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RF, COAXIAL, TYPE SMA, DC - 22GHz**

**ESCC Detail Specification No. 3403/006**

Issue 2

June 2007



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DCR No.	CHANGE DESCRIPTION
233	Specification upissued to incorporate editorial and technical 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. 3403.

**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: 340300601

- Detail Specification Reference: 3403006
- Component Type Variant Number: 01 (as required)

**1.4.2 Component Type Variants and Range of Components**

The component type variants and range of components applicable to this specification are as follows:

Variant Number	Connector Type	VSWR	Weight max (g)
01	SMA Male	$DC < f \leq 4GHz$ $\leq 1.05$  $4 < f \leq 12.4GHz$ $\leq 1.15$  $12.4 < f \leq 18GHz$ $\leq 1.2$  $18 < f \leq 22GHz$ $\leq 1.3$	5

Variant Number	Connector Type	VSWR	Weight max (g)
02	SMA Female	$DC < f \leq 4GHz$ $\leq 1.05$  $4 < f \leq 12.4GHz$ $\leq 1.15$  $12.4 < f \leq 18GHz$ $\leq 1.2$  $18 < f \leq 22GHz$ $\leq 1.25$	5

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.

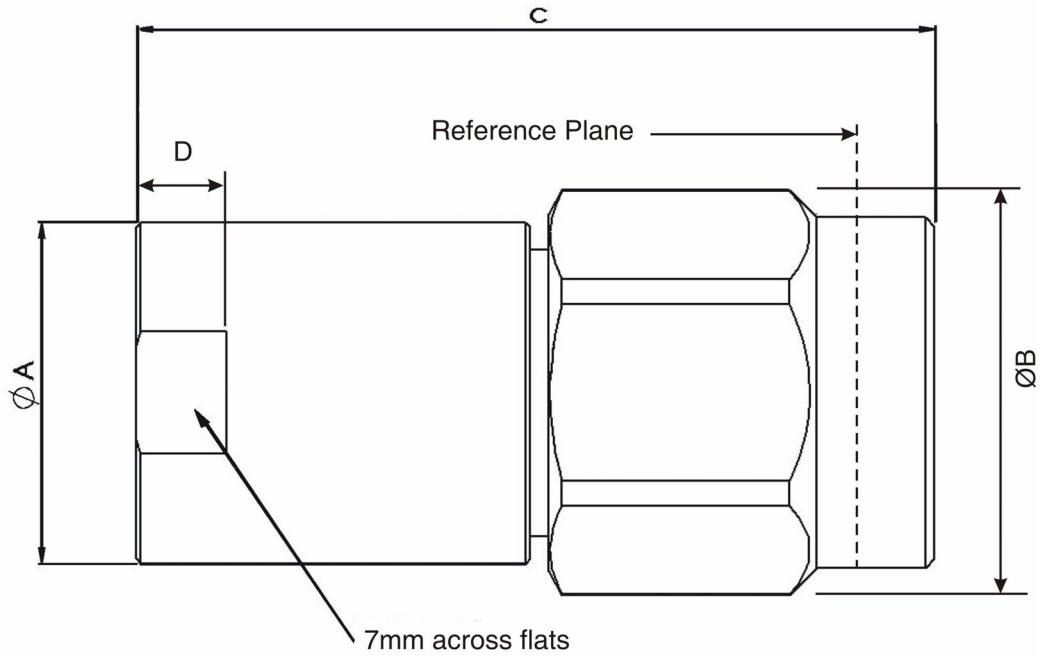
Characteristics	Symbols	Maximum Ratings	Units	Remarks
RF Power	$P_{RF}$	1	W	Note 1
Peak Power	$P_P$	100	W	duration 1 $\mu$ s 1% duty cycle
DC Power	$P_{DC}$	1	W	$T_{amb}=+25^{\circ}C$
Impedance	Z	47.5 to 52.5	$\Omega$	-
Frequency Range	$f_{op}$	DC to 22	GHz	-
RF Leakage	E	-85	dB <sub>i</sub>	-
Operating Temperature Range	$T_{op}$	-55 to +125	$^{\circ}C$	$T_{amb}$
Storage Temperature Range	$T_{stg}$	-55 to +125	$^{\circ}C$	-
Coupling Nut Torque	$T_q$	120	N.cm	Note 2

**NOTES:**

- RF Power shall be derated against operating temperature as follows:  
 $P_{RF}$  at  $T_{op} \leq +25^{\circ}C$ . Derate linearly to 500mW at  $T_{op} = +125^{\circ}C$ .
- Coupling Proof Torque: 170N.cm

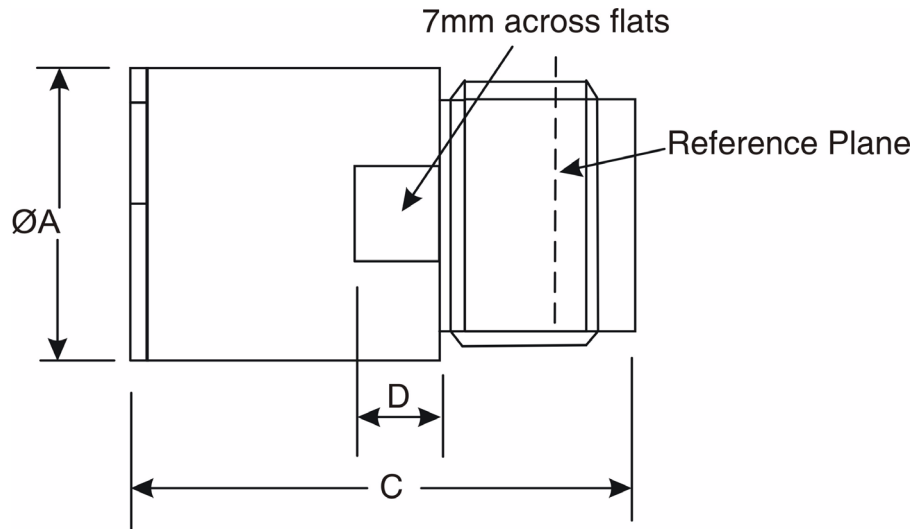
1.6 PHYSICAL DIMENSIONS

1.6.1 SMA Male Load



Symbols	Dimensions mm	
	Min	Max
$\varnothing A$	-	7.7
$\varnothing B$	8.5	9.5
$C$	-	16.5
$D$	1.9	2.3

1.6.2 SMA Female Load

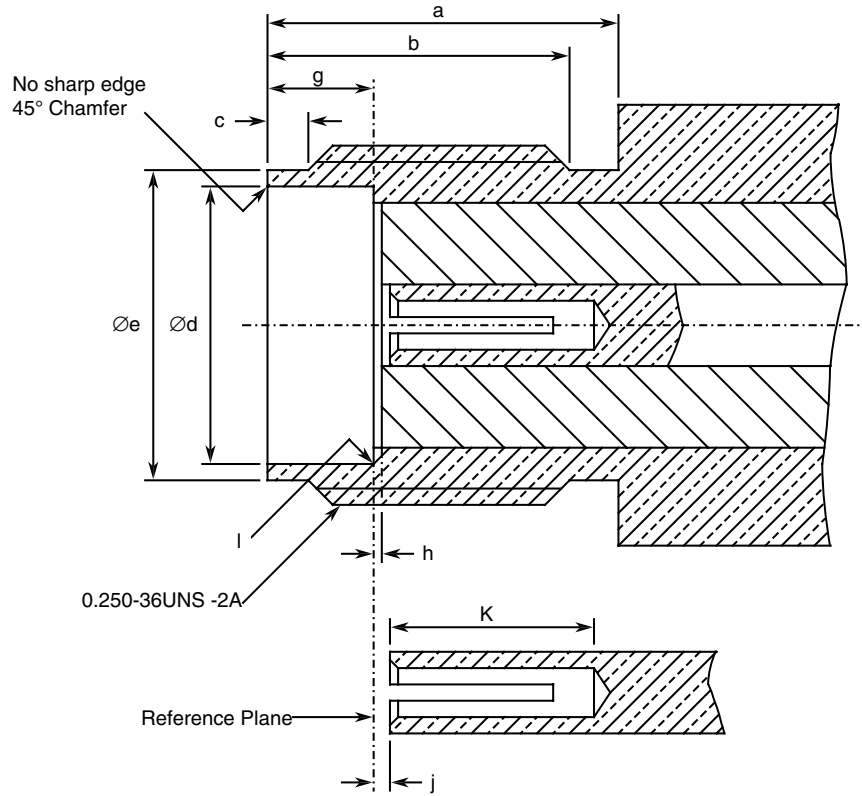


Symbols	Dimensions mm	
	Min	Max
$\varnothing A$	-	7.7
C	-	14.3
D	1.9	2.3



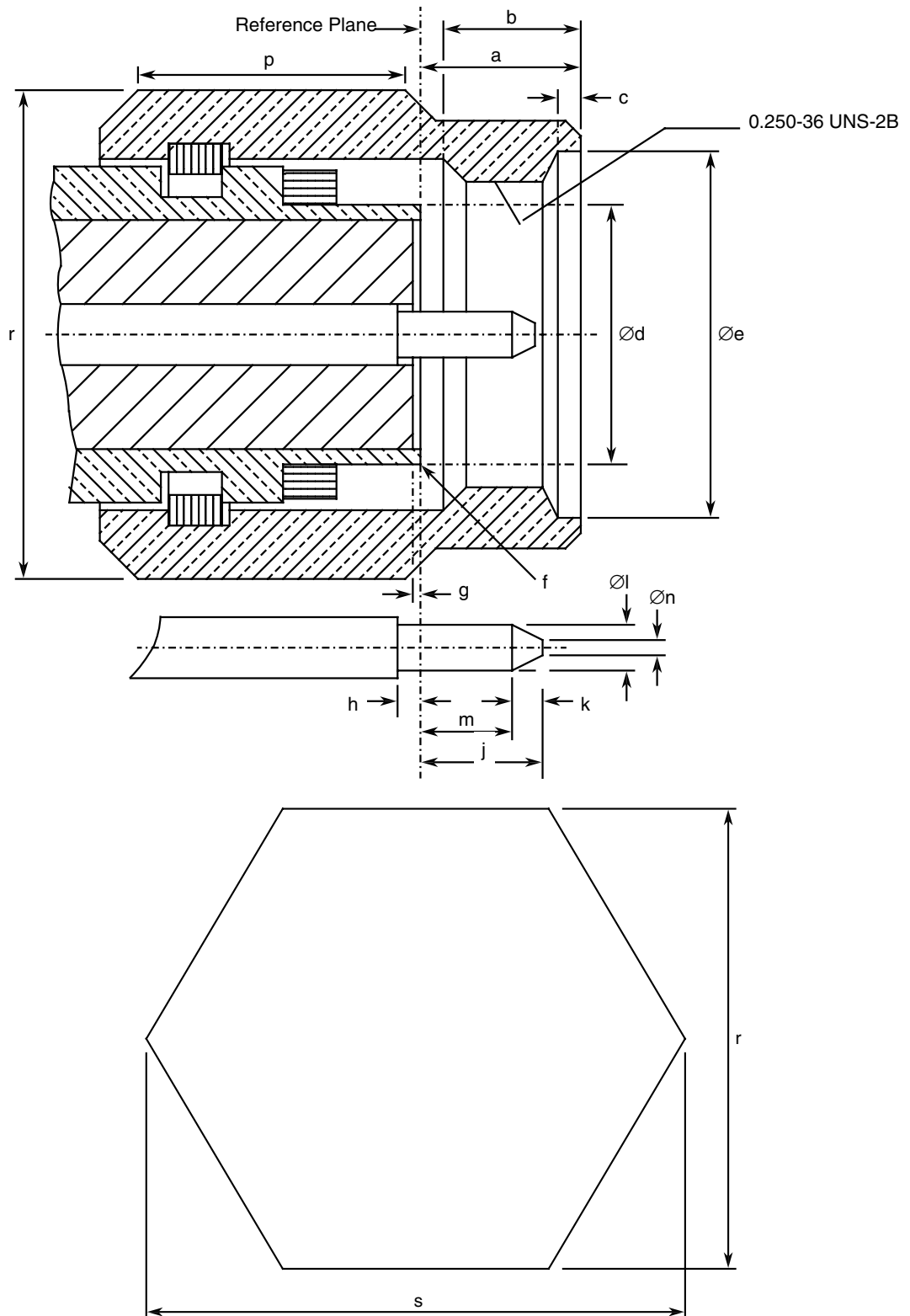
1.6.3 Interface Dimensions

Female Interface



Symbols	Dimensions mm		Notes
	Min	Max	
a	5.54	-	
b	4.32	-	
c	0.38	1.14	
$\varnothing d$	4.597	4.67	
$\varnothing e$	5.28	5.49	
g	1.88	1.98	
h	0	0.2	
j	0	0.25	
k	2.92	-	
l	-	0.04	Radius

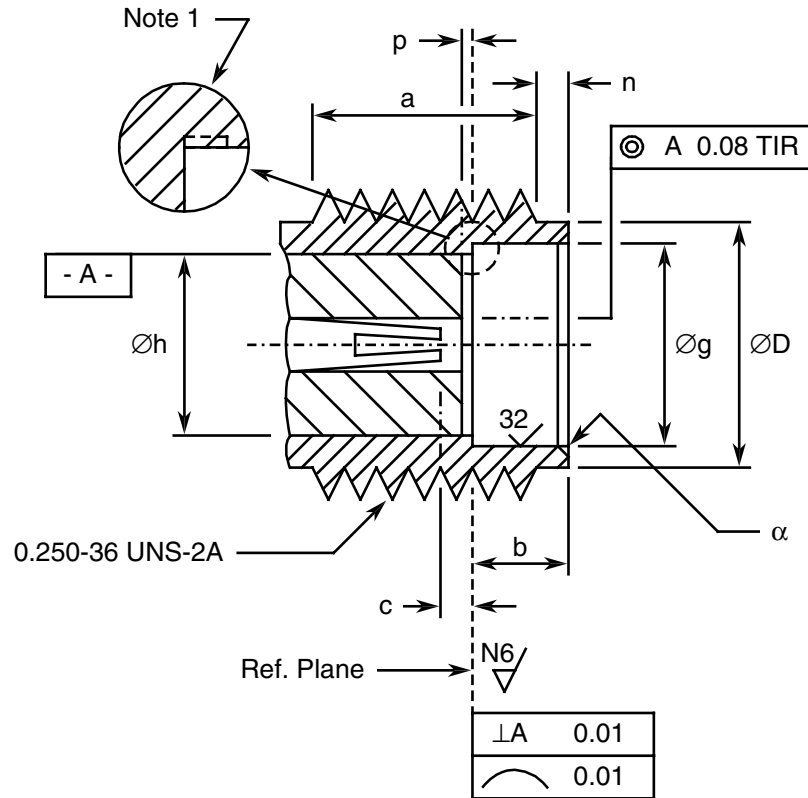
Male Interface



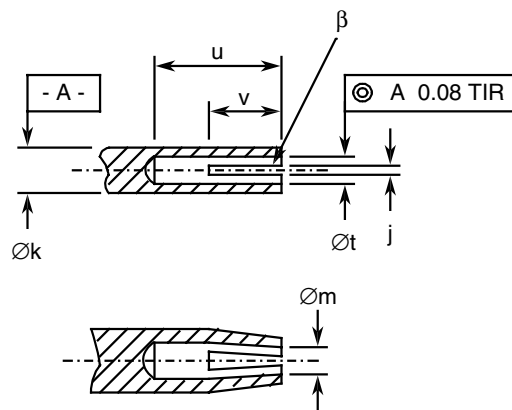
Symbols	Dimensions mm		Notes
	Min	Max	
a	-	3.43	
b	2.54	-	
c	0.38	1.14	
Ød	-	4.592	
Øe	6.35	-	
f	-	0.08	Radius or 45° chamfer
g	0	0.2	
h	0	0.25	
j	-	2.54	
k	0.38	-	
Øl	0.9	0.94	
m	1.27	-	
Øn	-	0.38	
p	3.17	-	
r	7.84	8	Hexagon
s	-	9.2	

1.6.4 Mating Gauge Dimensions

Female Interface



Detailed view of centre contact

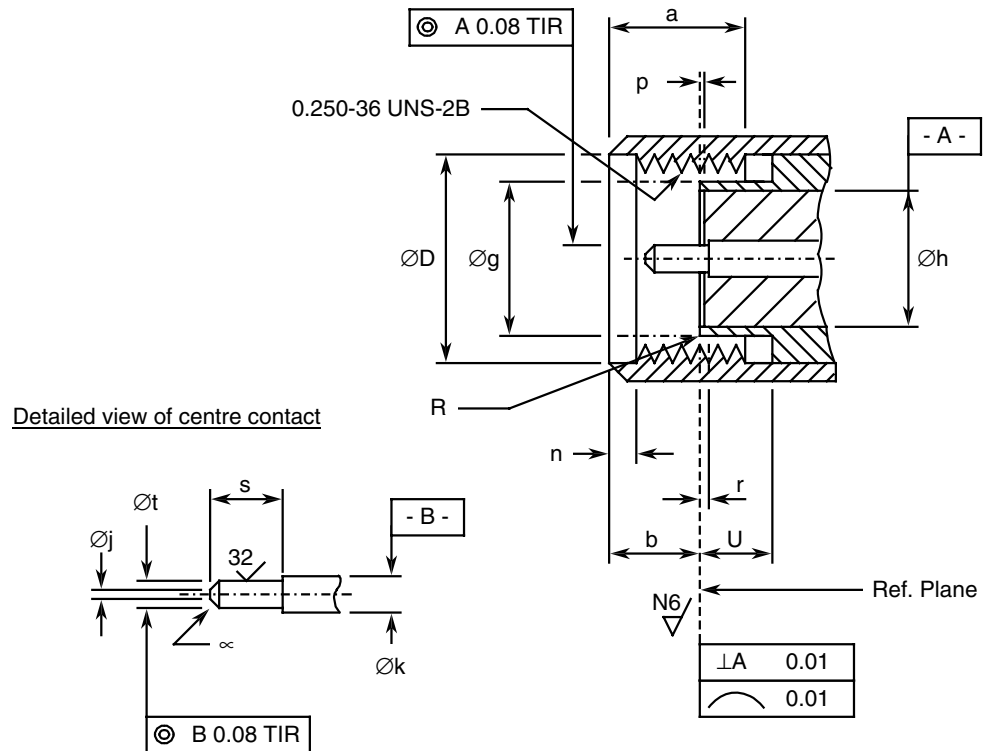


Symbols	Dimensions mm		Notes
	Min	Max	
a	3.81	-	
b	1.88	1.98	
c	0	0.08	Contact recess
∅D	5.28	5.49	
∅g	4.6	4.67	
∅h	4.1	4.13	
j	0.13	0.23	2 or more slots
∅k	1.27	1.29	
∅m	0.72	0.84	After closing
n	0.38	1.14	
p	0	0.05	Insert recess
u	2.54	-	
∅t	0.94	0.99	
v	1.91	2.41	
α	-	0.25	45° Chamfer
β	0.99	1.19	45° Chamfer

**NOTES:**

1. No fillet permitted. Radial undercut 0.2mm maximum deep x 0.89mm maximum long permitted.

Male Interface



Symbols	Dimensions mm		Notes
	Min	Max	
a	3.71	4.32	
b	2.59	3.35	
ØD	6.48	6.73	
Øg	4.34	4.59	
Øh	4.1	4.13	
Øj	-	0.38	Flat
Øk	1.27	1.29	
n	0.64	1.14	
p	0	0.05	Insert recess
r	0	0.08	Contact recessed
R	-	0.08	Radius
s	2.03	2.29	
Øt	0.9	0.93	
U	2.03	-	
α	-	-	45 ± 3° Chamfer

## 1.7 MATERIALS AND FINISHES

Materials and finishes shall be as follows:

- a. Shell: Amagnetic Stainless Steel, electro-passivated
- b. Coupling Nut: Amagnetic Stainless Steel, electro-passivated
- c. Centre Contact: Beryllium Copper, with nickel underplate (2µm minimum) and Gold plating (1.3µm minimum)
- d. Inserts: PTFE
- e. Gaskets: Silicone rubber.

## 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 Qualification and Periodic Tests - Chart F4*

- (a) Residual Magnetism: is not applicable

### 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 shall be:

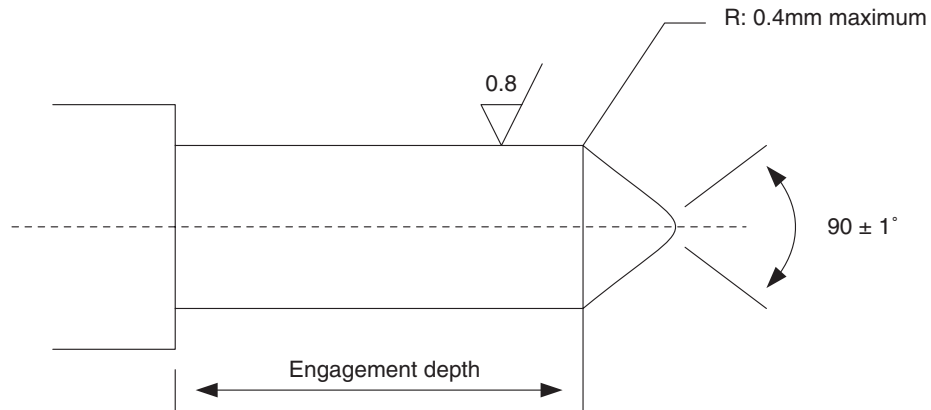
- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number.
- (c) Traceability information.

### 2.3 CONTACT ENGAGEMENT AND SEPARATION FORCES TEST

Ref. Contact Engagement and Separation Forces in the ESCC Generic Specification.

- a) Oversize Test Pin  
Pin diameter : 0.9525/0.955mm  
Insertion depth : 0.76/1.14mm
- b) Maximum Diameter Test Pin  
Pin diameter : 0.94/0.942mm  
Engagement depth : 1.27/1.91mm  
Engagement force: 1360g maximum.
- c) Minimum Diameter Test Pin  
Pin diameter : 0.902/0.904mm

Separation depth: 1.27/1.91mm  
 Separation force: 28.4g minimum.



2.4 COUPLING PROOF TORQUE TEST

Ref. Coupling Proof Torque in the ESCC Generic Specification.  
 Coupling Proof Torque: 170N.cm.

2.5 MATING AND UNMATING FORCES TEST

Ref. Mating and Unmating Forces in the ESCC Generic Specification.  
 Maximum Torque during mating or unmating: 24N.cm.

2.6 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

The measurements shall be performed at room, high and low temperatures.

2.6.1 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	
Voltage Standing Wave Ratio	VSWR	ESCC No. 3403 f = 0 to 22GHz	-	Note 1	-
Resistance	R	DC test	47.5	52.5	$\Omega$

**NOTES:**

1. The limits for VSWR are as specified in Component Type Variants and Range of Components.

2.6.2 High and Low Temperatures Electrical Measurements

The measurements shall be performed at  $T_{amb}=+125 (+0 -3)^{\circ}C$  and  $T_{amb}=-55 (+3 -0)^{\circ}C$ .



Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Temperature Coefficient of Resistance	TC <sub>R</sub>	DC test Reference Temperature: 25°C	-	3 x 10 <sup>-4</sup>	Ω/Ω°C

**NOTES:**

1. Measurements shall be performed during Screening Tests on a sample of 2 components. In the event of any failure a 100% inspection shall be performed.

**2.7 PARAMETER DRIFT VALUES**

Unless otherwise specified, the measurements shall be performed at T<sub>amb</sub>=+22 ±3°C.  
 The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.  
 The drift values (Δ) shall not be exceeded for each characteristic where specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Drift Value Δ	Units
Voltage Standing Wave Ratio	$\frac{\Delta VSWR}{VSWR}$	± 2	%
Resistance	Δ R	±250	mΩ

**2.8 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS**

Unless otherwise specified, the measurements shall be performed at T<sub>amb</sub>=+22 ±3°C.  
 The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.  
 The drift values (Δ) shall not be exceeded for each characteristic where specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Test Reference per ESCC No. 3403	Characteristics	Symbols	Limits		Units
			Min	Max	
Vibration Initial Measurements	Resistance	R	47.5	52.5	Ω
	Voltage Standing Wave Ratio	VSWR	Note 1	Note 1	-
Measurements during last cycle	Intermittent contact	-	No discontinuity > 0.5ms No open or short circuit		-
Final Measurements	Resistance	R	47.5	52.5	Ω
	Resistance Drift (from initial measurement)	ΔR	-	±250	mΩ
	Voltage Standing Wave Ratio	VSWR	Note 1	Note 1	-
	VSWR Drift (from Initial measurement)	$\frac{\Delta VSWR}{VSWR}$	-	±2	%

Test Reference per ESCC No. 3403	Characteristics	Symbols	Limits		Units	
			Min	Max		
Shock Initial Measurements	Resistance (Note 2) Voltage Standing Wave Ratio (Note 2)	R	47.5	52.5	$\Omega$	
		VSWR	Note 1	Note 1	-	
	Final Measurements	Resistance	R	47.5	52.5	$\Omega$
		Resistance Drift (from initial measurement)	$\Delta R$	-	$\pm 250$	m $\Omega$
	Voltage Standing Wave Ratio	VSWR	Note 1	Note 1	-	
	VSWR Drift (from Initial measurement)	$\frac{\Delta VSWR}{VSWR}$	-	$\pm 2$	%	
Rapid Change of Temperature						
Initial Measurements	Resistance Voltage Standing Wave Ratio	R	47.5	52.5	$\Omega$	
		VSWR	Note 1	Note 1	-	
Final Measurements	Resistance	R	47.5	52.5	$\Omega$	
	Resistance Drift (from initial measurement)	$\Delta R$	-	$\pm 250$	m $\Omega$	
	Voltage Standing Wave Ratio	VSWR	Note 1	Note 1	-	
	VSWR Drift (from Initial measurement)	$\frac{\Delta VSWR}{VSWR}$	-	$\pm 2$	%	
Climatic Sequence						
Initial Measurements	Resistance (Note 2) Voltage Standing Wave Ratio (Note 2)	R	47.5	52.5	$\Omega$	
		VSWR	Note 1	Note 1	-	
Measurements during Dry Heat	Temperature Coefficient of Resistance	$TC_R$	-	$3 \times 10^{-4}$	$\Omega/\Omega^\circ C$	
Measurements during Cold	Temperature Coefficient of Resistance	$TC_R$	-	$3 \times 10^{-4}$	$\Omega/\Omega^\circ C$	
Final Measurements	Resistance	R	47.5	52.5	$\Omega$	
	Resistance Drift (from initial measurement)	$\Delta R$	-	$\pm 250$	m $\Omega$	
	Voltage Standing Wave Ratio	VSWR	Note 1	Note 1	-	
	VSWR Drift (from Initial measurement)	$\frac{\Delta VSWR}{VSWR}$	-	$\pm 2$	%	
Operating Life Initial Measurements	Resistance (Note 2)	R	47.5	52.5	$\Omega$	
	Voltage Standing Wave Ratio (Note 2)	VSWR	Note 1	Note 1	-	
Final Measurements	Resistance	R	47.5	52.5	$\Omega$	

Test Reference per ESCC No. 3403	Characteristics	Symbols	Limits		Units
			Min	Max	
	Resistance Drift (from initial measurement)	$\Delta R$	-	$\pm 250$	m $\Omega$
	Voltage Standing Wave Ratio	VSWR	Note 1	Note 1	-
	VSWR Drift (from Initial measurement)	$\frac{\Delta VSWR}{VSWR}$	-	$\pm 2$	%
RF Leakage	RF leakage f = 0 to 22GHz	E	-85	-	dBi
Peak Power					
Final Measurements	Resistance Voltage Standing Wave Ratio	R VSWR	47.5 Note 1	52.5 Note 1	$\Omega$ -

**NOTES:**

1. The limits for VSWR are as specified in Component Type Variants and Range of Component:
2. This test need not be repeated. The most recent result from the previous test may be used instead.

2.9 BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T <sub>amb</sub>	+125	°C
Power	P <sub>in</sub>	0	W

2.10 OPERATING LIFE CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T <sub>amb</sub>	+25	°C
Power	P <sub>in</sub>	Note 1	W
Frequency	f <sub>in</sub>	18	GHz

**NOTES:**

1. Rated RF Power as specified in Maximum Ratings.