EMERGENCY USE AUTHORIZATION (EUA) SUMMARY
For the Kaiser Permanente High Throughput SARS-CoV-2 Assay

For *in vitro* Diagnostic Use
Rx Only
For 18 years of age or older
For Use Under Emergency Use Authorization (EUA) Only

The Kaiser Permanente High Throughput SARS-CoV-2 Assay will be used with the Kaiser Permanente Saliva Home Collection Kit. Testing will be performed at the SCPMG-RRL located at 13000 Peyton Drive, Chino Hills, CA 91709 which is certified under Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, and meets requirements to perform high complexity tests, as described in the Laboratory Standard Operating Procedure that was reviewed by the FDA under this EUA.

INTENDED USE

The Kaiser Permanente High Throughput SARS-CoV-2 Assay is a real-time reverse transcription polymerase chain reaction (RT-PCR) test intended for qualitative detection of nucleic acid from SARS-CoV-2 in saliva that is self-collected unsupervised at home using the Kaiser Permanente Saliva Home Collection Kit, by individuals 18 years or older suspected of COVID-19, when determined to be appropriate by a healthcare provider. Specimens collected using the Kaiser Permanente Saliva Home Collection Kit can be transported at ambient temperature for testing.

Testing is limited to the Southern California Permanente Medical Group - Regional Reference Laboratory (SCPMG-RRL) located at 13000 Peyton Drive, Chino Hills, CA 91709 which is certified under Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, and meets requirements to perform high complexity tests.

Results are for the identification of SARS-CoV-2 RNA. The SARS-CoV-2 RNA is generally detectable in saliva during the acute phase of infection. Positive results are indicative of the presence of SARS-CoV-2 RNA; clinical correlation with patient history and other diagnostic information is necessary to determine patient infection status. Positive results do not rule out bacterial infection or co-infection with other viruses. The agent detected may not be the definite cause of disease. Laboratories within the United States and its territories are required to report all results to the appropriate public health authorities.

Negative results do not preclude SARS-CoV-2 infection and should not be used as the sole basis for patient management decisions. Negative results must be combined with clinical observations, patient history, and epidemiological information. Negative results for SARS-CoV-2 RNA from saliva should be confirmed by testing of an alternative specimen type if clinically indicated.

The Kaiser Permanente High Throughput SARS-CoV-2 Assay is intended for use by qualified laboratory personnel specifically instructed and trained in molecular testing and in vitro diagnostic procedures. The Kaiser Permanente High Throughput SARS-CoV-2 Assay and the

Kaiser Permanente Saliva Home Collection Kit are only for use under the Food and Drug Administration's Emergency Use Authorization.

DEVICE DESCRIPTION AND TEST PRINCIPLE

1) Device Description

The Kaiser Permanente High Throughput SARS-CoV-2 Assay is a real-time reverse transcription polymerase chain reaction (RT-PCR) test intended for the qualitative detection of nucleic acid from SARS-CoV-2 performed on the Thermo Fisher Amplitude Solutions System. The SARS-CoV-2 primers are designed to detect RNA from SARS-CoV-2 in saliva specimens from individuals 18 years old or older as recommended for testing by a healthcare provider.

Saliva specimens must be self-collected using the Kaiser Permanente Saliva Home Collection Kit which contains the Spectrum Solutions, LLC SDNA-1000 Saliva Collection Device.

Kaiser Permanente Saliva Home Collection Kit Ordering Process:
Individuals may request the Kaiser Permanente Saliva Home Collection Kit by either speaking with a healthcare provider or requesting a test through an online questionnaire. The questionnaire is reviewed by a physician to ascertain patient symptoms or reasons for testing, such as exposure to COVID-19 and criteria that follows the CDC recommendations for testing prioritization. Patients are then approved by the healthcare provider to receive the unobserved self-collect Kaiser Permanente Saliva Home Collection Kit for at home collection. The home collection kit is only distributed to the patient after a prescription is written for the test.

The Kaiser Permanente Saliva Home Collection Kit collects and stabilizes viral RNA from saliva specimens and can also be used for the transportation and storage of samples. The Kaiser Permanente Saliva Home Collection Kit is for saliva self-collection from individuals who are suspected of COVID-19 by their healthcare provider for use with The Kaiser Permanente High Throughput SARS-CoV-2 Assay.

The Kaiser Permanente Saliva Home Collection Kit consists of the Spectrum Solutions, LLC SDNA-1000 Saliva Collection Device, an outbound corrugated box, biohazard specimen bag with absorbent material, pre-labeled return shipping bag along with a digitally printed personalized letter containing the sample identification label and instructions for shipping the samples. Saliva specimens must be received in the laboratory within 48 hours of sample collection. Specimens are received at the clinical laboratory for testing with the Kaiser Permanente High Throughput SARS-CoV-2 Assay.

Test results are returned to the individual who use the Kaiser Permanente Saliva Home Collection Kit via a secure online portal. Kaiser Permanente Medical Center staff will verbally contact patients who receive a positive or invalid/inconclusive result for follow up.

2) Test Principle

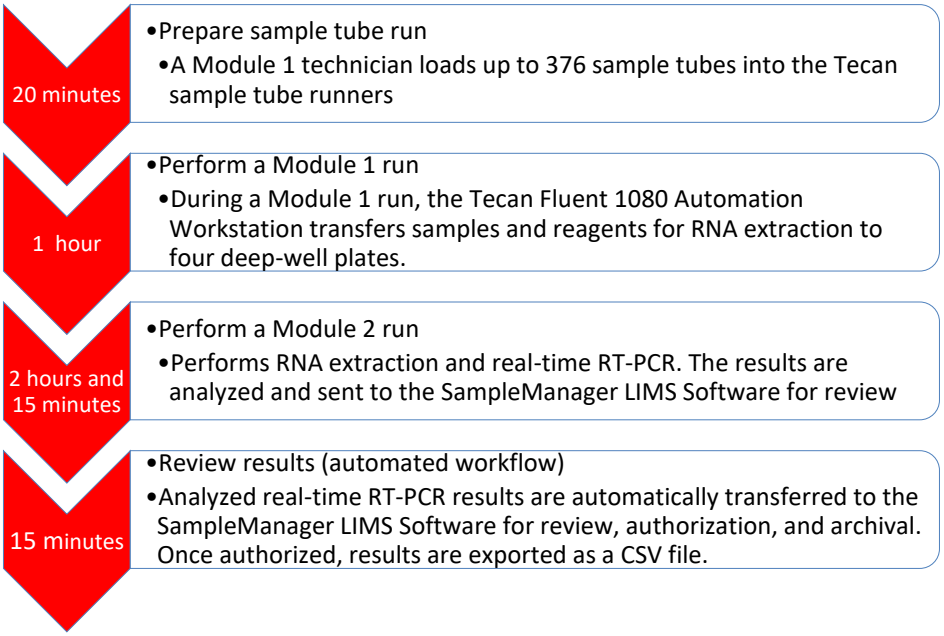
The Kaiser Permanente High Throughput SARS-CoV-2 Assay uses the TaqPath COVID-19

High Throughout Combo Kit which contains primers to detect specific nucleic acid sequences from the genome of the SARS-CoV-2 virus from the nucleocapsid (N) gene, spike glycoprotein gene (S), and ORF1ab region. The bacteriophage MS2 is also a target in the test to serve as an internal and extraction control.

The Kaiser Permanente High Throughput SARS-CoV-2 Assay is performed using the fully automated Thermo Fisher Amplitude Solutions System.

The real-time RT-PCR data is automatically analyzed by the Amplitude System COVID-19 Interpretive Software Driver to determine the presence or absence of SARS-CoV-2 RNA. A summary of the Kaiser Permanente High Throughput SARS-CoV-2 Assay workflow is illustrated in **Figure 1**.

Figure 1. Kaiser Permanente High Throughput SARS-CoV-2 Assay Workflow



COLLECTION KITS USED WITH THE TEST

This test must be used with the Kaiser Permanente Saliva Home Collection Kit to self-collect saliva specimens at home when determined to be appropriate by an HCP.

REAGENTS AND MATERIALS

Table 1 below lists the kit components for use with the Kaiser Permanente High Throughput SARS-CoV-2 Assay.

Table 1. Reagents for Use with the Kaiser Permanente High Throughput SARS-CoV-2 Assay

Components	Amount	Cat. No.	Sub-kits
TaqPath COVID-19 High-Throughput Combo Kit	20,000 reactions	A49869	TaqPath COVID-19 Module 1 MS2 Phage Control × 3
			TaqPath COVID-19 Module 2 assay Kit × 3
			TaqPath COVID-19 Control × 3
			TaqPath COVID-19 Module 2 Control Dilution Buffer × 3
			TaqPath HT Module 2 Empty Mixing Tubes × 3
Amplitude High-Throughput Consumable Package 1 Reagent Kit	20,000 reactions	A49599	MagMAX MVPII HT Module 1 Sample Prep Kit × 3
			MagMAX MVPII HT Module 2 Sample Prep Kit × 3
			TaqPath HT Module 2 1-Step Multiplex Master Mix (No ROX) × 3
Amplitude High-Throughput Consumable Package 3 Plastics	40,000 reactions	A49663	Amplitude Plastics and Tips Combo Kit 1
			Amplitude Plastics Combo Kit 2
			Nunc Microplate Lids

ASSAY CONTROLS

Assay controls listed in **Table 2** are run concurrently with test samples in each run of the Kaiser Permanente High Throughput SARS-CoV-2 Assay. The MS2 phage control is added to each sample prior to extraction. The assay positive, MS2, and negative controls are provided ready to use, no preparation is required.

Table 2. Assay Controls for the Kaiser Permanente High Throughput SARS-CoV-2 Assay

Control	Used to monitor	Assays
Positive Control (TaqPath COVID-19 Control)	RT-PCR reaction setup and reagent integrity	All three SARS-CoV-2 assays
MS2 Phage Control	RNA extraction	MS2 assay
Negative Control	Cross-contamination during RNA extraction and RT-PCR reaction setup	All three SARS-CoV-2 assays
		MS2 assay

INTERPRETATION OF RESULTS

All test controls must pass for the real-time RT-PCR plate results to be considered valid. Validation of the results is performed automatically based on the performance of the positive and negative controls. The Ct cutoff values for assay targets indicated in **Table 3** are used during the interpretation of results.

Table 3. Ct cutoff values for assay targets

Sample	Target C_t cutoff	Result
Positive Control	MS2 – C_t values are >37	Valid Positive Control
	Viral targets – C_t values are ≤37	
Negative Control	MS2 – C_t values are ≤32	Valid Negative Control
	Viral targets – C_t values are >37	
Clinical samples	MS2 – C_t values are ≤32	For interpretation of the test results, see Table 4
	Viral targets – Positive C_t values are ≤37	

The results for each assay target are used to determine the status and result for the sample, as indicated in **Table 4**.

Table 4. Interpretation of test results

ORF1 ab	N gene	S gene	MS2	Status	Result	Action
NEG	NEG	NEG	NEG	INVALID	NA	Repeat test. If the repeat result remains invalid, consider collecting a new specimen.
NEG	NEG	NEG	POS	VALID	SARS-CoV-2 Not Detected	Report results to a healthcare provider.
Only one SARS-CoV-2 target = POS			POS or NEG	VALID	SARS-CoV-2 Inconclusive	Repeat test. If the repeat result remains inconclusive, additional confirmation testing should be conducted if clinically indicated.
Two or more SARS-CoV-2 targets = POS			POS or NEG	VALID	Positive SARS-CoV-2	Report results to a healthcare provider.

SPECIMEN COLLECTION CONTROL

The integrity of the saliva specimen collected with the Kaiser Permanente Saliva Home Collection kit is visually evaluated during the accessioning process in the laboratory prior to placing the sample into the Amplitude system. The samples are inspected to confirm that the minimum volume requirements have been met, as indicated by the fill line on the sample collection device. The release of the stabilizing solution into the sample, consistency of the saliva sample, and presence of mucus is also assessed to determine acceptability for testing. The assay includes an internal MS2 Phage control that is added to each sample to monitor for the integrity of nucleic acid extraction and RT-PCR.

COMPONENTS INCLUDED WITH THE COLLECTION KIT

The Kaiser Permanente Saliva Home Collection Kit includes the Spectrum Solutions, LLC SDNA-1000 Saliva Collection Device to self-collect saliva specimens at home when determined to be appropriate by an HCP. The components for the Kaiser Permanente Saliva Home Collection Kit, described in **Table 5**, will be assembled and distributed by a fulfillment vendor, Previon.

Table 5. Contents of the Kaiser Permanente Saliva Home Collection Kit

Name	Description	Quantity	Material Supplier
SDNA-1000 blister pack	Saliva collection device, sample collection instructions	1	Spectrum Solutions, LLC
Outbound corrugated box	6 ¾" x 4 ½" x 2 ¼" white	1	Premier: My Binding Backup(s): Kelly Paper, Veritek
Printed personalized letter with ID label and shipping instructions	Digitally printed	1	Premier: Best Forms Backup: Wright Business Graphics
Biohazard bag	Biohazard bag	1	Premier: Kelly Paper Backup: Veritek
Shipping polybag, prelabeled and pre-paid	Opaque polybag for shipping sample. Includes SCPMG-RRL return address	1	Premier: Best Forms Backup: Wright Business Graphics

In addition to the printed sample collection and shipping instructions provided in the Kaiser Permanente Saliva Home Collection Kit, patients will also have access to an instructional video, by scanning a QR code provided on the individualized letter in the collection kit. The instructional video demonstrates how to fill the sample tube, seal the tube, label the sample, and

package the sample for return shipping. The video can be viewed here:

https://kp.qumucloud.com/view/oPAP-COVID-Home-Saliva-Test-How

SAMPLE STABILITY

Spectrum Solutions, LLC has granted Southern California Permanente a Right of Reference (RoR) to leverage the sample stability data for saliva samples collected in the SDNA-1000 to support 7 day sample stability at room temperature (15ºC-30ºC) and the data supporting viral inactivation of SARS-CoV-2 virus in the SDNA-1000 collection device.

To support the sample stability of saliva samples collected in the SDNA-1000 saliva collection device when used for home collection, Infinity BiologiX (IBX) has granted a RoR to Southern California Permanente to leverage the shipping stability studies. IBX performed the winter and summer simulated shipping studies that support a 48-hour shipping stability for saliva samples collected in the SDNA-1000 saliva collection device.

PERFORMANCE EVALUATION

1) Limit of Detection (LoD) - Analytical Sensitivity:

The LoD of Kaiser Permanente High Throughput SARS-CoV-2 Assay was evaluated using gamma-irradiated SARS-CoV-2 obtained from BEI Resources (SARS-CoV-2 isolate USA-WA1/2020, Item NR-52287) diluted in pooled SARS-CoV-2 negative saliva samples collected with the Spectrum Solutions, LLC SDNA-1000 Saliva Collection Device.

Preliminary LoD:
The preliminary LoD was determined in a two-phase approach. Phase 1 of the initial estimate of the LoD was determined by testing six 10-fold dilutions of inactivated SARS-CoV-2 in pooled negative saliva samples. One RNA extraction at each of the six different target levels, 1.75 to 175,000 copies/mL, was tested using the Kaiser Permanente High Throughput SARS-CoV-2 Assay on the Amplitude System to estimate the range for the LoD.

Phase 2 of the preliminary range finding study involved testing 3-fold dilutions of inactivated SARS-CoV-2 in pooled negative saliva samples around the concentration determined in the Phase 1 study. Three individual RNA extraction replicates of five target levels, 19.4, 58.3, 175, 525, and 1575 copies/mL, were tested on the Amplitude System to determine the presumptive LoD. Spiked saliva specimens were tested according to the Kaiser Permanente High Throughput SARS-CoV-2 Assay protocol.

Confirmation of the LoD:
The presumptive LoD was confirmed by testing an additional 20 replicates at 525 copies/mL on seven Amplitude Systems.

The assay LoD was confirmed to be **525 copies/mL** in saliva**. Table 6** below shows the summary of mean Ct values at the assay LoD for the Kaiser Permanente High Throughput SARS-CoV-2 Assay.

Table 6. Summary of overall results from LoD Confirmation at 525 copies/mL

Amplitude system	Mean Ct values (± SD) for each Amplitude system		
	N gene (# positive/ # tested)	ORF gene (# positive/ # tested)	S gene (# positive/ # tested)
1	29.2 ± 0.4 (20/20)	28.7 ± 0.4 (20/20)	30.6 ± 0.6 (20/20)
2	30.8 ± 0.6 (20/20)	29.9 ± 0.5 (20/20)	32.3 ± 0.7 (20/20)
3	28.5 ± 0.3 (20/20)	28.1 ± 0.4 (20/20)	30.5 ± 1.1 (20/20)
4	29.2 ± 0.5 (20/20)	28.0 ± 1.1 (20/20)	29.7 ± 0.9 (20/20)
5	30.4 ± 1.2 (20/20)	27.8 ± 1.5 (20/20)	30.7 ± 1.2 (20/20)
6	28.3 ± 2.3 (20/20)	27.8 ± 2.1 (20/20)	29.8 ± 1.8 (20/20)
7	29.0 ± 1.0 (20/20)	25.5 ± 2.4 (20/20)	28.2 ± 2.2 (20/20)

2) Inclusivity, Cross-Reactivity and Interfering Substances

SCPMG-RRL has obtained a Right of Reference from Thermo Fisher Scientific, manufacturer of the TaqPath COVID-19 High-Throughput Combo Kit, for data supporting inclusivity, cross reactivity and interfering substances.

3) Clinical Evaluation

The clinical performance of the Kaiser High Throughput SARS-CoV-2 Assay was evaluated by testing a total of 300 saliva samples collected under the supervision of a healthcare provider with the Spectrum SDNA-1000 saliva collection device. Saliva specimens were collected from symptomatic and suspected of COVID-19 patients who consented to enroll in the study from August 18, 2020 to November 1, 2020. A corresponding nasopharyngeal (NP) swab was collected within 10 minutes of saliva collection by a healthcare provider. The NP swab was collected in either viral transport medium or 0.9% saline and transported with the saliva samples collected in the SDNA-1000 collection device to the laboratory under ambient conditions. The NP swab was tested using a highly sensitive FDA authorized molecular assay.

Results for the paired NP swabs were used as the comparator method for calculating positive and negative percent agreement (PPA and NPA).

Of the 300 saliva specimens tested using the Kaiser High Throughput SARS-CoV-2 Assay, 12 (4.7%) had invalid results. These residual clinical specimens had insufficient volume for additional repeat testing as instructed in the standard operating procedure and were excluded from the analysis. The remaining 288 specimens were used for comparative analysis as denoted in **Table 7**.

Table 7. Clinical Evaluation Results

		NP Swab FDA Authorized Assay Result		
		Positive	Negative	Total
Saliva Kaiser High Throughput SARS-CoV-2 Assay	Positive	136	6	142
	Negative	2	144	146
	Total	138*	150*	288
Positive Percent Agreement		98.6% (95% CI, 94.9% - 99.6%)		
Negative Percent Agreement		96.0%, (95% CI, 91.5% - 98.2%)		

*An inconclusive result for the Kaiser High Throughput SARS-CoV-2 Assay occurs when only one of three SARS-CoV-2 targets tests as positive. Two comparator positive samples and one negative sample tested as inconclusive using the Kaiser assay. Inconclusive results were considered discrepant results between the candidate and comparator assays. There was insufficient residual volume for additional testing.

4) Human Usability Study

To support home use of the Kaiser Permanent Saliva Home Collection Kit, using the Spectrum Solutions, LLC SDNA-1000 Saliva Collection Device, a Human Usability Study was conducted to evaluate the entire workflow including sample collection, labeling the sample, packaging of the sample, and mailing to the laboratory with pre-paid shipping label. The saliva samples were collected using the sample collection instructions provided in the SDNA-1000 saliva collection device and were not subject to change or improvement based on the usability study results.

Testing included 30 adult participants representing varying education levels ranging from high school education to graduate level degrees and took place in a simulated home environment.

Each participant collected the saliva sample while under observation by a Southern California Permanente staff, who recorded any difficulties the participant experienced with the sample collection process. The participants were provided the instructional letter from Kaiser Permanente including the instructions for use and had access to an instructional video which demonstrates all aspects of the sample collection workflow. None of the participants in the usability study elected to watch the instructional video but used only the written instructions provided. The samples were returned to the lab and evaluated by laboratory staff to determine if the samples were collected, packaged, and received in the lab correctly.

Thirty out of the 30 samples were received at SCPMG-RRL within 48 hours of saliva collection.

Upon receipt, laboratory personnel inspected the packaging and recorded any packaging errors and noted acceptability of the sample for testing. All 30 samples were deemed acceptable for testing based on the evaluation of the sample volume and release of the stabilizing liquid into the sample.

After the entire process was completed, the user was given a questionnaire to indicate the ease of use of the kit and sample collection. The parameters that were evaluated in the Kaiser Permanente Saliva Home Collection Kit usability study are listed in **Table 8** along with the percentage of participants who performed each step correctly and without difficulty. Seventeen out of the 30 participants did not experience any difficulty collecting the saliva sample and did not provide any

comments or suggestions on the process.

Table 8. Parameters Evaluated and Performed Correctly

Parameters Evaluated	Percent Performed Correctly
Open sealed SDNA-1000 device	100% (30/30)
Fill the tube with saliva	100% (30/30)
Replace the funnel	100% (30/30)
Firmly screw cap to release liquid	93% (28/30)
Shake 5 sec	97% (29/30)
Write date and time of collection	90% (27/30)
Label tube and align with existing barcode	93% (28/30)
Wrap in tissue, bag and seal	90% (27/30)
Box bag and letter	97% (29/30)
Place in prepaid shipping bag	100% (30/30)
Ship sample	100% (30/30)

Upon review of the study results the instructions were updated to address identified difficulties for the user.

ADDITIONAL REQUIREMENTS

Upon authorization, within 30 days of the receipt of the first home collected sample, SCPMG-RRL will submit to the FDA a summary of any testing performed with the Kaiser Permanent Saliva Home Collection Kit including how many kits were prescribed and distributed for unsupervised collection, how many kits were returned, how many specimens had to be rejected during accession and the main reasons for rejection, and the positivity rate of the collection device

LIMITATIONS

- For 18 years of age or older.
- Negative results for SARS-CoV-2 RNA from saliva should be confirmed by testing of an alternate specimen type if clinically indicated.
- Performance of this test was not evaluated in an asymptomatic patient population from individuals suspected of COVID-19 by their healthcare providers.
- The clinical performance of this test has not been established in all circulating variants but is anticipated to be reflective of the prevalent variants in circulation at the time and location of the clinical evaluation. Performance at the time of testing may vary depending on the variants circulating, including newly emerging strains of SARS-CoV-2 and their prevalence, which change over time.

WARNINGS

- For Emergency Use Authorization (EUA) only.

- For *in vitro* diagnostic use.
- For prescription use.
- This product has not been FDA cleared or approved but has been authorized for emergency use by FDA under an EUA for use by SCPMG-RRL located at 13000 Peyton Drive, Chino Hills, CA 91709 which is certified under CLIA and meets the requirements to perform high-complexity tests.
- This product has been authorized only for the detection of nucleic acid from SARSCoV-2, not for any other viruses or pathogens.
- The emergency use of this product is only authorized for the duration of the declaration that circumstances exist justifying the authorization of emergency use of in vitro diagnostics for detection and/or diagnosis of COVID-19 under Section 564(b)(1) of the Federal Food, Drug and Cosmetics Act, 21 U.S.C. § 360bbb-3(b)(1), unless the declaration is terminated, or authorization is revoked sooner.