4.1.7 Hopping Frequency Separation

RESULT: **PASS**

Test standard	:	FCC Part 15.247(a)(1), RSS-247 5.1(b)
Requirement	:	ANSI C63.10-2013, Clause 7.8.2 KDB 558074 D01 v05r02, Clause 2.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Hopping
Operation Mode	:	A.1.a.iv
Ambient temperature	:	21.3°C
Relative humidity	:	42%

Table 4: Hopping Frequency Separation

Mode	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	2441	0.992	0.9479
π/4-DQPSK	2441	1.002	0.8547
8-DPSK	2441	1.035	0.8620

*Note: The systems operate with an output power no greater than 125mW (π /4-DQPSK, 8-DPSK).

Figure 31: Hopping Frequency Separation, Hopping Mode, GFSK

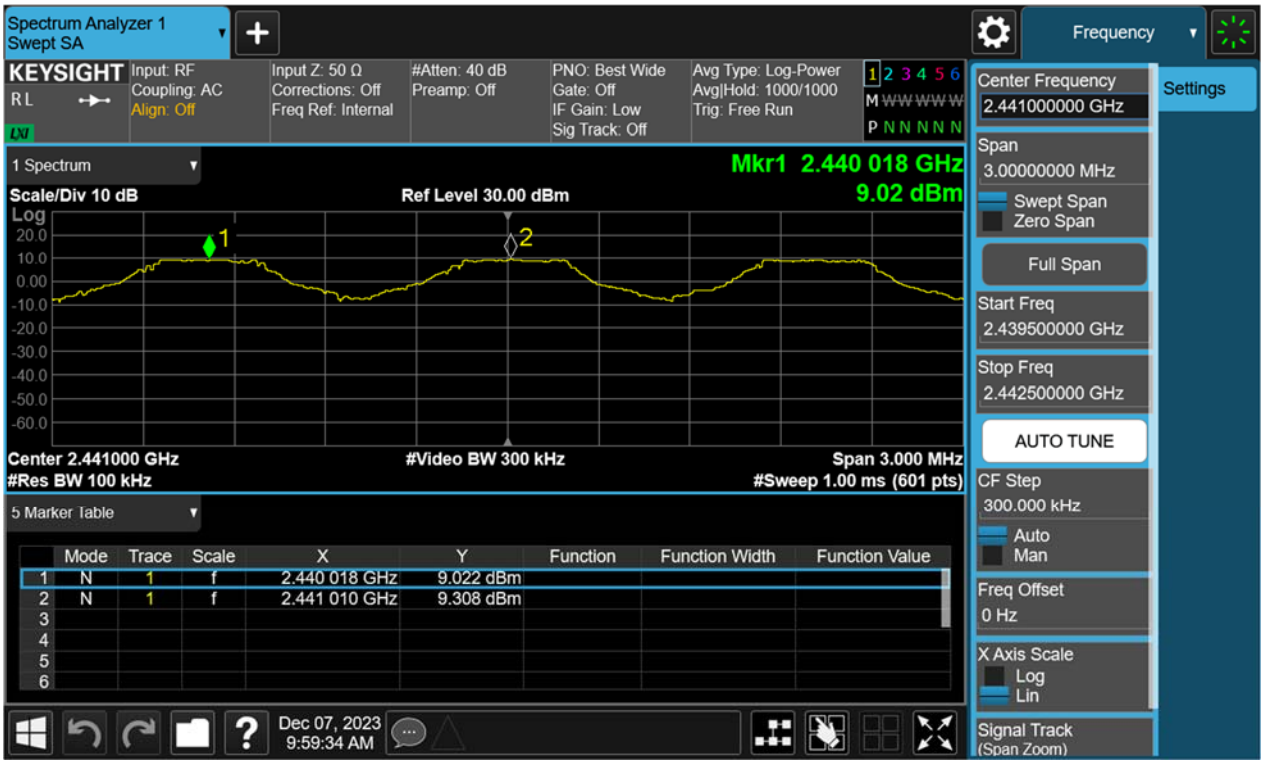


Figure 32: Hopping Frequency Separation, Hopping Mode, π/4-DQPSK

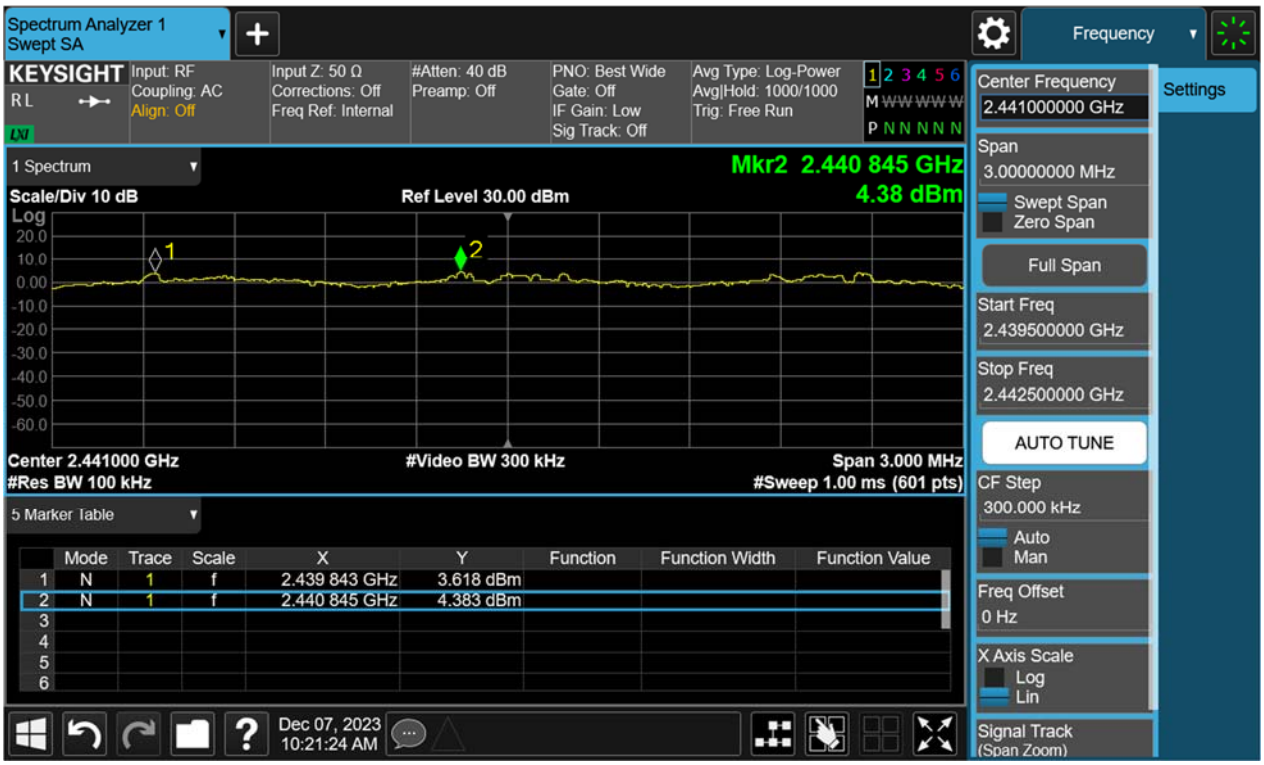
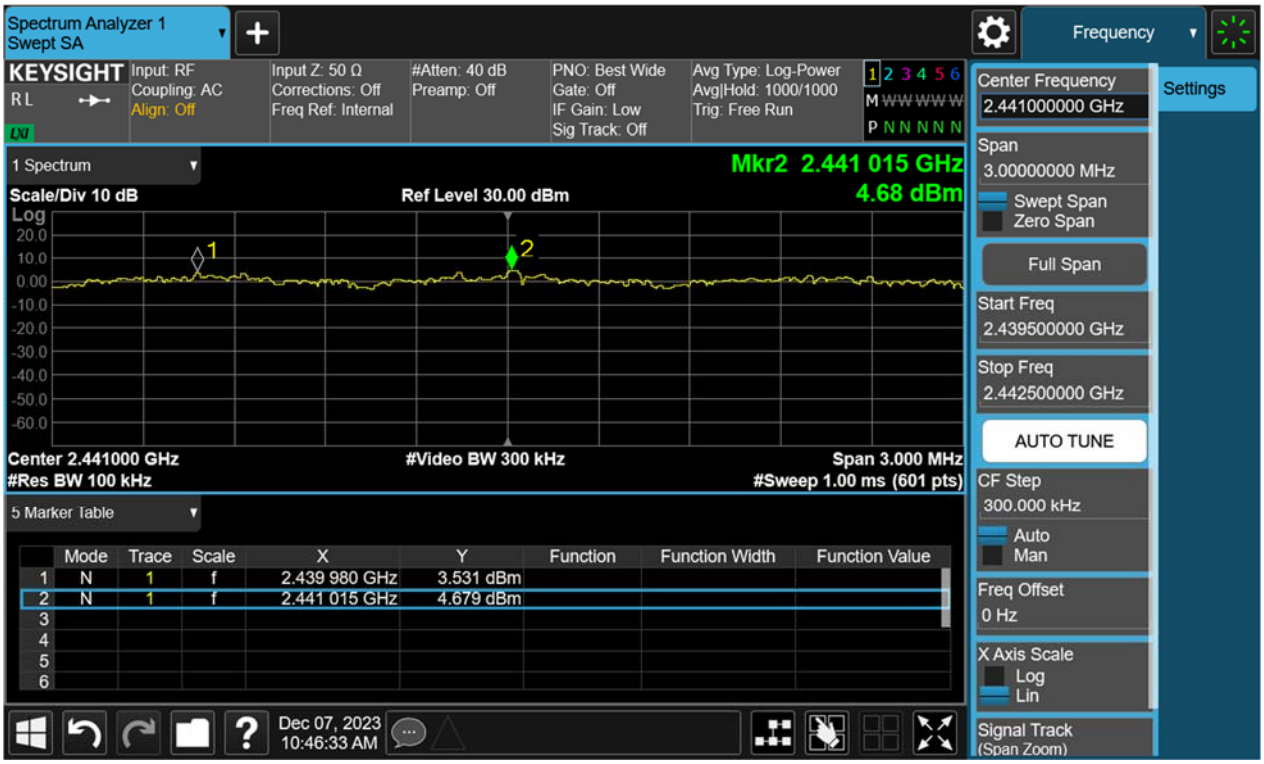


Figure 33: Hopping Frequency Separation, Hopping Mode, 8DPSK



4.1.8 Number of Hopping Frequency

RESULT: **PASS**

Test standard : FCC Part 15.247(a)(1)(iii), RSS-247 5.1(d)
Requirement : ANSI C63.10-2013, Clause 7.8.3
KDB 558074 D01 v05r02, Clause 2.2
Kind of test site : Shielded room

Test setup

Test Channel : Hopping
Operation Mode : A.1.a.iv
Ambient temperature : 21.3°C
Relative humidity : 42%

Table 5: Number of Hopping Frequency

Mode	Frequency Range	Measured Quantity of Hopping Channel	Limit
GFSK	2400 – 2483.5	79	≥15
π/4-DQPSK	2400 – 2483.5	79	≥15
8-DPSK	2400 – 2483.5	79	≥15

Figure 34: Number of Hopping Frequency, Hopping Mode, GFSK

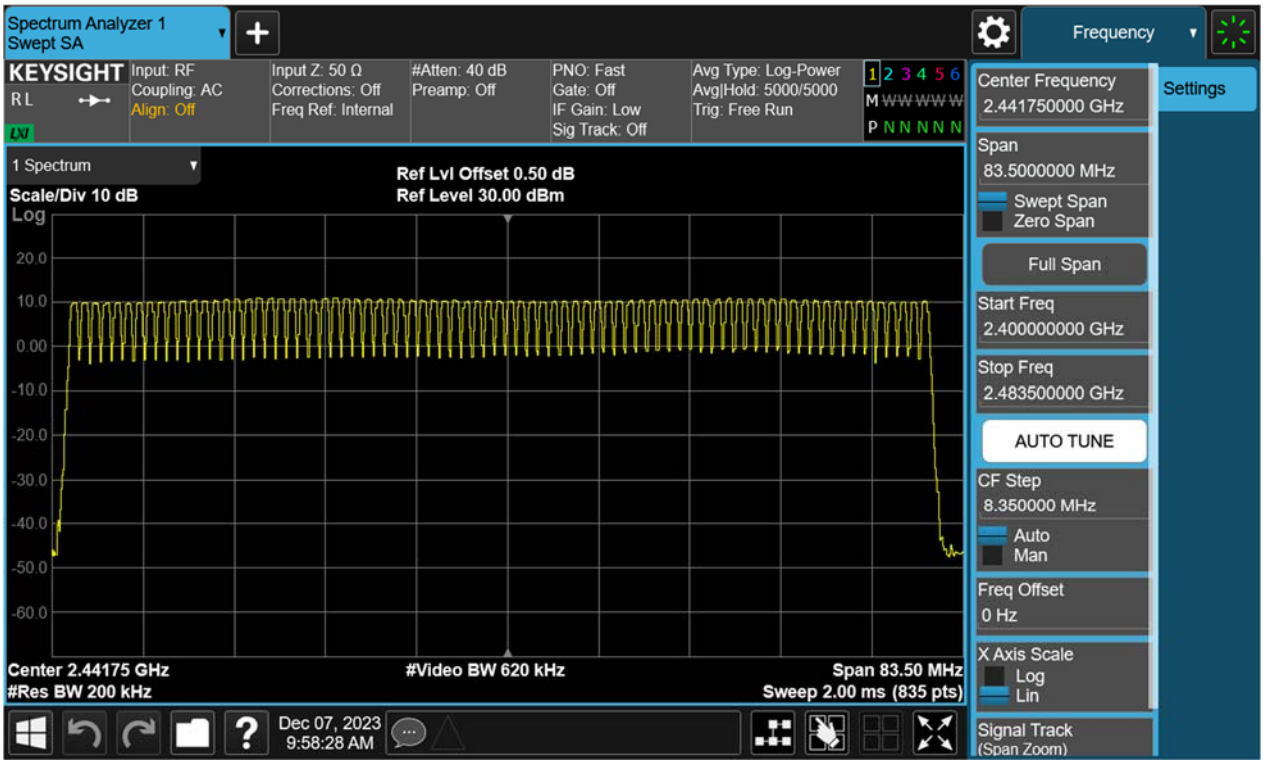


Figure 35: Number of Hopping Frequency, Hopping Mode, π/4-DQPSK

Figure 36: Number of Hopping Frequency, Hopping Mode, 8-DPSK

4.1.9 Time of Occupancy

RESULT: **PASS**

Test standard : FCC Part 15.247(a)(1)(iii), RSS-247 5.1(d)
Requirement : ANSI C63.10-2013, Clause 7.8.4
KDB 558074 D01 v05r02, Clause 2.2
Kind of test site : Shielded room

Test setup

Test Channel : Middle
Operation Mode : A.1.a
Ambient temperature : 21.3°C
Relative humidity : 42%

Table 6: Time of Occupancy

Mode	Packet Type	Pulse Time (ms)	Total of Dwell Time (ms)	Total of Dwell Time (s)	Limit (s)
GFSK	DH1	0.3817	122.144	0.1221	0.4
	DH3	1.6350	261.600	0.2616	0.4
	DH5	2.8870	307.947	0.3079	0.4
π/4-DQPSK	DH1	0.3867	123.744	0.1237	0.4
	DH3	1.6400	262.400	0.2624	0.4
	DH5	2.8870	307.947	0.3079	0.4
8-DPSK	DH1	0.3867	123.744	0.1237	0.4
	DH3	1.6350	261.600	0.2616	0.4
	DH5	2.8930	308.587	0.3086	0.4

Note:
For DH1 package type:
Total of Dwell = Pulse Time*(1600/2)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
For DH3 package type:
Total of Dwell = Pulse Time*(1600/4)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
For DH5 package type:
Total of Dwell = Pulse Time*(1600/6)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency

Figure 37: Time of Occupancy, 2441MHz, GFSK DH1

Figure 38: Time of Occupancy, 2441MHz, GFSK DH3

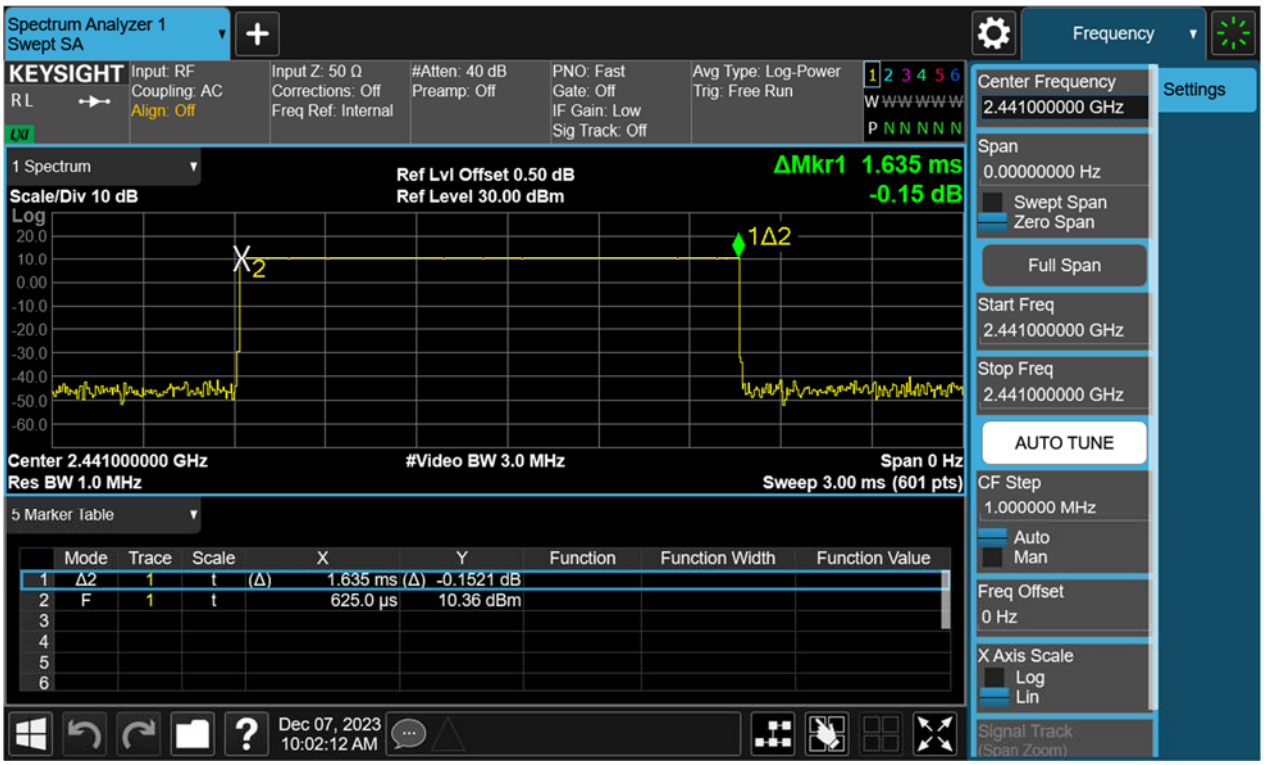


Figure 39: Time of Occupancy, 2441MHz, GFSK DH5

Figure 40: Time of Occupancy, 2441MHz, π/4-DQPSK DH1

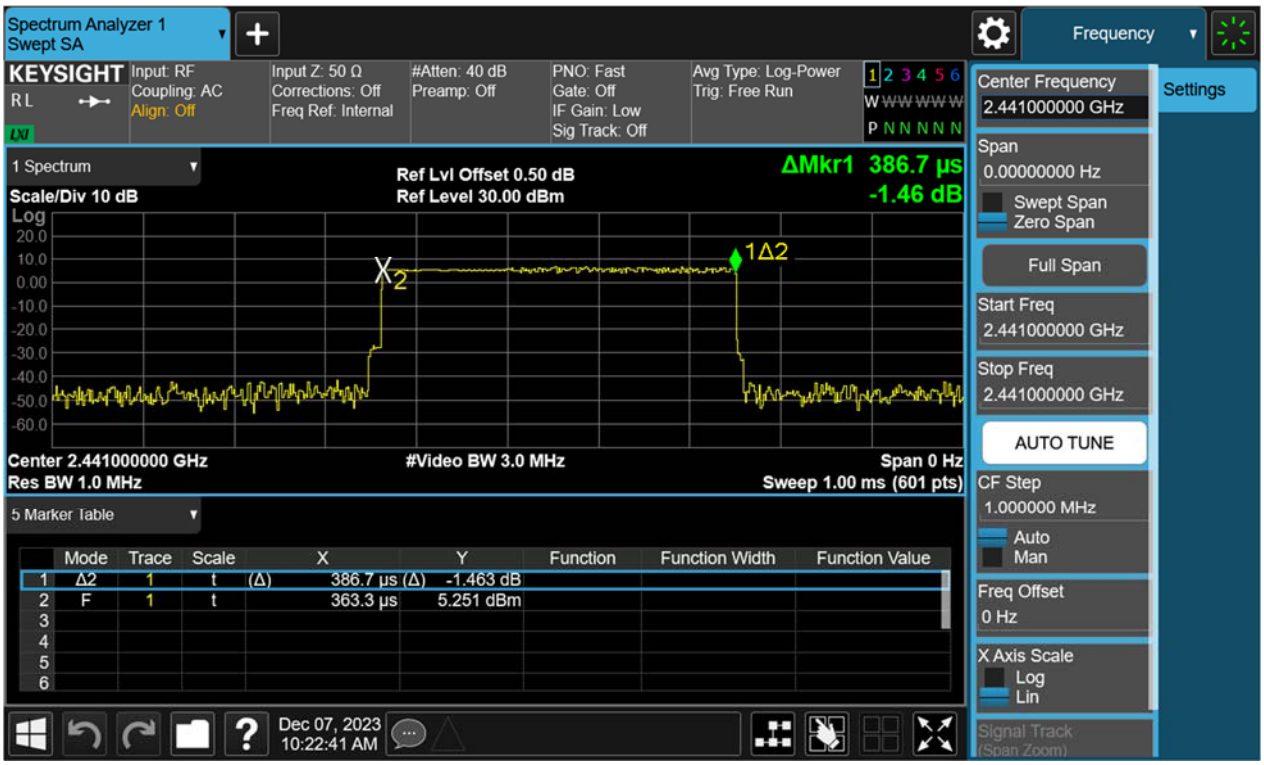


Figure 41: Time of Occupancy, 2441MHz, π/4-DQPSK DH3

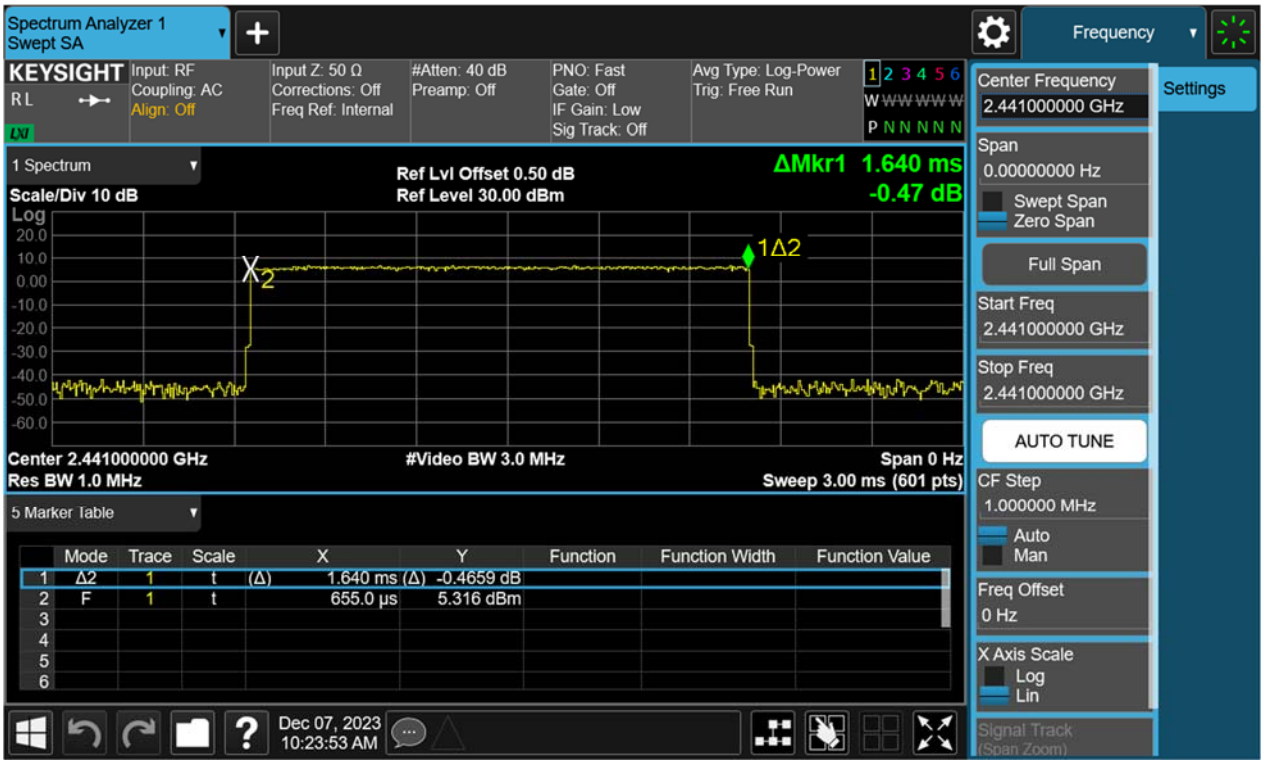
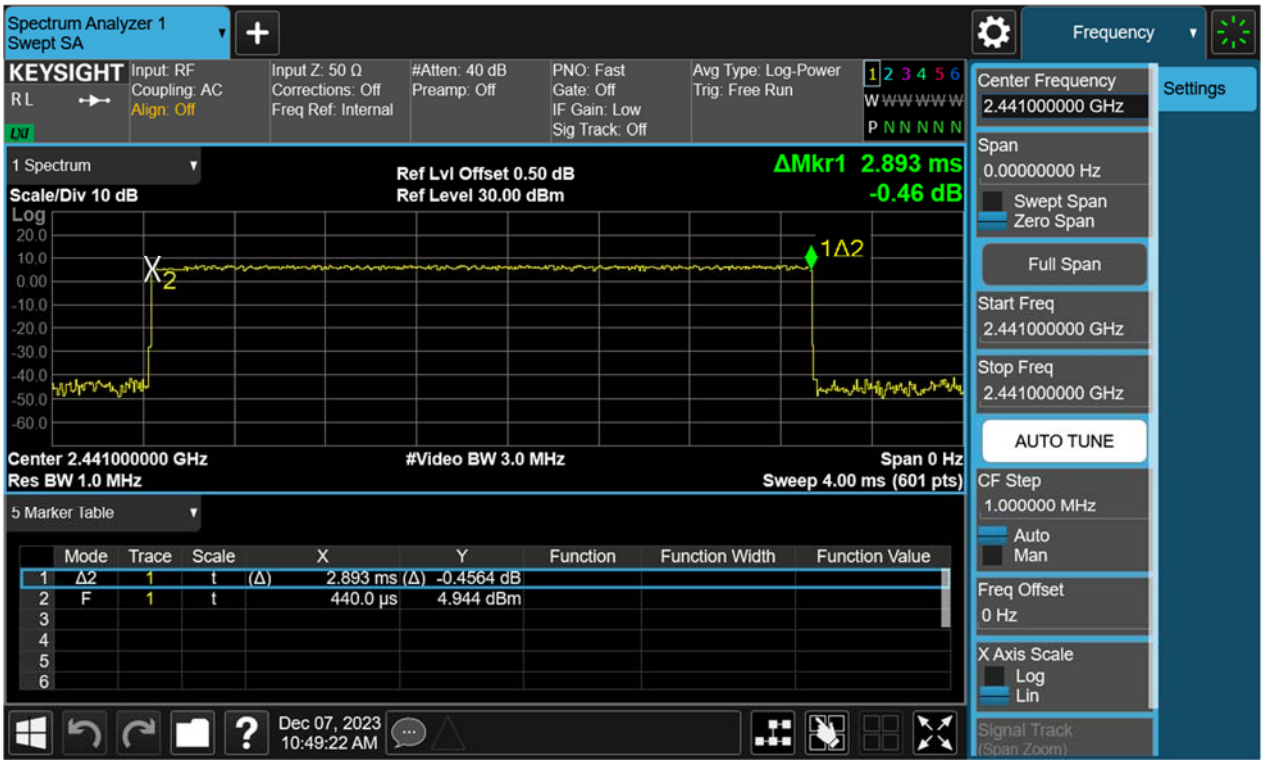


Figure 42: Time of Occupancy, 2441MHz, π/4-DQPSK DH5

Figure 43: Time of Occupancy, 2441MHz, 8-DPSK DH1

Figure 44: Time of Occupancy, 2441MHz, 8-DPSK DH3

Figure 45: Time of Occupancy, 2441MHz, 8-DPSK DH5



4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT: **PASS**

Test standard	:	FCC Part 15.207(a), RSS-Gen 8.8
Requirement	:	ANSI C63.10-2013, Clause 6.2
Kind of test site	:	Shielded room

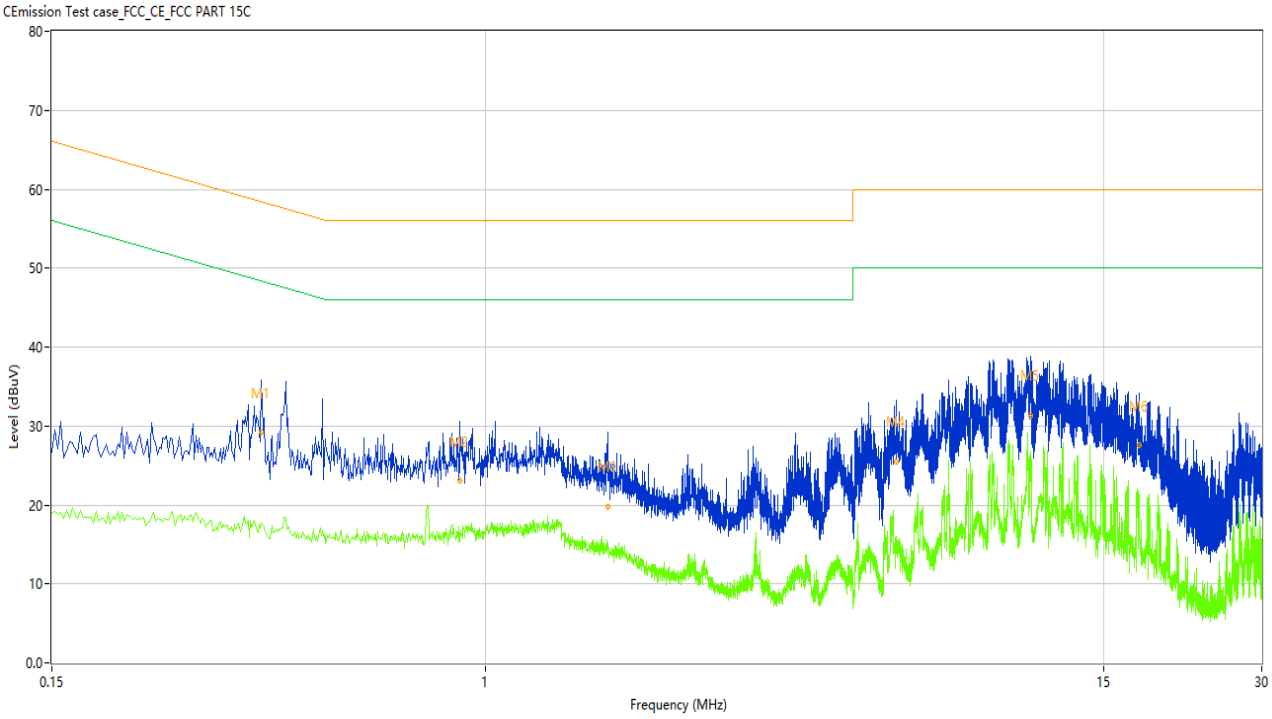
Test setup

Input Voltage	:	which received AC 120V, 60Hz Power
Operation Mode	:	A.1.a
Earthing	:	Connected to GND
Ambient temperature	:	26°C
Relative humidity	:	49%

For details refer to following test plot.

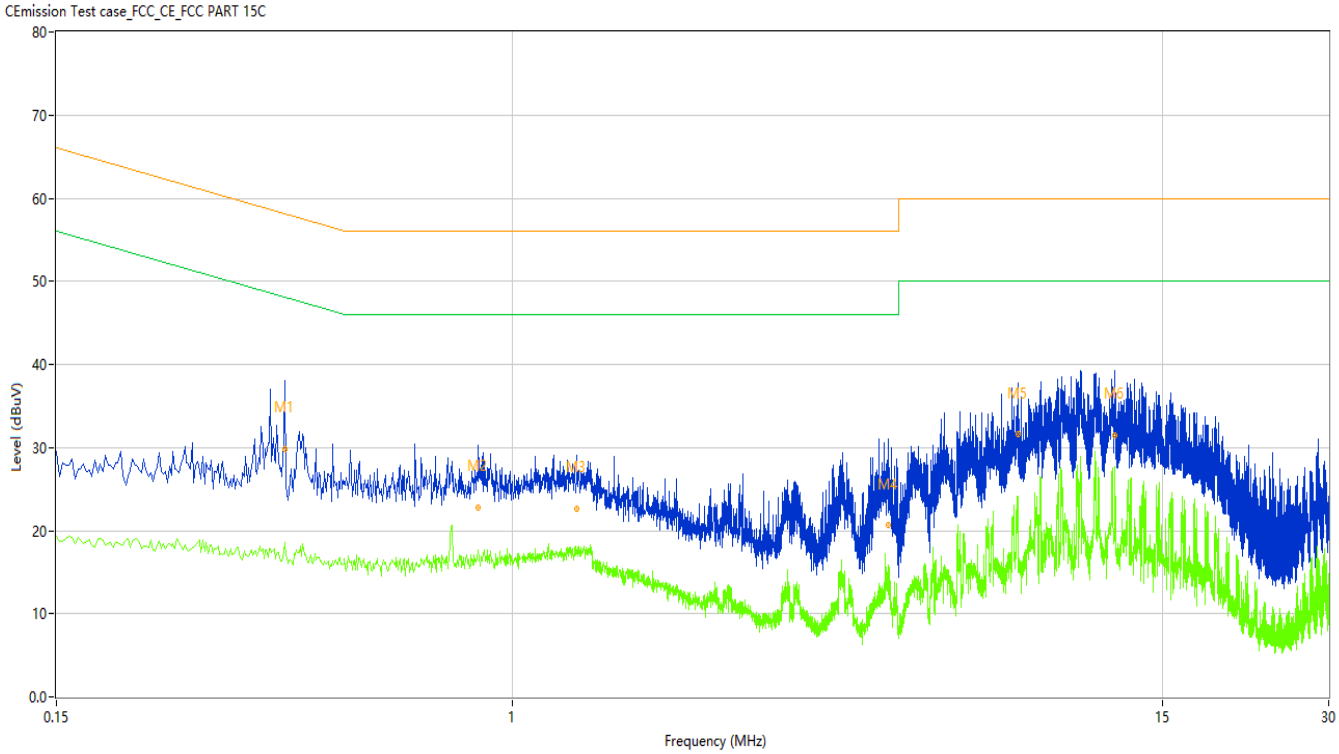
Note：The all configurations were tested respectively, Only the worst mode data of 8DPSK-hopping-DH5 was recorded in the test report.

Figure 46: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.376	40.49	9.96	58.37	17.88	Peak	L	Pass
1*	0.376	29.20	9.96	58.37	29.17	QP	L	Pass
1**	0.376	17.67	9.96	48.37	30.70	AV	L	Pass
2	0.896	34.26	9.94	56.00	21.74	Peak	L	Pass
2*	0.896	23.03	9.94	56.00	32.97	QP	L	Pass
2**	0.896	15.46	9.94	46.00	30.54	AV	L	Pass
3	1.710	28.55	9.85	56.00	27.45	Peak	L	Pass
3*	1.710	19.75	9.85	56.00	36.25	QP	L	Pass
3**	1.710	14.58	9.85	46.00	31.42	AV	L	Pass
4	6.048	34.98	9.80	60.00	25.02	Peak	L	Pass
4*	6.048	25.50	9.80	60.00	34.50	QP	L	Pass
4**	6.048	15.73	9.80	50.00	34.27	AV	L	Pass
5	10.890	40.35	9.66	60.00	19.65	Peak	L	Pass
5*	10.890	31.31	9.66	60.00	28.69	QP	L	Pass
5**	10.890	25.06	9.66	50.00	24.94	AV	L	Pass
6	17.546	34.44	9.44	60.00	25.56	Peak	L	Pass
6*	17.546	27.56	9.44	60.00	32.44	QP	L	Pass
6**	17.546	21.20	9.44	50.00	28.80	AV	L	Pass

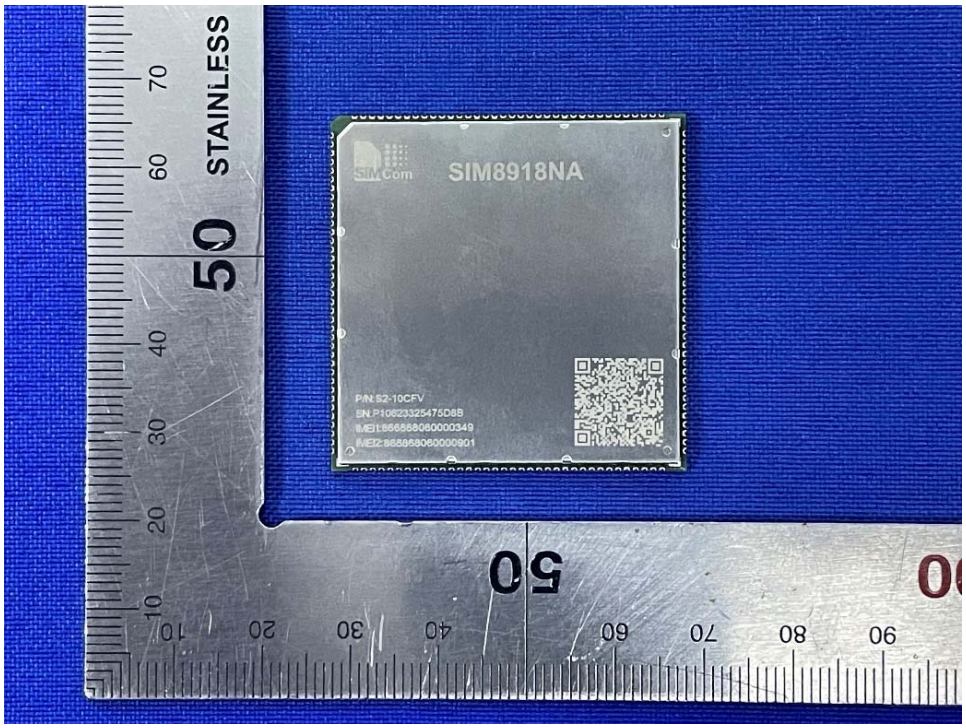
Figure 47: Conducted Emission on AC Mains, N Phase



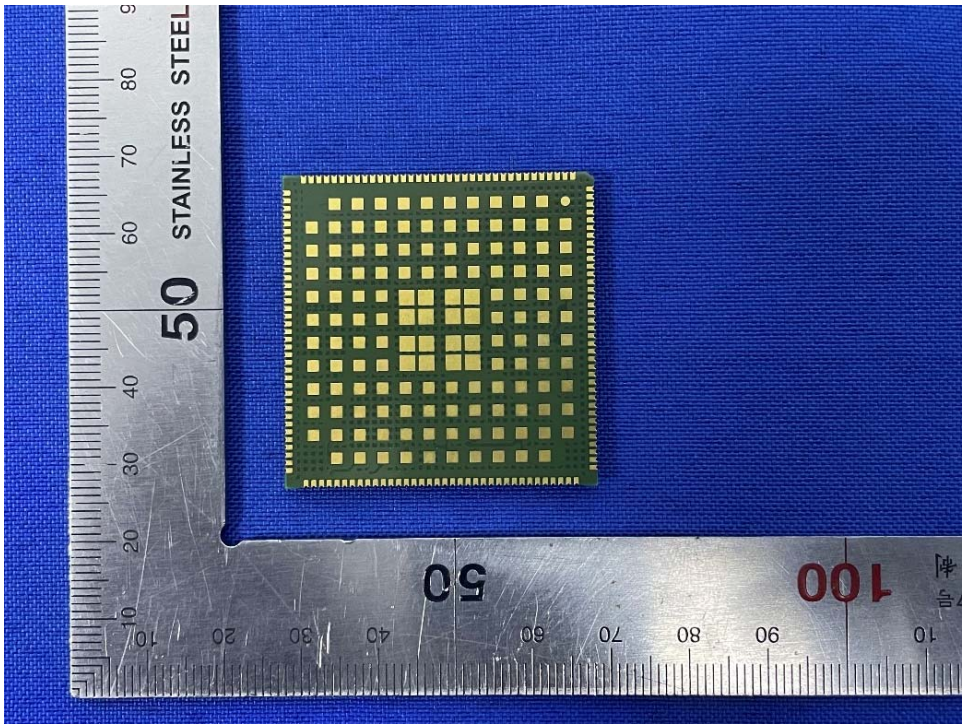
No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.388	42.78	10.06	58.11	15.33	Peak	N	Pass
1*	0.388	29.78	10.06	58.11	28.33	QP	N	Pass
1**	0.388	18.52	10.06	48.11	29.59	AV	N	Pass
2	0.870	33.94	10.03	56.00	22.06	Peak	N	Pass
2*	0.870	22.75	10.03	56.00	33.25	QP	N	Pass
2**	0.870	17.31	10.03	46.00	28.69	AV	N	Pass
3	1.312	30.33	9.94	56.00	25.67	Peak	N	Pass
3*	1.312	22.64	9.94	56.00	33.36	QP	N	Pass
3**	1.312	17.41	9.94	46.00	28.59	AV	N	Pass
4	4.800	30.98	9.75	56.00	25.02	Peak	N	Pass
4*	4.800	20.63	9.75	56.00	35.37	QP	N	Pass
4**	4.800	15.67	9.75	46.00	30.33	AV	N	Pass
5	8.244	40.24	9.81	60.00	19.76	Peak	N	Pass
5*	8.244	31.63	9.81	60.00	28.37	QP	N	Pass
5**	8.244	22.15	9.81	50.00	27.85	AV	N	Pass
6	12.320	39.95	9.69	60.00	20.05	Peak	N	Pass
6*	12.320	31.48	9.69	60.00	28.52	QP	N	Pass
6**	12.320	23.98	9.69	50.00	26.02	AV	N	Pass

5 Appendixes

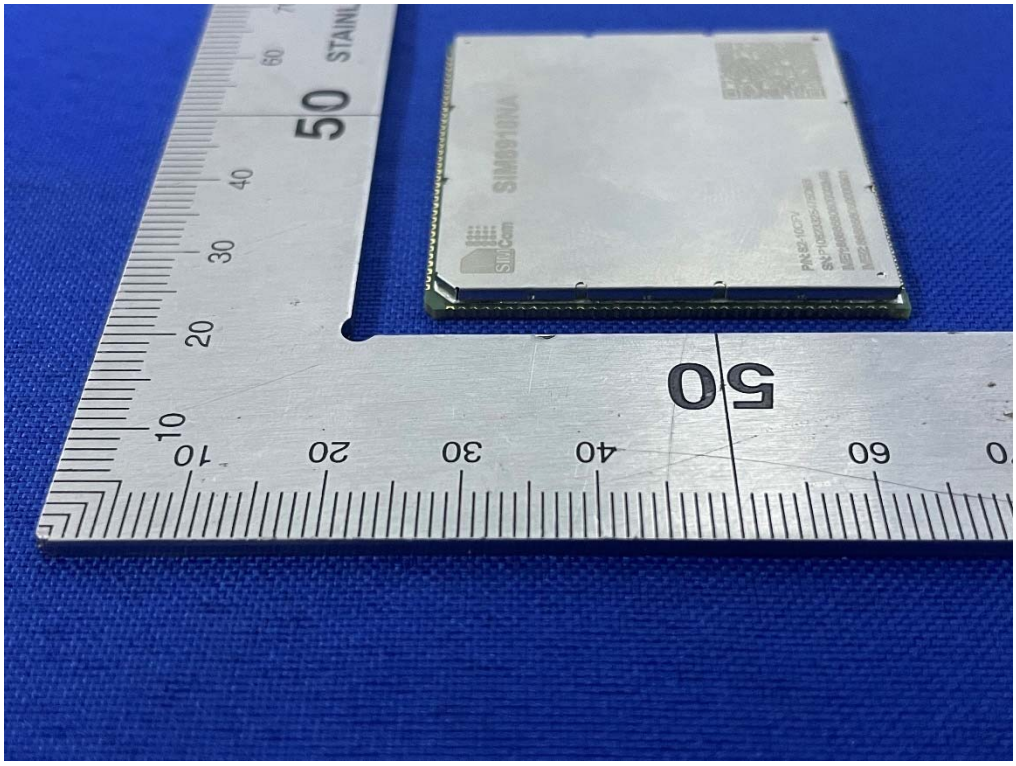
5.1 Photographs of the Sample



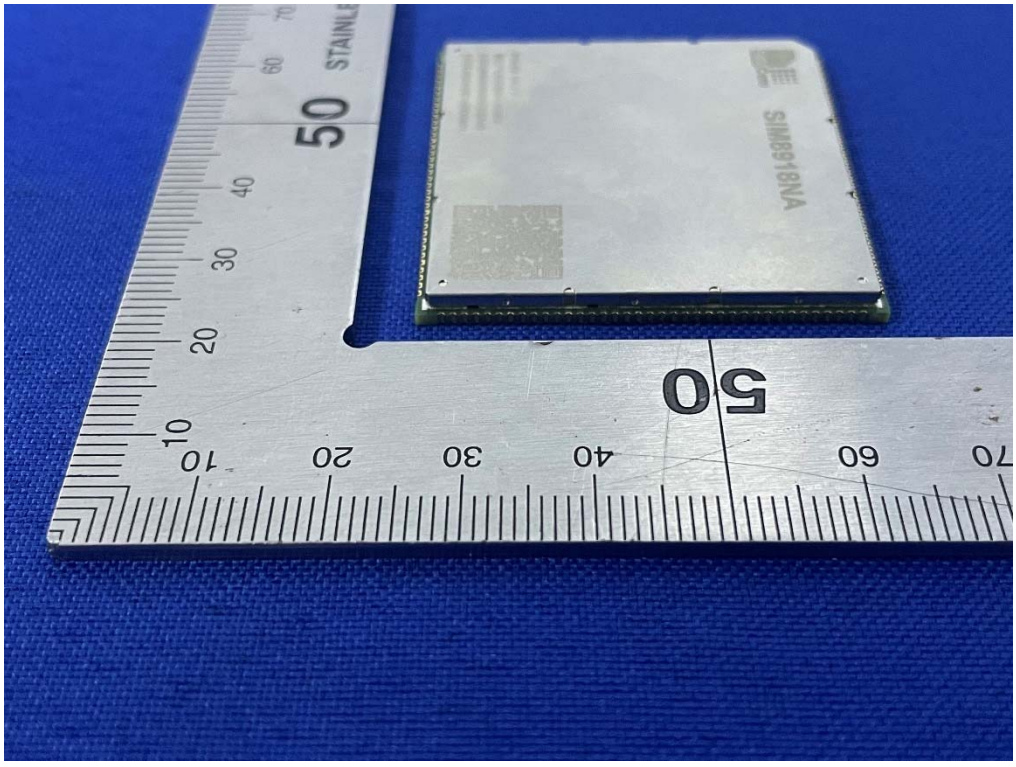
Front of the sample



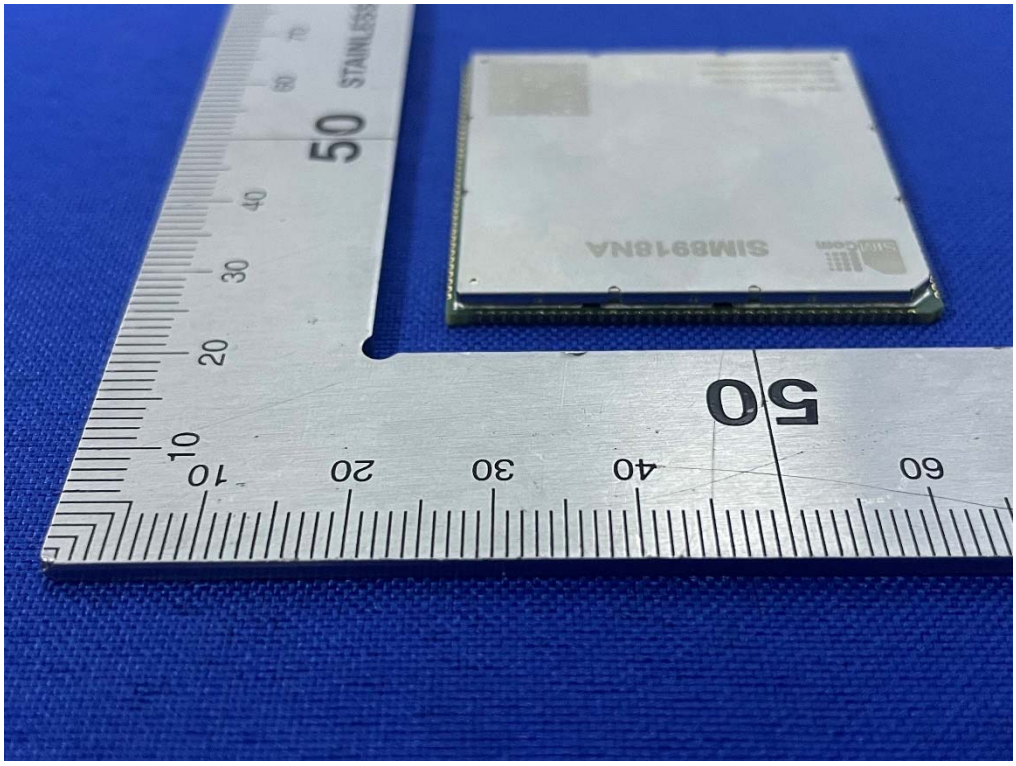
Rear of the sample



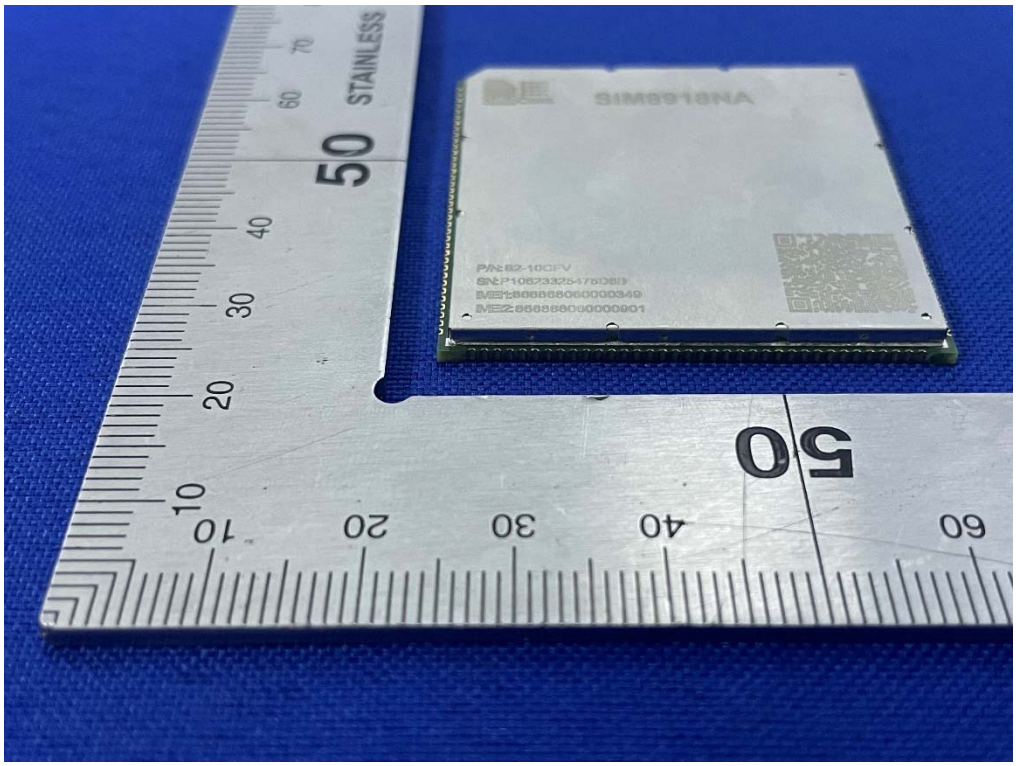
Left of the sample



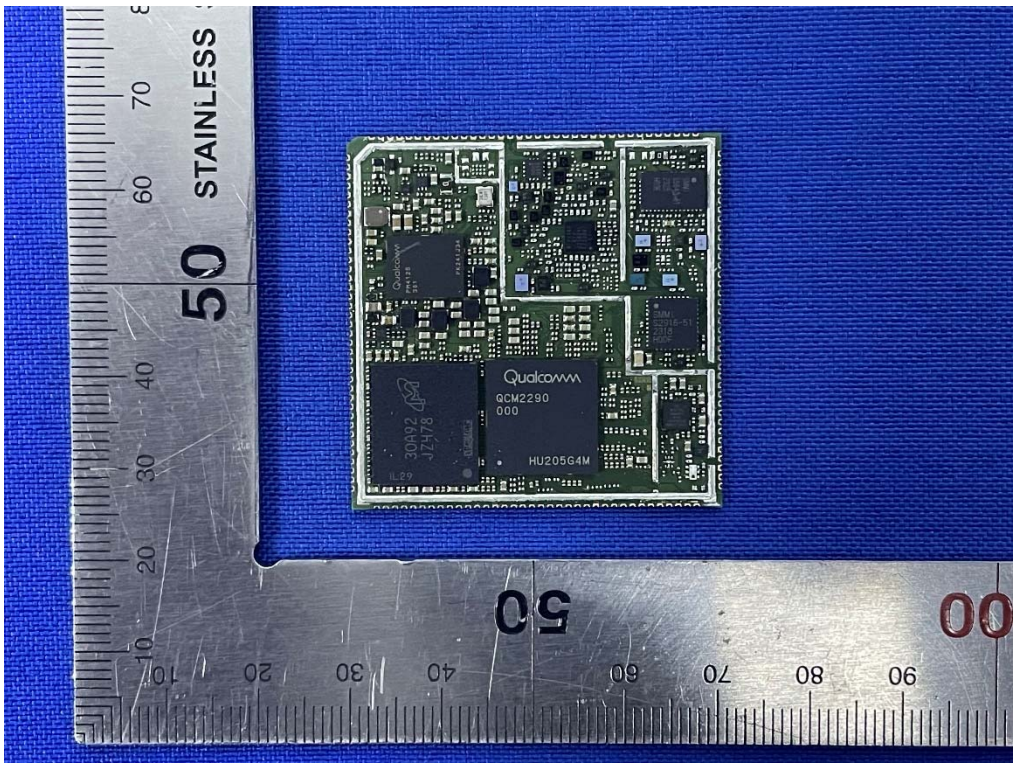
Right of the sample



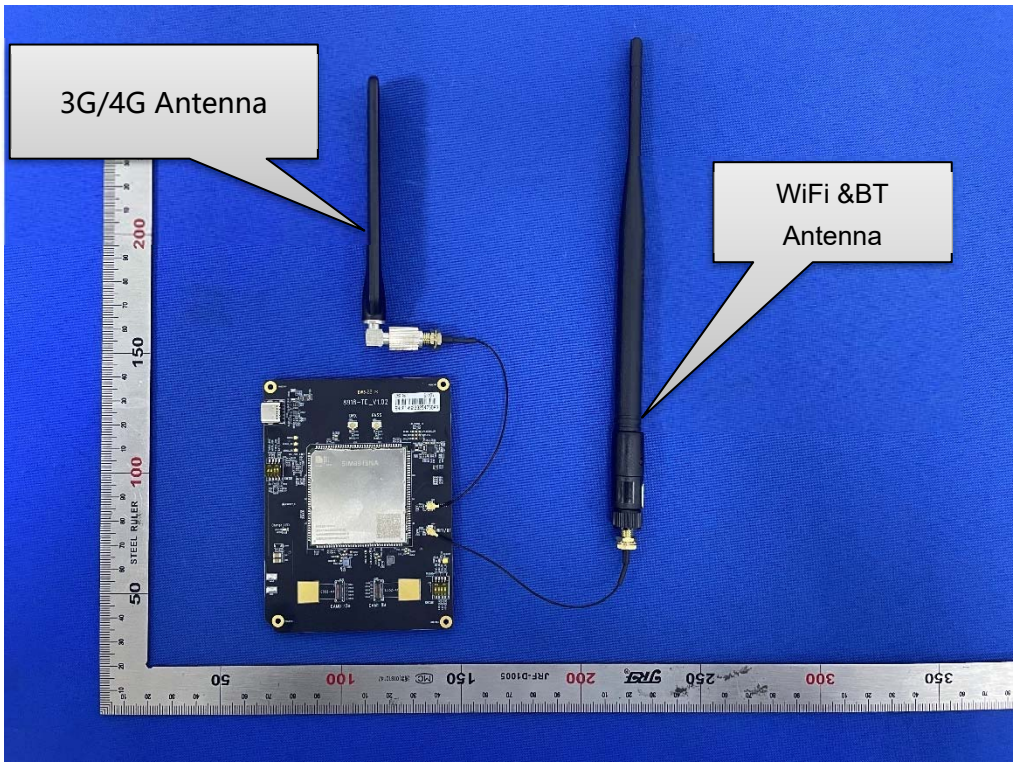
Top of the sample



Bottom of the sample

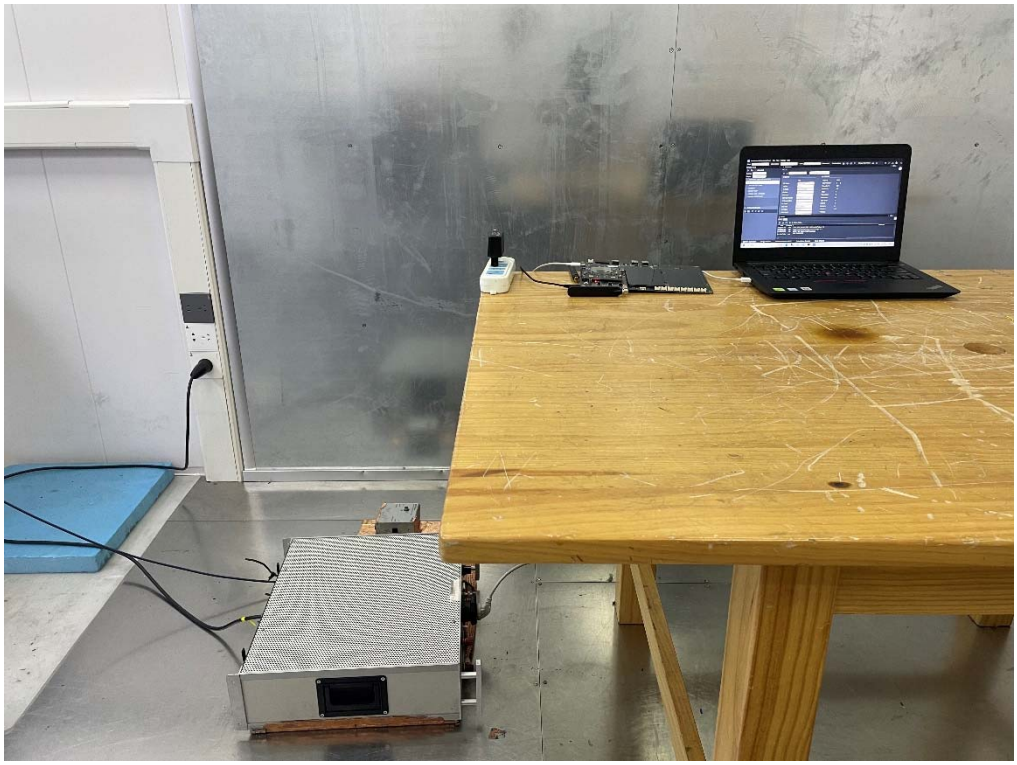


Internal-1 of the sample

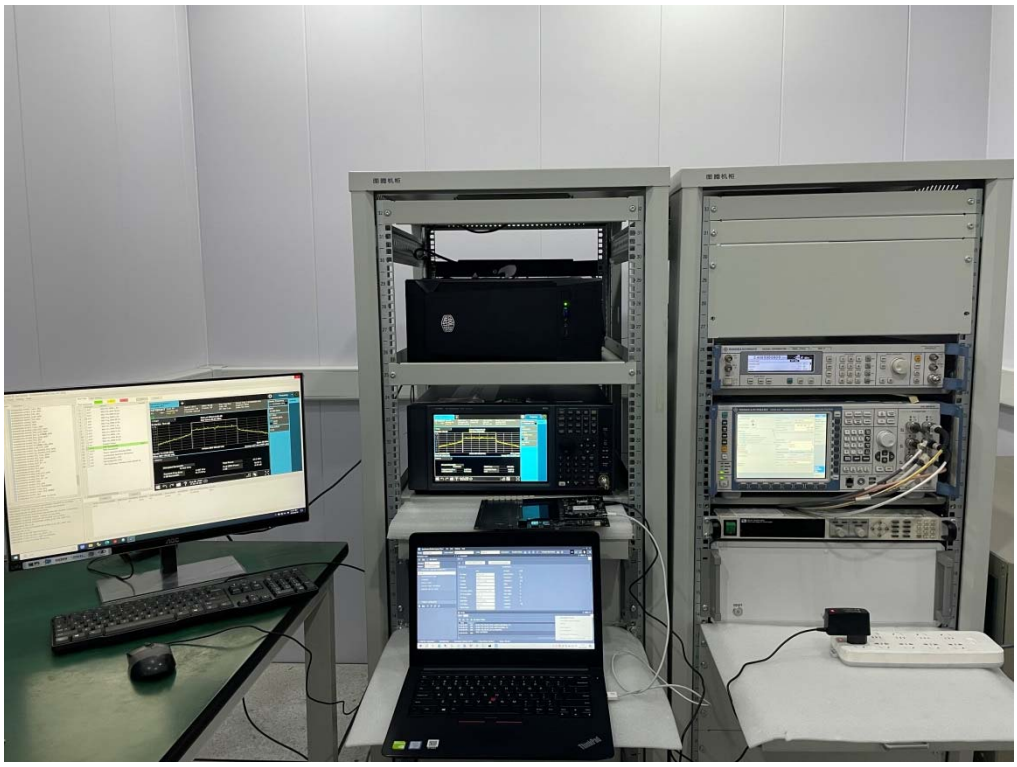


Antenna Photo

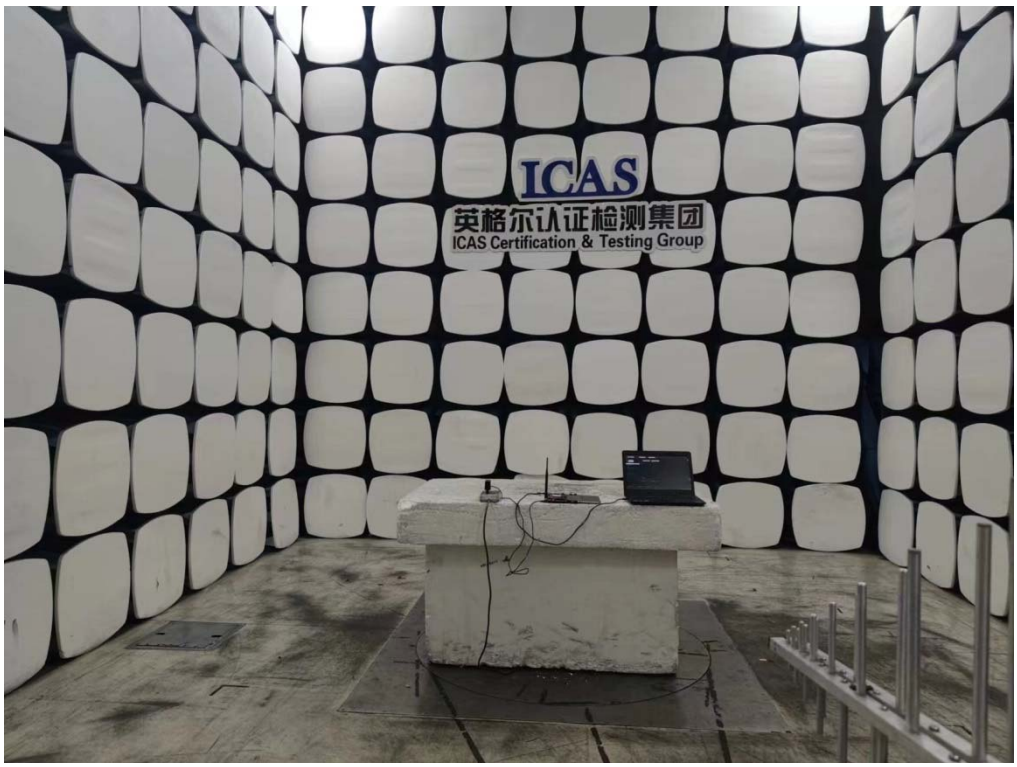
5.2 Set-up for Conducted Emission on AC Mains



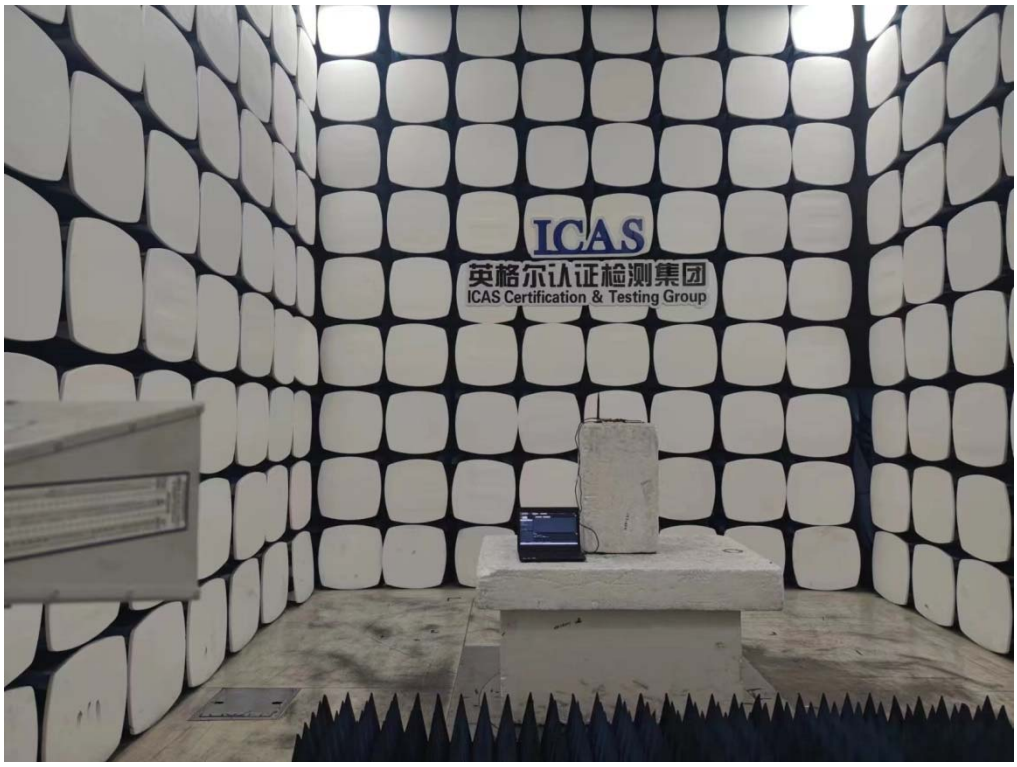
5.3 Set-up for Conducted RF test at Antenna Port



5.4 Set-up for Radiated Spurious Emissions below 1GHz



5.5 Set-up for Radiated Spurious Emissions above 1GHz



End of the report