



RF COAXIAL ADAPTORS AND CONNECTING PIECES

BASED ON TYPE SMA 2.9

ESCC Detail Specification No. 3402/023

| | |
|---------|---------------|
| Issue 8 | November 2023 |
|---------|---------------|



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DOCUMENTATION CHANGE NOTICE

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| DCR No. | CHANGE DESCRIPTION |
|----------------------|---|
| 1443 | Specification updated to incorporate changes per DCR. |

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1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

- (a) ESCC Generic Specification No. [3402](#).
- (b) [MIL-STD-348](#), Department of Defence Interface Standard: Radio Frequency Connector Interfaces.

1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. [21300](#) shall apply.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 340202301

- Detail Specification Reference: 3402023
- Component Type Variant Number: 01 (as required)

1.4.2 Component Type Variants

The component type variants applicable to this specification are as follows:

| Variant Number | Description (Note 1) |
|----------------|--------------------------------------|
| 01 | Straight Adaptor, Male - Male |
| 02 | Straight Adaptor, Female - Female |
| 03 | Straight Adaptor, Male - Female |
| 04 | Right Angle Adaptor, Male - Male |
| 05 | Right Angle Adaptor, Female - Female |
| 06 | Right Angle Adaptor, Male - Female |
| 07 | Hermetic Glass Seal Ø0.3mm |

NOTES:

1. See Para. 3 for details.

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

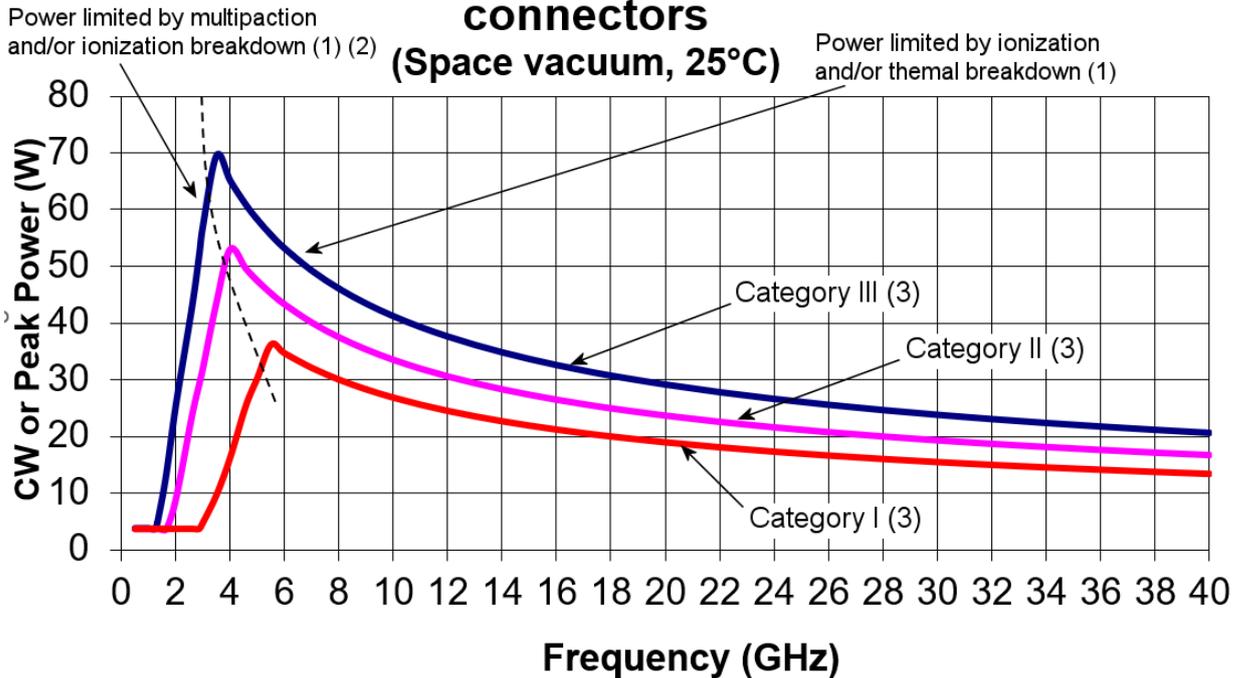
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

| Characteristics | Symbol | Maximum Ratings | Unit | Remarks |
|--|------------------|------------------------|------------------|--|
| Power | P | See Para. 3 | W | Notes 1, 2 |
| Nominal Impedance | Z | 50 | Ω | - |
| Operating Frequency Range | f | See Para. 3 | GHz | Note 2 |
| Operating Voltage | V _{op} | 350 | V _{rms} | - |
| Operating Temperature Range | T _{op} | See Para. 3 | °C | - |
| Storage Temperature Range | T _{stg} | As per T _{op} | °C | - |
| Coupling Nut Torque (Coupling Proof Torque) | T _q | 170 | N.cm | See Note 3 for nominal coupling torque |

NOTES:

- Derate Power with respect to Operating Frequency as follows:

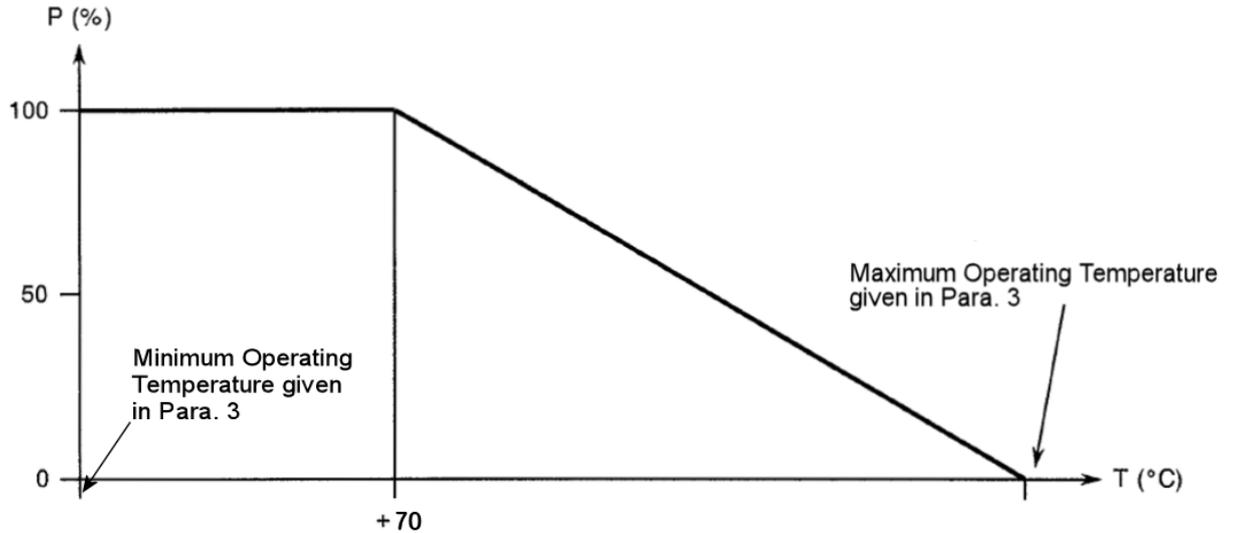
Maximum Power Handling: SMA 2.9 connectors
(Space vacuum, 25°C)



The following details apply:

- Load VSWR is better than 1.3:1.
- The part of the curve limited by multipaction takes into account a 6dB margin.
- See Para. 3 for applicability of power handling categories to the different Variants.
- These power handling curves have been constructed using the ESCC Multipactor Tool v1.0.

2. Derate Power with respect to Operating Temperature as follows:



3. Whenever a test is performed on mated pairs of connectors, the pairs shall be torqued at 80 to 115N.cm.

1.6 PHYSICAL DIMENSIONS (SEE ALSO PARA. 3)

1.6.1 Connector Interface Dimensions and Connector Interface Gauge Dimensions

- (a) SMA Male Connector and Gauge Interface: compatible with series SMK pin contact interface as specified in [MIL-STD-348](#).
- (b) SMA Female Connector and Gauge Interface: compatible with series SMK socket contact connector interface as specified in [MIL-STD-348](#).

1.7 MATERIALS AND FINISHES

Materials and finishes shall be as follows (as applicable, see Para. 3):

- (a) For Variants 01 to 06:
 - Shell, Coupling Nut: amagnetic stainless steel, electro-passivated.
 - Centre Contact: beryllium copper, plated gold 1.3µm minimum over nickel 2µm minimum.
 - Insulator: ULTEM 1000.
 - Gasket, Front: silicone.
- (b) For Variant 07:
 - Shell, Centre Contact: iron-nickel alloy, plated gold 1.27µm minimum over nickel 2µm minimum.
 - Insulator: glass.

2 REQUIREMENTS

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1 Deviations from the Generic Specification

2.1.1.1 *Deviations from Screening Tests – Chart F3*

- (a) Coupling Proof Torque: shall not be performed on connectors with a female contact; it shall be performed on connectors with a male contact.

2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. [21700](#) and as follows.

The information to be marked on the component or the primary package shall be:

- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number (see Para. 1.4.1).
- (c) Traceability information.

2.3 ENVIRONMENTAL AND MECHANICAL TESTS

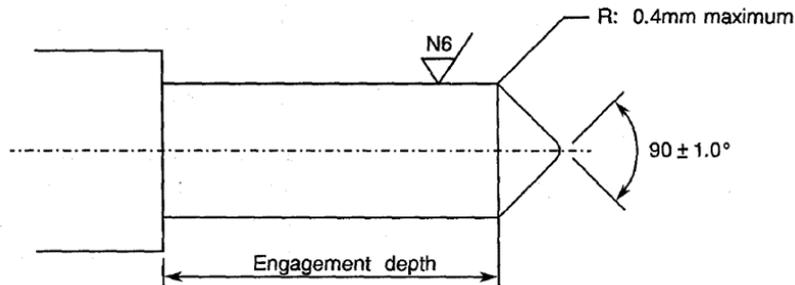
The following requirements apply to tests performed on the connector (and contact) lot as specified in the ESCC Generic Specification:

(a) Contact Engagement and Separation Forces:

| | Oversize Test Pin Test | Maximum Diameter Test Pin Test | Minimum Diameter Test Pin Test |
|----------------------------|------------------------|--------------------------------|--------------------------------|
| Test Pin Diameter (mm) (1) | 0.95 to 0.955 | 0.94 to 0.946 | 0.89 to 0.902 |
| Engagement Depth (mm) (1) | 0.76 to 1.14 | 1.27 to 1.91 | 1.27 to 1.91 |
| Engagement Force (N) | - | 13.53 maximum | - |
| Separation Force (N) | - | - | 0.27 minimum |

NOTES:

1. Test Pins details:



- (b) Coupling Proof Torque: See Para. 1.5.
- (c) Mating and Unmating Forces: Maximum torque: 23N.cm.
- (d) Centre Contact Retention: See Para. 3.
- (e) Seal: See Para. 3.

2.4 ROOM TEMPERATURE ELECTRICAL MEASUREMENTS

The measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}C$.

| Characteristics | Symbols | Test Method and Conditions | Limits | | Units |
|---|---------|--|--------|-----|-------|
| | | | Min | Max | |
| Insulation Resistance | R_i | ESCC No. 3402 | 5 | - | GΩ |
| Voltage Proof Leakage Current (Voltage Proof) | I_L | ESCC No. 3402 See Para. 3 Note 1 | - | 2 | mA |

NOTES:

1. Between centre contact and shell.

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}\text{C}$.

Unless otherwise specified, the test methods and test conditions shall be as per the corresponding test defined in Para. 2.4 Room Temperature Electrical Measurements.

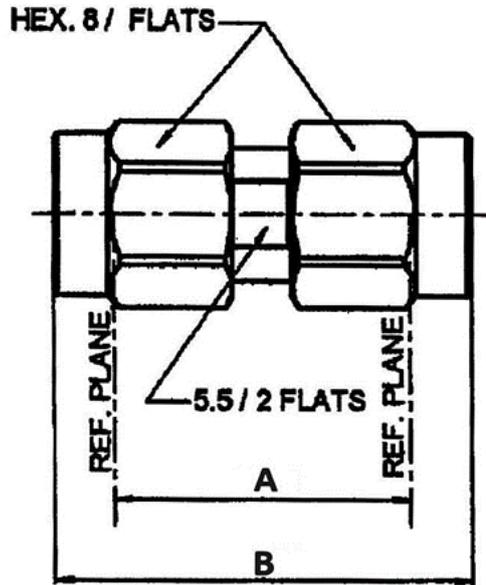
| Test Reference per ESCC No. 3402 | Characteristics and Test Conditions Ref. ESCC No. 3402 | Symbols | Limits | | Units |
|---|---|------------------------|--------|---------|--------------------------------------|
| | | | Min | Max | |
| Random Vibration | Contact Resistance: $I_T = 10\text{mA}$, $V_T = 6\text{V}$ | | | | |
| | Centre Contact: Variant 07 only: Centre Contact: | R_{ctc} R_{hgs} | - - | 3 12 | $\text{m}\Omega$ $\text{m}\Omega$ |
| Mechanical Shock | Contact Resistance: $I_T = 10\text{mA}$, $V_T = 6\text{V}$ | | | | |
| | Centre Contact: Variant 07 only: Centre Contact: | R_{ctc} R_{hgs} | - - | 3 12 | $\text{m}\Omega$ $\text{m}\Omega$ |
| Temperature Cycling | Contact Resistance: $I_T = 10\text{mA}$, $V_T = 6\text{V}$ | | | | |
| | Centre Contact: Variant 07 only: Centre Contact: | R_{ctc} R_{hgs} | - - | 3 12 | $\text{m}\Omega$ $\text{m}\Omega$ |
| | Voltage Proof Leakage Current: | I_L | Note 1 | | |
| Electrical Measurements at Room Temperature | Insulation Resistance: | R_i | Note 1 | | |
| | Voltage Proof Leakage Current: | I_L | Note 1 | | |
| | Contact Resistance: $I_T = 10\text{mA}$, $V_T = 6\text{V}$ | | | | |
| | Centre Contact: | R_{ctc} | - | 3 | $\text{m}\Omega$ |
| | Shell: | R_{cts} | - | 2 | $\text{m}\Omega$ |
| | Variant 07 only: Centre Contact: | R_{hgs} | - | 12 | $\text{m}\Omega$ |
| | VSWR (Note 3): | VSWR | Note 2 | | |
| | Insertion Loss: | LI | Note 2 | | |
| Endurance | Contact Resistance: $I_T = 10\text{mA}$, $V_T = 6\text{V}$ | | | | |
| | Centre Contact: | R_{ctc} | - | 4 | $\text{m}\Omega$ |
| | Shell: Variant 07 only: Centre Contact: | R_{cts} R_{hgs} | - - | 3 12 | $\text{m}\Omega$ $\text{m}\Omega$ |

NOTES:

- As specified in Para. 2.4.
- As specified in Para. 3.
- Measured with suitable low level RF power applied.

3 COMPONENT TYPE VARIANTS – DETAIL REQUIREMENTS

3.1 VARIANT 01 – STRAIGHT ADAPTOR, MALE - MALE



| Symbol | Dimensions mm | |
|--------|---------------|-------|
| | Min | Max |
| A | 14.03 | 14.09 |
| B | 17.1 | 20.6 |

| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|------------------------------|-------|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | $1.05 + 0.003 f$ (GHz) | |
| Maximum insertion loss | $0.02 + 0.03 \sqrt{f}$ (GHz) | dB |
| Voltage proof | 750 | Vrms |
| Power Handling Category (see Para. 1.5 Note 1) | III | |
| RF Leakage (Note 1) | $-90 + f$ (GHz) | dBi |

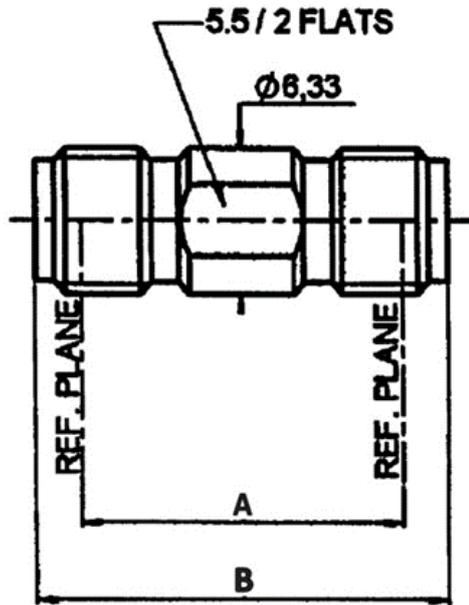
| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | 27 | N |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 5.5 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|-------------|-------|
| Operating temperature range | -65 to +165 | °C |

NOTES:

1. For information purposes only.

3.2 VARIANT 02 – STRAIGHT ADAPTOR, FEMALE - FEMALE



| Symbol | Dimensions mm | |
|--------|---------------|-------|
| | Min | Max |
| A | 14.03 | 14.09 |
| B | 17.79 | 18.05 |

| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|------------------------------|-------|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | $1.05 + 0.003 f$ (GHz) | |
| Maximum insertion loss | $0.02 + 0.03 \sqrt{f}$ (GHz) | dB |
| Voltage proof | 750 | Vrms |
| Power Handling Category (see Para. 1.5 Note 1) | III | |
| RF Leakage (Note 1) | $-90 + f$ (GHz) | dBi |

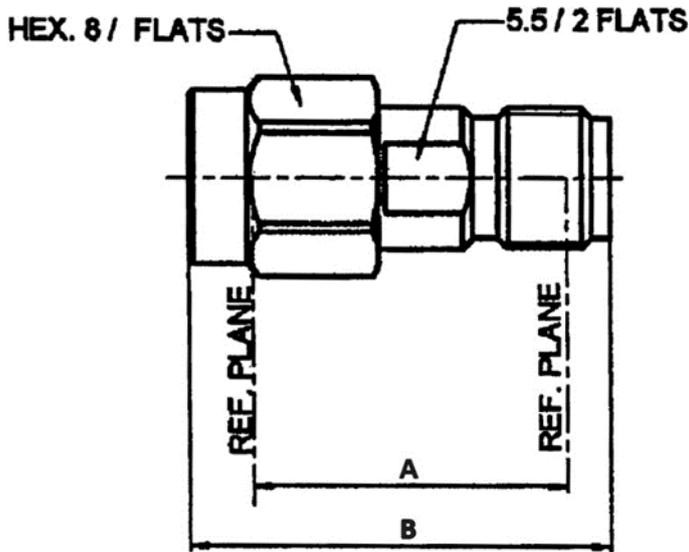
| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | 27 | N |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 3 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|-------------|-------|
| Operating temperature range | -65 to +165 | °C |

NOTES:

1. For information purposes only.

3.3 VARIANT 03 – STRAIGHT ADAPTOR, MALE - FEMALE



| Symbol | Dimensions mm | |
|--------|---------------|-------|
| | Min | Max |
| A | 14.03 | 14.09 |
| B | 18.2 | 19.32 |

| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|------------------------------|-------|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | $1.05 + 0.003 f$ (GHz) | |
| Maximum insertion loss | $0.02 + 0.03 \sqrt{f}$ (GHz) | dB |
| Voltage proof | 750 | Vrms |
| Power Handling Category (see Para. 1.5 Note 1) | III | |
| RF Leakage (Note 1) | $-90 + f$ (GHz) | dB |

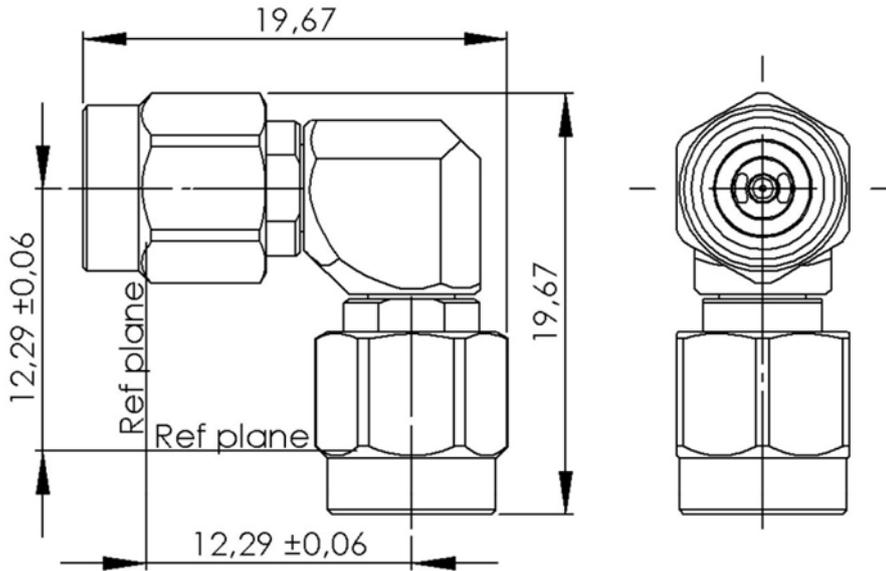
| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | 27 | N |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 4.1 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|-------------|-------|
| Operating temperature range | -65 to +165 | °C |

NOTES:

1. For information purposes only.

3.4 VARIANT 04 – RIGHT ANGLE ADAPTOR, MALE - MALE



N.B.: All dimensions are in mm.

| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|------------------------------|---|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | DC to 32GHz: 32 to 40GHz: | 1.20 1.50 |
| Maximum insertion loss | DC to 32GHz: 32 to 40GHz: | $0.02 + 0.07 \sqrt{f}$ (GHz) $0.09 \sqrt{f}$ (GHz) |
| Voltage proof | 750 | Vrms |
| Power Handling Category (see Para. 1.5 Note 1) | III | |
| RF Leakage (Note 1) | -90 + f (GHz) | dBi |

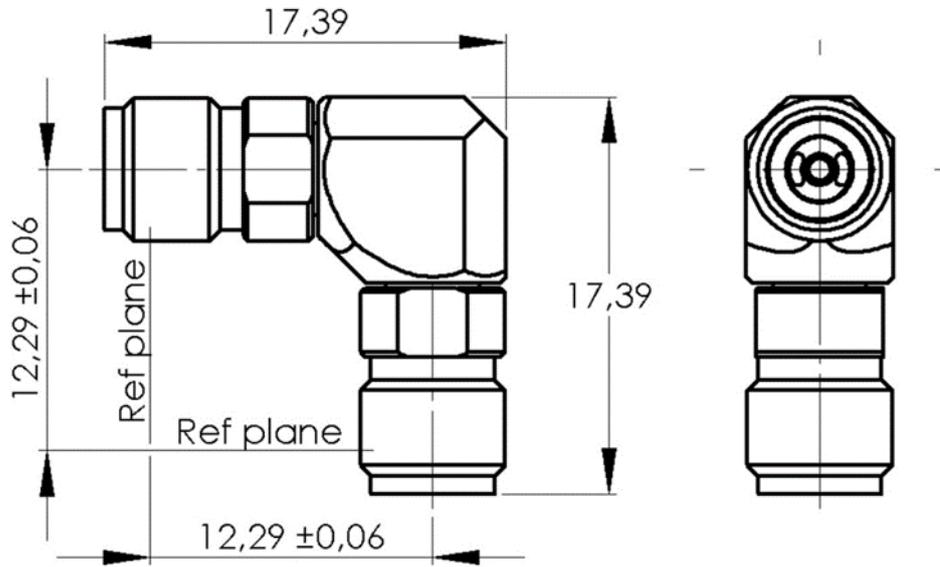
| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | 27 | N |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 7.5 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|-------------|-------|
| Operating temperature range | -65 to +165 | °C |

NOTES:

1. For information purposes only.

3.5 VARIANT 05 – RIGHT ANGLE ADAPTOR, FEMALE - FEMALE



N.B.: All dimensions are in mm.

| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|------------------------------|---------------------------------------|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | DC to 32GHz: 32 to 40GHz: | 1.20 1.50 |
| Maximum insertion loss | DC to 32GHz: 32 to 40GHz: | 0.02 + 0.07 √f (GHz) 0.09 √f (GHz) |
| Voltage proof | 750 | Vrms |
| Power Handling Category (see Para. 1.5 Note 1) | III | |
| RF Leakage (Note 1) | -90 + f (GHz) | dBi |

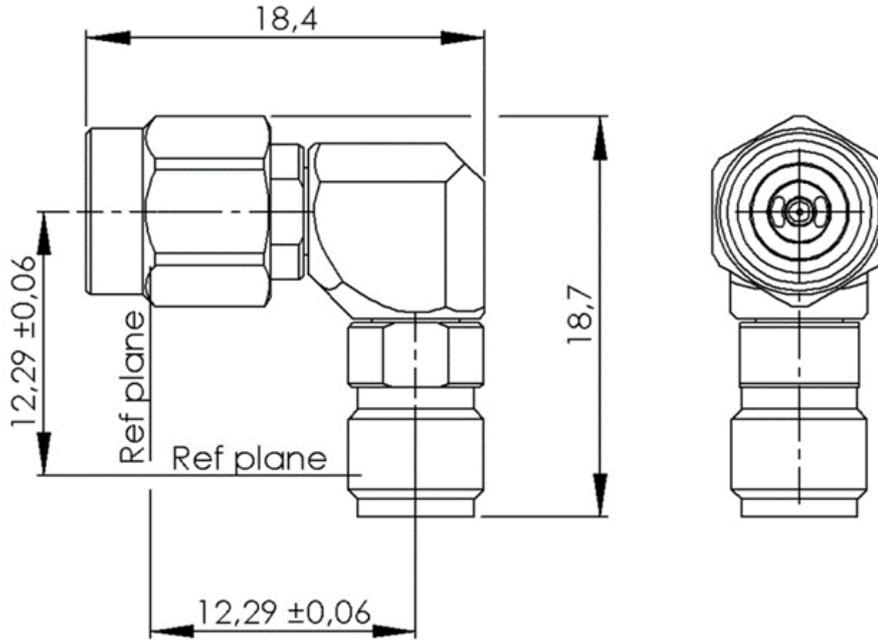
| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | 27 | N |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 5.5 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|-------------|-------|
| Operating temperature range | -65 to +165 | °C |

NOTES:

1. For information purposes only.

3.6 VARIANT 06 – RIGHT ANGLE ADAPTOR, MALE - FEMALE



N.B.: All dimensions are in mm.

| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|------------------------------|---------------------------------------|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | DC to 32GHz: 32 to 40GHz: | 1.20 1.50 |
| Maximum insertion loss | DC to 32GHz: 32 to 40GHz: | 0.02 + 0.07 √f (GHz) 0.09 √f (GHz) |
| Voltage proof | 750 | Vrms |
| Power Handling Category (see Para. 1.5 Note 1) | III | |
| RF Leakage (Note 1) | -90 + f (GHz) | dBi |

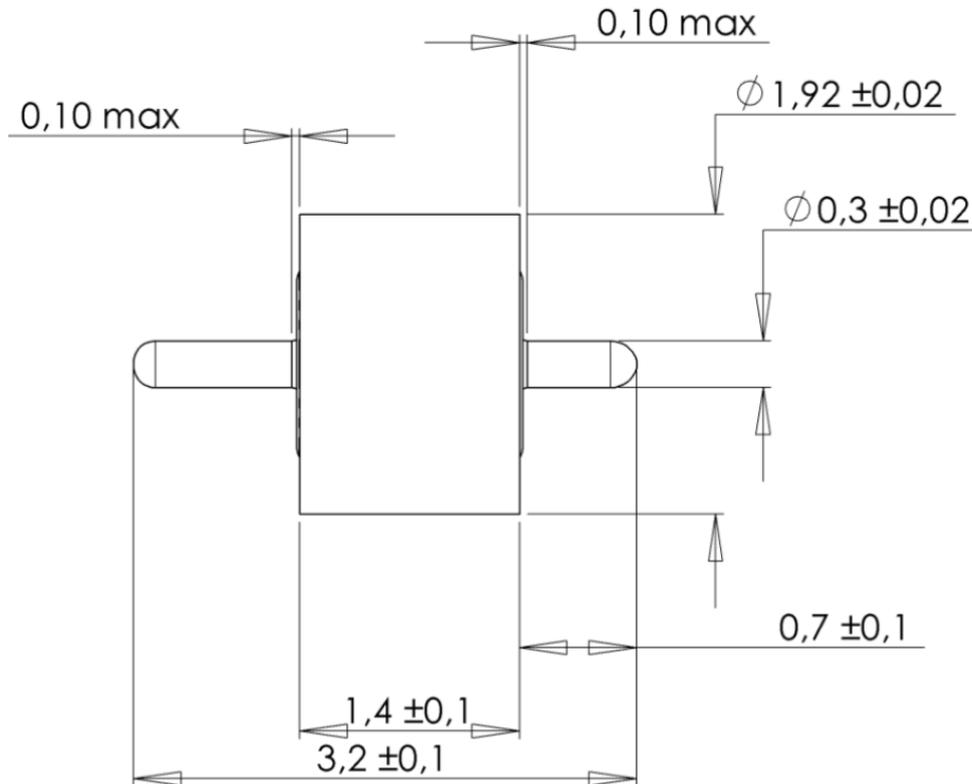
| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | 27 | N |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 7 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|-------------|-------|
| Operating temperature range | -65 to +165 | °C |

NOTES:

1. For information purposes only.

3.7 VARIANT 07 – HERMETIC GLASS SEAL Ø0.3MM (NOTE 1)



| ELECTRICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Frequency range | 0 to 40 | GHz |
| Maximum voltage standing wave ratio (VSWR) | Not applicable | |
| Maximum insertion loss | Not applicable | |
| Voltage proof | 750 | Vrms |
| Power Handling Category | Not applicable | |
| RF Leakage | Not applicable | |

| MECHANICAL CHARACTERISTICS | VALUES | UNITS |
|--|----------------|-------|
| Minimum centre contact retention force (axial) | Not applicable | |
| Minimum centre contact retention torque | Not applicable | |
| Maximum weight | 0.03 | g |

| OTHER CHARACTERISTICS | VALUES | UNITS |
|-----------------------------|----------------|------------------------|
| Operating temperature range | -65 to +200 | °C |
| Seal: Maximum leakage | 10^{-8} | atm.cm ³ /s |
| Solderability | Applicable | |
| Cables used | Not applicable | |

NOTES:

1. For use with connectors with rear socket contact for $\phi 0.3$ mm pin.
2. Dimensions in mm.

APPENDIX A
AGREED DEVIATIONS FOR RADIAL (F)

| ITEMS AFFECTED | DESCRIPTION OF DEVIATIONS |
|--|--|
| Para. 1.4.1, The ESCC Component Number | The ESCC Component Number may include the additional Manufacturer's codes 'B' and/or '3' as indicated in the following example: Example: 340202301 <u>B3</u> |

APPENDIX B
AGREED DEVIATIONS FOR ROSENBERGER (D)

| ITEMS AFFECTED | DESCRIPTION OF DEVIATIONS |
|--|---|
| Para. 1.4.1, The ESCC Component Number | The ESCC Component Number may include the additional Manufacturer's codes 'B' and/or '3' as indicated in the following example: Example: 340202301 B3 |