

2.4 GAIN STATE 3 DARK CURRENT TEMPERATURE DEPENDENCE

While analyzing the dark current calibration images, a linear temperature dependence to the Sensor Head Electronics for the dark current levels of Gain State 3 was discovered for both the NAC and the WAC FM. This anomaly is not seen in all other gain states. Variation of the dark current levels was approximately 5 DN over the Sensor Head Electronics temperature range of -13 °C to + 21 °C showing an inverse relationship (the higher the dark current DN level, the lower the temperature). See Figure 2.4-1 as compared to Figure 2.4-2 through Figure 2.4-4 for the NAC case.

The electronics design was reviewed as well as piece-part data. It was theorized that the Gain State 3 temperature dependence was attributable to the input circuit for Gain State 3, and more precisely the analog switch “on resistance” variance with temperature (which becomes significant because of the low resistance value for the gain select resistor). But, actual flight piece-part data for the parts used in the Gain State 3 input circuits for the NAC and WAC FM did not support the theory : the “on resistance” did not vary over temperature to the extent that would support the theorized gain variation. The exact cause of the temperature dependence has not be resolved to date.

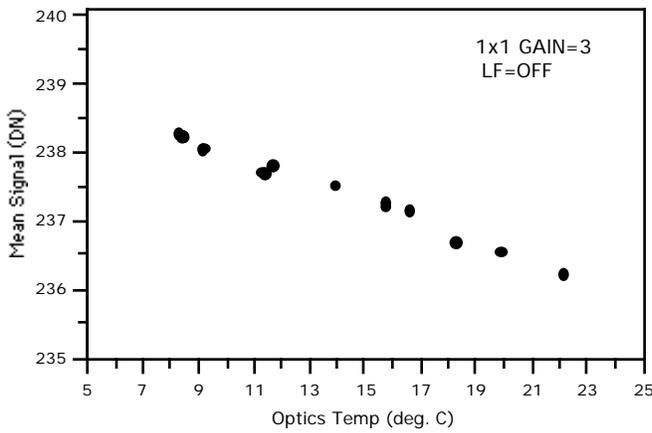


Figure 2.4-1 - Dark Current vs Optics Temp (Gain 3)

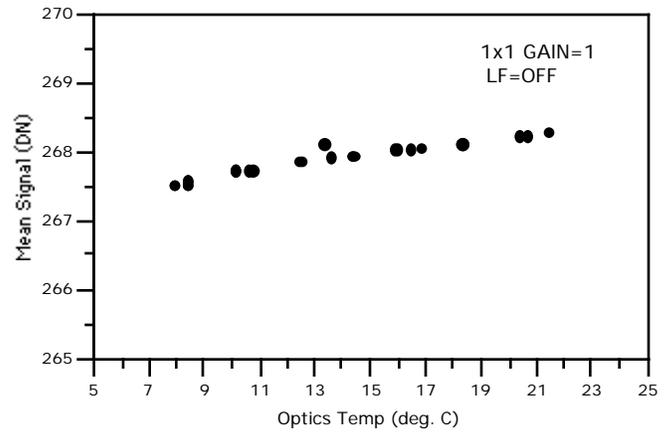


Figure 2.4-3 - Dark Current vs Optics Temp (Gain 1)

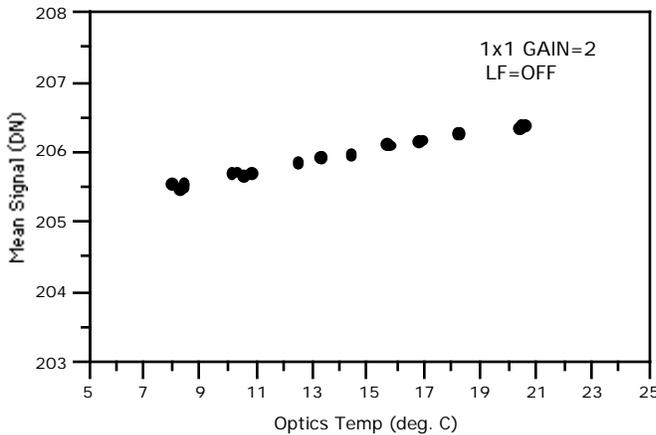


Figure 2.4-2 - Dark Current vs Optics Temp (Gain 2)

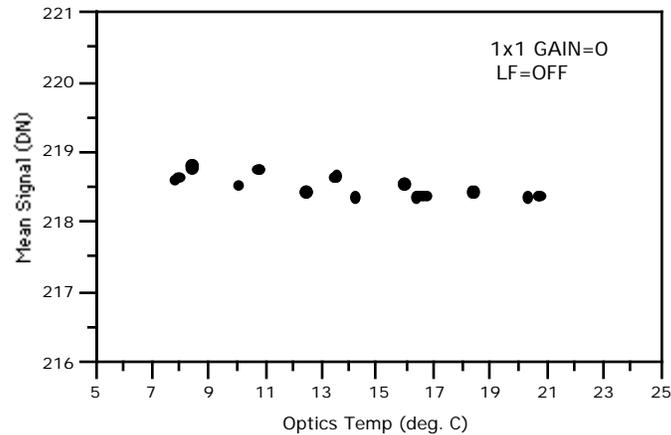


Figure 2.4-4 - Dark Current vs Optics Temp (Gain 0)