CMA Testing and Certification Laboratories
廠商會檢定中心

TEST REPORT

Report No.	:	AS0047343(0)	Date :	19 Aug 2014
Application No.	:	LS028462(0)		
Applicant	:	Capital Prospect Ltd 1303B, Veristrong Industrial center, 36 Aupuiwan street Fotan, Hong Kong		
Sample Description	:	One(1) item of submitted sample stated to be 315MHz Transmitter of Model No. MKA-315 Radio Frequency : 315MHz Transmitter Rating : 1 x 3V button cell No. of submitted sample : Two (2) piece (s)		
Date Received	:	24 Jul 2014.		
Test Period	:	31 Jul 2014 to 08 Aug 2014.		
Test Requested	:	FCC 47CFR Part 15 Certification. Industry Canada Interference Causing Equipment Standard RSS-210.		
Test Method	:	47 CFR Part 15 (10-1-12 Edition) ANSI C63.4 – 2009 RSS-210 Issue 8 RSS-GEN Issue 3		
Test Result	:	See attached sheet(s) from page 2 to 24.		
Conclusion	:	The submitted sample was found to comply with requirement of FCC 47CFR Part 15 Subpart C and Industry Canada RSS-210 Issue 8.		

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____

Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

FCC ID: KUTMKA315
IC: 4454A-MKA315

CMA Industrial Development Foundation Limited
Room 1302, Yan Hing Centre, 9-13 Wong Chuk Yeung St., Fo Tan, Shatin, N.T., Hong Kong.
Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: info@cmatcl.com Web Site: http://www.cmatcl.com

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IC: 4454A-MKA315

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1 General Information

1.1 General Description

The equipment under test (EUT) is a transmitter for remote control. It operates at 315MHz and the oscillation of radio control is generated by a 9.84375 MHz crystal and RF IC. The EUT is powered by 1 x 3V button cell. There are four buttons on th EUT. When the buttons are pressed, the EUT will send data to receiver..

The antenna terminal is permanently attached in EUT and the radio output power is unable to adjust.

The brief circuit description is listed as follows:

- U1 and its associated circuit act as code generator
- U4, Y2 and its associated circuit act as RF circuit
- C3, L2 and its associated circuit act as RF filter
- U2, U3 and its associated circuit act as power detect

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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 – 2009. 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 – 2009. 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 Registration Number: 552221
IC Assigned Code: 4093A-2

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1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date
EMI Test Receiver	R&S	ESCS30	100001	21 Nov 2014
Spectrum Analyze	Rohde & Schwarz	FSV 40	100964	17 Dec 2014
Broadband Antenna	Schaffner	CBL6112B	2718	06 Jan 2015
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	09 Oct 2014
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	09 Oct 2014
Loop Antenna	EMCO	6502	00056620	28 Oct 2015
Coaxial Cable	Schaffner	RG213/U	N/A	26 May 2014
Coaxial Cable	Suhner	RG214/U	N/A	26 May 2014
Coaxial Cable	Suhner	Sucoflex_102	N/A	08 Oct 2014

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)	4.63dB
30MHz ~ 200MHz (Vertical)	4.65dB
200MHz ~1000MHz (Horizontal)	4.45dB
200MHz ~1000MHz (Vertical)	4.41dB

Conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz ~ 30MHz	2.47dB

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2 Description of the radiated emission test

2.1 Test Summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emission	15.231(b)	RSS-210 Issue 8 Annex A1.1 Table A & Clause 2.2	Comply
Assigned bandwidth (20dB bandwidth)	15.231(c)	-	Comply
Occupied bandwidth >0.25% of the centre frequency	-	RSS-210 Issue 8 Annex A1.1.3	Comply
Power line conducted emission	15.207	RSS-Gen Issue 3 Clause 7.2.4	NA
Transmission time after manual activation	15.231(a)	RSS-210 Issue Annex A1.1.1	Comply

2.2 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then 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.

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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2.3 Test Result

Peak Detector data was measured unless otherwise stated.

The radiated emissions are measured from 9kHz to 3.15GHz (the tenth harmonics)

"#" means emissions appearing within the restricted bands shall follow the requirement of section 15.205 and ICES-003 clause 7.2.2.

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 (section 2.3).

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:	29	° C
Relative humidity:	64	%

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBµV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
315.008	H	72.2	16.8	89.0	95.6	- 6.6
630.014	H	18.1	22.8	40.9	75.6	- 34.7
945.038	V	23.0	25.1	48.1	75.6	- 27.5
1259.980	V	52.0	- 9.3	42.7	75.6	- 32.9
#1575.072	V	48.1	- 8.1	40.0	74.0	- 34.0
1890.074	V	59.4	- 8.1	51.3	75.6	- 24.3
#2205.066	V	48.2	- 6.3	41.9	74.0	- 32.1
2520.063	V	54.1	- 4.6	49.5	75.6	- 26.1
#2835.078	V	48.6	- 4.6	44.0	74.0	- 30.0
3150.117	V	49.2	- 2.9	46.3	75.6	- 29.3

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2.4 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	29	° C
Relative humidity:	64	%

Frequency (MHz)	Polarity (H/V)	Peak Reading at 3m (dBµVm)	Average Factor (dB)	Average Value at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
315.008	H	89.0	- 20.2	68.8	75.6	- 6.8
630.014	H	40.9	- 20.2	20.7	55.6	- 34.9
945.038	V	48.1	- 20.2	27.9	55.6	- 27.7
1259.980	V	42.7	- 20.2	22.5	55.6	- 33.1
#1575.072	V	40.0	- 20.2	19.8	54.0	- 34.2
1890.074	V	51.3	- 20.2	31.1	54.6	- 23.5
#2205.066	V	41.9	- 20.2	21.7	54.0	- 32.3
2520.063	V	49.5	- 20.2	29.3	54.6	- 25.3
#2835.078	V	44.0	- 20.2	23.8	54.0	- 30.2
3150.117	V	46.3	- 20.2	26.1	54.6	- 28.5

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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 C63.4 – 2009. 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 Graph and Table of Conducted Emission Measurement Data

Not Applicable

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4 Photograph

4.1 Photographs of the Test Setup for Radiated Emission and Conducted Emission

For electronic filing, the photos are saved with filename TSup1.jpg to TSup6.jpg.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename ExPho1.jpg to ExPho2.jpg and InPho1.jpg to InPho2.jpg.

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5 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	LabelSmp.jpg
Block Diagram	BlkDia.pdf
Schematic Diagram	Schem.pdf
Users Manual	UserMan.pdf
Operational Description	OpDes.pdf

5.1 Bandwidth

The plot saved in TestRpt2.pdf shows the fundamental emission is confined in the specified band. It also shows that the 20dB bandwidth met the 15.231(c) requirement..

The plot saved in TestRpt2.pdf shows the fundamental emission is confined in the specified band. The 20dB bandwidth is 434.2kHz and 99% bandwidth is 384.2kHz. The bandwidth requirement is 0.25% of 315 MHz = 787.5 kHz .

5.2 Duty cycle

Four switchs are tested and the worst duty cycle is used for the average factor calculation.

The duty cycle is simply the on-time divided by the period:

Time duration of one cycle = 100ms

Effective period of one cycle = 1.159ms x 1 = 507.2µs x 17
= 9.7818ms

Duty Cycle = 9.7818 ÷ 100
= 0.0978

Therefore, the average factor is found by $\underline{20 \log_{10}} 0.0978$ = -20.2dB

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5.3 Transmission time

Duration of each transmission =988.41ms

The duration of the transmission after manual switching is 988.41ms and it is less than 5s after being released. The plot is saved in TestRpt3.pdf. It shows to comply FCC part 15, section 15.231(a)(1) and RSS-210, Annex 1, section A1.1.1.

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6 Appendices

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A2.	Photos of External Configurations	1	page
A3.	Photos of Internal Configurations	1	page
A4.	ID Label/Location	1	page
A5.	Bandwidth Plot	1	page
A6.	Average Factor	2	pages
A7.	Transmission time	1	page

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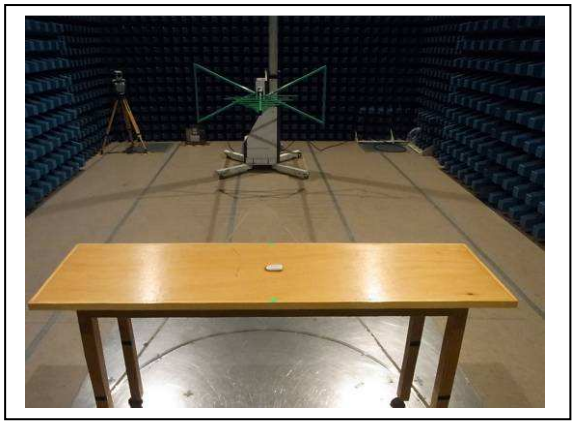
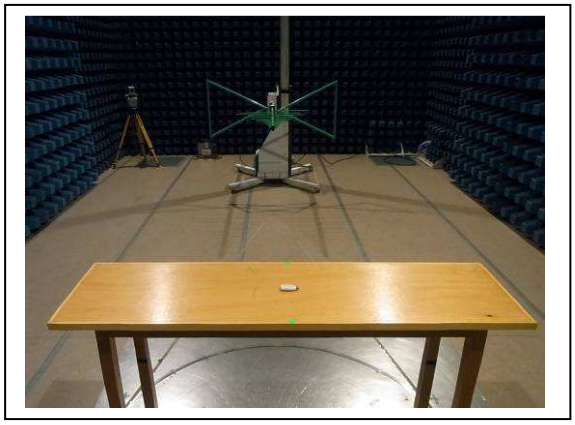
A1. Photos of the set-up of Radiated Emissions



(Front view, 30MHz – 1GHz)



(Back view, 30MHz – 1GHz)

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A1. Photos of the set-up of Radiated Emissions

(Front view, 9kHz – 30MHz)

(Back view, 9kHz – 30MHz)

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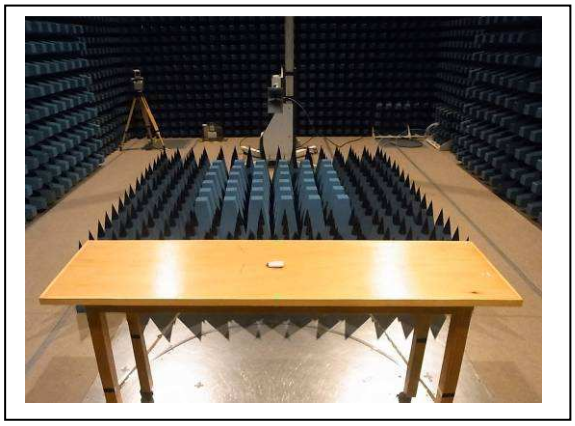
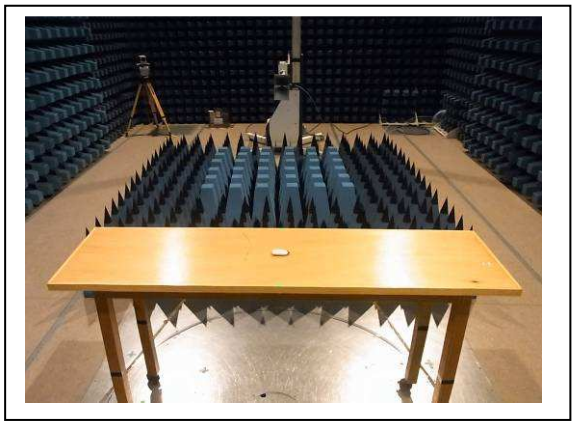
A1. Photos of the set-up of Radiated Emissions



(Front view, 1GHz – 3.15GHz)



(Back view, 1GHz – 3.15GHz)

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A2. Photos of External Configurations

External Configuration 1

External Configuration 2

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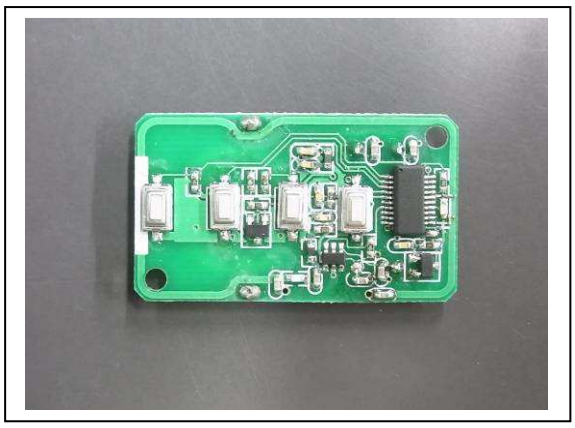
A3. Photos of Internal Configurations



Internal Configuration 1

Internal Configuration 2

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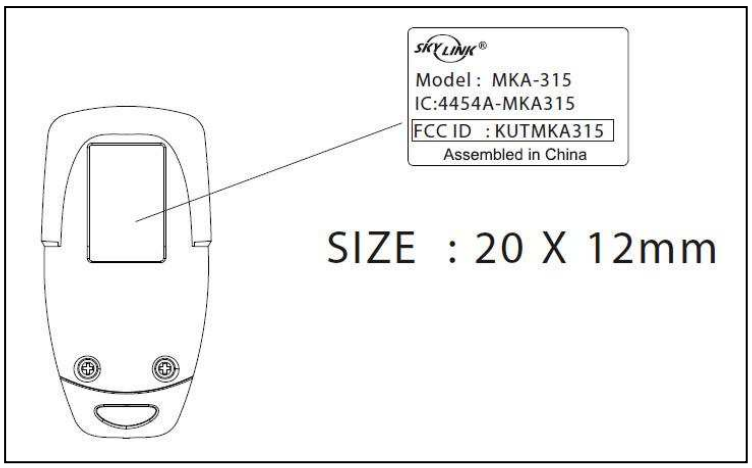
A4. ID Label / Location



ID Label 1

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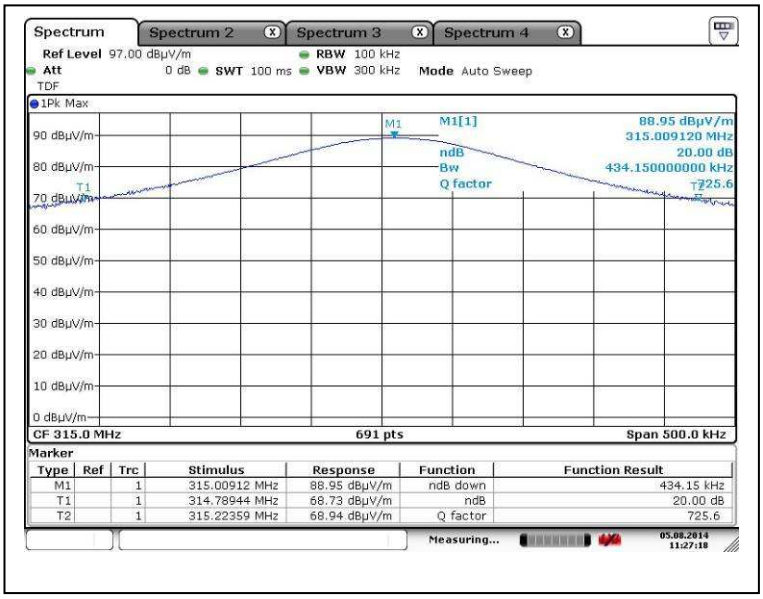
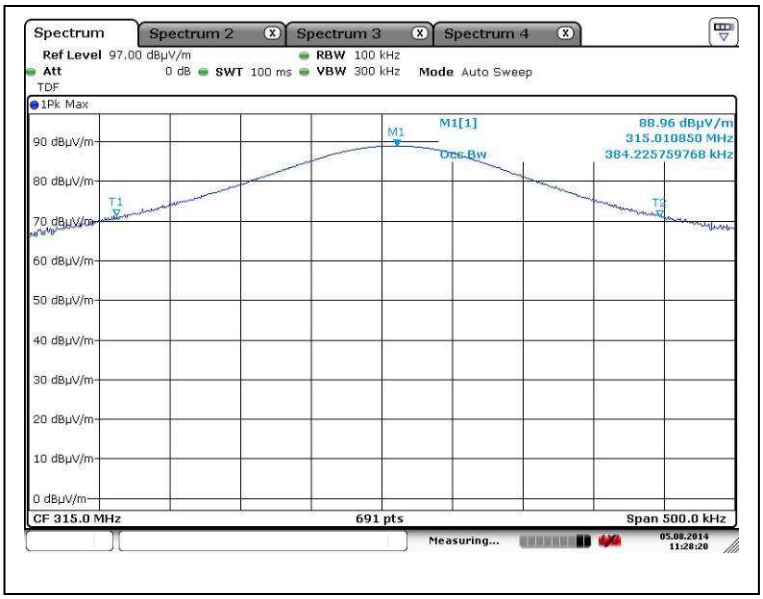
A5. Bandwidth Plot



20dB bandwidth



99% occupied bandwidth

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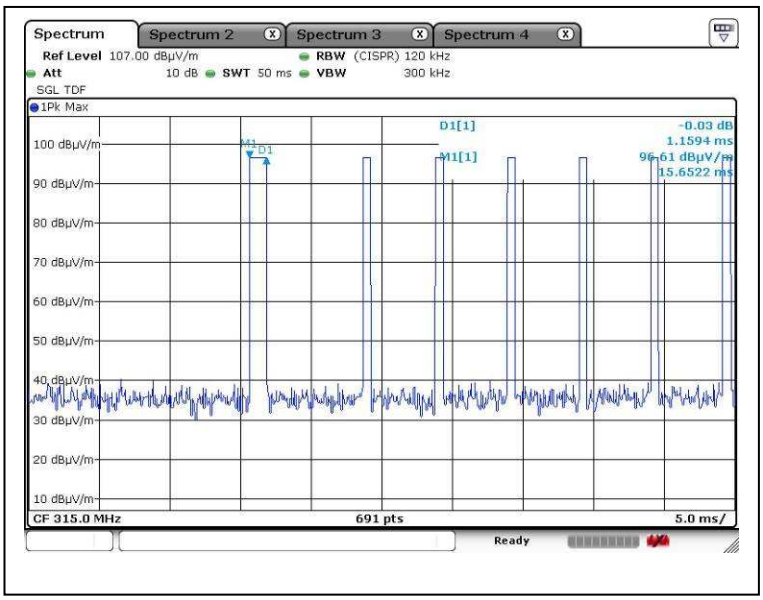
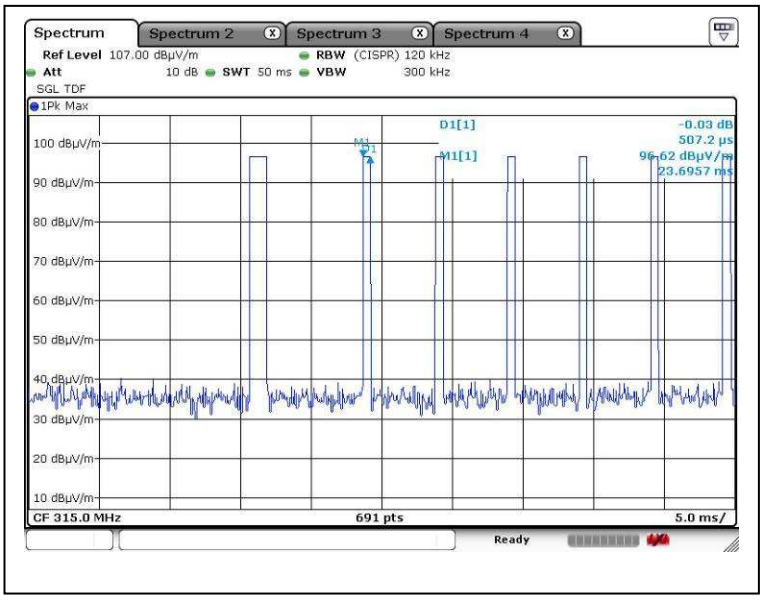
A6. Duty Cycle



Duty Cycle 1



Duty Cycle 2

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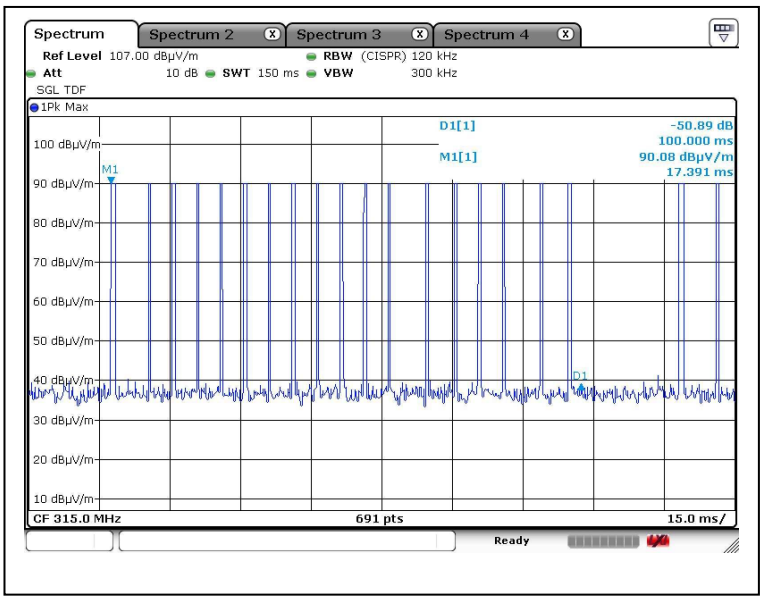
A6. Duty Cycle



Duty Cycle 3

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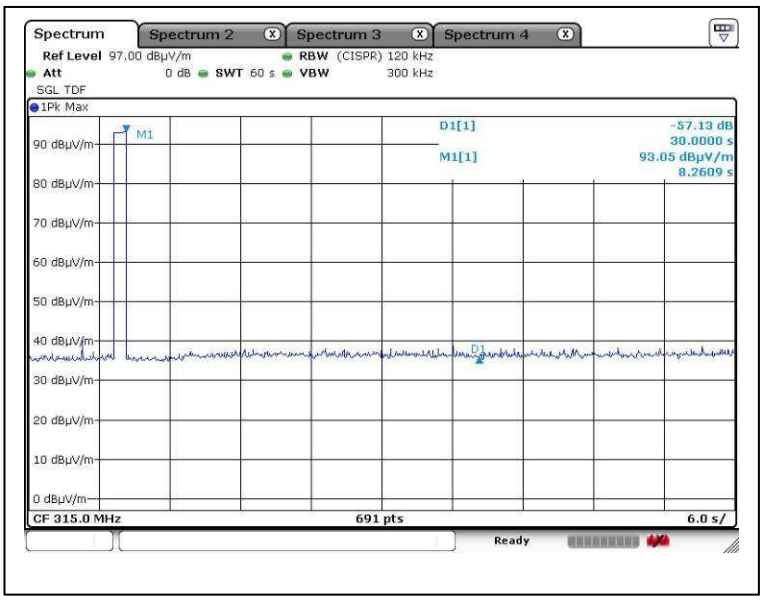
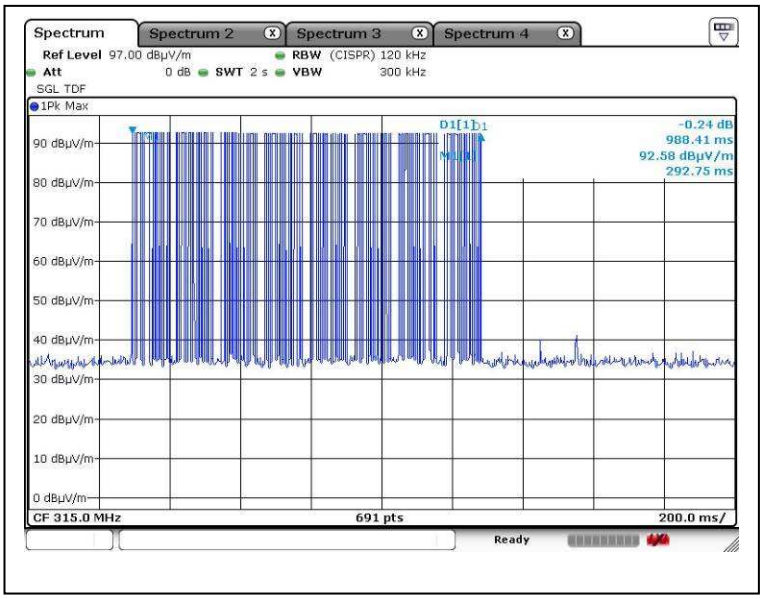
A7. Transmission time



Transmission time 1



Transmission time 2

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

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