EMC TEST REPORT

Applicant	SKSpruce Technologies Co., Ltd.
FCC ID	2AHKT-WOA5300-20
Product	Outdoor Access Point
Brand	SKSPRUCE
Model	WOA5300-20
Report No.	R1805A0243-E1V1
Issue Date	September 21, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2017)/ ANSI C63.4 (2014)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Wei Liu

Performed by: Wei Liu/ Manager

Guangchang Fan

Approved by: Guangchang Fan/ Director

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	15.107, ANSI C63.4-2014	PASS
Test Date: June 4, 2018~ June 20, 2018			

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

2 General Description of Equipment under Test

2.1 Client Information

Applicant	SKSpruce Technologies Co., Ltd.
Applicant address	A1, Tianfu Software Park, 1129 Century City Road, Hi-tech Zone, Chengdu, China
Manufacturer	SKSpruce Technologies Co., Ltd.
Manufacturer address	A1, Tianfu Software Park, 1129 Century City Road, Hi-tech Zone, Chengdu, China

2.2 General information

EUT Description			
Device Type:	Movable Device		
Model Number:	WOA5300-20		
SN:	8162017081500043		
HW Version:	A0		
SW Version:	AmOS 3.0		
Antenna Type:	Internal Antenna		
Frequency:		TX:	RX:
	WIFI 2.4G:	2400MHz ~ 2483.5MHz	2400MHz ~ 2483.5MHz
	WIFI 5G(U-NII-1):	5150MHz ~ 5250MHz	5150MHz ~ 5250MHz
	WIFI 5G(U-NII-2A):	5250MHz ~ 5350MHz	5250MHz ~ 5350MHz
	WIFI 5G(U-NII-2C):	5470MHz ~ 5725MHz	5470MHz ~ 5725MHz
	WIFI 5G(U-NII-3):	5725MHz ~ 5850MHz	5725MHz ~ 5850MHz
Modulation:	WLAN 802.11b: DSSS WLAN 802.11a/g/n/ac: OFDM		
Test Mode:	Transfer Data Mode		
EUT Accessory			
Adapter	Manufacturer: PROCET(Creative Lianjie Network Technology Co.Ltd) Model: PT-PSE106GRO		
Auxiliary test equipment			
PC	PC Manufacturer: Dell Model: E5450 (SN : P48G001)		
Note: The information of the EUT is declared by the manufacturer.			

2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards
FCC Code CFR47 Part15B (2017)
ANSI C63.4 (2014)

2.4 Test Mode

Test Mode	
Mode 1:	Adapter + LAN cable+Idle

3 Test Case Results

3.1 Radiated Emission

Ambient condition

Temperature	Relative humidity	Pressure
24°C~26°C	45%~50%	102.5kPa

Methods of Measurement

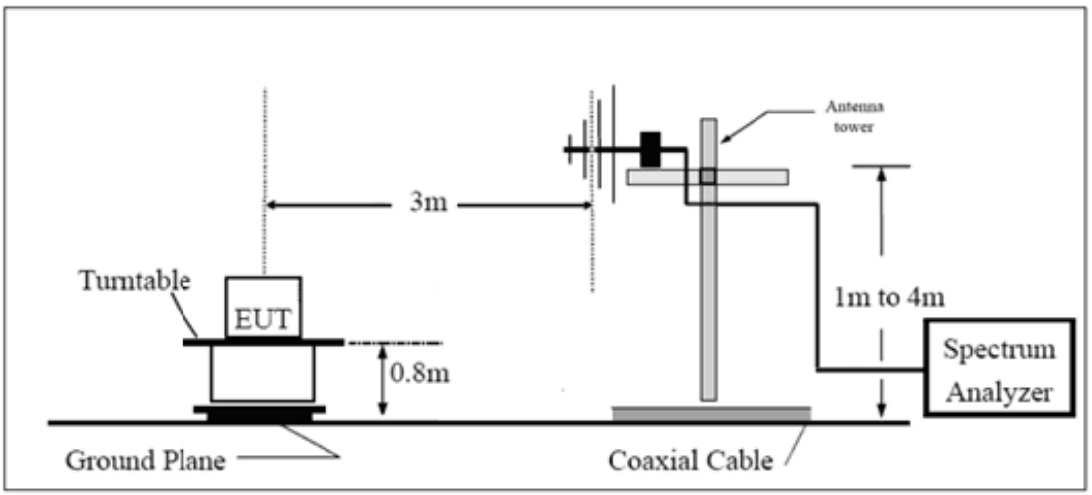
The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.
Set the spectrum analyzer in the following:
Below 1GHz:
RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=1MHz / VBW=3MHz/ Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=1Hz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

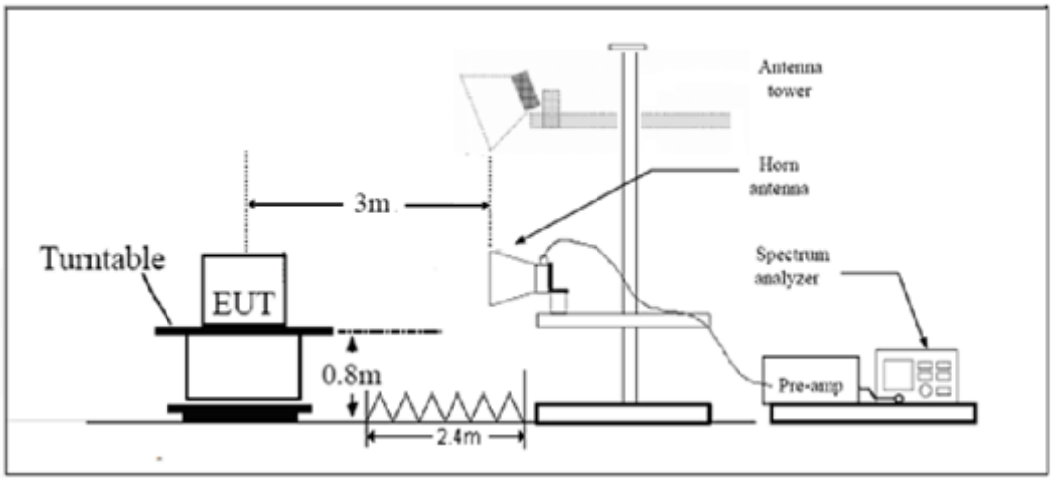
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup

Below 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

Limits

Frequency (MHz)	Field Strength (dBμV/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5th harmonic of the highest frequency or 40GHz,which is lower	54 74	Average Peak

Measurement Uncertainty

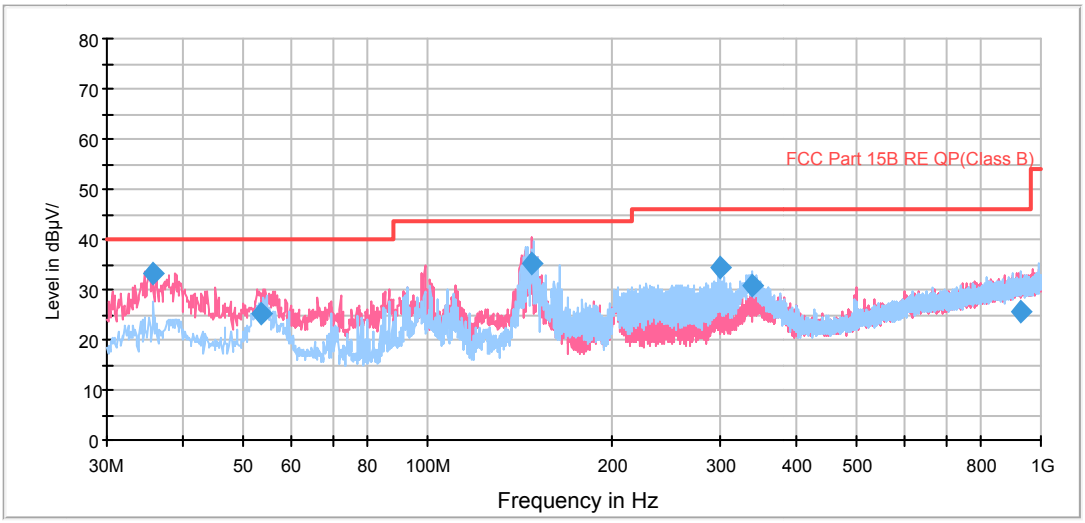
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96. U= 3.704 dB.

Test Results

The following graphs display the maximum values of horizontal and vertical by software.
For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

Sweep the whole frequency band through the range from 9kHz to the 5th harmonic of the carrier, the Emissions in the frequency band 9kHz-30MHz and 18GHz-26.5GHz are more than 20dB below the limit are not reported.

FCC RE 0.03-1GHz QP Class B



Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
35.653750	33.1	20.8	100.0	V	0.0	12.3	6.9	40.0
53.568750	25.4	12.6	100.0	V	96.0	12.8	14.6	40.0
147.531250	35.4	26.2	100.0	V	0.0	9.2	8.1	43.5
299.052500	34.4	18.7	100.0	H	289.0	15.7	11.6	46.0
338.578750	30.9	14.2	100.0	H	104.0	16.7	15.1	46.0
925.993750	25.8	-1.2	125.0	H	274.0	27.0	20.2	46.0

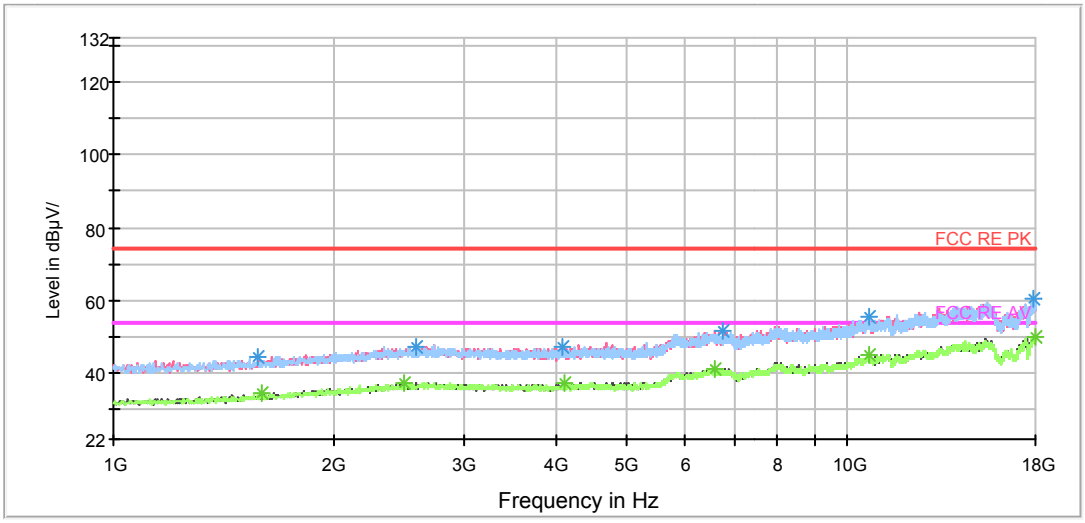
Remark: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

Frequency 30MHz: Correction Factor =Antenna factor (11.1) + Insertion loss (0.9) = 12

3. Margin = Limit – Quasi-Peak

FCC RE 1G-18GHz PK+AV Class B



Radiated Emission from 1GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1573.750000	44.4	50.4	100.0	H	0.0	-6.0	29.6	74
2581.000000	47.5	48.3	100.0	V	298.0	-0.8	26.5	74
6750.250000	51.7	44.9	100.0	H	81.0	6.8	22.3	74
10692.125000	55.8	42.9	100.0	H	81.0	12.9	18.2	74
17938.375000	60.7	39.4	100.0	H	12.0	21.3	13.3	74
4098.250000	47.1	46.2	100.0	V	239.0	0.9	26.9	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1588.625000	34.4	40.3	100.0	V	0.0	-5.9	19.6	54
2493.875000	37.3	38.2	100.0	V	0.0	-0.9	16.7	54
4104.625000	37.5	36.6	100.0	H	28.0	0.9	16.5	54
6588.750000	41.3	33.8	100.0	H	0.0	7.5	12.7	54
10673.000000	45.0	32.1	100.0	V	358.0	12.9	9.0	54
18000.000000	50.3	28.2	100.0	H	4.0	22.1	3.7	54

3.2 Conducted Emission

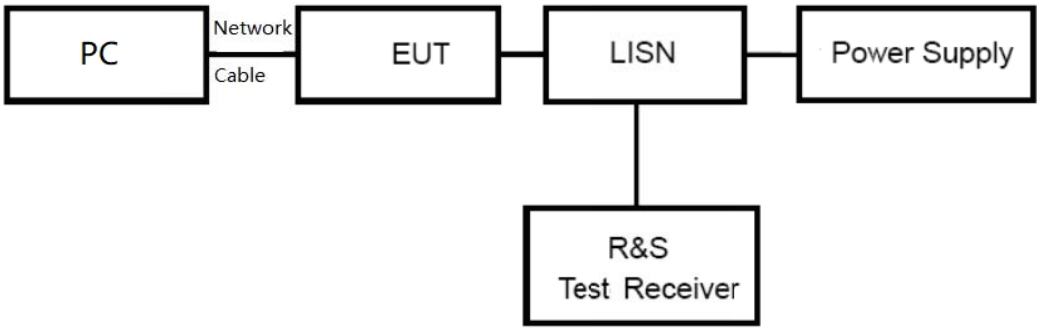
Ambient condition

Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

Limits

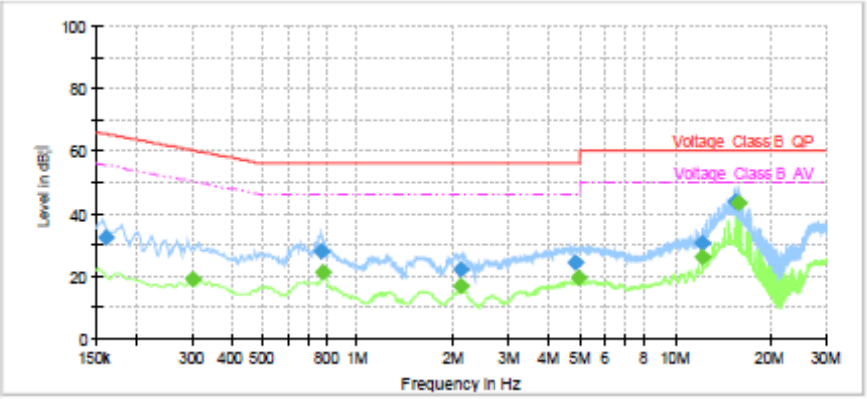
Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96. U= 2.57 dB.

Test Results

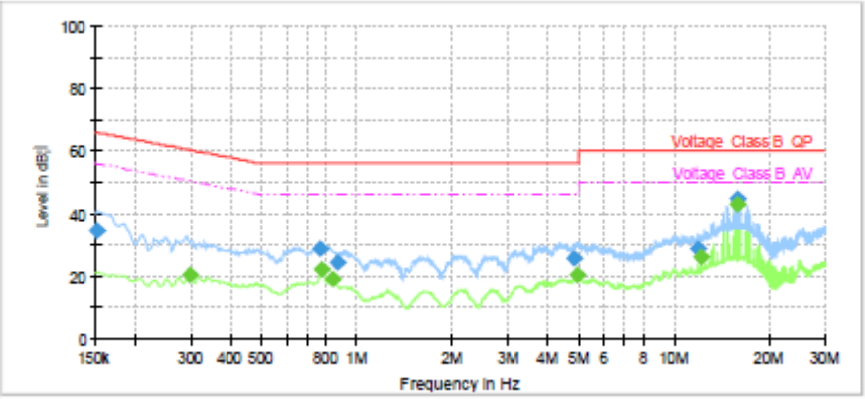
Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.161250	32.39	---	65.40	33.01	1000.0	9.000	L1	ON	19.1
0.300750	---	19.05	50.22	31.17	1000.0	9.000	L1	ON	19.2
0.766500	28.08	---	56.00	27.92	1000.0	9.000	L1	ON	19.2
0.777750	---	21.12	46.00	24.88	1000.0	9.000	L1	ON	19.2
2.098500	22.05	---	56.00	33.95	1000.0	9.000	L1	ON	19.1
2.103000	---	17.01	46.00	28.99	1000.0	9.000	L1	ON	19.1
4.866000	24.51	---	56.00	31.49	1000.0	9.000	L1	ON	19.1
4.931250	---	19.61	46.00	26.39	1000.0	9.000	L1	ON	19.1
12.180750	30.67	---	60.00	29.33	1000.0	9.000	L1	ON	19.4
12.180750	---	26.11	50.00	23.89	1000.0	9.000	L1	ON	19.4
15.526500	43.89	---	60.00	16.11	1000.0	9.000	L1	ON	19.4
15.762750	---	43.22	50.00	6.78	1000.0	9.000	L1	ON	19.4

L line

Conducted Emission from 150 KHz to 30 MHz



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	34.49	---	65.88	31.39	1000.0	9.000	N	ON	19.1
0.298500	---	20.54	50.28	29.74	1000.0	9.000	N	ON	19.2
0.762000	28.61	---	56.00	27.39	1000.0	9.000	N	ON	19.2
0.775500	---	22.03	46.00	23.97	1000.0	9.000	N	ON	19.2
0.838500	---	19.09	46.00	26.91	1000.0	9.000	N	ON	19.2
0.867750	24.34	---	56.00	31.66	1000.0	9.000	N	ON	19.2
4.854750	25.66	---	56.00	30.34	1000.0	9.000	N	ON	19.1
4.969500	---	20.48	46.00	25.52	1000.0	9.000	N	ON	19.1
11.951250	28.79	---	60.00	31.21	1000.0	9.000	N	ON	19.4
12.180750	---	25.99	50.00	24.01	1000.0	9.000	N	ON	19.4
15.760500	---	42.74	50.00	7.26	1000.0	9.000	N	ON	19.4
15.762750	44.60	---	60.00	15.40	1000.0	9.000	N	ON	19.4

N line

Conducted Emission from 150 KHz to 30 MHz

4 Main Test Instrument

Name	Manufacturer	Type	Serial Number	Last Cal.	Cal. Due Date
Signal Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
EMI Test Receiver	R&S	ESCI	100948	2018-05-20	2019-05-19
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-02-18	2019-02-17
Trilog Antenna	SCHWARZBECK	VULB 9163	9163-201	2017-11-18	2020-11-17
Horn Antenna	R&S	HF907	100126	2014-12-06	2019-12-05
Horn Antenna	ETS-Lindgren	3160-09	00102643	2015-01-30	2020-01-29
EMI Test Receiver	R&S	ESR	101667	2017-09-06	2018-09-05
LISN	R&S	ENV216	101171	2016-12-16	2019-12-15
Bore Sight Antenna mast	ETS	2171B	00058752	NA	NA
Test software	EMC32	R&S	V9.26.0	NA	NA

*******END OF REPORT *******