

NUMBER GS-12-1679	TYPE GENERAL PRODUCT SPECIFICATION	Amphenol ICC	
TITLE Flex Lock Double Rows 2.54mm & 3.20mm Pitch FPC TO BOARD		PAGE 1 of 23	REVISION D
		AUTHORIZED BY Ward.Wang	DATE 2022/08/09
		CLASSIFICATION UNRESTRICTED	

1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the FlexLock 2.54mm /3.20mm Pitch FPC TO BOARD product.

本规格书定义了 FlexLock 2.54mm/3.20mm 间距的 FPC TO BOARD 系列产品的性能、测试、质量以及可靠性要求。

2.0 Scope

This specification is applicable to the termination characteristics of the FlexLock 2.54mm /3.20mm Pitch FPC TO BOARD family of products which provides 2A per pin current that used in automobile.

本规范包括 FlexLock 2.54mm/3.20mm 间距的 FPC TO BOARD 系列产品的材料/表面处理、机械特性、电气特性和环境要求，产品可承受 2A 电流并用于汽车领域。

3.0 Ratings

3.1 Operating Voltage Rating = 48 V DC (Creepage distance > 1.1)

额定电压：48 V DC (爬电距离>1.1)

3.2 Operating Current Rating = 4A signal contacts or 2A * positions per connector

额定电流：单根端子 4A 最大，整体 2A 乘以孔位数

3.3 Operating Temperature Range

3.3.1 -40°C to + 105°C

使用温度范围：-40°C ~ +105°C

4.0 GENERAL

This document is composed of the following sections:

本文件由以下各节组成：

Paragraph	Title
1.0	OBJECTIVE
2.0	SCOPE
3.0	Ratings
4.0	GENERAL
5.0	APPLICABLE DOCUMENTS
6.0	REQUIREMENTS

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8.0	QUALITY ASSURANCE PROVISIONS
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8.3	Sample Quantity and Description
8.4	Acceptance
8.5	Qualification Testing
8.6	Requalification Testing
8.7	Qualification Test Table
9.0	RECORD RETENTION

5.0 Applicable Documents

The following documents, of the issue in effect on the date of the latest revision of this specification, shall form a part of this specification to the extent specified herein.

在本规范最新修订之日起生效的下列文件应在本规范中规定的范围内构成本规范的一部分。

5.1 AFCI Specifications(安费诺规范)

- 5.1.1 Engineering drawings
- 5.1.2 Process drawings
- 5.1.3 Application specification(s)
- 5.1.4 Material specification(s)

5.2 Industry or Trade Association standards(工业或行业协会标准)

- 5.2.1 SAE/USCAR-2 REVISION 7, 2020: Performance Specification for Automotive Electrical Connector Systems 汽车电气连接器性能规范系统
- 5.2.2 QC ISO16750-3-2012: Road vehicles -- Environmental conditions and testing for electrical and electronic equipment -- Part 3 Mechanical loads 道路车辆 - 电气和电子设备的环境条件和试验-第3部分机械负载
- 5.2.3 QC-T1067.1-2017: Automotive wiring harness and electrical equipment

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connectors 汽车电线束和电气设备用连接器

5.3 Other Standards and Specifications (其他标准和规范)

- 5.3.1 Flammability: UL94V-0 or similar applicable specification
- 5.3.2 EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications.
- 5.3.3 EC 60512: Connectors for Electronic Equipment – Tests and Measurement
- 5.3.4 AFCI Laboratory Reports - Supporting Data
- 5.3.5 Safety Agency Approvals

6.0 Requirements

6.1 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:

根据本规范连接器提供应以满足指定的资格测试需求,除非另有规定,所有测试应当执行以下的实验条件:

Temperature: 18 to 28°C

Relative Humidity: 45% to 75%

Atmospheric Pressure: 650mm to 800mm of Hg (86 ~106Kpa)

6.2 Definitions

6.2.1 A pair of Header and Receptacle power contact solder to board

A dual right angle contact with a solder tail for termination to the printed circuit board

6.2.2 Header insulator housing

The plastic modules in which the male contacts are retained

6.2.3 Receptacle Insulator Housing

The plastic modules in which the female contacts are retained

6.3 Material:

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6.3.1 Header insulator housing

Housing Material: PA9T or equivalent material; 94V-0; color, black or other

6.3.2 Header Insulator Guide Plate

Guide Plate Material: PA9T or equivalent material; 94V-0; color, black

6.3.3 Receptacle Insulator Housing

Housing Material: PA9T or equivalent material; 94V-0; color, black or other

6.3.4 Receptacle Insulator CPA

CPA Material: PA4T or equivalent material; 94V-0; color, red/black

6.3.5 Metallic Parts

Header Contact Body: it shall be brass copper alloy C2600H

Receptacle Contact Body: it shall be phosphor bronze alloy C5191H or Nickel Silver C7025

Hold down: The hold down shall be brass copper alloy C5191H

6.4 Finish

Plating: Full Reflow Tin Plated over Nickel or Cu under layer or refer to the latest engineering drawing.

6.5 Design and Construction

Connectors shall be of the design, construction, and physical dimensions specified on the applicable product drawing. There shall be no cracks, burrs, or other physical defects that may impair performance. Shall be capable of mating and un-mating manually without the use of special tools.

7.0 TEST METHODS AND REQUIREMENTS

7.1 Samples pretreatment 试样预处理

7.1.1 At all before the start of the test sample should be placed to room temperature (23 ±5)°C, relative humidity 45% ~ 75% of the environment for 24 h.

7.1.2 试验开始前应将试样置于室温(23±5)、相对湿度 45% ~ 75%的环境中 24 小时。

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Test requirements all test should be at room temperature (23 ±5)°C environment. All holes in the connector shall be tested

7.1.3 所有测试应在室温(23 + / - 5 环境)下进行. 连接器上的所有孔都应进行测试。

Wires shall meet the requirements of GB/T 25085, or as agreed between the supplier and the supplier. The wires used shall be recorded in the test report.

7.1.4 Each test and each test sample cannot affect each other. For example, test samples must be kept at a certain distance from each other in a high temperature chamber.

每个测试和每个测试样本不能相互影响。例如, 测试样品必须在高温室内保持一定的距离。

7.1.5 It is not allowed to apply lubricant or other additives to the surface of plugs and sockets during the test. Except the lubricant left in the production process.

在测试过程中, 不允许在插头和插座的表面使用润滑剂或其他添加剂, 除生产过程中遗留的润滑油外。

7.2 Appearance standard 外观标准

7.2.1 Equipment 设备

Camera, video recorder, magnifying glass (if needed).

设备.照相机、录像机、放大镜(如需要).

7.2.2 Methods: 方法

the test sequence is as follows :试验顺序如下

a) Visually inspect the test samples before the test, and record manufacturing and material defects, such as cracks, color changes, burrs, etc. Video or pictures of test samples for each group to prepare a don't do test samples, in order to compare the sample after test. 试验前,目视检在试验样品,记录制造和材料缺陷,如裂缝、色变、毛刺等。对试验样品拍照录像或为每个试验组准备一个不做试验的样品,以便试验后对比试样

b) After test, visual inspection of each tested sample and record all changes can be observed, after test samples and samples without test in step 1), comparing photos or video, and record all the difference in the test report. 试验后,目视检查每个试验过的样品并记录所有能观察到的变化,将试验后的样品与上第 1)步中未经试验的样品,照片或录像进行对比,并在试验报告中记录所有的差别

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7.2.3 Requirements 要求

The sample shall be free from defects affecting the product functions provides to the as expansion, corrosion, Then we can predict color change, contact wear, physical deformation and deformation 样品不应出现膨胀、腐蚀、色变、触点镀层磨损、物理变形、开裂等影响产品功能的缺陷

7.3 Electrical Characteristics 电气特性

7.3.1.1 Maximum Test Current Capability

Reference: SAE/USCAR-2, 5.3.3 Increase the current gradually until $\Delta T = 55^{\circ}\text{C}$

Record the maximum test current when $\Delta T = 55^{\circ}\text{C}$

依照 SAE/USCAR-2 5.3.3 增加电流值直到温差达到 55°C 时，记录此时的电流值。

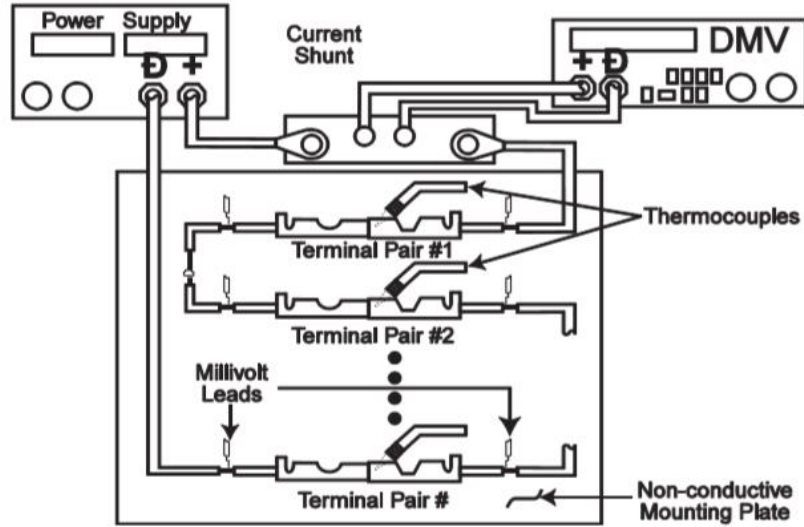
7.3.1.2 Current Cycling 电流循环：

测试方法如下：

- Test Current: the current to be applied for Current Cycling testing shall be 90% of the maximum test current at 55°C
- Test time: 1008H (according to USCAR-2 5.3.4);
- Acceptance criteria: the temperature of any terminal interface must not exceed a 55°C rise over ambient at any time during the test (ROA).

验收标准：在试验期间，任何接触位置的温度不得超过环境温度 55°C (ROA)。

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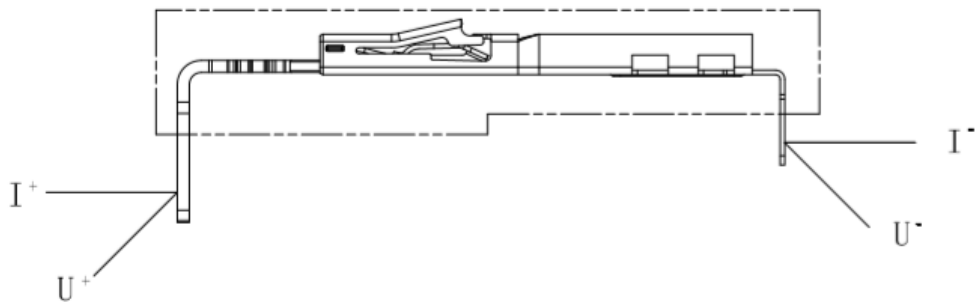


SET-UP FOR MAXIMUM TEST CURRENT

7.3.2 Dry Circuit resistance 干电路电阻

Reference: QC/T1067.1-2017, 4.7 or USCAR-2, 5.3.1

参考 QC/T1067.1-2017, 4.7 或 USCAR-2, 5.3.1



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Mated with applicable connector, the low level contact resistance is 25m ohm maximum initial when measured in accordance with SAE/USCAR-2 5.3.1, the contact resistance of after environmental exposure shall not exceed 15m ohm maximum angle from initial.

根据 SAE/USCAR-2 5.3.1 标准测量，低电平接触电阻最大初始值为 25m 欧姆，与适用连接器配合使用，环境暴露后接触电阻与初始值最大角度不超过 15m 欧姆。

7.3.3 Voltage drop 电压降

Reference: USCAR-2, 5.3.2 or QC/T1067.1-2017, 4.8

Acceptance criteria in accordance with USCAR-2-2020, 5.3.2.4 maximum voltage drop: 50 mV

接受标准依照 USCAR-2, 5.3.2.4 最大电压降: 50mV

7.3.4 Insulation Resistance 绝缘阻抗

Reference: Refer to QC /T 1067.1-2017, 4.27 or USCAR-2, 5.5.1

参考 QC /T 1067.1-2017, 4.27 或 USCAR-2, 5.5.1 进行测试。

a) The following details shall apply: 应满足如下要求:

Test Voltage: 500V DC 测试电压: 500 伏直流电

b) Acceptance criteria: the resistance between every combination of two adjacent terminals in the connection must exceed 100 M Ω at 500 VDC. 验收标准: 在 500 V 直流电下, 连接中两个相邻端子的每一个组合之间的电阻必须超过 100 M Ω 。

c) Electrification time 带电时间 : 1 minute. 1 分钟

d) Point of Measurement 测试点: Between adjacent contacts. 相邻近的端子

7.3.5 Dielectric strength of insulation 绝缘介电强度

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current (1mA max) when the mated connectors are tested in accordance with Customer. The following details shall apply: 与配插端配插进行测试时, 没有任何证据表明有电弧、绝缘损坏或过度泄漏电流 (1 毫安培最大)

a) Test Voltage: 500V AC or 700V DC

测试电压: 500 伏交流电或 700V 直流电

b) Test Duration: 1 minute. 测试持续时间: 1 分钟

c) Points of measurement: Between adjacent contacts.

测试点: 相邻的端子

d) Refer to QC /T 1067.1-2017, 4.28.1 Test method 参照 QC /T

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1067.1-2017, 4.28.1 中的测试方法

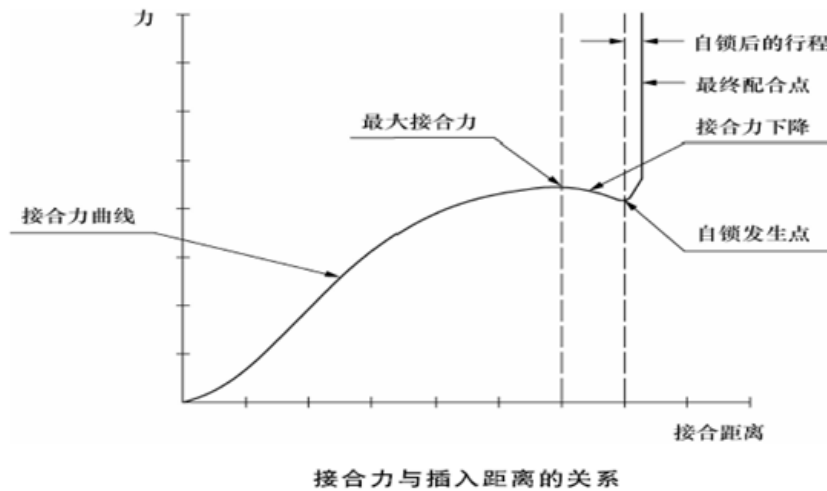
7.4 MECHANICAL CHARACTERISTICS 机械特性

7.4.1 Connector To Connector Mating /Un-mating Force/ Locking Device Strength (Retention Force)

连接器与连接器的插入/拔出力/保持力/锁止装置强度（保持力）

Reference: QC /T 1067.1-2017, 4.12 or USCAR-2, 5.4.2

参考 QC /T 1067.1-2017, 4.12 或 USCAR-2, 5.4.2 进行测试



Insert and withdraw connectors at the speed rate of 50±10mm/minute.

以 50±10 mm/分钟的速度插入和拔出连接器。

The following details shall apply: 应满足如下要求:

Mating /Un-mating Force: =15N MIN & 75N Max.(Rec Terminal without Convex Null)

插入/拔出力: =15N 最小 & 75N 最大 (母端端子弹片无凸包)。

Un-mating Force : =10 N min (Rec Terminal with Convex Null).

拔出力: =10N 最小 (母端端子弹片有凸包)。

Unlock the force: 6N~51N 解锁力: 6N~51N。

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Retention force must be ≥ 100 Newton with the connector lock fully engaged.
锁扣的保持力应须大于或等于 100N.

7.4.2 Durability

插拔循环

Plating spec	Durability Cycles	Application
Sn plating	10	Before the test, connector mated and unmated 10 cycles.
Au plating	30	Before the test, connector mated and unmated 10 cycles.

Reference: QC /T 1067.1-2017, 4.3 or USCAR-2, 5.1.7

参照 QC /T 1067.1-2017, 4.3 或 USCAR-2, 5.1.7

Insert mating terminals at a uniform speed not exceeding 50mm/min. The force should be applied parallel to the center line of the terminals.

以不超过 50mm/min 的均匀速度插入配对端子。力应平行于端子的中心线施加

Acceptance criteria: No physical damage. 验收标准: 无物理性损伤

7.4.3 Terminal to Terminal engage/Disengage Force

端子至端子的结合力与分离力

Reference: QC /T 1067.1-2017, 4.4 or USCAR-2, 5.2.1

参考 QC /T 1067.1-2017, 4.4 或 USCAR-2, 5.2.1

Terminal Insertion force : 3N Max/pin 端子插入力: 3 牛顿最大/ 每支端子.

Disengagement force: 0.8N/pin minimum 拔出力: 0.8 牛顿最小/ 每支端子.

Acceptance criteria according to 6.2.3 requirement. 须符合 6.2.3 的验收标准.

7.4.4 Fool-proofing Design structure of Connector 连接器防错结构设计

a) Reference: QC /T 1067.1-2017, 4.14 and USCAR-2, 5.4.4

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参照 QC /T 1067.1-2017, 4.14 和 USCAR-2, 5.4.4 进行测试.

b) Acceptance criteria: The connector should not be damaged when it bears the wrong connection force, and the plug terminals and socket terminals should not contact

验收标准: 连接器承受错误接合力时不应损毁, 插头端子和插座端子不应接触。

7.4.5 CPA's insertion force / withdrawal force CPA 的插入力/拔出力

a) Reference: QC /T 1067.1-2017, 4.16 or USCAR-2, 5.4.5.2

参照 QC /T 1067.1-2017, 4.16 或 USCAR-2, 5.4.5.2

进行测试.

b) Acceptance criteria according to QC /T 1067.1-2017, 4.16.3 or USCAR-2, 5.4.5.2

验收标准: 须符合 QC /T 1067.1-2017, 4.16.3 或 USCAR-2, 5.4.5.2

b-1) After the connector fits correctly, the maximum insertion force of CPA is 22N, and the pull-out force should be 3N~30N.

连接器正确配合后, CPA 的插入力最大为 22N,拔出力应为 3N~30N;

b-2) When the connector does not fit, the CPA insertion force shall be at least 60N.The pulling force at the pre-installed position shall be at least 30N.

连接器没有配合时, CPA 的插入力至少为 60N;在预装位置的拔出力至少为 30N

7.4.6 Connector to connector audible clicks 连接器到连接器可听见的咔哒声

a) Reference: QC /T 1067.1-2017, 4.18 or USCAR-2, 5.4.7

参考 QC /T 1067.1-2017, 4.18 或 USCAR-2, 5.4.7 进行测试.

b) Acceptance criteria according to QC /T 1067.1-2017, 4.18.3 or USCAR-2-2013, 5.4.7.4

须符合 QC /T 1067.1-2017, 4.18.3 或 USCAR-2, 5.4.7.4 的验收标准.

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7.4.7 Vibration / Mechanical Shock 振动/机械冲击

Per QC /T 1067.1-2017, 4.17 or SAE/USCAR-2, 5.4.6

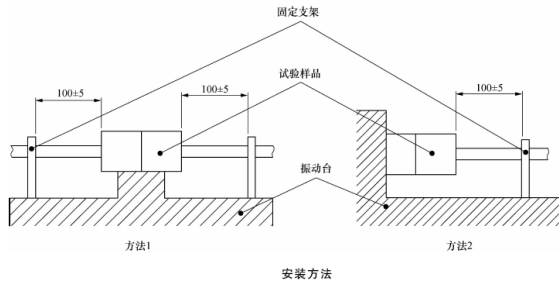
依 QC /T 1067.1-2017, 4.17 或 SAE/USCAR-2, 5.4.6 章

Test Condition: Random 5 Hz - 1000 Hz, 1.81 g's RMS overall

测试条件：以 60HZ-1200HZ 的频率随机振动，加速度为 12.1G.

Duration: 8 Hours per axis. 持续时间：8 小时/每轴

Direction: each of 3 orthogonal axis 方向, X,Y,Z 三个互相垂直的轴向



Vibration Duration by Vibration Class

Vibration Class	Sine Duration (Hrs./axis)	Random Duration (Hrs./axis)	Thermal Cycling
V1	n/a	8	n/a
V2	n/a	8	n/a
V3	22	22	Per 5.4.6.3 #6
V4	32	50	Per 5.4.6.3 #6
V5	n/a	22	n/a

NOTE: Sine and random profiles shall be run separately (not concurrently).

TABLE 5.4.6.3B: CLASS SCHEDULE FOR VIBRATION DURATION

Class Schedule for Shock

Vibration Class	Shocks per Axis	Wave Shape	Direction (+/-)	Duration (ms)	Acceleration (g)
V1	10	Half Sine Wave	Positive	5 ~ 10	35
V2	10	Half Sine Wave	Positive	5 ~ 10	35
V3 V4 V5 (Perform Both Tests)	1	132 x 6 = 792	Half Sine Wave	15	25
	2	3 x 6 = 18	Half Sine Wave	11	100

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No discontinuities greater than 1 μ s, when measured in accordance with SAE/USCAR-2 5.4.6 V2 level

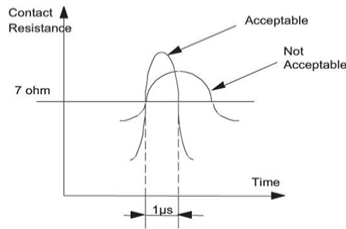
根据 SAE/UScar-2 5.4.6 V2 级测量时, 不连续性不应大于 1 微秒。

V1 - Random

F (Hz)	PSD ¹	PSD g ² /Hz
5.0	0.192	0.00200
12.5	23.8	0.24800
77.5	0.307	0.00320
145.0	0.192	0.00200
200.0	1.13	0.01180
230.0	0.031	0.00032
1000.0	0.002	0.00002
g_{rms}	17.74	1.81 g

V2 - Random

F (Hz)	PSD ¹	PSD g ² /Hz
60.0	0.096	0.00100
200.0	144	1.50000
210.0	9.60	0.10000
1200.0	9.60	0.10000
g_{rms}	119	12.1 g



Acceptance criteria: No damage allowed 验收标准: 无物理性损伤

7.4.8 Vibration / Mechanical Shock 振动/机械冲击 (Rec Terminal with Convex Null)

Per LV214 OR VW 75174 TG 17 – Dynamic loading S3

依 LV214 或 VW 75174 TG 17 S3

Test Condition: Random 20Hz - 1500 Hz, 10 g's RMS overall

测试条件: 以 20Hz-1500Hz 的频率随机振动, 加速度为 10G.

Duration: 22 Hours per axis. 持续时间: 22 小时/每轴

Direction: each of 3 orthogonal axis 方向, X,Y,Z 三个互相垂直的轴向

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No discontinuities greater than 1 μ s, when measured in accordance with LV214 S3 level

根据 LV214 S3 级测量时, 不连续性不应大于 1 微秒。

Severity	TC	Noise with TC		Vibration excitation, sinusoidal, with TC		Number of shocks
3. "Applications close to the engine"	0 min/20 °C 60 min/-40 °C 90 min/-40 °C 240 min/120 °C 420 min/120 °C 480 min/20 °C	22 h per axis; RMS value of acceleration: 105.5 m/s ²		22 h per axis		a = 30 g t = 6 ms sinusoidal half-wave No. of shock
		Hz	(m/s ²) ² /Hz	Hz	mm	
		20	10	100	0.095	
		95	10	Hz	m/s ²	
		110	0.01	200	150	
		380	0.01	220	150	
410	20	221	100			
800	10	400	100			
1500	5					

TG 17 Sine wave

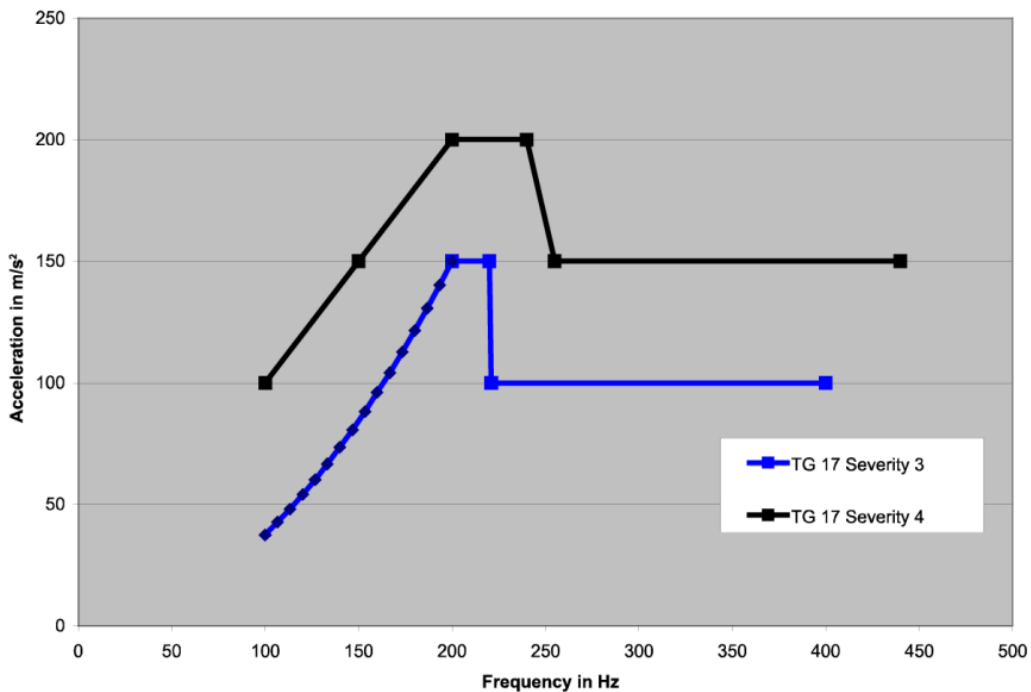


Figure 7 – Sinusoidal vibration excitation "Severities 3 and 4"

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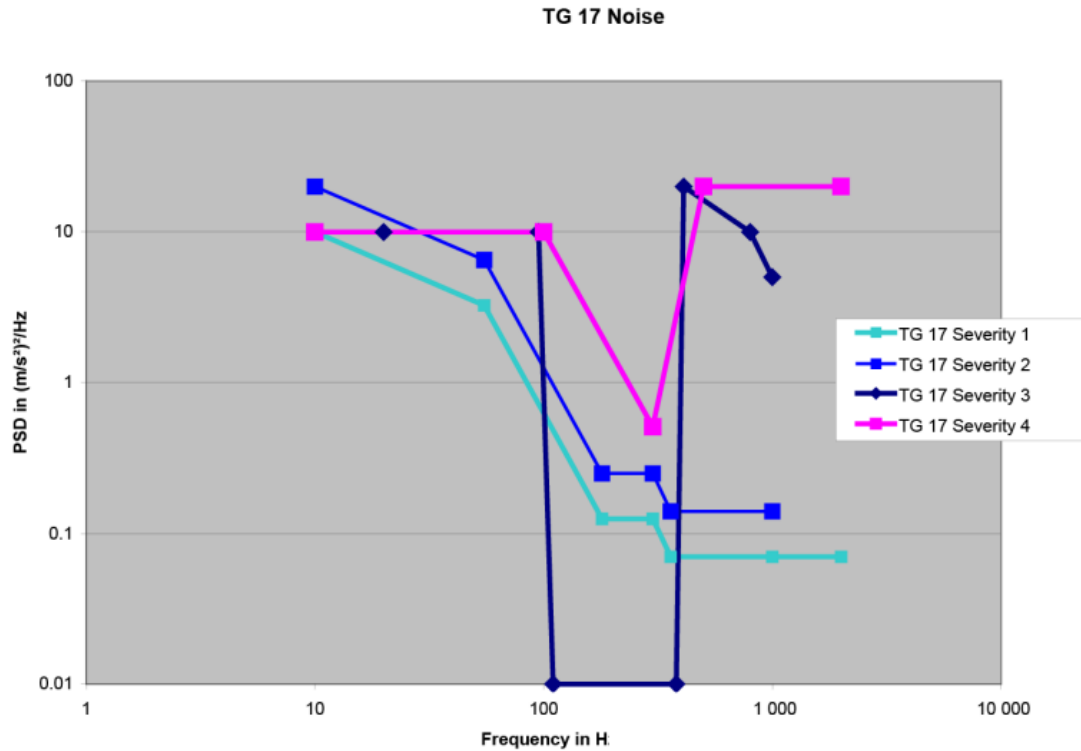


Figure 9 – "Noise" test profile

Acceptance criteria: No damage allowed 验收标准：无物理性损伤

7.4.9 Connector drop test 连接器跌落试验

a) Reference: QC /T 1067.1-2017, 4.19 or USCAR-2, 5.4.8

参考 QC /T 1067.1-2017, 4.19 或 USCAR-2, 5.4.8 进行测试.

b) Acceptance criteria according to QC /T 1067.1-2017, 4.19.3 或 USCAR-2, 5.4.8.4
须符合 QC /T 1067.1-2017, 4.19.3 或 USCAR-2, 5.4.8.4 的验收标准.

b-1) Samples shall meet the Acceptance Criteria of section 6.2.3, Visual Inspection
测试样品应符合外观检验要求。

b-2) Components shall not be displaced from their intended shipping position.
部件不得从预定的运输位置移动。

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7.4.10 Header pin and Receptacle terminal retention fore

公端 Pin 针与母端端子对塑体的的保持力

- a) Header pin Reference: QC /T 1067.1-2017, 4.26 or SAE/USCAR-2 5.7.1
 Rec terminal Reference: QC /T 1067.1-2017, 4.26 or SAE/USCAR-2 5.7.1
 公端端子参考 QC /T 1067.1-2017, 4.26 or SAE/USCAR-2 5.7.1 进行测试.
 母端端子参考 QC /T 1067.1-2017, 4.26 or SAE/USCAR-2 5.7.1 进行测试.

b) Acceptance criteria:

Header Contact Retention force: 1.5Kg.f Min

(The minimum force required to displace the pin 0.2mm for Header).

REC Contact Retention force: 1.5Kg.f Min

(The force required to the peak of Retention Force tester for Rec when the terminal is pulled out).

验收标准: 公端端子保持力 1.50KG.f/支最小.

母端端子保持力 1.50KG.f/支最小

7.5 Environmental CHARACTERISTICS 环境特性

7.5.1 Thermal Shock 热冲击

- a) Reference: QC/T1067.1-2017, 4.29 or USCAR-2, 5.6.1

参考: QC/T1067.1-2017, 4.29 或 USCAR-2, 5.6.1 章进行测试

- b) Determine the Temperature Class for the intended application of the connector system from table 5.1.4.1 with Class T2 : -40°C to +100°C.

选择连接器系统表 5.1.4.1 预期应用温度等级为等级 T2: -40°C to +100°C。

- c) Repeat Steps 4 and 5 ninety nine (99) more times.

重复步骤 4 和 5 (九十九)次以上。

- d) The resistance of any terminal pair not exceeds 7.0 Ω for more than 1us.

瞬断电阻 7 Ω 不大于 1 微秒.

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7.5.2 Temperature/Humidity Cycling 温湿度循环

a) Reference: QC/T1067.1-2017, 4.30 or USCAR-2, 5.6.2

参考：QC/T1067.1-2017, 4.30 或 USCAR-2, 5.6.2 章进行测试

b) Cycle the test samples 40 times using the cycling schedule shown in Figure 5.6.2.3. The cycle begins with the sample at -40°C to $+100^{\circ}\text{C}$, 0%-95%RH. Completion of the schedule shown in Figure 5.6.2.3 will constitute one cycle. Use the Maximum Ambient Temperature for hours 5 through 7 as determined from Table 5.1.4.1 level T2.

使用图 5.6.2.3 所示的循环时间表循环试验样品 40 次,循环从 -40°C 到 $+100^{\circ}\text{C}$, 0%-95%相对湿度, 完成图 5.6.2.3 所示的计划构成一个周期。根据表 5.1.4.1 等级 T2 确定的最大环境温度, 第 5 至第 7 小时。

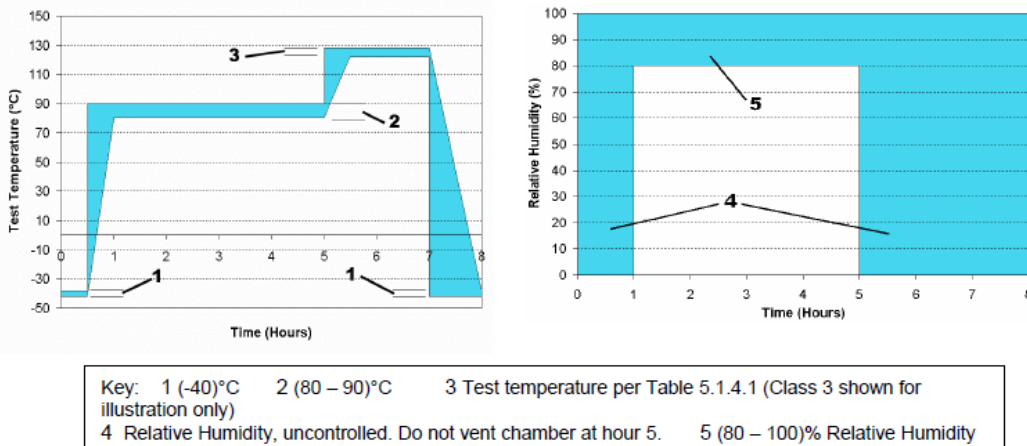


FIGURE 5.6.2.3: TEMPERATURE/HUMIDITY CYCLING SCHEDULE

7.5.3 Heat aging 热老化/ High Temperature Exposure 高温暴露

a) Reference: QC/T1067.1-2017, 4.31 or USCAR-2, 5.6.3

参考：QC/T1067.1-2017, 4.29 或 USCAR-2, 5.6.3 章进行测试

b) Place the samples in the chamber, set to the maximum ambient temperature, so that there is no substantial obstruction to air flow across and around the samples, and the samples are not touching each other. Leave the samples in the chamber for 1008 hours 将样品放入室内,设置好最高周围温度,以便样品与样品周围空气流动没有实质性阻碍,样品也没有相互接触,样品留下在室内 1008 小时。

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c) The Temperature for the intended application of the connector system from -40°C -+105°C.

连接器系统预期应用温度为-40°C- +105°C 。

7.5.4 Salt spray test 盐雾试验

Plating spec	testing time (H)
Sn plating	48
Au plating	96

a) Reference: QC/T1067.1-2017, 4.36.1

参考：QC/T1067.1-2017, 4.36.1

b) Acceptance criteria: The micro-current connection resistance after the salt spray test should not be more than 15m ohm that before the test, and the sample after the salt spray test should meet the requirements of 6.3.4 insulation resistance.

c) 验收标准：盐雾试验后的微电流连接电阻不应大于试验前测量值 15m 欧姆，且盐雾试验后样品应符合 6.3.4 绝缘电阻的要求

7.5.5 Solderability 可焊性

a) Per J-STD-002 依 J-STD-002 电子连接器可焊性测试方法

b) Solder Time 焊接时间: 5 ± 0.5 seconds(秒)

c) Solder Temperature 焊接温度: 245 ± 5°C(摄氏度)

d) Solder area shall have minimum of 95% solder coverage.

焊接面积应至少 95%的焊料覆盖。

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8.0 QUALITY ASSURANCE PROVISIONS 质量保证条款

8.1 Equipment Calibration 设备校准

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.

所有测试设备和检验设施用于测试时的性能应符合 MIL- C – 45662 和 ISO 9000 的校准系统的规定。

8.2 Inspection Condition. 检验条件

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions: 除非另有说明,所有的检查应在下列环境条件下进行:

- a) Temperature 温度 : $25 \pm 5^{\circ}\text{C}$
- b) Relative Humidity 相对湿度 : 30% ~ 60%
- c) Barometric Pressure 大气压: Local ambient 当地的环境

8.3 Sample Quantity and Description 样本数量和描述

The numbers of samples to be tested in each group shown in Qualification Testing Sequences are defined as follows: Groups A through N:

5 samples in each group: All samples must be free of defects that would impair normal connector operation. All samples must meet dimensional requirements of connector.

样品的数量在每组测试资格如下所示:A 组到 N 组,每组 5 个样品,所有的样品必须是无缺陷的,所有样品必须符合尺寸要求。

8.4 Acceptance 验收

8.4.1 Electrical and mechanical requirements placed on test samples as indicated in paragraphs 5.2 and 5.3 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. 测试样本应符合在段落 5.2 和 5.3 的机械与电气要求,测试数据使用适当的统计技术或按客户指定的规定,所有样品测试符合本产品规范所规定的要求。

Failures attributed to equipment, test setup, 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

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for qualification.测试失败归因于设备、测试设置或操作错误的原因不得取消产品认证。如果产品测试因以上原因,应采取纠正措施和再次提交样品认证。 .

8.5 Qualification Testing 资格测试

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。进行资格应测试样本应与通过正常生产设备和制程的产品一致。所示的测试序列应当体现在资格测试序列中。Visual Examination: Per SAE/USCAR-2 5.1.8 外观检查: 依照 SAE/USCAR-2 5.1.8 章

8.6 Re-qualification Testing 重新资格测试

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.如果出现下列情形之一的,产品工程师应启动重测表 1 中所有的测试。

- d) 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, normal force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.

重大的设计变更影响现有产品形状或功能.明显的变化的例子包括但不限于改变电镀材料成分或厚度、正向力、接触表面形状,绝缘体、端子底材或接触润滑要求发生改变。

- e) A significant change is made to the manufacturing process, which impacts the product form, fit or function.

生产过程的显著变化,影响产品形状,安装或功能的变化。

- f) A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

在生产过程中有重大事件发生或最终使用要求纠正产品设计或制造过程。

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8.7 Qualification Test Table

8.7.1 Qualification Testing Sequences-1 (Group E test is selective by CPA part)

USCAR TG	Test	Para.	Test Group																	
			A	B	C	D	E	F	G											
			A	C	G	H	E	F+I	K											
			Test Sequence																	
	Samples pretreatment	7.1	1	1	1	1	1	1	1											
	Visual Examination	7.2	2,4	2,6	2,4	2,4	2,4	2,4	2,5	2,4										
	Durability	7.4.2		3																
	Terminal to Terminal engage/Disengage Force	7.4.3	3																	
	Maximum Test Current Capability	7.3.1.1		4																
	One pair Current Cycling	7.3.1.2		5																
	Connector To Connector Mating /Un-mating Force/ Locking Device Strength	7.4.1			3															
	Fool-proofing Design structure of Connector	7.4.4				3														
	CPA's insertion force/ withdrawal force	7.4.5					3													
	Connector to connector audible clicks	7.4.6							3											
	Connector drop test	7.4.9							4											
	Header pin and Receptacle terminal retention fore	7.4.10								3										
	Sample quantity		5	5	5	5	5	5	5	5										

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8.7.2 Qualification Testing Sequences-2

		Test Group						
		H	J	K	L	M	N	P (Only for Rec Terminal with convex null)
USCAR TG		M	N	O	P	/	/	LV214 S3
Test	Para.	Test Sequence						
Samples pretreatment	7.1	1	1	1	1	1	1	1
Visual Examination	7.2	2,8	2,8	2,10	2,8	2,9	2,4	2,7
Durability	7.4.2	3	3	3	3	3		3
Dry Circuit resistance	7.3.2	4,6	4,6	4,6	4,6	4,6		4,6
Voltage drop	7.3.3	7	7	7	7	7		
Connector To Connector Mating /Un-mating Force	7.4.1			11	9			
Vibration/ Mechanical Shock (USCAR)	7.4.7	5						
Vibration/ Mechanical Shock (LV214)								5
Insulation Resistance	7.3.4			8		8		
Dielectric strength of insulation	7.3.5			9				
Thermal Shock	7.5.1		5					
Temperature/Humidity Cycling	7.5.2			5				
High Temperature Exposure	7.5.3				5			
Salt spray test	7.5.4					5		
Solderability	7.5.5						3	
Sample quantity		5	5	5	5	5	5	5

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9.0 RECORD RETENTION

REVISION RECORD

REV	PAGES	DESCRIPTION	EC #	DATE
A	ALL	--	-	06/28/2021
B	1	Operating Voltage Rating = 48 V DC	ELX-N-41892	08/02/2021
C	ALL	Add 3.20mm pitch product and USCAR TG		
D	ALL	Add LV214 S3 SPEC	ELX-N-45671	2022-08-09