

ASSAY NAME: GIPARA-QS (GI Parasite Panel for QuantStudio)

Quantity: 100 x 20µL PCR reactions

5-plex assay: *Cryptosporidium* spp., *Cyclospora cayetanensis*, *Entamoeba histolytica*, *Giardia intestinalis*, and human RPP30 DNA

SKU #: BUN-GIPARA-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-GIPARA-D-QS-100 on a QuantStudio™ 7 Pro. 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 GI parasite assay are provided in Tube 1 as a 5X concentrated working solution that detects 4 pathogens and a human extraction control. The primers and probe for the *Cryptosporidium* spp. assay detects the following species: *C. parvum*, and *C. hominis*. *G. intestinalis* is also commonly known as *G. lamblia* and *G. duodenalis*.

Table of Dyes used in this assay:

Pathogen/Target	Dyes	Quencher	Refs.
<i>Cryptosporidium</i> spp.	FAM	BHQ-1	1, 2
<i>Cyclospora cayetanensis</i>	HEX	BHQ-1	3
RPP30-DNA control	TAMRA	BHQ-2	4, 5
<i>E. histolytica</i>	TEX615	BHQ-2	6
<i>G. intestinalis</i>	Cy5	BHQ-2	7

The probes are designed as TaqMan⁸ cleavage mechanism and thus the reaction requires a DNA polymerase with 5'-exonuclease activity.

ASSAY HANDLING

The GIPARA-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 *Cryptosporidium* spp, *Cyclospora cayetanensis*, *E. histolytica*, *G. intestinalis*, and hRPP30DNA.

Tube 2: (Do NOT add to specimen unknowns) Positive control:

Synthetic 500 bp DNA fragments for *Cryptosporidium* spp., *C. cayetanensis*, *E. histolytica*, *G. intestinalis*, and hRPP30DNA.

Tube 3: InhibiTaq 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
Molecular biology grade water	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, with the following program:

Step	Thermocycling Protocol:
1	Incubate @ 95 °C for 2 minutes
2	Incubate @ 95 °C for 3 seconds
3	Incubate @ 55 °C for 22 seconds
4	Plate Read
5	Go to Step 2, repeat 44x 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 are 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 200 µL wells and 20 µL reaction volume, the average RFU was approximately 170,000 and we used a threshold of 26,000 for calling positives or “+” in the Table below.

<i>C. spp.</i> FAM™	<i>C. cayetanensis</i> HEX™	RPP30 TAMRA™	<i>E. histolytica</i> TEX615™	<i>G. intestinalis</i> Cy5™	Recommended Interpretation
—	—	—	—	—	The PCR reaction failed. Please repeat the experiment.
—	—	+	—	—	The sample contains human RPP30 DNA. The sample doesn't contain parasitic DNA.
+	—	—	—	—	The sample contains <i>C. spp.</i> DNA. The sample may not contain human RPP30 DNA.
+	—	+	—	—	The sample contains <i>C. spp.</i> DNA and human RPP30 DNA.
—	+	—	—	—	The sample contains <i>C. cayetanensis</i> DNA. The sample may not contain human RPP30 DNA.
—	+	+	—	—	The sample contains <i>C. cayetanensis</i> DNA and human RPP30 DNA.
—	—	—	+	—	The sample contains <i>E. histolytica</i> DNA. The sample may not contain human RPP30 DNA.
—	—	+	+	—	The sample contains <i>E. histolytica</i> DNA and human RPP30 DNA.
—	—	—	—	+	The sample contains <i>G. intestinalis</i> DNA. The sample may not contain human RPP30 DNA.
—	—	+	—	+	The sample contains <i>G. intestinalis</i> DNA and human RPP30 DNA.
+	+	—	+	+	The sample contains <i>C. spp.</i> , <i>C. cayetanensis</i> , <i>E. histolytica</i> , and <i>G. intestinalis</i> DNA. The sample may not contain human RPP30 DNA.
+	+	+	+	+	The sample contains <i>C. cayetanensis</i> , <i>E. histolytica</i> , and <i>G. intestinalis</i> DNA, and human RPP30 DNA.

VERIFICATION EXPERIMENTS

The GIPARA-QS assay verification was carried out as a 5-plex assay, which simultaneously detects DNA from *Cryptosporidium spp.*, *Cyclospora cayetanensis*, *Entamoeba histolytica*, *Giardia intestinalis*, 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 contained 1×10^4 copies/reaction of 500 bp synthetic DNA constructs (from Twist Biosciences) harboring the regions of interest from the pathogen genomes, human RPP30 DNA gene, and human genomic DNA. **Figure 1** shows the results of these experiments, which indicate that the 5-plex specifically detects the different parasitic species in the human genomic DNA matrix.

The limit of detection (LOD) was estimated by performing serial dilution experiments in triplicate (**Figure 2**). 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 5-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.

NOTES

¹ FAM™ (Carboxyfluorescein) is a trademark of Life Technologies, Inc.

² BHQ-1™ (Black Hole Quencher) is a trademark of Biosearch Technologies, Inc.

³ HEX™ (Hexachloro-fluorescein) is a trademark of Applera Corp.

⁴ TAMRA (Carboxyltetramethylrhodamine) is a trademark of Applera Corp.

⁵ BHQ-2™ (Black Hole Quencher) is a trademark of Biosearch Technologies, 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.

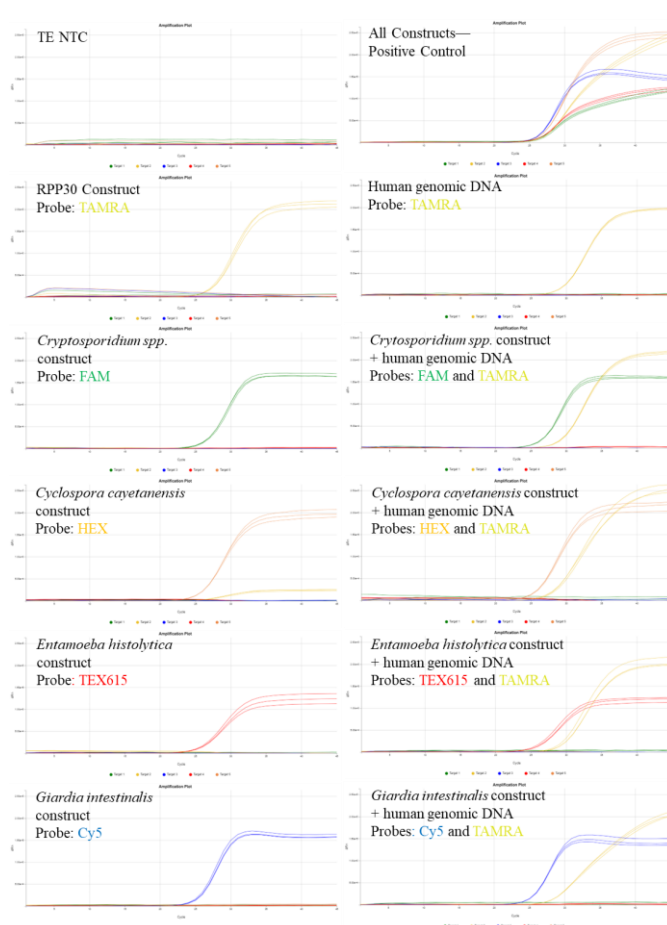


Figure 1: Verification experiments with single and multiple targets (given in text boxes for each panel). All sets of probes and primers are present in every reaction, but positive signal is only observed when the target(s) is present, indicating that the amplification is specific.

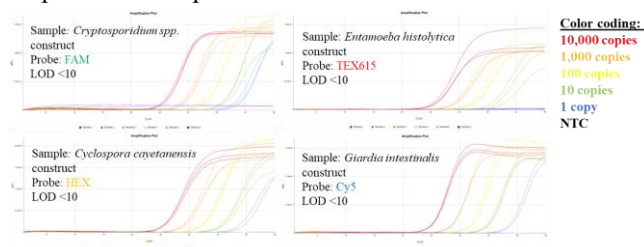


Figure 2: Serial dilution experiments show LOD <10 molecules for the synthetic DNA construct of each target.

CONTACT US

For assistance, please contact DNA Software using the link:
<https://www.pcrassays.com/contact/>

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