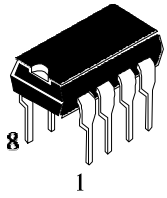
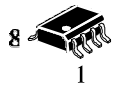
Description

The MC34063A 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. This series was specifically designed to be incorporated in Step-Down and Step-Up and Voltage-Inverting applications with a minimum number of external components.

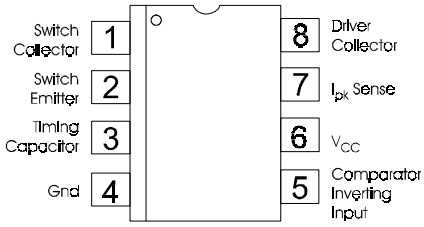
Features

- Operation from 3.0 V to 40 V Input
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.5 A
- Output Voltage Adjustable
- Frequency Operation to 100 kHz
- Precision 2% Reference



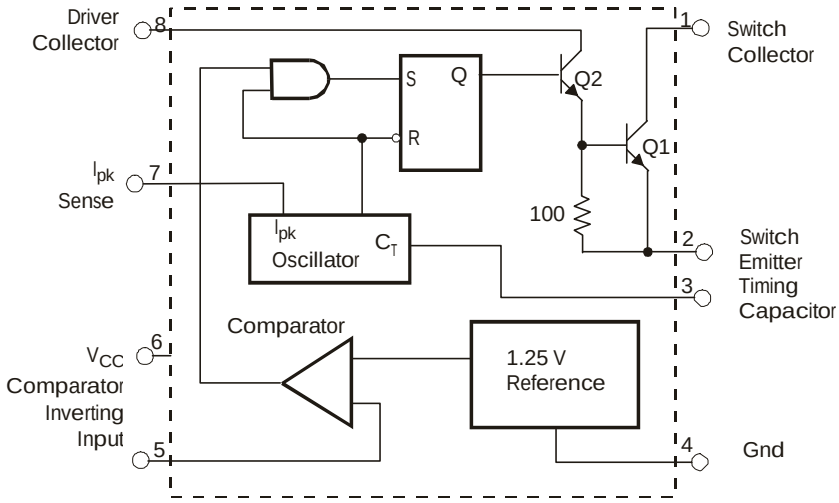


Plastic Package



Pin Connections

Internal Block Digram



Absolute Maximum Ratings

Symbol	Parameter	Maximum	Units
V_{CC}	Power Supply Voltage	40	Vdc
V_{IR}	Comparator Input Voltage Range	-0.3 to +40	Vdc
$V_{C(switch)}$	Switch Collector Voltage	40	Vdc
$V_{E(switch)}$	Switch Emitter Voltage (V_{PIN1} = 40 V)	40	Vdc
$V_{CE(switch)}$	Switch Collector to Emitter Voltage	40	Vdc
$V_{C(driver)}$	Driver Collector Voltage	40	Vdc
$I_{C(driver)}$	Driver Collector Current (Note 1)	100	mA
I_{SW}	Switch Current	1.5	A
T_J	Operating Junction Temperature	+150	°C
T_A	Operating Ambient Temperature Range	0 to +70	°C
Tstg	Storage Temperature Range	-65 to +150	°C

Electrical Characteristics

(Vcc=5.0V, Ta=Tlow to Thigh , unless otherwise

Characteristics	Symbol	Min	Typ	Max	Units
OSCILLATOR					
Frequency (V_{pin5} = 0V, C_T = 1.0 nF, T_A = 25°C)	f_{OSC}	24	33	42	kHz
Charge Current(V_{CC} = 5.0V to 40V, T_A = 25°C)	I_{chg}	24	35	42	µA
Discharge Current (V_{CC} = 5.0V to 40V, T_A = 25°C)	I_{dischg}	140	220	260	µA
Discharge to Charge Current Ratio (Pin 7 to V_{CC}, T_A = 25°C)	I_{dischg} / I_{chg}	5.2	6.5	7.5	–
Current Limit Sense Voltage (I_{chg} = I_{dischg}, T_A = 25°C)	$V_{ipk(sence)}$	250	300	350	mV
OUTPUT SWITCH (NOTE 2)					
Saturation Voltage, Darlington Connection (I_{SW} = 1.0 A, Pins 1, 8 connected)	$V_{CE(sat)}$	–	1.0	1.3	V
Saturation Voltage, Darlington Connection (I_{SW} = 1.0 A, $R_{pin\,8}$ = 82Ω to V_{CC} , Forced β ≒ 20)	$V_{CE(sat)}$	–	0.45	0.7	V
DC Current Gain (I_{SW} = 1.0 A, V_{CE} = 5.0 V, T_A = 25°C)	h_{FE}	50	75	–	–
Collector Off-State Current (V_{CE} = 40 V)	$I_{C(off)}$	–	40	100	µA
COMPARATOR					
Threshold Voltage (T_A=25°C) (T_A =T_{low} to T_{high})	Vth	 1.225 1.21	 1.25 –	 1.275 1.29	V
Threshold Voltage Line Regulation (Vcc=3.0 V to 40 V)	Reg_{line}	–	1.4	5.0	mV
Input Bias Current (Vin=0 V)	I_{IB}	–	-20	-400	nA
TOTAL DEVICE					
Supply Current (Vcc = 5.0 V to 40 V, C_T = 1.0 nF, Pin 7 = V_{CC}, Vpin 5 > Vth, Pin 2 = Gnd, remaining pins open)	I_{CC}	–	–	4.0	mA

NOTES : 1.Maximum package power dissipation limits must be observed.

2.Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient temperature as possible

Typical Performance Characteristics

Figure 1. Output Switch On-Off Time versus Oscillator Timing Capacitor

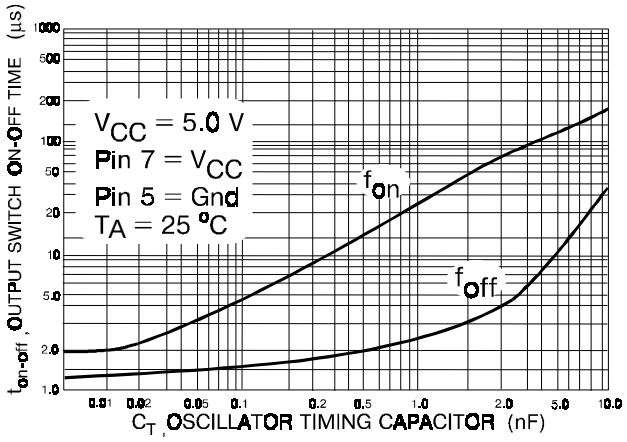


Figure 2. Timing Capacitor Waveform

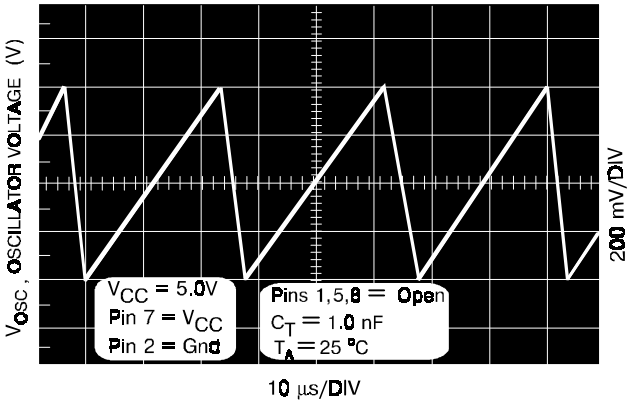


Figure 3. Emitter Follower Configuration Output Saturation Voltage versus Emitter Current versus

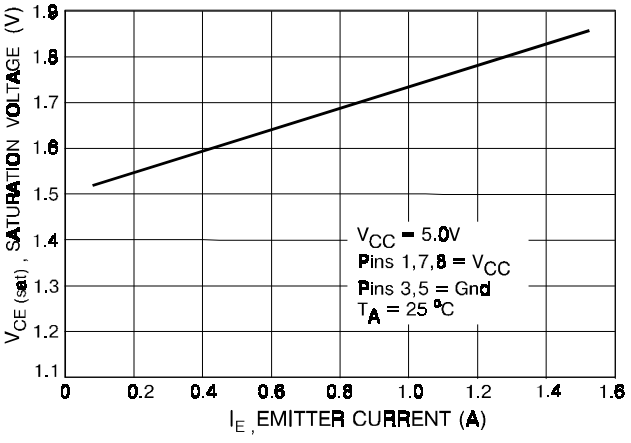


Figure 4. Common Emitter Configuration Output Switch Saturation Voltage

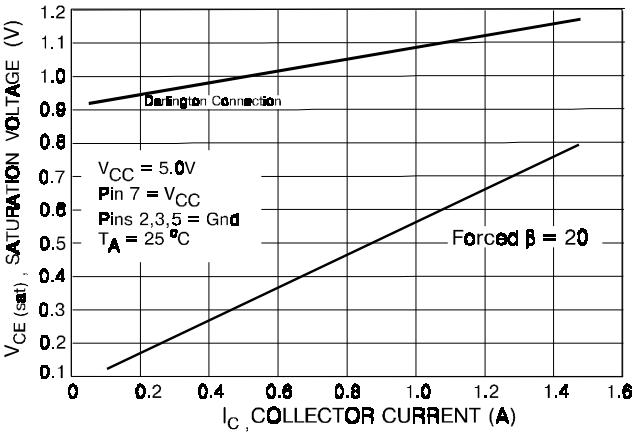


Figure 5. Current Limit Sense Voltage versus Temperature

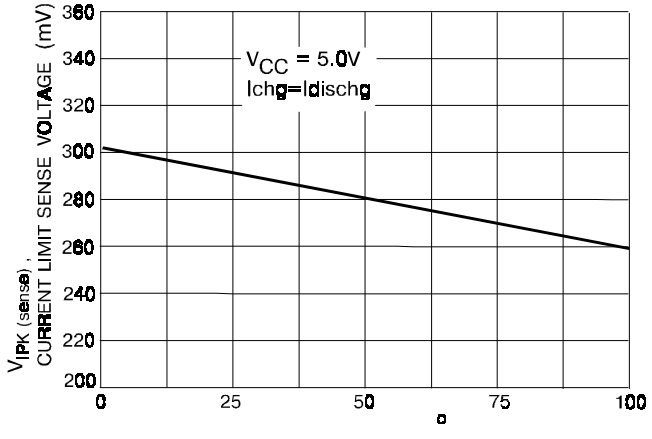
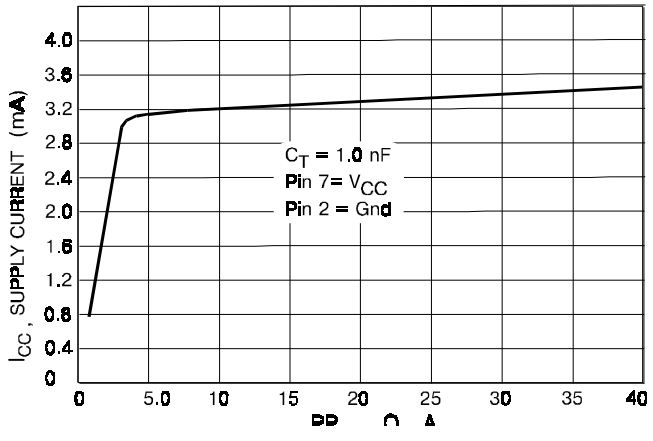


Figure 6. Standby Supply Current versus Supply Voltage



Typical Applications Circuit

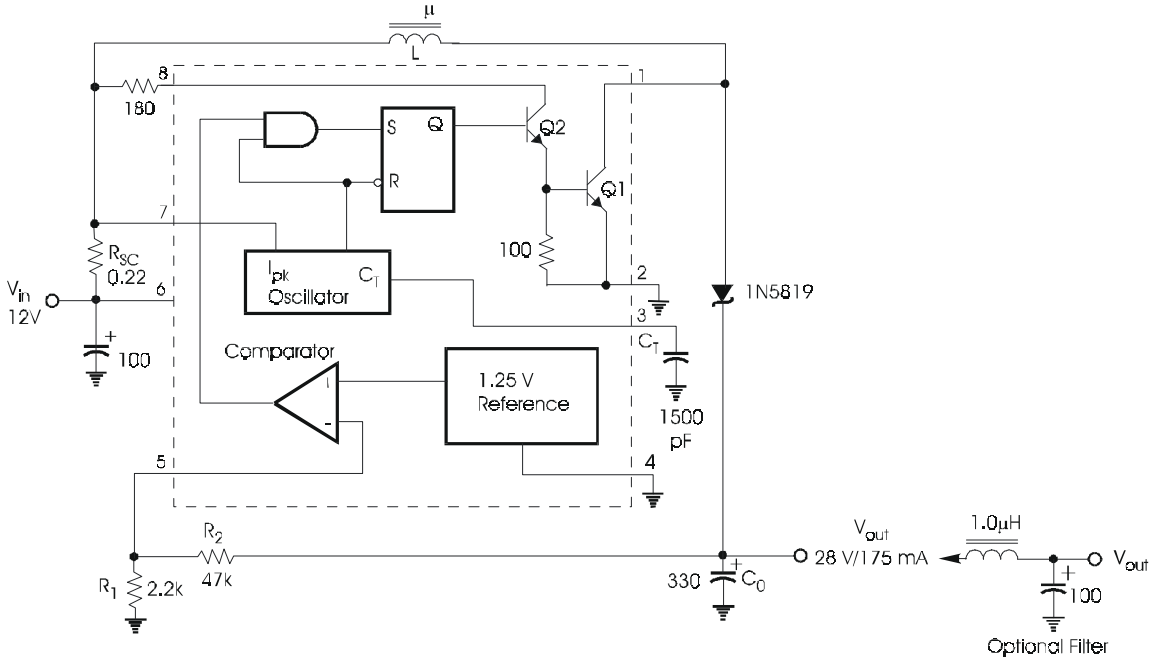


Figure 1. Step-Up Converte r

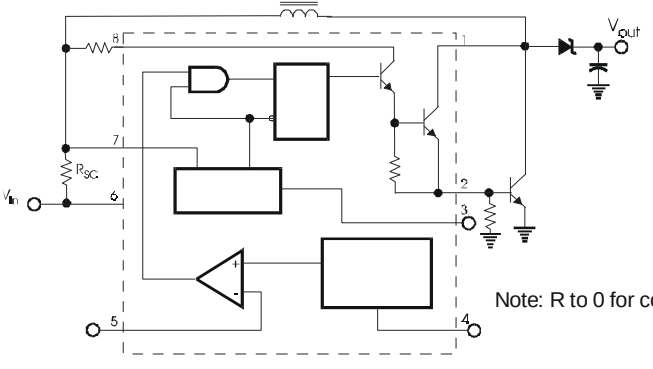


Figure 2a. External NPN Switch.

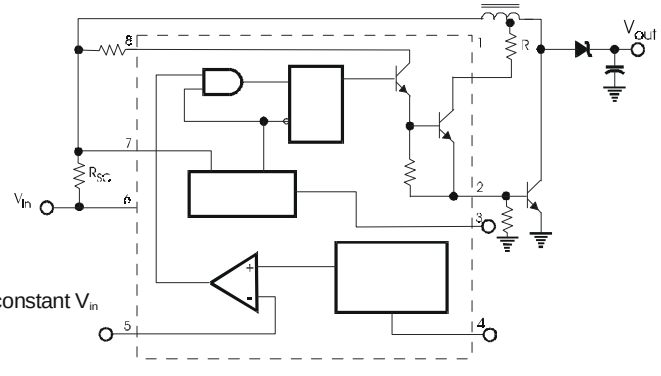


Figure 2b. External NPN Saturated Switch.

Note: R to 0 for constant V_{in}

Figure 2. External Current Boost Connections for I eak Greater than

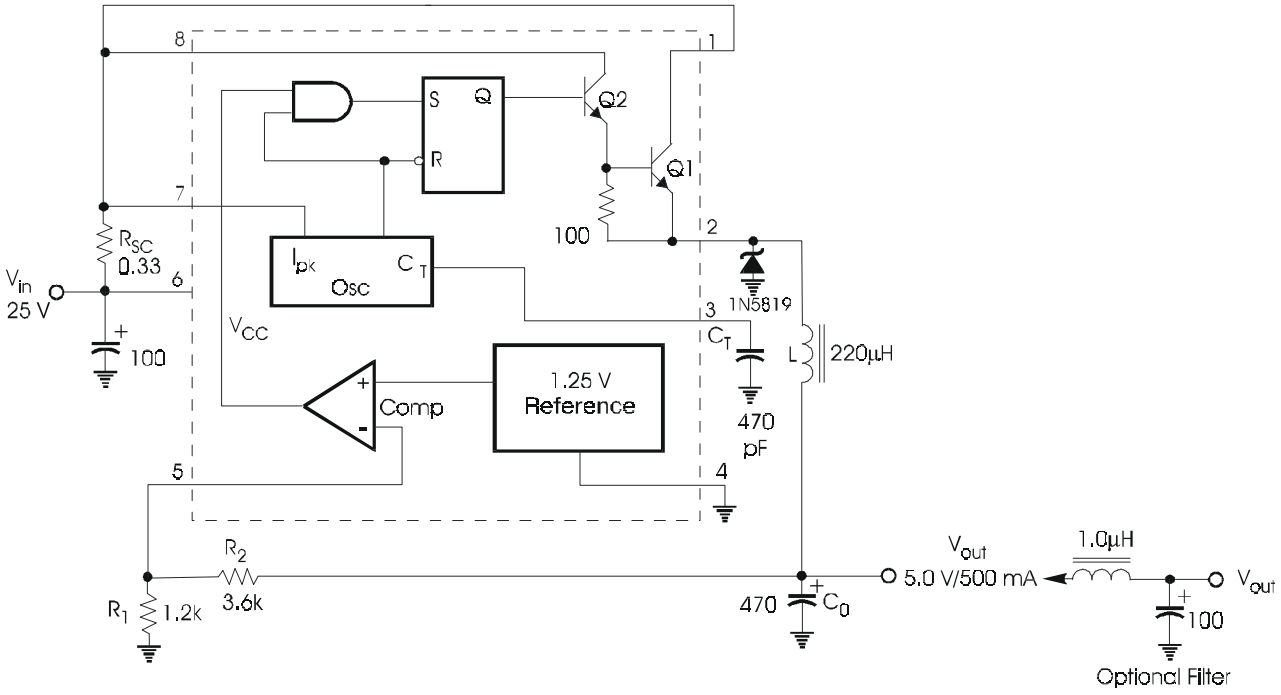


Figure 3. Step-Down Converte r

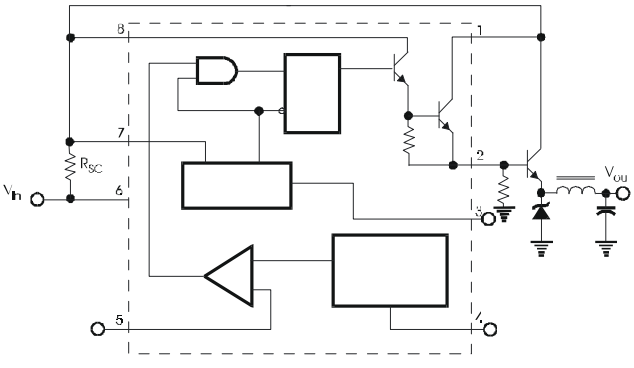


Figure 4a. External NPN Switch.

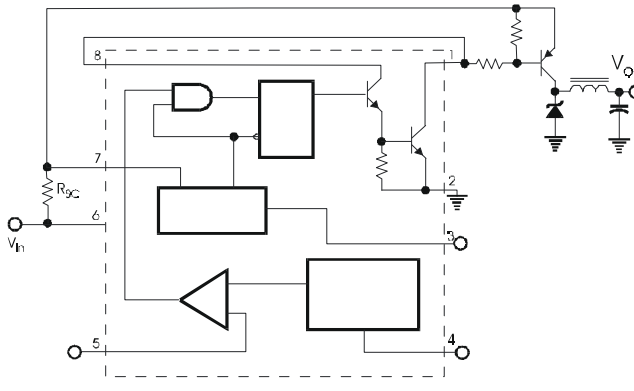


Figure 4b. External PNP Suturated Switch.

Figure 4. External Current Boost Connections for I eak Greater than

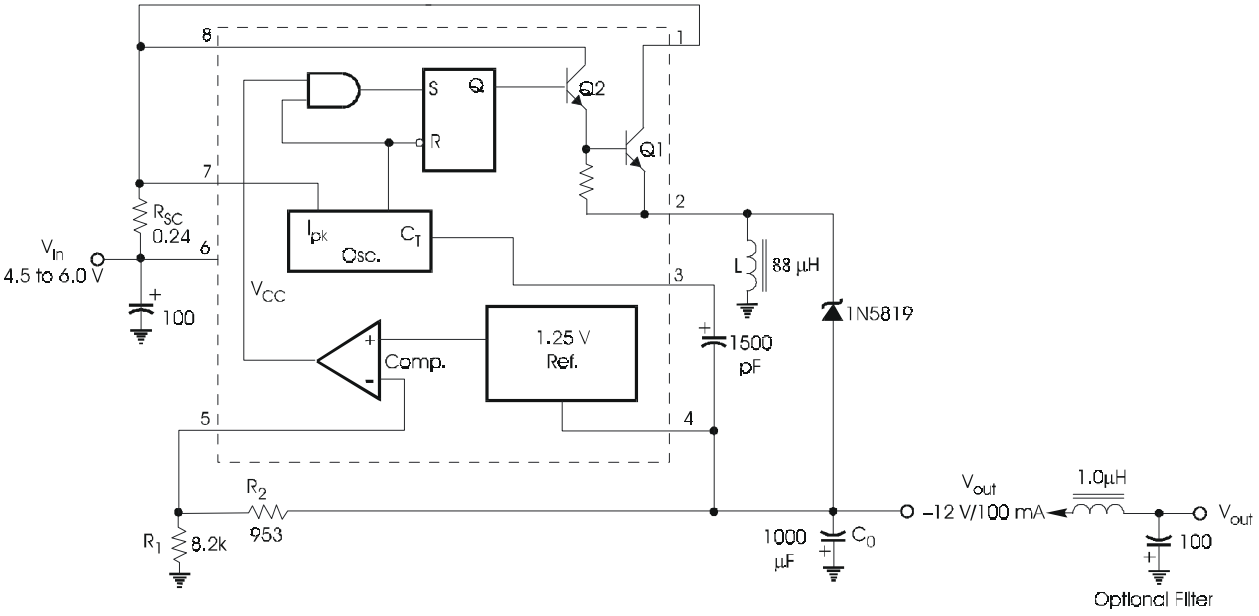


Figure 5. Voltage Inverting Converte r

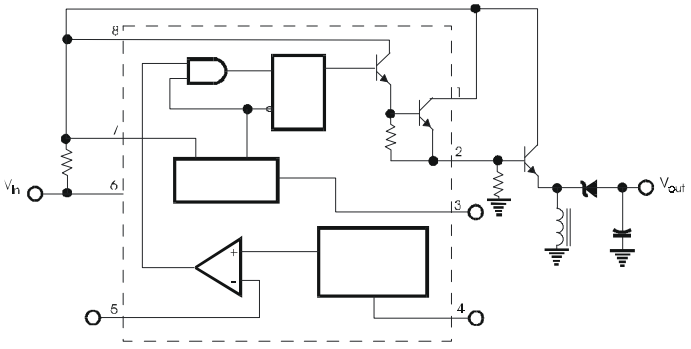


Figure 6a. External NPN Switch.

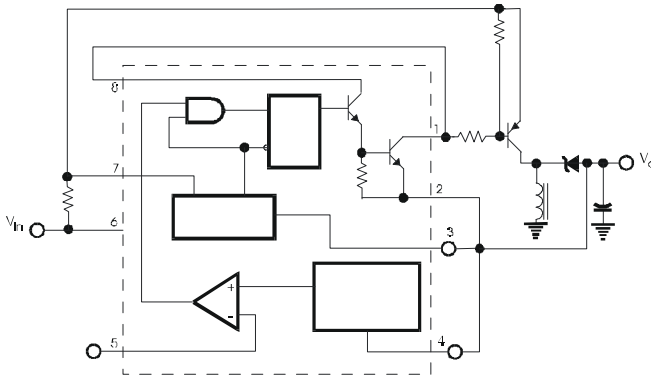


Figure 6b. External PNP Saturated Switch.

Figure 6. External Current Boost Connections for I eak Greater than

Design Formula Table

Calculation	Step-Up	Step-Down	Voltage-Inverting
t_{on}/t_{off}	$\frac{V_{out} + V_F - V_{in}}{V_{in} - V_{sat}}$	$\frac{V_{in(min)} - V_{sat}}{V_{out} + V_F}$	$\frac{\lvert V_{out} \rvert + V_F}{V_{in} + V_{sat}}$
$(t_{on}+t_{off})max$	$\frac{1}{f_{min}}$	$\frac{1}{f_{min}}$	$\frac{1}{f_{min}}$
C_T	$4.0 \times 10^{-5}\ t_{on}$	$4.0 \times 10^{-5}\ t_{on}$	$4.0 \times 10^{-5}\ t_{on}$
$I_{pk(switch)}$	$2 I_{(max)} \frac{t_{on}}{t_{on}+t_{off}}$	$2I_{out(max)}$	$2I_{out(max)} \frac{t_{on}}{t_{on}+t_{off}}$
R_{SC}	$0.3/I_{pk(switch)}$	$0.3/I_{pk(switch)}$	$0.3/I_{pk(switch)}$
$L_{(min)}$	$\frac{V_{in} - V_{sat}}{I_{pk(switch)}} \times t_{on(max)}$	$\frac{V_{in(min)} - V_{sat} - V_{out}}{I_{pk(switch)}} \times t_{on(max)}$	$\frac{V_{in(min)} - V_{sat}}{I_{pk(switch)}} \times t_{on(max)}$
C_O	$9 \frac{I_{out} t_{on}}{V_{ripple(pp)}}$	$\frac{I_{pk(switch)}}{8V_{ripple(pp)}}$	$9 \frac{tI}{V_{ripple(pp)}}$

TERMS AND DEFINITIONS

V_{sat} - Saturation voltage of the output switch.

V_F - Forward voltage drop of the output rectifier.

The following power supply characteristics must be chosen:

$|V_{out}| = 1.25 \left(1 + \frac{R}{R}\right)$

V_{in} - Nominal input voltage.

V_{out} - Desired output voltage,

I_{out} - Desired output current.

f_{min} - Minimum desired output switching frequency at the selected values of V_{in} and I_O.

$V_{ripple(p-p)}$ – Desired peack-to-peack output ripple voltage. In practice, the calculated capacitor value will need 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.

Ordering Information

ORDERING NUMBER	PACKAGE	MARKING
34063A	SOP-8 /DIP-8	MC34063A

Address : 北京市海淀区永定路 88 号长银大厦 6A06--6A07

Rm 6A07,Changyin Office Building ,No.88,Yong Ding Road,Hai Dian District ,Beijing

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