

Test Report

HELEM2111000488-2



INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 24

Equipment Under Test: Base station 4G with 915 MHz SRD

Model: Base Station 4G

Trademark: 

Manufacturer: Quanturi Oy
Lars Sonckin kaari 10
FI-02600 Espoo
FINLAND

Customer: Quanturi Oy
Lars Sonckin kaari 10
FI-02600 Espoo
FINLAND

FCC Rule Part: CFR 47 Part 24
KDB: 971168 D01 Power Meas License Digital Systems v03r01
Measurement Guidance for Certification of Licensed Digital Transmitters (April 9, 2018)

- *partial testing, see test suite for details*

Date: 1 December 2021

Issued by: 
Rauno Repo
Senior EMC Specialist

Date: 1 December 2021

Checked by: 
Henri Mäki
Testing Engineer

TABLE OF CONTENTS

TABLE OF CONTENTS	2
GENERAL REMARKS	3
Disclaimer	3
RELEASE HISTORY	4
PRODUCT DESCRIPTION	5
Equipment Under Test	5
General Description	5
Ratings and Declarations	5
Power Supply.....	5
Mechanical Size of the EUT	5
SUMMARY OF TESTING	6
EUT Test Conditions during Testing	6
Test Facility.....	6
TEST RESULTS	7
Radiated Spurious Emissions.....	7
TEST EQUIPMENT	10

GENERAL REMARKS**Disclaimer**

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>

Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

RELEASE HISTORY

Version	Changes	Issued
1.0	Initial release	1 December 2021

PRODUCT DESCRIPTION

Equipment Under Test

Type:	Base station 4G with 915 MHz SRD
Model:	Base Station 4G
Trademark:	
Serial no:	-
Software version:	-
Hardware version:	-
Cellular radio module:	QUECTEL EG21-G
FCC ID:	XMR201906EG21G
IC:	10224A-201906EG21G
Cellular antenna:	Teltonika 003R-00296 +5 dBi
SRD radio module:	ON Semiconductor AX8052F143-D
FCC ID:	-
IC:	-
SRD antenna:	Siretta Delta 22B (installed inside the enclosure) +3dBi

General Description

Base Station receives data from the probes or/and then forward it to the cloud through the 4G connection and then reply to the probes.

This test report contains the radiated spurious emissions results for cellular radio.

Classification

Fixed device	☒
Mobile Device (Human body distance > 20cm)	☐
Portable Device (Human body distance < 20cm)	☐

Modifications Incorporated in the EUT

No modifications.

Ratings and Declarations

Operating Frequency Range (OFR):	1850-1910 MHz (uplink), 1930-1990 MHz (downlink)
Channel separation:	100 kHz
Channel bandwidth:	1.4, 3, 5, 10, 15, 20 MHz (1.4 MHz used during testing)
Transmission technique:	OFDMA
Modulation:	QPSK, 16-QAM

Power Supply

AC/DC adapter:	TDCpower model: SA9A-120-2100W, input: 100-120 VAC/ 60 Hz, output 12.0V / 2.1A (120 VAC / 60 Hz used during testing)
----------------	--

Mechanical Size of the EUT

Height: 330 mm	Width: 60 mm	Length: 155 mm
----------------	--------------	----------------

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§24.235	Frequency Stability	N/T
§24.232	RF Output Power	N/T
§24.238	Occupied Bandwidth	N/T
§24.238	Radiated Spurious Emissions	PASS

The decision rule applied for the tests results stated in this test report is according to the requirements of section 1.3 of ANSI C63.26-2015.

EUT Test Conditions during Testing

The EUT was in continuous transmit mode during all the tests. LTE communication link was established with a communication analyzer provided by the test laboratory.



Figure 1: Test setup block diagram

Table 1: Test frequencies and settings

Band	Uplink Channel	Uplink Frequency [MHz]	Downlink frequency [MHz]
LTE Band 2	18900	1880.00	1960.00

Test Facility

Testing Laboratory / address: FCC designation number: FI0002 ISED CAB identifier: T004	SGS Fimko Ltd Takomotie 8 FI-00380, HELSINKI FINLAND
Test Site:	☐ K10LAB, ISED Canada registration number: 8708A-1 ☒ K5LAB, ISED Canada registration number: 8708A-2 ☐ T10LAB

TEST RESULTS

Radiated Spurious Emissions

Standard: ANSI C63.26-2015
Tested by: RRE, PKA
Date: 23-24 November 2021
Temperature: 23 ± 3 °C
Humidity: 20 - 75 % RH
Measurement uncertainty: ± 4.51 dB, level of confidence 95 % (k = 2)

FCC Rule: §24.238

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.

Test were performed with the intended position.

The limit with a transmitter output power of 1 W is -13 dBm.

Test results

Fewer than six final measurements were made due to margin being more than 20 dB.

Table 2: Test results for Radiated Spurious Emissions

Frequency (MHz)	QuasiPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
60.264000	-54.11	-13.00	41.11	15x1000.0	120.000	100.0	V	284.0	-85.7
123.362500	-50.61	-13.00	37.61	15x1000.0	120.000	100.0	V	96.0	-87.4
5639.966667	-48.80	-13.00	35.80	15x1000.0	1000.000	107.0	H	19.0	-91.4
7519.816667	-45.19	-13.00	32.19	15x1000.0	1000.000	139.0	H	0.0	-88.9
9400.116667	-48.04	-13.00	35.04	15x1000.0	1000.000	139.0	V	28.0	-85.5

The correction factor in the final result table contains the sum of the transducers (antenna + amplifier + cables).

Radiated Spurious Emissions

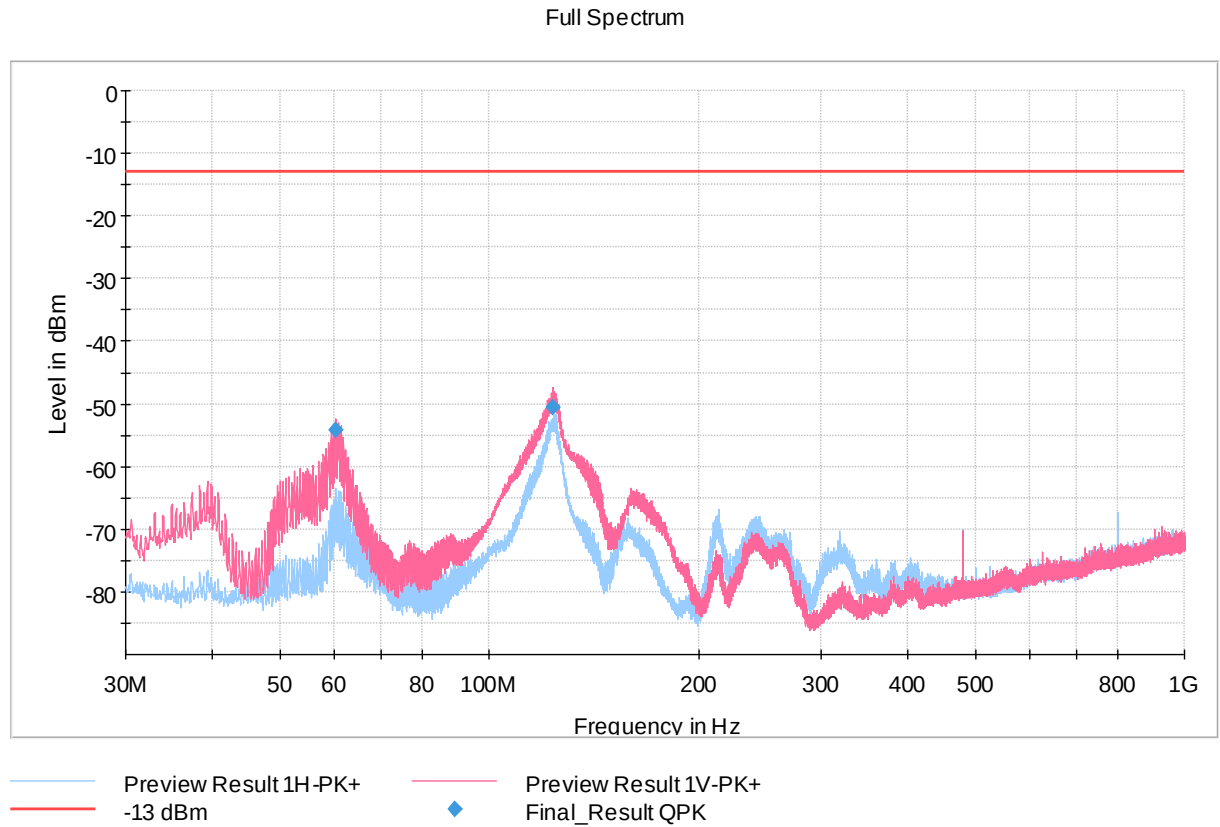


Figure 2: Radiated Spurious Emissions (30 MHz – 1 GHz).

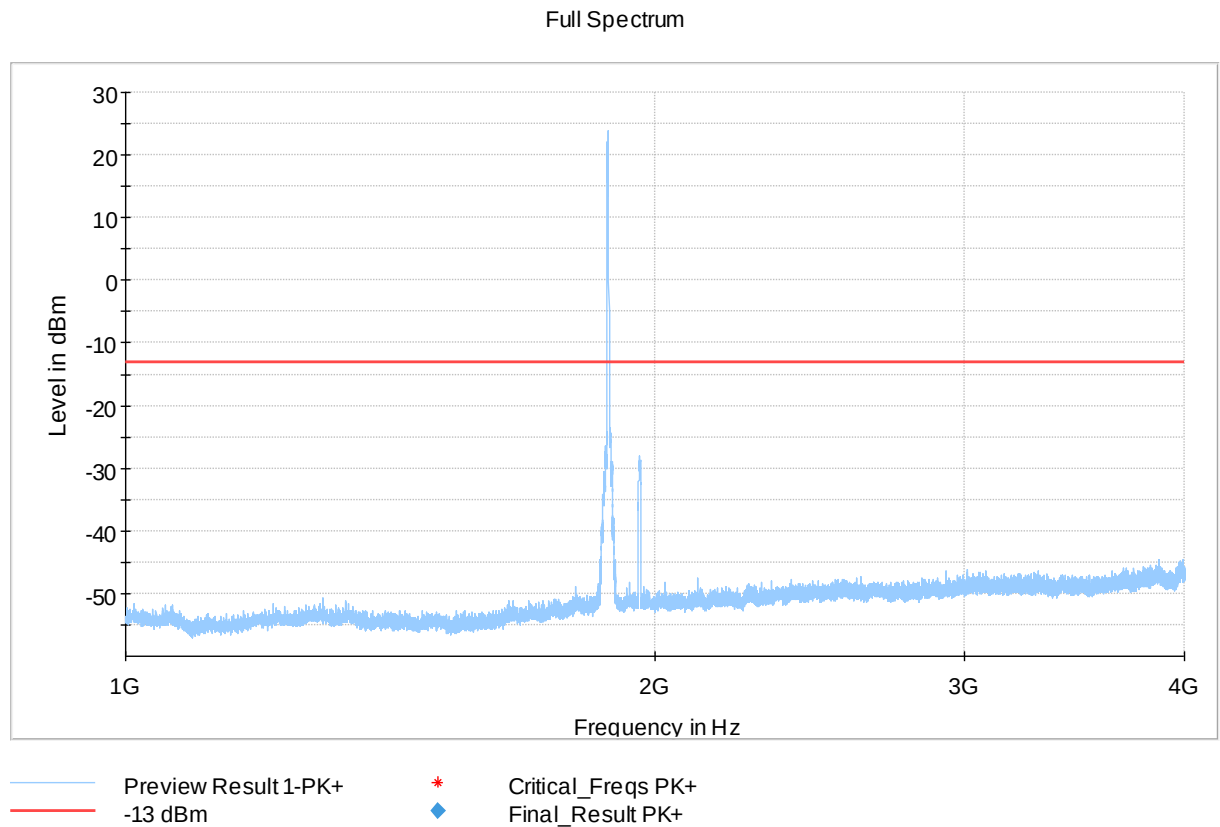


Figure 3: Radiated Spurious Emissions (1 – 4 GHz). High peaks are uplink and downlink communication.

Radiated Spurious Emissions

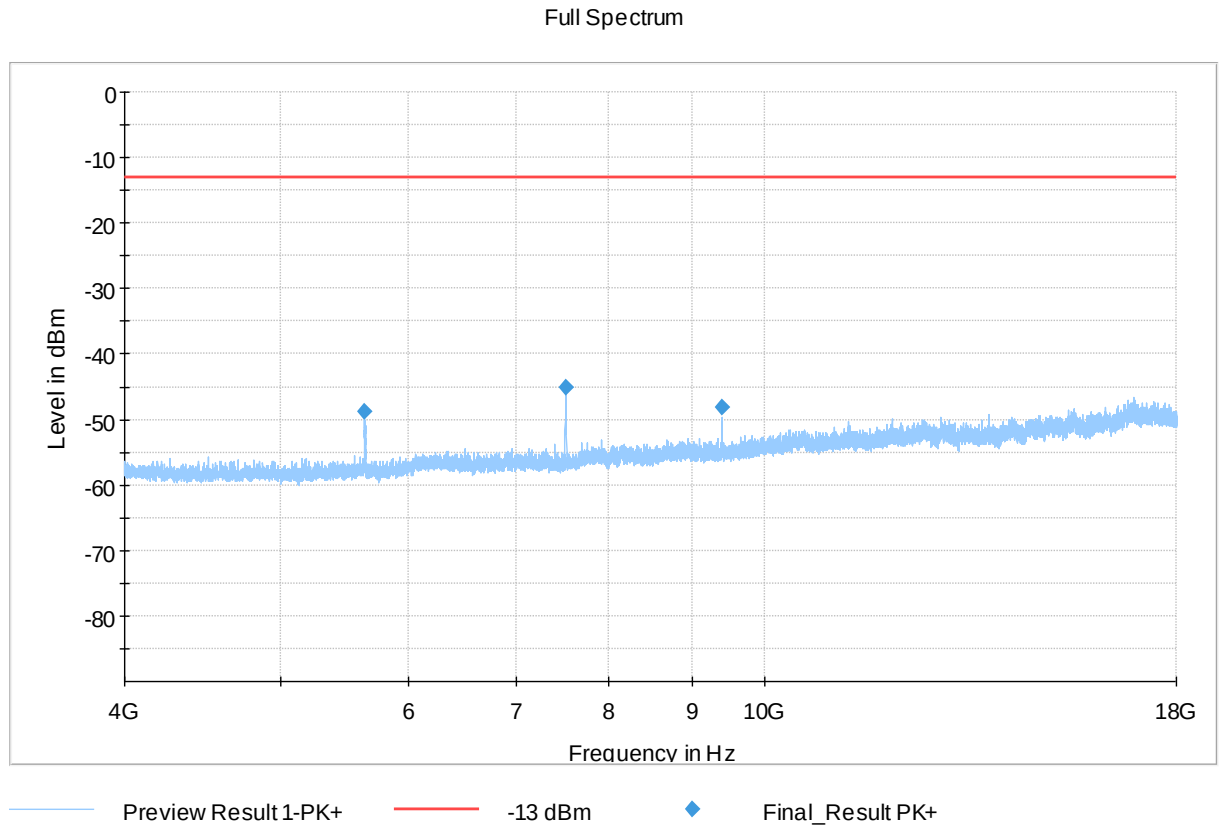


Figure 4: Radiated Spurious Emissions (4 – 18 GHz).

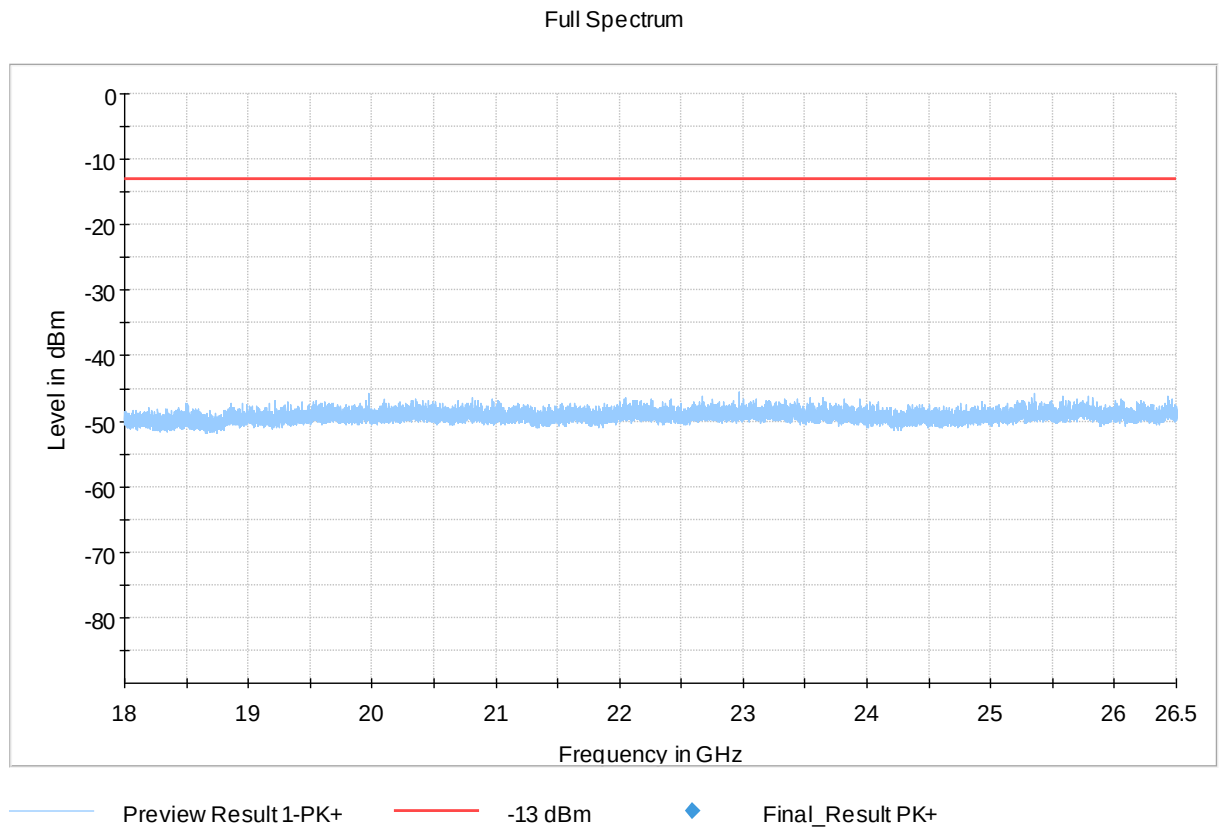


Figure 5: Radiated Spurious Emissions (18 – 26.5 GHz).

TEST EQUIPMENT

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
ANTENNA	EMCO	3117	inv. 7293	2020-03-11	2022-03-11
ANTENNA	SCHWARZBECK	VULB 9168	inv. 8911	2020-11-04	2022-11-04
ANTENNA	ETS LINDGREN	3160-10, emi 26.5-40GHz	inv:9151	2021-08-03	2022-08-03
ANTENNA MAST	MATURO	TAM 4.0E	inv. 10181	NCR	NCR
ATTENUATOR	PASTERNAK	PE 7004-4 (4dB)	inv. 10126	2021-03-26	2022-03-26
COMMUNICATION ANALYZER	ANRITSU	MT8815B	inv. 8026	NCR	NCR
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv. 10679	2021-06-22	2022-06-22
FILTER	WAINWRIGHT	WHKX4.0/18G-10SS	inv. 10403	2021-01-29	2023-01-29
FILTER	WAINWRIGHT	WRCD1880.4-0.3/40-8SS	inv. 10900	2021-01-29	2023-01-29
ATTENUATOR	INMET	10 dB, DC-40 GHz	inv:10347	2021-04-20	2023-04-20
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv. 10183	NCR	NCR
RF PREAMPLIFIER	CIAO	CA118-3123	inv. 10278	2021-10-05	2022-10-05
RF PREAMPLIFIER	CIAO	CA1840-5019	inv:10593	2021-10-05	2022-10-05
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	NCR	NCR
TURNTABLE	MATURO	DS430 UPGRADED	inv. 10182	NCR	NCR
ANTENNA	A.H. SYSTEMS	SAS-200/518	inv:7873	NCR	NCR
SPECTRUM ANALYZER	AGILENT	E7405A, monitoring	inv:9746	2020-02-17	2022-02-17

NCR = No Calibration Required

END OF REPORT