MIT OpenCourseWare http://ocw.mit.edu

6.334 Power Electronics Spring 2007

For information about citing these materials or our Terms of Use, visit: http://ocw.mit.edu/terms.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY Department of Electrical Engineering and Computer Science

6.334 Power Electronics Issued: April 31, 2007 Problem Set 10 Due: May 7, 2007

Reading: KSV Chapter 4

Problem 10.1

Consider a continuous conduction mode buck converter to be operated under peak current mode control. The converter parameters are fsw = 500 kHz, L = 16 μ H, C = 800 μ F, and Vout,ref = 24 V. What is the smallest magnitude of compensating ramp that will yield stable dynamics for the ripple instability over an input voltage range of 36 V < Vin < 75 V?

Note: Models for computing the ripple dynamics will be discussed in class. They can also be found in: H. Hsu, A. Brown, L. Rensink, and R.D. Middlebrook, "Modeling and Analysis of Switching dc-to-dc Converters in Constant-Frequency Current-Programmed Mode," 1979 IEEE Power Electronics Specialists Conference, pp. 284-301, *and in* R.W. Erickson, <u>Fundamentals of Power Electronics</u>, Boston: Kluwer, 1997, Chapter 11 (Current Programmed Control).

Problem 10.2 KSV Prob. 4.6

Problem 10.3 KSV Prob. 4.7

Problem 10.4 KSV Prob. 4.8