FCC Test Report

Report No.:	RFBDYS-WTW-P21061040
FCC ID:	A8J-FREESTYLSIP
Test Model:	FreeStyl SIP
Series Model:	FreeStyl SIP2, FreeStyl SIP HC, FreeStyl SIP B/U
Received Date:	Jul. 01, 2021
Test Date:	Jul. 01 ~ Aug. 06, 2021
Issued Date:	Sep. 03, 2021
Applicant:	EnGenius Technologies, Inc.
Address:	1580 Scenic Avenue, Costa Mesa, CA92626
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RFBDYS-WTW-P21061040	Original Release	Sep. 03, 2021

1 Certificate of Conformity

Product:	Digital Long Range SIP Cordless Telephone
Brand:	EnGenius
Test Model:	FreeStyl SIP
Series Model:	FreeStyl SIP2, FreeStyl SIP HC, FreeStyl SIP B/U
Sample Status:	Engineering Sample
Applicant:	EnGenius Technologies, Inc.
Test Date:	Jul. 01 ~ Aug. 06, 2021
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 : Lena Wang , **Date:** Sep. 03, 2021

Lena Wang / Specialist

Approved by : , **Date:** Sep. 03, 2021

Dylan Chiou / Senior 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 -13.36 dB at 0.23602 MHz.
15.247(a)(1)(i)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1)(i)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Pass	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -4.6 dB at 421.88 MHz.
15.247(d)	Band Edge Measurement	Pass	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector (Base) is TNC not a standard connector and Antenna connector (Handset) is RP SMA not a standard connector..

NOTE:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Digital Long Range SIP Cordless Telephone	
Brand	EnGenius	
Test Model	FreeStyl SIP	
Series Model	FreeStyl SIP2, FreeStyl SIP HC, FreeStyl SIP B/U	
Model Difference	Refer to Note as below	
Status of EUT	Engineering Sample	
Power Supply Rating	Base Station	Input 100~240 Vac / Output 5.0 Vdc (adapter)
	Portable Handset	3.7 Vdc (Li-ion battery)
Modulation Type	MSK	
Channel Spacing	202 kHz	
Operating Frequency	902 ~ 928 MHz	
Number of Channel	50	
Output Power	Base Station	839.46 mW
	Portable Handset	751.623 mW
Antenna Type	Refer to Note as below	
Antenna Connector	Base Station	Reverse TNC
	Portable Handset	RP SMA
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

1. All models are listed as below.

Brand	Model	Description	Difference
EnGenius	FreeStyl SIP	Base x 1 + Handset x 1 + Charger x 1	All models are electrically identical, different model names are for marketing purpose.
	FreeStyl SIP2	Base x 1 + Handset x 2 + Charger x 2	
	FreeStyl SIP HC	Handset x 1 + Charger x1	
	FreeStyl SIP B/U	Base x1	

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	DEE VAN ENTERPRISE CO., LTD.	DSA-6PFG-05 FUS 050100	I/P: 100-240 Vac, 50-60Hz, 0.2A O/P: 5 Vdc, 1 A DC Power Cable: 1.5m without core
RJ45 Cable 1	WINKEY ENTERPRISE CO.,LTD	CY-SZ-170601	1 meter non-shielded w/o core
RJ45 Cable 2	WINKEY ENTERPRISE CO.,LTD	CY-SZ-170611	0.5 meter non-shielded w/o core
Battery for Portable Handset used	EnGenius	P4-SE033L	3.7V/1100 mAh Li-Ion Battery

3. The antenna information is listed as below.

Antenna NO.	Antenna Type	Brand	Model	Antenna Gain (dBi)
Base Station	Dipole	JOYMAX ELECTRONICS CO., LTD	GMX-167TRXAX-100	2
Long Ant. Portable Handset		Master Wave Technology CO., LTD	98351ZSPX000	2
Short Ant. Portable Handset		Master Wave Technology CO., LTD	98350ZSPX004	1.5
* For Portable Handset, the max antenna gain was chosen for final test				

4. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
5. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.
6. A set of the EUT include Base station & Portable Handset.

3.2 Description of Test Modes

50 channels are provided to this EUT:

Ch	Freq. (MHz)	Ch	Freq. (MHz)
1	902.3840	26	915.3293
2	902.7885	27	915.7339
3	903.1930	28	916.5430
4	904.8112	29	916.9475
5	905.2158	30	917.3521
6	905.6203	31	917.7566
7	906.0248	32	918.1611
8	906.8339	33	918.9702
9	907.2385	34	919.3748
10	907.6430	35	919.7793
11	908.0476	36	920.1839
12	908.4521	37	920.5884
13	909.2612	38	921.3975
14	909.6657	39	921.8020
15	910.0703	40	922.6111
16	910.4748	41	923.0157
17	910.8794	42	923.8247
18	911.6885	43	924.2293
19	912.0930	44	924.6338
20	912.4975	45	925.0384
21	912.9021	46	925.4429
22	913.3066	47	926.2520
23	914.1157	48	926.6566
24	914.5203	49	927.0611
25	914.9248	50	927.4656

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Base Station
B	√	√	√	√	Portable Handset

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

NOTE:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane for Mode A and Z-plane for Mode B**.
2. "-" means no effect.

Radiated Emission Test (Above 1 GHz):

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

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

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology
A, B	1 to 50	1, 25, 50	MSK

Radiated Emission Test (Below 1 GHz):

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

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

EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology
A, B	1 to 50	1, 25, 50	MSK

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 Technology
A	1 to 50	25	MSK
B	1 to 50	1	MSK

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.

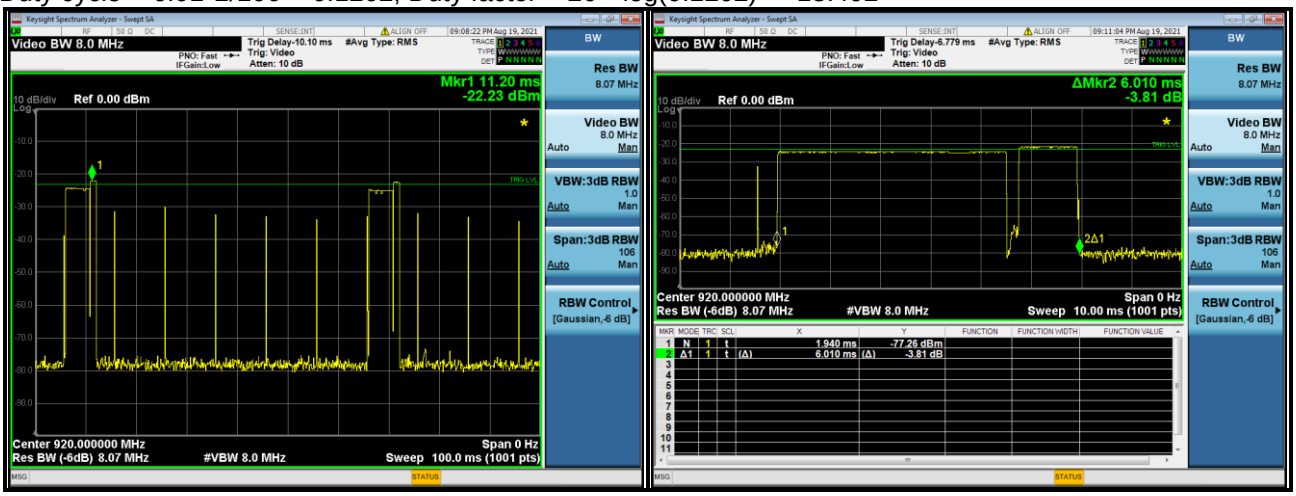
EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology
A, B	1 to 50	1, 25, 50	MSK

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Edison Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Edison Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Edison Lee
APCM	25 deg. C, 65 % RH	3.8 Vdc	Chris Lin

3.3 Duty Cycle of Test Signal

Duty cycle = 6.01*2/100 = 0.1202, Duty factor = 20 * log(0.1202) = -18.402



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.

No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Adapter	DEE VAN ENTERPRISE CO., LTD.	DSA-6PFG-05 FUS 050100	N/A	N/A
B	Earphone	N/A	N/A	N/A	N/A

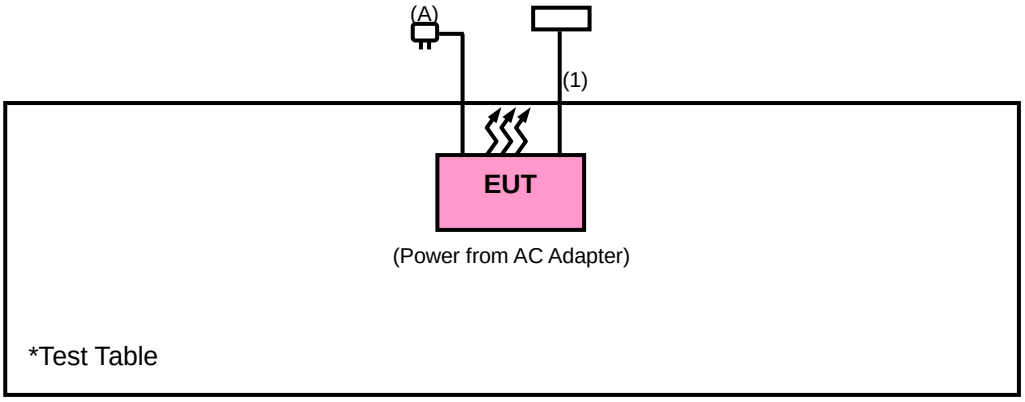
No.	Signal Cable Description Of The Above Support Units
1.	RJ45 Cable: 1m, provide by client
2.	RJ45 Cable: 0.5m, provide by client

Note:

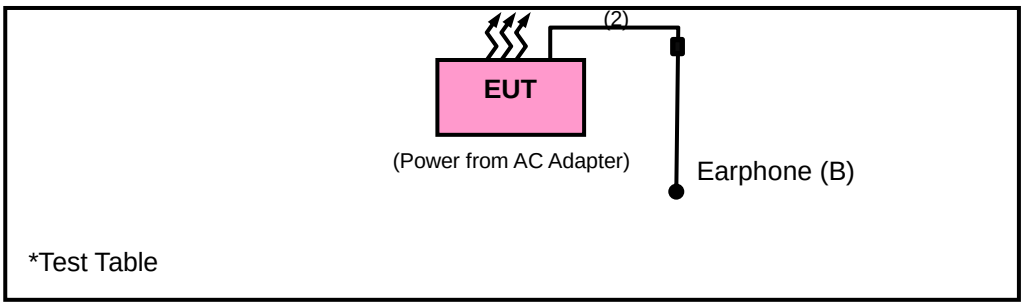
1. All power cords of the above support units are non-shielded (1.8m).

3.4.1 Configuration of System under Test

Mode A



Mode B



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:

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 20 dB below the highest level of the desired power:

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

NOTE:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 07, 2020	Dec. 06, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSV40	100979	Mar. 29, 2021	Mar. 28, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Loop Antenna	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier EMCI	EMC001340	980201	Oct. 21, 2020	Oct. 20, 2021
Preamplifier EMCI	EMC 012645	980115	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 184045	980116	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 330H	980112	Oct. 07, 2020	Oct. 06, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 01, 2020	Aug. 31, 2021
Power Sensor Anritsu	MA2411B	1315050	Sep. 01, 2020	Aug. 31, 2021
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

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

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

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

Note:

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

For Radiated Emission above 30 MHz

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

Note:

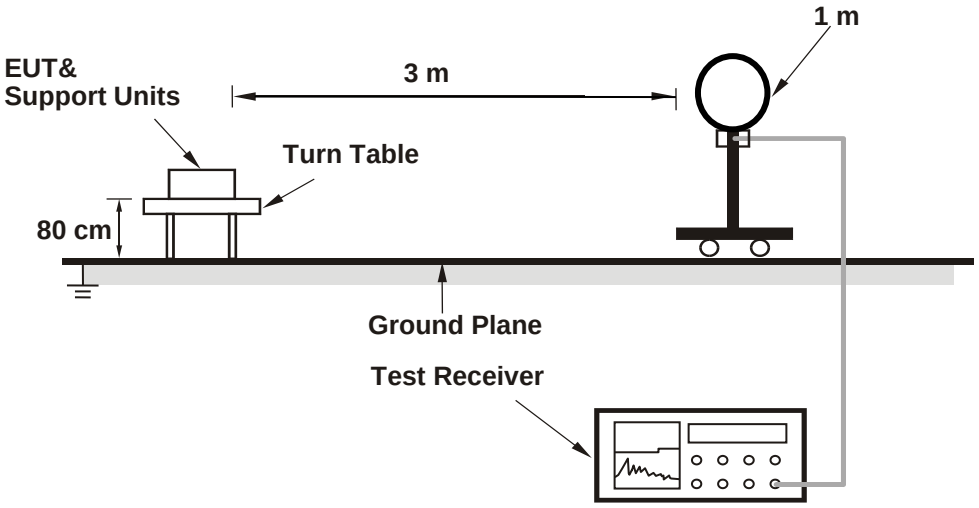
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detector (AV) at frequency above 1 GHz. Instrument measurement setting detector: RMS; sweep time: auto; trace count: average trace of at least 100 traces, measurement method according to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, 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.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

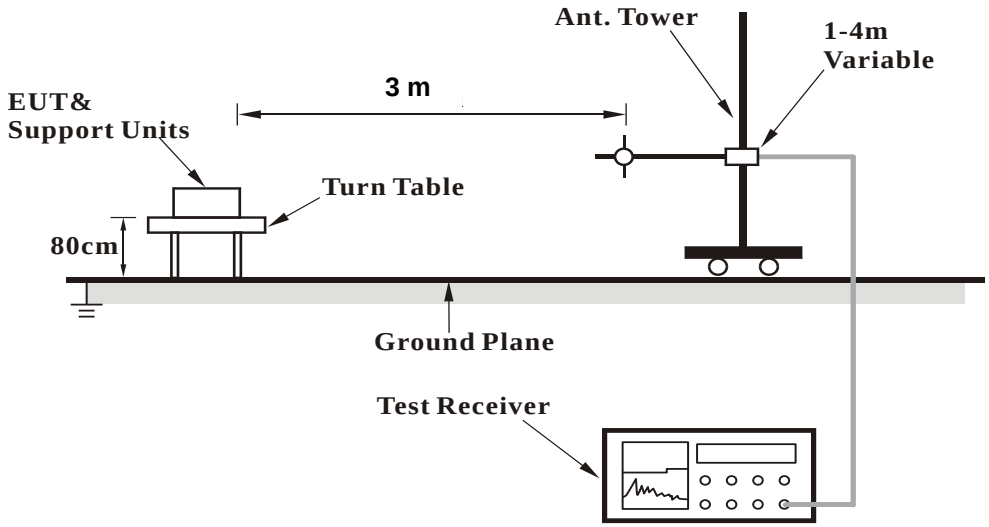
No deviation.

4.1.5 Test Set Up

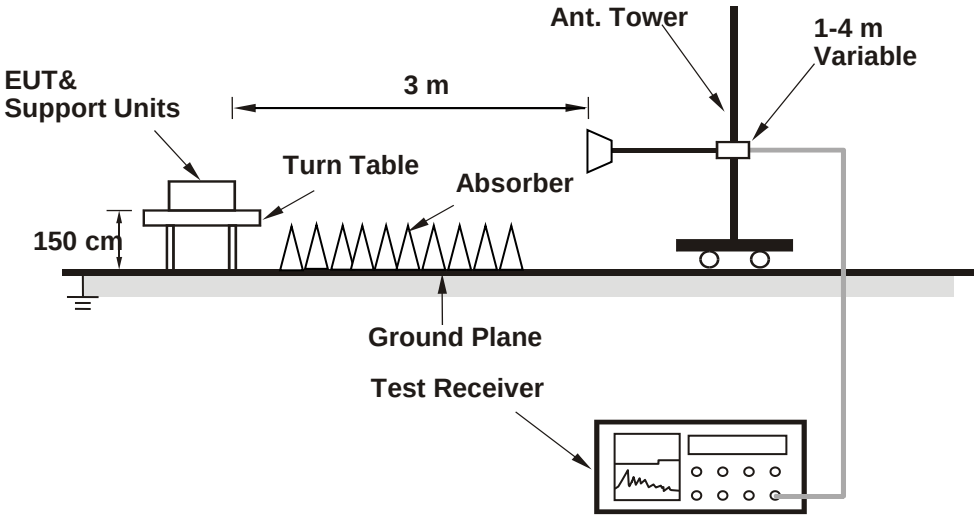
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

ABOVE 1 GHz DATA：

Mode A

Channel	TX Channel 1	**Detector Function**	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 10GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2706.90	49.5 PK	74.0	-24.5	1.46 H	213	50.8	-1.3
2	2706.90	31.1 AV	54.0	-22.9	1.46 H	213	32.4	-1.3
3	3609.20	46.1 PK	74.0	-27.9	1.85 H	225	44.3	1.8
4	3609.20	27.7 AV	54.0	-26.3	1.85 H	225	25.9	1.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	2706.90	51.0 PK	74.0	-23.0	2.64 V	1	52.3	-1.3
2	2706.90	32.6 AV	54.0	-21.4	2.64 V	1	33.9	-1.3
3	3609.20	47.1 PK	74.0	-26.9	2.59 V	341	45.3	1.8
4	3609.20	28.7 AV	54.0	-25.3	2.59 V	341	26.9	1.8

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.

Channel	TX Channel 25	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 10GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2782.20	44.2 PK	74.0	-29.8	1.64 H	58	45.2	-1.0
2	2782.20	25.8 AV	54.0	-28.2	1.64 H	58	26.8	-1.0
3	4637.00	48.4 PK	74.0	-25.6	3.18 H	299	43.8	4.6
4	4637.00	30.0 AV	54.0	-24.0	3.18 H	299	25.4	4.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2782.20	45.2 PK	74.0	-28.8	1.23 V	193	46.2	-1.0
2	2782.20	26.8 AV	54.0	-27.2	1.23 V	193	27.8	-1.0
3	4637.00	48.7 PK	74.0	-25.3	1.10 V	137	44.1	4.6
4	4637.00	30.3 AV	54.0	-23.7	1.10 V	137	25.7	4.6

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.

Channel	TX Channel 50	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 10GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2744.70	50.6 PK	74.0	-23.4	1.63 H	258	51.8	-1.2
2	2744.70	32.2 AV	54.0	-21.8	1.63 H	258	33.4	-1.2
3	3659.60	42.1 PK	74.0	-31.9	1.88 H	217	40.2	1.9
4	3659.60	23.7 AV	54.0	-30.3	1.88 H	217	21.8	1.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2744.70	51.7 PK	74.0	-22.3	2.96 V	35	52.9	-1.2
2	2744.70	33.3 AV	54.0	-20.7	2.96 V	35	34.5	-1.2
3	3659.60	43.1 PK	74.0	-30.9	2.41 V	321	41.2	1.9
4	3659.60	24.7 AV	54.0	-29.3	2.41 V	321	22.8	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

Mode B

Channel	TX Channel 1	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 10GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2706.90	44.8 PK	74.0	-29.2	1.58 H	67	46.1	-1.3
2	2706.90	26.4 AV	54.0	-27.6	1.58 H	67	27.7	-1.3
3	3609.20	52.8 PK	74.0	-21.2	3.35 H	321	51.0	1.8
4	3609.20	34.4 AV	54.0	-19.6	3.35 H	321	32.6	1.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2706.90	46.6 PK	74.0	-27.4	1.84 V	78	47.9	-1.3
2	2706.90	28.2 AV	54.0	-25.8	1.84 V	78	29.5	-1.3
3	3609.20	53.6 PK	74.0	-20.4	2.29 V	166	51.8	1.8
4	3609.20	35.2 AV	54.0	-18.8	2.29 V	166	33.4	1.8

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.

Channel	TX Channel 25	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 10GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2782.20	48.5 PK	74.0	-25.5	2.61 H	159	49.5	-1.0
2	2782.20	30.1 AV	54.0	-23.9	2.61 H	159	31.1	-1.0
3	4637.00	46.5 PK	74.0	-27.5	1.55 H	183	41.9	4.6
4	4637.00	28.1 AV	54.0	-25.9	1.55 H	183	23.5	4.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2782.20	49.3 PK	74.0	-24.7	1.91 V	233	50.3	-1.0
2	2782.20	30.9 AV	54.0	-23.1	1.91 V	233	31.9	-1.0
3	4637.00	47.4 PK	74.0	-26.6	1.83 V	253	42.8	4.6
4	4637.00	29.0 AV	54.0	-25.0	1.83 V	253	24.4	4.6

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.

Channel	TX Channel 50	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 10GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2744.70	44.0 PK	74.0	-30.0	1.69 H	71	45.2	-1.2
2	2744.70	25.6 AV	54.0	-28.4	1.69 H	71	26.8	-1.2
3	3659.60	49.5 PK	74.0	-24.5	3.52 H	341	47.6	1.9
4	3659.60	31.1 AV	54.0	-22.9	3.52 H	341	29.2	1.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2744.70	44.4 PK	74.0	-29.6	1.50 V	93	45.6	-1.2
2	2744.70	26.0 AV	54.0	-28.0	1.50 V	93	27.2	-1.2
3	3659.60	50.0 PK	74.0	-24.0	1.29 V	24	48.1	1.9
4	3659.60	31.6 AV	54.0	-22.4	1.29 V	24	29.7	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

9 kHz ~ 30 MHz Data:

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

30 MHz ~ 1 GHz Worst-Case Dada:

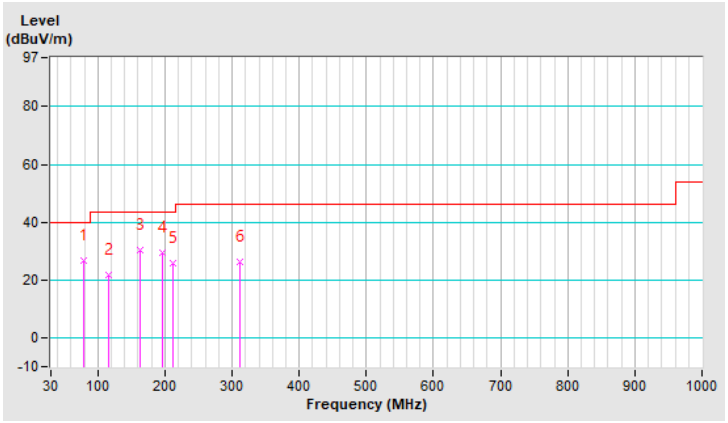
Mode A

Channel	TX Channel 1	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	78.50	26.5 QP	40.0	-13.5	2.00 H	316	39.5	-13.0
2	115.36	21.8 QP	43.5	-21.7	1.51 H	56	33.3	-11.5
3	163.86	30.4 QP	43.5	-13.1	1.51 H	126	38.8	-8.4
4	196.84	29.3 QP	43.5	-14.2	1.51 H	155	40.6	-11.3
5	212.36	25.9 QP	43.5	-17.6	1.00 H	154	36.8	-10.9
6	311.30	26.4 QP	46.0	-19.6	1.00 H	167	32.7	-6.3

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. 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.

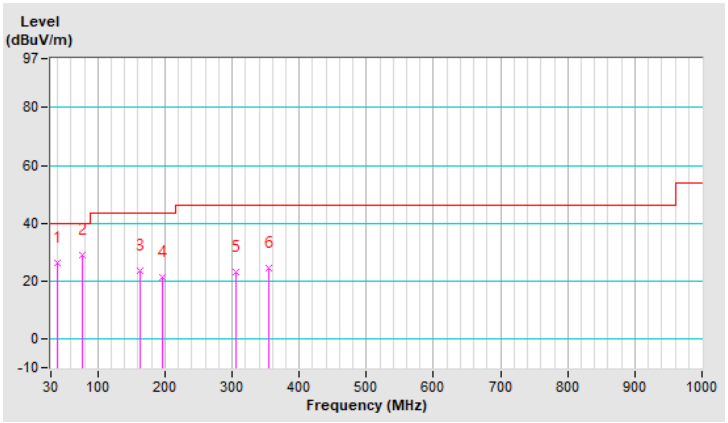


Channel	TX Channel 1	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (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	26.2 QP	40.0	-13.8	1.00 V	253	35.9	-9.7
2	76.56	28.8 QP	40.0	-11.2	1.00 V	157	41.4	-12.6
3	163.86	23.6 QP	43.5	-19.9	1.00 V	183	32.0	-8.4
4	196.84	21.3 QP	43.5	-22.2	1.49 V	256	32.6	-11.3
5	305.48	23.3 QP	46.0	-22.7	1.49 V	56	29.7	-6.4
6	353.98	24.4 QP	46.0	-21.6	1.49 V	171	29.9	-5.5

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.

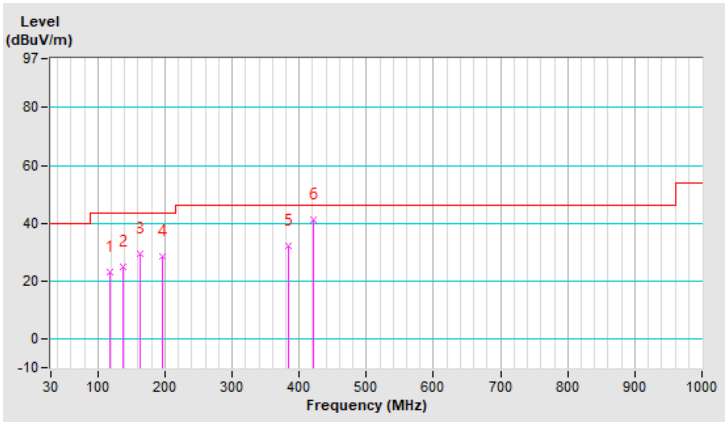


Channel	TX Channel 25	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	117.30	22.9 QP	43.5	-20.6	1.49 H	6	34.1	-11.2
2	136.70	24.8 QP	43.5	-18.7	1.49 H	6	34.1	-9.3
3	163.86	29.4 QP	43.5	-14.1	1.99 H	111	37.8	-8.4
4	196.84	28.4 QP	43.5	-15.1	1.49 H	355	39.7	-11.3
5	383.08	32.3 QP	46.0	-13.7	1.49 H	6	37.3	-5.0
6	421.88	41.4 QP	46.0	-4.6	1.99 H	331	45.4	-4.0

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. 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.

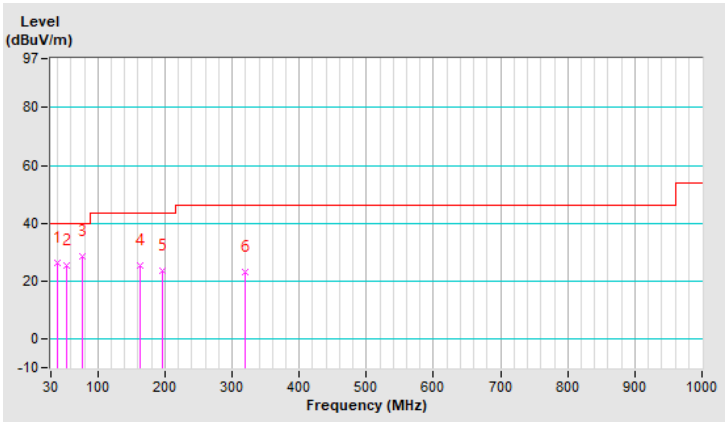


Channel	TX Channel 25	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	26.1 QP	40.0	-13.9	1.51 V	251	35.8	-9.7
2	53.28	25.3 QP	40.0	-14.7	1.01 V	16	34.4	-9.1
3	76.56	28.7 QP	40.0	-11.3	1.01 V	172	41.3	-12.6
4	163.86	25.4 QP	43.5	-18.1	1.51 V	98	33.8	-8.4
5	196.84	23.6 QP	43.5	-19.9	1.51 V	242	34.9	-11.3
6	319.06	23.2 QP	46.0	-22.8	1.01 V	16	29.3	-6.1

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. 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.

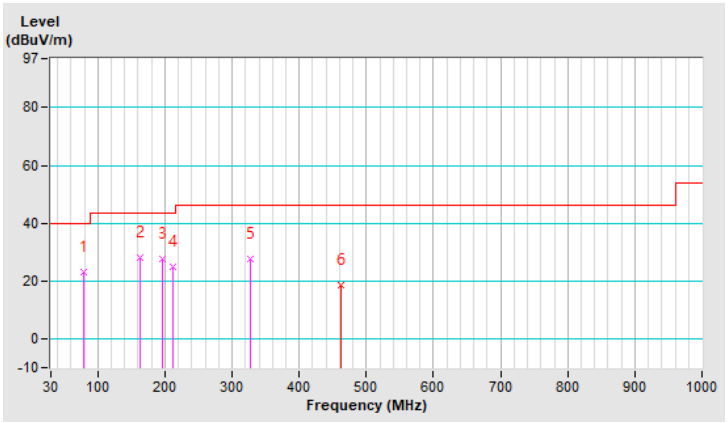


Channel	TX Channel 50	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	78.50	23.1 QP	40.0	-16.9	2.00 H	308	36.1	-13.0
2	163.86	28.0 QP	43.5	-15.5	1.51 H	106	36.4	-8.4
3	196.84	27.5 QP	43.5	-16.0	2.00 H	322	38.8	-11.3
4	212.36	24.8 QP	43.5	-18.7	1.51 H	137	35.7	-10.9
5	326.82	27.5 QP	46.0	-18.5	1.01 H	169	33.3	-5.8
6	461.94	18.6 QP	46.0	-27.4	1.00 H	81	21.6	-3.0

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. 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.

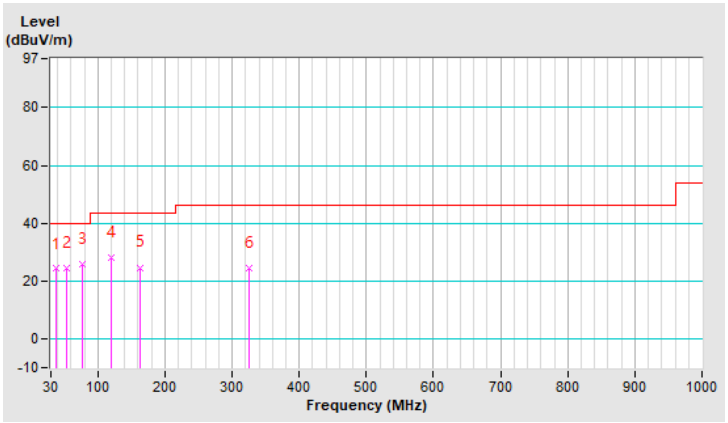


Channel	TX Channel 50	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.76	24.2 QP	40.0	-15.8	1.00 V	294	34.2	-10.0
2	53.28	24.6 QP	40.0	-15.4	1.49 V	7	33.7	-9.1
3	76.56	25.9 QP	40.0	-14.1	1.00 V	250	38.5	-12.6
4	119.24	28.2 QP	43.5	-15.3	1.49 V	16	39.2	-11.0
5	163.86	24.7 QP	43.5	-18.8	1.00 V	129	33.1	-8.4
6	324.88	24.6 QP	46.0	-21.4	1.49 V	292	30.5	-5.9

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. 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.



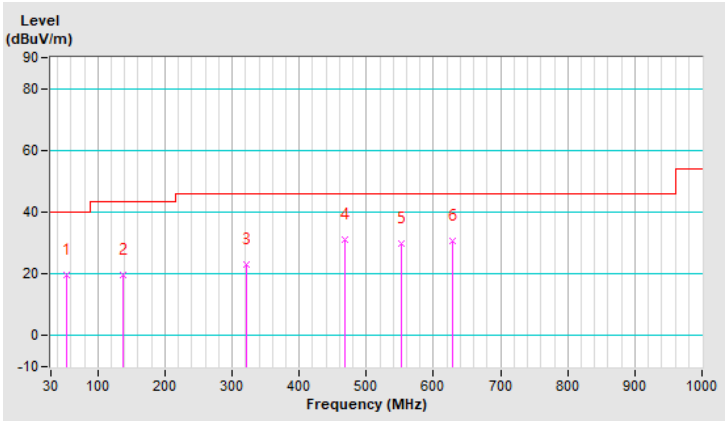
Mode B

Channel	TX Channel 1	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	52.49	19.7 QP	40.0	-20.3	1.49 H	54	28.7	-9.0
2	138.25	19.7 QP	43.5	-23.8	1.49 H	16	28.8	-9.1
3	321.00	23.2 QP	46.0	-22.8	1.49 H	348	29.3	-6.1
4	467.20	31.0 QP	46.0	-15.0	1.49 H	259	33.9	-2.9
5	552.96	29.8 QP	46.0	-16.2	1.00 H	245	31.0	-1.2
6	628.87	30.7 QP	46.0	-15.3	1.49 H	47	29.8	0.9

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. 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.

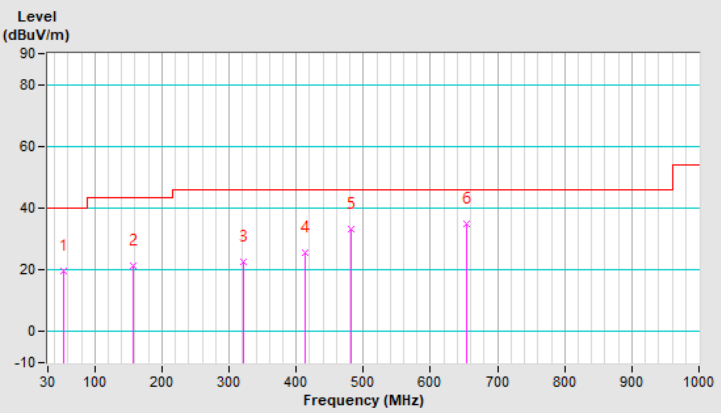


Channel	TX Channel 1	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	52.49	19.7 QP	40.0	-20.3	1.50 V	295	28.7	-9.0
2	156.52	21.3 QP	43.5	-22.2	1.50 V	340	29.7	-8.4
3	321.00	22.8 QP	46.0	-23.2	1.01 V	6	28.9	-6.1
4	413.78	25.6 QP	46.0	-20.4	1.01 V	295	30.0	-4.4
5	482.67	33.1 QP	46.0	-12.9	1.50 V	264	35.7	-2.6
6	654.17	35.0 QP	46.0	-11.0	1.01 V	199	33.8	1.2

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. 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.

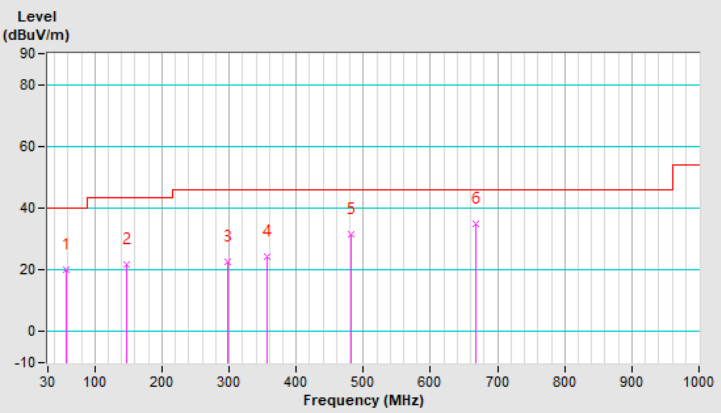


Channel	TX Channel 25	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	58.12	20.1 QP	40.0	-19.9	2.00 H	82	29.4	-9.3
2	148.09	21.8 QP	43.5	-21.7	1.49 H	59	30.5	-8.7
3	297.10	22.6 QP	46.0	-23.4	1.00 H	198	29.2	-6.6
4	357.55	24.5 QP	46.0	-21.5	1.49 H	16	29.9	-5.4
5	482.67	31.4 QP	46.0	-14.6	1.49 H	245	34.0	-2.6
6	666.83	34.8 QP	46.0	-11.2	1.00 H	229	33.3	1.5

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.

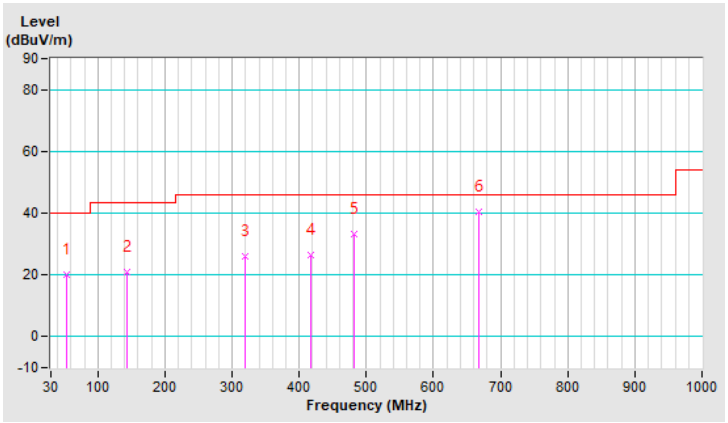


Channel	TX Channel 25	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	53.90	19.9 QP	40.0	-20.1	1.01 V	300	29.2	-9.3
2	143.87	20.8 QP	43.5	-22.7	1.01 V	262	29.6	-8.8
3	319.59	26.1 QP	46.0	-19.9	1.50 V	163	32.2	-6.1
4	418.00	26.5 QP	46.0	-19.5	1.01 V	173	30.6	-4.1
5	482.67	33.1 QP	46.0	-12.9	2.00 V	345	35.7	-2.6
6	666.83	40.6 QP	46.0	-5.4	1.50 V	332	39.1	1.5

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.

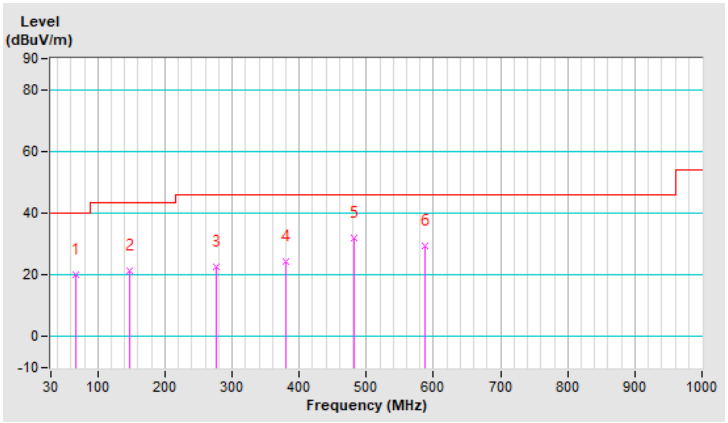


Channel	TX Channel 50	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.55	20.1 QP	40.0	-19.9	2.00 H	9	30.4	-10.3
2	148.09	21.2 QP	43.5	-22.3	1.01 H	10	29.9	-8.7
3	276.01	22.8 QP	46.0	-23.2	1.01 H	10	29.9	-7.1
4	380.04	24.2 QP	46.0	-21.8	1.01 H	10	29.2	-5.0
5	482.67	32.0 QP	46.0	-14.0	1.50 H	40	34.6	-2.6
6	586.70	29.4 QP	46.0	-16.6	1.01 H	10	29.7	-0.3

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. 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.

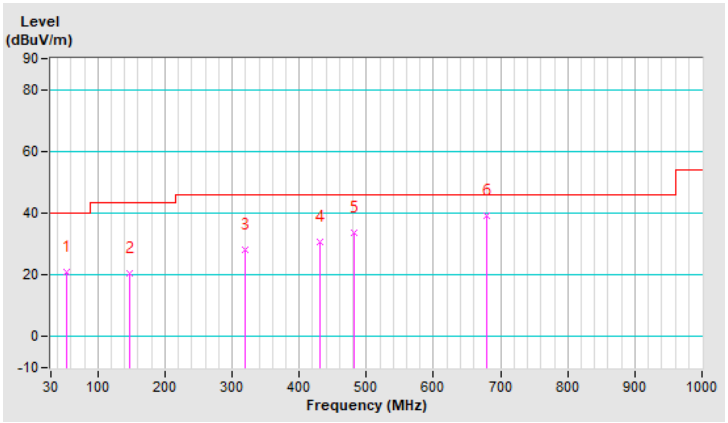


Channel	TX Channel 50	**Detector Function**	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	52.49	20.9 QP	40.0	-19.1	1.00 V	252	29.9	-9.0
2	146.68	20.7 QP	43.5	-22.8	1.50 V	23	29.3	-8.6
3	319.59	28.2 QP	46.0	-17.8	1.50 V	160	34.3	-6.1
4	430.65	30.8 QP	46.0	-15.2	1.00 V	310	34.4	-3.6
5	482.67	33.5 QP	46.0	-12.5	1.00 V	327	36.1	-2.6
6	679.48	39.2 QP	46.0	-6.8	1.50 V	338	37.4	1.8

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. 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 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102783	Dec. 21, 2020	Dec. 20, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 28, 2021	Jan. 27, 2022
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 18, 2020	Aug. 17, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

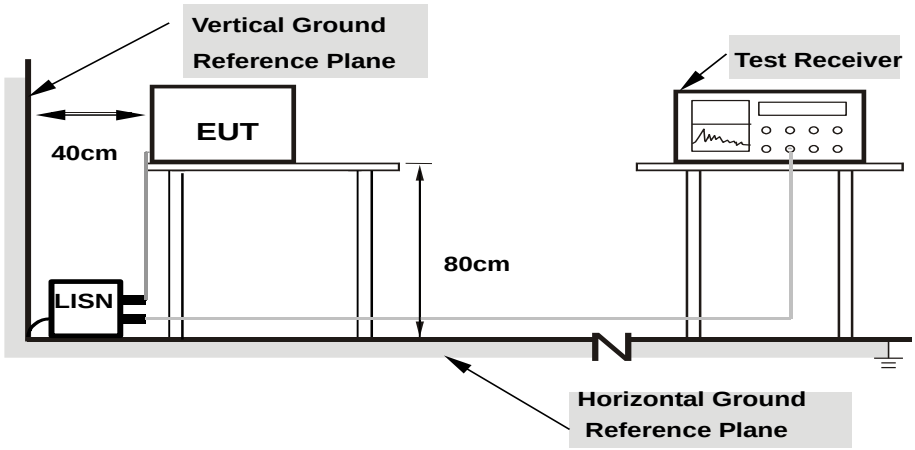
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

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

4.2.7 Test Results

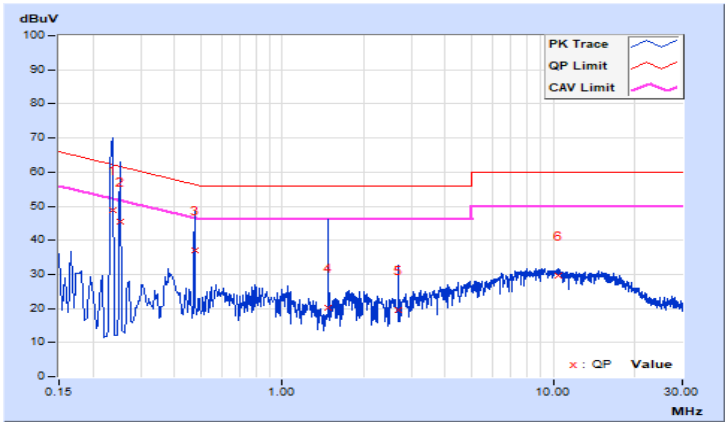
Mode A

Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	23℃, 66%RH
Tested by	Cookie Ku	**Test Date**	2021/7/21

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	**0.23602**	**10.13**	**38.75**	**6.54**	**48.88**	**16.67**	**62.24**	**52.24**	**-13.36**	**-35.57**
2	0.25166	10.14	35.41	2.85	45.55	12.99	61.70	51.70	-16.15	-38.71
3	0.47453	10.19	26.83	3.03	37.02	13.22	56.43	46.43	-19.41	-33.21
4	1.47549	10.27	9.94	1.74	20.21	12.01	56.00	46.00	-35.79	-33.99
5	2.68368	10.32	9.26	1.92	19.58	12.24	56.00	46.00	-36.42	-33.76
6	10.40984	10.50	19.25	6.18	29.75	16.68	60.00	50.00	-30.25	-33.32

Remarks:

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

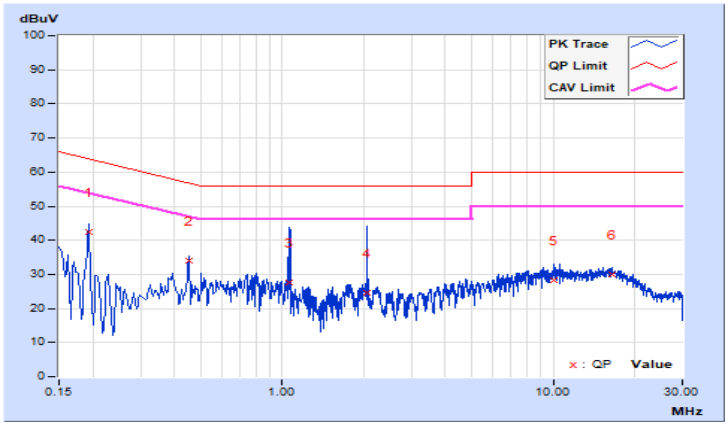


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	23℃, 66%RH
Tested by	Cookie Ku	**Test Date**	2021/7/21

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	0.19301	10.12	32.25	4.22	42.37	14.34	63.91	53.91	-21.54	-39.57
2	0.45107	10.21	23.96	2.84	34.17	13.05	56.86	46.86	-22.69	-33.81
3	1.05712	10.28	17.36	3.76	27.64	14.04	56.00	46.00	-28.36	-31.96
4	2.06199	10.32	14.39	1.42	24.71	11.74	56.00	46.00	-31.29	-34.26
5	10.03057	10.60	17.57	4.59	28.17	15.19	60.00	50.00	-31.83	-34.81
6	16.56418	10.79	19.07	4.21	29.86	15.00	60.00	50.00	-30.14	-35.00

Remarks:

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



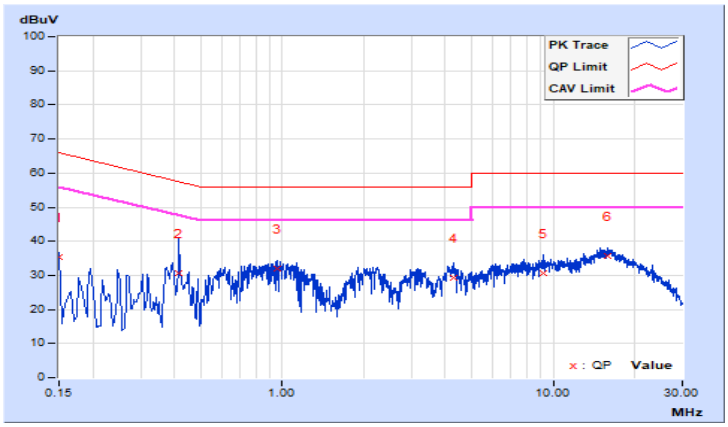
Mode B

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	3.7Vdc	Environmental Conditions	23℃, 66%RH
Tested by	Cookie Ku	Test Date	2021/7/21

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	0.15000	10.09	25.41	14.47	35.50	24.56	66.00	56.00	-30.50	-31.44
2	0.41588	10.18	20.40	14.50	30.58	24.68	57.53	47.53	-26.95	-22.85
3	0.95937	10.25	21.79	12.74	32.04	22.99	56.00	46.00	-23.96	-23.01
4	4.31806	10.38	18.81	8.60	29.19	18.98	56.00	46.00	-26.81	-27.02
5	9.20165	10.47	20.30	10.87	30.77	21.34	60.00	50.00	-29.23	-28.66
6	15.87602	10.58	25.10	14.33	35.68	24.91	60.00	50.00	-24.32	-25.09

Remarks:

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

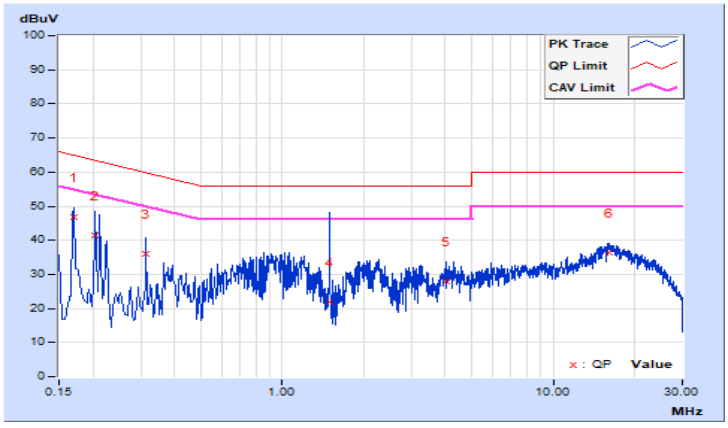


Frequency Range	150kHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	3.7Vdc	**Environmental Conditions**	23℃, 66%RH
Tested by	Cookie Ku	**Test Date**	2021/7/21

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	0.16955	10.10	36.83	11.95	46.93	22.05	64.98	54.98	-18.05	-32.93
2	0.20474	10.12	31.18	1.05	41.30	11.17	63.42	53.42	-22.12	-42.25
3	0.31422	10.17	25.94	7.55	36.11	17.72	59.86	49.86	-23.75	-32.14
4	1.49113	10.30	11.58	1.17	21.88	11.47	56.00	46.00	-34.12	-34.53
5	4.03654	10.43	17.39	6.18	27.82	16.61	56.00	46.00	-28.18	-29.39
6	16.09889	10.78	25.54	12.38	36.32	23.16	60.00	50.00	-23.68	-26.84

Remarks:

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

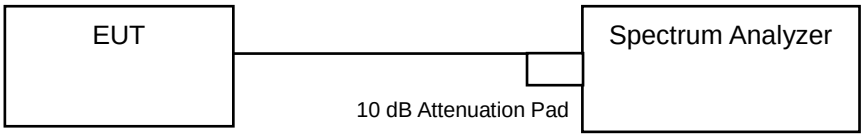


4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

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

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.

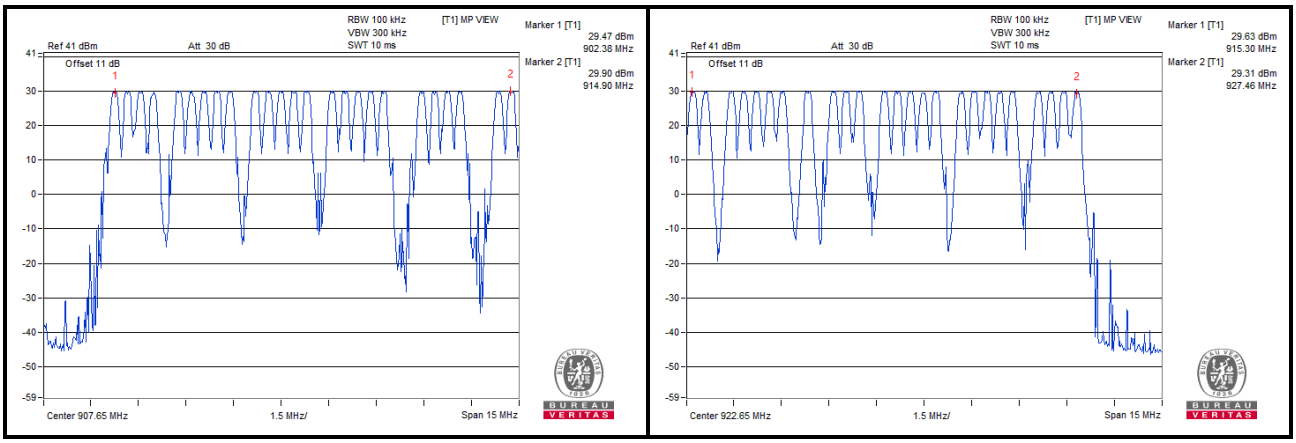
4.3.5 Deviation from Test Standard

No deviation.

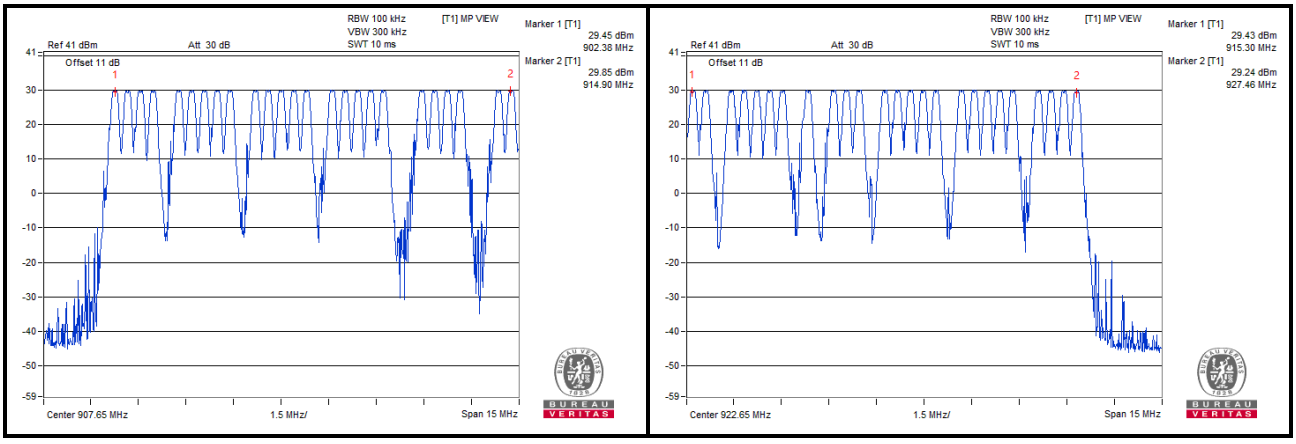
4.3.6 Test Results

There are 50 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

Mode A



Mode B

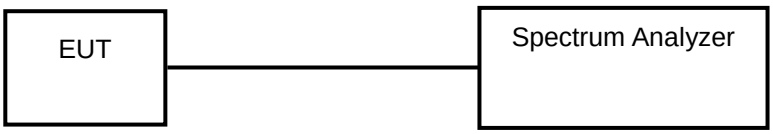


4.4 Dwell Time on Each Channel

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.

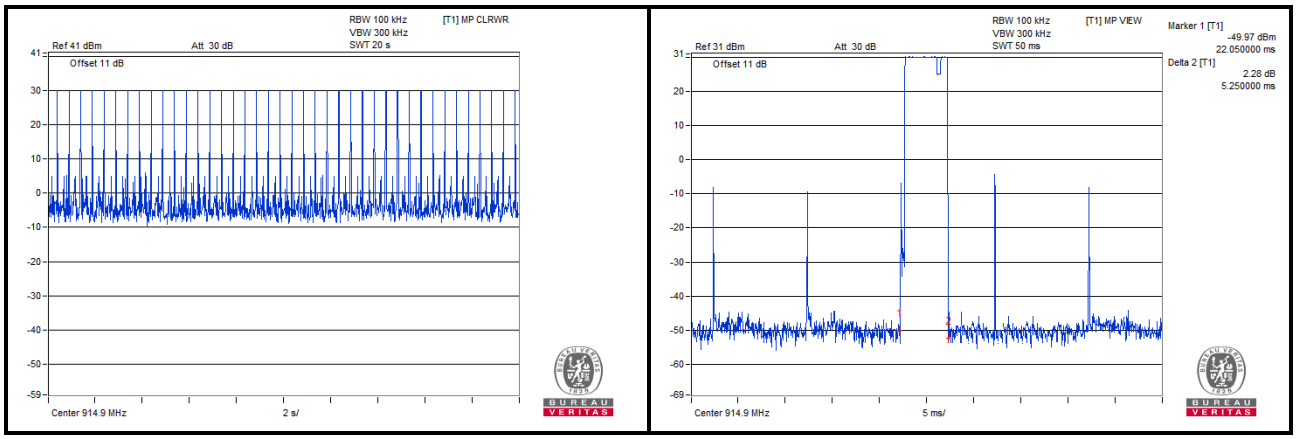
4.4.6 Test Results

Mode A

Number of transmission in a period (20s)	Length of transmission time (msec)	Result (msec)	Limit (msec)
40	5.25	210	400

NOTE:

1. Test plots of the transmitting time slot are shown as below.

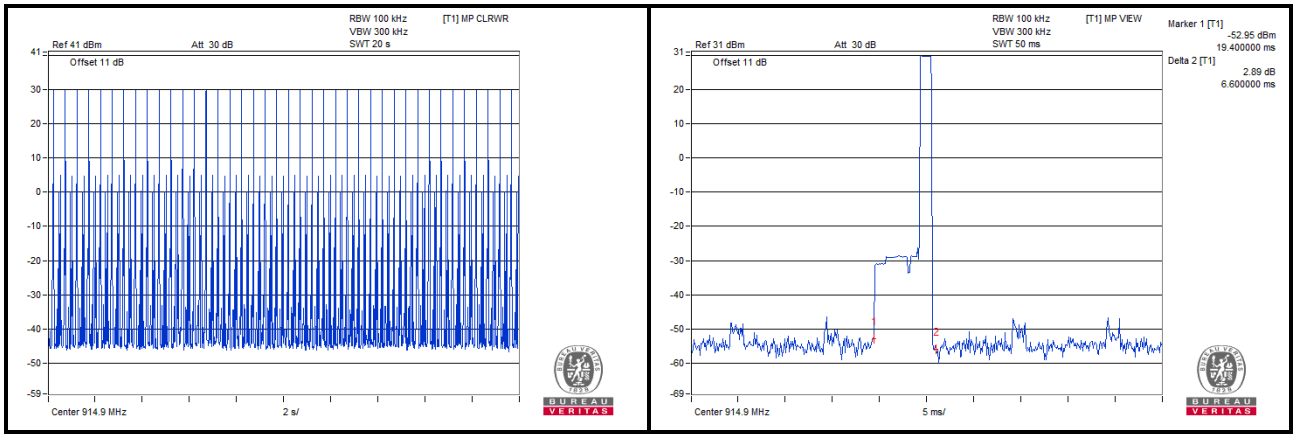


Mode B

Number of transmission in a period (20s)	Length of transmission time (msec)	Result (msec)	Limit (msec)
40	6.6	264	400

NOTE:

1. Test plots of the transmitting time slot are shown as below.

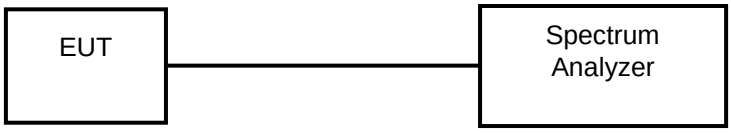


4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

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 20 dB 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

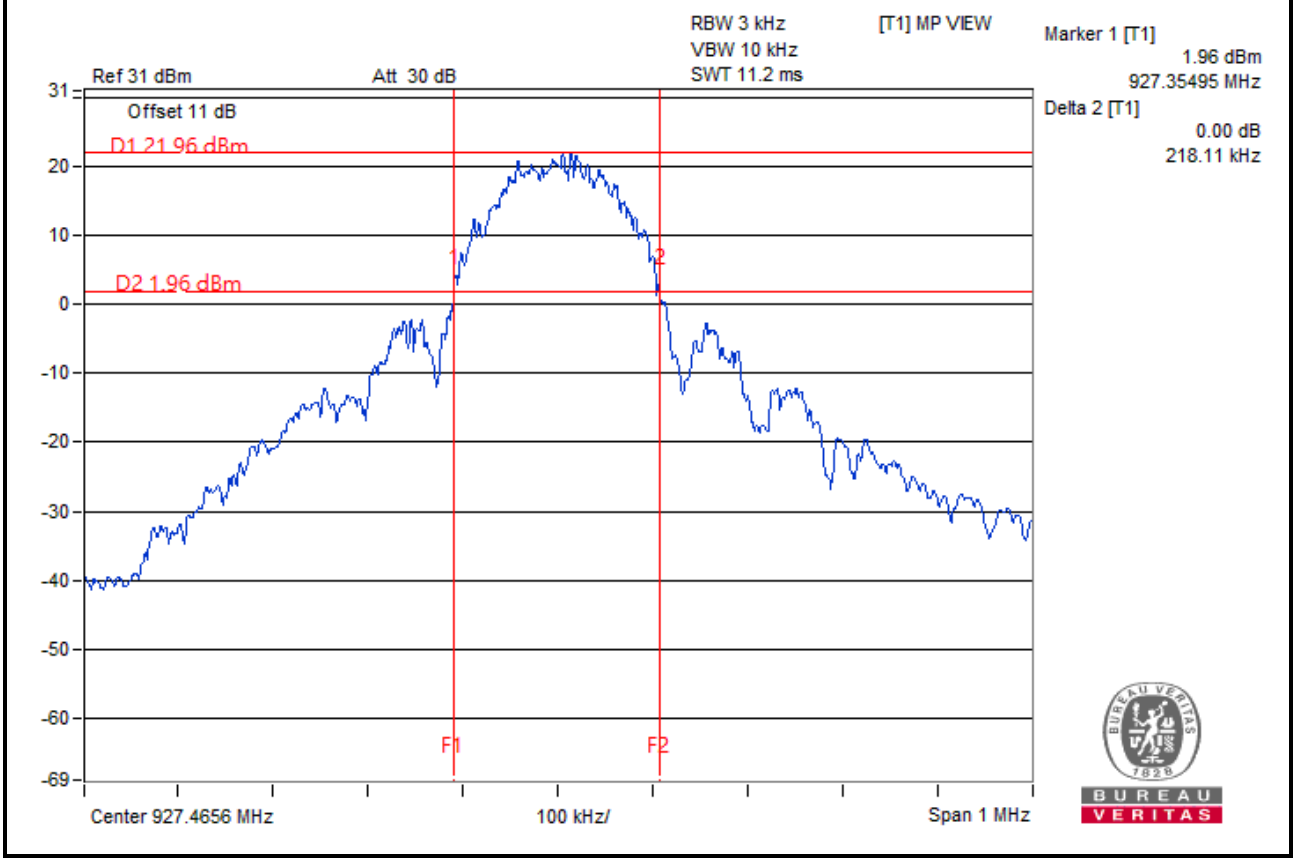
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

Mode A

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Limit (MHz)
1	902.384	0.20956	0.5
25	914.9248	0.21348	0.5
50	927.4656	0.21811	0.5

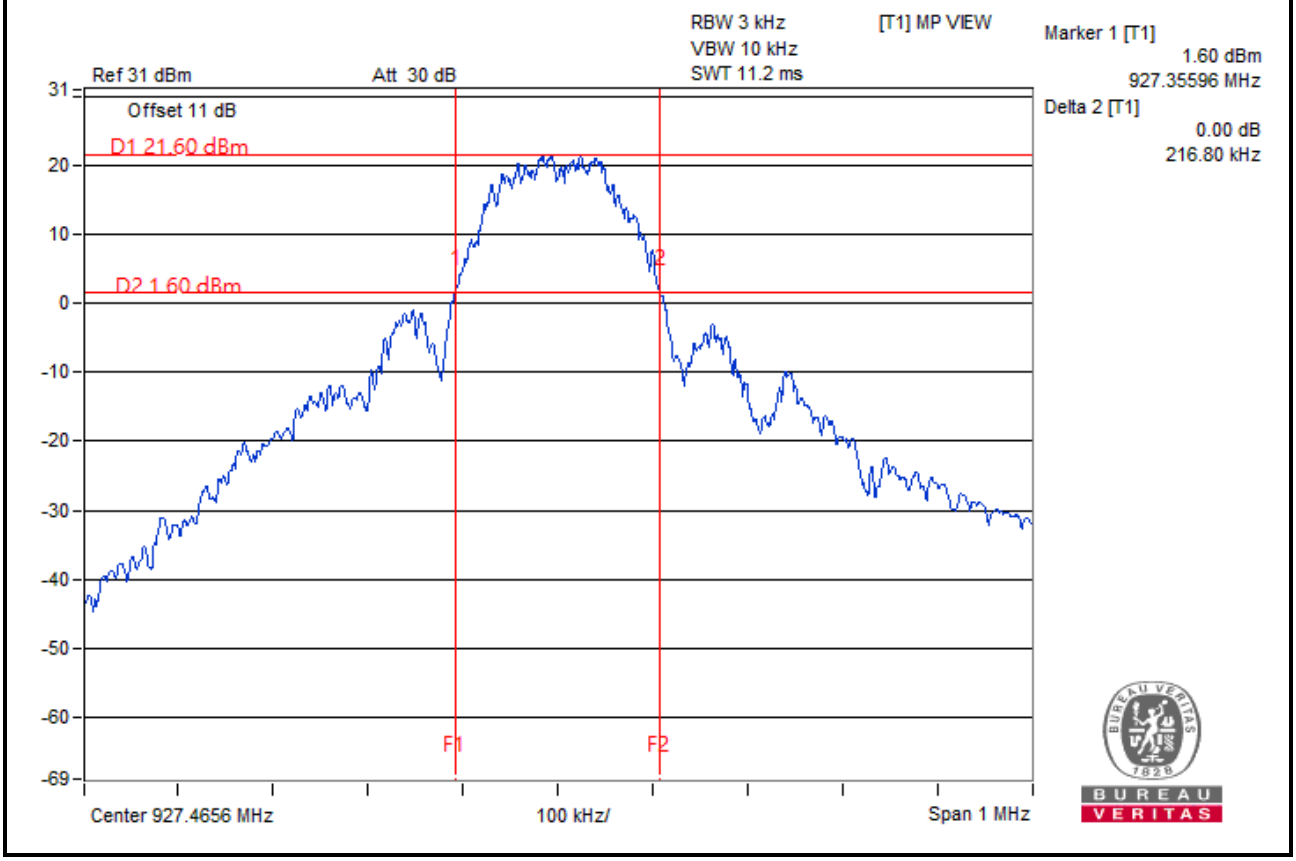
Spectrum Plot of Worst Value



Mode B

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Limit (MHz)
1	902.384	0.21456	0.5
25	914.9248	0.21501	0.5
50	927.4656	0.21680	0.5

Spectrum Plot of Worst Value

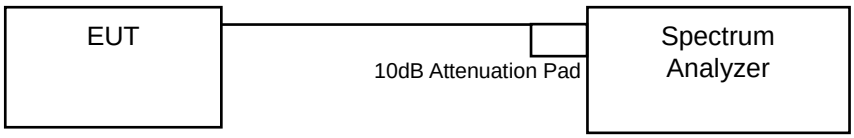


4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

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

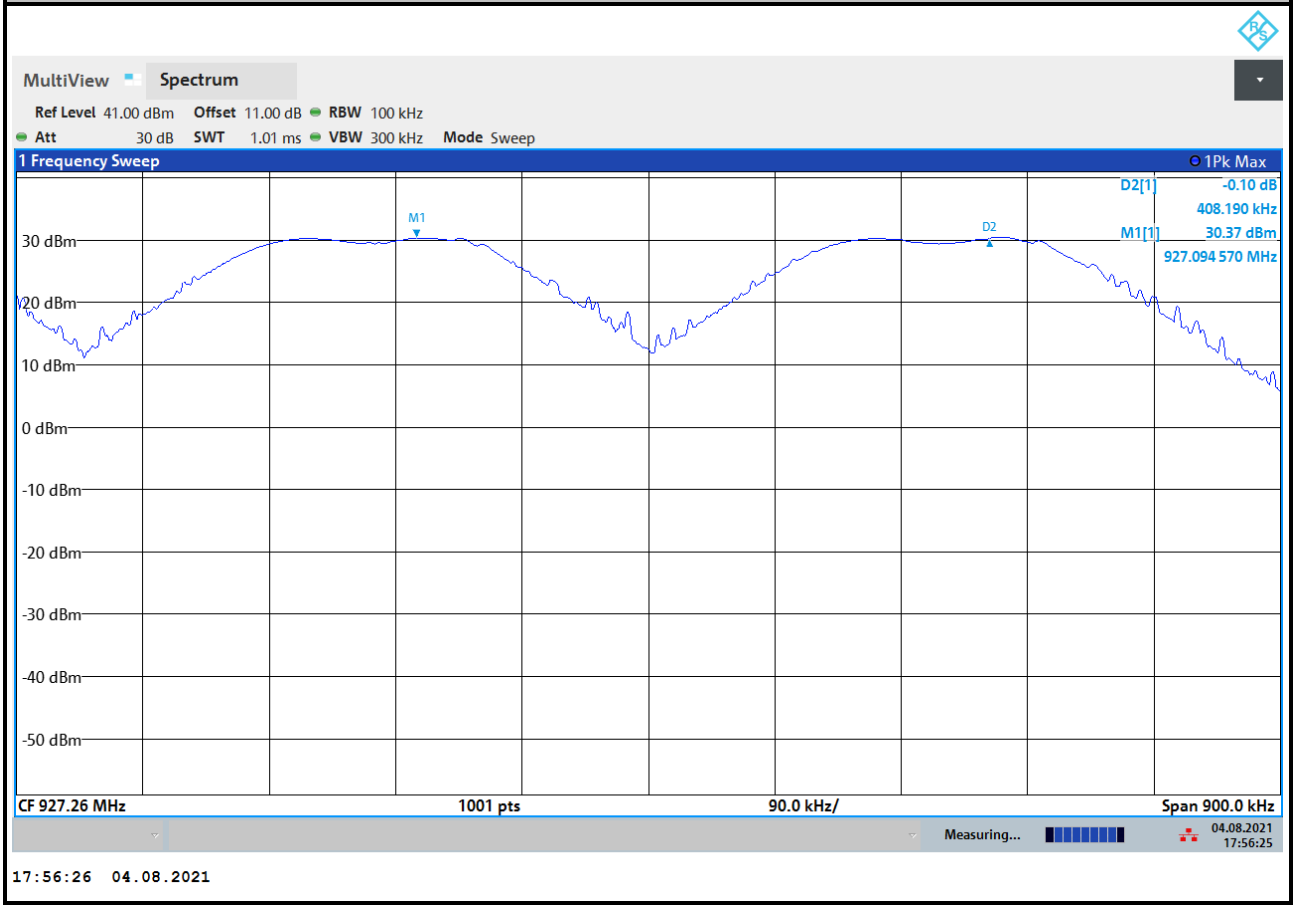
No deviation.

4.6.6 Test Results

Mode A

Channel	Freq. (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	902.384	0.41179	0.20956	0.21	Pass
25	914.9248	0.40729	0.21348	0.21	Pass
50	927.4656	0.40819	0.21811	0.22	Pass

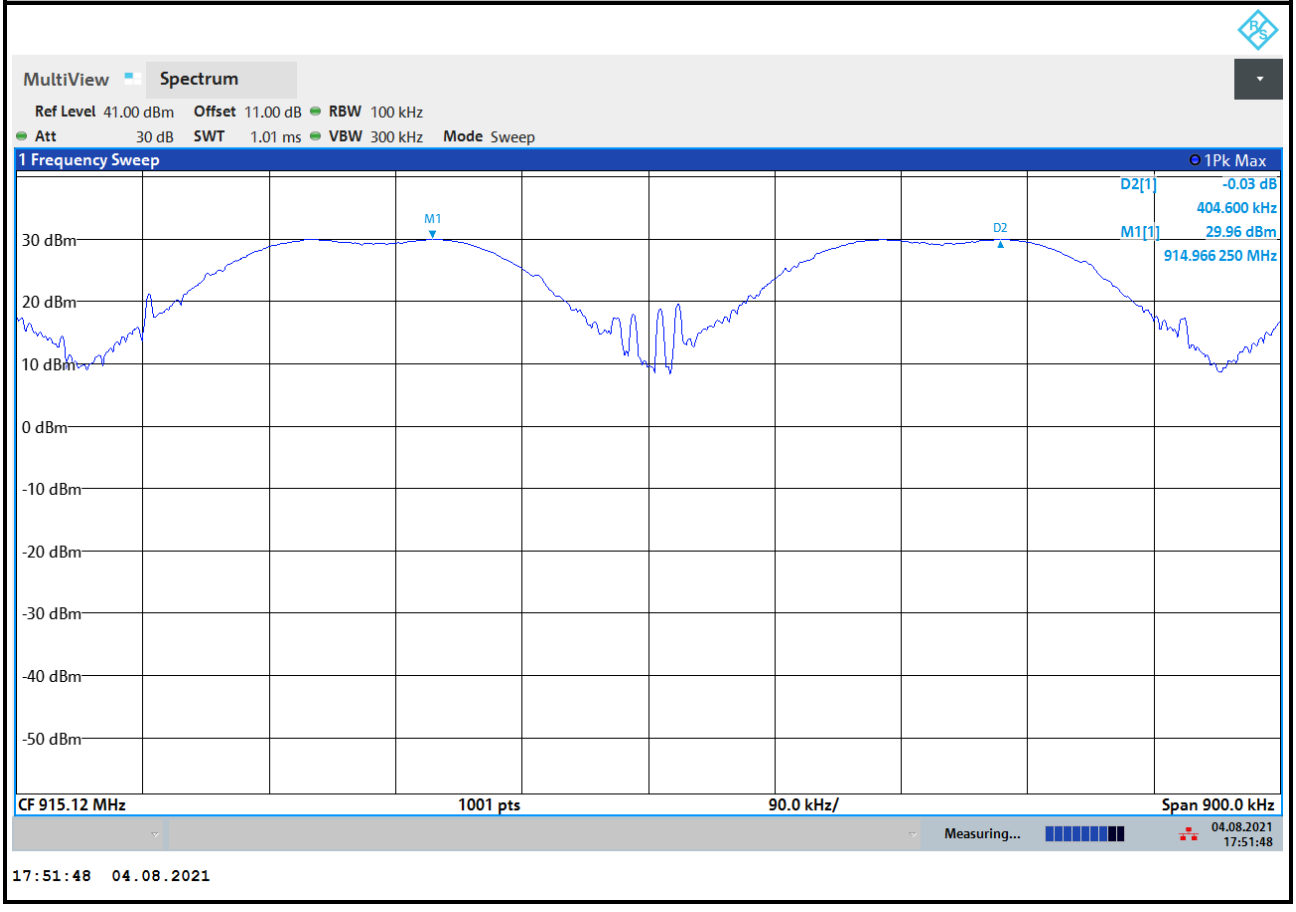
Spectrum Plot of Worst Value



Mode B

Channel	Freq. (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	902.384	0.40819	0.21456	0.21	Pass
25	914.9248	0.40460	0.21501	0.22	Pass
50	927.4656	0.40999	0.21680	0.22	Pass

Spectrum Plot of Worst Value

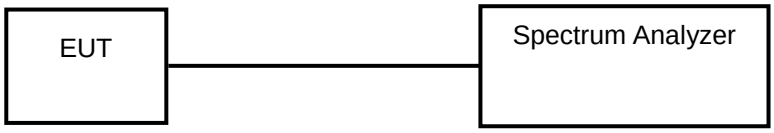


4.7 Maximum Output Power

4.7.1 Limits of Maximum Output Power Measurement

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

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 enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

Mode A

For Peak Power

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (dBm)	Pass / Fail
1	902.384	818.465	29.13	30	PASS
25	914.9248	839.46	29.24	30	PASS
50	927.4656	829.851	29.19	30	PASS

For Average Power

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)
1	902.384	797.995	29.02
25	914.9248	824.138	29.16
50	927.4656	805.378	29.06

Mode B

For Peak Power

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (dBm)	Pass / Fail
1	902.384	751.623	28.76	30	PASS
25	914.9248	749.894	28.75	30	PASS
50	927.4656	739.605	28.69	30	PASS

For Average Power

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)
1	902.384	743.019	28.71
25	914.9248	737.904	28.68
50	927.4656	729.458	28.63

4.8 Conducted Out of Band Emission Measurement

4.8.1 Limits of Conducted Out of Band Emission Measurement

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

4.8.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.8.3 Test Procedure

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

4.8.4 Deviation from Test Standard

No deviation.

4.8.5 EUT Operating Condition

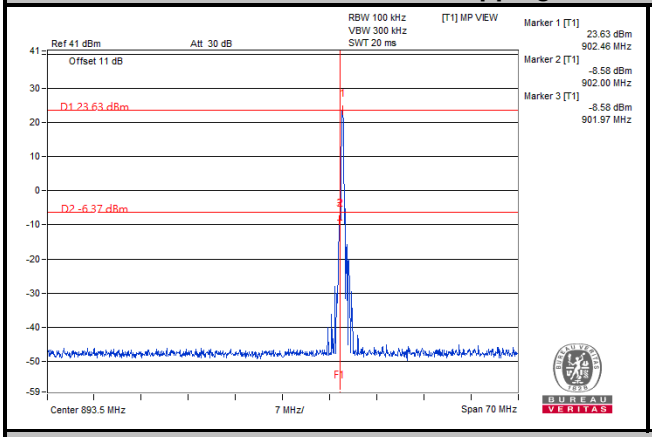
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

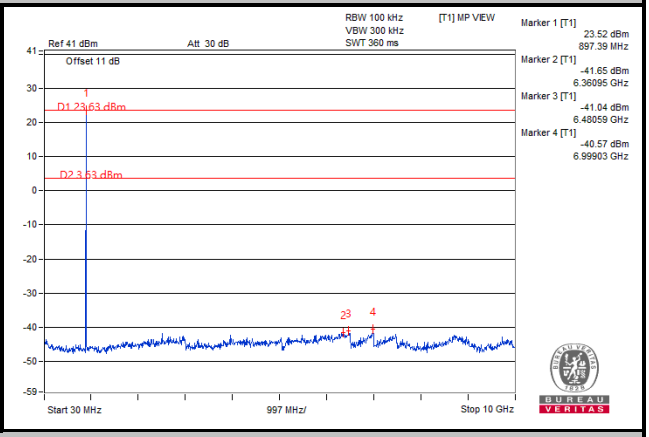
4.8.6 Test Results

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

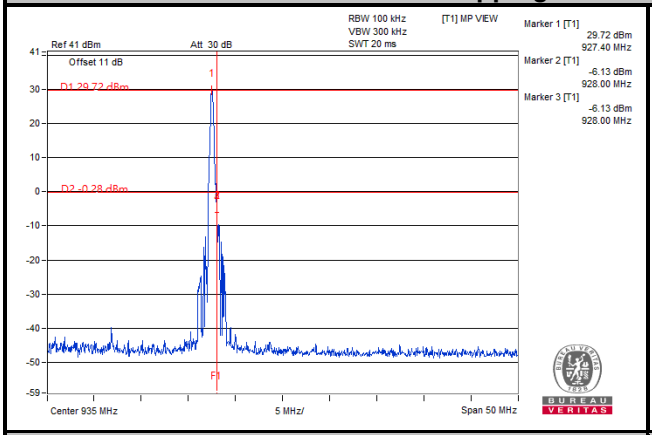
Mode A

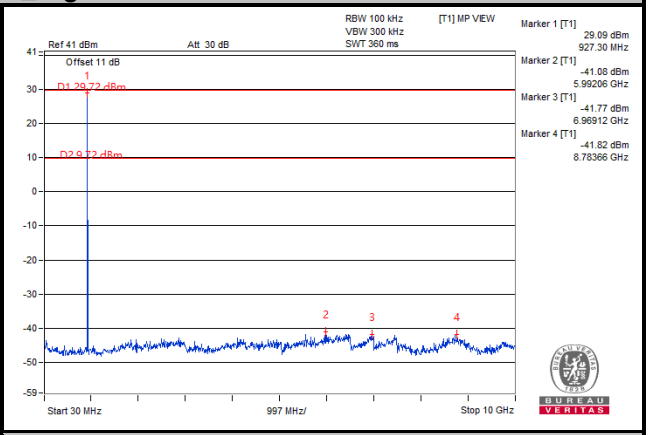
Hopping Disabled_Low Channel



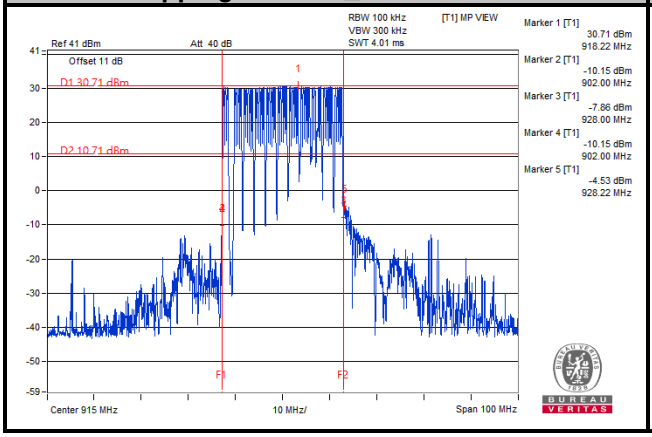


Hopping Disabled_High Channel

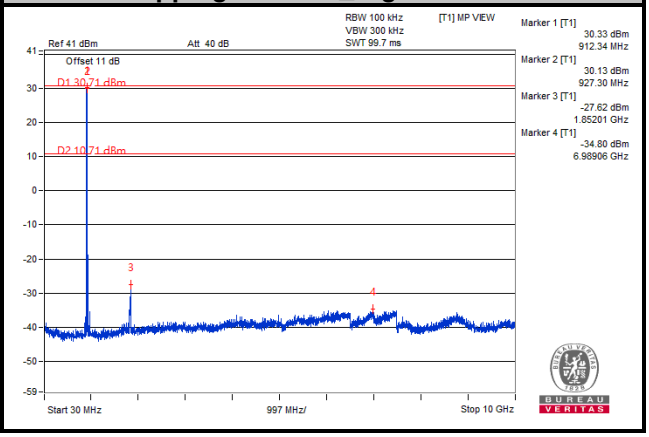




Hopping Enabled_Low Channel

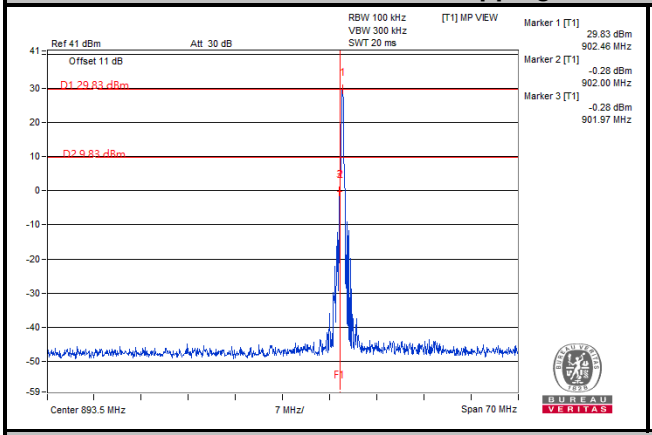


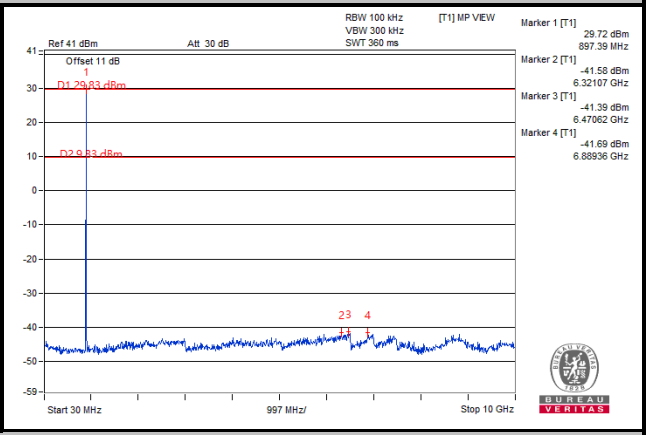
Hopping Enabled_High Channel



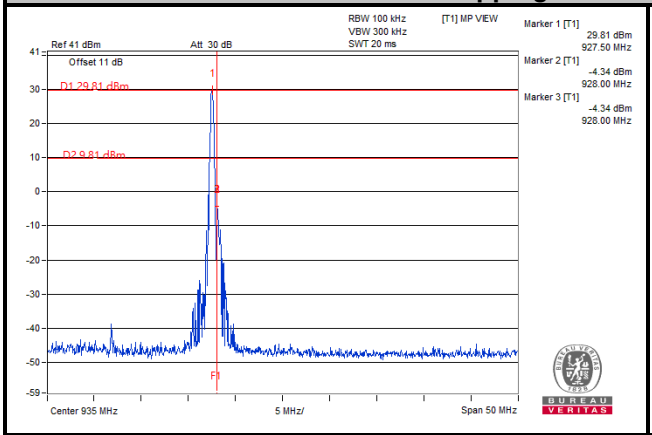
Mode B

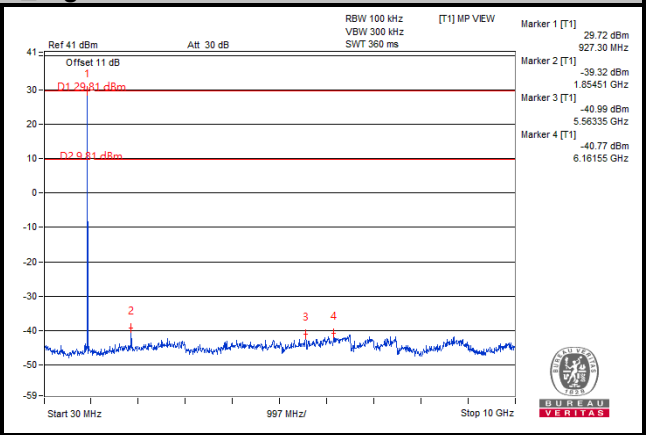
Hopping Disabled_Low Channel



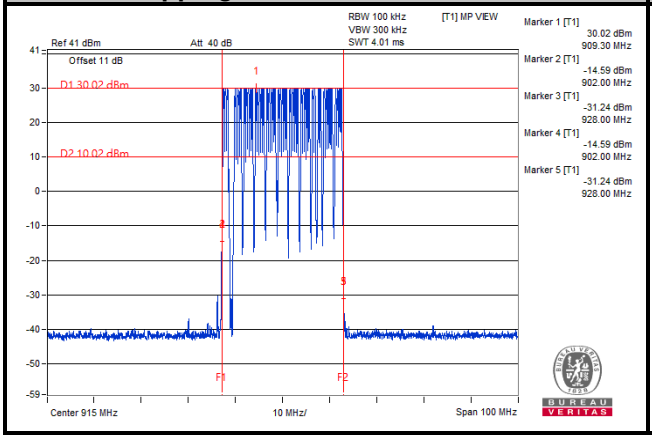


Hopping Disabled_High Channel

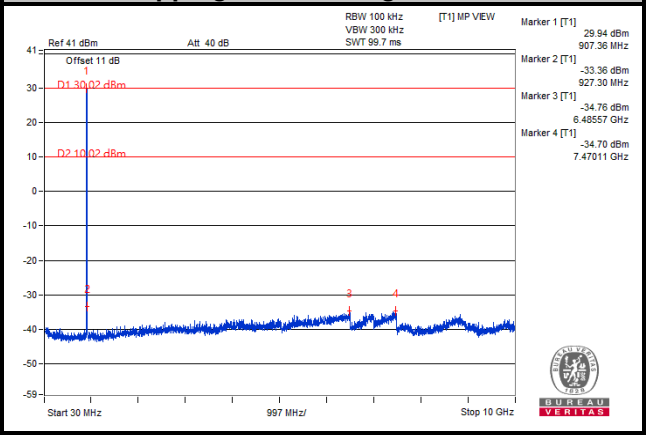




Hopping Enabled_Low Channel



Hopping Enabled_High Channel



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:

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

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