U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

September 8, 2015

Exemption No. 12783
Regulatory Docket No. FAA–2015–1586

Mr. Paul Guckian
Vice President, Engineering
Qualcomm Technologies, Inc.
5775 Morehouse Drive
San Diego, CA 92121

Dear Mr. Guckian:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated April 30, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Qualcomm Technologies, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct research and development.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner is a DJI Flamewheel F450.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in

consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection[1]. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Qualcomm Technologies, Inc. is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

[1] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

Conditions and Limitations

In this grant of exemption, Qualcomm Technologies, Inc. is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the DJI Flamewheel F450 when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents,

the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N−Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on September 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/
John S. Duncan
Director, Flight Standards Service

Enclosures

April 30, 2015

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave., SE
Washington, D.C. 20590

Re: Exemption Request Pursuant to Section 333 of the FMRA and Part 11 of the Federal Aviation Regulations, Seeking Exemption from 14 C.F.R. Part 21 Subpart H; 14 C.F.R. § 21.191(a); 14 C.F.R. § 45.23(b); 14 C.F.R. § 45.27; 14 C.F.R. §§ 61.23(a) and (c); 14 C.F.R. §§ 61.101(e)(4) and (5); 61.113(a) and (b); 14 C.F.R. § 61.315(a); 14 C.F.R. § 91.7(a); 14 C.F.R. § 91.119(c) ; 14 C.F.R. § 91.121; 14 C.F.R. § 91.151(a)(1); 14 C.F.R. § 91.405(a); 14 C.F.R. § 91.407(a)(1); 14 C.F.R. §§ 91.409(a)(1) and (2); 14 C.F.R. §§ 91.417(a) and (b).

Dear Sir or Madam:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("FMRA") and 14 C.F.R. Part 11, Qualcomm Technologies, Inc. ("Qualcomm" or "Petitioner") hereby applies for an exemption from the listed Federal Aviation Regulations ("FARs") and any other necessary regulations to allow operation of its small Unmanned Aircraft Systems ("UAS") for research and development ("R&D") of technologies to improve UAS functionality, on the condition that Qualcomm's wholly experimental operations are conducted pursuant to the detailed parameters described herein. Qualcomm requests such authorization to conduct outdoor R&D focusing on important issues for the development of UAS, such as flight control algorithms, communications links, and particularly the use of terrestrial long-term evolution ("LTE") mobile broadband technology for reliable wireless communications to and from UAS. Qualcomm's R&D work will enable Qualcomm to validate its algorithms and pursue work to improve UAS communications links. The R&D will also explore potential use of terrestrial wireless networks to provide UAS command, control and payload capabilities that employ the very best in state-of-the-art LTE mobile broadband technology. Through this testing, Qualcomm will gather information that helps to advance the FAA's goals of integrating safe, advanced and efficient UAS operations into the National Airspace System ("NAS").

Qualcomm, a wholly owned subsidiary of Qualcomm Incorporated ("Qualcomm Inc."), operates at the forefront of mobile technology. Over the past several decades, Qualcomm has revolutionized mobile technology through its innovations, including originally developing 2G and 3G technology based on Code Division Multiple Access ("CDMA") to enable the first forms of wireless broadband communications over cellular phones and other devices and creating microprocessors that offer mobile users unparalleled speed and efficiency in transmitting data. More recently, Qualcomm has been a leader in developing LTE and incorporating this 4G technology into its chipsets powering mobile devices here in the U.S. and around the world. The enormous growth of the wireless communications industry is based in large part on Qualcomm's technological solutions. And now, Qualcomm seeks to bring the innovations that built the modern wireless communications industry into the growing UAS sector and help to pioneer the future of UAS flight control technology.

Qualcomm, like the FAA, is "committed to the safe and efficient integration of UAS into the NAS" and wants "this emerging technology to safely achieve its full potential."[1] And, as the more than nine hundred submitted Section 333 exemption petitions have demonstrated, there is a rapidly growing demand for UAS services and applications across countless industries, including agriculture, public utilities, cinematography, insurance, railroads, and real estate. These petitioners want to use UAS to take aerial photographs, make films, inspect infrastructure, improve agriculture, create maps, survey land, evaluate insurance claims, and deliver retail goods. Most of these same industries also rely heavily on wireless broadband communications, including the technologies developed by Qualcomm and incorporated into its chipsets.

Qualcomm can play a pivotal role in realizing the FAA's goals and unlocking the immeasurable potential of UAS by implementing new technologies that optimize UAS for functionality, efficiency, and safety. The R&D proposed herein will enable Qualcomm, under safe conditions that present no harm to aviation or the public, to validate its algorithms and perfect its flight control technologies so that it may offer these safe and tested innovations to consumers. Qualcomm's goal is to ensure that the UAS industry, using technologies developed by Qualcomm Inc., will be able to safely, efficiently, and more quickly address all of the societal needs that UAS have the potential to fulfill while maintaining the existing level of safety in the NAS.

Beyond the numerous benefits that Qualcomm's technologies will bring to the UAS industry and the general public, Qualcomm's own proposed testing has the benefit of being conducted in safe and controlled environments. Qualcomm will use testing sites that are outside densely populated areas, controlled as to public access, and selected to ensure no risks to members of the general public. The testing sites also will not be near conflicting facilities such as airports. The airspace used will be limited to Class G airspace and UAS flights will be restricted to no higher than 400 feet above ground level ("AGL").[2]

It would not be practical to use one of the established FAA test sites because of their distance from Qualcomm's R&D facilities in San Diego, California, and because they do not provide the necessary conditions for the types of testing contemplated by Qualcomm. The nearest FAA-approved UAS test site to Qualcomm's research facilities is the Nevada site, which is more than 350 miles away. Qualcomm depends on the expertise and collaboration of its engineers to make major technological developments, and having these innovators in close proximity to the testing is essential for success. Qualcomm can conduct its R&D more efficiently, effectively, and economically by having the tests occur in close proximity to Qualcomm and Qualcomm Research, its corporate research and development division.

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[1] *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap* 5 (2013), *available at* http://www.faa.gov/uas/media/uas_roadmap_2013.pdf.

[2] Qualcomm notes that the FAA has a policy of issuing Certificate of Waiver or Authorization ("COA") to Section 333 exemption holders for flights at or below 200 feet. If this petition is granted, Qualcomm will operate below 200 feet in accordance with the terms of this "blanket" exemption. Qualcomm plans to file for a separate COA to operate at its specific test sites for flights over 200 feet.

Accordingly, the FAA's grant of this exemption services the goals of advancing UAS capabilities in the United States consistent with ensuring safety for manned aircraft and the public.

I. REQUEST FOR SUMMARY GRANT

The FAA can issue a summary grant when it finds it has already granted a previous exemption similar to the new request. As described in detail below, Qualcomm is requesting to use a small UAS for outdoor R&D. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in this petition in Grants of Exemption Nos. 11311 to Next Generation Aviation Services, L.L.C. (*see* Docket No. FAA-2014-1055), 11315 to The Climate Corporation and Precision Planting, LLC (*see* Docket No. FAA-2014-1037), and 11290 to Amazon.com (*see* Docket No. FAA-2014-0474). In these grants, the FAA found that the enhanced safety achieved using an unmanned aircraft with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gave the FAA good cause to find that the UAS operation enabled by the exemptions were in the public interest. The reasons stated by the FAA for granting Exemption Nos. 11311, 11315, and 11290 also apply to the situation Qualcomm presents and a grant of this exemption is in the public interest.

II. REQUEST FOR EXEMPTION TO USE UAS FOR RESEARCH AND DEVELOPMENT AT QUALCOMM'S TEST SITES

A. Overview of Request to Use UAS for R&D at Qualcomm's Test Sites.

Qualcomm's UAS testing will further two main areas of research. The first relates to UAS functionality and safety measures. Qualcomm is developing manned and unmanned flight control algorithms, which run on Qualcomm's Snapdragon processors. Snapdragon processors are used today in a wide variety of wireless devices. These algorithms utilize proprietary control and computer vision engines running on custom test vehicles capable of flight and ground roving. These algorithms enable various activities including autonomous navigation, obstacle avoidance, waypoint to waypoint navigation, landing zone determination, stabilized hovering, and sensor aided dead reckoning, among others. Improving the technology used to conduct these activities has huge positive implications for safety and performance in the UAS industry. As such, one aim of the UAS testing that this exemption would provide is to validate these implementations and achieve the desired functionality and performance for operations in the NAS.

A second focus of Qualcomm's testing involves another crucial aspect of commercial UAS use – the communications link. A reliable, robust, and efficient communications link is an essential component of safe UAS operations. "Lost link" scenarios can present serious safety concerns, especially in unmanned operations. Qualcomm's testing will focus on various metrics to measure the quality of the communications link to and from UAS in a range of operating environments, which will help Qualcomm improve UAS-operator communications and thus have a tremendous positive impact on the safety of UAS operations.

Given the benefits of testing, Petitioner requests an exemption to conduct its R&D on property owned or leased by Qualcomm that is not open to public access and is restricted to its employees or consultants. Qualcomm will maintain controls so that the testing is conducted safely and without risk to the safety of the public. The sites will be located in either unpopulated areas or areas closed to the public and controlled as to access. They will be at least five nautical miles from the nearest airport and a sufficient distance away from densely populated areas and U.S. government installations or airfields. UAS flights will occur only in Class G airspace at altitudes of 400 feet or less AGL following submission of a Notice to Airmen ("NOTAM"),[3] and Qualcomm will use geo-fencing to ensure that its UAS remain within these boundaries. Testing at these sites will enable Qualcomm to conduct important R&D related to its innovative technologies.

B. Public Interest Benefits of Permitting Use of UAS for R&D.

Granting Qualcomm's request to use UAS for R&D is decidedly in the public interest, as the testing creates tremendous benefits for the future of UAS without hazard to the public. Given the test site parameters and flight limitations, Qualcomm's testing will not present a physical hazard to people on the ground below or aircraft in the NAS. As mentioned above, the test sites will be located in either unpopulated areas or areas controlled as to access, with flights occurring within predefined airspace surrounded by geo-fencing. Pilots operating the UAS will adhere to rigorous operational parameters and qualification requirements. Finally, the proposed operations pose no credible threat to national security due to UAS size, speed, location of operation, lack of explosive materials or flammable jet fuels, and inability to carry a substantial external load.

In addition to presenting no hazard, Qualcomm's testing will create immense public benefits. The ability of Qualcomm to validate and implement its flight control algorithms directly advances Congress's goal of integrating civil UAS into the NAS quickly and safely. Once Qualcomm can perfect its UAS technologies and introduce them to the market, the UAS that enter U.S. airspace will be more functional, efficient, and safe. Flight control systems equipped with Qualcomm processors will provide an unparalleled level of performance, bringing the industry closer to achieving its full potential. The public benefits of these technological developments are immeasurable, and will flow from such diverse operations as retail deliveries for consumers, safer ways to maintain infrastructure and conduct inspections, unmatched aerial imagery, and enhanced public safety.

Finally, Qualcomm is willing to share the results of its testing with the FAA on a confidential basis. Qualcomm will have unique insights into UAS flight control algorithms, communications links, and the use of terrestrial long-term evolution ("LTE") networks. The results of Qualcomm's testing may be useful to the FAA as the agency promulgates UAS rules and benefit the development of the commercial UAS industry as a whole. An FAA grant of Qualcomm's exemption request will result in numerous cognizable benefits and is certainly in the public interest.

[3] Qualcomm notes that the NOTAM may cover flights at a site on a continuous basis for a stated period of testing.

III. THE FAA'S LEGAL AUTHORITY TO GRANT THIS EXEMPTION REQUEST

Congress passed Section 333 of the FMRA to provide an avenue for safe UAS operations to begin more quickly than regulatory procedures would generally allow. This provision directs the Secretary of Transportation to consider whether certain UAS may operate safely in the NAS before completion of the rulemaking required under Section 332 of the FMRA. The Secretary is required to determine which types of UAS do not create a hazard to users of the NAS or the public or pose a threat to national security in light of the UAS's size, weight, speed, and operational capability and whether operation will occur near airports or populated areas and within the visual line of sight of the operator.[4] The FMRA illustrates Congress's intent to have the FAA issue exemptions and allow civil UAS to operate in the NAS, subject to conditions and parameters that ensure safe operation.

In addition, the Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority by its terms includes exempting civil aircraft, as the term is defined under § 40101 of the Act, which includes UAS, from the requirement that all civil aircraft must have a current airworthiness certificate. The Administrator may grant an exemption from a requirement of a regulation prescribed under §§ 44701(a) or (b) or in §§ 44702-44716 of the Act if the Administrator finds the exemption in the public interest.[5] An FAA grant of Qualcomm's exemption request is therefore squarely within the FAA's legal authority and would have the benefit of advancing Congress's goals in passing Section 333.

IV. APPLICATION INFORMATION

The name and address of the applicant are:

Qualcomm Technologies, Inc.
Paul Guckian
Vice President, Engineering
5775 Morehouse Drive
San Diego, CA 92121
pguckian@qualcomm.com
(858) 651-1547

Regulations from which the exemption is requested:

14 C.F.R. Part 21 Subpart H;
14 C.F.R. § 21.191(a);
14 C.F.R. § 45.23(b);
14 C.F.R. § 45.27;
14 C.F.R. §§ 61.23(a) and (c);
14 C.F.R. §§ 61.101(e)(4) and (5)
14 C.F.R. §§ 61.113(a) and (b);

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[4] FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, 126 Stat. 75-76 (codified as a Note to 49 U.S.C. § 40101).

[5] 49 U.S.C. § 44701(f). *See also* 49 U.S.C. § 44711(a); 49 U.S.C. § 44704; 14 C.F.R. § 91.203(a)(1).

14 C.F.R. § 61.315(a);
14 C.F.R. § 91.7(a)
14 C.F.R. § 91.119(c);
14 C.F.R. § 91.121;
14 C.F.R. § 91.151(a)(1);
14 C.F.R. § 91.405(a);
14 C.F.R. § 91.407(a)(1);
14 C.F.R. §§ 91.409(a)(1) and (2);
14 C.F.R. §§ 91.417(a) and (b).

V. THE AIRCRAFT: SPECIFICATIONS AND CONDITIONS

Qualcomm specifically proposes to conduct its R&D operations using UAS of its own design. Qualcomm's UAS is a custom-built multi-rotor aircraft that uses the DJI Flamewheel F450 airframe. Qualcomm has outfitted the Flamewheel airframe with an APM:Copter basic motor and an 11.8V LiPo battery, which facilitates up to 10 to 13 minutes of flight time with payloads under 1200 grams. The UAS uses the ESC 20 Amp electronic speed controller with SimonK, further equipped with Qualcomm chips, which incorporate the latest wireless technology. Further details about the UAS are available in the Operations Manual, which Qualcomm submits under separate cover and with a request for confidential treatment.[6]

Qualcomm may also wish to use aircraft with comparable characteristics and safety features. Qualcomm agrees that any UAS it uses for R&D will include, at minimum: geo-fencing at a maximum ceiling of 400 feet AGL, flight programming capabilities, a flight termination link available to the operator to prevent a "fly away," and safe abort procedures. The UAS will also have the capability of performing an operation such as return-to-launch if a failsafe is triggered due to lost ground control station signal, lost GPS lock, lost R/C transmitter signal, and low battery. The UAS will have markings identifying the serial number and identification (N-number) as large as practicable. Any UAS to be used will weigh less than 55 pounds including energy source(s) and equipment.

VI. OPERATING PARAMETERS FOR UAS USE AT QUALCOMM'S TEST SITES

Qualcomm proposes that its exemption request apply to civil UAS that have the characteristics and operate with the limitations listed herein. These limitations provide for at least an equivalent or even higher level of safety to operations under the current regulatory structure because the proposed operations represent a safety enhancement to the already safe operations conducted with conventional aircraft. Further details about the UAS and operating procedures are available in the Operations Manual.

The limitations and conditions to which Qualcomm agrees to be bound when using UAS to conduct R&D at Qualcomm test sites under an FAA-issued exemption include:

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[6] Petitioner submits its Operations Manual as a Confidential document under 14 C.F.R. § 11.35(b) as it contains proprietary information that Petitioner has not and will not share with others. The document contains operating conditions and procedures that are not available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. § 552.

A. UAS Pilot and Observer

1. The UAS R&D flights will be conducted by a pilot-in-command ("PIC") holding either an airline transport, commercial, private, recreational, or sport pilot certificate.[7] The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license.

2. All UAS R&D flights must utilize a visual observer ("VO").

3. The PIC and VO must be able to communicate verbally at all times.

4. Prior to the outdoor R&D flights, the pilot must have logged a minimum of five hours as UAS pilot operating the make and model of UAS to be utilized for operations under the exemption and three take-offs and three landings in the preceding 90 days.

    a. Training, proficiency, and experience-building flights can also be conducted under the FAA's grant of exemption to accomplish the required flight cycles and flight time.

    b. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the pilot must operate the UAS with appropriate distance from nonparticipants in accordance with 14 C.F.R. § 91.119.

5. Prior to any R&D flight authorized by this grant of exemption, the PIC and VO must have successfully completed a qualification process, as outlined in the Operations Manual.

    a. The qualification process will be developed and implemented by a qualified person designated at the sole discretion of Qualcomm.

    b. A record of completing of this qualification process must be documented and made available to the Administrator upon request.

B. R&D Parameters.

1. Aircraft will not carry pilots or passengers, and aircraft will not carry explosive materials or flammable liquid fuels.

2. UAS must be operated within visual line of sight of the pilot at all times.

3. UAS may not be flown at ground speeds exceeding 87 knots.

[7] Qualcomm will document its experience in using a licensed pilot during its tests and, based on its findings, may seek authority from the FAA to waive or alter the licensed pilot requirement for future Qualcomm tests.

4. Flights will be operated at an altitude of no more than 400 feet AGL.

5. Each UAS R&D flight will be conducted with a reserve that allows the aircraft to reach a pre-designated safe landing zone and have at least five minutes of battery power remaining.

6. UAS will not be operated over any person (other than participating Qualcomm personnel) below an altitude that is hazardous to persons or property on the surface in the event of a UAS failure or emergency.

    a. The Operator's Manual includes safety mitigations for authorized and consenting Qualcomm personnel.

    b. Operations will be conducted as far as practicable from non-participating persons.

7. The UAS will abort the flight in the event of emergencies in accordance with the Operations Manual.

8. The operator must obtain an Air Traffic Organization ("ATO") issued Certificate of Waiver or Authorization ("COA") prior to conducting any operations under this grant of exemption.

    a. This COA will also require the operator to request a NOTAM not more than 72 hours in advance, but not less than 48 hours prior to the operation.

9. R&D operations will be limited to the test site(s) meeting the criteria described herein.

10. The UAS pilot will establish a working relationship with a representative at the local Flight Standards District Office ("FSDO") with which to periodically review safety procedures and other operations to further enhance safety. The operator will submit a written Plan of Activities to the local FSDO at least 48 hours prior to conducting R&D operations, or less at the concurrence of the FSDO. The Plan of Activities will include:

    a. Dates and times for all flights;

    b. Name and phone number of the operator for the UAS and for the person responsible for on-site operations;

    c. Make, model, and serial or N-number of UAS;

    d. Name and certificate number of pilot(s);

    e. Signature of exemption holder or representative;

f. Description of flight activity, including maps/diagrams of area over which operations are occurring and essential altitudes.

11. The documents required under 14 C.F.R. § 91.9 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

12. The UAS must remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).

13. Qualcomm will ensure safety to first responder aircraft and helicopter traffic, and all other aircraft. Upon notification from manned aircraft controllers or through visual identification of manned aircraft, Qualcomm will immediately suspend the UAS flight until the airspace is cleared.

14. UAS operations may not be conducted during night, as defined in 14 C.F.R. § 1.1. All operations must be conducted under visual meteorological conditions ("VMC"). Flights under special visual flight rules ("SVFR") are not authorized.

15. The UAS may not be operated by the PIC from any moving device or vehicle.

16. The UAS may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

17. The UAS may not operate in Class B, C, or D airspace without approval from the FAA. The UAS may not operate within 5 nautical miles of the geographic center of a non-towered airport as denoted on a current FAA-published aeronautical chart unless an agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the Operator's COA. The letter of agreement with the airport management should be made available to the Administrator upon request.

18. Altitude information will be provided to the UAS pilot via a digitally encoded telemetric data feed, which downlinks from the aircraft to a ground-based on-screen display. The UAS may have a GPS altitude readout. Prior to each flight, a zero altitude initiation point will be established and confirmed for accuracy by the PIC.

19. Any incident,[8] accident,[9] or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board ("NTSB") per instructions contained on the NTSB Web site: www.ntsb.gov. Further flight operations may not be conducted until the incident, accident, or transgression is reviewed by AFS-80 and authorization to resume operations is provided.

C. Operations Manual.

1. The operator must follow the procedures as outlined in its Operations Manual.

2. The Operations Manual must be maintained and made available to the Administrator upon request.

D. Pre-Flight Inspections and Maintenance.

1. Prior to each flight, pilot will inspect UAS to ensure it is in condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft will be prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

a. The preflight inspection must account for all discrepancies not covered in the relevant preflight inspection sections of the Operations Manual (*i.e.* inoperable components, items, or equipment).

2. All maintenance and alterations will be properly documented in the aircraft records.

3. Any UAS that undergoes maintenance or alterations that affect the UAS operation or flight characteristics will undergo a functional flight test in accordance with the Operations Manual.

4. Petitioner will institute a maintenance program to ensure airworthiness of UAS as described in the Operations Manual. The operator will follow the

[8] The FAA uses NTSB's definition of accident and incident. "Incident means an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations." 49 CFR § 830.2.

[9] "Aircraft accident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. For purposes of this part, the definition of 'aircraft accident' includes 'unmanned aircraft accident,' as defined herein. *Id.*

manufacturer's UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.

5. Operator will develop procedures to document and maintain a record of the UAS maintenance, preventative maintenance, alterations, status of replacement/overhaul component parts, and the total time in service of the UAS. These procedures will be added to the Operations Manual.

6. Operator will develop UAS technician qualification criteria. These criteria will be added to the Operations Manual.

VII. SPECIFIC SECTIONS OF 14 C.F.R. FROM WHICH PETITIONER SEEKS AN EXEMPTION

Qualcomm requests exemption from the following Federal Aviation Regulations ("FARs") to the extent necessary to enable the requested UAS operations for the reasons detailed below.

A. 14 C.F.R. Part 21 Subpart H including 14 C.F.R. § 21.191(a) Experimental certificates

Subpart H, entitled Airworthiness Certificates, establishes the procedural requirements for the issuance of airworthiness certificates. Given the size and limited operating area associated with the aircraft to be utilized, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act[10] and Section 333 of the FMRA both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular UAS. In all cases, an analysis of these criteria demonstrates that the UAS operated without an airworthiness certificate, in the proposed environments and under the conditions proposed will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate without the restrictions and conditions proposed.

The UAS to be operated hereunder will weigh less than 55 pounds with payload, carry neither a pilot nor passenger, carry no explosive materials or flammable liquid fuels, and operate exclusively within the parameters stated in the Operations Manual. Unlike other civil aircraft, operations under this exemption will be tightly controlled and monitored by both the operator and under the requirements and in compliance with local public safety requirements, to provide security for the area of operation. The FAA will have advance notice of all operations via NOTAMS. Finally, the UAS, as a result of its size, weight, speed, operational capability, and operation within visual line of sight does not create a hazard to users of the national airspace system or the public or pose a threat to national security.

Petitioner also seeks relief from the requirements of 14 C.F.R. § 21.191(a) regarding experimental certificates for the same reasons as listed above. Given the size and limited

[10] 49 U.S.C. § 44701(f).

operating area of the UAS to be used by Qualcomm, an exemption from this provision meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the FMRA.

B. 14 C.F.R. § 45.23(b) Display of marks; general; 14 C.F.R. § 45.27 Location of marks; non-fixed wing aircraft

Section 45.23(b) requires markings in letters not less than 2 inches nor more than 6 inches high the word "experimental," as applicable. Section 45.27 requires that each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by § 45.23.

Given the size of the UAS, two-inch lettering will not be feasible. The UAS will also have no entrance to the cabin, cockpit, or pilot station on which the word "experimental" can be placed. The word "experimental" will be displayed on the aircraft, as applicable, in letters of legible size, in a location where the pilot, observer, and others working with the UAS will see the identification. The FAA has issued exemptions to § 45.23 in Exemptions Nos. 10700, 8738, 10167, 10167A, and 11062. The FAA issued an exemption to 45.27 in Exemption No. 8496B.

C. 14 C.F.R. §§ 61.23(a) and (c) Medical certificates: Requirement and duration; 14 C.F.R. §§ 61.101(e)(4) and (5) Recreational pilot privileges and limitations; 14 C.F.R. §§ 61.113(a) and (b) Private pilot privileges and limitations; 14 C.F.R. § 61.315(a) What are the privileges and limits of my sport pilot certificate.

Because the UAS will not carry a pilot or passengers, the proposed operations can achieve the equivalent level of safety of current operations under the above-mentioned rules by requiring the PIC operating the aircraft to hold either an airline transport, commercial, private, recreational or sport pilot certificate and a current FAA airman medical certificate or a valid U.S. driver's license.[11] The area of operation is controlled and restricted, and all flights are planned and coordinated in advance as set forth in the Operations Manual. The level of safety provided by the requirements included in the Operations Manual exceeds that provided by a single individual holding a commercial pilot's certificate operating a conventional aircraft. The risks associated with the operation of the UAS are so diminished from the level of risk associated with commercial operations contemplated by Part 61 when drafted, that allowing operations of the UAS as requested with a private, recreational, or sport pilot as the PIC exceeds the present level of safety achieved by the above rule sections. The FAA issued an exemption to this regulation in Exemption No. 11310, among others.

D. 14 C.F.R. § 91.7(a) Civil Aircraft Airworthiness

Petitioner seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in airworthy condition to be operated. The FAA has stated that no exemption is required to the extent that the requirements of Part 21 are waived or found inapplicable.

[11] As mentioned in note 6, Qualcomm's real-world experience testing UAS may impact Qualcomm's view of the necessity of using a licensed pilot. If Qualcomm revisits this issue with the FAA, Qualcomm will define safeguards to ensure that an equivalent level of safety can be achieved using non-licensed pilots.

Accordingly, Petitioner requests that the requirements for Section 91.7 be treated in accordance with Section VI(A), *supra*.

E. 14 C.F.R. § 91.119(c) Minimum safe altitudes over congested and other areas

Section 91.119(c) establishes safe altitudes for operation of civil aircraft over areas other than congested areas. Qualcomm requests relief from this section with respect to those participating persons, vehicles, and structures directly involved with R&D. The UAS will never operate at higher than 400 AGL. It will be operated in a restricted area, where buildings and people will not be exposed to operations without their pre-obtained consent. Relief from this provision is warranted as operations will be conducted with the safety provisions as outlined herein and in the Operations Manual. The FAA issued an exemption to this regulation in Exemption No. 11062.

F. 14 C.F.R. § 91.121 Altimeter Settings

This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "…to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the UAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the operator, pursuant to the Operations Manual, confirming the altitude of the launch site shown on the GPS altitude indicator before flight. The FAA issued an exemption to this regulation in Exemption No. 11062.

G. 14 C.F.R. § 91.151(a)(1) Fuel requirements for flight in VFR conditions

Section 91.151 (a)(1) prohibits an individual from beginning "a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing, and, assuming normal cruising speed – (1) During the day, to fly after that for at least 30 minutes."

Complying with the 30 minute reserve requirement in 14 C.F.R. § 91.151(a)(1), would unnecessarily limit the length of Qualcomm's UAS flights. Given the limitations on the UAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight conditions is reasonable. Operating the small UAS, in a tightly controlled area where only people and property owners or official representatives who have signed waivers will be allowed does not engender the type of risks that § 91.151(a)(1) was intended to alleviate given the size and speed of the small UAS. Additionally, limiting UAS flight minutes would reduce the utility of the flights for R&D for which the exemption will be granted. Qualcomm believes that an equivalent level of safety can be achieved by maintaining a reserve that allows the aircraft to reach a pre-designated safe landing zone and have at least five minutes of battery power remaining. The FAA issued an exemption to this regulation in Exemption No. 11062 and 10673.

H. 14 C.F.R. § 91.405(a) Maintenance required; 14 C.F.R. § 91.407(a)(1) Operation after maintenance, preventive maintenance, rebuilding or alteration; 14 C.F.R. §§ 91.409(a)(1) and (2) Inspections; 14 C.F.R. §§ 91.417(a) and (b) Maintenance records

These regulations require that an aircraft operator or owner "shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter...," and others shall inspect or maintain the aircraft in compliance with Part 43.

Given that these sections and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply to the Petitioner. Maintenance will be accomplished by the operator pursuant to the Operations Manual. An equivalent level of safety will be achieved because this small UAS is very limited in size, will carry a small payload, and will operate only in restricted areas for limited periods of time. If mechanical issues arise, the UAS can land immediately and will be operating from no higher than 400 feet AGL. As provided in the Operations Manual, the operator will ensure that the UAS is in working order prior to initiating flight, perform required maintenance, and keep a log of any maintenance performed. Moreover, the operator is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety. The FAA issued an exemption to these regulations in Exemption No. 11062.

I. Such other relief as the FAA deems appropriate to enable the requested operations.

Qualcomm also requests exemption from such other FARs as the FAA deems appropriate to enable the requested operations. If, during the effective dates of any Grant of Exemption issued pursuant to this Petition, the FAA issues interim or final rules for small UAS, Qualcomm requests that it be relieved of the requirements of any conditions and limitations of said exemption and allowed to comply with any less burdensome applicable regulations that may have become effective.

VIII. SUMMARY TO BE PUBLISHED IN FEDERAL REGISTER

Petitioner: Qualcomm Technologies, Inc.

Sections of 14 C.F.R. Affected: Part 21 Subpart H; § 21.191(a); § 45.23(b); § 45.27; §§ 61.23(a) and (c); §§ 61.101(e)(4) and (5); §§ 61.113(a) and (b); § 61.315(a); §91.7(a); § 91.119(c); § 91.121; § 91.151(a)(1); § 91.405(a); § 91.407(a)(1); §§ 91.409(a)(1) and (2); §§ 91.417(a) and (b).

Description of Relief Sought: Petitioner seeks relief from the requirements of 14 C.F.R. Part 21 Subpart H; 14 C.F.R. § 21.191(a); 14 C.F.R. § 45.23(b); 14 C.F.R. § 45.27; 14 C.F.R. §§ 61.23(a) and (c); 14 C.F.R. §§ 61.101(e)(4) and (5); 14 C.F.R. §§ 61.113(a) and (b); 14 C.F.R. § 61.315(a); 14 C.F.R. §91.7(a); 14 C.F.R. § 91.119(c); 14 C.F.R. § 91.121; 14 C.F.R. § 91.151(a)(1); 14 C.F.R. § 91.405(a); 14 C.F.R. § 91.407(a)(1); 14 C.F.R. §§ 91.409(a)(1) and (2); and 14 C.F.R. §§ 91.417(a) and (b) to conduct small unmanned aircraft systems (UAS) research and development operations subject to operating procedures that meet or exceed those that FAA requires for similar operations.

IX. CONCLUSION

Satisfaction of the criteria provided in Section 333 of the FMRA regarding size, weight, speed, operating capabilities, proximity to airports and populated areas, operation within visual line of sight, and national security, provide more than adequate justification for the grant of the requested exemption allowing operation of Petitioner's UAS for R&D related to development of UAS flight control technologies pursuant to the Operations Manual.

Finally, Qualcomm reserves the right to seek modification to any exemption granted to Qualcomm by the FAA as Qualcomm, the FAA, and other commercial UAS operators gain experience in this emerging UAS industry. Real world use of UAS may indicate that alternative requirements for UAS may be sufficient to protect safety to aircraft and persons on the ground. Qualcomm intends to examine these issues in its testing and looks forward to collaborating with the FAA going forward on achieving safe operations of UAS for commercial uses.

Please do not hesitate to contact Qualcomm's outside counsel, R. Michael Senkowski at 202-719-7249 or msenkowski@wileyrein.com, Katy Ross at 202-719-7410 or kmross@wileyrein.com, and Gary Michel at 202-719-7252 or gmichel@wileyrein.com, with any questions about this filing.

Sincerely,

/s/ Dean R. Brenner

Dean R. Brenner
Senior Vice President, Government Affairs

Qualcomm Technologies, Inc.

Attachment: Confidential Operations Manual