3.2 Frequency Spectrum to be Investigated

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

The guidance in this section does not supersede or replace the manufacturer's responsibility to test and authorize the final composite product as an unintentional radiator (digital device and/or receiver) if the product is also within the scope of FCC Part 15 subpart B. In such a case, a test to FCC Part 15.109 would be performed to the upper frequency defined in FCC 15.33(b)(1), (b)(2) or (b)(3) as applicable, using ANSI C63.4.

Two examples are as follows.

a) A host product with a clock frequency of 30 MHz and dual band Wi-Fi (upper frequency range 5.8 GHz). In this case the frequency of the modular transmitter, 5.825 GHz, is the highest frequency used. Section 15.33(a)(1) would require testing to the lower of 10 times 5.825 GHz or 40 GHz, so in this case that would be 40 GHz. 15.33(b)(1) would require testing to the lower of 5 times 5.825 GHz, or 40 GHz, so in this case that would be 29.125 GHz[1]. For the investigation of the composite device emissions the upper frequency range is therefore 40 GHz, the higher of 40 GHz and 29.125 GHz.

b) A host product with a 13.56 MHz transmitter and a clock at 28 MHz. In this case, the digital clock rate of the host product is the highest frequency used and so the investigation range is based on a frequency of 28 MHz. Per the table in Section 15.33(b)(1) if the highest frequency is in the range 1.705-108 MHz the upper frequency to test is 1 GHz. Per 15.33(a)(1) the upper frequency would be 280 MHz. For the investigation of the composite device emissions the upper frequency range is therefore 1 GHz, the higher of 1 GHz and 280 MHz.

In both of the above cases the lower frequency to be investigated would be the lower of either 30 MHz (based on the digital device test requirements in 15.33(b)(1)) or the lowest frequency in the transmitter circuitry (based on 15.33(a)(1) through (a)(3)). For example (b) the lower frequency will need to include 13.56 MHz. For example (a) that lower frequency may be below 30 MHz if the module's transmitter circuitry includes frequencies below 30 MHz.

For a system evaluation to verify compliance of host plus module(s) the above guidance lists the frequency range over which the product must comply. As a system integrator it may not be necessary to test across the complete frequency range and some engineering judgment can be applied to limit the frequency range based on, for example:

- The highest frequency of emissions generated by the modular transmitters based on a review of the technical report submitted to support the modular certification (for many devices no emissions are observed above the third harmonic (e.g., 16 GHz in first example));
- For devices with multiple transmitters the expected frequencies of possible intermodulation products, primarily the third order product (calculated by twice the frequency of one transmitter minus the frequency of the other) should be included.

However, to avoid additional tests specifically aimed at verifying the compliance of the composite device (transmit module + host), the testing performed to support certification or SDoC for the unintentional radiator may also cover the testing to verify compliance of the composite device by having the transmitter(s) active during those tests[2]. Some frequency ranges may need to be tested with the transmitter inactive and any filters used to prevent

[1] When testing the Host System for compliance with Part 15 Subpart B the upper frequency to be investigated for the digital device would be 29.125 GHz.

[2] Please note that the test standards and methods differ between intentional and unintentional radiator mode testing. Part 15 subpart B uses ANSI C63.4, whereas the transmitters will use ANSI C63.10 or ANSI C63.26. If the final product is tested to Part 15 subpart B, using ANSI C63.4, and found to comply with the 15.109 limits when the transmitter and all digital device functions are active, there may be no need to repeat that testing in the transmit mode to ANSI C63.10 or ANSI C63.26, for that frequency range.

measurement system overload removed. This will allow the measurement of any unintentional radiator emissions that fall within the frequency bands attenuated by those filters, or that may be masked by emissions from the transmitter, that exceed the unintentional radiator limits.