Technical Comments and Response

6) It appears on page 15 of the test report that there is justification for not using 50 MHz RBW. In addition there is mention of CW and also the operational description mentions sweep between 78.5 and 79.5 GHz. It appears by these bits of information that the device may be FMCW. If so, then the average portion is usually calculated, not measured according to KDB 890966. Please review.

Response: Calculation of average is dwell time, $T_D=Ts/\Delta F$, divided by cycle time for an average factor, i.e. $T_D=0.00516/1001.6=5.1E\text{-}6$, average factor=5.1E-6/0.0085=6.1E-4

Calculating Test Configuration 1 from peak value 575mW x 6.1E-4=.35mW or -4.6 dBm. The value measured is -4.1 dBm.

Calculating Test Configuration 2 from peak value 214mW x 6.1E-4=.131mW or -8.8 dBm.

The value measured is -6.2 dBm.

The values measured are slightly higher and presented as worst case.

7) Given the significant mixer ghost images and their amplitude on plots such as 4-7, 4-8, 4-9, 4-14, 4-15, and 4-16, how was it asserted that real measurements were not masked and could not be seen. Per the FCC, the signal strength with respect to the conversion loss must be sufficient to provide enough signal to noise to permit the desired measurements and the effects of images and other unwanted signals must not interfere with the ability to identify the desired signal. The mm-wave procedures of KDB 200443 How is compliance of Millimeter Wave (mmwave) Devices determined?
https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?switch=P&id=20677
See document TR 14-1001 MMW.
This discusses how to use image suppression functions or a preselected mixers to solve these problems. Please review.

Response: Preselected millimeter mixers are prohibitively expensive. The analyzer has a built-in automated signal identification function as well as an auto ID however, the nature of the swept FMCW frequencies warrants that the automated ID function not be used, but manually calculated instead, and is dependent upon the LO frequency and selected harmonic of the first LO as:

$f_{in}=n*f_{LO}+f_{IF}$
where f_{in} is the frequency of the signal,
n is the order of the harmonic used for conversion,
f_{LO} is the frequency of the first LO,
and f_{IF} is the intermediate frequency 404.4 MHz,

and was used to verify false images. Sweep time can be adjusted for various pulse duration to determine if false images might be overlaying real signals, and the above calculation applied to determine if they are real. Signal strength is increased by moving the receive antenna to the transmitted signal, thus overcoming analyzer dynamic range decrease due to mixer loss. As the image began its sweep, the individual CW pulse image was noted, as well as any CW which might be mixed in the bandwidth, using max hold, thus overcoming the problem of signal bandwidth>2xIF. This was then compared to the IF, order of harmonic, and first LO frequency, and a manual determination made whether the requirements for validation were met.

8) It appears that a lab bench power supply (vs. simple AC adapter) was used for AC powerline emissions. It is uncertain if this lab bench supply contains filtering that would affect the general results using a representative supply. Please confirm that an unfiltered lab supply was used – provide further justification, or if necessary provide additional AC power line emissions test with a representative power supply for this device. Note the users manual was searched for power supply information, which referenced the Technical Data. The Technical Data section referenced see Power Supply Load Diagram. In short – representative supply information could not be found or determined.

Response: The lab power supply was EMI unfiltered. The EUT is typically used in industrial applications where an AC-to-DC unfiltered power supply supplies DC power. As such, this represents typical use.