

Radar Spectrum Engineering Criteria (RSEC), Measurements and Implementation, Present and Future

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The NTIA Radar Spectrum Engineering Criteria (RSEC) is a regulatorily defined set of limits for radar emissions. The RSEC promotes electromagnetic compatibility between radars and other radio systems. The centerpiece of the RSEC is a radar's emission spectrum, which must fall below a defined mask limit.

The RSEC mask limit is relative, not absolute. That is, it is adjusted to the radar's center-frequency peak power and does not itself impose any limit on a radar's peak operating power. (This US approach is opposite to what is preferred by some other administrations.)

Engineers who must measure a radar's emission spectrum for RSEC mask compliance are faced with a challenge that they might not necessarily always completely understand, though: A radar's relative-power emission spectrum, measured with some particular amount of total power at the radar's fundamental frequency or frequencies and then power relative to that level at other frequencies (out-of-band and spurious), can (and will) exhibit levels in the extended spectrum that *vary as a function of the IF bandwidth of the measurement system*.

So, measured in one IF bandwidth a radar might fail the RSEC mask, but measured in another IF bandwidth the same radar might pass the RSEC. How can this be? Is there not a single "true" radar emission spectrum? From whence does this paradox arise? What does it mean? How should engineers address it in regulatory measurements that can affect a radar's very practical, real-world engineering and its sales prospects for domestic and foreign customers who demand proof of RSEC compliance before they procure the system? That's what this talk explains. The author, an NTIA expert in the RSEC with broad 40-year experience in measuring radar emissions, explains both theoretically and in practical terms the Best Practices for proper measurement of a radar for RSEC compliance, including the best way to determine the optimal (proper) IF bandwidth for the RSEC measurement.