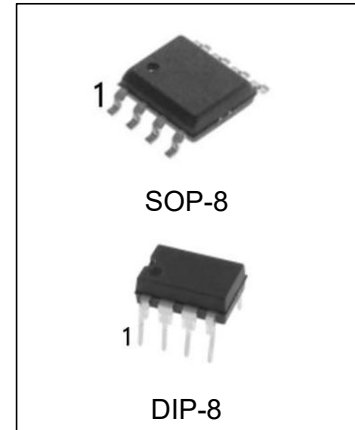


FEATURES

- Operation from 3V to 40V
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.2A
- Output Voltage Adjustable
- Operation Frequency up to 180 kHz (CT = 100pF)
- Precision 2% Reference
- Continuous Load Current up to 0.75A

(Vin =12 to 24V, Rcs≥0.2Ω, DIP-8 package, see Note for

Step-Down Application)



ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
MC34063PG	DIP-8	MC34063	TUBE	2000pcs/Box
MC34063DRG	SOP-8	MC34063	REEL	2500pcs/Reel
MC34063DRG4	SOP-8	MC34063	REEL	4000pcs/Reel

DESCRIPTION

The MC34063 is a monolithic switching regulator control circuit containing the primary functions required for DC-DC converters. This device consists of internal temperature compensated reference, voltage comparator, controlled duty cycle oscillator with active current limit circuit, driver and high current output switch. The device is specifically designed to be used in Step-Down, Step-Up and Voltage-Inverting applications with a minimum number of external components.

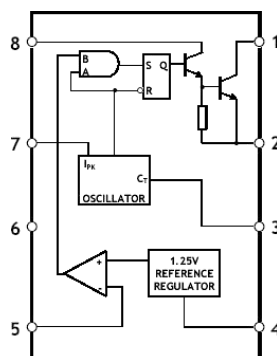
The MC34063 is the enhanced version of MC34063A with the ability to work in higher frequency.

The MC34063 is available in 2 packages: SOP- 8 and DIP-8.

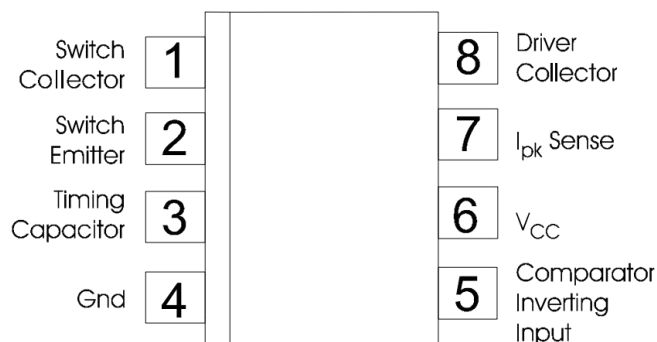
APPLICATIONS

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

SCHEMATIC DIAGRAM



PIN CONNECTIONS



PIN FUNCTIONS

PIN 1	Switch Collector	Internal switch transistor collector
PIN 2	Switch Emitter	Internal switch transistor emitter
PIN 3	Timing Capacitor	Timing Capacitor to control the switching frequency
PIN 4	GND	Ground pin for all internal circuits
PIN 5	Comparator Inverting Input	Inverting input pin for internal comparator
PIN 6	VCC	Voltage supply
PIN 7	IPK Sense	Peak Current Sense Input by monitoring the voltage drop across an external I sense resistor to limit the peak current through the switch
PIN 8	Driver Collector	Voltage driver collector

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{CC}	Supply Voltage	3	40	V
T_A	Ambient Temperature	-40	85	°C

ABSOLUTE MAXIMUM RATINGS (NOTE 1)

SYMBOL	PARAMETER		VALUE	UNIT
V _{CC}	Power Supply Voltage		40	V
V _{IR}	Comparator Input Voltage Range		-0.3 to 40	V
V _C (SWITCH)	Switch Collector Voltage		40	V
V _E (SWITCH)	Switch Emitter Voltage (V _{pin1} = 40V)		40	V
V _{CE} (SWITCH)	Switch Collector to Emitter Voltage		40	V
V _C (DRIVER)	Driver Collector Voltage		40	V
I _C (DRIVER)	Driver Collector Current (NOTE 2)		100	mA
I _{SW}	Switch Current		1.2	A
POWER DISSIPATION AND THERMAL CHARACTERISTICS				
P _D	DIP Package	Power Dissipation (TA= 25°C)	1.25	W
R _{θJA}		Thermal Resistance	100	°C/W
P _D	SOP Package	Power Dissipation (TA= 25°C)	625	mW
R _{θJA}		Thermal Resistance	160	°C/W
T _J	Operating Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-65 to 150	°C
ESD for MC34063			3000	V
T _L	Lead Temperature (Soldering, 10 seconds)		245	°C

ELECTRICAL CHARACTERISTICS

VCC = 5V, TA = -40 TO 85°C, UNLESS OTHERWISE SPECIFIED

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
OSCILLATOR						
F _{OSC}	Frequency	V _{pin5} = 0V; T _A = 25°C; C _T = 1 nF	30	38	45	kHz
I _{CHG}	Charge Current	V _{CC} = 5.0V to 40V; T _A = 25°C	30	38	45	μA
I _{DISCHG}	Discharge Current	V _{CC} = 5.0V to 40V; T _A = 25°C	180	240	290	μA
I _{DISCHG/ICHG}	Discharge to Charge Current Ratio	Pin 7 to V _{CC} ; T _A = 25°C	5.2	6.5	7.5	-
V _{IPK(SENCE)}	Current Limit Sense Voltage	I _{CHG} = I _{DISCHG} ; T _A = 25°C	250	300	350	mV
OUTPUT SWITCH (NOTE 3)						
V _{CE(SAT)}	Saturation Voltage, Darlington connection	I _{SW} = 0.8A; Pins 1,8 connected	-	1.0	1.3	V
V _{CE(SAT)}	Saturation Voltage (see NOTE 4)	I _{SW} = 0.8 A; R _{pin 8} = 82 to V _{CC} ; Forced β = 20	-	0.45	0.8	V
h _{FE}	DC Current Gain	I _{SW} = 0.8 A; V _{CE} = 5.0V T _A = 25°C	50	75	-	-
I _{C(OFF)}	Collector Off-State Current	V _{CE} = 40 V	-	0.01	100	μA
COMPARATOR						
V _{TH}	Threshold Voltage	T _A = 25°C	1.225	1.25	1.275	V
		T _A = -40°C to +85°C	1.210		1.290	
REG _{LINE}	Threshold Voltage Line Regulation	V _{CC} = 3V to 40V	-	1.4	5	mV
I _{IB}	Input Bias Current	V _{IN} = 0V	-	-20	-400	nA
TOTAL DEVICE						
I _{CC}	Supply Current	V _{CC} = 5.0V to 40V; C _T = 1.0 nF; Pin 7 = V _{CC} ; V _{pin 5} > V _{th} ; Pin 2 = GND; other pins open	-	-	4	mA

ELECTRICAL CHARACTERISTICS (CONTINUED)

NOTES

1. Stresses greater than those listed under «Absolute Maximum Ratings» may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under «Recommended Operating Conditions» is not implied. Exposure to «Absolute Maximum Ratings» for extended periods may affect device reliability.
2. Maximum package power dissipation limits must be observed.
3. Low duty cycle pulse technique are used during test to maintain junction temperature as close to ambient temperature as possible.
4. If the output 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 $2.0\mu\text{s}$ for it to come out of saturation. This condition will shorten the off time at frequencies 30 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:

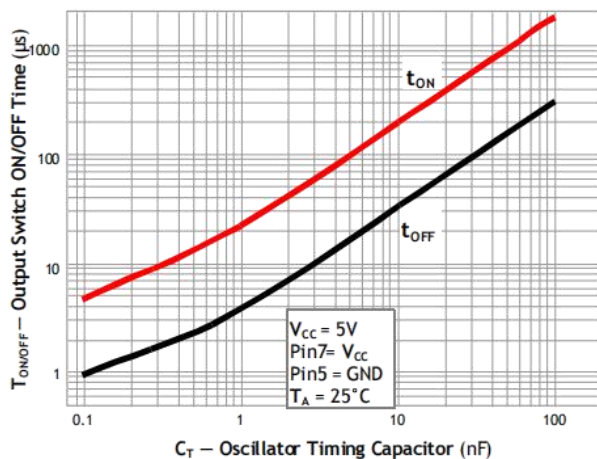
Forced β of output switch:

$$\frac{I_{C(OUTPUT)}}{I_{C(DRIVER)} - 7.0\text{mA}^*} \geq 10$$

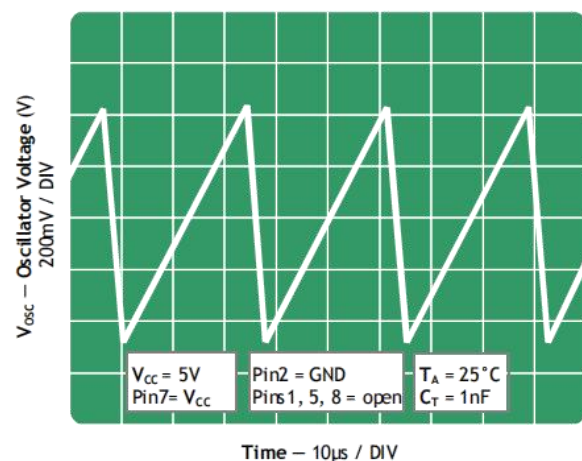
* The 100Ω resistor in the emitter of the driver device requires about 7 mA before the output switch conducts.

TYPICAL PERFORMANCE CHARACTERISTICS

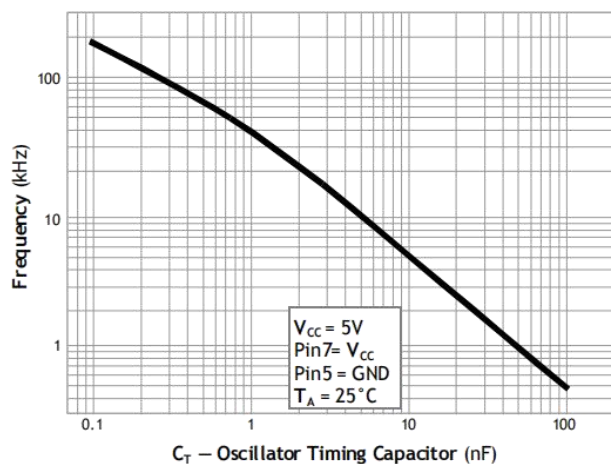
OUTPUT SWITCH ON-OFF TIME versus
OSCILLATOR TIMING CAPACITOR



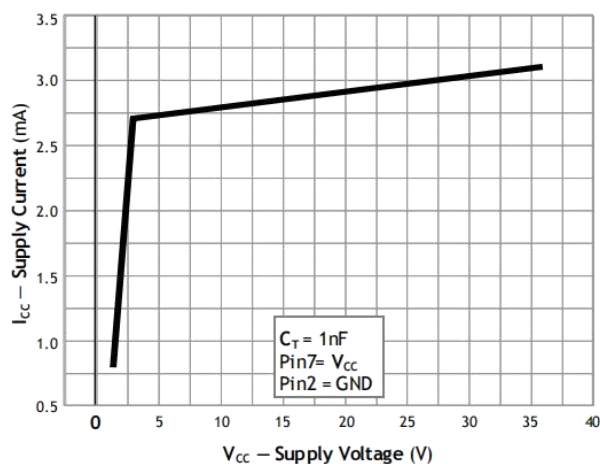
TIMING CAPACITOR WAVEFORM



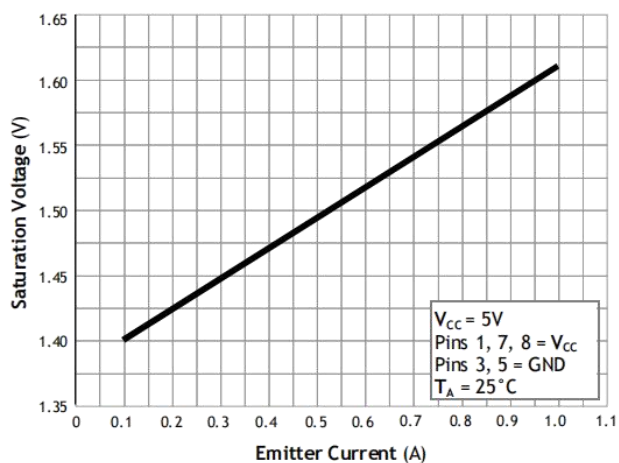
OSCILLATOR FREQUENCY versus TIMING CAPACITOR



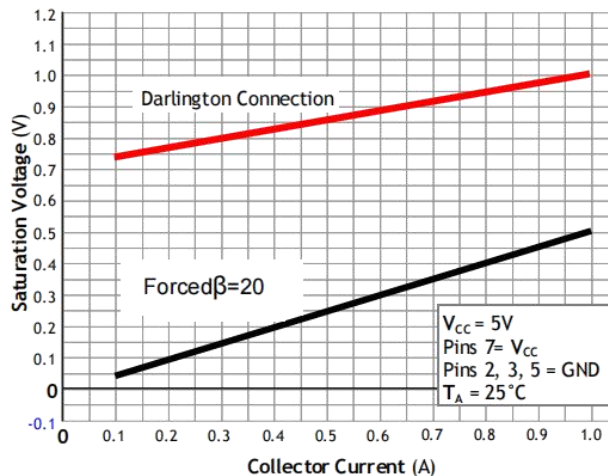
STANDBY SUPPLY CURRENT versus SUPPLY VOLTAGE



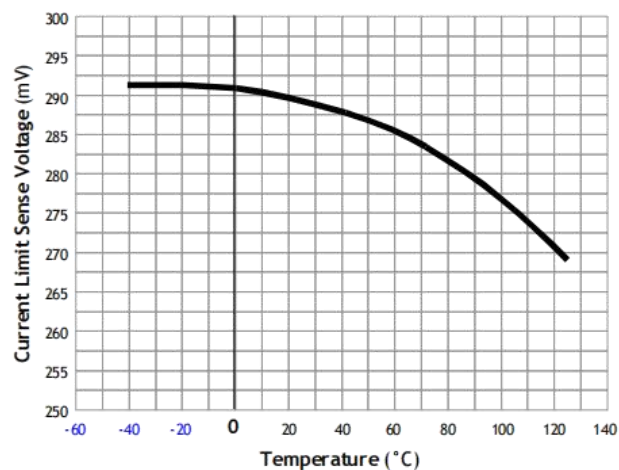
EMITTER FOLLOWER CONFIGURATION OUTPUT SATURATION VOLTAGE vs. EMITTER CURRENT



COMMON EMITTER CONFIGURATION OUTPUT SWITCH SATURATION VOLTAGE vs. COLLECTOR CURRENT

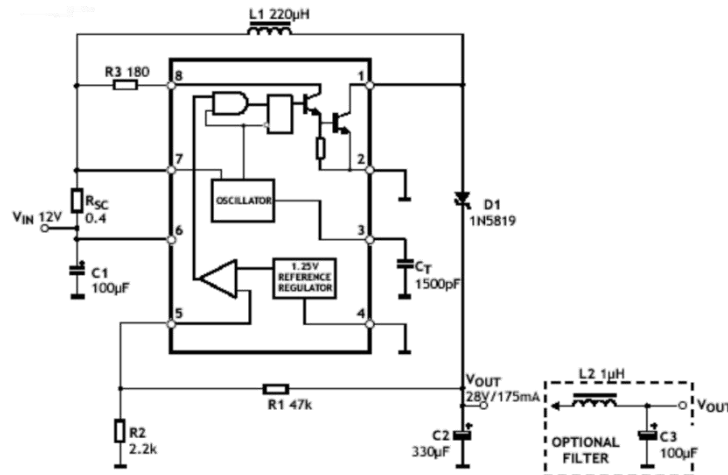


CURRENT LIMIT SENSE VOLTAGE versus TEMPERATURE



TYPICAL APPLICATIONS

STEP-UP CONVERTER



This is a typical step-up converter configuration. In the steady state, if the resistor divider voltage at pin 5 is greater than the voltage in the non-inverting input, which is 1.25V determined by the internal reference, the output of the comparator will go low. At the next switching period, the output switch will not conduct and the output voltage will eventually drop below its nominal voltage until the divider voltage at pin 5 is lower than 1.25V.

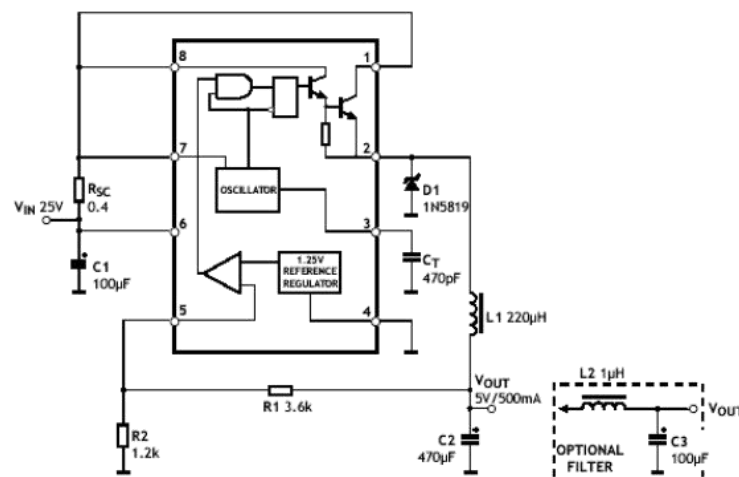
Then the output of the comparator will go high, the output switch will be allowed to conduct. Since

$$V_{pin5} = V_{OUT} * R2 / (R1 + R2) = 1.25(V),$$

the output voltage can be decided by

$$V_{OUT} = 1.25 * (R1 + R2) / R2 (V).$$

STEP-DOWN CONVERTER



Note: It is recommended to use $L=165\mu H$, $C_t=1nF$, $R_{cs}=0.2\Omega$ for Load Current 0.75A.

If $R_{cs} \leq 0.2\Omega$ then the IC could be damaged (the short circuit of collector-emitter)

This is a typical step-down converter configuration. The working process in the steady state is similar to step-up converter,

$$V_{pin5} = V_{OUT} * R2 / (R1 + R2) = 1.25 (V),$$

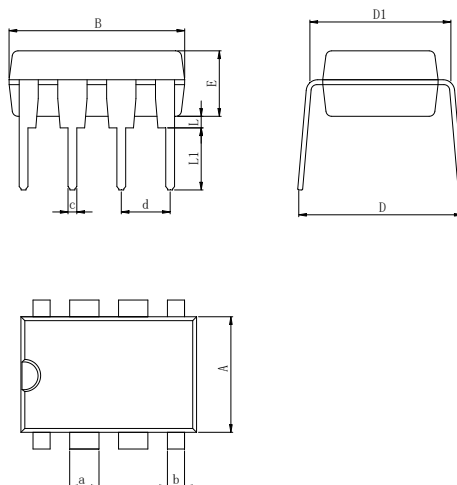
the output voltage can be decided by

$$V_{OUT} = 1.25 * (R1 + R2) / R2 (V).$$

$$V_{OUT} = -1.25 * (R1+R2)/R1 \text{ (V)}.$$

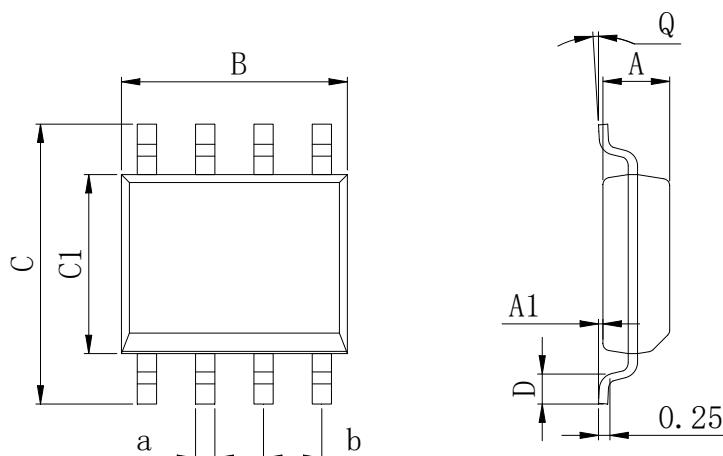
PHYSICAL DIMENSIONS

DIP-8



Dimensions In Millimeters(DIP-8)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

SOP-8



Dimensions In Millimeters(SOP-8)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

REVISION HISTORY

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2012-9	New	1-12
V1.1	2023-8	Update encapsulation type、Update Lead Temperature	1、 4

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