

Annex 191B (normative) — High-Pass Filter for SNDR Testing with Low-Frequency High-Pass Networks

191B.1 Introduction

This annex specifies the high-pass filter (HPF) to be applied to the captured MDI waveform during the transmitter distortion test defined in 191.6.2.5 when the device under test (DUT) or test configuration includes any network that introduces a low-frequency high-pass characteristic to the signal path. Examples include, but are not limited to, Power over Coax (PoC) and Power over Data Line (PoDL) bias-tee networks. Low-frequency high-pass networks introduce slow baseline wander (BLW) in the captured MDI waveform. Without compensation, this BLW is misclassified as distortion or noise in the SNDR calculation defined in 191.6.2.5

$$\text{SNDR} = 10 * \log_{10} (P_{\text{max}}^2 / (\sigma_e^2 + \sigma_n^2))$$

This causes the measured SNDR to underestimate the true transmitter performance. A 1st-order HPF applied to the captured MDI waveform removes the BLW contribution before the linear-fit estimation, restoring an accurate SNDR measurement. The corner frequency is chosen to be sufficiently above the typical low-frequency high-pass corner of PoC and PoDL networks (typically 1 MHz to 5 MHz) while preserving the signal band used in the SNDR computation per 120D.3.1.6.

191B.2 Applicability

This annex is required when the DUT or test configuration includes any network that introduces a low-frequency high-pass transfer to the signal path, such as a PoC or PoDL bias-tee. It may be omitted when no such network is present or it is bypassed or disabled. The presence of a low-frequency high-pass may be identified by visible baseline wander in the captured MDI waveform or by knowledge of the DUT or fixture configuration.

191B.3 HPF specification

When a low-frequency high-pass network is present, the following HPF shall be applied to the captured MDI waveform before the linear-fit pulse-response estimation defined in 120D.3.1.6.

Filter type: High-pass Corner frequency: $f_{\text{HPF}} = 15 \text{ MHz}$ Filter order: 1st order

191B.4 Constraints

The following constraints shall apply when using the HPF per this annex:

- a) Group delay introduced by the HPF shall be accounted for in symbol timing alignment prior to linear-fit estimation per 120D.3.1.6.
- b) $N_p = 300$ shall be used for the linear-fit estimation per 120D.3.1.6

191B.5 Reporting

The test report should record whether HPF compensation was applied and the reason (e.g., PoC present, PoDL present, or other low-frequency high-pass network identified).