FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

LTE-TDD Base Station

ISSUED TO
Baicells Technologies Co., Ltd.

3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, China

Tested by: Heng Aiping
Heng Aiping
(Engineer)
Date: Oct. 30, 2017

Approved by:
Wei Yanquan
(Chief Engineer)
Date: Oct. 30, 2017

Report No.:	BL-SZ17A0379-501
EUT Name:	LTE-TDD Base Station
Model Name:	pBS2120
Brand Name:	BaiCells
Test Standard:	FCC Part 90Z
	RSS-197 Issue 1 (2010-02)
FCC ID:	2AG32PBS2120
IC ID:	20982-PBS2120
Test Conclusion:	Pass
Test Date:	Oct. 26, 2017 ~ Oct. 29, 2017
Date of Issue:	Oct. 30, 2017

Block B, 1st FL,Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Oct. 30, 2017	Initial Issue

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location 1	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Accreditation Certificate1	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as an accredited testing laboratory. The designation number is CN1196. The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025. The accreditation certificate number is 4344.01. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	20 to 35 °C
Ambient Relative Humidity	30 to 60 %
Ambient Pressure	98 to 102KPa

1.4 Announce

(1) The test report reference to the report template version v4.3.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Baicells Technologies Co., Ltd.
Address	3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, China

2.2 Manufacturer Information

Manufacturer	Baicells Technologies Co., Ltd.
Address	3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	LTE-TDD Base Station
Model Name	pBS2120
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	LTE	QPSK
		16QAM
		64QAM
Operation Frequency	3655MHz – 3695MHz 10MHz: Low 3655MHz, Middle 3675MHz, High 3695MHz 20MHz: Low 3660MHz, Middle 3675MHz, High 3690MHz	
Antenna installation	Internal antenna	
Antenna Gain	9.0 dBi	
Ratings	AC 120V/60Hz	
Number of Transmitter chains	2*2 (MIMO)	

Note 1:
The device supports MIMO 2*2, and the MIMO works with STBC (Space – Time Block Coding). The antenna is omnidirectional, and does not support any directional gain in any modes.

MIMO date, antennas use two different streams, from this side, if RX side need to decode MIMO, data between the two stream should be correlated. The device transmits simultaneously in multiple channels in single frequency bands and uses carrier aggregation techniques.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2 (10–1–16 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	FCC Part 90Z (10–1–16 Edition)	Wireless Broadband Services in the 3650–3700 MHz Band
3	RSS-197 Issue 1 February 2010	Wireless Broadband Access Equipment Operating in the Band 3650-3700 MHz
4	RSS-GEN Issue 4 November 2014	General Requirements for Compliance of Radio Apparatus

3.2 Test Verdict

No.	Test Description	FCC Part No.	IC Part No.	Result
1	Spurious Emissions at Antenna Terminal (18GHz – 40GHz)	2.1051 90.1323	RSS GEN 6.13 RSS-197 5.7	Pass
2	Field strength of spurious radiation measurement (18GHz – 40GHz)	2.1053 90.1323	RSS GEN 6.13 RSS-197 5.7	Pass

Note: “N/A” means “Not Application” for the EUT.

3.3 Test Uncertainty

FCC Part No.	Test Description	Uncertainty
2.1051 90.1323	Spurious Emissions at Antenna Terminal (18GHz – 40GHz)	±2.2 dB
2.1053 90.1323	Field strength of spurious radiation measurement (18GHz – 40GHz)	±7.5dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Test Voltage of the EUT	NV (Normal Voltage)	120 V
	LV (Low Voltage)	105 V
	HV (High Voltage)	144 V
Test Temperature of the EUT	LT (Low Temperature)	-40 °C
	HT (High Temperature)	55 °C

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Software /Firmware Version	Cal. Date	Cal. Due
Wireless Communications Test Set	R&S	CMW 500	142028	V3.2.73	2017.06.12	2018.06.11
Power Splitter	KMW	DCPD-LDC	1305003215	N/A	N/A	N/A
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	N/A	N/A	N/A
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	N/A	N/A	N/A
Spectrum Analyzer	R&S	FSV-40	101544	2.30.SP4	2017.06.12	2018.06.11
DC Power Supply	R&S	IT6863A	600014010687210020	N/A	2017.06.12	2018.06.11
Temperature Chamber	AHK	SP20	1412	N/A	2017.07.12	2018.07.11
Test Antenna-Horn (18-40 GHz)	A-INFO	LB-180400KF	J211060273	N/A	2017.01.06	2018.01.05
Anechoic Chamber	EMC Electronic Co., Ltd	20.10m*11.60m*7.35m	N/A	N/A	2016.08.09	2018.08.08
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	N/A
Test Software	BALUN	BL410_E	N/A	V16.921	N/A	N/A

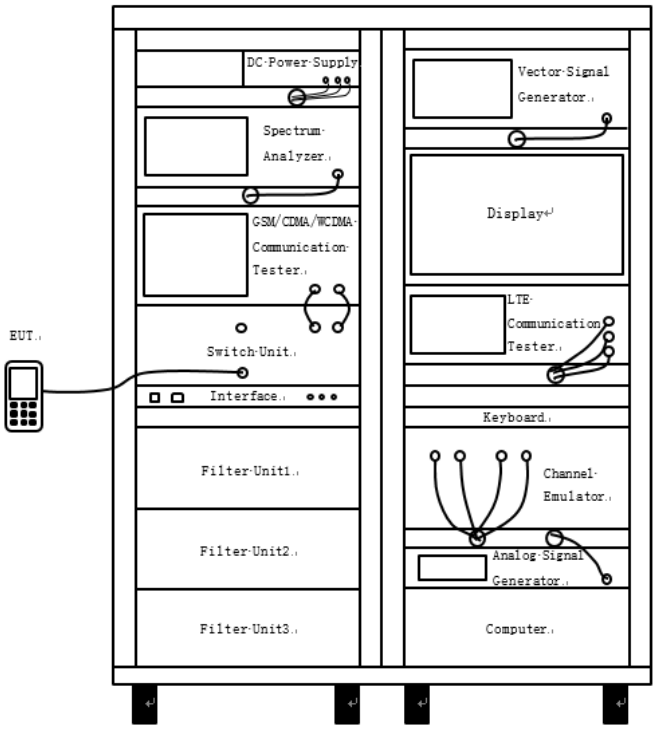
4.3 Test Configurations

Test Items	Bandwidth	ANT (Antenna)	Test Channel
			MCH
Spurious Emissions at Antenna Terminal (18GHz – 40GHz)	10MHz	ANT 1	v
		ANT 2	v
	20MHz	ANT 1	v
		ANT 2	v
Field strength of spurious radiation measurement (18GHz – 40GHz)	10MHz	ANT 1+ANT 2	v
	20MHz	ANT 1+ANT 2	v

Note 1: All the test Configuration were considered and test, only the worst data were recorded and reported.

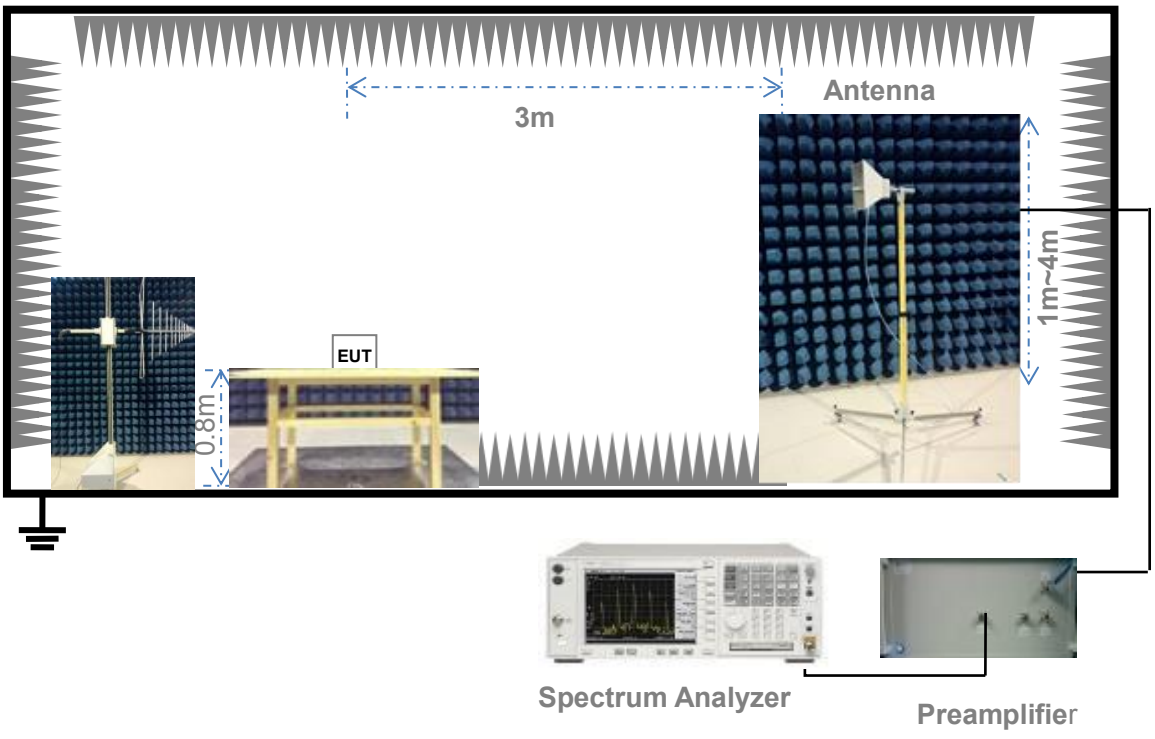
4.4 Test Setup

4.4.1 For Antenna Port Test



(Diagram 1)

4.4.2 For Radiated Test (Above 1 GHz)



(Diagram 2)

5 TEST ITEMS

5.1 Spurious Emission at Antenna Terminals

5.1.1 Limit

FCC § 2.1051

FCC § 90.1323

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P) dB. This is calculated to be -13 dBm.

Note: For 2*2 MIMO, the limit = -13 dBm – 10 log 2 = -16 dBm

5.1.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency blocks a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. CMW500 was used to establish communication with the EUT, Its parameters were set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

4. Spurious emissions were tested with 0.001MHz RBW for frequency less than 150kHz, 0.01MHz RBW for frequency less than 30MHz, 0.1MHz RBW for frequency less than 1GHz, and 1MHz RBW for frequency above 1GHz. And sweep point number were at least 401, referring to following formula.

Sweep point number = Span/RBW

VBW=3RBW

Detector Mode=mean or average power

5. Record the frequencies and levels of spurious emissions.

Note: Reference test setup 4.4.1 (Diagram 1).

5.1.4 Test Result

Please refer to ANNEX A.1.

5.2 Field Strength of Spurious Radiation

5.2.1 Limit

FCC § 2.1053

FCC § 90.1323

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P) dB. This is calculated to be -13 dBm.

5.2.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for

horizontal polarization.

Final measurement calculation as below:

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:
ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:
In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:
ERP (dBm) = 21dBm + 8dB = 29dBm
Note: Reference test setup 4.4.2 (Diagram 2)

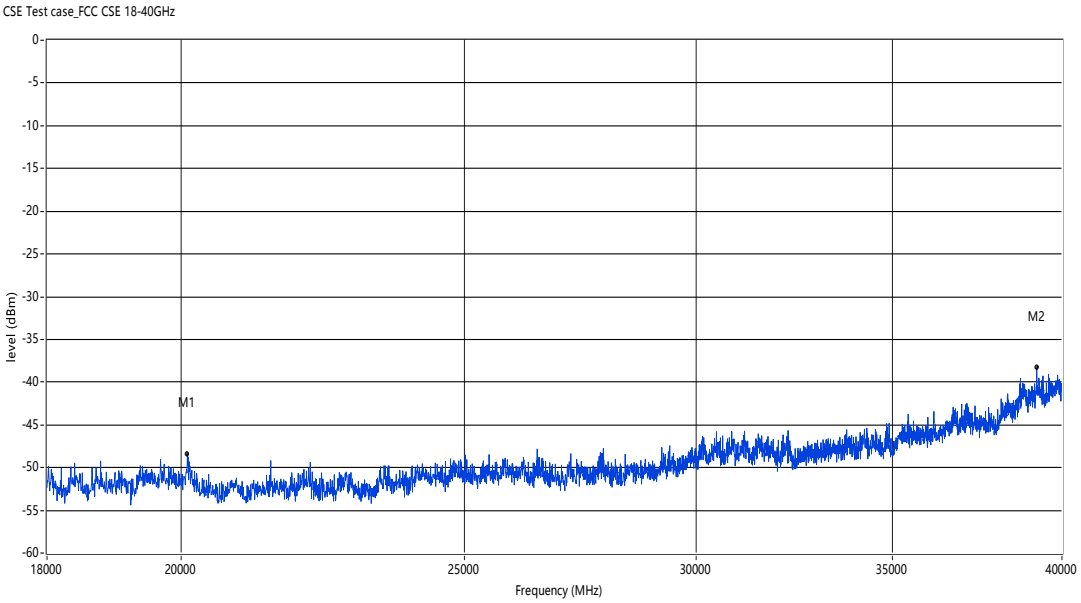
5.2.4 Test Result

Please refer to ANNEX A.2.

ANNEX A TEST RESULTS

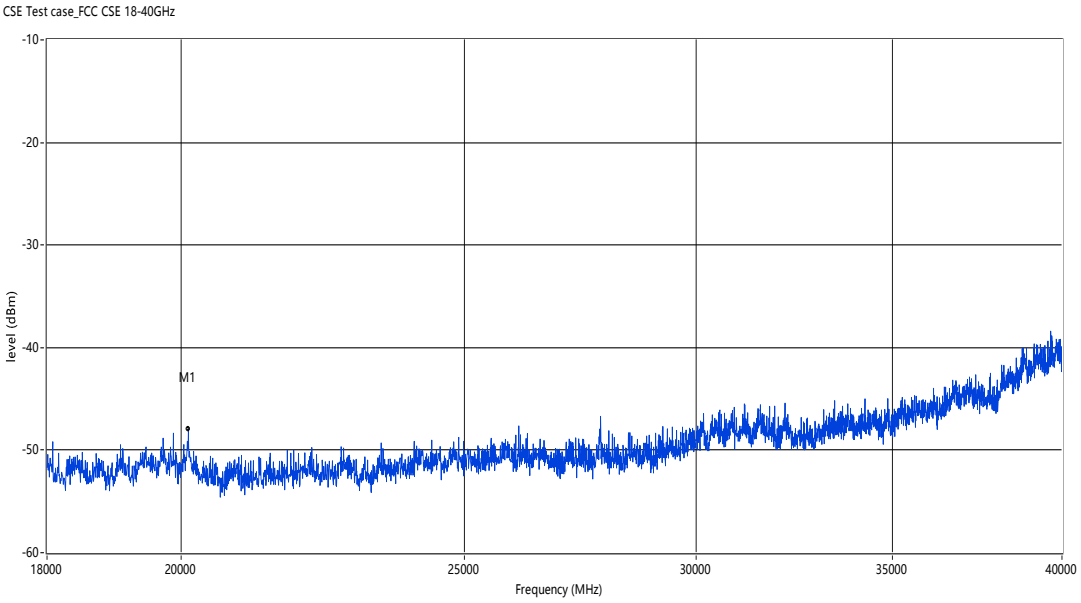
A.1 Spurious Emission at Antenna Terminals

a) 10MHz - 18GHz~40GHz-ANT1



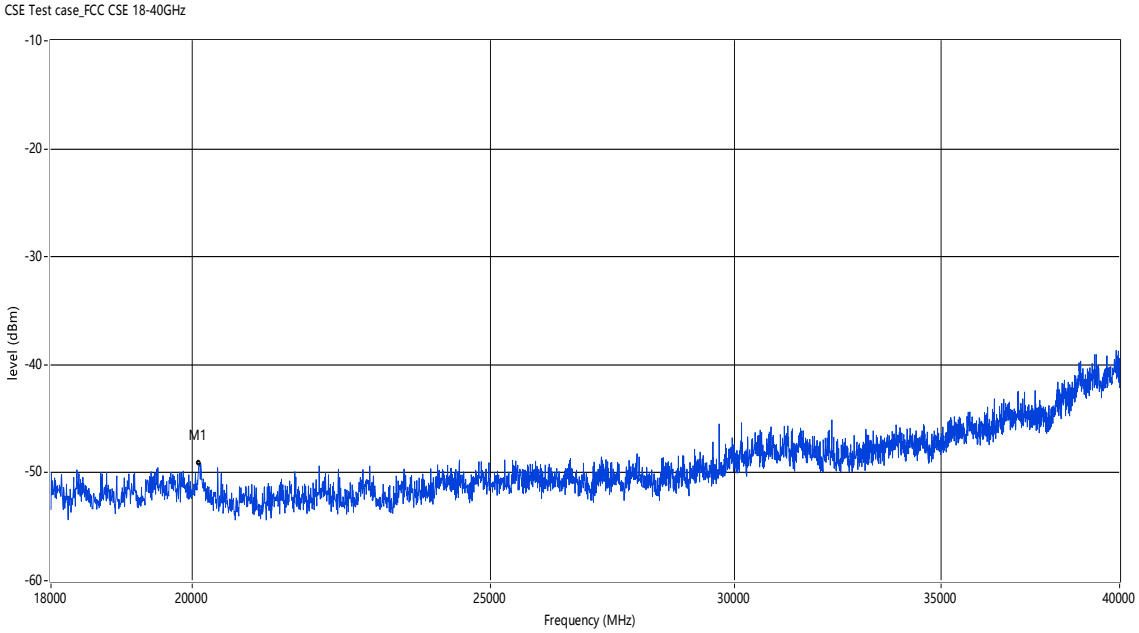
Frequency	Peak	Factor	PK Limit	Margin	Verdict
20100.999	-48.48	10.36	-16.0	32.48	Pass
39213.498	-38.34	14.82	-16.0	22.34	Pass

b) 20MHz - 18GHz~40GHz-ANT1



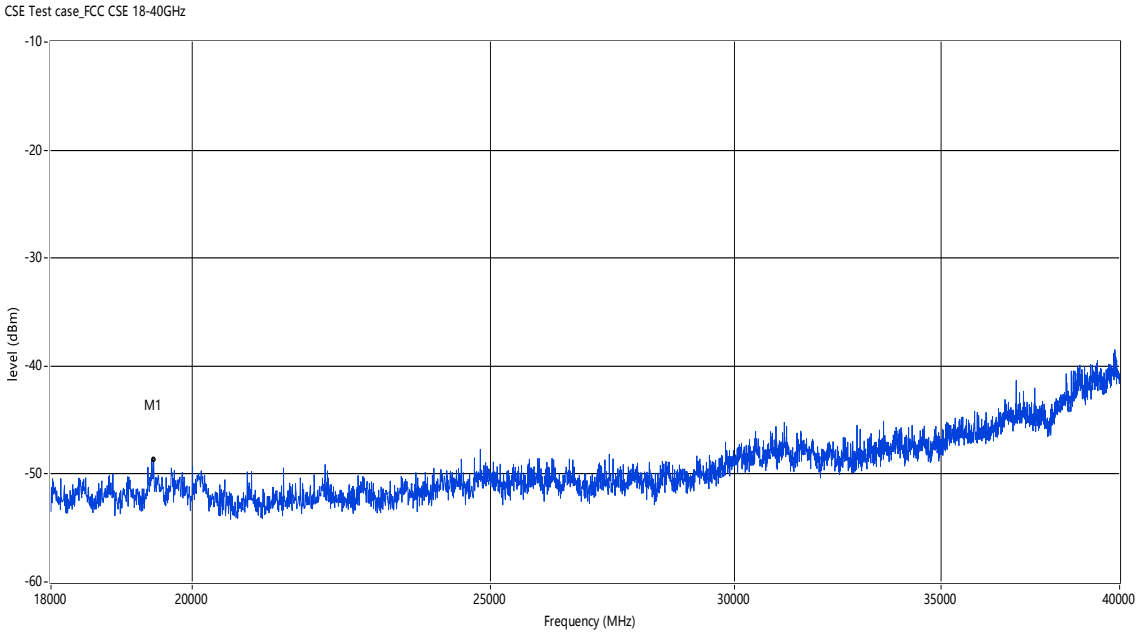
Frequency	Peak	Factor	PK Limit	Margin	Verdict
20117.500	-48.00	10.36	-16.0	32.00	Pass
39648.002	-38.39	14.92	-16.0	22.39	Pass

c) 10MHz - 18GHz~40GHz-ANT2



Frequency	Peak	Factor	PK Limit	Margin	Verdict
20106.500	-49.16	10.36	-16.0	33.16	Pass
39301.501	-39.04	14.84	-16.0	23.04	Pass

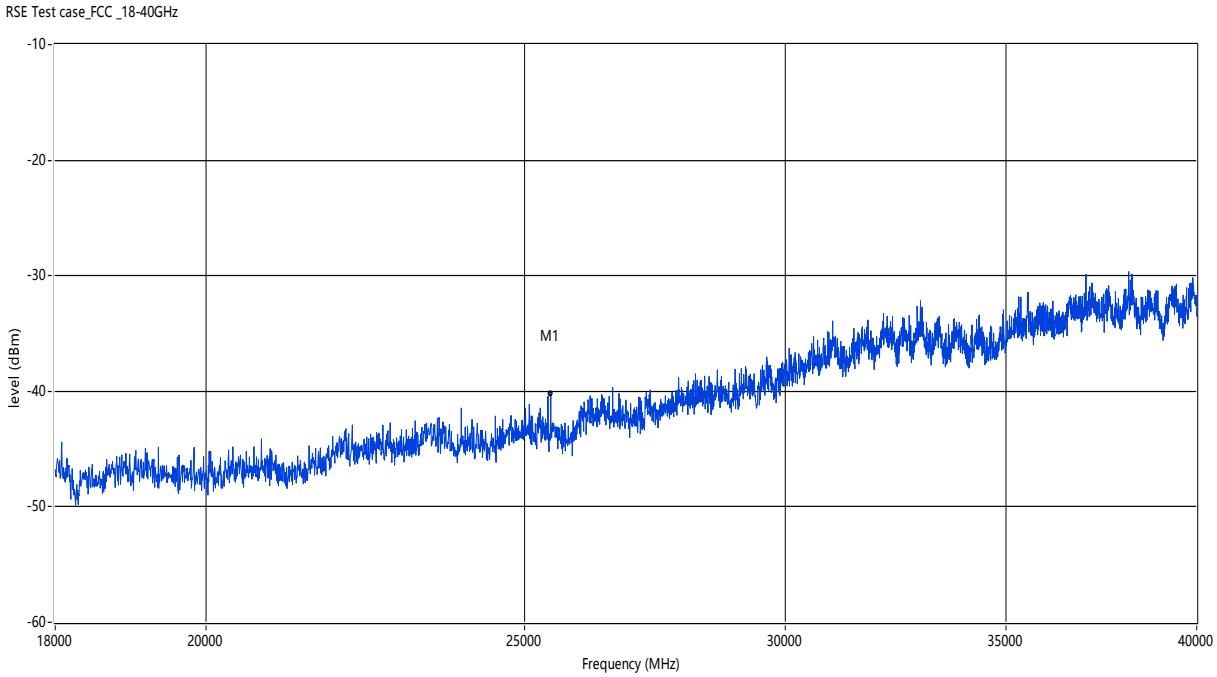
d) 20MHz - 18GHz~40GHz-ANT2



Frequency	Peak	Factor	PK Limit	Margin	Verdict
19435.500	-48.69	10.20	-16.0	32.69	Pass
37024.502	-41.33	14.31	-16.0	25.33	Pass

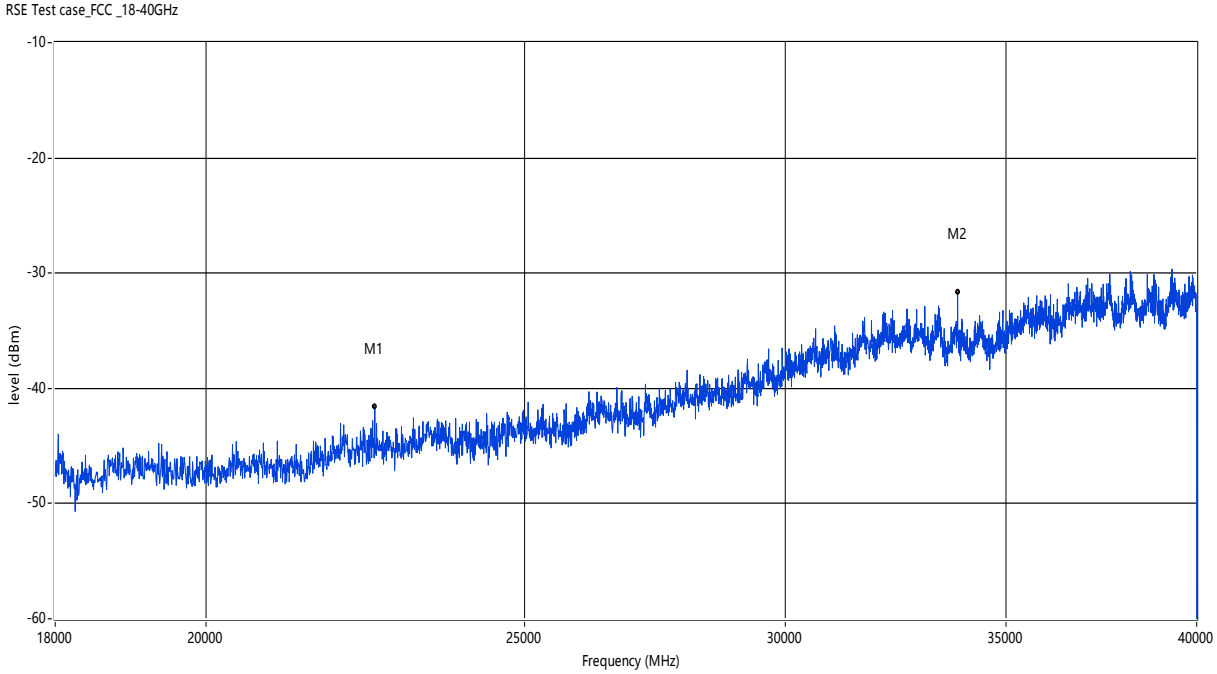
A.2 Field Strength of Spurious Radiation

a) ANT1+ANT2 20MHz-H



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
25458.000	-40.26	25.05	-13.0	27.26	0.00	Horizontal	Horizontal	Pass
37019.001	-29.87	29.22	-13.0	16.87	8.00	Horizontal	Horizontal	Pass

b) ANT1+ANT2 20MHz-V



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
22510.000	-41.59	25.16	-13.0	28.59	1.00	Vertical	Horizontal	Pass
33840.001	-31.69	28.58	-13.0	18.69	5.00	Vertical	Horizontal	Pass

ANNEX B TEST SETUP PHOTOS

B.1 Field strength of spurious radiation measurement (18GHz – 40GHz)

B.2 Spurious Emissions at Antenna Terminal (18GHz – 40GHz)

-END OF REPORT--