

Step-Down / Step-Up / Inverting DC-DC Converter

Primary characteristics		
Parameter	Value	Unit
Supply voltage	40	V
Power dissipation	780	mW

Description

The **MC34063A** is a monolithic switching regulator control circuit which contains 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.

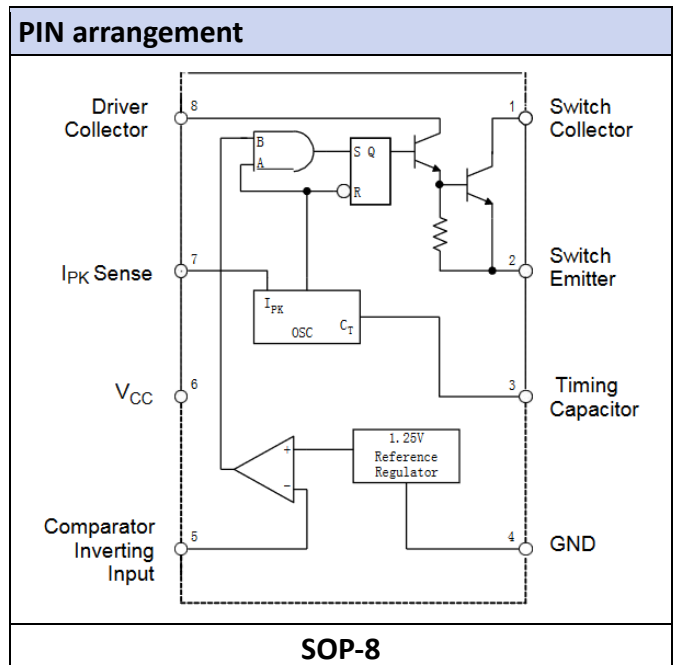
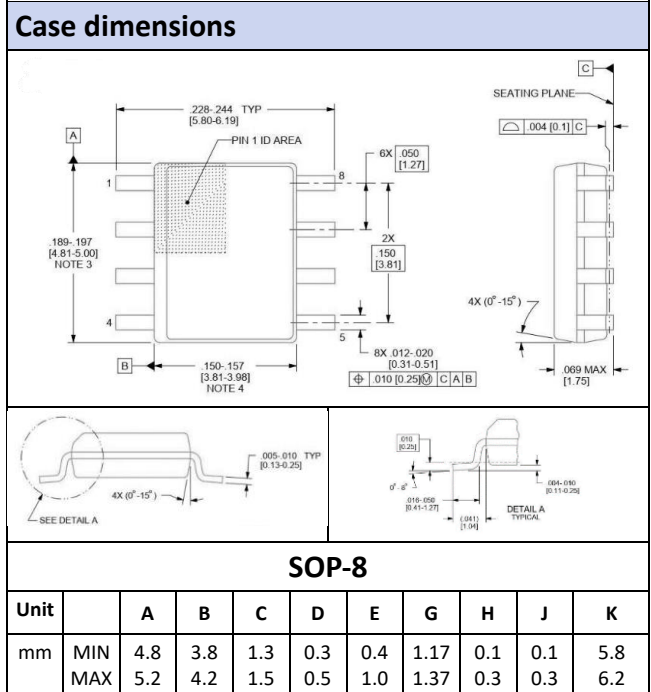
The **MC34063A** is specifically designed as a general DC-DC converter to be used in Step-Down, Step-Up and Voltage-Inverting applications with a minimum number of external components.

Features

- Pb-free and **RoHS** compliant
- **SOP-8** package for easy automatic insertion
- Operation from 3.0V to 36V input
- Low standby current
- Current limiting
- Output switch current to 1.5A
- Adjustable output voltage
- Operation frequency up to 180kHz
- Precision 2% reference

Applications

- Battery chargers
- ADSL modems
- Hubs
- Negative voltage power supplies



PIN description		
PIN number	PIN name	Function
1	Switch collector	Internal switch transistor collector
2	Switch emitter	Internal switch transistor emitter
3	Timing capacitor	Timing capacitor to control the switching frequency
4	GND	Ground pin for all internal circuits
5	Comparator inverting input	Inverting input pin for internal comparator
6	V _{CC}	Voltage supply
7	I _{PK} sense	Peak Current Sense Input by monitoring the voltage drop across an external current sense resistor to limit the peak current through the switch
8	Driver collector	Voltage driver collector

Absolute maximum ratings			
Parameter	Symbol	Value	Unit
Power supply voltage	V _{CC}	40	V
Comparator input voltage range	V _{IR}	-0.3 ~ 40	V
Switch collector voltage	V _C (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	V _C (driver)	40	V
Driver collector current (note 2)	I _C (driver)	100	mA
Switch current	I _{SW}	1.5	A
Power dissipation (T _A =25°C)	P _D	780	mW
Thermal resistance	Θ _{JA}	160	°C/W
Operating junction temperature	T _J	150	°C
Storage temperature range	T _{STG}	-65 ~ 150	°C
ESD (human body model)		2000	V
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			

Recommended operating conditions				
Parameter	Symbol	Value		Unit
		Min.	Max.	
Supply voltage	V _{CC}	3.0	36	V
Ambient temperature	T _A	-40	85	°C

Electrical characteristics
 $V_{CC}=5.0V, T_A=-40^{\circ}C \sim 85^{\circ}C$ unless otherwise specified

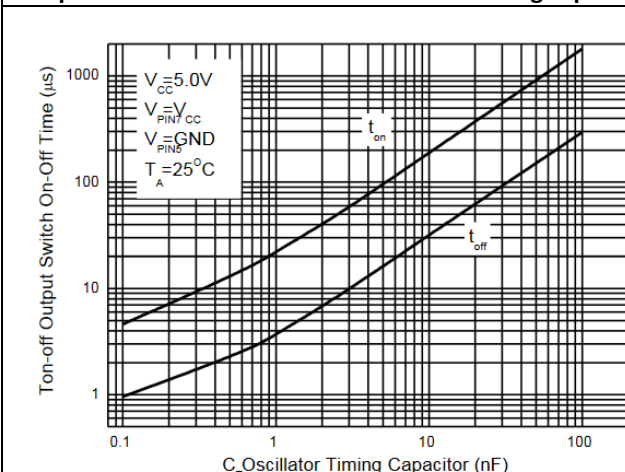
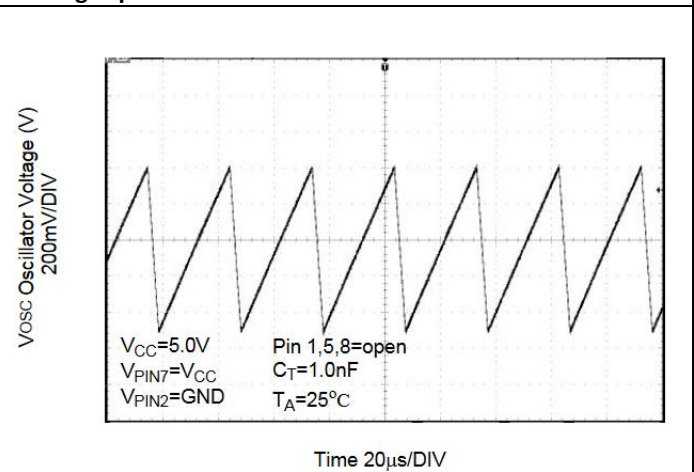
Parameter	Symbol	Test conditions	Value			Unit
			Min.	Typ.	Max.	
OSCILLATOR						
Frequency	f_{OSC}	$V_{PIN5}=0V, C_T=1.0nF, T_A=25^{\circ}C$	30	38	45	kHz
Charge current	I_{CHG}	$V_{CC}=5.0V$ to 36V, $T_A=25^{\circ}C$	30	38	45	μA
Discharge current	I_{DISCHG}	$V_{CC}=5.0V$ to 36V, $T_A=25^{\circ}C$	180	240	290	μA
Discharge to charge current ratio	I_{DISCHG}/I_{CHG}	Pin 7 to V_{CC} , $T_A=25^{\circ}C$	5.2	6.5	7.5	
Current limit sense voltage	$V_{IPK(sense)}$	$I_{CHG}=I_{DISCHG}, T_A=25^{\circ}C$	250	300	350	mV
OUTPUT SWITCH (note 3)						
Saturation voltage, Darlington connection	$V_{CE(sat)}$	$I_{SW}=1.0A$, PIN 1 and PIN 8 connected, common emitter	-	1.0	1.3	V
Saturation voltage (note 4)	$V_{CE(sat)}$	$I_{SW}=1.0A, R_{PIN8}=82\Omega$ to V_{CC} , forced $\beta=20$, common emitter	-	0.45	0.7	V
DC current gain	h_{FE}	$I_{SW}=1.0A, V_{CE}=5.0V, T_A=25^{\circ}C$	50	75	-	
Collector off-state current	$I_{C(off)}$	$V_{CE}=36V$	-	0.01	100	μA
COMPARATOR						
Threshold voltage	V_{TH}	$T_A=25^{\circ}C$	1.225	1.250	1.275	V
		$T_A=-40^{\circ}C \sim 85^{\circ}C$	1.210	1.250	1.290	
Threshold voltage line regulation	R_{EGLINE}	$V_{CC}=3.0V \sim 36V$	-	1.4	5.0	mV
Input bias current	I_{IB}	$V_{IN}=0V$	-	-20	-40	nA
TOTAL DEVICE						
Supply current	I_{CC}	$V_{CC}=5.0V \sim 36V, C_T=1.0nF, V_{PIN7}=V_{CC}, V_{PIN5}>V_{TH}, V_{PIN2}=GND$, other PINs open	-	-	4.0	mA

Notes:

- 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 ($\leq 300mA$) and high driver currents ($\geq 30mA$), it may take up to 2.0 μs for it 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:

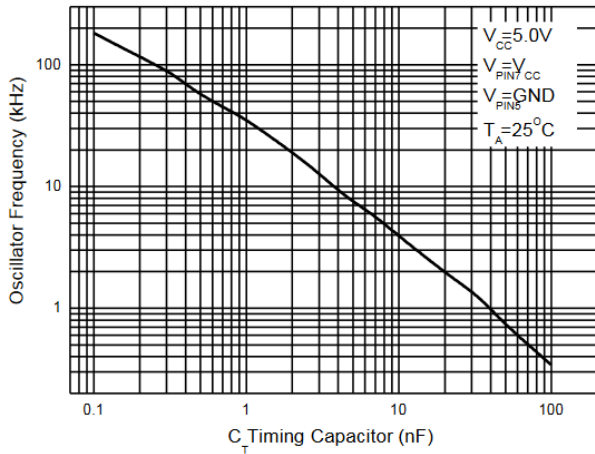
 Forced β of output switch: I_C output, I_C driver $\sim 7.0mA * \geq 10$

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

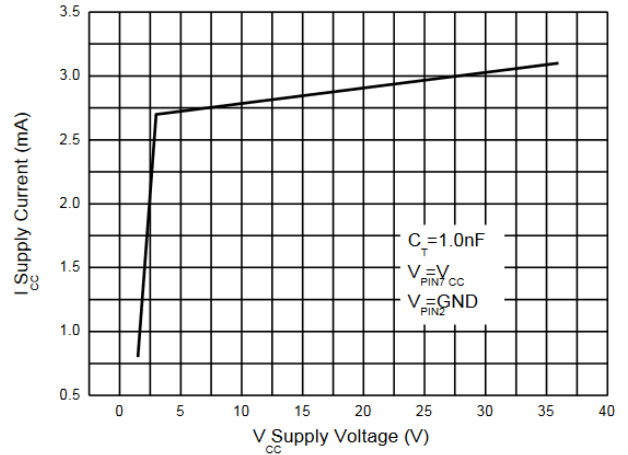
Typical performance characteristics
Output switch ON-OFF time vs. oscillator timing capacitor

Timing capacitor waveform


Typical performance characteristics

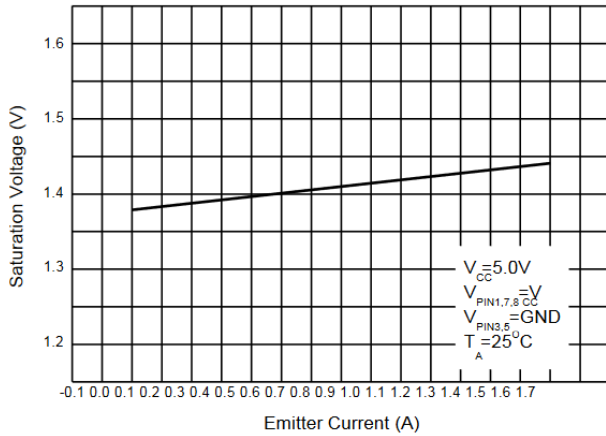
Oscillator frequency vs. timing capacitor



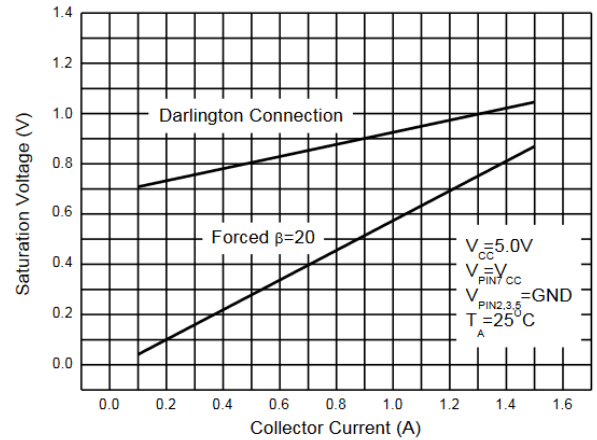
Standard supply current vs. supply voltage



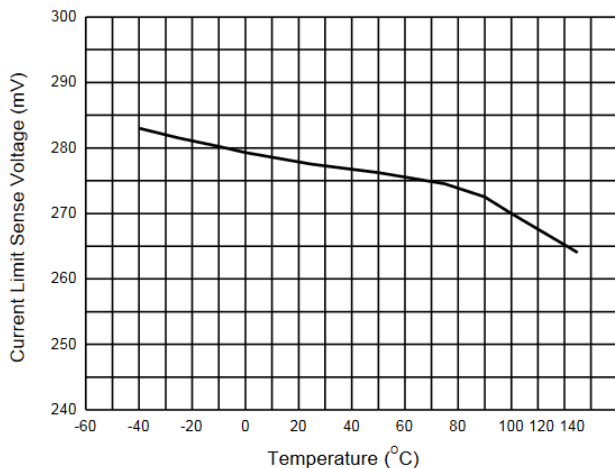
Emitter follower configuration output saturation voltage vs. emitter current



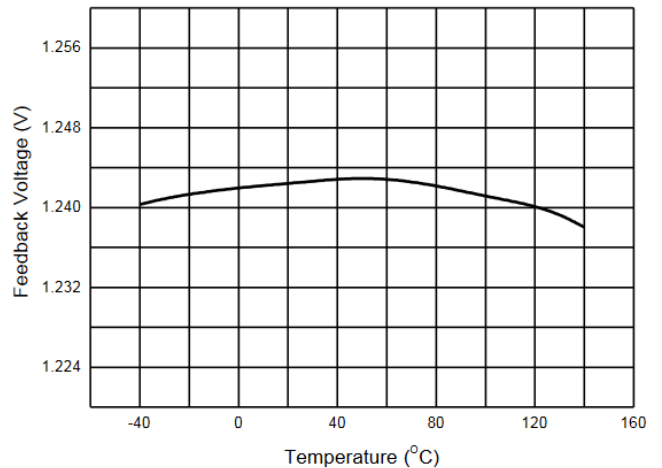
Common emitter configuration output switch saturation voltage vs. collector current



Current limit sense voltage vs. temperature

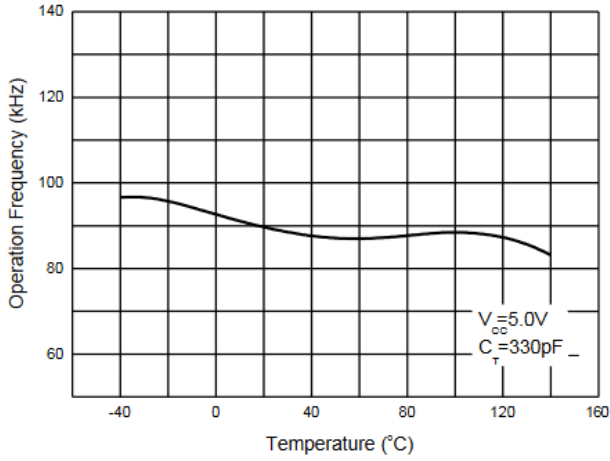


Feedback voltage vs. temperature

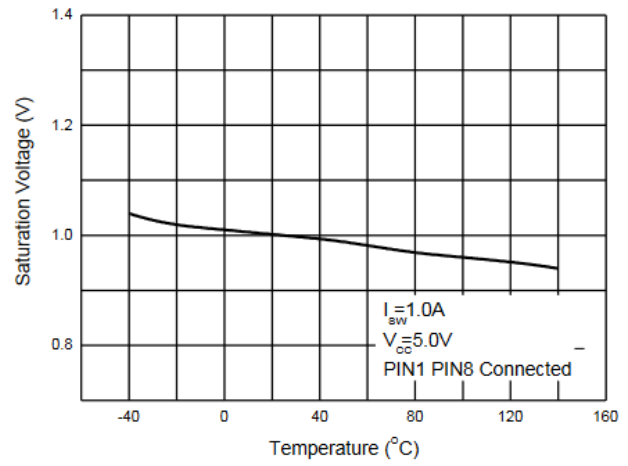


Typical performance characteristics

Operation frequency vs. temperature

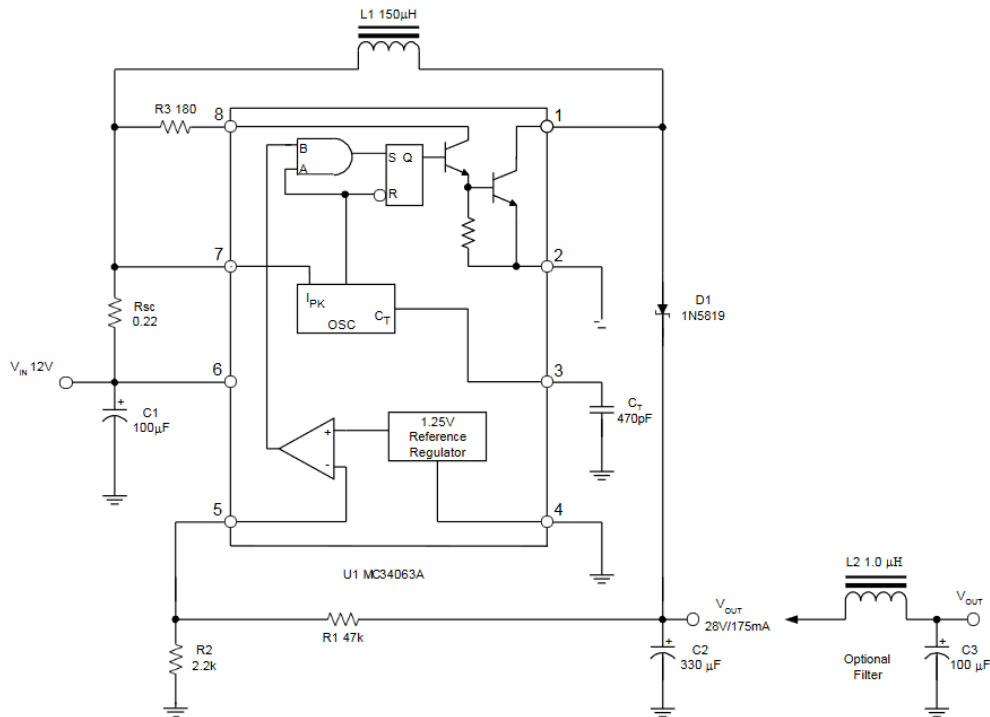


Saturation voltage vs. temperature



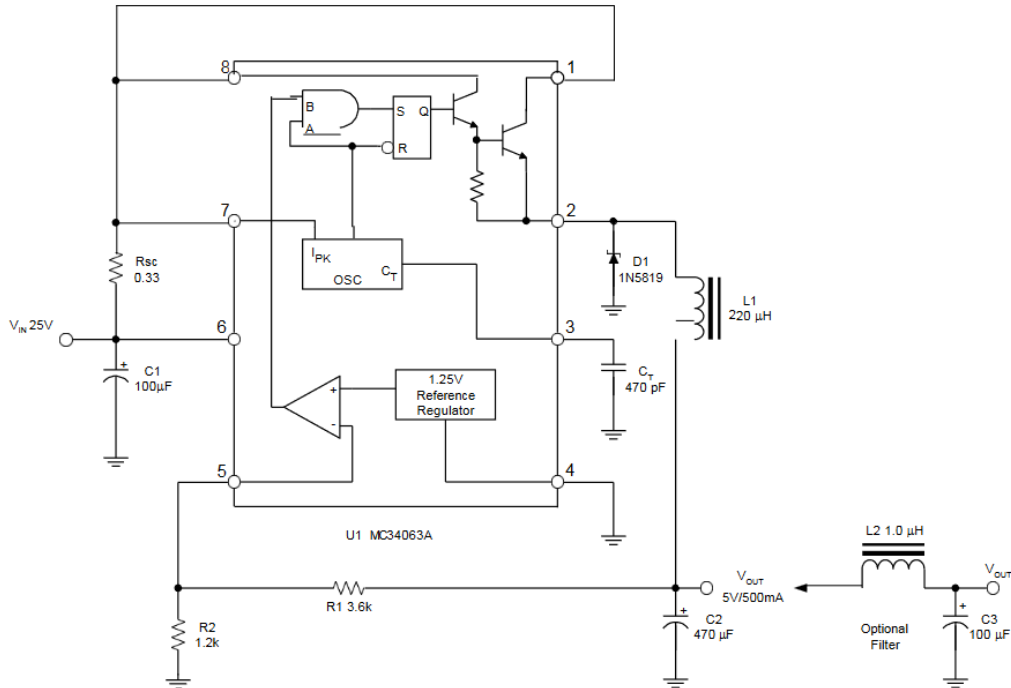
Typical applications

Step-up converter (note 5)

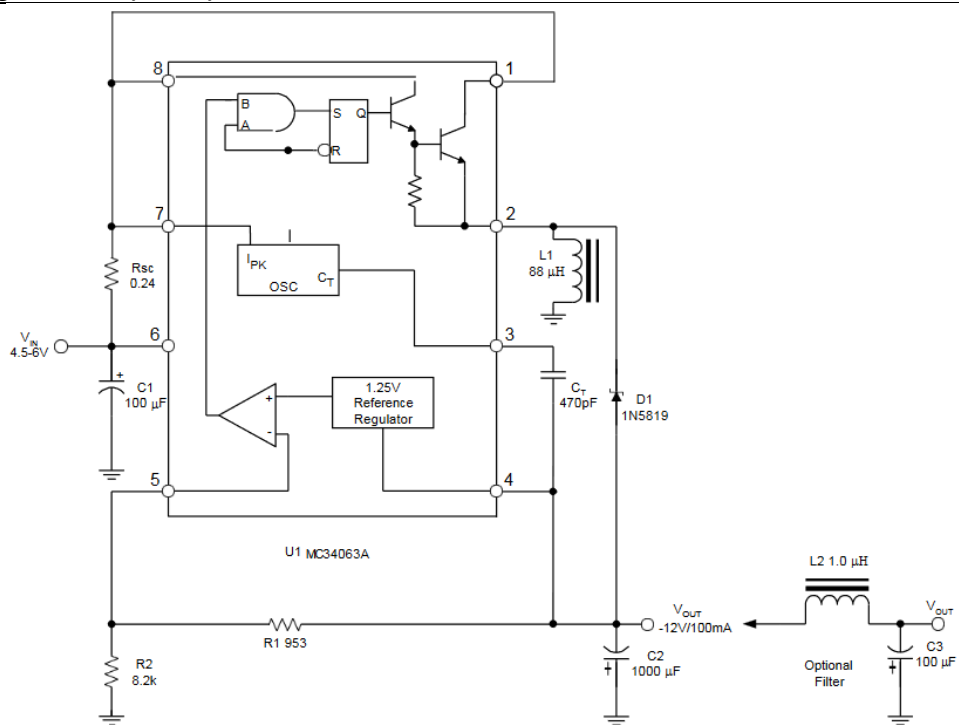


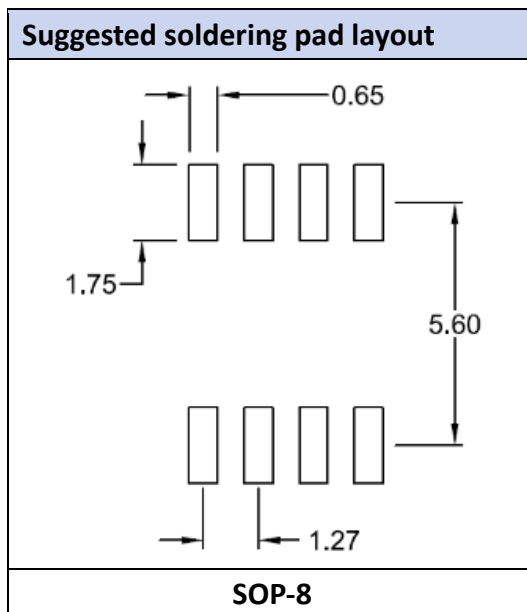
Typical applications

Step-down converter (note 6)



Voltage inverting converter (note 7)





Ordering information			
Part Number	Package	Shipping Quantity	Dimensions
MC34063A	SOP-8	2500 pcs / reel	---

Disclaimer

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