

**United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
RADIO STATION CONSTRUCTION PERMIT
AND LICENSE**

EXPERIMENTAL

(Nature of Service)

XT MO

(Class of Station)

WJ2XSO

(Call Sign)

0420-EX-CR-2020

(File Number)

NAME Thales Avionics, Inc.

Subject to the provisions of the Communications Act of 1934, subsequent acts, and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions and requirements set forth in this license, the licensee hereof is hereby authorized to use and operate the radio transmitting facilities hereinafter described for radio communications in accordance with the program of experimentation described by the licensee in its application for license.

Operation: In accordance with Sec. 5.3(h) of the Commission's Rules

Station Locations

- (1) MOBILE: CONUS and US territorial waters
- (2) MOBILE: Gulf of Mexico, Atlantic Ocean, Caribbean Sea

Frequency Information

MOBILE: CONUS and US territorial waters

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
27.912-28.128 GHz	MO	5M12G7D	79 W (ERP)	0.00001 %
28.438-28.563 GHz	MO	8M19G7D	53.83 kW (ERP)	0.00001 %
28.438-28.563 GHz	MO	6M14G7D	40.36 kW (ERP)	0.00001 %
29.3-30 GHz	MO	8M19G7D	53.83 kW (ERP)	0.00001 %

This authorization effective October 01, 2020 and
will expire 3:00 A.M. EST October 01, 2021

**FEDERAL
COMMUNICATIONS
COMMISSION**



Frequency Information

MOBILE: CONUS and US territorial waters

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
29.3-30 GHz	MO	6M14G7D	40.36 kW (ERP)	0.00001 %

MOBILE: Gulf of Mexico, Atlantic Ocean, Caribbean Sea

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
27.625-27.868 GHz	MO	5M12G7D	79 W (ERP)	0.00001 %
28.438-28.563 GHz	MO	8M19G7D	53.83 kW (ERP)	0.00001 %
28.438-28.563 GHz	MO	6M14G7D	40.36 kW (ERP)	0.00001 %
29.3-30 GHz	MO	8M19G7D	53.83 kW (ERP)	0.00001 %
29.3-30 GHz	MO	6M14G7D	40.36 kW (ERP)	0.00001 %

Special Conditions:

- (1) In lieu of frequency tolerance, the occupied bandwidth of the emission shall not extend beyond the band limits set forth above.
- (2) Licensee should be aware that other stations may be licensed on these frequencies and if any interference occurs, the licensee of this authorization will be subject to immediate shut down.
- (3) Stop Buzzer: Martin Matura (phone 321-292-0878) or Thales Network Operations Center (phone 407-812-2538; email MOC@us.thalesgroup.com).
- (4) Licensee is authorized to conduct tests on 4 units of 0.444- meter ACT-A ka-band antennas on board aircrafts (ESAA).

Special Conditions:

- (5) For communication between ESAA stations and GSO satellites, the operations are subject to the following conditions:

1)POINT OF COMMUNICATION: Geostationary-satellite orbit Satellites (GSO):
AMC-15 @105.05° WL (S2180), AMC-16 @ 85° WL (S2181), Echostar XVII
(Jupiter-1) @ 107.1° W.L. (S2753), Jupiter-2 @ 97.1° W.L. (S2834)

The ESAA stations are authorized to conduct tests via SES satellites AMC-15 and AMC-16 in the Ka bands 28.438 – 28.563 GHz and 29.5 – 30.0 GHz (Earth-to-space).

The ESAA stations are authorized to conduct tests via Hughes satellites Jupiter-1 and Jupiter-2 in the Ka bands 29.3 – 30.0 GHz (Earth-to-space).

Operations between ESAA and AMC-15 and AMC-16, Jupiter-1 and Jupiter-2 satellites are subject to applicable conditions listed in FCC File No.

SES-LIC-20170217-00183, Call Sign E170068, granted on 07/07/2017.

2)POINT OF COMMUNICATION: Thor -7 at 0.65° WL (NORAD ID: 40613) (owned by Norway's Telenor Satellite Broadcasting)

The ESAA stations are authorized to conduct tests via Thor -7 satellite in the 29.5-30 GHz frequency band.

Operations between ESSA and Thor -7 satellite are subject to the following additional conditions:

1. Flight test shall be over the North Atlantic Ocean and northeastern Canada.
2. Flight test shall not include U.S. airspace.
3. Beam coverage and tests provided by AMC-16 satellite in the CONUS and US territorial waters will be subjected to handing- off in the transatlantic region to provide continuous coverage without any disruption of connectivity.
4. Operations shall not exceed the Maximum EIRP of 45.4 dBW and the EIRP density of 18.4 dBW/4 kHz.
5. ESAA's authorized must cease transmissions when the antenna-to-GSO skew angle for antenna model MCT-A exceeds 40° and the off-axis EIRP spectral density emissions risk harmful interference to GSO space station. The ESAA(s) may resume transmissions once the risk of harmful interference has passed.
6. Authorization for operations by U.S.-registered aircraft outside U.S. territory, pursuant to this license, does not constitute a grant of access to the market in the United States under the Commission's DISCO II policies.

Special Conditions:

- (6) For communication between ESAA stations and NGSO satellites, the operations are subject to the following conditions:
- a.POINT OF COMMUNICATION: O3b Limited's NGSO (non-geostationary orbit space stations) satellites.
 - b.The ESAA stations are authorized to conduct tests in CONUS and US territorial waters via O3b Limited's NGSO satellites using the 27.912-28.128 GHz.
 - c.The ESAA stations are authorized to conduct tests in Gulf of Mexico, Atlantic Ocean, Caribbean Sea via O3b Limited's NGSO satellites using the 27.625-27.868 GHz bands.
 - d.The O3b "Florida Beam" will be used mainly for stationary tests to be conducted at Thales HQ lab facilities in Melbourne, FL, and for terrestrial-only mobile tests in the Melbourne area using Thales's custom van. In addition, the ACT-A may communicate with the Florida Beam during flight tests.
 - e.The O3b "San Andres Beam" will be used for flight tests over the Caribbean Sea to allow the ACT-A to test IFC service handovers between GEO (AMC-15) and MEO (O3b) satellites. Flight tests will be conducted using the US-registered, Gulfstream G3 aircraft. Flight tests will operate only in CONUS or above US territorial waters, the Gulf of Mexico, Atlantic Ocean, or Caribbean Sea. The ACT-A will not operate in the airspace or above territorial waters of any foreign country, and all test flights will originate and terminate within CONUS (no takeoffs or landings of the test aircraft will occur in foreign countries).
 - f.Operations in the 27.625-27.868 GHz and 27.912-28.128 GHz frequency bands must comply with Section 25.146(a)(2) of the Commission's rules and Article 22, Section II, and Resolution 76 of the ITU Radio Regulations. The equivalent power Flux-density limit, EPFD? must not exceed -162 dBW/m2 in 40 kHz bandwidth
 - g.The authorized ACT-A antenna is a moving antenna tracking an O3b satellite. The operations of ACT-A antenna must be in compliance with the following:
- | Maximum Frequency | Maximum Emission Designator | Authorized Power | EIRP |
|-------------------|-----------------------------|-------------------|----------|
| 27.912-28.128GHz | 5M12G7D | 79W (ERP) Maximum | 21.1 dBW |
| 27.625-27.868 GHz | 5M12G7D | 79W (ERP) Maximum | 21.1 dBW |
- (7) The authorized station's antenna performance specifications do not comply with Sections 25.218(i) and 25.209 of the FCC Rules. The operation of these antennas will not be protected from harmful interference caused by other geostationary satellite networks to the extent that harmful interference would not be expected to be caused to an antenna that is compliant with the antenna performance standards of Section 25.209.
- (8) Operations must comply with the applicable ESAA's requirement set forth in Section 25.228 (a), (b), (c), and (g) of the Commission's rules.
- (9) ESAAs in aircraft on the ground must not transmit at elevation angles less than three degrees. There is no minimum angle of antenna elevation for ESAAs while airborne

Special Conditions:

- (10) When operating in airspace within line-of-sight of the territory of a foreign administration where Fixed Service networks have an allocation in the 27.912-28.128 GHz, 28.438-28.563 GHz or 29.3-30.0 GHz frequency bands, the ESAs must not exceed the following EIRP limits:
+64 dBW in any 1 MHz band if Theta is less than or equal to 0°
+64 + 3*Theta dBW in any 1 MHz band if Theta is greater than 0° but less than or equal to 5°
where Theta is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.
- (11) Operation in the territory or airspace of any country other than the United States must comply with the applicable laws, regulations, and licensing procedures of that country, as well as with the conditions of this authorization.
- (12) The licensee shall comply with any pertinent limits established by the International Telecommunication Union to protect other services allocated internationally
- (13) Operations authorized pursuant to this license are operations by U.S.-registered aircraft anywhere within the coverage area frequency bands identified in the application for the satellites listed as points of communication. Operations authorized pursuant to this license also include operations by non-U.S.-registered aircraft within U.S. territory, including territorial waters.
- (14) Stations authorized herein must not be used to provide air traffic control communications
- (15) Operations of the authorized airborne antenna on board aircraft (ESAA) must be in compliance with the following additional conditions:
- a. Licensee's ESAA must employ a tracking algorithm that is resistant to capturing and tracking adjacent satellite signals, and each station must be capable of inhibiting its own transmission in the event it detects unintended satellite tracking.
- b. Licensee's ESAA must be monitored and controlled by a ground-based network control and monitoring center. Such stations must be able to receive "enable transmission" and "disable transmission" commands from the network control center and must cease transmission immediately after receiving a "parameter change" command until receiving an "enable transmission" command from the network control center. The network control center must monitor operation of each earth station to determine if it is malfunctioning, and each earth station must self-monitor and automatically cease transmission on detecting an operational fault that could cause harmful interference to a fixed satellite service network.
- c. Licensee must maintain a point of contact available 24 hours per day, seven days per week, with the authority and ability to terminate operations authorized herein, for discussing interference concerns with other licensees, and must submit a letter to be included in its license file with the name and telephone number of the point of contact prior to commencing operation.
- (16) Licensee must successfully secure consents from the Upper Microwave Flexible Use Service licensees throughout the proposed areas prior to operation in 27.5-28.35 GHz.

Special Conditions:

- (17) Licensee must successfully coordinate with the Fixed Microwave Service licensees throughout the proposed areas in accordance with 47 C.F.R, Part 101.103(d) prior to operation in 27.5-29.5 GHz band.
- (18) This authorization SUPERSEDES the previously issued authorization with the same call sign and file number: adding the condition.