Assembly Relocation to STATS ChipPAC Jiangyin and

Test Transfer to STATS ChipPAC Singapore of Select QFP Products

Automotive Qualification Plan Summary for LQFP_EP and MQFP at STATS ChipPAC China Jiangyin

TEST	SPECIFICATION	SAMPLE SIZE	EXPECTED COMPLETION DATE
Temperature Cycle (TC)*	JEDEC *JESD22-A104*	3 x 32	October 2016
Solder Heat Resistance (SHR)*	JEDEC/IPC *J-STD-020*	3 x 11	October 2016
Temperature Humidity and Bias Test (THB)*	JEDEC *JESD22-A101*	3 x 32	October 2016
Unbiased Highly Accelerated Stress Test (uHAST)*	JEDEC *JESD22-A118*	3 x 32	October 2016
High Temperature Storage (HTS)	JEDEC *JESD22-A103*	1 x 32	October 2016
Electrostatic Discharge *Field Induced Charge Device Model*	JEDEC *JESD22-C101*	3/voltage	October 2016

* These samples will be subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: 1. Bake – 24 hours at 125ºC; 2. Soak – unbiased soak for 192 hours at 30ºC, 60%RH; 3. Reflow – three passes through a reflow oven with a peak temperature of 260ºC. TC samples will be subjected to wire-pull test after 500 cycles where results should be within specification limits.

Automotive Qualification Results Summary for LQFP at STATS ChipPAC China Jiangyin

TEST	SPECIFICATION	SAMPLE SIZE	RESULTS
Temperature Cycle (TC)*	JEDEC *JESD22-A104*	3 x 77	PASS
Solder Heat Resistance (SHR)*	JEDEC/IPC *J-STD-020*	3 x 11	PASS
Highly Accelerated Stress Test (HAST)*	JEDEC *JESD22-A110*	3 x 77	PASS
Unbiased Highly Accelerated Stress Test (uHAST)*	JEDEC *JESD22-A118*	3 x 77	PASS
High Temperature Storage (HTS)	JEDEC *JESD22-A103*	1 x 77	PASS
Electrostatic Discharge *Field Induced Charge Device Model – All Pins*	JEDEC *JESD22-C101*	3/voltage	PASS ±500V
Electrostatic Discharge *Field Induced Charge Device Model – Corner Pins*	JEDEC *JESD22-C101*	3/voltage	PASS ±750V

* These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: 1. Bake – 24 hours at 125ºC; 2. Soak – unbiased soak for 192 hours at 30ºC, 60%RH; 3. Reflow – three passes through a reflow oven with a peak temperature of 260ºC. TC samples were subjected to wire-pull test after 500 cycles where results passed within specification limits.

Assembly Relocation to STATS ChipPAC Jiangyin and

Test Transfer to STATS ChipPAC Singapore OF Select QFP Products

Qualification Results Summary for TQFP and TQFP_EP at STATS ChipPAC China Jiangyin

TEST	SPECIFICATION	SAMPLE SIZE	RESULTS
Temperature Cycle (TC)*	JEDEC *JESD22-A104*	3 x 32	PASS
Solder Heat Resistance (SHR)*	JEDEC/IPC *J-STD-020*	3 x 11	PASS
Unbiased Highly Accelerated Stress Test (uHAST)*	JEDEC *JESD22-A118*	3 x 32	PASS
Electrostatic Discharge *Field Induced Charge Device Model*	JEDEC *JESD22-C101*	3/voltage	PASS ± 1250V

* Preconditioned per JEDEC/IPC J-STD0020

Test Correlation Plan

1. SCC Correlation Data Gathering
   - Loop 4 bin1 units x30
   - Run 100 bin1 units on handler
   - Serialize and test 10 bin1 units
   - Serialize and test 5 reject units
2. Ship correlation package from SCC to STA
3. STA Correlation Data Gathering
   - Loop 4 bin1 units x30
   - Run 100 bin1 units on handler
   - Test 10 already serialized bin1
   - Test 5 already serialized rejects
4. SCC send data to ADGT for Data Crunching and Analysis
5. CorL8 Analysis of x30 loop /100 units handler data
   - X30 loop must pass Mean Shift, Sigma Spread and CPK criteria
   - 100 Bin1 Correlation units must pass Mean Shift, Sigma Spread and CPK criteria
   - 10 serialized units must pass bin1 both in SCC and in STA
   - 5 serialized rejects must fail the same parameter for both SCC and STA
6. Correlation Data Approval
   - For TRB movement to Available with Condition
7. Validation lot run handled by STA

Note: CorL8 is ADI data analysis tool.

Correlation Test Criteria(TST00137)	
% Mean Shift Criteria	((SCC_mean - STA_Mean) / (Upper_Limit - Lower_Limit)) x 100 ≤ 5
Sigma Spread Criteria	(STA_Sigma / SCC_Sigma) ≤1.300000
Cpk Criteria	If CPK to the test limits is >10, then test given automatically PASS

Reject Correlation		
Unit	SCC	STA
1	TnumX: XXXXX	TnumX: XXXXX
...	TnumX: XXXXX	TnumX: XXXXX
5	TnumX: XXXXX	TnumX: XXXXX

Bin1 Correlation		
Unit	SCC	STA
1	Pass	Pass
...	Pass	Pass
10	Pass	Pass

Test Correlation Estimated Timeline

Devices	Dec, 2015 to June, 2016	Dec,2015 to August 2016	September, 2016
SCC Correlation Data Gathering& Shipment			
SCS Correlation Data Gathering			
Data Review and Approved by ADGT			
Validation Run/TRB Closure			

PLANNED

ACTUAL/ADJUSTED