

FCC Test Report

Report No.: RF170329E05B

FCC ID: YAISN10-12T

Test Model: SN10-12

Received Date: Aug. 17, 2017

Test Date: Sep. 02 to 20, 2017

Issued Date: Oct. 03, 2017

Applicant: InnoComm Mobile Technology Corp.

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

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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	11
3.3.1 Configuration of System under Test	11
3.4 General Description of Applied Standards	13
4 Test Types and Results	14
4.1 Radiated Emission and Bandedge Measurement	14
4.1.1 Limits of Radiated Emission and Bandedge Measurement	14
4.1.2 Test Instruments	15
4.1.3 Test Procedures	17
4.1.4 Deviation from Test Standard	17
4.1.5 Test Setup	18
4.1.6 EUT Operating Conditions	19
4.1.7 Test Results	20
4.2 Conducted Emission Measurement	28
4.2.1 Limits of Conducted Emission Measurement	28
4.2.2 Test Instruments	28
4.2.3 Test Procedures	29
4.2.4 Deviation From Test Standard	29
4.2.5 Test Setup	29
4.2.6 EUT Operating Condition	29
4.2.7 Test Results	30
4.3 Number of Hopping Frequency Used	32
4.3.1 Limits of Hopping Frequency Used Measurement	32
4.3.2 Test Setup	32
4.3.3 Test Instruments	32
4.3.4 Test Procedure	32
4.3.5 Deviation from Test Standard	32
4.3.6 Test Results	32
4.4 Dwell Time on Each Channel	37
4.4.1 Limits of Dwell Time on Each Channel Measurement	37
4.4.2 Test Setup	37
4.4.3 Test Instruments	37
4.4.4 Test Procedures	37
4.4.5 Deviation from Test Standard	37
4.4.6 Test Results	38
4.5 Channel Bandwidth	39
4.5.1 Limits of Channel Bandwidth Measurement	39
4.5.2 Test Setup	39
4.5.3 Test Instruments	39
4.5.4 Test Procedure	39
4.5.5 Deviation from Test Standard	39
4.5.6 EUT Operating Condition	39
4.5.7 Test Results	40
4.6 Hopping Channel Separation	42
4.6.1 Limits of Hopping Channel Separation Measurement	42

4.6.2	Test Setup	42
4.6.3	Test Instruments	42
4.6.4	Test Procedure	42
4.6.5	Deviation from Test Standard	42
4.6.6	Test Results	43
4.7	Maximum Output Power	45
4.7.1	Limits of Maximum Output Power Measurement	45
4.7.2	Test Setup	45
4.7.3	Test Instruments	45
4.7.4	Test Procedure	45
4.7.5	Deviation from Test Standard	45
4.7.6	EUT Operating Condition	45
4.7.7	Test Results	46
4.8	Conducted Out of Band Emission Measurement	48
4.8.1	Limits of Conducted Out of Band Emission Measurement	48
4.8.2	Test Instruments	48
4.8.3	Test Procedure	48
4.8.4	Deviation from Test Standard	48
4.8.5	EUT Operating Condition	48
4.8.6	Test Results	49
5	Pictures of Test Arrangements	50
	Appendix – Information on the Testing Laboratories	51

Release Control Record

Issue No.	Description	Date Issued
RF170329E05B	Original release.	Oct. 03, 2017

1 Certificate of Conformity

Product: SigFox module

Brand: InnoComm

Test Model: SN10-12

Sample Status: ENGINEERING SAMPLE

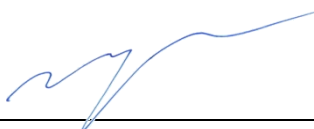
Applicant: InnoComm Mobile Technology Corp.

Test Date: Sep. 02 to 20, 2017

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 :  , **Date:** Oct. 03, 2017
Claire Kuan / Specialist

Approved by :  , **Date:** Oct. 03, 2017
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -20.21dB at 22.73047MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2760.41MHz
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	SigFox module
Brand	InnoComm
Test Model	SN10-12
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Modulation Type	TX: DBPSK RX: 2GFSK
Modulation Technology	FHSS
Transfer Rate	TX: 100bps RX: 600bps
Operating Frequency	902.1375MHz – 904.6625MHz, 920.1375MHz – 922.6625MHz
Number of Channel	Refer to 3.2
Output Power	902.1375 – 904.6625MHz: 192.752mW 920.1375 – 922.6625MHz: 198.153mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

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

Brand	Model	Antenna Gain(dBi)	Frequency range	Antenna Type	Connector type
InnoComm	SN10-12	-2	850~930MHz	PCB	NA

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

902.1375MHz – 904.6625MHz

Channel frequencies are distributed into 9 groups of 6 channels.

Groups	Micro Channel 1 (MHz)	Micro Channel 2 (MHz)	Micro Channel 3 (MHz)	Micro Channel 4 (MHz)	Micro Channel 5 (MHz)	Micro Channel 6 (MHz)
1	902.1375	902.1625	902.1875	902.2125	902.2375	902.2625
2	902.4375	902.4625	902.4875	902.5125	902.5375	902.5625
3	902.7375	902.7625	902.7875	902.8125	902.8375	902.8625
4	903.0375	903.0625	903.0875	903.1125	903.1375	903.1625
5	903.3375	903.3625	903.3875	903.4125	903.4375	903.4625
6	903.6375	903.6625	903.6875	903.7125	903.7375	903.7625
7	903.9375	903.9625	903.9875	904.0125	904.0375	904.0625
8	904.2375	904.2625	904.2875	904.3125	904.3375	904.3625
9	904.5375	904.5625	904.5875	904.6125	904.6375	904.6625

920.1375MHz – 922.6625MHz

Channel frequencies are distributed into 9 groups of 6 channels.

Groups	Micro Channel 1 (MHz)	Micro Channel 2 (MHz)	Micro Channel 3 (MHz)	Micro Channel 4 (MHz)	Micro Channel 5 (MHz)	Micro Channel 6 (MHz)
1	920.1375	920.1625	920.1875	920.2125	920.2375	920.2625
2	920.4375	920.4625	920.4875	920.5125	920.5375	920.5625
3	920.7375	920.7625	920.7875	920.8125	920.8375	920.8625
4	921.0375	921.0625	921.0875	921.1125	921.1375	921.1625
5	921.3375	921.3625	921.3875	921.4125	921.4375	921.4625
6	921.6375	921.6625	921.6875	921.7125	921.7375	921.7625
7	921.9375	921.9625	921.9875	922.0125	922.0375	922.0625
8	922.2375	922.2625	922.2875	922.3125	922.3375	922.3625
9	922.5375	922.5625	922.5875	922.6125	922.6375	922.6625

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

NOTE:

1. In the original test report, the EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

Operating Frequency (MHz ~ MHz)	Tested Frequency	Modulation Technology	Modulation Technology
902.1375 ~ 904.6625	902.1375, 904.6625	FHSS	DBPSK
920.1375 ~ 922.6625	920.1375, 922.6625	FHSS	DBPSK

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.

Operating Frequency (MHz ~ MHz)	Tested Frequency	Modulation Technology	Modulation Technology
902.1375 ~ 904.6625	902.1375, 904.6625	FHSS	DBPSK
920.1375 ~ 922.6625	920.1375, 922.6625	FHSS	DBPSK

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.

Operating Frequency (MHz ~ MHz)	Tested Frequency	Modulation Technology	Modulation Technology
902.1375 ~ 904.6625	922.6625	FHSS	DBPSK
920.1375 ~ 922.6625			

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.

Operating Frequency (MHz ~ MHz)	Tested Frequency	Modulation Technology	Modulation Technology
902.1375 ~ 904.6625	902.1375, 904.6625	FHSS	DBPSK
920.1375 ~ 922.6625	920.1375, 922.6625	FHSS	DBPSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE $\geq$ 1G	25deg. C, 69%RH	120Vac, 60Hz	Andy Ho
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	24deg. C, 67%RH	120Vac, 60Hz	Anderson Chen

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.	Test Tool	freescal	NA	NA	NA	Supplied by client
B.	Test Tool for Power	freescal	NA	NA	NA	Supplied by client
C.	DC Power Supply	GOOD WILL INSTRUMENT CO., LTD.	GPC-3030D	7700087	NA	Provided by Lab

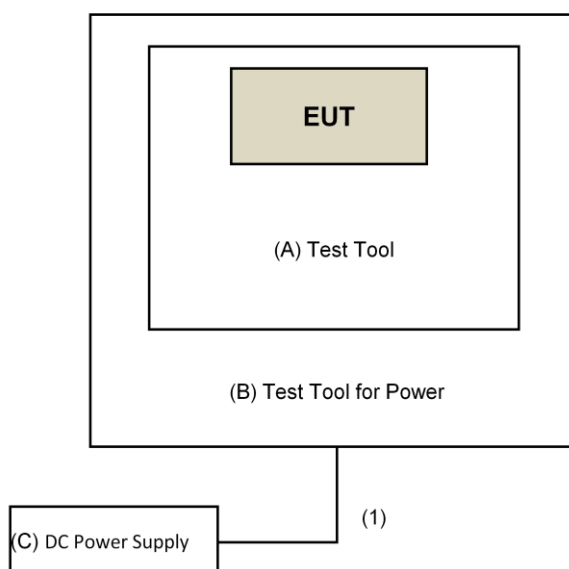
Note:

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

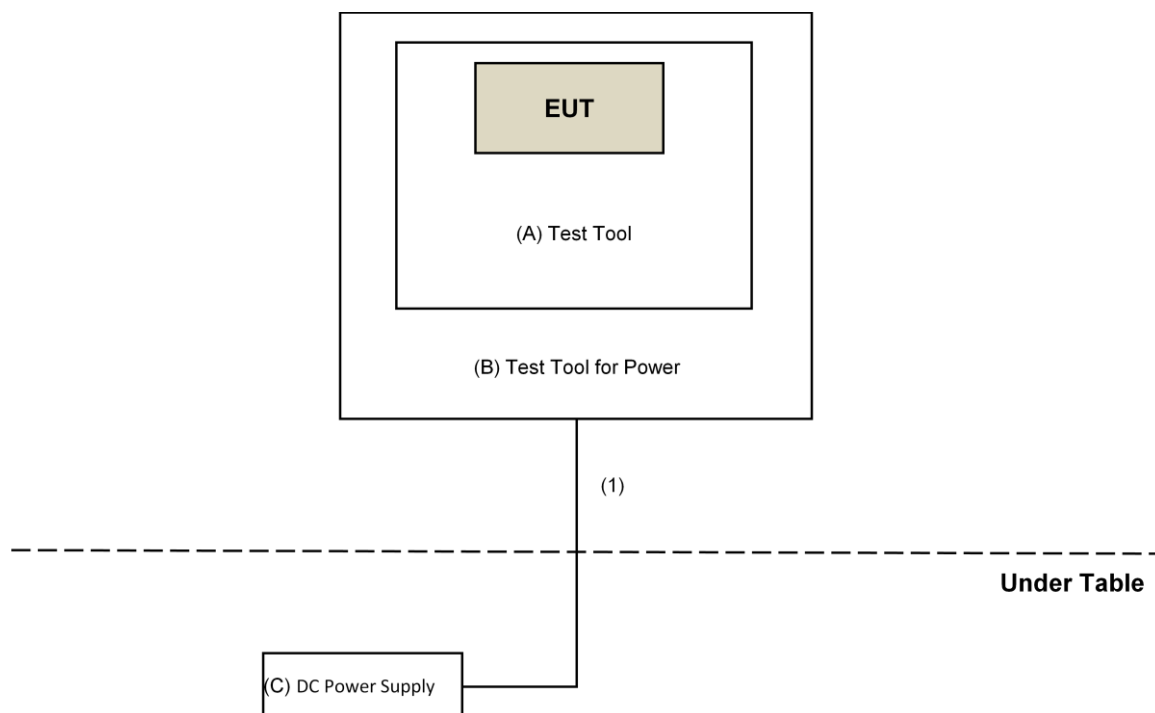
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	2	3	No	0	Provided by Lab

3.3.1 Configuration of System under Test

For conducted test:



For other test items:



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.

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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 10, 2016	Nov. 09, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Dec. 13, 2016	Dec. 12, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 27, 2016	Dec. 26, 2017
Pre-Amplifier EMCI	EMC12630SE	980385	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Pre-Amplifier EMCI	EMC184045SE	980387	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer Agilent	E4446A	MY48250253	Dec. 21, 2016	Dec. 20, 2017
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The FCC Designation Number is TW2022. The number will be varied with the Lab location and scope as attached.
5. The CANADA Site Registration No. is 20331-2
6. Tested Date: Sep. 02 to 20, 2017

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. Both X and Y axes 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:

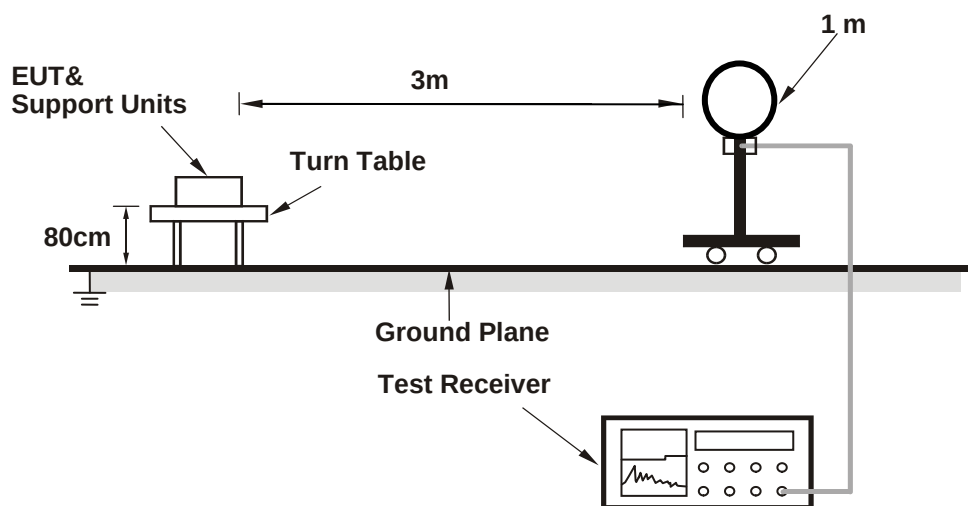
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

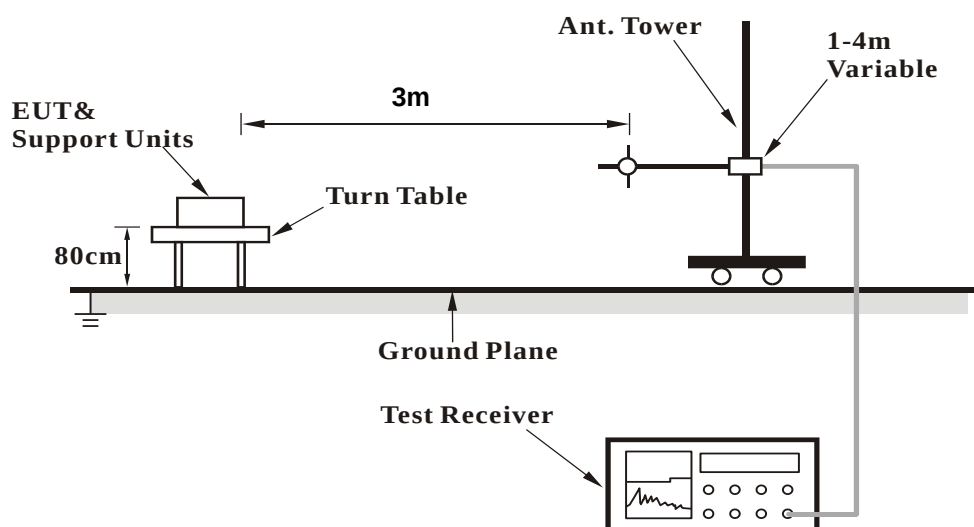
No deviation.

4.1.5 Test Setup

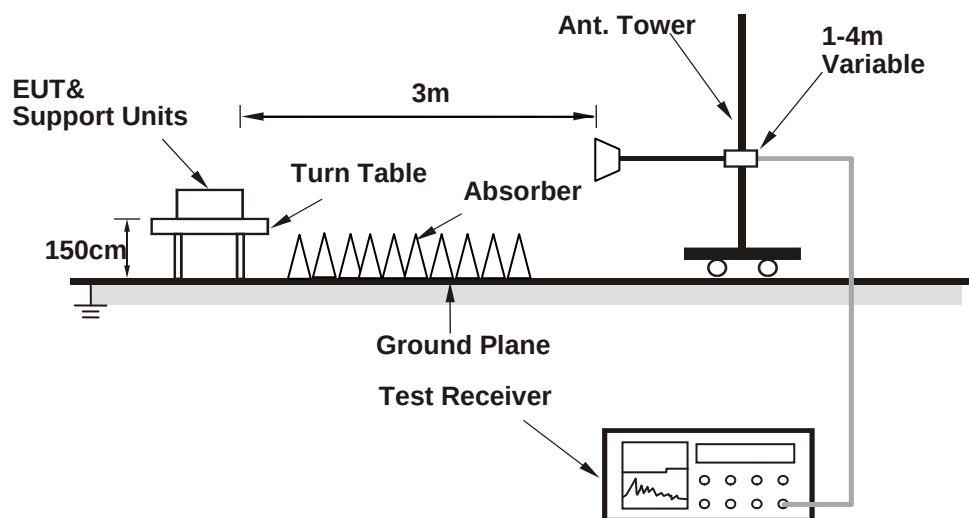
For Radiated emission below 30MHz



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

- a. Controlling software (HyperTerminal command) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data:

TESTED FREQUENCY	902.1375 MHz	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2706.41	61.6 PK	74.0	-12.4	1.36 H	360	62.1	-0.5
2	2706.41	53.8 AV	54.0	-0.2	1.36 H	360	54.3	-0.5
3	3608.55	54.7 PK	74.0	-19.3	1.23 H	36	53.5	1.2
4	3608.55	46.4 AV	54.0	-7.6	1.23 H	36	45.2	1.2
5	4510.69	56.6 PK	74.0	-17.4	2.91 H	113	54.3	2.3
6	4510.69	52.8 AV	54.0	-1.2	2.91 H	113	50.5	2.3
7	5412.82	51.5 PK	74.0	-22.5	1.94 H	184	47.1	4.4
8	5412.82	46.5 AV	54.0	-7.5	1.94 H	184	42.1	4.4
9	8119.24	52.2 PK	74.0	-21.8	2.20 H	35	40.9	11.3
10	8119.24	41.1 AV	54.0	-12.9	2.20 H	35	29.8	11.3
11	9021.37	54.9 PK	74.0	-19.1	1.98 H	73	44.1	10.8
12	9021.37	42.4 AV	54.0	-11.6	1.98 H	73	31.6	10.8
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	2706.41	57.9 PK	74.0	-16.1	3.18 V	141	58.4	-0.5
2	2706.41	49.9 AV	54.0	-4.1	3.18 V	141	50.4	-0.5
3	3608.55	53.0 PK	74.0	-21.0	1.26 V	22	51.8	1.2
4	3608.55	44.2 AV	54.0	-9.8	1.26 V	22	43.0	1.2
5	4510.69	55.0 PK	74.0	-19.0	2.88 V	109	52.7	2.3
6	4510.69	49.2 AV	54.0	-4.8	2.88 V	109	46.9	2.3
7	5412.82	50.2 PK	74.0	-23.8	2.86 V	105	45.8	4.4
8	5412.82	44.8 AV	54.0	-9.2	2.86 V	105	40.4	4.4
9	8119.24	50.1 PK	74.0	-23.9	3.03 V	38	38.8	11.3
10	8119.24	38.2 AV	54.0	-15.8	3.03 V	38	26.9	11.3
11	9021.37	47.7 PK	74.0	-26.3	3.05 V	115	36.9	10.8
12	9021.37	38.5 AV	54.0	-15.5	3.05 V	115	27.7	10.8

REMARKS:

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

TESTED FREQUENCY	904.6625 MHz	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2713.99	61.6 PK	74.0	-12.4	1.36 H	360	62.1	-0.5
2	2713.99	53.6 AV	54.0	-0.4	1.36 H	360	54.1	-0.5
3	3618.65	54.9 PK	74.0	-19.1	1.26 H	16	53.7	1.2
4	3618.65	46.2 AV	54.0	-7.8	1.26 H	16	45.0	1.2
5	4523.31	56.9 PK	74.0	-17.1	2.83 H	129	54.5	2.4
6	4523.31	53.4 AV	54.0	-0.6	2.83 H	129	51.0	2.4
7	5427.98	51.0 PK	74.0	-23.0	1.90 H	176	46.5	4.5
8	5427.98	45.7 AV	54.0	-8.3	1.90 H	176	41.2	4.5
9	8141.96	51.9 PK	74.0	-22.1	2.16 H	44	40.6	11.3
10	8141.96	40.6 AV	54.0	-13.4	2.16 H	44	29.3	11.3
11	9046.62	54.9 PK	74.0	-19.1	1.96 H	74	44.1	10.8
12	9046.62	42.7 AV	54.0	-11.3	1.96 H	74	31.9	10.8
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	2713.99	58.8 PK	74.0	-15.2	3.27 V	125	59.3	-0.5
2	2713.99	50.7 AV	54.0	-3.3	3.27 V	125	51.2	-0.5
3	3618.65	53.5 PK	74.0	-20.5	1.33 V	3	52.3	1.2
4	3618.65	44.4 AV	54.0	-9.6	1.33 V	3	43.2	1.2
5	4523.31	55.1 PK	74.0	-18.9	2.85 V	92	52.7	2.4
6	4523.31	49.4 AV	54.0	-4.6	2.85 V	92	47.0	2.4
7	5427.98	50.4 PK	74.0	-23.6	2.82 V	118	45.9	4.5
8	5427.98	45.2 AV	54.0	-8.8	2.82 V	118	40.7	4.5
9	8141.96	50.8 PK	74.0	-23.2	3.07 V	27	39.5	11.3
10	8141.96	38.9 AV	54.0	-15.1	3.07 V	27	27.6	11.3
11	9046.62	48.2 PK	74.0	-25.8	3.00 V	94	37.4	10.8
12	9046.62	38.6 AV	54.0	-15.4	3.00 V	94	27.8	10.8

REMARKS:

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

TESTED FREQUENCY	920.1375 MHz	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2760.41	61.9 PK	74.0	-12.1	1.33 H	360	62.3	-0.4
2	2760.41	53.9 AV	54.0	-0.1	1.33 H	360	54.3	-0.4
3	3680.55	55.0 PK	74.0	-19.0	1.24 H	31	53.8	1.2
4	3680.55	46.5 AV	54.0	-7.5	1.24 H	31	45.3	1.2
5	4600.69	56.7 PK	74.0	-17.3	2.89 H	115	54.1	2.6
6	4600.69	53.1 AV	54.0	-0.9	2.89 H	115	50.5	2.6
7	#5520.82	51.3 PK	74.0	-22.7	1.93 H	189	46.8	4.5
8	#5520.82	46.1 AV	54.0	-7.9	1.93 H	189	41.6	4.5
9	8281.24	51.9 PK	74.0	-22.1	2.19 H	39	40.7	11.2
10	8281.24	40.9 AV	54.0	-13.1	2.19 H	39	29.7	11.2
11	#9201.37	54.6 PK	74.0	-19.4	1.97 H	73	43.7	10.9
12	#9201.37	42.2 AV	54.0	-11.8	1.97 H	73	31.3	10.9
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	2760.41	58.4 PK	74.0	-15.6	3.23 V	131	58.8	-0.4
2	2760.41	50.3 AV	54.0	-3.7	3.23 V	131	50.7	-0.4
3	3680.55	53.2 PK	74.0	-20.8	1.31 V	7	52.0	1.2
4	3680.55	44.3 AV	54.0	-9.7	1.31 V	7	43.1	1.2
5	4600.69	54.9 PK	74.0	-19.1	2.86 V	107	52.3	2.6
6	4600.69	49.4 AV	54.0	-4.6	2.86 V	107	46.8	2.6
7	#5520.82	50.7 PK	74.0	-23.3	2.81 V	117	46.2	4.5
8	#5520.82	45.3 AV	54.0	-8.7	2.81 V	117	40.8	4.5
9	8281.24	50.2 PK	74.0	-23.8	3.03 V	22	39.0	11.2
10	8281.24	38.4 AV	54.0	-15.6	3.03 V	22	27.2	11.2
11	#9201.37	47.9 PK	74.0	-26.1	3.03 V	109	37.0	10.9
12	#9201.37	38.4 AV	54.0	-15.6	3.03 V	109	27.5	10.9

REMARKS:

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

TESTED FREQUENCY	922.6625 MHz	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2767.99	61.3 PK	74.0	-12.7	1.28 H	360	61.7	-0.4
2	2767.99	53.6 AV	54.0	-0.4	1.28 H	360	54.0	-0.4
3	3690.65	54.4 PK	74.0	-19.6	1.27 H	35	53.2	1.2
4	3690.65	46.2 AV	54.0	-7.8	1.27 H	35	45.0	1.2
5	4613.31	57.0 PK	74.0	-17.0	2.90 H	128	54.3	2.7
6	4613.31	53.3 AV	54.0	-0.7	2.90 H	128	50.6	2.7
7	#5535.98	51.9 PK	74.0	-22.1	1.96 H	178	47.4	4.5
8	#5535.98	46.4 AV	54.0	-7.6	1.96 H	178	41.9	4.5
9	8303.96	52.1 PK	74.0	-21.9	2.18 H	31	41.0	11.1
10	8303.96	41.3 AV	54.0	-12.7	2.18 H	31	30.2	11.1
11	#9226.62	55.0 PK	74.0	-19.0	1.97 H	81	44.1	10.9
12	#9226.62	42.5 AV	54.0	-11.5	1.97 H	81	31.6	10.9
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	2767.99	59.1 PK	74.0	-14.9	3.26 V	123	59.5	-0.4
2	2767.99	50.8 AV	54.0	-3.2	3.26 V	123	51.2	-0.4
3	3690.65	53.0 PK	74.0	-21.0	1.32 V	20	51.8	1.2
4	3690.65	44.3 AV	54.0	-9.7	1.32 V	20	43.1	1.2
5	4613.31	55.4 PK	74.0	-18.6	2.90 V	110	52.7	2.7
6	4613.31	49.9 AV	54.0	-4.1	2.90 V	110	47.2	2.7
7	#5535.98	50.8 PK	74.0	-23.2	2.77 V	125	46.3	4.5
8	#5535.98	45.2 AV	54.0	-8.8	2.77 V	125	40.7	4.5
9	8303.96	50.8 PK	74.0	-23.2	3.07 V	11	39.7	11.1
10	8303.96	38.7 AV	54.0	-15.3	3.07 V	11	27.6	11.1
11	#9226.62	47.7 PK	74.0	-26.3	3.04 V	102	36.8	10.9
12	#9226.62	38.1 AV	54.0	-15.9	3.04 V	102	27.2	10.9

REMARKS:

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

Below 1GHz Data:

TESTED FREQUENCY	902.1375 MHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.75	34.2 QP	40.0	-5.8	1.43 H	271	42.6	-8.4
2	62.97	26.5 QP	40.0	-13.5	1.50 H	187	35.4	-8.9
3	150.28	22.5 QP	43.5	-21.0	1.49 H	221	30.7	-8.2
4	198.78	21.6 QP	43.5	-21.9	1.50 H	179	33.0	-11.4
5	553.80	28.2 QP	46.0	-17.8	1.50 H	187	30.1	-1.9
6	809.88	35.5 QP	46.0	-10.5	1.00 H	263	33.0	2.5
7	902.00	66.2 QP	97.8	-31.6	1.00 H	154	62.2	4.0
8	*902.1375	117.8 QP			1.00 H	154	113.8	4.0
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	37.22	34.6 QP	40.0	-5.4	1.00 V	253	43.3	-8.7
2	62.98	22.2 QP	40.0	-17.8	1.48 V	226	31.1	-8.9
3	150.28	26.4 QP	43.5	-17.1	1.00 V	265	34.6	-8.2
4	329.73	21.1 QP	46.0	-24.9	1.50 V	243	27.9	-6.8
5	710.94	28.4 QP	46.0	-17.6	1.50 V	226	27.5	0.9
6	811.81	31.2 QP	46.0	-14.8	1.50 V	105	28.6	2.6
7	902.00	62.7 QP	89.8	-27.1	1.00 V	51	58.7	4.0
8	*902.1375	109.8 QP			1.00 V	51	105.8	4.0

REMARKS:

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

TESTED FREQUENCY	904.6625 MHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.75	34.4 QP	40.0	-5.6	1.52 H	187	42.8	-8.4
2	62.97	25.5 QP	40.0	-14.5	1.50 H	229	34.4	-8.9
3	150.28	21.5 QP	43.5	-22.0	1.49 H	168	29.7	-8.2
4	198.78	19.5 QP	43.5	-24.0	1.00 H	203	30.9	-11.4
5	553.80	29.5 QP	46.0	-16.5	1.64 H	87	31.4	-1.9
6	809.88	37.2 QP	46.0	-8.8	1.00 H	115	34.7	2.5
7	902.00	47.5 QP	97.4	-49.9	1.00 H	153	43.5	4.0
8	*904.6625	117.4 QP			1.00 H	153	113.4	4.0
9	928.00	40.1 QP	97.4	-57.3	1.00 H	153	35.6	4.5
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	37.22	34.1 QP	40.0	-5.9	1.21 V	58	42.8	-8.7
2	62.98	22.1 QP	40.0	-17.9	1.48 V	275	31.0	-8.9
3	150.28	26.3 QP	43.5	-17.2	1.14 V	239	34.5	-8.2
4	329.73	21.5 QP	46.0	-24.5	1.50 V	264	28.3	-6.8
5	710.94	29.4 QP	46.0	-16.6	1.50 V	243	28.5	0.9
6	811.81	31.2 QP	46.0	-14.8	1.50 V	178	28.6	2.6
7	902.00	43.2 QP	92.7	-49.5	1.90 V	305	39.2	4.0
8	*904.6625	112.7 QP			1.90 V	305	108.7	4.0
9	928.00	39.3 QP	92.7	-53.4	1.90 V	305	34.8	4.5

REMARKS:

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

TESTED FREQUENCY	920.1375 MHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.76	34.6 QP	40.0	-5.4	2.00 H	206	43.0	-8.4
2	62.98	24.6 QP	40.0	-15.4	2.00 H	153	33.5	-8.9
3	150.28	18.7 QP	43.5	-24.8	2.00 H	316	26.9	-8.2
4	198.78	17.2 QP	43.5	-26.3	1.50 H	178	28.6	-11.4
5	553.80	25.2 QP	46.0	-20.8	1.00 H	89	27.1	-1.9
6	809.88	33.5 QP	46.0	-12.5	1.00 H	262	31.0	2.5
7	*920.1375	114.5 QP			1.70 H	154	110.1	4.4
8	928.00	39.8 QP	94.5	-54.7	1.70 H	154	35.3	4.5
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	37.23	34.1 QP	40.0	-5.9	1.00 V	236	42.8	-8.7
2	62.98	24.0 QP	40.0	-16.0	1.50 V	116	32.9	-8.9
3	150.28	23.0 QP	43.5	-20.5	1.00 V	267	31.2	-8.2
4	329.73	19.9 QP	46.0	-26.1	1.26 V	330	26.7	-6.8
5	710.94	26.2 QP	46.0	-19.8	2.00 V	143	25.3	0.9
6	811.82	28.2 QP	46.0	-17.8	2.50 V	132	25.6	2.6
7	*920.16	107.2 QP			1.00 V	113	102.8	4.4
8	928.00	39.1 QP	87.2	-48.1	1.00 V	113	34.6	4.5

REMARKS:

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

TESTED FREQUENCY	922.6625 MHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.76	34.5 QP	40.0	-5.5	1.50 H	143	42.9	-8.4
2	62.97	25.5 QP	40.0	-14.5	2.00 H	262	34.4	-8.9
3	150.28	20.5 QP	43.5	-23.0	2.00 H	118	28.7	-8.2
4	198.78	19.1 QP	43.5	-24.4	1.50 H	220	30.5	-11.4
5	553.80	27.1 QP	46.0	-18.9	1.50 H	262	29.0	-1.9
6	809.88	34.5 QP	46.0	-11.5	1.00 H	143	32.0	2.5
7	*922.6625	116.1 QP			1.00 H	153	111.7	4.4
8	928.00	42.8 QP	96.1	-53.3	1.00 H	153	38.3	4.5
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	37.22	34.0 QP	40.0	-6.0	1.00 V	121	42.7	-8.7
2	62.98	23.2 QP	40.0	-16.8	1.50 V	264	32.1	-8.9
3	150.28	25.1 QP	43.5	-18.4	1.00 V	113	33.3	-8.2
4	329.73	19.9 QP	46.0	-26.1	1.50 V	229	26.7	-6.8
5	710.94	27.5 QP	46.0	-18.5	1.50 V	278	26.6	0.9
6	811.81	30.2 QP	46.0	-15.8	2.00 V	224	27.6	2.6
7	*922.6625	110.4 QP			1.03 V	296	106.0	4.4
8	928.00	40.6 QP	90.4	-49.8	1.03 V	296	36.1	4.5

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
Software BVADT	BVADT_Conc_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3. Tested Date: Sep. 13, 2017

4.2.3 Test Procedures

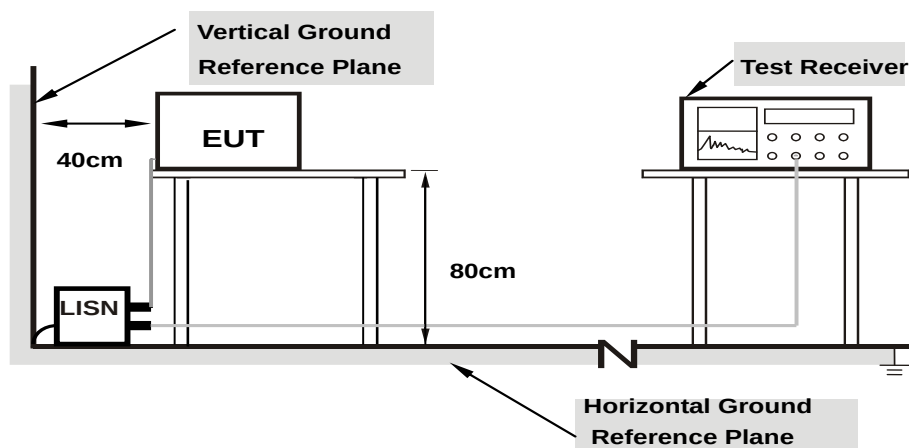
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

Same as 4.1.6.

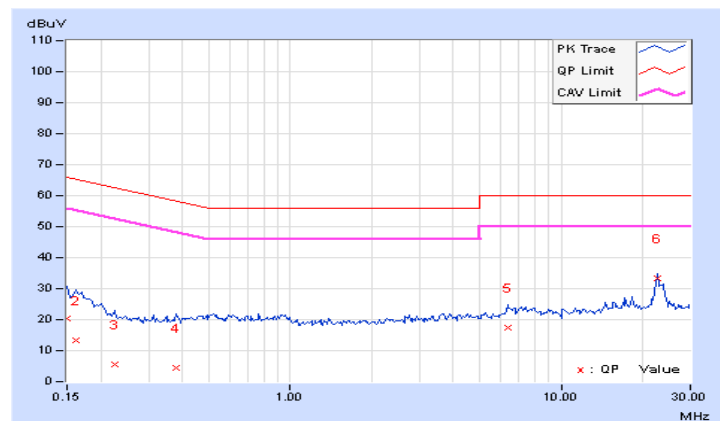
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
		(dB)								
1	0.15000	10.07	10.21	1.52	20.28	11.59	66.00	56.00	-45.72	-44.41
2	0.16172	10.07	3.30	-3.13	13.37	6.94	65.38	55.38	-52.01	-48.44
3	0.22422	10.07	-4.38	-8.78	5.69	1.29	62.66	52.66	-56.97	-51.37
4	0.38047	10.11	-5.63	-8.83	4.48	1.28	58.27	48.27	-53.79	-46.99
5	6.36719	10.42	6.98	2.55	17.40	12.97	60.00	50.00	-42.60	-37.03
6	22.73047	11.31	21.99	18.48	33.30	29.79	60.00	50.00	-26.70	-20.21

REMARKS:

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

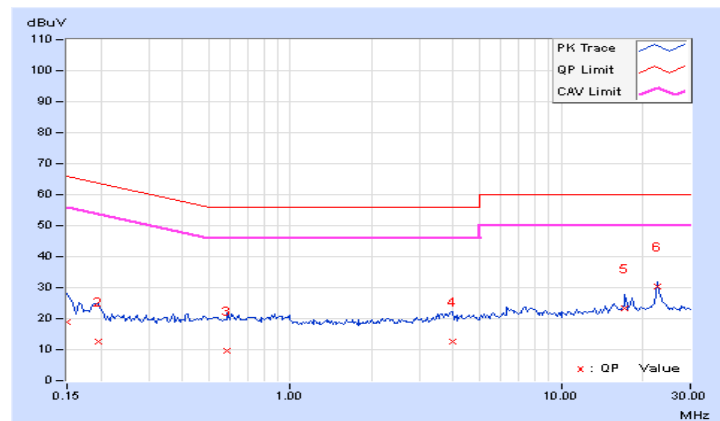


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.06	8.71	2.15	18.77	12.21	66.00	56.00	-47.23	-43.79
2	0.19687	10.03	2.52	0.54	12.55	10.57	63.74	53.74	-51.19	-43.17
3	0.58750	10.10	-0.53	-8.61	9.57	1.49	56.00	46.00	-46.43	-44.51
4	3.95703	10.22	2.35	-1.76	12.57	8.46	56.00	46.00	-43.43	-37.54
5	17.23828	10.89	12.29	10.27	23.18	21.16	60.00	50.00	-36.82	-28.84
6	22.69922	10.99	19.50	16.34	30.49	27.33	60.00	50.00	-29.51	-22.67

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.

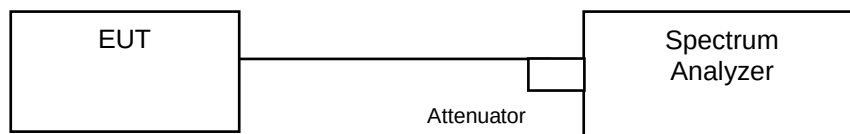


4.3 Number of Hopping Frequency Used

4.3.1 Limits of Hopping Frequency Used Measurement

CONDITION	HOPPING FREQUENCY USED	APPLICATION
20dB Bandwidth <250kHz	hopping channels ≥ 50	v
20dB Bandwidth >250kHz	hopping channels ≥ 25	x

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

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 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.
- 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.
- Set the SA on View mode and then plot the result on SA screen.
- Repeat above procedures until all frequencies measured were complete.

4.3.5 Deviation from Test Standard

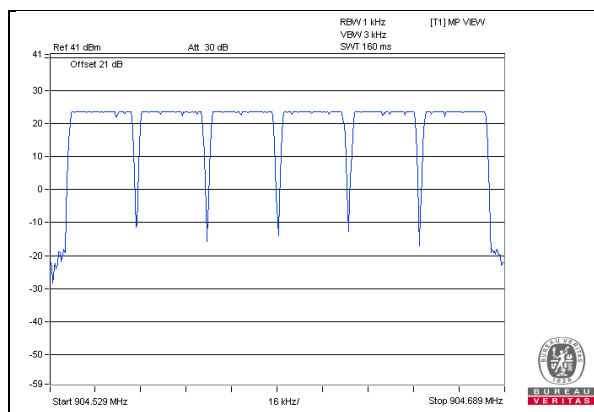
No deviation.

4.3.6 Test Results

There are 54 hopping frequencies in the hopping mode. Please refer to the test result. On the plots, it shows that the hopping frequencies are equally spaced.

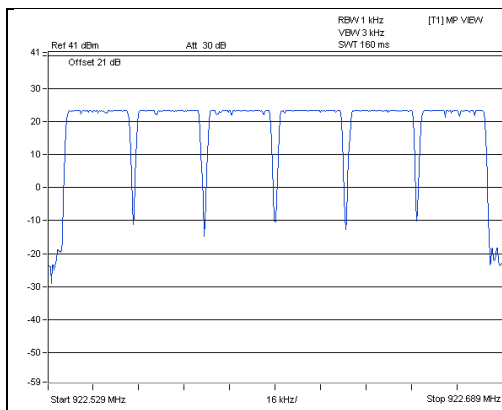
Frequency: 902.1375~904.6625MHz





Frequency: 920.1375~922.6625MHz



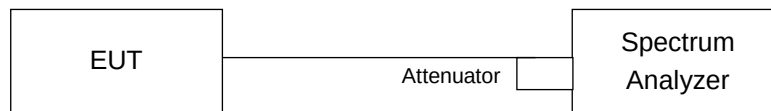


4.4 Dwell Time on Each Channel

4.4.1 Limits of Dwell Time on Each Channel Measurement

CONDITION	DWELL TIME	APPLICATION
20dB Bandwidth <250kHz (hopping channels ≥ 50)	0.4 seconds within a 20 second period	v
20dB Bandwidth >250kHz (hopping channels ≥ 25)	0.4 seconds within a 10 second period	x

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

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

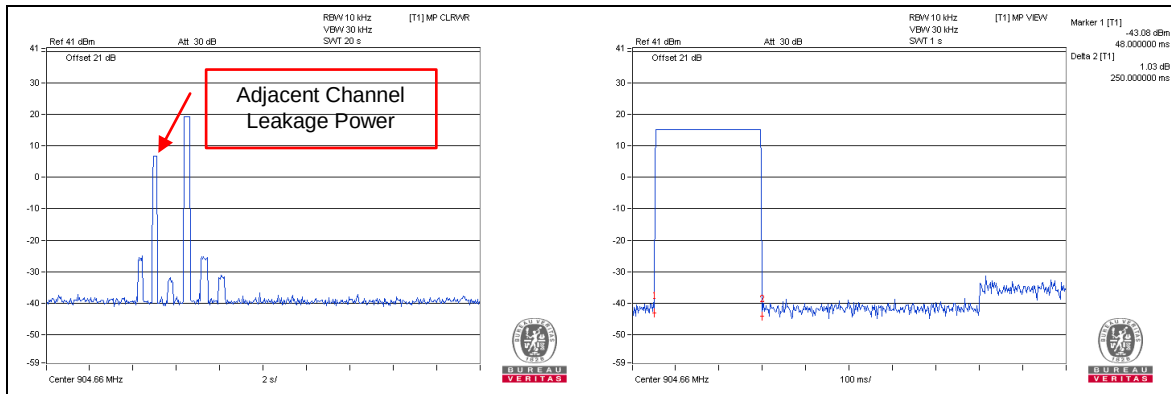
4.4.5 Deviation from Test Standard

No deviation.

4.4.6 Test Results

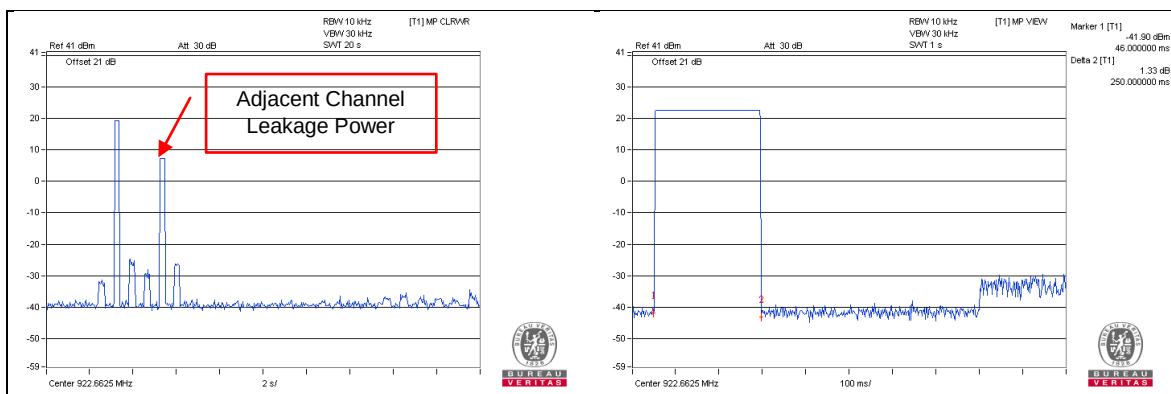
Frequency: 904.6625MHz

Number of transmission in a 20 s	Length of transmission time (msec)	Result (msec)	Limit (msec)
1 time	250	250	400



Frequency: 922.6625 MHz

Number of transmission in a 20 s	Length of transmission time (msec)	Result (msec)	Limit (msec)
1 time	250	250	400

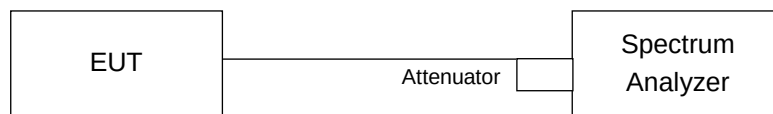


4.5 Channel Bandwidth

4.5.1 Limits of Channel Bandwidth Measurement

CONDITION	APPLICATION
20dB Bandwidth <250kHz (hopping channels ≥ 50)	v
20dB Bandwidth >250kHz (hopping channels ≥ 25)	x

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

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

4.5.5 Deviation from Test Standard

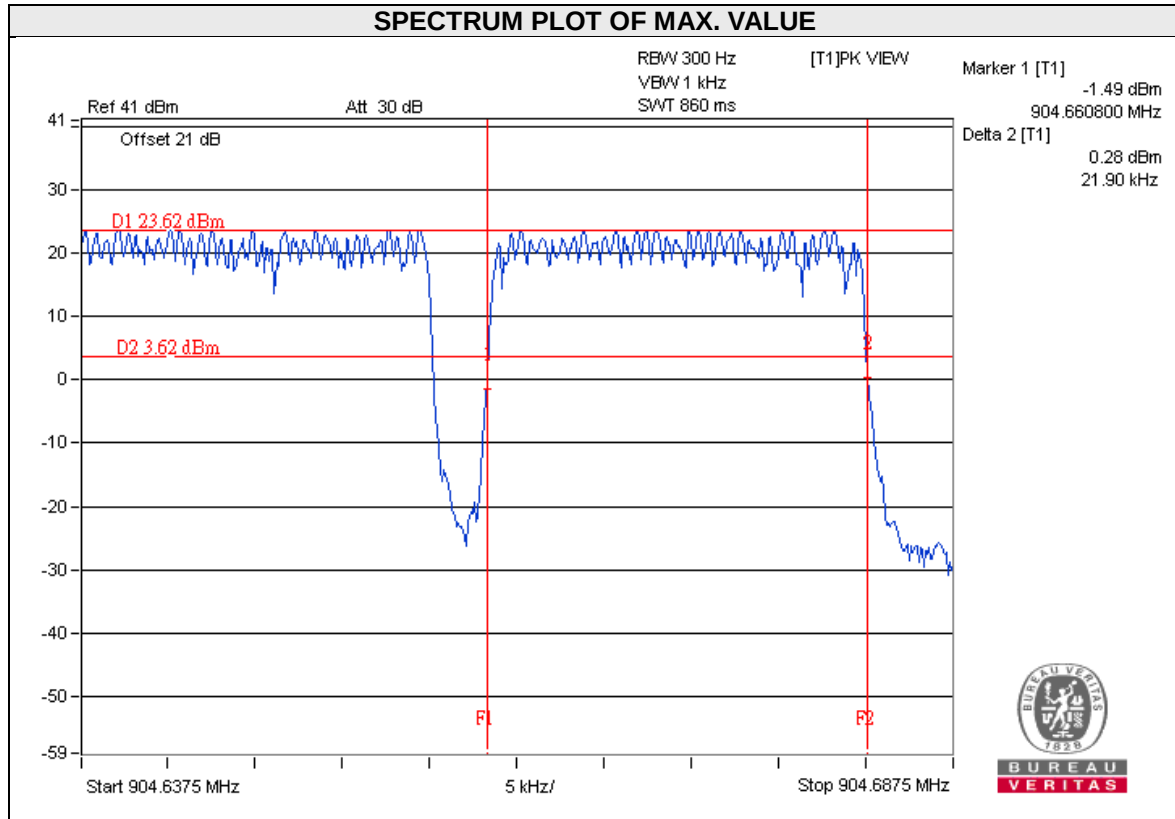
No deviation.

4.5.6 EUT Operating Condition

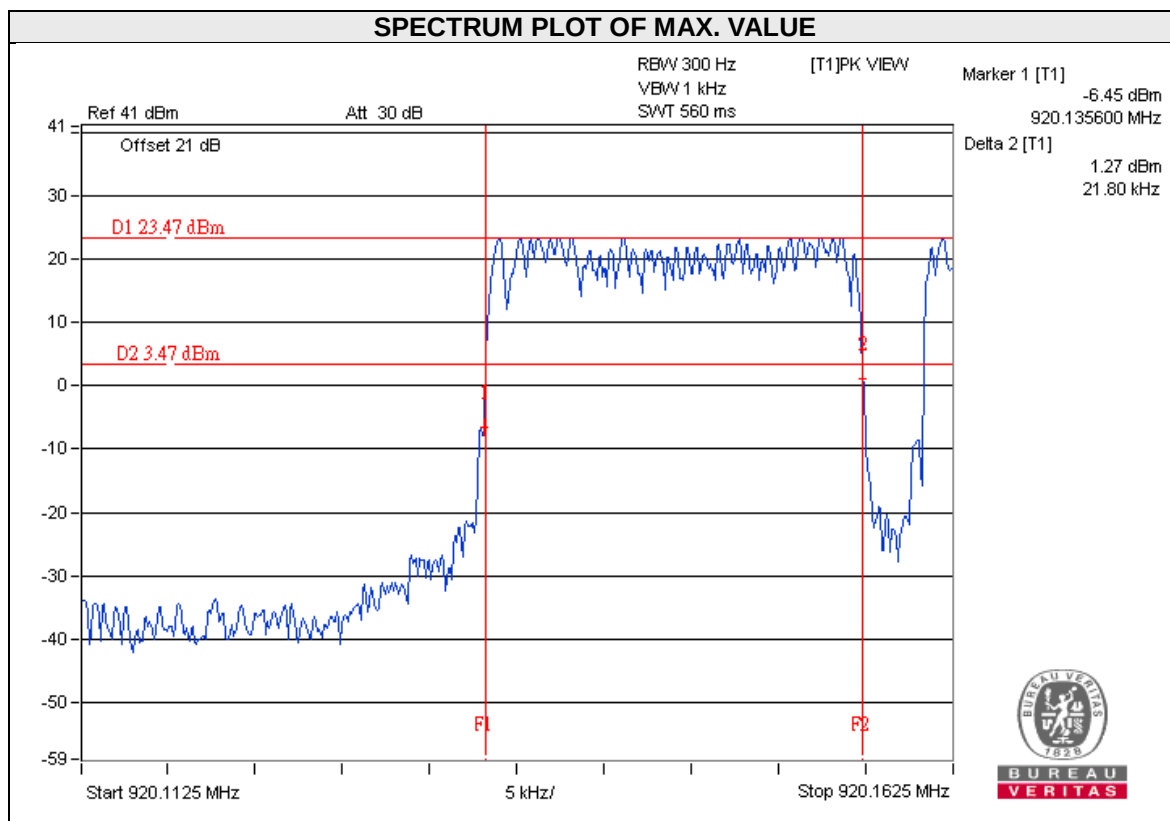
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

Frequency (MHz)	20dB Bandwidth (kHz)
902.1375	21.8
904.6625	21.9



Frequency (MHz)	20dB Bandwidth (kHz)
920.1375	21.8
922.6625	21.6

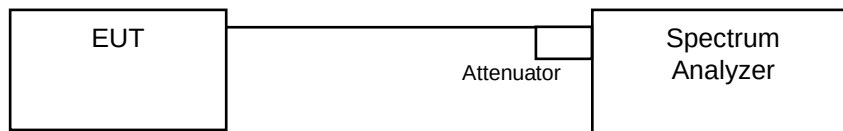


4.6 Hopping Channel Separation

4.6.1 Limits of Hopping Channel Separation Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

Measurement Procedure REF

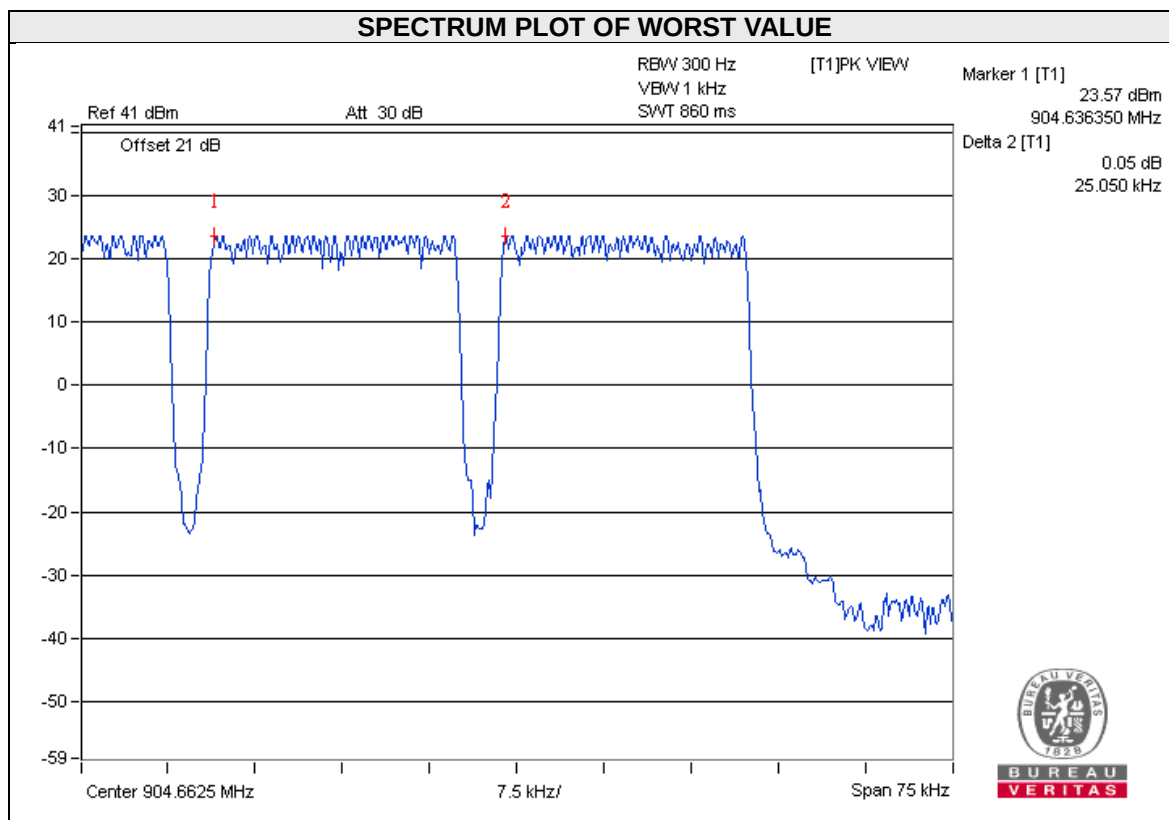
- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- By using the MaxHold function record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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 Test Results

Frequency (MHz)	Adjacent Channel Separation (kHz)	Minimum Limit (kHz)	Pass / Fail
902.1375	25	25	Pass
904.6625	25.05	25	Pass

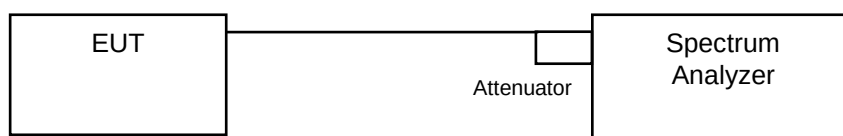


4.7 Maximum Output Power

4.7.1 Limits of Maximum Output Power Measurement

CONDITION	OUTPUT POWER	APPLICATION
hopping channels ≥ 50	1 W	v
hopping channels ≥ 25 & ≤ 50	0.25W	x

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

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 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.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using 30kHz RBW and 100 kHz VBW.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

4.7.5 Deviation from Test Standard

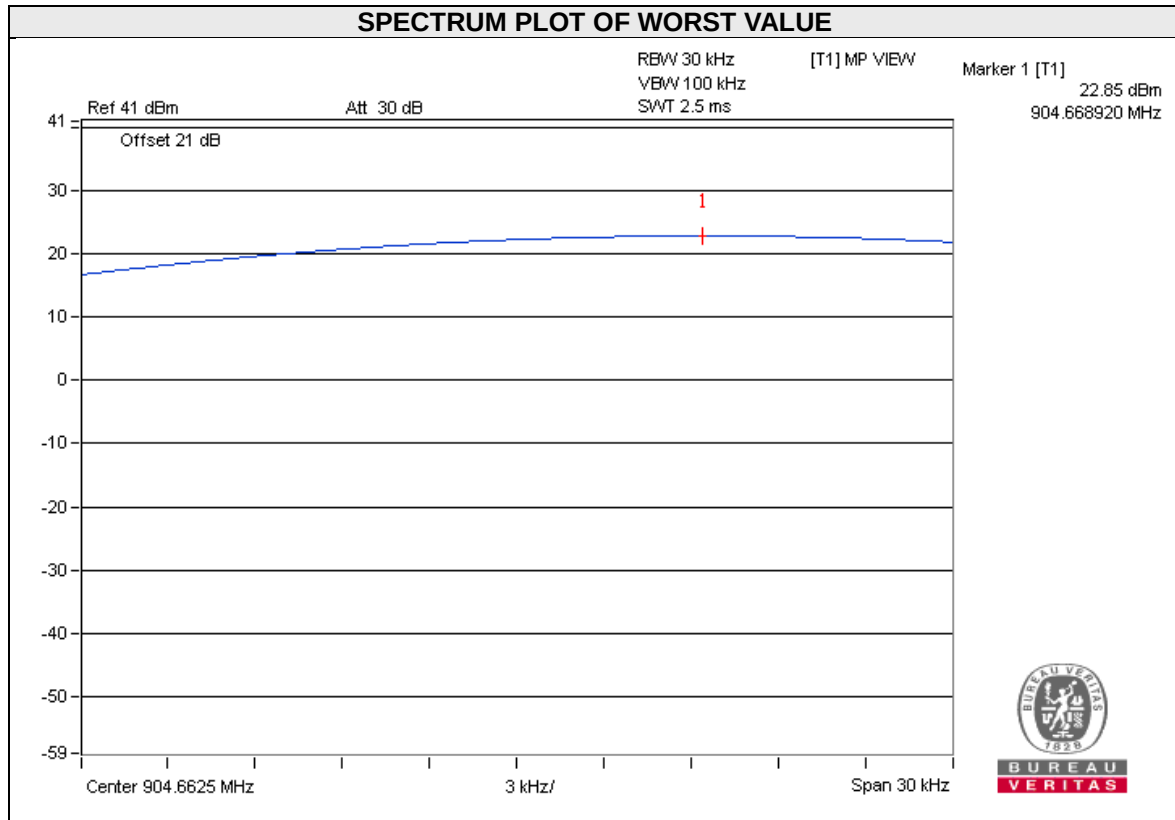
No deviation.

4.7.6 EUT Operating Condition

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

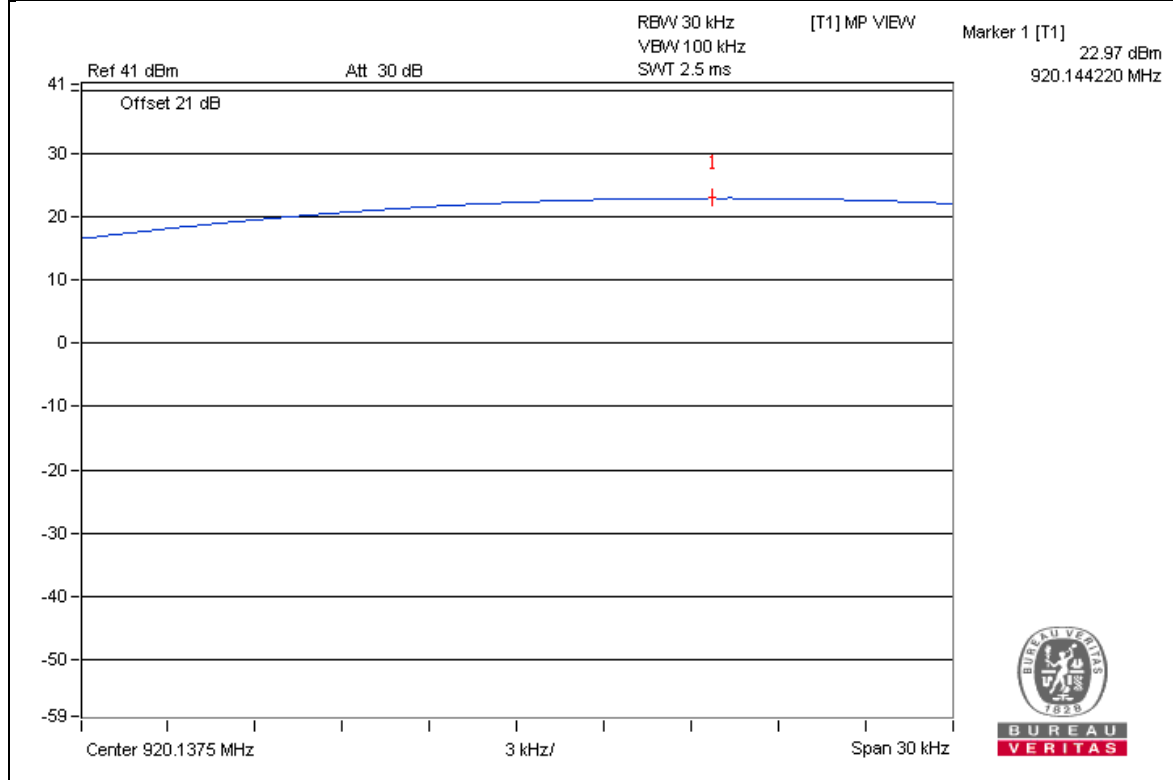
4.7.7 Test Results

Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (dBm)	Pass / Fail
902.1375	171.396	22.34	30.00	Pass
904.6625	192.752	22.85	30.00	Pass



Frequency (MHz)	Output Power (mW)	Output Power (dBm)	Power Limit (dBm)	Pass / Fail
920.1375	198.153	22.97	30.00	Pass
922.6625	197.697	22.96	30.00	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.

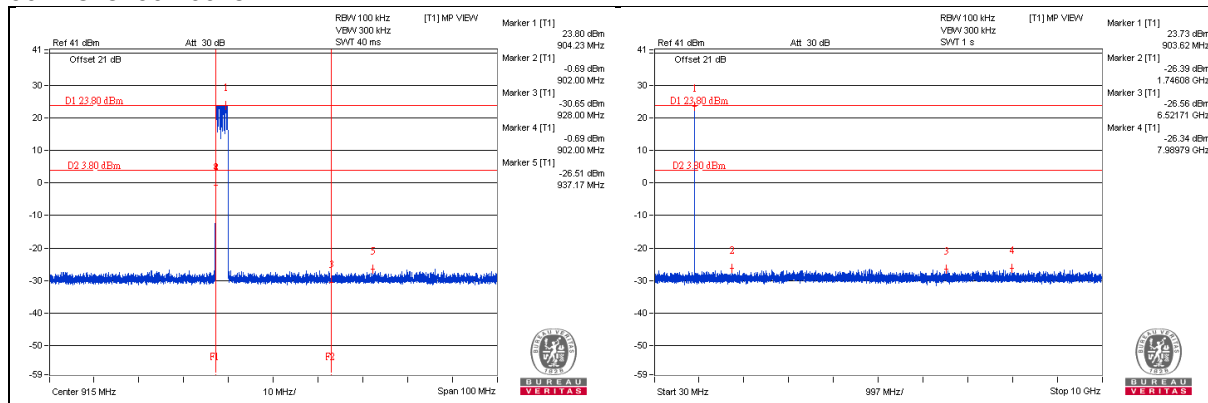
4.8.5 EUT Operating Condition

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

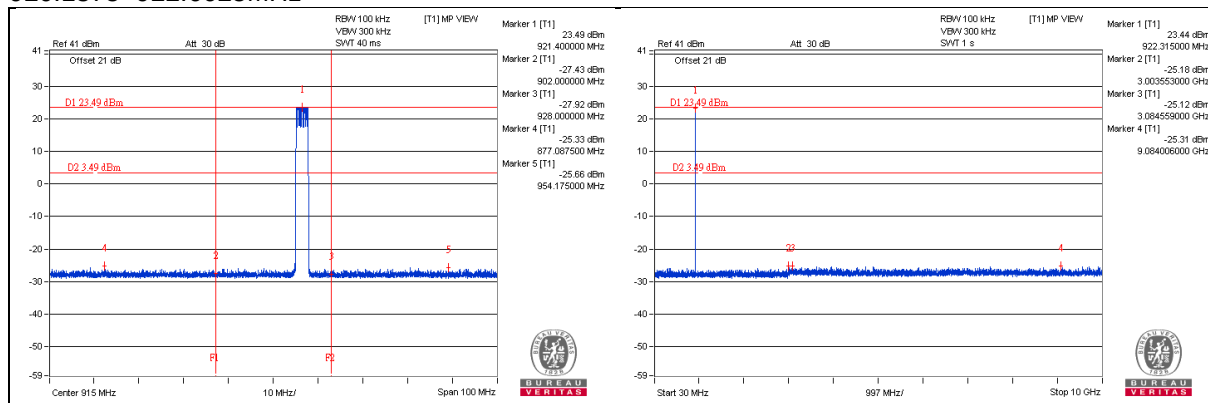
4.8.6 Test Results

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.

902.1345~904.6625MHz



920.1375~922.6625MHz



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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Web Site: www.bureauveritas-adt.com

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

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