

FCC Test Report

Report No.: RF191127E11

FCC ID: RPV-ATW310

Test Model: ATW310-32

Series Model: ATW310-31

Received Date: Nov. 27, 2019

Test Date: Dec. 07, 2019 to Apr. 10, 2020

Issued Date: June 09, 2020

Applicant: Atop Technologies, Inc.

Address: 1F, No. 30 R&D RD. II, Science-Based Industrial Park, Hsinchu, 30076
Taiwan.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No. 1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

Test Location: E-2, No. 1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

**FCC Registration /
Designation Number:** 723255 / TW2022



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	9
3.2.1 Test Mode Applicability and Tested Channel Detail	10
3.3 Duty Cycle of Test Signal	12
3.4 Description of Support Units	13
3.4.1 Configuration of System under Test	14
3.5 General Description of Applied Standards and References	16
4 Test Types and Results	17
4.1 Radiated Emission and Bandedge Measurement	17
4.1.1 Limits of Radiated Emission and Bandedge Measurement	17
4.1.2 Test Instruments	18
4.1.3 Test Procedures	20
4.1.4 Deviation from Test Standard	20
4.1.5 Test Setup	21
4.1.6 EUT Operating Conditions	22
4.1.7 Test Results	23
4.2 Conducted Emission Measurement	38
4.2.1 Limits of Conducted Emission Measurement	38
4.2.2 Test Instruments	38
4.2.3 Test Procedures	39
4.2.4 Deviation from Test Standard	39
4.2.5 Test Setup	39
4.2.6 EUT Operating Conditions	39
4.2.7 Test Results	40
4.3 6dB Bandwidth Measurement	42
4.3.1 Limits of 6dB Bandwidth Measurement	42
4.3.2 Test Setup	42
4.3.3 Test Instruments	42
4.3.4 Test Procedure	42
4.3.5 Deviation from Test Standard	42
4.3.6 EUT Operating Conditions	42
4.3.7 Test Results	43
4.4 Conducted Output Power Measurement	44
4.4.1 Limits of Conducted Output Power Measurement	44
4.4.2 Test Setup	44
4.4.3 Test Instruments	44
4.4.4 Test Procedures	44
4.4.5 Deviation from Test Standard	44
4.4.6 EUT Operating Conditions	44
4.4.7 Test Results	45
4.5 Power Spectral Density Measurement	46
4.5.1 Limits of Power Spectral Density Measurement	46
4.5.2 Test Setup	46
4.5.3 Test Instruments	46
4.5.4 Test Procedure	46
4.5.5 Deviation from Test Standard	46
4.5.6 EUT Operating Condition	46

4.5.7 Test Results	47
4.6 Conducted Out of Band Emission Measurement.....	48
4.6.1 Limits of Conducted Out of Band Emission Measurement	48
4.6.2 Test Setup.....	48
4.6.3 Test Instruments	48
4.6.4 Test Procedure	48
4.6.5 Deviation from Test Standard	48
4.6.6 EUT Operating Condition	48
4.6.7 Test Results	48
5 Pictures of Test Arrangements.....	50
Appendix – Information of the Testing Laboratories	51

Release Control Record

Issue No.	Description	Date Issued
RF191127E11	Original release.	June 09, 2020

1 Certificate of Conformity

Product: Wireless coordinator

Brand: Atop

Test Model: ATW310-32

Series Model: ATW310-31

Sample Status: ENGINEERING SAMPLE

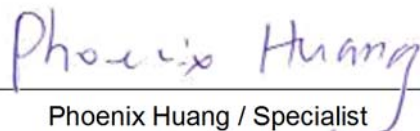
Applicant: Atop Technologies, Inc.

Test Date: Dec. 07, 2019 to Apr. 10, 2020

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 EMC characteristics under the conditions specified in this report.

Prepared by :


Phoenix Huang / Specialist

Date:

June 09, 2020

Approved by :



Clark Lin / Technical Manager

Date:

June 09, 2020

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 -12.33dB at 19.70903MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.4dB at 49.64MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is SMA. (The device is professionally installed)

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	1.8 dB
Conducted emissions	-	3.1 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.0 dB
	30MHz ~ 1GHz	4.8 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.0 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless coordinator
Brand	Atop
Test Model	ATW310-32
Series Model	ATW310-31
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12 Vdc from DC jack adapter, 12Vdc from DC terminal block, 45~57 Vdc for PoE
Modulation Type	2-GFSK
Modulation Technology	DTS
Transfer Rate	500 kbps
Operating Frequency	902 ~ 928 MHz
Number of Channel	20
Output Power	23.878 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	DC Jack Adapter x 1
Data Cable Supplied	Antenna Stander Cable x 1 (Model: BS3703SM) (unshielded, 1.5 m) (option)

Note:

1. The EUT has two model names which are identical to each other in all aspects except for the followings:

Brand Name	Model Name	Description
Atop	ATW310-32	With PoE PD
	ATW310-31	Without PoE PD

Note: From the above models, model: **ATW310-32** was selected as representative model for the test and its data was recorded in this report.

2. The EUT must be supplied with a DC Jack adapter and following table:

Brand	Model No.	Spec.
UNIFIUE	SV324-1215	Input: 100-240Vac, 0.6A, 50/60Hz Output: 12Vdc, 1.5A DC output cable (Unshielded, 1.5 m)

3. The antenna provided to the EUT, please refer to the following table:

With Antenna Stander							
Brand Name	Model No.	Ant. Net Gain (including cable loss) (dBi)	Freq. Range (MHz ~ MHz)	Ant. Type	Connector Type	Cable Length	Cable Loss (dB)
Invax	AN50(AN0908-5003BSM)	-0.83	902~928	Dipole	SMA	1.5 m (BS3703SM) + 6 cm	2.982
Without Antenna Stander							
Brand Name	Model No.	Ant. Net Gain (including cable loss) (dBi)	Freq. Range (MHz ~ MHz)	Ant. Type	Connector Type	Cable Length	Cable Loss (dB)
Invax	AN50(AN0908-5003BSM)	2.01	902~928	Dipole	SMA	6 cm	0.132

Note: Max. gain was selected for the final test.

4. The EUT was pre-tested under the following modes:

Pre-test Mode	Description
Mode A	Power from DC jack adapter
Mode B	Power from DC terminal block
Mode C	Power from PoE

For AC Power Conducted Emission test, from the above modes, the worst case was found in **Mode C**. Therefore only the test data of the mode was recorded in this report.

For Radiated Emission test, from the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

20 channels are provided for 2-GFSK mode:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.65	5	909.15	10	915.65	15	922.15
1	903.95	6	910.45	11	916.95	16	923.45
2	905.25	7	911.75	12	918.25	17	924.75
3	906.55	8	913.05	13	919.55	18	926.05
4	907.85	9	914.35	14	920.85	19	927.35

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 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 each 3 axis. The worst case was found when positioned on **X-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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 19	0, 10, 19	GFSK

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 19	19	GFSK

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 19	19	GFSK

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.

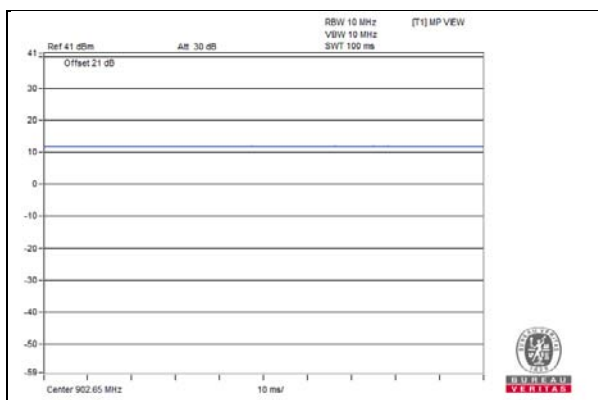
AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
0 to 19	0, 10, 19	GFSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	23deg. C, 57%RH	120Vac, 60Hz	Jeff Lee
RE $<$ 1G	22deg. C, 58%RH	120Vac, 60Hz	Jeff Lee
PLC	23deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.



3.4 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.	iPod	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
B.	Laptop	DELL	E6400	D814C A00 APCC	NA	Provided by Lab
C.	PoE Switch	ATOP	EHG7508-8POE	NA	NA	Supplied by client
D.	DC Power Supply	TOPWARD	6603D	809615	NA	Provided by Lab

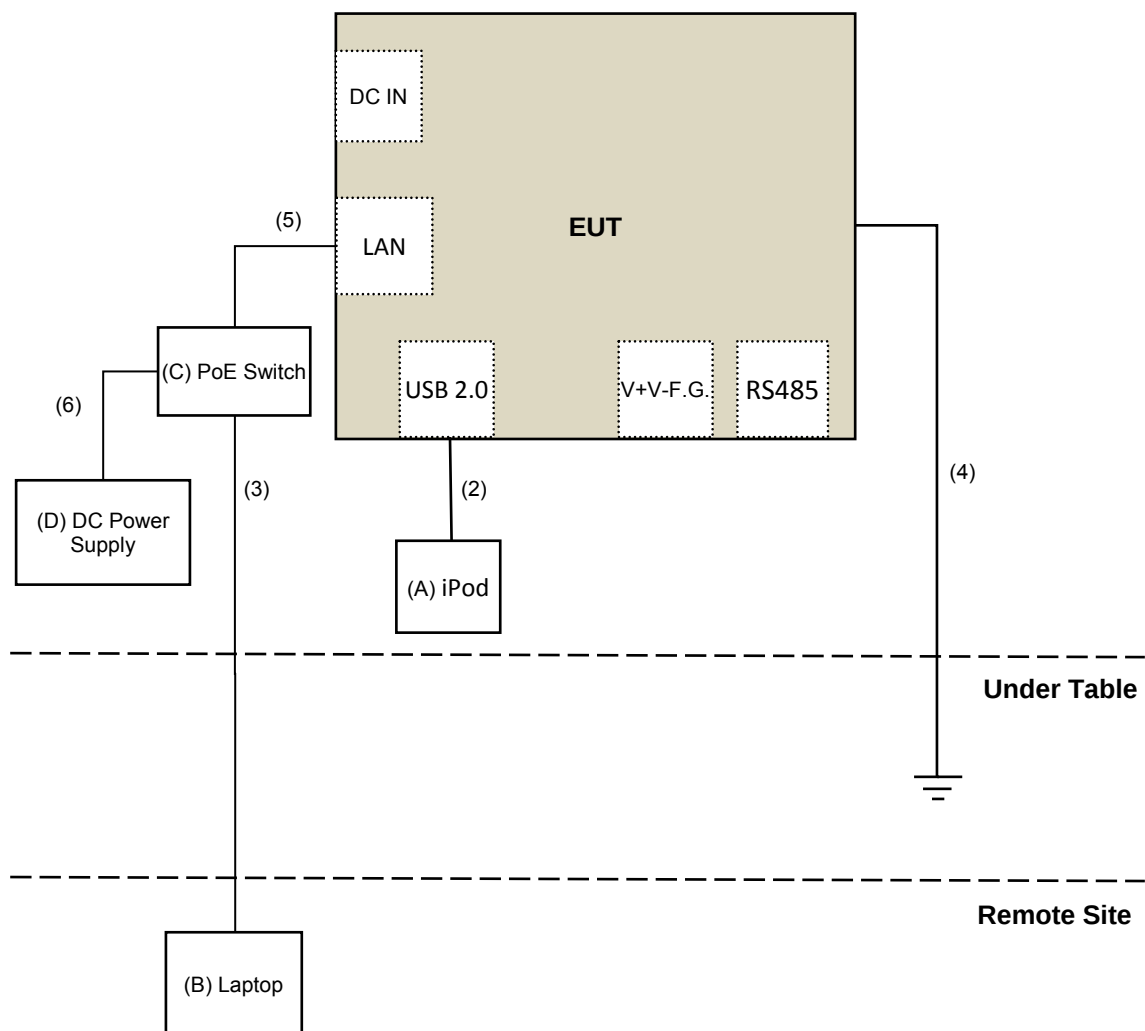
Note:

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

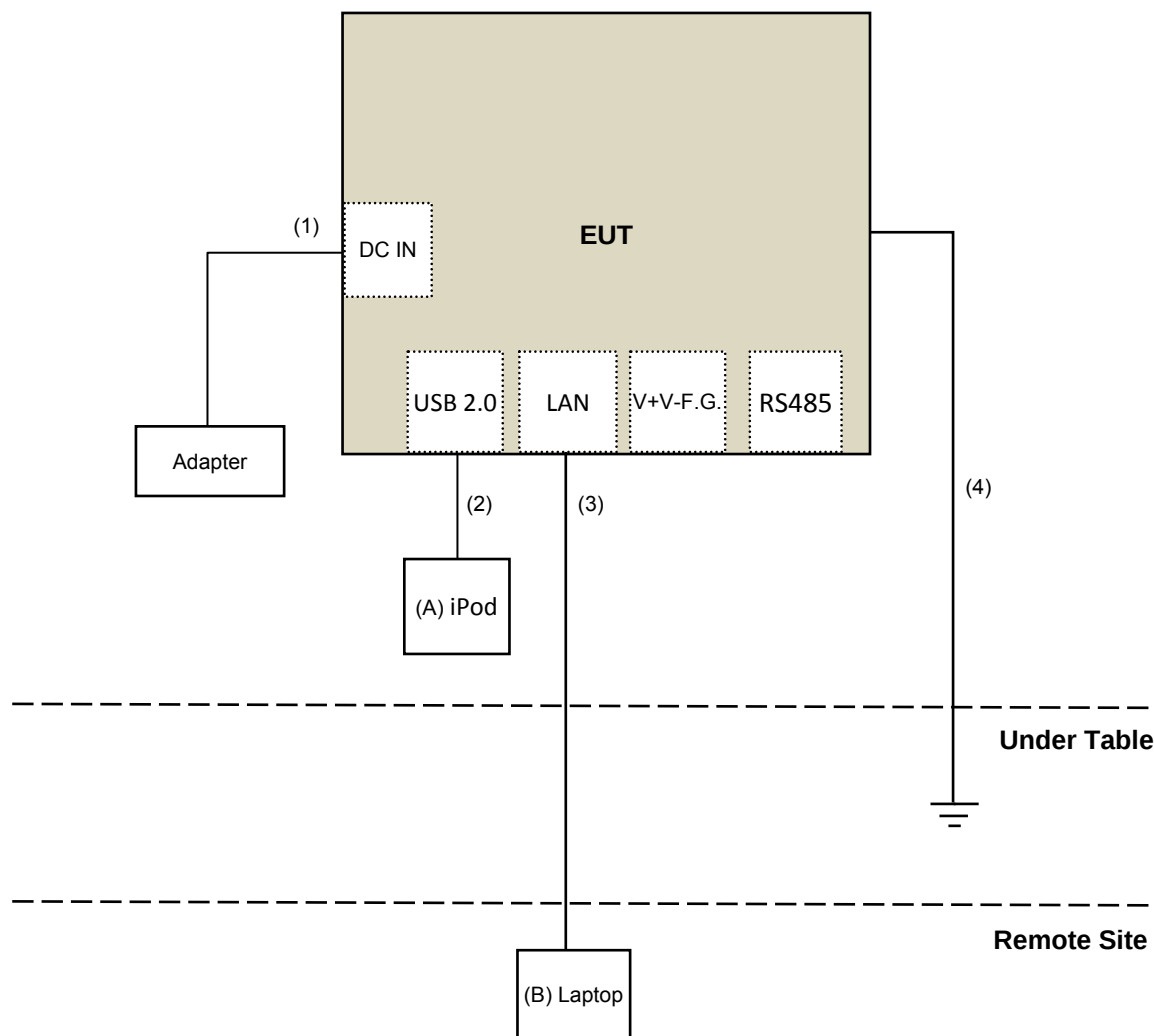
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.5	No	0	Supplied by client
2.	USB Cable	1	0.1	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	Grounding cable	1	3	No	0	Provided by Lab
5.	RJ-45 Cable	1	3	No	0	Provided by Lab
6.	DC Cable	1	1.8	No	0	Provided by Lab

3.4.1 Configuration of System under Test

For AC Power Conducted Emission test



For Radiated Emission test



3.5 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 and references:

Test Standard:

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

For Radioate Emission Test: (below 1GHz)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	May 25, 2019	May 24, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 30, 2019	May 29, 2020
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier EMCI	EMC330N	980538	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 08, 2019	Nov. 07, 2020
RF Cable	8D	966-5-1	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-2	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-3	May 03, 2019	May 02, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 14, 2020	Jan. 13, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 966 Chamber No. 5.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Apr. 10, 2020

For Radioate Emission Test: (above 1GHz)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	May 25, 2019	May 24, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980509	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-1500	180503	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-2000	180501	May 03, 2019	May 02, 2020
RF Cable EMCI	EMC104-SM-SM-6000	180505	May 03, 2019	May 02, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 966 Chamber No. 5.
3. Tested Date: Dec. 11, 2019

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

NOTE:

1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Dec. 12, 2019

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 detects 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:

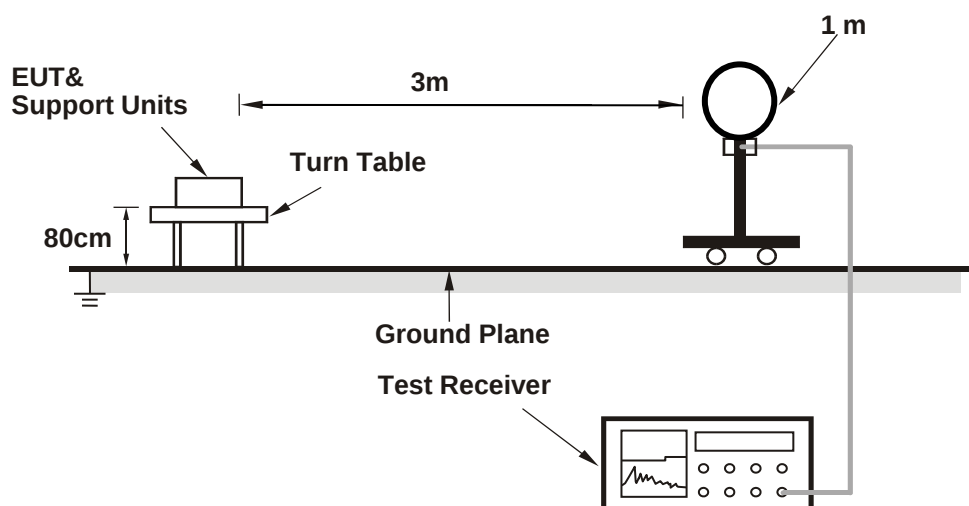
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

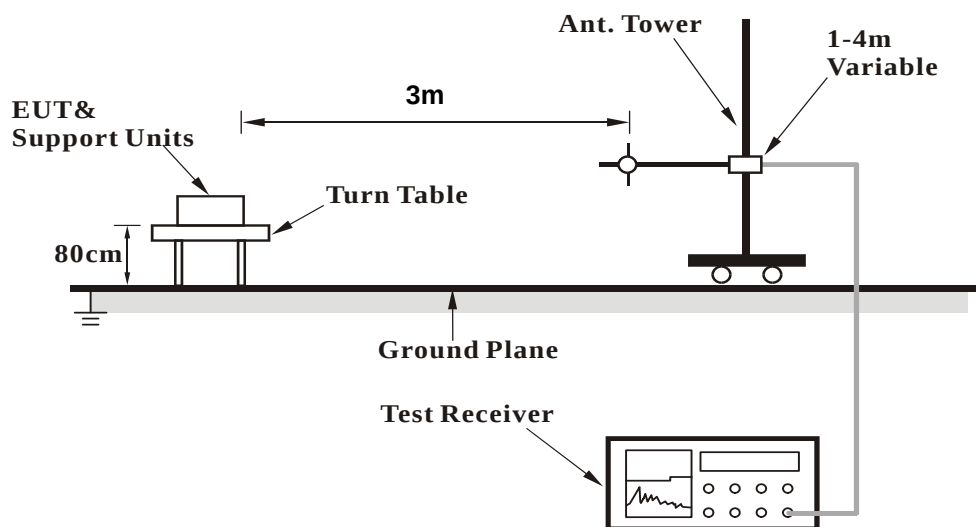
No deviation.

4.1.5 Test Setup

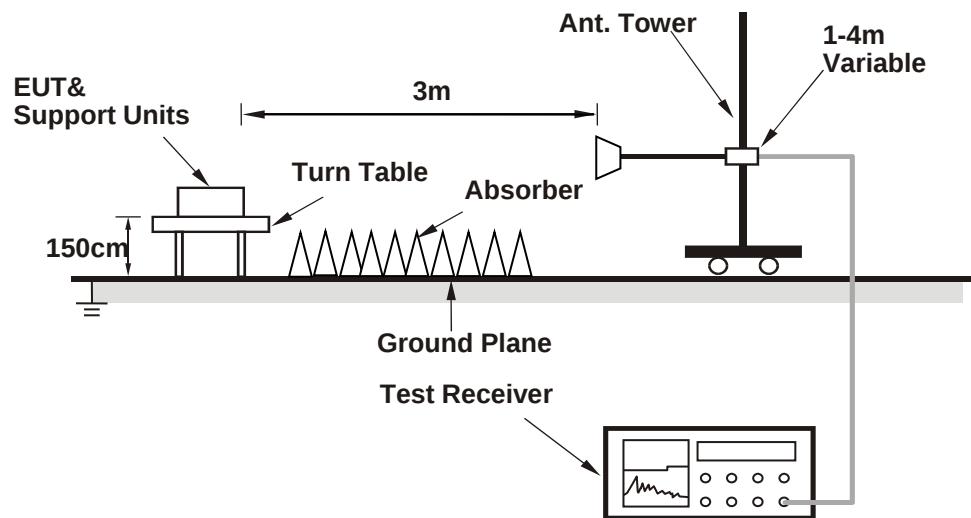
For Radiated emission below 30MHz



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

- Placed the EUT on the testing table.
- Controlling software (tcptest_v125) has been activated to set the EUT under transmission condition continuously.

4.1.7 Test Results

Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	4513.25	43.5 PK	74.0	-30.5	2.51 H	224	42.8	0.7
2	4513.25	32.8 AV	54.0	-21.2	2.51 H	224	32.1	0.7
3	8123.85	44.2 PK	74.0	-29.8	1.30 H	39	36.1	8.1
4	8123.85	32.9 AV	54.0	-21.1	1.30 H	39	24.8	8.1
5	9026.50	46.3 PK	74.0	-27.7	3.18 H	262	37.0	9.3
6	9026.50	33.2 AV	54.0	-20.8	3.18 H	262	23.9	9.3
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	4513.25	44.3 PK	74.0	-29.7	3.13 V	14	43.6	0.7
2	4513.25	32.7 AV	54.0	-21.3	3.13 V	14	32.0	0.7
3	8123.85	45.7 PK	74.0	-28.3	1.82 V	192	37.6	8.1
4	8123.85	33.3 AV	54.0	-20.7	1.82 V	192	25.2	8.1
5	9026.50	45.9 PK	74.0	-28.1	1.76 V	59	36.6	9.3
6	9026.50	33.1 AV	54.0	-20.9	1.76 V	59	23.8	9.3

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

CHANNEL	TX Channel 10	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2746.95	40.9 PK	74.0	-33.1	1.40 H	192	43.3	-2.4
2	2746.95	30.9 AV	54.0	-23.1	1.40 H	192	33.3	-2.4
3	4578.25	43.7 PK	74.0	-30.3	2.53 H	230	42.7	1.0
4	4578.25	32.9 AV	54.0	-21.1	2.53 H	230	31.9	1.0
5	8240.85	44.5 PK	74.0	-29.5	1.33 H	55	36.8	7.7
6	8240.85	33.3 AV	54.0	-20.7	1.33 H	55	25.6	7.7
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	2746.95	41.3 PK	74.0	-32.7	1.46 V	216	43.7	-2.4
2	2746.95	31.6 AV	54.0	-22.4	1.46 V	216	34.0	-2.4
3	4578.25	44.2 PK	74.0	-29.8	3.15 V	8	43.2	1.0
4	4578.25	32.8 AV	54.0	-21.2	3.15 V	8	31.8	1.0
5	8240.85	45.4 PK	74.0	-28.6	1.86 V	186	37.7	7.7
6	8240.85	33.0 AV	54.0	-21.0	1.86 V	186	25.3	7.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2782.05	41.0 PK	74.0	-33.0	1.35 H	193	43.3	-2.3
2	2782.05	30.5 AV	54.0	-23.5	1.35 H	193	32.8	-2.3
3	4636.75	43.4 PK	74.0	-30.6	2.47 H	218	42.3	1.1
4	4636.75	32.6 AV	54.0	-21.4	2.47 H	218	31.5	1.1
5	8346.15	46.1 PK	74.0	-27.9	3.12 H	266	38.4	7.7
6	8346.15	33.2 AV	54.0	-20.8	3.12 H	266	25.5	7.7
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	2782.05	40.5 PK	74.0	-33.5	1.46 V	227	42.8	-2.3
2	2782.05	30.8 AV	54.0	-23.2	1.46 V	227	33.1	-2.3
3	4636.75	44.3 PK	74.0	-29.7	3.16 V	16	43.2	1.1
4	4636.75	32.9 AV	54.0	-21.1	3.16 V	16	31.8	1.1
5	8346.15	45.3 PK	74.0	-28.7	1.83 V	195	37.6	7.7
6	8346.15	32.9 AV	54.0	-21.1	1.83 V	195	25.2	7.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

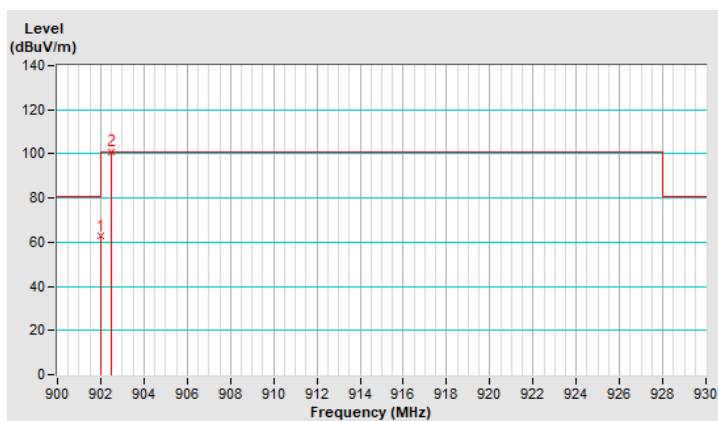
Below 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	900MHz ~ 930MHz		

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	62.8 QP	80.9	-18.1	1.66 H	239	32.5	30.3
2	*902.65	100.9 QP			1.66 H	239	70.6	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. " * ": Fundamental frequency.

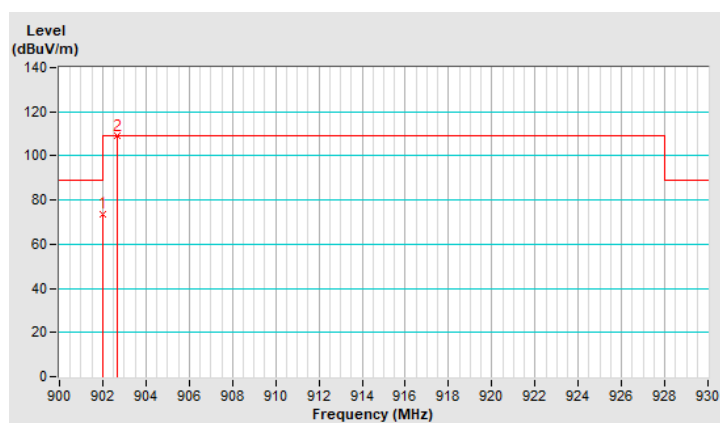


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	900MHz ~ 930MHz		

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	73.7 QP	89.1	-15.4	1.08 V	292	43.4	30.3
2	*902.65	109.1 QP			1.08 V	292	78.8	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. " * ": Fundamental frequency.

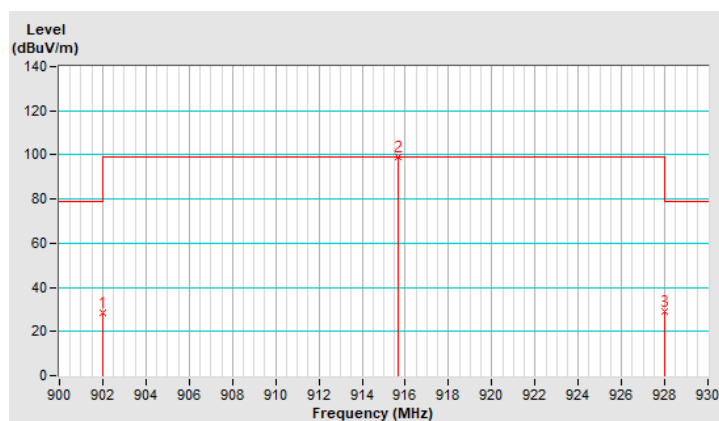


CHANNEL	TX Channel 10	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	900MHz ~ 930MHz		

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	28.3 QP	78.9	-50.6	1.64 H	234	-2.0	30.3
2	*915.65	98.9 QP			1.64 H	234	68.4	30.5
3	928.00	28.8 QP	78.9	-50.1	1.64 H	234	-2.0	30.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. " * ": Fundamental frequency.

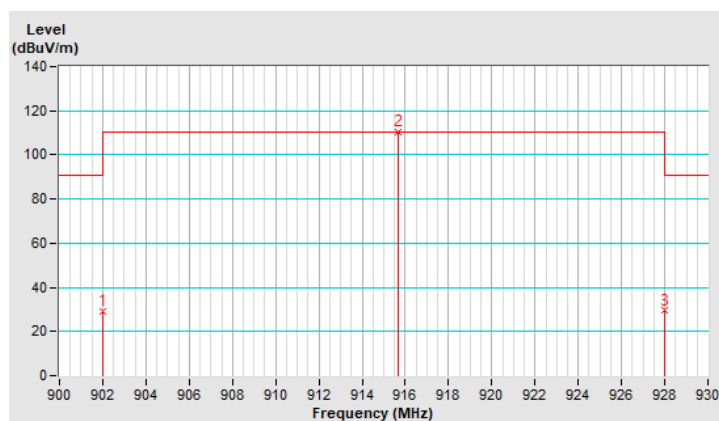


CHANNEL	TX Channel 10	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	900MHz ~ 930MHz		

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	29.3 QP	90.6	-61.3	1.04 V	292	-1.0	30.3
2	*915.65	110.6 QP			1.04 V	292	80.1	30.5
3	928.00	29.7 QP	90.6	-60.9	1.04 V	292	-1.1	30.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. " * ": Fundamental frequency.

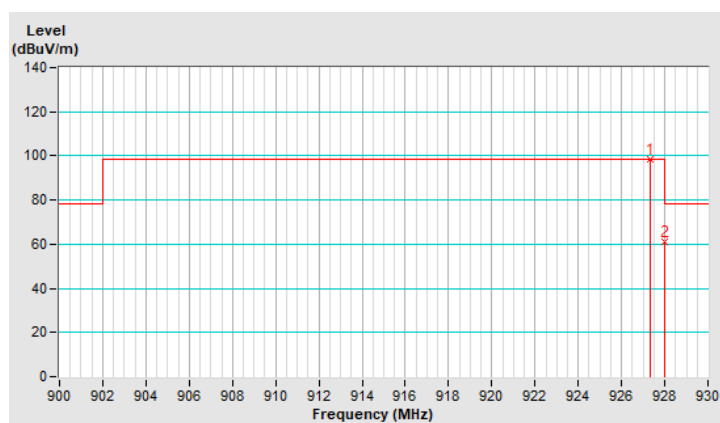


CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	900MHz ~ 930MHz		

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	*927.35	98.3 QP			1.56 H	228	67.6	30.7
2	928.00	60.9 QP	78.3	-17.4	1.56 H	228	30.1	30.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. " * ": Fundamental frequency.

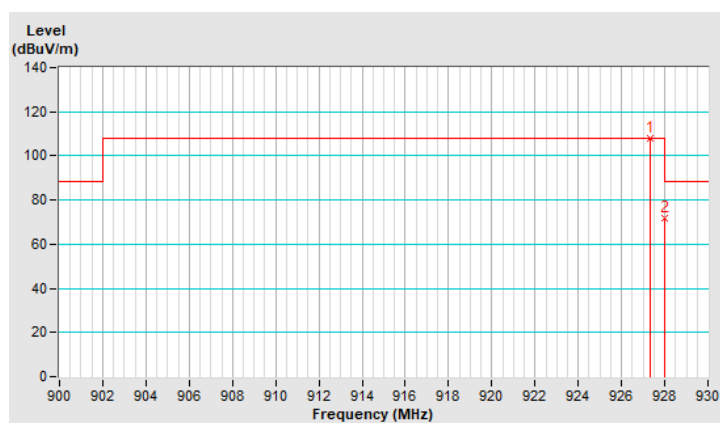


CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	900MHz ~ 930MHz		

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	*927.35	108.1 QP			1.03 V	312	77.4	30.7
2	928.00	71.9 QP	88.1	-16.2	1.03 V	312	41.1	30.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. " * ": Fundamental frequency.

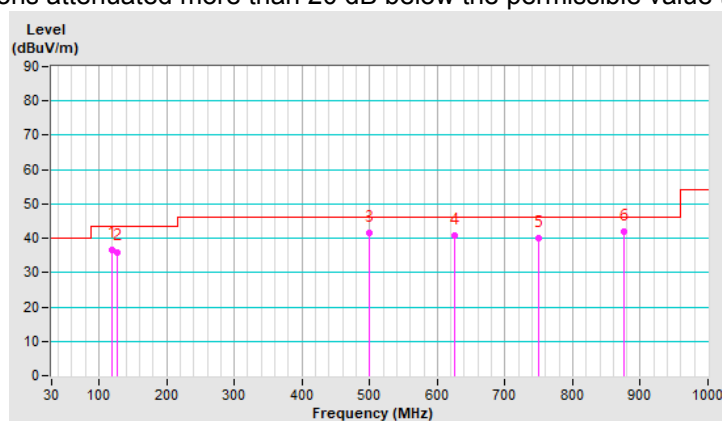


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	118.90	36.8 QP	43.5	-6.7	2.00 H	247	51.8	-15.0
2	127.54	36.0 QP	43.5	-7.5	1.50 H	262	50.2	-14.2
3	500.04	41.6 QP	46.0	-4.4	2.00 H	0	49.1	-7.5
4	625.03	40.8 QP	46.0	-5.2	1.50 H	318	45.6	-4.8
5	750.07	39.9 QP	46.0	-6.1	1.00 H	146	42.7	-2.8
6	875.06	41.8 QP	46.0	-4.2	1.00 H	295	43.4	-1.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

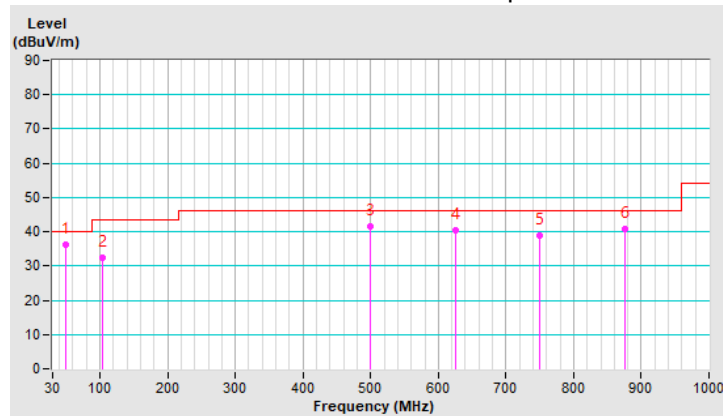


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	50.27	36.1 QP	40.0	-3.9	1.00 V	19	48.8	-12.7
2	104.21	32.5 QP	43.5	-11.0	1.00 V	329	49.1	-16.6
3	500.04	41.7 QP	46.0	-4.3	1.00 V	242	49.2	-7.5
4	625.03	40.4 QP	46.0	-5.6	1.00 V	233	45.2	-4.8
5	750.07	38.9 QP	46.0	-7.1	1.00 V	144	41.7	-2.8
6	875.06	40.7 QP	46.0	-5.3	1.00 V	177	42.3	-1.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

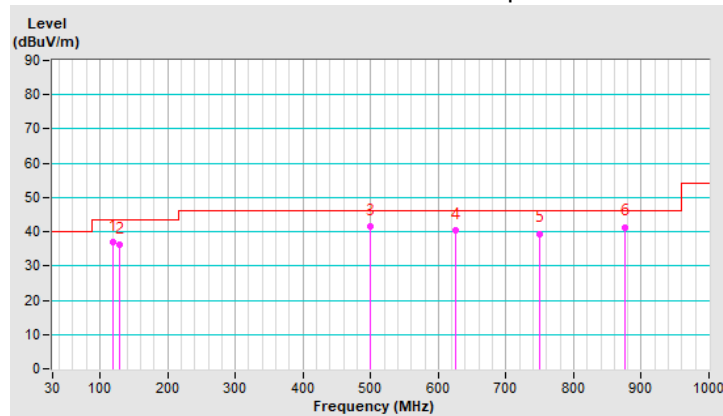


CHANNEL	TX Channel 10	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	118.95	36.8 QP	43.5	-6.7	1.50 H	274	51.8	-15.0
2	128.75	36.1 QP	43.5	-7.4	2.00 H	252	50.1	-14.0
3	500.04	41.7 QP	46.0	-4.3	2.00 H	0	49.2	-7.5
4	625.03	40.3 QP	46.0	-5.7	1.50 H	320	45.1	-4.8
5	750.07	39.5 QP	46.0	-6.5	1.00 H	147	42.3	-2.8
6	875.06	41.4 QP	46.0	-4.6	1.50 H	157	43.0	-1.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

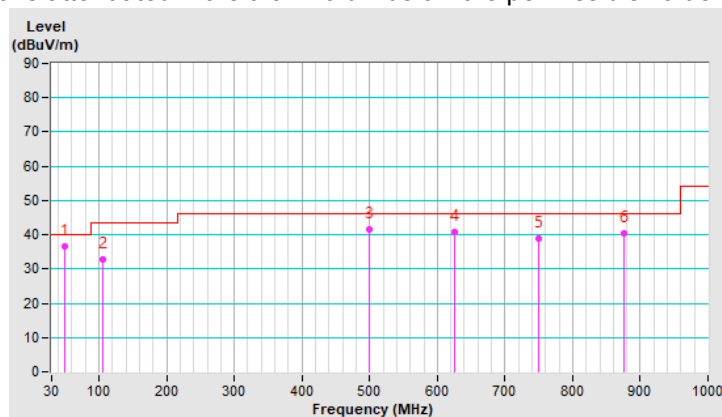


CHANNEL	TX Channel 10	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	50.23	36.5 QP	40.0	-3.5	1.00 V	360	49.2	-12.7
2	104.84	32.9 QP	43.5	-10.6	1.00 V	268	49.4	-16.5
3	500.04	41.6 QP	46.0	-4.4	1.00 V	246	49.1	-7.5
4	625.03	40.7 QP	46.0	-5.3	1.00 V	231	45.5	-4.8
5	750.07	38.9 QP	46.0	-7.1	1.00 V	150	41.7	-2.8
6	875.06	40.5 QP	46.0	-5.5	1.00 V	175	42.1	-1.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

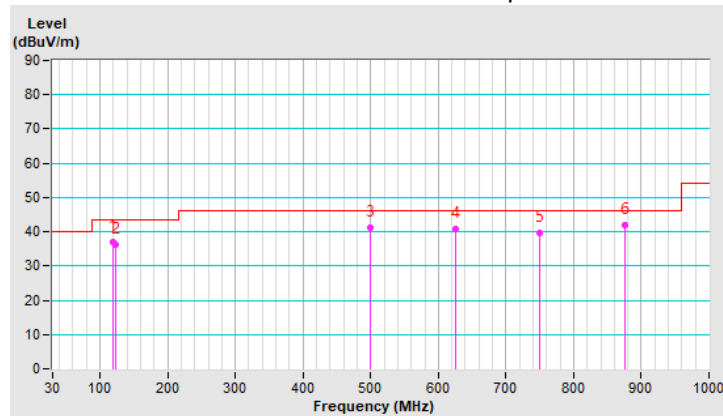


CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	119.00	37.1 QP	43.5	-6.4	2.00 H	260	52.1	-15.0
2	123.85	36.2 QP	43.5	-7.3	2.00 H	257	50.7	-14.5
3	500.04	41.3 QP	46.0	-4.7	2.00 H	6	48.8	-7.5
4	625.03	40.9 QP	46.0	-5.1	1.50 H	198	45.7	-4.8
5	750.07	39.7 QP	46.0	-6.3	1.00 H	150	42.5	-2.8
6	875.06	41.9 QP	46.0	-4.1	1.00 H	296	43.5	-1.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

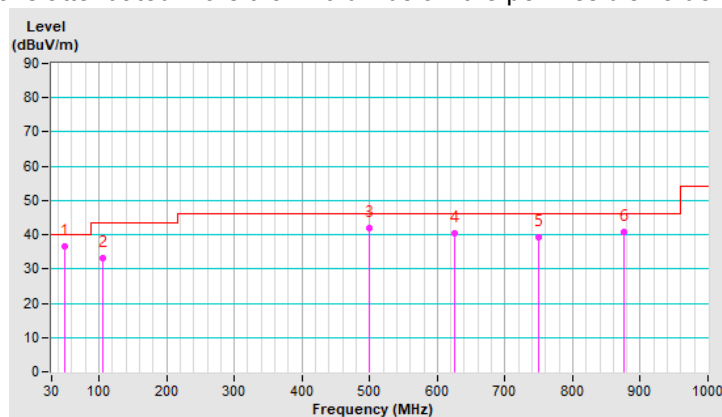


CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	49.64	36.6 QP	40.0	-3.4	1.00 V	42	49.3	-12.7
2	104.84	33.3 QP	43.5	-10.2	1.00 V	313	49.8	-16.5
3	500.04	41.9 QP	46.0	-4.1	1.00 V	246	49.4	-7.5
4	625.03	40.5 QP	46.0	-5.5	1.00 V	236	45.3	-4.8
5	750.07	39.1 QP	46.0	-6.9	1.00 V	146	41.9	-2.8
6	875.06	40.7 QP	46.0	-5.3	1.00 V	177	42.3	-1.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: Dec. 07, 2019

4.2.3 Test Procedures

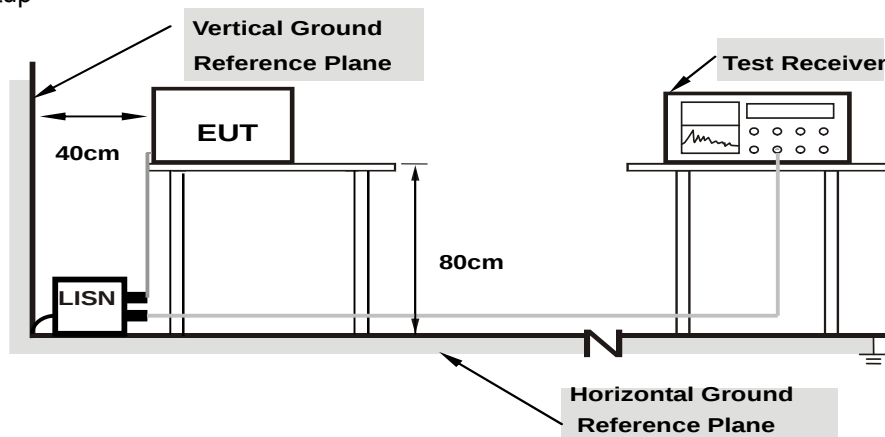
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 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.

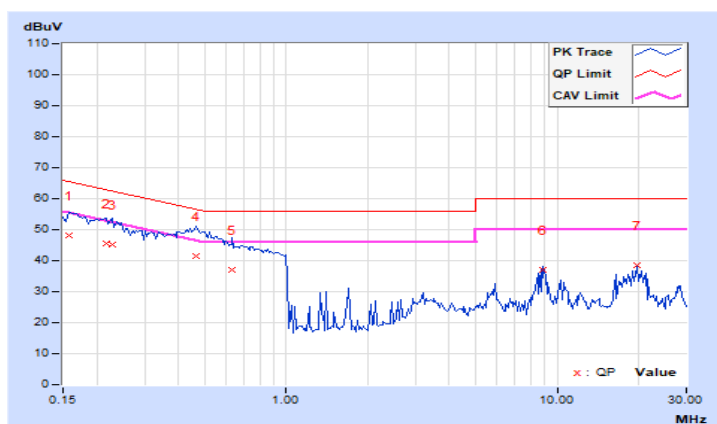
4.2.7 Test Results

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

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	0.15781	9.97	38.33	8.53	48.30	18.50	65.58	55.58	-17.28	-37.08
2	0.21641	9.97	35.67	5.22	45.64	15.19	62.96	52.96	-17.32	-37.77
3	0.22812	9.97	35.28	5.52	45.25	15.49	62.52	52.52	-17.27	-37.03
4	0.46641	9.98	31.58	0.86	41.56	10.84	56.58	46.58	-15.02	-35.74
5	0.63047	10.00	27.04	-2.18	37.04	7.82	56.00	46.00	-18.96	-38.18
6	8.89612	10.42	26.73	25.88	37.15	36.30	60.00	50.00	-22.85	-13.70
7	19.70903	11.03	27.51	26.64	38.54	37.67	60.00	50.00	-21.46	-12.33

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

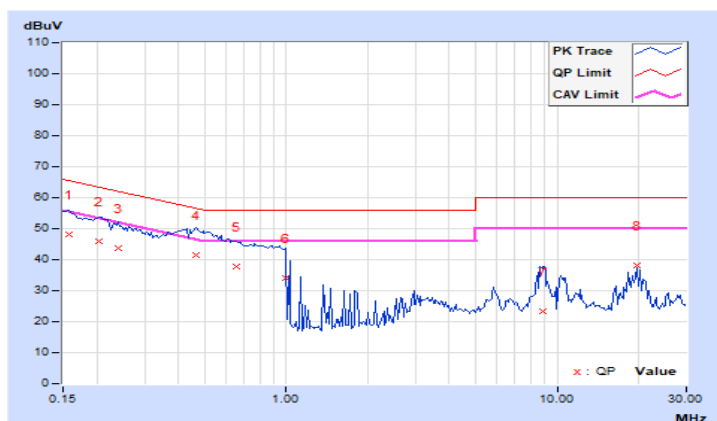


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

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	0.15781	9.99	38.16	8.81	48.15	18.80	65.58	55.58	-17.43	-36.78
2	0.20422	9.99	35.77	14.90	45.76	24.89	63.44	53.44	-17.68	-28.55
3	0.23984	9.99	33.68	3.92	43.67	13.91	62.10	52.10	-18.43	-38.19
4	0.46250	10.01	31.37	1.63	41.38	11.64	56.65	46.65	-15.27	-35.01
5	0.65391	10.03	27.85	-1.08	37.88	8.95	56.00	46.00	-18.12	-37.05
6	0.98984	10.05	23.85	-4.70	33.90	5.35	56.00	46.00	-22.10	-40.65
7	8.87109	10.51	12.76	7.36	23.27	17.87	60.00	50.00	-36.73	-32.13
8	19.71094	11.09	26.91	25.90	38.00	36.99	60.00	50.00	-22.00	-13.01

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

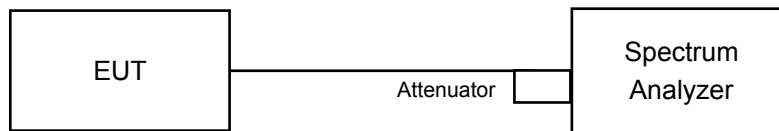


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

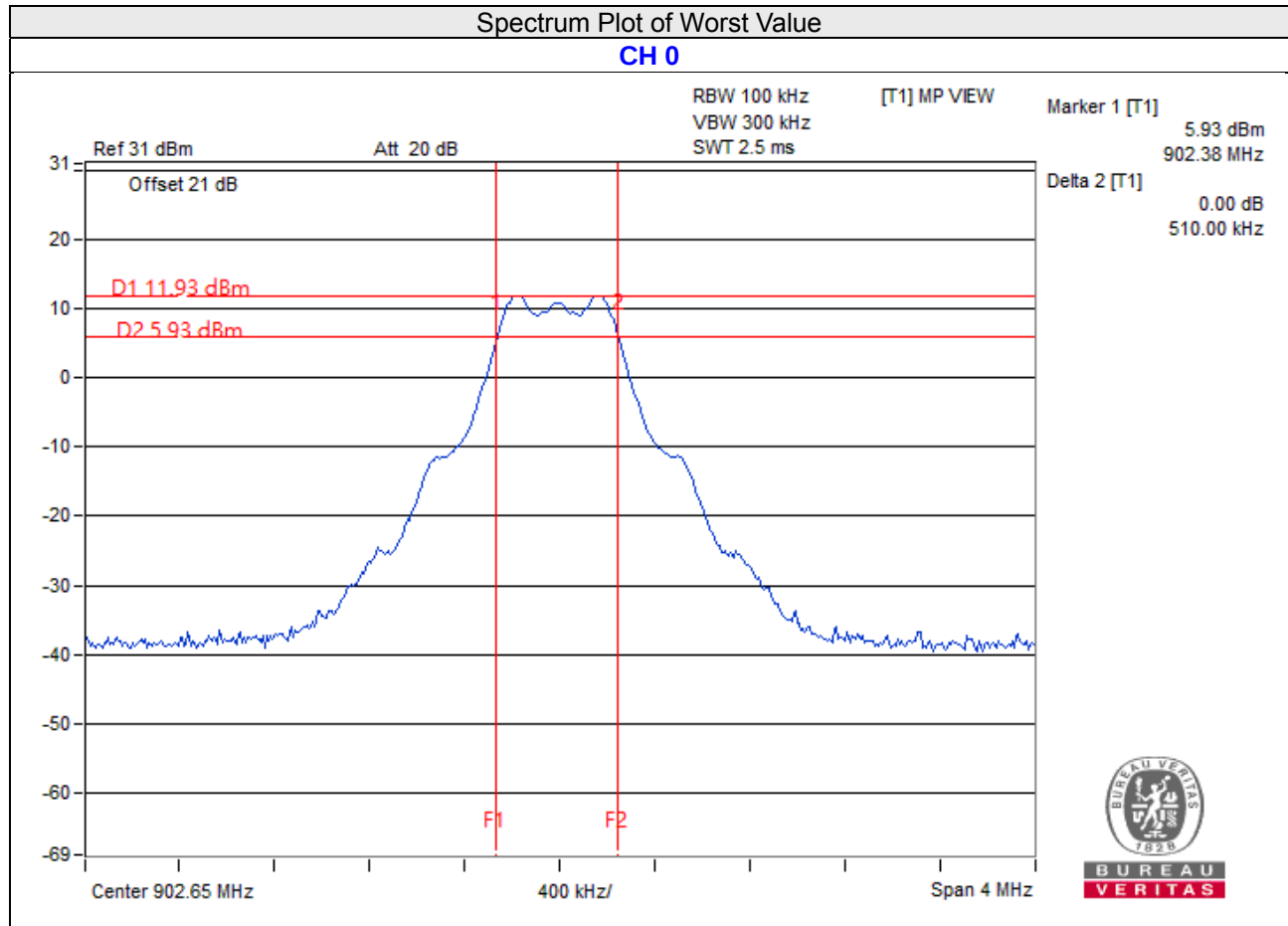
No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	902.65	0.51	0.5	Pass
10	915.65	0.51	0.5	Pass
19	927.35	0.51	0.5	Pass

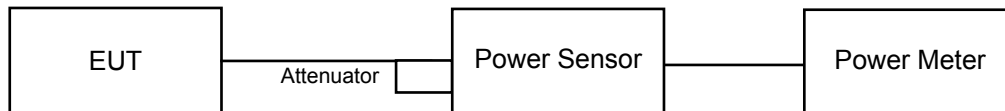


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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 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.

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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

FOR PEAK POWER

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	902.65	19.011	12.79	30	Pass
10	915.65	19.679	12.94	30	Pass
19	927.35	23.878	13.78	30	Pass

FOR AVERAGE POWER

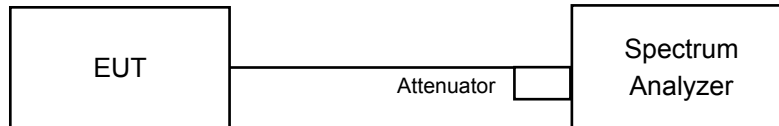
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	902.65	18.88	12.76
10	915.65	19.543	12.91
19	927.35	23.714	13.75

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 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

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

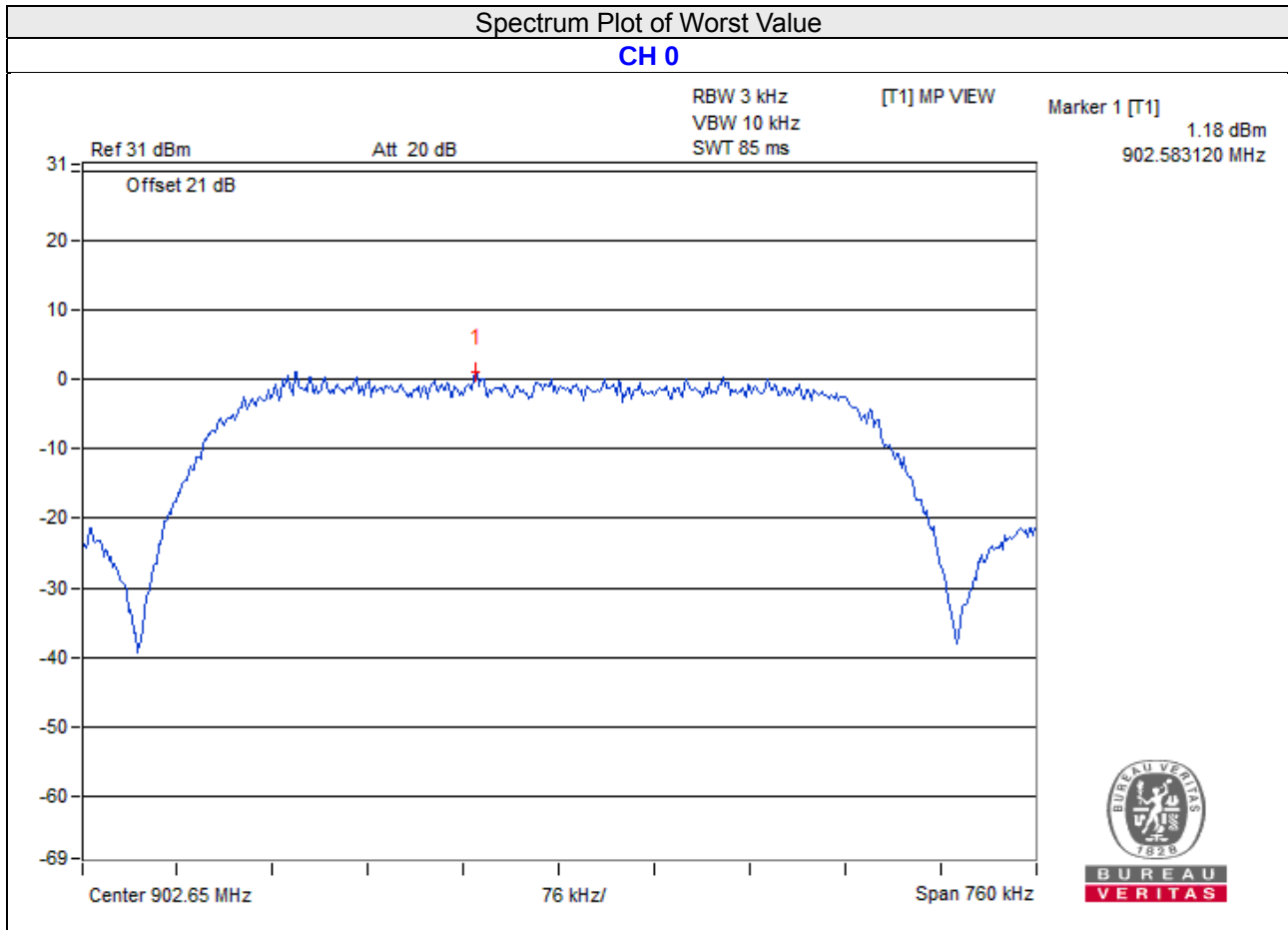
No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	902.65	1.18	8	Pass
10	915.65	0.62	8	Pass
19	927.35	0.51	8	Pass

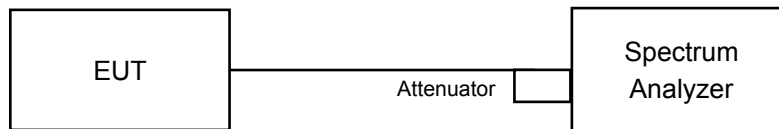


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

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

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

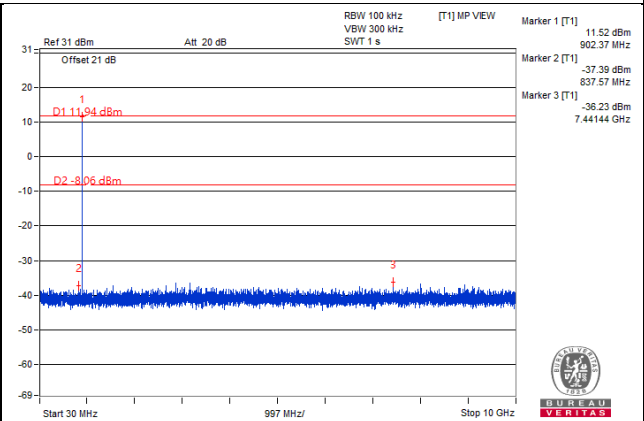
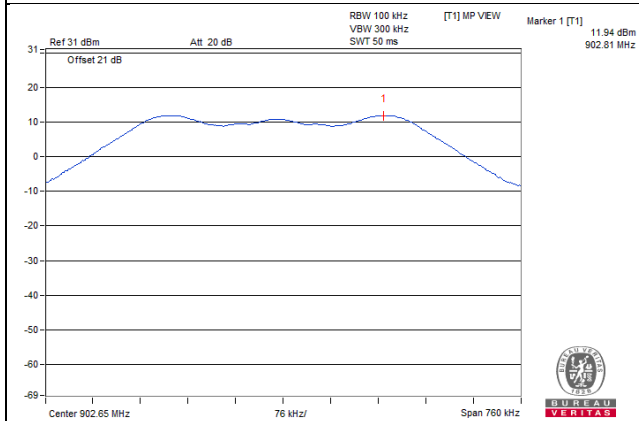
4.6.6 EUT Operating Condition

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

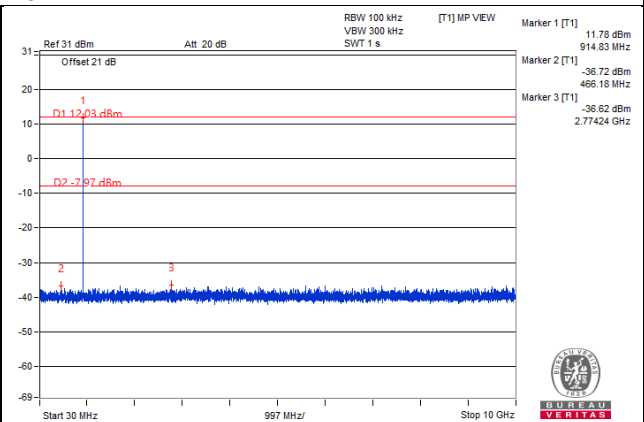
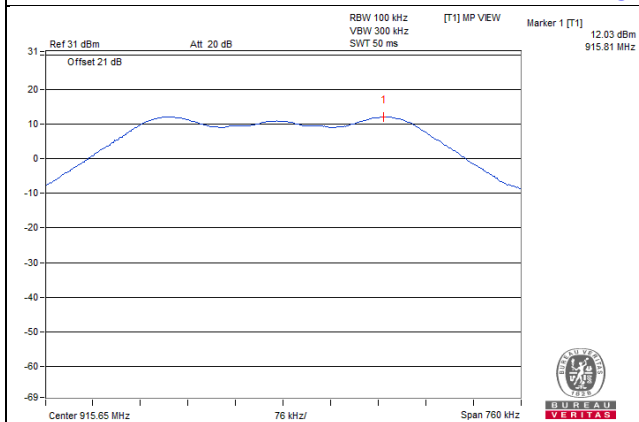
4.6.7 Test Results

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

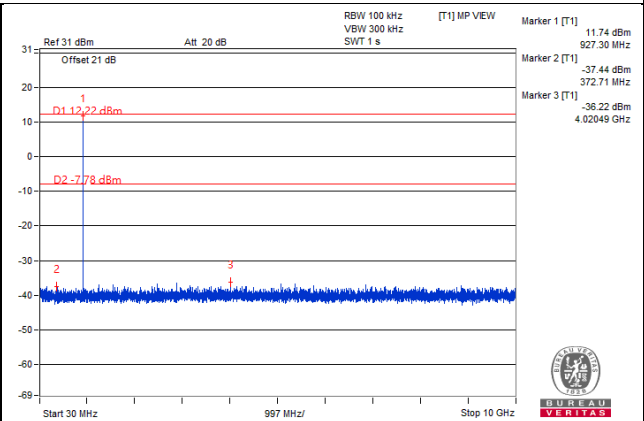
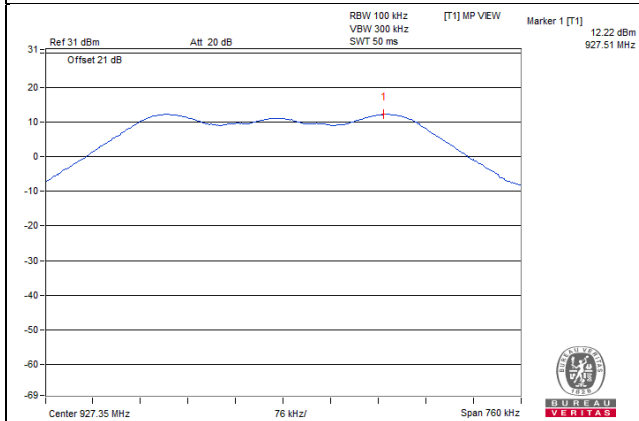
CH 0



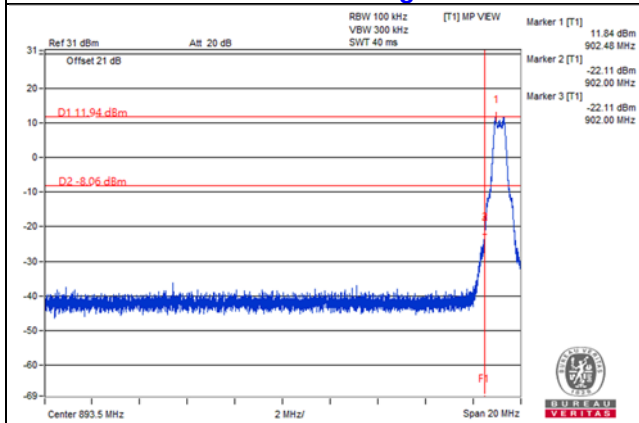
CH 10



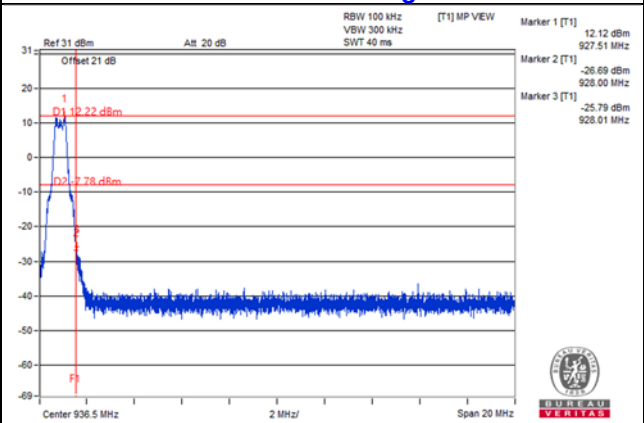
CH 19



CH 0 Band edge



CH 19 Band edge



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.

--- END ---