ON-BOARD TESTING

In recent years, the controlled impedance test market has seen increasing demand for on-board testing of pcb product. This results in a need for test equipment that has the bandwidth to measure shorter traces, and probe accessories that can handle the increased bandwidth.

The current state of the art for on-board test is a 20 Ghz or better TDR, with a probe that will measure differential traces as short as 20mm with good resolution. Typically the probe is impedance matched from the TDR head to the probe tip, to avoid mismatches that can cause ringing. Ringing due to impedance mismatch can disrupt the measurement data throughout the entire trace to be measured, especially when the trace is as short as 20mm. These probes will also use low loss coaxial cables that deliver minimal degradation of the TDR pulse to the probe tip.

The probes used currently in the industry for on-board high bandwidth testing are variable pitch probes that use coaxial cables inside the probe itself, that act as both delivery mechanism for the signal, and also as the mechanical connection to the probe tip. The variable pitch probe is good for testing a variety of pcb test point pitch configurations.

LIMITATIONS OF CURRENT TECHNIQUES

Traditionally, high bandwidth TDR's have been laboratory-type equipment intended for engineers and pcb designers, as opposed to production personnel. The design of probes for this equipment in the controlled impedance test market has had a similar laboratory-type approach. These probes have a high cost, and have to be repaired or replaced periodically. They are also slow to position for each test, and awkward to use. These, and other issues surrounding this type of equipment, make it's application to the production environment difficult.

ST800 20Gzh PRODUCTION TDR

The ST808 high-bandwidth TDR is designed to address the production requirement in both TDR and probing systems for on-board test measurements of controlled impedance pcb's. It is similar in design and use to other ST TDR systems, that are designed from the ground up to be used in production environments, but is adapted to the high-bandwidth requirements for on-board testing.

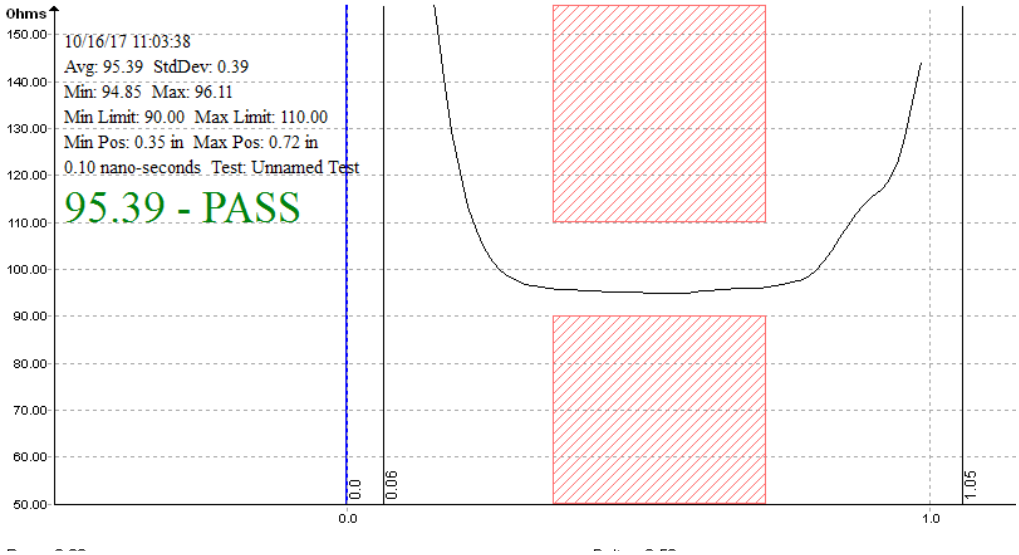
The ST 808 TDR probing system has a similar look and feel to previous ST systems, and uses a series of fixed pitch probes that are easy to position, and provide the required resolution for trace measurements down to 20mm in length. Probes are available with a series of pitches from 0.3 - 2.54mm. Cables and probes in the ST808 system are designed to deliver a high-quality signal, with low losses, all the way to the probe tip.

ST808 ADVANTAGES

PROBE TECHNOLOGY

Traditional industry on-board probe designs have difficulty measuring traces below 30mm, as the insertion of the signal typically has a mismatch in impedance as the signal goes from the probe tips to the pc board to be measured. Pin geometries at the probe tip can also creat 'ringing' - where the signal reflects back and forth multiple times along the length of the pin. An impedance mismatch will create a large dip in the beginnning of the data, and ringing will cause an oscillation in the first part of the measurement. Both of these effects have gross distortion effects on the true value of the pcb trace impedance, and make short trace measurements difficult, or impossible, depending on the geometries involved.

The probes in the ST808 have been designed to remove both the mismatch, and the ringing involved with these geometry problems. The plot below shows a typical 20mm trace measurement with an ST808 and the new probes. Note that the beginning of the measurement has a 'clean' insertion, and the true impedance of the trace under test is immediately available for measurement.



ESD RESISTANCE

The ST808 is designed to assist in removing the static charge from each production part before taking a measurement. Each of the six channels of the ST808 has a dedicated microwave switch that is normally closed to ground potential. As the probe comes into contact with the pcb, any charge on the trace is funneled to ground. When the operator initiates a measurement, through a mouse click, foot pedal, or keystroke, the switch will

open a path to the TDR channel, take a measurement, and then switch the path back to ground. This allows parts (especially panels) to be cleared of a high voltage, and prevent damage to TDR channels.

SETUP

The ST808 has no knobs, dials, switches, displays, or other distracting, and potentially test altering features on the frame. The only features on the front panel are the six SMA connectors. This prevents production workers from changing the operation of the unit, either inadvertenly or otherwise. All production test setups are software controlled, with acces level password protection. Only those authorized to change specific test settings will be able to do so.

The ST808 also has very little required setup to begin taking measurements. There is no 30 minute warm up requirement. There is also no calibration requirement. Simply open the software, take a verification measurement or two from the supplied NIST traceable reference standards, and begin production testing. Annual calibration by a Zmetrix authorized service center is all that is normally required.

COST OF OPERATION

The ST808 is designed to have a very low annual cost of operation. Most customers no longer have ESD related repair costs, due to the excellent protection provided by the microwave switches, and any switch replacement issues are handled as part of the annual callibration, without additional cost to the user. The only on-going costs of operation to the user are the replacements of cables and probes, due to normal wear.

2 TDR'S IN ONE

The ST808 has 2 separate TDR's inside the chassis. The first is a 4 channel 7 Ghz. TDR that is used for traditional coupon testing, and on-board testing of traces as short as 50mm. The second TDR is a 20 Ghz high bandwidth unit for on-board testing of traces as short as 20mm, and insertion loss testing using the latest standards. Both TDR's are true differential (simultaneous positive and negative pulse) TDR's, capable of the most demanding TDR measurements. The combination of TDR's in the ST808 also makes it possible to do all production TDR functions in a single rugged design.

ST808 FEATURES:

- 20 Ghz Bandwidth
- True Differential Measurement
- ESD Resistant
- Designed For Production Environments
- Measures On-Board Trace Lengths Down to 20mm
- Insertion Loss Capable

PROBE FEATURES:

- Pin Configurations from .3 - 2.54mm
- Custom pins remove signal ‘ringing’
- Impedance-matched signal insertion
- Simple And Fast To Use
- Measures Coupons, and On-Board
- Made with RF Low Loss Materials