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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
- 500mA_{pk}
- 300mA_{rms}
- 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	$N_{number_LED} =$ 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

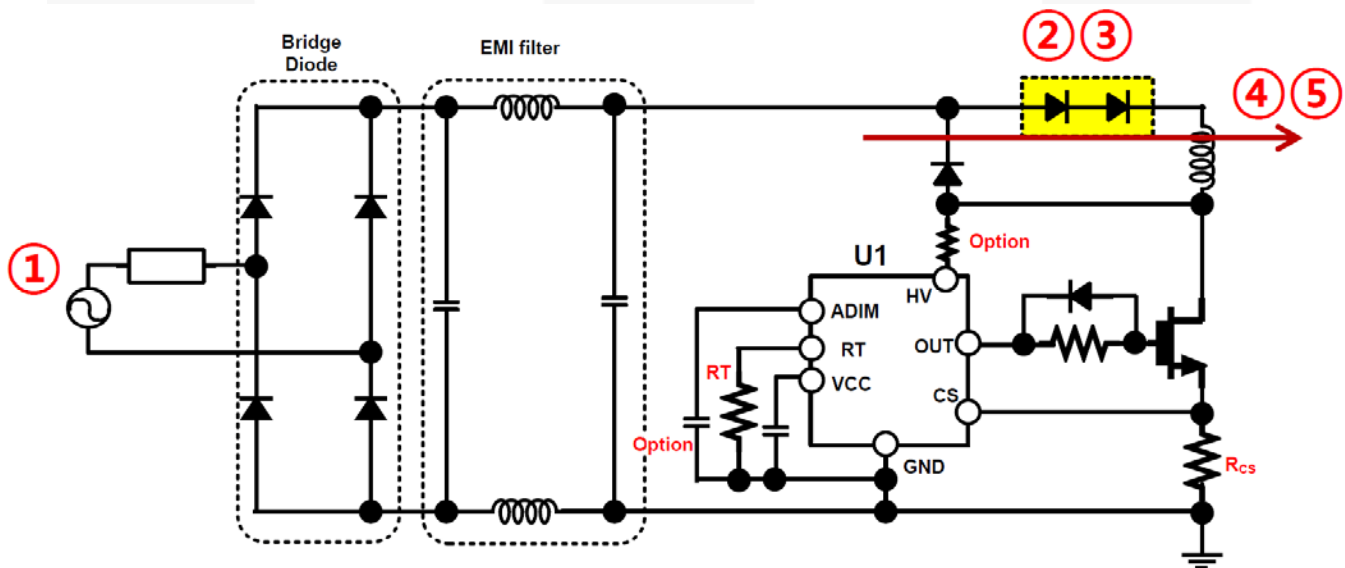


Figure 2. Output Capacitor Selection Guide Plot

Calculation Results

Table 2. Internal Process

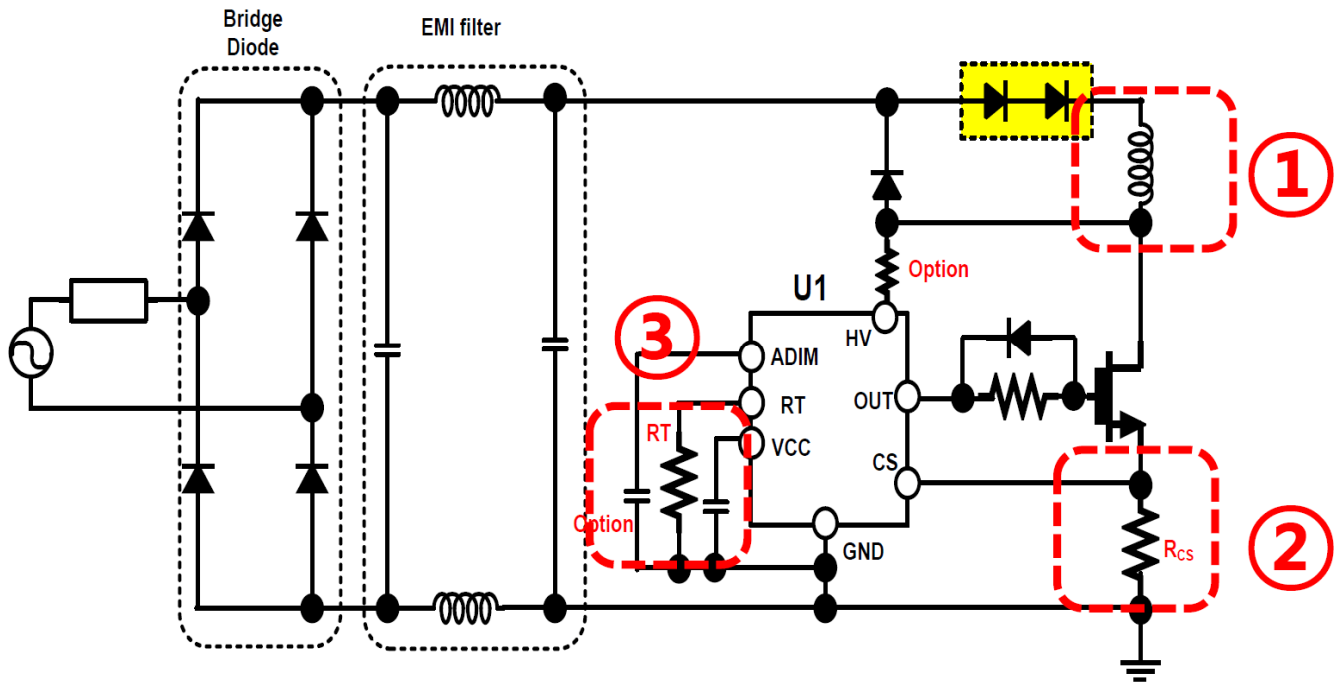
Item	Value	Units
Current Ripple	$\Delta I = 151.5$	<i>mA</i>
LED Minimum Current	$I_{MIN} = 348.53$	<i>mA</i>
LED Current Ave. Peak	$(I_{MAX} + I_{MIN}) / 2 = 424$	<i>mA</i>
Minimum Duty Cycle	$D_{MIN} = 13.237$	%
Output Voltage	$V_O = 35.000$	<i>V</i>

Table 3. Results

Item	Value	Units
Inductance	$L_M = 4.455$	<i>mH</i>
Current Sensing Resistor	$R_{CS} = 1.000$	Ω
Frequency Setting Resistor	$R_f = 44.919$	<i>kΩ</i>

Table 4. Expected Power

Item	Value	Units
Expected Output Power	$P_{OUT} = 10.500$	<i>W</i>
Expected Input Power	$P_{IN} = 12.353$	<i>W</i>


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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