

Draft Laboratory Division Publications Report

Title: LTE Rel. 10 KDB Inquiry Sheet

Short Title: LTE Rel. 10 KDB Inquiry Sheet

Reason: Pre-Release Draft

Publication: 941225

Keyword: SAR Test Procedures, 3G Devices, 2.5G, GPS/GPRS/Edge, Dual Xfer Mode, 2.1093

First Category: RF Exposure*

Second Category: Test Procedures (RF Exposure): 04/13/2013

Question: What are the current SAR test procedures for 3G devices?

Answer:

Attached document [941225 D01 SAR test for 3G devices v02](#) - provides the SAR test procedures for 3G devices that operate under rule Parts 22H, 24E, 27L are described in the attached document.

Attached document - [941225 D02 HSPA and 1x Advanced v02r02](#) - provides guidance 3GPP R6-HSPA and R7 HSPA plus SAR testing.

Attached document - [941225 D03 SAR Test Reduction GSM GPRS EDGE v01](#) - provides SAR Test Reduction Procedures for 3G devices with GSM/GPRS/EDGE modes (also applicable to 2.5G with the same GSM/GPRS/EDGE modes).

Attached document - [941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01](#) - provides SAR test procedures for GSM/(E)GPRS Dual Transfer Mode operation.

Attached document - [941225 D05 SAR for LTE Devices v02r03](#) - provides SAR test procedures for devices incorporating Long Term Evolution (LTE) capabilities. See transition period note below.

Attached document - [941225 D06 Hotspot SAR v01r01](#) - provides SAR test procedures for devices incorporating SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities (Hot Spot SAR).

Attached document - [941225 D07 UMPC Mini Tablet v01r01](#) - provides SAR Evaluation Procedures for UMPC Mini-Tablet Devices.

Attached document – [LTE Rel. 10 KDB Inquiry Sheet](#) – provides guidance on submitting KDB inquiries regarding the evaluation of devices using LTE Rel. 10 to SAR requirements. This document is a pre-release draft, posted to receive comments, but can be used as guidance for submitting KDB inquiries. These procedures must be used for applications submitted to TCBs for approval. Questions about using alternative procedures should be submitted to <http://www.fcc.gov/labhelp> and then use the link "[Submit An Inquiry](#)" to access the form to submit your question.

Attachment List:

941225 D01 SAR test for 3G devices v02
941225 D02 HSPA and 1x Advanced v02r02
941225 D03 SAR Test Reduction GSM GPRS EDGE vo1
941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01
941225 D05 SAR for LTE Devices v02r03
941225 D06 Hotspot Mode SAR v01r01
941225 D07 UMPC Mini Tablet v01r01
[LTE Rel. 10 KDB Inquiry Sheet](#)

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

December 5, 2013

DRAFT

Submitting KDB Inquires for Rel. 10 LTE SAR Test Guidance

This document identifies some *of the on-going developments for Rel. 10 LTE that are expected to introduce additional SAR testing concerns for equipment certification. As LTE products continue to evolve and incorporate Rel. 10 features, manufacturers and test labs are encouraged to seek SAR test guidance through KDB inquiries to address testing issues and to avoid equipment certification delays.* The Rel. 10 features are expected to emerge progressively in LTE products according to wireless carrier requirements and network infrastructure migration schedules. It may be necessary at some point before the technology matures to prepare interim test guidance through a draft KDB publication by compiling the issues addressed in applicable KDB inquiries.

According to information available from manufacturers, the additional SAR measurement concerns for Rel. 10 LTE consumer devices are mostly related to carrier aggregation, enhanced SC-FDMA and multiple uplink antenna requirements. The implementation of individual products may vary due to wireless carrier and product design requirements; for example, the number of frequency bands, FDD vs. TDD, SVLTE and VoLTE etc. that may also influence the Rel. 10 SAR concerns. Currently, only downlink carrier aggregation has been considered in a few recent products and it may take some time for consumer devices to incorporate the Rel. 10 features that require additional SAR considerations. The SAR issue will need to be reviewed according to individual product implementations on case-by-case basis until standardized procedures can be established to provide general test guidance. Besides the LTE specific issues, certain other product specific concerns that are indirectly associated with LTE; for example, power reduction, dynamic antenna tuning, envelop tracking PA designs etc., which may have other SAR testing difficulties and must be taken into consideration collectively in an aggregate manner.

The following should be considered to prepare KDB inquiries when seeking SAR test guidance for Rel. 10 LTE products. It should be noted that sufficient implementation details are necessary to clearly identify the SAR testing concerns and to facilitate identifying solutions. When applicable, a summary test plan may also be considered to expedite the process.

- 1) FCC ID of the specific device(s) covered by the KDB inquiry.
 - a) Only products with identical implementation, with respect to the required test guidance, may apply the procedures provided in a specific KDB inquiry.
 - b) The list of FCC IDs in each KDB inquiry must be updated for subsequent applicable products to qualify for TCB approval, regardless of whether a PBA is required.
- 2) The LTE release and version numbers of the 3GPP documents used to implement the specific device(s) and the associated 3GPP release and version numbers required for power measurements and RF test setup conditions must be clearly specified for each FCC ID in the KDB inquiry to identify product implementation and testing requirements.
- 3) When carrier aggregation applies, implementation details relating to the following are necessary.
 - a) Intra-band and inter-band aggregation carrier requirements for both uplink and downlink
 - i) Support of contiguous and non-contiguous component carriers for intra-band aggregation
 - ii) The frequency band combinations supported for inter-band carrier aggregation

- iii) The number of component carriers, including all combinations, supported for intra-band and inter-band carrier aggregation in the uplink and downlink
- iv) The channel bandwidth configurations applicable to each carrier aggregation configuration and the applicable carrier aggregation (CA) Bandwidth Classes; A ... F etc.
 - (1) Restrictions for certain channel combination in the implementation
- v) The RB combinations supported by the carrier aggregation configurations
- b) The maximum output power and tune-up tolerance specified for each component carrier in each carrier aggregation configuration and also the maximum output power without carrier aggregation to identify the SAR test configurations required due to power reduction
 - i) When the specified maximum output power varies across channels, this must be addressed separately to seek SAR test guidance
 - ii) When carrier aggregation is for downlink only, uplink maximum output power (single carrier) should be measured for the supported combinations of downlink carrier aggregation according to
 - (1) the frequency bands and channel bandwidths allowed
 - (2) the general SAR test exclusion provisions described in KDB 941225 for 3G/4G devices to determine SAR test reduction and/or exclusion
 - iii) Clear descriptions of the test equipment and setup required for power and SAR measurements
- c) Any other restrictions or limitations associated with the carrier aggregation implementation
- 4) When enhanced SC-FDMA is supported for uplink transmissions, details of the implementation, limitations and restrictions are necessary to determine the SAR measurement requirements, including
 - a) Decoupling of control and data transmissions to enable simultaneous transmission of PUCCH and PUSCH
 - b) Non-contiguous data transmission with clustered SC-FDMA to enable non-contiguous subcarriers in PUSCH transmissions
 - c) Issues relating to dynamic switching among these schemes also need consideration to determine SAR test configurations
 - d) When a partially allocated PUSCH, a cluster of partially allocated PUSCH or a fully allocated PUSCH is transmitted simultaneously either with or without PUCCH, peak to average power ratio of the signal can increase substantially above Rel. 8 implementations, which can raise SAR testing concerns
- 5) When multiple transmit antennas are used to support uplink MIMO or other transmit diversity configurations, details of the implementation and operation for such features are necessary to determine SAR measurement concerns. These are currently considered on a case-by-case basis for all emerging Rel. 10 LTE products until sufficient information and testing expertise can be established to prepare KDB procedures
- 6) UE category and descriptions of the category requirements for supporting carrier aggregation, uplink MIMO and other UE configurations
- 7) While it is highly unexpected and until more can be learned, if it is suspected that the hardware or firmware associated with any LTE Rel. 10 features may introduce SAR influences for a product; for example, CoMP, HetNet, Relay, SON, cross carrier scheduling, eICIC, enhanced downlink MIMO, MBMS, M2M/D2D support etc., the potential of SAR concerns and any hardware, firmware or other limitations or restrictions applied to alleviate such concerns must be explained
- 8) Detailed descriptions of SVLTE support in any carrier aggregation configurations
- 9) Information typically required to identify the device and other transmitters contained within it to identify various standalone and/or simultaneous transmission SAR testing concerns

A PBA is required for all Rel. 10 LTE devices; however, as LTE products and technology continue to evolve further updates are expected to streamline the TCB approval process. The Rel. 10 limitations and support restrictions must be clearly identified in an attestation letter from the grantee to confirm LTE

implementation status of the device. This should be included in the attestation exhibit of Form 731 along with applicable grant comments.