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Circuit Recommendations for Complimentary Logic Control of the PE4259 and PE42359

Introduction

Peregrine offers Complimentary Logic on the PE4259 and 42359 SPDT switches. This application note outlines the application circuit requirements for correct complimentary logic operation of these devices.

Summary

- Complimentary logic use
- Logic driver requirements
- Guaranteed Logic currents

PE4259 and PE42359 Complimentary Logic Operation

Control logic is usually driven by a circuit with limited current capability (<1 mA). When using the PE4259 and 42359 in Complimentary Logic mode, this 1 mA limit can be exceeded by a transient current on V_{DD} when switching logic states.

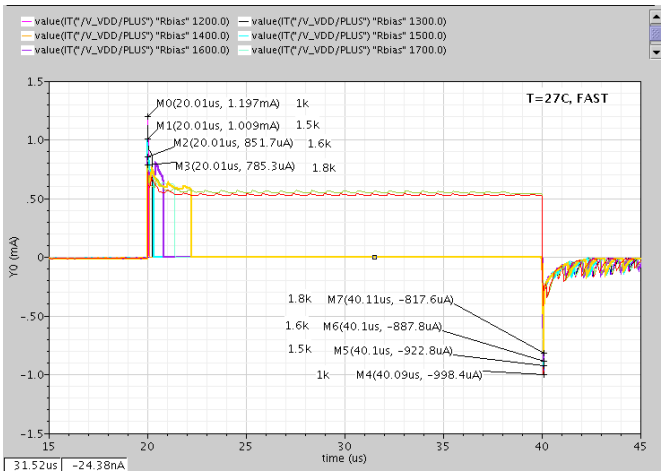
In Complimentary Logic mode, higher currents are present on the PE4259/42359 V_{DD} logic line as it switches state in conjunction with V_{CTRL}. These are generated by the charge pump circuit during and after the switching event. This is caused by the charge pump recovering from the switching event and by the charge pump supply switching from V_{DD} to V_{CTRL}.

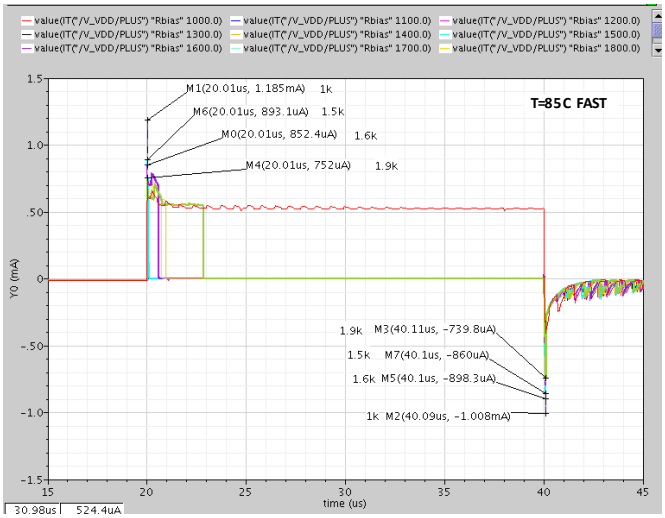
Detailed analysis of the circuit shows the current transients on V_{DD} can be reduced by changing the bias resistors.

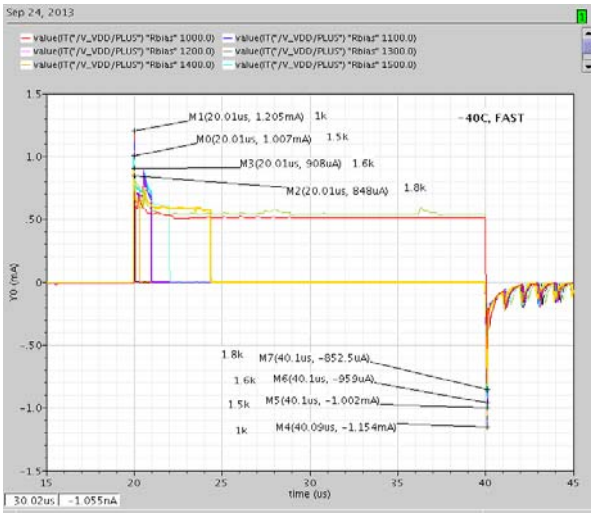
Figure 1 shows the analysis of the V_{DD} transient current for various resistor values across Process (FAST) and Temperature (+85, +27 and -40°C).

This analysis shows the maximum 1 mA transient current can be met with margin using a 1.6K V_{DD} resistor. The analysis also shows for the logic to operate correctly, the logic source used to drive V_{DD} should be able to sink as well as source current.

Figure 1. Analysis of Logic Current Limits







Single Ended Logic Control

When using Single Ended control logic using V_{CTRL} only, the 1 mA limit requirement will be met by the standard application circuit shown in the data sheet. In single ended operation, the V_{DD} current will exceed the 1 mA limit during device 'turn-on' and device 'turn-off' but any current limitation on the supply source will result in an increase of the device 'turn on/off' time. This does not affect the V_{CTRL} logic function.

Conclusion

This analysis has shown that the complimentary logic can be used successfully even with a limited logic drive capability.