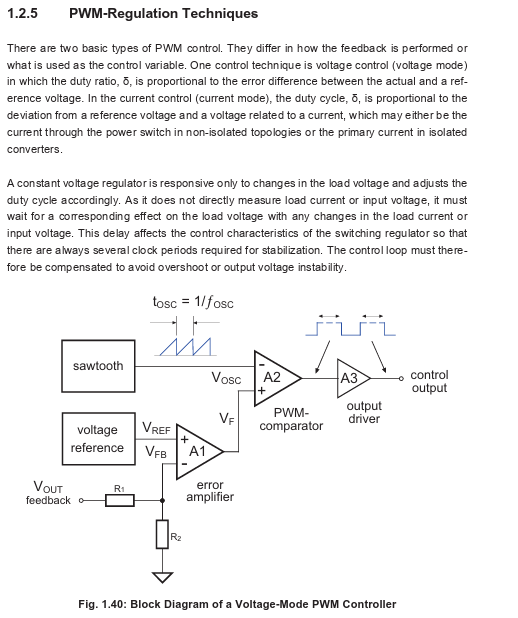
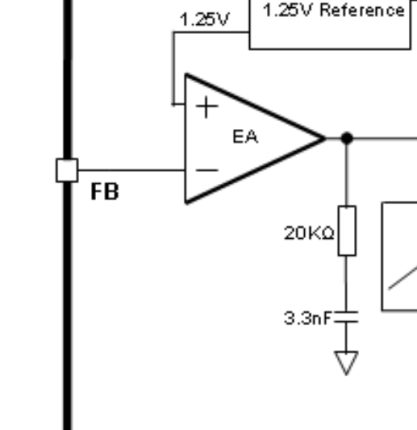
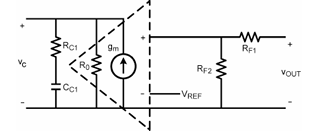
I’ll share pwm regulation techniques page numbers from the book I send you from discord before, dc/dc book of knowledge. Also, I put this book with application notes into same folder, that you can check for lots of things like capacitor types and their properties. I don’t think I can explain pwm regulation better than this. Pages : 46, 47, 48

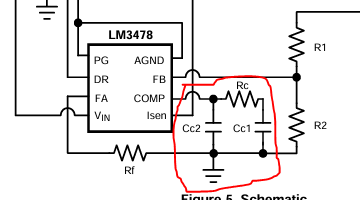
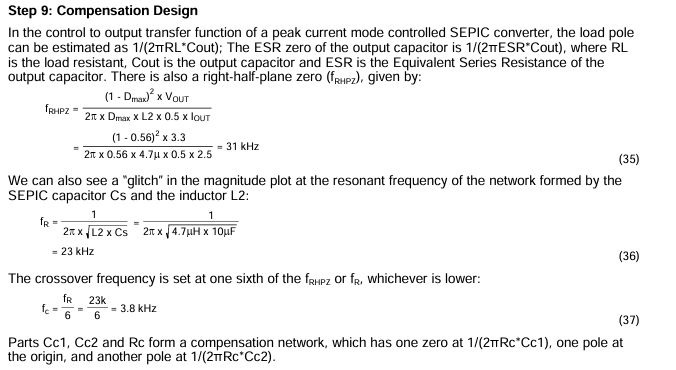


So, now im gonna explain how to implement voltage mode pwm control discretely. Not compensation nor fet driver circuit will be included. Because I show usally how compensator calculation works in current mode. And not gonna show how to implement current mode discretely. Because, it doesn’t make sense to implement discretely expense wise.

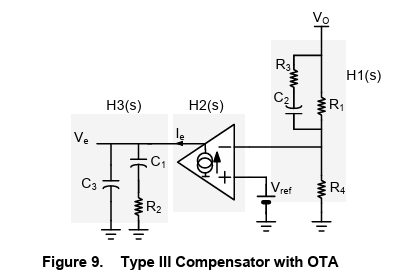
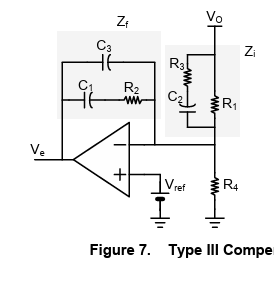
But first I can explain how to do compensator design. We did a lag compensator which is below.

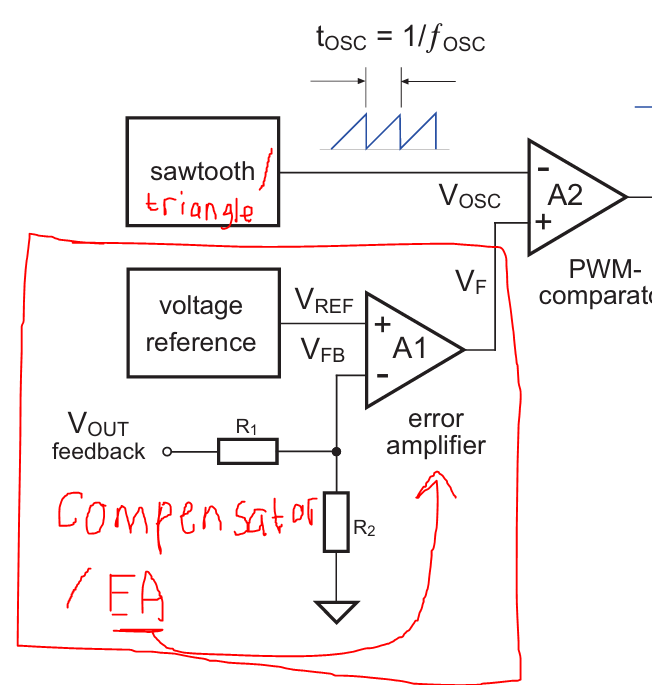
But also you can design type II compensator using SNVA168E application note of cut-off and pole frequency calculations. I show compensator network to point out this is an type III compensator using an OTA.

And using SLVA662 to implement an Type III controller using an OTA or Op-Amp.

Now, we are going to show you 1 way of triangle wave. But, you can use a 555 or 2 transistors and complementary parts to generat ramp voltage to use.



But with using an opamps to generate triangle wave you can simply use one 4 opamp chip for all pwm regulation. 2 opamps for triangle wave, one for error amplifier(compensator), on for pwm comparator. One IC should be better for layout and probably cheaper because at the end you need to use one opamp or ota, one analog comparator, and triangle or ramp generator. Also, It is not ideal to use opamps as an pwm comparator instead of using an analog comperator. But, as long as you don’t go high switching frequency a normal opamp is enough for aspect of speed. For example, you can go up to(with minumum specs of IC by the way) 58kHz – max 80% duty cycle operation under 1 dollar 4 opamp IC that even don’t have that high of a slew rate [TL974IDR](https://www.mouser.com.tr/ProductDetail/Texas-Instruments/TL974IDR?qs=vD%252BlfiDS0%252BOKf6UHUyfKHA%3D%3D). If typical values is thought of, 100kHz- max 80% duty cycle operation.

