ML34063 DC-to-DC Converter Control Circuit

❖ *Application*

- *Battery Powered Equipment*
- *Palmtops*
- *Video Recorders*

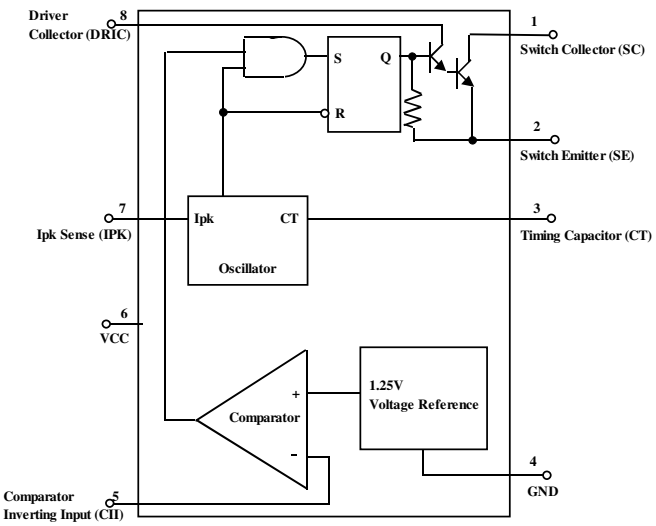
❖ *Features*

- Operating Voltage from 3V to 35V
- Low Standby Current
- Output Switch Current up to 1.5A
- Output Voltage Adjustable
- Operating Frequency at 100KHz
- 2% Accuracy Voltage Reference
- Package Available: PDIP-8 (1.25W) & SO-8 (625mW)

❖ *General Description*

The ML34063 is a DC/DC converter. It consists of an internal temperature compensated voltage reference, comparator, controlled duty cycle oscillator with an active current limit circuit, driver and high current output switch. It can be used in step-down, step-up and voltage-inverting applications with a minimum number of external components.

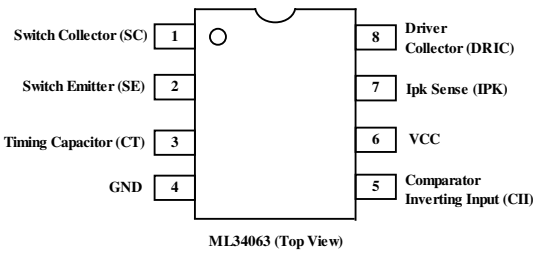
❖ *Block Diagram*



❖ *Ordering Information*

Part Number	Package
ML34063NG	PDIP-8 (PB Free)
ML34063MG	SO-8 (PB Free)
ML34063N	PDIP-8
ML34063M	SO-8

❖ *Pin Configuration*



ML34063 (Top View)

❖ *Absolute Maximum Ratings*

Parameter		Symbol	Ratings	Units
Input Voltage		V_{IN}	35	V
Comparator Input Voltage Range		V_{IR}	-0.3 to 35	V
Switch Collector Voltage		$V_{C(Switch)}$	35	V
Switch Emitter Voltage ($V_{Pin\ 1}$ = 35V)		$V_{E(Switch)}$	35	V
Switch Collector to Emitter Voltage		$V_{CE(Switch)}$	35	V
Drive Collector Voltage		$V_{C(Drive)}$	35	V
Switch Collector Current		$I_{C(Switch)}$	100	mA
Switch Current		I_{SW}	1.5	A
Power Dissipation at T_A = 25 °C	PDIP-8	P_d	1250	mW
	SO-8		625	
Thermal Resistance	PDIP-8	$R_{\theta JA}$	100	°C/W
	SO-8		160	
Operating Ambient Temperature		T_{opr}	-0 ~ +70	°C
Storage Temperature		T_{stg}	-65 ~ +150	°C

❖ *Electrical Characteristics* (V_{CC} = 5V, T_A = 25°C, C_T = 1nF, unless otherwise specified.)

Oscillator

Parameter	*Symbol*	*Conditions*	*Min*	*Typ*	*Max*	*Units*
Frequency	f_{OSC}	$V_{Pin\ 5}$ = 0V	*24*	*33*	*42*	*kHz*
Charge Current	*Ichg*	V_{CC} = 5.0V to 35V	*24*	*35*	*42*	*uA*
Discharge Current	*Idichg*	V_{CC} = 5.0V to 35V	*140*	*220*	*260*	*uA*
Discharge to Charge Current Ratio	*Idischg/Ichg*	*Pin 7 to* V_{CC},	*5.2*	*6.5*	*7.5*	
Current Limit Sense Voltage	*Vipk(sense)*	*Ichg = Idischg*	*250*	*300*	*350*	*mV*

Output Switch (Note1)

Parameter	*Symbol*	*Conditions*	*Min*	*Typ*	*Max*	*Units*
Saturation Voltage, Darlington Connection	$V_{CE(sat)}$	I_{SW} = 1.0A, Pins 1, 8 connected		*1.0*	*1.3*	*V*
Saturation Voltage (Note 6)	$V_{CE(sat)}$	I_{SW} = 1.0A, $R_{Pin\ 8}$ = 82 ohm to V_{CC}, Forced β = 20		*0.45*	*0.7*	*V*
DC Current Gain	h_{FE}	I_{SW} = 1.0A, V_{CE} = 5.0V	*50*	*75*		
Collector Off-State Current	$I_{C(off)}$	V_{CE} = 35V		*0.01*	*100*	*uA*

Comparator

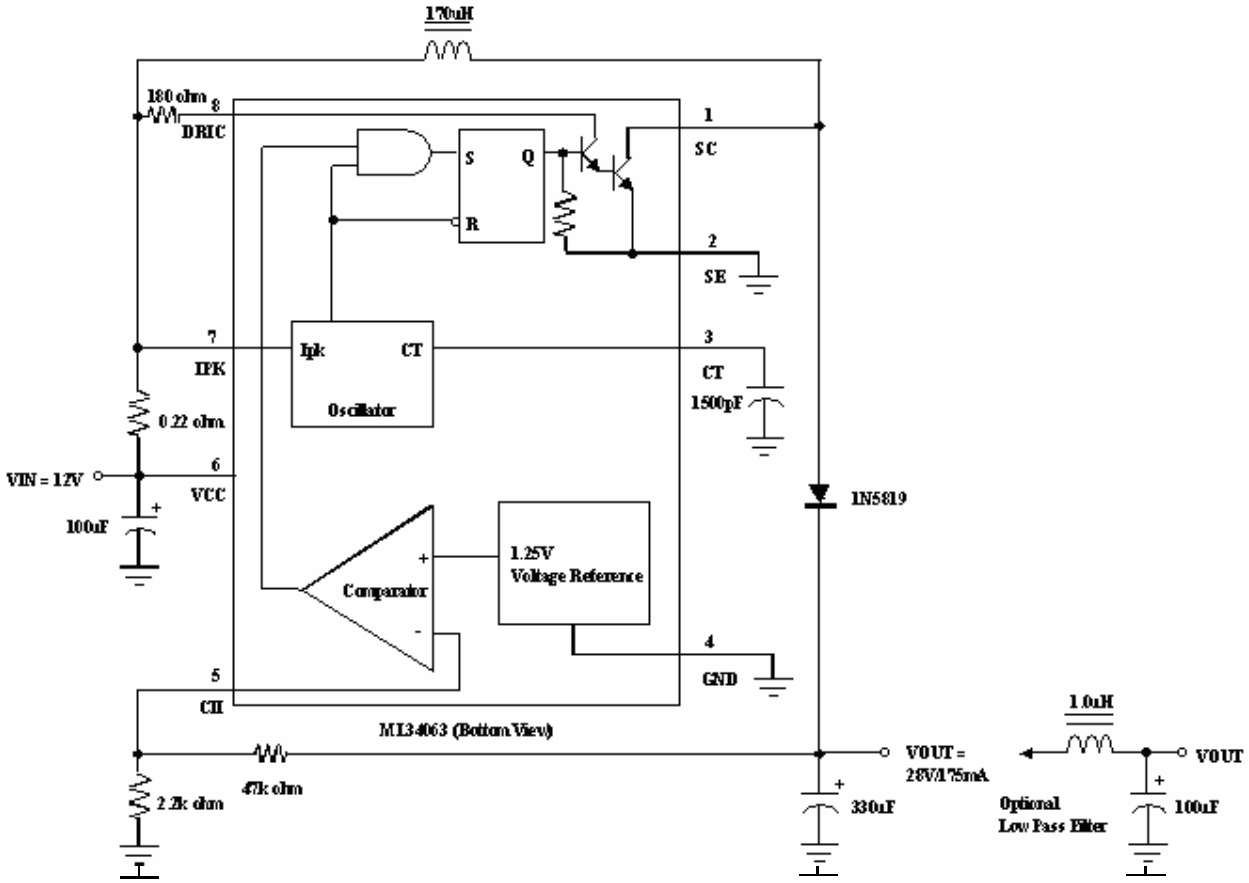
Parameter	*Symbol*	*Conditions*	*Min*	*Typ*	*Max*	*Units*
Threshold Voltage	V_{th}		*1.225*	*1.25*	*1.275*	*V*

Total Device

Parameter	*Symbol*	*Conditions*	*Min*	*Typ*	*Max*	*Units*
Supply Current	I_{cc}	V_{CC} = 5.0V to 35V, Pin 7 = V_{CC},, V_{pin5} > V_{th},, Pin2 = GND, remaining pins open			*4.0*	*mA*

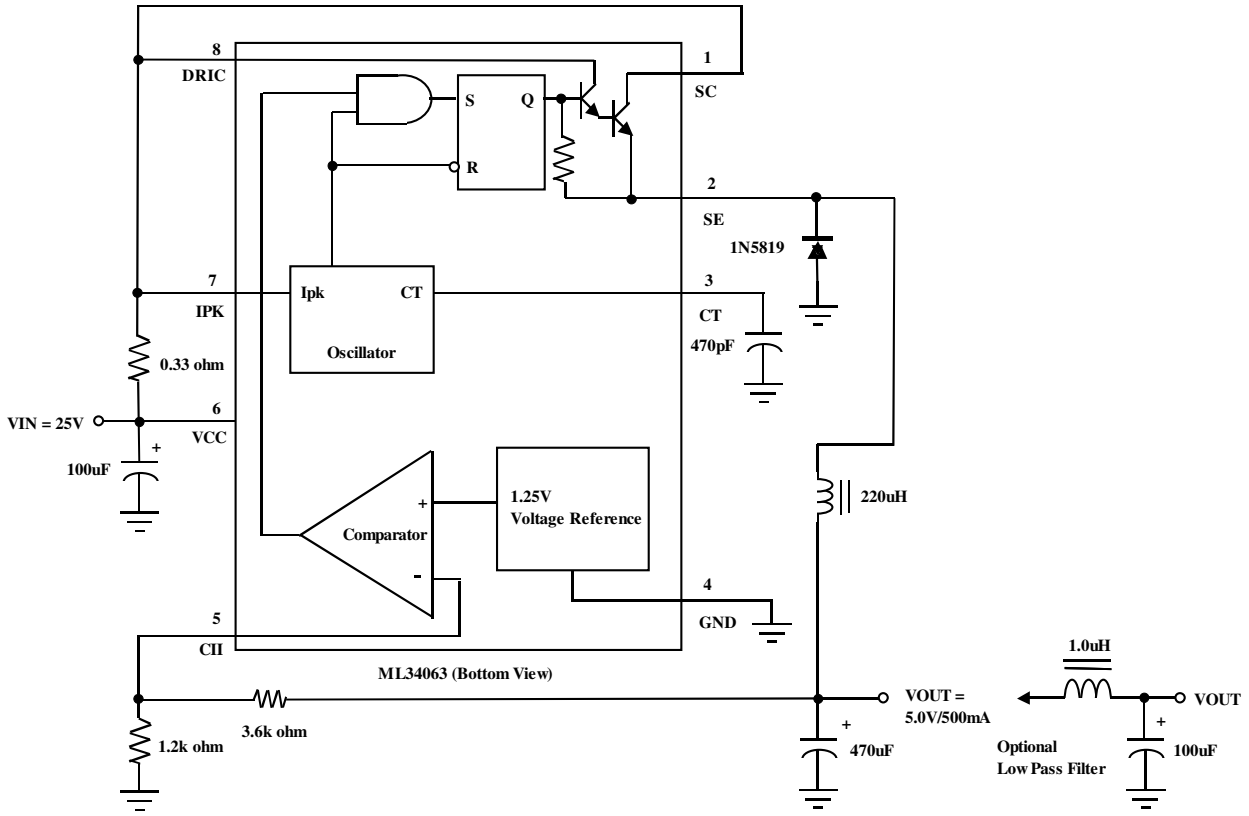
Note : 1. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient temperatures possible.

❖ *Step-Up Converter Application Circuit*



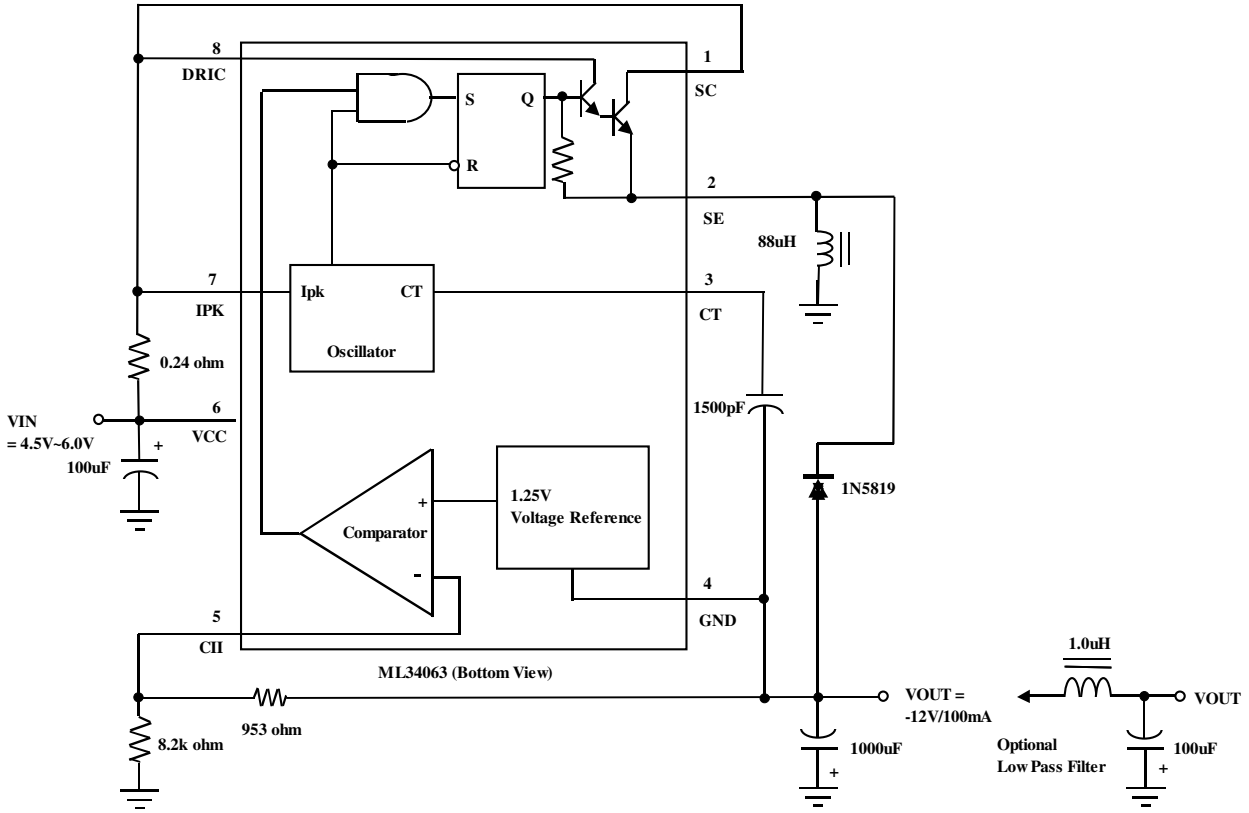
Test	Conditions	Results
Line Regulation	V_{in} = 8.0V to 16V, I_O = 175mA	30mV ± 0.05%
Load Regulation	V_{in} = 12V, I_O = 75mA to 175mA	10mV ± 0.017%
Output Ripple	V_{in} = 12V, I_O = 175mA	400 mVpp
Efficient	V_{in} = 12V, I_O = 175mA	87.7%
Output Ripple with Optional Filter	V_{in} = 12V, I_O = 175mA	40 mVpp

❖ *Step-Down Converter Application Circuit*



Test	Conditions	Results
Line Regulation	V_{in} = 15V to 25V, I_O = 500mA	12mV ± 0.12%
Load Regulation	V_{in} = 25V, I_O = 50mA to 500mA	3.0mV ± 0.03%
Output Ripple	V_{in} = 25V, I_O = 500mA	120 mVpp
Short Circuit Current	V_{in} = 25V, R_L = 0.1 ohm	1.1A
Efficient	V_{in} = 25V, I_O = 500mA	83.7%
Output Ripple with Optional Filter	V_{in} = 25V, I_O = 500mA	40 mVpp

❖ *Voltage Inverting Converter Application Circuit*



Test	Conditions	Results
Line Regulation	V_{in} = 4.5V to 6.0V, I_O = 100mA	3.0mV ± 0.012%
Load Regulation	V_{in} = 5.0V, I_O = 10mA to 100mA	0.022V ± 0.09%
Output Ripple	V_{in} = 5.0V, I_O = 100mA	500 mVpp
Short Circuit Current	V_{in} = 5.0V, R_L = 0.1 ohm	910 mA
Efficient	V_{in} = 5.0V, I_O = 100mA	62.2%
Output Ripple with Optional Filter	V_{in} = 5.0V, I_O = 100mA	70 mVpp