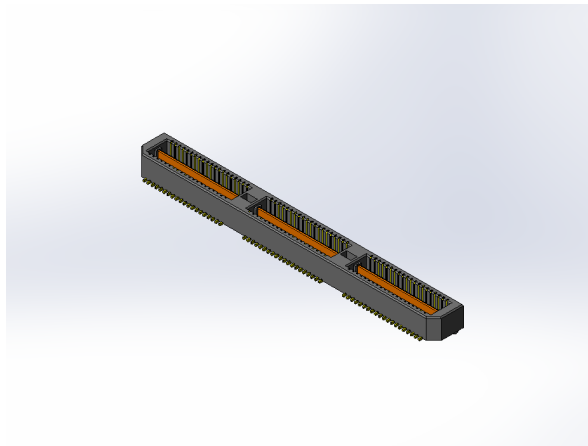
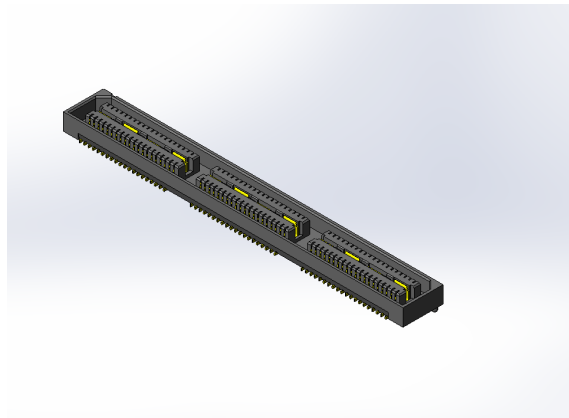




Project Number: Design Qualification Test Report		Tracking Code: 231303_Report_Rev_2	
Requested by: Craig Ryan		Date: 7/2/2013	Product Rev: GP
Part #: QSE-060-01-F-D-A / QTE-060-01-F-D-A		Tech: Aaron McKim	Eng: Eric Mings
Part description: QSE/QTE			Qty to test: 8
Test Start: 1/10/2013	Test Completed: 2/18/2013		



## DESIGN QUALIFICATION TEST REPORT

**QSE/QTE**  
**QSE-060-01-F-D-A / QTE-060-01-F-D-A**

Tracking Code: 231303_Report_Rev_2	Part #: QSE-060-01-F-D-A / QTE-060-01-F-D-A
Part description: QSE/QTE	

### REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
04/25/2013	1	Initial Issue	PC
07/02/2013	2	Update the cover page	PC

## CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to ISO 10012-1 and ANSI/NCSL 2540-1, as applicable.

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## SCOPE

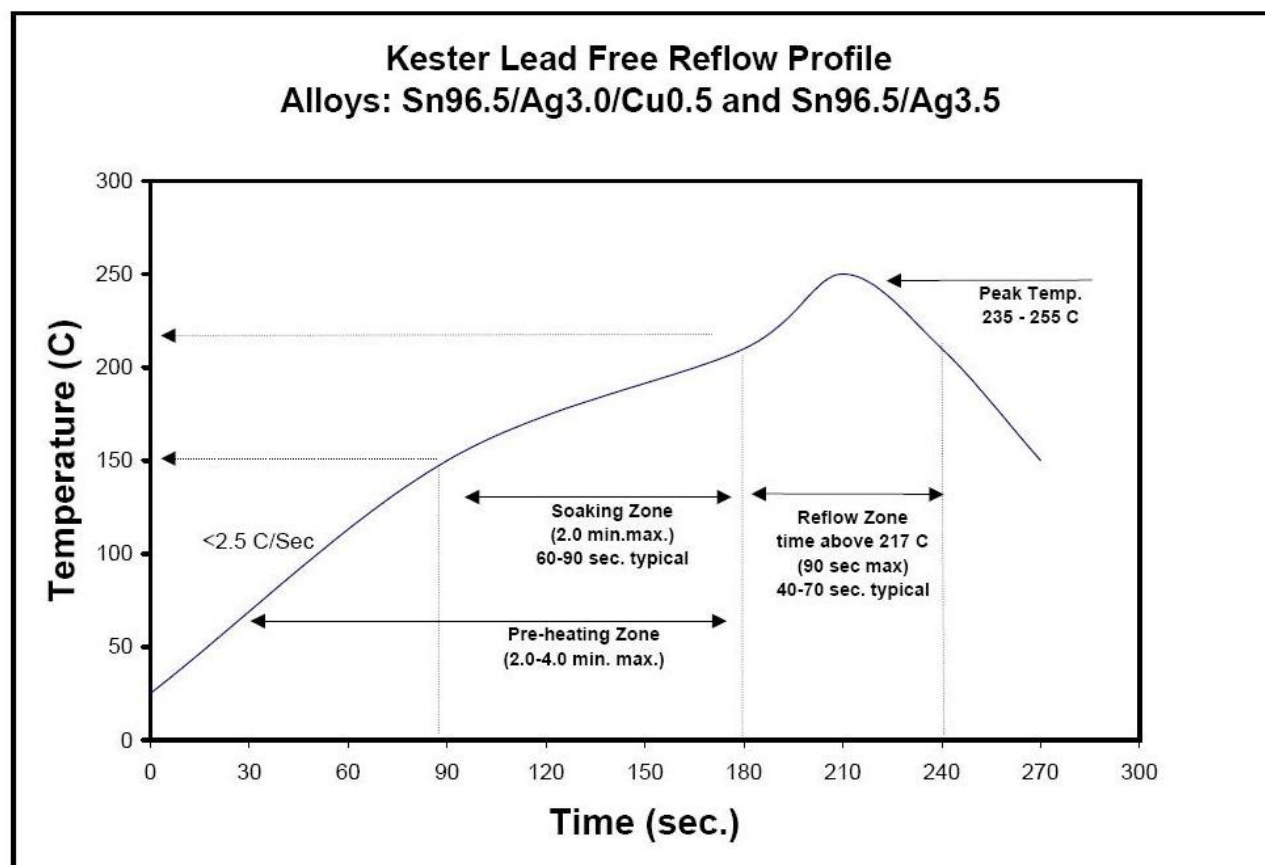
To perform the following tests: Design Qualification test. Please see test plan.

## APPLICABLE DOCUMENTS

Standards: EIA Publication 364

## TEST SAMPLES AND PREPARATION

- 1) All materials were manufactured in accordance with the applicable product specification.
- 2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
- 3) The automated procedure is used with aqueous compatible soldering materials.
- 4) Parts not intended for testing LLCR are visually inspected.
- 5) Any additional preparation will be noted in the individual test sequences.
- 6) Solder Information: Lead Free
- 7) Re-Flow Time/Temp: See accompanying profile.
- 8) Samtec Test PCBs used: PCB-102592-TST-XX

**TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)**

**FLOWCHARTS****Durability/LLCR**

TEST STEP	GROUP A1 3u" Gold (-F) 8 Mated Sets
01	LLCR-1
02	10 Cycles
03	LLCR-2
04	Thermal Shock (Mated and Undisturbed)
05	LLCR-3
06	Cyclic Humidity (Mated and Undisturbed)
07	LLCR-4

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

Humidity = EIA-364-31, Test Condition B (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### THERMAL SHOCK:

- 1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors*.
- 2) Test Condition 1: -55°C to +85°C
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Number of Cycles: 100
- 5) All test samples are pre-conditioned at ambient.
- 6) All test samples are exposed to environmental stressing in the mated condition.

### HUMIDITY:

- 1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors*.
- 2) Test Condition B, 240 Hours.
- 3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
- 4) All samples are pre-conditioned at ambient.
- 5) All test samples are exposed to environmental stressing in the mated condition.

### LLCR:

- 1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 3) The following guidelines are used to categorize the changes in LLCR as a result from stressing
  - a. <= +5.0 mOhms:----- Stable
  - b. +5.1 to +10.0 mOhms:----- Minor
  - c. +10.1 to +15.0 mOhms:----- Acceptable
  - d. +15.1 to +50.0 mOhms:----- Marginal
  - e. +50.1 to +2000 mOhms:----- Unstable
  - f. >+2000 mOhms:----- Open Failure

**RESULTS****LLCR Durability:****Signal pin:**

Initial-----24.41 mOhms Max

- **Durability, 10 Cycles**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure
- **Thermal Shock**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure
- **Humidity**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure

**Ground pin:**

Initial-----1.60 mOhms Max

- **Durability, 10 Cycles**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure
- **Thermal Shock**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure
- **Humidity**
  - <= +5.0 mOhms ----- 192 Points ----- Stable
  - +5.1 to +10.0 mOhms ----- 0 Points ----- Minor
  - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
  - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
  - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
  - >+2000 mOhms ----- 0 Points ----- Open Failure

**DATA SUMMARIES****LLCR Durability:**

- 1) A total of 192 points were measured.
- 2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
  - a.  $\leq +5.0$  mOhms:----- Stable
  - b.  $+5.1$  to  $+10.0$  mOhms:----- Minor
  - c.  $+10.1$  to  $+15.0$  mOhms:----- Acceptable
  - d.  $+15.1$  to  $+50.0$  mOhms:----- Marginal
  - e.  $+50.1$  to  $+2000$  mOhms ----- Unstable
  - f.  $>+2000$  mOhms:----- Open Failure

<b>LLCR Measurement Summaries by Pin Type</b>				
Date	1/10/2013	1/18/2013	2/4/2013	2/18/2013
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	31	32	34	33
Technician	Aaron McKim	Aaron McKim	Aaron McKim	Aaron McKim
mOhm values	<b>Actual Initial</b>	<b>Delta 10 Cycles</b>	<b>Delta Therm Shck</b>	<b>Delta Humidity</b>
<b>Pin Type 1: Signal</b>				
Average	22.24	0.73	0.60	0.63
St. Dev.	0.81	0.54	0.45	0.51
Min	19.92	0.00	0.00	0.00
Max	24.41	2.42	1.97	2.79
Summary Count	168	168	168	168
Total Count	168	168	168	168
<b>Pin Type 2: Ground</b>				
Average	1.50	0.05	0.07	0.09
St. Dev.	0.07	0.04	0.05	0.06
Min	1.37	0.00	0.00	0.00
Max	1.60	0.15	0.20	0.23
Summary Count	24	24	24	24
Total Count	24	24	24	24

<b>LLCR Delta Count by Category</b>						
	<b>Stable</b>	<b>Minor</b>	<b>Acceptable</b>	<b>Marginal</b>	<b>Unstable</b>	<b>Open</b>
mOhms	$\leq 5$	$>5 \text{ \& } \leq 10$	$>10 \text{ \& } \leq 15$	$>15 \text{ \& } \leq 50$	$>50 \text{ \& } \leq 1000$	$>1000$
<b>10 Cycles</b>	192	0	0	0	0	0
<b>Therm Shck</b>	192	0	0	0	0	0
<b>Humidity</b>	192	0	0	0	0	0



**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** MO-04**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0798688**Accuracy:** See Manual

... Last Cal: 04/30/2013, Next Cal: 04/30/2014

**Equipment #:** THC-02**Description:** Temperature/Humidity Chamber**Manufacturer:** Thermotron**Model:** SE-1000-6-6**Serial #:** 31808**Accuracy:** See Manual

... Last Cal: 02/16/2013, Next Cal: 02/16/2014

**Equipment #:** TSC-01**Description:** Vertical Thermal Shock Chamber**Manufacturer:** Cincinnatti Sub Zero**Model:** VTS-3-6-6-SC/AC**Serial #:** 10-VT14993**Accuracy:** See Manual

... Last Cal: 05/18/2013, Next Cal: 05/18/2014