F1325 Operation at 450 MHz

- July 28, 2014
- AT0105
- Non Automated Measurements

Michael J. Virostko
Principal Product Application Engineer

Integrated Device Technology

The Analog and Digital Company™

Agenda

- Introduction
- Test Requirements
- Test Results

Introduction

- A customer is interested in using the F1325 DPD Demodulator with a RF frequency of 450 MHz.
- This demodulator has a switched LO and a Switched RF input paths which are currently specified at an RF frequency of 600 to1100 MHz.
- The output is an I/Q signal in the 20 to 350 MHz range.
- We will test per their request with exceptions.

- *This is only for the non automated measurement for Return Losses and LO Isolations, RF Isolations.*

Test Requirements (1)

- Fixed IF Testing
  - Output IF = 138 MHz
  - RF 435 to 495 MHz in 10 MHz Steps
  - High Side Injection (LO > RF)
  - Conditions
    - ✓ Case Temperature: -40, +25, and +105 °C
    - ✓ LO Power = -3, 0, and +3 dBm
    - ✓ Vcc = +4.75, +5.00, and +5.25 V
    - ✓ Maximum Gain (Attenuation = 0 dB)
  - Parameters
    - ✓ Gain
    - ✓ Intermodulation Products, IP3, IP2
    - ✓ Harmonics
    - ✓ LO to IF Isolation
    - ✓ Power Compression
    - ✓ Current

Test Requirements (2)

- Fixed LO Testing
  - Output IF = 108 to 168 MHz in 10 MHz Steps
  - RF 435 to 495 MHz in 10 MHz Steps
  - High Side Injection (LO > RF)
  - Conditions
    - ✓ Case Temperature: +25°C
    - ✓ LO Power = 0 dBm
    - ✓ Vcc = +5.00 V
    - ✓ Attenuation = 0 to 26 dB in 2 dB steps
  - Parameters
    - ✓ Gain
    - ✓ Attenuator Accuracy
    - ✓ Intermodulation Products, IP3, IP2

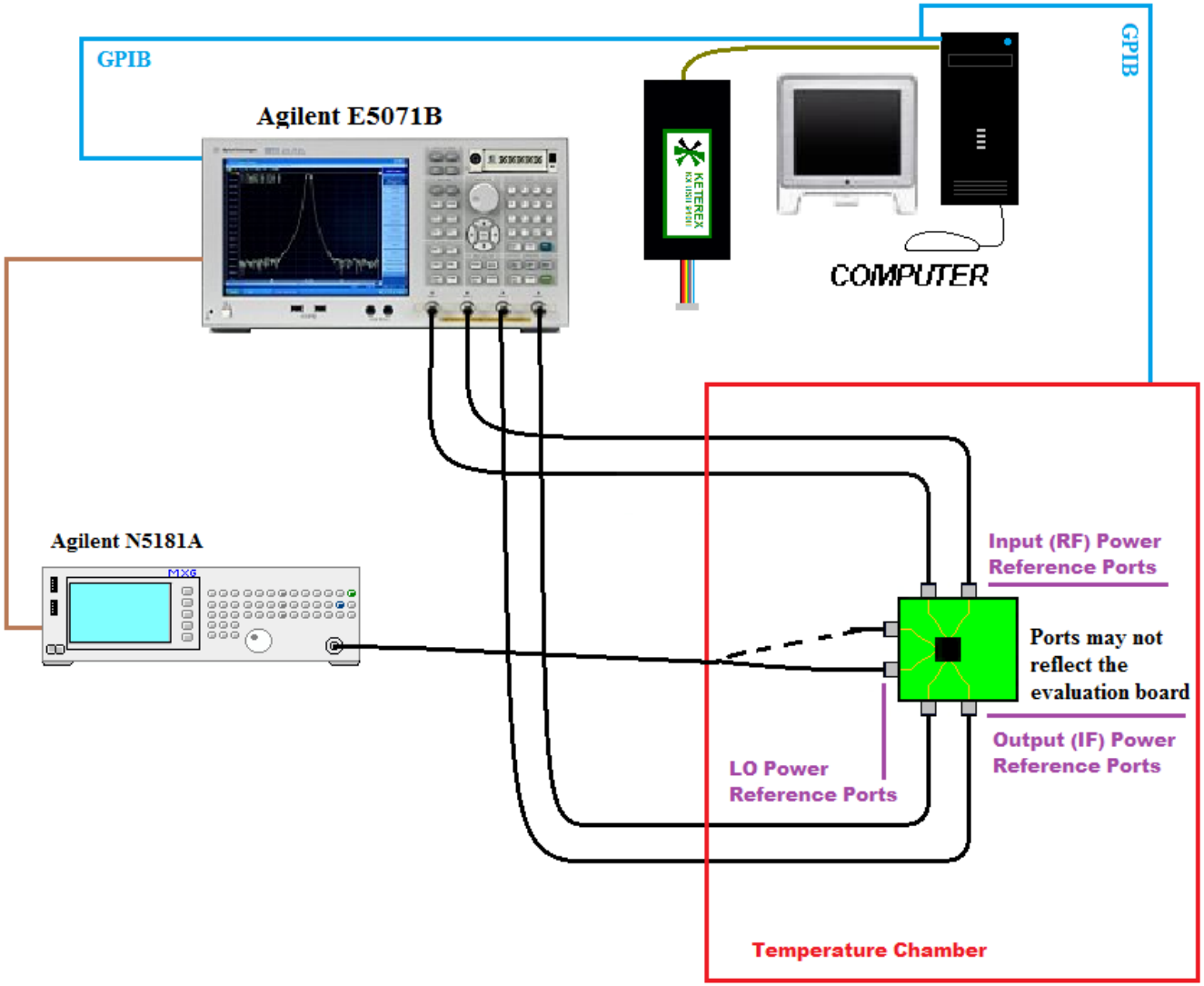
Test Requirements (3)

- Fixed IF
  - Output IF = 138 MHz
  - RF 435 to 495 MHz in 10 MHz Steps
  - High Side Injection (LO > RF)
  - Conditions
    - ✓ Case Temperature: -40, 25, and 105 °C
    - ✓ LO Power = -3, 0, and +3 dBm
    - ✓ Vcc = +4.75, +5.00, and +5.25 V
    - ✓ Maximum Gain (Attenuation = 0 dB)
  - Parameters
    - ✓ Noise Figure
    - ✓ Quadrature Parameters (I/Q Imbalance)

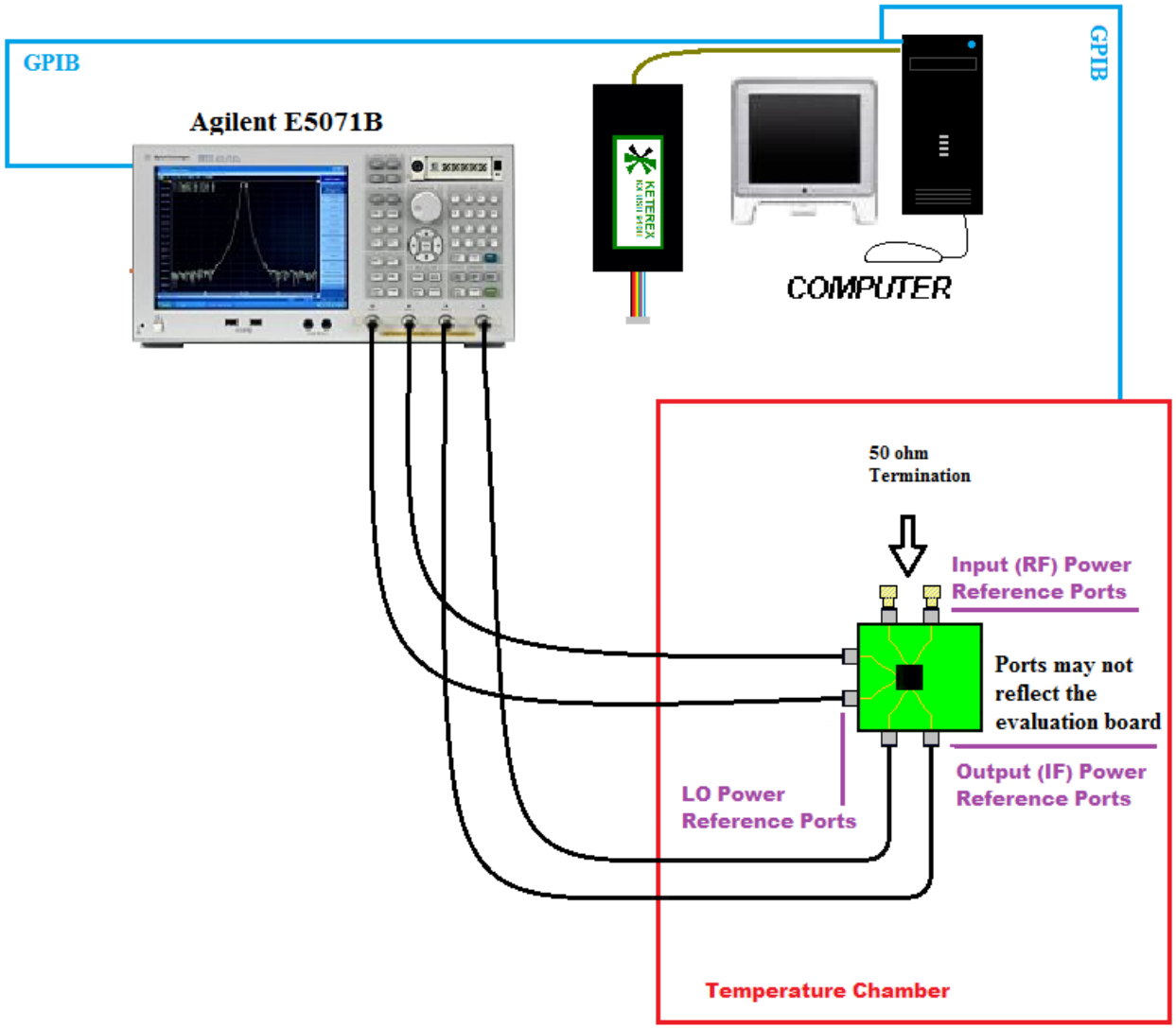
Test Requirements (4)

- Other Parameters
  - Conditions
    - ✓Case Temperature: +25 °C
    - ✓LO Power = 0 dBm
    - ✓Vcc = +5.00 V
  - Parameters
    - ✓Return Losses – RF, IF, and LO Ports
    - ✓Isolations
      - RFA to RFB
      - LOA to LOB
      - LO to IF
      - LO to RF

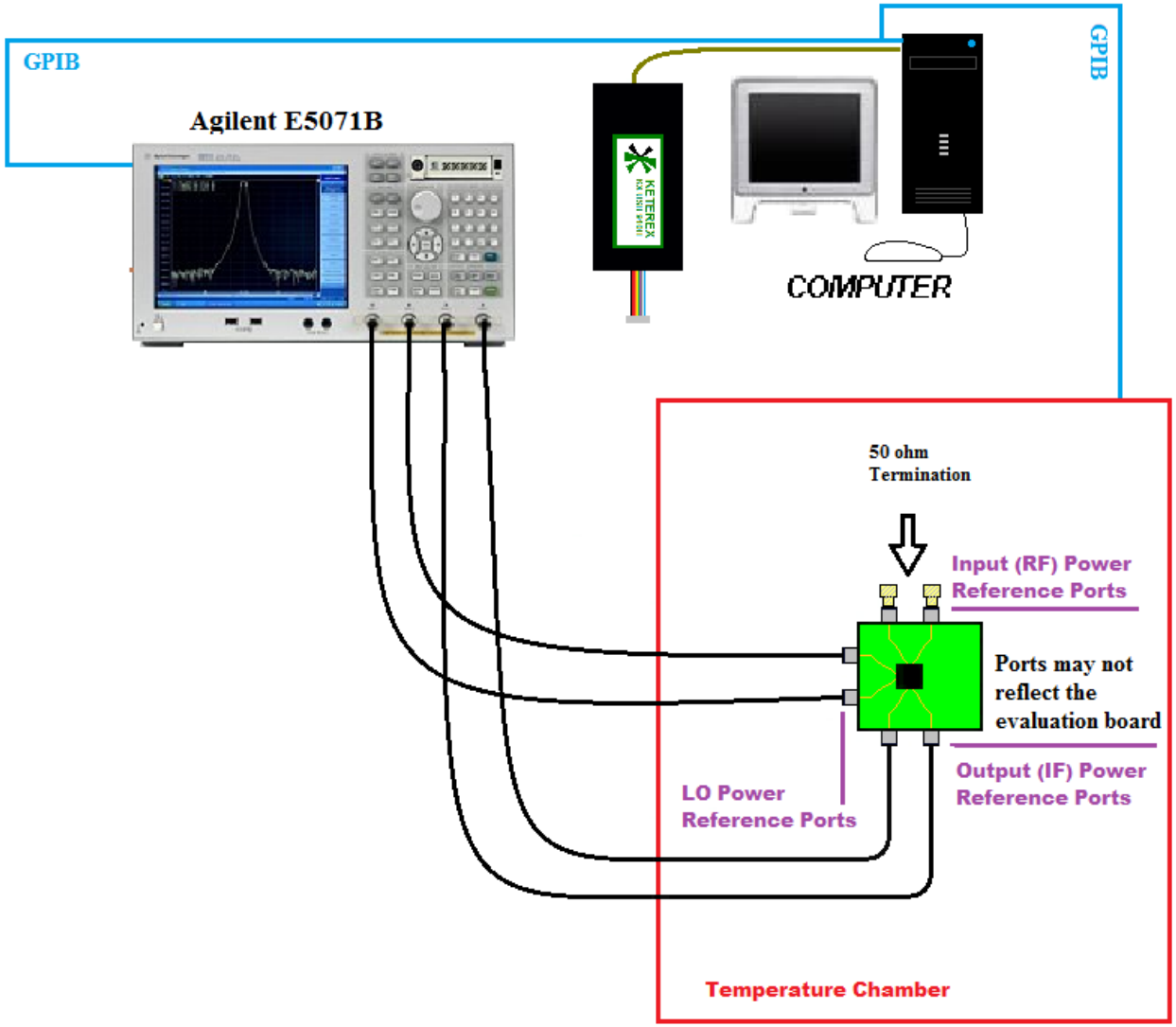
Test Setup for Return Loss and Isolation between RF and IF ports



Test Setup for Return Loss and Isolation between LO and IF



Test Setup for Return Loss and Isolation between LO and RF



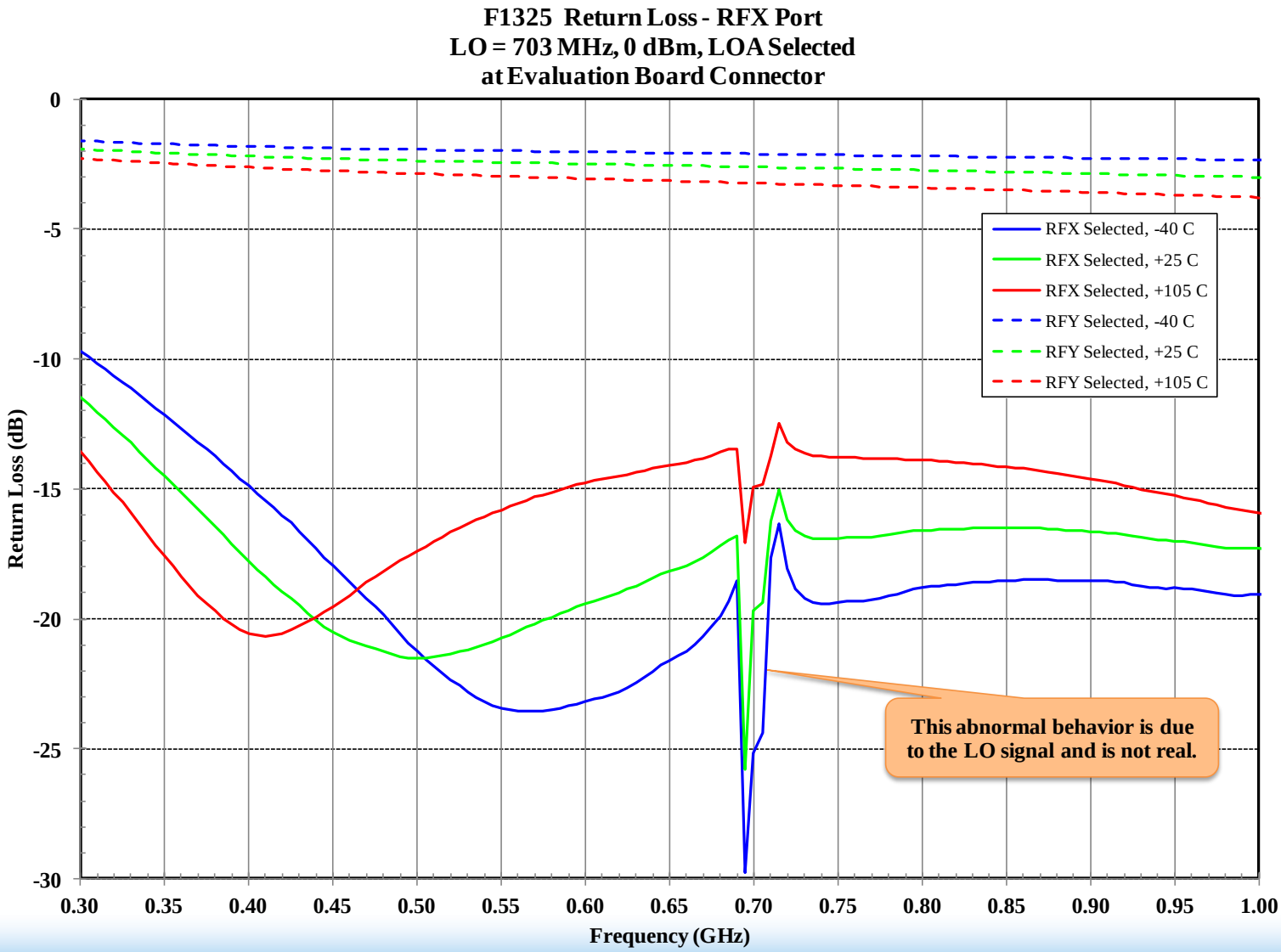
Exceptions

- The RF and LO input capacitors (C17, C18, C19, C25) where changed from 160 pF to 390 pF.
  - This will assure than the capacitor will not affect the RF signals.
- The LO was rebiased by changing R20 from 2.8 kohms to 4.0 kohms.
  - A previous task showed that doing this helps for operation at 450 MHz.
  - Under normal operation Noise Figure is greater than 15 dB and will not be measured.

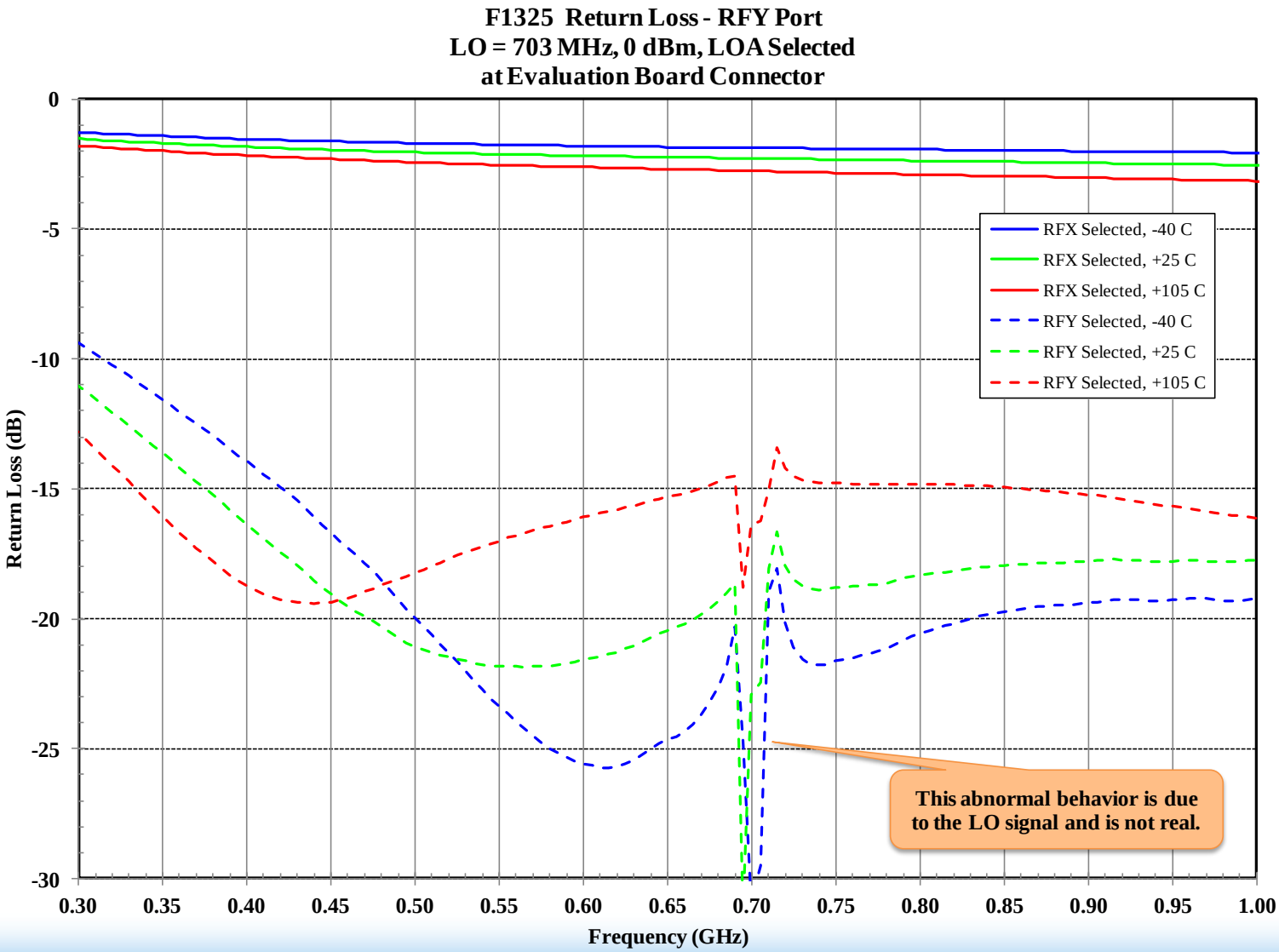
Test Case 4 (TC4):

- The following data was taken at the evaluation board connectors.
- The following parameters was varied:
  - Case Temperature: -40, +25, +105 °C
  - Applied Voltage: 5.00 V
  - LO Frequency: 703 MHz
  - LO Power: 0 dBm
  - LO Input: LOA
  - RF Power: -10 dBm
  - Attenuation: 0 dB (Maximum Gain)
  - Frequency
    - ✓ IF Band 10 MHz to 400 MHz
    - ✓ RF/LO Band 300 to 1000 MHz

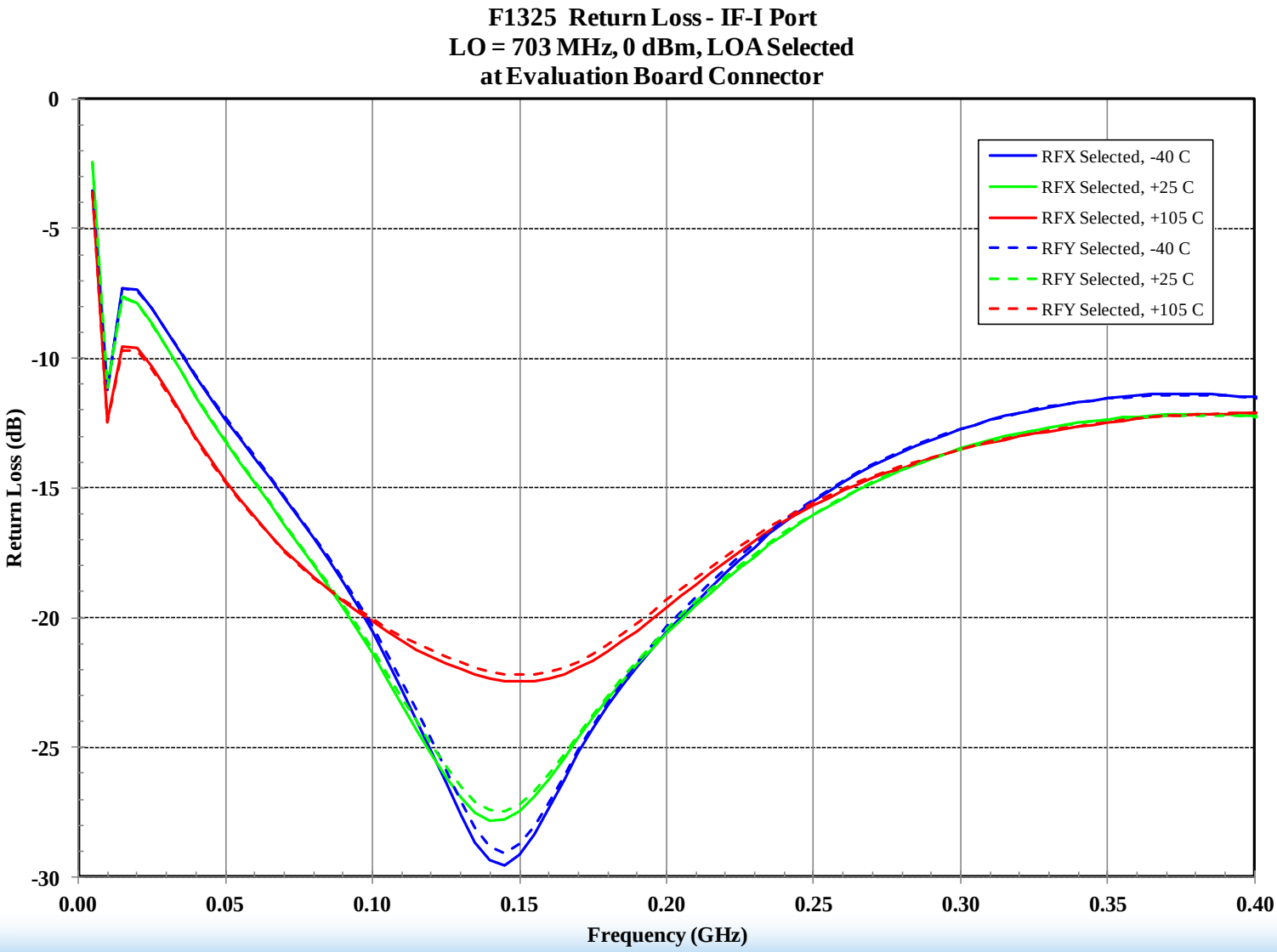
TC4: Port RFX Return Loss



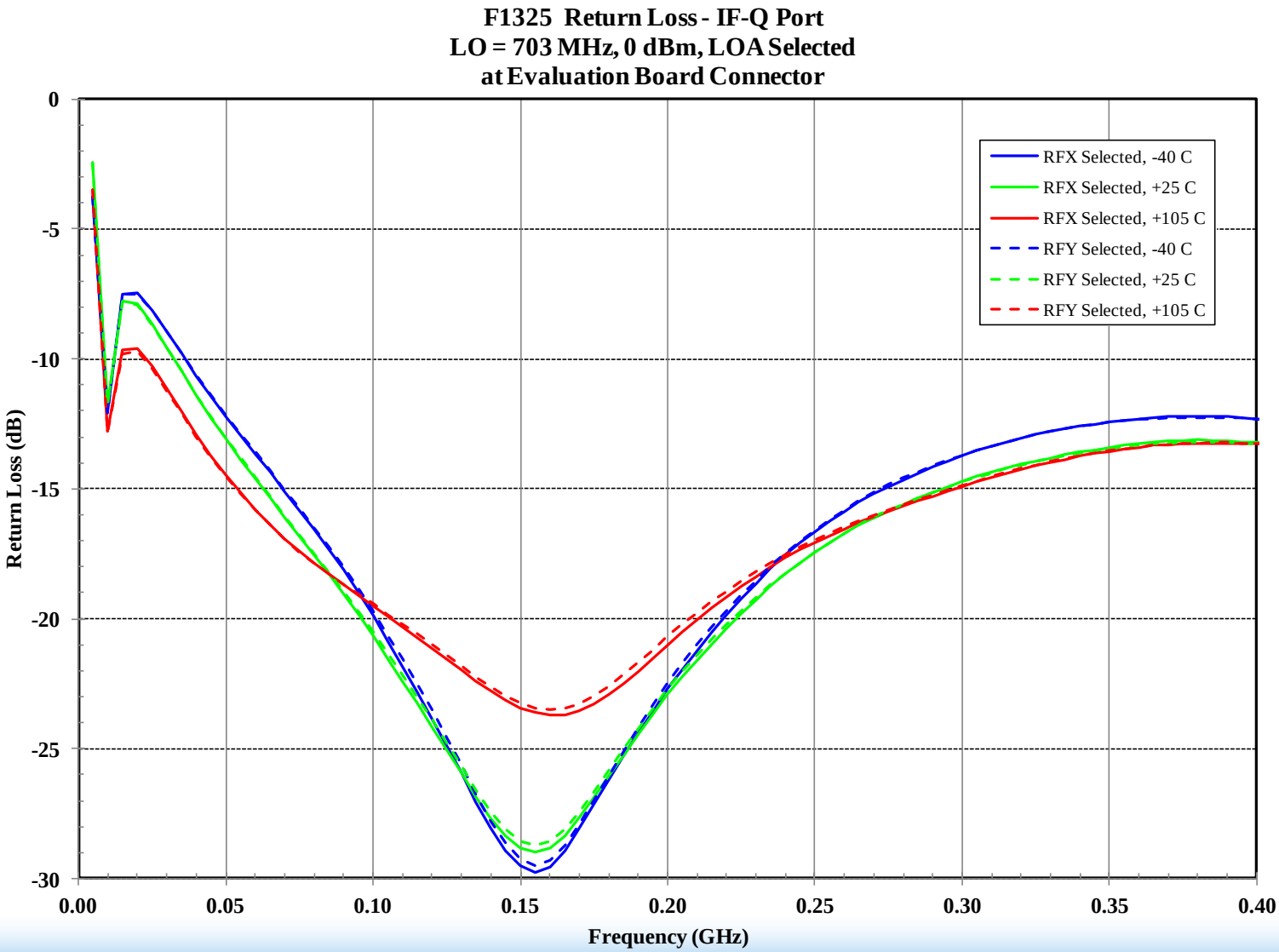
TC4: Port RFY Return Loss



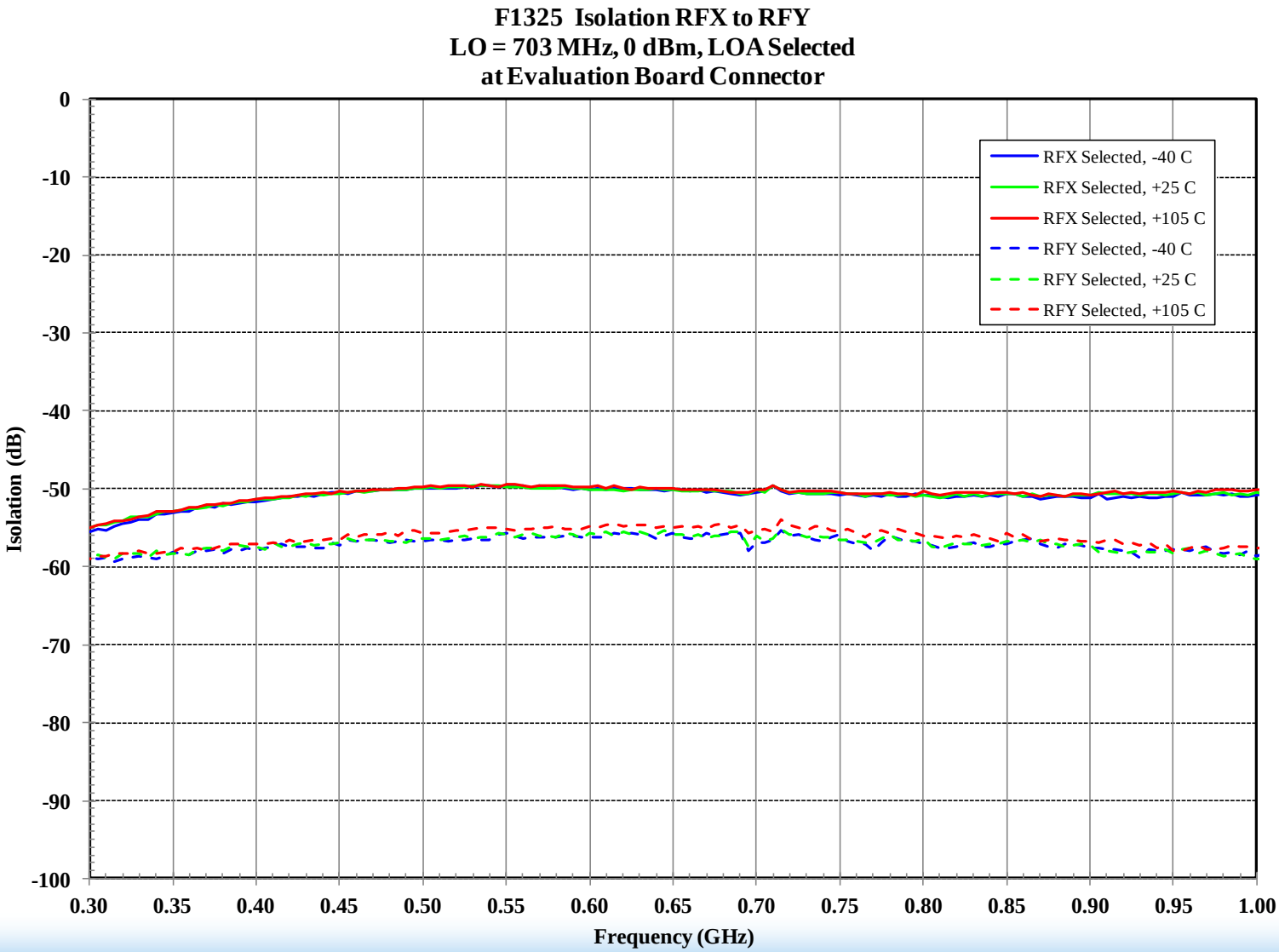
TC4: Port IF-I Return Loss



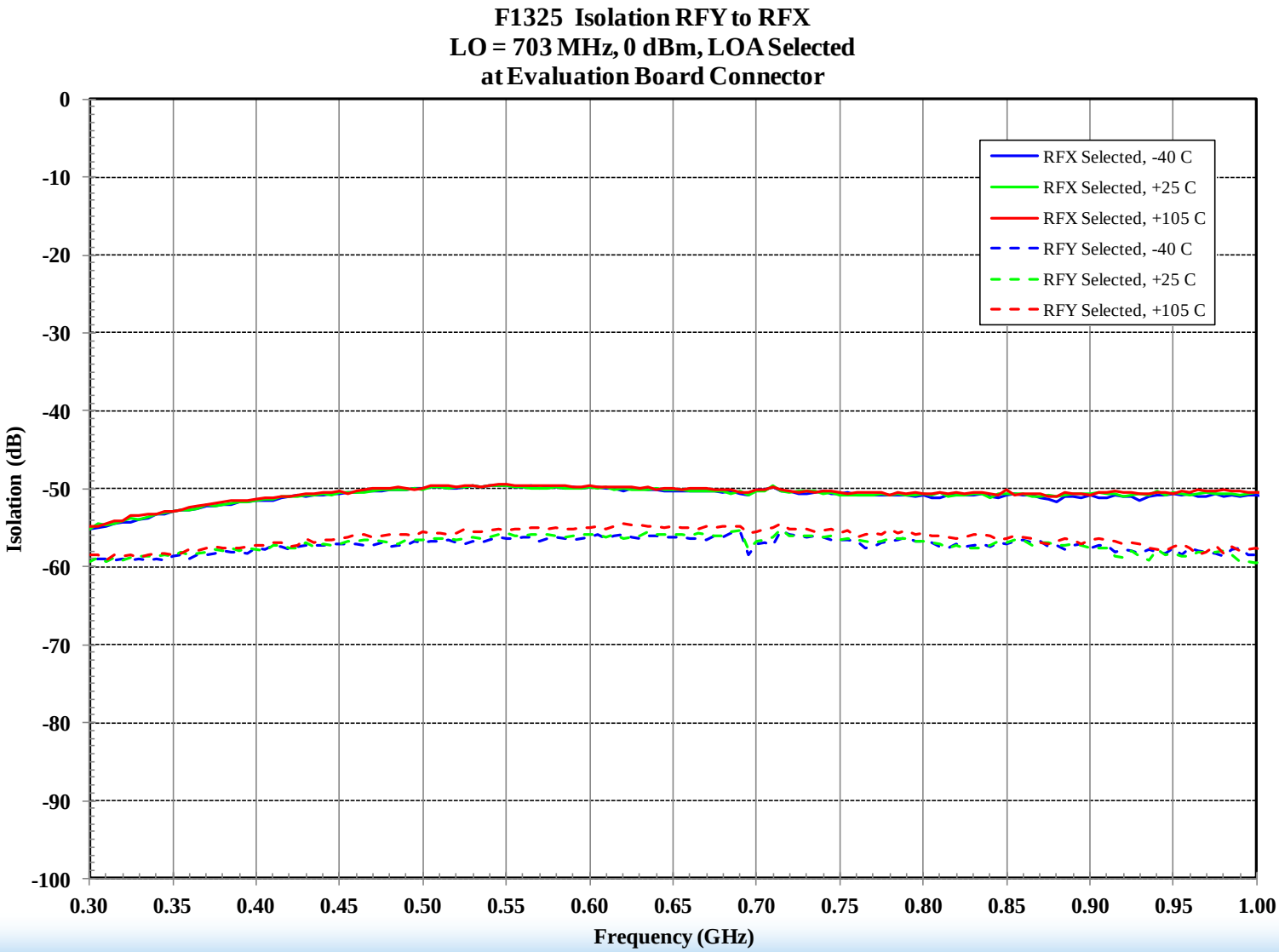
TC4: Port IF-Q Return Loss



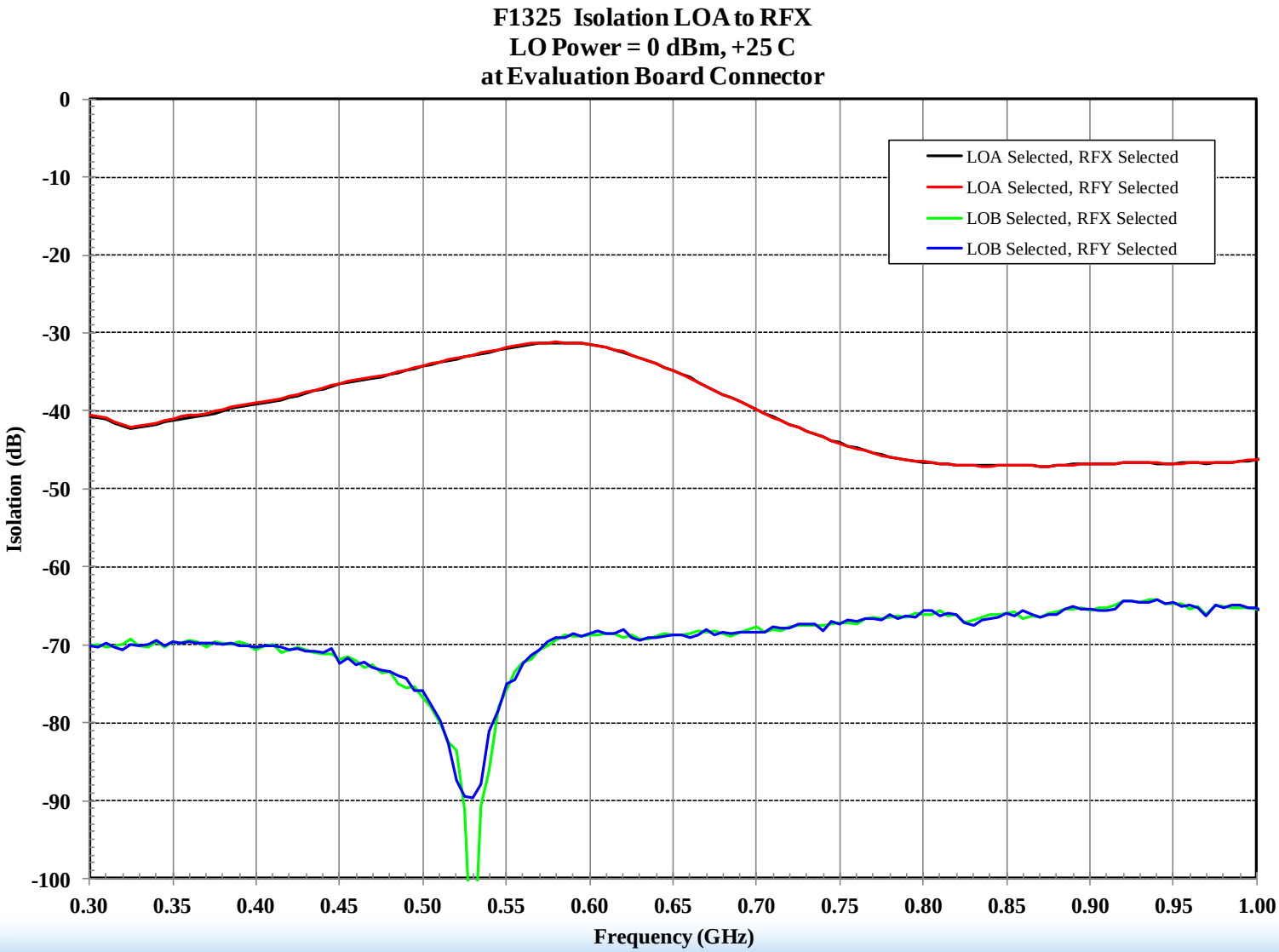
TC4: Isolation RFX to RFY



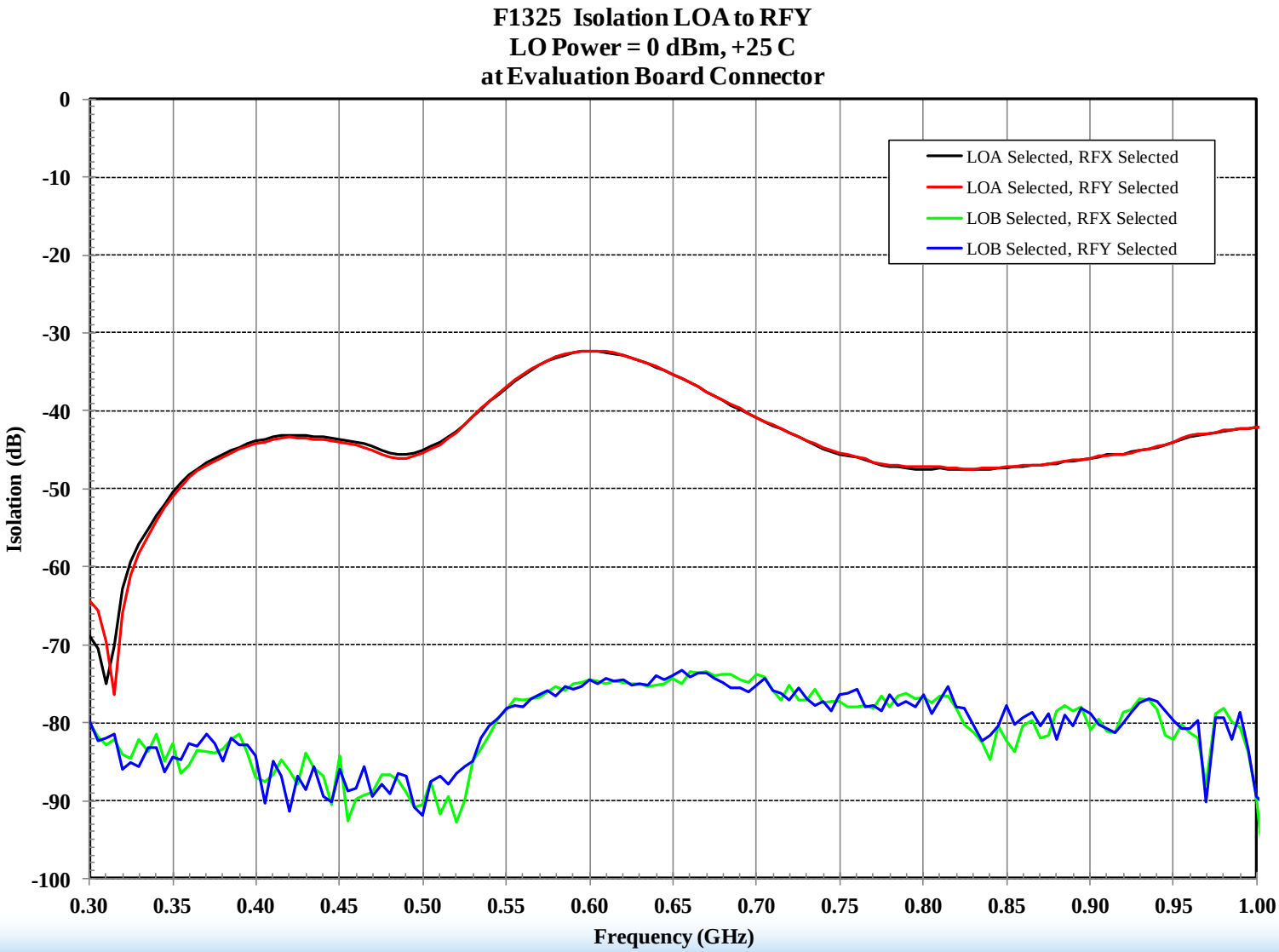
TC4: Isolation RFY to RFX



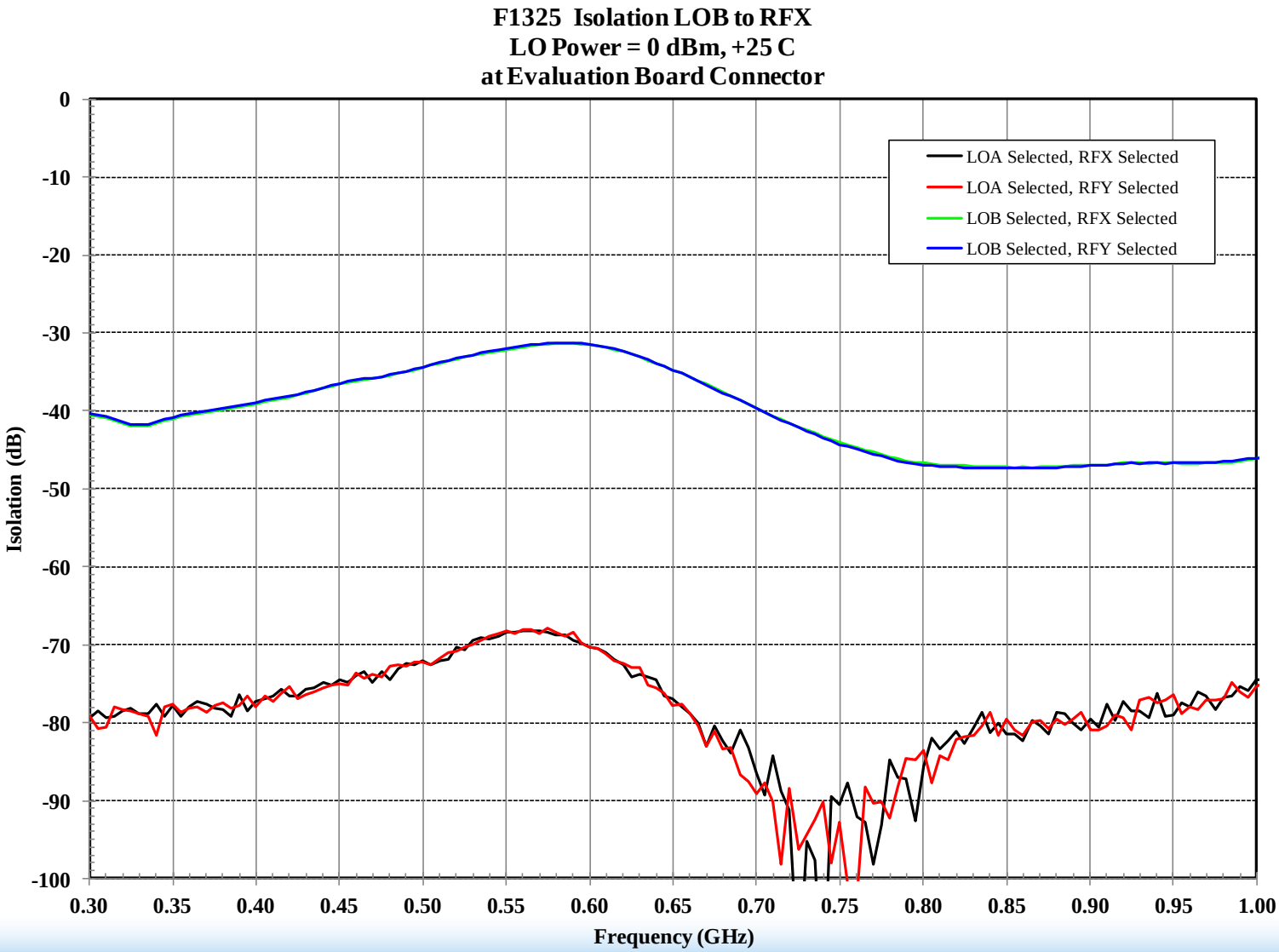
TC4: Isolation LOA to RFX



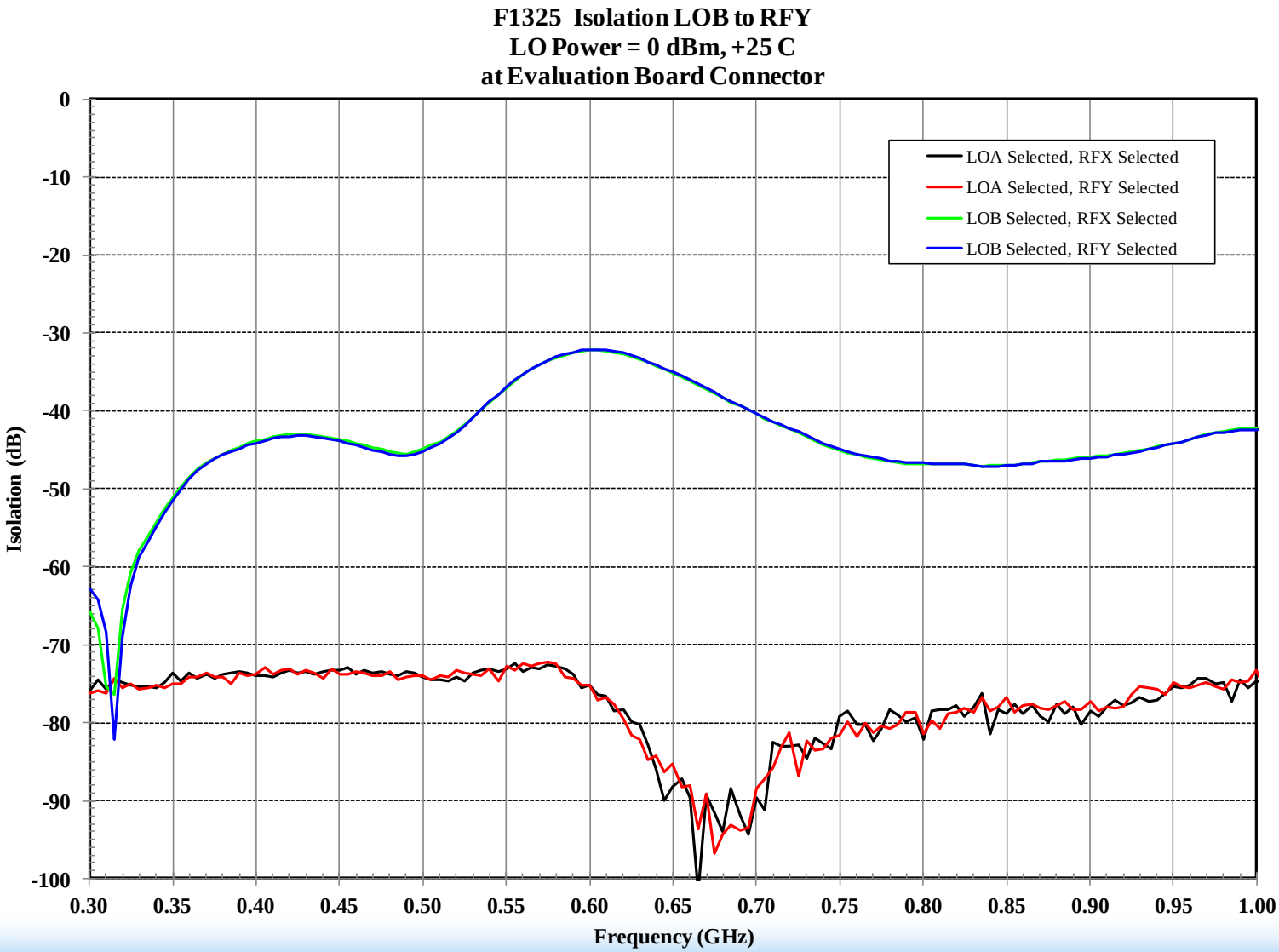
TC4: Isolation LOA to RFY



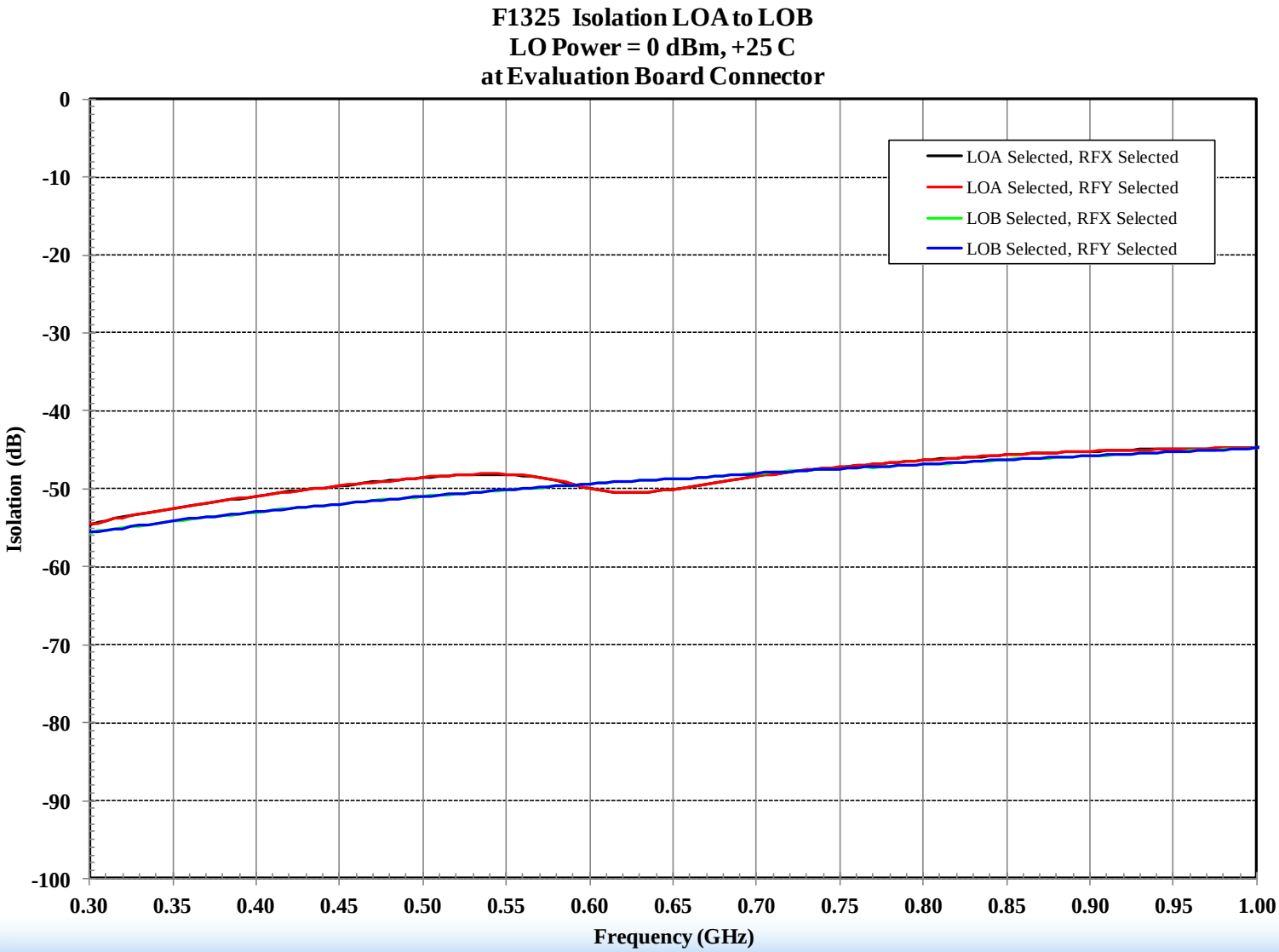
TC4: Isolation LOB to RFX



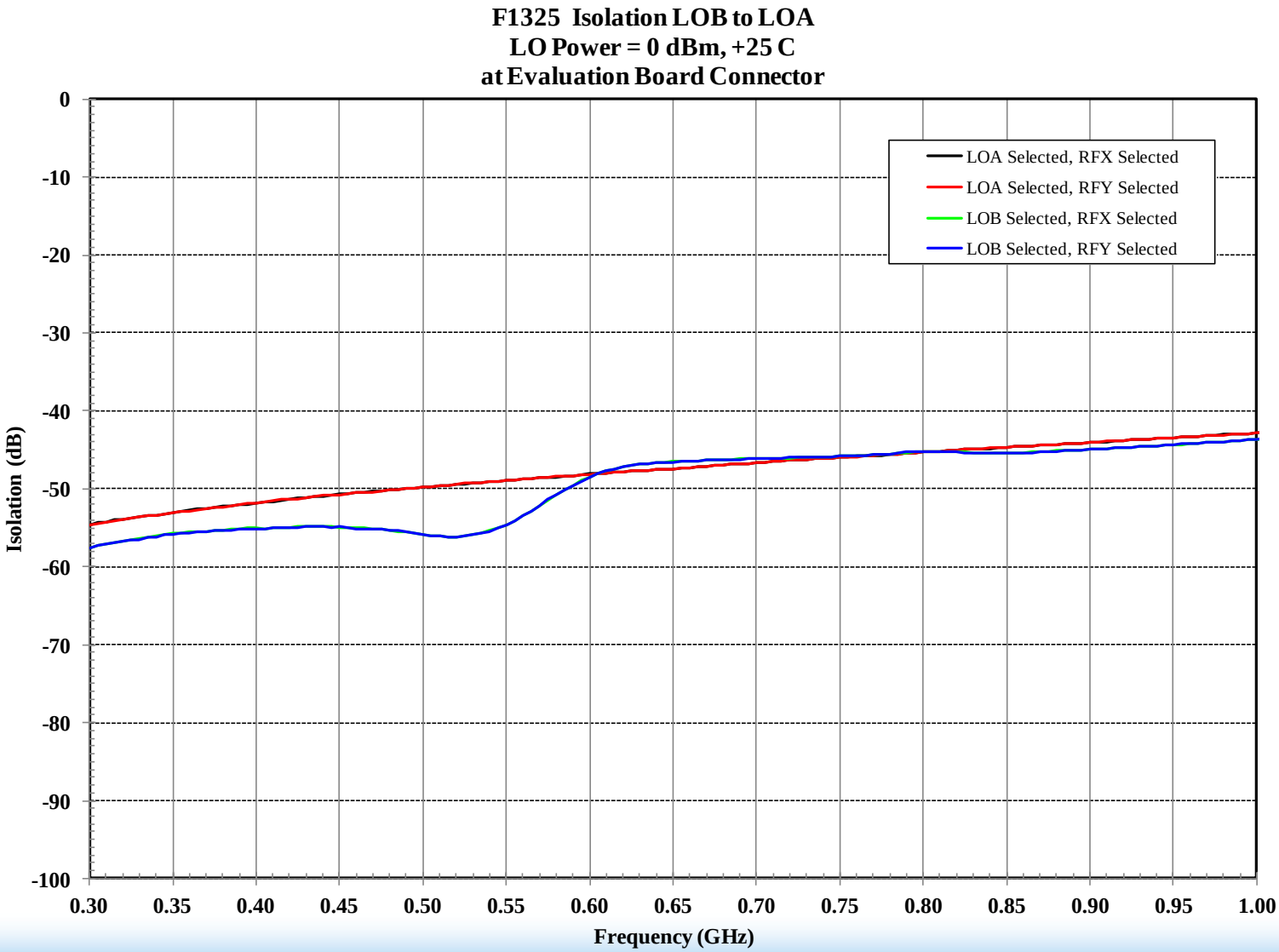
TC4: Isolation LOB to RFY



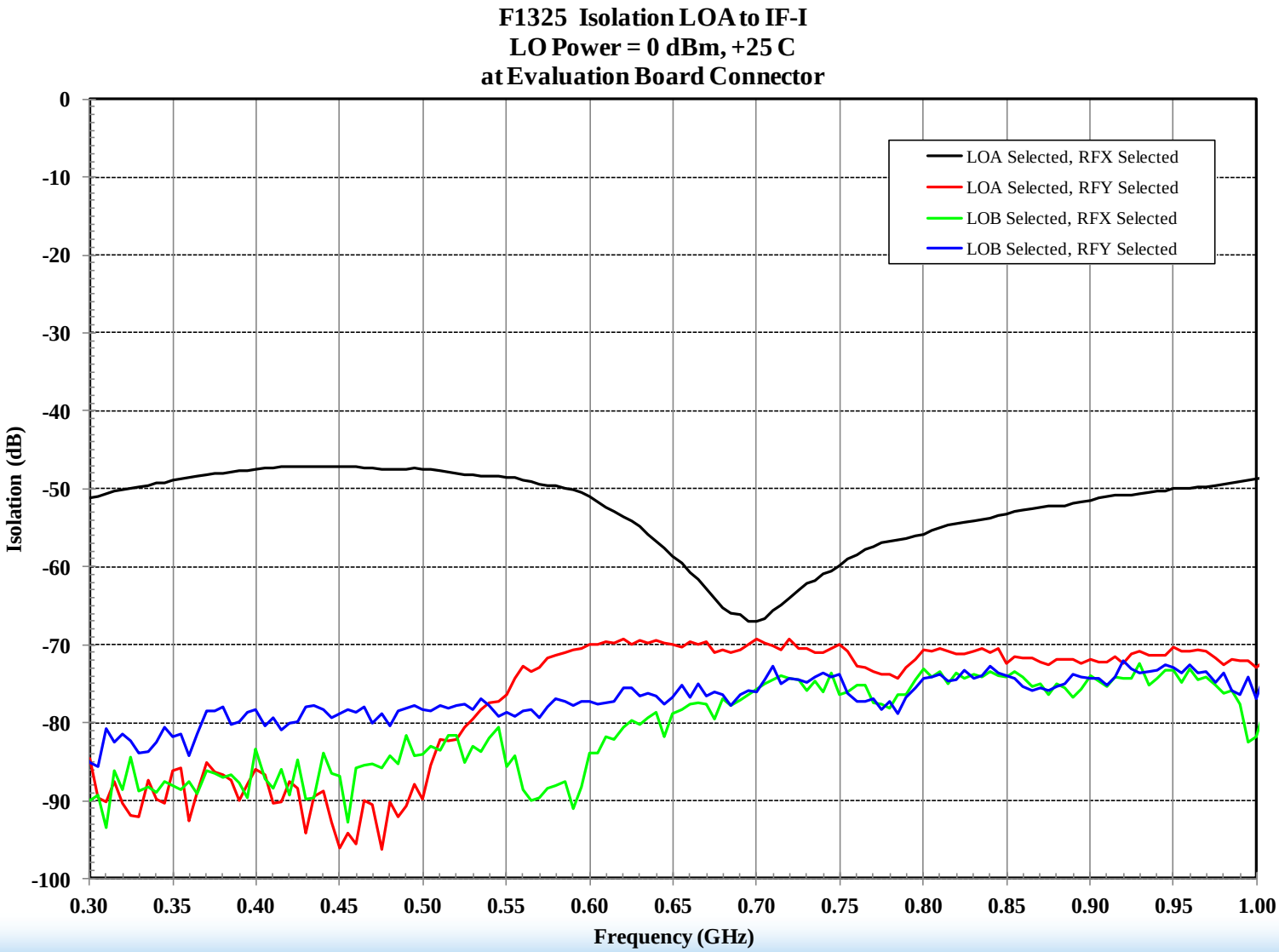
TC4: Isolation LOA to LOB



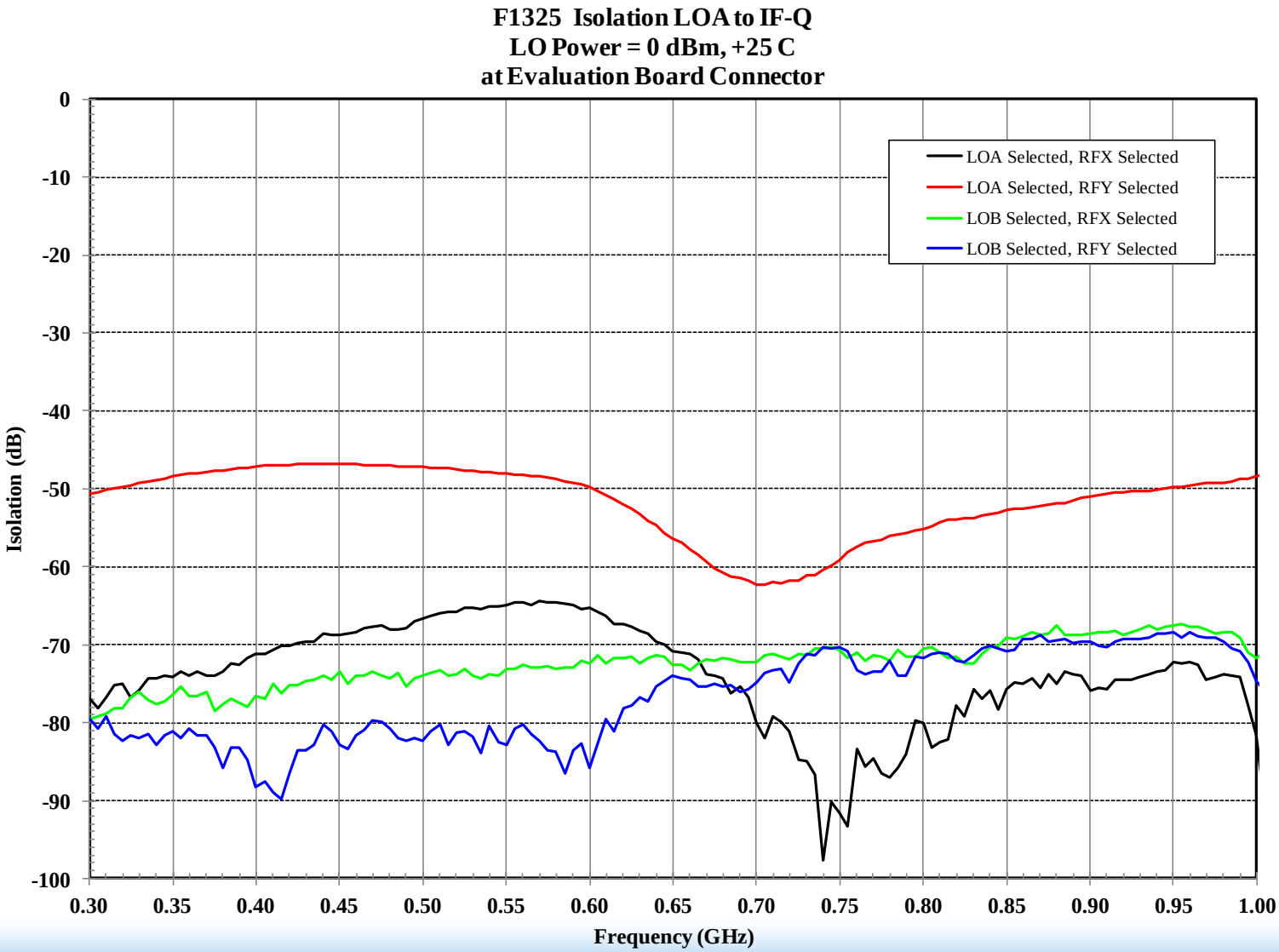
TC4: Isolation LOB to LOA



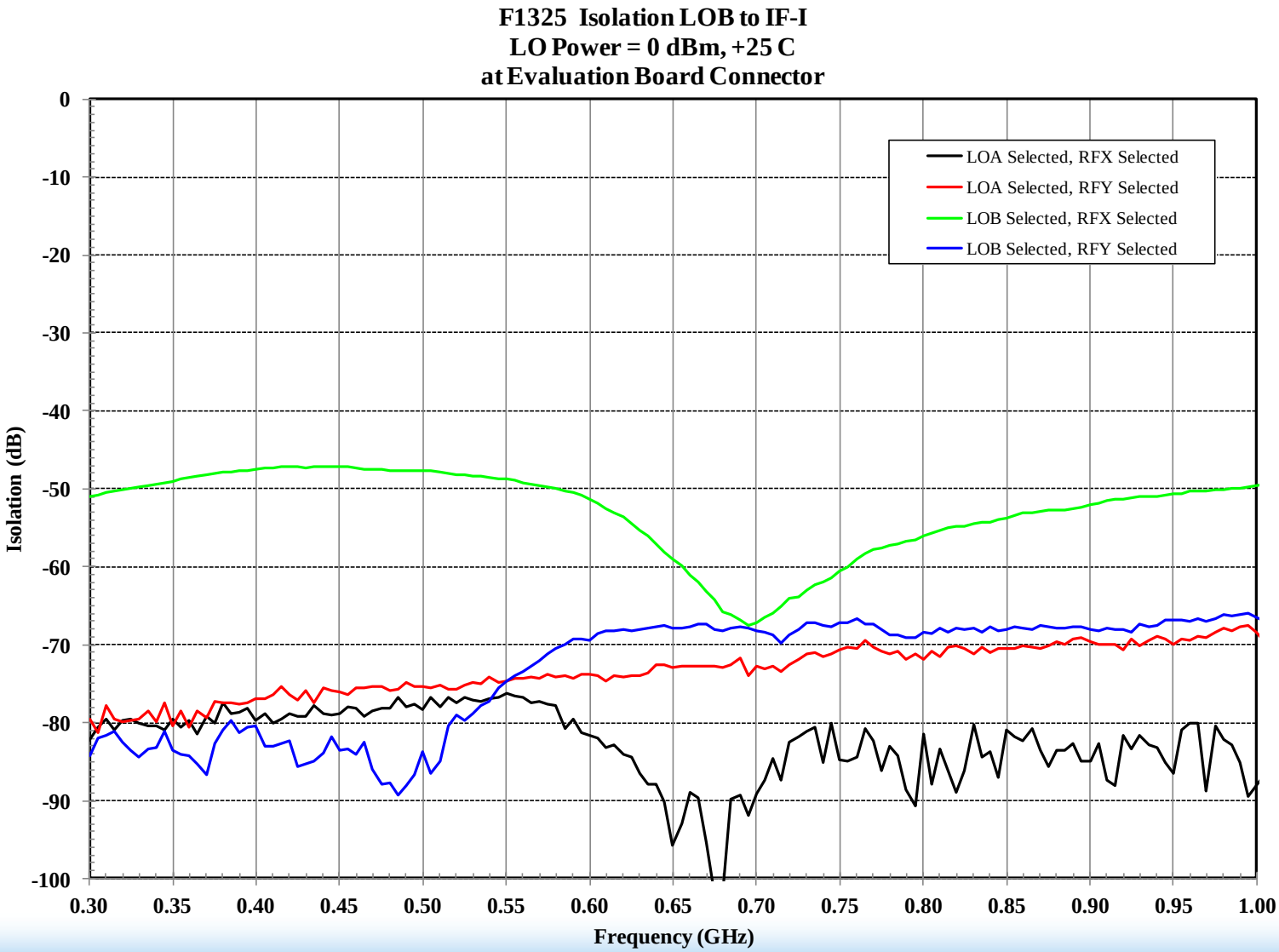
TC4: Isolation LOA to IF-I



TC4: Isolation LOA to IF-Q



TC4: Isolation LOA to IF-I



TC4: Isolation LOB to IF-Q