RF MEASUREMENT REPORT

FCC ID:	XMR202210EG915ULA
Application:	Quectel Wireless Solutions Co., Ltd
Product:	LTE Module
Model No.:	EG915U-LA
Brand Name:	Quectel
FCC Rule Part(s):	Part 2, 22 (H), 24 (E)
Result:	Complies
Test Date:	2022-09-21 ~ 2022-09-28

Reviewed By: Sunny Sun

Approved By: Robin Wu

Revision History

Report No.	Version	Description	Issue Date	Note
2209RSU051-U2	Rev. 01	Initial Report	2022-10-04	Valid

Note: This application for certification is leveraging the data reuse procedures from KDB 484596 based on reference FCC ID: XMR202111EG915ULA to cover variant FCC ID: XMR202210EG915ULA.

CONTENTS

1. General Information

1.1. Applicant

Quectel Wireless Solutions Co., Ltd

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.2. Manufacturer

Quectel Wireless Solutions Co., Ltd

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	LTE Module
Model No.	EG915U-LA
Brand Name	Quectel
IMEI	865413050003127
GSM Band	GSM 850, PCS1900
E-UTRA Band	Band 2, 4, 5, 7, 66.
Operating Temperature	-35 ~ 75 °C
Power Type	3.30 ~ 4.30 V, Typical 3.80V
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification Under Test

FDD T_X Frequency Range:	GSM 850: 824 ~ 849MHz, PCS 1900: 1850 ~ 1910MHz
FDD R_X Frequency Range:	GSM 850: 869 ~ 894MHz, PCS 1900: 1930 ~ 1990MHz,
Modulation	GMSK

1.6. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	MaxPeak Gain (dBi)
LTE Band 2 / PCS 1900	1850 ~ 1910	Dipole	1.59
LTE Band 4	1710 ~ 1755		2.00
LTE Band 5 / GSM 850	824 ~ 849		2.53
LTE Band 7	2500 ~ 2570		3.00
LTE Band 66	1710 ~ 1780		2.00

Note 1: All antenna information (Antenna type and Peak Gain) is provided by the manufacturer.

Note 2: The typical antennas used to calculate the ERP (EIRP).

1.7. Test Methodology

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26:2015
- FCC CFR 47 Part 2, Part 22, Part 24, Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01: Determining ERP and EIRP

1.8. Device Capabilities

This device contains the following capabilities:

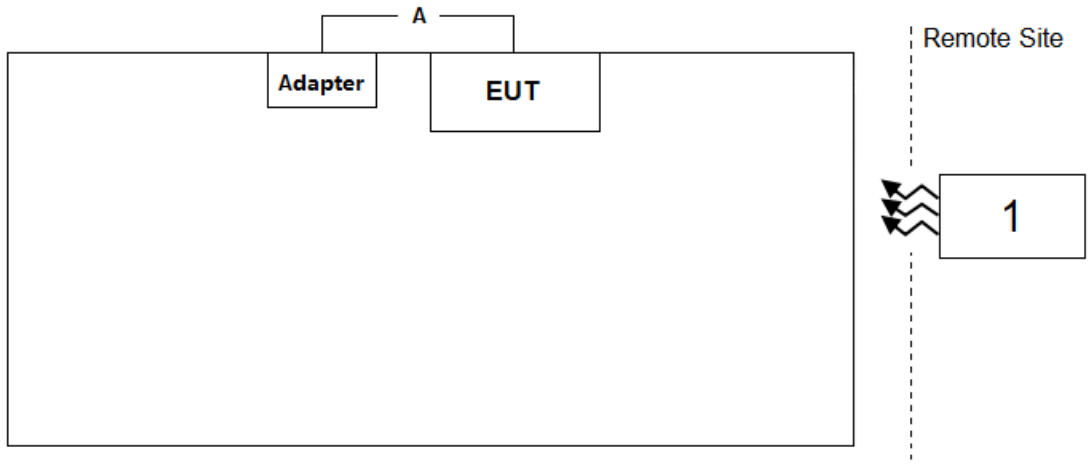
Working on GSM 850 and PCS 1900 and LTE Band 2, 4, 5, 7, 66; LTE Module.

LTE Band 66 (1710 ~ 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 ~ 1755 MHz).

Therefore, test data provided in this report covers Band 4 as well as Band 66.

2. Test Configuration

2.1. Test System Connection Diagram



No.	Cable Type	Cable Spec.	Length
A	Power Cable	Unshielding	1.5m
No.	Product	Manufacturer	Model No.
1	Wideband Radio Communication Tester	R&S	CMW 500

2.2. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Communication Tester	R&S	CMW500	MRTSUE06108	1 year	2023-04-06	WZ-SR6
Thermohygrometer	testo	608-H1	MRTSUE06362	1 year	2023-02-15	WZ-SR6
Shielding Room	HUAMING	WZ-SR6	MRTSUE06443	N/A	N/A	WZ-SR6
Radio Communication Analyzer	Anritsu	MT8821C	MRTSUE06960	1 year	2023-07-08	WZ-SR6
Signal Analyzer	Keysight	N9020B	MRTSUE07037	1 year	2023-03-29	WZ-SR6
Directional Coupler	narda	4226-10	MRTSUE06563	1 year	2022-10-28	WZ
Attenuator	MVE	MVE2213	MRTSUE11080	1 year	2023-06-09	WZ
Attenuator	MVE	MVE2213	MRTSUE11084	1 year	2023-06-09	WZ

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB

5. Test Result

5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Verdict
22.913(a)(5), 24.232(c)	Equivalent Isotropic Radiated Power	Conducted	Pass
2.1051, 22.917(a), 24.238(a)	Band Edge Emissions		Pass
2.1051, 22.917(a), 24.238(a)	Spurious Emissions		

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Channel Band Edge, Conducted Spurious Emission were presented the worst-case in the test report.

5.2. Equivalent Isotropically Radiated Power Measurement

5.2.1. Test Limit

GSM 850:

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

PCS 1900:

Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

5.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.2

5.2.3. Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

ERP or EIRP = P_{Meas} + G_T

where

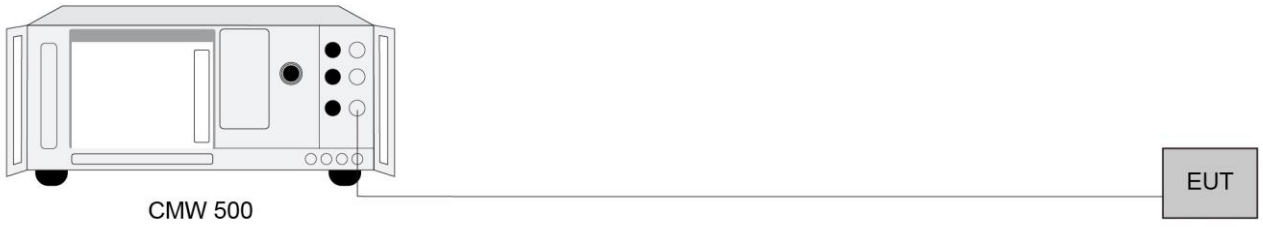
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

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)

ERP = EIRP -2.15

5.2.4. Test Setup



5.2.5. Test Result

Refer to Appendix A.1.

5.3. Band Edge Measurement

5.3.1. Test Limit

22.917(a), 24.238 (a)

For operations in the 824 ~ 849 MHz, 1850 ~ 1910 MHz, 1930 ~ 1990 MHz, 600MHz & 698 ~ 746 MHz and 1710 ~ 1755 MHz, the FCC limit is 43 + 10log10(P[$_{Watts}$]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

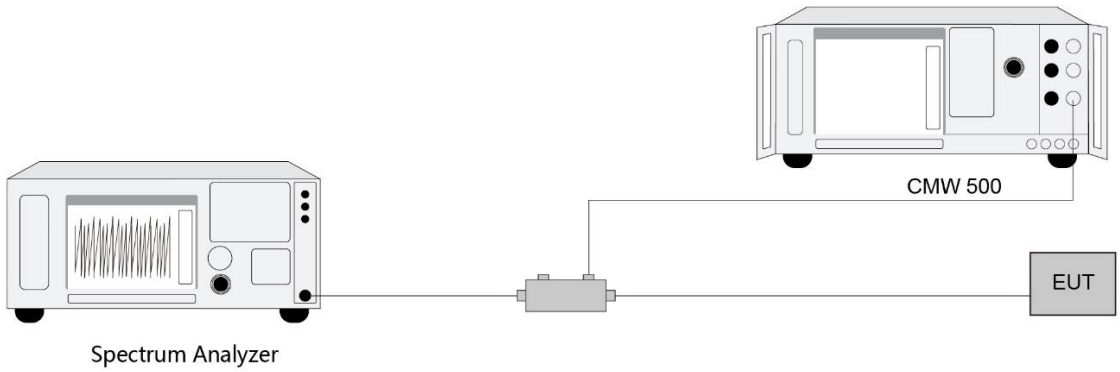
5.3.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.3.3. Test Setting

1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer’s band power functions.
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

5.3.4. Test Setup



5.3.5. Test Result

Refer to Appendix A.2.

5.4. Conducted Spurious Emissions Measurement

5.4.1. Test Limit

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. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

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.

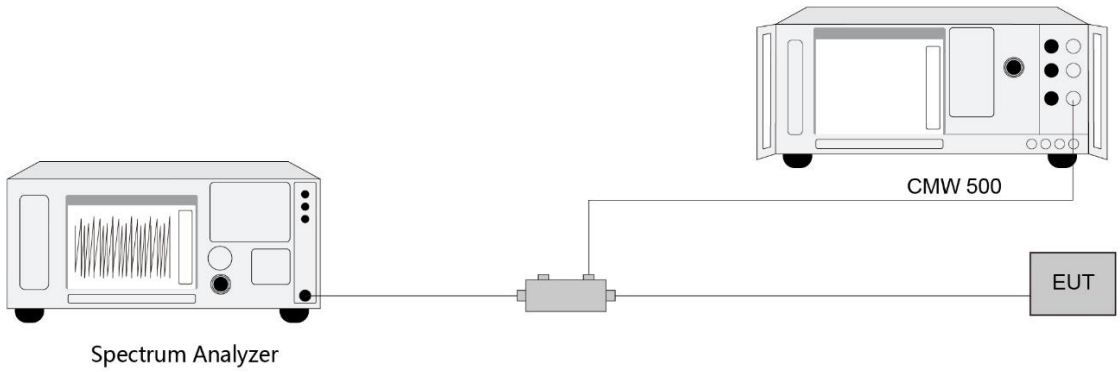
5.4.2. Test Procedure

ANSI C63.26-2015 - Section 5.7

5.4.3. Test Setting

1. Set the analyzer frequency to low, mid, high channel.
2. RBW = 1MHz
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power.
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

5.4.4. Test Setup



5.4.5. Test Result

Refer to Appendix A.3.

Appendix A - Test Result

A.1 Equivalent Isotropically Radited Power Test Result

Test Site	WZ-SR6	Test Engineer	Caitlin Chen
Test Date	2022-09-23	Test Band	GSM 850

Mode	Slot	Conducted Power (dBm)			Antenna Gain (dBi)	ERP (dBm)		
		GSM 850 Channel				GSM 850 Channel		
		128	189	251		128	189	251
GSM Voice	-	32.65	32.67	32.46	2.53	33.03	33.05	32.84
GPRS	1	32.65	32.67	32.48	2.53	33.03	33.05	32.86
	2	30.61	30.71	30.56	2.53	30.99	31.09	30.94
	3	28.52	28.48	28.38	2.53	28.90	28.86	28.76
	4	26.133	26.30	26.16	2.53	26.51	26.68	26.54
Limit	≤ 38.45dBm							

Note: The ERP (dBm) = Output Power (dBm) + Antenna Gain (dBi) - 2.15.

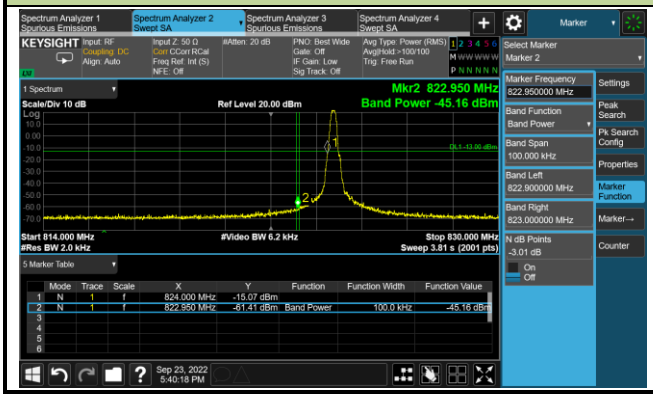
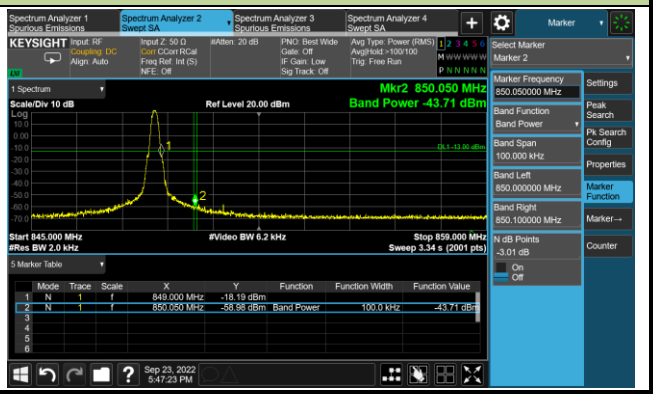
Test Site	WZ-SR6	Test Engineer	Caitlin Chen
Test Date	2022-09-23	Test Band	PCS 1900

Mode	Slot	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)		
		PCS 1900 Channel				PCS 1900 Channel		
		512	661	810		512	661	810
GSM Voice	-	29.07	29.10	28.88	1.59	30.66	30.69	30.47
GPRS	1	29.13	29.10	28.86	1.59	30.72	30.69	30.45
	2	27.19	27.34	27.25	1.59	28.78	28.93	28.84
	3	24.98	25.24	25.08	1.59	26.57	26.83	26.67
	4	22.95	23.17	22.99	1.59	24.54	24.76	24.58
Limit	≤ 33.01dBm							

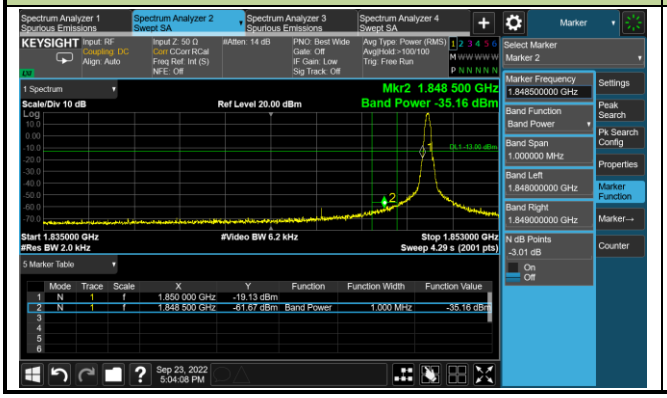
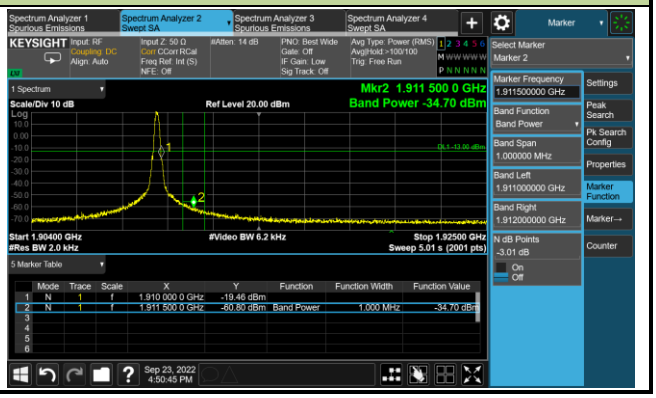
Note: The ERP (dBm) = Output Power (dBm) + Antenna Gain (dBi)

A.2 Band Edge Test Result

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2022-09-23	Test Band	GSM 850

GSM 850 - GPRS	
Lower Band Edge	Upper Band Edge
	

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2022-09-23	Test Band	PCS 1900

PCS 1900 - GPRS	
Lower Band Edge	Upper Band Edge
	

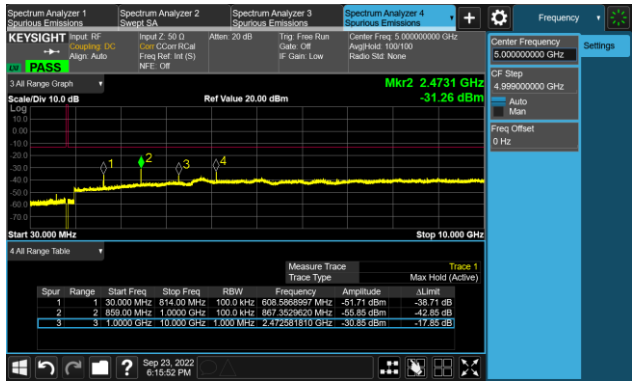
A.3 Conducted Spurious Emissions Test Result

Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2022-09-23	Test Band	GSM 850

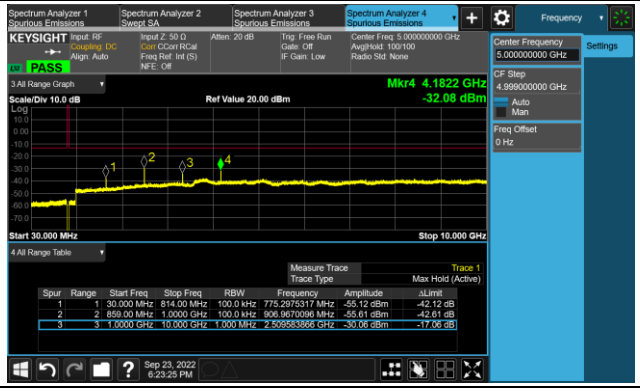
Mode	Frequency (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
GPRS 850	824.2	30 ~ 10000	-30.85	≤ -13.00	Pass
	836.4	30 ~ 10000	-30.06	≤ -13.00	Pass
	848.8	30 ~ 10000	-30.46	≤ -13.00	Pass

GSM 850 - GPRS

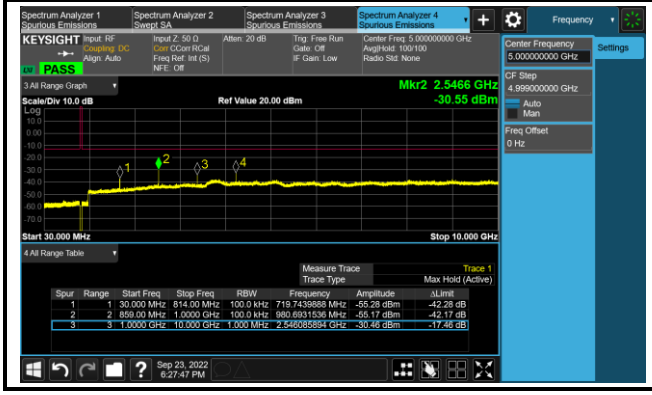
Channel 128 (824.2MHz)



Channel 189 (836.4MHz)



Channel 251 (848.8MHz)

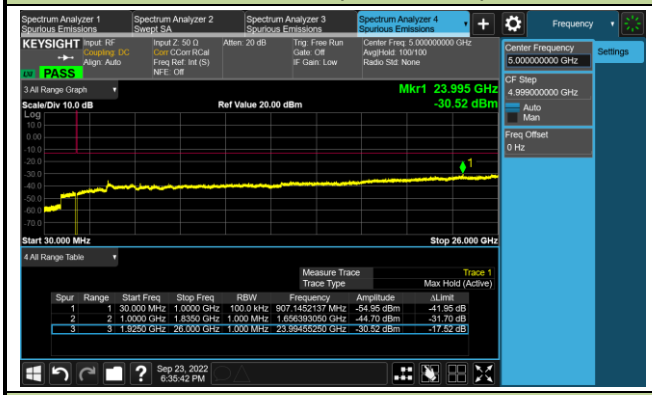


Test Site	WZ-SR6	Test Engineer	Larry Yan
Test Date	2022-09-23	Test Band	PCS 1900

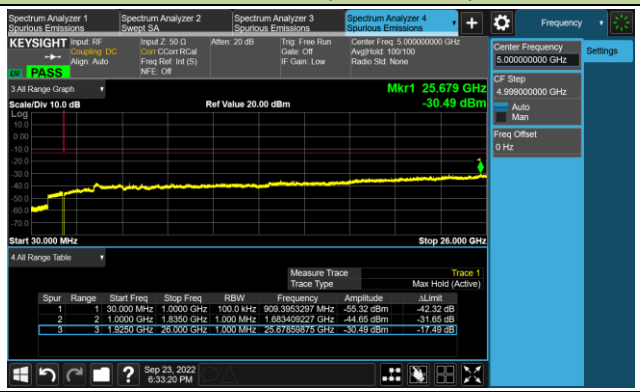
Mode	Frequency (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
GPRS 1900	824.2	30 ~ 20000	-30.52	≤ -13.00	Pass
	836.4	30 ~ 20000	-30.49	≤ -13.00	Pass
	848.8	30 ~ 20000	-30.32	≤ -13.00	Pass

PCS 1900 - GPRS

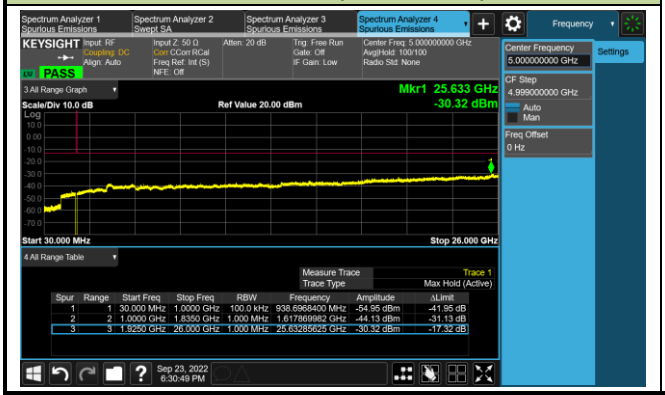
Channel 512 (1850.2MHz)



Channel 661 (1880.0MHz)



Channel 810 (1909.8MHz)



Appendix B - Test Setup Photograph

Refer to “2209RSU051-UT” file.

Appendix C - EUT Photograph

Refer to “2209RSU051-UE” file.

The End