

FCC and ISED Test Report

SECO S.p.A.

Wireless Network Device, Model: SYS-C60-LMC1

In accordance with FCC 47 CFR Part 27, FCC 47 CFR Part 2, ISED RSS-139, ISED RSS-199 and ISED RSS-GEN (4G - LTE)

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Add value.
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FCC ID: 2AZUJ-SYS-C60-LMC1 IC: 27093-SYSC60LMC1

COMMERCIAL-IN-CONFIDENCE

Document 75951487-04 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Steve Marshall	Senior Engineer	Authorised Signatory	10 June 2021

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 27, FCC 47 CFR Part 2, ISED RSS-139, ISED RSS-199 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	10 June 2021	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED Accreditation
12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 27: 2019, FCC 47 CFR Part 2: 2019, ISED RSS-139: Issue 3 (2015-07), ISED RSS-199 Issue 3 (2016-12) and ISED RSS-GEN: Issue 5 (2018-04) + A1 (2019-03) for the tests detailed in section 1.3.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	09-June-2021

Table 1

1.2 Introduction

Applicant	La Marzocco
Manufacturer	SECO S.p.A.
Model Number(s)	SYS-C60-LMC1
Serial Number(s)	210151871
Hardware Version(s)	SYS-C60-LMC1
Software Version(s)	HEDGEHOG 1.0
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 27: 2019 FCC 47 CFR Part 2: 2019 ISED RSS-139 Issue 3 (2015-07) ISED RSS-199 Issue 3 (2016-12) ISED RSS-GEN Issue 5 (2018-04) + A1 (2019-03)
Order Number	200057729
Date	24-February-2021
Date of Receipt of EUT	03-March-2021
Start of Test	07-March-2021
Finish of Test	07-March-2021
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.26: 2015 KDB 996369 D04 Module Integration Guide v02



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 27, FCC 47 CFR Part 2, ISED RSS-139, ISED RSS-199 and ISED-RSS-GEN is shown below.

Section	Specification Clause					Test Description	Result	Comments/Base Standard
	Part 27	Part 2	RSS-139	RSS-199	RSS-GEN			
Configuration and Mode: LTE FDD Band 4								
2.1	27.53 (h)	2.1053	6.6	-	6.13	Radiated Spurious Emissions	Pass	Measurements as per KDB 996369 D04, clause 3.4 only.
2.2	27.50	-	6.5	-	6.12	ERP/EIRP Verification	Pass	Measurements as per KDB 996369 D04, clause 3.4 only.
Configuration and Mode: LTE FDD Band 7								
2.1	27.53 (m)	2.1053	-	4.5	6.13	Radiated Spurious Emissions	Pass	Measurements as per KDB 996369 D04, clause 3.4 only.
2.2	27.50	-	-	4.4	6.12	ERP/EIRP Verification	Pass	Measurements as per KDB 996369 D04, clause 3.4 only.

Table 2



1.4 Application Form

Equipment Description

Technical Description: <i>(Please provide a brief description of the intended use of the equipment including the technologies the product supports)</i>	Wireless Network device equipped with one Dual-Band Module–Wi-Fi, Bluetooth, and Bluetooth Low Energy (LE) and one LTE, WCDMA, GSM module.
Manufacturer:	SECO S.p.A. Via Achille Grandi, 20 - 52100 Arezzo, ITALY
Model:	SYS-C60-LMC1
Part Number:	
Hardware Version:	SYS-C60-LMC1
Software Version:	HEDGEHOG 1.0
FCC ID of the product under test – see guidance here	2AZUJ-SYS-C60-LMC1
IC ID of the product under test – see guidance here	27093-SYSC60LMC1

Table 3

Intentional Radiators

Technology	BT	WiFi	LTE FDD Band 12	GSM 850 /WCDMA FDD V / LTE FDD Band 5	LTE FDD Band 4	PCS1900 / WCDMA FDD II / LTE FDD Band 2	LTE FDD Band 7
Frequency Range (MHz to MHz)	2400-2483.5	2400-2483.5 5150-5250, 5250-5350, 5470-5725, 5725-5850	699-716	824-849	1710-1755	1850-1910	2500-2570
Conducted Declared Output Power (dBm)	11,7	17.3/18	25	35/25	25	32/25	25
Antenna Gain (dBi)	2.7	1.6	1.3	2.8	0.3	2.9	0.3
Supported Bandwidth(s) (MHz) (e.g 1 MHz, 20 MHz, 40 MHz)	1	20, 40, 80	1.4, 3, 5, 10	0.2	1.4, 3, 5, 10, 15, 20	0.2, 1.4, 3, 5, 10, 15, 20	5, 10, 15, 20
Modulation Scheme(s) (e.g GFSK, QPSK etc)	GFSK, $\pi/4$ DQPSK, 8DPSK	DSSS/ OFDM	QPSK/ QAM	GMSK/ QPSK/ QAM	QPSK/ QAM	GMSK/ QPSK/ QAM	QPSK/ QAM
ITU Emission Designator (see guidance here)	1M00GD	20M0GD	1M40GD 3M00GD 5M00GD 10M0GD	200KGD 1M40GD 3M00GD 5M00GD 10M0GD	1M40GD 3M00GD 5M00GD 10M0GD 15M0GD 20M0GD	200KGD 1M40GD 3M00GD 5M00GD 10M0GD 15M0GD 20M0GD	5M00GD 10M0GD 15M0GD 20M0GD
Bottom Frequency (MHz)	2402	5180	699.7	824.2	1710.7	1850.2	2502.5
Middle Frequency (MHz)	2440	5500	707.5	836.6	1732.6	1950.0	2535.0
Top Frequency (MHz)	2480	5825	715.3	848.8	1754.3	1909.8	2567.5

Table 4



Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	1 GHz
Lowest frequency generated or used in the device or on which the device operates or tunes	32.768 kHz
Class A Digital Device (Use in commercial, industrial or business environment) <input type="checkbox"/>	
Class B Digital Device (Use in residential environment only) <input checked="" type="checkbox"/>	

Table 5

DC Power Source

Nominal voltage:	24	V
Extreme upper voltage:	25.2	V
Extreme lower voltage:	22.8	V
Max current:	0.5	A

Table 6

Charging

Can the EUT transmit whilst being charged	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	---

Table 7

Temperature

Minimum temperature:	5	°C
Maximum temperature:	32	°C

Table 8

Antenna Characteristics

Antenna connector <input checked="" type="checkbox"/> Type: SMA MALE RP	State impedance	50	Ohm
Temporary antenna connector <input type="checkbox"/>	State impedance		Ohm
Integral antenna <input type="checkbox"/> Type:	Gain		dBi
External antenna <input checked="" type="checkbox"/> Type: Dipole	Gain	2.9 dBi (@1900MHz)	dBi
For external antenna only: Standard Antenna Jack <input type="checkbox"/> If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed <input checked="" type="checkbox"/> Non-standard Antenna Jack <input checked="" type="checkbox"/>			

Table 9

Ancillaries (if applicable)

Manufacturer:		Part Number:	
Model:		Country of Origin:	

Table 10

I hereby declare that the information supplied is correct and complete.

Name: Tommaso Berna
 Position held: Testing Manager
 Date: 30/03/2021



1.5 Product Information

1.5.1 Technical Description

1.6 Wireless Network device equipped with one Dual-Band Module–Wi-Fi, Bluetooth, and Bluetooth Low Energy (LE) and one LTE, WCDMA, GSM module.

1.7 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.8 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: SYS-C60-LMC1, Serial Number: 210151871			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 11

1.9 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: LTE FDD Band 4		
Radiated Spurious Emissions	Graeme Lawler	UKAS
ERP/EIRP Verification	Graeme Lawler	UKAS
Configuration and Mode: LTE FDD Band 7		
Radiated Spurious Emissions	Graeme Lawler	UKAS
ERP/EIRP Verification	Graeme Lawler	UKAS

Table 12

Office Address:

TÜV SÜD
 Octagon House
 Concorde Way
 Fareham
 Hampshire
 PO15 5RL
 United Kingdom



2 Test Details

2.1 Radiated Spurious Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.53 (h) (m)
FCC 47 CFR Part 2, Clause 2.1053
ISED RSS-139, Clause 6.6
ISED RSS-199, Clause 4.5
ISED RSS-GEN, Clause 6.13

2.1.2 Equipment Under Test and Modification State

SYS-C60-LMC1, S/N: 210151871 - Modification State 0

2.1.3 Date of Test

07-March-2021

2.1.4 Test Method

A preliminary profile of the Radiated Spurious Emissions was obtained up to the 5th harmonic, as required by KDB 996369 D04, clause 3.2, by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber.

Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Testing was performed in accordance with ANSI C63.26, Clause 5.5.

Prescans and final measurements were performed using the direct field strength method.

2.1.5 Example Test Setup Diagram

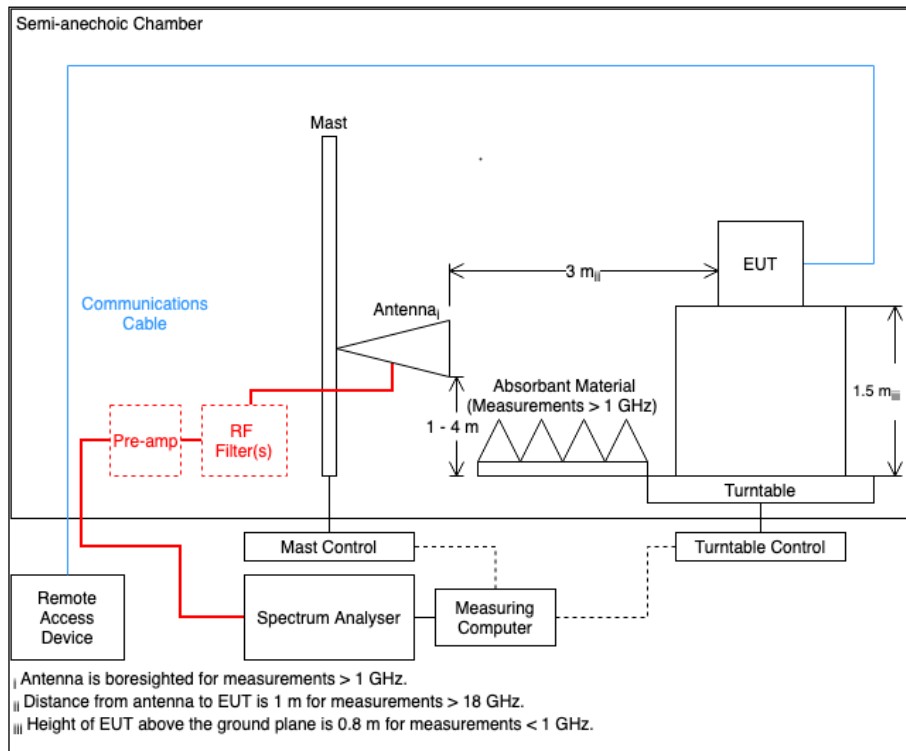


Figure 1

2.1.6 Environmental Conditions

Ambient Temperature 18.2 °C
Relative Humidity 23.9 %



2.1.7 Test Results

LTE FDD Band 4

Frequency (MHz)	Level (dBm)	Angle	Height	Polarisation	Orientation
*					

Table 13 – 30 MHz to 11 GHz

*No emissions were detected within 10 dB of the limit.

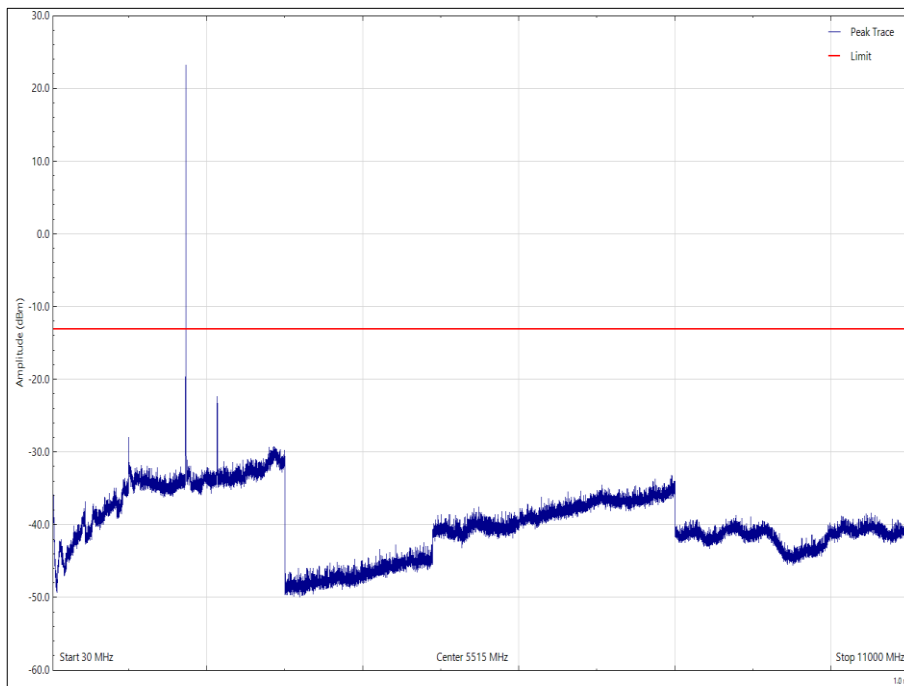


Figure 2 - 30 MHz to 11 GHz – Vertical

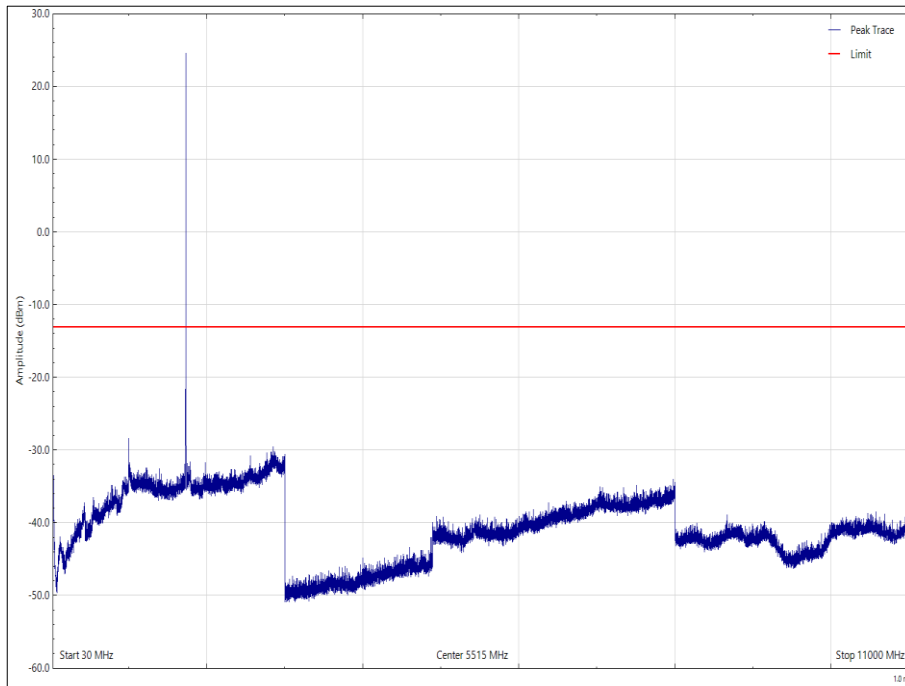


Figure 3 - 30 MHz to 11 GHz - Horizontal



LTE FDD Band 7

Frequency (MHz)	Level (dBm)	Angle	Height	Polarisation	Orientation
*					

Table 14 – 30 MHz to 15 GHz

*No emissions were detected within 10 dB of the limit.

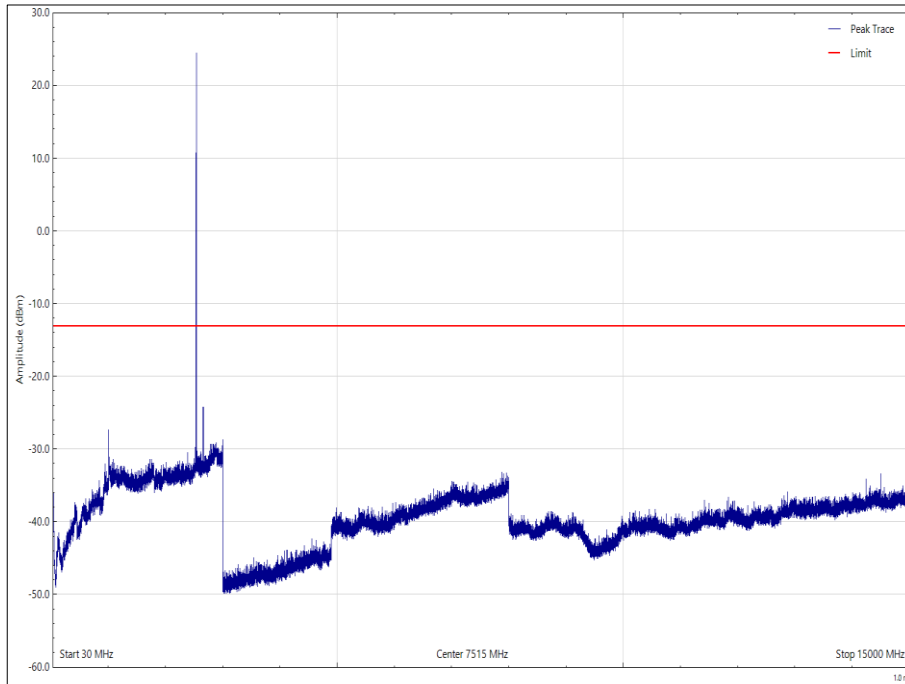


Figure 4 - 30 MHz to 15 GHz – Vertical

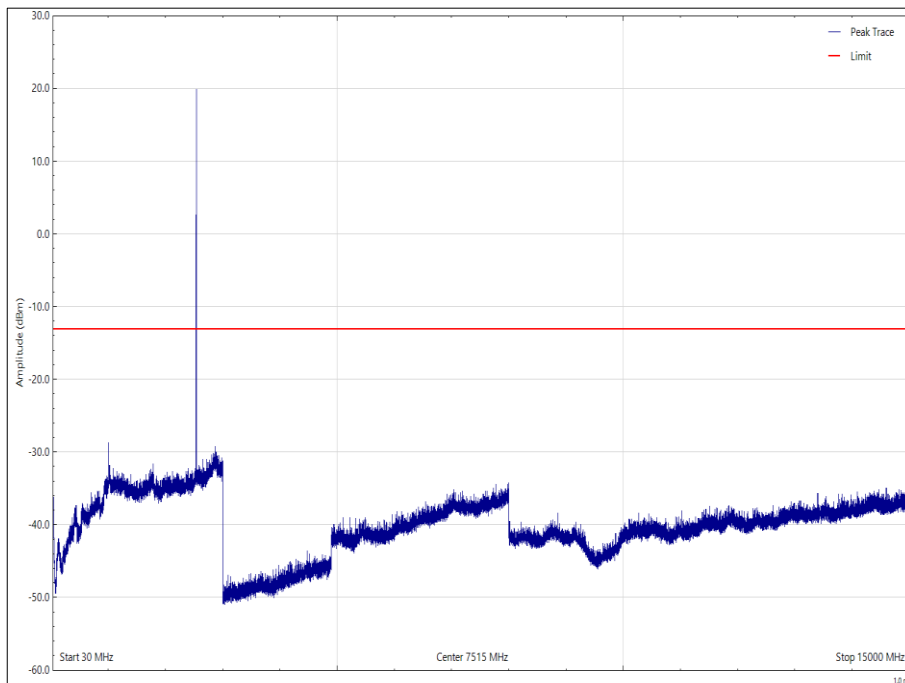


Figure 5 - 30 MHz to 15 GHz - Horizontal

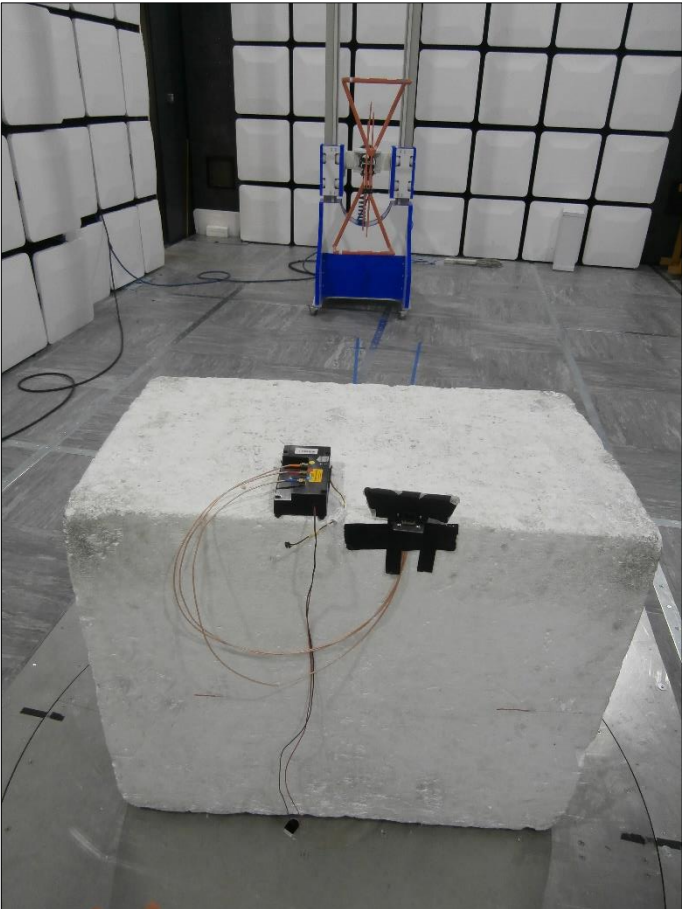


Figure 6 - Test Setup - 30 MHz to 1 GHz



Figure 7 - Test Setup - 1 GHz to 15 GHz



FCC 47 CFR Part 27, Limit Clause 27.53 (m)

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6).

In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz.

FCC CFR Part 27, Limit Clause 27.53 (h)

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.

ISED RSS-139, Limit Clause 6.6

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

ISED RSS-199, Limit Clause 4.5

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment, and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% or 2% of the occupied bandwidth, as applicable.

Equipment shall comply with the following unwanted emission limits:

- a) for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$
- b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
 - $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
 - $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
 - $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than $43 + 10 \log_{10} p$ on all frequencies between 2490.5 MHz and 2496 MHz, and $55 + 10 \log_{10} p$ at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.



2.1.8 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Power Supply	Hewlett Packard	6104A	1948	-	O/P Mon
Comb Generator	Schaffner	RSG1000	3034	-	TU
True RMS Multimeter	Fluke	179	4006	12	26-Mar-2021
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	10-Dec-2021
High Pass filter	Wainwright	WHKX12-1290-1500-18000-80SS	4961	12	25-Mar-2021
EmX Emissions Software	TUV SUD	V2.1.1	5125	-	Software
Test Receiver	Rohde & Schwarz	ESW44	5379	12	15-Dec-2021
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	18-Mar-2021
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	24-Mar-2021
3 GHz High pass Filter	Wainwright	WHKX12-2580-3000-18000-80SS	5548	12	05-May-2021
DRG Horn Antenna (7.5-18GHz)	Schwarzbeck	HWRD750	5610	12	22-Sep-2021
Broadband Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA 9120 B	5611	12	22-Sep-2021
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast TAM 4.0-P	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023

Table 15

TU - Traceability Unscheduled



2.2 ERP/EIRP Verification

2.2.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.50 (d)(4), (h)(2),
ISED RSS-139, Clause 6.5
ISED RSS-199, Clause 4.4

2.2.2 Equipment Under Test and Modification State

SYS-C60-LMC1, S/N: 210151871 - Modification State 0

2.2.3 Date of Test

07-March-2021

2.2.4 Test Method

The following test was performed to check the fundamental of the integrated module was not adversely affected when integrated into the host device as required by KDB 996369 D04, clause 3.4.

This test was performed in accordance with ANSI C63.26 clause 5.2.4.3.1 and 5.2.7.

2.2.5 Environmental Conditions

Ambient Temperature 18.2 °C
Relative Humidity 23.9 %

2.2.6 Test Results

LTE FDD Band 4

The worst-case mode was identified as:

10 MHz Bandwidth, QPSK, 1 RB, Mid Offset, Channel 20175

Frequency (MHz)	Result	Limit	Unit
1732.50	21.26	30.00	dBm

Table 16 - EIRP Verification Results

LTE FDD Band 7

The worst-case mode was identified as:

10 MHz Bandwidth, QPSK, 1 RB, Mid Offset, Channel 21100

Frequency (MHz)	Result	Limit	Unit
2535.00	21.30	33.00	dBm

Table 17 - EIRP Verification Results



2.2.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Power Supply	Hewlett Packard	6104A	1948	-	O/P Mon
Comb Generator	Schaffner	RSG1000	3034	-	TU
True RMS Multimeter	Fluke	179	4006	12	26-Mar-2021
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	10-Dec-2021
EmX Emissions Software	TUV SUD	V2.1.1	5125	-	Software
Test Receiver	Rohde & Schwarz	ESW44	5379	12	15-Dec-2021
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	18-Mar-2021
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	24-Mar-2021
Broadband Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA 9120 B	5611	12	22-Sep-2021
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast TAM 4.0-P	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023

Table 18

TU - Traceability Unscheduled



3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
ERP/EIRP Verification	± 3.2 dB

Table 19

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.