



TEST REPORT

Report No. : AA0062922 Date : January 12, 2022

Application No. : LA035718

Applicant : Capital Prospect Ltd
Rm 03, 13/F, Block B, Veristrong Industrial Building,
34-36 Au Pui Wan Street, Fo Tan, N.T.,
Hong Kong

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

Sample Description	Model No.	Serial Number
318MHz Transmitter	MM-318-3	ES0001

Radio Frequency : 318MHz
Rating : 1 x 3V CR2032 button cell
No. of submitted sample : One (1) piece
Sample registration No. : RA020318-001-4

Date Received : Nov 1, 2021

Test Period : Nov 1, 2021 – Dec 2, 2021

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

Test Method : 47 CFR Part 15 (10-1-20 Edition)
ANSI C63.10 – 2013
RSS-210 Issue 10
RSS-GEN Issue 5


Test Result : See attached sheet(s) from page 2 to 20.

Additional Model : Model: MM-318-1 and MM-318-2 is same as MM-318-3 except the number of keys on the housing.

Conclusion : The submitted sample and related models were found to comply with requirement of FCC 47CFR Part 15 Subpart C and ISED Canada RSS-210 Issue 10.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Wong Lap Pong / Andrew
Deputy Technical Manager

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FCC ID: KUTMM-318

IC: 4454A-MM318X

The conformity statement stated in Conclusion above is based on the decision rule agreed with applicant and listed in www.cmateesting.org/qac/statement-of-conformity.pdf.
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CMA Industrial Development Foundation Limited

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1 General Information

1.1 General Description

The equipment under test (EUT) model MM-318-3 is a wireless transmitter. It operates at frequency 318MHz for transmitter 10kbps ASK modulation. The oscillation of radio control is generated by a 9.9375MHz crystal for RF transmitter. Model:MM-318-3 is powered by one 3V CR2032 button cell. Model:MM-318-3 contains 3 keys. The keys are used to control the corresponding receiver.

The 0dBi PCB antenna is used. The RF output power is unable to adjust.

No any firmware and software are associated with the device.

The brief circuit description is listed as follows:

Model: MM-318-3	
-SW1-3,	and its associated circuit act as the key input
-U3	and its associated circuit act as RFIC, SYN115
-Y1	and its associated circuit act as oscillation clock, 9.9375MHz
-U1	and its associated circuit act as MCU, STM32L011G4U6.
-C1,C2,C3,C14,L2,L3	and its associated circuit act as matching network

Model Difference:

Model: MM-318-1 and MM-318-2 are same as Model: MM-318-3 except the number of keys on the housing.

Model:	MM-318-1	MM-318-2	MM-318-3
No. of Keys:	1	2	3
HVIN:	MM-318-1	MM-318-2	MM-318-3
PMN:	MM-318-1	MM-318-2	MM-318-3



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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	ESCI	100152	23 Dec 2021	1 Year
Spectrum Analyzer	R&S	FSV40	100964	14 Dec 2021	1 Year
Log Periodic Antenna	TESEQ	UPA6109	Log Periodic Antenna	29 Nov 2022	2 Years
Biconical Antenna	Rohde & Schwarz	HK116	Biconical Antenna	29 Nov 2022	2 Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	02 Feb 2023	3 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	02 Feb 2023	3 Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA917044 2	14 Sep 2023	3 Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	14 Sep 2023	3 Years
Coaxial Cable	Suhner	Sucoflex 106	N/A	03 May 2022	1 Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	14 Jan 2022	2 Year
LISN	Rohde & Schwarz	ENV216	101323	23 Dec 2021	1 Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	18 Oct 2022	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

1.5 Test Summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emission	15.231(b)	RSS-210 Annex A1.2	Comply
Assigned bandwidth (20dB)	15.231(c)	-	Comply
Occupied bandwidth >0.25% of the center frequency	-	RSS-210 Annex A1.3	Comply
Transmission time after manual activation	15.231(a)	RSS-210 Issue 10 Annex A1.1.1	Comply
Frequency Stability	-	RSS-Gen, Clause 8.11	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.

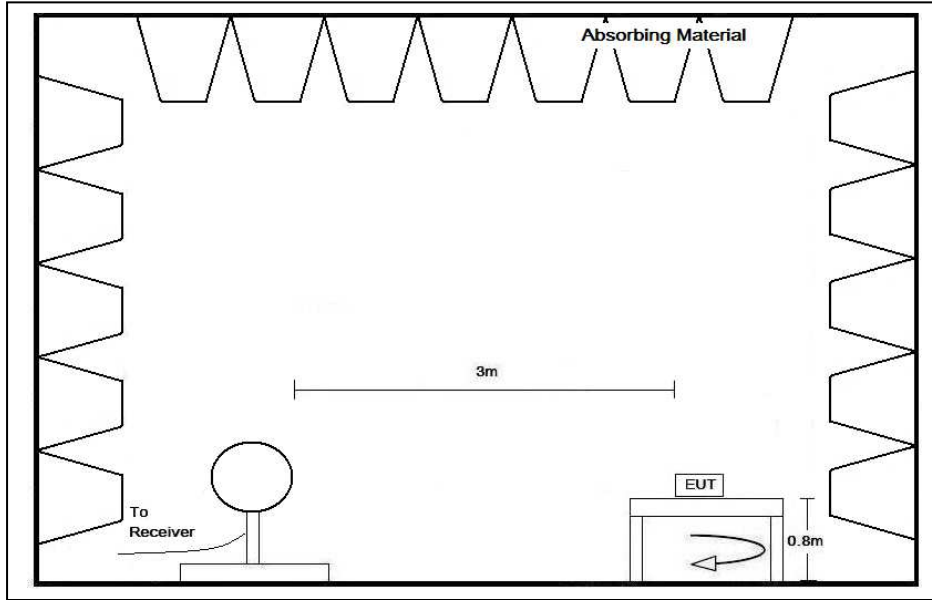
The EUT was pressed to make the continuous transmission during Radiated Emission test.

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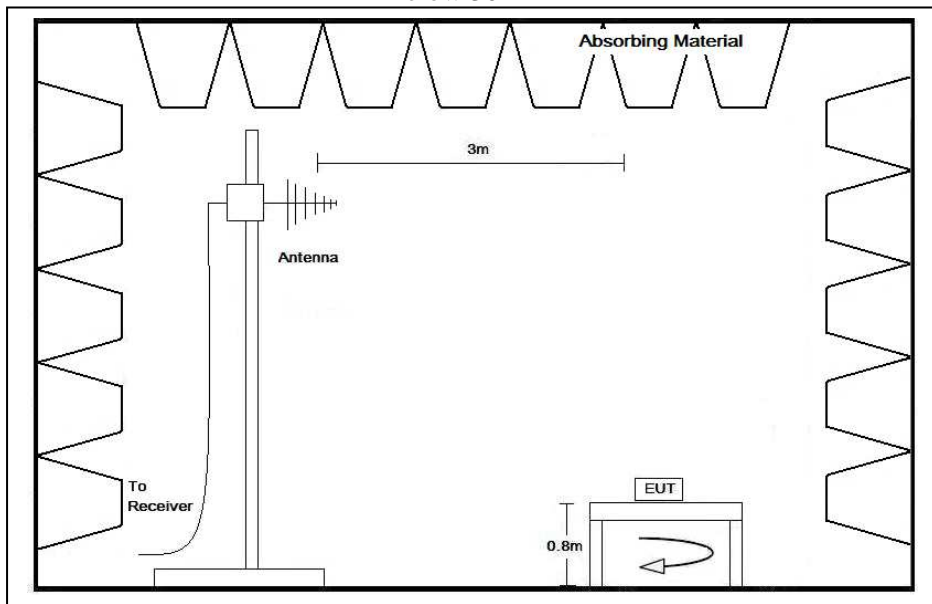
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2.2 Test Setup



Below 30MHz



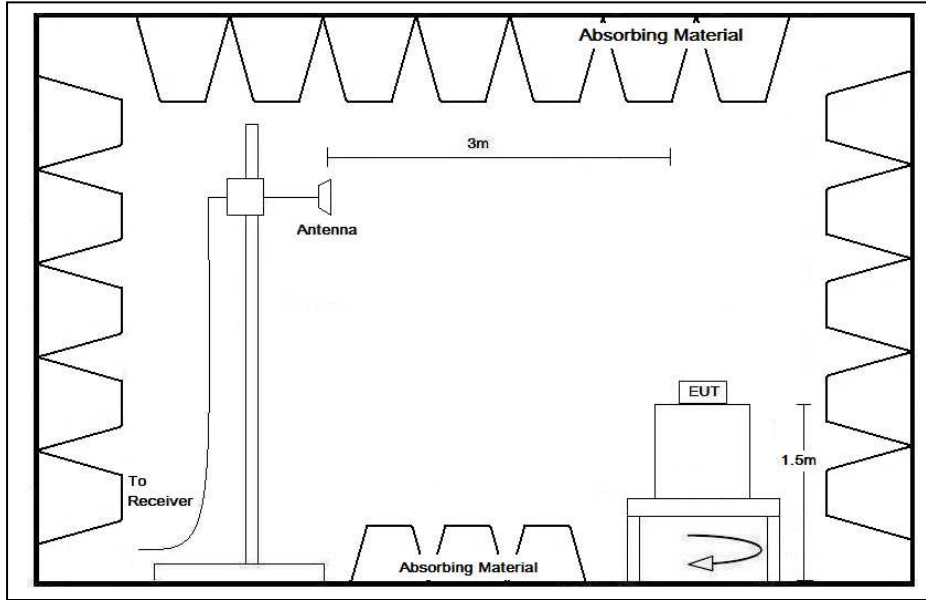
30MHz – 1GHz

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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 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.

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2.4 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	24.3	° C
Relative humidity:	49.8	%

Model: MM-318-3

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	318.005	59.7	16.9	76.6	95.8	-19.2	Peak
V	318.015	55.6	16.9	72.5	95.8	-23.3	Peak
H	636.006	35.2	23.8	59.0	75.8	-16.8	Peak
V	#1272.113	47.6	-8.2	39.4	74.0	-34.6	Peak
V	*#1590.065	56.7	-8.0	48.7	74.0	-25.3	Peak
H	1907.976	61.4	-7.2	54.2	75.8	-21.6	Peak
V	2544.088	50.7	-4.7	46.0	75.8	-29.8	Peak
V	*#2861.881	54.5	-4.7	49.8	74.0	-24.2	Peak
H	3180.025	50.9	-3.3	47.6	75.8	-28.2	Peak

Remark: 1) * The emission is fall in the restricted band of FCC section 15.205.
 2) # The emission is fall in the restricted band of RSS-Gen Table 6.



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Model: MM-318-3

Polarization	Frequency (MHz)	Field Strength at 3m in Peak data (dB μ V/m)	¹ Average Factor (dB)	² Average Field Strength at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
H	318.005	76.6	-4.5	72.1	75.8	-3.7
V	318.015	72.5	-4.5	68.0	75.8	-7.8
H	636.006	59.0	-4.5	54.5	55.8	-1.3
V	#1272.113	39.4	-4.5	34.9	54.0	-19.1
V	*#1590.065	48.7	-4.5	44.2	54.0	-9.8
H	1907.976	54.2	-4.5	49.7	55.8	-6.1
V	2544.088	46.0	-4.5	41.5	55.8	-14.3
V	*#2861.881	49.8	-4.5	45.3	54.0	-8.7
H	3180.025	47.6	-4.5	43.1	55.8	-12.7

- Remark: 1) Average factor is calculated from section 4.2 of this report.
 2) The Average Field Strength (in Column 5) are calculated by Peak Field Strength (in Column 3) plus Average Factor (in Column 4).
 3) # The emission is fall in the restricted band of RSS-Gen Table 6
 4) * The emission is fall in the restricted band of FCC section 15.205.

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3 Description of the Line-conducted Test

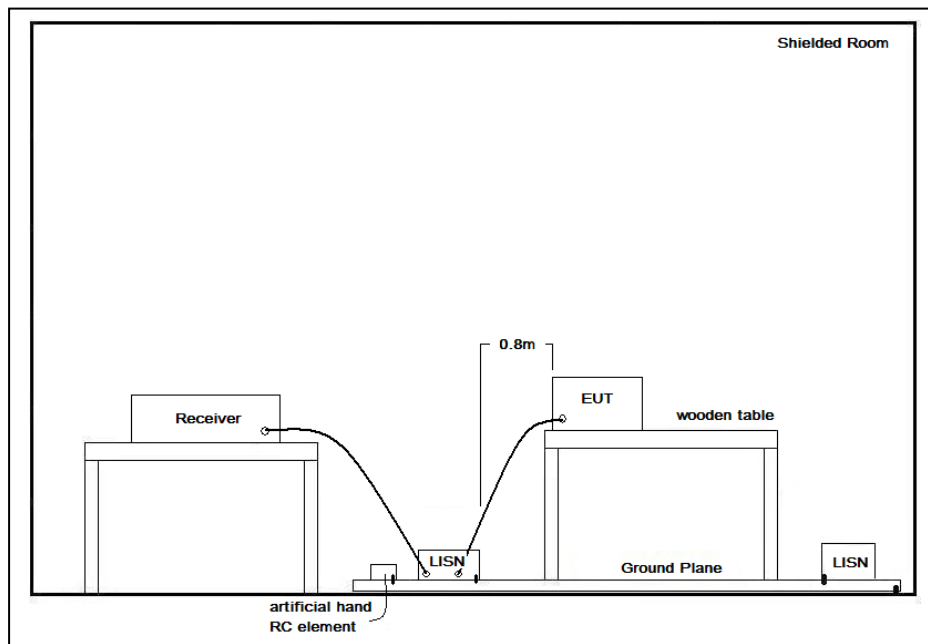
3.1 Test Procedure

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

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



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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 worst case fundamental emission of three models is confined in the specified band. The 20dB bandwidth is 4.050kHz and 99% bandwidth is 16.081kHz. The bandwidth requirement is 0.25% of 318MHz = 795kHz . It also shows that the EUT met the FCC Part 15.231(c) and RSS-210 Annex A1.3 bandwidth requirement and frequency stability requirement.

4.2 Average Factor

All three keys are tested and found that the lowest key of MM-318-3 is the worst case of average factor.

Note: Where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval.

$$\text{Duty Cycle} = (18.675\text{ms} \times 1 + 3.9125\text{ms} \times 2 + 1.4125\text{ms} \times 18 + 0.6875\text{ms} \times 11) / 100\text{ms} = 0.594875$$

Therefore, the average factor is found by $20 \log_{10} 0.594875 = -4.5 \text{ dB}$



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4.3 Transmission time

All keys are tested and following worst case found:
Worst case: the lowest key

Duration of each transmission = 1.42

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.



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5 Appendices

A1.	Bandwidth Plot	1	page
A2.	Average Factor Plot	2	pages
A3.	Transmission Time Plot	1	Page

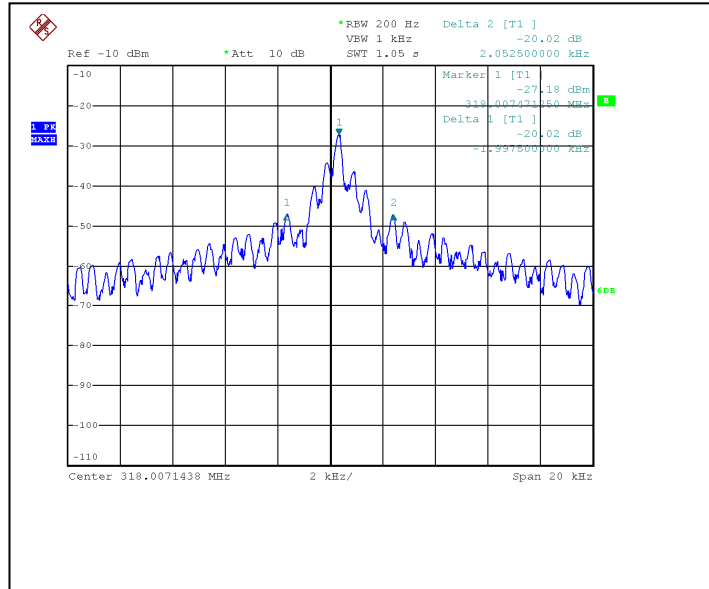


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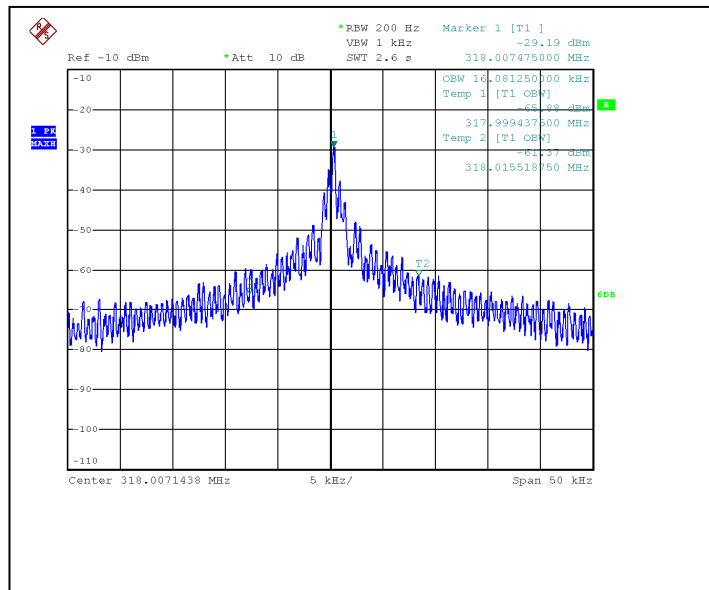
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A1. Bandwidth Plot



20dB bandwidth



99% bandwidth

FCC ID: KUTMM-318
 IC: 4454A-MM318X

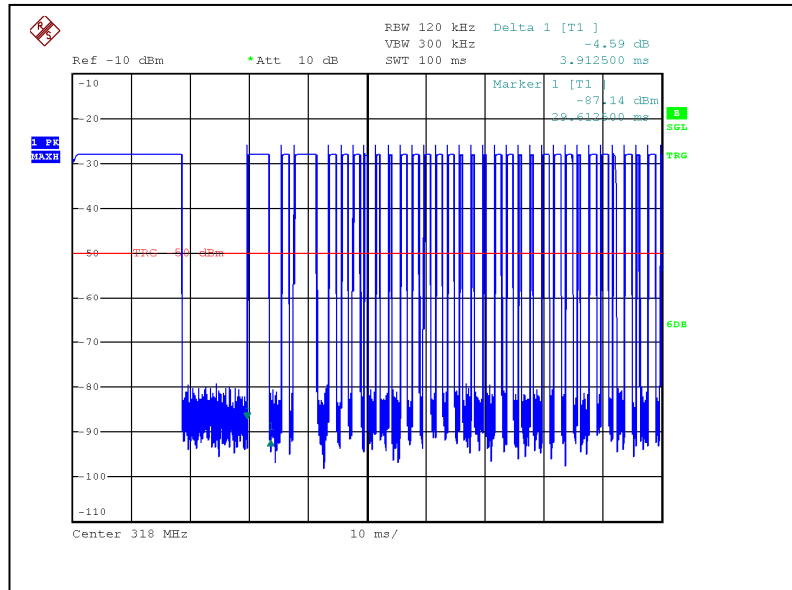
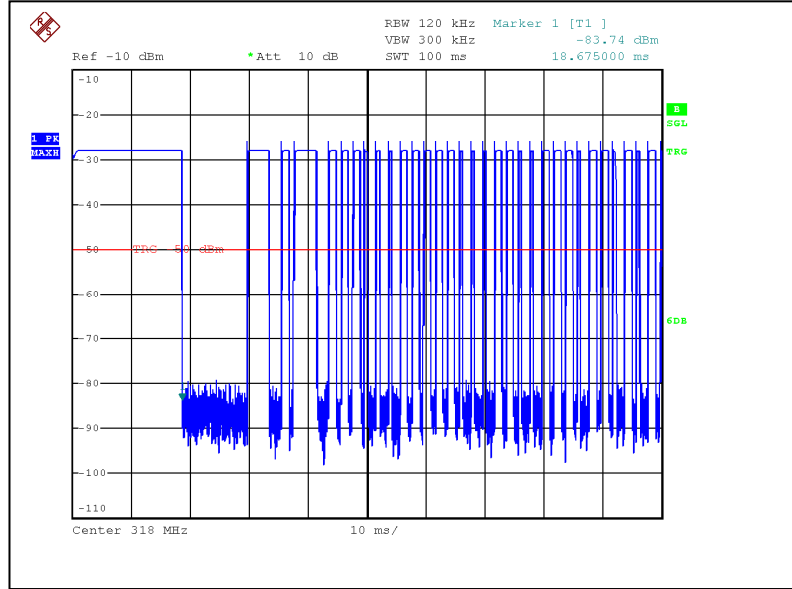


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A2. Average Factor Plot

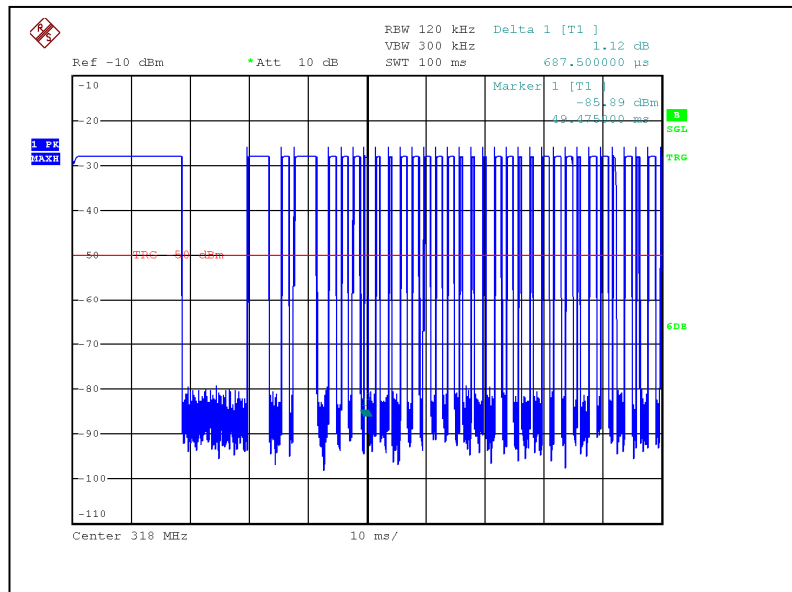
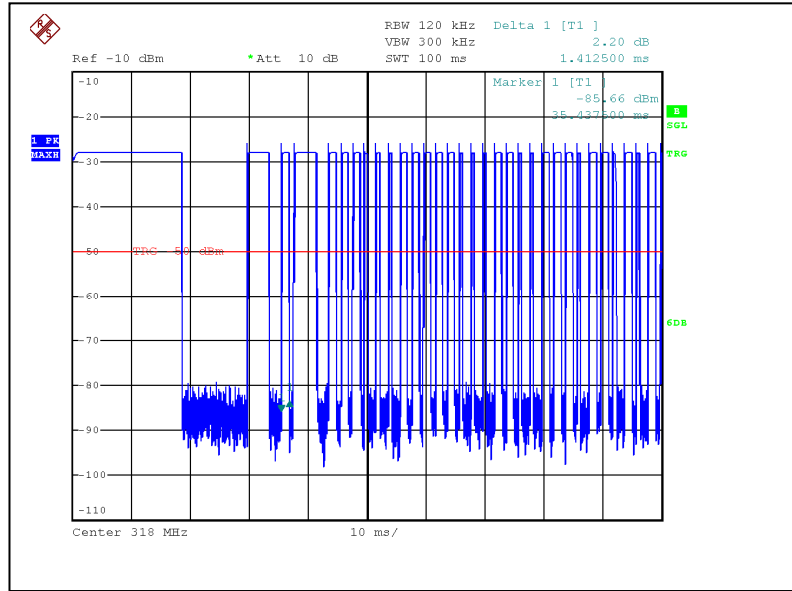




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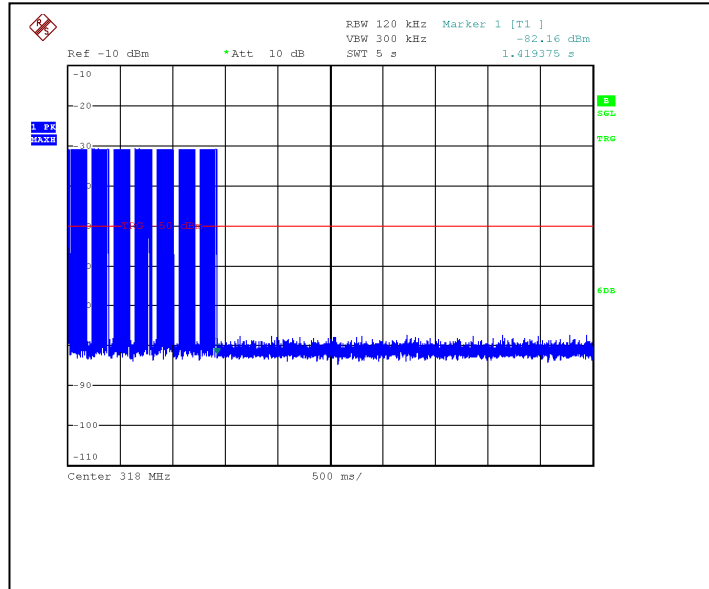


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A3. Transmission Time Plot



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