

FCC Test Report

Report No.: RF190705C07-1 R1

FCC ID: WS2-WS2116A0

Test Model: WS2116-A0

Series Model: WS2116-F0

Received Date: Jul. 05, 2019

Test Date: Aug. 20 ~ Sep. 02, 2019

Issued Date: Oct. 18, 2019

Applicant: JORJIN TECHNOLOGIES INC.

Address: 17F, No.239, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF190705C07-1	Original Release	Sep. 23, 2019
RF190705C07-1 R1	Original Release	Oct. 18, 2019

1 Certificate of Conformity

Product: BLE and Sigfox wireless module

Brand: Jorjin

Test Model: WS2116-A0

Series Model: WS2116-F0

Sample Status: Engineering Sample

Applicant: JORJIN TECHNOLOGIES INC.

Test Date: Aug. 20 ~ Sep. 02, 2019

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.


Prepared by : _____, **Date:** Oct. 18, 2019
Lena Wang / Specialist


Approved by : _____, **Date:** Oct. 18, 2019
Dylan Chiou / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -4.04 dB at 0.74823 MHz.
15.247(a)(1)(i)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -0.13 dB at 9046.625 MHz
15.247(d)	Band Edge Measurement	Pass	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is i-pex(MHF) not a standard connector.

NOTE:

1. If The Frequency Hopping System operating in 902-928 MHz band and the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	BLE and Sigfox wireless module
Brand	Jorjin
Test Model	WS2116-A0
Series Model	WS2116-F0
Status of EUT	Engineering Sample
Power Supply Rating	3.3 Vdc (host equipment)
Modulation Type	Uplink: DBPSK Downlink: GFSK
Operating Frequency	902.1375 ~ 904.6625 MHz
Number of Channel	54
Output Power	283.139 mW
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. All models are listed as below.

Brand	Model	Difference
Jorjin	WS2116-A0	Without encryption IC
	WS2116-F0	With encryption IC

2. The antenna information is listed as below.

No	Ant. Type	Brand	Model No.	Frequency range	Connector Type	Antenna Gain (dBi)	
						BT LE	Sigfox
1	Dipole	WIESON	GPOT155-002	2.4~2.4835GHz	SMA	2.6	
2	Dipole	STAF	T13-047-1085	2.4~2.5GHz	SMA	2.01	
3	Dipole	STAF	T13-047-1086	2.4~2.5GHz	SMA	1.71	
4	PCB	STAF	T16-100-1032	2.4~2.5GHz	i-pex(MHF)	1.95	
5	PCB	STAF	T16-062-1022	2.4~2.5GHz	i-pex(MHF)	2.18	
6	PCB	STAF	T16-062-1022	890~925MHz	i-pex(MHF)		-0.71
7	Dipole	SANAV	EEN-107	902~928MHz	SMA		3.53
8	PCB	Unictron	H2B1SD1A2C0100	902~928MHz	i-pex(MHF)		2.1
9	PCB	Unictron	H2B1SG2A2C0100	902~928MHz	i-pex(MHF)		-0.2
10	Monopole	STAF	T13-047-1038	902~928MHz	SMA		1.86
11	Monopole	STAF	T13-047-1040	902~928MHz	SMA		1.92
12	Monopole	STAF	T16-068-1021	902~928MHz	SMA		1.61
13	Dipole	STAF	T18-023-1095	900~960MHz	i-pex(MHF)		2.69
14	Monopole	STAF	T18-018-1098	860~960MHz	i-pex(MHF)		2.53

3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

3.2 Description of Test Modes

54 channels are provided to this EUT:

CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)
0	902.1375	10	902.5375	20	903.0875	30	903.6375	40	904.0375	50	904.5875
1	902.1625	11	902.5625	21	903.1125	31	903.6625	41	904.0625	51	904.6125
2	902.1875	12	902.7375	22	903.1375	32	903.6875	42	904.2375	52	904.6375
3	902.2125	13	902.7625	23	903.1625	33	903.7125	43	904.2625	53	904.6625
4	902.2375	14	902.7875	24	903.3375	34	903.7375	44	904.2875		
5	902.2625	15	902.8125	25	903.3625	35	903.7625	45	904.3125		
6	902.4375	16	902.8375	26	903.3875	36	903.9375	46	904.3375		
7	902.4625	17	902.8625	27	903.4125	37	903.9625	47	904.3625		
8	902.4875	18	903.0375	28	903.4375	38	903.9875	48	904.5375		
9	902.5125	19	903.0625	29	903.4625	39	904.0125	49	904.5625		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Antenna 7
B	√	√	-	-	Antenna 11
C	√	√	-	-	Antenna 8
D	√	√	-	-	Antenna 13

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz

RE<1G: Radiated Emission below 1 GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane** of Mode A , B , D and **Y-plane** of Mode C

2. “-” means no effect.

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A, B, C, D	0 to 53	0, 26, 53	DBPSK

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A, B, C, D	0 to 53	0	DBPSK

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A, B, C, D	0 to 53	0, 26, 53	DBPSK

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A	0 to 53	0, 26, 53	DBPSK

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim-Chen, Thomas Wei
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Thomas Wei
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin

3.3 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.

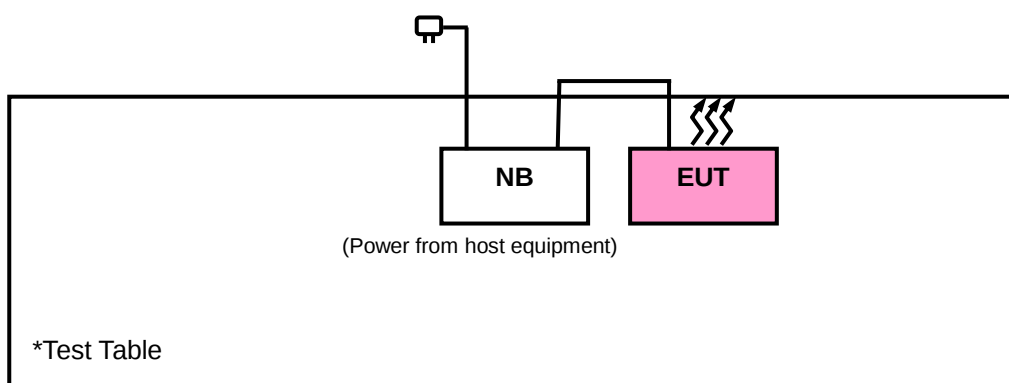
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

FCC Public Notice DA 00-705

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 25, 2018	Nov. 24, 2019
Broadband Horn Antenna SCHWARZBECK	BBHA 9170	148	Nov. 25, 2018	Nov. 24, 2019
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Loop Antenna	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier EMCI	EMC001340	980201	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 184045	980116	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

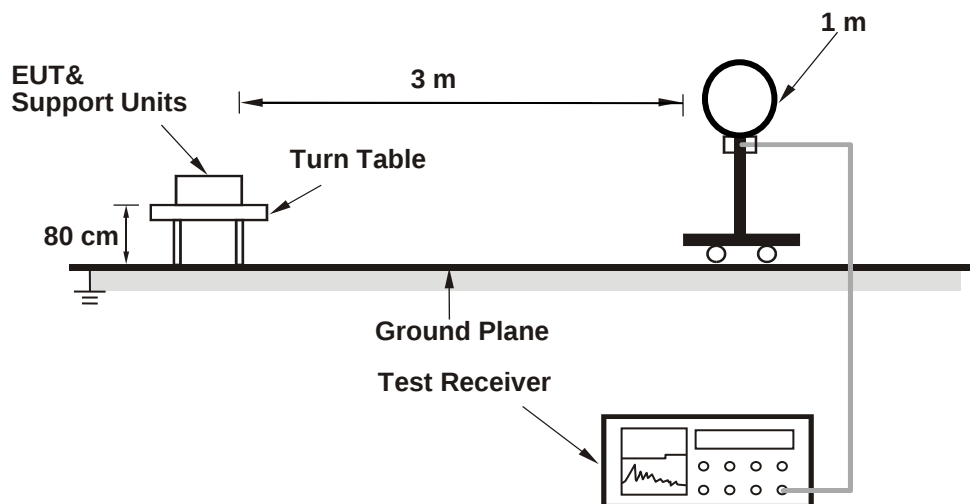
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (RBW = 1 MHz, VBW = 1 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

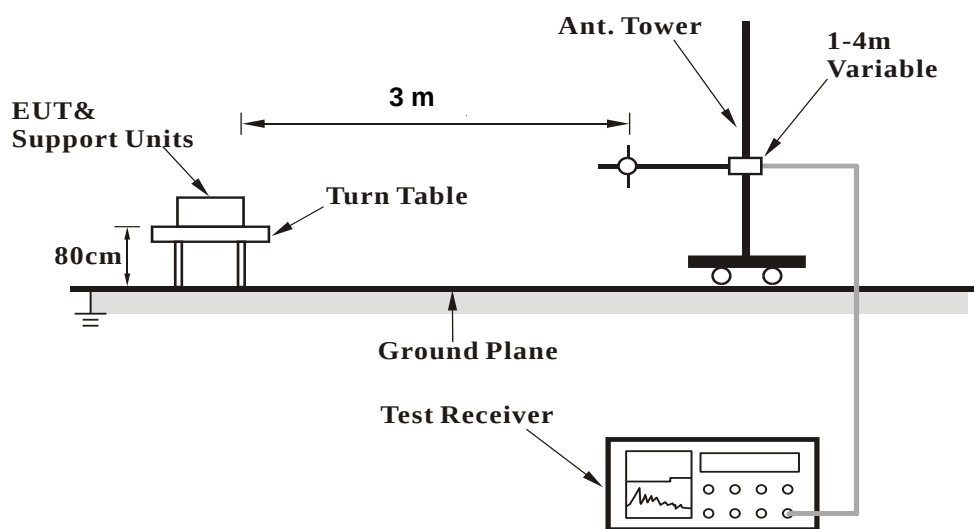
No deviation.

4.1.5 Test Set Up

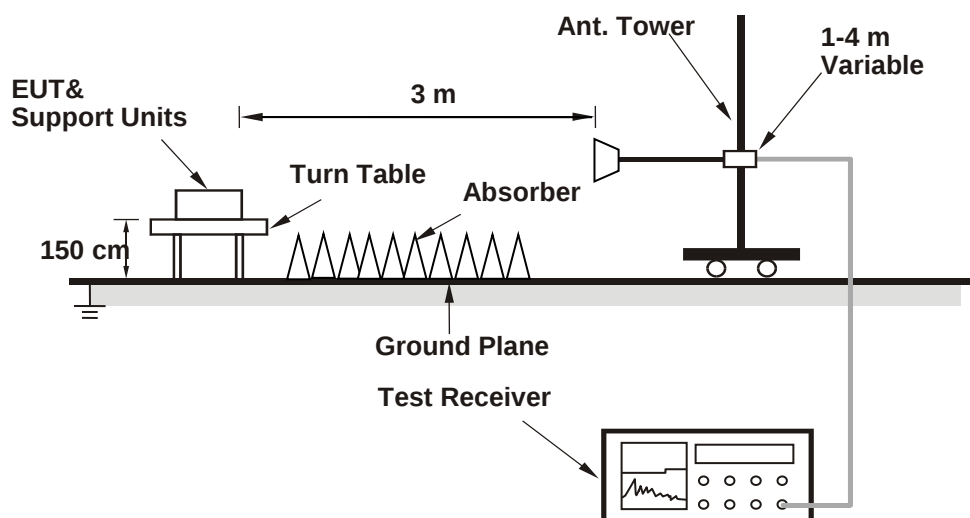
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

ABOVE 1 GHz DATA :

Mode A

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2706.413	44.15	64.5	-20.35	54	-9.85	116	68	Average
2706.413	47.15	67.5	-20.35	74	-26.85	116	68	Peak
9021.375	49.5	54.84	-5.34	54	-4.5	116	59	Average
9021.375	55.26	60.6	-5.34	74	-18.74	116	59	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2706.413	46.75	67.1	-20.35	54	-7.25	136	236	Average
2706.413	48.65	69	-20.35	74	-25.35	136	236	Peak
9021.375	51.86	57.2	-5.34	54	-2.14	121	249	Average
9021.375	56.4	61.74	-5.34	74	-17.6	121	249	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamplifier Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	45.32	65.5	-20.18	54	-8.68	132	127	Average
2710.163	48.07	68.25	-20.18	74	-25.93	132	127	Peak
9033.875	50.69	55.91	-5.22	54	-3.31	124	66	Average
9033.875	55.79	61.01	-5.22	74	-18.21	124	66	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	48.17	68.35	-20.18	54	-5.83	112	194	Average
2710.163	50.62	70.8	-20.18	74	-23.38	112	194	Peak
9033.875	52.89	58.11	-5.22	54	-1.11	115	252	Average
9033.875	57.09	62.31	-5.22	74	-16.91	115	252	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	46.6	66.78	-20.18	54	-7.4	107	128	Average
2713.988	49.12	69.3	-20.18	74	-24.88	107	128	Peak
9046.625	50.16	55.39	-5.23	54	-3.84	127	65	Average
9046.625	55.77	61	-5.23	74	-18.23	127	65	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	49.09	69.27	-20.18	54	-4.91	134	333	Average
2713.988	51.02	71.2	-20.18	74	-22.98	134	333	Peak
9046.625	52.67	57.9	-5.23	54	-1.33	118	252	Average
9046.625	57.12	62.35	-5.23	74	-16.88	118	252	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2706.413	47.85	68.2	-20.35	54	-6.15	152	53	Average
2706.413	49.76	70.11	-20.35	74	-24.24	152	53	Peak
9021.375	50.66	56	-5.34	54	-3.34	116	66	Average
9021.375	55.69	61.03	-5.34	74	-18.31	116	66	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2706.413	44.75	65.1	-20.35	54	-9.25	152	207	Average
2706.413	47.65	68	-20.35	74	-26.35	152	207	Peak
9021.375	53.76	59.1	-5.34	54	-0.24	100	254	Average
9021.375	57.76	63.1	-5.34	74	-16.24	100	254	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	48.14	68.32	-20.18	54	-5.86	122	52	Average
2710.163	50.03	70.21	-20.18	74	-23.97	122	52	Peak
9033.875	50.37	55.59	-5.22	54	-3.63	115	65	Average
9033.875	55.89	61.11	-5.22	74	-18.11	115	65	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	41.37	61.55	-20.18	54	-12.63	270	10	Average
2710.163	45.42	65.6	-20.18	74	-28.58	270	10	Peak
9033.875	53.79	59.01	-5.22	54	-0.21	114	253	Average
9033.875	57.99	63.21	-5.22	74	-16.01	114	253	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	43.85	64.03	-20.18	54	-10.15	186	211	Average
2713.988	47.98	68.16	-20.18	74	-26.02	186	211	Peak
9046.625	51.66	56.89	-5.23	54	-2.34	118	68	Average
9046.625	56.35	61.58	-5.23	74	-17.65	118	68	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	44.85	65.03	-20.18	54	-9.15	114	351	Average
2713.988	47.53	67.71	-20.18	74	-26.47	114	351	Peak
9046.625	53.42	58.65	-5.23	54	-0.58	118	254	Average
9046.625	57.77	63	-5.23	74	-16.23	118	254	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

Mode C

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
9021.375	51.66	57	-5.34	54	-2.34	117	67	Average
9021.375	57.46	62.8	-5.34	74	-16.54	117	67	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
9021.375	53.36	58.7	-5.34	54	-0.64	112	249	Average
9021.375	57.76	63.1	-5.34	74	-16.24	112	249	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim-Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	37.1	57.28	-20.18	54	-16.9	378	166	Average
2710.163	44.88	65.06	-20.18	74	-29.12	378	166	Peak
9033.875	48.94	54.16	-5.22	54	-5.06	107	151	Average
9033.875	58.11	63.33	-5.22	74	-15.89	107	151	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	33.44	53.62	-20.18	54	-20.56	379	137	Average
2710.163	44.35	64.53	-20.18	74	-29.65	379	137	Peak
9033.875	53.73	58.95	-5.22	54	-0.27	392	336	Average
9033.875	59.76	64.98	-5.22	74	-14.24	392	336	Peak

Remarks:

3. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

4. *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim-Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	37.82	58	-20.18	54	-16.18	378	165	Average
2713.988	45.27	65.45	-20.18	74	-28.73	378	165	Peak
9046.625	49.52	54.75	-5.23	54	-4.48	100	29	Average
9046.625	57.08	62.31	-5.23	74	-16.92	100	29	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	33.03	53.21	-20.18	54	-20.97	376	139	Average
2713.988	43.53	63.71	-20.18	74	-30.47	376	139	Peak
9046.625	53.26	58.49	-5.23	54	-0.74	392	340	Average
9046.625	59.06	64.29	-5.23	74	-14.94	392	340	Peak

Remarks:

3. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

4. *: Out of Restricted Band

Mode D

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2706.413	41.22	61.57	-20.35	54	-12.78	160	106	Average
2706.413	45.1	65.45	-20.35	74	-28.9	160	106	Peak
9021.375	49.16	54.5	-5.34	54	-4.84	128	68	Average
9021.375	56.34	61.68	-5.34	74	-17.66	128	68	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2706.413	38.05	58.4	-20.35	54	-15.95	122	147	Average
2706.413	43.25	63.6	-20.35	74	-30.75	122	147	Peak
9021.375	53.79	59.13	-5.34	54	-0.21	117	250	Average
9021.375	57.66	63	-5.34	74	-16.34	117	250	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	40.62	60.8	-20.18	54	-13.38	131	92	Average
2710.163	44.82	65	-20.18	74	-29.18	131	92	Peak
9033.875	48.29	53.51	-5.22	54	-5.71	115	69	Average
9033.875	54.59	59.81	-5.22	74	-19.41	115	69	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2710.163	36.82	57	-20.18	54	-17.18	134	295	Average
2710.163	42.42	62.6	-20.18	74	-31.58	134	295	Peak
9033.875	53.29	58.51	-5.22	54	-0.71	121	246	Average
9033.875	57.79	63.01	-5.22	74	-16.21	121	246	Peak

Remarks:

5. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

6. *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	1 GHz ~ 10 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	41.82	62	-20.18	54	-12.18	132	92	Average
2713.988	45.82	66	-20.18	74	-28.18	132	92	Peak
9046.625	48.97	54.2	-5.23	54	-5.03	107	72	Average
9046.625	55.77	61	-5.23	74	-18.23	107	72	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2713.988	37.62	57.8	-20.18	54	-16.38	134	294	Average
2713.988	42.82	63	-20.18	74	-31.18	134	294	Peak
9046.625	53.87	59.1	-5.23	54	-0.13	116	246	Average
9046.625	58.02	63.25	-5.23	74	-15.98	116	246	Peak

Remarks:

5. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

6. *: Out of Restricted Band

9 kHz ~ 30 MHz Data:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

Mode A

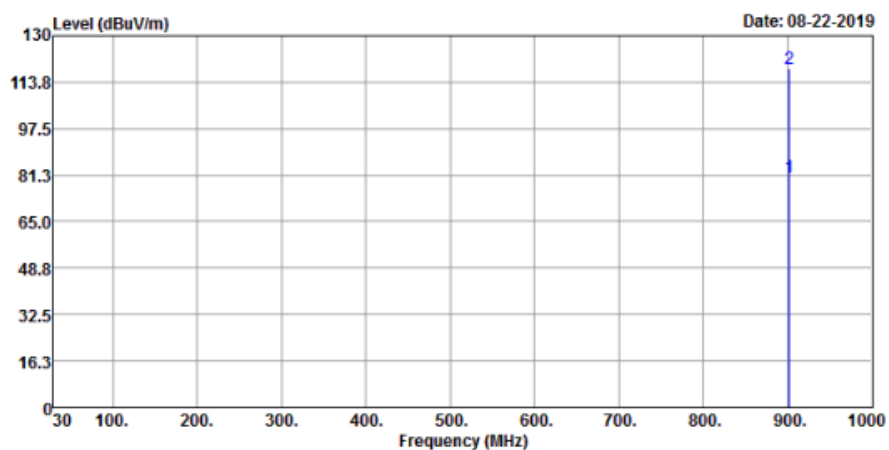
EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	80.56	84.89	-4.33	98.65	-18.09	100	207	QP
902.138	118.65	122.98	-4.33	-----	-----	100	207	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
902	80.52	84.85	-4.33	98.55	-18.03	112	112	QP
902.138	118.55	122.88	-4.33	-----	-----	112	112	QP

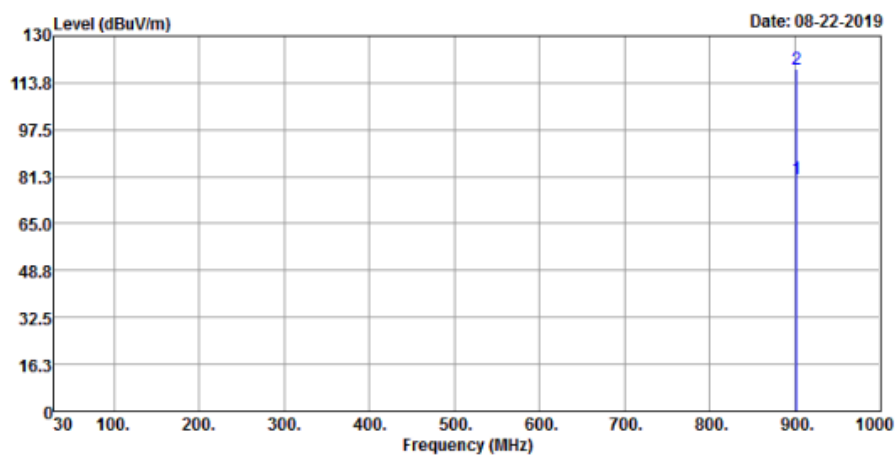
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	48.54	53	-4.46	98.72	-50.18	100	208	QP
903.388	118.72	123.1	-4.38	-----	-----	100	208	QP
*928	38.36	41.31	-2.95	98.72	-60.36	100	208	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	48.54	53	-4.46	98.62	-50.08	113	112	QP
903.388	118.62	123	-4.38	-----	-----	113	112	QP
*928	41.14	44.09	-2.95	98.62	-57.48	113	112	QP

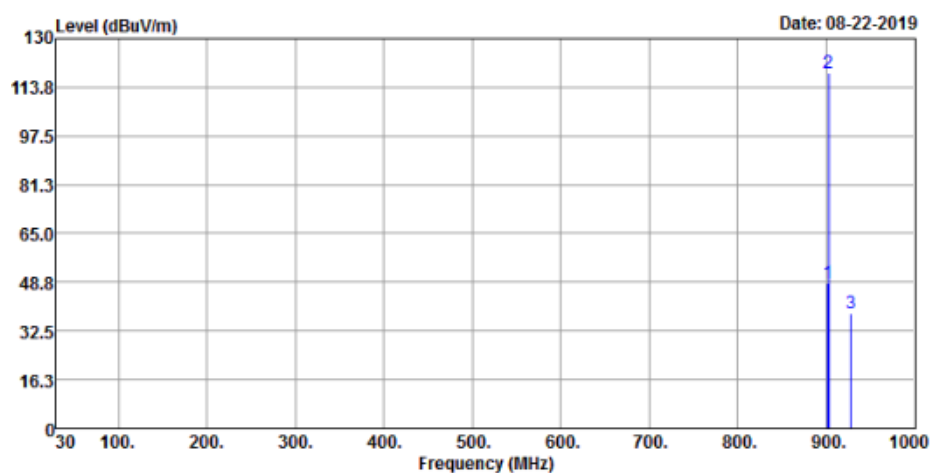
Remarks:

3. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

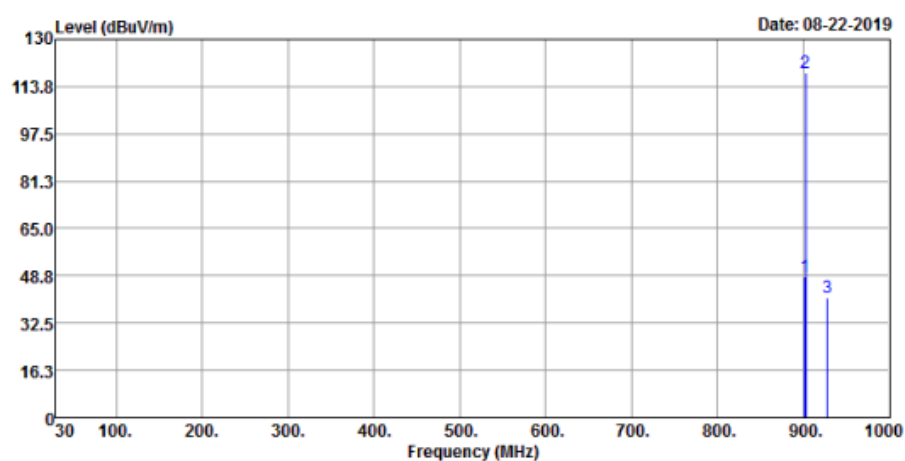
Margin value = Emission level – Limit value

4. *: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	43.77	48.23	-4.46	98.84	-55.07	100	208	QP
904	118.84	123.14	-4.3	-----	-----	100	208	QP
*928	39.44	42.39	-2.95	98.84	-59.4	100	208	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	44.59	49.05	-4.46	98.78	-54.19	113	113	QP
904.663	118.78	123	-4.22	-----	-----	113	113	QP
*928	40.54	43.49	-2.95	98.78	-58.24	113	113	QP

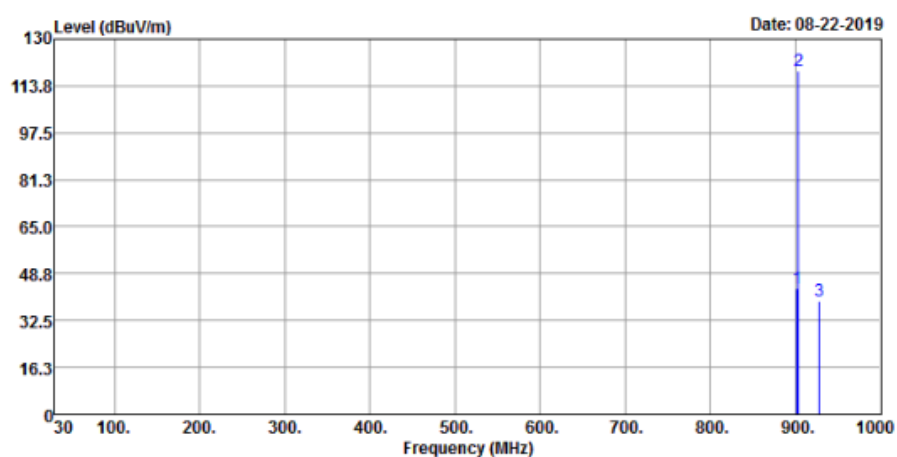
Remarks:

3. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

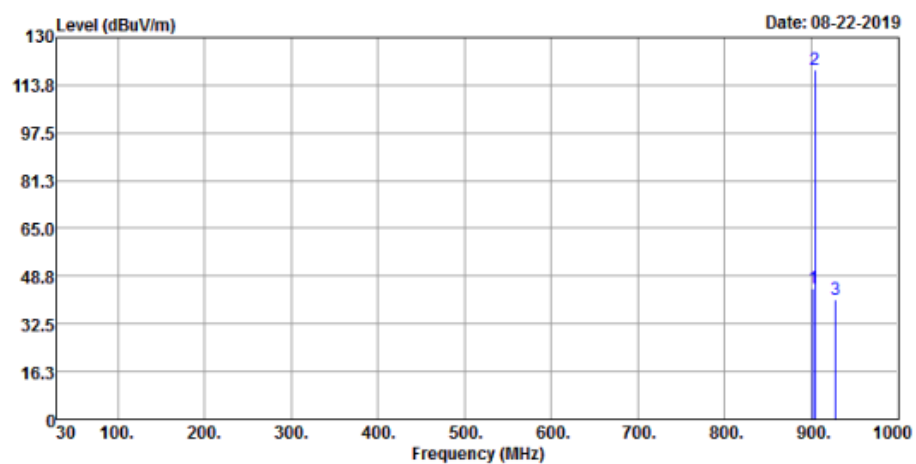
Margin value = Emission level – Limit value

4. *: Out of Restricted Band

Horizontal



Vertical



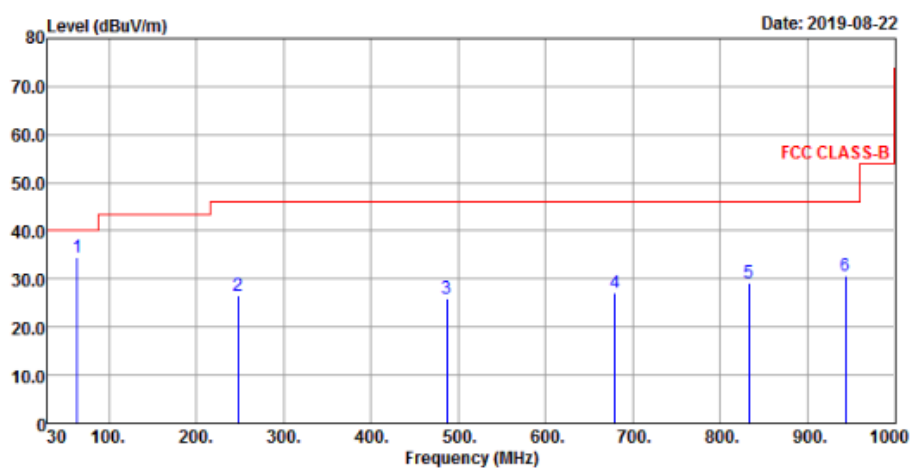
EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
63.95	34.44	53.4	-18.96	40	-5.56	213	197	Peak
248.25	26.53	44.22	-17.69	46	-19.47	177	162	Peak
486.87	25.87	37.29	-11.42	46	-20.13	189	105	Peak
679.9	27.03	34.03	-7	46	-18.97	204	176	Peak
833.16	29.33	33.78	-4.45	46	-16.67	186	21	Peak
943.74	30.61	33.34	-2.73	46	-15.39	202	184	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
77.53	36.12	57.36	-21.24	40	-3.88	100	177	Peak
169.68	25.04	42.66	-17.62	43.5	-18.46	103	261	Peak
334.58	24.9	39.92	-15.02	46	-21.1	112	317	Peak
614.91	26.73	35.06	-8.33	46	-19.27	104	157	Peak
779.81	28.75	33.3	-4.55	46	-17.25	144	158	Peak
936.95	30.78	33.57	-2.79	46	-15.22	104	199	Peak

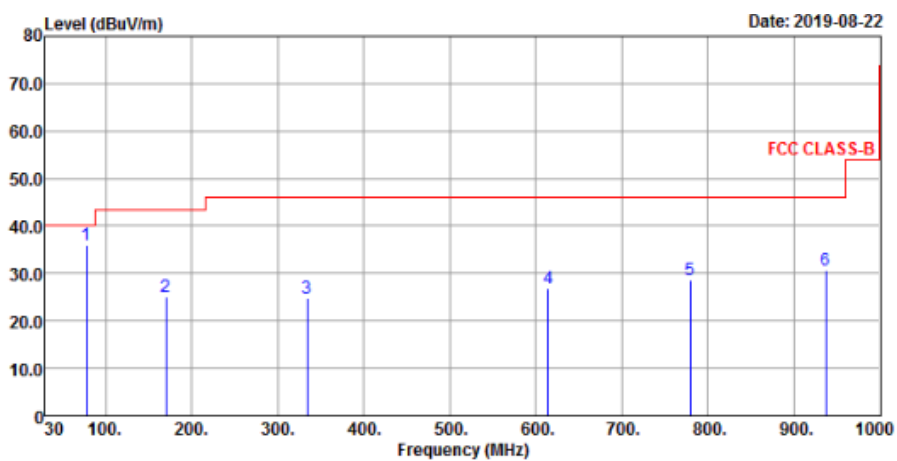
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

Horizontal



Vertical



Mode B

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	79.07	83.53	-4.46	97.44	-18.37	100	205	QP
902.138	117.44	121.9	-4.46	-----	-----	100	205	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	82.57	87.03	-4.46	99.24	-16.67	108	67	QP
902.138	119.24	123.7	-4.46	-----	-----	108	67	QP

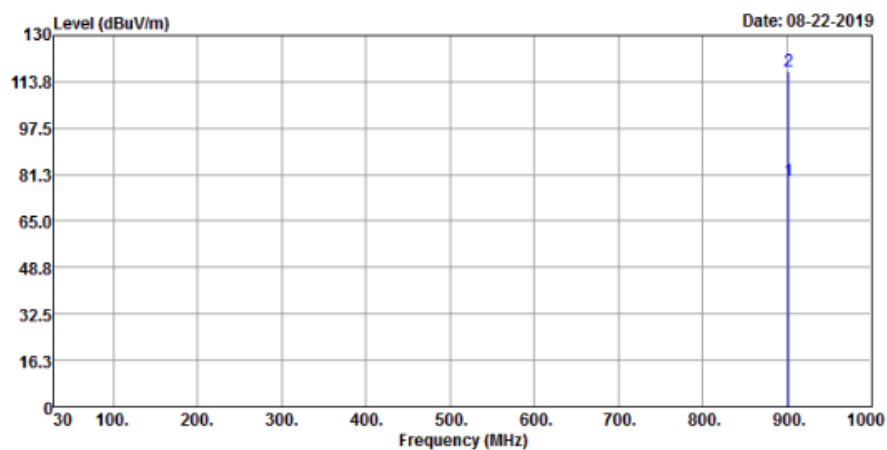
Remarks:

3. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

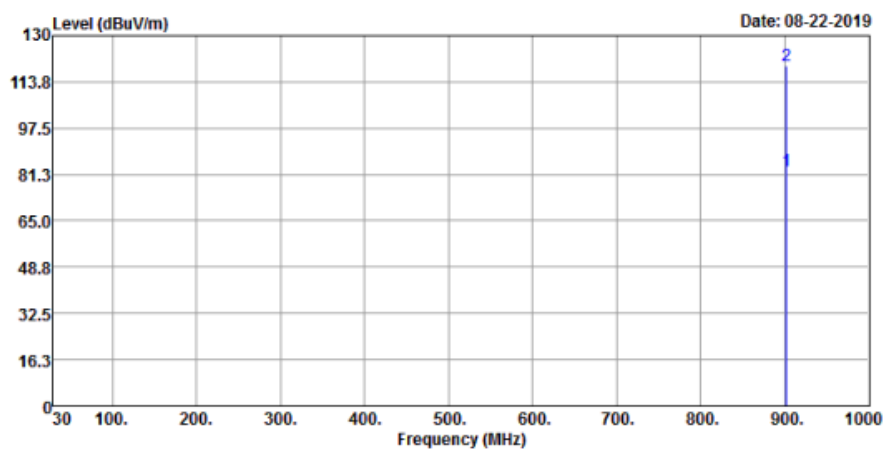
Margin value = Emission level – Limit value

4. *: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	48.65	53.11	-4.46	97.62	-48.97	100	205	QP
903.388	117.62	122	-4.38	-----	-----	100	205	QP
*928	38.83	41.78	-2.95	97.62	-58.79	100	205	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	49.55	54.01	-4.46	97.01	-47.46	110	64	QP
903.388	117.01	121.39	-4.38	-----	-----	110	64	QP
*928	40.34	43.29	-2.95	97.01	-56.67	110	64	QP

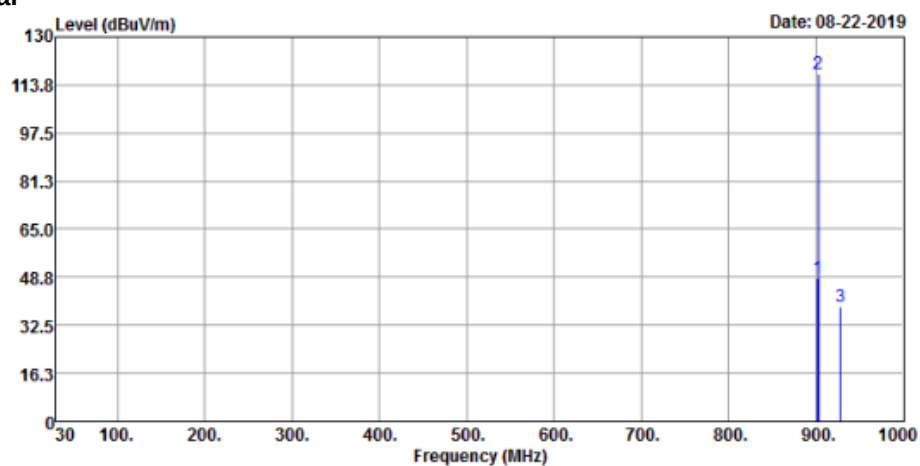
Remarks:

7. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

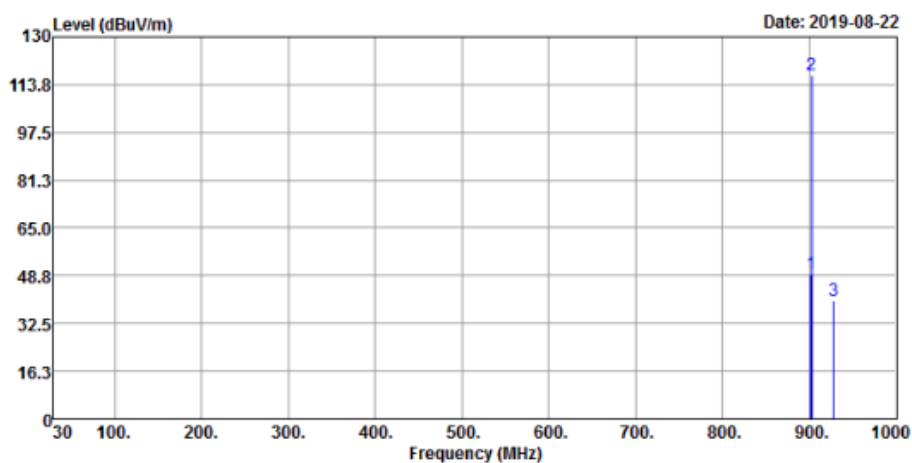
Margin value = Emission level – Limit value

8. *: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	43.2	47.66	-4.46	97.75	-54.55	100	206	QP
904.663	117.75	121.97	-4.22	-----	-----	100	206	QP
*928	39.21	42.16	-2.95	97.75	-58.54	100	206	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	44.9	49.36	-4.46	99.56	-54.66	110	65	QP
904.663	119.56	123.78	-4.22	-----	-----	110	65	QP
*928	40.25	43.2	-2.95	99.56	-59.31	110	65	QP

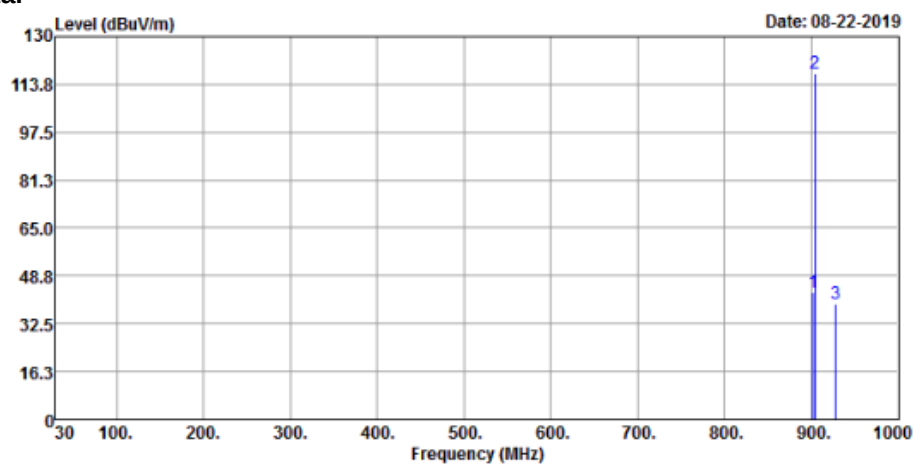
Remarks:

7. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

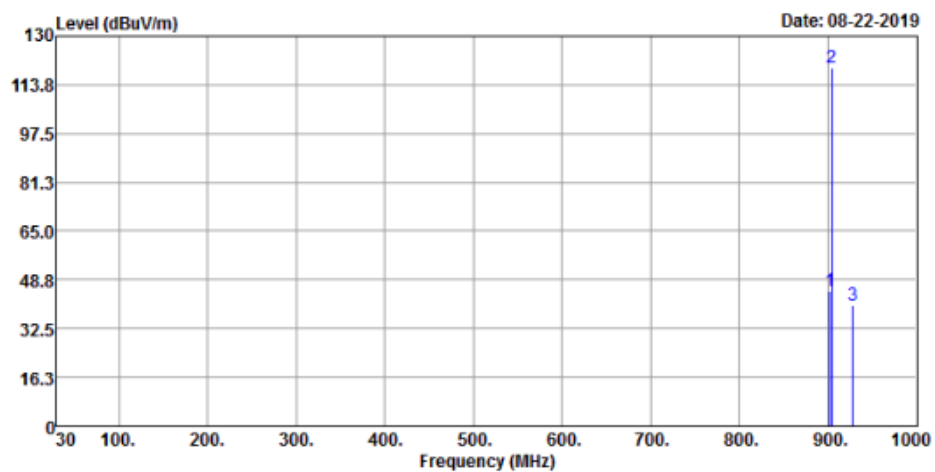
Margin value = Emission level – Limit value

8. *: Out of Restricted Band

Horizontal



Vertical



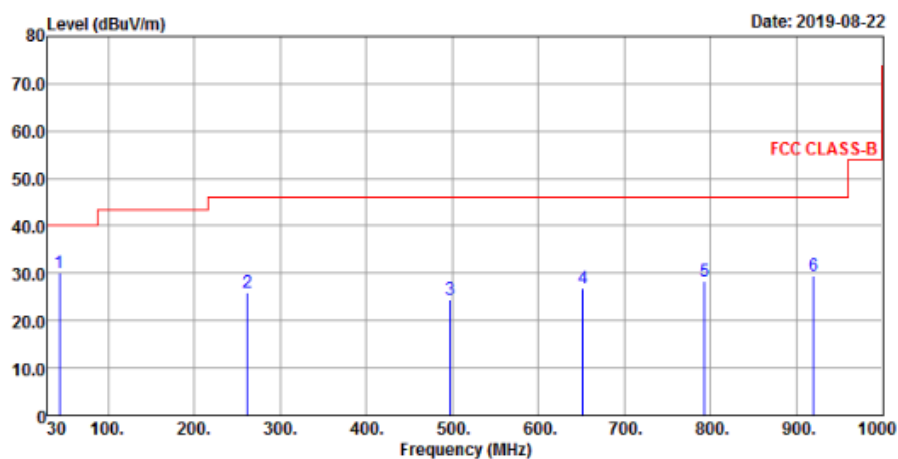
EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	30.04	46.99	-16.95	40	-9.96	213	146	Peak
261.83	25.86	43.12	-17.26	46	-20.14	196	228	Peak
497.54	24.37	35.08	-10.71	46	-21.63	193	339	Peak
651.77	27	35.08	-8.08	46	-19	202	155	Peak
793.39	28.4	33.4	-5	46	-17.6	212	193	Peak
920.46	29.53	33	-3.47	46	-16.47	169	56	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
63.95	31.21	50.17	-18.96	40	-8.79	102	136	Peak
167.74	25.1	42.52	-17.42	43.5	-18.4	129	304	Peak
343.31	23.29	38.19	-14.9	46	-22.71	128	206	Peak
606.18	25.69	33.99	-8.3	46	-20.31	101	78	Peak
787.57	28.54	33.31	-4.77	46	-17.46	105	310	Peak
923.37	30.05	33.29	-3.24	46	-15.95	107	319	Peak

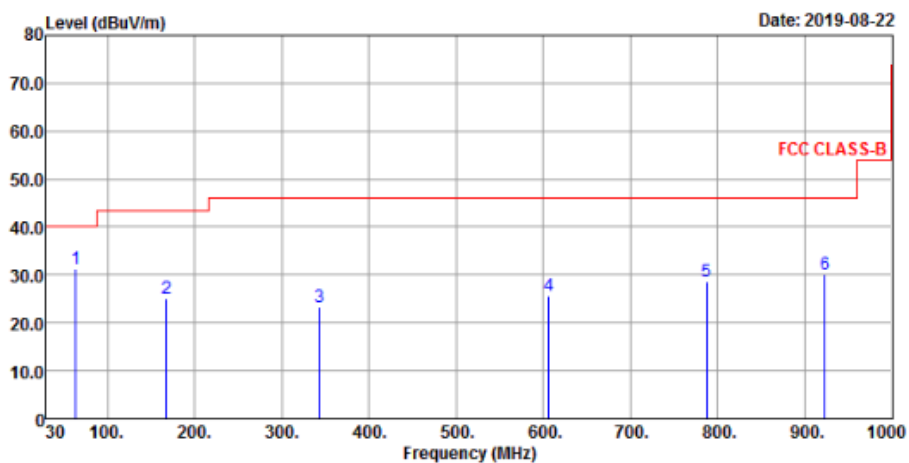
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

Horizontal



Vertical



Mode C

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim-Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	82.49	86.95	-4.46	99.24	-16.75	150	208	QP
902.138	119.24	123.7	-4.46	-----	-----	150	208	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	79.57	84.03	-4.46	96.84	-17.27	155	247	QP
902.138	116.84	121.3	-4.46	-----	-----	155	247	QP

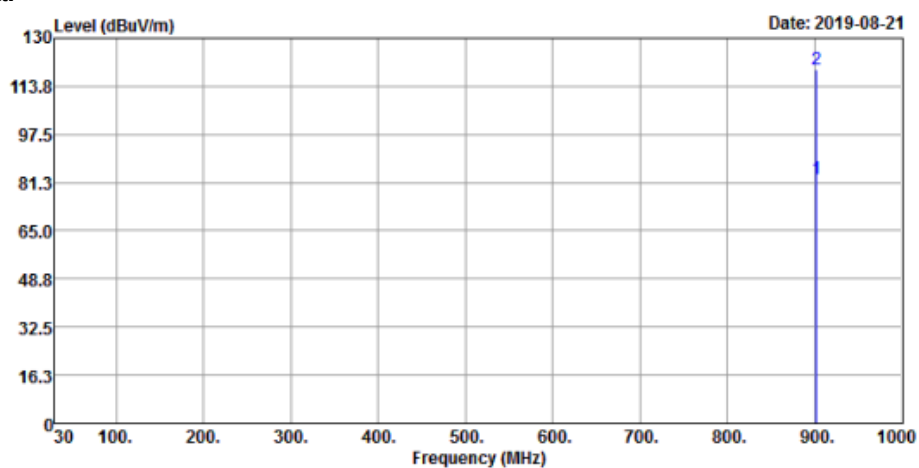
Remarks:

3. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

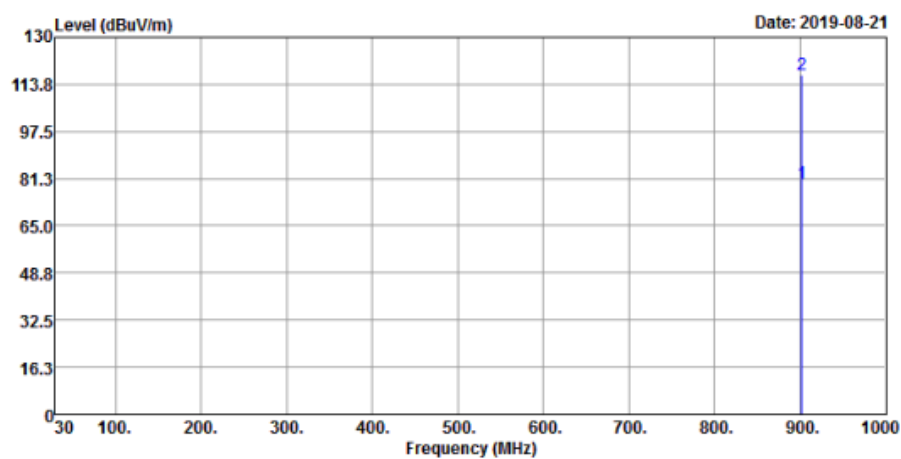
Margin value = Emission level – Limit value

4. *: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim-Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	49.34	53.8	-4.46	99.32	-49.98	151	209	QP
903.388	119.32	123.7	-4.38	-----	-----	151	209	QP
*928	38.38	41.33	-2.95	99.32	-60.94	151	209	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	46.89	51.35	-4.46	96.92	-50.03	154	248	QP
903.388	116.92	121.3	-4.38	-----	-----	154	248	QP
*928	38.05	41	-2.95	96.92	-58.87	154	248	QP

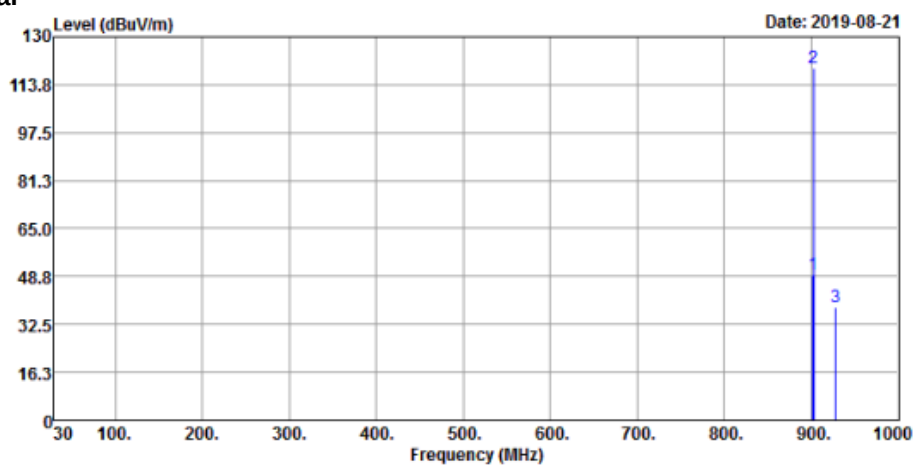
Remarks:

9. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

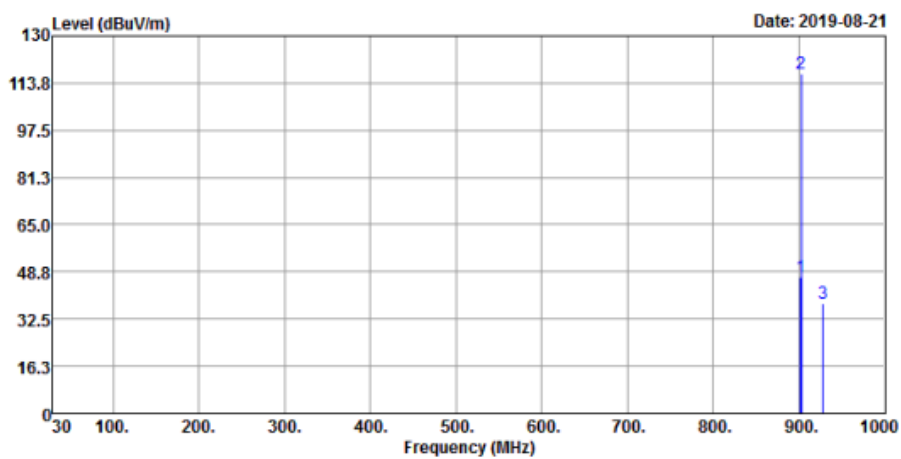
Margin value = Emission level – Limit value

10.*: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim-Chen

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	44.15	48.61	-4.46	99.38	-55.23	149	207	QP
904.663	119.38	123.6	-4.22	-----	-----	149	207	QP
*928	38.37	41.32	-2.95	99.38	-61.01	149	207	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	42.23	46.69	-4.46	96.97	-54.74	154	246	QP
904.663	116.97	121.19	-4.22	-----	-----	154	246	QP
*928	38.34	41.29	-2.95	96.97	-58.63	154	246	QP

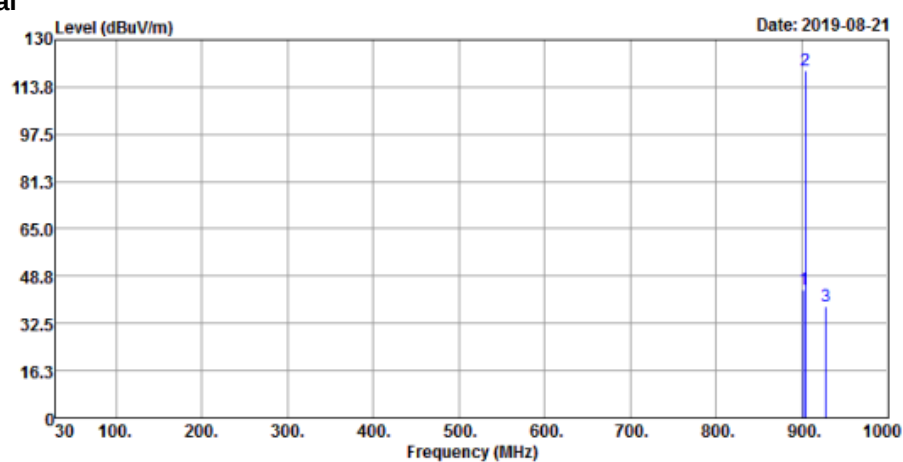
Remarks:

9. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

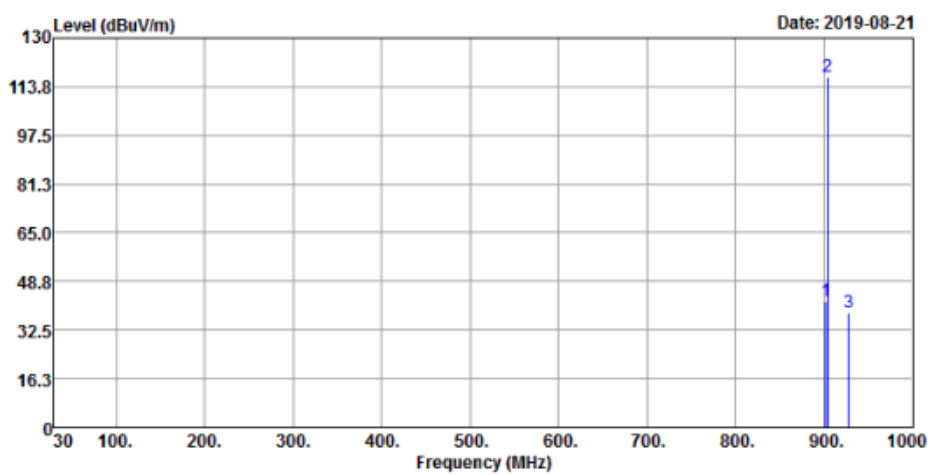
Margin value = Emission level – Limit value

10.*: Out of Restricted Band

Horizontal



Vertical



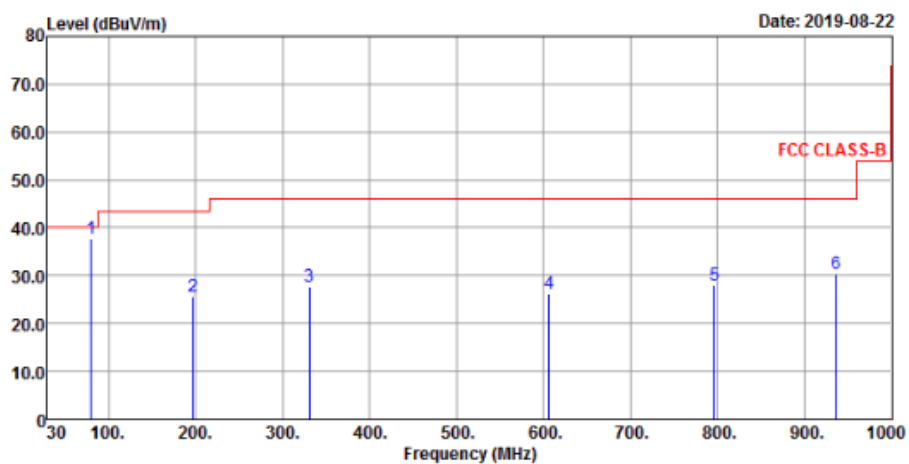
EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
79.47	37.75	59.11	-21.36	40	-2.25	205	193	Peak
196.84	25.63	45.33	-19.7	43.5	-17.87	172	163	Peak
330.7	27.61	42.73	-15.12	46	-18.39	213	104	Peak
606.18	26.4	34.7	-8.3	46	-19.6	183	316	Peak
796.3	28.14	33.22	-5.08	46	-17.86	199	104	Peak
935.98	30.46	33.26	-2.8	46	-15.54	196	222	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
63.95	31.23	50.19	-18.96	40	-8.77	102	166	Peak
171.62	24.13	41.92	-17.79	43.5	-19.37	113	141	Peak
256.01	24.37	41.86	-17.49	46	-21.63	124	186	Peak
491.72	25.04	36.15	-11.11	46	-20.96	133	326	Peak
714.82	28.97	36.05	-7.08	46	-17.03	125	59	Peak
960.23	30.06	33.16	-3.1	54	-23.94	102	164	Peak

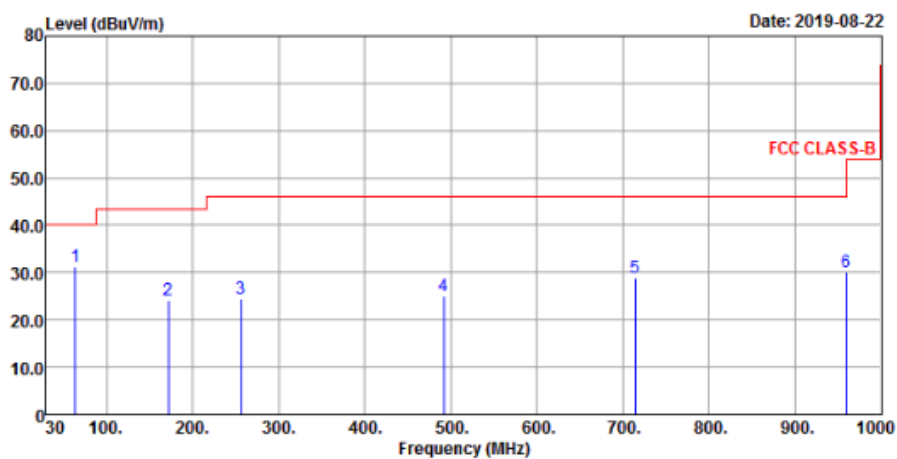
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

Horizontal



Vertical



Mode D

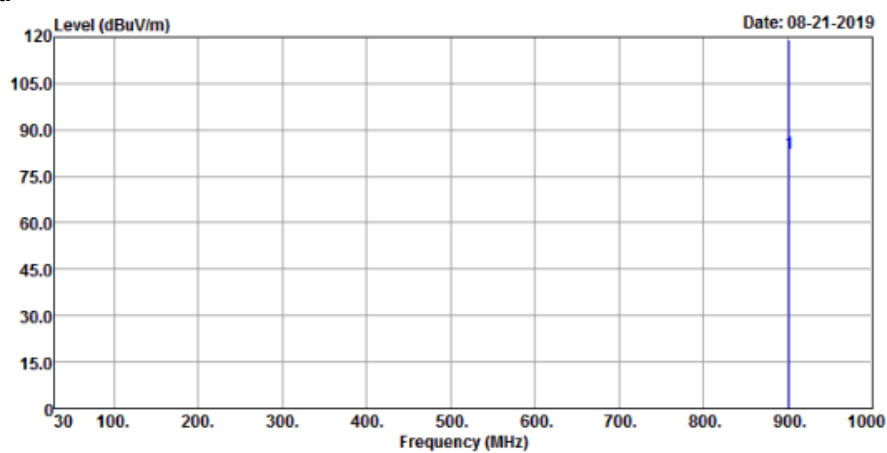
EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	82.16	86.62	-4.46	99.14	-16.98	151	10	QP
902.138	119.14	123.6	-4.46	-----	-----	151	10	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	77.63	82.09	-4.46	95.34	-17.71	153	245	QP
902.138	115.34	119.8	-4.46	-----	-----	153	245	QP

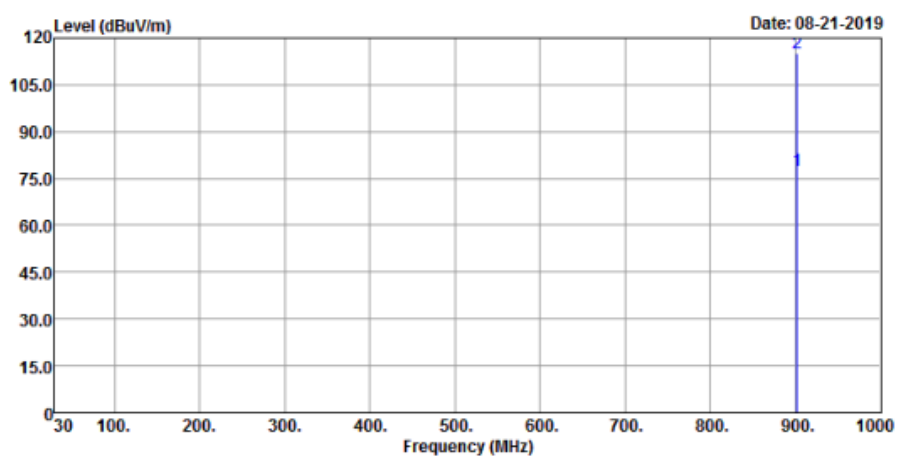
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- *: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 26	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	49.64	54.1	-4.46	99.22	-49.58	156	11	QP
903.388	119.22	123.6	-4.38	-----	-----	156	11	QP
*928	38.16	41.11	-2.95	99.22	-61.06	156	11	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	45.54	50	-4.46	94.92	-49.38	156	248	QP
903.388	114.92	119.3	-4.38	-----	-----	156	248	QP
*928	37.64	40.59	-2.95	94.92	-57.28	156	248	QP

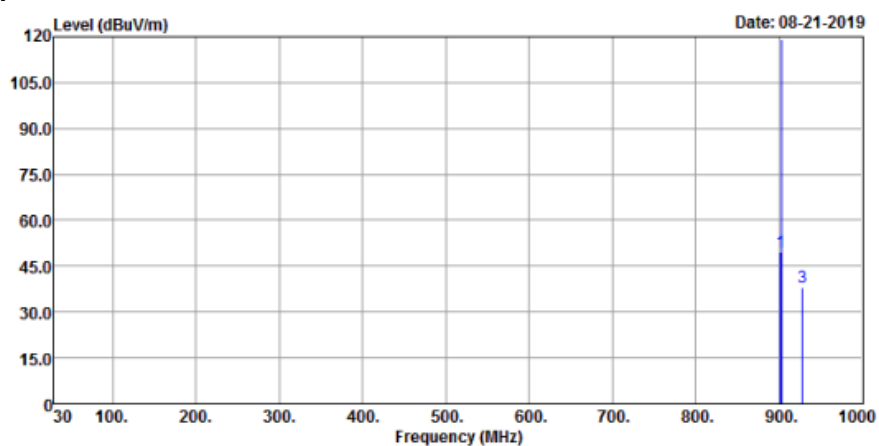
Remarks:

11. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

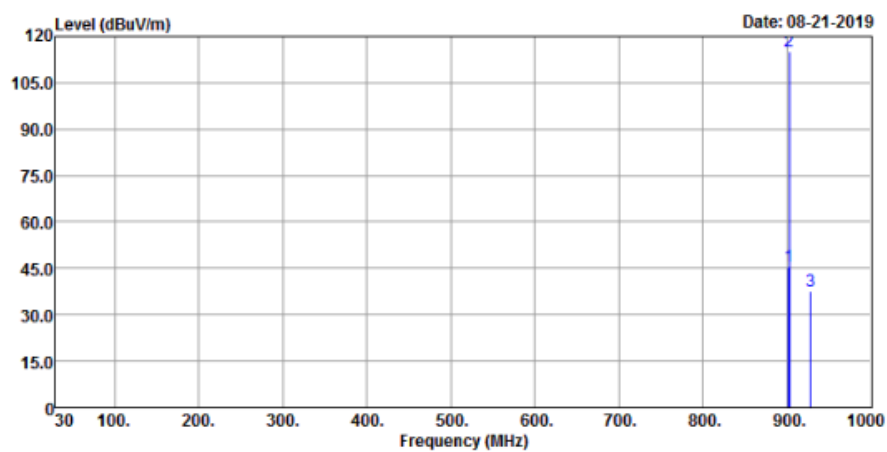
Margin value = Emission level – Limit value

12.*: Out of Restricted Band

Horizontal



Vertical



EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	43.96	48.42	-4.46	99.38	-55.42	154	12	QP
904.663	119.38	123.6	-4.22	-----	-----	154	12	QP
*928	38.72	41.67	-2.95	99.38	-60.66	154	12	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*902	40.46	44.92	-4.46	94.88	-54.42	100	251	QP
904.663	114.88	119.1	-4.22	-----	-----	100	251	QP
*928	37.95	40.9	-2.95	94.88	-56.93	100	251	QP

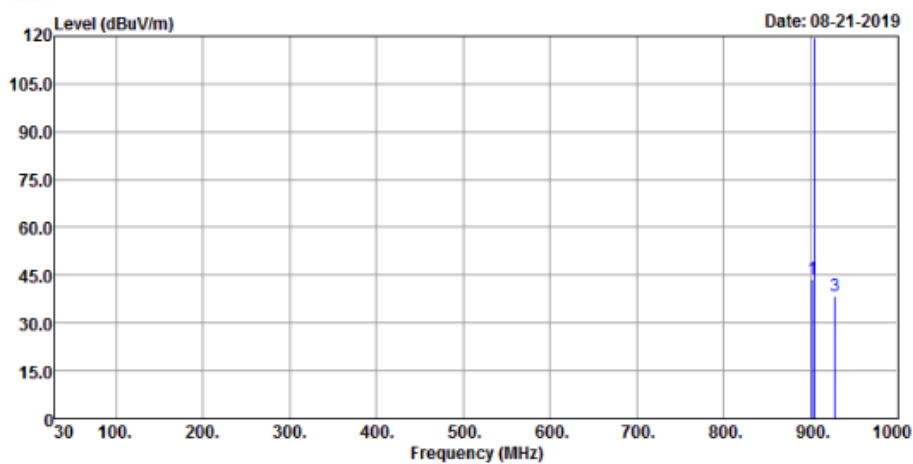
Remarks:

11. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

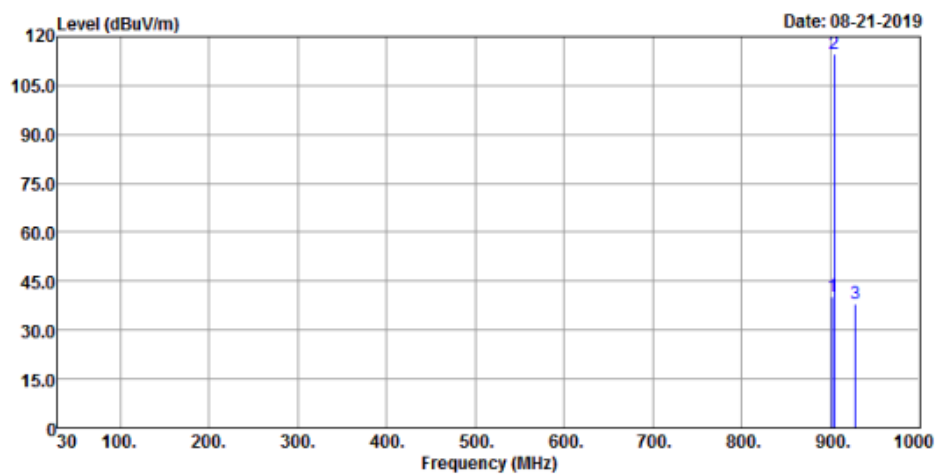
Margin value = Emission level – Limit value

12.*: Out of Restricted Band

Horizontal



Vertical



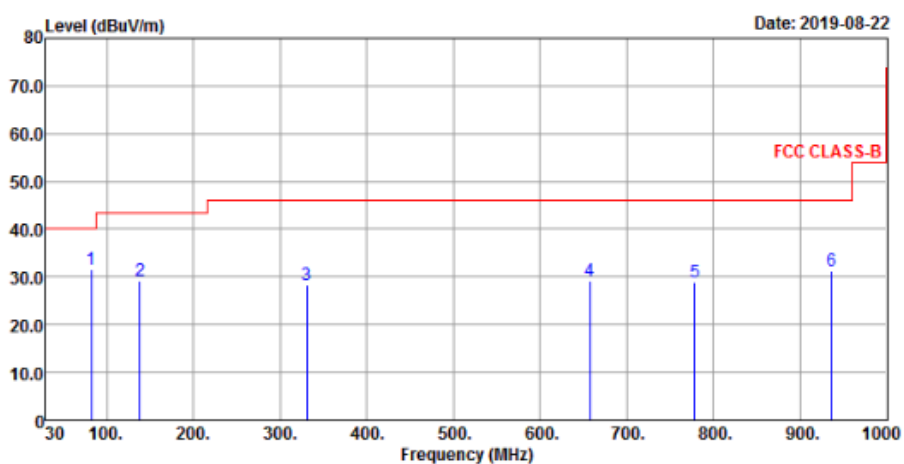
EUT Test Condition		Measurement Detail	
Channel	Channel 53	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Jisyong Wang

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
82.38	31.48	53.29	-21.81	40	-8.52	172	193	Peak
138.64	29.34	47.3	-17.96	43.5	-14.16	204	126	Peak
330.7	28.44	43.56	-15.12	46	-17.56	199	312	Peak
657.59	29.28	37.06	-7.78	46	-16.72	217	297	Peak
778.84	28.83	33.36	-4.53	46	-17.17	133	236	Peak
935.98	31.23	34.03	-2.8	46	-14.77	199	127	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
77.53	35.67	56.91	-21.24	40	-4.33	105	233	Peak
170.65	25.17	42.75	-17.58	43.5	-18.33	109	187	Peak
431.58	23.26	35.53	-12.27	46	-22.74	111	183	Peak
663.41	27.17	34.7	-7.53	46	-18.83	103	306	Peak
850.62	29.06	33.22	-4.16	46	-16.94	112	128	Peak
935.01	29.98	32.78	-2.8	46	-16.02	101	99	Peak

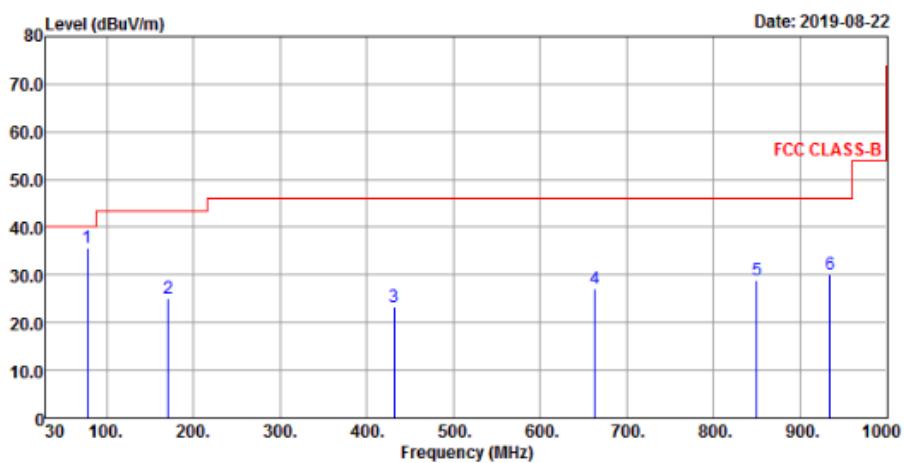
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

Horizontal



Vertical



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

- Note: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 10, 2018	Dec. 09, 2019
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 2.
 3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

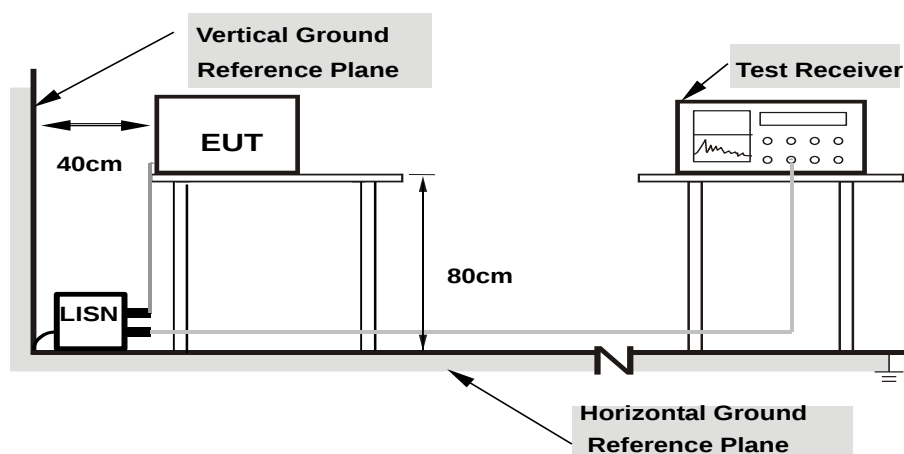
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



**Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Condition

Set the EUT under transmission condition continuously at specific channel frequency.

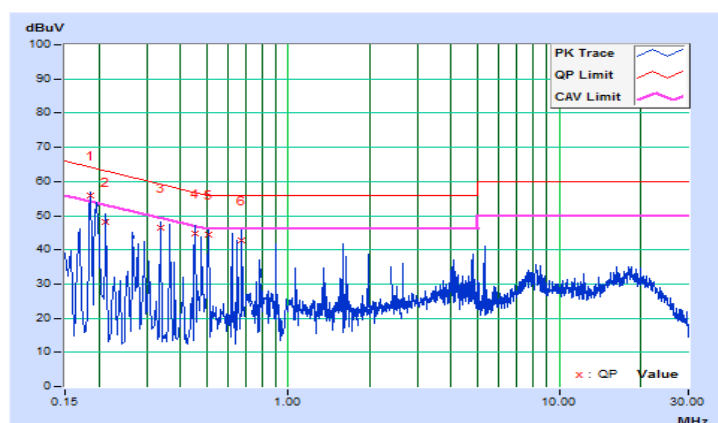
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/22
Test Mode	Mode A		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18519	9.68	46.16	34.04	55.84	43.72	64.25	54.25	-8.41	-10.53
2	0.21256	9.68	38.57	28.36	48.25	38.04	63.10	53.10	-14.85	-15.06
3	0.33768	9.68	36.79	23.83	46.47	33.51	59.26	49.26	-12.79	-15.75
4	0.45107	9.68	35.01	22.65	44.69	32.33	56.86	46.86	-12.17	-14.53
5	0.50581	9.68	34.81	20.15	44.49	29.83	56.00	46.00	-11.51	-16.17
6	0.67394	9.68	33.02	22.21	42.70	31.89	56.00	46.00	-13.30	-14.11

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

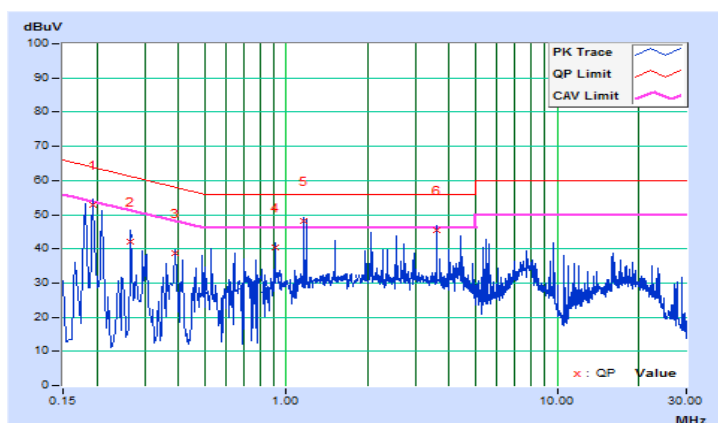


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/22
Test Mode	Mode A		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19305	9.66	43.09	30.94	52.75	40.60	63.90	53.90	-11.15	-13.30
2	0.26730	9.66	32.38	25.70	42.04	35.36	61.20	51.20	-19.16	-15.84
3	0.38851	9.65	29.14	23.58	38.79	33.23	58.10	48.10	-19.31	-14.87
4	0.90854	9.64	30.76	17.82	40.40	27.46	56.00	46.00	-15.60	-18.54
5	1.16269	9.64	38.63	22.69	48.27	32.33	56.00	46.00	-7.73	-13.67
6	3.59080	9.71	35.77	26.11	45.48	35.82	56.00	46.00	-10.52	-10.18

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

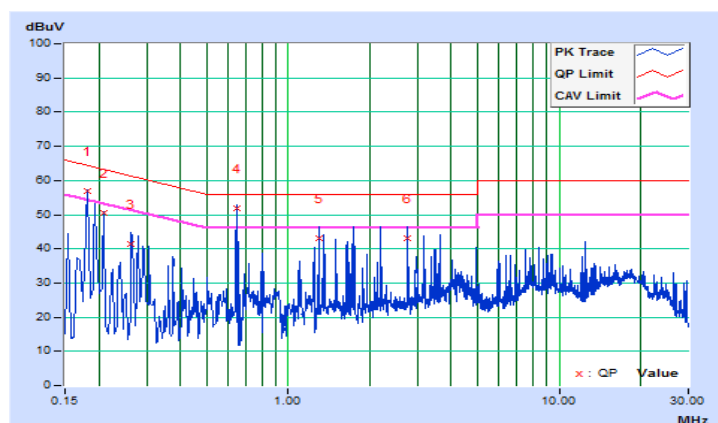


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/22
Test Mode	Mode B		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18128	9.68	47.26	32.87	56.94	42.55	64.43	54.43	-7.49	-11.88
2	0.20865	9.68	40.93	30.74	50.61	40.42	63.26	53.26	-12.65	-12.84
3	0.26346	9.68	31.88	24.10	41.56	33.78	61.32	51.32	-19.76	-17.54
4	0.64266	9.68	42.11	32.03	51.79	41.71	56.00	46.00	-4.21	-4.29
5	1.30345	9.68	33.27	25.71	42.95	35.39	56.00	46.00	-13.05	-10.61
6	2.76188	9.72	33.30	23.65	43.02	33.37	56.00	46.00	-12.98	-12.63

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

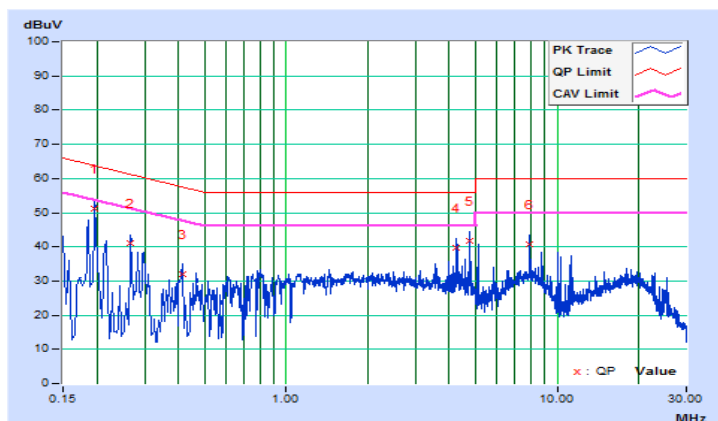


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/23
Test Mode	Mode B		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19692	9.66	41.60	29.14	51.26	38.80	63.74	53.74	-12.48	-14.94
2	0.26730	9.66	31.34	24.58	41.00	34.24	61.20	51.20	-20.20	-16.96
3	0.41197	9.65	22.23	13.51	31.88	23.16	57.61	47.61	-25.73	-24.45
4	4.24768	9.73	29.97	17.59	39.70	27.32	56.00	46.00	-16.30	-18.68
5	4.77553	9.74	32.03	20.90	41.77	30.64	56.00	46.00	-14.23	-15.36
6	7.92308	9.81	31.07	19.35	40.88	29.16	60.00	50.00	-19.12	-20.84

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

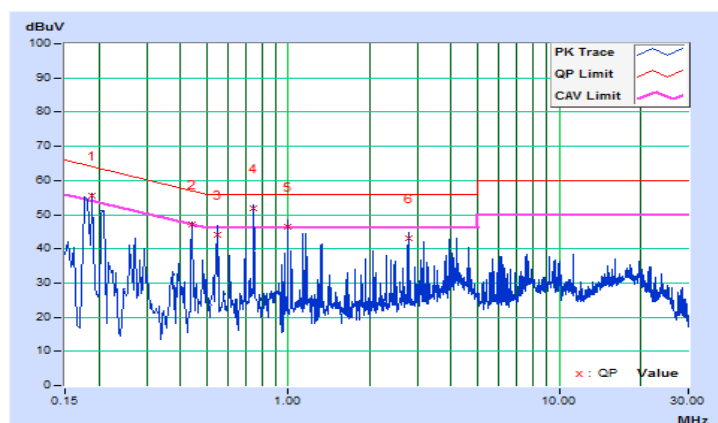


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/23
Test Mode	Mode D		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18910	9.68	45.85	34.23	55.53	43.91	64.08	54.08	-8.55	-10.17
2	0.43934	9.68	37.38	28.04	47.06	37.72	57.07	47.07	-10.01	-9.35
3	0.54491	9.68	34.33	26.10	44.01	35.78	56.00	46.00	-11.99	-10.22
4	0.74823	9.67	42.29	29.24	51.96	38.91	56.00	46.00	-4.04	-7.09
5	0.99456	9.67	36.90	25.41	46.57	35.08	56.00	46.00	-9.43	-10.92
6	2.77752	9.72	33.52	26.56	43.24	36.28	56.00	46.00	-12.76	-9.72

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

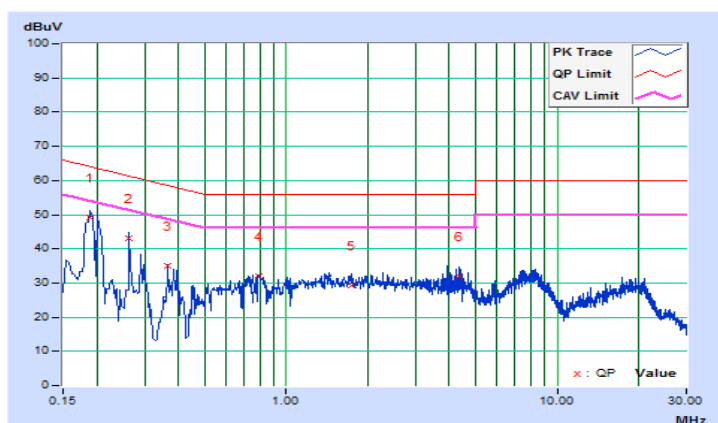


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/23
Test Mode	Mode D		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18910	9.66	39.55	23.62	49.21	33.28	64.08	54.08	-14.87	-20.80
2	0.26346	9.66	33.36	24.88	43.02	34.54	61.32	51.32	-18.30	-16.78
3	0.36505	9.65	25.23	15.68	34.88	25.33	58.61	48.61	-23.73	-23.28
4	0.79124	9.64	22.43	12.38	32.07	22.02	56.00	46.00	-23.93	-23.98
5	1.73746	9.66	19.74	6.11	29.40	15.77	56.00	46.00	-26.60	-30.23
6	4.36889	9.73	22.25	5.63	31.98	15.36	56.00	46.00	-24.02	-30.64

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

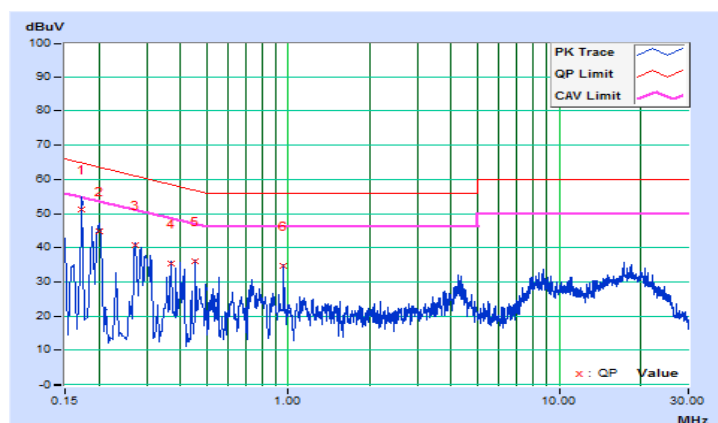


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/23
Test Mode	Mode C		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17346	9.69	41.58	32.20	51.27	41.89	64.79	54.79	-13.52	-12.90
2	0.20084	9.68	35.16	24.21	44.84	33.89	63.58	53.58	-18.74	-19.69
3	0.27120	9.68	31.05	11.51	40.73	21.19	61.08	51.08	-20.35	-29.89
4	0.36896	9.68	25.72	12.03	35.40	21.71	58.52	48.52	-23.12	-26.81
5	0.45498	9.68	26.19	16.29	35.87	25.97	56.78	46.78	-20.91	-20.81
6	0.95937	9.67	25.13	15.53	34.80	25.20	56.00	46.00	-21.20	-20.80

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

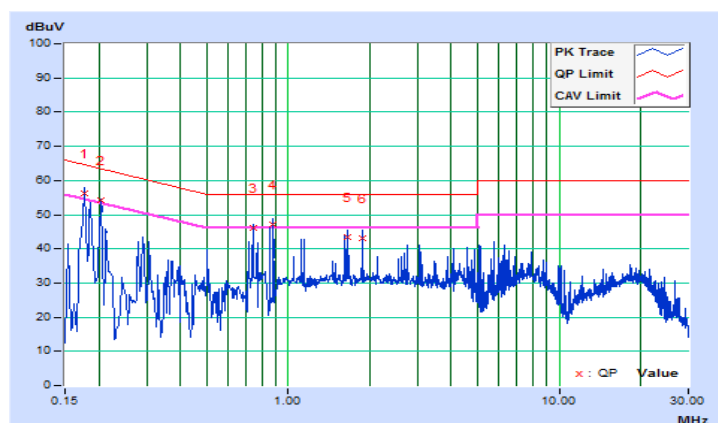


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Thomas Wei	Test Date	2019/8/23
Test Mode	Mode C		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17737	9.66	46.52	31.11	56.18	40.77	64.61	54.61	-8.43	-13.84
2	0.20474	9.66	44.45	30.69	54.11	40.35	63.42	53.42	-9.31	-13.07
3	0.74041	9.64	36.47	26.30	46.11	35.94	56.00	46.00	-9.89	-10.06
4	0.88117	9.64	37.65	20.23	47.29	29.87	56.00	46.00	-8.71	-16.13
5	1.66317	9.66	33.82	25.35	43.48	35.01	56.00	46.00	-12.52	-10.99
6	1.87822	9.67	33.56	21.33	43.23	31.00	56.00	46.00	-12.77	-15.00

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

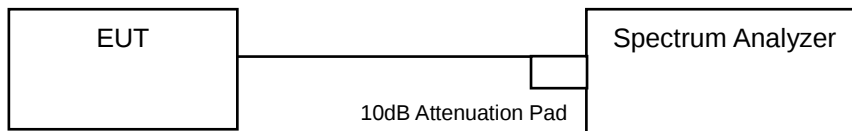


4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

At least 50 channels frequencies, and should be equally spaced, if the 20 dB bandwidth of the hopping channel is less than 250 kHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

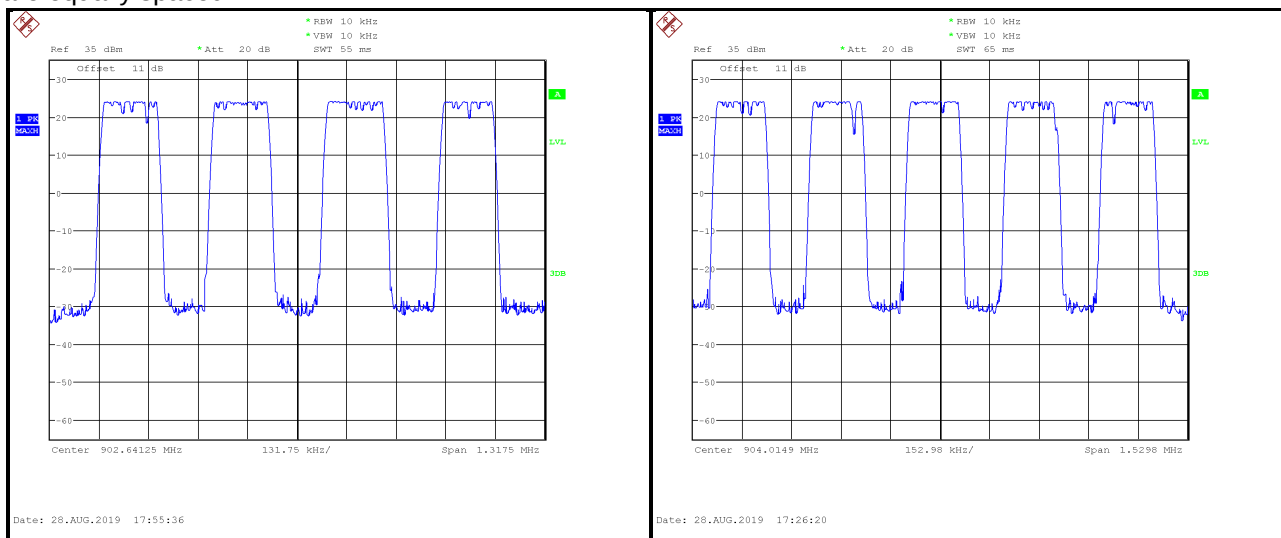
- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- Set the SA on View mode and then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 Test Results

There are 54 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

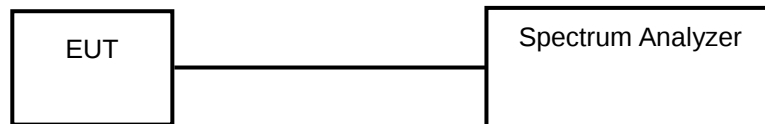


4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 20 seconds multiplied by the number of hopping channels employed, if the 20 dB bandwidth of the hopping channel is less than 250 kHz.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- Repeat above procedures until all different time-slot modes have been completed.

4.4.5 Deviation from Test Standard

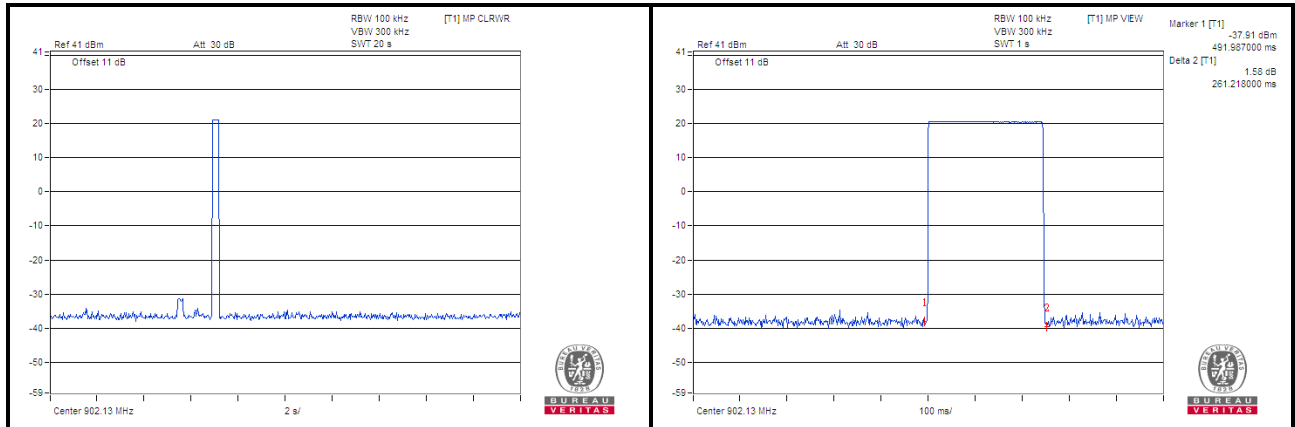
No deviation.

4.4.6 Test Results

Average Hopping Channel	Package Transfer Time (msec)	Result (msec)	Limit (sec)
54	261.218	282.115	0.4

NOTE:

- Test plots of the transmitting time slot are shown as below.
- Calculator Result = $54 * 0.4 \text{ s} * (1 \text{ time} / 20 \text{ s}) * 261.218 = 282.115$

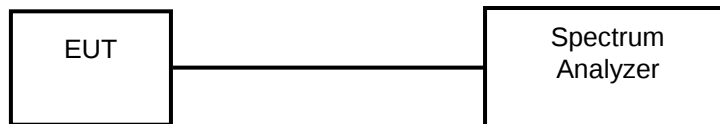


4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

The 20 dB bandwidth of the hopping channel shall be less than 500 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

4.5.5 Deviation from Test Standard

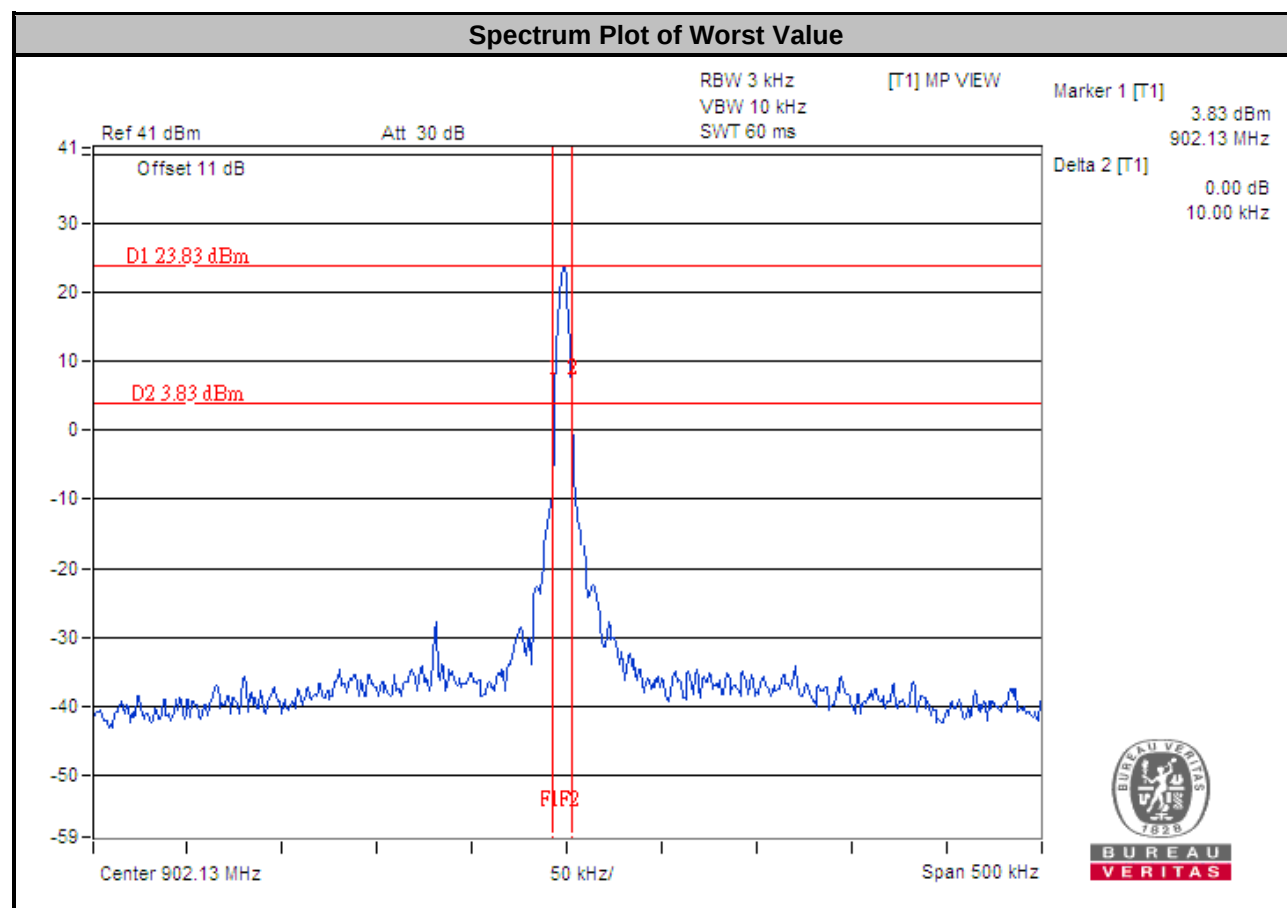
No deviation.

4.5.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Limit (kHz)
0	902.1375	0.01	500
26	903.3875	0.01	500
53	904.6625	0.01	500

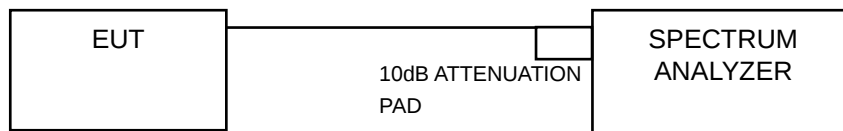


4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

At least 25 kHz or 20 dB hopping channel bandwidth (whichever is greater).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

4.6.5 Deviation from Test Standard

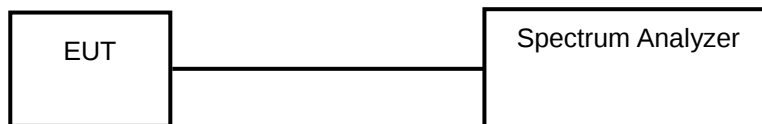
No deviation.

4.7 Maximum Output Power

4.7.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 30 dBm for systems employing at least 50 hopping channels.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

4.7.5 Deviation from Test Standard

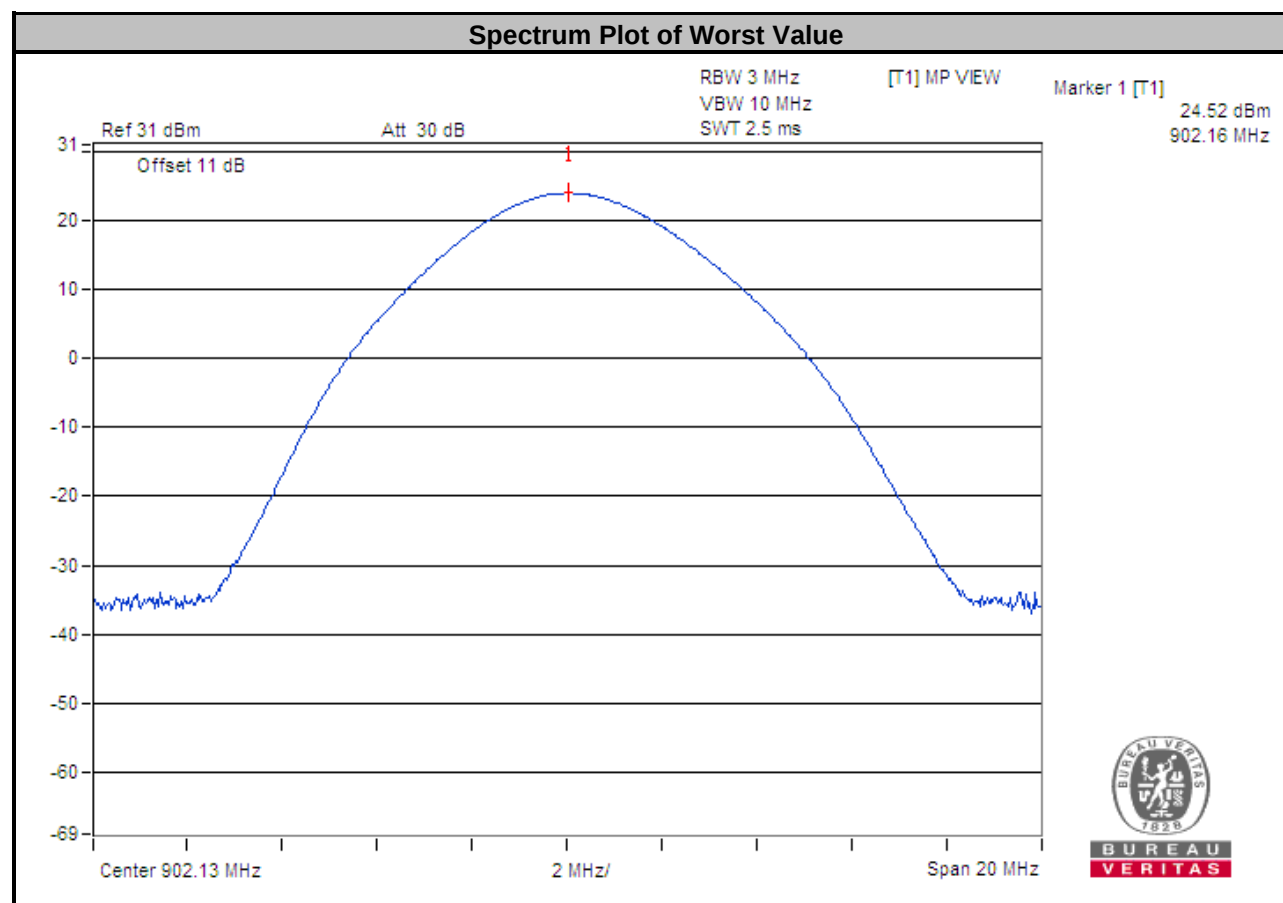
No deviation.

4.7.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (dBm)	Pass / Fail
0	902.1375	283.139	24.52	30	PASS
26	903.3875	281.838	24.50	30	PASS
53	904.6625	279.898	24.47	30	PASS



4.8 Conducted Out of Band Emission Measurement

4.8.1 Limits of Conducted Out of Band Emission Measurement

Below -20 dB of the highest emission level of operating band (in 100 kHz RBW).

4.8.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.8.3 Test Procedure

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 Deviation from Test Standard

No deviation.

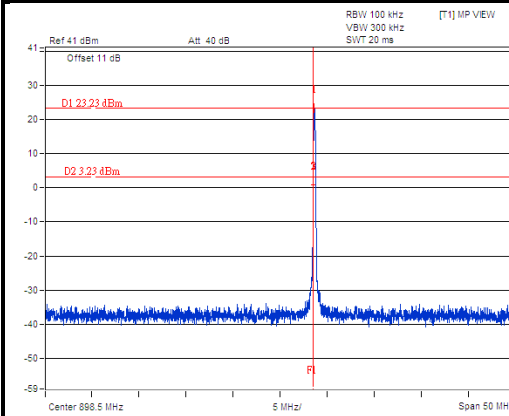
4.8.5 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

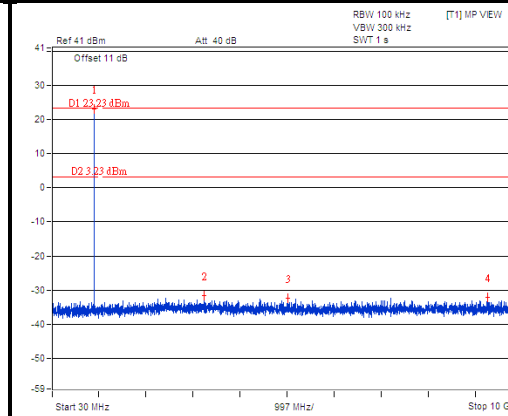
4.8.6 Test Results

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20 dB offset below D1. It shows compliance with the requirement.

Hopping Disabled_Low Channel

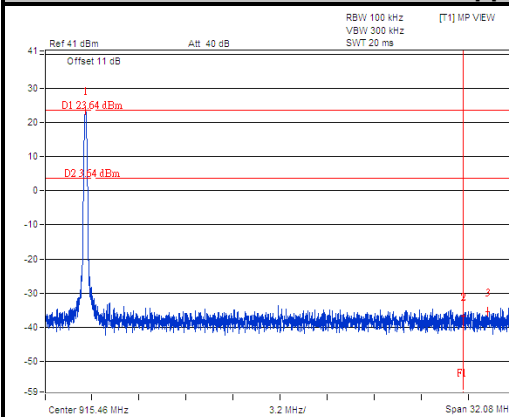


Marker 1 [T1]	23.23 dBm	902.13 MHz
Marker 2 [T1]	0.77 dBm	902.00 MHz
Marker 3 [T1]	0.77 dBm	902.00 MHz

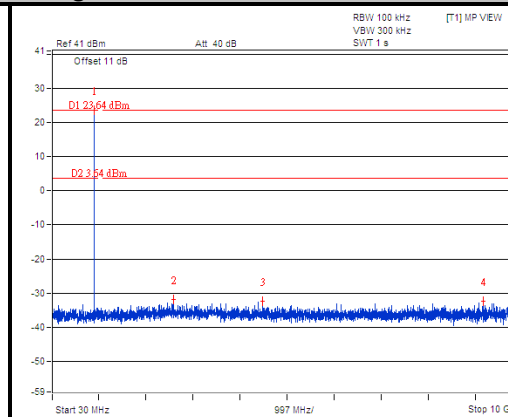


Marker 1 [T1]	23.21 dBm	902.37 MHz
Marker 2 [T1]	-31.57 dBm	3.23535 GHz
Marker 3 [T1]	-32.30 dBm	5.01749 GHz
Marker 4 [T1]	-32.04 dBm	9.26465 GHz

Hopping Disabled_High Channel

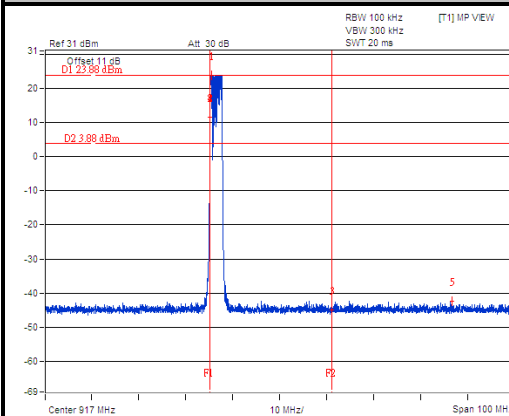


Marker 1 [T1]	23.64 dBm	902.11 MHz
Marker 2 [T1]	-36.82 dBm	928.00 MHz
Marker 3 [T1]	-35.41 dBm	929.62 MHz

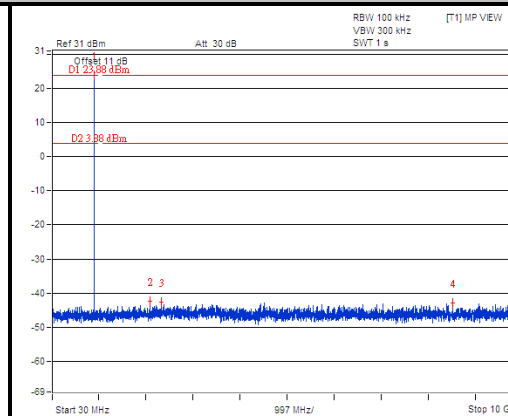


Marker 1 [T1]	23.62 dBm	902.37 MHz
Marker 2 [T1]	-31.97 dBm	2.59229 GHz
Marker 3 [T1]	-32.42 dBm	4.48409 GHz
Marker 4 [T1]	-32.35 dBm	9.18495 GHz

Hopping Enabled Channel



Marker 1 [T1]	23.88 dBm	902.45 MHz
Marker 2 [T1]	11.66 dBm	902.00 MHz
Marker 3 [T1]	-44.95 dBm	928.00 MHz
Marker 4 [T1]	11.66 dBm	902.00 MHz
Marker 5 [T1]	-42.48 dBm	953.75 MHz



Marker 1 [T1]	23.82 dBm	902.37 MHz
Marker 2 [T1]	-42.51 dBm	2.08382 GHz
Marker 3 [T1]	-42.61 dBm	2.32559 GHz
Marker 4 [T1]	-42.85 dBm	8.53191 GHz

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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