FCC and ISED Test Report

SECO S.p.A.
Wireless Network Device, Model: SYS-C60-LMC1

In accordance with FCC 47 CFR Parts 15, 22, 24 and 27 and ISED RSS-130, RSS-132, RSS-133, RSS-139, RSS-247 and RSS-GEN (Simultaneous Transmission)

Add value.
Inspire trust.

Prepared for: La Marzocco
Via La Torre 14/H
Loc. La Torre
50038
Scarperia (FI)
Italy

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

COMMERCIAL-IN-CONFIDENCE

Document 75951487-01 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 Parts 15, 22, 24 and 27 and ISED RSS-130, RSS-132, RSS-133, RSS-139, RSS-247 and 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 with FCC Parts 15 (2019), 22 (2019), 24 (2019), 27 (2019) and ISED RSS-130 Issue 2 (2019-02), RSS-132 Issue 3 (2013-01), RSS-133 Issue 6 + A1 (2018-01), RSS-139 Issue 3 (2015-07), RSS-247 Issue 2 (2017-02) and RSS-GEN Issue 5 (2018-04) + A1 (2019-03). for the tests detailed in section 1.3.

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TÜV SÜD
is a trading name of TUV SUD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TUV SUD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuvsud.com/en

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

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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 15: 2019 FCC 47 CFR Part 22: 2019 FCC 47 CFR Part 24: 2019 FCC 47 CFR Part 27: 2019 ISED RSS-130 Issue 2 (2019-02) ISED RSS-132 Issue 3 (2013-01) ISED RSS-133 Issue 6 + A1 (2018-01) ISED RSS-139 Issue 3 (2015-07) ISED RSS-247 Issue 2 (2017-02) ISED RSS-GEN Issue 5 (2018-04) + A1 (2019-03)
Order Number Date	200057729 24-February-2021
Date of Receipt of EUT	03-March-2021
Start of Test	10-March-2021
Finish of Test	14-March-2021
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.26: 2015 ANSI C63.10: 2013 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 Parts 15, 22, 24 and 27 and ISED RSS-130, RSS-139, RSS-247 and RSS-GEN is shown below.

Section	Specification Clause										Test Description	Result	Comments/Base Standard
	Part 15	Part 22	Part 24	Part 27	RSS-130	RSS-132	RSS-133	RSS-139	RSS-247	RSS-GEN			
Configuration and Mode: GSM 850 and 2.4 GHz WLAN													
2.1	15.247 (d) and 15.209	22.917 (a)	-	-	-	5.5	-	-	5.5	8.9 and 8.10	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	
Configuration and Mode: WCDMA FDD Band II and 2.4 GHz Bluetooth													
2.1	15.247 (d) and 15.209	-	24.238 (a)	-	-	-	6.5	-	5.5	8.9 and 8.10	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	
Configuration and Mode: LTE FDD Band 4 and 2.4 GHz WLAN													
2.1	15.247 (d) and 15.209	-	-	27.53 (h)	-	-	-	6.6	5.5	8.9 and 8.10	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	
Configuration and Mode: LTE FDD Band 12 and 5 GHz WLAN													
2.1	15.407 (b) and 15.209	-	-	27.53 (g)	4.7	-	-	-	6.2	8.9 and 8.10	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	

Table 2

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment including the technologies the product supports)*	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
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, π/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) ☐ Class B Digital Device (Use in residential environment only) ☒	

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 ☐ No ☐

Table 7

Temperature

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

Table 8

Antenna Characteristics

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

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

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

1.6 Deviations from the Standard

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

1.7 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
1	GSM 850 Carrier power was reduced to power class 5 (29 dBm) for this testing only.	Graeme Lawler	07-March-2021

Table 11

1.8 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: GSM 850 and 2.4 GHz WLAN		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: WCDMA FDD Band II and 2.4 GHz Bluetooth		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: LTE FDD Band 4 and 2.4 GHz WLAN		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: LTE FDD Band 12 and 5 GHz WLAN		
Radiated Spurious Emissions (Simultaneous Transmission)	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 (Simultaneous Transmission)

2.1.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247(d), 15.209 and 15.407(b)
FCC 47 CFR Part 22, Clause 22.917(a)
FCC 47 CFR Part 24, Clause 24.238(a)
FCC 47 CFR Part 27, Clause 27.53(g)(h)
ISED RSS-130, Clause 4.7
ISED RSS-132, Clause 5.5
ISED RSS-133, Clause 6.5
ISED RSS-139, Clause 6.6
ISED RSS-247, Clause 5.5 and 6.2
ISED RSS-GEN, Clause 8.9 and 8.10

2.1.2 Equipment Under Test and Modification State

SYS-C60-LMC1, S/N: 210151871 - Modification State 0
SYS-C60-LMC1, S/N: 210151871 - Modification State 1

2.1.3 Date of Test

10-March-2021 to 14-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

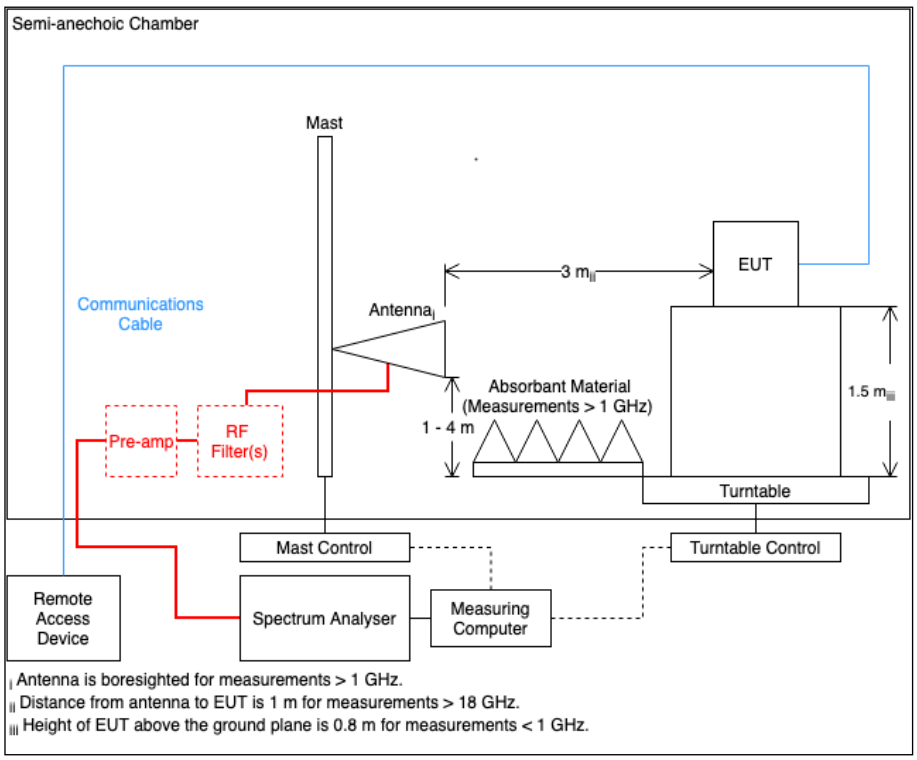

Figure 1

2.1.6 Environmental Conditions

Ambient Temperature	22.1 - 22.9 °C
Relative Humidity	27.5 - 36.6 %

2.1.7 Test Results

GSM 850 and 2.4 GHz WLAN

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
GSM	850	836.4
802.11g	2400 to 2483.5	2412

Table 13 - Modes of Operation

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2509.053	-18.9	-13.0	-5.9	Peak	167	125	Horizontal

Table 14 - 30 MHz to 13 GHz

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

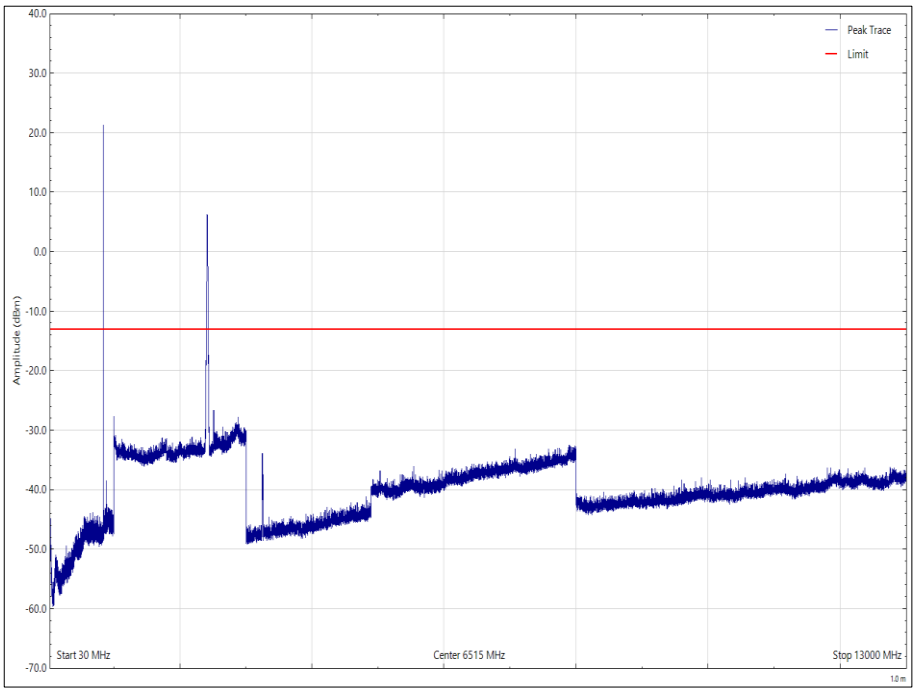

Figure 2 - 30 MHz to 13 GHz, Peak, Vertical

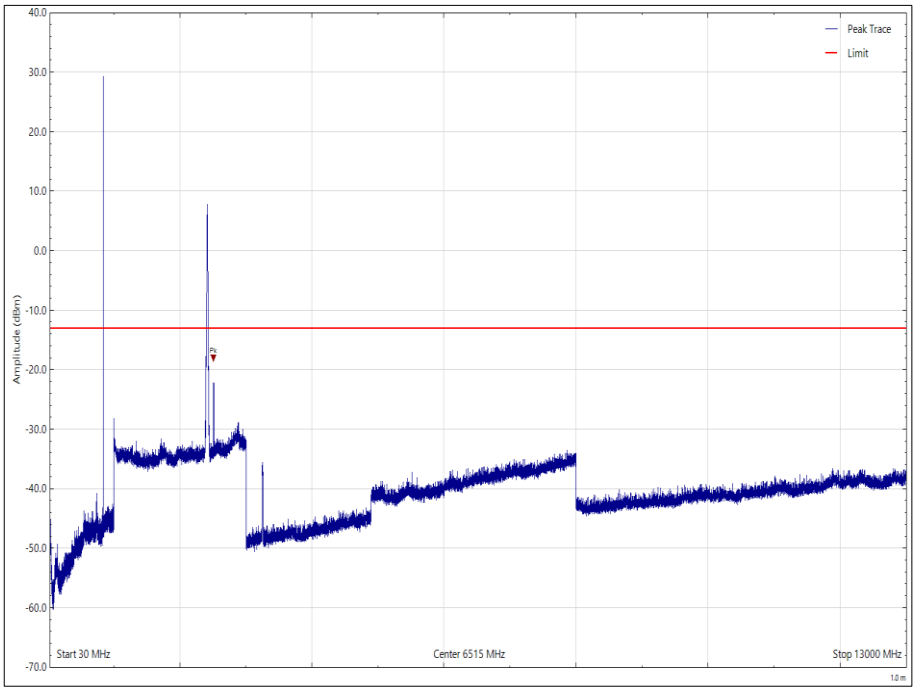

Figure 3 - 30 MHz to 13 GHz, Peak, Horizontal

WCDMA FDD Band II and 2.4 GHz Bluetooth

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
WCDMA FDD II	1850 t0 1910	1880
Bluetooth GFSK (DH5)	2400 to 2483.5	2402

Table 15 - Modes of Operation

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 16 - 30 MHz to 13 GHz

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

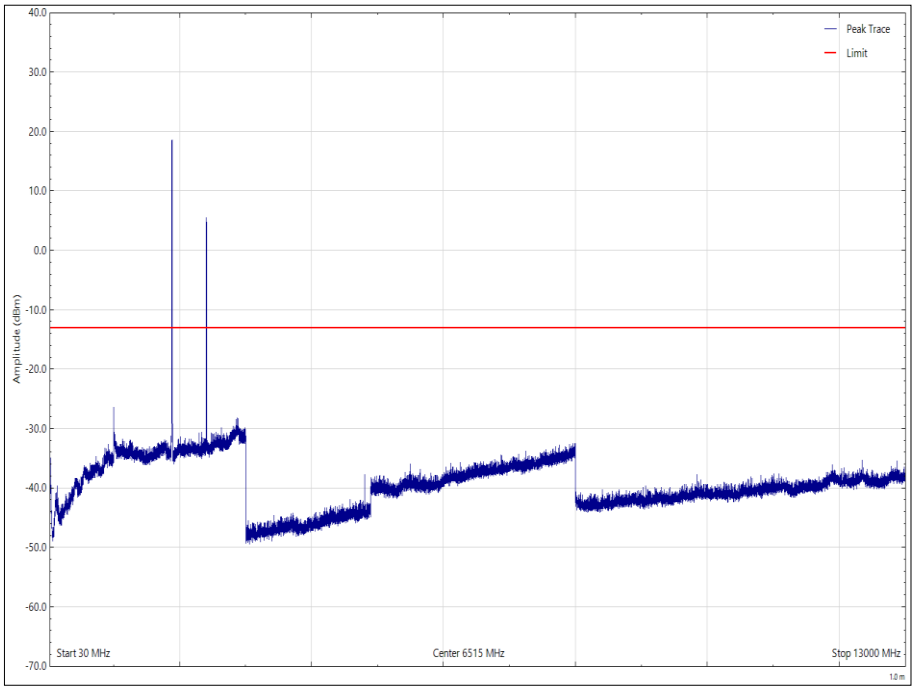

Figure 4 - 30 MHz to 13 GHz, Peak, Vertical

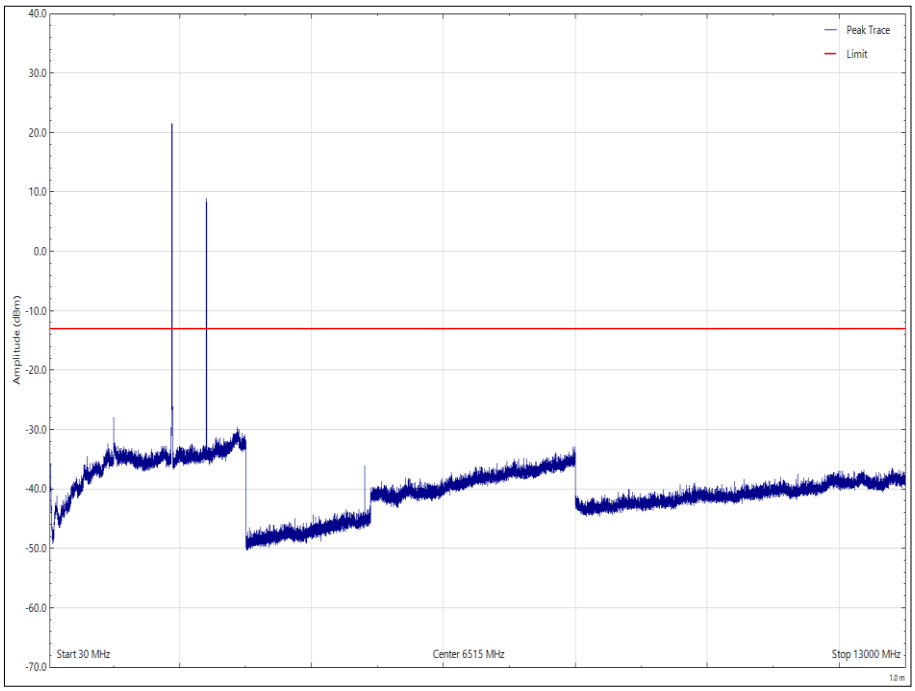

Figure 5 - 30 MHz to 13 GHz, Peak, Horizontal

LTE FDD Band 4 and 2.4 GHz WLAN

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
LTE FDD Band 4, QPSK, 10 MHz BW, 1 RB Mid Offset	1710 to 1755	1732.5
802.11g, 6 Mbps	2400 to 2483.5	2412

Table 17 - Modes of Operation

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 18 - 30 MHz to 13 GHz

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

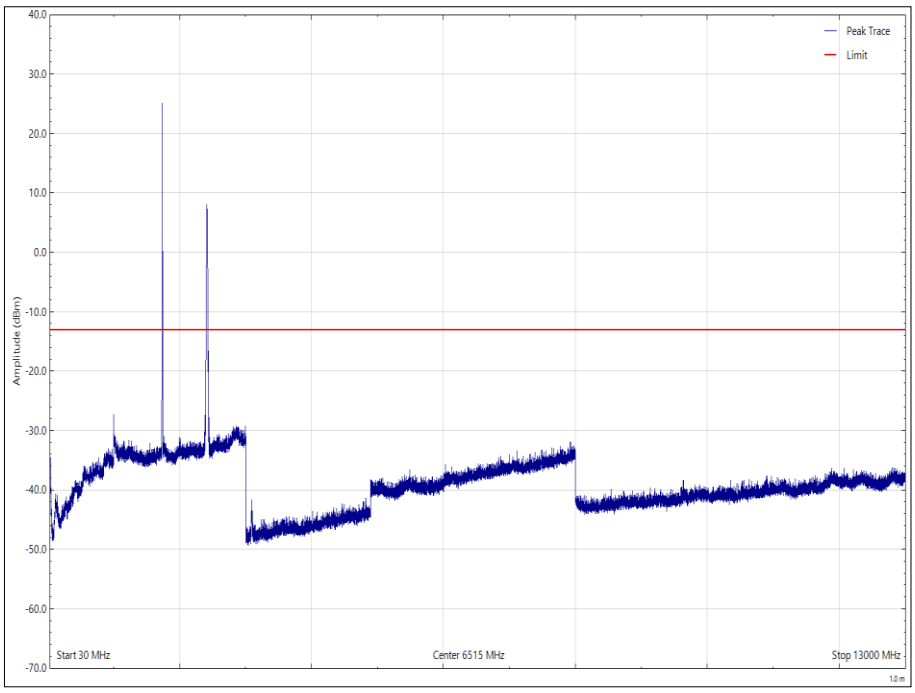

Figure 6 - 30 MHz to 13 GHz, Peak, Vertical

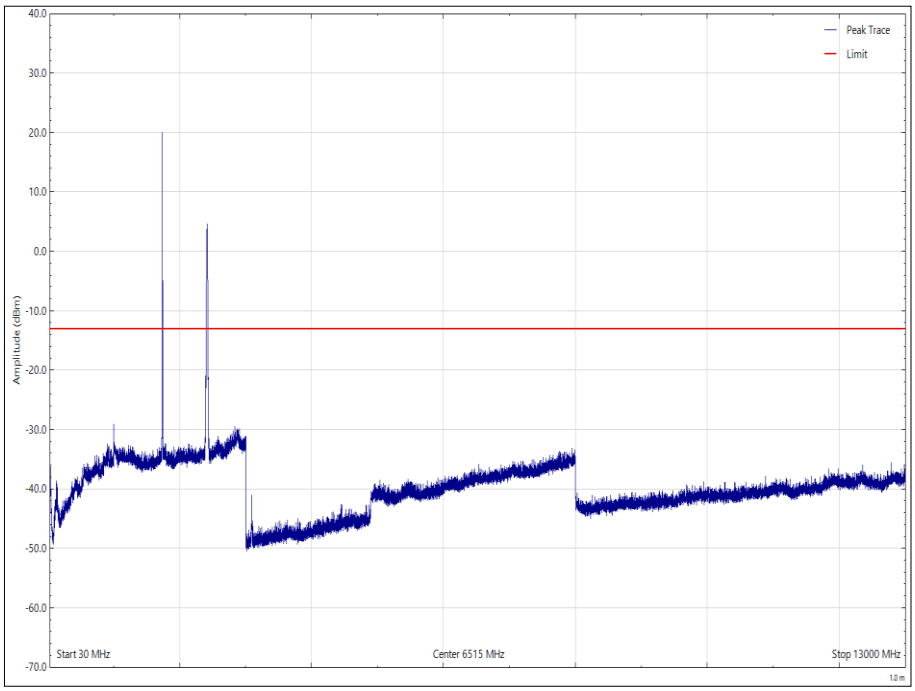

Figure 7 - 30 MHz to 13 GHz, Peak, Horizontal

LTE FDD Band 12 and 5 GHz WLAN

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
LTE FDD Band 12, QPSK, 10 MHz BW, 1 RB Mid Offset	699 to 716	707.5
WLAN - 802.11a 6 Mbps	5470 to 5850	5785

Table 19 - Modes of Operation

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 20 - 30 MHz to 30 GHz

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

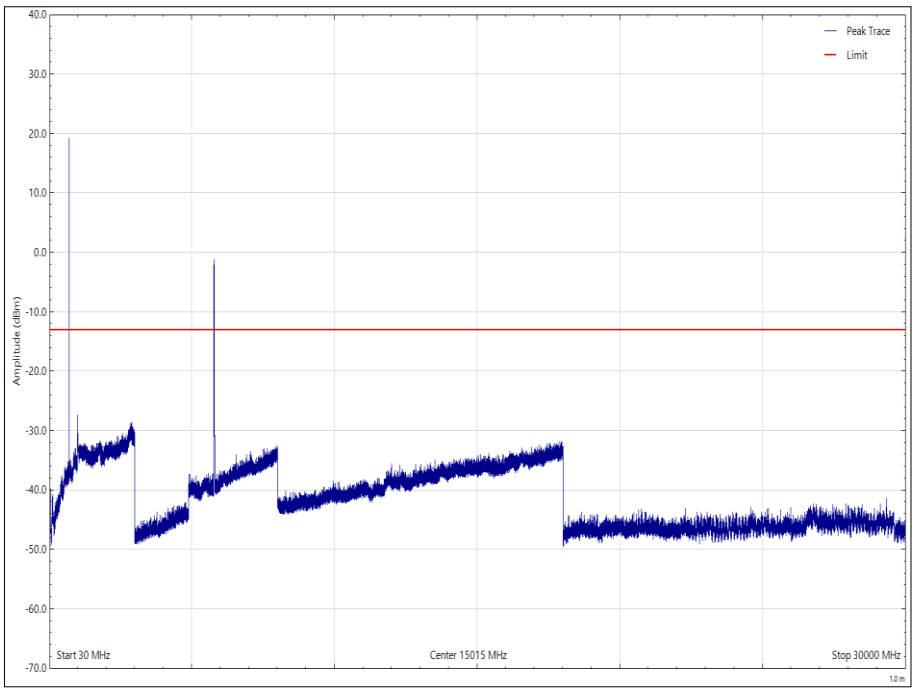

Figure 8 - 30 MHz to 30 GHz, Peak, Vertical

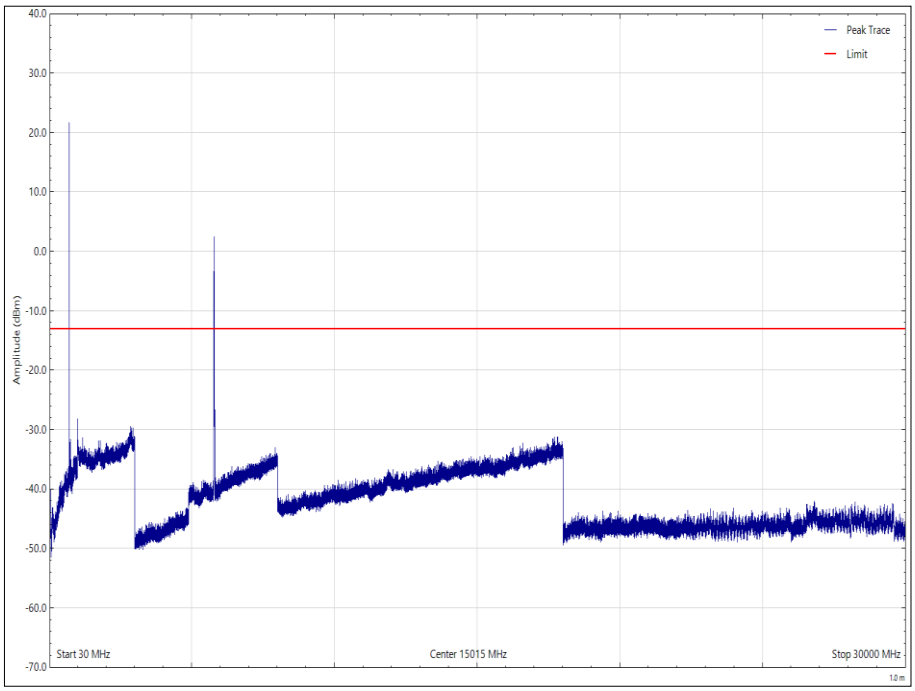

Figure 9 - 30 MHz to 30 GHz, Peak, Horizontal

Limit Clause

The least stringent limit from the applicable rule parts was used to determine compliance for Radiated Emissions testing of multiple transmission sources.

The least stringent applicable limit was -13 dBm (EIRP) / 82 dBµV/m at 3m.

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 18-40GHz (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	27-Jul-2022
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	23-Apr-2021
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	18-Feb-2022
Power Supply	Hewlett Packard	6104A	1948	-	O/P Mon
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
EMI Test Receiver	Rohde & Schwarz	ESW44	5382	12	18-Feb-2022
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
1m K-Type Cable	Junkosha	MWX241-01000KMSKMS/A	5511	12	03-Apr-2021
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	24-Mar-2021
2 m K Type Cable	Junkosha	MWX241-02000KMSKMS/A	5523	12	03-Apr-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 21

TU - Traceability Unscheduled

3 Photographs

3.1 Test Setup Photographs

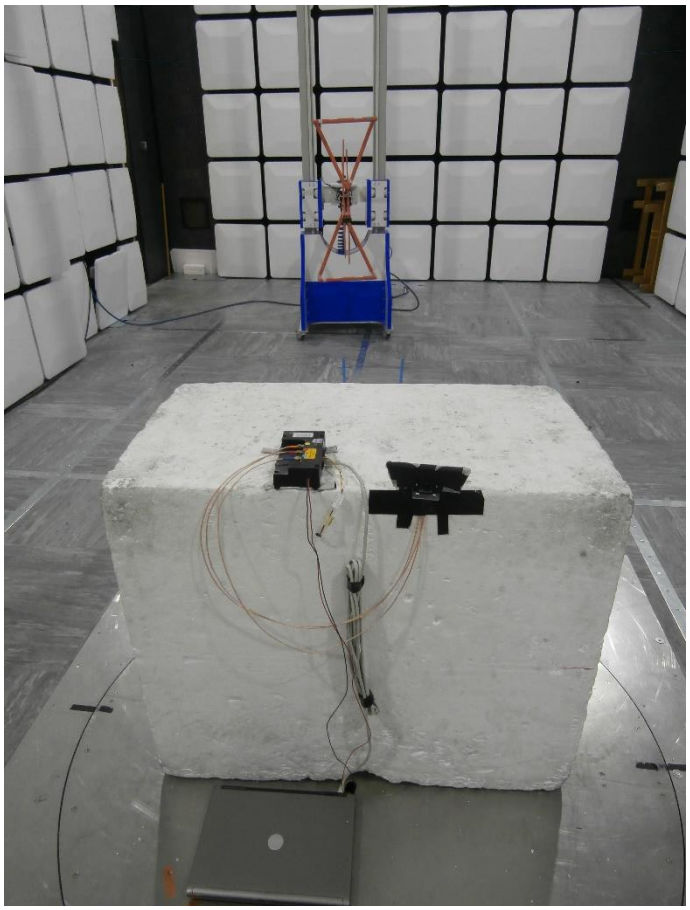

Figure 10 – Test Setup Photo, 30 MHz to 1 GHz

Figure 11 – Test Setup Photo, 1 GHz to 18 GHz

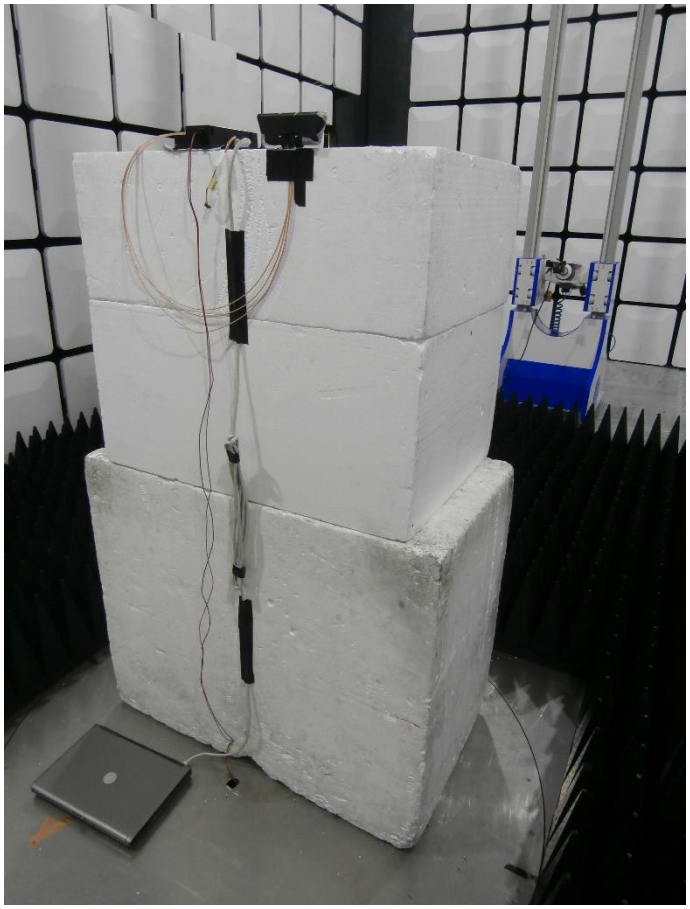

Figure 12 – Test Setup Photo, 18 GHz to 30 GHz

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Spurious Emissions (Simultaneous Transmission)	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB

Table 22

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.