

Skytech II, Inc.

TEST REPORT

Model:

5301-B, 5301P-B, RC-5301P-B

REPORT NUMBER

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Radio Spectrum TEST REPORT

Applicant:	Skytech II, Inc. 9230 Conservation Way, Ft. Wayne, IN 46809, USA
Product:	Remote control transmitter
Model No.:	5301-B, 5301P-B, RC-5301P-B
FCC ID:	K9L5301R2TX
Test Method/ Standard:	47 CFR FCC Part 15.231
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 17, Ln. 246, Niupu S. Rd., Xiangshan Dist, Hsinchu City 300075, Taiwan



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Revision History

Report No.	Issue Date	Revision Summary
231200195THC-001	Mar. 07, 2024	Original report

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Summary of Test Data

Test Requirement	Applicable Rule	Result
Radiated Emission test	15.231(b), 15.209	Pass
Measured bandwidth	15.231(c)	Pass
Timing requirement of operated transmitter	15.231(b)	Pass
Conducted Emission test	15.207	N/A
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Remote control transmitter
Model No.:	5301P-B
Operating Frequency:	303.8 MHz
Rated Power:	DC 6V
Power Cord:	N/A
Sample receiving date:	2023/12/21
Sample condition:	Workable
Test Date(s):	2024/01/10 ~ 2024/02/05

1.2 Additional information about the EUT

The customer confirmed the models listed as below were series model to model 5301P-B (EUT), the difference between main model and series model are listed as below.

Model Number	Different
5301-B	W/O Program function
5301P-B	With Program function
RC-5301P-B	With Program function

1.3 Antenna description

Antenna Type : Helical Antenna

Connector Type : Fixed

1.4 Operation mode

The EUT was supplied with DC 6V from battery.

The EUT is set in engineer mode to transmit continuously.

The signal is maximized through rotation and placement in the three orthogonal axes.



X axis



Y axis



Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at X axis. The final test data was executed under this configuration.

Frequency (MHz)	Signal on time(ms)	Signal on & off time(ms)	Duty Cycle	Duty Cycle factor
303.8	41.32	100.00	0.413	7.68

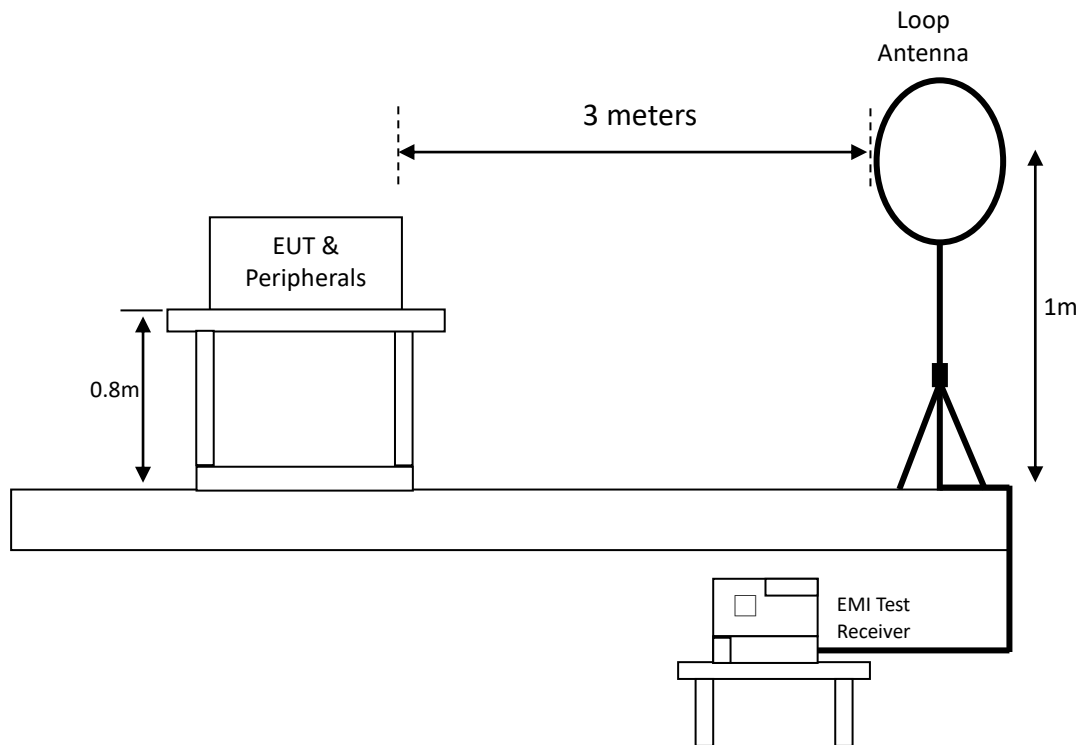
1.5 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
AAA Battery*4	GP	R03	N/A	N/A

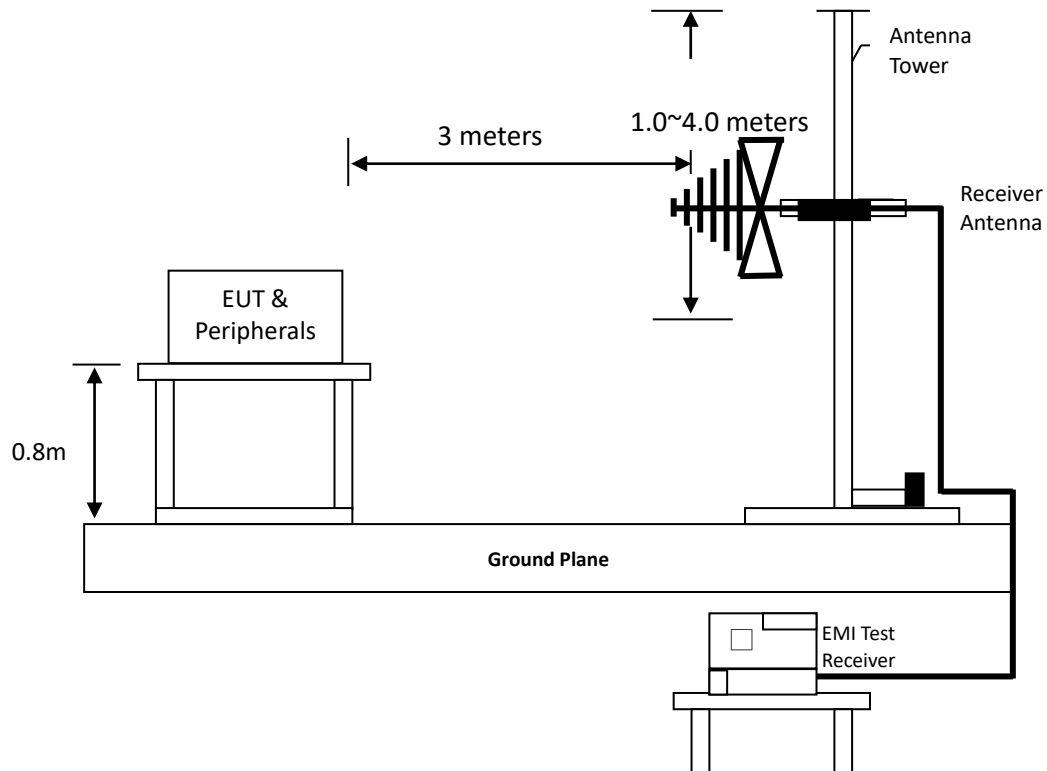
2. Radiated emission test FCC 15.231 (b)

2.1 Test setup & procedure

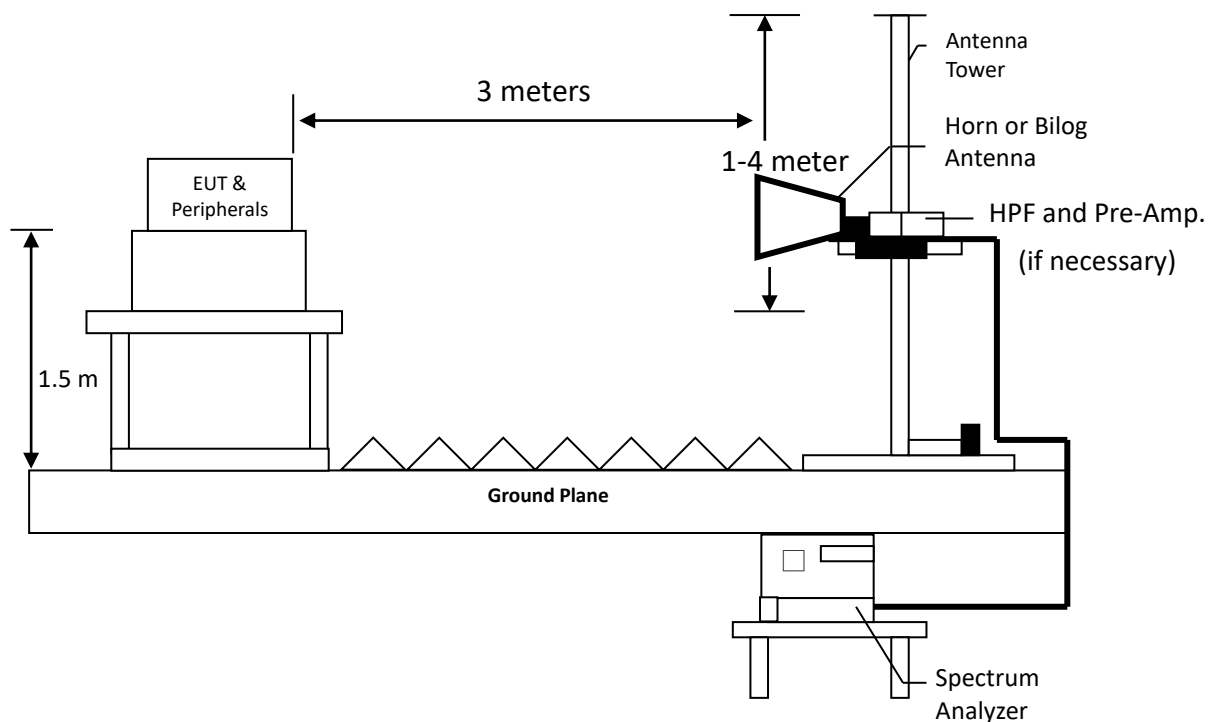
2.1.1 Radiated emission from 9kHz to 30MHz uses Loop Antenna:



2.1.2 Radiated emission below 1GHz using Bilog Antenna



2.1.3 Radiated emission above 1GHz using Horn Antenna



2.2 Radiated emission limit

2.2.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(uV/m@3 m)	(dBuV/m@3 m)	(uV/m@3 m)	(dBuV/m@3 m)
303.8	5575	74.92	557.5	54.92

2.2.2 General radiated emission limit

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency MHz	15.209 Limits (dBμV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

2.3 Radiated emission test data FCC 15.231

2.3.1 Measurement results: Fundamental emission

Temperature: 22 °C
 Relative Humidity: 68 %
 Test date: 2024/02/01

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarization	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
303.80	PK	H	21.74	53.16	74.90	94.92	-20.02
303.80	AV	H	-	-	67.22	74.92	-7.70
303.80	PK	V	21.74	40.74	62.48	94.92	-32.44
303.80	AV	V	-	-	54.80	74.92	-20.12

Remark: 1. Correction Factor = Antenna Factor + Cable Loss

2. AV Corrected Reading = PK Corrected Reading +Duty cycle correction factor (-7.68)

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2.3.2 Measurement results: frequencies equal to or less than 1 GHz

Temperature: 22 °C
Relative Humidity: 68 %
Test date: 2024/01/10

9kHz – 30MHz

Antenna Polarization	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.549	PK	18.20	19.24	37.44	72.81	-35.37
Perpendicular	1.389	PK	18.28	16.00	34.28	64.75	-30.47
Perpendicular	1.898	PK	18.18	14.00	32.18	69.54	-37.36
Perpendicular	2.618	PK	18.23	11.33	29.56	69.54	-39.98
Perpendicular	3.818	PK	18.70	11.43	30.13	69.54	-39.41
Perpendicular	6.787	PK	20.23	10.17	30.40	69.54	-39.14

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarization	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Parallel	0.519	PK	18.20	20.77	38.97	73.30	-34.33
Parallel	1.419	PK	18.28	16.33	34.61	64.56	-29.95
Parallel	1.838	PK	18.19	13.45	31.64	69.54	-37.90
Parallel	2.648	PK	18.23	13.66	31.89	69.54	-37.65
Parallel	7.897	PK	20.15	9.74	29.89	69.54	-39.65
Parallel	11.765	PK	20.76	8.13	28.89	69.54	-40.65

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarization	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Ground-parallel	0.519	PK	18.20	18.75	36.95	73.30	-36.35
Ground-parallel	1.329	PK	18.28	15.48	33.76	65.13	-31.37
Ground-parallel	2.468	PK	18.22	11.79	30.01	69.54	-39.53
Ground-parallel	5.947	PK	20.16	9.43	29.59	69.54	-39.95
Ground-parallel	10.986	PK	20.67	8.93	29.60	69.54	-39.94
Ground-parallel	15.304	PK	20.62	8.79	29.41	69.54	-40.13

Remark: Corr. Factor = Antenna Factor + Cable Loss

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Temperature: 23 °C
Relative Humidity: 75 %
Test date: 2024/02/01

30MHz – 1GHz

Antenna Polarization	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Horizontal	46.49	PK	20.48	4.30	24.78	74.92	-50.14
Horizontal	160.95	PK	20.64	2.95	23.59	74.92	-51.33
Horizontal	481.05	PK	26.04	3.15	29.19	74.92	-45.73
Horizontal	590.66	PK	28.63	3.74	32.37	74.92	-42.55
Horizontal	845.77	PK	32.64	5.45	38.09	74.92	-36.83
Horizontal	897.18	PK	33.24	5.23	38.47	74.92	-36.45

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarization	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	75.59	PK	17.11	10.82	27.93	74.92	-46.99
Vertical	146.40	PK	20.34	2.60	22.94	74.92	-51.98
Vertical	372.41	PK	23.61	3.67	27.28	74.92	-47.64
Vertical	634.31	PK	29.55	3.00	32.55	74.92	-42.37
Vertical	897.18	PK	33.24	4.49	37.73	74.92	-37.19
Vertical	934.04	PK	34.03	5.44	39.47	74.92	-35.45

Remark: Corr. Factor = Antenna Factor + Cable Loss

2.3.3 Measurement results: frequency above 1GHz

Temperature: 21 °C
 Relative Humidity: 77 %
 Test date: 2024/02/05

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
1519	PK	H	31.06	23.26	54.32	74.00	-19.68
1519	AV	H	-	-	46.64	54.00	-7.36
1822.8	PK	H	31.25	15.19	46.44	74.92	-28.48
2126.6	PK	H	33.82	25.44	59.26	74.92	-15.66
2126.6	AV	H	-	-	51.58	54.92	-3.34
2430.4	PK	H	34.43	25.65	60.08	74.92	-14.84
2430.4	AV	H	-	-	52.40	54.92	-2.52
2734.2	PK	H	35.61	21.34	56.95	74.00	-17.05
2734.2	AV	H	-	---	49.27	54.00	-4.73
1519	PK	V	31.06	16.00	47.06	74.00	-26.94
1822.8	PK	V	31.25	17.89	49.14	74.92	-25.78
2126.6	PK	V	33.82	17.77	51.59	74.92	-23.33
2522.4	PK	V	34.52	18.65	53.17	74.92	-21.75
3038	PK	V	36.46	18.98	55.44	74.92	-19.48
3038	AV	V	-	-	47.76	54.92	-7.16

Remark: 1. Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain
 2. AV Corrected Reading = PK Corrected Reading +Duty cycle correction factor (-7.68)

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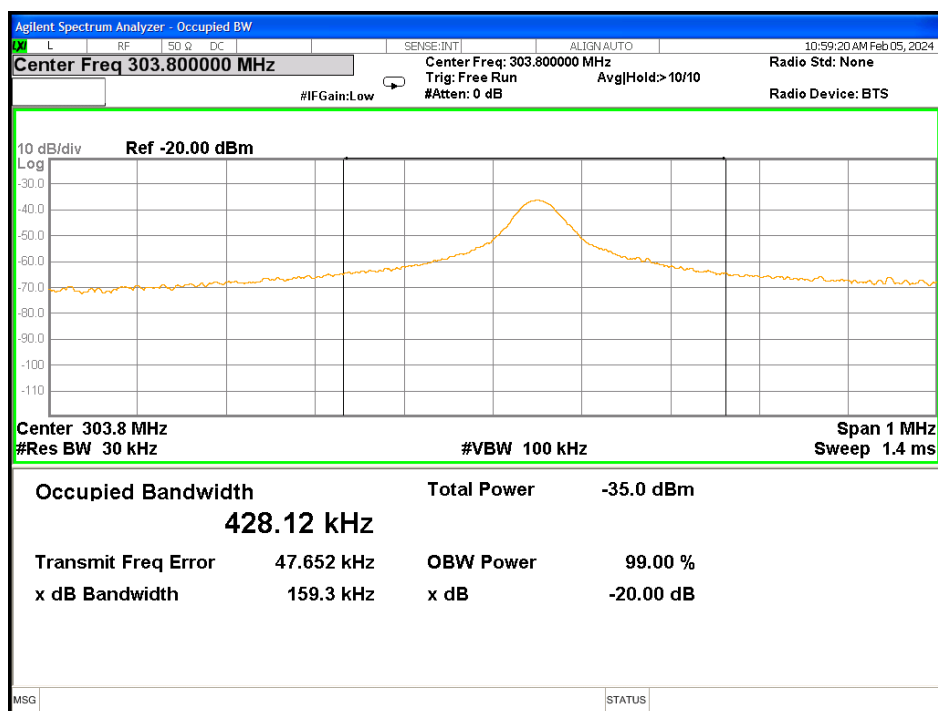
3. Measured bandwidth FCC 15.231(C)

Temperature: 21 °C
 Relative Humidity: 78 %
 Test date: 2024/02/05

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

Frequency (MHz)	20dB Occupied Bandwidth (MHz)	Limit (MHz)	Result
303.80	0.159	0.760	Pass

20dB Occupied Bandwidth



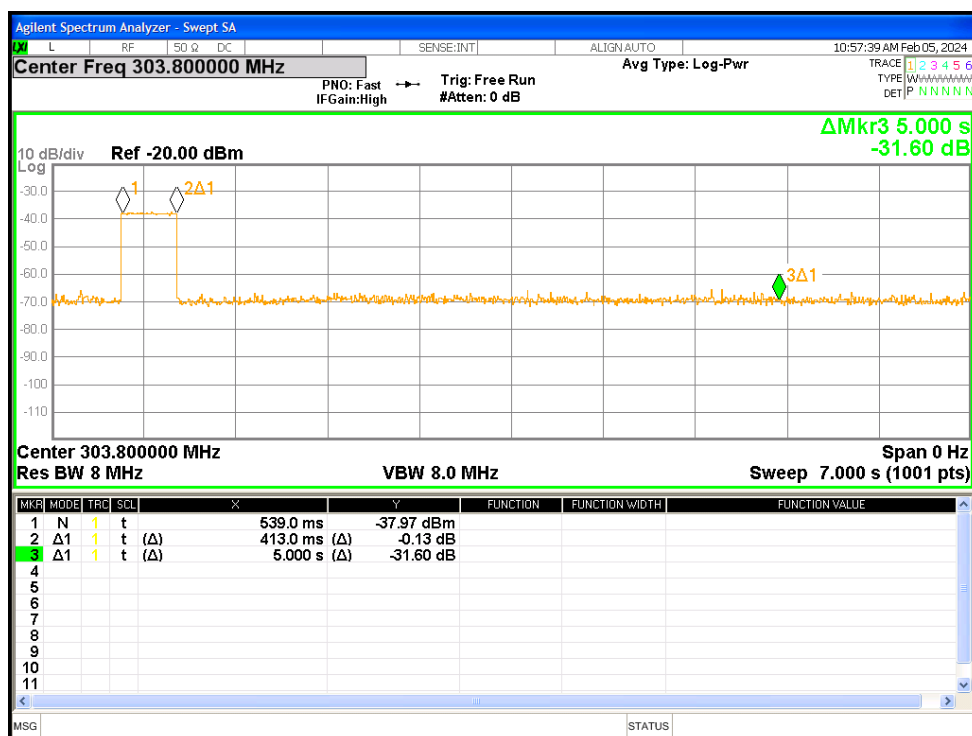
4. Timing requirement of operated transmitter

Temperature: 21 °C
 Relative Humidity: 78 %
 Test date: 2024/02/05

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Frequency (MHz)	Transmission Time (s)	Limit (s)	Result
303.80	0.413	< 5	Pass

Transmitter Pulse Duration



5. Conducted emission FCC 15.207

Since the EUT is not connected to AC source, therefore, the test can be waived.

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	KEYSIGHT	N9038B	MY63060107	2023/04/02	2024/04/01
Spectrum analyzer	KEYSIGHT	N9020B	MY63450146	2023/04/01	2024/03/31
Signal Analyzer	R&S	FSV40	101532	2023/08/03	2024/08/02
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-067	2023/02/21	2024/02/20
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-172	2024/01/02	2025/01/01
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-456	2023/12/27	2024/12/26
966-2(A) Cable	SUHNER	SUCOFLEX 104	295105/4	2023/03/03	2024/03/01
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2023/03/03	2024/03/01
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2023/08/01	2024/07/31
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

Item	Uncertainty
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	2.73 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.91 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.49 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Conducted Measurement	0.69 dB
AC Conducted Emission	1.31 dB