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AN-7701
FL7701 Design Tool Flow

Overview

This document is intended to provide in-depth guidance to using the Fairchild Design Tool for FL7701. Use the Design Tool with the product datasheet.

Step-by-Step

1. Enter the input voltage.
2. Enter the LED characteristics (forward voltage).
3. Enter the LED counts.
4. Enter the LED peak current.
5. Enter the LED rms current.
6. Enter the target system efficiency.
7. Enter the desired switching frequency.

Example:

- 220V Input Voltage
- 3.5V Forward Voltage
- 10 LEDs in series
- 500mApk
- 300mArms
- 85% efficiency
- 45kHz

Table 1. Design Values to Enter

Item		Value	Units
Maximum Input Voltage	$V_{IN.MAX.AC}$=	220	*V*
LED Forward Voltage	V_f=	3.5	*V*
Number of LEDs	N_{umber_LED}=	10	*EA*
LED Peak Current	$I_{LED.peak}$=	500	*mA*
LED rms Current	I_{VAE_rms}=	300	*mA*
Efficiency	E_{ff}=	85	*%*
Switching Frequency	f_{SW}=	45	*kHz*

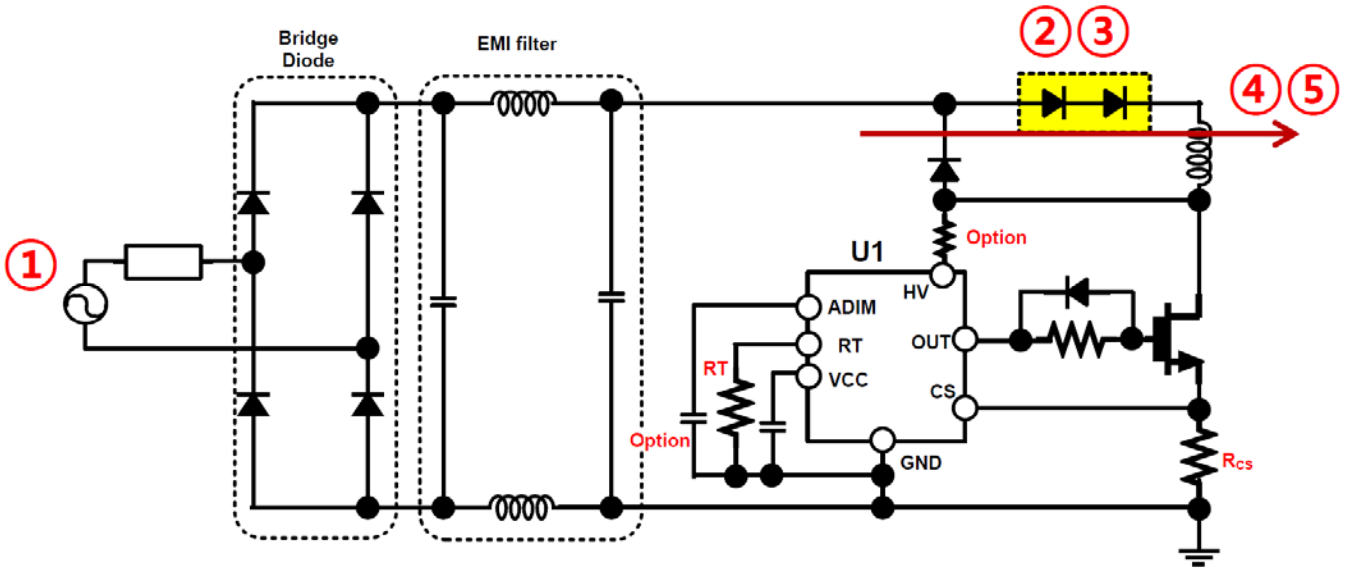

Figure 2. Output Capacitor Selection Guide Plot

Calculation Results

Table 2. Internal Process

Item		Value	Units
Current Ripple	ΔI=	151.5	*mA*
LED Minimum Current	I_{MIN}=	348.53	*mA*
LED Current Ave. Peak	(I_{MAX} + I_{MIN}) / 2=	424	*mA*
Minimum Duty Cycle	D_{MIN}=	13.237	*%*
Output Voltage	V_O=	35.000	*V*

Table 3. Results

Item		Value	Units
Inductance	L_M=	4.455	*mH*
Current Sensing Resistor	R_{CS}=	1.000	Ω
Frequency Setting Resistor	R_f=	44.919	*k*Ω

Table 4. Expected Power

Item		Value	Units
Expected Output Power	P_{OUT}=	10.500	*W*
Expected Input Power	P_{IN}=	12.353	*W*

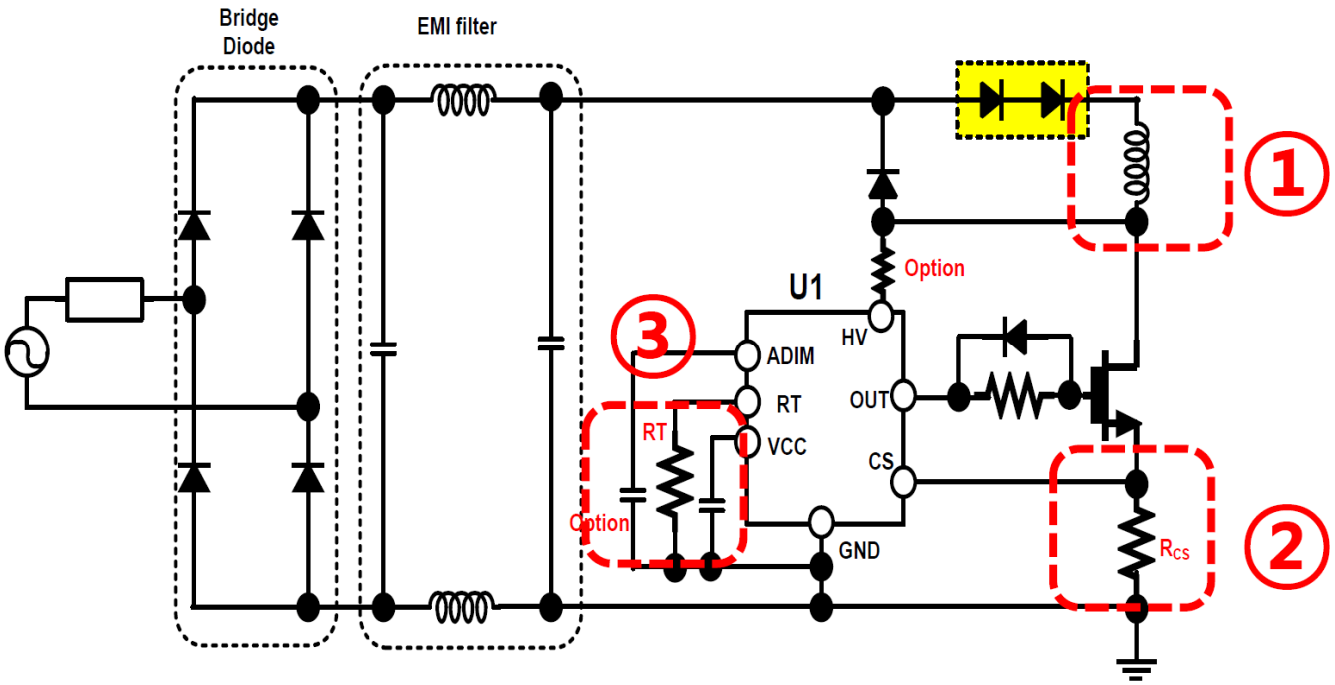

Figure 3. Output Capacitor Selection Guide Plot and Table

Notes:
1. Inductance.
2. Sensing resistor value (R_{cs}).
3. R_T value.
4. Can omit R_T, when f_{SW} is close to 45kHz.

Related Resources

Locate the Design Tool at:

http://www.fairchildsemi.com/design_tools/led-driver-design-tool/

Consult the product datasheet at:

FL7701 — Smart Non-isolated PFC Buck LED Driver

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