

NUMBER GS-12-1339	TYPE PRODUCT SPECIFICATION	Amphenol FCI	
TITLE Power - Pwr Profile connector for OCTIS Cable to Board I/O Connector System		PAGE 1 of 10	REVISION G
		AUTHORIZED BY S. ALOSIUS	DATE 2021-08-17
		CLASSIFICATION UNRESTRICTED	

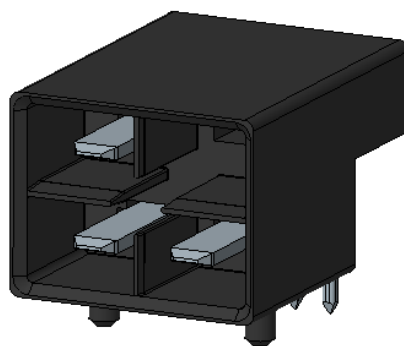
Power - Pwr Profile connector for OCTIS

Cable to Board I/O Connector System

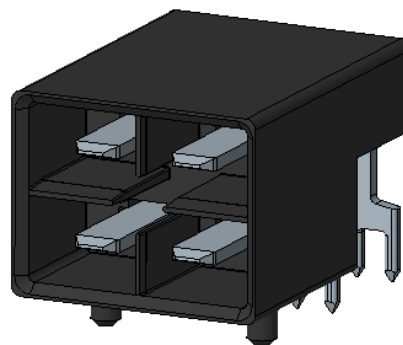
BOARD CONNECTORS



(2 POS. POWER)



(3 POS. POWER)



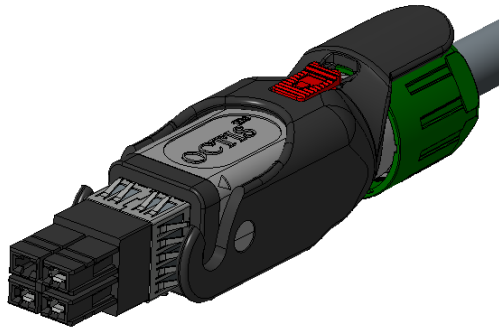
(4 POS. POWER)

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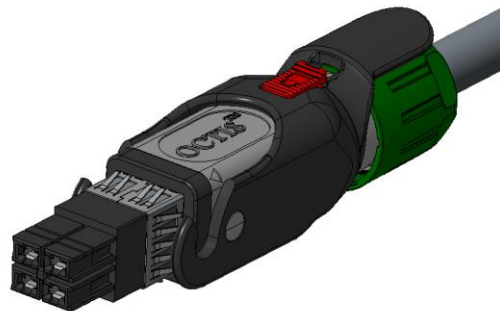
PLUG ASSEMBLY



(2 POS. POWER)



(3 POS. POWER)



(4 POS. POWER)

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1.0 Objective

This specification defines the performance, test, quality and reliability requirements of power connector interface for OCTIS Cable to Board System. This specification is based on standard product performance.

2.0 Scope

This specification is applicable to the termination characteristics of the power connector interface Cable to Board Connector System which consists of a right angle board connector mated with a straight cable connector intended for outdoor use.

3.0 Applicable Documents

3.1 AFCI Specifications

- Applicable AFCI product customer drawings
- AFCI Connector System, GS-12-002
- Application specification, GS-20-0454

3.2 Other Standards and Specifications

- UL94V-O: Test for Flammability of Plastic Materials in Devices and Appliances
- EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- GR-1217-CORE: Telcordia Specification "Generic Requirements for Separable Electrical Connectors"
- IEC 60512-9: Electromechanical Components for Electronic Equipment; Basic Testing Procedures and Measuring Methods

4.0 General Requirements

4.1 Operation and Storage

Operating temperature range: -40°C to 105°C
Storage temperature range: -55°C to 105°C

4.2 Material :

The materials for each component shall be as specified herein or equivalent.

Board connector:

Housing: High temperature glass filled thermoplastic, LCP, UL 94 V-0
Signal & Power Contacts: Copper Alloy

Cable connector:

Housing: PBT Glass filled, UL 94 V-0
Housing holder, secondary lock, nut – PBT, Glass filled
Tightening cone - PA 66
Shields – Stainless steel
Signal & Power Contacts: Copper Alloy
Rubber parts: Silicone
Lever - IXEF

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4.3 Finish

Plating - power contacts

Contact area: Ni under layer with Au or Sn top layer.
Solder tail: Ni under layer with Sn top layer.

4.4 Design and Construction

The design, construction, physical dimensions, bulk head dimensions, printed circuit board dimensions and stencil layout of the connectors have been specified on the applicable product drawings or applicable AFCI specifications.

4.5 Visual Examination of Product

Visual examinations shall be performed using 10 x magnifications. Parts should be free from blistering, cracks, discoloration, etc.

5.0 Electrical Characteristics

5.1 Contact resistance

The power contact resistance at the specified current (16/20/30A DC) shall not exceed 4 milli-Ohm initially or after mating cycles and environmental exposure when measured in accordance with EIA 364-06.

5.2 Working voltage

Unshielded headers: max. 320V AC (r.m.s.)

5.3 Insulation Resistance

5000 M Ω minimum initial and 1000 M Ω minimum after environmental in accordance with EIA 364-21

5.4 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current (>0.5mA) when the mated connectors are tested in accordance with EIA 364-20. The following details shall apply:

- a. Test voltage: 500V DC
- b. Test duration: 60 seconds
- c. Test condition :1 atm
- d. Points of measurement: between adjacent contacts and conductive surfaces

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5.5 Current Rating

2 Position Power:

Max. 30°C with continuous current at both power pins with

- i. 16A in combination with 1.5mm² conductors (16AWG)
- ii. 21.5A in combination with 2.5mm² (14AWG) & 3.3mm² conductors (12AWG)
- iii. 30A in combination with 5mm² (10AWG) conductors

3 Position Power:

Max. 30°C with continuous current at power pins with

- i. 16A in combination with 1.5mm² conductors (16AWG)
- ii. 20A in combination with 2.5mm² (14AWG)
- iii. 30A in combination with 5mm² (10AWG) conductors

4 Position Power:

Max. 30°C with continuous current at power pins with 18A in combination with 2.5mm² (14AWG)

6.0 Mechanical Characteristics

6.1 Mating / Unmating Force

Perform in accordance with EIA 364-13B. The force to mate a receptacle connector and compatible header shall not exceed 29N per contact.

The force to un-mate a receptacle connector and compatible header shall not be less than 4N per contact

The following details shall apply:

- a. Cross head speed: 12.5mm/min
- b. Lubrication: None
- c. Lever should be removed from plug while testing

7.0 Environmental Conditions

7.1 Thermal Shock

Perform in accordance with EIA 364-32C. The following details shall apply:

- a. Number of cycles: 5
- b. Temperature range: -55 to + 105°C
- c. Time at each temperature: 30 minutes minimum
- d. Transfer time: 30 seconds maximum

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7.2 Cyclical Humidity and Temperature

Mated samples are to be exposed to cyclical humidity and temperature in accordance with EIA 364-31B. Samples are to be subjected to 50 cycles of 10-hour duration for a total of 21 days or 504 hours.

A cycle consists of the following steps.

- a) 2 hour ramp from 25°C at 80%-98% RH to 65°C at 90%-98% RH
- b) 4 hour dwell at 65°C at 90%-98% RH
- c) 2 hour ramp down to 25°C at 80%-98% RH
- d) 2 hour dwell at 25°C at 80%-98% RH

7.3 Temperature Life

Perform in accordance with EIA 364-17B. Headers and receptacles shall remain mated without any electrical load. The following details shall apply:

- a. Temperature: 105°C
- b. Duration: 21 days or 504 hours

7.4 Vibration

Low level vibration is in accordance with GR3108 specification as per following test conditions:

Test Parameter	Test Conditions and Severity		
ASD (m^2/s^3)	Ramp up to 0.04	Constant at 0.04	Ramp down from 0.04
Ramp (dB/oct)	+12 dB/oct from	Constant over	-12 dB/oct from
Frequency Range (Hz)	5 to 10 Hz	10 to 50 Hz	50 to 100 Hz
Axes of Vibration	3 Axes with 30 minutes per axial direction		

Electrical load to be applied during the test: 100mA

There shall be no visual damage and no electrical discontinuity exceeding 1 micro second

7.5 Durability

Perform in accordance with EIA 364-09C. Use standard laboratory procedure as applicable to the specific product. The following details shall apply:

- a. 100 mating cycles for Tin plated products
- b. 200 mating cycles for Gold plated products
- c. Cycling rate: 12.5 cm (0.5 inches) per minute

7.6 Mechanical Shock

Perform in accordance with IEC 60068-2-27. The following details shall apply:

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- a. Amplitude: 50G
- b. Duration: 6 milliseconds
- c. Number of shocks: 3 shocks along each of three orthogonal axis
- d. Mounting: rigidly mounted assemblies
- e. Take contact resistance measurements (max 4 mΩ) after shock in each axis
- f. No discontinuities greater than 1 micro second

8.0 QUALITY ASSURANCE PROVISIONS

8.1 Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with ISO 9000.

8.2 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

- a. Temperature: 25 ± 5°C
- b. Relative humidity: 20% to 80%
- c. Barometric pressure: Local ambient

8.3 Sample Quantity and Description

The test sequences for qualification testing and connector sample sizes for each are shown in Table 001. The number of readings is specified in the description for each test.

8.4 Acceptance

Electrical and mechanical requirements placed on test samples as indicated in the sections of this specification shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with the product specification shall meet the stated requirements.

Failures attributed to equipment, test set-up or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

8.5 Qualification Testing

Qualification testing shall be performed on sample units build with equipment and procedures normally used in production. The test sequence is shown in the Table 001, Qualification test matrix.

8.6 Re-Qualification Testing

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 matrices.

- a. 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, contact force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.

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- b. A significant change is made to the manufacturing process which impacts the product form, fit or function.
- c. A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

9.0 Table 001 – Qualification Test Matrix

Table 001-Qualification Test Matrix							
TESTGROUP ID		1	2	3	4	6	7
QTY OF 2 POS. POWER CABLE ASSEMBLIES		3	3	3	3	3	3
QTY OF 2 POS. POWER BOARD HEADERS		3	3	3	3	3	3
TEST DESCRIPTION	SECTION	TEMP LIFE	THERMAL SHOCK & HUMIDITY	DURABILITY	VIBRATION & MECH. SHOCK	CURRENT RATING	VOLTAGE & IR
VISUAL EXAMINATION OF PRODUCT		1.5	1.8	1.5	1.7	1.3	1.4
ELECTRICAL							
CONTACT RESISTANCE	5.1	2.4	2.5	4	2,4,6		
INSULATION RESISTANCE (IR)	5.3						2
DIELECTRIC WITHSTANDING VOLTAGE	5.4		3.7				3
CURRENT RATING	5.5					2	
MECHANICAL							
MATING UNMATING FORCE	6.1			2			
ENVIROMENTAL							
THERMAL SHOCK	7.1		4				
CYCLICAL HUMIDITY AND TEMPARATURE	7.2		6				
TEMPARATURE LIFE	7.3	3					
VIBRATION	7.4				3		
MECHANICAL SHOCK	7.6				5		
DURABILITY 100 CYCLES (Sn plated pwr contacts)	7.5			3			
DURABILITY 200 CYCLES (Au plated pwr contacts)	7.5			3			

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REVISION RECORD

Rev	Page	Description	EC#	Date
A	ALL	New Product spec	-	2017-08-11
B	7	Mechanical shock specification changed	ELX-I-33045	2019-03-27
	4	Lower Storage temperature range corrected to -55°C (typo error)		2019-03-27
C	7	Max contact resistance measured changed to 4 mΩ from 20 mΩ in the clause "mechanical shock"	ELX-I-33097	2019-04-01
D	6	Current rating value is changed for 2 pos power from 20 A to 21.5 A for 14 & 12 AWG wires	ELX-I-36418	2020-03-20
E	1,2 6	Photos of 4 pos. power header and plug assembly added. Current rating test result for 4 pos. power added	ELX-I-39095	2020-11-25
F	6	Added the current rating test results of 2&3 pos. power with 5mm2 receptacle contact & AWG10 cable	ELX-I-39300	2020-12-23
G	5	Updated max working voltage to 320V	ELX-I-42044	2021-08-17