FCC Test Report

Report No.:	RF150810C22A-1
FCC ID:	PZWBHT1200QU
Test Model:	BHT-1281QULWB-CE
Received Date:	Aug. 04, 2015
Test Date:	Aug. 04 ~ Aug. 24, 2015
Issued Date:	Aug. 24, 2015
Applicant:	DENSO WAVE INCORPORATED
Address:	1, Yoshiike, Kusagi, Agui-cho, Chita-gun, Aichi, 470-2297 Japan
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.)

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Release Control Record

Issue No.	Description	Date Issued
RF150810C22A-1	Original release	Aug. 24, 2015

1 Certificate of Conformity

Product:	2D Code Handy Terminal
Brand:	DENSO
Test Model:	BHT-1281QULWB-CE
Sample Status:	Mass Production
Applicant:	DENSO WAVE INCORPORATED
Test Date:	Aug. 04 ~ Aug. 24, 2015
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

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

Prepared by : Polly Chien / Specialist , **Date:** Aug. 24, 2015

Approved by : Ken Liu / Senior Manager , **Date:** Aug. 24, 2015

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 -7.33dB at 0.44557MHz.
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)(2)	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 -2.7dB at 45.45MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -34.3dB at 902.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

NOTE: If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 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	2D Code Handy Terminal
Brand	DENSO
Test Model	BHT-1281QULWB-CE
Status of EUT	Mass Production
Power Supply Rating	3.7Vdc from battery 12Vdc from cradle
Modulation Type	PSK
Channel Spacing	500kHz
Operating Frequency	902.75~927.25 MHz
Number of Channel	50
Output Power	510.505mW
Antenna Type	Inverted- F antenna with 4dBi gain
Antenna Connector	NA
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The following devices are support units only.

Device	Brand Name	Model No.	Remark
Battery	DENSO	BT-110L	Rating: 3.7Vdc, 3450mAh, 12.8Wh
Cradle	DENSO	CU-1233	12Vdc, 1.8A
AC adapter for cradle	FSP	FSP050-DBAE1	I/P: 100-240Vac, 1.5A, 50/60Hz O/P: 12.0Vdc, 4.16A MAX (50W Max) AC 1.7m power cable without core DC 1.2m power cable with 1 core

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

3.2 Description of Test Modes

50 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.75	25	915.25
1	903.25	26	915.75
2	903.75	27	916.25
3	904.25	28	916.75
4	904.75	29	917.25
5	905.25	30	917.75
6	905.75	31	918.25
7	906.25	32	918.75
8	906.75	33	919.25
9	907.25	34	919.75
10	907.75	35	920.25
11	908.25	36	920.75
12	908.75	37	921.25
13	909.25	38	921.75
14	909.75	39	922.25
15	910.25	40	922.75
16	910.75	41	923.25
17	911.25	42	923.75
18	911.75	43	924.25
19	912.25	44	924.75
20	912.75	45	925.25
21	913.25	46	925.75
22	913.75	47	926.25
23	914.25	48	926.75
24	914.75	49	927.25

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	-	√	EUT + Battery mode
B	-	√	√	-	EUT + Cradle mode

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
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**.
2. "-" means no effect.

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 TECHNOLOGY
A	0 to 49	0, 24, 49	PSK

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 TECHNOLOGY
A, B	0 to 49	0, 24, 49	PSK

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
B	0 to 49	0, 24, 49	PSK

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
B	0 to 49	0, 24, 49	PSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	18deg. C, 70%RH	3.7Vdc (Battery)	Nick Hsu
RE<1G	18deg. C, 70%RH	120Vac, 60Hz (System) 3.7Vdc (Battery)	Nick Hsu
PLC	24deg. C, 64%RH	120Vac, 60Hz (System)	Jones Chang, Match Tsui
APCM	25deg. C, 60%RH	3.7Vdc (Battery)	Nick Hsu

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.	Cradle	DENSO	CU-1233	NA	NA	Provided by client.
B.	AC adapter for cradle	FSP	FSP050-DBAE1	NA	NA	Provided by client.
C.	Battery	DENSO	BT-110L	NA	NA	Provided by client.

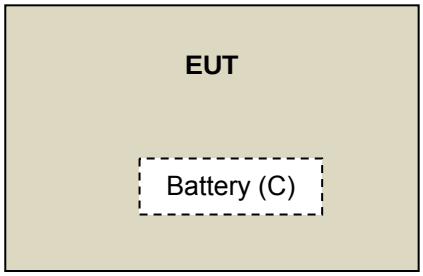
Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.8	Y	0	-
2.	RS232 cable	1	1.8	Y	0	-
3.	AC Power cable	1	1.7	-	0	Provided by client.
4.	DC Power cable	1	1.2	-	1	Provided by client.

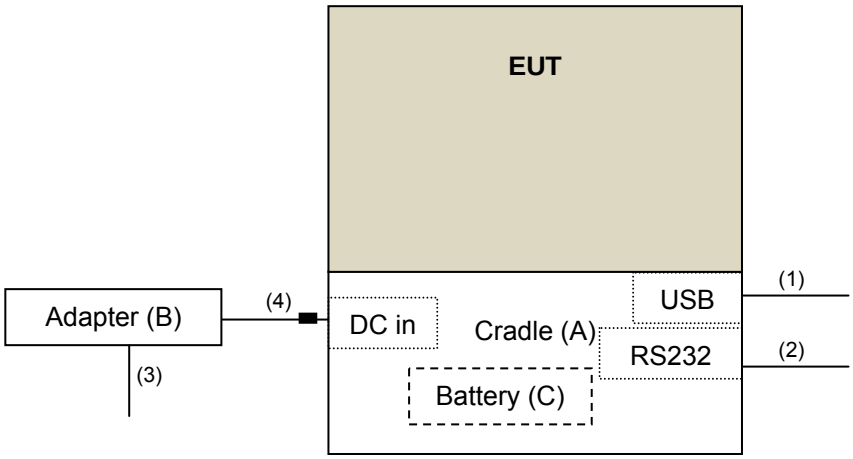
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

Test mode A



Test mode B



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)
ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class A (Verification). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Aug. 29, 2014	Aug. 28, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
			Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
			Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
			Aug. 22, 2015	Aug. 21, 2016
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. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016

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 4.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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 detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note:

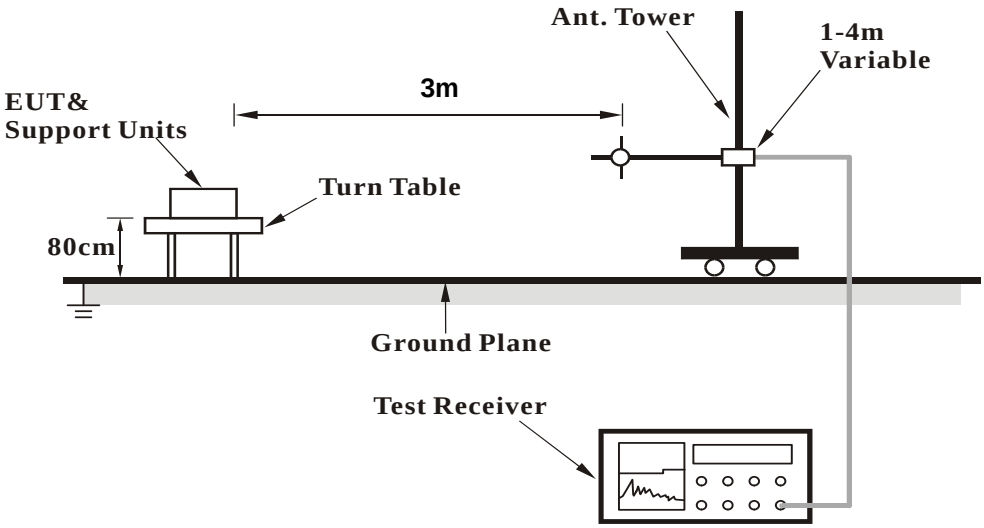
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. For Average measurement, due to the DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 / 100)= -30.1 dB, therefore Average value = peak reading + 20log(duty cycle).
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

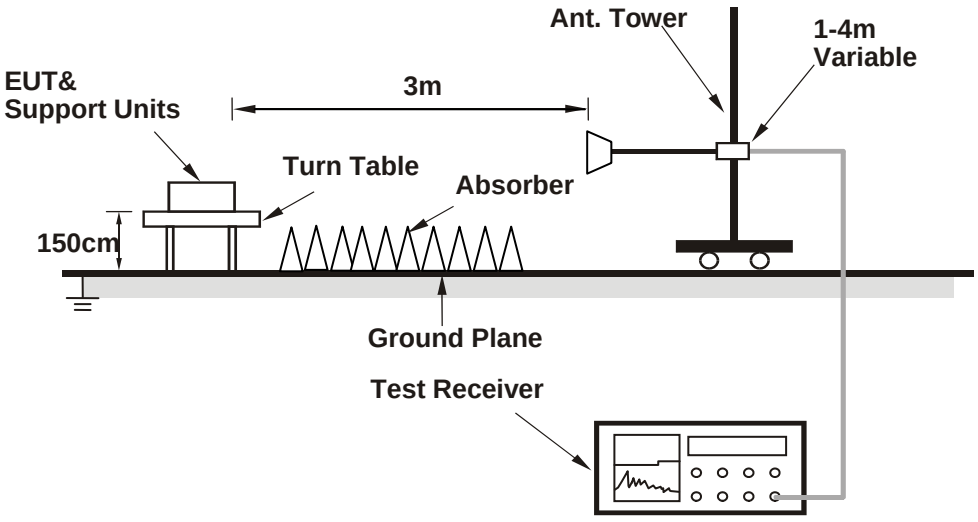
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range 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 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#902.00	66.2 PK	102.5	-36.3	1.46 H	35	38.50	27.70
2	#902.00	56.5 AV	99.3	-42.8	1.46 H	35	28.80	27.70
3	*902.75	122.5 PK			1.53 H	1	94.80	27.70
4	*902.75	119.3 AV			1.53 H	1	91.60	27.70
5	2708.25	49.1 PK	74.0	-24.9	1.15 H	184	50.30	-1.20
6	2708.25	48.2 AV	54.0	-5.8	1.15 H	184	49.40	-1.20
7	3611.00	50.0 PK	74.0	-24.0	1.00 H	285	49.00	1.00
8	3611.00	47.4 AV	54.0	-6.6	1.00 H	285	46.40	1.00
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	65.1 PK	103.7	-38.6	1.13 V	5	37.40	27.70
2	#902.00	56.1 AV	100.2	-44.1	1.13 V	5	28.40	27.70
3	*902.75	123.7 PK			1.20 V	7	96.00	27.70
4	*902.75	120.2 AV			1.20 V	7	92.50	27.70
5	2708.25	49.1 PK	74.0	-24.9	1.00 V	216	50.30	-1.20
6	2708.25	47.7 AV	54.0	-6.3	1.00 V	216	48.90	-1.20
7	3611.00	49.6 PK	74.0	-24.4	1.32 V	215	48.60	1.00
8	3611.00	47.2 AV	54.0	-6.8	1.32 V	215	46.20	1.00

REMARKS:

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

CHANNEL	TX Channel 24	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*914.75	123.8 PK			1.57 H	7	95.80	28.00
2	*914.75	120.0 AV			1.57 H	7	92.00	28.00
3	2744.25	48.7 PK	74.0	-25.3	1.08 H	237	49.80	-1.10
4	2744.25	46.0 AV	54.0	-8.0	1.08 H	237	47.10	-1.10
5	3659.00	52.9 PK	74.0	-21.1	1.00 H	289	51.60	1.30
6	3659.00	50.2 AV	54.0	-3.8	1.00 H	289	48.90	1.30
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	*914.75	124.2 PK			1.16 V	9	96.20	28.00
2	*914.75	121.0 AV			1.16 V	9	93.00	28.00
3	2744.25	48.1 PK	74.0	-25.9	1.00 V	200	49.20	-1.10
4	2744.25	46.8 AV	54.0	-7.2	1.00 V	200	47.90	-1.10
5	3659.00	50.2 PK	74.0	-23.8	1.00 V	216	48.90	1.30
6	3659.00	47.7 AV	54.0	-6.3	1.00 V	216	46.40	1.30

REMARKS:

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

CHANNEL	TX Channel 49	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*927.25	122.7 PK			1.51 H	2	94.50	28.20
2	*927.25	119.4 AV			1.51 H	2	91.20	28.20
3	#928.00	63.7 PK	102.7	-39.0	1.10 H	11	35.50	28.20
4	#928.00	55.4 AV	99.4	-44.0	1.10 H	11	27.20	28.20
5	2781.75	44.3 PK	74.0	-29.7	1.10 H	178	45.30	-1.00
6	2781.75	34.7 AV	54.0	-19.3	1.10 H	178	35.70	-1.00
7	3709.00	50.7 PK	74.0	-23.3	1.00 H	287	49.20	1.50
8	3709.00	46.4 AV	54.0	-7.6	1.00 H	287	44.90	1.50
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	*927.25	124.1 PK			1.18 V	352	95.90	28.20
2	*927.25	120.6 AV			1.18 V	352	92.40	28.20
3	#928.00	67.2 PK	104.1	-36.9	1.21 V	3	39.00	28.20
4	#928.00	57.0 AV	100.6	-43.6	1.21 V	3	28.80	28.20
5	2781.75	47.0 PK	74.0	-27.0	1.02 V	200	48.00	-1.00
6	2781.75	43.3 AV	54.0	-10.7	1.02 V	200	44.30	-1.00
7	3709.00	49.6 PK	74.0	-24.4	1.05 V	173	48.10	1.50
8	3709.00	45.9 AV	54.0	-8.1	1.05 V	173	44.40	1.50

REMARKS:

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

BELOW 1GHz WORST-CASE DATA:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	189.33	31.0 QP	43.5	-12.5	1.50 H	59	47.00	-16.00
2	276.82	34.3 QP	46.0	-11.7	1.01 H	112	47.30	-13.00
3	348.76	32.9 QP	46.0	-13.1	1.01 H	271	44.50	-11.60
4	444.03	36.7 QP	46.0	-9.3	2.00 H	41	46.10	-9.40
5	469.31	38.5 QP	46.0	-7.5	2.00 H	47	47.40	-8.90
6	817.34	33.2 QP	46.0	-12.8	1.01 H	203	35.10	-1.90
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	**45.45**	**37.3 QP**	**40.0**	**-2.7**	**1.49 V**	**9**	**52.10**	**-14.80**
2	195.16	24.4 QP	43.5	-19.1	1.00 V	331	40.90	-16.50
3	276.82	26.1 QP	46.0	-19.9	1.00 V	195	39.10	-13.00
4	348.76	25.0 QP	46.0	-21.0	1.00 V	141	36.60	-11.60
5	469.31	30.5 QP	46.0	-15.5	1.99 V	177	39.40	-8.90
6	930.11	35.3 QP	46.0	-10.7	1.49 V	9	35.20	0.10

REMARKS:

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

CHANNEL	TX Channel 24	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	189.33	30.5 QP	43.5	-13.0	1.49 H	64	46.50	-16.00
2	276.82	34.8 QP	46.0	-11.2	1.00 H	88	47.80	-13.00
3	372.09	33.4 QP	46.0	-12.6	1.00 H	35	44.40	-11.00
4	444.03	36.5 QP	46.0	-9.5	1.99 H	43	45.90	-9.40
5	469.31	37.6 QP	46.0	-8.4	1.99 H	43	46.50	-8.90
6	897.05	36.5 QP	46.0	-9.5	1.49 H	337	37.20	-0.70
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	47.40	36.4 QP	40.0	-3.6	1.01 V	14	51.00	-14.60
2	59.06	31.1 QP	40.0	-8.9	1.01 V	15	45.90	-14.80
3	191.28	23.7 QP	43.5	-19.8	1.01 V	148	39.90	-16.20
4	276.82	26.1 QP	46.0	-19.9	1.01 V	191	39.10	-13.00
5	372.09	26.0 QP	46.0	-20.0	1.01 V	165	37.00	-11.00
6	469.31	30.4 QP	46.0	-15.6	2.00 V	171	39.30	-8.90

REMARKS:

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

CHANNEL	TX Channel 49	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	45.45	26.7 QP	40.0	-13.3	1.51 H	110	41.50	-14.80
2	189.33	29.9 QP	43.5	-13.6	1.51 H	66	45.90	-16.00
3	276.82	34.4 QP	46.0	-11.6	1.01 H	105	47.40	-13.00
4	372.09	34.1 QP	46.0	-11.9	1.01 H	37	45.10	-11.00
5	469.31	37.5 QP	46.0	-8.5	2.00 H	40	46.40	-8.90
6	900.94	37.6 QP	46.0	-8.4	1.51 H	14	38.20	-0.60
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	47.40	36.6 QP	40.0	-3.4	1.50 V	316	51.20	-14.60
2	61.01	31.1 QP	40.0	-8.9	1.50 V	8	46.30	-15.20
3	195.16	23.1 QP	43.5	-20.4	1.00 V	133	39.60	-16.50
4	469.31	30.3 QP	46.0	-15.7	1.99 V	173	39.20	-8.90
5	729.84	28.3 QP	46.0	-17.7	1.00 V	243	31.90	-3.60
6	897.05	33.2 QP	46.0	-12.8	1.00 V	10	33.90	-0.70

REMARKS:

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

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	148.50	30.2 QP	43.5	-13.3	1.00 H	116	44.20	-14.00
2	189.33	34.6 QP	43.5	-8.9	1.50 H	259	50.60	-16.00
3	251.55	32.2 QP	46.0	-13.8	1.00 H	258	46.50	-14.30
4	348.76	32.2 QP	46.0	-13.8	1.00 H	196	43.80	-11.60
5	469.31	33.7 QP	46.0	-12.3	1.99 H	50	42.60	-8.90
6	673.46	33.6 QP	46.0	-12.4	1.00 H	279	38.50	-4.90
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	148.50	31.0 QP	43.5	-12.5	1.01 V	257	45.00	-14.00
2	195.16	28.9 QP	43.5	-14.6	1.50 V	6	45.40	-16.50
3	348.76	37.4 QP	46.0	-8.6	1.50 V	270	49.00	-11.60
4	372.09	35.7 QP	46.0	-10.3	1.50 V	293	46.70	-11.00
5	444.03	37.3 QP	46.0	-8.7	1.01 V	248	46.70	-9.40
6	469.31	37.3 QP	46.0	-8.7	1.01 V	248	46.20	-8.90

REMARKS:

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

CHANNEL	TX Channel 24	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	167.94	28.7 QP	43.5	-14.8	1.50 H	76	43.00	-14.30
2	189.33	33.3 QP	43.5	-10.2	2.00 H	268	49.30	-16.00
3	251.55	31.1 QP	46.0	-14.9	1.01 H	250	45.40	-14.30
4	348.76	30.4 QP	46.0	-15.6	1.01 H	201	42.00	-11.60
5	469.31	30.7 QP	46.0	-15.3	1.50 H	48	39.60	-8.90
6	648.18	31.1 QP	46.0	-14.9	1.01 H	261	36.30	-5.20
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	142.67	30.3 QP	43.5	-13.2	1.00 V	272	44.70	-14.40
2	195.16	29.2 QP	43.5	-14.3	1.49 V	15	45.70	-16.50
3	348.76	37.0 QP	46.0	-9.0	1.49 V	265	48.60	-11.60
4	372.09	35.7 QP	46.0	-10.3	1.49 V	268	46.70	-11.00
5	444.03	36.6 QP	46.0	-9.4	1.00 V	243	46.00	-9.40
6	469.31	36.8 QP	46.0	-9.2	1.00 V	238	45.70	-8.90

REMARKS:

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

CHANNEL	TX Channel 49	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	189.33	32.4 QP	43.5	-11.1	1.50 H	273	48.40	-16.00
2	251.55	30.7 QP	46.0	-15.3	1.00 H	234	45.00	-14.30
3	348.76	31.0 QP	46.0	-15.0	1.00 H	208	42.60	-11.60
4	444.03	30.6 QP	46.0	-15.4	2.00 H	58	40.00	-9.40
5	648.18	30.1 QP	46.0	-15.9	1.00 H	270	35.30	-5.20
6	768.73	32.4 QP	46.0	-13.6	1.50 H	285	35.20	-2.80
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	148.50	30.8 QP	43.5	-12.7	1.01 V	284	44.80	-14.00
2	276.82	30.3 QP	46.0	-15.7	1.50 V	16	43.30	-13.00
3	348.76	36.7 QP	46.0	-9.3	1.50 V	79	48.30	-11.60
4	372.09	35.1 QP	46.0	-10.9	1.50 V	122	46.10	-11.00
5	444.03	35.7 QP	46.0	-10.3	1.01 V	236	45.10	-9.40
6	469.31	35.6 QP	46.0	-10.4	1.01 V	234	44.50	-8.90

REMARKS:

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

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 11, 2014	Nov. 10, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ 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

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

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

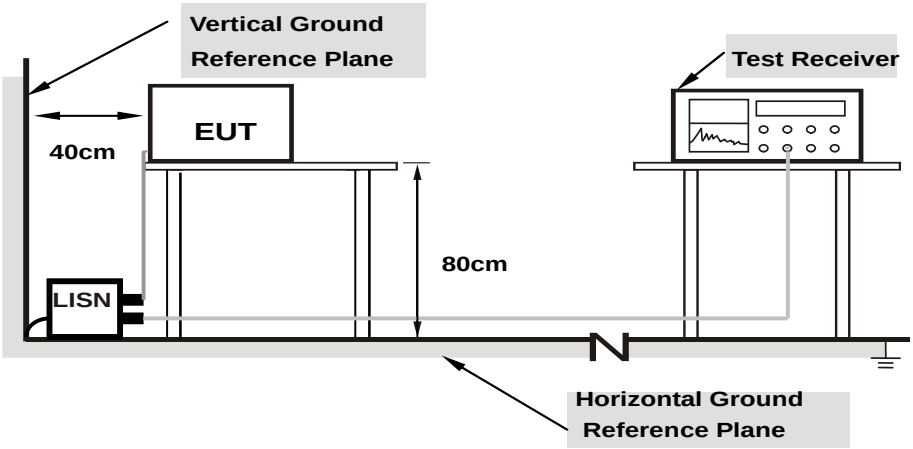
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation From Test Standard

No deviation.

4.2.5 Test Setup



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

Same as 4.1.6.

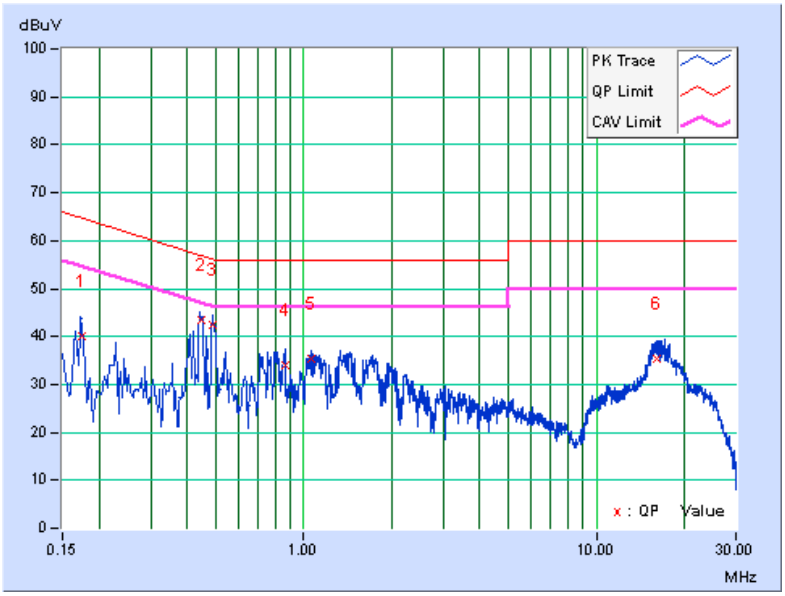
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 0		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17474	0.05	40.05	25.54	40.10	25.59	64.73	54.73	-24.63	-29.14
2	0.44552	0.06	43.28	36.57	43.34	36.63	56.96	46.96	-13.62	-10.33
3	0.48759	0.06	42.25	35.57	42.31	35.63	56.21	46.21	-13.90	-10.58
4	0.86238	0.08	33.89	25.61	33.97	25.69	56.00	46.00	-22.03	-20.31
5	1.06596	0.08	35.28	24.24	35.36	24.32	56.00	46.00	-20.64	-21.68
6	16.11147	0.73	34.69	28.74	35.42	29.47	60.00	50.00	-24.58	-20.53

REMARKS:

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

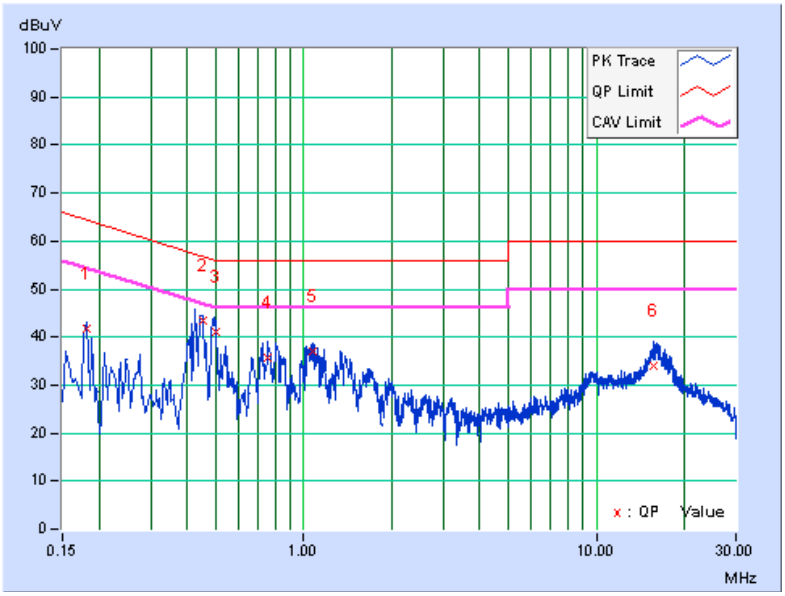


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 0		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18129	0.05	41.57	33.25	41.62	33.30	64.43	54.43	-22.81	-21.13
2	0.45285	0.06	43.38	38.51	43.44	38.57	56.82	46.82	-13.38	-8.25
3	0.50266	0.06	40.87	32.42	40.93	32.48	56.00	46.00	-15.07	-13.52
4	0.75308	0.07	35.47	29.29	35.54	29.36	56.00	46.00	-20.46	-16.64
5	1.07357	0.08	37.08	28.69	37.16	28.77	56.00	46.00	-18.84	-17.23
6	15.77358	0.60	33.45	27.06	34.05	27.66	60.00	50.00	-25.95	-22.34

REMARKS:

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

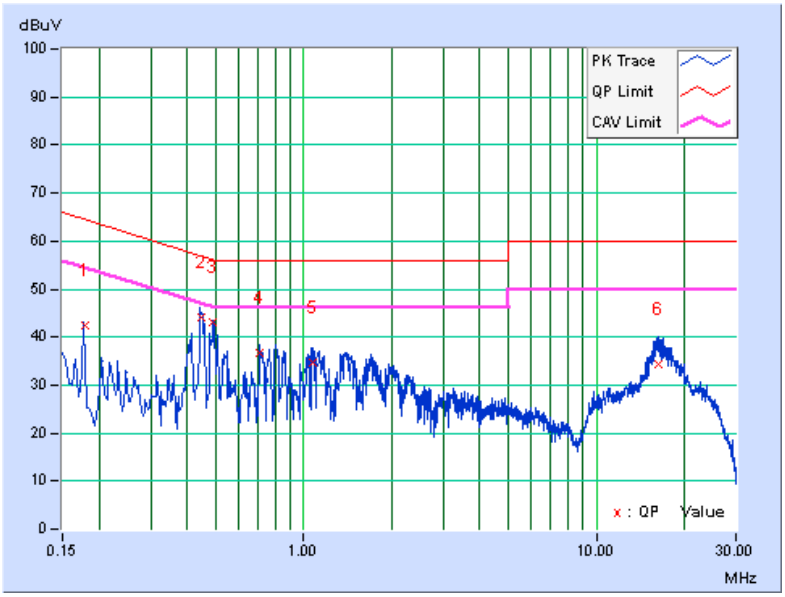


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 24		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17863	0.06	42.23	31.08	42.29	31.14	64.55	54.55	-22.26	-23.41
2	0.44458	0.06	44.05	38.25	44.11	38.31	56.98	46.98	-12.86	-8.66
3	0.49163	0.06	42.98	36.87	43.04	36.93	56.14	46.14	-13.10	-9.21
4	0.70987	0.07	36.72	27.08	36.79	27.15	56.00	46.00	-19.21	-18.85
5	1.07752	0.08	34.58	26.88	34.66	26.96	56.00	46.00	-21.34	-19.04
6	16.39226	0.74	33.60	28.74	34.34	29.48	60.00	50.00	-25.66	-20.52

REMARKS:

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

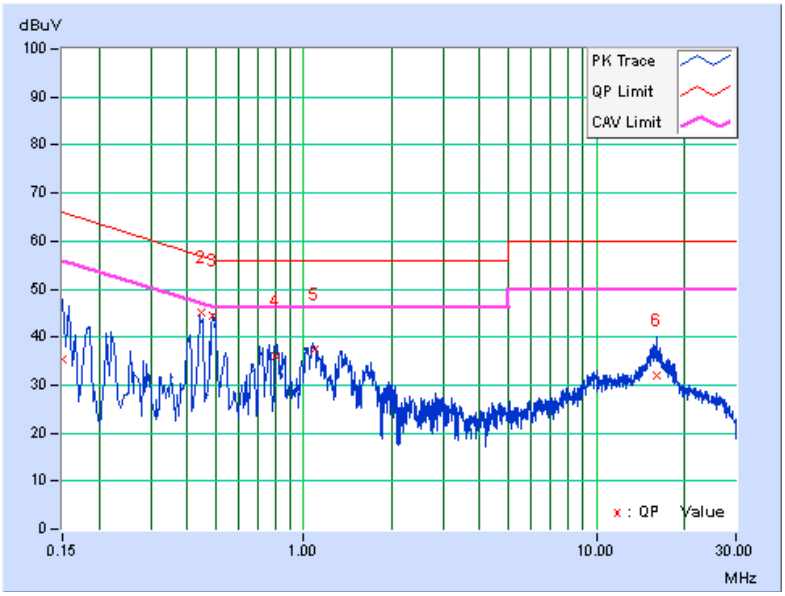


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 24		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	35.24	23.87	35.29	23.92	66.00	56.00	-30.71	-32.08
2	**0.44557**	**0.06**	**45.08**	**39.57**	**45.14**	**39.63**	**56.96**	**46.96**	**-11.82**	**-7.33**
3	0.48752	0.06	44.26	37.85	44.32	37.91	56.21	46.21	-11.89	-8.30
4	0.79899	0.07	36.05	28.41	36.12	28.48	56.00	46.00	-19.88	-17.52
5	1.08352	0.08	37.14	28.28	37.22	28.36	56.00	46.00	-18.78	-17.64
6	15.99867	0.61	31.27	25.64	31.88	26.25	60.00	50.00	-28.12	-23.75

REMARKS:

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

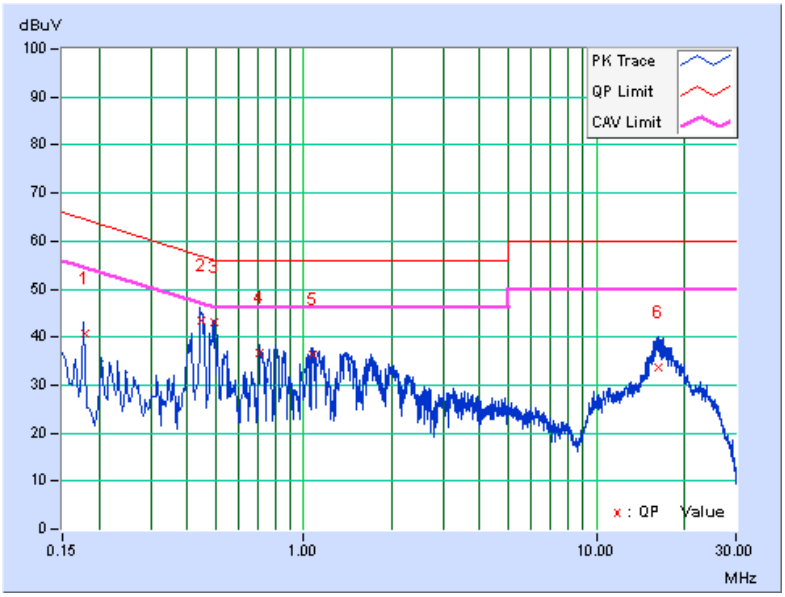


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 49		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17886	0.06	40.53	29.75	40.59	29.81	64.54	54.54	-23.95	-24.73
2	0.44652	0.06	43.25	36.87	43.31	36.93	56.94	46.94	-13.63	-10.01
3	0.49351	0.06	43.01	37.08	43.07	37.14	56.11	46.11	-13.04	-8.97
4	0.70985	0.07	36.54	29.72	36.61	29.79	56.00	46.00	-19.39	-16.21
5	1.07785	0.08	36.28	28.04	36.36	28.12	56.00	46.00	-19.64	-17.88
6	16.39856	0.74	33.01	26.87	33.75	27.61	60.00	50.00	-26.25	-22.39

REMARKS:

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

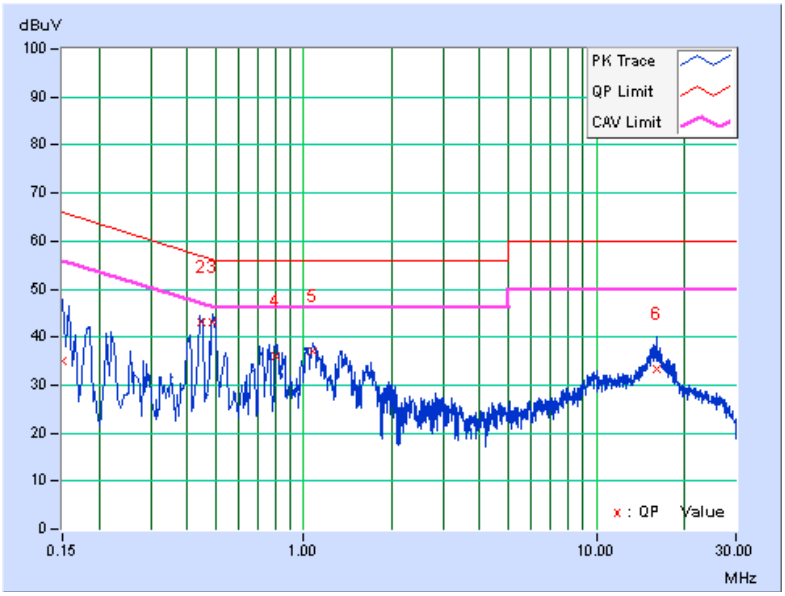


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 49		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15006	0.05	34.87	23.85	34.92	23.90	66.00	56.00	-31.08	-32.10
2	0.44456	0.06	43.08	38.54	43.14	38.60	56.98	46.98	-13.83	-8.37
3	0.48675	0.06	42.96	37.85	43.02	37.91	56.22	46.22	-13.20	-8.31
4	0.79968	0.07	36.08	28.17	36.15	28.24	56.00	46.00	-19.85	-17.76
5	1.08153	0.08	37.05	28.44	37.13	28.52	56.00	46.00	-18.87	-17.48
6	15.99811	0.61	32.62	25.67	33.23	26.28	60.00	50.00	-26.77	-23.72

REMARKS:

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

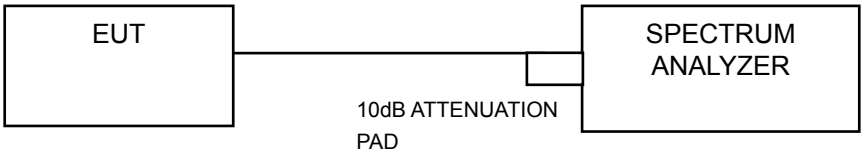


4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

At least 50 channels frequencies, and should be equally spaced.

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.

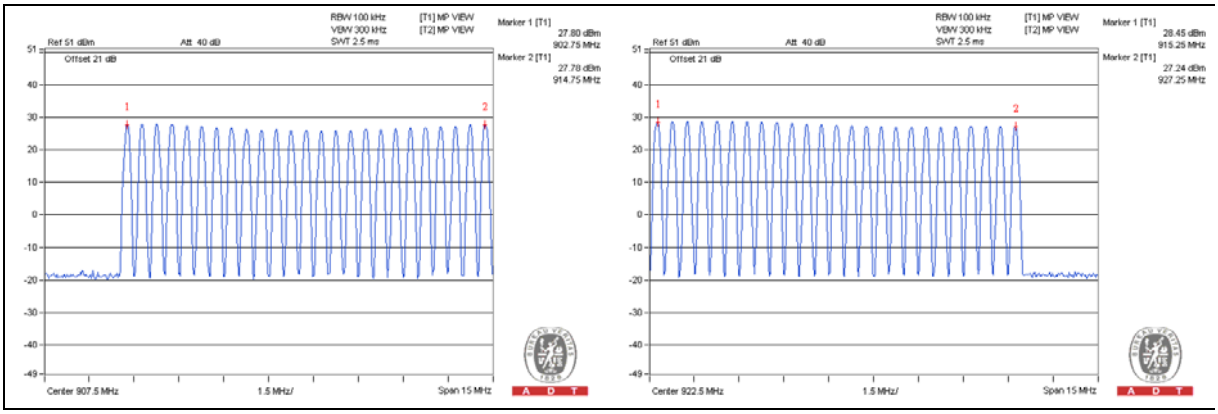
e. Repeat above procedures until all frequencies measured were complete.

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 Test Results

There are 50 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.



4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

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

4.4.2 Test Setup

4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

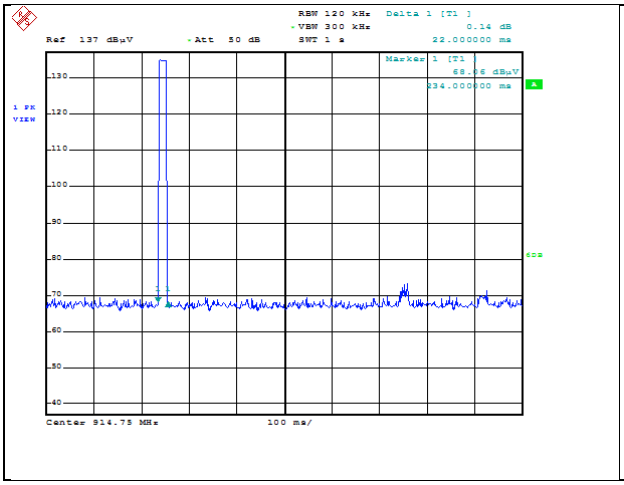
4.4.5 Deviation from Test Standard

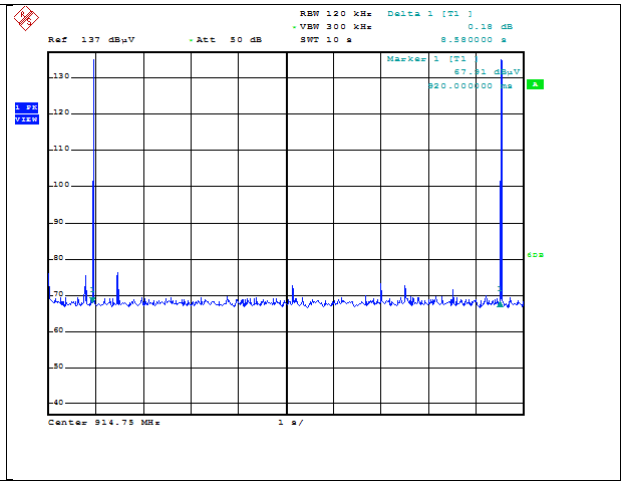
No deviation.

4.4.6 Test Results

Number of transmission in a 20 (50Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
2 (times / 10 sec) * 2 = 4 times	22	88	400

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



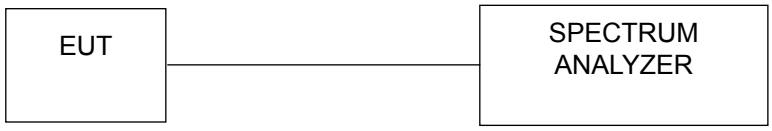


4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

The 20 dB bandwidth of the hopping channel shall be less than 250 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 20dB from the reference level. Record the frequency difference as the emission bandwidth.
d. Repeat above procedures until all frequencies measured were complete.

4.5.5 Deviation from Test Standard

No deviation.

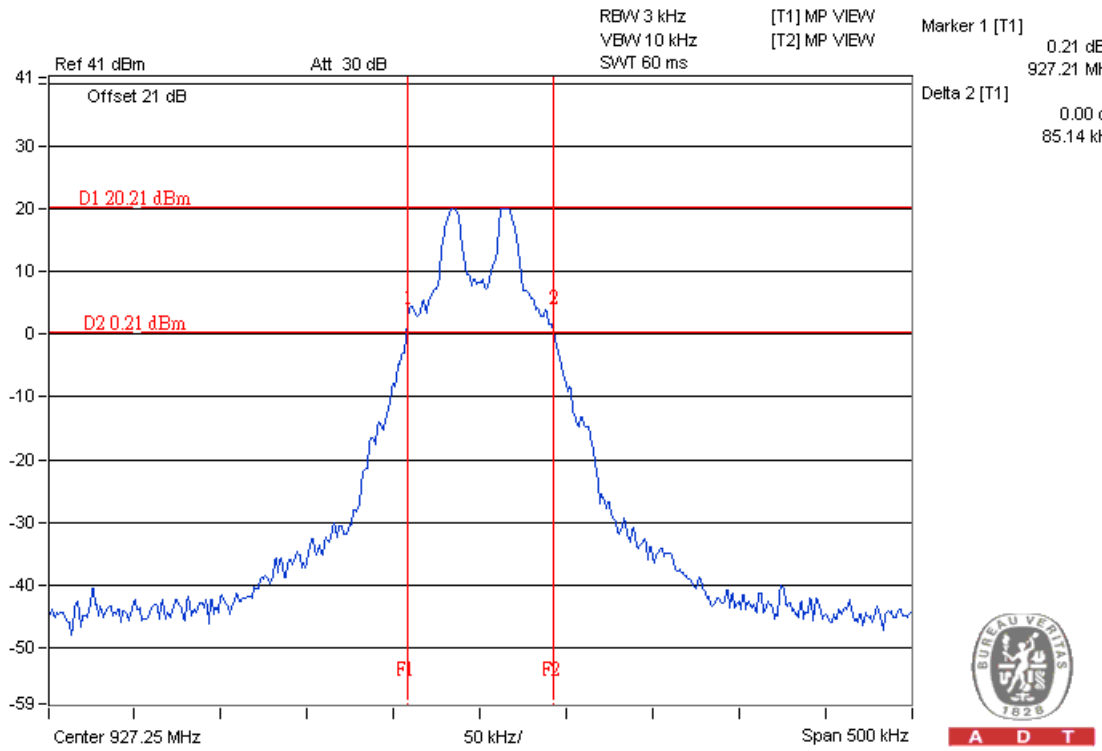
4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
0	902.75	0.084902	0.25
24	914.75	0.084398	0.25
49	927.25	0.085142	0.25

SPECTRUM PLOT OF WORST VALUE

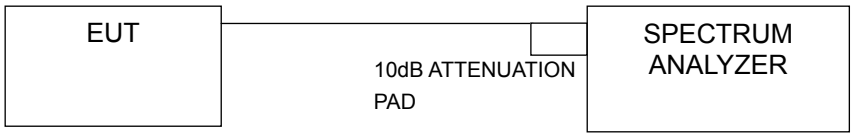


4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.

c. By using the MaxHold function record the separation of two adjacent channels.

d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were complete.

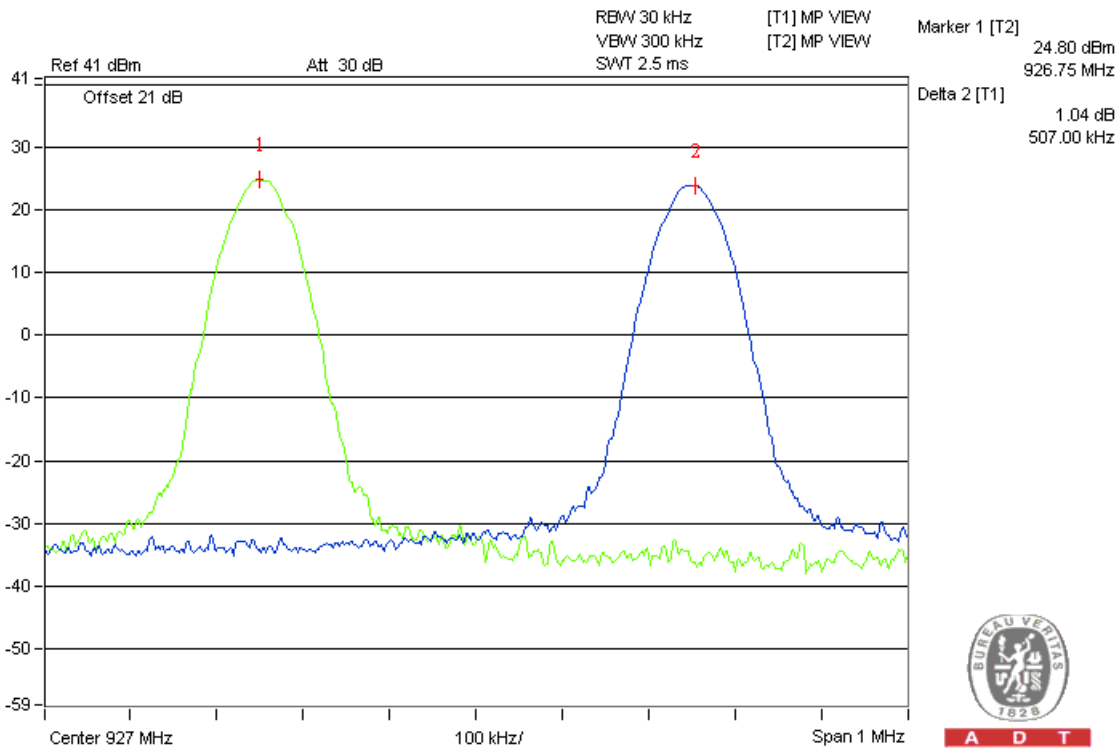
4.6.5 Deviation From Test Standard

No deviation.

4.6.6 Test Results

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	902.75	0.505	0.084902	PASS
24	914.75	0.506	0.084398	PASS
49	927.25	0.507	0.085142	PASS

SPECTRUM PLOT OF WORST VALUE



4.7 Maximum Output Power

4.7.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 30dBm.

4.7.2 Test Setup

4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

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. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.

d. Measure the captured power within the band and recording the plot.

e. Repeat above procedures until all frequencies required were complete.

4.7.5 Deviation fromTest Standard

No deviation.

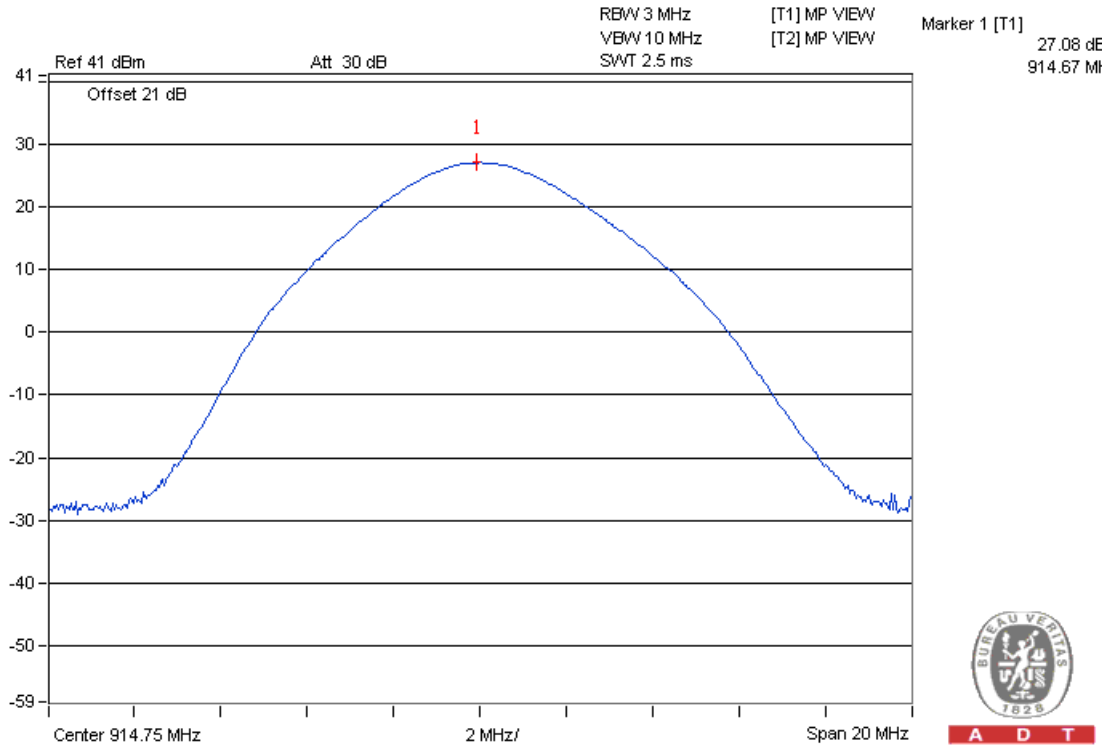
4.7.6 EUT Operating Condition

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

4.7.7 Test Results

Channel	Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (dBm)	Pass / Fail
0	902.75	459.198	26.62	30	PASS
24	914.75	**510.505**	27.08	30	PASS
49	927.25	380.189	25.80	30	PASS

SPECTRUM PLOT OF WORST VALUE



4.8 Conducted Out of Band Emission Measurement

4.8.1 Limits Of Conducted Out Of Band Emission Measurement

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

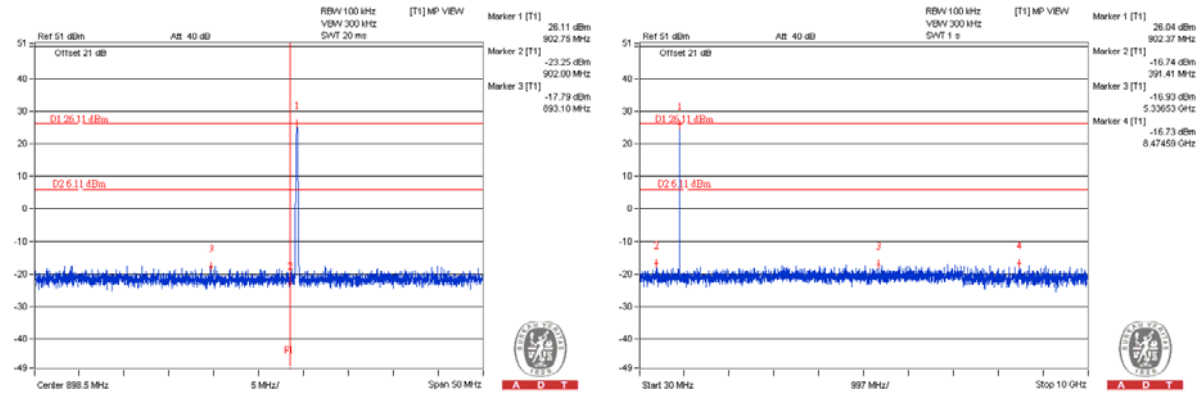
4.8.5 EUT Operating Condition

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

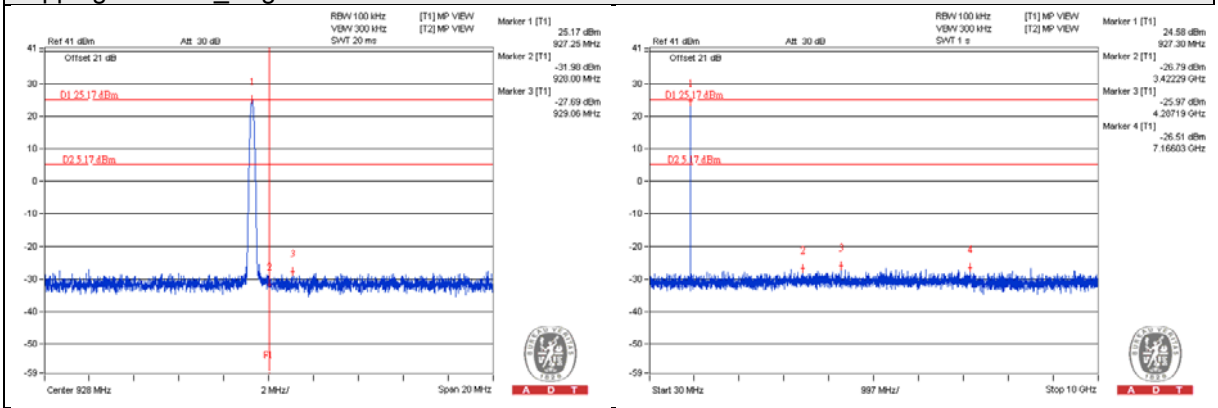
4.8.6 Test Results

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

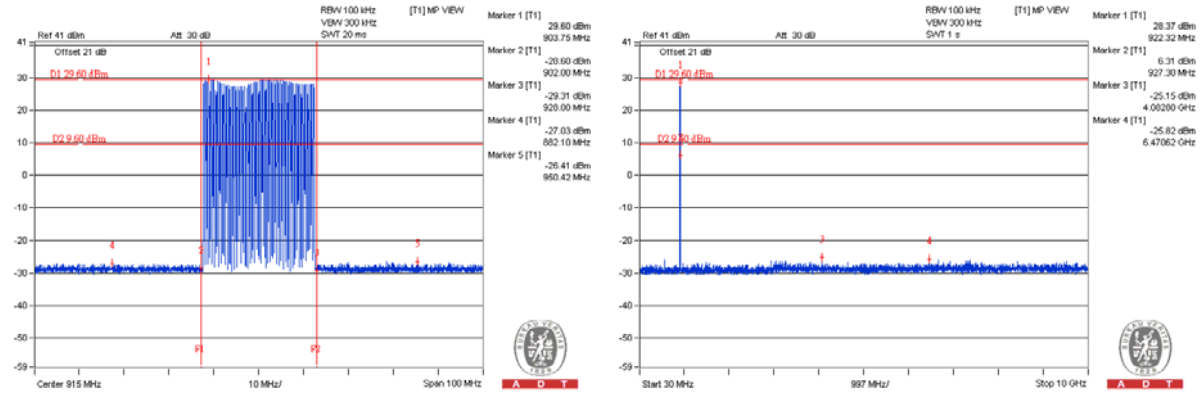
Hopping disabled_ Low Channel



Hopping disabled_ High Channel



Hopping enabled



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 accredited and approved 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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