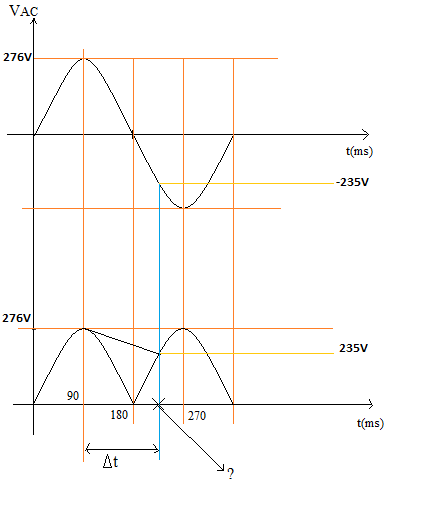
# **17.5W 15V 1A and 5V 0.5A FLYBACK SMPS DESIGN**

= 230VAC => 235 < < 265

235x = 276V Eff (Efficient) = 0,75

̬△ = %

276 x 0,85 = 235V





Note: ? = wt

276 x = -235V

wt = 238°, -58,37°

△t = x 10ms = 8,22ms

△ = = 255V

= = 91.5mA

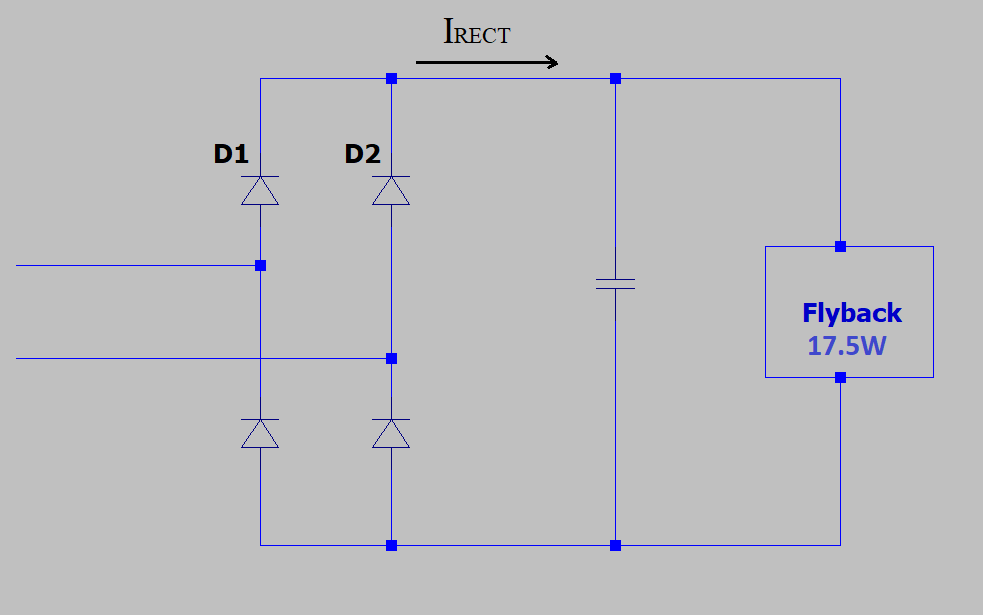
△V = 276 – 235 = 41V

x 8,22ms = 41V => C = 18.345uF

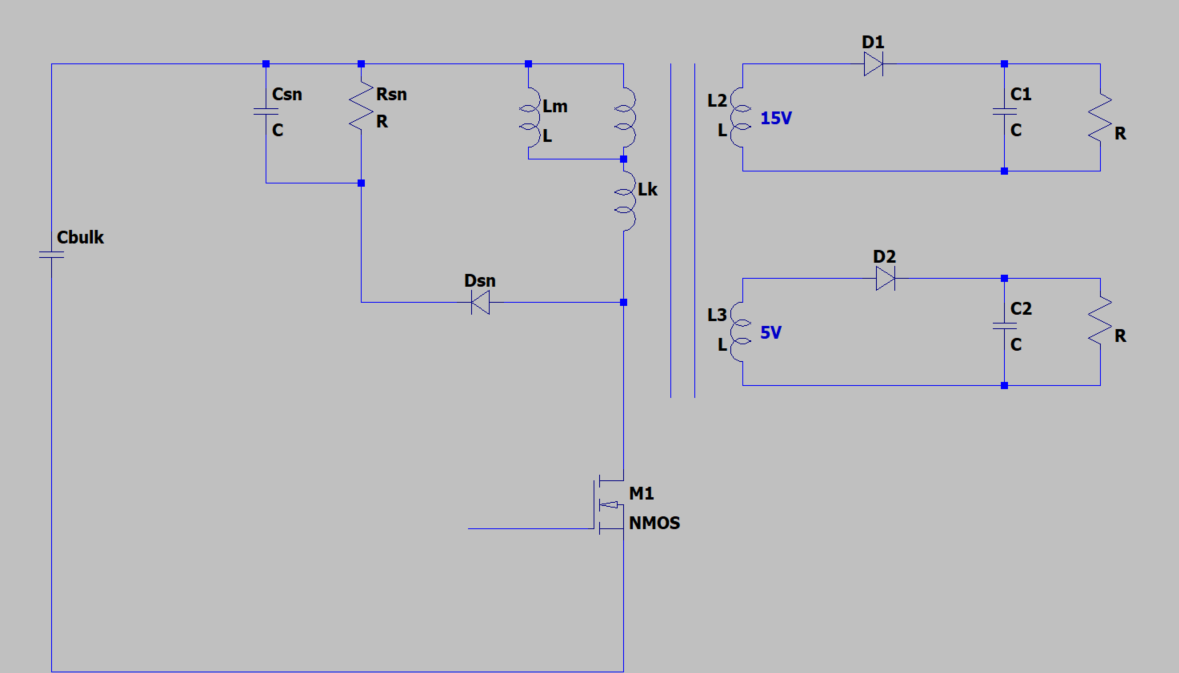
230 =>

Universal input =>

So 47uF(400V) CAP is chosen



## **# D, L and #**



= 6 => = 6 => = 90V

= = => =0.857

= = => =0.143

235 x D = 90 x (1 – D) => D = 0,277

= = => = 23.3W

D = x => 0,277 = x => = 1.378mH

P = x x f => 33.3 = x 66000 => = 0.716A

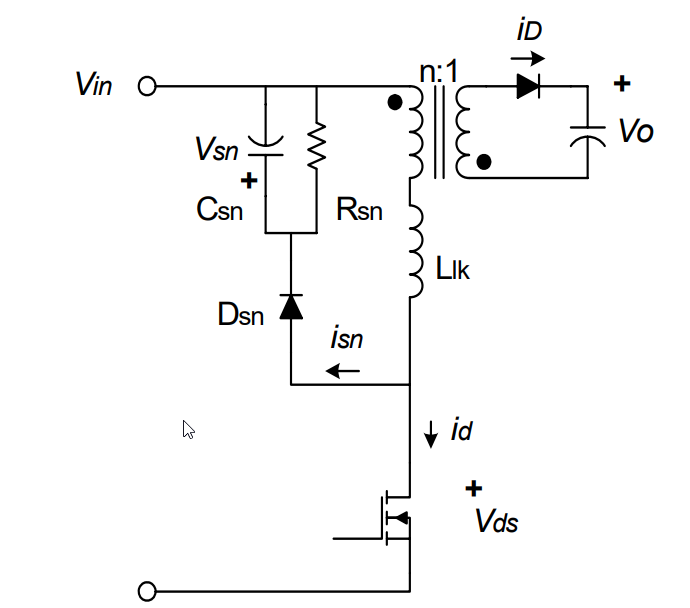
## **# #**

= 255V => x x  = 0.716 => = 0,255

(@66kHz)

x x => x 0.716 x => = 0.209

## **# Snubber Power and RCD Snubber**



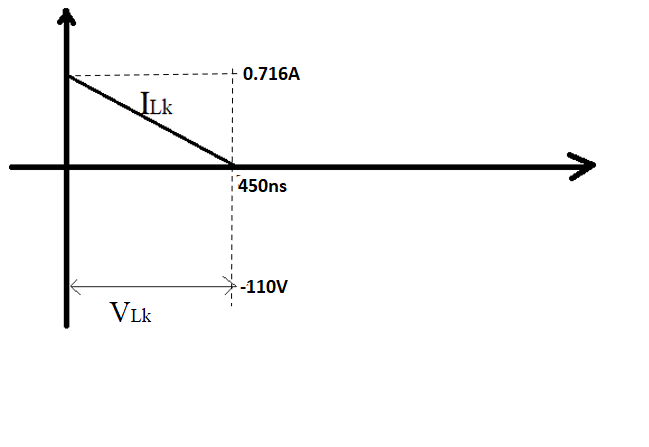
should be 2 2,5 times of n.

Therefore = 200V

= 0,05 x 1378uH => = 69uH

x x x = 1.167W So > 1.167W

△t =x = x3.233 => △t = 450ns



= 0.716 -xt

= 0 => △t = 115.4ns

0.716-1.594x x t)dt = 90x0.716 x 450x – 90 x 1.594 x x =>

= 14.47u joule

=66000 x [x 69 x x + 14.47 x ] => = 2.1W

Rsn = => => Rsn = 19047Ω 18kΩ

△ = => = = 8.42nF => = 10nF

When the converter operates in DCM at the maximum input voltage and full-load condition, the is obtained by:

= => =0.716A

## **# #**

= x x

= 0.209 x x => = 1.736Arms

= x x

= 0.209 x x => = 0.87Arms

= 0.716 x 6 x 0.857 => = 3.682A

= 0.716 x 18 x 0.143 => = 1.843A

**# Output Diode #**

265 = 375V => 375/6 = 62.22V

= 62.22 +15 => = 77.22V

265 = 375V => 375/18 = 20.83V

= 20.83 +5 => = 25.83V

200V diode is suitable. It is SB3200.

= => = 1A

= 0,7V = 25 °C/W

= 0,7 x 1 => = 0,7W

△T = 0,7 x 25°C => △T = 17.5°C

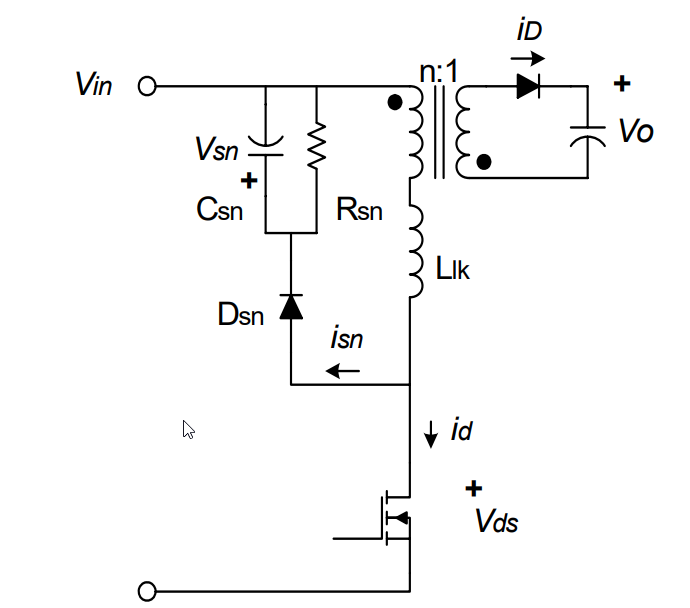
= => = 0.5A

= 0,7V = 25 °C/W

= 0,7 x 0.5 => = 0,35W

△T = 0,35 x 25°C => △T = 8.75°C

## **# Snubber Diode ( #**



= 575V

= 1000V

< => So UF4007can be choose.

## **# MOSFET #**

DRAIN Voltage ........................................................ 650 V(min)

DRAIN Pin Peak Current: FSL176MRT................................. 3.5 A

## **# TRANSFORMER #**

**Transformer Core**

EF25(EE2525F)

= 51.8 = 95.3

1.378mH x 0.716A = x 0.2T x 51.8 => =95.3 turns

108 Turns

18 Turns

J = 5 A/

5A 🡪 1

0.209A 🡪 => = 0.0418

5A 🡪 1

1.736A 🡪 => = 0.3472

5A 🡪 1

0.87A 🡪 => = 0.174

2 x = 0.26 => 0.203mm and = 0.406mm (AWG-32)

6 x = 1.072 => 0.24mm and = 0.48mm (AWG-26/7/34\_TIW) or (AWG25?\_TIW)

= 48 x 2 x x + 12 x 6 x x => = 25.457

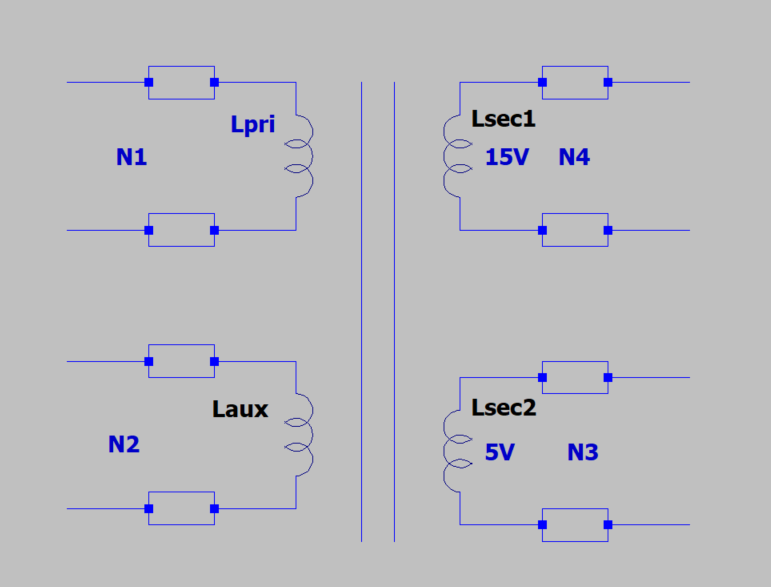
= = %17.2 < %25

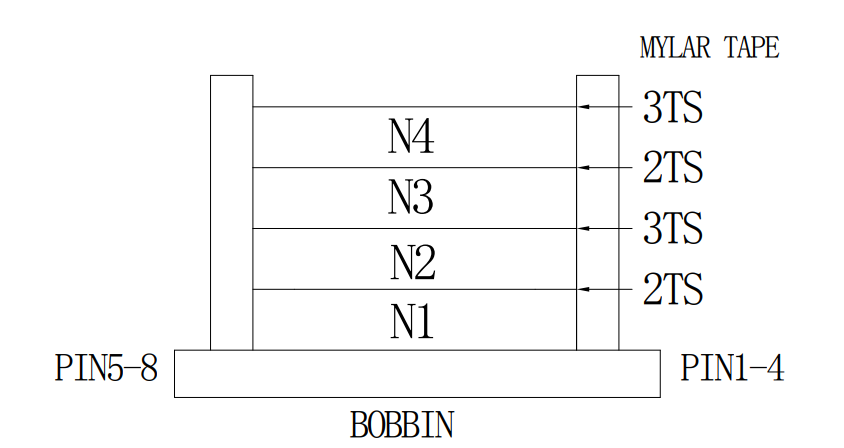
**Aux winding**

* For FSL176 Vcc = 16V

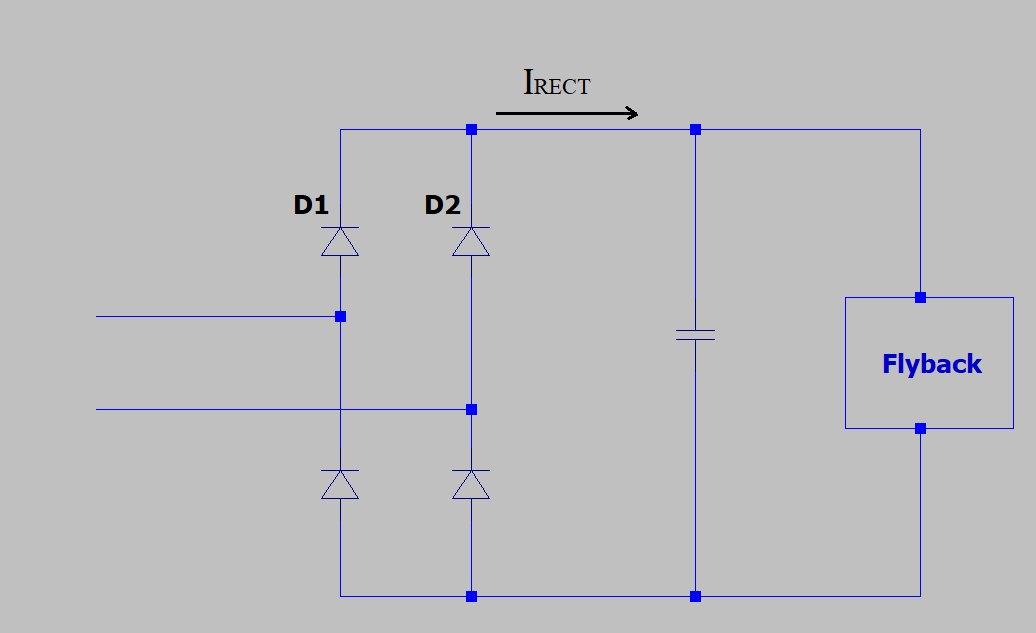
8 Turns

= 0.02 0.1mm and = 0.2mm (AWG-32)





## **# Full Bridge Rectifier**



=23.3W

=255V

= => = 92mA

= = => = =46mA

For MB10S:

= 46 x x 1 => = 0.046W

= 85°C/W

4 x = 4 x 0.46W = 0,184W

△T = 0.184 x 85 => △T 15.64°C

## **# NTC - Common Mode Choke #**

= => = 171m

NTC = B5713S0100 10Ω = 100uF @230

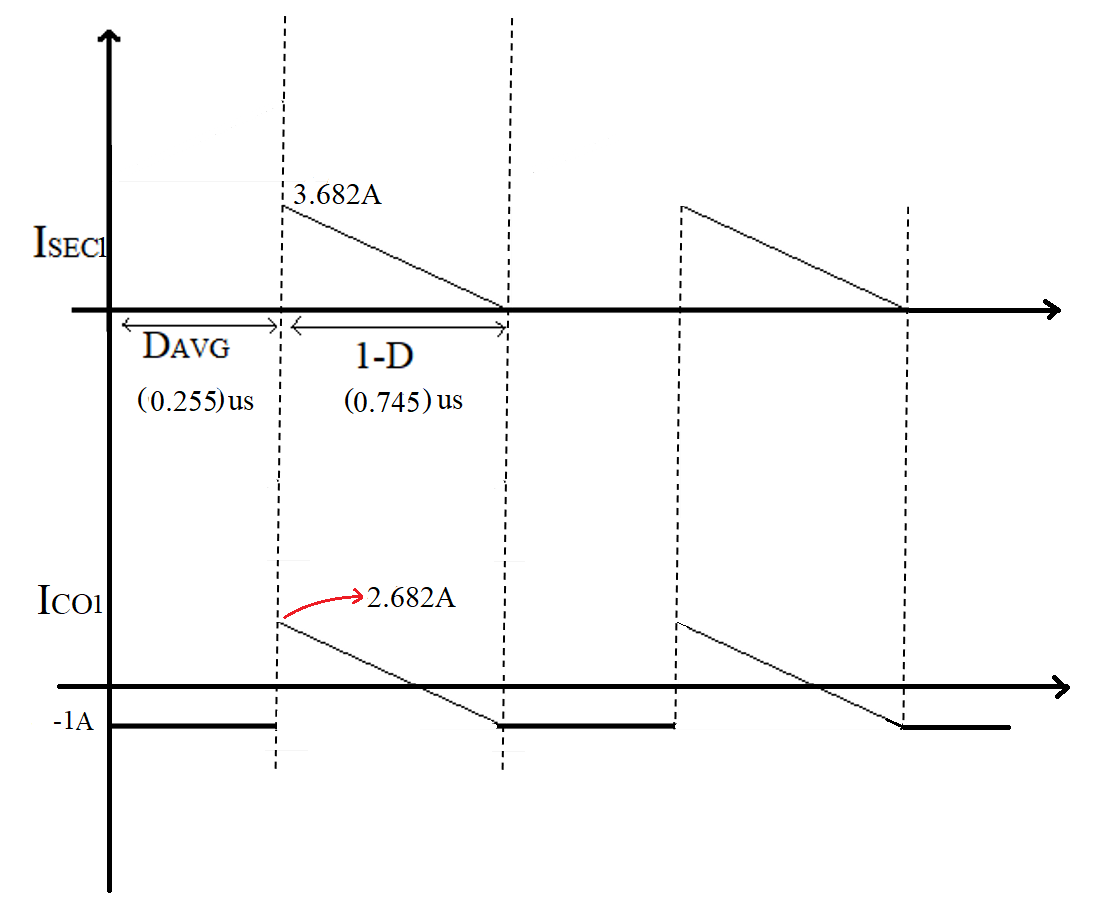
= 4Ω @171mA

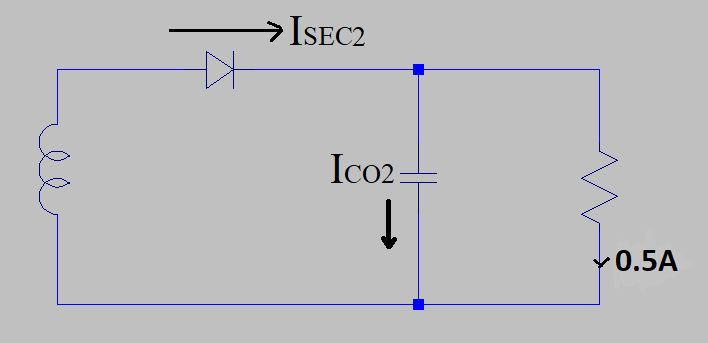
= 60°C @4Ω

## **# Output Capacitor #**

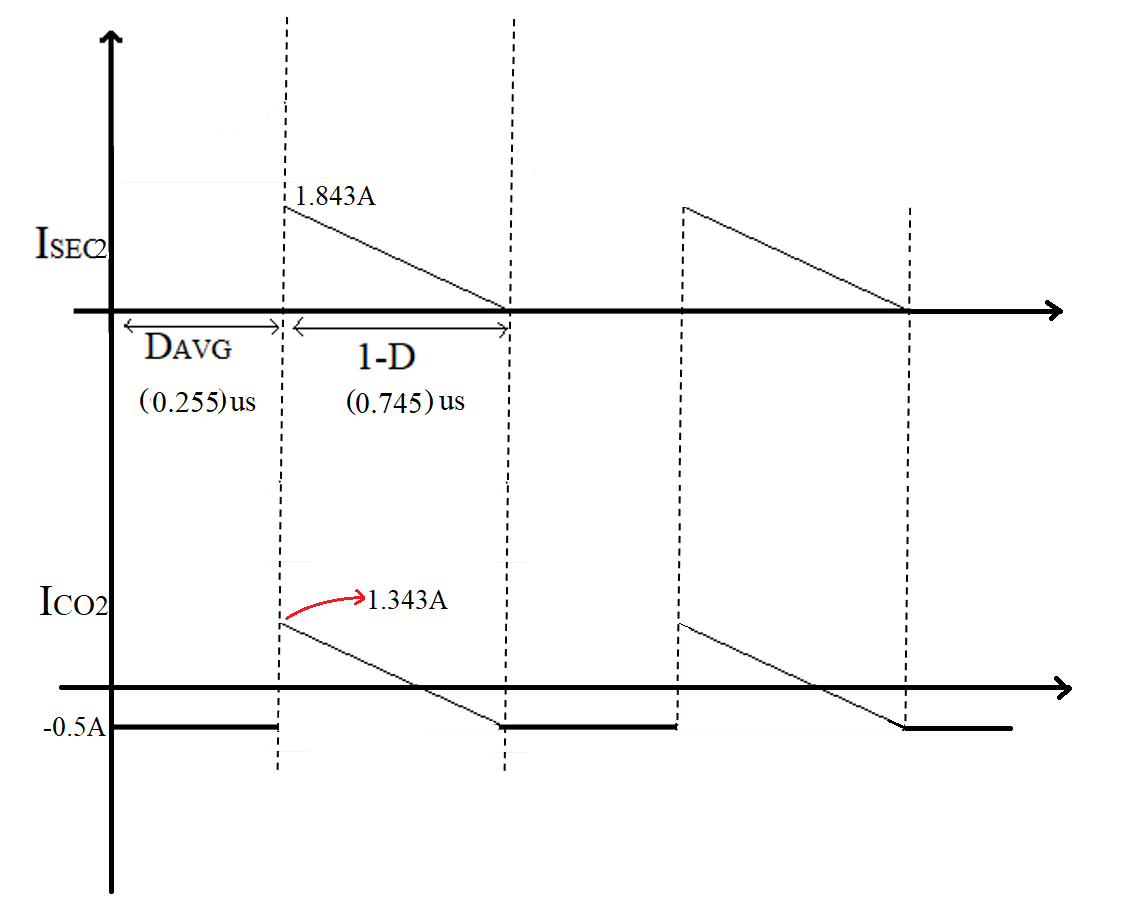
= 1A

= 1,14 (@66kHz)



 = 0.5A

= 0.572 (@66kHz)



## **# LTSpice Simulation #**

