Teradyne Z1800 to Agilent Medalist i5000 Conversion Solution

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Agilent Technologies

Overview

The Teradyne Z1800 to Medalist i5000 Conversion Solution was created for production environments that want to protect their investment in Teradyne Z1800 test fixtures while migrating to the state-of-the-art test capabilities of the Agilent Medalist i5000. This conversion solution:

Allows Teradyne Z1800 test fixtures to run on the Medalist i5000 test system
Converts Teradyne Z1800 test program into Medalist i5000 files
Allows Teradyne Z1800 fixtures to be debugged on the Medalist i5000
Provides a way to move from the older Teradyne test system to a new, supportable, Windows XP-based Agilent test platform

The non-multiplexed "Tester-per-Pin" channel architecture of the Medalist i5000 lends itself to the conversion of Teradyne Z1800 test fixtures. This paper outlines the development steps that are required for the conversion, and discusses the limitations of the conversion.

Conversion Solution Components

The Z1800 to Medalist i5000 conversion solution is comprised of two main parts:

Fixture adapter to mate the Z1800 test fixture to the Medalist i5000 testhead.
Software modules to convert the Z1800 test program into files the Medalist i5000 is able to use to test the board.

The Fixture Adapter

The Fixture adapter is a piece of hardware that rests on the Agilent Medalist i5000 and interfaces between the i5000 testhead and the Z1800 test fixture (Figure 1).

The fixture adapter has hardware to allow it to be pulled down onto the Medalist i5000. The i5000 side of the adapter has the necessary interface pins to allow it to interface with the i5000's un-multiplexed pin cards. In addition, the fixture adapter provides a capture mechanism and interface connectors for the Z1800 test fixture.

Wires in the fixture adapter connect the Z1800 fixture interface pins to the Medalist i5000 testhead resource pins. Since the Medalist i5000 pin card has an un-multiplexed architecture, the wiring is greatly simplified, even for digital testing.

The Z1800 porting solution has an adapter "map" file for the fixture adapter that maps the Z1800 fixture interface pin to the Medalist i5000 tester resource. This map file is used by the software modules that convert the Z1800 test program to the Medalist i5000 files.

Note that the fixture adapter is a customized to the number of nodes in the target Z1800 test fixture. For example, a 1200-node fixture will have a different fixture adapter than a 2400-node fixture. The maximum node count of the Medalist i5000 is 5184 nodes. Therefore, if a Z1800 fixture has more nodes than 5184, test coverage will be affected with the Z1800 to i5000 fixture adapter.
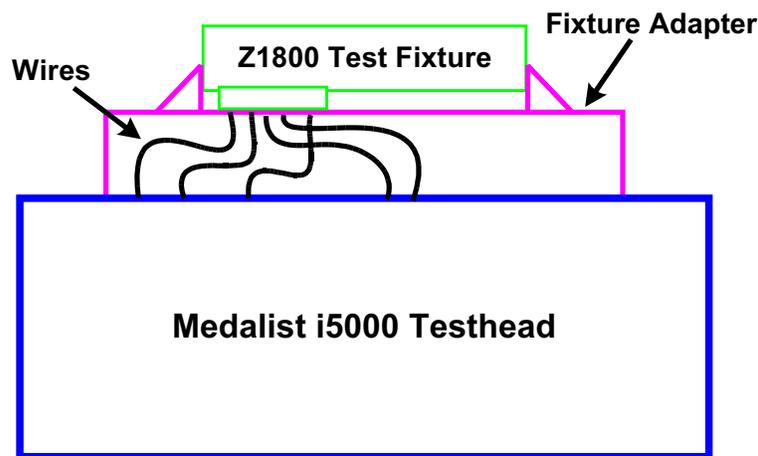
Figure 1. Simplified diagram of Z1800-to-i5000 fixture adapter.

Software Modules

The Z1800 to i5000 conversion solution also includes software modules to convert Z1800 test program files for use on the Medalist i5000 (Figure 2). While the diagram may look complicated, the flow is really only the black boxes and black lines between the Start and Done flow terminators. The files used during the flow are connected to the process flow with blue dashed lines.

The software conversion modules basically read the Z1800 file to create input files that are used by the Medalist i5000 development software to create a new i5000 board directory for the Z1800 test fixture. The Medalist i5000 is then used to debug the test program and fixture.
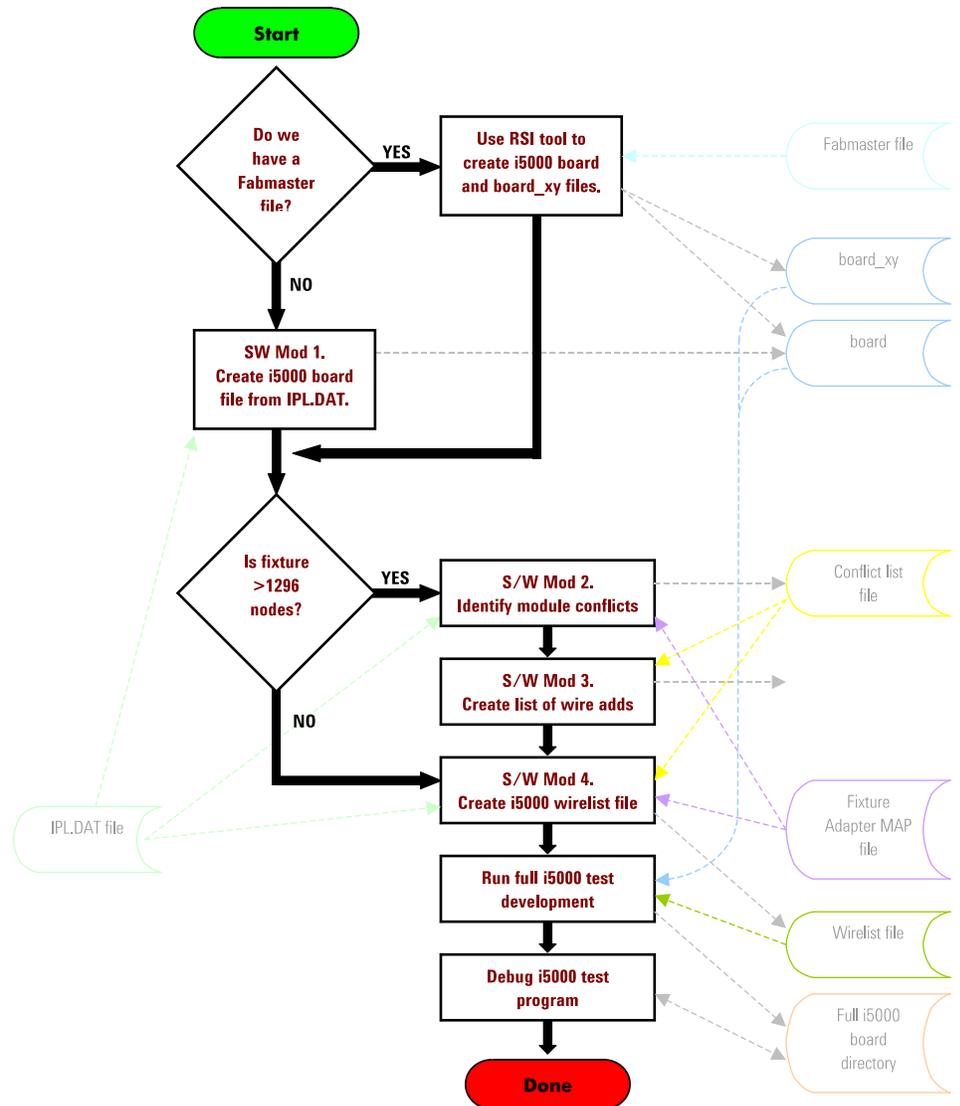
Figure 2. Z1800-to-i5000 software conversion flow diagram. Conversion flow shown in black, related files shown in blue.

There are two sources of data that can be used by the software modules:

1. The Teradyne Z1800 IPL.DAT file (also known as the "Input List") is **required** for the conversion solution. This file contains all device test information as well as the Z1800 fixture resource pin numbers used by the device tests.
2. The Fabmaster file describing the board is optional. However, if this file does exist, it is possible to create the board_xy file for the Z1800 board, which allows for a graphical display of the board and components using the Medalist i5000 Board Browser. To create the board_xy file, a software tool from Router Solutions, Inc. (RSI) is needed to read the Fabmaster file and create the actual board and board_xy files.

Required modules: less than 1296 nodes

The software modules required for file conversion depends on the maximum node count of the Z1800 test fixture. If the test fixture has 1296 nodes or less, then it can be tested by a one-module Medalist i5000. This is the simplest configuration since in-circuit device tests will not span Medalist i5000 modules. In this case, two software modules are required.

The first module, labeled "S/W Mod 1" in Figure 2, is used to create the Medalist i5000 board file (assuming that the RSI tool is not used to create the board and board_xy files from the Fabmaster file).
The second module, labeled "S/W Mod 4" in Figure 2, creates the Medalist i5000 wirelist file.

Required modules: more than 1296 nodes

If the Z1800 test fixture is greater than 1296 nodes, then two additional software modules are needed.

The first additional module, labeled "S/W Mod2" in Figure 2, will look at the Z1800 IPL.DAT file and the fixture adapter map file to determine what tests will be crossing the Medalist i5000 module boundaries. Since the i5000 does not support testing of analog components across modules, a few tests may have a conflict, although most will be okay. In order to allow the testing of this component, a wire must be added to the Z1800 test fixture to eliminate the module crossing conflict.

Figure 3 diagrams a potential wiring conflict for resistor R101. In this scenario, the Z1800 fixture resource for Node_1 ends up in module 2, and the fixture resource for Node_2 ends

up in module 3 on the Medalist i5000 testhead due to the resource mapping on the fixture adapter. This problem can be fixed by adding a wire from Node_1 to an unused Z1800 fixture interface pin that is wired to module 3 on the Medalist i5000 fixture adapter. (With this fix, the Z1800 test fixture can still be tested on a Z1800 if needed.)

The second additional software module, labeled "S/W Mod 3" in Figure 2, will look at the list of conflicts and generate a file that lists the fixture wire additions needed to correct the cross-module conflicts. These wires must be added to the Z1800 test fixture before the board can be tested on the Medalist i5000. The Fixture Adapter will also reserve enough pins for each module to handle these conflicts.

The software conversion flow for a fixture that has greater than 1296 nodes will finish up by executing the module "S/W Mod 4" in Figure 2 to create the final Medalist i5000 wirelist file. Then the full Medalist i5000 board directory can be developed, and the Medalist i5000 debug capability can be used to finish test program conversion
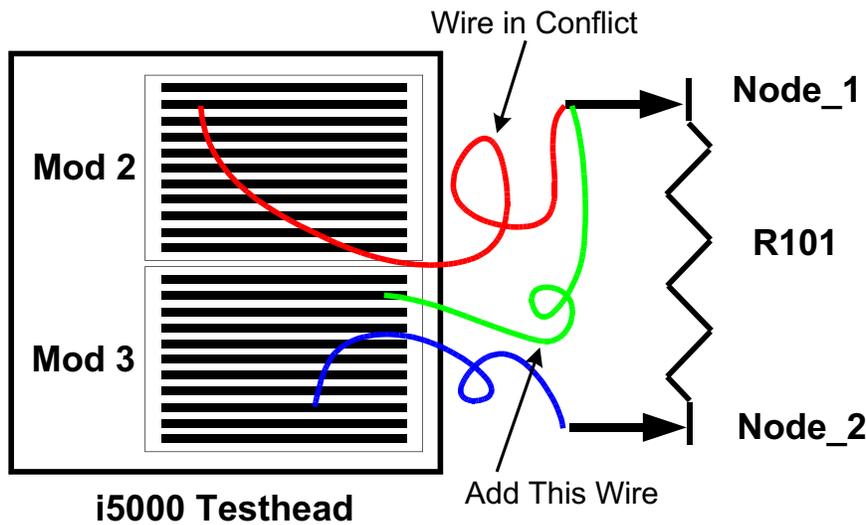
Figure 3. Cross-module wiring conflict

Limitations

The Z1800 to Medalist i5000 conversion solution takes Z1800 fixtures most of the way toward a Medalist i5000 implementation. Still, there are some limitations to consider:

1. The resulting analog tests will not have remote sensing. If remote sensing is an absolute requirement for analog in-circuit tests, it's likely that additional wires will need to be added to the Z1800 test fixture. This will be a manual process. However, the Medalist i5000 does have the capability to do "Scanner Sensing," which allows the sense busses to be connected to the nodes on the un-multiplexed pin card. This eliminates the need to add sense wires to the test fixture. It is not suitable in all instances, however. Very high accuracy analog in-circuit measurements or very low values of resistors may require the use of remote sense wires.

2. No Z1800 digital vector tests will be converted to the Medalist i5000 digital test language (VCL/PCF). If the digital device on the board is in the Medalist i5000 digital test library, then a test will be written for that device. A digital library test can also be created using the development tools on the Medalist i5000. It is too large a job to convert Z1800 digital tests and get a test that works properly on the Medalist i5000.

3. None of the Z1800 vectorless tests will be ported over. This includes any DeltaScan, FrameScan, or WaveScan tests. The only vectorless test techniques offered on the Medalist i5000 today is TestJet or Vectorless Test Extended Performance (VTEP). These require TestJet/VTEP probes and mux cards installed in the test fixture. If the Z1800 test fixture already has FrameScan probes installed, it may be possible to convert those to TestJet or VTEP probes and replace Teradyne's mux card with a TestJet/VTEP mux card.

4. Any custom tests done on the Z1800 will not be ported over. If custom tests are needed, a new version of these tests must be developed on the Medalist i5000. The Agilent Medalist i5000 has many capabilities for developing custom tests including Flash and PLD programming, analog functional testing, mixed analog and digital testing, frequency measurements, and a full complement of boundary scan test techniques.

Conclusion

Each production environment needs to determine whether the Z1800 to Medalist i5000 conversion solution makes sense. If the boards being tested on the Z1800 are in limited production or near the end of their support life, it may make more sense to keep them on the Teradyne Z1800 system and not port them to the Medalist i5000. High-volume boards may justify the cost of using Medalist i5000 development software to create a new test fixture and program for the i5000. The conversion solution may also require additional steps to develop an equivalent test on the Medalist i5000, as discussed in Limitations, so if engineering resources are stretched thin, it may not make sense to move forward with a conversion.

However, for those who want to protect their Z1800 fixture investment while moving up to the capabilities of the Medalist i5000, the advantages on the test floor can be significant. The Agilent Medalist i5000 provides a current technology platform that will be supportable for many years. It also provides superior analog in-circuit, digital, boundary scan, and mixed-signal testing on an easy to use, un-multiplexed architecture platform. For many environments, the Z1800 to Medalist i5000 conversion solution might be the perfect way to ease the transition to state-of-the-art test capabilities.

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