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**Measurement Procedure
for Noise Figure**

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1.0 SCOPE AND DEFINITIONS

1.1 Scope

This procedure defines a method of measurement for Noise Figure of active Cable Telecommunications equipment. It is intended for measurement of 75-ohm devices having type "F" or 5/8-24 KS connectors, and for the measurement of true broadband noise as opposed to narrowband disturbances.

Test equipment characteristics limit this procedure to frequencies no lower than 10 MHz. See Appendix 3 for a further discussion of evaluation below 10 MHz.

1.2 Definitions

- 1.2.1 NF (Noise Figure): The amount, in dB, by which the carrier-to-thermal noise (CTN) of a signal is degraded when passing through the device. For purposes of this measurement, some other non-external sources of noise (such as shot noise) of uniform spectral density will be treated as if they were part of the thermal noise. Stated as an equation (in dB):

$$NF = (CTN)_{in} - (CTN)_{out} \quad (1)$$

The term Noise Factor (F) is often used to denote the same quantity expressed in terms of linear power ratio:

$$F = \frac{(C/N)_{in}}{(C/N)_{out}} \quad (2)$$

The power ratio form will be used in some of the explanatory materials presented later.

- 1.2.2 ENR (Excess Noise Ratio): A characteristic of noise generators, relating the effective noise temperature of the source to a reference temperature of 290° K (≈17° C). Specifically, if T_N is the actual noise temperature of the source (in ° K), and T_0 is the 290° K reference temperature, then (expressed in dB):

$$ENR = 10 \log \left(\frac{T_N - T_0}{T_0} \right) \quad (3)$$

EQUIPMENT

- 1.3 Only equipment specific to this procedure is described in detail here. The Test Procedures Introduction, ANSI/SCTE 96 2003, should be consulted for further information on all other equipment.

1.4 Required Test Equipment

ANFM (Automatic Noise Figure Meter), Agilent 8970B or equivalent

Broadband Noise Source, Agilent 346B or equivalent

MLP (Minimum Loss Pads), 75 - 50 Ω , Agilent 11852B or equivalent

NOTE: Use of a lower ENR Noise Source, such as Agilent 346A, will usually require that the Minimum Loss Pad be omitted, or that a matching transformer be used instead. See Appendix 1 for a discussion of the pros and cons of the various approaches.

Power Inserter (if required):

5 - 1000 MHz frequency range

Current rating sufficient for the DUT (Device Under Test)

Adapters, connectors, and cables as required

CAUTION

Be especially careful when using “N” connectors. The 50 Ω and 75 Ω types are not intermateable. Inserting the larger-diameter pin of a 50 Ω male connector into a 75 Ω female will result in severe damage to the female contact. Conversely, the smaller pin of a 75 Ω male connector will have intermittent or no contact if used with a 50 Ω female.

NORMATIVE REFERENCES

ANSI/SCTE 17 2001

ANSI/SCTE 82 2003

ANSI/SCTE 96 2003