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Tools and Techniques for Validation of VNA Calibrations with Wafer Microprobes

IMS 2019

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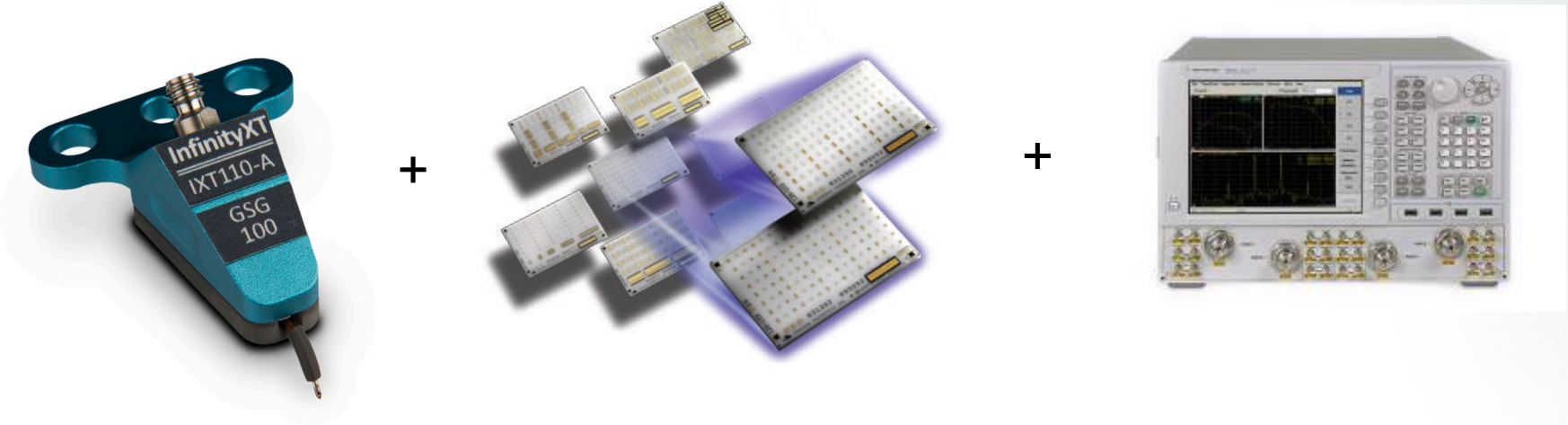
FormFactor WinCal Software for VNA Calibration



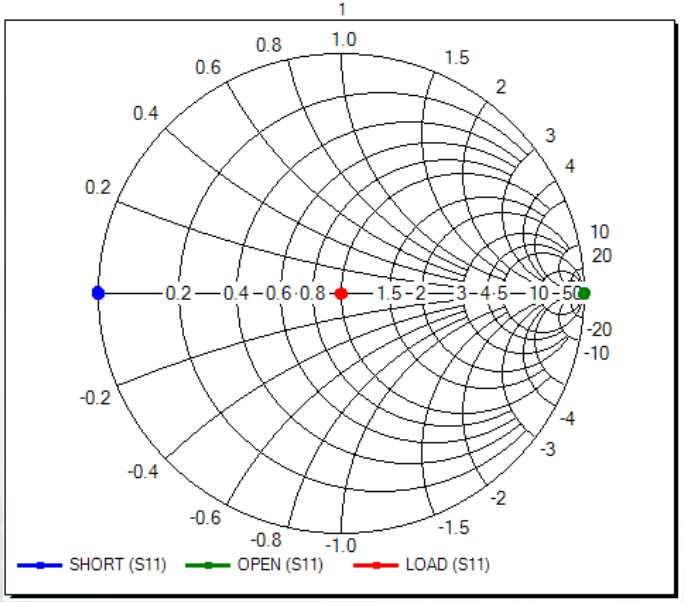
- WinCal makes the task of VNA calibration as accurate, repeatable, and simple as possible.

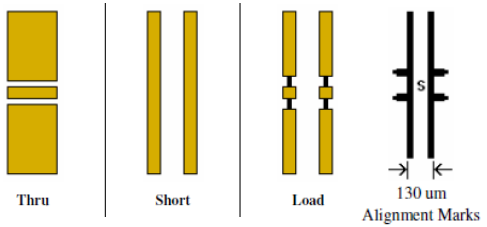
When you have finished a VNA calibration it is natural to wonder *How Good is my Calibration?*

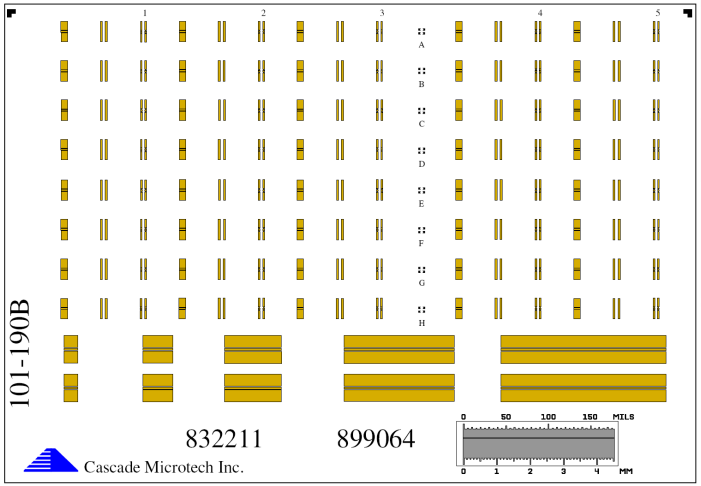
- Reasonable Concerns do Exist
  - Are the calibration standards altered or damaged in any way?
  - Are the probes and ISS setup correctly?
  - Are the probes making good contact?
  - Are the calibration coefficients correct?
  - Is the calibration limited in frequency by probe geometry?
  - Are the VNA settings correct?

Will re-measuring the calibration standards indicate if the calibration is good or not?

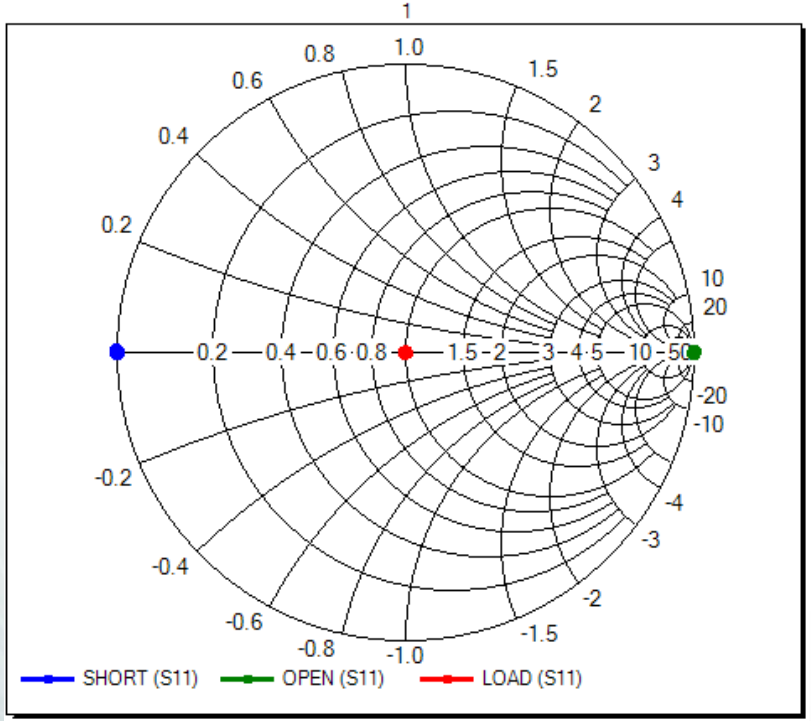
- Should things look like this?

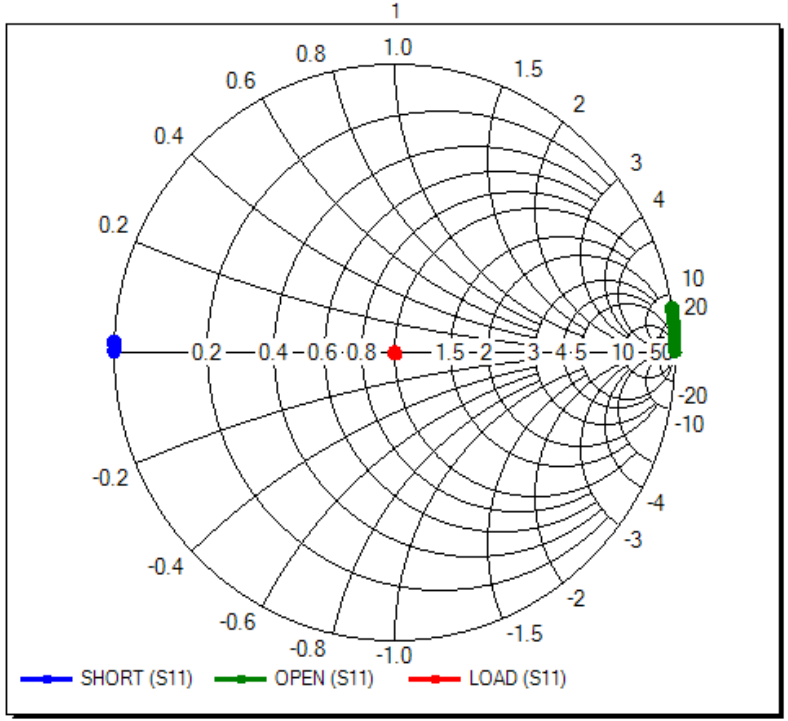




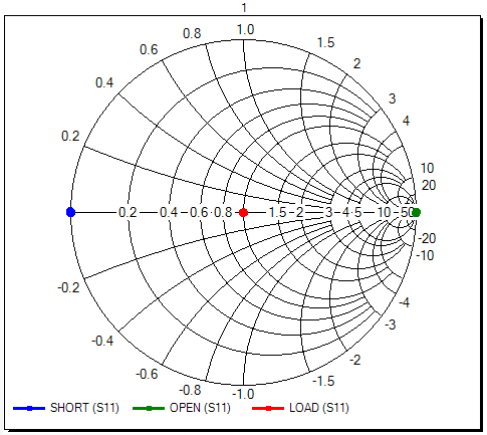


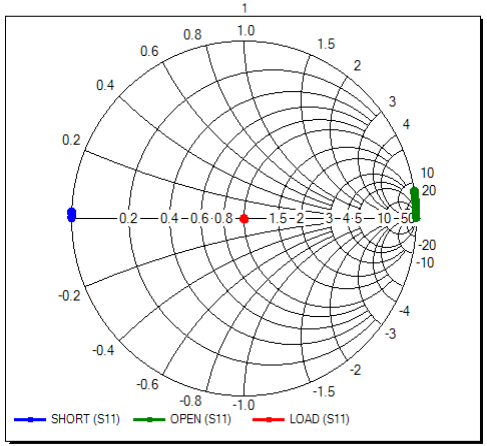
Re-Measuring Calibration Standards
Which of these shows “better” calibration?





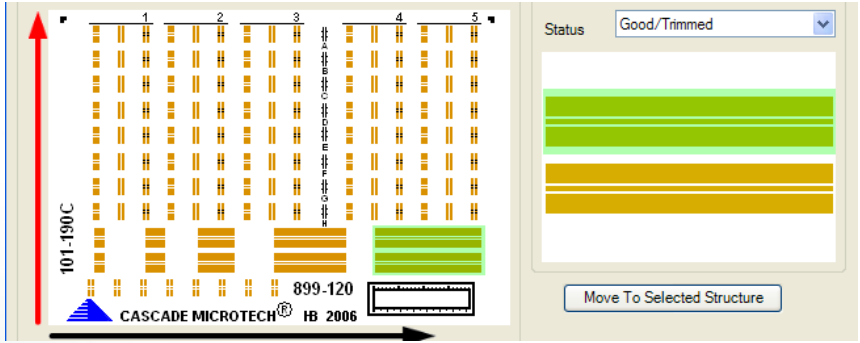
Usually Re-Measuring Calibration Standards tells little of the quality of a calibration. Instead it tells of measurement repeatability.





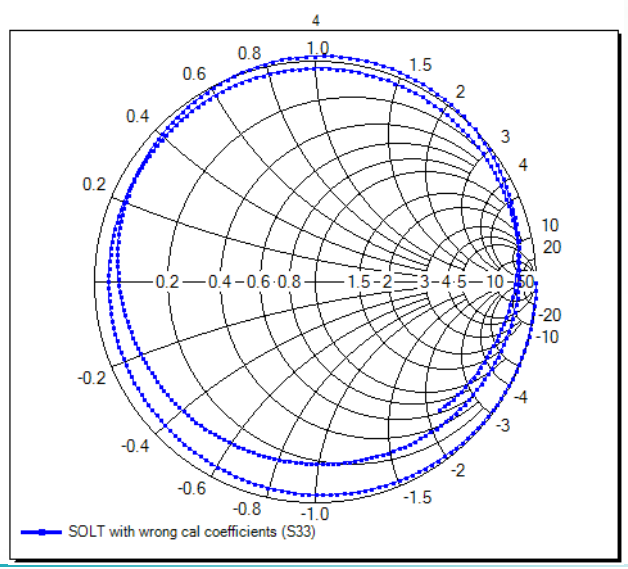
Neither measurement tells much about calibration accuracy, only system repeatability. In many cases the calibration math will drive the solution to equal the calibration coefficients.

Instead of re-measuring calibration Short, Opens, and Loads, try measuring some independent device with known or predictable behavior



- Most ISSs have verification lines
  - Indicators of a poor calibration:
    - Points outside of the Smith Chart
    - Lines crossing
    - Not well centered in the chart

S11 of offset Open



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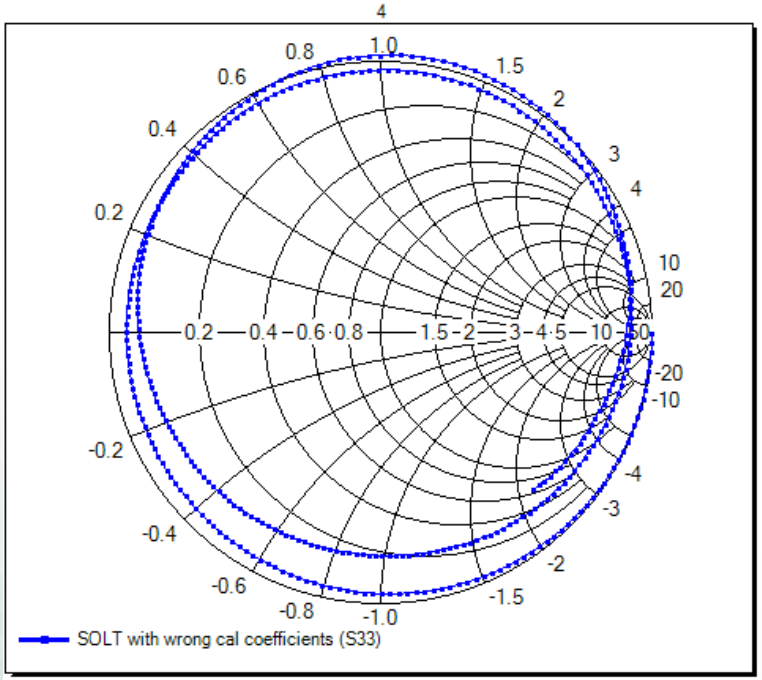
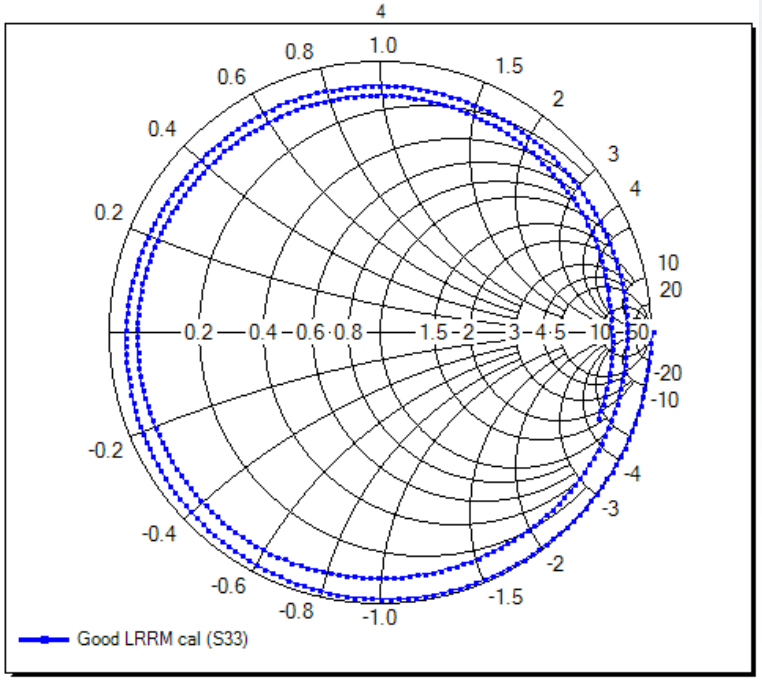
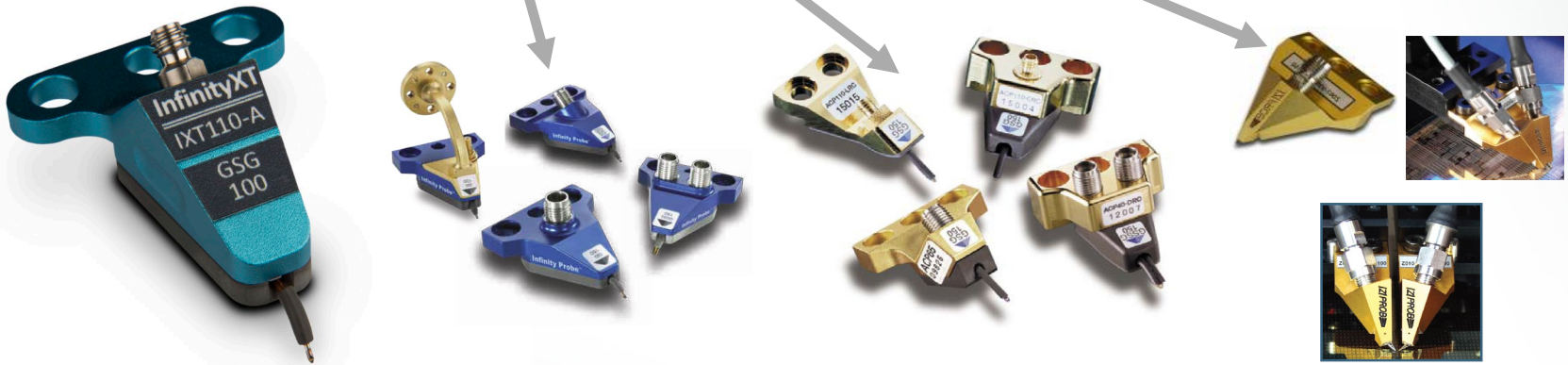
S11 of an Offset Open
Which of these shows the “better” calibration?





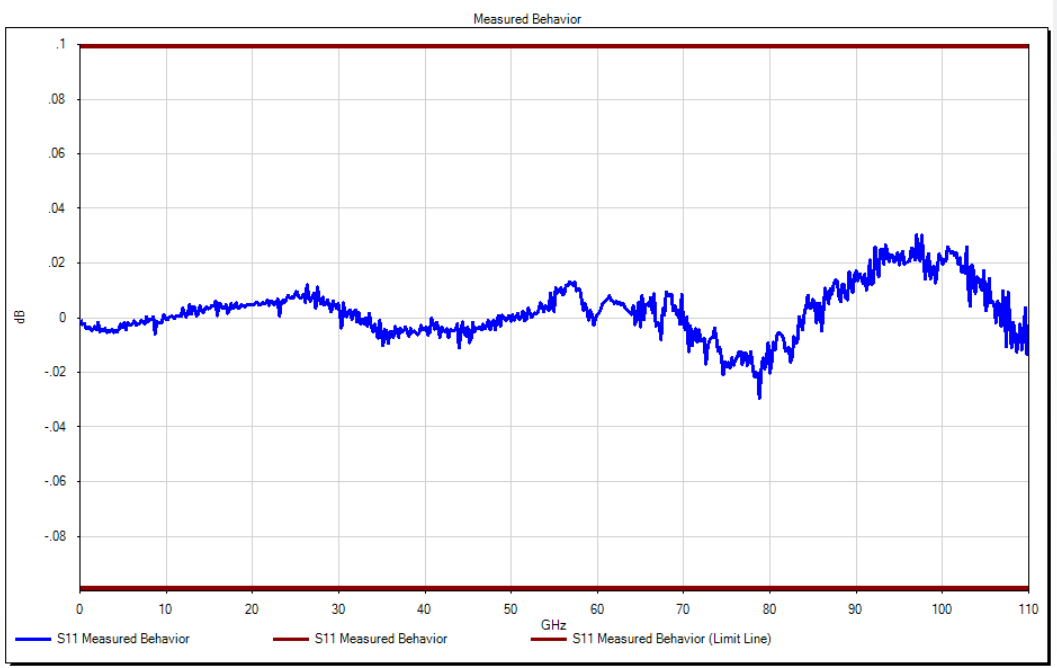
Case Study, introducing InfinityXT

- InfinityXT is FormFactor's newest RF probe family
  - Adding to our existing Infinity, ACP, and Z Probe families of RF probes



Calibration – Validation within WinCal XE
Comparing InfinityXT Measurements to Predicted Results

- **Solving the typical customer dilemma "is my calibration any good"**



After LRRM calibration, examine S11 of the OPEN *treated as unknown by LRRM*

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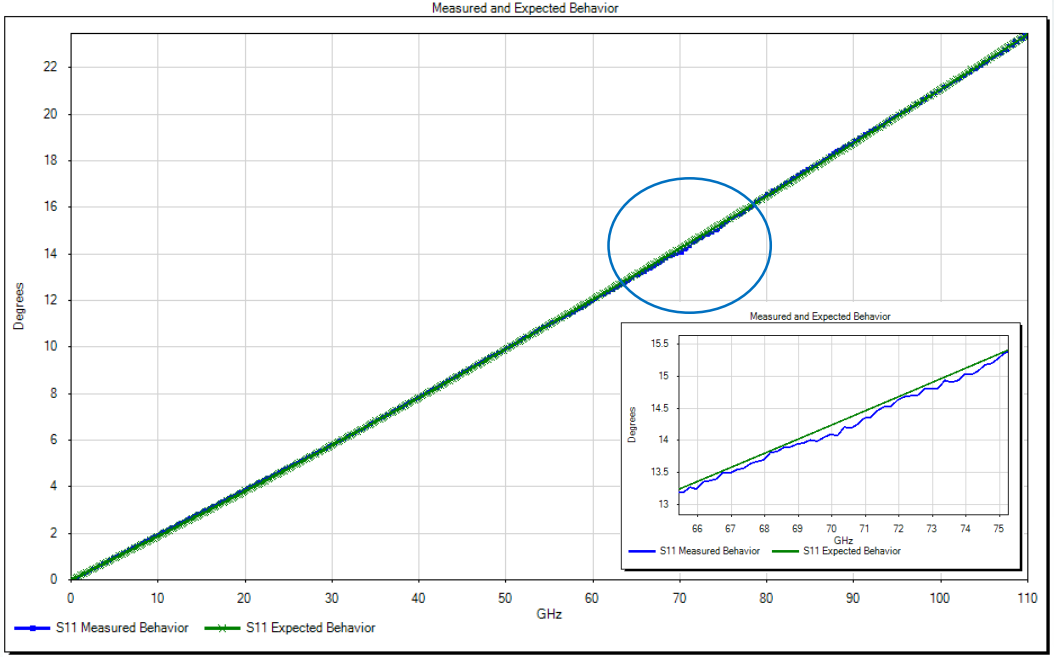
Calibration – Validation within WinCal XE
Comparing InfinityXT Measurements to Predicted Results

- **Solving the typical customer dilemma "is my calibration any good"**



After LRRM calibration, compare the S11 phase of the OPEN to the prediction

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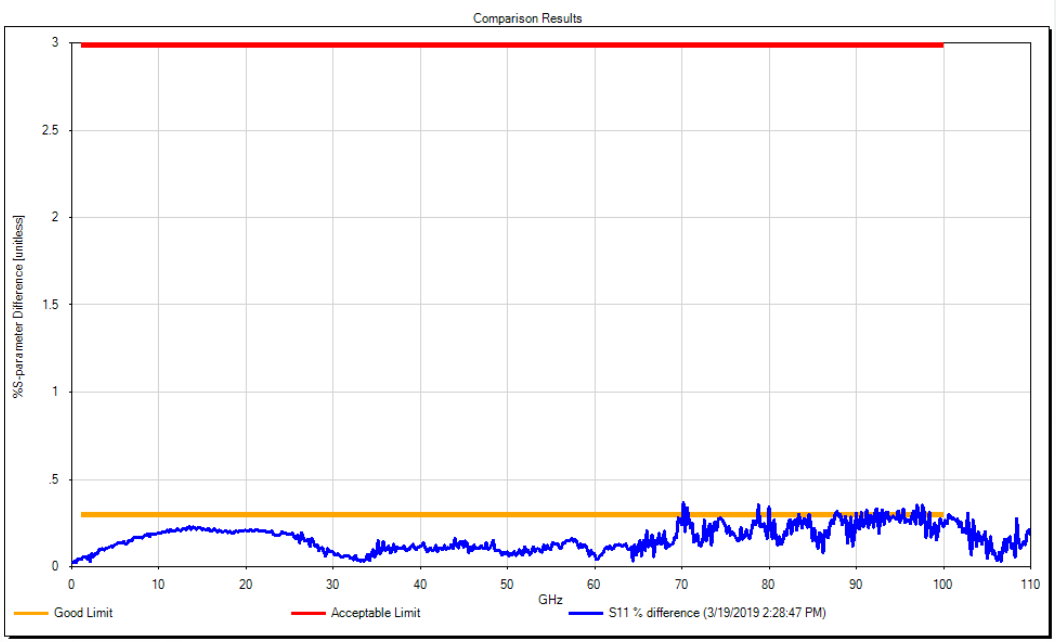
Calibration – Validation within WinCal XE
Comparing InfinityXT Measurements to Predicted Results

- **Solving the typical customer dilemma “is my calibration any good”**



Examine the % difference in the S11 phase measurement of the OPEN

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InfinityXT Compared to our flagship Infinity Probe

- Both probes targeted to demanding high frequency RF performance
- Both probes enjoy our probe repair program
- InfinityXT can handle up to 175C, Infinity limited to 125C
- InfinityXT has much better tip visibility. Easier for novices to use.

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Thank You for Attending

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