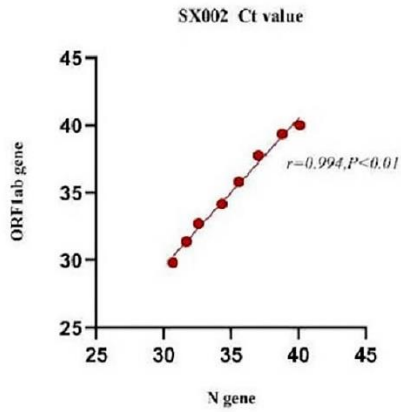
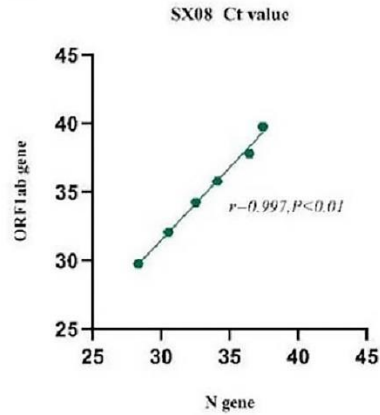


**Appendix 1.** Correlation between the Ct values for the two target genes from the four SARS-CoV-2 detection kits. A, B, C, and D present the correlation analysis results for the two target genes of SX002, SX08, KYD, and SS, respectively. Pearson's correlation coefficient was used to measure the linear correlation among the Ct values.

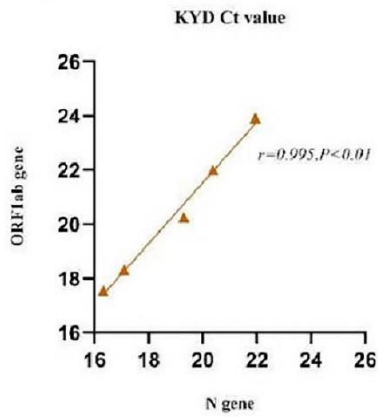
**A**



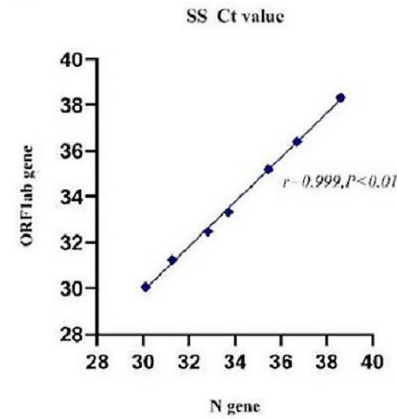
**B**



**C**

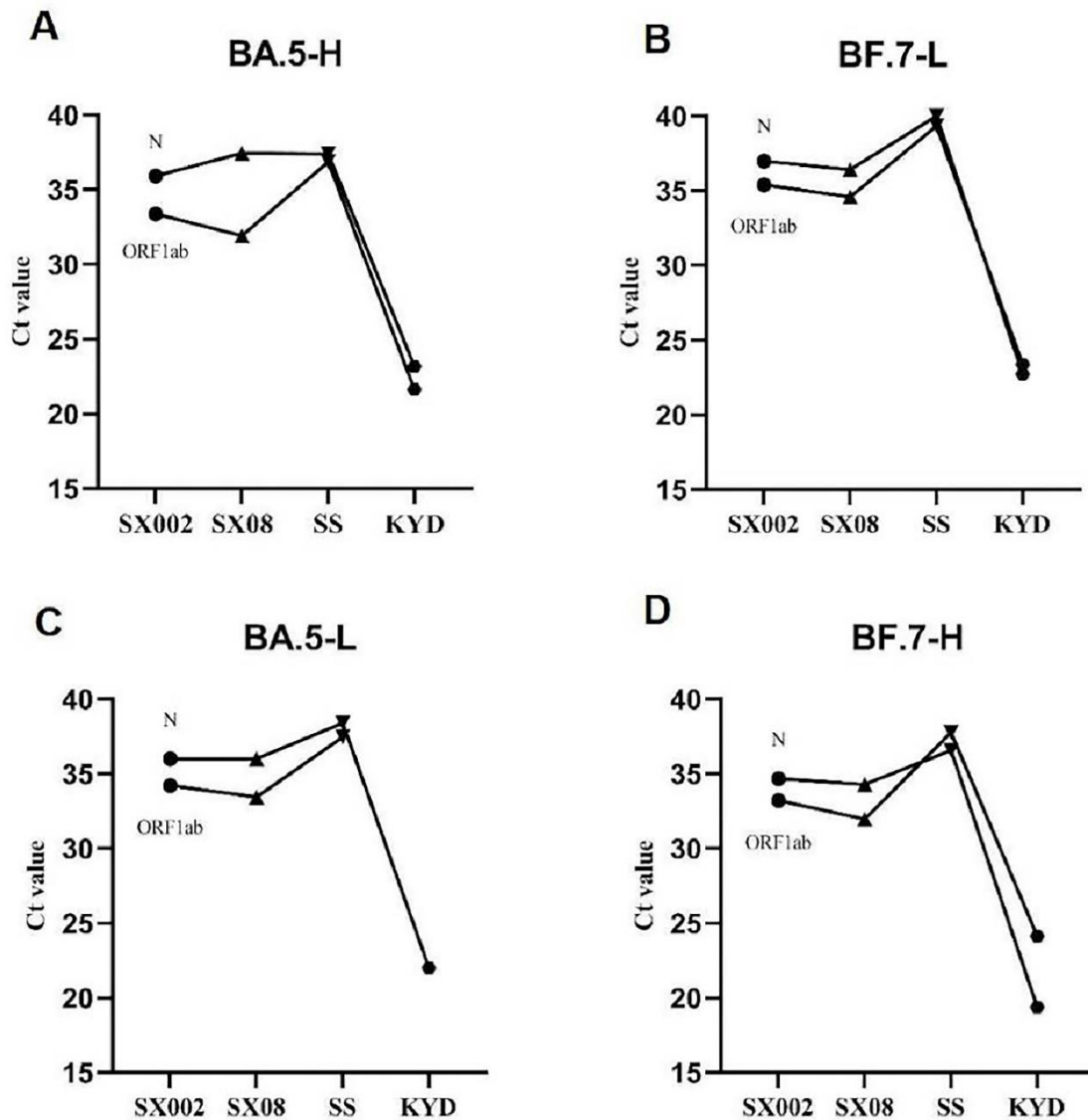


**D**



**Appendix 2.** Comparison of the four assay kits for the detection of variants BA.5 and BF.7.

A displays the comparison of the detection results for the variant BA.5 at 3000 copies/ml by using the four kits. B presents the comparison of the detection results for the variant BF.7 at 750 copies/ml. C illustrates the comparison of the detection results for the variant BA.5 at 750 copies/ml. D displays the comparison of the detection results for the variant BF.7 at 3000 copies/ml by using the four kits.



**Appendix 3.** Overview of four commercially available RT-PCR assay kits used to detect the SARS-CoV-2

<b>SARS-CoV-2 Assay Kits</b>	<b>SX002</b>	<b>SX08</b>	<b>SS</b>	<b>KYD</b>
Reverse transcription	50 °C, 30 min	50 °C, 5 min	50 °C 10 min	42 °C 3 min
Pre-denaturation	95 °C, 1 min	95 °C, 1 min	97 °C, 1 min	96 °C, 3 s/55 °C, 5 s (pre-amplification)
Denaturation	95 °C, 15 s	95 °C, 10 s	97 °C, 5 s	96 °C, 3 s
Annealing and elongation	60 °C, 30 s	60 °C, 20 s	58 °C, 30 s	55 °C, 10 s
Internal Control	RNase P	RNase P	RNase P	RNase P
Target Genes	ORF1ab, N	ORF1ab, N	ORF1ab, N	ORF1ab, N
Number of cycles	45	45	45	45
Total reaction system/template system (μl)	50/10	50/10	25/5	52/15
Fluorescence detection channel	ROX: N, FAM: ORF1ab, HEX: RNase P	ROX: N, FAM: ORF1ab, HEX: RNase P	VIC: N, FAM: ORF1ab, CY5: RNase P	ROX: N, FAM: ORF1ab, HEX: RNase P
Positive result	Ct ≤ 40	Ct ≤ 40	Ct ≤ 40	Ct ≤ 27
Nucleic acid extraction method	Extraction-free	Extraction-free	Magnetic bead method	Extraction-free
Amplifying instrument	QuantStudio™ Dx	MA-1630Q	QuantStudio™ Dx	Flash20
Running time (min)	95	60	70	30

Ct = Threshold of cycle.

**Appendix 4.** Comparison of precision Ct values (Mean Value  $\pm$  SD) of four RT-PCR assay kits

Sample number	Assay kits	N gene				ORF1ab gene			
		Ct Values (Intra-batch)	precision CV (%) (Intra-batch)	Ct Values (Inter-batch)	precision CV (%) (Inter-batch)	Ct Values (Intra-batch)	precision CV (%) (Intra-batch)	Ct Values (Inter-batch)	precision CV (%) (Inter-batch)
Y1	SX002	34.40 $\pm$ 0.30	0.86	36.77 $\pm$ 0.62	1.69	35.53 $\pm$ 0.41	1.14	36.76 $\pm$ 0.78	2.13
	SX08	34.02 $\pm$ 0.46	1.36	34.27 $\pm$ 0.59	1.71	35.94 $\pm$ 0.53	1.48	36.30 $\pm$ 0.70	1.93
	SS	34.81 $\pm$ 0.33	0.95	35.25 $\pm$ 0.32	0.91	34.64 $\pm$ 0.24	0.69	35.75 $\pm$ 0.27	0.76
	KYD	20.33 $\pm$ 0.74	3.76	20.24 $\pm$ 0.53	2.6	21.29 $\pm$ 0.63	2.97	21.16 $\pm$ 0.85	4.03
Z0	SX002	36.09 $\pm$ 0.37	1.03	36.03 $\pm$ 0.60	1.67	36.87 $\pm$ 0.46	1.25	33.25 $\pm$ 0.34	1.02
	SX08	34.20 $\pm$ 0.35	1.03	35.28 $\pm$ 0.44	1.24	35.61 $\pm$ 0.23	0.66	34.23 $\pm$ 0.27	0.78
	SS	35.99 $\pm$ 0.22	0.62	35.59 $\pm$ 0.31	0.87	34.88 $\pm$ 0.28	0.81	34.71 $\pm$ 0.22	0.62
	KYD	20.92 $\pm$ 0.59	2.82	20.75 $\pm$ 0.50	2.42	Nd	Nd	Nd	Nd

CV= Coefficient of variation, Nd = Not detected.

**Appendix 5.** Comparison of Ct values (Mean Value) and concentrations of Y1 and Y2 detected by four assay kits

Target Genes	Assay kits	Y1 (4.301)			Z0 (3.013)		
		Ct Value	Logarithm of concentration	Deviation from target value	Ct Value	Logarithm of concentration	Deviation from target value
N	SX002	34.40	4.388	0.037	36.09	3.998	0.985
	SX08	34.02	4.404	0.103	34.20	4.373	1.360
	SS	34.81	4.244	-0.057	35.99	3.989	0.976
	KYD	20.33	4.425	0.124	20.92	4.303	1.290
ORF1ab	SX002	35.53	4.149	-0.152	36.87	3.869	0.856
	SX08	35.94	4.390	0.089	35.61	4.441	1.428
	SS	34.64	4.239	-0.062	34.88	4.187	1.174
	KYD	21.29	4.539	0.238	Nd	Nd	Nd

Nd = Not detected.

**Appendix 6.** Ct values of four SARS-CoV-2 nucleic acid detection kits in 35 positive samples

Sample Number	SX002		SX08		KYD		SS	
	N	ORFlab	N	ORFlab	N	ORFlab	N	ORFlab
1	26.98	28.71	25.23	28.76	13.89	15.49	28.75	30.88
2	22.58	22.07	21.76	22.14	7.02	7.28	23.17	24.04
3	21.44	21.31	19.57	21.23	6.96	7.23	22.7	23.77
4	31.39	31.25	29.97	31.31	16.89	16.89	32.4	33.48
5	32.9	32.63	30.91	32.97	19.22	19.77	33.26	34.47
6	29.4	29.32	27.23	29.23	14.27	15.19	30.41	31.31
7	30.88	30.95	28.79	30.43	15.17	15.26	31.25	32.29
8	32.21	31.55	30.19	31.31	17.05	16.65	32.53	33.46
9	27.25	27.42	25.94	28.09	11.99	12.28	29	29.97
10	21.98	23.12	20.19	23.11	7.2	8.16	22.92	25.16
11	25.71	26.63	23.98	26.59	10.14	11.66	24.56	27.29
12	33.9	34.72	31.63	34.29	20.17	20.19	34.59	35.31
13	29	28.91	26.69	28.81	13.19	13.51	29.45	30.31
14	25.39	25.61	23.05	25.48	10.22	10.48	26	27.14
15	36.97	37.19	35.65	36.65	20.79	22.24	31.09	31.83
16	29.26	29.39	27.46	29.29	14.03	14.84	30.59	31.82
17	30.38	30.19	28.5	30.09	15.23	15.03	31.1	31.43
18	25.54	26.37	23.9	26.54	10.58	11.42	27.1	29.04
19	22.53	22.74	22.04	23.4	10.3	10.42	24.23	25.71
20	20.7	23.5	18.88	22.78	5.5	8.14	22.43	26.06
21	29.1	28.8	27.11	28.27	14.44	13.8	30.78	31.78
22	31.22	30.96	29.45	30.2	15.22	14.97	32.93	33.73
23	24.34	24.72	22.01	23.82	10.47	11.09	25.76	27.28
24	32.52	32.45	30	31.62	16.68	17.04	33.76	35.36
25	27.6	27.6	25.55	27.27	11.84	11.44	28.98	30.19
26	28.56	28.5	26.67	28.06	13.39	13.24	30.41	31.41
27	29.74	29.8	28.26	29.61	16.04	16.27	31.83	32.85
28	16.33	18.17	14.68	17.59	3.69	4.2	17.81	20.58
29	27.17	26.93	25.2	26.41	11.97	11.48	28.48	29.54
30	19.99	21.29	17.91	20.45	4.69	5.61	21.27	23.6
31	37.79	36.15	36.84	38.65	Nd	Nd	36.53	39.96
32	Nd	36.86	36.94	38.26	Nd	Nd	39.58	40
33	34.14	36.99	34.56	37.45	21.26	Nd	36.22	38.08
34	33.9	35.97	33.87	36.44	19.05	Nd	35.91	39.78
35	35.41	37.36	35.07	37.31	19.36	Nd	37.08	38.9

Nd = Not detected.