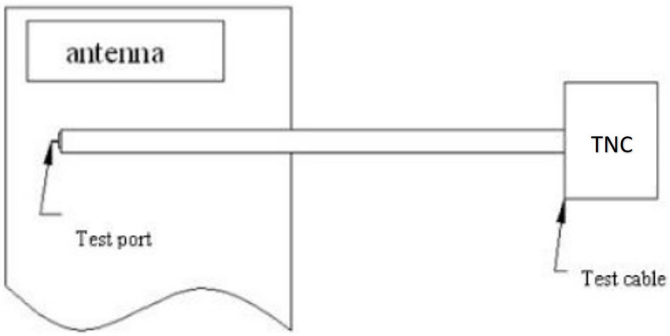
Nokia Industrial 5-in-1 Multi-port Antenna (Japan)

Test diagram

Purpose: To test antenna passive parameters as accurately as possible.

Methods: The fixture is to use a 50 ohm coaxial cable, one end is connected to the pad after the antenna ‘s matching circuit (the front of the antenna switch) , and the other end is connected to the TNC connector.



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Antenna details

Cable 1: 5G&4G&3G&2G

General Data										
FRE (MHz)	600	698	960	1400	1880	2170	2700	3000	5000	6000
VSWR	3.3	3.0	1.7	2.5	2.6	1.8	1.3	1.6	2.4	2.4
Return	-5.7	-6.1	-12.5	-7.5	-7.2	-10.7	-16.8	-12.4	-7.7	-7.6
Eff (%)	38.5	82.0	32.4	58.5	43.4	58.5	50.0	56.0	49.7	44.0
Average	-4.2	-0.8	-4.9	-2.3	-3.6	-2.3	-3.1	-2.5	-3.0	-3.6

Gain(Test based on 2m wire length)

Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi
600	0.75	1710	0.15	2210	1.86	3300	0.39	4700	0.75
620	0.98	1730	0.25	2230	1.8	3350	0.48	4750	0.31
640	1.18	1750	0.39	2250	2.12	3400	0.46	4800	0.27
660	1.1	1770	0.28	2270	2.11	3450	0.55	4850	0.28
680	1.01	1790	0.9	2290	1.67	3500	0.28	4900	0.16
700	1.06	1810	0.13	2310	1.4	3550	0.68	4950	0.61
720	1.24	1830	0.04	2330	1.59	3600	0.56	5000	0.64
740	1.92	1850	0.13	2350	2.22	3650	0.49	5050	0.17
760	2.93	1870	0.63	2370	1.76	3700	0.55	5100	0.84
780	2.07	1890	0.77	2390	1.04	3750	0.63	5150	1.08
800	1.93	1910	0.45	2410	0.45	3800	0.67	5200	0.91
820	2.18	1930	1.29	2430	2.42	3850	0.6	5250	0.64
840	1.91	1950	1.23	2450	1.09	3900	0.54	5300	0.45
860	2.33	1970	0.41	2470	0.49	3950	0.75	5350	0.1
880	0.92	1990	1.16	2490	0.88	4000	0.79	5400	0.79
900	1.81	2010	1.63	2510	1.86	4050	0.99	5450	0.63
920	1.58	2030	1.2	2530	0.31	4100	0.71	5500	0.11
940	0.95	2050	1.09	2550	0.6	4150	0.63	5550	0.24
960	0.88	2070	1.64	2570	1.23	4200	0.69	5600	0.6
		2090	1.34	2590	0.69	4250	0.96	5650	0.59
		2110	1.46	2610	1.04	4300	0.64	5700	0.99
		2130	0.84	2630	0.5	4350	0.51	5750	0.63
		2150	0.41	2650	1.15	4400	0.84	5800	0.36
		2170	1.95	2670	0.28	4450	0.58	5850	0.72
		2190	1.99	2690	0.54	4500	0.57	5900	0.86
						4550	0.71	5950	0.07
						4600	0.23	6000	0.13

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Cable 2: 5G&4G&3G&2G

General Data										
FRE (MHz)	600	698	960	1400	1880	2170	2700	3000	5000	6000
VSWR	4.6	2.7	1.5	3.5	2.6	1.8	1.4	1.9	2.2	2.1
Return	-3.9	-7.1	-15.0	-5.1	-7.2	-10.8	-14.7	-10.4	-8.7	-8.8
Eff (%)	18.2	59.0	33.4	51.9	37.0	59.7	47.2	47.6	51.4	39.1
Average	-7.4	-2.3	-4.8	-2.9	-4.3	-2.2	-3.3	-3.2	-2.9	-4.1

Gain(Test based on 2m wire length)

Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi
600	-1.36	1710	-0.83	2210	2.08	3300	-0.27	4700	-0.89
620	-1.43	1730	-0.64	2230	1.07	3350	-0.2	4750	-1.09
640	1.81	1750	-0.67	2250	1.47	3400	0.04	4800	-1.12
660	2.62	1770	0.03	2270	1.06	3450	-0.01	4850	-0.98
680	0.96	1790	0.6	2290	1.17	3500	0.75	4900	-1.35
700	2.19	1810	-0.06	2310	0.99	3550	0.49	4950	-1.1
720	2.76	1830	-1.11	2330	0.9	3600	0.68	5000	-0.78
740	1.19	1850	-0.94	2350	0.43	3650	0.57	5050	-0.49
760	1.95	1870	-0.72	2370	0.23	3700	0.05	5100	-0.46
780	0.77	1890	0.26	2390	0.21	3750	0.31	5150	0.1
800	-0.14	1910	-1.16	2410	-1.13	3800	-0.01	5200	0.08
820	1.33	1930	-0.14	2430	0.13	3850	0.52	5250	0.66
840	0.55	1950	-0.95	2450	-0.28	3900	0.54	5300	0.2
860	0.32	1970	0.3	2470	-0.47	3950	-0.11	5350	-0.22
880	0.5	1990	0.53	2490	-0.95	4000	-0.27	5400	0.13
900	-0.41	2010	0.19	2510	-0.71	4050	-0.05	5450	-0.1
920	-0.79	2030	0.72	2530	-1.35	4100	-0.09	5500	-0.25
940	-0.3	2050	0.27	2550	-0.83	4150	-0.5	5550	0.44
960	0.88	2070	1.11	2570	-1	4200	-0.29	5600	-0.12
		2090	0.94	2590	-0.39	4250	-0.06	5650	0.11
		2110	0.74	2610	-0.63	4300	0.1	5700	-0.39
		2130	1.31	2630	-0.42	4350	-0.02	5750	-0.7
		2150	1.11	2650	0.03	4400	-0.03	5800	-0.74
		2170	2.14	2670	-1.15	4450	-0.53	5850	-1.24
		2190	2.19	2690	-0.97	4500	-0.03	5900	-0.81
						4550	-0.6	5950	-0.47
						4600	-0.66	6000	-1.15

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Cable 3: 5G&4G&3G&2G

General Data										
FRE (MHz)	600	698	960	1400	1880	2170	2700	3000	5000	6000
VSWR	4.6	1.2	2.7	2.1	2.2	2.4	1.6	1.8	2.5	2.6
Return	-3.9	-19.3	-6.8	-9.5	- 8.4	-7.6	-12.8	-11.1	-7.3	-7.2
Eff (%)	35.0	65.0	55.3	42.3	41.1	56.5	51.1	49.2	49.1	31.6
Average	-4.6	-2.3	-2.6	-3.7	-3.9	-2.5	-2.9	-3.1	-3.1	-5.0

Gain(Test based on 2m wire length)

Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi
600	0.57	1710	0.31	2210	1.77	3300	0.66	4700	-1.59
620	-0.33	1730	-0.3	2230	1.28	3350	0.66	4750	-1.49
640	0.82	1750	-0.52	2250	1.67	3400	0.7	4800	-1.22
660	0.88	1770	-0.96	2270	1.59	3450	0.06	4850	-1.12
680	0.3	1790	-0.2	2290	1.1	3500	-0.3	4900	-1.37
700	0.27	1810	-1.33	2310	0.68	3550	0.03	4950	-1.29
720	0.19	1830	-1.5	2330	0.98	3600	-0.42	5000	-0.35
740	0.38	1850	-1.29	2350	0.6	3650	-0.22	5050	-0.39
760	-0.52	1870	-0.16	2370	0.25	3700	-0.45	5100	-0.82
780	-1.56	1890	1.09	2390	0.73	3750	-0.33	5150	-0.5
800	0.77	1910	-0.65	2410	-0.19	3800	-0.23	5200	0.03
820	1.41	1930	0.93	2430	1.51	3850	-0.29	5250	0.03
840	1.23	1950	-0.54	2450	0.97	3900	-0.47	5300	0.21
860	-0.41	1970	-0.16	2470	0.66	3950	-0.74	5350	-0.08
880	0.9	1990	-1.15	2490	0.56	4000	-0.5	5400	-0.05
900	0.37	2010	-1.09	2510	0.59	4050	-0.34	5450	0.13
920	1	2030	-0.17	2530	0.21	4100	-0.55	5500	-0.07
940	1.14	2050	-0.74	2550	0.56	4150	-0.67	5550	-0.77
960	1.29	2070	-0.25	2570	0.49	4200	-0.76	5600	-0.79
		2090	-0.26	2590	1.14	4250	-1.01	5650	-0.45
		2110	-0.43	2610	-0.07	4300	-0.6	5700	-0.33
		2130	0.09	2630	-0.3	4350	-1.25	5750	-0.4
		2150	-0.64	2650	0.56	4400	-1.37	5800	-0.89
		2170	0.95	2670	-0.18	4450	-1.41	5850	-0.38
		2190	1.09	2690	0.15	4500	-1.53	5900	-0.31
						4550	-1.44	5950	-0.75
						4600	-1.43	6000	-1.41

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Cable 4: 5G&4G&3G&2G

General Data										
FRE (MHz)	600	698	960	1400	1880	2170	2700	3000	5000	6000
VSWR	3.6	2.7	1.6	2.8	2.1	1.6	1.5	2.0	2.2	2.0
Return	-4.9	-6.9	-12.7	-6.4	-8.8	-13.1	-13.7	-9.4	-8.7	-9.4
Eff (%)	31.4	57.5	41.5	79.2	40.8	57.3	52.6	48.3	52.9	43.0
Average	-5.0	-2..4	-3.8	-1.0	-3.9	-2.4	-2.8	-3.2	-2.8	-3.7

Gain(Test based on 2m wire length)

Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi
600	-0.99	1710	0.26	2210	-0.2	3300	0.23	4700	-0.61
620	0.5	1730	-0.34	2230	0.03	3350	-0.11	4750	-0.3
640	1.07	1750	0.78	2250	0.84	3400	-0.27	4800	-0.3
660	0.53	1770	0.57	2270	0.84	3450	-0.27	4850	-0.65
680	0.89	1790	1.23	2290	-0.57	3500	-0.02	4900	-0.8
700	-0.41	1810	1.27	2310	-0.52	3550	0.01	4950	-0.84
720	-0.4	1830	0.85	2330	0.18	3600	-0.13	5000	-1.02
740	-0.46	1850	0.95	2350	-0.38	3650	-0.63	5050	-0.85
760	-0.57	1870	1.08	2370	-0.03	3700	-1.02	5100	-0.92
780	-0.77	1890	1.48	2390	-0.58	3750	-0.6	5150	-0.84
800	-0.73	1910	0.48	2410	-0.43	3800	-0.41	5200	-0.5
820	-0.17	1930	0.91	2430	0.5	3850	-0.75	5250	-0.18
840	0.23	1950	0.98	2450	0.17	3900	-0.71	5300	-0.46
860	0.85	1970	1.4	2470	0.13	3950	-0.57	5350	-0.84
880	0.82	1990	-0.69	2490	-0.56	4000	-0.3	5400	-1.04
900	0.82	2010	-0.57	2510	0.15	4050	-0.13	5450	-0.95
920	0.82	2030	0.83	2530	-0.58	4100	-0.29	5500	-0.74
940	0.03	2050	0.41	2550	0.06	4150	-0.13	5550	-0.75
960	0.16	2070	1.29	2570	0.26	4200	0.05	5600	-0.75
		2090	0.17	2590	0.32	4250	0.03	5650	-0.86
		2110	0.66	2610	0.13	4300	-0.36	5700	-0.36
		2130	0.65	2630	-0.89	4350	0.02	5750	-0.92
		2150	0.97	2650	0	4400	0.19	5800	-0.79
		2170	0.41	2670	-0.88	4450	0.01	5850	-1.12
		2190	0.31	2690	-0.33	4500	-0.23	5900	-0.77
						4550	-0.53	5950	-0.56
						4600	-0.7	6000	-1.09

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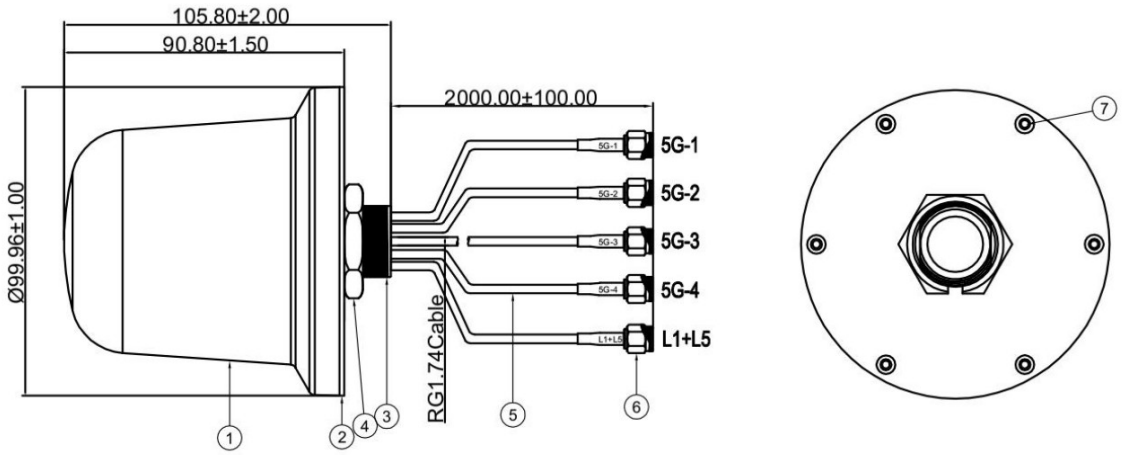
Cable 5: GPS

Frequency /MHz	Gain /dBi	Frequency /MHz	Gain /dBi
1100	0.09	1550	0.74
1110	0.14	1555	0.84
1120	0.32	1560	1.01
1130	0.37	1565	1.29
1140	0.56	1570	1.59
1150	0.88	1575	1.55
1160	1.34	1580	1.34
1170	1.63	1585	1.01
1180	1.18	1590	1.39
1190	0.98	1595	1.66
1200	0.78	1600	1.71
		1605	1.55

Engineering image



1. Wire through the shell hole through the steel plate whole welding antenna (steel plate should be divided into positive and negative).
2. The antenna is valid to the Steel sheet as shown in the above figure.
3. Steel sheet hot melt under the shell 4 points.
4. Test the antenna performance.
5. Assemble the waterproof ring and then put a circle of waterproof glue (glue JL 510) on the waterproof ring grove.
6. Close the upper cover with 6 M3 screws.
7. Fill M27 screw with waterproof glue JL 905L.

Part description				
Number	Screw	Description	Color	Count
1	Top cabinet	SABIC PC1414	black	1
2	Lower casing	SABIC PC1414, copper gold injection screw M27	black	1
3	Coupling nut	Copper plated gold	golden	1
4	Main assembly of antenna	PCB+wire+5G-1-2-3-4		1
5	GPS assembly of antenna	Ceramic+wire		1
6	Screw	M3X6-overall length 7,82	Black	6

Environmental Specifications

Operating Temperature	-40°C to +70°C

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