DESIGN OF A 8 CHANNEL DATA ACQUISITION SYSTEM FOR MEASURING DIODE JUNCTION TEMPERATURE

BY JASON E. MAYNARD

ABSTRACT

The solid state lighting industry is striving to expand the use of light emitting diodes (LEDs) in more applications, particularly in high brightness applications. As the power of LEDs increase, heat removal becomes a critical issue. To improve device lifetime, quantum efficiency, and LED colour, the diode *p-n* junction temperature (T_j) must be kept to a minimum. Measuring this key parameter is difficult or impossible with direct methods, such as thermocouples and infrared cameras, due to the small size of LEDs. Fortunately, junction temperature can be measured indirectly by using a relationship between the diode forward voltage (V_f) and junction temperature. This allows for measurement of LED junction temperature after initial calibration with a digital multi-meter with an approximately linear equation that relates the forward voltage of the diode to its junction temperature. This senior project is a summary of the design, fabrication and testing of a system that allows for calibration necessary to develop a working equation that can be used to measure junction temperature of a given diode.