

## **İÇİNDEKİLER**

### **1.PROJE 1 (DRIVER SUPPLY)**

**1.1 MALZEME BİLGİSİ**

**1.2 ENTEGRELERİN DATASHEETLERİ**

**1.3 DEVRENİN ISIS GÖRÜNTÜLERİ**

**1.4 ISIS SONUÇLARI**

**1.5 HAZIRLIK SORULARI**

### **2.PROJE 2 (OSILATOR TASARIMI)**

**2.1 MALZEME BİLGİSİ**

**2.2 DEVRENİN ISIS SİMÜLASYONU**

**2.3 OSİLOSKOPTA ÖLÇÜLEN DEĞERLER**

**2.4 DEVREMİN GENEL GÖRÜNTÜSÜ**

**2.5 TEORİK BİLGİLER**

### **3.PROJE 2.2 (PULSE GENERATOR)**

**3.1 MALZEME BİLGİSİ**

**3.2 PROJENİN ISIS GÖRÜNTÜSÜ**

**3.4 ENTEGRELERİN İÇ YAPILARI**

**3.5 OSİLOSKOP İLE ÇLÇÜMLER**

**3.6 SLOW RATE VEKAYNAKÇA**

## PROJE 1 : DRİVER POWER SUPPLY

Malzemeler

Mavi Led

Direnç (470 R)

LM7815

LM7812

LM7809

LM7805

35V 1000uF

160V 47uF

16V 47uF\*3

35V 0.1uF\*4

Zil Teli

Priz Ve Kablo

BreadBoard

1n4007\*4

Transformatör

220V-24V/25VA

## Entegrelerin Datasheetleri

### LM7805 Datasheet

#### **Electrical Characteristics (LM7805)**

Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 10\text{V}$ ,  $C_I = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$		4.8	5.0	5.2	V
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 7\text{V}$ to $20\text{V}$		4.75	5.0	5.25	
Regline	Line Regulation <sup>(1)</sup>	$T_J = +25^{\circ}\text{C}$	$V_O = 7\text{V}$ to $25\text{V}$	—	4.0	100	mV
			$V_I = 8\text{V}$ to $12\text{V}$	—	1.6	50.0	
Regload	Load Regulation <sup>(1)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA}$ to $1.5\text{A}$	—	9.0	100	mV
			$I_O = 250\text{mA}$ to $750\text{mA}$	—	4.0	50.0	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$		—	5.0	8.0	mA
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA}$ to $1\text{A}$		—	0.03	0.5	mA
		$V_I = 7\text{V}$ to $25\text{V}$		—	0.3	1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(2)</sup>	$I_O = 5\text{mA}$		—	-0.8	—	mV/ $^{\circ}\text{C}$
$V_N$	Output Noise Voltage	$f = 10\text{Hz}$ to $100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$		—	42.0	—	$\mu\text{V}/V_O$
RR	Ripple Rejection <sup>(2)</sup>	$f = 120\text{Hz}$ , $V_O = 8\text{V}$ to $18\text{V}$		62.0	73.0	—	dB
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$		—	2.0	—	V
$r_O$	Output Resistance <sup>(2)</sup>	$f = 1\text{kHz}$		—	15.0	—	$\text{m}\Omega$
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		—	230	—	mA
$I_{\text{PK}}$	Peak Current <sup>(2)</sup>	$T_J = +25^{\circ}\text{C}$		—	2.2	—	A

### LM7809 Datasheet

#### **Electrical Characteristics (LM7809)**

(Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 15\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$		8.65	9.0	9.35	V
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 11.5\text{V}$ to $24\text{V}$		8.6	9.0	9.4	
Line Regulation (Note 8)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{V}$ to $25\text{V}$	—	6.0	180	mV
			$V_I = 12\text{V}$ to $17\text{V}$	—	2.0	90.0	
Load Regulation (Note 8)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA}$ to $1.5\text{mA}$	—	12.0	180	mV
			$I_O = 250\text{mA}$ to $750\text{mA}$	—	4.0	90.0	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$		—	5.0	8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA}$ to $1\text{A}$		—	—	0.5	mA
		$V_I = 11.5\text{V}$ to $26\text{V}$		—	—	1.3	
Output Voltage Drift (Note 9)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$		—	-1.0	—	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$		—	58.0	—	$\mu\text{V}/V_O$
Ripple Rejection (Note 9)	RR	$f = 120\text{Hz}$ , $V_O = 13\text{V}$ to $23\text{V}$		56.0	71.0	—	dB
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$		—	2.0	—	V
Output Resistance (Note 9)	$r_O$	$f = 1\text{kHz}$		—	17.0	—	$\text{m}\Omega$
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		—	250	—	mA
Peak Current (Note 9)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$		—	2.2	—	A

## LM7812 Datasheet

### Electrical Characteristics (LM7812)

(Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 19\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$		11.5	12.0	12.5	V
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 14.5\text{V}$ to $27\text{V}$		11.4	12.0	12.6	
Line Regulation (Note 12)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V}$ to $30\text{V}$	–	10.0	240	mV
			$V_I = 16\text{V}$ to $22\text{V}$	–	3.0	120	
Load Regulation (Note 12)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA}$ to $1.5\text{mA}$	–	11.0	240	mV
			$I_O = 250\text{mA}$ to $750\text{mA}$	–	5.0	120	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$		–	5.1	8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA}$ to $1\text{A}$		–	0.1	0.5	mA
		$V_I = 14.5\text{V}$ to $30\text{V}$		–	0.5	1.0	
Output Voltage Drift (Note 13)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$		–	-1.0	–	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$		–	76.0	–	$\mu\text{V}/V_O$
Ripple Rejection (Note 13)	RR	$f = 120\text{Hz}$ , $V_I = 15\text{V}$ to $25\text{V}$		55.0	71.0	–	dB
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$		–	2.0	–	V
Output Resistance (Note 13)	rO	$f = 1\text{KHz}$		–	18.0	–	$\text{m}\Omega$
Short Circuit Current	$I_{SC}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		–	230	–	mA
Peak Current (Note 13)	$I_{PK}$	$T_J = +25^{\circ}\text{C}$		–	2.2	–	A

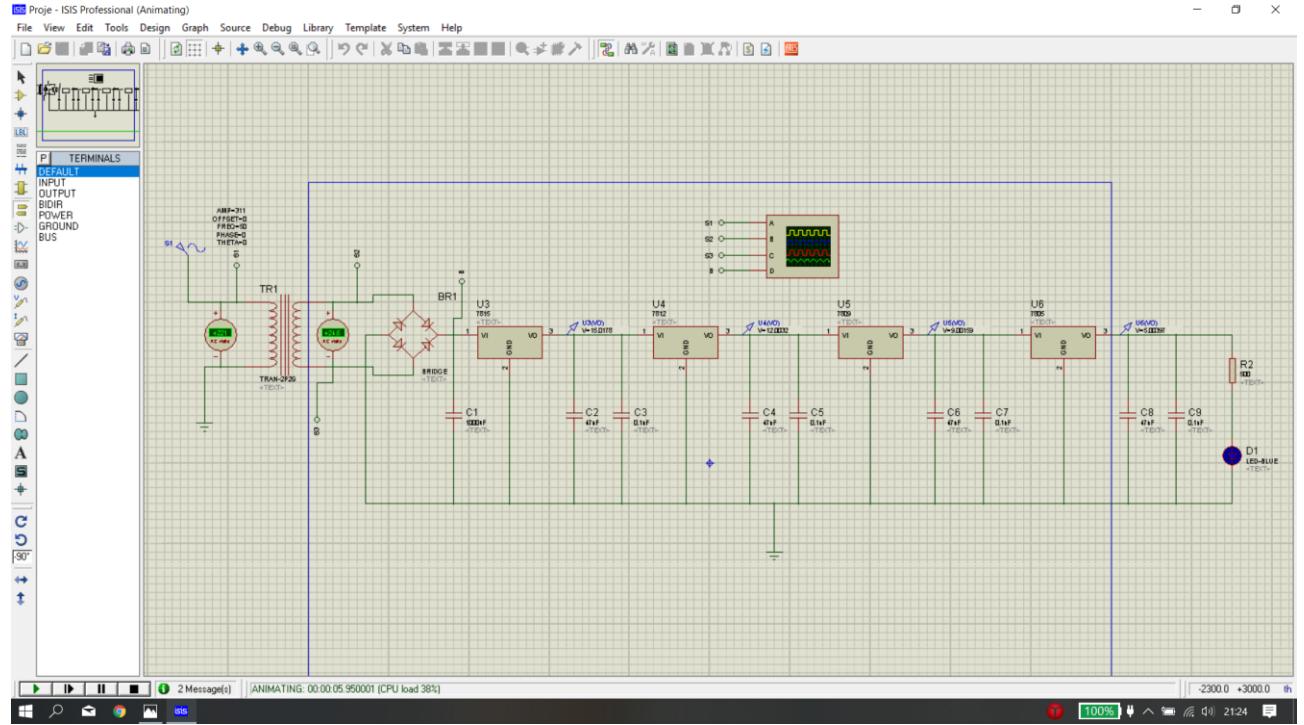
## LM7815 Datasheet

### Electrical Characteristics (LM7815)

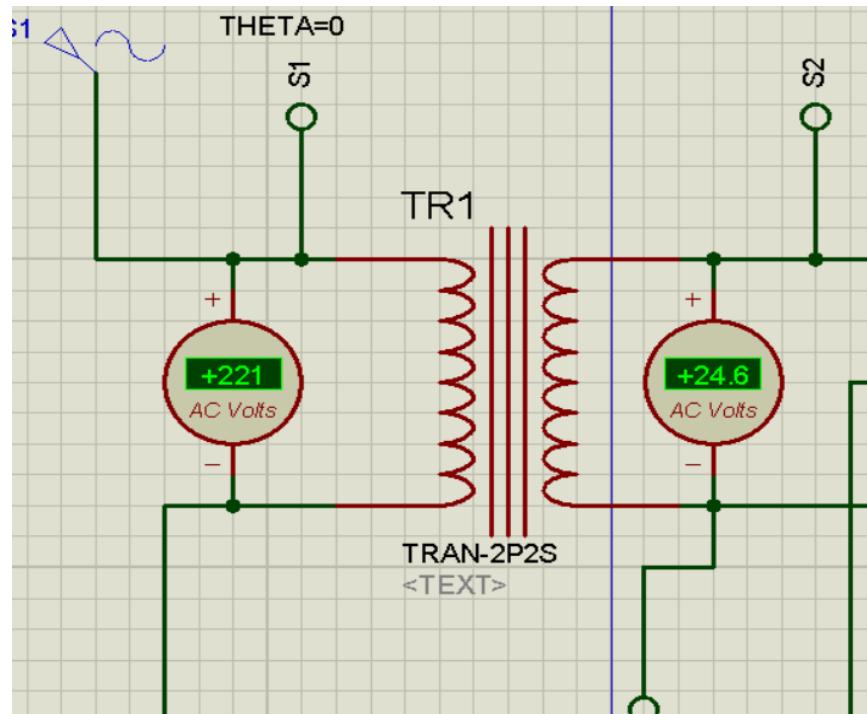
(Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 23\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

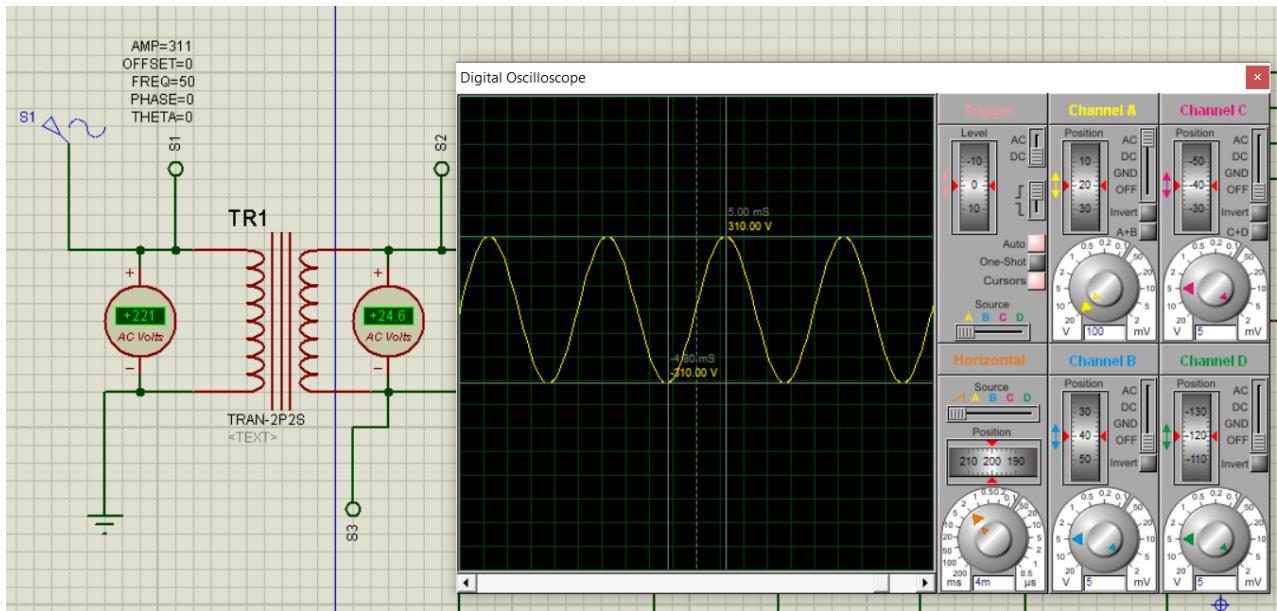
Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$		14.4	15.0	15.6	V
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 17.5\text{V}$ to $30\text{V}$		14.25	15.0	15.75	
Line Regulation (Note 14)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{V}$ to $30\text{V}$	–	11.0	300	mV
			$V_I = 20\text{V}$ to $26\text{V}$	–	3.0	150	
Load Regulation (Note 14)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA}$ to $1.5\text{mA}$	–	12.0	300	mV
			$I_O = 250\text{mA}$ to $750\text{mA}$	–	4.0	150	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$		–	5.2	8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA}$ to $1\text{A}$		–	–	0.5	mA
		$V_I = 17.5\text{V}$ to $30\text{V}$		–	–	1.0	
Output Voltage Drift (Note 15)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$		–	-1.0	–	mV/ $^{\circ}\text{C}$
Output Noise Voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$		–	90.0	–	$\mu\text{V}/V_O$
Ripple Rejection (Note 15)	RR	$f = 120\text{Hz}$ , $V_I = 18.5\text{V}$ to $28.5\text{V}$		54.0	70.0	–	dB
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$		–	2.0	–	V
Output Resistance (Note 15)	rO	$f = 1\text{KHz}$		–	19.0	–	$\text{m}\Omega$
Short Circuit Current	$I_{SC}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$		–	250	–	mA
Peak Current (Note 15)	$I_{PK}$	$T_J = +25^{\circ}\text{C}$		–	2.2	–	A

## Devrenin Genel Görüntüsü



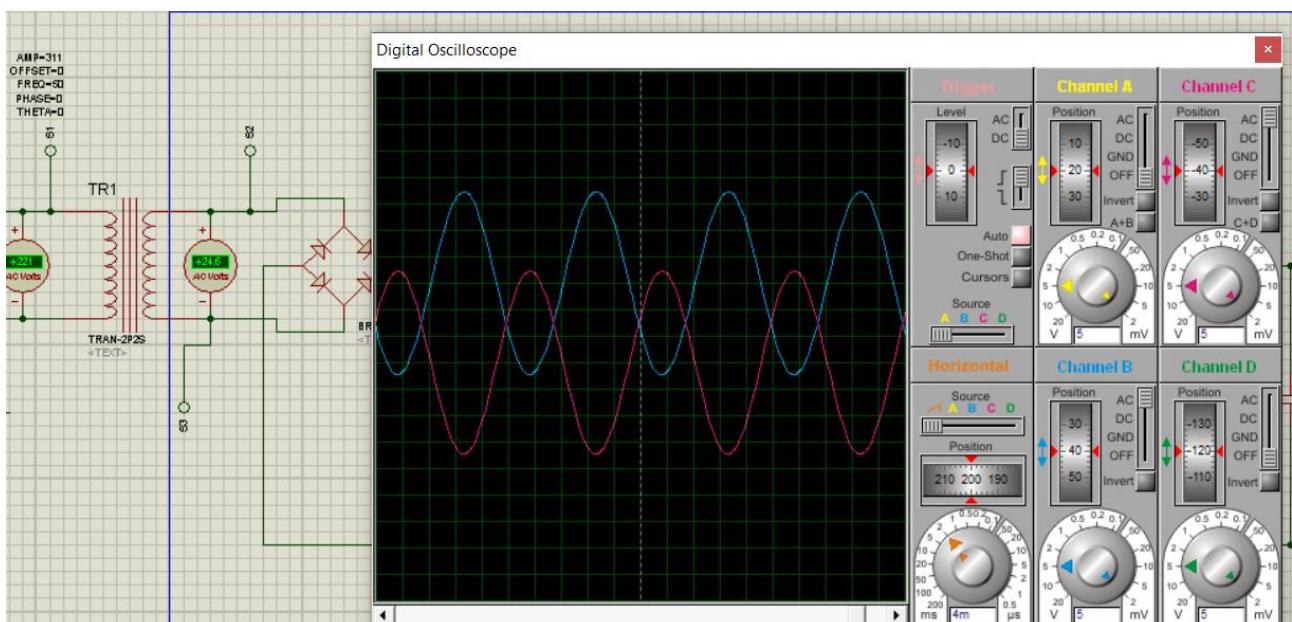
## Primer ve Sekonder Voltajları



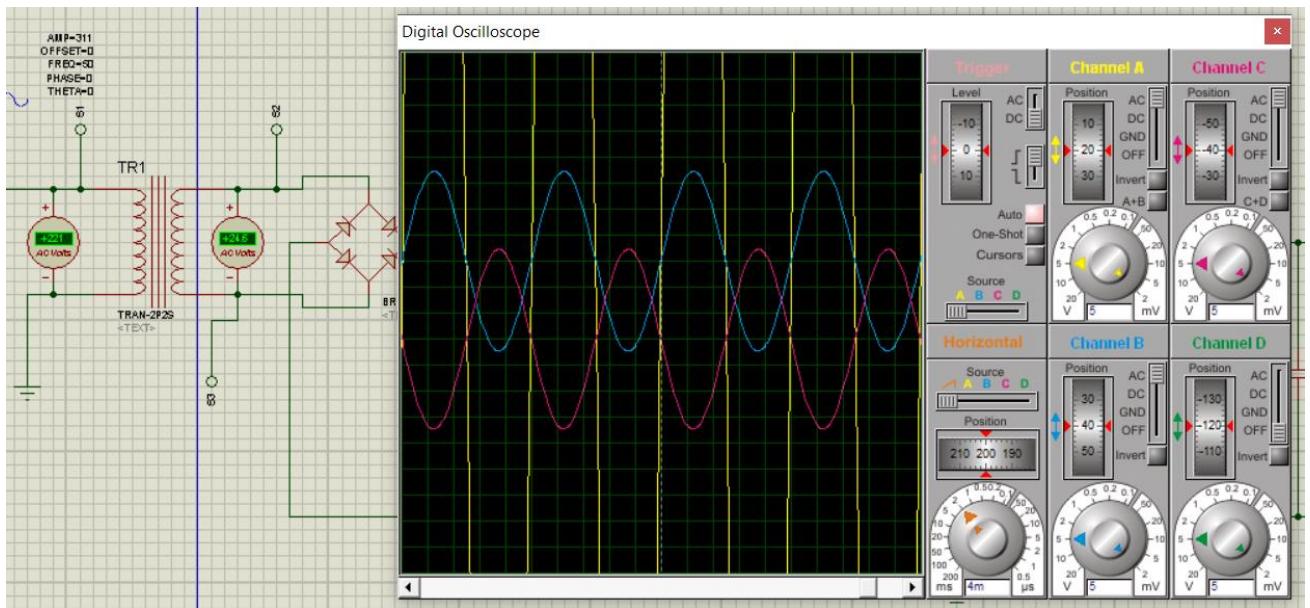
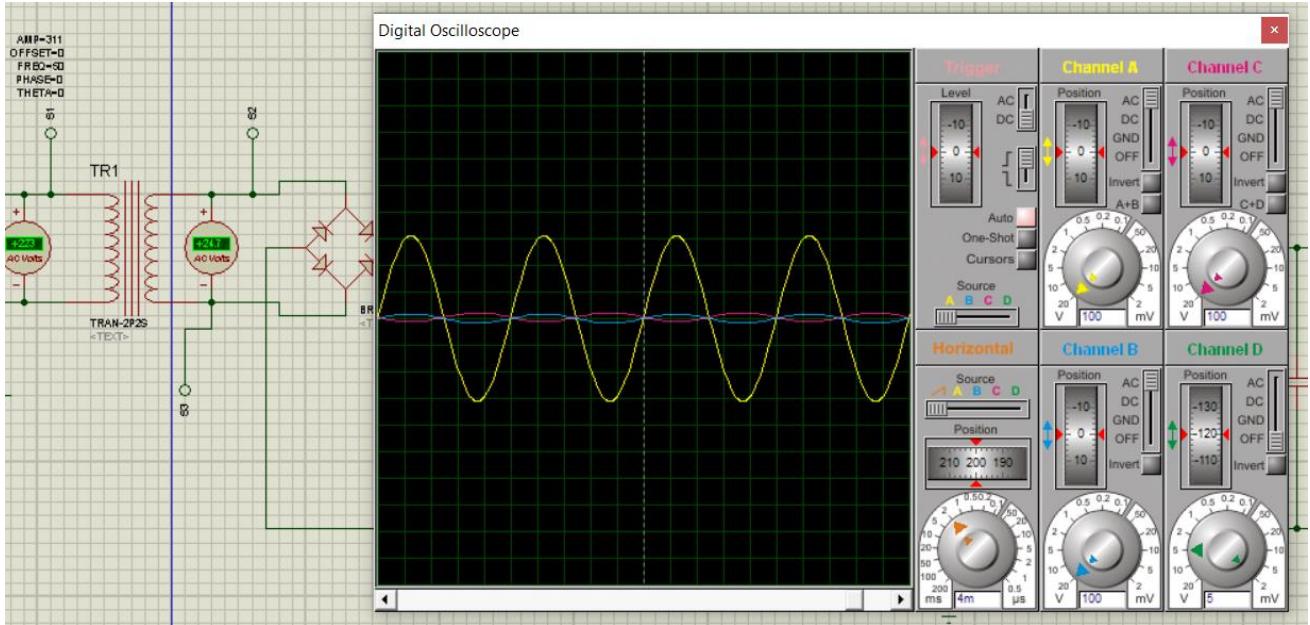


2-Primer voltajının osiloskopaktaki tek kanal ölçümü

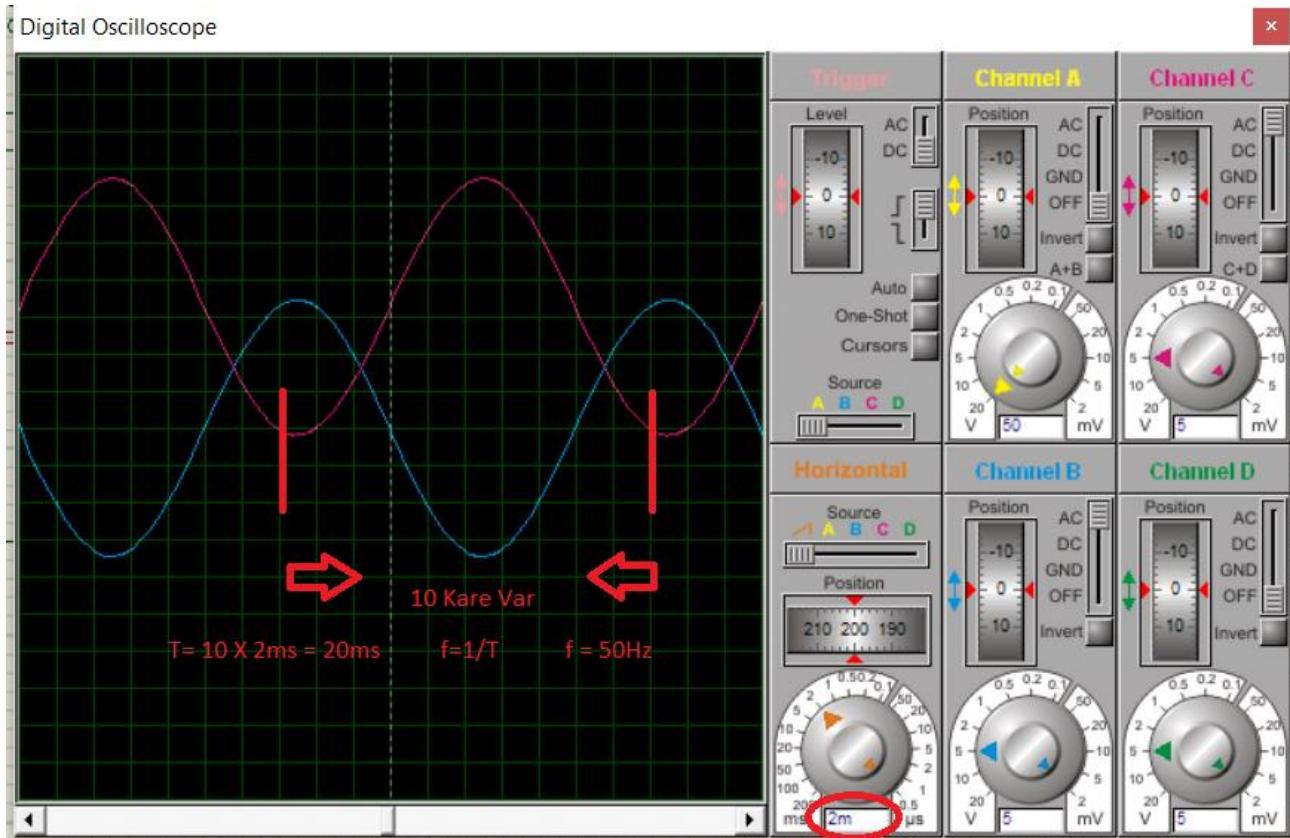
2.a-Sekonder voltajının osiloskopaktaki çift kanal ölçümü



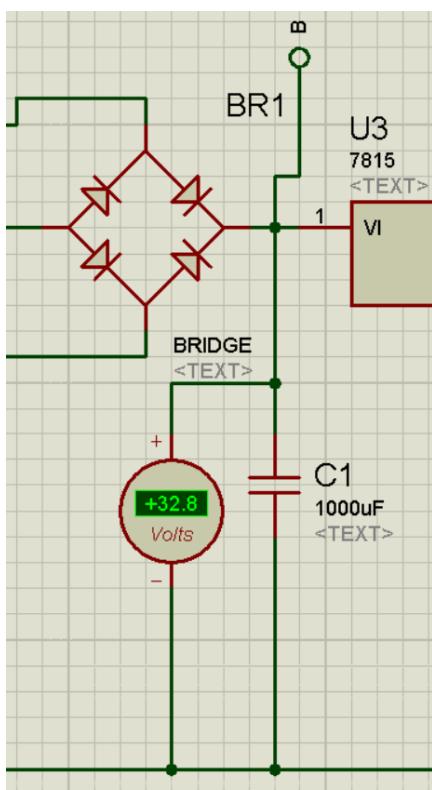
## Primer ve Sekonder Voltajlarının Karşılaştırılması



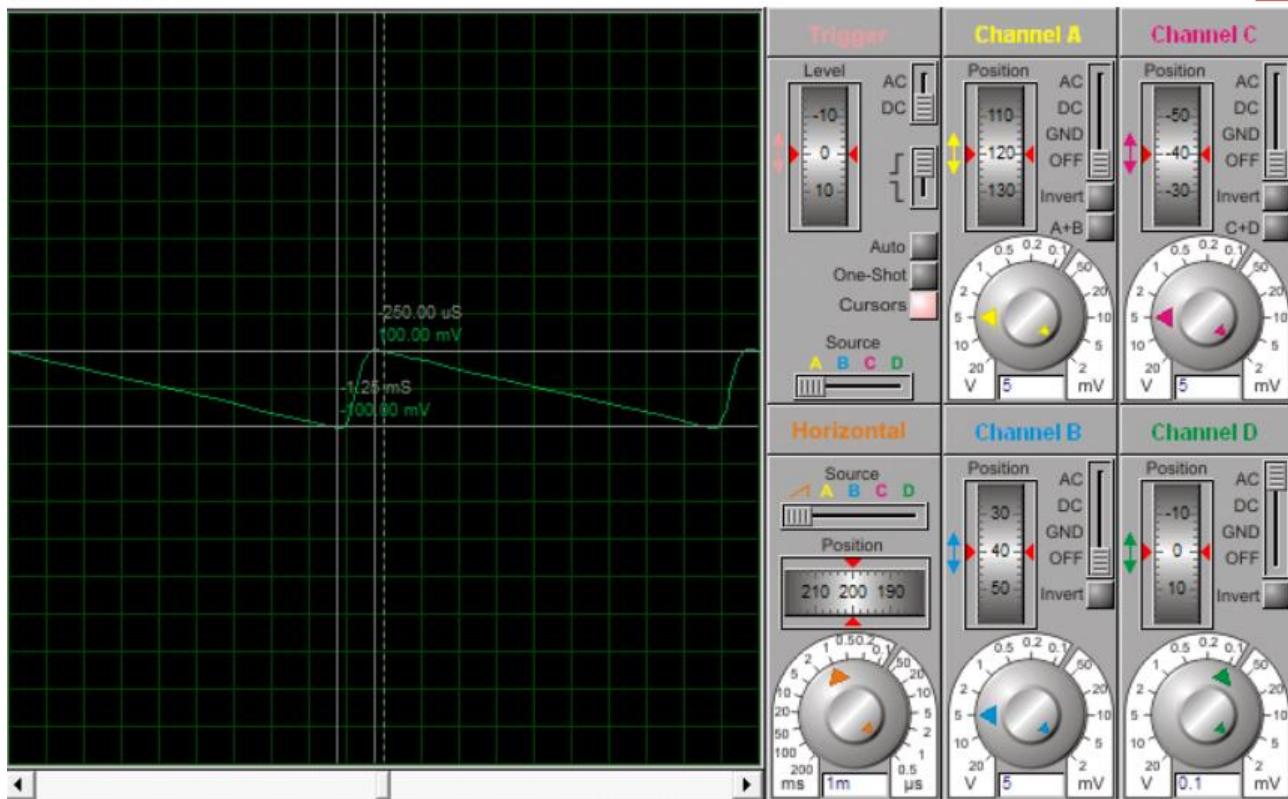
### 3. Sekonder Frekansının Osiloskop ile Ölçülmesi



### 4.a-Köprü Çıkışının C Varken Osiloskop ve Voltmetre ile Ölçümleri

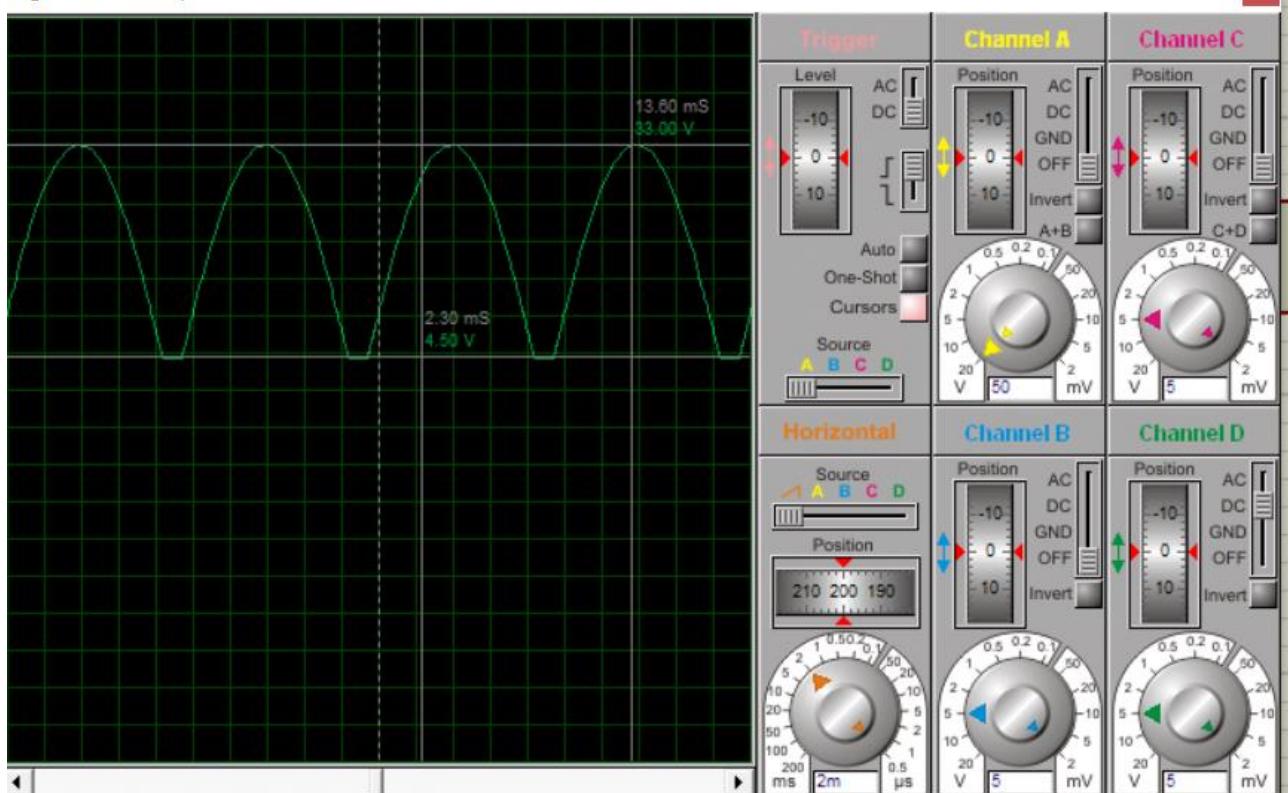


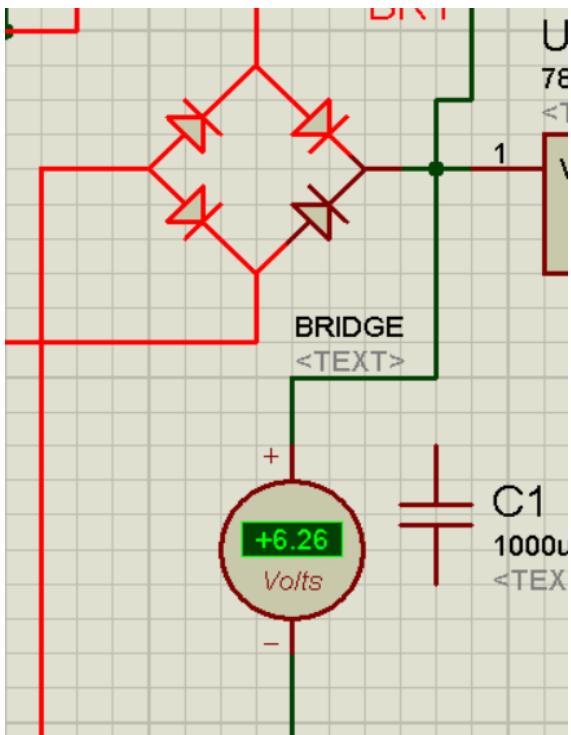
Digital Oscilloscope



#### 4.b-Köprü Çıkışının C Yokken Osiloskop ve Voltmetre ile Ölçümleri

Digital Oscilloscope





Cıkış sinyali çok hareketli olduğu için voltmetrede görünen değer sürekli değişiyordu.

## Proje soruları

ISIS te trafonun primer sekonder voltajları ve trafo özelliklerini arasındaki ilişki nedir?

$$V_s/V_p = CP * (\sqrt{L_s} / \sqrt{L_p})$$

V<sub>s</sub>=sekonder voltajı

V<sub>p</sub>=primer voltajı

CP=kuplaj faktörü

L<sub>p</sub>=primer indüktans

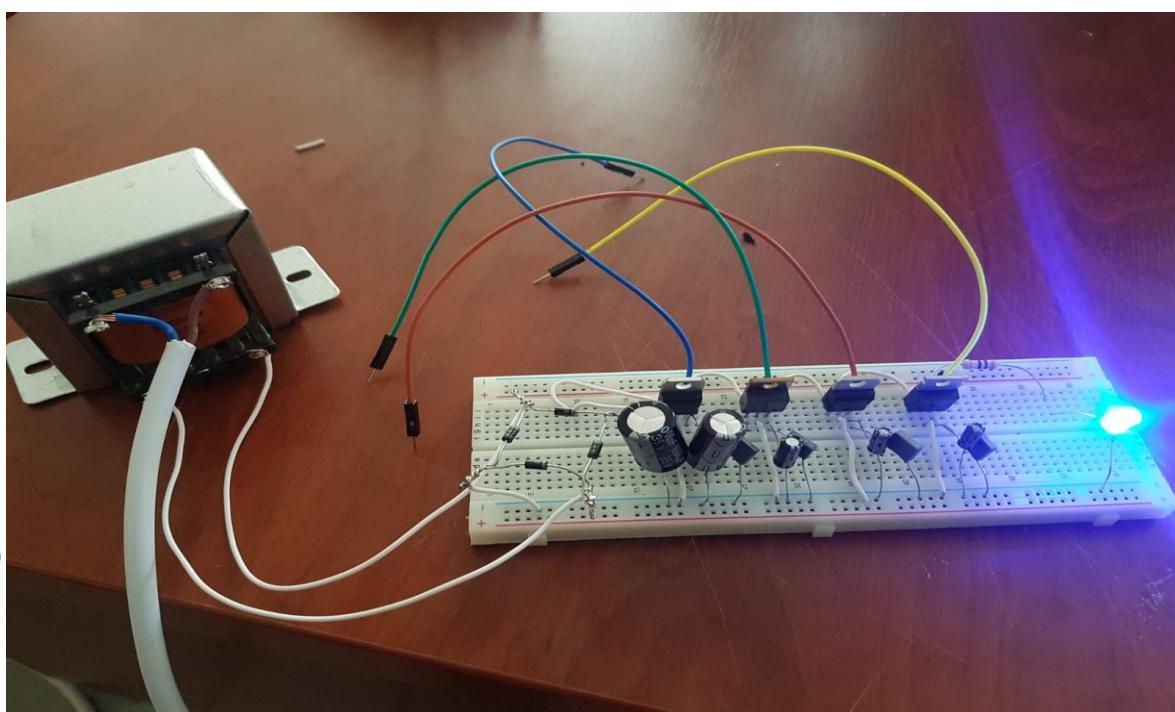
L<sub>s</sub>=sekonder indüktans

Köprü tipi doğrultucu AC girişi ve DC çıkışının arasındaki ilişki nedir?

Köprü diyonet AC giriş gerilimi DC çıkış gerilimine dönüştürmeye yarar.

	Voltmetre	Osiloskop	Teori
Primer Voltajı	311 V AC	<b>Kare Sayma</b> Volt/div=100 Kare sayısı=3 $V_p(\text{tepe})=310V$ <b>Cursors yöntemi</b> $V_p(\text{tepeden tepeye})=620V$	
	Voltmetre	Trafo Ayarı	Hesap
Sekonder Voltajı	$V_s(\text{rms})=34.5V$ AC	Primary inductance=81H Secondary inductance=1H Coupling factor=1	$A=81^{1/2}$ $A=9V$ $311/9=34.5V$

	Osiloskop		Teori		
Sekonder Frekansı	<b>Kare Sayma</b> Time/div=5ms Kare sayısı=3.5 Periyod(tepeden tepeye)=20ms <b>Cursors yöntemi</b> Periyod(tepeden tepeye)=20ms	Voltmetre	Osiloskop	$f=1/T$ $f=50Hz$	
	Voltmetre	Osiloskop	Voltmetre	Osiloskop	
C Yokken Köprü Çıkışı DC mi? AC mi?	Değişken DC 4.55-25.8V	4.5V-33V DC	C Varken Köprü Çıkışı DC mi? AC mi?	32.8V DC	32.75V DC

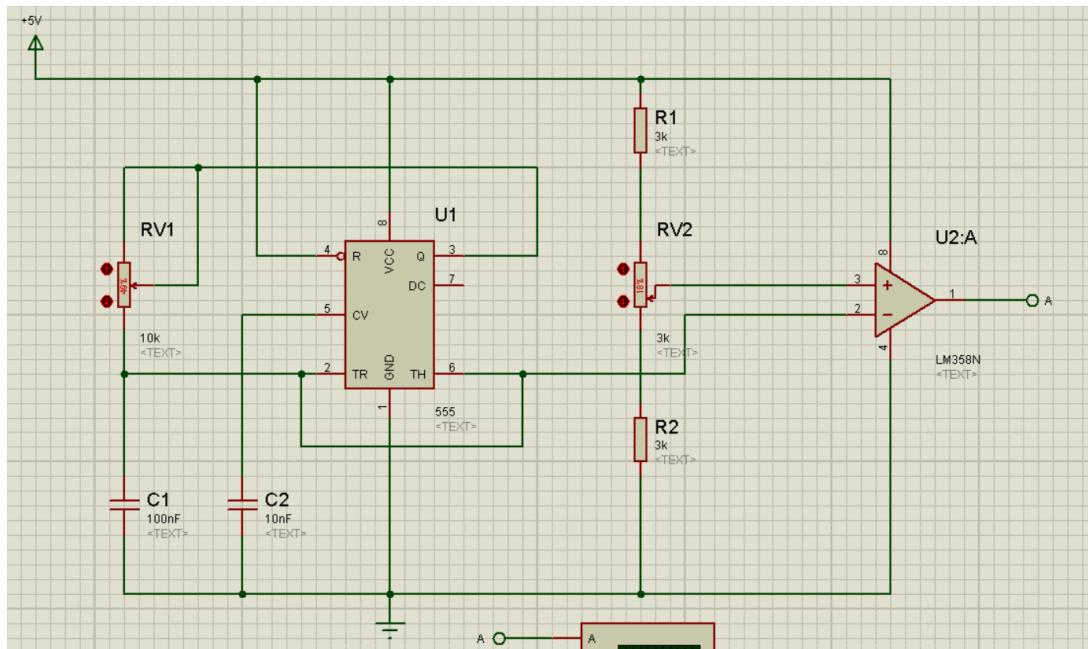


# OSİLATÖR TASARIMI

## 1. MALZEME LİSTESİ

10K POT
5K POT
100 nF kondansatör
10 nF kondansatör
3K direnç x2
Osiloskop
5V güç kaynağı
UA741
555 entegresi

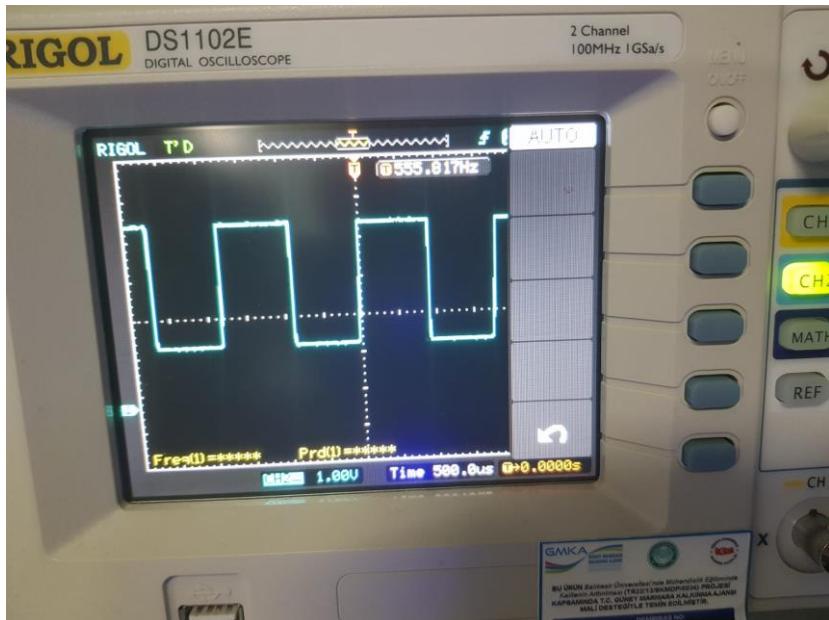
## 2. OSİLOSKOP DEVRESİNİN İSİS SİMÜLASYONU;



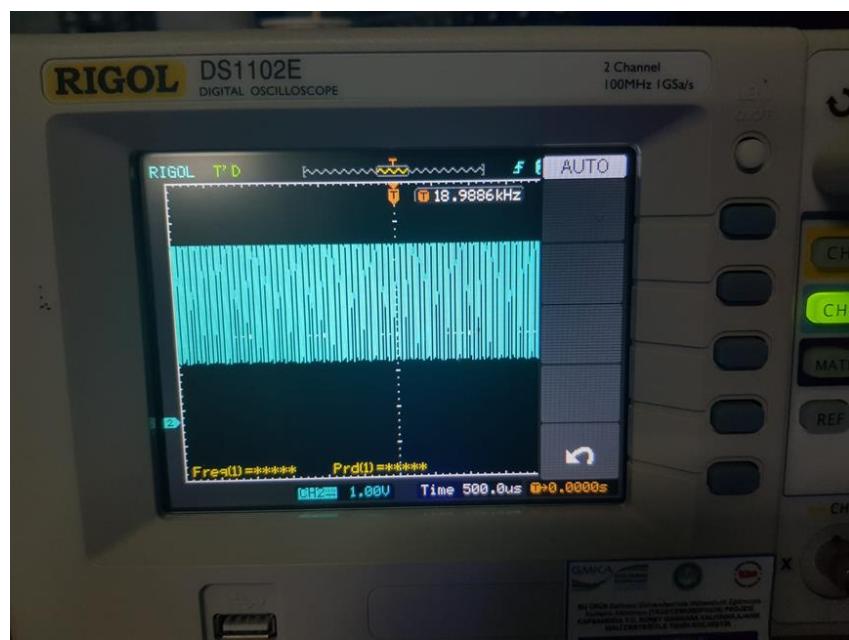
### 3. OSİLOSKOP İLE EN YÜKSEK VE EN DÜŞÜK FREKANS ÖLÇÜMÜ;

Doluluk oranı %50'deyken gözlediğimiz max. ve min. frekanslar şu şekilde

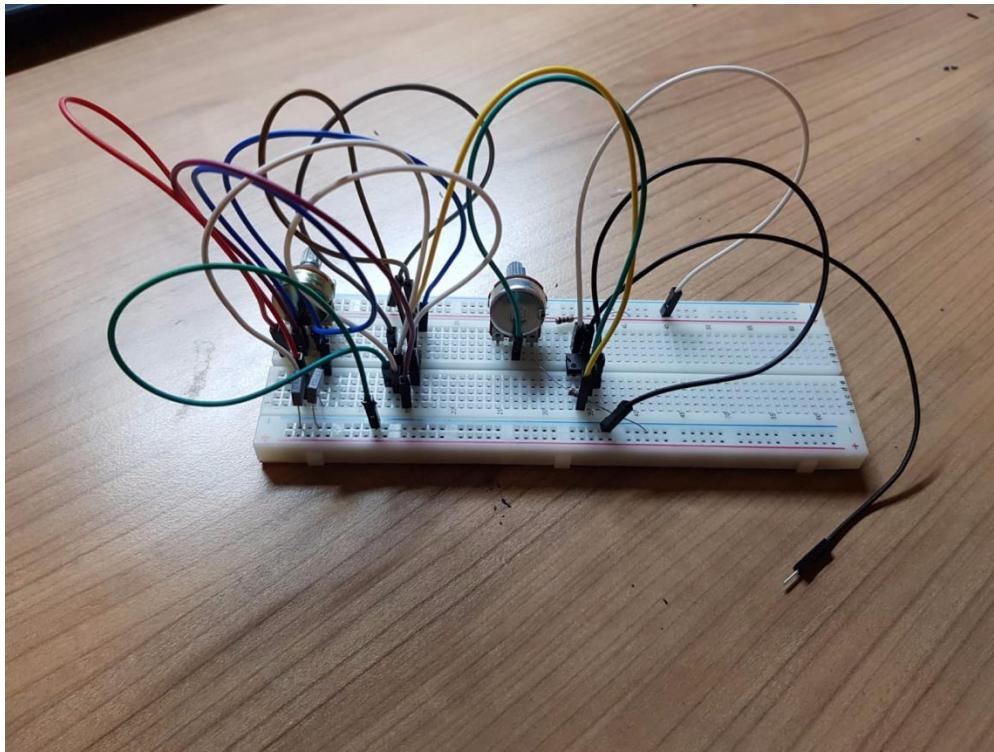
-Minimum frekansı 555 Hz



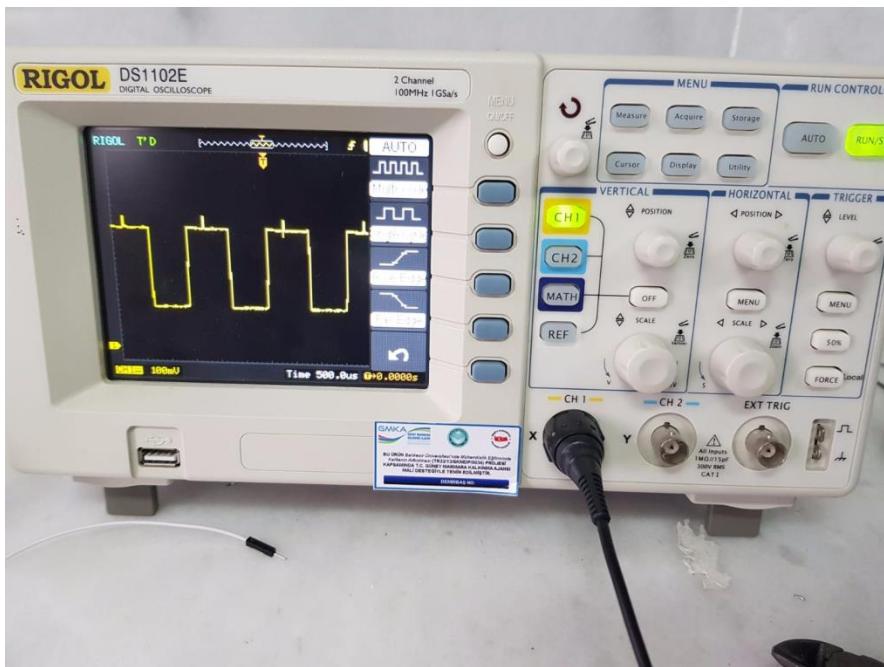
-Maksimum frekansı 18.9 KHz

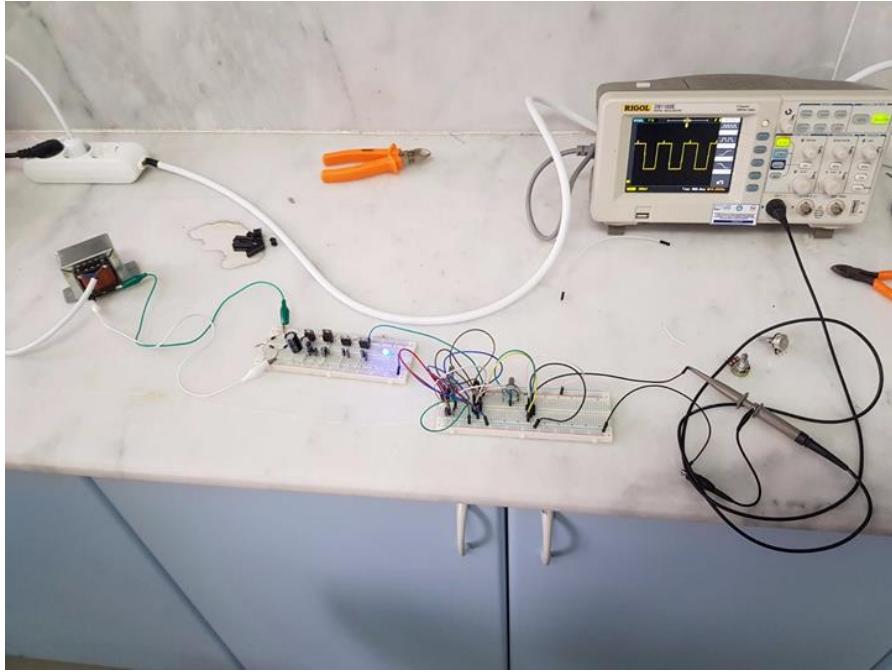


#### **4. DEVRENİN GÖRÜNÜMÜ;**



#### **5. SİNYALİN GÖRÜNTÜSÜ**





Devredeki R ve C değerleriyle üretilen frekansın hesaplanması;

$$f = \frac{1}{2\pi\sqrt{R_1.C_1.R_2.C_2}}$$

Devrede R<sub>1</sub> = R<sub>2</sub> = R ve C<sub>1</sub> = C<sub>2</sub> = C olarak seçilirse formül şu şekilde olur.

$$f = \frac{1}{2\pi.R.C}$$

## **PROJE 2,2**

### **DÜZGÜN KARE DALGA**

#### **Malzemeler**

**10uF Kapasitör**

**1uF Kapasitör**

**0.1uF Kapasitör**

**10nF Kapasitör**

**1nF Kapasitör**

**100pF\*3 Kapasitör**

**10pF Kapasitör**

**10K Potansiyometre**

**8'li Dip Switch**

**5.6K Direnç**

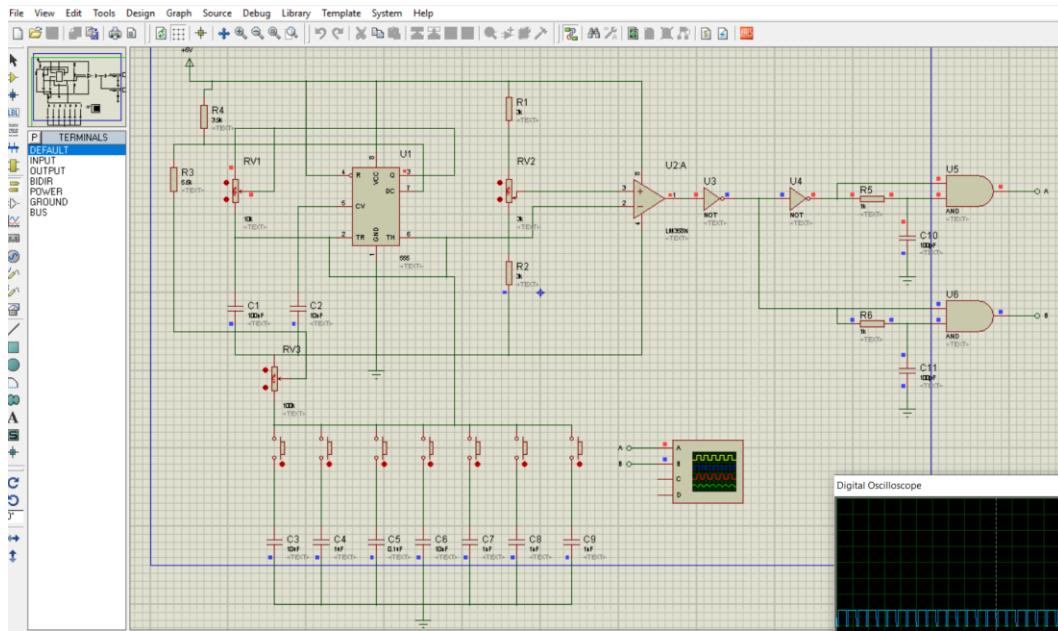
**3.9K Direnç**

**74HC08 Entegre**

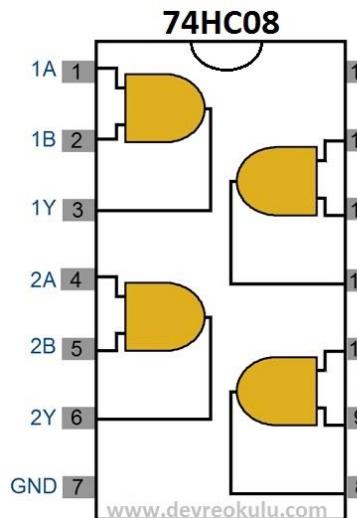
**74HC14 Entegre**

**1K\*2 Direnç**

## Projemizin ISIS Üzerindeki Tasarımı



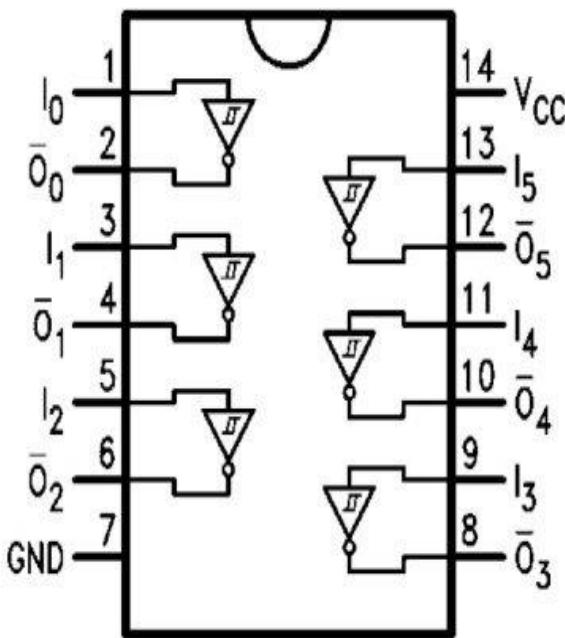
## 74HC08 İç Yapısı



Yanda gördüğünüz entegre basitçe 4 adet and kapısı içerir.

And kapısının 2 girişi ve 1 adet çıkışı bulunur.

VCC pininden 3-7V arası bir gerilim ile beslenmesi gereklidir.

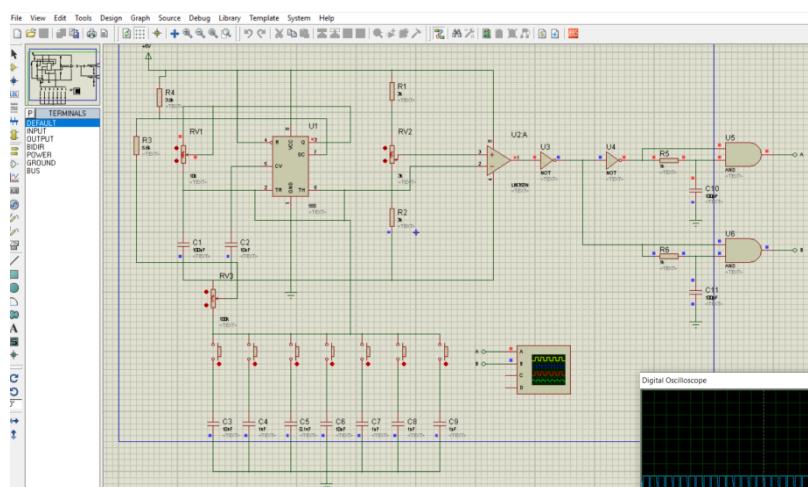


### 74HC14 İÇ YAPISI

Yanda gördüğünüz entegre 6 adet not kapısı içerir.

Not kapısının 1 girişi ve 1 çıkışı bulunur.

VCC pininden 3-7V arası bir gerilim ile beslenmesi gereklidir.

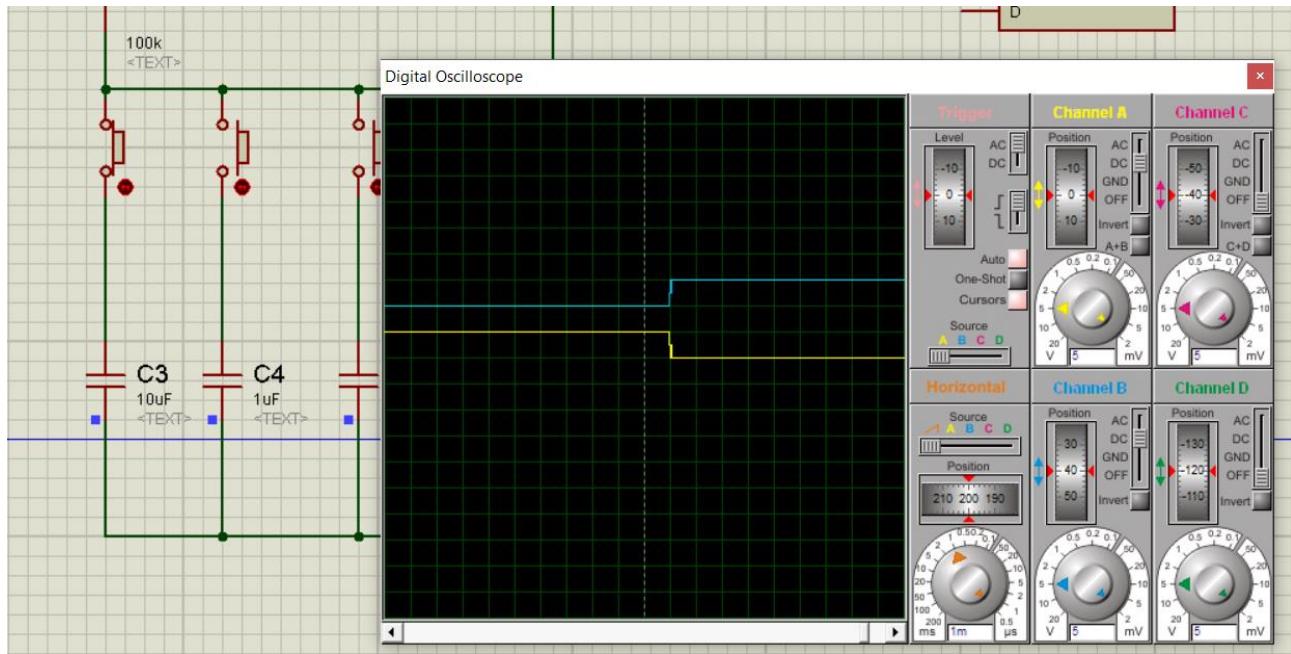


Yukarıdaki görselin sağ tarafında bulunan AND kapılarından çıkış pinleri alarak osiloskop ölçümlerini inceleyeceğiz.

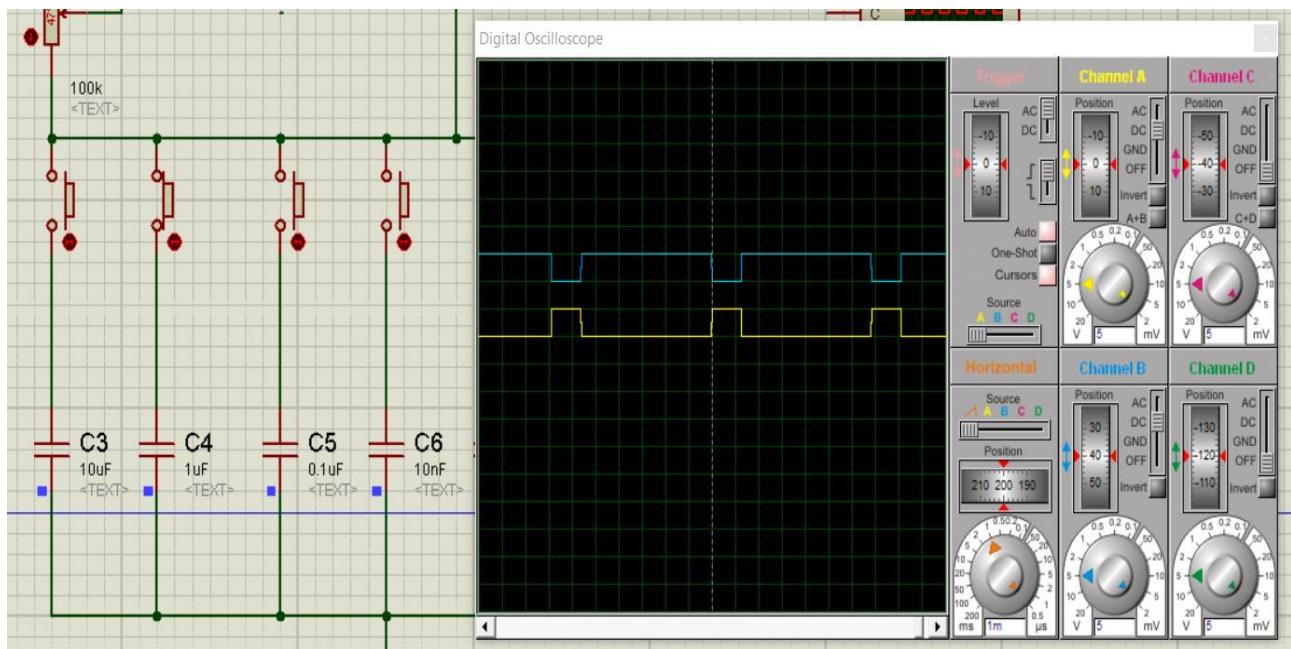
AND kapılarından üstteki, op-amp'tan aldığı sinyali aynı şekilde iletirken, alttaki AND kapısı sinyalin tersini alır. Böylelikle elde edeceğimiz osiloskop ölçümlerinde aynalaranmış iki sinyal göreceğiz.

Görselin sol altında yan yana dizilmiş ve anahtarlarla sırayla devreye alınacak kondansatörler, gözlemleyeceğimiz sinyalin frekansında değişikliği sebep olacaktır.

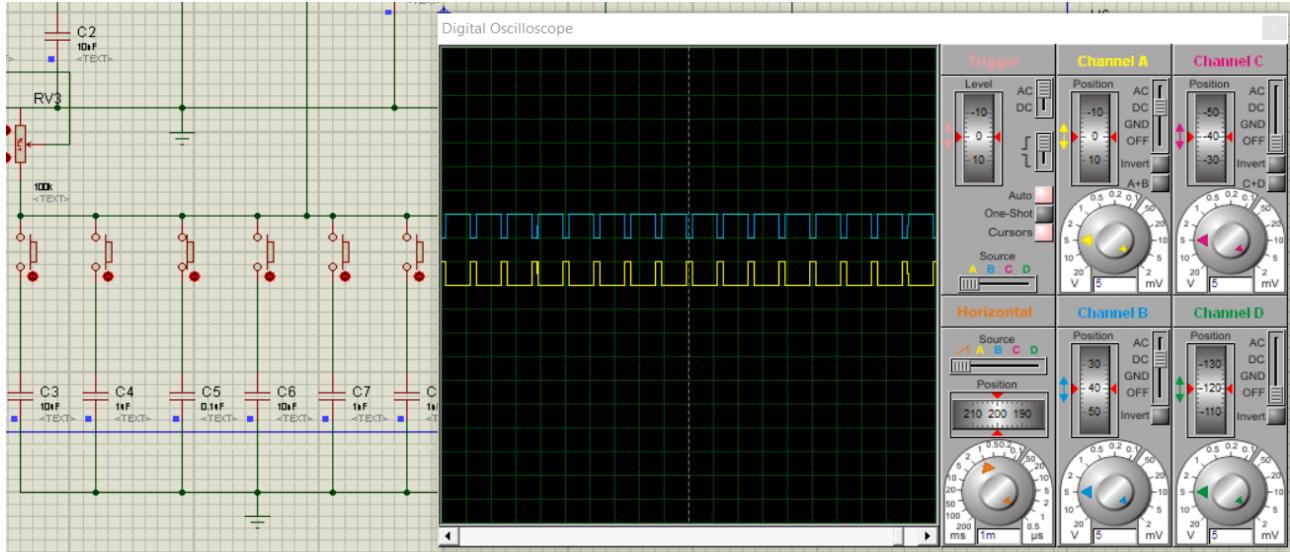
## 10uF'lik Kapasitör Devreye Alındığında



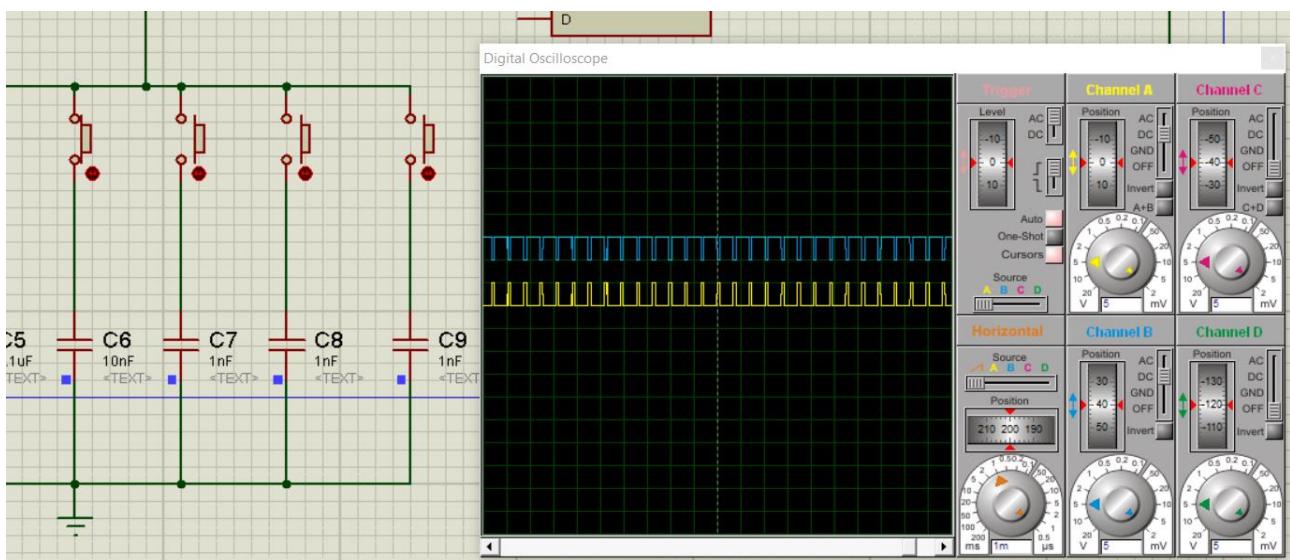
## 1uF'lik Kapasitör Devreye Alındığında



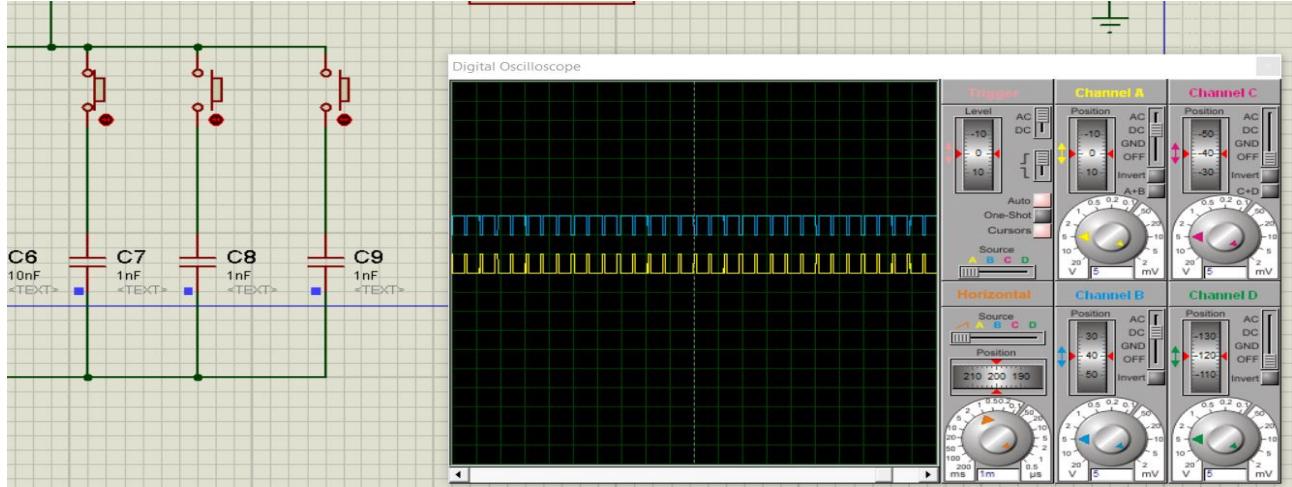
## 0.1uF' lik Kapasitör Devreye Alındığında



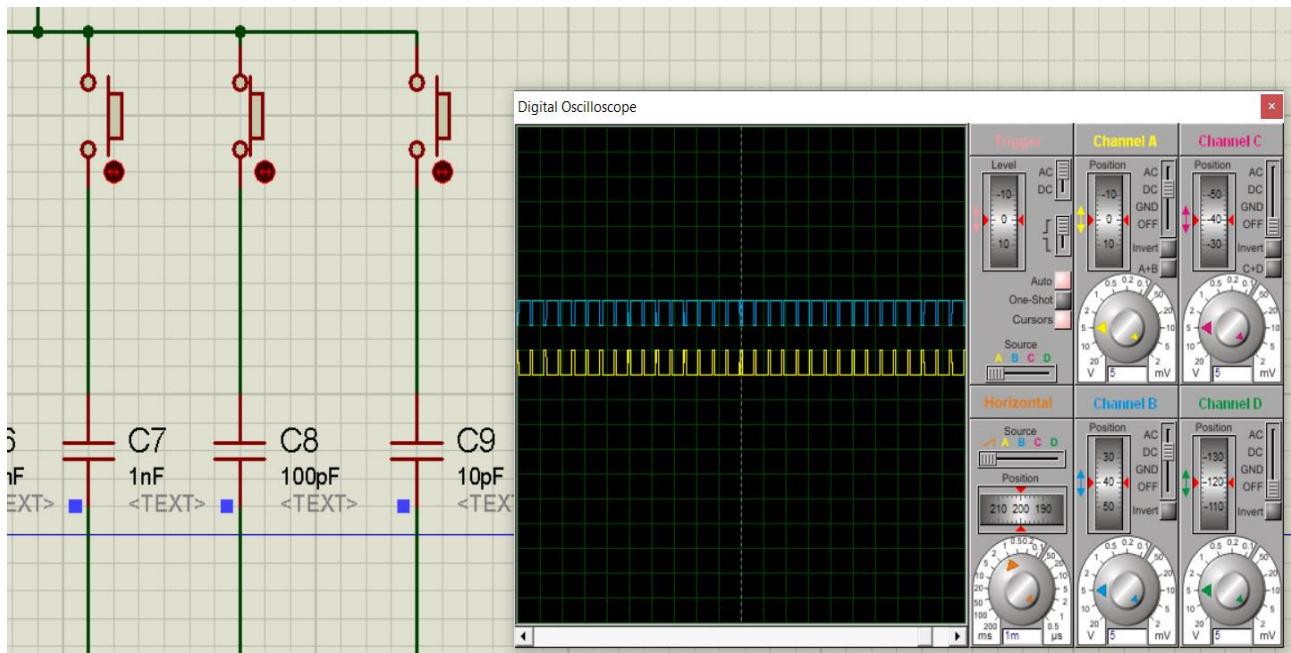
## 10nF' lik Kapasitör Devreye Alındığında



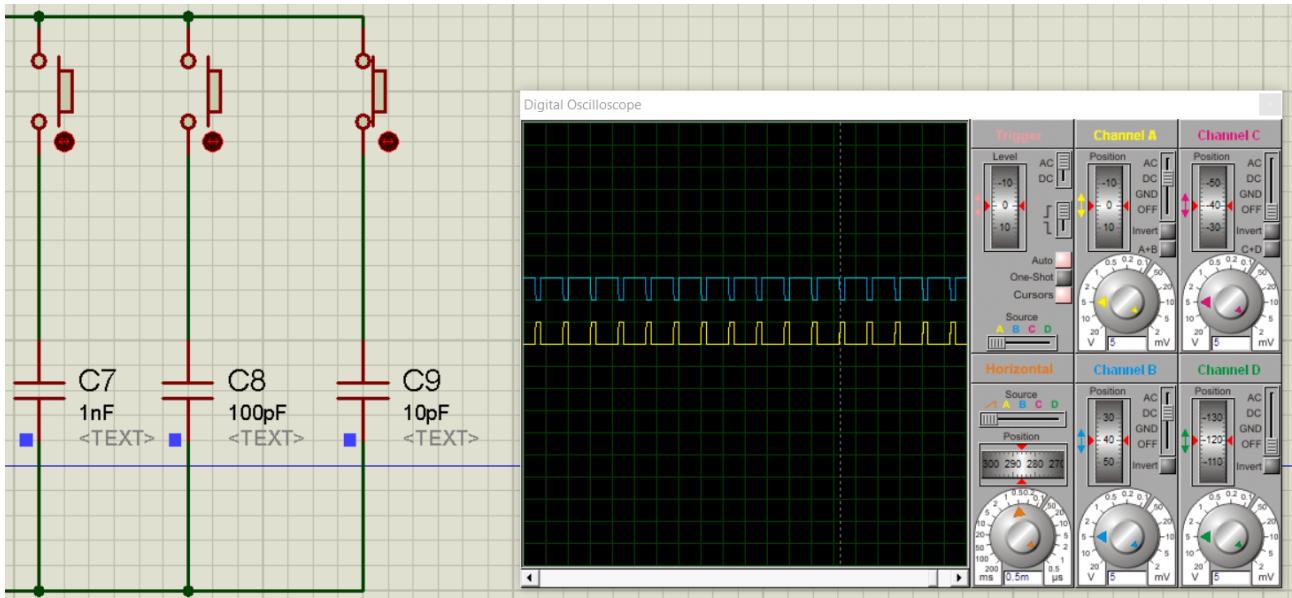
## 1nF'lik Kapasitör Devreye Alındığında



## 100pF'lik Kapasitör Devreye Alındığında



## 10pF'lik Kapasitör Devreye Alındığında



Anahtarlardan önce kullandığımız potansiyometre üzerinde küçük frekans değişiklikleri yapabilmemizi sağlıyor.

### Slew Rate Ne Demektir ?

Elektronikte, hız oranı, zaman birimi başına voltaj veya akım veya başka herhangi bir elektriksel miktar değişikliği olarak tanımlanır. ... Yükseltecülerde, hız oranı yeteneğinde sınırlamalar doğrusal olmayan etkilere yol açabilir.

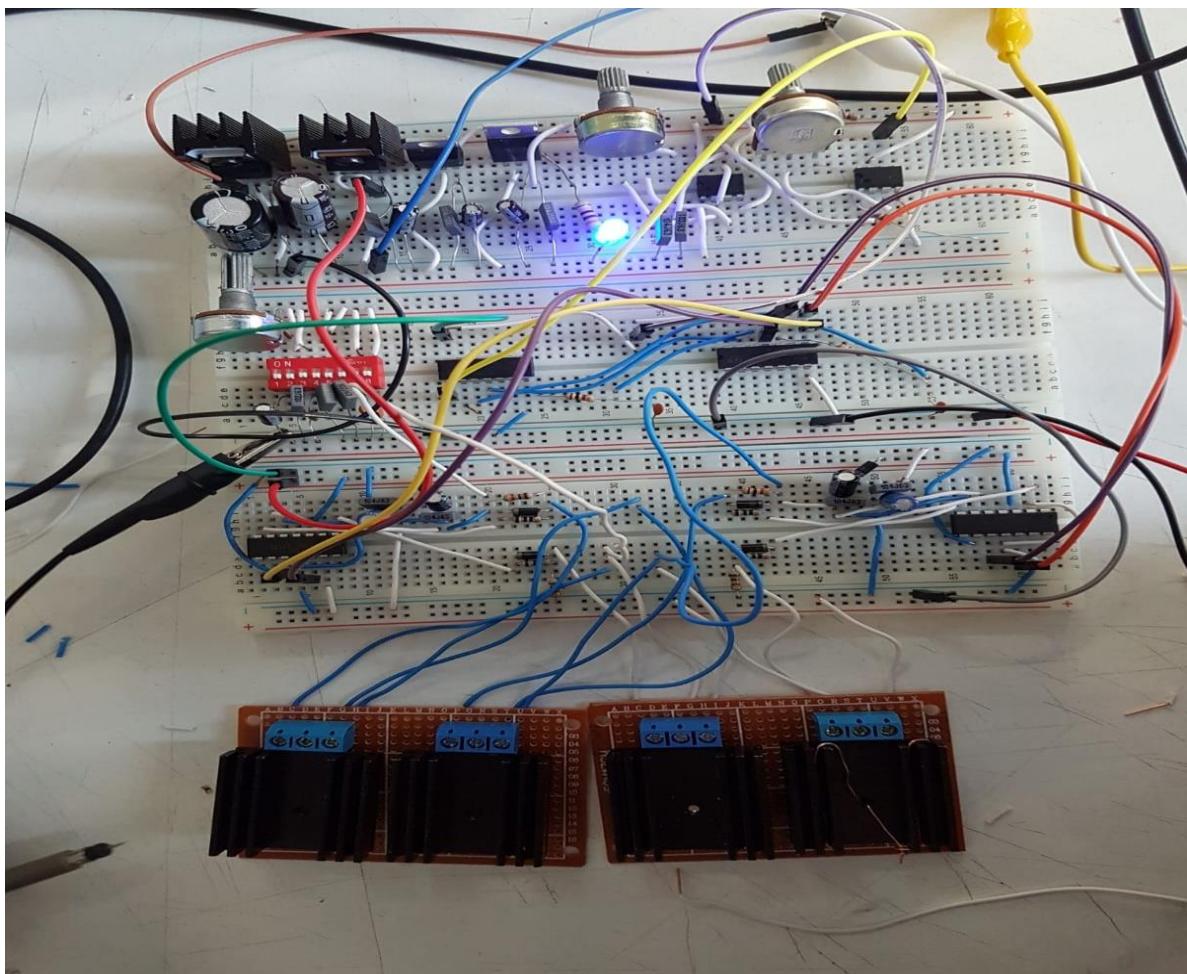
**PROJE 5:**

**MALZEME LİSTESİ**

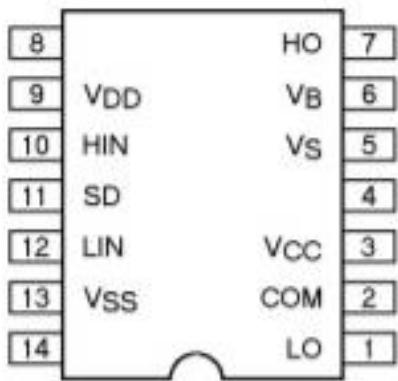
10k direnç	4 adet
1k direnç	4 adet
IR2112	2 adet
100Nf/12v	4 adet
22uF/25V	2 adet
33uF/25V	2 adet
1n4007	6 adet
IRF250	4 adet

	<b>IR2154 (30) (15,69)</b>	<b>IR2153 (27) (6,28)</b>	<b>IR2112 (51) (10,99)</b>	<b>IR2110 (31) (9,73)</b>
<b>MAX ÇALIŞMA FREKANSI</b>	<b>106 kHz</b>	<b>106 kHz</b>	<b>6 kHz</b>	<b>6 kHz</b>
<b>1,2 VEYA 4 MOSFET SÜRÜLEBİ LİR</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>

### DEVRENİN GÖRÜNTÜSÜ



## IR2112 İÇ YAPISI



14 Lead PDIP  
**IR2112**

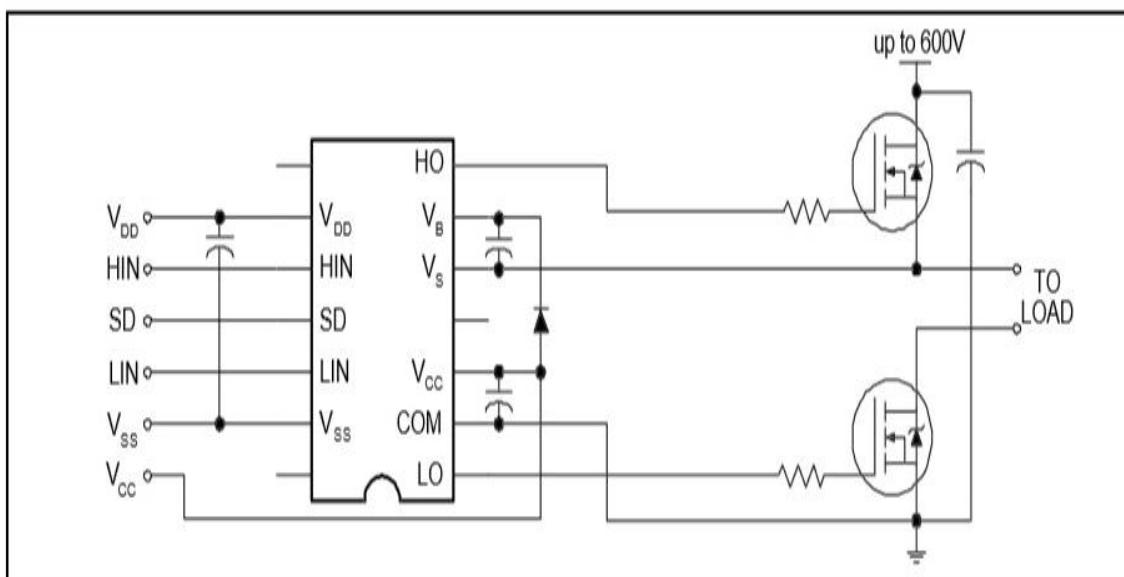
### SEMBOLLERİN TANIMLARI :

V DD	Mantık Kaynağı
HIN	Yüksek yan kapı çıkışı (HO) için lojik giriş
SD	Kapatma için mantık girişi
LN	Düşük yan kapı sürücü çıkışı(LO) için lojik giriş
V SS	Mantık zemin
V B	Yüksek yan yüzen kaynağı
HO	Yüksek yan kapısı sürücü çıkışı
V S	Yüksek yan yüzey tedarik iadesi
V CC	Düşük yan besleme
LO	Düşük yan kapak sürücü çıkışı
COM	Düşük yan dönüş

## IR2112 DIP-14 MOSFET SÜRÜCÜ ENTEGRESİ ÖZELLİKLERİ

IR2112 Mosfet Sürücü entegresi DIP-14 kılıfta olup Güç Kontrol Entegreleri kategorisinde bulunan bir entegresidir. IR2112 Mosfet Sürücü entegresi 10 - 20 V arasında gerilim ile 420mA 'e kadar çıkış akımı sunmaktadır. IR2112 entegresi High Side, Low Side tipi uygulamalar için uygun olan bir Mosfet Sürücü entegresidir. IR2112 entegresinin giriş gecikmesi 125ns ve çıkış gecikmesi 105ns dir.

## IR2112 TİPİK BAĞLANTI



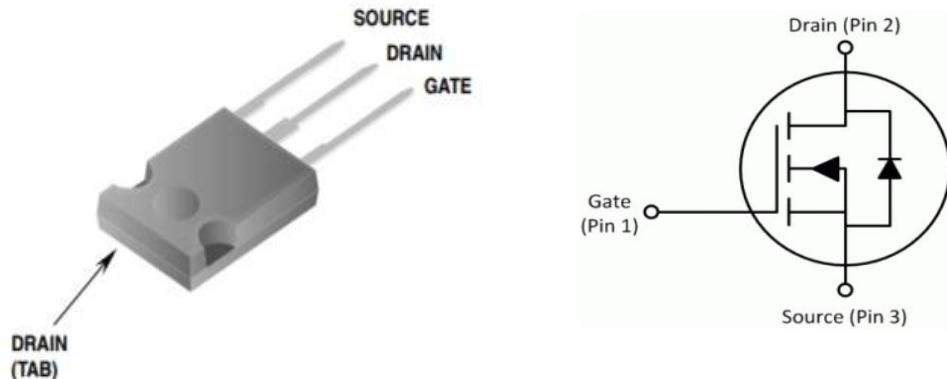
**IR2112**

## Absolute Maximum Ratings

Absolute Maximum Ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The Thermal Resistance and Power Dissipation ratings are measured under board mounted and still air conditions. Additional information is shown in Figures 28 through 35.

Symbol	Parameter Definition	Value		Units
		Min.	Max.	
$V_B$	High Side Floating Supply Voltage	-0.3	625	V
$V_S$	High Side Floating Supply Offset Voltage	$V_B - 25$	$V_B + 0.3$	
$V_{HO}$	High Side Floating Output Voltage	$V_S - 0.3$	$V_B + 0.3$	
$V_{CC}$	Low Side Fixed Supply Voltage	-0.3	25	
$V_{LO}$	Low Side Output Voltage	-0.3	$V_{CC} + 0.3$	
$V_{DD}$	Logic Supply Voltage	-0.3	$V_{SS} + 25$	
$V_{SS}$	Logic Supply Offset Voltage	$V_{CC} - 25$	$V_{CC} + 0.3$	
$V_{IN}$	Logic Input Voltage (HIN, LIN & SD)	$V_{SS} - 0.3$	$V_{DD} + 0.3$	
$dV_S/dt$	Allowable Offset Supply Voltage Transient (Figure 2)	—	50	V/ns
$P_D$	Package Power Dissipation @ $T_A \leq +25^\circ\text{C}$ (14 Lead DIP)	—	1.6	W
	(14 Lead DIP w/o Lead 4)	—	1.5	
	(16 Lead DIP w/o Leads 5 & 6)	—	1.6	
	(16 Lead SOIC)	—	1.25	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (14 Lead DIP)	—	75	°C/W
	(14 Lead DIP w/o Lead 4)	—	85	
	(16 Lead DIP w/o Leads 5 & 6)	—	75	
	(16 Lead SOIC)	—	100	
$T_J$	Junction Temperature	—	150	°C
$T_S$	Storage Temperature	-55	150	
$T_L$	Lead Temperature (Soldering, 10 seconds)	—	300	

## IRF250 DATASHEET



DIŞ GÖRÜNÜMÜ

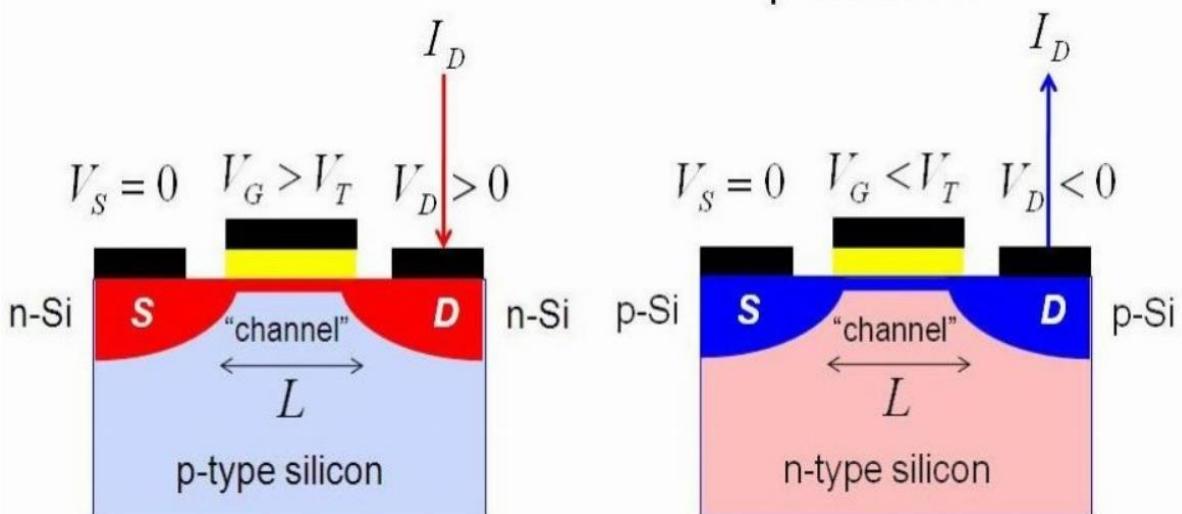
İÇ GÖRÜNÜMÜ

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

SYMBOL	PARAMETER	TEST CONDITIONS	VALUE	UNIT
$V_{DSS}$	Drain to Source voltage	$T_J=25^\circ\text{C}$ to $150^\circ\text{C}$	200	
$V_{DGR}$	Drain to Gate voltage	$R_{GS}=20\text{ k}\Omega$	200	V
$V_{GS}$	Gate to Source voltage		$\pm 20$	
$I_D$	Continuous Drain Current ( $V_{GS}=10\text{V}$ )	$T_C=25^\circ\text{C}$	30	A
		$T_C=100^\circ\text{C}$	21	
$I_{DM}$	Pulsed Drain current (Note 1)		120	
$I_{AR}$	Avalanche current (Note 1)		30	
$E_{AR}$	Repetitive avalanche energy (Note 1)	$I_{AR}=30\text{A}$ , $R_{GS}=50\Omega$ , $V_{GS}=10\text{V}$	19	mJ
$E_{AS}$	Single pulse avalanche energy (Note 2)	$I_{AS}=30\text{A}$ , $L=0.7\text{mH}$	410	
$dv/dt$	Peak diode recovery $dv/dt$ (Note 3)		5.0	V/ns
$P_D$	Total power dissipation	$T_C=25^\circ\text{C}$	190	W
	Derate above $25^\circ\text{C}$		1.5	W/ $^\circ\text{C}$
$T_J$	Operation junction temperature		-55 to 150	
$T_{STG}$	Storage temperature		-55 to 150	$^\circ\text{C}$
$T_L$	Maximum soldering temperature, for 10 seconds	1.6mm from case	300	
	Mounting torque, #6-32 or M3 screw		10 (1.1)	lbf-in (N·m)

ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)						
SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.
© STATIC						
$V_{(\text{BR})\text{DSS}}$	Drain to source breakdown voltage	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$		200		V
$\Delta V_{(\text{BR})\text{DSS}}/\Delta T_J$	Breakdown voltage temperature coefficient	$I_D = 1\text{mA}$ , $V_{DS} = V_{GS}$		0.27		$\text{V}/^\circ\text{C}$
$I_{\text{DSS}}$	Drain to source leakage current	$V_{DS}=200\text{V}$ , $V_{GS}=0\text{V}$	$T_C = 25^\circ\text{C}$		25.0	$\mu\text{A}$
		$V_{DS}=160\text{V}$ , $V_{GS}=0\text{V}$	$T_C=125^\circ\text{C}$		250	
$I_{\text{GSS}}$	Gate to source forward leakage current	$V_{GS} = 20\text{V}$ , $V_{DS} = 0\text{V}$			100	$\text{nA}$
	Gate to source reverse leakage current	$V_{GS} = -20\text{V}$ , $V_{DS} = 0\text{V}$			-100	
$R_{\text{DS}(\text{ON})}$	Static drain to source on-state resistance	$I_D = 18\text{A}$ , $V_{GS} = 10\text{V}$			0.085	$\Omega$
$V_{GS(\text{TH})}$	Gate threshold voltage	$V_{GS}=V_{DS}$ , $I_D=250\mu\text{A}$		2.0	4.0	V
$g_{\text{fs}}$	Forward transconductance	$V_{DS} = 50\text{V}$ , $I_D = 18\text{A}$		12		S
© DYNAMIC						
$C_{\text{ISS}}$	Input capacitance	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$		2800		$\text{pF}$
$C_{\text{OSS}}$	Output capacitance			780		
$C_{\text{RSS}}$	Reverse transfer capacitance			250		
$t_{d(\text{ON})}$	Turn-on delay time	$V_{DD} = 100\text{V}$ , $V_{GS} = 10\text{V}$ $I_D = 30\text{A}$ , $R_G = 6.2\Omega$ , $R_D = 3.2\Omega$ (Note1,2)		16		$\text{ns}$
$t_r$	Rise time			86		
$t_{d(\text{OFF})}$	Turn-off delay time			70		
$t_f$	Fall time			62		
$Q_G$	Total gate charge	$V_{DD} = 160\text{V}$ , $V_{GS} = 10\text{V}$ $I_D = 30\text{A}$ , (Note1,2)			140	$\text{nC}$
$Q_{GS}$	Gate to source charge				28	
$Q_{GD}$	Gate to drain charge (Miller charge)				74	
$L_D$	Internal drain inductance	Between lead, 6mm(0.25") from package and center of die contact		5		$\text{nH}$
$L_S$	Internal source inductance			13		

- P Kanallı ve N Kanallı Mosfetler



## MOSFET Çalışma Prensibi

Çalışma karakteristiklerine göre 2 tip MOSFET vardır:

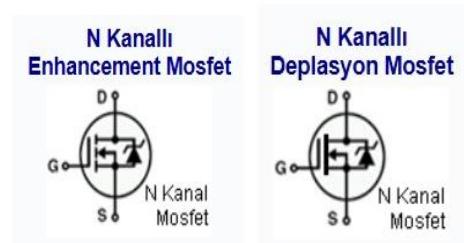
- Depletion (Azalan) Tip MOSFET
- Enhance (Çoğalan) Tip MOSFET

### Depletion Tip MOSFET (N Kanal):

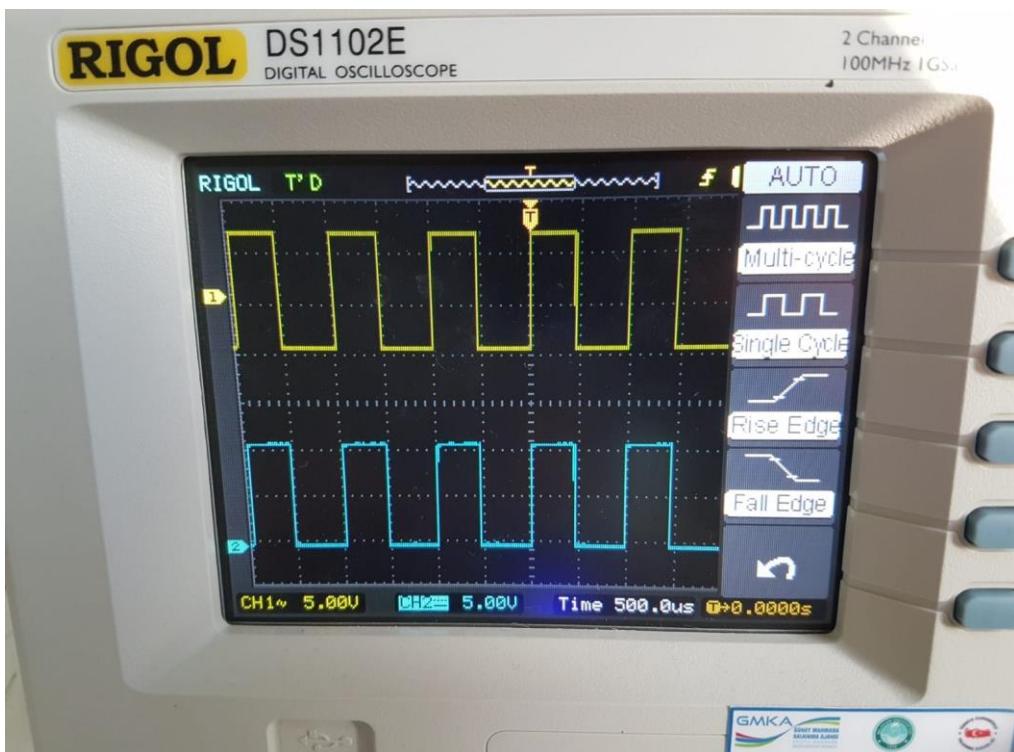
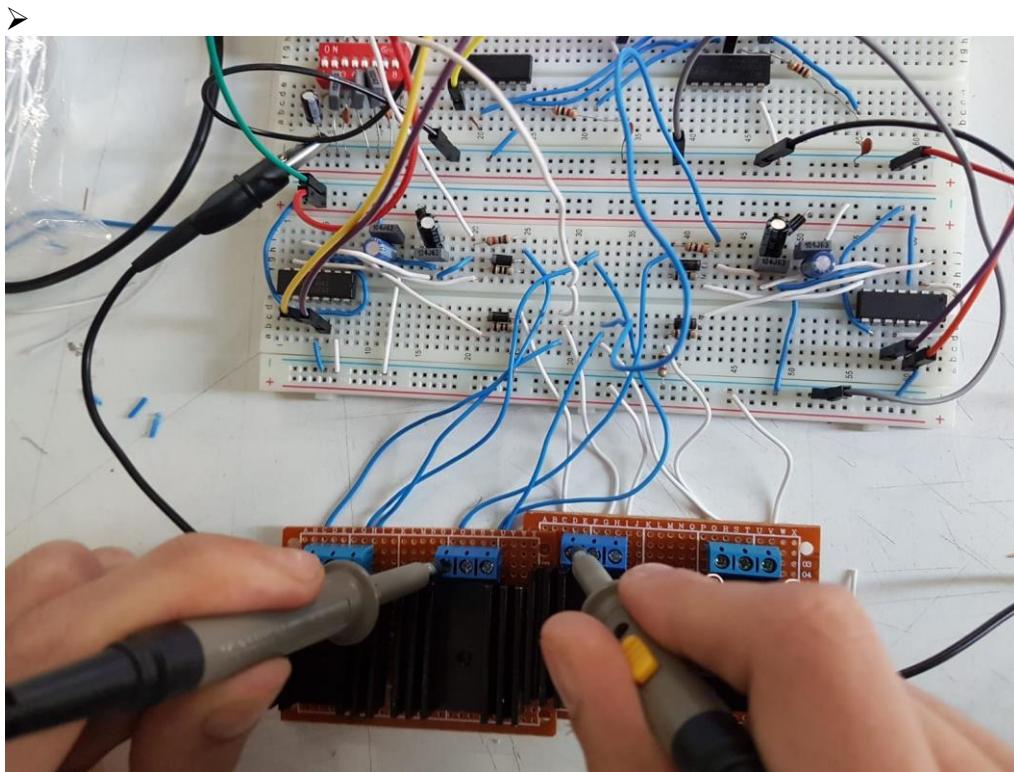
Bu tip MOSFET'lerin yapılarında, Drain ve Source uçlarına bağlı iki N tipi bölgenin arasında kanal bulunmaktadır. Gate ucu üzerindeki gerilim 0V olduğunda bile bu kanal sayesinde Drain ve Source arasında belirli bir akım geçer. Gate'e (+) gerilim uygulandığında Drain-Source arasındaki kanal genişleyerek üzerlerinden geçen akım artar. (-) gerilim uygulandığında ise kanal daralarak geçen akım azalır.

### Enhancement Tip MOSFET (N Kanal):

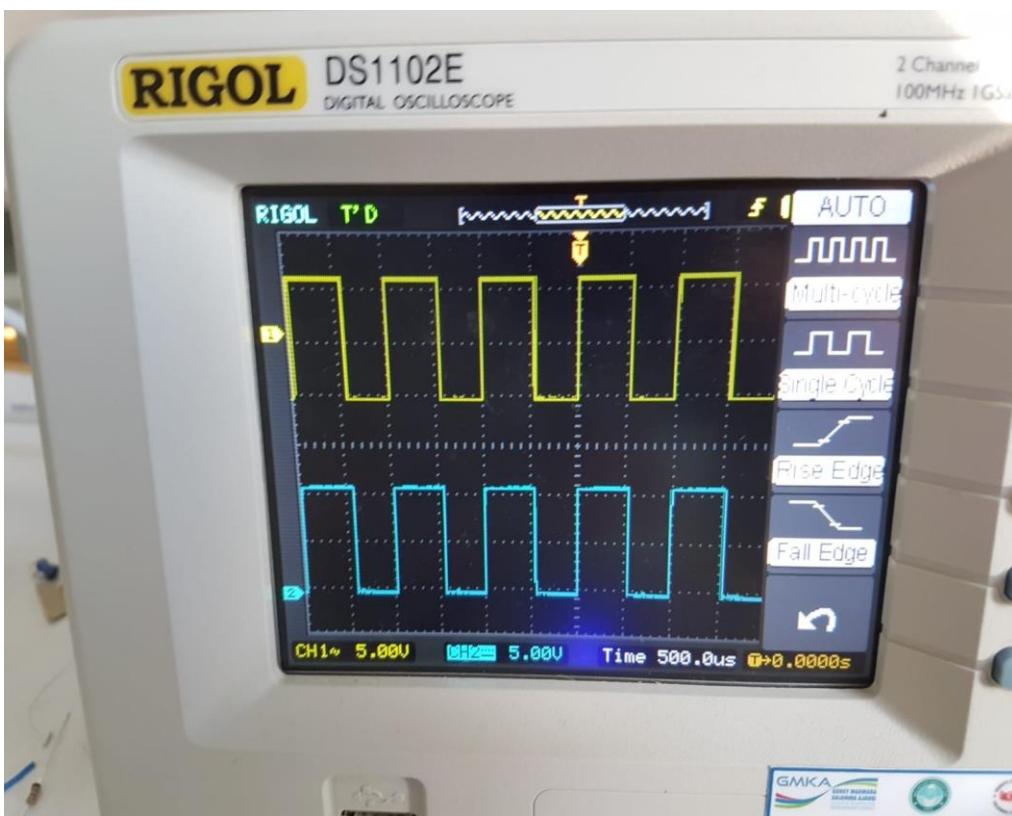
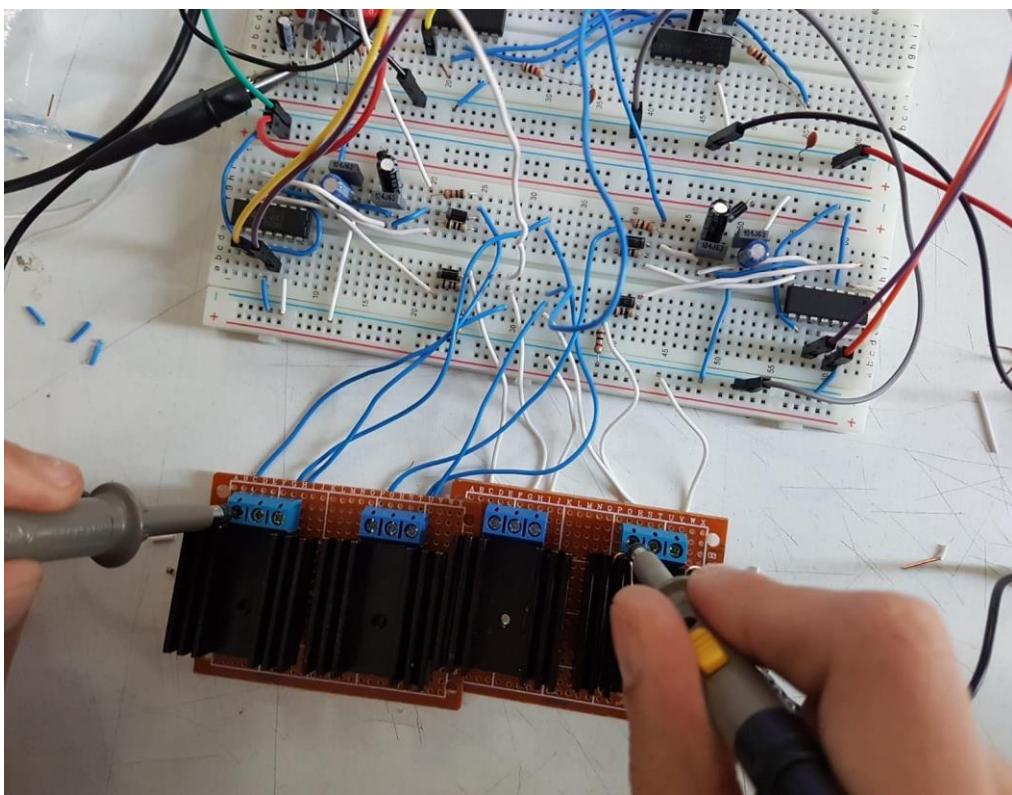
Depletion tip MOSFET'lerden farkları, Drain-Source arasında bir kanal bulunmamasıdır. Gate terminaline bir gerilim uygulanmadığı takdirde Drain-Source arasında bir akım akmaz. Bu tip MOSFET'lerde iki N tipi iletken ve aralarındaki yalıtkan, bir kondansatör yapısı oluşturmaktadır. Gate terminaline (+) ve (-) gerilim uygulanarak Drain-Source arasındaki akım kontrol edilir.

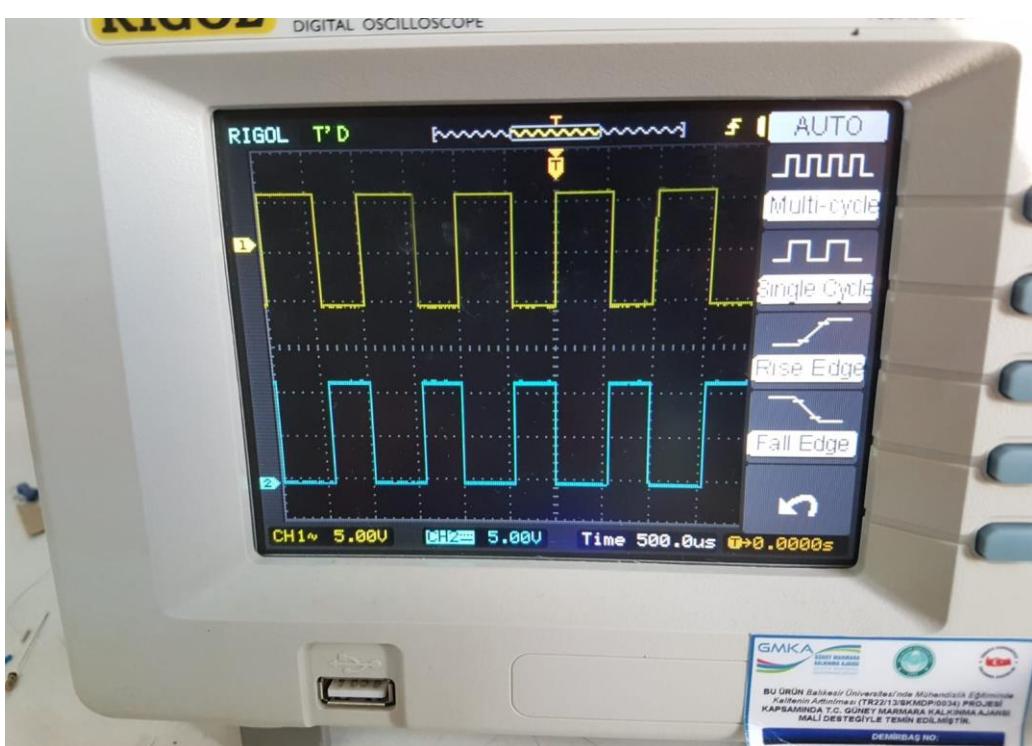
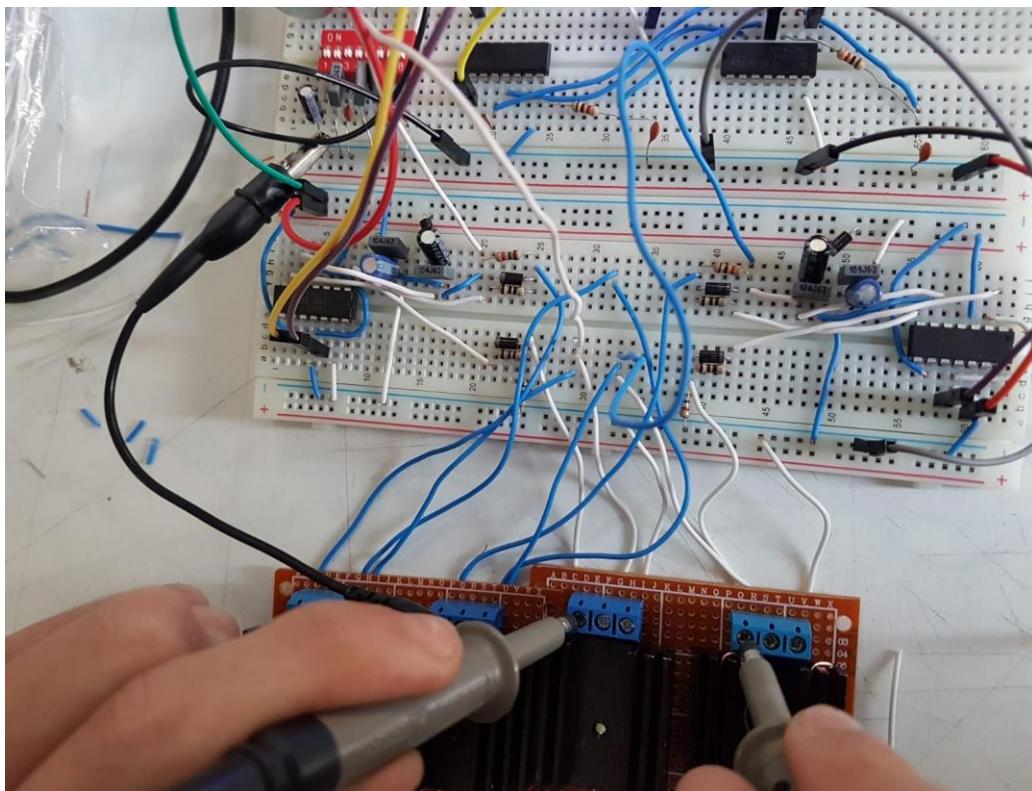


## MOSFETLERİN OSİLOSKOPLA ÖLÇÜMÜ

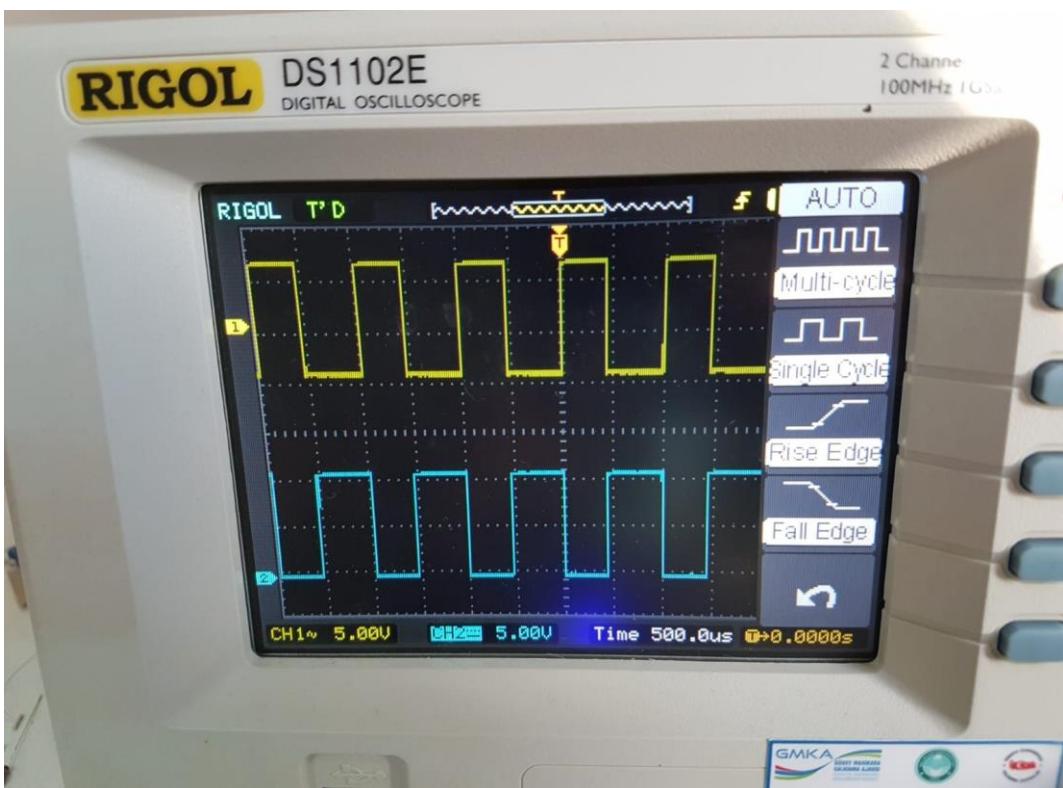
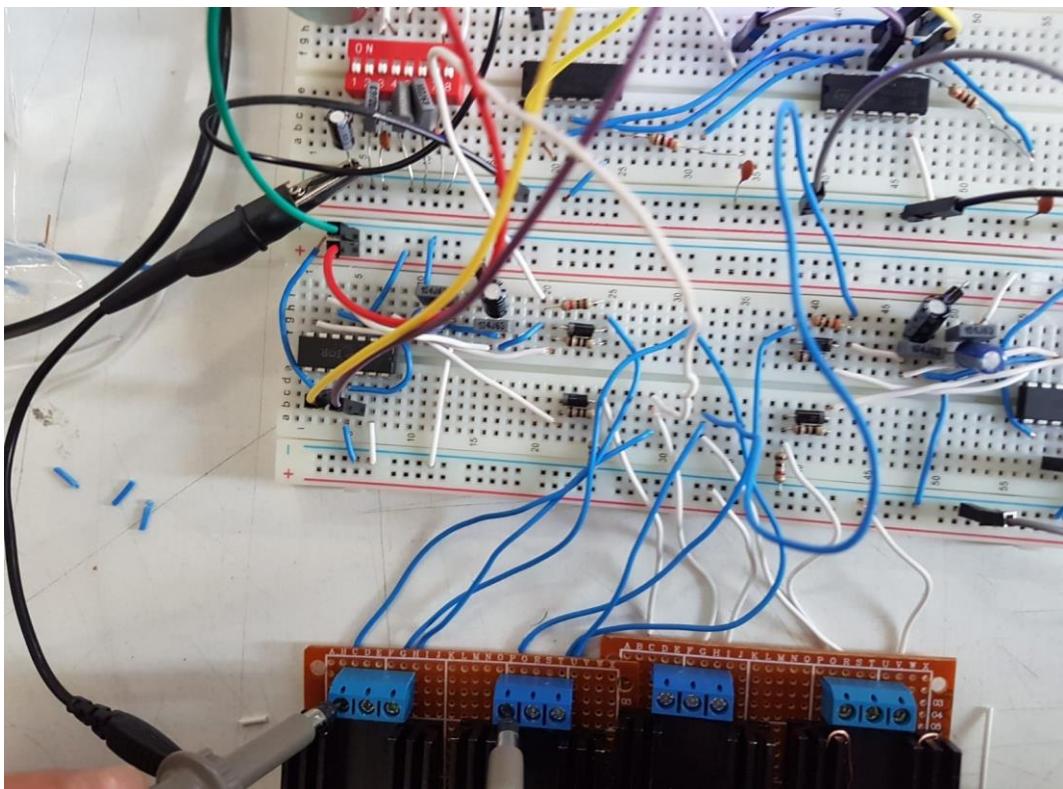


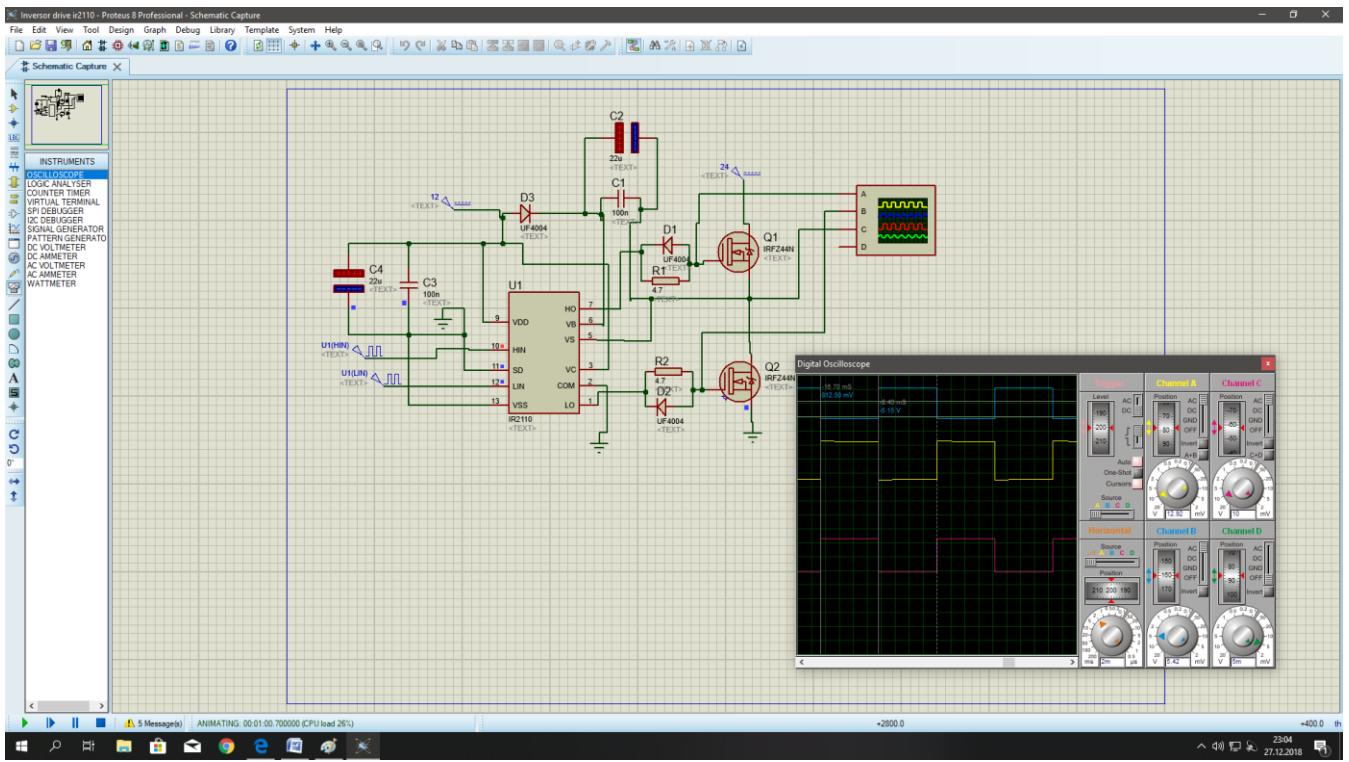
➤





➤





KANAL	A	B	C
GENLİK	12.25	5.15	10

