28P Hybrid Inline Unsealed Connector Design Objective

28P 混合型线-线非密封连接器产品设计目标

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CONTENT

1. SCOPE 适用范围

1.1 Content 内容

This specification covers the performance, test and quality requirements for Hybrid 28P unsealed inline connector (hereinafter referred to as 28P Connector).
This specification applies to the product 2385446-*/ 2385449-*, but not limited to it.

本规范适用于线-线 28 位非密封连接器 (以下简称 28P) 的性能，测试和质量要求。
本规范适用但不仅限于以下零件号：2385446-*/ 2385449-*

1.2 Qualification 鉴定

When tests are performed, the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

本测试规范依照下面的规范及标准执行。所有的检验应依照合适的检验计划及产品图纸执行。

2. APPLICABLE DOCUMENTS 适用文件

2.1 Usable document 使用文件

In the event of conflict between the requirements of this specification and the drawing, the drawing shall take precedent.
In the event of conflict between the requirement of this specification and the referenced documents, this specification shall take precedent.

在本规范的要求与图纸发生冲突时，以产品图纸为准。在本规范的要求与参考文件发生冲突时，以本规范为准。

2.2 TE specifications 泰科电子规范

109-1: General requirements for Test Specifications / 测试通用规范
C2385446 28P Plug housing ASSY
C2385449 28P TAB housing ASSY
114-160142 28P Application Specification

2.3 Other specifications 其他规范

VW 75174 issue 2018-10	Connectors, motor vehicle connectors, test specification VW 汽车连接器测试规范
USCAR-2 R7	Performance Specification for Automotive Electrical Connector Systems 美国汽车电子连接器测试规范
GMW3191-2019	Connector Test and Validation Specification 连接器测试验证规范
USCAR-25, R3	Ergonomics Specification for Electrical Connections 电子连接器人体工学规范
IEC 60529_2013	Degree of Protection Provided by Enclosures (IP Code) 外壳防护等级

3. REQUIREMENT 要求

3.1 Design and Construction 设计和结构

Products must meet the design, construction and physical dimensions specified in the applicable product drawings.

产品必须满足产品图纸上的设计，结构和尺寸要求。

3.2 Material 材料

Description of the material sees the related product drawings.

材料描述见相关产品图纸。

Component List	Raw material	Surface Treatment
2385446	(C-Drawing)	-
2385449	(C-Drawing)	-

3.3 Test parameters and tolerances 测试参数与公差

Table 1: Test parameters and tolerances

Requirement 要求	Tolerance 公差
Ambient temperature 环境温度	23°C ± 5°C
Relative humidity 相对湿度	45% to 75%
Atmospheric pressure 大气压力	96kPa ± 10kPa

3.4 Ratings 等级

A. Operating Temperature / 工作温度: -40~105°C
B. Rated voltage / 额定工作电压: 12V
C. Application / 产品应用: Passenger Counterpart 乘内室

3.5 General Performance and Test description 通用性能和试验描述

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in Para.4. All testes must be performed at the test condition of the TE test specification 109-1 unless otherwise specified.

产品应能满足段落 4 中的电气，机械和环境等性能要求。所有试验均需按照 TE 规范 109-1 中的测试条件进行，除非另有说明。

Sample Preparation:

The test samples to be used for the test shall be prepared by random selection from the current production. No sample shall be reused, unless otherwise specified.

样品准备：

测试样品应该从量产品中随机选择，没有特殊要求的情况下测试样品不被重复使用。

3.6 Tests requirement and method summary 测试要求及方法

Para.	Test Items	Requirements	Procedures
3.6.1	Visual Examination	There shall be no corrosion, discoloration, cracks, etc., which could affect the functionality of the part.	ACC to GMW3191 3.4.1
3.6.2	Connector Cycling	Mate & Un-mate 10 times	ACC to GMW3191 3.2.1
3.6.3	Connector Condition	Connector housings without terminals be aged for a minimum of 24 h at +40 °C ± 3 °C and a relative humidity of 95% to 98%	ACC to GMW3191 3.2.1
Mechanical Test			
3.6.4	Terminal to Connector Engagement Force	TPA in open position: terminal size ⩽ 1.2 , Force ⩽ 15N terminal size > 1.2~ 2.8 , Force ⩽ 20N Forward stop: 50N or largest wire strength TPA in seated position: Wire size < 1.0 mm^2 , Force ⩾ 30N Wire Size = 1.0 mm^2 , Force ⩾ 40N Wire size > 1.0 mm^2 , Force ⩾ 60N	ACC to GMW3191 4.2.4
3.6.5	Terminal from Connector Extraction Force	Primary Lock Only Terminal Size ⩽ 1.2mm, Force ⩾ 30N Terminal Size ⩽ 2.8mm, Force ⩾ 60N Primary & Secondary Locks Terminal Size = .64mm, Force ⩾ 60N Terminal Size ⩽ 1.2mm, Force ⩾ 70N Terminal Size ⩽ 2.8mm, Force ⩾100N Primary & Secondary Locks (Thermal Aging) Terminal Size = .64mm, Force ⩾ 50N Terminal Size ⩽ 1.2mm, Force ⩾ 60N Terminal Size ⩽ 2.8mm, Force ⩾ 90N Primary & Secondary Locks (Humid Heat Cycle) Terminal Size = .64mm, Force ⩾ 50N Terminal Size ⩽ 1.2mm, Force ⩾ 60N Terminal Size ⩽ 2.8mm, Force ⩾ 90N	ACC to GMW3191 4.2.5
3.6.6	Terminal Cavity Polarization	Terminals inserted in any incorrect orientation shall not fit or lock into a connector cavity at a force 1.5× the normal insertion force, 15 N, or the column strength of the largest applicable wire size, whichever is greater	ACC to GMW3191 4.2.6
3.6.7	Connector to Connector Engagement Force	Connector Class 3, Force ⩽ 75N	ACC to GMW3191 4.2.8
3.6.8	TPA	TPA Pre Lock Position to TPA Removal from Connector Force Protected TPA Removal Force ⩾ 20N TPA Pre Lock Position to TPA Locked Position Force 15N ⩽ Protected TPA Removal Force ⩽ 45N	ACC to GMW3191 4.2.9

		TPA Closing Force w/ Properly Assembled Terminals 15N ≤ Protected TPA Removal Force ≤ 45N TPA Closing Force w/ One Improperly Assembled Protected TPA Removal Force ≥ X +30N Retention Force of Seated TPA 20N ≤ protected TPA Removal Force ≤ 45N	
3.6.9	Lever/Slide Blocking Force (Open Position)(Optional)	Slide/Lever shall be 75N force max to reset mechanical assist Slide/Lever shall withstand 100N force without inadvertent closure	ACC to GMW3191 4.2.10
3.6.10	Mechanical Assist Robustness (Prior to Mate)(Optional)	Slide/Lever shall withstand 100N force for 30s without separation or damage in 3 directions	ACC to GMW3191 4.2.11
3.6.11	Connector Mounting Feature Mechanical Strength	With fixture F1~F5>50N With clip F6>110N	ACC to GMW3191 4.2.12
3.6.12	Connector Audible Feedback	Connector Audible Feedback(reference only)	ACC to GMW3191 4.2.13
3.6.13	Connector Lock Mechanical Overstress (Wire Snagging)(Optional)	There shall be no damage to the connector lock assembly,150N	ACC to GMW3191 4.2.14
3.6.14	CPA(optional)	Mated 10N≤Force to close CPA ≤ 25N 10N ≤ Force to Open CPA ≤ 30N unmated Force to close CPA ≥ 110N CPA Extraction Force ≥ 60N	ACC to GMW3191 4.2.15
3.6.15	Locked Connector Disengagement Force	Disengagement Force > 120N (no CPA)	ACC to GMW3191 4.2.18
3.6.16	Unlocked Connector Disengagement Force	With Locking Feature Disengaged Disengagement Force < 100N Lock Feature Disengagement Disengagement Force < 70N	ACC to GMW3191 4.2.19
3.6.17	Connector Polarization (Coding) and Mis-mating Feature Effectiveness	Minimum Force > 150N	ACC to GMW3191 4.2.20
3.6.18	Mechanical Shock	Continuity Loss≤ 1μs	ACC to GMW3191 4.2.21
3.6.19	Vibration with Thermal Cycling	V1a,44H per axial, Continuity Loss≤ 1μs	ACC to GMW3191 4.2.21

Electrical Test			
3.6.20	Isolation Resistance	>100MΩ @500VDC,15s	ACC to GMW3191 4.3.5
3.6.21	Dry Circuit Resistance	Terminal Size ≤ .64mm, Resistance ≤ 15.0 mΩ Terminal Size ≤ 1.2mm, Resistance ≤ 10.0 mΩ Terminal Size ≤ 2.8mm, Resistance ≤ 5.0 mΩ	ACC to GMW3191 4.3.2
3.6.22	Voltage Drop	50mV max	ACC to GMW3191 4.3.3
3.6.23	Dielectric Strength	No dielectric breakdown or flash-over shall occur between cavities and between the cavities and the outside of a connector	ACC to GMW3191 4.3.6
Environmental Test			
3.6.24	Thermal Aging	105℃ 1008 h	ACC to GMW3191 4.4.1
3.6.25	Thermal Shock	-40~+105, 300cycles	ACC to GMW3191 4.4.2
3.6.26	Humid Heat Cyclic	+65~+25~-10℃, 93% humidity, 10 days	ACC to GMW3191 4.4.3
3.6.27	Corrosion	GMW3172 Salt Mist	ACC to GMW3191 4.4.7

Figure 1 Test Method of Ventilation

3.7 Test sequence 试验顺序

Test Item	Test Group													
	29A	29B	29C	29D	29E	29F	29G	29H	29J	29K	29L	29P	29Q	29R
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
3.6.1	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4
3.6.2														
3.6.3	2	2-1[1]	2	2	2	2	2	2	2	2	2	2	2	2
3.6.4	3													
3.6.5		3												
3.6.6			3											
3.6.7				3										
3.6.8					3									
3.6.9						X								
3.6.10							X							
3.6.11								3						
3.6.12									3					
3.6.13										3				
3.6.14											X			
3.6.15												3		
3.6.16													3	
3.6.17														3
3.6.18														
3.6.19														
3.6.20														
3.6.21														
3.6.22														
3.6.23														
3.6.24		2-2[1]												
3.6.25														
3.6.26		2-3[1]												
3.6.27														
3.6.28														
Sample Size	10	10	10	15	10	5	5	30	16	10	10	10	10	3

Notes:
1) each 10pcs terminals test after general condition / high temperature aging / HHC
2) “X” means not application

Test Item	Test Group													
	29S	31A	31B	31C	31D									
	15	16	17	18	19									
3.6.1	1,8	1,7	1,7	1,7	1,6									
3.6.2	2	2	2	2	2									
3.6.3														
3.6.4														
3.6.5														
3.6.6														
3.6.7														
3.6.8														
3.6.9														
3.6.10														
3.6.11														
3.6.12														
3.6.13														
3.6.14														
3.6.15														
3.6.16														
3.6.17														
3.6.18	4													
3.6.19	6													
3.6.20		3,5	**3,5**	**3,5**										
3.6.21	3,5, 7				3,5									
3.6.22														
3.6.23		6	6	6										
3.6.24		4												
3.6.25			4											
3.6.26				4										
3.6.27					4									
3.6.28														
Sample Size	10	10	10	10	10									

Notes:
1) each 10pcs terminals test after general condition / high temperature aging / HHC
2) “X” means not application

4. QUALITY 质量

4.1 Qualification test 鉴定

Samples must be in accordance with drawings and be taken in a random way in the production in progress.

样件必须与产品图纸一致，并且是生产过程中随机选取的。

4.2 Requalification test 重新鉴定

If changes significantly affecting form, fit, or function are made to the product or to the manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by product engineering.

如果产品或者制造过程中有显著影响外观，装配和功能的设变，质保需要协调按照原先工程部定义的测试顺序，重新验证全部或者部分测试项目。

4.3 Acceptance 验收

Acceptance is based on verification that the product meets the requirements of section 3.6. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmitted.

归咎于测试设备，样件安装或者操作员的失误的失效不应判定产品不合格。当产品失效发生时，需要有纠正措施以及重新提交样件进行验证。在重新验证前，需确认已有纠正措施。

4.4 Quality conformance inspection 质量合格检验

The applicable TE Connectivity quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification

TE Connectivity 的质量检验计划将指定适用的质量标准。尺寸和功能要求，应按照适用的产品图纸和本规范。