

Prüfbericht-Nr.: Test report no.:	S22GG5D-001	Auftrags-Nr.: Order no.:	P00627053	Seite 1 von 27 Page 1 of 27
Kunden-Referenz-Nr.: Client reference no.:	2380811	Auftragsdatum: Order date:	2022.03.14	
Auftraggeber: Client:	Axis Communications AB			
Prüfgegenstand: Test item:	Network surveillance camera including 60GHz radar sensor			
Bezeichnung / Typ-Nr.: Identification / Type no.:	Axis Q1656-DLE / FCC ID: PNB-AXISQ1656-DLE			
Auftrags-Inhalt: Order content:	Accredited testing			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15B with parts 15.107 & 15.109 ANSI C63.4: 2014			
Wareneingangsdatum: Date of sample receipt:	2022.05.18			
Prüfmuster-Nr.: Test sample no.:	See section 2.3			
Prüfzeitraum: Testing period:	2022.06.16 – 2022.06.23			
Ort der Prüfung: Place of testing:	Lund, Sweden			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Sweden			
Prüfergebnis*: Test result*:	Pass			
überprüft von: reviewed by:	genehmigt von: authorized by:			
Datum: 2022.09.01 Date:	Datum: 2022.09.01 Date:			
Stellung / Position: Senior Technical Expert	Stellung / Position: Lab Manager			
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:				
Prüfmuster vollständig und unbeschädigt Test item complete and undamaged				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
5 = mangelhaft N/T = nicht getestet				
5 = poor N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.</i>				

Revision HistoryS22GG5D-001S22GG5D-001

REVISION	DATE	REMARKS	AUTHOR
001	2022.08.25	First release	Niall Forrester

Note: Latest revision report will replace all previous reports

This report based on FCC Part 15B no JBP Template version 1.3

Summary of Test Results

FCC 47 CFR Rule Part	Test Description	Applicability	Report Section	RESULT	REMARKS
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	YES	4.1	PASS	
15.109	Radiated Emissions (Unintentional Radiators)	YES	4.2	PASS	

Possible test case verdicts:

- | | |
|--|-----------------------|
| - Test case does not apply to the test object: | N/A |
| - Test object complies with the requirement: | PASS or COMPLIANT |
| - Test object does not meet the requirement: | FAIL or NOT COMPLIANT |
| - Test case not performed on the test object: | N.P. |

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1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	TÜV Rheinland Sweden AB
Address:	Mobilvägen 10
	223 62 Lund
	Sweden
Swedac Registration Number:	10325
FCC Test Firm Registration Number:	517458
ISED Test Site Registration Number:	24753

1.2 Client Information

Company Name:	Axis Communications AB
Address:	Gränden 1
	22369 Lund
	Sweden
Contact Person:	Dag Mårtensson / Johan Lundqvist
Contact e-Mail / Telephone	Dag.martensson@axis.com Johan.lundqvist@axis.com

2. PRODUCT INFORMATION

2.1 General Description

Model name:	Axis Q1656-DLE
Manufacturer:	Axis Communications AB
Model number / Marketing name:	Axis Q1656-DLE
FCC ID:	PNB-AXISQ1656-DLE
Description:	Network surveillance camera including 60GHz radar sensor
Ancillary Equipment:	See section 2.7

2.2 Device Characteristics

Device Class for 47 CFR Part 15 B	Class B
Type of Power Supply	Power Over Ethernet (PoE) or DC
Nominal Supply Voltage	PoE (class 4): 55V DC DC power port: 12V or 24V DC
Supply Voltage Range	PoE (class 4): 50V to 57V DC DC power port: 10V to 28V DC
Operating Temperature Range	-40°C to 60°C
Operating Air Humidity Range	-
Highest Internal Frequency Source	61.5 GHz

2.3 Test Samples

EUT ID	Description	Hardware & Software Versions	Used For:
P00627053_21-0263_004 (S/N B8A44F3B6E92)	Default sample	Hw: 1.0 Sw: 11.0+snapshot-20220602	Radiated Tests
P00627053_21-0263_005 (S/N B8A44F3B41DF)	Default sample	Hw: 1.0 Sw: 11.0+snapshot-20220602	AC Conducted Emissions

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
FMCW radar	61 GHz	61.0 GHz – 61.5 GHz	YES

*This statement refers only to this report. Other wireless technologies may be covered by other reports.

2.5 Antenna Information

Technology	Band	Number of Antennas	Antenna Type(s)	Gain
FMCW radar	61 GHz	3 x Tx 4 x Rx	Patch	6 dBi

2.6 Wireless Technology Details

Technology	Band	Modulation Type(s)	Frequency Hopping	No. of Channels	Transmitter Type
FMCW radar	61 GHz	FMCW	NO	2	Field Disturbance Sensor

2.7 Ancillary Equipment

ID	Description	Manufacturer / Model	Hardware & Software Versions
P00627053_21-0263_002	PoE Midspan	Axis T8134	-
P00627053_21-0263_006	PoE Midspan	Axis T8134	-
P00627053_21-0263_007	Laptop PC	HP Elitebook	-
P00627053_21-0263_009	AC/DC Adapter (12V DC)	Axis T8006 PS12 E2	-

2.8 EUT Diagrams

-

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
FCC 47 CFR 15.107	-	Conducted limits
FCC 47 CFR 15.109	-	Radiated emission limits

3.2 Additional references

The following standards / references were also considered for the testing

Standard	Version	Description
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.3 Limits

FCC 47 CFR Rule Part	Test Description	Limit Reference (FCC 47 CFR Reference)
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	15.107 (a) for Class B Devices
15.109	Radiated Emissions (Unintentional Radiators)	15.109 (a) for Class B Devices *See Note 1

Interpretation of the measurement results has been performed in accordance with ANSI C63.4 section 10.2.8.2

Compliance with the requirements has been based on the results of the measurements compared to the specified limits, not taking into account measurement instrumentation uncertainty.

Measurement Uncertainty figures are stated in section 6

Note 1

Radiated Emissions limits in the tables from 47 CFR sections 15.109 are presented in $\mu\text{V/m}$. Measurements on the test system are made in $\text{dB}\mu\text{V/m}$. To convert between these, the following adjustment is used:

$$\text{New Limit} = 20 \log \left(\frac{\text{Original Limit}}{10^6} \right) + 120$$

Example: from 15.209(a) the limit for 30MHz – 88MHz is $100\mu\text{V/m}$ at 3m. This gives:

$$\text{New Limit} = 20 \log \left(\frac{100}{10^6} \right) + 120 = 40\text{dB}\mu\text{V/m at 3m}$$

Additionally, in some cases testing has been performed at distances other than those specified in the tables. When this has occurred, the limits have been adjusted in accordance with the requirements in 47 CFR 15.31, using an extrapolation factor of 40dB/decade at frequencies below 30MHz and 20dB/decade at or above 30MHz

Example: from 15.209(a) the limit for 1.705MHz – 30MHz is $30\mu\text{V/m}$ (=29.54 $\text{dB}\mu\text{V/m}$) at 30m

$$\text{Limit@3m} = \text{Limit@30m} + 40 \log \left(\frac{30}{3} \right) = 29.54 + 40.00 = 69.54 \text{ dB}\mu\text{V/m at 3m}$$

Example: from 15.209(a) the limit for 1GHz – 18GHz is $500\mu\text{V/m}$ (=53.98 $\text{dB}\mu\text{V/m}$) at 3m

$$\text{Limit@1m} = \text{Limit@3m} + 20 \log \left(\frac{3}{1} \right) = 53.98 + 9.54 = 63.52 \text{ dB}\mu\text{V/m at 1m}$$

3.4 Description of Test Methods and Equipment Setup

3.4.1 General Description

Testing was performed in accordance with the various requirements of ANSI C63.4 and ANSI C63.10. Any deviations from the test methods are described in section 0

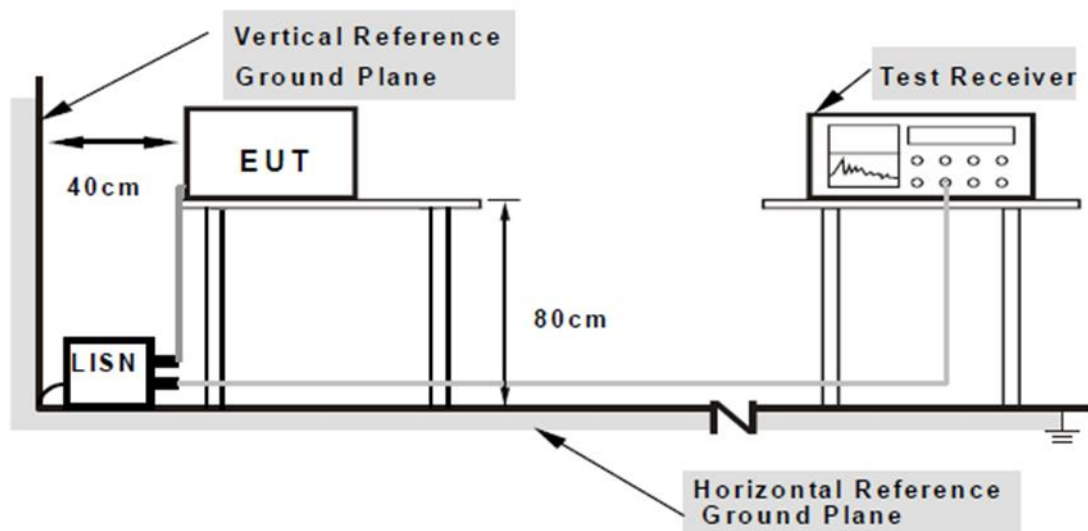
Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

3.4.2 Test Equipment Setup Used by Test Type

FCC 47 CFR Rule Part	Test Description	Test Equipment Used
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	Conducted Emissions
15.109	Radiated Emissions (Unintentional Radiators)	SAC5

3.4.3 Test Equipment Setup – Conducted Emissions

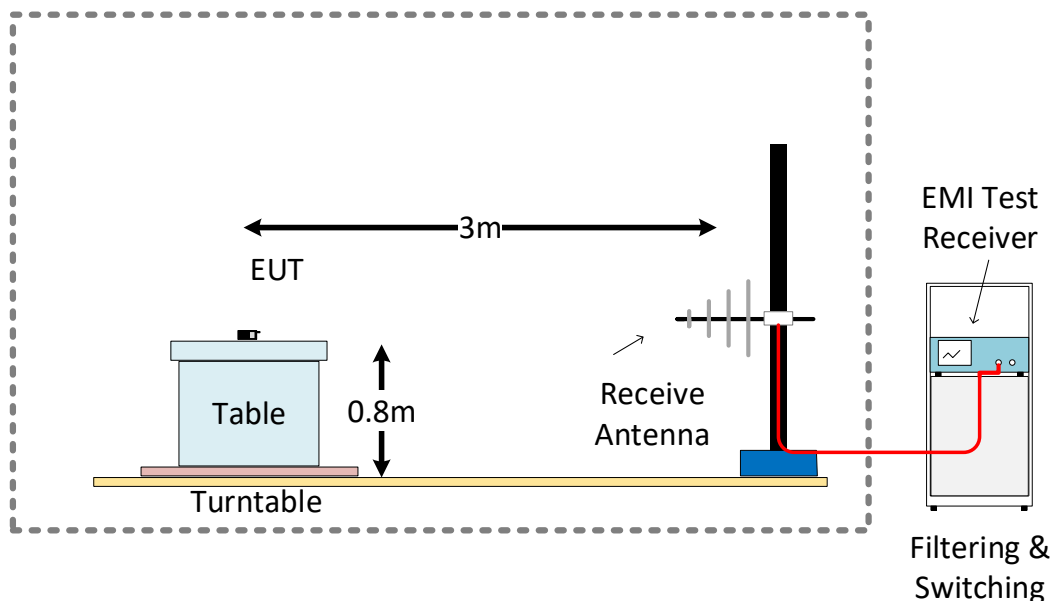
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The LISNs provide 50Ω/ 50μH of coupling impedance for the measuring instrument.
- The lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10 dB under the prescribed limits could not be reported.



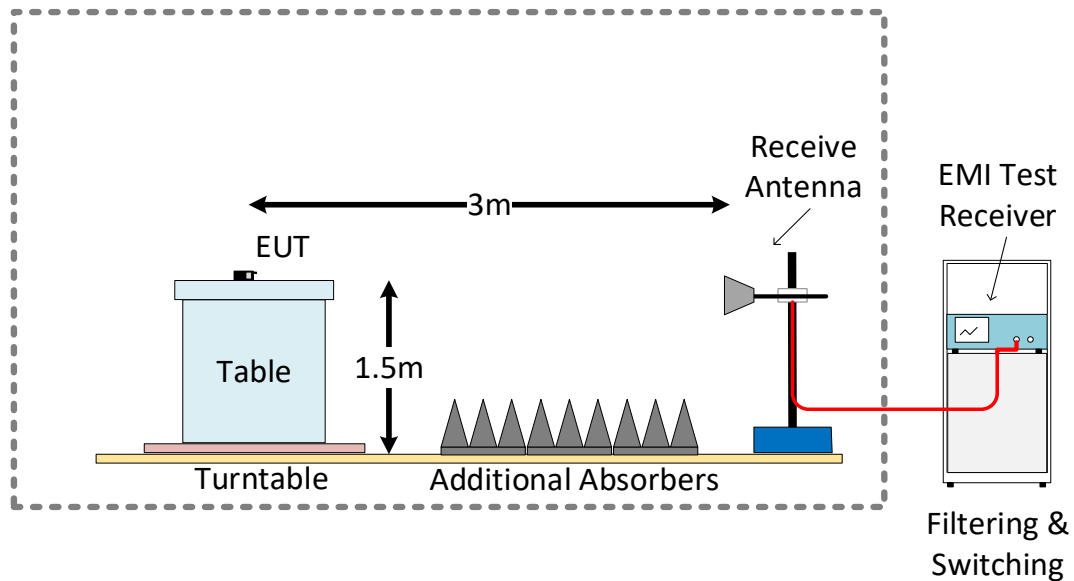
3.4.4 Test Equipment Setup – SAC 5 (Radiated Emissions)

- For measurements between 30MHz and 1GHz, the device is placed on a table at a height of 80cm from the floor with the radiating structure located above the center of the turntable. A bilog antenna is placed with its reference point at a distance of 3m from the center of the turntable. The height of the antenna reference point is varied between 100cm and 400cm above the floor, with the angle continuously adjusted so that the axis of the antenna is oriented towards the EUT. The output of the antenna is connected to the external rack to allow for appropriate amplification and filtering where required. Testing is repeated with the antenna in both horizontal and vertical polarisation positions. The EUT is rotated using the turntable to determine the position with maximum emissions.
- For measurements between 1GHz and 18GHz, the device is placed on a table at a height of 150cm from the floor with the radiating structure located above the center of the turntable. A horn antenna is placed with its reference point at a distance of 3m from the center of the turntable, with absorbers placed on the floor between the EUT and the measurement antenna. A low-noise amplifier and high-pass filter is connected to the output of the antenna for frequencies above 6GHz to improve performance. The output of the antenna or amplifier is connected to the external rack to allow for appropriate amplification and filtering where required. The height of the antenna reference point is varied between 100cm and 400cm above the floor. Testing is repeated with the antenna in both horizontal and vertical polarisation positions. The EUT is rotated using the turntable to determine the position with maximum emissions.
- For measurements between 18GHz and 40GHz, the device is placed on a table at a height of 150cm from the floor with the radiating structure located above the center of the turntable. A mounting with two standard-gain horn antennas with associated low-noise amplifiers is placed so the reference point of the antennas is at a fixed height of 150cm from the floor and at a distance of 1m from the center of the turntable. One antenna is used for measurements between 18GHz and 26GHz, while the second is used between 26GHz and 40GHz. To reduce losses, the measuring instrument is placed close to the antenna mast with the output of the low-noise amplifiers connected directly to its input via a short cable. Absorbers are placed on the floor between the EUT and the measurement antennas. Testing is repeated with the antennas in both horizontal and vertical polarisation positions. The EUT is rotated using the turntable to determine the position with maximum emissions.

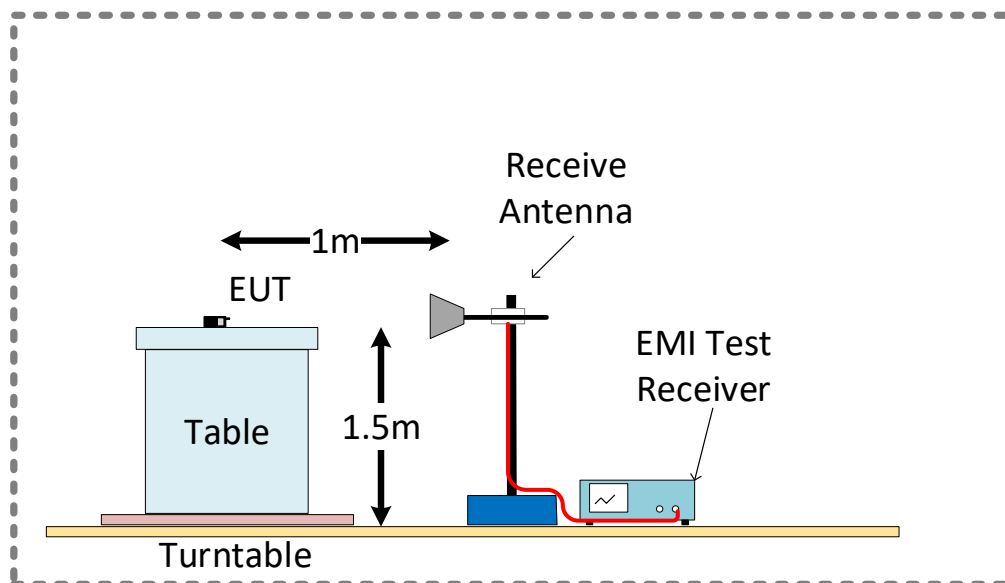
SAC 5 Test Setup Configuration 30MHz – 1GHz



SAC 5 Test Setup Configuration 1GHz – 18GHz

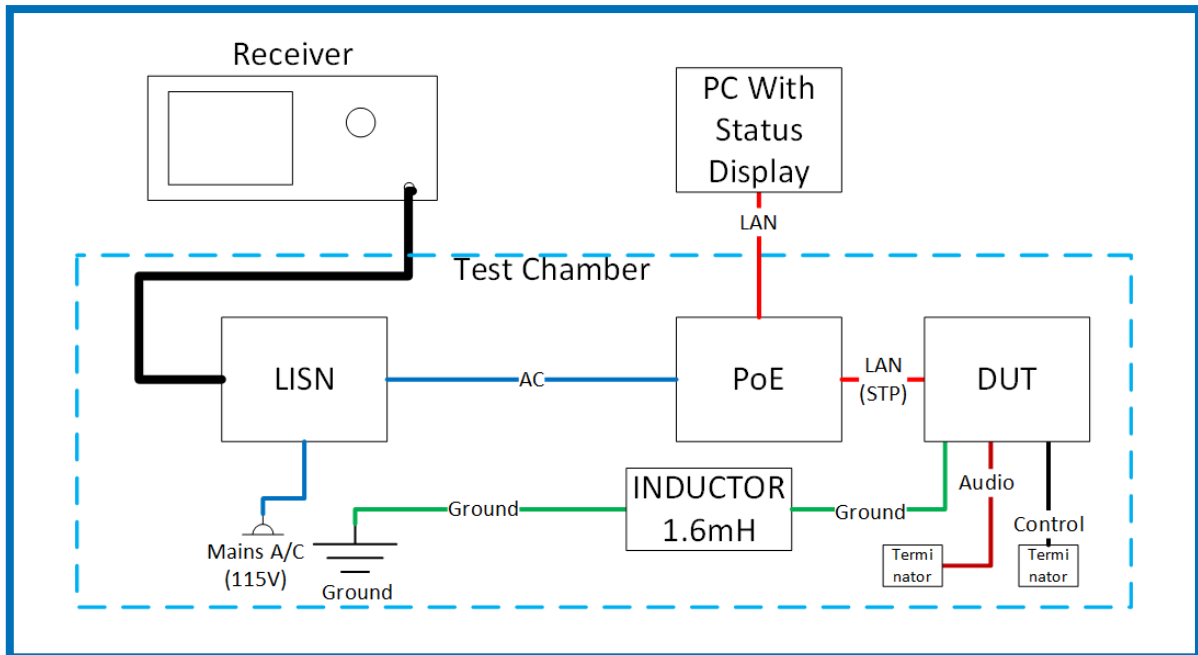


SAC 5 Test Setup Configuration 18GHz – 40GHz



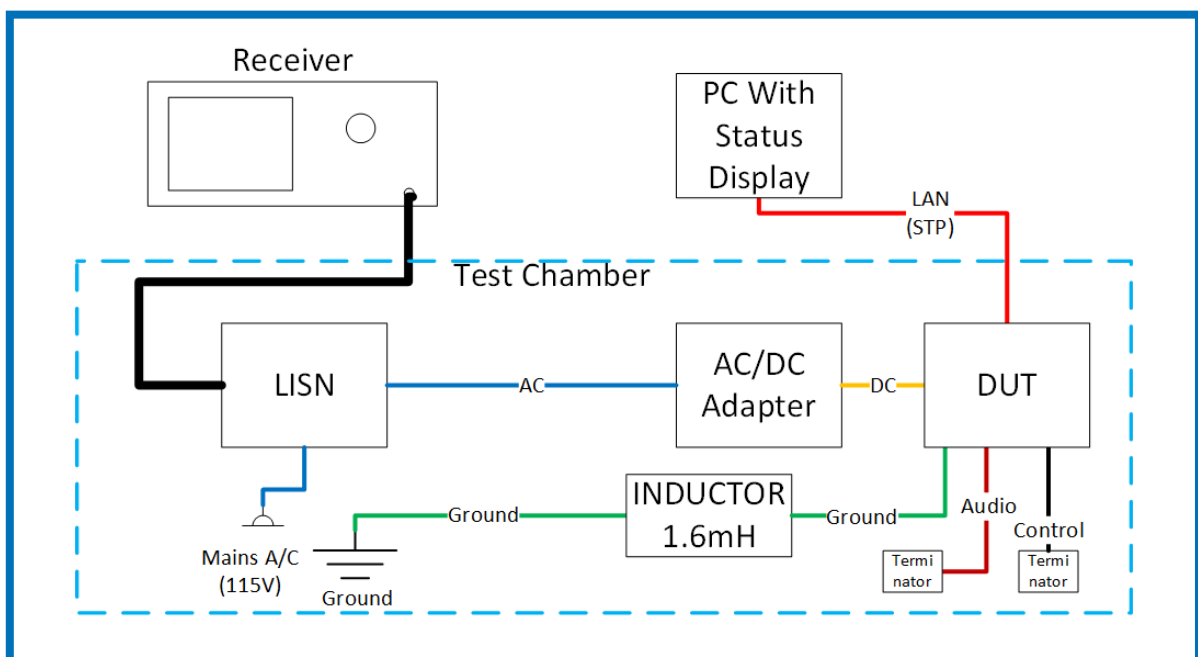
3.5 EUT Configuration During Test

Conducted Emissions Testing: Block Diagram (Power via PoE)



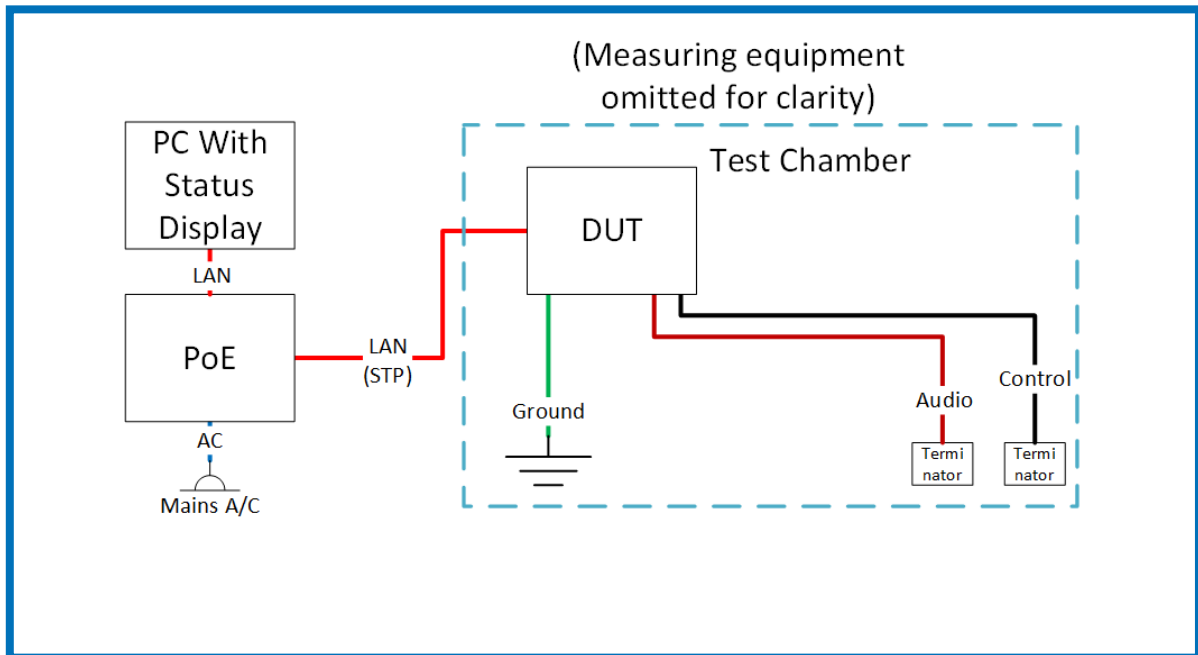
Note that the DUT has its own protective ground connection. To maximise the emissions through the LISN, a 1.6mH inductor was placed in this ground line.

Conducted Emissions Testing: Block Diagram (Power from AC/DC Adapter)

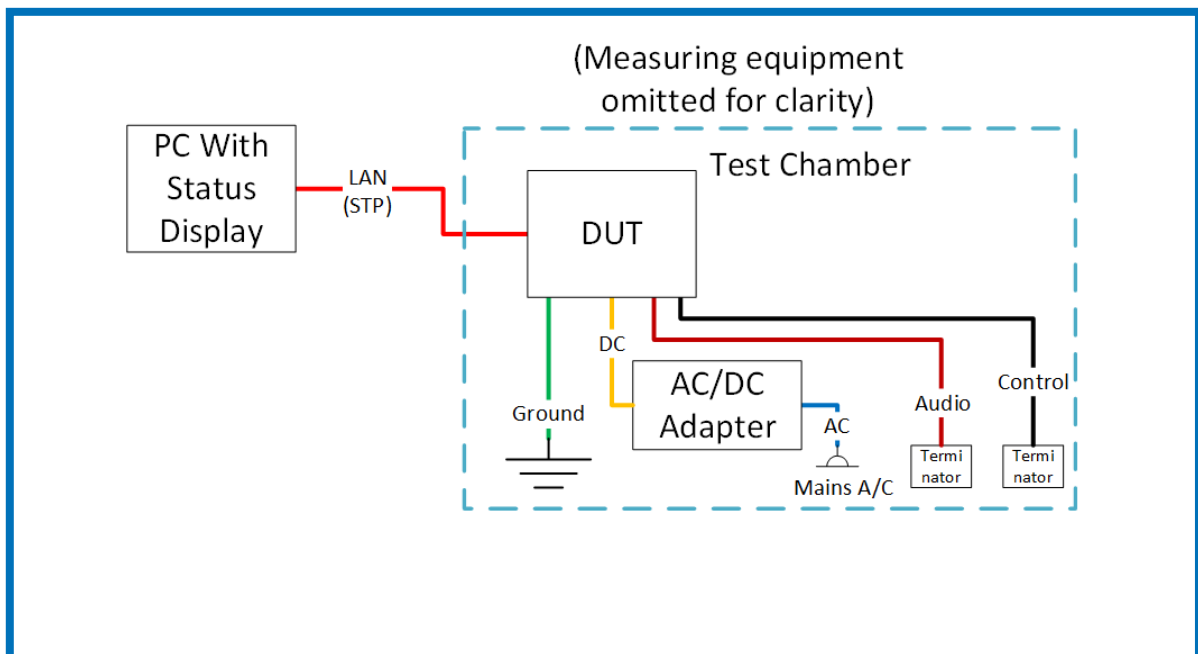


Note that the DUT has its own protective ground connection. To maximise the emissions through the LISN, a 1.6mH inductor was placed in this ground line.

Radiated Emissions & Radiated RF Testing: Block Diagram (Power via PoE)



Radiated Emissions & Radiated RF Testing: Block Diagram (Power from AC/DC Adapter)



3.6 EUT Operation Modes

Operation mode	Description
Default (PoE)	The device is powered and the radar is operating as normal. Power via PoE over an STP LAN cable.
Default (AC/DC)	The device is powered and the radar is operating as normal. DC power from an AC/DC adapter.

The radar transceiver supports two different “channels” and two different modes of operation, as follows:

- Channel 0 (“CH0”) – occupies the upper part of the 61.0GHz – 61.5GHz band
- Channel 1 (“CH1”) – occupies the lower part of the 61.0GHz – 61.5GHz band
- “People” mode uses all three Tx antennas and has a higher bandwidth & faster frequency ramp
- “Traffic” mode uses two Tx antennas and has a lower bandwidth and slower frequency ramp

Note on choice of channels/modes used for testing:

The default configuration for the device is “People” mode on Channel 0. In normal operation, the device can be set to use the different modes and can automatically change between channels.

For the purposes of testing, the mode and channel were set manually and fixed for the duration of testing. Where relevant, testing was performed for multiple modes and/or channels.

As tests in this report only cover frequencies below the carrier frequency (60 GHz), tests were performed with the device in the default setup: “People” mode and channel 0.

3.7 Deviations from the Test Standard

Note that as the radar transmitter was always operating when power was supplied to the DUT, all tests have been run with the radar operating. This means that some results below for parts 15.107 and 15.207 are identical to the results used to show compliance with part 15.255.

3.8 Environmental Conditions

3.8.1 Environmental Conditions – Conducted Emissions System

Date	Time	Temperature (°C)	Relative Humidity (%)
2022.06.16	11.05	24.3	39

3.8.2 Environmental Conditions – SAC5 (Radiated Emissions)

Date	Time	Temperature (°C)	Relative Humidity (%)
2022.06.17	07:50	18.8	56
2022.06.20	07:22	19.5	54
2022.06.21	08:40	18.7	58
2022.06.23	07:30	19.5	56

4. TEST RESULTS

4.1 Test Results – AC Power Line Conducted Emissions (Unintentional Trans.)

4.1.1 AC Power Line Conducted Emissions (Unintentional) – Test Summary

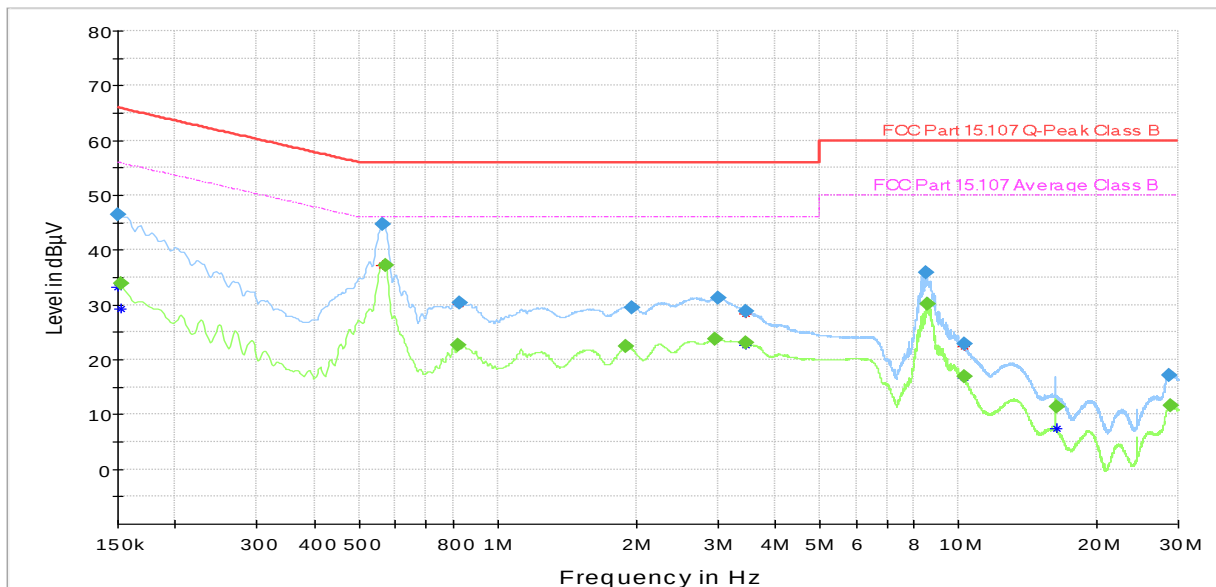
Test Specification	FCC 47 CFR 15.107 (Part 15 Subpart B)		
Test Engineer & Date	Fariborz Abasi	2022.06.16	
EUT and Ancillary Equipment IDs	P00627053_21-0263_005	P00627053_21-0263_006 P00627053_21-0263_009	
EUT Operation Mode(s)	Default (PoE) & Default (AC/DC)		
EUT Wireless Configuration(s)	People CH0		
EUT Hardware Configuration(s)	-		
Overall Result	PASS		
Test Parameter	Wireless Configuration	Frequency Range	Result*
AC Conducted Power Line Emissions – “N” Line (PoE)	People CH0	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – “L1” Line (PoE)	People CH0	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – “N” Line (AC/DC)	People CH0	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – “L1” Line (AC/DC)	People CH0	150 kHz – 30 MHz	PASS

* For detailed measurements, see tables and graphs in sections below

4.1.2 AC Power Line Conducted Emissions (Unintentional) – Test Details

AC Power Line Conducted Emissions - PoE

Test mode condition	Conducted Emissions	
Sweep frequency	150 kHz – 30 MHz	
Standard	FCC 47 Part 15.207	
EUT	P00627053_21-0263_005	
Ancillary Equipment	P00627053_21-0263_006	
Test Engineer	Fariborz Abasi	Date: 2022.06.16

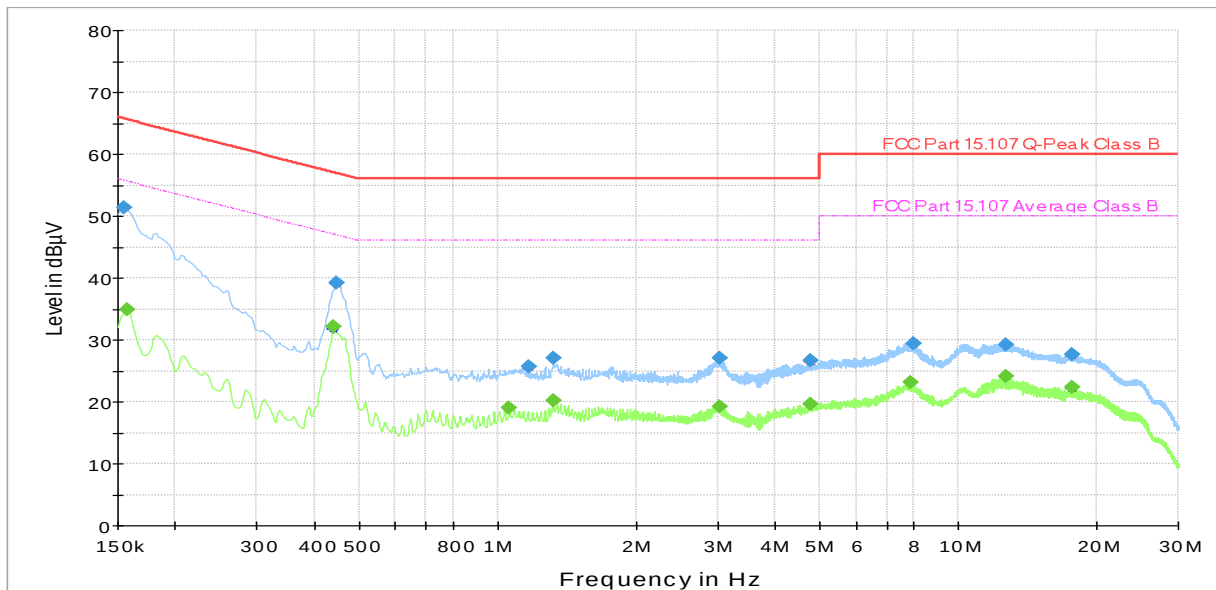


	Preview Result 2-CAV		Preview Result 1-QPK
	Critical_Freqs CAV		Critical_Freqs QPK
	FCC Part 15.107 Q-Peak Class B		FCC Part 15.107 Average Class B
	Final_Result QPK		Final_Result CAV
	QuasiPeak-QPK (Single)		CAverage-CAV (Single)

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	46.48	---	66.00	19.52	1000.0	9.000	L1	ON	9.7
0.152250	---	33.80	55.88	22.08	1000.0	9.000	N	ON	9.7
0.564000	44.78	---	56.00	11.22	1000.0	9.000	N	ON	9.6
0.570750	---	37.29	46.00	8.71	1000.0	9.000	N	ON	9.6
0.822750	---	22.64	46.00	23.36	1000.0	9.000	N	ON	9.6
0.827250	30.30	---	56.00	25.70	1000.0	9.000	N	ON	9.6
1.902750	---	22.53	46.00	23.47	1000.0	9.000	N	ON	9.7
1.963500	29.44	---	56.00	26.56	1000.0	9.000	N	ON	9.7
2.969250	---	23.72	46.00	22.28	1000.0	9.000	N	ON	9.8
3.003000	31.20	---	56.00	24.80	1000.0	9.000	N	ON	9.8
3.444000	28.83	---	56.00	27.17	1000.0	9.000	N	ON	9.8
3.444000	---	23.03	46.00	22.97	1000.0	9.000	N	ON	9.8
8.506500	35.99	---	60.00	24.01	1000.0	9.000	N	ON	9.8
8.535750	---	30.24	50.00	19.76	1000.0	9.000	N	ON	9.8
10.286250	---	16.85	50.00	33.15	1000.0	9.000	N	ON	9.8
10.286250	22.90	---	60.00	37.10	1000.0	9.000	N	ON	9.8
16.298250	---	11.46	50.00	38.54	1000.0	9.000	N	ON	9.9
28.664250	17.20	---	60.00	42.80	1000.0	9.000	L1	ON	9.9
28.959000	---	11.55	50.00	38.45	1000.0	9.000	L1	ON	9.9

AC Power Line Conducted Emissions – AC/DC

Test mode condition	Conducted Emissions	
Sweep frequency	150 kHz – 30 MHz	
Standard	FCC 47 Part 15.207	
EUT	P00627053_21-0263_005	
Ancillary Equipment	P00627053_21-0263_009	
Test Engineer	Fariborz Abasi	Date: 2022.06.16



	Preview Result 2-CAV		Preview Result 1-QPK
	Critical_Freqs CAV		Critical_Freqs QPK
	FCC Part 15.107 Q-Peak Class B		FCC Part 15.107 Average Class B
	Final_Result QPK		Final_Result CAV
	QuasiPeak-QPK (Single)		CAverage-CAV (Single)

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	51.42	---	65.75	14.33	1000.0	9.000	L1	ON	9.7
0.156750	---	34.81	55.63	20.82	1000.0	9.000	L1	ON	9.7
0.440250	---	32.08	47.06	14.98	1000.0	9.000	L1	ON	9.6
0.447000	39.17	---	56.93	17.76	1000.0	9.000	L1	ON	9.6
1.061250	---	19.06	46.00	26.94	1000.0	9.000	N	ON	9.7
1.164750	25.64	---	56.00	30.36	1000.0	9.000	N	ON	9.7
1.320000	---	20.10	46.00	25.90	1000.0	9.000	N	ON	9.7
1.320000	27.05	---	56.00	28.95	1000.0	9.000	N	ON	9.7
3.025500	---	19.14	46.00	26.86	1000.0	9.000	N	ON	9.8
3.027750	27.08	---	56.00	28.92	1000.0	9.000	N	ON	9.8
4.787250	---	19.69	46.00	26.31	1000.0	9.000	L1	ON	9.8
4.787250	26.67	---	56.00	29.33	1000.0	9.000	L1	ON	9.8
7.865250	---	23.16	50.00	26.84	1000.0	9.000	L1	ON	9.8
7.971000	29.42	---	60.00	30.58	1000.0	9.000	L1	ON	9.8
12.653250	29.26	---	60.00	30.74	1000.0	9.000	L1	ON	9.9
12.653250	---	24.14	50.00	25.86	1000.0	9.000	L1	ON	9.9
17.670750	---	22.34	50.00	27.66	1000.0	9.000	N	ON	9.9
17.673000	27.64	---	60.00	32.36	1000.0	9.000	N	ON	9.9

4.2 Test Results – Radiated Emissions (Unintentional Transmitter)

4.2.1 Radiated Emissions (Unintentional) – Test Summary

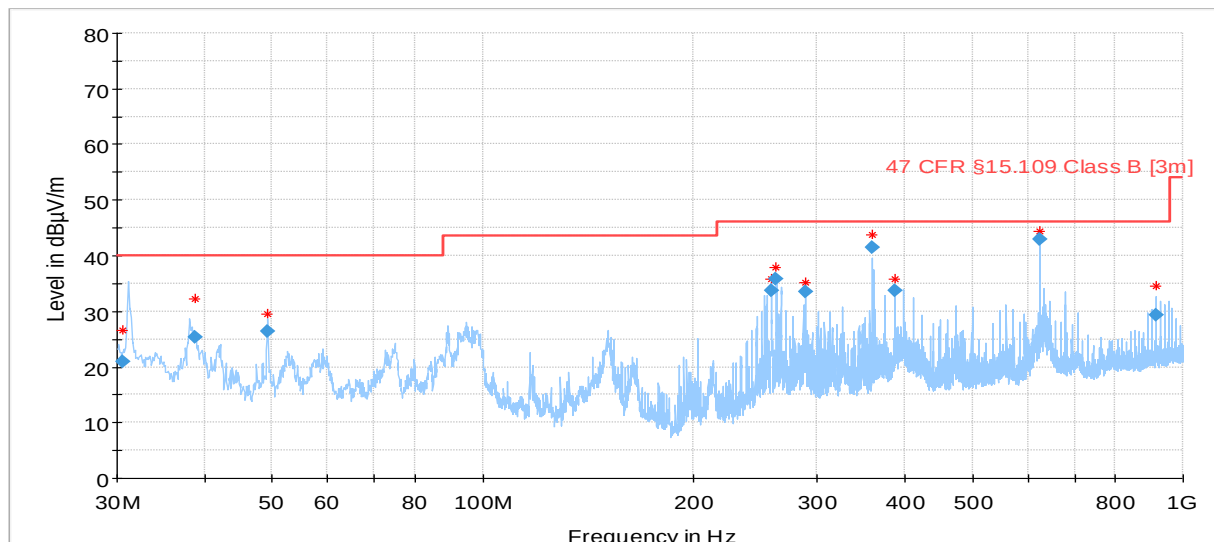
Test Specification	FCC 47 CFR 15.109 (Part 15 Subpart B)	
Test Engineer & Date	Niall Forrester	2022.06.13 – 2022.06.23
EUT and Ancillary Equipment IDs	P00627053_21-0263_004	P00627053_21-0263_002
EUT Operation Mode(s)	Default (PoE) & Default (AC/DC)	
EUT Wireless Configuration(s)	People CH0	
EUT Hardware Configuration(s)	-	
Overall Result	PASS	
Test Parameter	Frequency Range	Result*
Radiated Emissions – Default (PoE)	30 MHz – 1 GHz	PASS
Radiated Emissions – Default (AC/DC)	30 MHz – 1 GHz	PASS
Radiated Emissions – Default (PoE)	1 GHz – 18 GHz	PASS
Radiated Emissions – Default (AC/DC)	1 GHz – 18 GHz	PASS
Radiated Emissions – Default (PoE)	18 GHz – 40 GHz	PASS
Radiated Emissions – Default (AC/DC)	18 GHz – 40 GHz	PASS

* For detailed measurements, see tables and graphs in sections below

4.2.2 Radiated Emissions (Unintentional) – Test Details

30MHz – 1GHz: Default (PoE)

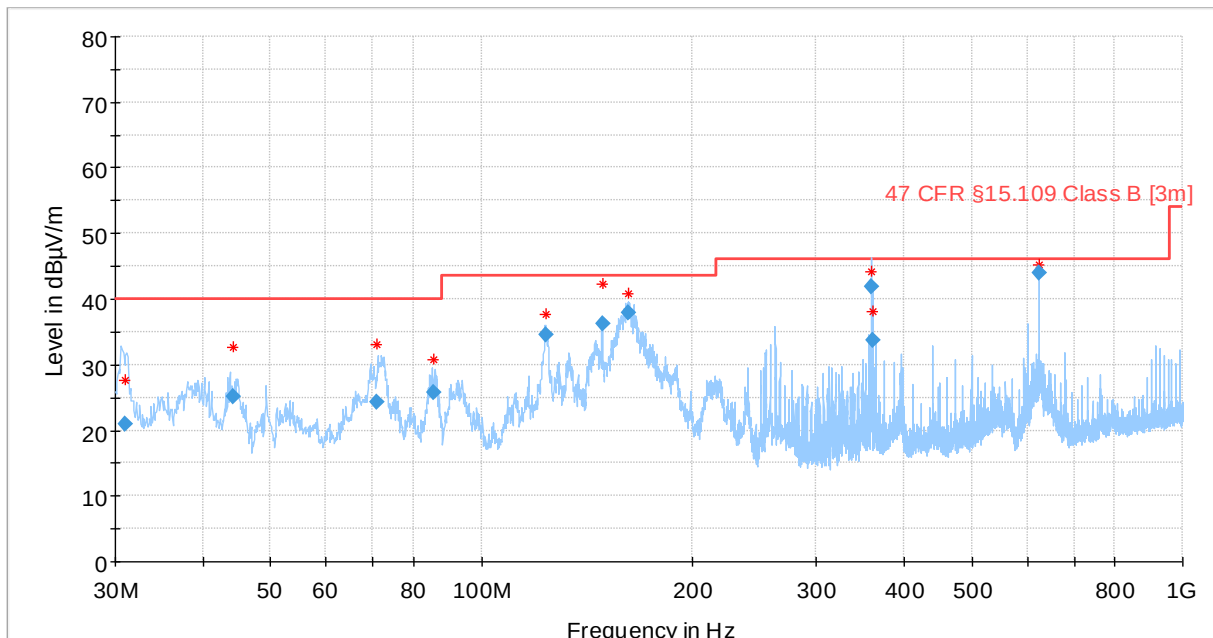
Test mode condition	People CH0	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	P00627053_21-0263_004	
Ancillary Equipment	P00627053_21-0263_002	
Test Engineer	Niall Forrester	Date: 2022.06.23
Chamber details	Chamber: SAC 5	



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.585120	20.88	40.00	19.12	1000.0	120.000	104.0	V	68.0
38.711520	25.42	40.00	14.58	1000.0	120.000	100.0	V	177.0
49.302600	26.44	40.00	13.56	1000.0	120.000	100.0	V	143.0
258.161920	33.77	46.02	12.25	1000.0	120.000	104.0	V	177.0
262.375600	35.79	46.02	10.23	1000.0	120.000	100.0	V	162.0
288.756520	33.48	46.02	12.54	1000.0	120.000	157.0	H	9.0
359.503800	41.41	46.02	4.61	1000.0	120.000	307.0	H	131.0
387.074160	33.80	46.02	12.22	1000.0	120.000	100.0	H	9.0
624.998960	42.93	46.02	3.09	1000.0	120.000	100.0	V	266.0
915.445560	29.26	46.02	16.76	1000.0	120.000	100.0	H	252.0

30MHz – 1GHz: Default (AC/DC)

Test mode condition	People CH0	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	P00627053_21-0263_004	
Ancillary Equipment	P00627053_21-0263_002	
Test Engineer	Niall Forrester	Date: 2022.06.23
Chamber details	Chamber: SAC 5	

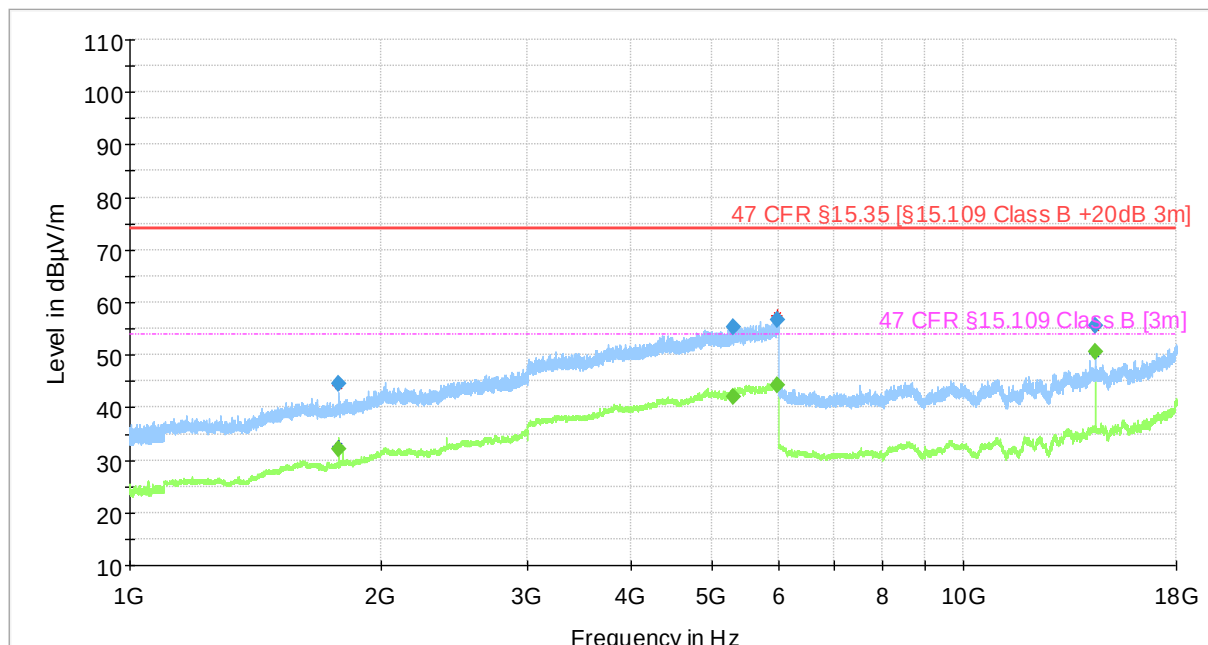


47 CFR §15.109 Class B [3m]	47 CFR §15.109 Class B [3m]
Preview Result 2-AVG	Preview Result 1-PK+
Critical_Freqs AVG	Critical_Freqs PK+
Final_Result QPK	Final_Result AVG

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.938153	21.01	40.00	18.99	1000.0	120.000	100.0	V	19.0
44.278480	25.16	40.00	14.84	1000.0	120.000	100.0	V	267.0
70.739160	24.25	40.00	15.75	1000.0	120.000	225.0	V	116.0
85.362920	25.84	40.00	14.16	1000.0	120.000	325.0	V	-22.0
123.206200	34.59	43.52	8.93	1000.0	120.000	375.0	H	112.0
148.508800	36.21	43.52	7.31	1000.0	120.000	225.0	H	109.0
162.130200	37.95	43.52	5.57	1000.0	120.000	275.0	H	86.0
359.479240	41.81	46.02	4.21	1000.0	120.000	375.0	H	131.0
360.657280	33.73	46.02	12.29	1000.0	120.000	100.0	H	131.0
625.000880	43.93	46.02	2.09	1000.0	120.000	157.0	H	323.0

1GHz – 18GHz: Default (PoE)

Test mode condition	People CH0	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	P00627053_21-0263_004	
Ancillary Equipment	P00627053_21-0263_002	
Test Engineer	Niall Forrester	Date: 2022.06.17
Chamber details	Chamber: SAC 5	

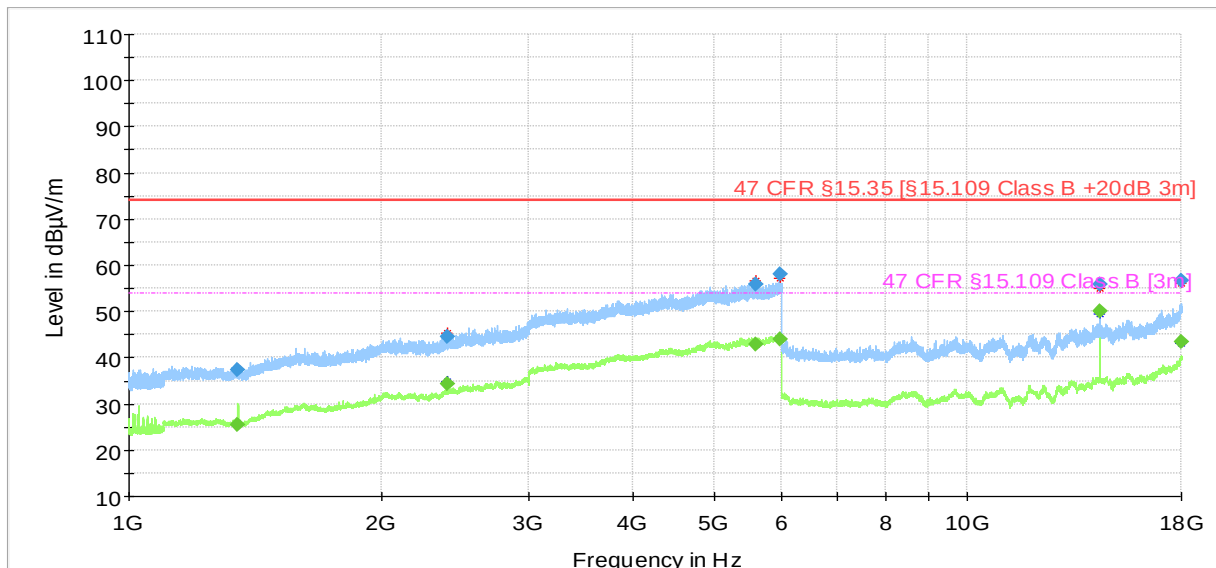


—	Preview Result 2-AVG	—	Preview Result 1-PK+
*	Critical_Freqs AVG	*	Critical_Freqs PK+
—	47 CFR §15.35 [§15.109 Class B +20dB 3m]	—	47 CFR §15.109 Class B [3m]
◆	Final_Result PK+	◆	Final_Result AVG
×	MaxPeak-PK+ (Single)	+	Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1782.030000	---	32.12	53.98	21.86	1000.0	1000.000	189.0	V	266.0
1782.158000	44.52	---	73.98	29.46	1000.0	1000.000	100.0	H	222.0
5292.175000	55.30	---	73.98	18.68	1000.0	1000.000	385.0	H	-4.0
5298.667000	---	41.97	53.98	12.01	1000.0	1000.000	410.0	V	188.0
5979.167000	---	44.19	53.98	9.79	1000.0	1000.000	189.0	H	322.0
5984.994000	56.70	---	73.98	17.28	1000.0	1000.000	315.0	V	8.0
14400.010000	---	50.72	53.98	3.26	1000.0	1000.000	165.0	H	322.0
14400.101000	55.66	---	73.98	18.32	1000.0	1000.000	185.0	H	322.0

1GHz – 18GHz: Default (AC/DC)

Test mode condition	People CH0	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	P00627053_21-0263_004	
Ancillary Equipment	P00627053_21-0263_002	
Test Engineer	Niall Forrester	Date: 2022.06.21
Chamber details	Chamber: SAC 5	

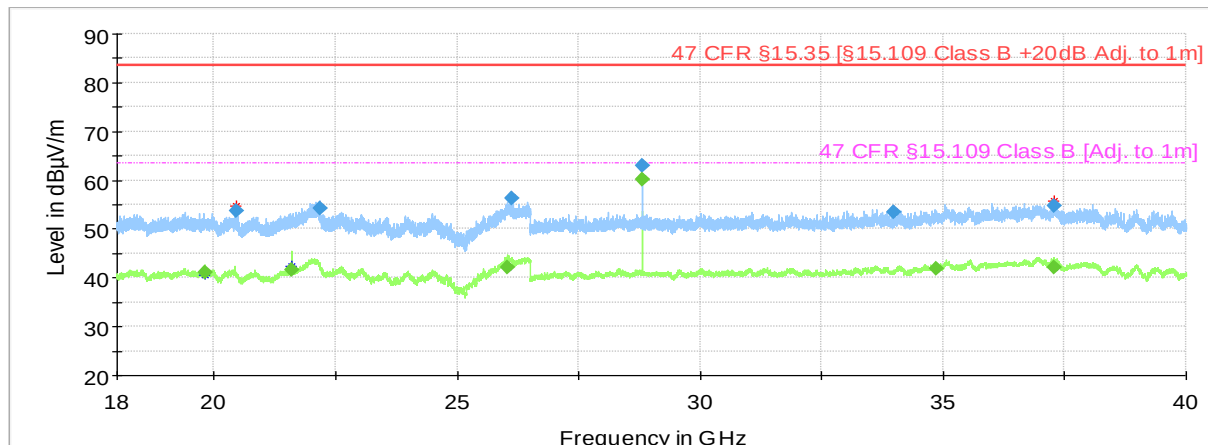


—	Preview Result 2-AVG	—	Preview Result 1-PK+
*	Critical_Freqs AVG	*	Critical_Freqs PK+
—	47 CFR §15.35 [§15.109 Class B +20dB 3m]	—	47 CFR §15.109 Class B [3m]
◆	Final_Result PK+	◆	Final_Result AVG
×	MaxPeak-PK+ (Single)	+	Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1348.563000	37.27	---	73.98	36.71	1000.0	1000.000	335.0	V	262.0
1349.831000	---	25.52	53.98	28.46	1000.0	1000.000	104.0	V	128.0
2397.093000	44.51	---	73.98	29.47	1000.0	1000.000	139.0	V	188.0
2399.979000	---	34.34	53.98	19.64	1000.0	1000.000	104.0	V	8.0
5592.929000	---	42.76	53.98	11.22	1000.0	1000.000	104.0	H	38.0
5602.611000	55.79	---	73.98	18.19	1000.0	1000.000	239.0	V	86.0
5973.259000	57.95	---	73.98	16.03	1000.0	1000.000	389.0	V	128.0
5987.297000	---	44.10	53.98	9.88	1000.0	1000.000	385.0	H	222.0
14400.017000	---	50.11	53.98	3.87	1000.0	1000.000	185.0	H	322.0
14400.167000	55.91	---	73.98	18.07	1000.0	1000.000	135.0	H	322.0
17983.997000	---	43.39	53.98	10.59	1000.0	1000.000	410.0	H	322.0
17993.690180	56.67	---	73.98	17.31	1000.0	1000.000	365.0	H	8.0

18GHz – 40GHz: Default (PoE)

Test mode condition	People CH0	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	P00627053_21-0263_004	
Ancillary Equipment	P00627053_21-0263_002	
Test Engineer	Niall Forrester	Date: 2022.06.20
Chamber details	Chamber: SAC 5	

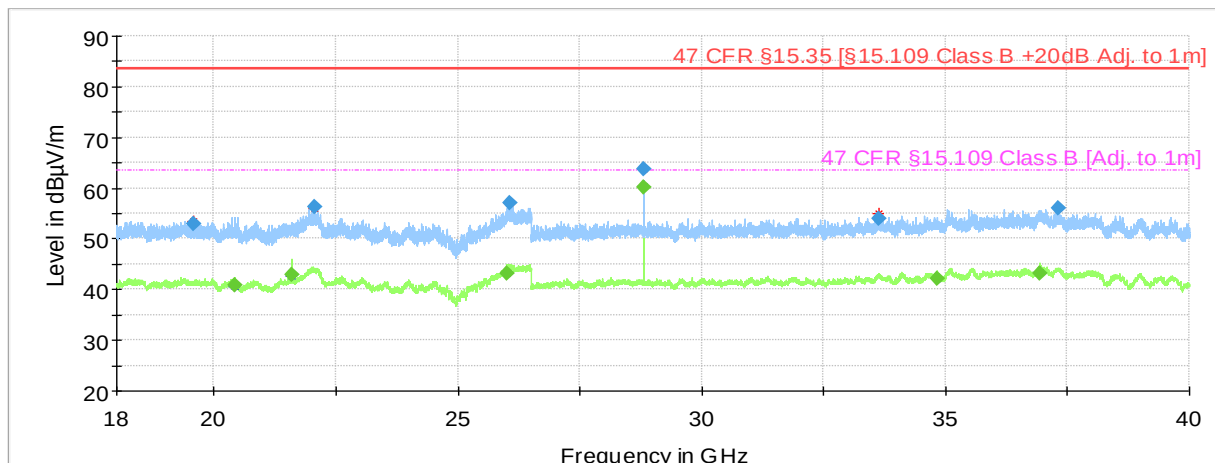


- Preview Result 2-AVG
- Preview Result 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- 47 CFR §15.35 [§15.109 Class B +20dB Adj. to 1m]
- 47 CFR §15.109 Class B [Adj. to 1m]
- ◆ Final_Result PK+
- ◆ Final_Result AVG
- × MaxPeak-PK+ (Single)
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
19800.102000	---	41.02	63.52	22.50	1000.0	1000.000	152.0	V	0.0
20454.901000	53.63	---	83.52	29.89	1000.0	1000.000	152.0	V	-5.0
21600.193000	---	41.74	63.52	21.78	1000.0	1000.000	152.0	V	335.0
22169.121000	54.23	---	83.52	29.29	1000.0	1000.000	152.0	H	294.0
26042.665000	---	42.18	63.52	21.34	1000.0	1000.000	152.0	H	178.0
26119.004000	56.28	---	83.52	27.24	1000.0	1000.000	152.0	V	158.0
28800.038000	62.92	---	83.52	20.60	1000.0	1000.000	152.0	V	295.0
28800.167000	---	60.22	63.52	3.30	1000.0	1000.000	152.0	V	295.0
33967.723000	53.57	---	83.52	29.95	1000.0	1000.000	152.0	V	162.0
34860.036000	---	41.94	63.52	21.58	1000.0	1000.000	152.0	H	121.0
37269.782000	54.66	---	83.52	28.86	1000.0	1000.000	152.0	H	262.0
37293.896000	---	42.03	63.52	21.49	1000.0	1000.000	152.0	H	154.0

18GHz – 40GHz: Default (AC/DC)

Test mode condition	People CH0	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	P00627053_21-0263_004	
Ancillary Equipment	P00627053_21-0263_002	
Test Engineer	Niall Forrester	Date: 2022.06.21
Chamber details	Chamber: SAC 5	



- Preview Result 2-AVG
- Preview Result 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- 47 CFR §15.35 [§15.109 Class B +20dB Adj. to 1m]
- 47 CFR §15.109 Class B [Adj. to 1m]
- ◆ Final_Result PK+
- ◆ Final_Result AVG
- × MaxPeak-PK+ (Single)
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
19564.919000	53.02	---	83.52	30.50	1000.0	1000.000	152.0	V	222.0
20417.068000	---	40.76	63.52	22.76	1000.0	1000.000	152.0	V	15.0
21600.002000	---	42.82	63.52	20.70	1000.0	1000.000	152.0	V	334.0
22051.889000	56.22	---	83.52	27.30	1000.0	1000.000	152.0	H	181.0
26015.254000	---	43.21	63.52	20.31	1000.0	1000.000	152.0	V	98.0
26056.054000	56.95	---	83.52	26.57	1000.0	1000.000	152.0	V	118.0
28800.160000	---	60.07	63.52	3.45	1000.0	1000.000	152.0	V	289.0
28800.164000	63.73	---	83.52	19.79	1000.0	1000.000	152.0	V	295.0
33620.387000	53.87	---	83.52	29.65	1000.0	1000.000	152.0	H	314.0
34842.453000	---	42.20	63.52	21.32	1000.0	1000.000	152.0	V	249.0
36939.132000	---	43.19	63.52	20.33	1000.0	1000.000	152.0	V	18.0
37311.538000	55.92	---	83.52	27.60	1000.0	1000.000	152.0	H	134.0

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – Conducted Emissions System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Two-Line V-network	Rohde & Schwarz	ENV216	101090 2704076	2021.08.03	2022.08.03
Test Receiver 9KHz to 3.5 GHz	Rohde & Schwarz	ESR3	101674 2704016	2021.07.09	2022.07.09
Humidity Temperature Probe	Lufft	OPUS 20 THI	113.0118.0802.033 2771025	2020.07.31	2022.07.31

5.1.2 Hardware List – SAC5 System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
EMI Test Receiver	Rohde & Schwarz	ESW44	101760 2881044	2021.07.15	2022.07.15
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988 2823181	2021.07.26	2023.07.26
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678 2823164	2021.07.26	2023.07.26
Horn Antenna	ETS Lindgren	UG-596A/U	20898 2814839	2020.07.27	2022.07.27
Horn Antenna	ETS Lindgren	UG-600A/U	20623 2814834	2020.07.27	2022.07.27
Control Device	Maturo	NCD	NCD/393/2372.01	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	2021.08.04	2022.08.04
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	2021.08.04	2022.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension	101333 2761265	2021.08.04	2022.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension	101335 2761266	2021.08.04	2022.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330 2761262	2021.08.04	2022.08.04
Humidity Temperature Probe	Lufft	OPUS 20 THI	126.0118.0802.033 2771042	2020.07.31	2022.07.31

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
Conducted Emissions System	EMC 32	V10.60.20
SAC 5	EMC 32	V10.60.20

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for Conducted Emissions

Parameter	Uncertainty (Coverage Factor k=2)
Conducted emissions with LISN 150KHz to 30 MHz	2.98 dB

6.2 Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)

Parameter	Uncertainty (Coverage Factor k=2)
Field Strength 10 Hz -9 kHz	3.38 dB
Field Strength 9 kHz -30 MHz	3.38 dB
Field Strength 30 MHz -1000 MHz	3.38 dB
Field Strength 1 GHz -18 GHz	4.88 dB
Field Strength 18 GHz - 40 GHz	5.14 dB

7. PHOTOGRAPHS

For photographs, see Appendix 1