Assuring 100% reliability
in over 5,000 missile launches
to our armed forces and global allies

Engineered for life
The Challenge

ICS’s top tier Micro connector customers approached ITT, Interconnect Solutions about a high density and robust low profile Nano miniature connector that allowed more signal carrying capacity in a smaller package. In addition, these customers identified the need to have these connectors perform in high shock and vibration environments as well as high temperature +200 degree C environments. These same customers requested the use of ITT’s standard twist pin contact system within this new form factor of products.

The ITT Solution …

Interconnect Solutions collated VOC information from multiple OEM’s manufacturing sophisticated electronics equipment for Aerospace, Geophysical, and Industrial applications and correlated this input with market trend data for small form factor connectors. Based on the strong VOC results and ITT’s engineering expertise in designing and manufacturing micro miniature connectors, ICS developed the dual row Nano Miniature NDD Series connector family. This new family of nano miniature connector products addresses the harsh environments typically seen in our customers’ applications and provides higher density signals within a smaller profile connector package.
Nano Miniature NDD Series Connectors

Technical Overview

ITT has been manufacturing harsh environment single row nano miniature connectors since 1971. The new NDD series from ITT takes advantage of ITT’s over 35 years experience in nano miniature connector design to introduce a new level of innovative higher density family of connector products. This new Nano Miniature NDD Series connector will be qualified to the new military specification MIL-DTL-32139.

ITT’s NDD miniature connectors are small form factor high density interconnects designed and manufactured for high reliability and harsh environment applications. These interconnects are ideal where size and weight limitations require an ultra low profile and robust interconnect package. Utilizing our innovative twist pin contact system on 0.025 contact spacing and having 5 points of electrical contact, the NDD series offers an extremely rugged small form factor interconnect solution. Typical applications for the NDD series are Avionics, Aerospace, Defense Electronics, Geophysical, Industrial Control Systems, and Medical Diagnostics.

Twist Pin technology

At the heart of ITT’s new dual row NDD series we’ve incorporated our proven twist pin contact system. The twist pin contact system has been utilized exclusively for ITT’s larger MDM series of products for over 45 years.

NDD Series- Nano Miniature Connector Performance Summary

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Withstanding Voltage:</td>
<td>250 VAC RMS at Sea Level, 100 VAC RMS at 70,000 feet</td>
</tr>
<tr>
<td>Contact Rating:</td>
<td>1 amp maximum</td>
</tr>
<tr>
<td>Wire Accommodation:</td>
<td>#30-#32 AWG</td>
</tr>
<tr>
<td>Insulation Resistance:</td>
<td>5000 Meg ohms min @ 100 VDC</td>
</tr>
<tr>
<td>Contact Resistance:</td>
<td>71 mv max @ 1 amp</td>
</tr>
<tr>
<td>Engagement/Separation Force:</td>
<td>Forces not to exceed 5 oz/contact</td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td>-55 ° C to +125 ° C*</td>
</tr>
<tr>
<td>Humidity (Mated):</td>
<td>Per EIA-364, procedure 31-A</td>
</tr>
<tr>
<td>Vibration:</td>
<td>20 g’s, in accordance with EIA-364-28, condition IV</td>
</tr>
<tr>
<td>Mechanical Shock:</td>
<td>100 g’s, in accordance with EIA-364-27m condition G</td>
</tr>
<tr>
<td>Durability:</td>
<td>500 cycles of mating durability (500 CPH Max)</td>
</tr>
<tr>
<td>Mating/Unmating after Durability:</td>
<td>Forces not to exceed 7 oz/contact</td>
</tr>
<tr>
<td>Salt Spray/Corrosion Resistance:</td>
<td>48 hour salt spray, in accordance with EIA-364-26, condition B</td>
</tr>
<tr>
<td>Thermal Vacuum Out gassing:</td>
<td>Total Mass Loss (TML) 1.0% maximum, Volatile Condensible Material, (VCM) 0.1% Max</td>
</tr>
</tbody>
</table>

* Temperature Rating of -55 ° C to +200 ° C available with special termination processes
Nano Miniature NDD Series Connectors

Electrical Specifications for the Connector

ITT's dual row NDD series of connectors have a contact rating of 1 Amp maximum with a contact resistance rating of 71 millivolt drop maximum. This new connector series has a voltage rating of 250 VAC RMS at sea level and a 100 VAC RMS at 70,000 feet altitude. Insulation resistance for the connector series is rated at 5000 megaohms minimum.

<table>
<thead>
<tr>
<th>Current Rating</th>
<th>Voltage Rating (DWV)</th>
<th>Insulation Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 AMP maximum</td>
<td>250 VAC RMS seal level, 100 VAC RMS at 70,000 feet</td>
<td>5000 Meg ohms minimum</td>
</tr>
</tbody>
</table>

ITT PART NUMBER NOMENCLATURE TO MIL-DTL-32139

ITT CANNON SERIES
MIL-DTL-32139 SLASH SHEET
INSERT ARRANGEMENT
WIRE TYPE
HARDWARE
SHELL FINISH
SPACE CLASS

ITT CANNON SERIES:
NDS - Metal Shell, Single Row, Liquid Crystalline Polymer (LCP) Insulator (Not Currently Tooled)
NDD - Metal Shell, Dual Row, LCP Insulator

MIL-DTL-32139 SLASH SHEET
01 - Connector, Plug, Single Row, Nano Miniature, Dual Lobe Polarization
02 - Connector, Receptacle, Single Row, Nano Miniature, Dual Lobe Polarization
03 - Connector, Plug, Dual Row, Nano Miniature, Dual Lobe Polarization
04 - Connector, Receptacle, Dual Row, Nano Miniature, Dual Lobe Polarization

INSERT ARRANGEMENT
*A9 - 9 Contacts
*B15 - 15 Contacts
*C21 - 21 Contacts
*D25 - 25 Contacts
*E31 - 31 Contacts
*F37 - 37 Contacts
*G51 - 51 Contacts
*Not currently tooled by ITT

WIRE TYPE
01 - 6 inches long #30 AWG wire per Nema HP3-ETXBBB9, White
02 - 18 inches long #30 AWG wire per Nema HP3-ETXBBB9, White
03 - 36 inches long #30 AWG wire per Nema HP3-ETXBBB9, White
04 - 6 inches long #30 AWG wire per Nema HP3-ETXBBB9(*), Color Coded per MIL-STD-681, Sys 1, Ten Solid Colors Repeating
05 - 18 inches long #30 AWG wire per Nema HP3-ETXBBB9(*), Color Coded per MIL-STD-681, Sys 1, Ten Solid Colors Repeating
06 - 36 inches long #30 AWG wire per Nema HP3-ETXBBB9(*), Color Coded per MIL-STD-681, Sys 1, Ten Solid Colors Repeating
07 - 6 inches long #30 AWG wire per MIL-W-22759/33-30-9, White
08 - 18 inches long #30 AWG wire per MIL-W-22759/33-30-9, White
09 - 36 inches long #30 AWG wire per MIL-W-22759/33-30-9, White
10 - 6 inches long #30 AWG wire per MIL-W-22759/33-30-(*), Color Coded per MIL-STD-681, Sys 1, Ten Solid Colors Repeating

Consult Factory for additional wire terminations

HARDWARE
For slash sheets /1 and /3 only:
S = Jackscrew Installed
For slash sheets /2 and /4 only:
T = Threaded hole

SHELL FINISH
C = Aluminum, Cadmium Finish
N = Aluminum, Electroless Nickel Finish
S = Stainless Steel, Passivated – Not currently tooled by ITT Cannon
T = Titanium – Not currently tooled by ITT Cannon

SPACE CLASS
Blank = For Non-Space Applications
S = Space Class Testing Performed

Dimensions shown in inches (mm)
Specifications and dimensions subject to change

www.ittcannon.com

D-75
Nano Miniature NDD Series Connectors

Even with a wide range of choices in interconnect configurations, ITT recognized that customers were demanding higher density connectors operating at higher temperature ranges. Based on ITT’s nearly 50 years of experience in developing Micro interconnect technologies, we proudly present our next generation dual row NDD Nano (0.025) connector system, soon to be qualified to the Mil DTL 32139 specification. This high density interconnect package provides a robust shock and vibration capable solution, offering multiple configurations from 9 to 51 contact positions and including PCB versions. The unique knurled jackscrew assemblies allow for easier mating and demating, which is important for such small form factor connectors. Also, the entire connector family can be rated for 200 degree C environments based on ITT’s material selection and process technologies.

Product Features

- Micro twist Pin contact system
- 0.025 contact spacing
- Meets the performance requirements of Mil DTL-32139 (Qualification in process)
- 1 amp contact rating
- LCP Dielectric with operating temperature from -55 degrees C to 200 degrees C
- Multiple contact arrangements from 9 to 51 positions
- Knurled jack screw assembly hardware

Applications

- Defense Electronics
- High Temperature Geophysical Exploration
- Aerospace Structures
- Satellite Systems
- Medical Electronics
### Standard Shell

<table>
<thead>
<tr>
<th>Part Number by Shell Size</th>
<th>T</th>
<th>+ .020 (0.05)</th>
<th>- .000 (0.00)</th>
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</thead>
<tbody>
<tr>
<td>2DE19P</td>
<td>5</td>
<td>.250 (6.35)</td>
<td></td>
</tr>
<tr>
<td>2DE19S</td>
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<td>.250 (6.35)</td>
<td></td>
</tr>
<tr>
<td>2DA31P</td>
<td>5</td>
<td>.250 (6.35)</td>
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<tr>
<td>2DA31S</td>
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<tr>
<td>2DB52P</td>
<td>5</td>
<td>.236 (5.99)</td>
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<td>2DC79P</td>
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<tr>
<td>2DD100P</td>
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### Float Mount

<table>
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<th>+ .020 (0.05)</th>
<th>- .000 (0.00)</th>
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</thead>
<tbody>
<tr>
<td>2DE19P</td>
<td>5</td>
<td>.250 (6.35)</td>
<td></td>
</tr>
<tr>
<td>2DE19S</td>
<td>5</td>
<td>.250 (6.35)</td>
<td></td>
</tr>
<tr>
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<td>.250 (6.35)</td>
<td></td>
</tr>
<tr>
<td>2DB52P</td>
<td>5</td>
<td>.236 (5.99)</td>
<td></td>
</tr>
<tr>
<td>2DB52S</td>
<td>5</td>
<td>.236 (5.99)</td>
<td></td>
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<tr>
<td>2DC79P</td>
<td>5</td>
<td>.236 (5.99)</td>
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<tr>
<td>2DC79S</td>
<td>5</td>
<td>.236 (5.99)</td>
<td></td>
</tr>
<tr>
<td>2DD100P</td>
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<td>.236 (5.99)</td>
<td></td>
</tr>
<tr>
<td>2DD100S</td>
<td>5</td>
<td>.236 (5.99)</td>
<td></td>
</tr>
</tbody>
</table>

### Jackscrew/Jackpost Assembly

- **Standard (F172) Jackscrew** (factory installed)
- **Low Profile (F173) Jackscrew** (factory installed)
- **Jackscrew/Jackpost Assembly**
- **Front Panel Connector Mounting Only**

For shell with float mounts, add letter F after shell size, e.g., 2DEF19P.

Specifications and dimensions subject to change.

www.ittcannon.com
Double Density D - .075" Contact Spacing
2D

Contact Arrangements

All views are pin front face. Use reverse order for socket side.

19 Contacts

31 Contacts

52 Contacts

79 Contacts

100 Contacts

Cavity identification numbers are shown for reference only and do not appear on insulator front face. However they do appear on rear of insulator.

90° PCB Mounting - 3 Row

PCB Termination Leads
(all contact arrangements)

Size .024 (0.61) to .028 (7.11).

Suggested finished PC hole

Size .033 (8.38) ± .003 (0.08)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>A ± .015 (0.38)</th>
<th>B ± .010 (0.25)</th>
<th>C Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2DE19SBRP</td>
<td>1.215 (30.86)</td>
<td>.984 (24.99)</td>
<td>.690 (17.53)</td>
</tr>
<tr>
<td>2DA31SBRP</td>
<td>1.540 (39.12)</td>
<td>1.312 (33.32)</td>
<td>.690 (17.53)</td>
</tr>
<tr>
<td>2DB52SBRP</td>
<td>2.090 (53.09)</td>
<td>1.852 (47.04)</td>
<td>.690 (17.53)</td>
</tr>
<tr>
<td>2DC79SBRP</td>
<td>2.730 (69.34)</td>
<td>2.500 (63.50)</td>
<td>.690 (17.53)</td>
</tr>
</tbody>
</table>

Dimensions shown in inches (mm)
Specifications and dimensions subject to change

www.ittcannon.com
Double Density D - .075" Contact Spacing

90° PCB Mounting - 4 Row

Dimensions shown in inches (mm)
Specifications and dimensions subject to change

www.ittcannon.com
### Double Density D - .075" Contact Spacing 2D

#### Panel Cutouts

![Diagram of panel cutouts](image)

<table>
<thead>
<tr>
<th>Conn. Method</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>.874 (22.20)</td>
<td>.437 (11.19)</td>
<td>.984 (24.99)</td>
<td>.492 (12.50)</td>
<td>.513 (13.03)</td>
<td>.257 (6.53)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.083 (2.11)</td>
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<tr>
<td>Rear</td>
<td>.806 (20.47)</td>
<td>.403 (10.24)</td>
<td>.984 (24.99)</td>
<td>.492 (12.50)</td>
<td>.449 (11.40)</td>
<td>.225 (5.71)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.132 (3.35)</td>
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<tr>
<td>Front</td>
<td>1.202 (30.53)</td>
<td>.601 (15.26)</td>
<td>1.312 (33.32)</td>
<td>.656 (16.66)</td>
<td>.513 (13.03)</td>
<td>.257 (6.53)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.083 (2.11)</td>
</tr>
<tr>
<td>Rear</td>
<td>1.134 (28.80)</td>
<td>.567 (14.40)</td>
<td>1.312 (33.32)</td>
<td>.656 (16.66)</td>
<td>.449 (11.40)</td>
<td>.225 (5.71)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.132 (3.35)</td>
</tr>
<tr>
<td>Front</td>
<td>1.743 (44.27)</td>
<td>.872 (22.15)</td>
<td>1.852 (47.04)</td>
<td>.926 (23.52)</td>
<td>.513 (13.03)</td>
<td>.257 (6.53)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.083 (2.11)</td>
</tr>
<tr>
<td>Rear</td>
<td>1.674 (42.52)</td>
<td>.837 (21.28)</td>
<td>1.852 (47.04)</td>
<td>.926 (23.52)</td>
<td>.449 (11.40)</td>
<td>.225 (5.71)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.132 (3.35)</td>
</tr>
<tr>
<td>Front</td>
<td>2.391 (60.73)</td>
<td>1.196 (30.38)</td>
<td>2.500 (63.50)</td>
<td>1.250 (31.75)</td>
<td>.513 (13.03)</td>
<td>.257 (6.53)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.083 (2.11)</td>
</tr>
<tr>
<td>Rear</td>
<td>2.326 (59.08)</td>
<td>1.163 (29.55)</td>
<td>2.500 (63.50)</td>
<td>1.250 (31.75)</td>
<td>.449 (11.40)</td>
<td>.225 (5.71)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.132 (3.35)</td>
</tr>
<tr>
<td>Front</td>
<td>2.297 (58.34)</td>
<td>1.149 (29.18)</td>
<td>2.406 (61.11)</td>
<td>1.203 (30.56)</td>
<td>.623 (15.82)</td>
<td>.312 (7.92)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.083 (2.11)</td>
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<tr>
<td>Rear</td>
<td>2.218 (56.34)</td>
<td>1.109 (28.17)</td>
<td>2.406 (61.11)</td>
<td>1.203 (30.56)</td>
<td>.555 (14.10)</td>
<td>.278 (7.10)</td>
<td>.120 (3.05)</td>
<td>.060 (1.52)</td>
<td>.132 (3.35)</td>
</tr>
</tbody>
</table>

For contact part numbers, termination tooling and assembly see pages D-86 to D-88.

### Panel Mounting

- **Front Mounting Standard**
- **Front Mounting Float**
- **Rear Mounting Standard**
- **Rear Mounting Float**

Dimensions shown in inches (mm)

Specifications and dimensions subject to change
Environmentally sealed Double Density D connector offers superior vibration and moisture resistant characteristics.

The connector features superior environmental sealing which makes it suitable for any application where severe environmental protection is critical. The connector's contact density design was achieved by using field proven, highly reliable Centipin/Centsocket contacts on .075" centers.

Designed to maximize positive contact mating, the contact positions are reversed, leaving the flexible Centipin contacts recessed in the insulator while the more ruggedized centsocket contacts are exposed. This reversal of positions and the chamfered-entry of the sockets assures positive mating even under severe conditions where misalignment of mismatching of the connector might occur.

High reliability and protection of the contacts is assured through superior environmental sealing. The socket contacts as well as the Centipin contacts, which feature ITT Cannon's reliable Twist Pin contact design, are retained in the connector body. A rubber grommet seal the signal wires and connector from external contaminants and moisture. The 90° PCB mounting 2D*D is potted behind the grommet for additional sealing.

How to Order

SERIES

SHELL SIZES

CLASS

CONTACT ARRANGEMENT

CONTACT STYLE

MODIFICATION CODES

CONTACT ARRANGEMENT

100*
Consult factory for sizes 19, 31, 52, 79

CONTACT STYLE

P - Cent-Loc pin (receptacle shell config.)
S - Centi-Lock socket (plug shell config.)

MODIFICATION CODES

*** (Two 3-digit codes permissible)
F0 - Connector without contacts
(F0 will not be printed on the connector)
6 - Environmental D 90° PCB mounting
(socket configuration only)

Standard Data

Contacts: Insertable/removable gold-plated size 22 centi-loc crimp contacts (wire sizes #2 thru #26 AWG, stranded or solid).

MATERIALS AND FINISHES

Housings: Aluminum alloy, yellow chromate over cadmium plate
Peripheral Seal: Silicone
Insulators: Diallyl Phthalate
Contacts Retainer: Nylon
Grommet: Polychloroprene (bonded to housing)

Contact Arrangement

View of pin front face, use reverse order for socket side

Dimensions shown in inches (mm)
Specifications and dimensions subject to change

www.ittcannon.com
Double Density D - .075" Contact Spacing
2D*D

90° PCB Mounting

Plug/Socket Connector

2DDD100S-6

Receptacle/Pin Connector

2DDD100P

All tolerances are ±.010 (0.25) unless otherwise noted.

Dimensions shown in inches (mm)
Specifications and dimensions subject to change
www.ittcannon.com
Double Density D - .075" Contact Spacing
2D*D

Standard Mount (continued)

Plug/Socket Connector 2DDD100S

All tolerances are ± .010 (0.25) unless noted otherwise.

Panel Cutout

USE .120(3.05) DIA. HOLE OR 4-40 TAP (CUSTOMER PREFERENCE) FOR FRONT MOUNTING
FOR REAR MOUNTING USE .120(3.05) DIA. HOLE COUNTERSUNK FOR FLATHEAD SCREW.

Mounting Dimensions

1. With both connectors rear mounted, use #4-40 flat head screws flush with the panel.
2. With both connectors front mounted, use #4-40 binder or pan head screws.
3. With both connectors rear mounted (float mounting on either plug or receptacle side),
   use #4-40 flat head screws, flush with the panels.
4. With both connectors front mounted (float mounting on either plug or receptacle side),
   use #4-40 binder or pan head screws.
5/6. With plug assembly front mounted and receptacle assembly rear mounted, use hardware
from Figures 5 and 6. If float mounting is desired, use Figure 3 or 4 for the float mounted connector.

*Dimensions between panels represent the recommended limit to be used in the design of the connector mounting method.

**NOTE:** Max. panel thickness is .125 (3.17) for non-floating rear panel mounting.

Dimensions shown in inches (mm)
Specifications and dimensions subject to change

www.ittcannon.com