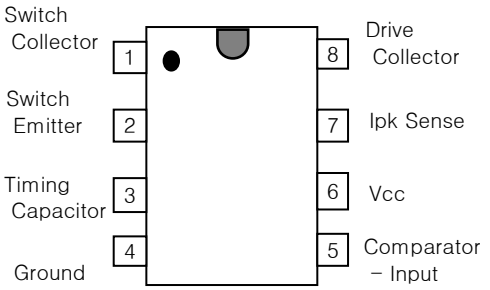
FEATURES

- 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

8 SOP/ 8 DIP PIN Configulation

SOP-8 PKG

DIP-8 PKG



APPLICATION

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

ORDERING INFORMATION

Device	Package
MC34063AD	8 SOP
MC34063AN	8 DIP

DESCRIPTION

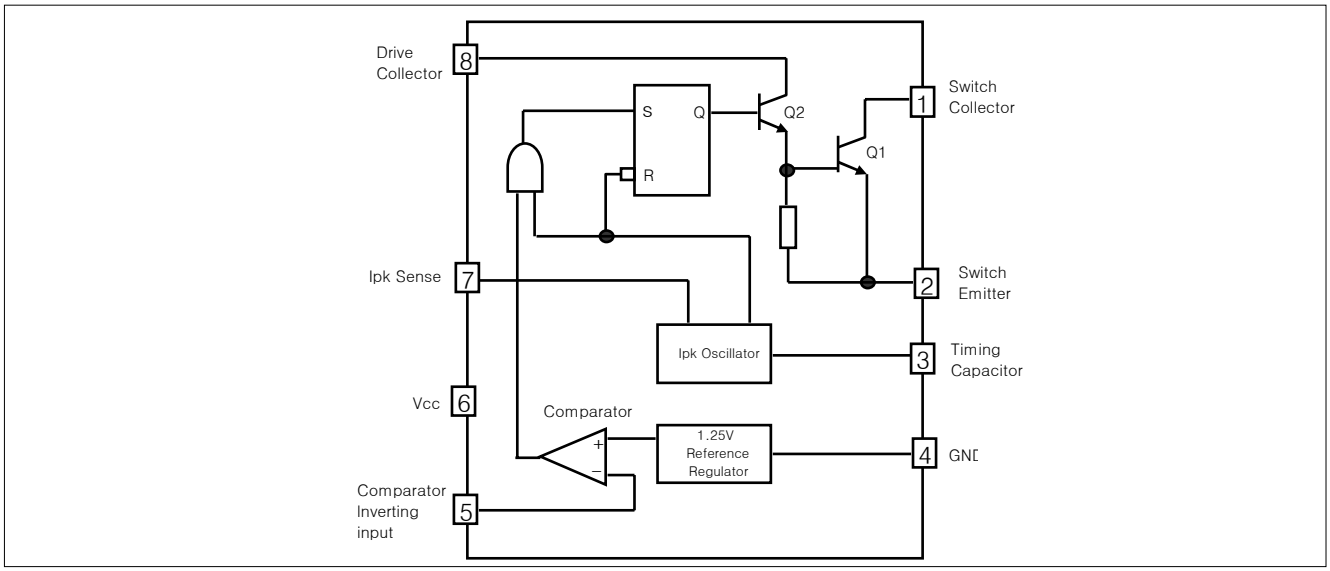
The MC34063A series is a monolithic control circuit delivering the main functions for DC-DC voltage converting.

The device contains an intermal 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	SO-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	33	42	μA
I_{dischg}	Discharge Current	V_{CC}= 5 to 40V ,T_a= 25°C	140	200	260	μA
I_{dischg}/I_{chg}	Discharge to Charge Current Ratio	Pin 7= V_{CC} ,T_a= 25°C	5.2	6.2	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	1.3	V
$V_{CE(sat)}$	Saturation Voltage	I_{SW}= 1A ,R_{pin8}= 82Ω to V_{CC}, Forced β ~ 20		0.45	0.7	V
h_{FE}	DC Current Gain	I_{SW}= 1A, V_{CE}= 5V, T_a= 25°C	50	120		
$I_{C(off)}$	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		2.5	4	mA
$V_{START-UP}$	Start-up Voltage(note 4)	T_a= 25°C ,C_T=1μF ,Pin5= 0V for MC34063A		2.1		V

Notes:

1) Maximum package power dissipation limit must be observed.

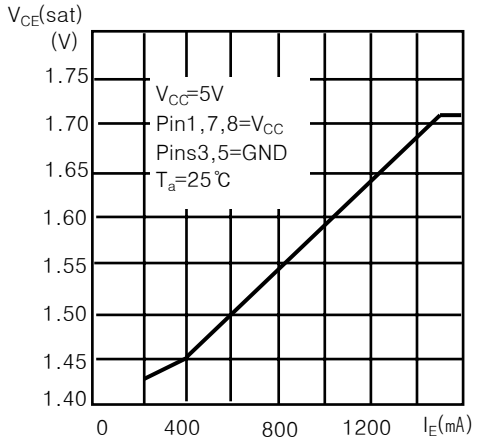
2) T_{LOW}= '-30℃, T_{HIGH}= '+125℃

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= $I_{COUTPUT}/(I_{CDRIVER}-1mA^*)\geq 10$
* Current less due to a built in 1KΩ antileakage resistor.

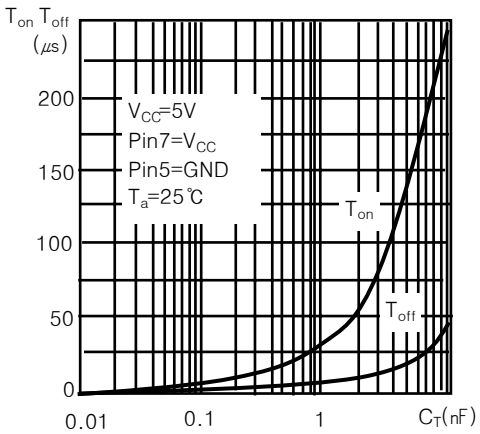
4) Start-up Voltage is the minimum Power Supply Voltage at which the internal oscillator begains to work.

TYPICAL ELECTRICAL CHARACTERISTICS

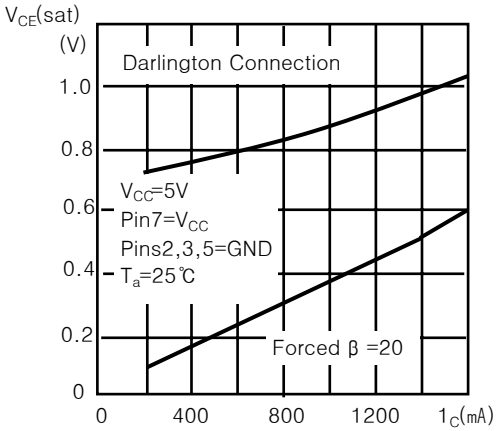
Emitter Follower Configuration Output Saturation Voltage vs Emitter Current



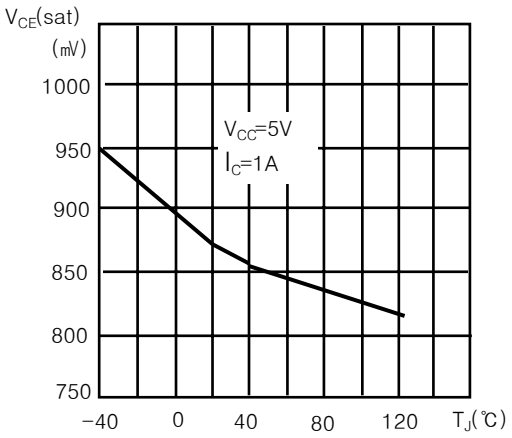
Output Switch ON-OFF Time vs Oscillator Timing Capacitor



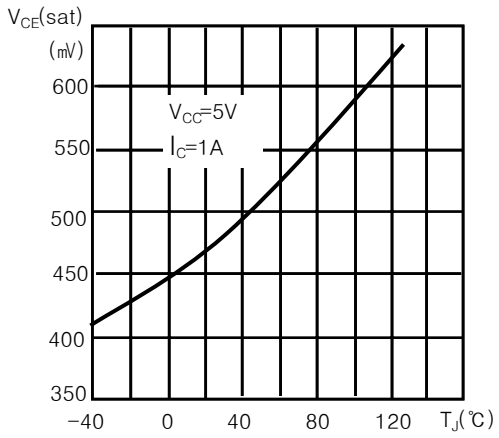
Common Emitter Configuration Output Switch Saturation Voltage vs Collector Current



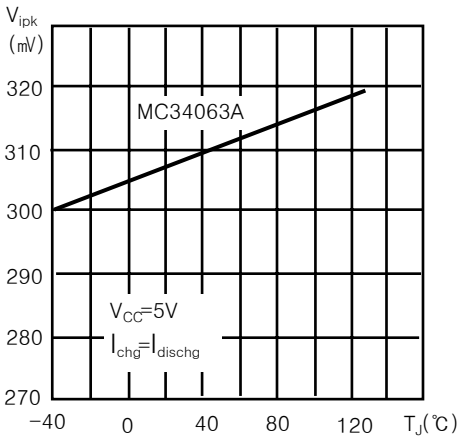
Darlington Configuration Collector Emitter Saturation Voltage ($V_{CE(sat)}$) vs Temperature



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

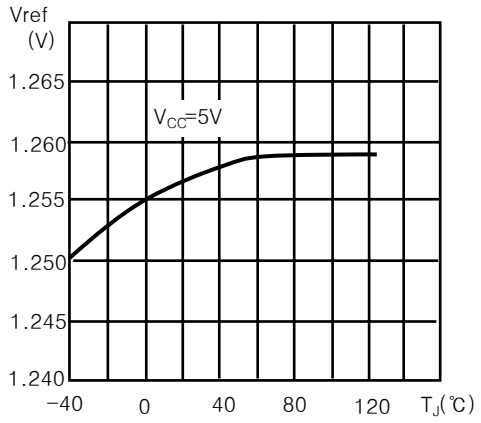


Current Limit Sense Voltage Voltage (V_{ipk}) vs Temperature

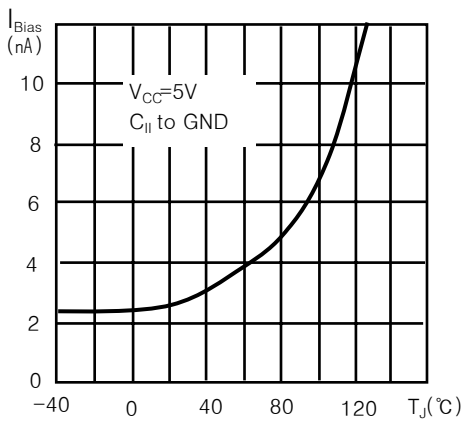


TYPICAL ELECTRICAL CHARACTERISTICS(Continued)

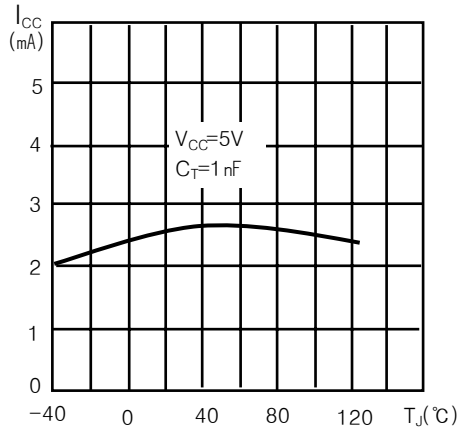
Reference Voltage vs Temperature



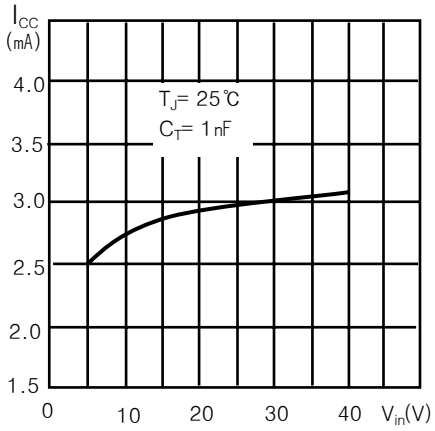
Bias Current vs Temperature



Supply Current vs Temperature

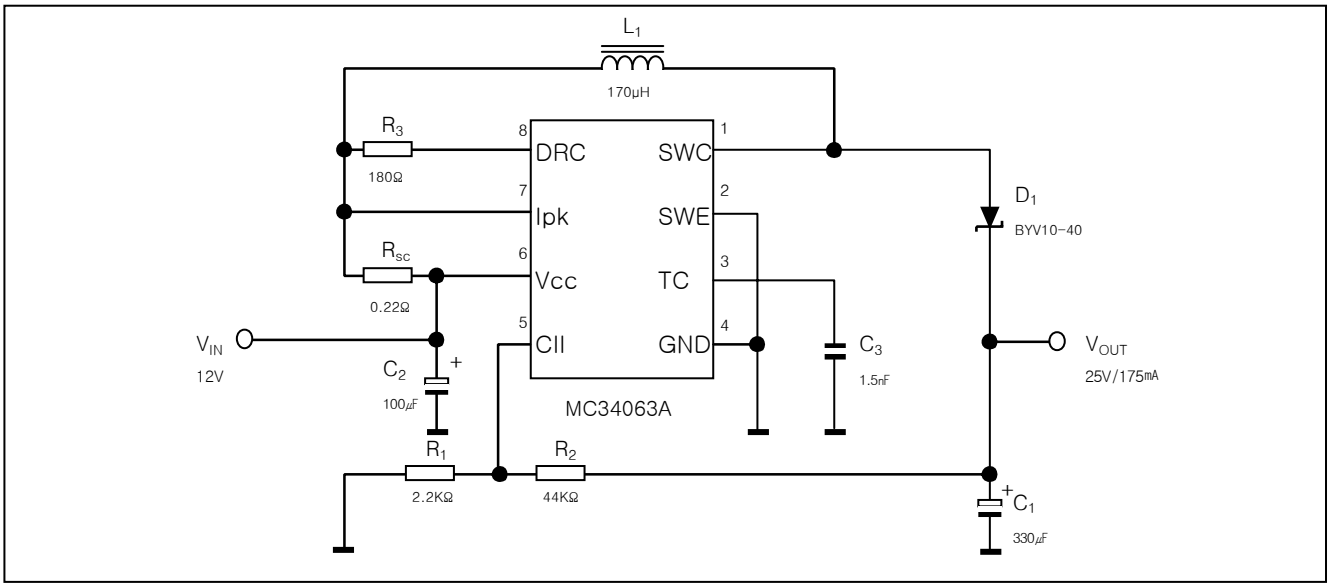


Supply Current vs Input Voltage

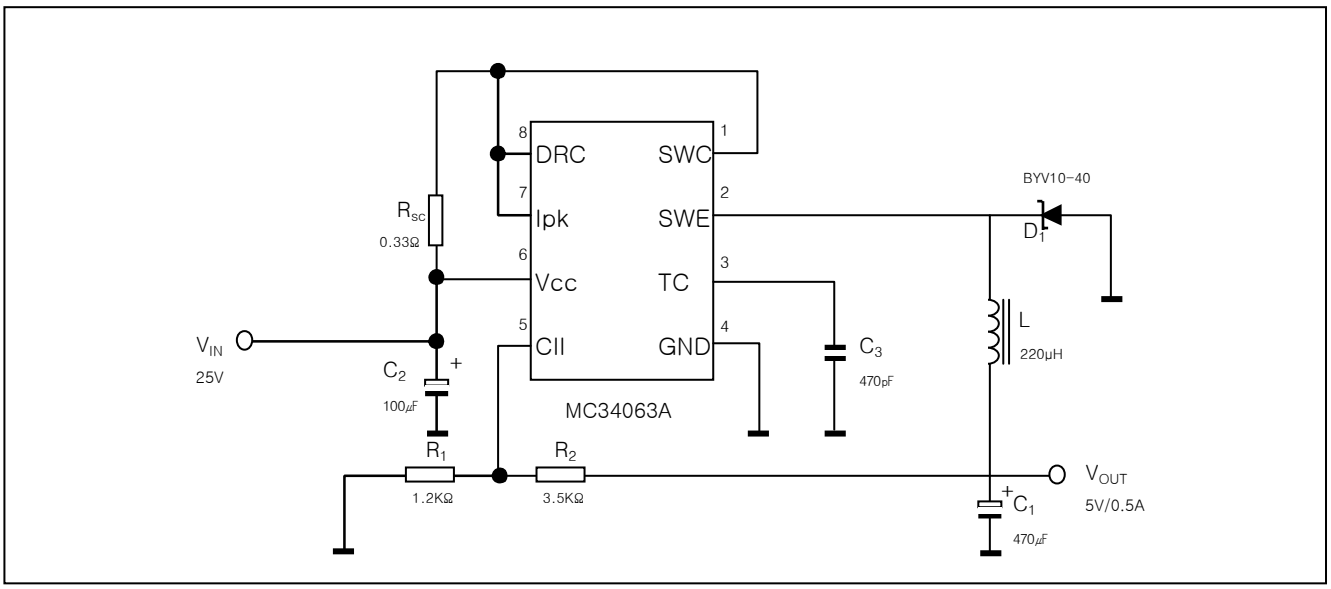


TYPICAL APPLICATION CIRCUIT

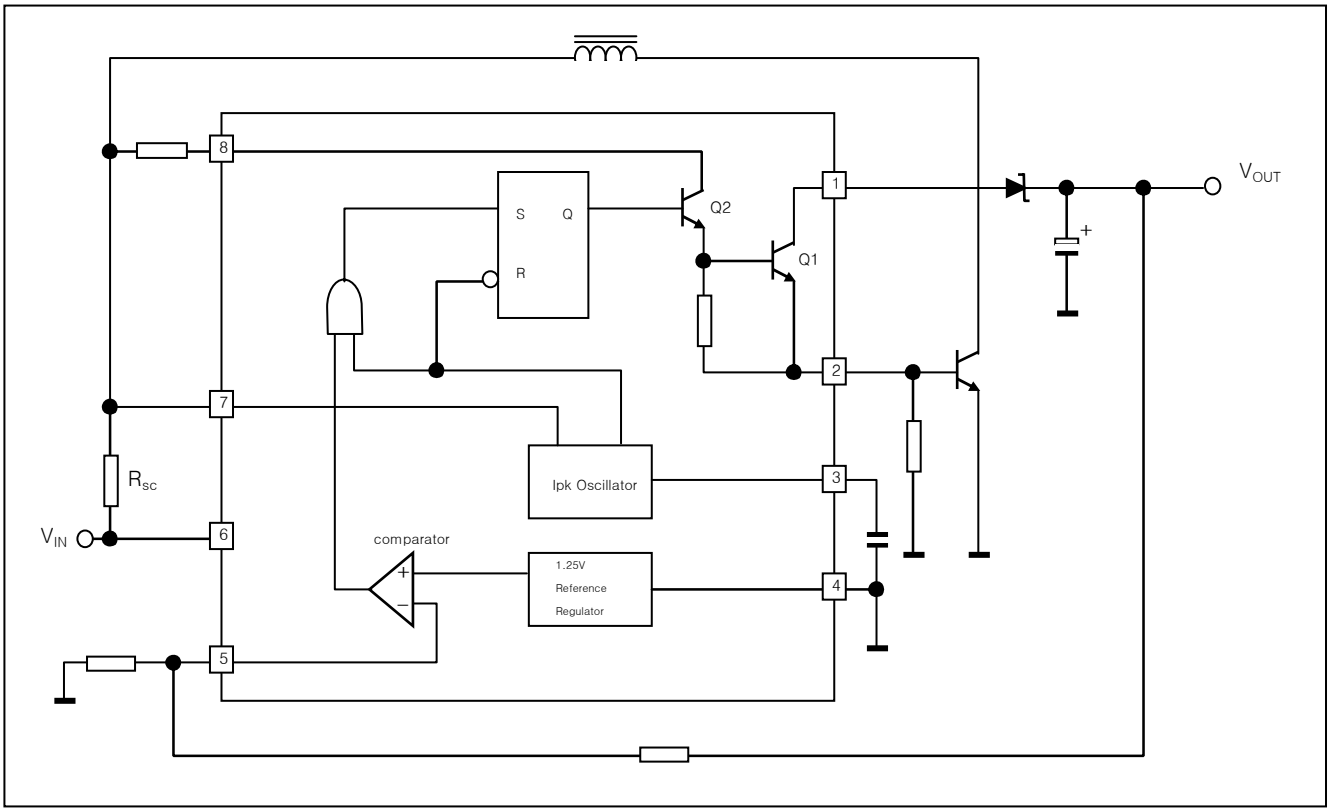
Step-Up Converter



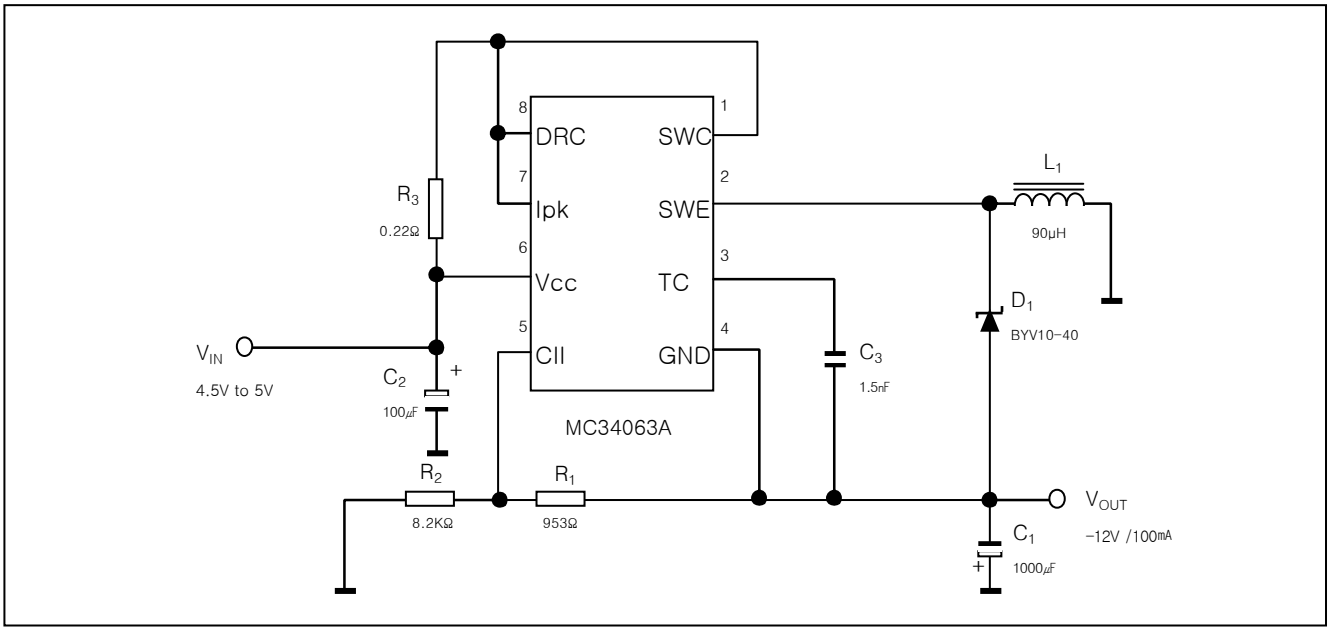
Step-Down Converter



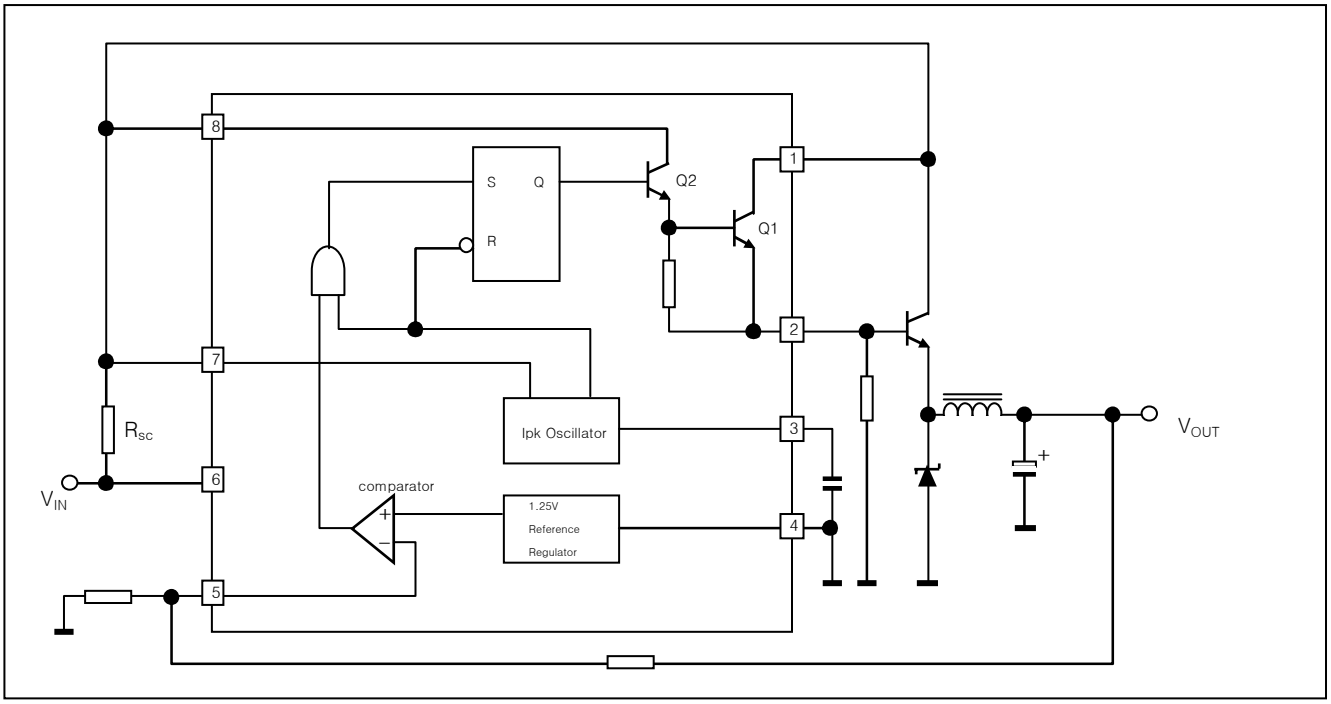
Step-Up With External NPN Switch



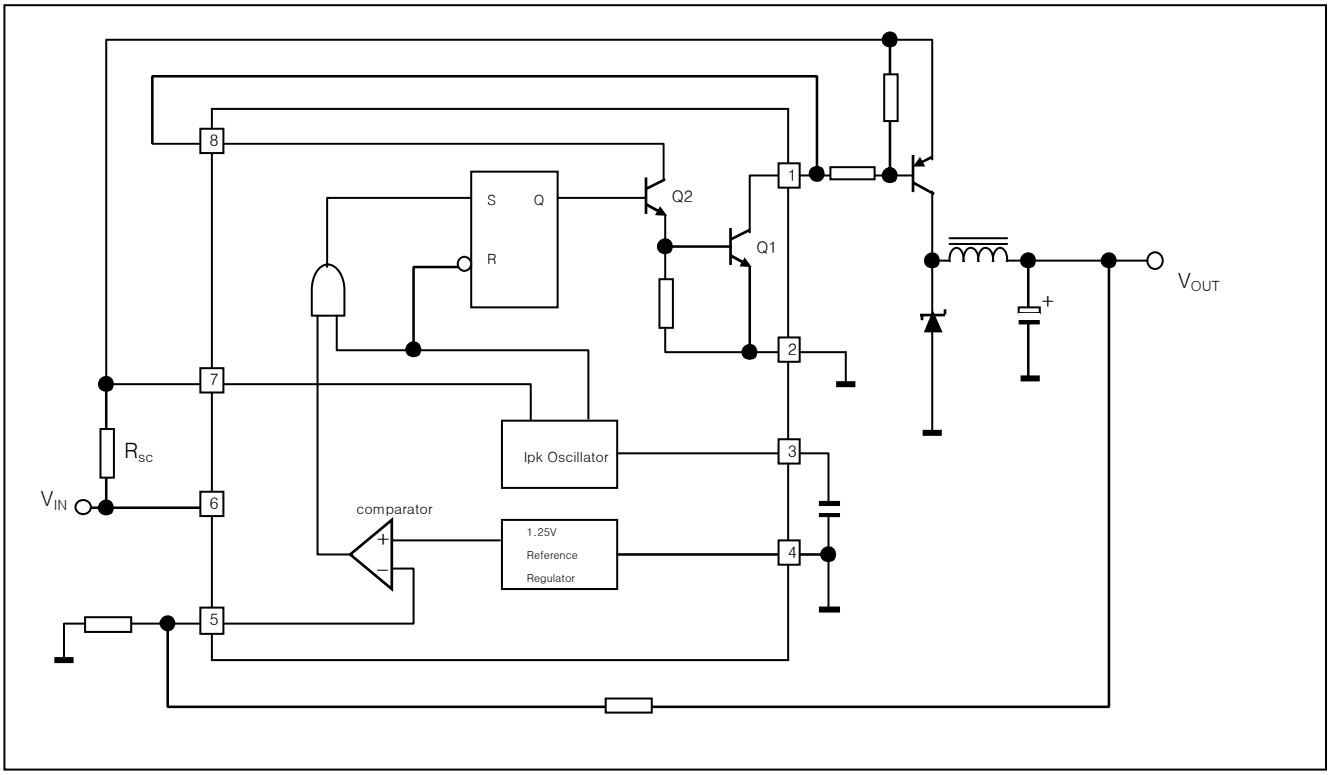
Voltage Inverting Converter



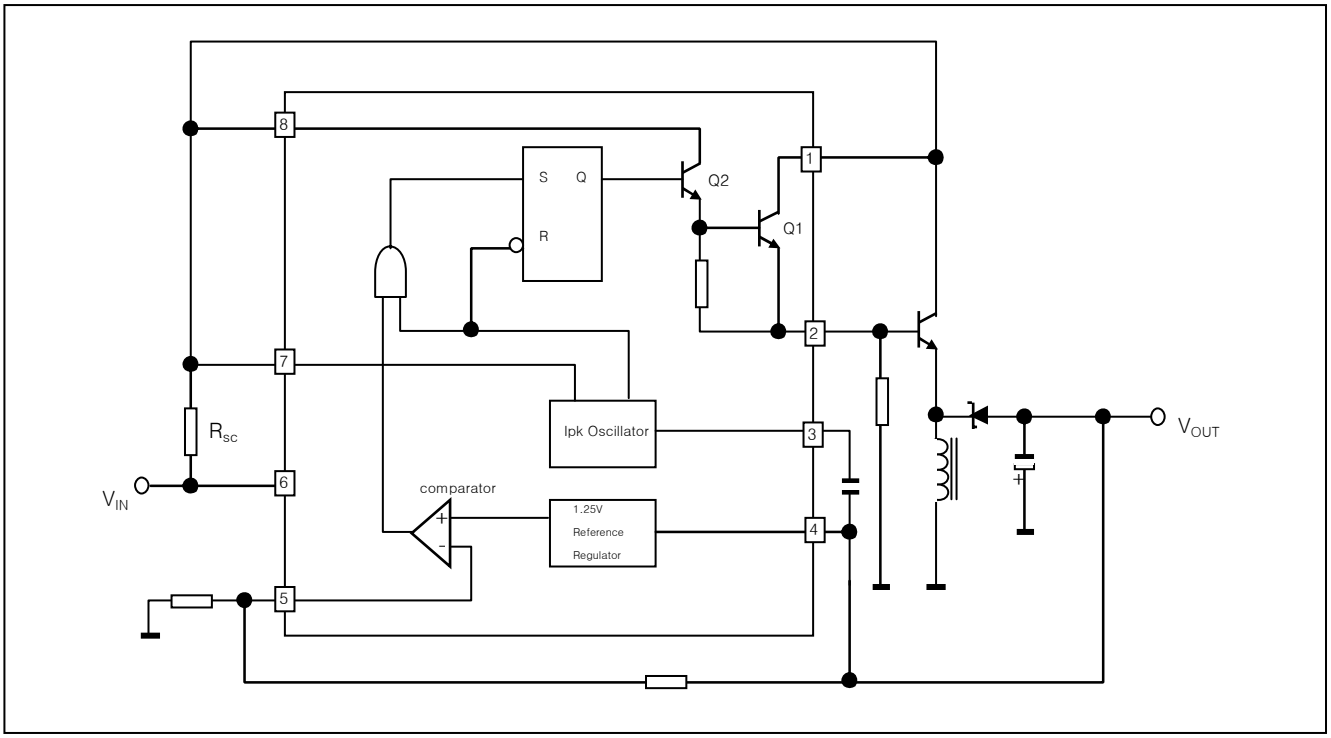
Step-Down With External NPN Switch



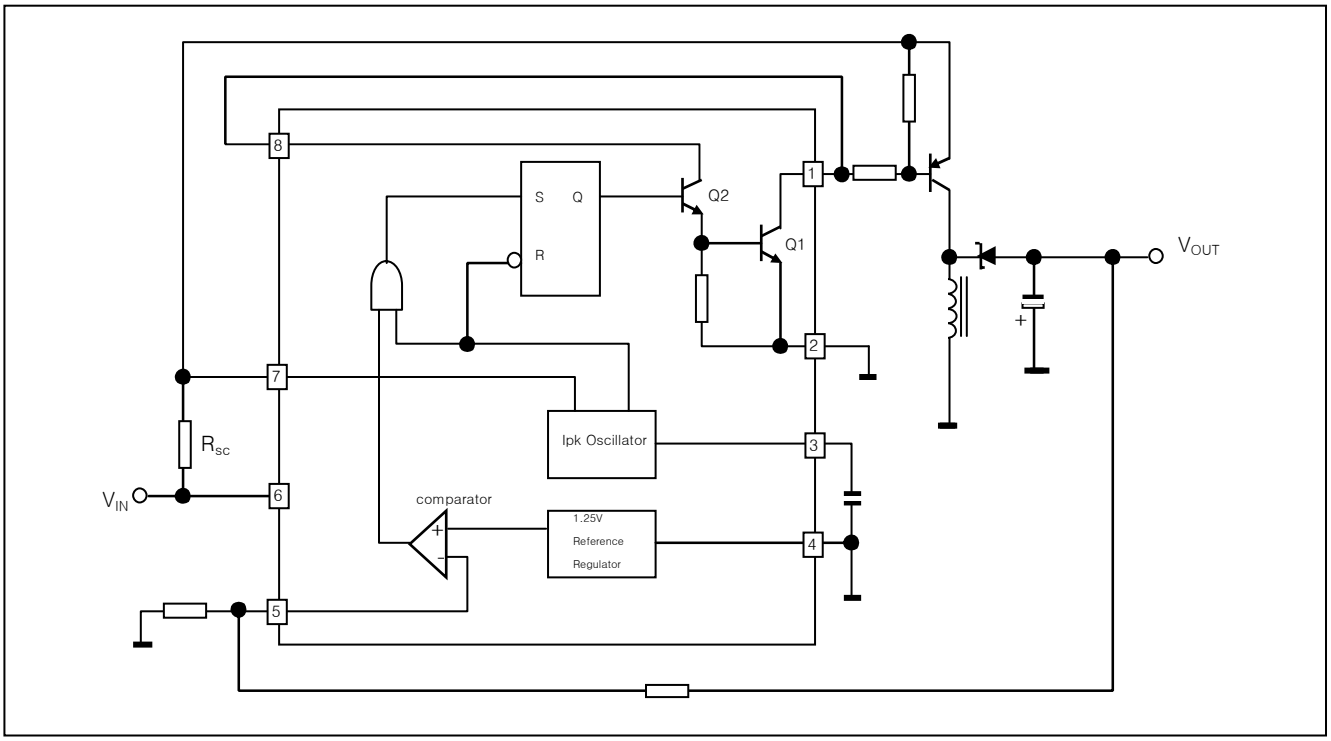
Step-Down With External PNP Switch



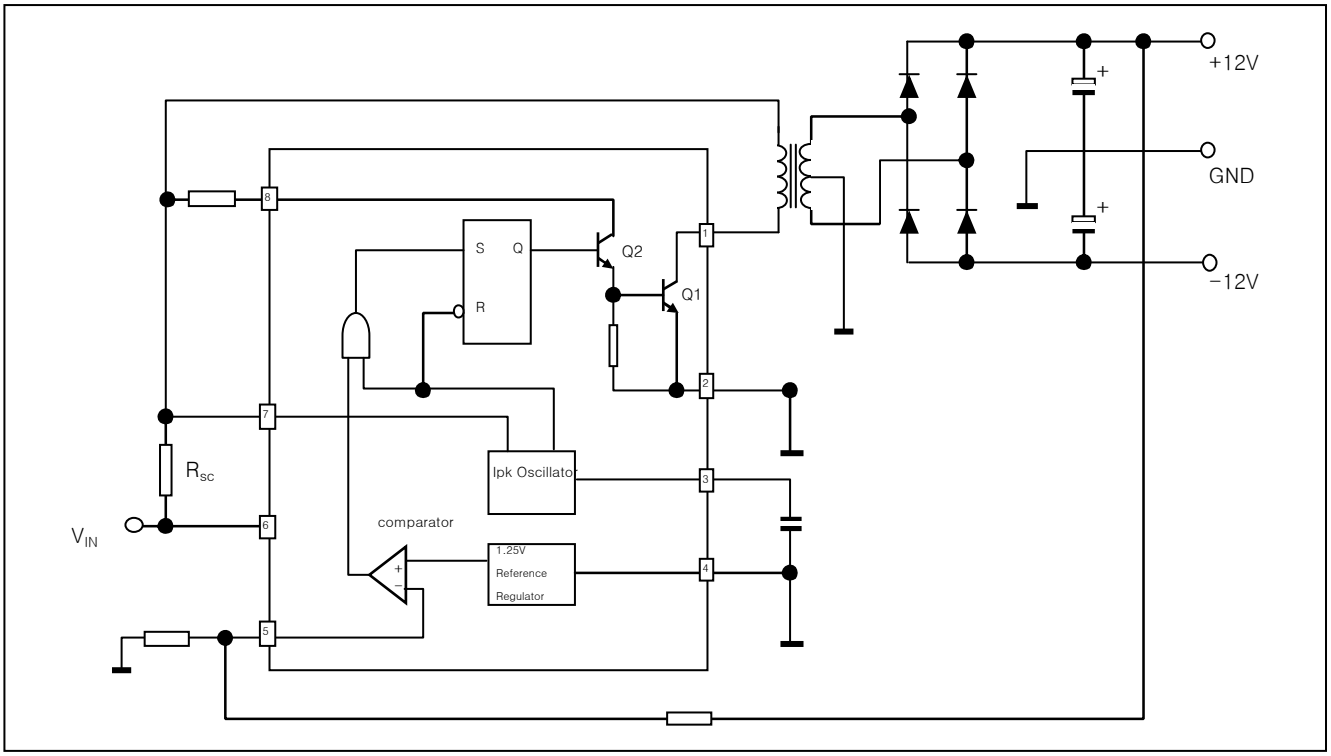
Voltage Inverting With External NPN Switch



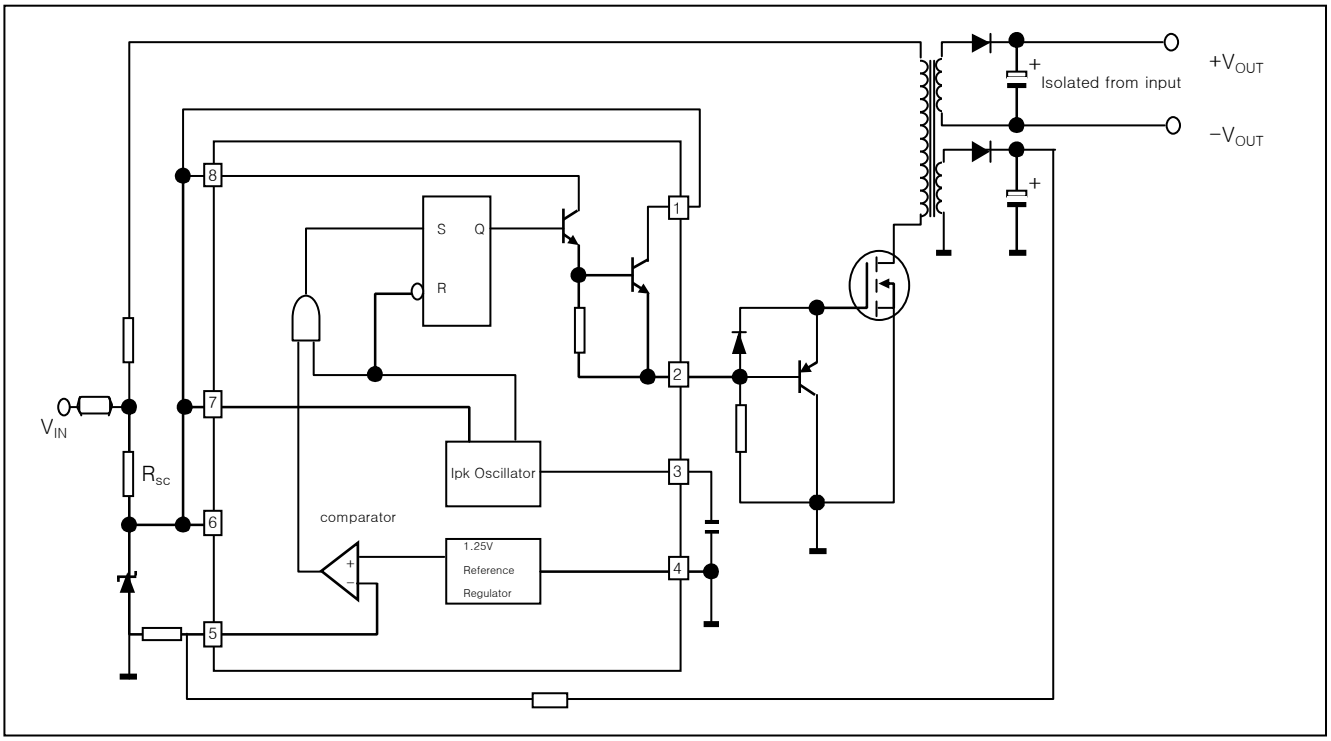
Voltage Inverting With External PNP Saturated Switch



Dual Output Voltage



Higher Output Power, Higher Input Voltage



Inductor Data

Converter	Inductance (uH)	Turns / Wire
Step-up	170	38 Turns of #22 AWG
Step-Down	220	48 Turns of #22 AWG
Voltage-Inverting	88	28 Turns of #22 AWG

Design Formula Table

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

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, $\lvert V_{out}\rvert = 1.25\left(1 + \frac{R2}{R1}\right)$
I_{out} – Desired output current.
f_{min} – Minimum desired output switching frequency at the selected values of V_{in} and I_O.
$V_{ripple(pp)}$ – Desired peak-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.