

ASSAY NAME: GIVIR1_QS
(GI Viruses 1 Panel for QuantStudio)

Quantity: 100 x 20µL PCR reactions

**10-plex (5-color) assay: Rotavirus (A and B),
Astrovirus, Sapovirus (GI, GII, GIV, GV),
Norovirus (GI and GII), and human RPP30 DNA**

SKU #: BUN-GIVIR1-D-QS-100 (QuantStudio)

**(RUO). Research Use Only. Not for use in
Diagnostic Procedures.**

**SCOPE OF THIS PRODUCT INFORMATION
SHEET (PIS):**

The oligonucleotide recipes are optimized for each instrument (QuantStudio, BioRad). The verification data presented in this PIS were performed with BUN-GIVIR1-D-QS-100 on a QuantStudio™ 7 Pro Real-Time System. The performance of the other SKUs on their corresponding instrument should be similar. Contact PCRassays.com if you are planning to use a different instrument.

CONTENTS

The primers and probes in the GIVIR1 assay are provided in Tube 1 as a 5X concentrated working solution that detects 9 virus types and a human extraction control.

Table of Dyes used in this assay:

Pathogen/Target	Dyes	Quencher	Refs.
Rotavirus A and B	FAM	BHQ-1	1, 2
Astrovirus	HEX	BHQ-1	3
RPP30-DNA control	TAMRA	BHQ-2	4, 5
Sapovirus (GI, GII, GIV, GV)	TEX615	BHQ-2	6
Norovirus (GI, GII)	Cy5	BHQ-2	7

The probes are designed as TaqMan[®] cleavage mechanism and thus the reaction requires a DNA polymerase with 5'-exonuclease activity.

ASSAY HANDLING

The GIVIR1_QS assay is shipped at ambient temperature, and should be stored at -20 °C. The tubes should be kept on ice once thawed. Do not subject the enzyme to multiple freeze-thaw cycles.

Contamination should be avoided by using appropriate personal protective equipment (PPE), powder free gloves, aerosol barrier pipette tips, and a clean hood.

ASSAY CONTENTS:

Tube 1: 5X Primer/Probe mix for Rotavirus, Astrovirus, Sapovirus, Norovirus, and hRPP30DNA.

Tube 2: (Do NOT add to specimen unknowns) Positive control: 5000 copies/µl of synthetic 500 bp DNA fragments for Rotavirus, Astrovirus, Sapovirus, Norovirus, and hRPP30DNA.

Tube 3: InhibiTaq RT-qPCR enzyme Mastermix (enough for 100 rxns. with 20 µL total volume). This is a custom formulation from Fortis Life Sciences to the specifications of PCRassays.com.



EXPERIMENTAL

Perform nucleic acid extraction/purification (recommended). Set up your PCR reaction (20 µL) as follows on ice:

Component	Volume (µL)
InhibiTaq enzyme mastermix (2X)	10
Primer/Probe mix (5X)	4
Sample or positive control	2
Water (Molecular Biology Grade)	4

Notes: To improve assay sensitivity, up to 6 µL of sample can be added (water volume adjusted accordingly) for a total reaction volume of 20 µL. For positive control rxns., add 2 µL of the solution from Tube 2.

A PCR protocol was used for verification on a QuantStudio™ 7 Pro Real-Time System, with the following program:

Step	Thermocycling Protocol:
1	Incubate @ 50 °C for 10 minutes
2	Incubate @ 95 °C for 3 minutes
3	Incubate @ 95 °C for 5 seconds
4	Incubate @ 55 °C for 22 seconds
5	Plate Read
6	Go to Step 3, repeat 44× more

RESULT INTERPRETATION

After running the qPCR reaction, use the instrument software to determine the quantification cycle, C_q (or use C_T if your instrument does not have the capability to compute a C_q). Fluorescence channels with a C_q < 38 cycles, and final RFU > Threshold is considered “positive” or “+” in the Table below. The “Threshold” value for calling a PCR positive is dependent on the instrument model, well size, and sample volume; thus the user must determine the threshold that is appropriate for their method. For our QuantStudio™ 7 Pro with 96 well plate with 100 µL wells and 20 µL reaction volume, the average RFU was approximately 200,000 and we used a threshold of 20,000 for calling positives or “+” in the Table below.

Rotavirus us FAM TM	Astrovirus us HEX TM	RPP30 TAM RA	Sapovirus TEX615 TM	Norovirus us Cy5 TM	Recommended Interpretation
—	—	—	—	—	The PCR reaction failed. Please repeat the experiment.
—	—	+	—	—	The sample contains human RPP30 DNA. The sample doesn't contain bacterial DNA.
+	—	—	—	—	The sample contains Rotavirus RNA. The sample may not contain human RPP30 DNA.
+	—	+	—	—	The sample contains Rotavirus RNA and human RPP30 DNA.
—	+	—	—	—	The sample contains Astrovirus RNA. The sample may not contain human RPP30 DNA.
—	+	+	—	—	The sample contains Astrovirus RNA and human RPP30 DNA.
—	—	—	+	—	The sample contains Sapovirus RNA. The sample may not contain human RPP30 DNA.
—	—	+	+	—	The sample contains Sapovirus RNA and human RPP30 DNA.
—	—	—	—	+	The sample contains Norovirus RNA. The sample may not contain human RPP30 DNA.
—	—	+	—	+	The sample contains Norovirus RNA and human RPP30 DNA.
+	+	—	+	+	The sample contains Rotavirus, Astrovirus, Sapovirus, and Norovirus RNA. The sample may not contain human RPP30 DNA.
+	+	+	+	+	The sample contains Rotavirus, Astrovirus, Sapovirus, Norovirus RNA, and human RPP30 DNA.

VERIFICATION EXPERIMENTS

The GIVIR1 QS assay verification was carried out as a 10-plex assay, which simultaneously detects RNA from Rotavirus, Astrovirus, Sapovirus, Norovirus, and human RPP30 DNA, which serves as a positive extraction-control assay.

Experiments were performed in triplicate using the experimental procedure given above, but with different samples added to each reaction. The samples used for the verification experiments were ~500 nt. RNA (**Figure 2**) transcribed by PCRassays.com using Jena Bioscience High Yield T7 mRNA synthesis kit (#RNT-107-S) and using ~500 bp synthetic DNA constructs from Twist Biosciences harboring the regions of interest from the pathogen genomes. In addition the amplification and detection was tested (**Figure 1**) for the ~500 BP DNA constructs (from Twist Biosciences) harboring the regions of interest from the pathogen genomes and human RPP30 DNA gene, and human genomic DNA.

Figures 1 and 2 show the results of these experiments, which indicate that the 10-plex specifically detects the different viruses in the human genomic DNA matrix.

The limit of detection (LOD) was estimated by performing serial dilution experiments in triplicate (**Figure 3**). For each dilution series only one target construct was added. The results show a limit of detection (LOD) <10 copies/reaction.

Conclusion: The data in **Figure 1** indicate that the 10-plex primers and probes specifically detect and differentiate the pathogens and are also compatible with RPP30_DNA positive control primers. Human genomic DNA doesn't interfere with the detection of the pathogens.

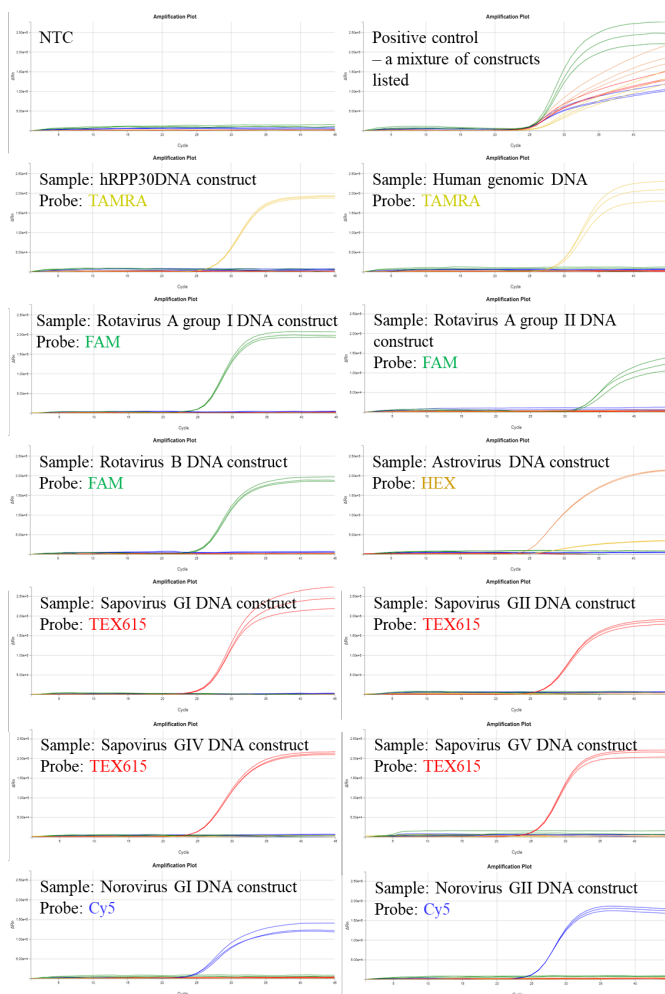


Figure 1: Verification experiments with single DNA target constructs (given in text boxes for each panel). All sets of probes and primers are present in every reaction, but positive signal is only observed when the target(s) is present, indicating that the amplification is specific.

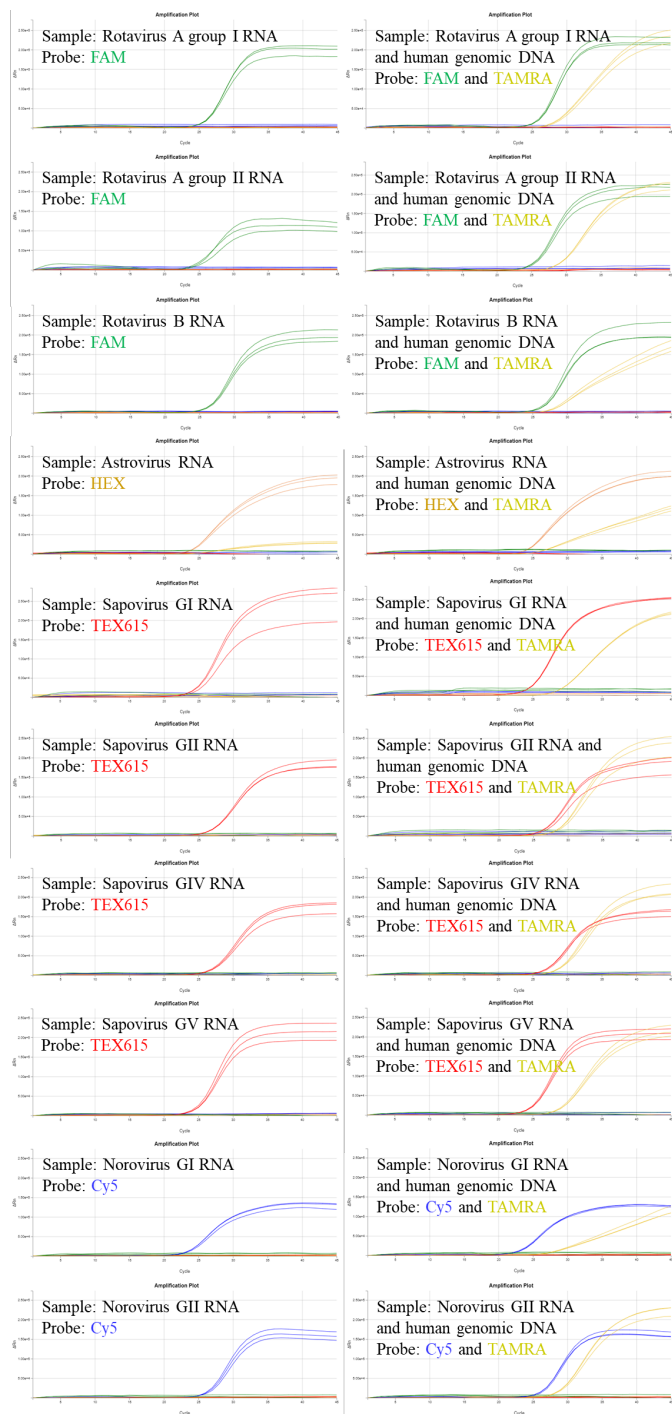
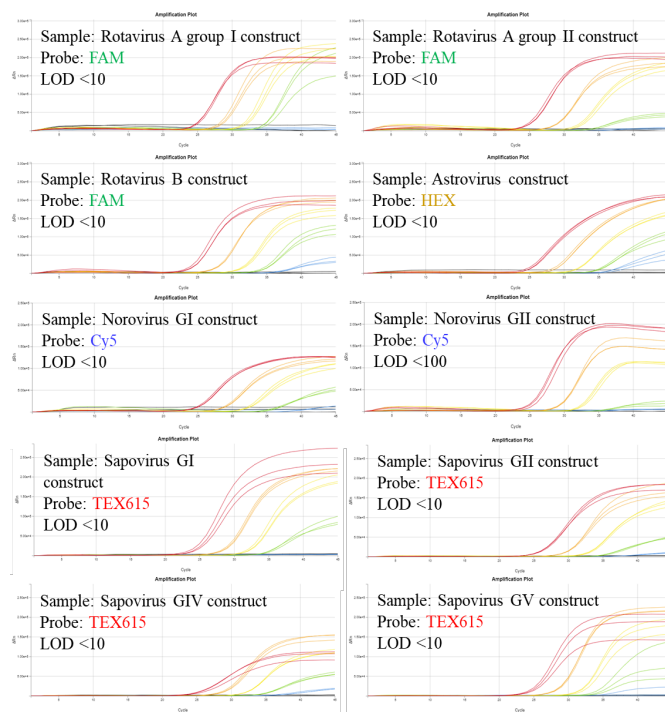


Figure 2: Verification experiments with single and multiple targets (given in text boxes for each panel). All sets of probes and primers are present in every reaction, but positive signal is only observed when the target(s) is present, indicating that the amplification is specific. Amplifications with Cq >38 are negative.



Color coding:

10,000 copies
1,000 copies
100 copies
10 copies
1 copy
NTC

Figure 3: Serial dilution experiments show LOD <10 molecules for the synthetic DNA construct of each target.

CONTACT US

For assistance, please contact DNA Software using the link:

<https://www.pcrassays.com/contact/>

Address: Michigan Life Science and Innovation Center,
46701 Commerce Center Dr, Plymouth, MI 48170

Phone: (734) 222-9080

NOTES

- 1 FAM™ (Carboxyfluorescein) is a trademark of Life Technologies, Inc
- 2 BHQ-1™ (Black Hole Quencher) is a trademark of Biosearch Technol., Inc.
- 3 HEX™ (Hexachloro-fluorescein) is a trademark of Applera Corp
- 4 TAMRA (Carboxyltetramethylrhodamine) is a trademark of Applera Cor.
- 5 BHQ-2™ (Black Hole Quencher) is a trademark of Biosearch Technol., Inc.
- 6 TEX615™ is a trademark of Thermo Fisher Scientific.
- 7 Cy5™ is a trademark of GE Healthcare
- 8 “TaqMan” is a trademark of Roche Molecular Systems, Inc.