



**Federal Communications Commission
Office of Engineering and Technology
Laboratory Division**

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**BASIC GUIDANCE FOR INTERMODULATION PRODUCT SPURIOUS EMISSION
TESTING OF FREQUENCY TRANSLATING REPEATER SYSTEM EQUIPMENT AND
SIMILAR DEVICES**

The basic procedures for filing applications for certification of licensed services radio equipment are contained in § 2.1033(c). Further to § 2.911(c), the basic operational technical requirements are contained in the applicable radio service rules, *e.g.*, Parts 22, 24, 27, 74, 90, 95, 101.

For devices that are classified as signal boosters under §§ 20.21 or 90.219, please refer to KDB Publication 935210 for the applicable procedures.

In addition, for any devices like amplifiers, repeaters, and boosters, a comparison of the input modulated spectrum and the output modulated spectrum are required. This corresponds to the occupied bandwidth test required under § 2.1049. For units handling multiple signals, an intermodulation (IM) test is required as follows: Consider that IM products are spurious emissions and are covered by the general emissions limitations (mask) in each radio service. This normally refers to the IM products produced by the transmitter / amplifier carrying two or more signals at the same time. § 2.1051 requires that measurements be made for spurious emissions at the antenna terminals while the transmitter is modulated.

NOTE—we consider an amplifier to be a transmitter – since it is transmitting and is licensed; Part 2 and many of the licensed radio services do not have specific requirements for equipment authorization of amplifier devices.

The FCC normally requires that the IM test(s) be done with three signals of equal magnitude – at their highest rated output level – for each type of modulation. The signals are spaced so that two are near to each other at one edge of the pass band and the other signal is alone at the other edge of the pass band. This placement will potentially produce both in-band and out-of-band IM products. A two-signal test is acceptable as a default, meaning that the three signal test could not be performed because of equipment shortages or other limitations.

The two-signal test is the second best choice – not an option of A OR B. When a two-signal test is used - both the upper and lower side of the band edge must be tested – meaning two tests are made in place of one three signal test. The three signal test is still considered to be the preferred/primary procedure. In both cases, all different emission modes should be tested.