



General Description

The MC34063 Series is a monolithic control circuit containing the primary functions required for DC-to-DC converters. These devices consist of an internal temperature compensated reference, comparator, controlled duty cycle oscillator with an active current limit circuit, driver and high current output switch. Employing a minimum number of external components the MC34063 devices series is designed for Step-Down, Step-Up and Voltage-Inverting applications.

Features

- Operating From 3.0V to 40V
- Active Current Limiting
- Low Quiescent Current: 3mA
- Output Switch Current in Excess of 1.5A
- Adjustable Output Voltage
- Frequency Operation to 100KHz
- 2% Reference Accuracy

Absolute Maximum Rating

Parameter		Symbol	Value	Unit
Supply Voltage		V_{CC}	40	V
Comparator Input Voltage Range		V_{Ir}	-0.3~+40	V
Switch Collector Voltage		$V_{C(SW)}$	40	V
Switch Emitter Voltage		V_{SWE}	40	V
Switch Collector to Emitter Voltage		V_{CE}	40	V
Driver Collector Voltage		$V_{C(DR)}$	40	V
Switch Current		I_{SW}	1.5	A
Tamb=25°C Power Dissipation	DIP-8	P_D	1.25	W
	SOP-8		0.625	
Operating Ambient Temperature Range		T_{opr}	A = 0~+70 B = 0~+125 C = -40~+85	°C
Storage Temperature Range		T_{stg}	-65~+150	°C
Operating Junction Temperature		T_{opJ}	120	°C



MC34063 DC/DC CONVERTER CONTROL CIRCUITS

Electrical Characteristics (V_{CC}=5V, T_A=25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Oscillator						
Charging Current	I _{chg}	V _{CC} =5~40V, T _A =25°C	24	33	42	μA
Discharge Current	I _{dischg}	V _{CC} =5~40V, T _A =25°C	140	200	260	μA
Voltage Amplitude	V _{OSC}	T _A =25°C	-	0.6	-	V
Discharge to Charge Current Ratio	K	V _{PIN7} =V _{CC} , T _A =25°C	5.2	6.0	7.5	
Current Limit Sense Voltage	V _{IPK}	I _{dischg} = I _{chg} , T _A =25°C	250	300	350	mV
Output Switch						
Saturation Voltage, Darlington Connection	V _{CE(sat)1}	I _{SW} =1.0A, V _{C(SW)} =V _{C(DR)}	-	1.0	1.3	V
Saturation Voltage	V _{CE(sat)2}	I _{SW} =1.0A, I _{C(DR)} =50mA		0.4	0.7	V
DC Current Gain	h _{FE}	I _{SW} =1.0A, V _{CE} =5.0V	35	150	-	
Collector Off-State Current	I _{CC(off)}	V _{CE} =40V, T _A =25°C	-	10	100	nA
Comparator						
Threshold Voltage	V _{FB}		1.227	1.250	1.273	V
Threshold Voltage Line Regulation	Δ V _{FB}	V _{CC} =5~40V	-	1.5	6	mV
Input Bias Current	I _{IB}	V _{IN} =0	-	40	400	nA
TOTAL DEVICE						
Supply Current	I _{CC}	V _{CC} =5~40V, V _{PIN7} =V _{CC} V _{PIN5} >V _{FB} , C _T =0.001μF Pin7=Gnd Remaining pins open	-	3	4	mA

Application Information

V_{sat} Saturation voltage of the output switch;

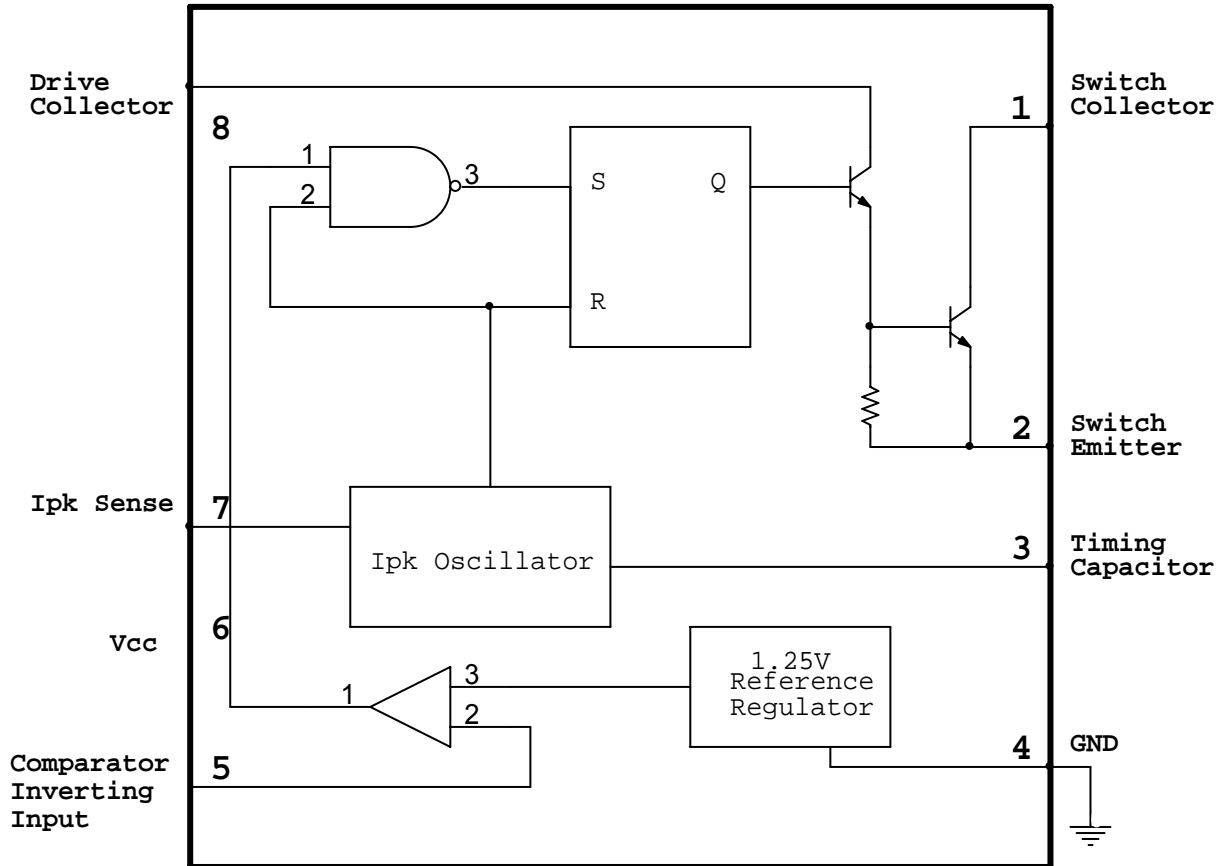
t_{on} Output Switch on Time; t_{off} Output Switch off Time;

V_F Forward voltage drop of the output rectifier;

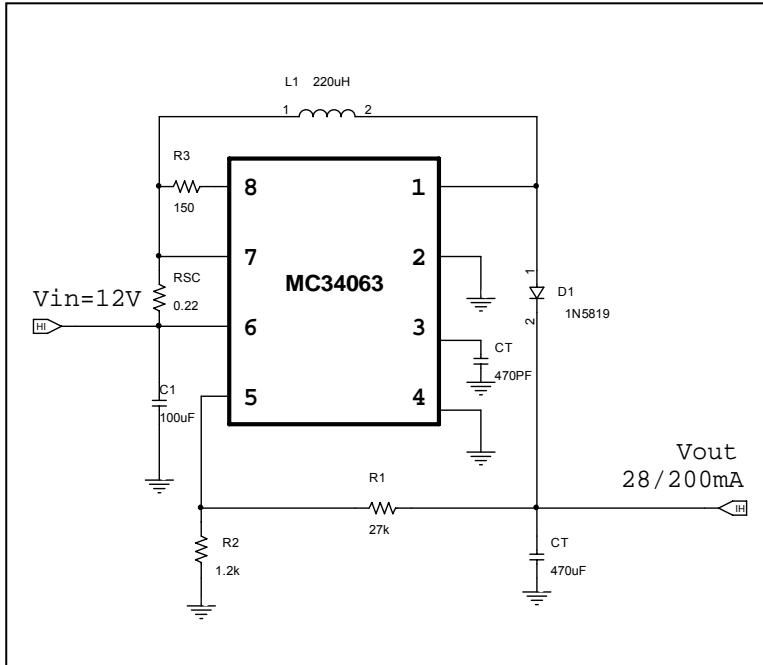
$F_{(min)}$ Minimum desired output switching frequency at the selected values for V_{in} and I_{out} .

Calculation	Step-Down	Step-Up	Voltage-Inverting
$\frac{t_{on}}{t_{off}}$	$\frac{V_{out} + V_F}{V_{in(min)} - V_{sat} - V_{out}}$	$\frac{V_{out} + V_F - V_{in(min)}}{V_{in(min)} - V_{sat}}$	$\frac{ V_{out} + V_F}{V_{in(max)} - V_{sat}}$
$(t_{on} + t_{off})_{max}$	$1/F_{min}$	$1/F_{min}$	$1/F_{min}$
C_T	$4 \times 10^{-5} t_{on}$	$4 \times 10^{-5} t_{on}$	$4 \times 10^{-5} t_{on}$
$I_{C(SW)}$	$2 \times I_{out(max)}$	$2 \times I_{out(max)} (t_{on} + t_{off})/t_{off}$	$2 \times I_{out(max)} (t_{on} + t_{off})/t_{off}$
R_s	$0.3/I_{C(SW)}$	$0.3/I_{C(SW)}$	$0.3/I_{C(SW)}$
$L_{(min)}$	$\frac{V_{in(min)} - V_{sat}}{I_{PK(SW)}} \times t_{on(max)}$	$\frac{V_{in(min)} - V_{sat}}{I_{PK(SW)}} \times t_{on(max)}$	$\frac{V_{in(min)} - V_{sat}}{I_{PK(SW)}} \times t_{on(max)}$
C_o	$\frac{I_{PK(SW)} \times (t_{on} + t_{off})}{8 \times V_{ripple(P-P)}}$	$\frac{I_{out} \times t_{on}}{V_{ripple(P-P)}}$	$\frac{I_{out} \times t_{on}}{V_{ripple(P-P)}}$

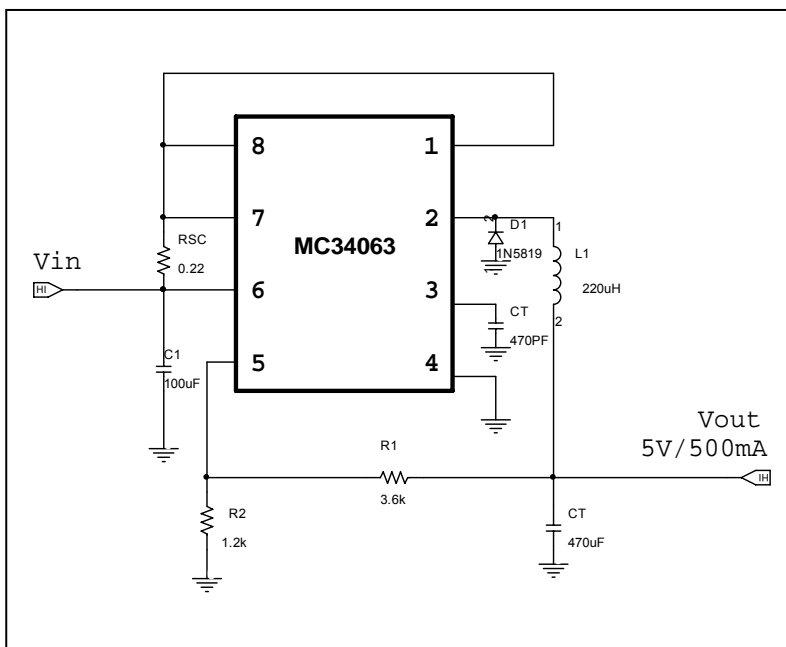
BLOCK DIAGRAM



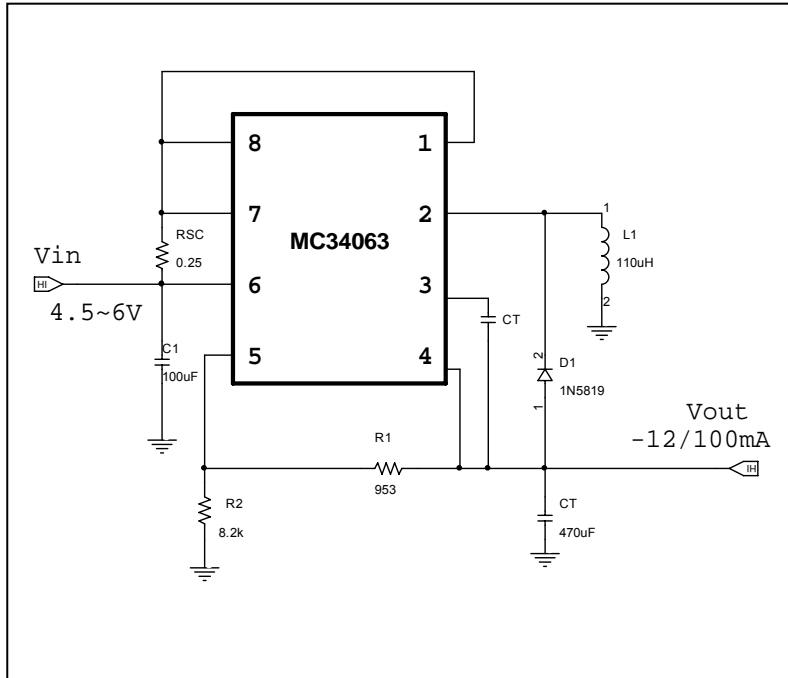
Step-Up Converter



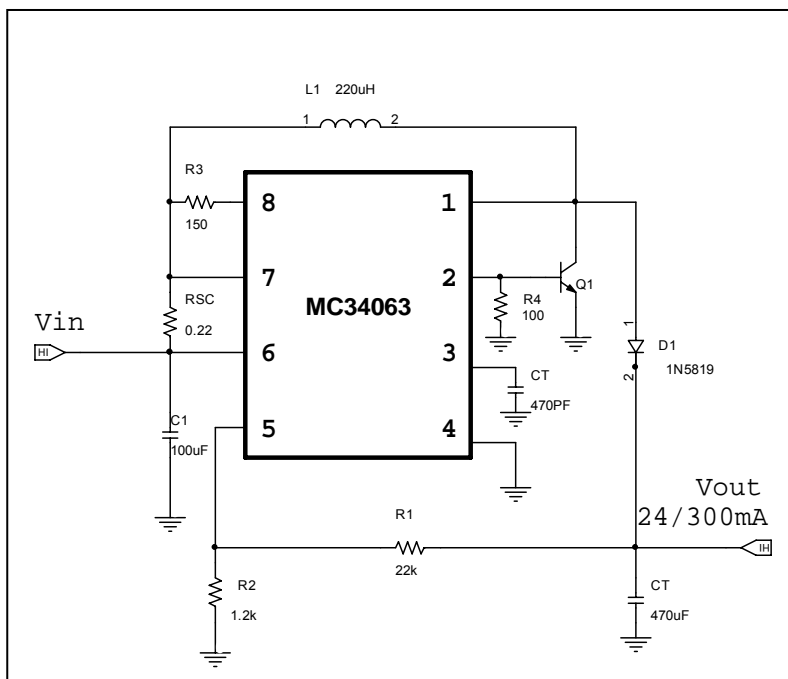
Step-down Converter



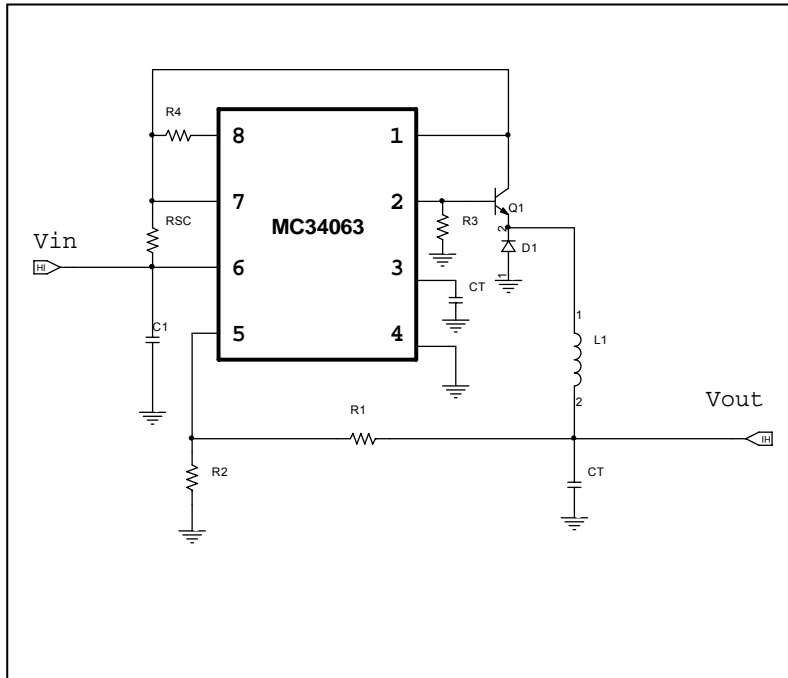
Voltage Inverting Converter



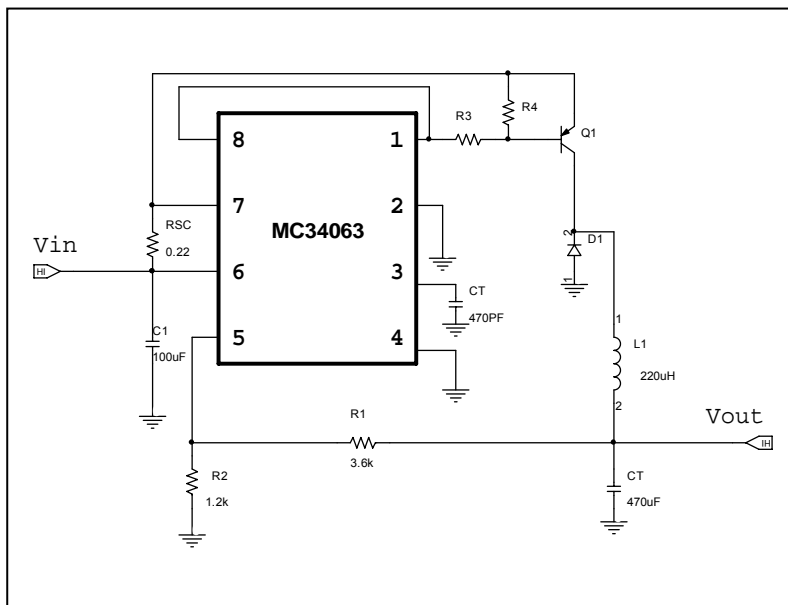
Step-up With External NPN Switch



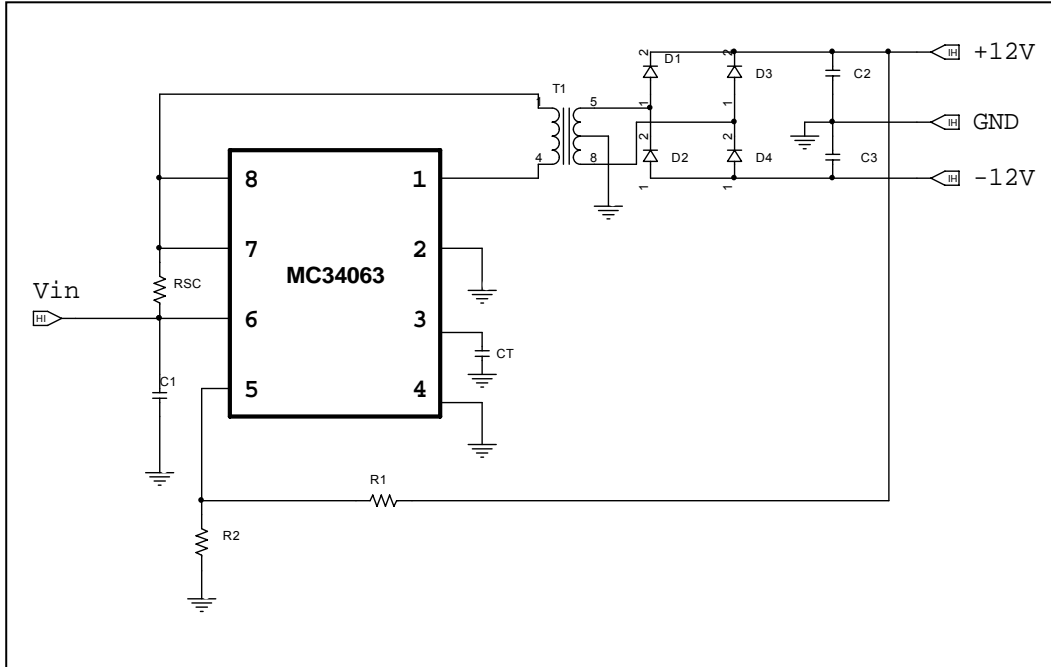
Step-down With External NPN Switch



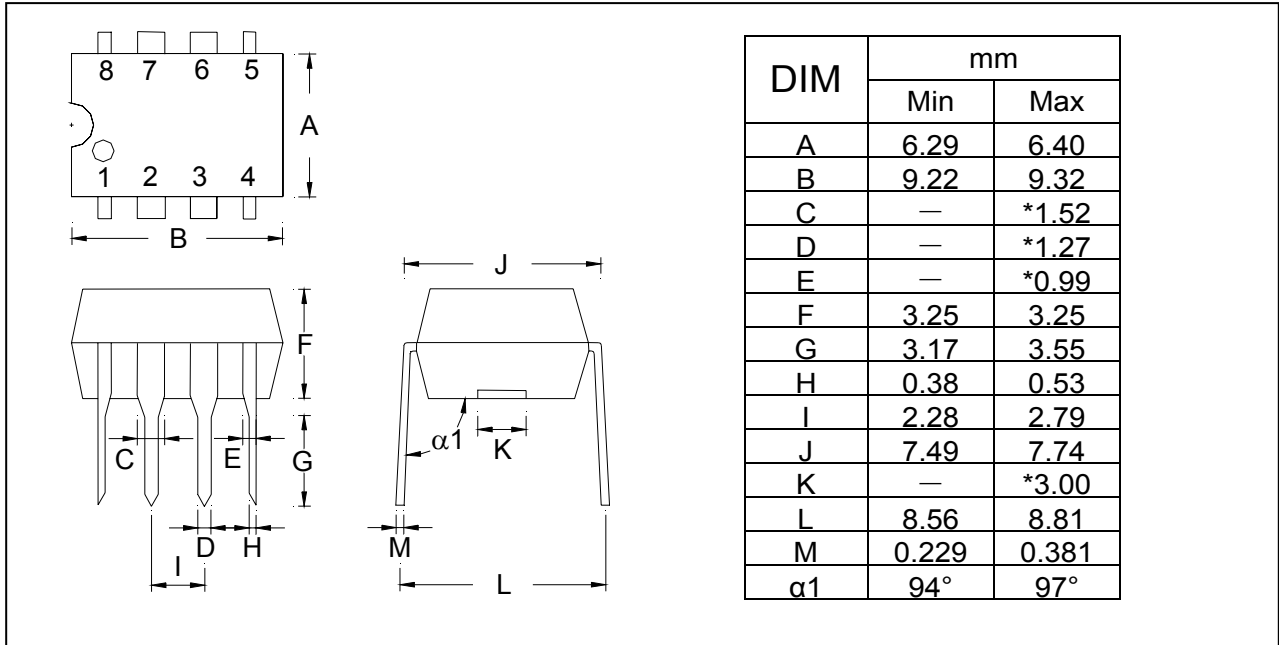
Step-down With External PNP Switch



Dual Output Voltage



DIP-8P Dimension



SO-8 Dimension

