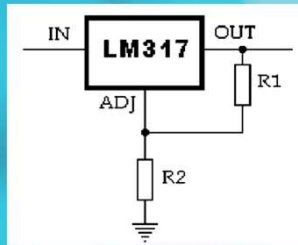


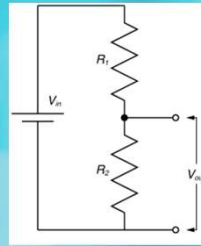
**GİRİŞ 12VDC, ÇIKIŞ 5VDC/2A, 3.3VDC/2A, 1.8VDC/2A
ANAHTARLAMALI MOD GÜÇ KAYNAĞI
(BUCK CONVERTER)**

MUHAMMED ŞEYHOĞLU / 170221997

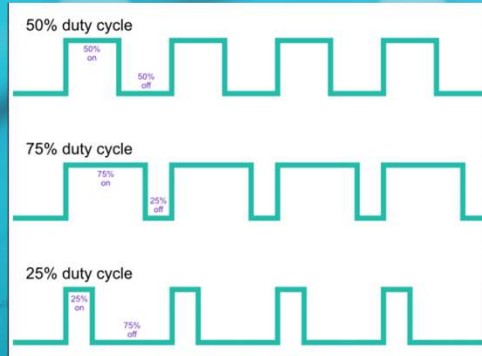
MRM3048 / MEKATRONİK SİSTEM TASARIMI



$$V_{out} = 1.25 \times \left(1 + \frac{R2}{R1}\right)$$

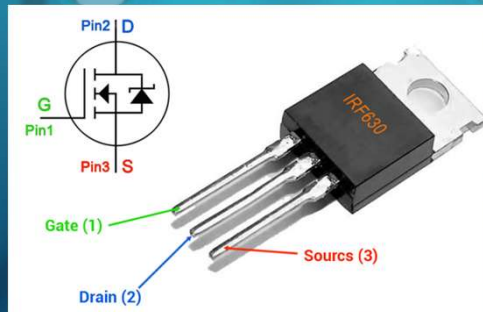


$$V_{out} = V_{in} \times \frac{R2}{R1 + R2}$$



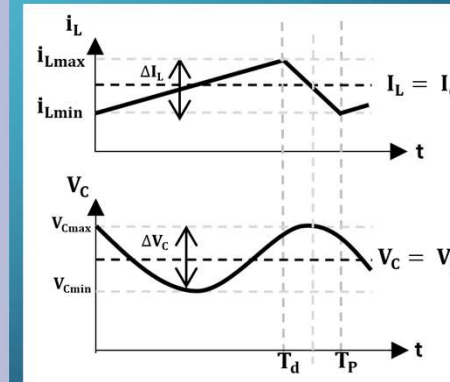
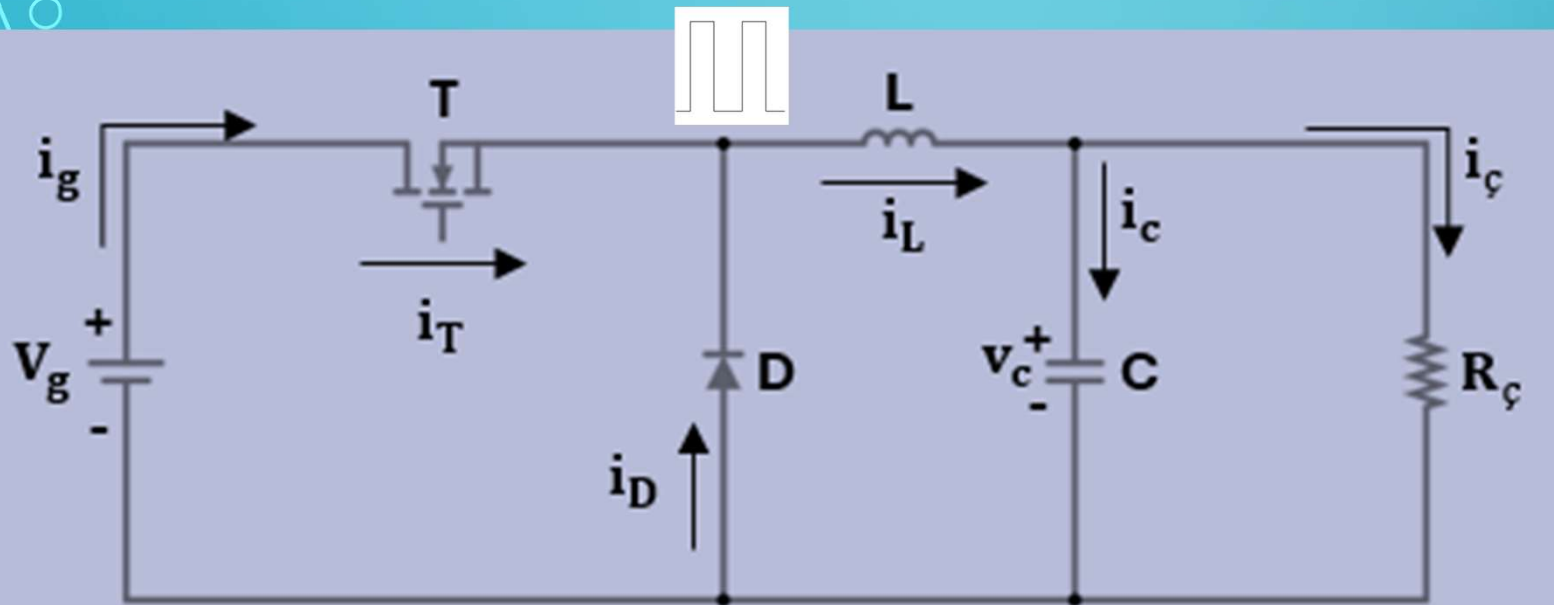
$$\lambda = \frac{T_{on}}{T_{on} + T_{off}} = \frac{T_{on}}{T}$$

λ : Doluluk oranı $0 < \lambda < 1$
(Duty cycle)



- DC-DC Düşürücü Dönüştürücü (Buck Converter) (Step Down)
- Anahtarlama Mod Güç Kaynağı (Switching Mode Power Supply) (SMPS)
- PWM
- Anahtarlama elemanı (MOSFET)

• DC-DC BUCK CONVERTER DEVRESİ



$V_{\text{ç}} = \lambda V_g$	$L = \lambda(1 - \lambda) \frac{V_g}{f_p \Delta I_L}$	$C = \frac{\Delta I_L}{8 f_p \Delta V_C}$
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- Kondansatör $\Delta V_C / V_C$ (%)
- Endüktans $\Delta I_L / I_L$ (%)

• CCM / BCM / DCM MODLARINDA ÇALIŞMA

• Sürekli İletim Modu (CCM)

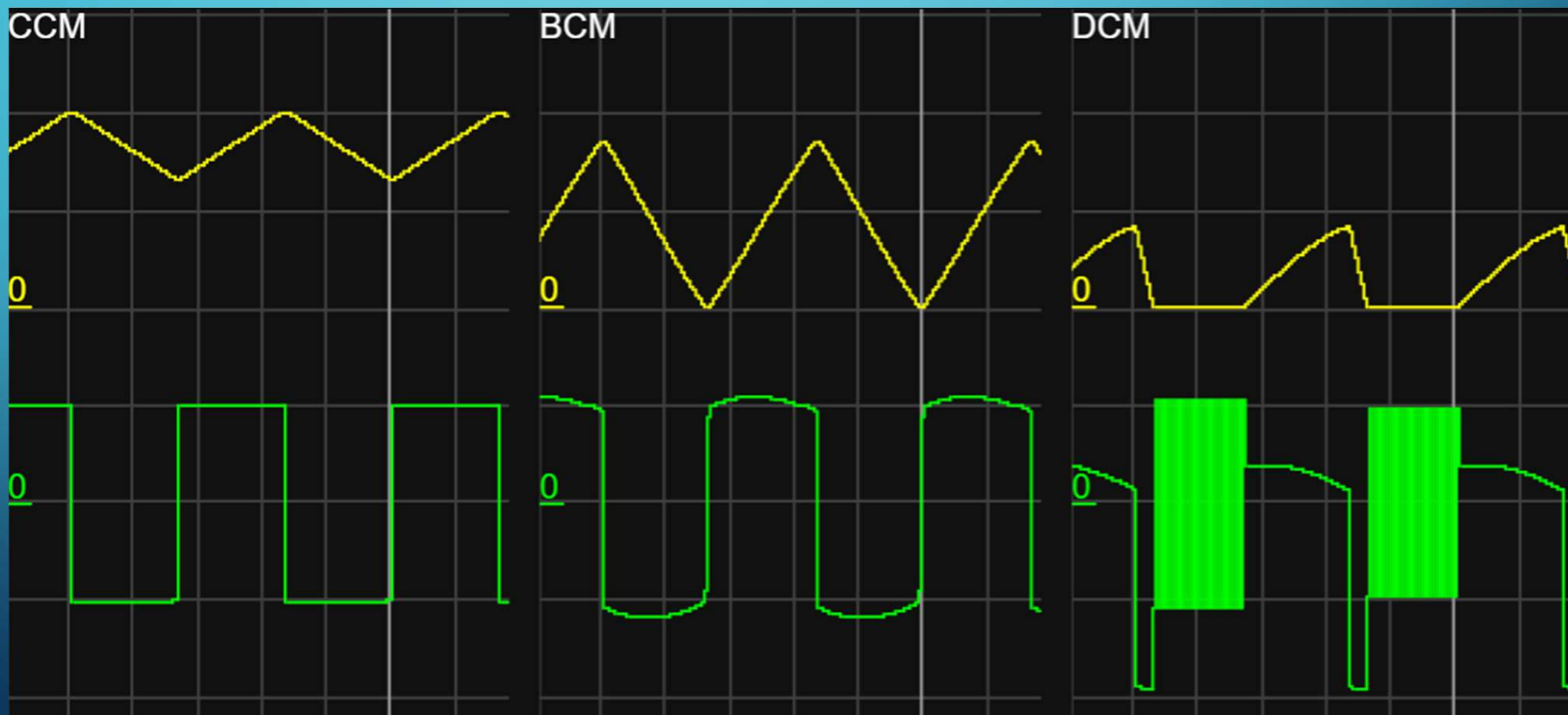
(Continuous Conduction Mode)

• Sınırdaki İletim Modu (BCM)

(Boundary Conduction Mode)

• Kesintili İletim Modu (DCM)

(Discontinuous Conduction Mode)

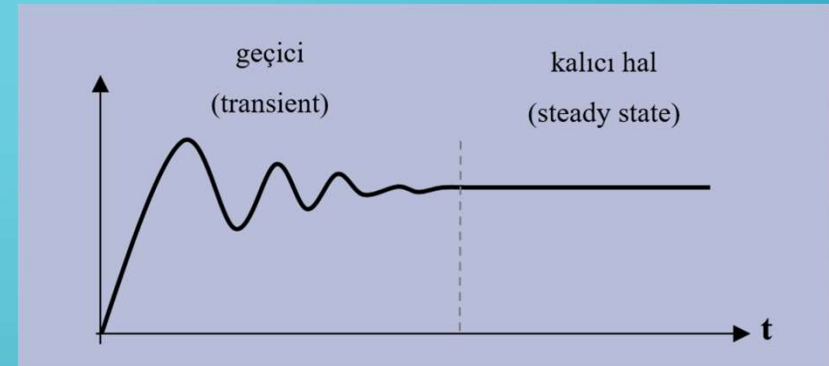


$$\Delta I_{Lmax} = \frac{V_g}{4f_p L}$$
$$L > \frac{\lambda(1-\lambda)V_g}{2f_p I_c}$$

• DEVRE TASARIMI

KABULLER :

- Devre elemanları ideal olma
- Devre CCM modunda çalışma
- Kalıcı hale gelme



• Verilenler :

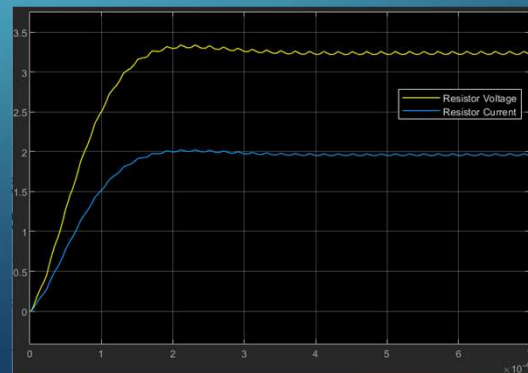
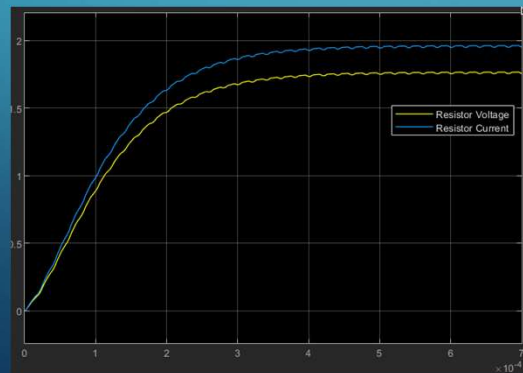
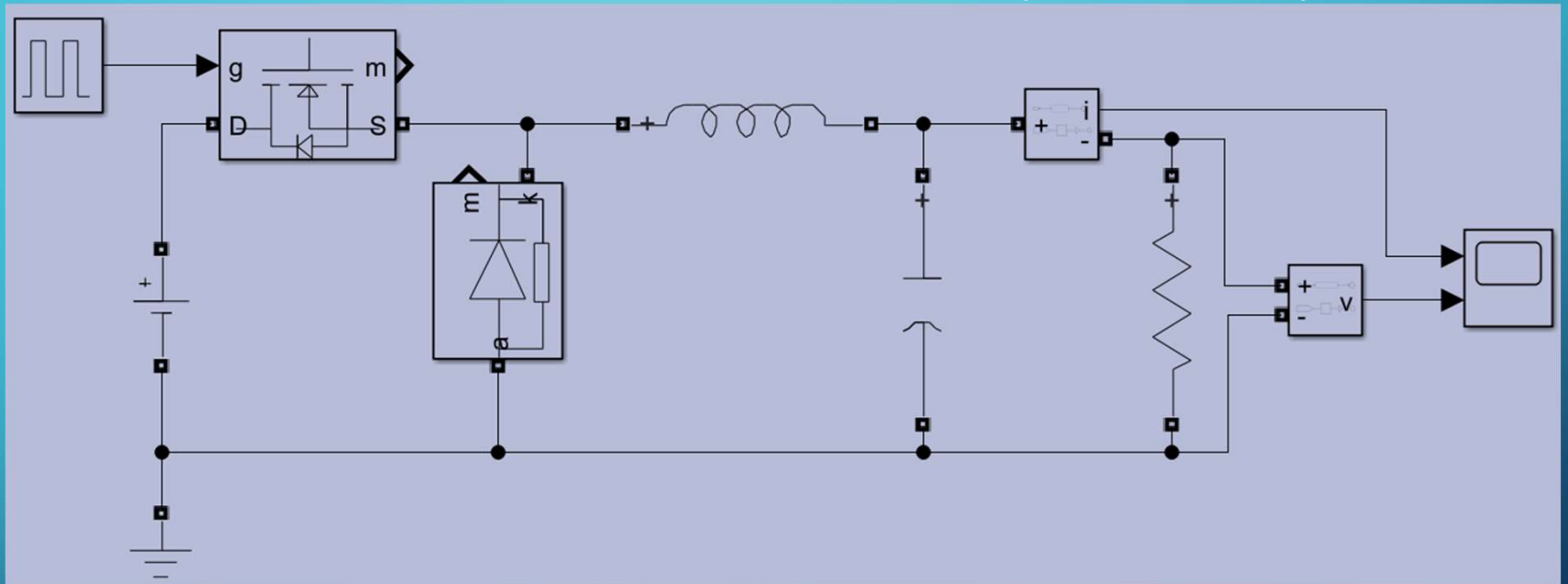
- $\Delta V_C / V_C = \%2$
- $\Delta I_L / I_L = \%25$
- $V_g = 12V$
- $I_\phi = 2A$
- $f = 50kHz$

$$V_\phi = \lambda V_g \quad L = \frac{V_g}{4f_p \Delta I_L} \quad C = \frac{\Delta I_L}{8f_p \Delta V_C} \quad V_\phi = I_\phi R$$

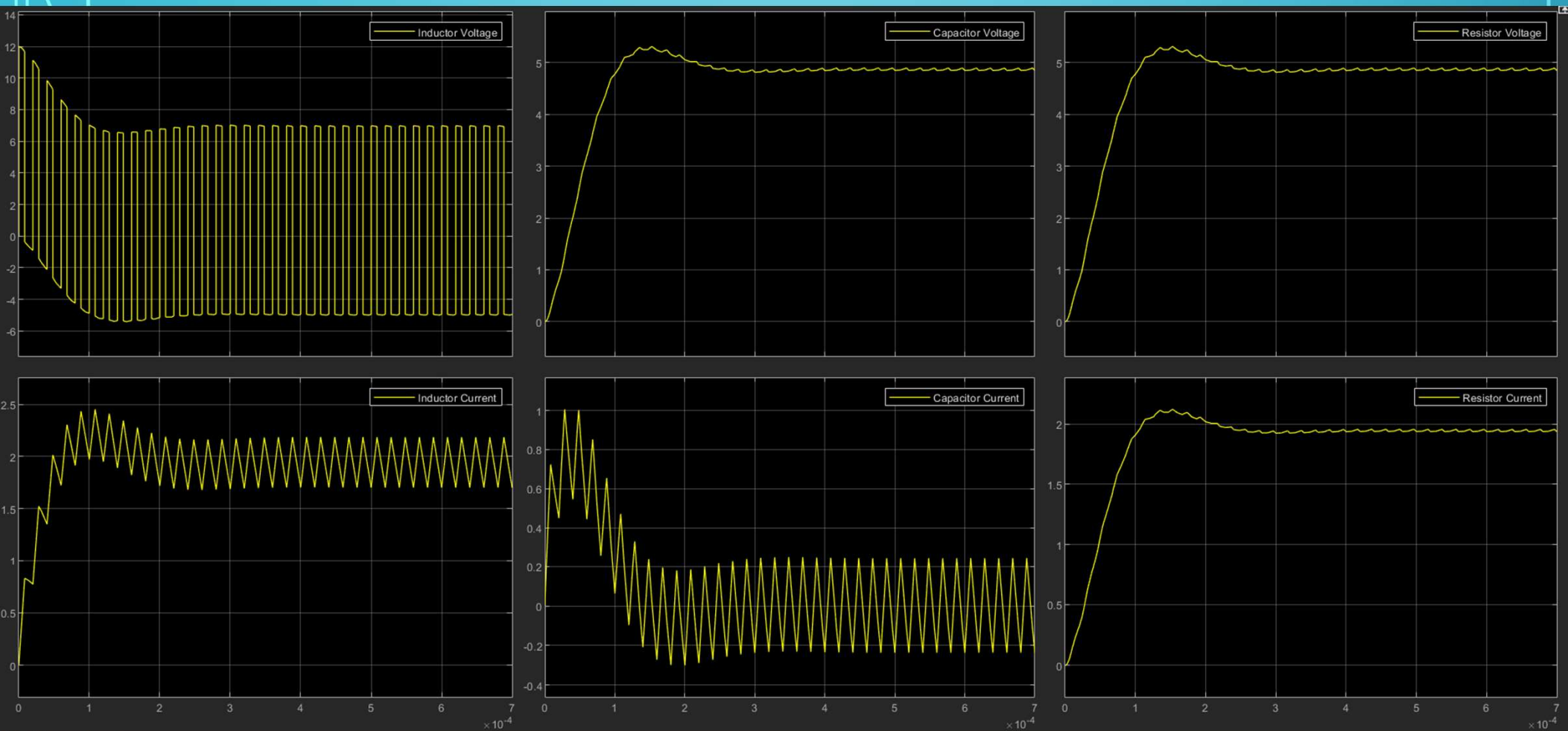
$V_\phi(V)$	λ	$R(\Omega)$	$\Delta I_L(A)$	$\Delta V_C(V)$	$L(\mu H)$	$C(\mu F)$
5	0.417	2.5	0.5	0.1	120	12.5
3.3	0.275	1.65	0.5	0.066	120	18.939
1.8	0.15	0.9	0.5	0.036	120	34.722

• MATLAB

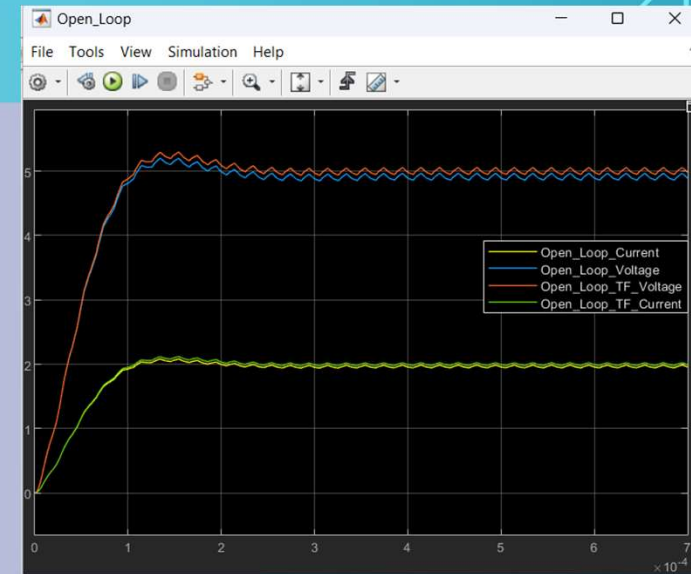
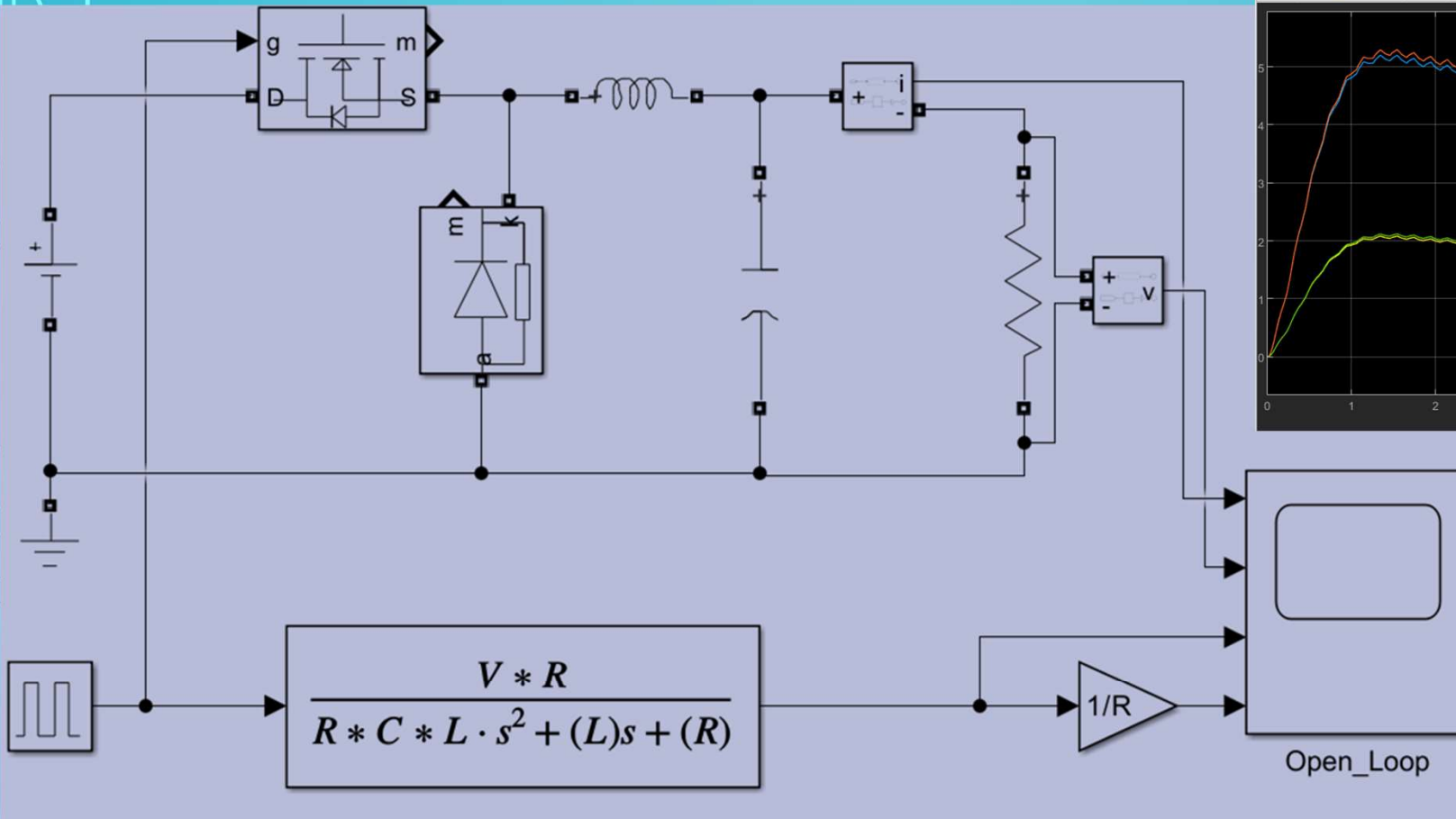
- › Simscape
- › Electrical
- › Specialized Power Systems



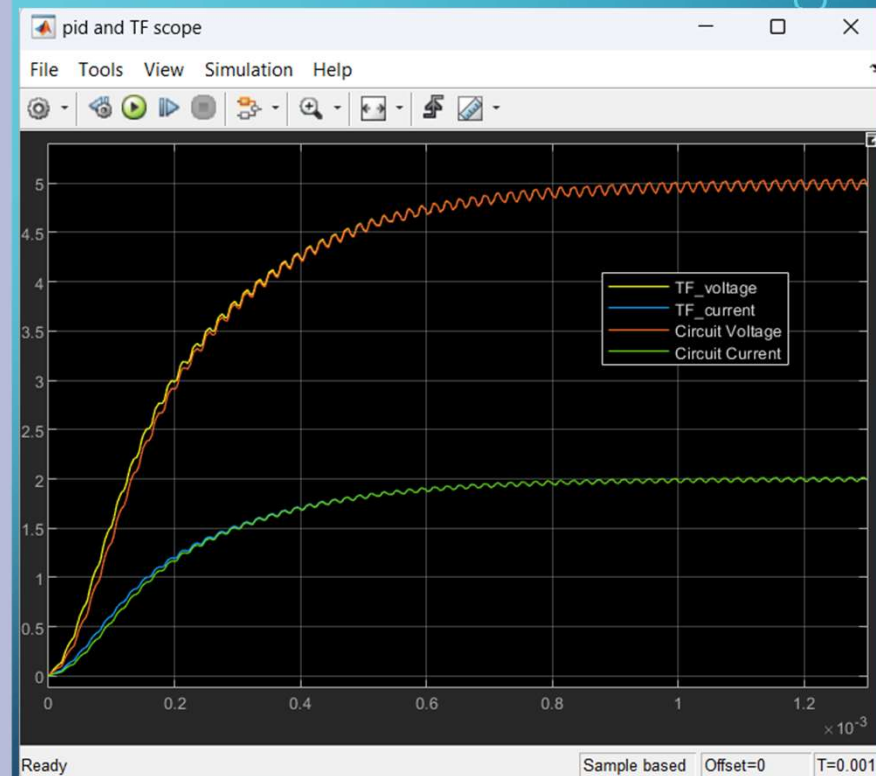
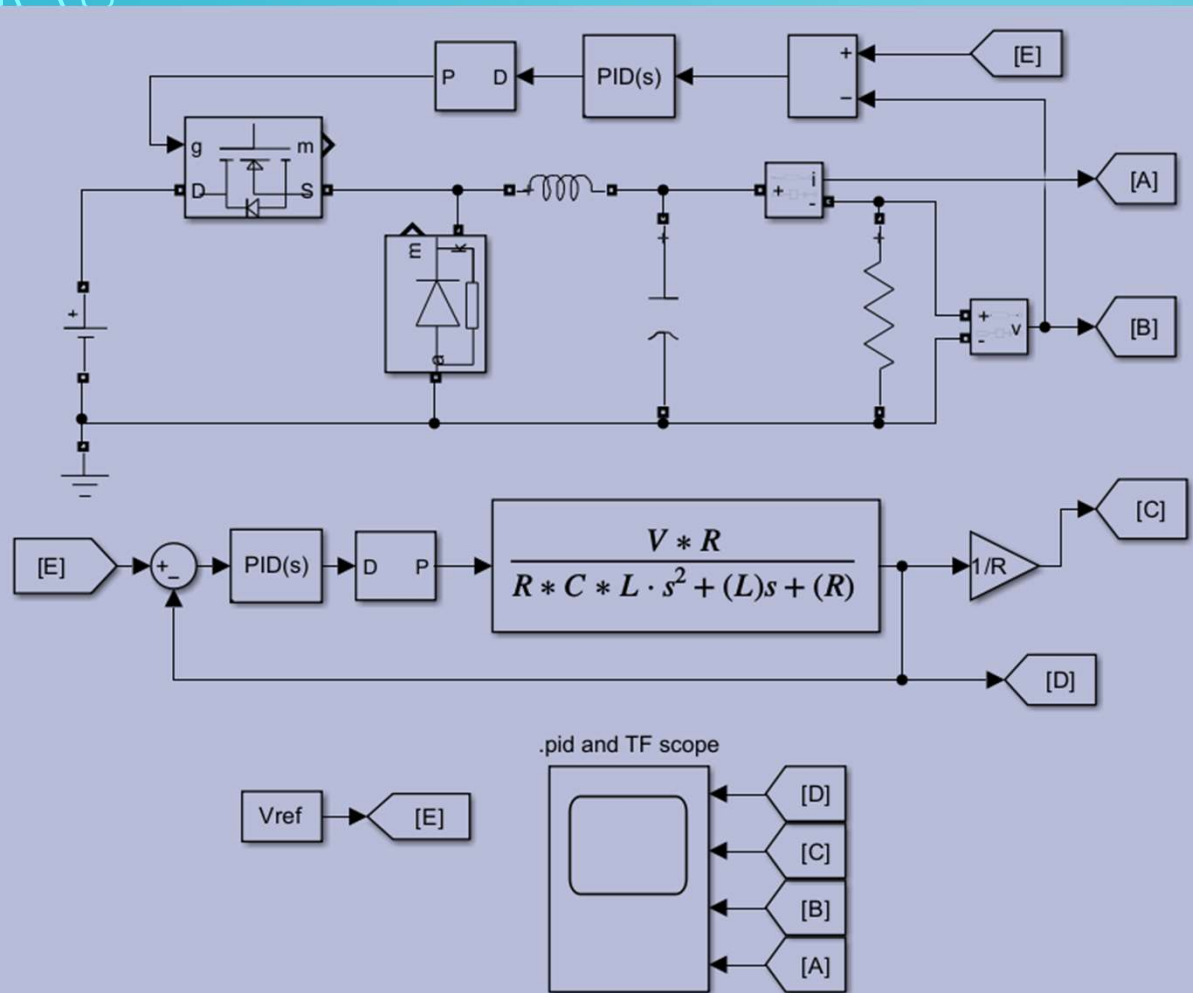
$$V_C = 5V \quad I_C = 2A \quad L = 120\mu H \quad C = 12.5\mu F \quad R = 2.5\Omega \quad \lambda = 0.4167$$

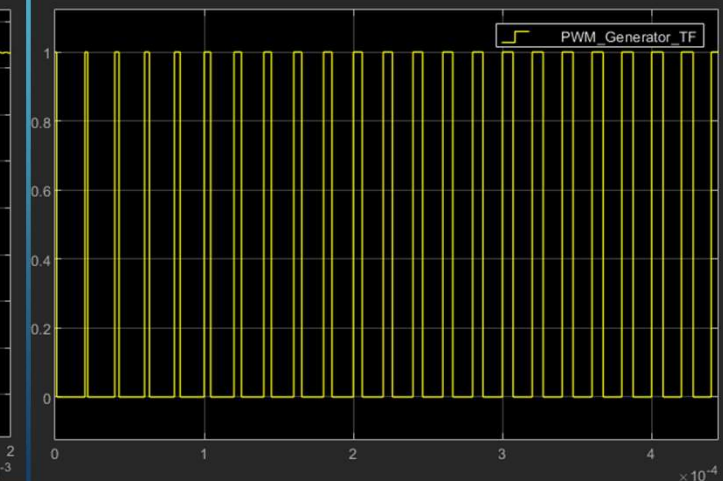
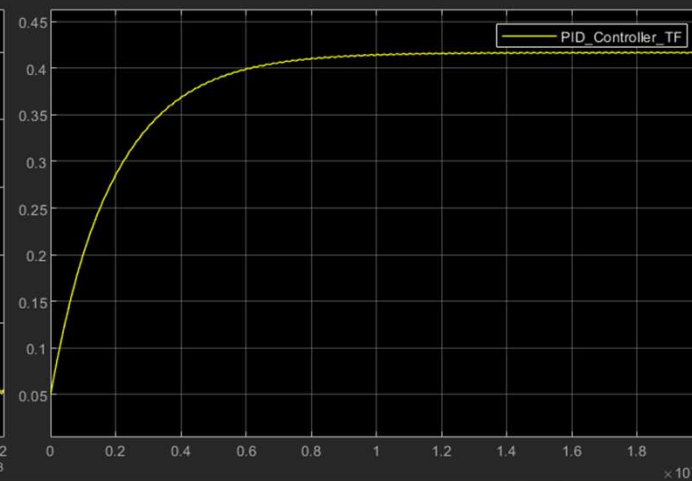
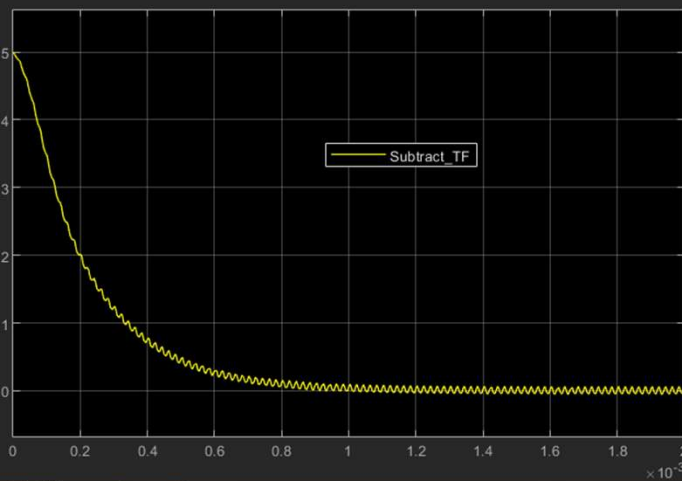
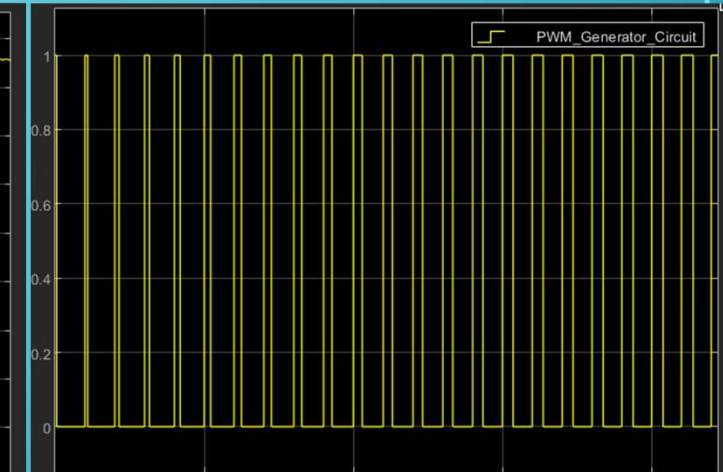
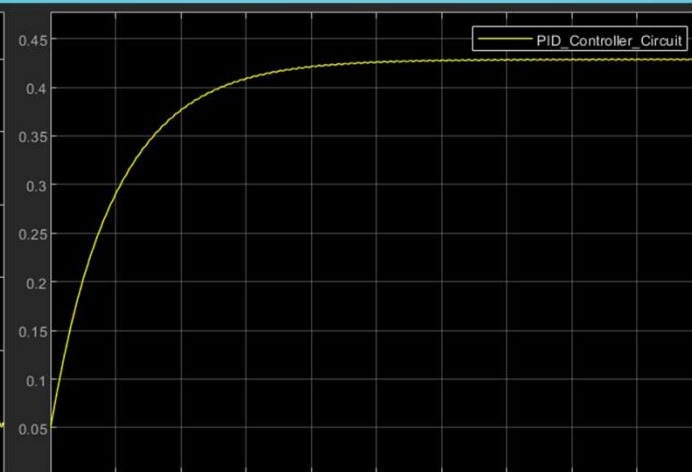
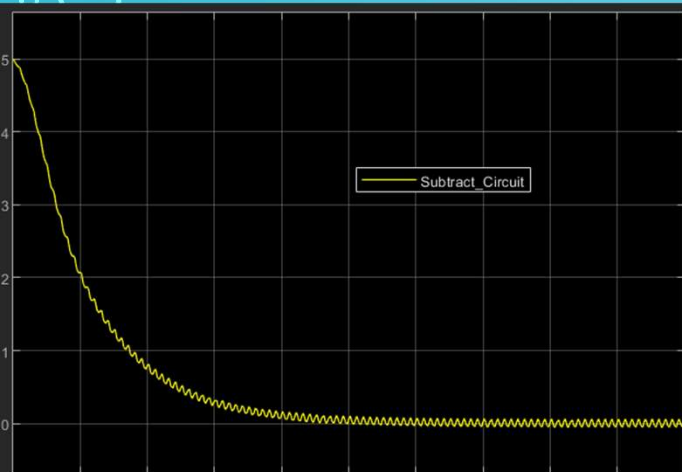


• TRANSFER FONKSIYONU

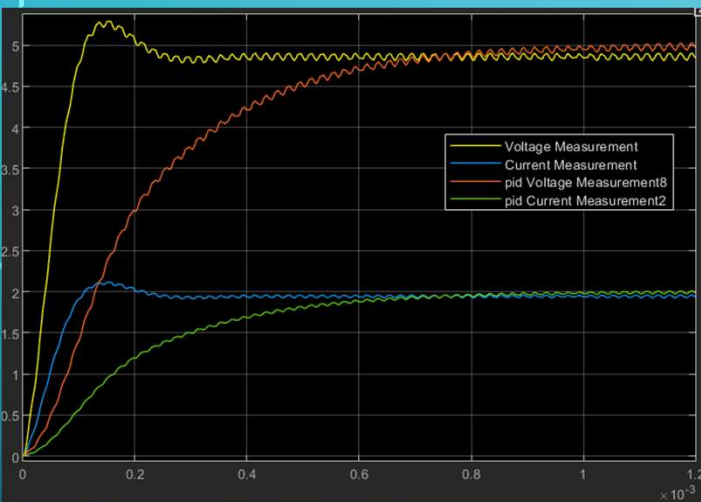


• GERİ BESLEMELİ KONTROL (PID)

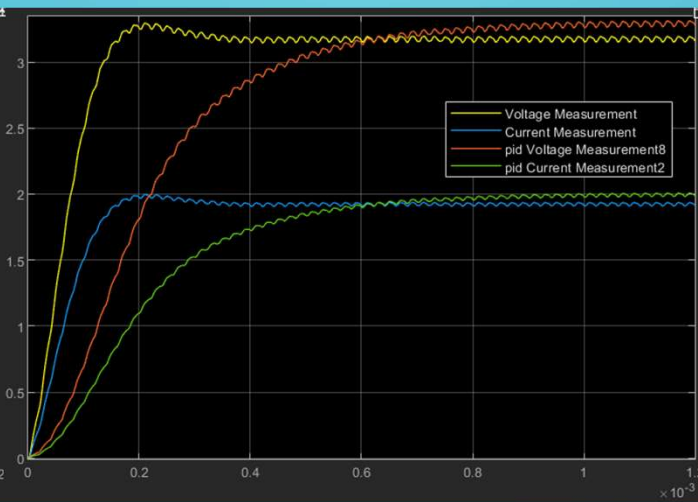




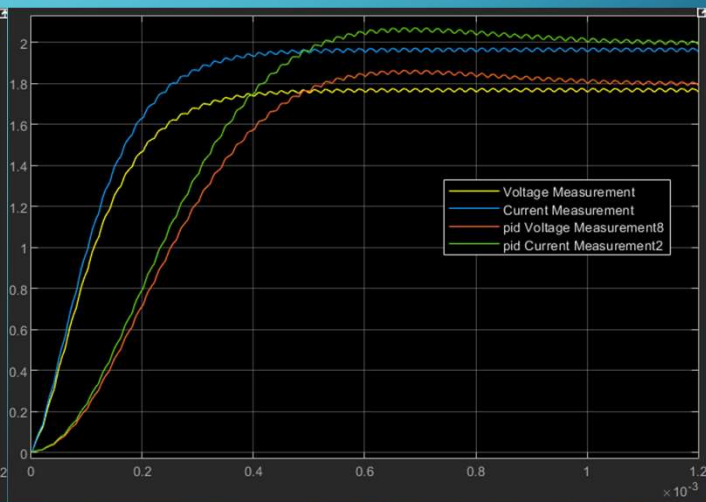
$$k_p = 0.01, k_i = 380, k_d = 0$$



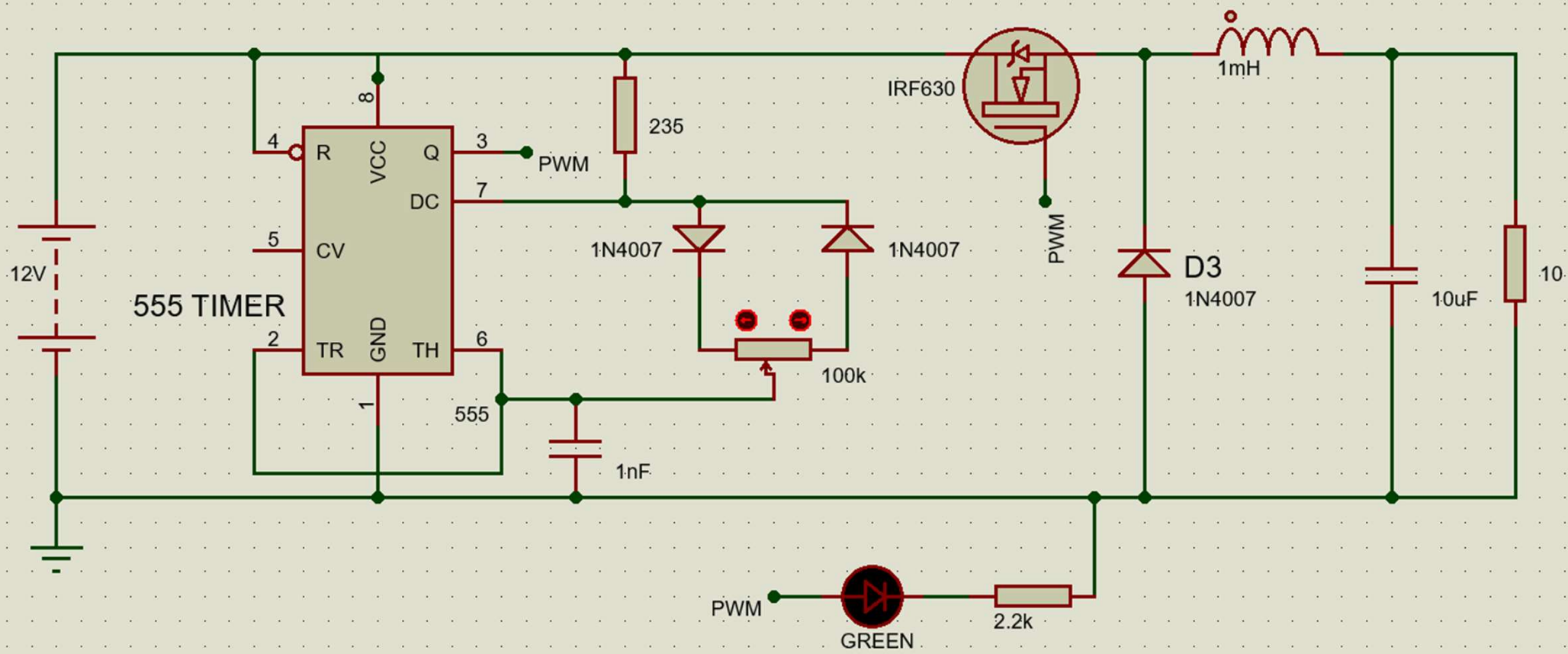
- $V_C = 5V$
- $I_C = 2A$



- $V_C = 3.3V$
- $I_C = 2A$



- $V_C = 1.8V$
- $I_C = 2A$



- KAYNAKÇA

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DİNLEDİĞİNİZ İÇİN TEŞEKKÜRLER

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