

RHIC BPM IFE Temperature Test – Using Phase Matched Signals
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Objective: To test the position stability performance of the IFE over a temperature range, while the input signal phase is matched as well as possible. Higher temperature sensitivity is thought to be caused by an off-center signal. This will be tested as well.

Hypothesis: The main contributor to temperature related position error is timing mismatch. When the timing is matched, very little error will be observed.

Experimental Method:

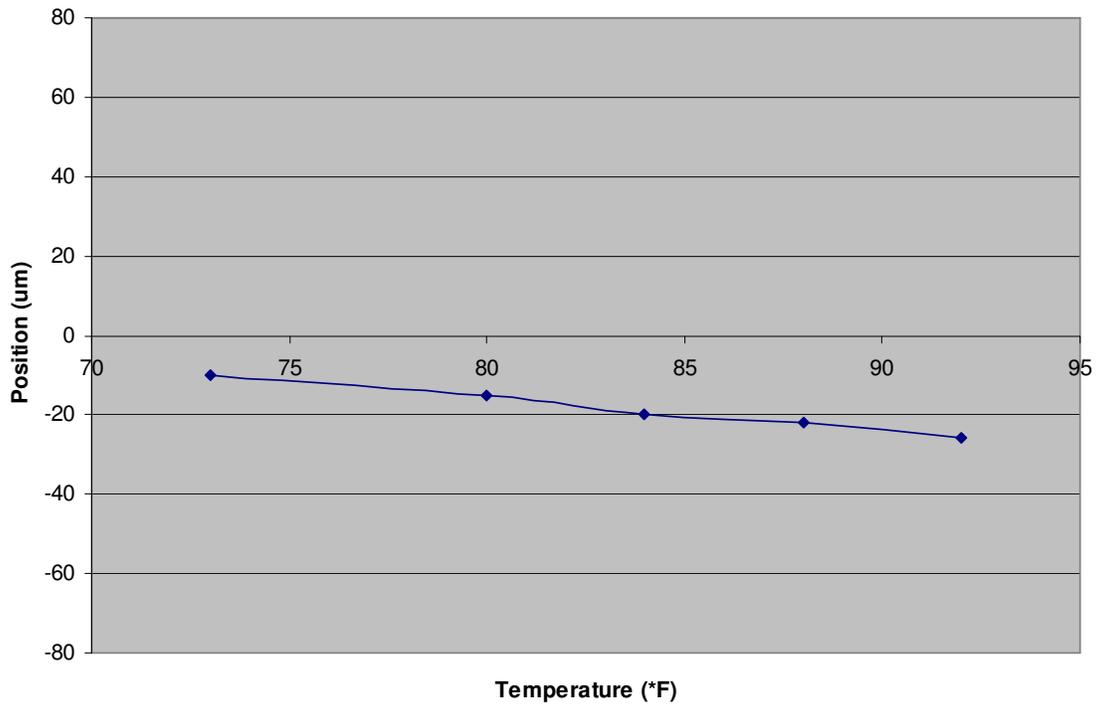
- 1) At ambient temperature and no attenuation, calibrate the IFE.
- 2) Record the temperature, take data, and record the position.
- 3) Increase temperature, take data, and record the position.
- 4) Repeat step 3 three times.
- 5) Return the IFE to ambient temperature, add 3dB attenuation to one channel.
- 6) Perform ***timing*** calibration to eliminate timing mismatch caused by attenuator.
- 7) Record temperature, take data, and record the position.
- 8) Increase temperature, take data, and record the position.
- 9) Repeat step 8 three times.
- 10) Return the IFE to ambient temperature, add another 3dB attenuation to one channel.
- 11) Perform ***timing*** calibration to eliminate timing mismatch caused by attenuator.
- 12) Record temperature, take data, and record the position.
- 13) Repeat step 12 three times.

Experimental Results: The position did not change appreciably over the tested temperature range for any of the attenuation values. See attached spreadsheet.

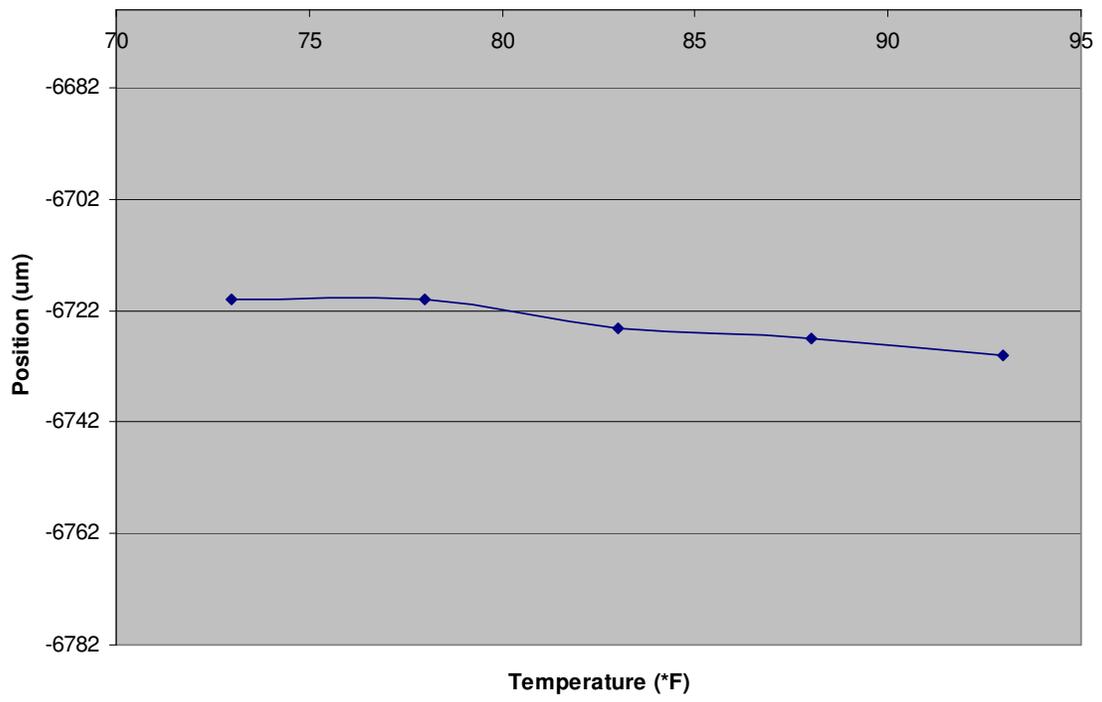
Conclusion: The position stability of the IFE is not significantly sensitive to temperature in the absence of input signal timing mismatch.

| 0dB attenuation | | 3dB attenuation | | 6dB attenuation | |
|-----------------|----------|-----------------|----------|-----------------|----------|
| Temp | Position | Temp | Position | Temp | Position |
| 73 | -10 | 73 | -6720 | 74 | -13325 |
| 80 | -15 | 78 | -6720 | 80 | -13330 |
| 84 | -20 | 83 | -6725 | 85 | -13332 |
| 88 | -22 | 88 | -6727 | 90 | -13335 |
| 92 | -26 | 93 | -6730 | 95 | -13335 |
| | | | | 111 | -13335 |

0dB Attenuation



3dB Attenuation



6dB Attenuation

