

# TapTation

PT2399 Interface Application Note

Rev. v1.0



## Features:

- PT2399 delay control via MCP41100 compatible digital potentiometer
- Delay time from 25ms to 1125ms with an average accuracy of 5ms
- Tap Tempo with selectable tempo divisions
- Variable DC voltage delay time control
- Logic clock input to sync to external clock sources
- Delay modulation using PWM output

## Introduction

The TapTation controller can be used to control the delay time of a PT2399 based delay. The TapTation controller is interfaced to the PT2399 delay using a MCP41100 compatible digital potentiometer. Delay times range from approximately 25ms to 1125ms with an average accuracy of 5ms.

The delay time can be set either by a DC voltage source such as a potentiometer or an external clock source be it a logic clock or a switch. This allows for syncing to external clock sources possible. By using a switch “tap tempo” control can be added. The delay can be modulated with only a few extra parts.

The total part count for the TapTation controller is low making for a small footprint, easy assembly, and low cost while adding a large number of features. This makes the TapTation controller an excellent upgrade option for both DIY and commercial builders.



## Electrical Connections

When using the TapTation controller with the PT2399 the delay tempo accuracy is limited by the resolution of the MCP41100 compatible digital potentiometer. When a tempo is selected the TapTation controller will set the potentiometer to the closest value possible. In general use this should not be noticeable but when a large number of delay repeats are in use this may become apparent as the delays will go out of time with the **Tempo Clock Output** and **Tempo Scale Output**.

The connection between the PT2399 and MCP41100 compatible digital potentiometer should be as close as possible and care should be taken in the routing of these connections as the PT2399 is sensitive to noise and any extra resistance. This may throw off the delay setting calibration of the TapTation controller resulting in inaccurate delay tempo settings.

When using the **Tempo Clock Output** and **Tempo Scale Output** (pins 3 and 5 respectively) to drive loads the outputs have a maximum current sink / source capability of 20mA at 5v. With LEDs this means the minimum current limiting resistor value is 250 ohms. Do not use a resistor of lower value otherwise damage may occur to the TapTation controller.

If you wish to use a toggle switch instead of momentary switch for the **Tempo Clock Input** connect the **Tempo Clock Pulse Mode Input** (pin 4) to ground.

## Delay Modulation

The delay repeats can be modulated by slightly adjusting the delay time which causes a mild pitch shift. Using a MOSFET transistor (i.e.

BS170) placed in series with the MCP4110 digital potentiometer connecting to ground services as an element to adjust the delay time. The **Tempo PWM Output** provides a signal that can drive the MOSFET adjusting the ground connection in a ramping fashion thus providing a smooth pitch modulation.

Placing a potentiometer connected to shunt ground around the MOSFET creates a modulation depth control. On higher depth settings the accumulation of delay variations maybe enough to cause the delay to go out of sync with the selected tempo particularly when a large number of audio delay repeats are in use. Either re-enter the tempo or lower the modulation depth.

The **PWM Cycle Speed** switch will select the rate the **Tempo PWM Output** will sweep allowing for chorus and vibrato effects. Some delay tempos will not exhibit strong chours / vibrato characteristics until an appropriate cycle speed and/or large enough modulation depth setting is selected causing enough pitch shift in each audio delay cycle.

If you do not want to have the delay modulation feature modify the Typical Application Circuit by doing the following:

1. Remove the MOSFET, the 1K resistor connected to the MOSFET gate, and the depth potentiometer
2. Leave the **Tempo PWM Output** and **PWM Cycle Speed** pin unconnected
3. Connect pin 7 of the MCP41100 digital potentiometer to ground

## 50K Delay Time Potentiometer Simulation

Some delay designs use a 50K potentiometer for control of the delay time. The **TapTation** controller can simulate this potentiometer value by connecting the **Tempo Double Time** input to ground. This will roughly limit the digital potentiometer to the lower half of the potentiometer thus keeping the maximum value to approximately 50K.