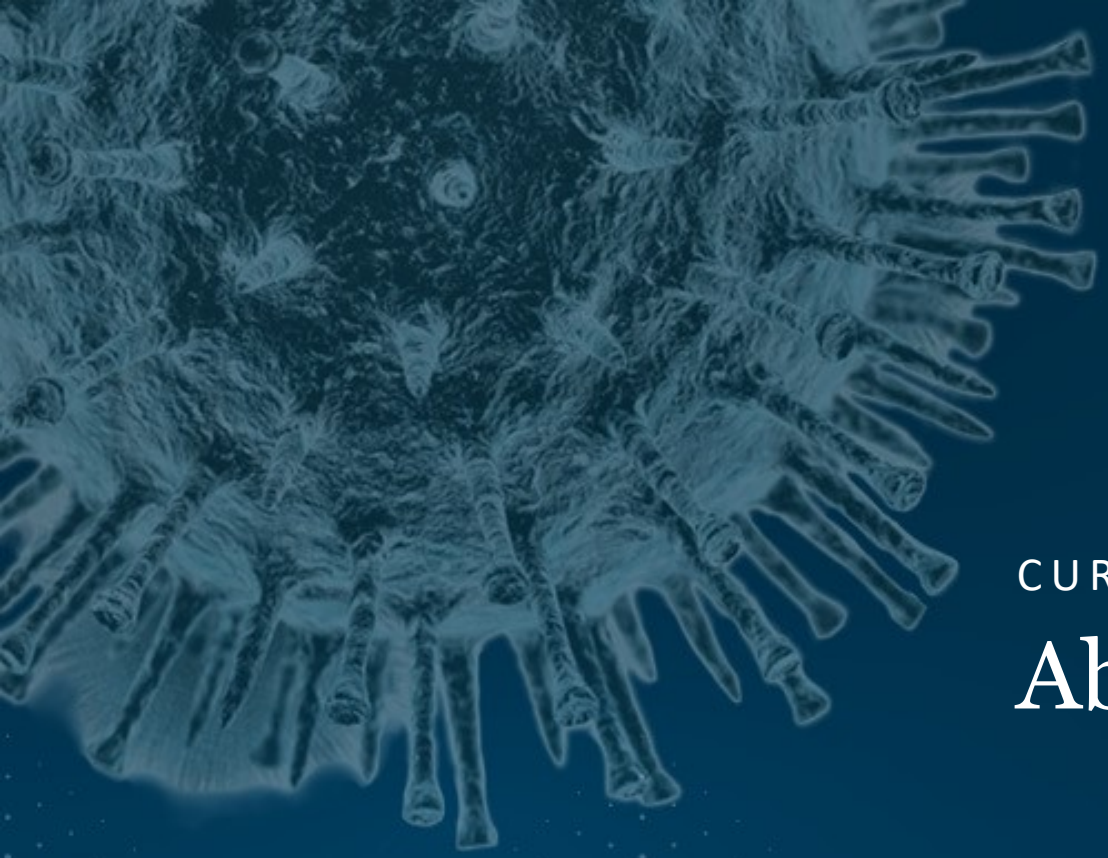


MOLECULAR

CURBING THE COVID-19 OUTBREAK IN REALTIME

Abbott RealTime SARS-CoV-2

April 30th, 2020

Abbott

AMD.14849 USA

Abbott‘s committment to fight the COVID-19 pandemic

Launched in the US and in EMEA:

- **RealTi*me* SARS-CoV-2** assay for ***m*2000** received CE-IVD, US: FDA EUA. Scalable, automated process for flexible testing volumes (24-96 samples) and up to 470 patient samples in 24 hours.

Launched in the US:

- **ID NOW SARS-CoV-2 assay EUA**

Launched in the US and in EMEA:

SARS-CoV-2 IgG

In development:

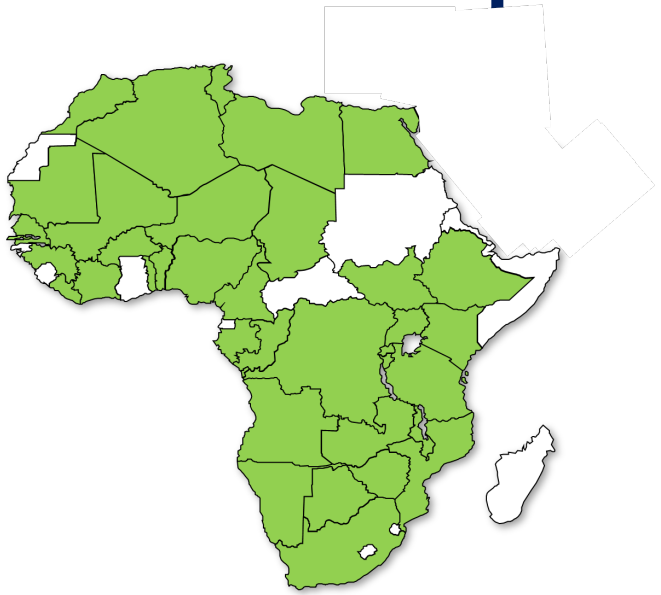
- **Alinity m SARS-CoV-2**

- **SARS-CoV-2 IgM**

Panbio COVID 19 IgG / IgM

*m*2000 SYSTEM – Sub-Saharan Africa Placements & Capabilities

m2000
RealTime System



Menu

- RealTime HIV-1 Viral Load
- RealTime HIV-1 Qualitative
- RealTime MTB
- RealTime MTB RIF/INH
- RealTime HCV Viral Load
- *max*Cycle HIV/HCV
- RealTime HCV Genotyping II
- RealTime HBV Viral Load
- RealTime CMV
- RealTime EBV

Menu Cont

- RealTime High Risk HPV
- RealTime CT & CT/NG
- m2000*sp* open mode extraction capability
- m2000*rt* open mode capability
- RealTime SARS-CoV-2

Reliable (<2 calls/year)
Efficient use of controls and floor space

Abbott RealTime SARS-CoV-2 Specimen Types

Nasal swab, Nasopharyngeal swab (NP) or Oropharyngeal swab (OP):

- Swab material: Sterile Dacron/nylon swab (Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing)
- Once sample is collected, the tip of the swab should be placed in a viral transport media tube (should contain 1-3mL of sterile viral transport medium)

Common collection devices:

BD Universal Viral Transport Kits

COPAN UTM Viral Transport

Sources: https://www.bd.com/en-us/offerings/capabilities/specimen-collection/swab-based-specimen-collection/bd-universal-viral-transport-system; https://www.copanusa.com/sample-collection-transport-processing/utm-viral-transport/

Abbott RealTi*m*e SARS-CoV-2 Sample Preparation

Primary Tubes

- Collection devices may be loaded directly onto the *m*2000sp
- Swabs must be removed prior to loading
- Custom rack calibration available to minimize required dead volume

Secondary Tubes

- Transfer 0.9-1.3mL of the viral/universal transport media from the collection device into either the *m*2000sp reaction vessel or transport tube
- Custom rack calibration available to minimize required dead volume

Note:

- Laboratories should follow their own procedures for handling respiratory viruses before starting sample preparation on the *m*2000sp
- Please visit https://www.cdc.gov/coronavirus/2019-nCoV/lab/lab-biosafety-guidelines.html for biosafety guidance of SARS CoV-2 specimen handling

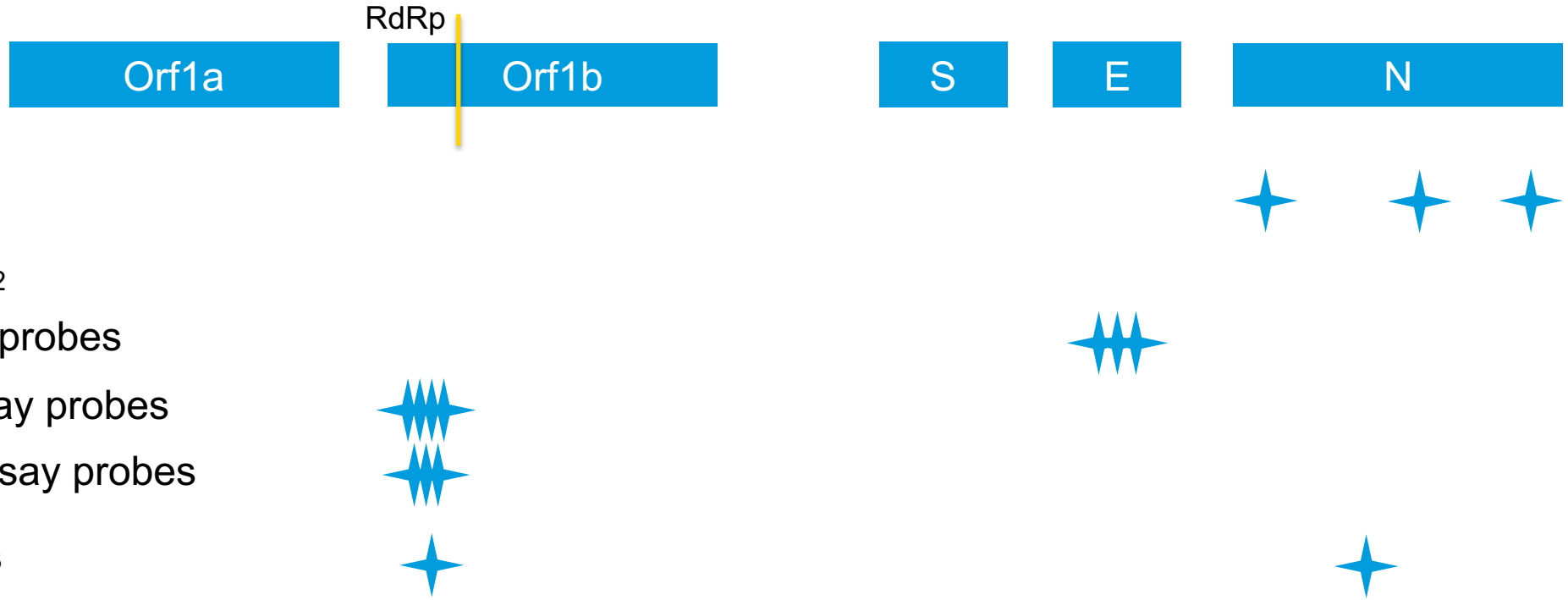
Abbott RealTi*m*e SARS-CoV-2 Reagent Preparation

Abbott *m*Sample Preparation System$_{DNA}$
(LN 06K12-24)

- **m**Lysis$_{DNA}$ - Add 35 mL ethanol to each bottle of *m*Lysis$_{DNA}$
- **m**Microparticles$_{DNA}$
- **m**Wash1$_{DNA}$ - Add 23 mL ethanol to each bottle of *m*Wash1$_{DNA}$
- **m**Wash2$_{DNA}$ - Add 70 mL ethanol to each bottle of *m*Wash2$_{DNA}$
- **m**Elution$_{DNA}$ Buffer

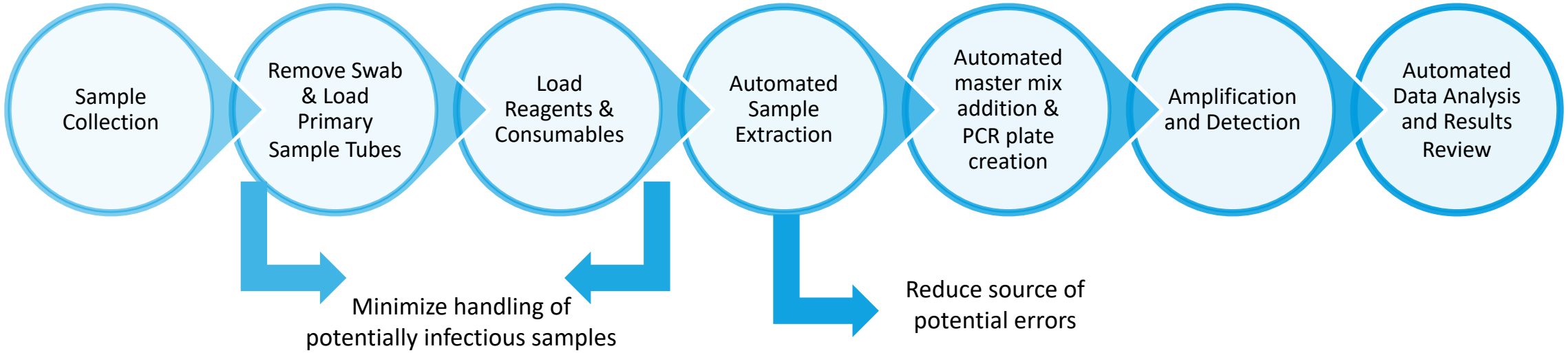
Abbott RealTi*me* SARS-CoV-2 Dual Target Assay Design

- Dual Target, Single Stranded Linear Probes
- RdRp (RNA dependent RNA polymerase) and N-gene



1. https://www.cdc.gov/coronavirus/2019-ncov/downloads/rt-pcr-panel-for-detection-instructions.pdf (accessed 7-Apr-2020)
2. https://www.who.int/docs/default-source/coronaviruse/protocol-v2-1.pdf (accessed 22-March-2020)
3. Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608442/R1

Automated Sample Handling
Reduces Potential Sources of Error and Contamination



Simple workflow with minimal sample handling
Maintains 'Chain of Custody' and Provides confidence in results

Result List

m2000

A clear interpretation of results enables laboratories to provide results to clinicians to quickly determine patient management and care

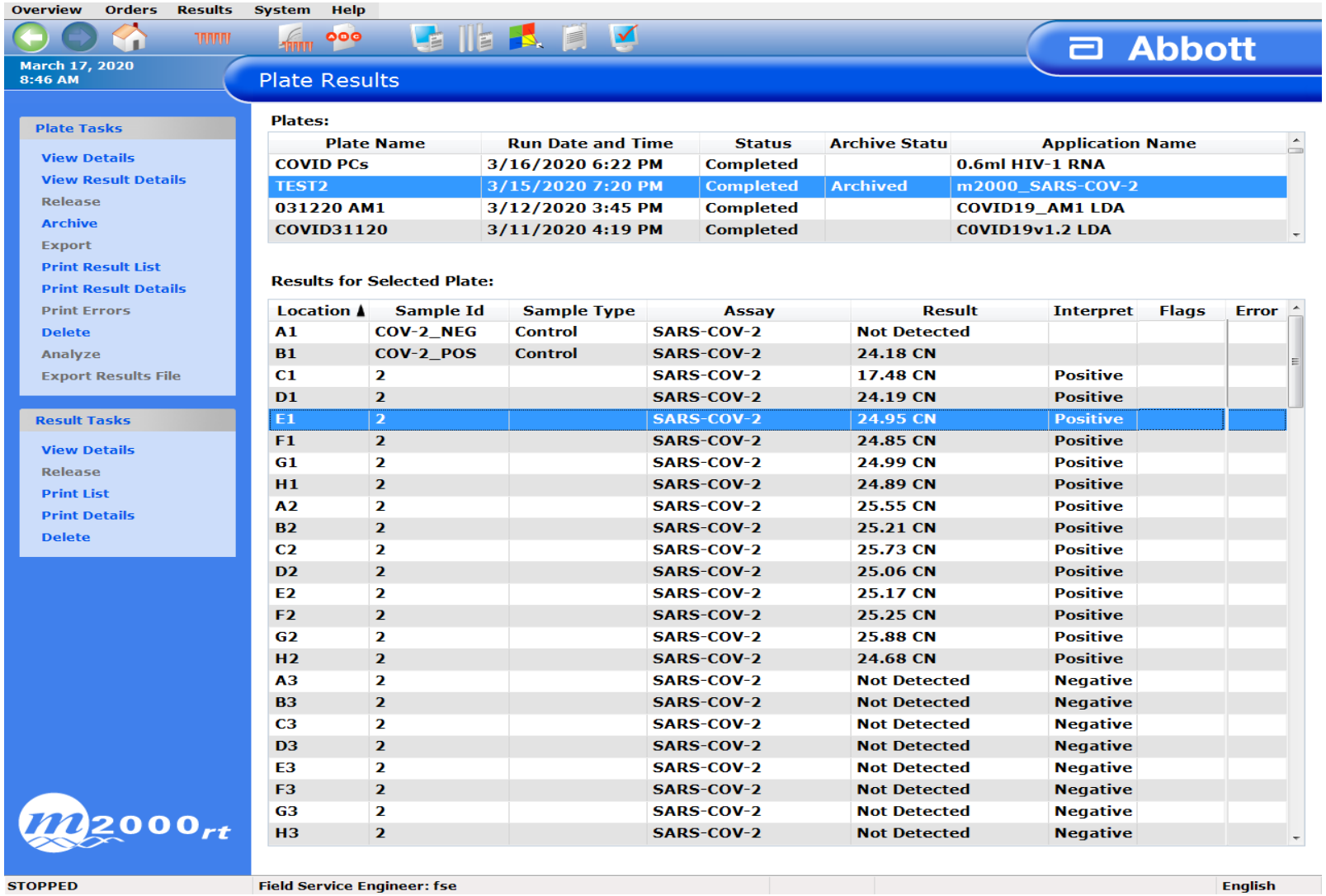
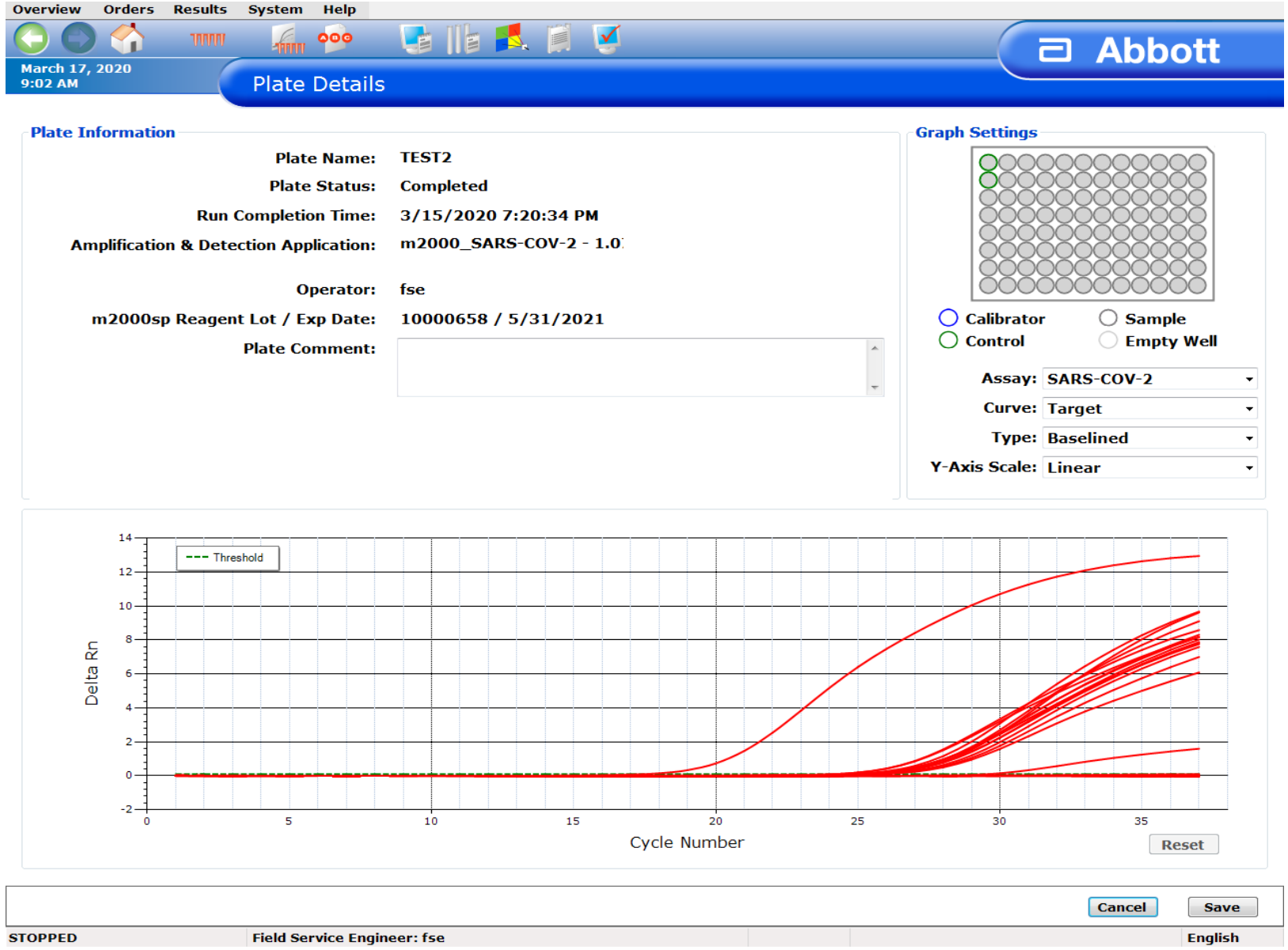
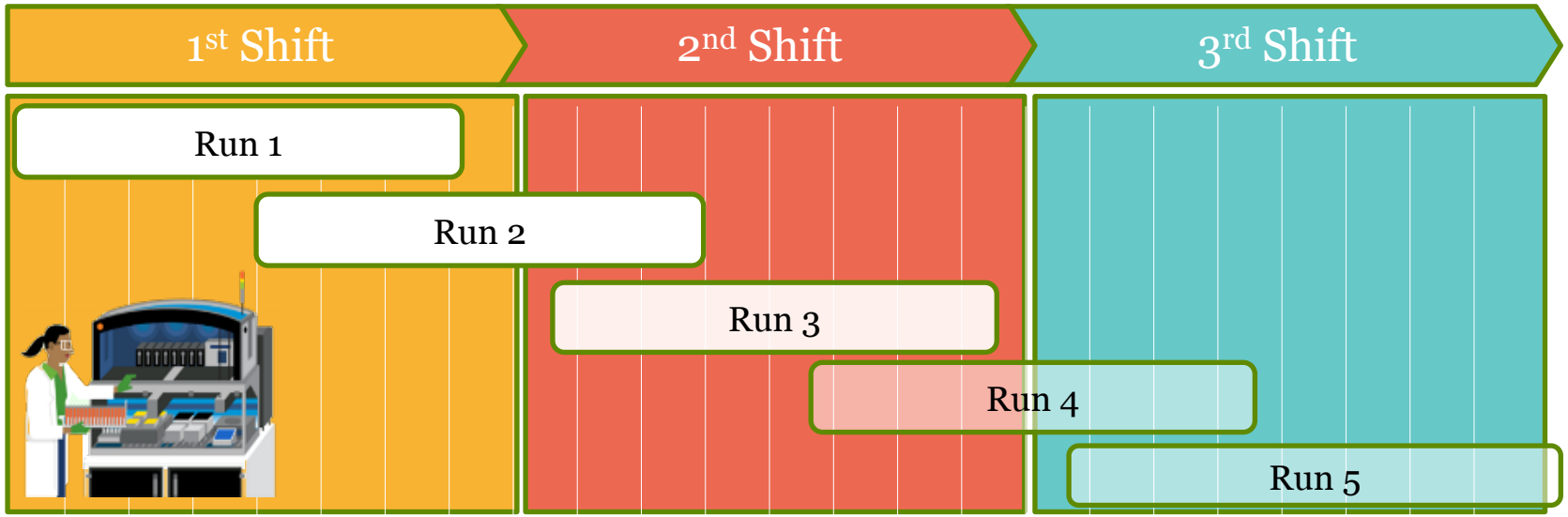


Plate Details

*m*2000



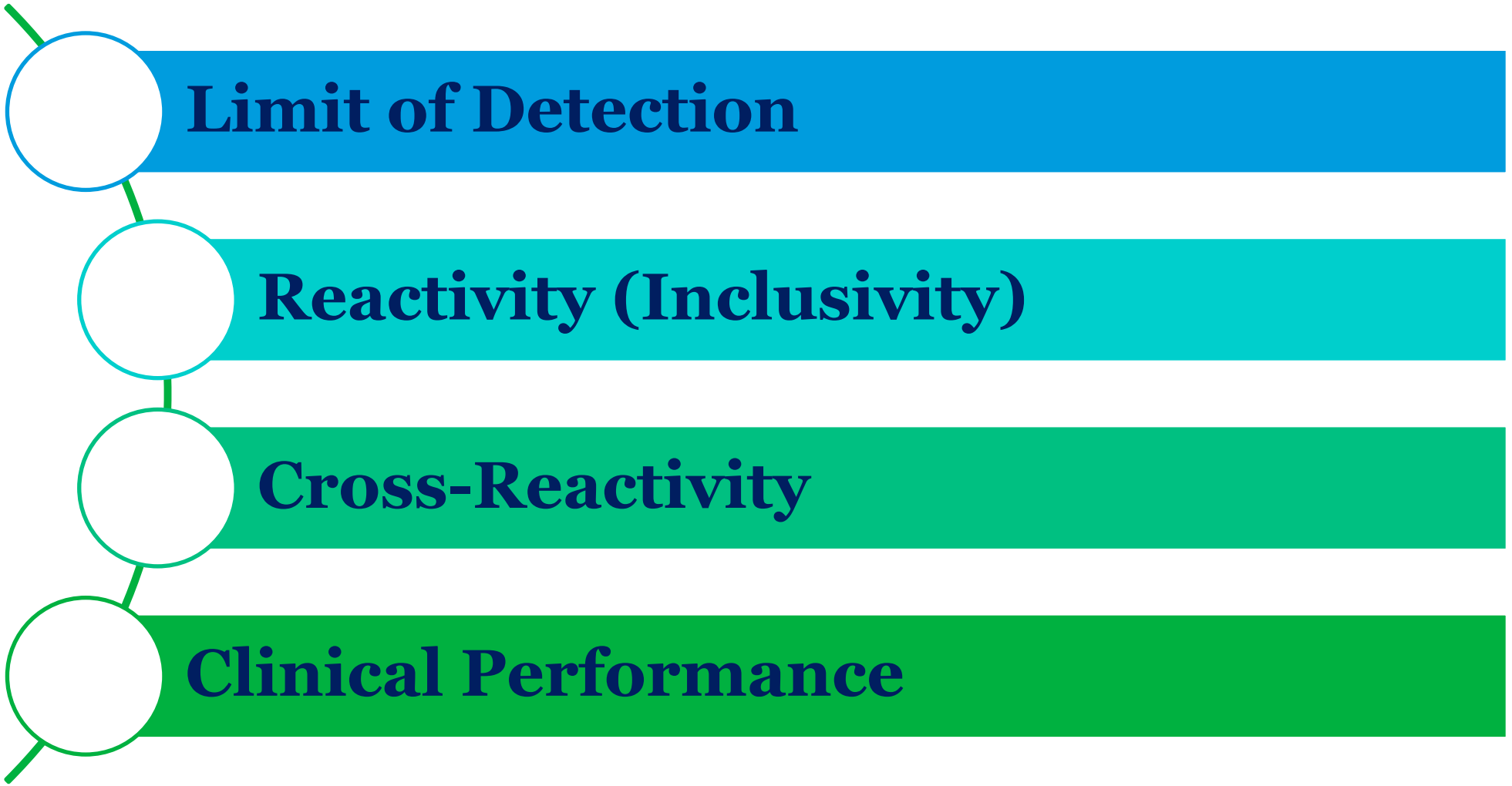
Maximizing m2000sp/rt System Throughput



Abbott *m2000* capacity of batches and tests per day			
With 1 *m2000* system	up to 2 batches up to 188 tests	up to 3 batches up to 282 tests	up to 5 batches up to 470 tests
With 2 *m2000* systems	up to 4 batches up to 376 tests	up to 6 batches up to 564 tests	up to 10 batches up to 940 tests
With 3 *m2000* systems	up to 6 batches up to 564 tests	up to 9 batches up to 846 tests	up to 15 batches up to 1410 tests

Source: Abbott data on file

Run 1-5 = 94 tests + 2 Controls/Run


Limit of Detection
Reactivity (Inclusivity)
Cross-Reactivity
Clinical Performance

Performance Characteristics– Limit of Detection (LOD) *m*2000

- Recombinant virus containing SARS-CoV-2 RNA was serially diluted in simulated nasal matrix (SNM).
- LOD was confirmed by testing 4 panel members with target concentrations at 400, 300, 200, and 100 copies/mL.
- LOD of the Abbott RealTi*m*e SARS-CoV-2 is 100 copies/mL with ≥ 95% detection

Table 1. LOD Determination Using Recombinant Virus Containing SARS-CoV-2

Virus Copies/mL	GE/Reaction[1]	Total Valid Replicates	Positive Replicates	Positive Rate (%)
400	12.5	21	21	100
300	9.4	21	21	100
200	6.2	21	21	100
100	3.1	21	20	95.2

1Genome equivalent per reaction (GE/reaction) was determined from calibration curve established using genomic RNA from SARS-Related Coronavirus 2, Isolate USAWA1/2020 (BEI Resources, Catalog No. NR-52285).

Source: Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608445/R2, *Abbott data on file

Performance Characteristics – Reactivity (Inclusivity)

*m*2000

- Inclusivity was demonstrated by comparing the Abbott RealTi*m*e SARS-CoV-2 assay primers and probes to an alignment of all SARS-CoV-2 sequences available in Genbank as of March 5, 2020.
- The regions of the test's primers and probes were compared by in silico analysis to verify sequence homology with circulating SARS-CoV-2 strains.
- A total of 78 sequences from 10 countries (Australia, Belgium, Brazil, China, Finland, Nepal, South Korea, Sweden, Taiwan, and USA) had sequence coverage of at least one of the test's primers or probes for the comparison.
- Amongst the 78 sequences, there were also 6 strains without any country information listed in Genbank.

All of the primers and probes in the test had 100% homology to all of the available circulating SARS-CoV-2 sequences.

Source: Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608445/R2, *Abbott data on file

In Silico Analysis

- Related pathogens, high prevalence disease agents, and normal or pathogenic flora that are reasonably likely to be encountered in the clinical specimen have been evaluated in silico to identify the % homology between the selected probe/primer sequences and the sequence present in the microorganism.

- *The conclusion of this analysis is that there is limited opportunity for cross-reactivity to allow for false-positive reporting or affect performance of SARS-CoV-2 virus detection.*

Source: Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608445/R2, *Abbott data on file

Laboratory Testing

- Cross reactivity performance of Abbott RealTi*me* SARS-CoV-2 assay was evaluated by testing 31 whole organisms or appropriate representative samples.
- *No cross-reactivity of the RealTime SARS-CoV-2 assay with the selected microorganisms was observed at the concentrations tested.*

Microorganism	Concentration	Result (No. Positive/No. Tested)	Final Result
Human coronavirus 229E	1.00 x 10^5 Copies/mL	0/4	Negative
Human coronavirus OC43	1.00 x 10^5 Copies/mL	0/4	Negative
Human coronavirus HKU1	Clinical Isolates	0/2	Negative
Human coronavirus NL63	1.00 x 10^5 Copies/mL	0/4	Negative
SARS-coronavirus	25-28 (Ct range)	0/4	Negative
MERS-coronavirus	25-28 (Ct range)	0/4	Negative
Adenovirus (Ad. 71)	1.00 x 10^5 TCID50/mL	0/4	Negative
Human Metapneumovirus (hMPV)	Clinical Isolates	0/3	Negative
Parainfluenza virus 1	1.00 x 10^5 TCID50/mL	0/4	Negative
Parainfluenza virus 2	1.00 x 10^5 Copies/mL	0/4	Negative
Parainfluenza virus 3	5.00 x 10^5 TCID50/mL	0/4	Negative
Parainfluenza virus 4	Clinical Isolates	0/4	Negative
Influenza A (H1N1)	1.00 x 10^5 Copies/mL	0/4	Negative
Influenza A /(H3N2)	1.00 x 10^5 Copies/mL	0/4	Negative
Influenza B	1.00 x 10^5 Copies/mL	0/4	Negative
Enterovirus Type 71	1.00 x 10^5 TCID50/mL	0/4	Negative
Respiratory syncytial virus	1.00 x 10^5 Copies/mL	0/4	Negative
Rhinovirus	1.00 x 10^5 Copies/mL	0/4	Negative
Chlamydia pneumoniae	1.00 x 10^6 IFU/mL	0/4	Negative
Haemophilus influenzae	1.00 x 10^6 CFU/mL	0/4	Negative
Legionella pneumophila	1.00 x 10^6 CFU/mL	0/3	Negative
Mycobacterium tuberculosis	1.00 x 10^6 CFU/mL	0/4	Negative
Streptococcus pneumoniae	1.00 x 10^6 CFU/mL	0/4	Negative
Streptococcus pyogenes	1.00 x 10^6 CFU/mL	0/4	Negative
Bordetella pertussis	1.00 x 10^6 CFU/mL	0/3	Negative
Mycoplasma pneumoniae	1.00 x 10^6 CFU/mL	0/4	Negative
Pneumocystis jirovecii (PJP)	23-25 (Ct range)	0/4	Negative
Candida albicans	1.00 x 10^5 CFU/mL	0/4	Negative
Pseudomonas aeruginosa	1.00 x 10^6 CFU/mL	0/4	Negative
Staphylococcus epidermis	1.00 x 10^6 CFU/mL	0/4	Negative
S. salivarius	1.00 x 10^6 CFU/mL	0/4	Negative

Source: Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608445/R2, *Abbott data on file

Performance Characteristics – Clinical Performance

*m*2000

- A clinical evaluation study was performed to evaluate the performance of the Abbott RealTi*me* SARS-CoV-2 Assay using nasopharyngeal swab specimens.
  - 61 contrived positive specimens at approximately 1X to 2X LOD and 20x LOD were tested. Samples were contrived by spiking known concentrations of recombinant virus containing SARS-CoV-2 RNA sequences into negative patient specimens.
  - 34 negative specimens were tested.
  - Positive and Negative Percent Agreement were 100%, respectively.

Table 3. Clinical Evaluation of the Abbott RealTi*me* SARS-CoV-2 Assay

SARS CoV-2 Concentration	Number Tested	Number Detected	% Detection
1x to 2X LOD[a]	20	20	100
20X LOD	40	40	100
Negative[b]	31	0	0

a One replicate was invalid and excluded from the analysis; [b] Three replicates were invalid and excluded from the analysis.

Source: Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608445/R2, *Abbott data on file

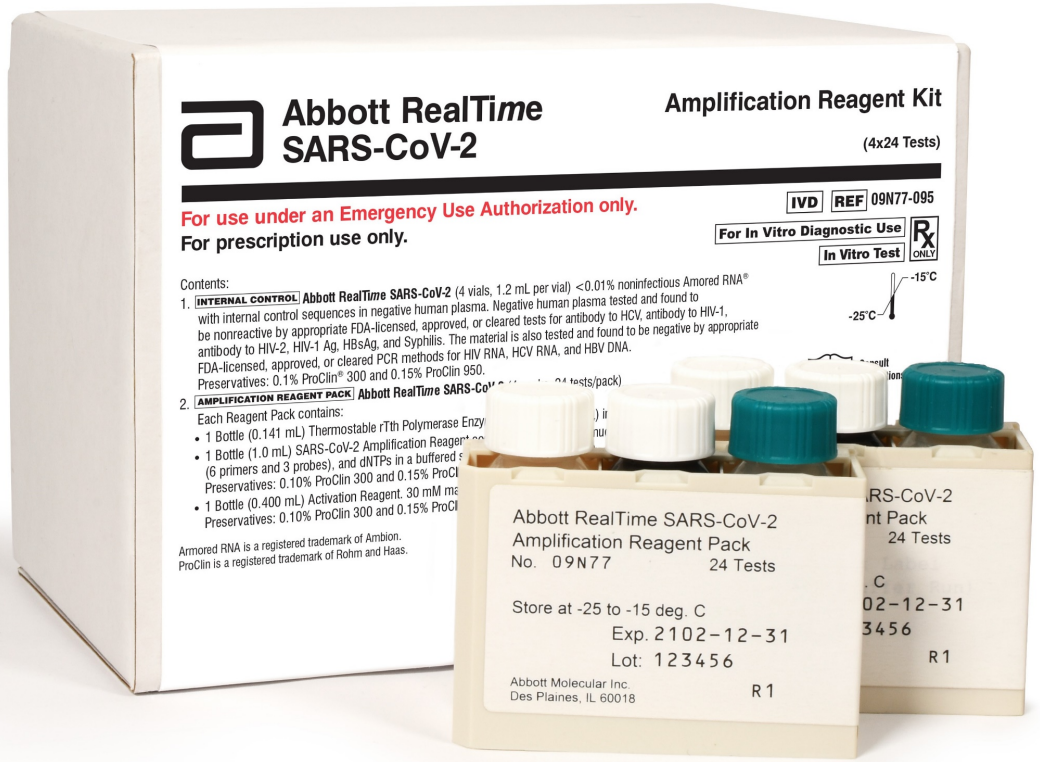
Abbott RealTi*me* SARS-CoV-2 Assay

Assay Specifications	
Technology	Qualitative Multiplex RT-PCR
Probe Design	Single Stranded Linear Probes
Target Region	Dual Target, RdRp and N-genes
Assay Runtime*	< 7 hours for 96 results
Throughput*	470 patient samples in 24 hours
Specimen type	Nasal, Nasopharyngeal and Oropharyngeal swabs
Result Interpretation	Positive / Negative
Sample input volume	0.5mL
Internal Control (IC)	Armored RNA (Pumpkin), Added to each specimen and control
Controls	One negative and One positive control per run

Source: Abbott RealT*ime* SARS-CoV-2 Assay PI: 51-608445/R2, *Abbott data on file


Abbott

Abbott RealTime SARS-CoV-2 Assay



Dual Target

HIGHLY conserved target regions

Automated

MINIMIZE manual processes

Positive or Negative

SIMPLE & CLEAR result interpretation