Save Time and Trouble with Mod 429 Space Grade Nanominiature Connectors

M32139 Class S Nanominiature connectors are DSCC approved for space programs. NASA EEE-INST-002 provides guidance on additional screening for Nano connectors. Glenair Mod 429 upgrades inspection and screening to NASA requirements without the need for a customer Statement of Work or Specification Control Drawing. This section explains Glenair Mod 429 ordering, and provides valuable information on outgassing and other space flight topics.

Six things you should know about Nano connectors for space flight:

1 Outgassing: What is outgassing, why is it important, and how does it affect connector selection? Is special processing required to meet outgassing requirements?

2 Screening: What is NASA screening and what level of screening is required?

3 Magnetic Permeability: Are nonmagnetic connectors required?

4 Cryogenic Exposure: Are Nano connectors suitable for -200° C. exposure?

5 Materials: Nano connectors offer a variety of materials and plating finishes. Which ones are recommended for space flight?

6 Wire Corrosion: M22759/33 irradiated Tefzel® wire is preferred for space applications. What about corrosion problems caused by this wire?

HOW TO ORDER SPACE GRADE NANO CONNECTORS

Step 1: Find a Standard Nano Part Number

Titanium shells, nickel-plated aluminum shells and stainless steel shells are suitable for use in vacuum environments. Cadmium plating is prohibited for space flight.

Step 2: Select a NASA Screening Level

The term “Screening Level” refers to the final inspection procedure.
Level 1 for mission-critical highest reliability
Level 2 for high reliability
Level 3 for standard reliability

Step 3: Outgassing Processing

Glenair Nano connectors are certified to meet NASA outgassing requirements without special processing. However, if additional outgassing processing is required, choose the appropriate suffix code from the table below.

Step 4: Select the Mod 429 Code that Matches the Desired Level of Screening and Outgassing

Use the following table to choose the right modification code. Add the mod code to the connector part number.
Example: 891-002-9ST-0A1-12J-***429***

NASA Screening Level	Special Screening Only	Special Screening Plus Outgassing Processing	
		8 Hour Oven Bake 400° F.	Thermal Vacuum Outgassing 24 hrs. 125° C.
Level 1 Highest Reliability	Mod 429B	Mod 429J	Mod 429C
Level 2 High Reliability	Mod 429	Mod 429K	Mod 429A
Level 3 Standard Reliability	(Use standard part number)	Mod 186	Mod 186M

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GLENAIR, INC. • 1211 AIR WAY • GLENDALE, CA 91201-2497 • 818-247-6000 • FAX 818-500-9912
www.glenair.com

E-Mail: sales@glenair.com

Series 89 Nanominiature Connectors
Mod 429 Space Grade Information

1 Outgassing: What is outgassing and how does it affect connector selection? Is special processing required to meet outgassing requirements?

What is Outgassing?

Plastic and rubber materials give off gaseous molecules. For example, the smell inside a new car is caused by polymer outgassing. Heat and vacuum increase the rate of diffusion. In a spacecraft the gases coming off polymers can contaminate optical surfaces and instruments. The result is degraded performance.

How is Outgassing Measured?

The space industry has adopted a standardized test procedure, ***ASTM E 595***, to evaluate outgassing properties of polymers. Small samples of material are heated to 125° C. at a vacuum of 5 X 10^{-5} torr for 24 hours. Then the sample is weighed to calculate the ***Total Mass Loss*** (TML). The TML cannot exceed 1.00% of the total initial mass. During the test, outgassed matter condenses on a cooled collector plate. The quantity of outgassed matter is calculated to determine the ***Collected Volatile Condensable Material*** (CVCM). The CVCM cannot exceed 0.10% of the original specimen mass.

Do Nano Connectors Require Special Outgassing Processing?

No. Nano connectors meet NASA outgassing requirements without special processing.

2 Screening: What is NASA screening and what level of screening is required?

What is NASA Screening?

NASA specification EEE-INST-002 provides instructions on selecting, screening and qualifying parts for use on NASA GSFC space flight projects. Table 2J in the NASA spec contains specific inspection instructions for Nanominiature connectors. These screening requirements exceed the standard mil spec inspection levels.

What Screening Level is Required for Space Applications?

NASA defines three levels of screening: level 1 for highest reliability, level 2 for high reliability, and level 3 for standard reliability.

Is Glenair NASA Certified?

Yes. Meeting NASA requirements means not only inspecting per EEE-INST-002, but also building parts in accordance with NASA Technical Standard NASA-STD-8739.4 “Crimping, Interconnecting Cables, Harnesses, and Wiring”. Glenair fully meets these requirements and has obtained NASA certification. Our extra inspection steps reflect the fact that pre-wired connectors not only require best practices on the assembly floor, but also require thorough final electrical and mechanical testing. For more information on Glenair's NASA qualifications and certifications, please contact our Micro-D and Nanominiature connector product manager.

SCREENING REQUIREMENTS

Inspection/ Test	Glenair Level 1 (Mod 429B)	Glenair Level 2 (Mod 429)
Visual Inspection	100% (10X)	100%
Mechanical	100%	2 pcs.
Voltage (DWV)	100%	100%
Insulation Resistance	100%	100%
Low Level Contact Resistance	100% (Read and Record)	2 pcs. (Read and Record)
Mating Force	2 pcs.	N/A
Contact/Wire Retention	2 pcs.	N/A
Solderability/Resistance to Soldering Heat	2 pcs.	N/A

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3 Magnetic Permeability: Are nonmagnetic connectors required?

Spacecraft designers generally avoid the use of ferromagnetic materials, which can become magnetized and can interfere with sensitive instruments. Nano connectors have a maximum permeability of 2 mu.

4 Cryogenic Exposure: Are Nano connectors suitable for use at temperatures approaching -200° C. ?

Nano connectors are rated to -55° C. Glenair has not performed testing below this temperature. EEE-INST-002 states "...experience has proven it is possible for (non-certified) connector types to be used successfully at cryogenic temperatures. It is recommended that connector samples should be subjected to five cycles of cryogenic temperature...(followed by examination for cracks and DWV)".

5 Materials: Which materials are recommended for space flight?

Cadmium plated shells are prohibited from space programs. Other Nano materials are acceptable.

6 Wire Corrosion: M22759/33 irradiated Tefzel® wire is preferred for space applications. What about corrosion problems caused by this wire?

Does M22759/33 Wire Have an Outgassing Problem?

Irradiated Tefzel® wire is known to cause tarnishing and corrosion of metal parts in close proximity, usually in sealed bags. Both MIL-DTL-32139 and NASA EEE-INST-002 contain cautionary notes regarding this problem. Wire manufacturers have not been able to eliminate this problem. This corrosion problem is referred to as "wire outgassing", which has led to confusion over the term outgassing. This problem has nothing to do with the ability of the wire to meet the TML and CVCM outgassing requirements of ASTM E595. M22759/33 irradiated Tefzel wire continues to be the wire of choice for spacecraft. This wire complies with outgassing requirements.

Nano connectors with M22759/33 wire should not be stored in sealed bags for extended periods.

New Unit Pack Minimizes Corrosion

Glenair has adopted an inovative new packaging system to protect the connector from performance hindering corrosion. Metal shell connectors supplied wtih M22759/33 wire are now packaged as follows: the connector is wrapped in Teflon® tape and placed in a ventilated sulpher-free paper envelope to ensure that your mission-critical component arrives in perfect order.

OUTGASSING PROPERTIES OF NANO CONNECTORS

Component	Material	Brand Name	% Total Mass Loss	% Collected Volatile Condensable Material	Test Report
Thermoplastic Insulators and PCB Trays	Liquid Crystal Polymer	Vectra® C-130	0.03	0.00	NASA Test #GSC17478
Potting Compound	Epoxy	Hysol C9-4215	0.48	0.01	Glenair Test
Wire	Tefzel®	Tefzel®	0.22	0.01	NASA Test #GSC19998

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