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SMALL ENTITY COMPLIANCE GUIDE

**Amendment of Parts 1, 2, 15, 90, and 95 of the Commission's Rules
To Permit Radar Services in the 76-81 GHz Band**

**FCC 17-94
ET Docket No. 15-26
Adopted July 13, 2017**

In accordance with Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996, this Small Entity Compliance Guide (Guide) is intended to help small entities—small businesses, small organizations (non-profits), and small governmental jurisdictions—comply with the rules adopted in the above-referenced Federal Communications Commission (FCC or Commission) rulemaking dockets. This Guide is not intended to replace or supersede these rules, but to facilitate compliance with the rules. Although we have attempted to cover all parts of the rules that might be especially important to small entities, the coverage may not be exhaustive. This Guide cannot anticipate all situations in which the rules apply. Furthermore, the Commission retains the discretion to adopt case-by-case approaches, where appropriate, that may differ from this Guide. Any decision regarding a particular small entity will be based on the statute and any relevant rules.

In any civil or administrative action against a small entity for a violation of rules, the content of the Small Entity Compliance Guide may be considered as evidence of the reasonableness or appropriateness of proposed fines, penalties, or damages. Interested parties are free to file comments regarding this Guide in the above-referenced proceeding and the appropriateness of its application to a particular situation. The Commission will then consider whether the recommendations or interpretations in the Guide are appropriate in that situation. The Commission may decide to revise this Guide without public notice to reflect changes in its approach to implementing a rule or it may clarify or update the text of the Guide. Direct your comments, recommendations, or request for further assistance to the FCC's Consumer Center:

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I. OBJECTIVES OF THE PROCEEDING

The Federal Communications Commission (Commission) has long prioritized the objectives of ensuring the efficient and effective utilization of spectrum, while also providing flexibility and growth opportunities for small and other entities providing services in frequency bands. In keeping with these objectives, the *Report and Order* in ET Docket No. 15-26¹ established an efficient regulatory framework for radar applications operating in the 76-81 GHz band, while also promoting more effective use of spectrum, fostering technological innovation, and providing a consistent set of technical rules and policies for vehicular radars and airport operations areas radars operating within the band. Under the Commission's rules, any person is eligible to operate a radar in the 76-81 GHz band without an individual license; however, such operations must comply with all applicable rules in part 95, subpart M of the Commission's rules.²

The *Report and Order* became effective on October 20, 2017, and provided protection from harmful interference for vehicular radars and certain radars that are used exclusively for ground use only in airport air operations areas³ (such as foreign object debris (FOD) detection radars) or are aircraft-based (for example, wingtip-mounted radars) that operate in the 76-81 GHz band. In addition, the *Report and Order* allocated the 77.5-78 GHz band to the Radiolocation Service (RLS) on a primary basis in the U.S. Table of Frequency Allocations, adding this allocation to the existing primary RLS allocations in the 76-77.5 GHz and 78-81 GHz bands, in order to provide a contiguous five-gigahertz band at 76-81 GHz for vehicular and airport air operations areas radar operations under the primary RLS allocation. As a result, vehicular radars and non-vehicular fixed and mobile radars used exclusively in airport air operations areas, including but not limited to FOD detection radars and aircraft-mounted radars for ground use only, may operate in the entire 76-81 GHz band.⁴ Fixed radar systems in the 76-81 GHz band are limited to airport air operations areas and are prohibited from operating outside of airport air operations areas;⁵ operation of 76-81 GHz band radars is prohibited aboard aircraft (including helicopters) in flight.⁶ No specific spectrum blocks or bandwidths are designated or required within the 76-81 GHz frequency range for any particular radar operations in this band.

The Commission also adopted a consolidated set of rules to govern these 76-81 GHz radar operations. Vehicular radars and non-vehicular fixed and mobile radars used exclusively for ground use in airport air operations areas that operate in the 76-81 GHz range are now governed by subpart M, The 76-81 GHz Radar Service, in part 95 of the Commission's rules (sections 95.3301-95.3385),⁷ to be

¹ *Amendment of Parts 1, 2, 15, 90 and 95 of the Commission's Rules to Permit Radar Services in the 76-81 GHz Band*; ET Docket No. 15-26, Report and Order, 32 FCC Rcd 8822 (2017) (*Report and Order*).

² See 47 CFR § 95.3305, Radar operator eligibility in the 6-81 GHz Band, <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-95/subpart-M/subject-group-ECFRc74eda7bff11a91/section-95.3305>. The part 95, subpart M rules are available at <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-95/subpart-M?toc=1>.

³ "Air operations areas" are all airport areas where aircraft can operate, either under their own power or while in tow. The airport operations area includes runways, taxiways, apron areas, and all unpaved surfaces within the airport's perimeter fence. An apron area is a surface in the air operations area where aircraft park and are serviced (refueled, loaded with cargo, and/or boarded by passengers). See 47 CFR § 87.5, Definitions, <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-87/subpart-A/section-87.5>.

⁴ See 47 CFR § 95.3331, Permissible 76-81 GHz Radar Band Service uses, <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-95/subpart-M/subject-group-ECFR25ec71a3b2e7cb7/section-95.3331>.

⁵ *Id.*

⁶ See 47 CFR § 95.3333, Airborne use of 76-81 GHz Radar Service is prohibited, <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-95/subpart-M/subject-group-ECFR25ec71a3b2e7cb7/section-95.3333>.

⁷ The part 95, subpart M, The 76-81 GHz Radar Service, rules are available at <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-95/subpart-M?toc=1>.

licensed-by-rule and protected from interference.⁸ The *Report and Order* also removed unlicensed vehicular radar operations from the 16.2-17.7 GHz and 46.7-46.9 GHz bands, and established that the Commission would no longer consider licensing FOD detection radars designed to operate in the 78-81 GHz band under section 90.103.⁹

The part 95, subpart M rules contain technical parameters (e.g., maximum average and peak effective isotropic radiated power (EIRP) limits, and unwanted (i.e., out-of-band) emissions limits) for vehicular and airport air operation areas radars (ground use only) in the 76-81 GHz band that mirror the parameters previously specified in the Commission's part 15 rules for vehicular and FOD detection radars that operate in the 76-77 GHz band. Consistent with interpretations of sections 15.252 and 15.515 of the rules, which specify technical requirements for vehicular radar systems and which permit the use of sensors mounted in "terrestrial transportation vehicles," devices certified under part 15 and part 95, subpart M for use on vehicles may be deployed on automobiles; trucks; railroad train locomotives; train cars; monorails or trams; construction vehicles; farming vehicles, such as tractors and harvesters; motorcycles; scooters and motorbikes; mobile scissor-lifts and mobile work platforms; and boats and ships operated within territorial waters of the United States.¹⁰ The overall installation must comply with all the conditions of the grant of certification and the relevant technical rules for such operation.¹¹ It is not necessary to obtain a new grant of certification for approved sensors to be used on different types of vehicles.¹²

Additionally, the *Report and Order* adopted provisions to phase out unlicensed 24 GHz wideband and ultra-wideband (UWB) vehicular radars operations and transition these radar operations to the 76-81 GHz band. However, phasing out use of the 23.12-29 GHz and 22-29 GHz bands for unlicensed 24 GHz wideband and UWB vehicular radars, respectively, was not intended to apply to unlicensed radars that operate at 24.075-24.175 GHz under section 15.245 and at 24.0-24.25 GHz under section 15.249. These rules, which were not modified, authorize a wide variety of narrowband devices that include, but are not limited to, vehicular-specific radars. As such, devices that operate under these rules will continue to be certified and may continue to be used in vehicular radar applications under part 15 of the rules. Moreover, the part 95, subpart M rules do not apply to Level Probing Radars (LPRs). These specialized radars operate in a variety of frequency ranges, including the 75-85 GHz band, under section 15.256 of the rules, and will remain authorized to operate on an unlicensed basis under part 15 of the rules.¹³

⁸ "Licensed-by-rule" means that an authorized user can access the entire available spectrum without an individual station license document and is instead authorized to operate as long as the operations are in accordance with the applicable service rules. See 47 U.S.C. § 307(e). Thus, while all spectrum use is shared among users who meet the eligibility and technical qualifications and no one has exclusive rights to any portion of the spectrum, those users are collectively afforded interference protection *vis-à-vis* other services, based on the allocation status under which they operate.

⁹ 47 CFR § 90.103, Radiolocation service.

¹⁰ See Knowledge Database (KDB) publication Equipment Authorization Guidance for 76-81 GHz Radar Devices, 653005 76-81 GHz Radars, available at <https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=230830&switch=P> (last visited May 22, 2023). The Commission's KDB is best accessed using an Internet browser other than Mozilla Firefox (e.g., Chrome).

¹¹ Certification is an equipment authorization approved by the Commission or issued by a Telecommunication Certification Body (TCB) and authorized under the authority of the Commission, based on representations and test data submitted by the applicant. See 47 CFR § 2.907, Certification, <https://www.ecfr.gov/current/title-47/chapter-1/subchapter-A/part-2/subpart-J?toc=1>.

¹² See KDB 653005, *supra* note 10.

¹³ Unlike part 95 services, which are afforded interference protection rights based on the associated frequency allocation, unlicensed operations may not cause harmful interference and must accept any interference received, including interference that may cause undesired operation. See 47 CFR §§ 2.105(c)(2)(i), 15.5(b).

In short, the actions taken in the *Report and Order* harmonize the Commission's rules with international efforts to create a global allocation for vehicular radars, while promoting efficient use of spectrum by consolidating those radar operations into a single band. Further, these actions will facilitate and encourage the development and deployment of new safety devices, along with new and innovative radar applications that can provide important public benefits while also ensuring that the authorized radar operations can coexist with one another and with incumbent users in the 76-81 GHz and adjacent bands.

II. COMPLIANCE REQUIREMENTS

In addition to these rules changes, the *Report and Order* also provides clear direction to small businesses and other entities on how best to comply with the adopted rules. An overview of these compliance requirements is provided below.

A. Transition Provisions for Compliance with the Rules (47 CFR § 15.37)

Parties may certify equipment and operate vehicular radars and non-vehicular fixed and mobile radars used exclusively in airport air operations areas for ground use only in the 76-81 GHz band in accordance with part 95, subpart M of the Commission's rules.

Existing vehicular radars and fixed radar systems used in airport air operations areas operating in the 76-77 GHz band that are already installed or in use may continue to operate in accordance with their previously obtained certification. However, the certification under part 15 of new radars and fixed radar systems used in airport air operations areas that are designed to operate in the 76-77 GHz band has not been permitted since October 20, 2017. Any future certification or any change of already issued certification and operation of such equipment shall be under part 95, subpart M of the rules.

Unlicensed 24 GHz wideband and UWB vehicular radars that are already installed or in use may continue to operate in accordance with their previously obtained certification. However, certification of such radars were not permitted after September 20, 2018 and Class II permissive changes¹⁴ for previously-certified radars have not been permitted since January 1, 2022.

While the manufacture, importation, marketing, sale, and installation of unlicensed 24 GHz wideband or UWB vehicular radars have not been permitted since January 1, 2022, the sale and installation for the repair/replacement of defective, damaged, or malfunctioning equipment already installed in a vehicle on or before January 1, 2022 continue to be permitted indefinitely, but only when it is not possible to repair or replace the radar equipment designed to operate in the 24 GHz band with radar equipment designed to operate in the 76-81 GHz band.

1. This exception is further limited to the repair and replacement of unlicensed 24 GHz wideband and UWB vehicular radar equipment that has been certified for operation in the 24 GHz band.
2. The Commission expects manufacturers to draw on existing stock of equipment approved before January 1, 2022 and will address requests for additional relief (e.g., manufacture, importation, or product redesign) on a case-by-case basis.

The *Report and Order* deleted the references to vehicular radar operations in the 16.2-17.7 GHz and 46.7-46.9 GHz bands from part 15 of the Commission's rules and ceased accepting applications for equipment certification of such devices effective July 13, 2017.

¹⁴ A Class II permissive change includes those modifications which degrade the performance characteristics as reported to the Commission at the time of the initial certification. Such degraded performance must still meet the minimum requirements of the applicable rules. When a Class II permissive change is made by the grantee, the grantee shall provide complete information and the results of tests of the characteristics affected by such change. The modified equipment shall not be marketed under the existing grant of certification prior to acknowledgement that the change is acceptable. See 47 CFR § 2.1043(b)(2), Changes in certificated equipment, <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-2/subpart-J/subject-group-ECFR55475dd0ca1a058>.

1. The continued manufacture, importation, marketing, sale, and installation for use in the United States of such equipment in the 16.2-17.7 GHz band under the sole existing equipment authorization for such a device in that band, FCC ID No. L2C0004TR, is prohibited.
2. Any vehicular radars that are already installed or in use under this authorization are grandfathered for the life of the vehicle, thus allowing such systems to continue operating in accordance with their previously-obtained certification for the life of the vehicle or until the supply of existing equipment necessary for maintenance is exhausted. Class II changes will not be permitted for such equipment.

B. Radar Operator Eligibility in the 76-81 GHz Band (47 CFR § 95.3305)

In order to reduce unnecessary compliance burdens and promote increased spectrum efficiency, the *Report and Order* provides that subject to the requirements of sections 95.305 and 95.307 of the Commission's rules, any person is eligible to operate a radar in the 76-81 GHz band without an individual license. Any such operation, however, must comply with all applicable rules in part 95, subpart M.

C. Permissible 76-81 GHz Band Radar Service Uses (47 CFR § 95.3331)

Radar systems operating in the 76-81 GHz band may operate as vehicular radars, or as fixed or mobile radars in airport air operations areas, including but not limited to FOD detection radars and aircraft-mounted radars for ground use only.

The part 95, subpart M rules maintain the restriction that fixed radar operations in the 76-81 GHz band may only operate in airport air operations areas that do not illuminate public roadways. Operation of fixed radars outside of airport areas is not permitted. Fixed airport area radars do not need to be coordinated with other licensed services.

D. Airborne Use of 76-81 GHz Band Radar Service Is Prohibited (47 CFR § 95.3333)

The Commission has prohibited airborne use due to concerns of possible interference with Radio Astronomy Service (RAS) operations in the 76-81 GHz band. Further, aircraft-mounted radars must include an automatic shut-off capability that discontinues all 76-81 GHz radar functions while the aircraft (including helicopters) is airborne. The inclusion of an automatic shut-off mechanism provides greater assurance of compliance with the Commission's ground-based use restrictions.

E. Automatic Control for 76-81 GHz Band Radar Service (47 CFR § 95.3347)

While section 95.347 prohibits the operation of Personal Radio Services stations under automatic control, the *Report and Order* allows for exceptions for a few specified services. Under this section, 76-81 GHz Band Radar Service operations may be conducted under manual or automatic control.

F. Equipment Certification (47 CFR § 95.3361)

Radar equipment operating in the 76-81 GHz band shall be certified in accordance with part 95, subpart M and part 2, subpart J of the Commission's rules.

The general technical parameters to be measured and provided in an application for equipment certification are listed in sections 2.1046 through 2.1057, along with sections 95.3367 and 95.3379 of the Commission's rules.

Application for Equipment Authorization FCC Form 731 should include applicable emission designators. Concerning the section 2.1047 modulation characteristics requirement, the following information should be provided:

1. Radar: Pulse width and pulse repetition frequency (PRF) (if the PRF is variable, then report maximum and minimum values).

2. Non-Pulsed Radar (e.g., Frequency Modulated Continuous-Wave (FMCW): modulation type (i.e., sawtooth, sinusoid, triangle, or square wave) and sweep characteristics (sweep bandwidth, sweep rate, sweep time).

Vehicular and FOD detection radars currently certified under part 15 to operate in the 76-77 GHz band need not be re-certified under part 95 to continue to operate in that band. These devices may continue their operations, but will now do so on a licensed-by-rule basis and be entitled to interference protection from amateur operations in the 76-77 GHz band. However, any changes for such previously certified devices and any new equipment designed to operate in the 76-81 GHz band will need to comply with and be certified under the applicable part 95 rules.

G. 76-81 GHz Band Radar Service Radiated Power Limits (47 CFR § 95.3367)

The radiated emissions limits associated with the fundamental emissions of radars intended for operation within the 76-81 GHz frequency band under part 95 of the Commission's rules, including but not limited to short-range vehicular radars, are specified in section 95.3367 as:

- (a) The maximum power (EIRP) within the 76-81 GHz band shall not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz Resolution Bandwidth (RBW).
- (b) The maximum peak power (EIRP) within the 76-81 GHz band shall not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW.

The requirement in (a) specifies an average EIRP limit of 50 dBm, which is applicable over the total emission bandwidth (occupied or necessary bandwidth) of the transmission. For example, if the occupied bandwidth (OBW) of the radiated fundamental emission is 10 MHz, then this average power limit is to be interpreted as an EIRP density of 50 dBm/10 MHz. Similarly, if the OBW is 20 MHz, then the applicable output power limit is 50 dBm/20 MHz. The requirement further specifies that measurement of the output power to demonstrate compliance with the limit be performed using a 1 MHz RBW, and then integrated over the full OBW (10 MHz or 20 MHz in the above examples).¹⁵

The requirement in (b) specifies an EIRP limit of 55 dBm that cannot be exceeded in any 1 MHz resolution bandwidth, measured using a peak detector (i.e., a peak EIRP spectral density limit of 55 dBm/MHz). The compliance measurement is to be performed by sweeping the transmitted OBW with a positive peak power detector, with peak hold activated, using a 1 MHz RBW. Power integration is not to be used in performing this measurement.¹⁶

Further specific compliance measurement guidance for both pulsed and frequency-modulated continuous-wave (FMCW) radar operations under part 95, subpart M are under development by the FCC Laboratory¹⁷ in collaboration with ASC C63.¹⁸ In the interim, the measurement procedures such as those specified in ANSI C63.10-2013 may continue to be used.

When performing average and peak power and power density measurements on part 95, subpart M 76-81 GHz radars using FMCW modulation techniques, there is no requirement to stop the FM sweep

¹⁵ See KDB 653005, *supra* note 10.

¹⁶ *Id.*

¹⁷ The FCC Laboratory has received several technical comments with regards to measurement procedures for different types of radars. These comments are under review and will be used to further develop the measurement procedures. Any questions about alternate test procedures should be submitted through the KDB inquiry system (www.fcc.gov/labhelp).

¹⁸ Accredited Standards Committee (ASC) C63[®]—Electromagnetic Compatibility (EMC); accredited by the American National Standards Institute, Inc.; Secretariat: Institute of Electrical and Electronics Engineers, Inc.; www.c63.org.

(or step) as had previously been specified by section 15.31(c). However, when a swept spectrum/signal analyzer is used to perform power measurements on a swept (or stepped) frequency transmitter operating in a normal mode, care must be taken in setting the sweep rate of the measurement instrument to ensure that the entire transmitted sweep (or hop) frequency range is fully examined.¹⁹

H. 76-81 GHz Band Radar Service Unwanted Emissions Limits (47 CFR § 95.3379)

In the *Report and Order*, the Commission addressed concerns of potential harmful interference in the band by setting unwanted emissions limits low enough for incumbent services in the band to operate without experiencing harmful interference. This section requires that the power density of any unwanted emissions outside of the 76-81 GHz band shall consist solely of spurious emissions and shall not exceed the limits specified in section 95.3379 of the rules.

I. 76-81 GHz Band Radar Service Radiofrequency (RF) Exposure Evaluation (47 CFR § 95.3385)

Mobile and portable radar devices that operate in the 76-81 GHz band are subject to routine environmental evaluation for radiofrequency exposure prior to equipment authorization or use, per sections 2.1091 and 2.1093 of the Commission's rules. Applications for equipment authorization of 76-81 GHz Band Radar Service devices must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Additionally, section 95.3385 of the rules requires that, upon request, any existing technical information providing support for this statement must be submitted to the Commission.

III. RECORDKEEPING AND REPORTING REQUIREMENTS

The Commission's actions in the *Report and Order* did not create any new recordkeeping or reporting requirements.

IV. IMPLEMENTATION DATE

The rules in the *Report and Order* became effective October 20, 2017, with the exception for ceasing application acceptance for equipment certification of vehicular radars designed to operate in the 16.2-17.7 GHz and 46.7-46.9 GHz bands, which became effective July 13, 2017.

V. INTERNET LINKS

A copy of the *Report and Order* is available at:

https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-94A1.docx.

A copy of the Federal Register Summary of the *Report and Order*, 82 FR 43865, is available at:

<https://www.federalregister.gov/documents/2017/09/20/2017-18463/permitting-radar-services-in-the-76-81-ghz-band>.

The Commission's rules (Title 47 Code of Federal Regulations (47 CFR)) are available at:

https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title47/47tab_02.tpl.

¹⁹ See KDB 653005, *supra* note 10.