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**ATTENUATOR,  
RF, COAXIAL, TYPE SMA 2.9, DC - 31.5GHZ**

**ESCC Detail Specification No. 3403/008**

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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: 340300801

- Detail Specification Reference: 3403008
- 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	Nominal Attenuation (dB)	Attenuation Tolerance (dB)		Voltage Standing Wave Ratio	Weight Max (g)
		DC to 17.5GHz	17.5 to 31.5GHz	DC to 31.5GHz	
01	0	± 0.8	± 0.5	≤ 1.5	7
02	0.5	± 0.8	± 0.5	≤ 1.5	7
03	1	± 0.8	± 0.5	≤ 1.5	7
04	1.5	± 0.8	± 0.5	≤ 1.5	7
05	2	± 0.8	± 0.5	≤ 1.5	7
06	2.5	± 0.8	± 0.5	≤ 1.5	7
07	3	± 0.8	± 0.5	≤ 1.5	7
08	3.5	± 0.8	± 0.5	≤ 1.5	7
09	4	± 0.8	± 0.5	≤ 1.5	7
10	4.5	± 0.8	± 0.5	≤ 1.5	7
11	5	± 0.8	± 0.5	≤ 1.5	7
12	5.5	± 0.8	± 0.5	≤ 1.5	7
13	6	± 0.8	± 0.5	≤ 1.5	7
14	6.5	± 0.8	± 0.5	≤ 1.5	7
15	7	± 0.8	± 0.5	≤ 1.5	7
16	7.5	± 0.8	± 0.5	≤ 1.5	7
17	8	± 0.8	± 0.5	≤ 1.5	7
18	8.5	± 0.8	± 0.5	≤ 1.5	7
19	9	± 0.8	± 0.5	≤ 1.5	7
20	9.5	± 0.8	± 0.5	≤ 1.5	7
21	10	± 0.8	± 0.5	≤ 1.5	7

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	dBi	-
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	Tq	120	N.cm	Note 2

**NOTES:**

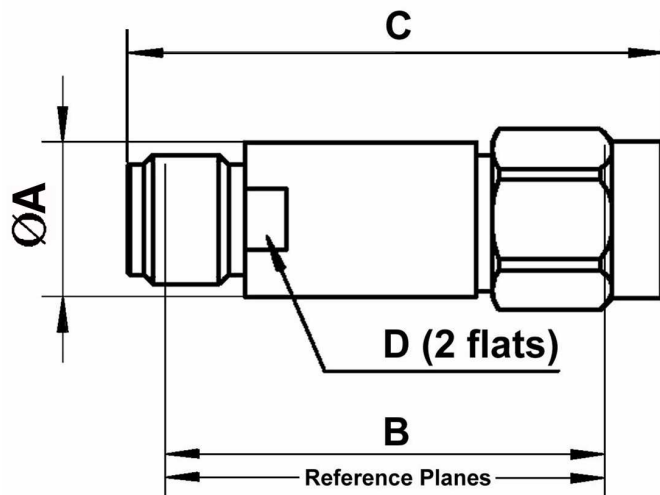
1. RF Power shall be derated against operating temperature as follows:

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

2. Coupling Proof Torque: 170N.cm

1.6

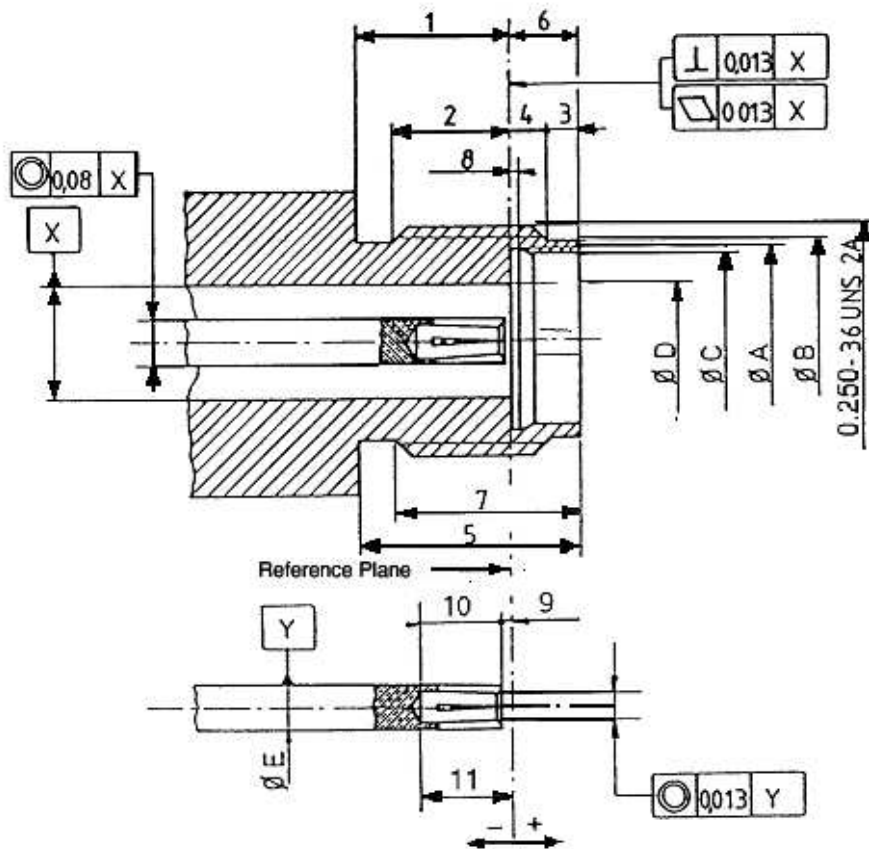
PHYSICAL DIMENSIONS



Symbols	Dimensions mm	
	Min	Max
ØA	7	8
B	21	22
C	-	26.5
D	6.5	7.5

1.6.1 Interface Dimensions

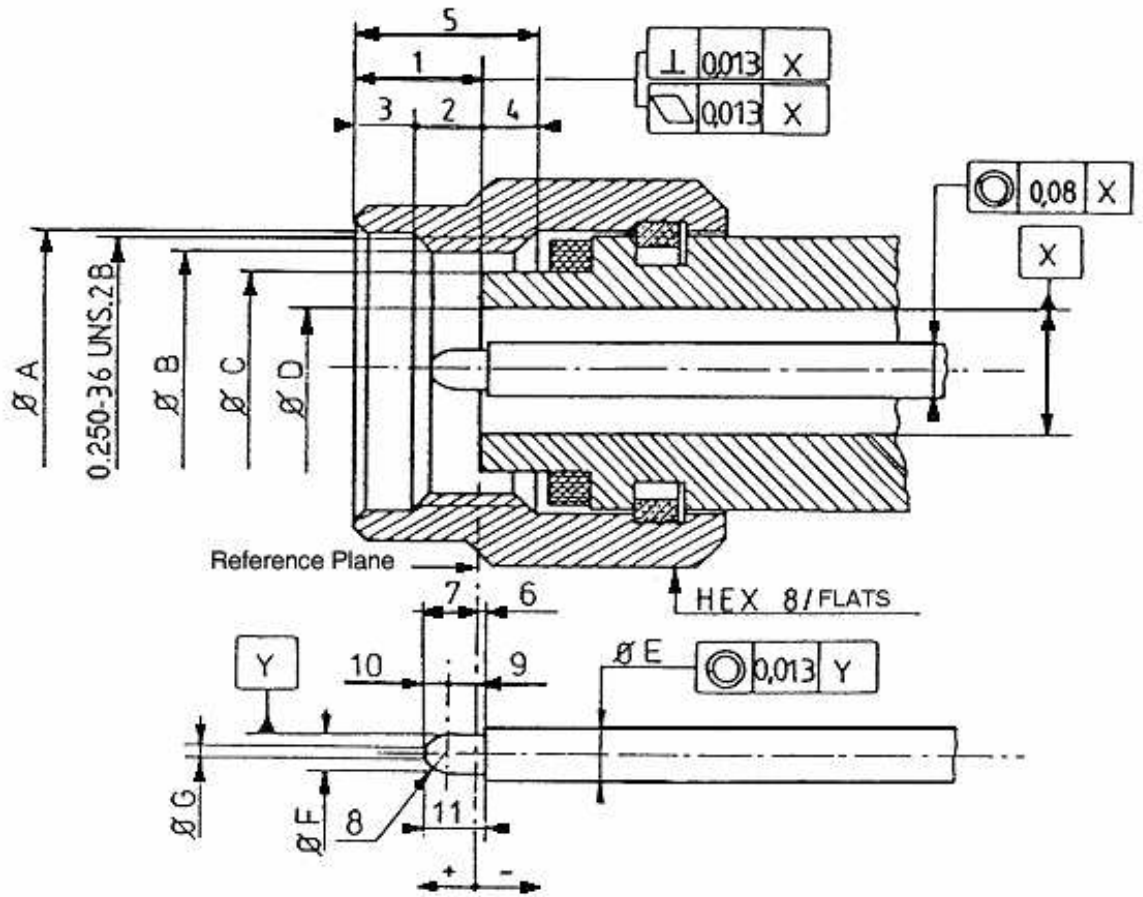
Female Interface





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
ØC	4.6	4.63
ØD	2.905	2.945
ØE	1.26	1.28

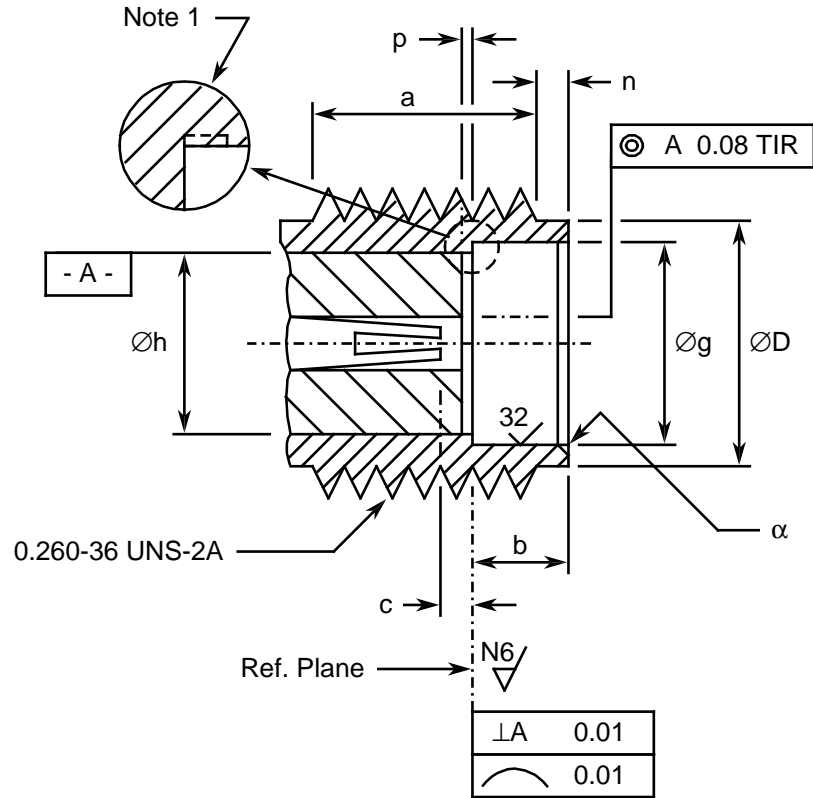
Male Interface



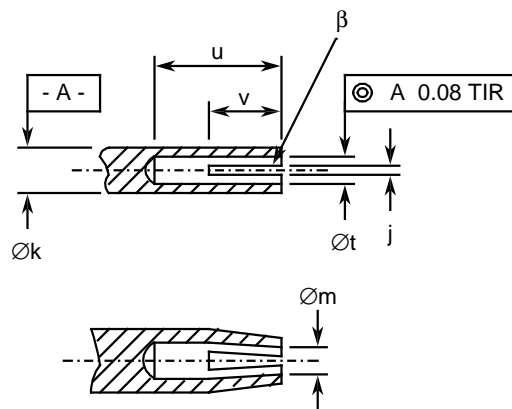
Symbols	Dimensions mm		Notes
	Min	Max	
1	2.63	3.25	
2	1.58	2.2	
3	0.75	1.15	
4	0.85	1.47	
5	3.8	4.2	
6	0	0.08	
7	1.22	1.4	
8	0.8	0.9	Radius
9	0.493	0.784	
10	0.616	0.727	
11	1.3	1.4	
ØA	6.6	6.7	
ØB	5.59	-	
ØC	4.55	4.58	
ØD	2.905	2.94	
ØE	1.26	1.28	
ØF	0.92	0.94	
ØG	0.2	0.34	

1.6.2 Mating Gauge Dimensions

Female Interface



Detailed view of centre contact

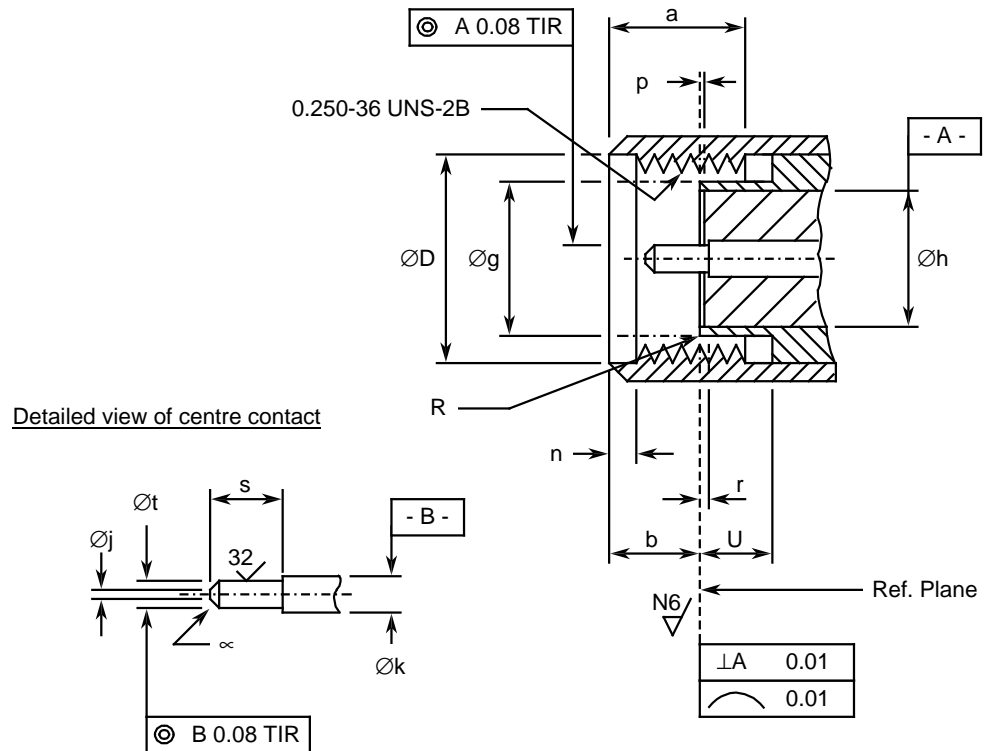


Symbols	Dimensions mm		Notes
	Min	Max	
a	3.81	-	
b	1.88	1.98	
c	0	0.08	Contact recess
ØD	5.28	5.49	
Øg	4.6	4.67	
Øh	4.1	4.13	
j	0.13	0.23	2 or more slots
Øk	1.27	1.29	
Øm	0.72	0.84	After closing
n	0.38	1.14	
p	0	0.05	Insert recess
u	2.54	-	
Øt	0.94	0.99	
v	1.91	2.41	
α	-	0.25	45° Chamfer
β	0.99	1.19	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: 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
- (b) Power Sensitivity: 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.

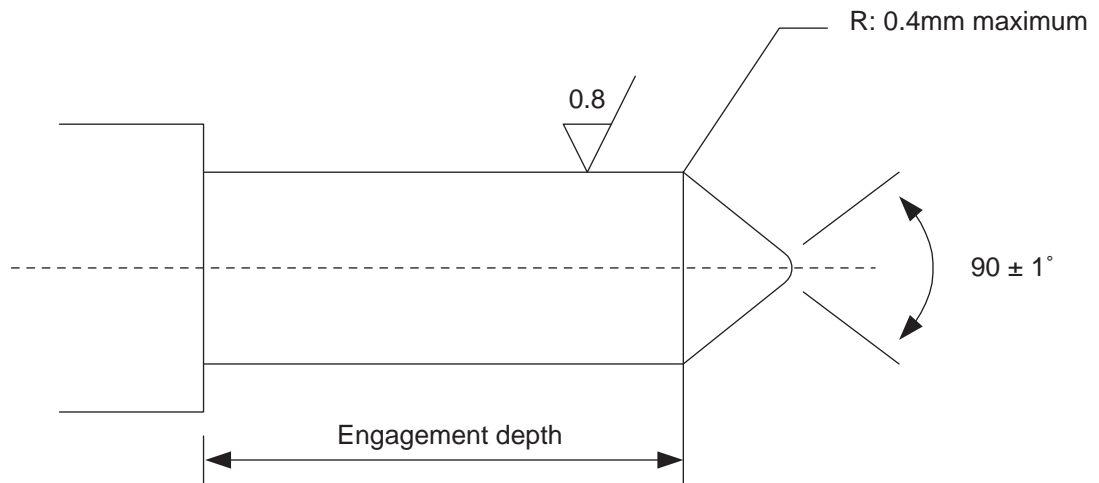
### 2.3 CONTACT ENGAGEMENT AND SEPARATION FORCES TEST

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

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	-
Attenuation	Att	ESCC No. 3403 f = 0 to 31.5GHz	Note 1	Note 1	dB



**NOTES:**

1. The limits for Attenuation are as specified in Component Type Variant and Range of Components: Nominal Attenuation + Attenuation Tolerance.

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 Attenuation	$TC_{Att}$	ESCC No. 3403 $f = 0$ to $31.5\text{GHz}$	-	$4 \times 10^{-4}$	dB/dB/ $^\circ\text{C}$

**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	$\frac{\Delta VSWR}{VSWR}$	$\pm 2$	%
Attenuation	$\Delta Att$	$\pm 0.05$ or (1) $\pm 0.5$	dB %

**NOTES:**

1. Whichever is greater.

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	Attenuation	Att	Note 1	Note 1	dB
Measurements during last cycle	Intermittent contact	-	No discontinuity > 0.5ms No open or short circuit		-
Final Measurements	Attenuation	Att	Note 1	Note 1	dB
	Attenuation Drift (from initial measurement)	$\Delta$ Att	-	$\pm 0.05$ or (2) $\pm 0.5$	dB dB %
Shock					
Initial Measurements	Attenuation (Note 3)	Att	Note 1	Note 1	dB
Final Measurements	Attenuation	Att	Note 1	Note 1	dB
	Attenuation Drift (from initial measurement)	$\Delta$ Att	-	$\pm 0.05$ or (2) $\pm 0.5$	dB dB %
Rapid Change of Temperature					
Initial Measurements	Attenuation	Att	Note 1	Note 1	dB
Final Measurements	Attenuation	Att	Note 1	Note 1	dB
	Attenuation Drift (from initial measurement)	$\Delta$ Att	-	$\pm 0.05$ or (2) $\pm 0.5$	dB dB %
Climatic Sequence					
Initial Measurements	Attenuation (Note 3)	Att	Note 1	Note 1	dB
Measurements during Dry Heat	Temperature Coefficient of Attenuation	$TC_{Att}$	-	$4 \times 10^{-4}$	dB/dB/°C
Measurements during Cold	Temperature Coefficient of Attenuation	$TC_{Att}$	-	$4 \times 10^{-4}$	dB/dB/°C
Final Measurements	Attenuation	Att	Note 1	Note 1	dB
	Attenuation Drift (from initial measurement)	$\Delta$ Att	-	$\pm 0.05$ or (2) $\pm 0.5$	dB dB %
Connector Repeatability	Attenuation Attenuation Drift (during test)	Att $\Delta$ Att	Note 1 -	Note 1 $\pm 0.05$ or (2) $\pm 0.5$	dB dB %

Test Reference per ESCC No. 3403	Characteristics	Symbols	Limits		Units
			Min	Max	
Operating Life Initial Measurements	Attenuation (Note 3)	Att	Note 1	Note 1	dB
Final Measurements	Attenuation Attenuation Drift (from initial measurement)	Att $\Delta$ Att	Note 1 -	Note 1 $\pm 0.05$ or (2) $\pm 0.5$	dB dB %
RF Leakage	RF leakage f = 0 to 21.5GHz f = 21.5 to 31.5GHz	E	-70 -60	- -	dB dB
Peak Power Final Measurements	Attenuation	Att	Note 1	Note 1	dB

**NOTES:**

1. The limits for attenuation are as specified in Component Type Variants and Range of Components: Nominal Attenuation + Attenuation Tolerance.
2. Whichever is greater.
3. 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	$T_{amb}$	+125	$^{\circ}$ C
Power	$P_{in}$	0	W

2.10 OPERATING LIFE CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	$T_{amb}$	+25	$^{\circ}$ C
Power	$P_{in}$	500	mW
Frequency	$f_{in}$	18	GHz