



UŞAK ÜNİVERSİTESİ

**ELEKTRİK-ELEKTRONİK MÜHENDİSLİĞİ
2022-2023 BAHAR DÖNEMİ**

**MİKROELEKTRONİK DEVRELER DERSİ
DENEY RAPORU**

Deney No: 1,2,3,4,5,6,7

Deney Tarihi :07/04/2023

Deney Teslim Tarihi: 22/06/2023

Adı Soyadı: Şerif Batıkan Çobanoğlu

Öğrenci No:190517012

DENEY 1: Ortak Emiterli BJT Yükselteç

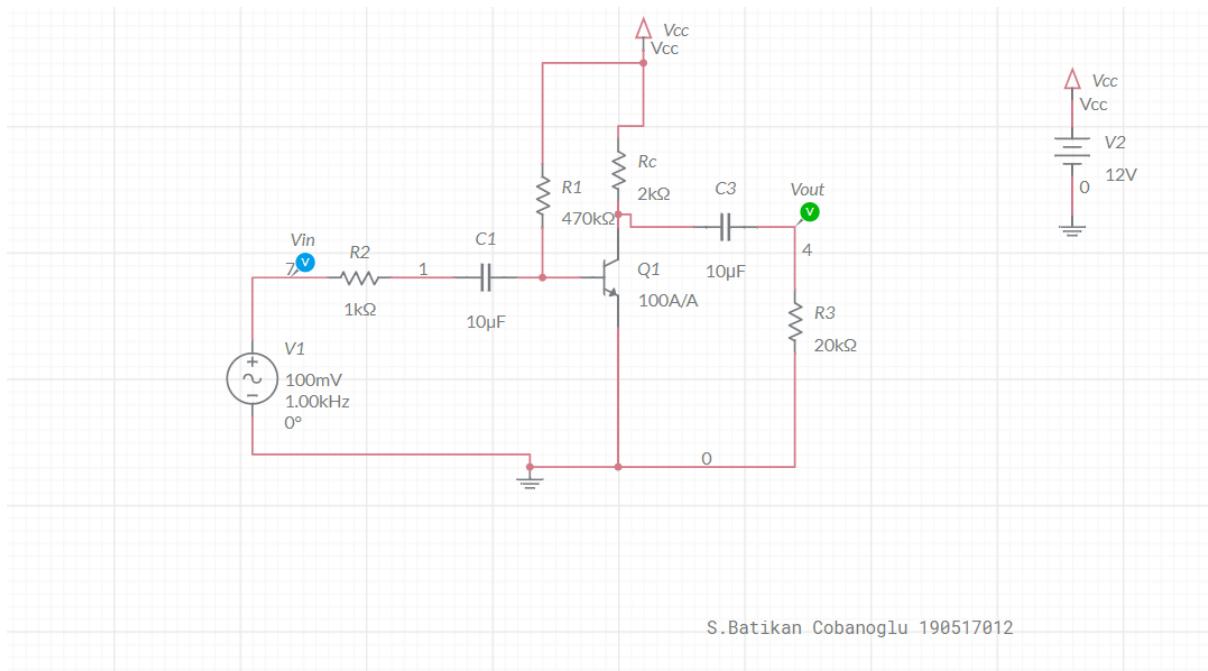


Figure 1 Ortak Emiterli Yükselteç

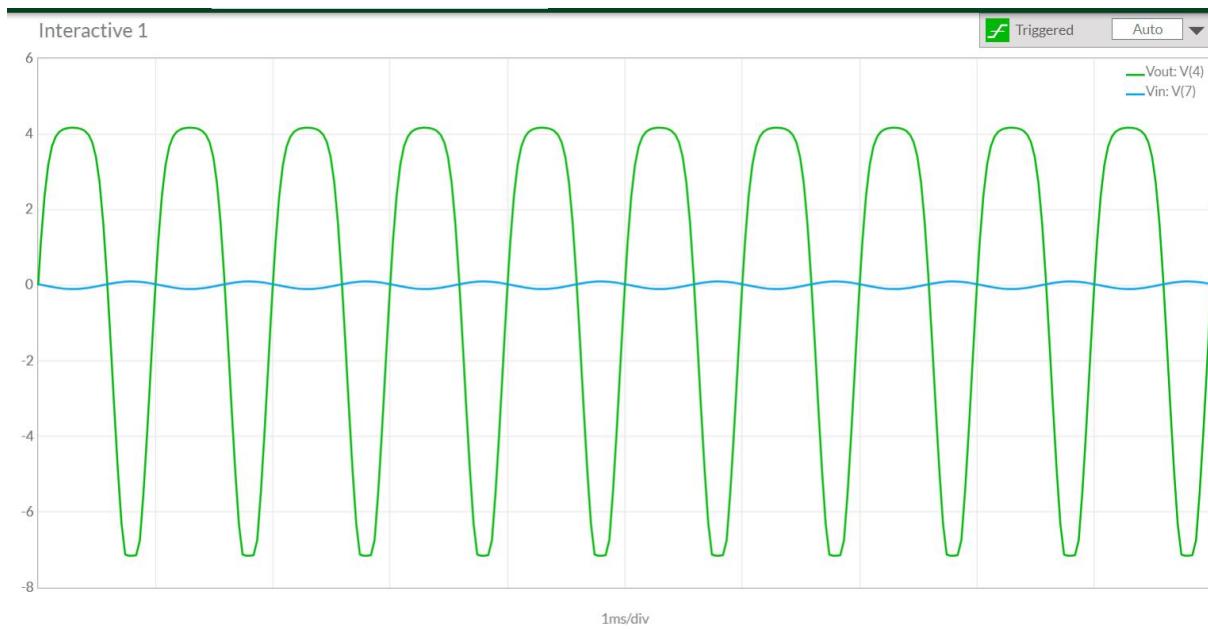


Figure 2 Interactive

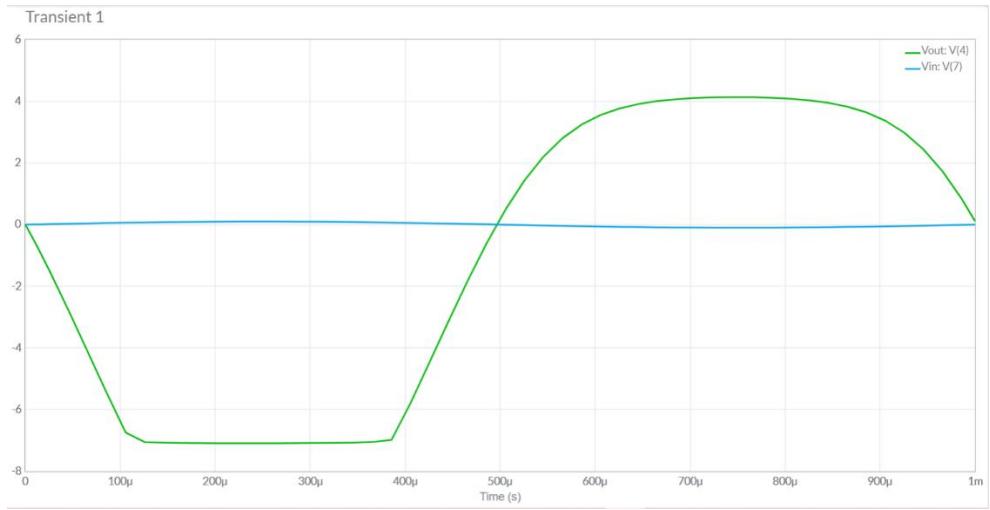


Figure 3 Transient

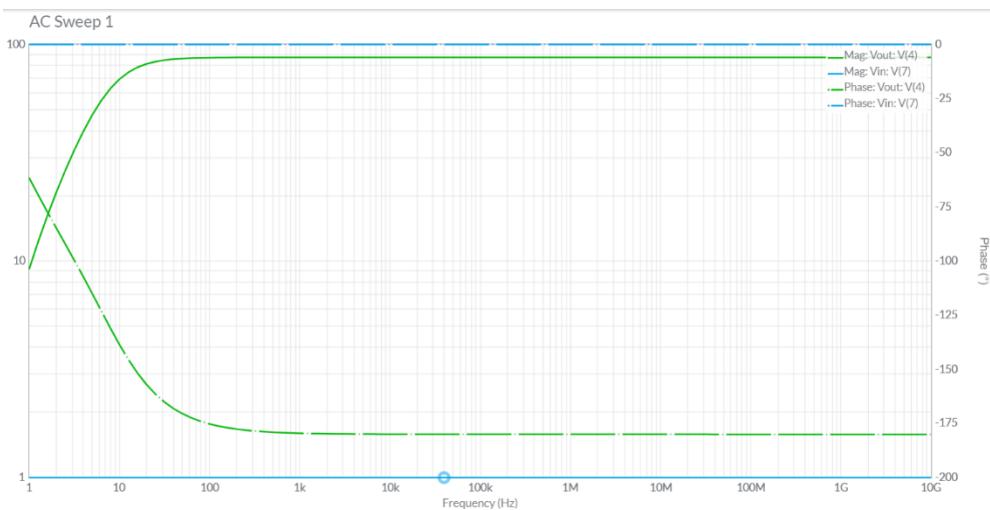
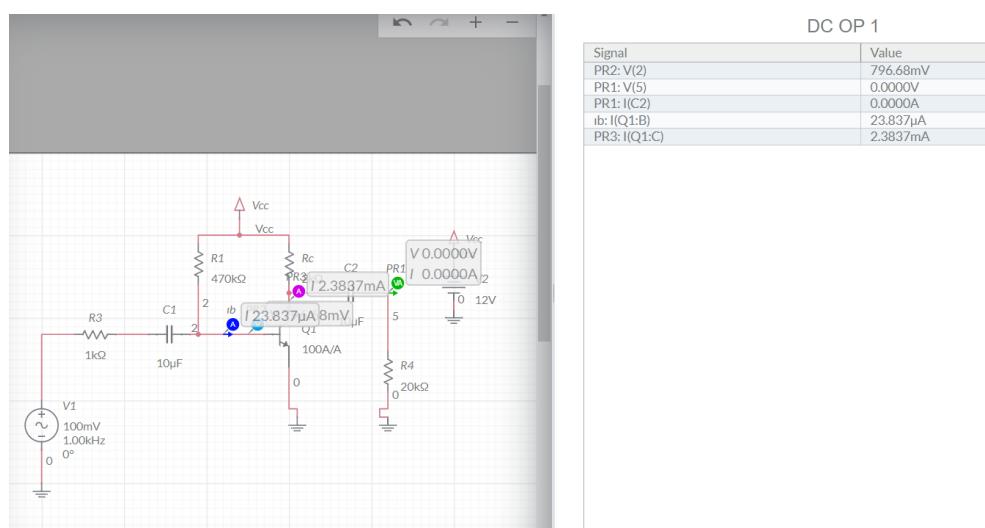
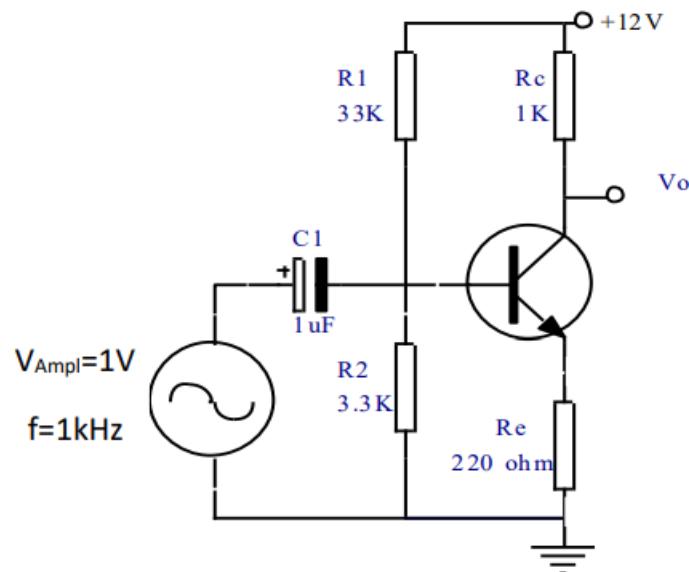


Figure 4 AC Sweep



DENEY 2: Ortak Emitterli BJT Kuvvetlendirici



Şekil 19 Ortak Emitterli BJT Kuvvetlendirici Deneyi

Multisim Deney Devresi ve Çıktıları:

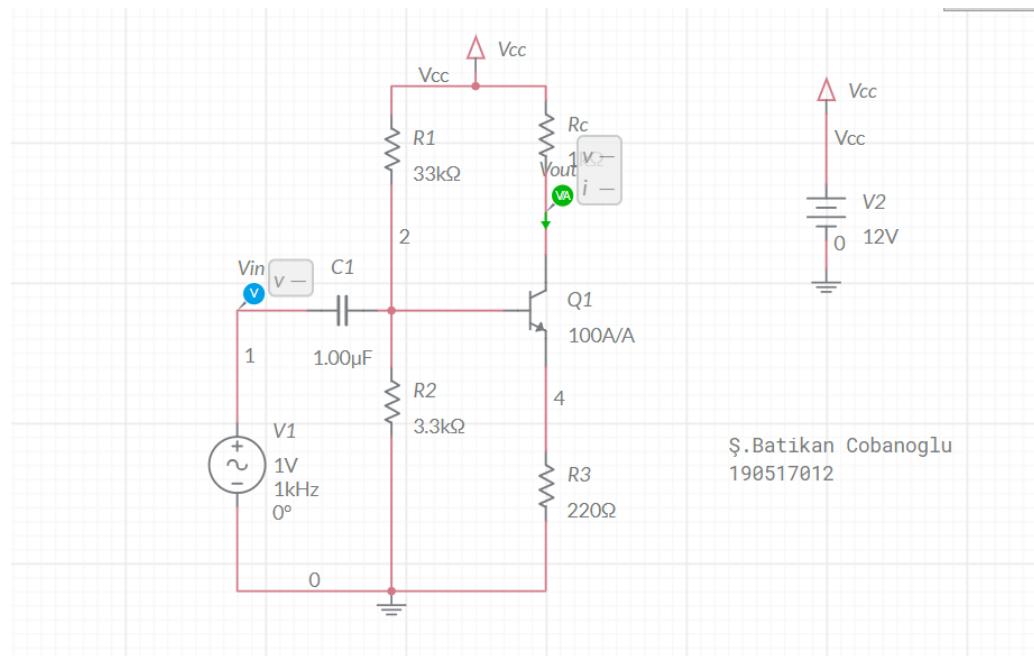


Figure 5 Deney Devresi

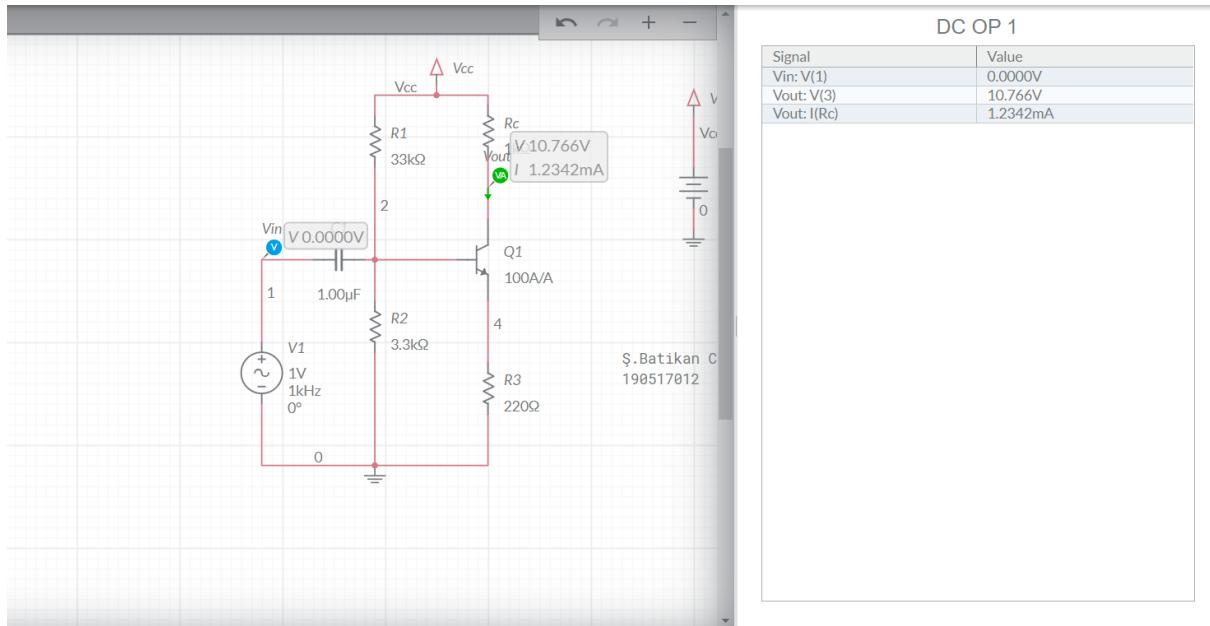


Figure 6 DC OP

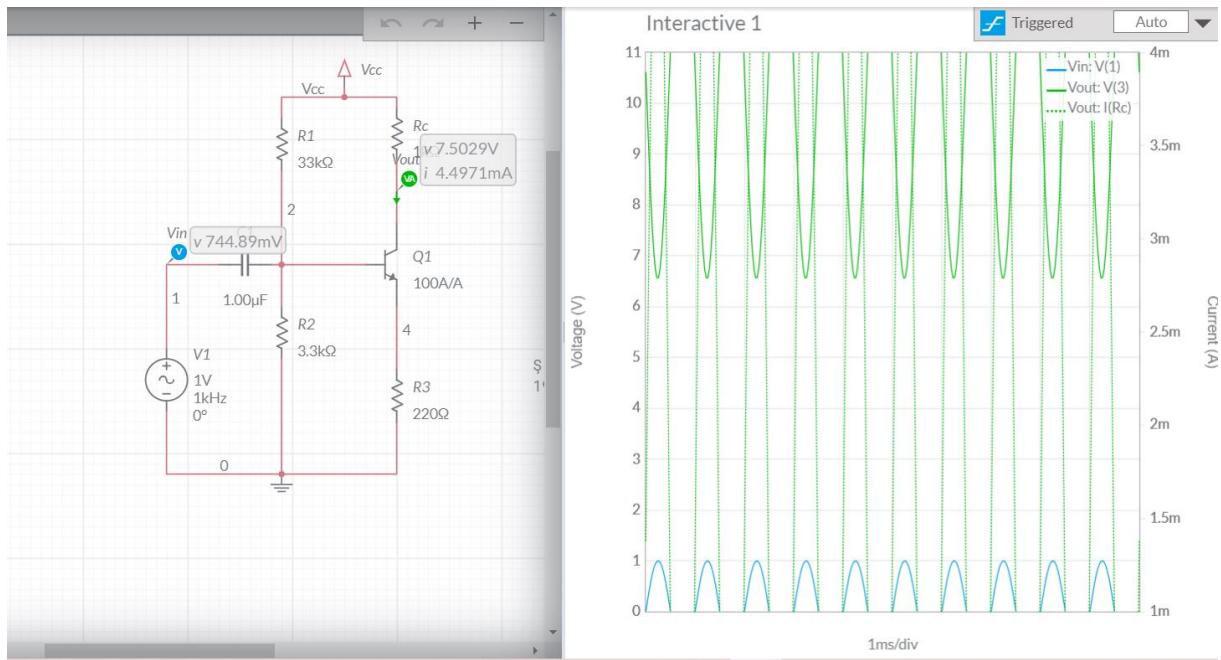


Figure 7 Interactive

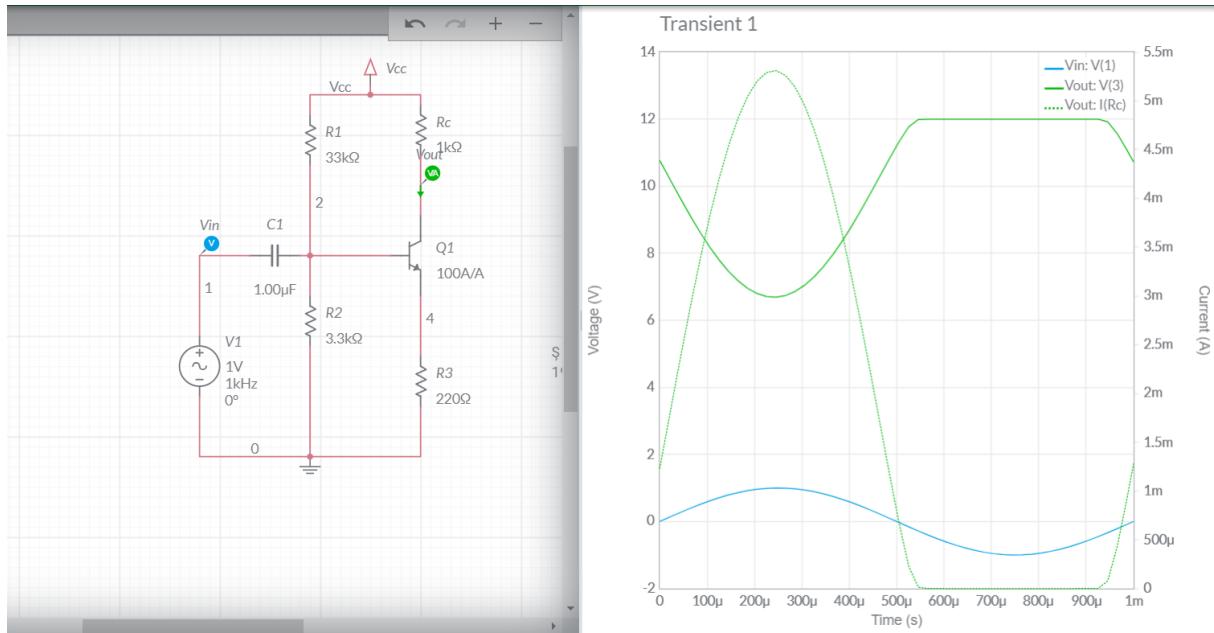


Figure 8 Transient

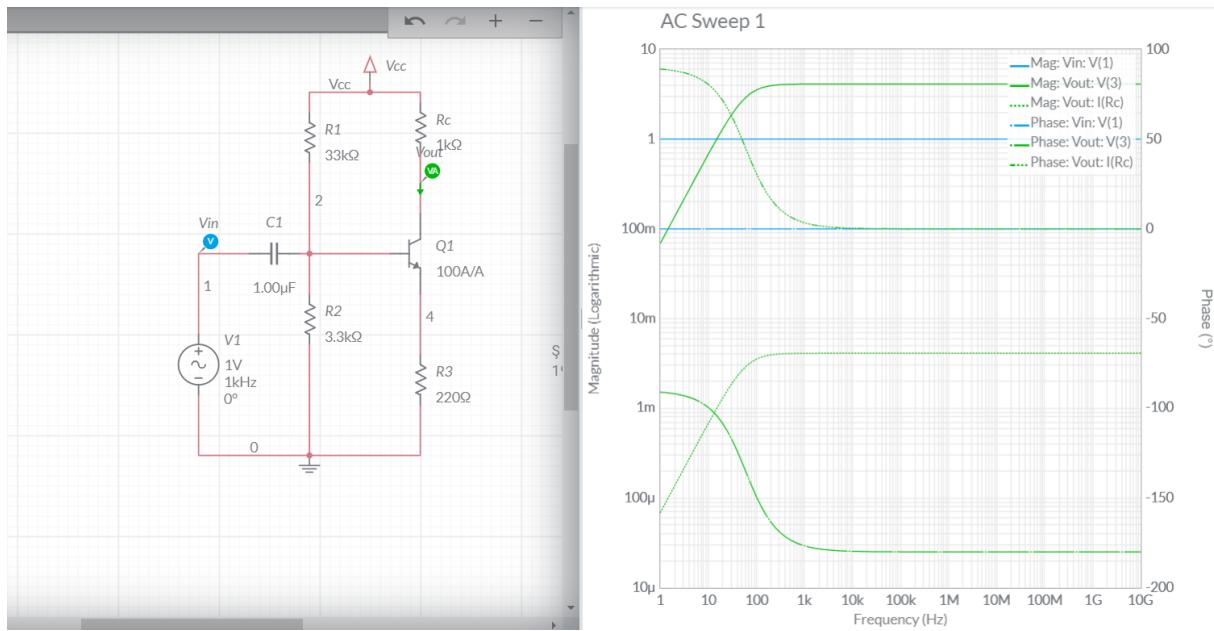
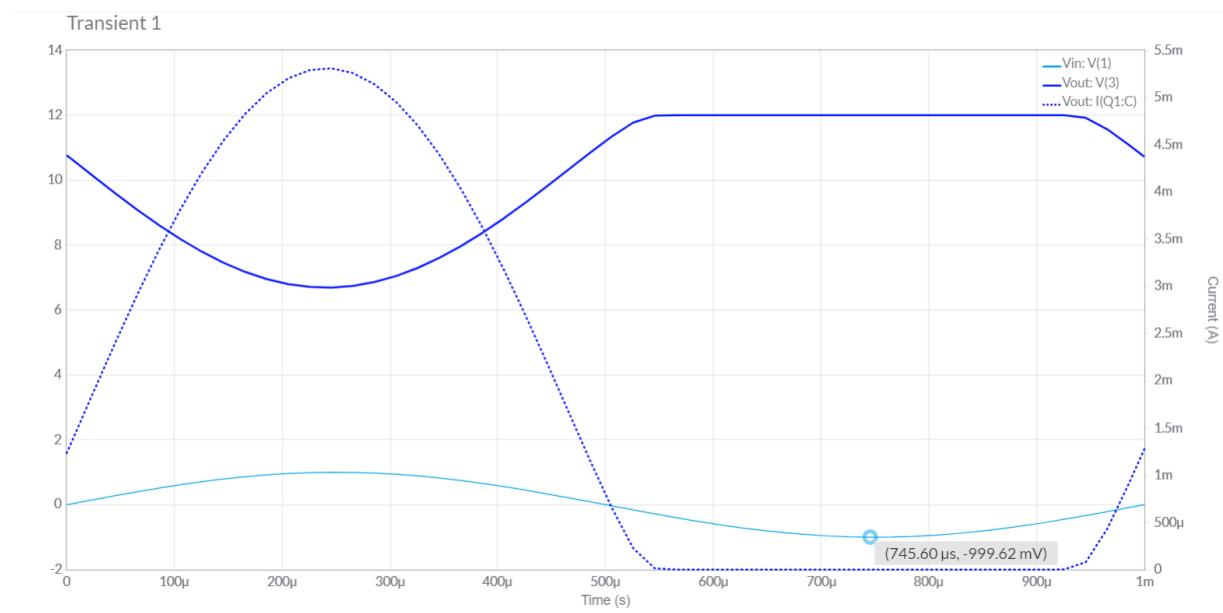
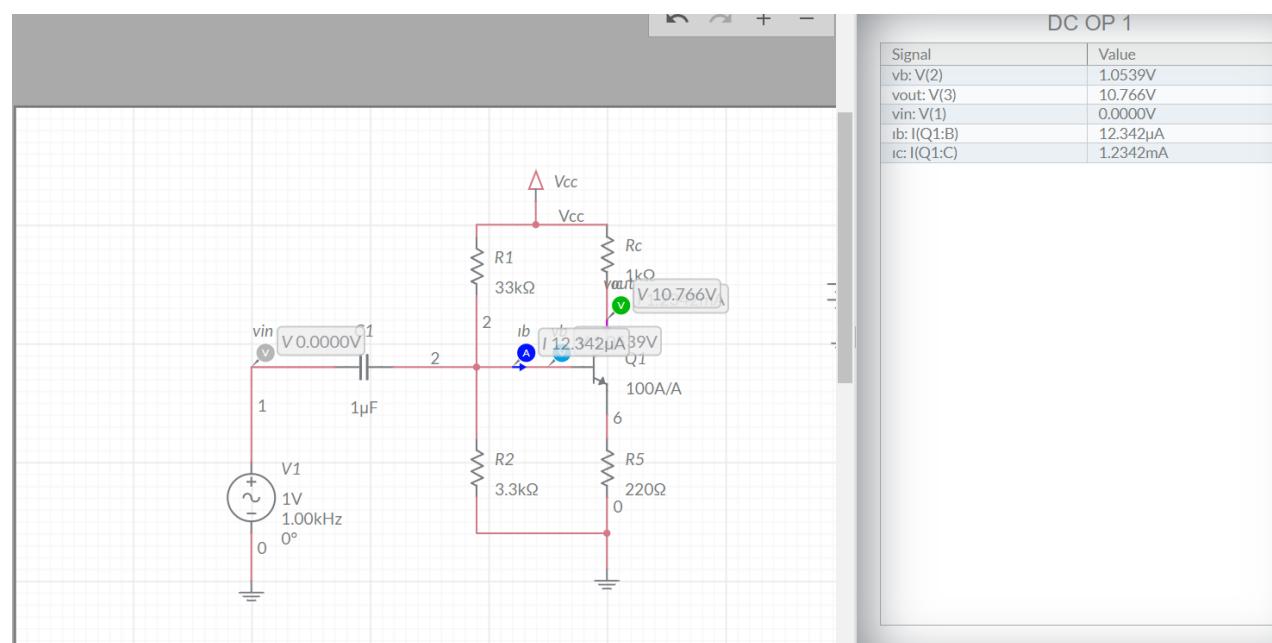


Figure 9 AC Sweep

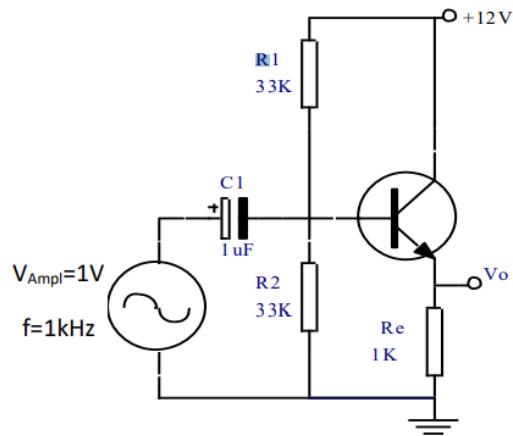
AV GERİLİM KAZANCI:



$$V_0 = 12V \quad V_i = -999.62mV \quad AV = V_0/V_i = -12.004$$



DENEY 3: Ortak Kollektörlü BJT Kuvvetlendirici



Şekil 20 Ortak Kollektörlü BJT Kuvvetlendirici Deneyi

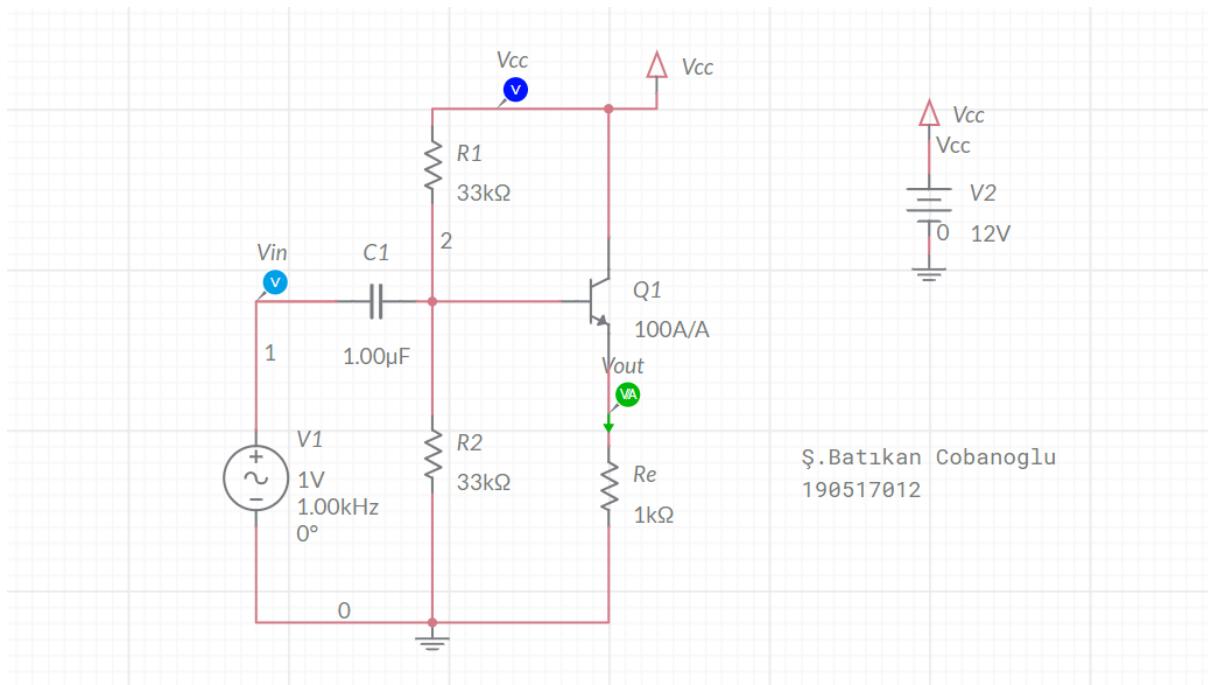


Figure 10 Deney Devresi

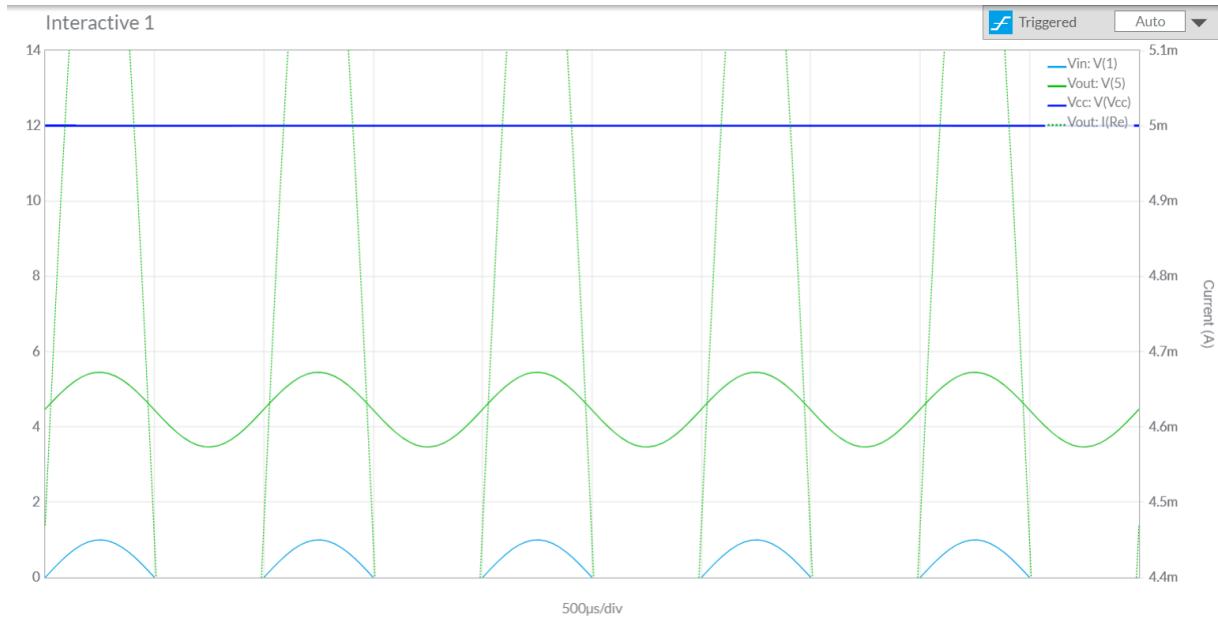


Figure 11 Interactive

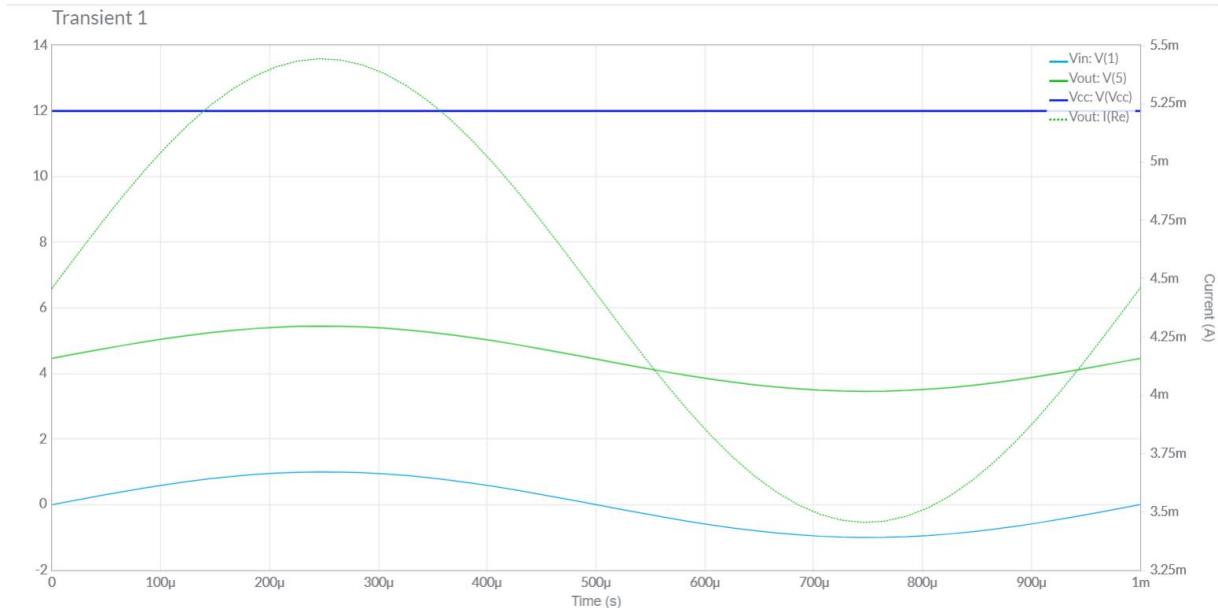


Figure 12 Transient

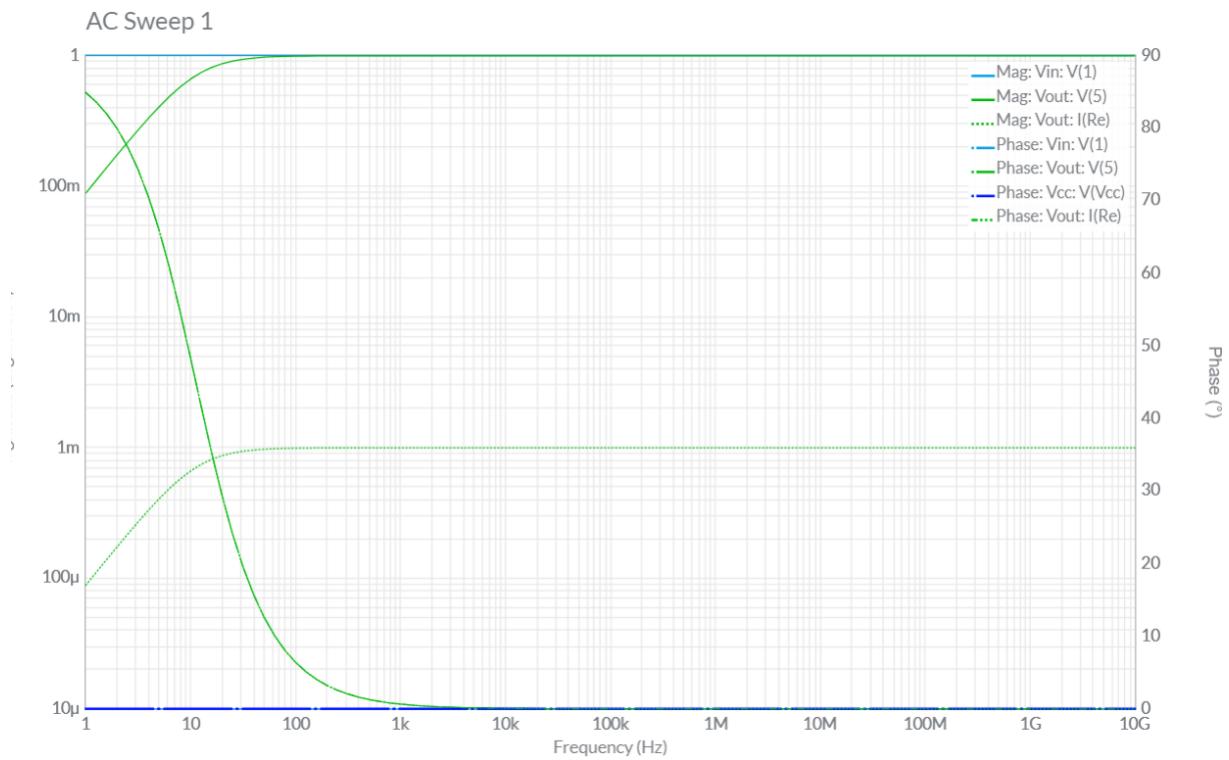


Figure 13 AC Sweep

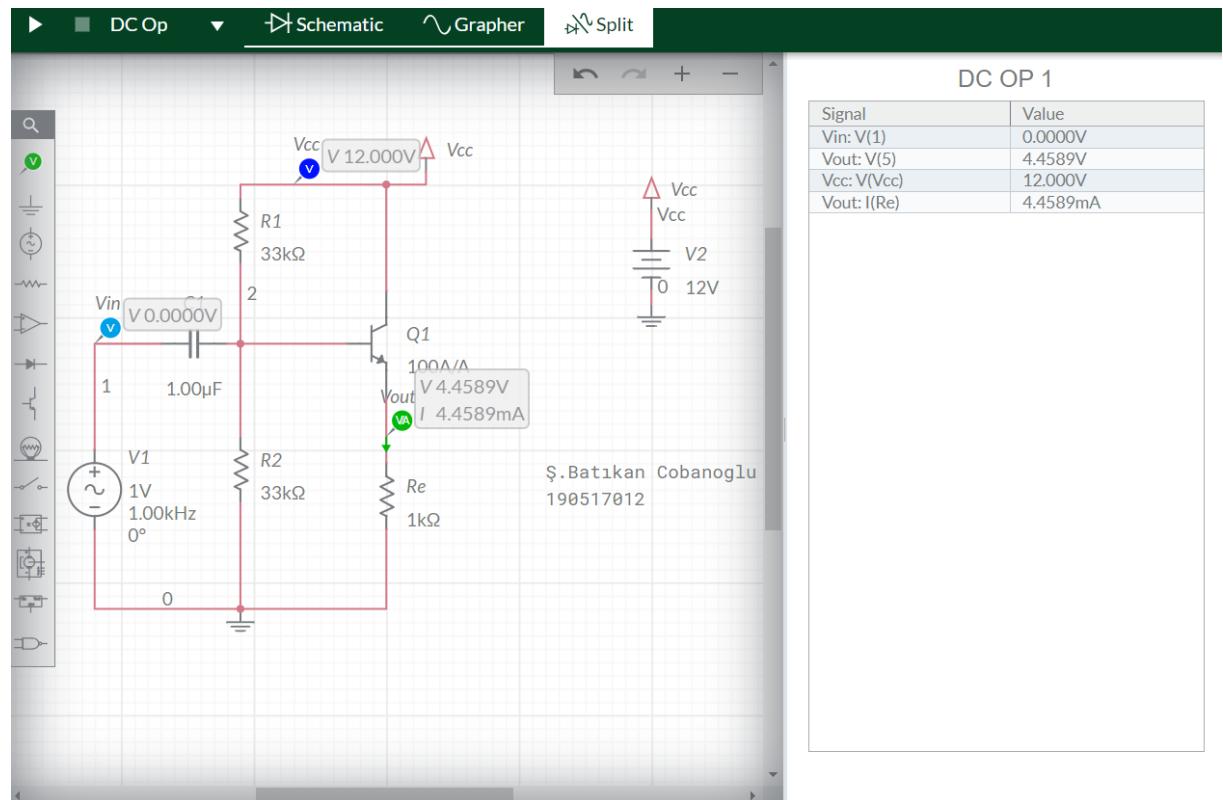
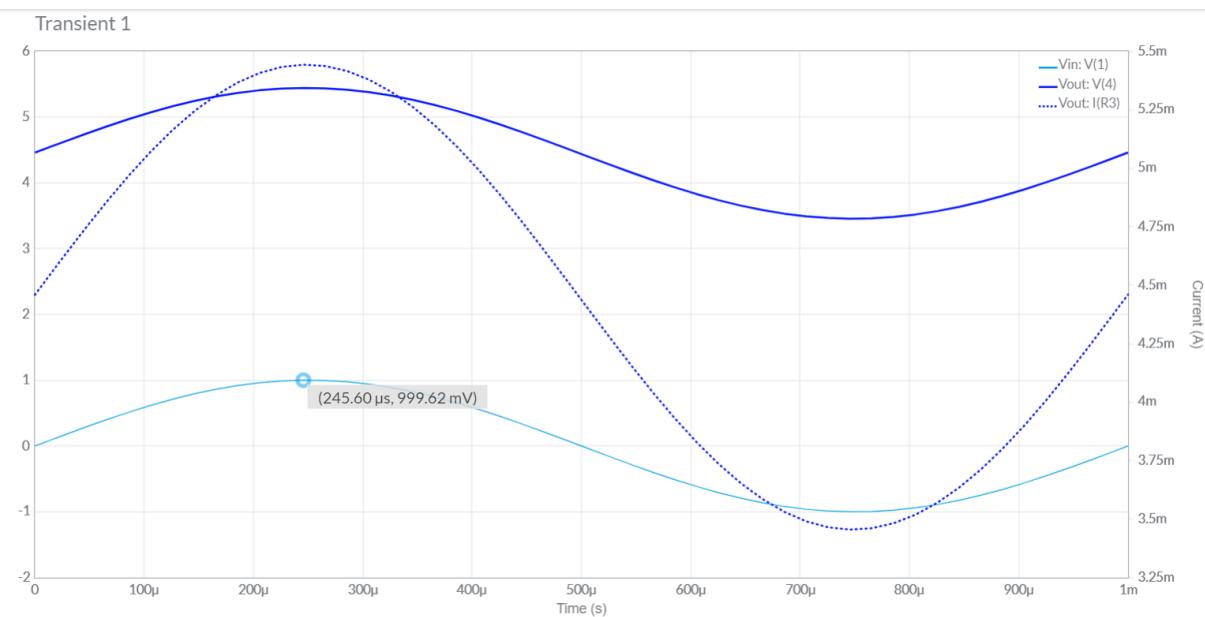


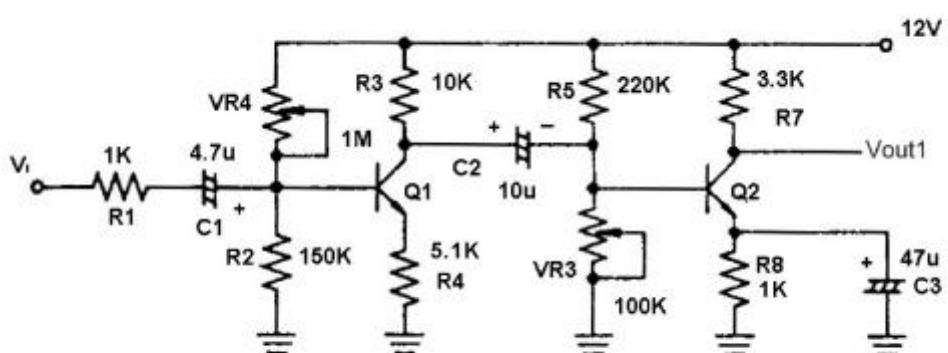
Figure 14 DC OP

AV GERİLİM KAZANCI:



$$V_0 = 5.44V \quad V_i = 999.62\text{mV} \quad AV = V_0/V_i = 5.44$$

DENEY 4-1 RC Kuplajlı Yükselteç



Şekil 7-1-1 İki katlı RC kuplajlı yükseltçeç

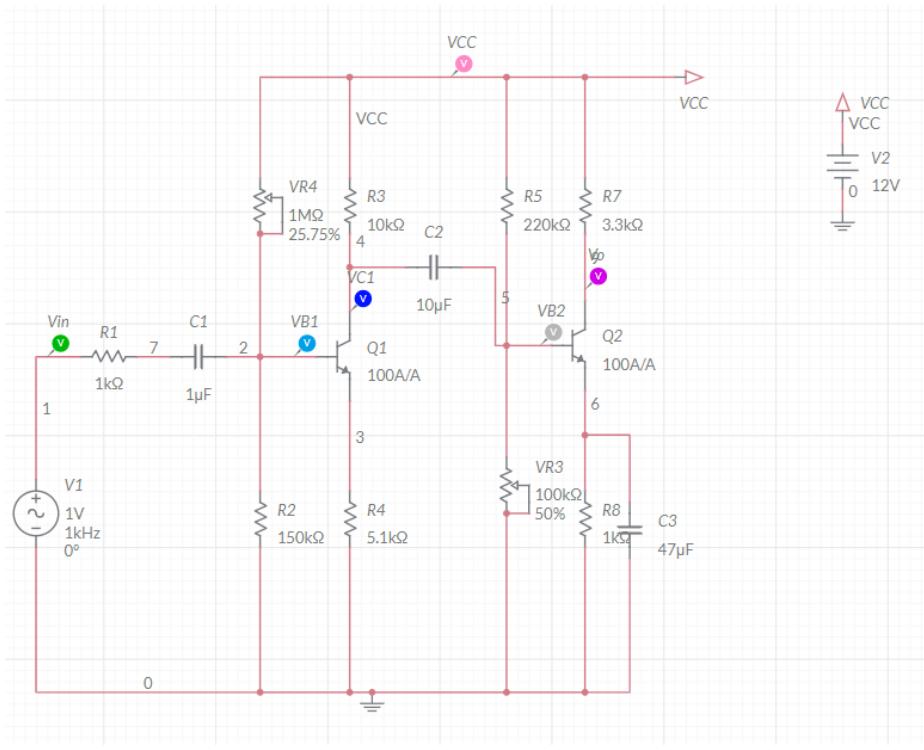


Figure 15 Deney Devresi

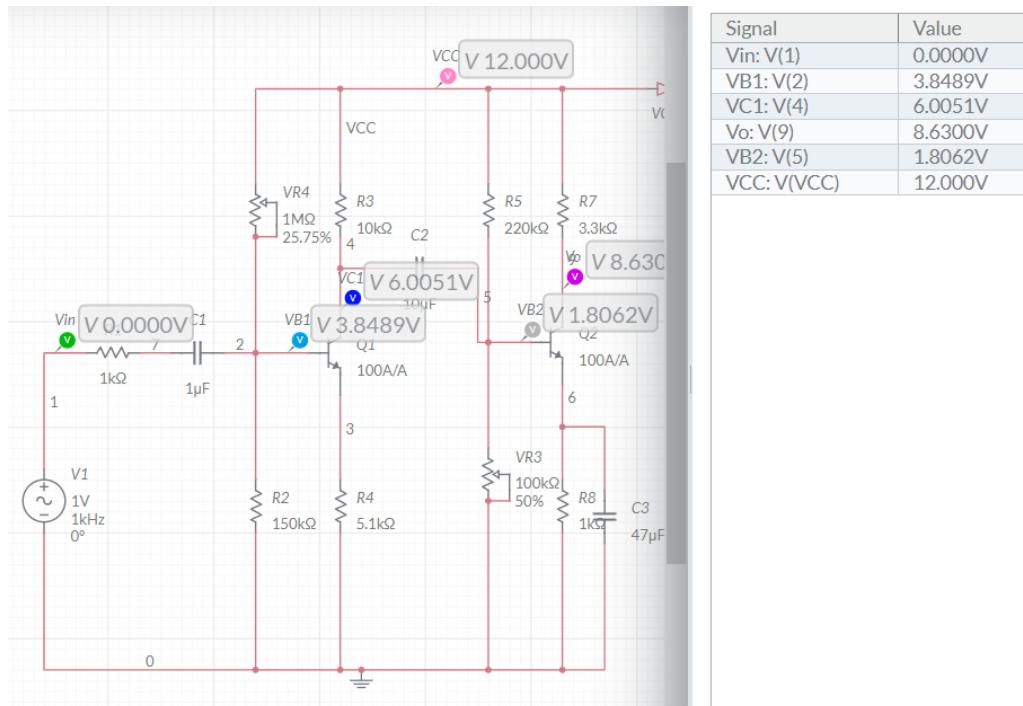


Figure 16 DC Op

Interactive 1



Figure 17 Interactive

Transient 1

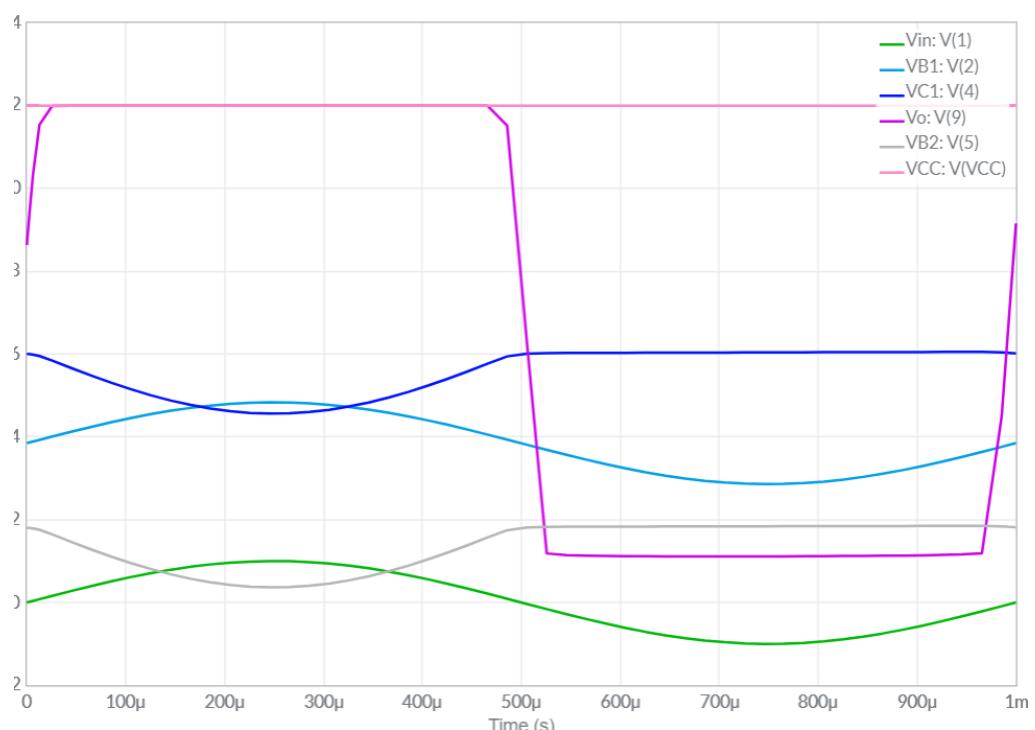


Figure 18 Transient

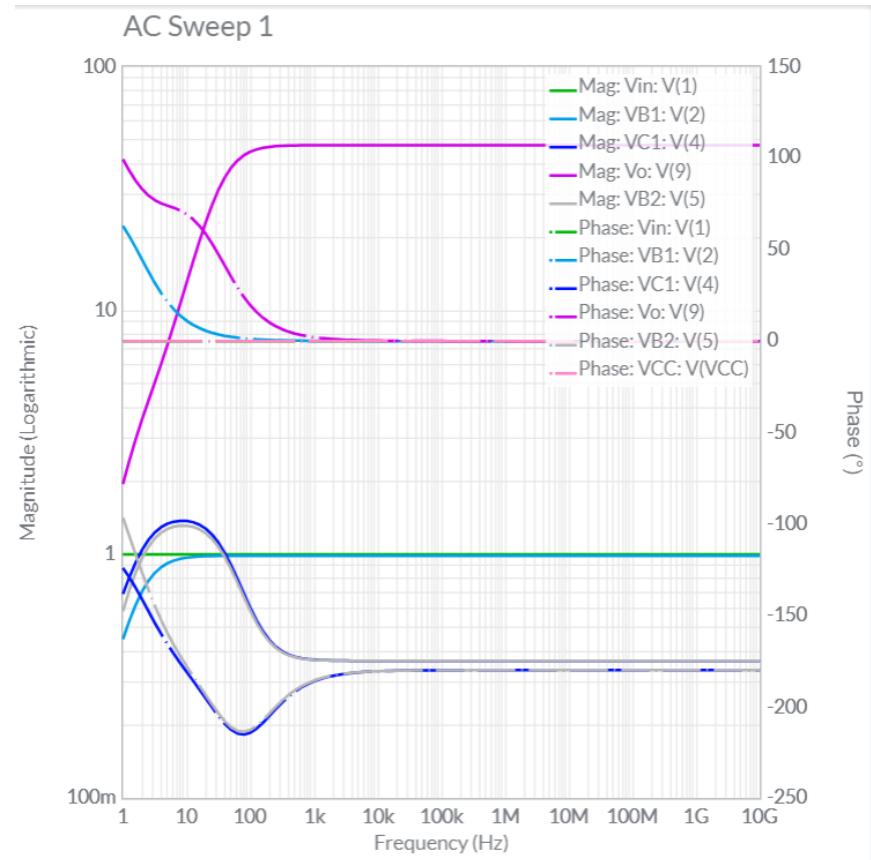


Figure 19 AC Sweep

C3 Kapasitörünün Dahil Edilmediği Durum:

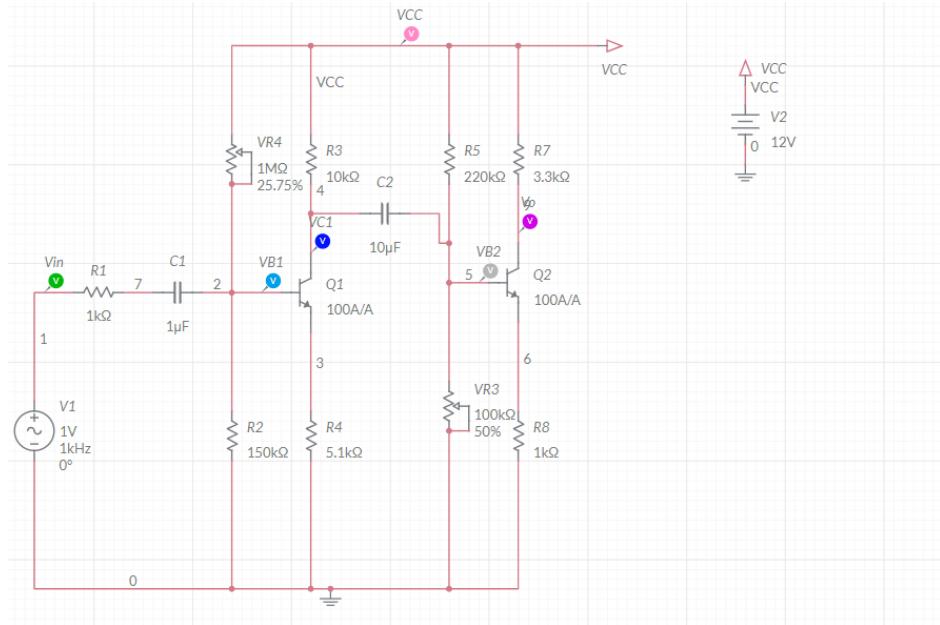


Figure 20 Deney Devresi C3 Yok

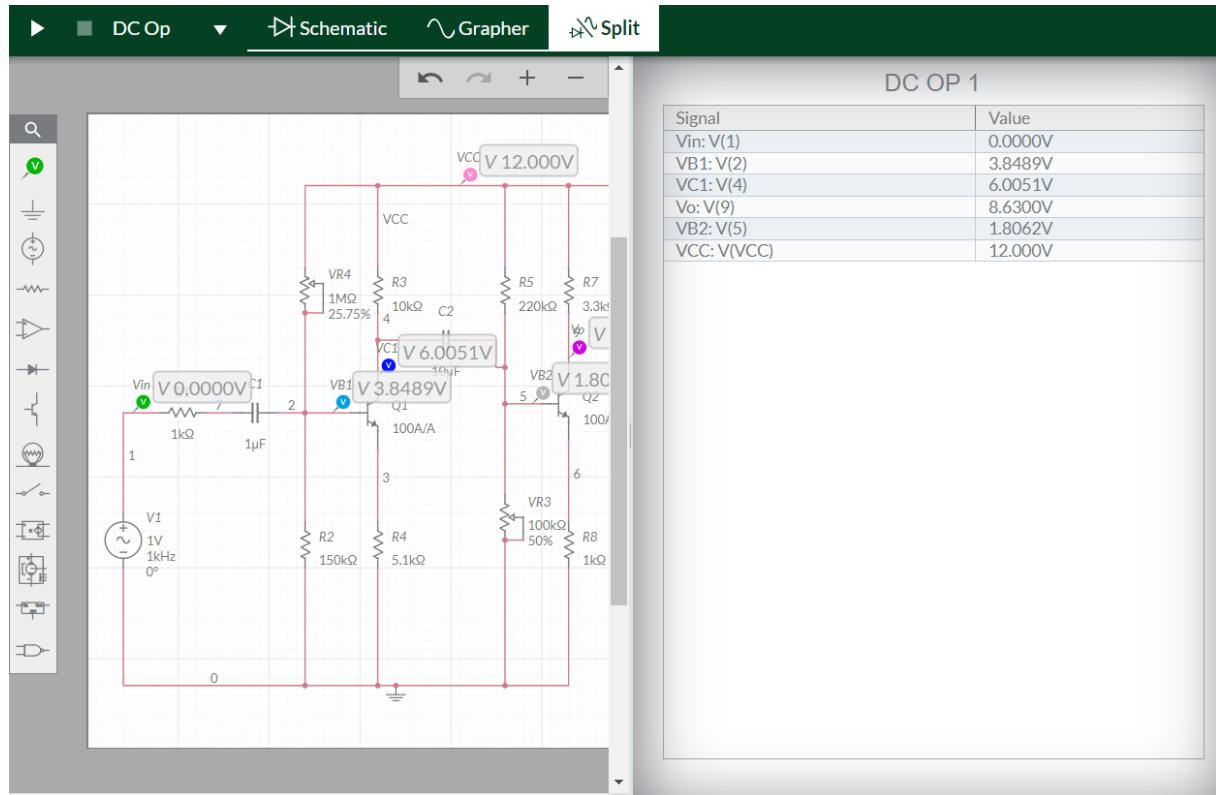


Figure 21 DC Op C3 yok

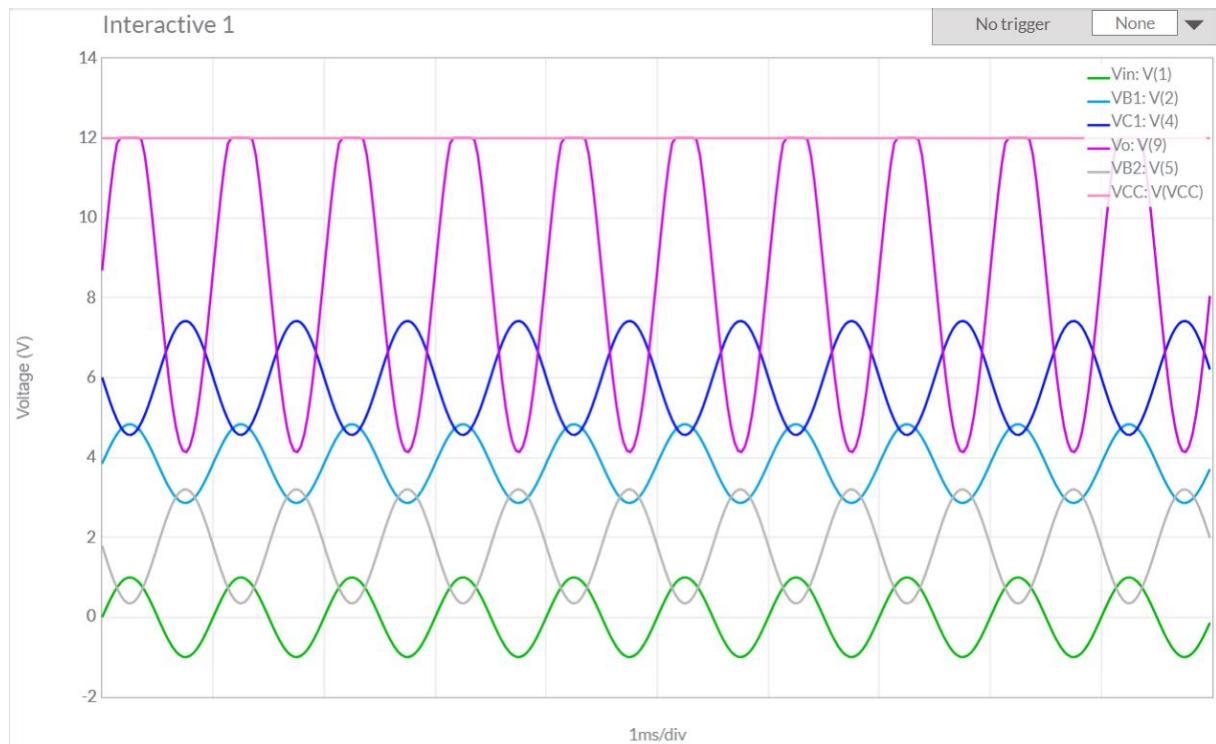


Figure 22 Interactive C3 yok

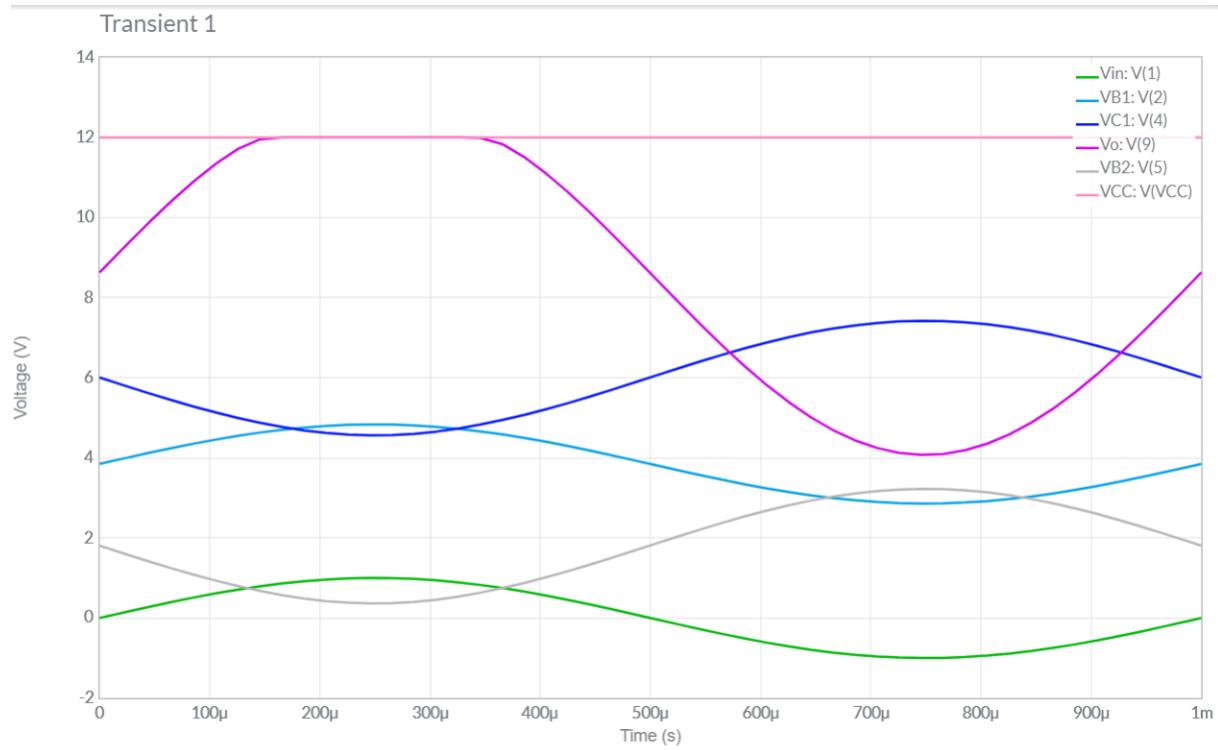


Figure 23 Transient C3 yok

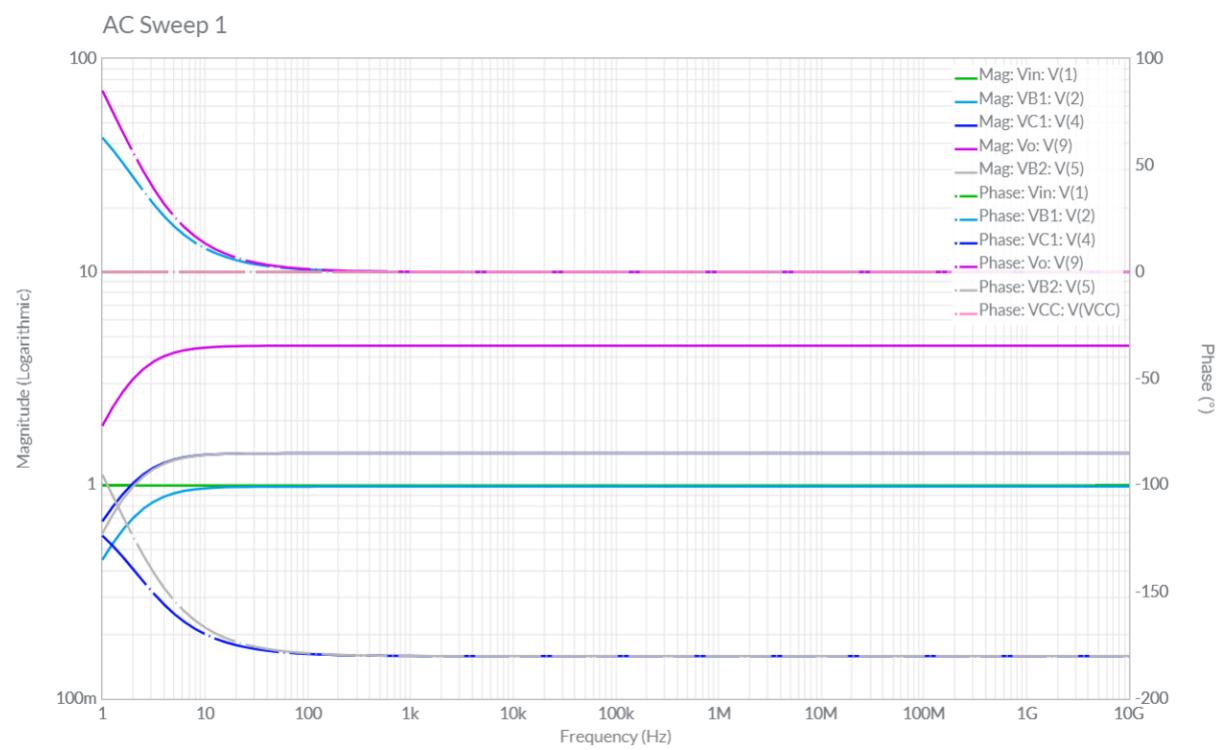


Figure 24 AC Sweep C3 yok

POTANSİYOMETRE DEĞİŞTİRİLDİĞİ DURUMLAR:

Interactive Değerleri:

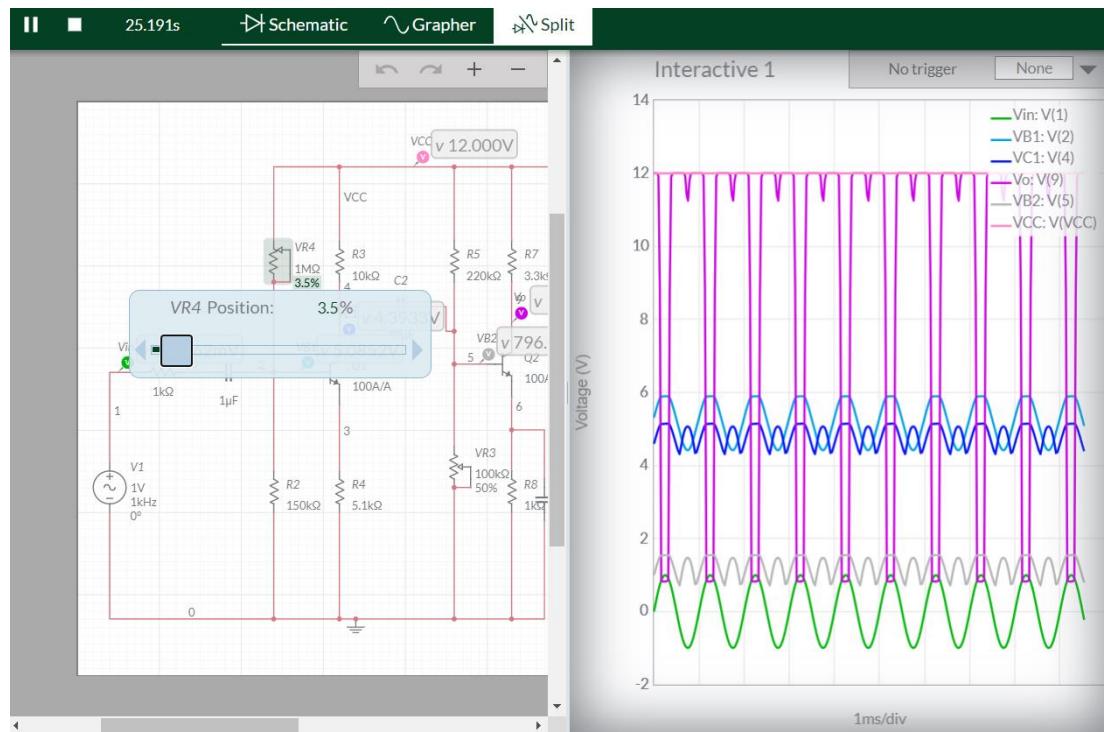


Figure 25 VR4 3.5

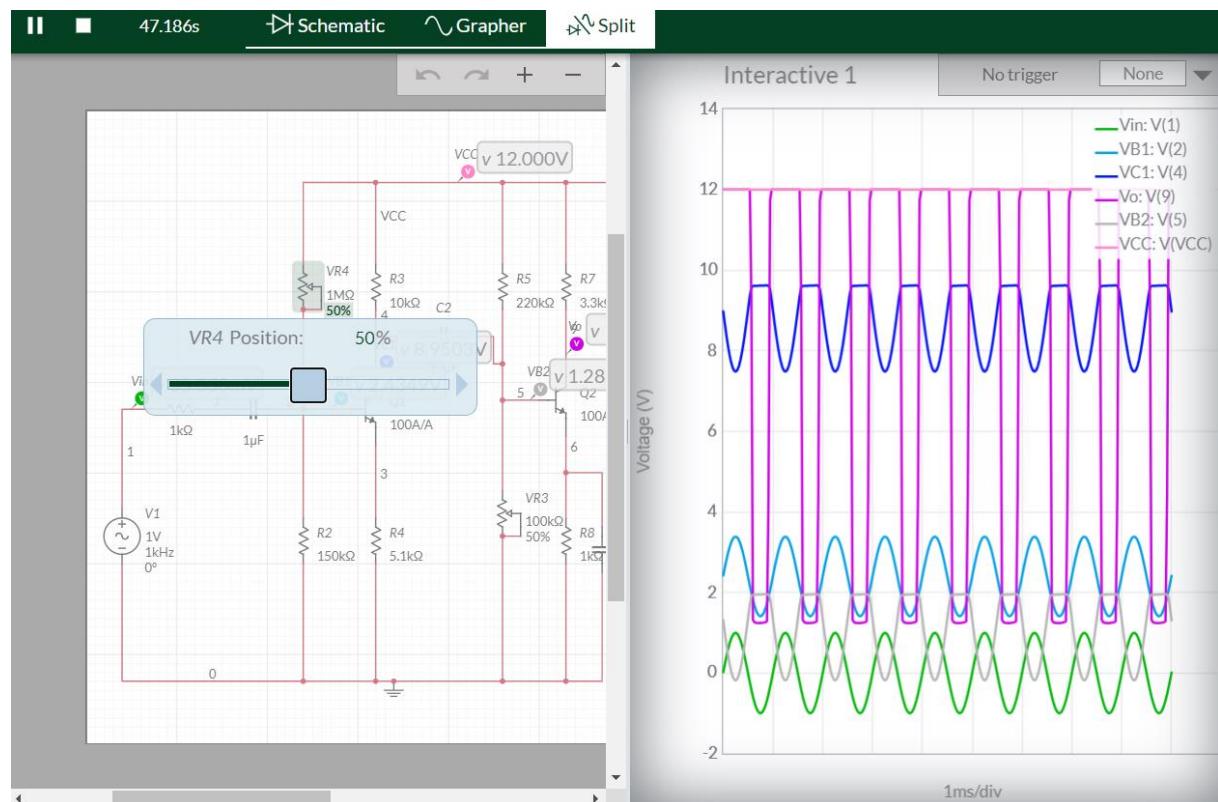


Figure 26 vr4 50

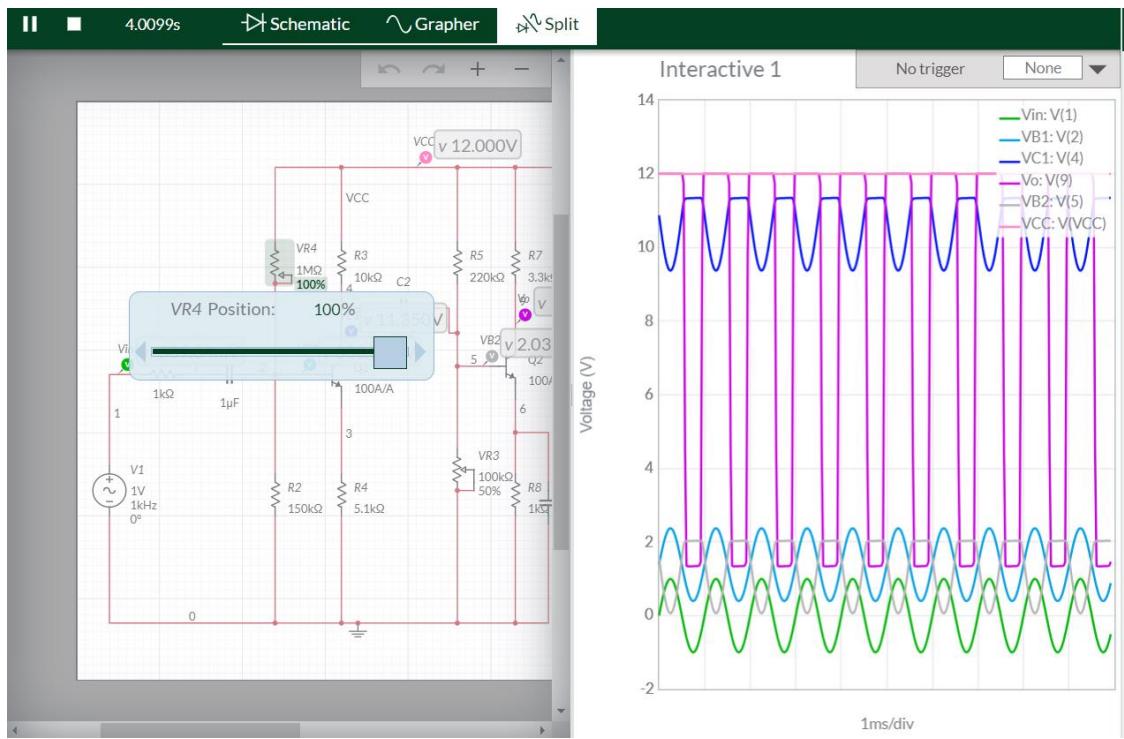


Figure 27 VR4 100

TRANSIENT DEĞERLERİ:

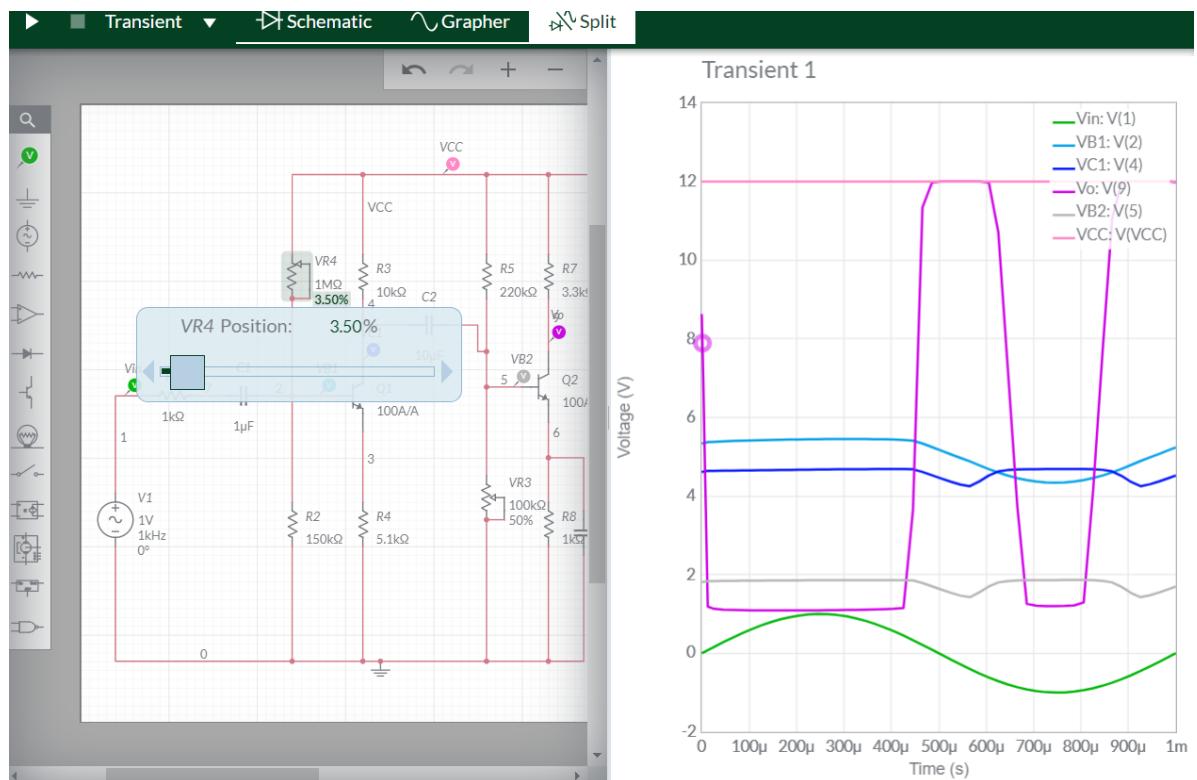


Figure 28 VR4 3.5

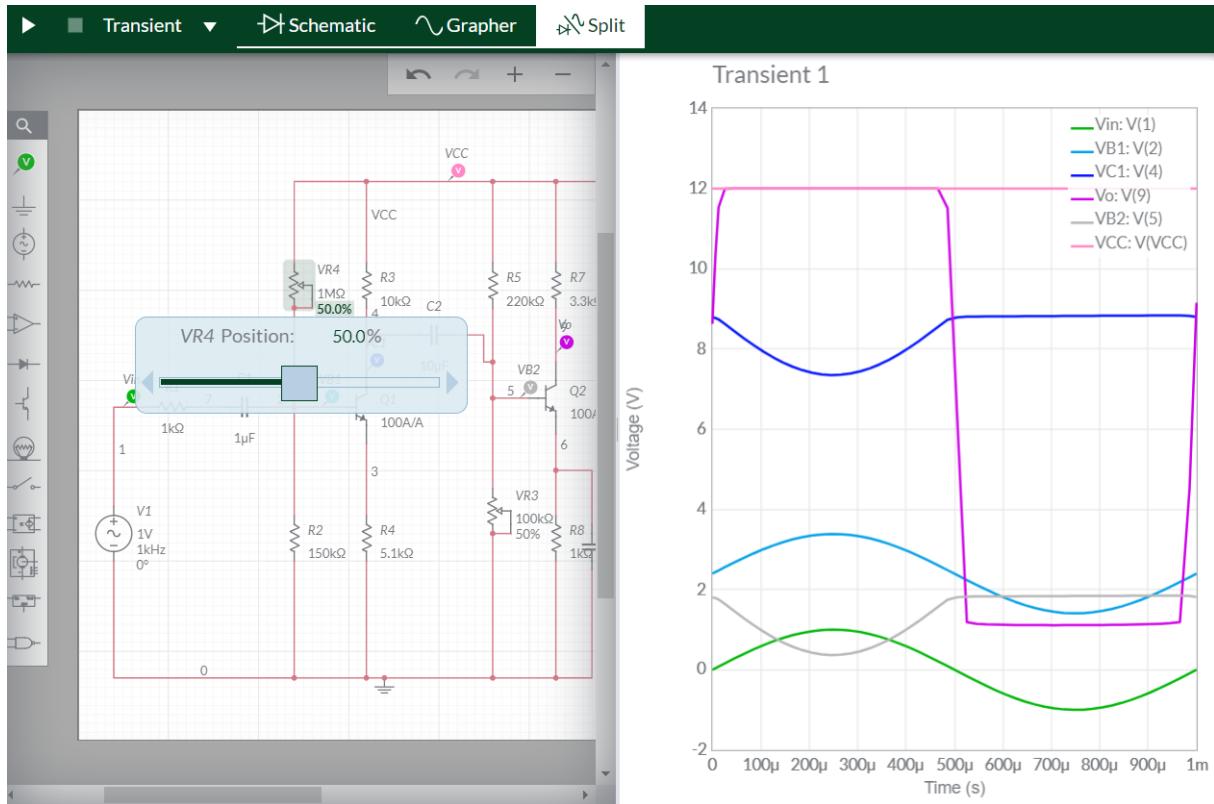


Figure 29 VR4 50

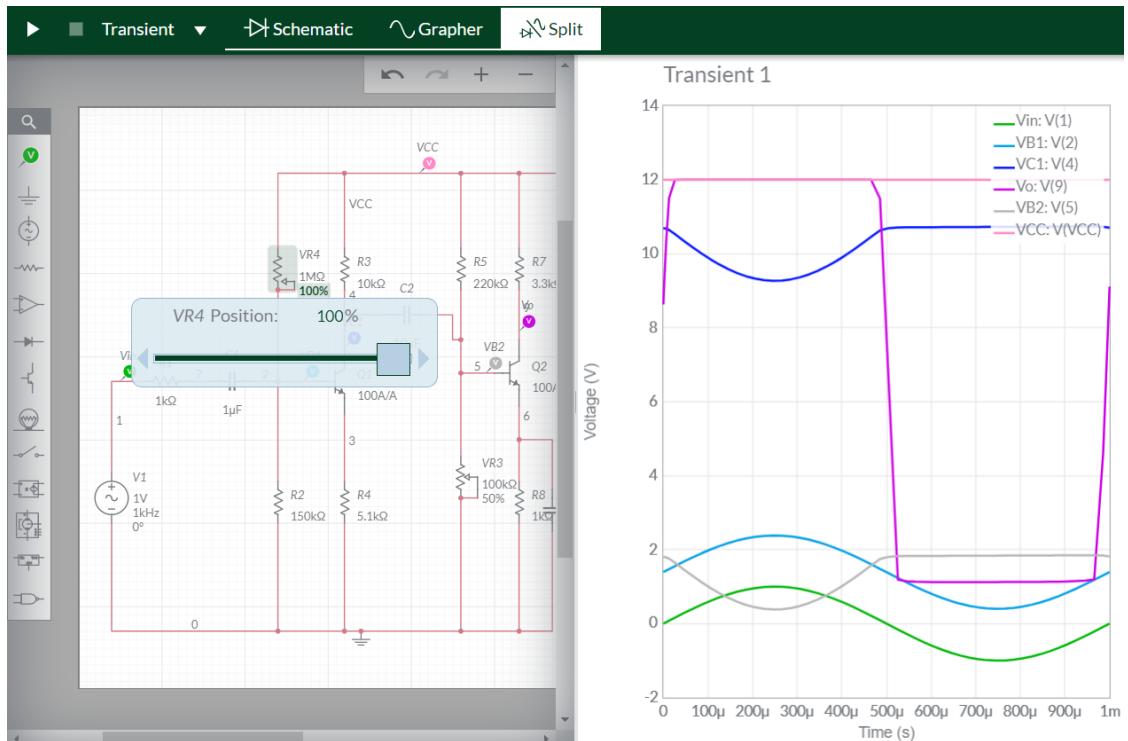


Figure 30 VR4 100

AC SWEEP DEĞERLERİ:

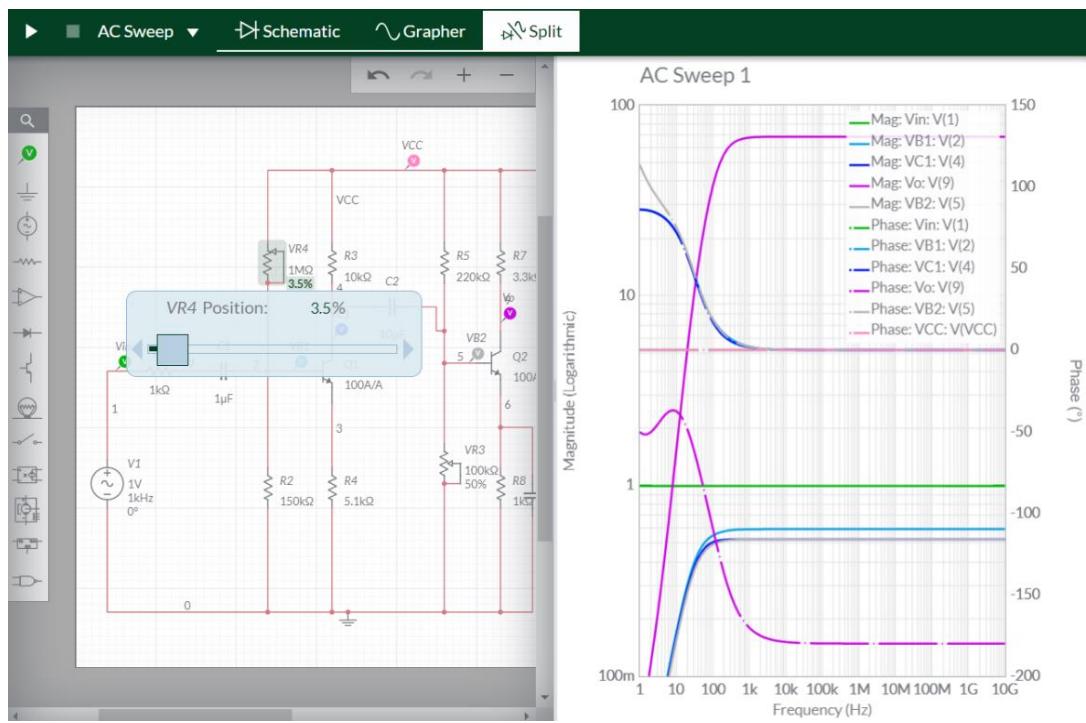


Figure 31 VR4 3.5

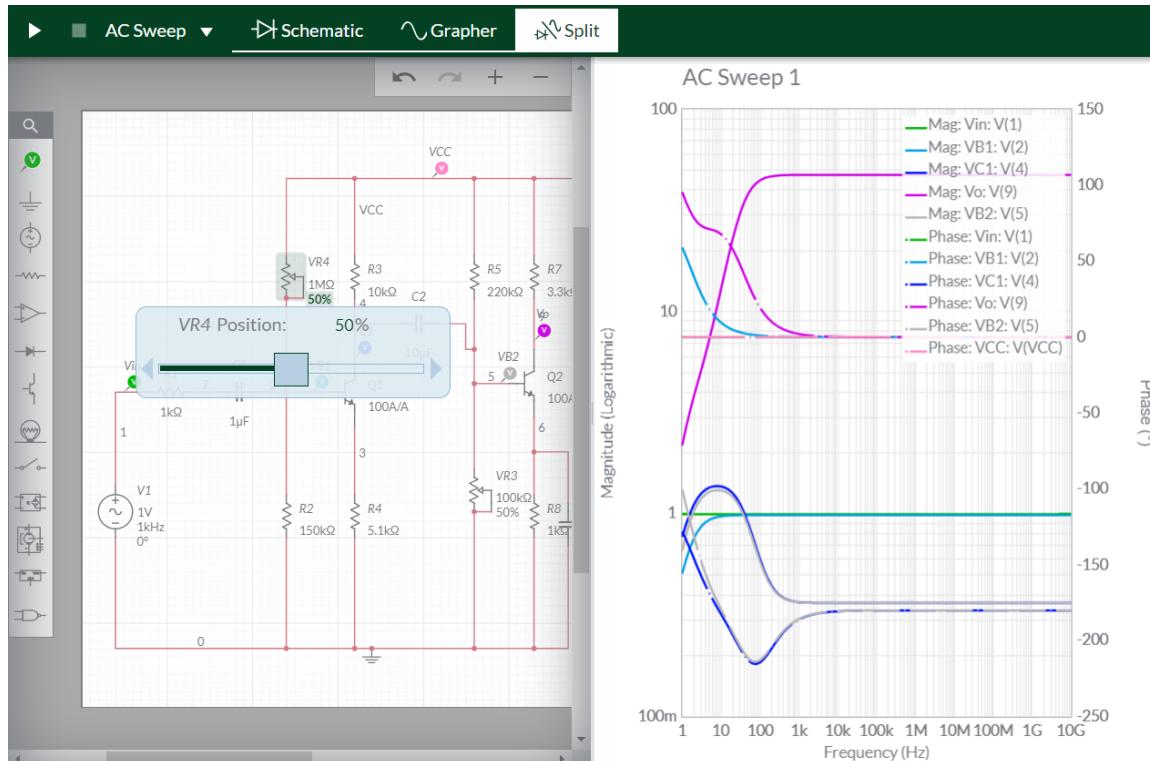


Figure 32 VR4 50

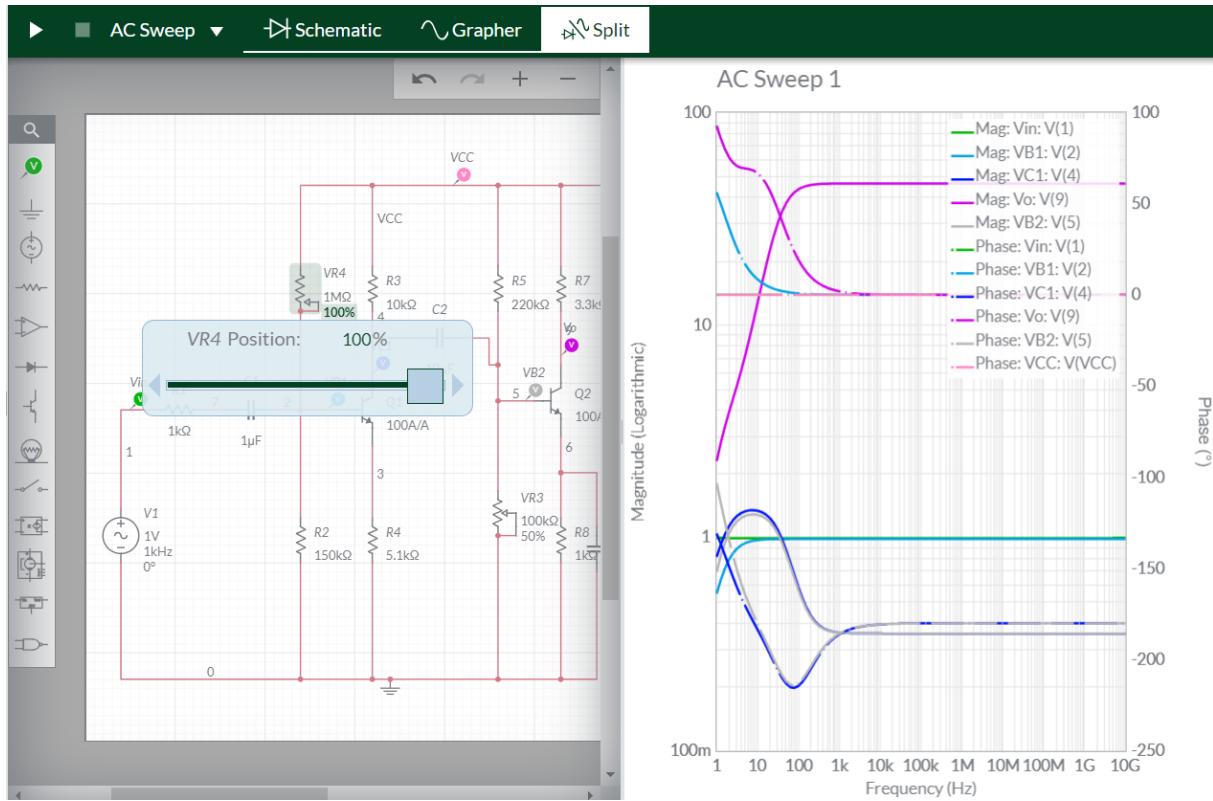
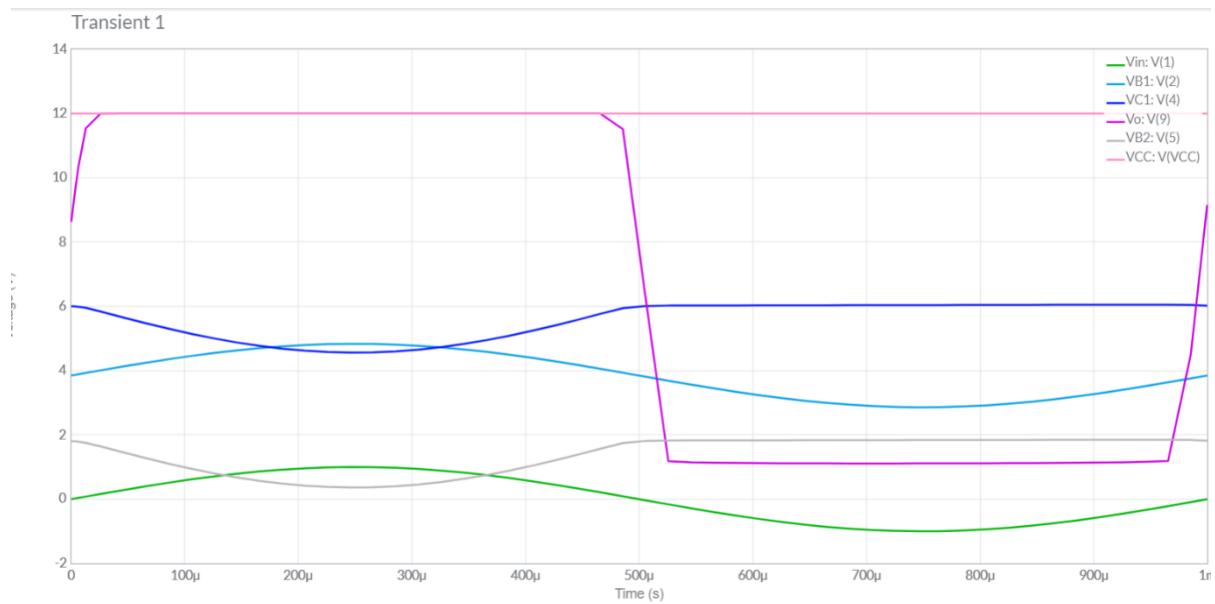


Figure 33 VR4 100

AV GERİLİM KAZANCI GRAFİĞİ VE HESAPLAMALARI C3 KAPASİTÖRÜ VAR İKEN :



VC2=V0=12V

AV1 = -0.39

VB1=4.83V

AV2 = -32.98

VC1=4.56V

AV=AV1*AV2 = 12.86

Vin=999.68mv

AVS = VO/Vi = 12.004

VB2=363.85mv

DENEYDEN ÇIKARILAN SONUÇLAR:

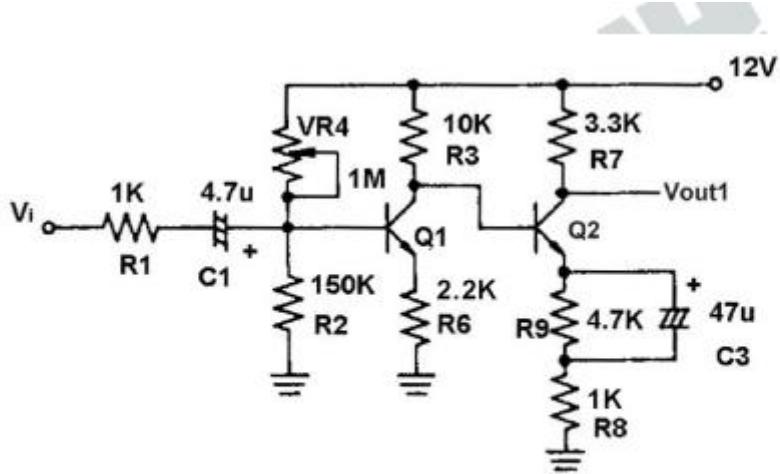
İki katlı RC kuplajlı yükselteç aşağıdaki özelliklere sahiptir:

1. İkinci kattaki yükseltecin DC öngerilimlemesi, birinci kattaki yükseltecin DC öngerilimlemesindeki değişimden etkilenmez.

2. Q2'nin emetör by-pass kondansatörü C3, doğrudan ikinci yükseltecin gerilim kazancı AV2'yi belirler. C3 devreden çıkarıldığında, negatif geribesleme ortaya çıktığı için AV2 değeri azalır.

3. Alçak frekans bölgesinde, kuplaj kondansatörünün kapasitif reaktansı büyük olduğu için, RC kuplajlı yükseltecin alçak frekanks tepkisi kötüdür

DENEY 4-2 Doğrudan Kuplajlı Yükselteç



Şekil 7-2-1 İki katlı doğrudan kuplajlı yükselteç

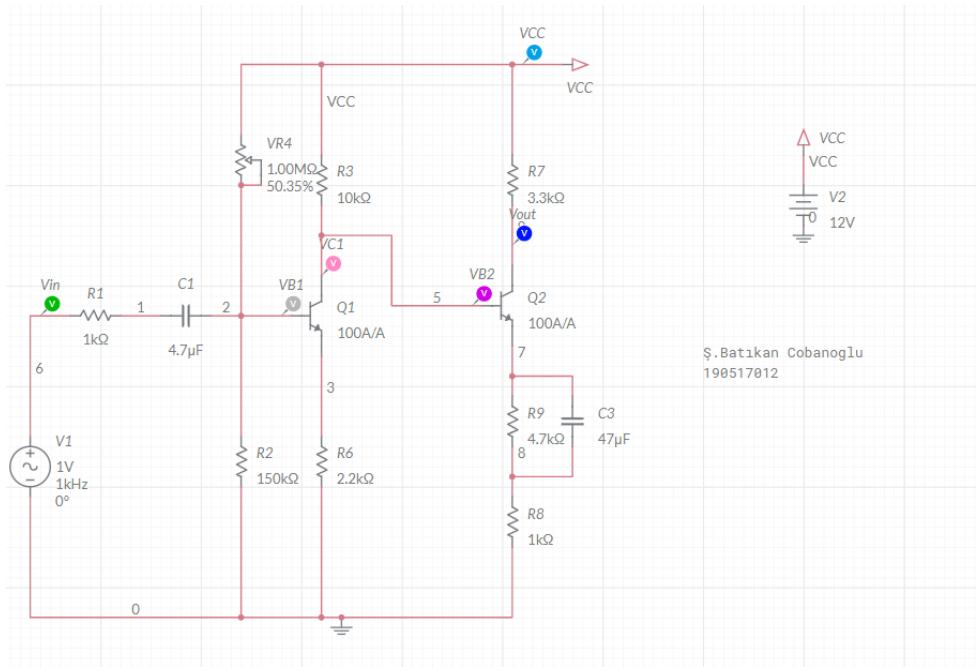


Figure 34 Deney Devresi

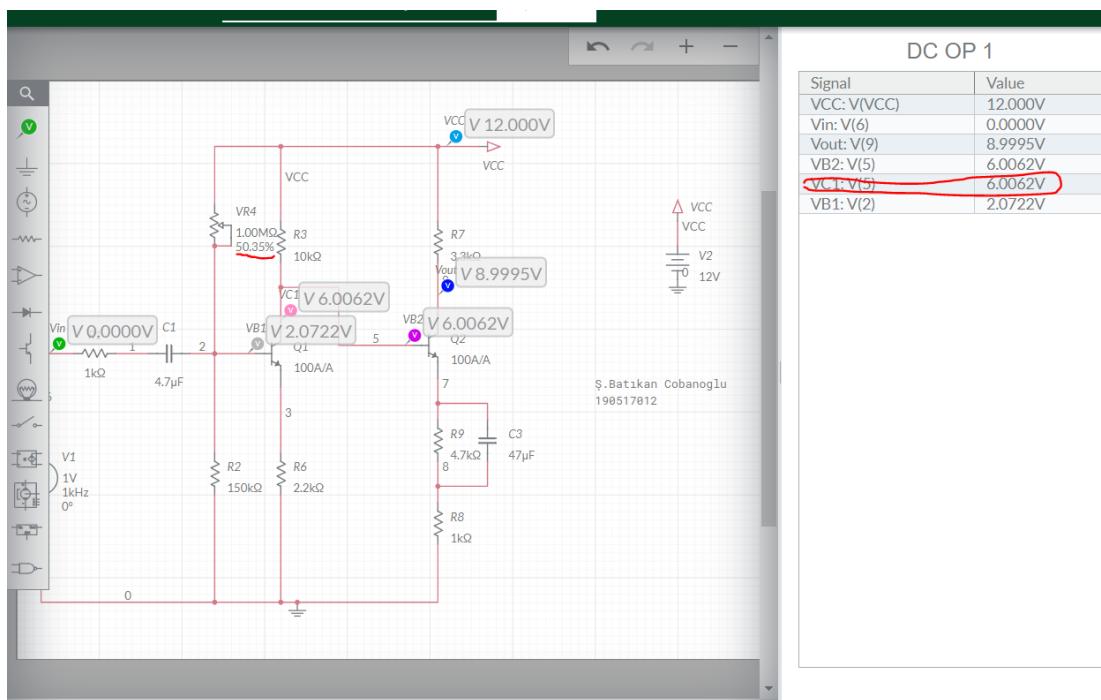


Figure 35 DC OP

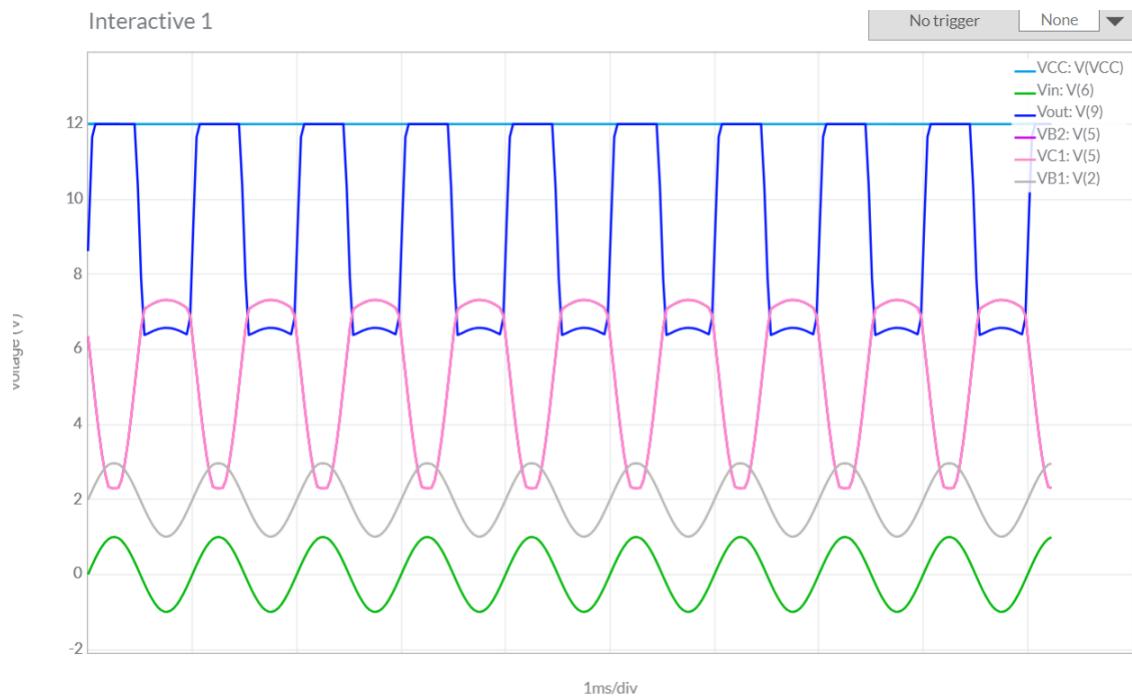


Figure 36 Interactive

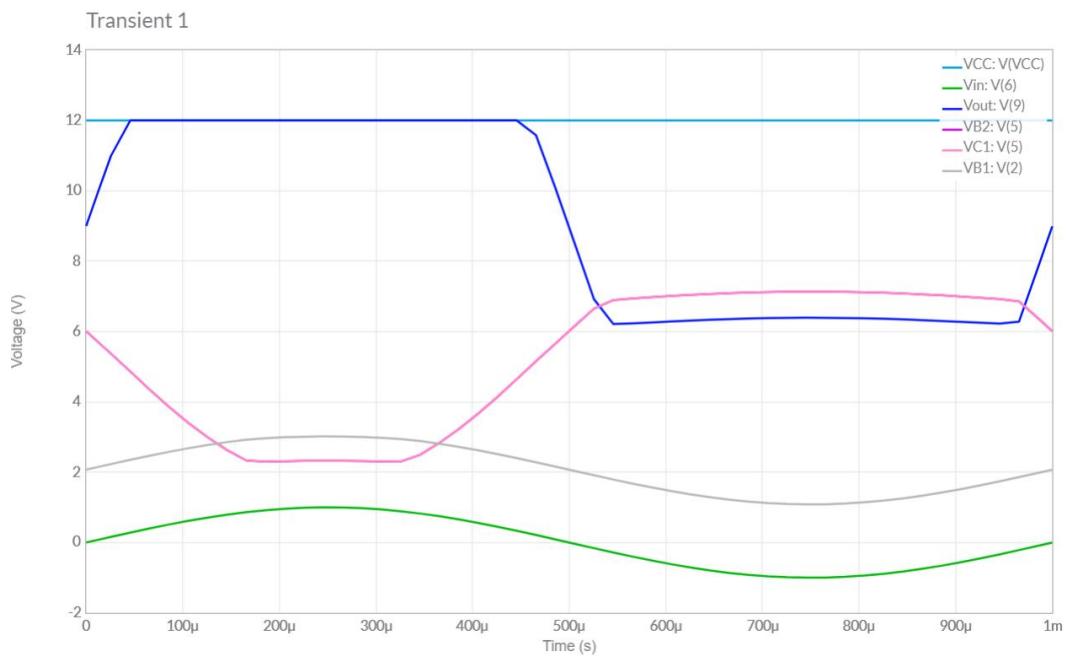


Figure 37 Transient

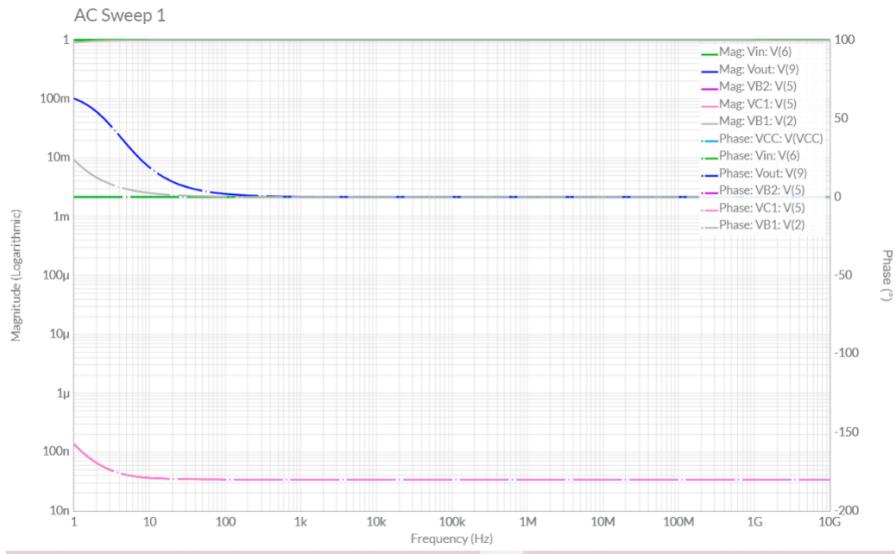


Figure 38 AC Sweep

POTANSİYOMETRE DEĞİŞTİRİLDİĞİ DURUMLAR:

INTERACTIVE DEĞERLERİ:

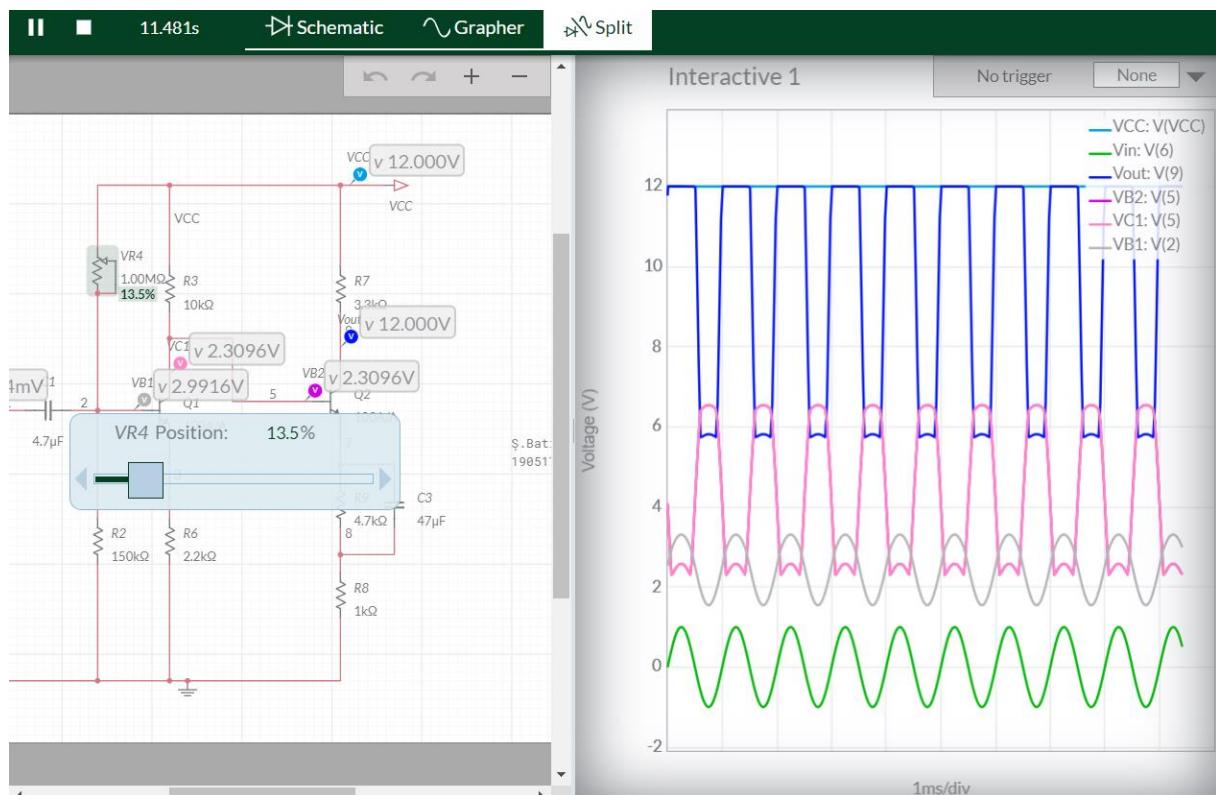


Figure 39 VR4 13.5

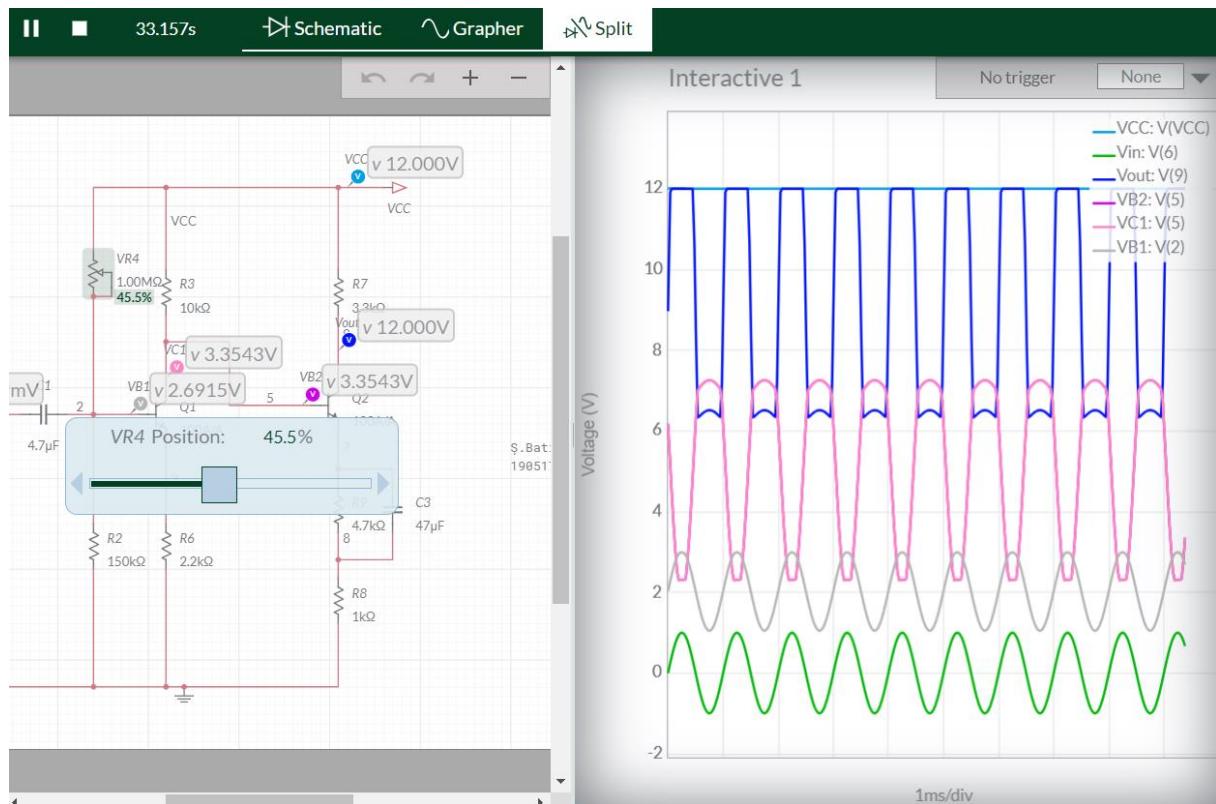


Figure 40 VR4 45.5

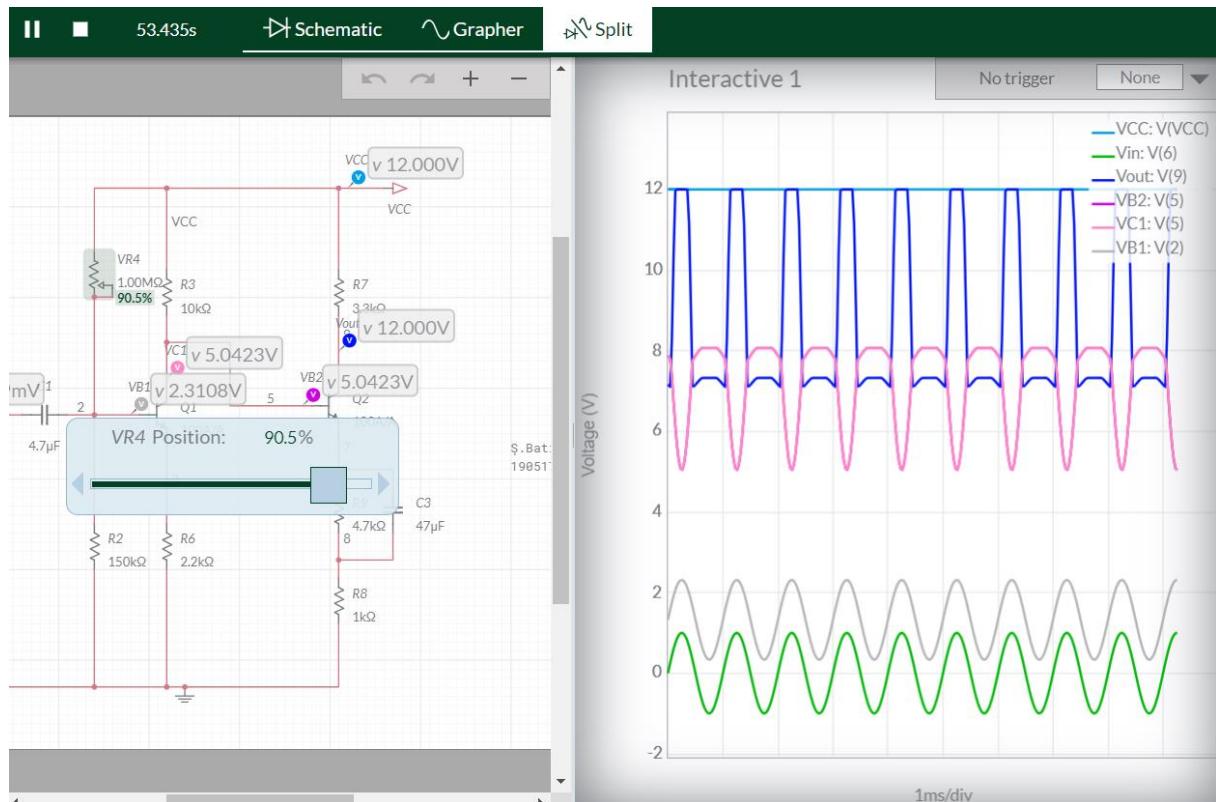


Figure 41 VR4 90.5

TRANSİENT DEĞERLERİ:

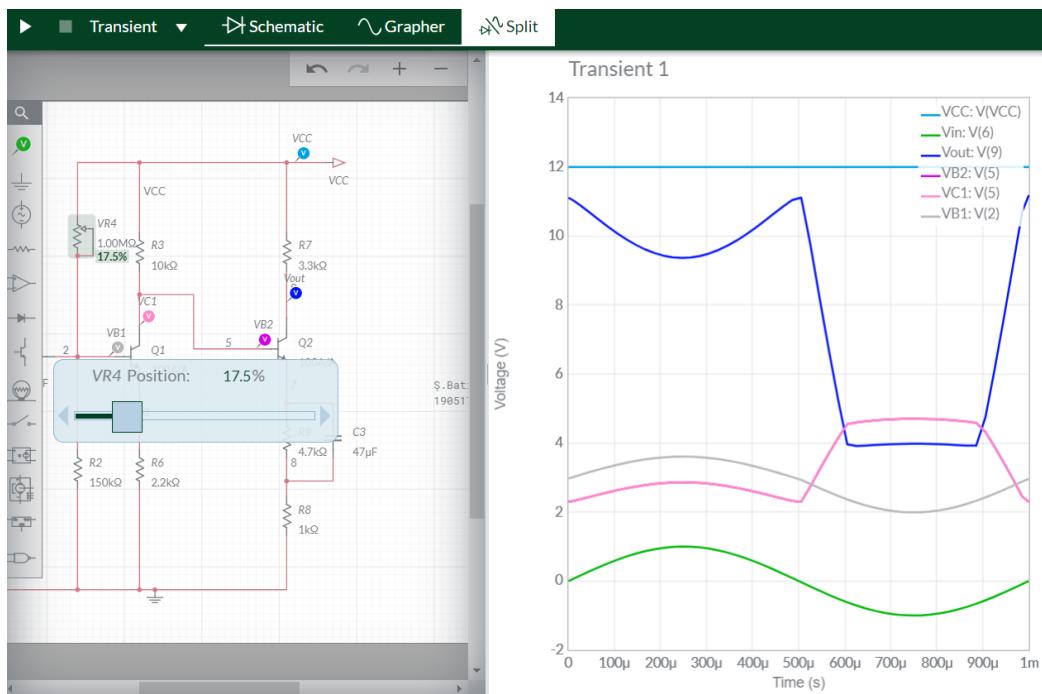


Figure 42 VR4 17.5

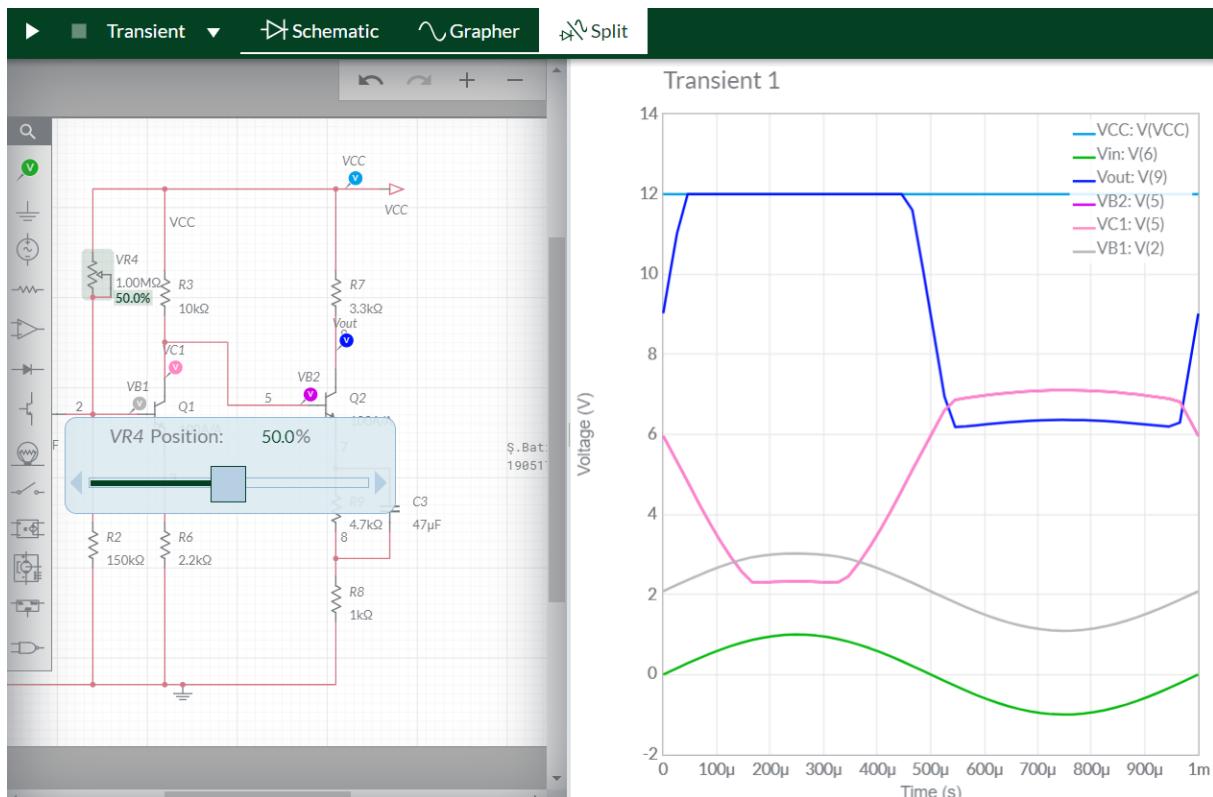


Figure 43 VR4 50

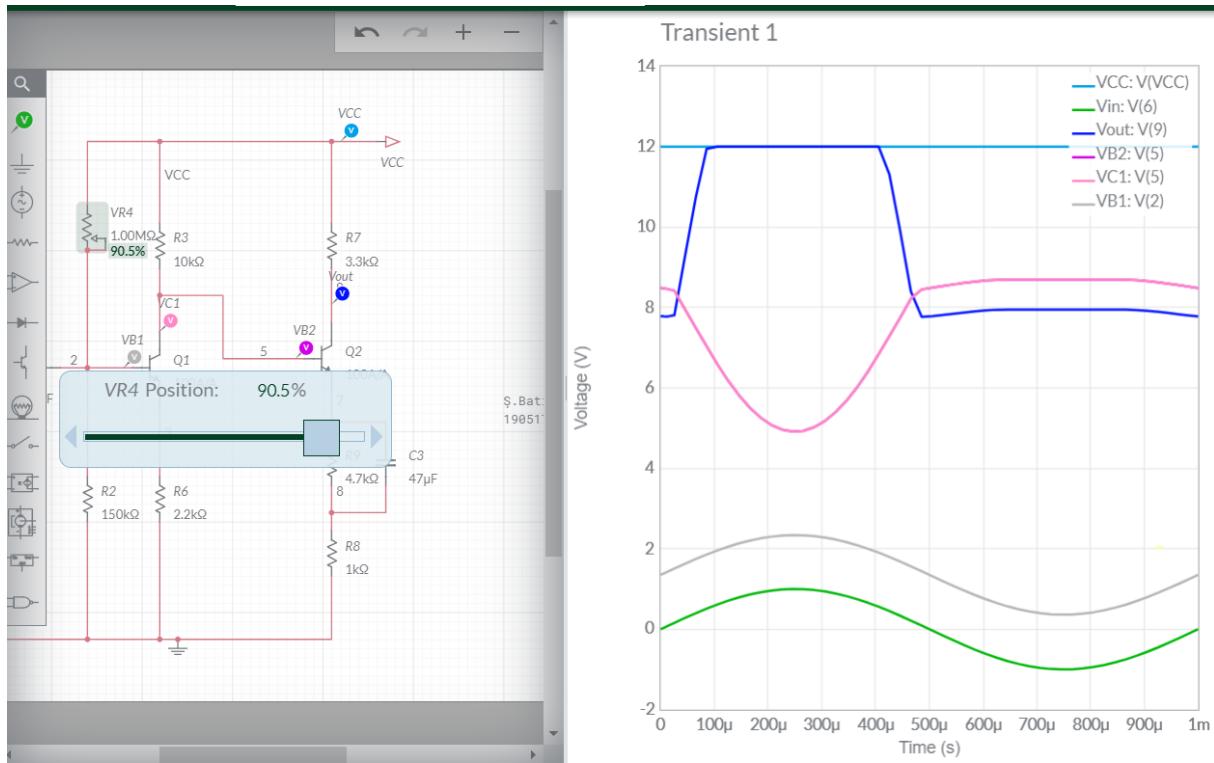


Figure 44 VR4 90.5

AC SWEEP DEĞERLERİ:

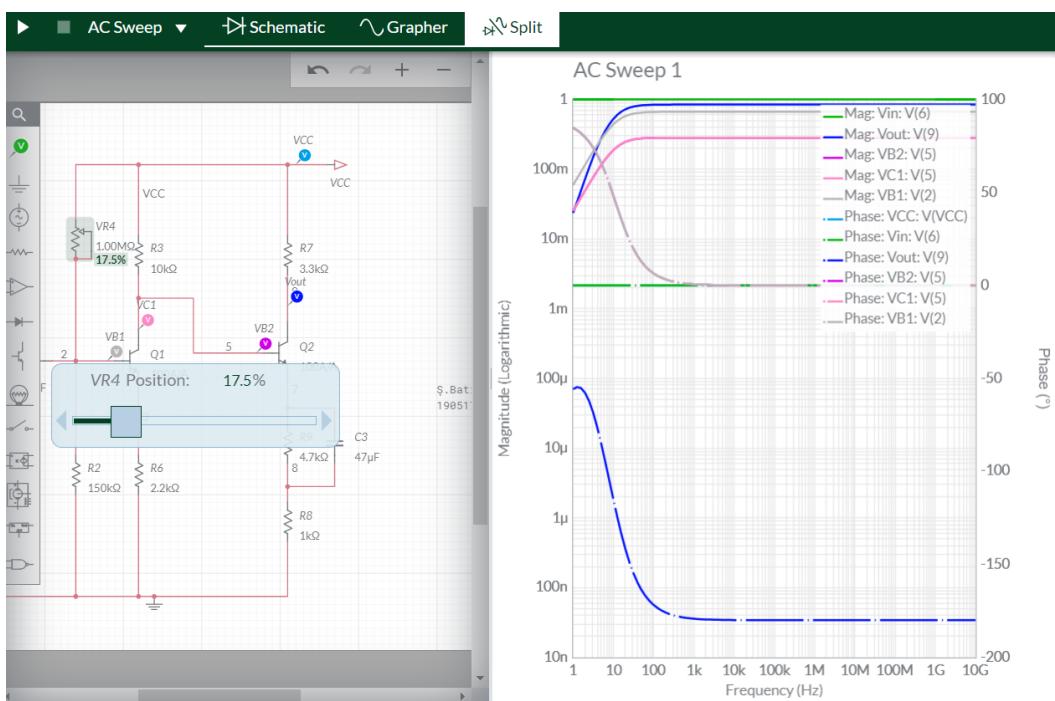


Figure 45 VR4 17.5

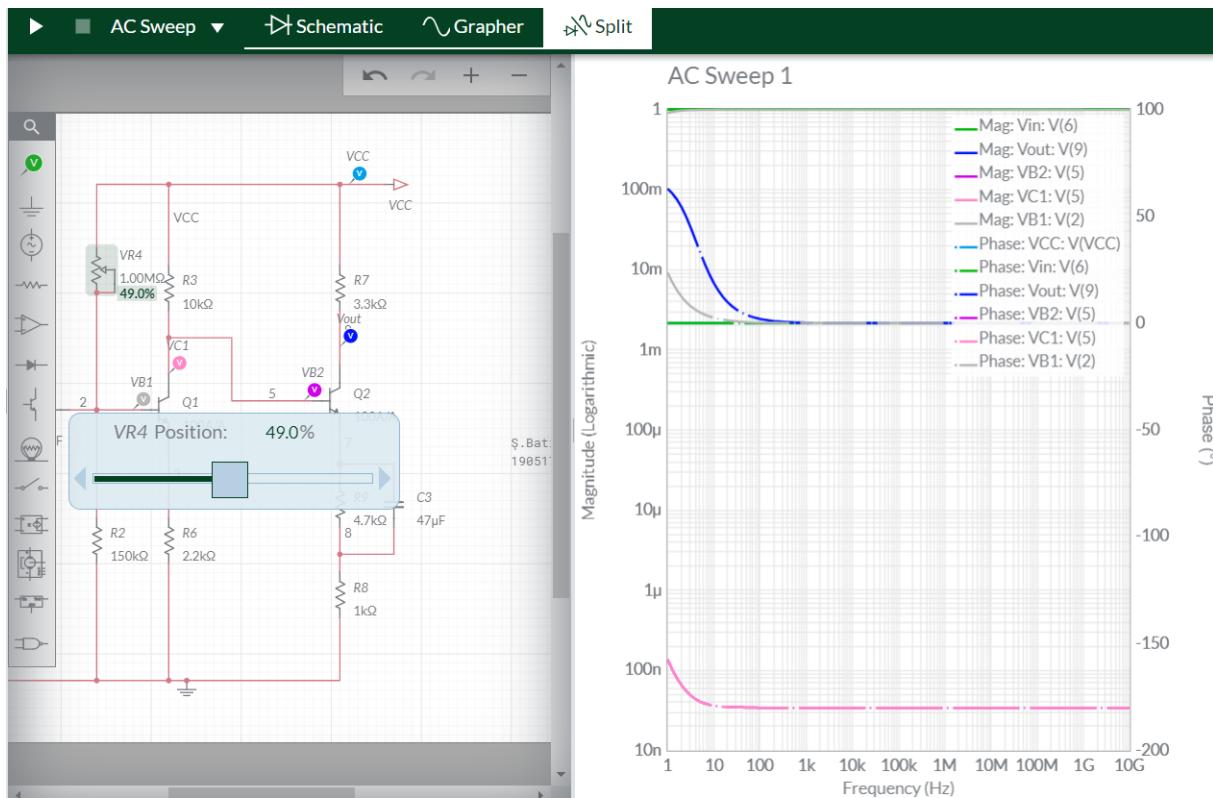


Figure 46 VR4 49

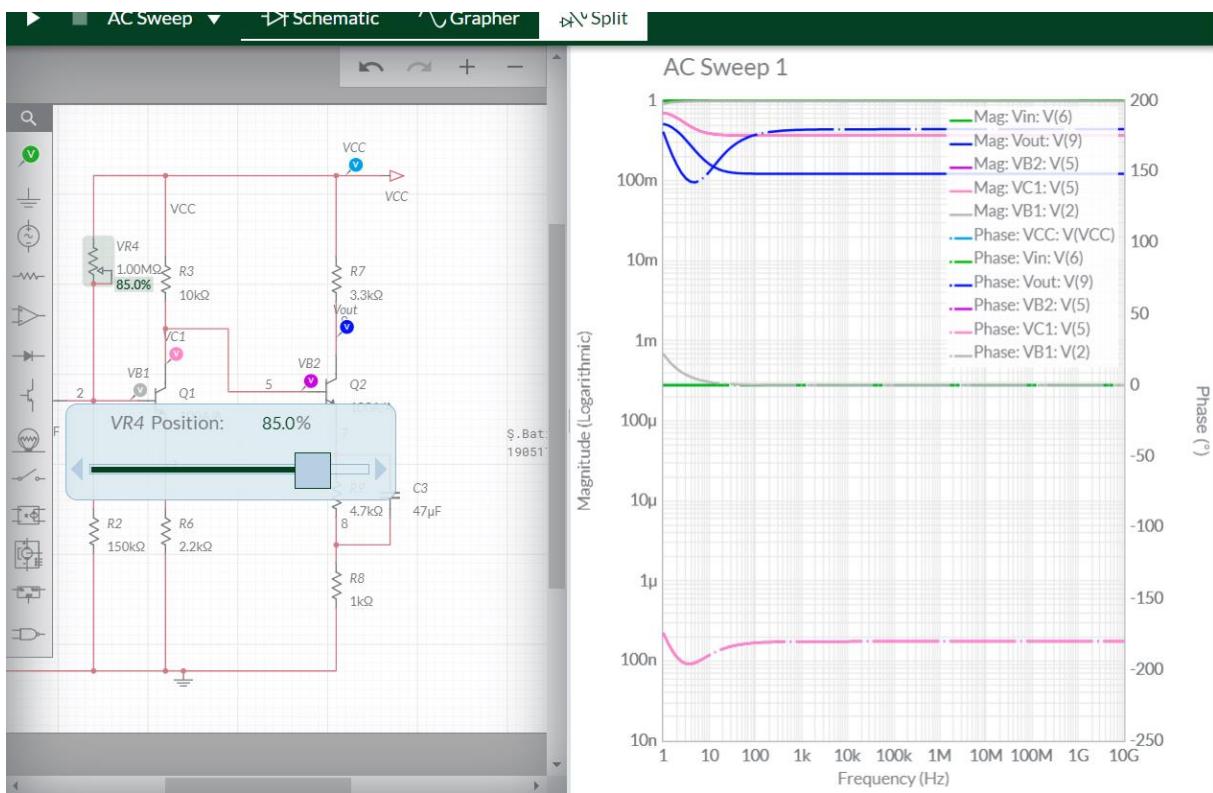
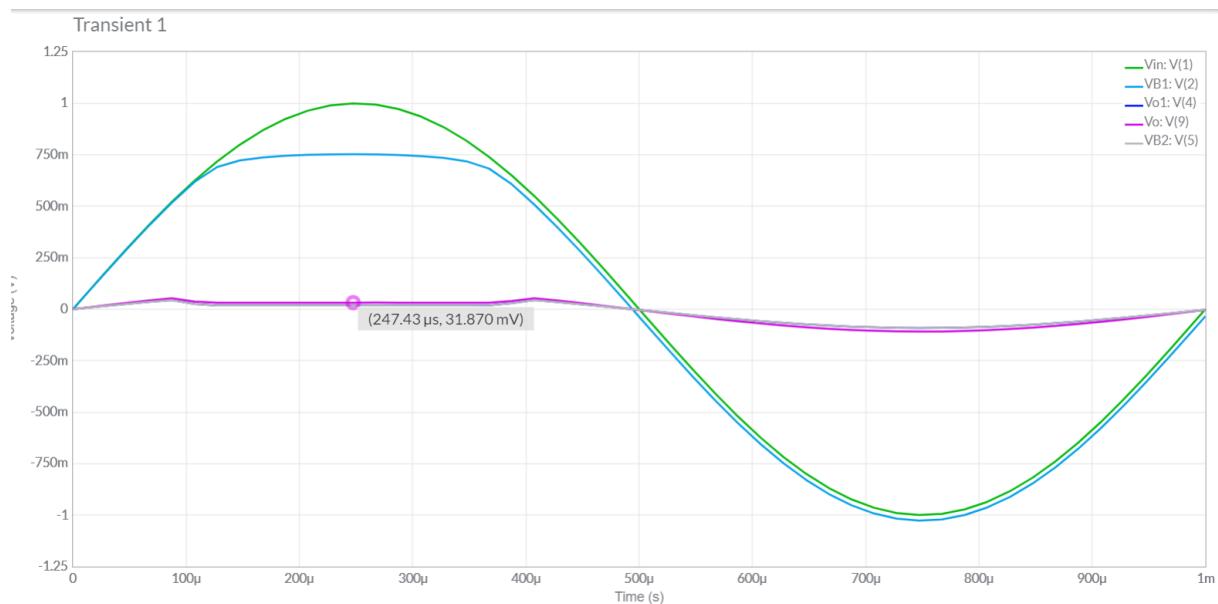


Figure 47 VR4 85

AV GERİLİM KAZANCI:



Vi=999.87mV

C3 KALDIRILDIĞINDA DEĞERLER:

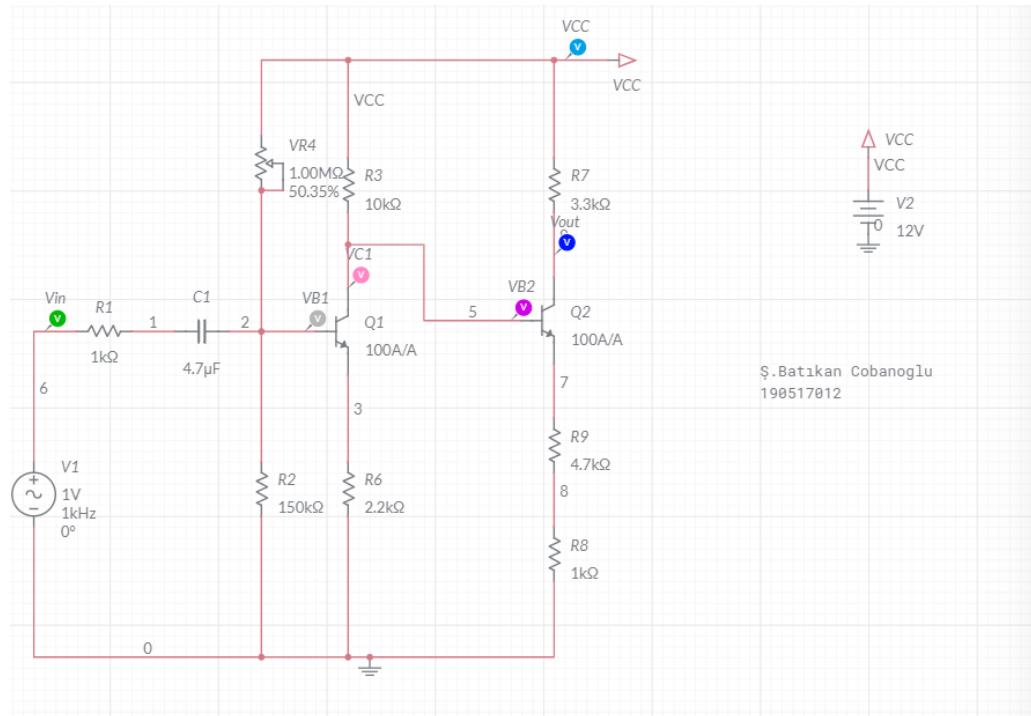


Figure 48 Deney Devresi c3 yok

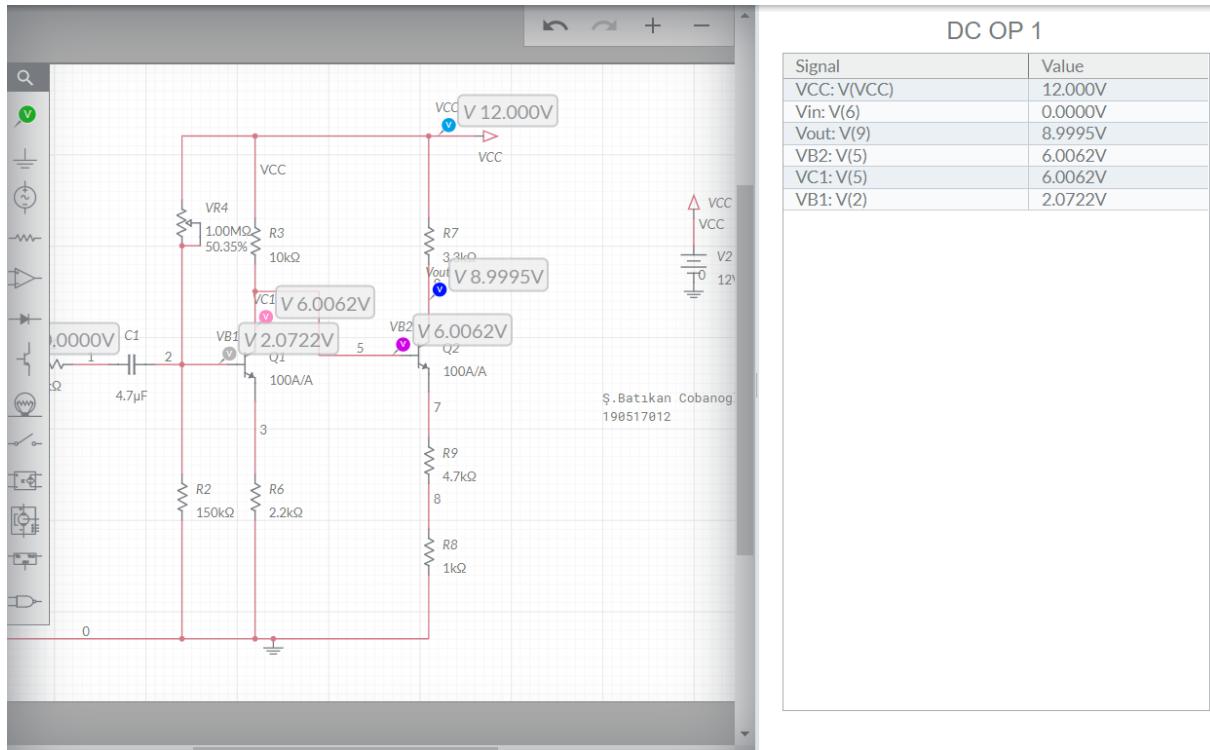


Figure 49 DC op

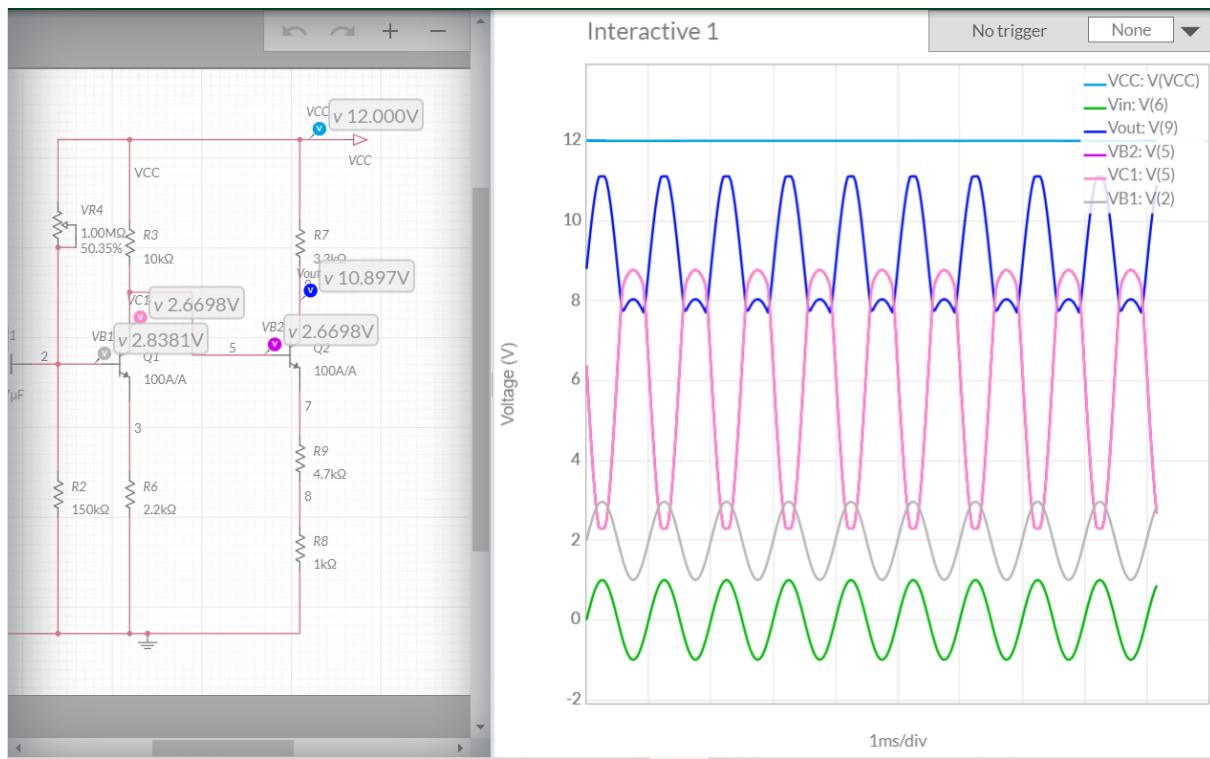


Figure 50 Interactive

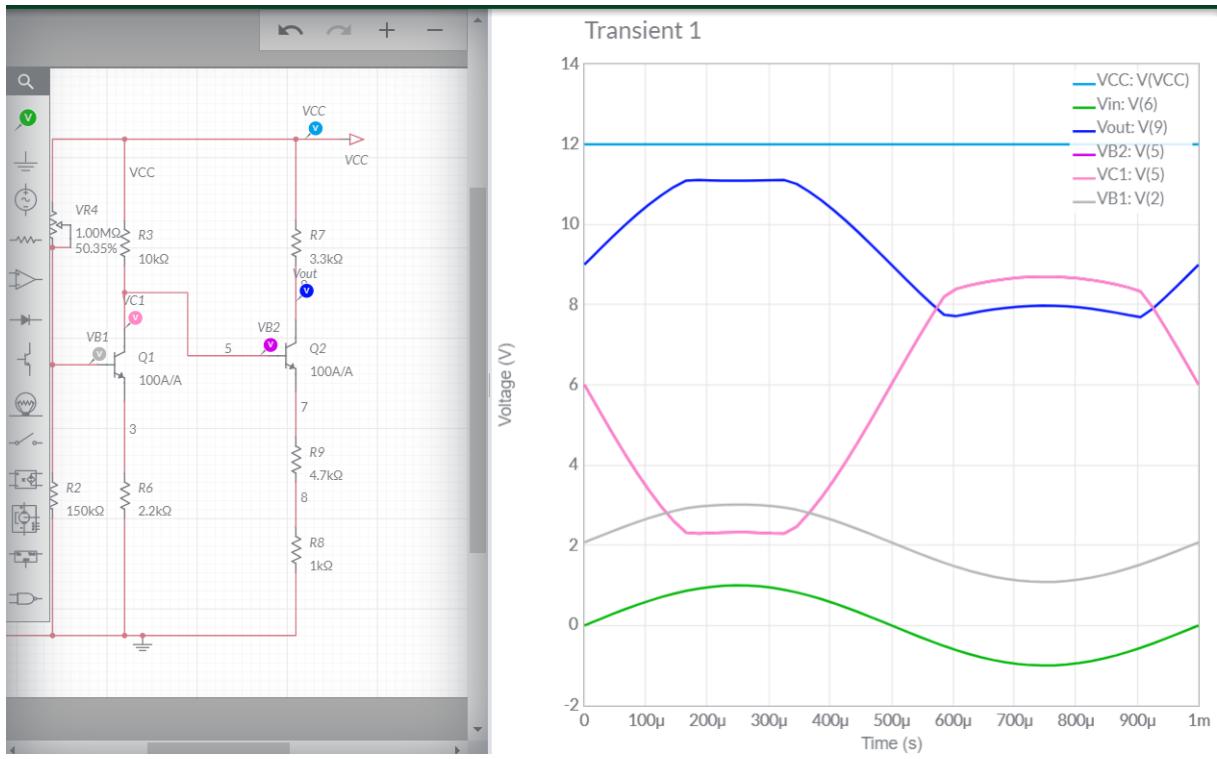


Figure 51 Transient

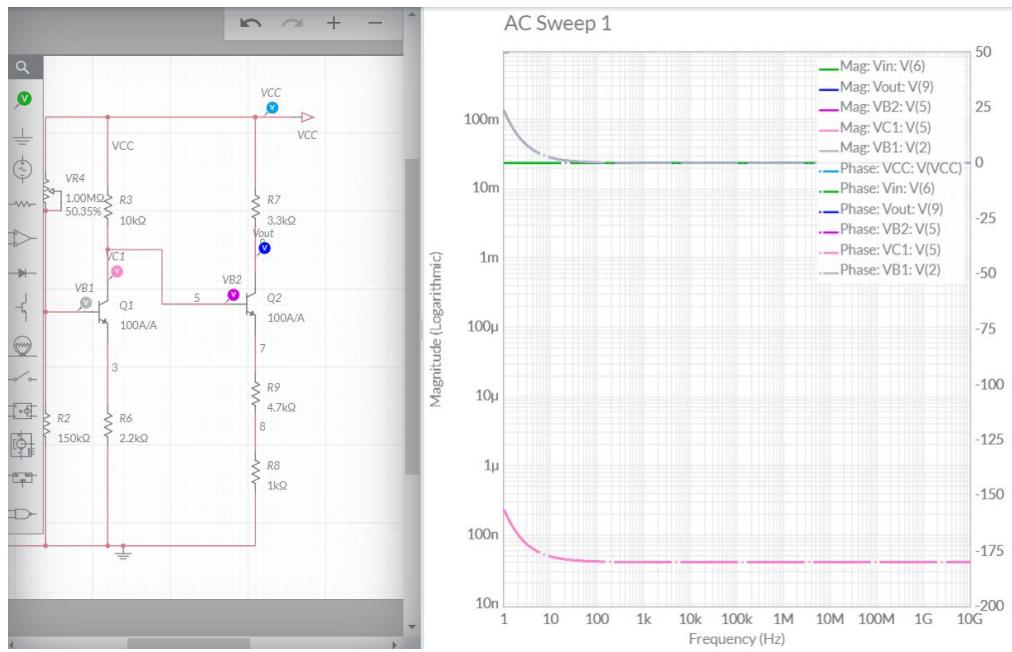
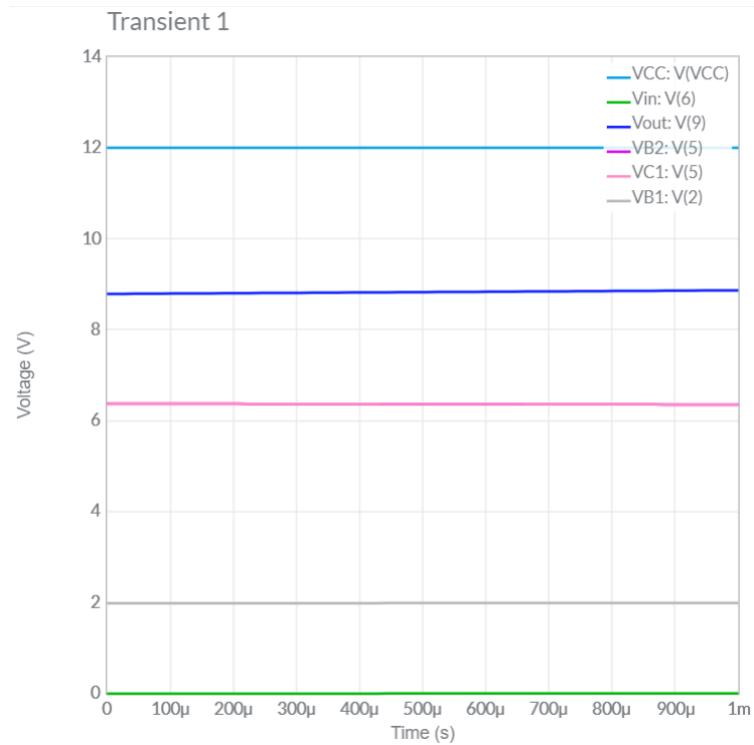


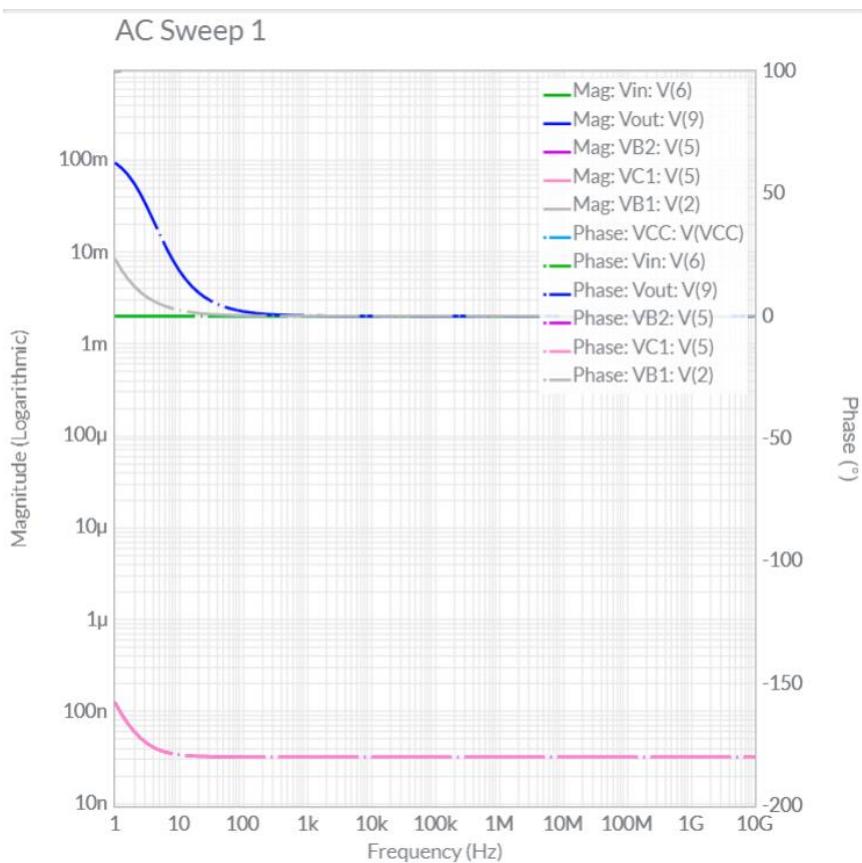
Figure 52 AC Sweep

FREKANS DEĞERİ 1HZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT :

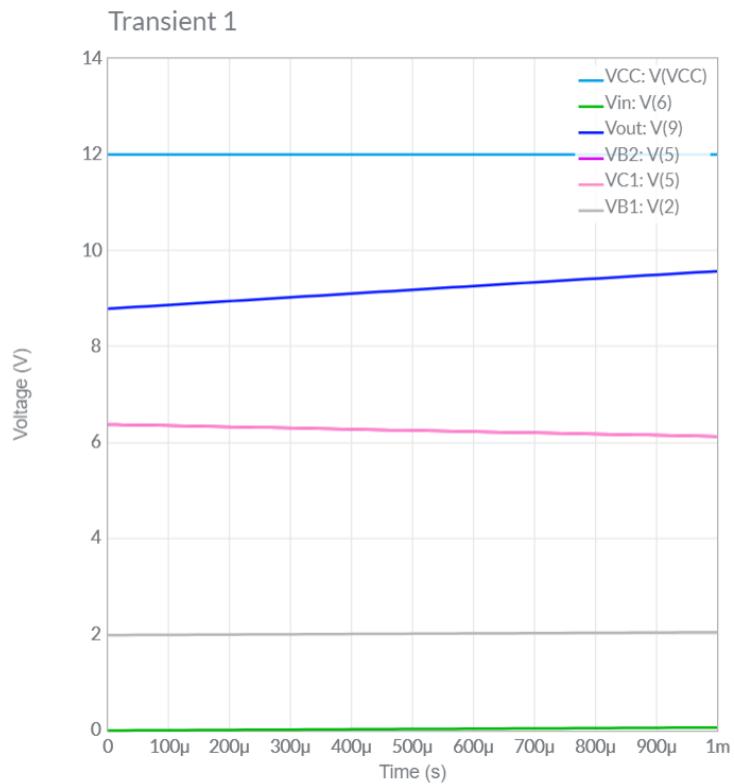


AC SWEEP:

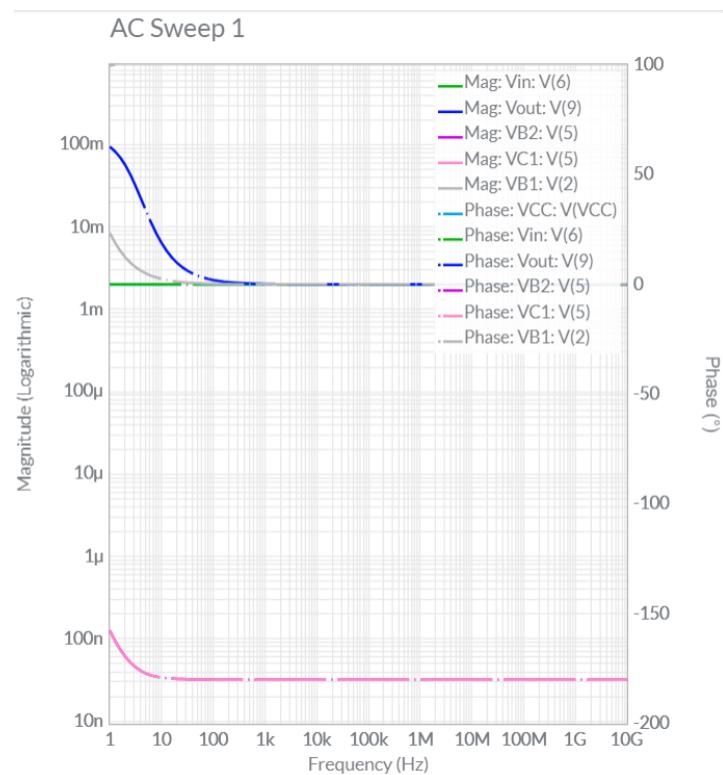


FREKANS DEĞERİ 10HZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT:

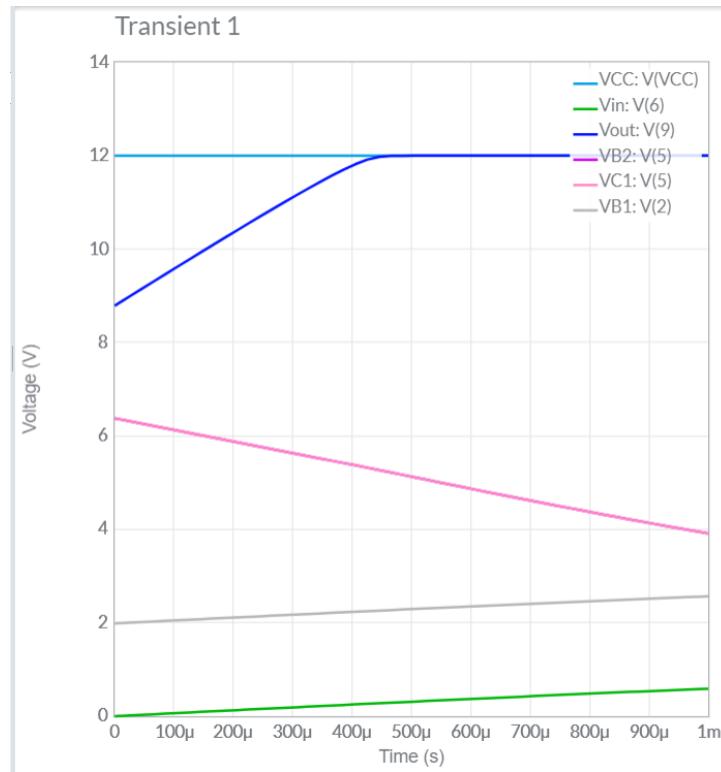


AC SWEEP:

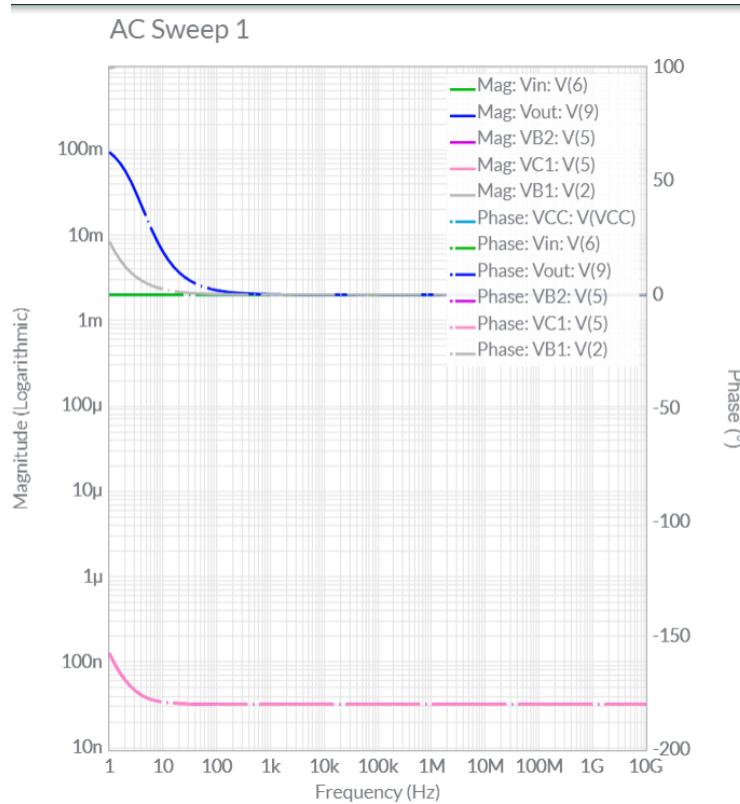


FREKANS DEĞERİ 100HZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT:

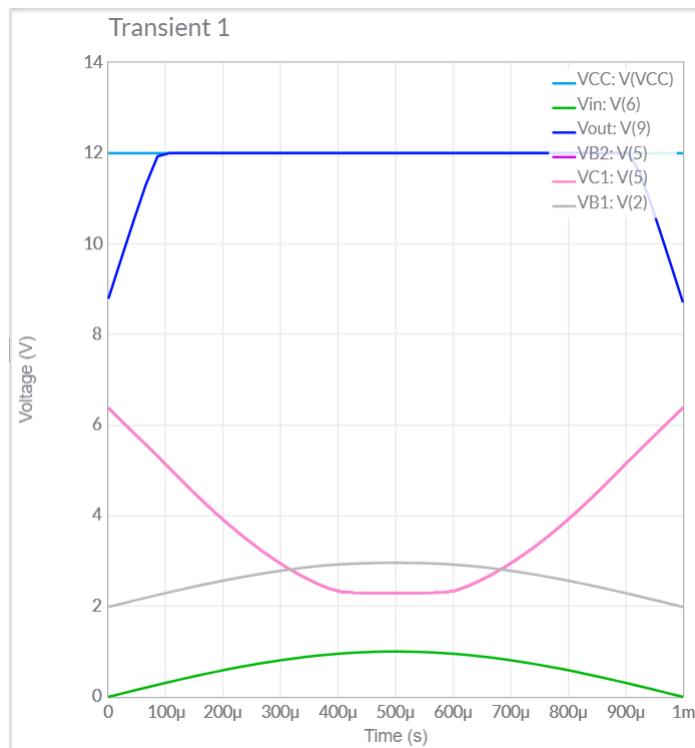


AC SWEEP:

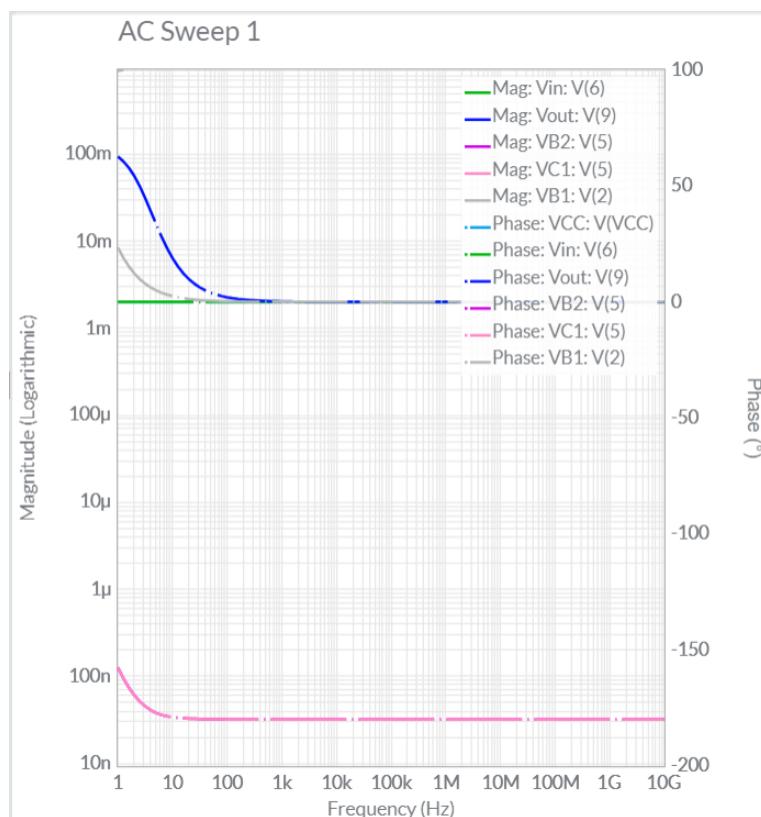


FREKANS DEĞERİ 500HZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT:

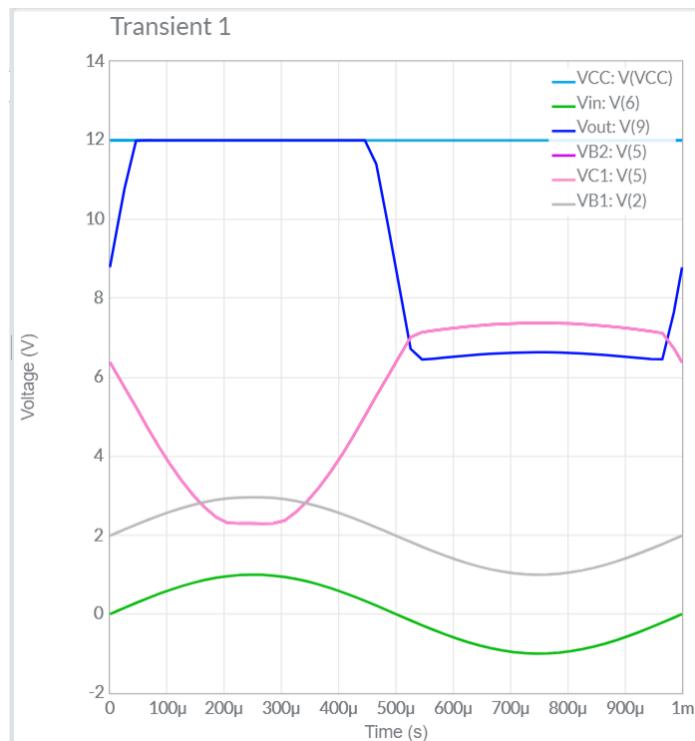


AC SWEEP:

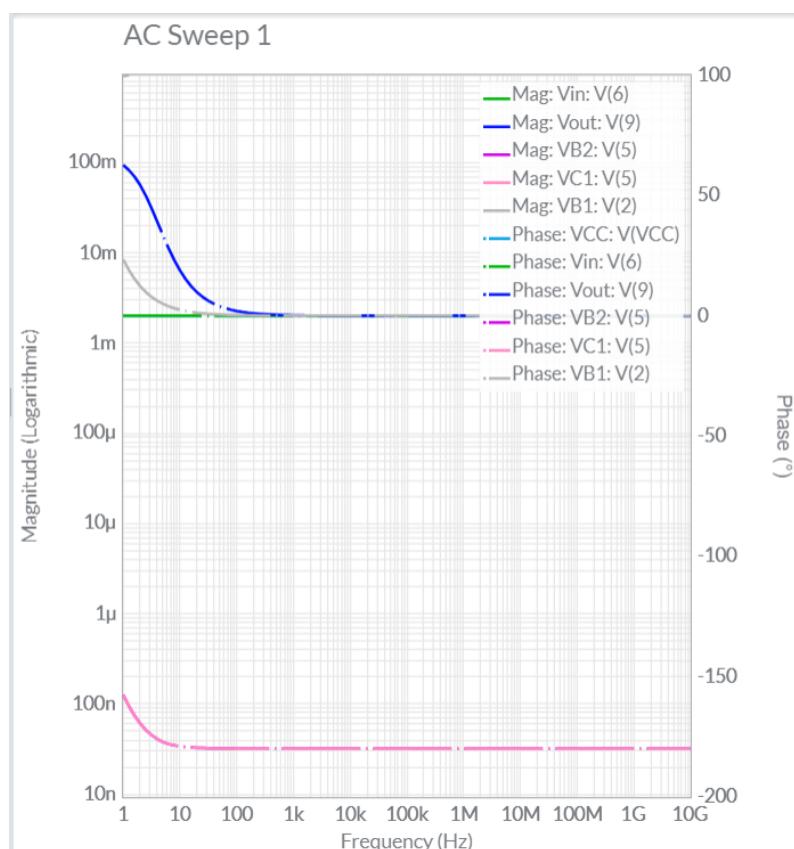


FREKANS DEĞERİ 1KHZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT:

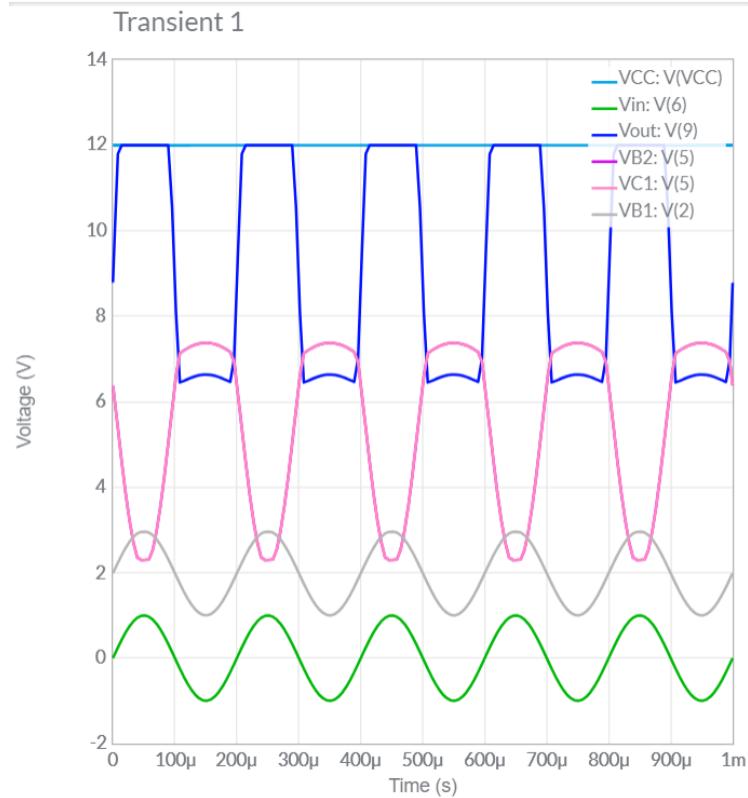


AC SWEEP:

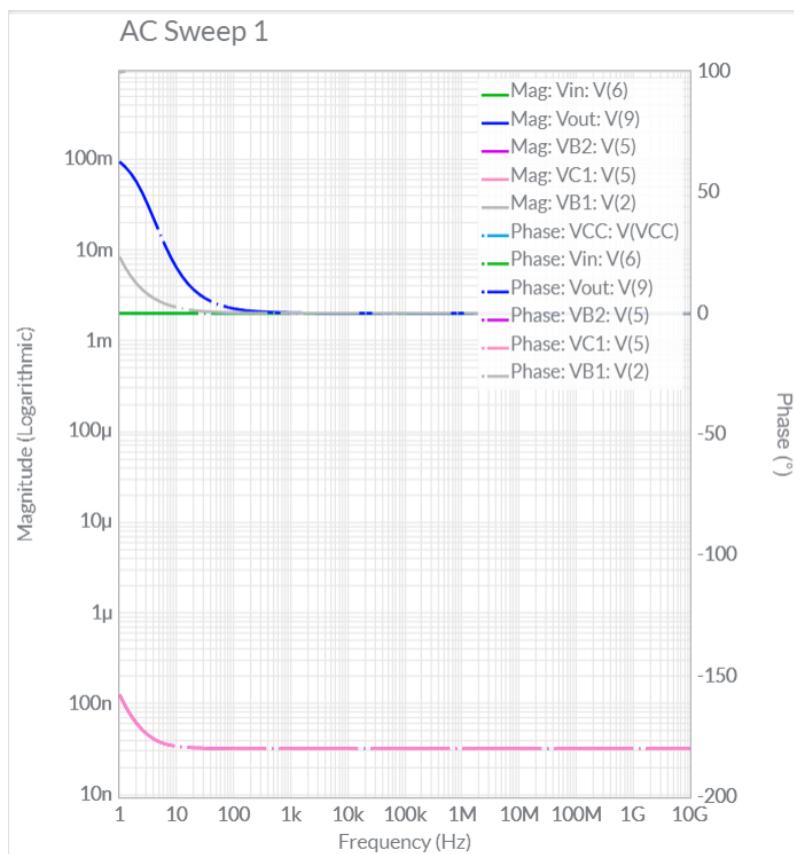


FREKANS DEĞERİ 5KHZ OLARAK DEĞİŞTİRİLDİĞİNDE:

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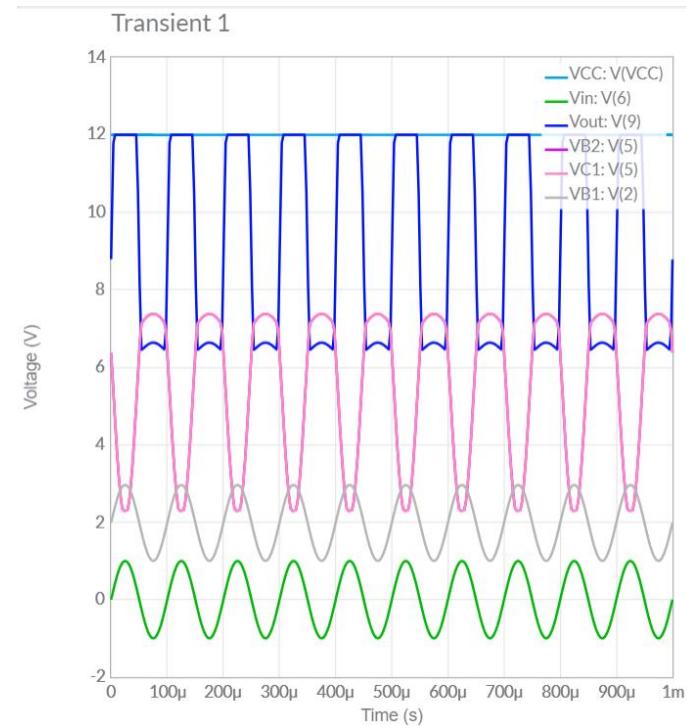


AC SWEEP:

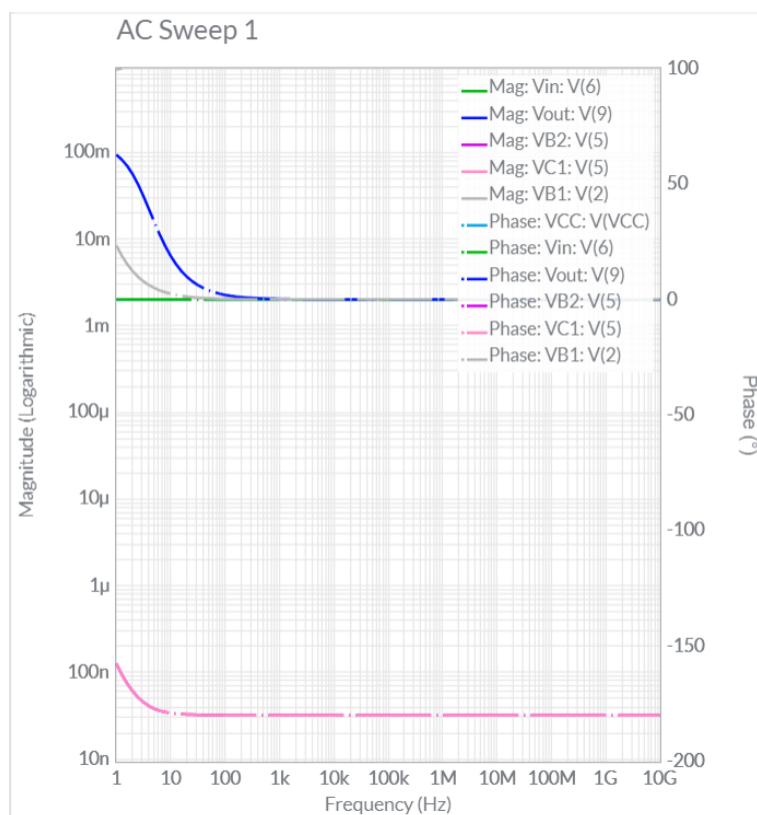


FREKANS DEĞERİ 10KHZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT:

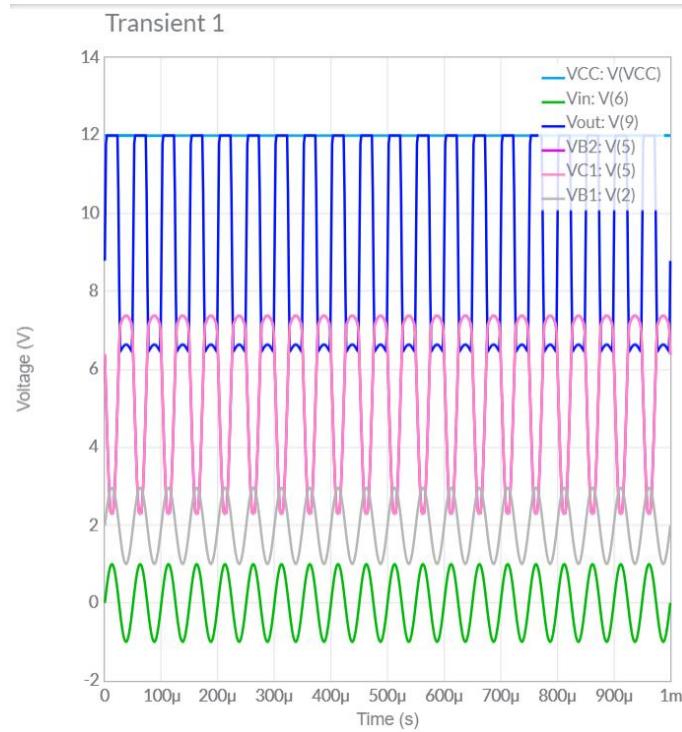


AC SWEEP:

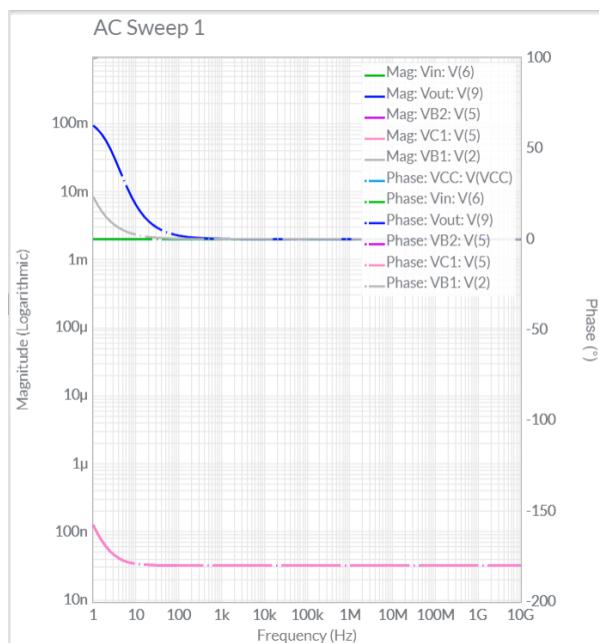


FREKANS DEĞERİ 20KHZ OLARAK DEĞİŞTİRİLDİĞİNDE:

TRANSIENT:



AC SWEEP:



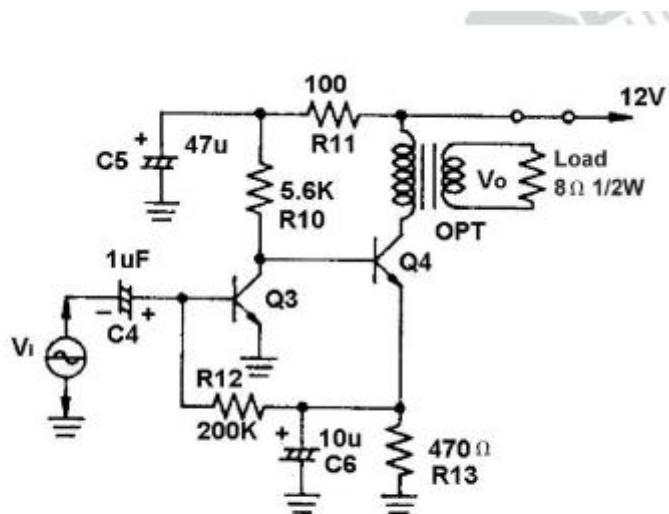
Frekans	1Hz	10Hz	100Hz	500Hz	1KHz	5KHz	10KHz	20KHz
V _O (V)	8.86	9.57	12	12	12	12	12	12
V _i (mV)	6.28	6.27	587.79	989.76	999.62	998.49	998.49	998.49
AV	1410.82	1526.3	20.41	12.12	12,0045	12.018	12.018	12.018

DENEYDEN ÇIKARILAN SONUÇLAR:

İki katlı doğrudan kuplajlı yükselteç aşağıdaki özelliklere sahiptir:

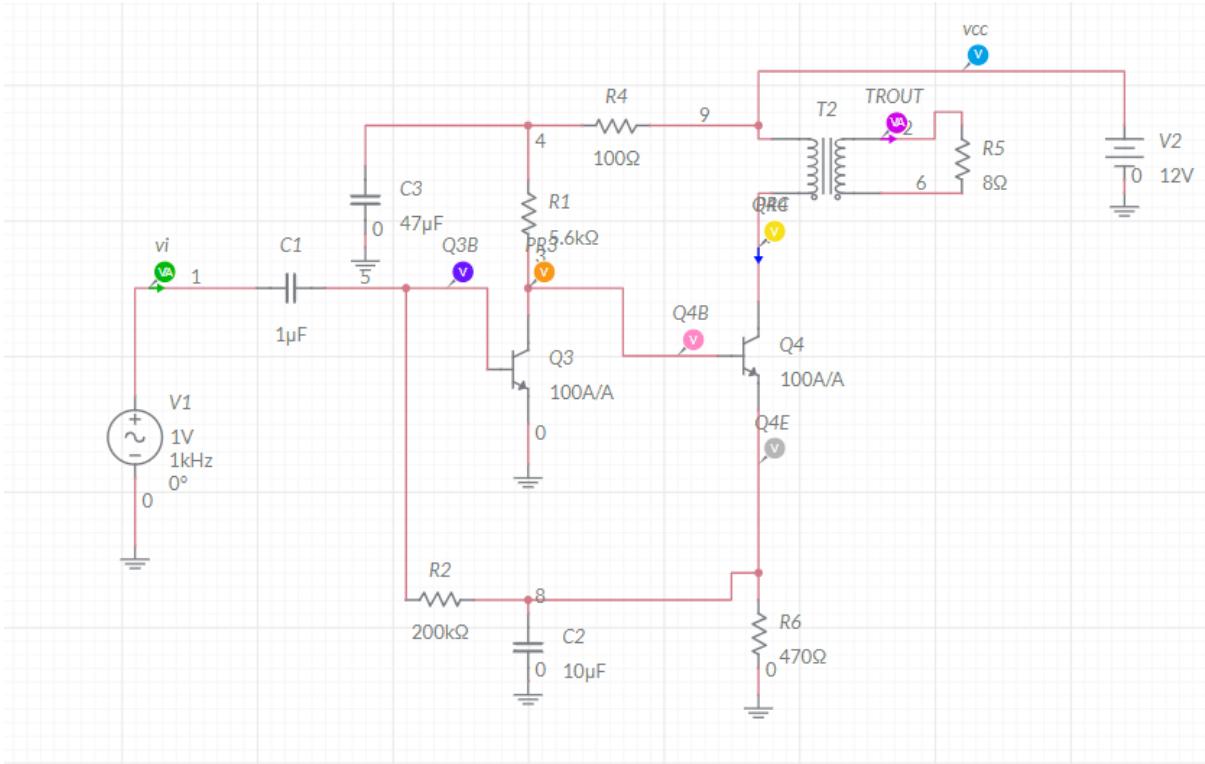
1. İkinci kat yükseltecin DC öngerilimlemesi, birinci kat yükseltecin DC öngerilim beslemesindeki değişimden doğrudan etkilenir.
2. Q2'nin emetör by-pass kondansatörü C3, doğrudan ikinci yükseltecin gerilim kazancı AV2'yi belirler. C3 devreden çıkarıldığında, negatif geribesleme ortaya çıktığı için AV2 değeri azalır.
3. Doğrudan kuplajlı yükselteç frekanks cevabı çok iyidir.

DENEY 4-3 Transformatör Kuplajlı Yukselteç



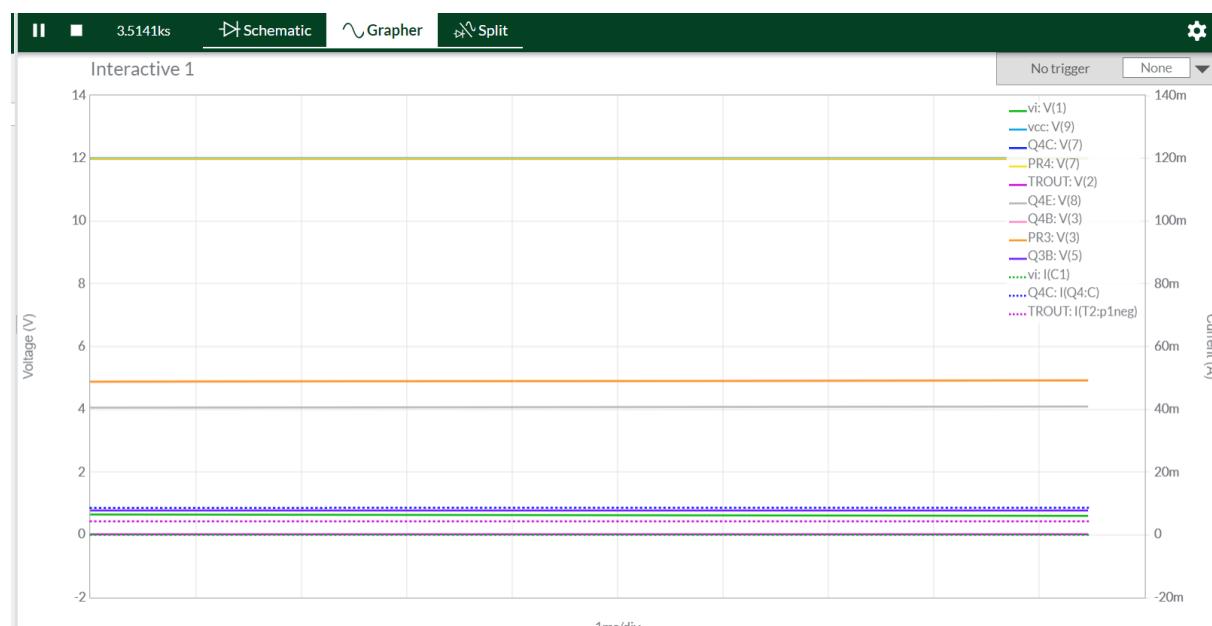
Şekil 7-3-1 Transformatör kuplajlı yükselteç

MULTİSİM DENEY DEVRE ÇİZİMİ:

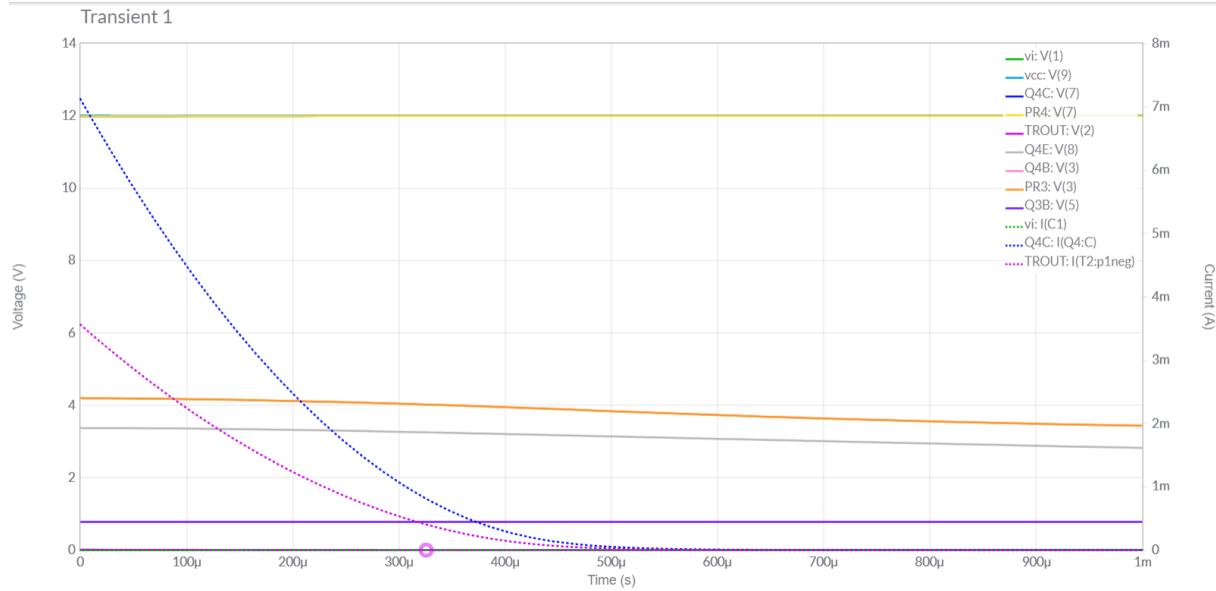


FREKANS DEĞERİ 1HZ İÇİN DENEY ÇIKTILARI:

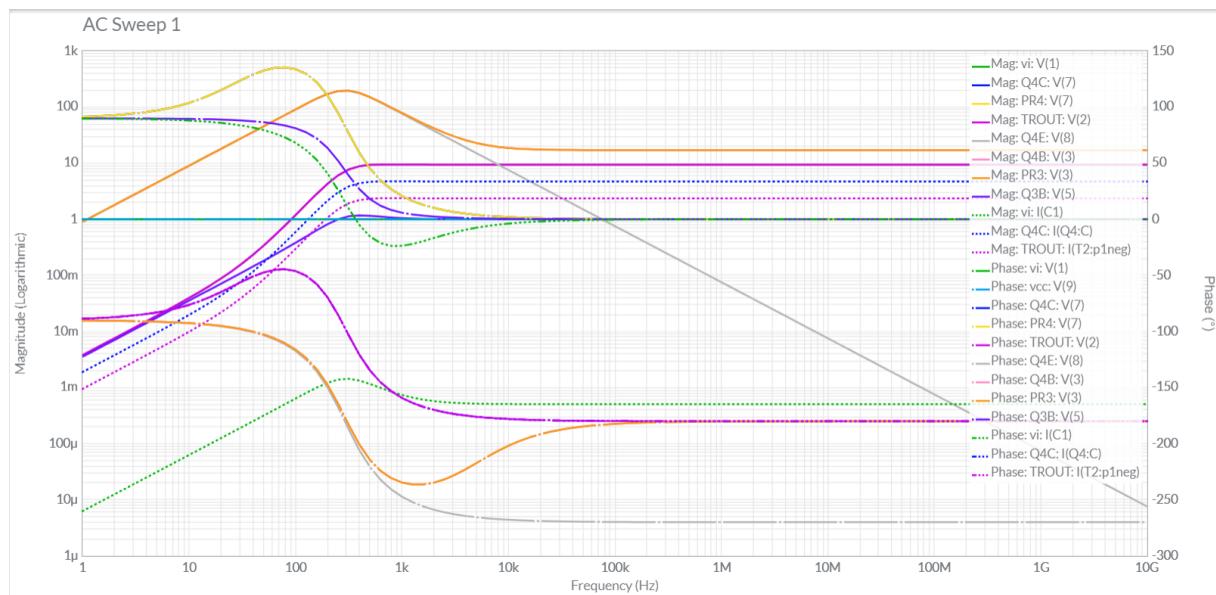
INTERACTIVE



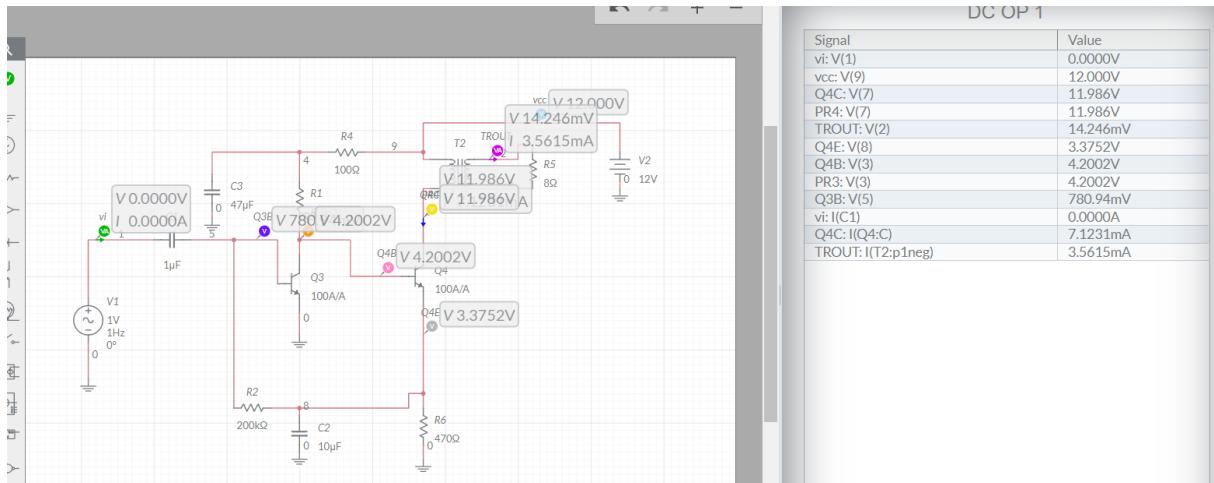
TRANSIENT



AC SWEEP

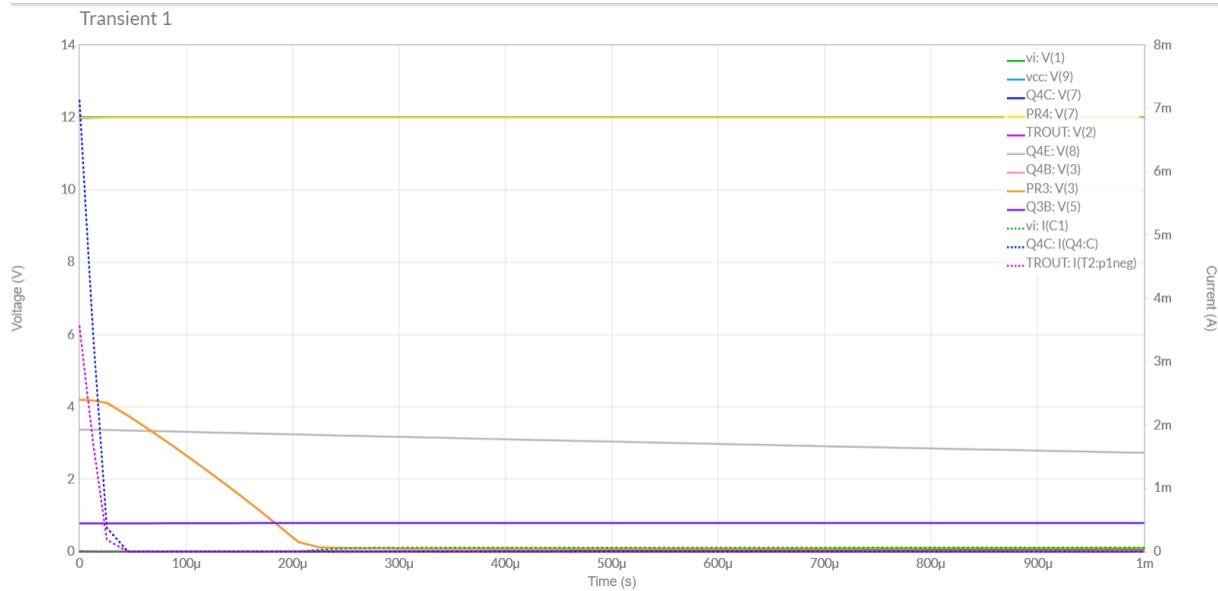


DC OP

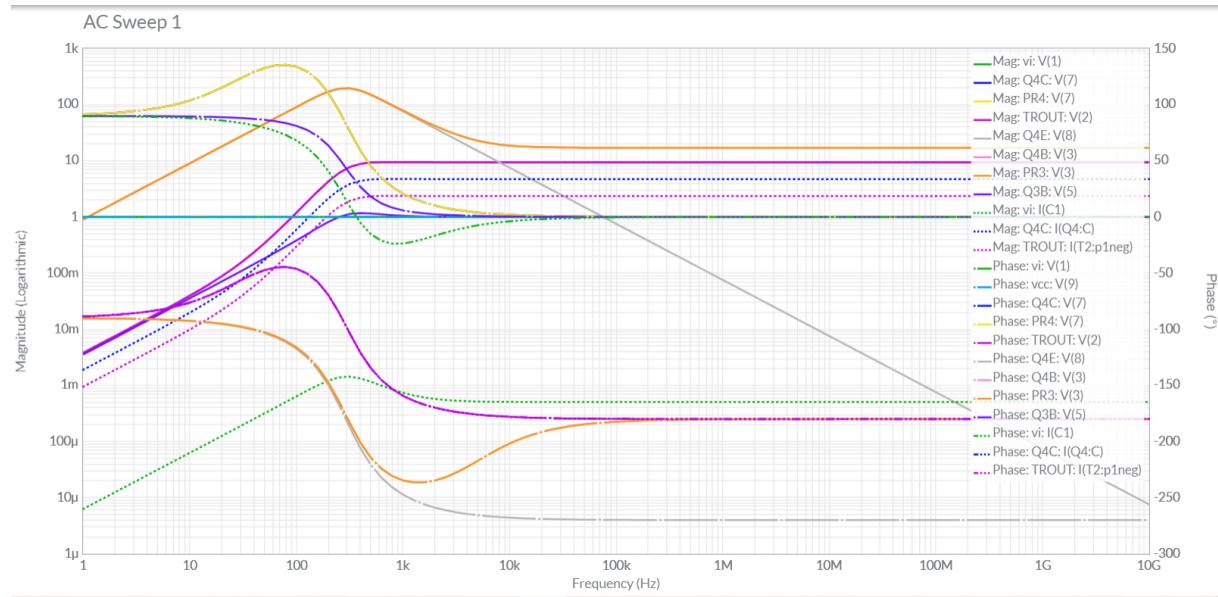


FREKANS DEĞERİ 10HZ İÇİN DENEY ÇIKTILARI:

TRANSIENT

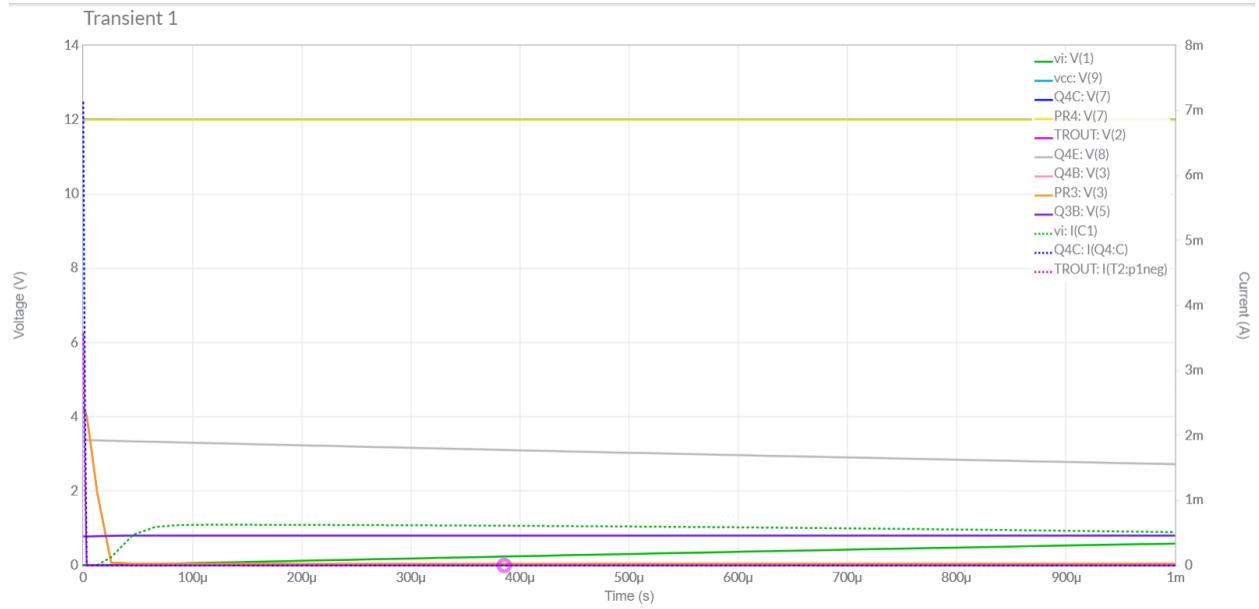


AC SWEEP

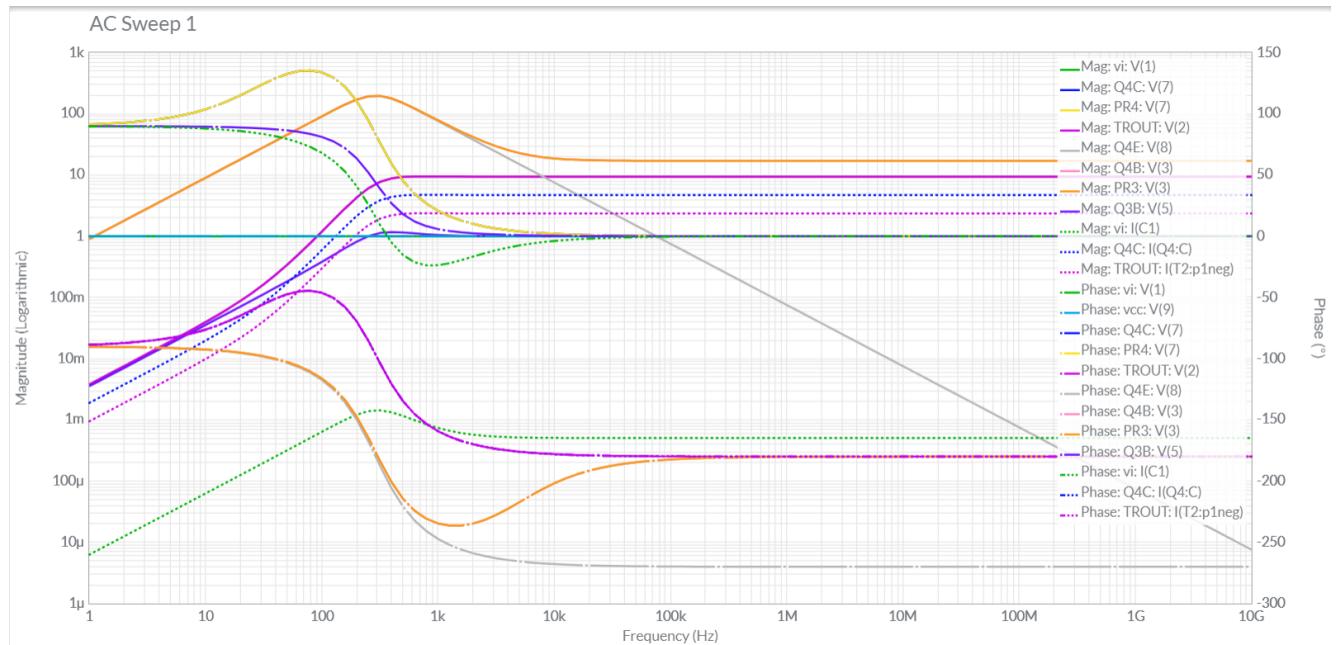


FREKANS DEĞERİ 100HZ İÇİN DENEY ÇIKTILARI:

TRANSIENT

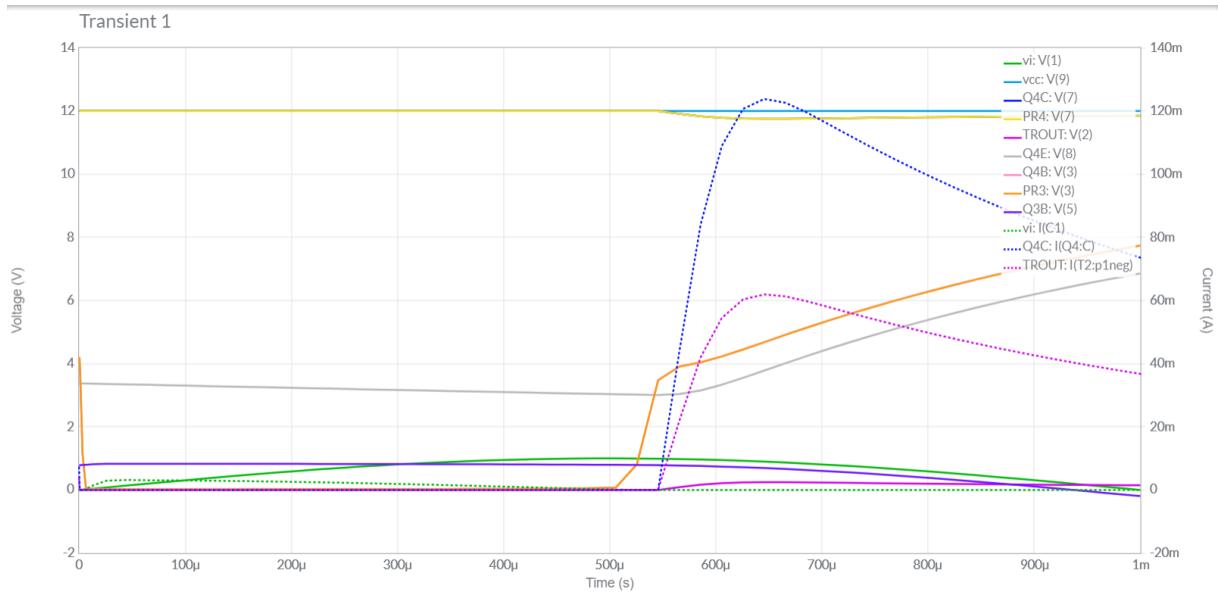


AC SWEEP

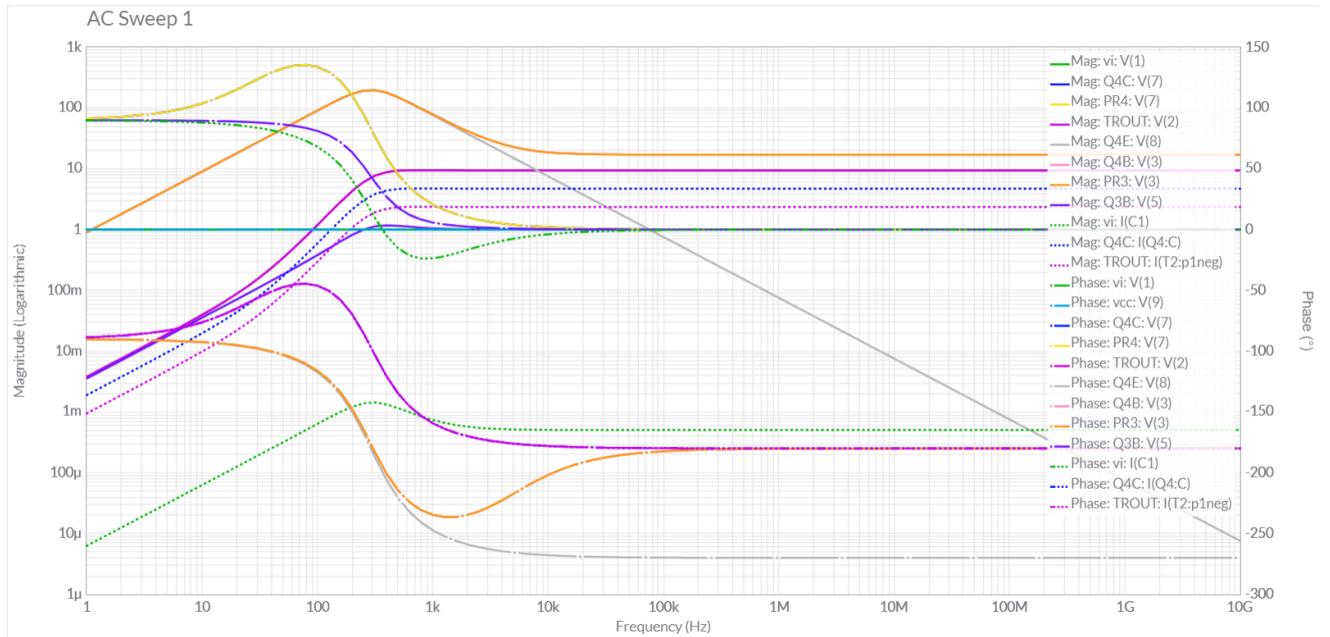


FREKANS DEĞERİ 500HZ İÇİN DENNEY ÇIKTILARI:

TRANSIENT

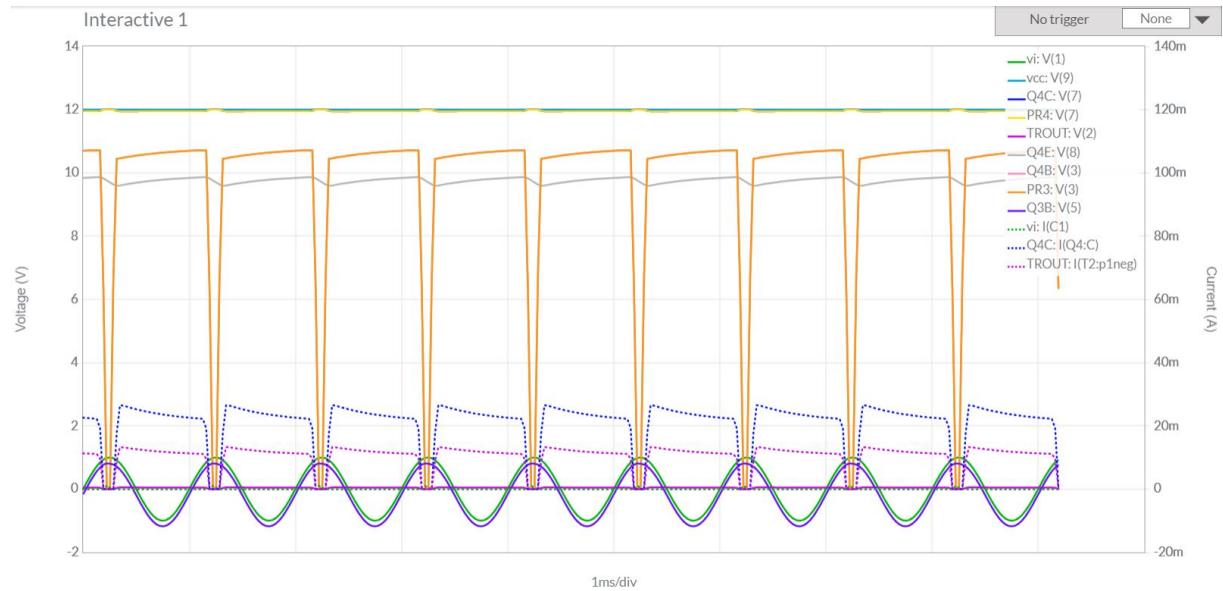


AC SWEEP

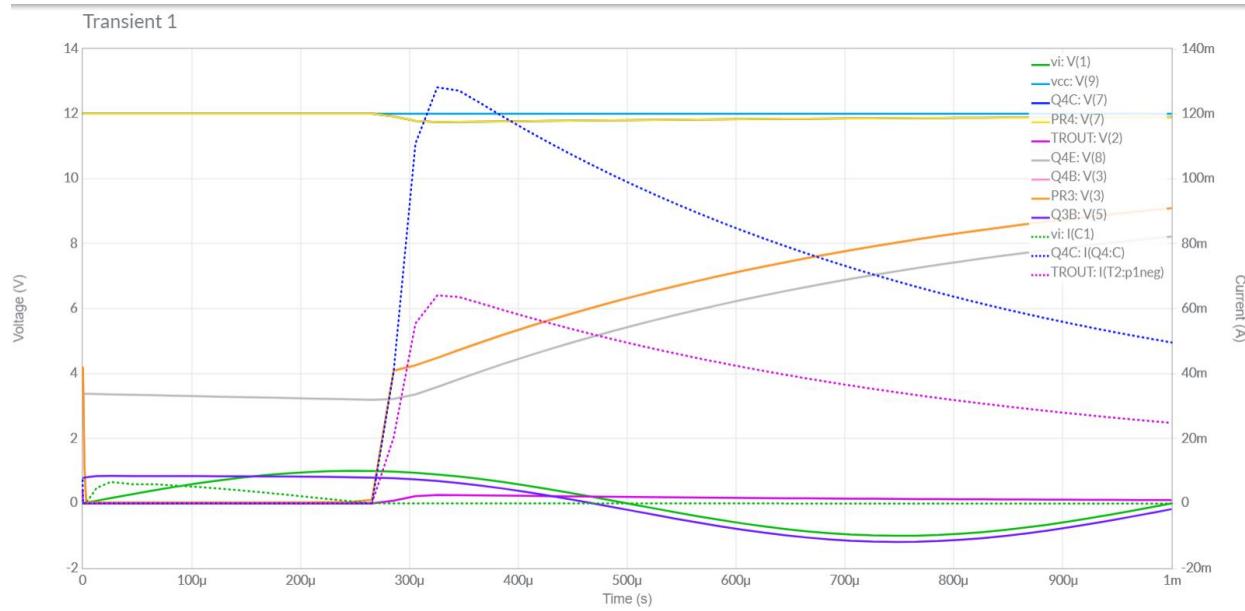


FREKANS DEĞERİ 1KHZ İÇİN DENEY ÇIKTILARI:

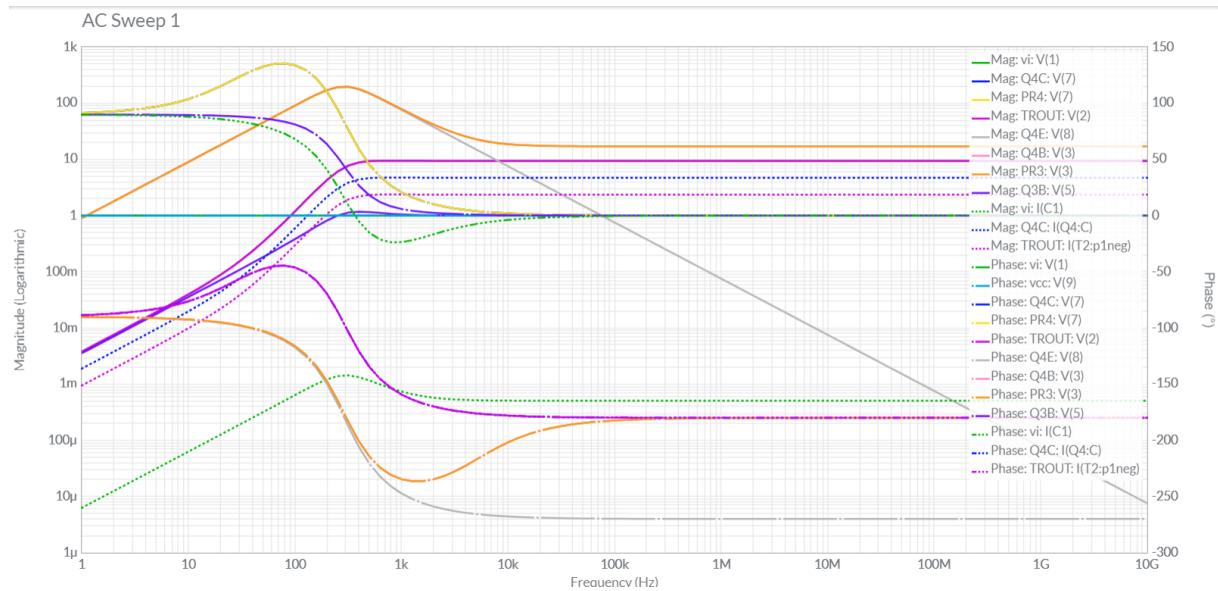
INTERACTIVE



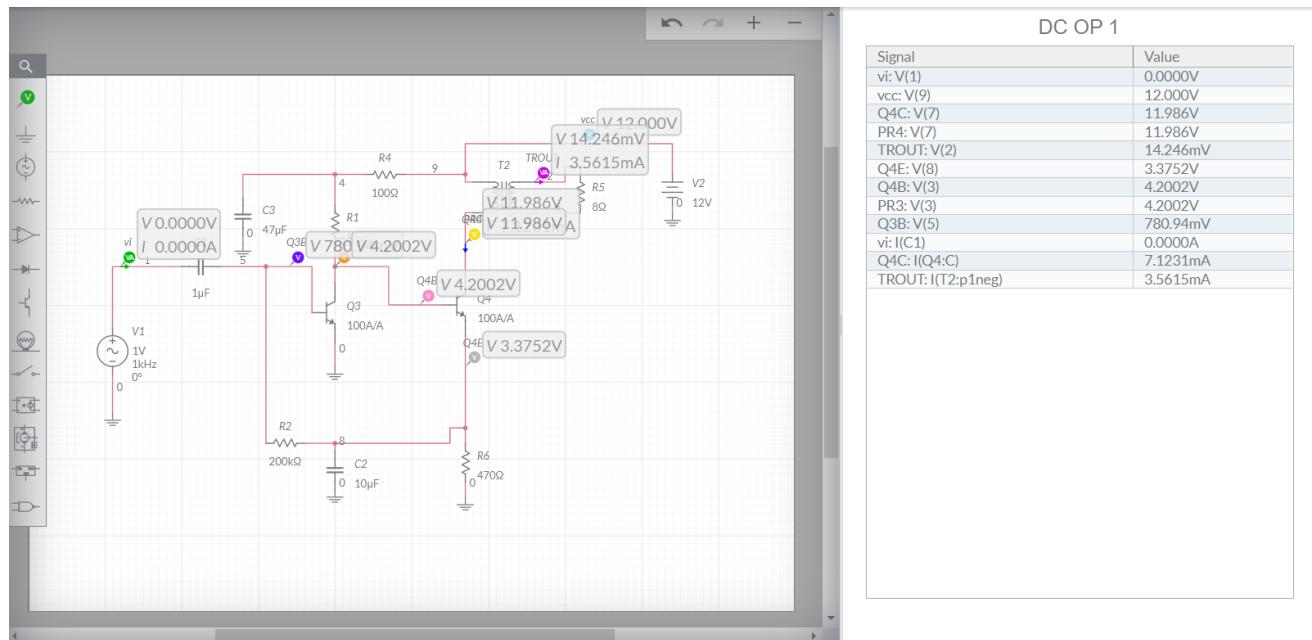
TRANSIENT



AC SWEEP

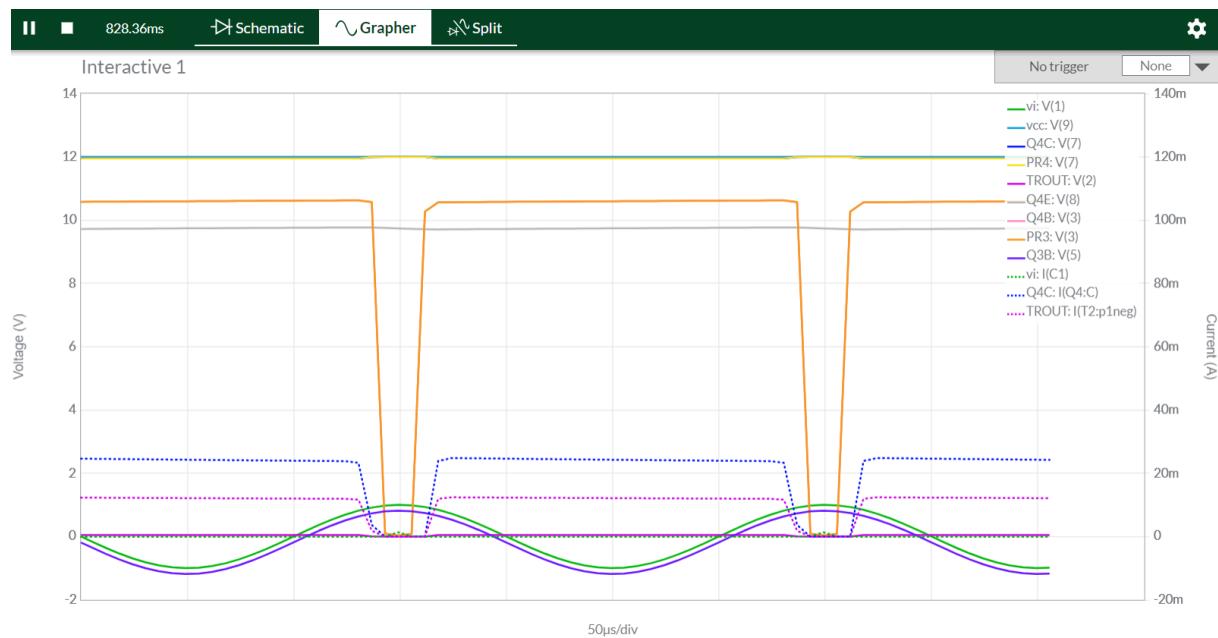


DC OP

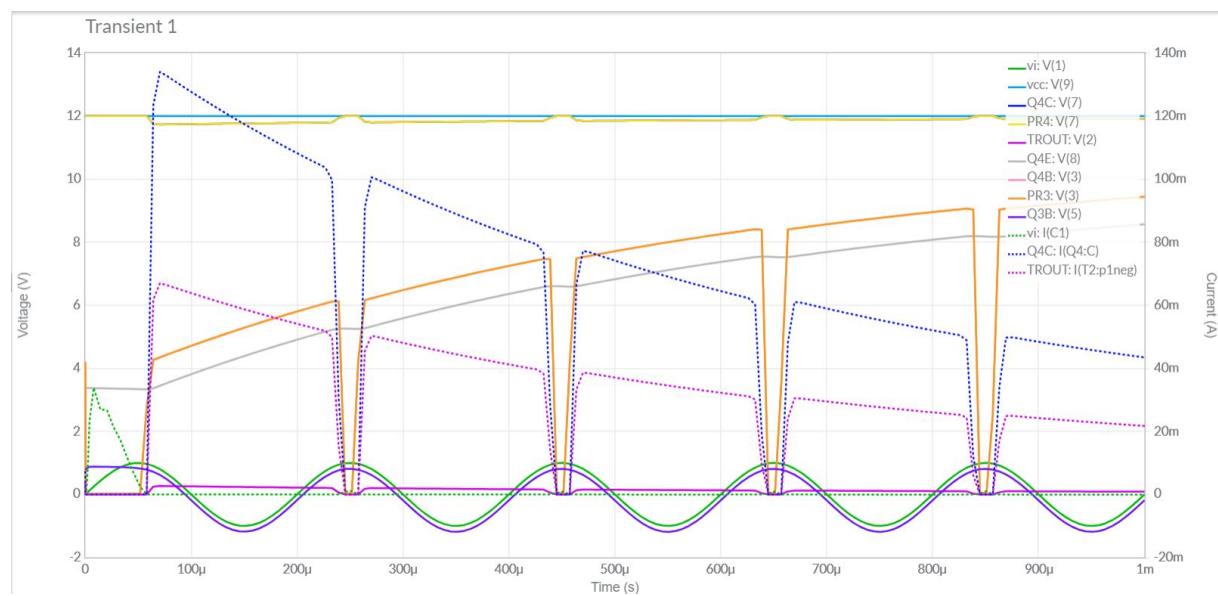


FREKANS DEĞERİ 5kHz İÇİN DENEY ÇIKTILARI:

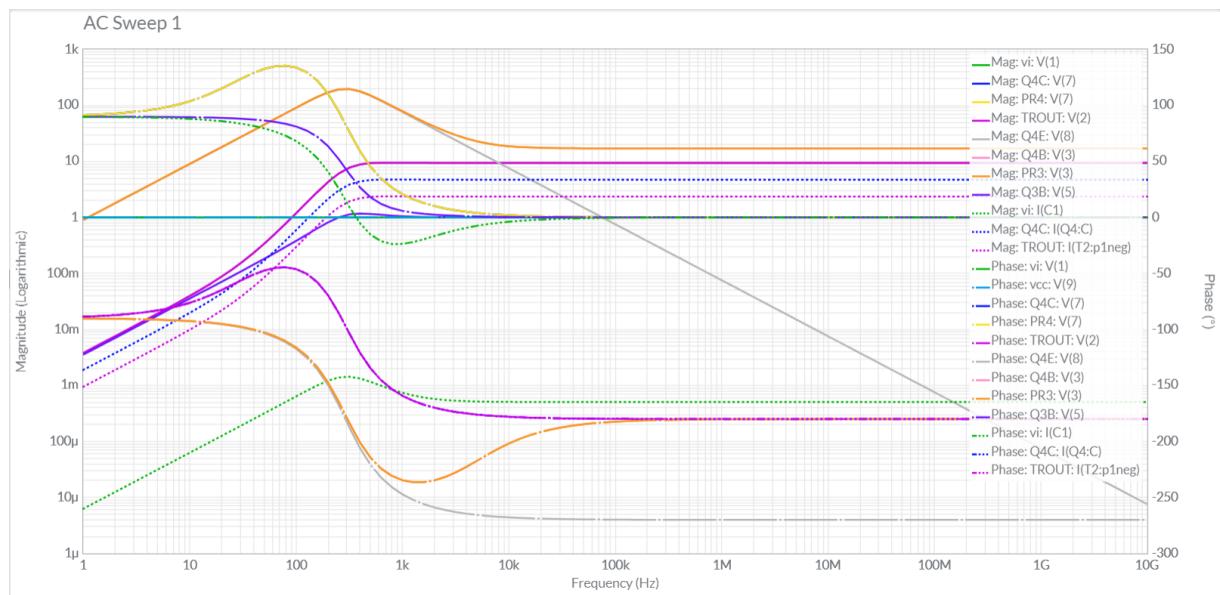
INTERACTIVE



TRANSIENT

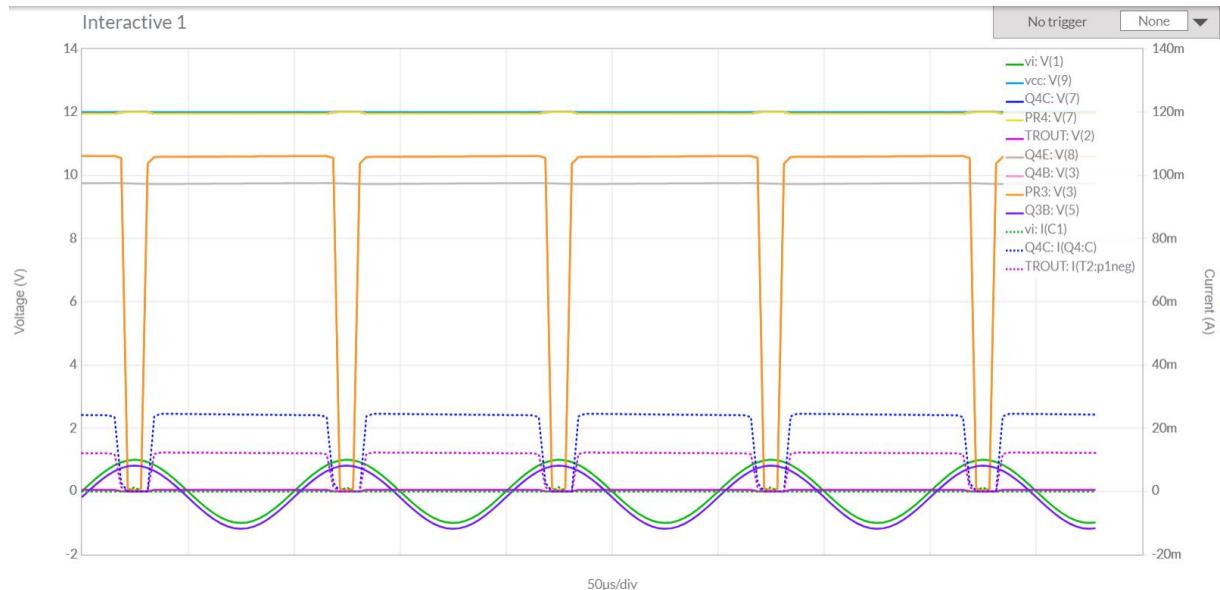


AC SWEEP

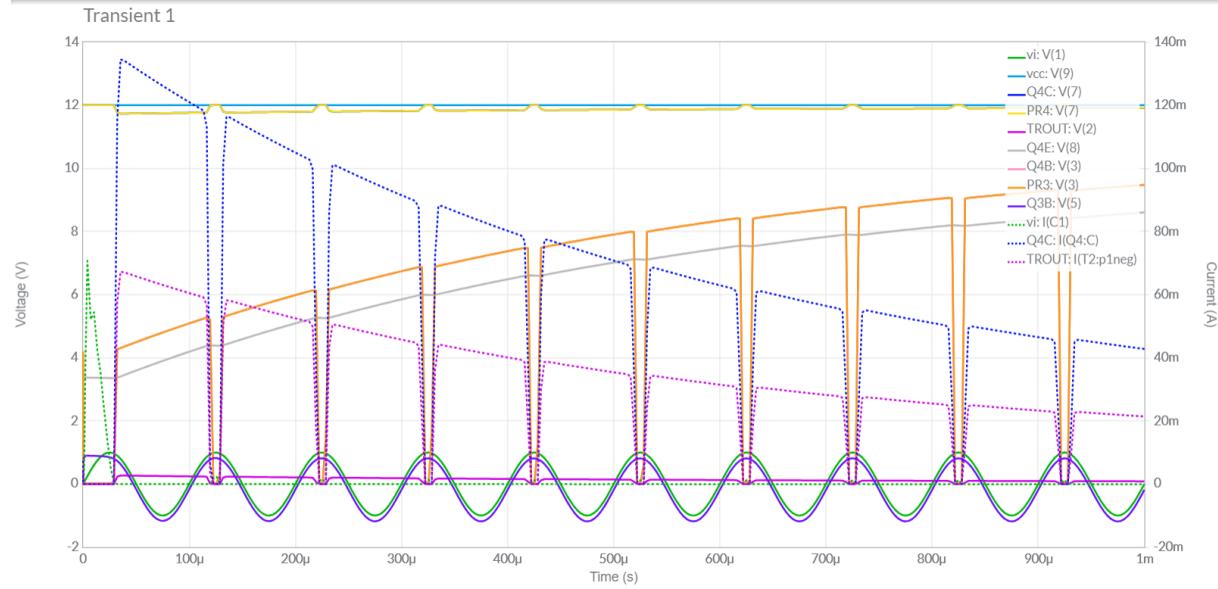


FREKANS DEĞERİ 10Khz İÇİN DENEY ÇIKTILARI:

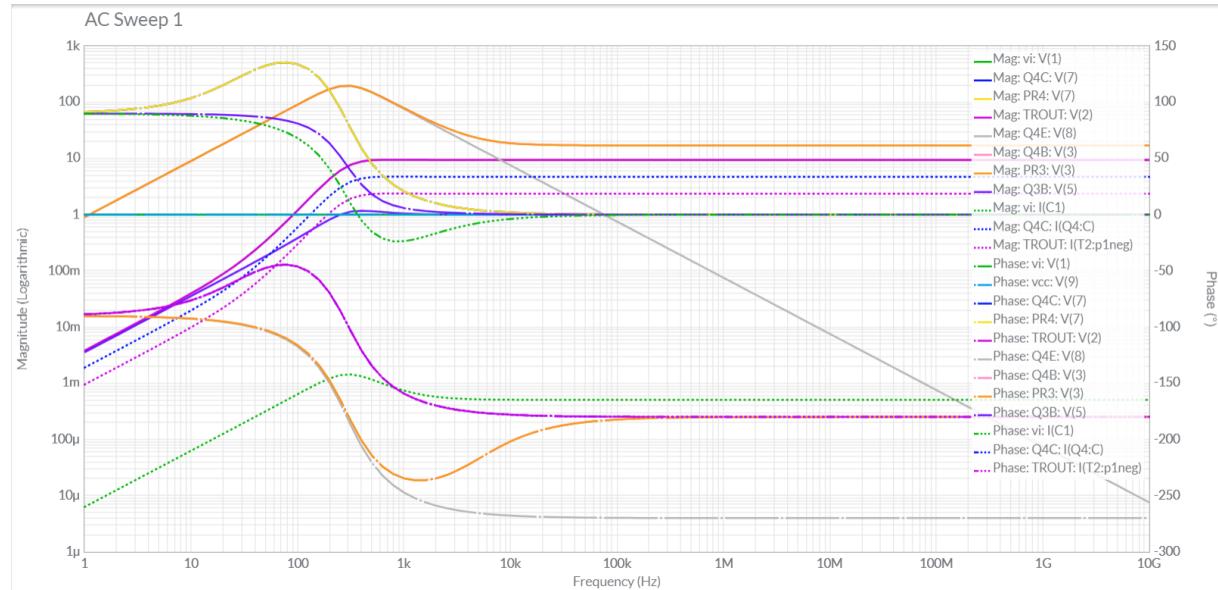
INTERACTIVE



TRANSIENT

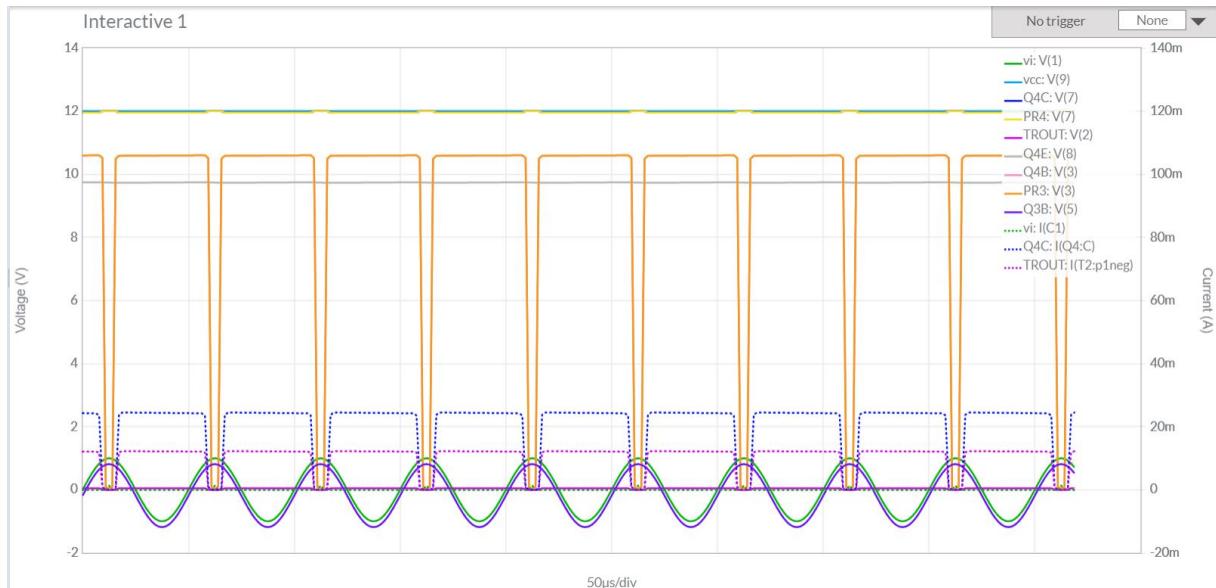


AC SWEEP

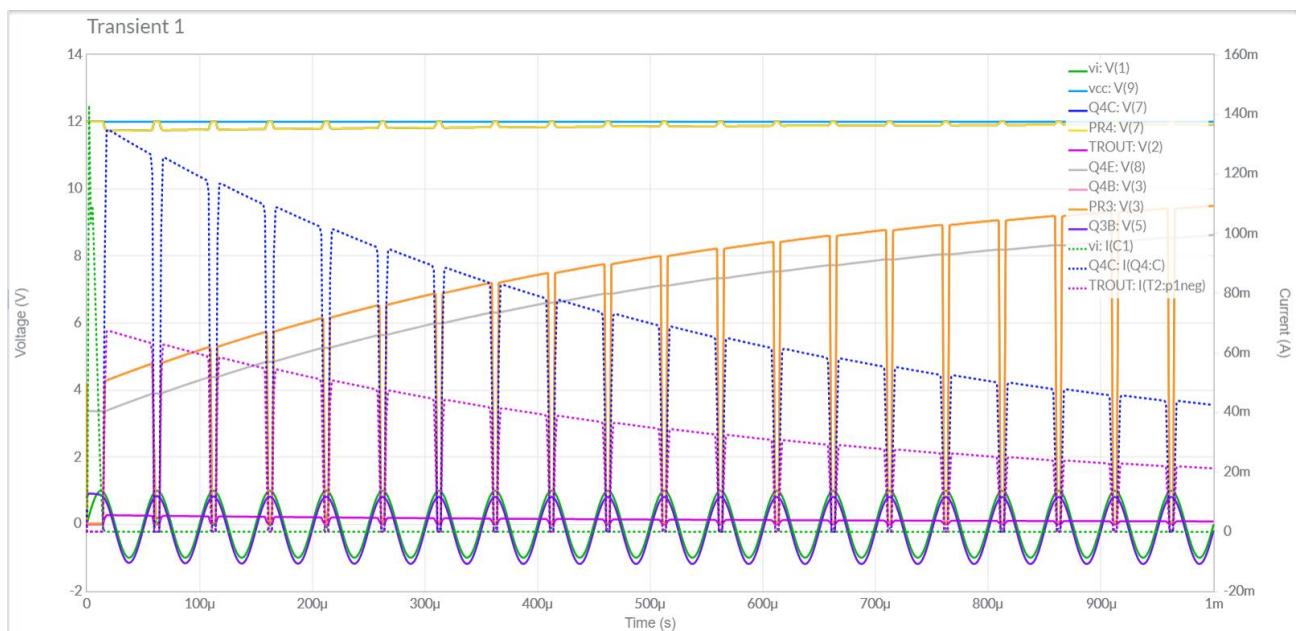


FREKANS DEĞERİ 20Khz İÇİN DENEY ÇIKTILARI:

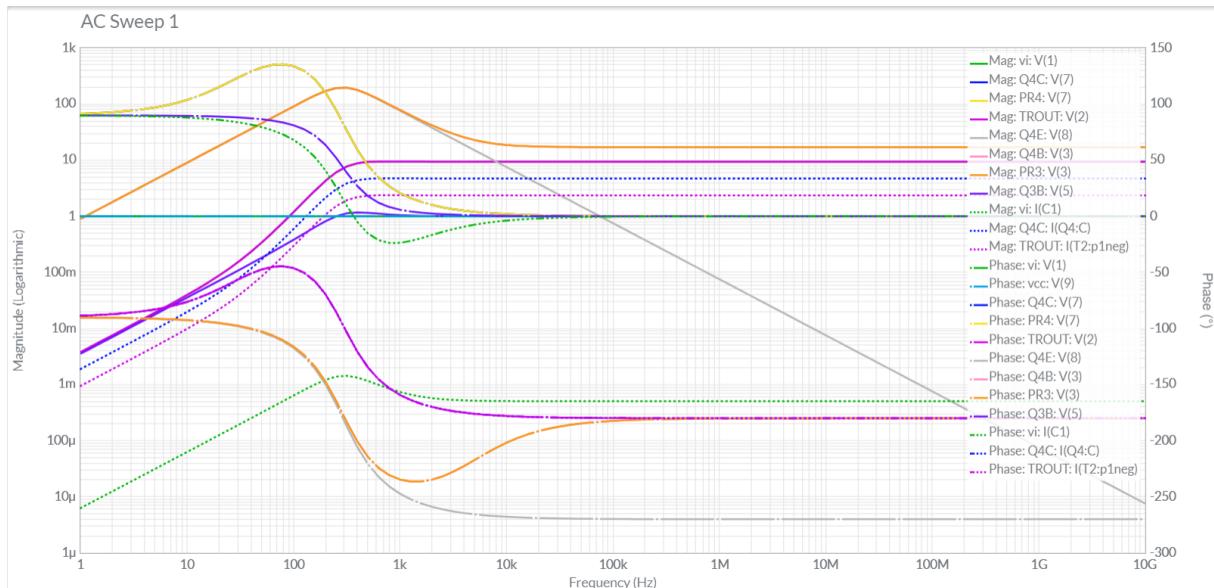
INTERACTIVE



TRANSIENT



AC SWEEP

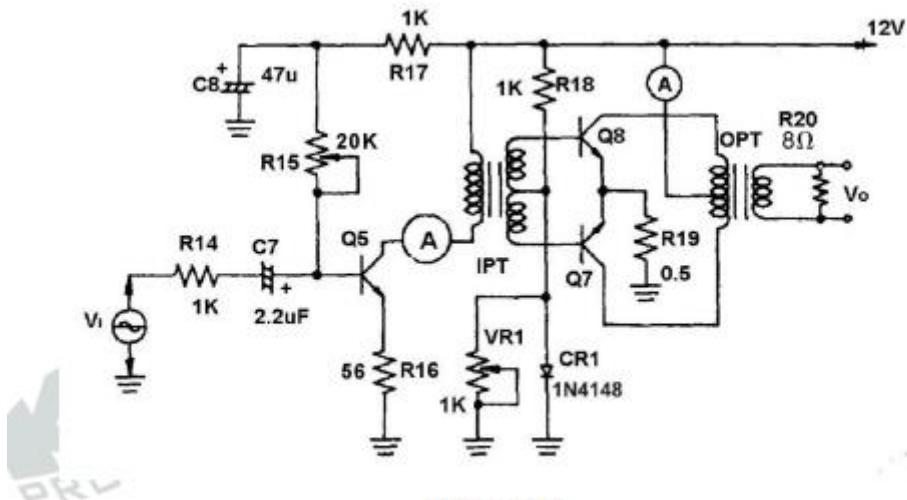


DENEYDEN ÇIKARILAN SONUÇLAR:

Transformatör kuplajlı yükselteç aşağıdaki özelliklere sahiptir:

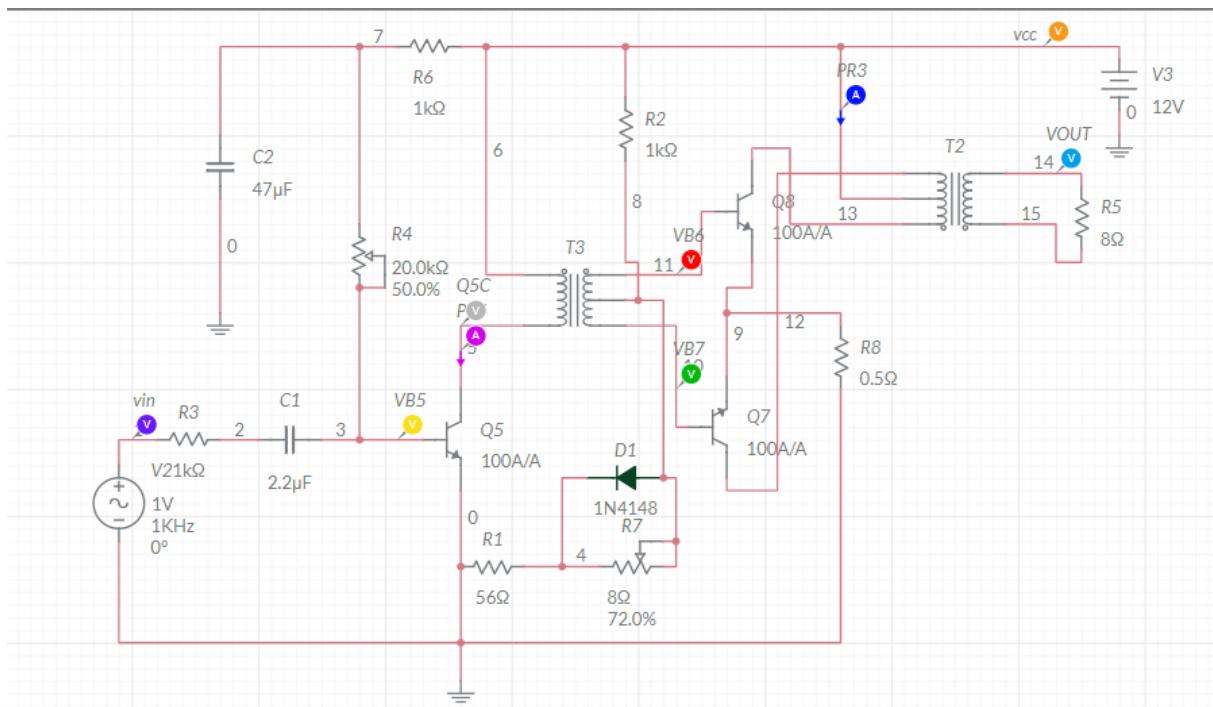
1. Transformatör kullanıldığı için katlar arasında empedans uydurmak kolaydır.
2. Transformatör kuplajlı yükseltecin frekans cevabı zayıftır.

DENEY 4-4 Çift-Uçlu Push-Pull Yükselteç

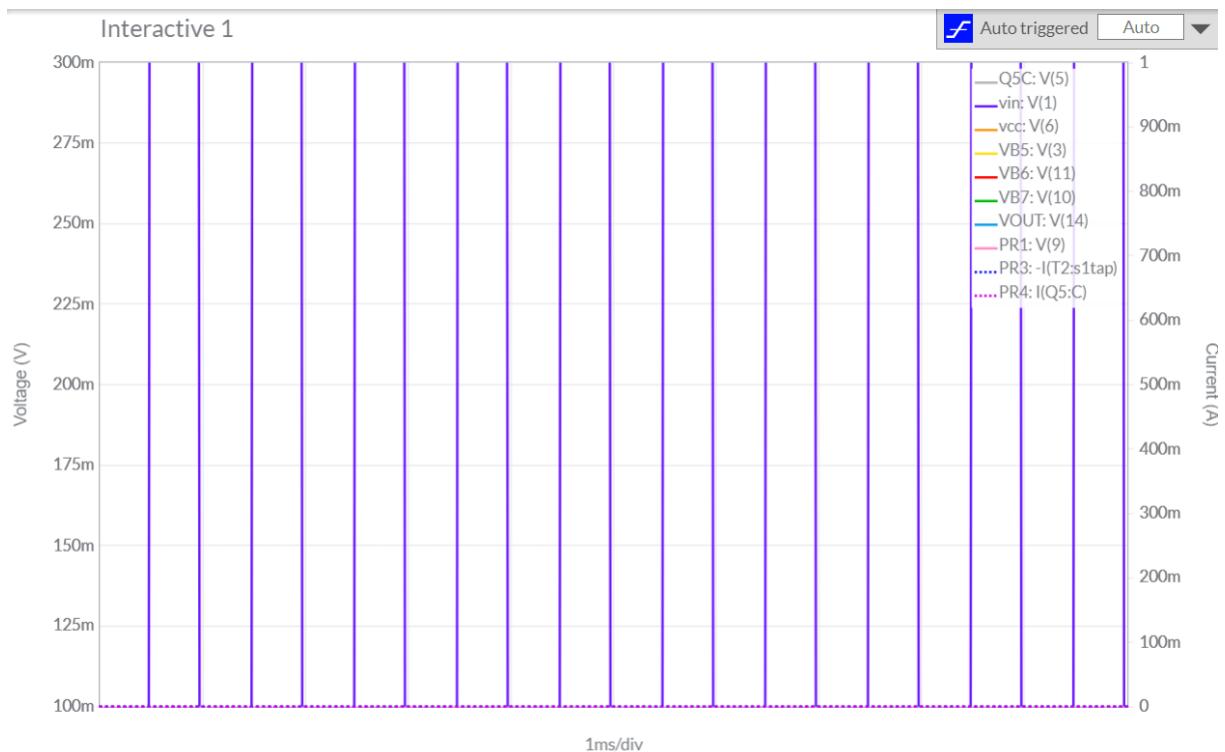


Şekil 7-4-11

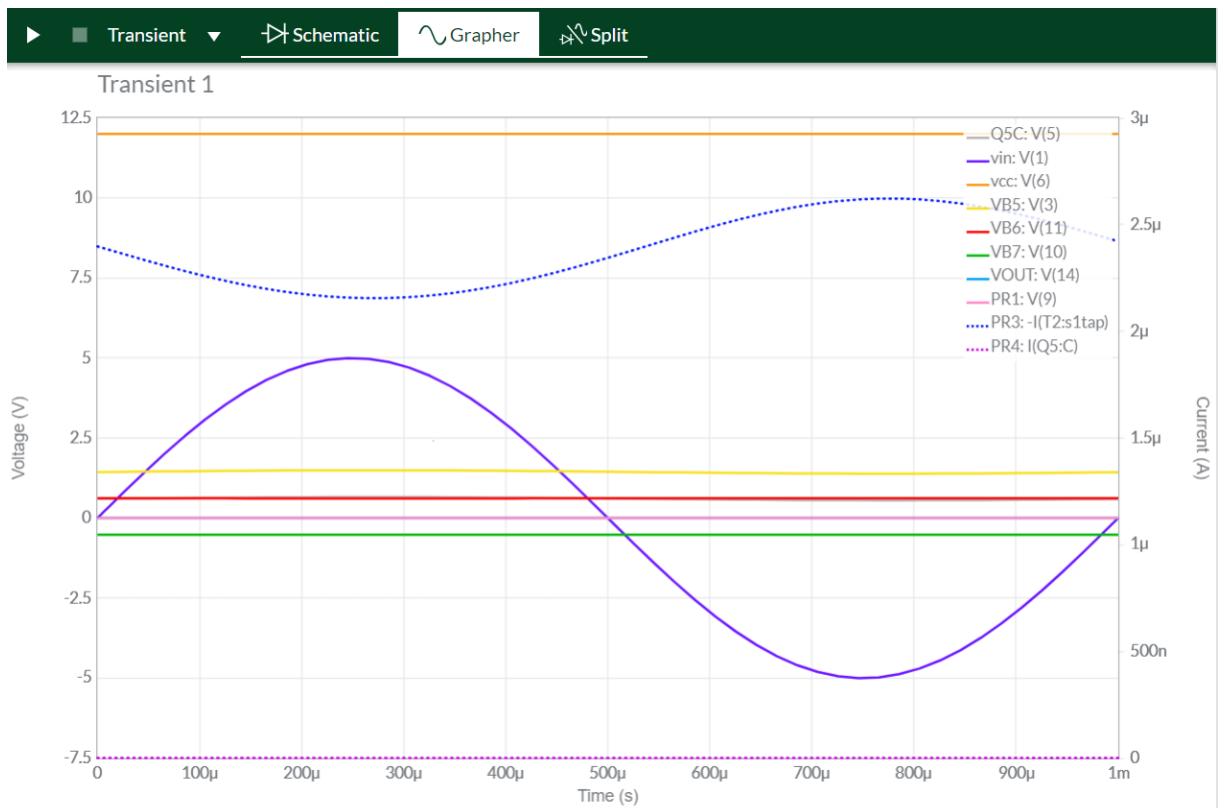
DENEY DEVRESİ MULTİSİM ÇİZİMİ



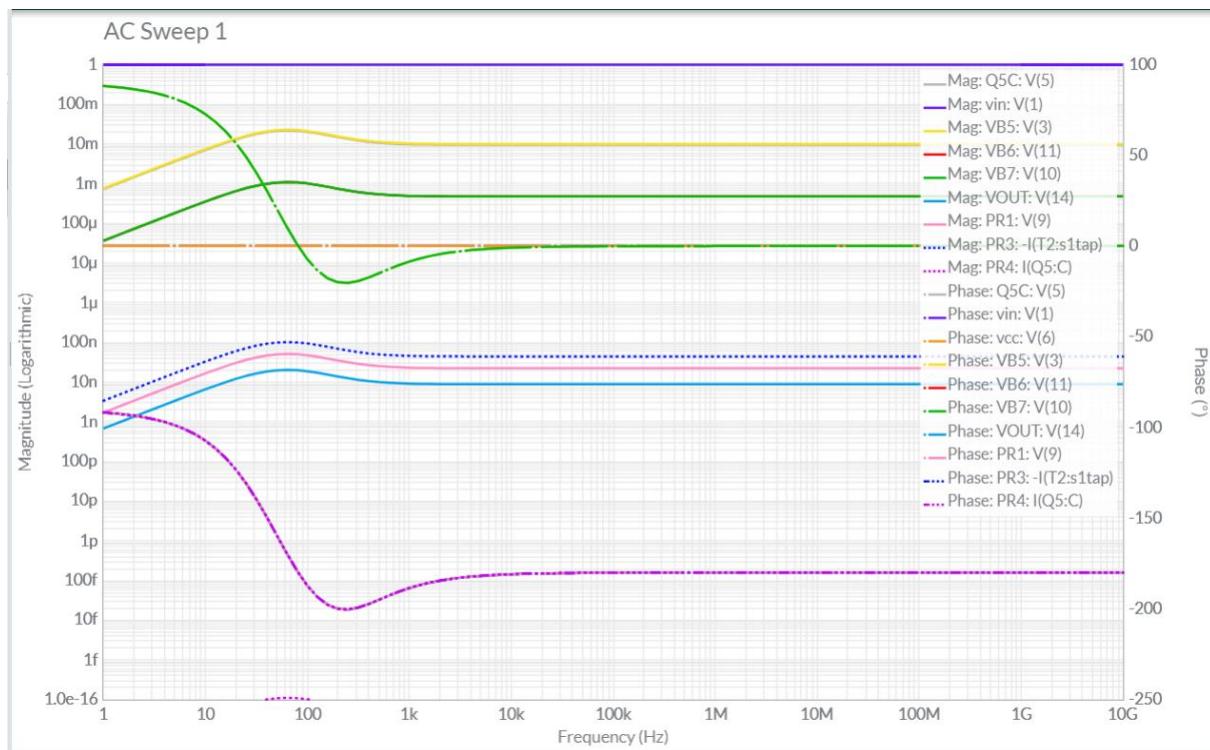
INTERACTIVE



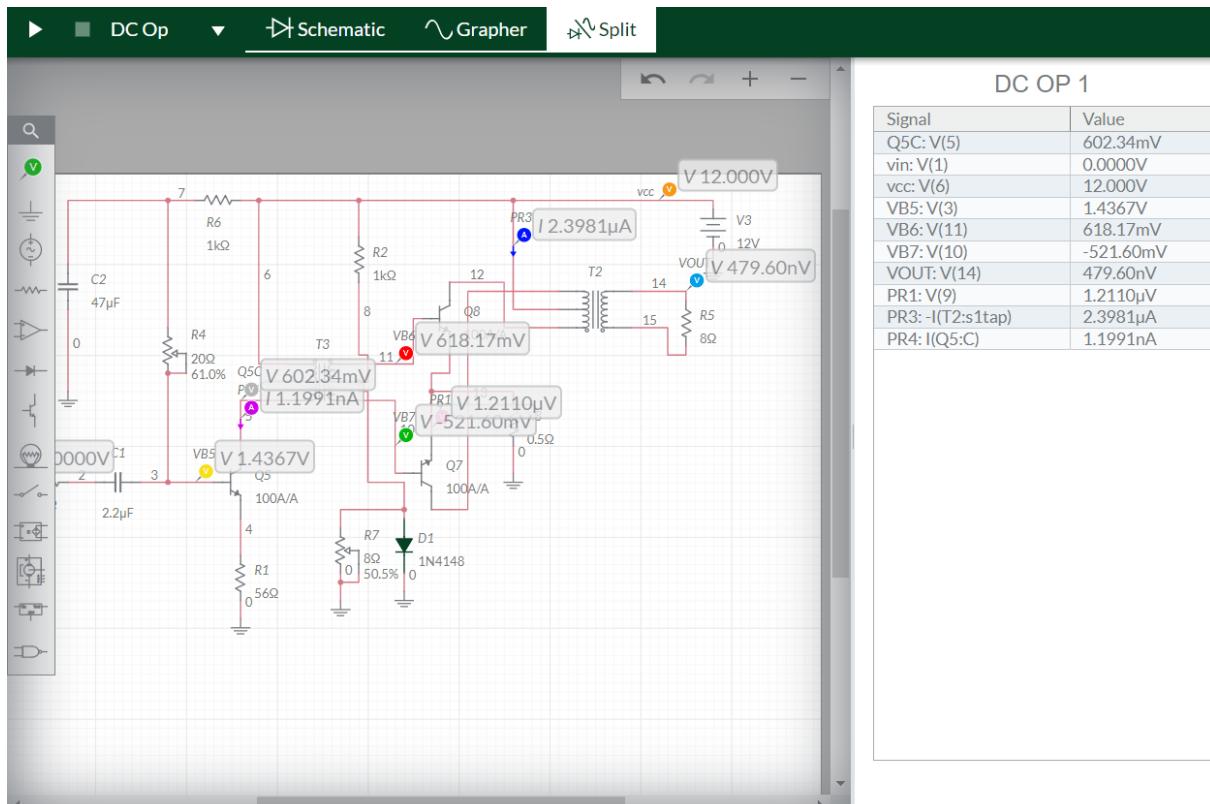
TRANSIENT



AC SWEEP

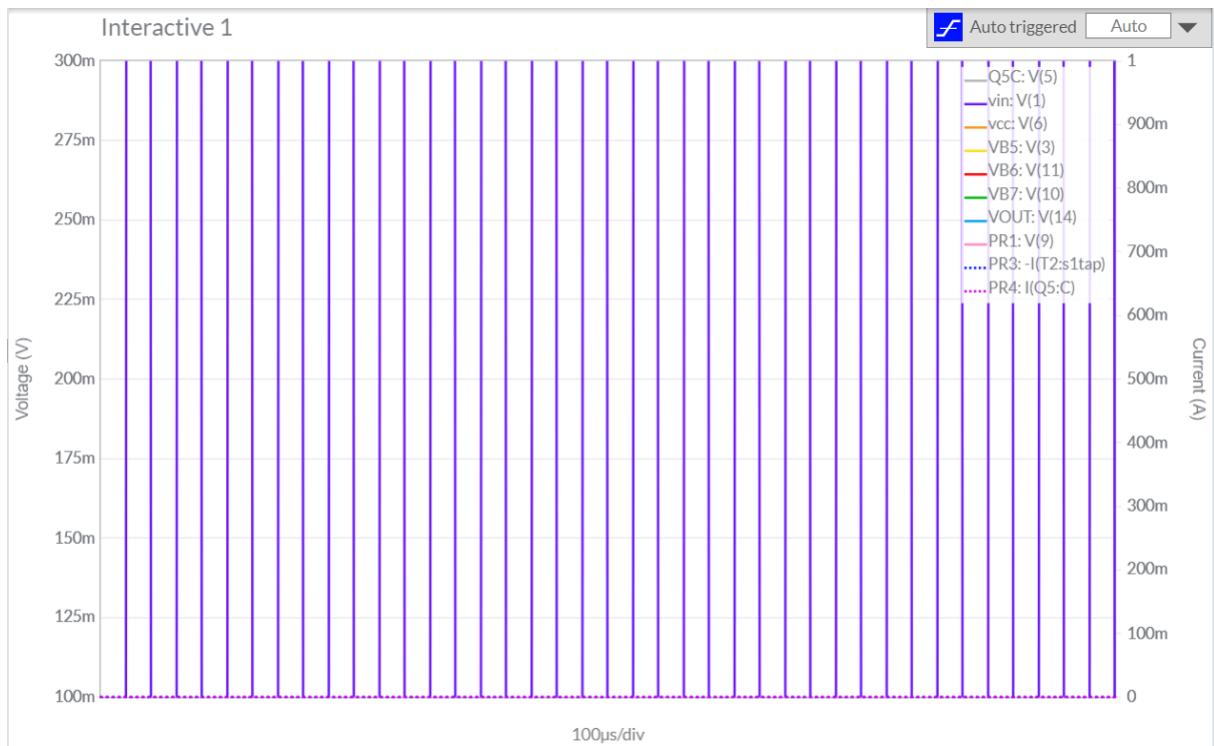


DC OP

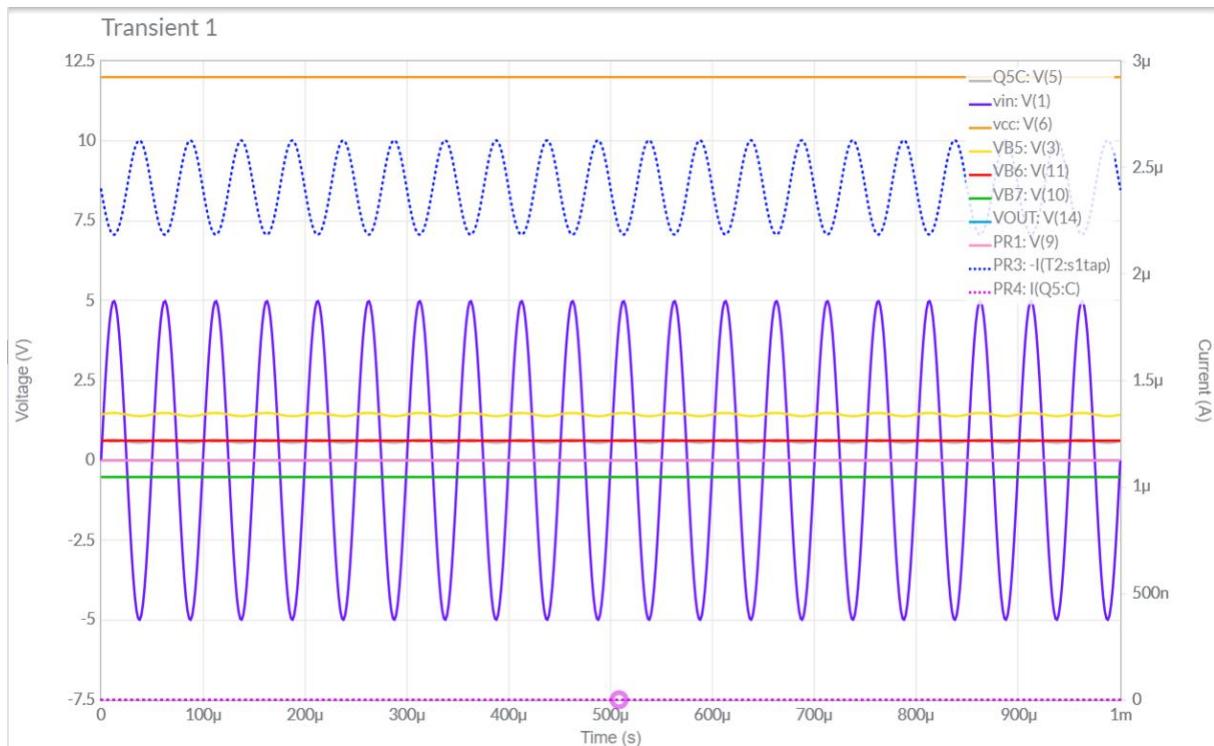


FREKANS YÜKSELTİLDİĞİNDE

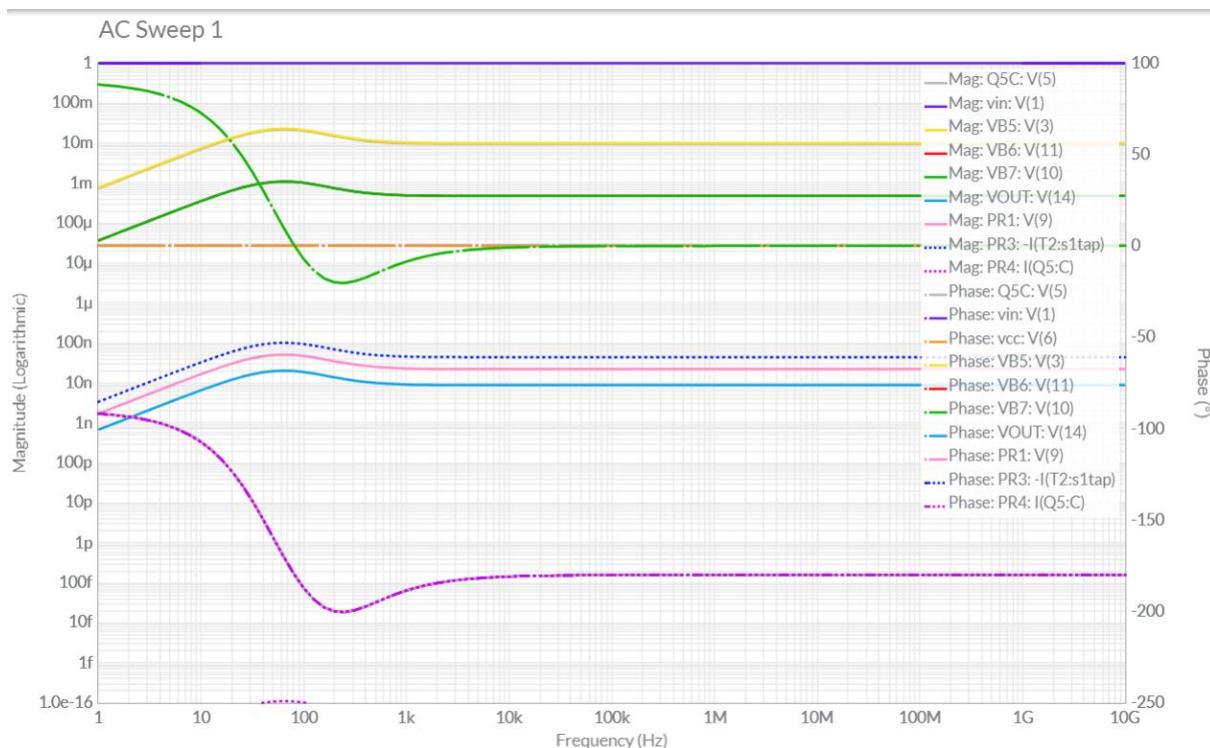
INTERACTIVE



TRANSIENT



AC SWEEP



DENEYDEN ÇIKARILAN SONUÇLAR:

Çift-uçlu push-pull yükselteç aşağıdaki özelliklere sahiptir:

1. Transformatör kullanıldığı için katlar arasındaki empedans uyumluluğunu sağlamak kolaydır.
2. Çift-uçlu push-pull yükseltecin frekans tepkisi kötüdür.
3. Yetersiz öngerilimleme durumunda geçiş bozulması meydana gelir.
4. Aynı güç kaynağı kullanılması durumunda, transformatör kuplajlı yükseltecin iki katı çıkış gücü verir.