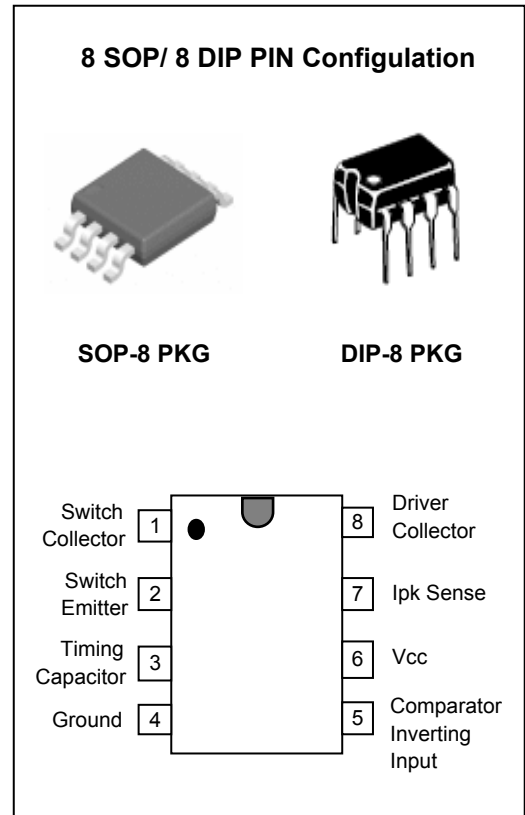## FEATURES

● OUTPUT SWITCH CURRENT IN EXCESS OF 1.5A
● 2% REFERENCE ACCURACY
● LOW QUIESCENT CURRENT:2.5mA(TYP.)
● OPERATING FROM 3V TO 40V
● FREQUENCY OPERATION TO 100KHz
● ACTIVE CURRENT LIMITING
● MOISTURE SENSITIVITY LEVEL 3
● MC34063AG is Halogen Free products

APPLICATION

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

8 SOP/ 8 DIP PIN Configulation

SOP-8 PKG   **DIP-8 PKG**

Pin		Pin	
Switch Collector	1	8	Driver Collector
Switch Emitter	2	7	Ipk Sense
Timing Capacitor	3	6	Vcc
Ground	4	5	Comparator Inverting Input

ORDERING INFORMATION

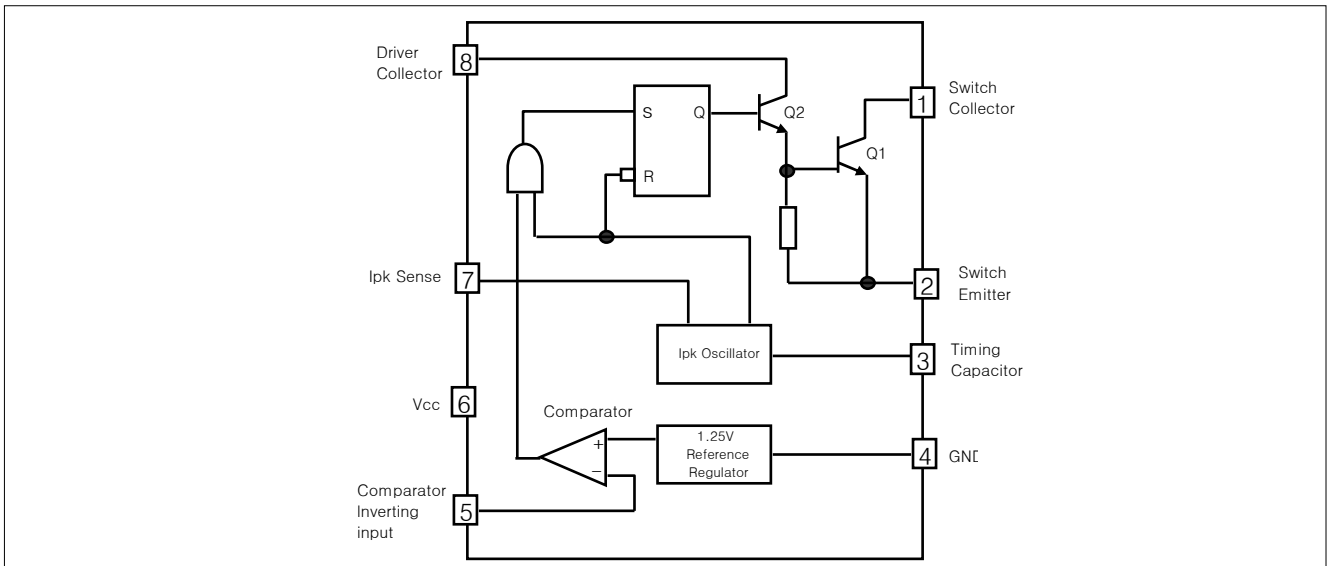| Device	Package
MC34063AD	SOP-8
MC34063AGD	
MC34063AN	DIP-8

DESCRIPTION

The MC34063A 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 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 devices series is designed for Step-Down, Step-Up and Voltage-Inverting applications.

BLOCK DIAGRAM

THERMAL DATA

SYMBOL	PARAMETER		DIP-8	SOP-8	UNIT
$R_{thi-amb}$	Thermal Resistance Junction-ambient (*)	Max	100	160	℃/w

(*) This Value depends from thermal design of PCB on which the device is mounted.

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	VALUE	UNIT
V_{cc}	Power Supply Voltage	50	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	100	mA
I_{sw}	Switch Current	1.5	A
P_{tot}	Power Dissipation at T_{amb}=25℃ (for **Plastic Package**)	1.25	W
	(for **SOIC Package**)	0.625	
T_{op}	Operating Ambient Temperature Range	-30 to +125	℃
T_{stg}	Storage Temperature Range	-40 to +150	℃

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

Functional operation under these condition is not implied.

ELECTRICAL CHARACTERISTICS (Refer to the test circuits, V_{CC}=5V, T_a=T_{LOW} to T_{HIGH}, unless otherwise specified, see note 2)

OSCILLATOR

SYMBOL	PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
F_{OSC}	Frequency	V_{pin5}= 0 V , C_T= 1nF , T_a= 25°C	24	33	42	KHz
I_{chg}	Charge Current	V_{CC}= 5 to 40V , T_a= 25°C	24	35	42	μA
I_{dischg}	Discharge Current	V_{CC}= 5 to 40V , T_a= 25°C	140	220	260	μA
I_{dischg}/I_{chg}	Discharge to Charge Current Ratio	Pin 7= V_{CC} , T_a= 25°C	5.2	6.5	7.5	
$V_{ipk(sense)}$	Current Limit Sense Voltage	I_{chg}= I_{dischg} , T_a= 25°C	250	300	350	mV

OUTPUT SWITCH

SYMBOL	PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CE(sat)}$	Saturation Voltage, Darlington connection	I_{SW}= 1A , Pins 1,8 connected		1.0	1.3	V
$V_{CE(sat)}$	Saturation Voltage	I_{SW}= 1A , R_{pin8}= 82Ω to V_{CC}, Forced $\beta \sim 20$		0.45	0.7	V
h_{FE}	DC Current Gain	I_{SW}= 1A, V_{CE}= 5V, T_a= 25°C	50	75		
$I_{C(off)}$	Collector Off-State Current	V_{CE}= 40V		0.01	100	μA

COMPARATOR

SYMBOL	PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{th}	Threshold Voltage	T_a= 25°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	5	mV
I_{IB}	Input Bias Current	V_{IN}= 0V		-5	-400	nA

TOTAL DEVICE

SYMBOL	PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CC}	Supply Current	V_{CC}= 5 to 40V, C_T=1nF Pin7= V_{CC} , V_{pin5}>V_{th}, Pin2=GND Remaining pins open for MC34063A		1.4	4	mA

Notes:

1) Maximum package power dissipation limit must be observed.

2) T_{LOW}= '-30℃ , T_{HIGH}= '+125℃

3) If Darlington configuration is not used, care must be taken to avoid deep saturation of output switch.
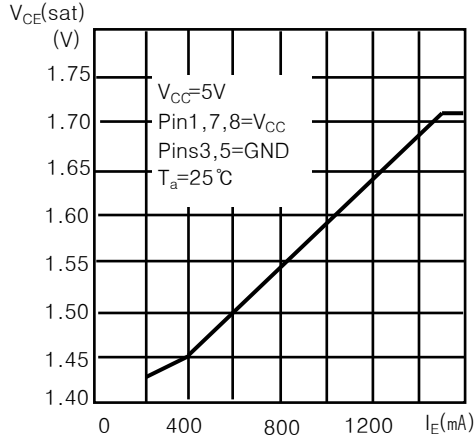   The resulting switch-off time may be adversely affected.
   In a Darlington configuration the following output driver condition is suggested:
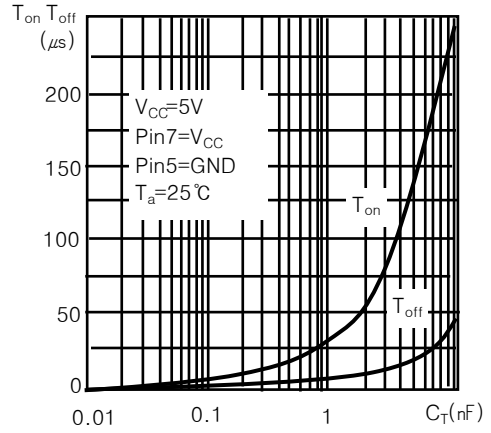   Forced β of output current switch= $I_{COUTPUT}/(I_{CDRIVER}-1mA^{*})\geq10$

   [*] Current less due to a built in 1KΩ antileakage resistor.
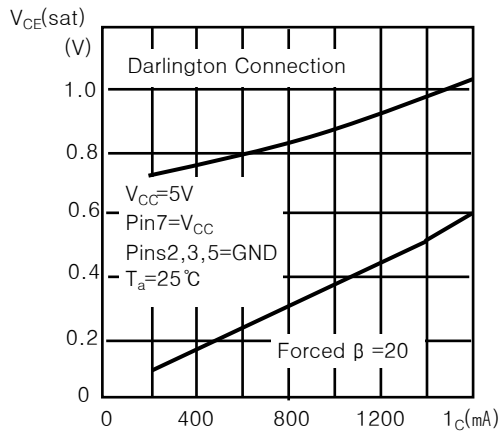
TYPICAL ELECTRICAL CHARACTERISTICS

Emitter Follower Configuration Output Saturation
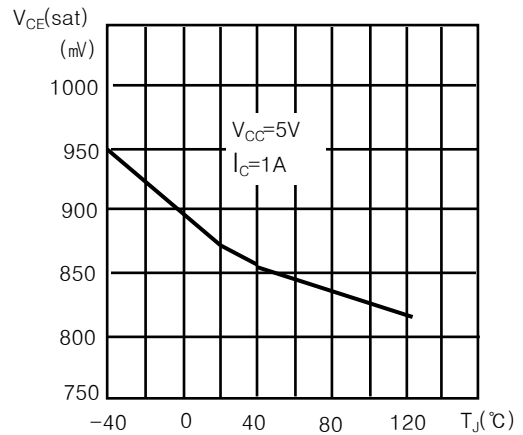Voltage vs Emitter Current

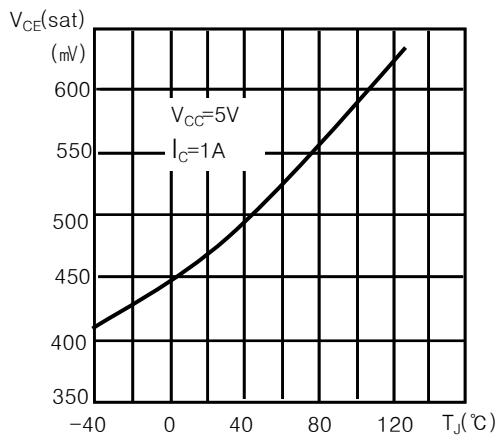
Output Switch ON-OFF Time vs Oscillator
Timing Capacitor

Common Emitter Configuration Output Switch
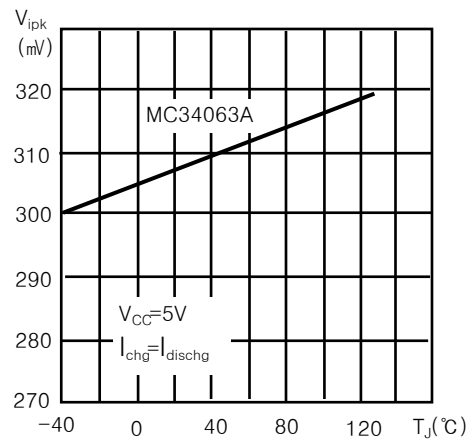Saturation Voltage vs Collector Current

Darlington Configuration Collector Emitter
Saturation Voltage ($V_{CE(sat)}$) vs Temperature

Power Collector Emitter Ssturation Voltage
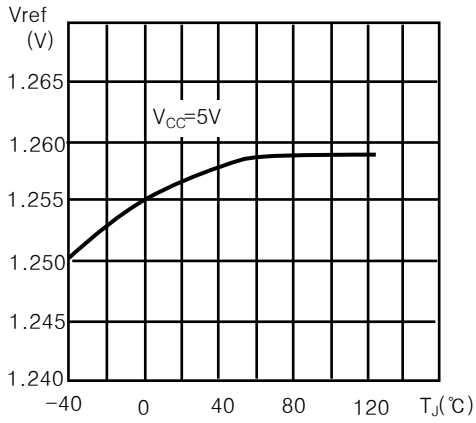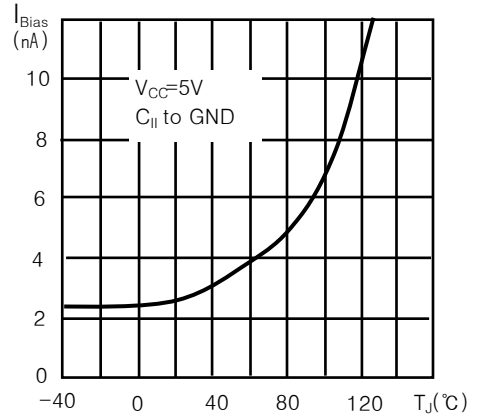($V_{CE(sat)}$) vs Temperature

Current Limit Sense Voltage Voltage (V_{ipk}) vs
Temperature

TYPICAL ELECTRICAL CHARACTERISTICS (Continued)

Reference Voltage vs Temperature

$V_{CC}=5V$

Bias Current vs Temperature

$V_{CC}=5V$
C_{II} to GND

Supply Current vs Temperature

$V_{CC}=5V$
$C_T=1\,nF$

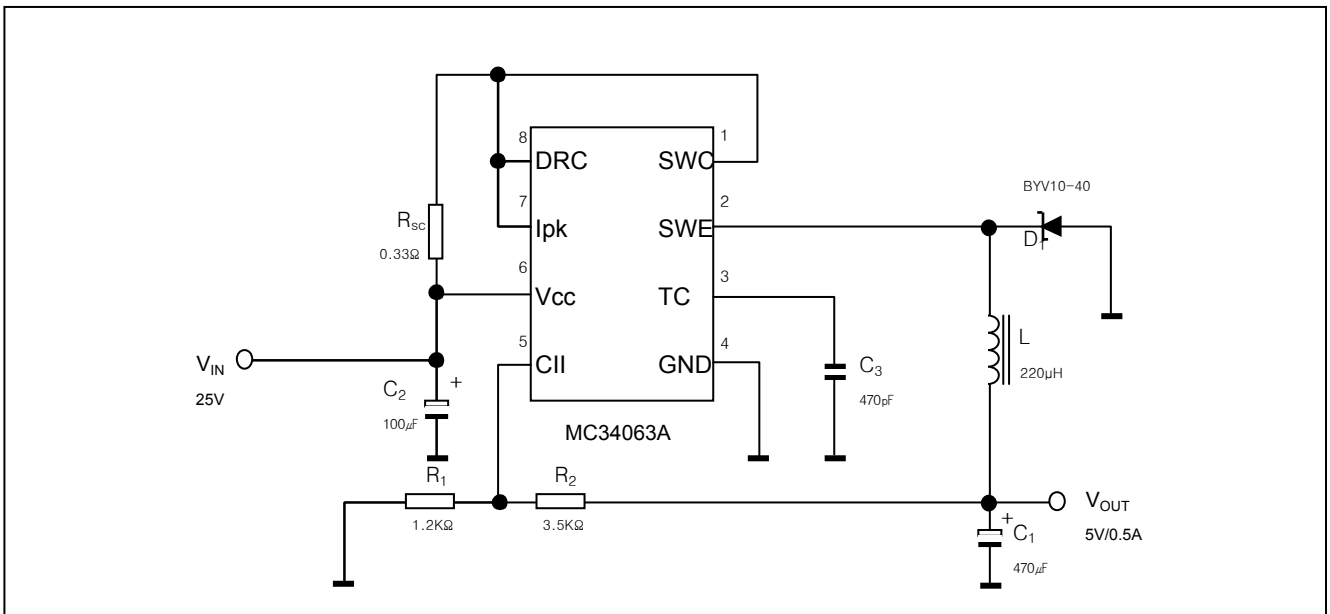Supply Current vs Input Voltage

$T_J= 25℃$
$C_T= 1\,nF$

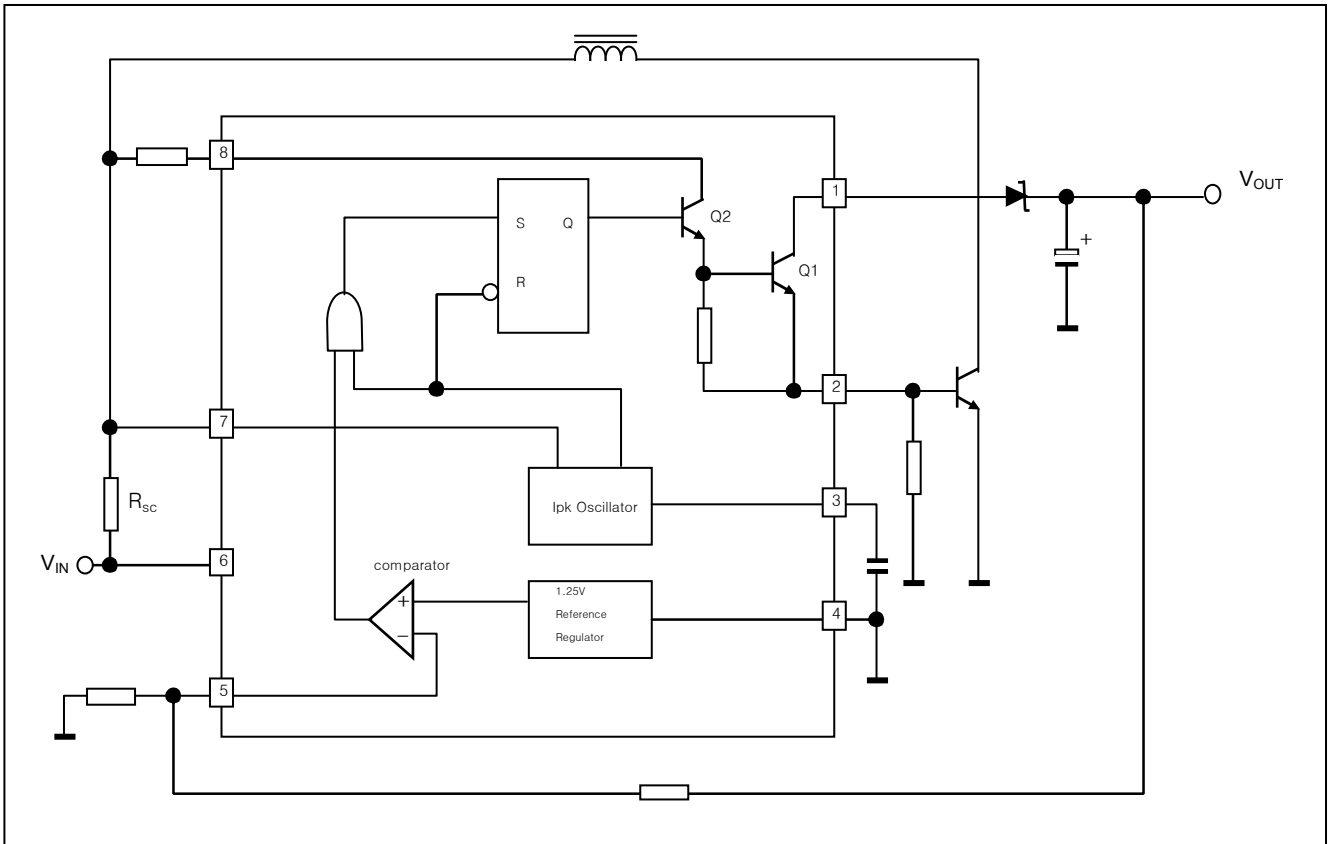## TYPICAL APPLICATION CIRCUIT
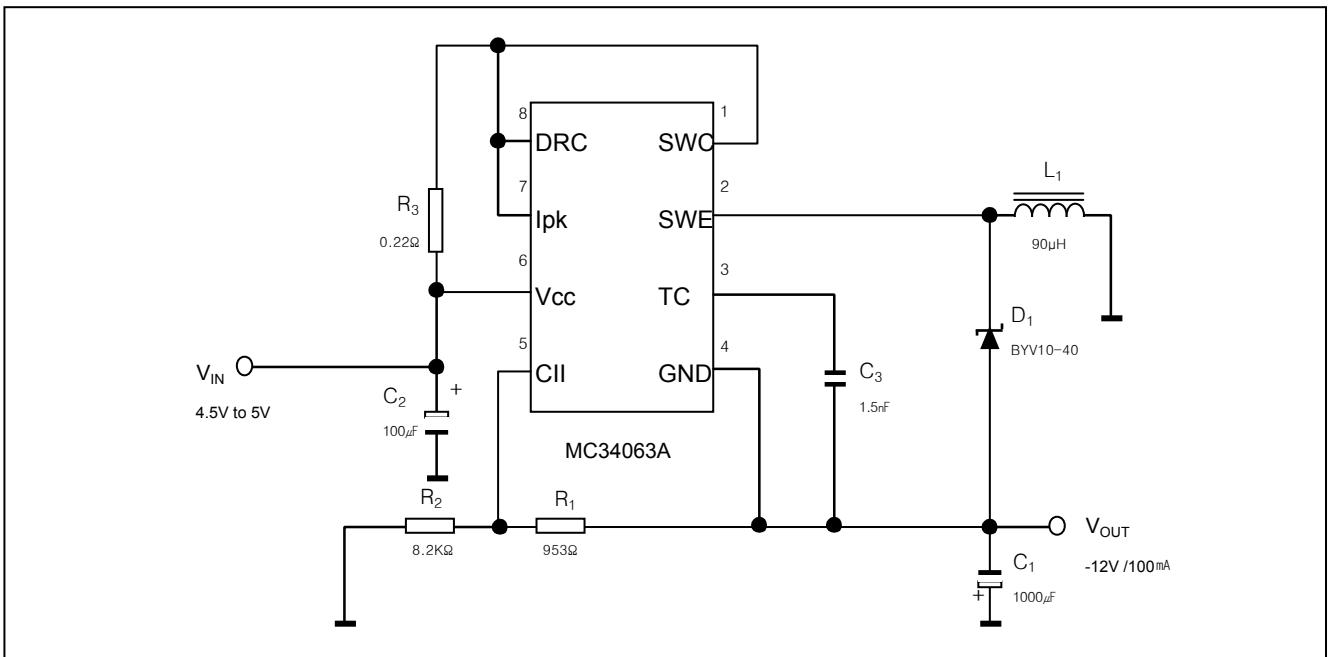
Step-Up Converter
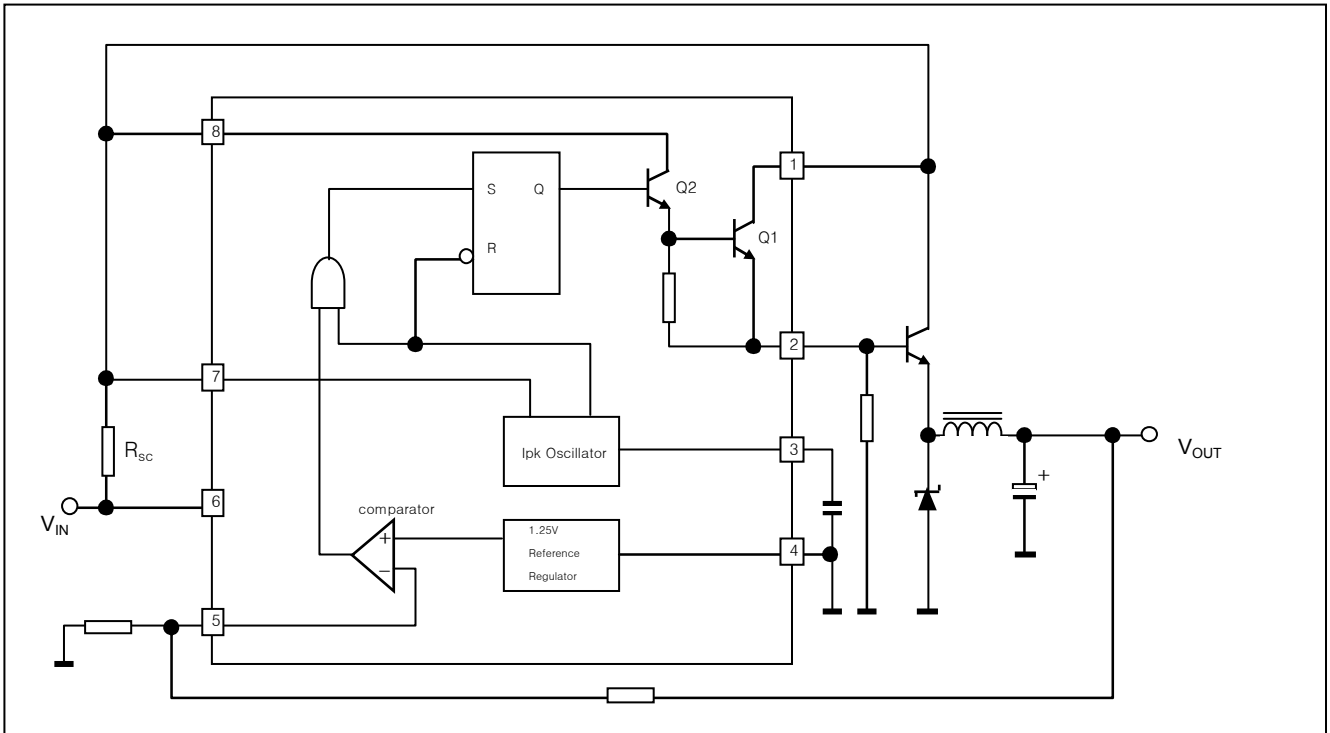

Step-Down Converter
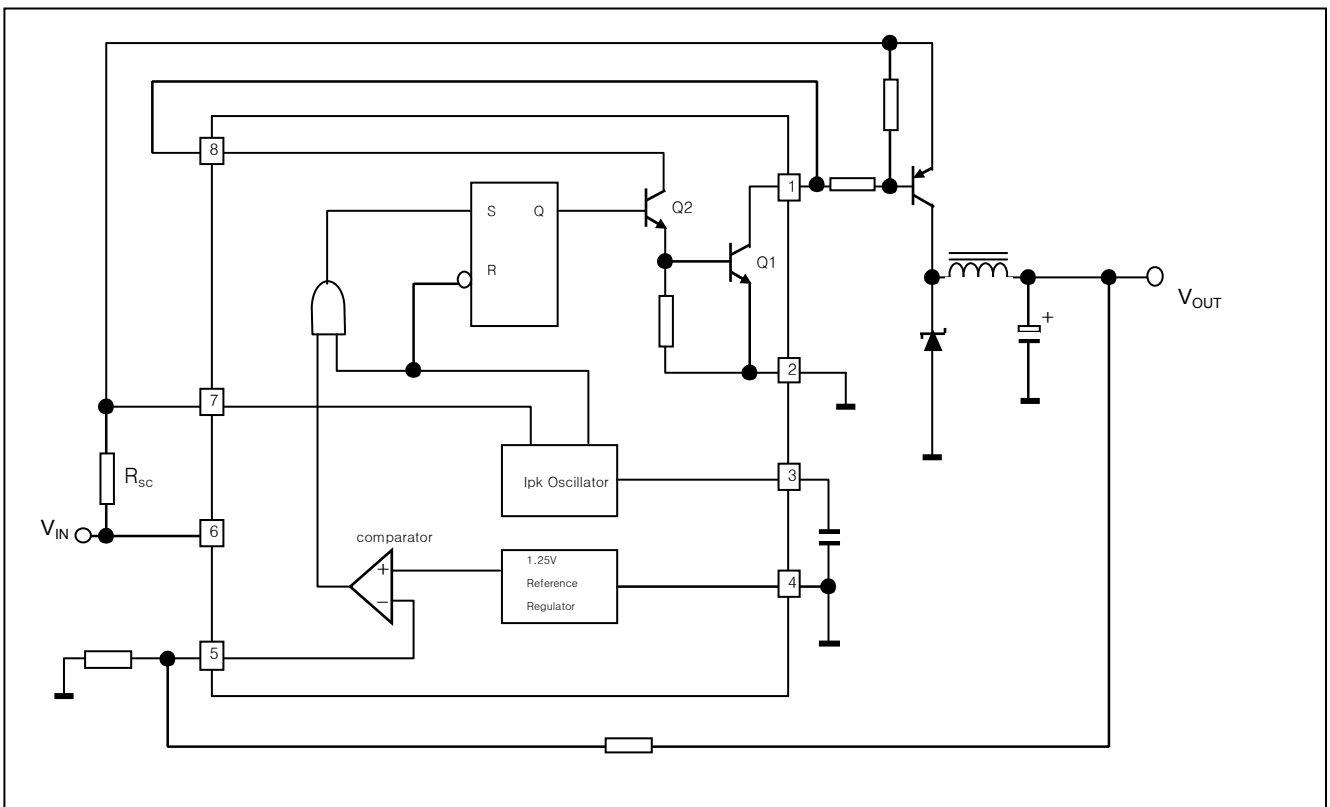
Step-Up With External NPN Switch
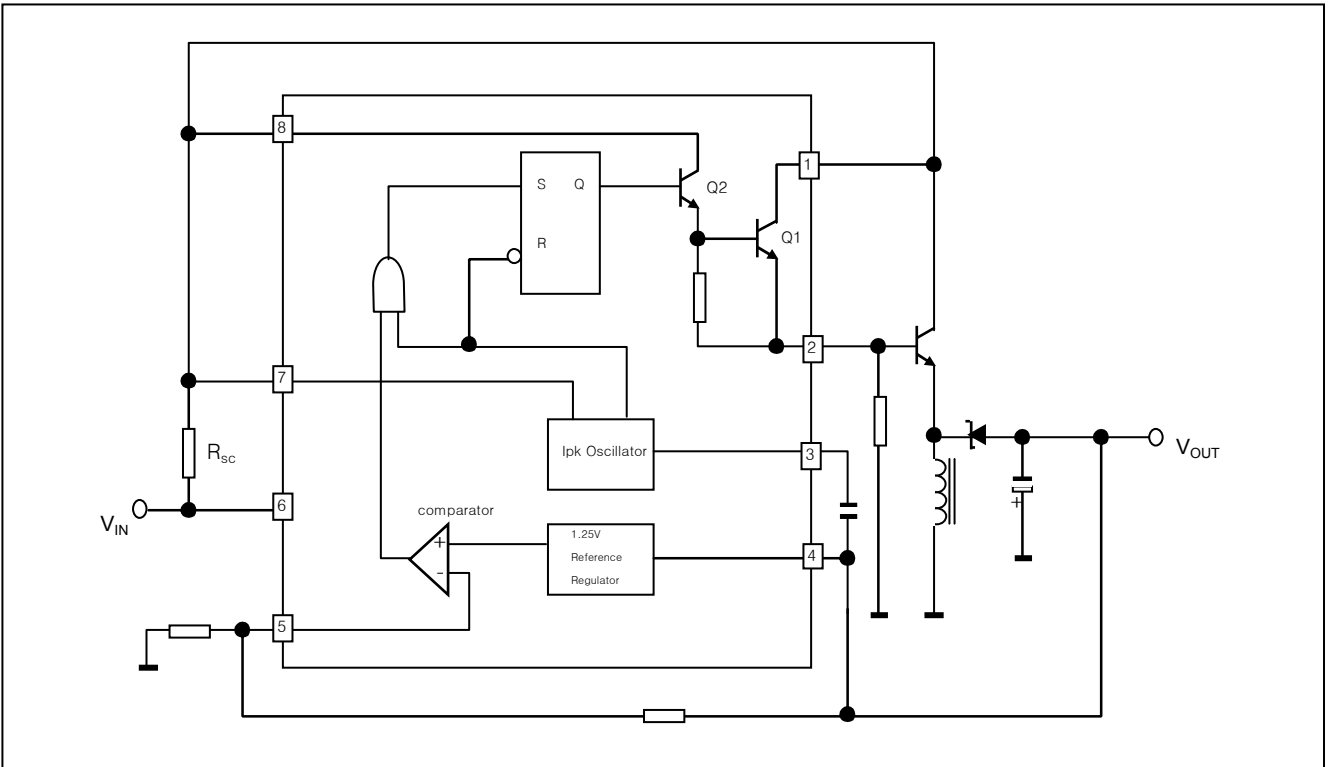

Voltage Inverting Converter

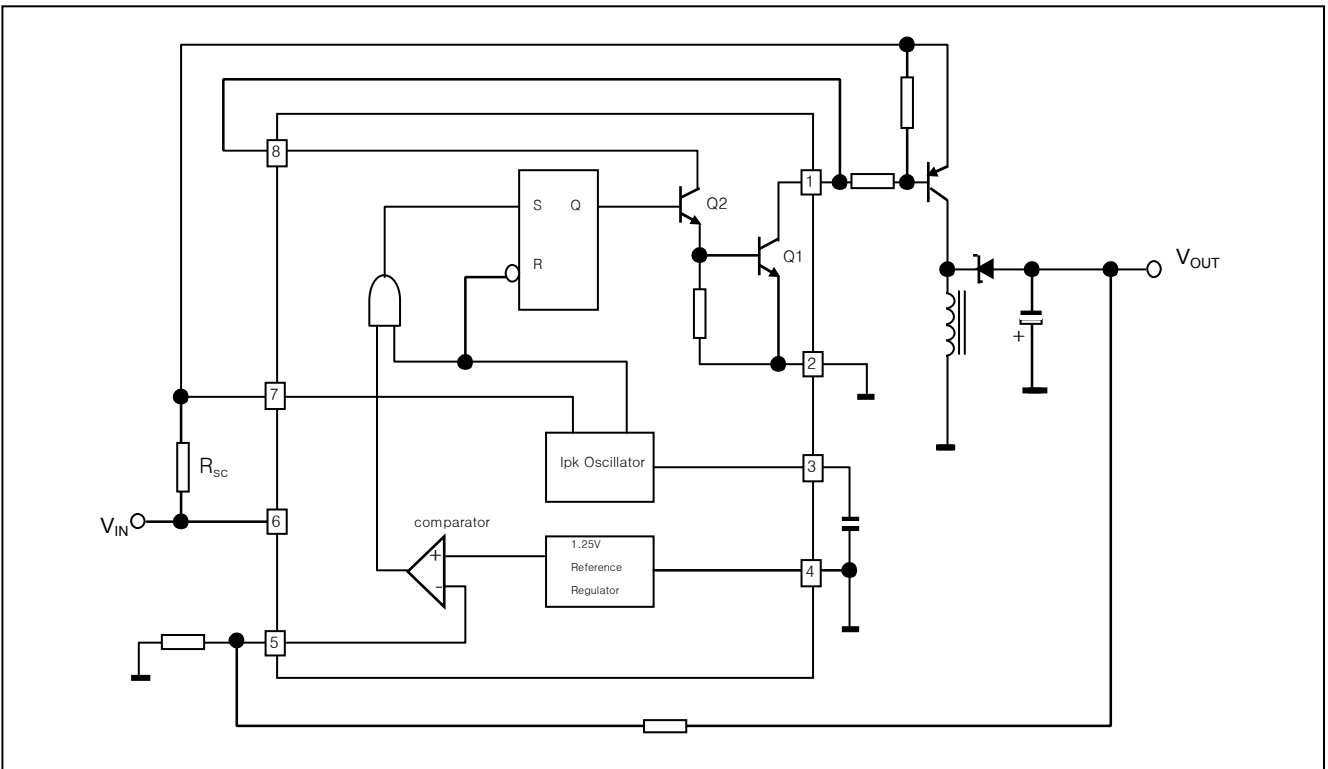## Step-Down With External NPN Switch

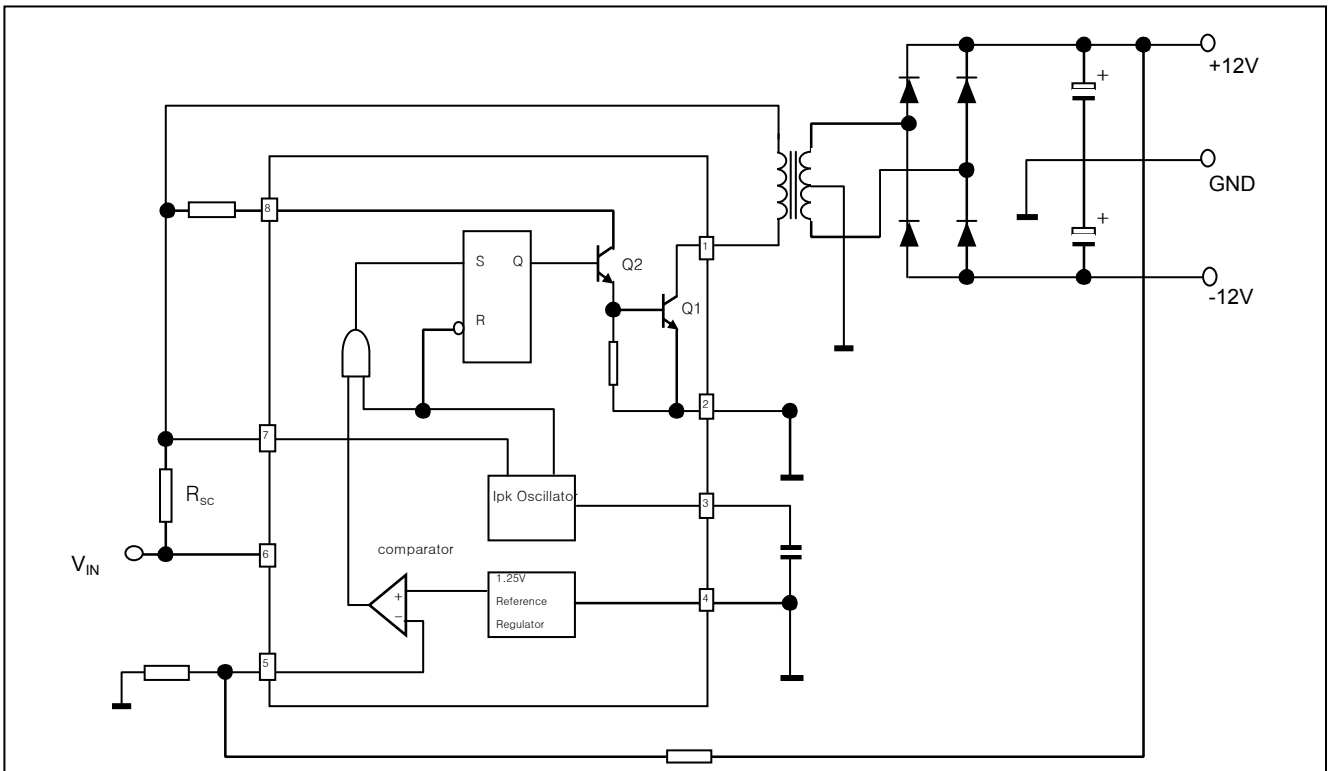

Step-Down With External PNP Switch

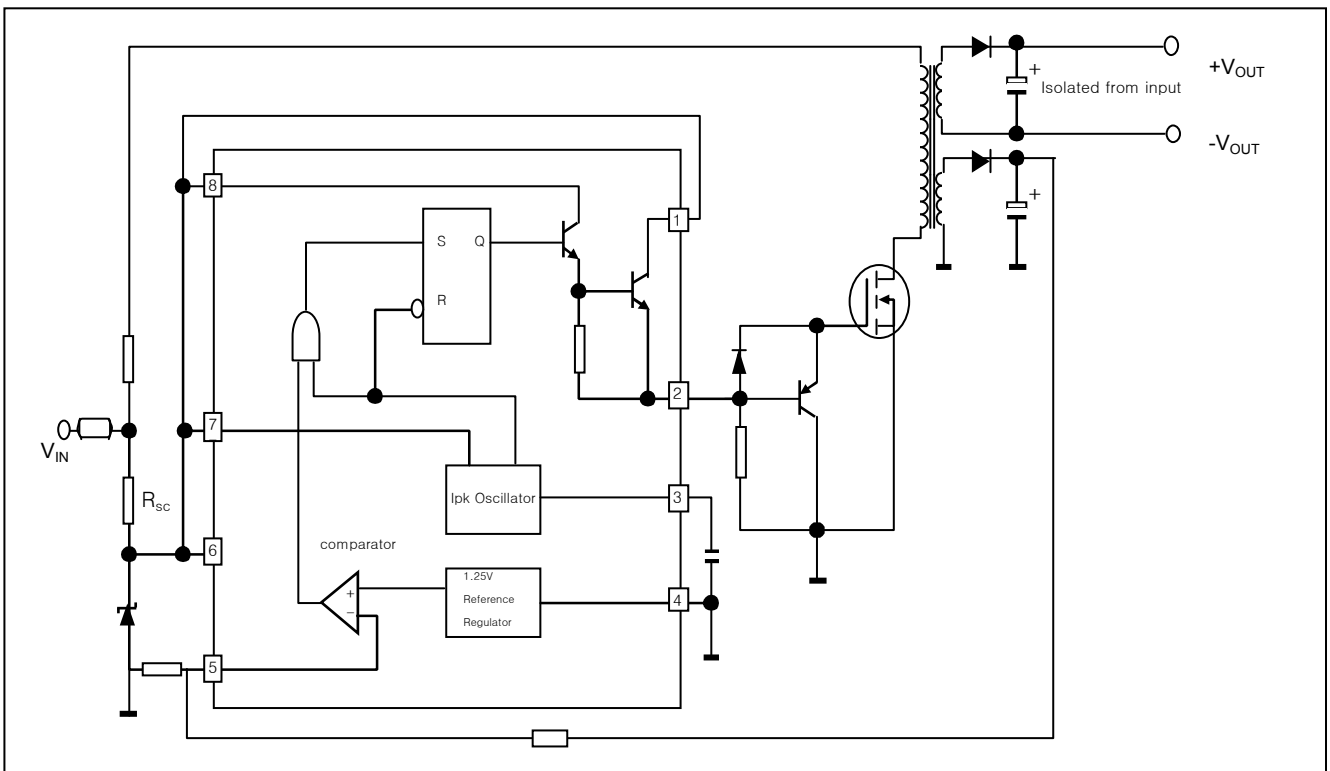## Voltage Inverting With External NPN Switch

Voltage Inverting With External PNP Saturated Switch

Dual Output Voltage

Higher Output Power, Higher Input Voltage

Design Formula Table

Calculation	Step-Up	Step-Down	Voltage-Inverting
t_{on}/t_{off}	$\dfrac{V_{out} + V_F - V_{in(min)}}{V_{in(min)} - V_{sat}}$	$\dfrac{V_{out} + V_F}{V_{in(min)} - V_{sat}}$	$\dfrac{|V_{out}| + V_F}{V_{in} + V_{sat}}$
$(t_{on}/t_{off})max$	$\dfrac{1}{f_{min}}$	$\dfrac{1}{f_{min}}$	$\dfrac{1}{f_{min}}$
C_T	$4.0 \times 10^{-5}\ t_{on}$	$4.0 \times 10^{-5}\ t_{on}$	$4.0 \times 10^{-5}\ t_{on}$
$I_{pk(switch)}$	$2I_{out(max)} \left(\dfrac{t_{on}}{t_{off}} + 1 \right)$	$2I_{out(max)}$	$2I_{out(max)} \left(\dfrac{t_{on}}{t_{off}} + 1 \right)$
R_{sc}	$0.3 / I_{pk(switch)}$	$0.3 / I_{pk(switch)}$	$0.3 / I_{pk(switch)}$
$L_{(min)}$	$\left(\dfrac{V_{in(min)} - V_{sat}}{I_{pk(switch)}} \right) \times t_{on(max)}$	$\left(\dfrac{V_{in(min)} - V_{sat} - V_{out}}{I_{pk(switch)}} \right) \times t_{on(max)}$	$\left(\dfrac{V_{in(min)} - V_{sat}}{I_{pk(switch)}} \right) \times t_{on(max)}$
C_o	$9 \dfrac{I_{out}\, t_{on}}{V_{ripple(pp)}}$	$\dfrac{I_{pk(switch)}(t_{on} + t_{off})}{8 V_{ripple(pp)}}$	$9 \dfrac{I_{out}\, t_{on}}{V_{ripple(pp)}}$

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_{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-peak 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.