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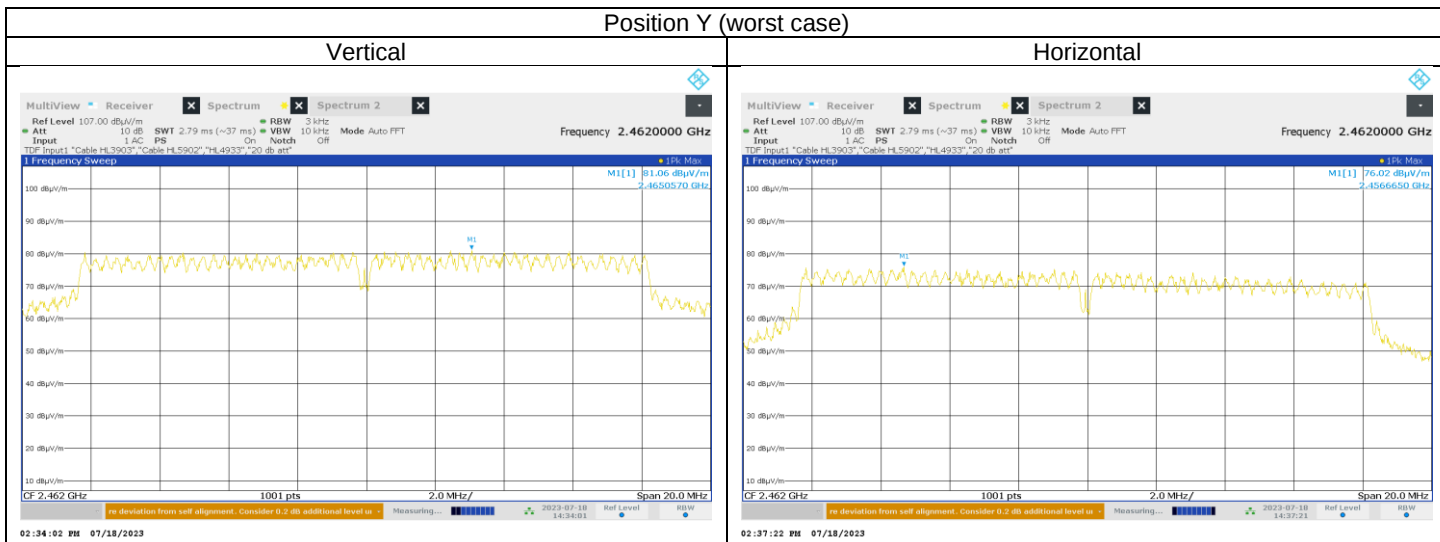
Report ID: ESSRAD_FCC.50382_WiFi.docx

Date of Issue: 25-Jan-24

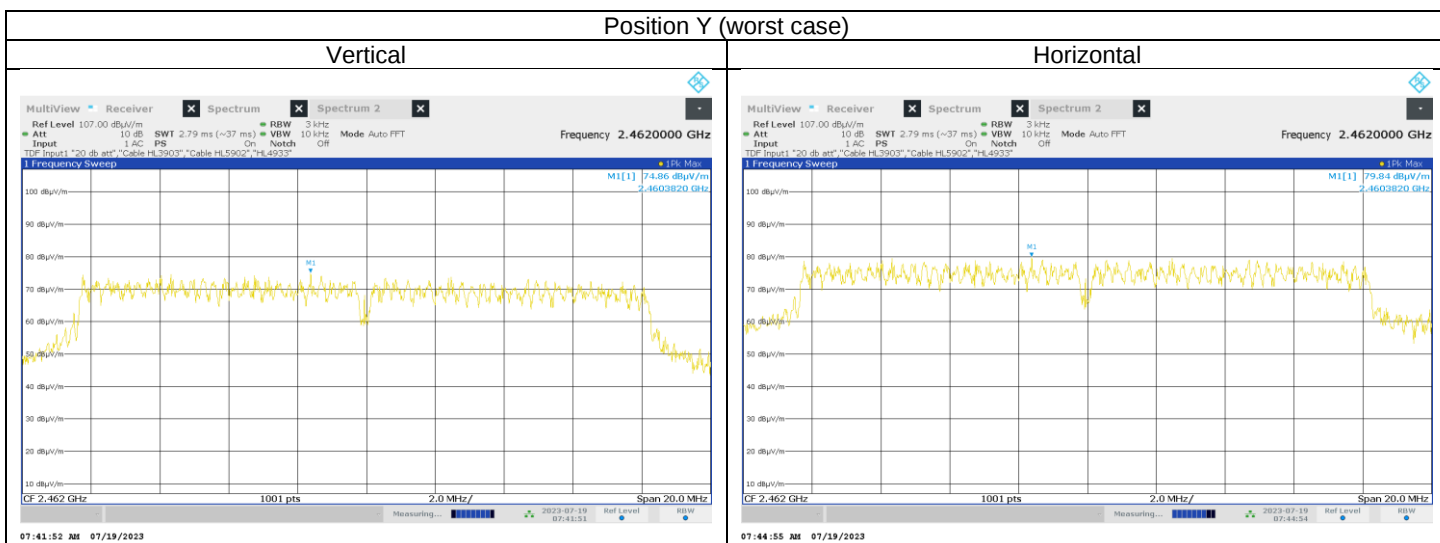
Test specification: Section 15.247(e) / RSS-247 section 5.2(b), Maximum power spectral density			
Test procedure: ANSI C63.10 section 11.9.2.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Jul-23			
Temperature: 25 °C	Relative Humidity: 59 %	Air Pressure: 1012 hPa	Power: 4.3 VDC
Remarks:			

Field strength of carrier at high frequency

CHANNEL BANDWIDTH: 20 MHz
MODULATION / BITRATE: BPSK / 6 Mbps



CHANNEL BANDWIDTH: 20 MHz
MODULATION / BITRATE: 64QAM / 54 Mbps





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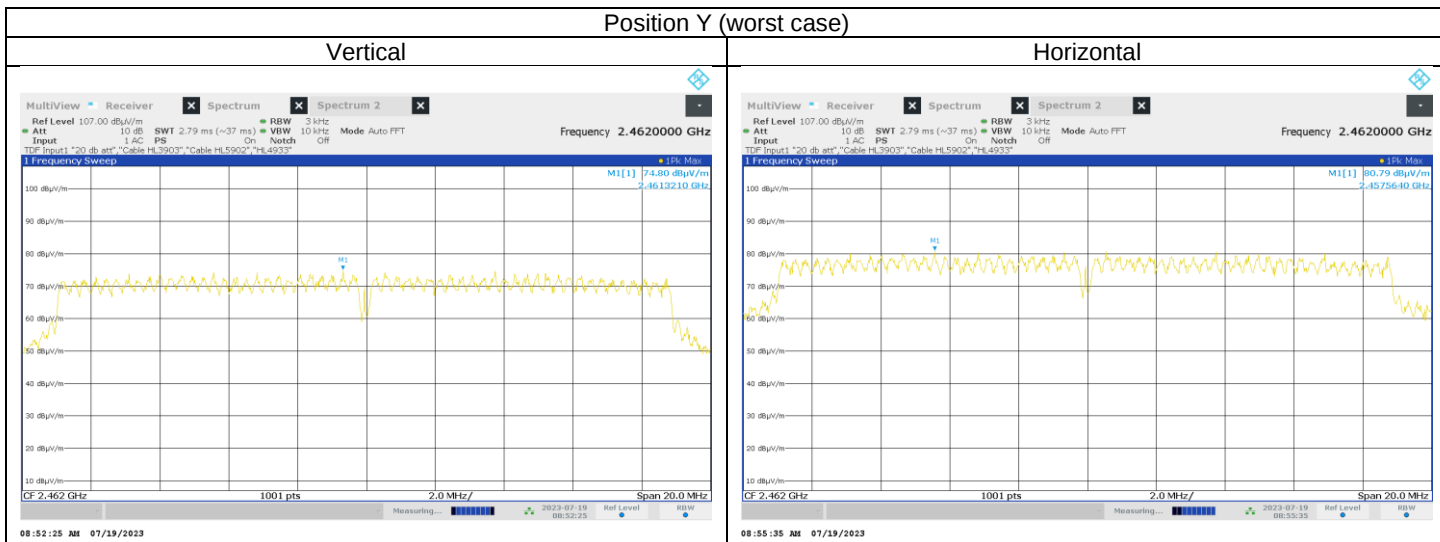
Report ID: ESSRAD_FCC.50382_WiFi.docx

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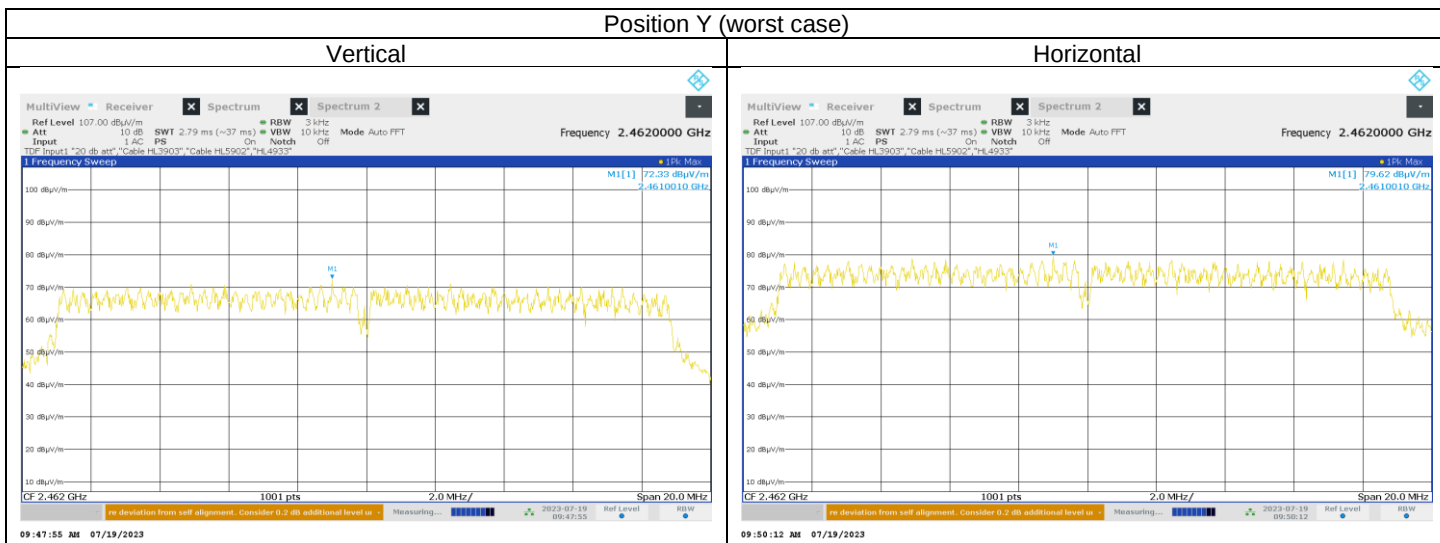
Test specification: Section 15.247(e) / RSS-247 section 5.2(b), Maximum power spectral density			
Test procedure: ANSI C63.10 section 11.9.2.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Jul-23			
Temperature: 25 °C	Relative Humidity: 59 %	Air Pressure: 1012 hPa	Power: 4.3 VDC
Remarks:			

Field strength of carrier at high frequency

CHANNEL BANDWIDTH: 20 MHz
MODULATION / BITRATE: BPSK/ 6.5 Mbps



CHANNEL BANDWIDTH: 20 MHz
MODULATION / BITRATE: 64QAM/ 65 Mbps





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Report ID: ESSRAD_FCC.50382_WiFi.docx
Date of Issue: 25-Jan-24

Test specification:		Section 15.247(e) / RSS-247 section 5.2(b), Maximum power spectral density	
Test procedure:		ANSI C63.10 section 11.9.2.2.4	
Test mode:		Verdict: PASS	
Date(s):			
23-Jul-23			
Temperature: 25 °C	Relative Humidity: 59 %	Air Pressure: 1012 hPa	Power: 4.3 VDC
Remarks:			

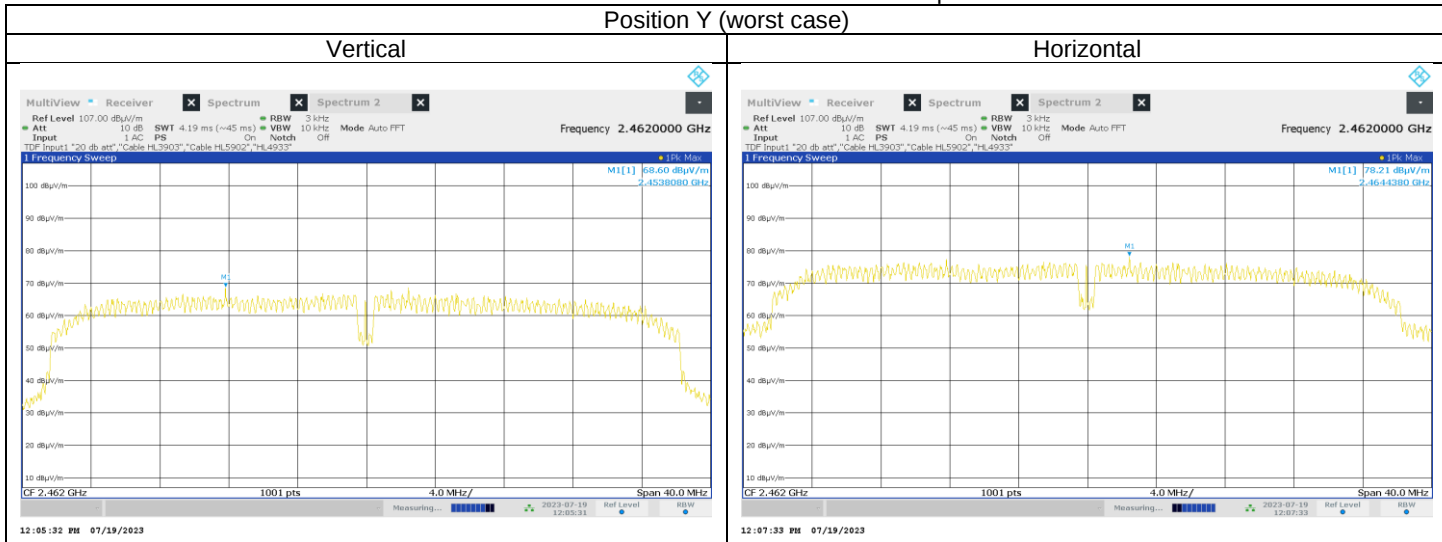


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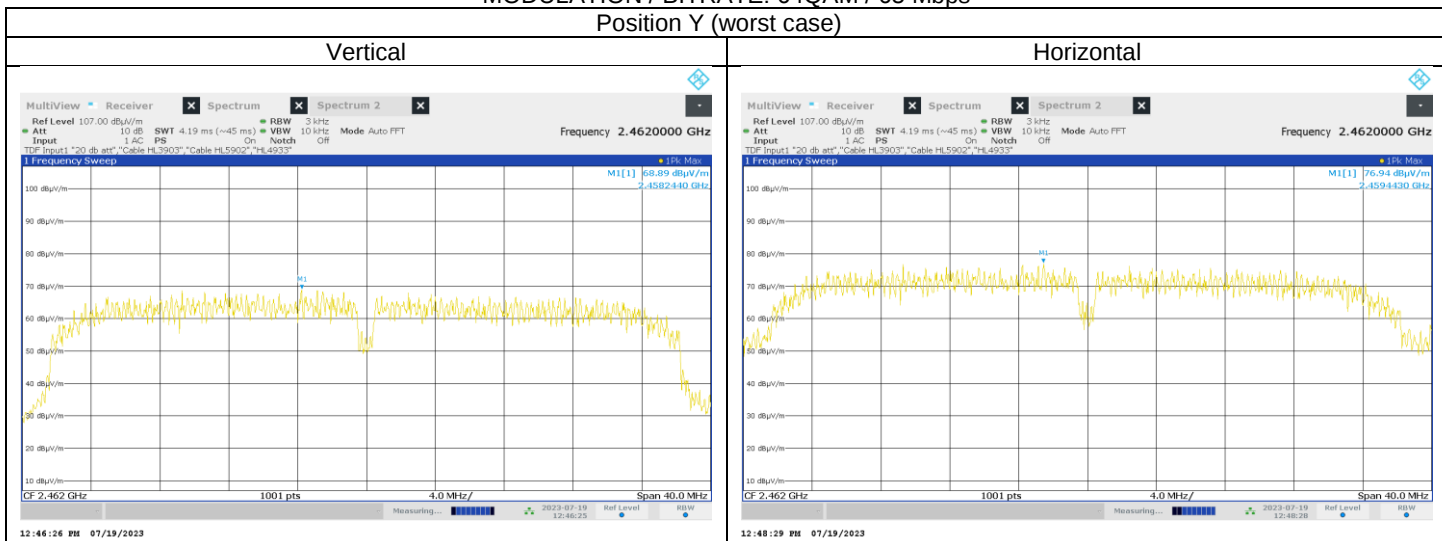
Test specification: Section 15.247(e) / RSS-247 section 5.2(b), Maximum power spectral density			
Test procedure: ANSI C63.10 section 11.9.2.2.4			
Test mode: Compliance		Verdict: PASS	
Date(s): 23-Jul-23			
Temperature: 25 °C	Relative Humidity: 59 %	Air Pressure: 1012 hPa	Power: 4.3 VDC
Remarks:			

Field strength of carrier at high frequency

CHANNEL BANDWIDTH: 40 MHz
MODULATION / BITRATE: BPSK/ 6.5 Mbps



CHANNEL BANDWIDTH: 40 MHz
MODULATION / BITRATE: 64QAM / 65 Mbps





Test specification: FCC section 15.203, RSS-Gen section 6.8, Antenna requirement			
Test procedure: Visual inspection			
Test mode: Compliance		Verdict: PASS	
Date(s): 10-Aug-23 - 14-Aug-23			
Temperature: 25 °C	Relative Humidity: 59 %	Air Pressure: 1012 hPa	Power: 4.3 VDC
Remarks:			

7.6 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.6.1.

Table 7.6.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
2976	Fieldmeter with EF2 isotropic probe (100 kHz to 2.5 GHz, 0.1 V/m to 200 V/m).	CHAUVIN ARNOUX	C.A 43	2976	15-Dec-22	15-Dec-23
3521	Multimeter	Fluke	115	94771103	06-Jul-22	06-Jul-23
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFL EX 102A	1226/2A	16-Apr-23	16-Apr-24
4135	Shield Box	TESCOM CO., LTD	TC-5916A	5916A000 136	03-May-23	03-May-24
4339	High pass Filter, 50 Ohm, 1000 to 18000 MHz, SMA-FM / SMA-M	Micro-Tronics	HPM5011 5-02	001	21-Jun-23	21-Jun-25
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	19-Jan-23	19-Jan-24
4976	Magnetic Field HiTester, with 100 cm ² and 3 cm ² sensors, ICNIRP 2010	Hioki	FT3470-50	150232060	13-Apr-22	13-Apr-24
5288	Trilog Antenna, 25 MHz - 8 GHz, 100W	Frankonia	ALX-8000E	00809	24-Mar-22	24-Mar-25
5376	EXA Signal Analyzer, 10 Hz - 32 GHz	Keysight Technologies	N9010B	MY57470404	27-Dec-22	27-Dec-23
5624	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB, DC to 18 GHz	Mini Circuits	BW-N20W5+	NA	08-Mar-23	08-Mar-24
5644	Cable, 50 Ohm, DC to 18 GHz, 1.8 m, SMA/SMA	Mini Circuits	CBL-6FT-SMSM+	NA	29-Nov-22	29-Nov-23
5902	RF cable, 18 GHz, 6.0m, N-type	Huber-Suhner	SF126EA/11N/11N/6000	NA	08-Dec-22	08-Dec-23
7546	Power supply 60VDC/12.5A	Agilent Technologies	N5747A	US25F6762C	16-May-23	16-May-24
7585	EMI Test Receiver, 1 Hz to 44 GHz	Rohde & Schwarz	ESW44	103130	19-Sep-22	21-Sep-23

9 APPENDIX B Test equipment correction factors

HL 5288: Trilog Antenna
Frankonia, model: ALX-8000E, s/n: 00809

Frequency, MHz	Antenna factor, dB/m
1000	26.9
1100	28.1
1200	28.4
1300	29.6
1400	29.1
1500	30.4
1600	30.7
1700	31.5
1800	32.3
1900	32.6
2000	32.5
2100	32.9
2200	33.5
2300	33.2
2400	33.7
2500	34.6
2600	34.7
2700	34.6
2800	35.0
2900	35.5
3000	36.2
3100	36.8
3200	36.8
3300	37.0
3400	37.5
3500	38.2

Frequency, MHz	Antenna factor, dB/m
3600	38.9
3700	39.4
3800	39.4
3900	39.6
4000	39.7
4100	39.8
4200	40.5
4300	40.9
4400	41.1
4500	41.4
4600	41.3
4700	41.6
4800	41.9
4900	42.3
5000	42.7
5100	43.0
5200	42.9
5300	43.5
5400	43.6
5500	44.3
5600	44.7
5700	45.0
5800	45.0
5900	45.3
6000	45.9

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.

HL 4933 Active Horn Antenna, 1 GHz to 18 GHz
COM-POWER CORPORATION AHA-118 , s/n 701046

Frequency, MHz	Measured antenna factor, dB/m
1000	-16.1
1050	-16.0
1100	-15.1
1150	-16.4
1200	-16.0
1250	-15.6
1300	-15.1
1350	-14.8
1400	-15.1
1450	-15.1
1500	-15.5
1550	-15.2
1600	-14.7
1650	-14.4
1700	-14.4
1750	-14.0
1800	-13.6
1850	-12.7
1900	-11.9
1950	-11.9
2000	-11.8
2050	-11.3
2100	-11.3
2150	-11.7
2200	-12.3
2250	-12.3
2300	-12.4
2350	-12.2
2400	-11.7
2450	-11.5
2500	-11.5
2550	-11.5
2600	-11.5
2650	-11.3
2700	-11.3
2750	-11.1
2800	-11.1
2850	-11.3
2900	-11.1
2950	-11.0
3000	-11.1
3050	-10.9
3100	-10.7
3150	-10.6

Frequency, MHz	Measured antenna factor, dB/m
3200	-11.2
3250	-10.8
3300	-10.8
3350	-10.7
3400	-10.3
3450	-10.2
3500	-10.1
3550	-10.4
3600	-10.5
3650	-10.4
3700	-10.4
3750	-10.3
3800	-10.1
3850	-10.0
3900	-9.9
3950	-9.8
4000	-9.7
4050	-9.3
4100	-8.6
4150	-8.2
4200	-8.3
4250	-8.5
4300	-8.5
4350	-8.3
4400	-8.0
4450	-7.7
4500	-7.6
4550	-7.4
4600	-7.5
4650	-7.8
4700	-7.6
4750	-6.8
4800	-6.1
4850	-5.7
4900	-5.8
4950	-5.8
5000	-6.0
5050	-5.7
5100	-5.4
5150	-5.1
5200	-4.6
5250	-4.6
5300	-4.8
5350	-5.1

10 APPENDIX C Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

11 APPENDIX D Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.

Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), ISED #2186A, CAB identifier is IL1001; Certified by VCCI, Japan (the registration numbers for OATS are R-10808 for RE measurements below 1 GHz, G-20112 for RE measurements above 1 GHz, R-11082 for anechoic chamber for RE measurements below 1 GHz, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).

The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

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Person for contact: Mr. Michael Nikishin, EMC and radio group manager

12 APPENDIX E Specification references

FCC 47CFR part 15: 2020	Radio Frequency Devices
ANSI C63.10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-247 Issue 2: 2017	Digital Transmission Systems (DTSSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 5 with _amendment_1_2: 2021	General Requirements and Information for the Certification of Radiocommunication Equipment

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF DOCUMENT