grafik, daire, renklilik, simge, sembol içeren bir resim

Açıklama otomatik olarak oluşturuldukırpıntı çizim, simge, sembol, grafik, tasarım içeren bir resim

Açıklama otomatik olarak oluşturuldu

MIDDLE EAST TECHNICAL UNIVERSITY

ELECTRICAL & ELECTRONICS ENGINEERING DEPARTMENT

**EE464 HOMEWORK 1 – Magnetic Design of the Hardware Project**

Members: Onat Şimşek - 2375772

Selen Özge Özgür –

Onur Emirhan Çon -

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## Introduction

Question 1)

As Team “The Isolated Ones”, we plan to design a Flyback converter as an isolated DC/DC converter, or in other words as an SMPS.

1. While checking the analog controllers of the Flyback converter, we found out that UC3845 will be more than enough for this project. UC3845 can supply a duty cycle of 0.5 maximum, which gives us an upper boundary to choose our duty cycle. Hence, we have chosen a duty cycle range of 0.2 to 0.4. In order to ensure that the controller gives a duty cycle in this range, our turns ratio should be 1:1. This can be calculated as follows:

Due to the diode between the secondary side and the load, assume secondary voltage as 12.75V (Vsecondary = 12.75V) so that our output voltage is around 12V. Moreover, it is known that the voltage equation of a Flyback converter is as follows:

where V2 = 12.75 V, V1 = 20-40 V. When V1 = 20 and ratio is taken as 1, Dmax is found as around 0.39. Furthermore, when V1 = 40 and ratio is taken as 1, Dmin is found as around 0.24. The found duty cycles determine the boundaries of the operating region of the Flyback converter.

1. For the transformer of the Flyback converter, we have selected an E-core with a gap of 1mm. The datasheet of the core [1] can be found in the appendix section. An E-core is selected since the leakage flux in E cores is smaller than toroid cores due to their shape. Moreover, due to the existence of coil formers for each and every E-core, it is much easier to wind the coils to the core.