

Checklist

TaqMan SARS-CoV-2 Mutation Panel

A customizable menu of verified real-time PCR assays to give you the results you need today, while preparing you for what's to come

Applied Biosystems™ TaqMan® SARS-CoV-2 Mutation Panel is designed to be used with the following instruments or kits:

- Applied Biosystems™ 7500 Real-Time PCR Instrument
- Applied Biosystems™ 7500 Fast Real-Time PCR Instrument
- Applied Biosystems™ 7500 Fast Dx Real-Time PCR Instrument
- Applied Biosystems™ QuantStudio™ 5 Real-Time PCR System (96-well, 0.1 mL or 0.2 mL; and 384-well)
- Applied Biosystems™ QuantStudio™ 7 Flex Real-Time PCR System (384-well block)
- Applied Biosystems™ MagMAX™ Viral/Pathogen II Nucleic Acid Isolation Kit
- Applied Biosystems™ MagMAX™ Viral/Pathogen Nucleic Acid Isolation Kit
- Thermo Scientific™ KingFisher™ Flex Magnetic Particle Processor

This document lists all instruments, consumables, and reagents recommended for instrument installation, training, and running an experiment to identify currently relevant SARS-CoV-2 mutations from RNA. Please review this list carefully to ensure all necessary materials are available before installation and training dates. Missing materials can delay your setup process. Intended uses of the products mentioned may vary. For specific intended use statements, please refer to the product label.

Note: To avoid contamination, it is highly recommended that you have separate sets of pipettes for samples and extraction, PCR reaction setup, and any post-PCR processing. Ideally these steps should all be performed in separate laboratory spaces as well. Always follow necessary precautions when handling patient samples. Testing with the TaqMan SARS-CoV-2 Mutation Panel should be done by qualified and trained clinical laboratory personnel specifically instructed in the techniques of real-time PCR and research use procedures.

Ordering information: Orders may be placed at thermofisher.com/mutationpanel

Naming convention

Gene. **Mutation.** **Reference codon.** **Mutant codon**

Note: For multi-nucleotide deletions the reference codon and mutant codon are not part of the naming convention. Ex. S.delH69V70.

Example:

S.D215G.GAT.GGT

Assays associated with the publication, A method for variant agnostic detection of SARS-CoV-2, rapid monitoring of circulating variants, detection of mutations of biological significance, and early detection of emergent variants such as Omicron by E. Lai, D. Becker, et al. are highlighted below in gray. For more information visit thermofisher.com/mutationpanel

Premier assays—Premier assays are high-demand assays for popular variants. These assays come in one standard size of 1,250 reactions and have shorter timelines for delivery than the custom assays (next page).

Mutation	WHO label	Top associated variants and sublineages	Earliest documented samples	Size (reactions)	Cat. No.
S.D614G.GAT.GGT	Various	All Omicron sublineages, B.1.1.207, P.1, B.1.1.33, B.1.1.7, B.1.177, B.1.258, B.1.351, B.1.525, Mink variant	Various countries	1,250	A51818
S.K417N.AAG.AAT	Omicron, Beta	BA.1 and all sublineages, BA.2 and all sublineages, BA.3, BA.4, BA.5 and all sublineages, B.1.351	Various countries	1,250	A51814
S.L452R.CTG.CGG	Omicron, Delta, Epsilon	BA.5, BA.4, BA.2.11, B.1.617, B.1.617.1, B.1.617.2, B.1.617.3, B.1.429	Various countries	1,250	A51819
S.P681R.CCT.CGT	Delta	B.1.617.1, B.1.617.2, B.1.617.3	India	1,250	A51822
S.E484Q.GAA.CAA	Delta (absence of this mutation)	B.1.617, B.1.617.1, B.1.617.3	India	1,250	A51820
S.delH69V70	Alpha	B.1.1.7, B.1.258, B.1.525	United Kingdom	1,250	A51808
S.delY144	Alpha	B.1.1.7	United Kingdom	1,250	A51817
S.N501Y.AAT.TAT	Alpha, Beta, Gamma	P.1, B.1.1.7, B.1.351	United Kingdom, South Africa, Brazil/Amazon	1,250	A51812
S.P681H.CCT.CAT	Alpha	B.1.1.207, B.1.1.7	Nigeria, United Kingdom	1,250	A51816
S.D215G.GAT.GGT	Beta	B.1.351	South Africa	1,250	A51823
S.E484K.GAA.AAA	Beta, Gamma, Eta	P.1, B.1.1.33, B.1.351, B.1.525	South Africa, Brazil	1,250	A51813
S.K417T.AAG.ACG	Gamma	P.1	Brazil/Amazon	1,250	A51815
S.L18F.CTT.TTT	Gamma	P.1, B.1.351	Brazil/Amazon	1,250	A51830

Mutation	WHO label	Top associated variants and sublineages	Earliest documented samples	Size (reactions)	Cat. No.
S.T20N.ACC.AAC	Gamma	P.1	Brazil/Amazon	1,250	A51821
S.S13I.AGT.ATT	Epsilon	B.1.427, B.1.429	California	1,250	A51828
S.F888L.TTT.CTT	Eta	B.1.525		1,250	A51827
S.S477N.AGC.AAC	Iota	B.1.526	New York	1,250	A51824
S.N439K.AAC.AAA		B.1.258		1,250	A51825
S.V1176F.GTT.TTT		P.2	Brazil	1,250	A51826

Our team is closely tracking literature and trends in partner labs across the globe to identify and design assays for detecting emerging mutations related to increased penetration, vaccine efficacy, immune response, and therapy. Please visit thermofisher.com/mutationpanel for the latest SARS-CoV-2 mutation assays available.

Custom assays—Custom assays are available but have longer delivery timelines than premier assays, as these products are made to order.

Mutation	WHO label	Top associated variants and sublineages	Earliest documented samples	Assay ID
N.E136D.GAG.GAT	Omicron	BA.5.3.1, BE and all sublineages	Various countries	CV9HHWW
M.D3N.GAT.AAT	Omicron	BA.5, BA.5.1, BE and BF sublineages	Various countries	CVAAAAK
ORF7b.L11F.TTG.TTT	Omicron	BA.4 and all sublineages	Various countries	CVCE3VH
C12880T	Omicron	BA.2 and all Omicron variants except BA.1 sublineages	Various countries	CVEPRZD
S.S704L.TCA.TTA	Omicron	BA.2.12 and all sublineages	Various countries	CVMFWVY
T15009C	Omicron	BA.2.12.1	Various countries	CVFVKKA
S.L452Q.CTG.CAG	Omicron, Lambda	BA.2.12.1, C.37	Various countries	CVKA3AV
ORF1a.A2710T.GCT.ACT	Omicron	BA.1, BA.1.1	Various countries	CVZTDZ7
ORF1a.T13195C	Omicron	BA.1, BA.1.1	Various countries	CVWCWCF
S.T547K.ACA.AAA	Omicron	BA.1, BA.1.1	Various countries	CVYMJGA
S.Q954H.CAA.CAT	Omicron	All Omicron lineages	Various countries	CVAAAAH
S.T19R.ACA.AGA	Delta	B.1.617.2	India	CVXGPWD
S.T478K.ACA.AAA	Delta	B.1.617.2	India	CVNKRFP
ORF1a.A13057T	Mu	B.1.621	Colombia	CVXGPV9
ORF1a.F2387V.TTT.GTT	Lambda	C.37	Peru	CVH49PY
ORF1ab.Q5412H.CAA.CAC (ORF1b.Q1011H)	Iota	B.1.526	United States	CVPRJZN
S.W152C.TGG.TGC	Epsilon	B.1.427, B.1.429	United States	CVYMJF7
S.D80A.GAT.GCT	Beta	B.1.351	South Africa	CV32Z6V
T16176C	Alpha	B.1.1.7	United Kingdom	CVNKRFR
S.R346T.AGA.ACA	Omicron	BA.4.6, BF.7	Various countries	CV47VR2
ORF10.L37F.CTT.TTT	Omicron	BA.5.1	Various countries	CVYMJGD

Mutation	WHO label	Top associated variants and sublineages	Earliest documented samples	Assay ID
S.N460K.AAT.AAG	Omicron	BA.2.75	Various countries	CV9HHWN
S.F157L.TTC.TTA	Omicron	BA.2.75	Various countries	CVGZE4Y
ORF1a.S2519P.TCT.CCT	Omicron	BA.2.11	Various countries	CVWCWCH
S.L452M.CTG.ATG	Omicron	BA.2.9.1, BA.2.13	Various countries	CVXGPWF
ORF3a.H78Y.CAC.TAC	Omicron	BA.2.9 and all sublineages	Various countries	CVZTD2A
N.P151S.CCT.TCT	Omicron	BA.4 and all sublineages	Various countries	CV32Z64
S.T376A.ACT.GCT	Omicron	BA.2 and all sublineages, BA.4, BA.5 and all sublineages	Various countries	CVNKRFB
S.V213G.GTG.GGG*	Omicron	BA.2, BA.4, BA.5 and all sublineages	Various countries	CV32Z62
S.Q493R.CAA.CGA	Omicron	B.1.1.529, BA.1 and all sublineages, BA.2 and all sublineages, BA.3 and all sublineages	Various countries	CVH49P2
S.R346K.AGA.AAA	Omicron, Mu	B.1.621, BA.1.1 and all sublineages	Various countries	CVZTDZ3
S.T95I.ACT.ATT	Omicron, Iota, Mu	B.1.526, B.1.621.1, BA.1 and all sublineages, BA.3 and all sublineages	Various countries	CVRWEKJ
S.A701V.GCA.GTA	Omicron, Beta	BA.1.17.2, B.1.351	Various countries	CVZTDZZ
S.G339D.GGT.GAT	Omicron	All Omicron lineages except BA.2.75	Various countries	CV47VRX

* Recommend running an additional assay in parallel with V213G, such as Q493R, that will produce amplification from BA.1 which is found to a high prevalence in Omicron variants.

Our team is closely tracking literature and trends in partner labs across the globe to identify and design assays for detecting emerging mutations related to increased penetration, vaccine efficacy, immune response, and therapy. Please visit thermofisher.com/mutationpanel for the latest SARS-CoV-2 mutation assays available.

Recommended materials not supplied

Nucleic acid extraction

Ordering information

Product	Supplier	Storage	Cat. No.
Kits and reagents			
MagMAX Viral/Pathogen Nucleic Acid Isolation Kit (up to 200 preparations when 200 µL of sample is used)	Thermo Fisher Scientific	RT	A42352
MagMAX Viral/Pathogen Nucleic Acid Isolation Kit (up to 2,000 preparations when 200 µL of sample is used)	Thermo Fisher Scientific	RT	A48310
MagMAX Viral/Pathogen II Nucleic Acid Isolation Kit (up to 2,000 preparations when 200 µL of sample is used)	Thermo Fisher Scientific	RT	Recommended: A48383
Ethanol, absolute (200 proof), ACS reagent-grade or equivalent	Fisher Scientific	RT	Recommended: BP2818100, BP2818500, BP28184
Nuclease-free water (not DEPC-treated) or equivalent	Thermo Fisher Scientific or Fisher Scientific	RT	Recommended: AM9932, BP2819-100, BP2819-1, BP2819-4, BP2819-10, BP2819-20
Automated processing tools			
KingFisher Flex Purification System with 96 Deep-Well Head and Deep-Well Heating Block	Thermo Fisher Scientific	RT	5400630
KingFisher Flex 96 Deep-Well Heating Block (if currently using standard block)*	Thermo Fisher Scientific	RT	24075430
KingFisher 96 tip comb for deep-well magnets	Thermo Fisher Scientific	RT	97002534, A48438, A48414
KingFisher deep-well 96 plate	Thermo Fisher Scientific	RT	95040450, A48305, A48424, 95040455
96-well microplate	Thermo Fisher Scientific	RT	97002540, AB0796, AB1127, 136101
Manual processing tools			
Magnetic Stand-96	Thermo Fisher Scientific	RT	AM10027 (side magnet) AM10050 (ring magnet)
Digital Microplate Shaker	Thermo Fisher Scientific	RT	88882005
Incubator capable of reaching 65°C, with slatted shelves	Fisher Scientific	RT	Various
KingFisher deep-well 96 plate	Thermo Fisher Scientific	RT	95040450, A48305, A48424, 95040455
96-well microplate	Thermo Fisher Scientific	RT	97002540, AB0796, AB1127, 136101
MicroAmp Clear Adhesive Film	Thermo Fisher Scientific	RT	4306311

* Included in Cat. No. 5400630.

Real-time PCR

Ordering information

Product	Supplier	Storage	Cat. No.
Real-time PCR instruments			
7500 Fast Real-Time PCR Instrument (used with SDS Software v1.5.1 or 7500 Software v2.3)	Thermo Fisher Scientific	RT	4351106 (with laptop computer) 4351107 (with desktop computer)
7500 Real-Time PCR Instrument (used with 7500 Software v2.3)	Thermo Fisher Scientific	RT	4351104 (with laptop computer) 4351105 (with desktop computer)
7500 Fast Dx Real-Time PCR Instrument (used with SDS Software v1.4.1)	Thermo Fisher Scientific	RT	4406984 (with laptop computer) 4406985 (with desktop computer)
QuantStudio 5 Real-Time PCR Instrument, 96-well, 0.2 mL block (used with QuantStudio Design and Analysis Desktop Software v1.5.1)	Thermo Fisher Scientific	RT	A28569 (with laptop computer) A28574 (with desktop computer) A28139 (instrument only)
QuantStudio 5 Real-Time PCR Instrument, 96-well, 0.1 mL block (used with QuantStudio Design and Analysis Desktop Software v1.5.1)	Thermo Fisher Scientific	RT	A28568 (with laptop computer) A28573 (with desktop computer) A28138 (instrument only)
QuantStudio 5 Real-Time PCR Instrument, 384-well block (used with QuantStudio Design and Analysis Desktop Software v1.5.1)	Thermo Fisher Scientific	RT	A28570 (with laptop computer) A28575 (with desktop computer) A28140 (instrument only)
QuantStudio 7 Flex Real-Time PCR Instrument, 384-well block (used with QuantStudio Design and Analysis Desktop Software v1.3)	Thermo Fisher Scientific	RT	4485695 (with laptop computer) 4485701 (with desktop computer)

A maintained real-time PCR instrument will be calibrated for all dyes that are used with the mutation panel assays. Ensure that the calibrations for Applied Biosystems™ FAM™, VIC™, and ROX™ dyes are current. If calibration is required, refer to the standard calibration process in your instrument user guide. We strongly recommend qualifying the 7500 Fast Dx Real-

Time PCR Instrument with a certified engineer from Thermo Fisher Scientific. 7500 Fast Dx instruments do not require requalification if qualified within the last 6 months. For a list of all real-time PCR instrument calibration and verification kits, go to thermofisher.com/real-time-calibration-kits.

Ordering information

Product	Supplier	Cat. No.
Required reagents		
TaqPath 1-Step RT-qPCR Master Mix, CG	Thermo Fisher Scientific	A15299 (5 x 1 mL) A15300 (1 x 10 mL)

Recommended controls

Product	Cat. No.
RNA wildtype controls	
AcroMetrix Coronavirus 2019 (COVID-19) RNA Control (RUO)	954519

Product	Mutations Included	Size	Cat. No.
GeneArt DNA Plasmid Mutant Controls			
TaqMan SARS-CoV-2 Mutation Control A	A222V, A701V, D215G, D614G, D80A, K417T, L18F, L242_244L, N439K, Y453F	1x10 ⁴ copies/μL, 100 μL	A52504
TaqMan SARS-CoV-2 Mutation Control B	A1708D, A570D, delH69V70, delY144, E484K, K417N, N501Y, P681H, Q27stop, S982A, T716I	1x10 ⁴ copies/μL, 100 μL	A52505
TaqMan SARS-CoV-2 Mutation Control C	E484Q, F157L, F888L, L452R, P681R, Q677H, R246, S13I, T20N, V1176F, W152L	1x10 ⁴ copies/μL, 100 μL	A52506

Data analysis

Ordering information

Product	Supplier	Cat. No.
QuantStudio Design and Analysis Software v2.5 or later with the Genotyping Analysis Module	Thermo Fisher Scientific	thermofisher.com/qpcrsoftware

General laboratory equipment and consumables

Ordering information

Product	Supplier	Storage	Cat. No.
MicroAmp Fast Optical 96-Well Reaction Plate with Barcode, 0.1 mL	Thermo Fisher Scientific	RT	4346906, 4366932
MicroAmp Fast Optical 96-Well Reaction Plate (no barcode), 0.1 mL	Thermo Fisher Scientific	RT	4346907
MicroAmp EnduraPlate Optical 96-Well Fast Clear Reaction Plates with Barcode	Thermo Fisher Scientific	RT	4483485, 4483494
MicroAmp EnduraPlate Optical 96-Well Fast Clear Reaction Plates (no barcode)	Thermo Fisher Scientific	RT	A36930
MicroAmp Optical 96-Well Reaction Plate with Barcode, 0.2 mL	Thermo Fisher Scientific	RT	4306737, 4326659
MicroAmp Optical 96-Well Reaction Plate (no barcode), 0.2 mL	Thermo Fisher Scientific	RT	N8010560, 4316813
MicroAmp EnduraPlate Optical 96-Well Clear Reaction Plates with Barcode	Thermo Fisher Scientific	RT	4483354, 4483352
MicroAmp EnduraPlate Optical 96-Well Clear Reaction Plates (no barcode)	Thermo Fisher Scientific	RT	A36924
MicroAmp Optical 384-Well Reaction Plate with Barcode	Thermo Fisher Scientific	RT	4309849, 4326270, 4343814
MicroAmp Optical 384-Well Reaction Plate (no barcode)	Thermo Fisher Scientific	RT	4343370
MicroAmp EnduraPlate Optical 384-Well Clear Reaction Plates with Barcode	Thermo Fisher Scientific	RT	4483285, 4483273
MicroAmp EnduraPlate Optical 384-Well Clear Reaction Plates (no barcode)	Thermo Fisher Scientific	RT	A36931
MicroAmp Optical Adhesive Film	Thermo Fisher Scientific	RT	4311971, 4360954
MicroAmp Adhesive Film Applicator	Thermo Fisher Scientific	RT	4333183
MicroAmp Splash-Free 96-Well Base	Thermo Fisher Scientific	RT	4312063
Sterile aerosol barrier (filtered) pipette tips	Thermo Fisher Scientific	RT	thermofisher.com/pipettetips

Note: To avoid contamination, it is highly recommended that you have separate sets of pipettes for samples and extraction, PCR reaction setup, and any post-PCR processing. Ideally these steps should all be performed in separate laboratory spaces as well. Always follow necessary precautions when handling patient samples.

Ordering information

Product	Supplier	Recommended product	Cat. No.
1–10 µL single channel adjustable volume pipette	Thermo Fisher Scientific	F1-ClipTip Variable Volume Single Channel Pipette (1–10 µL)	4641320N
10–100 µL single channel adjustable volume pipette	Thermo Fisher Scientific	F1-ClipTip Variable Volume Single Channel Pipette (10–100 µL)	4641200N
100–1,000 µL single channel adjustable volume pipette	Thermo Fisher Scientific	F1-ClipTip Variable Volume Single Channel Pipette (100–1,000 µL)	4641230N
Multichannel pipette in 5–20 µL volume range	Thermo Fisher Scientific	E1-ClipTip Equalizer 384 8-Channel (2–125 µL)	4672060BT
		or	or
		E1-ClipTip Equalizer 384 12-Channel (2–125 µL)	4672070BT
Multichannel pipette in 50–1,000 µL volume range (optional)	Thermo Fisher Scientific	E1-ClipTip Equalizer 8-Channel Pipette (15–1,250 µL) (optional)	4672100BT
Multichannel 10–300 µL pipette	Thermo Fisher Scientific	E1-ClipTip Equalizer 8-Channel (10–300 µL)	4672080BT
30–850 µL multichannel adjustable volume pipette, 12-well (optional)	Thermo Fisher Scientific	E1-ClipTip 12-Channel Pipette (30–850 µL) (optional)	4671090BT
15–1,250 µL single or multichannel adjustable volume pipette (optional)	Thermo Fisher Scientific	E1-ClipTip Electronic 1-Channel Pipette (15–1,250 µL) (optional)	4670040BT
		or	or
		E1-ClipTip Electronic 8-Channel Pipette (15–1,250 µL) (optional)	4671100BT
Aerosol-resistant barrier pipette tips, various sizes (1–1,250 µL)	Thermo Fisher Scientific	Aerosol-resistant barrier tips compatible with F1-ClipTip and E1-ClipTip pipettes	Recommended: 94420153, 94420813
Centrifuge with rotor for microplates	Thermo Fisher Scientific	Sorvall General Purpose Centrifuges	Various
Laboratory vortex with plate pad	Thermo Fisher Scientific	Various	Various
Biosafety cabinet	Thermo Fisher Scientific	Herasafe 2030i Class 2 A2 Biological Safety Cabinets or Thermo Scientific 1300 Series Class II, Type A2 Biological Safety Cabinet Packages	51032334 or 1336
PCR workstation (optional)	Fisher Scientific	AirClean Systems Combination PCR Workstation	36-101-8894, 36-101-8897
Incubator capable of reaching 65°C, with slatted shelves	Thermo Fisher Scientific	Heratherm Advanced Protocol Microbiological Incubator	51028067
Benchtop microcentrifuge, to accommodate 1.5 mL tubes	Thermo Fisher Scientific	mySPIN 6 Mini Centrifuge	75004061
		or	or
		Sorvall Legend Micro 21R Microcentrifuge, refrigerated	75002447
–20°C freezer	Thermo Fisher Scientific	TSX Series High-Performance –20°C Manual Defrost Freezers (or similar)	TSX2320FA
4°C refrigerator	Thermo Fisher Scientific	TSX Series High-Performance Laboratory Refrigerator (or similar)	TSX3005GA
Gloves	Fisher Scientific	Various	Various
Safety glasses	Fisher Scientific	Various	Various
Laboratory coat	Fisher Scientific	Various	Various
General purpose lab tissues/wipers	Fisher Scientific	Kimberly-Clark Professional Kimwipes Delicate Task Wipers	S47299

Ordering information

Product	Supplier	Recommended product	Cat. No.
Microcentrifuge tube rack for 1.5 mL tubes	Thermo Fisher Scientific	Flipper Microtube Rack for 1.5 mL and 2.0 mL Tubes	8760, 8770-11, 8780
Cold blocks, or ice and ice buckets	Thermo Fisher Scientific Fisher Scientific	Benchtop Coolers and Eppendorf PCR Cooler	5116-1300 and 05-403-00
1.5 mL RNase-free microcentrifuge tubes	Thermo Fisher Scientific or Fisher Scientific	Microcentrifuge tubes, nonstick, RNase-free, 1.5 mL (250 tubes) or Snap Cap Low Retention Microcentrifuge Tubes, 1.5 mL, graduated, sterile	Recommended: AM12450 or 21-402-903
RNase-free conical tubes, 15 mL	Thermo Fisher Scientific	RNase-Free Conical Tubes, 15 mL (racked) (500 tubes)	Recommended: AM12500
RNase-free conical tubes, 50 mL	Thermo Fisher Scientific	RNase-Free Conical Tubes, 50 mL (racked) (200 tubes)	Recommended: AM12501
Nalgene bottles	Thermo Fisher Scientific	Nalgene Square PETG Media Bottles (125 mL)	342020-0125
Reagent reservoirs	Thermo Fisher Scientific	Matrix Reagent Reservoirs, polystyrene; 100 mL, individually wrapped, with divider	95128085
Serological pipettes	Thermo Fisher Scientific	Nunc Serological Pipettes, individually wrapped, paper/plastic peel packaging, plugged	170355
Pipette filler	Fisher Scientific	S1 Pipet Filler	Various
96-well plate holder	Thermo Fisher Scientific	MicroAmp Splash-Free 96-Well Base	4312063
8-tube strip	Thermo Fisher Scientific	PCR Tubes & Caps, RNase-free, 0.2 mL (8-strip format)	AM12230
Reagent dispenser (optional)	Thermo Fisher Scientific	Multidrop Combi Reagent Dispenser	5840300

 Find out more at thermofisher.com/mutationpanel

applied biosystems

Intended use of the products mentioned vary. For specific intended use statements, please refer to the product label.

© 2020–2022 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. Kimwipes is a trademark of Kimberly-Clark Worldwide, Inc. TaqMan is a registered trademark of Roche Molecular Systems, Inc., used under permission and license. Eppendorf is a trademark of Eppendorf AG. AirClean is a trademark of Applied Medical Technologies, Inc. **COL35304 0922**