

Vehicular Radar Certification Measurement Procedures

Office of Engineering and
Technology

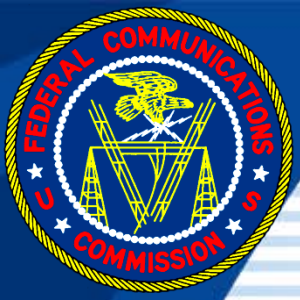
Laboratory Division

October 3, 2018



Background

- Briefed a relatively new FCC rule part (Part 95M) at April Workshop
- Part 95M accommodates vehicular radars in the globally harmonized 76-81 GHz frequency band
- Announced that a C63.26 task group had been formed to develop compliance measurement procedures
- This presentation provides a status report of the activities in that task group since the April Workshop



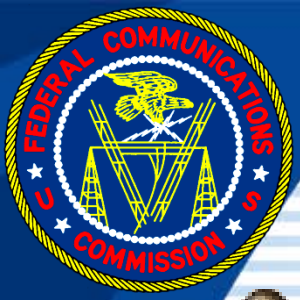
Scope and Membership of the Task Group

- Tasked to develop best methods for performing requisite compliance measurements on vehicular radar devices applying for certification under Part 95M
- Initial focus on FMCW (linear chirped) emissions, but has expanded to also include traditional pulsed radar emissions
- Relatively small group primarily representing manufacturers, test laboratories, and regulatory bodies



Approach

- Using ETSI measurement standard (EN 303 396) as basis to promote harmonization to the extent practical
- Expanding to include pulsed modulation measurement methods
- Modifying to make users aware of the potential for instrumentation desensitization when measuring peak power of either FMCW or pulsed radar emissions
- Eliminating some methods found to be technically questionable (e.g., integration of peak power)



Task Group Activities

- Bi-weekly meetings typical
- Measurement campaign performed to determine whether measurement instrumentation desensitization is a valid consideration for FMCW modulations as in pulsed modulations.
- Data also collected to determine whether power integration is an accurate method for measuring the peak power or power spectral density of FMCW modulated radar emissions



Measurement Data

- Measurements of FMCW emissions initially performed by UL (Mike Heckrotte) in coordination with Keysight Technologies
- Rhode & Schwarz performed similar measurements to verify the results obtained by UL/Keysight
- For peak power measurements the data indicate that:
 - An FMCW Desensitization Factor may be required when performing peak power measurements of FMCW Radars
 - The value of the applicable FMCW desensitization factor can be calculated using formulas provided in Keysight Application Note (and to be included as an Annex to the C63.26 Standard)
 - Band integration/Channel Power methodology does not provide accurate results in the measurement of peak power of FMCW emissions
 - Peak power and power spectral density measurements for pulsed radars currently under discussion
- For average power measurements the data indicate that:
 - No desensitization factor is required for power averaging (RMS) measurements
 - Band integration/channel power methodologies do provide accurate average power measurements (consistent with true average results obtained with a power meter)



Moving Forward

- Wrapping up with bandwidth and fundamental emission measurement procedures
- Moving to development of unwanted emissions measurement procedures
- Currently specifying 99% Occupied Bandwidth measurement to demonstrate chirp bandwidth
- Power Averaging (RMS) measurement preferred for determining fundamental emission power of FMCW radar (still under consideration for pulsed)
 - Relieves concerns with regard to BW/PRF contributions to desensitization
 - Can be performed using spectrum/signal analyzer or average (RMS) power meter
- Will incorporate final procedures into KDB guidance soon



Applicability of Procedures to Other Radar Transmitters

- FCC lab considering how information from task group can be applied to similar FMCW and/or pulsed-modulated radar emissions applying for certification under other rule parts
- May not be directly applicable to radars applying under unlicensed rule parts
 - For example, for unlicensed radar devices are subject to 15.31(c) requirements to stop the sweep when performing measurements
- Will clarify applicability in KDB guidance
- Use KDB inquiry system to inform us of specific applications and/or data for consideration