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## Designing Flyback Converters Using Peak-Current-Mode Controllers

By: [Ganesh Kumar Venkatesh](#)  
Date: 07/2019

Abstract: Flyback converters design using [TI's TMS320F28001](#) is covered. Design methodology and calculations for continuous-conduction mode (CCM) and peak-to-peak inductance mode (DCM) and related inductance.

### Introduction

This application note describes the methodology of designing flyback converters using the [TMS320F28001](#) peak-current-mode controller. Flyback converters may be operated in discontinuous-conduction mode (DCM) or continuous-conduction mode (CCM). The important design parameters in power density and inductor design vary depending on the operating mode of the converter. Formulas for calculating component values and ratings are also presented.

### DCM Flyback

#### Primary Inductance Selection

In a DCM flyback converter, the energy stored in the primary inductance of the flyback transformer is delivered during the output. The important primary inductance value for which the converter behaves in DCM at all operating conditions can be calculated as:

$$L_{\text{primary}} = \frac{V_{\text{max}} - V_{\text{aux}}}{f_{\text{sw}}} \sqrt{\frac{2P_{\text{out}}}{V_{\text{max}} - V_{\text{aux}} - V_{\text{aux}}}} \quad (Eq. 1)$$

where  $V_{\text{max}}$  is the maximum V<sub>DS</sub> for the MOSFET (minimum V<sub>DS</sub>),  $V_{\text{aux}}$  is the voltage drop of the output capacitor during the switching period, and  $f_{\text{sw}}$  is the switching frequency of the power converter. Choose the primary inductance value to be less than  $L_{\text{primary}}$ .

#### Duty Cycle Calculation

The average value of the duty cycle (D<sub>avg</sub>) for the selected primary inductance  $L_{\text{primary}}$  can be

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**Christophe Basso**



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