

Product Specification 【产品规格书】	Document No.	PS-2024-01
Product Name 【产品名称】： 2.00mm Pitch 2024 Series Connector	Date Issued	2021/02/26
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This specification is only referred to the 2024 series connector

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**【1.适用范围 Scope】**

此规格包括 2.00mm Pitch 2024 Series 连接器规格说明。

This Specification includes the 2.00mm Pitch 2024 Series Connector Specification.

**【2.产品型号描述 Product Description】**

产品名称 Part Name	产品料号 Part No.	产品图示 Picture
公端子/Male Terminal	2024TM-BSN1	
母端子/Female Terminal	2024TXF-HXX	
母胶壳/Female Housing	2024AF-2*XXX-PTBK 2024AF-XXX-PTBK	
公胶壳/Male Housing	2024AM-2*XX-PTBK 2024AM-XX-PTBK	
针座/Wafer	2024WVS-2*XX-LPXBR 2024WVS-XX-LPXBR 2024WRS-2*XX-LPXBR 2024WRS-XX-LPXBR	

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### 【3.材质与表面处理 Material and surface treatment】

规格内容 Specification	材质 Materials	颜色/表面处理 Color/Surface treatment	
公端子/Male Terminal	黄铜/Brass	Underplated: Ni (1~3μm)overall; Top plating: Sn (2~5μm) overall	
母端子/Female Terminal	高导铜/High conductivity copper	Top plating: Sn (1~3μm) overall	
		Underplated: Ni (1~3μm)overall; Contact area Plating Au 1u"(0.025μm)Min	
公胶壳/Male Housing	PBT-GF15(UL 94V-0)	黑色 Black	
母胶壳/Female Housing	PBT-GF15(UL 94V-0)	黑色 Black	
TPA	PBT-GF15(UL 94V-0)	白色 White	
针座 Header	Housing	LCP-GF35 (UL 94V-0)	黑色 Black
	Pin	黄铜/Brass	Underplated: Ni (1~3μm)overall; Top plating: Sn (2~5μm) overall
			Underplated: Ni (1~3μm)overall; Contact area Plating Au 1u"(0.025μm)Min Weld area Plating Sn 80~200u"(2~5μm)
Solder tab	黄铜/Brass	Underplated: Ni (1~3μm)overall; Top plating: Sn (2~5μm) overall	

(上述参数请以工程图为准/Please Refer to the Project drawing for the above Specification)

### 【4. 额定等级 Ratings and applicable wires】

项目 Item	规格 Specification
额定电压 Rated Voltage	50V
额定电流 Rated Current	3A 0.35mm <sup>2</sup>
使用温度范围 Ambient Temperature Range	-40°C~+125°C

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## 【5.测试方法及要求 Test Methods and Requirements】

### 5-1. 外观检查 Examination of product.

测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-1-1 产品外观检查 Visual Inspection	借助 10 倍放大镜对每一个试验样品进行检查，详细记录所有制造或材料的瑕疵，如：裂缝、变色、毛刺等。 Inspect each sample with a 10x magnification, recording all defects in all process or material defects such as cracks, discoloration, flash, etc.	USCAR-2 Rev.7 5.1.8

### 5-2. 电气性能 Electrical Performance.

测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-2-1 电路连贯性监控 Circuit Continuity Monitoring	电流的连续性监控中断不能超过 1us 不允许任何端子电阻超过 7 欧的时间大于 1us 的情况发生 There must be no loss of electrical continuity for more than 1 microsecond There must be no instance in which the resistance of any terminal pair exceeds 7.0 $\Omega$ for more than 1 microsecond	USCAR-2 Rev.7 5.1.9
5-2-2 干电路电阻 Dry Circuit Resistance	在环境后 $\leq 25m\Omega$ Final $\leq 25m\Omega$	USCAR-2 Rev.7 5.3.1
5-2-3 电压降 Voltage Drop	在环境后 $\leq 50mV$ Final $\leq 50mV$	USCAR-2 Rev.7 5.3.2
5-2-4 最大试验电流能力 Maximum test current capacity	在无风的封闭场所内搭建一个电路 温度：23 $\pm$ 5 $^{\circ}C$ (室温) 时间：等待 15 分钟（电流在输出时，电路的温度达到稳定） 温升：55 $^{\circ}C$ Create a circuit in a draft free environment Temperature :23 $\pm$ 5 $^{\circ}C$ (room temperature) Time: Wait at least 15 minutes for the circuit temperature to reach Steady State Temperature Rise: 55 $^{\circ}C$	USCAR-2 Rev.7 5.3.3

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测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-2-5 电流循环 Current Cycling	1.测试电流为最大试验电流 90% (测试项 5-2-4) 2.通电 45 分钟, 断电 15 分钟, 完成 1008 个循环 3.任何端子温升不超过 55°C 4.干电路电阻 $\leq 25\text{m}\Omega$ 1.The test current is 90% of the maximum test current (Item:5-2-4) 2.45 minutes of power on ,15 minutes of power off ,and 1008 cycles are completed. 3.The temperature rise must not exceed 55°C at any time during the test for any terminal 4.Dry circuit resistance is less than or equal 25m $\Omega$	USCAR-2 Rev.7 5.3.4
5-2-6 绝缘电阻 Insulation Resistance	将试验样品的所有接端交错连接成两组, 再施加 500 VDC 电压测量绝缘电阻。绝缘电阻 $>100\text{M}\Omega$ Apply 500 VDC voltage (desiccation bound) between all contacts connected together and a metal foil surrounding the housing. In addition, apply the voltage a different test sample to every two adjacent contacts. Insulation resistance $>100\text{M}\Omega$	USCAR-2 Rev.7 5.5.1

### 5-3. 机械性能 Mechanical Performance.

测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-3-1 连接器/端子循环 Connector and/or Terminal Cycling	完成每一对连接器或端子 10 次插拔 Completely mate and un-mate each connector or terminal pair 10 times	USCAR-2 Rev.7 5.1.7
5-3-2 端子到端子啮合/分离力 Terminal to Terminal Engage/Disengage Force	以不超过 50mm/min 的均匀速度插入-分离对配端子 注意接触面的任何磨损, 不应暴露基材 Engage and disengage the mating terminals at a uniform rate not to exceed 50 mm/min No base material should be exposed	USCAR-2 Rev.7 5.2.1
5-3-3 连接器至连接器的配合/分离力 (无机械辅助) Connector-Connector Mating/Unmating/ Retention Forces (non-assist)	组装所有适配组件, 以 50mm/min 的均匀速度配合连接器, 插入力 $\leq 75\text{N}$ 以不超过 50mm/min 的均匀速度拔出配合的主锁被完全分离/禁用的连接器, 拔出力 $\leq 75\text{N}$ Completely assemble all connector halves using all applicable components, mating the connectors at a uniform rate 50mm/min, Mating Force $\leq 75\text{N}$ Disengage the mating connectors that primary lock completely disengaged/disabled at a uniform rate not to exceed 50mm/min. Unmating Force $\leq 75\text{N}$	USCAR-2 Rev.7 5.4.2 LV214-1 TG7 (Table 5)

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		<p>注：组装所有适配组件，以 50mm/min 的均匀速度卡扣保持力（不含端子）不依 5.4.2.4 要求的&gt;110N 标准。该项标准依 LV214-1 TG7 执行（下表）。</p> <p>Note: All adaptive components shall be assembled, and the retaining force of the buckle (excluding terminals) shall not comply with 5.4.2.4 at a uniform speed of 50mm/min. 110 n. This standard is implemented according to LV214-1 TG7 (Table below).</p> <p style="text-align: center;">Table 5 – Positive-locking contact housing holding forces</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4" style="text-align: center;">Positive-locking contact housing holding forces</th> </tr> <tr> <th rowspan="2">Contact size in mm</th> <th colspan="3">Number of pins</th> </tr> <tr> <th>1 to 2 pins</th> <th>3 to 6 pins</th> <th>&gt; 6 pins</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td>&gt; 40 N</td> <td>&gt; 50 N</td> <td>&gt; 60 N</td> </tr> <tr> <td>0.63 to 1.2</td> <td>&gt; 60 N</td> <td>&gt; 80 N</td> <td>&gt; 100 N</td> </tr> <tr> <td>&gt; 1.2 to 2.8</td> <td>&gt; 80 N</td> <td>&gt; 100 N</td> <td>&gt; 100 N</td> </tr> <tr> <td>&gt; 2.8 to 6.3</td> <td>&gt; 100 N</td> <td>&gt; 100 N</td> <td>&gt; 100 N</td> </tr> <tr> <td>&gt; 6.3</td> <td>&gt; 150 N</td> <td>&gt; 150 N</td> <td>&gt; 150 N</td> </tr> </tbody> </table>	Positive-locking contact housing holding forces				Contact size in mm	Number of pins			1 to 2 pins	3 to 6 pins	> 6 pins	0.5	> 40 N	> 50 N	> 60 N	0.63 to 1.2	> 60 N	> 80 N	> 100 N	> 1.2 to 2.8	> 80 N	> 100 N	> 100 N	> 2.8 to 6.3	> 100 N	> 100 N	> 100 N	> 6.3	> 150 N	> 150 N	> 150 N
Positive-locking contact housing holding forces																																	
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<b>测试内容</b> <b>Item</b>	<b>规格要求</b> <b>Specification requirements</b>	<b>参考标准</b> <b>Reference standard</b>
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5-3-4	端子至连接器插入/保持力 Terminal-Connector Insertion/Retention Force	端子以不超过 50mm/min 的均匀速度插入连接器 端子插入力 ≤15N 端子以不超过 50mm/min 的均匀速度拉出连接器 端子保持力(一次锁+二次锁) ≥40N The terminal straight into the connector at a uniform rate not to exceed 50 mm/min Insertion Force ≤15N Pull the terminal straight back from the connector at a uniform rate not to exceed 50mm/min, until pullout occurs. Retention Force (Primary+Secondary Lock) ≥40N	USCAR-2 Rev.7 5.4.1
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5-3-5	混合组件的啮合分离力 Miscellaneous Component Engage/Disengage Force	15N ≤ 啮合力 ≤ 60N 分离力：18N ≤ 锁定到预锁 ≤ 60N 预锁到完全分离 ≥ 25N 15N ≤ Engagement Force ≤ 60N Removal Force：18N ≤ Lock to pre-set ≤ 60N Removal from Pre-state ≥ 25N	USCAR-2 Rev.7 5.4.5
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测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-3-6 震动/机械冲击 Vibration/Mechanical Shock	<p>冲击：1.加速度 35g、脉宽 5~10ms、半正弦 2.每轴 10/次、6 个轴向 振动：三个相互垂直的轴中各进行 8 小时振动测试，使用 60-1200HZ 12.1grms 没有任何端子对的电阻在 1 微秒内超过 7.0Ω的情况发生 Shock： 1. Acceleration 35 g, Duration 5~10 ms,Half Sine Wave 2.Each axis 10/times ,6 axes. Vibration :8 hours of vibration test in each of the three vertical axes, using 60-1200 HZ 12.1grms Does not occur when the resistance of any terminal pair exceeds 7.0Ω within 1 microsecond.</p> <p><b>Vibration Class V2 - On Engine Random (PSD)</b></p>	USCAR-2 Rev.7 5.4.6

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测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-3-7 极性特征有效性 Polarization Feature Effectiveness	以错误的方向将公连接器插入母连接器,公母端子间不通电 Insert the male connector into the female connector in the wrong direction, and the male and female terminals are not electrical contact	USCAR-2 Rev.7 5.4.4
5-3-8 端板 Pin 针保持力 Header Pin Retention	保持力 $\geq 15\text{N}$ Retention force $\geq 15\text{ N}$	USCAR-2 Rev.7 5.7.1
5-3-9 连接器安装特征机械强度 Connector Mounting Feature Mechanical Strength	断开安装特征或将连接器与安装部件分离所需的最小力: F1 到 F5 方向: $>50\text{N}$ ; F6 方向: $>110\text{N}$ The minimum force required to break the mounting feature or separate the connector from the mounting feature: Direction F1 to F5: $>50\text{N}$ ;Direction F6: $>110\text{N}$	USCAR-2 Rev.7 5.4.11

#### 5-4. 环境性能及特殊要求 Environmental Performance and Special Requirments.

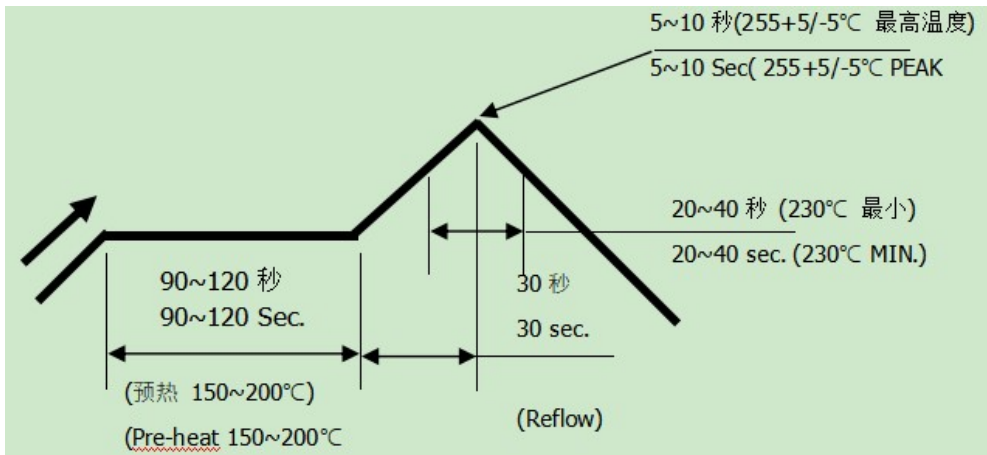
测试内容 Item	规格要求 Specification requirements	参考标准 Reference standard
5-4-1 热冲击 Thermal Shock	低温 $-40^{\circ}\text{C}$ , 高温 $+125^{\circ}\text{C}$ 低温保持 30 分钟, 高温保持 30 分钟, 高低温转换小于 30 秒, 100 次循环, 不能有任何端子电阻超过 7 欧的时间大于 1us 的情况发生 干电路电阻 $\leq 25\text{m}\Omega$ ; 电压降 $\leq 50\text{mV}$ Min.temperature: $-40^{\circ}\text{C}$ ,Max.temperature: $+125^{\circ}\text{C}$ Cold soak for 30 min,Heat soak for 30 min,Transfer time $<30\text{s}$ , Cycles 100 times,There must be no instance in which the resistance of any terminal pair exceeds 7.0 $\Omega$ for more than 1 microsecond Dry Circuit Resistance $\leq 25\text{m}\Omega$ ; Voltage Drop $\leq 50\text{mV}$	USCAR-2 Rev.7 5.6.1
5-4-2 高温暴露 High Temperature Exposure	时间: 1008H, 温度: $125^{\circ}\text{C}$ 干电路电阻 $\leq 25\text{m}\Omega$ ;电压降 $\leq 50\text{mV}$ 端子插入力 $\leq 15\text{N}$ 端子保持力(一次锁+二次锁) $\geq 40\text{N}$ Time: 1008H, Temperature : $125^{\circ}\text{C}$ Dry Circuit Resistance $\leq 25\text{m}\Omega$ ; Voltage Drop $\leq 50\text{mV}$ Insertion Force $\leq 15\text{N}$ Retention Force (Primary+Secondary Lock) $\geq 40\text{N}$	USCAR-2 Rev.7 5.6.3



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测试内容 Item		规格要求 Specification requirements	参考标准 Reference standard
5-4-3	温度/湿度循环 Temperature/Humidity Cycling	温度变化幅度: -40°C to 125°C 时间: 温室内 5 小时内不能进行泄漏 湿度: (80-100)% 干电路电阻 ≤ 25mΩ; 电压降 ≤ 50mV 绝缘电阻 > 100 MΩ 端子插入力 ≤ 15N 端子保持力(一次锁+二次锁) ≥ 40N Time: No leakage within 5 hours of greenhouse Temperature range : -40°C to 125°C Humidity :(80-100)% Dry Circuit Resistance ≤ 25mΩ; Voltage Drop ≤ 50mV Insulation resistance > 100 MΩ Insertion Force ≤ 15N Retention Force (Primary+Secondary Lock) ≥ 40N	USCAR-2 Rev.7 5.6.2
5-4-4	焊锡耐热性 Resistance to Soldering Heat	焊接时间: 5~10 秒. 焊接温度: 255+5/-5°C. Soldering time: 5~10 sec solder. Temperature: 255+5/-5°C.	EIA-364-56

**【6. SMT 回流条件 SMT REFLOW CONDITION】**



温度条件曲线图/ 基板上温度

TEMPERATURE CONDITION GRAPH/ (TEMPERATURE ON BOARD PATTERN SIDE)

注记: 由于 P.C 板等焊接装置改变条件,所以请预先用自己的装置检查回流焊的条件.

Notes: Please check the reflow soldering condition by your own devices beforehand. Because the condition changes by the soldering devices, P.C. boards, and so on.

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## 【7.测试组 Test Group】

流程图		端子机械测试	电气性能	连接器机械测试					
参考标准	测试序列	端子至端子的啮合/分离力	最大电流/电流循环	端子至连接器的插入/保持力	混合部件的啮合/分离力	连接器至连接器的配合/分离力	极性特征	连接器安装特征机械强度	板端 Pin 针保持力
USCAR-2	序列 ID	A	B	C	D	E	F	G	H
	测试样品	10	10	10	10	15	10	30	10
5.1.7	连接器/端子循环		2						
5.1.8	外观检查	1、3	1、5	1、3	1、3	1、3	1、3	1、3	1、3
5.2.1	端子至端子的啮合/分离力	2							
5.3.3	最大试验电流能力		3						
5.3.4	电流循环		4						
5.4.1	端子至连接器的插入/保持力			2					
5.4.2	连接器至连接器的配合/分离力 (无机械辅助)					2			
5.4.4	极化特征效果						2		
5.4.5	混合部件的啮合/分离力				2				
5.4.11	连接器安装特征机械强度							2	
5.7.1	板端 Pin 针保持力								2

说明:

准备的样品应与适用于生产的说明一致，应随机从当前生产中选取

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流程图		连接器系统电性能测试顺序				
参考标准	测试序列	振动冲击	热冲击	温度/湿度循环	高温暴露	焊锡耐热性
USCAR-2 或 EIA-364	序列 ID	I	J	K	L	M
	测试样品	10	10	10	10	5
5.1.8	外观检查	1、7	1、7	1、8	1、7	1、3
5.1.7	连接器/端子循环	2	2	2	2	
5.1.9	电路连贯性监控	4	4			
5.3.1	干式电路电阻	3、5	3、5	3、5	3、5	
5.3.2	电压降	6	6	6	6	
5.4.1	端子至连接器的插入/保持力			9	8	
5.4.6	振动/机械冲击	4				
5.5.1	绝缘电阻			7		
5.6.1	热冲击		4			
5.6.2	温度/湿度循环			4		
5.6.3	高温暴露				4	
EIA-364-56	焊锡耐热性					2

注释：  
(1) 环境温度等级 T3: -40°C to 125°C。  
(2) 振动等级 V2  
(3) 本产品适用于线缆选用 AWG 24~22 (0.22~0.35mm<sup>2</sup>)。