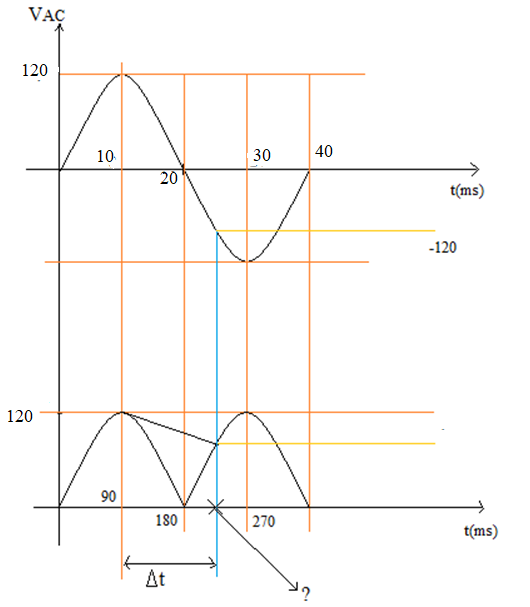
# **6W 5V FLYBACK SMPS DESIGN**

= 120V(60Hz) or 230V(50Hz) => 100 < < 265

85x = 120V Eff (Efficient) = 0,8

̬△ = %

120 x 0,85 = 102V





Note: ? = wt

120 x = -102V

wt = 238°, -58,21°

△t = x 10ms = 8,2ms

△ = = 111V

= = 67,56mA

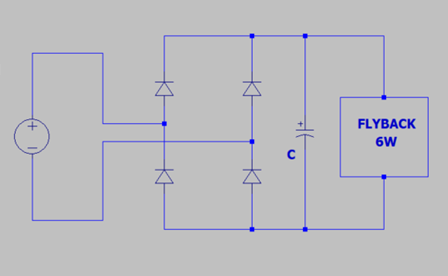
△V = 120 – 102 = 18V

x 8,2ms = 18V => C = 30,7uF

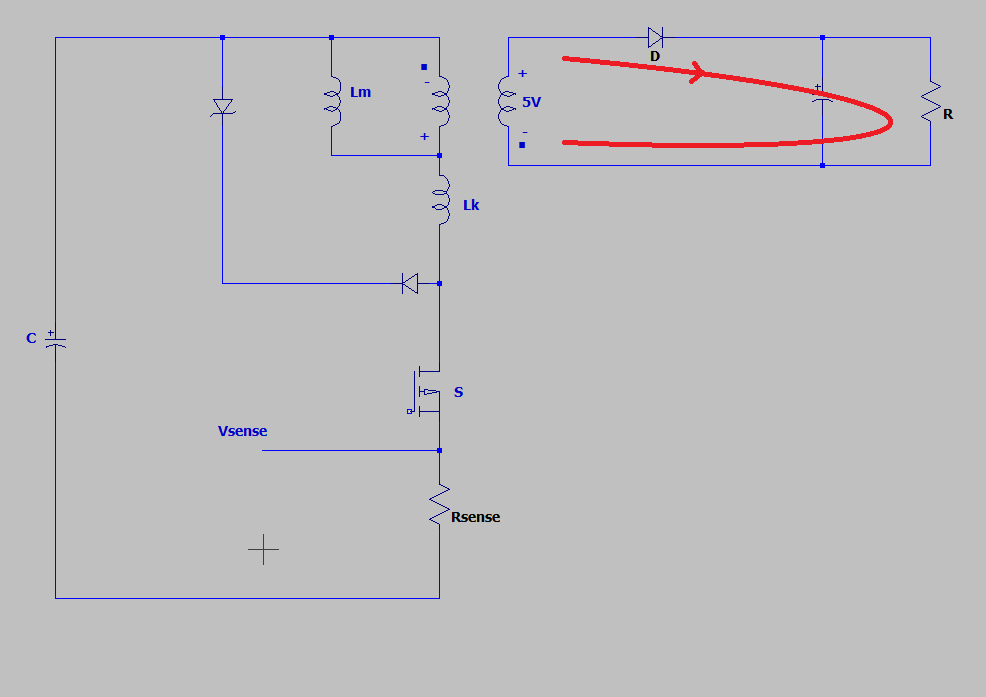
230 =>

Universal input =>

So 68uF(400V) CAP is chosen



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



= 20 => = 20 => = 100V

102 x D = 100 x (1 – D) => D = 0,495

= = => = 7,5W

D = x => 0,495 = x => = 1,7mH

P = x f => 7,5 = x 66000 => = 0,366A

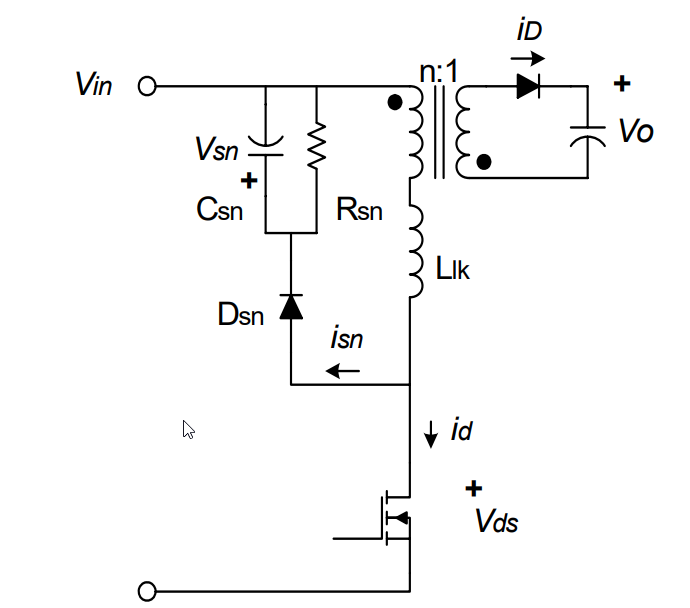
## **# #**

= 111V => x x  = 0,366A => = 0,37

(@66kHz)

x x => x 0,366 x = 0,128

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



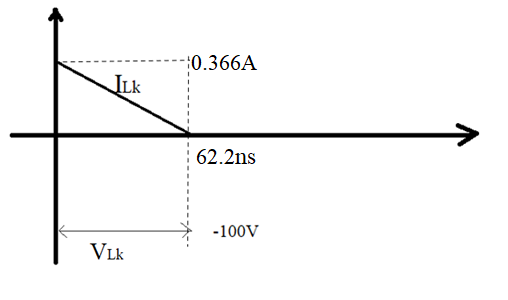
should be 2 2,5 times of n.

Therefore = 200V

= 0,01 x 1,7mH => = 17uH

x x x = 0,0748W So > 0,0751W

△t =x = x0,366 => △t = 62,2ns



= 0,366A -xt

= 0 => △t = 62,2ns

0,366-5,882 x x t)dt = 100x0,366 x 62,2x – 100 x 5,882 x x =>

= 1,139u joule

=66000 x [x 17 x x + 1,139 x ] => = 0,15W

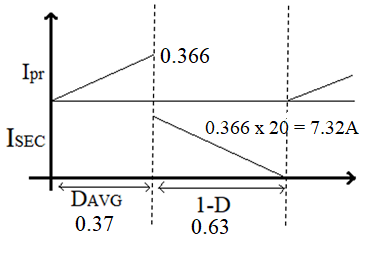
Rsn = => => Rsn = 266,667kΩ 330kΩ

△ = => = = 470pF => = 470pF

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

=

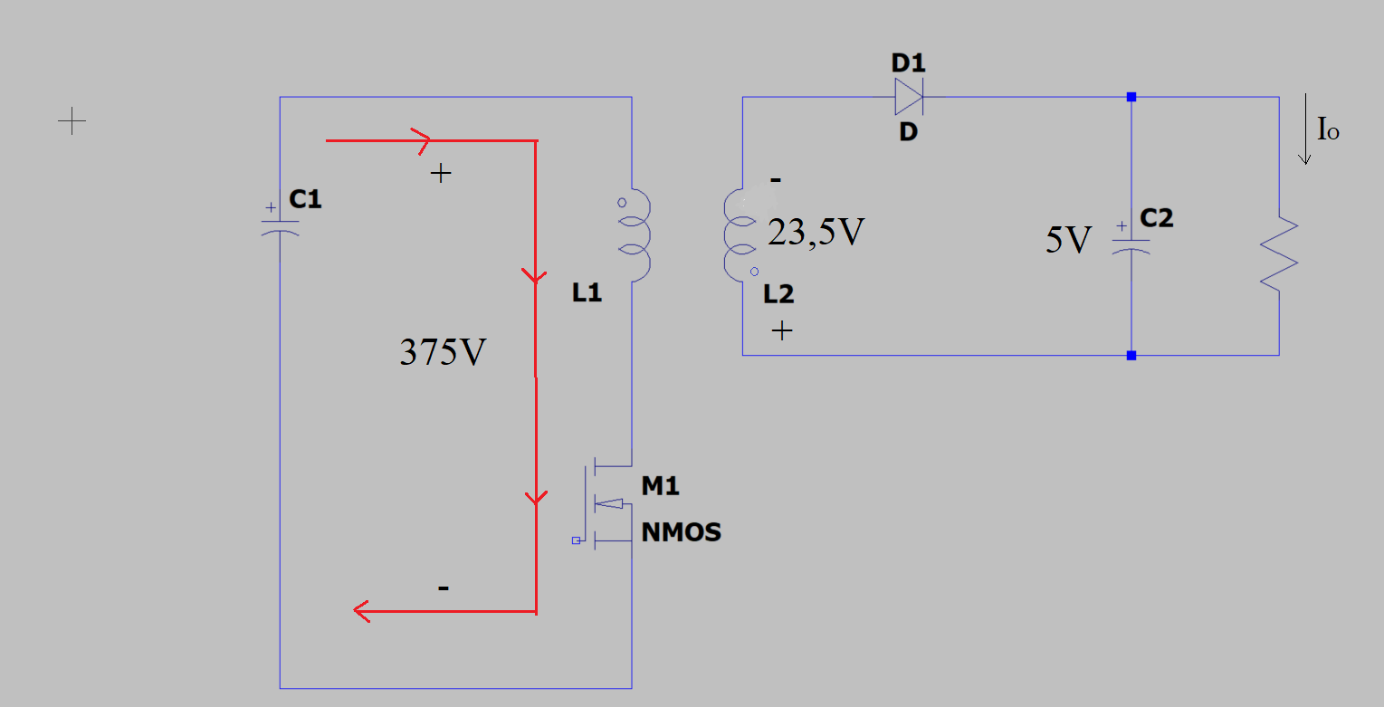
## **# #**



= => => = 3,354

△V

## **# Output Diode #**



265 = 375V => 375/20 = 18,75V

= 18,75 +5 => = 23,5V

70V diode is suitable. It is SB270.

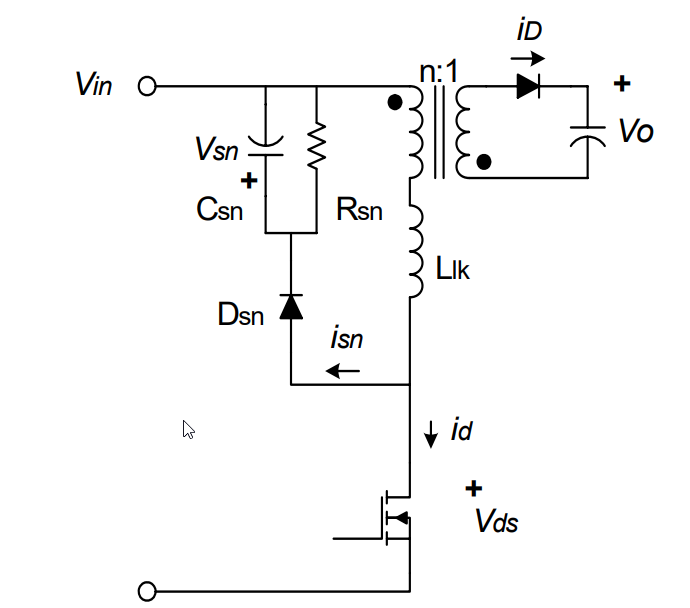
= => = 1,2A

= 0,7V = 15 °C/W

= 0,7 x 1,2 => = 0,84W

△T = 0,84 x 15°C => △T = 12,6°C

## **# Snubber Diode ( #**



= 575V

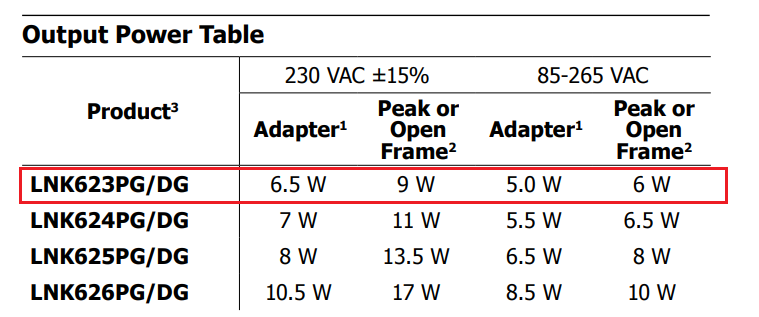
= 1000V

< => So UF4007can be choose.

## **# MOSFET #**

DRAIN Voltage ........................................................-0.3 V to 725 V

DRAIN Peak Current: LNK623 .................................400 (600) mA



## **# TRANSFORMER #**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  | **Primer = Seconder  n** |  |  |  |  |  |  |
|  | 20 | 6W | 0,128ARMS | 3,354ARMS | 1,7mH | 0,336A |  |
|  |  |  |  |  |  |  |  |

Beginning => EF20: 13W, @66kHz, Ae =32,2, Aw =61,8

* L x I = N x Ø => L x I = N x B x Ae

1,7mH x 0,366A = N x 0,2T x 32,2 x => = 96.6 => = 100

: => 100 : 5 => = 5

Let I = 5A/ be choosen.(3 < J < 8)

5A => 1

0,128 => 0,0256 => = 0,2mm (primer area)

Acu = 0,0314

= 3,354

5A => 10

3,354A => 0,6708 => = 0,94mm

4x(seconder area)

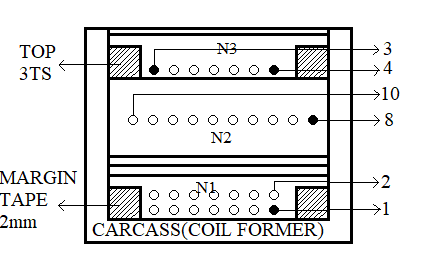
But 0,94mm enamel cable can be hard to bent. Also there is the skin effect too. It should not be higher than 0,5mm.

Acu = 0,7

Acu = 100 x 0,0314 + 5 x 0,7 = 6.64

Winding factor = (Acu / Aw) x 100 = 6,64 / 61,8 = %10,07

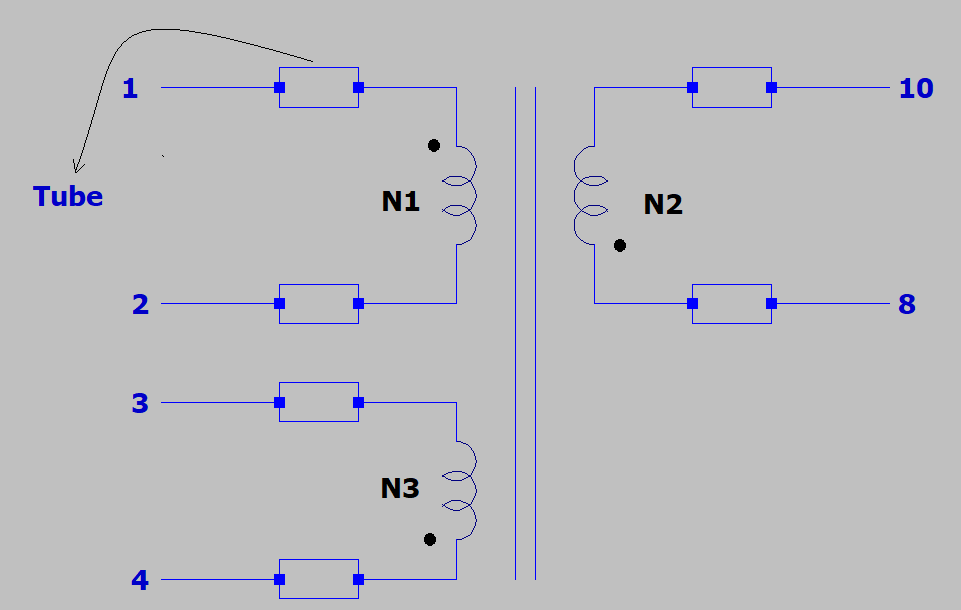
%10,07 < %25 => The area of the windings fits easily.



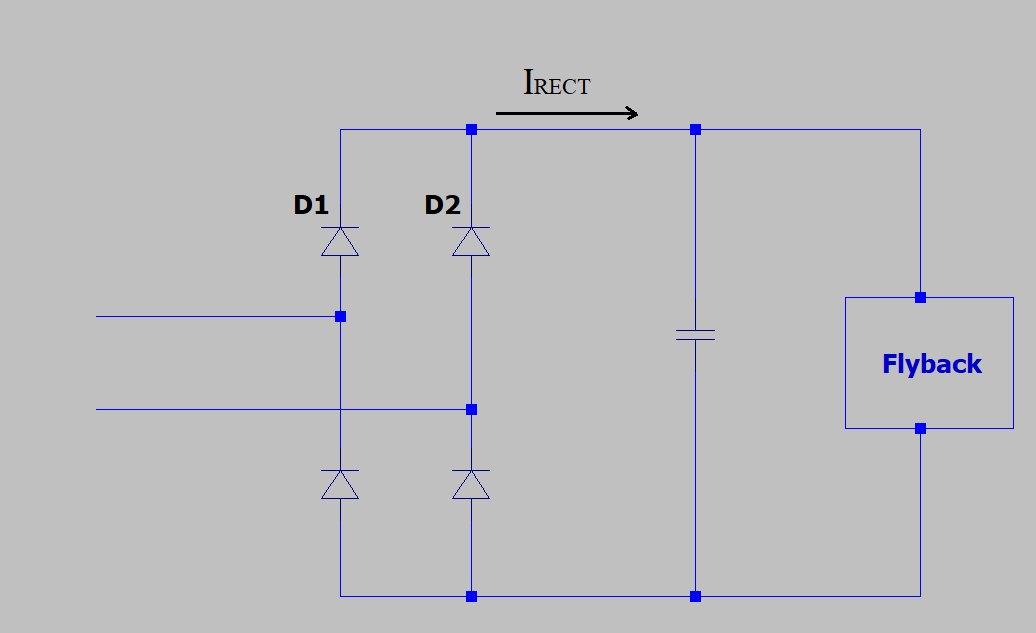
: 100 x x 1P x 0,2mm 2UEW-F

: 5 x x 3P x 0,56mm TIW

: 5 x x 1P x 0,2mm 2UEW-F



## **# Full Bridge Rectifier**



=7,5W

=111V

= => = 67,5mA

= = => = =33,75mA

For MB6S:

= 33,75x x 1 => = 0,03375W

= 85°C/W

4 x = 4 x 0,03375 = 0,135W

△T = 0,135 x 85 => △T 11,475°C

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

= => = 126m

NTC = NTB02-010MV 10Ω = 60uF @240

= 1,87Ω @107mA

= 90°C => It is very high value. So it is not acceptable.

NTC = B57153S0100 10Ω = 100uF @230

= 400uF @110

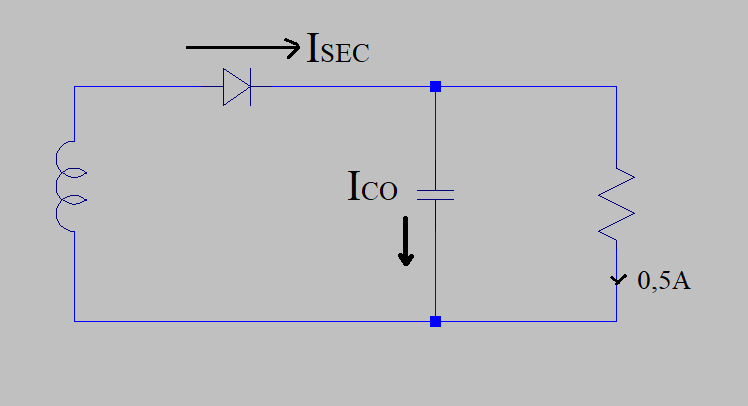
= 4Ω @126mA

= 60°C

**For Line filter :**

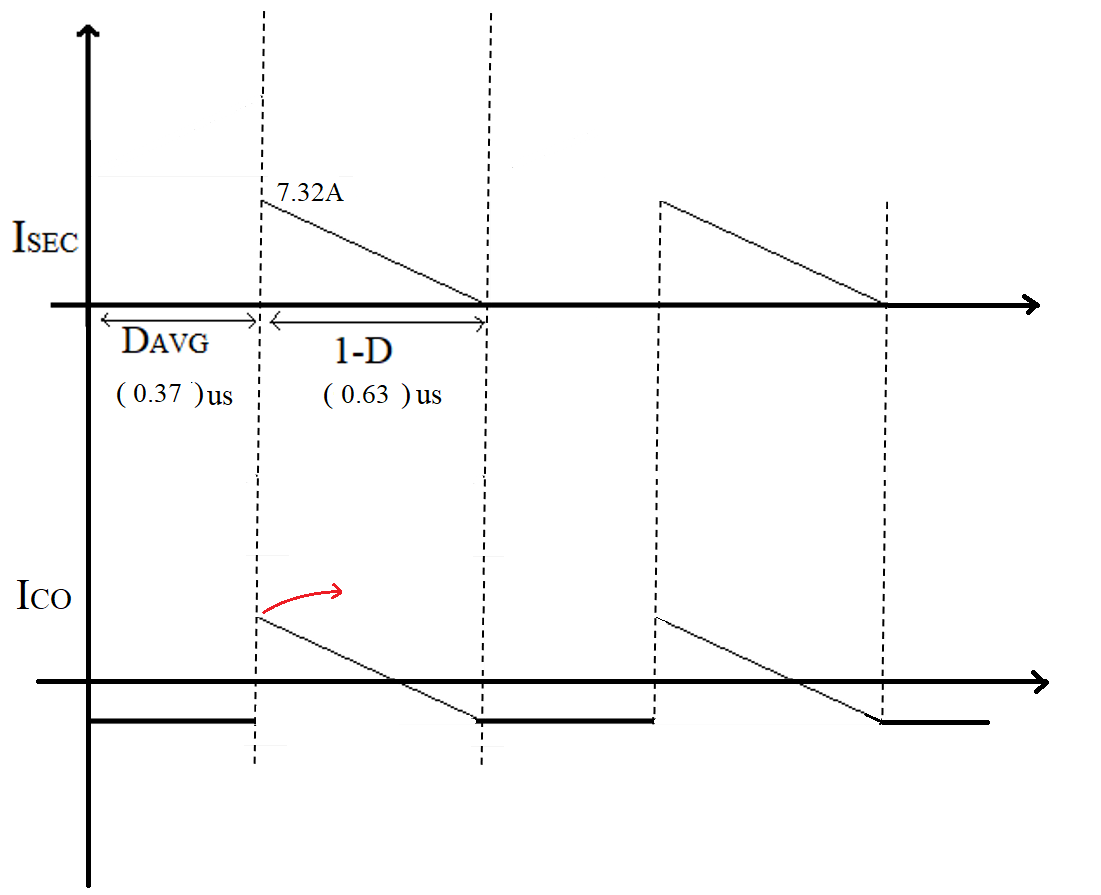
Common mode => 0,8A 40mH 400uH(leakage) R = 1,1Ω

## **# Output Capacitor #**



= 1,2A

= 1,736 (@100kHz)



So we chose **PKLH-016V222MH200-T/A5.0**