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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.

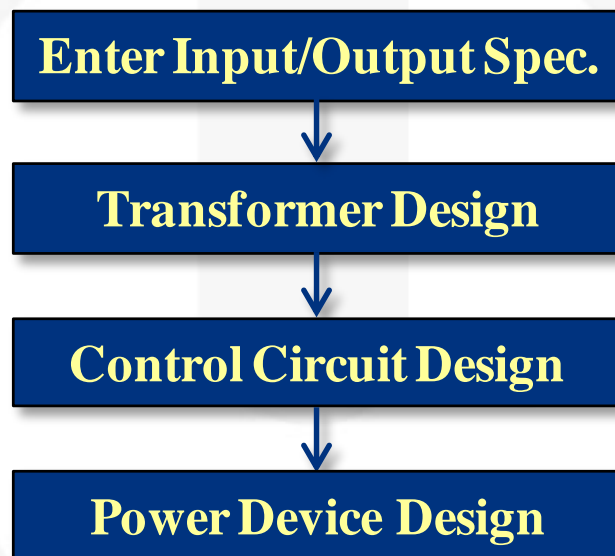


Figure 1. Design Flow

Step 1 — Enter Input Output Specification

Input
Output

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		
R _{sense}	1.108	ohm
V _{in.bnk}	50	V
V _f	0.7	V
R _{vs1}	155	kohm
R _{vs2}	22	kohm
C _{vs}	5	pF
C _{comi}	1	uF
C _{vdd}	10	uF

V_{in.bnk} is VS blanking level.
 VS blanking : VS voltage detection is disabled.
 V_{in.bnk} is generally set as 50~70V.

V_f is secondary diode forward voltage.

C_{vs} is VS filter capacitor, generally set as 5~10pF.

COMI capacitor is generally 0.68~3.3uF.

V_{dd} capacitor is generally in 10~22uF.
 If V_{dd} drops too close to V_{dd-off} at startup, increase C_{vdd}.

Step 4 — Power Device Design

Power Device Design		
SW/Dout V _{max}	460	V
SW/Dout I _{pk}	0.850	A

V_{max} is maximum voltage of MOSFET drain-source and output rectifier.

I_{pk} 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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