

GSC34063

DC TO DC CONVERTER CONTROLLER

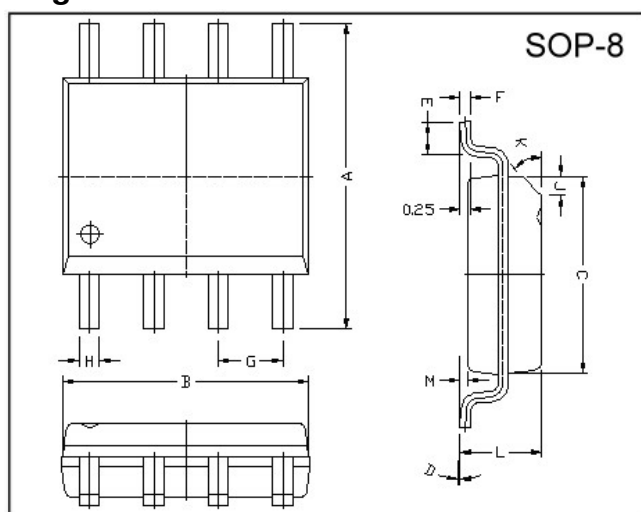
Description

The GSC34063 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.

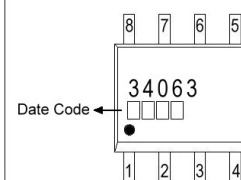
Features

- *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

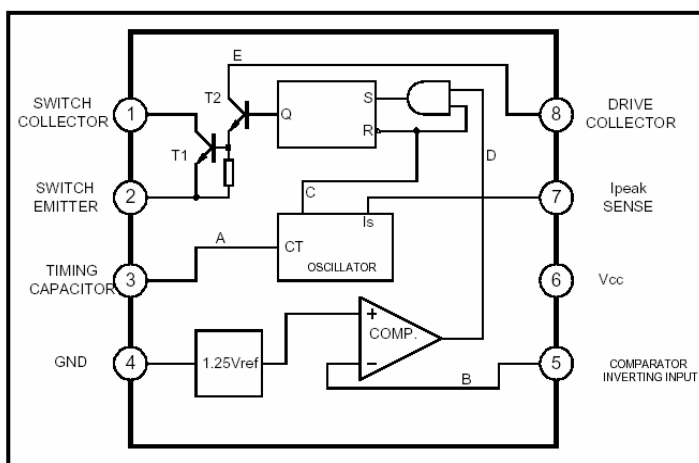
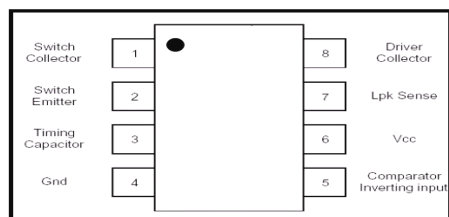


Marking :



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	5.80	6.20	M	0.10	0.25
B	4.80	5.00	H	0.35	0.49
C	3.80	4.00	L	1.35	1.75
D	0°	8°	J	0.375 REF.	
E	0.40	0.90	K	45°	
F	0.19	0.25	G	1.27 TYP.	

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	625	mW
Thermal Resistance	RθJA	160	°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	Ichg	Vcc = 5 to 40, Ta = 25°C	22	31	42	uA
Discharging Current	Idischg	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	Vsense	Ichg = idischg, Ta = 25°C	250	300	350	mV
Output Switch						
Saturation Voltage 1(note)	Vce(sat)1	Isw = 1A, Vc(driver) = Vc(sw)		0.95	1.3	V
Saturation Voltage 2(note)	Vce(sat)2	Isw = 1A, Vc(driver) = 50mA		0.45	0.7	V
DC Current Gain(note)	Gi(DC)	Isw = 1A, Vce = 5V, Ta = 25°C	50	180		
Collect Off State Current (note)	C(off)	Vce = 40V, Ta = 25°C		0.01	100	uA
Comparator						
Threshold Voltage	Vth	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	Vth	Vcc = 3 ~ 40V		2	5	mV
Input Bias Current	Ibias	Vi = 0V		50	400	nA
Total Device						
Supply Current	Icc	Vcc = 5 ~ 40V, Ct = 0.001, Pin7 to Vcc, Vc > Vth, Pin2 = GND		2.7	4.0	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

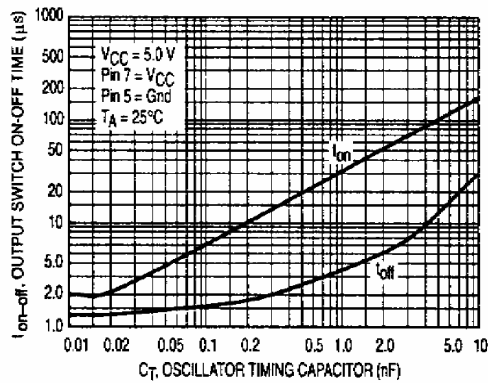


Figure 2. Timing Capacitor Waveform

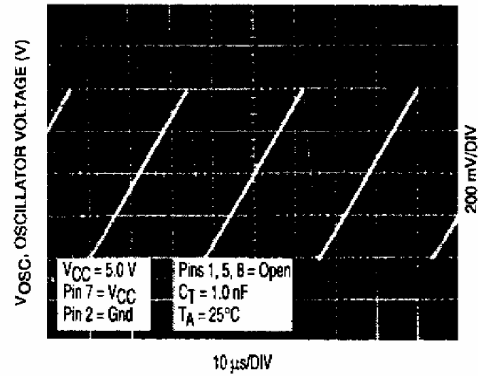


Figure 3. Emitter Follower Configuration Output Saturation Voltage versus Emitter Current

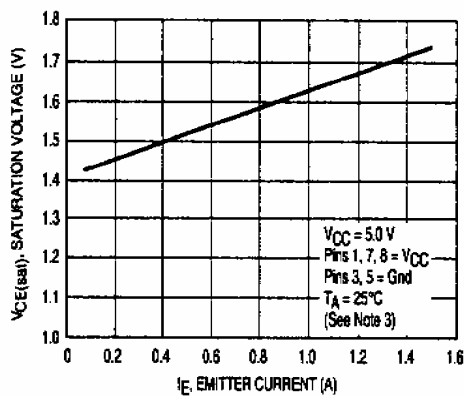


Figure 4. Common Emitter Configuration Output Switch Saturation Voltage versus Collector Current

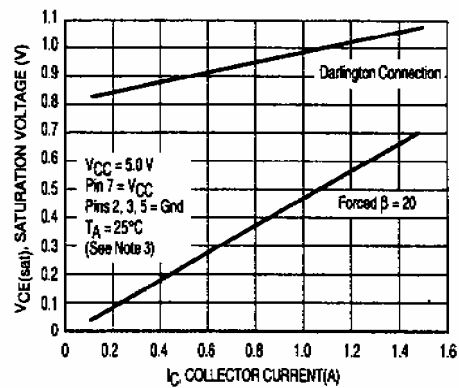


Figure 5. Current Limit Sense Voltage versus Temperature

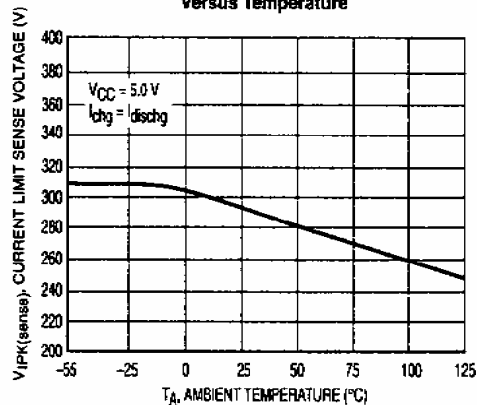
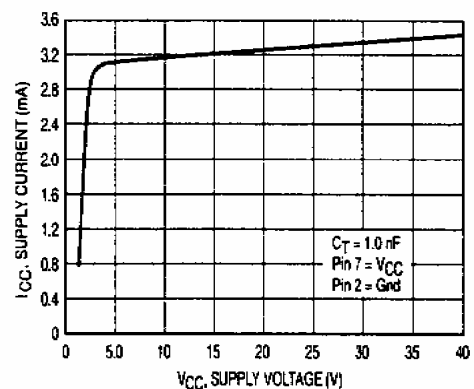
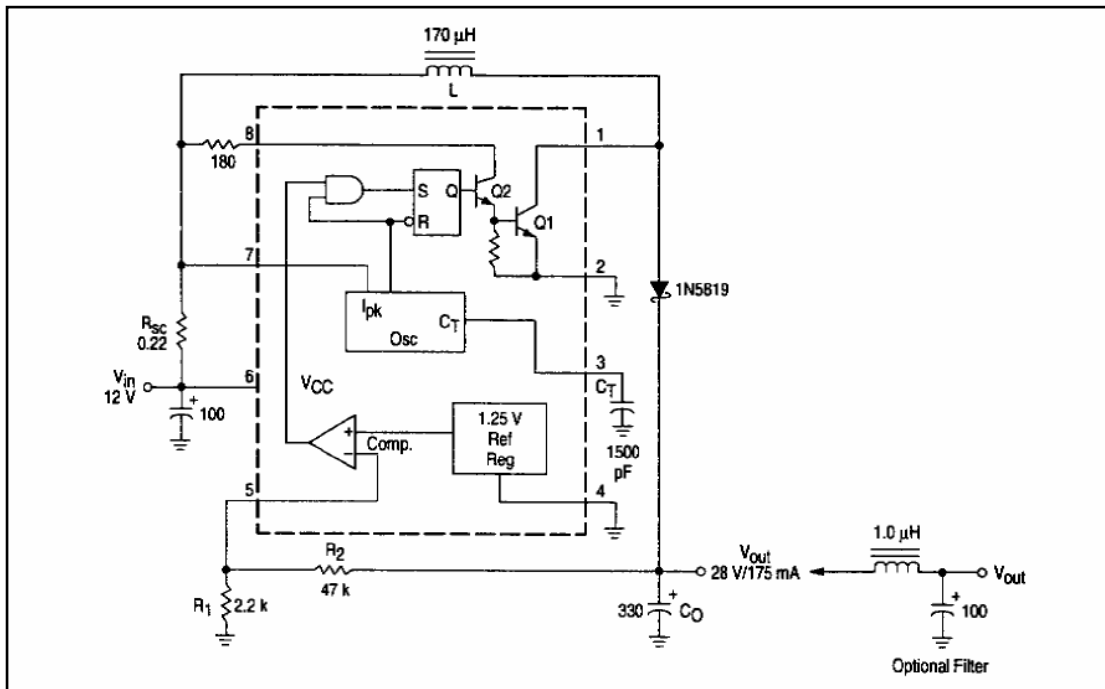


Figure 6. Standby Supply Current versus Supply Voltage



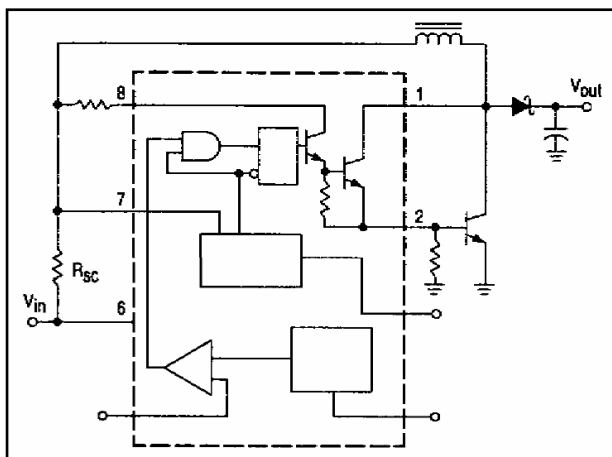
Application Information

Step-Up Converter

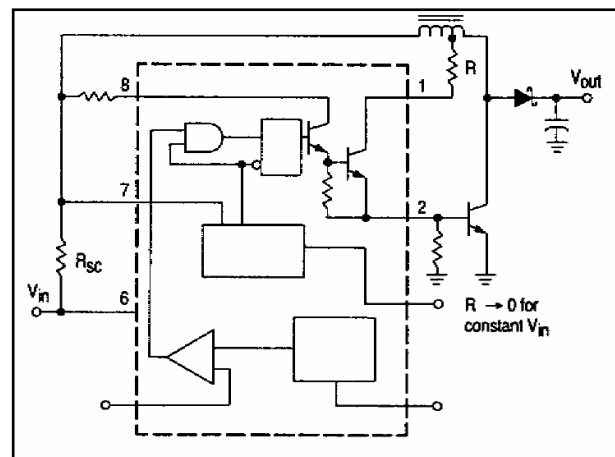


Test	Conditions	Results
Line Regulation	$V_{in} = 8V$ to $16V$, $I_o = 175mA$	$30mV = \pm 0.05\%$
Load Regulation	$V_{in} = 12V$, $I_o = 75mA$ to $175mA$	$10mV = \pm 0.017\%$
Output Ripple	$V_{in} = 12V$, $I_o = 175mA$	$400mV_{p-p}$
Efficiency	$V_{in} = 12V$, $I_o = 175mA$	87.7%
Output Ripple With Optional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

External Current Boost Connections for I_c Peak Greater than 1.5A



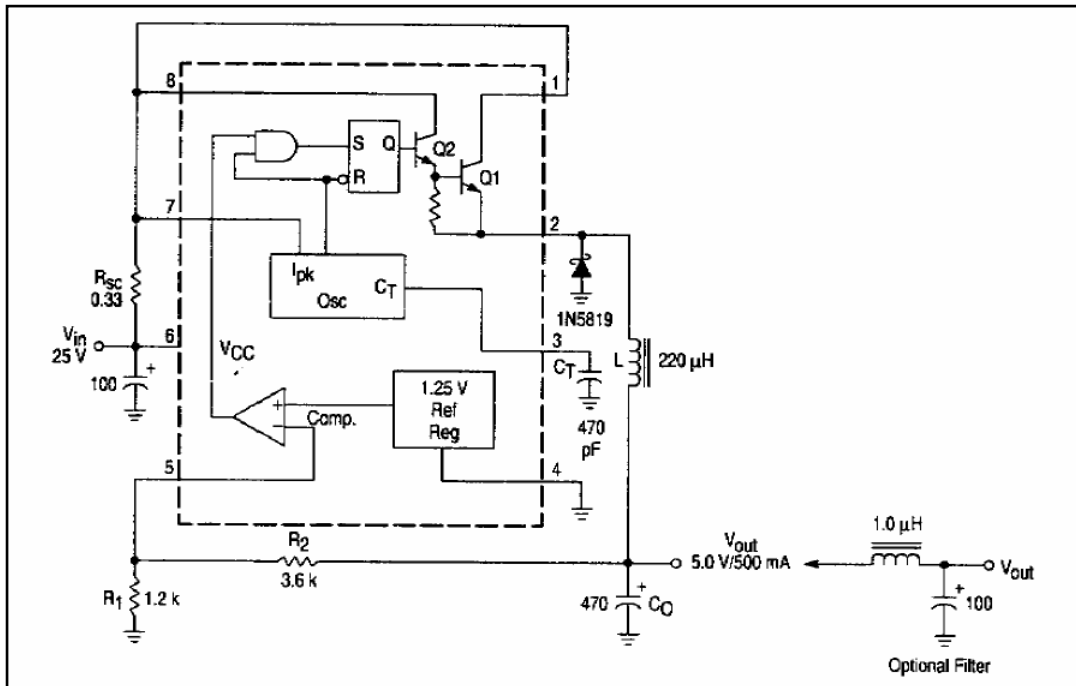
External NPN Switch



External NPN Saturated Switch (NOTE)

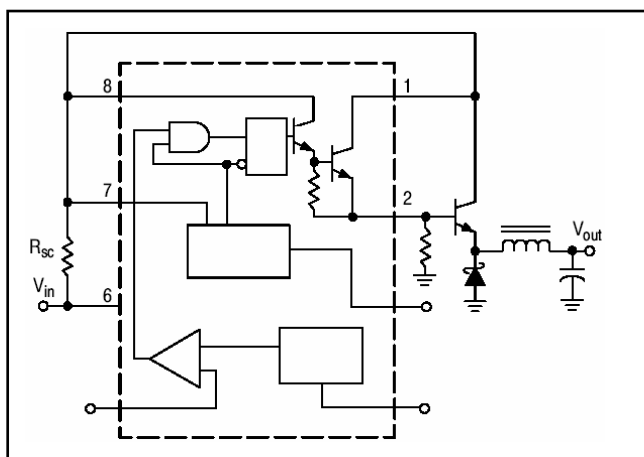
NOTE : If the switch is driven into hard saturation (non-Darlington configuration) at low switch currents ($\leq 300mA$) and high driver currents ($\geq 30mA$), it may take up to 2.0 us to come out of saturation. This condition will shorten the off time at frequencies $\geq 30kHz$, and is magnified at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

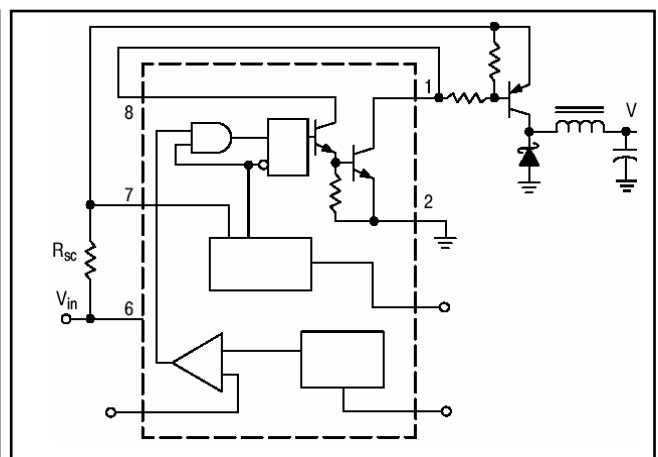


Test	Conditions	Results
Line Regulation	$V_{in} = 15V \text{ to } 25V, I_o = 50mA$	$12mV = \pm 0.12\%$
Load Regulation	$V_{in} = 25V, I_o = 50mA \text{ to } 500mA$	$3mV = \pm 0.03\%$
Output Ripple	$V_{in} = 25V, I_o = 500mA$	$120mV_{p-p}$
Short Circuit Current	$V_{in} = 25V, R_L = 0.1\Omega$	$1.1A$
Efficiency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

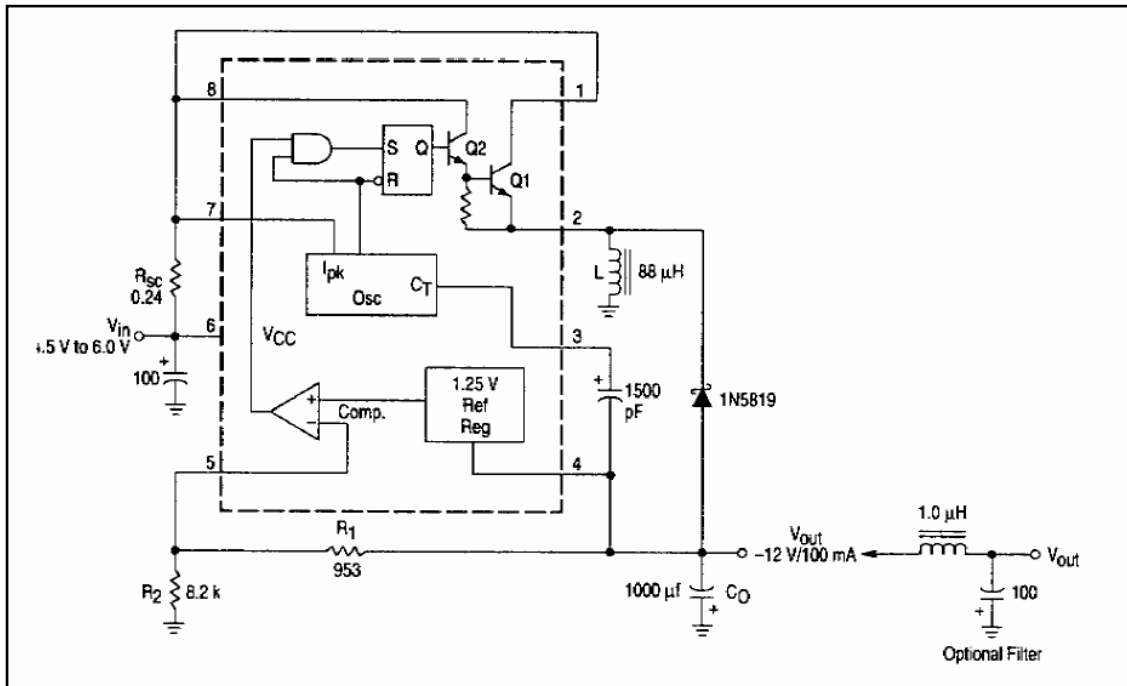


External NPN Switch



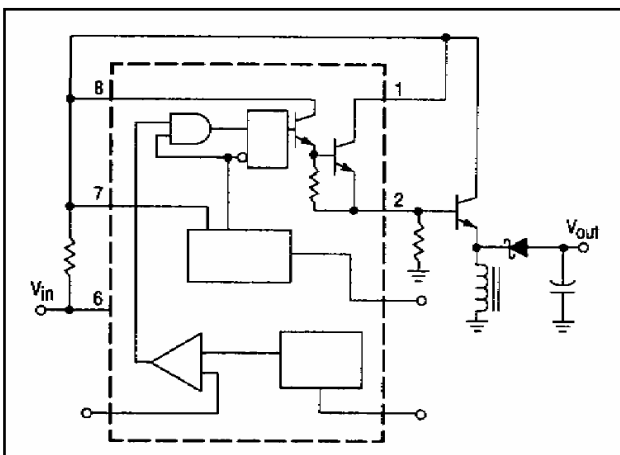
External PNP Saturated Switch

Voltage Inverting Converter

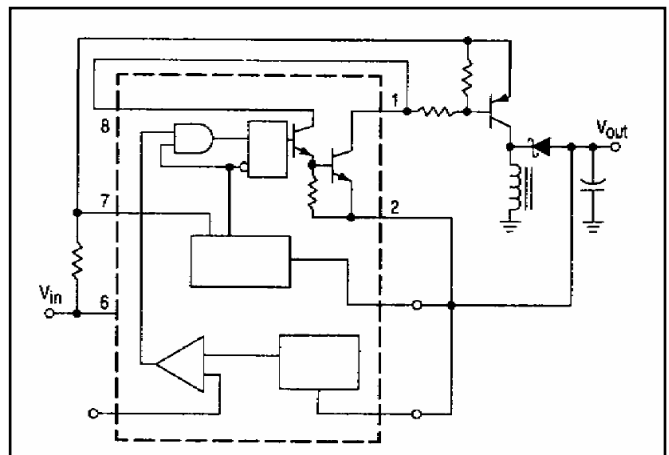


Test	Conditions	Results
Line Regulation	$V_{in} = 4.5V \text{ to } 6.0V, I_o = 100mA$	$3mV = \pm 0.12\%$
Load Regulation	$V_{in} = 5V, I_o = 10mA \text{ to } 100mA$	$0.022V = \pm 0.09\%$
Output Ripple	$V_{in} = 5V, I_o = 100mA$	$500mV_{p-p}$
Short Circuit Current	$V_{in} = 5V, R_L = 0.1\Omega$	$910mA$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

External Current Boost Connections for I_c Peak Greater than 1.5A



External NPN Switch



External PNP Saturated Switch

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