



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AT0082776 (8) Date : 28 Dec 2015

Application No. : LT049598(2)

Applicant : Skylink Technologies Inc.
17 Sheard Avenue, Brampton
Ontario, L6Y 1J3, Canada

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

Sample Description	Model No.
Wireless On/Off Control	PM-318-2

Radio Frequency : 433.9MHz Transmitter; 317.5MHz Receiver

Rating : AC 120 V

No. of submitted sample : Two (2) piece (s)

Sample registration No. : RT057161-001

Date Received : 14 Dec 2015

Test Period : 21 Dec 2015 to 28 Dec 2015.

Test Requested : FCC 47CFR Part 15 Certification.
Industry Canada Interference Causing Equipment Standard RSS-210.

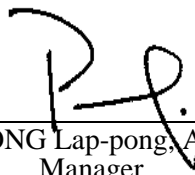
Test Method : 47 CFR Part 15 (10-1-15 Edition)
ANSI C63.10 – 2013
RSS-210 Issue 8
RSS-GEN Issue 4

Test Result : See attached sheet(s) from page 2 to 23.

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

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FCC ID: MY5PM3182
IC: 3133B-PM3182

CMA Industrial Development Foundation Limited

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1 General Information

1.1 General Description

The equipment under test (EUT) model PM-318-2 is a transceiver for wireless plug-in on/off control. It operates at frequency 433.9MHz for transmitter and 317.5MHz for receiver. The oscillation of radio control is generated by a 13.56 MHz crystal for RF transmitter and a 9.893534 MHz crystal for RF receiver. The EUT is powered by AC120V. The EUT is able to control the power of appliances such as lamp or fan with up to 1500Watt by external remote transmitter. The EUT contains a button to setup the remote.

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:

-U3, X1	and its associated circuit act as MCU
-U4	and its associated circuit act as rectifier bridge
-U1, D2, ZD1	and its associated circuit act as voltage regulator
-SW1	and its associated circuit act as learn button
-LED	and its associated circuit act as LED
-U2	and its associated circuit act as reset circuit
-Q1, D1, J1	and its associated circuit act as relay control
-U1-T, Y3, ANT(LOOP)	and its associated circuit act as TX module
-U5, Y1, RX-ANT1	and its associated circuit act as RX module



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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	Rohde & Schwarz	ESCI	100152	28 Sep 2016
Spectrum Analyze	Rohde & Schwarz	FSV 40	100964	03 Feb 2016
Broadband Antenna	Schaffner	CBL6112B	2718	20 Feb 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	25 Nov 2016
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	25 Nov 2016
Loop Antenna	EMCO	6502	00056620	28 Dec 2015
Artificial Main Network	Rohde & Schwarz	ENV216	101232	22 Oct 2016
Coaxial Cable	Schaffner	RG213/U	N/A	18 May 2016
Coaxial Cable	Suhner	RG214/U	N/A	18 May 2016
Coaxial Cable	HUBER+SUHNER	84225426	MY24201/4	24 Nov 2016

Supporting equipment:

1,500W light bulbs (supplied by CMA)

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)	4.66dB
30MHz ~ 200MHz (Vertical)	4.67dB
200MHz ~1000MHz (Horizontal)	4.68dB
200MHz ~1000MHz (Vertical)	4.67dB

Conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz ~ 30MHz	2.63dB



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1.5 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 4 Clause 7.2.4	Comply
Transmission time after manual activation	15.231(a)	RSS-210 Issue Annex A1.1.1	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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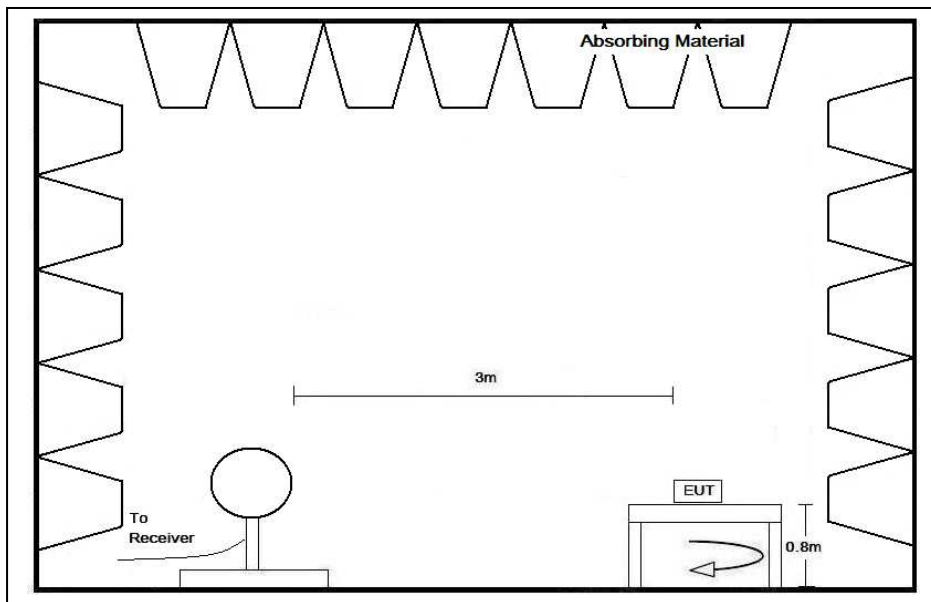
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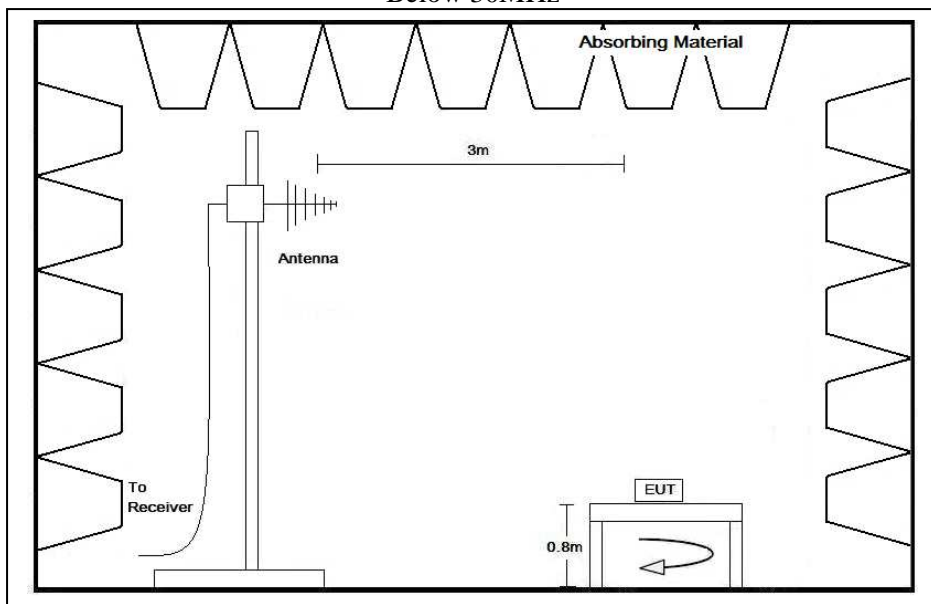
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2.2 Test Setup



Below 30MHz



30MHz – 1GHz

FCC ID: MY5PM3182
IC: 3133B-PM3182

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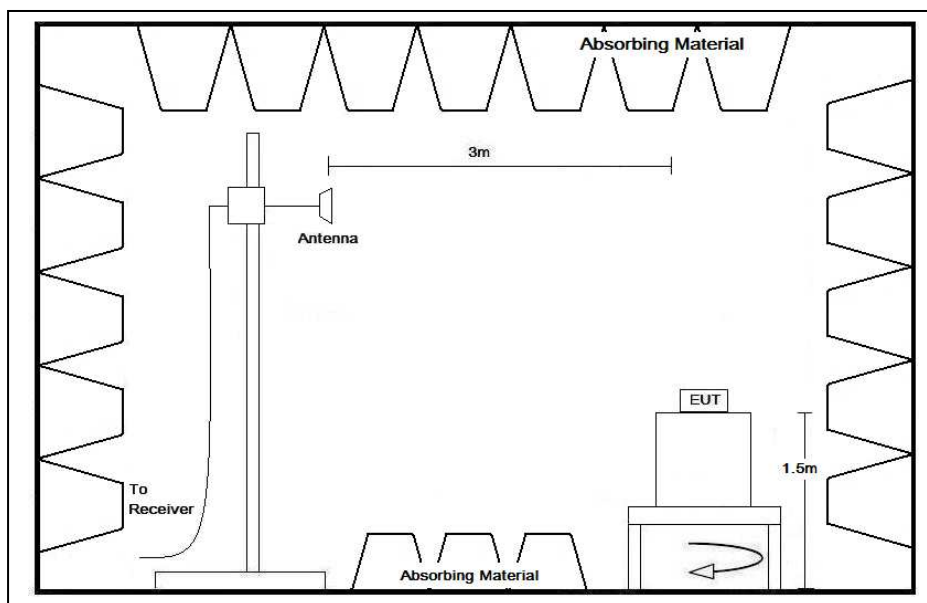
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2.2 Test Setup



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 4.4GHz (the tenth harmonics)

“#” means emissions appearing within the restricted bands shall follow the requirement of 47 CFR Part 15 section 15.205 and 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:	23 °C
Relative humidity:	65 %

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)	Detector Type
433.927	V	58.4	21.6	80.0	100.8	-20.8	Peak
867.987	H	17.4	24.3	41.7	80.8	-39.1	Peak
#1301.915	V	39.7	-7.6	32.1	74.0	-41.9	Peak
1735.572	V	43.4	-7.7	35.7	80.8	-45.1	Peak
2169.635	H	50.0	-6.5	43.5	80.8	-37.3	Peak
2603.505	H	48.4	-4.2	44.2	80.8	-36.6	Peak
3037.437	H	51.7	-2.8	48.9	80.8	-31.9	Peak
3471.355	V	46.6	-2.8	43.8	80.8	-37.0	Peak
#3905.292	H	46.2	-1.7	44.5	74.0	-29.5	Peak



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2.4 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	23	° C
Relative humidity:	65	%

Frequency (MHz)	Polarity (H/V)	Peak Reading at 3m (dBµV/m)	Average Factor (dB)	Average Value at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
433.927	V	80.0	-7.7	72.3	80.8	-8.5
867.987	H	41.7	-7.7	34.0	60.8	-26.8
#1301.915	V	32.1	-7.7	24.4	54.0	-29.6
1735.572	V	35.7	-7.7	28.0	60.8	-32.8
2169.635	H	43.5	-7.7	35.8	60.8	-25.0
2603.505	H	44.2	-7.7	36.5	60.8	-24.3
3037.437	H	48.9	-7.7	41.2	60.8	-19.6
3471.355	V	43.8	-7.7	36.1	60.8	-24.7
#3905.292	H	44.5	-7.7	36.8	54.0	-17.2

Remark: According to FCC Part15 C clause 15.231 (b) and (or) RSS-210 Issued 8 Annex 1, the EUT shall demonstrate the compliance with the limits on the field strength of emissions based on the average value of the measured emissions. The equation with a sample calculation as follow: Average value = Peak value + 20 Log₁₀ (Duty cycle), where the Duty cycle is calculated from following section 4.2.



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3 Description of the Line-conducted Test

3.1 Test Procedure

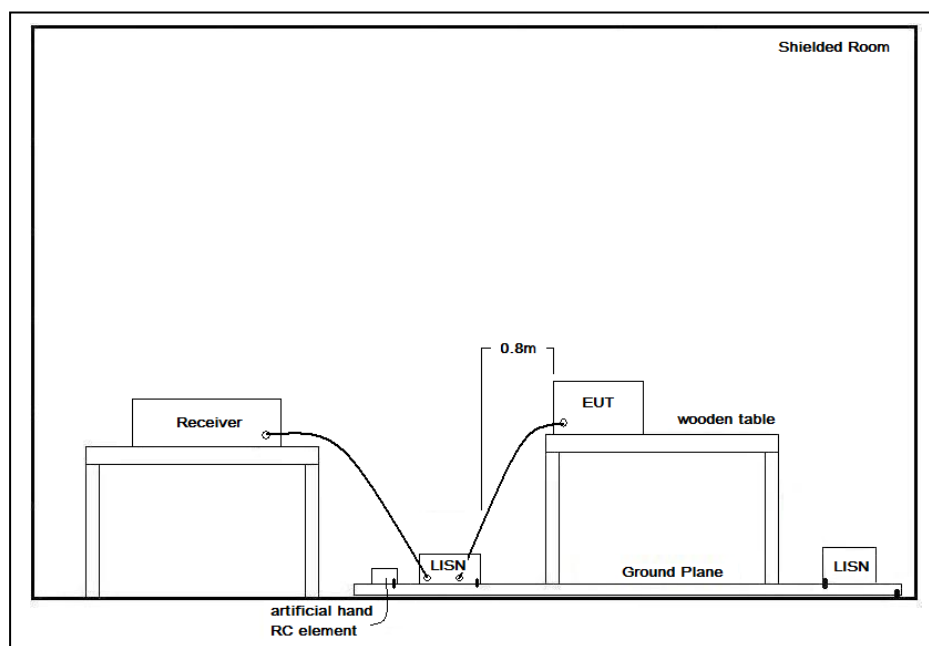
Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.10 – 2013. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

The EUT has been tested in Transmission mode.

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

3.3 Test Setup



3.4 Graph and Table of Conducted Emission Measurement Data

The test data and graphs had shown in Appendices A4.



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

4.1 Bandwidth

Appendices A1 is shown the fundamental emission is confined in the specified band. The 20dB bandwidth is 388.49kHz and 99% bandwidth is 371.703kHz. The bandwidth requirement is 0.25% of 433MHz = 1.083MHz . 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 device has difference code for difference sample sold; therefore the worst case 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 = 100 ms

Effective period of one cycle = (2.8x1+0.7x26+0.5x9+2.8x1+0.7*18+0.3) ms = 41.2 ms

Duty Cycle = (41.2 ÷ 100) ms = 0.412

Therefore, the average correction factor is found by $20 \log_{10} 0.412 = -7.7\text{dB}$



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4.3 Transmission time

Duration of each transmission =2.94s

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(s)
A2.	Average Factor	1	page(s)
A3.	Transmission time	1	page(s)
A4.	Conducted Emission Measurement Data	2	page(s)



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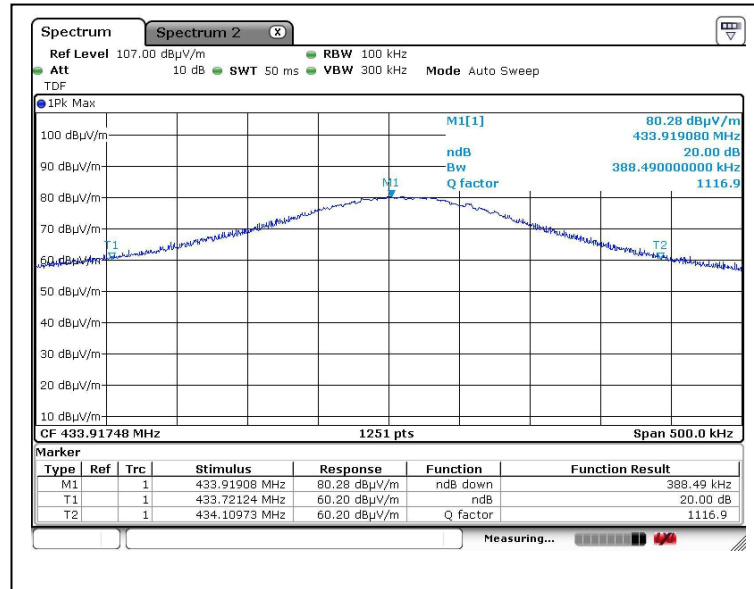
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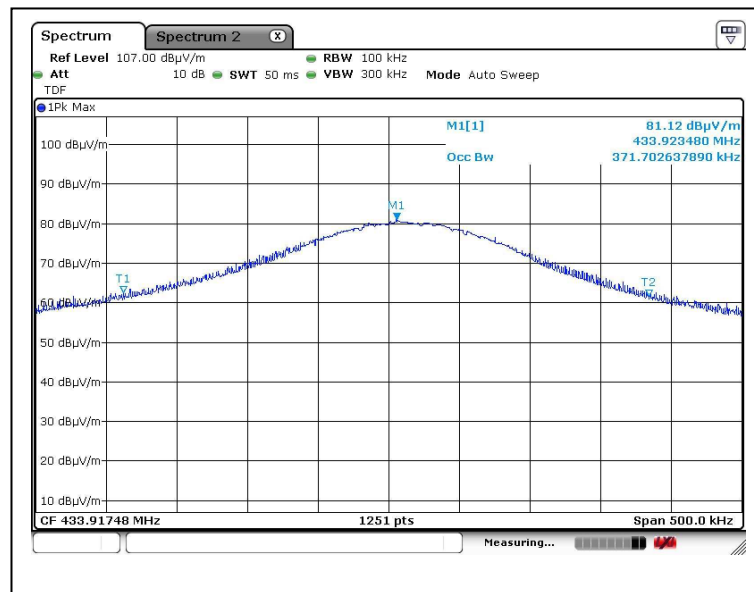
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A1. Bandwidth Plot



20dB bandwidth



99% occupied bandwidth

FCC ID: MY5PM3182
IC: 3133B-PM3182



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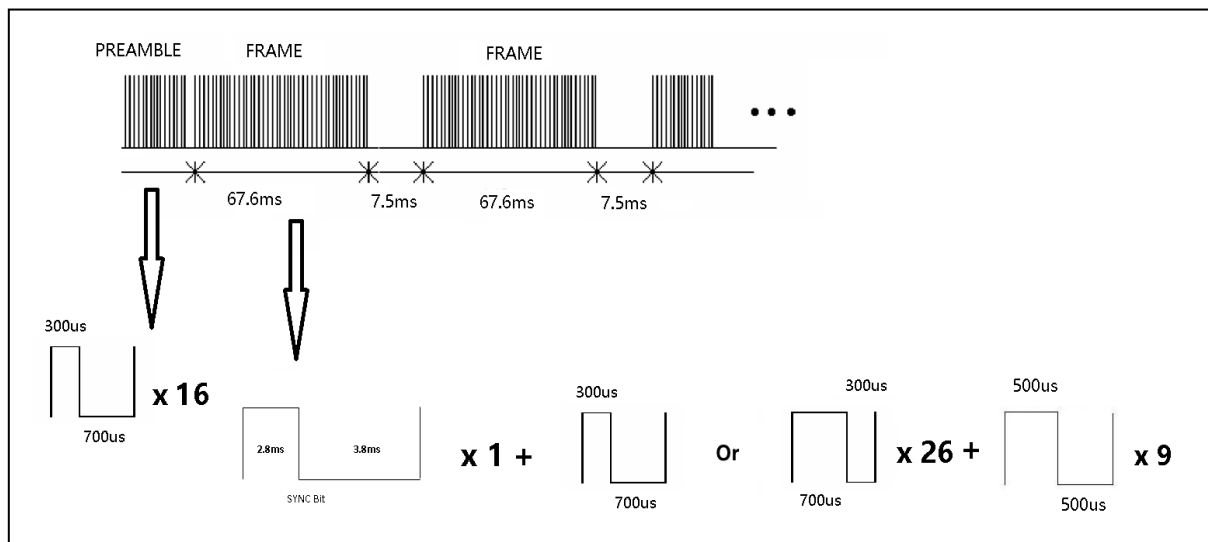
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A2. Duty Cycle





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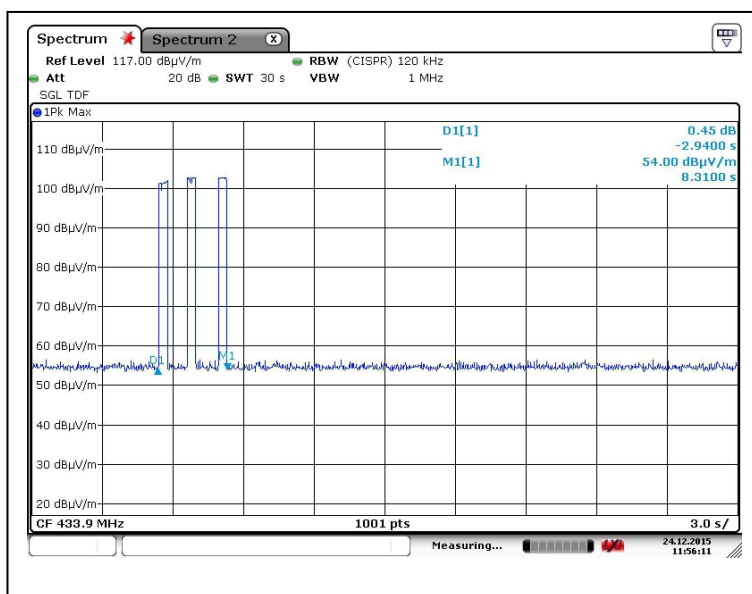
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A3. Transmission time





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A4 Line conducted measurement data

Parameter	Recorded value	
Ambient temperature:	22	°C
Relative humidity:	66	%

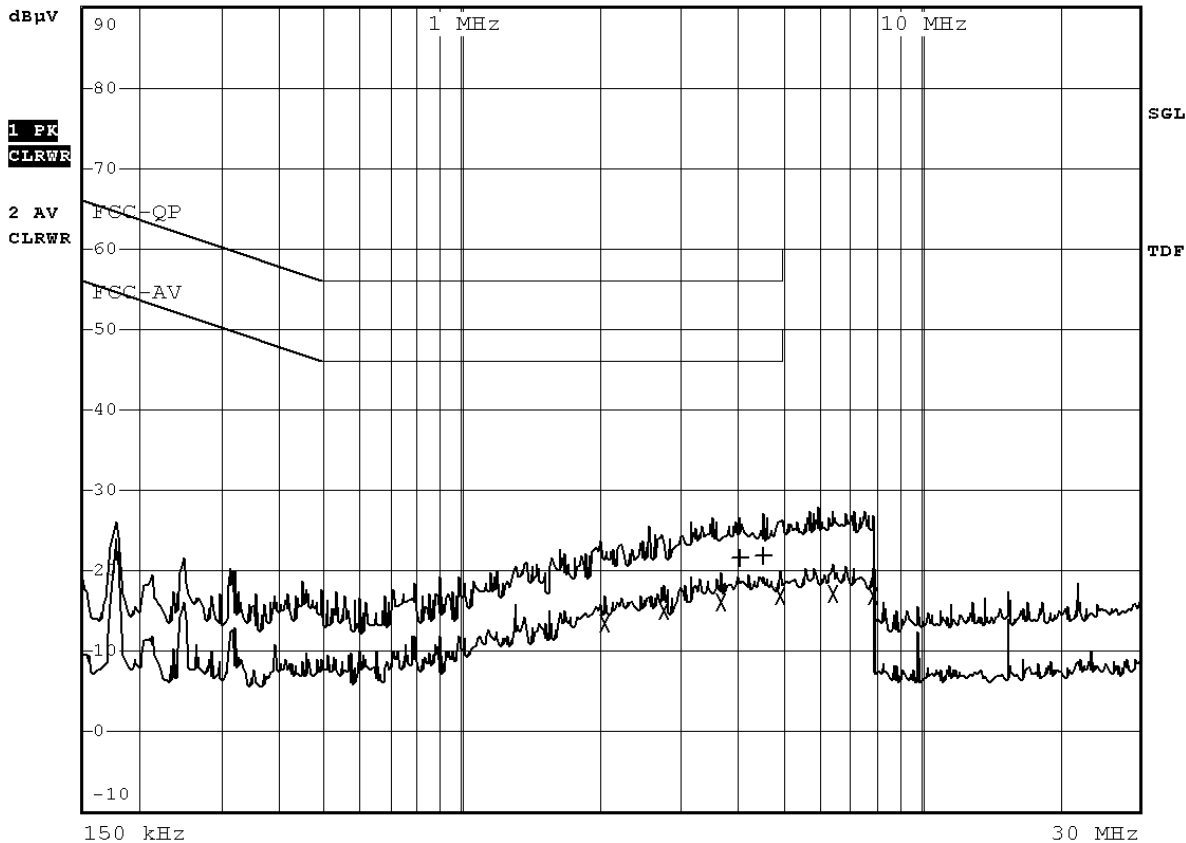
Terminal:	AC Mains
Line:	Live
Mode:	transmission



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF





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A4 Line conducted measurement data

Parameter	Recorded value	
Ambient temperature:	22	°C
Relative humidity:	66	%

Terminal:	AC Mains
Line:	Live
Mode:	transmission

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC-QP			
Trace2:	FCC-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2 Average	2.057 MHz	13.51	L1 gnd	-32.48
2 Average	2.768 MHz	15.16	L1 gnd	-30.83
2 Average	3.6725 MHz	16.20	L1 gnd	-29.79
1 Quasi Peak	4.064 MHz	21.63	L1 gnd	-34.36
1 Quasi Peak	4.541 MHz	21.87	L1 gnd	-34.12
2 Average	4.9595 MHz	16.81	L1 gnd	-29.18
2 Average	6.4175 MHz	17.14	L1 gnd	-32.85
2 Average	7.988 MHz	17.02	L1 gnd	-32.97



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A4 Line conducted measurement data

Parameter	Recorded value	
Ambient temperature:	22	°C
Relative humidity:	66	%

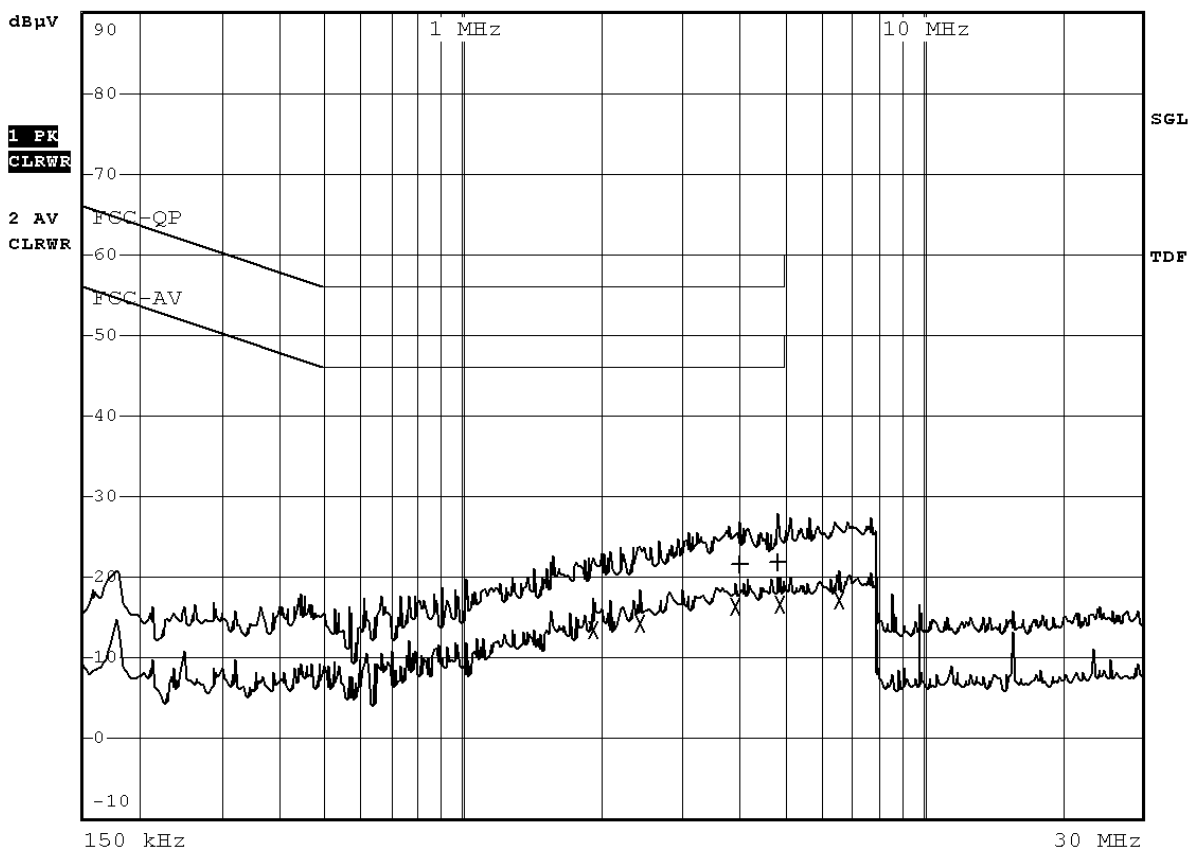
Terminal:	AC Mains
Line:	Neutral
Mode:	transmission



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF





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A4 Line conducted measurement data

Parameter	Recorded value	
Ambient temperature:	22	°C
Relative humidity:	66	%

Terminal:	AC Mains
Line:	Neutral
Mode:	transmission

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC-QP		
Trace2:	FCC-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	1.9175 MHz	13.36 N gnd	-32.63
2 Average	2.4395 MHz	14.39 N gnd	-31.60
2 Average	3.902 MHz	16.24 N gnd	-29.75
1 Quasi Peak	3.9965 MHz	21.56 N gnd	-34.43
1 Quasi Peak	4.865 MHz	21.96 N gnd	-34.03
2 Average	4.91 MHz	16.75 N gnd	-29.24
2 Average	6.5705 MHz	17.16 N gnd	-32.84

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