TIGER ELECTRONIC CO.,LTD

DC-to-DC Converter Control Circuits

MC34063A

GENERAL DESCRIPTION

The MC34063A is a monolithic control circuit containing the primary functions required for DC-to-DC converters. These devices consist of an internal temperature compensated reference, comparator, controlled duty cycle oscillator with an active current limit circuit, driver and high current output switch. This series was specifically designed to be incorporated in Step-Down and Step-Up and voltage- Inverting applications with a minimum number of external components.

Outline Drawing

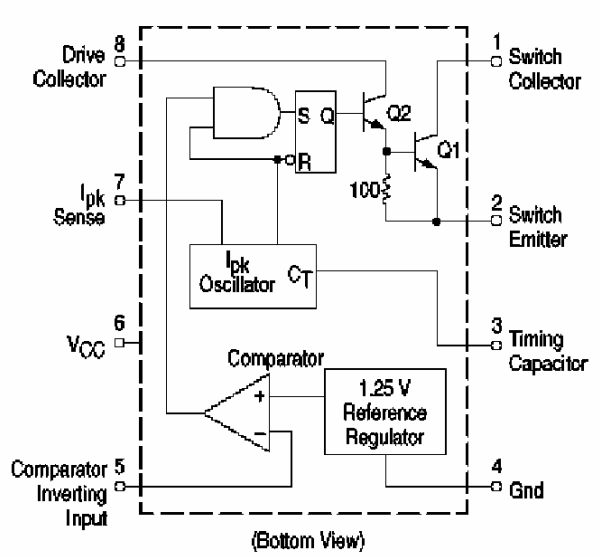
DIP8

SOP8

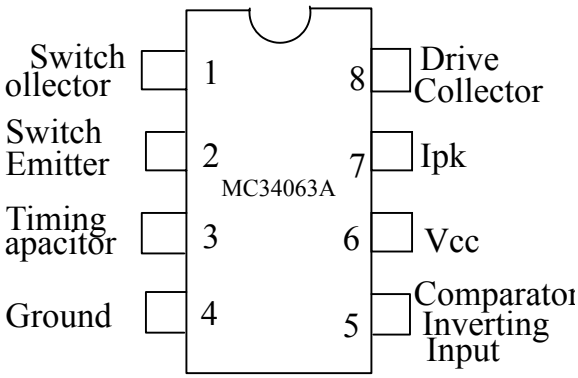
FEATURES

- Operation from 3.0V to 40V Input
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.2A
- Output Voltage Adjustable
- Frequency Operation to 100kHz
- Precision 2% Reference

BLOCK DIAGRAM



PIN CONNECTION



MAXIMUM RATINGS (Ta=25°C)

Rating		Symbol	Value	Unit
Power Supply Voltage		Vcc	40	V
Comparator Input Voltage Range		V_{IR}	0.3~40	V
Switch Collector Voltage		Vc(switch)	40	V
Switch Emitter Voltage (V_{Pin1}=40V)		V_E(switch)	40	V
Switch Collector to Emitter Voltage		V_{CE}(switch)	40	V
Driver Collector Voltage		Vc(drive)	40	V
Driver Collector Current (Note 1)		Ic(drive)	100	mA
Switch Current		I_{SW}	1.2	A
Power Dissipation	DIP8	P_D	1.25	W
	SOP8		625	mW
Operating Ambient Temperature Range		Ta	0~70	°C
Storage Temperature Range		Tstg	-65~150	°C

Notes: 1.Maximum package power dissipation limits must be observed

2.ESD data available upon request

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vcc=5.0V, Ta=0~70°C)

CHARACTERISTICS	SYMBOL	MIN	TYP	MAX	UNIT
OSCILLATOR					
Frequency (Vpin5=0V, Vcc=5.0V)	fosc	24	33	42	kHz
Charge current (Vcc=5.0~40V, Vpin3=L)	Ichg	24	31	42	μA
Discharge current (Vcc=5.0~40V, Vpin3=H)	Idischg	140	199	260	μA
Discharge to charge current ratio ($V_{PIN7}=V_{CC}$, Ta=25°C)	Idischg/Ichg	5.2	6.2	7.5	
Current limit sense voltage (Ichg=Idischg, Ta=25°C)	Vipk(sense)	250	300	350	mV
OUTPUT SWITCH (Note 3)					
Saturation voltage, Darlington connection(Note 4) (I_{SW}=0.8A, pins 1,8 connected)	V_{CE}(sat)		0.9	1.3	V
Saturation voltage, Darlington connection (I_{SW}=0.8A, Rpin 8=82Ω to Vcc)	V_{CE}(sat)		0.45	0.7	V
DC current gain (I_{SW}=0.8A,V_{CE}=5.0V, Ta=25°C)	h_{FE}	50	120		
Collector off-state current (V_{CE}=40V)	Ic(off)		2	100	μA
COMPARATOR					
Threshold voltage (Ta=25°C, Vcc=5.0V)	Vth	1.23	1.25	1.27	V
Threshold voltage line regulation (Vcc=5.0~40V)	Regline		4.0	5.0	mV
Input bias current(Vin=0V)	I_{IB}		-40	-400	nA
TOTAL DEVICE					
Supply current (Vcc=5.0~40V, Vpin5 =H)	Icc		2.36	4.0	mA

Notes: 3. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient temperature as possible.

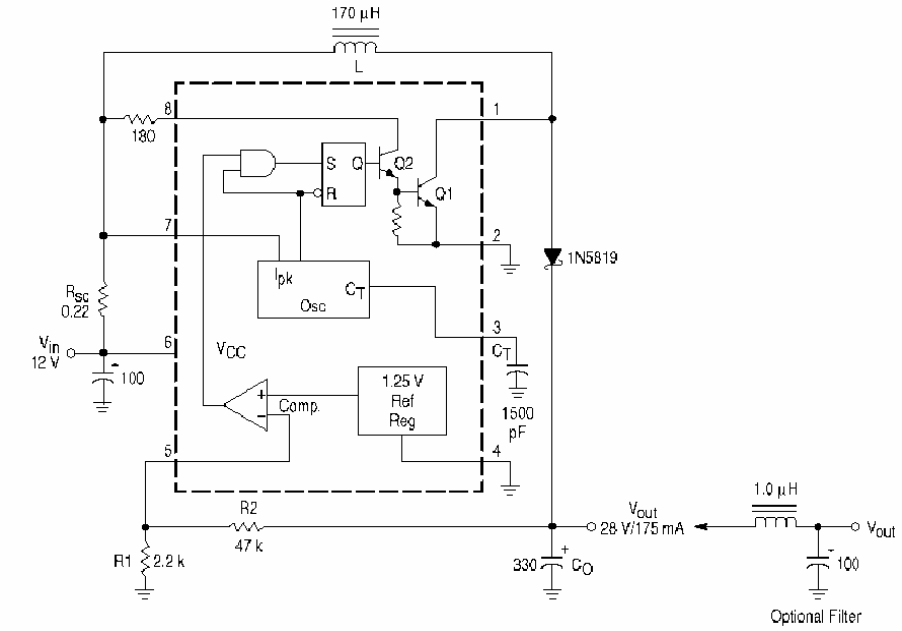
4. If the output switch is driven into hard saturation (non-Darlington configuration) at low switch currents (≤ 300 mA) and high driver currents (≥ 30 mA), it may take up to 2.0 μs for it to come out of saturation. This condition will shorten the off time at frequencies≥ 30 kHz, and is magnified at high 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 βof output switch : Ic output/ (Ic drive –7.0mA)* ≥10

*The 100Ω resistor in the emitter of the driver device requires about 7.0 mA before the output switch conducts.

APPLICATION CIRCUITS

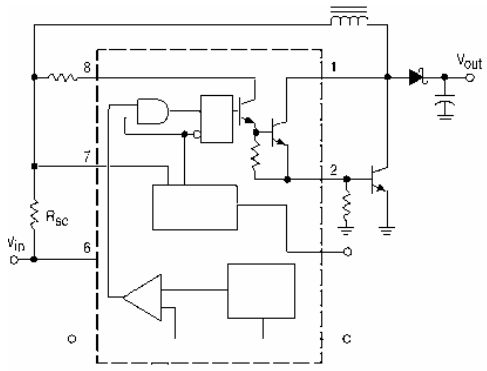
1.Step-Up Converter



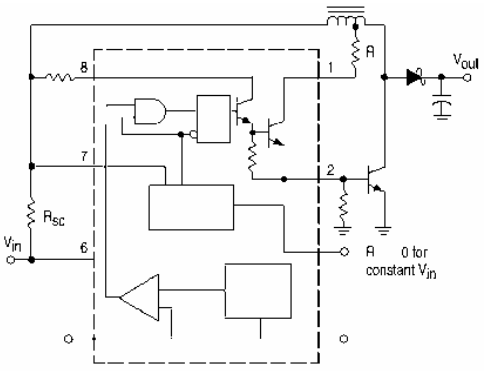
test	conditions	Results
Line Regulation	Vin=8.0~16V, Io=175mA	30mV=±0.05%
Load Regulation	Vin=12V,Io=75~175mA	10mV=±0.017%
Output Ripple	Vin=12V, Io=175mA	400mVpp
Efficiency	Vin=12V, Io=175mA	87.7%
Output Ripple With Optional Filter	Vin=12V, Io=175mA	40mVpp

2.External Current Boost Connections for Ic Peak Greater than 1.5A

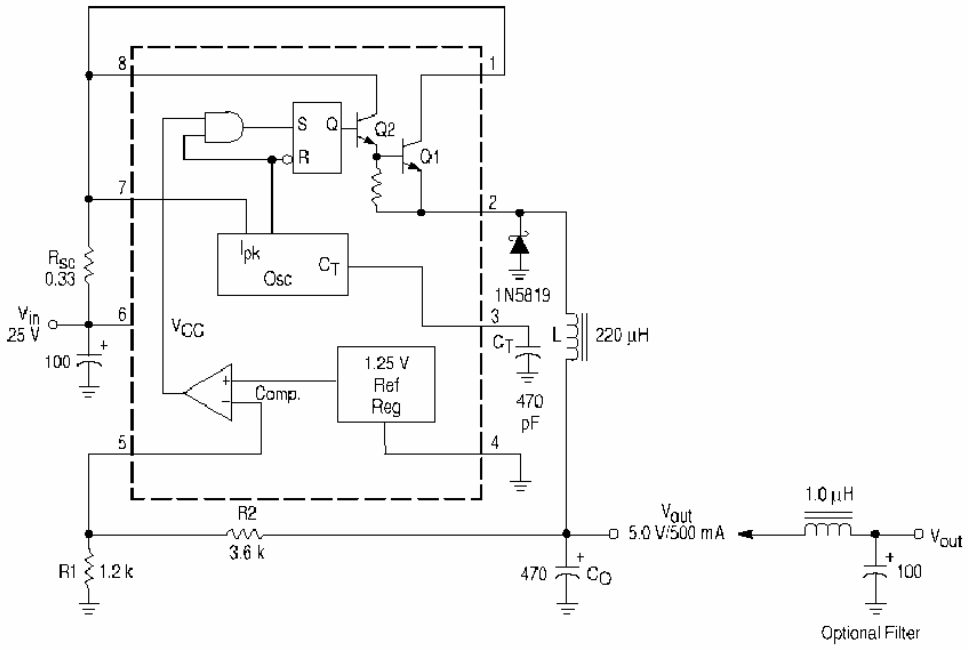
(1).External NPN Switch



(2) External NPN Saturated Switch (Note 4)



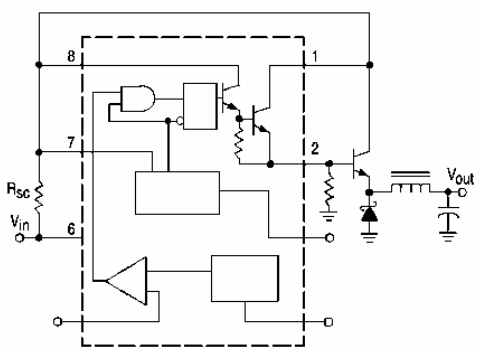
3.Step-Down Converter



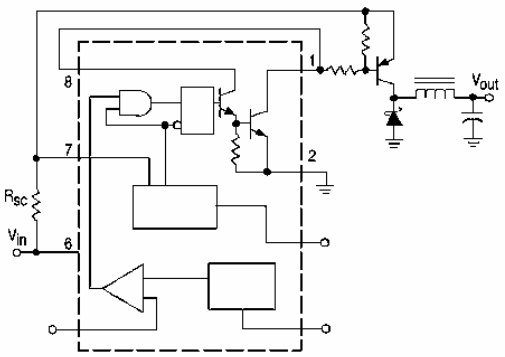
test	conditions	Results
Line Regulation	Vin=15~25V, Io=500mA	12mV=±0.12%
Load Regulation	Vin=25V,Io=50~500mA	3.0mV=±0.03%
Output Ripple	Vin=25V, Io=500mA	120mVpp
Short Circuit Current	Vin=25V,RL=0.1Ω	1.1A
Efficiency	Vin=25V, Io=500mA	83.7%
Output Ripple With Optional Filter	Vin=25V, Io=500mA	40mVpp

4.External Current Boost Connections for Ic Peak Greater than 1.5A

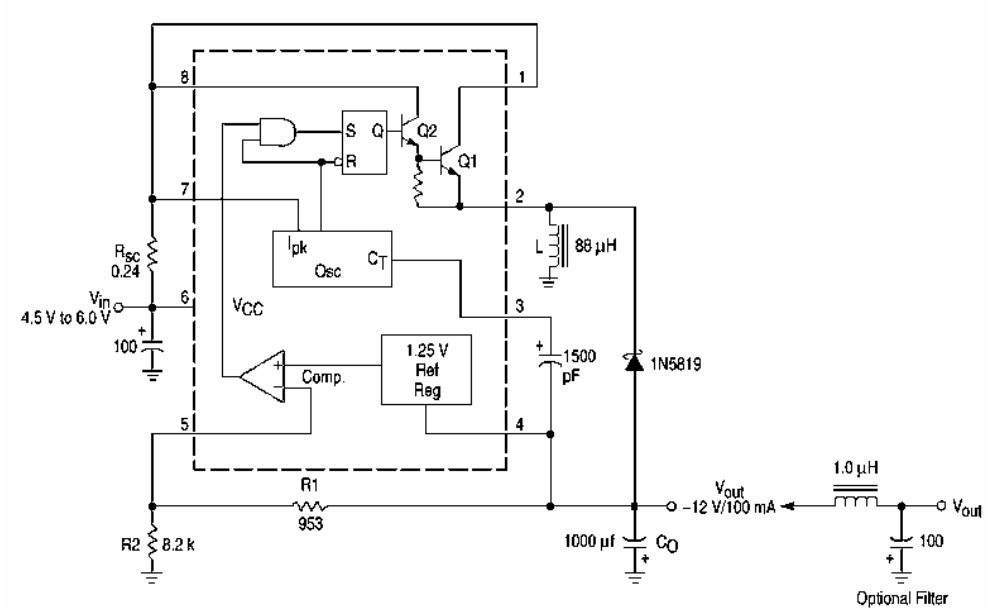
(1).External NPN Switch



(2) External NPN Saturated Switch



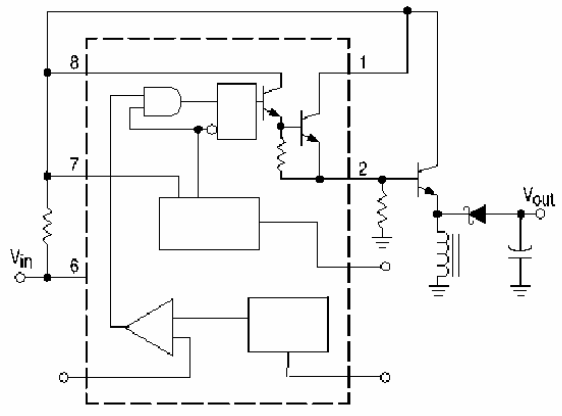
5. Voltage inverting converter



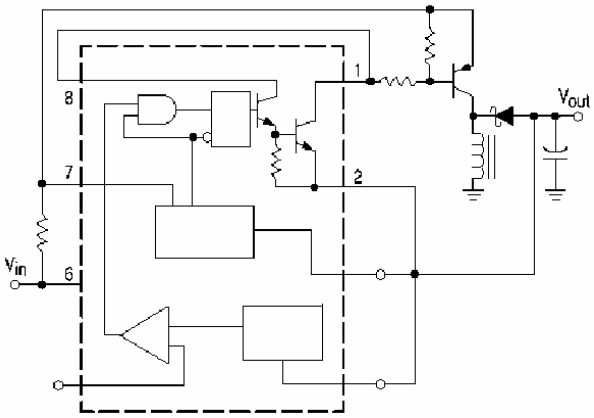
test	conditions	Results
Line Regulation	Vin=4.5~6.0V, Io=100mA	3.0mV=±0.012%
Load Regulation	Vin=5.0V,Io=10~100mA	3.0mV=±0.09%
Output Ripple	Vin=5.0V, Io=100mA	500mVpp
Short Circuit Current	Vin=5.0V,RL=0.1Ω	910mA
Efficiency	Vin=5.0V, Io=100mA	62.2%
Output Ripple With Optional Filter	Vin=5.0V, Io=100mA	70mVpp

6.External Current Boost Connections for Ic Peak Greater than 1.5A

(1).External NPN Switch

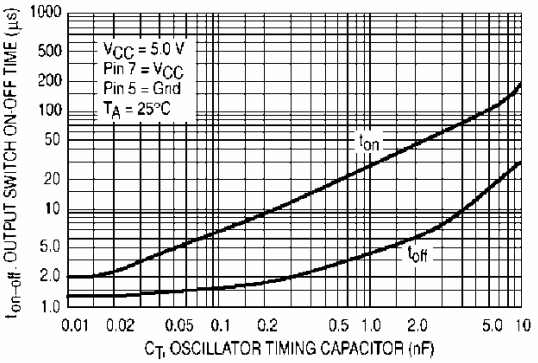


(2) External NPN Saturated Switch

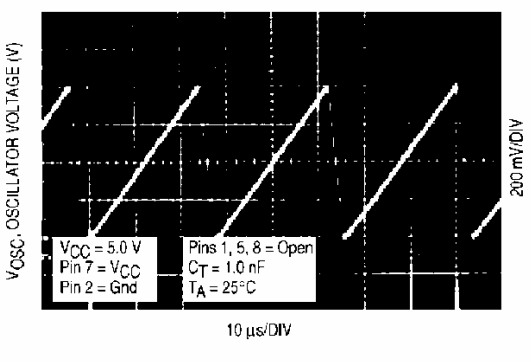


CHARACTERISTICS CURVES

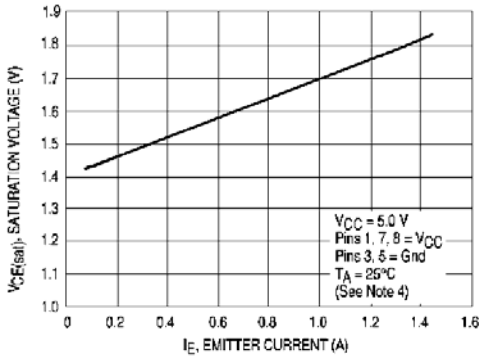
Output switch on-off time versus oscillator timing capacitor



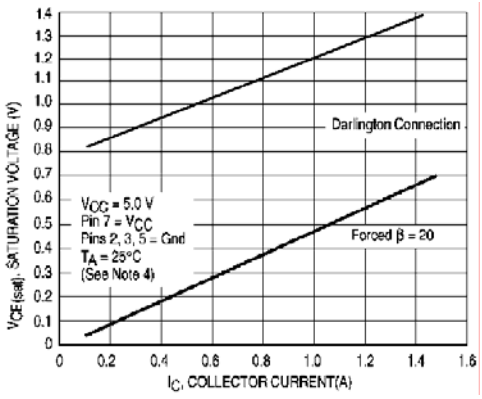
Timing capacitor waveform



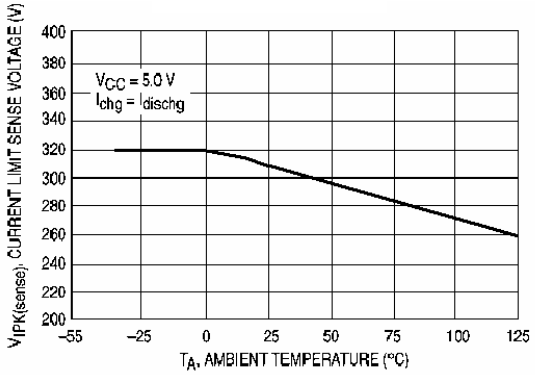
Emitter follower configuration output Saturation voltage versus emitter current



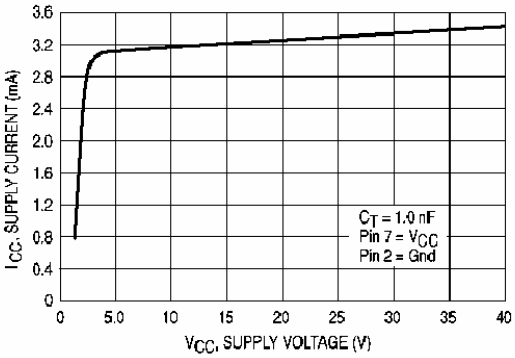
common emitter configuration output switch saturation voltage versus collector current



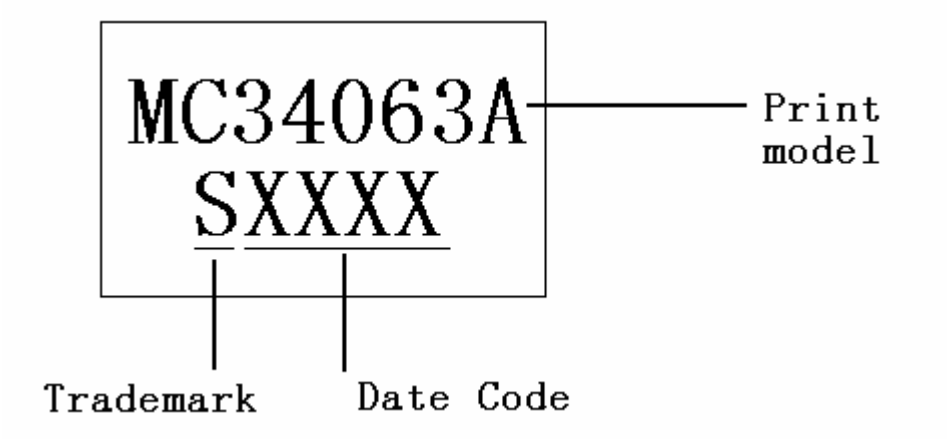
current limit sense voltage versus temperature



standby supply current versus supply voltage

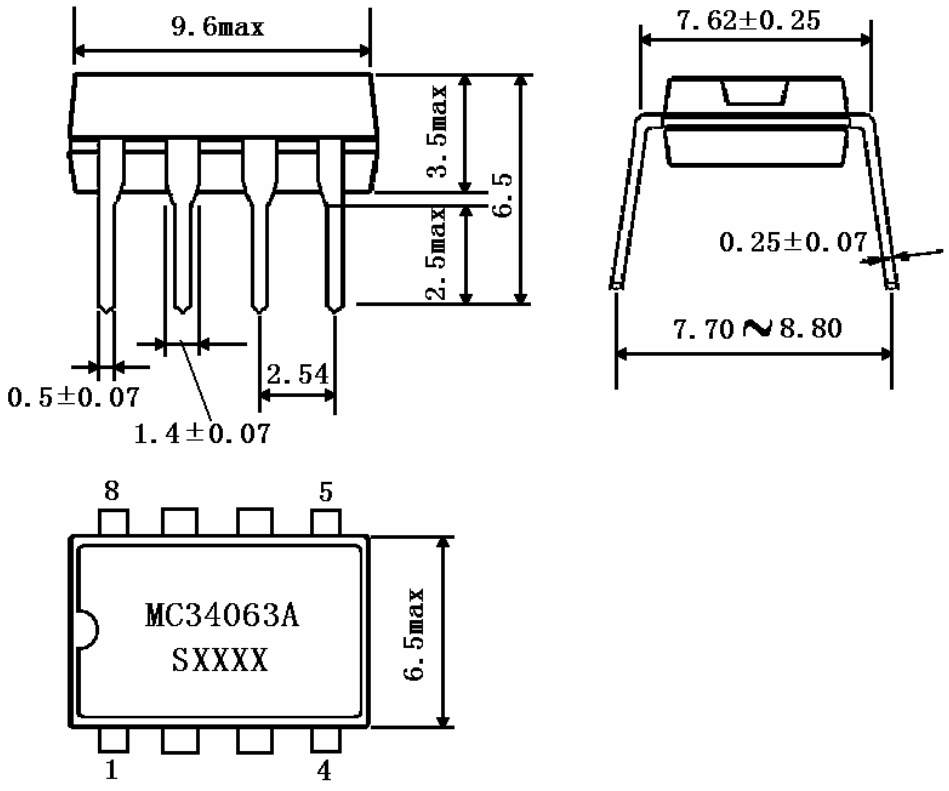


MARKING INFORMATION:

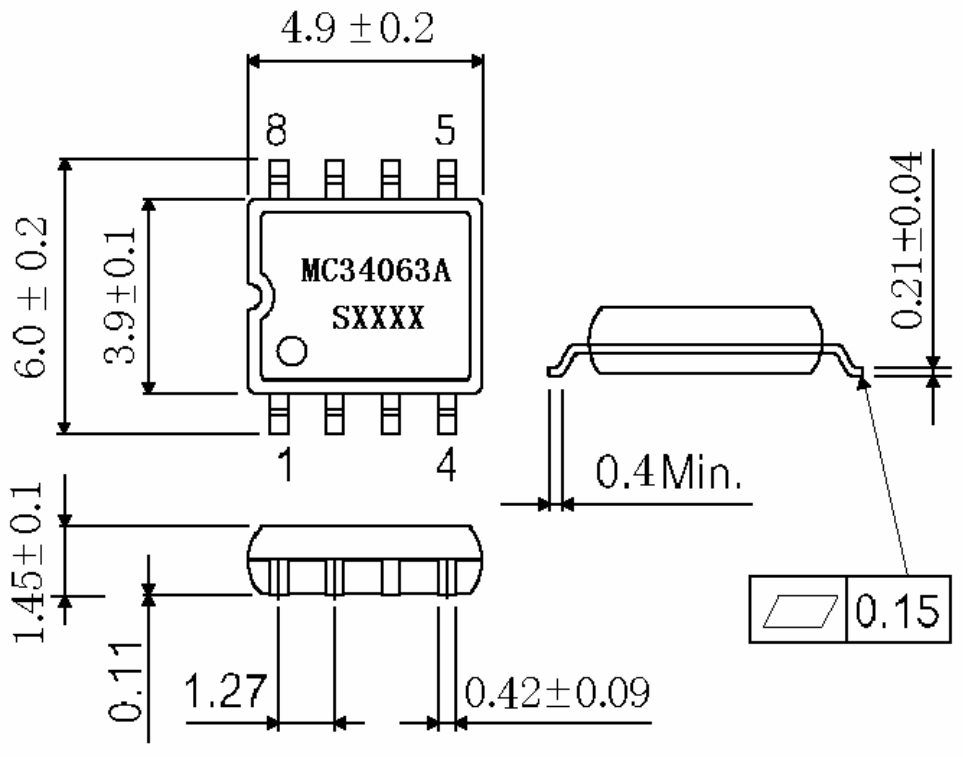


OUTLINE DRAWING

DIP8: Unit:mm



SOP8： Unit:mm


4.9 ±0.2
8
5
6.0 ± 0.2
3.9±0.1
MC34063A
SXXXX
1
4
0.21±0.04
0.4Min.
1.45±0.1
0.15
0.11
1.27
0.42±0.09