About Omnetics

Omnetics Connector Corporation is a privately held, world class connector design and manufacturing company with over 30 years experience focused on ultra-lightweight micro-miniature and nano-miniature highly reliable electronic connectors and interconnection systems. Our products are designed and assembled at our plant in Minneapolis, Minnesota that includes in-house automatic machining and overmolding equipment.

Omnetics’ Flex Pin

Omnetics’ Flex Pin contact was designed and produced many years before the creation of MIL-DTL-32139. This simple one piece design is stamped from ASTM B194 BeCu. The spring characteristic of BeCu is ideal for withstanding high shock and vibration situations.
About High Speed

Today’s design engineers have a strong directive when it comes to military electronics, and much of the emphasis is focused heavily around SWaP (Size, Weight and Power). The main challenge when designing SWaP-optimized electronics is finding the delicate balance between size, weight, and power consumption, without physically compromising the devices’ overall performance, durability, and reliability. Many advanced avionics platforms today are processing mountains of data, and in doing so, are consuming more power than ever before. This requires today’s engineers to design embedded electronics and interconnect systems differently, so they can handle increased data speeds and bandwidth without adding significant weight. Omnetics Connector Corporation has been able to lend their expertise to this issue by releasing a new set of miniaturized high-speed standards featuring ruggedized USB 3.1 Gen 1, HDMI and Cat6a Ethernet connector offerings. This new family of miniature circulars allows designers the ability to transmit uninterrupted, high-speed digital signals in some of the smallest Mil-spec footprints on the market.

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USB 3.1 Gen 1 Circular

Electrical-Mechanical Specifications

- **Performance:** Product family tested to and passed or exceeded the performance specifications of Table VIII of MIL-DTL-32139
- **Contact Resistance (Nano):** 71 Milliohm Max (71 mV Drop Max) @ 1.0 Amps per MIL-DTL-32139
- **Contact Resistance (Micro):** 26 Milliohm Max (65 mV Drop Max) @ 2.5 Amps per MIL-DTL-32139
- **Current Rating (Nano):** 1 Amp per MIL-DTL-32139
- **Current Rating (Micro):** 3 Amps per MIL-DTL-83513
- **Operating Temperature:** -55°C to 85°C
- **Durability:** >2000 mating cycles min
- **Insulation Resistance:** 5000 megohms @ 500 VDC
- **Shock:** 50 g’s with no discontinuities > 10 nanosecond
- **Vibration:** 20 g’s with no discontinuities > 10 nanosecond
- **Thermal Vacuum Outgassing (Space Class):** 1.0% max TML, 0.03% max CVCM
- **Mating/Unmating Force:** 2.5 oz (71 g) typical per contact

Material Specifications

- **Contact:** Copper Alloy Per MIL-DTL-32139
- **Contact Finish:** Gold per ASTM B488, Type II, Class 1.27, Code C Over Nickel Underplate
- **Insulator:** Thermoplastic per MIL-M-24519
- **Overmold:** Black Thermoplastic Polyurethane
- **O-Ring:** BUNA-N
- **Cable (Shielded):** 30 AWG (7-38) SPC, FEP / 26 AWG (19-38) SPC, FEP color coded, Black Polyurethane Jacket
- **Shield:** Foil wrap with braid - 38 AWG tin plated copper

Shell Options

- **Brass Alloy 360 1/2 Hard:** Electroless Nickel per SAE-AMS-2404
  - Black Nickel per MIL-P-18317
- **Stainless Steel, 300 Series:** Passivated per SAE-AMS-2700
  - Black Oxide Finish per MIL-DTL-13924, Class 4*, Passivated per SAE-AMS-2700

* less resistance to salt spray test.
USB 3.1 Gen 1 Circular

Electrical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Spec</th>
<th>1-Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Differential Impedance</td>
<td>$Z_{\text{MIN}}$</td>
<td>75 Ω</td>
</tr>
<tr>
<td></td>
<td>$Z_{\text{MAX}}$</td>
<td>105 Ω</td>
</tr>
<tr>
<td>Differential Insertion Loss</td>
<td>Loss @ 7.5 GHz</td>
<td>&lt; 25 dB</td>
</tr>
<tr>
<td>Differential Far-End Crosstalk</td>
<td>FEXT @ 7.5 GHz</td>
<td>&lt; -23 dB</td>
</tr>
<tr>
<td>Diff-to-Common Mode Conversion</td>
<td>DCM @ 7.5 GHz</td>
<td>&lt; -20 dB</td>
</tr>
</tbody>
</table>

Various cable options are available. Measurements shown above with cables manufactured in Asia.
USB 3.1 Gen 1 Circular Keyed Break Away - KBXP
USB 3.1 Gen 1 Circular
Keyed Break Away - KBXS

[Diagram of USB 3.1 Gen 1 Circular Keyed Break Away - KBXS]

PART NUMBER: A79936-601
NOMENCLATURE: BAXX-09-WC-18.0-C-BN-OM

PART NUMBER: A79902-601
NOMENCLATURE: BAXX-09-WC-18.0-C-BN-RP

(plots and diagram details)

OMNETICS HIGH SPEED CATALOG
USB 3.1 Gen 1 Circular
Threaded - MXC

OMNETICS HIGH SPEED CATALOG

OMNETICS CONNECTOR CORPORATION
USB 3.1 Gen 1 Circular
Triple Threaded - RXC
USB 3.1 Gen 1 Circular Twist Lock - TXC
Cat6a Ethernet Micro

Electrical-Mechanical Specifications

- Operating Temperature: -55°C to 85°C
- Dielectric Withstand Voltage: 600 VAC RMS @sea level
- Contact Resistance: 26 milliohms(65 mV) Max @2.5 Amps
- Current Rating: 3 Amps per contact
- Operating Temperature: -55°C to 85°C
- Durability: 2000 Mating Cycles min
- Insulation Resistance: 5000 megohms @ 500 VDC
- Shock: 50 g's with no discontinuities > 1 microsecond
- Vibration: 20 g's with no discontinuities > 1 microsecond
- Thermal Vacuum Outgassing (Space Class): 1.0% max TML, 0.03% max CVCM
- Mating/Unmating Force: 3 oz (85 g) per contact

Material Specifications

- Contact: Copper Alloy per MIL-DTL-83513
- Contact Finish: Gold per ASTM B488, Type II, Class 1.27, Code C Over Nickel Underplate
- Insulator: Thermoplastic per MIL-M-24519
- Overmold: Black Thermoplastic Polyurethane
- Cable (Shielded): 26 AWG (7-34) TPC, HDPE color coded, Black Polyurethane Jacket
- Shield: Foamed Polypropylene wrap with braid - 38 AWG tin plated copper

Shell Options

- Stainless Steel, 300 Series: Passivated per SAE-AMS-2700 Black Oxide Finish per MIL-DTL-13924, Class 4*, Passivated per SAE-AMS-2700
- Brass Alloy 360 1/2 Hard: Electroless Nickel per SAE-AMS-2404 Black Nickel per MIL-P-18317
- Aluminum 6061: Electroless Nickel per SAE-AMS-2404 Black Nickel per MIL-P-18317

* less resistance to salt spray test.
### Cat6a Ethernet Micro

#### Electrical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Spec</th>
<th>1-Meter</th>
<th>3-Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential Cable Impedance</td>
<td>$Z_{\text{MIN}}$</td>
<td>90 Ω</td>
<td>97 Ω</td>
</tr>
<tr>
<td></td>
<td>$Z_{\text{MAX}}$</td>
<td>110 Ω</td>
<td>98 Ω</td>
</tr>
<tr>
<td>Differential Insertion Loss</td>
<td>Loss @ 500 MHz</td>
<td>&lt; 44 dB</td>
<td>1 dB</td>
</tr>
<tr>
<td>Differential Return Loss</td>
<td>Loss @ 500 MHz</td>
<td>&lt; -8 dB</td>
<td>-13 dB</td>
</tr>
<tr>
<td>Differential Far-End Crosstalk</td>
<td>NEXT @ 500 MHz</td>
<td>&lt; -27 dB</td>
<td>-48 dB</td>
</tr>
<tr>
<td>Differential Power Sum Far-End Crosstalk</td>
<td>PSNEXT @ 500 MHz</td>
<td>&lt; -24 dB</td>
<td>-45 dB</td>
</tr>
</tbody>
</table>

Various cable options are available. Measurements shown above with cables manufactured in Asia.
Cat6a Ethernet Micro Circular
Keyed Break Away - KBMP

OMNETICS HIGH SPEED CATALOG

PART NUMBER:
A90235-601
NOMENCLATURE:
KBMP-13-WC-18.0-BN-IS-OR-IP68-OM

PART NUMBER:
A90209-601
NOMENCLATURE:
KBMP-13-WC-18.0-BN-RP-OR-IP68

ETHERNET MICRO CIRCULAR  KEYED BREAKAWAY, SEALED KBM
Cat6a Ethernet Micro Circular
Keyed Break Away - KBMS

OMNETICS CONNECTOR CORPORATION
Cat6a Ethernet Micro Circular Threaded - MMC

OMNETICS HIGH SPEED CATALOG

PART NUMBER: A90203-601
NOMENCLATURE: MMCP-13-WC-18.0-IS-OR-IP68-OM

PART NUMBER: A90205-601
NOMENCLATURE: MMCP-13-WC-18.0-RP-OR-IP68

PART NUMBER: A90204-601
NOMENCLATURE: MMCS-13-WC-18.0-IS-OR-IP68-OM
Cat6a Ethernet Micro Circular Ratcheting - RMC

- **1/2-20-ACME -2G TRIPLE START THREAD**
- **SHRINK TUBE**
- **PANEL THICKNESS**
- **1/2-20-ACME -2G TRIPLE START THREAD**
- **CABLE LENGTH AS REQUIRED**
- **RATCHETING MECHANISM**
- **O-RING**
Cat6a Ethernet Micro Circular Twist Lock - TMC
Cat6a Ethernet Nano

Electrical-Mechanical Specifications

- **Performance:** Product family tested to and passed or exceeded the performance specifications of Table VIII of MIL-DTL-32139
  
- **Contact Resistance:** 71 Milliohm Max (71mV Drop Max) @ 1.0 Amps per MIL-DTL-32139
  
- **Current Rating:** 1 Amp per MIL-DTL-32139
  
- **Operating Temperature:** -55°C to 85°C
  
- **Durability:** >2000 mating cycles min
  
- **Insulation Resistance:** 5000 megohms @ 100 VDC
  
- **Shock:** 100 g's with no discontinuities > 10 nanosecond
  
- **Vibration:** 20 g's with no discontinuities > 10 nanosecond
  
- **Thermal Vacuum Outgassing (Space Class):** 1.0% max TML, 0.03% max CVCM
  
- **Mating/Unmating Force:** 2.5 oz (71 g) typical per contact

Material Specifications

- **Contact:** Copper Alloy Per MIL-DTL-32139
  
- **Contact Finish:** Gold per ASTM B488, Type II, Class 1.27, Code C Over Nickel Underplate
  
- **Insulator:** Thermoplastic per MIL-M-24519
  
- **Overmold:** Black Thermoplastic Polyurethane
  
- **O-Ring:** BUNA-N
  
- **Cable (Shielded):** 32 AWG (7-40) SPC, FEP color coded, Black Polyurethane Jacket
  
- **Shield:** Aluminum/Poly wrap with braid - 40 AWG tin plated copper

Shell Options

- **Brass Alloy 360 1/2 Hard:** Electroless Nickel per SAE-AMS-2404, Black Nickel per MIL-P-18317
  
- **Stainless Steel, 300 Series:** Passivated per SAE-AMS-2700, Black Oxide Finish per MIL-DTL-13924, Class 4*, Passivated per SAE-AMS-2700

* less resistance to salt spray test.
# Cat6a Ethernet Nano

## Electrical Specifications

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<td>1 dB</td>
</tr>
<tr>
<td>Differential Return Loss</td>
<td>Loss @ 500 MHz</td>
<td>&lt; -8 dB</td>
<td>-16 dB</td>
</tr>
<tr>
<td>Differential Far-End Crosstalk</td>
<td>NEXT @ 500 MHz</td>
<td>&lt; -27 dB</td>
<td>-50 dB</td>
</tr>
<tr>
<td>Differential Power Sum Far-End Crosstalk</td>
<td>PSNEXT @ 500 MHz</td>
<td>&lt; -24 dB</td>
<td>-48 dB</td>
</tr>
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</table>

Various cable options are available. Measurements shown above with cables manufactured in Asia.
Cat6a Ethernet Nano Circular
Keyed Break Away - KBNP

OMNETICS HIGH SPEED CATALOG
Cat6a Ethernet Nano Circular Keyed Break Away - KBNS

PART NUMBER: A79914-601
NOMENCLATURE: KBNP-13-WC-18.0-BN-IS-OR-IP68-OM

PART NUMBER: A79913-601
NOMENCLATURE: KBNP-13-WC-18.0-BN-RP-OR-IP68

(VIEW FROM MATING FACE)

PLUG
ETHERNET PINOUT
SOCKET

OMNETICS HIGH SPEED CATALOG
Cat6a Ethernet Nano Circular Threaded - MNC

OMNETICS HIGH SPEED CATALOG
Cat6a Ethernet Nano Circular Twist Lock - TNC

OMNETICS HIGH SPEED CATALOG

PART NUMBER:
A79940-601
NOMENCLATURE:
TNCP-13-WC-18.0-IS-OR-IP68-OM

PART NUMBER:
A79942-601
NOMENCLATURE:
TNCP-13-WC-18.0-RP-OR-IP68

PART NUMBER:
A79941-601
NOMENCLATURE:
TNCS-13-WC-18.0-IS-OR-IP68-OM
HDMI Nano

Electrical-Mechanical Specifications

- **Performance:** Product family tested to and passed or exceeded the performance specifications of Table VIII of MIL-DTL-32139
- **Contact Resistance:** 71 Milliohm Max (71mV Drop Max) @ 1.0 Amps per MIL-DTL-32139
- **Current Rating:** 1 Amp per MIL-DTL-32139
- **Operating Temperature:** -55°C to 85°C
- **Durability:** >2000 mating cycles min
- **Insulation Resistance:** 5000 megohms @ 100 VDC
- **Shock:** 100 g’s with no discontinuities > 10 nanosecond
- **Vibration:** 20 g’s with no discontinuities > 10 nanosecond
- **Thermal Vacuum Outgassing (Space Class):** 1.0% max TML, 0.03% max CVCM
- **Mating/Unmating Force:** 2.5 oz (71 g) typical per contact

Material Specifications

- **Contact:** Copper Alloy Per MIL-DTL-32139
- **Contact Finish:** Gold per ASTM B488, Type II, Class 1.27, Code C Over Nickel Underplate
- **Insulator:** Thermoplastic per MIL-M-24519
- **Overmold:** Black Thermoplastic Polyurethane
- **O-Ring:** BUNA-N
- **Cable (Shielded):** 32 AWG (7-40) SPA, EPTFE/PFA, color coded, Black Polyurethane Jacket
- **Shield:** Mylar foil wrap, 38 AWG tin plate copper braiding

Shell Options

- **Brass Alloy 360 1/2 Hard:** Electroless Nickel per SAE-AMS-2404
  - Black Nickel per MIL-P-18317
- **Stainless Steel, 300 Series:** Passivated per SAE-AMS-2700
  - Black Oxide Finish per MIL-DTL-13924, Class 4*, Passivated per SAE-AMS-2700

* less resistance to salt spray test.
## HDMI Nano

### Electrical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Spec</th>
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<th>3-Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Differential Impedance</td>
<td>$Z_{\text{MIN}}$</td>
<td>75 Ω</td>
<td>85 Ω</td>
</tr>
<tr>
<td></td>
<td>$Z_{\text{MAX}}$</td>
<td>125 Ω</td>
<td>108 Ω</td>
</tr>
<tr>
<td>Cable Differential Impedance</td>
<td>$Z_{\text{MIN}}$</td>
<td>90 Ω</td>
<td>95 Ω</td>
</tr>
<tr>
<td></td>
<td>$Z_{\text{MAX}}$</td>
<td>100 Ω</td>
<td>104 Ω</td>
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<tr>
<td>Differential Insertion Loss</td>
<td>0.825 GHz</td>
<td>5 dB</td>
<td>2 dB</td>
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<tr>
<td></td>
<td>2.475 GHz</td>
<td>12 dB</td>
<td>5 dB</td>
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<td></td>
<td>4.125 GHz</td>
<td>20 dB</td>
<td>7 dB</td>
</tr>
<tr>
<td></td>
<td>5.100 GHz</td>
<td>25 dB</td>
<td>9 dB</td>
</tr>
<tr>
<td>Differential Far-End Crosstalk</td>
<td>FEXT MAX</td>
<td>&lt; -20 dB</td>
<td>-32 dB</td>
</tr>
<tr>
<td>Intra-Pair Skew</td>
<td>Skew MAX</td>
<td>112 ps</td>
<td>34 ps</td>
</tr>
</tbody>
</table>

Various cable options are available. Measurements shown above with cables manufactured in Asia.
HDMI Nano Circular
Keyed Break Away - KBNS

Part Number:
A79904-601
Nomenclature:
KBNS-19-WC-18.0-C-BN-OM-IS

Part Number:
A79905-601
Nomenclature:
KBNS-19-WC-18.0-C-RP-OR-BN-IP68

O-Ring Retaining Spring

Cable Length as Required

Panel Thickness

M12 X .75

Nut Retaining Spring

Shrink Tube

View Less Nut

HDMI PINOUT

Plug

Socket

(View from Mating Face)
HDMI Nano Circular
Threaded - MNC

OMNETICS HIGH SPEED CATALOG

PART NUMBER:
A79944-601
NOMENCLATURE:
MNCP-19-WC-18.0-C-IS-N-OM-IP68

PART NUMBER:
A79945-601
NOMENCLATURE:
MNCS-19-WC-18.0-C-IS-N-OM-IP68

PART NUMBER:
A79946-601
NOMENCLATURE:
MNCP-19-WC-18.0-C-RP-N-OR-IP68

1.57 [40]
(1.82[46.2])
(0.55[14])

CABLE LENGTH AS REQUIRED

M10 X .75

NUT

O-RING

SHRINK TUBE

PANEL CUTOUT

CABLE LENGTH AS REQUIRED

M14 X .75

M10 X .75

NUT

O-RING

SHRINK TUBE

PANEL CUTOUT

CABLE LENGTH AS REQUIRED

M10 X .75

NUT

O-RING

SHRINK TUBE

PANEL CUTOUT
See our other miniature and ruggedized connector options at www.omnetics.com!