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AN-4168

FL7733A Design Tool Flow (Buck Boost)

Overview

This document is intended to provide guidance to using the Fairchild Design Tool for FL7733A. Use the Design Tool with the product datasheet.

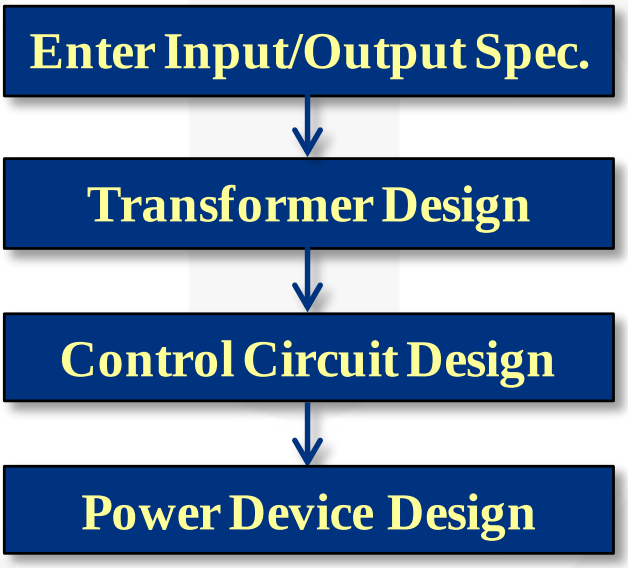
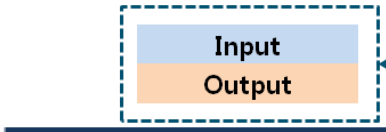


Figure 1. Design Flow

Step 1 — Enter Input Output Specification



Blue box is input from user.
Red box is calculated output.

Input & Output Spec		
Min. Vin	90	Vac
Max. Vin	265	Vac
Vout	70	V
Max. Vout	85	V
Iout	300	mA
Pout	21.000	W

Max. Vout is OVP level.

Step 2 — Transformer Design

Transformer Design		
Max. Duty	40	%
Max. Ton	6.15	us
Switchin freq.	65	kHz
Efficiency	86	%
Ae	36	mm^2
Bmax	0.26	
Lm	0.922	mH
Np.min	83.7	T
Np	85	T
Na	23.0	T
Nap	0.271	
Ts	15.385	us
Ton+Tdis	19.208	us
Vcs.max	0.685	V

Max. duty is generally between 20 ~ 50%.
High max. duty → Low conduction loss, Suitable for low-line
Low max. duty → More Bmax margin, Suitable for high-line

Max. Ton should be less than 10us.

Enter Ae value from Core datasheet.

For safe operation, 0.23 ~ 0.27 is recommended.

Enter Np over Np.min.
If Np is too big to fit in transformer window, reduce Max. Duty.

Tdis means secondary diode conduction time at peak input voltage. If Ton+Tdis is longer than Ts, CRM is shown at peak input voltage area. In order to operate only in DCM, Ton+Tdis should be less than Ts. To make "Ton+Tdis < Ts", decrease Max. Duty

Pulse by pulse current limit is 1.0 V.
If Vcs.max is too close to 1.0V, increase Max. Duty.

Step 3 — Control Circuit Design

Control Circuit Design		
Rsense	1.108	ohm
Vin.bnk	50	V
Vf	0.7	V
Rvs1	155	kohm
Rvs2	22	kohm
Cvs	5	pF
Ccomi	1	uF
Cvdd	10	uF

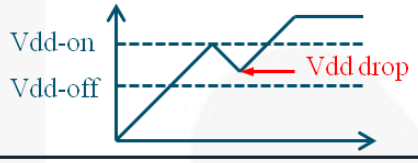
Vin.bnk is VS blanking level.
VS blanking : VS voltage detection is disabled.
Vin.bnk is generally set as 50~70V.

Vf is secondary diode forward voltage.

Cvs is VS filter capacitor, generally set as 5~10pF.

COMI capacitor is generally 0.68~3.3uF.

Vdd capacitor is generally in 10~22uF.
If Vdd drops too close to Vdd-off at startup, increase Cvdd.



Step 4 — Power Device Design

Power Device Design		
SW/Dout Vmax	460	V
SW/Dout Ipk	0.850	A

Vmax is maximum voltage of MOSFET drain-source and output rectifier.

Ipk is peak current of MOSFET and output rectifier.

Related Resources

Consult the product datasheet at:

FL7733A —Primary-Side-Regulated LED Driver with Power Factor Correction

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