

FCC Test Report

Report No.: RF180509C29-1

FCC ID: RID-LM110H1

Test Model: LM-110H1

Received Date: Mar. 17, 2016

Test Date: May 18 ~ Sep. 08, 2016 (Radiated emission above 1GHz, Antenna port conducted tests)

May 22 ~ May 31, 2018 (Radiated emission below 1GHz, Power line conducted emission tests)

Issued Date: Jun. 01, 2018

Applicant: GlobalSat WorldCom Corporation

Address: 16F., No.186, Jian 1st Rd. Zhonghe Dist., New Taipei City, 235, Taiwan (R.O.C)

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

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

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

FCC Registration / Designation Number: 788550 / TW0003



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 unless 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. This report should 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	8
3.2.1 Test Mode Applicability and Tested Channel Detail	9
3.3 Description of Support Units	10
3.3.1 Configuration of System under Test	10
3.4 General Description of Applied Standards	10
4 Test Types and Results (DTS Mode (500kHz Bandwidth, 42 channels))	11
4.1 Radiated Emission and Bandedge Measurement	11
4.1.1 Limits of Radiated Emission and Bandedge Measurement	11
4.1.2 Test Instruments	12
4.1.3 Test Procedures	14
4.1.4 Deviation from Test Standard	14
4.1.5 Test Setup	15
4.1.6 EUT Operating Conditions	16
4.1.7 Test Results	17
4.2 Conducted Emission Measurement	23
4.2.1 Limits of Conducted Emission Measurement	23
4.2.2 Test Instruments	23
4.2.3 Test Procedures	24
4.2.4 Deviation from Test Standard	24
4.2.5 Test Setup	24
4.2.6 EUT Operating Conditions	24
4.2.7 Test Results	25
4.3 6dB Bandwidth Measurement	31
4.3.1 Limits of 6dB Bandwidth Measurement	31
4.3.2 Test Setup	31
4.3.3 Test Instruments	31
4.3.4 Test Procedure	31
4.3.5 Deviation from Test Standard	31
4.3.6 EUT Operating Conditions	31
4.3.7 Test Result	32
4.4 Conducted Output Power Measurement	33
4.4.1 Limits of Conducted Output Power Measurement	33
4.4.2 Test Setup	33
4.4.3 Test Instruments	33
4.4.4 Test Procedures	33
4.4.5 Deviation from Test Standard	33
4.4.6 EUT Operating Conditions	33
4.4.7 Test Results	33
4.5 Power Spectral Density Measurement	34
4.5.1 Limits of Power Spectral Density Measurement	34
4.5.2 Test Setup	34
4.5.3 Test Instruments	34
4.5.4 Test Procedure	34
4.5.5 Deviation from Test Standard	34
4.5.6 EUT Operating Condition	34

4.5.7 Test Results	35
4.6 Conducted Out of Band Emission Measurement.....	36
4.6.1 Limits of Conducted Out of Band Emission Measurement.....	36
4.6.2 Test Setup.....	36
4.6.3 Test Instruments	36
4.6.4 Test Procedure	36
4.6.5 Deviation from Test Standard	36
4.6.6 EUT Operating Condition	37
4.6.7 Test Results	37
5 Pictures of Test Arrangements.....	39
Appendix – Information on the Testing Laboratories	40

Release Control Record

Issue No.	Description	Date Issued
RF180509C29-1	Original release	Jun. 01, 2018

1 Certificate of Conformity

Product: LoRa Wireless Module

Brand: GlobalSat

Test Model: LM-110H1

Sample Status: Mass product

Applicant: GlobalSat WorldCom Corporation

Test Date: May 18 ~ Sep. 08, 2016 (Radiated emission above 1GHz, Antenna port conducted tests)
May 22 ~ May 31, 2018 (Radiated emission below 1GHz, Power line conducted emission tests)

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 : Sunt Lee , **Date:** Jun. 01, 2018
Sunt Lee / Specialist

Approved by : Bruce Chen , **Date:** Jun. 01, 2018
Bruce Chen / Project Engineer

2 Summary of Test Results

DTS Mode (500kHz Bandwidth, 42 channels)

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 -15.79dB at 0.57620MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.0dB at 928.00MHz.
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 RP SMA not a standard connector.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	LoRa Wireless Module	
Brand	GlobalSat	
Test Model	LM-110H1	
Sample Status	Mass product	
Power Supply Rating	5Vdc (host equipment)	
Modulation Type	FSK, GFSK, OOK	
Transfer Rate	21.9kbps	
Operating Frequency	902~928MHz	
Number of Channel	DTS Mode (500kHz Bandwidth, 42 channels)	42
Channel Spacing	DTS Mode (500kHz Bandwidth, 42 channels)	1.6MHz, 0.7MHz, 0.6MHz
Output Power	DTS Mode (500kHz Bandwidth, 42 channels)	84.723mW
Antenna Type	Refer to Note	
Antenna Connector	Refer to Note	
Accessory Device	NA	
Cable Supplied	NA	

Note:

1. The EUT uses following antenna (support unit).

Antenna Type	Dipole	Antenna Connector	RP SMA
Antenna Gain (dBi)			
902MHz	915MHz	928MHz	
2.95	2.88	2.89	

* The maximum antenna gain is chosen for final test.

3.2 Description of Test Modes

42 channels are provided for DTS Mode (500kHz Bandwidth):

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	902.9	12	909.5	23	916.1	34	922.7
2	903.5	13	910.1	24	916.7	35	923.3
3	904.1	14	910.7	25	917.3	36	923.9
4	904.7	15	911.3	26	917.9	37	924.5
5	905.3	16	911.9	27	918.5	38	925.1
6	905.9	17	912.5	28	919.1	39	925.7
7	906.5	18	913.1	29	919.7	40	926.3
8	907.1	19	913.7	30	920.3	41	926.9
9	907.7	20	914.3	31	920.9	42	927.5
10	908.3	21	914.9	32	921.5		
11	908.9	22	915.5	33	922.1		

3.2.1 Test Mode Applicability and Tested Channel Detail

DTS Mode (500kHz Bandwidth, 42 channels)

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 and modulation type. The worst case was found when positioned on X-plane with FSK modulation.

Radiated Emission Test (Above 1GHz):

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

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 42	1, 21, 42	FSK

Radiated Emission Test (Below 1GHz):

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

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 42	1, 21, 42	FSK

Power Line Conducted Emission Test:

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

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 42	1, 21, 42	FSK

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 42	1, 21, 42	FSK

Test Condition:

Applicable to	Environmental Conditions	Input Power (system)	Tested by
RE $\geq$ 1G	16 deg. C, 70% RH 18 deg. C, 70% RH	120Vac, 60Hz	Nick Hsu
RE<1G	25 deg. C, 65% RH	120Vac, 60Hz	Greg Lin
PLC	23 deg. C, 66% RH	120Vac, 60Hz	Jones Chang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Leo Tsai

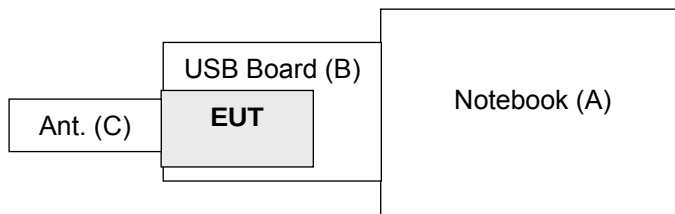
3.3 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	S430	MP-2DBFW	PD92230BNHU	-
B.	USB Board	GlobalSat	GS-EB-LM110H-01-V0.1	NA	NA	Provided by manufacturer
C.	Antenna	GlobalSat	98619ZRSX003-715	NA	NA	Provided by manufacturer

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

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 DTS Meas Guidance v04
FCC KDB Publication Number: 453039
ANSI C63.10:2013

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

4 Test Types and Results (DTS Mode (500kHz Bandwidth, 42 channels))

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 30dB 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 30dB under any condition of modulation.

4.1.2 Test Instruments

Test date: May 18 ~ Sep. 08, 2016

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 16, 2015 Aug. 16, 2016	Aug. 15, 2016 Aug. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	9120D	209	Jan. 20, 2016	Jan. 19, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015 Aug. 22, 2016	Aug. 21, 2016 Aug. 21, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2015 Aug. 22, 2016	Aug. 21, 2016 Aug. 21, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2015 Aug. 22, 2016	Aug. 21, 2016 Aug. 21, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015 Jul. 09, 2016	Jul. 08, 2016 Jul. 08, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2015 Aug. 11, 2016	Aug. 10, 2016 Aug. 10, 2017

- 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 3.
 3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 988962.
 5. The IC Site Registration No. is IC 7450F-3.

Test date: May 22 ~ May 31, 2018

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 11, 2018	Apr. 10, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2017	Aug. 07, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A01638	Feb. 22, 2018	Feb. 21, 2019
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 15, 2018	Jan. 14, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 9.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

Note:

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

For Radiated emission above 30MHz

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

Note:

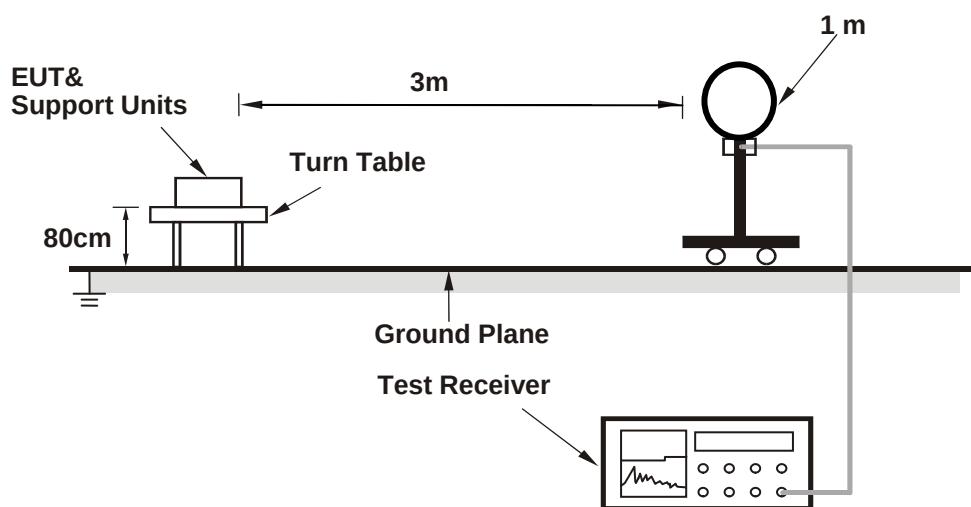
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

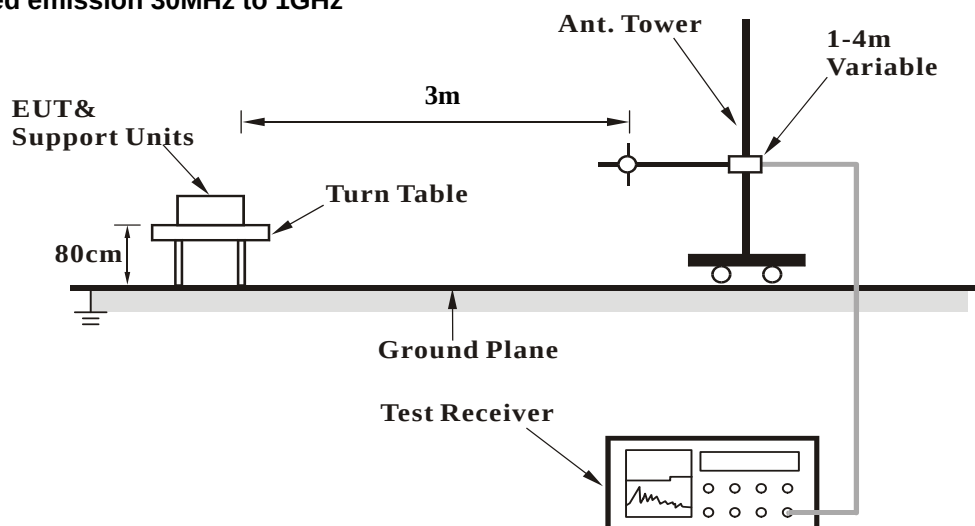
No deviation.

4.1.5 Test Setup

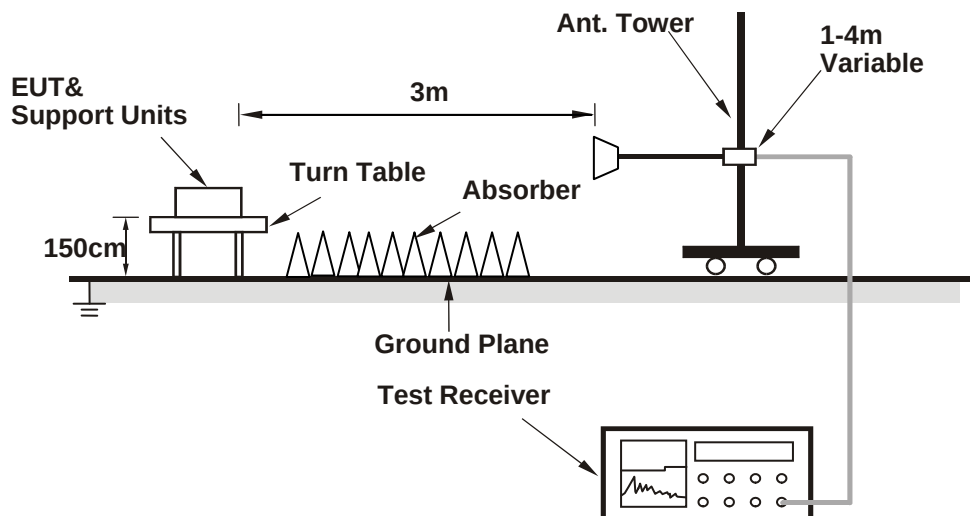
For Radiated emission below 30MHz



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

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

4.1.7 Test Results

Above 1GHz Data:

CHANNEL	TX Channel 1	DETECTOR	Peak (PK)
FREQUENCY RANGE	30MHz ~ 10GHz	FUNCTION	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	902.00	59.2 PK	87.0	-27.8	1.59 H	41	31.0	28.2
2	902.00	54.7 AV	86.8	-32.1	1.59 H	41	26.5	28.2
3	*902.90	117.0 PK			1.59 H	41	88.7	28.3
4	*902.90	116.8 AV			1.59 H	41	88.5	28.3
5	1805.80	48.4 PK	87.0	-38.6	2.52 H	108	51.9	-3.5
6	1805.80	45.0 AV	86.8	-41.8	2.52 H	108	48.5	-3.5
7	2708.70	45.1 PK	74.0	-28.9	1.99 H	57	45.6	-0.5
8	2708.70	39.8 AV	54.0	-14.2	1.99 H	57	40.3	-0.5
9	3611.60	46.6 PK	74.0	-27.4	1.99 H	147	45.2	1.4
10	3611.60	39.6 AV	54.0	-14.4	1.99 H	147	38.2	1.4
11	4514.50	50.9 PK	74.0	-23.1	1.97 H	338	46.5	4.4
12	4514.50	46.3 AV	54.0	-7.7	1.97 H	338	41.9	4.4
13	5417.40	50.7 PK	74.0	-23.3	2.34 H	212	43.9	6.8
14	5417.40	41.6 AV	54.0	-12.4	2.34 H	212	34.8	6.8
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	60.7 PK	89.6	-28.9	1.08 V	305	32.5	28.2
2	902.00	56.6 AV	89.5	-32.9	1.08 V	305	28.4	28.2
3	*902.90	119.6 PK			1.08 V	305	91.3	28.3
4	*902.90	119.5 AV			1.08 V	305	91.2	28.3
5	1805.80	55.5 PK	89.6	-34.1	2.17 V	283	59.0	-3.5
6	1805.80	54.0 AV	89.5	-35.5	2.17 V	283	57.5	-3.5
7	2708.70	46.9 PK	74.0	-27.1	1.73 V	278	47.4	-0.5
8	2708.70	43.1 AV	54.0	-10.9	1.73 V	278	43.6	-0.5
9	3611.60	45.7 PK	74.0	-28.3	1.84 V	282	44.3	1.4
10	3611.60	37.5 AV	54.0	-16.5	1.84 V	282	36.1	1.4
11	4514.50	52.1 PK	74.0	-21.9	2.92 V	331	47.7	4.4
12	4514.50	47.7 AV	54.0	-6.3	2.92 V	331	43.3	4.4
13	5417.40	50.1 PK	74.0	-23.9	2.79 V	291	43.3	6.8
14	5417.40	43.4 AV	54.0	-10.6	2.79 V	291	36.6	6.8

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * " : Fundamental frequency.

CHANNEL	TX Channel 21	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	30MHz ~ 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	*914.90	117.5 PK			1.61 H	41	89.1	28.4
2	*914.90	117.2 AV			1.61 H	41	88.8	28.4
3	1829.80	46.7 PK	74.0	-27.3	1.15 H	111	50.3	-3.6
4	1829.80	43.2 AV	54.0	-10.8	1.15 H	111	46.8	-3.6
5	2744.70	45.0 PK	74.0	-29.0	1.30 H	52	45.4	-0.4
6	2744.70	40.6 AV	54.0	-13.4	1.30 H	52	41.0	-0.4
7	3659.60	47.3 PK	74.0	-26.7	2.00 H	150	45.6	1.7
8	3659.60	40.4 AV	54.0	-13.6	2.00 H	150	38.7	1.7
9	4574.50	47.9 PK	74.0	-26.1	2.01 H	335	43.3	4.6
10	4574.50	41.0 AV	54.0	-13.0	2.01 H	335	36.4	4.6
11	7319.20	56.5 PK	74.0	-17.5	2.24 H	286	43.7	12.8
12	7319.20	49.9 AV	54.0	-4.1	2.24 H	286	37.1	12.8
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	*914.90	119.9 PK			1.09 V	301	91.5	28.4
2	*914.90	119.7 AV			1.09 V	301	91.3	28.4
3	1829.80	51.7 PK	74.0	-22.3	1.82 V	285	55.3	-3.6
4	1829.80	50.8 AV	54.0	-3.2	1.82 V	285	54.4	-3.6
5	2744.70	46.3 PK	74.0	-27.7	1.32 V	262	46.7	-0.4
6	2744.70	42.6 AV	54.0	-11.4	1.32 V	262	43.0	-0.4
7	3659.60	46.0 PK	74.0	-28.0	3.25 V	264	44.3	1.7
8	3659.60	39.9 AV	54.0	-14.1	3.25 V	264	38.2	1.7
9	4574.50	51.2 PK	74.0	-22.8	3.21 V	333	46.6	4.6
10	4574.50	46.7 AV	54.0	-7.3	3.21 V	333	42.1	4.6
11	7319.20	58.2 PK	74.0	-15.8	2.60 V	286	45.4	12.8
12	7319.20	52.7 AV	54.0	-1.3	2.60 V	286	39.9	12.8

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	30MHz ~ 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	*927.50	117.3 PK			1.59 H	36	88.7	28.6
2	*927.50	117.1 AV			1.59 H	36	88.5	28.6
3	928.00	86.0 PK	87.3	-1.3	1.59 H	36	57.3	28.7
4	928.00	80.0 AV	87.1	-7.1	1.59 H	36	51.3	28.7
5	1855.00	44.4 PK	74.0	-29.6	1.79 H	111	48.0	-3.6
6	1855.00	41.4 AV	54.0	-12.6	1.79 H	111	45.0	-3.6
7	2782.50	44.4 PK	74.0	-29.6	1.90 H	53	44.6	-0.2
8	2782.50	39.0 AV	54.0	-15.0	1.90 H	53	39.2	-0.2
9	3710.00	47.0 PK	74.0	-27.0	1.95 H	149	45.2	1.8
10	3710.00	41.3 AV	54.0	-12.7	1.95 H	149	39.5	1.8
11	4637.50	48.3 PK	74.0	-25.7	1.69 H	335	43.5	4.8
12	4637.50	40.6 AV	54.0	-13.4	1.69 H	335	35.8	4.8
13	7420.00	57.3 PK	74.0	-16.7	2.18 H	285	44.3	13.0
14	7420.00	49.9 AV	54.0	-4.1	2.18 H	285	36.9	13.0
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	*927.50	119.8 PK			1.03 V	298	91.2	28.6
2	*927.50	119.6 AV			1.03 V	298	91.0	28.6
3	928.00	88.8 PK	89.8	-1.0	1.03 V	298	60.1	28.7
4	928.00	84.4 AV	89.6	-5.2	1.03 V	298	55.7	28.7
5	1855.00	49.2 PK	74.0	-24.8	1.81 V	285	52.8	-3.6
6	1855.00	47.1 AV	54.0	-6.9	1.81 V	285	50.7	-3.6
7	2782.50	46.3 PK	74.0	-27.7	1.76 V	275	46.5	-0.2
8	2782.50	42.5 AV	54.0	-11.5	1.76 V	275	42.7	-0.2
9	3710.00	47.6 PK	74.0	-26.4	3.25 V	266	45.8	1.8
10	3710.00	41.9 AV	54.0	-12.1	3.25 V	266	40.1	1.8
11	4637.50	51.9 PK	74.0	-22.1	2.69 V	333	47.1	4.8
12	4637.50	47.7 AV	54.0	-6.3	2.69 V	333	42.9	4.8
13	7420.00	58.0 PK	74.0	-16.0	2.58 V	290	45.0	13.0
14	7420.00	52.2 AV	54.0	-1.8	2.58 V	290	39.2	13.0

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz worst-case data:

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	34.85	21.7 QP	40.0	-18.3	1.25 H	223	36.4	-14.7
2	177.44	14.7 QP	43.5	-28.8	1.25 H	203	29.0	-14.3
3	419.94	18.2 QP	46.0	-27.8	1.00 H	52	28.7	-10.5
4	594.54	22.3 QP	46.0	-23.7	1.25 H	234	29.7	-7.4
5	762.35	25.4 QP	46.0	-20.6	1.00 H	170	29.7	-4.3
6	955.38	27.4 QP	46.0	-18.6	1.50 H	258	28.5	-1.1
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	37.76	30.4 QP	40.0	-9.6	1.25 V	320	44.8	-14.4
2	146.40	22.7 QP	43.5	-20.8	1.00 V	74	36.2	-13.5
3	293.84	24.6 QP	46.0	-21.4	1.25 V	74	37.1	-12.5
4	581.93	22.3 QP	46.0	-23.7	1.50 V	97	30.1	-7.8
5	745.86	28.4 QP	46.0	-17.6	1.00 V	333	33.1	-4.7
6	954.41	28.1 QP	46.0	-17.9	1.25 V	176	29.3	-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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 21	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	31.94	24.1 QP	40.0	-15.9	1.00 H	57	39.0	-14.9
2	155.13	15.4 QP	43.5	-28.1	1.25 H	188	28.5	-13.1
3	380.17	17.9 QP	46.0	-28.1	1.00 H	175	28.9	-11.0
4	564.47	22.2 QP	46.0	-23.8	1.50 H	284	30.6	-8.4
5	818.61	26.7 QP	46.0	-19.3	1.50 H	92	30.4	-3.7
6	993.21	28.3 QP	54.0	-25.7	1.25 H	61	29.3	-1.0
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	34.85	34.5 QP	40.0	-5.5	1.50 V	206	49.2	-14.7
2	151.25	16.9 QP	43.5	-26.6	1.00 V	91	30.0	-13.1
3	297.72	20.7 QP	46.0	-25.3	1.25 V	111	33.1	-12.4
4	479.11	20.9 QP	46.0	-25.1	1.00 V	227	30.4	-9.5
5	729.37	26.6 QP	46.0	-19.4	1.00 V	299	31.8	-5.2
6	938.89	27.7 QP	46.0	-18.3	1.00 V	6	29.4	-1.7

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

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	30.00	32.6 QP	40.0	-7.4	1.25 H	210	47.7	-15.1
2	145.43	15.6 QP	43.5	-27.9	1.50 H	223	29.2	-13.6
3	365.62	18.2 QP	46.0	-27.8	1.50 H	336	29.6	-11.4
4	550.89	21.5 QP	46.0	-24.5	1.25 H	3	30.2	-8.7
5	784.66	25.1 QP	46.0	-20.9	1.00 H	199	29.3	-4.2
6	940.83	27.8 QP	46.0	-18.2	1.25 H	122	29.5	-1.7
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	42.61	22.5 QP	40.0	-17.5	1.00 V	299	36.2	-13.7
2	141.55	18.6 QP	43.5	-24.9	1.25 V	101	32.4	-13.8
3	280.26	21.0 QP	46.0	-25.0	1.25 V	121	33.7	-12.7
4	535.37	20.7 QP	46.0	-25.3	1.00 V	265	29.6	-8.9
5	686.69	24.1 QP	46.0	-21.9	1.25 V	200	30.2	-6.1
6	846.74	26.7 QP	46.0	-19.3	1.00 V	16	29.9	-3.2

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Conc_ V7.3.7.3	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 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

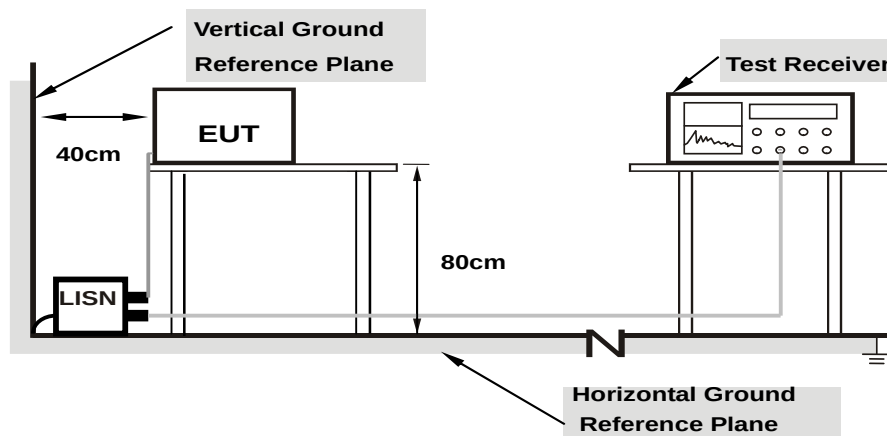
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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.

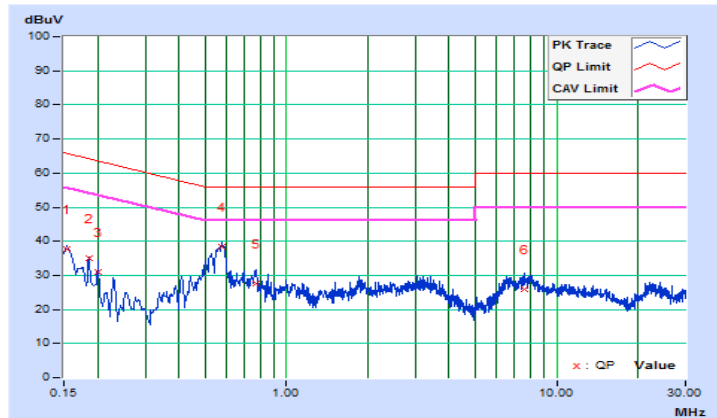
4.2.7 Test Results

Channel	TX Channel 1	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.09	27.65	14.36	37.74	24.45	65.79	55.79	-28.05	-31.34
2	0.18508	10.10	24.87	9.58	34.97	19.68	64.25	54.25	-29.28	-34.57
3	0.20084	10.10	20.81	5.83	30.91	15.93	63.58	53.58	-32.67	-37.65
4	0.57620	10.11	28.35	19.89	38.46	30.00	56.00	46.00	-17.54	-16.00
5	0.77195	10.12	17.46	9.88	27.58	20.00	56.00	46.00	-28.42	-26.00
6	7.60637	10.49	15.50	10.40	25.99	20.89	60.00	50.00	-34.01	-29.11

Remarks:

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

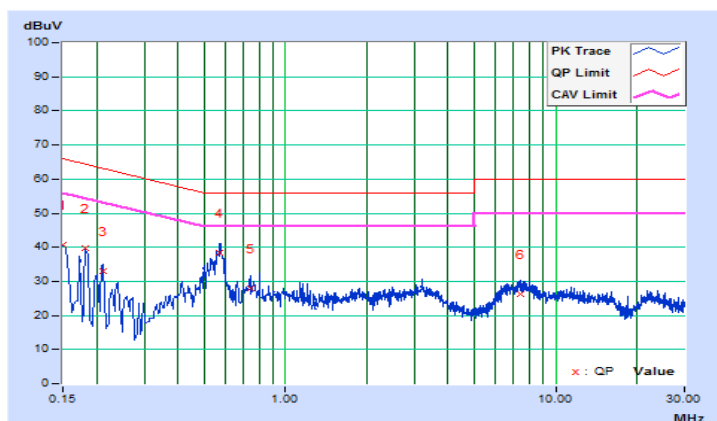


Channel	TX Channel 1	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.09	30.64	20.86	40.73	30.95	66.00	56.00	-25.27	-25.05
2	0.18128	10.09	29.72	14.25	39.81	24.34	64.43	54.43	-24.62	-30.09
3	0.21256	10.09	22.80	8.41	32.89	18.50	63.10	53.10	-30.21	-34.60
4	0.57166	10.11	28.36	19.59	38.47	29.70	56.00	46.00	-17.53	-16.30
5	0.74432	10.12	17.76	10.66	27.88	20.78	56.00	46.00	-28.12	-25.22
6	7.38366	10.43	15.83	10.68	26.26	21.11	60.00	50.00	-33.74	-28.89

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.

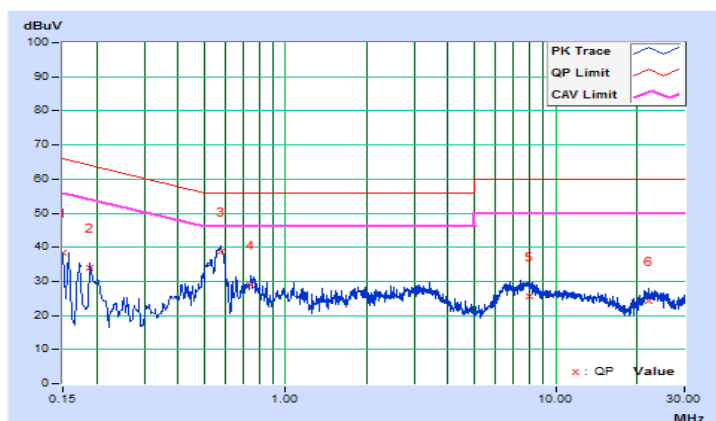


Channel	TX Channel 21	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]	(dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.09	28.34	18.67	38.43	28.76	66.00	56.00	-27.57	-27.24
2	0.18910	10.10	23.74	3.07	33.84	13.17	64.08	54.08	-30.24	-40.91
3	0.57620	10.11	28.61	20.10	38.72	30.21	56.00	46.00	-17.28	-15.79
4	0.74823	10.12	18.82	10.76	28.94	20.88	56.00	46.00	-27.06	-25.12
5	8.05211	10.52	15.18	10.15	25.70	20.67	60.00	50.00	-34.30	-29.33
6	22.01863	11.32	12.90	7.51	24.22	18.83	60.00	50.00	-35.78	-31.17

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.

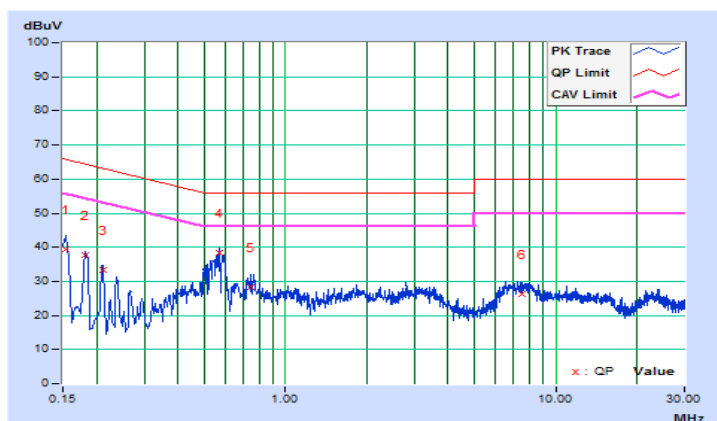


Channel	TX Channel 21	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.09	29.36	16.61	39.45	26.70	65.79	55.79	-26.34	-29.09
2	0.18122	10.09	27.70	14.11	37.79	24.20	64.43	54.43	-26.64	-30.23
3	0.21059	10.09	23.17	9.57	33.26	19.66	63.18	53.18	-29.92	-33.52
4	0.56866	10.11	28.18	19.31	38.29	29.42	56.00	46.00	-17.71	-16.58
5	0.74432	10.12	18.05	10.63	28.17	20.75	56.00	46.00	-27.83	-25.25
6	7.55163	10.44	15.74	10.15	26.18	20.59	60.00	50.00	-33.82	-29.41

Remarks:

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

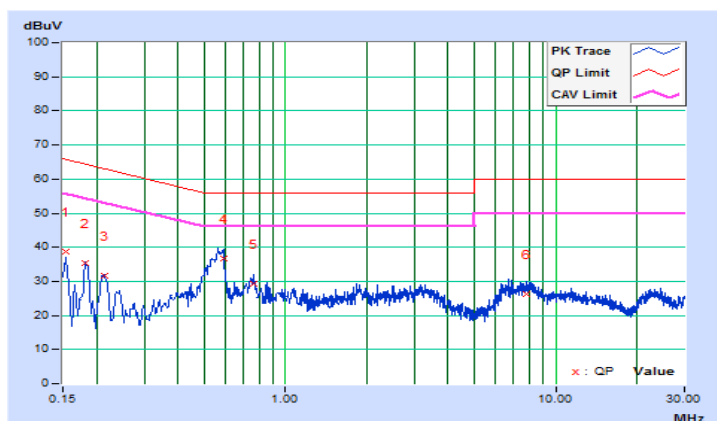


Channel	TX Channel 42	Phase	Line (L)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.09	28.57	16.96	38.66	27.05	65.79	55.79	-27.13	-28.74
2	0.18122	10.10	25.22	11.06	35.32	21.16	64.43	54.43	-29.11	-33.27
3	0.21282	10.10	21.45	9.17	31.55	19.27	63.09	53.09	-31.54	-33.82
4	0.58792	10.11	26.47	18.16	36.58	28.27	56.00	46.00	-19.42	-17.73
5	0.75996	10.12	19.12	10.42	29.24	20.54	56.00	46.00	-26.76	-25.46
6	7.76668	10.50	15.61	10.26	26.11	20.76	60.00	50.00	-33.89	-29.24

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.

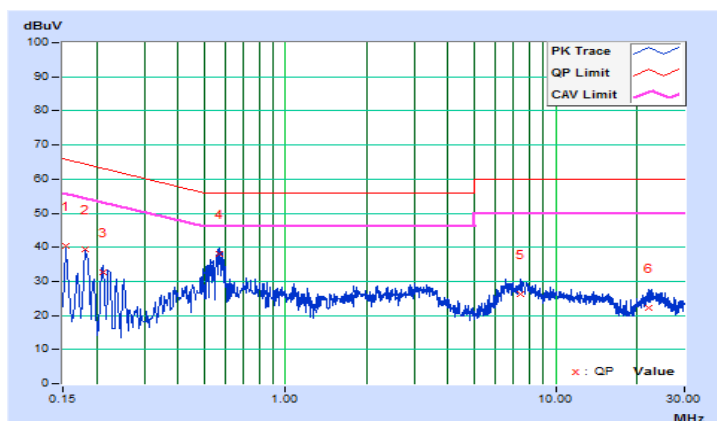


Channel	TX Channel 42	Phase	Neutral (N)
Detector Function	Quasi-Peak (QP) / Average (AV)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.09	30.19	19.15	40.28	29.24	65.79	55.79	-25.51	-26.55
2	0.18122	10.09	29.36	13.76	39.45	23.85	64.43	54.43	-24.98	-30.58
3	0.21170	10.09	22.71	8.51	32.80	18.60	63.14	53.14	-30.34	-34.54
4	0.56837	10.11	28.05	19.44	38.16	29.55	56.00	46.00	-17.84	-16.45
5	7.41478	10.43	15.83	10.50	26.26	20.93	60.00	50.00	-33.74	-29.07
6	22.21022	11.04	11.11	6.23	22.15	17.27	60.00	50.00	-37.85	-32.73

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.

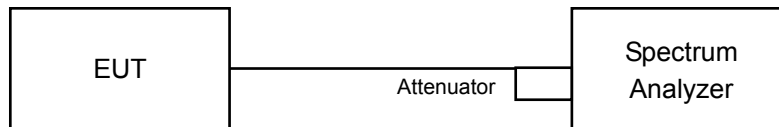


4.3 6dB Bandwidth Measurement

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

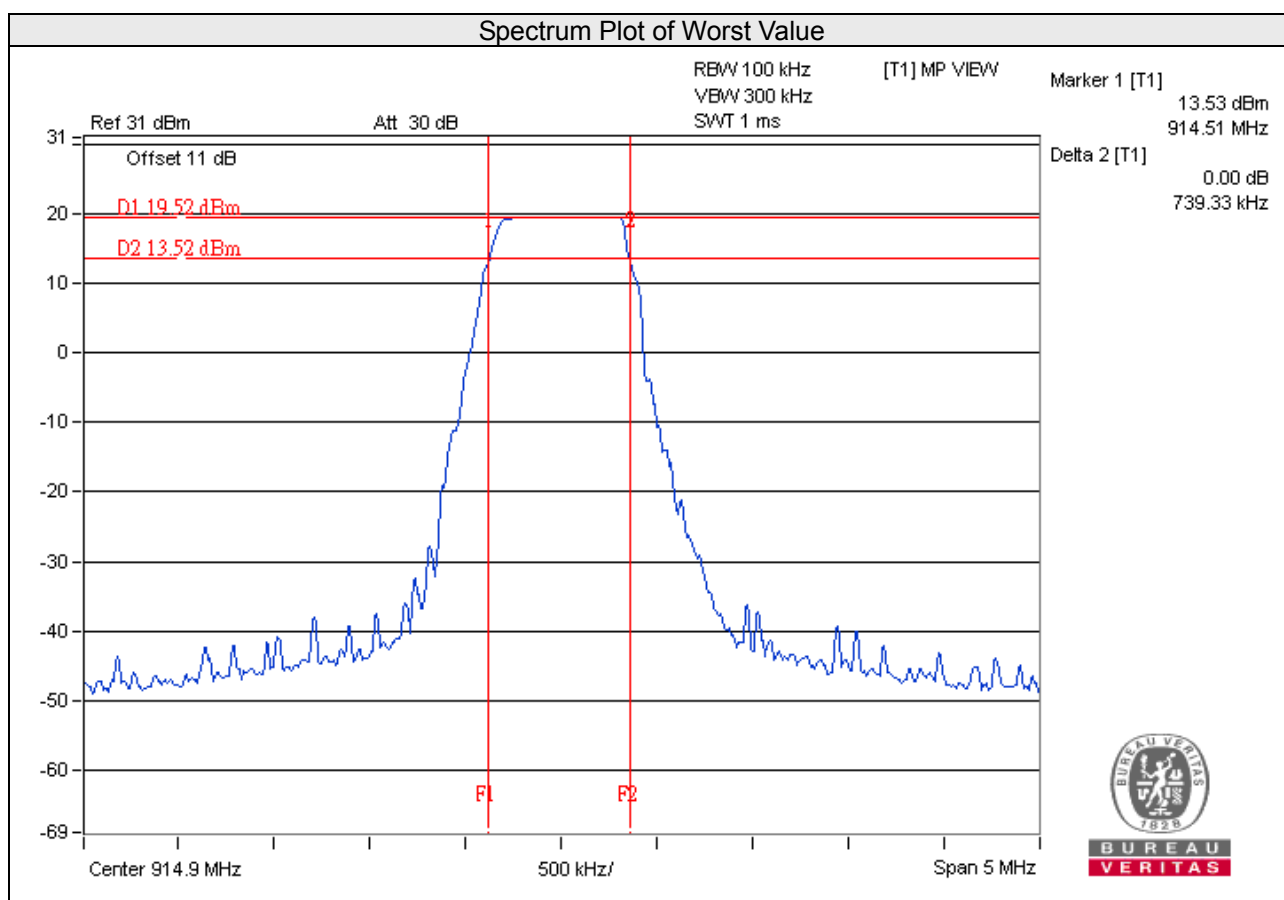
No deviation.

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 Result

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	902.9	0.71	0.5	Pass
21	914.9	0.73	0.5	Pass
42	927.5	0.71	0.5	Pass

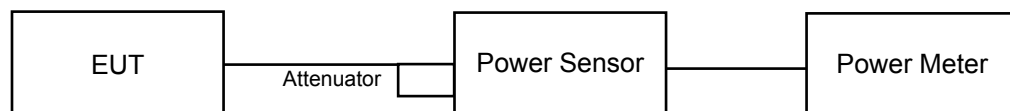


4.4 Conducted Output Power Measurement

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

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as 4.3.6.

4.4.7 Test Results

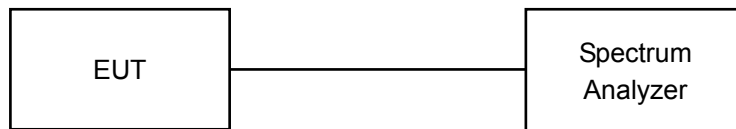
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	902.9	84.723	19.28	30	Pass
21	914.9	84.333	19.26	30	Pass
42	927.5	83.946	19.24	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

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 instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

4.5.5 Deviation from Test Standard

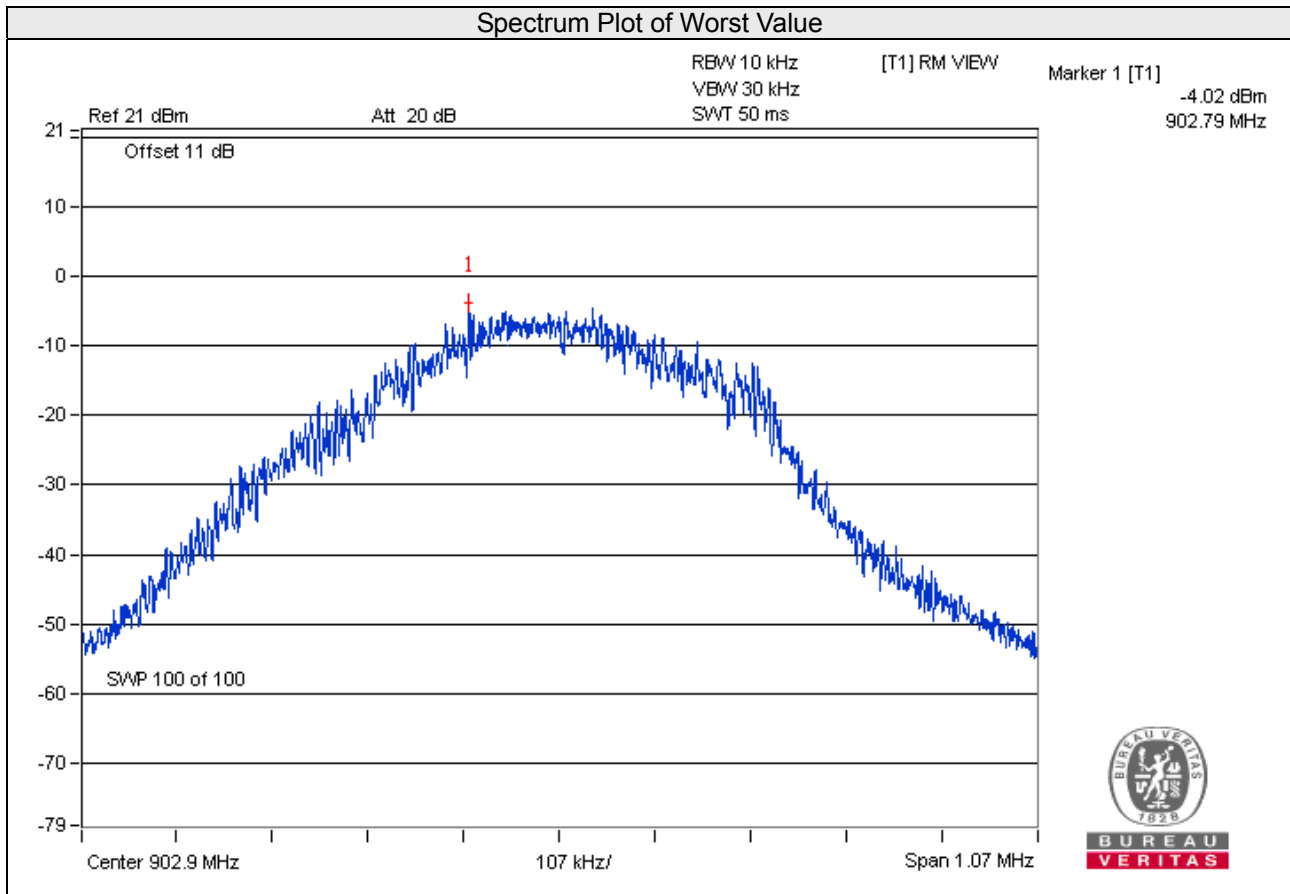
No deviation.

4.5.6 EUT Operating Condition

Same as 4.3.6

4.5.7 Test Results

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	902.9	-4.02	8	Pass
21	914.9	-4.14	8	Pass
42	927.5	-4.47	8	Pass

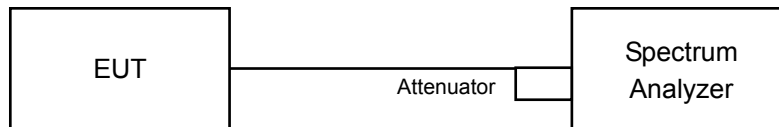


4.6 Conducted Out of Band Emission Measurement

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

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

Measurement Procedure OOB

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

4.6.5 Deviation from Test Standard

No deviation.

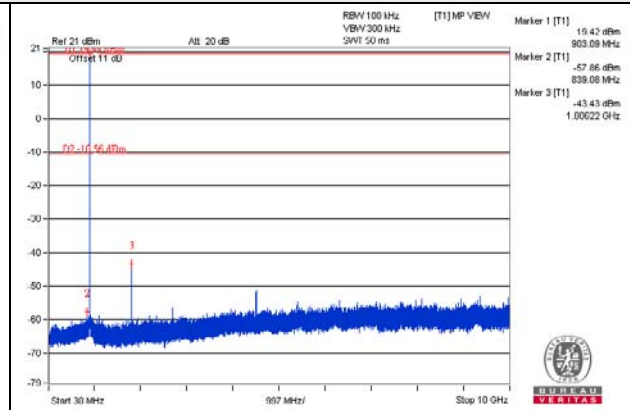
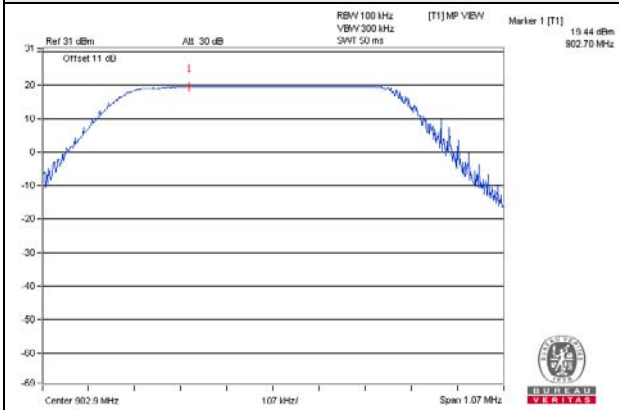
4.6.6 EUT Operating Condition

Same as 4.3.6

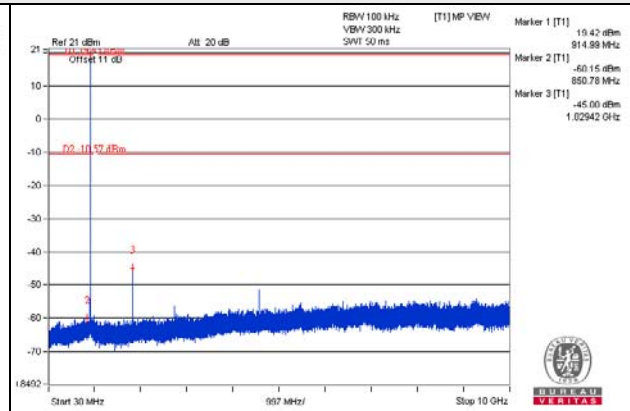
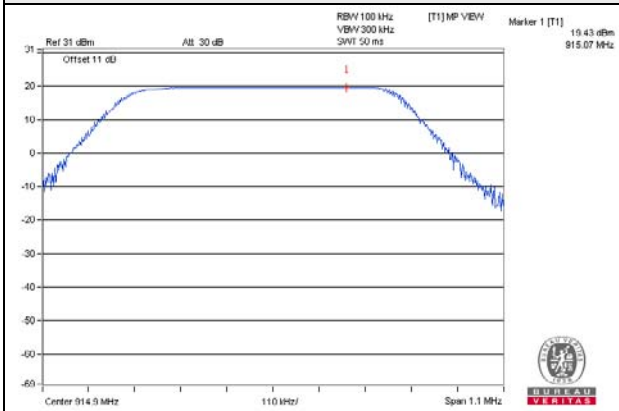
4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

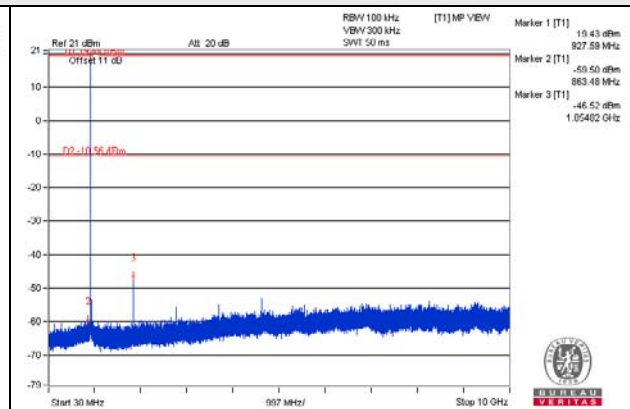
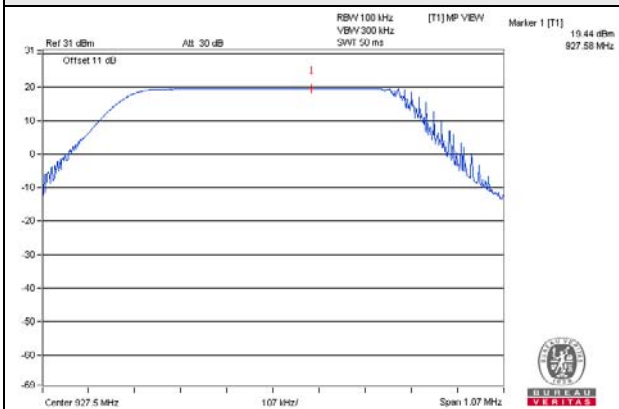
CH 1



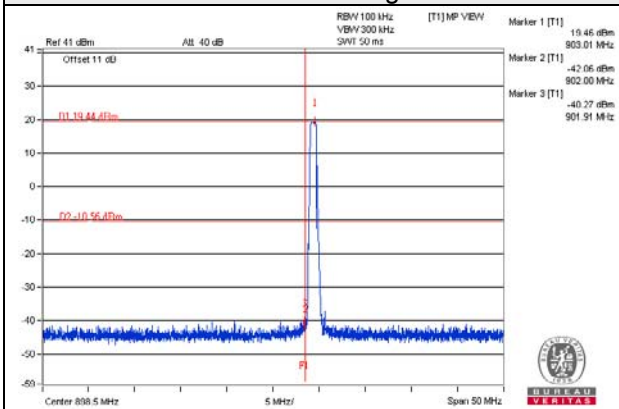
CH 21



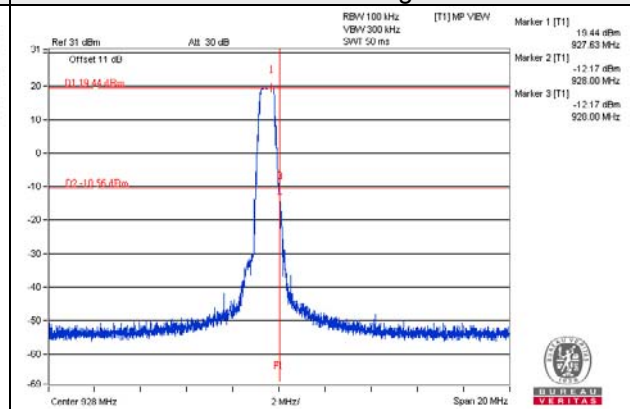
CH 42



CH 1 Band edge



CH 42 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

Linko 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 ---