

Amphenol

**The Product Specification for
Mini Cool Edge, 0.60mm pitch,
Connector**

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1. OBJECTIVE

This specification defines the performance, test, quality and reliability requirements of Amphenol Mini Cool Edge 0.60mm pitch connector (not contained orthogonal type).

2. SCOPE

This Specification includes the Materials/Finishing, Mechanical Characteristics, Electrical Characteristics and Environmental requirements of Amphenol Mini Cool Edge 0.60mm pitch connector.

3. APPLICABLE DOCUMENTS

3.1. Application

3.1.1. Engineering drawings

3.2. Military Standards

3.2.1. MIL-C-45662 : Equipment Calibration

3.3. Other Standards and Specifications

3.4.1. UL94 V-0 : Tests for Flammability of Plastic Materials in Devices and Appliances

3.4.2. EIA 364 : Electrical Connector/Socket Test Procedures Including Environmental Classifications

3.4.3. EIA 364 -1000: Environmental test methodology for assessing the performance of electrical connectors and sockets used in business office applications.

4. REQUIREMENTS

4.1. Qualification

Connectors furnished under this specification shall be capable of meeting the qualification test requirements specified herein. Unless otherwise specified, all measurements shall be performed within the following lab conditions:

- a) Temperature: 25°C±10°C.
- b) Relative Humidity : 20% to 80%
- c) Atmospheric Pressure : 650mm to 800mm of Hg (86 ~106Kpa)

4.2. Material

Material for each part shall be specified herein, or equivalent. Substitute material shall meet the performance requirements of this specification.

- a) Contacts: Copper and Copper alloy.
- b) Insulator: High temperature Engineering plastics, UL94 V-0.
- c) Other material: Stainless steel

4.3. Finish

Plated finished for qualification components shall be meet the connector's application.

4.4. Workmanship

Connectors shall be uniform in quality and shall be free from burrs, scratches, cracks, voids, chips, blisters, pin holes, sharp edges, and other defects that will adversely affect product's life or serviceability.

5. RATINGS

- 5.1. Operating temperature: -40°C to +85°C
5.2. Storage conditions: -5°C to +30°C and 20% RH to 75% RH;
5.3. Current rating:

PIN COUNT	Current
12Pins	1.1A
28pins	0.9A
56pins	0.8A
84pins	0.6A
140pins	0.5A
168pins	0.5A
280pins	0.5A

6. ELECTRICAL CHARACTERISTIC

6.1. Current Rating

The temperature rise above ambient shall not exceed 30°C at any point in the system when contact positions specified are powered at the power levels specified herein:

- Ambient Conditions: still air at 25°C±5°C.
- Current Rating : 1.1A/pin up to 12pins.
- Reference: EIA 364-70.
- Mated with applicable AIC card

6.2. Low Level Contact Resistance

Mated with applicable board, the low-level contact resistance shall not exceed a change of 15mΩ after environmental exposure and durability, when measured in accordance with EIA 364-23. The following details shall apply:

- Test Voltage: 20mV DC maximum at open circuit.
- Test Current: not to exceed 100mA.

6.3. Insulation Resistance

The insulation resistance shall not be less than 1000MΩ between the adjacent contacts of unmated connector assemblies. when measured in accordance with EIA 364-21. The following details shall apply:

- Test Voltage: 100V DC .
- Preparation: The connectors shall be Unmated.
- Electrification Time: 1 minute.
- Point of Measurement: Between adjacent contacts.

6.4. Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current (0.5mA max) when tested in accordance with EIA 364-20. The following details shall apply:

- Test Voltage: 300V AC.
- Test Duration : 1 minute
- Test Conditions: EIA 364-20C Method B
- Points of measurement: Between adjacent contacts of unmated connector assemblies.

7. MECHANICAL CHARACTERISTIC

7.1. Durability

Mating and un-mating with applicable AIC card, Durability tested in accordance with EIA-364-09.

The following details shall apply:

- Number of Cycles: 5 cycles for preconditioning, 200 cycles for 0.76um Au and PdNi+G/F plated, 100cycles for 0.38um Au plated, 50cycles for Gold flash with normal durability.
- Cycling Rates: 25.4±3mm/minute.
- No physical damage.

7.2. Mating/un-mating Force

Mating with the applicable AIC card, the following details shall apply:

- Reference: EIA 364-13.
- Speed Rate: 25.4±3mm/minute.
- Mating force: 1.1N/pin pair Max with maximum guage or AIC card
- Un-mating force: 0.10N/pin pair Min with minimum guage or AIC card

7.3. Contact Retention Force

The contact and the insulator are axially pull out at the speed rate of 25.4±3mm/minute

- Reference: EIA 364-29.
- Contact Retention force signal pin: 1.0N/pin Min.

7.4. Reseating

- Test condition: Manually mating and un-mating the connector with applicable PCB.
- Requirement: Perform 3 such cycles.

8. ENVIRONMENTAL CHARACTERISTIC

8.1. Thermal Shock.

Mated with applicable card. No physical damage shall be observed after tested in accordance with EIA 364-32.

The following details shall apply:

- Reference: EIA 364-32, method A, Table 2
- Test condition : test condition I
 - step 1: -55°C, 30minutes min; step 2: 25°C, 5minutes max; step 3: 85°C, 30minutes min;
 - step 4: 25°C, 5minutes max
- Number of cycles: 5 continuous cycles in mated condition.

8.2. Humidity- Temperature Cycling

Mated with applicable card. No physical damage shall be observed after tested in accordance with EIA 364-31.

The following details shall apply:

- Test condition : Method III without conditioning Cycle the connector between 25 °C ± 3 °C at 80 % ± 3% RH and 65 °C ± 3 °C at 50 % ± 3% RH. Ramp times should be 0.5 hour and dwell times should be 1.0 hour
- Test Duration : 24 hours per cycle
- Number of cycles: Perform 24 continuous cycles.

8.3. Thermal Disturbance

Mated with applicable card. No physical damages shall be observed after tested in accordance with EIA-364-1000,

- a) Test condition : Cycle the connector between 15°C ±3°C and 85°C±3°C, Humidity is not controlled
- b) Test Duration : Ramps should be a minimum of 2 °C per minute, and dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes)
- c) Number of cycles: Perform 10such cycles.

8.4. Temperature Life.

Mated with applicable card. No physical damage shall be observed after tested in accordance with EIA-364-17. The following details shall apply:

- a) 60 °C field temperature. Test Temperature and Test Duration per EIA 364-1000 Table 8

8.5. Temperature Life (Preconditioning).

Mated with applicable card. No physical damage shall be observed after tested in accordance with EIA-364-17. The following details shall apply:

- a) 60 °C field temperature. Test Temperature and Test Duration per EIA 364-1000 Table 9

8.6. Physical Shock

No discontinuities greater than 1 µs and no physical damage shall be observed after tested in accordance with EIA 364-27. The following details shall apply:

- a) Trapezoidal shock 50 g, ± 10%
- b) Duration 11 ms
- c) Velocity change 170 inch/sec, ± 10%
- d) Three drops in each of six directions are applied to each of the three samples

8.7. Vibration

No discontinuities greater than 1 µs and no physical damage shall be observed after tested in accordance with EIA 364-28 The following details shall apply:

- a) Random profile:
- b) 5 Hz @ 0.01 g²/Hz to 20 Hz @ 0.02 g²/Hz (slope up)
- c) 20 Hz to 500 Hz @ 0.02 g²/Hz (flat) Input acceleration is 3.13 g RMS
- d) 10 minutes per axis for all 3 axes on all samples Random control limit tolerance is ± 3 dB
- e) Shock and Vibration board, Annex D

8.8. Salt Spray

No abnormal nicks, cracks, or scratches on finished surfaces that indicate the removal of the normal protective coating. The following details shall apply:

- a) Reference: EIA 364-26, Test Condition B.
- b) Temperature: 35°C+1/-2°C.
- c) Humidity: 95%~98% RH.
- d) Concentration: 5%;
- e) Duration: 48 hours.

8.9. Porosity Testing

Tested in accordance with EIA 364-53, minimum of 10 contacts from 3 samples must be tested, optical microscope of 10X magnification concentrated reagent grade nitric acid: 75% +/- 1% HNO₃.

8.10. Mix Flowing Gas (MFG)

The following details shall apply:

- a) Reference: EIA 364-65, Class IIA
- b) Gas Concentration: Cl₂ 10± 3ppb, NO₂ 200± 50ppb, H₂S 10± 5ppb, SO₂ 100± 20ppb
- c) Temperature: 30± 1°C;
- d) Humidity: 70± 2% RH
- e) Test Duration: exposed 160hours un-mating with applicable AIC card and 80hours mating with applicable AIC card.

8.11. Solder ability

The termination is at least 95% covered by a contact In accordance with J-STD-002D. The following details shall apply:

- a) Condition C,
- b) 8 hours ± 15 minutes steam precondition.

8.12. Resistance to Soldering Heat.

No physical damage shall be observed after tested, the following details shall apply:

- a) Reference: EIA 364-56, procedure 6
- b) Test Temperature: test level 3(250°C+10°C/-0°C)

9. QUALITY ASSURANCE PROVISIONS

9.1. Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with MIL-C-45662 and ISO 9000.

9.2. Inspection Condition

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

- a) Temperature: 25°C±10°C.
- b) Relative Humidity : 20% to 80%
- c) Atmospheric Pressure : 650mm to 800mm of Hg (86 ~106Kpa)

9.3. Sample Quantity and Description

The sample size to be tested in each group shown in Qualification Testing Sequences should follow **Table 1**; All samples must be free of defects that would impair normal connector operation. All samples must meet dimensional requirements of connector.

9.4. Acceptance

- 9.4.1. Electrical and mechanical requirements placed on test samples as indicated in Paragraphs 5 and Paragraphs 6 shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with this product specification shall meet the stated requirements.
- 9.4.2. Failures attributed to equipment, test set up, or operator error shall not disqualify the product. If product failure occurs, corrective actions shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

9.5. Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures, normally used in production. The test sequence shall be as shown in Qualification Testing Sequences

Visual Examination : EIA 364-18

9.6. Re-qualification Testing

If any of the following conditions occur, the responsible product engineer shall initiate re-qualification testing consisting of all applicable parts of the qualification test matrix Table 1.

- a) A significant design change is made to the existing product which impacts the product form, fit or function. Examples of significant changes shall include, but not be limited to, changes in the plating material composition or thickness, contact force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.
- b) A significant change is made to the manufacturing process, which impacts the product form, fit or function.
- c) A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

Table 1: Qualification Testing Sequences

TEST OR EXAMINATION	TEST GROUP													
	item	A	B	C	D	E	F	G	H	I	J	K	L	M
Examination of connector(s)	4.4	1,8	1,10	1,10	1,12	1,8	1,9	1	1	1	1	1	1	1
Current Rating	6.1							2						
LLCR	6.2	2,5,7	2,5 7,9	2,5 7,9	2,5,7 9,11	2,5 7	4,6							
Insulation Resistance	6.3						3,8							
Dielectric Withstanding Voltage	6.4						2,7							
Durability	7.1						5							
Durability (Preconditioning)	7.2	3	3	3	3	3								
Matting/un-mating Force	7.3								3,6					
Contact Retention Force	7.4									2				
Reseating	7.5	6	8		10	6			2,5					
Thermal Shock	8.1		4											
Humidity-Temperature Cycling	8.2		6											
Thermal disturbance	8.3				8	4								
Temperature Life	8.4	4							4					
Temperature Life (Preconditioning)	8.5			4	4									
Physical Shock	8.6			8										
Vibration	8.7			6										
Salt Spray	8.8										2			
Porosity Testing	8.9											2		
Mix Flowing Gas(MFG)	8.10				6									
Solder ability	8.11												2	
Resistance to Soldering Heat	8.12													2
Sample size		10	10	10	10	10	10	5	5	5	5	5	5	5