

Radio Spectrum TEST REPORT

Report No.: 170300653TWN-001
Model No.: ATSFOCUS01
Issued Date: Jul. 10, 2018

Applicant: Advanced Thinking Systems Ltd.
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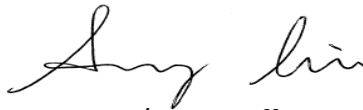
Test Method/ Standard: 47 CFR FCC Part 15.247 & ANSI C63.10 2013
KDB 558074 D01 v04

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

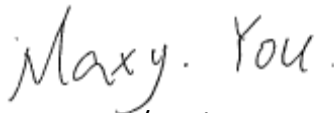
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The test report was prepared by:


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These measurements were taken by:


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Title Supervisor

Revision History

Report No.	Issue Date	Revision Summary
170300653TWN-001	Jul. 10, 2018	Original report

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Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Minimum 6 dB Bandwidth	15.247(a)(2) KDB 558074 D01 v04	Pass
Maximum Peak Conducted Output Power	15.247(b)(3) KDB 558074 D01 v04 KDB 662911 D01 v02r01	Pass
Power Spectral Density	15.247(e)	Pass
Emissions In Non-Restricted Frequency Bands	15.247(d)	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass
Emission On The Band Edge	15.247(d), 15.205	Pass
AC Power Line Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass

1. General information

1.1. Identification of the EUT

Product:	Multimedia Player
Model No.:	ATSFOCUS01
Operating Frequency:	2402 MHz ~ 2480 MHz
Channel Number:	40 channels
Frequency of Each Channel:	2402+2 k MHz, k = 0~39
Access scheme:	GFSK
Rated Power:	1. DC 3.7 V from battery 2. DC 5 V from USB for charging
Power Cord:	N/A
Sample Received:	Mar. 17, 2017
Test Date(s):	Jun. 30, 2017 ~ Jul. 26, 2017 & Jul. 04, 2018

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.

Note 3: Except where explicitly agreed in writing, all work and services performed by Intertek is subject to our standard Terms and Conditions which can be obtained at our website: <http://www.intertek-twn.com/terms/>. Intertek's responsibility and liability are limited to the terms and conditions of the agreement.

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1.2. Description of the EUT

Modulation mode	Transmit path	
	Chain 0 / Main	Chain 1 / AUX
BT4.0	V	X

1.3. Antenna Description

The EUT uses a permanently connected antenna.

Antenna Gain : 2 dBi
Antenna Type : Chip antenna
Connector Type : Fixed

1.4. Operation Mode

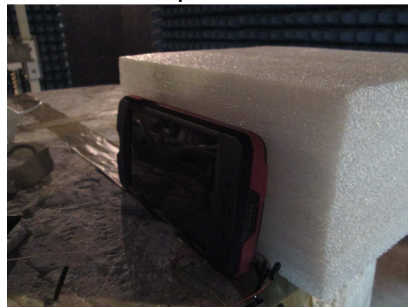
The EUT was supplied with DC 3.7 V from battery.

TX-MODE is based on a specific test program “USBTest3”, and the program can select different frequency and modulation.

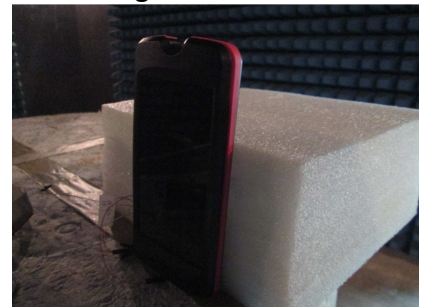
The signal is maximized through rotation and placement in the three orthogonal axes.



X axis



Y axis



Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at X axis. The final test data was executed under this configuration.

1.5. Applied Test Modes and Channels

Test items	Mode	Channel	Antenna
Minimum 6 dB Bandwidth	BLE	Low, Middle , High	Chain0
Maximum peak conducted output power	BLE	Low, Middle , High	Chain0
Power Spectral Density	BLE	Low, Middle , High	Chain0
RF Antenna Conducted Spurious	BLE	Low, Middle , High	Chain0
Radiated spurious Emission 9kHz~1GHz	Worst case		
Radiated Spurious Emission 10GHz~10th Harmonic	BLE	Low, Middle , High	Chain0
Restricted-Band Band edge	BLE	Low, Middle , High	Chain0
AC Power Line Conducted Emission	Normal Link		

1.6. Peripherals Equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	DELL	Latitude D610	2YWZK1S	RS232 0.5 meter × 1

2. Minimum 6 dB Bandwidth

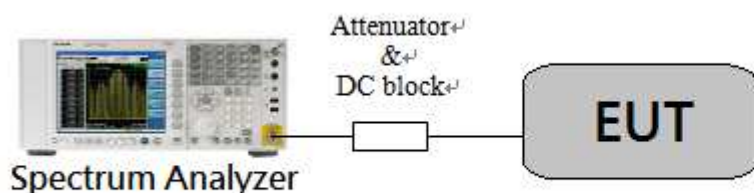
2.1. Instrument Setting

Spectrum Function	Setting
Detector	Peak
RBW	100kHz
VBW	$\geq 3 \times \text{RBW}$
Sweep	Auto couple
Trace	Allow the trace to stabilize
Span	Between two times and five times the occupied bandwidth
Attenuation	Auto

2.2. Test Procedure

- Step 1 The transmitter output was connected to the spectrum analyzer
- Step 2 Test was performed in accordance with clause 8.1 option1 of KDB 558074 D01
- Step 3 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

2.3. Test Diagram



2.4. Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

2.5. Operating Environment Condition

Temperature (°C) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 6/30/2017

2.6. Test Results

Mode	Channel	Frequency (MHz)	6dB BW (MHz)	Limit (MHz)
BLE	0	2402	0.707	>0.5
BLE	19	2440	0.681	>0.5
BLE	39	2480	0.680	>0.5

Agilent Spectrum Analyzer - dB Occupied Bandwidth_AITS_FCC (Lower Energy_Chain0_Ch 0_240Z)

F R L RF S D Q CC ALIGN OFF 12:10:43 PM Jun 30, 2017

Ref Level 16.90 dBm PNO: Wide IF Gain: Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr Avg/Hold: 100/100 TYPE M H A W I N N N DET P N N N N N N

MNR	NMR	FREQ [Hz]	SFL	%	V	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	2.402 024 2 GHz	f	-	1.878 dBm			
2	N	2.401 659 5 GHz	f	-	-4.090 dBm			
3	Δ2	1 f (Δ)		707.2 kHz (Δ)	-0.005 dB			

MSG STATUS

Agilent Spectrum Analyzer - dB Occupied Bandwidth_AITS_FCC (Lower Energy_Chain0_Ch 19_2440)

F L RF 150 GHz OC

SENSE:INT

ALIGN OFF

12:16:36 PM Jun 20, 2017

RANGE [E] 3 E 6

Avg Type: Log-Pwr

Avg/Hold: 100/100

PNO: Wide IF Gain: Low

Trig: Free Run

#Atten: 20 dB

TYPE M H A A A A A A A A

DET P N N N N N

Ref Offset 6.9 dB

Ref 16.90 dBm

ΔMkr3 680.8 kHz

0.143 dB

10 dB/div

Log

6.90

-3.10

-13.1

23.1

-43.1

53.1

63.1

73.1

Center 2.440000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 4.000 MHz

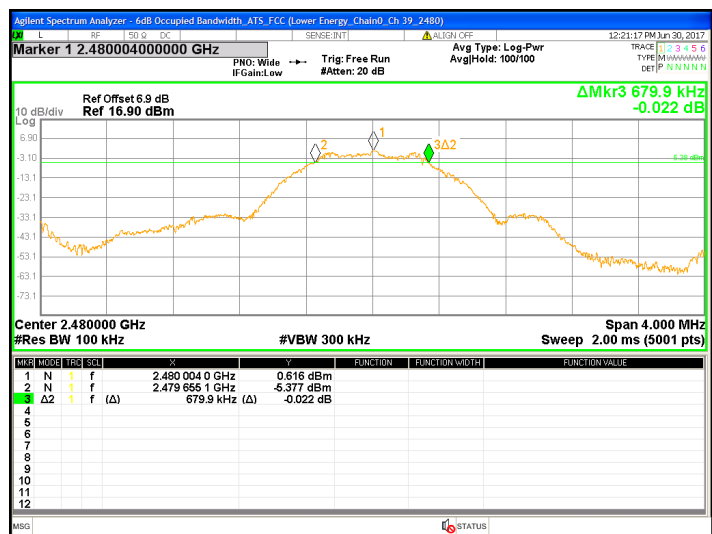
Sweep 2.00 ms (5001 pts)

Mkx	Mode	Hz	Sz	C	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.440 006 6 GHz	-1.494 dBm			
2	N	f		2.439 653 8 GHz	-4.555 dBm			
3	Δ2	f	(Δ)	680.8 kHz (Δ)	0.143 dB			
4								
5								
6								
7								
8								
9								
10								
11								
12								

MSG

STATUS

Chain0 : 6dB Bandwidth @ BLE Mode Ch39



3. Maximum Peak Conducted Output Power

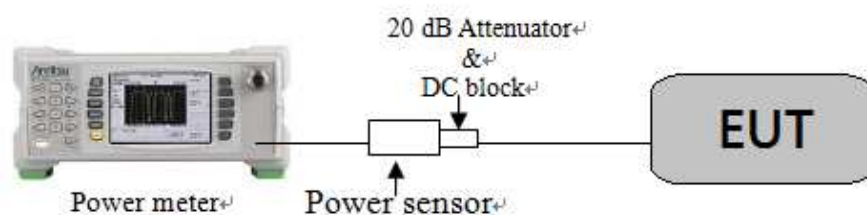
3.1. Instrument Setting

Power Meter Parameter	Setting
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak & Average

3.2. Test Procedure

Test procedures refer to clause 9.1.3 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01.

3.3. Test Diagram



3.4. Limit

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

3.5. Operating Environment Condition

Temperature (°C) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 6/30/2017

3.6. Test Results

Mode	Channel	Pk Output Power (dBm)	Pk Output Power (mW)	Av Output Power (dBm)	Av Output Power (mW)	Limit (dBm)	Margin (dB)
BLE	0	3.30	2.14	1.35	1.36	30.00	-26.70
BLE	19	3.72	2.36	1.66	1.47	30.00	-26.28
BLE	39	3.51	2.24	1.15	1.30	30.00	-26.49

4. Power Spectral Density

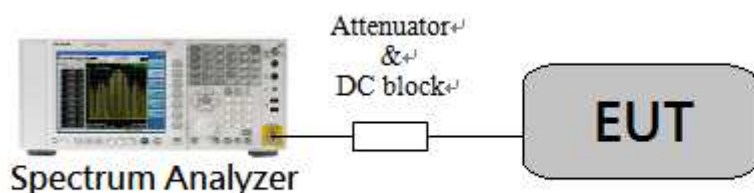
4.1. Instrument Setting

Spectrum Function	Setting
Detector	Peak
RBW	≥ 3 kHz
VBW	$\geq 3 \times$ RBW
Sweep	Auto couple
Trace	Max hold
Span	1.5 times x 6dB bandwidth
Attenuation	Auto

4.2. Test Procedure

- Step 1 Test procedure refer to clause 10.2 method PKPSD (peak PSD) of KDB 558074 D01.
- Step 2 Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
- Step 3 Use the peak marker function to determine the maximum amplitude level within the RBW.

4.3. Test Diagram



4.4. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

4.5. Operating Environment Condition

Temperature (°C) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 2017/6/30

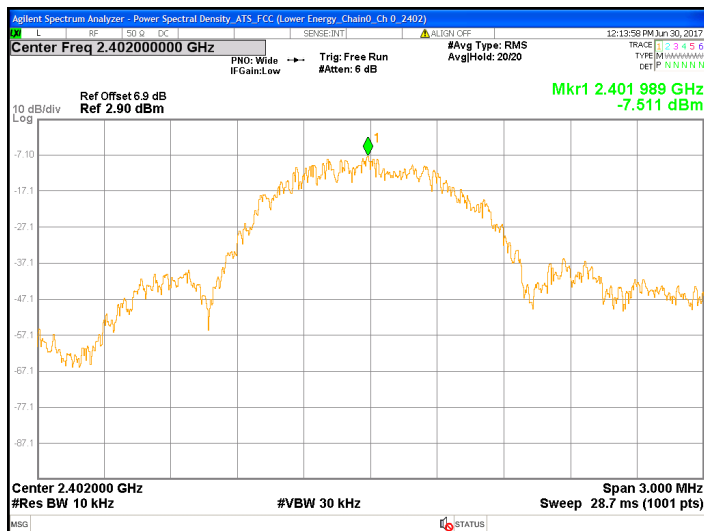
4.6. Test Results

Mode	Channel	Freq.(MHz)	RBW factor (dB)	PSD in 10 kHz (dBm)	PSD in 3 kHz (dBm)	Limit (dBm)	PSD (dBm)
BLE	0	2402	5.229	-7.511	-12.74	8	-20.74
BLE	19	2440	5.229	-8.038	-13.267	8	-21.267
BLE	39	2480	5.229	-8.702	-13.931	8	-21.931

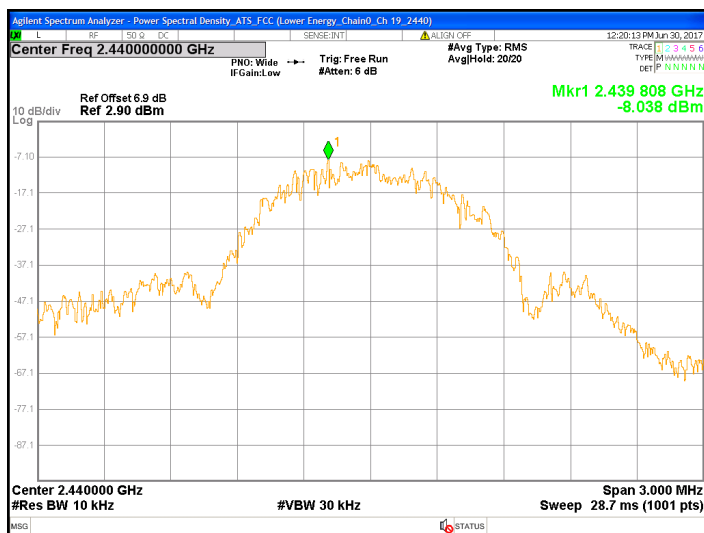
Remark1: RBW Correction = $10 \cdot \log(10\text{kHz}/3\text{kHz}) = 5.229$

Remark2: PSD in 3kHz = PSD in 10kHz – RBW Correction

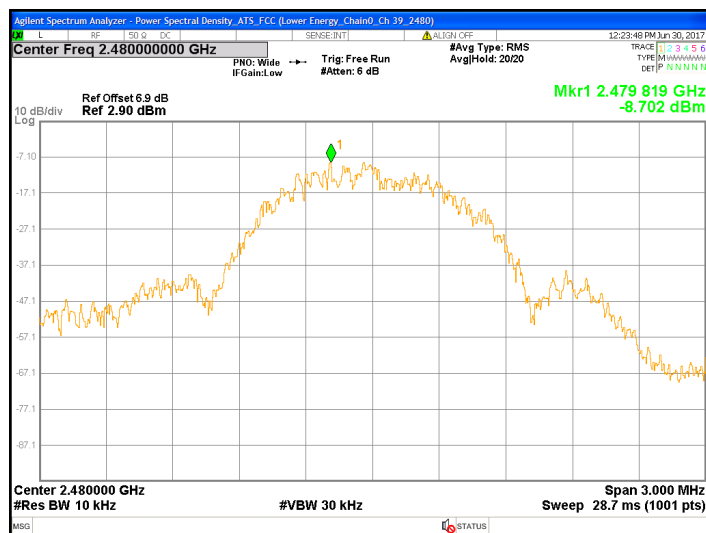
Chain0 : Power Spectral Density @ BLE Mode Ch 0



Chain0 : Power Spectral Density @ BLE Mode Ch 19



Chain0 : Power Spectral Density @ BLE Mode Ch39



5. Emissions in Non-Restricted Frequency Bands

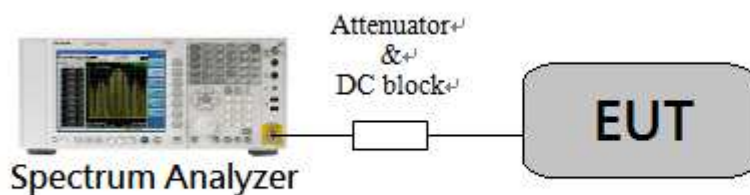
5.1. Instrument Setting

Spectrum Function	Setting (Reference level)	Setting (Emission level)
Detector	Peak	Peak
RBW	≥ 100 kHz	≥ 100 kHz
VBW	$\geq 3 \times$ RBW	$\geq 3 \times$ RBW
Sweep	Auto couple	Auto couple
Trace	Max hold	Max hold
Span	≥ 1.5 time 6dB bandwidth	
Attenuation	Auto	Auto

5.2. Test Procedure

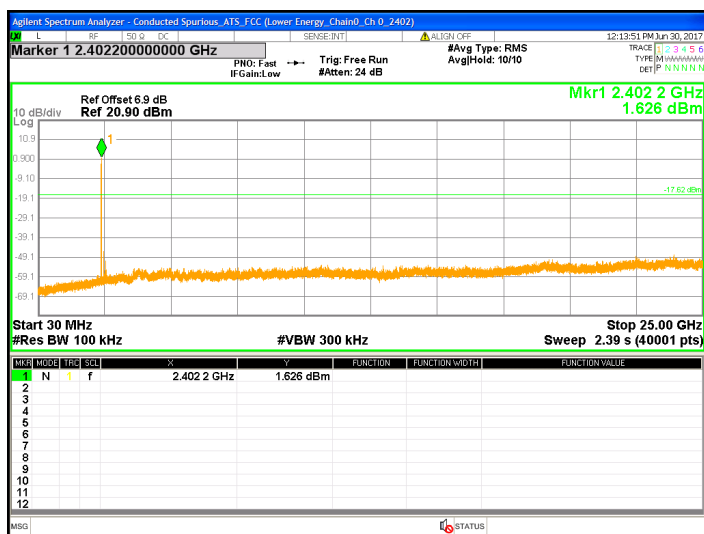
- Step 1 The procedure was used in antenna-port conducted and connected to the spectrum analyzer.
- Step 2 Set instrument center frequency to center frequency.
- Step 3 Use the parameter configured in clause 5.1 to measure
- Step 4 Use the peak marker function to determine the maximum amplitude level.

5.3. Test Diagram



5.4. Limit

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz



Agilent Spectrum Analyzer - Conducted Spurious_ ATIS_FCC (Lower Energy_Chain0_Ch 39_2480)

Ref Value 16.90 dBm

PN0: Wide IF Gain: Low

Trig: Free Run #Atten: 20 dB

#Avg Type: RMS AvgHold: 10/10

12:21:28 PM Jun 30, 2017

TRACE [1] 2 x 5 S

TYPE M H M M M M M M M M

DET P N N N N N N N

10 dB/div

Ref Offset 6.9 dB

Ref 16.90 dBm

Mkr1 2.479 999 595 GHz

0.649 dBm

Log

6.90

-3.10

-13.1

-23.1

-33.1

-43.1

-53.1

-63.1

-73.1

Center 2.4800000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 1.020 MHz

Sweep 2.67 ms (40001 pts)

MSG

STATUS

[illegible]

6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1. Instrument Setting

Receiver function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz ; 9-10 kHz 30-1000 MHz ; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz
Sweep	Auto couple	Auto couple
Start Frequency	9 KHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

6.2. Test Procedure

- Step 1 Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter (below 1GHz) and 1.5 meter (above 1GHz) 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.
- Step 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.
- Step 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.
- Step 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.
- Step 5 Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
- Step 6 For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for reading in spectrum analyzer.
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
- Step 7 If the emissions level of the EUT in peak mode was 3dB lower than the average limit

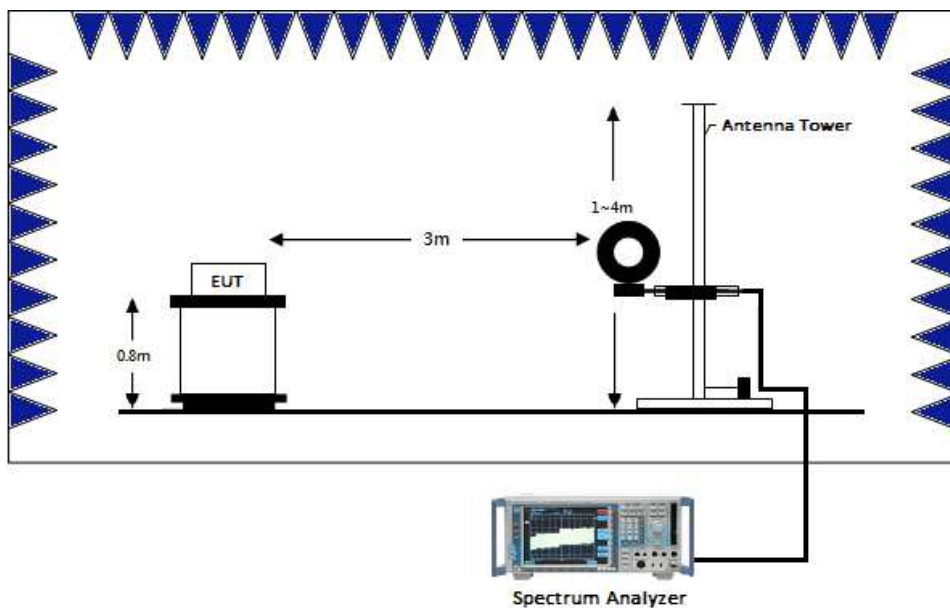
specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.

Step 8 For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

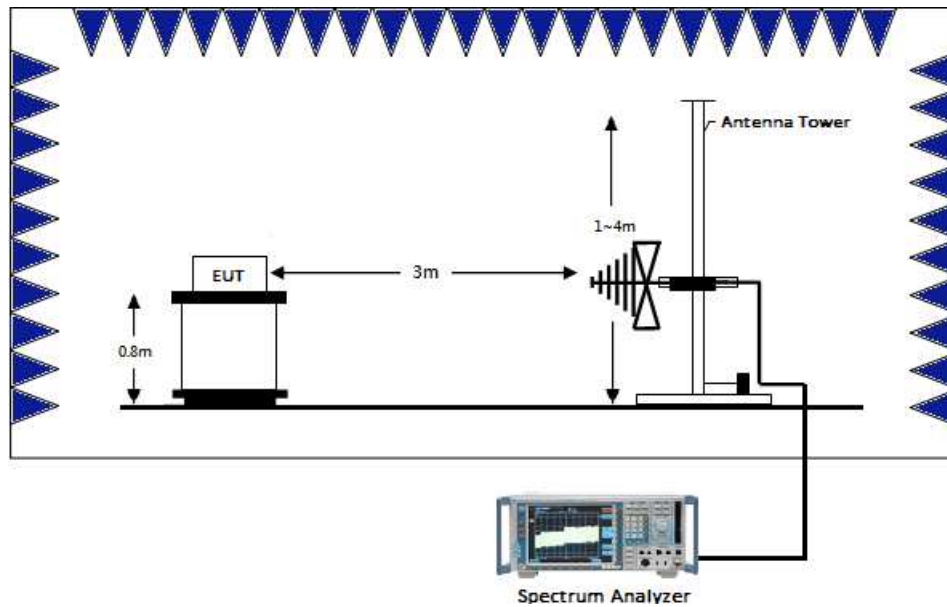
Step 9 In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

6.3. Test Diagram

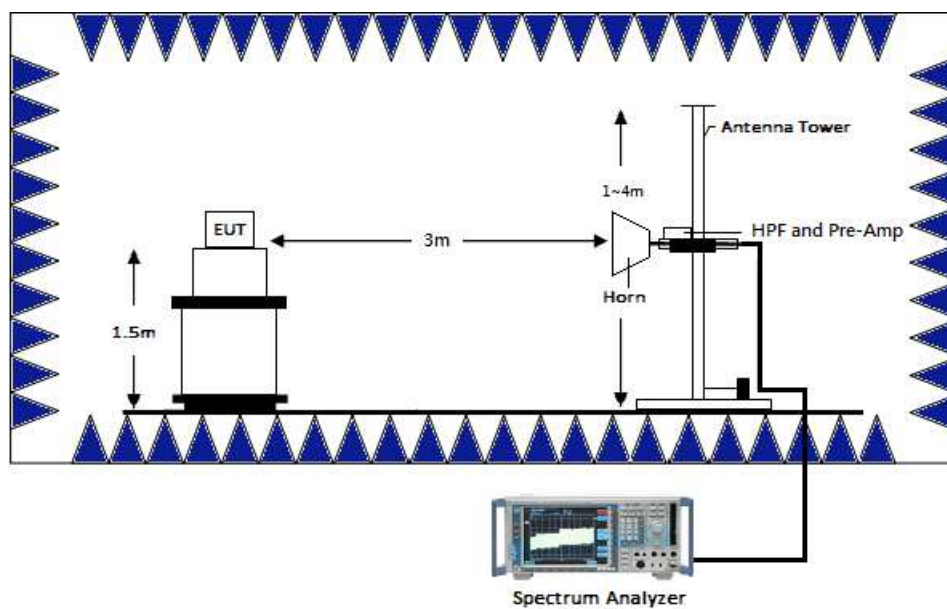
6.3.1. Radiated emission from 9kHz to 30MHz uses Loop Antenna:



6.3.2. Radiated emission below 1GHz using Bilog Antenna



6.3.3. Radiated emission above 1GHz using Horn Antenna



6.4. Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
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

6.5. Operating Environment Condition

Temperature (°C) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 7/4/2017

6.6. Test Result

6.6.1. Measurement results: frequencies 9kHz to 30MHz

The test was performed on EUT low/middle/high channels. The worst case occurred at middle channel.

Mode	Channel	Detector	Freq. (MHz)	Factor (dB/m)	Reading (dBuV/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
BLE	19	QP	0.02	20.23	34.83	55.06	121.58	-66.52
BLE	19	QP	0.03	20.35	35.27	55.62	118.06	-62.44
BLE	19	QP	0.04	20.13	33.74	53.87	115.56	-61.69
BLE	19	QP	0.05	19.79	26.83	46.62	113.62	-67.00
BLE	19	QP	0.08	19.35	55.84	75.19	109.54	-34.35

Remark: Factor = Antenna Factor + Cable Loss

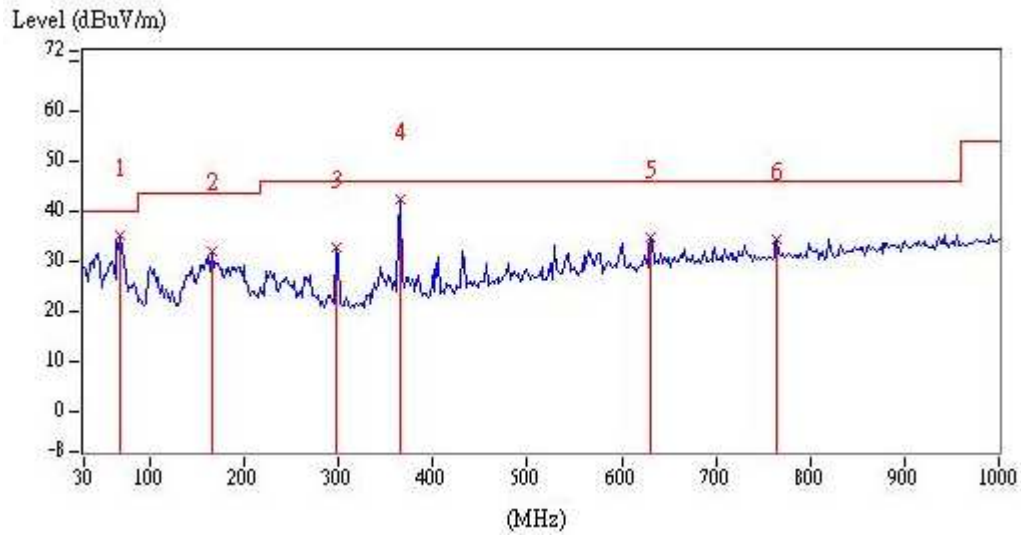
6.6.2. Measurement results: frequencies below 1 GHz

The test was performed on EUT low/middle/high channels. The worst case occurred at middle channel.

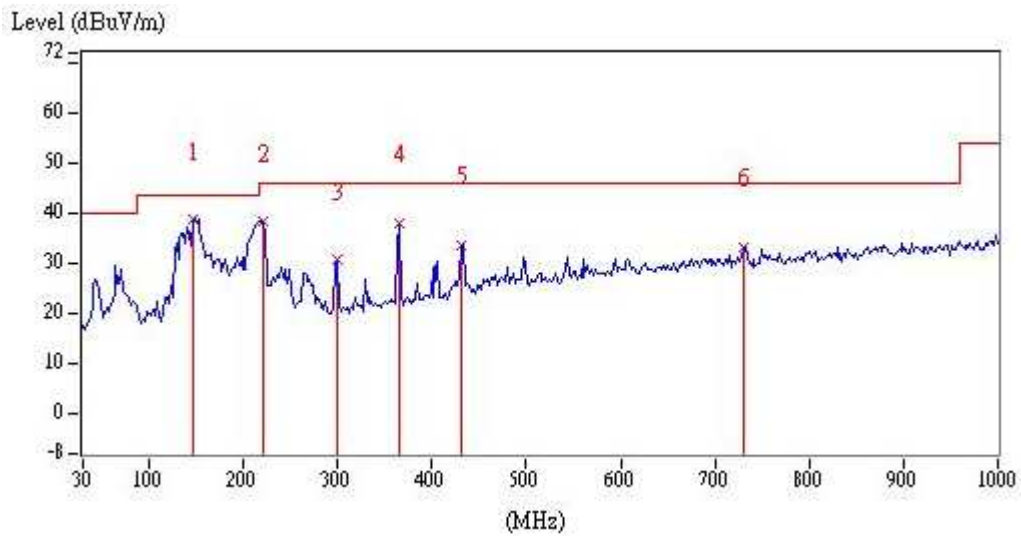
Mode	Ch	Chain	Ant Polarity	Detector	Freq. (MHz)	Factor (dB/m)	Reading (dBuV/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
BLE	19	Chain0	V	QP	68.80	18.39	16.69	35.08	40.00	-4.92
BLE	19	Chain0	V	QP	165.80	20.61	11.42	32.04	43.50	-11.46
BLE	19	Chain0	V	QP	297.72	21.70	10.97	32.67	46.00	-13.33
BLE	19	Chain0	V	QP	365.62	23.44	18.90	42.34	46.00	-3.66
BLE	19	Chain0	V	QP	631.40	29.55	5.11	34.67	46.00	-11.33
BLE	19	Chain0	V	QP	765.26	31.74	2.48	34.22	46.00	-11.78
BLE	19	Chain0	H	QP	146.40	20.46	18.28	38.74	43.50	-4.76
BLE	19	Chain0	H	QP	220.12	18.77	19.61	38.38	46.00	-7.62
BLE	19	Chain0	H	QP	299.66	21.74	9.00	30.74	46.00	-15.26
BLE	19	Chain0	H	QP	365.62	23.44	14.62	38.06	46.00	-7.94
BLE	19	Chain0	H	QP	431.58	25.30	8.31	33.62	46.00	-12.38
BLE	19	Chain0	H	QP	730.34	31.21	2.10	33.31	46.00	-12.69

Remark: Factor = Antenna Factor + Cable Loss

Vertical



Horizontal



6.6.3. Measurement results: frequency above 1GHz to 25GHz

Mode	Ch	Ant Polarity	Detector	Freq. (MHz)	Pream p(dB)	Factor (dB/m)	Reading (dBμV/m)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
BLE	0	V	PK	1600	38.73	30.80	14.27	45.07	74.00	-28.93
BLE	0	V	PK	4804	40.06	2.99	52.60	55.59	74.00	-18.41
BLE	0	V	AV	4804	40.06	2.99	50.34	53.33	54.00	-0.67
BLE	19	V	PK	1060	39.17	29.08	13.71	42.79	74.00	-31.21
BLE	19	V	PK	1328	38.95	29.51	11.71	41.22	74.00	-32.78
BLE	19	V	PK	1596	38.73	30.76	21.94	52.70	74.00	-21.30
BLE	19	V	PK	4884	39.93	3.30	51.84	55.14	74.00	-18.86
BLE	19	V	AV	4884	39.93	3.30	49.77	53.07	54.00	-0.93
BLE	39	V	PK	1596	38.73	30.76	22.79	53.55	74.00	-20.45
BLE	39	V	PK	2128	38.6	34.91	15.80	50.71	74.00	-23.29
BLE	39	V	PK	4960	39.8	3.59	51.70	55.29	74.00	-18.71
BLE	39	V	AV	4960	39.8	3.59	49.61	53.20	54.00	-0.80
BLE	0	H	PK	1064	39.17	29.08	15.53	44.61	74.00	-29.39
BLE	0	H	PK	1596	38.73	30.76	22.39	53.14	74.00	-20.86
BLE	0	H	PK	1860	38.51	33.43	13.97	47.40	74.00	-26.60
BLE	0	H	PK	2124	38.6	34.90	12.77	47.68	74.00	-26.32
BLE	0	H	PK	4804	40.06	2.99	49.27	52.26	74.00	-21.74
BLE	19	H	PK	1600	38.73	30.80	17.28	48.08	74.00	-25.92
BLE	19	H	PK	4884	39.93	3.30	49.59	52.89	74.00	-21.11
BLE	39	H	PK	1224	39.04	29.34	12.56	41.90	74.00	-32.10
BLE	39	H	PK	1244	39.02	29.38	12.82	42.20	74.00	-31.80
BLE	39	H	PK	1596	38.73	30.76	16.47	47.23	74.00	-26.77
BLE	39	H	PK	4960	39.8	3.59	48.43	52.03	74.00	-21.97

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

7. Emission on Band Edge

7.1. Instrument Setting

Spectrum Function	Setting
Detector	Peak
RBW	1MHz
VBW	3MHz
Sweep	Auto couple
Restrict bands	2310 MHz ~ 2390 MHz 2483.5 MHz ~ 2500 MHz
Attenuation	Auto

7.2. Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

7.3. Operating Environment Condition

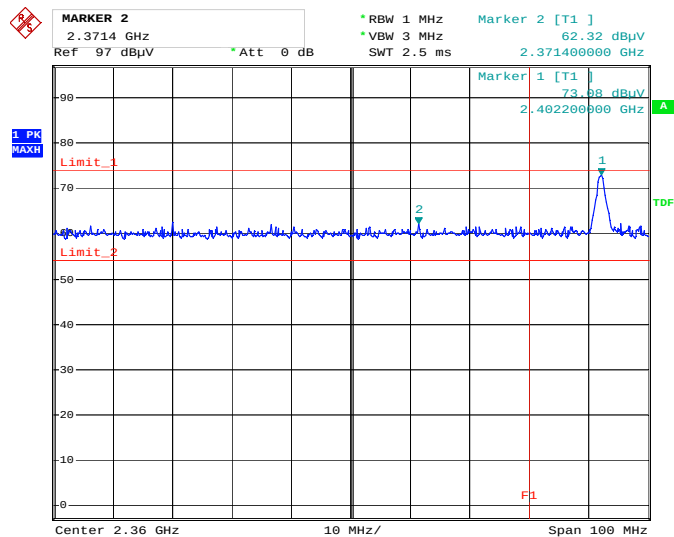
Temperature (°C) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 6/30/2017~7/5/2017

7.4. Test Results

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
2371.40	PK	V	33.76	28.56	62.32	74	-11.68	2310~2390
2390.00	AV	V	33.85	15.01	48.86	54	-5.14	
2486.70	PK	V	34.32	26.73	61.05	74	-12.95	2483.5~2500
2483.50	AV	V	34.30	13.59	47.89	54	-6.11	

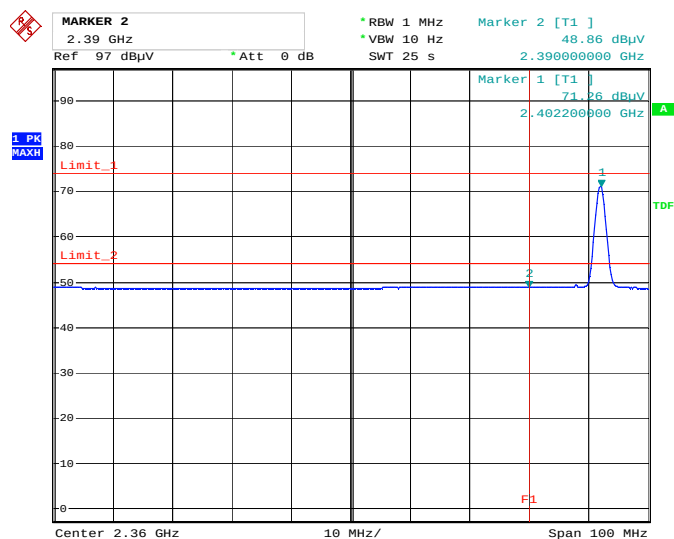
Remark: Correction Factor = Antenna Factor + Cable Loss

Restricted Band Bandedge @ ch 0 pk Mode



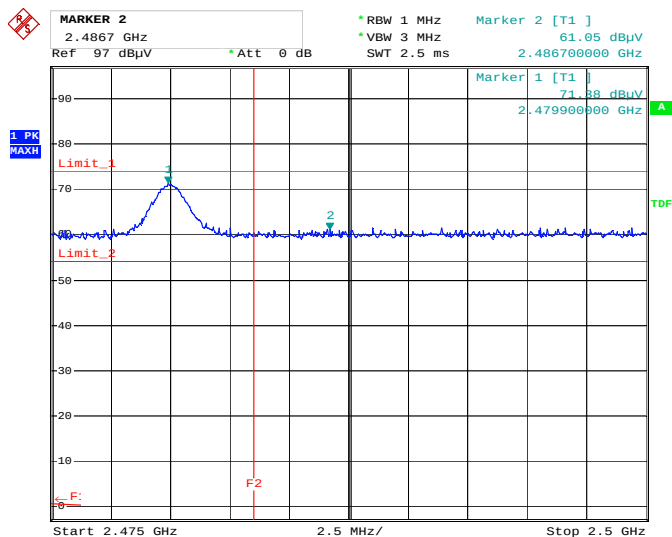
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Restricted Band Bandedge @ ch 0 av Mode



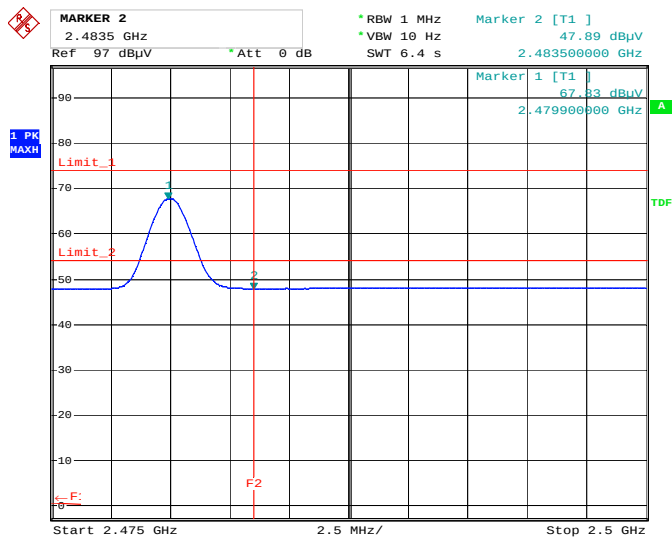
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Restricted Band Bandedge @ ch 39 pk Mode



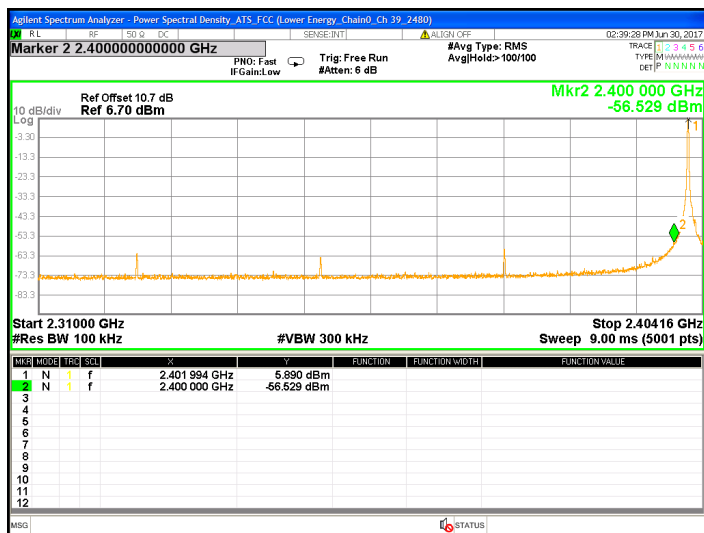
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Restricted Band Bandedge @ ch 39 av Mode

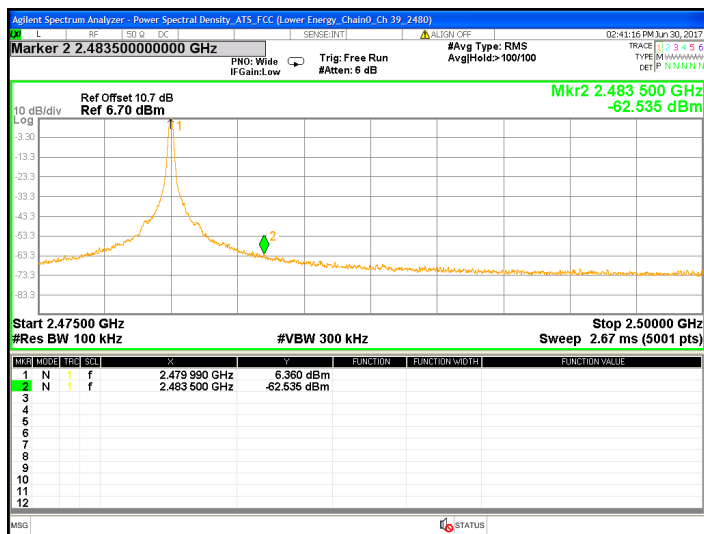


Date: 5.JUL.2017 12:32:37

Authorized Band Bandedge @ BLE ch0



Authorized Band Bandedge @ BLE ch39



8. AC Power Line Conducted Emission

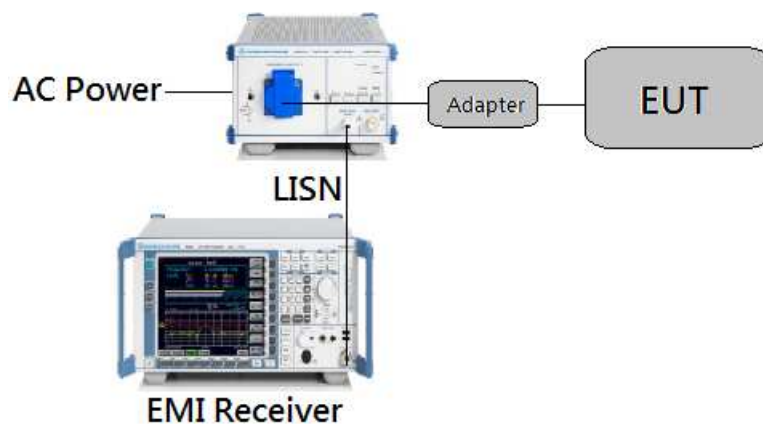
8.1. Instrument Setting

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

8.2. 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.

8.3. Test Diagram



8.4. 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

8.5. Operating Environment Condition

Temperature (°C) : 25
 Relative Humidity (%) : 50
 Atmospheric Pressure (hPa) : 1008
 Test Date : 7/24/2017 & 7/04/2018

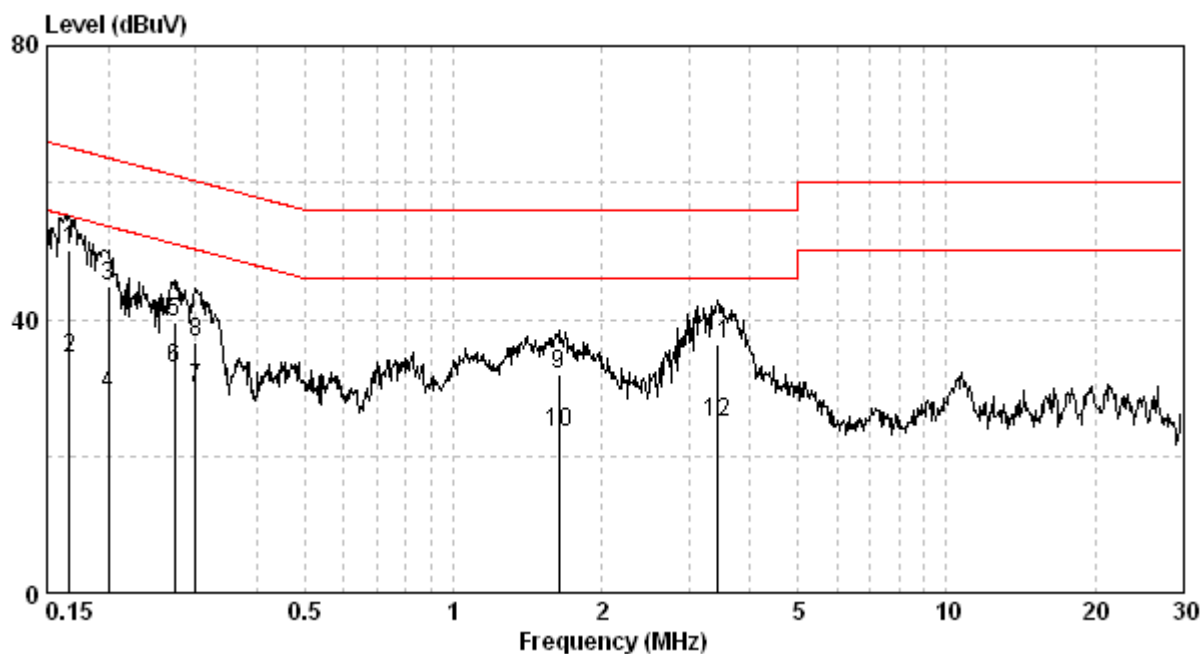
8.6. Test Results

Phase:	Live Line			
Temperature:	25	°C	Model No.:	ATSFOCUS01
Relative Humidity:	55	%	Test Date:	Jul. 24, 2017
Atmospheric Pressure:	1009	hPa	Test voltage:	120Vac, 60 Hz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.167	9.70	50.19	65.12	34.20	55.12	-14.93	-20.92
0.200	9.70	44.90	63.62	28.94	53.62	-18.72	-24.68
0.272	9.70	39.65	61.07	32.71	51.07	-21.42	-18.36
0.300	9.70	36.53	60.24	29.91	50.24	-23.71	-20.33
1.636	9.72	31.83	56.00	23.44	46.00	-24.17	-22.56
3.417	9.75	36.43	56.00	24.81	46.00	-19.57	-21.19

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)

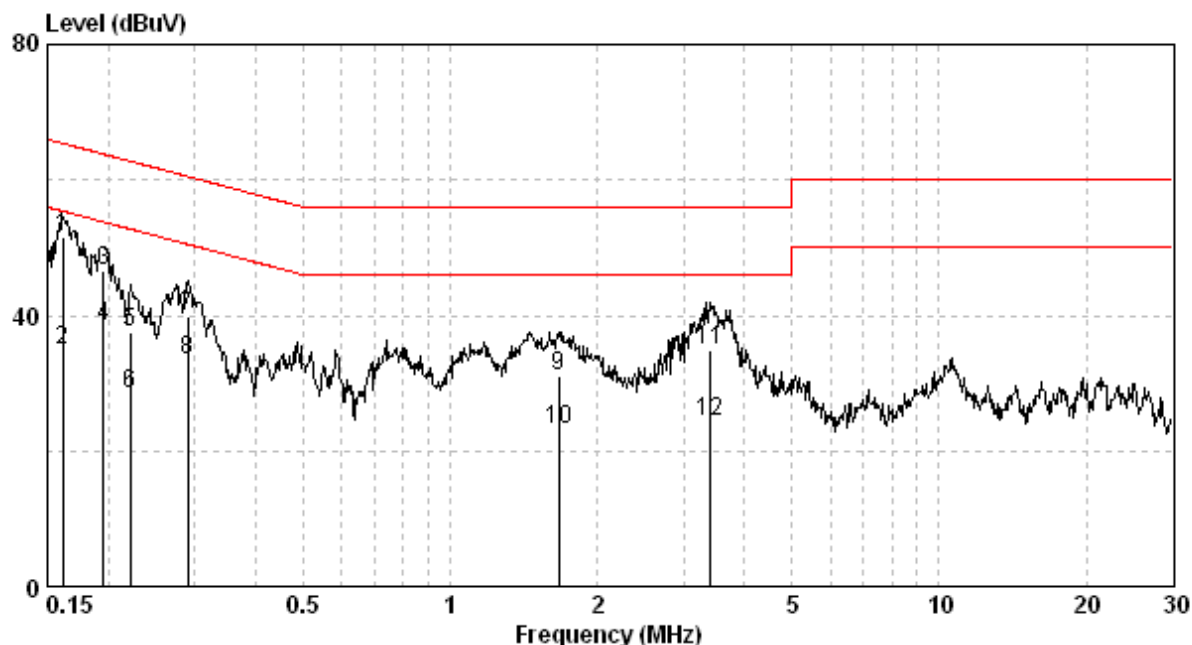


Phase:	Neutral Line			
Temperature:	25	°C	Model No.:	ATSFOCUS01
Relative Humidity:	55	%	Test Date:	Jul. 24, 2017
Atmospheric Pressure:	1009	hPa	Test voltage:	120Vac, 60 Hz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.162	9.73	51.58	65.38	34.73	55.38	-13.80	-20.65
0.195	9.73	46.48	63.80	38.28	53.80	-17.32	-15.52
0.222	9.73	37.53	62.74	28.52	52.74	-25.21	-24.22
0.291	9.73	39.91	60.50	33.35	50.50	-20.59	-17.15
1.671	9.74	31.20	56.00	23.08	46.00	-24.80	-22.92
3.399	9.75	34.88	56.00	24.28	46.00	-21.12	-21.72

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)

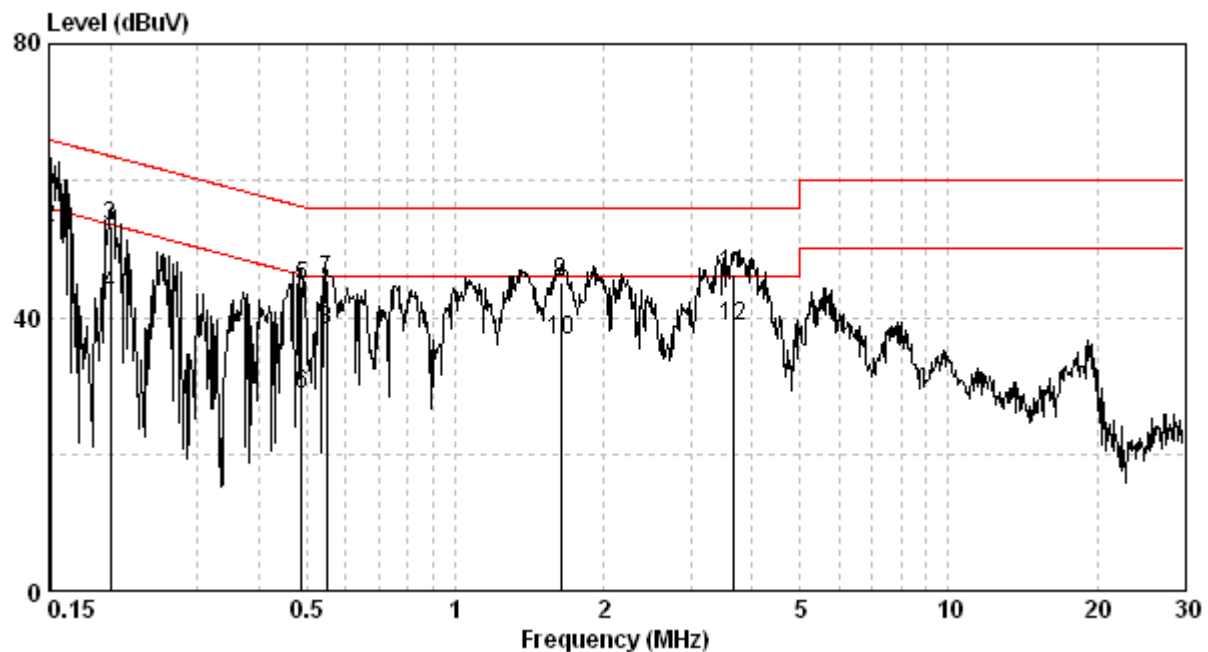


Phase:	Live Line			
Temperature:	25	°C	Model No.:	ATSFOCUS01
Relative Humidity:	55	%	Test Date:	Jul. 04, 2018
Atmospheric Pressure:	1009	hPa	Test voltage:	240Vac, 60 Hz

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	AV
0.151	9.73	51.73	61.46	65.96	43.34	53.07	55.96	-4.50	-2.89
0.200	9.73	43.67	53.40	63.62	33.65	43.38	53.62	-10.22	-10.24
0.489	9.74	34.94	44.68	56.19	18.93	28.67	46.19	-11.50	-17.52
0.549	9.75	35.60	45.35	56.00	28.35	38.10	46.00	-10.65	-7.90
1.636	9.82	35.23	45.05	56.00	26.87	36.69	46.00	-10.95	-9.31
3.681	9.85	36.33	46.18	56.00	28.88	38.73	46.00	-9.82	-7.27

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)

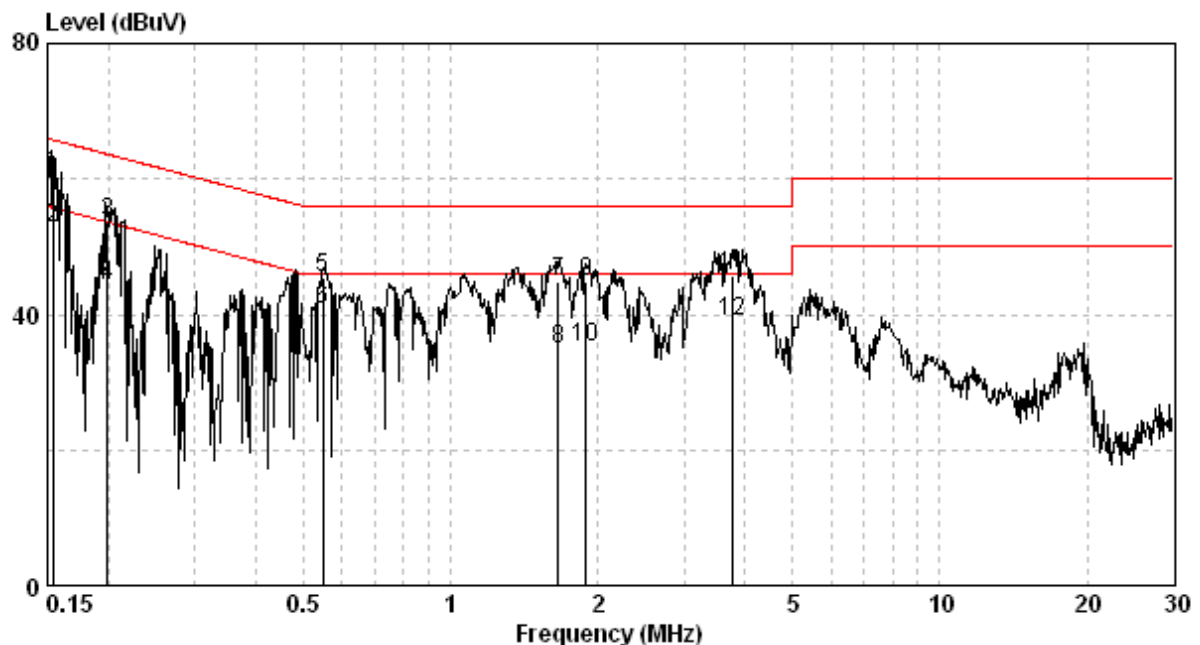


Phase:	Neutral Line			
Temperature:	25	°C	Model No.:	ATSFOCUS01
Relative Humidity:	55	%	Test Date:	Jul. 04, 2018
Atmospheric Pressure:	1009	hPa	Test voltage:	240Vac, 60 Hz

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	AV
0.154	9.74	50.82	60.56	65.78	42.97	52.71	55.78	-5.22	-3.07
0.199	9.74	44.00	53.74	63.67	34.42	44.16	53.67	-9.93	-9.51
0.549	9.75	35.69	45.45	56.00	30.85	40.61	46.00	-10.55	-5.39
1.662	9.82	35.02	44.84	56.00	25.11	34.94	46.00	-11.16	-11.06
1.888	9.83	35.10	44.93	56.00	25.34	35.17	46.00	-11.07	-10.83
3.759	9.86	35.85	45.70	56.00	29.18	39.03	46.00	-10.30	-6.97

Remark:

1. Corr. Factor (dB) = AMN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)



Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2016/11/30	2017/11/29
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2016/08/16	2017/08/15
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2014/08/29	2017/08/27
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2014/09/16	2017/09/14
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2017/04/05	2018/04/04
Pre-Amplifier	EMC Co.	EMC12635SE	980205	2016/10/08	2017/10/07
Pre-Amplifier	MITEQ	JS4-26004000--27-8A	828825	2016/09/12	2017/09/11
Power Meter	Anritsu	ML2495A	0844001	2016/11/09	2017/11/08
Power Sensor	Anritsu	MA2411B	0738452	2016/11/09	2017/11/08
Signal Analyzer	Agilent	N9030A	MY51380492	2016/09/13	2017/09/12
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2016/08/16	2017/08/15
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 104P	CB0005	2016/08/16	2017/08/15
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
High Pass Filter	Wainwright	WHKX3.0/18G-12SS	N/A	2017/06/02	2018/06/01
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2017/03/30	2018/03/29

Note: No Calibration Required (NCR).

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESR7	101822	2017/06/01	2018/05/31
Two-Line V-Network	R&S	ENV216	101160	2016/11/16	2017/11/15
Two-Line -V-Network	R&S	ESH3-Z5	838979/014	2016/09/30	2017/09/29
CON-2 Shielded Room	N/A	N/A	N/A	NCR	NCR
CON-2 Cable	SUHNER	BNC / RG-58	2146637	2017/05/08	2018/05/07
Test software	Audix	e3	4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

Test Equipment/ Test site	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	2018/06/01	2019/05/31
Two-Line -V-Network	R&S	ESH3-Z5	825562/003	2017/09/04	2018/09/03
CON-1 Shielded Room	N/A	N/A	N/A	NCR	NCR
CON-1 Cable	SUHNER	SUCOFLEX-104	26438414	2018/05/03	2019/05/02
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
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.54 dB
Emission on the Band Edge Test	3.64 dB
RF Antenna Conducted Spurious Test	1.22 dB
Maximum Output Power Test	0.42 dB
20dB Bandwidth Test	1.22 dB
Carrier Frequency Separation Test	1.22 dB
Number of Hopping Frequencies Test	1.22 dB
Time of Occupancy (Dwell Time) Test	1.22 dB
AC Power Line Conducted Emission	2.48 dB