AMERICAN NATIONAL STANDARD

ANSI/SCTE 151 2021

Mechanical, Electrical, and Environmental Requirements for RF Traps and Filters
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Document Tags:

☐ Test or Measurement  ☐ Checklist  ☐ Facility
☐ Architecture or Framework  ☐ Metric  ☑ Access Network
☐ Procedure, Process or Method  ☐ Cloud  ☑ Customer Premises

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<td>SCTE 151 2008</td>
<td>05/09/2008</td>
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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 60] ANSI/SCTE 60 2015, Test Method for Interface Moisture Migration Double Ended
[SCTE 81] ANSI/SCTE 81 2018, Surge Withstand Test Procedure
[SCTE 144] ANSI/SCTE 144 2017, Test Procedure for Measuring Transmission and Reflection
2.2. Standards from Other Organizations


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

<table>
<thead>
<tr>
<th>Term</th>
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<tr>
<td>shall</td>
<td>This word or the adjective “required” means that the item is an absolute requirement of this document.</td>
</tr>
<tr>
<td>shall not</td>
<td>This phrase means that the item is an absolute prohibition of this document.</td>
</tr>
<tr>
<td>forbidden</td>
<td>This word means the value specified shall never be used.</td>
</tr>
<tr>
<td>should</td>
<td>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.</td>
</tr>
<tr>
<td>should not</td>
<td>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.</td>
</tr>
<tr>
<td>may</td>
<td>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.</td>
</tr>
<tr>
<td>deprecated</td>
<td>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.</td>
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5. Abbreviations and Definitions

5.1. Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>°C</td>
<td>degree celsius</td>
</tr>
<tr>
<td>lb-in</td>
<td>pound-inch torque</td>
</tr>
<tr>
<td>SCTE</td>
<td>Society of Cable Telecommunications Engineers</td>
</tr>
<tr>
<td>dB</td>
<td>decibel</td>
</tr>
<tr>
<td>MHz</td>
<td>megahertz</td>
</tr>
<tr>
<td>°F</td>
<td>degree fahrenheit</td>
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5.2. Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>lowpass</td>
<td>passes signal from a certain frequency and lower, while rejecting unwanted carriers above the certain frequency</td>
</tr>
<tr>
<td>highpass</td>
<td>Passes signal from a certain frequency and higher, while rejecting unwanted carriers below a certain frequency</td>
</tr>
<tr>
<td>notch</td>
<td>removes a very small segment of band while passing frequencies above and below the band</td>
</tr>
<tr>
<td>bandstop</td>
<td>removes a larger segment of band than a notch filter and passes frequencies above and below the band</td>
</tr>
</tbody>
</table>

Figure 1 - Lowpass
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

Figure 5 - Device Port and Installation Tool Dimensions
<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>REF</th>
<th>MM</th>
<th>INCHES</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>CENTER CONDUCTOR DIAMETER</td>
<td>A</td>
<td>0.76</td>
<td>0.030</td>
<td>0.042</td>
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<tr>
<td>COLLAR NARROW DIAMETER</td>
<td>B</td>
<td>10.29</td>
<td>0.405</td>
<td>0.445</td>
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<tr>
<td>COLLAR THREADED LENGTH</td>
<td>C</td>
<td>6.10</td>
<td>0.240</td>
<td>-</td>
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<tr>
<td>PORT FACE DEPTH TO COLLAR LEADING EDGE</td>
<td>D</td>
<td>5.84</td>
<td>0.230</td>
<td>0.270</td>
</tr>
<tr>
<td>PORT CENTER CONDUCTOR TO PORT FACE LENGTH</td>
<td>E</td>
<td>7.40</td>
<td>0.291</td>
<td>0.358</td>
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<tr>
<td>COLLAR WIDE DIAMETER</td>
<td>H</td>
<td>10.92</td>
<td>0.430</td>
<td>0.625</td>
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<tr>
<td>DIMENSION FOR INSTALLATION TOOL (optional)</td>
<td>J</td>
<td>-</td>
<td>13.46</td>
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<tr>
<td>MINIMUM HOLE SIZE FOR INSTALLATION TOOL (optional)</td>
<td>K</td>
<td>2.39</td>
<td>0.094</td>
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