15.255 Radar Updates

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Note: The views expressed in this presentation are those of the authors and may not necessarily represent the views of the Federal Communications Commission.

Overview

- Certification Trends
- Equipment Authorization Requirements & Procedures
- Test Requirements

Equipment Authorization Trends

● More than 50 unique FCC IDs certified under FDS in the past 12 months

Legend:
- Camera Range Finding
- Distance Measurement
- Unmanned Aircraft
- Intrusion Detection
- LPR
- Module
- Occupant Safety
- Motion Sensor
- Velocity Radar

Pie chart values: 4%, 9%, 14%, 4%, 14%, 14%, 9%, 27%, 5%
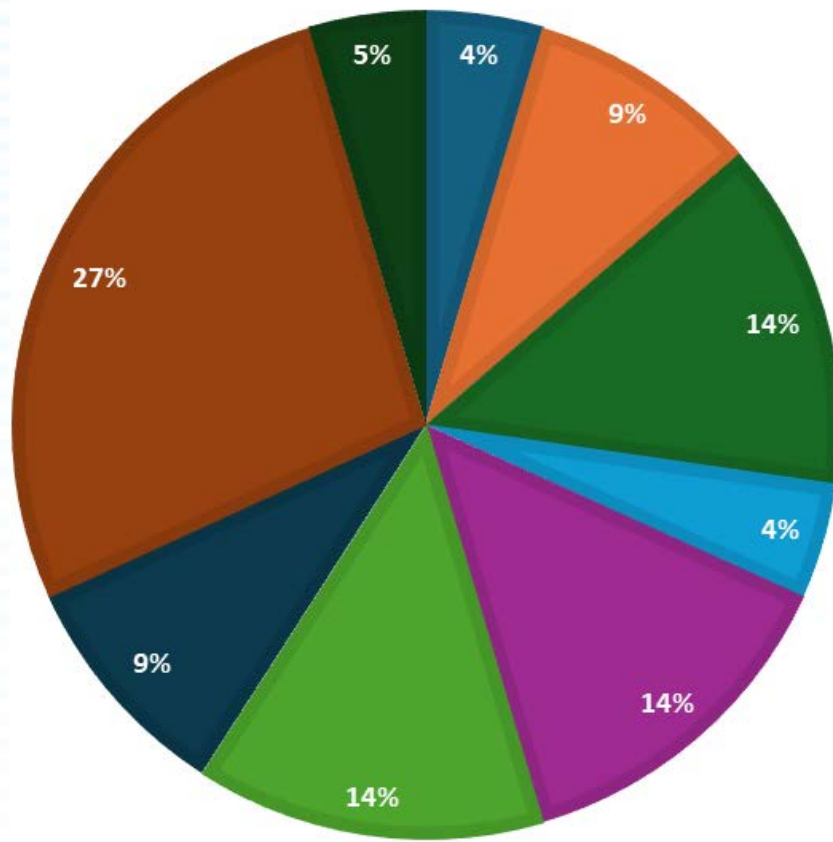
Equipment Authorization Requirements & Procedures

- Guidance found in KDB 364244 D01
- <u>Always</u> reference to specific subpart in test report
  - It's not enough to say §15.255(c)!

- PAG item RDR255 is required for all radar and FDS operating under §15.255
- Always include checklist for PAG review
- Considering removal from PAG list
  - PAG items are removed once established guidance is published and industry demonstrates understanding of rule part and/or novel test techniques

EA Requirements & Procedures

Table A-1. Industry Consensus Agreement

Mode	Frequency Range (GHz)	Use Cases	Power Limit (Peak EIRP)	Off-Time Requirement: off times (>= 2 ms) must sum to at least X ms per 33 ms interval
Field disturbance sensors excluding outdoor drones /UA (*i.e.*, unmanned aircraft – see below)	57.0 - 59.4	All	20 dBm for indoor 30 for outdoor, including all vehicular applications	None
	57.0 - 61.56	All	3 dBm	None
	57.0 - 61.56	All	20 dBm	16.5 ms off time per 33 ms
	57.0 - 64.0	All	14 dBm	25.5 ms off time per 33 ms
	57.0 - 64.0	Fixed outdoor or vehicular uses (except in-cabin)[3]	20 dBm	16.5 ms off time per 33 ms
Outdoor drones/UA	60 - 64	Drones/UA	20 dBm	16.5 ms off time per 33 ms

Test Requirements

- ANSI C63.10-2020 Clause 9.9, footnote 73 & C63.10-2013 Clause 9.11, footnote 79, specifying mandatory use of an RF detector, are not applicable to new §15.255 radar certifications

- Roughly 80% still use RF Detector method.
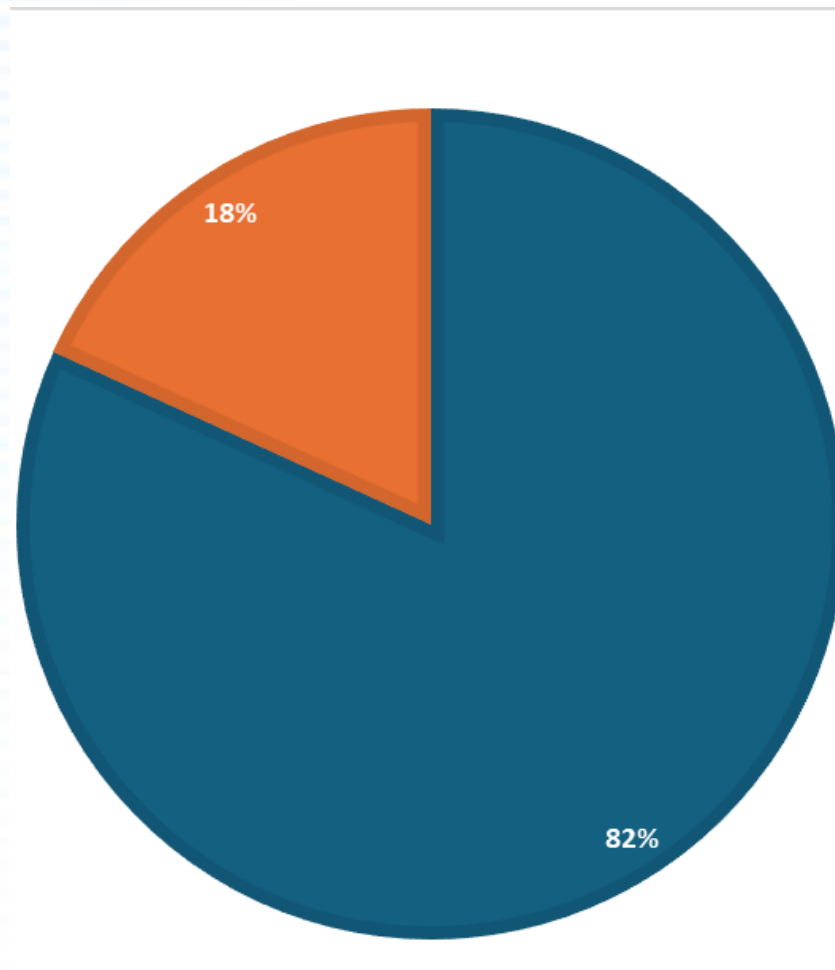
Test Requirements
Measuring EIRP using a Spectrum Analyzer

- There are at least two possible approaches for determining the peak EIRP using a spectrum or signal analyzer:

  1. To directly measure the peak amplitude of the radiated power for use in determining the peak EIRP.

  2. To measure the average (RMS) radiated power and include the transmission duty cycle to calculate the peak power. Each of these approaches has its unique considerations.

- Show plots!

Test Requirements
Measuring EIRP using a Spectrum Analyzer

● Pulse desensitization factor described in annex L

– Note that C63.10-2020 corrigendum 1 equation L.1 shall be used in determining the pulse-desensitization factor for FMCW using peak detection

$$\alpha = \frac{1}{\left(1 + \left[\left(\frac{2 \times \ln 2}{\pi}\right) \times \left(\frac{BW_{Chirp}}{T_{Chirp} \times RBW^2}\right)\right]\right)^{0.25}}$$

Where:

α	reduction in amplitude
BW$_{Chirp}$	FMCW Chirp BW
T$_{Chirp}$	FMCW Chirp Time
RBW	3 dB IF BW

Show your work!

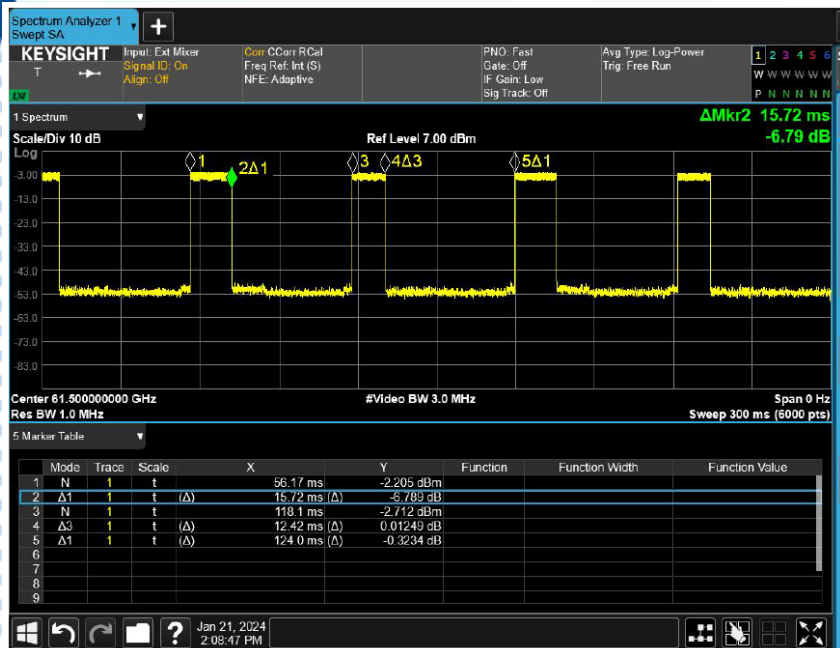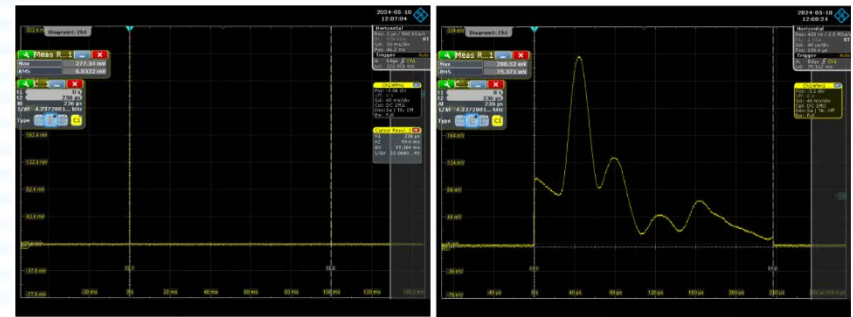# **Test Requirements**
Validating Temporal Requirements

- We've seen various ways of presenting the data
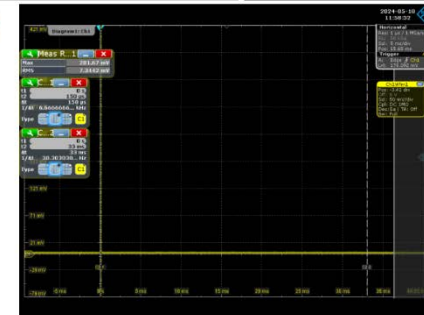- Always provide substantiating plots

SA in Zero Span

Period (T)

PW

33ms
Window

DSO w/ RF Detector

Questions?