Test Report No:
2440153R-RFUSV23S-A

TEST REPORT
FCC Rules&Regulations

Product Name	5G NR Wi-Fi 6 AX1800 CPE, 5G NR CPE
Brand Name	BEC by BILLION
Model No.	AirConnect® BEC 8355P, AirConnect® 8355P, BEC 8355P, AirConnect® BEC 8355PU, AirConnect® 8355PU, BEC 8355PU, AirConnect® BEC 8355, AirConnect® 8355, BEC 8355
FCC ID	QI3BEC-8355P
Applicant´s Name / Address	Billion Electric Co., Ltd. 8F., No. 192, Sec. 2, Zhongxing Rd., Xindian Dist.,New Taipei City 231 Taiwan
Manufacturer's Name	Billion Electric Co., Ltd.
Test Method Requested, Standard	FCC CFR Title 47 Part 24 Subpart E ANSI/TIA-603-E-2016, ANSI C63.26-2015
Verdict Summary	IN COMPLIANCE
Documented by Genie Chang	Genie Chang
Tested by Joe Wang	Joe Wang
Approved By Will Chen	Will Chen
Date of Receipt	2024/04/08
Date of Issue	2024/06/13
Report Version	V1.0

INDEX

Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General Conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	2024/06/13

Summary of Test Result

Report Clause	Test Items	Band	Ref Std. Clause	Limit	Result (PASS/FAIL)	Remark
3	RF Output Power	5GNR n2	§2.1033 §2.1046 §24.232	< 2 Watts	PASS	-
4	Occupied Bandwidth	5GNR n2	§2.1049	N/A	PASS	-
5	Peak to Average Power Ratio	5GNR n2	§24.232	≦ 13 dB	PASS	-
6	Spurious Emission	5GNR n2	§2.1053 §24.238	< -13 dBm	PASS	-
7	Conducted Band Edge	5GNR n2	§24.238	< -13 dBm	PASS	-
8	Frequency Stability	5GNR n2	§2.1055 §24.235	± 2.5 ppm	PASS	-

Comments and Explanations
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1. General Information

1.1. EUT Description

Frequency Range	5G NR n2	1850~1910 MHz (Uplink) 1930~1990 MHz (Downlink)	
Bandwidth	5G NR n2	SCS: 15 kHz	5 / 10 / 15 / 20 MHz
Type of Modulation	pi/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM		
IMEI No.	861075060013090		

Accessories Information					
No.	Equipment Name	Brand Name	Model No.	Rating	Remark
1	48VDC 0.5A Passive PoE injector	RiSUNIC	RP024W01-4 800500YE	INPUT: AC 100-240V~0.6A 50/60Hz OUTPUT: 48V⎓0.5A	N/A
2	Stand	N/A	N/A	N/A	N/A
No.	Equipment Name	Description			
1	Power cord	Non-Shielded, 1.8 m			
2	Flat Ethernet Cable 10Meter	Non-Shielded, 10m			

Antenna Information						
Item.	Ant.	Brand Name	Model No.	Type	Gain (dBi)	Remark
1	1	GTT	DA-8355P-01-BL	Omni+Directional	2.6	TX/RX
	3				4.0	RX
	5				4.0	RX
	7				2.3	RX

The difference for each model is shown as below:

	Product Name	Brand (Trade) Name	2.5GbE LAN	SIM Slot (2FF)	Reset Button	Wi-Fi 6
AirConnect® BEC 8355P	5G NR Wi-Fi 6 AX1800 CPE	BEC by BILLION	2.5 Gigabit LAN Interface with IEEE 802.3at complaint PoE P.D x 1	1	1	Wi-Fi 2.4GHz/5GHz
AirConnect® 8355P						
BEC 8355P						
AirConnect® BEC 8355PU						
AirConnect® 8355PU						
BEC 8355PU						
AirConnect® BEC 8355	5G NR CPE					N/A
AirConnect® 8355						
BEC 8355						

From the above models, model: AirConnect® BEC 8355P was selected as representative model for the test and its data was recorded in this report.

1.2. EUT Information

EUT Power Type	From PoE

1.3. Testing Location Information

USA	FCC Designation Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C.
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual	Test Date
Conducted Emission	Temperature (°C)	15~35 ℃	24.8 ℃	2024/05/06~2024/05/10
	Humidity (%RH)	20~75 %	62.0 %	
Radiated Emission	Temperature (°C)	15~35 ℃	23.4 ℃	2024/04/23~2024/05/10
	Humidity (%RH)	20~75 %	55.2 %	

1.4. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Test Item	Uncertainty
RF Output Power	± 1.58 dB
Occupied Bandwidth	± 1580.61 Hz
Peak to Average Power Ratio	± 2.14 dB
Spurious Emissions	± 5.88dB for 30MHz~1GHz ± 3.11dB for 1GHz~18GHz ± 3.09dB for 18GHz~40GHz
Conducted Band Edge	± 2.14 dB
Frequency Stability	± 0.42 ppm

1.5. List of Test Equipment

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023/08/09	2025/08/08
Horn Antenna	Com-Power	AH-840	101100	2023/10/02	2025/10/01
Horn Antenna	RF SPIN	DRH18-E	210802A18ES	2024/03/28	2025/03/27
Pre-Amplifier	SGH	0301	20211007-7	2024/01/10	2025/01/09
Pre-Amplifier	EMCI	EMC051845SE	980632	2024/01/10	2025/01/09
Pre-Amplifier	EMCI	EMC05820SE	980362	2024/01/10	2025/01/09
Pre-Amplifier	EMCI	EMC184045SE	980369	2024/01/10	2025/01/09
Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314	2024/01/10	2025/01/09
Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242	2024/01/10	2025/01/09
Spectrum Analyzer	R&S	FSV3044	101115	2024/01/11	2025/01/10
Coaxial Cable	SUHNER	SUCOFLEX 106	25450/6	2024/01/10	2025/01/09
Coaxial Cable	SGH	SGH18	2021003-8	2024/01/10	2025/01/09
Coaxial Cable	SGH	HA800	GD20110222-8	2024/01/10	2025/01/09
Coaxial Cable	EMCI	EMC106	151113	2024/01/10	2025/01/09
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY59321672	2023/05/30	2024/05/29
Universal Radio Communication Tester	Anritsu	MT8000A	6262134961	2023/05/30	2024/05/29
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510357	2023/05/18	2024/05/17
Temperature & Humidity Test Chamber	KSON	THS-D4T-100	A0606	2024/03/06	2025/03/05
Power Supply	KEYSIGHT	E36234A	MY59001234	2023/11/09	2024/11/08

Note: Test Software Version: e3 230303 dekra V9.

2. Test Configuration of EUT

2.1. Test Condition

EUT Operational Condition	
Testing Voltage	AC 120V/60Hz to DC 48V by POE

2.2. Measurement Configuration

Test Mode	Mode 1: 5G NR n2

Note:

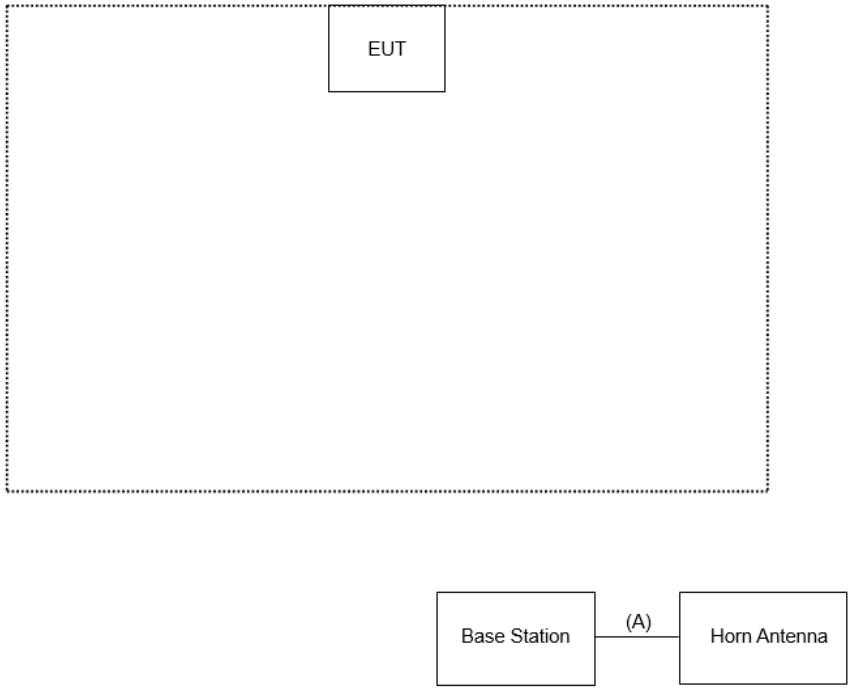
1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.
3. The device was tested under all configurations, combinations, bandwidths, RB configurations and modulations, and the worst case was found in PI/2 BPSK modulation, therefore the “Conducted Band Edge” & “Spurious Emission” test items perform PI/2 BPSK modulation in this report.
4. The EUT was performed at X axis, Y axis and Z axis position for radiated spurious emission test. The worst case was found at Z axis, so the measurement will follow this same test configuration.

2.3. Tested System Details

No.	Equipment	Brand Name	Model No.	Serial No.
1	Base Station	Keysight	E7515B	MY59321672
2	Base Station	Anritsu	MT8000A	6262134961
3	Horn Antenna	Schwarzbeck	BBHA 9120D	1640

2.4. Configuration of Tested System

Connection Diagram



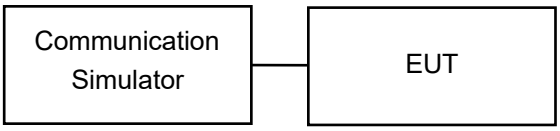
Signal Cable Type		Signal cable Description
A	RF Cable	Shielded, 10m

2.5. EUT Operating Procedures

1.	Setup the EUT and simulators as shown on.
2.	Turn on the power of all equipment.
3.	The EUT will continue receive the signal from 5G NR function.
4.	Repeat the above procedure (3)

3. RF Output Power

3.1. Test Setup



3.2. Test Procedure

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum conducted RF output power under transmission mode and specific channel frequency. The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$\text{ERP or EIRP} = P_{Meas} + G_T - L_C$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

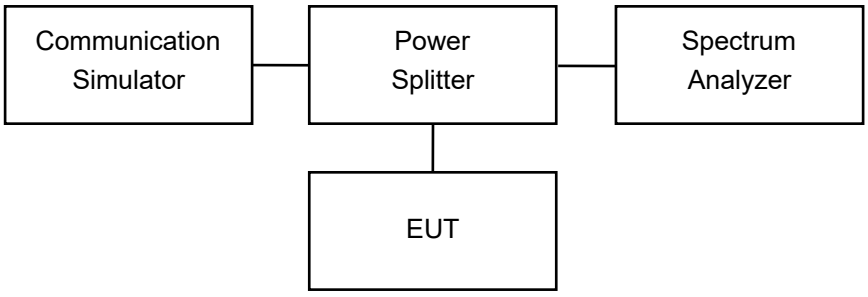
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB

3.3. Test Result of RF Output Power

Refer as Appendix A

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedure

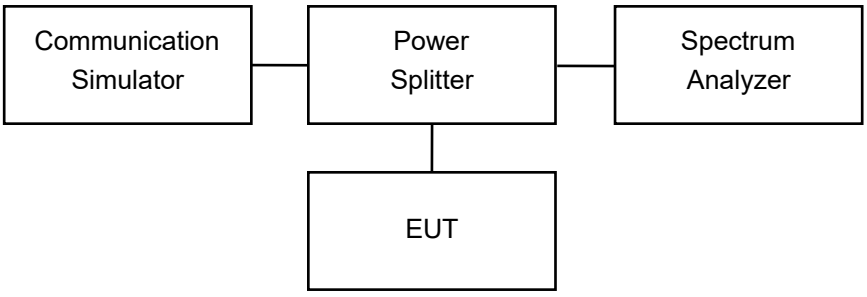
The EUT makes a call to the communication simulator. The 26dB bandwidth and 99% occupied bandwidth measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.

4.3. Test Result of Occupied Bandwidth

Refer as Appendix B

5. Peak to Average Power Ratio

5.1. Test Setup



5.2. Test Procedure

1. The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.
2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth.
3. Set the number of counts to a value that stabilizes the measured CCDF curve.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

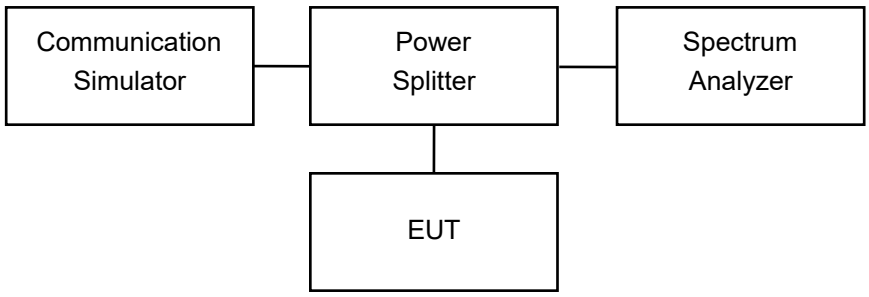
5.3. Test Result of Peak to Average Power Ratio

Refer as Appendix C

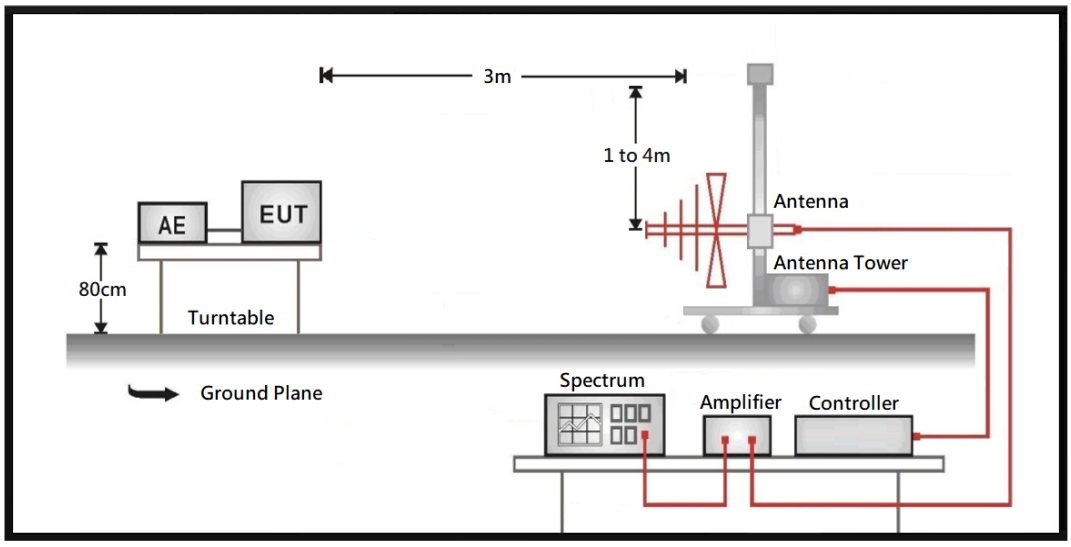
6. Spurious Emissions

6.1. Test Setup

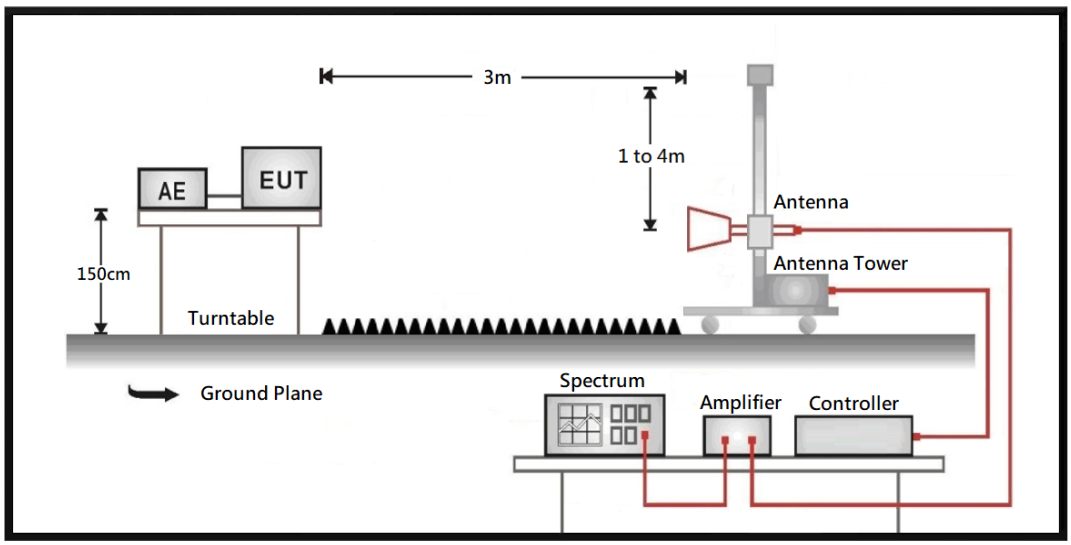
Conducted Spurious Measurement



Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



6.2. Test Procedure

Conducted Spurious Measurement:

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement. The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10^{th} harmonic.

Radiated Spurious Measurement:

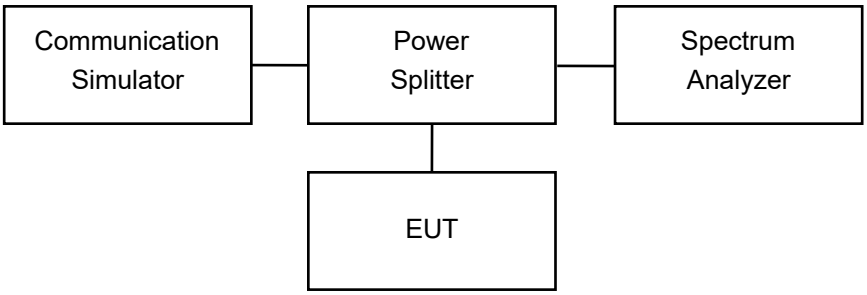
The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations. The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic. Taking the record of maximum spurious emission.

6.3. Test Result of Spurious Emission

Refer as Appendix D

7. Conducted Band Edge

7.1. Test Setup



7.2. Test Procedure

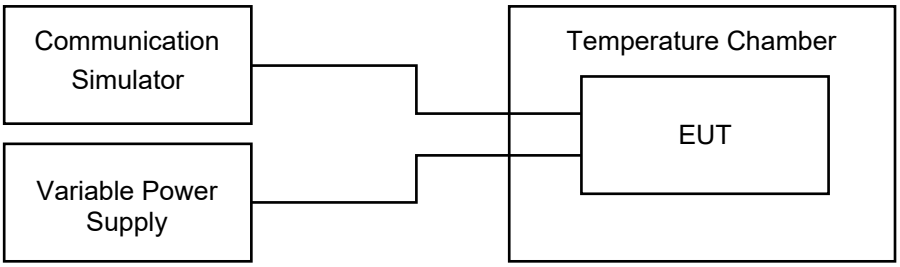
1. The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.
2. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

7.3. Test Result of Conducted Band Edge

Refer as Appendix E

8. Frequency Stability

8.1. Test Setup



8.2. Test Procedure

Frequency Stability under Temperature Variations:

The EUT under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a communication simulator. The EUT was placed inside the temperature chamber. Set the EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:

Set chamber temperature to 20℃. Use a variable AC or DC power supply to power the EUT and set the voltage to rated voltage. Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

8.3. Test Result of Frequency Stability

Refer as Appendix F