



Project Number:		Tracking Code: TC0834-qms/qfs-1913			
Requested by: Kevin Bratcher		Date: 8/19/2008		Product Rev: see print	
Part #: QMS-026-01-S-D-RA-PC4/QFS-026-01-S-D-RA-PC4		Lot #: 1	Tech: Rodney Riley & Tony Wagoner		Eng: Troy Cook
Part description: QMS/QFS					Qty to test: 48
Test Start: 8/19/2008		Test Completed: 10/22/2008			

CCC, MATING UNMATING REPORT

PART DESCRIPTION

QMS-026-01-S-D-RA-PC4/QFS-026-01-S-D-RA-PC4

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

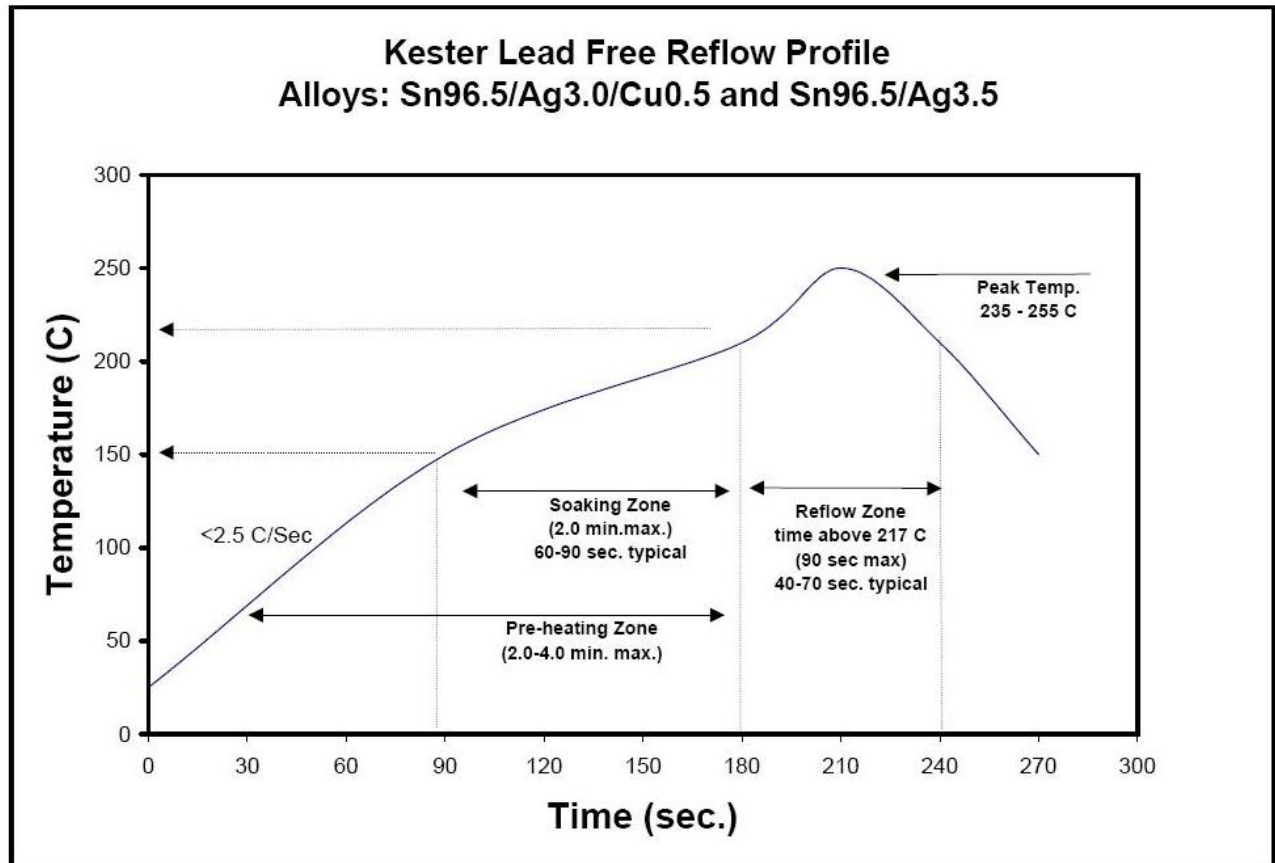
To perform the following tests: CCC, MATING UNMATING

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) After soldering, the parts to be used for LLCR and DWV/IR testing were cleaned according to TLWI-0001.
- 4) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
- 5) The automated procedure is used with aqueous compatible soldering materials.
- 6) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
- 7) Any additional preparation will be noted in the individual test sequences.
- 8) Solder Information: Lead Free
- 9) Re-Flow Time/Temp: See accompanying profile.
- 10) Samtec Test PCBs used: PCB-101369-TST-XX

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)

FLOWCHARTS**Mating/Unmating/Gaps/Normal Force/Deflection Force**

TEST STEP	GROUP A 10 Boards
01	Contact Gaps
02	Mating / Unmating
03	Data Review
04	100 Cycles
05	Mating / Unmating
06	Contact Gaps
07	Data Review
08	Thermal Aging (Mated)
09	Mating / Unmating
10	Contact Gaps
11	Data Review
12	Humidity (Mated)
13	Contact Gaps
14	Mating / Unmating

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg C;
Time Condition 'B' (250 hours)

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

Mating/Un-Mating Forces = EIA-364-13

Contact Gaps/Height - No standard method. Usually measured optically

Current Carrying Capacity

3 Mated Assemblies Each

TEST STEP	GROUP A 3 Mated Assemblies 2 CONTACT POWERED	GROUP B 3 Mated Assemblies 4 CONTACTS POWERED
01	CCC	CCC

(TIN PLATING) - Tabulate calculated current at RT, 65° C, 75° C and 95° C
after derating 20% and based on 105° C

(GOLD PLATING) - Tabulate calculated current at RT, 85° C, 95° C and 115° C
after derating 20% and based on 125° C

CCC, Temp rise = EIA-364-70

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL:

- 1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors*.
- 2) Test Condition 4 at 105° C.
- 3) Test Time Condition B for 250 hours.
- 4) All test samples are pre-conditioned at ambient.
- 5) 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.

CONTACT GAPS:

- 1) Gaps above the surrounding plastic surface were measured before and after stressing the contacts (e.g. thermal aging, mechanical cycling, etc.).
- 2) Typically, all contacts on the connector are measured.

MATING/UNMATING:

- 1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
- 2) The full insertion position was to within 0.003" to 0.004" of the plug bottoming out in the receptacle to prevent damage to the system under test.
- 3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

TEMPERATURE RISE (Current Carrying Capacity, CCC):

- 1) EIA-364-70, *Temperature Rise versus Current Test Procedure for Electrical Connectors and Sockets*.
- 2) When current passes through a contact, the temperature of the contact increases as a result of I^2R (resistive) heating.
- 3) The number of contacts being investigated plays a significant part in power dissipation and therefore temperature rise.
- 4) The size of the temperature probe can affect the measured temperature.
- 5) Copper traces on PC boards will contribute to temperature rise:
 - a. Self heating (resistive)
 - b. Reduction in heat sink capacity affecting the heated contacts
- 6) A de-rating curve, usually 20%, is calculated.
- 7) Calculated de-rated currents at three temperature points are reported:
 - a. Ambient
 - b. 80° C
 - c. 95° C
 - d. 115° C
- 8) Typically, neighboring contacts (in close proximity to maximize heat build up) are energized.
- 9) The thermocouple (or temperature measuring probe) will be positioned at a location to sense the maximum temperature in the vicinity of the heat generation area.
- 10) A computer program, *TR 803.exe*, ensures accurate stability for data acquisition.
- 11) Hook-up wire cross section is larger than the cross section of any connector leads/PC board traces, jumpers, etc.
- 12) Hook-up wire length is longer than the minimum specified in the referencing standard.

RESULTS

Temperature Rise, CCC at a 20% de-rating

- CCC for a 30°C Temperature Rise -----4.1A per contact with 2 adjacent contacts powered
- CCC for a 30°C Temperature Rise -----3.1A per contact with 4 adjacent contacts powered

Contact Gaps

- **Initial**
 - Min ----- .013"
 - Max ----- .015"
- **After 100 Cycles**
 - Min ----- .014"
 - Max ----- .016"
- **Thermal**
 - Min ----- .014"
 - Max ----- .016"
- **Humidity**
 - Min ----- .014"
 - Max ----- .016"

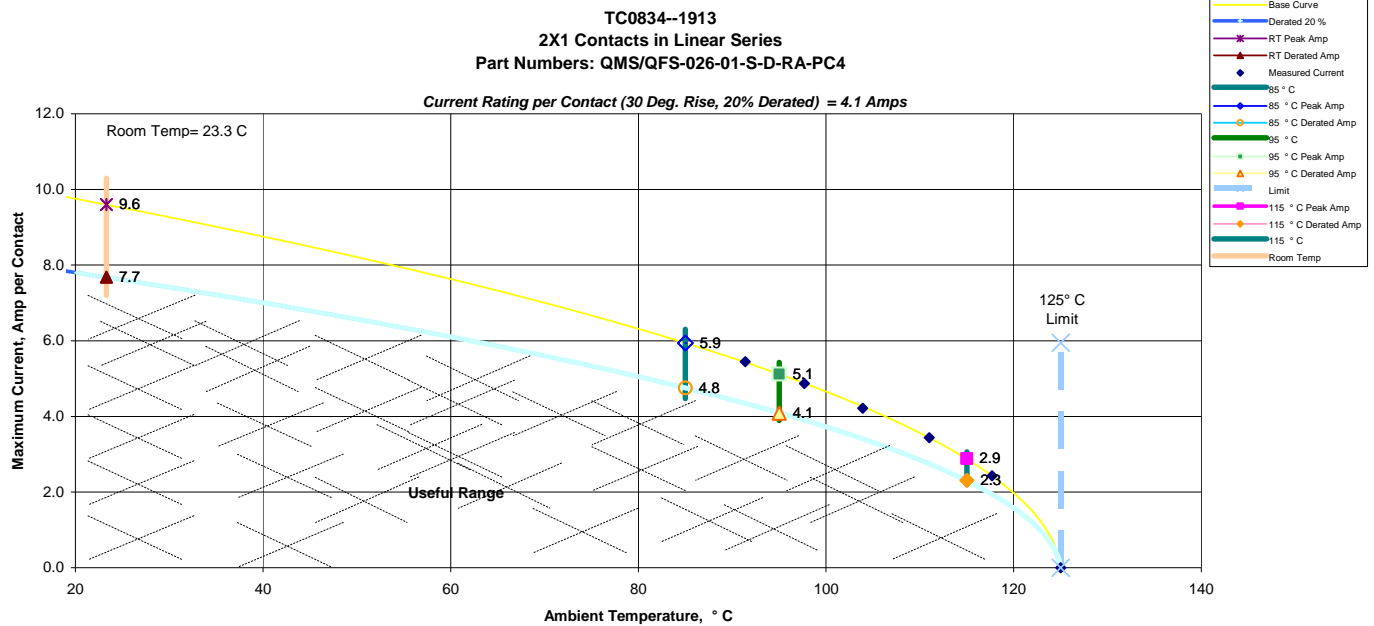
Mating – Unmating Forces

- **Initial**
 - **Mating**
 - Min ----- 4.4 lbs
 - Max ----- 5.3 lbs
 - **Unmating**
 - Min ----- 3.2 lbs
 - Max ----- 4.2 lbs
- **After 100 Cycles**
 - **Mating**
 - Min ----- 4.6 lbs
 - Max ----- 5.6 lbs
 - **Unmating**
 - Min ----- 3.5 lbs
 - Max ----- 4.5 lbs
- **Thermal**
 - **Mating**
 - Min ----- 2.9 lbs
 - Max ----- 4.5 lbs
 - **Unmating**
 - Min ----- 2.3 lbs
 - Max ----- 3.2 lbs
- **Humidity**
 - **Mating**
 - Min ----- 3.6 lbs
 - Max ----- 5.7 lbs
 - **Unmating**
 - Min ----- 2.7 lbs
 - Max ----- 3.9 lbs

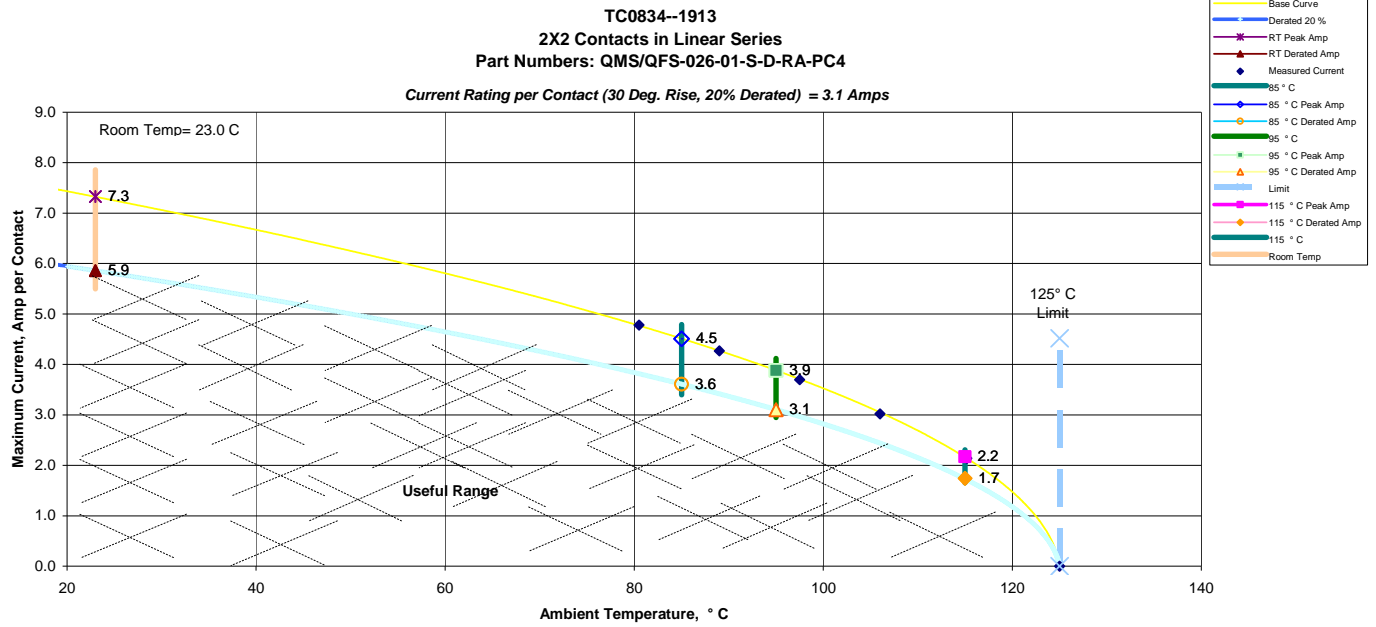
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

- 1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
- 2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
- 3) Temperature readings recorded are those for which three successive readings, 15 minutes apart, differ less than 1° C (computer controlled data acquisition).
- 4) Adjacent contacts were powered:
 - a. Linear configuration with 2 adjacent conductors/contacts powered



b. Linear configuration with 4 adjacent conductors/contacts powered



DATA SUMMARIES Continued**CONTACT GAPS:**

Initial		After 100 Cycles		After Thermal		After Humidity	
Measured in inches		Measured in inches		Measured in inches		Measured in inches	
<i>Minimum</i>	0.0129	<i>Minimum</i>	0.0139	<i>Minimum</i>	0.0142	<i>Minimum</i>	0.0143
<i>Maximum</i>	0.0154	<i>Maximum</i>	0.0158	<i>Maximum</i>	0.0160	<i>Maximum</i>	0.0158
<i>Average</i>	0.0147	<i>Average</i>	0.0149	<i>Average</i>	0.0153	<i>Average</i>	0.0151
<i>St. Dev.</i>	0.0004	<i>St. Dev.</i>	0.0004	<i>St. Dev.</i>	0.0003	<i>St. Dev.</i>	0.0004
<i>Count</i>	80	<i>Count</i>	80	<i>Count</i>	80	<i>Count</i>	80

MATING/UNMATING:

	Initial				After 100 Cycles			
	Mating		Unmating		Mating		Unmating	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	69.8	4.4	50.7	3.2	73.6	4.6	56.5	3.5
Maximum	84.8	5.3	67.2	4.2	89.4	5.6	71.2	4.5
Average	77.2	4.8	58.6	3.7	81.1	5.1	62.8	3.9
	After Thermal				After Humidity			
	Mating		Unmating		Mating		Unmating	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	45.8	2.9	37.1	2.3	57.9	3.6	43.0	2.7
Maximum	71.4	4.5	51.8	3.2	90.6	5.7	61.9	3.9
Average	59.4	3.7	43.5	2.7	76.7	4.8	52.0	3.2

DATA

CONTACT GAPS:

Initial										
Measured in inches										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	0.014725	0.014922	0.014647	0.014961	0.014783	0.014627	0.01493	0.014705	0.014785	0.014693
2	0.014922	0.014784	0.015021	0.014537	0.015158	0.014981	0.01504	0.015099	0.012855	0.01493
3	0.014981	0.014846	0.014707	0.014813	0.015	0.01508	0.015001	0.015079	0.01317	0.014915
4	0.013721	0.01455	0.014509	0.014604	0.014649	0.014423	0.014398	0.014764	0.014647	0.014287
5	0.014811	0.014418	0.014953	0.014461	0.015041	0.014529	0.014455	0.014524	0.014355	0.014724
6	0.015142	0.014886	0.01528	0.015105	0.014929	0.015032	0.014965	0.015083	0.014866	0.014846
7	0.014905	0.014541	0.015181	0.015358	0.015021	0.015045	0.015123	0.015113	0.014571	0.014965
8	0.01459	0.014433	0.01465	0.014426	0.014993	0.014792	0.014551	0.014975	0.014119	0.01459
After 100 Cycles										
Measured in inches										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	0.014961	0.014824	0.015532	0.014784	0.015375	0.014784	0.015316	0.015119	0.014367	0.014922
2	0.015217	0.015276	0.015217	0.014705	0.014981	0.014866	0.01508	0.014863	0.013859	0.014607
3	0.014489	0.014902	0.015335	0.014863	0.015276	0.014486	0.014765	0.015473	0.01502	0.014607
4	0.014627	0.014824	0.015493	0.015158	0.015237	0.014503	0.014843	0.015434	0.014587	0.014725
5	0.015158	0.015335	0.015729	0.015493	0.015749	0.014625	0.015158	0.015591	0.015099	0.014961
6	0.015099	0.014922	0.015768	0.015729	0.015631	0.01441	0.014863	0.015394	0.014627	0.014725
7	0.01506	0.014723	0.0151	0.014703	0.014906	0.014704	0.014466	0.014858	0.014532	0.014586
8	0.014843	0.014804	0.01506	0.014705	0.014489	0.014248	0.014508	0.01502	0.014804	0.01441
After Thermal										
Measured in inches										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	0.01504	0.01528	0.01535	0.01575	0.01575	0.01528	0.01567	0.01567	0.01457	0.0152
2	0.01457	0.01535	0.01567	0.01543	0.01551	0.01496	0.0152	0.01559	0.01535	0.01535
3	0.01528	0.01535	0.01598	0.0152	0.01551	0.01504	0.01441	0.01591	0.01425	0.01535
4	0.01528	0.01535	0.01567	0.01528	0.01567	0.01528	0.01512	0.01559	0.01417	0.01488
5	0.01512	0.01543	0.01567	0.01591	0.01551	0.01496	0.0152	0.01551	0.01535	0.0152
6	0.01472	0.01567	0.01551	0.01543	0.01512	0.01528	0.01504	0.01543	0.01504	0.01551
7	0.0148	0.01496	0.0152	0.01559	0.01504	0.01528	0.01543	0.01528	0.01528	0.01512
8	0.0152	0.0152	0.01559	0.01488	0.01551	0.01512	0.01512	0.01535	0.01528	0.01528
After Humidity										
Measured in inches										
Pos.#	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	0.0152	0.0152	0.0146	0.0149	0.0156	0.0154	0.0149	0.0151	0.0147	0.0146
2	0.0147	0.0151	0.0146	0.0147	0.0156	0.015	0.0148	0.0153	0.015	0.015
3	0.0155	0.015	0.0156	0.0153	0.0151	0.015	0.0151	0.0157	0.0146	0.0156
4	0.015	0.0155	0.0152	0.015	0.0153	0.0155	0.0153	0.0155	0.0146	0.0157
5	0.0154	0.0151	0.0143	0.0147	0.0154	0.015	0.0144	0.0149	0.015	0.0157
6	0.0158	0.0148	0.0143	0.0151	0.0154	0.015	0.0154	0.0151	0.0154	0.0147
7	0.0151	0.015	0.0155	0.0154	0.0147	0.015	0.015	0.0153	0.015	0.0154
8	0.0148	0.0154	0.0155	0.0154	0.0152	0.015	0.0154	0.0156	0.0151	0.0156

DATA Continued**MATING/UNMATING:**

Sample#	Initial		After 100 Cycles		After Thermal		After Humidity	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	4.56	3.53	4.67	3.63	3.54	2.55	5.30	3.87
2	4.59	3.62	4.72	3.72	3.93	2.72	5.66	3.65
3	4.94	3.22	5.14	3.93	4.27	2.73	4.59	2.92
4	5.01	3.61	5.46	4.05	2.86	2.32	5.65	3.58
5	5.15	3.17	5.59	4.19	3.15	2.51	4.40	3.43
6	5.30	4.15	5.27	4.45	3.90	3.24	3.62	2.85
7	4.36	3.79	4.60	3.53	4.46	2.85	4.38	2.88
8	4.59	3.73	5.21	3.80	3.29	2.57	3.84	2.69
9	5.25	4.20	5.35	4.22	4.26	3.12	5.37	3.37
10	4.49	3.63	4.68	3.74	3.49	2.56	5.15	3.24

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** OGP-01**Description:** 6"X 6" Video Measuring Machine**Manufacturer:** Optical Gauging Products**Model:** Smartscope 200 CFOV**Serial #:** SF2001956**Accuracy:** See Manual

... Last Cal: 03/13/07, Next Cal: 03/13/08

Equipment #: OGP-02**Description:** Automatic Video Measuring System, 18" (X) x 18" (Y) x 12" (Z)**Manufacturer:** Optical Gauging Products (OGP)**Model:** Smartscope Flash**Serial #:** SVL 5001462**Accuracy:** See Manual

... Last Cal: 03/13/2007, Next Cal: 03/13/2008

Equipment #: TCT-03**Description:** Dillon Quantrol TC2 Test Stand**Manufacturer:** Dillon Quantrol**Model:** TC2**Serial #:** 02-1033-03**Accuracy:** Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.

... Last Cal: 5/18/07, Next Cal: 5/18/08

Equipment #: TCT-04**Description:** Dillon Quantrol TC21 25-1000 mm/min series test stand**Manufacturer:** Dillon Quantrol**Model:** TC2 I series test stand**Serial #:** 04-1041-04**Accuracy:** Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;

... Last Cal: 05/18/2007, Next Cal: 05/18/2008

Equipment #: PS-07**Description:** 20 V, 120 A DC Power Supply - AutoRanging SO/HPIB**Manufacturer:** Hewlett Packard / Agilent**Model:** AT-6031A**Serial #:** 2721A00648**Accuracy:** See Manual Current Carrying Capacity (CCC) Chamber

... Last Cal: 10/25/2007, Next Cal: 10/25/2008

Equipment #: MO-04**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0798688**Accuracy:** See Manual - DO NOT USE UNTIL CALIBRATED.

... Last Cal: 03/10/08, Next Cal: 03/10/09

Equipment #: TC111307-(001 - 017)

Description: CCC Chamber Thermocouples

Manufacturer: Samtec

Model:

Serial #: TC111307-(001 - 017)

Accuracy: +/- 1 Deg. +/- 1 Deg.

... Last Cal: 11/30/2007, Next Cal: 11/30/2008

Equipment #: OV-03

Description: Cascade Tek Forced Air Oven

Manufacturer: Cascade Tek

Model: TFO-5

Serial #: 0500100

Accuracy: Temp. Stability: +/- .1C/C change in ambient

... Last Cal: 06/62/07, Next Cal: 06/22/08

Equipment #: THC-02

Description: Temperature/Humidity Chamber

Manufacturer: Thermotron

Model: SE-1000-6-6

Serial #: 31808

Accuracy: See Manual (SJR Unit #1)

... Last Cal: 9/21/2007, Next Cal: 9/21/2008

Equipment #: Null

Description:

Manufacturer:

Model:

Serial #:

Accuracy:

... Last Cal: , Next Cal: