Testing Laboratory
3023

Test Report No:
2520308R-RFUSV26S-A

TEST REPORT
FCC Rules & Regulations

Product Name	5G NR Module
Brand Name	BEC by BILLION
Model No.	BEC 4900 5G
FCC ID	QI3BEC-4900-5G
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 96 ANSI/TIA-603-E-2016 ANSI C63.26-2015
Verdict Summary	IN COMPLIANCE
Documented By Jinn Chen	Jinn Chen
Tested by Daniel Wu	Daniel Wu
Approved By Will Chen	Will Chen
Date of Receipt	2025/02/13
Date of Issue	2025/04/02
Report Version	V2.0

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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.	2025/03/24
V2.0	Change antenna brand name.	2025/04/02

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3	Part 2.1046, 96.41(b)	RF Output Power	PASS	-
-	Part 2.1046, 96.41(b)	Maximum Power Spectral Density	PASS	Note
-	Part 2.1049, 96.41	Occupied Bandwidth	PASS	Note
-	Part 2.1051, 96.41	Spurious Emission at Antenna Terminals	PASS	Note
4	Part 2.1051, 96.41	Spurious Emission	PASS	-
-	Part 2.1055	Frequency Stability	PASS	Note
-	Part 96.41	Peak to Average Ratio	PASS	Note

Note:
This report is to request the Class II Permissive Change for FCC ID: QI3BEC-4900-5G. The major change filed under this application is to:
Change #1: Only 5G NR n48 band is enabled, other WCDMA, LTE and 5G NR bands are diabled by SW.
Change #2: Add 1 antenna and this antenna is used for the platform: CBRS Outdoor Router, model: BEC RidgeWave® 4900 5G, RidgeWave® 4900 5G, BEC 4900 5G.
Change #3: Reduce the Output Power through firmware.
Except for the above differences, the hardware design is identical with the original grant.
According to the major change, DEKRA tests RF Output Power and Radiated Spurious Emission, and other testing data refer to original module reports.

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.

1. General Information

1.1. EUT Description

Frequency Range	3550 ~ 3700 MHz (Uplink) 3550 ~ 3700 MHz (Downlink)	
Bandwidth	SCS: 30 kHz	10 / 20 / 40 MHz
Type of Modulation	DFT-s-OFDM (pi/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM) CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM)	
Maximum Output Power	9.29 dBm	
Maximum E.I.R.P	22.99 dBm	

Accessories Information					
No.	Equipment Name	Brand Name	Model No.	Rating	Remark
1	PoE injector	Billion	BP035-560063PAX	INPUT : 100-240V ~ 50/60Hz 0.8A OUTPUT : 56V⎓0.625A	--
No.	Equipment Name	Description			
2	Power Cable	Brand Name: Billion, Model No.: N/A, Non-Shielded, 1.8m			

Host Information		
Brand Name	Product Name	Model No.
BEC by BILLION	CBRS Outdoor Router	BEC RidgeWave® 4900 5G, RidgeWave® 4900 5G, BEC 4900 5G

Note:

1. The EUT are available in different model names for marketing purposes.

Antenna Information						
Item.	Ant.	Brand Name	Model No.	Type	Gain (dBi)	Remark
1	0	BEC	DA-B48G-12-01-BL	PIFA	13.5	RX
	1				13.7	TX/RX
	2				13.3	RX
	3				13.6	TX/RX

1.2. 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. 85, Wenlin St., Linkou Dist., New Taipei City 244017, 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
RF Output Power	Temperature (°C)	15~35 °C	24.2 °C	2025/02/27 ~ 2025/03/04
	Humidity (%RH)	20~75 %	61.2 %	
Radiated Emission	Temperature (°C)	15~35 °C	25.3 °C	2025/03/04
	Humidity (%RH)	20~75 %	69.9 %	

1.3. 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
Radiated Spurious Emissions	± 5.88 dB for 30MHz~1GHz ± 3.11 dB for 1GHz~18GHz ± 3.09 dB for 18GHz~40GHz

1.4. List of Test Equipment

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Universal Radio Communication Tester	Anritsu	MT8000A	6262134961	2024.06.02	2025.06.01
DC Power Supply	Keysight	E36234A	MY59001234	2024.10.29	2025.10.28
Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023.08.09	2025.08.08
Horn Antenna	Com-Power	AH-840	101101	2023.12.04	2025.12.03
Horn Antenna	RF SPIN	DRH18-E	210507A18ES	2024.05.15	2025.05.14
Pre-Amplifier	SGH	SGH0301-9	20211007-11	2025.01.10	2026.01.09
Pre-Amplifier	SGH	PRAMP118	20200701	2025/01/10	2026/01/09
Pre-Amplifier	EMCI	EMC184045SE	980369	2025/01/10	2026/01/09
Coaxial Cable	EMCI	EMC102-KM-KM-600	1160311	2025/01/10	2026/01/09
Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242	2025/01/10	2026/01/09
Spectrum Analyzer	R&S	FSV3044	101115	2025.01.07	2026.01.06
EMI Test Receiver	R&S	ESR3	102793	2024/12/06	2025/12/05
Coaxial Cable	SGH	SGH18	2021005-1	2025/01/10	2026/01/09
Coaxial Cable	SGH	SGH18	202108-4	2025/01/10	2026/01/09
Coaxial Cable	SGH	HA800	GD20110223-1	2025/01/10	2026/01/09
Coaxial Cable	SGH	HA800	GD20110222-3	2025/01/10	2026/01/09

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 for host and DC 3.3V for module

2.2. The Measurement Configuration

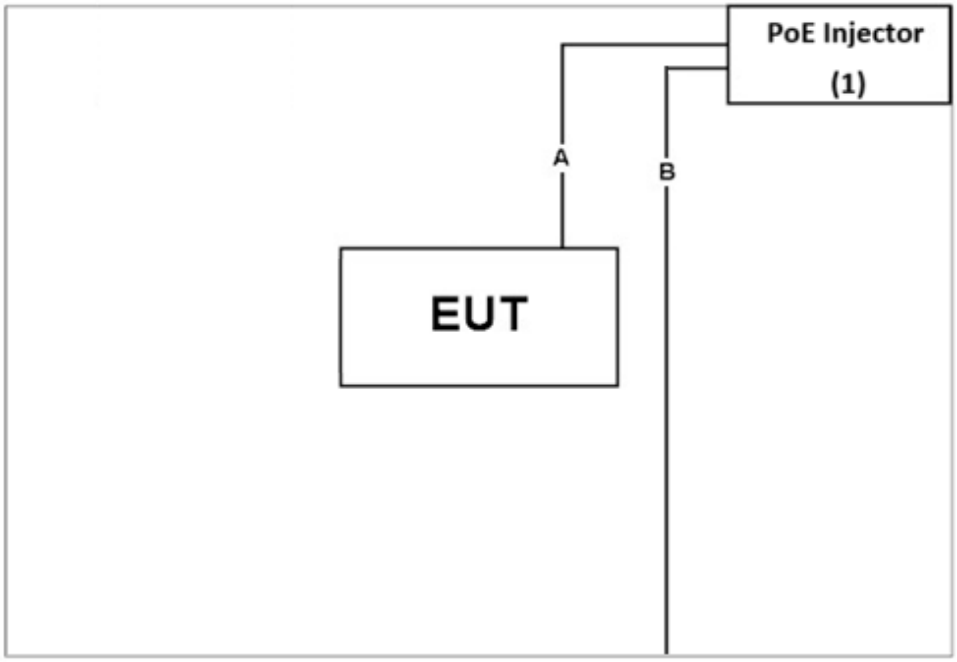
Test Mode	Mode 1: 5G NR n48

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 “Radiated 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 positions for radiated spurious emission test. The worst case was found and the measurement will follow this same test configuration.

2.3. Tested System Details

Product		Manufacturer	Model No.	Description
1	PoE Injector	Billion	BP035-560063PAX	N/A

2.4. Configuration of Tested System

Connection Diagram


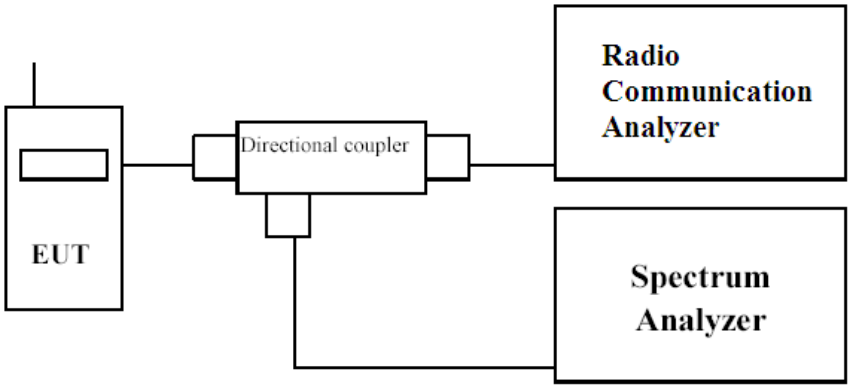
Signal Cable Type		Signal cable Description
A	LAN Cable	Shielded, 1m
B	LAN Cable	Shielded, 8m

2.5. EUT Operating Procedures

1.	Setup the EUT connect to the base station.
2.	Setup the parameter (Band, Channel, Frequency).
3.	The EUT will continue receive the signal from 5GNR function.
4.	Repeat the above procedure (2) and (3).

3. RF Output Power

3.1. Test Setup



3.2. Test Limit

Type	Device	Maximum EIRP (dBm/10 MHz)	Maximum PSD (dBm/MHz)
X	End User Device	23	N/A
	Category A CBSD	30	20
	Category B CBSD	47	37

3.3. Test Procedure

1. Channel power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz.
3. VBW ≥ 3 x RBW.
4. Span = 1.5 times the OBW.
5. No. of sweep points > 2 x span / RBW.
6. Detector = RMS.
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was set to 10MHz.
9. Trace mode = trace averaging (RMS) over 100 sweeps.
10. The trace was allowed to stabilize.

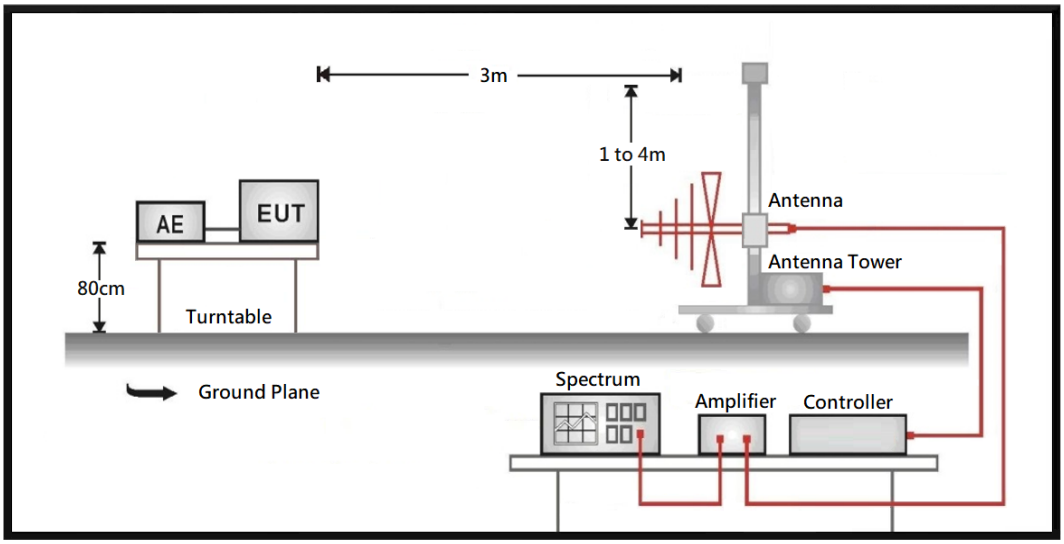
3.4. Test Result of RF Output Power

Refer as Appendix A

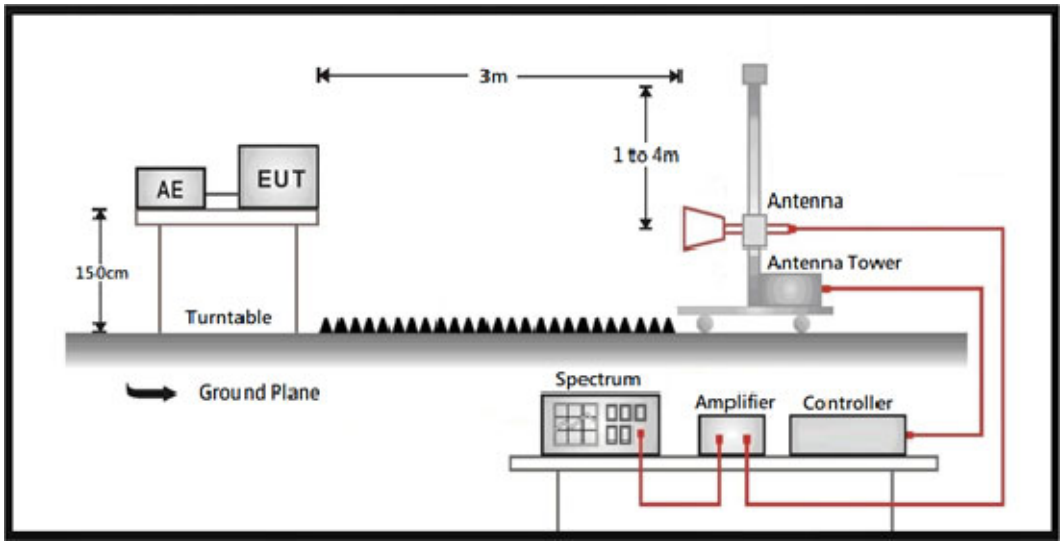
4. Spurious Emissions

4.1. Test Setup

Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



4.2. Test Procedure

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.

4.3. Test Result of Spurious Emission

Refer as Appendix B