

FEDERAL COMMUNICATIONS COMMISSION

**FCC PROCEDURE FOR MEASURING CABLE
TELEVISION SWITCH ISOLATION**

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1. INTRODUCTION

1.1. This procedure (MP-9) describes the method the Federal Communications Commission will use for the measurement of the isolation between ports of a cable television switch. These switches are used to allow consumers to connect both a cable system input and a home antenna system to a television receiver. In some instances the switch will be an integral part of the television receiver itself. In accordance with Section 15.606 of the F.C.C. Rules, such switches are required to provide the following minimum value of isolation between the cable and antenna input ports:

54 - 216 MHz.....80 dB
216 - 550 MHz.....60 dB

1.2. While this document sets forth one procedure for measuring the isolation of a cable TV switch, the Commission recognizes that other measurement procedures may also accomplish the same results. For the purpose of demonstrating compliance with Section 15.606, another procedure may be used, provided it gives accurate and repeatable measurements and is acceptable to the Commission. The burden of proof of acceptability rests upon the individual using a different method.

2. INSTRUMENTATION

2.1. EUT The equipment under test is the cable television switch to be measured for isolation between the antenna and Cable TV input ports. Typically, these switches have three ports labeled A/B/C, A/TV/B, VCR/TV/ANT or similar nomenclature and are designed to be connected to coax cable via F-type connectors. If the switch is internal to a Television receiver, then the isolation is measured between the two antenna input ports.

2.2. Receiver Any type of tuned RF receiver may be used for this procedure, provided it covers the prescribed frequency range, has sufficient sensitivity, and an input SWR of 1.5 or better.

2.3. Signal Generator The accuracy of the measurement procedure is dependent on the Signal Generator (S/G) used. Accordingly, the S/G shall be capable of covering the specified frequency range, have a minimum RF CW output of 0 dBm and an amplitude accuracy of ± 2 dB down to at least -90 dBm. Routine calibration of this instrument shall be done in accordance with the manufacturer's recommendations.

2.4. Coax Cable Double shielded coax cable, such as RG-55, shall be used to provide for connection between the switch, S/G and receiver. Cables shall be kept as short as possible.

2.5. Termination The TV output port of the EUT shall be terminated with a standard 75 ohm (resistive) laboratory coaxial termination at the output port. If the switch is internal to a Television then the Television shall be tuned to a channel nearest the measurement frequency.

2.6. Matching Devices Care must be taken to match the impedances of the receiver, S/G and EUT to the cable, which typically means that a 50 to 75 ohm matching transformer should be used. The matching transformer shall have a 50/75 ohm input/output impedance and an insertion loss of less than 0.75 dB and a VSWR of less than 1.2 over the specified frequency range. Care must also be taken in the selection of any adapters that may be used, since some BNC/F-type adapters have been shown to exhibit very poor impedance matching and insertion losses at 500 MHz.

2.7. Test Environment These measurements may be made in a shielded room or other facility where the level of ambient radio frequency signals is low enough to have minimal effects on these measurements.

3. FREQUENCY RANGE The isolation of the EUT shall be measured over the frequency range of 54 to 550 MHz. The frequencies to be measured shall include as a minimum, the following: 54, 100, 150, 200, 250, 300, 350, 400, 450, 500 and 550 MHz.

4. MEASUREMENT METHODOLOGY

4.1. The EUT to be tested and instrumentation shall be placed on a non-conducting table to allow for convenience of testing. The TV output port of the EUT shall be terminated into a 75 ohm termination plug as specified in sub-clause 2.5. The output of the S/G shall be connected and matched to one port of the EUT. The other port of the EUT shall be connected and matched to the receiver. (Note: A matching transformer, if used, shall be connected as close to the EUT as possible. See sub-clause 2.6.)

4.2. The receiver shall be tuned to the frequency to be measured. The bandwidth, attenuator and detector function switches shall be set to a convenient setting for sensitivity and accuracy. Once set, these switches shall not be changed during the measurement at each frequency. (Note: Since the input impedance of some receivers is not well defined, it is desirable to use the 10 dB internal attenuator which is available on most quality receivers, or a 10 dB external attenuator.)

4.3. The output of the S/G shall be adjusted to a CW signal at a level of 0dBm on the frequency to be measured.

4.4. Select each position of the switch and use the position that gives the highest indication on the receiver. The fine tuning control on the receiver should be adjusted to verify that the highest level is actually being observed. (Note: The indicated value should be at a minimum of 10 dB above the noise floor of the receiver. This can be checked by observing at least a 10 dB drop in the indicated value when the S/G is turned off or disconnected from the receiver. However, the noise floor need not be more than 100 dB below the reference level used in sub-clause 4.3.)

4.5. The indicating device (typically a meter) of the receiver shall be adjusted to a convenient setting and noted.

4.6. Without further adjustment of the receiver, the EUT shall be removed and replaced with an appropriate type "barrel" connector. The matching transformers, connectors and cables shall remain connected to the S/G and receiver. An appropriate amount of attenuation should be added to the S/G before making this connection. The attenuation setting of the S/G shall be adjusted to obtain the same indicated value as noted above in sub-clause 4.5.

4.7. The amount of attenuation added to the S/G to reproduce the value noted in sub-clause 4.5 is the isolation of the EUT at that frequency. This value shall be recorded.

4.8. The procedure in sub-clauses 4.1 through 4.7 shall be repeated at each frequency listed in clause 3, above.

5. REPORTING FORMAT A report containing the following information should be prepared for each EUT:

5.1. Identification The EUT tested shall be identified by manufacturers name and address, make, model and serial number (if any).

5.2. Location The location of the measurements shall include the name and address of the facility at which the tests were conducted.

5.3. Test Engineer The engineer performing the tests shall sign and date the report.

5.4. Instrumentation All instrumentation used, including cables and connectors, shall be listed and identified.

5.5. Procedure If this procedure is used to measure cable TV switch isolation, it shall be so stated and all deviations from this procedure shall be described and justified. If an alternative procedure is used, that procedure shall be described in detail and justification for its use shall be provided.

5.6. Data All values recorded in sub-clause 4.7 shall be recorded for each port of the EUT required to be measured.