

**AMP**

ENVIRONMENTAL TESTING LABORATORY

<b>Job Number</b> E97.09.04	<b>Project Number:</b> 640439	<b>Date of issue:</b> March 1998
<b>Description:</b>  <b>Micro-MaTch COSI</b>		<b>Part numbers:</b> 0-338095-6, rev. code A 338097, rev. code D 215079-6, rev. code L 161173-1, rev. code O

**Scope:**

To determine the electrical and mechanical performance of the Micro-Match COSI, when the connector is tested according to AMP Product Specification 108-19052.

**Conclusions:**

The measuring results of the tests of group 1 to 6 meet the requirements according to AMP Product Specification 108-19052.

**Test Specification:** AMP Product Specification 108-19052.

**Test Carried Out:** 1 see page 3 and 4  
2  
3

**Distribution:** 1 H. v. Delft  
2 Doc. center  
3 File Lab.

**Test Engineer:** J. Peetjens

**Requested by:** Product Engineering

**Laboratory Manager:** D.M.J. Jooren.

**Classification:** Unrestricted

**Disposal of Samples:** returned to requester

**Report Number:** 501-19005

**Appendices:**

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**SAMPLE DESCRIPTION:**

Group 1 to 3 and group 5 consist of five 6 pos. Micro-MaTch COSI connectors (P/N-housing: 0-338095-6, rev. code A, P/N-contact: 0-338097, rev. code D) crimped on a wire (P/N: 161173-1, rev. code O) and five 6 pos. female Micro-MaTch connectors (P/N: 215079, rev. code L) soldered on a test PCB.

Group 4 and 6 consist of five 6 pos. Micro-MaTch COSI connectors (P/N-housing: 0-338095-6, rev. code A, P/N-contact: 0-338097, rev. code D) crimped on a wire (P/N:161173-1, rev. code O).

**TESTPROCEDURES:**

IEC 512-2-2a:

**Termination resistance:**

The termination resistance was measured with an open circuit voltage of 20 mVolt and a maximum current of 100 mA DC.

IEC 512-2-3a:

**Insulation resistance:**

This measurement was done with a programmable electrometer. The measuring voltage was 100 Volt DC during one minute.

IEC 512-2-4a:

**Voltage proof:**

This measurement was done with a high voltage tester. The test duration was one minute at  $500V_{rms}$ .

IEC 512-5-9e:

**Current load cyclic:**

All test samples in series were charged with a current of 1,25A, which is 125% of the maximum current as specified in the detail specification and placed in an oven with a temperature of 70°C.

Current ON : 45 minutes.

Current OFF : 15 minutes.

Number of cycles : 500.

IEC 512-4-6d:

**Vibration:**

The fixture with the connector system was mounted on a vibration table. The frequency was traversed from 10-55-10 Hz with one octave per minute. The samples were vibrated with an amplitude of 0,75 mm. The duration was 10 cycles in each of the three mutually perpendicular directions. The samples were provided with a circuit to detect interruptions of continuity longer than 1 micro-second.

IEC 512-5-9a:

**Mechanical operation:**

The samples were mated and unmated for 20 times at a rate of 10 cycles per minute.

IEC 512-7-13b:

**Mating and unmating force:**

The samples were mounted on a push-pull tester.

During a mechanical operation, with a rate of 25 mm per minute, the mating and unmating forces were measured.

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IEC 68-2-2 Ba:

**Dry heat:**

The samples were subjected to a dry heat test under the following conditions:

Temperature : 105 °C.  
 Condition : unmated.  
 Duration : 16 hours.

IEC 512-6-11d:

**Rapid change of temperature:**

The samples were subjected to a rapid change of temperature test under the following conditions:

One cycle consists of:

Upper temperature : 105 °C for 15 minutes.  
 Lower temperature : -40 °C for 15 minutes.  
 Condition : mated.  
 Number of cycles : 25.

IEC 512-6-11m:

**Damp heat cyclic:**

The samples were subjected to a cyclic damp heat test under the following conditions:

Upper temperature : 55 °C.  
 Lower temperature : 25 °C.  
 Relative humidity : 95%.  
 Condition : mated.  
 Number of cycles : 6.

IEC 512-6-11j:

**Cold:**

The samples were in unmated condition subjected to a temperature of -40 °C during 2 hours.

IEC 512-8-15a:

**Contact retention in housing:**

The contact retention force was measured on a push-pull tester.  
 (contacts with locking)

**TESTSEQUENCES:****Group 1:**

Termination Resistance

Climatic sequence: Dry heat

Damp heat cyclic, first cycle

Cold

Damp heat cyclic, remaining 5 cycles

Termination Resistance

**Group 2:**

Mating/Unmating force  
Termination resistance  
Mechanical operation  
Mating/Unmating force  
Termination resistance  
Damp heat cyclic  
Mating/unmating force  
Termination resistance

**Group 3:**

Termination resistance  
Rapid change of temperature  
Termination resistance  
Vibration  
Termination resistance

**Group 4:**

Contact retention in housing

**Group 5:**

Termination resistance  
Current load cyclic  
Termination resistance

**Group 6:**

Insulation resistance  
Voltage proof  
Climatic sequence: Dry heat  
Damp heat cyclic, first cycle  
Cold  
Damp heat cyclic, remaining 5 cycles  
Insulation resistance  
Voltage proof

EQUIPMENT USED:

<u>Equipment</u>	<u>Producer</u>	<u>Type</u>	<u>Series Nb</u>	<u>Cal Due.</u>
Micro-ohmmeter	Keithley	580	374687	11-98.
Electrometer	Keithley	617	325475	11-98.
High voltage tester	Sefelec	PR-12-NN	264	03-98.
Push pull tester	AMP	MkI	Blue	
Force measuring system	HBM	KWS 3073	07057	each use.
Oven	Heraeus	T5042EK	7901719	12-99.
Current source	Delta	SM 7020	01422	
Dig. Therm. meter	Keithley	874-C	T-13399	11-98.
Accelerometer	B & K	4371	650308	12-98.
Exciter control	B & K	1050	1412882	12-98.
Vibrator	Ling+B&K	PA2000	S1165-002	12-98.
Climatic chamber	Weiss	125SBDU70	200776	11-98.
Climatic chamber (TS)	Weiss	64/80DUST	224/17413	11-98.

SUMMARY OF TESTRESULTS:**REQUIREMENT****MEASURED RESULTS**

**NOTE:** All the measured resistance values include the bulk resistance ( $\pm 2,0 \text{ m}\Omega$ ) of 60 mm of wire.

**- Group 1:**

*The testresults of the termination resistance before and after the tests are presented in listed form on page 8.*

Termination resistance, after Climatic sequence:

**maximum R = 12 m $\Omega$  (10 m $\Omega$  + bulk resistance)**

**max. R = 10,88 m $\Omega$ .**

**- Group 2:**

*The testresults of the mating/unmating force and the termination resistance before and after the tests, are presented in listed form on page 9 and 10 (forces).*

Termination resistance after mechanical operation:

**maximum R = 12 m $\Omega$  (10 m $\Omega$  + bulk resistance)**

**max. R = 10,59 m $\Omega$ .**

Termination resistance after damp heat cyclic:

**maximum R = 12 m $\Omega$  (10 m $\Omega$  + bulk resistance)**

**max. R = 11,82 m $\Omega$ .**

Mating/unmating force after mechanical operation:

**maximum (mating) : 5N/contact**

**max.: 1,48N/contact.**

**minimum (unmating): 0,65N/contact**

**min.: 0,73N/contact.**

Mating/unmating force, final:

**maximum (mating) : 5N/contact**

**max.: 1,33N/contact.**

**minimum (unmating): 0,65N/contact**

**min.: 0,65N/contact.**

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Continuation of the summary of testresults.

## REQUIREMENT

## MEASURED RESULTS

### - Group 3:

*The testresults of the termination resistance before and after the tests are presented in listed form on page 11.*

Termination resistance, after rapid change of temperature:

**maximum R=12 mΩ (10 mΩ + bulk resistance)**

**max. R=9,70 mΩ.**

Termination resistance, after vibration:

**maximum R=12 mΩ (10 mΩ + bulk resistance)**

**max. R=10,78 mΩ.**

Vibration:

During the vibration test no interruptions of continuity > 1μsec were detected.

### -Group 4:

*The testresults of the retention force in housing are presented in listed form on page 12.*

Contact retention in housing:

**Minimum : 10N**

**min.: 16,60N.**

### - Group 5:

*The testresults of the termination resistance before and after the tests are presented in listed form on page 13.*

Termination resistance, after current load cyclic

**maximum R=10 mΩ**

**max. R=10,61 mΩ.**

### - Group 6:

Insulation resistance, initial:

**minimum 1000 MΩ.**

All tested connectors: > 1000 MΩ.

Insulation resistance, final:

**minimum 1000 MΩ.**

All tested connectors: > 1000 MΩ.

Voltage proof:

All tested connectors, initial and final, passed the voltage proof, no breakdown or flashover was detected.



TESTRESULTS: group 1

All values represented in milli-ohms.

Product name: Micro-MaTch COSI

Column.	Group	Lot	Test
-1-	Group 1	1..5	Termination resistance initial
-2-	Group 1	1..5	Mechanical operation
-3-	$\Delta R = \text{Resistance final} - \text{Resistance initial} \quad (\text{Column2-Column1})$		
	<b>-1-</b>	<b>-2-</b>	<b>-3-</b>
1	9.19	10.02	0.83
2	9.23	9.66	0.43
3	8.96	9.72	0.76
4	9.02	9.29	0.27
5	8.68	8.96	0.28
6	9.20	9.54	0.34
7	8.87	9.67	0.80
8	8.92	9.54	0.62
9	8.64	8.86	0.22
10	9.25	10.82	1.57
11	9.26	10.88	1.62
12	9.25	10.23	0.98
13	9.01	9.29	0.28
14	8.96	9.68	0.72
15	9.12	9.23	0.11
16	9.16	9.93	0.77
17	9.35	9.80	0.45
18	9.36	9.34	-0.02
19	8.89	9.95	1.06
20	8.87	9.15	0.28
21	8.71	9.21	0.50
22	9.27	10.70	1.43
23	9.17	9.57	0.40
24	9.17	10.29	1.12
25	9.12	9.66	0.54
26	9.12	10.09	0.97
27	8.85	9.64	0.79
28	8.84	10.00	1.16
29	9.24	9.19	-0.05
30	9.25	9.82	0.57
<b>Max.</b>	<b>9.36</b>	<b>10.88</b>	<b>1.62</b>
<b>Min.</b>	<b>8.64</b>	<b>8.86</b>	<b>-0.05</b>
<b>Mean.</b>	<b>9.06</b>	<b>9.72</b>	<b>0.56</b>





Group 2

All values represented in milli-ohms.

Product name: Micro-MaTch COSI

Column.	Group	Lot	Test	
-1-	Group 2	1..5	Termination resistance initial	
-2-	Group 2	1..5	Mechanical operation	
-3-	Group 2	1..5	Damp heat cyclic	
-4-	ΔR = Resistance final - Resistance initial			(Column3-Column1)
	<b>-1-</b>	<b>-2-</b>	<b>-3-</b>	<b>-4-</b>
1	9.09	9.52	9.95	0.86
2	9.06	9.81	10.61	1.55
3	9.11	9.82	10.37	1.26
4	8.92	9.57	10.41	1.49
5	8.99	10.06	10.81	1.82
6	8.75	10.36	10.63	1.88
7	9.04	9.24	11.82	2.78
8	8.95	9.68	11.48	2.53
9	8.75	9.09	10.69	1.94
10	9.13	9.54	9.71	0.58
11	9.22	9.95	10.55	1.33
12	9.33	10.36	9.94	0.61
13	9.02	9.65	10.39	1.37
14	9.01	10.03	10.74	1.73
15	9.85	10.59	9.76	-0.09
16	8.84	9.08	11.42	2.58
17	8.80	9.33	10.91	2.11
18	8.84	9.20	9.77	0.93
19	9.34	9.61	10.71	1.37
20	9.32	9.39	11.46	2.14
21	9.30	9.56	11.66	2.36
22	9.03	9.42	10.04	1.01
23	8.95	9.45	9.77	0.82
24	8.93	9.51	9.56	0.63
25	9.23	9.55	11.22	1.99
26	9.28	9.77	11.29	2.01
27	9.17	9.38	10.19	1.02
28	8.77	9.02	9.22	0.45
29	8.99	9.59	9.52	0.53
30	9.00	9.09	9.30	0.30
<b>Max.</b>	<b>9.85</b>	<b>10.59</b>	<b>11.82</b>	<b>2.78</b>
<b>Min.</b>	<b>8.75</b>	<b>9.02</b>	<b>9.22</b>	<b>-0.09</b>
<b>Mean.</b>	<b>9.07</b>	<b>9.61</b>	<b>10.46</b>	<b>1.14</b>



All values represented in Newton's

Product name: Micro-MaTch COSI

Column.	Group	Lot	Test			
-1-	Group 2	1..5	Mating force initial			
-2-	Group 2	1..5	Unmating force initial			
-3-	Group 2	1..5	Mating force after mechanical operation			
-4-	Group 2	1..5	Unmating force after mechanical operation			
-5-	Group 2	1..5	Mating force final			
-6-	Group 2	1..5	Unmating force final			
	<b>-1-</b>	<b>-2-</b>	<b>-3-</b>	<b>-4-</b>	<b>-5-</b>	<b>-6-</b>
1	14.00	8.90	8.90	5.90	7.80	4.90
2	12.10	7.00	8.00	4.70	6.30	4.60
3	13.50	7.20	8.00	4.40	8.00	3.90
4	11.20	6.50	6.00	4.40	6.10	4.40
5	12.10	6.30	7.40	4.80	7.80	4.40
Max.	14.00	8.90	8.90	5.90	8.00	4.90
Min.	11.20	6.30	6.00	4.40	6.10	3.90
Mean.	12.58	7.18	7.66	4.84	7.20	4.44



## Group 3

All values represented in milli-ohms.

Product name: Micro-MaTch COSI

Column.	Group	Lot	Test	
-1-	Group 3	1..5	Termination resistance initial	
-2-	Group 3	1..5	Rapid change of temperature	
-3-	Group 3	1..5	Vibration	
-4-	$\Delta R = \text{Resistance final} - \text{Resistance initial}$			(Column3-Column1)
	<b>-1-</b>	<b>-2-</b>	<b>-3-</b>	<b>-4-</b>
1	8.75	8.82	9.46	0.71
2	8.75	8.93	9.82	1.07
3	8.79	8.79	9.16	0.37
4	9.24	9.70	9.73	0.49
5	9.27	9.37	9.26	-0.01
6	9.18	9.30	9.42	0.24
7	8.74	8.80	9.89	1.15
8	9.13	9.36	10.20	1.07
9	8.97	9.32	9.30	0.33
10	9.03	9.18	9.43	0.40
11	9.31	9.38	9.26	-0.05
12	9.21	9.26	9.50	0.29
13	9.12	9.40	10.18	1.06
14	9.14	9.49	10.78	1.64
15	9.06	9.24	9.71	0.65
16	8.86	8.81	10.30	1.44
17	8.91	8.69	10.57	1.66
18	8.94	8.67	10.47	1.53
19	9.02	9.24	9.60	0.58
20	8.99	9.27	9.31	0.32
21	8.97	8.96	9.34	0.37
22	8.98	9.01	9.85	0.87
23	9.25	9.44	9.44	0.19
24	9.18	9.35	9.97	0.79
25	9.45	9.61	9.76	0.31
26	9.58	9.69	10.30	0.72
27	9.26	9.69	9.94	0.68
28	9.15	9.20	10.37	1.22
29	8.89	8.98	10.72	1.83
30	8.96	9.03	10.25	1.29
<b>Max.</b>	<b>9.58</b>	<b>9.70</b>	<b>10.78</b>	<b>1.83</b>
<b>Min.</b>	<b>8.74</b>	<b>8.67</b>	<b>9.16</b>	<b>-0.05</b>
<b>Mean.</b>	<b>9.07</b>	<b>9.20</b>	<b>9.84</b>	<b>0.64</b>



Group 4

All values represented in Newton's

Product name: Micro-MaTch COSI

Column.	Group	Lot	Test
-1-	Group 4	1..5	Contact retention in housing
	-1-		
1	23.20		
2	23.50		
3	22.40		
4	22.30		
5	23.10		
6	22.20		
7	24.30		
8	22.30		
9	22.40		
10	23.90		
11	20.60		
12	20.00		
13	16.60		
14	22.40		
15	23.60		
16	23.80		
17	22.30		
18	23.80		
19	22.90		
20	21.10		
21	19.50		
22	24.60		
23	22.30		
24	22.40		
25	22.80		
26	22.40		
27	23.00		
28	22.70		
29	20.80		
30	22.10		
Max.	24.60		
Min.	16.60		
Mean.	22.31		



Group 5

All values represented in milli-ohms.

Product name: Micro-MaTch COSI

Column.	Group	Lot	Test
-1-	Group 5	1..5	Termination resistance initial
-2-	Group 5	1..5	Current load cyclic
-3-	$\Delta R = \text{Resistance final} - \text{Resistance initial} \quad (\text{Column2}-\text{Column1})$		
	<b>-1-</b>	<b>-2-</b>	<b>-3-</b>
1	9.37	9.90	0.53
2	9.34	10.39	1.05
3	9.02	9.85	0.83
4	8.74	10.61	1.87
5	8.86	9.43	0.57
6	8.87	9.31	0.44
7	9.09	9.65	0.56
8	9.22	9.64	0.42
9	9.19	10.27	1.08
10	8.91	9.43	0.52
11	8.87	9.34	0.47
12	9.00	9.97	0.97
13	9.51	10.29	0.78
14	9.37	9.75	0.38
15	9.50	10.49	0.99
16	9.25	9.47	0.22
17	9.08	9.75	0.67
18	9.22	10.53	1.31
19	9.21	9.65	0.44
20	9.22	9.65	0.43
21	9.32	8.36	-0.96
22	9.02	9.38	0.36
23	9.16	9.35	0.19
24	8.99	9.52	0.53
25	8.99	9.91	0.92
26	9.30	9.82	0.52
27	9.22	9.63	0.41
28	9.06	9.85	0.79
29	9.50	9.68	0.18
30	9.27	9.93	0.66
<b>Max.</b>	<b>9.51</b>	<b>10.61</b>	<b>1.87</b>
<b>Min.</b>	<b>8.74</b>	<b>8.36</b>	<b>-0.96</b>
<b>Mean.</b>	<b>9.16</b>	<b>9.76</b>	<b>0.49</b>