



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AY0059771(7) Date : Feb 13, 2020

Application No. : LY023332(2)

Applicant : CAPITAL PROSPECT LIMITED
ROOM 1303, BLOCK B, VERISTRONG IND CENTRE
34-36 AU PUI WAN STREET
FOTAN, SHATIN, N.T. HONG KONG

Sample Description : One(1) item of submitted sample stated to be:

Sample Description	Model No.
Garage Door Controller Mini Nova Hub	2NV9

Radio Frequency : 910 – 918 MHz and 2412 – 2462MHz
Rating : DC7.5V (EUT) and AC 100-240V (AC/DC Adapter)
Sample registration No. : RY037224-003(0) and RY037224-005(1)
PMN : 2NV9
HVIN : 2NV9

Date Received : Oct 2, 2019.

Test Period : Oct 3, 2019 to Oct 30, 2019

Test Requested : FCC 47CFR Part 15 Certification
ISED Certification for License-exempt Device

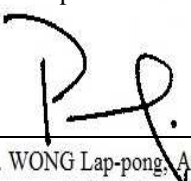
Test Method : 47 CFR Part 15 (10-1-18 Edition)
ANSI C63.10 – 2013
ANSI C63.4 – 2014
RSS-210 Issue 9
RSS-Gen Issue 5

Test Result : See attached sheet(s) from page 2 to 19.

Conclusion : The submitted sample was found to comply with requirement of FCC 47CFR Part 15
Subpart C, section 15.249 and ISED Canada Radio Standard Specification RSS-210.

Remark : This report is only for the measurement of 900MHz transmitter. The authorization of the
WiFi module has been certified by FCC and ISED and the 900MHz receiver is under
another sDoC report.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature :  Page 1 of 19
Mr. WONG Lap-pong, Andrew
Manager

FCC ID: KUT2NV9
IC: 4454A-2NV9

Document name: FCC/ISED for LPD - Document Ref No: RT-EL-EMC-047 - Issue Date: 13 Mar 2019 - Edition: 2

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1 General Information

1.1 General Description

The EUT is a Garage Door Controller Mini Nova Hub, model: 2NV9. It is used to control and monitor the garage door with smartphone and other security sensor. It is equipped with a 900MHz transceiver and WiFi transceiver to make the communication with the smartphone and the other security sensor. The WiFi function is mainly to connect with smartphone and local router for smartphone controlling the garage door with "Orbit Home" mobile App. The 900MHz transceiver is connected with other 900MHz security control and other 900MHz Siren for security purpose. The voltage input of the 2NV9 is DC 7.5V and supplied by an AC adapter with AC 100 – 240V input and DC 7.5V output.

The 900MHz transceiver is operating in frequency band from 910 – 918MHz and operated by the RF IC, CMT2380 with 26MHz oscillator. GFSK modulation is used. The RF signal is transmitted with a PCB antenna, 0.0dBi antenna gain.

The WiFi transceiver is operating with IEEE 802.11b/g/n(HT20) and in frequency band 2412 – 2462MHz. The WiFi transceiver is operated by WiFi Module, model: HM-WF8266A. The WiFi module has been certified by FCC and ISED under WiFi module with FCC ID: 2ASEO-HM-WF8266A and IC: 24999-WF8266A respectively.

Brief Circuit Description is listed below

U1	: RF IC of 900MHz Transceiver, CMT2380
Y1	: 26MHz clock for 900MHz RF IC
U2	: RF amplifier
L1, L2, L3, C2, C3, C5	: Matching circuit
U3	: WiFi Module, HM-WF8266A

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1.2 Location of the test site

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2014. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2014. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
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FCC Accredited Lab (Designation Number: HK0004)
ISED Wireless Test Site (ISED Assigned Code: 4093A)

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1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	Rohde & Schwarz	ESCS30	100001	29 Mar 2020	1 Year
Spectrum Analyzer	R&S	FSV40	100964	07Feb 2020	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSP30	100628	26 Mar 2020	1 Year
Broadband Antenna	Schaffner	CBL6112B	2692	27 Mar 2021	2 Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2020	2 Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	21 Dec 2020	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	21 Dec 2020	2 Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	01 Aug 2020	2 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	01 Aug 2020	2 Years
Coaxial Cable	Schaffner	RG 213/U	N/A	16 May 2020	1 Year
Coaxial Cable	Suhner	RG 214/U	N/A	16 May 2020	1 Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	21 Dec 2019	1 Year
LISN	Rohde & Schwarz	ENV216	101323	22 Jan 2020	1 Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	23 Oct 2019	1 Year

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1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

Radiated emissions

Frequency	Uncertainty (U_{lab})
30MHz ~ 200MHz (Horizontal)	4.59dB
30MHz ~ 200MHz (Vertical)	4.49dB
200MHz ~ 1000MHz (Horizontal)	4.94dB
200MHz ~ 1000MHz (Vertical)	4.97dB
1GHz ~ 6GHz	4.52dB
6GHz ~ 18GHz	4.58dB

1.5 Test Summary

TEST ITEM	FCC REFERENCE	RSS REFERENCE	RESULT
Fundamental and harmonic emission	15.249(a)	RSS-210, Annex B.10(a)	Comply
Out-band emission	15.249(d)	RSS-210, Annex B.10(b)	Comply
Peak Limit	15.249(e)	RSS-Gen, 8.1	Comply
Bandwidth	15.215(c)	RSS-Gen, 6.7	Comply
Conducted Emission	15.207(a)	RSS-Gen, 8.8	Comply
Frequency Stability	Not applicable	RSS-Gen, 8.11	Comply

1.6 External Photo, Internal Photo and Test Configuration Photo

The External Photo, Internal Photo and Test Configuration Photo associated with this report for the tested product are saved in separated pdf file listed in the following

File content	File name
External Photo	KUT2NV9_4454A-2NV9 External Photo.pdf
Internal Photo	KUT2NV9_4454A-2NV9 Internal Photo.pdf
Test Configuration Photo	KUT2NV9_4454A-2NV9 Test Setup Photo.pdf

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2 Description of the radiated emission test

2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013.

A non-conductive turntable with dimensions of 1.5m x 0.4m x 0.8m (L x W x H) placed above the reference ground plane. The equipment under test (EUT) was placed at 0.8m height for below 1GHz measurement and 1.5m height for above 1GHz measurement. The test distance is 3m between EUT and receiving antenna. A broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated. Additional absorbing material will be placed between the EUT and receiving antenna for above 1GHz measurement.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement.

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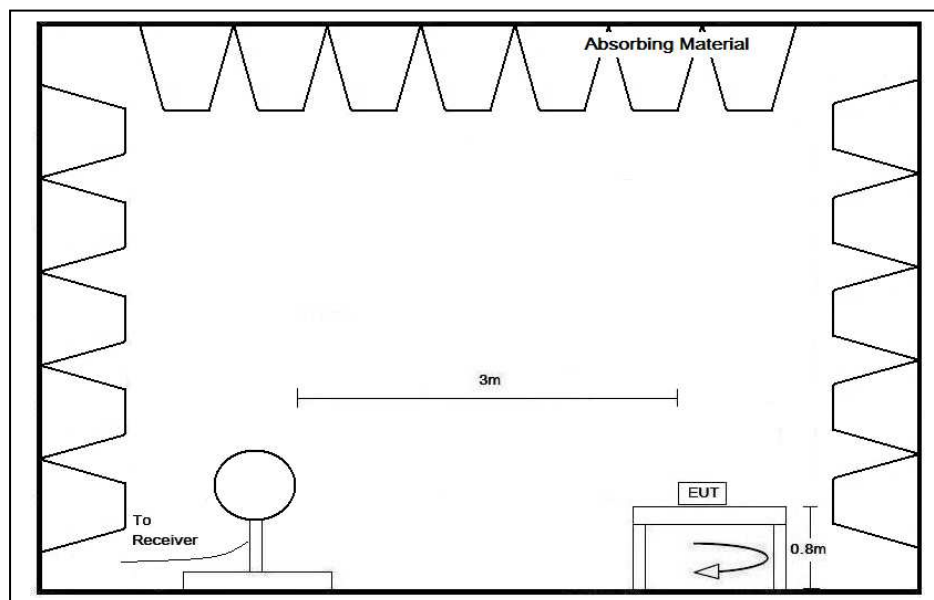
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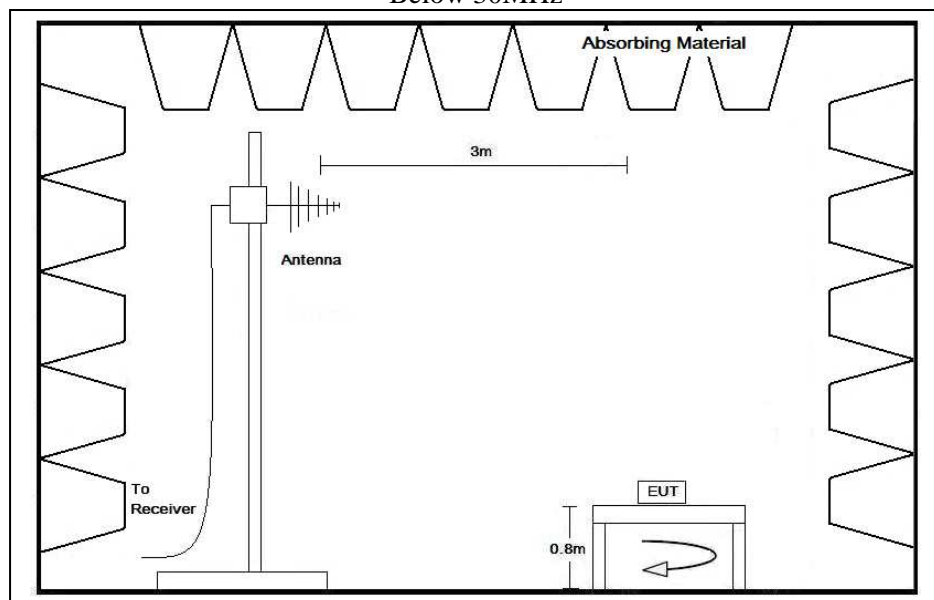
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2.2 Test Setup



Below 30MHz



30MHz – 1GHz

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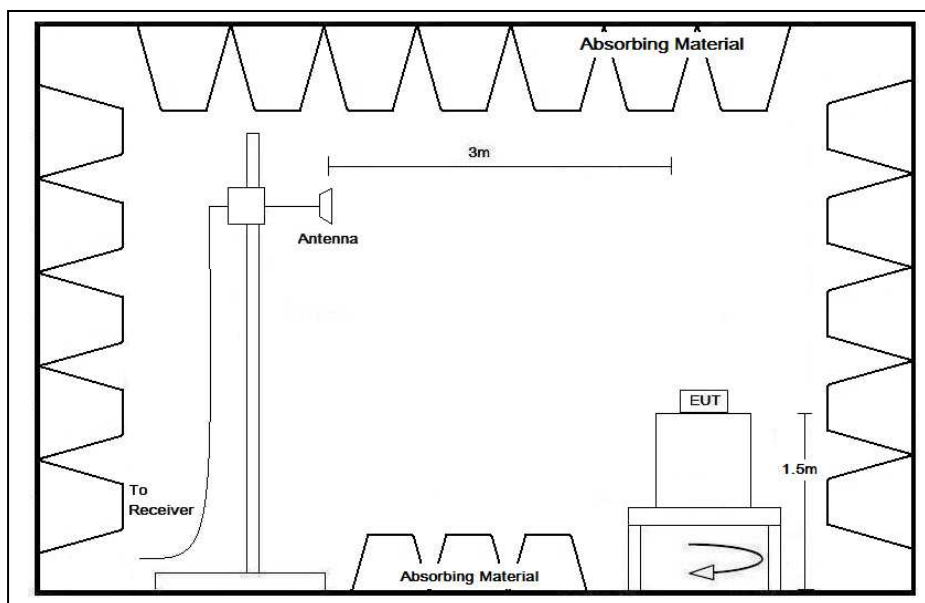
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2.2 Test Setup



Above 1GHz

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2.3 Test Result

Peak Detector data was measured unless otherwise stated.

The radiated emissions are measured from 9kHz to 10GHz (the tenth harmonics)

The worst case configuration is shown on the worst case configuration of test setup photo.

The frequencies from fundamental up to tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next pages.

The EUT has been tested in Transmission mode.

It was found that the EUT meet the FCC and RSS requirement.

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2.4 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value
Ambient temperature:	28.2 °C
Relative humidity:	43.6 %

Channel: 910MHz

Polarization	Frequency(MHz)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector Type
H	909.984	62.5	28.3	90.8	94.0	-3.2	QP
V	909.932	53.9	28.3	82.2	94.0	-11.8	QP
V	902.000	12.9	28.3	41.2	46.0	-4.8	PK
H	1819.885	55.4	-7.6	47.8	54.0	-6.2	PK
H	2729.845	44.4	-4.7	39.7	54.0	-14.3	PK
V	3639.810	44.9	-2.3	42.6	54.0	-11.4	PK
V	5460.030	41.3	3.2	44.5	54.0	-9.5	PK

Remark: 1) All emission above 1GHz is measured with Peak detector and compared with the average limit, so no average measurement is performed.

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Channel: 918MHz

Polarization	Frequency (MHz)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector Type
H	917.938	61.6	28.3	89.9	94.0	-4.1	QP
V	917.928	56.8	28.3	85.1	94.0	-8.9	QP
V	928.000	12.6	28.3	40.9	46.0	-5.1	QP
H	1835.855	55.1	-7.6	47.5	54.0	-6.5	PK
H	2753.950	44.6	-4.7	39.9	54.0	-14.1	PK
V	3671.770	47.4	-2.3	45.1	54.0	-8.9	PK
V	5507.560	39.6	4.1	43.7	54.0	-10.3	PK

Remark: 1) All emission above 1GHz is measured with Peak detector and compared with the average limit, so no average measurement is performed.

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3 Description of the Line-conducted Test

3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

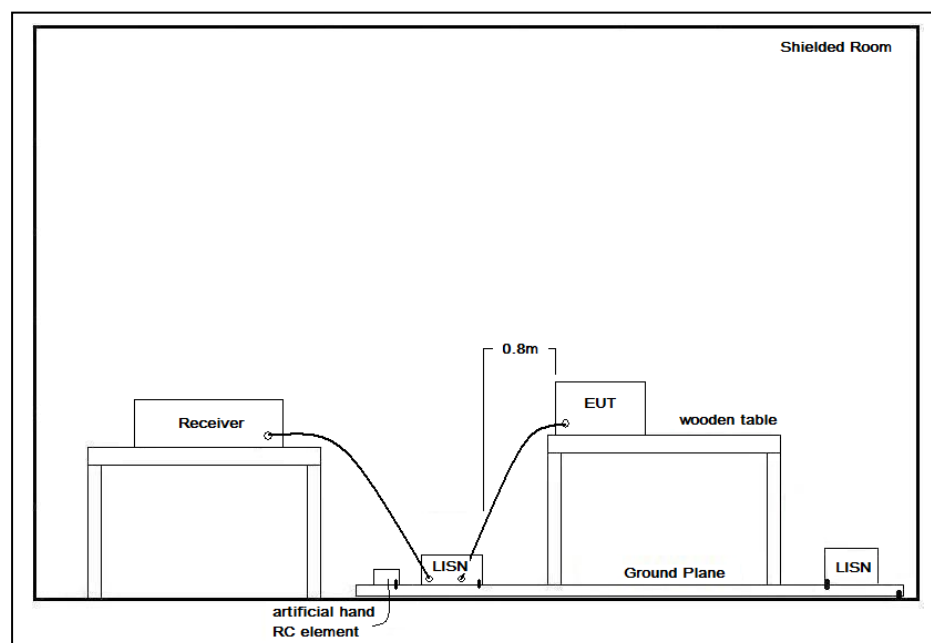
3.2 Test Result

The worst case configuration is shown on the worst case configuration of test setup photo.

The EUT has been tested in Transmission mode of 910MHz and 918MHz and found the worst case on 910MHz transmission.

It was found that the EUT meet the FCC and RSS requirement.

3.3 Test Setup



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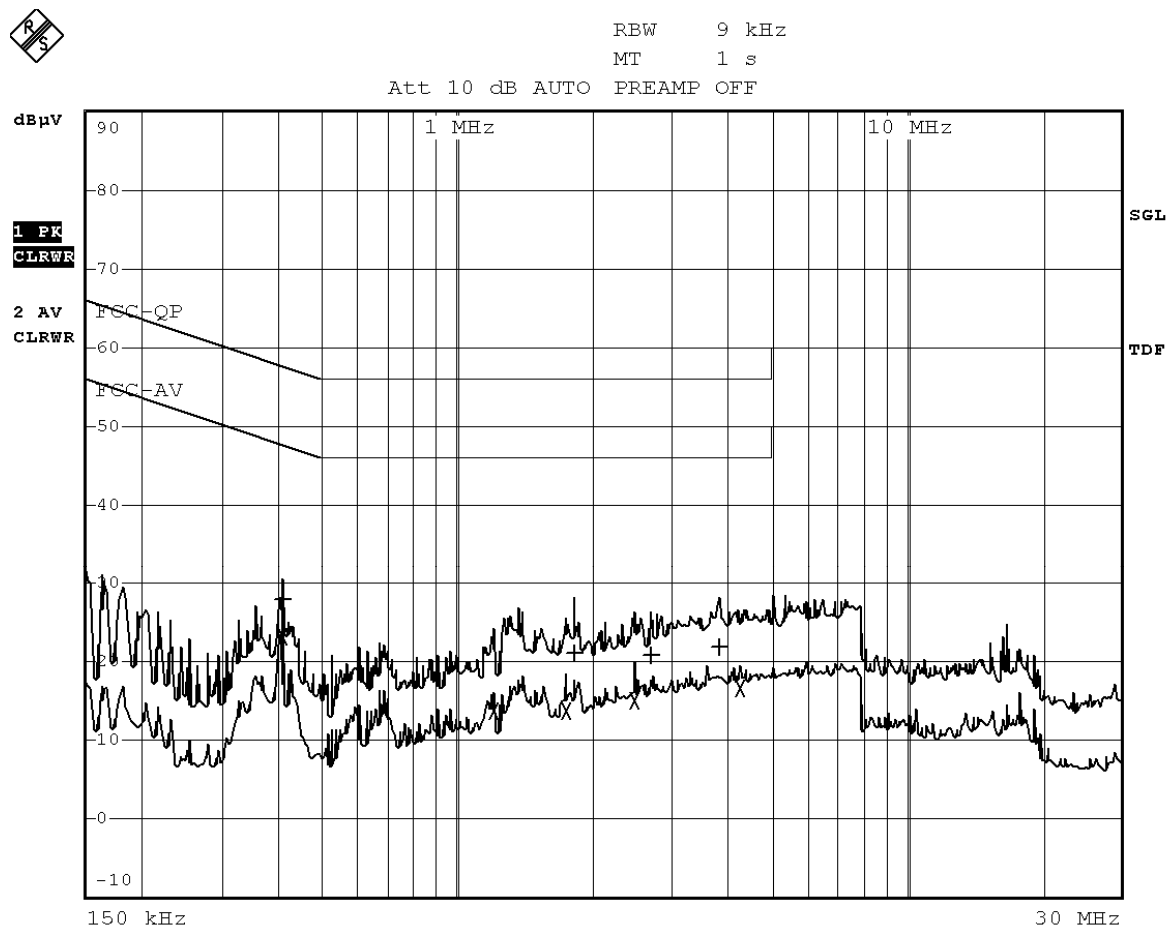
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3.4 Graph and Table of Conducted Emission Measurement Data



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EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC-QP			
Trace2:	FCC-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	411 kHz	27.80	N gnd	-29.82
2 Average	411 kHz	23.31	L1 gnd	-24.31
2 Average	684.5 kHz	13.73	N gnd	-32.26
2 Average	1.211 MHz	13.81	N gnd	-32.18
2 Average	1.742 MHz	13.77	N gnd	-32.22
1 Quasi Peak	1.8185 MHz	20.99	N gnd	-35.00
2 Average	2.4755 MHz	15.15	N gnd	-30.84
1 Quasi Peak	2.714 MHz	20.94	N gnd	-35.05
1 Quasi Peak	3.8345 MHz	21.88	N gnd	-34.11
2 Average	4.28 MHz	16.72	N gnd	-29.27

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4 Bandwidth

Appendices A1 and A2 show the fundamental emission is confined in the specified band. 20dB bandwidth is 208.7kHz and 99% bandwidth is 200.8kHz. Both bandwidths fall in the band of 902 – 928MHz. It also shows that the EUT met the bandwidth requirement of FCC Part 15.215(c) and bandwidth and frequency stability requirement of RSS-GEN.

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FCC ID: KUT2NV9
IC: 4454A-2NV9

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TEST REPORT

Report No. : AY0059771(7)

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5 Appendices

A1.	20dB Bandwidth Plot	2	page(s)
A2.	99% Bandwidth Plot	2	Page(s)

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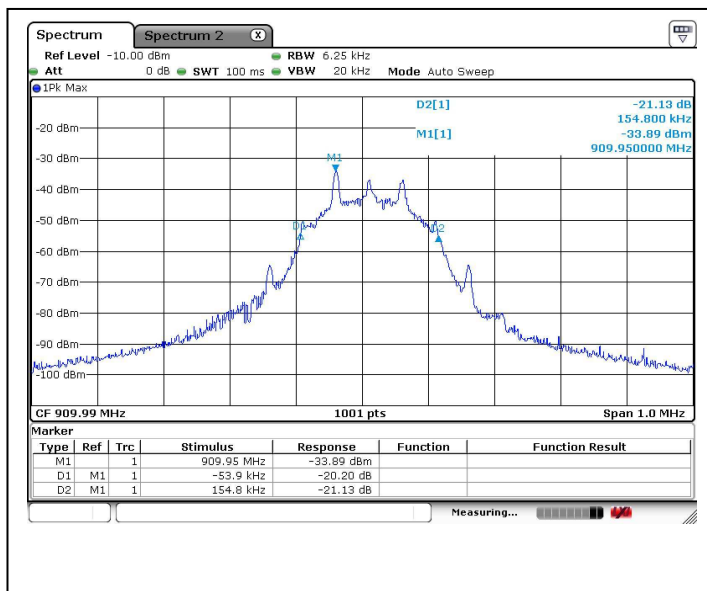
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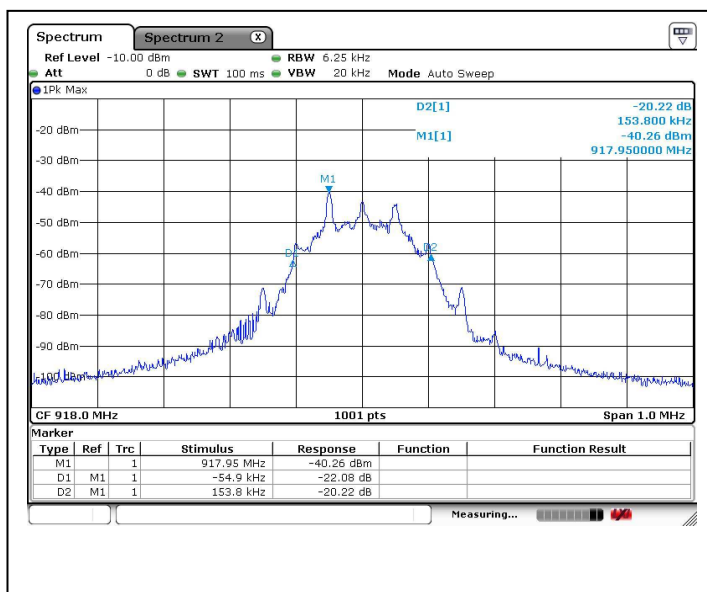
Report No. : AY0059771(7)

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A1. 20dB Bandwidth Plot



Channel: 910MHz



Channel: 918MHz

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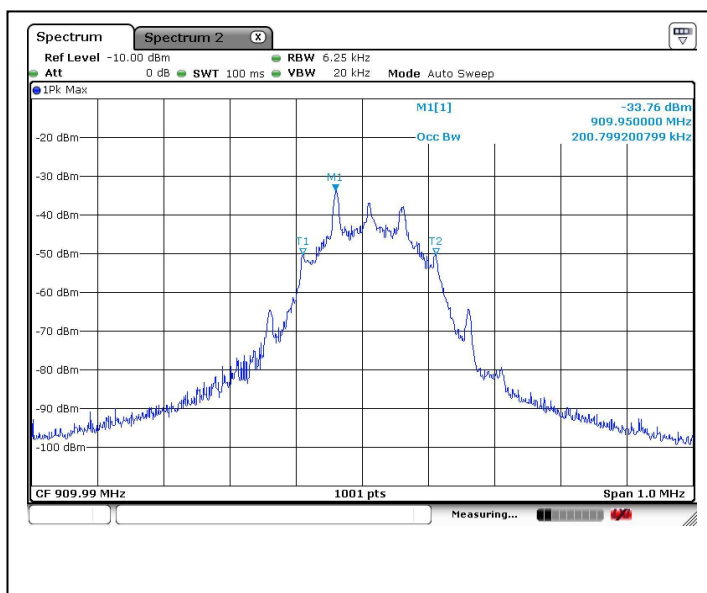
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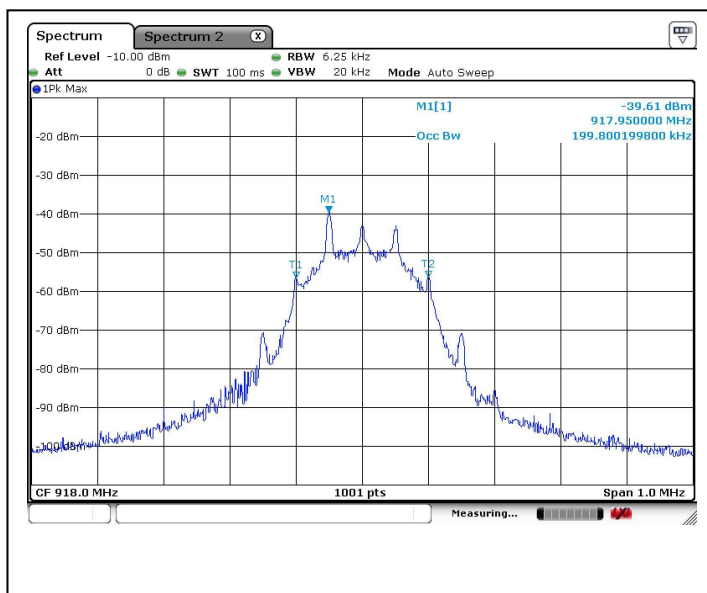
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A2. 99% Bandwidth Plot



Channel: 910MHz



Channel: 918MHz

***** End of Report *****

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