



Wireless Charging for Consumer Devices

**TCB Workshop
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Laboratory Division
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Authorization

- May be approved under Part 15 or Part 18 or both Rule Parts
- Chargers and clients are generally approved separately; however, they should satisfy compliance in both standalone mode and as a system
- Dependent on load management and communications:
 - Load management may include client device detection, charging status reporting and control etc.
 - Method of communication; e.g. active vs. passive, such as load modulation
 - Communication may be on primary charging frequency or separate frequency
 - Separate frequency allows communications and charging to be authorized under separate Rule Parts



Authorization

- Primary Charging Frequency:
 - Can be used for both charging and load management
 - Management can be passive (load modulation) or active (modulating the primary charging signal)
- Part 18 Authorization for the charger and clients
 - Load and power management must be integral to wireless charging operation and frequency
 - May not communicate any information not related to power management and control
 - Proximity of the charger and client device(s) must be satisfy Part 18 requirement that the RF energy is locally generated and used
 - Other communications are authorized separately under Part 15



Authorization

● Part 15 Authorization Required

- If primary charging frequency includes information not related to power management
- If a secondary frequency is used for communications (primary frequency may be authorized under Part 18 and secondary on Part 15)

● EMC Considerations

- Charger must be evaluated with appropriate client(s) in place
- The worst case transmitting conditions for the system as a whole must be evaluated for each applicable configuration
 - Bluetooth, WWan, and WLan [etc.]



Radio Frequency Exposure

- Part 18 devices are not exempt from RF exposure compliance
- Most designs rely on close-coupling
- Single client low power devices generally do not present exposure concerns for nearby users
- Multi-client devices or short-distance power transfer can result in widely varied fields and potential exposure concerns



Radio Frequency Exposure

● Considerations for Evaluation

- Must be examined according to operating configurations and exposure conditions
- Mobile or portable considerations may apply
- For most small consumer chargers, exposure conditions identified in §2.1091(d)(4) may apply
- SAR and MPE limits do not cover wireless chargers operating below 100 kHz and 300 kHz, respectively
 - Compliance needs to be determined with respect to 1.1307 (c) and (d) of the FCC rules.
 - Emissions should be within the limits at 300 kHz in Table 1 of 1.1310 for operations near the 100 kHz range; for the interim until further specific procedures are established
 - Contact the FCC for lower frequencies



Radio Frequency Exposure

- RF exposure compliance is determined for charging conditions under worst case exposure conditions; depending on individual designs worst case exposure may not be the same as worst case load conditions; multiple client systems may require different client combination charging conditions to be evaluated for compliance
 - Influence of client devices under non-charging conditions to the operation of the host device is generally tested or considered according to the individual host RF exposure test requirements



Radio Frequency Exposure

- Portable devices
 - SAR systems and test procedures designed for frequencies above 100 MHz
 - Numerical modeling may be used to demonstrate SAR compliance for lower frequency devices
 - Analytical analysis, field strength and radiated and conducted power measurements may also be considered to evaluate compliance by submitting a KDB inquiry



Radio Frequency Exposure

● Mobile devices

- Typical desktop use conditions do not fully justify 20 cm separation distance; 2.1091(d)(4) generally needs consideration
- 10 cm separation is generally acceptable for devices from 60 cm² to 200 cm²
- A KDB Inquiry should be submitted for chargers that do meet the size limits or have an unusual form factor
- An Inquiry should be submitted for configurations other than horizontal charger with client on top



Radio Frequency Exposure

- Mobile devices (cont.)
 - E and H field strength measurements or analyses based on design details can be used to determine compliance
 - The diameter of measurement probes for the kHz frequency range is a significant percentage of the measurement distance
 - The test separation distance is from the edge of the device to the center of the probe the calibration point which is usually the geometric center of the sensors



Conclusion

- A KDB Inquiry should be submitted for guidance for wireless charger applications
- Wireless Chargers remain on the PBA list



Questions and Answers

Thanks!