



# **Discussion of Selected RF Exposure Concepts and Related KDB Publications**

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# MPE Basics Review

- Filings for rule parts listed in 2.1091 with output power above the categorical exclusion levels must include at one of following:
  - MPE test (TCB or FCC filings)
  - Numerical model (FCC filings)
  - Other methods based on sound engineering practice (may be considered for FCC filings)
  - MPE *estimation* is not applicable for *routine evaluation* of mobile devices in lieu of preceding items
- Far-field power density equation can be used for MPE estimation only for  $d \geq 20$  cm for FCC purposes
  - MPE *estimation* equation is not applicable in near-field  $d < 20$  cm (i.e. portable *exposure condition*)
  - SAR limits apply for all distances less than 20 cm  
=> MPE *estimation* for  $d < 20$  cm is not relevant for SAR (portable)
- Do not include unsupported compliance claims in users manuals or filing other contents
  - Preclude analyses or statements based on use of inapplicable MPE *estimation* for  $d < 20$  cm



# MPE Basics Review

- 2.1033 requires device operating and installation instructions to be submitted during equipment authorization, which is requested to include antenna installation info, to support FCC RF exposure compliance
- Besides MPE, please ensure antenna configurations comply with service-rule ERP/EIRP limits (peak or average), where applicable
- Please ensure source-based time-average is used for power levels listed in MPE estimations and for comparison to 2.1091(c) ERP thresholds
  - e.g. 2.1091(c) check needs to address 1/8 duty factor for GSM

2.1091(c)	ERP, W	EIRP, W
$f \leq 1.5$ GHz	1.5	2.46
$f > 1.5$ GHz	3	4.92

$$EIRP = 1.64 \times ERP$$



# Optional Antennas & Portable Devices

- USB-dongle transmitters for example are a peripheral device that can be used in various hosts chosen by the user
- Some designs might also support use configurations such as:
  - RF-connector port which can be freely used with optional and non-specific external antenna(s)
  - Mounting accessory or clip to attach USB-cable-connected dongle to the display section of a laptop computer or next to user
- Installation & operation instructions should effectively preclude:
  - Antenna installed directly at port thereby operating in portable exposure condition subject to SAR evaluation requirements
  - Simultaneous transmission operations for cabled external antenna, or USB-cable-connected integral-antenna dongle, attached to display section of laptops which already contain nearby built-in antennas (e.g. WiFi)
- Identify RF port is for testing purposes only
  - Additional SAR testing may be appropriate if specifically intended for connecting non-specified antenna(s)



# Permissive Change Update

- In general changes in portable device antenna and/or key radiating or metallic structures need SAR evaluation to determine whether C1pc or C2pc applies
- SAR compliance considerations are separate from 15.204 antenna-gain test reductions
- KDB 178919 (v04r04) item 5) b) iii) (3) change for equivalent antenna for part 15 device SAR report in C2pc not required if:
  - Identical antenna type with the same or lower gain
  - No other change to the transmitter and host device configurations
  - Highest SAR measured for that antenna type in previous certification(s) is less than 0.8 W/kg
- Otherwise SAR report needed in C2pc for the additional equivalent antenna(s)

178919, v04r04, 8/6/09, D01 Permissive Change Policies



# Grant Remarks Review

- Consistent grant notes are intended to support uniformity in application processing
- Most filings requiring RF exposure consideration should include some types of RF exposure grant remarks
  - Example: 15.247 desktop 100 mW or less, e.g. use:
    - “This device is approved as a mobile device with respect to 2.1091; the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons ...”
  - Mobile device grants shall list other distance for FCC RF exposure compliance when greater than 20 cm
  - Example: fixed-mounted devices, e.g. listed in 1.1307 Table 1:
    - The antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures. RF exposure compliance is addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of §1.1307(b)(3).
- Grant remarks for items other than RF exposure are also needed where applicable (including e-filing numbered grant notes, listed power is conducted not radiated for DSS, etc.)



# Grant Remarks Review

- Rather than a “boilerplate” grant remarks list, FCC Lab staff have intended to prepare uniform guidance about filing contents to support and facilitate having minimal grant remarks
  - This task currently under review
- Items being compiled to be considered all together in preparing procedures for device categories include:
  - device installation requirements
  - operation configurations & usage conditions
  - end-user or OEM / integrator instructions
  - authorized operating frequency ranges & modes, SAR, HAC, modular



# Grant Remarks Review

- Unless co-located (multi-transmitter) configurations have been evaluated or addressed within equipment authorization applications under an FCC ID, for uniformity in processing FCC and TCB approvals have continued using a "no co-location" grant remark (grant condition) for single module, single transmitter, or specific transmitter combination approvals
- As products and technologies have continued to evolve, the issue has become not so much about transmitters being co-located, rather what are the simultaneous transmitting conditions and configurations
- Authorized collocations are as documented within filings for specific FCC ID(s), or per exceptions or conditions established by FCC procedures or guidance where appropriate
  - Example grant remark:
    - The antenna(s) used for this transmitter must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.
  - Permissive change filings have not been required for all simultaneously-transmitting associated-device FCC IDs, e.g. categ. excl. mobile devices
  - Examples of recent FCC Lab policy and procedure documents about simultaneous transmit considerations include KDBs 447498, 616217, and 648474



# Grant Remarks Review

- Any grant certificate remarks / conditions about device operations should be reflected in user instructions as well
  - As part of a Certification, all info within an application filing is reviewed, including specific device characteristics and whether operating instructions appear appropriate to ensure compliance with applicable FCC rules
  - FCC generally does not regulate actual contents of user instructions; however user instructions should be such as to ensure proper use of device in compliance with FCC rules
- See OET B 65 Suppl. C Appendix D for suggested phone handset body-worn grant notes and user instructions



# Grant Remarks Review

- SAR listings on grant certificates
  - Numeric values
    - Grant-listed SAR rounded to two decimal places
    - Contact FCC Lab for other guidance e.g. in case round-off SAR is above a threshold for FCC filing
  - Example format for dual-band PCE:  
The highest reported SAR values are:  
Part 22: head 0.09 W/kg, body 0.75 W/kg;  
Part 24: head 0.12 W/kg, body 1.41 W/kg.
  - SAR listing is in terms of head and/or body (i.e. liquid type)
    - consult with FCC for other applicable terms (omit e.g. face, hand, near-body, etc.)
- Class II filings must carry-over original grant remarks, but can amend / expand remarks
  - Class II grants list highest SAR from all filings within an FCC ID



## In closing

- TCBs need to diligently and exhaustively apply policies and procedures in existing documents
- Consult the FCC Lab for additional guidance on the current policies
- Contact FCC whenever the application of the rules or requirements or policies is unclear, and/or where interpretations of the regulations or test procedures may be necessary