Content

Introduction

In this report, we will study MC34063 IC and we will use MC34063 design a Buck converter.

MC34063 is a 1.5A Step up or step down or inverting regulator, due to DC voltage conversion property, MC34063 is a DC-DC converter IC.

☑This IC provides following features in its 8pin package

☑Temperature compensated reference

☑Current limit circuit

☑Controlled Duty cycle oscillator with an active high current driver output switch.

☑Accept 3.0V to 40V DC.

☑Can be operated at 100 kHz switching frequency with a 2% tolerance.

☑Very low Standby current

☑Adjustable output voltage

☑Also, despite these features, it is widely available and it is much cost efficient than other ICs available in such segment.

This report includes 4 parts: first, we will conclude MC34063 features and functions. Second, we will simulate and test step up converter circuit given in the datasheet. Third, we will simulate and test step down converter circuit given in the datasheet. Fourth, we will design a buck converter circuit.

MC34063

Description

The MC34063A/E series is a monolithic control circuit delivering the main functions for DC-DC voltage converting. The device contains an internal temperature compensated reference, comparator, duty cycle is controlled oscillator with an active current limit circuit, driver and high current output switch. Output voltage is adjustable through two external resistors with a 2% reference accuracy. Employing a minimum number of external components the MC34063A/E devices series is designed for Step-Down, Step-Up and Voltage-Inverting applications.

Features

☑This IC provides following features in its 8pin package-

☑Temperature compensated reference

☑Current limit circuit

☑Controlled Duty cycle oscillator with an active high current driver output switch.

☑Accept 3.0V to 40V DC.

☑Can be operated at 100 kHz switching frequency with a 2% tolerance.

☑Very low Standby current

☑Adjustable output voltage

☑Also, despite these features, it is widely available and it is much cost efficient than other ICs available in such segment.

Below image is the internal circuit of MC34063 is shown- Black Diagram.

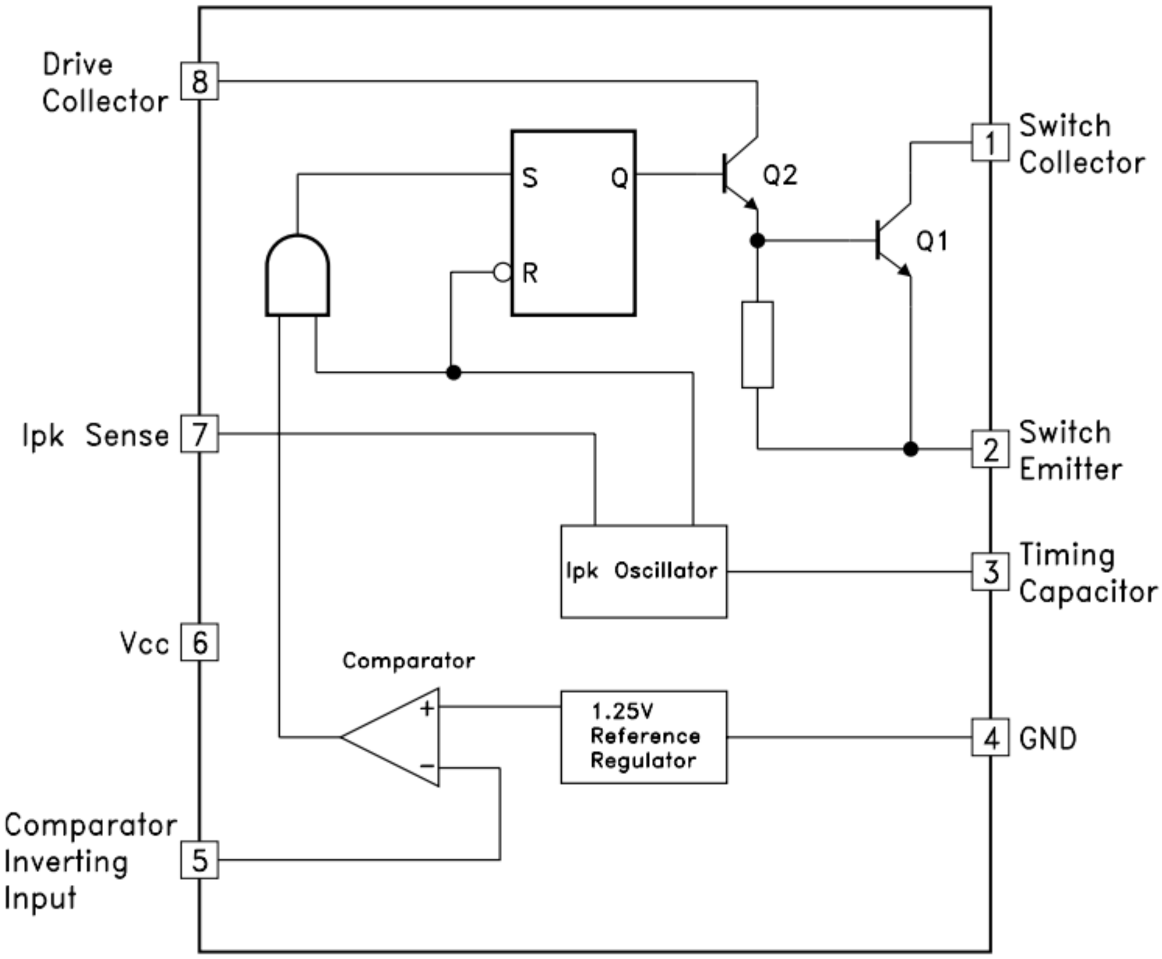


Figure 1 Black Diagram

Black Diagram Description
Inverting Input of Comparator (Pin 5 CII) monitors the output voltage (V_{out}) through two external voltage divide resistors. From Figure 1, we know the reference voltage is 1.25V, it is constant. Pin 3 Timing capacitor recharged and discharged in order to produce oscillation. Recharging and discharging current is constant, oscillation frequency and switch on-off time depend on Pin 3 external timing capacitor. When Pin 5 input voltage larger than 1.25, Pin1 and Pin 2 turn on. Source recharge output capacitor and inductor. In contrast, Pin 2 and Pin1 turn off, the inductance recharged capacitor.

Between Pin 6 and Pin7 external resistor, through testing resistor voltage drop realizes current limit. When testing resistor voltage drop nears 0.3V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time. If Pin 8 and Pin 2 external ground. T2 will have higher voltage drop, to prevent higher voltage, Pin 8 and Pin 2 external resistor and inductor.

Pin Configuration

The pin configuration of the MC34063 DC to DC converter is shown below. This IC includes 8-pins where each pin with its functionality is discussed below. MC34063 pin out diagram has been shown in the below image.

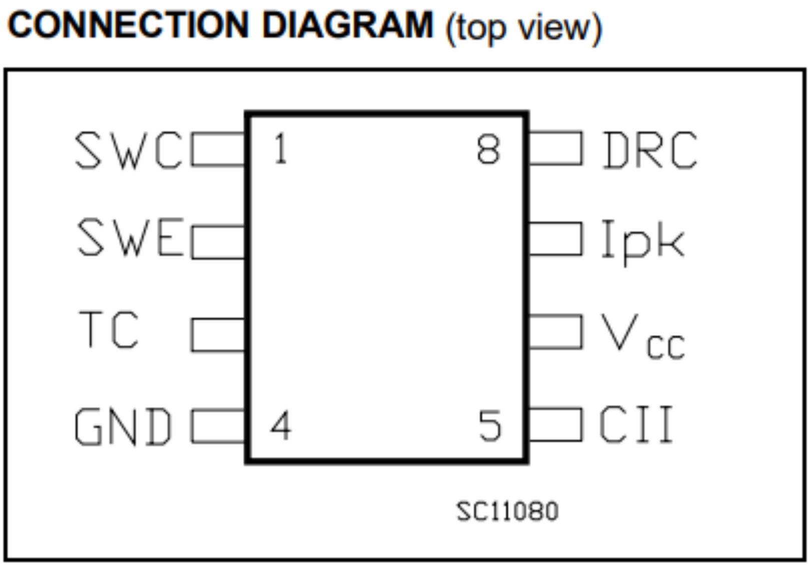


Figure 2 Pin Configuration Diagram

Pin No	Symbol	Name	Function
1	SWC	Switch Collector	Switch collector pin of the transistor which is also known as an o/p voltage pin.
2	SWE	Switch Emitter	Switch emitter pin of the transistor
3	TC	Timing Capacitor	This pin is connected to a capacitor to decide the switching frequency
4	GND	Ground	This pin is connected to the GND pin
5	CII	Inverting Input of Comparator	This pin is used to set the o/p voltage
6	V_{cc}	Input Voltage	Input voltage is given to this pin
7	I_{pk}	I_{pk} $Sense$	This pin is used to set the o/p current
8	DRC	Driver Collector	This is the collector pin of the transistor

Chart 2 Pin Configuration Function

Step-down Converter

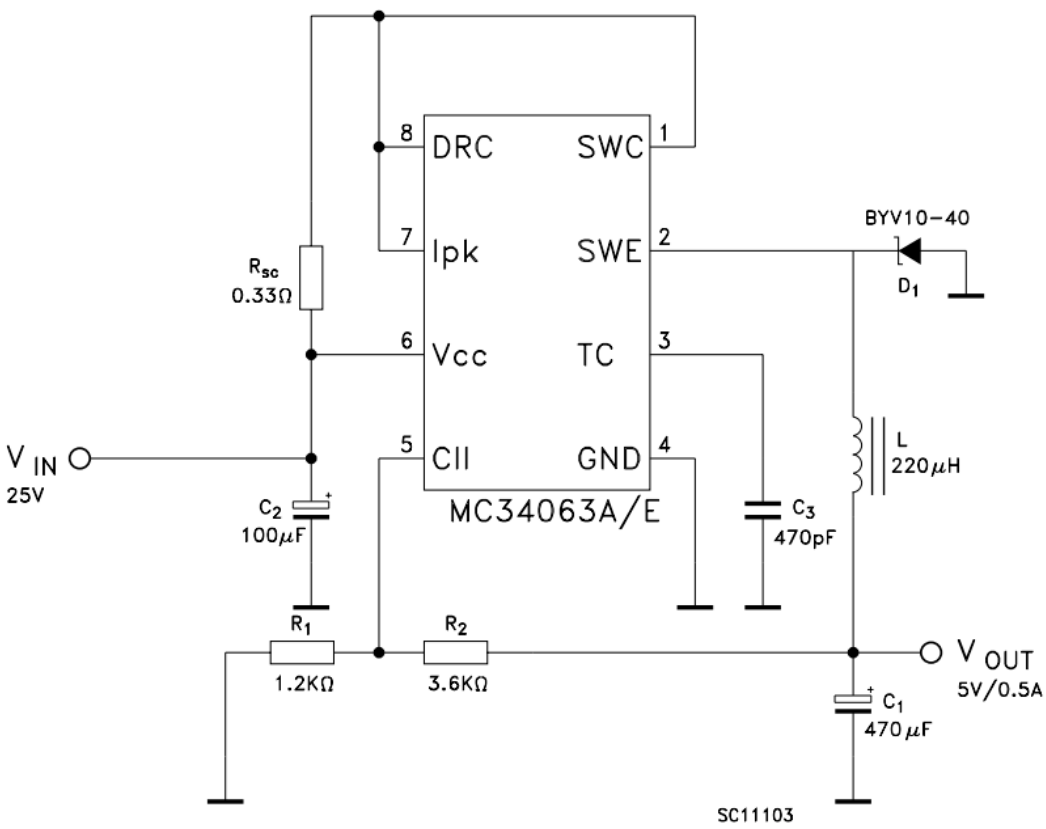


Figure 3 Step-down Converter Circuit of Datasheet

Results

This is a MC 34063 step-down coverter circuit, input voltage (V_{in}) is 25V, through the step-down circuit, the output voltage (V_{out}) is 5V.

Description

Step-down converter circuit

Inverting Input of Comparator (Pin 5 CII) monitors the output voltage (V_{out}) through two external voltage divide resistors R_1 and R_2. V_{out} = 1.25*(1+$\frac{R_2}{R_1}$). From Figure 1, we know the reference voltage is 1.25V, it is constant. Pin 3 Timing capacitor recharged and discharged in order to produce oscillation. Recharging and discharging current is constant, oscillation frequency and switch on-off time depend on Pin 3 external timing capacitor. When Pin 5 input voltage larger than 1.25, Pin1 and Pin 2 turn on. Source recharge output capacitor and inductor. In contrast, Pin 2 and Pin1 turn off, the inductor recharged capacitor.

Between Pin 6 and Pin7 is R_{sc}, through testing R_{sc} voltage drop realizes current limit. When testing resistor voltage drop nears 0.3V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time. Pin 8 and Pin 2 external resistor and inductor to prevent higher voltage drop.

Step-down Diagram

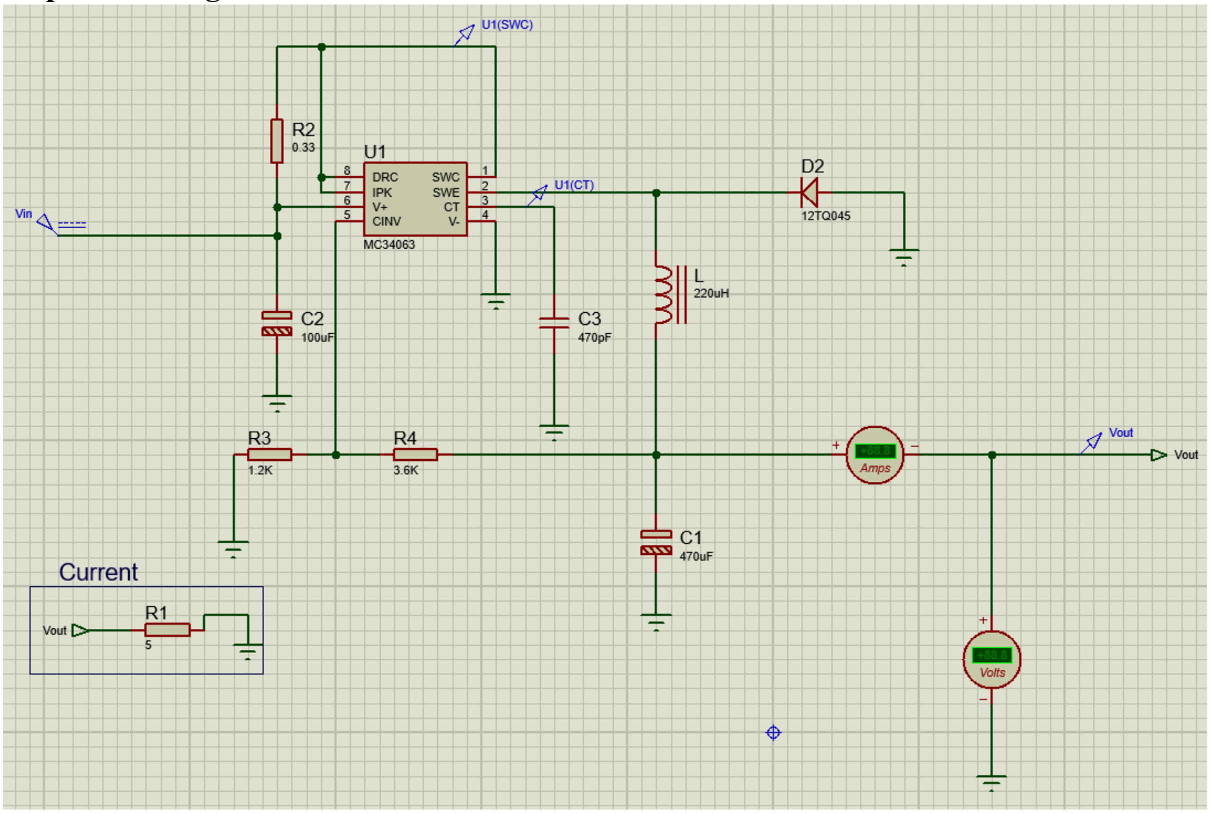


Figure 4 Step-down Proteus Diagram

Result

This is a MC 34063 step-down coverter circuit Proteus Diagram, input voltage (V_{in}) is 25V, through the step-down circuit, the output voltage (V_{out}) is 5.05V.

Discussion

Inverting Input of Comparator (Pin 5 CII) monitors the output voltage (V_{out}) through two external voltage divide resistance (R_3 *and* R_4) V_{out} = 1.25*(1+$\frac{R_4}{R_3}$), from Figure 1, we know the reference voltage is 1.25V, it is constant. Pin 3 Timing capacitor recharged and discharged in order to produce oscillation. Recharging and discharging current is constant, oscillation frequency depends on Pin 3 external timing capacitor. When Pin 5 input voltage larger than 1.25, Pin1 and Pin 2 turn on. Source recharge C_1 *and* L,. In contrast, Pin 2 and Pin1 turn off, the inductor (L) recharged capacitor (C_1).

Between Pin 6 and Pin7 is R_2, through testing R_2 voltage drop realizes current limit. When testing R_2 voltage drop nears 0.3V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time. Pin 8 and Pin 2 external resistor and inductor to prevent higher voltage.

From the Figure 5 and Figure 7, when time =200.023ms, V_{CT} = 1.29V, V_{out} = 5.04V, V_{swc}= 25V, switch turn on, source (V_{in}) recharge C_1 *and* L, V_{out} increased. When time = 200.052ms, the circuit produced voltage drop, V_{swc} reduced. When time = 200.062ms,V_{CT} = 1.36V, V_{out} = 5.07V, V_{swc}= 24.6V, since voltage drop = 25-24.6=0.4V nears 0.3V, current limit circuit operates,through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time. Switch turn off suddenly, V_{out} suddenly drop (between time = 200.062ms and time = 00.068ms), the inductor (L) recharged capacitor (C_1), V_{out} slowly drop. When time =200.097ms, V_{CT} = 1.27V, $V_{out} = 5.04$V, V_{swc}= 25V, switch turn on, source (V_{in}) recharge C_1 *and* L, V_{out} increased.

$T_{on} + T_{off}$ = 1/ (200.105-200.079) =38us (from Figure 6)

$V_{ripple} = \frac{I_{pk(switch)} * (T_{on} + T_{off})}{8 * C_o}$

$V_{ripple} = \frac{1*38*10^{-6}}{8*470*10^{-6}}$

V_{ripple} = 0.01V

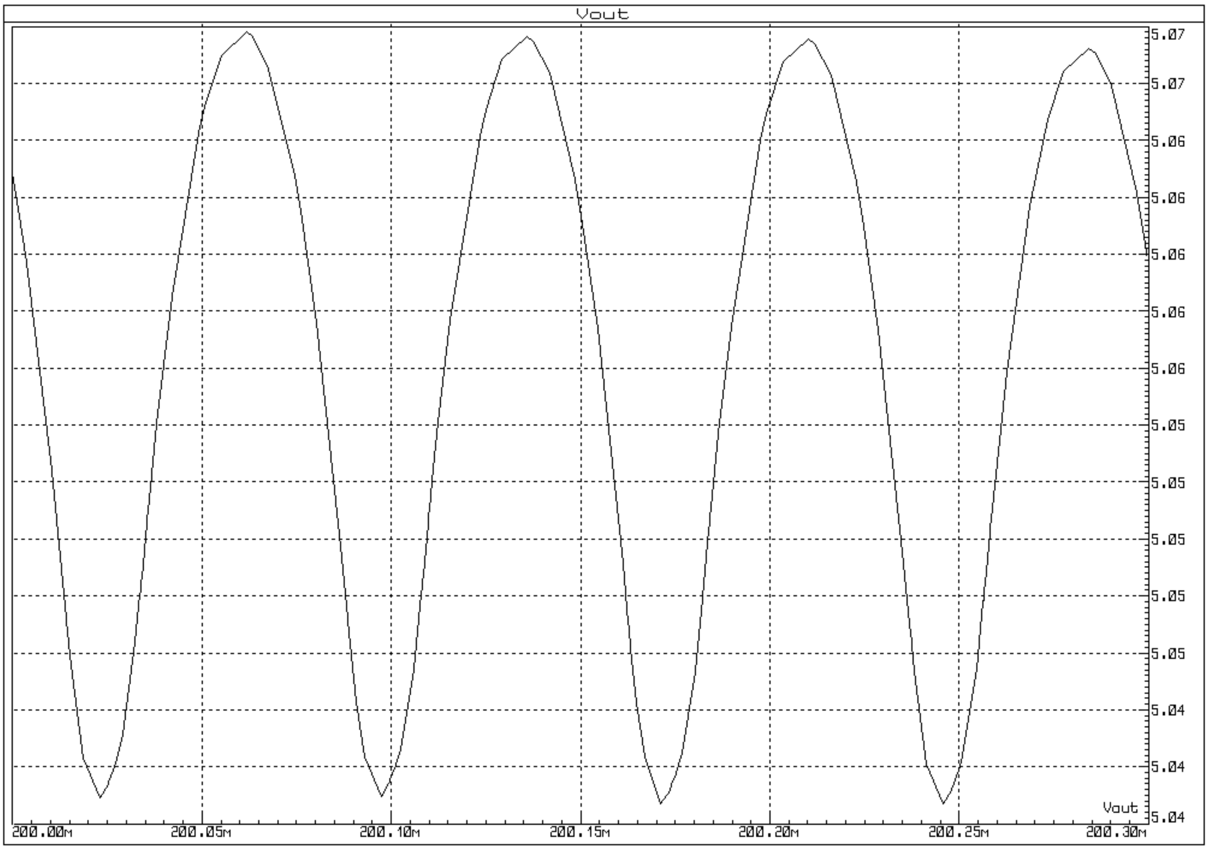


Figure 5 V_{out} *Analog Graph*

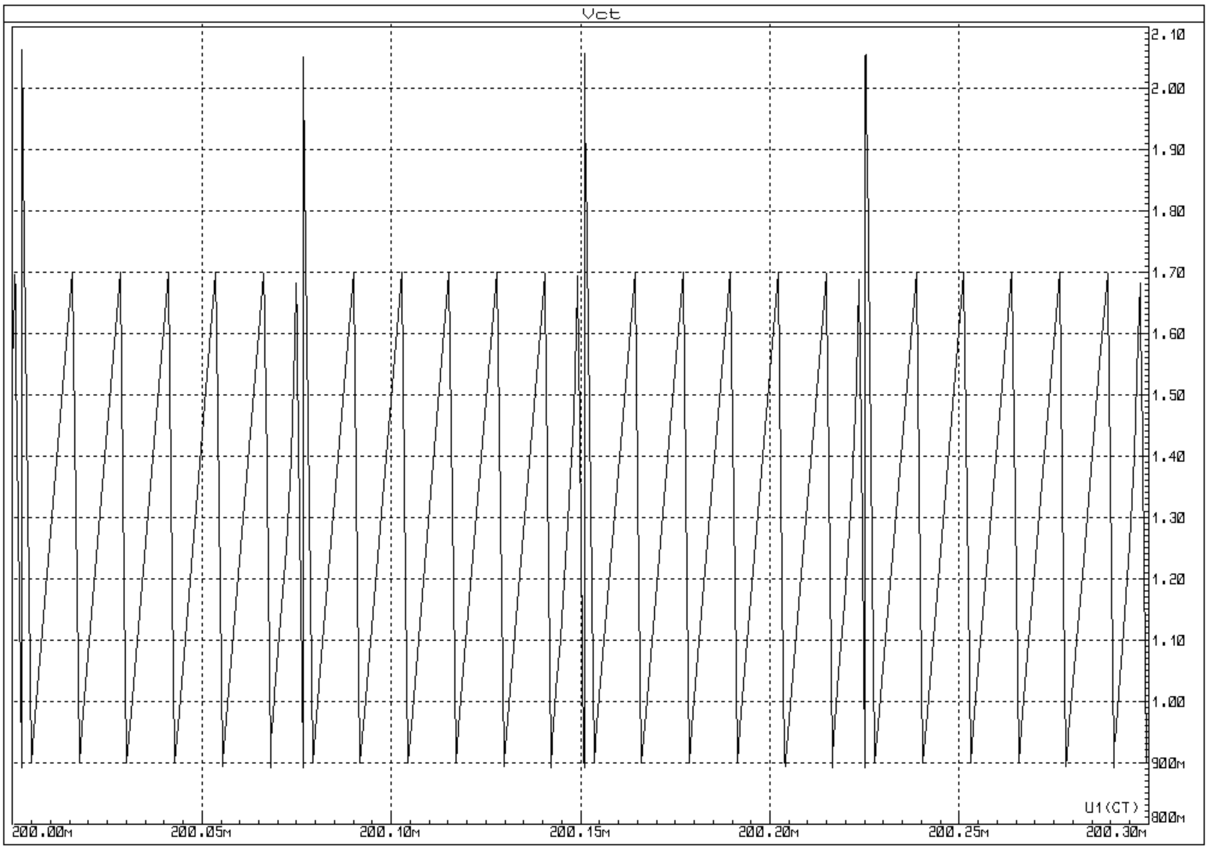


Figure 6 V_{CT} Analog Graph

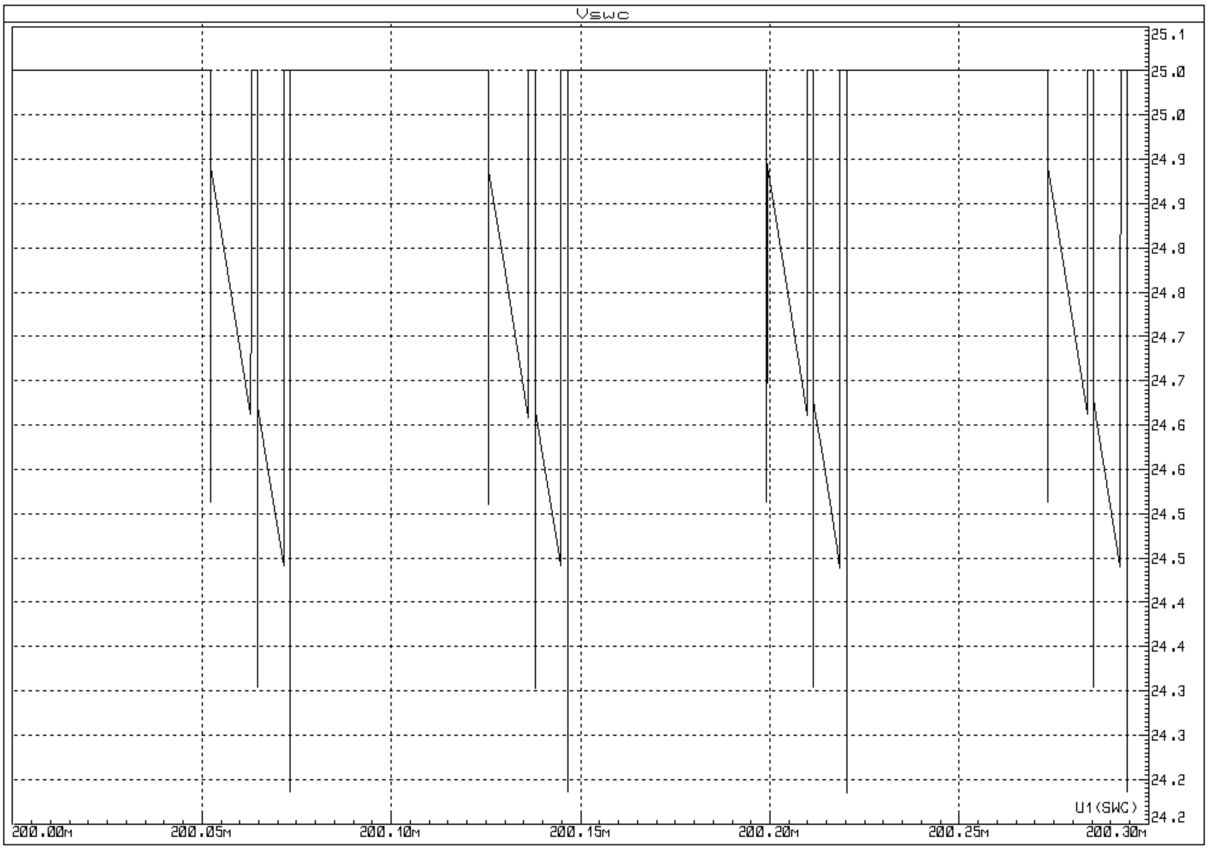


Figure 7 V_{swc} Analog Graph

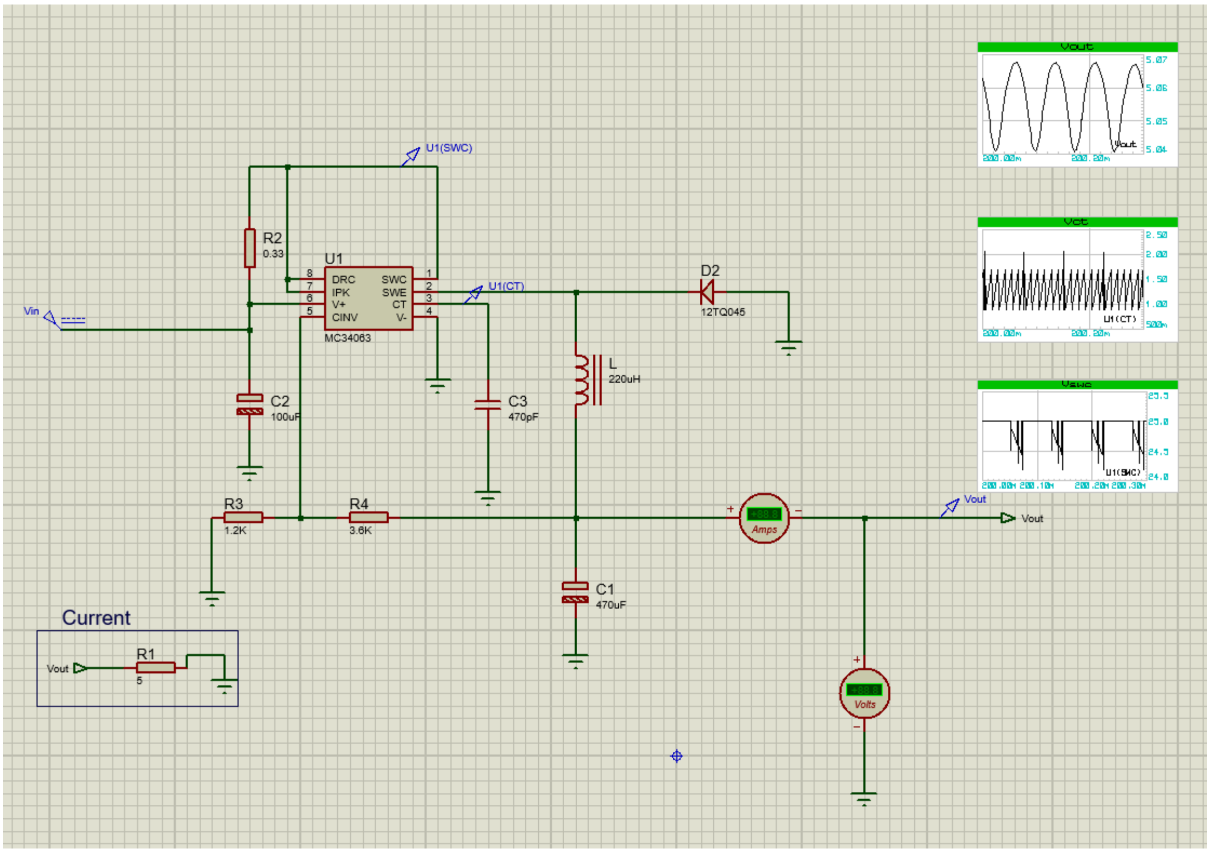


Figure 8 Step – down Analysis

Step-up converter

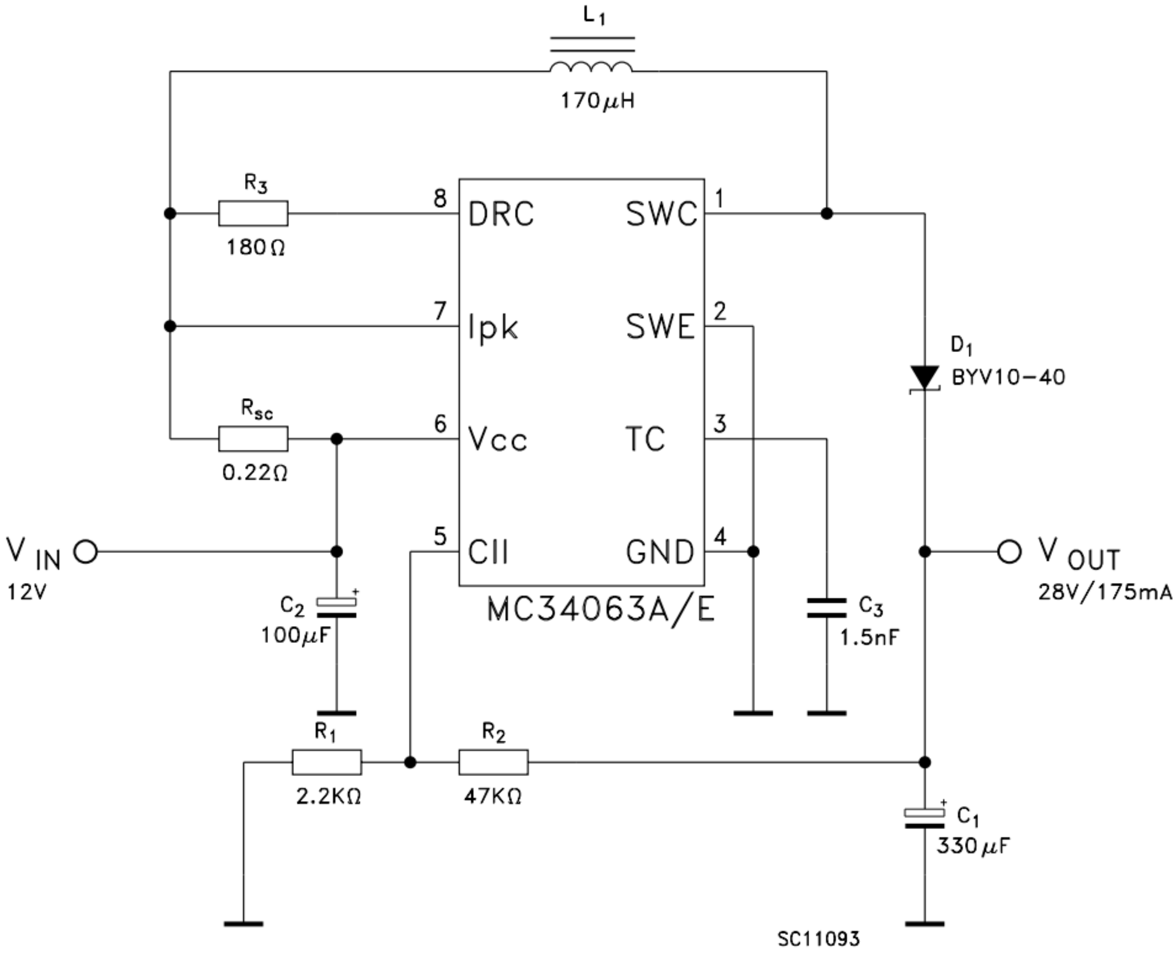


Figure 9 Step-up Converter Circuit of Datasheet

Result
This is a MC 34063 step-up coverter circuit Proteus Diagram, input voltage (V_{in}) is 12V, through the step-down circuit, the output voltage (V_{out}) is 28V.

Discussion
Step-up converter circuit

Inverting Input of Comparator (Pin 5 CII) monitors the output voltage (V_{out}) through two external voltage divide resistors R_1 *and* R_2. V_{out} = 1.25*(1+$\frac{R_2}{R_1}$). From Figure 1, we know the reference voltage is 1.25V, it is constant. Pin 3 Timing capacitor recharged and discharged in order to produce oscillation. Recharging and discharging current is constant, oscillation frequency and switch on-off time depend on Pin 3 external timing capacitor. When Pin 5 input voltage larger than 1.25, Pin1 and Pin 2 turn on. Source recharged inductor and capacitor discharged the R_1 *and* R_2. In contrast, Pin 2 and Pin1 turn off, inductor recharged capacitor R_1 *and* R_2, since the electromotive force polarity at both ends is the same as the power supply polarity, equivalent to two power supplies connected in series, so output voltage over V_{in}

Between Pin 6 and Pin7 external resistor (R_{SC}), through testing resistor voltage drop realizes current limit. When testing resistor (R_{SC}) voltage drop nears 0.3V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time. Pin 2 connect the GND.

Step-up Diagram

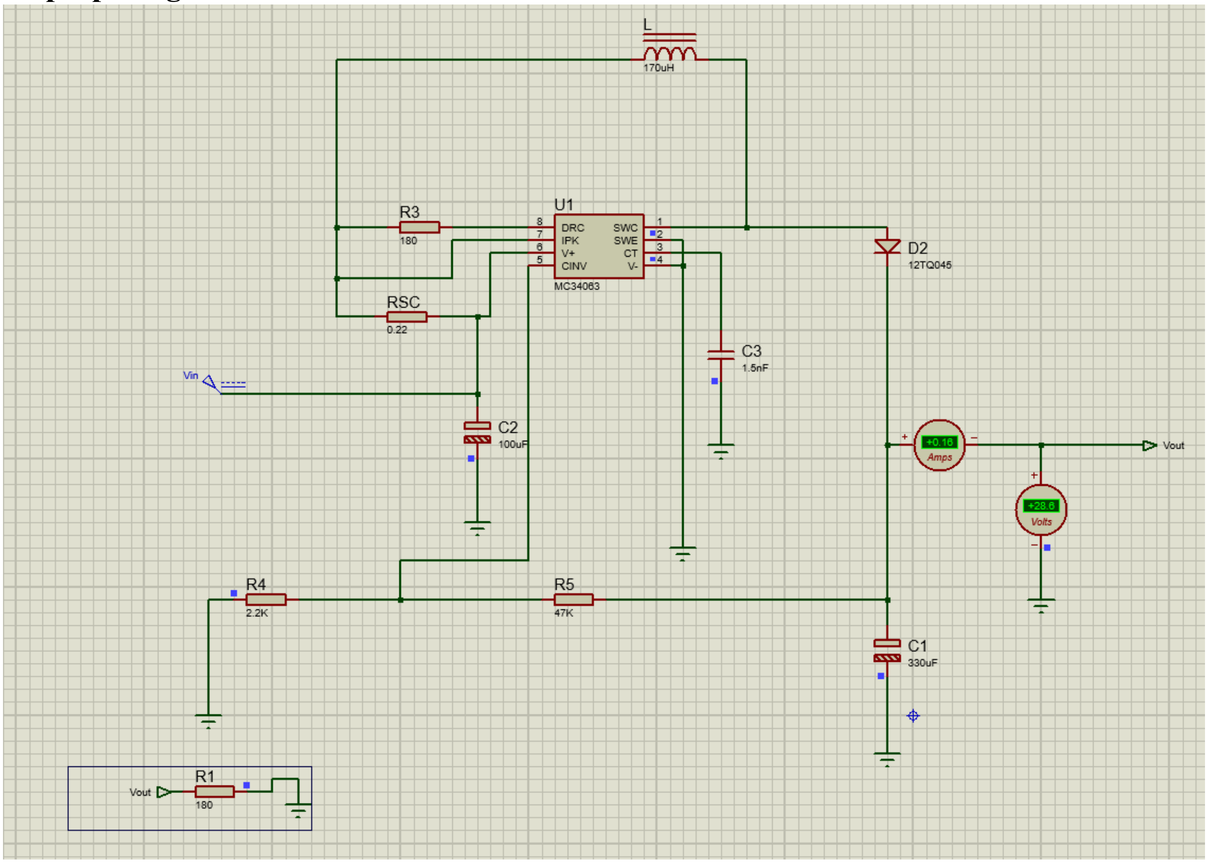


Figure 10 Step-up Diagram

Results

This is a MC 34063 step-up coverter circuit Proteus Diagram, input voltage (V_{in}) is 12V, through the step-down circuit, the output voltage (V_{out}) is 28.6V.

Discussion

Inverting Input of Comparator (Pin 5 CII) monitors the output voltage (V_{out}) through two external voltage divide resistors R_4 *and* R_5. $V_{out} = 1.25*(1+\frac{R_5}{R_4})$. From Figure 1, we know the reference voltage is 1.25V, it is constant. Pin 3 Timing capacitor recharged and discharged in order to produce oscillation. Recharging and discharging current is constant, oscillation frequency and switch on-off time depend on Pin 3 external timing capacitor. When Pin 5 input voltage larger than 1.25, Pin1 and Pin 2 turn on. Source recharged inductor and capacitor discharged the R_4 *and* R_5. In contrast, Pin 2 and Pin1 turn off, inductor recharged capacitor R_4 *and* R_5, since the electromotive force polarity at both ends is the same as the power supply polarity, equivalent to two power supplies connected in series, so output voltage over V_{in}

Between Pin 6 and Pin7 external resistor (R_{SC}), through testing resistor (R_{SC}) voltage drop realizes current limit. When testing resistor voltage drop nears 0.3V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time. Pin 2 connect the GND.

From Figure 11, 12, 13. When time = 0, switch turn off, inductor recharged capacitor R_4 and R_5, since the electromotive force polarity at both ends is the same as the power supply polarity, equivalent to two power supplies connected in series, so output voltage over V_{in}, V_{out} increased. When time = 4.691ms, V_{out} = 28.6V, V_{CT}= 1.29V, V_{SWC} = 29V, switch turn on, source recharged inductor and capacitor discharged the R_4 and R_5, V_{out} begins drop, switch turn off again.

$$T_{on} = \frac{C_T}{4.5*10^{-5}}$$

$$T_{on} = \frac{1.5*10^{-9}}{4.5*10^{-5}}$$

$$T_{on} = \frac{1.5*10^{-9}}{4.5*10^{-5}} = 33us$$

$$V_{ripple} = \frac{I_{out}*T_{on}}{C_o}$$

$$V_{ripple} = \frac{0.175*33*10^{-6}}{330*10^{-6}} = 0.0175V$$

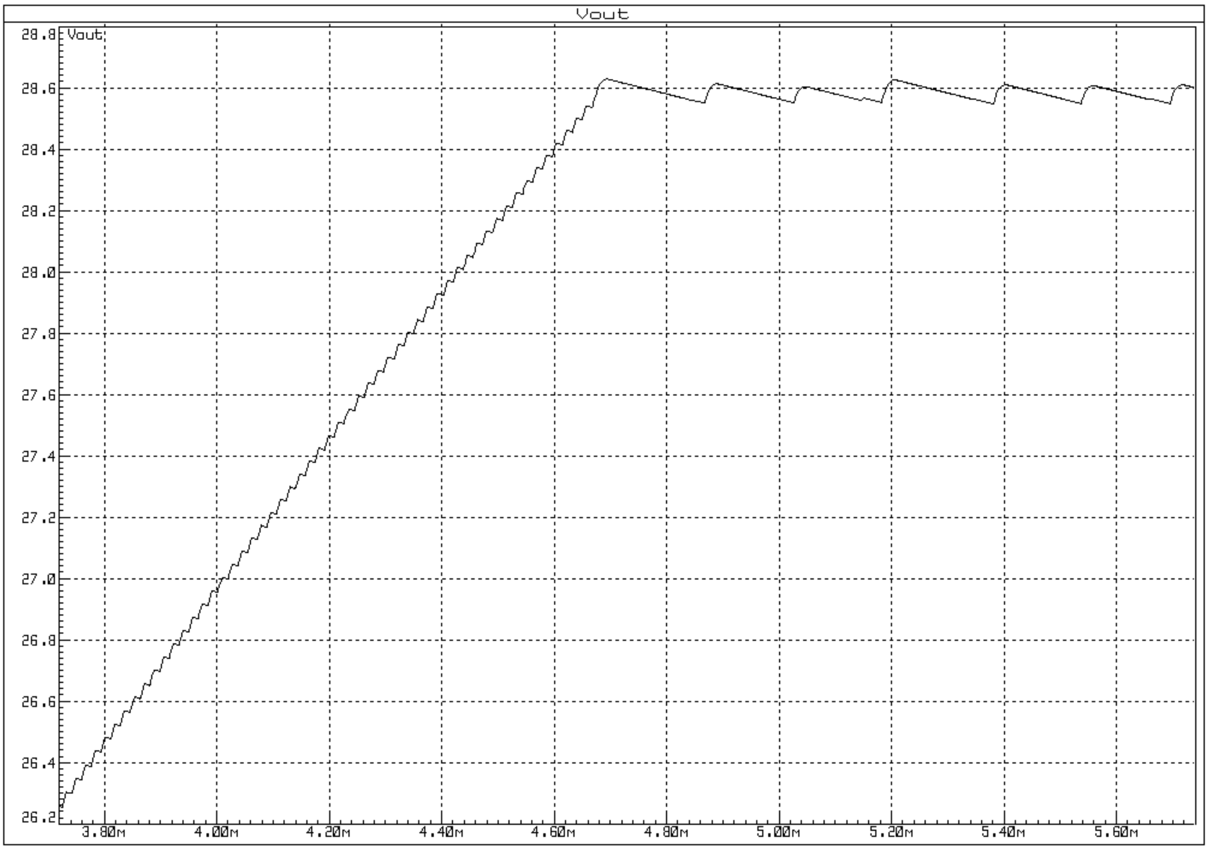


Figure 11 V_{out} *Analog Graph*

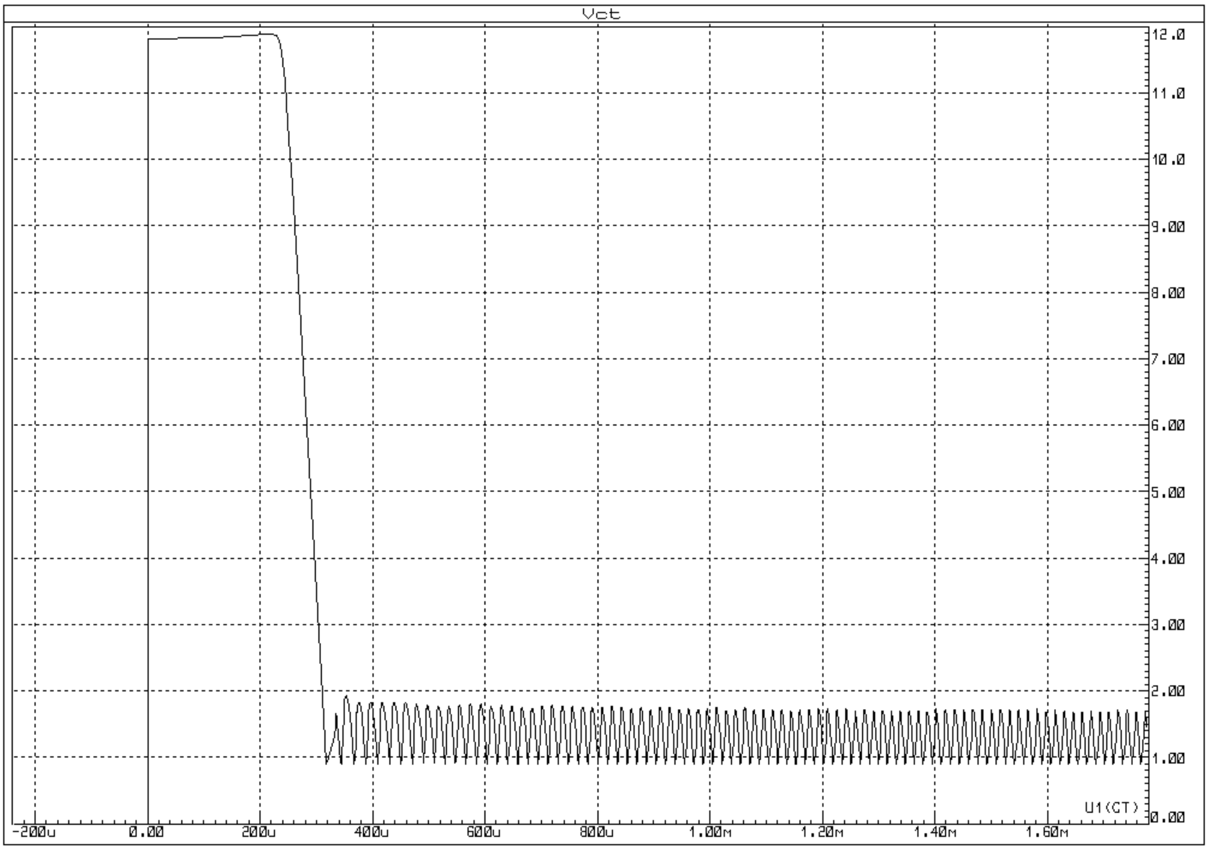


Figure 12 V_{CT} *Analog Graph*

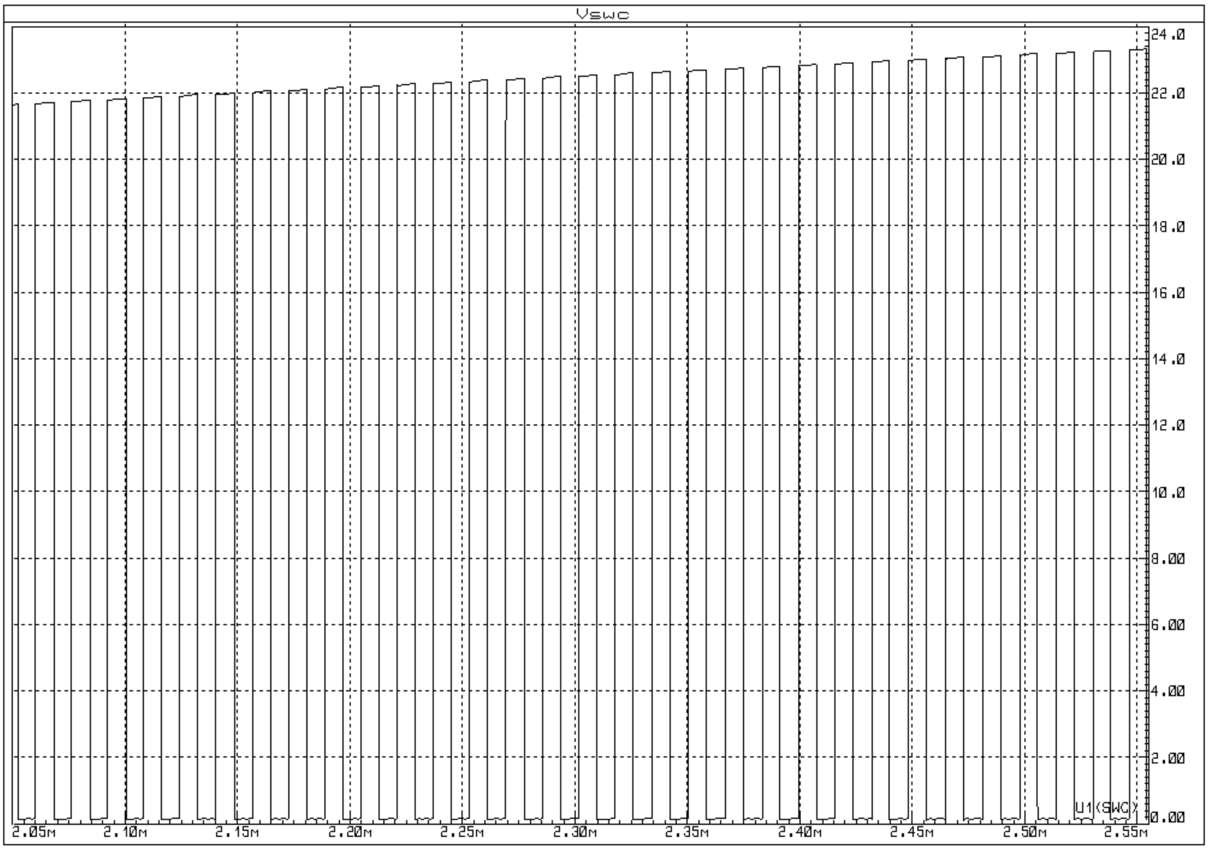


Figure 13 V_{ripple} *Analog Graph*

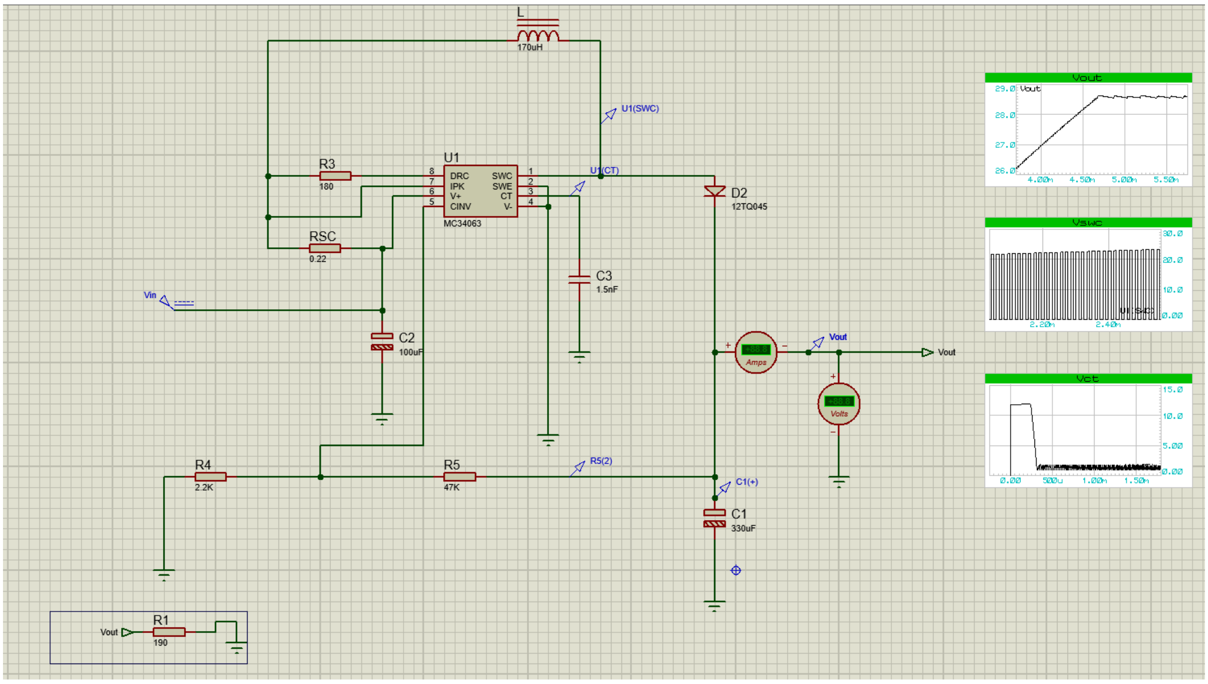


Figure 14 Step – up Analysis

Buck Converter Design

Design a buck converter select output current value in range of 200mA to 500mA, output voltage under 12V. $V_{in} = 10V$ V_{out} = 5V. f = 40kHz. V_{ripple} = 100mV(pp)

If we check the datasheet, we can see the complete formula chart is present to calculate the desired values required as per our requirement. Here is the formula sheet available inside the datasheet, and the step-down circuit is also shown.

Calculation

Parameter	Step-Up (Discontinuos mode)	Step-Down (Continuos mode)	Voltage Inverting (Discontinuos mode)
t_{on}/t_{off}	$\frac{V_{out}+V_F-V_{in(min)}}{V_{in(min)}-V_{sat}}$	$\frac{V_{out}+V_F}{V_{in(min)}-V_{sat}-V_{out}}$	$\frac{\lvert V_{out}\rvert+V_F}{V_{in}-V_{sat}}$
$(t_{on}+t_{off})max$	$1/f_{min}$	$1/f_{min}$	$1/f_{min}$
C_T	$4.5x10^{-5}t_{on}$	$4.5x10^{-5}t_{on}$	$4.5x10^{-5}t_{on}$
$I_{PK(switch)}$	$2I_{out(max)}[(t_{on}/t_{off})+1]$	$2I_{out(max)}$	$2I_{out(max)}[(t_{on}/t_{off})+1]$
R_{SC}	$0.3/I_{PK(switch)}$	$0.3/I_{PK(switch)}$	$0.3/I_{PK(switch)}$
C_O	$\cong\frac{I_{out}t_{on}}{V_{ripple(p-p)}}$	$\frac{I_{PK(switch)}(t_{on}+t_{off})}{8V_{ripple(p-p)}}$	$\cong\frac{I_{out}t_{on}}{V_{ripple(p-p)}}$
L(min)	$\frac{V_{in(min)}-V_{sat}}{I_{PK(switch)}}t_{on(max)}$	$\frac{V_{in(min)}-V_{sat}-V_{out}}{I_{PK(switch)}}t_{on(max)}$	$\frac{V_{in(min)}-V_{sat}}{I_{PK(switch)}}t_{on(max)}$

NOTES:
V_{sat} = Saturation voltage of the output switch
V_F = Foward voltage drop of the output rectifier
THE FOLLOWING POWER SUPPLY CHARACTERISTICS MUST BE CHOSEN:
V_{in} = Nominal input voltage
V_{out} = Desired output voltage, $|V_{out}| = 1.25(1+R_2/R_1)$
I_{out} = Desired output current
f_{min} = Minimum desired output switching frequency at the selected values of Vin and Io
V_{ripple} = Desired peak to peak output ripple voltage. In practice, the calculaed capacitor value will and to be increased due to its equivalent series resistance and board layout. The ripple voltage should be kept to a low value since it will directly affect the line and load regulation.

Figure 15 Formula Calculation

OUTPUT SWITCH

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Saturation Voltage, Darlington Connection	I_{SW} = 1 A Pins 1, 8 connected		1	1.3	V
$V_{CE(sat)}$	Saturation Voltage	I_{SW} = 1 A R_{pin8} = 82 Ω to V_{CC}, Forced β ~ 20		0.45	0.7	V
h_{FE}	DC Current Gain	I_{SW} = 1 A V_{CE} = 5 V T_a = 25 °C	50	120		
$I_{C(off)}$	Collector Off-State Current	V_{CE} = 40 V		0.01	100	µA

Figure 16 MC34063 datasheet- Saturation Voltage

V_{sat} *Typ. =1, so we make* $V_{sat} = 1V$

We will use 12TQ045 diode, from this datasheet, *so we make* $V_F = 0.35\ V$

Step 1: First, we need to select the Diode. We will choose widely available diode 12TQ045. As per the datasheet, at 1A forward current the forward voltage of the diode will be 0.35 V.

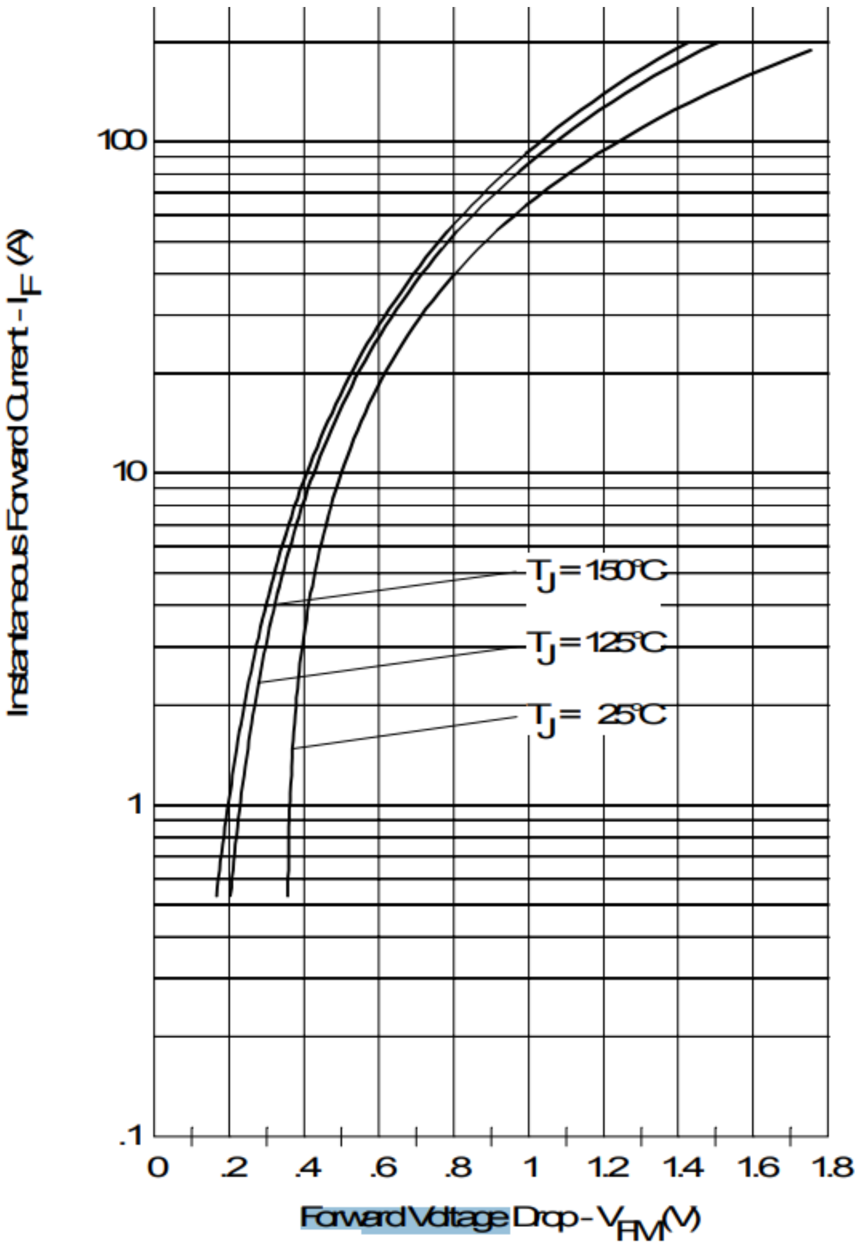


Fig. 1 - Maximum Forward Voltage Drop Characteristics

Figure 17 12TQ045 diode datasheet - Forward voltage

Step 2: We will calculate the T_{on}/T_{off} using the formula below:

$$\frac{T_{on}}{T_{off}} = \frac{V_{out} + V_F}{V_{in(min)} - V_{sat} - V_{out}}$$

$$\frac{T_{on}}{T_{off}} = \frac{5V + 0.5V}{10V - 1V - 5V}$$

$$\frac{T_{on}}{T_{off}} = 1.34$$

$$T_{on} = 1.34*T_{off}$$

Step 3: Now we will calculate the $T_{on} + T_{off}$ time, as per the formula $T_{on} + T_{off} = 1 / f$

We will select a lower switching frequency, 40kHz.

$T_{on} + T_{off} = \frac{1}{f}$

$T_{on} + T_{off} = \frac{1}{40 * 10^3}$ =25 us

Step 4: Now we will calculate the T_{off} time. As we calculated the $T_{on} + T_{off}$ and $\frac{T_{on}}{T_{off}}$ previously, the calculation will be easier now

$1.34 * T_{off} + T_{off} = 25$ us

$T_{off} = 10.68$

Step 5: Now the next step is to calculate T_{on}

$T_{on} = 14.32$

Step 6: We need to choose the timing Capacitor C_T, which will be required to produce the desired frequency

$C_T = 4.5 * 10^{-5} * T_{on}$

$C_T = 4.5 * 10^{-5} * 14.32$

$C_T = 644$pF we can use 680pF

Step 7: The Switching peak current

$I_{pk(switch)} = 2 * I_{out(max)}$

$I_{pk(switch)} = 2 * 500$mA

$I_{pk(switch)} = 1$A

Step 8: For the R_{sc} value will be 0.3/ $I_{pk(switch)}$

$R_{sc} = \frac{0.3}{I_{pk(switch)}}$

$R_{sc} = 0.3$

Step 9: Depending on those values we will calculate the Inductor value

$L_{min} = \frac{V_{in(min)} - V_{sat} - V_{out}}{I_{pk(switch)}} * T_{on}$

$L_{min} = \frac{10V - 1V - 5V}{1} * 14.32$

$L_{min} = 57.28$uH we can use 100uH

Step 10: Let’s calculate the output capacitor values, we can choose a ripple value of 100mV (peak to peak) from the boost output.

$C_o = \frac{I_{pk(switch)} * (T_{on} + T_{off})}{8 * V_{ripple}}$

$C_o = \frac{1 * 25}{8 * 10 * 10^{-3}}$ = 31uF we can use 33uF

Step 11: Last we need to calculate the voltage feedback resistors value. We will choose R1 value 1k, So, the R2 value will be calculated as

V_{out} = 1.25*(1+$\frac{R_2}{R_1}$)

R_1 = 1K, R_2 =3K

Component	Value	Unit	Select	Unit
C_T	644	pF	680	pF
R_{sc}	0.3	ohms	0.33	ohms
L_{min}	57.28	uH	100	uH
C_o	31	uF	33	uF
R_3	1K	ohms	1K	ohms
R_4	3K	ohms	3K	Ohms
C_1	/	/	100	uF

Chart2 Component value

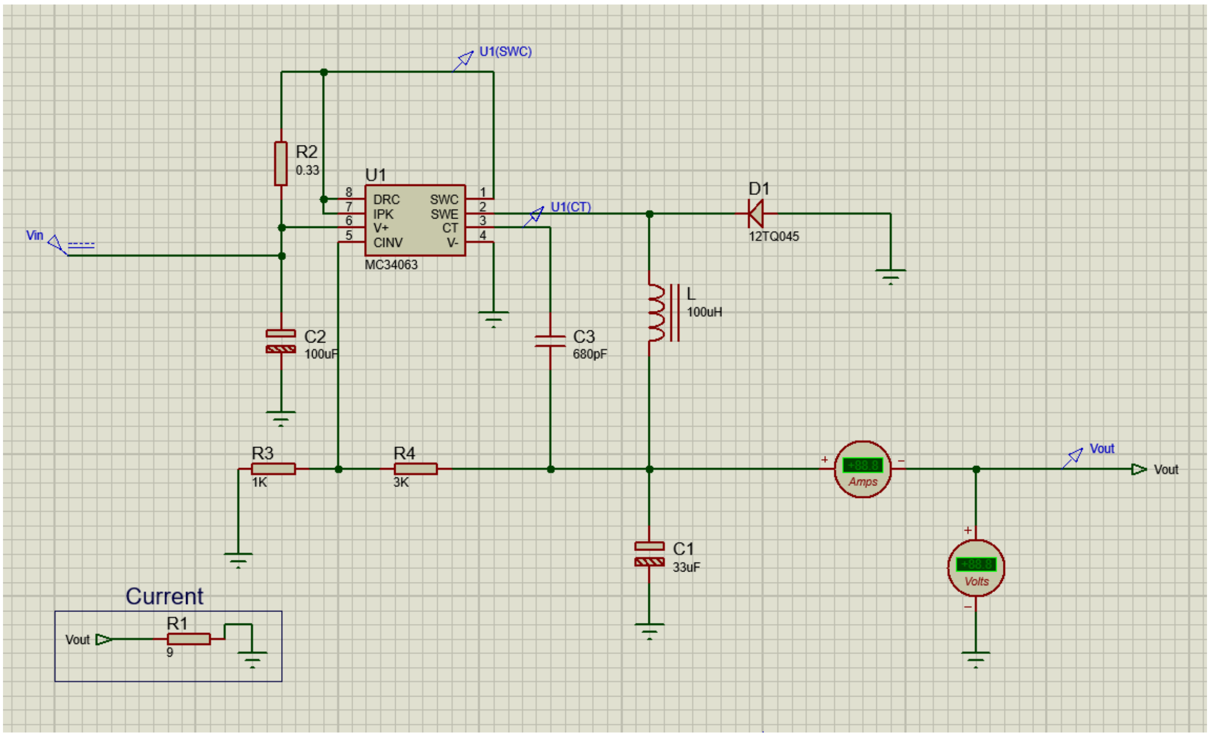


Figure18 Buck Converter

Results

This is a MC 34063 new design buck coverter circuit Proteus Diagram, input voltage (V_{in}) is 10V, through the step-down circuit, the output voltage (V_{out}) is 5.07V.

☑ Capacitor C_2, since input voltage is 10V, the withstand voltage must be greater than 12V, double the input voltage here.

☑ R_{sc} = R_2 is current limit resistor. It adjusted output load current and when between Pin 6 and Pin 7 voltage over 165mV, internal current limit function will be opened.

☑ Capacitor C_T connect with GND, it determines operating frequency.

☑ Diode D_1 , we use fast switch diode, but for high efficiency application, the Schottky diode must be used.

☑Inductance L, energy storage.

☑ $R_{1=}R_{3,}R_{2=}R_4$, feedback circuit. They determine output voltage.

☑ Capacitor $C_{1\,=}$ C_o, output capacitor, the within voltage is OK.

☑ R_5 is discharge resistor, the value is larger, discharge is slower.

Discussion

Inverting Input of Comparator (Pin 5 CII) monitors the output voltage (V_{out}) through two external voltage divide resistance (R_3 *and* R_4) V_{out} = 1.25*(1+$\frac{R_4}{R_3}$), from Figure 1, we know the reference voltage is 1.25V, it is constant. Pin 3 Timing capacitor recharged and discharged in order to produce oscillation. Recharging and discharging current is constant, oscillation frequency depends on Pin 3 external timing capacitor. When Pin 5 input voltage larger than 1.25, Pin1 and Pin 2 turn on. Source recharge C_1 *and* L,. In contrast, Pin 2 and Pin1 turn off, the inductor (L) recharged capacitor (C_1).

Between Pin 6 and Pin7 is R_2, through testing R_2 voltage drop realizes current limit. When testing R_2 voltage drop nears 0.1V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly, reducing recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time, Pin 8 and Pin 2 external resistor and inductor to prevent higher voltage.

From the Figure 19 and Figure 21, when time =200.072ms, $V_{CT} = 1.05V$, $V_{out} = 4.88V$, V_{swc}= 9.82V, swith turn on, souce (V_{in}) recharge $C_1$and L, V_{out} increased. When time =200.084ms, $V_{CT} = 1.69V$, $V_{out} = 4.94V$, V_{swc}= 9.71V, since R_2 voltage drop = 9.81-9.71=0.1V nears 0.1V, current limit circuit operates, through Pin 3 ocsilltion recharging timing capacitor quickly to reduce recharging time and Pin 2 switch turn on time, then extending Pin 2 switch turn off time, V_{out} continus increased. When time = 200.107ms, $V_{CT} = 1.19V$, V_{swc}= 10V, $V_{out} = 5.16V$, switch turn off, V_{out} suddenly drop (between time=200.107ms and time= 200.111ms), since switch suddenly turn off, V_{out} suddenly drop, L begins to recharge C_1, V_{out} slowly drop. When time=200.146ms, $V_{CT} = 1.09V, V_{out} =$ 4.88V, V_{swc}= 9.82V, swith turn on, souce (V_{in}) recharge $C_1$and L, V_{out} increased.

$T_{on} + T_{off}$ = 1/ (200.069-200.029) =25 (from Figure 20)

$$V_{ripple} = \frac{I_{pk(switch)} * (T_{on} + T_{off})}{8 * C_o}$$

$$V_{ripple} = \frac{1*25}{8*33} = 95 \text{ mV}$$

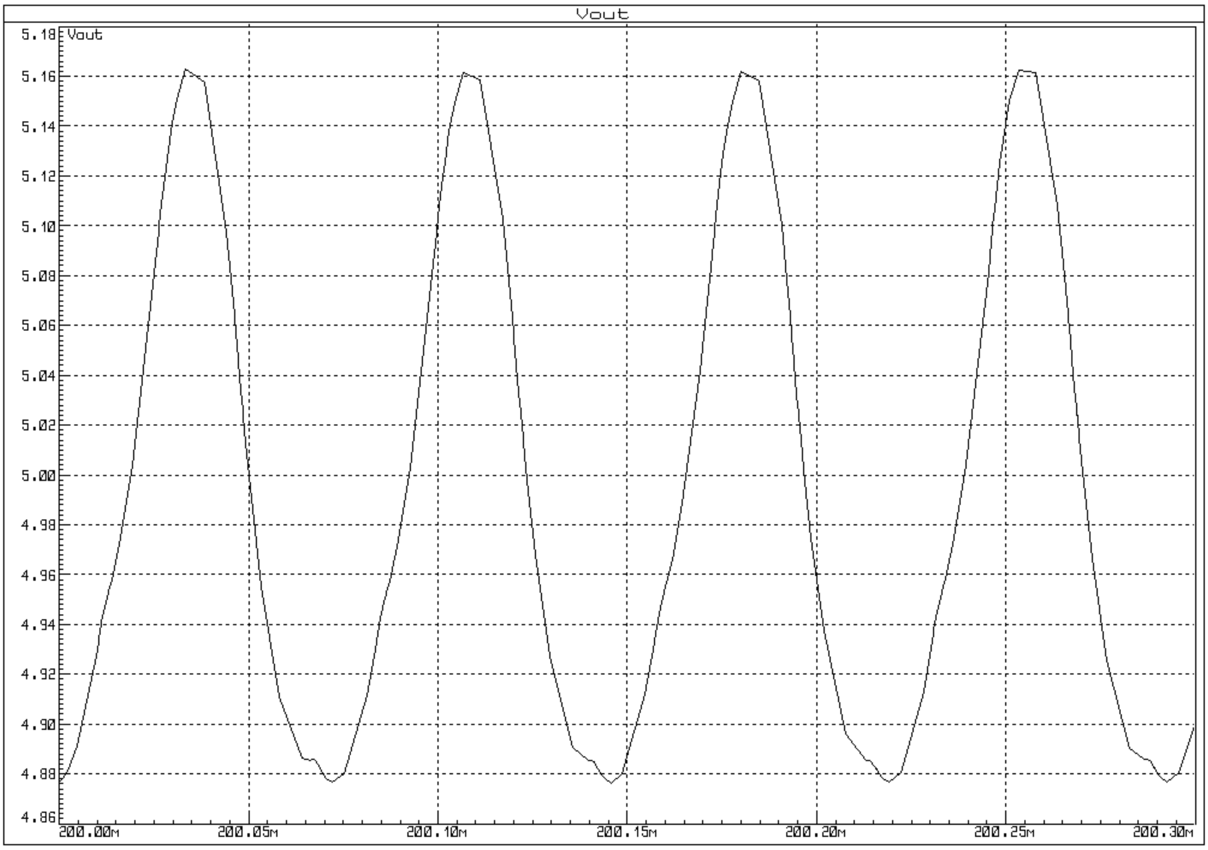


Figure 19 V_{out} *Analog Graph*

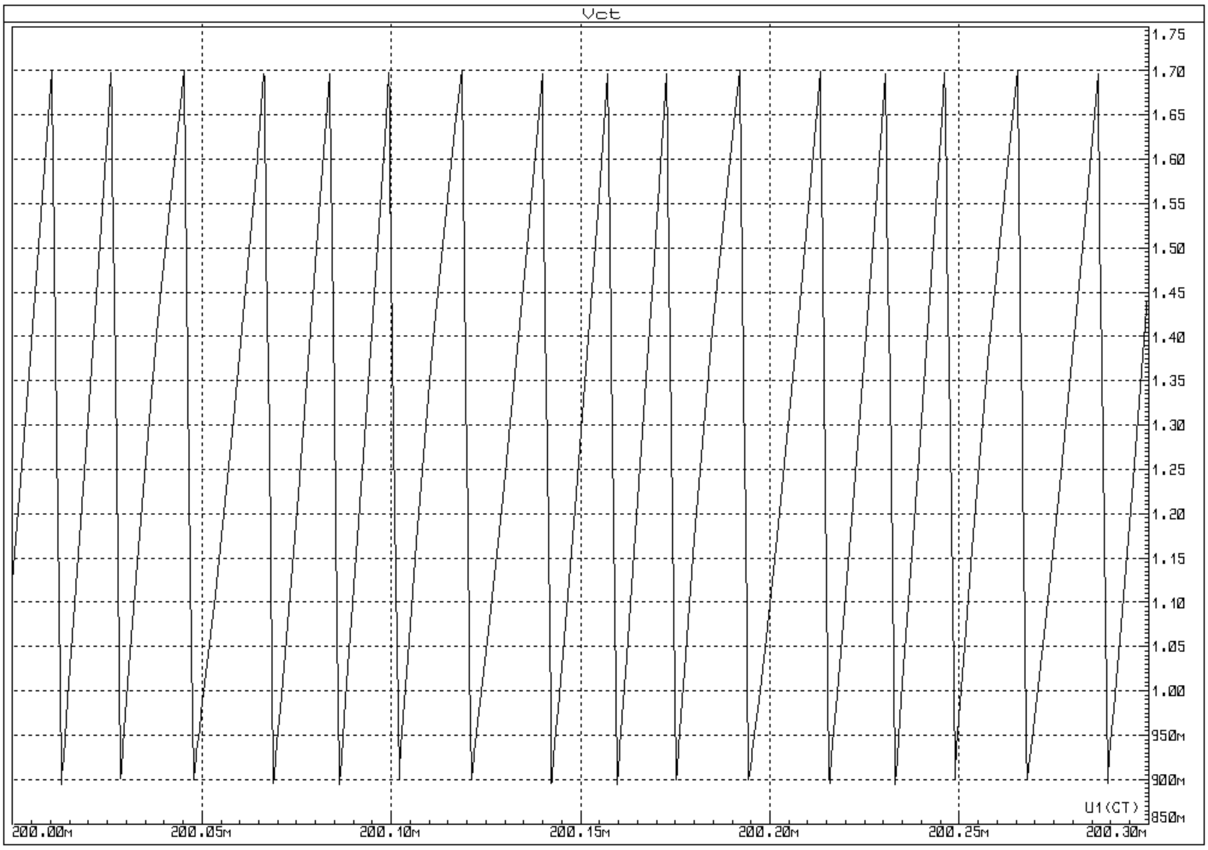


Figure 20 V_{CT} *Analog Graph*

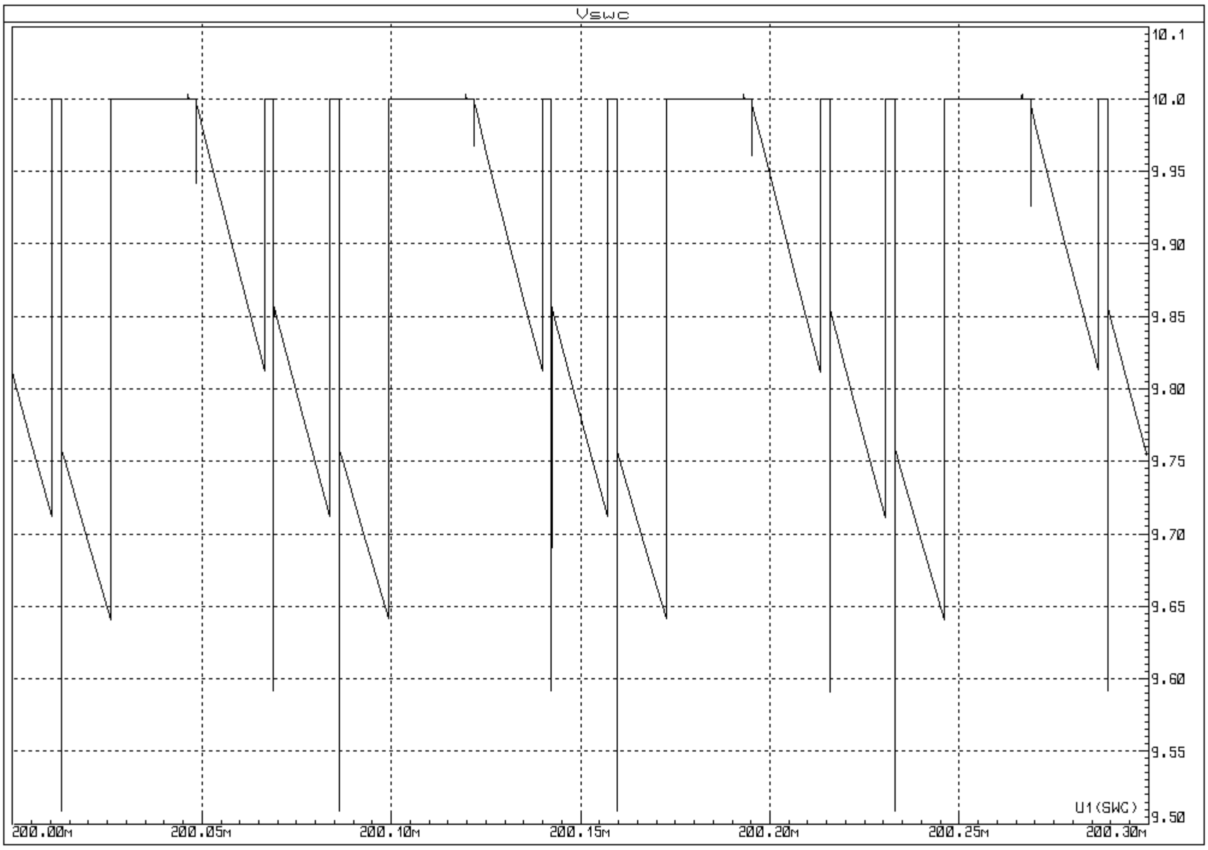


Figure 21 V_{swc} Analog Graph

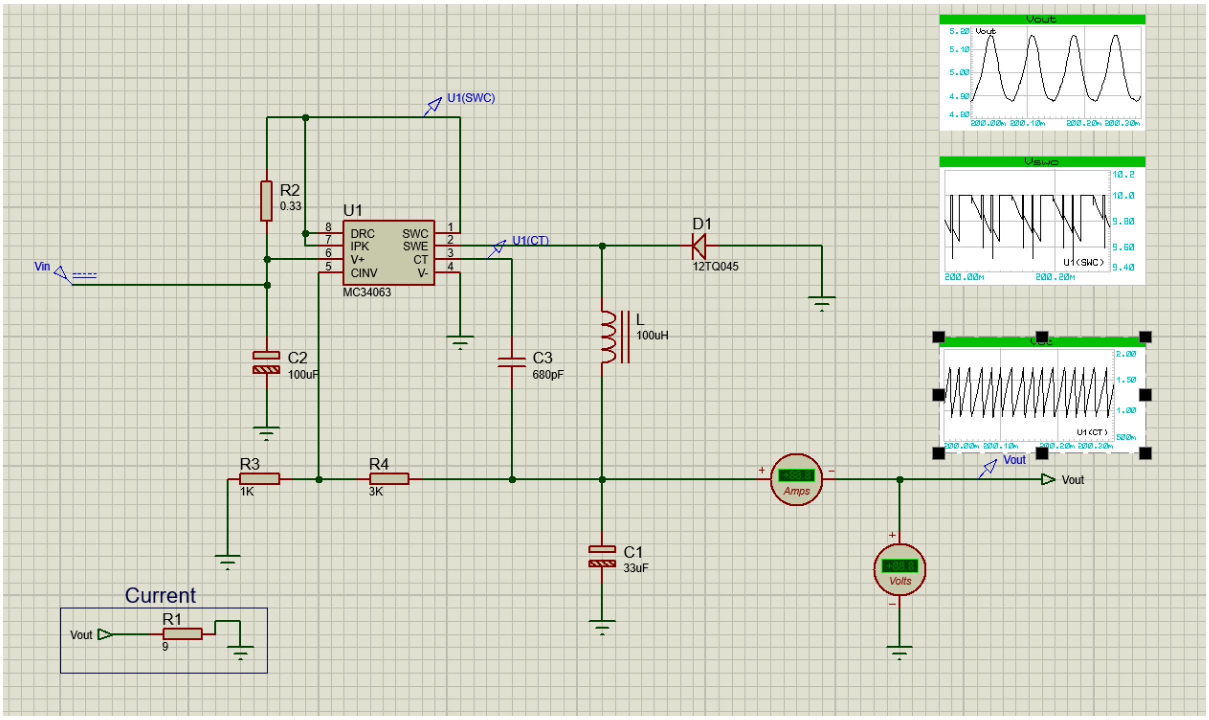
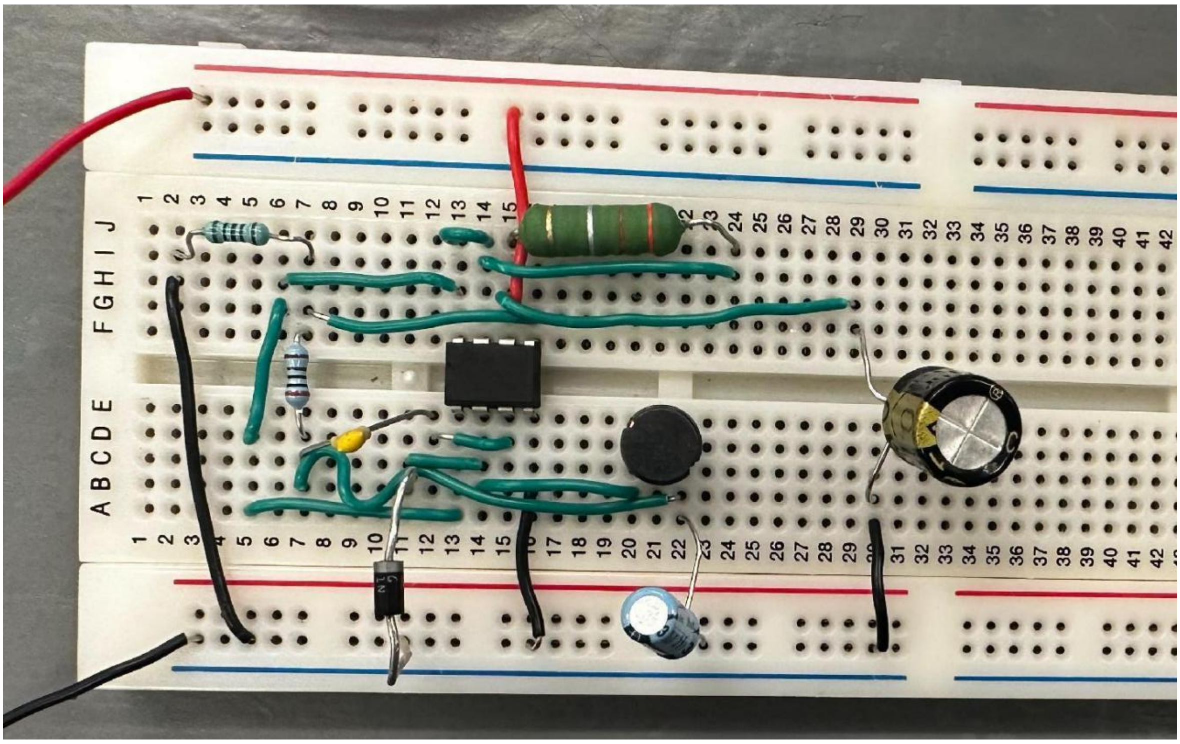


Figure 22 Buck converter Analysis

Buck Converter Circuit



Fugure 23 Buck Converter Circuit

From Figure 24, this is pin3 Voltage, we can see the frequency is 36.44kHz, PK-PK voltage is 1.06V.

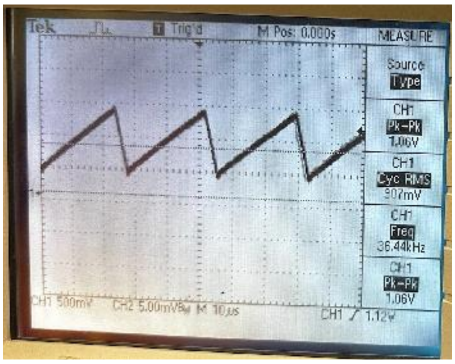


Figure 24 Frenquency

From Figure 25, this is pin2 voltage, that is the output voltage we can see the voltage (V_{out}) is 5.2V, ripple voltage (V_{ripple}) is 0.2V.

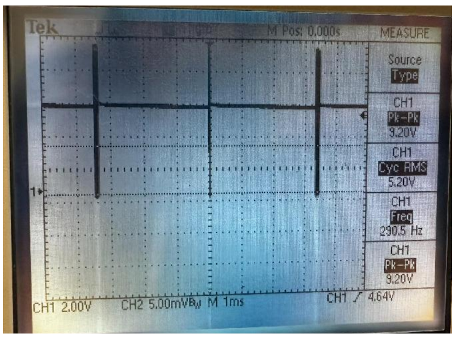


Figure 25 V_{ripple}

Figure 26 V_{out} *Tested Value = 5V*

Conclusions

Reflections

This report analyses the DC-DC Buck converter is its ability to act as a voltage regulator, using MC34063 IC to control the flow of current to the load. It is widely used in applications that require a steady, reliable output voltage.

We through test and simulate step up/down converter circuit and know MC34063 internal operating structure.

☑This IC provides following features in its 8 pins package

☑ High efficiency adjustable output voltage, especially important for battery-operated equipment that needs to run for long periods of time.

☑ Adjustable switching frequency. Can be operated at 100 kHz switching frequency with a 2% tolerance.

☑Temperature compensated reference

☑Current limit circuit

☑Controlled Duty cycle oscillator with an active high current driver output switch.

☑Wide input voltage range: accept 3.0V to 40V DC.

☑Very low Standby current

☑ Simply design circuit. It saved too much time.

☑ Wide range of applications: MC34063 can be used in a variety of applications, including power supplies, LED drivers, chargers, voltage regulators and other occasions requiring power management.

☑Also, despite these features, it is widely available and it is much cost efficient than other ICs available in such segment.

Referencing

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