FCC Test Report

Report No.:	RFBEDV-WTW-P23010251-2
FCC ID:	2AWD3ESRMKV2C
Test Model:	ESRM10V2
Received Date:	2023/1/11
Test Date:	2023/2/6 ~ 2023/3/28
Issued Date:	2023/4/19
Applicant:	Aetheros Inc
Address:	80 Liberty Ship Way, Suite 26, Sausalito, CA 94965 USA
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 (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
Test Location (2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003 281270 / TW0032

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBEDV-WTW-P23010251-2	Original release	2023/4/19

1 Certificate of Conformity

Product:	ESR-M
Brand:	Aetheros (AOS)
Test Model:	ESRM10V2
Sample Status:	Engineering sample
Applicant:	Aetheros Inc
Test Date:	2023/2/6 ~ 2023/3/28
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 : Polly Chien , **Date:** 2023/4/19

Polly Chien / Specialist

Approved by : Jeremy Lin , **Date:** 2023/4/19

Jeremy Lin / 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 -20.05dB at 0.46568MHz.
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)(i)	Channel Bandwidth	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)(2)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -6.7dB at 38.73MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is MMCX not a standard connector.

Note: 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 as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	ESR-M
Brand	Aetheros (AOS)
Test Model	ESRM10V2
Sample Status	Engineering sample
Power Supply Rating	108-132Vac
Modulation Type	MR-FSK/MR-OFDM/MR-OQPSK
Transfer Rate	128 kbps
Operating Frequency	902.2 ~ 927.8MHz
Number of Channel	129
Channel Spacing	0.2MHz
Output Power	592.925mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	NA

Note:

1. The following antennas were provided to the EUT.

Gain (dBi)	Antenna Type	Connector Type
902.2 - 927.8MHz		
3.76	PIFA	MMCX

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.2 Description of Test Modes

129 channels are provided:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.2	33	908.8	66	915.4	99	922.0
1	902.4	34	909.0	67	915.6	100	922.2
2	902.6	35	909.2	68	915.8	101	922.4
3	902.8	36	909.4	69	916.0	102	922.6
4	903.0	37	909.6	70	916.2	103	922.8
5	903.2	38	909.8	71	916.4	104	923.0
6	903.4	39	910.0	72	916.6	105	923.2
7	903.6	40	910.2	73	916.8	106	923.4
8	903.8	41	910.4	74	917.0	107	923.6
9	904.0	42	910.6	75	917.2	108	923.8
10	904.2	43	910.8	76	917.4	109	924.0
11	904.4	44	911.0	77	917.6	110	924.2
12	904.6	45	911.2	78	917.8	111	924.4
13	904.8	46	911.4	79	918.0	112	924.6
14	905.0	47	911.6	80	918.2	113	924.8
15	905.2	48	911.8	81	918.4	114	925.0
16	905.4	49	912.0	82	918.6	115	925.2
17	905.6	50	912.2	83	918.8	116	925.4
18	905.8	51	912.4	84	919.0	117	925.6
19	906.0	52	912.6	85	919.2	118	925.8
20	906.2	53	912.8	86	919.4	119	926.0
21	906.4	54	913.0	87	919.6	120	926.2
22	906.6	55	913.2	88	919.8	121	926.4
23	906.8	56	913.4	89	920.0	122	926.6
24	907.0	57	913.6	90	920.2	123	926.8
25	907.2	58	913.8	91	920.4	124	927.0
26	907.4	59	914.0	92	920.6	125	927.2
27	907.6	60	914.2	93	920.8	126	927.4
28	907.8	61	914.4	94	921.0	127	927.6
29	908.0	62	914.6	95	921.2	128	927.8
30	908.2	63	914.8	96	921.4		
31	908.4	64	915.0	97	921.6		
32	908.6	65	915.2	98	921.8		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of X-axis and Z-axis. The worst case was found when positioned on **Z-plane**.

Radiated Emission Test (Above 1GHz):

☒ 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	Data Rate
-	0 to 128	0, 64, 128	MR-FSK	128Kbps

Radiated Emission Test (Below 1GHz):

☒ 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	Data Rate
-	0 to 128	0, 64, 128	MR-FSK	128Kbps

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	Data Rate
-	0 to 128	0	MR-FSK	128Kbps

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.

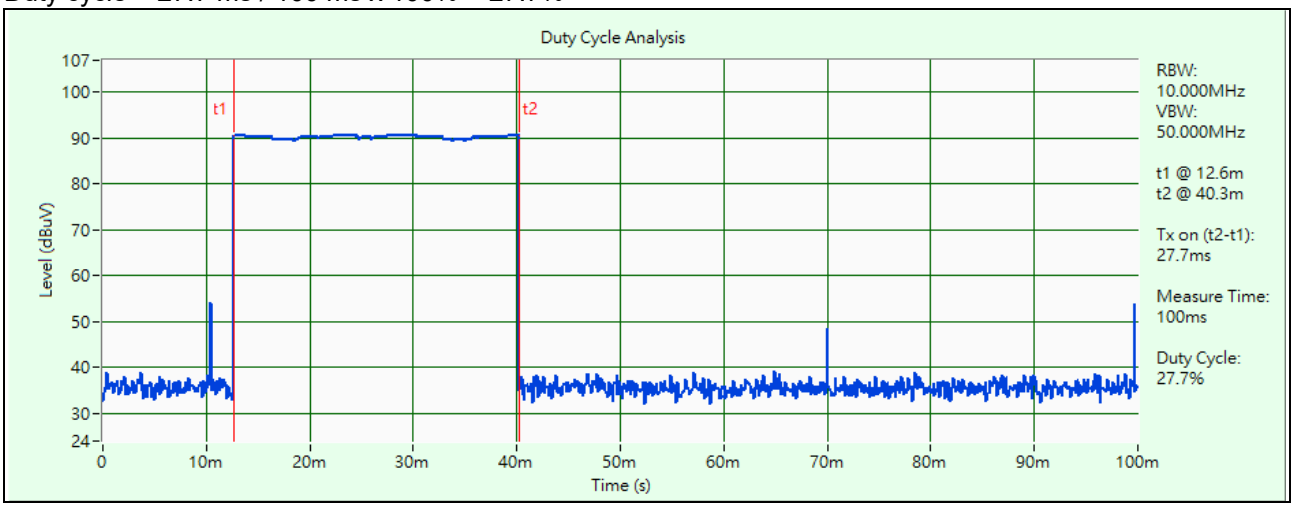
EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Data Rate
-	0 to 128	0, 64, 128	MR-FSK	128Kbps

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE≥1G	23 deg. C, 67% RH	120Vac, 60Hz	Edison Lee
RE<1G	23 deg. C, 67% RH	120Vac, 60Hz	Edison Lee
PLC	24 deg. C, 73% RH	120Vac, 60Hz	Gary Lin
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Gary Lin

3.1 Duty Cycle of Test Signal

Duty cycle = 27.7 ms / 100 ms x 100% = 27.7%



3.2 Description of Support Units

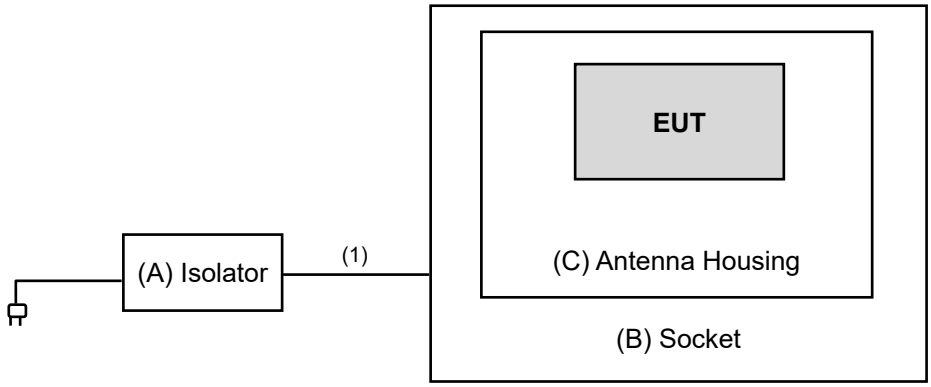
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Isolator	NA	NA	NA	NA	Supplied by applicant
B.	Socket	NA	NA	NA	NA	Supplied by applicant
C.	Antenna Housing	Aclara	kV2c	NA	NA	Supplied by applicant

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC Cable	1	1.5	No	0	Supplied by applicant

3.2.1 Configuration of System under Test



3.3 General Description of Applied Standards and references

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)
ANSI C63.10-2013

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

References Test Guidance:
KDB 558074 D01 15.247 Meas Guidance v05r02

All test items have been performed as a reference to the above KDB test guidance.

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 20dB 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 1000MHz, 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 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
Bi-log Broadband Antenna Schwarzbeck	VULB9168	9168-1213	2022/10/20	2023/10/19
Loop Antenna EMCI	EM-6879	269	2022/9/19	2023/9/18
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-amplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
Pre_Amplifier EMCI	EMC330N	980782	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
	EMCCFD400-NM-NM-500	201233	2023/1/16	2024/1/15
	EMCCFD400-NM-NM-3000	201235	2023/1/16	2024/1/15
	EMCCFD400-NM-NM-9000	201236 (with PAD)	2023/1/16	2024/1/15
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Test Receiver R&S	ESR3+	102782	2022/12/12	2023/12/11
Turn Table Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/ MY55190004/ MY55190007/ MY55210005	2022/7/13	2023/7/12

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 WM - 966 chamber 8.
3. Tested Date: 2023/2/6-2023/3/8

4.1.3 Test Procedures

For Radiated emission below 30MHz

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. 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 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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 detect 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:

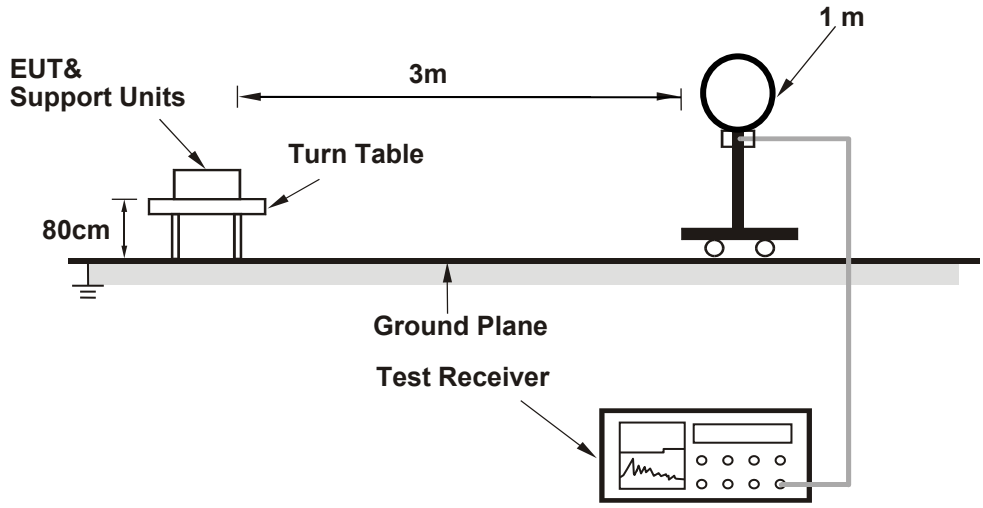
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) and Peak detection (PK) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. 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 1GHz. According to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. The duty cycle correction factor refer to Chapter 3.3 of this report.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

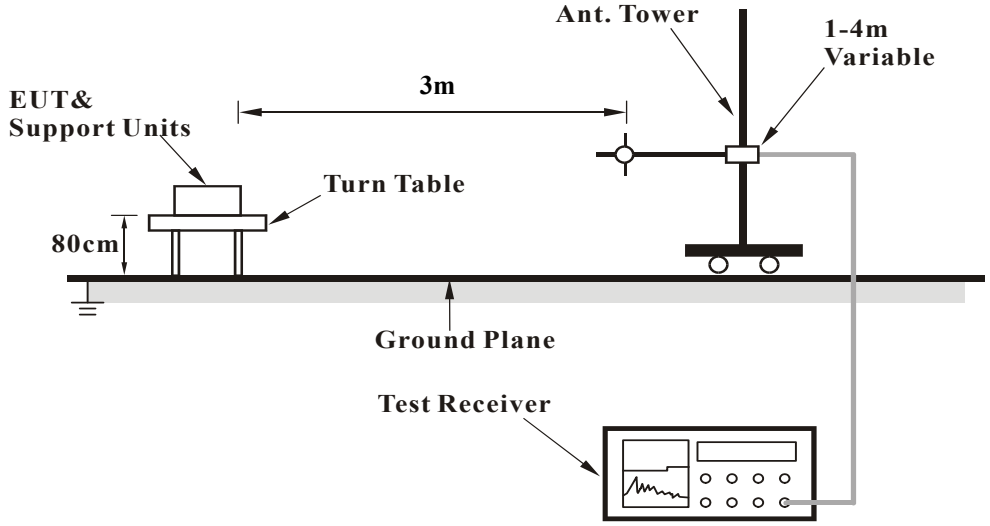
No deviation.

4.1.5 Test Setup

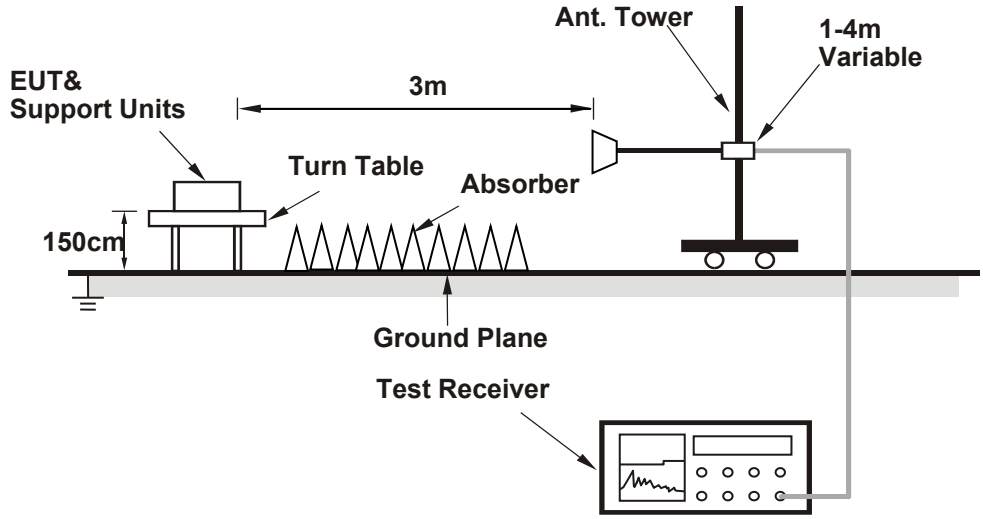
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

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

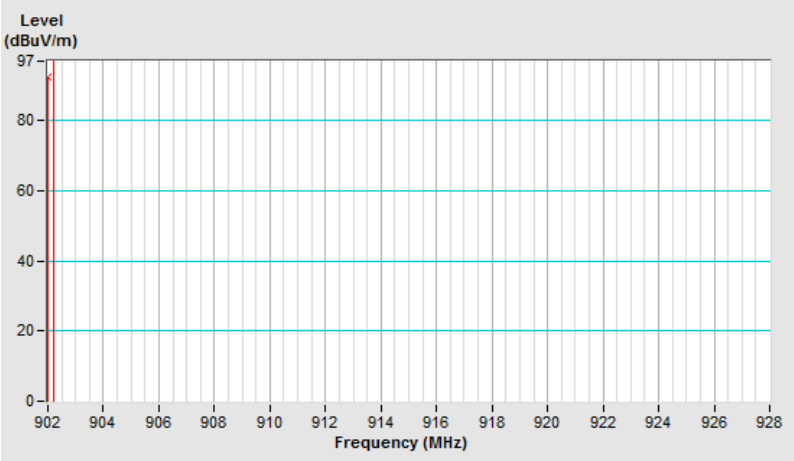
4.1.7 Test Results

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK)
FREQUENCY RANGE	902.2MHz ~ 927.8MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	902.00	88.8 QP	103.8	-15.0	1.08 H	69	59.0	29.8
2	*902.20	123.4 QP			1.08 H	69	93.6	29.8
3	*902.20	123.8 PK			1.08 H	69	94.0	29.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. " * ": Fundamental frequency.

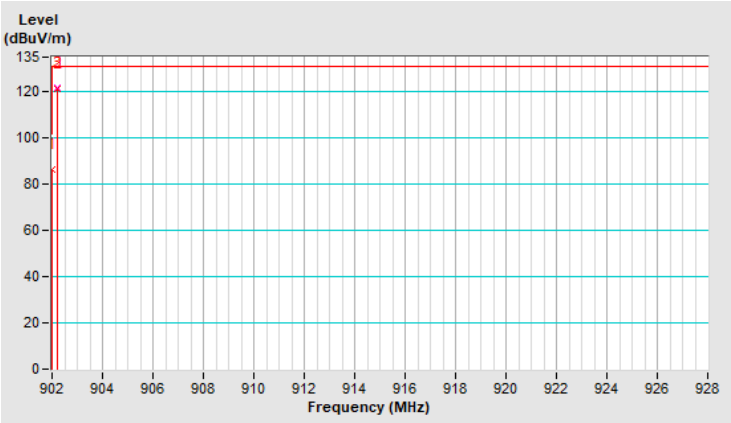


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK)
FREQUENCY RANGE	902.2MHz ~ 927.8MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	902.00	86.2 QP	101.9	-15.7	1.29 V	42	56.4	29.8
2	*902.20	121.3 QP			1.29 V	42	91.5	29.8
3	*902.20	121.9 PK			1.29 V	42	92.1	29.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. " * ": Fundamental frequency.

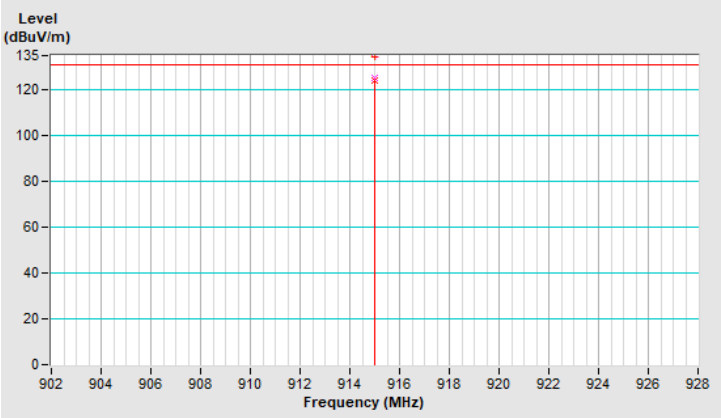


CHANNEL	TX Channel 64	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK)
FREQUENCY RANGE	902.2MHz ~ 927.8MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*915.00	124.2 QP			1.27 H	43	94.1	30.1
2	*915.00	125.1 PK			1.27 H	43	95.0	30.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. " * ": Fundamental frequency.

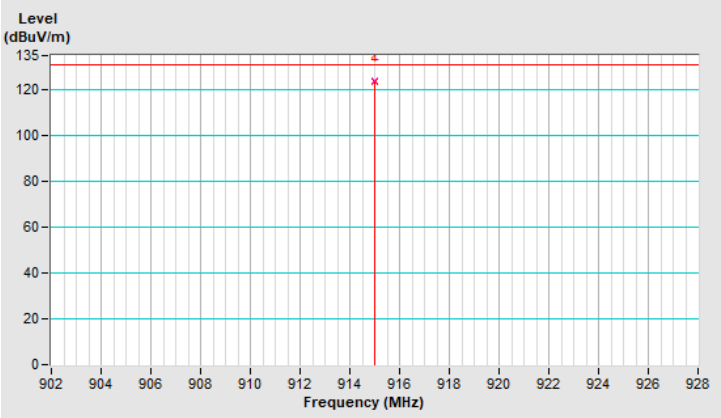


CHANNEL	TX Channel 64	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK)
FREQUENCY RANGE	902.2MHz ~ 927.8MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*915.00	123.8 QP			1.00 V	79	93.7	30.1
2	*915.00	124.2 PK			1.00 V	79	94.1	30.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. " * ": Fundamental frequency.

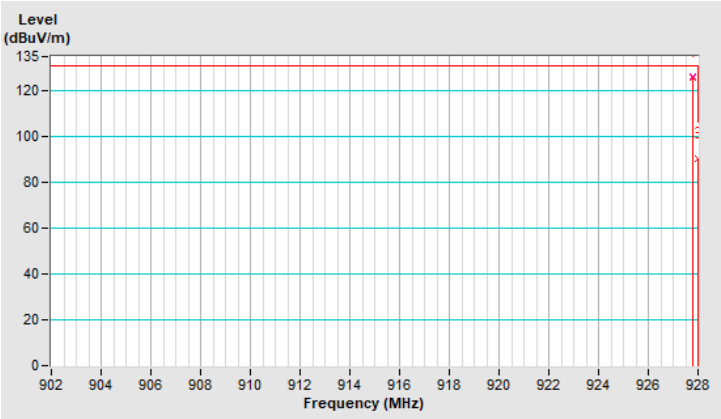


CHANNEL	TX Channel 128	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK)
FREQUENCY RANGE	902.2MHz ~ 927.8MHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*927.80	125.9 QP			1.28 H	40	95.6	30.3
2	*927.80	126.3 PK			1.28 H	40	96.0	30.3
3	928.00	90.5 QP	106.3	-15.8	1.28 H	40	60.2	30.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. " * ": Fundamental frequency.

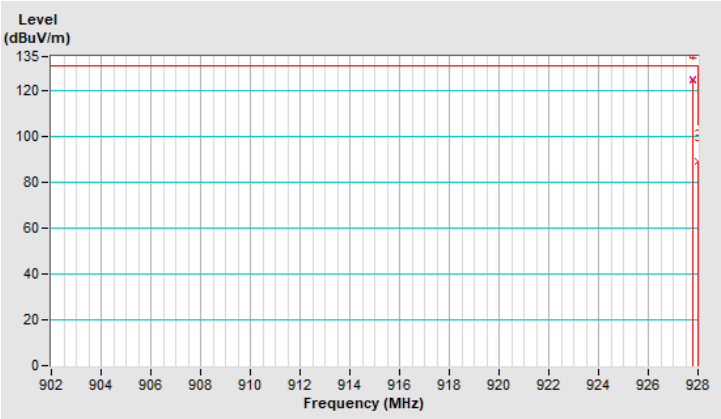


CHANNEL	TX Channel 128	DETECTOR FUNCTION	Quasi-Peak (QP) Peak (PK)
FREQUENCY RANGE	902.2MHz ~ 927.8MHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*927.80	124.9 QP			1.00 V	79	94.6	30.3
2	*927.80	125.3 PK			1.00 V	79	95.0	30.3
3	928.00	89.5 QP	105.3	-15.8	1.00 V	79	59.2	30.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. " * ": Fundamental frequency.



Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1804.40	70.1 PK	103.8	-33.7	2.26 H	83	75.8	-5.7
2	1804.40	58.9 AV	83.8	-24.9	2.26 H	83	64.6	-5.7
3	2706.60	55.2 PK	74.0	-18.8	2.83 H	74	57.8	-2.6
4	2706.60	44.0 AV	54.0	-10.0	2.83 H	74	46.6	-2.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1804.40	68.5 PK	101.9	-33.4	2.31 V	87	74.2	-5.7
2	1804.40	57.3 AV	81.9	-24.6	2.31 V	87	63.0	-5.7
3	2706.60	52.6 PK	74.0	-21.4	3.11 V	96	55.2	-2.6
4	2706.60	41.4 AV	54.0	-12.6	3.11 V	96	44.0	-2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The EUT was tested by a test tool (provided by manufacturer), please refer to section 3.3 for duty cycle spectrum plot.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula: 20 log(Duty cycle) = 20 log(27.7 ms / 100 ms) = -11.2 dB

CHANNEL	TX Channel 64	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1830.00	70.8 PK	105.1	-34.3	2.08 H	71	76.4	-5.6
2	1830.00	59.6 AV	85.1	-25.5	2.08 H	71	65.2	-5.6
3	2745.00	52.2 PK	74.0	-21.8	2.77 H	82	54.6	-2.4
4	2745.00	41.0 AV	54.0	-13.0	2.77 H	82	43.4	-2.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1830.00	69.1 PK	104.2	-35.1	2.24 V	91	74.7	-5.6
2	1830.00	57.9 AV	84.2	-26.3	2.24 V	91	63.5	-5.6
3	2745.00	51.0 PK	74.0	-23.0	3.03 V	107	53.4	-2.4
4	2745.00	39.8 AV	54.0	-14.2	3.03 V	107	42.2	-2.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The EUT was tested by a test tool (provided by manufacturer), please refer to section 3.3 for duty cycle spectrum plot.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula: 20 log(Duty cycle) = 20 log(27.7 ms / 100 ms) = -11.2 dB

CHANNEL	TX Channel 128	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1855.60	71.2 PK	106.3	-35.1	1.88 H	83	76.7	-5.5
2	1855.60	60.0 AV	86.3	-26.3	1.88 H	83	65.5	-5.5
3	2783.40	54.6 PK	74.0	-19.4	2.54 H	85	56.8	-2.2
4	2783.40	43.4 AV	54.0	-10.6	2.54 H	85	45.6	-2.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1855.60	69.7 PK	105.3	-35.6	2.18 V	88	75.2	-5.5
2	1855.60	58.5 AV	86.3	-27.8	2.18 V	88	64.0	-5.5
3	2783.40	52.3 PK	74.0	-21.7	3.02 V	101	54.5	-2.2
4	2783.40	41.1 AV	54.0	-12.9	3.02 V	101	43.3	-2.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The EUT was tested by a test tool (provided by manufacturer), please refer to section 3.3 for duty cycle spectrum plot.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula: 20 log(Duty cycle) = 20 log(27.7 ms / 100 ms) = -11.2 dB

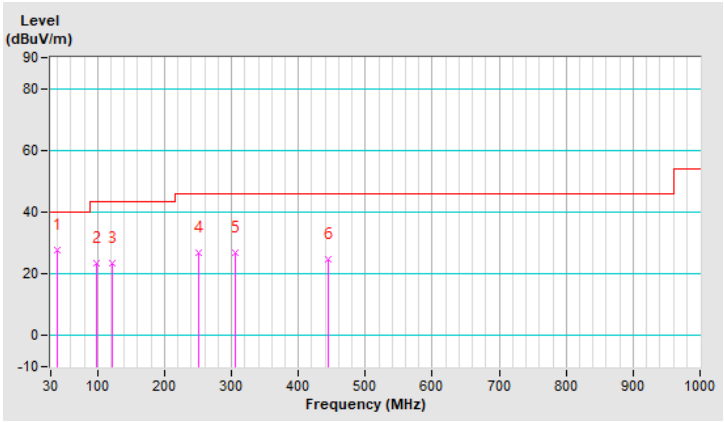
Below 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.70	27.7 QP	40.0	-12.3	1.50 H	3	41.5	-13.8
2	98.87	23.5 QP	43.5	-20.0	1.00 H	249	41.4	-17.9
3	121.18	23.5 QP	43.5	-20.0	1.00 H	93	38.7	-15.2
4	251.16	26.9 QP	46.0	-19.1	2.00 H	292	41.5	-14.6
5	306.45	26.9 QP	46.0	-19.1	1.00 H	85	39.4	-12.5
6	445.16	24.9 QP	46.0	-21.1	1.50 H	193	33.8	-8.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

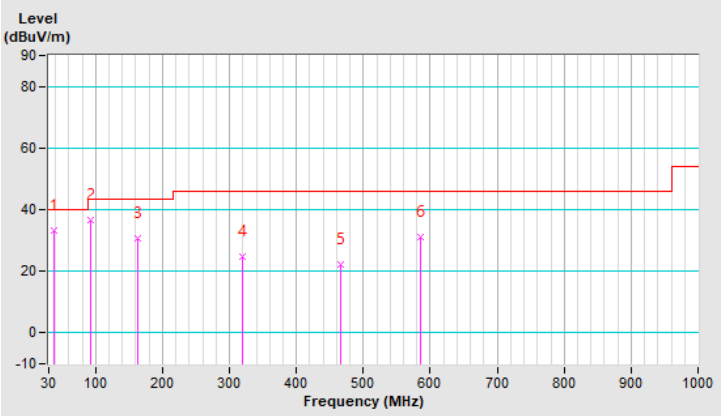


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	**38.73**	**33.3 QP**	**40.0**	**-6.7**	**1.00 V**	**230**	**47.0**	**-13.7**
2	93.05	36.4 QP	43.5	-7.1	1.00 V	244	55.1	-18.7
3	162.89	30.8 QP	43.5	-12.7	1.00 V	283	44.0	-13.2
4	320.03	24.6 QP	46.0	-21.4	1.00 V	87	36.6	-12.0
5	466.50	22.2 QP	46.0	-23.8	1.00 V	8	30.6	-8.4
6	585.81	30.9 QP	46.0	-15.1	1.00 V	8	36.9	-6.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

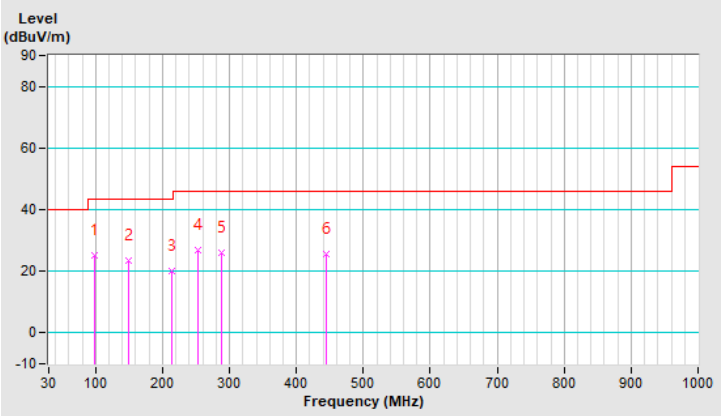


CHANNEL	TX Channel 64	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	97.90	25.1 QP	43.5	-18.4	2.00 H	269	43.2	-18.1
2	148.34	23.5 QP	43.5	-20.0	1.00 H	144	36.7	-13.2
3	214.30	20.2 QP	43.5	-23.3	1.00 H	255	37.0	-16.8
4	252.13	27.0 QP	46.0	-19.0	2.00 H	278	41.6	-14.6
5	288.02	26.2 QP	46.0	-19.8	1.50 H	202	39.2	-13.0
6	445.16	25.4 QP	46.0	-20.6	2.00 H	185	34.3	-8.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

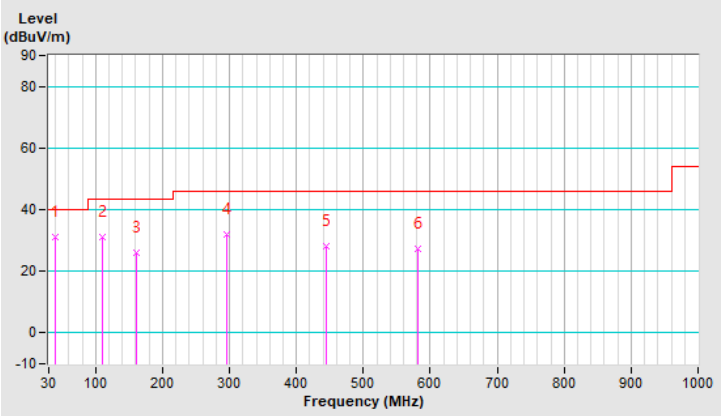


CHANNEL	TX Channel 64	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.70	31.0 QP	40.0	-9.0	1.50 V	267	44.8	-13.8
2	109.54	31.0 QP	43.5	-12.5	1.00 V	270	47.3	-16.3
3	161.92	26.1 QP	43.5	-17.4	1.00 V	252	39.2	-13.1
4	296.75	31.9 QP	46.0	-14.1	2.00 V	226	44.6	-12.7
5	445.16	28.1 QP	46.0	-17.9	1.00 V	253	37.0	-8.9
6	580.96	27.3 QP	46.0	-18.7	1.50 V	18	33.5	-6.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

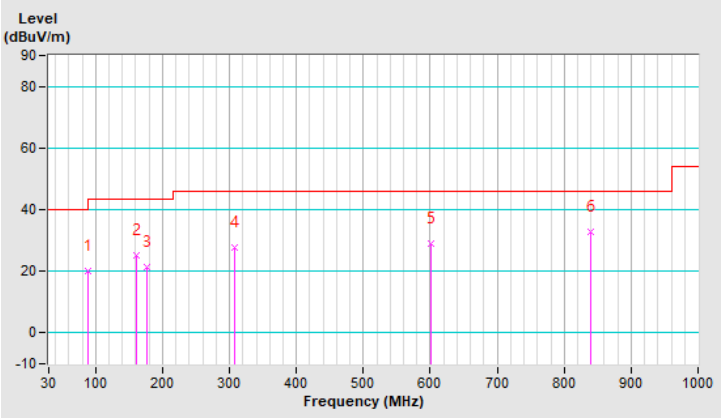


CHANNEL	TX Channel 128	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	88.20	19.9 QP	43.5	-23.6	1.00 H	237	39.0	-19.1
2	161.92	25.1 QP	43.5	-18.4	1.00 H	249	38.2	-13.1
3	177.44	21.2 QP	43.5	-22.3	1.00 H	75	35.6	-14.4
4	307.42	27.6 QP	46.0	-18.4	1.00 H	75	40.0	-12.4
5	600.36	28.8 QP	46.0	-17.2	1.00 H	3	34.4	-5.6
6	839.95	33.0 QP	46.0	-13.0	1.00 H	317	34.9	-1.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

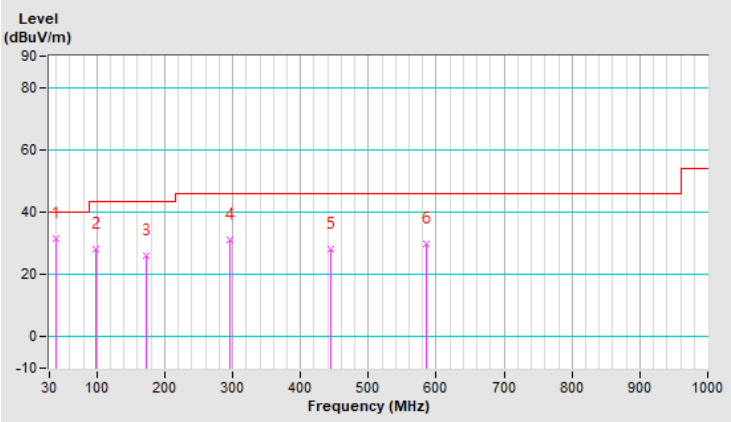


CHANNEL	TX Channel 128	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.67	31.6 QP	40.0	-8.4	1.50 V	48	45.2	-13.6
2	98.87	28.0 QP	43.5	-15.5	1.00 V	252	45.9	-17.9
3	173.56	25.9 QP	43.5	-17.6	1.00 V	300	39.7	-13.8
4	296.75	31.1 QP	46.0	-14.9	2.00 V	20	43.8	-12.7
5	445.16	28.3 QP	46.0	-17.7	1.00 V	253	37.2	-8.9
6	585.81	29.7 QP	46.0	-16.3	2.00 V	2	35.7	-6.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
LISN R&S	ESH3-Z5	100311	2022/9/12	2023/9/11
LISN ROHDE & SCHWARZ	ENV216	101826	2022/3/14	2023/3/13
RF Coaxial Cable WOKEN	5D-FB	Cable-cond1-01	2023/1/7	2024/1/6
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
Test Receiver Rohde&Schwarz	ESCI	100613	2022/12/5	2023/12/4
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2022/8/31	2023/8/30

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 HY - Conduction 1.
3. The VCCI Site Registration No. is C-12040.
4. Tested date: 2023/2/7

4.2.3 Test Procedures

a. 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/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

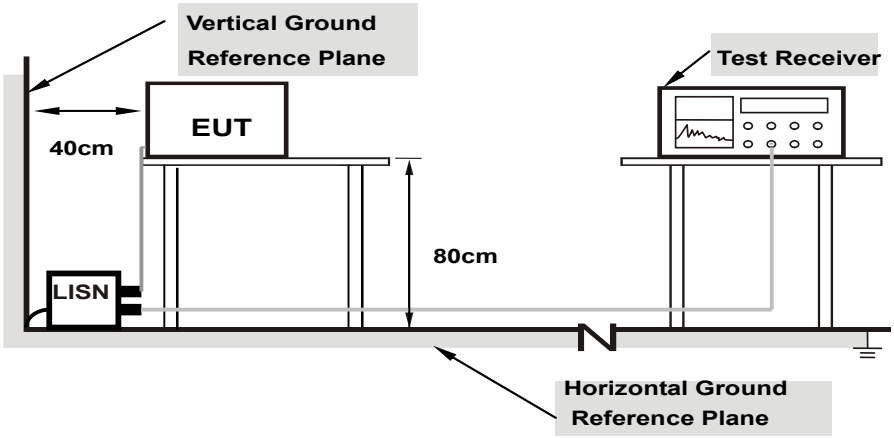
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

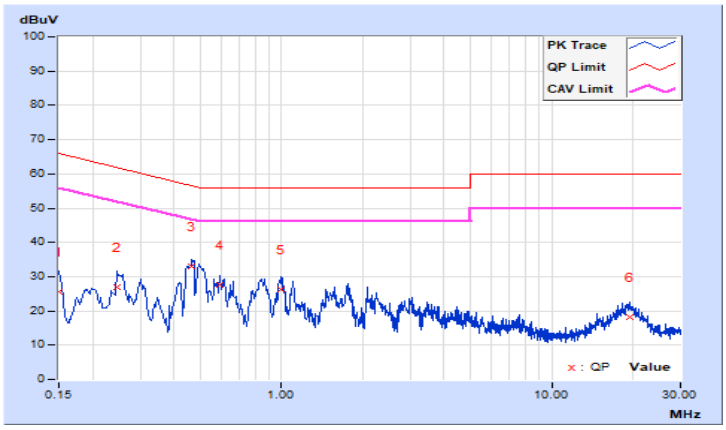
Worst-case data:

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.64	15.99	10.96	25.63	20.60	66.00	56.00	-40.37	-35.40
2	0.24600	9.67	17.31	11.70	26.98	21.37	61.89	51.89	-34.91	-30.52
3	**0.46568**	**9.69**	**23.36**	**16.85**	**33.05**	**26.54**	**56.59**	**46.59**	**-23.54**	**-20.05**
4	0.59341	9.70	17.78	10.97	27.48	20.67	56.00	46.00	-28.52	-25.33
5	1.00200	9.71	16.58	10.73	26.29	20.44	56.00	46.00	-29.71	-25.56
6	19.37000	9.88	8.42	3.37	18.30	13.25	60.00	50.00	-41.70	-36.75

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.

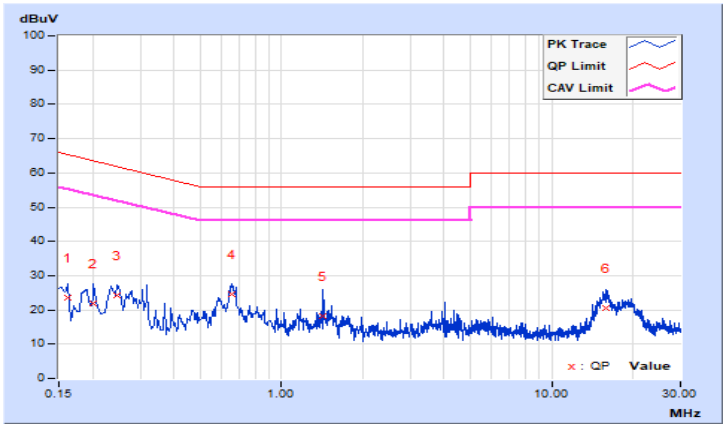


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	9.64	13.87	6.07	23.51	15.71	65.37	55.37	-41.86	-39.66
2	0.20200	9.66	12.17	6.88	21.83	16.54	63.53	53.53	-41.70	-36.99
3	0.24600	9.67	14.59	7.06	24.26	16.73	61.89	51.89	-37.63	-35.16
4	0.65763	9.70	14.93	9.78	24.63	19.48	56.00	46.00	-31.37	-26.52
5	1.43000	9.72	8.31	3.29	18.03	13.01	56.00	46.00	-37.97	-32.99
6	15.81400	9.88	10.61	5.71	20.49	15.59	60.00	50.00	-39.51	-34.41

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.

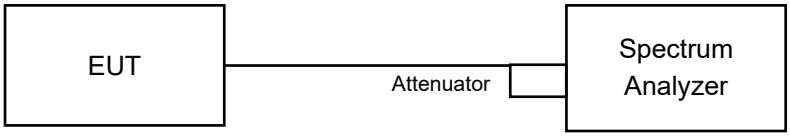


4.3 Number of Hopping Frequency Used

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

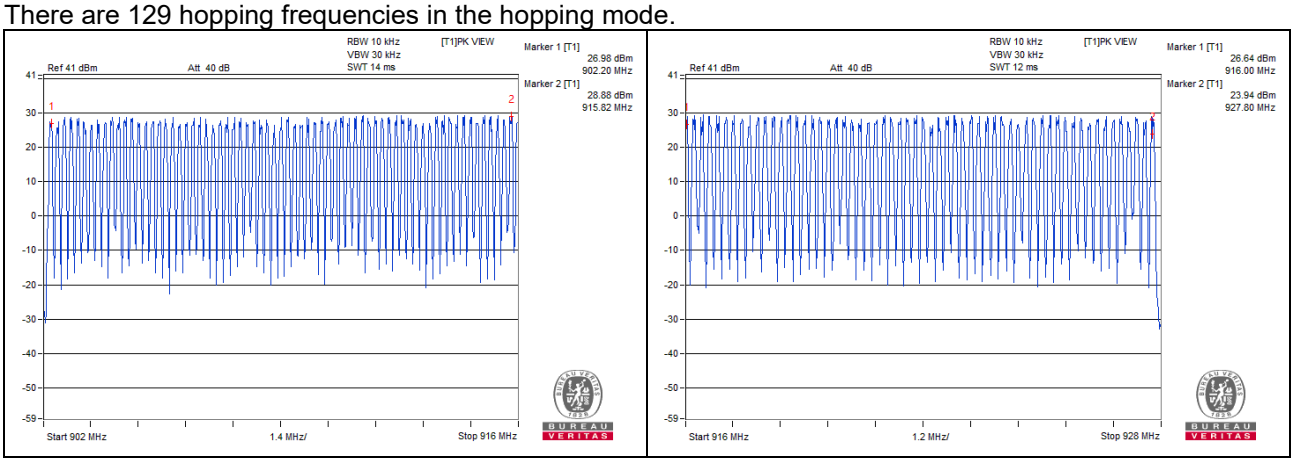
a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
c. 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.
d. Set the SA on View mode and then plot the result on SA screen.
e. 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 129 hopping frequencies in the hopping mode.

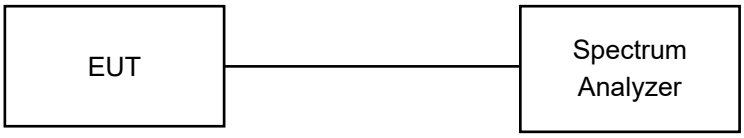


4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period, 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

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. 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.
c. 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.
d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

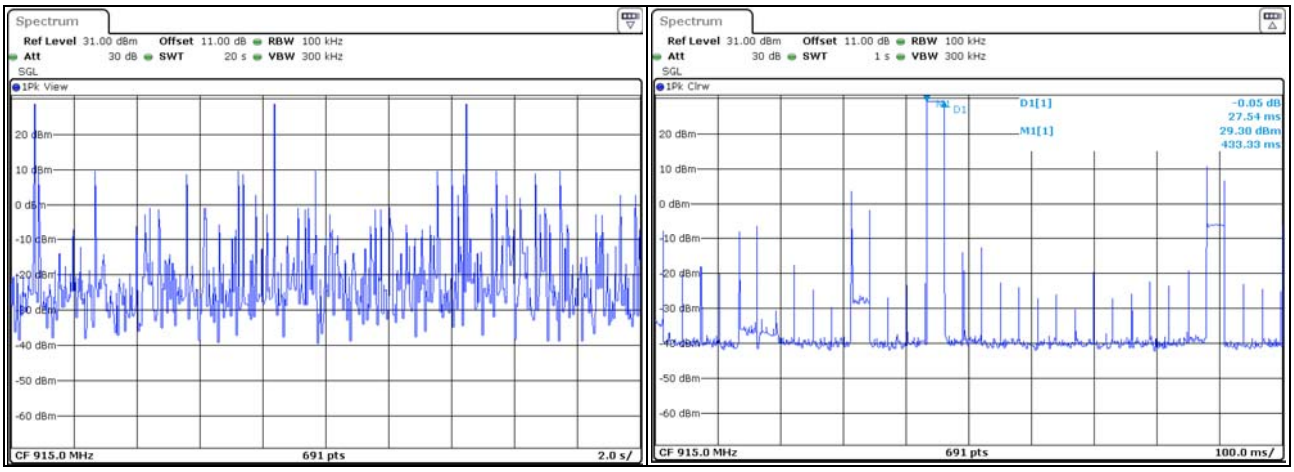
4.4.5 Deviation from Test Standard

No deviation.

4.4.6 Test Results

Number of transmission in 20 sec	Length of transmission time (msec)	Result (msec)	Limit (msec)
3 times	27.54	82.62	400

Note: Test plots of the transmitting time slot are shown on following.



4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b. 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.
c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
d. Repeat above procedures until all frequencies measured were complete.

4.5.5 Deviation from Test Standard

No deviation.

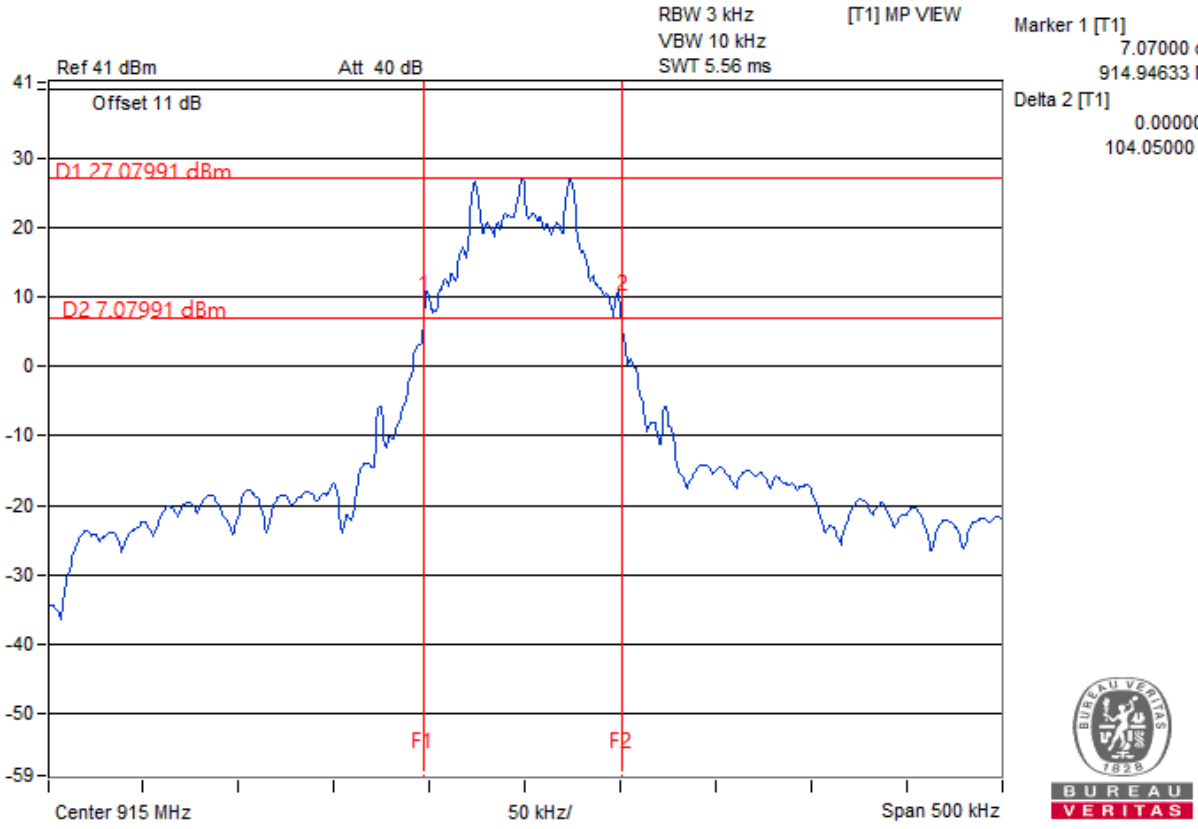
4.5.6 EUT Operating Condition

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)	20dB Bandwidth (kHz)
0	902.2	104.02
64	915.0	104.05
128	927.8	103.85

Spectrum Plot of Worst Value



4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

At least 25kHz or 20dB 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

Measurement Procedure REF

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

4.6.5 Deviation from Test Standard

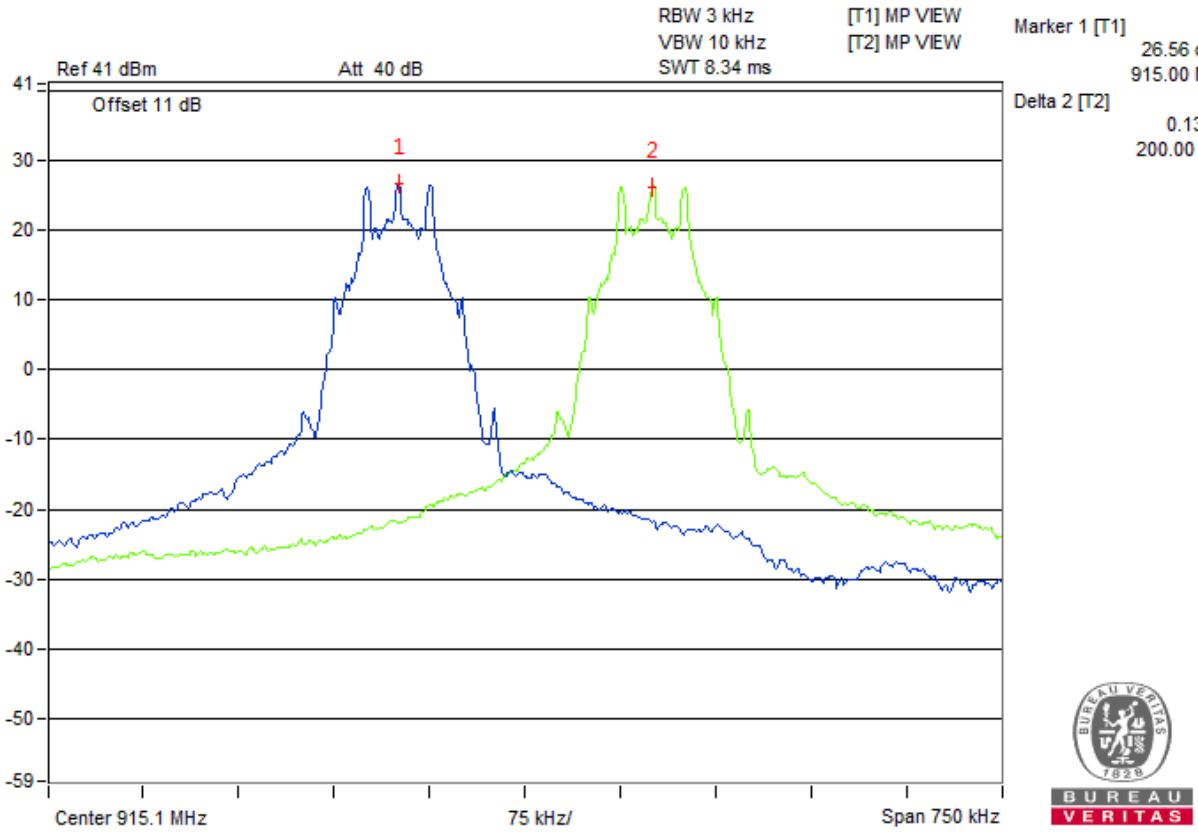
No deviation.

4.6.6 Test Results

Channel	Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (kHz)	Pass / Fail
0	902.2	200	104.02	Pass
64	915.0	200	104.05	Pass
128	927.8	200	103.85	Pass

Note: The minimum limit is 20dB bandwidth.

Spectrum Plot of Worst Value

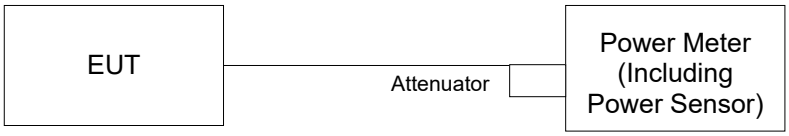


4.7 Conducted Output Power Measurement

4.7.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 902-928 MHz bands: 1 Watt (30dBm)

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

For Peak Power
A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

For Average Power
Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

The software provided by client to set hopping enabled and Hopping disabled_ Low and High Channel frequencies individually.

4.7.7 Test Results

For Peak Power

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Pass / Fail
0	902.2	548.277	27.39	30.00	Pass
64	915.0	590.201	27.71	30.00	Pass
128	927.8	**592.925**	27.73	30.00	Pass

For Average Power

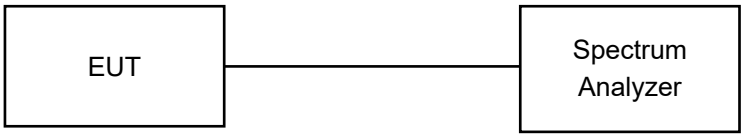
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	902.2	543.250	27.35
64	915.0	583.445	27.66
128	927.8	587.489	27.69

4.8 Conducted Out of Band Emission Measurement

4.8.1 Limits of Conducted Out Of Band Emission Measurement

Below 20dB of the highest emission level of operating band.

4.8.2 Test Setup



4.8.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.8.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

4.8.5 Deviation from Test Standard

No deviation.

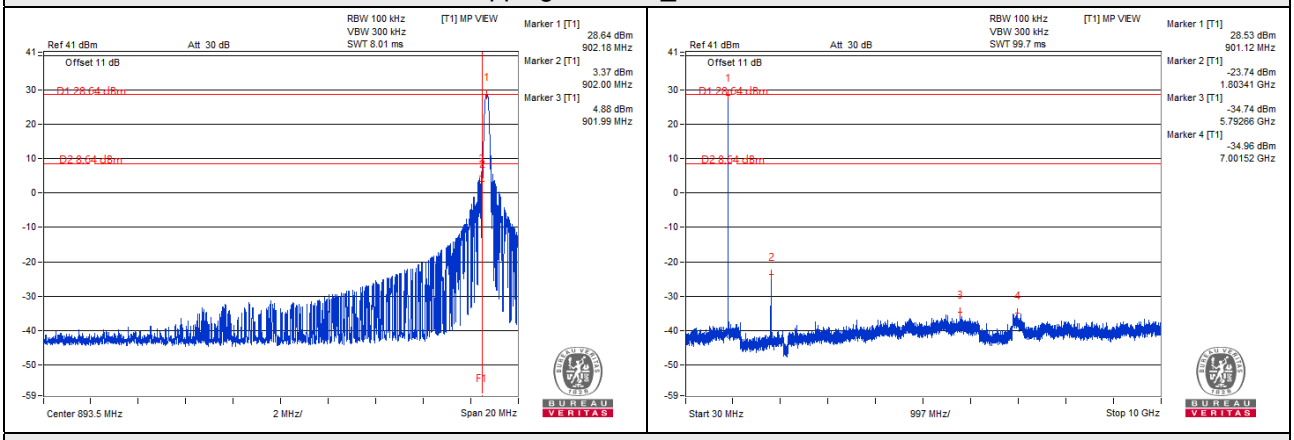
4.8.6 EUT Operating Condition

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

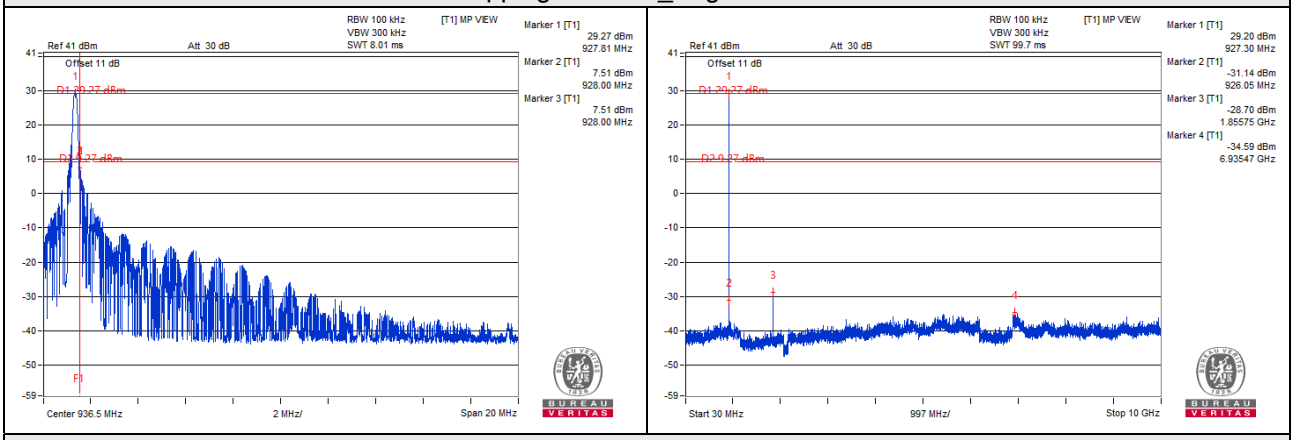
4.8.7 Test Results

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

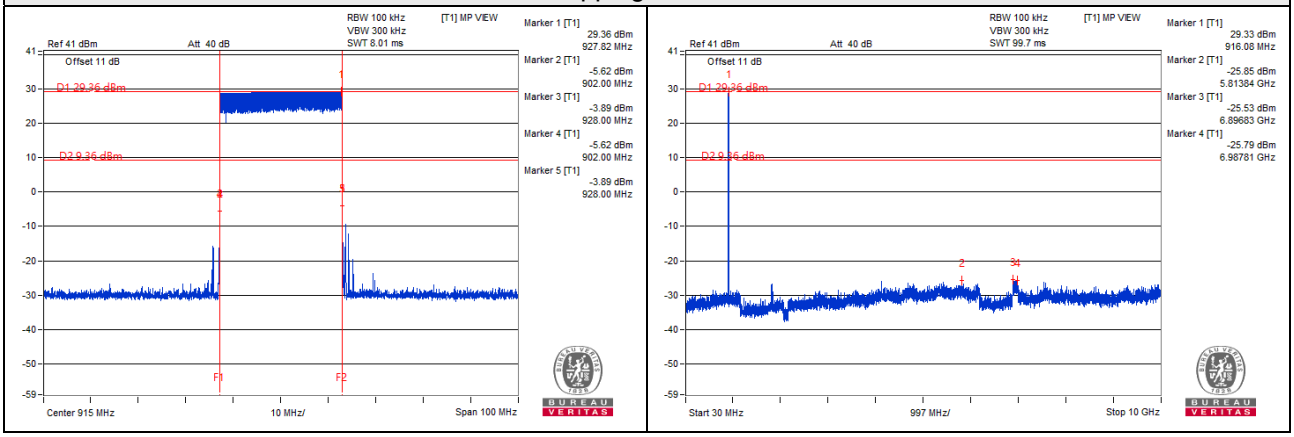
Hopping disabled_ Low Channel



Hopping disabled_ High Channel



Hopping enabled



Note: Emissions in nonrestricted frequency bands by radiated measurement comply with test requirement.

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 and approved 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: http://ee.bureauveritas.com.tw

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

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