LED Driver Circuitry for Serial Attached SCSI

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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 V_{OL} 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 V_{OL} Driver Output Level: 150mV @ 15mA

- Power Supply Regulation: 5%

- Bias Resistor Tolerance: 1%

- AllenGAP LED: Kingbright APTD3216SEC

- AllenGAP LED: Fairchild QTLP660C

- 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.
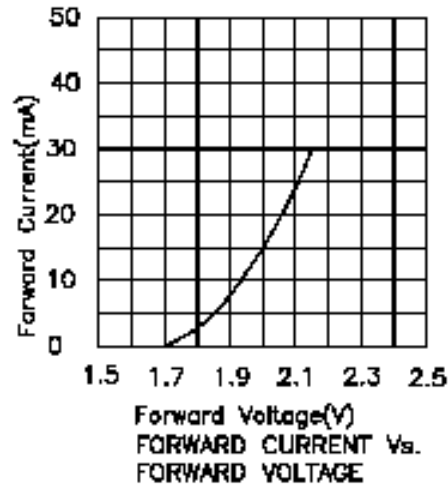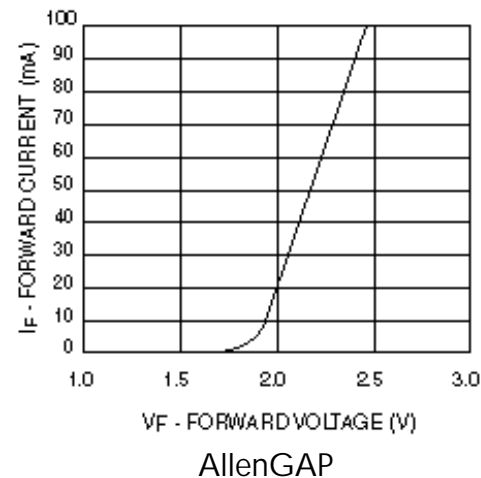
- Minimum intensity goes from 20mcd to 400mcd

FORWARD CURRENT Vs. FORWARD VOLTAGE

Fig. 1 Forward Current vs. Forward Voltage

AllenGAP

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.