

## **onTAP Boundary Scan Software Serializer and GPIO Board Product Brief**

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FLYNN SYSTEMS CORP.  
PROVIDING BOUNDARY SCAN SOLUTIONS SINCE 2000

## Introduction

The onTAP Serializer and GPIO Board is designed to allow JTAG distribution to multiple JTAG ports with different voltages and locations, providing all logic level voltage translations and buffering along with 200 general purpose IO lines for test.

☞ Please note that while this document references features and functions of onTAP® Boundary Scan Software in conjunction with the Serializer and GPIO board, the Serializer Board can be run independently of onTAP Software.

## Overview

Many applications include multiple JTAG devices that must be accessed for programming and test. Other applications may have multiple printed circuit boards to program or test simultaneously. The TAP Serializer delivers a versatile solution to serialize boundary scan chains, adjust for different TAP voltage levels and it also provides 200 CPLD-based GPIO lines.

This tool enables connectivity from a single host JTAG port and provides up to four independent output ports. It also features an adjustable built-in Vref capable of operating at voltages from +1.5VDC up to +3.3 VDC. Adjusting to the Vref eliminates the need for the user to provide level translators and routing logic in their application. The TAP Serializer and GPIO Board also allows for daisy chaining of multiple TAP Serializers providing as many output channels as required.

Additionally, by incorporating the CPLDs in the project JTAG chain, the user gains access to 200 CPLD-based general purpose IO lines, expanding the reach of the test.

## Key Features

- **Serialize 1 to 4 JTAG chains per Serializer Board**
- **Voltage level shift and buffer JTAG ports**
- **Daisy chain multiple onTAP Serializer and GPIO boards for applications having more than four boards JTAG ports**
- **Provides on board adjustable Vref for use when Vref is not available from target UUT**
- **Includes 200 GPIO pins when on board CPLDs are included in boundary scan chains**
- **Voltage adjustable CPLD GPIO pins from 1.5 to 3.3V**
- **On board oscillator for stand-alone demo applications**

## TAP Serializer Functional Description

The TAP Serializer and GPIO Board offers two main functions, serializing JTAG ports and providing 200 general purpose I/O pins.

From one to four JTAG TAPs can be serialized to provide the effect of a single chain when independent chains exist on a user's board or boards. The TAPs on the user's assemblies can be simply connected to the TAPs on the Serializer where jumper settings configure one overall chain, depending on the number of user JTAG chains.

Level shifters and buffers are available at each JTAG port to handle TAP I/O voltages over the range of 1.5V to 3.3V. Where a user's TAP does not include a Vref voltage, the a voltage reference may be connected to the Serializer's on-board adjustable voltage source. The Serializer includes two voltage sources, 3.3V VCC and the Vref adjustable source.

Chain assignments for multiple JTAG chains are accomplished within onTAP. The order that the chains are defined on the Development screen's Scan page is the order in which each TAP should be connected on the Serializer. TAPs closest to the Test Data In pin should be connected to the first Serializer port and successive ports should be assigned in order. The last TAP's TDO pin will be connected to the onTAP TAP CONNECT JTAG Controller's TDO pin.

The scan path through the Serializer is as follows:

onTAP TAP CONNECT JTAG Controller TDI Pin -> Serializer Port1 -> Serializer Port 2 -> Serializer Port 3 -> Serializer Port 4 -> onTAP TAP CONNECT JTAG Controller TDO Pin

If fewer than four JTAG TAPs are used, then board jumpers are set to bypass the unused Serializer TAPs.

When the user's JTAG TAPs reside on more than one PC board, then the onTAP Netlist Merge tool can be used to merge netlists so that single chain test solutions can be generated.

Included with the TAP Serializer:

- **onTAP TAP Serializer PCB**
- **6 VDC Wall Adaptor**
- **2 IDC Ribbon Cable**
- **3 Fly Lead Adaptors**
- **5 Jumper Wires**
- **Instruction Manual**

## Functional Description—GPIO

The use of GPIO pins provided from two CPLDs on the board can be optionally included in the user's scan chain. When using the Serializer GPIO board with onTAP Boundary Scan software, this is accomplished by selecting the option **Include GPIO Netlist** on onTAP's Projects page when creating test files. The two CPLDs on the Serializer board will appear on the list of devices on the Scan page and the two CPLDs must be placed at the beginning of the overall JTAG chain.

When the CPLDs for the GPIO pins are included in an application, the boundary scan path for an application that serializes four JTAG chains would be:

onTAP TAP CONNECT JTAG Controller TDI →CPLDs → Serializer Port 1→Port 2→Port 3→Port 4→onTAP TAP CONNECT JTAG Controller TDO pin.

The GPIO pins are brought out to header pins on the Serializer.

When developing boundary scan tests using onTAP Boundary Scan software, the Jumpers page may be used to show which connections will be made to the GPIO pins.

## Voltage Selection

The default voltage selections are as follows:

1. VCC is 3.3 Volts
2. The CPLD VCC and bank reference voltages are connected to 3.3V
3. Vref at each JTAG port is connected to the user's Vref input. Voltages at the level adjusters will shift 3.3V power on the Serializer side of the board to the user's Vref power.

### CPLD Bank Voltages for GPIO Pins

CPLD bank voltages may be selected from the internal 3.3V VCC or from an adjustable internal voltage source.

### JTAG Port Voltage Reference

In the event that Vref is not available from a target UUT, Vref at each of the JTAG ports can be selected from the internal 3.3V VCC or from an adjustable internal voltage source.

## Technical Support

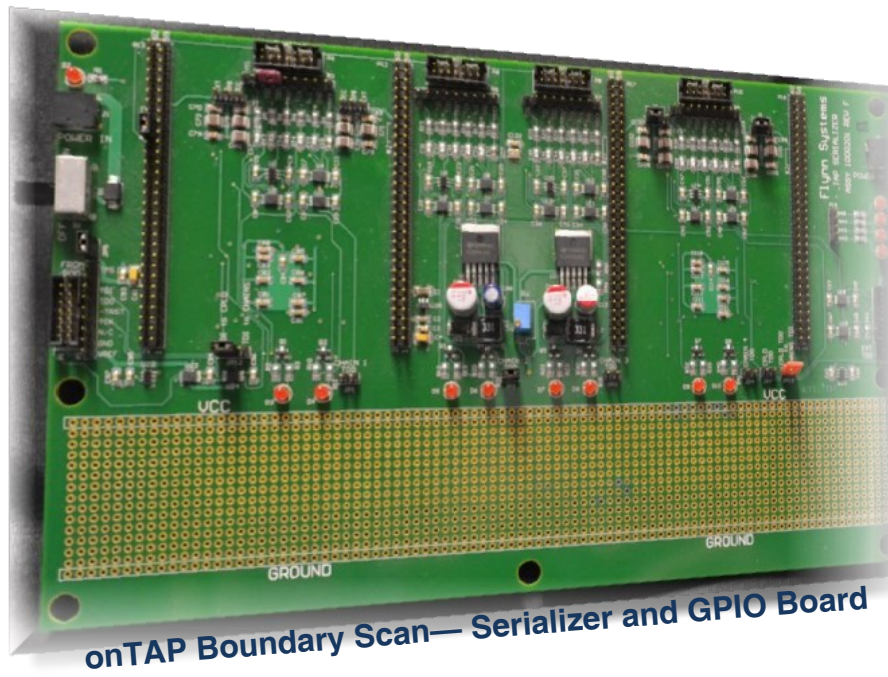
Should you have any questions about the onTAP Serializer and GPIO Board, please do not hesitate to contact Technical Support.

Technical Support is available by telephone or by email, 8:30 a.m.—5:00 p.m. Eastern Standard Time, Monday through Friday.

Contact Support by:

Telephone: + 1 (603) 598-4444

Email: [Support@flynn.com](mailto:Support@flynn.com)



**onTAP Boundary Scan—Serializer and GPIO Board**