Iridium Narrowband Series Product Certification Process Guide

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Revision History

Version	Date	Description
1.0	16 October 2024	Initial release
2.0	21 April 2025	Updated to reflect the new narrowband certification process. Updated document number from IR5187 to IRDM-5215.
3.0	28 May 2026	Updated to reflect the addition of the Iridium 9604 transceiver.
3.1	09 June 2026	In Appendix A, updated voltage specifications in Section A.2.2 and corrected a GPIO pin description for syncing for greater clarity in Section A.2.3.

Documentation Feedback

To provide feedback on this document, open a ticket in the Narrowband Partner Support portal or 9604 Partner Support portal (Iridium Service Desk) and under Component select Document Feedback.

Table of Contents

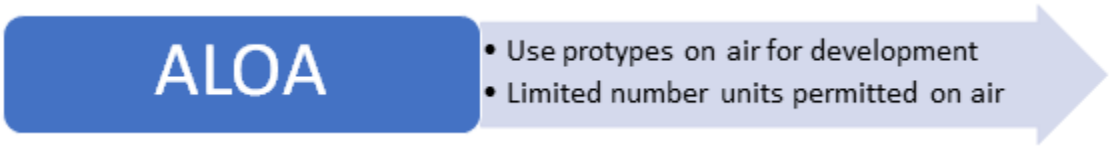
Revision History . . . 2
Documentation Feedback . . . 2
1. Introduction . . . 5
1.1. Document Scope . . . 5
1.2. Referenced Documents . . . 6
1.3. Abbreviations . . . 7
2. Overview . . . 8
2.1. Objective . . . 8
2.2. Certification Philosophy . . . 8
2.2.1. Same Base Unit - Different Antenna . . . 9
2.2.2. Same Base Unit and Antenna - Different Features . . . 9
2.2.3. Qualified Antennas . . . 9
2.2.4. OEM Product Certification Considerations . . . 10
2.2.5. Product Re-certification . . . 11
2.2.6. Antenna Only Certification Consideration . . . 11
2.3. Adding an Additional Vertical . . . 12
2.4. Product Classes . . . 12
2.5. Certification Test Configuration Mode . . . 13
2.6. VAM Manufacturing Expectations . . . 14
2.7. Certification Testing Options . . . 14
3. Certification Phases . . . 15
3.1. Certification Request . . . 16
3.1.1. Application Form . . . 17
3.1.2. Product Declaration . . . 18
3.2. Approval for Limited On-Air (ALOA) Operation . . . 18
3.2.1. Product Declaration Update . . . 18
3.2.2. Report Submission . . . 19
3.3. Iridium Certification Grant . . . 19
3.3.1. Product Declaration Update . . . 19
3.3.2. Test Reports . . . 19
3.3.3. Product Samples Submission . . . 19
3.3.4. User Manual . . . 19
3.3.5. PTT Products . . . 20
3.4. Audit . . . 20
4. Submissions . . . 21
4.1. Product Compliance Assessment (PCA) . . . 21

4.2. Hardware and L-Band Physical Layer Tests . . . 22
4.3. Antenna Tests . . . 23
4.4. Class 2 Tests . . . 24
4.5. Use Case Compliance . . . 25
4.6. Product Samples . . . 25
4.6.1. Sample Units . . . 25
4.6.2. User/Installation Manual . . . 26
4.7. Manufacturing Compliance . . . 27
4.8. Narrowband Transceiver Purchase Authorization . . . 28
Appendix A: All Classes CTC Preparation Instructions . . . 29
A.1. 9602/9603/9523 Modem Pin and Serial Port Access . . . 29
A.1.1. Modem Pin Definitions . . . 29
A.1.2. Confirm AT Commands Can Be Conducted via Pin Access . . . 31
A.2. 9604 Modem Pin and Serial Port Access . . . 32
A.2.1. Serial Port Access . . . 32
A.2.2. Power Supply Input and Monitoring . . . 32
A.2.3. Sync Out . . . 32
A.3. RF Port Access . . . 33
A.4. Powering the CTC Unit . . . 33
A.5. Supply Current Monitoring . . . 33

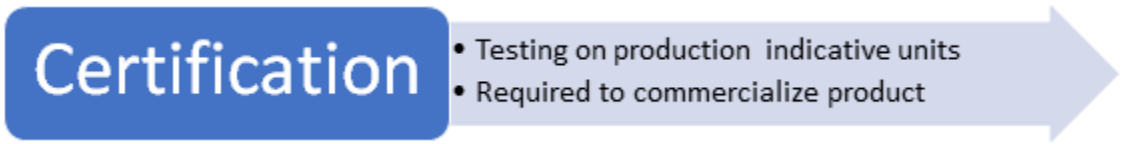
1. Introduction

The purpose of this guide is to describe the Iridium Certification process for products using the Iridium® narrowband series transceivers (includes the Iridium Core 9523, Iridium Core 9523N, Iridium 9602, Iridium 9603, and Iridium 9604). The Iridium Certification process for the Iridium narrowband series transceiver grants a Value Added Manufacturer (VAM):

a. Approval for Limited on Air (ALOA) operation for test and development purposes, and



b. Iridium Certification, which is necessary for a VAM to sell and activate commercial products on the Iridium® network. Iridium Certification is also referred to as Iridium Compatible Equipment (ICE) certification in commercial VAM agreements.



Prior to starting any Iridium narrowband series transceiver product development, a VAM must have signed a commercial agreement. The commercial agreement should include an exhibit that describes the VAM product. If this is not completed, please contact your account manager or Line of Business contact within Iridium.

1.1. Document Scope

This document outlines the process and items a VAM must provide for obtaining Iridium Certification. The certification test procedures and requirements are defined in the Referenced Documents. These documents are available on the Iridium for Partners (IFP) website.

1.2. Referenced Documents

For the latest Iridium partner documentation, log in to the Iridium for Partners (IFP) website at https://ifp.iridium.com/login and then go to the Resources section.

No.	Document Number	Document Description
[RD1]	IRDM-5215-CG-005	*Iridium Narrowband Series Product Certification Declaration Template*
[RD2]	IRDM-5215-TPR-005	*Iridium Narrowband Series Product Certification Hardware and Physical Layer Test Procedure*
[RD3]	IRDM-5215-PCA-004	*Iridium Narrowband 9600 Series Certification Product Compliance Assessment*
[RD4]	IRDM-5215-PCA-005	*Iridium Narrowband 9523 Series Certification Product Compliance Assessment*
[RD5]	MAN0009 v5.0	*Iridium ISU AT Command Reference*
[RD6]	IRDM-5215-TPR-006	*Iridium Narrowband Series Product Certification Antenna Test Procedure*
[RD7]	IRDM-5215-TPR-007	*Iridium Narrowband Series Product Certification Class 2 HW and PL TPR*
[RD8]	IRDM-5215-AQG-004	*Iridium Narrowband Series Antenna Qualification Declaration Template*
[RD9]	IRDM-5220-UDOC-001	*Iridium 9604 Hardware Development Guide*
[RD10]	IRDM-1113-AN-002	*Iridium Manufacturing Test Kit Application Note*
[RD11]	IRDM-5220-ICD-001	*Iridium 9604 AT Command Guide*
[RD12]	IRDM-5220-UDOC-003	*Iridium 9604 Technical Reference Guide*

Always use the latest published version of a referenced document.

1.3. Abbreviations

Term	Description
9523(N)	Refers to either the Iridium 9523 or the 9523N transceivers.
ALOA	Approval for Limited On-Air (ALOA) allows a VAM to go on-air for testing and development. ALOA is not equivalent to product certification.
Approvals_tx or Approvals_rx	Special test firmware for the Iridium transceiver that allows it to be placed into a continuous transmit or receive mode.
AT	Attention commands sent to the Iridium transceiver.
CTC	Certification Test Configuration (CTC) mode provides access to internal test points on a VAM product. Some of the certification tests require the use of CTC mode.
EoL	End of Line test tool, used by VAMs to test their products in an indoor environment. (Contact Iridium to purchase this tool).
ICE	Iridium Compatible Equipment is a term used in a VAM contract for Iridium certification.
IMEI	International Mobile Equipment Identity
IoT	Internet of Things
MTK	Manufacturing Test Kit
Model	The Model uniquely identifies a certified product in Iridium's provisioning system. The Model should match the product's name assigned by the VAM to sell and market the product.
PCA	The Product Compliance Assessment (PCA) is a spreadsheet that lists the test requirements for Iridium Certification. A VAM is expected to update the PCA to record the status for each test.
PTT	Push-To-Talk a voice service provided by the 9523(N) Iridium transceiver.
RF Path	The RF Path includes the antenna and any cable/components between the antenna and the Iridium narrowband series transceiver's RF connector.
V	Volts
VAM	Value Added Manufacturer

2. Overview

2.1. Objective

The objective of the Iridium Product Certification process is to confirm that a VAM product does not harm, interfere or disrupt in any way the Iridium satellite vehicles, RF links, command and control links, services, or data network(s), and operates in compliance with all of Iridium's applicable requirements, developer guides and specifications.

Iridium Certification does not confirm the quality of the VAM product. A VAM is expected to perform product quality tests for hardware, software, and service performance outside the certification process. Additionally, Iridium Certification does not imply that the VAM product complies with any regulatory or safety standards. A VAM is obligated to work with the appropriate agencies to obtain all necessary regulatory and other approvals prior to the commercial launch of their product.

2.2. Certification Philosophy

Iridium's certification philosophy for the Iridium narrowband series transceiver is that a VAM product, inclusive of all subassemblies, must be tested to all applicable requirements. This means, Iridium does not certify any Iridium narrowband series transceiver's subassemblies (for example, antennas) as standalone components. All Iridium Certification testing is performed on a complete terminal. At any point in the Certification process, Iridium reserves the right to request the VAM to perform additional testing (e.g. KPI testing) to validate the performance of the product undergoing Iridium Certification.

A VAM may require Iridium Certification for multiple products that share a common base unit but use different antennas or provide different functionality.

2.2.1. Same Base Unit - Different Antenna

A VAM may produce several models with different antennas that have the same base unit. Although the VAM base unit is identical between the product versions, a VAM must certify a product version for each antenna configuration.

2.2.2. Same Base Unit and Antenna - Different Features

If a VAM brings several product versions to market with different service feature sets (that is, data only, or voice and data), only a 9523(N) based product with Push-To-Talk (PTT) features requires additional testing than what is specified for data or voice and data. This does not require a separate certification for VAM products with PTT functionality. Please contact Iridium for more information.

2.2.3. Qualified Antennas

Qualified antennas offer several advantages to Iridium narrowband series VAM partners. They are easily identifiable for potential configurations and solutions, thereby reducing the development cycle for Iridium narrowband series VAM partners. For a list of qualified antennas, contact your account manager or visit iridium.com.

If the product uses a qualified antenna, then the only antenna test case that must be performed for final certification is EIRP. No antenna testing will be required for ALOA if a qualified antenna is used. If a qualified antenna is used in a manner that is not consistent with its qualification conditions, Iridium reserves the right to determine if any of the antenna test cases must be performed [RD8].

2.2.4. OEM Product Certification Considerations

This section defines the requirements for end users, system integrators, and distributors utilizing certified OEM products in their white-label, reused, or finished products. It ensures compliance with the certification specifications under which the OEM product was certified initially and listed in the certification letter. To maintain compliance, OEM manufacturers are responsible for sharing the certification letter with end users, system integrators, and distributors and ensuring proper configuration compliance. Supposing any modifications are made, or the end users' products deviate from accredited specifications, the OEM manufacturer must submit an updated Product Declaration or Delta Analysis to Iridium for review and further action. By adhering to this procedure, all parties ensure the correct use, certification criteria, and continued compliance of OEM products. Failure to comply with the certification specifications may result in Loss of OEM product certification. End users, system integrators, and distributors must comply with the following conditions:

- **Certified Specifications:**
  - The OEM product must only be used within the parameters defined in its certification letter.
  - Any modifications or use beyond the certified configuration is not permitted and may void the certification.
- **Integration with Other Components:**
  - If the certified OEM product is integrated into another system, the integration must not alter the product’s certified performance or introduce non-compliance.
  - Any changes affecting RF performance, electrical characteristics, or intended function require evaluation and potential re-certification by Iridium.
  - Any firmware or software updates must be approved by the OEM manufacturer and in alignment with the certification requirements.
- **Regulatory & Safety Compliance:**
  - End users ensure all installations comply with local, national, international, and applicable regulatory standards, and Iridium won’t be responsible in any manner.
- **Verification, Quality & Compliance Assurance:**
  - End users must reference the certification letter when signing agreements with the OEM-certified manufacturer to ensure compliance with the product use cases.
  - The certified OEM product must be installed per the manufacturer’s guidelines and the certification letter’s specifications.
  - Any installation outside of these guidelines requires consultation with the OEM manufacturer.

2.2.5. Product Re-certification

If a previously certified device is changed from the original configuration in any way, it may require re-certification. This includes alterations such as cosmetic modifications, standards updates, physical alterations, additional accessories (antennas), etc. The following diagram (Figure 1) outlines what re-certification will entail for each case, or if the changes will require a new certification to be issued. For any inquiries regarding this process, please contact Iridium.

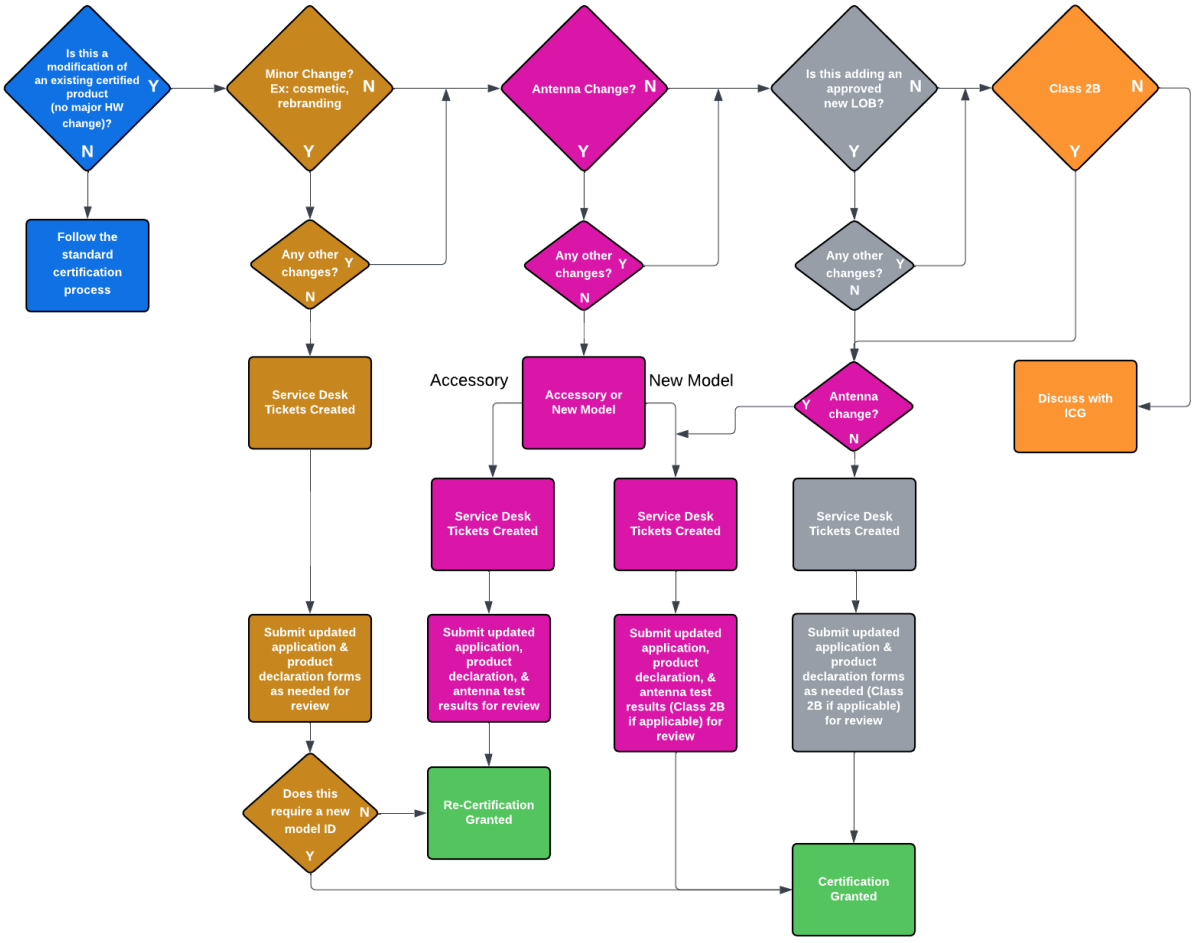


Figure 1. Re-certification Flow Chart

2.2.6. Antenna Only Certification Consideration

Currently, Iridium is no longer certifying antenna-only products for narrowband. Antennas must be combined with a partner's narrowband product to be eligible for certification. Previously "certified" antennas will be "grandfathered" into the list of qualified antennas.

2.3. Adding an Additional Vertical

Since Iridium uses the product certification process to match a Model to vertical industry price plans, a VAM must “re-certify” the product for a new vertical industry to sell into additional market verticals. The certification process should be largely a paper exercise if there are no changes to the product (that is, new antenna, new services, modified base unit). As part of the paper exercise, a VAM submits a certification application and the appropriate documentation that can include pre-existing test reports.

All re-certification requests for use in a different market vertical require the Iridium Line of Business lead’s approval.

2.4. Product Classes

Iridium classifies VAM products for certification purposes into a Product Class. The certification process and the corresponding test procedures referenced by this document support the VAM product classes defined in the table below.

Table 1. Product Classes

Product Class	Document Description
Class 1	VAM product has no active components in the RF Path and no collocated transmitters or antennas. Receive-only antenna(s) and devices such as a GNSS receiver are allowed.
Class 2A	VAM product has active components between the transceiver and the passive antenna. Typical examples of active components include switches and non-linear devices such as active splitters and lightning arrestors. **Note: At this time, products based on the Iridium 9604 are not eligible for certification as Class 2A. Upon resolution of pending requirements, Iridium expects to remove this restriction. Contact Iridium for more information.**
Class 2B	VAM product contains a co-located transceiver in the same housing as the Iridium narrowband series transceiver. Typically, co-located transceivers include Wi-Fi and Bluetooth. Receive only devices such as a GNSS receiver is not a co-located transceiver.

All VAM products must pass the baseline procedures defined by Class 1. VAM products in Class 2A or Class 2B must be tested to additional requirements.

* VAM products with a power amplifier are not in the scope of this certification procedure.

** For any product using an Iridium narrowband series transceiver that is not co-located in a housing with other transmitters but uses a multi-use antenna with other transmitters or antennas in the same antenna housing, this will be considered Class 2B.

2.5. Certification Test Configuration Mode

Some certification test procedures require the use of Certification Test Configuration (CTC) mode. As shown in Figure 2 below, CTC mode provides external access to several test and monitoring points.

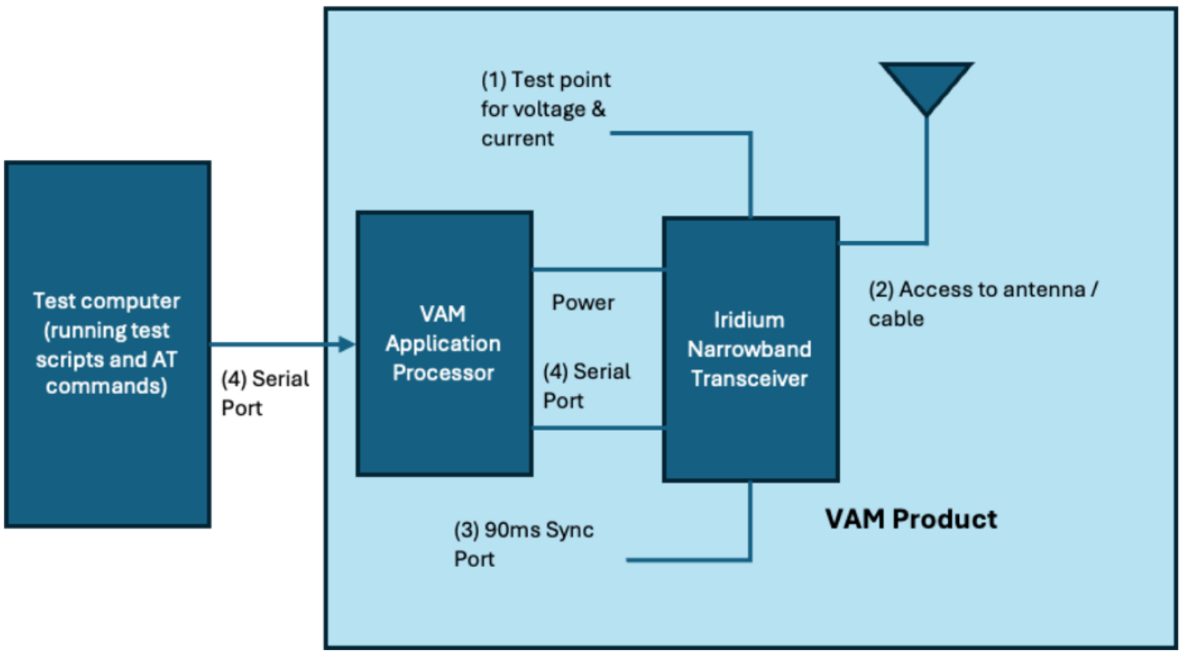


Figure 2. Certification Test Configuration (CTC) Mode

CTC mode requires access to the serial pins of the transceiver. Both the VAM and Iridium (for audit purposes) require external access to the serial pins (port) along with instructions to use "Approvals_rx" and "Approvals_tx" modes (for the 9602/9603/9523 based devices). Per the figure above, the serial pins can either be brought out of the product via wires and a header connection (see Appendix A) or transparently through the VAM application processor.

Note: for the 9604 a test token must be obtained. As detailed in [RD11] the test commands and DLOG access are locked behind a token. To obtain the token, issue the AT command described in [RD11] to generate a "challenge", providing that "challenge" to the Authorization Broker will generate the token response to be sent to the 9604 via AT command. Contact Iridium for more information.

In addition to providing access to the serial port pins, the VAM product must provide easy external access to the following monitoring points:

1. Measuring the input voltage and current to the Iridium narrowband series transceiver.
2. Providing access to the antenna cable and the Iridium narrowband series transceiver's RF connector. This monitoring point allows the Iridium narrowband series transceiver and/or the RF Path to be replaced with bench test equipment.

3. 90 ms Sync Port for performing RF transmit and receive measurements. Access to this port allows test instruments to synchronize the bursts to the frame. This must be brought out to a header pin. For products including a 9602, 9603, or 9523 transceiver, the port shall support a sync-in signal, for products using a 9604 transceiver, the port shall support a sync-out signal. **Consult Iridium for further information**.
4. Serial port connection for running test scripts (if needed), configuring the VAM product, providing AT commands to the transceiver, as well as for loading the Approvals firmware (9602/9603/9523 based devices) or entering test mode (9604 based devices).

NOTE An RS232 to TTL level shifter may be needed to be implemented for the serial port connections if testing is done by some other party than Iridium. Consult Iridium for further information.

2.6. VAM Manufacturing Expectations

Over time, changes in a VAM's manufacturing process could affect the Iridium narrowband series transceiver's performance such that a product no longer meets the certification requirements. Consequently, the Iridium Certification Process includes manufacturing requirements to monitor the Iridium narrowband series transceiver's performance. Refer to Section 4.7 for more information.

2.7. Certification Testing Options

Partners have four options for device testing. The first and most recommended option is to utilize a approved third-party test house. This approach expedites certification testing completion. Iridium maintains a comprehensive list of globally trained test houses. For further details, contact Iridium.

The second option permits partners to conduct testing at their facilities. This method allows in-house testing followed by submission of results to Iridium for review. Cost savings in shipping and test time are achievable if the partner possesses the necessary resources.

The third option entails contracting with a partner's preferred test house. Before sharing documentation with the test house, the required non-disclosure agreements (NDAs) must be in place. Contact Iridium before making such arrangements to ensure all necessary documentation is in place.

The final option involves Iridium conducting testing at our US-based facility in Arizona. Iridium provides a complimentary one-time test on your device. In the event of device failure, subsequent testing will be conducted by the partner, one of the approved test houses, or the partner's preferred test house.

Should you have any inquiries regarding testing options, please contact Iridium for further clarification prior to conducting any testing. This proactive approach will assist in mitigating any potential delays or additional costs associated with testing the partner's device.

3. Certification Phases

The Iridium narrowband series transceiver certification process has four phases.



The certification process formally starts with a Certification Request. In this first phase, the VAM provides some product details. Typically, a VAM makes the Certification Request when they have a product that is ready for testing.

The second phase is Approval for Limited On-Air (ALOA) operation. In this phase the VAM obtains authorization to go on-air for development and test purposes, possibly using prototypes or early production units. Some VAMs may elect to skip ALOA and proceed directly to the Iridium Certification phase, or some VAMs may submit multiple versions of their prototypes for ALOA before they proceed to the final Certification Grant phase.

The third phase is the Iridium Certification Grant. After completion of this phase (successful completion of all applicable tests), the VAM's product obtains an Iridium Certification Grant. Iridium Certification is also referred to as Iridium Compatible Equipment (ICE) as per the commercial VAM agreement. Iridium Certification is a requirement for a VAM to sell a product commercially that incorporates the Iridium narrowband series transceiver.

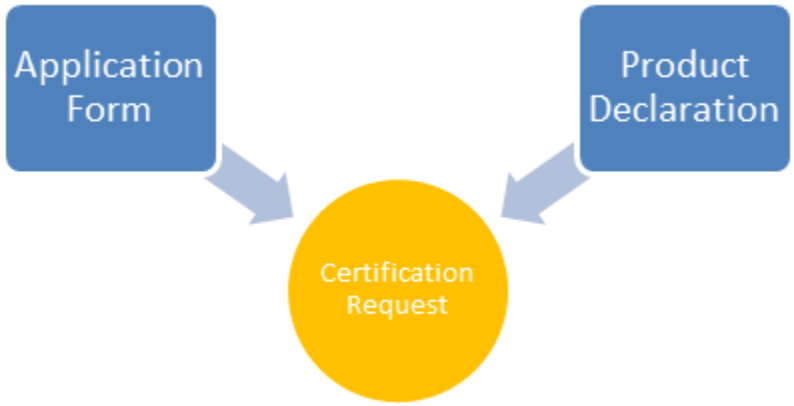
The final phase is the Audit phase. This phase allows Iridium to request a random sample from production to ensure consistency in the performance and quality of the certified product.

3.1. Certification Request

Certification Request is the first phase of the certification process. In this phase, a VAM makes a formal request to start the certification process. This phase typically starts after a VAM has progressed its product design and is ready to start testing.

The VAM's Certification Request includes two submissions:

1. Application Form
2. Product Declaration



The following sections provide more details on the information required for the Narrowband Certification Request. In addition, the reference document [RD1] provides a format template on how to prepare the Product Declaration.

3.1.1. Application Form

The submitted Application Form registers the certification request, submitted through Service desk tickets or an online form. The exhibit should describe the product as defined in prior commercial discussions between the VAM and Iridium.

The Narrowband Certification Application Form requests the following information:

- Company Name
- Contact Details
- Product Name
- Request type
  - New product concept, or
  - Modification of an existing certification
- Model
  - Product's name as found on external labels and marketing collateral
- Product Class
  - Either Class 1, Class 2A or Class 2B
- Vertical Industry
  - Land Mobile, Aviation, Maritime, IoT
- Iridium Transceiver Model
  - 9602 / 9603 / 9523(N) / 9604
- Iridium Services
  - SBD, Voice, Data
  - Push-to-Talk (PTT)
- Key Dates
  - Completion of Iridium Compatible Equipment Certification
  - Expected Market Announcement Date
- Iridium Contact
  - Iridium contact supporting the VAM Product concept

A review is conducted of all documentation presented, additional requests for information may be made during this time. When all information has been reviewed, a determination of which tests are required will be made.

3.1.2. Product Declaration

The Product Declaration describes the VAM product and provides design details. A template for the Product Declaration is provided in the reference document [RD1].

If the VAM changes the product definition, additional Product Declarations are required for Iridium Certification. The final Product Declaration ensures that Iridium has the product details of the terminal that went into production.

For Iridium Certification Grant requests, the Product Declaration document describes the product's planned purpose, function, high-level design, typical use cases, operating and environmental specifications, and expected data use. The Product Declaration document should also include design elements such as block diagrams, antenna selection, mechanical and thermal design, power supply overview, voice service descriptions, diagnostic capabilities, and boot procedure.

3.2. Approval for Limited On-Air (ALOA) Operation

In the Approval for Limited On-Air operation (ALOA) phase, Iridium authorizes a partner to go on-air simultaneously with no more than six (6) units to develop and test their product. ALOA expires after one year by which time a VAM is expected to complete their product certification.

To obtain ALOA, a VAM submits a Product Declaration and test reports that demonstrate the product can safely use the Iridium network. The test requirements for ALOA are a subset of the test requirements for Iridium Certification. Further, if a Class 1 product uses a qualified antenna, antenna testing is not required.



3.2.1. Product Declaration Update

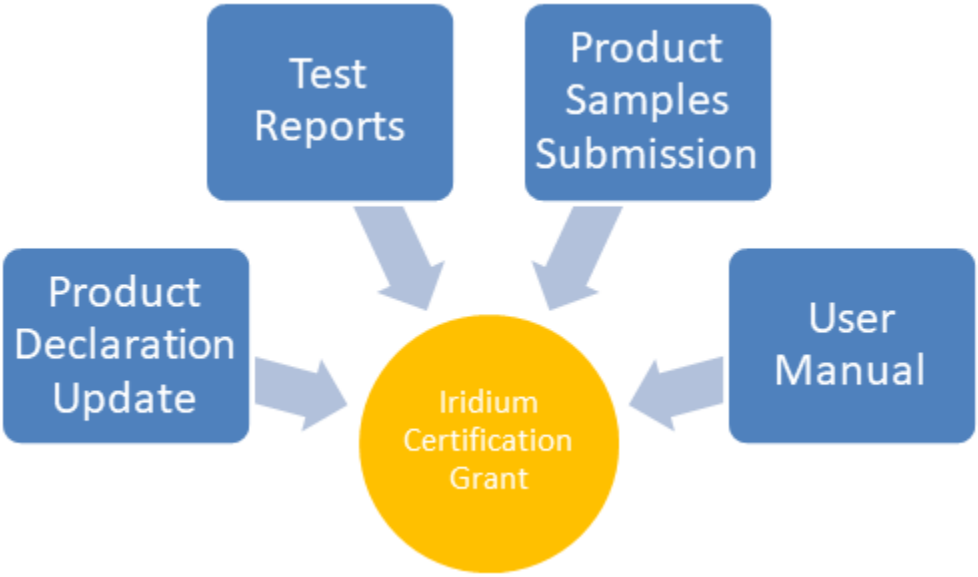
An updated Product Declaration should be submitted during the Certification Request phase with any pertinent product changes to the document.

3.2.2. Report Submission

The Test Reports submitted at ALOA are a subset of the tests required for Iridium Certification. Refer to Section 4 for details.

3.3. Iridium Certification Grant

A VAM must submit the items outlined below to obtain Iridium Certification.



After a product is certified, the certification letter is placed in the Service Desk for the partner. The certification letter identifies the model, configuration, antenna, and market segment.

3.3.1. Product Declaration Update

An updated Product Declaration should be submitted during the Certification Request phase with any pertinent product changes to the document.

3.3.2. Test Reports

All test reports must be completed and submitted using a production-indicative product. Refer to Section 4 for a description of the reports required for submission.

3.3.3. Product Samples Submission

Iridium reserves the right to request a product sample for review before the Certification Grant. Refer to Section 4.6.1 for more information.

3.3.4. User Manual

Partner shall provide a completed User Manual for review by Iridium.

3.3.5. PTT Products

For partner products that are utilizing the PTT voice service available on the 9523(N), a use case summary needs to be provided and reviewed by Iridium.

3.4. Audit

In the audit phase, Iridium may ask the VAM to provide manufacturing test data to confirm that all shipped products were tested in accordance with the manufacturing requirements defined in the Iridium Certification process.

Additionally, Iridium may request a random sample product from a production build at any time to confirm the product conforms with Iridium Certification requirements and matches the information provided by the VAM in their Product Declaration.

If a product is not in compliance with its Iridium Certification requirements, Iridium may revoke the product's Iridium Certification.

4. Submissions

For the Iridium Narrowband Certification Grant phases, a VAM must submit their test reports and an updated transceiver-associated Product Compliance Assessment (PCA) which summarizes the results of all tests and declarations against the certification requirements. Refer to PCA-004 [RD3], which is for Iridium 9600 series based products (9602, 9603, and 9604), and and PCA-005 [RD4] is for 9523(N) based products.

During each phase of certification testing, a VAM should submit test documentation as a snapshot of the product's testing progress and status at that time. With snapshots of progress, Iridium can review interim submissions and provide more timely feedback.

A VAM product's operating specifications and use case definitions defined in the Product Declaration are inputs to the test procedures. For example, some tests require minimum and maximum temperature testing as per VAM-supplied specifications, and some tests need to be performed with the end-user-supplied power cables to confirm the power supply's operation.

All test reports and procedures should be reported as per the test procedures. It is important that the test reports include the date the test was performed, the transceiver's IMEI, and software versions for both the Iridium narrowband series transceiver and the product.

4.1. Product Compliance Assessment (PCA)

The Product Compliance Assessment (PCA) is a single file that is an integral part of the submission process. The PCA file has two sections:

- A header section describing the product, submission type, and date
- A list of test requirements with a column for a VAM to enter the test status

A VAM must **update the header section** of the PCA every time they submit a new test report.

Table 2 illustrates the category of tests in the PCA. For each category, the PCA details specific test requirements and identifies if the test is required for the Iridium Certification Grant phases. As per Table 2, each test requirement contains a test status and an artifact location/comment entry for a VAM to complete. With each test report submission to Iridium, a VAM must update the test status entry in the PCA. Depending on whether the product uses a qualified antenna or not, the required test cases may vary, so use the appropriate columns as applicable to determine which requirements must be filled out.

Table 2. PCA Overview

Requirement Category	Approval for Limited On-Air Approval (ALOA)	Iridium Certification Grant	Test Status	Artifact Location/ Comment
Hardware Test	A subset of tests at room temperature **(ALOA)**	All tests with minimum, maximum and room temperature coverage	VAM to complete	VAM to complete
Antenna Test	A subset of tests at room temperature or No antenna testing required if a qualified antenna is used	All tests, with minimum, maximum and room temperature coverage		
L-Band Physical Layer	A subset of tests at room temperature	All tests, with minimum, maximum and room temperature coverage		
Sample Product	Not Applicable	Sample units and documentation		
Class 2	Subset of tests at room temperature	All tests with minimum, maximum and room temperature coverage		
Use Case	Not Applicable	All		
Manufacturing	Not Applicable	All		

4.2. Hardware and L-Band Physical Layer Tests

Table 3 provides a summary of the combined Hardware and L-Band Physical Layer tests in the PCA that are required for certification. Test procedures for the Hardware and L-Band Physical Layer Tests are found in the reference document [RD2]. As per Table 3, a subset of the tests is required for ALOA.

The Hardware and Physical Layer tests should be executed prior to the Antenna tests and Class 2 test procedures.

Table 3. Hardware and L-Band Physical Layer Testing Summary

Test Name	Test Required for		Test Description
	ALOA	Iridium Certification Grant	
Error Vector Magnitude (EVM)	Yes	Yes	Signal quality measurement with vector signal analyzer
In-band Spurious	Yes	Yes	Includes adjacent channel power to Iridium
Out-of-Band Spurious Emissions	No	Yes	Based on international standards
Voltage Input	No	Yes	Compliance with voltage input specification including VAM product's power cables
Receive Scan	Yes	Yes	Scan for any internal leaking power (i.e., switching power supplies, processors etc.) that can harm and interfere with any of the iridium channels

A VAM can execute the Hardware and Physical Layer tests themselves; however, they are encouraged to use a third-party qualified test lab approved by Iridium. A third-party lab is recommended as the test procedures require familiarity with specialized RF test equipment that must be configured to properly perform the specified measurements. Contact Iridium to obtain contact information for recommended third-party test labs.

4.3. Antenna Tests

An antenna's performance can vary significantly depending on its mounting and the proximity of a ground plane. Given that an antenna's performance is affected by its mounting, a VAM must declare the end user antenna mounting options (i.e., mounting on a ground plane, mounted without a ground plane, mounted on edge of a ground plane) in the Product Declaration and test the antenna in these configuration(s).

A summary of the antenna tests requirements is itemized in Table 4. As per Table 4, only the EIRP test is required for ALOA. There is an ALOA test exemption for a Class 1 Product that uses a qualified antenna with a direct connection to the transceiver's RF connector. Refer to the PCA for details.

All antenna tests must consider not only the antenna element, but also the cable system that connects to the Iridium Narrowband series transceiver's RF connector. Collectively, the antenna, cable, and related circuitry are referred to as the RF Path.

Table 4. Antenna Testing Summary (Refer to the PCA for a definitive list of tests)

Test Name	Test Required for		Test Description
	ALOA	**Iridium Certification Grant**	
Antenna Gain test	No	Yes	Accomplished with Gain measurements over elevation and azimuth
Antenna Cross-polarization	No	Yes	Cross Polarization Discrimination Ratio measurement
Antenna G/T	No	Yes	Accomplished with G/T measurements over elevation and azimuth
EIRP	Yes	Yes	Vector signal analyzer over azimuth and elevation
VSWR	No	Yes	Antenna port protection against reflected power

The antenna test procedures are described in reference document [RD6]. These tests must be performed at a qualified lab to ensure that these critical tests are performed accurately. The advantage of using an antenna provider's lab is a VAM can ensure the antenna performs optimally when integrated in the VAM product. Further, an antenna partner may already have some test reports that can be reused, especially if the VAM product uses an external antenna.

4.4. Class 2 Tests

All Class 2 products must meet the Class 1 test requirements. Table 5 summarizes the additional testing requirements for Class 2 products. Refer to the PCA for details on each test requirement and reference document [RD7] listed in the Referenced Documents for a description of the Class 2 test procedures.

All Class 2B products must be done with the co-located transceiver(s) and the Iridium narrowband series transceiver simultaneously transmitting.

Table 5. Class 2 Testing Summary (Refer to the PCA for a definitive list of tests)

Test Name	Class 2 Type	Test Required for		Test Description
		ALOA	Iridium Certification Grant	
Receiver Interference	2B	Yes	Yes	Operating in presence of an interferer
Transmit and Receive bursts	2A	No	Yes	Able to transmit and receive all burst types
Transmit ACPR	2A	Yes	Yes	Confirm no adjacent channel interference
Receiver Blocking	2A	No	Yes	Operating in presence of an interferer
Receiver SNR	2A	No	Yes	Confirm receiver operation
Regulatory	2A	No	Yes	FCC Part 25

4.5. Use Case Compliance

The PCA defines mandatory use case testing that must be completed for the Iridium Certification Grant phase. Depending on the test, a VAM may need to provide a compliance statement and/or provide a test report.

4.6. Product Samples

Iridium requires product samples for the Iridium Certification Grant phase. Requirements for the Product Sample submission are in the PCA.

At its discretion, Iridium may test some units and compare results to the VAM's submitted test report during the certification process if the product has not been tested by Iridium. This test audit allows Iridium to assess the accuracy of the VAM testing and the completeness of the test results.

4.6.1. Sample Units

The VAM is required to deliver two products to Iridium along with two sets of cables and all accessories (if any) required to use the product. One of the two units must be in Certification Test Configuration (CTC) mode as per Section 2.5. The other submitted product must be a standard production unit. All products should be labeled to identify the product name/model and IMEI.

In cases where a VAM is certifying several products that have a common base unit and different external antennas, a VAM only needs to submit one base unit and all applicable antennas for each certified product type.

Iridium shall keep the standard production unit and return the CTC unit to the VAM at the end of the certification process.

Iridium recommends that the VAM provide Iridium with a checklist of items and their tested configurations in advance of shipping samples. The checklist helps remove additional delays by allowing Iridium to confirm in advance that it will be receiving the required items, in the expected configurations and with proper documentation.

4.6.2. User/Installation Manual

A VAM must submit a user and/or installation manual. Iridium reviews the manual(s) to confirm that the product's specifications and antenna mounting instructions align with the Product Declaration and submitted test reports.

4.6.2.1. Self-Declaration Procedure for Compliance with PCB Trace Topology (9604 based product only)

The VAM shall outline a product's compliance with Microstrip requirements. This self-declaration ensures that the PCB design meets industry, regulatory, and Iridium signal quality requirements, impedance control, and electromagnetic performance standards. The PCB trace design shall be part of the product declaration as a self-declaration, see [RD9] for details. This procedure ensures that all PCB designs meet high-performance standards, facilitating reliable product development and certification. To qualify for self-declaration, the product must present and adhere to the following Microstrip PCB design principles for review, approval, and post-certification audit:

- Impedance: Trace width and dielectric material properties to achieve the required impedance.
- Trace Routing: Proper trace width and spacing via structures to minimize signal loss and reflection.
- Manufacturing: PCB fabrication follows controlled tolerances to maintain PCB trace topology's performance.
- Self-Declaration includes:
  - Design Validation:
    - VAM's product design and engineering team uses simulation tools (e.g., Altium Designer) to ensure that the product's PCB design meets topology standards.
  - Documentation:
    - Partner will provide all compliance design parameters and test results as supportive documents for the self-declaration.
  - Issuance of Self-Declaration Statement & approval:
    - Once all criteria are met, VAM issues a Self-Declaration of Compliance as part of the product declaration service desk ticket as part of product certification deliverable.

If any design modifications impact signal quality, a reassessment is required, and a new self-declaration must be issued.

4.7. Manufacturing Compliance

Iridium requires a VAM to test their products on an ongoing basis to ensure that they continue to conform with the certification requirements.

Manufacturing testing requires the use of Iridium's MTK to verify the Iridium narrowband series transceiver's receive and transmit functionality when the transceiver is placed in "loopback". VAMs **shall not** use over-the-air testing in their manufacturing test. The MTK is an Iridium 9700 series HDK with a special authorization token. The test configuration is shown in Figure 3. Contact Iridium for details on the MTK.

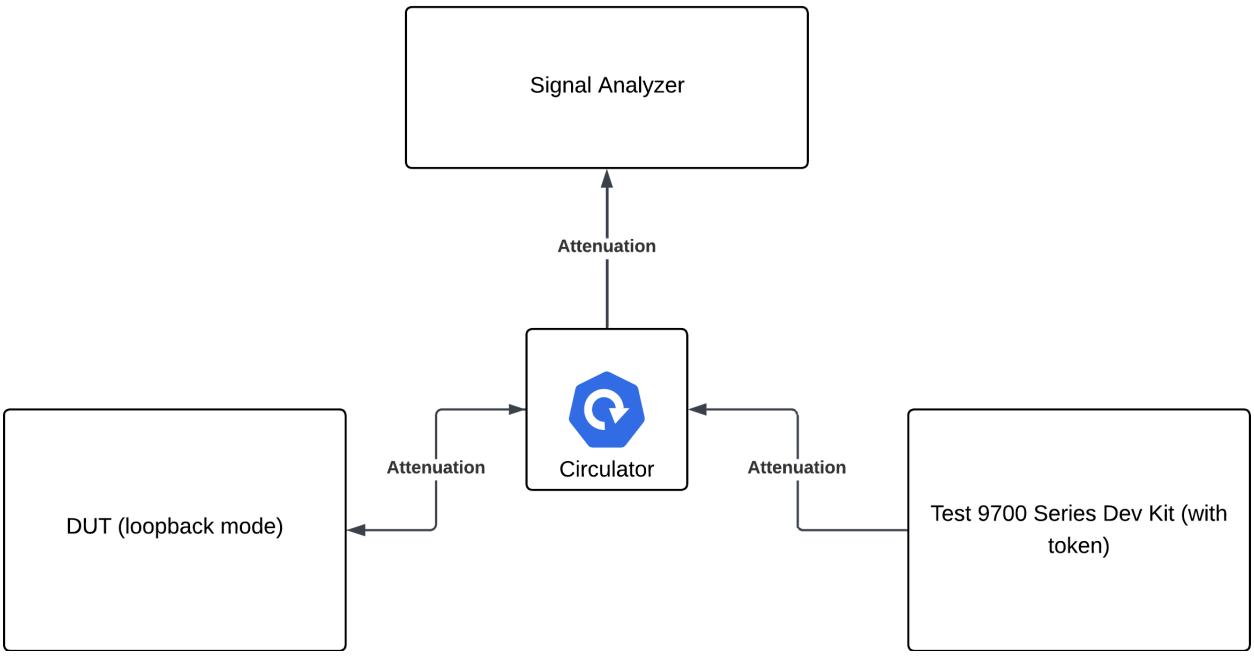


Figure 3. EXAMPLE MTK Test Setup

The DUT can be placed in "loopback" mode by issuing the 'AT&T1' command. Once the initial command is issued, the number of cycles can be queried with 'AT&T1?'. No approvals firmware (9602/9603/9523 based) or test mode authorization token (9604 based) is required for the DUT. Refer to [RD10] for information on how to use the MTK.

Iridium may use this tool to test partner products for compliance using the "loopback" test mode offered by the MTK. Iridium will need access to the DPL pins (for 9602/9603/9523 based transceivers) to issue the AT&T1 command. This test consists of a software radio sending a test signal to the partner product to see if the product can echo the test signal back. Please see [RD3], [RD4], and [RD5] for details.

Iridium requires that each VAM product unit is tested. However, in cases when a VAM is building products in larger batches, sampling may be acceptable. In this case, a VAM needs to define an acceptable sampling approach. See [RD3] for the 9602/9603/9604 and [RD4] for the 9523 series.

4.8. Narrowband Transceiver Purchase Authorization

Please be advised that purchasing narrowband transceivers in bulk requires those transceivers to be used in a certified product. A final verification step will be conducted by our Order Management Team to confirm that the quantities ordered correspond to a certified product. Should you have any inquiries regarding your purchase, please contact your Iridium business account manager.

Appendix A: All Classes CTC Preparation Instructions

The following sections describe how to prepare your CTC device for testing. **Please review these sections thoroughly**. Failure to properly prepare your device could result in the device being returned, resulting in testing delays. It is expected that your device will be configured for testing when it arrives. Minor exceptions would include pieces not connected due to possible damage during shipping.

Ensure all solder connections/connector assemblies are well tested and robust. If the CTC device does not power on or is unable to communicate, minimum troubleshooting will be done in the form of visual observations. If the troubleshooting is unsuccessful, your device will be returned.

Detailed instructions on how to power on your device and ensure its readiness for testing shall be provided. Any specific settings (jumpers, switches, etc.) that require activation should also be documented.

NOTE: Please ask questions regarding the CTC device preparation before the device is shipped.

A.1. 9602/9603/9523 Modem Pin and Serial Port Access

A.1.1. Modem Pin Definitions

Certification testing will require the use of the Data/Fax interface and the DPL interface. These connections must be brought out of the partner's device. **If testing is done outside of Iridium, then a RS232 to TTL level shifter is needed so that proper communication can be made with the test computer. Consult Iridium for further information.**

For all Classes testing, please follow the steps below:

1. Modem pin access will be required by whoever is performing the testing. **All pins must be brought out, then connected to a header connection and labeled**.
2. Pin header specifications:
   a. Pitch = 2.54 mm (0.1 inches)
   b. Contact Mating length = 5.08 mm – 7.62 mm (0.2 inches – 0.3 inches)
   c. Example header pin assembly:



   d. Make sure the soldering connection is secure. Shipping fragile connections may lead to cut

connections upon arrival. The **PRODUCT WILL BE RETURNED** by Iridium or 3rd party test house if connections are cut or loose.

e. The length of pin access cables shall not exceed 12 inches.

f. The connector placement shall be such that the mating connector and cable can exit the product enclosure without impeding the operation of the product.

g. All pin access cables must be modified to be direct external connections, with no other components or circuits connected.

3. If your product is 9602/9603 based, please refer to the following table for pin designations:

9600 Series Pin Number	Signal Name	Signal Direction	Signal Function	Signal Level
1	EXT_PWR	Input	Supply	+5V +/- 0.5V
2	EXT_PWR	Input	Supply	+5V +/- 0.5V
3	EXT_GND	Input	Supply return	0V
4	EXT_GND	Input	Supply return	0V
6	DF_S_TX	Input	Data Fax port Serial Input	3.3V digital
7	DF_S_RX	Output	Data Fax port Serial Output	3.3V digital
8	SIG_GND	Input	Signal ground	0V
16	TP_TX	Output	DPL port Serial Output	3.3V digital
17	TP_RX	Input	DPL port Serial Input	3.3V digital
18	SIG_GND	Input	Signal ground	0V
19	FRAME_IN	Input	In test mode becomes input locked to 11Hz (90ms) frame clock	3.3V digital

4. If your product is 9523(N) based, please refer to the following table for pin designations:

9523 Pin Number	Signal Name	Signal Direction	Signal Function	Signal Level
4	CODEC_PCMOUT	Input	In test mode becomes input locked to 11Hz (90ms) frame clock	3.3V digital, high = available
13	DPL_RXD	Input	DPL port Serial Input	3.3V digital
14	DPL_TXD	Output	DPL port Serial Output	3.3V digital
15	DF_RX	Output	Data Fax port Serial Output	3.3V digital
16	DF_TX	Input	Data Fax port Serial Input	3.3V digital
34	SIG_GND	Input	Signal ground	0V
35	SIG_GND	Input	Signal ground	0V
36	VBAT	Input	Battery Voltage	3.3V
37	VBOOST	Input	Boost Voltage for PA	27V to 35V
38	VBAT	Input	Battery Voltage	3.2V to 6V
39	VBOOST	Input	Boost Voltage for PA	27V to 35V
40	VBAT	Input	Battery Voltage	3.2V to 6V

A.1.2. Confirm AT Commands Can Be Conducted via Pin Access

The Partner shall verify that the AT commands are responding through the data/fax header pins. Access to the AT commands can be referenced in [RD5]. A serial interface program such as Putty or Tera Term can be used to verify the AT commands.

1. Should be able to generate responses with these three pins:
   a. 15, 16, and 34 (DF_RX, DF_TX, GND) with a 9523(N) based product.
   b. 6, 7, and 8 (DF_S_TX, F_S_RX, SIG_GND) with a 9602, 9603, or a 9604 based product.
2. Entering the command “AT” (no quotes) at the terminal prompt should respond with “OK”.
3. AT+CGMR should respond with the firmware version of the Iridium transceiver.

A.2. 9604 Modem Pin and Serial Port Access

A.2.1. Serial Port Access

For 9604-based transceivers, pins from the UART 1 interface will need to be brought out to a header pin connector.

The necessary signals to be routed are: CTS, TXD, RXD, RTS, and GND. These pins should be connected to a header pin assembly, which will then be attached to a TTL to USB serial converter cable. This cable will connect to the test computer, enabling the device under test to be controlled with the appropriate AT commands. A recommended cable is the FTDI TTL-232RG-VREG1V8-WE-FTDI.

Signal Name	9604 Pin Number	TTL to USB Cable Leads
RTS	10	Green lead
CTS	11	Brown lead
TXD	12	Orange lead
RXD	13	Yellow lead
GND	14	Black lead

A.2.2. Power Supply Input and Monitoring

The 9604 power supply requirement is 3.8 V typical, with a minimum of 3.3 V and a maximum of 4.4 V. Three V_{CC} pins and three ground pins shall be brought outside the device for monitoring. These pins shall end in a header pin assembly.

Pin Name	Pin Number	Notes
VCC	51-53	Available voltage supply pins
GND	1, 3, 5,14, 22, 30, 32, 43, 50, 54, 55, 57-61, 63, 64	Available ground pins

A.2.3. Sync Out

The 9604 differs from the previous generation of SBD transceivers regarding the 90ms sync port. The sync signal is supplied by the 9604 and must be brought out to provide proper synchronization with the required test equipment. The sync out signal is available on GPIO 1, Pin 16 and shall be brought out to a header pin. Please refer to [RD9] and [RD12] sections on the GPIO pins and note the ESD sensitivity.

NOTE	ESD sensitivity rating of the GPIO pins is 1 kV (Human Body Model according to JESD22-A114). Higher protection level could be required if the lines are externally accessible, and it can be achieved by mounting an ESD protection (e.g. EPCOS CA05P4S14THSG varistor) close to accessible points.

A.3. RF Port Access

For conducting the RF tests, access to the Iridium transceiver modem's RF port will be required. The CTC unit should have the antenna cable disconnected, and a test cable attached to the Iridium transceiver brought outside the device. This RF pigtail should extend approximately 6 inches outside the device body and terminate to a SMA connector.

A.4. Powering the CTC Unit

The power load test referenced in [RD2] requires powering the CTC unit with a lab bench power supply so that various supply voltages can be used for the test. **It is preferable if the power supply leads for the CTC device end in standard banana jacks**. This will make connections to the bench supply easier. If banana jacks are not available, the power leads will be prepared by the party conducting the testing (Iridium, test house, or partner).

A.5. Supply Current Monitoring

The power load test referenced in [RD2] requires monitoring of the current draw. The CTC unit will be powered by an external supply for this test. The ability to support a shunt resistor in line with the positive power lead shall be supported.