SCTE · ISBE

STANDARDS

Interface Practices Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 176 2019

Specification for 75 ohm 'MCX' Connector, Male & Female Interface

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1. Introduction

1.1. Executive Summary

This document outlines the mechanical, electrical and environmental requirements for the 75 ohm MCX connector interface.

1.2. Scope

The purpose of this document is to specify requirements for the male/female interface of a 75 ohm, 3 GHz rated connector series generically known as MCX. This is an indoor connector with applications in controlled environment headends and hubsites.

All requirements of this document are measured after installation per manufacturer's instructions of the cable into the connector.

This document will address only the interface, not the connector body or the cable requirements. Mechanical, electrical and environmental performance is defined to ensure a reliable connection for permanent installations, as well as temporary adapters and calibration standards.

1.3. Benefits

This specification is necessary to provide manufacturers and users of this product a basic set of standard dimensional and performance requirements from which to gauge design performance.
It's useful for cable and equipment manufacturers to ensure proper mating with varied connector manufactured designs. This specification provides confidence to end users that designs which meet these minimum criteria will perform properly in their systems.

1.4. Intended Audience

This document is intended for manufacturers and end users of this product, and products to which this connector type is intended to be used.

1.5. Areas for Further Investigation or to be Added in Future Versions

- None

2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. At the time of Subcommittee approval, the editions indicated were valid. All documents are subject to revision; and while parties to any agreement based on this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below, they are reminded that newer editions of those documents might not be compatible with the referenced version.

2.1. SCTE References

- ANSI/SCTE 103 2018 Test Method for DC Contact Resistance, Drop cable to "F" connectors and F 81 Barrels
- ANSI/SCTE 04 2014 Test Method for "F" Connector Return Loss

- ANSI/SCTE 48-1 2015 Test Method for Measuring Shielding Effectiveness of Passive and Active Devices Using a GTEM Cell
- ANSI/SCTE 144 2017 Test Procedure for Measuring Transmission and Reflection

2.2. Standards from Other Organizations

- EIA-364-65
- MIL-STD-202
- Bellcore GR-1503-CORE 4.8
- CECC-22200

2.3. Published Materials

- No normative references are applicable.

3. Informative References

The following documents might provide valuable information to the reader but are not required when complying with this document.

3.1. SCTE References

- No informative references are applicable.

3.2. Standards from Other Organizations

- MIL-STD-889

3.3. Published Materials

- No informative references are applicable.

4. Compliance Notation

shall	This word or the adjective "***required***" means that the item is an absolute requirement of this document.
shall not	This phrase means that the item is an absolute prohibition of this document.
forbidden	This word means the value specified shall never be used.
should	This word or the adjective "*recommended*" means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course.
should not	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
may	This word or the adjective "*optional*" means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.
deprecated	Use is permissible for legacy purposes only. Deprecated features may be removed from future versions of this document. Implementations should avoid use of deprecated features.

5. Electrical Requirements

Table 1 - Electrical Requirements of MCX Plug – Socket Interface only

Electrical Specification		Min	Typ	Max	Unit	Comments
Frequency Range		5		3000	MHz	unless otherwise stated
Nominal Impedance			75		Ω	
Insulation Resistance		5000			MΩ	(per MIL-STD-202 Method 302)
Dielectric Withstand Voltage		1000			Vrms	at sea level (per MIL-STD-202 Method 301)
RF HI-Potential		670			Vrms	at 5MHz
Voltage Rating		300			Vrms	at sea level
RF Leakage				-70	dB	ANSI/SCTE 48-1 2015
Insertion Loss				0.2	dB	ANSI/SCTE 144 2017
Center Contact Resistance				6	mΩ	ANSI/SCTE 103 2018 Initial
				15	mΩ	After Conditioning
Outer Conductor Continuity				2.5	mΩ	Initial
				7.5	mΩ	After Conditioning*
Return Loss	5-1002 MHz	30			dB	ANSI/SCTE 04 2014
	1-2 GHz	28				
	2-3 GHz	25				

*After Conditioning defined as any single test in Table 8. If a test procedure referenced in Table 8 already defines a maximum deviation from baseline, then that value takes precedence.

6. Mechanical Dimensions

6.1. Female Socket Geometry

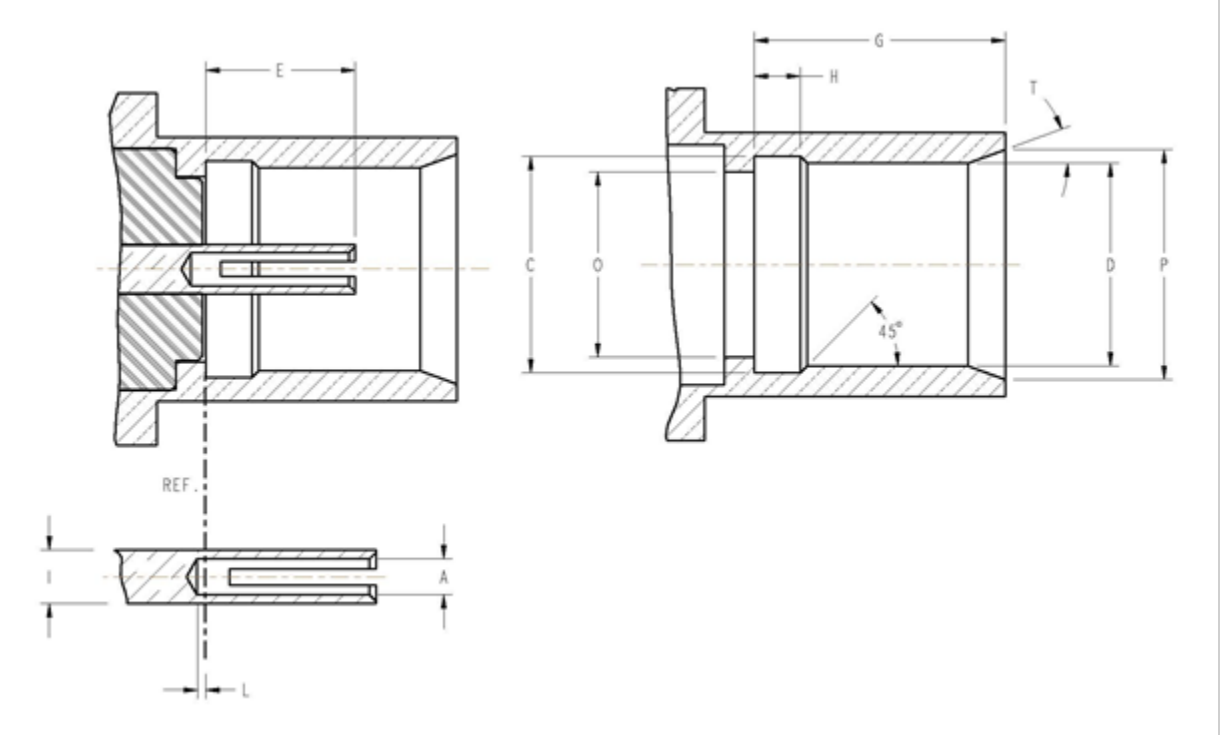

Figure 1 – Female Socket Geomerty

Table 2 - Female Socket Dimensions

Reference	mm		in		Note
	Min	Max	Min	Max	
A	-	-	-	-	1, Diameter
C	3.60	3.71	0.142	0.146	Diameter
D	3.42	3.48	0.135	0.137	Diameter
E	2.30	2.80	0.091	0.110	Diameter
G	4.00	4.12	0.157	0.162	
H	0.75	0.85	0.030	0.033	
I	-	-	-	-	1, Diameter
L	0.00	-	0.000	-	
O	-	3.00	-	0.118	Diameter
P	3.80	-	0.15	-	Diameter
T	18	22			Degrees

1. Design to meet electrical and mechanical performance

6.2. Male Plug Geometry

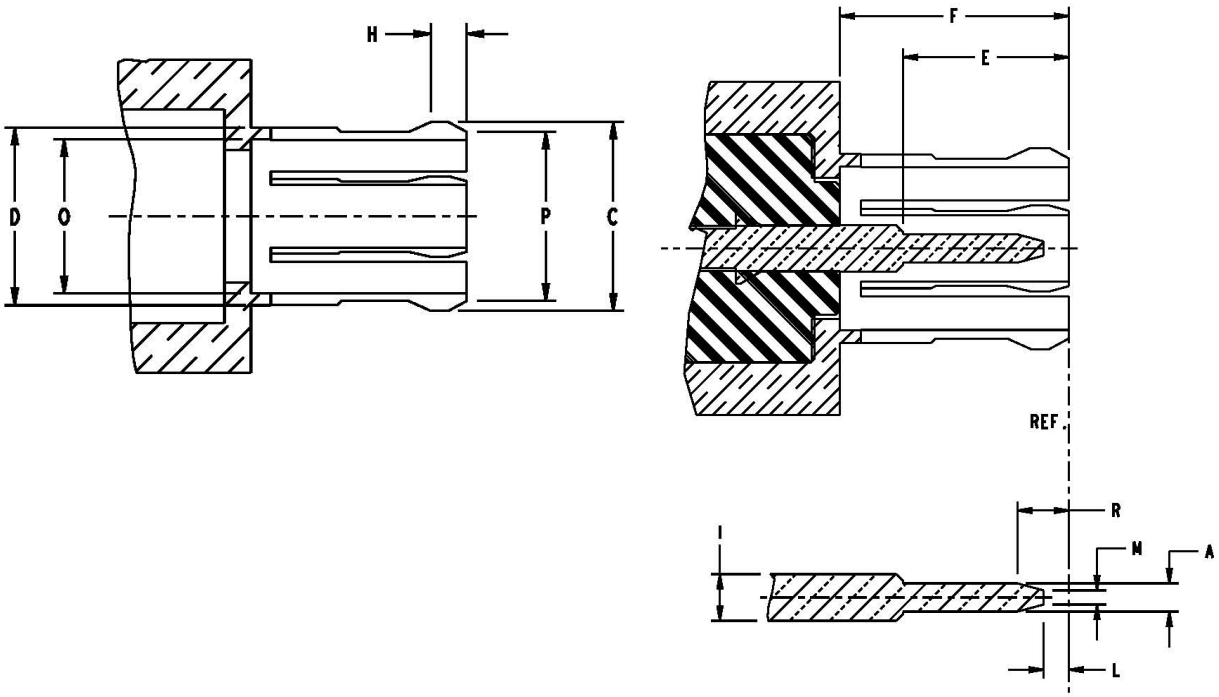

Figure 2 – Male Plug Geomerty

Table 3 - Male Plug Dimensions

Reference	mm		in		Note
	Min	Max	Min	Max	
A	0.48	0.53	0.019	0.021	Diameter
C	3.73	-	0.147	-	
D	-	3.40	-	0.134	Diameter
E	2.80	-	0.110	-	1
F	4.15	-	0.163	-	
H	0.70	0.75	0.028	0.030	
I	-	-	-	-	2, Diameter
L	0.15	-	0.006	-	
M	-	0.25	-	0.010	Diameter
O	-	3.00	-	0.118	2, Diameter
P	-	3.60	-	0.142	Diameter
R	-	1.20	-	0.047	

1. Shoulder Optional

2. Diameter chosen to meet mechanical and electrical requirements and to compensate for electrical effect of slots

6.3. Gauge for Center Pin

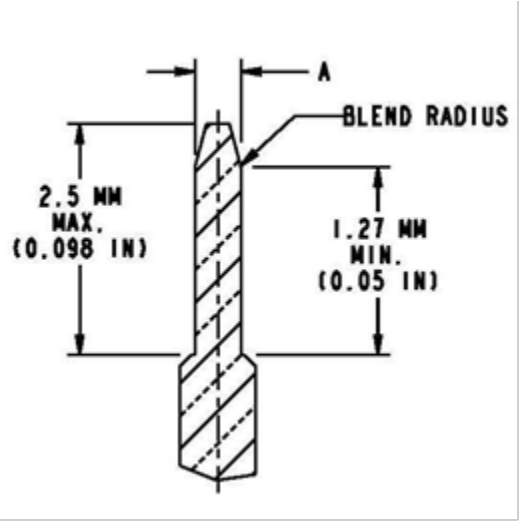

Figure 3 – Gauge for Center Pin

Table 4 - Center Pin Gauge

Ref.	Gauge A		Gauge B	
	min	max	min	max
Aϕ (mm)	0.533	0.538	0.477	0.482
Aϕ (mils)	20.98	21.18	18.78	18.98
Insertion Force*		11 N		
Retention Force*			27 g	
Material:	Steel, polished Surface roughness Ra = 0.4 μm max (0.0157 mil)			

* After alternate inserting Gauge A and B for five cycles. As per CECC-222200.

6.4. Gauge for Outer Plug

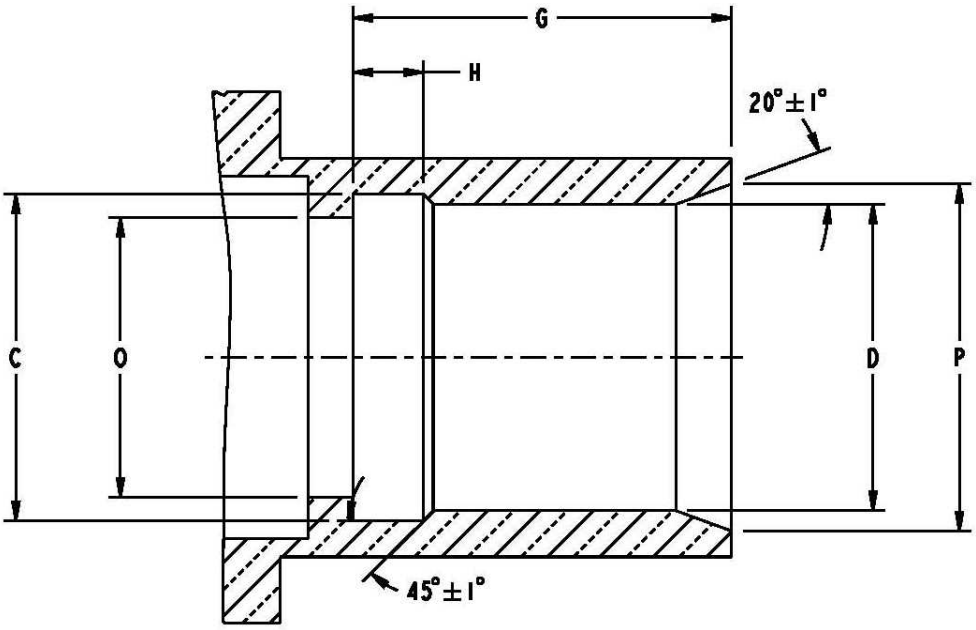

Figure 4 – Gauge for Outer Plug

Table 5 - Outer Plug Gauge

Ref.	Gauge A (max material)		Gauge B (min material)	
	min	max	min	max
C	3.6 (142)	3.62 (143)	3.6 (142)	3.62 (143)
D	3.4 (134)	3.42 (135)	3.46 (136)	3.48 (137)
G	4.1 (161)	4.12 (162)	4.1 (161)	4.12 (162)
H	0.79 (31)	0.81 (32)	0.79 (31)	0.81 (32)
P	3.75 (148)	3.85 (152)	3.75 (148)	3.85 (152)
O	2.6 (102)	2.8 (110)	2.6 (102)	2.8 (110)
Weight (g)	1990	2010	790	810
Removal Force*	8N (1.80 lbf)	20N (4.5 lbf)	800g (1.76 lb)	
Insertion Force*		63N (14.2 lbf)		

Unless otherwise stated, units in mm (mils)

Material: Steel, polished

Surface roughness Ra = 0.4 μm max (0.0157 mil)

* Alternate inserting Gauge A and B for five cycles. As per CECC-222200.

6.5. Test Plug

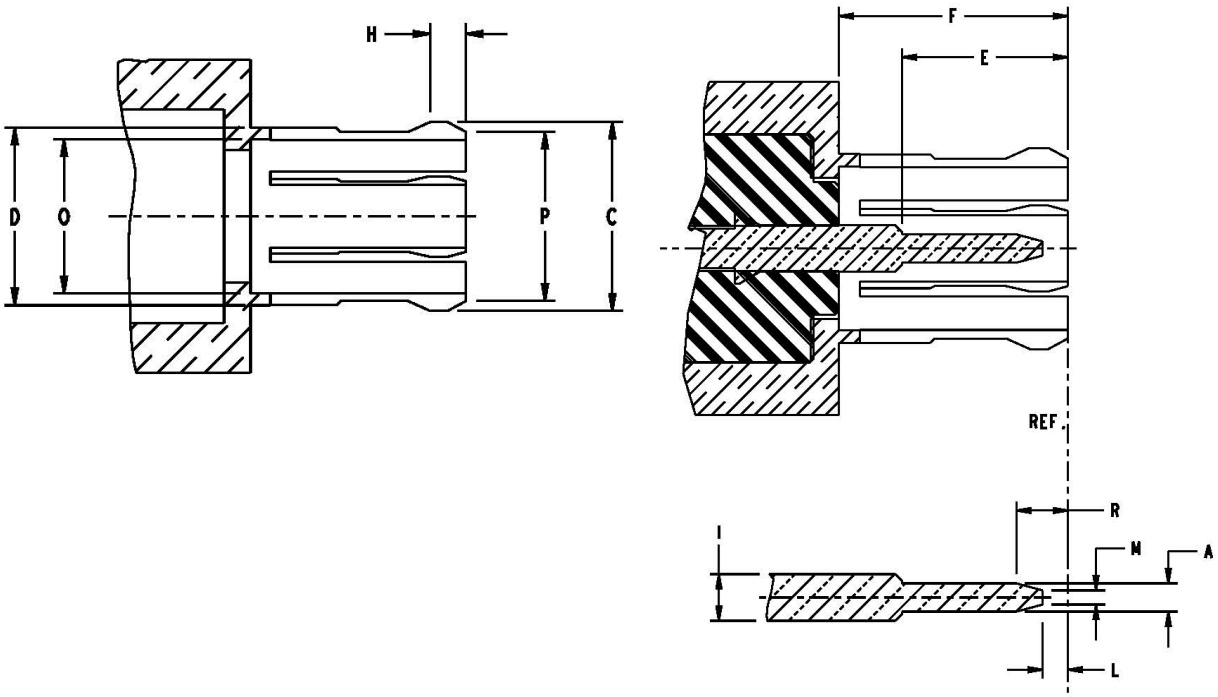

Figure 5 – Test Plug

Table 6 - Test Plug

Ref.	Min	Max	Note
A	0.5 (20)	0.53 (21)	Diameter
C	3.73 (147)	3.76 (148)	Diameter
D	3.37 (133)	3.4 (134)	Diameter
E	2.81 (111)	3 (118)	
F	4.15 (163)		
H	0.7 (28)	0.75 (30)	
I	0.93 (37)	0.95 (37)	Diameter
L	0.15 (6)		
M		0.25 (10)	Diameter
O	2.8 (110)	2.83 (111)	Diameter
P		3.6 (142)	Diameter
R		1.2 (47)	

Unless otherwise stated, units in mm (mils)

Mate with test plug five times. Engagement/Disengagement forces of Table 8 apply to first and last cycles

6.6. Test Socket

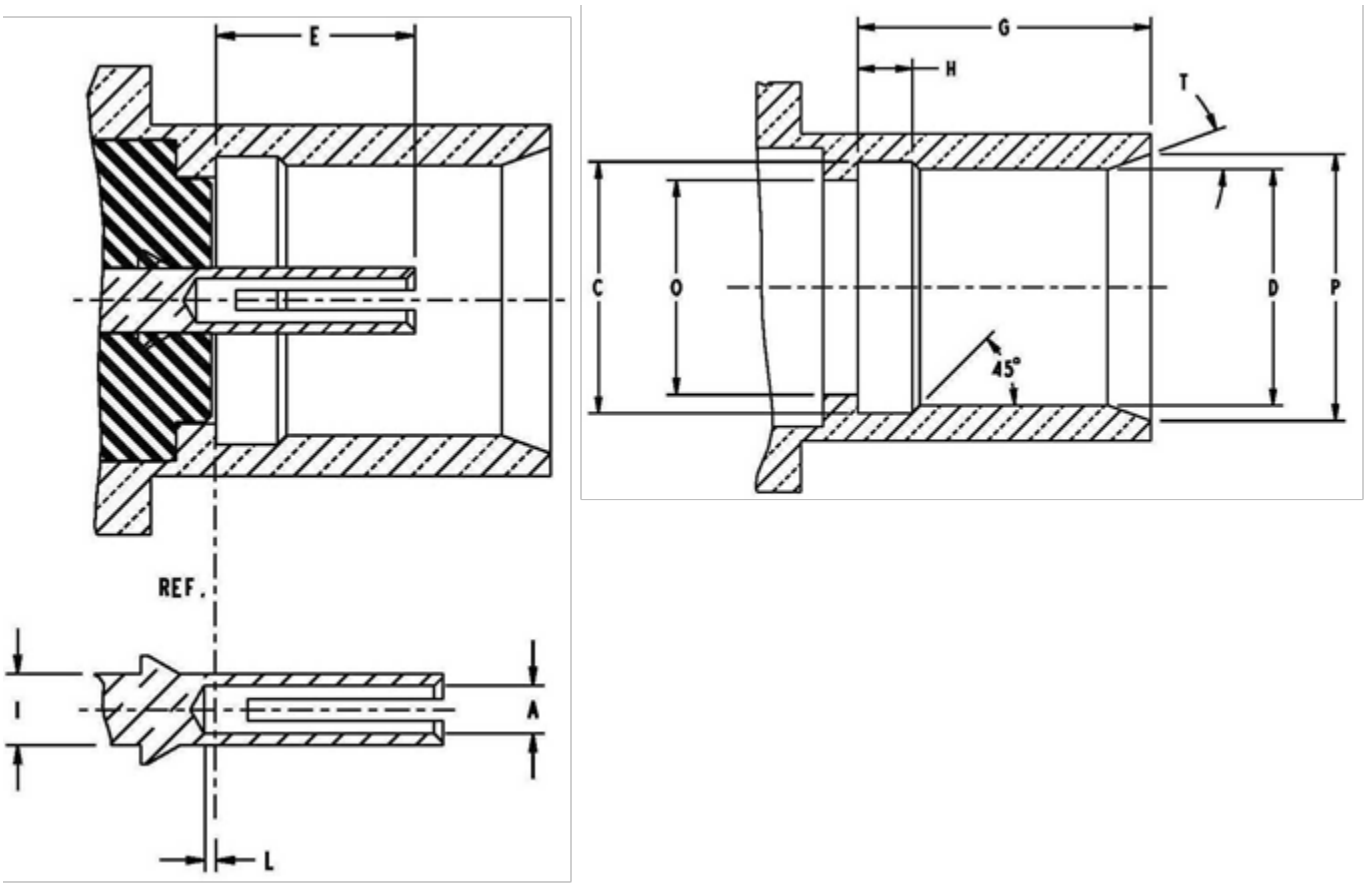

Figure 6 – Test Socket

Table 7 - Test Socket

Ref.	Min	Max	Note
A	0.55 (22)	0.58 (23)	Diameter, before slotting and closing
C	3.66 (144)	3.69 (145)	Diameter
D	3.45 (136)	3.48 (137)	Diameter
E	2.6 (102)	2.79 (110)	
G	4 (157)	4.12 (162)	
H	0.8 (31)	0.85 (33)	
I	0.93 (37)	0.95 (37)	Diameter
L	0		
O	2.75 (108)	2.8 (110)	Diameter
P	3.8 (150)		
T	18	22	degrees

Mate with test socket five times. Engagement/Disengagement forces of Table 8 apply to first and last cycles

7. Mechanical Requirements

Table 8 - Mechanical Requirements of MCX Plug – Socket Interface

Mechanical Specification	Min	Typ	Max	Unit	Comments
Bending Movement		0.5 (4.43)		Nm (lbf-in)	Relative to reference plane As per CECC-222200
Contact Captivation	10 (2.25)			N (lbf)	For captive contact designs only. Center contact to connector body force.
Durability	500			cycles	

8. Environmental Requirements

Table 9 - Environmental Specifications

Environmental Specification	Min	Typ	Max	Unit	Comments
Temperature Rating	-40 -40		85 185	°C °F	Operational Ambient temp
Mechanical Shock					per MIL-STD-202, method 213, Condition B
Vibration					per MIL-STD-202, method 204, Condition B
Moisture Resistance					per MIL-STD-202, method 106
Thermal Shock					per MIL-STD-202, method 107, Condition F
Chemical Resistance(indoor)					Bellcore GR-1503-CORE 4.7
Mix Flow Gas			10	mΩ	max change over baseline as per EIA-364-65, Condition IIA