

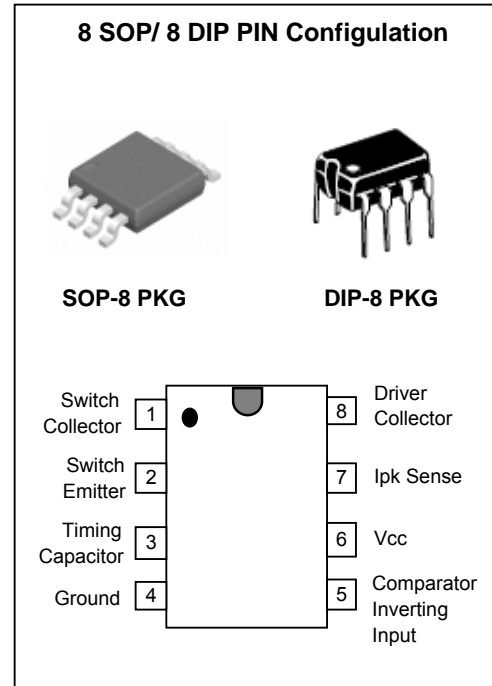
# 0.8A Step Down / Step Up / Inverting DC-DC Converter **MC34063C**

## FEATURES

- Operating From 3V To 40V
- Low Standby Current
- Current Limiting
- Output Switch Current to 0.8A
- Output Voltage Adjustable
- Operation Frequency up to 180KHz (CT=100pF)
- Precision 2% Reference
- Moisture Sensitivity Level 3

## Application

- Battery Chargers
- NICs / Switches / Hubs
- ADSL Modems
- Negative Voltage Power Supplies



## ORDERING INFORMATION

| Device    | Package |
|-----------|---------|
| MC34063CD | SOP-8   |
| MC34063CN | DIP-8   |

## DESCRIPTION

The MC34063C is a monolithic switching regulator control circuit containing the primary functions required for DC-DC converters.

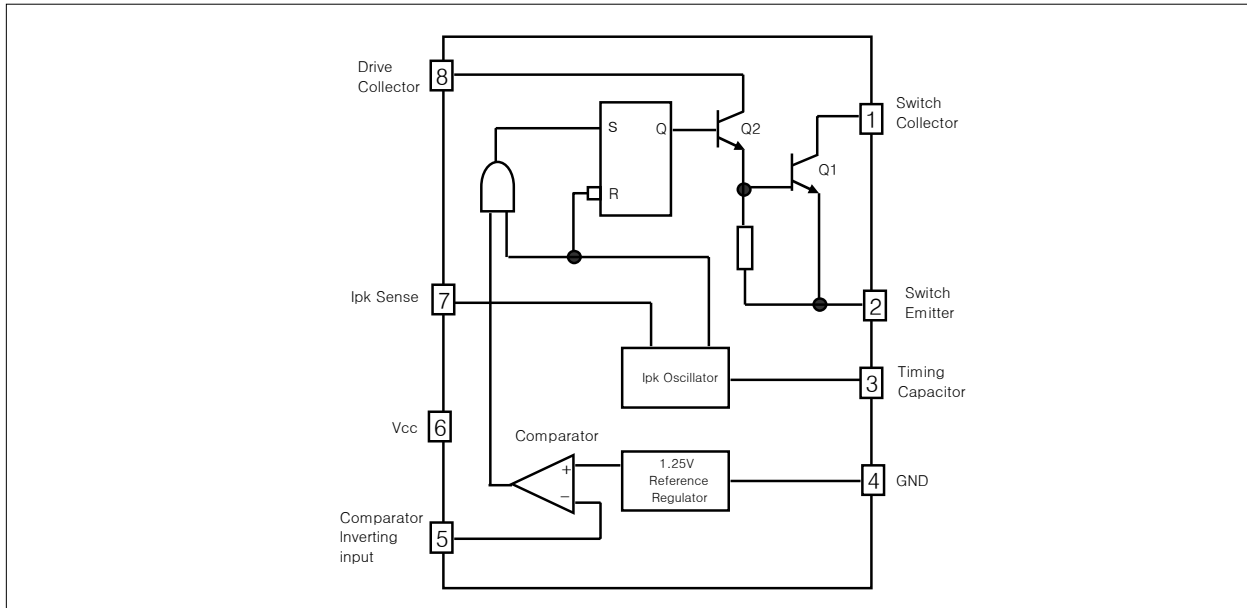
This device consists of internal temperature compensated reference, voltage comparator, controlled duty cycle duty cycle oscillator with active current. The device is specifically designed to be used in Step-Down, Step-Up and Voltage-Inverting applications with a minimum number of external components.

The MC34063C is the enhanced version of MC34063A with the ability to work in higher frequency.

The 34063C is available in 2 packages : SOP-8 and DIP-8.

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### BLOCK DIAGRAM



### ABSOLUTE MAXIMUM RATINGS (NOTE 1)

| SYMBOL          | PARAMETER                            |  | VALUE       | UNIT          |
|-----------------|--------------------------------------|--|-------------|---------------|
| $V_{cc}$        | Power Supply Voltage                 |  | 40          | V             |
| $V_{ir}$        | Comparator input Voltage Range       |  | -0.3 to 40  | V             |
| $V_{SWC}$       | Switch Collector Voltage             |  | 40          | V             |
| $V_{SWE}$       | Switch Emitter Voltage (VSWC=40V)    |  | 40          | V             |
| $V_{CE}$        | Switch Collector to Emitter Voltage  |  | 40          | V             |
| $V_{dc}$        | Driver Collector Voltage             |  | 40          | V             |
| $I_{dc}$        | Driver Collector Current (NOTE 2)    |  | 100         | mA            |
| $I_{sw}$        | Switch Current                       |  | 0.8         | A             |
| PD              | SOP Package                          | Power Dissipation at $T_{amb}=25^{\circ}C$ | 1.25        | W             |
| $P_{\theta JA}$ |                                      | Thermal Resistance                         | 100         | $^{\circ}C/W$ |
| PD              | DIP Package                          | Power Dissipation at $T_{amb}=25^{\circ}C$ | 0.625       | W             |
| $P_{\theta JA}$ |                                      | Thermal Resistance                         | 160         | $^{\circ}C/W$ |
| $T_J$           | Operating Junction Temperature Range |  | -40 to 150  | $^{\circ}C$   |
| $T_{stg}$       | Storage Temperature Range            |  | -65 to +150 | $^{\circ}C$   |

Absolute Maximum Rating are those values beyond which damage to the device may occur.

Functional operation under these condition is not implied.

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**ELECTRICAL CHARACTERISTICS**(Refer to the test circuits,  $V_{CC}=5V$ ,  $T_a=-40^{\circ}C$  to  $85^{\circ}C$ )

### OSCILLATOR

| SYMBOL               | PARAMETER                         | TEST CONDITIONS                           | MIN. | TYP. | MAX. | UNIT    |
|----------------------|-----------------------------------|---|------|------|------|---------|
| $F_{OSC}$            | Frequency                         | $V_{pin5}=0V, C_T=100pF, T_a=25^{\circ}C$ | 170  | 180  | 190  | KHz     |
| $I_{chg}$            | Charge Current                    | $V_{CC}=5$ to $40V, T_a=25^{\circ}C$      | 30   | 38   | 45   | $\mu A$ |
| $I_{dischg}$         | Discharge Current                 | $V_{CC}=5$ to $40V, T_a=25^{\circ}C$      | 180  | 240  | 290  | $\mu A$ |
| $I_{dischg}/I_{chg}$ | Discharge to Charge Current Ratio | Pin 7= $V_{CC}, T_a=25^{\circ}C$          | 5.2  | 6.5  | 7.5  |         |
| $V_{ipk(sense)}$     | Current Limit Sense Voltage       | $I_{chg}=I_{dischg}, T_a=25^{\circ}C$     | 250  | 300  | 350  | mV      |

### OUTPUT SWITCH (NOTE 3)

| SYMBOL        | PARAMETER                                 | TEST CONDITIONS   | MIN. | TYP. | MAX. | UNIT    |
|---------------|---|---|------|------|------|---------|
| $V_{CE(sat)}$ | Saturation Voltage, Darlington connection | $I_{SW}=1A$ , Pins 1,8 connected                                    |      | 1    | 1.3  | V       |
| $V_{CE(sat)}$ | Saturation Voltage (NOTE 4)               | $I_{SW}=1A, R_{pin8}=82\Omega$ to $V_{CC}$ , Forced $\beta \sim 20$ |      | 0.45 | 0.8  | V       |
| $h_{FE}$      | DC Current Gain                           | $I_{SW}=1A, V_{CE}=5V, T_a=25^{\circ}C$                             | 50   | 75   |      |         |
| $I_{C(off)}$  | Collector Off-State Current               | $V_{CE}=40V$  |      | 0.01 | 100  | $\mu A$ |

### COMPARATOR

| SYMBOL       | PARAMETER                         | TEST CONDITIONS             | MIN.  | TYP. | MAX.  | UNIT |
|--------------|-----------------------------------|-----------------------------|-------|------|-------|------|
| $V_{th}$     | Threshold Voltage                 | $T_a=25^{\circ}C$           | 1.225 | 1.25 | 1.275 | V    |
|              |                                   | $T_a=T_{LOW}$ to $T_{HIGH}$ | 1.21  |      | 1.29  | V    |
| $Reg_{line}$ | Threshold Voltage Line Regulation | $V_{CC}=3$ to $40V$         |       | 1.4  | 5     | mV   |
| $I_{IB}$     | Input Bias Current                | $V_{IN}=0V$                 |       | -20  | -400  | nA   |

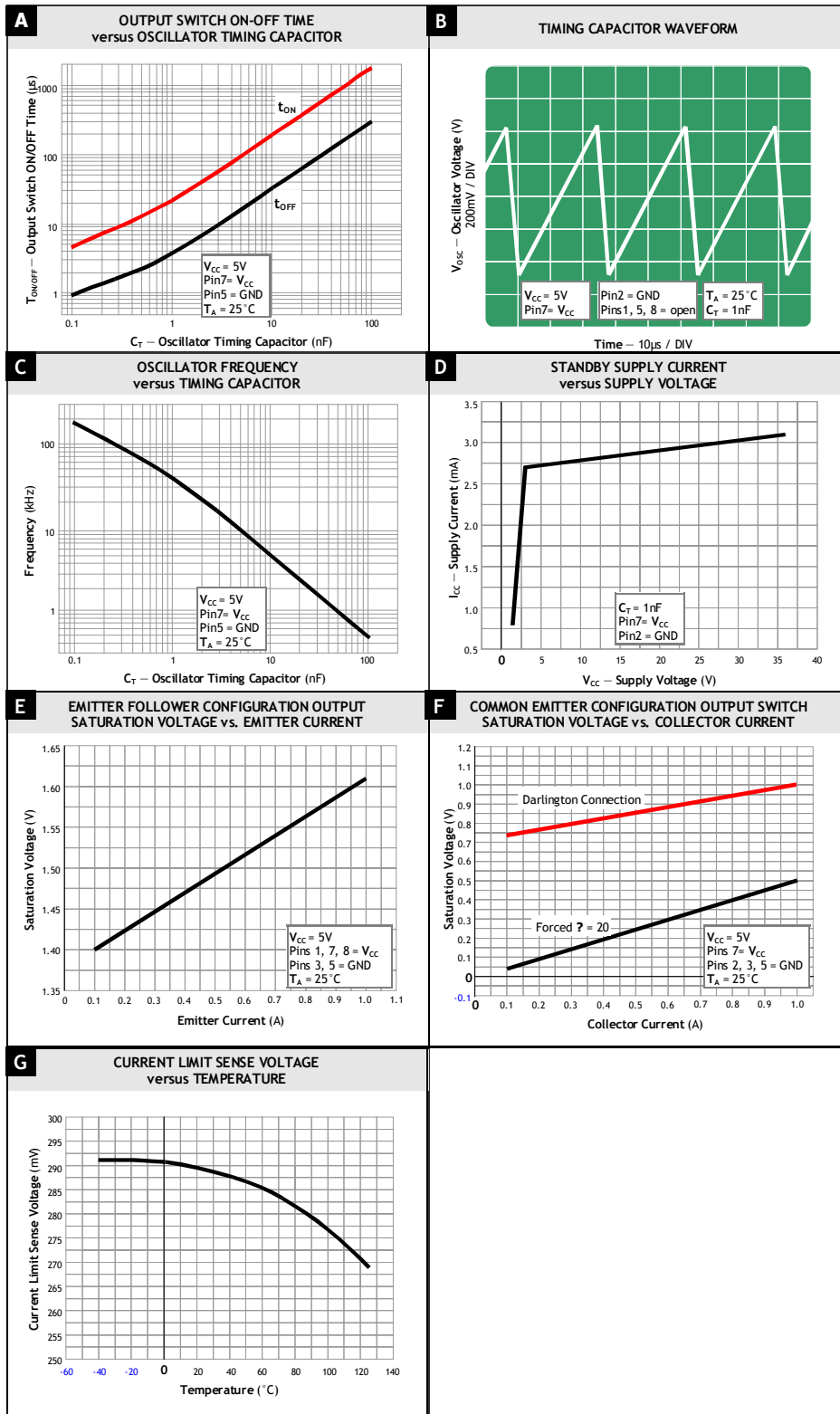
### TOTAL DEVICE

| SYMBOL   | PARAMETER      | TEST CONDITIONS   | MIN. | TYP. | MAX. | UNIT |
|----------|----------------|---|------|------|------|------|
| $I_{CC}$ | Supply Current | $V_{CC}=5$ to $40V, C_T=1nF$<br>Pin7= $V_{CC}, V_{pin5}>V_{th}$ , Pin2=GND<br>Remaining pins open<br>for MC34063C |      | 2.5  | 4    | mA   |

#### Notes:

- Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress retings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.
- Maximum package power dissipation limits must be observed.
- Low duty cycle pulse technique are used during test to maintain junction temperature as close to ambient Temperature as possible.
- If the output switch is driven into hard saturation (non-Darlington configuration) at low switch currents ( $\leq 600mA$ ) and high driver currents ( $\geq 30mA$ ), it may take up to  $2.0 \mu s$  for it to come out of saturation. This condition will shorten the off time at frequencies 30kHz, and is magnified at high temperatures. This condition does not occur with a Darlington configuration, since the output switch cannot saturate.

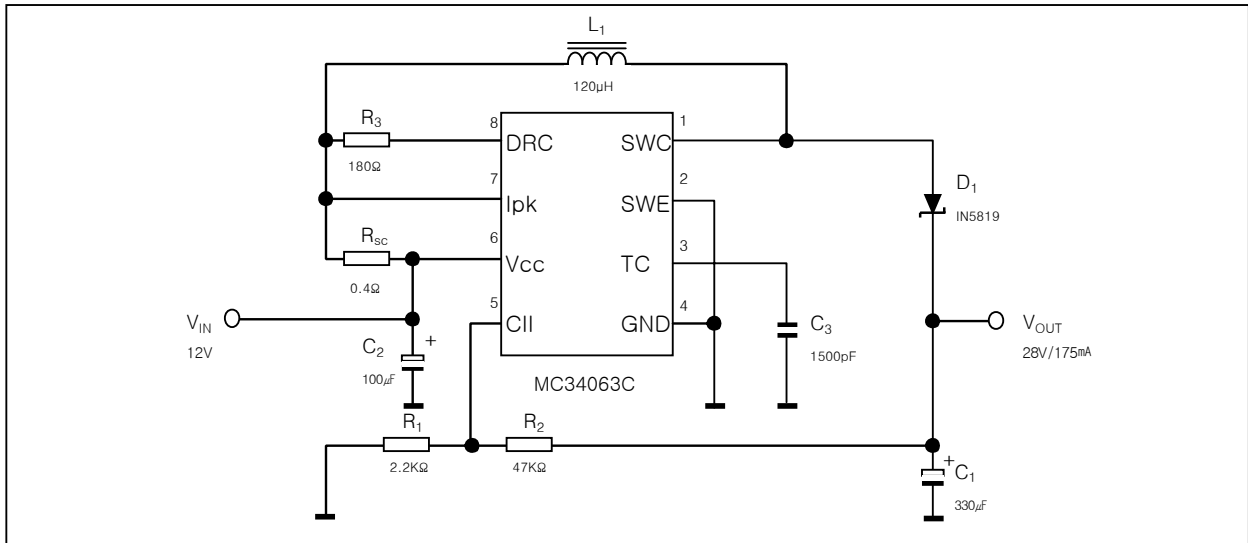
## TYPICAL PERFORMANCE CHARACTERISTICS



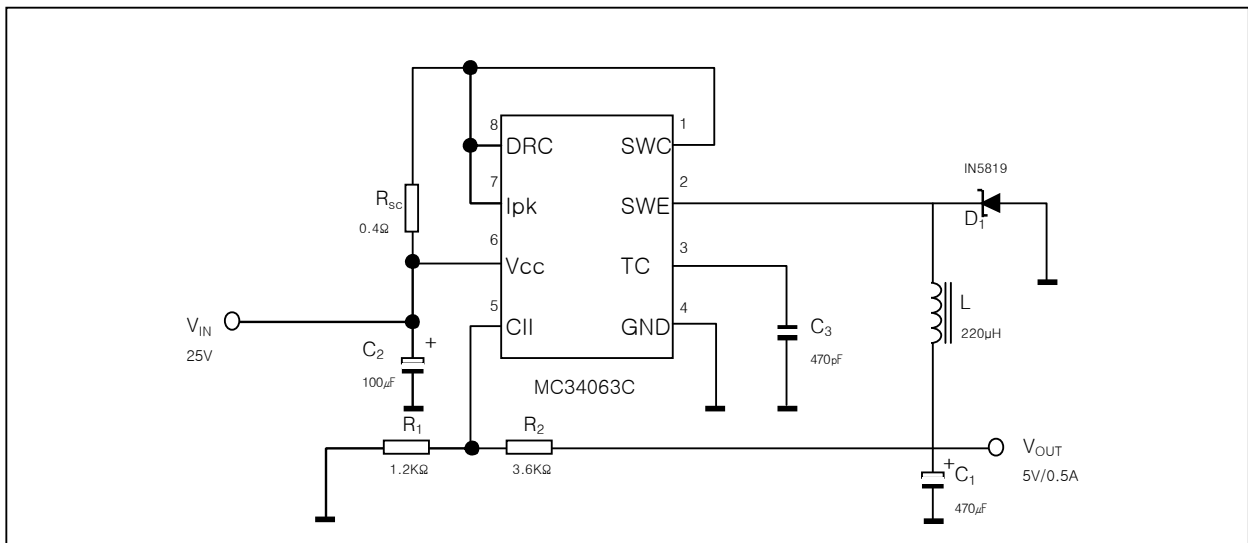
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## TYPICAL APPLICATION CIRCUIT

### Step-Up Converter

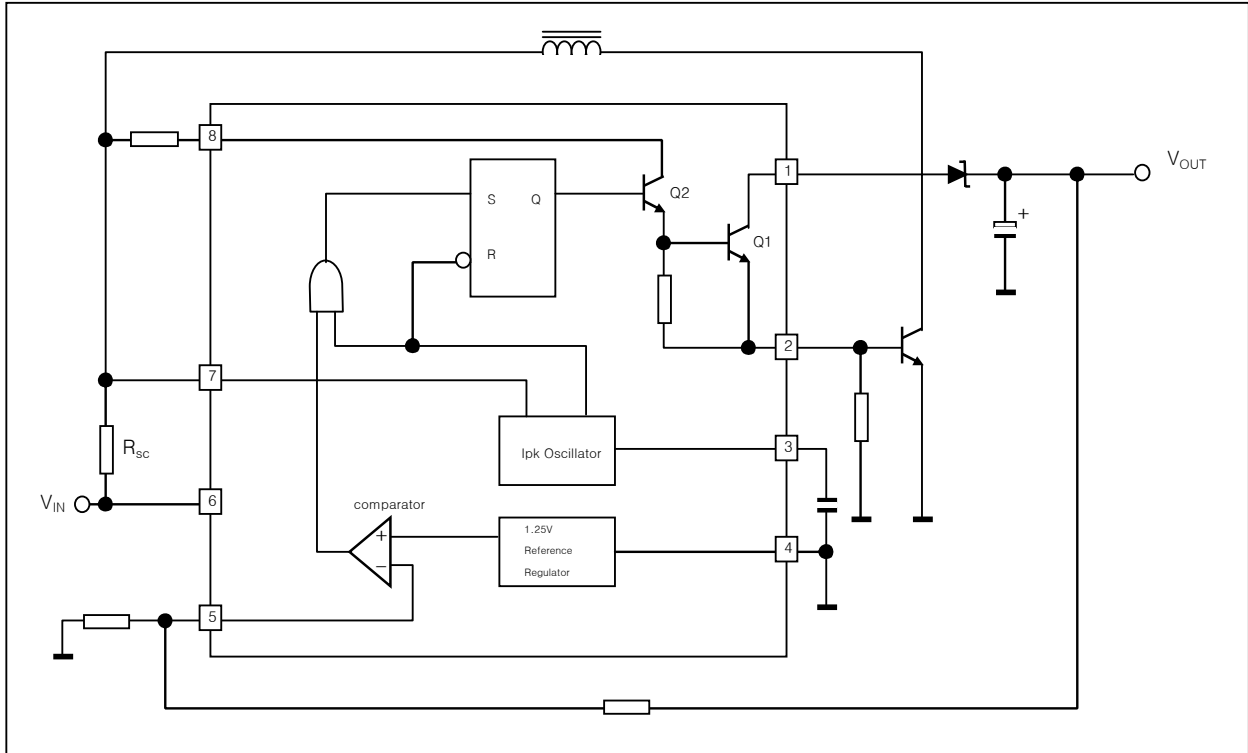


### Step-Down Converter

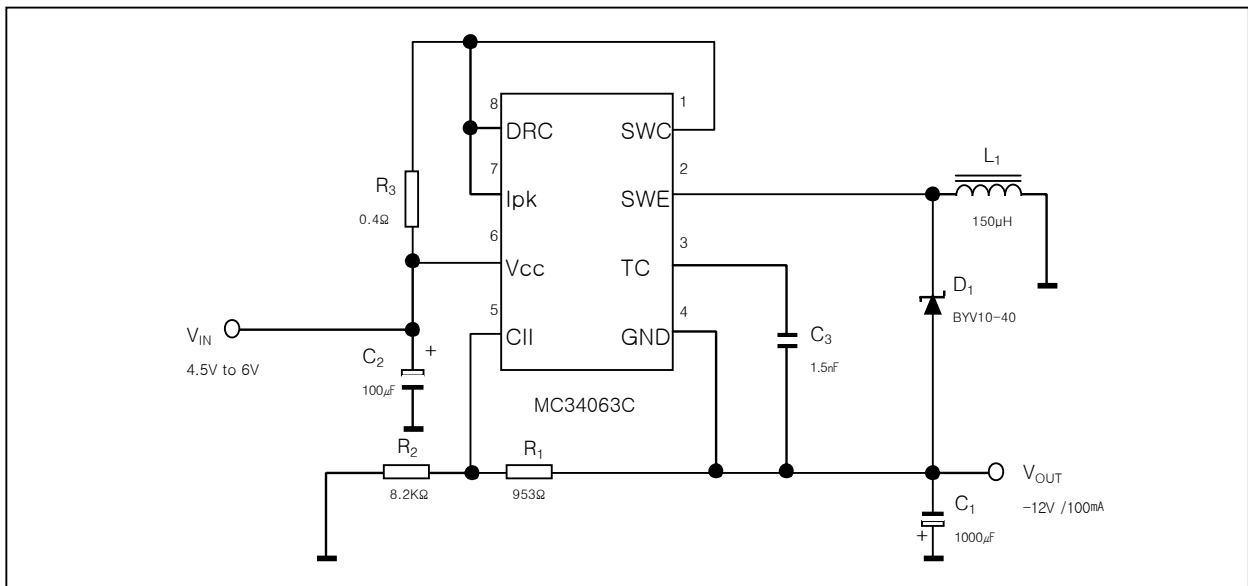


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## Step-Up With External NPN Switch

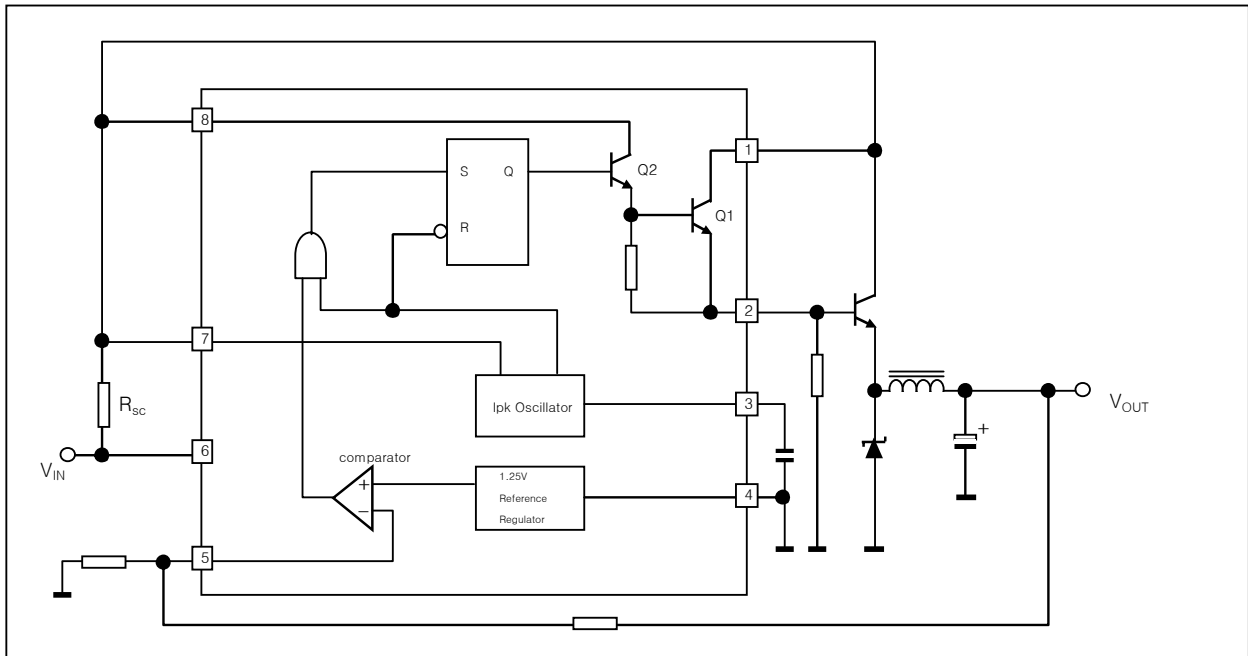


## Voltage Inverting Converter

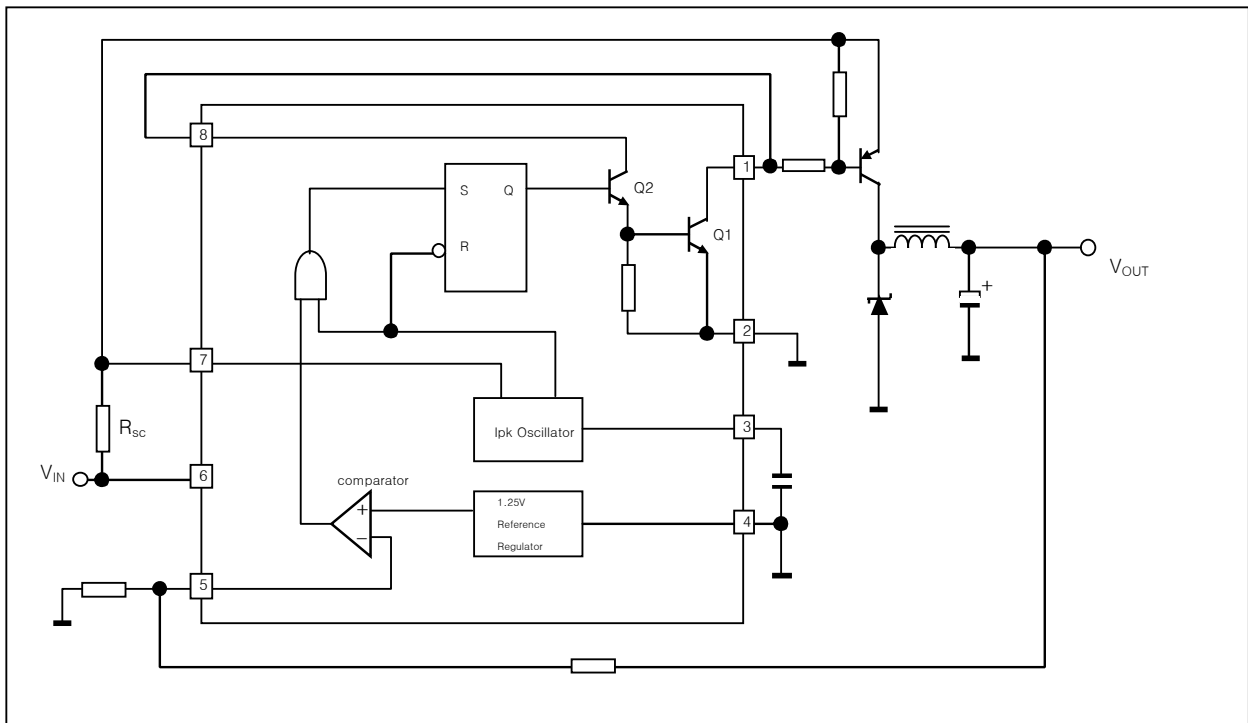


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## Step-Down With External NPN Switch

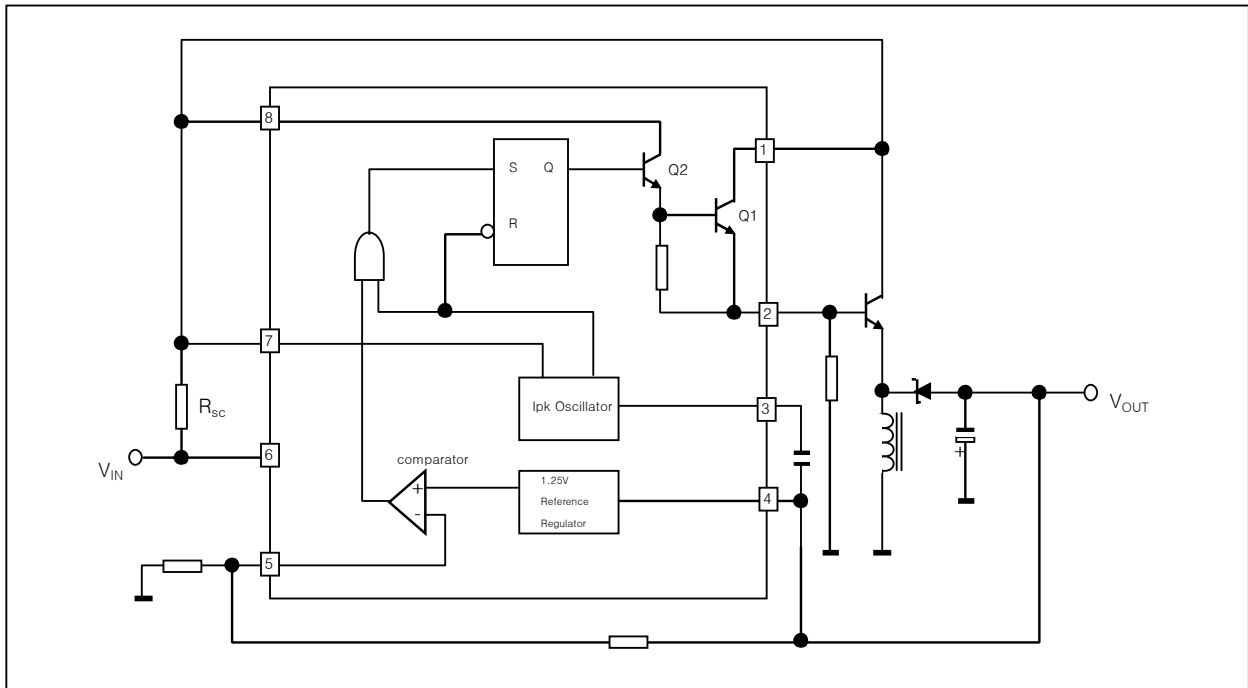


## Step-Down With External PNP Switch

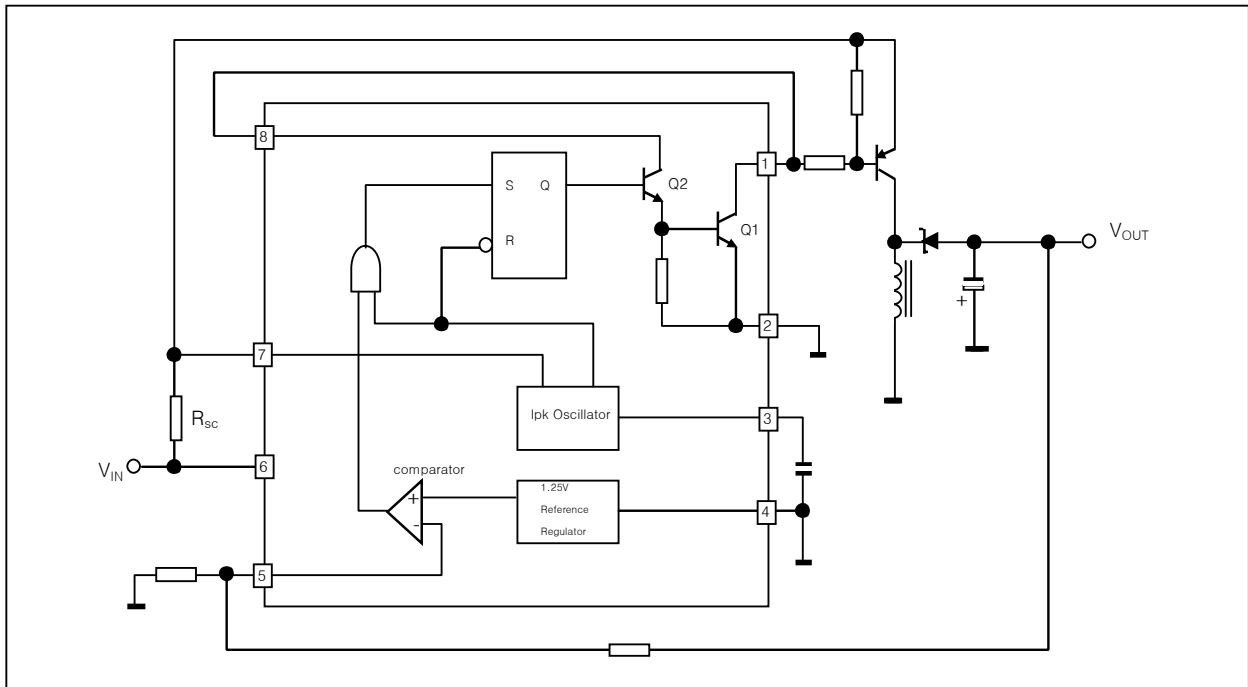


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## Voltage Inverting With External NPN Switch



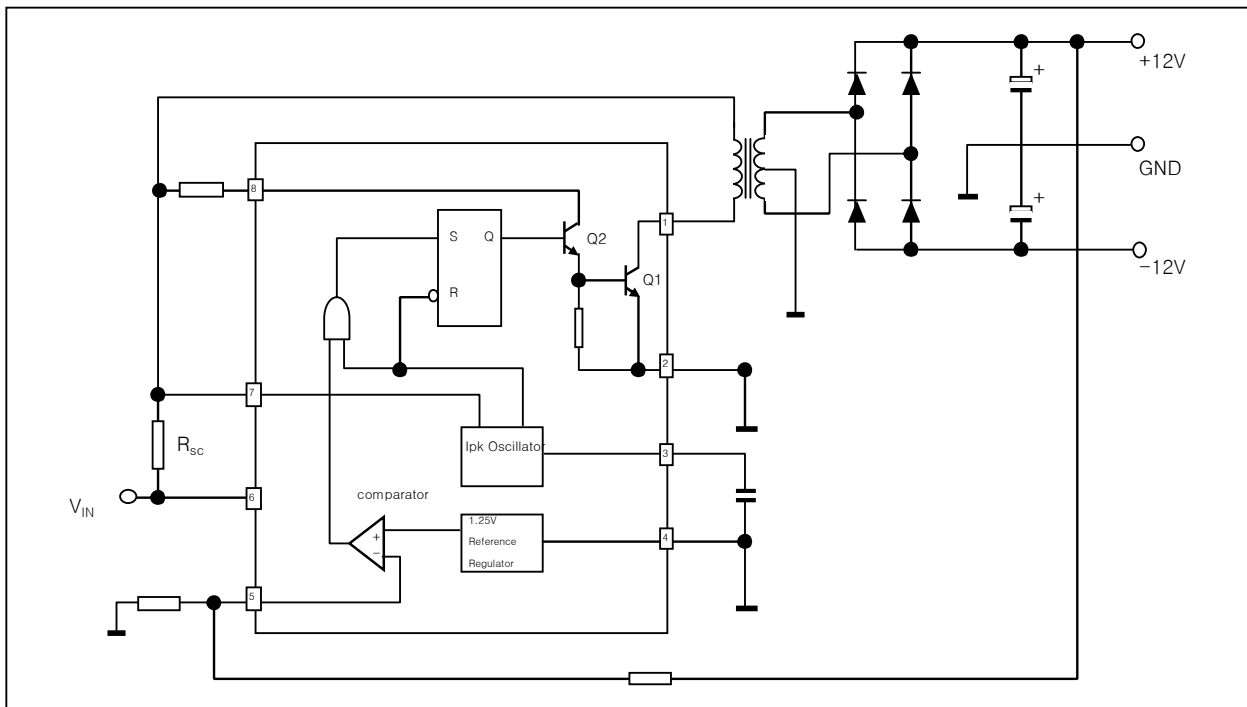
## Voltage Inverting With External PNP Saturated Switch





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## Dual Output Voltage



## Higher Output Power, Higher Input Voltage

