LED Driver Circuitry for Serial Attached SCSI

Barry Olawsky
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Serial Attached SCSI LED Driver Issue

• Proposed drivers are not 5V tolerant

• Bias current may be more difficult to predict since voltage drop across bias resistor is reduced

• Tolerances of all components in driver circuit design will have a greater effect than in parallel SCSI
Bias Current Variations

- Max Vol Driver Output Level: 500mV
- Power Supply Regulation: 10%
- Bias Resistor Tolerance: 5%
- LED: Kingbright APL3015
- Nominal Case (3.3 supply, 2.1 diode drop, 200mV driver)
- Worst Case High Side Bias = 1.7V
  - (3.3*1.1 - 0.050 driver - 2.0 diode drop) * 1.05 bias resistor
- Worst Case Low Side Bias = 0V
  - 3.3*.9 - 0.500 driver - 2.5 diode drop
Proposed Bias Circuitry Changes

• Max Vol Driver Output Level: 150mV @ 15mA
• Power Supply Regulation: 5%
• Bias Resistor Tolerance: 1%
• AllenGAP LED: Kingbright APTD3216SEC
• AllenGAP LED: Fairchild QTL660C
• Nominal Case (3.3 supply, 2.1 diode drop, 150mV driver, 10mA)
  • Worst Case High Side Bias = 1.5V
    – 3.3*1.05 - 0.050 driver - 1.9 diode drop
• Worst Case Low Side Bias = 0.8V
  – 3.3*.95 - 0.15 driver - 2.2 diode drop
Summary of LED Characteristics

- AllenGAP devices give more predictable operating points while increasing intensity and decreasing bias current.
- Minimum intensity goes from 20mcd to 400mcd

Note. These are typical characteristics obtained after review of several different devices from three manufacturers.
Recommendations

• Reduce maximum $V_{OL}$ level to at least 150mV @ 10mA

• This change along with more realistic power supply regulation specs of 5%, tighter bias resistor specs of 1% and newer high output LED devices should result in a product equal or superior to the existing LED designs.