

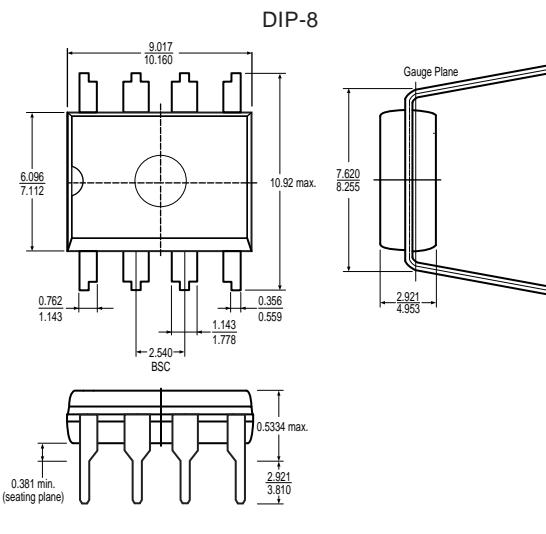
RoHS Compliant Product

## Description

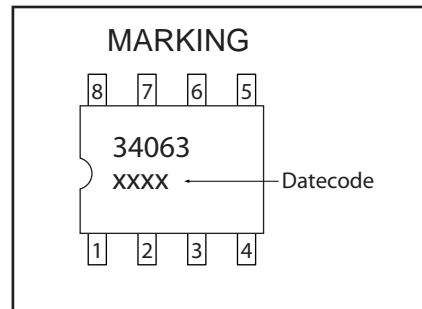
The SGP34063 is a monolithic regulator subsystem, intended for use as DC to DC converter. This device contains a temperature compensated band gap reference, a duty-cycle control oscillator, driver and high current output switch. It can be used for step-down, step-up or inverting switching regulators as well as for series pass regulators.

## Features

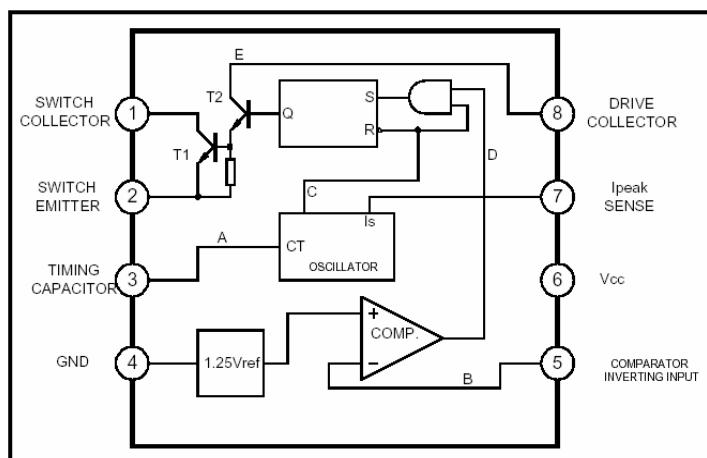
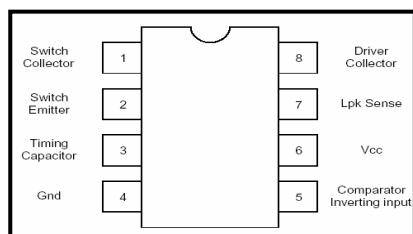
- \*Operation from 3.0V to 40V.
- \*Short circuit current limiting.
- \*Low standby current.
- \*Output switch current of 1.5A without external transistors.
- \*Frequency of operation from 100Hz to 100kHz.
- \*Step-up, step-down or inverting switch regulators.



Dimensions in mm



## Pin Configuration & Representative Schematic Diagram





Elektronische Bauelemente

SGP34063

DC To DC Converter Controller

**Absolute Maximum Ratings at Ta = 25 °C**

Parameter	Symbol	Value	Unit
Operating Junction Temperature	T <sub>j</sub>	150	°C
Operating Ambient Temperature Range	T <sub>a</sub>	0 ~ 70	°C
Storage Temperature Range	T <sub>stg</sub>	-65 ~ 150	°C
Supply Voltage	V <sub>cc</sub>	40	V
Comparator Input Voltage Range	V <sub>i(comp)</sub>	-0.3 ~ +40	V
Switch Collector Voltage	V <sub>c(sw)</sub>	40	V
Switch Emitter Voltage	V <sub>e(sw)</sub>	40	V
Switch Collector to Emitter Voltage	V <sub>ce(dr)</sub>	40	V
Switch Current	I <sub>sw</sub>	1.5	A
Power Dissipation	P <sub>d</sub>	1250	mW
Thermal Resistance	R <sub>θJA</sub>	100	°C / W

**Electrical Characteristics (0 °C ≤ TA ≤ 70°C, V<sub>cc</sub>=5V unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit.
<b>Oscillator</b>						
Frequency	f <sub>osc</sub>	V <sub>Pin5</sub> =0 V, C <sub>T</sub> =1.0 nF, T <sub>a</sub> =25°C	24	42	48	kHz
Charging Current	I <sub>chg</sub>	V <sub>cc</sub> = 5 to 40, T <sub>a</sub> = 25°C	22	31	42	uA
Discharging Current	I <sub>dischg</sub>	V <sub>cc</sub> = 5 to 40, T <sub>a</sub> = 25°C	140	190	260	uA
Discharge to Chart Current Ratio	K	Pin7 to V <sub>cc</sub> , T <sub>a</sub> = 25°C	5.2	6.1	7.5	
Current Limit Sense Voltage	V <sub>sense</sub>	I <sub>chg</sub> = I <sub>dischg</sub> , T <sub>a</sub> = 25°C	250	300	350	mV
<b>Output Switch</b>						
Saturation Voltage 1 (note)	V <sub>ce(sat)1</sub>	I <sub>sw</sub> = 1A, V <sub>c(driver)</sub> = V <sub>c(sw)</sub>		0.95	1.3	V
Saturation Voltage 2 (note)	V <sub>ce(sat)2</sub>	I <sub>sw</sub> = 1A, V <sub>c(driver)</sub> = 50mA		0.45	0.7	V
DC Current Gain (note)	G <sub>i(DC)</sub>	I <sub>sw</sub> = 1A, V <sub>ce</sub> = 5V, T <sub>a</sub> = 25°C	50	180		
Collect Off State Current (note)	I <sub>c(off)</sub>	V <sub>ce</sub> = 40V, T <sub>a</sub> = 25°C		0.01	100	uA
<b>Comparator</b>						
Threshold Voltage	V <sub>th</sub>	V <sub>cc</sub> = 5V, T <sub>a</sub> = 25°C	34063A	1.241	1.25	1.259
			34063B	1.237	1.25	1.262
			34063C	1.225	1.25	1.275
Threshold Voltage Line Regulation	V <sub>th</sub>	V <sub>cc</sub> = 3 ~ 40V		2	5	mV
Input Bias Current	I <sub>bias</sub>	V <sub>i</sub> = 0V		50	400	nA
<b>Total Device</b>						
Supply Current	I <sub>cc</sub>	V <sub>cc</sub> = 5 ~ 40V, C <sub>t</sub> = 0.001, Pin7 to V <sub>cc</sub> , V <sub>c</sub> > V <sub>th</sub> , Pin2 = GND		2.7	4	mA

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

### Characteristics Curve

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

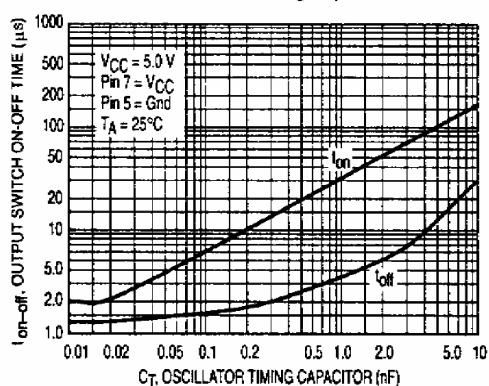


Figure 2. Timing Capacitor Waveform

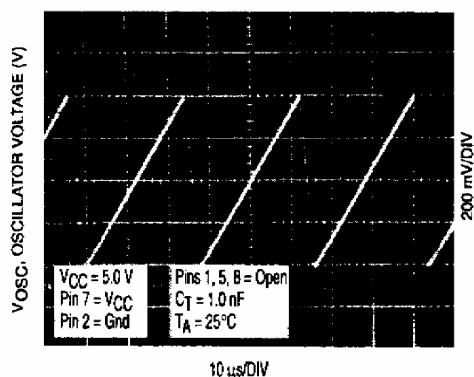


Figure 3. Emitter Follower Configuration Output Saturation Voltage versus Emitter Current

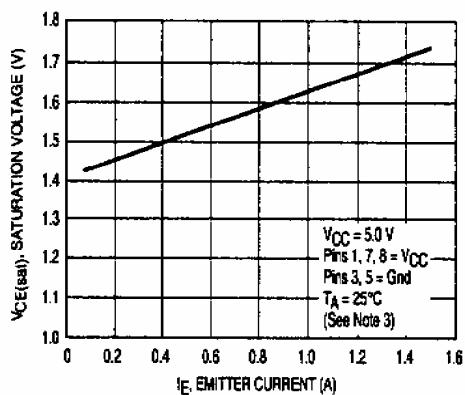


Figure 4. Common Emitter Configuration Output Switch Saturation Voltage versus Collector Current

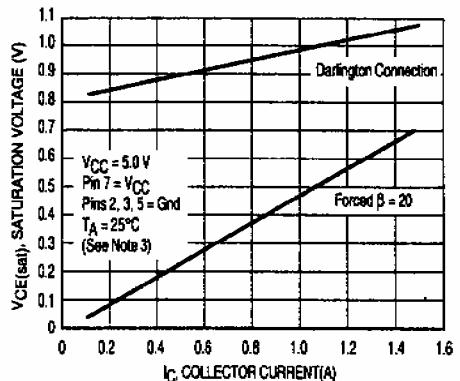


Figure 5. Current Limit Sense Voltage versus Temperature

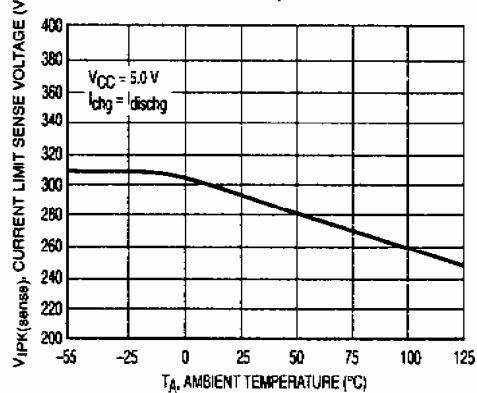
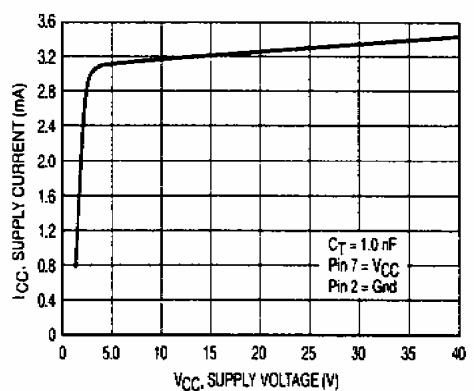
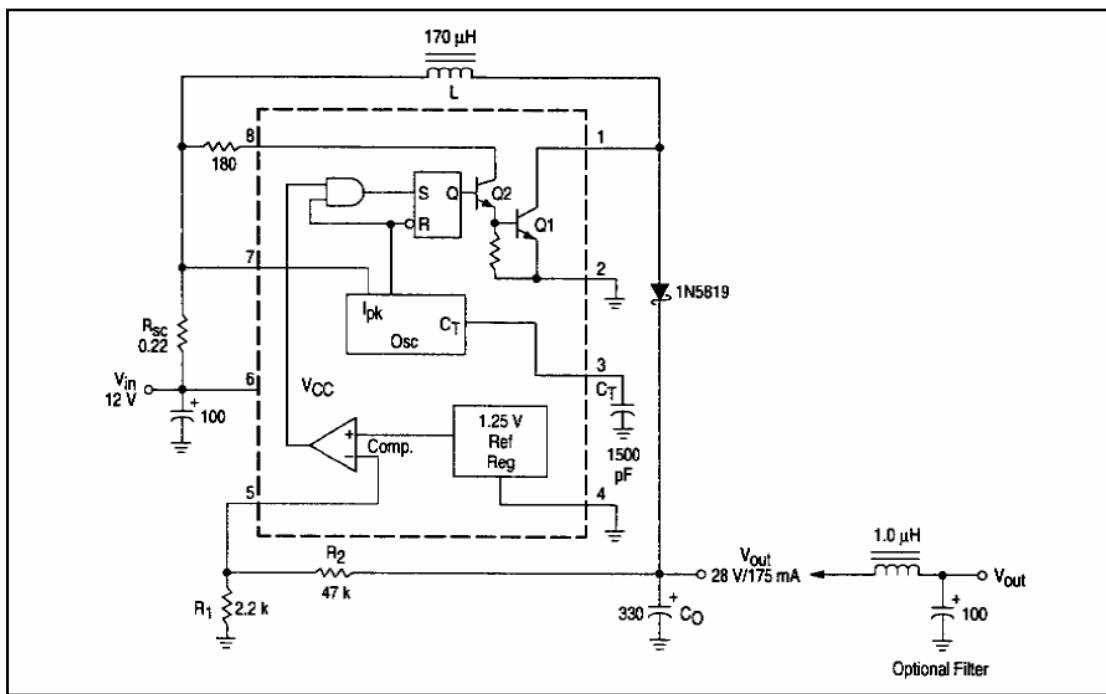


Figure 6. Standby Supply Current versus Supply Voltage



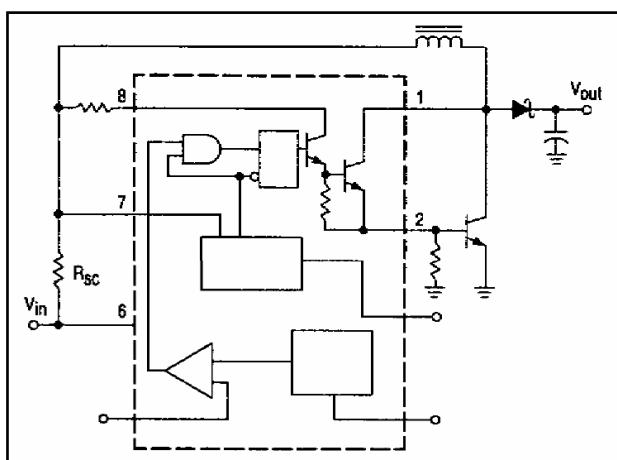
### Application Information

#### Step-Up Converter

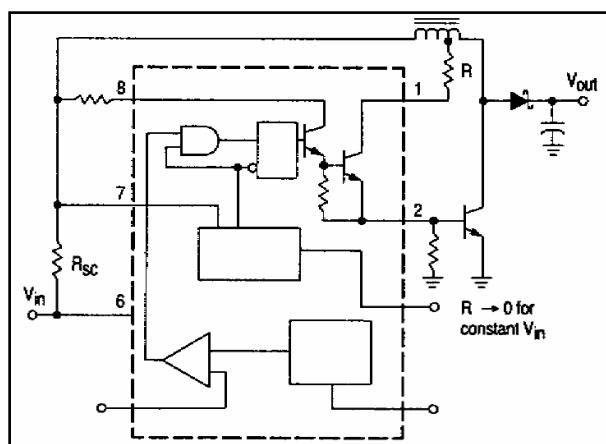


Test	Conditions	Results
Line Regulation	$V_{in} = 8V$ to $16V$ , $I_o = 175mA$	$30mV = \pm 0.05\%$
Load Regulation	$V_{in} = 12V$ , $I_o = 75mA$ to $175mA$	$10mV = \pm 0.017\%$
Output Ripple	$V_{in} = 12V$ , $I_o = 175mA$	400mVp-p
Efficiency	$V_{in} = 12V$ , $I_o = 175mA$	87.7%
Output Ripple With Optional Filter	$V_{in} = 12V$ , $I_o = 175mA$	40mVp-p

External Current Boost Connections for Ic Peak Greater than 1.5A



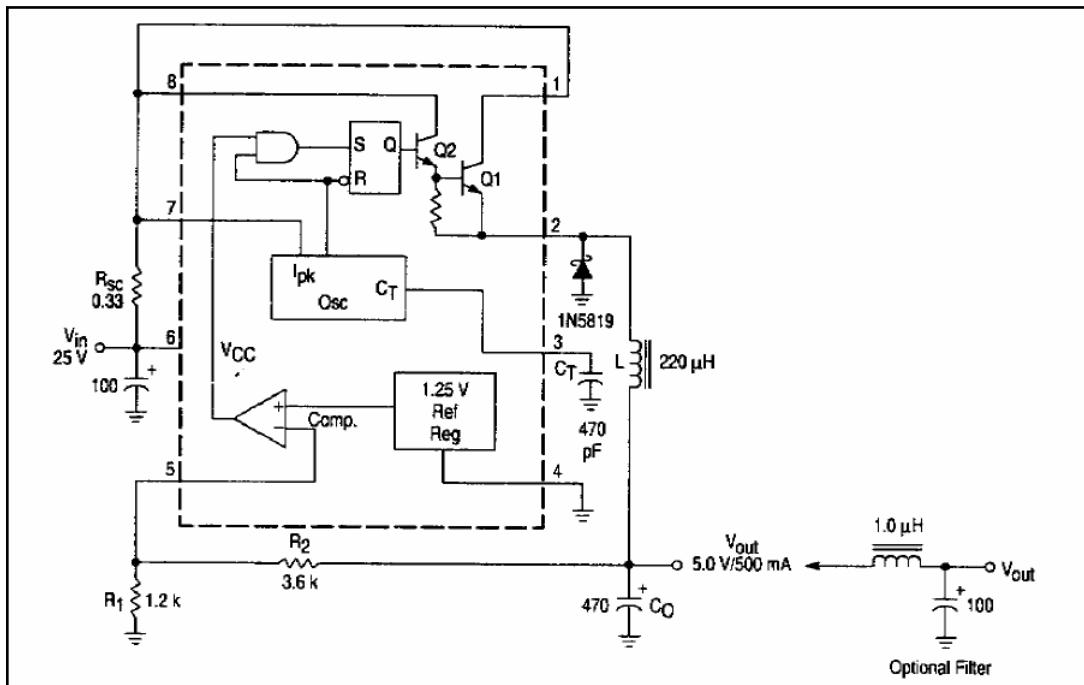
External NPN Switch



External NPN Saturated Switch (NOTE)

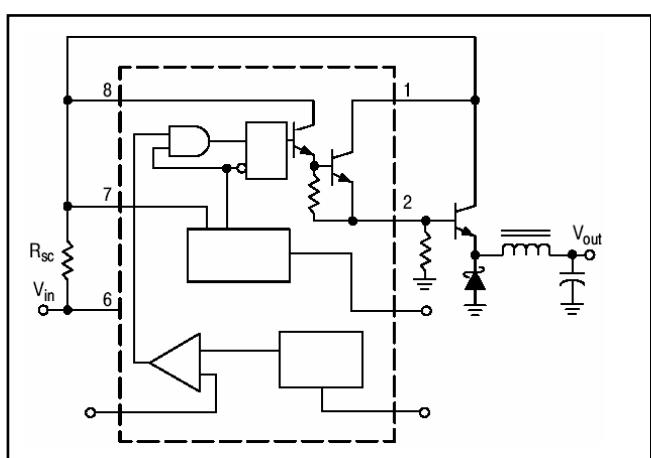
NOTE : If the switch is driven into hard saturation (non-Darlington configuration) at low switch currents ( $\leq 300mA$ ) and high driver currents ( $\geq 30mA$ ) , it may take up to 2.0 us to come out of saturation. This condition will shorten the off time at frequencies  $\geq 30kHz$ , and is magnified 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

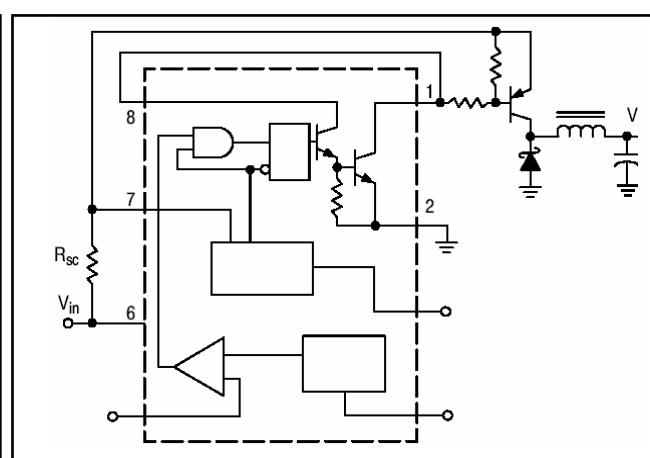


Test	Conditions	Results
Line Regulation	$V_{in} = 15V$ to $25V$ , $I_o = 50mA$	$12mV = \pm 0.12\%$
Load Regulation	$V_{in} = 25V$ , $I_o = 50mA$ to $500mA$	$3mV = \pm 0.03\%$
Output Ripple	$V_{in} = 25V$ , $I_o = 500mA$	$120mVp-p$
Short Circuit Current	$V_{in} = 25V$ , $R_L = 0.1\Omega$	$1.1A$
Efficiency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

External Current Boost Connections for  $I_C$  Peak Greater than 1.5A

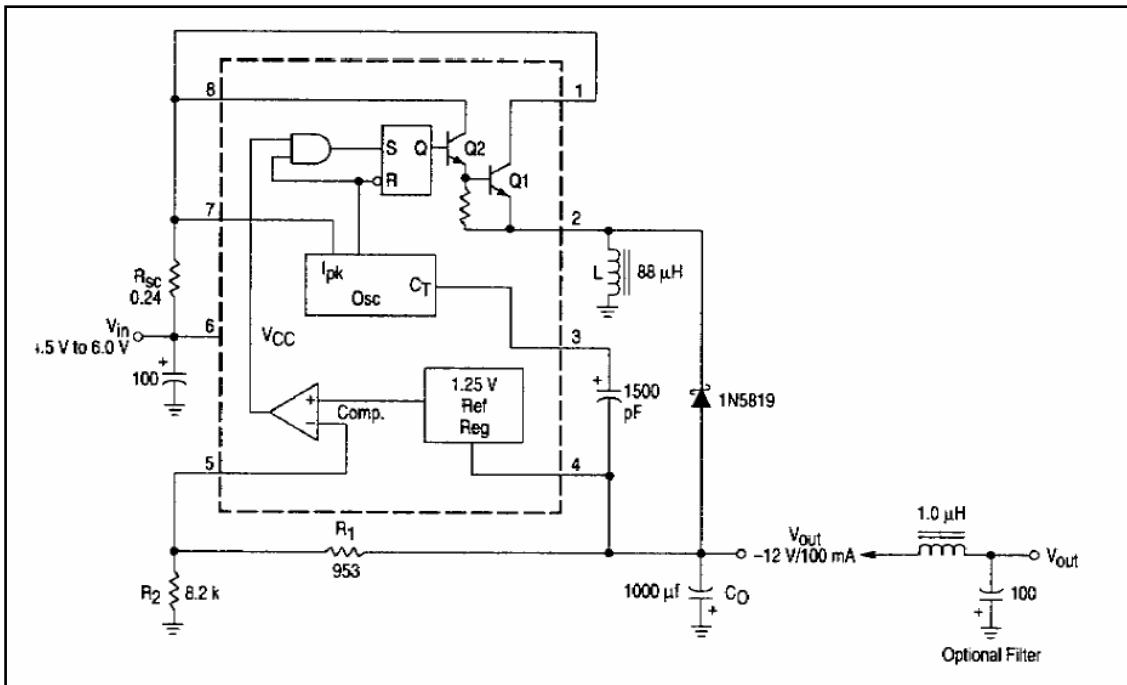


External NPN Switch



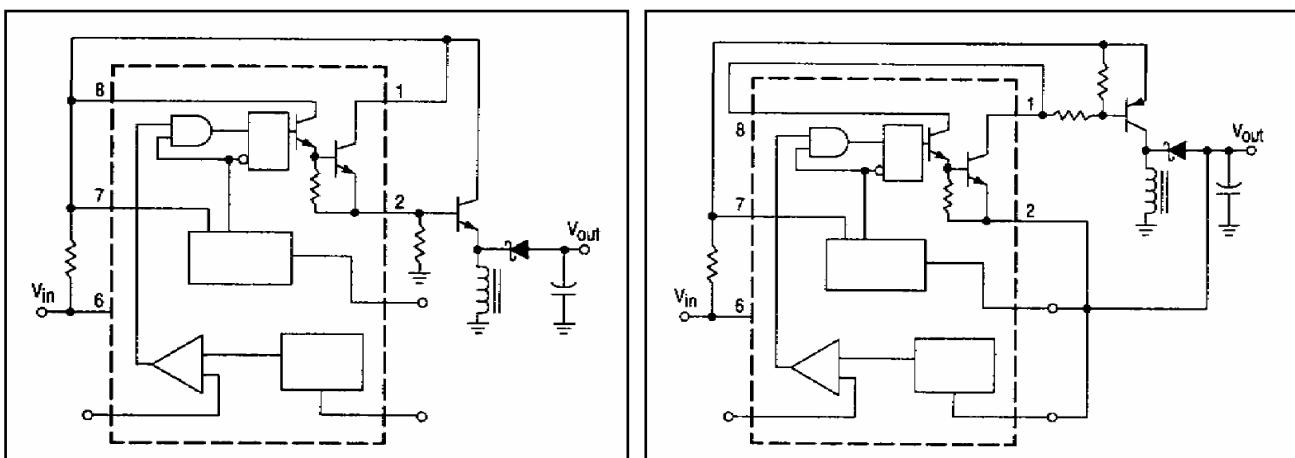
External PNP Saturated Switch

### 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 PNP Saturated Switch