

PI6C2520 High Frequency Applications

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Introduction

Pericom Semiconductor Corp. offers a variety of clock drivers for high frequency applications. One in particular is the PI6C2520. It allows the user to select the number of outputs in banks of four ranging from 4 outputs to 20 outputs. It has a maximum operating frequency of 125MHz and with a maximum power dissipation of 850mW. This application note will explain the usage of the PI6C2520 for high frequency applications.

Power Dissipation

Power dissipation is the only constraint of the PI6C2520. The absolute maximum power dissipation specified for the PI6C2520 is 850mW. This constraint puts a limitation on three areas of the PI6C2520: the operating frequency, number of active outputs, and capacitive load. Since power and current are directly proportional to each other, current should also be taken notice. The general formula for power is shown in equation 1.

$$W = I * V \quad \text{Eq. 1}$$

The typical operating voltage for the PI6C2520 is 3.3V with an allowable ± 10 change. At 3.3V and a power dissipation of 850mW, the maximum current the PI6C2520 can tolerate is 257.58mA. Graph 1 and 2 provides a generalized curve on the performance of the PI6C2520.

Number of Outputs

The total number of outputs offered by the PI6C2520 is 20 outputs. The number of active outputs should be reduced below the maximum provided when operating at high frequency due to the power dissipation constraint. With active outputs ranging from 4 outputs to 12 outputs, the PI6C2520 has no frequency limitation (will operate up to 125MHz). As number of active output increase to 16 or 20, the maximum operating frequency is decreased.

Capacitive Load Conditions

The capacitive load at the outputs is also another important consideration when the PI6C2520 is used for high frequency applications. Similar to the number of active outputs, as frequency increases, the capacitive load should be reduced. With a 20pF load at all 20 outputs, the PI6C2520 can operate to a maximum frequency of 99.5MHz.

When the number of active outputs is reduced to 16, the maximum operating frequency increases to 123MHz.

If design requirement demand the load condition to increase to a maximum of 30pF for each output, the maximum operating frequency should be further reduced. If the capacitive load is increased to 30pF at all 20 outputs, the maximum operating frequency will be 80MHz. Again, with the decrease in the number of active outputs, the maximum operating frequency increases. With 16 active outputs carrying a 30pF load, the PI6C2520 can operate to a maximum frequency of 100MHz. The PI6C2520 can operate up to 125MHz when the number of active is 12 or less.

Laboratory Testing

Measurements were taken at various frequencies ranging from 10MHz to 125MHz to demonstrate the capability of the PI6C2520. Tests were done with outputs ranging from 12 active outputs to 20 active outputs, with load condition at 20pF and 30pF. The total current was obtained by measuring the DVcc current and the AVcc current. From the total measured current and using equation 1, the power dissipation of the PI6C2520 was obtained. The test circuit is shown in Figure 1. It should be noted that the frequency limitation indicated in this application note for the PI6C2520 can vary slightly from lot to lot.

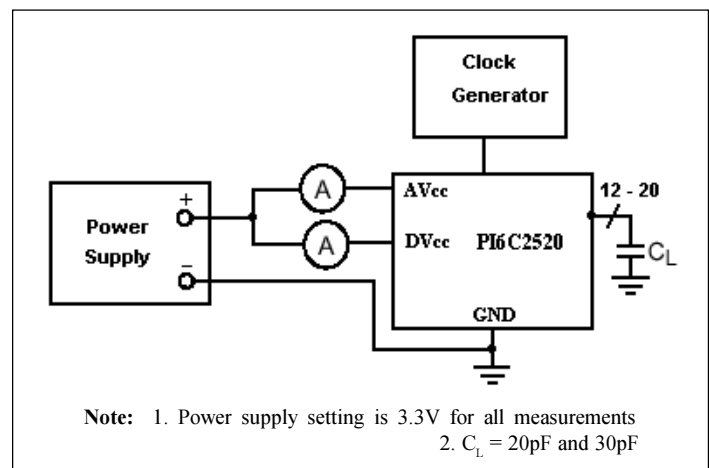


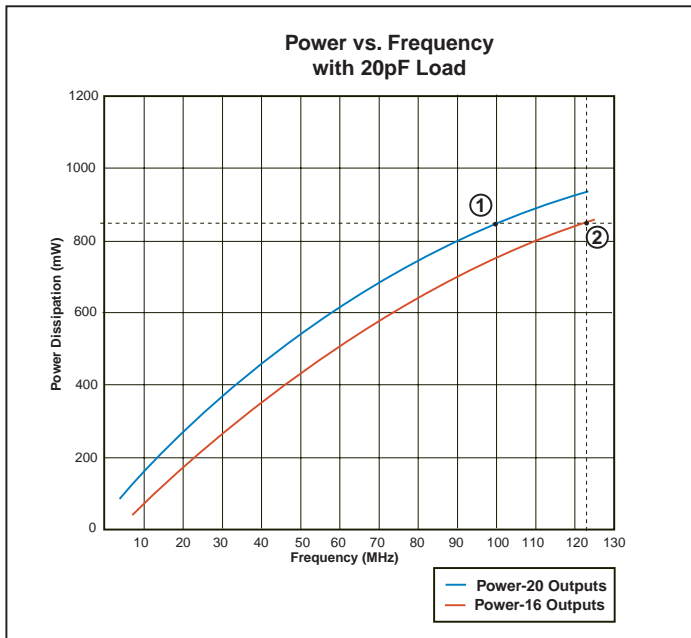
Figure 1. Test Circuit

Conclusion

Pericom Semiconductor PI6C2520 offers many different features with power dissipation as the only constraint. For high frequency applications, the PI6C2520 is slightly limited in certain areas. If there is a

requirement for higher operating frequencies, Pericom Semiconductor also offers the PI6C2516 with a maximum output of 16 and a higher operating frequency than that of the PI6C2520.

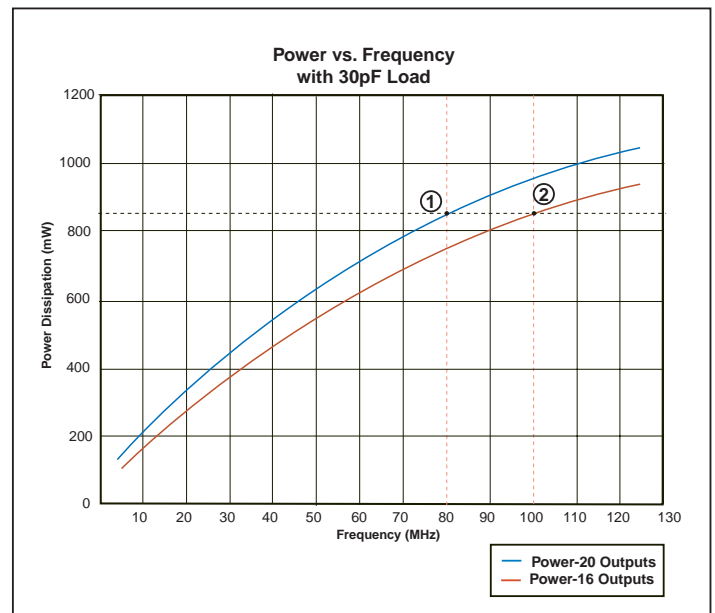
Graph 1. Operating Frequency with 20pF Load



Note:

1. Graph indicates a generalize curve of the PI6C2520 performance
2. Bubble 1 indicates maximum operating frequency for 20 active outputs
3. Bubble 2 indicates maximum operating frequency for 16 active outputs
4. Maximum power dissipation is 850mW

Graph 2 Operating Frequency with 30pF Load



- Note:**
1. Graph indicates a generalize curve of the PI6C2520 performance
 2. Bubble 1 indicates maximum operating frequency for 20 active outputs
 3. Bubble 2 indicates maximum operating frequency for 16 active outputs
 4. Maximum power dissipation is 850mW