STANDARD M10 Arbovirus Panel

STANDARD™ M10 Arbovirus Panel

REF M10-AB5-01

INSTRUCTIONS FOR USE

For use with STANDARD™ M10 system

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SD BIOSENSOR

Contents

1. Intended Use

STANDARD M10 Arbovirus Panel test is a multiplex real-time reverse transcription polymerase chain reaction (real-time RT-PCR) test intended for use with STANDARD M10 system for the qualitative detection of viral RNA from Arbovirus; Dengue virus (DENV) including 4 serotypes (Dengue virus 1~4), Zika virus (ZIKV), Chikungunya virus (CHIKV), Yellow Fever virus (YFV) and West Nile virus (WNV) in serum or plasma collected from patients with symptoms. Positive results are indicative of the presence of DENV from 4 serotypes, ZIKV, CHIKV, YFV and/or WNV RNA; clinical correlation with patient history and other diagnostic information is necessary to determine patient infection status. Negative results 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. STANDARD M10 Arbovirus Panel test is intended to be performed by trained users in both laboratories and near-patient laboratories and near-patient testing settings.

2. Summary and Explanation

Arboviruses are transmitted by arthropods, including those responsible for the current pandemic, flaviviruses (Dengue, Zika, Yellow Fever and West Nile, etc) and alphavirus (Chikungunya, Mayaro and Ross River, etc).These viruses are transmitted by *Aedes* mosquitoes, especially *Aedes albopictus* and *Aedes aegypti* are the presumed vector. The illnesses caused by arbovirus have similar clinical presentation with prominent fever, headache, rash, vomiting, fatigue, myalgias (muscle aches), arthralgias (joint aches) and other unspecific illnesses can be observed.

Dengue viruses are widely distributed throughout the tropical and subtropical areas of the world. There are four known distinct serotypes of dengue virus (DENV-1, DENV-2, DENV-3 and DENV-4). Rapid and reliable tests for primary and secondary infections of dengue are essential for patient management.

Zika virus is transmitted to humans primarily through the bite of certain infected mosquitoes mainly *Aedes aegypti* in tropical and sub-tropical regions. The disease usually causes mild febrile symptoms with maculo-papular rash lasting for several days to a week and then can be cured completely. However, there is now growing concern following reports from several countries including Brazil that Zika virus infection may be linked to fetal and newborn microcephaly and serious neurological complications, such as Guillain-Barré syndrome. Therefore, great efforts to establish best practice to detect it promptly are required in order to treat in time and to prevent further spread and recurrence of the infection.

Chikungunya virus is a genus of alpha virus and is transmitted by *Aedes* mosquitoes especially *Aedes albopictus* and *Aedes aegypti* are the presumed vector. Chikungunya disease does not often result in death, but the symptoms can be severe and disabling. The common symptoms of Chikungunya are fever, rash, arthralgia, and joint pain.

Yellow Fever is caused by a flavivirus which is transmitted to humans by the bites of mosquitoes infected *Aedes* and *Haemogogus* spp. Yellow Fever virus is found in tropical and subtropical areas in South America and Africa. Once contracted, the Yellow Fever virus incubates in the body for 3 to 6 days, followed by infection that can occur in one or two phases. The first, “acute”, phase usually causes fever, muscle pain with prominent backache, headache, shivers, loss of appetite, and nausea or vomiting. Most patients improve and their symptoms disappear after 3 to 4 days.

West Nile virus (WNV) is commonly found in Africa, Europe, the Middle East, North America and West Asia. It is most commonly spread to people by the bite of an infected mosquito. There are no vaccines to prevent or medications to treat WNV in people. Fortunately, most people infected with WNV do not feel sick. About 1 in 5 people who are infected develop a fever and other symptoms. About 1 out of 150 infected people develop a serious, sometimes fatal, illness.

Arbovirus infections are challenging to diagnose, especially during the early stages. It can be confused with severe malaria, leptospirosis, viral hepatitis (especially the fulminating forms of hepatitis B and D), other hemorrhagic fevers, (Bolivian, Argentine, and Venezuelan), and other diseases, as well as poisoning. Therefore, great efforts to establish best practices to be recognized and distinguished promptly are required to treat in time and prevent the further spread and recurrence of their infections.

[Cartridge Description]

STANDARD M10 Arbovirus Panel is a molecular *in vitro* diagnostic assay that aids in the simultaneous detection and differentiation of DENV-1, DENV-2, DENV-3, DENV-4, ZIKV, CHIKV, YFV and WNV RNA based on nucleic acid amplification technology, real-time RT-PCR. STANDARD M10 Arbovirus Panel cartridge contains viral RNA extraction buffers and RT-PCR reagents for the *in vitro* qualitative detection of DENV-1, DENV-2, DENV-3, DENV-4, ZIKV, CHIKV, YFV and WNV RNA in human serum and plasma.

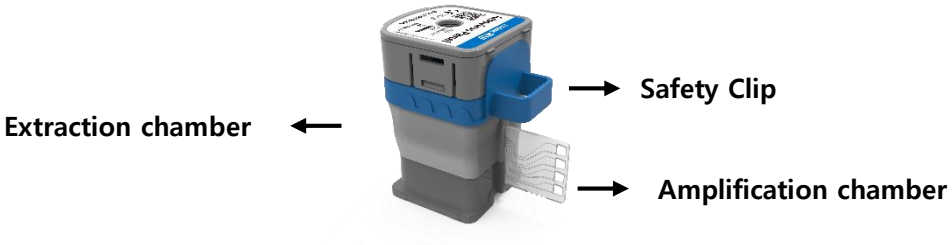

Figure 1. Layout of STANDARD M10 Arbovirus Panel cartridge

3. Principle of the Procedure

STANDARD M10 Arbovirus Panel test is an automated *in vitro* diagnostic test for qualitative detection of nucleic acid from Arbovirus. STANDARD M10 Arbovirus Panel test is performed on STANDARD M10 system.

STANDARD M10 system automates and integrates sample preparation, nucleic acid extraction and amplification, and detection of the target sequences in various specimens using molecular diagnostic assays. The system consists of STANDARD M10 Module and STANDARD M10 Console with preloaded software for running tests and viewing the results. The system requires the use of single-use disposable cartridges that hold the RT-PCR reagents and host the RT-PCR process. Because the cartridges are self-contained, cross-contamination between samples is minimized. For a full description of the systems, see STANDARD M10 system User Manual.

STANDARD M10 Arbovirus Panel test includes reagents for the detection of RNA from Arbovirus in serum or plasma. The cartridge is present to control for adequate processing of the sample and RT-PCR reaction.

The table below indicates which target is designed to be detected by which channel.

Table 1. Fluorescent channel of each target gene

Target	Channel
DENV-1	HEX
DENV-2	HEX
DENV-3	FAM
DENV-4	HEX
ZIKV	HEX
CHIKV	FAM

Target	Channel
YFV	FAM
WNV	FAM
Internal control (IC)	Cy5

4. Materials Provided

STANDARD M10 Arbovirus Panel contains sufficient reagents to process 10 specimens or quality control samples.

Table 2. Contents of STANDARD M10 Arbovirus Panel

	Contents	Quantity	Usage in each reaction
1	Cartridge	10	1ea
2	Quick Reference Instructions	1	-

5. Storage and Handling

Store STANDARD M10 Arbovirus Panel kit at 2 ~ 28℃ (36 ~ 82℉). If the cartridge has been refrigerated, perform the test after stabilizing it for 30 minutes at room temperature (20 ~ 28°C, 68 ~ 82℉). Do not remove the Safety Clip of the cartridge and do not press the cartridge until actual use. Do not use a cartridge that has leaked or is wet. Under these conditions, cartridges can be stored until the expiration date printed on the packaging.

6. Materials Required but Not Provided

- STANDARD M10 system with User Manual

  At least one STANDARD M10 (Cat. No. 11M1011) Console and one STANDARD M10 Module (Cat. No. 11M1012)
- Blood collection tubes

  - Serum separation tubes (SSTs)

  - EDTA K2 or K3 Tubes
- Sample transfer pipettes

  - STANDARD Fixed volume dropper (600µL) (Cat. No. 90DR10)

  - Micropipette with filter tips
- PPE (Personal Protective Equipment)
- Biohazard container

7. Warnings and Precautions

1) This kit is only for *in vitro diagnosis.*
2) Please read the Instructions for Use carefully before testing.
3) Improper specimen collection, transfer, storage, and processing may cause erroneous test results.
4) Do not remove the Safety Clip of the cartridge before use.
5) Do not press the cartridge until actual use.
6) Do not use a cartridge that has leaked or is wet.
7) Do not use the kit after its expiration date.
8) Do not shake, tilt, or invert the cartridge especially after pressing the cartridge to punch the seal. It may yield invalid or false test results.
9) Do not use a cartridge with a damaged barcode label.
10) Do not reuse processed cartridges.
11) All patient samples should be handled as if these samples are infectious.
12) All materials should be considered potentially infectious and should be handled with precautions.
13) As this test involves extraction of viral RNA and PCR amplification, care should be taken to avoid contamination. Regular monitoring of laboratory contamination is recommended.
14) Clinical laboratories should be equipped with equipment and operators in strict accordance with the "Code of Practice for Clinical Gene Amplification Laboratories".
15) When using this kit, it should be operated strictly in accordance with the instructions and follow the technical requirements of the clinical gene amplification laboratory.
16) Follow your institution's environmental waste procedures for proper disposal of used cartridges.

8. Specimen Collection and Storage

[Serum]

1. Collect the whole blood into the commercially available plain tube not containing anti-coagulant, leave to settle for 30 minutes for blood coagulation, and then centrifuge blood to get a specimen of supernatant.
2. If serum in the plain tube is stored in a refrigerator at 2 ~ 8°C / 36 ~ 46°F, the specimen can be used for testing within 1 week after collection. For prolonged storage, it should be stored at below -20°C / -4°F.
3. Thawing on ice prior to use and during sample processing.

[Plasma]

1. Collect the whole blood into the commercially available tube containing anti-coagulant and centrifuge blood to get plasma specimen.
2. If plasma in tube is stored in a refrigerator at 2 ~ 8°C/ 36 ~ 46°F, the specimen can be used for testing within 1 week after collection. For prolonged storage, it should be stored at below -20°C/ -4°F.
3. Thawing on ice prior to use and during sample processing.

9. Procedure

9.1 Starting STANDARD M10 system

Note	For detailed instructions, refer to STANDARD M10 system User Manual. If you have scanned the cartridge barcode in STANDARD M10 and the software version is not compatible, a 'Not Supported Device' error message appears. Update the software before proceeding with the test.

1) Turn on STANDARD M10 system.
2) Check STANDARD M10 Console and STANDARD M10 Module are connected and working.

Figure 2. Power connection

3) Enter the User ID and Password on the Log In screen of STANDARD M10 Console and click the Log In button.
4) Touch STANDARD M10 Module to run on the Home screen. (The door of the selected STANDARD M10 Module will automatically open for cartridge loading.)

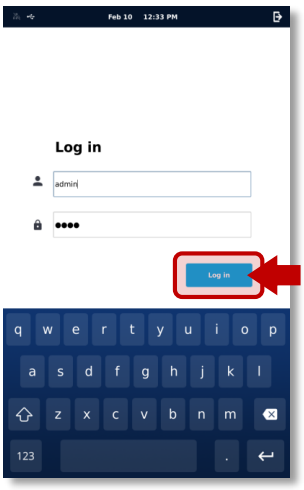

Figure 3. Log In screen

Figure 4. Home screen, Status of M10 module

5) Enter a Patient ID by scanning the barcode or using virtual keyboard on the M10 Console screen. (Patient ID is

optional. You can turn off the Patient ID option from the ‘Settings’.)

6) Enter a Sample ID by scanning the barcode of the specimen or using the virtual keyboard on the M10 Console screen. Make sure that the specimen tube cap is firmly closed when scanning the ID barcode printed on the specimen tube. (For quality control test, tick the QC check box.)
7) Scan the STANDARD M10 Arbovirus Panel cartridge to be used.

Figure 5. Entering Sample ID

Figure 6. Scanning a cartridge

8) STANDARD M10 Module automatically recognizes the assay to be run based on the cartridge barcode.

Note	If you have scanned the cartridge barcode in the STANDARD M10 and the expiration date has expired, an 'Expired Device' error message appears. Check validity period and test with unexpired cartridges.

9.2 Loading a sample into STANDARD M10 Arbovirus Panel cartridge

Caution	If the cartridge has been refrigerated, perform the test after stabilizing it for 30 minutes at room temperature (20 ~ 28°C, 68 ~ 82°F). Once the sample has been loaded into the cartridge, start the test as soon as possible (within 10 minutes).
Note	False negative results may occur if insufficient sample is added into the cartridge.

1) Remove the Safety Clip located underneath the lid of the cartridge.
2) Pierce the sealed cartridge by pressing down the lid until fully engaged into the cartridge groove.
3) Open the lid and check that the seal is completely punctured before loading a sample.
4) Carefully open the cap of the specimen tube or external control.
5) Dispense 600µL of the sample into the hole in the lower right corner of the cartridge using a 600µL of STANDARD Fixed volume dropper (not provided) or a pipette with a filter tip (not provided).

Figure 7. Loading a sample

6) After a few seconds, Sample Guide screen will automatically change to the Insert Cartridge screen. Touch the Sample Guide screen if you want to skip the guide.
7) Close the lid.

Figure 8. Sample Guide Screen

Figure 9. Insert Cartridge screen

9.3 Running a test

1) Load the cartridge on the selected STANDARD M10 Module with the Amplification chamber facing the inside of the module. (The status indicator of the selected module will blink green.)
2) Close the door completely.
3) After confirm the sample and cartridge information, touch the OK button on the screen. (Touch the Reset button to re-input the information.)
4) Assay starts automatically, and remaining time will appear on the screen.

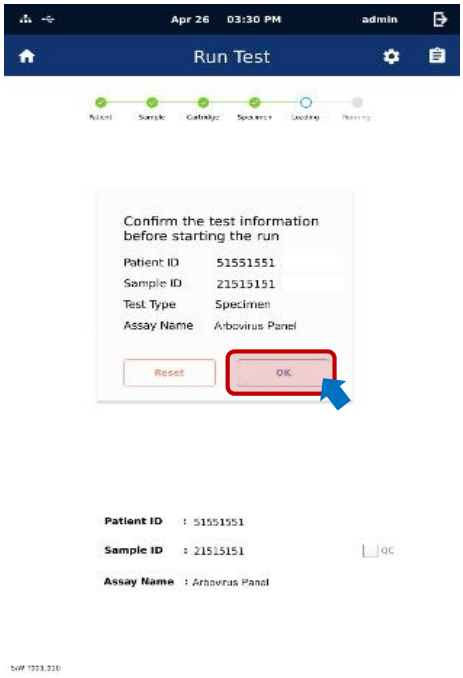

Figure 10. Running screen

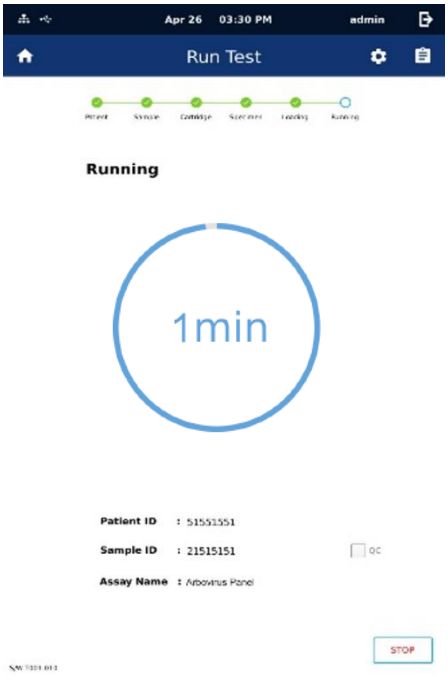

Figure 11. Running screen

5) When the run is finished, it switches to the Review screen and the result is displayed.
6) Dispose of used cartridges in the appropriate biohazard waste container according to your institution's standard practices.
7) To run another test, touch the Home icon and repeat the process. (If another STANDARD M10 Module connected to STANDARD M10 Console is available, you can start a new test while another test is running.)

10. Interpretation of Results

The results are interpreted automatically by STANDARD M10 Console and are clearly shown in the Review screen. STANDARD M10 Arbovirus Panel test provides test results based on the detection of five gene targets according to the algorithms shown in Table 3.

Table 3. Description of results

Outcome (Home screen)	Result (Review screen)	Description
Positive		At least one pathogen is positive.
Negative		No pathogen was detected.
Invalid		All pathogens are not detected and IC signal does not have a Ct value within the valid range.
Error		The test failed because either an error occurred or the test was canceled by the user.

Table 4. Description of IC results

Outcome (Summary screen)	Result (Summary screen)	Description
IC Valid		IC has a Ct within the valid range. : The test was completed. Report positive/negative results of target according to the interpretation shown in table 5.
IC Invalid		All pathogens are not detected and IC signal does not have a Ct value within the valid range.
IC Error		The test failed because either an error occurred or the test was canceled by the user. Repeat the test.

Table 5. Interpretation of results

Result	Interpretation
DENV-1 Positive	The DENV-1 target RNA is detected. • The DENV-1 signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because DENV-1 target amplification occurred.
DENV-2 Positive	The DENV-2 target RNA is detected. • The DENV-2 signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because DENV-2 target amplification occurred.
DENV-3 Positive	The DENV-3 target RNA is detected. • The DENV-3 signal has a Ct within the valid ranged. • IC: N/A (not applicable); IC is ignored because DENV-3 target amplification occurred.

Result	Interpretation
DENV-4 Positive	The DENV-4 target RNA is detected. • The DENV-4 signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because DENV-4 target amplification occurred.
ZIKV Positive	The ZIKV target RNA is detected. • The ZIKV signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because ZIKV target amplification occurred.
CHIKV Positive	The CHIKV target RNA is detected. • The CHIKV signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because CHIKV target amplification occurred.
YFV Positive	The YFV target RNA is detected. • The YFV signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because YFV target amplification occurred.
WNV Positive	The WNV target RNA is detected. • The WNV signal has a Ct within the valid range. • IC: N/A (not applicable); IC is ignored because WNV target amplification occurred.
Negative	• DENV-1, DENV-2, DENV-3, DENV-4, ZIKV, CHIKV, YFV and/or WNV target RNAs are not detected. • IC: Valid; IC has a Ct within the valid range.
Invalid	IC does not meet acceptance criteria and all targets are not detected. Repeat test. • IC: Invalid; IC and viral RNA signals do not have a Ct within valid range.
Error	The test failed because either an error occurred or the test was canceled by the user. Presence or absence of target nucleic acids cannot be determined. Repeat the test.

 Note	- If the IC is negative and the results for any of the targets are positive, the results for all targets are considered valid. A high copy number of target-specific gene can lead to reduced or absent IC. - If an invalid result is confirmed in one or more of the pathogen results, that tests will be invalidated. Please conduct a re-test.

11. Quality Control

Quality Control procedures are intended to monitor cartridge and assay performance. If the controls are not valid, the patient results cannot be interpreted.

Internal control(IC): Ensures a proper sample has been applied, reagents in the cartridge are well functioning, there were no other interfering factors in the sample, and the procedure was performed correctly. In clinical samples showing positive signal for DENV-1, DENV-2, DENV-3, DENV-4, ZIKV, CHIKV, YFV and/or WNV, the IC is reluctant and is ignored. If the IC fails where no DENV-1, DENV-2, DENV-3, DENV-4, ZIKV, CHIKV, YFV and/or WNV are detected the result is invalid.

External controls should be performed in conformance with local, state, and/or federal regulations or accreditation requirements and your laboratory's standard quality control procedures.

For external controls, it is recommended to use the list below. Please comply with the information stated on the user manual.

- AMPLIRUN® TOTAL Dengue 1 virus RNA Control (Cat No. MBC055-R) by vircell
- AMPLIRUN® TOTAL Dengue 2 virus RNA Control (Cat No. MBC056-R) by vircell
- AMPLIRUN® TOTAL Dengue 3 virus RNA Control (Cat No. MBC057-R) by vircell
- AMPLIRUN® TOTAL Dengue 4 virus RNA Control (Cat No. MBC058-R) by vircell
- AMPLIRUN® TOTAL Chikungunya virus RNA Control (Cat No. MBC099-R) by vircell
- AMPLIRUN® TOTAL Yellow fever virus RNA Control (Cat No. MBC100-R) by vircell
- AMPLIRUN® TOTAL West nile virus RNA Control (Cat No. MBC069-R) by vircell
- Zika virus Strain: PRVABC59 Quantitative RNA (Cat. No. VR-1843DQ) by ATCC

Products other than the mentioned substance can be used after being evaluated and validated for efficacy by each country or hospital independently.

12. Performance

12.1 Limit of Detection Test

The analytical sensitivity of the STANDARD M10 Arbovirus Panel was assessed with two lots of cartridges and 8 standard materials (Dengue virus 1, 2, 3, 4, Zika virus, Chikungunya virus, Yellow Fever virus, West Nile virus).

To estimate the tentative LoD, the concentration at which 100% detection was confirmed after 5 repeated tests for each concentration for a total of 8 types was set as the initial concentration of the LoD test.

For the LoD test, each positive standard was diluted by 1/2, and the test product of 2 lots was repeated 24 times for each concentration. Based on the test results, LoD were set through probit analysis.

The verified LoD values for the viruses tested are summarized in the Table 6.

Table 6. Limit of detection for each target of STANDARD M10 Arbovirus Panel

1) Serum

Target	LoD
Dengue virus 1	78 PFU/mL
Dengue virus 2	64 PFU/mL
Dengue virus 3	14 PFU/mL
Dengue virus 4	3 PFU/mL
Zika virus	286 copies/mL
Chikungunya virus	54 copies/mL
Yellow Fever virus	6 copies/mL
West Nile virus	82 copies/mL

2) Plasma

Target	LoD
Dengue virus 1	71 PFU/mL
Dengue virus 2	64 PFU/mL
Dengue virus 3	15 PFU/mL
Dengue virus 4	3 PFU/mL
Zika virus	321 copies/mL
Chikungunya virus	52 copies/mL
Yellow Fever virus	6 copies/mL
West Nile virus	80 copies/mL

12.2 Interference Test

8 types of endogenous and exogenous interfering substances were added into negative clinical matrix and positive standard material. The test was repeated 3 times with one lot product for each case.

As a result, there was no observed interference reaction for the eight substances listed in Table 7.

Table 7. Substances tested in interference test

No.	Interfering Substance	Concentration
1	Human genomic DNA	15μg/mL
2	Triglyceride	16.94mmol/L
3	Hemoglobin	0.2g/mL
4	Bilirubin	475μmol/L
5	Albumin	0.24mg/mL
6	Biotin	0.2mg/mL
7	Acetaminophen	1.66μmol/L
8	Ibuprofen	19mmol/L

12.3 Competitive interference test

Competitive interference reaction test among the analytes was evaluated to verify whether there is mutual interference or inhibition caused by concurrent infection with respect to the performance of this product. All 8 target strains were included and mixed. Among the target strains, the low concentration was mixed with 3X LoD and the high concentration was mixed with 100X LoD to evaluate for mutual interference and inhibition.

As a result, 100% detection was confirmed under all conditions, and it was verified that there was no mutual interference and inhibition.

Table 8. Summary of competitive interference test

Target Pathogen	Interference	Detection Rate
Dengue virus 1: 3X LoD	Dengue virus 2, 3, 4, Zika virus, Chikungunya virus, Yellow fever virus, West Nile virus: 100x LoD	3/3(100%)
Dengue virus 2: 3X LoD	Dengue virus 1, 3, 4, Zika virus, Chikungunya virus, Yellow fever virus, West Nile virus: 100x LoD	3/3 (100%)
Dengue virus 3: 3X LoD	Dengue virus 1, 2, 4, Zika virus, Chikungunya virus, Yellow	3/3 (100%)

Target Pathogen	Interference	Detection Rate
	fever virus, West Nile virus: 100x LoD	
Dengue virus 4: 3X LoD	Dengue virus 1, 2, 3, Zika virus, Chikungunya virus, Yellow fever virus, West Nile virus: 100x LoD	3/3 (100%)
Zika virus: 3X LoD	Dengue virus 1, 2, 3, 4, Chikungunya virus, Yellow fever virus, West Nile virus: 100x LoD	3/3 (100%)
Chikungunya virus: 3X LoD	Dengue virus 1, 2, 3, 4, Zika virus, Yellow fever virus, West Nile virus: 100x LoD	3/3 (100%)
Yellow Fever virus: 3X LoD	Dengue virus 1, 2, 3, 4, Zika virus, Chikungunya virus, West Nile virus: 100x LoD	3/3 (100%)
West Nile virus: 3X LoD	Dengue virus 1, 2, 3, 4, Zika virus, Chikungunya virus, Yellow fever virus: 100x LoD	3/3 (100%)
Dengue virus 1, 2, 3, 4, Zika virus, Chikungunya virus, Yellow fever virus, West Nile virus: 3x LoD		3/3 (100%)

12.4 Cross-reactivity

The following potentially cross-reactive viruses were tested 3 times per sample with 1 lot to evaluate cross-reactivity. As a result, no cross-reactivity was observed for tested viruses other than product targets. In addition, no mutual cross-reactivity was observed between the target analytes of the assay.

Table 9. Substances tested in cross-reactivity test

No.	Substance	Concentration
1	Dengue virus serotype 1	1 x 10^5 PFU/mL
2	Dengue virus serotype 2	1 x 10^5 PFU/mL
3	Dengue virus serotype 3	1 x 10^5 PFU/mL
4	Dengue virus serotype 4	1 x 10^5 PFU/mL
5	Zika virus	1 x 10^5 copies/mL
6	Chikungunya virus	10μg/mL
7	Yellow fever virus	10μg/mL
8	West Nile virus	1x10^5 $TCID_{50}$/mL
9	Measles virus	10μg/mL
10	Japanese encephalitis virus	1x10^5 PFU/mL
11	Cytomegalovirus	1x10^5 PFU/mL
12	Hepatitis A virus	1x10^5 $TCID_{50}$/mL
13	Hepatitis B virus	1x10^5 IU/mL
14	Hepatitis C virus	1x10^5 IU/mL

12.5 Precision Test

1) Repeatability

Three concentrations of each of the 8 standard materials (Dengue 1, 2, 3, 4, Zika, Chikungunya, Yellow fever, West Nile virus) were repeated twice a day for one lot, twice a day for 5 days, for each concentration during the test.

As a result, within-Run, Between-Run, Between-Day, and Within-Laboratory satisfy the acceptance criteria with SD < 2.0 Ct, confirming repeatability.

2) Reproducibility

Reproducibility was confirmed by repeating the test twice a day, for 5 days, by two inspectors at two sites with two lots using the same test concentration.

As a result, it was confirmed that there was reproducibility by satisfying the acceptance criteria with SD < 2.0 Ct and CV < 5% in the evaluation between inspectors and lots and between sites and the equipment.

12.6 Clinical Trial

The test results of the STANDARD M10 Arbovirus Panel were compared with the confirmed results of positive samples and negative samples. The test was conducted using frozen samples for virus stocks and serum. Based on the clinical performance test, the clinical sensitivity and specificity are calculated.

Table 10. Summary of Sensitivity and Specificity

	Sensitivity	Specificity
YFV	100.00% (10/10) (95% CI 69.15% to 100.00%)	98.08% (102/104) (95% CI 93.23% to 99.77%)
DENV-1	100.00% (10/10) (95% CI 69.15% to 100.00%)	98.08% (102/104) (95% CI 93.23% to 99.77%)
DENV-2	100.00% (6/6) (95% CI 54.07% to 100.00%)	100.00% (108/108) (95% CI 96.64% to 100.00%)
DENV-3	100.00% (10/10) (95% CI 69.15% to 100.00%)	100.00% (104/104) (95% CI 96.52% to 100.00%)
WNV	100.00% (1/1) (95% CI 2.50% to 100.00%)	100.00% (113/113) (95% CI 96.79% to 100.00%)
ZIKV	100.00% (12/12) (95% CI 73.54% to 100.00%)	100.00% (102/102) (95% CI 96.45% to 100.00%)
CHIKV	80.00% (8/10) (95% CI 44.39% to 97.48%)	100.00% (104/104) (95% CI 96.52% to 100.00%)

Table 11. Summary of Sensitivity and Specificity for another site

	Sensitivity	Specificity
DENV-1	93.94% (31/33) (95% CI 79.77% to 99.26%)	100.00% (268/268) (95% CI 98.63% to 100.00%)
DENV-2	95.00% (19/20) (95% CI 75.13% to 99.87%)	100.00% (268/268) (95% CI 98.63% to 100.00%)
DENV-3	90.91% (10/11) (95% CI 58.72% to 99.77%)	99.25% (266/268) (95% CI 97.33% to 99.91%)

DENV-4	100.00% (27/27) (95% CI 87.23% to 100.00%)	99.25% (266/268) (95% CI 97.33% to 99.91%)
ZIKV	100.00% (13/13) (95% CI 75.29% to 100.00%)	99.63% (267/268) (95% CI 97.94% to 99.99%)
CHIKV	95.83% (46/48) (95% CI 85.75% to 99.49%)	98.51% (264/268) (95% CI 96.22% to 99.59%)
YFV	100.00% (09/09) (95% CI 66.37% to 100.00%)	100.00% (268/268) (95% CI 98.63% to 100.00%)

13. Limitations

1) Performance characteristics of this test have been established with the specimen types listed in the Intended Use Section only. The performance of this assay with other specimen types or samples has not been evaluated.
2) A false negative result may occur if :
   - Sample concentrations are near or below the limit of detection of the test.
   - A specimen is improperly collected, transported or handled.
   - Inadequate numbers of organisms are present in the specimen.
   - Cartridges are exposed to improper environmental factors (temperature / humidity).
3) False positive results may happen from cross-contamination between patient samples, specimen mix-up and/or RNA contamination during product handling.
4) Qualitative detection of positive results in this kit does not indicate the presence of live virus. It is recommended to use other methods for confirmation at the same time.
5) This kit only classifies and identifies the Arbovirus (DENV-1, DENV-2, DENV-3, DENV-4/ZIKV/CHIKV/YFV/WNV). The test results are for clinical reference only. The clinical diagnosis and treatment of patients should be combined with their symptoms / signs, medical history, other laboratory tests and treatment responses considering.
6) Potential mutations within the target regions covered by the primer and/or probes of the test may result in failure to detect the presence of the pathogen.

14. References

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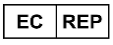
15. Symbols

	Reference number		Batch code
	*In vitro* diagnostic medical device		CE marking - European Conformity
	Consult Instructions for Use		Manufacturer
	Contains Sufficient for <n> Tests		Date of manufacture
	Caution		Authorized representative in the European Community
	Note		keep dry
	Do not re-use.		Keep away from sunlight
	Temperature limit		Do not use if packaging is damaged
	Use-by date		

For further information on

STANDARD M10
Arbovirus Panel

Please contact your
SD BIOSENSOR representative

Manufacturer
SD Biosensor, Inc.
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CE IVD

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For *In Vitro* Diagnostic Use Only

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