



FCC&ISED Radio Test Report

FCC ID: 2AO2D-MJJGYY02FM

IC: 23681-MJJGYY02FM

This report concerns (check one):	oxtimesOriginal Grant $oxtimes$	」Class I Change	」Class II Change
-----------------------------------	---------------------------------	-----------------	------------------

Project No. : 1803C261

Equipment: Mi Ultra-Short Range Laser Projector

Test Model for : MJJGYY02FM

FCC&IC

Series Model for: MJJGYYXXFM (X=0-9, A-Z,- or blank, indicates for

FCC different market purposes)

Applicant: Fengmi(Beijing)Technology Co.,Ltd

Address : 301, 3F, Building 3 No. 10, Shunyi District Renhe

Town Barracks South Street, Beijing, China

Date of Receipt : Mar. 26, 2018

Date of Test: Mar. 28, 2018 ~ May 10, 2018

Issued Date : May 29, 2018 Tested by : BTL Inc.

Testing Engineer :

(Paul Li)

Technical Manager

(Shawn Xiao)

Authorized Signatory

wid Man

(David Mao)

BTL INC.

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

TESTING
NVLAP LAB CODE 200788-0

Report No.: BTL-FICP-4-1803C261 Page 1 of 136





Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

BTL's report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL**'s authorized written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Report No.: BTL-FICP-4-1803C261 Page 2 of 136





Table of Contents	Page
1 . CERTIFICATION	6
2 . SUMMARY OF TEST RESULTS	7
2.1 TEST FACILITY	8
2.2 MEASUREMENT UNCERTAINTY	8
3 . GENERAL INFORMATION	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF TEST MODES	11
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	13
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TES	TED 14
3.5 DESCRIPTION OF SUPPORT UNITS	14
4 . EMC EMISSION TEST	15
4.1 CONDUCTED EMISSION MEASUREMENT	15
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	15
4.1.2 TEST PROCEDURE	15 45
4.1.3 DEVIATION FROM TEST STANDARD 4.1.4 TEST SETUP	15 16
4.1.5 EUT OPERATING CONDITIONS	16
4.1.6 EUT TEST CONDITIONS	16
4.1.7 TEST RESULTS	16
4.2 RADIATED EMISSION MEASUREMENT 4.2.1 RADIATED EMISSION LIMITS	17 17
4.2.2 TEST PROCEDURE	18
4.2.3 DEVIATION FROM TEST STANDARD	18
4.2.4 TEST SETUP	19
4.2.5 EUT OPERATING CONDITIONS 4.2.6 EUT TEST CONDITIONS	20 20
4.2.7 TEST RESULTS (9KHZ TO 30MHZ)	20
4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)	20
4.2.9 TEST RESULTS (ABOVE 1000MHZ)	20
5 . BANDWIDTH TEST	21
5.1 APPLIED PROCEDURES	21
5.1.1 TEST PROCEDURE 5.1.2 DEVIATION FROM STANDARD	21 21
5.1.3 TEST SETUP	21
5.1.4 EUT OPERATION CONDITIONS	21
5.1.5 EUT TEST CONDITIONS 5.1.6 TEST RESULTS	21 21
6 . MAXIMUM PEAK CONDUCTED OUTPUT POWER TEST	22

Report No.: BTL-FICP-4-1803C261 Page 3 of 136





Table of Contents	Page
6.1 APPLIED PROCEDURES / LIMIT 6.1.1 TEST PROCEDURE 6.1.2 DEVIATION FROM STANDARD 6.1.3 TEST SETUP 6.1.4 EUT OPERATION CONDITIONS 6.1.5 EUT TEST CONDITIONS	22 22 22 22 22 22
6.1.6 TEST RESULTS	22
7 . ANTENNA CONDUCTED SPURIOUS EMISSION	23
7.1 APPLIED PROCEDURES / LIMIT 7.1.1 TEST PROCEDURE 7.1.2 DEVIATION FROM STANDARD 7.1.3 TEST SETUP 7.1.4 EUT OPERATION CONDITIONS 7.1.5 EUT TEST CONDITIONS 7.1.6 TEST RESULTS	23 23 23 23 23 23 23
8 . POWER SPECTRAL DENSITY TEST	24
8.1 APPLIED PROCEDURES / LIMIT 8.1.1 TEST PROCEDURE 8.1.2 DEVIATION FROM STANDARD 8.1.3 TEST SETUP 8.1.4 EUT OPERATION CONDITIONS 8.1.5 EUT TEST CONDITIONS 8.1.6 TEST RESULTS	24 24 24 24 24 24 24
9 . MEASUREMENT INSTRUMENTS LIST	25
10 . EUT TEST PHOTO	27
APPENDIX A - CONDUCTED EMISSION	31
APPENDIX B - RADIATED EMISSION (9KHZ TO 30MHZ)	34
APPENDIX C - RADIATED EMISSION (30MHZ TO 1000MHZ)	39
APPENDIX D - RADIATED EMISSION (ABOVE 1000MHZ)	46
APPENDIX E - BANDWIDTH	83
APPENDIX F - MAXIMUM PEAK CONDUCTED OUTPUT POWER	90
APPENDIX G - ANTENNA CONDUCTED SPURIOUS EMISSION	93
APPENDIX H - POWER SPECTRAL DENSITY	124

Report No.: BTL-FICP-4-1803C261 Page 4 of 136





REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FICP-4-1803C261	Original Issue.	May 22, 2018
MDG1805049	Update the applicant name.	May 29, 2018

Report No.: BTL-FICP-4-1803C261 Page 5 of 136





1. CERTIFICATION

Equipment : Mi Ultra-Short Range Laser Projector

Brand Name: MI

Test Model : MJJGYY02FM

for FCC&IC

Series Model: MJJGYYXXFM (X=0-9, A-Z,- or blank, indicates for different market purposes)

for FCC

Applicant : Fengmi(Beijing)Technology Co.,Ltd Date of Test : Mar. 28, 2018 ~ May 10, 2018

Test Sample: Engineering Sample No.: D180302577 for Conducted, D180302578 for

Radiated

Standard(s) : FCC Part15, Subpart C (15.247) / ANSI C63.10-2013

RSS-247 Issue 2, Feb. 2017 RSS-GEN Issue 4, Nov. 2014

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FICP-4-1803C261) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP according to the ISO-17025 quality assessment standard and technical standard(s).

Report No.: BTL-FICP-4-1803C261 Page 6 of 136





2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15 (15.247), Subpart C Canada RSS-247 Issue 2, Feb. 2017, RSS-GEN Issue 4, Nov. 2014

Standard(s) Section FCC IC		Test Item	Judgment	Remark
15.207	RSS-GEN 8.8	Conducted Emission	PASS	
15.247(d)	RSS-247 5.5	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	RSS-247 5.2 (a)	6dB Bandwidth	PASS	
15.247(b)(3)	RSS-247 5.4 (d)	Peak Output Power	PASS	
15.247(e)	RSS-247 5.2 (b)	Power Spectral Density	PASS	
15.203	-	Antenna Requirement	PASS	
15.247(d)/ 15.205/ 15.209	RSS-247 5.5	Transmitter Radiated Emissions	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this test report.

Report No.: BTL-FICP-4-1803C261 Page 7 of 136





2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 854385 BTL's designation number for FCC: CN5020 BTL's test firm number for IC: 4428B-1

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) k=1.96 or k=2(which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).

The BTL measurement uncertainty as below table:

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150 KHz ~ 30MHz	2.32

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9KHz~30MHz	V	3.79
		9KHz~30MHz	Ι	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	Ι	3.78
DG-CB03	CISPR	200MHz ~ 1,000MHz	V	4.10
DG-CB03	DG-CBUS CISPR	200MHz ~ 1,000MHz	Ι	4.06
		1GHz~18GHz	V	3.12
		1GHz~18GHz	Ι	3.68
		18GHz~40GHz	V	4.15
		18GHz~40GHz	Н	4.14

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

Report No.: BTL-FICP-4-1803C261 Page 8 of 136





3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Mi Ultra-Short Range Laser Projector			
Brand Name	MI			
Test Model for FCC&IC	MJJGYY02FM	MJJGYY02FM		
Series Model for FCC	MJJGYYXXFM (X=0-9, market purposes)	MJJGYYXXFM (X=0-9, A-Z,- or blank, indicates for different market purposes)		
Model Difference	Only differ in market purpo	oses.		
	Operation Frequency	2412~2462 MHz		
	Modulation Technology	802.11b:DSSS 802.11g:OFDM 802.11n:OFDM		
Product Description	Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n up to 300 Mbps		
	Output Power (Max.)	802.11b: 18.55dBm 802.11g: 23.97dBm 802.11n(20MHz): 24.46dBm		
Power Source	AC Mains			
Power Rating	100-240V~ 50/60Hz			

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

	CH01 - CH11 for 802.11b, 802.11g, 802.11n(20MHz)						
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	80	2447	11	2462
03	2422	06	2437	09	2452		

Report No.: BTL-FICP-4-1803C261 Page 9 of 136





3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	1.5
2	N/A	N/A	Internal	N/A	1.5

Note:

(1) The EUT incorporates a MIMO function. Physically, the EUT provides two completed two transmitters and receivers (2T2R).
4. The worst case for 1TX/ 2TX as follow:

Operating Mode TX Mode	1TX	2TX
802.11b	V (ANT 1)	-
802.11g	-	V (ANT 1+ANT 2)
802.11n(20MHz)	-	V (ANT 1+ANT 2)

Report No.: BTL-FICP-4-1803C261 Page 10 of 136





3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description	
Mode 1	TX B MODE CHANNEL 01/06/11	
Mode 2	TX G MODE CHANNEL 01/06/11	
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11	
Mode 4	Normal Link	

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Conducted Test		
Final Test Mode	Description	
Mode 5	Normal Link	

For Radiated Test		
Final Test Mode	Description	
Mode 1	TX B MODE CHANNEL 01/06/11	
Mode 2	TX G MODE CHANNEL 01/06/11	
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11	

For Band Edge Test		
Final Test Mode	Description	
Mode 1	TX B MODE CHANNEL 01/06/11	
Mode 2	TX G MODE CHANNEL 01/06/11	
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11	

Report No.: BTL-FICP-4-1803C261 Page 11 of 136





6dB Spectrum Bandwidth		
Final Test Mode	Description	
Mode 1	TX B MODE CHANNEL 01/06/11	
Mode 2	TX G MODE CHANNEL 01/06/11	
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11	

Maximum Conducted Output Power			
Final Test Mode	Description		
Mode 1	TX B MODE CHANNEL 01/06/11		
Mode 2	TX G MODE CHANNEL 01/06/11		
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11		

Power Spectral Density			
Final Test Mode	Description		
Mode 1	TX B MODE CHANNEL 01/06/11		
Mode 2	TX G MODE CHANNEL 01/06/11		
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11		

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) 802.11b mode: DBPSK (1Mbps) 802.11g mode: OFDM (6Mbps)
 - 802.11n HT20 mode : BPSK (13Mbps)
 - For radiated emission tests, the highest output powers were set for final test.
- (3) For radiated below 1G test, the 802.11b is found to be the worst case and recorded.
- (4) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Report No.: BTL-FICP-4-1803C261 Page 12 of 136





3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

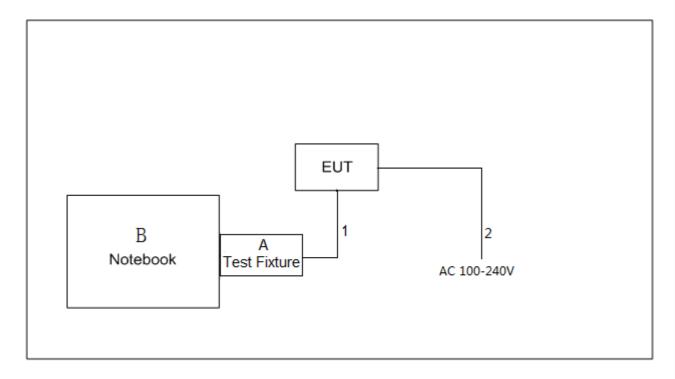
Test software version	IPOP		
Frequency (MHz)	2412	2437	2462
802.11b	54	53	52
802.11g	52	51	51
802.11n (20MHz)	52	52	52

Report No.: BTL-FICP-4-1803C261 Page 13 of 136





3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
Α	Test Fixture	N/A	N/A	N/A	N/A
В	Notebook	Dell	DCSM	DOC	G7K832X

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	ОИ	1.0m	Data Cable
2	NO	NO	1.5m	AC Cable

Report No.: BTL-FICP-4-1803C261 Page 14 of 136





4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)

Fraguency of Emission (MHz)	Conducted Limit (dBµV)		
Frequency of Emission (MHz)	Quasi-peak	Average	
0.15 -0.50	66 to 56*	56 to 46*	
0.50 -5.0	56	46	
5.0 -30.0	60	50	

Note:

(1) The limit of " * " decreases with the logarithm of the frequency

(2) The test result calculated as following: Measurement Value = Reading Level + Correct Factor Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use) Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e For the actual test configuration, please refer to the related Item -EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

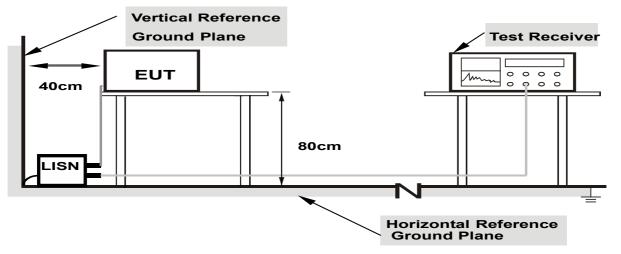
No deviation

Report No.: BTL-FICP-4-1803C261 Page 15 of 136





4.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was placed on the test table and programmed in normal function.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Appendix A.

Report No.: BTL-FICP-4-1803C261 Page 16 of 136





4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on 15.205(a) & RSS-247 5.5, then the 15.209(a) & RSS-Gen limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
Friequency (Minz)	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C/RSS-247.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following: Measurement Value = Reading Level + Correct Factor Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use) Margin Level = Measurement Value - Limit Value

Report No.: BTL-FICP-4-1803C261 Page 17 of 136





Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW	1MHz / 3MHz for Peak,
(Emission in restricted band)	1MHz / 1/T for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency 9KHz~90KHz for PK/AVG detector	
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.2.2 TEST PROCEDURE

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. For the actual test configuration, please refer to the related Item -EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

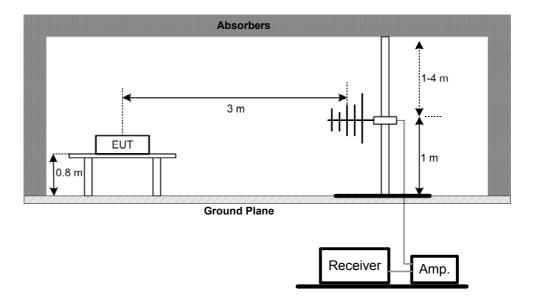
Report No.: BTL-FICP-4-1803C261 Page 18 of 136



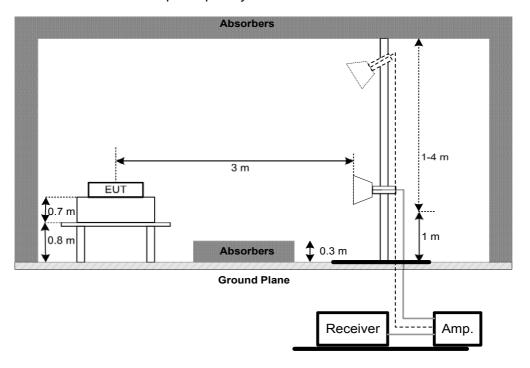


4.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz

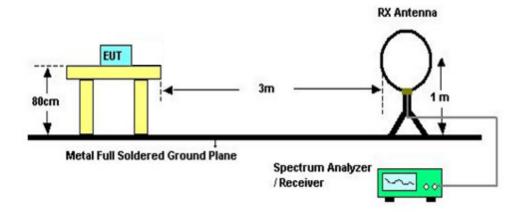


Report No.: BTL-FICP-4-1803C261 Page 19 of 136





(C) For Radiated Emissions Below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.2.6 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Appendix B

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Appendix C.

4.2.9 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the Appendix D.

Remark:

(1) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.

Report No.: BTL-FICP-4-1803C261 Page 20 of 136





5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247				
Section Test Item Frequency Range (MHz) Result				
15.247(a)(2)				
RSS-GEN section 6.6	Bandwidth	2400-2483.5	PASS	
RSS-247 5.2 (a)				

5.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

EUT		SPECTRUM	
		ANALYZER	

5.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Appendix E.

Report No.: BTL-FICP-4-1803C261 Page 21 of 136





6. MAXIMUM PEAK CONDUCTED OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C/ RSS-247					
Section	Test Item	Limit	Frequency Range (MHz)	Result	
15.247(b)(3) RSS-247 5.4 (d)	Maximum Output Power	1 Watt or 30dBm	2400-2483.5	PASS	

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance and FCC KDB 662911 D01 Multiple Transmitter Output.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP

EUT	Power Meter
	1 ower weter

6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Appendix F.

Report No.: BTL-FICP-4-1803C261 Page 22 of 136





7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

7.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto.
- c. Offset=antenna gain+cable loss

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

7.1.6 TEST RESULTS

Please refer to the Appendix G.

Report No.: BTL-FICP-4-1803C261 Page 23 of 136





8. POWER SPECTRAL DENSITY TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C / RSS-247					
Section Test Item Limit Frequency Range (MHz)					
15.247(e) RSS-247 5.2 (b)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS	

8.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW=3KHz, VBW=10KHz, Sweep time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP

EUT	SPECTRUM		
	ANALYZER		

8.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS

Please refer to the Appendix H.

Report No.: BTL-FICP-4-1803C261 Page 24 of 136





9. MEASUREMENT INSTRUMENTS LIST

	Conducted Emission Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 11, 2019		
2	LISN	EMCO	3816/2	52765	Mar. 11, 2019		
3	50Ω Terminator	SHX	TF2-3G-A	8122901	Mar. 11, 2019		
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Mar. 11, 2019		
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A		
6	Cable	N/A	RG223	12m	Oct. 19, 2018		

	Radiated Emission Measurement - Below 1GHz						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 11, 2019		
2	Amplifier	HP	8447D	2944A09673	Oct. 19, 2018		
3	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018		
4	Cable	emci	LMR-400(30MHz-1 GHz)(8m+5m)	N/A	Jun. 26, 2018		
5	Controller	CT	SC100	N/A	N/A		
6	Controller	MF	MF-7802	MF780208416	N/A		
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A		
8	Antenna	EM	EM-6876-1	230	Feb. 07, 2019		

	Radiated Emission Measurement - Above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 11, 2019	
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 08, 2018	
3	Amplifier	Agilent	8449B	3008A02274	Mar. 11, 2019	
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019	
5	Receiver	Agilent	N9038A	MY52130039	Aug. 20, 2018	
6	Controller	СТ	SC100	N/A	N/A	
7	Controller	MF	MF-7802	MF780208416	N/A	
8	Cable	emci	EMC104-SM-SM-1 2000(12m)	N/A	Jun. 26, 2018	
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A	

Report No.: BTL-FICP-4-1803C261 Page 25 of 136





	6dB Bandwidth					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018	

Peak Output Power					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	ANRITSU	ML2495A	1128009	Mar. 11, 2019
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	Mar. 11, 2019

	Antenna Conducted Spurious Emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018	

Power Spectral Density					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 20, 2018

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

Report No.: BTL-FICP-4-1803C261 Page 26 of 136





10. EUT TEST PHOTO







Report No.: BTL-FICP-4-1803C261 Page 27 of 136

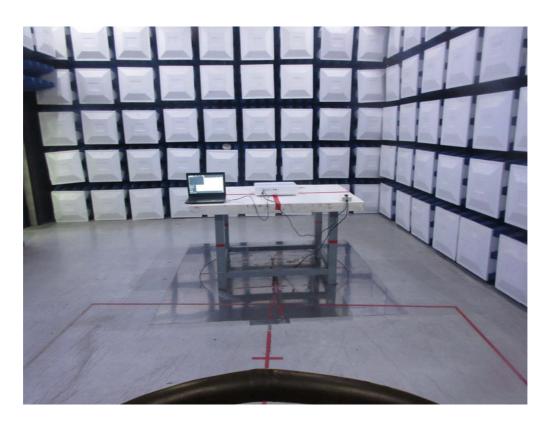




Radiated Measurement Photos

9KHz to 30MHz





Report No.: BTL-FICP-4-1803C261 Page 28 of 136





Radiated Measurement Photos

30MHz to 1000MHz





Report No.: BTL-FICP-4-1803C261 Page 29 of 136

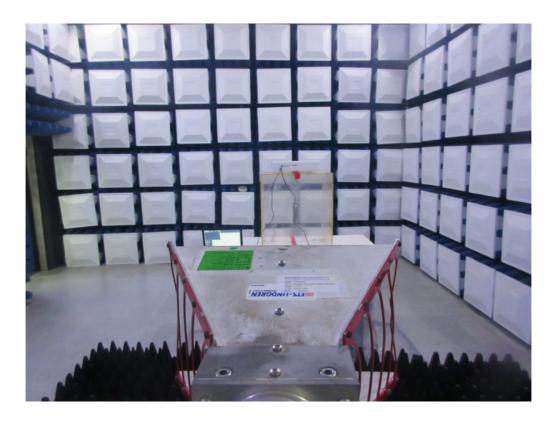




Radiated Measurement Photos

Above 1000MHz





Report No.: BTL-FICP-4-1803C261 Page 30 of 136