

A HERO ELECTRONIX VENTURE

System Level Test (SLT) HW and SW Solutions

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Why SLT is needed ?

- System Level Test (SLT) enables IC manufacturers to emulate the final user environment in order to test software and validate connections between IP blocks. It is a more effective and less expensive way to test I/O protocol stacks, IP block to block interfaces and different clock, power, thermal and hardware/software domain interactions.
- Three markets in particular have demand for SLT Smartphones, Automotive, and high-performance computing. They do so for different reasons and drive different test conditions.
- **Cell-phone chips** usually will be tested at room temperature. The goal of this insertion for these high-volume chips is to ensure the highest quality to minimize equipment returns.
- Automotive chips are more demanding and make use of automatic temperature control. They need to be tested from -40°C to 150°C to ensure chips can survive these environmental extremes in a safety-critical system.
- Makers of chips for high-intensity computing, on the other hand, are mostly concerned with ensuring their chips don't overheat during test. So rather than the test site enforcing a specific temperature, the goal is to provide enough cooling to keep the temperature below 125°C. Cold testing isn't generally needed because the chips will quickly self-heat once started up.

What is System-Level Test?

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Embedded Software Development for SLT

To develop platform automation solution that enables System Level Test content execution on both on AI and Server Compute segments on either a standalone/bench or handler configuration and to generate test and characterization data (per unit) to monitor the health of custom Si products.

Automation Solution =Test program + (handler + thermal + various test electronics control) + data generation/upload





SLT Software Environment





- The engineering test capability saving both cost and time, A user-friendly graphical interface (Windows) system provides a quick and easy device setup changeover, simplifying the process and increasing its efficiency.
- System Level Test Applications (SLT)
- Software configurable binning
- Allows for maximizing the test socket lifetime
- Protection against IC double stacking and incorrect device placement orientation
- Continuous automated re-test capabilities

SLT – Automation application

The SLT application will run in the handler PC. Handler PC controls handler robot movement, thermal control Communicates to Host PCs via Ethernet/TCPIP protocol

• writing a test

- SLT Application is using YML file format to write test cases
- The test files are divided into different formats as mentioned
 - > Test sequencer files contains list of all test cases
 - > Test execution procedure procedure to run the test

case	#Prerequisites of the node
Name: '@SLTName' Timeout: 00:35:00 TestSequence: #list of contents that will - Name: PlatformPowerOffSocPowerOff Enable: True - Name: SoCPowerOffStagetoFuseBreakStage Enable: True - Name: FuseBreakStagetoSoCPowerOffStage Enable: True	Thermal: SetTemperature: 30 Sensor: TSD Enable: True #Main content of the node Main: Type: Method Function: PlatformPowerOffSocPowerOff Timeout: 00:03:00 Parameters:
Test Sequencer in YML	Test Procedure in YML

- Execution of test
 - Load the test sequencer YML file in to SLT application, this will be displayed test the test cases as per the test sequence and the procedure mentioned in the YML files
 - Generates the testcases in tree view. The loading process also loads the procedure of executing each test node from the test procedure file.
 - Start executing the SLT test
 - The handler uses pick and place technology to pick DUT from trays and move them to the test site
 - The application will run all log and reports in txt and STDF formats
 - then move them to the appropriate bin after test

debugging any failures

• The failures will be identified from the STDF reports and the detailed debugging can be done using the test log information. The test log information contains all the test execution procedure and report with time stamp and module level test data information.

SLT Hardware Environment





- Host PCs(Site 1 to 4 Test PCs) are identical builds, this is where SLT test program runs.
- Handler PC controls handler robot movement, thermal control Communicates to Host PCs via Ethernet/TCPIP protocol
- SLT handler for high volume/multi-site IC testing at system level. It is capable of handling packages of various types including QFP, TQFP, BGA, PGA, etc. The handler uses pick and place technology to pick up devices from JEDEC trays, move them to the test site, then move them to the appropriate bin after test. It features a 90-degree device rotation which is required for various pin one orientations.
- SLT handler can test up to 4 devices in parallel at high temperature with ATC (Auto Temperature Cooling) ranging from 50°C to 125°C.

SLT - Productize for volume [1/2]

SLT handler for high volume/multi-site IC testing at system level. SLT handler can test up to 4 devices in parallel at

high temperature with ATC. It is capable of handling packages of various types including QFP, TQFP, BGA, PGA,

etc. The handler uses pick and place technology to pick up devices from trays. move them to the test site, then move them to the appropriate bin after test.

Why is Productize Volume Needed / or Must?

- Make analyze the system's performance against increased data / how it behave based on large data
- Identify the issues that will occur with huge data and the threshold point
- Beyond the sustainable or threshold point, the system behavior, process or complete application crashes irresponsive of timing out

SLT - Productize for volume [2/2]

SLT Volume testing is stretched to a threshold point by adding large amount of data into test cases. This kind of

testing is generally done before launching / release the complete product. For example, our products Test sequence

we follow for 1 loop test it may all pass/fail based on H/W dependencies & environmental condition.

The same may behave different result if we make loop count for n number of times and add more test cases into the scenario.

A few limitation & challenge for Volume Productize is

- it is difficult to create the exact fragmentation of memory
- Creating an ideal real environment, i.e. replica of failed scenario in one system/server is tricky
- o The failure scenario depend on Automation tools used, networks bandwidth etc., also test result will be





Q & A

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Thank You

