

Space Nano AT-314

Antenna Specification

SmartLink and Sidewalk FSK operating in 902-928MHz band

(Proprietary sub-GHz protocol, SRD multi-band radio,)

Type of antenna: shared fixed internal antenna; **Antenna gain:** -6.1 dBi

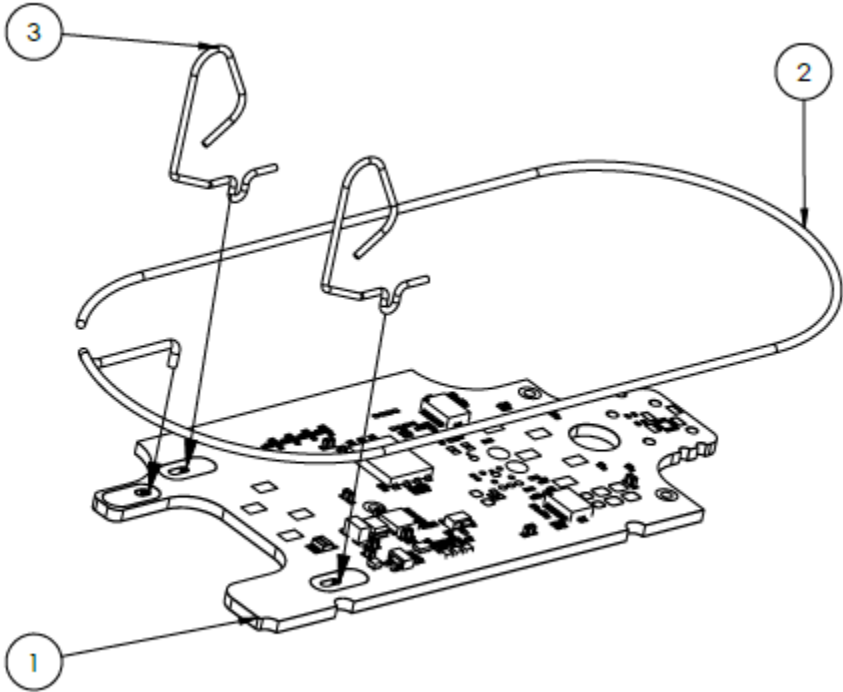
Bluetooth operating in 2402~2480MHz band

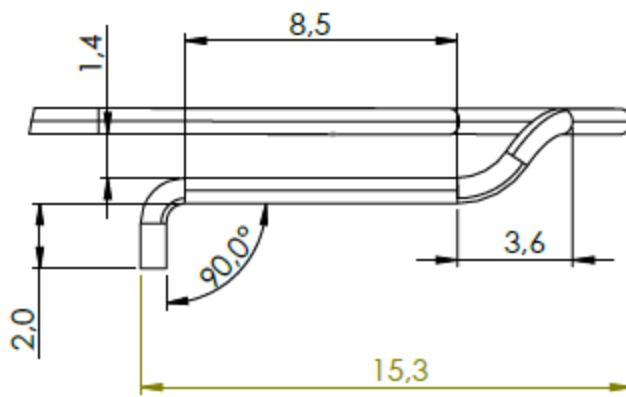
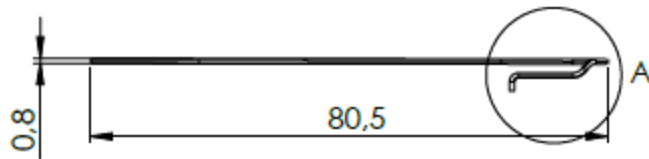
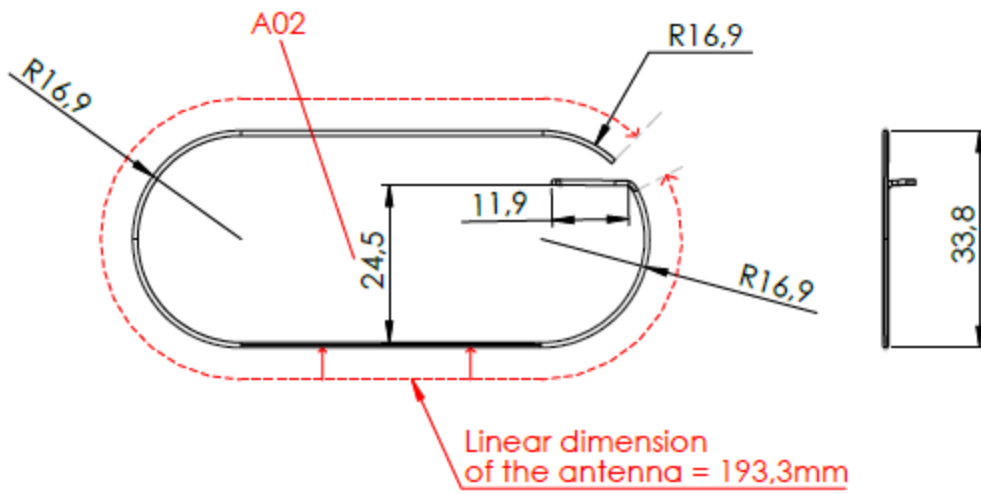
Type of antenna: shared fixed internal antenna; **Antenna gain:** 2.8 dBi

Device	AT-314	
Frequency	915 MHz	2440 MHz
Conducted (dBm)	11.5	2.8
TRP (dBm)	0.7	1.2
Peak EIRP (dBm)	5.5	5.6
Directivity (dBm)	4.7	4.5
Efficiency (dB)	-10.8	-1.7
Gain (dBi)	-6.1	2.8

Shared fixed internal antenna is an integrated 5/8 lambda wire antenna that is soldered onto the board and slotted in around the perimeter of the product housing.

Antenna mechanical drawings





DÉTAIL A
ECHELLE 5 : 1

Good soldering is mandatory



915MHz Radiated measured results

Conducted (dBm)	11.5
TRP (dBm)	0.7
Peak EIRP (dBm)	5.5
Directivity (dBm)	4.7
Efficiency (dB)	-10.8
Gain (dBi)	-6.1

$$TPR = \frac{1}{(N_{th} N_{ph})} \sum_{i=0}^{N_{th}-1} \sum_{j=0}^{N_{ph}-1} EIRP(i, j)$$

Horiz Power (dBm)							
	0	30	60	90	120	150	180
0	-1.35E-01	-4.68E+00	-1.35E+01	-5.43E+00	-3.21E+00	1.53E-01	-1.56E+00
30	-9.67E-01	-5.61E+00	-1.10E+01	-4.69E+00	-2.78E+00	-1.10E-03	-1.89E+00
60	-4.70E+00	-1.08E+01	-7.89E+00	-3.96E+00	-3.06E+00	-2.12E+00	-4.41E+00
90	-1.53E+01	-1.39E+01	-5.05E+00	-3.79E+00	-4.72E+00	-7.26E+00	-1.16E+01
120	-8.40E+00	-5.58E+00	-3.12E+00	-4.31E+00	-8.25E+00	-1.90E+01	-1.37E+01
150	-2.47E+00	-1.54E+00	-2.05E+00	-5.25E+00	-1.23E+01	-7.52E+00	-5.18E+00

180	-3.37E-01	2.96E-01	-1.63E+00	-5.73E+00	-1.34E+01	-4.08E+00	-2.06E+00
210	-2.44E-01	4.75E-01	-1.53E+00	-5.40E+00	-1.37E+01	-4.39E+00	-1.75E+00
240	-2.35E+00	-1.16E+00	-2.43E+00	-4.74E+00	-1.40E+01	-7.91E+00	-3.99E+00
270	-9.11E+00	-5.41E+00	-4.73E+00	-4.34E+00	-1.05E+01	-1.22E+01	-1.08E+01
300	-1.50E+01	-1.31E+01	-8.81E+00	-4.74E+00	-6.87E+00	-5.96E+00	-1.47E+01
330	-3.90E+00	-8.47E+00	-1.41E+01	-5.19E+00	-4.81E+00	-2.36E+00	-5.48E+00
360	-1.35E-01	-4.68E+00	-1.35E+01	-5.43E+00	-3.21E+00	1.53E-01	-1.56E+00

Vert Power (dBm)							
0	-1.41E+01	-1.52E+01	-1.49E+01	-1.40E+01	-8.04E+00	-8.46E+00	-8.13E+00
30	-6.16E+00	-6.19E+00	-3.17E+00	-2.51E+00	-4.38E+00	-1.68E+01	-1.75E+01
60	-2.16E+00	-8.60E-01	2.34E+00	2.94E+00	8.25E-01	-4.40E+00	-7.64E+00
90	-8.10E-01	8.57E-01	3.95E+00	4.90E+00	2.98E+00	-4.19E-01	-3.44E+00
120	-1.48E+00	7.13E-01	3.13E+00	4.41E+00	2.74E+00	5.05E-01	-2.46E+00
150	-4.58E+00	-1.45E+00	-6.80E-01	1.30E+00	-3.82E-01	-1.12E+00	-3.81E+00
180	-1.17E+01	-5.71E+00	-1.11E+01	-7.54E+00	-1.08E+01	-6.27E+00	-8.53E+00
210	-9.11E+00	-6.87E+00	-2.58E+00	-3.88E+00	-6.73E+00	-1.61E+01	-1.97E+01
240	-3.49E+00	-2.14E+00	2.83E+00	2.65E+00	2.45E-01	-5.55E+00	-8.36E+00
270	-1.52E+00	4.71E-01	4.71E+00	4.89E+00	2.40E+00	-1.75E+00	-3.92E+00
300	-2.19E+00	6.89E-01	4.23E+00	4.61E+00	2.06E+00	-6.94E-01	-2.46E+00
330	-4.82E+00	-2.00E+00	1.76E+00	1.62E+00	-3.81E-01	-1.79E+00	-2.93E+00
360	-1.41E+01	-1.52E+01	-1.49E+01	-1.40E+01	-8.04E+00	-8.46E+00	-8.13E+00

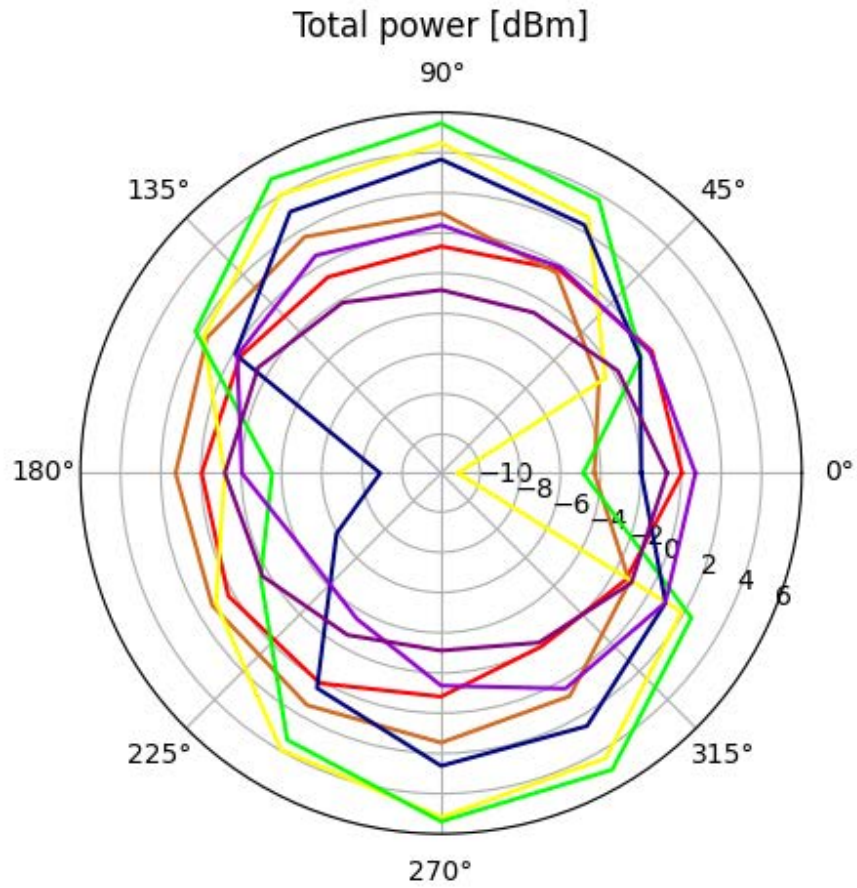
Total Power (dBm)							
0	0.0360889	-4.311792	-11.10445	-4.866194	-1.978536	0.7127115	-0.696751
30	0.1808387	-2.878473	-2.51059	-0.45629	-0.494135	0.0879885	-1.773716
60	-0.23831	-0.436994	2.733827	3.747906	2.3130668	-0.103268	-2.719875
90	-0.657765	0.9989863	4.4689374	5.452749	3.6608598	0.397176	-2.826453
120	-0.680735	1.6296955	4.0553913	4.9565573	3.0711085	0.55307	-2.143554
150	-0.383858	1.512104	1.6999793	2.1675616	-0.113088	-0.227314	-1.431108
180	-0.028239	1.2682554	-1.16455	-3.530544	-8.904748	-2.026573	-1.179116
210	0.285856	1.209774	0.9860708	-1.566645	-5.933179	-4.109642	-1.682008
240	0.1285492	1.3871981	3.9617849	3.3753625	0.4062922	-3.560955	-2.639505
270	-0.821185	1.4680741	5.1738903	5.3837726	2.6201345	-1.368917	-3.109022
300	-1.971199	0.8680047	4.4394602	5.0914473	2.5848092	0.4367406	-2.20367
330	-1.328053	-1.114347	1.8717925	2.4406683	0.9561356	0.9432876	-1.011684
360	0.0360889	-4.311792	-11.10445	-4.866194	-1.978536	0.7127115	-0.696751

Total Power (mW)							
0	1.0083444	0.3705278	0.0775452	0.3261224	0.6340834	1.1783414	0.851775
30	1.0425187	0.5154098	0.5609718	0.9002664	0.8924554	1.0204667	0.6647042
60	0.9466054	0.9042752	1.8766475	2.3702306	1.7033609	0.9765021	0.5345797
90	0.8594557	1.2586316	2.7982966	3.5097396	2.3231967	1.0957654	0.5216206
120	0.854922	1.455357	2.544129	3.1308029	2.0282003	1.1358134	0.6104423
150	0.9154069	1.4164799	1.4791013	1.6472373	0.9742966	0.9490051	0.7192654
180	0.9935189	1.3391386	0.7647949	0.443553	0.1286842	0.6271086	0.7622342
210	1.0680353	1.3212269	1.2548941	0.6971649	0.2550834	0.3881823	0.6788897

240	1.030042	1.3763212	2.4898804	2.1753856	1.098068	0.440458	0.5445648
270	0.8277164	1.4021918	3.2914634	3.4544368	1.8281569	0.7296394	0.4887624
300	0.6351555	1.2212385	2.7793678	3.2295702	1.813347	1.1057936	0.6020507
330	0.7365372	0.7736869	1.5387896	1.7541504	1.2462741	1.2425926	0.7921942
360	1.0083444	0.3705278	0.0775452	0.3261224	0.6340834	1.1783414	0.851775

Color coding:

Red = 0°, chocolate=30°, yellow = 60°, lime = 90°, navy = 120°, darkviolet = 150°, purple = 180°



2440MHz Radiated measured results

	dBm
Conducted	2.8
TRP (dBm)	1.2
Peak EIRP (dBm)	5.6
Directivity (dBm)	4.5
Efficiency (dB)	-1.7
Gain (dBi)	2.8

$$TPR = \frac{1}{(N_{th} N_{ph})} \sum_{i=0}^{N_{th}-1} \sum_{j=0}^{N_{ph}-1} EIRP(i, j)$$

Horiz Power (dBm)							
	0	30	60	90	120	150	180

0	8.47E-02	-6.24E+00	-6.18E+00	2.43E+00	2.18E+00	3.48E-01	1.28E+00
30	-1.58E+00	-4.59E+00	-7.54E+00	1.08E+00	8.91E-01	-5.88E+00	-1.46E+00
60	-5.82E+00	-3.34E+00	2.36E-01	-2.53E+00	-4.79E+00	-6.23E+00	-6.74E+00
90	-6.30E+00	-2.64E+00	3.48E+00	-2.79E+00	-2.15E+00	-7.47E+00	-1.08E+00
120	-2.70E+00	-2.58E+00	4.54E+00	3.80E+00	2.81E-01	-6.08E+00	1.68E+00
150	-1.64E+00	-2.82E+00	4.67E+00	5.41E+00	7.44E-01	-5.76E+00	2.17E+00
180	-1.60E+00	-3.49E+00	4.22E+00	5.58E+00	8.51E-01	-6.12E+00	2.02E+00
210	-3.42E+00	-4.06E+00	2.80E+00	5.12E+00	-1.43E+00	-5.95E+00	-3.77E-01
240	-8.41E+00	-4.43E+00	-3.54E-01	2.91E+00	-8.40E+00	-7.47E+00	-6.36E+00
270	-5.74E+00	-5.01E+00	-4.14E+00	-2.30E+00	-4.98E+00	-1.36E+01	-2.56E+00
300	-1.94E+00	-6.12E+00	-3.25E+00	-3.08E+00	-1.21E+00	-7.57E+00	3.52E-01
330	-6.78E-01	-7.44E+00	2.50E-01	1.39E+00	-3.84E-01	-4.05E+00	1.00E+00
360	8.47E-02	-6.24E+00	-6.18E+00	2.43E+00	2.18E+00	3.48E-01	1.28E+00

Vert Power (dBm)							
0	-1.10E+01	-1.06E+01	-1.59E+01	-1.19E+01	-9.87E+00	-5.15E+00	-1.09E+01
30	-5.25E+00	-6.91E+00	-1.25E+01	-7.35E+00	-3.56E+00	-1.07E+00	-2.88E+00
60	-2.06E+00	-5.96E+00	-8.42E+00	-5.78E+00	-5.97E-01	-5.01E-03	6.63E-01
90	-1.69E+00	-5.88E+00	-6.76E+00	-5.53E+00	9.36E-01	-9.59E-04	1.16E+00
120	-2.14E+00	-6.25E+00	-6.24E+00	-8.80E+00	3.63E-01	-2.78E+00	5.12E-01
150	-4.63E+00	-6.35E+00	-6.40E+00	-1.34E+01	-2.29E+00	-1.04E+01	-2.56E+00
180	-7.88E+00	-6.61E+00	-7.27E+00	-1.37E+01	-7.78E+00	-8.30E+00	-9.30E+00
210	-4.04E+00	-6.48E+00	-9.67E+00	-1.22E+01	-9.25E+00	-2.74E+00	-2.73E+00
240	-1.37E+00	-4.56E+00	-1.07E+01	-1.01E+01	-2.65E+00	-1.57E+00	7.64E-01
270	-1.14E+00	-4.02E+00	-7.53E+00	-9.37E+00	-1.05E+00	-1.49E+00	1.54E+00

300	-1.73E+00	-4.11E+00	-6.63E+00	-9.42E+00	-1.54E+00	-3.25E+00	9.88E-01
330	-4.11E+00	-6.89E+00	-7.33E+00	-8.10E+00	-4.00E+00	-6.99E+00	-1.30E+00
360	-1.10E+01	-1.06E+01	-1.59E+01	-1.19E+01	-9.87E+00	-5.15E+00	-1.09E+01

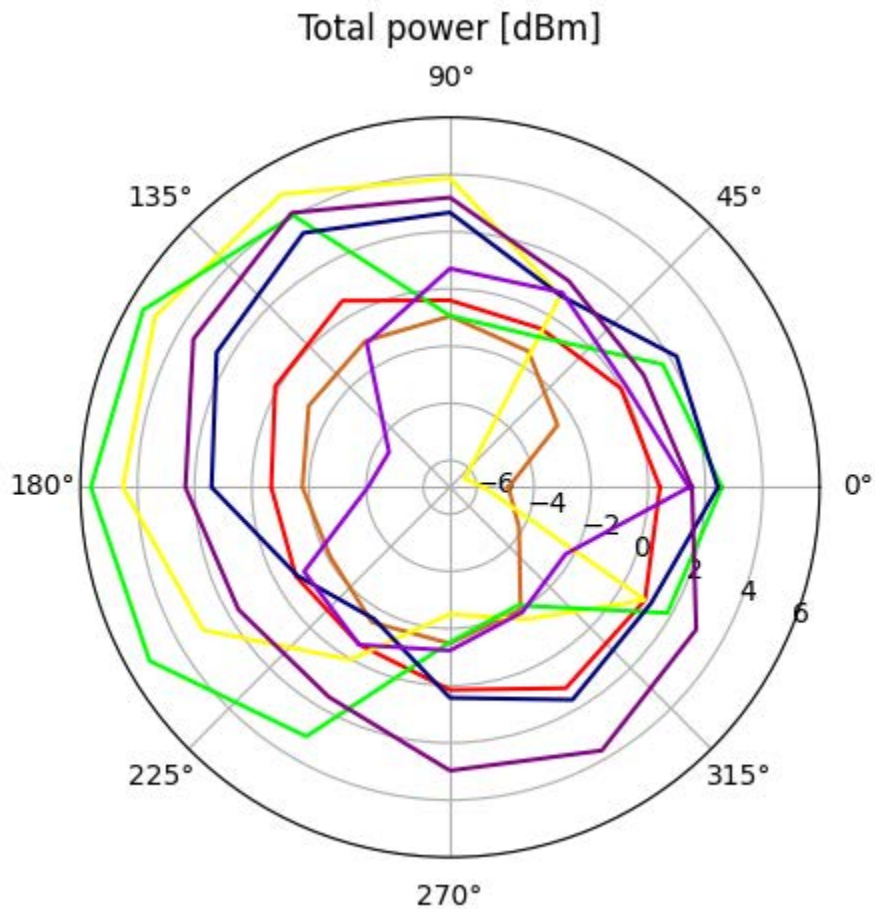
Total Power (dBm)							
0	0.0360889	-4.311792	-11.10445	-4.866194	-1.978536	0.7127115	-0.696751
30	0.1808387	-2.878473	-2.51059	-0.45629	-0.494135	0.0879885	-1.773716
60	-0.23831	-0.436994	2.733827	3.747906	2.3130668	-0.103268	-2.719875
90	-0.657765	0.9989863	4.4689374	5.452749	3.6608598	0.397176	-2.826453
120	-0.680735	1.6296955	4.0553913	4.9565573	3.0711085	0.55307	-2.143554
150	-0.383858	1.512104	1.6999793	2.1675616	-0.113088	-0.227314	-1.431108
180	-0.028239	1.2682554	-1.16455	-3.530544	-8.904748	-2.026573	-1.179116
210	0.285856	1.209774	0.9860708	-1.566645	-5.933179	-4.109642	-1.682008
240	0.1285492	1.3871981	3.9617849	3.3753625	0.4062922	-3.560955	-2.639505
270	-0.821185	1.4680741	5.1738903	5.3837726	2.6201345	-1.368917	-3.109022
300	-1.971199	0.8680047	4.4394602	5.0914473	2.5848092	0.4367406	-2.20367
330	-1.328053	-1.114347	1.8717925	2.4406683	0.9561356	0.9432876	-1.011684
360	0.0360889	-4.311792	-11.10445	-4.866194	-1.978536	0.7127115	-0.696751

Total Power (mW)							
0	1.0083444	0.3705278	0.0775452	0.3261224	0.6340834	1.1783414	0.851775
30	1.0425187	0.5154098	0.5609718	0.9002664	0.8924554	1.0204667	0.6647042
60	0.9466054	0.9042752	1.8766475	2.3702306	1.7033609	0.9765021	0.5345797
90	0.8594557	1.2586316	2.7982966	3.5097396	2.3231967	1.0957654	0.5216206
120	0.854922	1.455357	2.544129	3.1308029	2.0282003	1.1358134	0.6104423

150	0.9154069	1.4164799	1.4791013	1.6472373	0.9742966	0.9490051	0.7192654
180	0.9935189	1.3391386	0.7647949	0.443553	0.1286842	0.6271086	0.7622342
210	1.0680353	1.3212269	1.2548941	0.6971649	0.2550834	0.3881823	0.6788897
240	1.030042	1.3763212	2.4898804	2.1753856	1.098068	0.440458	0.5445648
270	0.8277164	1.4021918	3.2914634	3.4544368	1.8281569	0.7296394	0.4887624
300	0.6351555	1.2212385	2.7793678	3.2295702	1.813347	1.1057936	0.6020507
330	0.7365372	0.7736869	1.5387896	1.7541504	1.2462741	1.2425926	0.7921942
360	1.0083444	0.3705278	0.0775452	0.3261224	0.6340834	1.1783414	0.851775

Color coding:

Red = 0°, chocolate=30°, yellow = 60°, lime = 90°, navy = 120°, darkviolet = 150°, purple = 180°



Testsetup for radiated measurements

Hardware R&S®TS8991 OTA (Over The Air) performance test system. Additional RSE (Radiated Spurious Emission) test capability with additional filter/LNA support for spurious emissions measurements.

Software R&S®EMC32 measurement software for Automation for EMC compliance and pre-compliance

Table of Calibrated Instruments SA12 - R&S FSL - Due 25th July 2023

Test Site Information TI Norway, Validation Lab, Hoffsvveien 70C, 0377 Oslo

Completed Test Dates 5th July 2023

Test Personnel Richard Wallace

Test Setup Photos:

Placement of AUT on turn arm in chamber:



Receiving antenna in chamber:

