



Instructions for life science research use only. Not tested for use in diagnostic procedures. For *in vitro* use only.



Instructions For Use

VirSNIp SARS-CoV-2 Spike S371L S373P

530

Cat.-No. 53-0827-96

Roche SAP n° 09 634 835 001

Kit with reagents for 96 PCR reactions 20 µl for genotyping of SARS-CoV-2 RNA [lyophilized]

1. Content, Storage and Expiry

Storage at Arrival:

1 Vial yellow cap 96 reactions SARS CoV (lyophilized)

Store cooled or at ambient temperature
Do **not** freeze the lyophilized reagents.

- Kits are stable for one year after production (store 4°C to 25°C in the dark). See lot-specific expiry date.
- Reconstituted reagents are stable for two weeks if stored protected from light and cooled (2°C to 8°C).
- Dissolved reagent can be stored long-term if frozen (-15°C to -25°C). Avoid multiple freeze-thaw cycles.

2. Additional Reagents required

LightCycler® Multiplex RNA Virus Master
or 1-step RT polymerase

Roche Cat.-No. 06 754 155 001
90-9999-96

3. Introduction

Hundreds of thousands of isolates have been sequenced since the SARS-CoV-2 genome was published (MN908947). The novel **Omicron** variant is derived from Alpha, but carrying many new mutations.

Spike Prot. Variation	Genetic Variation	Alpha B.1.1.7	Beta B.1.351	Gamma B.1.1.28	Delta B.1.617	Omicron B.1.1.529	Function, Effect	Assay
del HV69/70	del21765-770	x				x	evasion of immune response	53-0781
ins214EPE						x		53-0826
S371L	T22673C					x		53-0827
S373P	C22674T							
	T22679C							
K417T	A22812C			x			RBD (ACE binding domain)	53-0817
K417N	G22813T		x			x	RBD (ACE binding domain)	53-0787
L452R	T22917G				x		ACE binding, immune escape	53-0788
E484K	G23012A		x	x		A	RBD (ACE binding domain)	53-0789
N501Y	A23063T	x	x	x		x	RBD (stronger ACE binding)	53-0780
P681H/R	C23604A/G	H			R	H	furin cleavage site	53-0786

4. Description

A 108 bp PCR long fragment is amplified and analyzed with a melting curve using a 371L and 373P specific probe.

5. Specification

Sensitivity not tested.

6. Sample Material and Extraction

Coronaviruses affect normally the lower respiratory system, but SARS-CoV-2 is found also in nose and throat. Typical clinical samples are throat and nasopharyngeal swabs, sputum, saliva or gargle solution. Product tested with heat-treated gargle solution. For RNA extraction see manufacturer's kit instructions.

7. Material Safety Data (MSDS)

This product is not hazardous (according to regulation (EC) No 1272/2008), not toxic, not IATA-restricted. Not from human, animal or plant origin. Product contains synthetic oligonucleotide primers and probes. According to OSHA 29CFR1910.1200, Australia [NOHSC:1005, 1008 (1999)] and EU Directives (EC) No 1907/2006 and (EC) No 2015/830 any products which do not contain more than 1% of a component classified as hazardous or classified as carcinogenic do not require a MSDS.



8. Instructions for Use

Instruction for Roche 480 instruments. Capillary LightCycler®, LightCycler® 96, MyGo and BioRad CFX96 instruments give similar results (FAM channel). For other instruments use SYBR Green melting option.

8.1. Programming Roche 480 Instruments (Standard ModularDx Program)

Detection Format 530 Channel **Set Quant Factor 10, Max Integration Time 1 sec**

LightCycler® 480 Instrument: 483-533

LightCycler® 480 II Instrument: 465-510

cobas z 480 Analyzer (open channel): 465-510

Program Step:	RT Step	Denaturation	Cycling			Cooling
Parameter						
Analysis Mode	None	None	Quantification mode			None
Cycles	1	1	40-45			1
Target [°C]	55	95	95	60	72*	40
Hold [hh:mm:ss]	00:05:00	00:05:00	00:00:05	00:00:15	00:00:15	00:00:30
Ramp Rate [°C/s] 96	4.4	4.4	4.4	2.2	4.4	1.5
Ramp Rate [°C/s] 384	4.6	4.6	4.6	2.4	4.6	2.0
Acquisition Mode	None	None	None	Single	None	None

* 72°C step can be skipped. 95°C can be cut to 3 s, 60°C to 12 s. RT and Den to 3 min (total time 45 min) Table 1

8.1.1. Melting Analysis (may be added or programmed as second run)

Detection Format Hydrolysis Probe or SimpleProbe

LightCycler® 480 Instrument: 483-533

LightCycler® 480 II Instrument: 465-510

cobas z 480 Analyzer (open channel): 465-510

Program Step:	Melting			Cooling
Parameter				
Analysis Mode	Melting Curves mode			None
Cycles	1			
Target [°C]	95	40	75	40
Hold [hh:mm:ss]	00:00:30	00:02:00	00:00:00	00:00:30
Ramp Rate [°C/s]	4.4	1,5	-	1.5
Acquisition Mode	-	-	Continuous	
Acquisitions [per °C]	-	-	3**	None

Table 2

** Melting slope shall be 0.19 to 0.29°C per second. If reading more channels reduce the number of acquisitions/sec.

8.2. Experimental Protocol

- **Sample material:** Use aqueous nucleic acid preparations
- **Negative control:** Always run at least one no-template control (NTC) - replace the template NA with water.
- **Positive control:** Run a positive control - replace the template NA with a positive control.

For an increased sensitivity use 10 µl nucleic acid per 20 µl reaction.

Product tested for 10 µl reaction volume (192 reactions).

8.2.1. Preparation of Parameter-Specific Reagents (PSR, 96 reactions):

The reagent vial with the **yellow** cap contains the primers and probe to run 96+ PCR reactions.

Check for the orange pellet, then **add 50 µl** PCR-grade water, mix (vortex) and spin down. For robotic pipetting the volume can be extended to 55 µl (signals will decrease by 10-20%).

► **Use 0.5 µl** reagent per 20 µl PCR reaction.

8.2.2. Preparation of the Positive Control

- not provided -

8.2.3. Preparation of the Reaction Mix

Multiply volumes by the number of reactions plus controls and one reserve, prepare in a cooled tube:

LightCycler® Multiplex RNA Virus Master		1-step RT Polymerase 90-9999-96	
10.4 µl	Water, PCR-grade	Water, PCR-grade	4.5 µl
0.5 µl	This reagent (PSR)	This reagent (PSR)	0.5 µl
4.0 µl	Roche Mastermix	TIB Mastermix	10.0 µl
0.1 µl	RT Enzym	-	-
15.0 µl		15.0 µl	

Table 3

Mix gently, spin down and transfer 15 µl (10 µl) per well.

Add 5 µl (10 µl) of sample or control to each well for a final reaction volume of 20 µl. Seal plate and centrifuge.

Start run

9. Typical Results

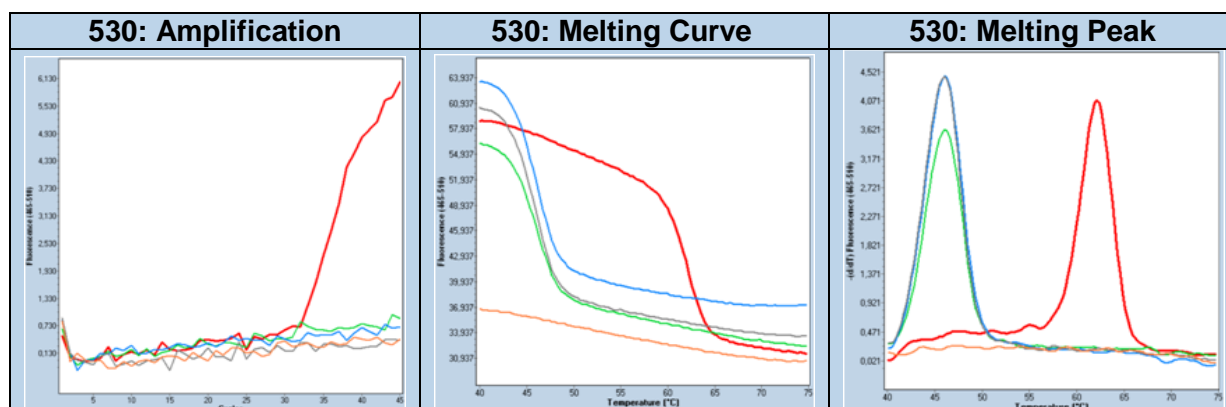


Figure 1: Blue Alpha (B.1.1.7), grey Beta (B.1.351), green Delta (B.1.617.2), red Omicron (B.1.1.529), orange NTC. **Left:** Only Omicron visible. **Center** Melting curves. **Right** S371/S373 has a Tm of 46 (± 2)°C, 371L/373P 62 (± 2)°C

10. Reading the Results

Use the Second Derivative Maximum method (Automated (F'' max). View results in the 530 channel. The negative control (NTC) must show no signal. For the melting curve analysis use 'Tm calling'.

Channel 530 Amplification	Channel 530 Melting analysis	Channel 530 NTC Control	Reference Strain (example)
Not relevant	Not relevant	Negative / no peak	No virus amplified / not detectable
Invisible	Tm 45°C*	Negative	SARS Spike not Omicron
Visible	Tm 62°C*	Negative	SARS Spike S371L S373P
Not relevant	Not relevant	Positive	Contamination Repeat experiment

Tm values shift depending on the instrument, speed of heating, mastermix, salt contents and detection format.

* Temperatures with 1step RT pol. 90-9999-96 are 3-4°C higher.

Single peak with lower Tm values are an indication for the presence of another mutation in the probe region.

The assay detects the genetic situation and not a strain; the correlation to a reference strain describes the most likely assignment for isolates reported as VOI and VOC.

11. References

Genomic characterisation of emergent SARS-CoV-2 lineage in UK defined by novel set of spike mutations. Rambaut et al., 2020 www.ecdc.europa.eu/en/publications-data/threat-assessment-brief-rapid-increase-sars-cov-2-variant-united-kingdom

Circulating SARS-CoV-2 spike var. N439K maintains fitness while evading antibody-mediated immunity. Thomson et al., 2020

Mutations in SARS-CoV-2 spike protein and RNA pol. are associated with COVID-19 mortality risk. Hahn et al., 2020 www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/DESH/Bericht_VOC_05022021.pdf?__blob=publicationFile

12. Multiplex PCR Compatibility

This SNP assay can be combined with 51-0776-96 SARS E+N and either EAV spiked extraction control or UBC human mRNA extraction control or with the complete kit 60-0770-96 Sarbecovirus E+N+UBC.


Multiplex PCR and Instrument Compatibility						480 II	z 480	LC96	LC2.0	Nano
Color Comp 40-0320 mandatory only for Multiplex PCR using more channels										
500	530	580	610	640	660	X	X	X	X	X
	SNP					X	X	X		
SarbecoV	SNP	UBC mRNA				X	X	X		
SarbecoV	SNP				UBC	X	X	X		
SarbecoV	SNP				EAV	X	X	X		
	SNP	SARS N	SARS E		UBC	X	X	X		

Table 3

13. Version History

V211127 Release version
V211129 Tm values for Omicron

2021-11-27
2021-11-29

Certificate of Analysis (CoA)					
Lot n° 5161 Expiry : YYYY-MM-DD					
	WT	S371L S373P		PC	passed
Tm range	44-46°C	61-63°C	Cp range	-	
Measured				-	✓
Signal level	2-10	2-10			✓
Measured					✓
Negatives	10/10				✓
Note: Cp (crossing point) values collected with pDNA (single target PCR). Fluorescence (FL) levels depend on instrument settings and may vary. The Cp values will vary from instrument to instrument by up to 2 cycles, while the distance between two dilution steps should be relative constant (Δ Cp).					
DOM (manufactured): YYYY-MM-DD			QC Acceptance: YYYY-MM-DD		
We, the undersigned, certify that the product designated above has been obtained in accordance with the rules of production and quality control.					
Name(s) :					
<i>Name1</i>			<i>Name2</i>		

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