

SCTE | **STANDARDS**

Interface Practices Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 151 2021

**Mechanical, Electrical, and Environmental
Requirements for RF Traps and Filters**

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1. Introduction

1.1. Executive Summary

This document outlines the mechanical, electrical and environmental requirements for 75 ohm traps and filters.

1.2. Scope

The purpose of this specification is to provide the mechanical, electrical and environmental requirements for broadband radio frequency (RF) trap and filter devices whose primary purpose is to provide a fixed attenuation of RF signal(s) at user defined frequencies while preserving adjacent topology.

DOCSIS 4.0 specifications include operation at frequencies up to 1794 MHz. Many service providers would like to futureproof their networks for eventual operation up to 3000 MHz. This document provides specifications or procedures for frequencies up to 1794 MHz.

1.3. Benefits

This specification provides manufacturers and users of this product a basic set of standard dimensional and performance requirements from which to gauge design performance.

1.4. Intended Audience

This document is intended for installers, equipment manufacturers, and end users of this product.

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

Specifications or procedures for frequencies up to 3000 MHz should be considered in a future revision of this document.

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

- [SCTE 01] ANSI/SCTE 01 2021, Specification for “F” Port, Female, Outdoor
- [SCTE 45] ANSI/SCTE 45 2017, Test Method for Group Delay
- [SCTE 48-1] ANSI/SCTE 48-1 2015, Test Method for Measuring Shielding Effectiveness of Passive and Active Devices Using a GTEM Cell
- [SCTE 60] ANSI/SCTE 60 2015, Test Method for Interface Moisture Migration Double Ended
- [SCTE 81] ANSI/SCTE 81 2018, Surge Withstand Test Procedure
- [SCTE 98] ANSI/SCTE 98 2020, Test Method for Withstand Tightening Torque – “F” Male
- [SCTE 143] ANSI/SCTE 143 2018, Test Method for Salt Spray
- [SCTE 144] ANSI/SCTE 144 2017, Test Procedure for Measuring Transmission and Reflection

[SCTE 149] ANSI/SCTE 149 2019, Test Method for Withstand Tightening Torque – “F” Female

2.2. Standards from Other Organizations

[IEEE] IEEE C 62.41-1991, IEEE Recommended Practice for Surge Voltage in Low-Voltage AC Power Circuits

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

No informative references are applicable.

3.3. Published Materials

No informative references are applicable.

4. Compliance Notation

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<i>shall not</i>	This phrase means that the item is an absolute prohibition of this document.
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<i>deprecated</i>	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. Abbreviations and Definitions

5.1. Abbreviations

°C	degree celsius
lb-in	pound-inch torque
SCTE	Society of Cable Telecommunications Engineers
dB	decibel
MHz	megahertz
°F	degree fahrenheit

5.2. Definitions

lowpass	passes signal from a certain frequency and lower, while rejecting unwanted carriers above the certain frequency
highpass	Passes signal from a certain frequency and higher, while rejecting unwanted carriers below a certain frequency
notch	removes a very small segment of band while passing frequencies above and below the band
bandstop	removes a larger segment of band than a notch filter and passes frequencies above and below the band

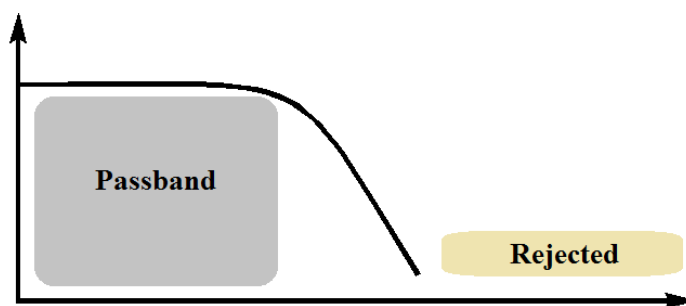


Figure 1 - Lowpass

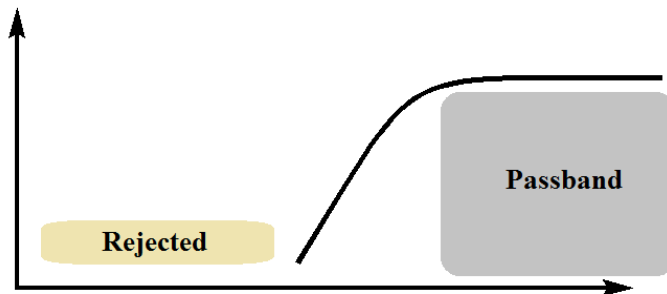


Figure 2 - Highpass

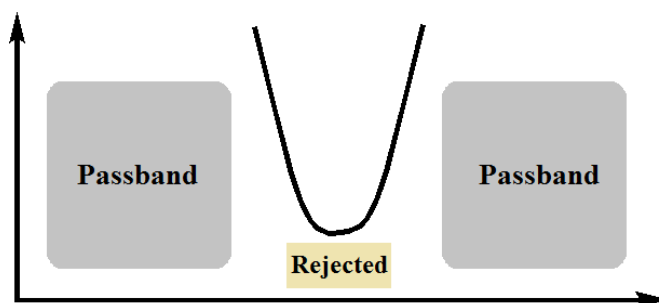


Figure 3 - Notch

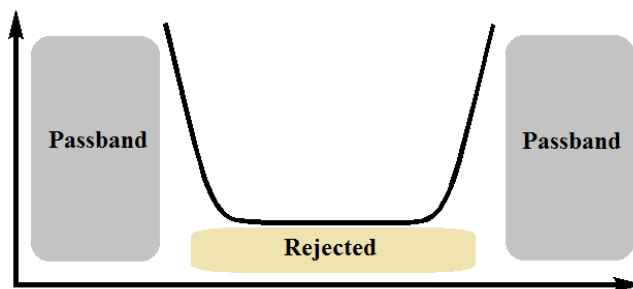


Figure 4 - Bandstop

6. Mechanical

6.1. "F" Ports

1. All RF ports *shall* be type F
2. Female ports *shall* conform to the requirements of [SCTE 01]
3. Male ports *shall* conform to Figure 5

6.2. Physical Parameters

The physical limits of the housing are defined in Figure 5.

There *shall* be no relative movement of the outer housing to the inner housing.

6.3. Labeling

Each device *shall* be permanently marked with product part number, date code and manufacturer.

6.4. Torque Requirements

The Female “F” port *shall* withstand 40 pound-inch (lb-in) of torque, without damage or permanent deformation to the threads, reference plane or body when tested in accordance with [SCTE 149] .

The Male “F” plug *shall* withstand 60 lb-in of torque, without damage or permanent deformation to the threads, reference plane or body when tested in accordance with [SCTE 98] .

7. Electrical

7.1. Frequency Range

All devices *shall* meet all performance requirements over a frequency range of at least 5 MHz to 1794 MHz.

7.2. Shielding Effectiveness

The shielding effectiveness *shall* be a minimum of 110 dB when tested in accordance with [SCTE 48-1] .

7.3. Surge Withstand

The surge withstand when measured in accordance with [SCTE 81] *shall* be a minimum of [IEEE] Category A3 Ring Wave, 6KV 200 amps for devices used indoors and [IEEE] Category B3 Combination Wave, 6KV 3000 amps for devices prior to the demarcation point.

7.4. Rejection Band Attenuation and bandwidth

The rejection band attenuation and bandwidth is dependent on band edge slope design, frequency and filter type. Which is determined by customer and manufacturer and tested in accordance with [SCTE 144] .

7.5. Group Delay

The group delay *shall* be less than 20 nanoseconds in the passband, when tested in accordance with [SCTE 45].

7.6. Return Loss

The return loss of passbands *shall* be a minimum of 16 dB, when tested in accordance with [SCTE 144] .

8. Salt Spray

Devices intended for outdoor use *shall* meet all electrical and mechanical performance requirements after 1,000 hours of conditioning when tested in accordance with [SCTE 143].

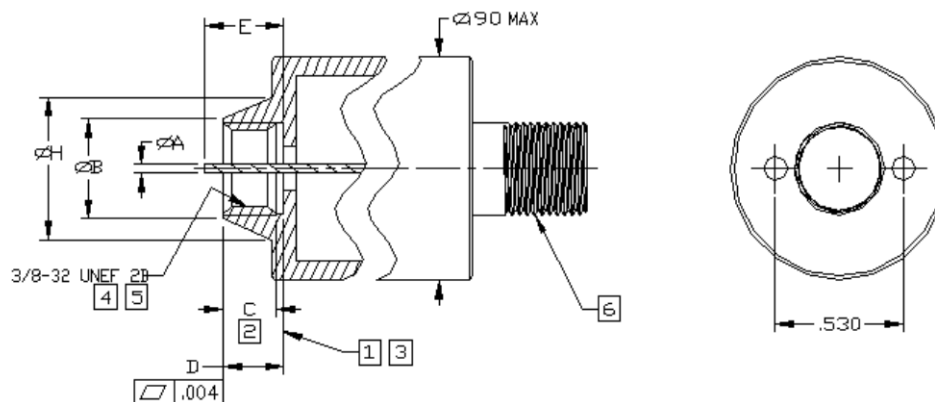
8.1. Interface Moisture Migration

Devices *shall* be tested in accordance with [SCTE 60], with no degradation in electrical or mechanical performance.

8.2. Temperature

The devices *shall* meet all performance requirements after exposure to temperatures ranging from -40 °F (-40 °C) to +140 °F (+60 °C) inclusive.

9. Dimensions



NOTES:

- 1 DIELECTRIC MUST NOT PROTRUDE BEYOND REF. PLANE
- 2 MINIMUM 4 FULL THREADS
- 3 REF. PLANE AFTER INSTALLATION ON STANDARD PORT TIGHTENED TO 40 INCH POUNDS AND REMOVED
- 4 MAXIMUM 1 THREAD LEAD IN
- 5 ANSI SPECIFICATION B1.1
- 6 *F* PORT TO MEET THE REQUIREMENTS OF ANSI/SCTE 01

Figure 5 - Device Port and Installation Tool Dimensions

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DESCRIPTION	REF	MM		INCHES		NOTES
		MIN	MAX	MIN	MAX	
CENTER CONDUCTOR DIAMETER	A	0.76	1.07	0.030	0.042	
COLLAR NARROW DIAMETER	B	10.29	11.30	0.405	0.445	
COLLAR THREADED LENGTH	C	6.10	-	0.240	-	2
PORT FACE DEPTH TO COLLAR LEADING EDGE	D	5.84	6.86	0.230	0.270	
PORT CENTER CONDUCTOR TO PORT FACE LENGTH	E	7.40	9.10	0.291	0.358	
COLLAR WIDE DIAMETER	H	10.92	15.88	0.430	0.625	
DIMENSION FOR INSTALLATION TOOL (optional)	J	-	13.46	-	0.530	
MINIMUM HOLE SIZE FOR INSTALLATION TOOL (optional)	K	2.39	-	0.094	-	