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AN-4169

FL7733A Design Tool Flow (Flyback)

Overview

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

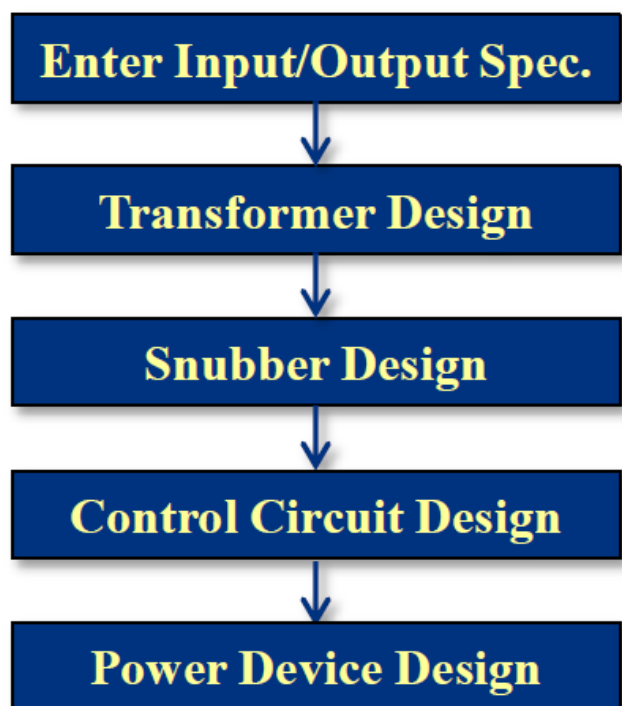


Figure 1. Design Flow

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	24	V
Max. Vout	30	V
Iout	350	mA
Pout	8.400	W

Max. Vout is OVP level.

Step 2 — Transformer Design

Transformer Design		
Max. Duty	40	%
Max. Ton	6.2	us
Switchin freq.	65	kHz
Max. Vcs	0.85	V
Efficiency	86	%
Ae	37	mm ²
Bmax	0.26	T
Lm	1.021	mH
Nps	3.101	T
Nas	0.767	T
Nap	0.247	T
Np.min	81.4	T
Np	81	T
Ns	26.1	T
Na	20.0	T

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.

Pulse by pulse current limit is 1.0 V.
Proper Max. V_{CS} is 0.7 V ~ 0.85 V.

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.

Step 3 — Snubber Design

Snubber Design		
Nps x Vout	83.4	V
Vsn	200	V
ΔVsn	30	V
Rsn	11	kohm
Csn	9	nF

Vsn is snubber voltage.
Vsn is generally set as 2 ~ 2.5 times Nps·Vout

ΔVsn is generally set as 5% ripple of Vsn.

Step 4 — 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 5 — Power Device Design

Power Device Design		
MOSFET V _{max}	575	V
MOSFET I _{pk}	4.568	A
Diode V _{max}	308	V
Diode I _{pk}	6.800	A

V_{max} is MOSFET drain-source maximum voltage.
 I_{pk} is MOSFET peak current

V_{max} is maximum reverse voltage of secondary diode.
 I_{pk} is peak current of secondary diode.

Related Resources

Consult the product datasheet at:

[FL7733A—Primary-Side-Regulated LED Driver with Power Factor Correction](#)

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