



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5) Date : August 6, 2018

Application No. : LW023348 (9)

Applicant : 9141-0720 Quebec Inc. DBA MANARAS/OPERA
136 Oneida Drive, Pointe-Claire
Canada, H9R 1A8

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

Sample Description	Model No.
390MHz Transmitter	EM-144

Radio Frequency : 390MHz
Rating : 2 x 1.5V AA batteries
No. of submitted sample : Two (2) piece (s)
Sample registration No. : RW022773-002(1) and RW022773-001(0)

Date Received : July 27, 2018

Test Period : July 30, 2018 – August 6, 2018

Test Requested : FCC 47CFR Part 15 Certification.
ISED Canada Radio Standards Specification RSS-210.


Test Method : 47 CFR Part 15 (10-1-17 Edition)
ANSI C63.10 – 2013
RSS-210 Issue 9
RSS-GEN Issue 4

Test Result : See attached sheet(s) from page 2 to 16.

Conclusion : The submitted sample was found to comply with requirement of FCC 47CFR Part 15 Subpart C and ISED Canada RSS-210 Issue 9.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

Page 1 of 16

FCC ID: X7ORADIOEM144
IC: 8860A-RADIOEM144



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

Table of Contents

1	General Information	3
1.1	General Description	3
1.2	Location of the test site	4
1.3	List of measuring equipment.....	5
1.4	Measurement Uncertainty.....	6
1.5	Test Summary	6
2	Description of the radiated emission test	7
2.1	Test Procedure	7
2.2	Test Setup	8
2.3	Test Result	10
3	Description of the Line-conducted Test.....	12
3.1	Test Procedure	12
3.2	Test Result	12
3.3	Test Setup	12
3.4	Graph and Table of Conducted Emission Measurement Data	12
4	Supplementary document.....	13
4.1	Bandwidth.....	13
4.2	Duty cycle.....	13
4.3	Transmission time.....	13
5	Appendices.....	14



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

1 General Information

1.1 General Description

The equipment under test (EUT) model EM-144 is a wireless transmitter. It operates at frequency 390MHz for transmitter. The oscillation of radio control is generated by a 12.1875 MHz crystal for RF transmitter. The EUT is powered by two 1.5V AA batteries. The EUT contains two knobs to setup the channels and other switch control corresponding receiver.

The integral coil antenna is used in EUT and the radio output power is unable to adjust.

The brief circuit description is listed as follows:

- SW1, SW2, SW3, SW5, SW8 and its associated circuit act as switch
- U2 and its associated circuit act as RFIC, SYN115
- Y1, C5, C6 and its associated circuit act as oscillation clock
- L3, C7, C8, C9 and its associated circuit act as matching network



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

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,
Fo Tan, Shatin,
New Territories,
Hong Kong.

FCC Accredited Lab (Designation Number: HK0004)
ISED Wireless Test Site (ISED Assigned Code: 4093A)



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	Rohde & Schwarz	ESCS30	100001	01 Feb 2019	1Year
EMI Test Receiver	Rohde & Schwarz	ESCI	100152	07 Dec 2018	1Year
Spectrum Analyzer	R&S	FSV40	100964	08 Feb 2019	1Year
Spectrum Analyzer	Rohde & Schwarz	FSP30	100628	27 Mar 2019	1Year
Broadband Antenna	Schaffner	CBL6112B	2692	28 Mar 2020	2Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2020	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	21 Dec 2018	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	21 Dec 2018	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	01 Aug 2020	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	01 Aug 2020	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	17 May 2019	1Year
Coaxial Cable	Suhner	RG 214/U	N/A	17 May 2019	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	21 Dec 2018	1Year
LISN	Rohde & Schwarz	ENV216	101323	16 Jan 2019	1Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	24 Oct 2018	1Year



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

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

1.5 Test Summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emission	15.231(b)	RSS-210 Issue 9 Annex A1.1 Table A & Clause 2.2	Comply
Assigned bandwidth (20dB bandwidth)	15.231(c)	-	Comply
Occupied bandwidth >0.25% of the center frequency	-	RSS-210 Issue 9 Annex A1.1.3	Comply
Transmission time after manual activation	15.231(a)	RSS-210 Issue 9 Annex A1.1.1	Comply



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

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.



CMA Testing and Certification Laboratories

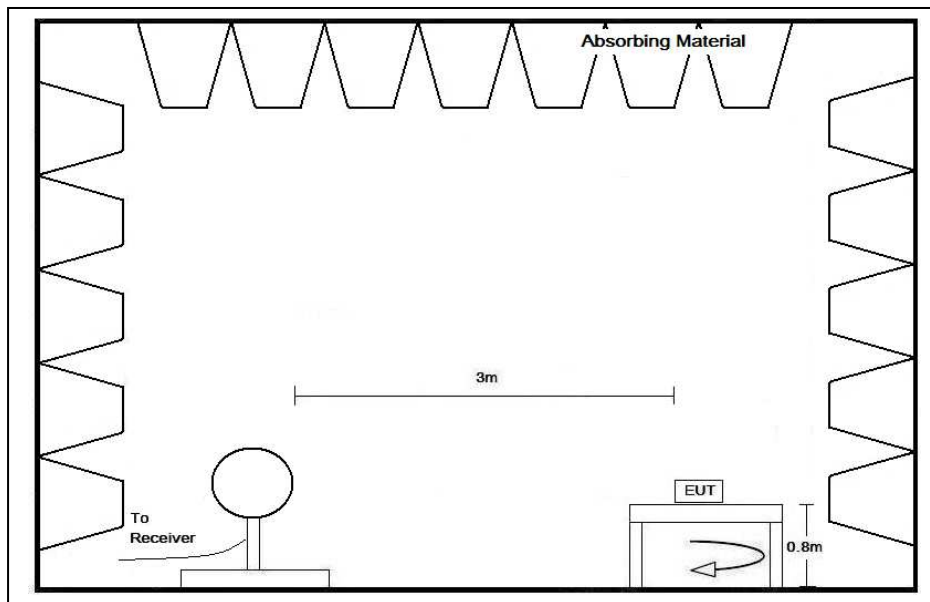
廠商會檢定中心

TEST REPORT

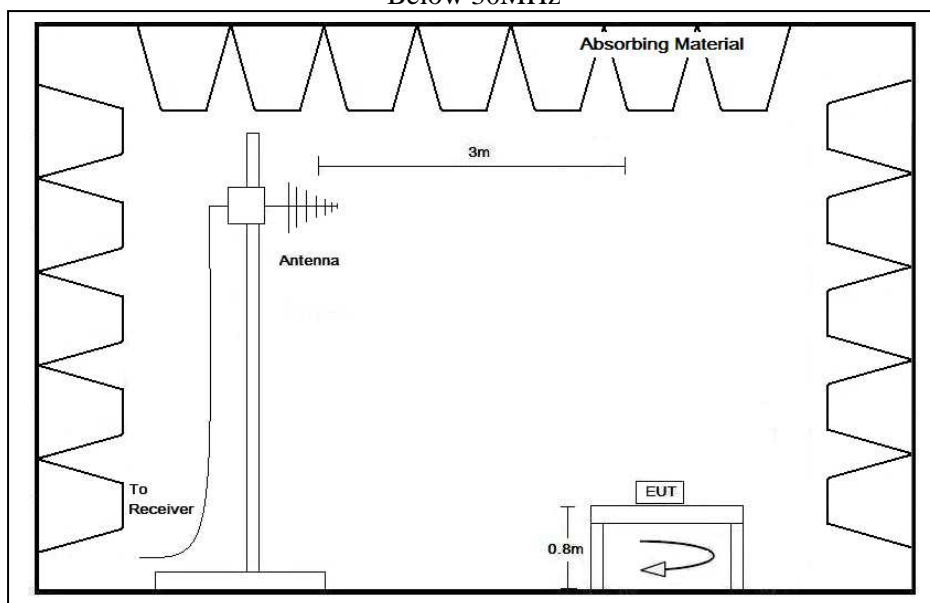
Report No. : AW0044260(5)

Date : August 6, 2018

2.2 Test Setup



Below 30MHz



30MHz – 1GHz

FCC ID: X7ORADIOEM144
IC: 8860A-RADIOEM144

Page 8 of 16



CMA Testing and Certification Laboratories

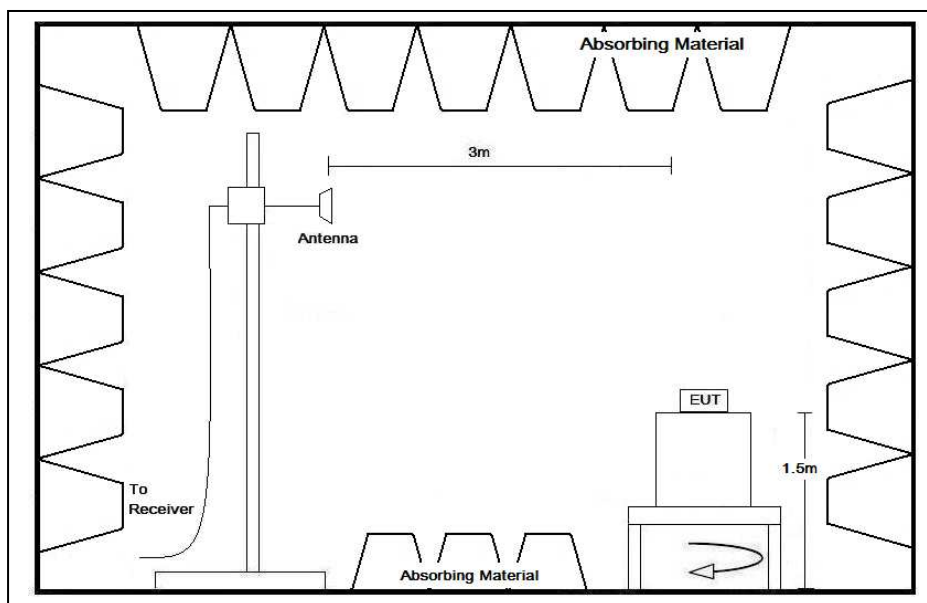
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TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

2.2 Test Setup



Above 1GHz



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

2.3 Test Result

Peak Detector data was measured unless otherwise stated.

The radiated emissions are measured from 9kHz to 4GHz (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 and RSS requirement.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

2.4 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value
Ambient temperature:	26.6 °C
Relative humidity:	52.3 %

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	389.996	36.1	16.9	53.0	79.2	-26.2	Peak
V	389.980	34.3	16.9	51.2	79.2	-28.0	Peak
V	780.062	21.8	25.1	46.9	59.2	-12.3	Peak
H	*#1169.932	49.8	-9.0	40.8	54.0	-13.2	Peak
H	*#1559.912	52.6	-8.0	44.6	54.0	-9.4	Peak
V	1949.884	46.4	-7.2	39.2	59.2	-20.0	Peak
V	*#2730.064	47.9	-4.7	43.2	54.0	-10.8	Peak

- Remark: 1) The peak detector value is below the average limit, so no average measurement is done.
 2) * The emission is fall in the restricted band of FCC section 15.205.
 3) # The emission is fall in the restricted band of RSS-Gen Table 6.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

3 Description of the Line-conducted Test

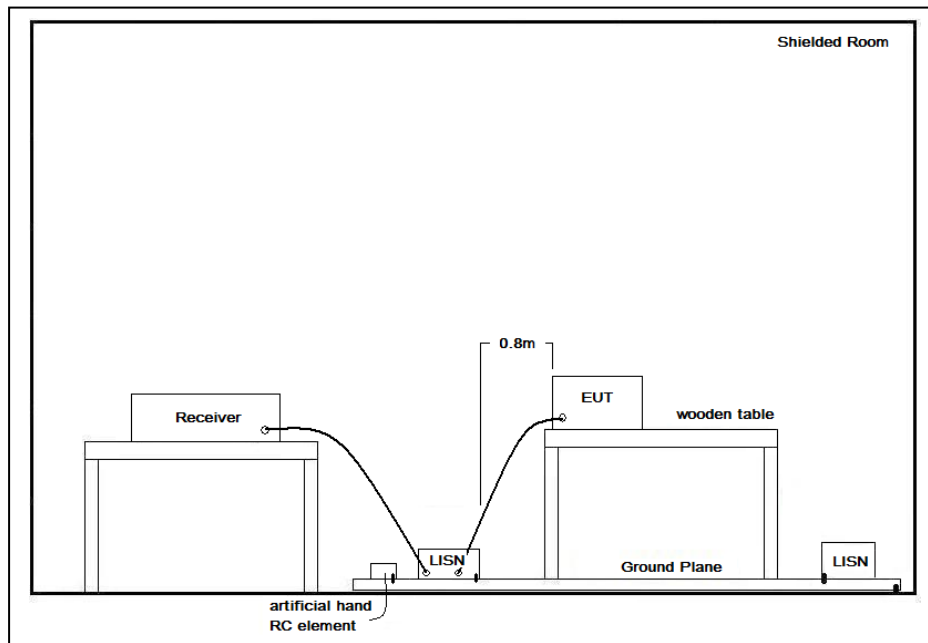
3.1 Test Procedure

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

No measurement is required as the EUT is a battery-operated product.

3.3 Test Setup



3.4 Graph and Table of Conducted Emission Measurement Data

Not Applicable

FCC ID: X7ORADIOEM144
IC: 8860A-RADIOEM144

Page 12 of 16



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

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. The 20dB bandwidth is 5.24kHz and 99% bandwidth is 8.4kHz. The bandwidth requirement is 0.25% of 390MHz = 975kHz . It also shows that the EUT met the FCC Part 15.231(c) and RSS-210 Annex A1.1.3 bandwidth requirement.

4.2 Duty cycle

Since the peak value of emission is below the average limit, duty cycle and average factor calculation is not necessary in this case.

4.3 Transmission time

All 3 keys are tested and following worst case found:
Worst case: Open Key

Duration of each transmission =0.128s

The duration of the transmission is less than 5s after the transmission is activated by remote controller. An Appendices A3 is shown the EUT to comply with FCC part 15, section 15.231(a)(1) and RSS-210, Annex 1, section A1.1.1.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

5 Appendices

A1.	Bandwidth Plot	1	page(s)
A2.	Transmission time	1	page(s)



CMA Testing and Certification Laboratories

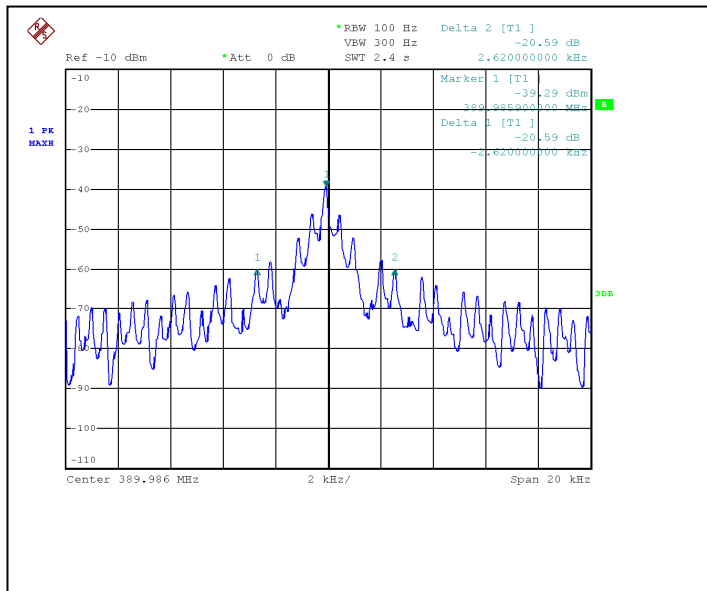
廠商會檢定中心

TEST REPORT

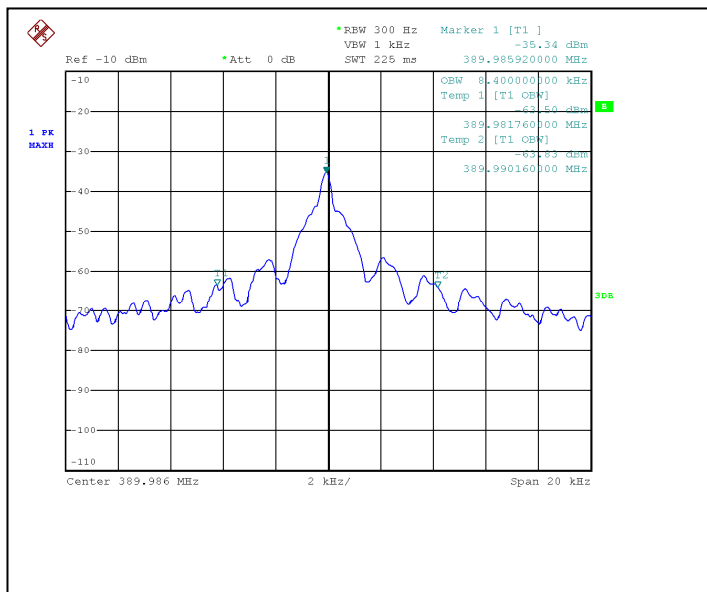
Report No. : AW0044260(5)

Date : August 6, 2018

A1. Bandwidth Plot



20dB bandwidth





CMA Testing and Certification Laboratories

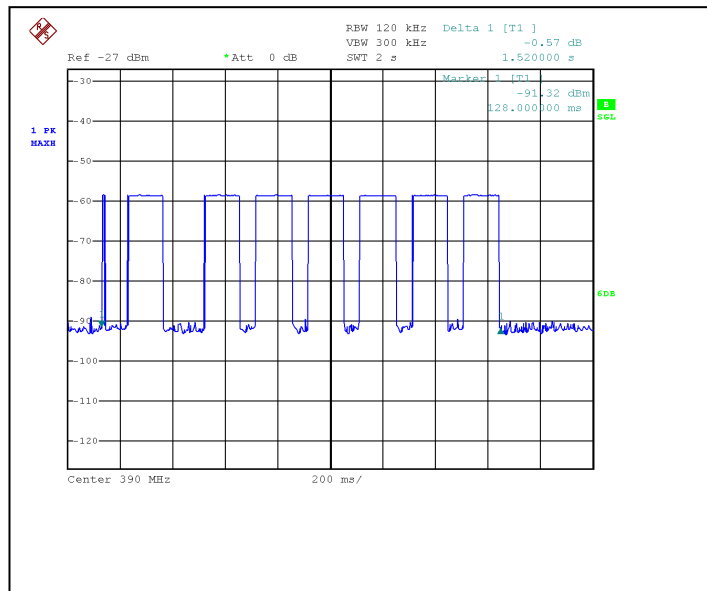
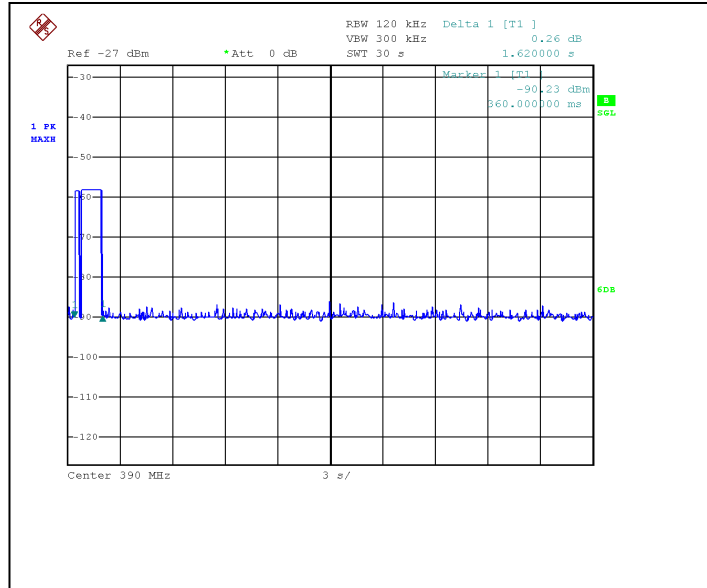
廠商會檢定中心

TEST REPORT

Report No. : AW0044260(5)

Date : August 6, 2018

A2. Transmission time



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