

# F1200 Temperature Performance

- August 10, 2014
- AT0089
  
- Revised September 3, 2014

Michael J. Virostko  
Principal Product Application Engineer



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The Analog and Digital Company™



# Agenda

- Introduction
- Testing
- Results

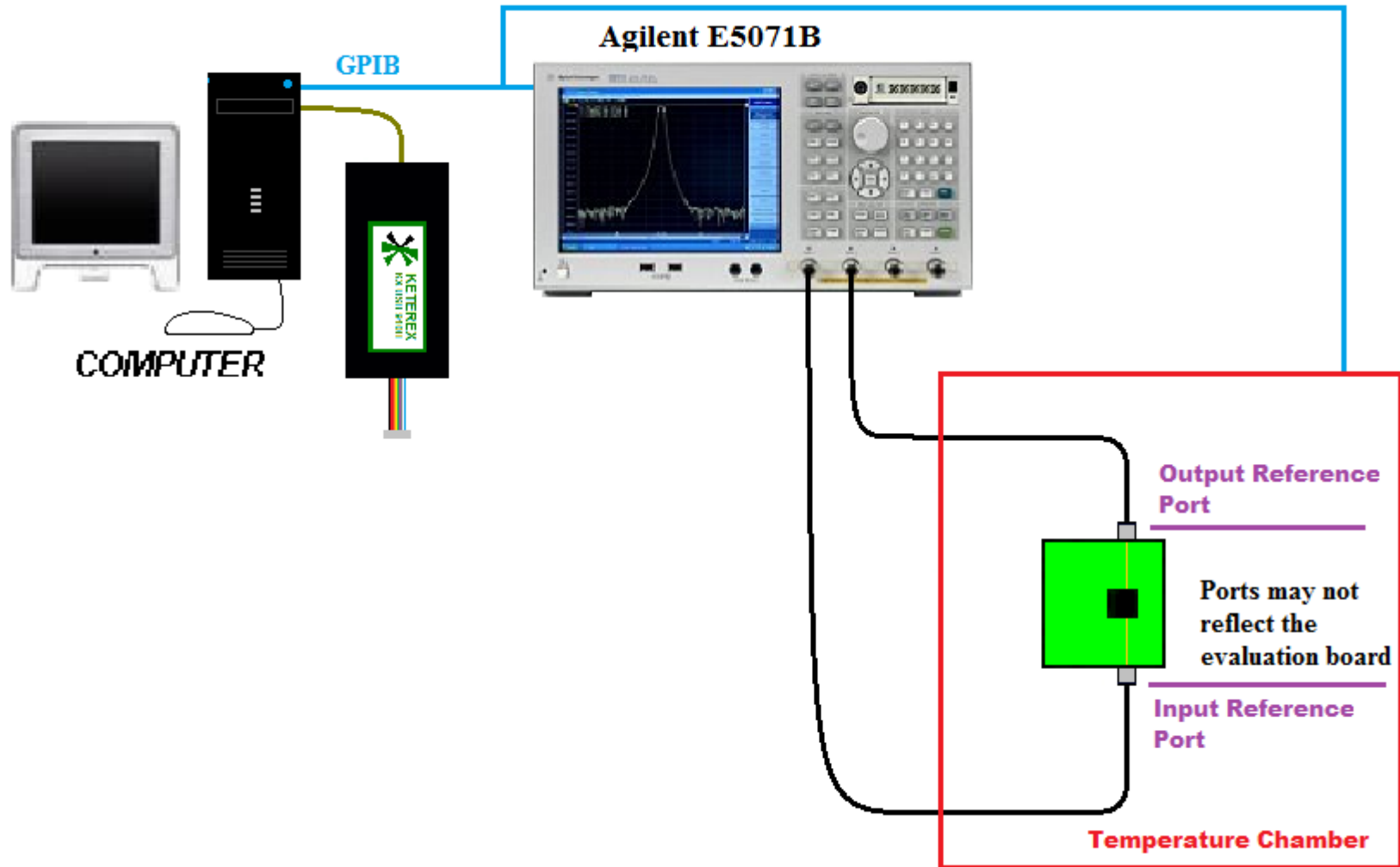


# Introduction

- Customer is interested in the F1200, Intermediate Frequency Digital Variable Gain Amplifier, and has a concern with temperature variation.
- The temperature specification say the product can be used to +85 °C. Customer's environment can go to +105 °C.
- Customer is interested in the parameter variations with the temperature.

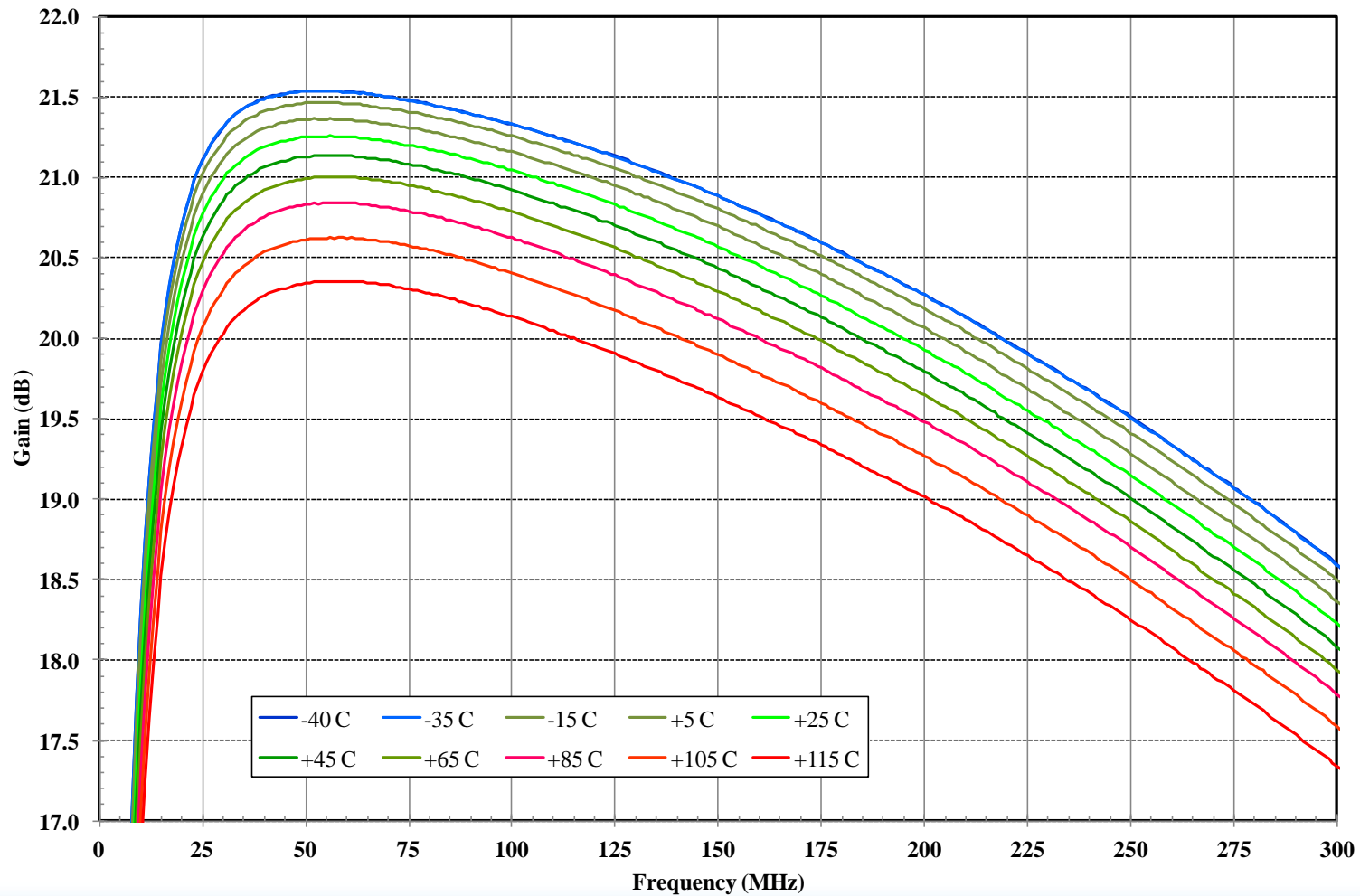


# S-Parameter Test Setup



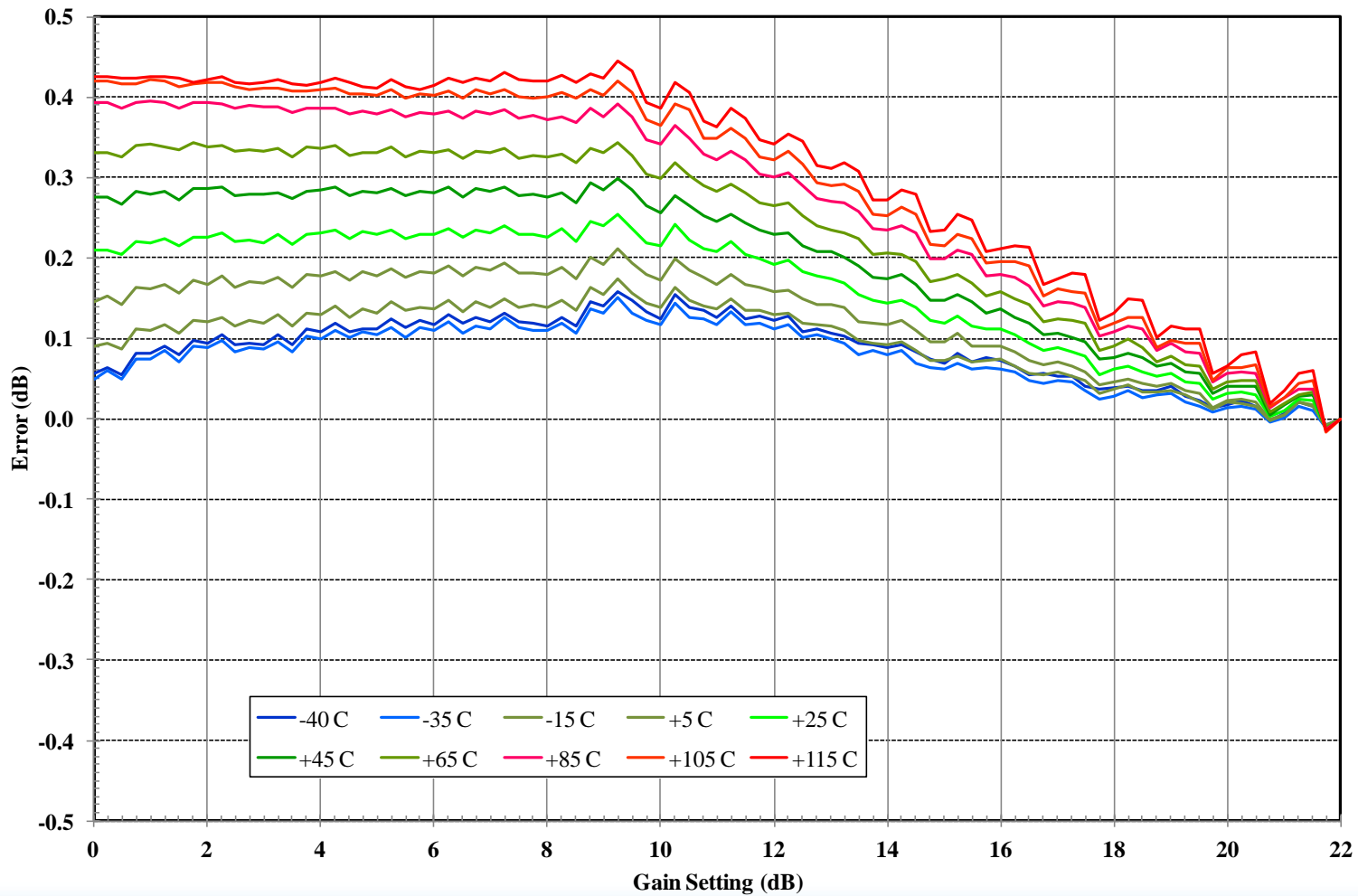
# Maximum Gain Variation

F1200 (Evaluation Board) - EB4313002  
Maximum Gain



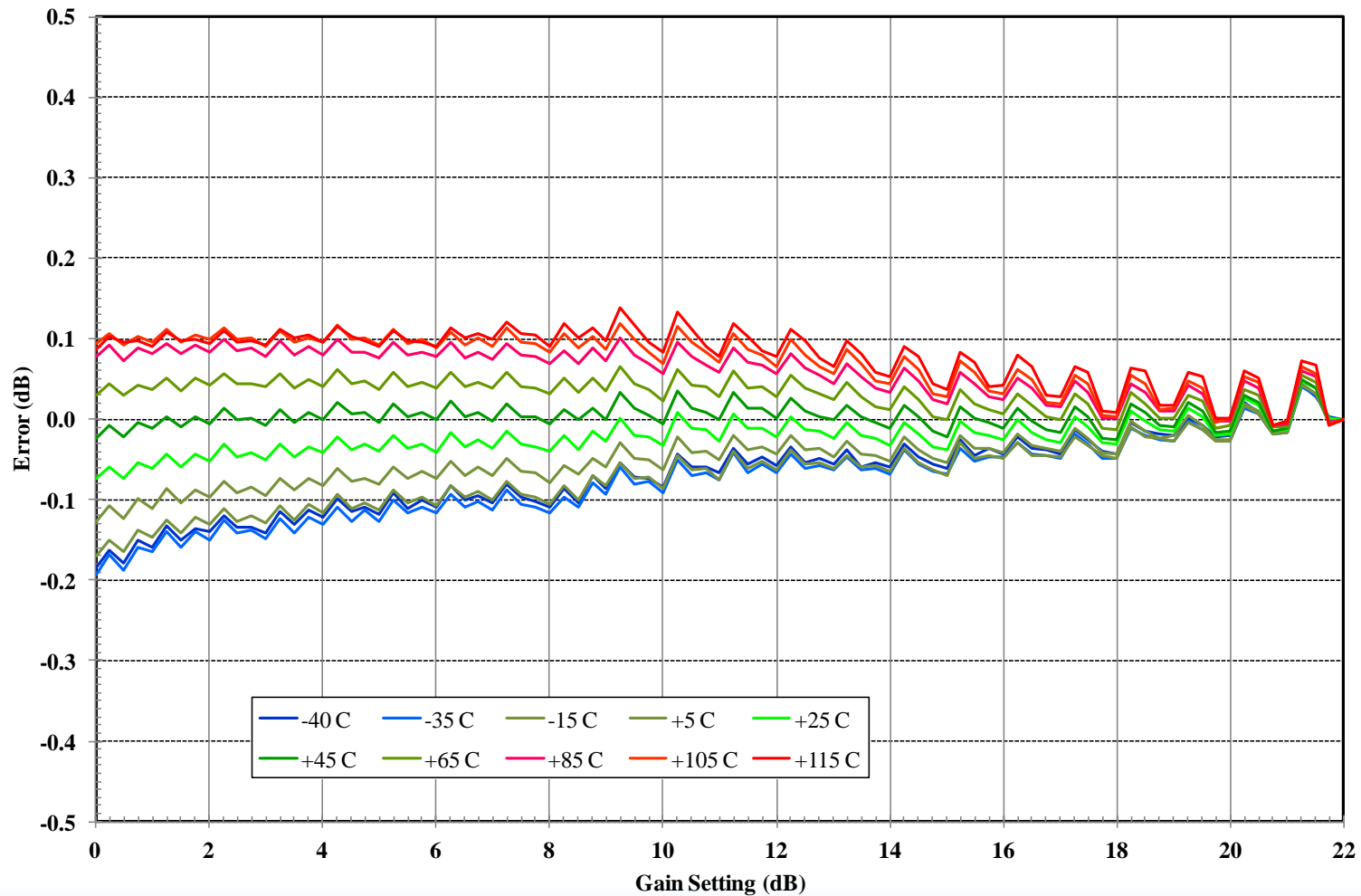
# Attenuator Accuracy at 50 MHz

F1200 (Evaluation Board) - EB4313002  
Bit Error - 50 MHz



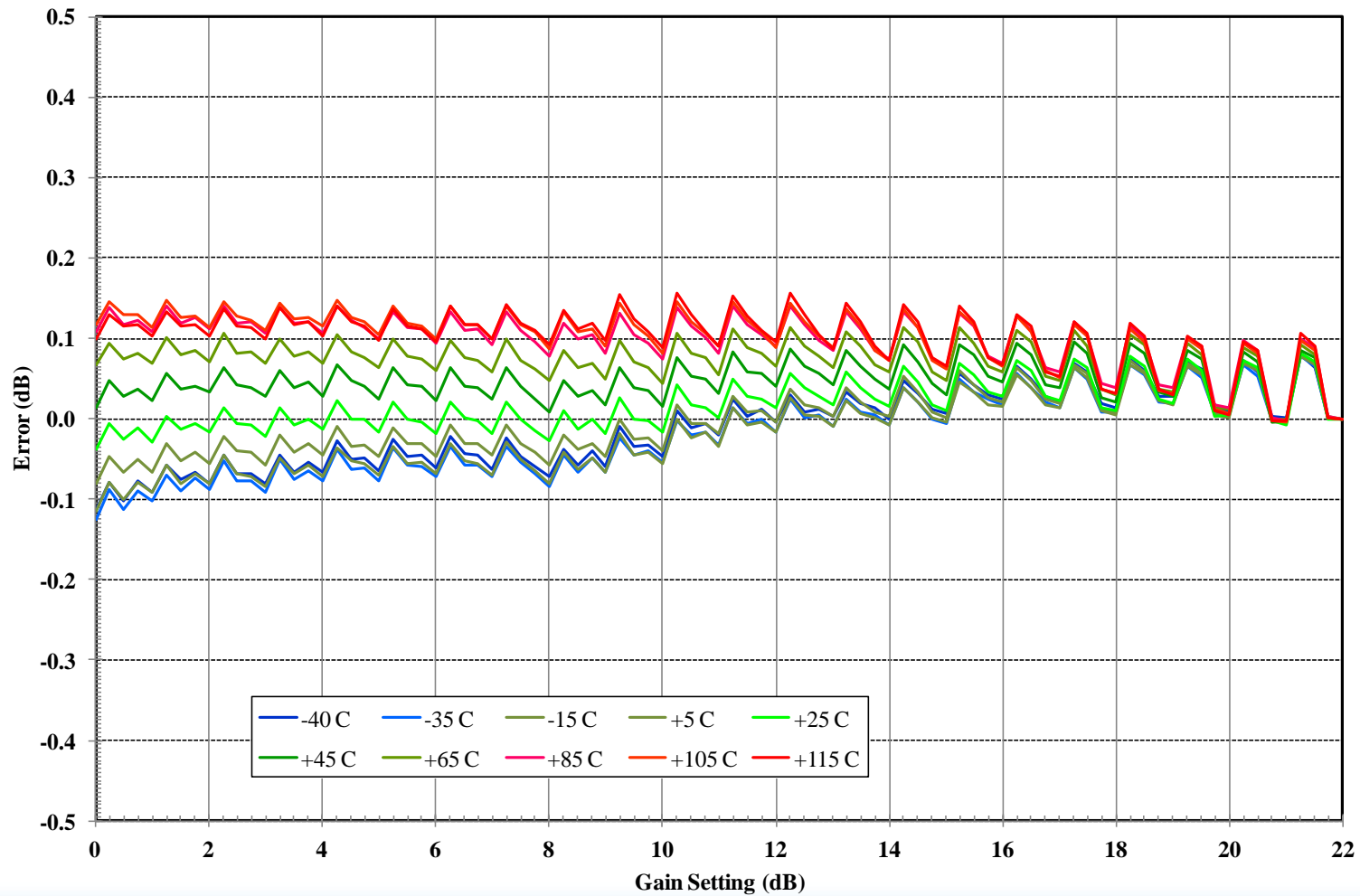
# Attenuator Accuracy at 100 MHz

F1200 (Evaluation Board) - EB4313002  
Bit Error - 100 MHz



# Attenuator Accuracy at 160 MHz

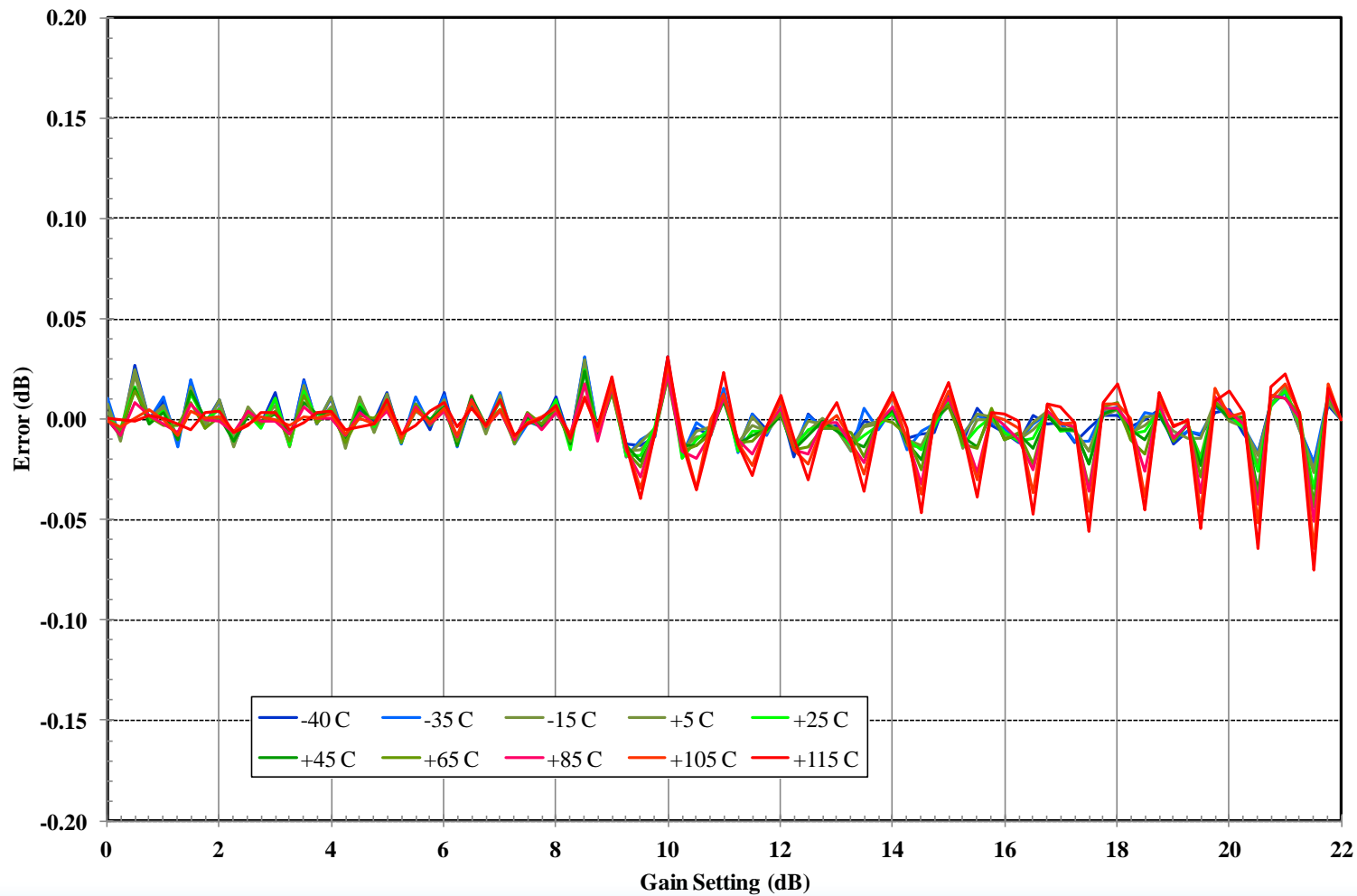
F1200 (Evaluation Board) - EB4313002  
Bit Error - 160 MHz





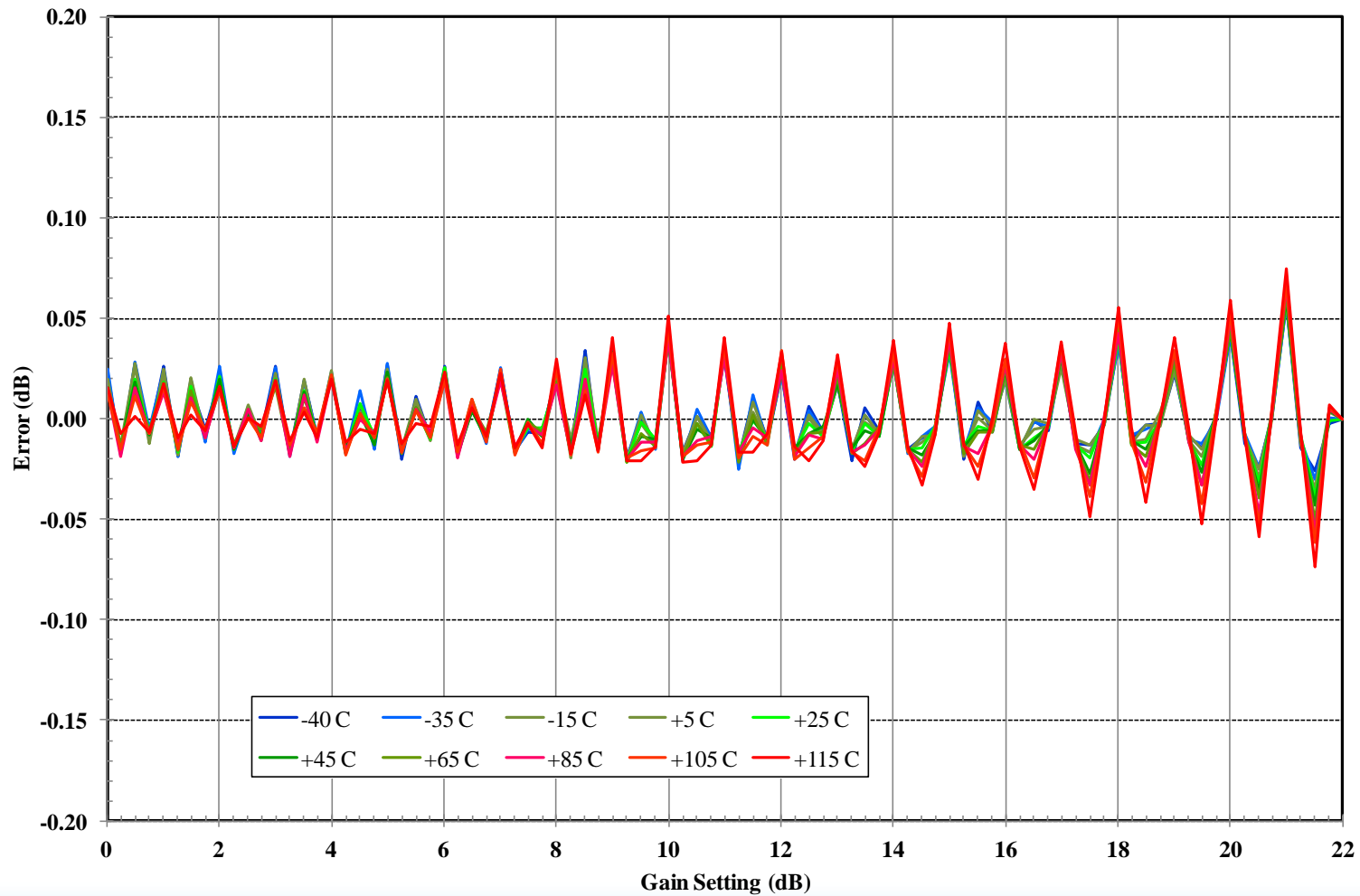
# Step Accuracy (DNL) at 50 MHz

F1200 (Evaluation Board) - EB4313002  
Step Error - 50 MHz



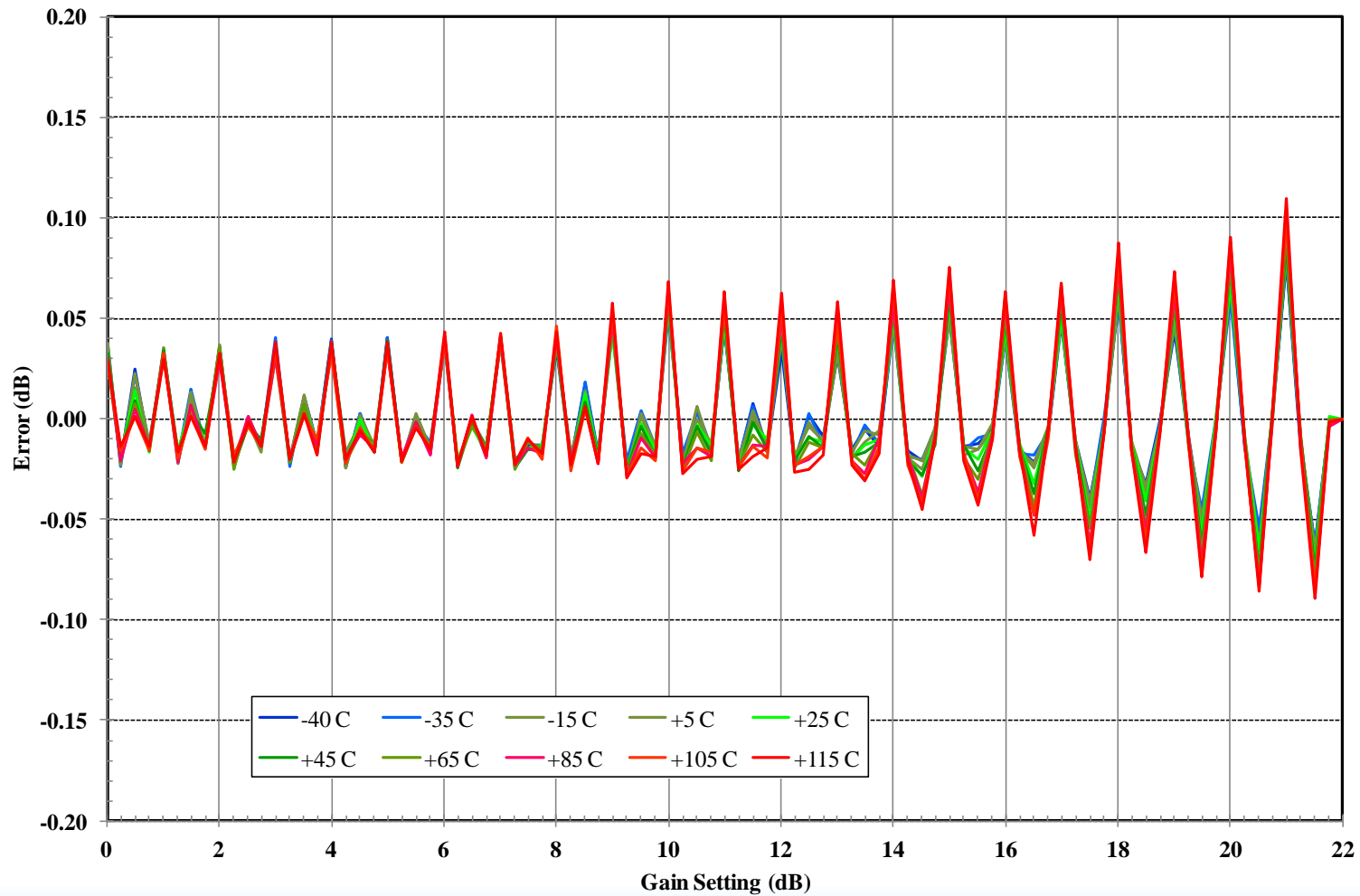
# Step Accuracy (DNL) at 100 MHz

F1200 (Evaluation Board) - EB4313002  
Step Error - 100 MHz

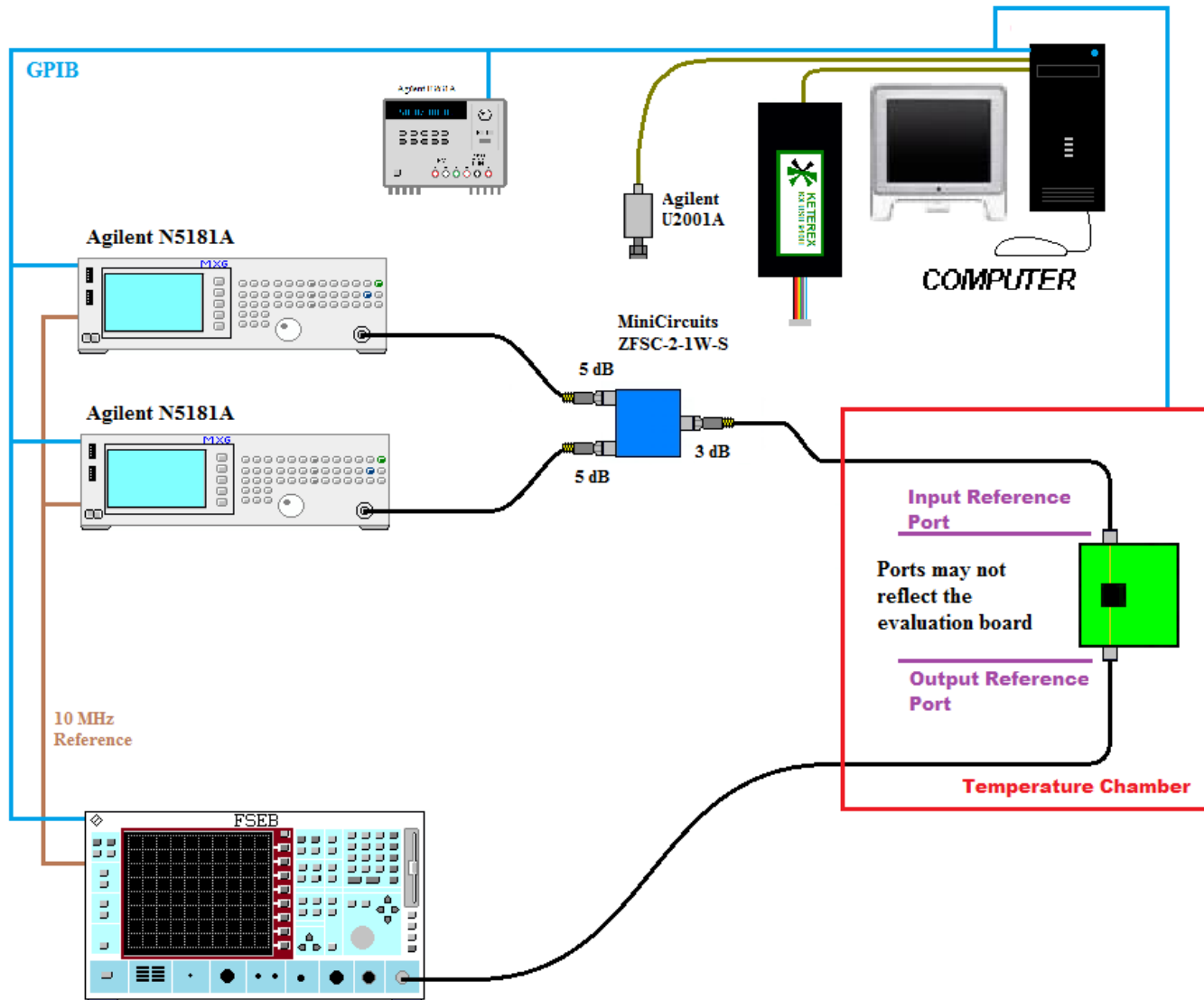


# Step Accuracy (DNL) at 160 MHz

F1200 (Evaluation Board) - EB4313002  
Step Error - 160 MHz

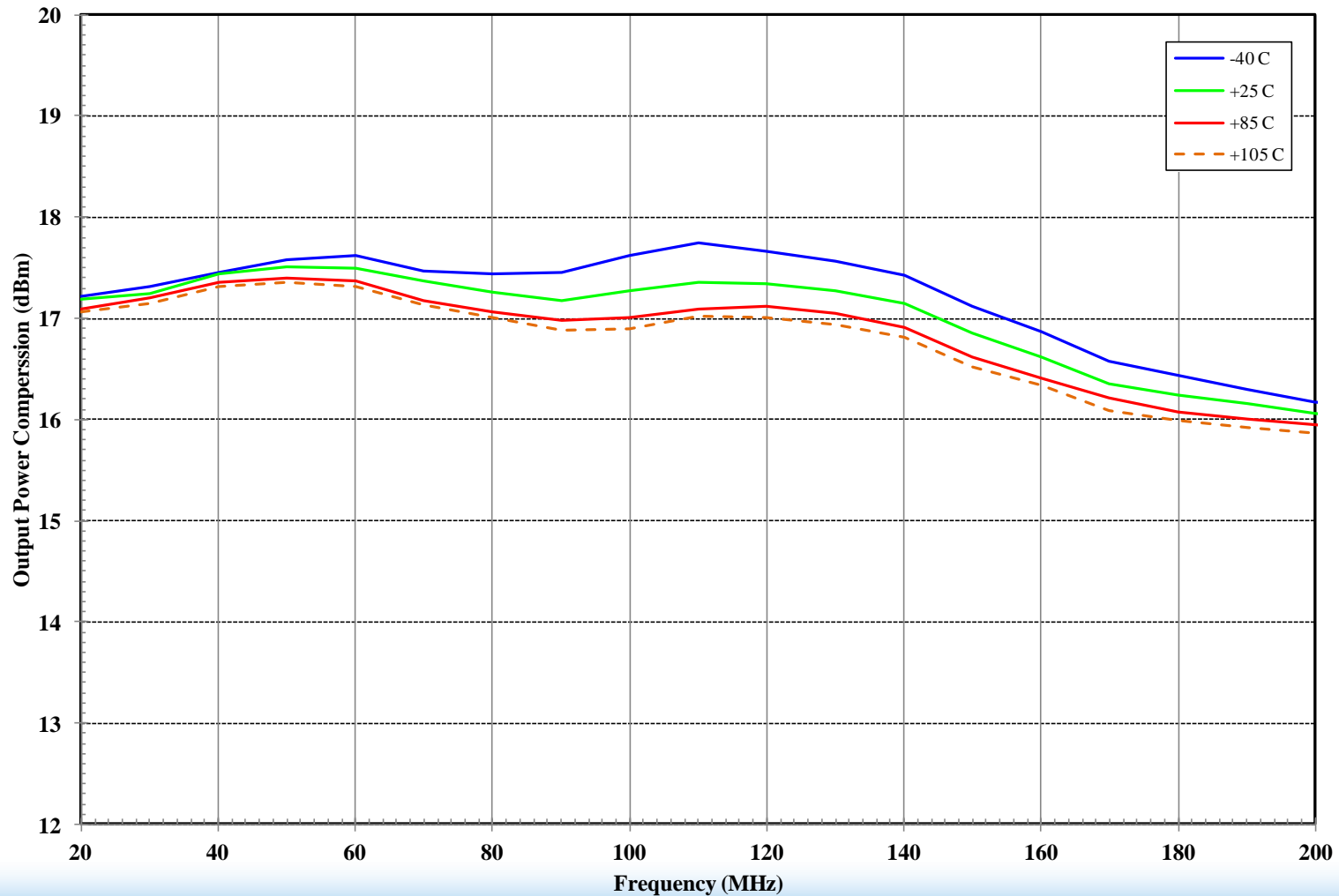


# P1dB, IP3, Harmonic Test Setup



# OP1dB: Maximum Gain

F1200 - Output 1 dB Compression  
Vcc = 5.0 V, Maximum Gain Setting  
Data is collected at the Evaluation Board Connectors

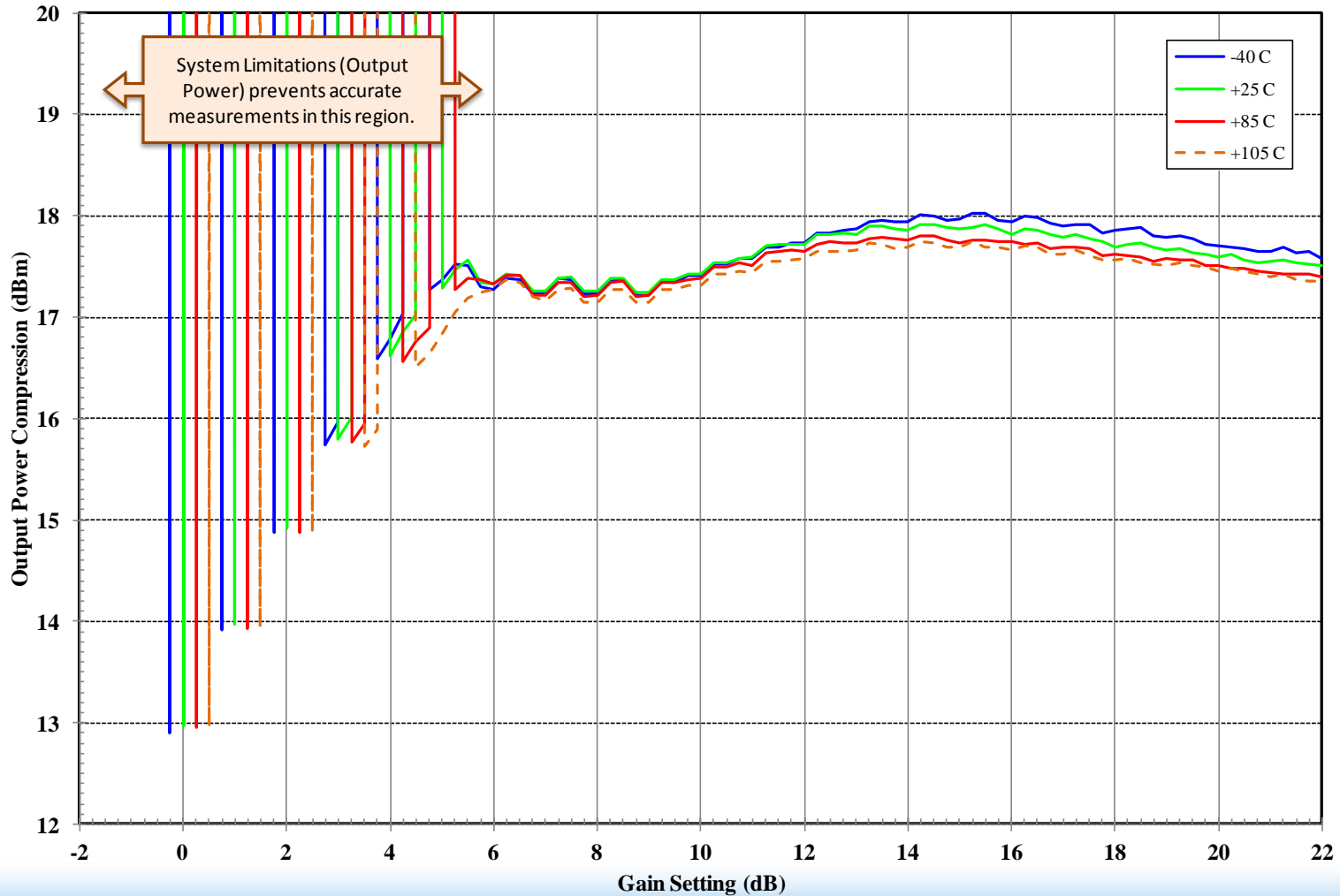


# OP1dB: 50 MHz

## F1200 - Output 1 dB Compression

V<sub>cc</sub> = 5.0 V, 50 MHz

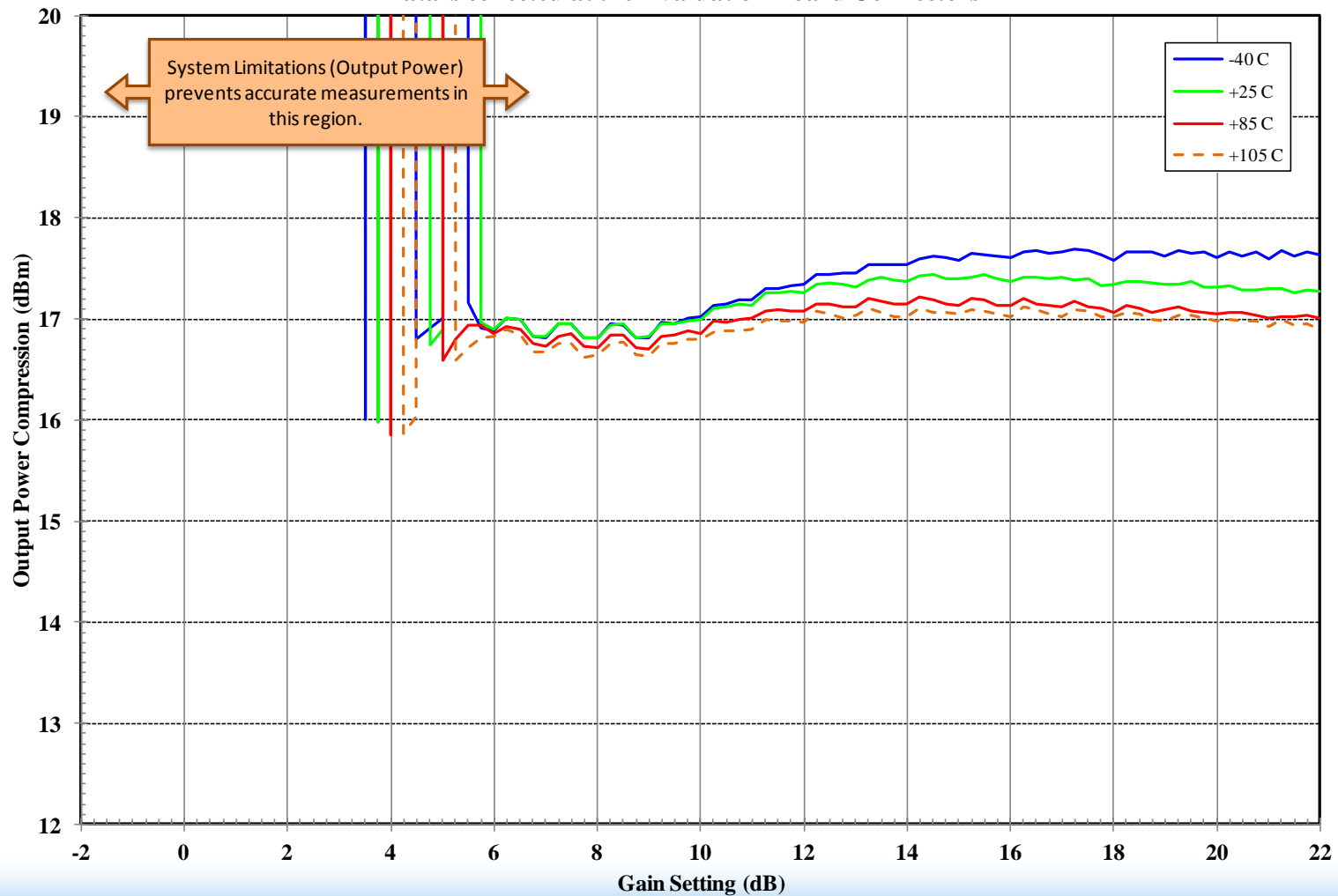
Data is collected at the Evaluation Board Connectors



# OP1dB : 100 MHz

F1200 - Output 1 dB Compression  
Vcc = 5.0 V, 100 MHz

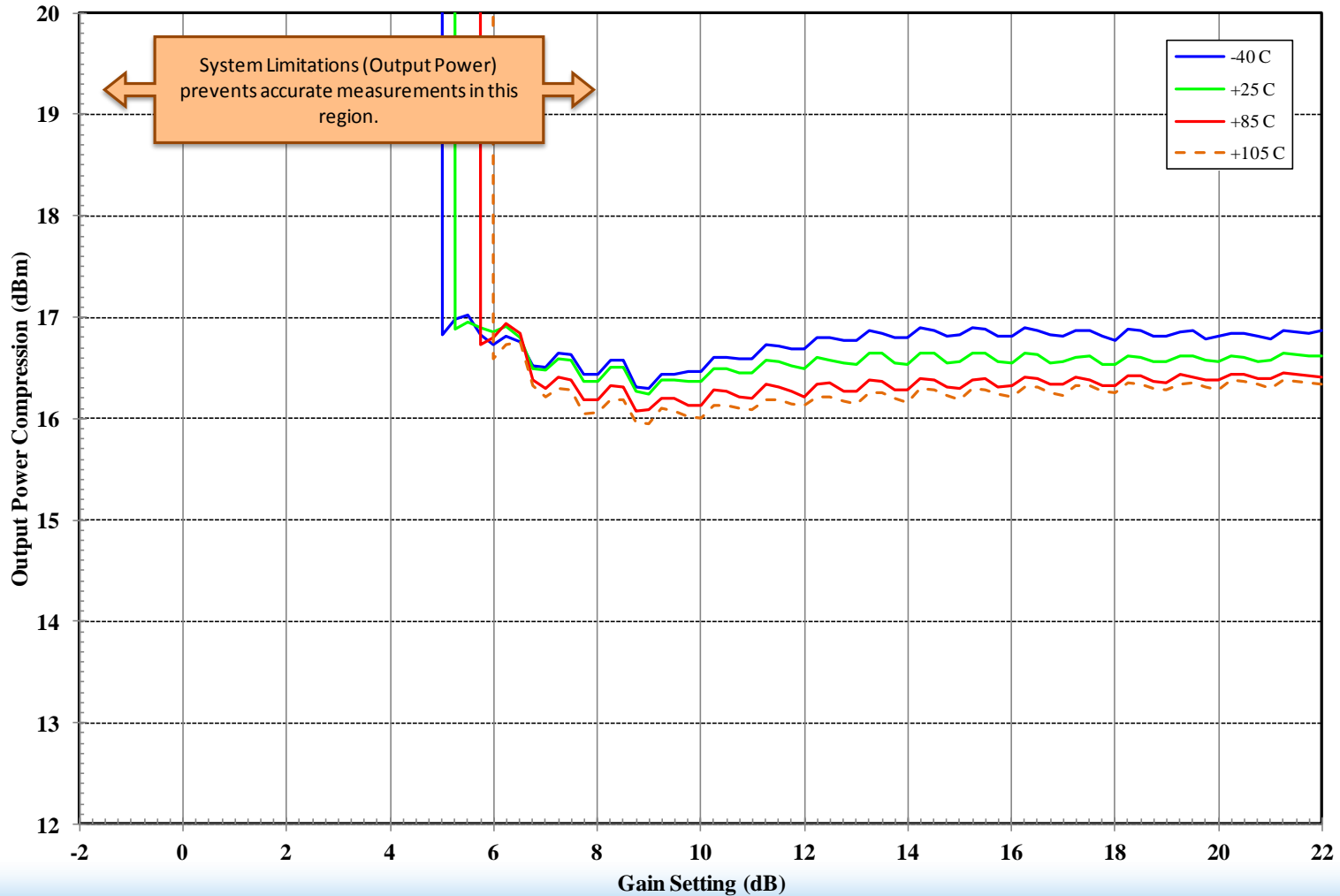
Data is collected at the Evaluation Board Connectors



# OP1dB : 160 MHz

F1200 - Output 1 dB Compression  
Vcc = 5.0 V, 160 MHz

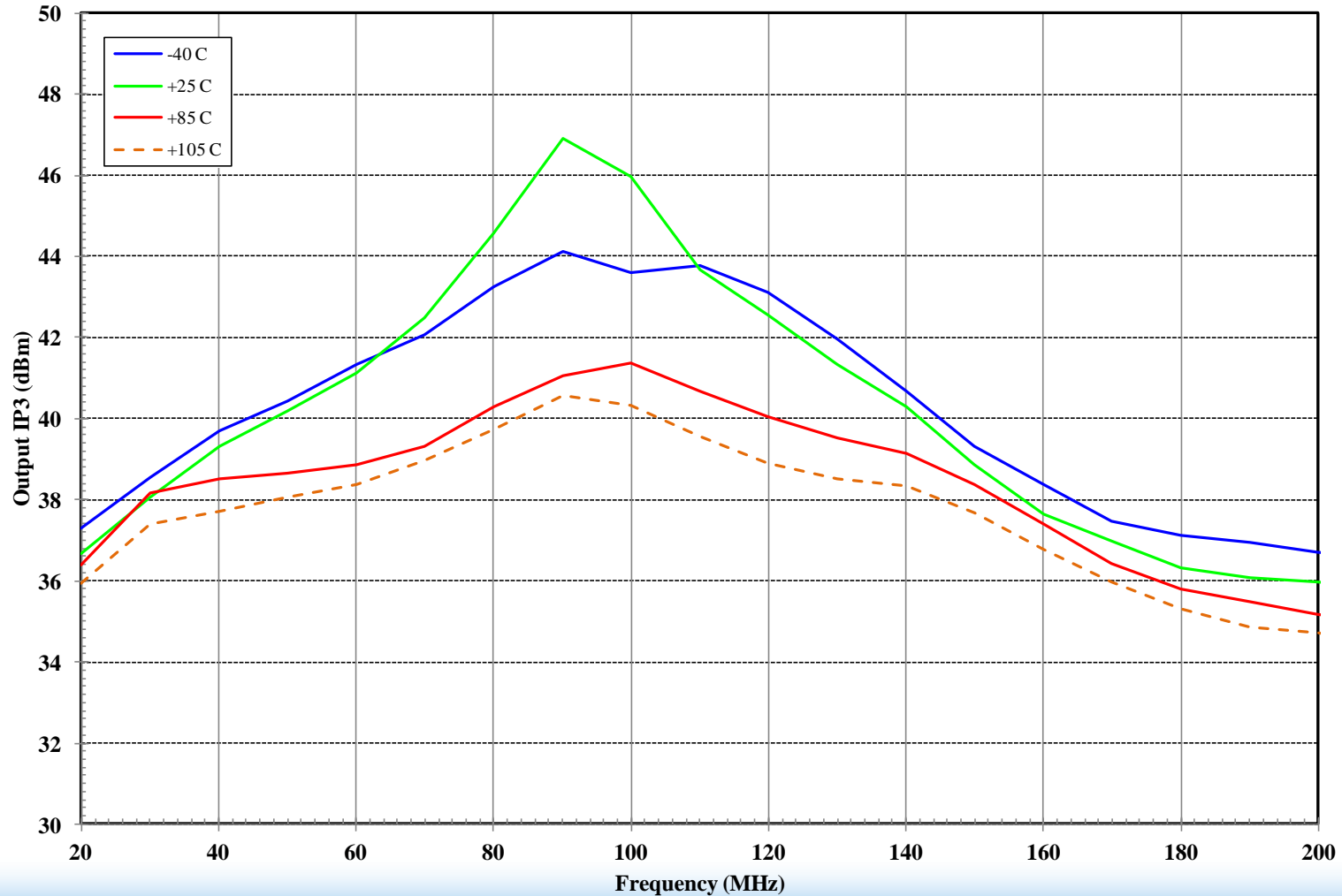
Data is collected at the Evaluation Board Connectors





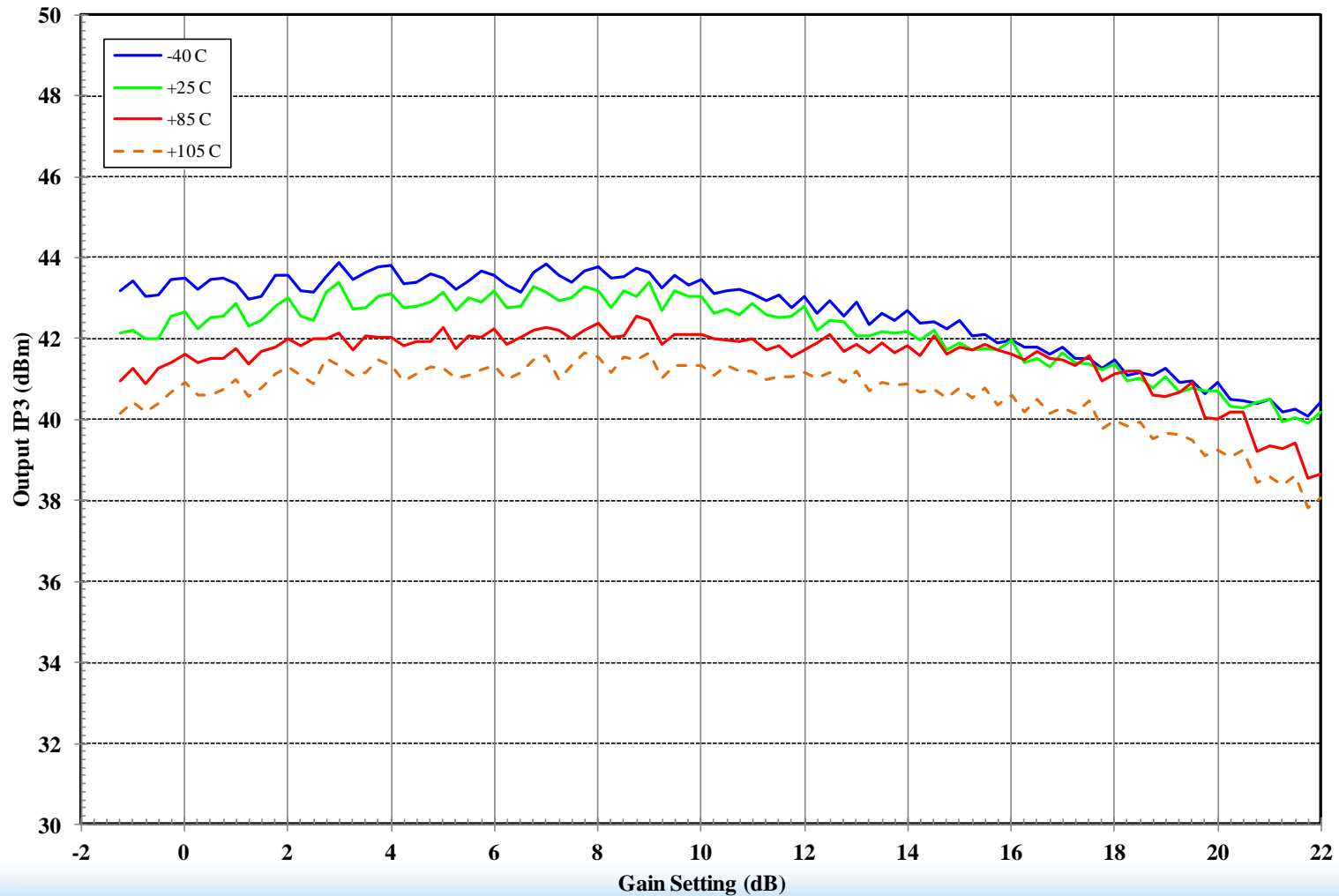
# OIP3: Maximum Gain

**F1200 - Output IP3**  
**Vcc = 5.0 V, Maximum Gain Setting, Pout = 0 dBm**  
**Data is collected at the Evaluation Board Connectors**



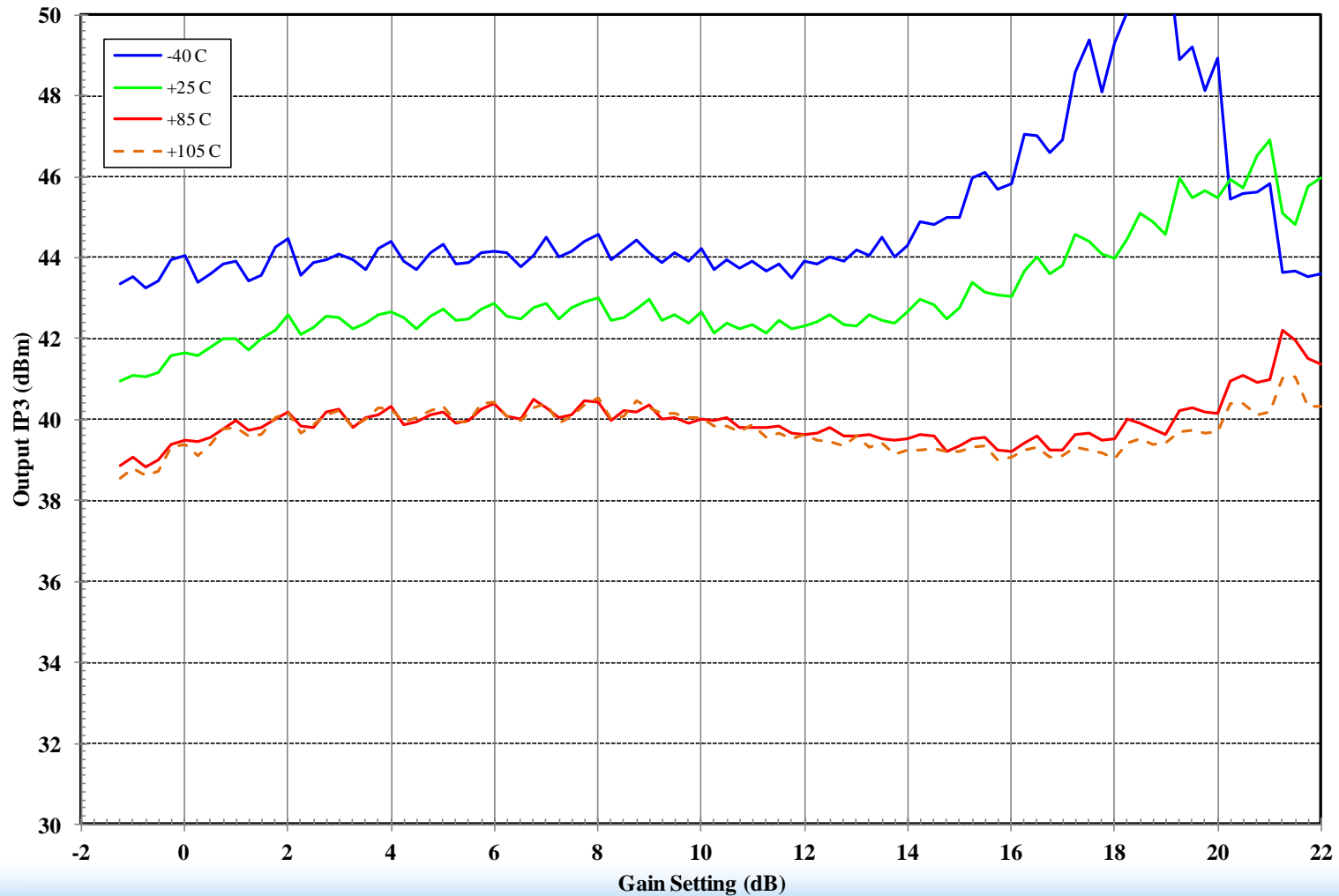
# OIP3: 50 MHz

F1200 - Output IP3  
Vcc = 5.0 V, 50 MHz, Pout = 0 dBm  
Data is collected at the Evaluation Board Connectors



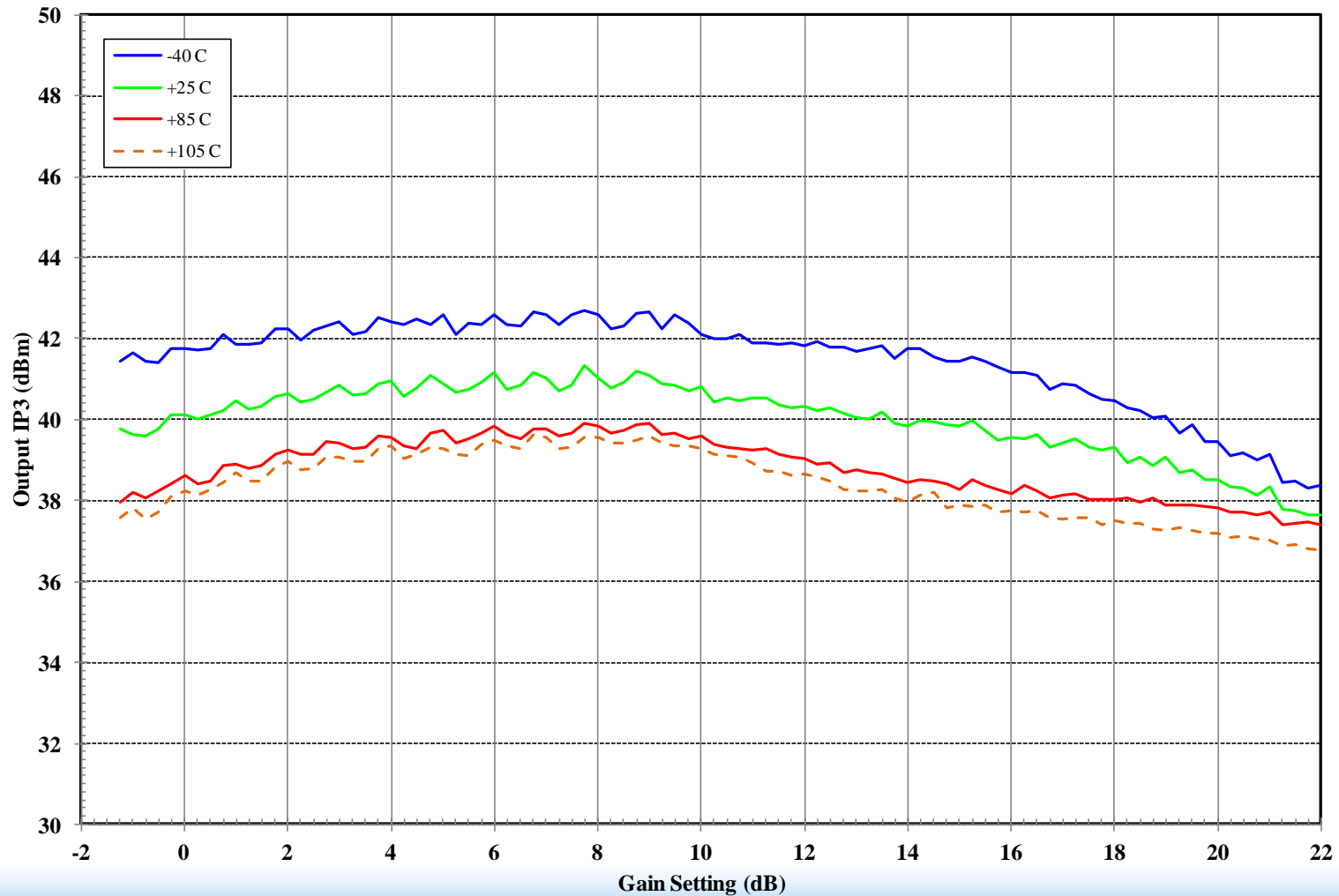
# OIP3: 100 MHz

F1200 - Output IP3  
Vcc = 5.0 V, 100 MHz, Pout = 0 dBm  
Data is collected at the Evaluation Board Connectors



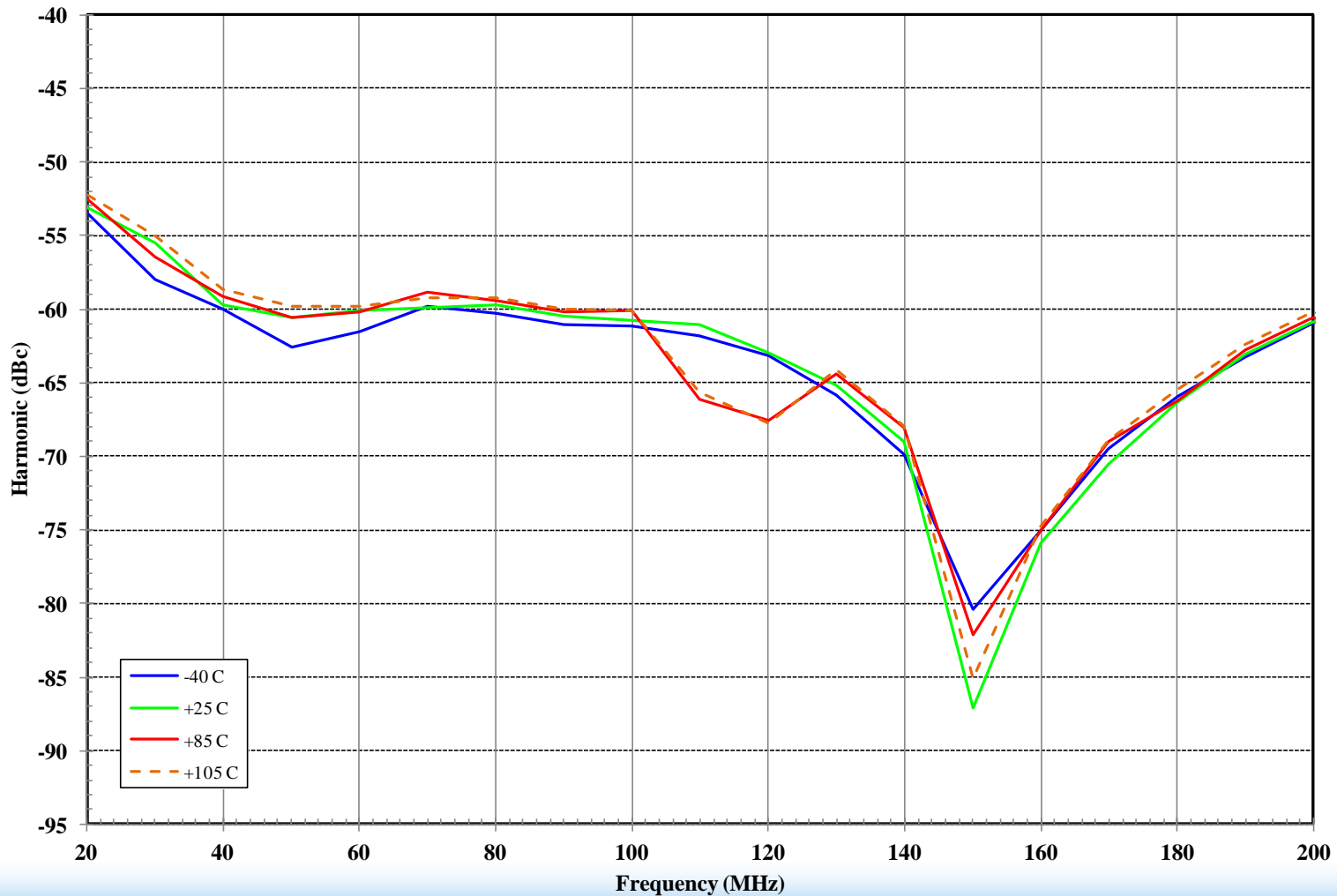
# OIP3: 160 MHz

F1200 - Output IP3  
Vcc = 5.0 V, 160 MHz, Pout = 0 dBm  
Data is collected at the Evaluation Board Connectors



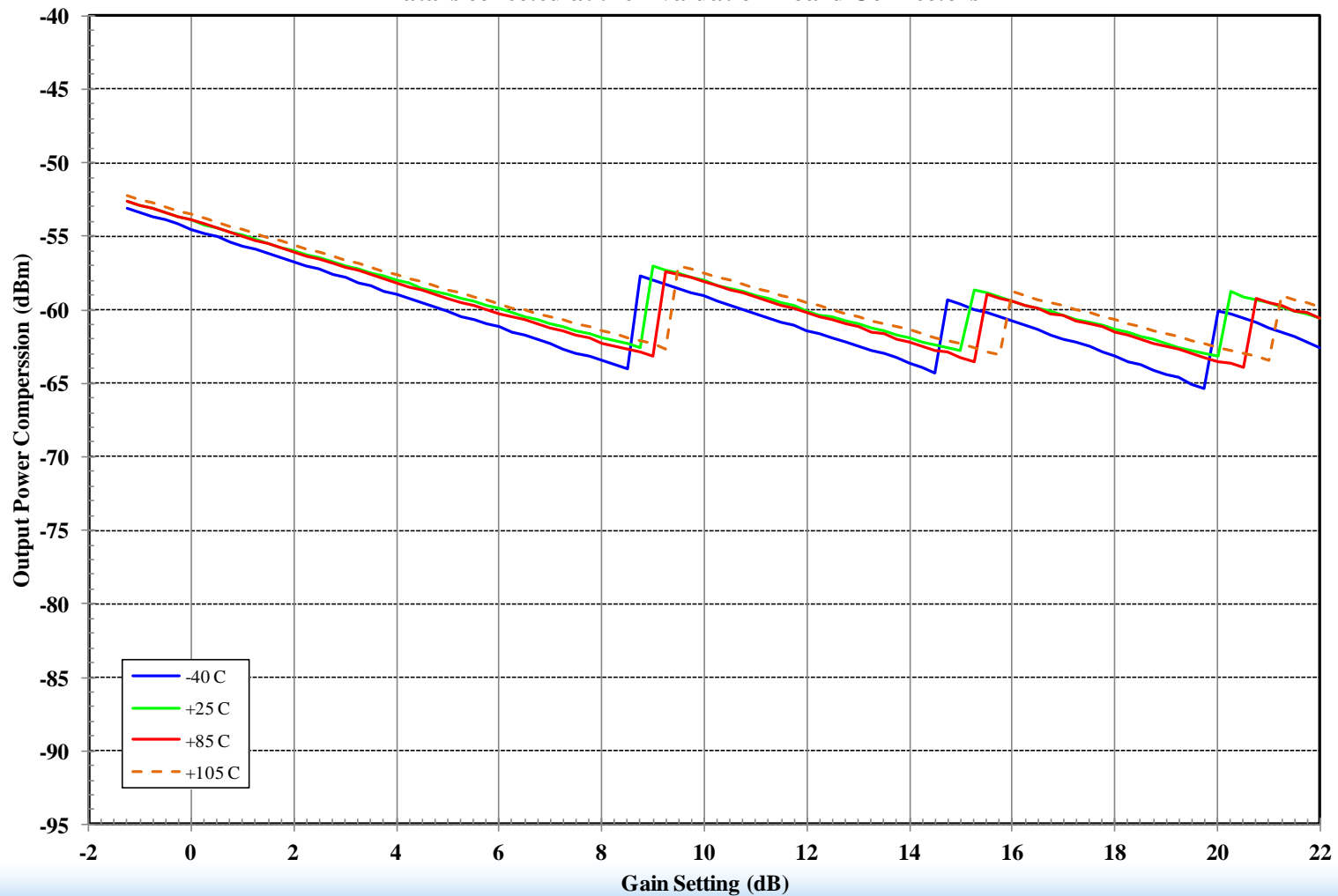
# 2<sup>nd</sup> Harmonic: Maximum Gain

F1200 - Second Harmonic  
V<sub>cc</sub> = 5.0 V, Maximum Gain Setting, P<sub>out</sub> = 0 dBm  
Data is collected at the Evaluation Board Connectors



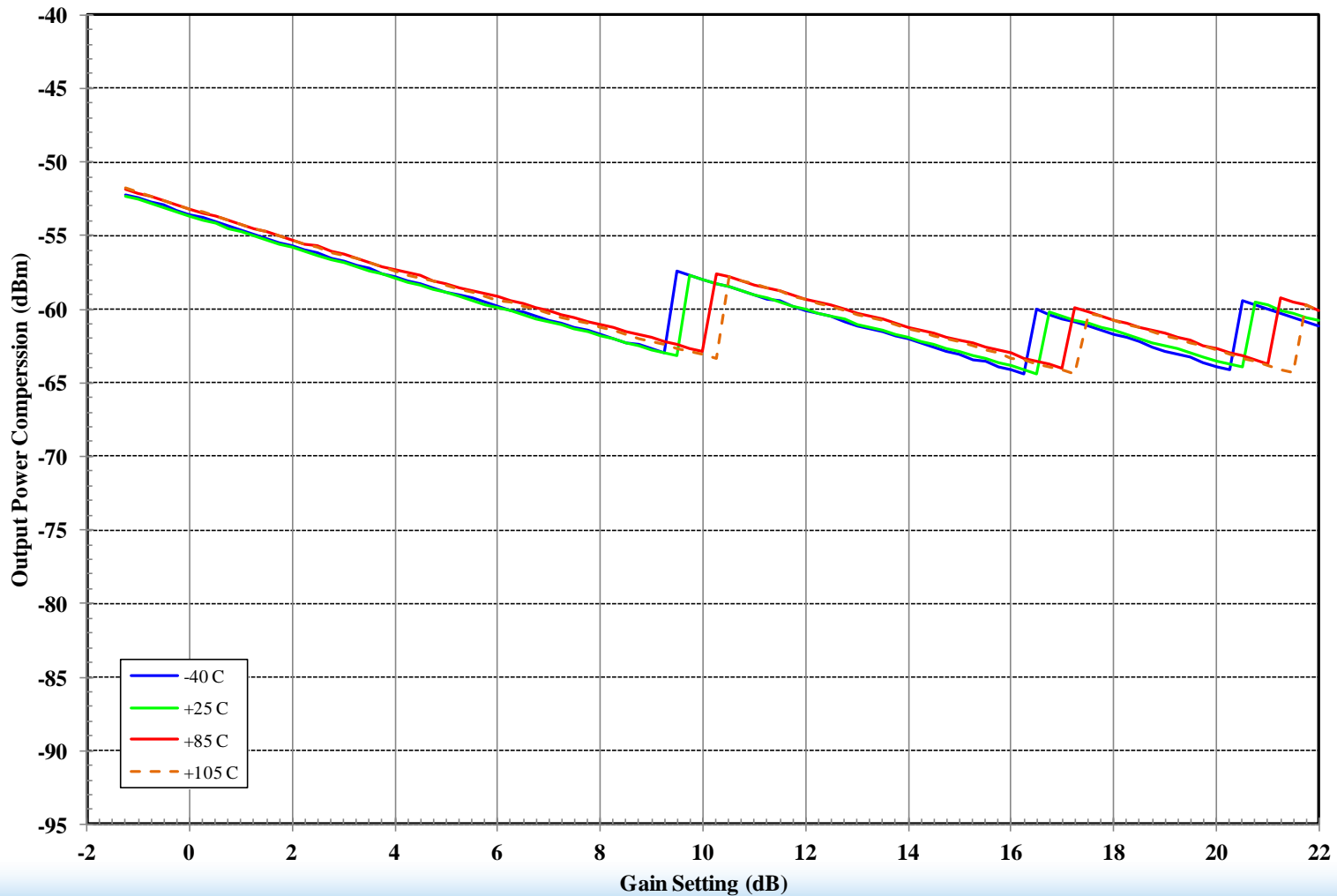
# 2<sup>nd</sup> Harmonic: 50 MHz

F1200 - Second Harmonic  
V<sub>cc</sub> = 5.0 V, 50 MHz, P<sub>out</sub> = 0 dBm  
Data is collected at the Evaluation Board Connectors



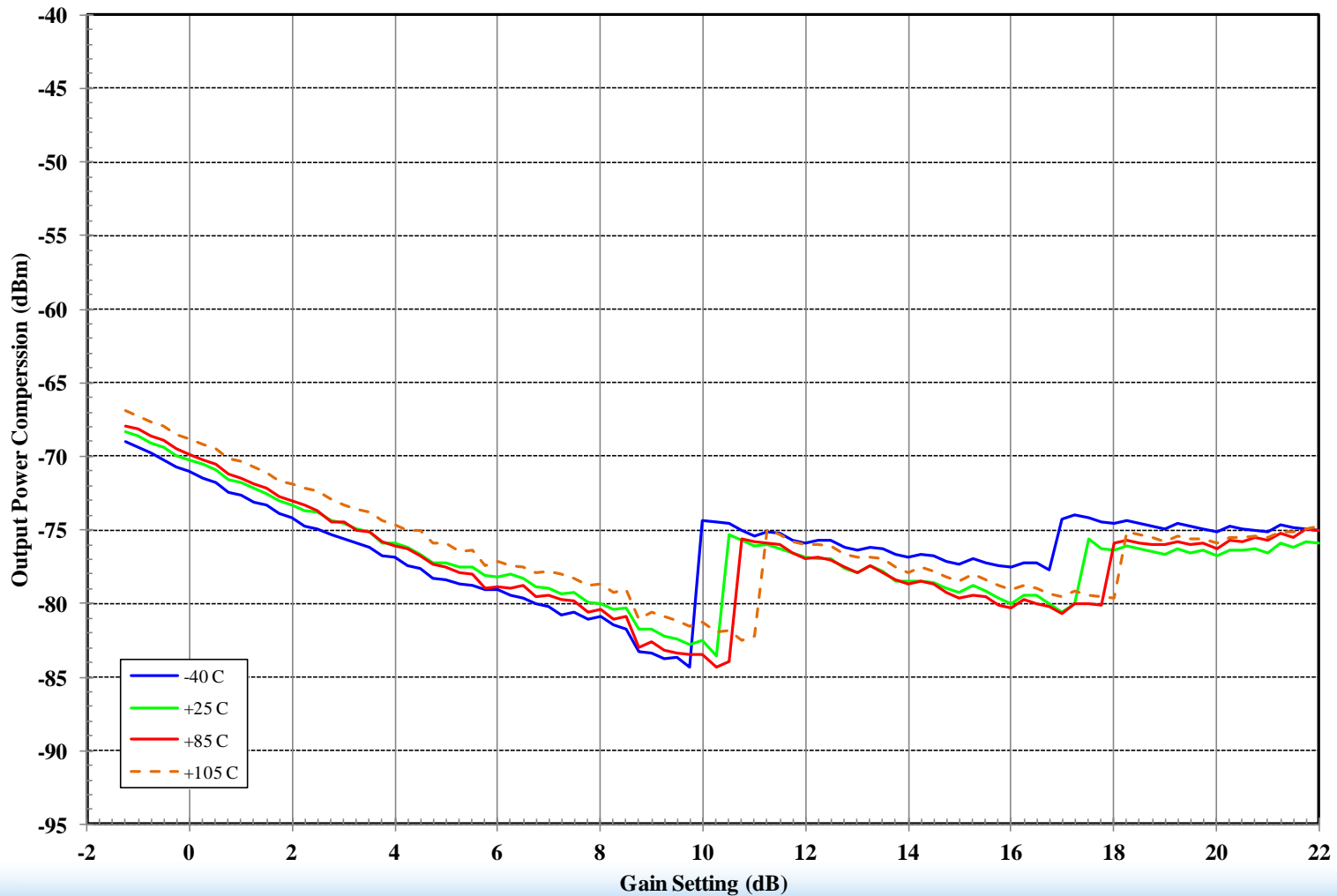
# 2<sup>nd</sup> Harmonic: 100 MHz

F1200 - Second Harmonic  
V<sub>cc</sub> = 5.0 V, 100 MHz, P<sub>out</sub> = 0 dBm  
Data is collected at the Evaluation Board Connectors



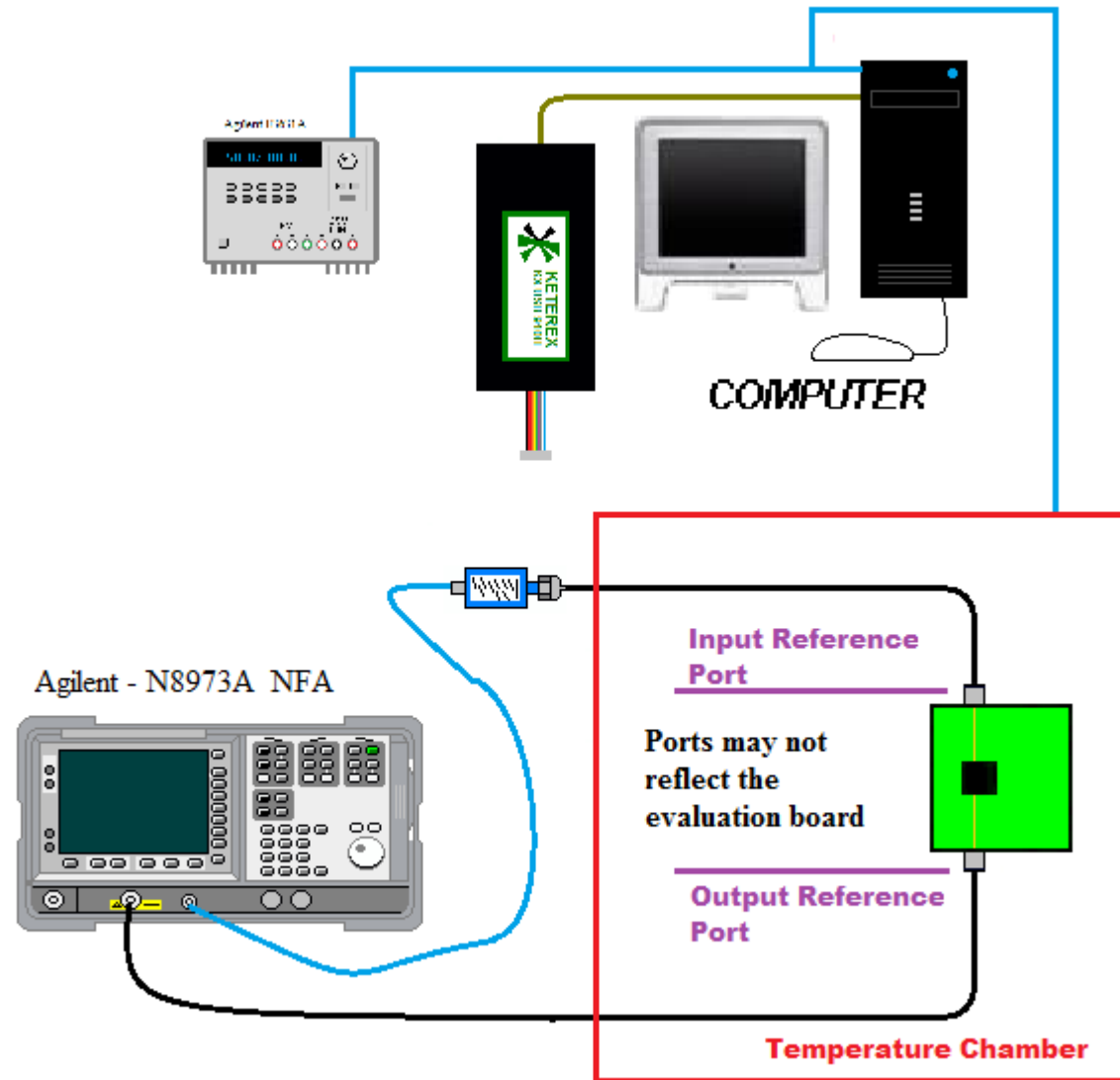
# 2<sup>nd</sup> Harmonic: 160 MHz

F1200 - Second Harmonic  
Vcc = 5.0 V, 160 MHz, Pout = 0 dBm  
Data is collected at the Evaluation Board Connectors



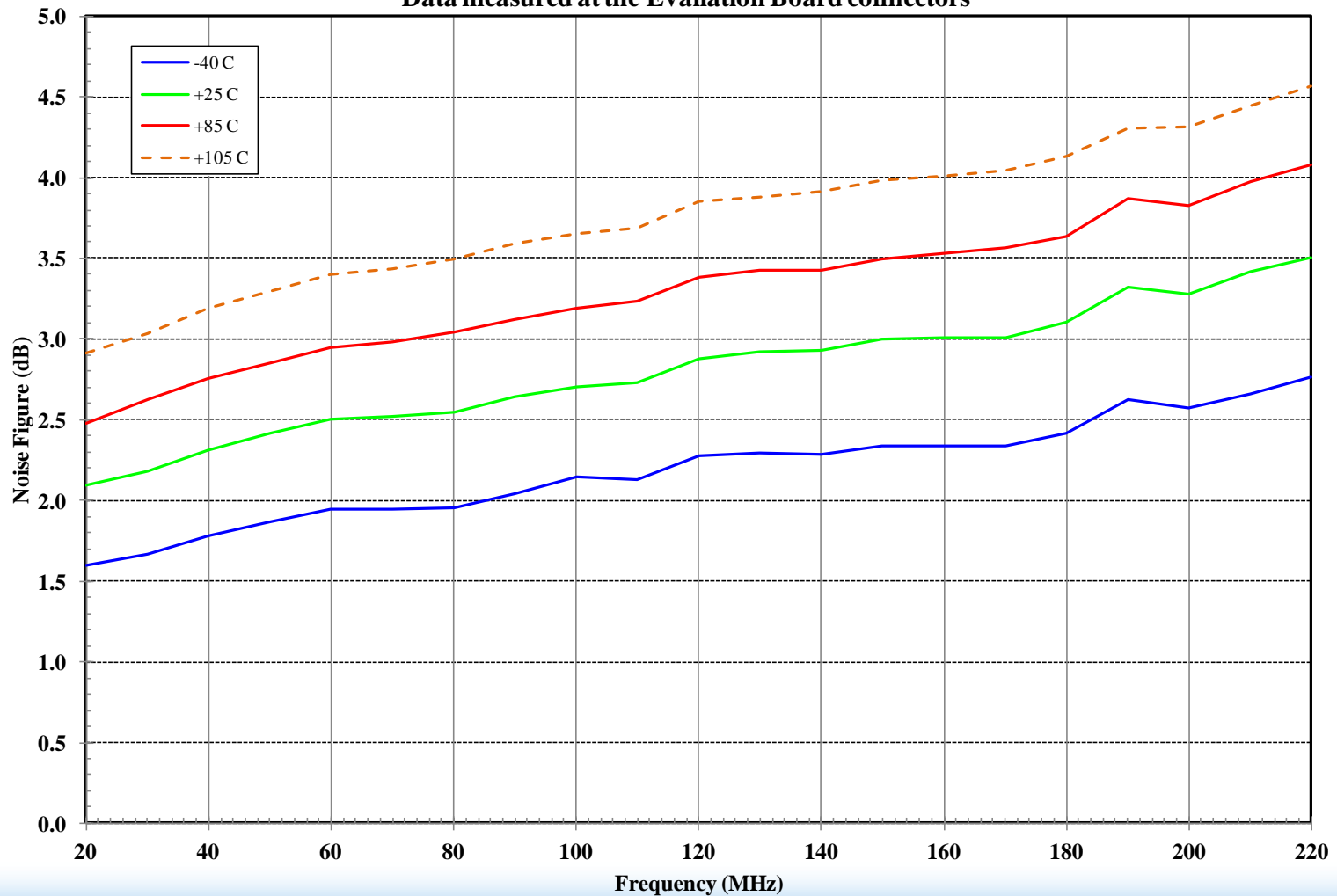


# Noise Figure Test Setup



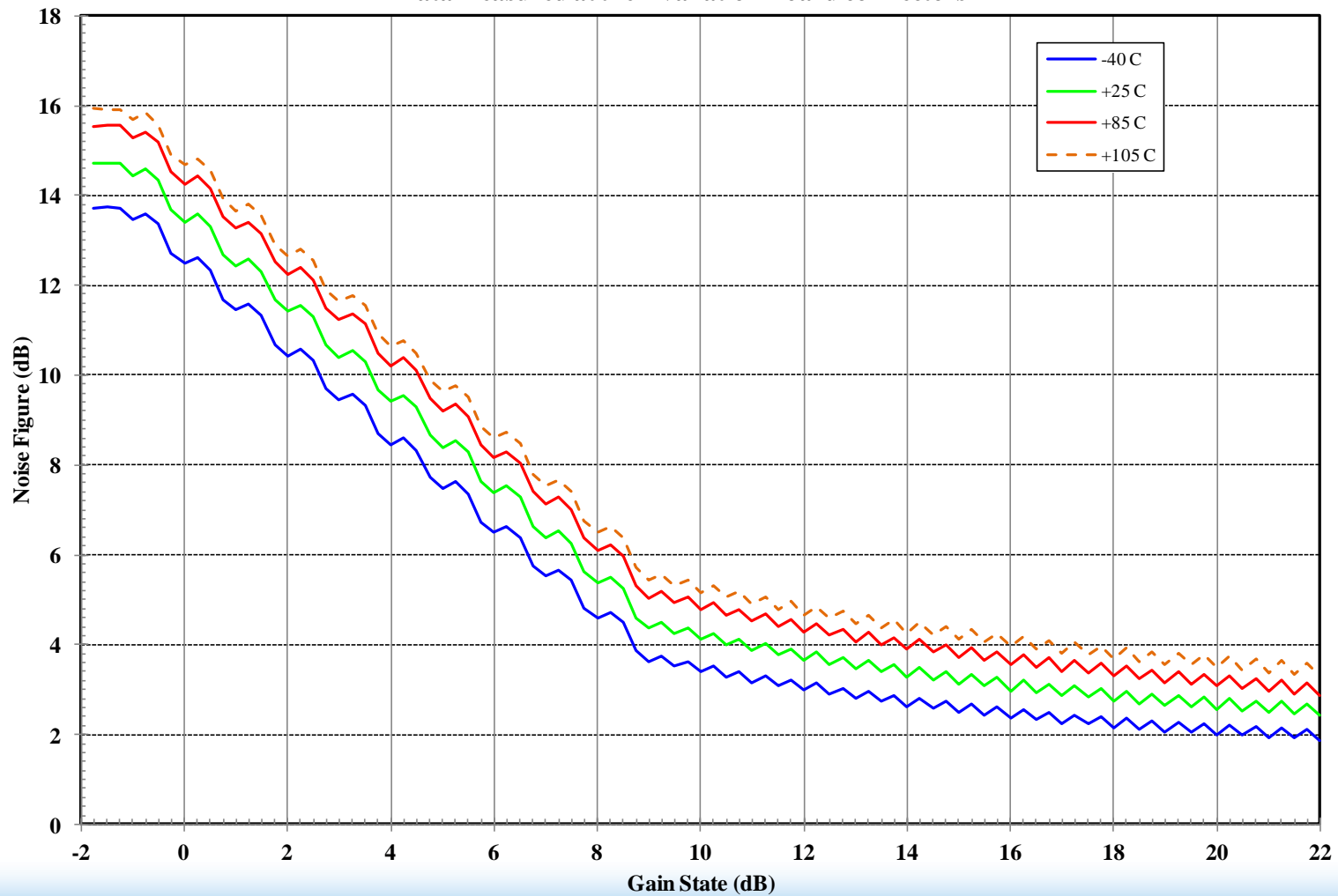
# Noise Figure: Maximum Gain

F1200 - Noise Figure  
+5.00 V, Maximum Gain  
Data measured at the Evaluation Board connectors



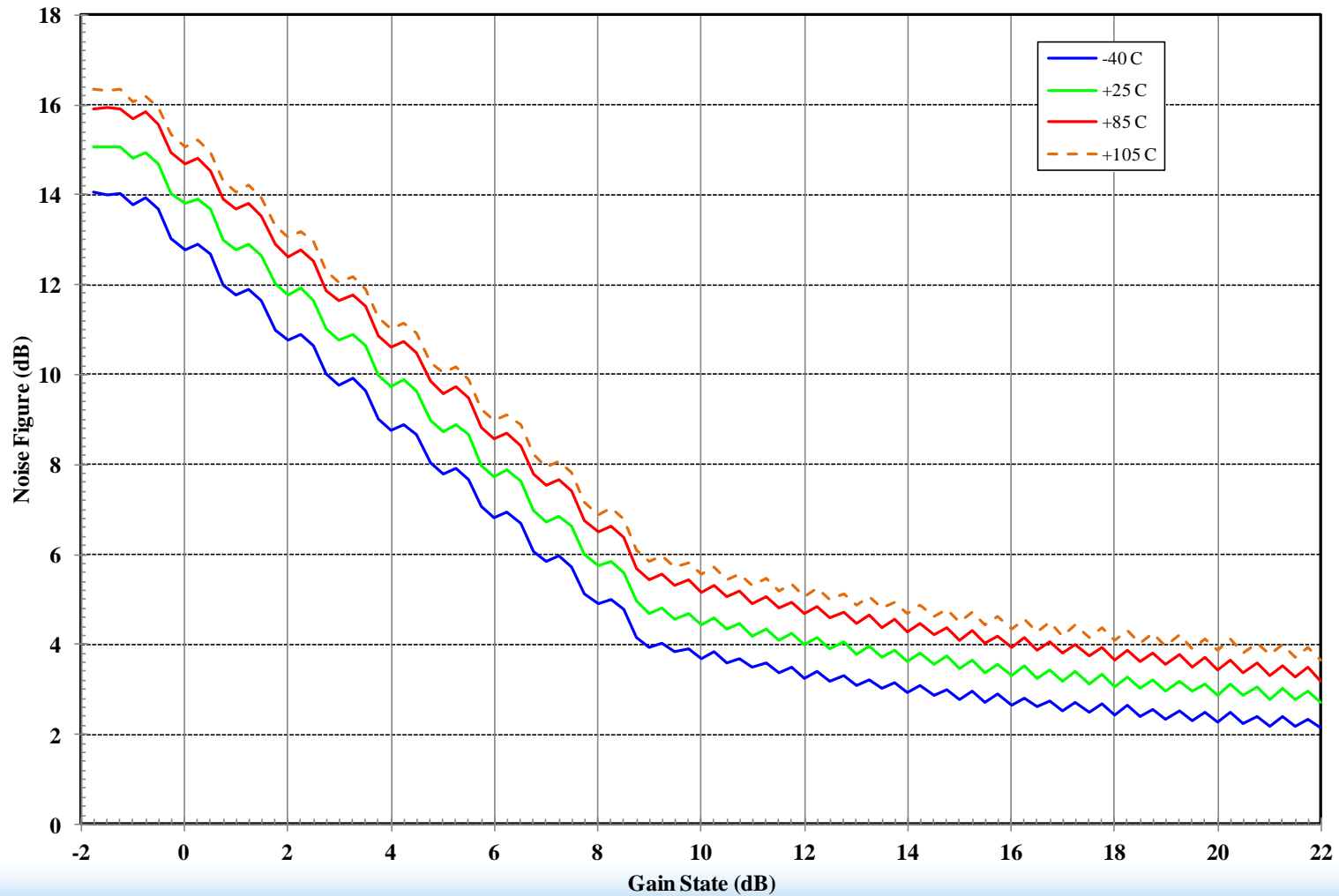
# Noise Figure: 50 MHz

F1200 - Noise Figure  
+5.00 V, 50 MHz  
Data measured at the Evaluation Board connectors



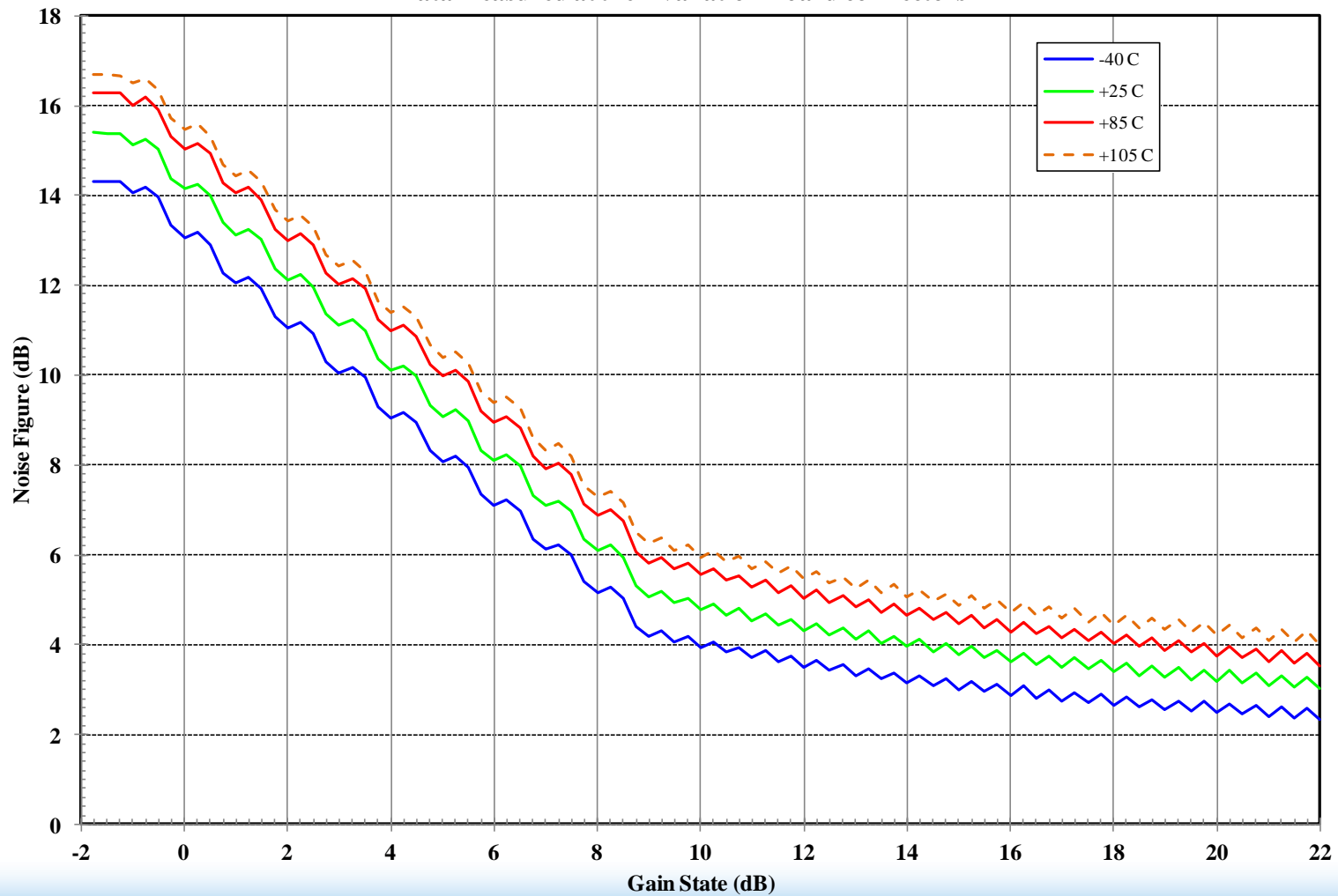
# Noise Figure: 100 MHz

F1200 - Noise Figure  
+5.00 V, 100 MHz  
Data measured at the Evaluation Board connectors



# Noise Figure: 160 MHz

F1200 - Noise Figure  
+5.00 V, 160 MHz  
Data measured at the Evaluation Board connectors



# Conclusion

- Data was taken at -45, +25, +85, and +105 °C.
- Data shows that there is a nominal change from +85 to +105 C for all parameters.
- Use of the product for **LONG PERIODS** of time beyond 85 °C will increase the failure rate and is **NOT RECOMMENDED**.