iXA: 2-port PIM Analyzer

Quick Start Guide

The iXA is a 2-port PIM analyzer typically used to measure Passive Intermodulation (PIM) located either internally or externally to an antenna system. The iXA comes with two integrated Range to Fault (RTF) modules to seamlessly perform Distance To PIM (DTP) and Distance To Fault (DTF) measurements. The iXA can also be used as part of the Kaelus 2-port PIM Finder Solution to troubleshoot the antenna system for external PIM.

For more information on setting up the PIM Finder software, check out the PIM Finder software Quick Start guide.

The following steps outline how to:

- Set up the 2-port PIM Analyzer to find PIM sources that are internal or external to the antenna infrastructure.
- Zero the two integrated RTF to measure the Distance To PIM (DTP) and Distance To Fault (DTF).
- Perform the measurements and document the results.

Please read the entire Quick Start guide BEFORE using the iXA.

Equipment Required

1. **iXA-0707A, 2-Port PIM Analyzer with integrated RTF**
2. **CIS-0001A, PIM source***
3. **PIL-0005A, Low PIM Load***
4. **Low PIM cables and adaptors**
5. **Conceal Fab external PIM source, P/N: 900643 or 900645**
6. **2-Port PIM Finder Solution: iVA-0627A with PIM Finder Software, BPA-0707A and Low PIM probe**
7. **Optional: PC or Tablet with either Windows, iOS or Android to control the iXA.**

(*) Note: One PIM source and one Low PIM load minimum is required. Two PIM sources and two PIM loads would make the Zeroing function and instrument verification more efficient

Instrument Overview: iXA measurement modes

Instrument Overview: iXA port modes

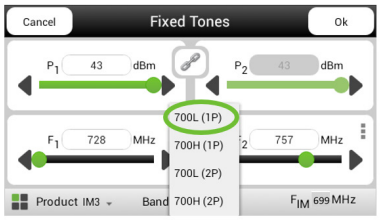
700 Low Band 1-port mode

LED Status

Port Selected: ○ ●

RF on: ○ ✹

700L (1P)



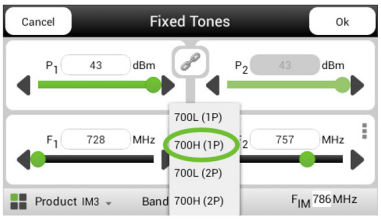
700 High Band 1-port mode

LED Status

Port Selected: ● ○

RF on: ✹ ○

700H (1P)



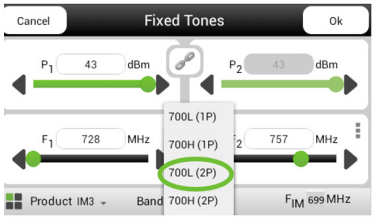
700 Low Band 2-port mode

LED Status

Port Selected: ● ●

RF on: ✹ ✹

700L (2P)



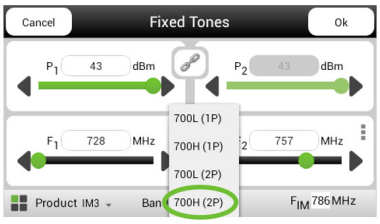
700 High Band 2-port mode

LED Status

Port Selected: ● ●

RF on: ✹ ✹

700H (2P)



Before you start...

Preparing the test configuration and reporting

If no state files are available, configure the instrument for frequencies, power, IM order and more. You can save the settings in a state file as demonstrated in Creating State File for PIM testing video.

With the iXA, you can document your testing activities as you go. The tags make it easy to indentify the captured plots, results and photos in an orderly manner. Check out Creating Tag Matrix for PIM testing video in the PIM minutes section. You can also prepare the report template in advance. Check out Creating Site Details for PIM test report video.

Tools and Instrument verification

It is good practice to verify the PIM analyzer prior to any testing on site.

- Clean all RF connectors (iXA, CIS-0001A, PIL-0005A, Low PIM cables and adaptors) as per PIM testing Cleaning Kit Video, to ensure perfect cleanliness and to avoid cross-contamination at all RF junctions.
- Using the CIS-0001A and the PIL-0005A, perform a Swept PIM measurement on 1-port mode and tones set to 20W. The expected measurement results should be as per this table:

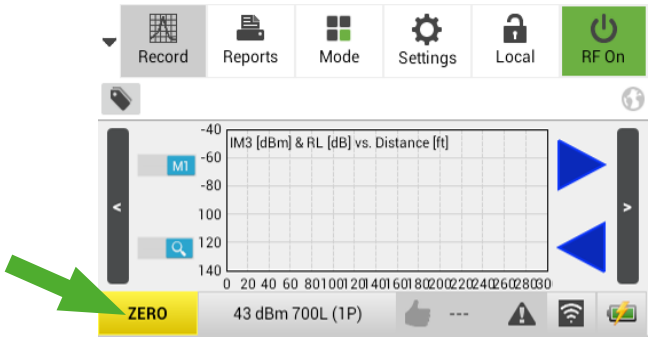
	CIS-0001A	PIL-0005A
700L (1P)	-75dBm +/-5dBm	-123dBm min
700H (1P)	-75dBm +/-5dBm	-123dBm min

Range to Fault Zeroing

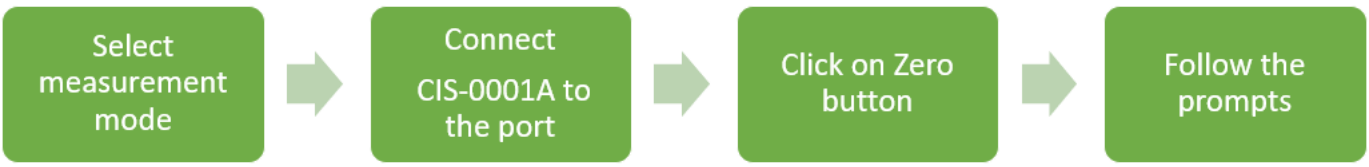
A Yellow Zero Button, indicates that RTF (Port) requires zeroing.

To use the RTF function, both Ports require to be Zero-ed in order to perform DTP and DTF measurements.

Press the Yellow Zero and follow the prompts.



Zeroing process:



Important notes:

- Both ports / RTF need to be Zero-ed
- Once the Zeroing is complete, the Zero button will turn grey: ZERO
- You can perform the Zeroing even if the Zero button is grey
- Once Zeroing is complete, user is able to make set-up changes, i.e.. frequency, power, range, etc., without having to re-Zero.

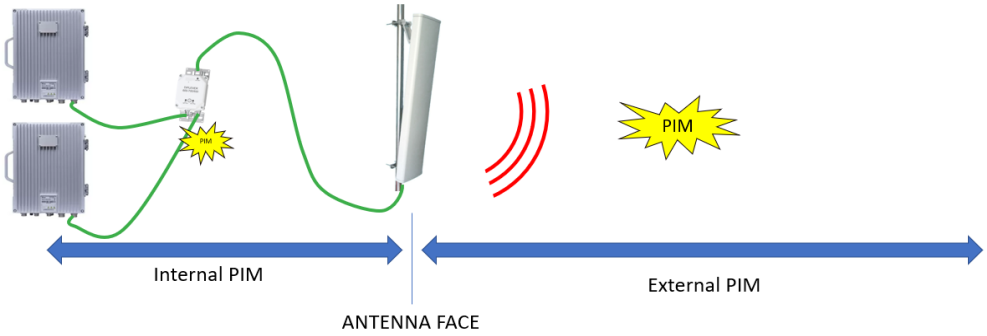
Range to Fault Measurement

The RTF is a critical tool used to locate the PIM faults inside and outside the antenna system.

The antenna face is the delimiter between “internal” PIM faults and “external” PIM faults.

Troubleshooting activities should always begin by identifying and mitigating PIM sources internal to the antenna system.

The first step to this process is to identify the distance to the antenna face.



Step 1: Identify Antenna face position

Step 2: Fix Internal PIM

Step 3: Fix External PIM

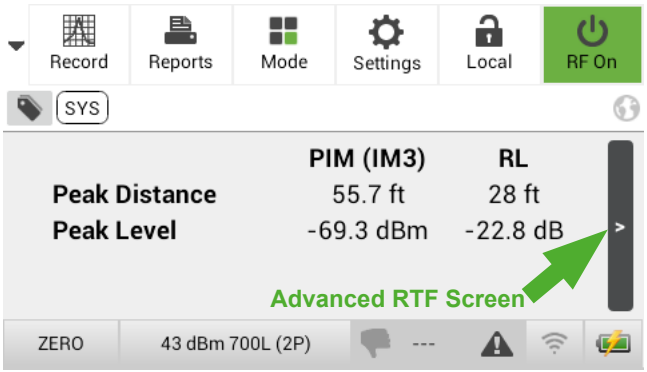
Important notes:

- When troubleshooting for “***internal***” PIM sources, it is recommended to set the Velocity Factor (VF) to ***0.8*** (signal propagating through cable)
- When troubleshooting for “***external***” PIM sources, it is recommended to set the Velocity Factor (VF) to ***1*** (signal propagating through air).

Step 1: Identifying the distance to Antenna face using the RTF

Method: placing a PIM source on the antenna face

1. Set the Range to 300ft
2. Set the VF to 0.8
3. Create 2 tags:”Internal PIM” and “External PIM”
4. If still in “Basic RTF Screen”, Switch to “Advanced RTF screen”
5. Perform a DTP measurement, add tag “Internal PIM” and record the measurement
6. Place a strong PIM source on the Antenna Face
7. Perform a second DTP measurement and compare it with the previous DTP measurement. You should see a strong peak has appeared on the second measurement. This is the location of the Antenna face for Internal PIM measurements.
8. Place marker 1 on the peak, add tag “Internal PIM” and record the measurement.
9. Set the VF to 1
10. Perform a third DTP measurement. You should see the same strong peak but at a different distance. This is still the location of the Antenna face but for External PIM measurements.
11. Place marker 1 on the peak, add tag “External PIM” and record the measurement.



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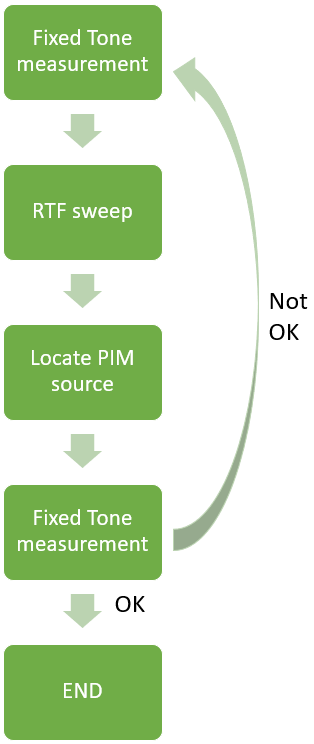
Step 2: Mitigate PIM internal to an Antenna System

RTF mode set up:

- Select the measurement range: it needs to be larger than the distance from the PIM tester to the antenna face. Typically 200 ft should be sufficient.
- Set the velocity factor to the cable velocity factor, typically 0.8.
- Switch to “Advanced RTF screen”
- Recall the Marker 1 position for “internal PIM” to identify the antenna face location.

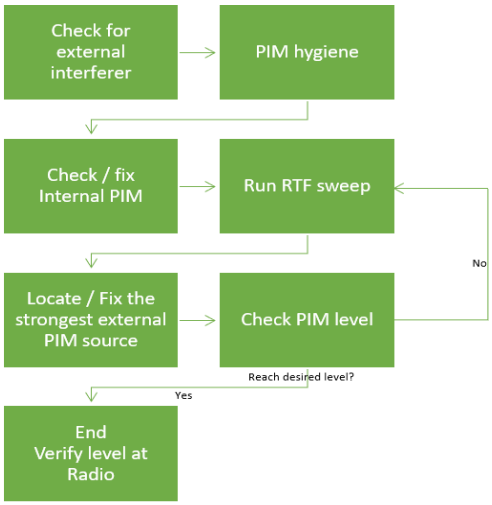
Follow the process steps on the right. In RTF mode, identify the PIM sources located ***before*** the antenna face. Mitigate those PIM sources and repeat the process until no PIM sources are detected internally to the system (ie before the antenna face). Perform a Fixed tone PIM measurement to verify the PIM level improvement and record the result.



Important note: The Fixed tone PIM measurement might still provide a poor result if a strong external PIM source is present. If this is the case, then proceed to step 3.

If strong lobes on the Distance to PIM (DTP) trace are observed, PIM sources have been identified at those locations. Overlay the Distance to Fault (DTF) with the DTP plots. If the DTF and DTP lobes coincide, the PIM source is located at an RF junction such as connector joints.

Step 3: Mitigate PIM external to an Antenna System



RTF mode set up:

- Select the measurement range: it needs to be larger that the distance from the PIM tester to the antenna face, plus the distance from the antenna to the edge of the site. Generally 300 to 400 ft should be sufficient.
- Set the velocity factor to 1.
- Switch to “Advanced RTF screen”
- Recall the Marker 1 position for “external PIM” to identify the antenna face location.

Follow the PIM Finder Process step on the left. In RTF mode, identify the PIM sources located ***after*** the Antenna Face. Using the iVA in PIM Finder Mode, the BPA-0707A and the PIM Finder Probe, locate and fix the PIM sources. Repeat the process the desired Fixed Tone PIM level is acheived. Record the result.

The RTF plot can be zoom-ed in to ignore the area before the Antenna face. Press on the RTF screen to enter the plot settings screen and change the distance to start at the antenna face.

Since Marker 1 represents the location of the antenna face, it is a critical marker position. It can be locked to prevent accidental change.

Kaelus Demystifying PIM Finding
Making PIM Finding methodology simple to execute and less time consuming