



Pages 1 to 18

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RF, COAXIAL, TYPE SMA 2.9, DC - 31.5GHz**

**ESCC Detail Specification No. 3403/009**

Issue 2	February 2006
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DCR No.	CHANGE DESCRIPTION
221	Specification up issued to incorporate editorial and technical change per DCR.

**TABLE OF CONTENTS**

<b>1.</b>	<b><u>GENERAL</u></b>	<b>5</b>
1.1	Scope	5
1.2	Applicable Documents	5
1.3	Terms, Definitions, Abbreviations, Symbols and Units	5
1.4	The ESCC Component Number and Component Type Variants	5
1.4.1	The ESCC Component Number	5
1.4.2	Component Type Variants	5
1.5	Maximum Ratings	5
1.6	Physical Dimensions	7
1.6.1	Interface Dimensions	9
1.6.2	Mating Gauge Dimensions	11
1.7	Materials and Finishes	14
<b>2.</b>	<b><u>REQUIREMENTS</u></b>	<b>14</b>
2.1	General	14
2.1.1	Deviations from the Generic Specification	14
2.1.1.1	Deviations from Qualification and Periodic Tests - Chart F4	14
2.2	Marking	14
2.3	Contact Engagement and Separation Forces Test	14
2.4	Coupling Proof Torque Test	15
2.5	Mating and Unmating Forces Test	15
2.6	Electrical Measurements at Room, High and Low temperatures	15
2.6.1	Room Temperature Electrical Measurements	15
2.6.2	High and Low Temperatures Electrical Measurements	16
2.7	Parameter Drift Values	16
2.8	Intermediate and End-Point Electrical Measurements	16
2.9	Burn-in Conditions	18
2.10	Operating Life Conditions	18

## 1. GENERAL

### 1.1 SCOPE

This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants 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: 340300901

- Detail Specification Reference: 3403009
- 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	Voltage Standing Wave Ratio	Weight Max (g)
		DC to 31.5GHz	
01	MALE LOAD	≤ 1.5	5
02	FEMALE LOAD	≤ 1.5	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	$P_{RF}$	500	mW	Note 1
Peak Power	$P_P$	50	W	duration 1 $\mu$ s 1% duty cycle
DC Power	$P_{DC}$	500	mW	$T_{amb}=+25^{\circ}C$
Impedance	Z	47.5 to 52.5	$\Omega$	-
Frequency Range	$f_{op}$	DC to 40	GHz	-
RF Leakage	E	-60	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:**

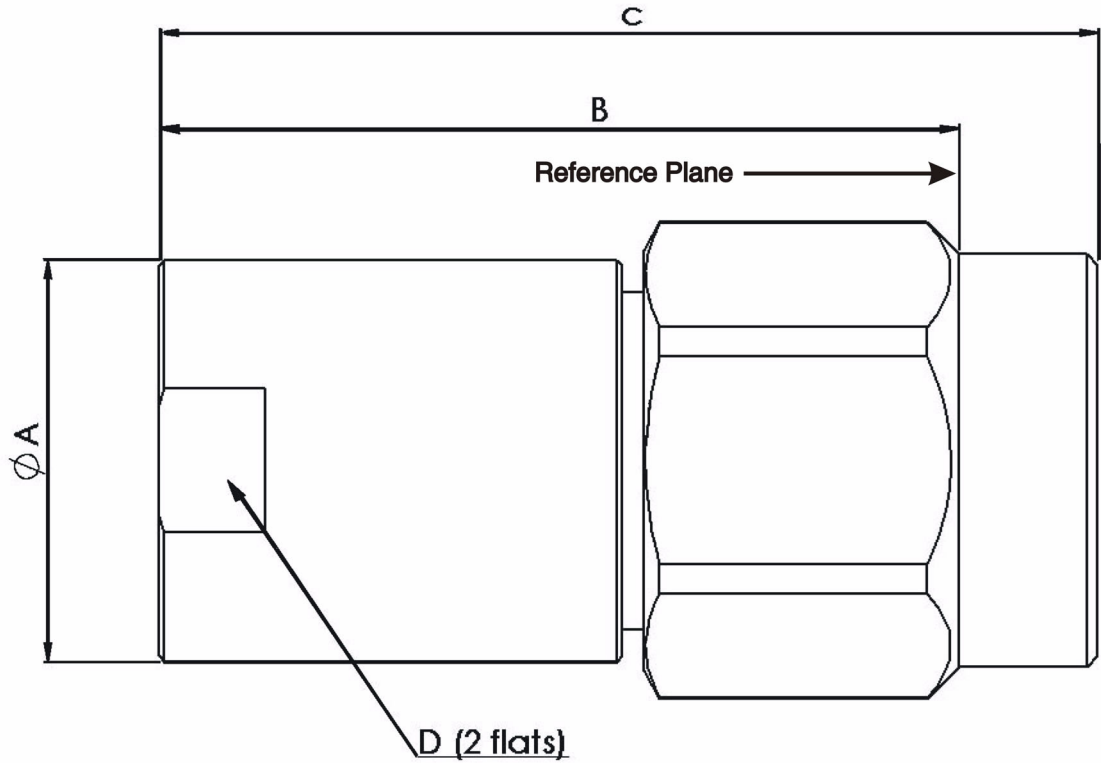
- RF Power shall be derated against operating temperature as follows:

$$P_{RF} = 500\text{mW for } T_{op} \leq +25^{\circ}C. \text{ Derate linearly to } 125\text{mW at } T_{op} = +125^{\circ}C.$$

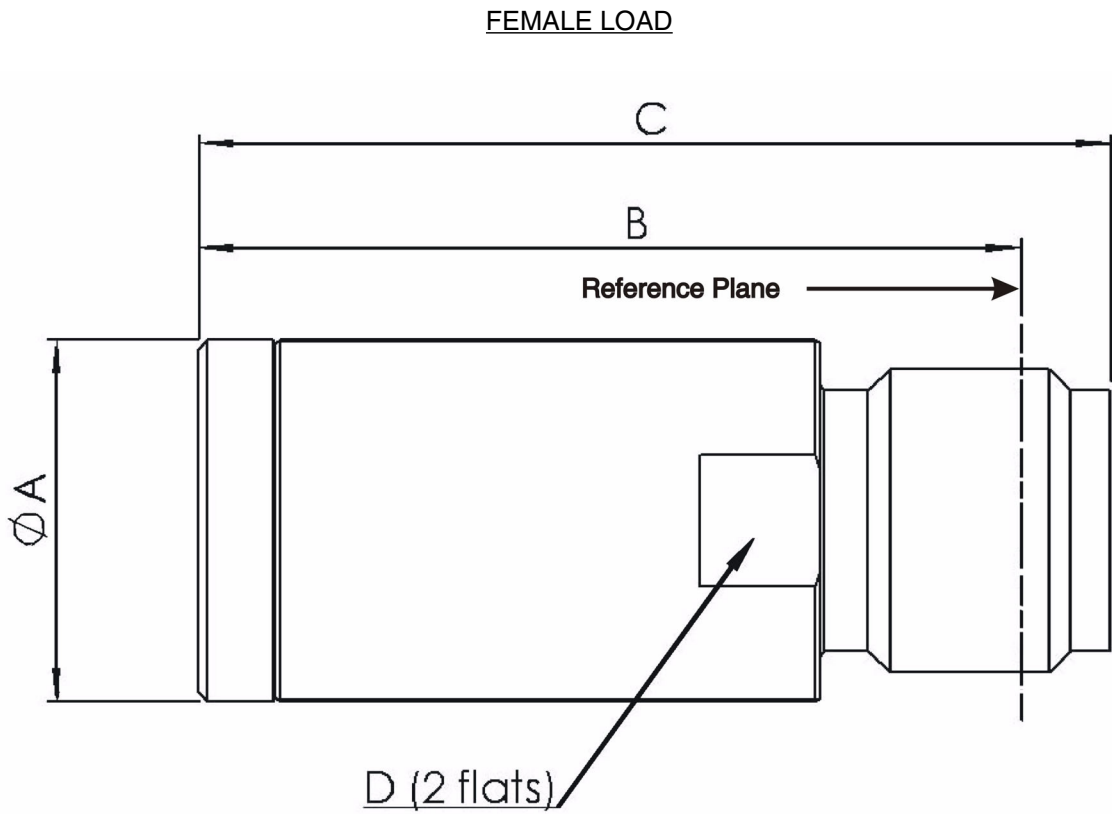
- Coupling Proof Torque: 170N.cm.

1.6 PHYSICAL DIMENSIONS

MALE LOAD



Symbols	Dimensions mm	
	Min	Max
$\phi A$	7	8
B	14.5	15.5
C	-	18.5
D	6.5	7.5

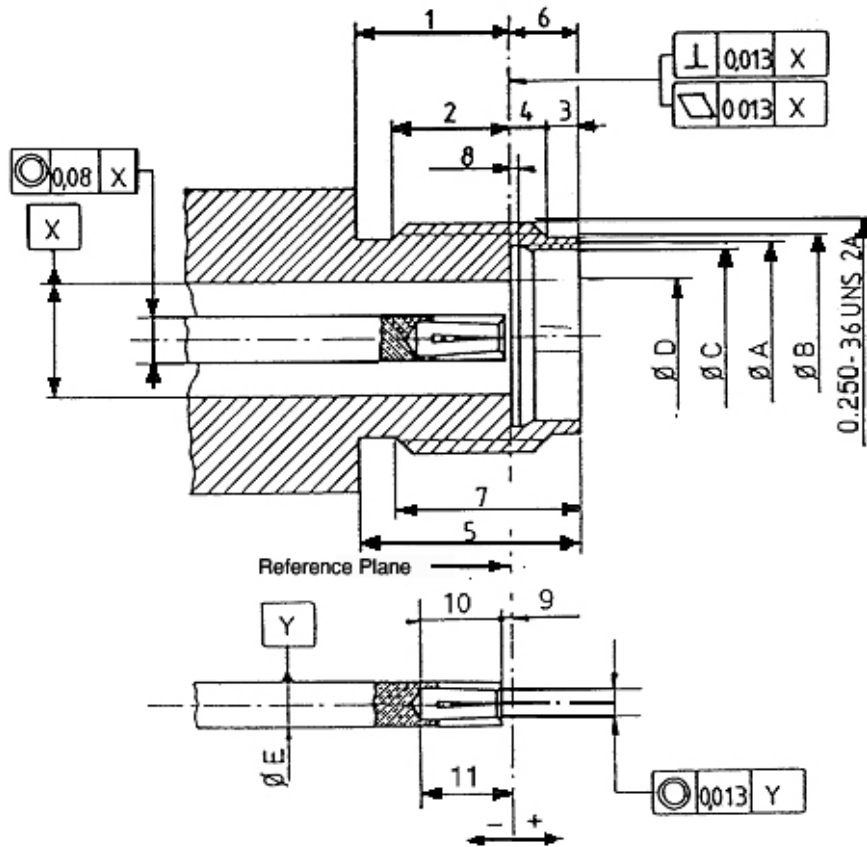


Symbols	Dimensions mm	
	Min	Max
ØA	7	8
B	16.5	17.5
C	-	19.5
D	6.5	7.5



1.6.1 Interface Dimensions

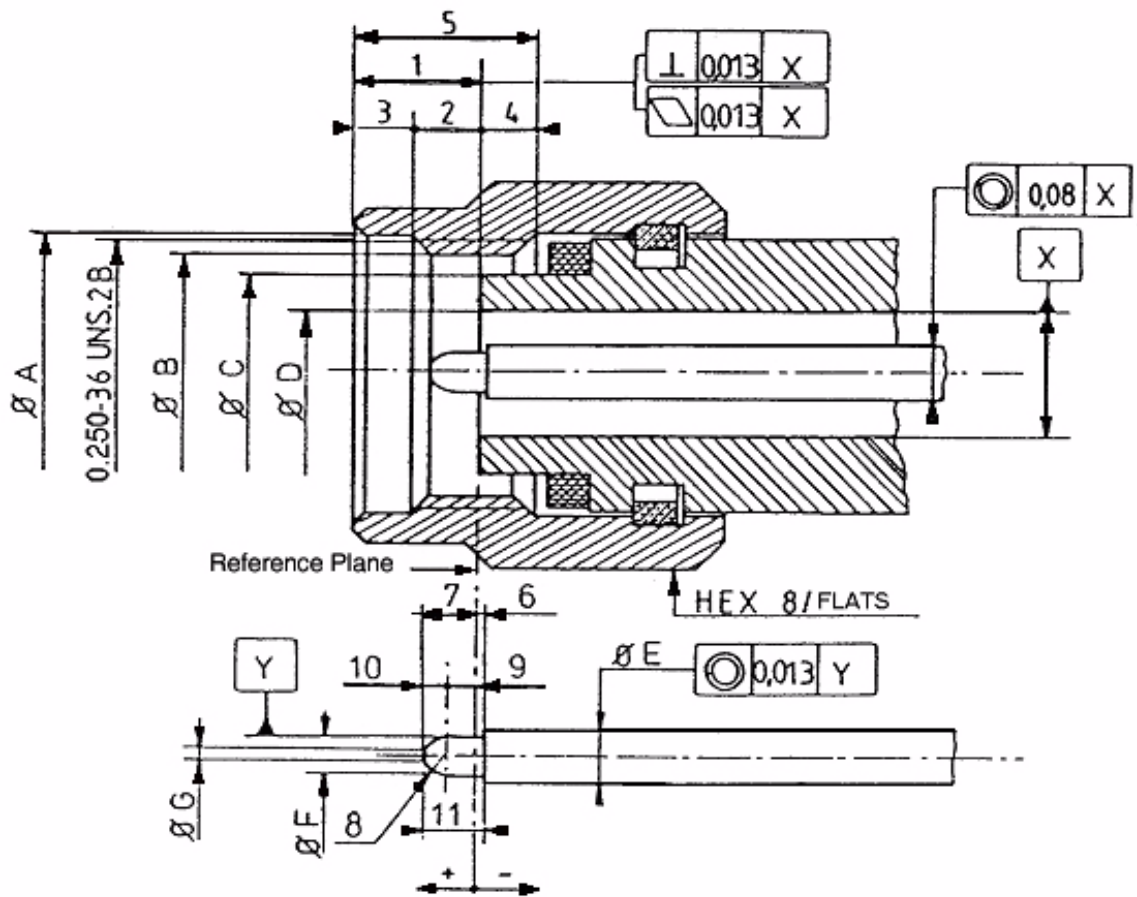
Female Interface



Symbols	Dimensions mm	
	Min	Max
1	3.82	4.32
2	2.87	3.27
3	0.65	0.95
4	0.93	1.33
5	5.8	6.2
6	1.88	1.98
7	4.85	5.15
8	0.3	0.5
9	0	0.08
10	2.4	2.6
11	2.4	2.68
ØA	4.8	5
ØB	5.3	5.35

Symbols	Dimensions mm	
	Min	Max
∅C	4.6	4.63
∅D	2.905	2.945
∅E	1.26	1.28

Male Interface

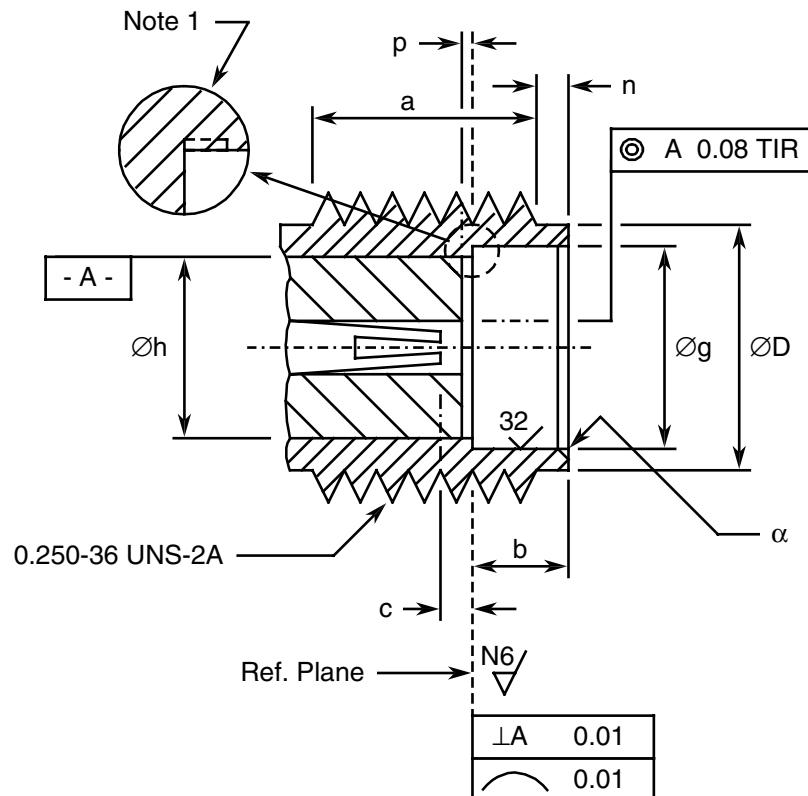


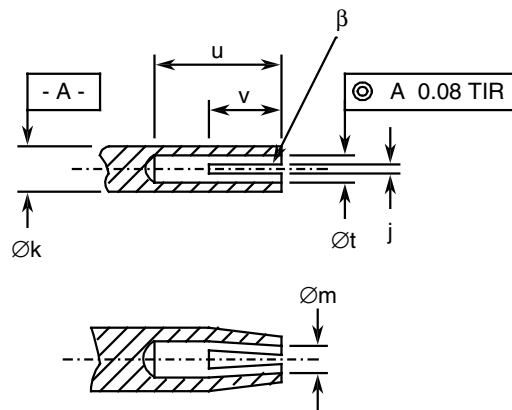
Symbols	Dimensions mm		Notes
	Min	Max	
1	2.63	3.25	
2	1.58	2.2	
3	0.75	1.15	
4	0.85	1.47	
5	3.8	4.2	
6	0	0.08	
7	1.22	1.4	
8	0.8	0.9	Radius

Symbols	Dimensions mm		Notes
	Min	Max	
9	0.493	0.784	
10	0.616	0.727	
11	1.3	1.4	
ØA	6.6	6.7	
ØB	5.59	-	
ØC	4.55	4.58	
ØD	2.905	2.94	
ØE	1.26	1.28	
ØF	0.92	0.94	
ØG	0.2	0.34	

1.6.2 Mating Gauge Dimensions

Female Interface



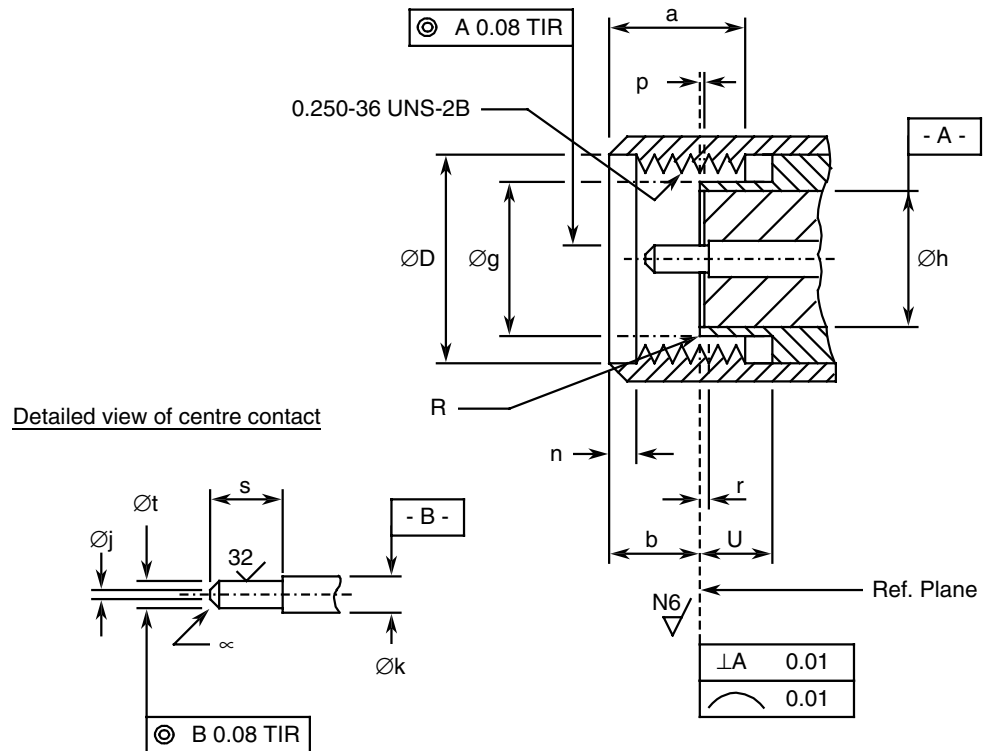


Symbols	Dimensions mm		Notes
	Min	Max	
a	3.81	-	
b	1.88	1.98	
c	0	0.08	Contact recess
$\text{Ø}D$	5.28	5.49	
$\text{Ø}g$	4.6	4.67	
$\text{Ø}h$	4.1	4.13	
j	0.13	0.23	2 or more slots
$\text{Ø}k$	1.27	1.29	
$\text{Ø}m$	0.72	0.84	After closing
n	0.38	1.14	
p	0	0.05	Insert recess
u	2.54	-	
$\text{Ø}t$	0.94	0.99	
v	1.91	2.41	
$\alpha$	-	0.25	45° Chamfer
$\beta$	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	
$\text{Ø}D$	6.48	6.73	
$\text{Ø}g$	4.34	4.59	
$\text{Ø}h$	4.1	4.13	
$\text{Ø}j$	-	0.38	Flat
$\text{Ø}k$	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	
$\text{Ø}t$	0.9	0.93	
$U$	2.03	-	
$\alpha$	-	-	$45 \pm 3^\circ$ 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: ULTEM 1000
- 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.

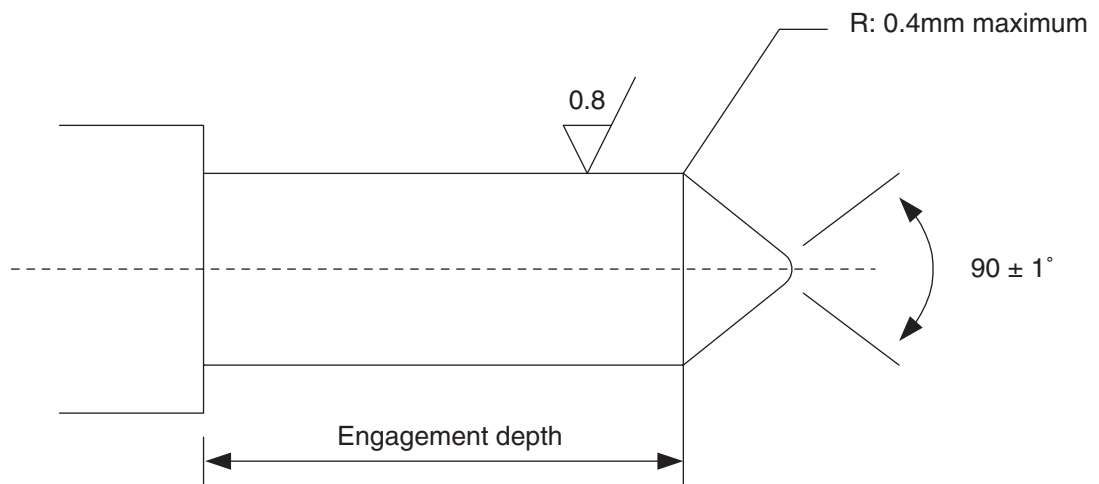
### 2.3 CONTACT ENGAGEMENT AND SEPARATION FORCES TEST

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

- a) Oversize Test Pin  
Pin diameter : 0.95/0.955mm  
Insertion depth : 0.76/1.14mm
- b) Maximum Diameter Test Pin  
Pin diameter : 0.94/0.946mm

Engagement depth : 1.27/1.9mm  
 Engagement force: 1380g maximum.

- c) Minimum Diameter Test Pin  
 Pin diameter : 0.89/0.902mm  
 Separation depth: 1.27/1.9mm  
 Separation force: 28g 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 31.5GHz	-	1.5	-
Resistance	R	Test current < 50mA DC to 2kHz max.	47.5	52.5	$\Omega$

2.6.2 High and Low Temperatures Electrical Measurements

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

Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Temperature Coefficient of Resistance	$TC_R$	Test current < 50mA DC to 2kHz max.	-	$3 \times 10^{-4}$	$\Omega/\Omega/^\circ\text{C}$

**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  $T_{amb}=+22 \pm 3^\circ\text{C}$ .

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

The drift values ( $\Delta$ ) 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 $\Delta$	Units
Voltage Standing Wave Ratio	$\frac{\Delta VSWR}{VSWR}$	$\pm 2$	%
Resistance	$\Delta R$	$\pm 250$	$m\Omega$

2.8 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

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

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

The drift values ( $\Delta$ ) 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 VSWR $f = 0$ to 31.5GHz	R VSWR	47.5 -	52.5 1.5	$\Omega$ -
Measurements during last cycle	Intermittent contact	-	No discontinuity > 0.5ms No open or short circuit		-



Test Reference per ESCC No. 3403	Characteristics	Symbols	Limits		Units
			Min	Max	
Final Measurements	Resistance Resistance Drift VSWR f = 0 to 31.5GHz VSWR Drift f = 0 to 31.5GHz	R $\Delta R$ VSWR  $\frac{\Delta VSWR}{VSWR}$	47.5 - -  -	52.5 $\pm 250$ 1.5  $\pm 2$	$\Omega$ m $\Omega$ -  %
Shock					
Initial Measurements	Resistance (Note 1) VSWR (Note 1) f = 0 to 31.5GHz	R VSWR	47.5 -	52.5 1.5	$\Omega$ -
Final Measurements	Resistance Resistance Drift VSWR f = 0 to 31.5GHz VSWR Drift f = 0 to 31.5GHz	R $\Delta R$ VSWR  $\frac{\Delta VSWR}{VSWR}$	47.5 - -  -	52.5 $\pm 250$ 1.5  $\pm 2$	$\Omega$ m $\Omega$ -  %
Rapid Change of Temperature					
Initial Measurements	Resistance VSWR f = 0 to 31.5GHz	R VSWR	47.5 -	52.5 1.5	$\Omega$ -
Final Measurements	Resistance Resistance Drift VSWR f = 0 to 31.5GHz VSWR Drift f = 0 to 31.5GHz	R $\Delta R$ VSWR  $\frac{\Delta VSWR}{VSWR}$	47.5 - -  -	52.5 $\pm 250$ 1.5  $\pm 2$	$\Omega$ m $\Omega$ -  %
Climatic Sequence					
Initial Measurements	Resistance (Note 1) VSWR (Note 1) f = 0 to 31.5GHz	R VSWR	47.5 -	52.5 1.5	$\Omega$ -
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 Resistance Drift VSWR f = 0 to 31.5GHz VSWR Drift f = 0 to 31.5GHz	R $\Delta R$ VSWR  $\frac{\Delta VSWR}{VSWR}$	47.5 - -  -	52.5 $\pm 250$ 1.5  $\pm 2$	$\Omega$ m $\Omega$ -  %

Test Reference per ESCC No. 3403	Characteristics	Symbols	Limits		Units
			Min	Max	
Operating Life					
Initial Measurements	Resistance (Note 1) VSWR (Note 1) f = 0 to 31.5GHz	R VSWR	47.5 -	52.5 1.5	$\Omega$ -
Final Measurements	Resistance	R	47.5	52.5	$\Omega$
	Resistance Drift	$\Delta R$	-	$\pm 250$	m $\Omega$
	VSWR	VSWR	-	1.5	-
	f = 0 to 31.5GHz				
	VSWR Drift	$\frac{\Delta VSWR}{VSWR}$	-	$\pm 2$	%
	f = 0 to 31.5GHz				
RF Leakage	RF leakage	E			dBi
	f = 0 to 21.5GHz		-70	-	
	f = 21.5 to 31.5GHz		-60	-	
Peak Power					
Final Measurements	Resistance	R	47.5	52.5	$\Omega$

**NOTES:**

1. 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>	500	mW
Frequency	f <sub>in</sub>	18	GHz