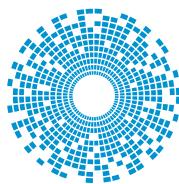


JOHNSON™

## 2.92mm (SMK) Series Adapters & Connectors

Catalog



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# 2.92mm Series

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The Johnson™ 2.92mm Series Connector provides an excellent solution for demanding applications requiring high frequency transmission. Although similar to the SMA interface, a smaller internal body diameter (2.92mm) and air dielectric provide a higher cutoff frequency and other key advantages:

- Precision manufacturing allows superior electrical performance to 40 GHz.
- Female contacts have a unique three-slot construction, which enhances connectivity by creating a more rugged connector while reducing the chance of intermittent connections.
- Precise assembly tooling assures excellent, repeatable contact and support bead location on cabled connectors.
- Connector mating interface per MIL-STD-348.
- Mating interface control provides consistent electrical performance.
- The plug connector VSWR is 1.20 Max to 40 GHz and a 12 inch 2.92mm plug to plug cable assembly performs better than 1.35 VSWR to 40 GHz.
- The Field Replaceable Jacks are teamed with a high quality hermetic seal feed thru for use in sealed circuit modules.
- The 2.92mm plug interface employs more precise dimensions than an SMA and uses a shorter snub nose male pin such that the connector bodies align before the contacts engage.

## MATERIAL SPECIFICATIONS

**Bodies:** Stainless steel/passivated per QQ-8-626, gold plated per MIL-G-45204 .00005" min. or stainless steel/passivated per MIL-F-14072 B (EL) 300

**Contacts:** Female - beryllium copper per QQ-C-530, gold plated per MIL-G-45204 .00005" min.

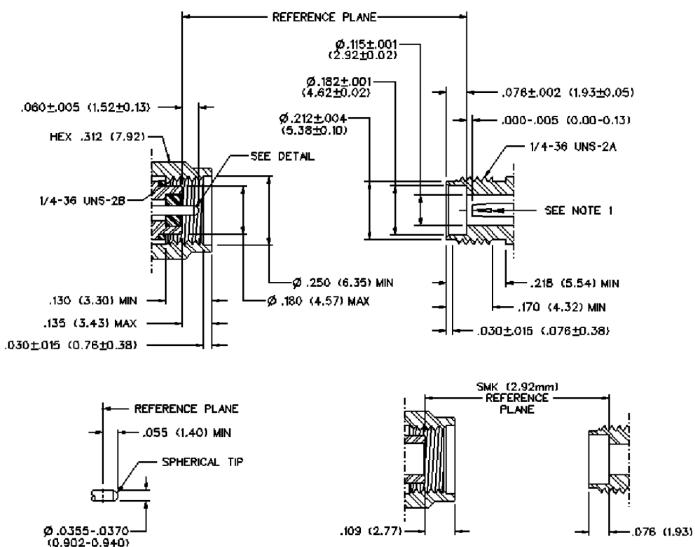
**Contact Support Beads:** PTFE fluorocarbon per ASTM D 1710 and ASTM D 1457 or modified PPE resin

**Seal Rings:** Silicone rubber per ZZ-R-765

\*All gold plated parts include a .00005" min. nickel underplate barrier layer.

## MATING ENGAGEMENT:

### 2.92MM SERIES PER MIL-STD-348



## MECHANICAL SPECIFICATIONS

**Engagement Design:** MIL-STD-348, Series 2.92mm

**Engagement/Disengagement Force:** 2 inch-pounds maximum

**Mating Torque:** 7 to 10 inch-pounds

**Coupling Proof Torque:** 15 inch-pounds minimum

**Coupling Nut Retention:** 60 pounds minimum

**Contact Retention:** 6 pounds minimum axial force (captivated contacts)

Cable Retention:	Axial Force (lbs)	Torque (in-oz)
.086 semi-rigid	30	16
.141 semi-rigid	60	55

## Notes:

1. ID of contact shall meet VSWR and connectivity requirements when mated with dia. .0355-.0365 male pin.

## ENVIRONMENTAL RATINGS

(Meets or exceeds the applicable paragraph of MIL-C-39012)

**Temperature Range:** -65°C to + 165°C

**Thermal Shock:** MIL-STD-202, Method 107, Condition B

**Corrosion:** MIL-STD-202, Method 101, Condition B

**Shock:** MIL-STD-202, Method 213, Condition I

**Vibration:** MIL-STD-202, Method 204, Condition D

**Moisture Resistance:** MIL-STD-202, Method 106

# 2.92mm Series

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## ELECTRICAL RATINGS

**Impedance:** 50 ohms

**Frequency Range:** 0-40 GHz

**VSWR:** {f = GHz}

Semi-rigid straight cabled connectors and adapters 120 Max

Field replaceable (see typical return loss graph) N/A

**Working Voltage:** (Vrms maximum)

**Connectors for Cable Type**

.086 semi-rigid and field replaceable 335 85

.141 semi-rigid and adapters 500 125

**Dielectric Withstanding Voltage:** (VRMS minimum at sea level)

.086 semi-rigid and field replaceable 1000

.141 semi-rigid and adapters 1500

**Corona Level:** (Volts minimum at 70,000 feet)

.086 semi-rigid and field replaceable 250

.141 semi-rigid and adapters 375

**Insertion Loss:** (dB maximum)

Adapters  $0.06\sqrt{f}$  (GHz), tested at 6 GHz

Straight semi-rigid cable connectors  $0.03\sqrt{f}$  (GHz), tested at 10 GHz

**Insulation Resistance:** 5000 megohms minimum

**Contact Resistance:** (milliohms maximum)

	Initial	After Environmental
Center contact straight cabled connectors	3.0*	4.0
Center contact adapters	4.0	6.0
Field replaceable connectors	6.0	8.0
Outer contact (all connectors)	2.0	N/A
Body to cable (gold plated connectors)	0.5	N/A
Body to cable (stainless steel/passivated connectors)	5.0	N/A

**RF Leakage:** (dB minimum, tested at 2.5 GHz) -90dB

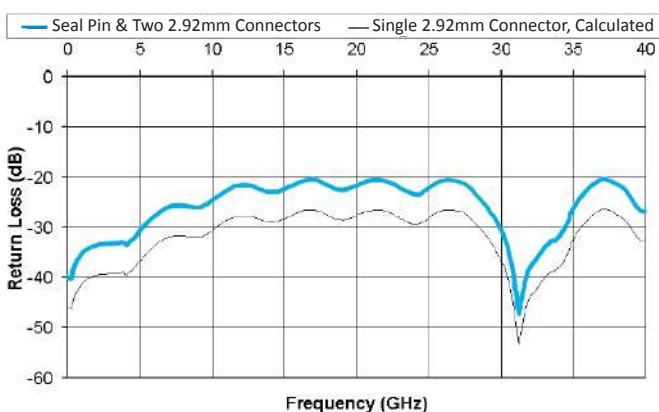
**RF High Potential Withstanding Voltage:**

(Vrms minimum, tested at 4 and 7 MHz)

.086 semi-rigid and field replaceable 670

.141 semi-rigid and adapters 1000

## Typical Return Loss



## FIELD REPLACEABLE APPLICATION NOTES

The field replaceable connectors manufactured by Johnson™, are easy to install and replace. The hermetic seal is mounted into the circuit module wall and the connector can be removed and replaced without destroying the hermeticity of the circuit housing.

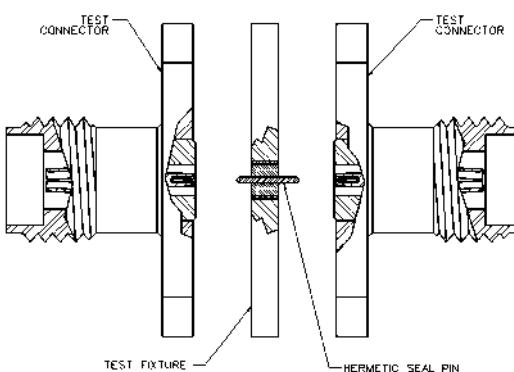
The field replaceable connector creates a transition from microstrip circuitry to a coaxial transmission line. The 2.92mm seal pin diameter is .012 (.030) to minimize the capacitive effects on the circuit trace. For optimum electrical performance, the transition from the hermetic seal to the microstrip trace must be properly compensated. Compensation involves adjusting the microstrip trace width to minimize any Impedance discontinuities found in the transition area.

The plot shown below is representative of the typical return loss of a Johnson™ field replaceable 2.92mm connector. To produce the data shown below, a test fixture is created using the Johnson™ 2.92mm hermetic seal. The fixture consists of a suitably thick spacer plate with the hermetic seal mounted flush to both surfaces. Two connectors are mounted back to back around the fixture and the VSWR of this test assembly is measured. The calculated return loss trace shown is equivalent to the square root of the measured VSWR of the test assembly. Since the connectors tested are of identical design, it can be stated with fair accuracy that the calculated data shown represents the response of a single field replaceable connector and its transition to the hermetic seal.

Although Johnson™ does not publish a VSWR specification for field replaceable connectors, typical connector return loss can be expected to be less than -20 dB through 40 GHz. A VSWR specification is not stated because an Industry standard method for testing field replaceable connectors does not exist. The actual performance of the connector is dependent upon the following:

1. For optimum electrical performance, Johnson™ recommends the use of our standard 142-1000-033 hermetic seal with a pin diameter of .0120 (0.305) +/- .0005 (0.013).
2. It is recommended that the hermetic seal be mounted flush with the circuit housing. Tolerance variations between the hermetic seal and machined housing do not always guarantee an optimum transition to the connector. Some manufacturers recommend an additional counterbore in the circuit housing to accommodate a solder washer during installation of the seal. Johnson™ does not recommend this type of installation because if the counterbore is not completely filled with solder, electrical discontinuities may be created.
3. The transition between the hermetic seal pin and the microstrip trace will effect electrical performance, as stated above. Several different methods of hermetic seal mounting and seal pin to microstrip trace attachment are used in the industry.

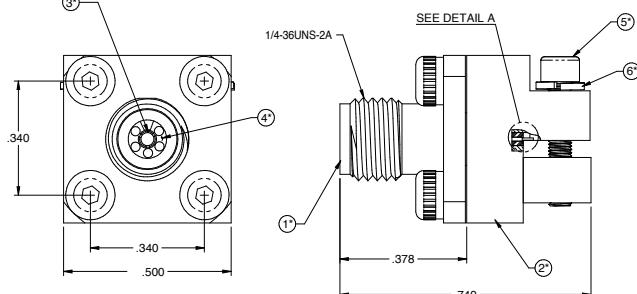
## Field Replaceable Test Assembly



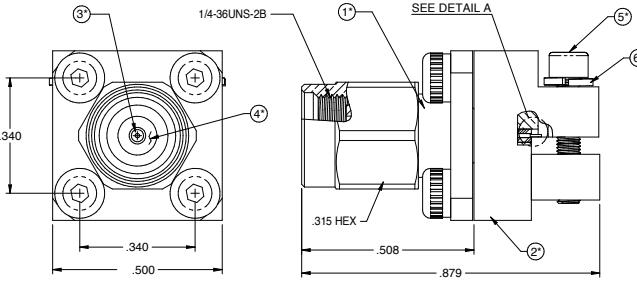
# 2.92mm Connectors

JOHNSON™

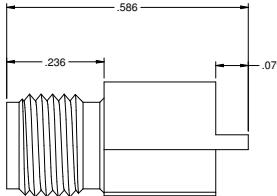
## End Launch Jack - Screw-On Type

Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
145-0701-802	50 Ohms	40GHz	1.50
 			

## End Launch Plug - Screw-On Type

Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
145-0801-802	50 Ohms	40GHz	1.50
 			

## End Launch Jack - Solder Type

Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
145-0701-811	50 Ohms	40GHz	1.50
  			

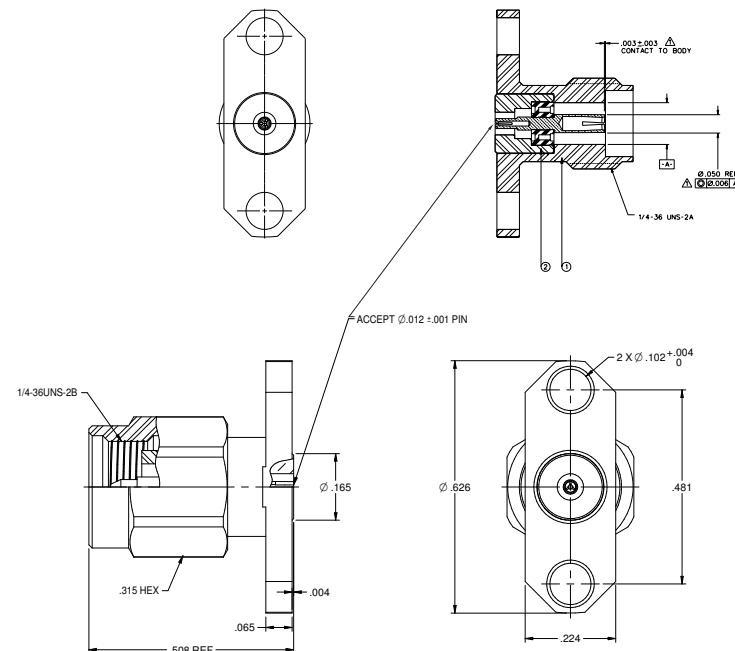
\* For more information, please see the drawings on the Cinch website at [belfuse.com/Cinch](http://belfuse.com/Cinch) and search by part number.

# 2.92mm Connectors

**JOHNSON™**

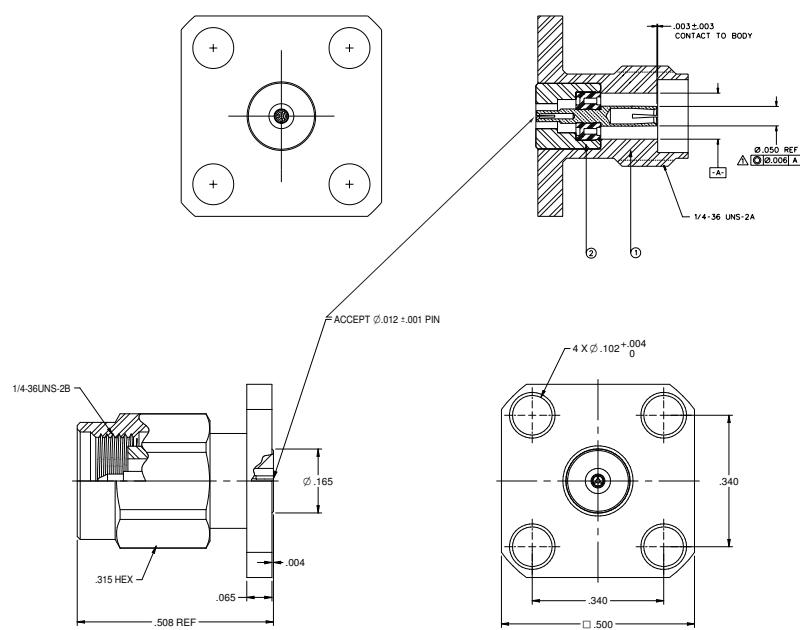
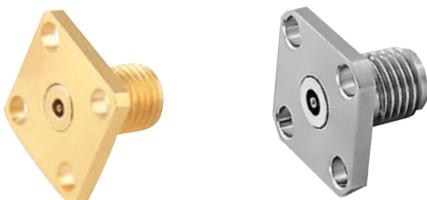
## 2-Hole Flange Mount Jack and Plug Receptacle

Gold Plated	Stainless Steel/Passivated	Type	Impedance	Max Frequency	VSWR
145-0701-601	145-0701-602	Jack	50 Ohms	40GHz	1.20 (Test result seen on Rogers 3003 board with 0.062" board thickness
	145-0801-602	Plug			



## 4-Hole Flange Mount Jack and Plug Receptacle

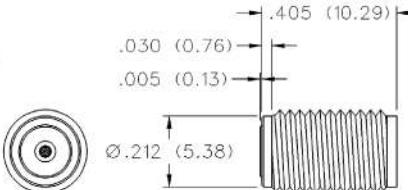
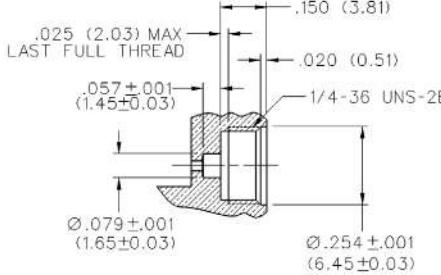
Gold Plated	Stainless Steel/Passivated	Type	Impedance	Max Frequency	VSWR
145-0701-611	145-0701-612	Jack	50 Ohms	40GHz	1.20 (Test result seen on Rogers 3003 board with 0.062" board thickness
	145-0801-612	Plug			



# 2.92mm Connectors

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## Jack Receptacle - Thread Mount Field Replaceable

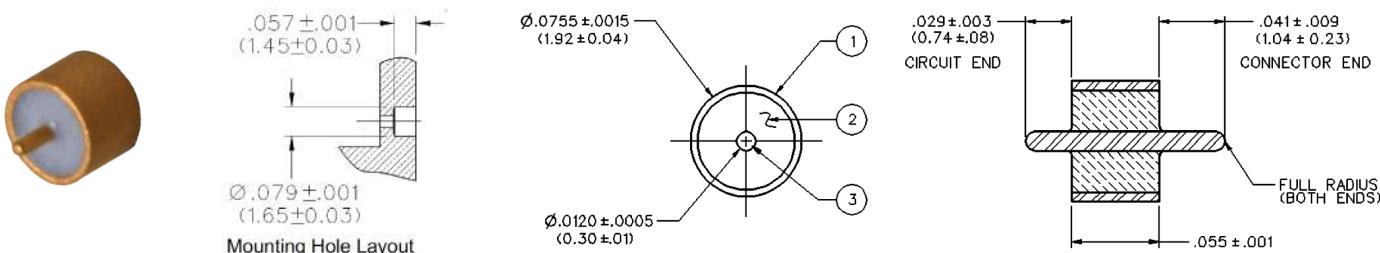
Accepts Pin Size	Gold Plated	Stainless Steel/Passivated
.0120 +/- .0005 (0.305 +/- .013)	145-0701-001	145-0701-002
		 Mounting Hole Layout

## Hermetic Seal Feedthru

Part Number	Item 1 - Outer Ring	Item 2 - Insulator	Item 3 - Pin	Environmental	Electrical
142-1000-033	Kovar Gold pl .00005 min. over Nickel pl .00005 min.	Glass Corning 7070 or equivalent	Kovar Gold pl .00005 min. over Nickel pl .00005 min.	<b>Hermeticity:</b> 1x10 <sup>-8</sup> cc/sec at one atmosphere <b>Solderability:</b> MIL-STD-202, Method 209 Operating <b>Temperature:</b> -55° C to 165° C	<b>Impedance:</b> 50 Ohms <b>Frequency Range:</b> DC to 40 GHz <b>VSWR:</b> Dependent upon application <b>Working Voltage:</b> 250 Vrms max at sea level <b>Dielectric Withstanding Voltage:</b> 500 Vrms min. at sea level <b>Insulation Resistance:</b> 5000 Megohm min. <b>Insertion Loss:</b> 0.2 dB max at 40 GHz

### Notes:

1. The hermetic seal should be mounted as flush as possible with the housing. Excessive recession will create a high impedance air gap between connection and housing which degrades electrical performance.
2. The use of an additional counterbore to accommodate a solder ring for seal mounting is not recommended. A slight chamfer may be used if care is taken to completely fill the area with solder - **avoid air gaps**.

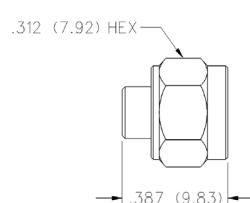


## Straight Solder Type Plug - with contact, slide-on nut

Cable Type	Gold Plated	Stainless Steel/Passivated
.086 Semi-Rigid (RG-405)	145-0693-001	145-0693-002
.141 Semi-Rigid (RG-402)	145-0694-001	145-0694-002

### Notes:

1. Stainless steel/passivated coupling nut & gold plated body.
2. Assembly instructions on page 12.



# 2.92mm Adapters

## Same Series Adapters

**JOHNSON™**

2.92mm Adapters are offered in Same Series and Between Series configurations. They are precision manufactured to RF component industry specifications, with a maximum frequency of 40 GHz.

### Plug to Plug Same-Series Adapter

Gold Plated	Impedance	Max Frequency	VSWR
145-0901-811	50 Ohms	40GHz	1.20

### Plug to Jack Same-Series Adapter

Gold Plated	Impedance	Max Frequency	VSWR
145-0901-821	50 Ohms	40GHz	1.20

### Jack to Jack Same-Series Adapter

Gold Plated	Impedance	Max Frequency	VSWR
145-0901-801	50 Ohms	40GHz	1.20

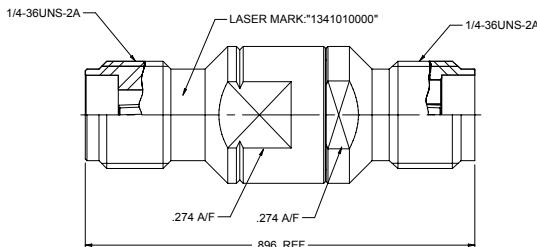
# 2.92mm to SMA Adapters

## Between Series Adapters

**JOHNSON™**

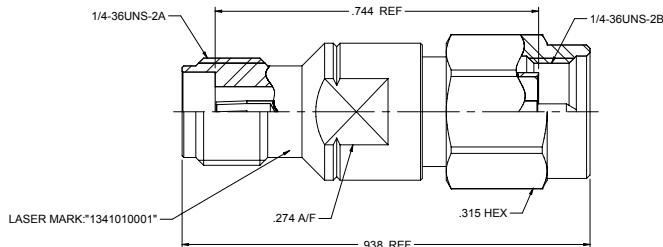
### Between-Series, 2.92mm Jack To SMA Jack

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMA	134-1010-000	50 Ohms	26.5GHz	1.30



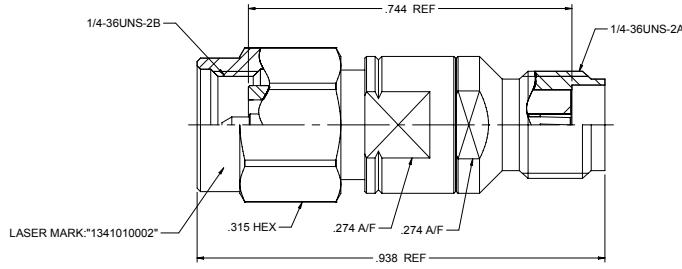
### Between-Series, 2.92mm Jack To SMA Plug

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMA	134-1010-001	50 Ohms	26.5GHz	1.30



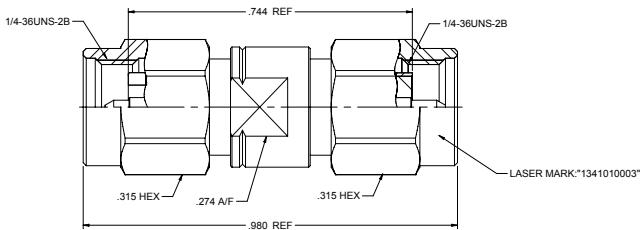
### Between-Series, 2.92mm Plug To SMA Jack

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMA	134-1010-002	50 Ohms	26.5GHz	1.30



### Between-Series, 2.92mm Plug To SMA Plug

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMA	134-1010-003	50 Ohms	26.5GHz	1.30



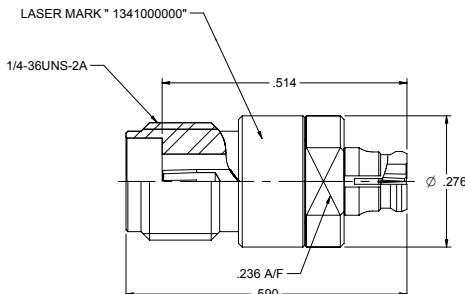
# 2.92mm to SMP Adapters

## Between Series Adapters

**JOHNSON™**

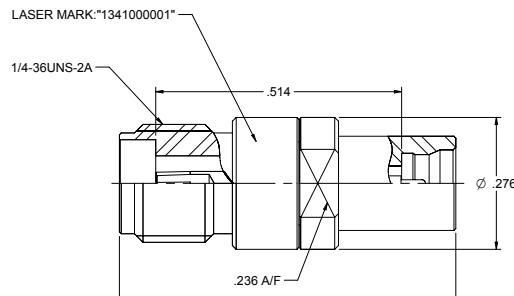
### Between-Series, 2.92mm Jack To SMP Jack

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMP	134-1000-000	50 Ohms	40GHz	1.25



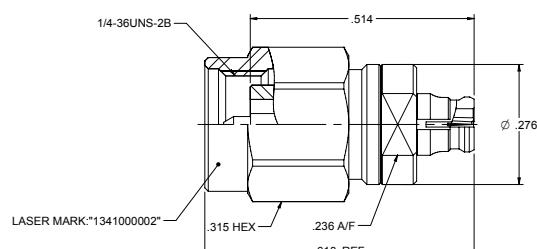
### Between-Series, 2.92mm Jack To SMP Plug

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMP	134-1000-001	50 Ohms	40GHz	1.25



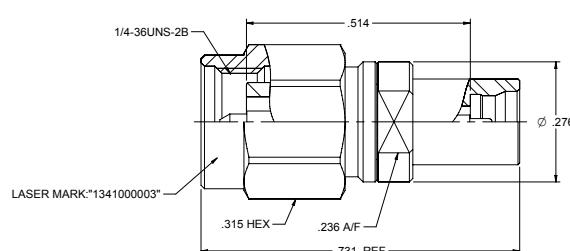
### Between-Series, 2.92mm Plug To SMP Jack

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMP	134-1000-002	50 Ohms	40GHz	1.25



### Between-Series, 2.92mm Plug To SMP Plug

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMP	134-1000-003	50 Ohms	40GHz	1.25



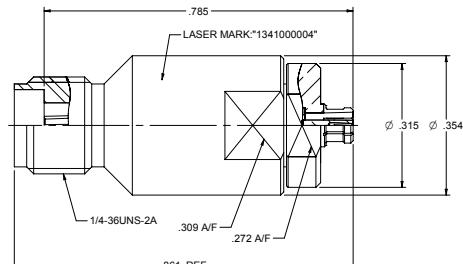
# 2.92mm to SMPM Adapters

## Between Series Adapters

**JOHNSON™**

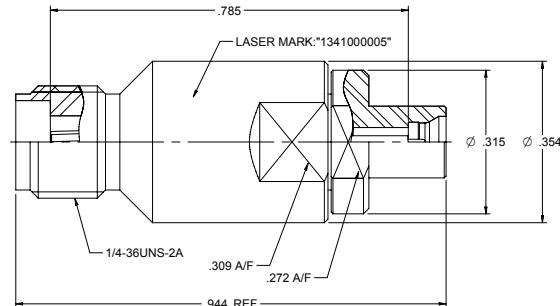
### Between-Series, 2.92mm Jack To SMPM Jack

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMPM	134-1000-004	50 Ohms	40GHz	1.25



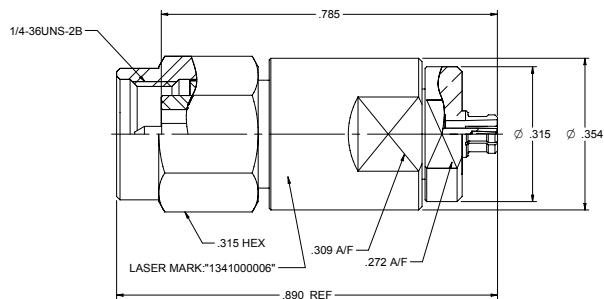
### Between-Series, 2.92mm Jack To SMPM Plug

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMPM	134-1000-005	50 Ohms	40GHz	1.25



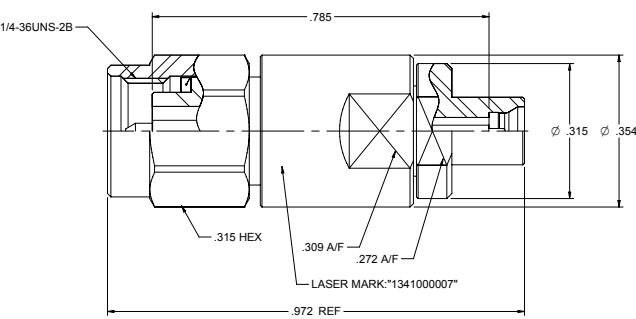
### Between-Series, 2.92mm Plug To SMPM Jack

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMPM	134-1000-006	50 Ohms	40GHz	1.25

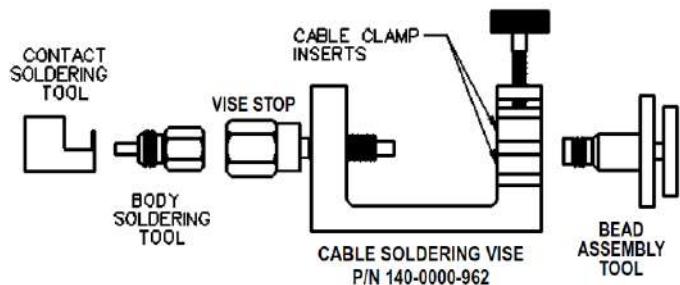
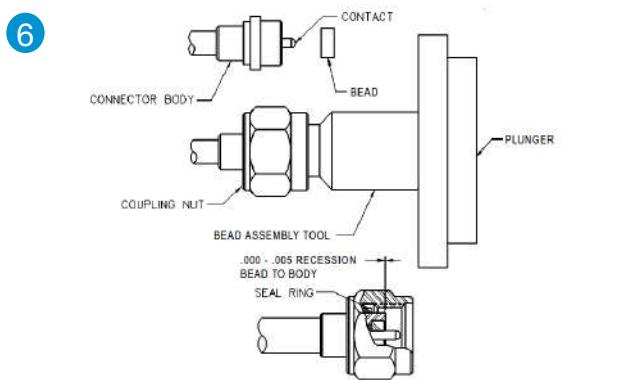
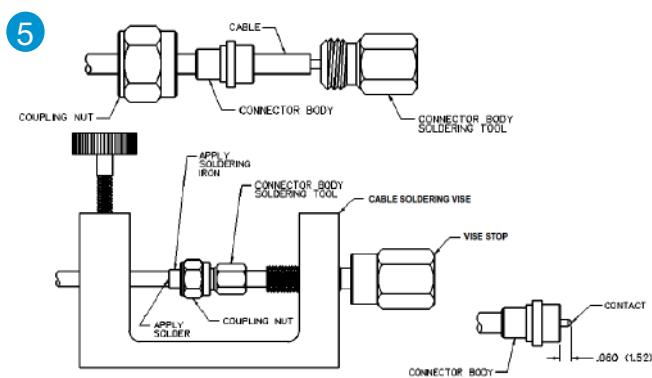
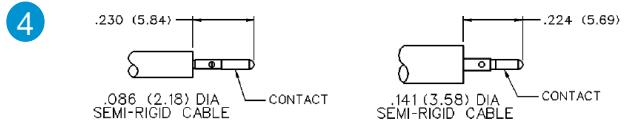
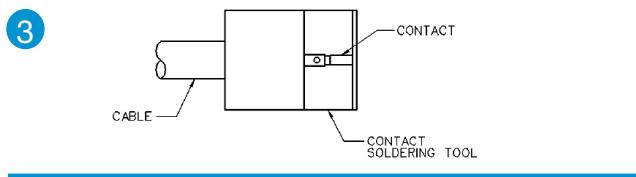
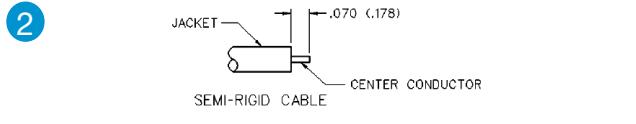
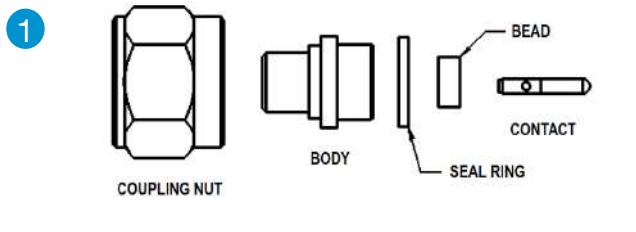


### Between-Series, 2.92mm Plug To SMPM Plug

Type	Stainless Steel/Passivated	Impedance	Max Frequency	VSWR
2.92mm/SMPM	134-1000-007	50 Ohms	40GHz	1.25



## 2.92mm Solder Type Straight Plugs For Semi-rigid Cable



- 1 Identify connector parts (5 piece parts) and tools (5 tools.)
- 2 Strip cable jacket and dielectric to dimension shown.
- 3 Place center contact onto center conductor. Slide contact soldering tool onto contact. Clamp the cable contact and tool into cable soldering vise and solder contact to center conductor. **High temperature** solder, such as 95/5 Sn/Ag is recommended so that contact solder joint remains stable during body soldering operation. Solder paste is recommended for the contact solder joint to minimize excess solder. The assembled dimension should be as shown.
- 4 Remove excess solder from contact with a sharp blade and clean contact. Check for presence of excess solder by sliding body soldering tool over the contact. Remove soldering tool.
- 5 Place connector nut and body on cable. Place connector body soldering tool over contact and thread the coupling nut and connector body firmly to the tool. Place cable subassembly into cable soldering vise. Clamp cable and soldering tool securely to insure the cable dielectric expansion will not disturb the cable in the vise during soldering. Place hot soldering iron on the connector body sleeve and apply solder from the opposite side. **A low temp** solder, such as 60/40 Sn/Pb is recommended for the body solder joint. Allow the soldered joint to cool and remove from fixture. Check contact location to the body. The best electrical results are achieved when the contact location is within a tolerance of .060 +/- .001.
- 6 Place bead onto neck portion of the tool. Thread Bead Assembly tool firmly into the coupling nut. Push the tool's plunger between your thumb and fingers to assemble the bead. Check bead location. Assemble seal ring onto body.

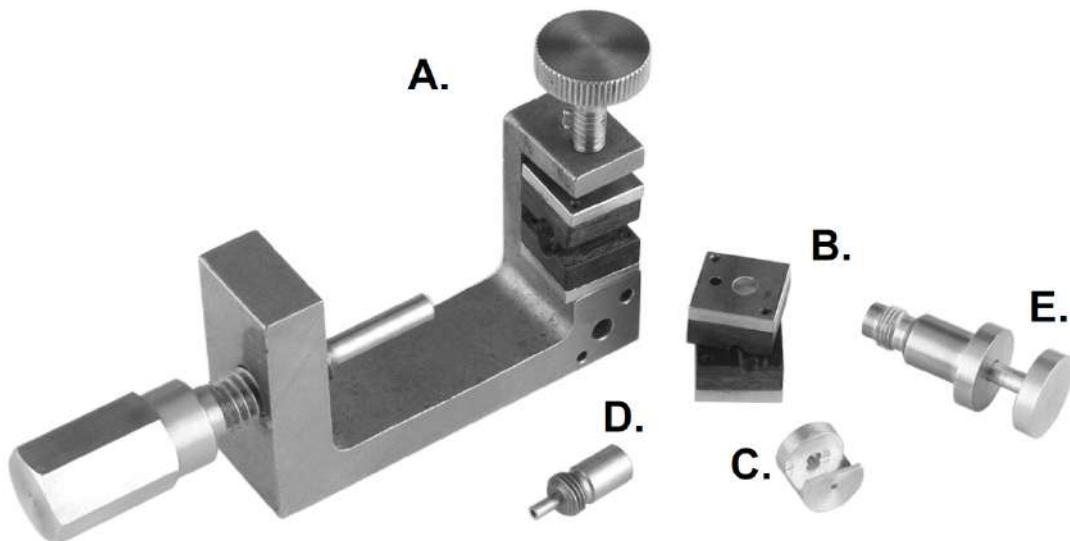
Tool	145-0693-001/002 (FOR .086 SEMI-RIGID)	145-0694-001/002 (FOR 141 SEMI-RIGID)
Semi-Rigid Cable Vise	140-0000-962	140-0000-962
Vise Stop	140-0000-968	140-0000-968
Bead Assy. Tool	140-0000-957	140-0000-957
Contact Soldering Tool	140-0000-960	140-0000-961
Body Soldering Tool	140-0000-958	140-0000-959
Cable Clamp Insert	140-0000-964	140-0000-965

# Assembly Instructions

JOHNSON™

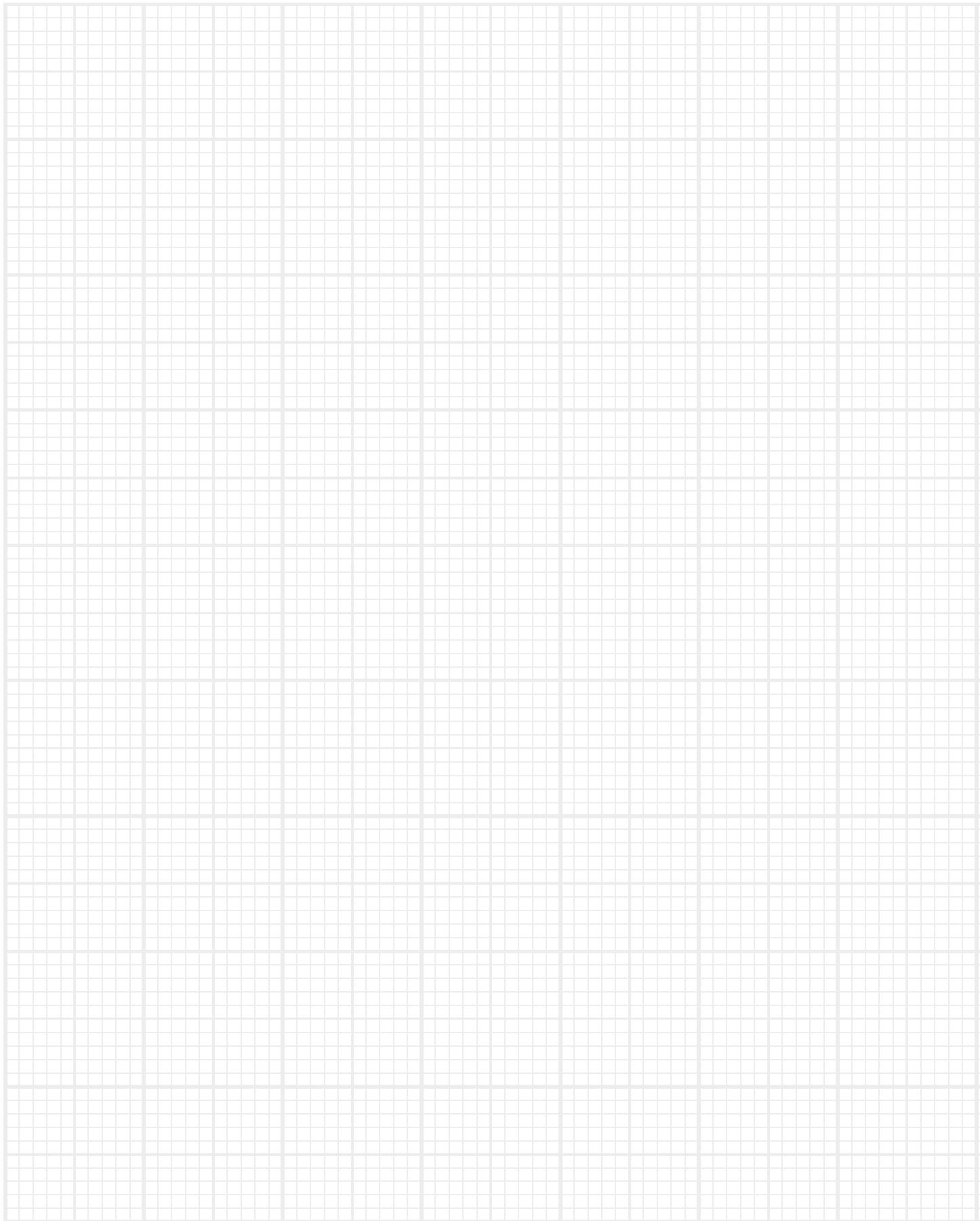
## 2.92mm Tools

Accurate assembly of the 2.92mm Cabled Connectors is obtained with the tools listed below. Industry standard devices are used if possible for customer convenience and tool compatibility.



Item	Part Number	Description
A	140-0000-962	Semi-rigid Cable Vise (does not include inserts(B) or Vise Stop (F))
B	140-0000-964	Cable Clamp Inserts, .086 Semi-rigid
	140-0000-965	Cable Clamp Inserts, .141 Semi-rigid
C	140-0000-960	Contact Soldering Tool, .086 Plug
	140-0000-961	Contact Soldering Tool, .141 Plug
D	140-0000-958	Body Soldering Tool, .086 Plug
	140-0000-959	Body Soldering Tool, .141 Plug
E	140-0000-957	Bead Assembly Tool, Semi-rigid Plugs, All Cables
F	140-0000-968	Vise Stop, (2.92mm)

# Notes





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### **Innovative Interconnect Solutions Across the Globe**

In operation since 1917, Cinch supplies high quality, high performance connectors and cables globally to the Aerospace, Military/Defense, Commercial Transportation, Oil & Gas, High End Computer, and other markets. We provide custom solutions with our creative, hands on engineering and end to end approach.

Our diverse product offerings include: connectors, enclosures and cable assemblies utilizing multiple contact technologies including copper and fiber optics. Our product engineering and development activities employ cutting edge technologies for design and modeling, and our various technologies and expertise enable us to deliver custom solutions and products for our strategic partnerships. We also serve a broad range of commercial markets, largely through our highly efficient distribution network.

We aim to exceed our customer's expectations, and to continually provide innovative solutions to the rapidly changing needs of the markets, and customers, we serve. For more information, visit [belfuse.com/cinch](http://belfuse.com/cinch)