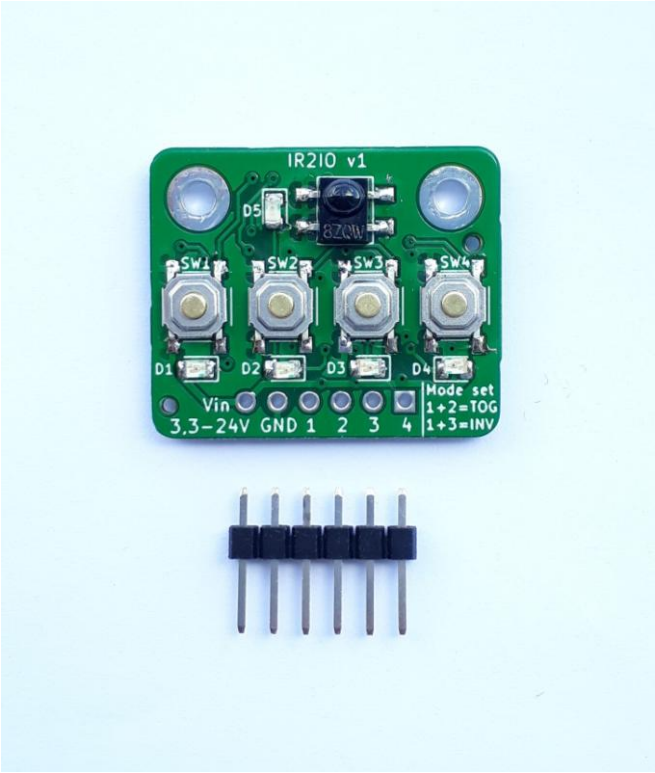
ROOT FROGS MAKES

IR2IO v1

User Manual



Last Update: 07th October 2020

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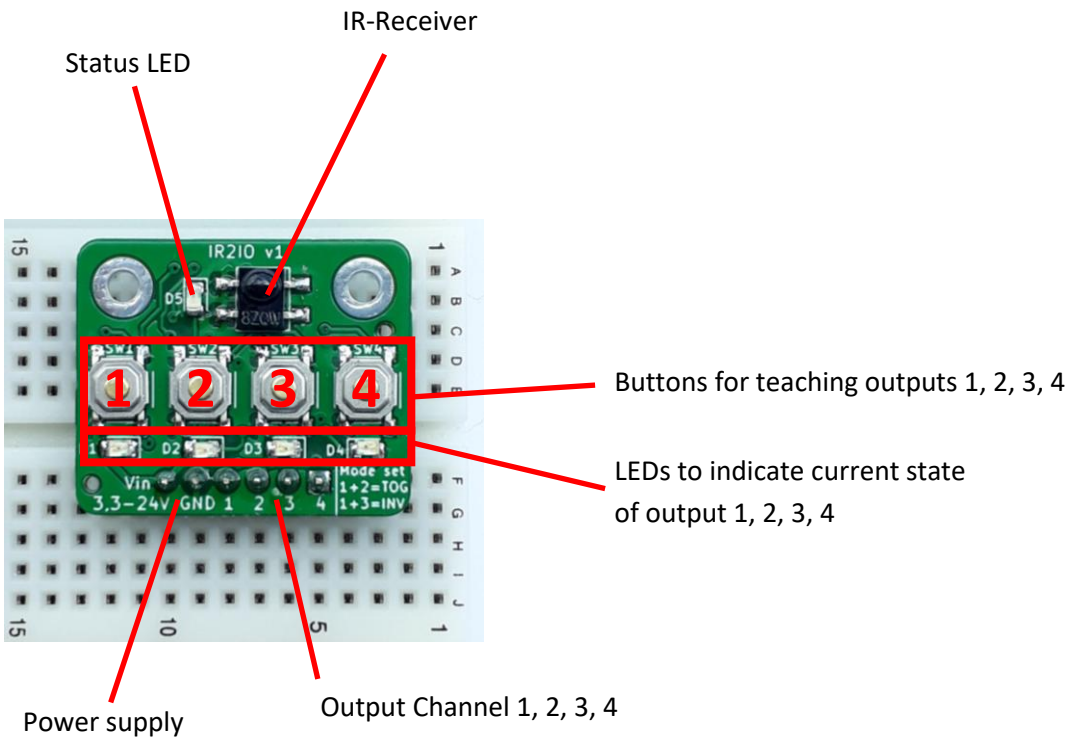
Overview

- Wide supply voltage range (3,3 V* - 24 V DC)
- 4 independent output channels (NPN with pull up)
- Easy teach-in procedure for each channel
- Up to 6 buttons each channel
- Works with all common IR-frequencies from 20 kHz to 60 kHz
- Independent from the protocol of your IR-remote control.
- Toggle Mode
- Inverted Mode

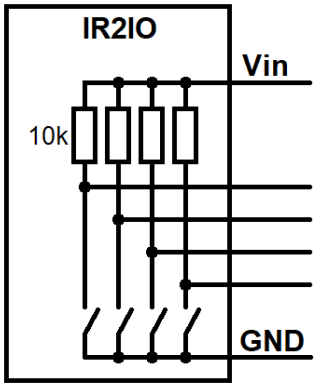
* Onboard LEDs will only work with supply Voltage ≥ 5 V. Nevertheless, full functionality is given with 3,3 V supply (except LEDs).



Functional Description

The 4 outputs can be controlled by an IR-remote control. This can be any IR-remote control you want. It doesn't matter if it is from a TV, DVD, HiFi, RGB-LED stripes or any other device.
Each output can be connected to a button on your IR-remote control.
You can use up to 6 Buttons (also from different remote controls) for each channel.
The output stays active as long as you press the button on your remote control.

All outputs are switching against GND. It is an open collector output with a 10 kΩ Pull-up (to V_{in}) resistor.



Teach in

Press and hold the push button on the IR2IO board for the channel you want to use. As long as you press the push button, press the button on your remote control which should be coupled with the output. The green status LED will flicker as long as you press the button. When the corresponding output activates, the teach in procedure is finished. As long as you hold the push button on the IR2IO you can teach additional buttons from your IR-remote control. You can teach up to 6 buttons for each channel. When you release the push button the teach in procedure for this channel is finally finished. The corresponding output is now coupled with the button(s) of your remote control you have pressed. This setting will be automatically saved and is available also after power off/on.

If you want to change the output to another button, just repeat the teach in procedure described above.

Note: If you start a new teach in procedure, all previous stored buttons for this channel will be cleared.

Note: Some remote controls have a toggle-bit in their protocol. This has the effect that the output switches only on each second button press. If you have this problem, just press the button on your remote control two times during the teach-in procedure.

Mode Settings

There are three different working modes available:

Normal Mode

This is the default mode - the output is active as long as you press the button on your remote control.

Inverting Mode

Due to the open collector outputs, it has the effect, that the voltage at the output goes to 0 V (GND) when the switching output is active. This is good for switching something like a relay. But it results in an inverted logic if you want to connect the output to a microcontroller or other control-boards like a motor controller. Because of that, we made it possible to invert the output logic.

To invert the outputs just press button 1+3 at the same time and hold them for about 1 second.
If the green status LED is blinking two times, the inverted mode is now activated. You can see this change on the output status LEDs too. This setting will be stored, also after power off/on.

To change back from inverted mode to normal mode, just repeat the procedure above.

Note: If you are in toggle mode and activating inverted mode, the toggle mode will be reset. (An inverted toggle mode makes no sense)

Toggle Mode

Normally the switching output is active as long as you press the button on your remote control.
To make it possible to realize an on/off functionality with just one button of your remote control, we created the toggle mode.
In this mode, the output is activated when you press the button on your IR-remote control and stays activated even when you release the button. The output deactivates when you press the button a second time.

To enable the toggle mode press button 1+2 at the same time and hold them for 1 second. If the green status LED is blinking two times, the toggle mode is activated. This setting is stored even after power off/on.

To change back from toggle mode to normal mode, just repeat the procedure above.

Note: If you are in inverted mode and are activating toggle mode, the inverted mode will be reset. (An inverted toggle mode makes no sense)

Technical Data

Supply voltage	3,3 V* - 24 V
Quiescent current @5V (all outputs off)	265 µA
Max current @5V (all outputs on)	18,8 mA
Switching output current	80 mA
Pull Up resistor	10 kΩ
Number of outputs	4
IR-receiver frequency	20 kHz - 60 kHz
Board dimensions	23 x 28 mm

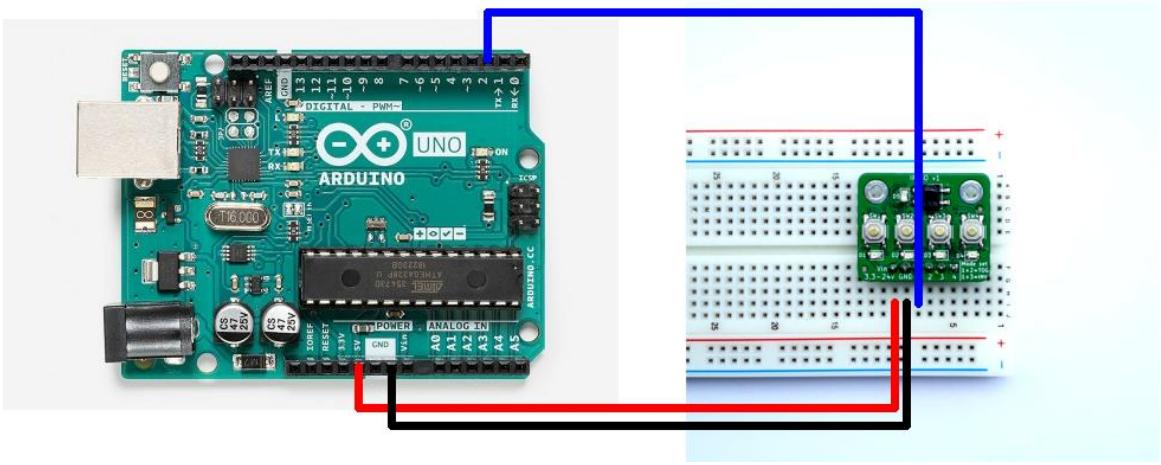
* Onboard LEDs will only work with Voltage ≥ 5V. Nevertheless, full functionality is given with 3,3 V supply, except LEDs.

Application examples

Arduino

You can connect the IR2IO board directly to your Arduino. The IR2IO board is compatible to all Arduino boards. In your Arduino code you can simply read the corresponding pin to see if a button on the IR-remote control is pressed (don't forget to teach the output on IR2IO board before). You don't need any library for this.

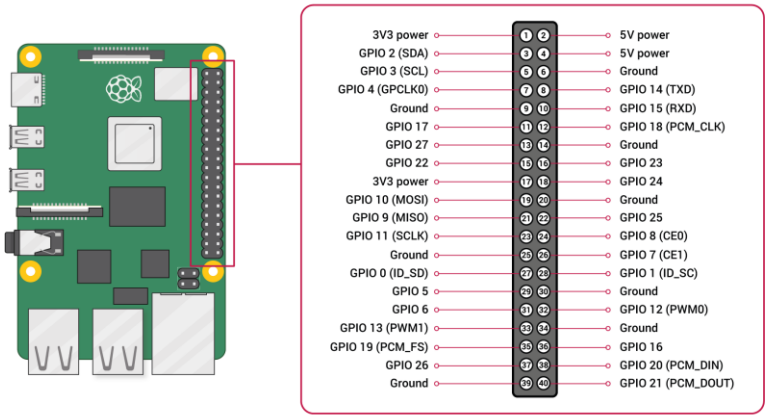
Example for an Arduino UNO:




```
void loop()
{
   if(digitalRead(2) == LOW)
   {
       //button is pressed, do something...
   }
   else
   {
        //button is not pressed
   }
}
```

Raspberry Pi

Due to the capability to run with 3,3 V, IR2IO can be connected to any Raspberry Pi directly.



Connect the Vin pin to one of the 3V3 power pins and the GND pin to any Ground pin.
The 4 outputs can be connected to any GPIO you want.

Note: GPIO pins on Raspberry Pi are 3,3V Pins. So do not use the 5V power!

The following example is showing how you can control something on your Raspberry Pi with the IR2IO board.

Python

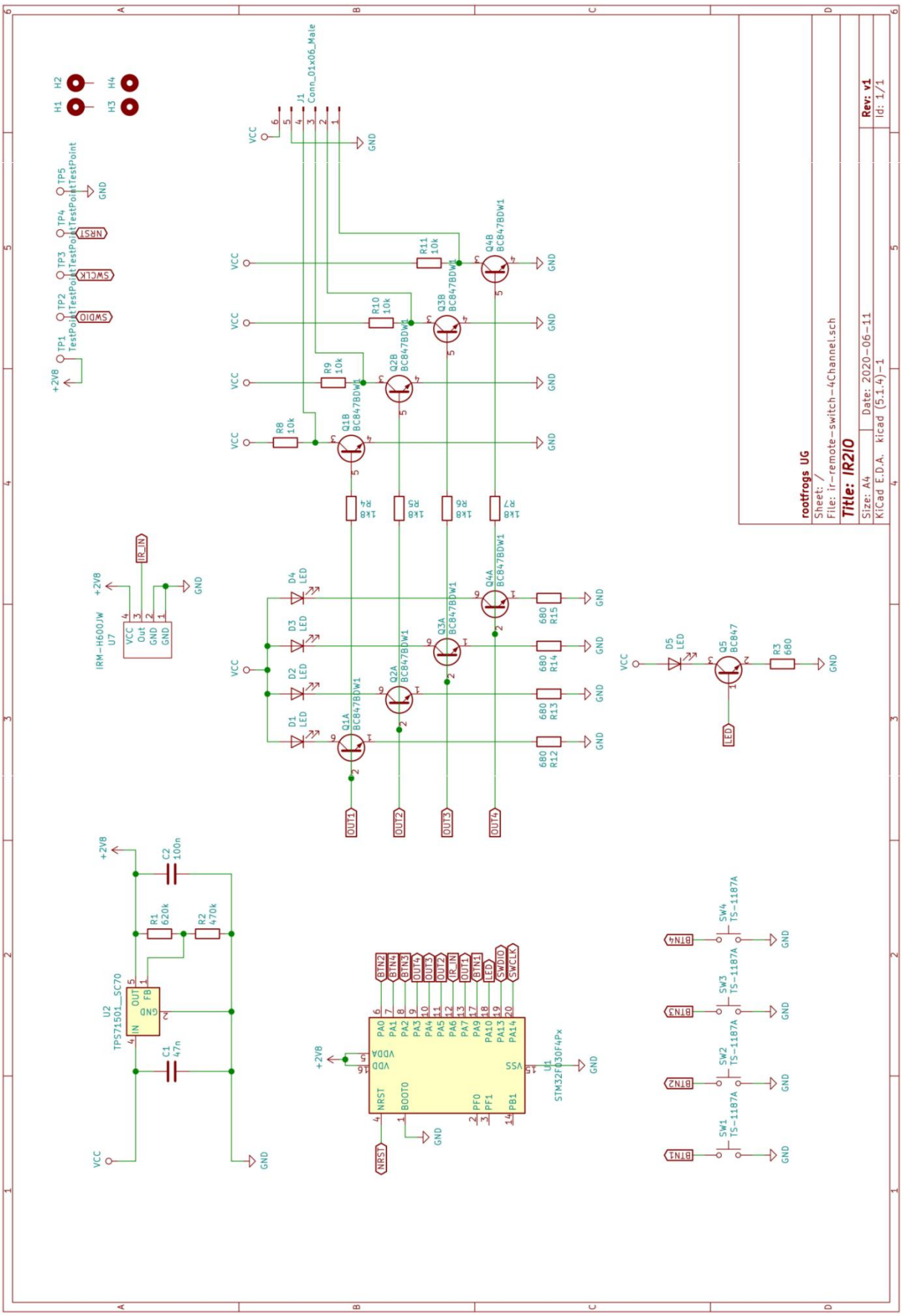
```
import RPi.GPIO as GPIO
import time
import webbrowser

GPIO.setmode(GPIO.BCM)   #use GPIO-Numbers instead of Pin numbers
GPIO.setup(24, GPIO.IN)
pressed=0

while True:
    # button is pressed if input is 0
    if GPIO.input(24) == 0:
        if pressed == 0:
            print("Pressed")
            pressed=1
            webbrowser.open('http://makes.rootfrogs.com')
    else:
        if pressed == 1:
            print("Released")
            pressed=0
    time.sleep(0.3)
```

Raspberry Pi Shutdown and Boot by IR-remote Control

If you have a Raspberry Pi 4 with new boot loader, you can enable the `WAKE_ON_GPIO` feature. Thereafter, connect an output of the IR2IO with GPIO3 (Pin 5) and follow one of the instructions on the Internet "How to Add a Power Button to Your Raspberry Pi".

Now you can shut down and turn on your Raspberry Pi with your IR remote control.

Schematic


rootfrogs UG
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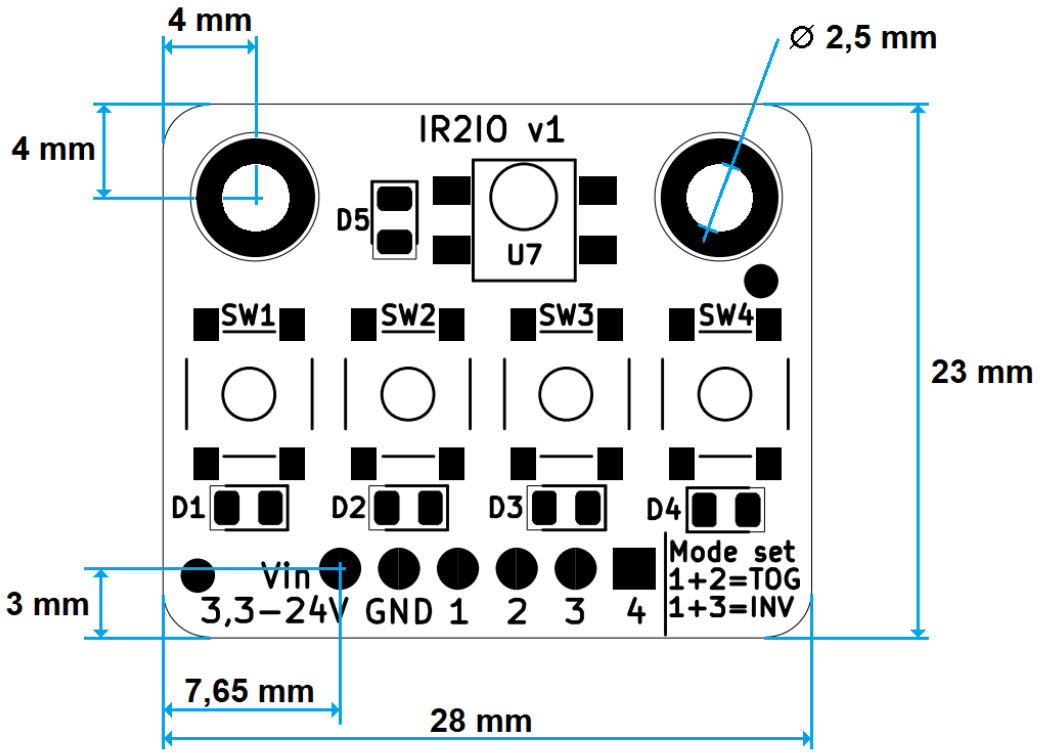
File: ir-remote-switch-4Channel.sch
Title: IR2IO
Size: A4
Date: 2020-06-11
KiCad E.D.A. kicad (5.1.4)-1
Rev: v1
Id: 1/1
Conn_01x06_Male
TestPoint
BC847BDW1
LED
IRM-H600JW
TPS71501_SC70
STM32F030F4Px
TS-1187A

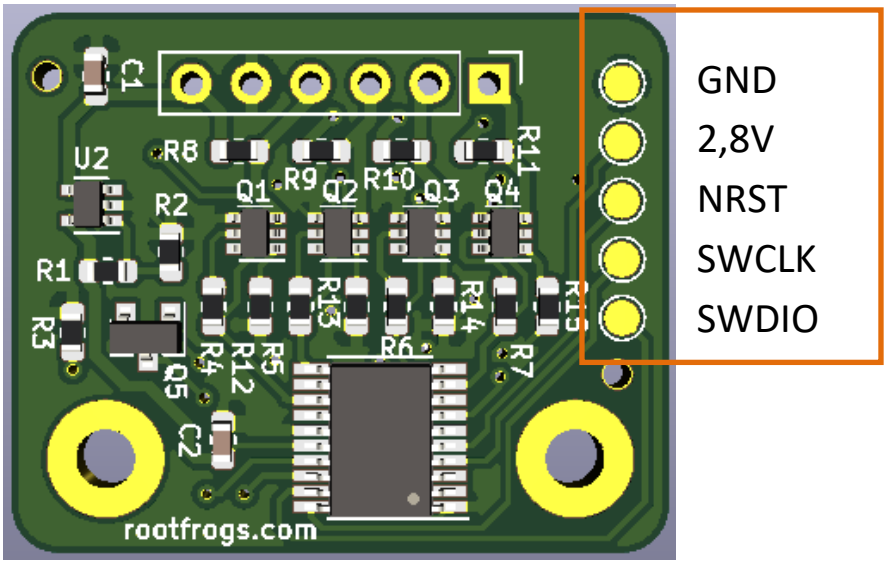
Mechanical Dimensions



You can also find the PCB as 3D model (STEP file) on our website.

Programming Interface

If you want, you can flash your own software into the microcontroller.
The used controller is a STM32F030F4P6TR. The SWD programming interface is on the bottom of the PCBA with following pinout:



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