

**Supplementary Table S1. Information of clinical samples**

Sample ID	Sampling Date	Age (years)	Gender	Infection sources <sup>§</sup>	Infection stage*	Ct value (ORF1ab/N) <sup>†</sup>	Identification of SARS-CoV-2 strains by Sequencing
20SF5770	2020/3/19	54	Male	UK	Mild	37/36	Wild-type
20SF5783	2020/3/18	34	Male	Philippines	Moderate	28/28	Wild-type
20SF5774	2020/3/14	50	Male	Philippines	Mild	21/21	Wild-type
20SF5787	2020/3/19	56	Female	Philippines	Moderate	21/22	Wild-type
20SF5787	2020/3/19	48	Male	Philippines	Moderate	28/28	Wild-type
20SF9238	2020/3/26	20	Male	UK	Asymptomatic	33/35	Wild-type
20SF13480	2021/3/18	22	Male	UK	Mild	34/35	Wild-type
2021A-XG01725	2021/2/7	54	Male	UAE	Asymptomatic	17/16	Alpha
2021A-XG01774	2021/2/5	46	Male	Iraq	Moderate	21/20	Alpha
2021A-XG02064	2021/2/15	27	Male	UAE	Moderate	24/23	Alpha
2021A-XG03594	2021/3/22	55	Female	France	Moderate	17/16	Alpha
2021A-XG03595	2021/3/22	34	Female	Zambia	Moderate	26/26	Alpha
2021A-XG03596	2021/3/22	34	Male	Zambia	Moderate	15/15	Alpha
2021A-XG03607	2021/3/24	49	Female	Morocco	Moderate	18/16	Alpha
2021A-XG03612	2021/3/25	39	Male	Guyana	Asymptomatic	34/34	Alpha
2021A-XG03623	2021/3/27	71	Female	Panama	Moderate	16/15	Alpha
2021A-XG04560	2021/5/6	44	Male	Iraq	Moderate	18/16	Alpha
2021A-XG04704	2021/5/9	23	Female	Oman	Moderate	18/17	Alpha
2021A-XG04850	2021/5/13	31	Male	Cambodia	Moderate	21/22	Alpha
2021A-XG05194	2021/5/20	44	Male	China	Asymptomatic	19/18	Alpha
2021A-XG08048	2021/7/10	46	Male	Turkey	Moderate	16/16	Alpha
2021A-XG08145	2021/7/14	40	Male	Philippines	Asymptomatic	24/22	Alpha
2021A-XG08337	2021/7/19	29	Female	China	Asymptomatic	17/16	Alpha
2021A-XG03265	2021/3/22	46	Male	Djibouti	Asymptomatic	16/16	Beta
2021A-XG02289	2021/2/22	35	Male	UAE	Moderate	23/23	Beta

2021A-XG02981	2021/3/9	43	Male	Mozambique	Moderate	31/30	Beta
2021A-XG03246	2021/3/18	45	Male	Djibouti	Mild	18/18	Beta
2021A-XG03255	2021/3/21	29	Male	Djibouti	Mild	19/19	Beta
2021A-XG03240	2021/3/18	41	Male	Djibouti	Mild	14/13	Beta
2021A-XG05824	2021/5/26	17	Female	USA	Moderate	18/17	Beta
2021A-XG05827	2021/5/26	17	Female	USA	Mild	24/21	Beta
2021A-XG06000	2021/5/31	29	Male	Philippines	Moderate	23/23	Beta
2021A-XG06386	2021/6/2	34	Male	Tanzania	Moderate	15/16	Beta
2021A-XG06552	2021/6/10	41	Female	South Africa	Moderate	27/28	Beta
2021A-XG06750	2021/6/14	38	Female	Malaysia	Asymptomatic	26/26	Beta
2021A-XG07514	2021/6/23	23	Male	Philippines	Moderate	32/32	Beta
2021A-XG07753	2021/6/25	27	Female	Philippines	Asymptomatic	27/26	Beta
2021A-XG07933	2021/7/7	35	Male	Philippines	Asymptomatic	22/22	Beta
2021A-XG08741	2021/8/7	34	Male	Qatar	Moderate	31/31	Beta
2021A-XG08520	2021/7/27	31	Male	Iraq	Moderate	15/13	Delta
2021A-XG08527	2021/7/28	50	Male	Malaysia	Moderate	19/18	Delta
2021A-XG08542	2021/7/28	37	Female	Malaysia	Asymptomatic	23/22	Delta
2021A-XG08547	2021/7/29	30	Male	Turkey	Mild	20/19	Delta
2021A-XG08859	2021/8/13	43	Male	Iran	Moderate	18/19	Delta
2021A-XG09082	2021/8/24	29	Male	UAE	Moderate	16/17	Delta
2021A-XG09089	2021/8/24	45	Female	Kenya	Moderate	30/31	Delta
2021A-XG08688	2021/8/5	49	Female	Malaysia	Moderate	21/21	Delta
2021A-XG08689	2021/8/5	32	Female	Kenya	Moderate	15/15	Delta
2021A-XG08692	2021/8/5	50	Male	Congo	Moderate	16/16	Delta
2021A-XG08693	2021/8/5	28	Male	Kenya	Moderate	16/16	Delta
2021A-XG08694	2021/8/5	31	Female	USA	Moderate	18/16	Delta
2021A-XG08715	2021/8/6	29	Male	Kenya	Asymptomatic	30/30	Delta
2021A-XG08905	2021/8/15	34	Female	Philippines	Moderate	24/22	Delta (AY.1)

21XG-10658	2021/12/13	67	Male	Canada	NA	23/25	Omicron
21XG-10659	2021/12/13	64	Female	USA	NA	26/23	Omicron
21XG-10786	2021/12/16	28	Male	Ethiopia	NA	20/17	Omicron
21XG-10790	2021/12/16	70	Female	China	NA	20/19	Omicron
21XG-10794	2021/12/18	41	Female	China	NA	25/25	Omicron

§ UK, United Kingdom; UAE, United Arab Emirates; USA, United States of America.

\*The severity of illness was assessed according to the guideline for COVID-19 (version 6.0) published by the National Health Commission of China. Asymptomatic carriers present with no clinical symptom but with a positive result of the pathogens tests of SARS-CoV-2 in respiratory tract specimens and so on; Mild patients have mild clinical symptoms and no pneumonia on chest imaging; Moderate patients have clinical symptoms (i.e. fever and respiratory tract symptoms) and pneumonia on chest imaging. NA, not available.

†Ct, Cycle threshold. SARS-CoV-2 positive oropharyngeal swab samples were detected by quantitative qRT-PCR assay targeting both ORF1a/b and nucleocapsid (NP) genes of SARS-CoV-2 according to the manufacturer's protocols (Easydiagnosis Biomedicine Co., Ltd, Wuhan, China). SARS-CoV-2 positive reaction was confirmed when cycle threshold (Ct) value is less than 40.

# Supplementary Figure S1

	1	10	20	30	40	50	60	70	
MN908947/Wuhan-Hu-1	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OL672836/BA.1/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
OL677199//BA.1/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
EPI_ISL_7701122/BA.2/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQS	..YTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
EPI_ISL_7747545/BA.2/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQS	..YTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
EPI_ISL_7747552/BA.2/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQS	..YTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
EPI_ISL_7605589/BA.3/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
EPI_ISL_7740766/BA.3/Omicron	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
OU514176/B.1.1.7/Alpha	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
OU562608/B.1.1.7/Alpha	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
MZ895877/B.1.1.7/Alpha	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	..SGTNGTKRF					
MZ376663/B.1.351/Beta	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ298840/B.1.351/Beta	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ202314/B.1.351/Beta	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU492255/P.1/Gamma	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ896669/P.1/Gamma	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU565182/P.1/Gamma	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU562629/B.1.617.2/Delta	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ854387/B.1.617.2/Delta	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU539690/B.1.617.2/Delta	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ857990/C.37/Lambda	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ942542/C.37/Lambda	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ953277/C.37/Lambda	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ487800/B.1.617.1/Kappa	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU322235/B.1.617.1/Kappa	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ746235/B.1.617.1/Kappa	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OK025270/B.1.621/Mu	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU466149/B.1.621/Mu	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU571573/B.1.621/Mu	MFVFLVLLPLVSS	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
MZ687447/B.1.429/Epsilon	MFVFLVLLPLVSI	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU235436/B.1.429/Epsilon	MFVFLVLLPLVSI	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					
OU282717/B.1.429/Epsilon	MFVFLVLLPLVSI	QCVNLTTRTQ	LPPAYTNSFTRGVYYPDKVFRSSVLHSTQDLFLPFFSNVTWFHAI	HVSGTNGTKRF					

	80	90	100	110	120	130	140	150		
MN908947/Wuhan-Hu-1	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
OL672836/BA.1/Omicron	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSEF	
OL677199//BA.1/Omicron	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSEF	
EPI_ISL_7701122/BA.2/Omicron	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSEF	
EPI_ISL_7747545/BA.2/Omicron	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSEF	
EPI_ISL_7747552/BA.2/Omicron	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSEF	
EPI_ISL_7605589/BA.3/Omicron	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSEF	
EPI_ISL_7740766/BA.3/Omicron	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSEF	
OU514176/B.1.1.7/Alpha	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
OU562608/B.1.1.7/Alpha	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
MZ895877/B.1.1.7/Alpha	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
MZ376663/B.1.351/Beta	ANPVL	PFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF
MZ298840/B.1.351/Beta	ANPVL	PFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF
MZ202314/B.1.351/Beta	ANPVL	PFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF
OU492255/P.1/Gamma	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
MZ896669/P.1/Gamma	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
OU565182/P.1/Gamma	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSEF	
OU562629/B.1.617.2/Delta	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSE	
MZ854387/B.1.617.2/Delta	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSE	
OU539690/B.1.617.2/Delta	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	
MZ857990/C.37/Lambda	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	
MZ942542/C.37/Lambda	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	
MZ953277/C.37/Lambda	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	
MZ487800/B.1.617.1/Kappa	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSE	
OU322235/B.1.617.1/Kappa	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	DV..YHKNNKSNMSE	
MZ746235/B.1.617.1/Kappa	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSE	
OK025270/B.1.621/Mu	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSE	
OU466149/B.1.621/Mu	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSE	
OU571573/B.1.621/Mu	DNPVLPFNDGVYFAS	IEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	LD...HKNNKSNMSE	
MZ687447/B.1.429/Epsilon	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	
OU235436/B.1.429/Epsilon	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	
OU282717/B.1.429/Epsilon	DNPVLPFNDGVYFAS	TEKSNII	IRGWI	FGTTLDSKTQ	SLIVNNA	TNVV	IKVCF	QFCNDPFL	GV..YHKNNKSNMSE	

















MN908947/Wuhan-Hu-1	SEPVLKGVKLLHYY
OL672836/BA.1/Omicron	SEPVLKGVKLLHYY
OL677199//BA.1/Omicron	SEPVLKGVKLLHYY
EPI_ISL_7701122/BA.2/Omicron	SEPVLKGVKLLHYY
EPI_ISL_7747545/BA.2/Omicron	SEPVLKGVKLLHYY
EPI_ISL_7747552/BA.2/Omicron	SEPVLKGVKLLHYY
EPI_ISL_7605589/BA.3/Omicron	SEPVLKGVKLLHYY
EPI_ISL_7740766/BA.3/Omicron	SEPVLKGVKLLHYY
OU514176/B.1.1.7/Alpha	SEPVLKGVKLLHYY
OU562608/B.1.1.7/Alpha	SEPVLKGVKLLHYY
MZ895877/B.1.1.7/Alpha	SEPVLKGVKLLHYY
MZ376663/B.1.351/Beta	SEPVLKGVKLLHYY
MZ298840/B.1.351/Beta	SEPVLKGVKLLHYY
MZ202314/B.1.351/Beta	SEPVLKGVKLLHYY
OU492255/P.1/Gamma	SEPVLKGVKLLHYY
MZ896669/P.1/Gamma	SEPVLKGVKLLHYY
OU565182/P.1/Gamma	SEPVLKGVKLLHYY
OU562629/B.1.617.2/Delta	SEPVLKGVKLLHYY
MZ854387/B.1.617.2/Delta	SEPVLKGVKLLHYY
OU539690/B.1.617.2/Delta	SEPVLKGVKLLHYY
MZ857990/C.37/Lambda	SEPVLKGVKLLHYY
MZ942542/C.37/Lambda	SEPVLKGVKLLHYY
MZ953277/C.37/Lambda	SEPVLKGVKLLHYY
MZ487800/B.1.617.1/Kappa	SEPVLKGVKLLHYY
OU322235/B.1.617.1/Kappa	SEPVLKGVKLLHYY
MZ746235/B.1.617.1/Kappa	SEPVLKGVKLLHYY
OK025270/B.1.621/Mu	SEPVLKGVKLLHYY
OU466149/B.1.621/Mu	SEPVLKGVKLLHYY
OU571573/B.1.621/Mu	SEPVLKGVKLLHYY
MZ687447/B.1.429/Epsilon	SEPVLKGVKLLHYY
OU235436/B.1.429/Epsilon	SEPVLKGVKLLHYY
OU282717/B.1.429/Epsilon	SEPVLKGVKLLHYY

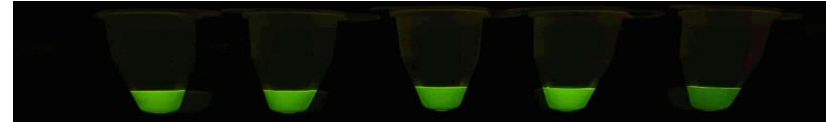
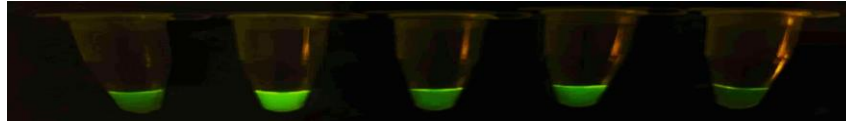
# Supplementary Figure S2<sub>crRNA-S-37X</sub>

# crRNA-S-49X

Sample ID 21XG-10658 21XG-10659 21XG-10786 21XG-10790 21XG-10794

21XG-10658 21XG-10659 21XG-10786 21XG-10790 21XG-10794

**Omicron**



Sample ID 20SF5770 20SF5783 20SF5774 20SF5787 20SF5788 20SF9238 20SF13480

20SF5770 20SF5783 20SF5774 20SF5787 20SF5788 20SF9238 20SF13480

**WT**

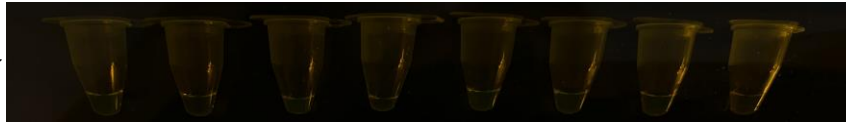


Sample ID

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
1725 1774 2064 3594 3595 3596 3607 3612

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
1725 1774 2064 3594 3595 3596 3607 3612

**Alpha**



Sample ID

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
3623 4560 4704 4850 5194 8048 8145 8337

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
3623 4560 4704 4850 5194 8048 8145 8337

**Alpha**



Sample ID

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
3265 2289 2981 3246 3255 3240 5824 5827

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
3265 2289 2981 3246 3255 3240 5824 5827

**Beta**



Sample ID

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
6000 6386 6552 6750 7514 7753 7933 8741

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
6000 6386 6552 6750 7514 7753 7933 8741

**Beta**



Sample ID

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
8520 8527 8542 8547 8859 9082 9089

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
8520 8527 8542 8547 8859 9082 9089

**Delta**



Sample ID

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
8688 8689 8692 8693 8694 8715 8905

2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0 2021A-XG0  
8688 8689 8692 8693 8694 8715 8905

**Delta**

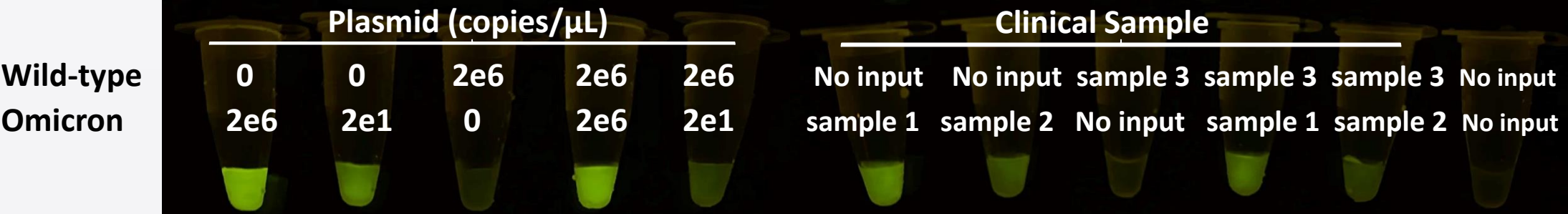


# Supplementary Figure S3

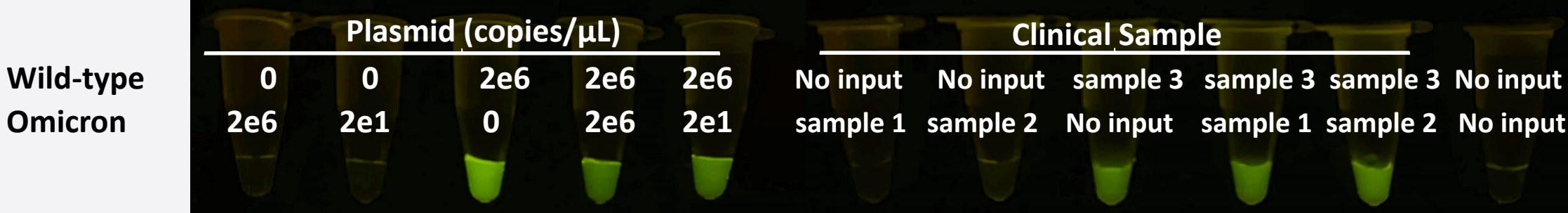
## crRNA-S-37X



## crRNA-S-49X



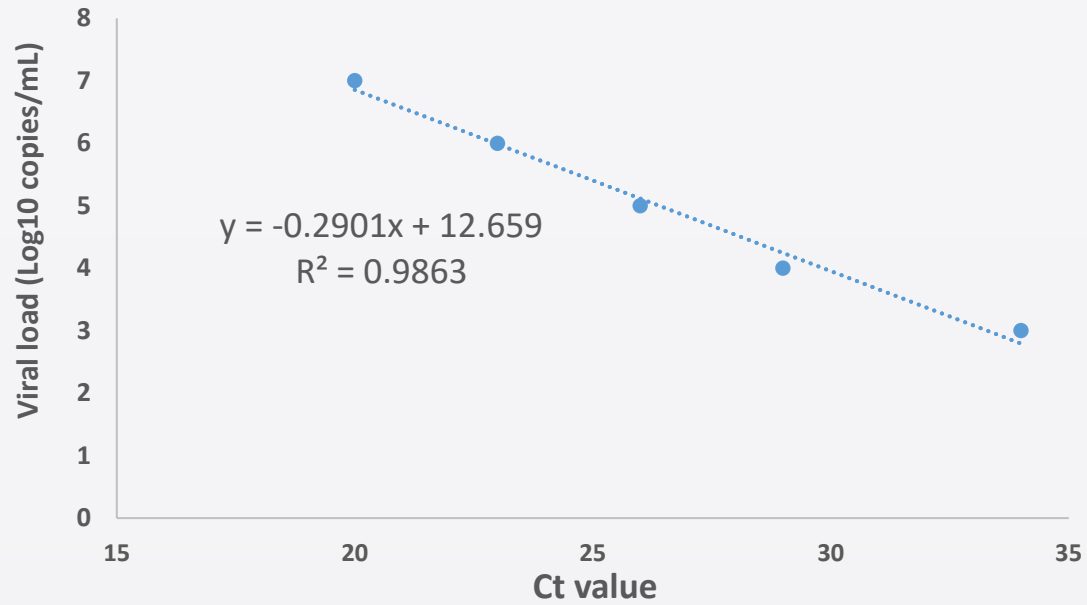
## crRNA-S-501N



# Supplementary Figure S4

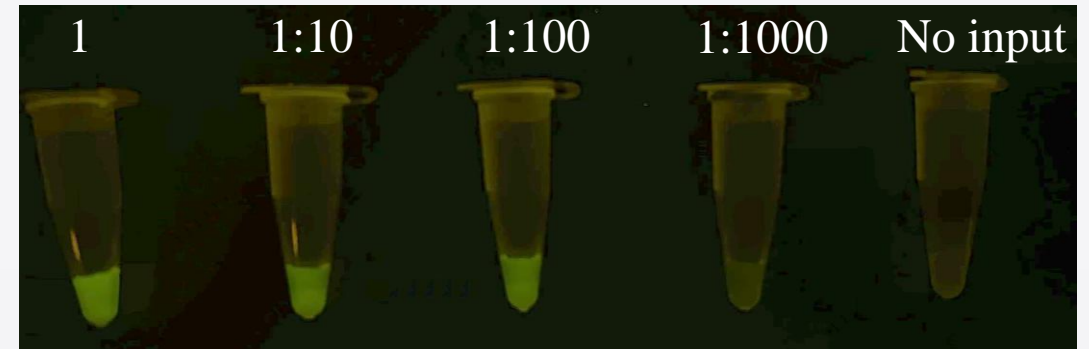
## A

### Standard curve



## B

### crRNA-S-49X



Ct value	20				
Estimated Viral load (Copies/ $\mu$ L)	$1e4$	$1e3$	$1e2$	$1e1$	