GP34063

DC TO DC CONVERTER CONTROLLER

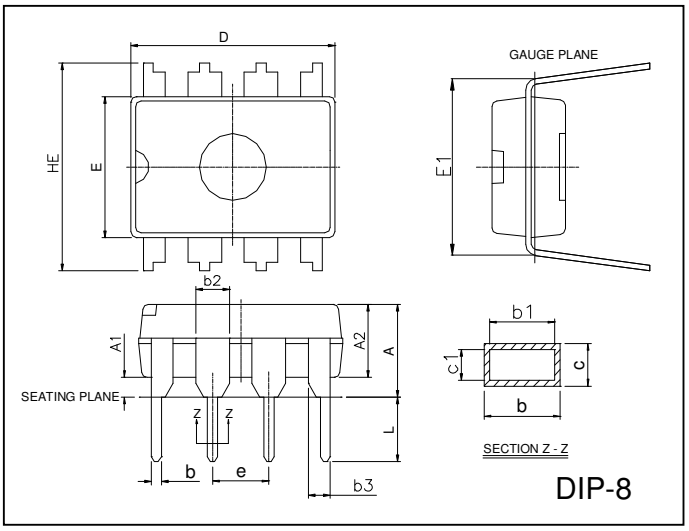
Description

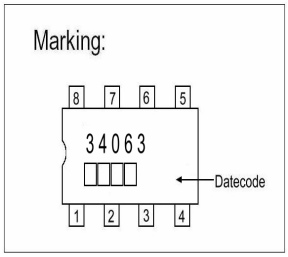
The GP34063 is a monolithic regulator subsystem, intended for use as DC to DC converter. This device contains a temperature compensated band gap reference, a duty-cycle control oscillator, driver and high current output switch. It can be used for step down, step-up or inverting switching regulators as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

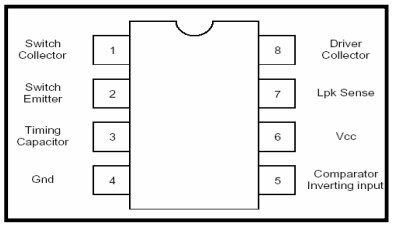
Package Dimensions

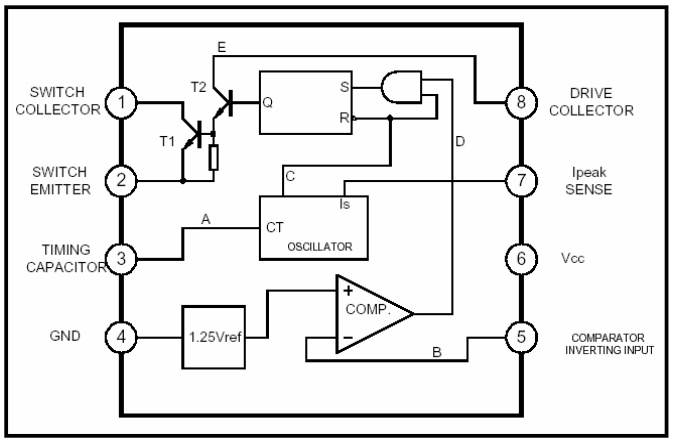




REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	0.5334	c1	0.203	0.279
A1	0.381	-	D	9.017	10.16
A2	2.921	4.953	E	6.096	7.112
b	0.356	0.559	E1	7.620	8.255
b1	0.356	0.508	e	2.540 BSC	
b2	1.143	1.778	HE	-	10.92
b3	0.762	1.143	L	2.921	3.810
c	0.203	0.356			

Pin Configuration & Block Diagram





Absolute Maximum Ratings at Ta = 25℃

Parameter	Symbol	VALUE	Unit
Operating junction temperature	Tj	150	℃
Operating ambient temperature range	Ta	0 ~ 70	℃
Storage Temperature range	Tstg	-65 ~ 150	℃
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 Resistance	$R_{\theta JA}$	100	℃ / W

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

Parameter	SYMBOL	Test Conditions	Min	Typ.	Max.	Unit
Oscillator						
Frequency	fosc	V_{Pin}5=0V, C_T=1.0nF, Ta=25℃	24	42	48	kHz
Charging Current	Ichg	Vcc = 5 to 40, Ta = 25℃	22	31	42	uA
Discharging Current	Idischg	Vcc = 5 to 40, Ta = 25℃	140	190	260	uA
Discharge to Charge Current Ratio	K	Pin7 to Vcc, Ta = 25℃	5.2	6.1	7.5	
Current limit Sense Voltage	Vsense	Ichg = idschg, Ta = 25℃	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℃	50	180		
Collect Off State Current (note)	C(off)	Vce = 40V, Ta = 25℃		0.01	100	uA
Comparator						
Threshold Voltage	Vth	Vcc=5V, Ta = 25℃ 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

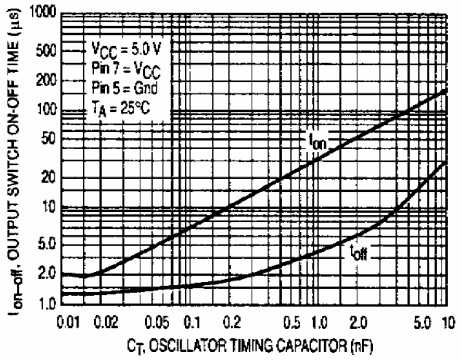


Figure 2. Timing Capacitor Waveform

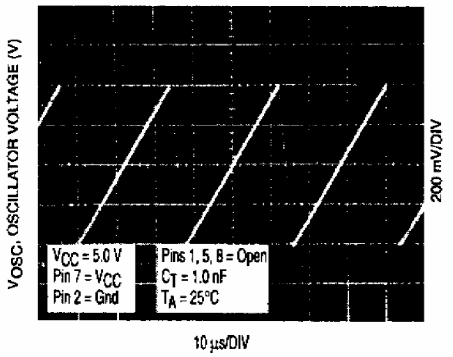


Figure 3. Emitter Follower Configuration Output Saturation Voltage versus Emitter Current

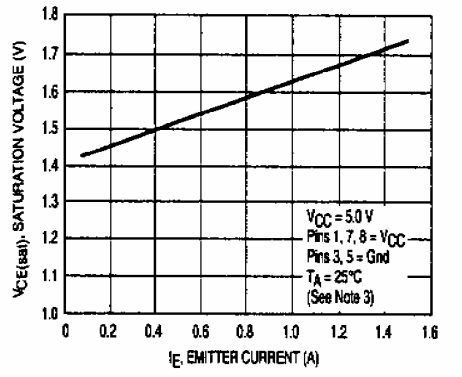


Figure 4. Common Emitter Configuration Output Switch Saturation Voltage versus Collector Current

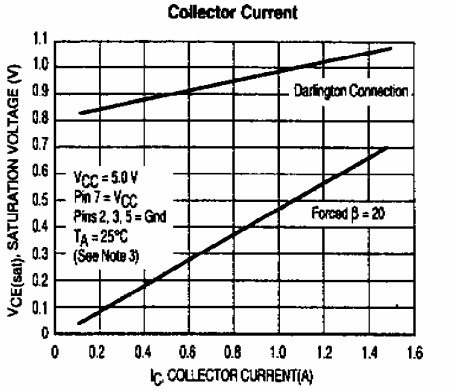


Figure 5. Current Limit Sense Voltage versus Temperature

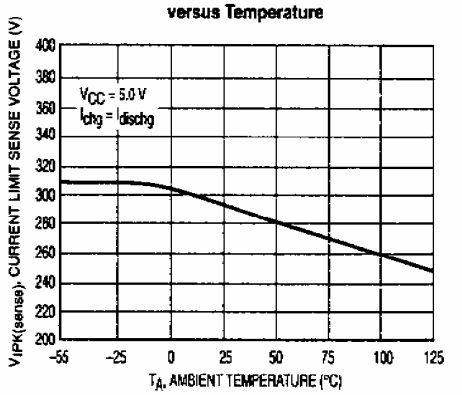
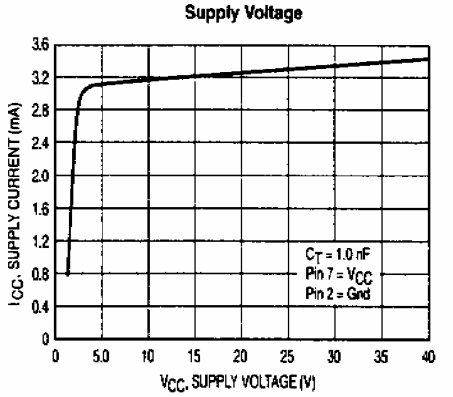
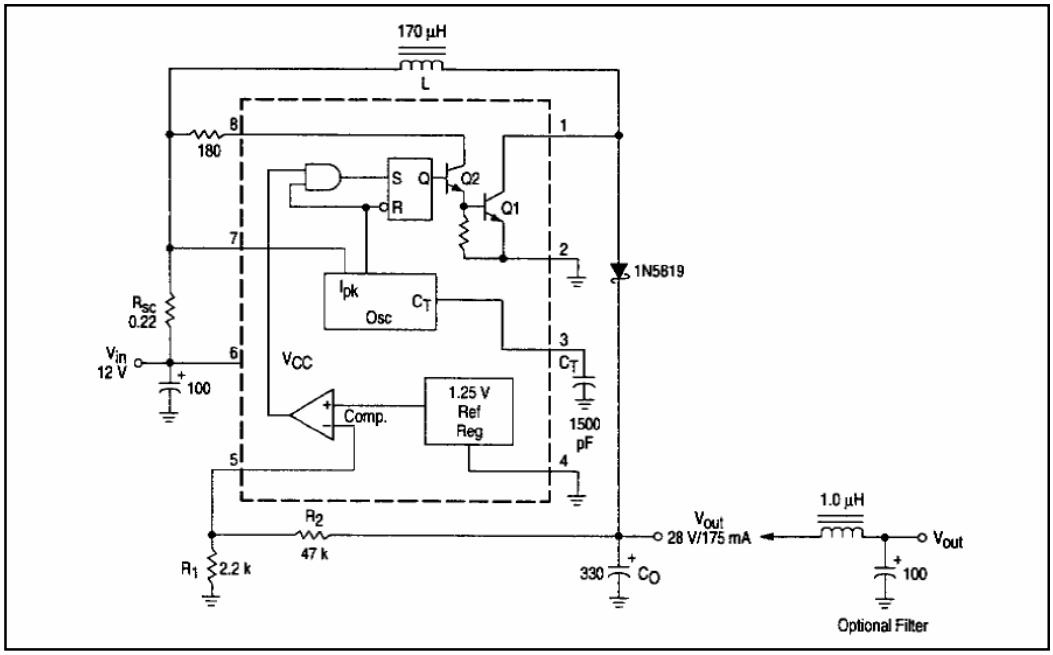


Figure 6. Standby Supply Current versus Supply Voltage



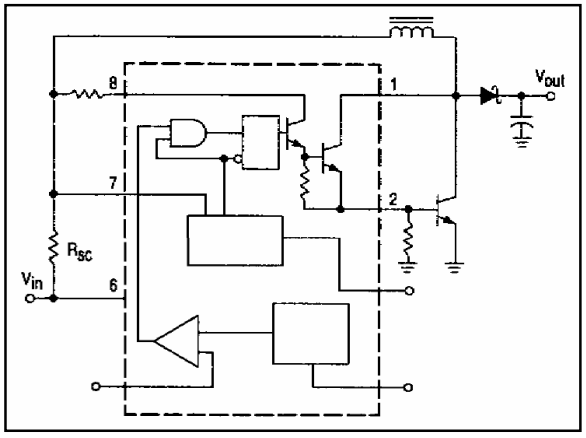
Application Information

Step-Up Converter

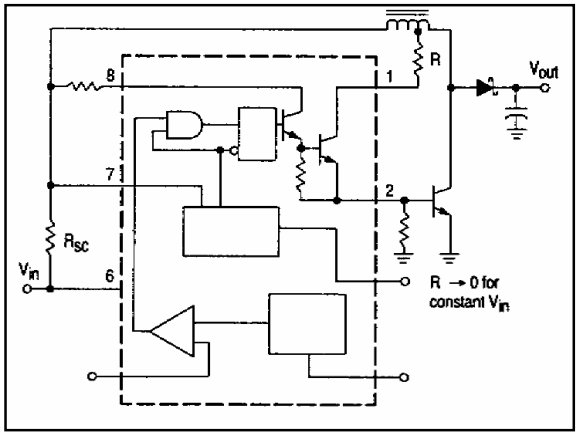


Test	Conditions	Results
Line Regulation	Vin = 8V to 16V, Io = 175mA	30mV = ± 0.05%
Load Regulation	Vin = 12V, Io = 75mA to 175mA	10mV = ± 0.017%
Output Ripple	Vin = 12V,Io = 175mA	400mVp-p
Efficiency	Vin = 12V, Io = 175mA	87.7%
Output Ripple With Optional Filter	Vin = 12V, Io = 175mA	40mVp-p

External Current Boost Connections for Ic Peak Greater than 1.5A



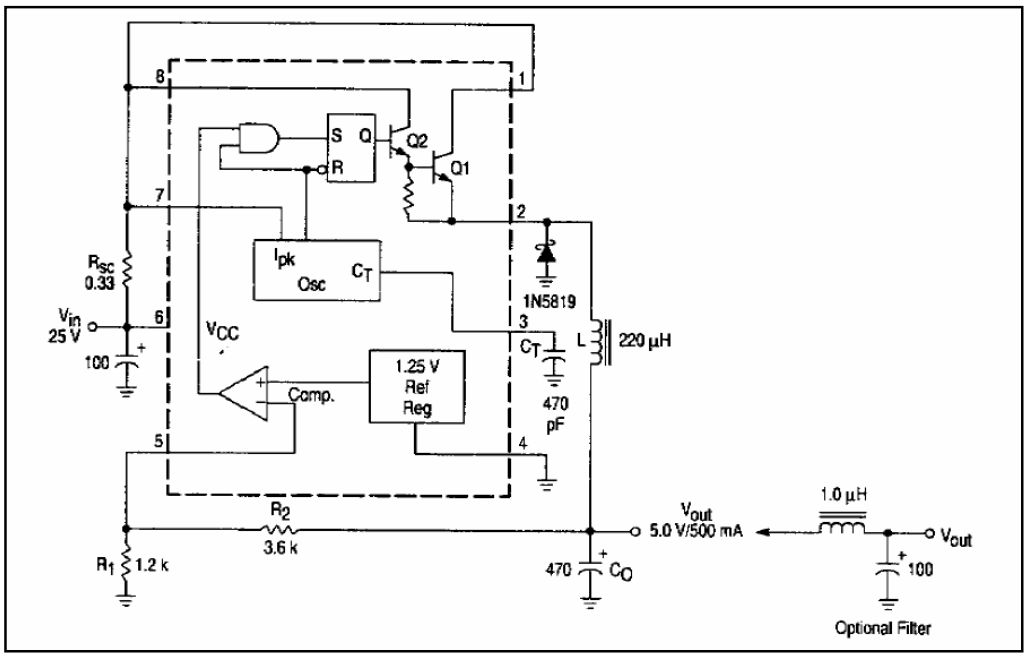
External NPN Switch



External NPN Saturated Switch (NOTE)

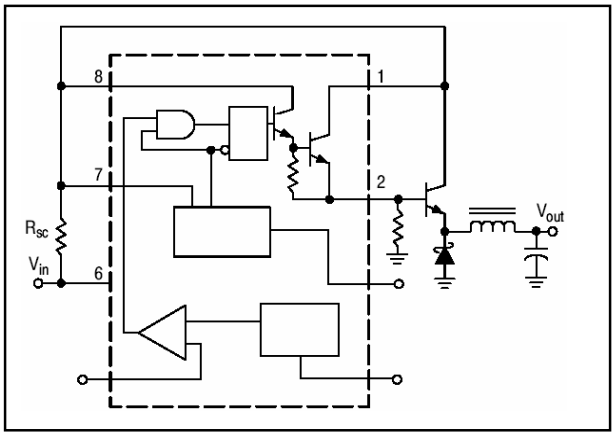
NOTE ：If the switch is driven into hard saturation (non-Darlington configuration) at low switch currents (≤ 300mA) and high driver currents (≥ 30mA)，it may take up to 2.0 us to come out of saturation. This condition will shorten the off time at frequencies ≥ 30kHz, and is magnified at high temperatures.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

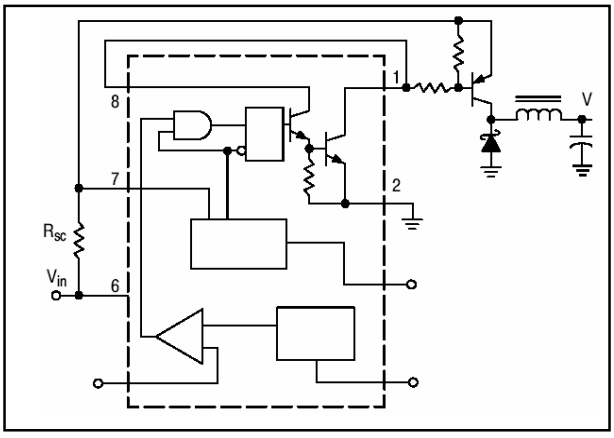


Test	Conditions	Results
Line Regulation	Vin = 15V to 25V, Io = 50mA	12mV = ± 0.12%
Load Regulation	Vin = 25V, Io = 50mA to 500mA	3mV = ± 0.03%
Output Ripple	Vin = 25V,Io = 500mA	120mVp-p
Short Circuit Current	Vin = 25V, R_L = 0.1Ω	1.1A
Efficiency	Vin = 25V, Io = 500mA	83.7%
Output Ripple With Optional Filter	Vin = 25V, Io = 500mA	40mVp-p

External Current Boost Connections for Ic Peak Greater than 1.5A

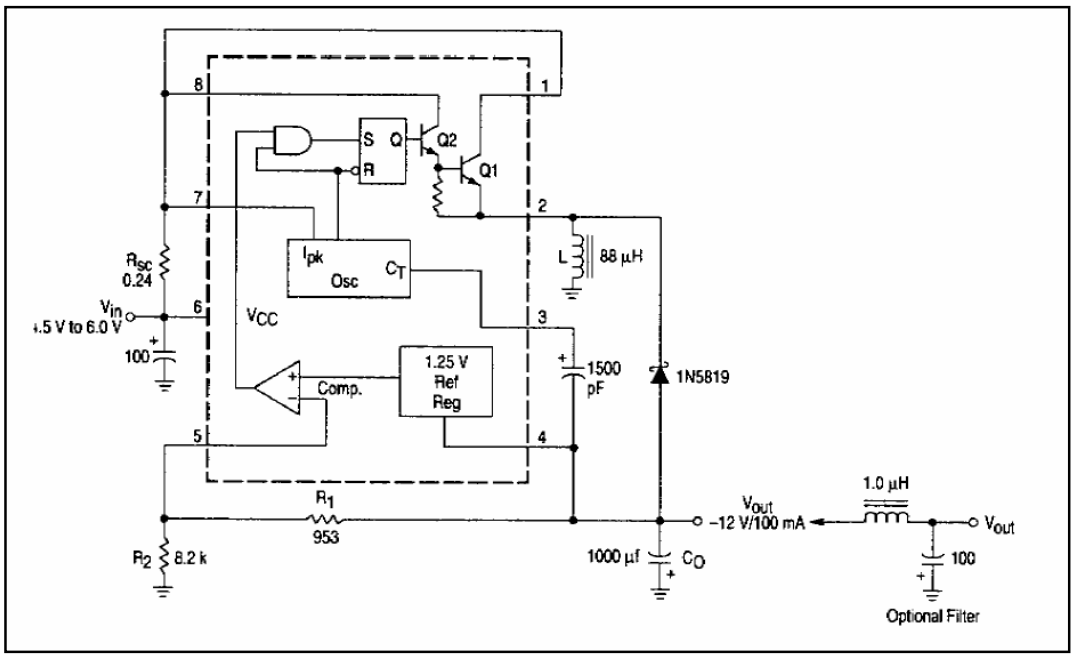


External NPN Switch



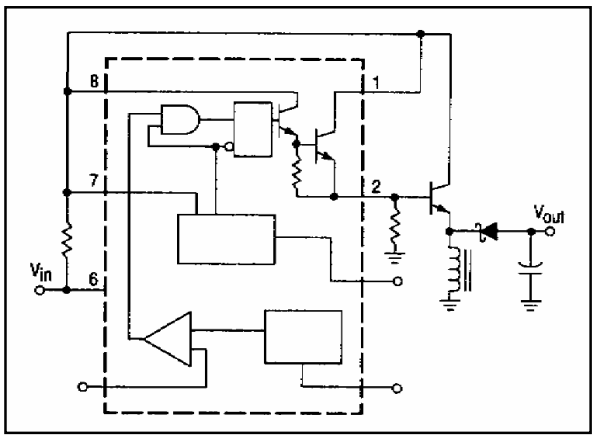
External PNP Saturated Switch

Voltage Inverting Converter

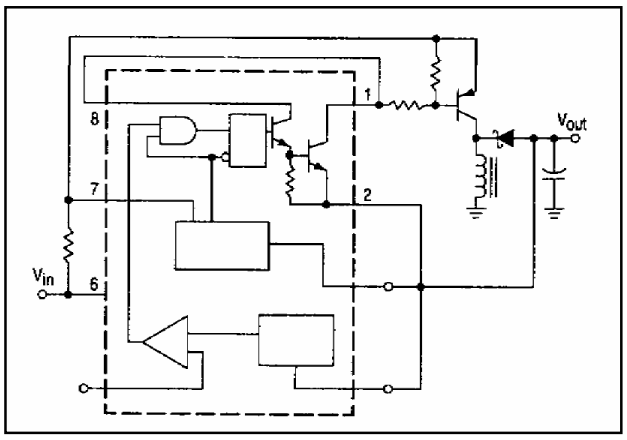


Test	Conditions	Results
Line Regulation	Vin = 4.5V to 6.0V, Io = 100mA	3mV = ± 0.12%
Load Regulation	Vin = 5V, Io = 10mA to 100mA	0.022V = ± 0.09%
Output Ripple	Vin = 5V,Io = 100mA	500mVp-p
Short Circuit Current	Vin = 5V, R_L = 0.1Ω	910mA
Efficiency	Vin = 5V, Io = 100mA	62.2%
Output Ripple With Optional Filter	Vin = 5V, Io = 100mA	70mVp-p

External Current Boost Connections for Ic Peak Greater than 1.5A



External NPN Switch



External PNP Saturated Switch

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