

Qualification Test Report

AMP 1.5mm Pitch Mini CT Connector (MT Type)

501-60006

Rev. 0

Product Specification : 108-60018 Rev.C  
Reference Test Report No. : TR-99062 TR-100143  
Date : 29JUN'04  
Classification : Unrestricted

Prepared by	Reviewed by	Reviewed by	Approved by
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## 1. Introduction

1.1 Testing was performed on the 1.5mm pitch Mini CT Connector (MT Type) to determine if it meets the requirements of AMP Specification, 108-60018, Rev.C.

## 1.2 Scope

This report covers the electrical, mechanical and environmental performance requirements of the 1.5mm pitch Mini CT Connector (MT Type).

## 1.3 Conclusion

The 1.5mm pitch Mini CT Connector (MT Type) meets the electrical, mechanical and environmental performance requirements of Product Specification, 108-60018, Rev.C

## 1.4 Product Description

- This connector is wire-to-board connector of 1.5mm pitch.
- Applicable wire size: AWG#26,#28 (Insulation diameter:  $\phi$  0.8~0.95mm)

## 1.5 Test Samples

Samples were taken randomly from current production.

The samples of Fig.1 were used.

Part Number	Description
0-292271-2 2-292271-0	Receptacle Assembly (MT Type) 2,20 Pos.
0-292207-2 2-2922077-0	Single Row Post Header Assembly(V)Dip Staggered Type With Boss With Kink 2,20 Pos
4-353294-0	Double Row Holdr Housing 40 Pos.
4-292208-0	Duble Row Post Header Assembly (V) Dip Staggered Type With Boss With Kink 40 Pos.

Fig. 1

And, the following wire were used.

AWG #26 : Hitachi Cable.Co. UL-10272 (Wire Specificcation Number SP23-39660)

AWG #28 : Hitachi Cable.Co. UL-1061 (Wire Specificcation Number SP23-40290)

2. Test Contents

No.	Test Items	Requirements	Judgement
2.1	Examination of Product	Visual Inspection No physical damage	Acceptable
Electrical Requirements			
2.2	Termination Resistance (Low Level)	Initial 10mΩ Max. Final 20mΩ Max.	Acceptable
2.3	Dielectric withstanding Voltage	Initial/Final 0.5kV AC, (50 Hz), 1 minute No abnormality allowed. Current leakage 0.5mA Max.	Acceptable
2.4	Insulation Resistance	Initial 500MΩ Min. Final 100MΩ Min.	Acceptable
2.5	Temperature Rising	30°C Max. Test Current AWG #26:2A, AWG #28:1A	Acceptable
Mechanical Requirements			
2.6	Tensile Strength of Wire Termination	AWG	N(kgf)
		26	19.6(2.0)
		28	14.7(1.5)
		N(kgf)	11.8(1.2)
Operation Speed 50mm/minute			
2.7	Post Retention Force	9.8N (1.0 kgf) Min. Operation Speed : 50mm/minute	Acceptable
2.8	Contact Retention Force	4.9N (0.5 kgf) Min. Operation Speed : 50mm/minute	Acceptable
2.9	Panel Mounting Force	49N (5.0 kgf) Min.	Acceptable
2.10	Panel Retention Force	83.3 (8.5 kgf) Min.	Acceptable
2.11	Connector Mating Force	2Pos. : 29.302 N (2.99 kgf) Max. 10Pos. : 76.832 N (7.84 kgf) Max. 20Pos. : 129.752N (13.24 kgf) Max. Operation Speed : 50mm/minute	Acceptable
	Connector Unmating Force	2Pos. : 4.508 N (0.46 kgf) Min. 10Pos. : 16.856 N (1.72 kgf) Min. 20Pos. : 30.756 N (3.12 kgf) Min. Operating Speed : 50mm/minute	Acceptable
2.12	Durability (Repeated Mating / Unmating)	Repeated mating/unmating for 30 cycles Operation Speed : 50mm/minute Final 20mΩ Max.	Acceptable

Fig. 2 (to be continued)

No.	Test Items	Requirements	Judgement
2.13	Vibration (Low Frequency)	10-55-10Hz/1minutes, 98 m/s <sup>2</sup> (10 G), Amplitude :1.52mm, X, Y & Z Axes : 2 hours each No electrical discontinuity greater than 1 μ sec shall occur. Final 20mΩ Max.	Acceptable
2.14	Physical Shock	No electrical discontinuity greater than 1 μ sec allowed. 490m/s <sup>2</sup> (50 G), Halfsine Wave., 11msec XYZ drops, Total 18 drops Final 20mΩ Max.	Acceptable
2.15	Hammering Shocks	No electrical discontinuity greater than 1 μ sec allowed. Under 10000cycles of repeated hammering shocks . Final 20mΩ Max.	Acceptable
2.16	Solderability	Solder Temperature : 230 ± 5 °C Immersion Duration :3 ± 0.5 seconds Flux : Alpha 100 (NON-active rosin base)	Acceptable
2.17	Resistance to Soldering Heat	<u>Flow Soldering</u> Test connector on PCB. Solder Temperature : 260 ± 5 °C Immersion Duration : 10 ± 1 sec. <u>Reflow Soldering</u> SMT product mounted on PCB to solder like Fig. 3 (measure at housing surface)  No physical damage shall occur.	Acceptable
Environmental Requirements			
2.18	Thermal Shock	-55°C/30minutes, +85°C/30minutes,500 cycles Final 20mΩ Max.	Acceptable
2.19	Humidity (Steady State)	40°C, 90~95% RH, 500Hrs. Final 20mΩ Max. Final 0.5kV AC, (50 Hz), 1 minute No abnormality allowed. Insulation Resistance 100MΩ MIN.	Acceptable
2.20	Humidity-Temperature Cycling	25~65°C、90~95% RH、10Cycles Cold shock -10°C Final 20mΩ Max. Final 0.5kV AC, (50 Hz), 1 minute No abnormality allowed. Insulation Resistance 100MΩ MIN.	Acceptable
2.21	Salt Spray	Salt concentration 5%, 35±2°C, 48Hrs. Final 20mΩ Max.	Acceptable
2.22	Temperature Life (Heat Aging)	85±2°C, 500Hrs. Final 20mΩ Max.	Acceptable
2.23	Resistance to Cold	-40±3°C, 500Hrs. Final 20mΩ Max.	Acceptable

Fig. 2 (to be continued)

No.	Test Items	Requirements	Judgement
2.24	Sulfurous Acid Gas Resistivity	10±3ppm, 35±2°C, 95% RH 240Hrs. Final 20mΩ Max.	Acceptable
2.25	Hydrogen Sulfide Gas Resistivity	3ppm, 40±3°C, 75% RH 240Hrs. Final 20mΩ Max.	Acceptable
2.26	Ammonia Gas Resistivity	After 72Hrs exposure in ammonia chamber with 25cc of 3% ammonia solution for every liter of chamber capacity. Final 20mΩ Max.	Acceptable
2.27	Resistance to Solvent	Unmated connector (Isopropylalcohol) Immerse in solvent nominal temperature 90 seconds. Connector shall be free from fusion and discoloration that is detrimental to connector function.	Acceptable

Fig. 2 (End)

### 3. Product Qualification Test Sequence

Test Examination	Test Group																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Test Sequence (a)																							
Examination of Product	1,7	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
Termination Resistance (LowLevel)									2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4
Dielectric withstanding Voltage	3,6																							
Insulation Resistance	2,5																							
Temperature Rising		2																						
Tensile Strength of Wire Termination			2																					
Post Retention Force				2																				
Contact Retention Force					2																			
Panel Mounting Force						2																		
Panel Retention Force							2																	
Connector Mating/Unmating Force								2																
Durability(Repeated Mate/Unmating)									3															
Vibration (Low Frequency)										3														
Physical Shock											3													
Hammering Shocks												3												
Solderability													3											
Resistance to Soldering Heat														3										
Thermal Shock															3									
Humidity (Steady State)	4-a															3								
Humidity-Temperature Cycling	4-b																3							
Salt Spray																		3						
Temperature Life (Heat Aging)																			3					
Resistance to Cold																					3			
Sulfurous Acid Gas Resistivity																						3		
Hydrogen Sulfide Gas Resistivity																							3	
Ammonia Gas Resistivity																								3
Resistance to Solvent																								3

(a) Numbers indicate sequence in which the tests are performed.

4. Test Result

Test Group	Test Items		Unit	Result					Spec.	Judgement	
				N	Max.	Min.	Ave.	S			
1	Dielectric withstanding Voltage	Initial		40	Tested samples withstood test potential of 0.5kVAV for 1minute, and showed no evidence of abnormality in appearance.					Initial/Final 0.5kVAC, (50 Hz), 1minute No abnormality allowed.	Acceptable
		After Humidity		40							
		After Humidity – Temperature		40							
	Insulation Resistance	Initial	Ω	40	All samples 500MΩ Min.					500MΩ Min.	Acceptable
		After Humidity	Ω	40	All samples 100MΩ Min.					100MΩ Min.	
		After Humidity – Temperature	Ω	40							
2	Temperature Rising	AWG #26	°C	20	14.35	10.10	12.513	2.001	30°C Max.	Acceptable	
		AWG #28	°C	20	6.01	3.80	4.987	1.090			
3	Tensile Strength of Wire Termination	AWG #26	Traverse Direction	N	80	16.95	15.19	15.954	0.588	11.8N Min.	Acceptable
				kgf		1.73	1.55	1.628	0.060	1.2kgf Min.	
			Axial Direction	N	80	34.3	29.89	32.948	1.499	19.6N Min.	
				kgf		3.50	3.05	3.362	0.153	2.0kgf Min.	
		AWG #28	Traverse Direction	N	80	15.19	13.72	14.445	0.431	11.8N Min.	
				kgf		1.55	1.40	1.474	0.044	1.2kgf Min.	
			Axial Direction	N	80	29.20	22.64	25.539	1.921	14.7N Min.	
				kgf		2.98	2.31	2.606	0.196	1.5kgf Min.	

Test Group	Test Items		Unit	Result					Spec.	Judgement	
				N	Max.	Min.	Ave.	S			
4	Post Retention Force		N	40	26.75	22.15	24.451	1.294	9.8N Min.	Acceptable	
			kgf		2.73	2.26	2.495	0.132	1.0kgf Min.		
5	Contact Retention Force		N	40	6.66	6.08	6.350	0.255	4.9N Min.	Acceptable	
			kgf		0.68	0.62	0.648	0.026	0.5kgf Min.		
6	Panel Mounting Force	PCB THK=1.6mm	N	30	31.95	20.78	26.107	3.744	49N Max.	Acceptable	
			kgf		3.26	2.12	2.664	0.382	5.0kgf Max.		
		PCB THK=0.8mm	N	30	29.50	21.46	24.853	3.577	49N Max.		
			kgf		3.01	2.19	2.536	0.365	5.0kgf Max.		
7	Panel Retention Force	PCB THK=1.6mm	N	30	181.6	125.1	161.04	19.081	83.3N Min.	Acceptable	
			kgf		18.53	12.76	16.433	1.947	8.5kgf Min.		
		PCB THK=0.8mm	N	30	134.9	105.9	124.85	11.437	83.3N Min.		
			kgf		13.76	10.81	12.740	1.167	8.5kgf Min.		
8	Connector Mating Force	2Pos.	1 <sup>st</sup> Mating	N	30	15.39	12.54	14.406	1.186	29.302NMax.	Acceptable
				kgf		1.57	1.28	1.470	0.121	2.99kgf Max.	
			30times Mating	N	30	24.01	18.82	20.952	1.950	29.302NMax.	
				kgf		2.45	1.92	2.138	0.199	2.99kgf Max.	
		20Pos.	1 <sup>st</sup> Mating	N	30	58.80	46.55	52.352	4.743	76.832NMax.	
				kgf		6.00	4.75	5.342	0.484	7.84kgf Max.	
			30times Mating	N	30	65.17	53.90	57.898	4.136	76.832NMax.	
				kgf		6.65	5.50	5.908	0.422	7.84kgf Max.	
		40Pos.	1 <sup>st</sup> Mating	N	30	93.10	87.71	89.915	2.029	129.752NMax.	
				kgf		9.50	8.95	9.175	0.207	13.24kgf Max.	
			30times Mating	N	30	101.43	87.71	94.080	5.488	129.752NMax.	
				kgf		10.35	8.95	9.600	0.560	13.24kgf Max.	

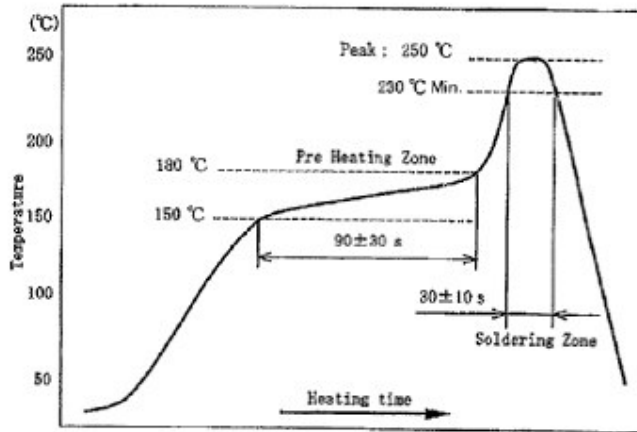
Test Group	Test Items			Unit	Result					Spec.	Judgement
					N	Max.	Min.	Ave.	S		
9	Connector Unmating Force	2Pos.	1 <sup>st</sup> Mating	N	30	13.82	12.25	12.760	0.735	4.508 N Min.	Acceptable
				kgf		1.41	1.25	1.302	0.075	0.46kgf Min.	
		30times Mating	N	30	18.23	15.48	16.758	1.068	4.508N Min.		
			kgf		1.86	1.58	1.710	0.109	0.46kgf Min.		
		20Pos.	1 <sup>st</sup> Mating	N	30	37.24	31.36	34.300	2.381	16.856N Min.	
				kgf		3.80	3.20	3.500	0.243	1.72kgf Min.	
	30times Mating	N	30	33.32	27.44	30.870	2.597	16.856N Min.			
		kgf		3.40	2.80	3.150	0.265	1.72kgf Min.			
	40Pos.	1 <sup>st</sup> Mating	N	30	60.27	54.88	57.408	2.087	30.576N Min.		
			kgf		6.15	5.60	5.858	0.213	3.12kgf Min.		
		30times Mating	N	30	76.44	53.41	64.602	7.546	30.576N Min.		
			kgf		7.80	5.45	6.592	0.770	3.12kgf Min.		
10	Durability (Repeated Mating / Unmating)		1 <sup>st</sup> Mating	m Ω	80	3.43	2.74	3.037	0.220	10m Ω Max.	Acceptable
			30times Mating	m Ω	80	4.53	3.09	3.864	0.319	20m Ω Max.	
11	Vibration (Low Frequency)		Initial	m Ω	80	3.15	2.75	2.953	0.107	10m Ω Max.	Acceptable
			Final	m Ω	80	4.10	2.85	3.083	0.256	20m Ω Max.	
12	Physical Shock		Initial	m Ω	80	4.18	3.14	3.671	0.221	10m Ω Max.	Acceptable
			Final	m Ω	80	4.51	3.19	3.830	0.310	20m Ω Max.	
13	Hammering Shock		Initial	m Ω	80	3.72	3.11	3.453	0.122	10m Ω Max.	Acceptable
			Final	m Ω	80	3.85	3.16	3.379	0.164	20m Ω Max.	





Test Group	Test Items		Unit	Result					Spec.	Judgement
				N	Max.	Min.	Ave.	S		
14	Solderability		\	30	More than 90% of tested area was covered with fresh wetr solder.				Wet Solder Coverage 90% Min.	Acceptable
15	Resistance to Soldering Heat			30	All tested samples proved acceptable. Tesed samples showed no evidense of effects such as deformation etc. that are detrimental to connector function.				No physical damage shall occur.	Acceptable
16	Thermal Shock	Initial	mΩ	80	3.14	2.71	2.949	0.094	10mΩ Max.	Acceptable
		Final	mΩ	80	5.01	2.98	3.487	0.448	20mΩ Max.	
17	Humidity (Steady State)	Initial	mΩ	80	3.04	2.67	2.898	0.082	10mΩ Max.	Acceptable
		Final	mΩ	80	4.17	2.98	3.441	0.264	20mΩ Max.	
18	Humidity-Temperatu re Cycling	Initial	mΩ	80	3.18	2.75	3.088	0.123	10mΩ Max.	Acceptable
		Final	mΩ	80	3.56	3.05	3.314	0.084	20mΩ Max.	
19	Salt Spray	Initial	mΩ	80	4.06	2.82	3.494	0.306	10mΩ Max.	Acceptable
		Final	mΩ	80	4.37	3.03	3.717	0.314	20mΩ Max.	
20	Temperature Life	Initial	mΩ	80	3.28	2.80	2.998	0.111	10mΩ Max.	Acceptable
		Final	mΩ	80	3.60	3.16	3.396	0.108	20mΩ Max.	
21	Resistance to Cold	Initial	mΩ	80	3.32	2.61	2.89	0.220	10mΩ Max.	Acceptable
		Final	mΩ	80	3.43	2.85	3.10	0.168	20mΩ Max.	
22	Sulfurrous Acid Gas Resistivity	Initial	mΩ	80	3.24	2.78	2.985	0.119	10mΩ Max.	Acceptable
		Final	mΩ	80	4.65	3.79	4.276	0.232	20mΩ Max.	

Test Group	Test Items		Unit	Result					Spec.	Judgement
				N	Max.	Min.	Ave.	S		
23	Hydrogen Sulfide Gas Resistivity	Initial	mΩ	80	3.31	2.81	2.999	0.118	10mΩ Max.	Acceptable
		Final	mΩ	80	4.81	3.85	4.262	0.242	20mΩ Max.	
24	Ammonia Gas Resistivity	Initial	mΩ	80	3.20	2.83	3.020	0.079	10mΩ Max.	Acceptable
		Final	mΩ	80	4.11	3.37	3.747	0.201	20mΩ Max.	
25	Resistance to Solvent	Final		30	All tested samples proved acceptable. Tested samples showed no evidence of effects such as fusion and discoloration that are detrimental to connector function.			Connector shall be free from fusion and discoloration that is detrimental to connector function.		Acceptable



Measured at housing surface

Fig. 3

O	Released (FB00-0130-04)	29.JUN.'04	R.H	S.Y	I.E
LTR	Revision Record	Date	Prepared.by	Revised by	Approved by