

GP34063

DC TO DC CONVERTER CONTROLLER

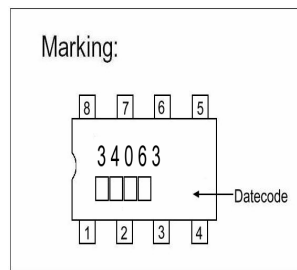
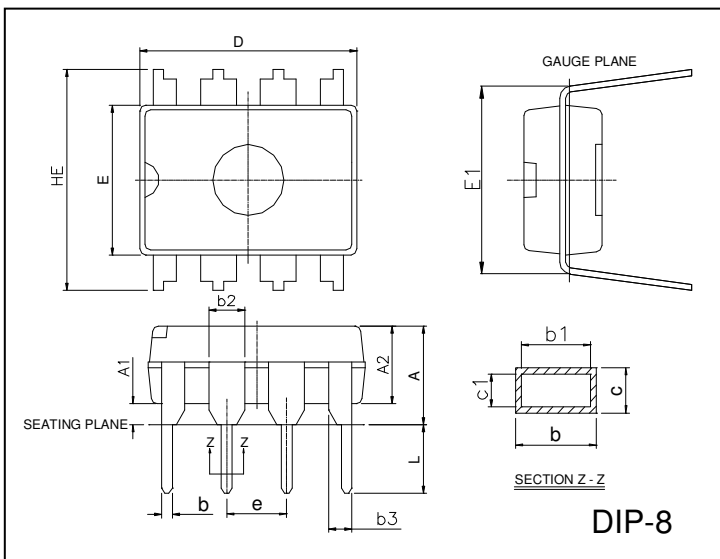
Description

The GP34063 is a monolithic regulator subsystem, intended for use as DC to DC converter. This device contains a temperature compensated band gap reference, a duty-cycle control oscillator, driver and high current output switch. It can be used for step down, step-up or inverting switching regulators as well as for series pass regulators.

Features

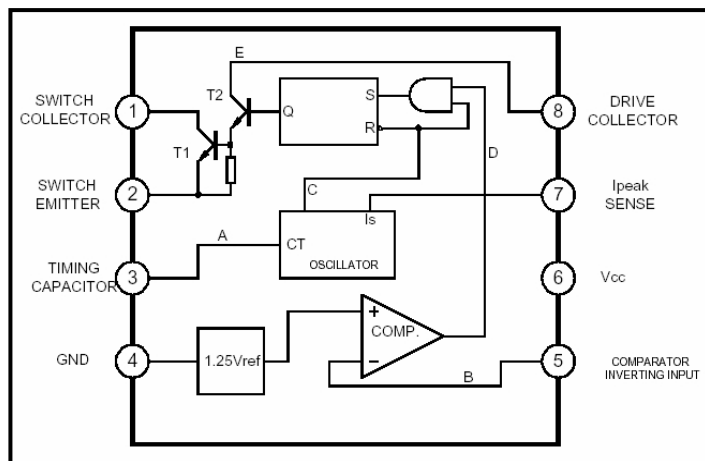
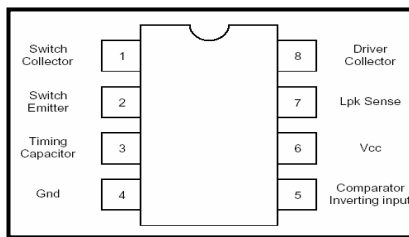
- *Operation from 3.0V to 40V.
- *Short circuit current limiting.
- *Low standby current.
- *Output switch current of 1.5A without external transistors.
- *Frequency of operation from 100Hz to 100kHz.
- *Step-up, step-down or inverting switch regulators.

Package Dimensions



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	0.5334	c1	0.203	0.279
A1	0.381	-	D	9.017	10.16
A2	2.921	4.953	E	6.096	7.112
b	0.356	0.559	E1	7.620	8.255
b1	0.356	0.508	e	2.540 BSC	
b2	1.143	1.778	HE	-	10.92
b3	0.762	1.143	L	2.921	3.810
c	0.203	0.356			

Pin Configuration & Block Diagram



Absolute Maximum Ratings at Ta = 25°C

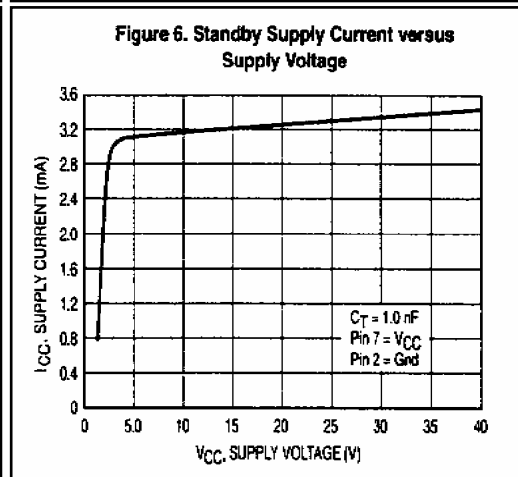
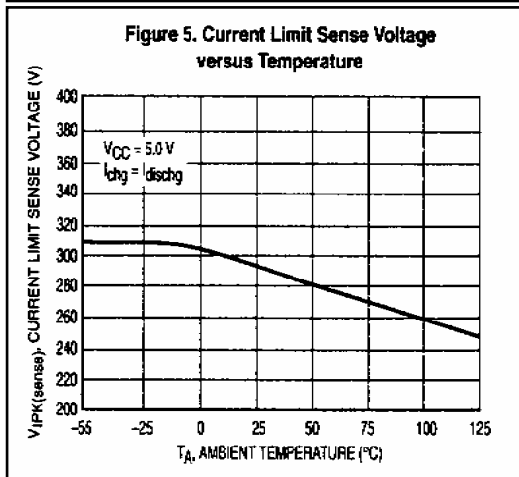
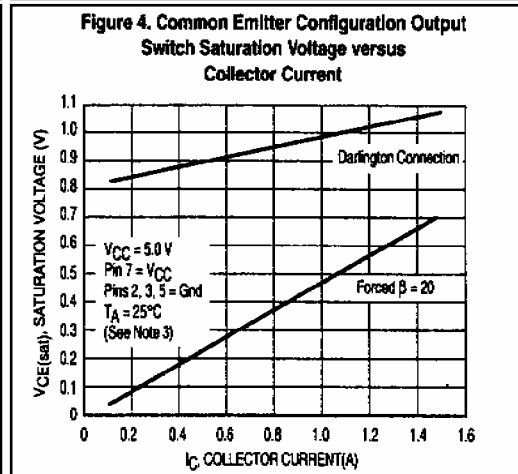
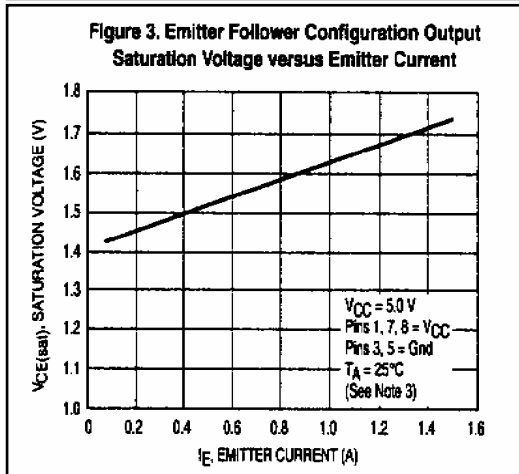
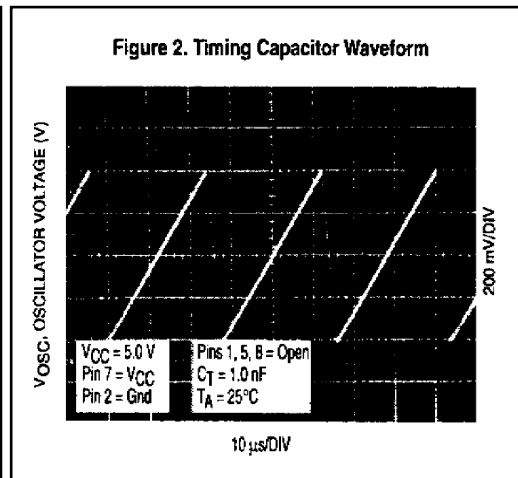
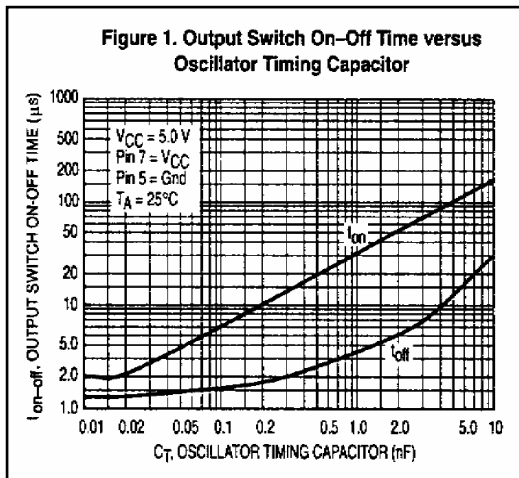
Parameter	Symbol	VALUE	Unit
Operating junction temperature	Tj	150	°C
Operating ambient temperature range	Ta	0 ~ 70	°C
Storage Temperature range	Tstg	-65 ~ 150	°C
Supply Voltage	Vcc	40	V
Comparator input voltage range	Vi(comp)	-0.3 ~ +40	V
Switch collector voltage	Vc(sw)	40	V
Switch Emitter voltage	Ve(sw)	40	V
Switch collector to Emitter voltage	Vce(dr)	40	V
Switch current	Isw	1.5	A
Power Dissipation	Pd	1250	mW
Thermal Characteristics		100	°C / W

Electrical Characteristics (0°C ≤ TA ≤ 70°C, Vcc=5V unless otherwise specified)

Parameter	SYMBOL	Test Conditions	Min	Typ.	Max.	Unit	
Oscillator							
Frequency	fosc	V _{Pin5} =0V, C _T =1.0nF, Ta=25°C	24	42	48	kHz	
Charging Current	I _{chg}	Vcc = 5 to 40, Ta = 25°C	22	31	42	uA	
Discharging Current	I _{dischg}	Vcc = 5 to 40, Ta = 25°C	140	190	260	uA	
Discharge to Charge Current Ratio	K	Pin7 to Vcc, Ta = 25°C	5.2	6.1	7.5		
Current limit Sense Voltage	V _{sense}	I _{chg} = I _{dischg} , Ta = 25°C	250	300	350	mV	
Output Switch							
Saturation Voltage 1(note)	V _{ce(sat)1}	I _{sw} = 1A, V _{c(driver)} = V _{c(sw)}		0.95	1.3	V	
Saturation Voltage 2(note)	V _{ce(sat)2}	I _{sw} = 1A, V _{c(driver)} = 50mA		0.45	0.7	V	
DC Current Gain(note)	G _{i(DC)}	I _{sw} = 1A, V _{ce} = 5V, Ta = 25°C	50	180			
Collect Off State Current (note)	C(off)	V _{ce} = 40V, Ta = 25°C		0.01	100	uA	
Comparator							
Threshold Voltage	V _{th}	Vcc=5V, Ta = 25°C	34063A	1.241	1.25	1.259	V
			34063B	1.237	1.25	1.262	V
			34063C	1.225	1.25	1.275	V
Threshold Voltage Line Regulation	V _{th}	Vcc = 3 ~ 40V		2	5	mV	
Input Bias Current	I _{bias}	V _i = 0V		50	400	nA	
Total Device							
Supply Current	I _{cc}	Vcc = 5 ~ 40V, C _t = 0.001, Pin7 to Vcc, V _c > V _{th} , Pin2 = GND		2.7	4.0	mA	

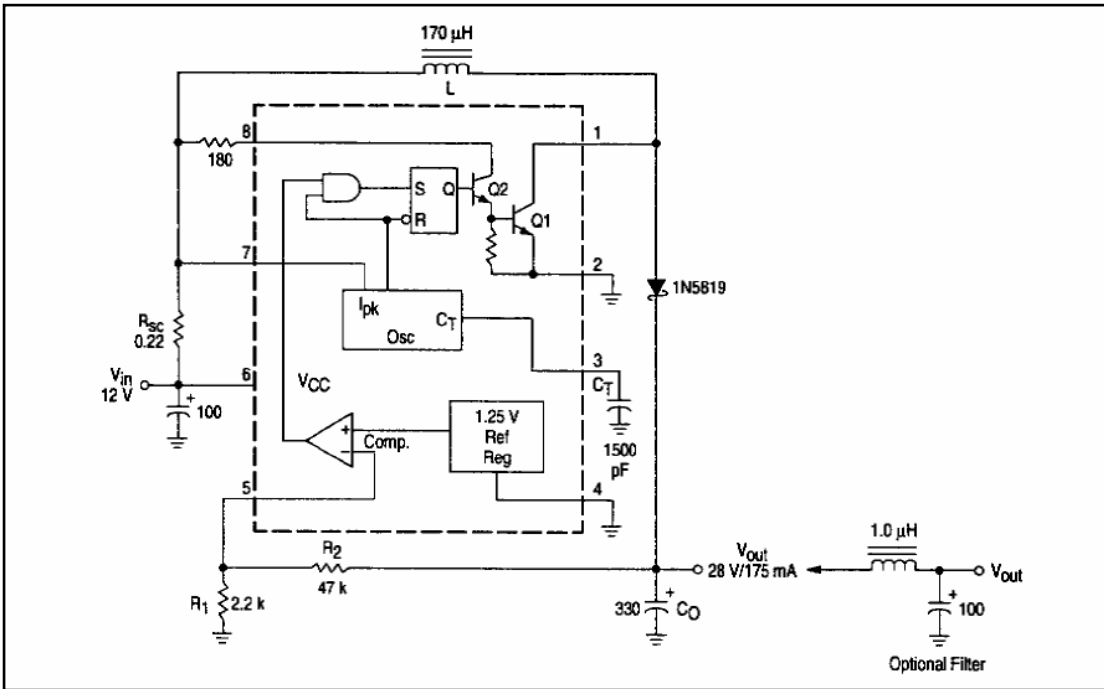
Note : Output switch tests are performed under pulsed conditions to minimize power dissipation.

Characteristics Curve



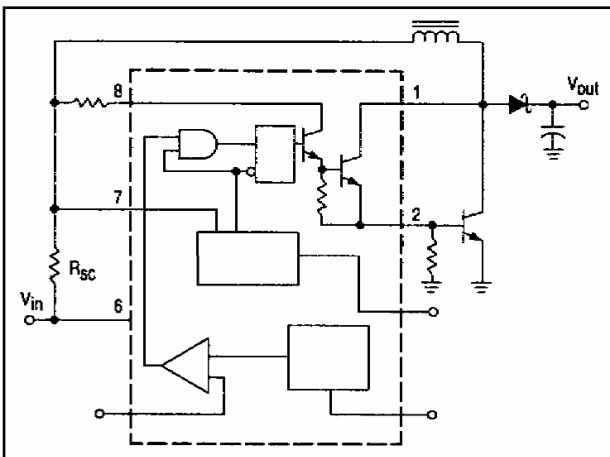
Application Information

Step-Up Converter

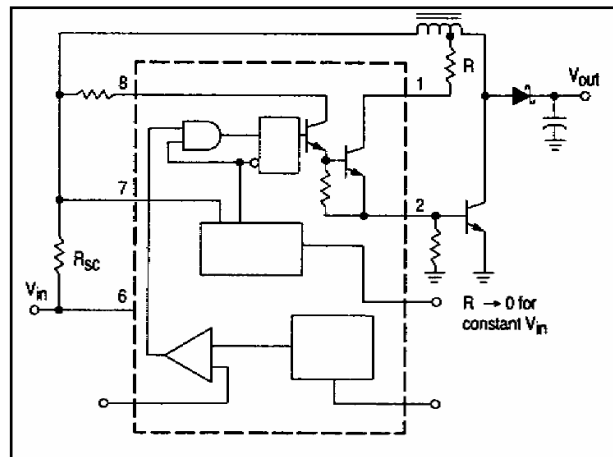


Test	Conditions	Results
Line Regulation	Vin= 8V to 16V, Io = 175mA	30mV = ± 0.05%
Load Regulation	Vin = 12V, Io = 75mA to 175 mA	10mV = ± 0.017%
Output Ripple	Vin = 12V, Io = 175mA	400mVp-p
Efficiency	Vin = 12V, Io = 175mA	87.7%
Output Ripple With Optional Filter	Vin = 12V, Io = 175mA	40mVp-p

External Current Boost Connections for Ic Peak Greater than 1.5A



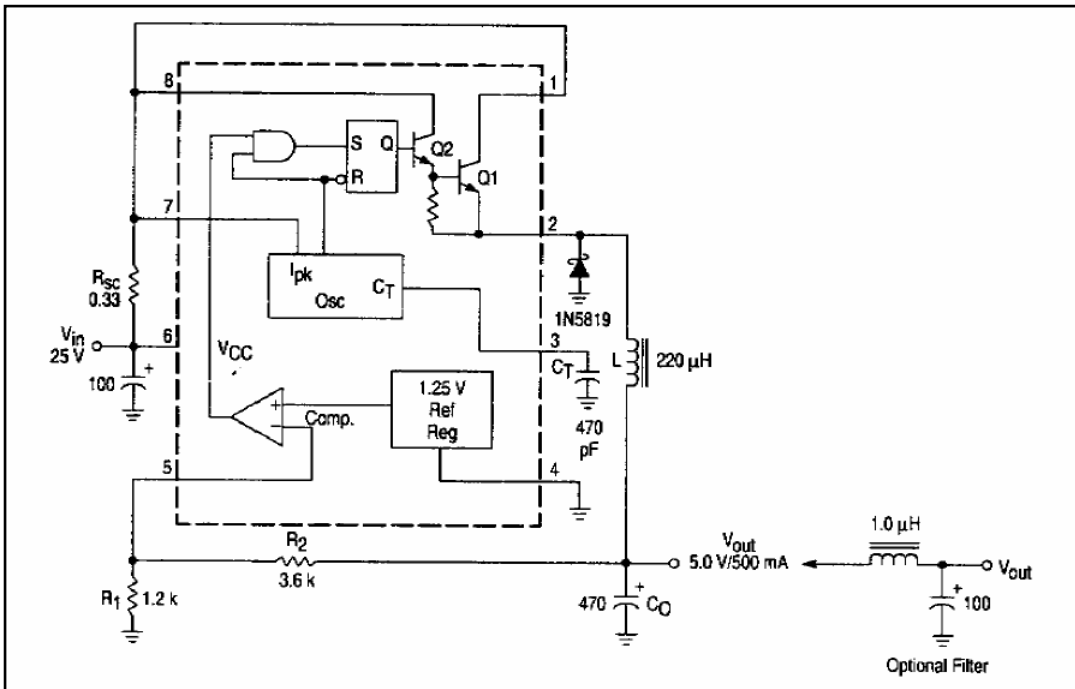
External NPN Switch



External NPN Saturated Switch (NOTE)

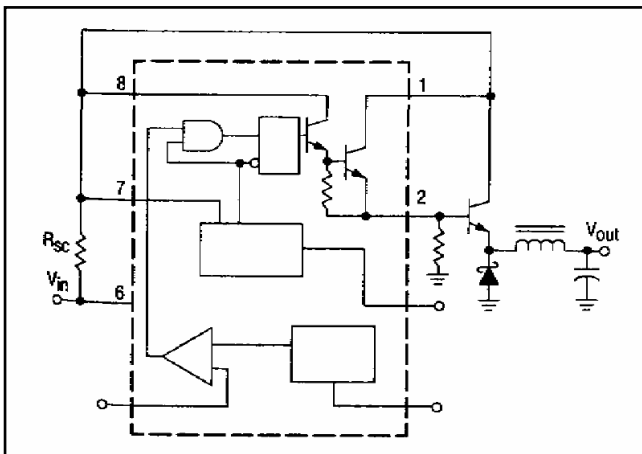
NOTE : If the switch is driven into hard saturation (non-Darlington configuration) at low switch currents ($\leq 300\text{mA}$) and high driver currents ($\geq 30\text{mA}$) it may take up to 2.0 us to come out of saturation. This condition will shorten the off time at frequencies $\geq 30\text{kHz}$, and is magnified at high temperatures. This condition does not occur with a Darlington configuration, since the output switch cannot saturate. If a non-Darlington configuration is used, the following output drive condition is recommended.

Step-Down Converter

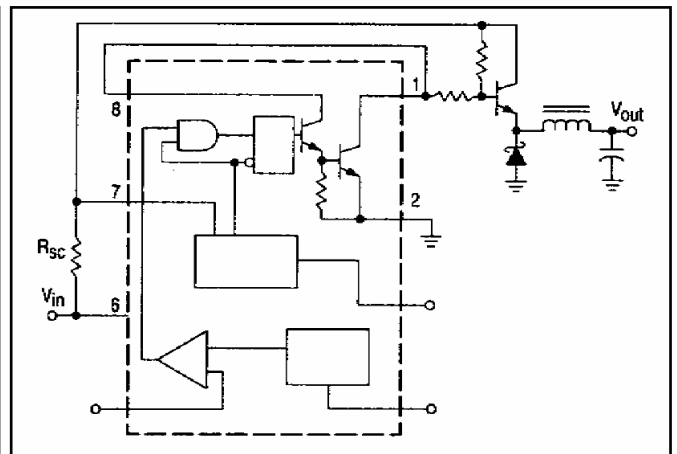


Test	Conditions	Results
Line Regulation	$V_{in} = 15V$ to $25V$, $I_o = 50mA$	$12mV = \pm 0.12\%$
Load Regulation	$V_{in} = 25V$, $I_o = 50mA$ to $500mA$	$3mV = \pm 0.03\%$
Output Ripple	$V_{in} = 25V, I_o = 500mA$	$120mV_{p-p}$
Short Circuit Current	$V_{in} = 25V, R_L = 0.1\Omega$	$1.1A$
Efficiency	$V_{in} = 25V, I_o = 500mA$	83.7%
Output Ripple With Optional Filter	$V_{in} = 25V, I_o = 500mA$	$40mV_{p-p}$

External Current Boost Connections for I_c Peak Greater than 1.5A

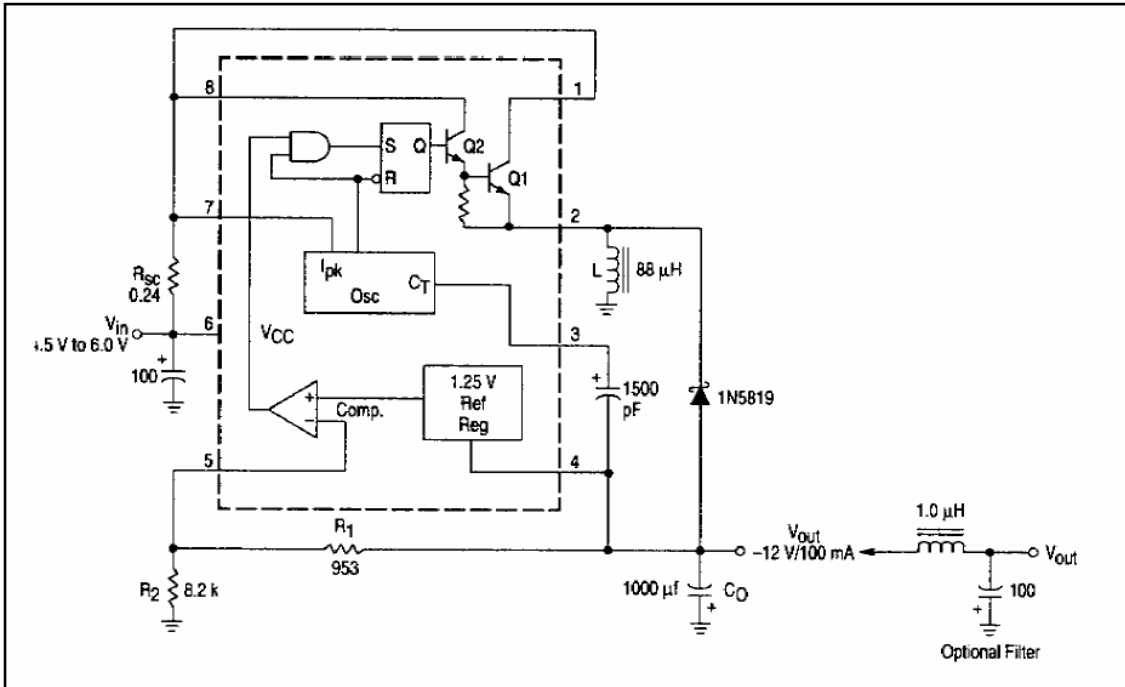


External NPN Switch



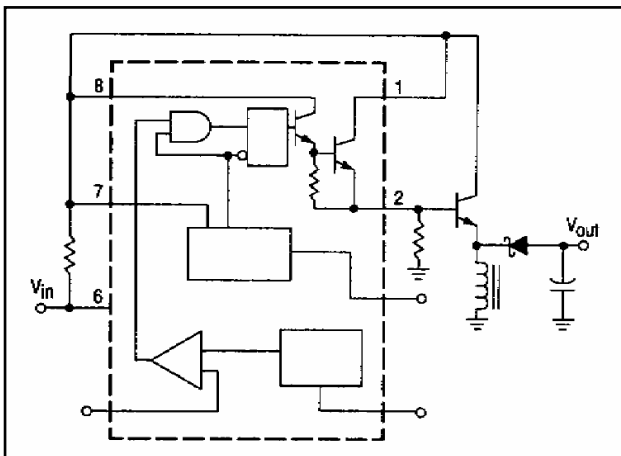
External NPN Saturated Switch

Voltage Inverting Converter

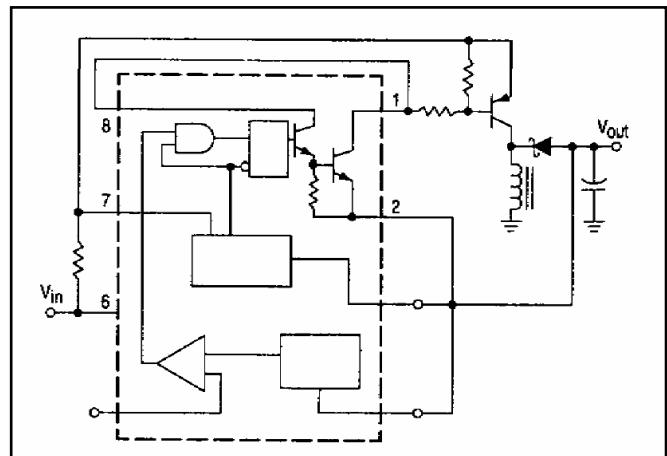


Test	Conditions	Results
Line Regulation	$V_{in} = 4.5V \text{ to } 6.0V, I_o = 100mA$	$3mV = \pm 0.12\%$
Load Regulation	$V_{in} = 5V, I_o = 10mA \text{ to } 100mA$	$0.022V = \pm 0.09\%$
Output Ripple	$V_{in} = 5V, I_o = 100mA$	500mVp-p
Short Circuit Current	$V_{in} = 5V, R_L = 0.1\Omega$	910mA
Efficiency	$V_{in} = 5V, I_o = 100mA$	62.2%
Output Ripple With Optional Filter	$V_{in} = 5V, I_o = 100mA$	70mVp-p

External Current Boost Connections for I_c Peak Greater than 1.5A



External NPN Switch



External NPN Saturated Switch

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