

# Power Connector PWMU Series

## Product Specification



## 1. Scope / 概論

A leading professional solutions provider of waterproof connectors (overmolded with cable, receptacle, field installable) in the industry, Amphenol LTW (ALTW) always fulfills any requirements with high functionality and reliability products; even it is a very special requirement. And it is highly recommended to be applied to harsh environment.

Amphenol LTW (ALTW) 是防水連接器計設及生產的領導者,主要包含線端,板端及現場組裝式連接器以滿足各種使用求及特殊要求,產品具有高效能及高可靠性,非常適合在各種惡劣的環境條件下提供安裝及使用。

This product specification sheet describes the product application in the markets such as Renewable Energy, Industrial

Automation, LED Lighting, Marine, Broadband Wireless Access, Smart Grid, Heavy Equipment, Medical, Electrical Vehicle....etc.

本規範主要描述了 Amphenol LTW(ALTW)產品的應用要求。 本產品廣泛應用於可再生能源，工業自動化，LED，船舶，寬帶無線接入，智能電網，建築機械/重型車輛，醫療設備等，電動車行業...

## 2. Applicable Documents / 參考文件

### 2.1 Industry Document / 業界標準

Amphenol LTW (ALTW) 設計及生產的產品符合各項世界標準,包括 IEC, EIA, MIL, NMEA...

## 3. Specification / 規格

### 3.1 Material / 材質

| Parts / 零件                                 | Material / 材質                           |
|--|---|
| Connector / 連接器                            | Thermoplastic / 熱塑性塑膠                   |
| Power Pin / 電源端子                           | Copper Alloy with silver plated / 銅合金鍍銀 |
| Signal Pin / 訊號端子                          | Copper Alloy with gold plated / 銅合金鍍金   |
| Lock Nut & Panel Nut / 螺帽                  | Thermoplastic / 熱塑性塑膠                   |
| Clamp Ring / 夾環                            | Thermoplastic / 熱塑性塑膠                   |
| Sealing Nut / 尾夾<br>Nut Plate / 壓板         | Thermoplastic / 熱塑性塑膠                   |
| O-Ring / O 型環<br>Gasket / 墊圈<br>Seal / 密封圈 | Rubber / 橡膠                             |
| Screw & Nut 螺絲&螺母                          | Stainless steel / 不銹鋼                   |

### 3.2 Rating / 操作評級

|                              |  |
|------------------------------|--|
| Voltage / 電壓                 | Power: 600V D.C./A.C. 電源 600 伏 直流/交流<br>Signal: 30V D.C./A.C. 訊號 30 伏 直流/交流                    |
| Current / 電流                 | Power: 50A 電源 50 安培; Signal: 2A 訊號 2A  |
| Operating Temperature / 操作溫度 | Receptacle: -20°C to +105°C (攝氏-20 度~105 度)<br>Field Installable : -20°C~105°C (攝氏-20 度~105 度) |
| IP / 防水等級                    | Receptacle / Receptacle With Wires : IP67, Mated.<br>Field Installable : IP67, Mated.          |

## 4. Test Requirement/測試要求

### 4.1 Appearance/外觀

| Item / 項目                      | Test Condition / 測試條件   | Requirement / 條件需求                                     |
|--------------------------------|---|--|
| Examination of product<br>外觀檢查 | EIA-364-18<br>Visual inspection No physical damage<br>檢查外觀是否有損壞 | No defect would impair normal operation<br>沒有缺陷會影響正常操作 |

### 4.2 Electrical/電氣

| Item / 項目                                   | Test Condition / 測試條件   | Requirement / 條件需求   |
|---|---|--|
| Contact Resistance<br>接觸阻抗                  | EIA-364-23 Mate connectors and measured by dry circuit, 20mV 10mA maximum.<br>參考 EIA-364-23，公母對插的狀況下，使用 20mV MAX., 10mA.進行量測。   | initial : 10 mΩ maximum<br>After test: Δ<10 mΩ maximum<br>初始值: 10 mΩ maximum<br>功能測試后: Δ<10 mΩ maximum   |
| Dielectric Withstanding<br>Voltage<br>耐電壓試驗 | EIA 364-20 or IEC 60512-4-1<br>Supply test voltage for 1 minute.<br>Power contacts: Test Voltage 2200 Vac, Signal contacts: Test Voltage 500Vac<br>給予固定測試電壓，測試 1 分鐘。<br>電源端測試交流電壓 2200 伏特; 訊號端測試交流電壓 500 伏特   | <ul style="list-style-type: none"> <li>• Current leakage less than 5mA</li> <li>• No physical damage, flashover, sparks, breakdown</li> <li>• 漏電流小於 5mA</li> <li>• 無物理損害,飛弧,跳火,擊穿</li> </ul>   |
| Insulation Resistance<br>絕緣電阻               | EIA 364-21<br>Supply DC 500 voltage±10% for 2 minutes.<br>給予固定 DC500V±10%, 2 分鐘.  | The Insulation Resistant should be more than 100MΩ<br>絕緣阻抗須達 100MΩ 以上  |
| Temperature Rise<br>溫升試驗                    | UL1977 section 16.1 or CSA C22.2 No. 182.3, Clause 6.5<br>Test current DC 50A+2A, 6 set (mated ) specimens with all contacts connected with rated current. Continue for 4 hours. Measurement position Thermocouples 12 point<br>UL1977 第 16.1 章節或 CSA C22.2 No. 182.3 條款 6.5<br>公母配對組合狀態 6 組串聯測試，布置 12 個感溫接點，電源端測試電流 50A，訊號端測試電流 2A，持續 4 小時且必須達到溫度平衡. | <ul style="list-style-type: none"> <li>•UL : The temperature do not exceed the RTI of insulating material.</li> <li>•CUL : Temperature rise Δt is no more than 30°C , also for CUL ( CSA C22.2 No. 182.3, Clause 6.5 )</li> <li>•UL: 溫度不超過絕緣材料的 RTI</li> <li>•CUL: 溫度升高 Δt 不超過 30°C</li> </ul> |

## 4.4 Mechanical/機械

| Item / 項目                                  | Test Condition / 測試條件  | Requirement / 條件需求   |
|--|--|--|
| Durability<br>耐久性                          | Test method reference EIA-364-09, at rated cycling of 500±50 per hour<br>參考 EIA-364-09 進行測試，插拔速率為每小時插拔 500±50 次  | 1000 cycles minimum, no physical damage;<br>Pass the sequenced tests<br>插拔壽命最小 1000 次，無物理損害；符合群組測試   |
| Mating force and<br>Un-mating force<br>插拔力 | EIA-364-13, The connectors shall then be fully mated at a rate of 25.4 millimeters/minute<br>連接器插拔速率為 25.4mm/分鐘  | <ul style="list-style-type: none"> <li>• Mating Force: 68.6N(7.0kgf) maximum</li> <li>• Un-mating Force: 19.6N(2.0kgf) maximum</li> <li>• 插入力: 最大 68.6N(7.0kgf)</li> <li>• 拔出力: 最大 19.6N(2.0kgf)</li> </ul>                                |
| Vibration<br>振動試驗                          | EIA-364-28, Test condition I,<br>frequency: 10~55~10Hz, amplitude : 1.5 mm; Two hours in each of 3 mutually perpendicular planes.<br>頻率 : 10~55~10Hz, 振幅: 1.5mm,每軸向測試 2 小時，三個軸向平面均需測試  | <ul style="list-style-type: none"> <li>• No physical damages</li> <li>• No electrical discontinuity more than 1μ second.</li> <li>• 無物理損害</li> <li>• 電氣訊斷不超過 1 μ second</li> </ul>   |
| Strain Relief Test<br>吊重試驗                 | UL2238 Sec.24<br>The assembly of a cord to a fitting shall be subjected to a straight pull force as specified for 1 minute.<br>參考 UL2238 章節 24，以額定的扭力吊重持續 1 分鐘   | <ul style="list-style-type: none"> <li>• Wire Size 8 AWG: 133N</li> <li>• Wire Size 20 AWG: 44.5N</li> <li>• Wire Size 22 AWG: 35.6N</li> <li>• 線材 8 AWG: 吊重 133N</li> <li>• 線材 20 AWG: 吊重 44.5N</li> <li>• 線材 22 AWG: 吊重 35.6N</li> </ul> |
| Conductor Secureness<br>導體吊重試驗             | Reference to UL2238<br>The terminals of a device intended for crimp connection to individual leads shall be capable of withstanding a direct pull for a period of 1 min, without damage to the connection or separation of the conductor from the terminal.<br>參考 UL2238 章節 23，固定試驗件端子並以法碼吊電子線 1 分鐘，測試後端子與電子線連接處不得分離或破損。 | <ul style="list-style-type: none"> <li>• Wire Size 8 AWG: 200N</li> <li>• Wire Size 20 AWG: 44.5N</li> <li>• Wire Size 22 AWG: 35.6N</li> <li>• 線材 8 AWG: 吊重 200N</li> <li>• 線材 20 AWG: 吊重 44.5N</li> <li>• 線材 22 AWG: 吊重 35.6N</li> </ul> |

## 4.5 Environmental/環境

| Item / 項目  | Test Condition / 測試條件   | Requirement / 條件需求   |
|--|---|--|
| Temperature /Humidity<br>Chamber test<br>溫濕度循環測試 | EIA-364-31B<br>5 cycles at -20°C to +105°C, Relative humidity of 85%, 24 hours per cycle<br>溫度-20~105°C 共 5 個循環, 相對濕度 85%, 每一個循環為 24 小時<br><p>The graph shows a 24-hour temperature cycle. The temperature starts at 25°C, rises to 105°C at 2.5 hours, stays there until 5.5 hours, drops to 25°C at 8 hours, rises to 105°C at 10.5 hours, stays there until 13.5 hours, drops to 25°C at 16 hours, drops to -20°C at 18.5 hours, stays there until 21.5 hours, and then rises back to 25°C at 22 hours, remaining constant until 24 hours.</p> | <ul style="list-style-type: none"> <li>• No physical damages</li> <li>• Electrical Performance test</li> <li>• Meet Waterproof IPX7.</li> <li>• 無物理損壞</li> <li>• 電氣性能檢查</li> <li>• 符合 IPX7</li> </ul>                        |
| Thermal Shock<br>冷熱衝擊試驗                          | EIA 364-32C<br>For 5 cycles at least under -20°C ~ +105°C and no impact on the product function and appearance.<br>最少 5 cycles at -20°C ~ +105°C, 測試後不影響產品功能性及外觀。<br><p>The graph shows 5 thermal shock cycles. Each cycle consists of a 30-minute dwell at -20°C, a 5-minute ramp up to 105°C, a 35-minute dwell at 105°C, and a 5-minute ramp down to -20°C. The total duration for 5 cycles is 350 minutes.</p>  | <ul style="list-style-type: none"> <li>• No physical damages</li> <li>• Electrical Performance test</li> <li>• 無物理損壞</li> <li>• 電氣性能檢查</li> </ul>  |
| Mold stress release<br>模流應力(高溫)試驗                | UL 1977<br>Place in the chamber 115 °C for 7 hours.<br>參考 UL1977, 將試件在溫度 115 °C 的條件下進行烤箱測試 7 小時   | <ul style="list-style-type: none"> <li>• No warpage, shrinkage or other distortion that results in unisolated live part exposed.</li> <li>• 塑膠外殼不得產生扭曲, 收縮變型或導體外露之現象。</li> </ul>   |
| Salt Spray<br>鹽水噴霧試驗                             | EIA-364-26,<br>5% salt solution for 720 hours mated and for 48hours un-mated.<br>5%鹽水溶液持續 720 小時(公母對插狀態下), 48 小時(不對插狀態)   | <ul style="list-style-type: none"> <li>• No physical damages</li> <li>• 無物理損壞</li> </ul>   |
| Waterproof<br>防水試驗                               | IEC 60529, IPX7<br>Should be immersed in water at depth of at least 1 m for 30 minutes.<br>浸入深度至少 1 米的水中 30 分鐘。   | <ul style="list-style-type: none"> <li>• No physical damages</li> <li>• Visual inspection inside no water</li> <li>• Insulation resistance test passed</li> <li>• 無物理損壞</li> <li>• 目視內部無水侵入</li> <li>• 絕緣電阻符合規格要求</li> </ul> |

## 5. Product Qualification Test Sequence/測試群組及順序

|               | Test or Examination                      | Test Group    |   |         |      |      |   |   |      |
|---------------|--|---------------|---|---------|------|------|---|---|------|
|               |  | A             | B | C       | D    | E    | F | G | H    |
|               |  | Test Sequence |   |         |      |      |   |   |      |
| Appearance    | Examination of product 外觀檢查              | 1             | 1 | 1, 9    | 1, 3 | 1, 5 | 1 | 1 | 1, 3 |
| Electrical    | Contact Resistance 接觸阻抗                  | 2, 6          |   |         |      | 2, 4 |   |   |      |
|               | Dielectric Withstanding Voltage 耐電壓試驗    |               |   | 8       |      |      |   |   |      |
|               | Insulation Resistance 絕緣電阻               |               |   | 2, 4, 7 |      |      |   |   |      |
|               | Temperature Rise 溫升試驗                    |               | 2 |         |      |      |   |   |      |
| Mechanical    | Durability 耐久性                           | 4             |   |         |      |      |   |   |      |
|               | Mating force and Un-mating force 插拔力     | 3, 5          |   |         |      |      |   |   |      |
|               | Vibration 振動試驗                           |               |   |         | 2    |      |   |   |      |
|               | Strain Relief Test 吊重試驗                  |               |   |         |      |      | 2 |   |      |
|               | Conductor Secureness 導體吊重試驗              |               |   |         |      |      |   | 2 |      |
| Environmental | Temperature /Humidity Chamber test 溫濕度循環 |               |   | 5       |      |      |   |   |      |
|               | Mold stress release 模流應力(高溫)試驗           |               |   |         |      |      |   |   | 2    |
|               | Salt Spray 鹽水噴霧試驗                        |               |   |         |      | 3    |   |   |      |
|               | Waterproof 防水試驗                          |               |   | 3, 6    |      |      |   |   |      |

6. Others/其他

6.1 Torque/扭力

|  |                                 |
|--|---------------------------------|
| Panel Nut (Receptacle) / 鎖板 (板端)         | 11.5~14 kgf.cm                  |
| Clamp Ring/ 接管 (組裝式)                     | 10~12 kgf.cm                    |
| Sealing Nut / 尾蓋 (組裝式)                   | 10~12 kgf.cm                    |
| Screw of the Screw-in type / 鎖芯線螺絲 (組裝式) | M2.5: 3.5kgf.cm<br>M5: 12kgf.cm |
| Nut plate screw 鎖附壓板                     | 10~12 kg.cm                     |

7. Quality Assurance Provisions/品質保證

Unless otherwise specified, in the contract or purchase order, we will be responsible for the quality of the part as it is delivered to client. We will be responsible for having controlled processes to ensure product is in total compliance with this specification. Failing lots shall be subject to return or other corrective action.

除非在合同或採購訂單中另有規定者外，我們將對交付給客戶的部件質量負責。我們將負責控制流程，以確保產品完全符合規格。未通過的批次應退回或採取其他糾正措施。

Re-qualification Testing : 重新資格測試

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

如果對產品或製造過程產生顯著影響的形狀，配合或功能的變化，產品保證應協調重新認證測試，包括由開發/產品，質量和可靠性工程確定的全部或部分的原始測試順序。

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