



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AZ0020191(2) Date : 20 May 2020

Application No. : LZ010969(3)

Applicant : One World Technologies, Inc.
115 Innovation Way,
Anderson, South Carolina, United States, 29625.

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

Sample Description	Model number
Car of Hart RC Truck	HPRC01

Sample registration no. : RZ025921-001
Radio Frequency : 2415MHz – 2473MHz Transceiver
Rating : DC 20V rechargeable battery
: AC 120V to DC 20V adaptor
No. of submitted sample : Two (2) piece (s)

Date Received : 28 Apr 2020
Test Period : 11 May 2018 to 20 May 2020.

Test Requested : FCC Certification for FCC Part 15, subpart C
ISED Certification for License-exempt Device

Test Method : 47 CFR Part 15 (10-1-19 Edition), ANSI C63.10 – 2013, ANSI C63.4 – 2014
RSS-210 Issue 10, RSS-Gen Issue 5

Test Engineer : Mr. LEUNG Shu-kan, Ken

Test Result : See attached sheet(s) from page 2 to 25.

Conclusion : The submitted sample was found to comply with requirement of FCC Part 15
Subpart B and C and RSS-210 Issue 10.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Mr. WONG Lap-pang, Andrew
Manager
Electrical Division

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IC: 9880A-HPRC01R



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1 General Information

1.1 General Description

The equipment under test (EUT) is a car for Hart RC Truck. The EUT is power by DC 20V rechargeable battery. It operates at 2415MHz – 2473MHz. When the EUT received the signal from controller, it will take the corresponding action. .

The brief circuit description is listed as follows:

- U7 and its associated circuit act as motor control
- U1 and its associated circuit act as RF circuit
- Y1 and its associated circuit act as oscillator
- U2, U3, U6 and its associated circuit act as voltage control



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1.2 Location of the test site

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013. 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 C63.10 – 2013. A shielded room is located at :

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

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	R&S	ESCI	100152	15 Jan 2021	1Year
Spectrum Analyzer	R&S	FSV40	100964	29 Oct 2020	1Year
Biconical Antenna	Rohde & Schwarz	HK116	837414/004	20 Oct 2020	2Years
Log Periodic Antenna	Teseq	UPA6109	43666	20 Oct 2020	2Years
Loop Antenna	EMCO	6502	00056620	29 Oct 2020	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	02 Feb 2023	3Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	02 Feb 2023	3Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	15 Sep 2021	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	12 Sep 2021	2Years
Horn Antenna	Schwarzbeck	BBHA 9120C	9120C 594	27 Sep 2020	2Years
Pre-amplifier	Schwarzbeck	BBV9718	BBV9718 297	27 Sep 2020	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	08 May 2020	1Year
Coaxial Cable	Suhner	RG 214/U	N/A	08 May 2020	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	14 Jan 2022	2Years
LISN	Rohde & Schwarz	ENV 216	101232	12 Jan 2023	1Year
Coaxial Cable	Tyco Electronics	RG 58/U	N/A	20 Oct 2020	1Year



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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

Conducted emissions

Frequency	Uncertainty (U _{lab})
9kHz ~ 150kHz	2.83dB
150kHz ~ 30MHz	2.80dB

1.5 Test Summary

TEST ITEM	FCC REFERANCE	RESULT
Radiated emission	15.249(a)	Comply
Out-band emission	15.249(d)	Comply
Peak Limit	15.249(e)	Comply
Bandwidth	15.215(c)	Comply



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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.

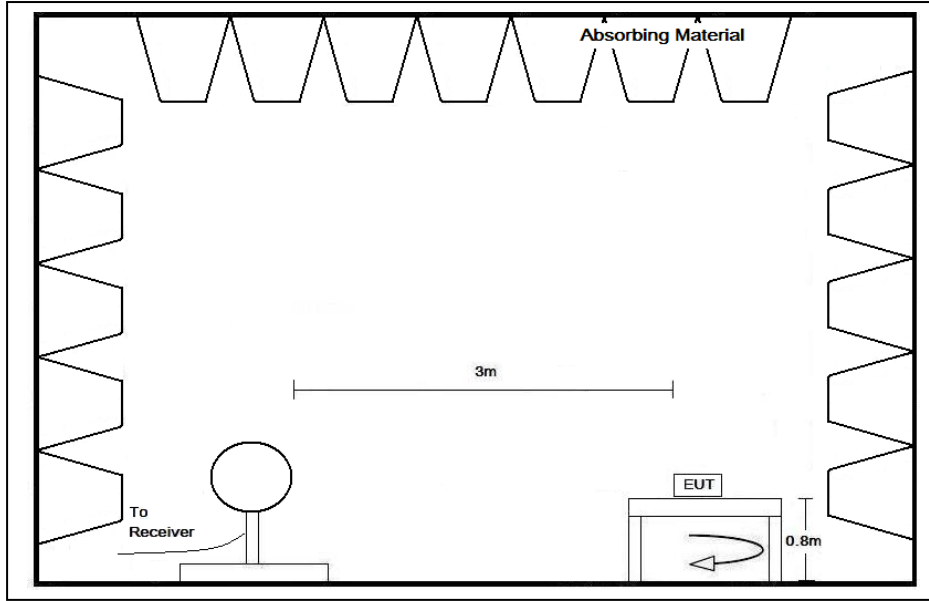


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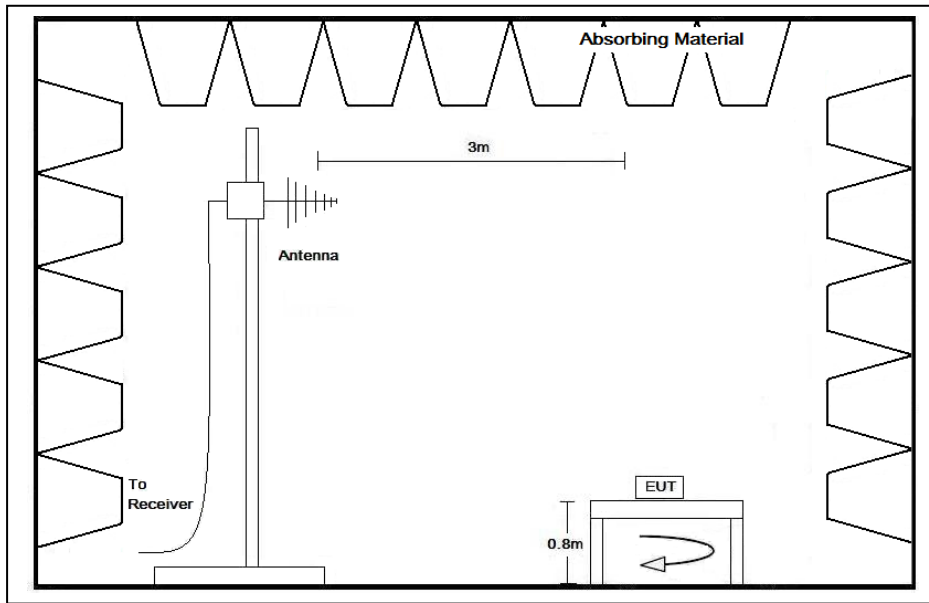
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2.2 Test Setup



Below 30MHz



30MHz – 1GHz

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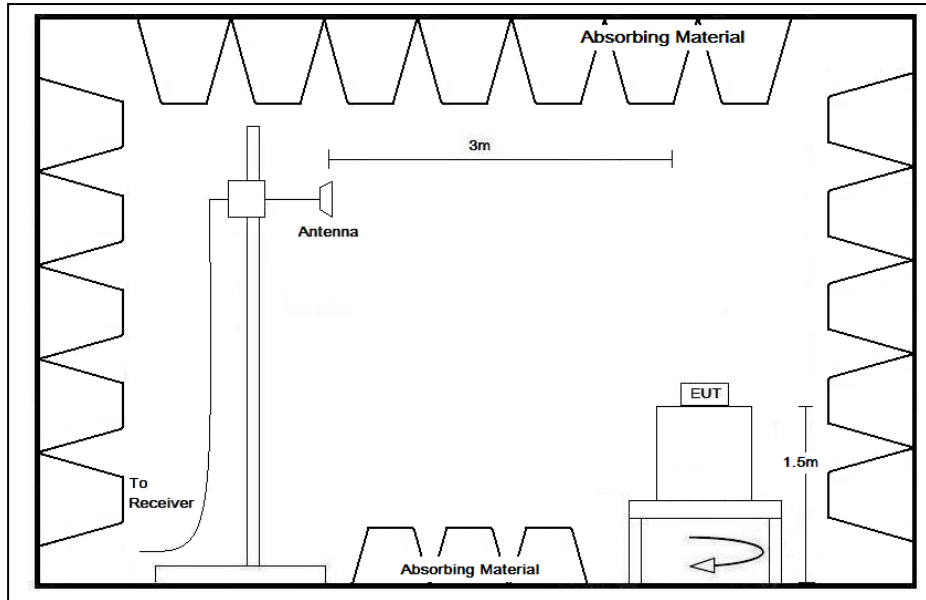


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2.2 Test Setup



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 26GHz (the tenth harmonics)

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

“#” means emissions appearing within the restricted bands of 47 CFR Part 15 section 15.205 and “*” means emission appearing within the restricted band of RSS-GEN section 8.10.

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 requirement.



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2.4 Radiated Emission Measurement Data

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	24.3	°C
Relative humidity:	52.7	%

Channel: 2415MHz

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	2414.763	94.7	-4.7	90.0	94.0	-4.0	Peak
V	2414.920	96.6	-4.7	91.9	94.0	-2.1	Peak
H	2400.000	54.8	-4.7	50.1	54.0	-3.9	Peak
V	2400.000	55.9	-4.7	51.2	54.0	-2.8	Peak
H	4829.938	47.8	3.8	51.6	54.0	-2.4	Peak
V	4829.996	46.9	3.8	50.7	54.0	-3.3	Peak
H	7244.964	33.5	11.2	44.7	54.0	-9.3	Peak
V	7244.996	33.9	11.2	45.1	54.0	-8.9	Peak

Remark: 1) The peak detector value is below the average limit for all emissions, so no additional average measurement is needed

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Channel: 2444MHz

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	2443.979	96.4	-4.7	91.7	94.0	-2.3	Peak
V	2443.999	99.9	-4.7	95.2	114.0	-18.8	Peak
V	2443.999	83.2	-4.7	78.5	94.0	-15.5	Average
H	4886.481	51.6	3.8	55.4	74.0	-18.6	Peak
H	4887.945	32.7	3.8	36.5	54.0	-17.5	Average
V	4888.005	52.9	3.8	56.7	74.0	-17.3	Peak
V	4887.935	36.2	3.8	40.0	54.0	-14.0	Average
H	7332.005	34.0	11.2	45.2	54.0	-8.8	Peak
V	7332.137	34.2	11.2	45.4	54.0	-8.6	Peak

Remark: 1) The peak detector value is below the average limit at emission of 2443.979MHz and above 7GHz, so no additional average measurement is done

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Channel: 2473MHz

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	2472.972	97.2	-4.7	92.5	94.0	-1.5	Peak
V	2472.715	101.1	-4.7	96.4	114.0	-17.6	Peak
V	2472.990	84.5	-4.7	79.8	94.0	-14.2	Average
H	2483.500	61.2	-4.7	56.5	74.0	-17.5	Peak
H	2483.500	28.1	-4.7	23.4	54.0	-30.6	Average
V	2483.500	65.4	-4.7	60.7	74.0	-13.3	Peak
V	2483.500	29.2	-4.7	24.5	54.0	-29.5	Average
H	4945.825	48.5	3.8	52.3	54.0	-1.7	Peak
V	4945.944	53.9	3.8	57.7	74.0	-16.3	Peak
V	4945.954	37.4	3.8	41.2	54.0	-12.8	Average
H	7418.980	35.5	11.2	46.7	54.0	-7.3	Peak
V	7418.905	34.5	11.2	45.7	54.0	-8.3	Peak

Remark: 1) The peak detector value is below the average limit at emission of 2472.972MHz, 4945.825MHz and above 7GHz, so no additional average measurement is done

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Test mode: Charging

Polarization	Frequency (MHz)	Reading at 3m (dBμV)	Transducer Factor (dB/m)	Field Strength at 3m ¹ (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector (PK/QP/AV)
H	40.497	22.0	13.0	35.0	40.0	-5.0	QP
V	44.155	21.4	13.0	34.4	40.0	-5.6	QP
V	80.241	26.8	10.5	37.3	40.0	-2.7	QP
H	140.682	10.5	15.0	25.5	43.5	-18.0	QP
V	202.800	8.1	15.0	23.1	43.5	-20.4	QP
H	231.065	9.0	15.0	24.0	46.0	-22.0	QP
H	313.066	10.9	17.7	28.6	46.0	-17.4	QP

Remark: 1) Field Strength = Reading + transducer factor.

2) Other emissions with more than 20dB margin are not reported in this report



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3 Description of the Line-conducted Test

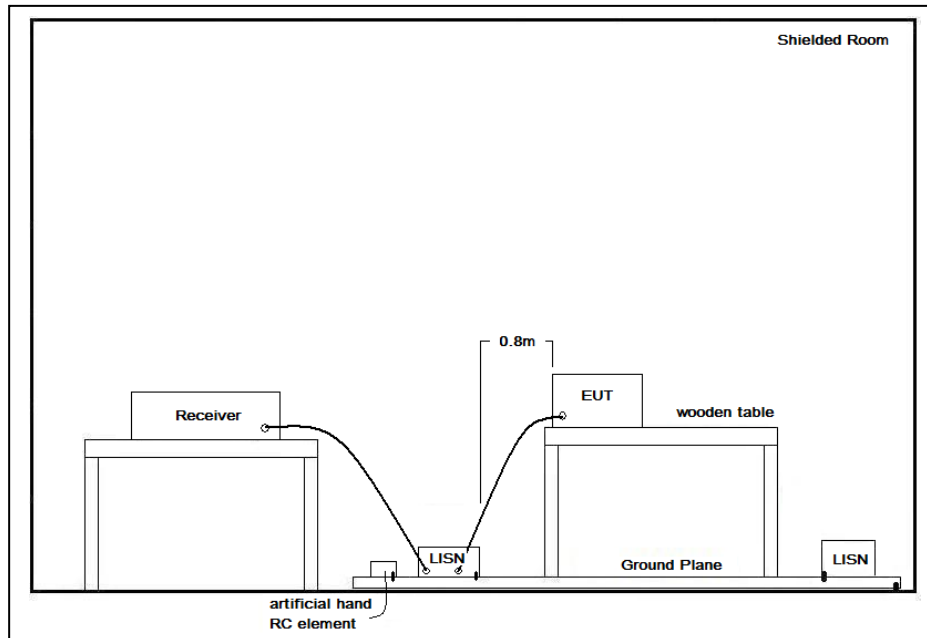
3.1 Test Procedure

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

It was found that the EUT met the FCC requirement.

3.3 Test Setup





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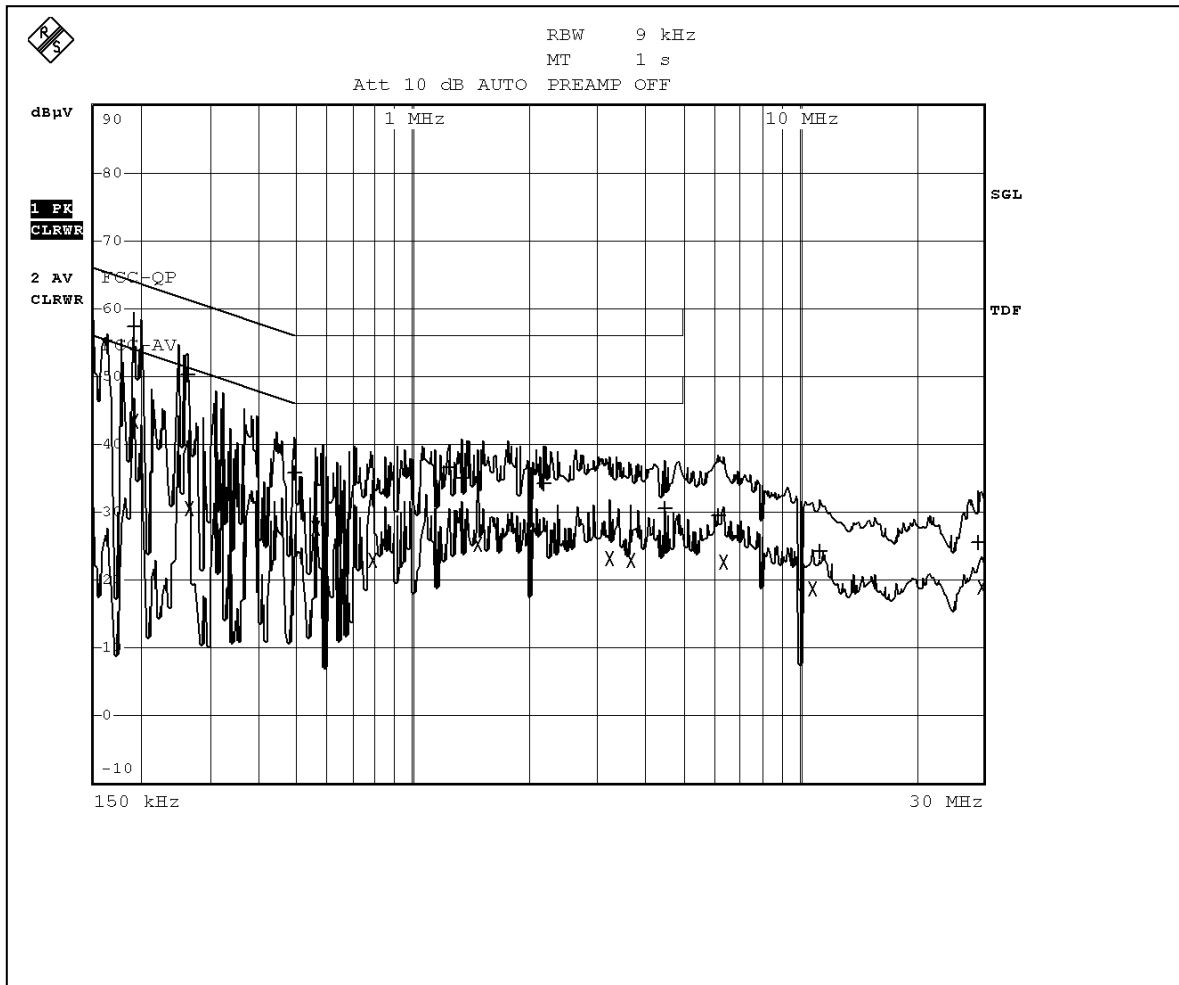
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3.4 Graph and Table of Conducted Emission Measurement Data

Testing terminal: L



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3.4 Graph and Table of Conducted Emission Measurement Data

Testing terminal: L

Table with 5 columns: TRACE, FREQUENCY, LEVEL dBμV, DELTA, LIMIT dB. Contains 20 rows of measurement data for various frequencies from 190.5 kHz to 29.7995 MHz.



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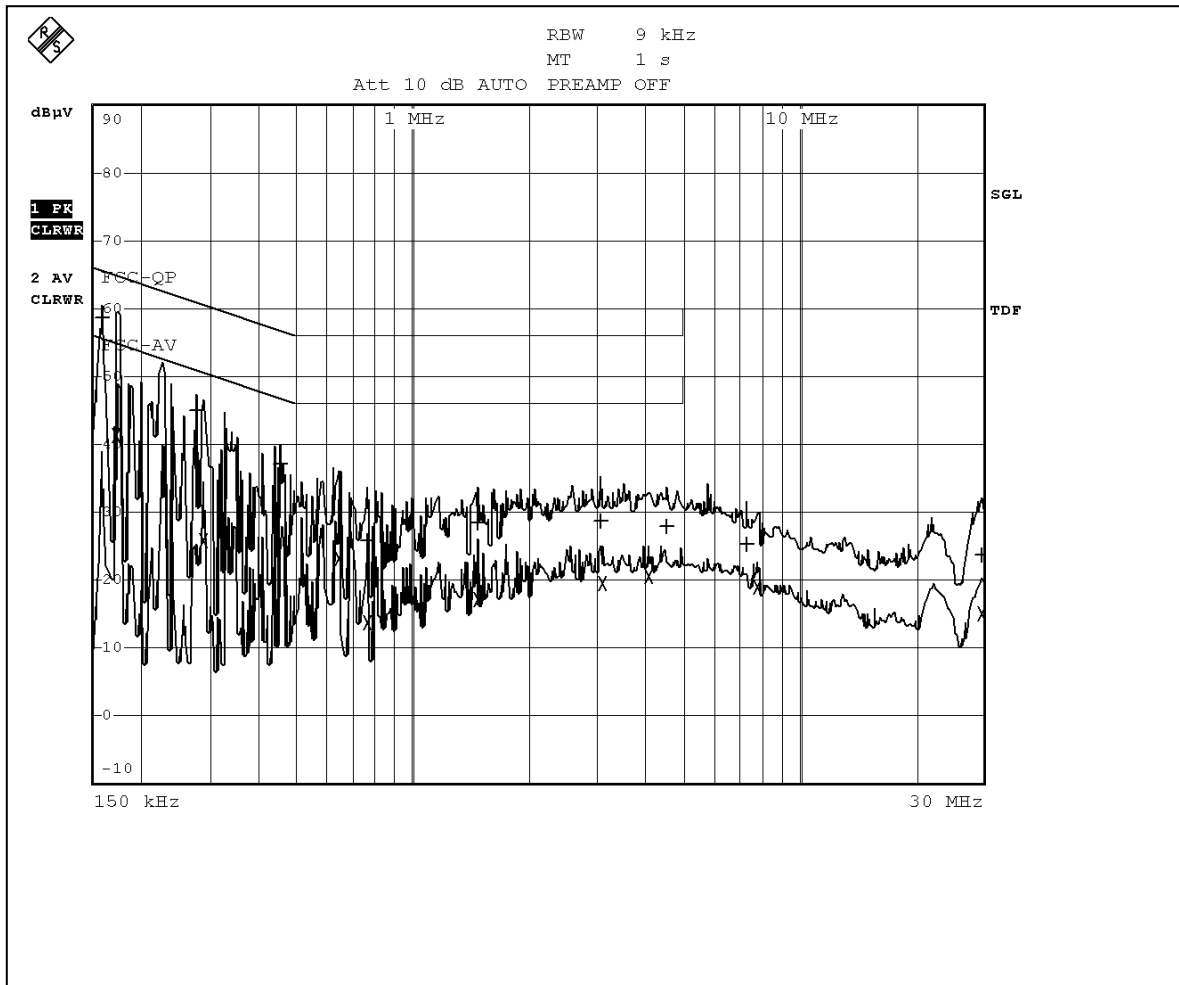
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3.4 Graph and Table of Conducted Emission Measurement Data

Testing terminal: N



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3.4 Graph and Table of Conducted Emission Measurement Data

Testing terminal: N

EDIT PEAK LIST (Final Measurement Results)				
TRACE		FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
Trace1:	FCC-QP			
Trace2:	FCC-AV			
Trace3:	---			
1	Quasi Peak	159 kHz	58.73 N gnd	-6.78
2	Average	172.5 kHz	41.18 N gnd	-13.65
1	Quasi Peak	276 kHz	44.86 N gnd	-16.07
2	Average	289.5 kHz	25.80 N gnd	-24.73
1	Quasi Peak	456 kHz	37.07 N gnd	-19.69
2	Average	644 kHz	23.20 N gnd	-22.80
1	Quasi Peak	761 kHz	25.76 N gnd	-30.23
2	Average	761 kHz	13.86 N gnd	-32.13
1	Quasi Peak	1.481 MHz	28.40 N gnd	-27.59
2	Average	1.481 MHz	17.28 N gnd	-28.71
1	Quasi Peak	3.065 MHz	28.79 N gnd	-27.21
2	Average	3.11 MHz	19.62 N gnd	-26.38
2	Average	4.0955 MHz	20.52 N gnd	-25.47
1	Quasi Peak	4.5455 MHz	28.03 N gnd	-27.96
1	Quasi Peak	7.3265 MHz	25.28 N gnd	-34.71
2	Average	7.799 MHz	18.92 N gnd	-31.07
1	Quasi Peak	29.7005 MHz	23.79 N gnd	-36.21
2	Average	29.7005 MHz	15.17 N gnd	-34.82



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4 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

Document	Filename
ID Label/Location	Label Artwork and Location.pdf
Block Diagram	Block Diagram.pdf
Schematic Diagram	Schematic.pdf
Users Manual	User Manual.pdf
Operational Description	Operation Description.pdf

4.1 Bandwidth

Appendices A1 is shown the fundamental emission is confined in the specified band. 20dB bandwidth is 4.327MHz. It also shows that the EUT met the FCC Part 15.215(c).



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5 Appendices

A1	20dB Bandwidth Plot	2	pages
A2	99% Bandwidth Plot	2	pages



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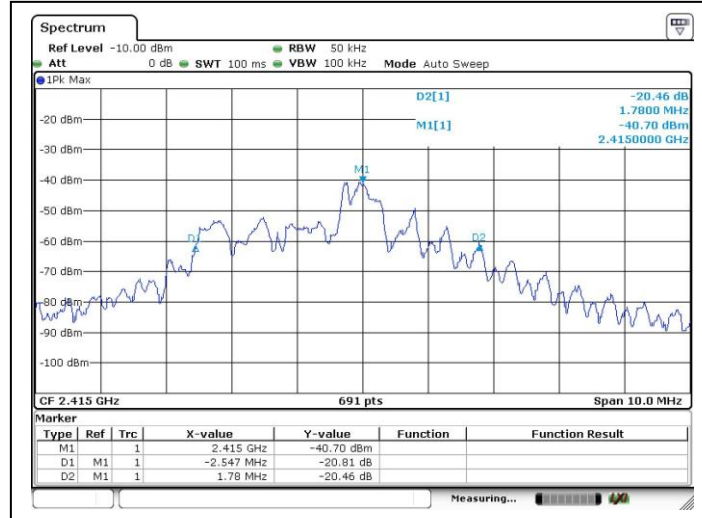
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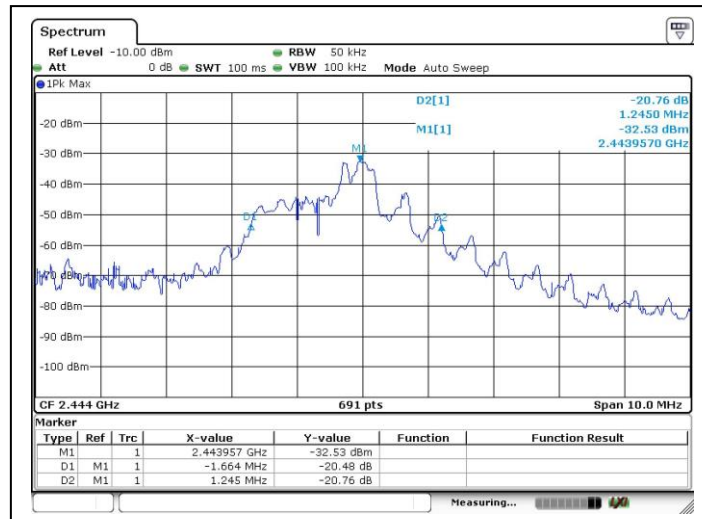
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A1. 20dB Bandwidth Plot



Channel: 2415MHz



Channel: 2444MHz

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew



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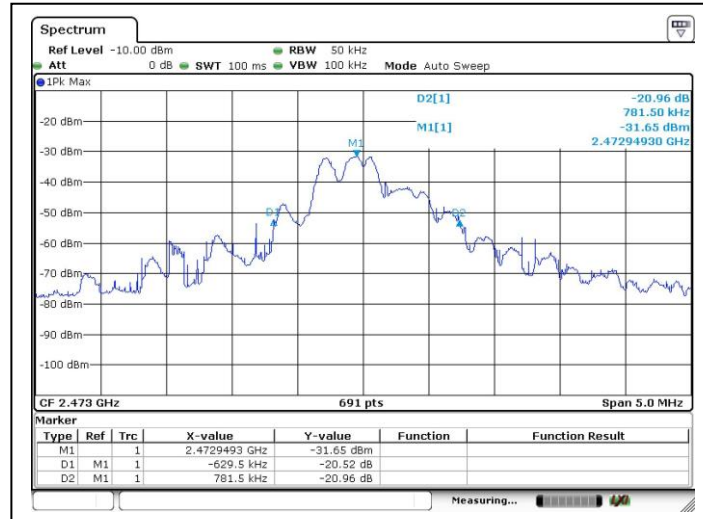
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A1. 20dB Bandwidth Plot



Channel: 2473MHz

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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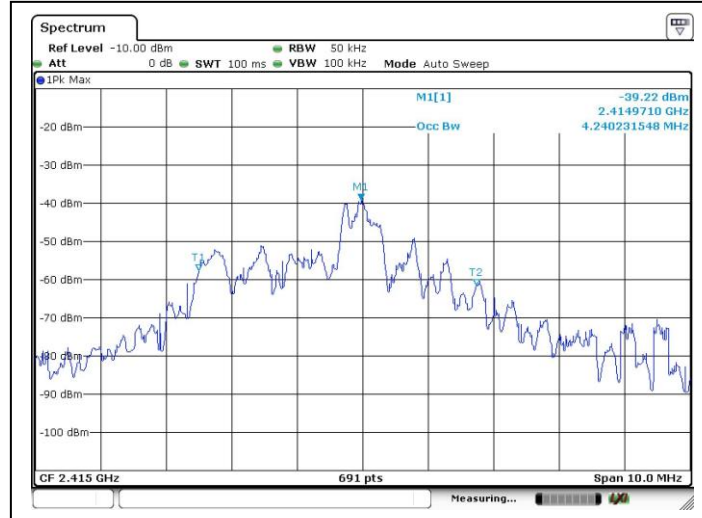
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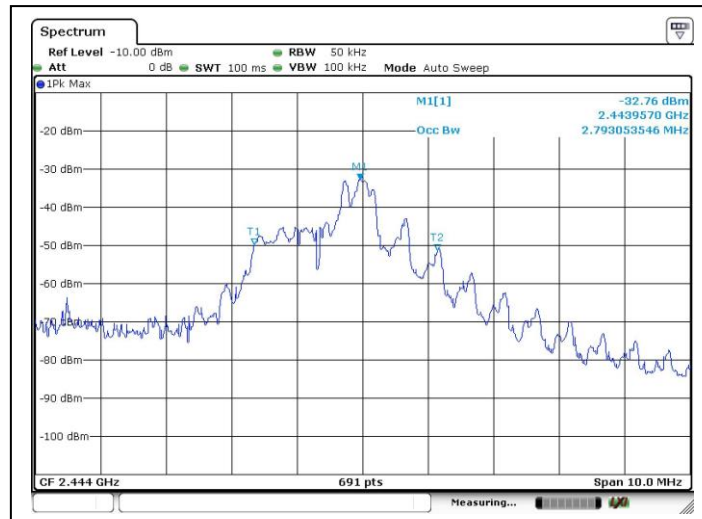
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A2. 99% Bandwidth Plot



Channel: 2415MHz



Channel: 2444MHz

Tested by: *Ken*
Mr. LEUNG Shu-kan, Ken

Reviewed by: *RP*
Mr. WONG Lap-pong, Andrew

FCC ID: VMZ-HPRC01R
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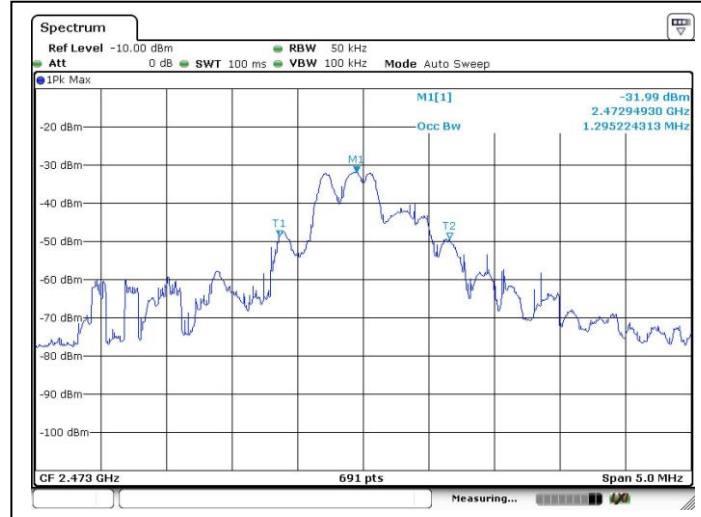
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A2. 99% Bandwidth Plot



Channel: 2473MHz

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

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew

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