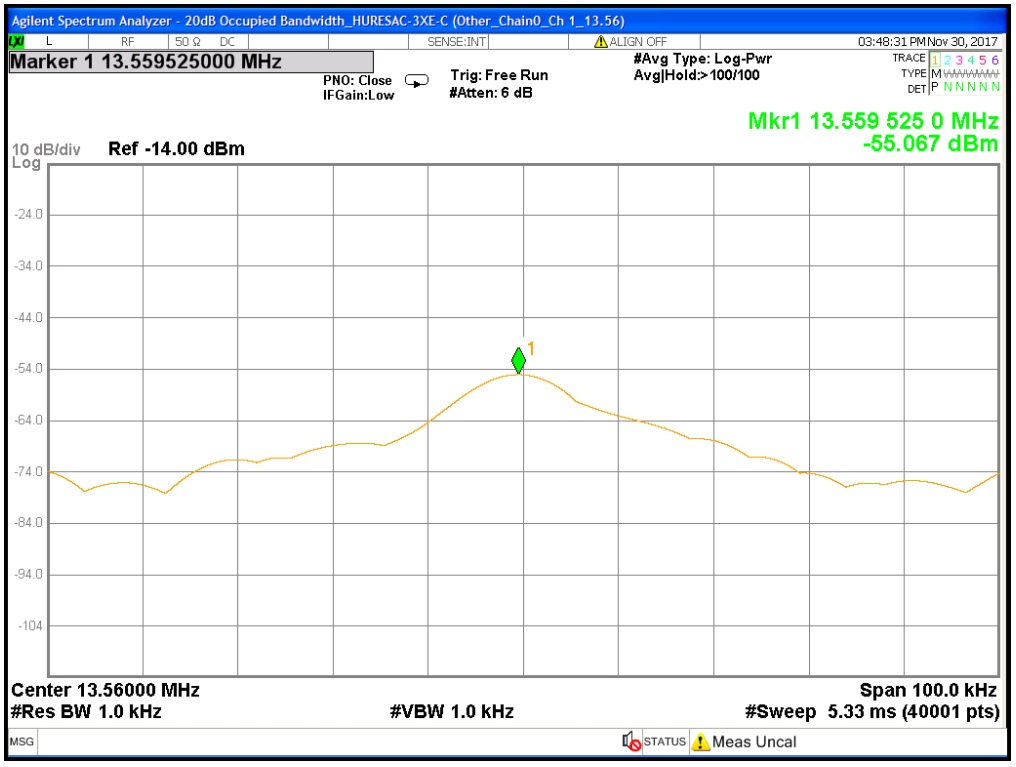
30℃


Agilent Spectrum Analyzer - 20dB Occupied Bandwidth_HURESAC-3XE-C (Other_Chain0_Ch 1_13.56)
Marker 1 13.559652500 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
#Avg Type: Log-Pwr
Avg|Hold:>100/100
03:37:57 PM Nov 30, 2017
Mkr1 13.559 652 5 MHz
-54.840 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
Meas Uncal

40℃


Agilent Spectrum Analyzer - 20dB Occupied Bandwidth_HURESAC-3XE-C (Other_Chain0_Ch 1_13.56)
RF 50 Ω DC
SENSE:INT
ALIGN OFF
03:44:38 PM Nov 30, 2017
Marker 1 13.559762500 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
#Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 13.559 762 5 MHz
-53.856 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
MSG
STATUS
Meas Uncal

50℃


Agilent Spectrum Analyzer - 20dB Occupied Bandwidth_HURESAC-3XE-C (Other_Chain0_Ch 1_13.56)
RF 50 Ω DC
SENSE:INT
ALIGN OFF
03:48:31 PM Nov 30, 2017
Marker 1 13.559525000 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 6 dB
#Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 13.559 525 0 MHz
-55.067 dBm
10 dB/div
Log
Ref -14.00 dBm
-24.0
-34.0
-44.0
-54.0
-64.0
-74.0
-84.0
-94.0
-104
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 100.0 kHz
#Sweep 5.33 ms (40001 pts)
MSG
STATUS
Meas Uncal

6. In band Radiated Emissions

6.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Requirement	15.225(b),15.225(c)	

6.2 Limit for emissions in non-restricted frequency bands

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

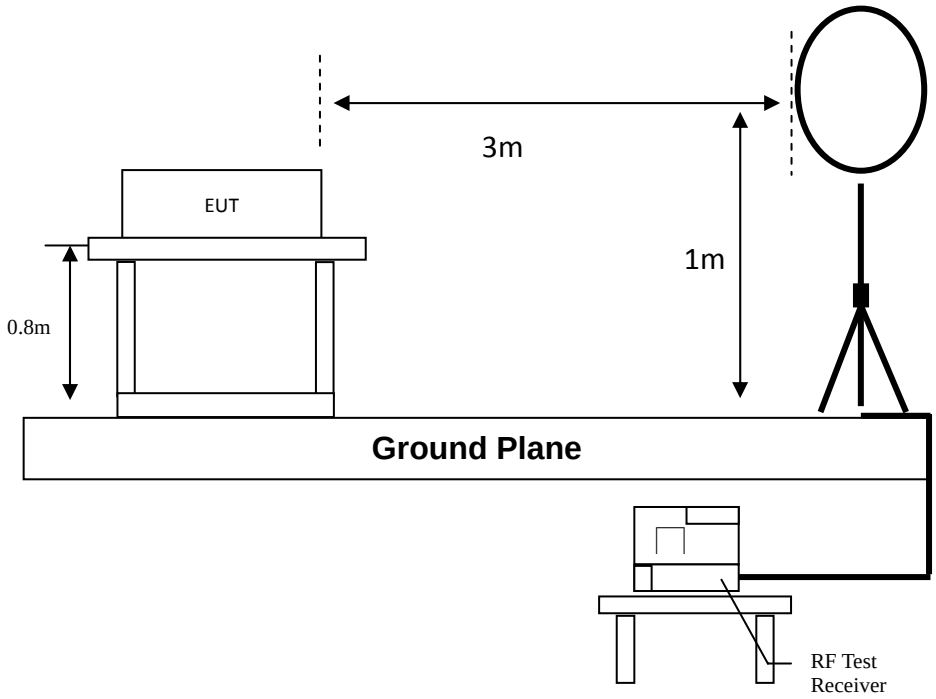
6.3 Measuring instruments setting

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

6.4 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 is 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.

6.5 Test diagram



6.6 Test results

Unwanted_emission_in_the_spurious_domain @ 13.56MHz

Start Freq	Stop Freq	Integ BW	dBµV	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBµV	Upper ΔLim(dB)	Upper Freq (Hz)
0.0 Hz	7.000 kHz	10.00 kHz	42.35	(-81.65)	0.0	42.35	(-81.65)	0.0
7.000 kHz	150.0 kHz	10.00 kHz	39.26	(-51.24)	-7.000 k	38.77	(-51.73)	7.000 k
150.0 kHz	450.0 kHz	10.00 kHz	38.37	(-42.13)	-231.3 k	37.57	(-42.93)	391.5 k
300.0 kHz	450.0 kHz	10.00 kHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

7. Out of band Radiated Emissions

7.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Requirement	15.225(d), 15.205, 15.209	

7.2 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

7.3 Measuring instrument setting

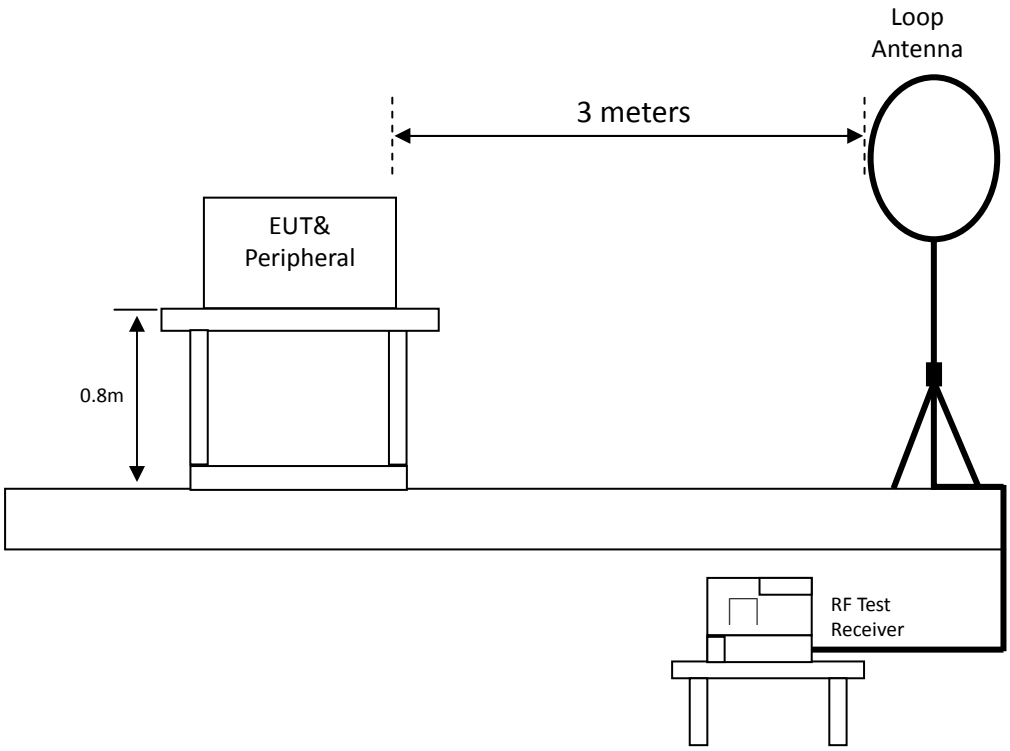
Receiver settings	
Receiver function	**Setting**
Detector	QP
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Attenuation	Auto

7.4 Test procedure

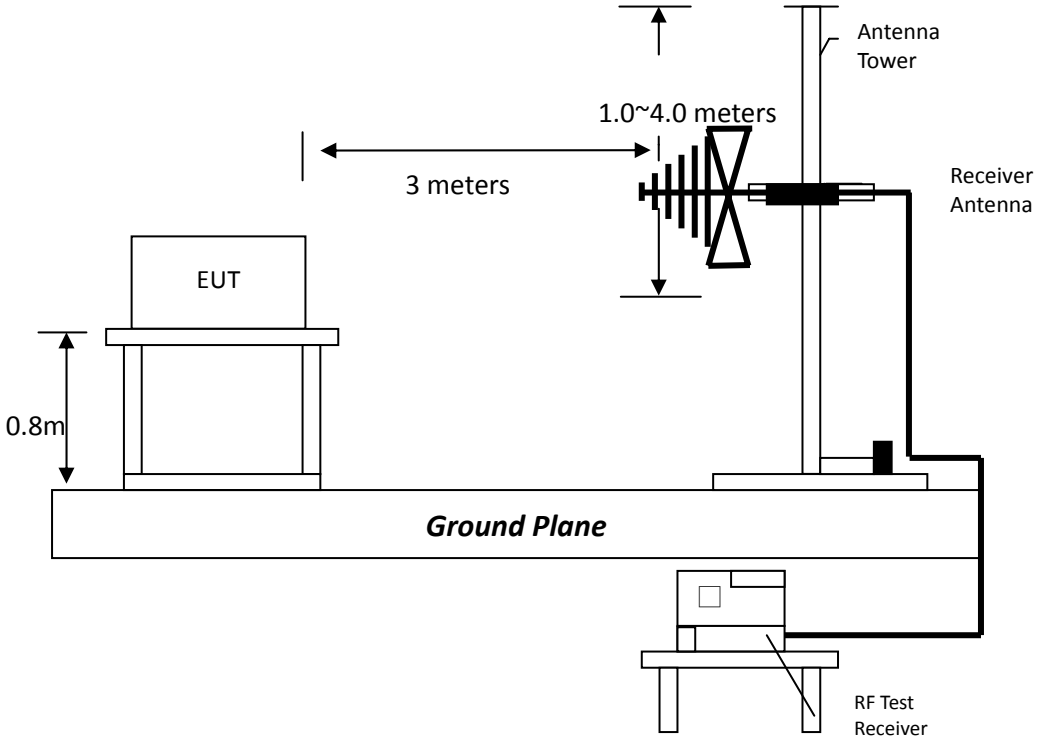
1. Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the companion 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.

7.5 Test configuration

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



7.5.2 Radiated emission below 1GHz using Bilog Antenna



7.6 Test result

7.6.1 Measurement results: frequency range from 9 kHz to 30 MHz

The test was performed on EUT under continuously transmitting mode.

EUT : HURESAC-3XE-C
Worst Case : Tx mode

Polarity (circle)	Frequency (MHz)	Detection value	factor (dB/m)	Reading (dBµV)	value (dBµV/m)	Limit @ 3m (dBµV/m)	Tolerance (dB)
Plane	0.02	PK	20.27	22.53	42.80	121.58	-78.78
Plane	0.05	PK	19.62	26.35	45.97	113.62	-67.65
Plane	0.07	PK	19.47	27.01	46.48	110.70	-64.22
Plane	0.09	PK	19.17	24.76	43.93	108.52	-64.59
Plane	0.11	PK	19.06	20.14	39.20	106.78	-67.58
Plane	0.12	PK	19.05	22.36	41.41	106.02	-64.61
Plane	0.15	PK	19.05	31.54	50.59	104.08	-53.49
Plane	0.69	QP	19.12	23.61	42.73	70.83	-28.10
Plane	1.94	QP	19.06	16.86	35.92	69.54	-33.62
Plane	12.09	QP	20.83	13.11	33.94	69.54	-35.60
Plane	12.51	QP	20.89	21.39	42.28	69.54	-27.26
Plane	12.93	QP	20.94	28.20	49.14	69.54	-20.40

7.6.2 Measurement results: frequencies below 1 GHz

The test was performed on EUT under continuously transmitting mode.

EUT : HURESAC-3XE-C
Worst Case : Tx mode

Antenna Polariz. (V/H)	Freq. (MHz)	Detection value	factor (dB/m)	Reading (dBμV)	value (dBμV/m)	Limit @ 3m (dBμV/m)	Tolerance (dB)
V	39.70	QP	20.02	12.32	32.34	40.00	-7.66
V	47.46	QP	19.45	10.01	29.46	40.00	-10.54
V	59.10	QP	19.50	8.54	28.04	40.00	-11.96
V	70.74	QP	18.06	11.28	29.34	40.00	-10.66
V	95.96	QP	14.91	22.80	37.71	43.50	-5.79
V	111.48	QP	17.37	9.88	27.25	43.50	-16.25
H	41.64	QP	20.16	4.92	25.08	40.00	-14.92
H	55.22	QP	19.08	6.69	25.77	40.00	-14.23
H	86.26	QP	14.95	7.65	22.60	40.00	-17.40
H	95.96	QP	14.91	18.50	33.41	43.50	-10.09
H	128.94	QP	18.98	7.58	26.56	43.50	-16.94
H	134.76	QP	19.67	7.36	27.03	43.50	-16.47

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.

8. AC Power Line Conducted Emission

8.1 Operating environment

Temperature:	20	℃
Relative Humidity:	58	%
Atmospheric Pressure	1009	hPa
Requirement	15.207	

8.2 Limit for AC power line conducted emission

Freq. (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

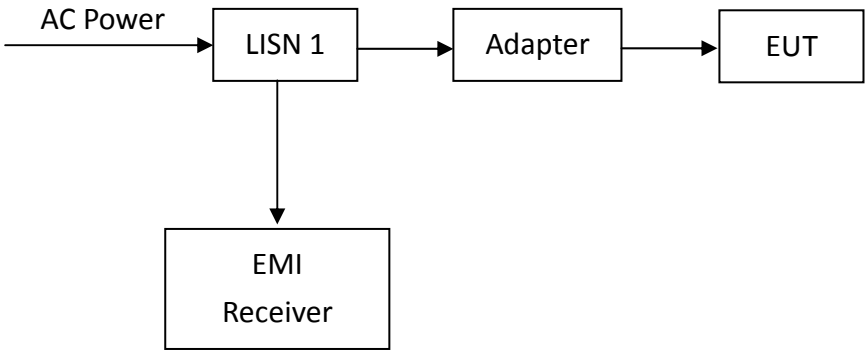
8.3 Measuring instrument setting

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

8.4 Test procedure

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.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
3. All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30MHz was searched
5. Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
6. The measurement has to be done between each power line and ground at the power terminal.

8.5 Test diagram



Note: The EUT was tested while in normal communication mode.

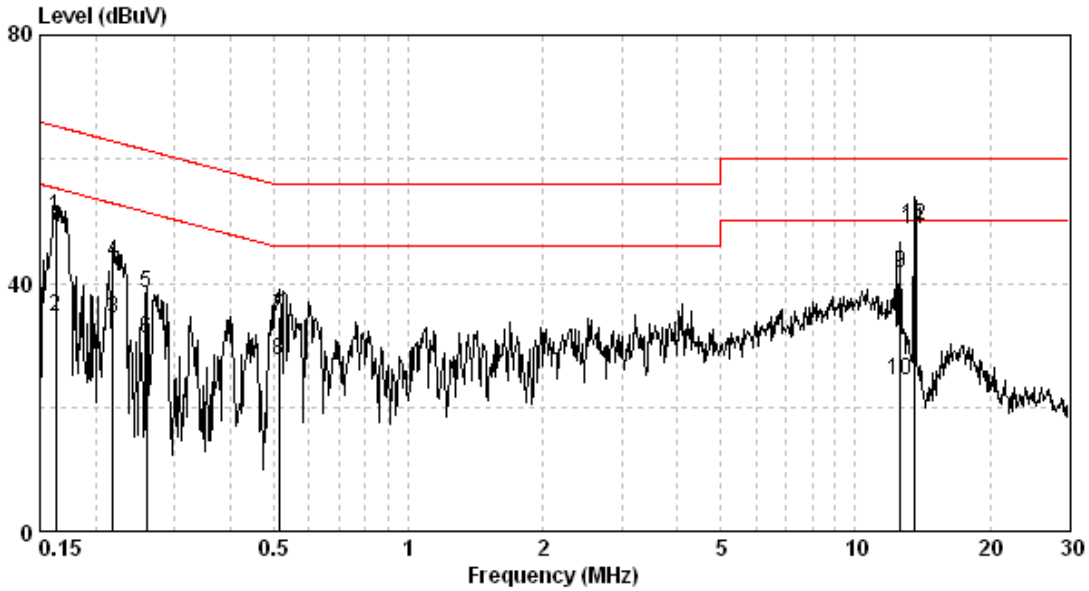
8.6 Test results

Phase : Live Line
EUT : HURESAC-3XE-C
Test Condition : normal communication 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
0.162	9.70	40.91	50.61	65.34	24.75	34.45	55.34	-14.73	-20.89
0.219	9.70	33.72	43.42	62.88	24.50	34.20	52.88	-19.45	-18.68
0.260	9.70	28.69	38.39	61.42	21.44	31.14	51.42	-23.04	-20.28
0.513	9.70	24.82	34.52	56.00	17.83	27.53	46.00	-21.48	-18.47
12.582	9.85	31.75	41.60	60.00	14.35	24.20	50.00	-18.40	-25.80
13.551	9.87	39.22	49.09	60.00	38.72	48.59	50.00	-10.91	-1.41

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)

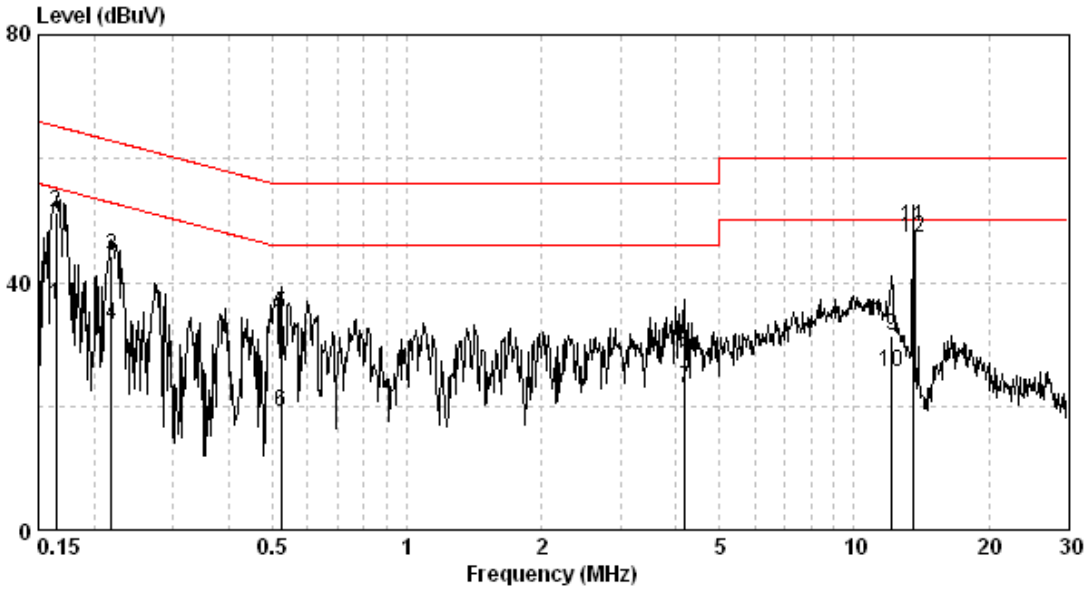


Phase : Neutral Line
EUT : HURESAC-3XE-C
Test Condition : normal communication mode

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
0.164	9.73	41.55	51.28	65.25	26.73	36.46	55.25	-13.98	-18.79
0.219	9.73	34.57	44.30	62.88	23.47	33.20	52.88	-18.57	-19.67
0.524	9.73	25.23	34.96	56.00	9.24	18.97	46.00	-21.04	-27.03
4.180	9.75	18.96	28.71	56.00	13.14	22.90	46.00	-27.29	-23.10
12.124	9.86	21.52	31.38	60.00	15.72	25.58	50.00	-28.62	-24.42
13.551	9.90	39.17	49.07	60.00	37.15	47.04	50.00	-10.93	-2.96

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)



9. Antenna Requirement

9.1 Limit for Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

9.2 Test results

The sample tested met the antenna requirement. The antenna was a Loop Antenna attached to the circuit board by a Specific cable.

Appendix A: Test equipment list

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2017/11/21	2018/11/20
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2017/02/15	2018/02/14
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2017/04/05	2018/04/04
Signal Analyzer	Agilent	N9030A	MY51380492	2017/08/29	2018/08/28
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2017/08/15	2018/08/14
966-2(B) Cable	JUNFLON	SMA / J12J100880-00	AUG-26-08-002	2017/05/04	2018/05/03
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2017/05/04	2018/05/03
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2017/03/29	2018/03/28
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2017/03/30	2018/03/29
EMI Test Receiver	Rohde & Schwarz	ESR-7	101232	2017/01/23	2018/01/22
Test software	ADT	Radiated test system	7.5.14	NCR	NCR

Note: No Calibration Required (NCR).

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Receiver	R&S	ESCI	100059	2017/11/13	2018/11/12
Two-Line V-Network	R&S	ENV216	101159	2017/06/03	2018/06/02
Artificial Mains Network (LISN)	SCHAFFNER	MN2050D	1586	2017/05/31	2018/05/30
CON-1 Shielded Room	N/A	N/A	N/A	NCR	NCR
CON-1 Cable	SUHNER	SUCOFLEX-104	26438414	2017/05/04	2018/05/03
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
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.14 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.22 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Conducted Output power	0.86 dB
Radiated electromagnetic disturbances in the frequency range from 9kHz to 30MHz	3.54 dB
Conducted disturbance measurements at a mains port from 9 kHz to 30 MHz using a 50 Ω/50 µH +5Ω artificial mains network (AMN)	2.48 dB