

AMP

QUALIFICATION TEST REPORT

AMP *MTA-100 Connectors
P/N 640441-7

501-25

Rev. 0

Product Specification: 108-1050 *E* *10/26/87*

CTL No.: CTL1524-401-001

Date: September 10, 1985

Classification: Unrestricted

Distribution 16

*Trademark of AMP Incorporated

©COPYRIGHT 1985
BY AMP INCORPORATED HARRISBURG, PA. ALL INTERNATIONAL
RIGHTS RESERVED. AMP PRODUCTS MAY BE COVERED BY U.S. AND
FOREIGN PATENTS AND/OR PATENTS PENDING.

Corporate Test Laboratory Harrisburg, Pennsylvania

Table of Contents

1.0	Introduction	Page 1
1.1	Purpose	Page 1
1.2	Conclusion	Page 1
1.3	Product Description	Page 1
1.4	Test Samples	Page 2
1.5	Test Sequence	Page 2
2.1	Summary of Testing - Group 1	Page 2
2.2	Examination of Product	Page 2
2.3	Temperature Rise vs. Current - Group 2	Page 3
2.4	Termination Resistance, Specified Current - Group 2	Page 4
2.5	Current Cycling - Group 2	Page 5
2.6	Insulation Resistance - Group 3	Page 5
2.7	Termination Resistance, Dry Circuit - Group 3	Page 7
2.8	Humidity Temperature Cycling - Group 3	Page 8
2.9	Dielectric Withstand Voltage	Page 8
2.10	Mating Force - Group 4	Page 9
2.11	Termination Resistance, Dry Circuit - Group 4	Page 9
2.12	Durability - Group 4	Page 11
2.13	Unmating Force - Group 4	Page 11
2.14	Termination Resistance - Group 5	Page 11
2.15	Thermal Shock - Group 5	Page 13
2.16	Termination Resistance - Group 5	Page 13
2.17	Termination Resistance After Vibration - Group 6	Page 14
2.18	Vibration - Group 6	Page 14
2.19	Termination Resistance - Group 7	Page 15
2.20	Temperature Life	Page 16
2.21	Contact Retention - Group 8	Page 16
2.22	Tensile Straight - Group 9	Page 16
2.23	Tensile Perpendicular - Group 9	Page 17
3.1	Validation	Page 18

WCT/kd
(501-25/LABREP(5))



HARRISBURG, PENNSYLVANIA 17105 • PHONE: 717-564-0100 • TWX 510-657-4110

CORPORATE TEST LABORATORY

Qualification Test on
MTA-100 Connectors
P/N 640441-7

1.0 Introduction

The MTA-100 Connectors were submitted for testing by the Component and Assemblies Division, Communication and Assemblies Group. The test was performed in accordance with AMP Specification 108-1050, Rev. D, dated May 20, 1983. The test samples were applied to AWG 24 Solid UL 1007 conductor.

1.1 Purpose

Testing was conducted to determine product conformance to the specification requirements.

1.2 Conclusion

The test samples conform to the requirements of the specification.

1.3 Product Description

MTA (Mass Termination Assemblies) is a complete printed circuit board interconnection system, offering design versatility and low applied cost. The MTA technique eliminates the need for prestripping the conductors. The insulation is displaced, and the wire makes positive contact with the dual slotted beams. The wire deflection of the beams results in stored energy spring contact force which provides a stable, long life termination.

1.4 Test Samples

<u>Quantity per Test Group</u>	<u>Part Number</u>	<u>Description</u>
2	640441-7	MTA-100
<u>Mating Parts</u>	640098-7	Header
	640438-1 Rev. V	Contact
	Without Dimple	

1.5 Test Sequence

Test or Examination	Test Group								
	1	2	3	4	5	6	7	8	9
	Test Sequence								
Examination of Product	1								
Termination Resistance, Dry Circuit			2,4	2,4	1,3	1,3	1,3		
Termination Resistance, Specified Current		2,5							
Dielectric Withstanding Voltage			6						
Insulation Resistance			1,5						
Temperature Rise vs. Current		1,4							
Current Cycling		3							
Mating Force				1					
Unmating Force				5					
Tensile, Straight and Perpendicular									1
Durability				3					
Contact Retention									1
Vibration						2			
Humidity-Temperature Cycling			3						
Thermal Shock					2				
Temperature Life							2		

Numbers indicate sequence in which tests are performed. One-half of the samples shall be subjected to the straight tensile test and the remaining half to the perpendicular tensile test.

2.1 Summary of Testing - Group 1

2.2 Examination of Product

Visual, dimensional and functional inspections were made, in accordance with AMP Application Specification 114-1019.

Test Results

All components conformed dimensionally and functionally to the specification requirements.

2.3 Temperature Rise vs. Current - Group 2

The temperature rise at rated current was recorded. The temperature rise at rated current is specified in Figure 1 of the Appendix. The maximum current for the 24 AWG conductor is 3.0 amperes.

Test Results

The recorded temperature rise was as follows:

The ambient temperature was 25°C. The test current was 3.0 amperes.

Initial 2-1 -	<u>Position #</u>	<u>Connector Temp. °C</u>	<u>Δ-T °C</u>
	1	32.0	7.0
	2	32.0	7.0
	3	33.0	8.0
	4	33.0	8.0
	5	33.0	8.0
	6	32.0	7.0
	7	32.0	7.0

Initial 2-2 -	<u>Position #</u>	<u>Connector Temp. °C</u>	<u>Δ-T °C</u>
	1	33.0	8.0
	2	33.0	8.0
	3	33.0	8.0
	4	33.0	8.0
	5	33.0	8.0
	6	33.0	8.0
	7	33.0	8.0

The specified limit is 30°C rise maximum, at rated current.

Final temperature rise vs. current after current cycling. Ambient temperature 25°C. Test current 3.0 amperes.

Initial 2-1 -	<u>Position #</u>	<u>Connector Temp. °C</u>	<u>Δ-T °C</u>
	1	34.0	9.0
	2	34.0	9.0
	3	34.0	9.0
	4	34.0	9.0
	5	34.0	9.0
	6	34.0	9.0
	7	34.0	9.0

The specified limit is 30°C rise maximum, at rated current.

Initial 2-2 -	<u>Position #</u>	<u>Connector Temp. °C</u>	<u>Δ-T °C</u>
	1	34.0	9.0
	2	34.0	9.0
	3	34.0	9.0
	4	34.0	9.0
	5	34.0	9.0
	6	34.0	9.0
	7	34.0	9.0

The specified limit is 30°C rise maximum, at 3.0 amperes.

2.4 Termination Resistance, Specified Current - Group 2

The potential drop of mated contacts assembled in housings was recorded. The termination resistance was calculated from the recorded data. See Figure 2 in the Appendix for test set up.

Test Results

The calculated resistance data is as follows:

Energizing current 1.0 ampere. Equal wire length resistance 4.71 milliohms.

Initial 2-1 -	<u>Position #</u>	<u>Milliohms</u>
	1	4.51
	2	3.21
	3	4.52
	4	3.35
	5	4.74
	6	3.21
	7	3.47
	Min.	3.17
	Max.	4.74
	Avg.	3.82

Initial 2-2 -	<u>Position #</u>	<u>Milliohms</u>
	1	3.14
	2	3.23
	3	4.60
	4	3.22
	5	3.18
	6	3.29
	7	3.28
	Min.	3.14
	Max.	4.60
	Avg.	3.42

The specified limit is 4.75 milliohms.

Final after Current Cycling.

Final 2-1 -	<u>Position #</u>	<u>Milliohms</u>
	1	3.06
	2	3.05
	3	3.21
	4	3.17
	5	3.46
	6	2.99
	7	3.13
	Min.	2.99
	Max.	3.46
	Avg.	3.15

Final 2-2 -	<u>Position #</u>	<u>Milliohms</u>
	1	3.15
	2	3.27
	3	3.09
	4	3.27
	5	3.27
	6	3.35
	7	3.07
	Min.	3.07
	Max.	3.35
	Avg.	3.21

Specified limit 4.75 milliohms maximum.

2.5 Current Cycling - Group 2

The mated samples were energized at 125% rated current, 3.75 amperes. The current was "on" for 15 minutes and "off" for 15 minutes. The test was continued for 500 cycles.

Test Results

No physical damage was observed after the test. Termination resistance and temperature rise vs. current tests were performed after the current cycling test.

2.6 Insulation Resistance - Group 3

The test voltage of 500 VDC was applied between adjacent contacts of unmated connector assemblies. The voltage was applied for a period of one minute, after which the resistance measurement was recorded.

Test Results

The recorded data is as follows:

<u>Initial 3-1 - Position #</u>	<u>Resistance Megohms</u>
1-2	2.0×10^5
2-3	1.6×10^5
3-4	1.8×10^5
4-5	1.8×10^5
5-6	2.0×10^5
6-7	2.0×10^5
Min.	1.6×10^5
Max.	2.0×10^5
Avg.	1.8×10^5

<u>Initial 3-2 - Position #</u>	<u>Resistance Megohms</u>
1-2	1.4×10^5
2-3	1.8×10^5
3-4	1.7×10^5
4-5	1.8×10^5
5-6	2.0×10^5
6-7	2.0×10^5
Min.	1.4×10^5
Max.	2.0×10^5
Avg.	1.7×10^5

Specification limit 5000 megohms minimum.

Final after temperature humidity cycling.

<u>Final 3-1 - Position #</u>	<u>Resistance Megohms</u>
1-2	2.0×10^3
2-3	2.0×10^3
3-4	1.9×10^3
4-5	1.5×10^3
5-6	1.6×10^3
6-7	1.7×10^3
Min.	1.5×10^3
Max.	2.0×10^3
Avg.	1.7×10^3

Final 3-2 -	<u>Position #</u>	<u>Resistance Megohms</u>
	1-2	1.8 X 10 ³
	2-3	1.6 X 10 ³
	3-4	2.0 X 10 ³
	4-5	1.9 X 10 ³
	5-6	1.8 X 10 ³
	6-7	1.6 X 10 ³
	Min.	1.6 X 10 ³
	Max.	2.0 X 10 ³
	Avg.	1.7 X 10 ³

Specification limit 1000 megohms minimum.

2.7 Termination Resistance, Dry Circuit - Group 3

Millivolt measurements were recorded for mated contacts assembled in housings. The circuit parameters were 50 millivolts open circuit at 100 milliamperes maximum. See test in Figure 2 of the Appendix.

Test Results

The calculated resistance data is as follows:

Energizing current 1.0 amperes. Equal wire length resistance 4.71 milliohms.

Initial 3-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.12
	2	3.15
	3	3.16
	4	3.20
	5	3.12
	6	3.21
	7	3.21
	Min.	3.12
	Max.	3.21
	Avg.	3.16

Initial 3-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.21
	2	3.28
	3	3.19
	4	3.18
	5	3.18
	6	3.17
	7	3.11
	Min.	3.11
	Max.	3.28
	Avg.	3.18

Specified limit 5.0 milliohms.

Final

Final 3-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.25
	2	3.32
	3	3.35
	4	3.54
	5	4.06
	6	4.34
	7	4.72
	Min.	3.25
	Max.	4.72
	Avg.	3.79

Specified limit 5.0 milliohms maximum.

Final 3-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.28
	2	3.29
	3	3.37
	4	3.40
	5	3.41
	6	3.42
	7	3.47
	Min.	3.28
	Max.	3.47
	Avg.	3.37

Specified limit 7.0 milliohms maximum.

2.8 Humidity Temperature Cycling - Group 3

The mated connectors were subjected to 10 cycles of humidity-temperature cycling. The temperature extremes were 25°C to 65°C at 95% relative humidity. See Figure 3 in the Appendix for the temperature profile.

Test Results

No physical damage was observed. The samples were subjected to the electrical test after humidity-temperature cycling.

2.9 Dielectric Withstand Voltage

The test voltage of 750 vac was applied between adjacent contacts of unmated connector assemblies. The voltage was applied for a period of one minute.

Test Results

No breakdown or arcing was observed during the test.

2.10 Mating Force - Group 4

The force necessary to mate the connector assemblies, with the locking latches removed, a distance of 0.20 inch from the point of initial contact was recorded. The force was applied at a rate of 0.5 inch per minute.

Test Results

The total force for each connector was divided by the number of contacts to give the force per contact.

Initial 4-1 - Total Force 3.3 lbs. divided by 7 contacts
gives 0.47 lb. per contact.

Initial 4-2 - Total Force 2.7 lbs. divided by 7 contacts
gives 0.38 lb. per contact.

Specified limit 2.0 lb. per contact maximum.

2.11 Termination Resistance Dry Circuit - Group 4

See Termination Resistance 2.7.

Test Results

The calculated resistance data is as follows: Energizing current 1.0 ampere. Equal wire length resistance 4.71 milliohms.

Initial 4-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	2.97
	2	3.13
	3	2.94
	4	3.24
	5	2.97
	6	3.06
	7	3.20
	Min.	2.94
	Max.	3.24
	Avg.	3.07

Specified limit 5.0 milliohms maximum.

Initial 4-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.25
	2	3.19
	3	3.15
	4	3.10
	5	3.20
	6	3.05
	7	3.10
	Min.	3.05
	Max.	3.25
	Avg.	3.14

Specified limit 5.0 milliohms maximum.

Final - After Durability

Final 4-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.19
	2	3.13
	3	3.06
	4	3.33
	5	3.35
	6	3.30
	7	3.69
	Min.	3.06
	Max.	3.69
	Avg.	3.29

Final 4-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.20
	2	3.13
	3	3.15
	4	3.19
	5	3.21
	6	3.16
	7	3.07
	Min.	3.07
	Max.	3.21
	Avg.	3.16

Specified limit 6.0 milliohms maximum.

2.12 Durability - Group 4

The connector assemblies were mated and unmated 25 times. The header was mounted in a fixture, and the connector was mated manually.

Test Results

No physical damage was observed. Termination resistance was performed after the durability test.

2.13 Unmating Force - Group 4

The force necessary to unmate the connector assemblies, with locking latches removed, was recorded. The force per contact was calculated from the recorded data. The unmating force was applied at a rate of 0.5 inch per minute.

Test Results

Initial 4-1 - Total force 2.4 lbs. divided by 7 contacts gives 0.34 lbs. per contact.

Initial 4-2 - Total force 2.5 lbs. divided by 7 contacts gives 0.35 lbs. per contact.

Specification limit 0.1 lb. per contact.

2.14 Termination Resistance - Group 5

See Termination Resistance 2.7.

Test Results

Initial 5-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.14
	2	3.20
	3	3.16
	4	3.15
	5	3.21
	6	3.11
	7	3.12
	Min.	3.11
	Max.	3.21
	Avg.	3.15

Specified limit 5.0 milliohms maximum.

Initial 5-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.15
	2	3.20
	3	3.16
	4	3.16
	5	3.22
	6	3.11
	7	3.13
	Min.	3.11
	Max.	3.22
	Avg.	3.16

Specified limit 5.0 milliohms maximum.

Final after Thermal Shock.

Final 5-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.34
	2	3.27
	3	3.20
	4	3.26
	5	3.23
	6	3.25
	7	3.26
	Min.	3.20
	Max.	3.34
	Avg.	3.25

Final 5-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.37
	2	2.92
	3	3.29
	4	2.91
	5	3.25
	6	3.22
	7	3.36
	Min.	2.91
	Max.	3.37
	Avg.	3.19

Specified limit 7.5 milliohms maximum.

2.15 Thermal Shock - Group 5

The mated connectors were subjected to the temperature extremes, as follows:

<u>Temperature</u>	<u>Time</u>
85°C	30 Minutes
-55°C	30 Minutes
Transition Time	< 1 Minute

The exposure at the temperature extremes constitutes one cycle. The test was continued for five cycles.

Test Results

No physical damage was observed after the test. Termination resistance was performed after the test.

2.16 Termination Resistance - Group 6

See Termination Resistance Group 2.7.

Test Results

<u>Initial 6-1 -</u>	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.11
	2	3.12
	3	3.14
	4	3.15
	5	3.16
	6	3.20
	7	3.21
	Min.	3.11
	Max.	3.21
	Avg.	3.16
<u>Initial 6-2 -</u>	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.13
	2	3.20
	3	3.16
	4	3.16
	5	3.22
	6	3.21
	7	3.13
	Min.	3.13
	Max.	3.22
	Avg.	3.17

Specified limit 5.0 milliohms maximum.

2.17 Termination Resistance After Vibration - Group 6

Test Results

Final

Final 6-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.15
	2	3.14
	3	3.09
	4	3.09
	5	3.16
	6	3.09
	7	3.13
	Min.	3.09
	Max.	3.16
	Avg.	3.12

Final 6-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.22
	2	3.24
	3	3.09
	4	3.11
	5	3.16
	6	3.14
	7	3.18
	Min.	3.09
	Max.	3.24
	Avg.	3.16

Specified limit 6.0 milliohms maximum.

2.18 Vibration - Group 6

The samples were subjected to vibration parameters as follows: 10-55-10 Hz traversed in one minute, displacement was 0.6 inch peak to peak; 2 hours in each of 3 mutually perpendicular planes. The samples were monitored for discontinuities of 1 microsecond or greater during the test. Total test time was 6 hours.

Test Results

No physical damage or discontinuities were observed during the test. Termination resistance was performed after the vibration test.

2.19 Termination Resistance - Group 7

See Termination Resistance Group 2.7.

Test Results

Initial 7-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.04
	2	2.92
	3	2.83
	4	3.10
	5	2.84
	6	3.24
	7	3.05
	Min.	2.83
	Max.	3.24
	Avg.	3.00

Initial 7-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.16
	2	3.11
	3	3.13
	4	3.09
	5	3.20
	6	3.11
	7	3.14
	Min.	3.09
	Max.	3.20
	Avg.	3.13

Specified limit 5.0 milliohms maximum.

Final - After Temperature Life

Final 7-1 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	3.38
	2	3.77
	3	3.49
	4	3.59
	5	3.49
	6	4.07
	7	3.54
	Min.	3.38
	Max.	4.07
	Avg.	3.61

Specified limit 14.0 milliohms maximum.

Final 7-2 -	<u>Position #</u>	<u>Resistance Milliohms</u>
	1	4.04
	2	3.29
	3	4.06
	4	3.97
	5	3.88
	6	3.50
	7	3.82
	Min.	3.29
	Max.	4.06
	Avg.	3.79

Specified limit 14.0 milliohms maximum.

2.20 Temperature Life

The mated connectors were subjected to 33 days heat age at 118°C.

Test Results

No physical damage was observed. Termination resistance was performed after the temperature life test.

2.21 Contact Retention - Group 8

The retention force was applied to the contacts using a special housing.

Test Results

All samples conform to the minimum requirement of 5.0 pounds.

2.22 Tensile Straight - Group 9

The slot tensile was determined by applying the force parallel to the axis of the wire. The force was applied at a rate of one inch per minute.

Test Results

Initial 9-1 -	<u>Position #</u>	<u>Tensile - (Lbs.)</u>
	1	14.2
	2	11.1
	3	14.6
	4	11.3
	5	14.7
	6	14.6
	7	14.6
	Min.	11.1
	Max.	14.7
	Avg.	12.2

Specified limit is 8.0 lbs. minimum.

Initial 9-2 -	<u>Position #</u>	<u>Tensile - (Lbs.)</u>
	1	12.2
	2	11.1
	3	14.9
	4	14.6
	5	14.5
	6	14.6
	7	14.8
	Min.	11.1
	Max.	14.9
	Avg.	14.2

Specified limit is 8.0 lbs. minimum.

2.23 Tensile Perpendicular - Group 9

The slot tensile was determined by applying the force perpendicular to the axis of the wire, no covers were on the samples.

Test Results

Initial 9-1 -	<u>Position #</u>	<u>Tensile - (Lbs.)</u>
	1	9.7
	2	11.6
	3	12.4
	4	13.2
	5	12.3
	6	11.8
	7	7.8
	Min.	7.8
	Max.	13.2
	Avg.	12.5

Specified limit is 1.5 lbs. minimum.

Initial 9-2 -	<u>Position #</u>	<u>Tensile - (Lbs.)</u>
	1	11.8
	2	13.6
	3	12.8
	4	11.8
	5	12.2
	6	12.4
	7	8.1
	Min.	8.1
	Max.	13.6
	Avg.	11.3

Specified limit is 1.5 lbs. minimum.

3.0 Validation

Report prepared by,

William C. Taylor 11/8/84
William C. Taylor
Test Engineer
Product Testing Section
Corporate Test Laboratory

Reviewed by,

James R. Kohout 11/8/84
James R. Kohout
Manager
Product Testing Section
Corporate Test Laboratory

Approved by,

David R. McAdoo 8/22/85
David McAdoo
Product Assurance Manager
Component and Assemblies Division

APPENDIX

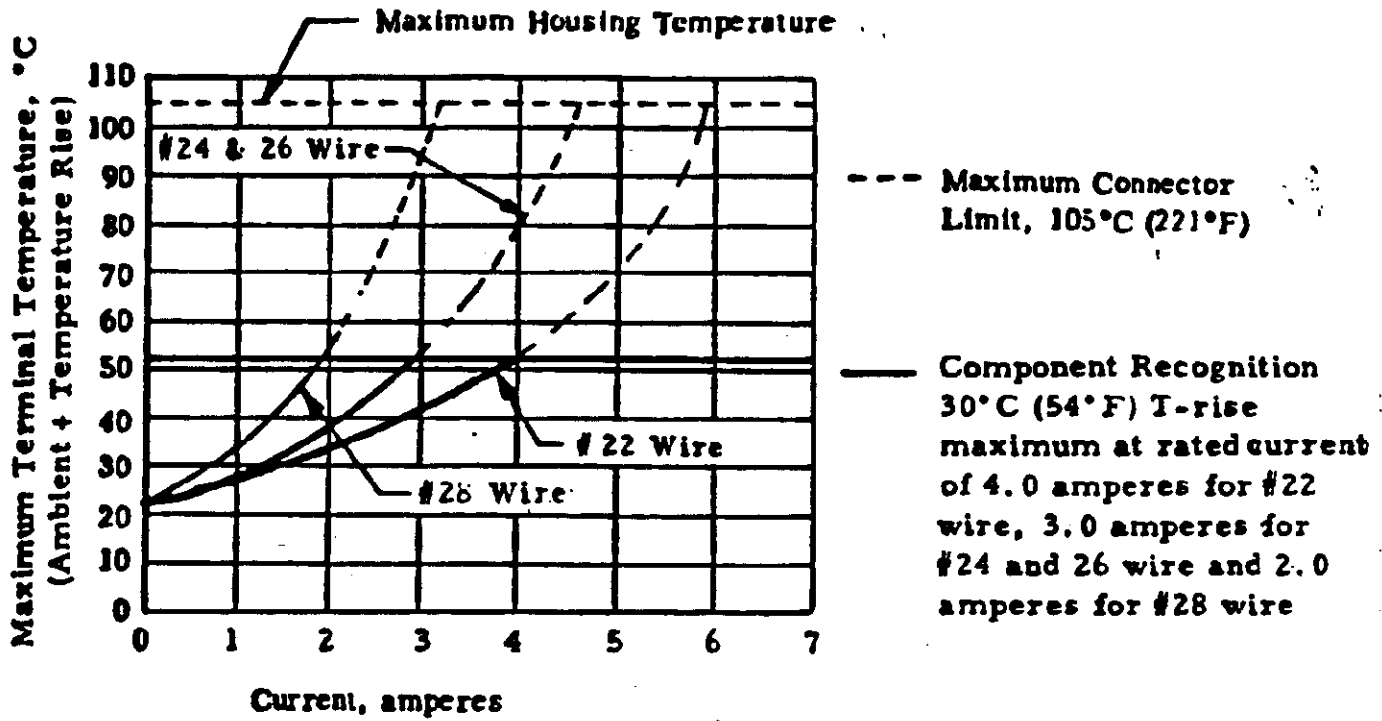


Figure 1

Terminal Temperature vs Current/Circuit