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Feedback on KDB 447498 D01 General RF Exposure Guidance for Equipment Authorization

Dear FCC OET

Schmid & Partner Engineering AG, a manufacturer of measurement equipment and simulation tools for exposure assessment, has reviewed DRAFT KDB Publication 447498 D01 "General RF Exposure Guidance for Equipment Authorization" DR05-44791 that was posted for review and comment on August 17, 2022 and updated on September 20, 2022. The following is a list of our comments on the draft KDB.

Technical Comments

Section 2.3.2 – 1-mW Test Exemption for Multiple Sources

We propose adding a test exemption that follows from a) and b). The test exemption reads as follows:
"…a device can obtain equipment authorization without requiring RF exposure compliance data if it is shown to operate according one of the following criteria:

a) When maximum available power of each individual transmitting antenna within the same time averaging period is ≤ 1 mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm.
b) When the aggregate maximum available power of all transmitting antennas is ≤ 1 mW in the same time-averaging period."

It makes logical sense to combine a) and b). We propose item c) as follows:

c) "When the aggregate maximum available power within same time-averaging period is ≤ 1 mW for each group of antennas where the separation distance is less than 2 cm between the nearest parts of the antenna structures for each pair of antennas within the group."

Section 3.3.2 – 1-g SAR Approximations Based on Area Scans for Test Reductions

We propose to further provide clarification how the ±10% accuracy of the area scan approximation method can be warrantied. We propose three methods:

a) The user provides sufficient evidence that the approximated 1-g SAR using the distribution from the area is equivalant to the assessment by the zoom scan within ±10% in general or for the specific case;
b) The measurement system manufacturer provides sufficient evidence that the 1-g SAR approximation using the distribution from the area scan is equivalent to the assessment by the zoom scan within ±10% for any induced field distributions.
c) The measurement system displays after the area scan based on the measured distribution if the ±10% equivalence to the assessment by the zoom scan can be warrantied, the proof of which is provided by the system manufacturer.

Section 3.4.1 – Head Exposure Conditions

This text says that "Other head exposure conditions, for example, in-front-of the face, shall be tested using a flat phantom according to the applicable KDB publication (e.g., 643646)."
Flat phantoms are only conservative if the device is not conformal to the face and in other cases, it is too conservative. On the other hand, the SAM face-down phantom as specified in the specific standard section of IEC/IEEE 62209-1528 results in a realistic conservative assessment for the majority of the cases. We suggest the

adoption of the application-specific phantoms defined in IEC/IEEE 62209-1528 and require justification by the test laboratory for the choice of phantom in all cases.

Section 3.4.3 – Extremity Exposure Conditions
The text states that a KDB inquiry is needed to determine the appropriate SAR measurement procedures if a flat phantom cannot be used for exposure evaluation. The flat phantom may overestimate or underestimate the real exposure and is often a poor choice for conformally mounted devices, e.g., watches. We again suggest to adopt the application-specific phantoms defined in IEC/IEEE 62209-1528 and additionally always require justification by the test laboratory for the choice of phantom.

Annex E.3.1 – General approach (unintentional radiators)
This section would benefit from an explanation on how to identify unintentional radiators. We propose adding a procedure here, e.g., by measuring the electromagnetic spectrum of the DUT using a spectrum analyzer and broadband time-domain probes or antennas inside a shielded enclosure to minimize readings from other sources.

Annex E.3.3 – URS Included in the Intentional Radiator Evaluation
This section says that if the URS operates within the frequency range of another intentional radiator, and at the same time, then the URS is considered to be included in the evaluation, and no other evaluation is necessary. We understand the need for a simplified procedure like this. We would like to additionally propose that the evaluation can be simplified as long as it can be demonstrated that the assessment is conservative.

Annex E.3.4.2 – Radiated Power Estimate for URS Exemptions
For the small dipole formula, we propose adding guidance on how to determine the RF current I_0 and the length l. It is not clear how a test lab would know the values of these parameters. Should conservative values be chosen (e.g., use the length of the DUT for l)?

For the E-field formula, we suggest adding guidance or a reference to a standard on how to reasonably measure the radiated power. At the lower frequencies covered by this KDB, measurement in the far field might mean using a very large chamber that may not be easily available.

Annex E.3.4.3 – URS Requiring RF Exposure Testing
We propose adding an example conservative procedure to measure the exposure from each URS of the DUT. The procedure is as follows:

a) Use a spectrum analyzer and broad band time-domain probe or antenna to find all URSs of the DUT. Identify the frequency of each URS.
b) Perform a frequency selective or a broadband SAR measurement if there is at least one URS whose frequency is within the frequency range of the SAR measurement system (e.g., 4 MHz to 6 GHz). Ensure that the assessment is conservative, e.g., using the most conservative probe parameters.
c) Perform a frequency selective or a broadband power density measurement if there is at least one URS frequency operating within the frequency range of the power density measurement system (e.g., 6 GHz to 100 GHz). Ensure that the assessment is conservative, e.g., using the most conservative probe parameters.
d) For each URS that is not covered in steps b) and c), perform a SAR or MPE measurement at the URS operating frequency.

Editorial Comments
Section 2.1.3 – RF Source Power
Delete “the power” from the sentence “In many cases, ~~the power~~ direct measurements are impractical, and a conservative estimate of the output power level is acceptable, so long as a clear description of the chosen approach is provided as part of the RF Exposure filing exhibits.”

Section 2.2.1 – 1-mW Test Exemption
Delete "is" from the sentence "The 1 mW exemption ~~is~~ shall not be used in devices with higher-power transmitters operating in the same time-averaging period."

Section 3.1.5 – Test Separation Distances for SAR and MPE Evaluations
Delete "and" from the sentence "To qualify for test exemptions, the test separation distances applied must be ~~and~~ justified...".

References

[1] DASY8 Module SAR System Handbook, Schmid & Partner Engineering AG, Zurich, Switzerland.