



Iridium Certus™ 9770

Application Note

EXAMPLE DATE FOR EXPERIMENTAL LICENSE APPLICATION

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Owner	Doug Reveler



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Revision History

Version	Date	Author	Description
v0.1	25 July 2019	M. K. Hess	Data Items for Exp. Lic. App
v1.0	22 Aug 2019	D. Reveler	Added Exhibit 1 in line, extracted only Iridium technical fields

Publication History

Version	Date	Author	Description	Originating Document

Approvals

CCR #	Issue	CCB	Date

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The information in this document is proprietary to Iridium Satellite LLC. It may not be used, reproduced, or disclosed without written approval from Iridium Satellite LLC.



1 Introduction

Iridium® has a Value-Added Manufacturer (VAM) Beta program for the Iridium Certus™ 9770. As part of the Beta program, Beta VAM have procured Iridium Certus 9770 development kits, initially for bench evaluation. Some of Iridium's Beta VAMs may want to test the Iridium Certus 9770 over-the-air testing in advance of Iridium obtaining formal regulatory approval for the Iridium Certus 9770 transceiver. In this case, the Beta VAM needs to acquire an experimental license.

The purpose of this technical memo is to provide the various technical data items to VAMs to aid their completion of the FCC application for an Experimental Station License. Specifically, the document outlines Iridium technical information required to complete Form 442 along with its accompanying exhibit. Although this technical memo contains FCC specific forms, the information in this document may be pertinent to other countries as regulatory bodies typically request similar information.

This technical memo only provides Iridium specific technical information required to aid the VAM to complete the experimental license. In all cases, Iridium Beta VAM partners are responsible for accurately completing all regulatory filings.

Iridium approves the sharing of this documentation with the Federal Communication Commission (for USA based VAMs) or with an equivalent regulatory agency (for VAMs are based outside the USA) for the sole purpose of obtaining an Experimental Station License referenced above.

2 FCC Experimental License Form 442

This section describes the fields in Form 442 that require the VAM to provide Iridium specific technical information. The section does not describe all the fields in Form 442 that are VAM specific.

The legend for items in this section below are defined in this table below

Item	Description
Blue Item	Selective header items from Form 442 requiring Iridium technical responses
Black Item	Specific questions in a selective header (blue item) on Form 442 that require an individual response
Red Item in round brackets	Iridium specific technical information to provide for Form 442
Green Item in square brackets	VAM Partner specific technical information that should be provided.



Exhibit Information

(As per description in Exhibit 1)

Manufacturer

(9770 Dev Kit Iridium Satellite, LLC.)

[Number of units to be put on air. Note: It should match information provided in Exhibit 1]

Station Location

City State Latitude Longitude Mobile Street (or other indication of location) County Radius of Operation

[Your Company information]

Is a directional antenna (other than radar) used? (No)

Exhibit submitted: (Yes)

- (a) Width of beam in degrees at the half-power point: *(Blank)*
- (b) Orientation in horizontal plane (degrees from True North): *(Blank)*
- (c) Orientation in vertical plane (degrees from horizontal): *(Blank)*

Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? *[As pertinent to your situation]*

- (a) Overall height above ground to tip of antenna in meters: *(As per description in Exhibit 1)*
- (b) Elevation of ground at antenna site above mean sea level in meters: *(As per description in Exhibit 1)*
- (c) Distance to nearest aircraft landing area in kilometers: *[as pertinent to your situation]*
- (d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft: *[as pertinent to your situation]*

(Fill in table as below)



Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	1618.72500000- 1626.00000000 MHz	FX	1.6 W 4.800000 W	M	0.00210000 %	41K7Q7W	25,000
Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	1618.72500000- 1626.00000000 MHz	FX	1.6 W 4.800000 W	M	0.00210000 %	41K7Q7W	30,000
Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	1618.72500000- 1626.00000000 MHz	FX	1.6 W 4.800000 W	M	0.00210000 %	83K0Q7W	60,000
Action	Frequency	Station Class	Output Power/ERP	Mean Peak	Frequency Tolerance (+/-)	Emission Designator	Modulating Signal
New	1618.72500000- 1626.00000000 MHz	FX	6.0 W 9.000000 W	M	0.00210000 %	333KQ7W	175,000

3 FCC Exhibit 1 Form 442

The information in this section provides a sample Exhibit 1 form to provide with Form 442 (excluding the document's header and footer information). The Exhibit 1 is written for case that all Iridium Certus 9770 development kits are used at a single location.

Items enclosed in green square brackets are VAM specific items that need to be completed by the VAM in their application.

Request for Experimental Authorization

[YOUR COMPANY NAME] herein requests experimental authority to demonstrate and test earth station facilities in connection with Iridium Satellite LLC's non-geostationary satellite orbit space station constellation (Call Sign S2110) in the manner described below. [YOUR COMPANY NAME] seeks authority for a period of twenty-four (24) months.

The [NUMBER OF TEST UNITS (i.e. two (2))] earth station terminals are experimental proto-type terminals at a single location, fixed to the building. The antennas are low-gain omni-directional antennas with a hemispheric coverage having a maximum +3 dBi gain.

Necessary Bandwidth Description

The necessary bandwidth is determined by the frequency channelization that Iridium uses and is filed with other Iridium licenses. The frequency of a center of an Iridium channel can be calculated by this equation. There are 270 channels numbered 1 to 270 for transmit and 7 more that are receive only.

$$chan_{frequency} = 1616 \times 10^6 + \left((41.6666 \times 10^3) \times ((chan_{number} - 1) + 0.5) \right) MHz$$

Ground Station Locations

- [Building Name (i.e. HQ, Engineering Office)]
- [Latitude longitude (degrees, minutes, seconds format)]
- [Postal address (street, city, state)]
- [Antenna Elevation - Mean Sea level (in meters)]
- [Antenna Elevation - Absolute Ground Level (in meters)]

Table 1: Particulars of Operation

Lower Freq MHz	Upper Freq MHz	Input Power (watts) ¹	ERP (watts) ²	Mean /Peak	Freq. Tolerance (%)	Station Class
1618.725	1626.0	1.8	4.8	M	0.0021	FX
1618.725	1626.0	1.8	4.8	M	0.0021	FX
1618.725	1626.0	1.8	4.8	M	0.0021	FX
1618.725	1626.0	6.0	9.0	M	0.0021	FX

¹ **NOTE:** defined as the nominal mean power input from the 9770 into the antenna

² **NOTE:** ERP(dBW) = EIRP(dBW) – 2.15 dB.

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Table 2: Emission Data

Emission Designator	Modulating Signal	Necessary Bandwidth (KHz)
41K7Q7W	25,000	41.7
41K7Q7W	30,000	41.7
83K0Q7W	60,000	83.0
333KQ7W	175,000	333.33

Table 3: Waveforms and types of antennas used as well as the number of carriers

Waveform	Modulation Scheme	Antenna Type	Number of Carriers
B1 (Block 1)	DEQPSK	LGA	1
C1 (NEXT)	QPSK	LGA	1
C2 (NEXT)	QPSK	LGA	1
1XC8 (NEXT)	QPSK	LGA	1

Table 4: Beamwidth and Antenna Gain

	3dB Beamwidth (degrees)	Gain (dBi)
Transmit	Hemisphere Omni	3.0
Receive	Hemisphere Omni	3.0