

ASSAY NAME: UTI7_BR

Quantity: 100 x 20µL PCR reactions

5-plex assay: *Candida* genus, *Enterobacter cloacae*, *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, and human RPP30 DNA

SKU: BUN-UTI7-D-BR-100 (Bio-Rad)

(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 (BioRad, QuantStudio, MIC). The verification data presented in this PIS were performed using BUN-UTI7-D-BR-100 on a BioRad CFX96. The performance of the other SKUs on their corresponding instrument should be similar. Contact PCRassays.com if you need to use a different qPCR instrument.

CONTENTS

The primers and probes in the UTI7 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 *Candida* genus assay detects at least 27 species of *Candida* including: *C. africana*, *C. albicans*, *C. auris*, *C. bracarensis* (*Nakaseomyces bracarensis*), *C. dubliniensis*, *C. duobushaemulonii*, *C. glabrata* (*Nakaseomyces glabratus*, *Cryptococcus glabratus*), *C. guilliermondii* (*Meyerozyma guilliermondii*, *Pichia guilliermondii*), *C. guilliermondii var membranifaciens* (*Kodamaea ohmeri*), *C. inconspicua*, *C. krusei* (*Pichia kudriavzevii*, *Issatchenkia orientalis*), *C. lusitaniae* (*Clavispora lusitaniae*, *C. obtusa*), *C. mesorugosa* (*Diutina mesorugosa*), *C. metapsilosis*, *C. neorugosa* (*Diutina neorugosa*), *C. nivariensis*, *C. norvegensis* (*Pichia norvegensis*), *C. parapsilosis*, *C. pararugosa*, *C. pseudohaemulonii*, *C. pseudorugosa* (*Diutina pseudorugosa*), *C. pulcherrima*, *C. robusta* (*Saccharomyces cerevisiae*), *C. rugosa* (*Diutina rugosa*), *C. tropicalis*, *Debaryomyces hansenii*, *Meyerozyma caribbica*. The design targets an uncharacterized protein (Protein ID: XM_445466.1, in NC_006027.1) that is conserved in most *Candida* genomes.

Table of Dyes used in this assay:

Pathogen/Target	Dyes	Quencher	Refs.
<i>Candida</i> genus	FAM	BHQ-1	1, 2
RPP30-DNA control	HEX	BHQ-1	3
<i>P. aeruginosa</i>	TEX615	BHQ-2	4, 5
<i>E. cloacae</i>	Cy5	BHQ-2	6
<i>S. epidermidis</i>	Cy5.5	BHQ-2	7

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

Assay contents:

Tube 1: Primer/Probe mix (5X) for *Candida* genus, *E. cloacae*, *P. aeruginosa*, *S. epidermidis*, and hRPP30DNA.

Tube 2: (Do NOT add to specimen unknowns) Positive control: 5000 copies/µl positive controls of synthetic 500 bp DNA fragments of *Candida* genus, *E. cloacae*, *P. aeruginosa*, *S. epidermidis*, and human RPP30DNA.

Tube 3: InhibiTaq Standard 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.



ASSAY HANDLING AND CONTAMINATION

The UTI7 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.

EXPERIMENTAL

Perform nucleic acid extraction/purification (recommended).

Set up your reaction (20 µL) as follows on ice:

Component	Volume (µL)
InhibiTaq qPCR 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 BioRad CFX96 system using white plates, 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 15 seconds
4	Plate Read
5	Go to Step 2, repeat 44× more

RESULT INTERPRETATION

After running the qPCR reaction, use the instrument software to determine the quantification cycle, C_q (C_q is preferred over C_T). 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 BioRad CFX-96 with 100 µL wells and 20 µL reaction volume, the average RFU was approximately between 1,000 and 3,000 we used a threshold of 200 for calling positives or “+” in the Table below.

<i>Candida</i> genus FAM TM Cy5 TM	<i>P. aeruginosa</i> TEX TM 615 TM	<i>E. cloacae</i> Cy5 TM	<i>S. epidermidis</i> Cy5.5 TM	RPP30 HEX 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 <i>Candida</i> genus DNA. The sample may not contain human RPP30 DNA.
+	—	—	—	+	The sample contains <i>Candida</i> genus DNA and human RPP30 DNA.
—	+	—	—	—	The sample contains <i>P. aeruginosa</i> DNA. The sample may not contain human RPP30 DNA.
—	+	—	—	+	The sample contains <i>P. aeruginosa</i> DNA and human RPP30 DNA.
—	—	+	—	—	The sample contains <i>E. cloacae</i> DNA. The sample may not contain human RPP30 DNA.
—	—	+	—	+	The sample contains <i>E. cloacae</i> DNA and human RPP30 DNA.
—	—	—	+	—	The sample contains <i>S. epidermidis</i> DNA. The sample may not contain human RPP30 DNA.
—	—	—	+	+	The sample contains <i>S. epidermidis</i> DNA and human RPP30 DNA.
+	+	+	+	—	The sample contains <i>Candida</i> genus DNA, <i>P. aeruginosa</i> DNA, <i>E. cloacae</i> DNA, and <i>S. epidermidis</i> DNA. The sample may not contain human RPP30 DNA.
+	+	+	+	+	The sample contains <i>Candida</i> genus DNA, <i>P. aeruginosa</i> DNA, <i>E. cloacae</i> DNA, <i>S. epidermidis</i> DNA, and human RPP30 DNA.

VERIFICATION EXPERIMENTS

The UTI7 assay verification was carried out as a 5-plex assay, which simultaneously detects DNA from *Candida* genus, *Enterobacter cloacae*, *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, 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 synthetic 500 bp DNA constructs (from Twist Biosciences) harboring the regions of interest from the pathogen genomes, human RPP30 DNA gene, and human genomic DNA. DNA extracts were obtained from ATCC, *Candida albicans* (MYA-2876DQ), *Candida glabrata* (2001DQ), *Candida tropicalis* (750DQ), *P. aeruginosa* (47085DQ), *E. cloacae* (13047DQ), *S. epidermidis* (12228DQ). **Figure 1** shows the results of these experiments, which indicate that the 5-plex specifically detects the different pathogens.

The limit of detection (LOD) was estimated by performing serial dilution experiments in triplicate (**Figure 2**). For dilution series only 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 FAMTM (Carboxyfluorescein), a trademark of Life Technologies Corporation.
- ² BHQ-1TM (Black Hole Quencher) is a trademark of Biosearch Technol., Inc.
- ³ HEXTM (Hexachloro-fluorescein), a trademark of Thermo Fisher Scientific.
- ⁴ TEX615TM is a trademark of Thermo Fisher Scientific.
- ⁵ BHQ-2TM (Black Hole Quencher) is a trademark of Biosearch Technol., Inc.
- ⁶ Cy5TM, a trademark of GE Healthcare.
- ⁷ Cy5.5TM is a trademark of GE Healthcare.
- ⁸ TaqManTM is a trademark of Roche Diagnostics, Inc.

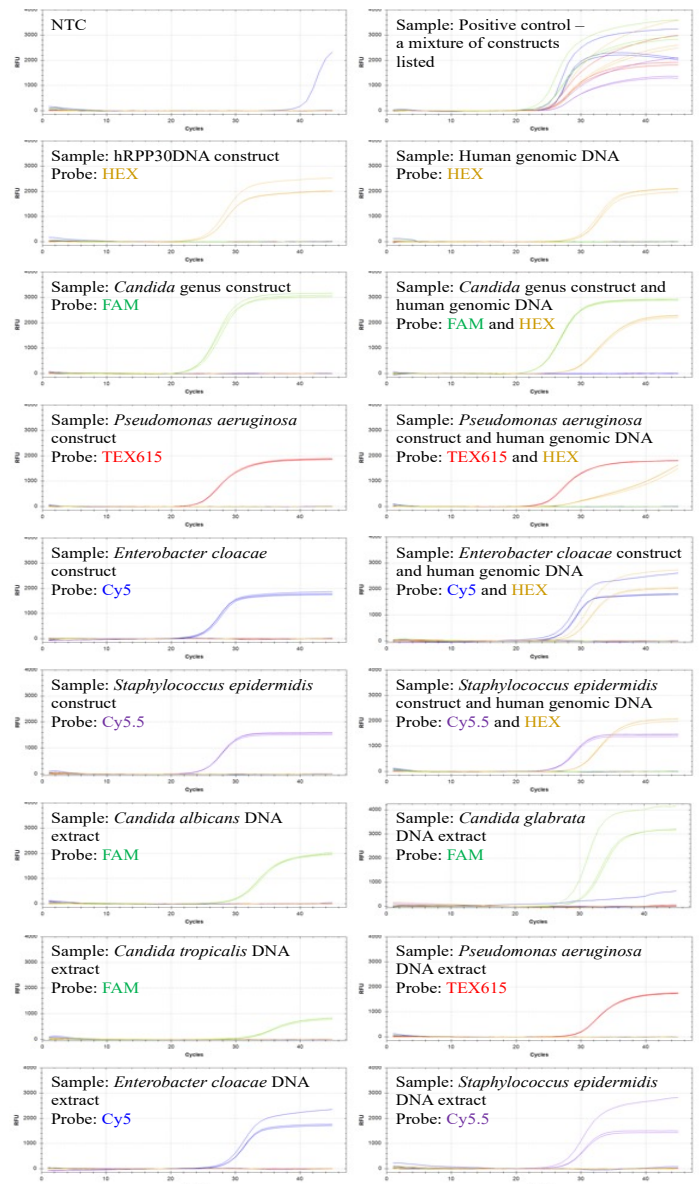


Figure 1: Verification experiments with single and multiple targets (given in text boxes for each panel). All sets of probes and primers are present in every reaction, but positive signal is only observed when the target(s) is present, indicating that the amplification is specific.

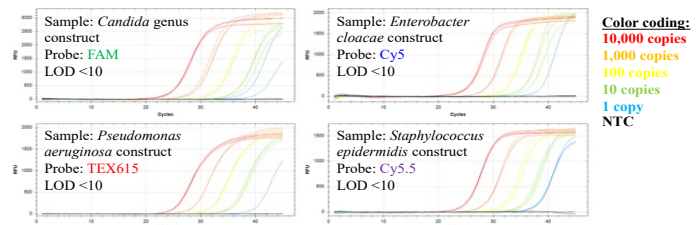


Figure 2: Serial dilution experiments show LOD <10 molecules for the synthetic DNA construct of each target.

CONTACT US

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

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