

AMC Doc. #: AMC34063_A
November 2001



AMC34063A

DC - DC CONVERTER CONTROL CIRCUITS

DESCRIPTION	FEATURES
The AMC34063A is designed for the applications which require DC - DC converters. It can be operated in a wide input range from 3.0V to 40V and has the controlled duty cycle oscillator, driver and high current output switch. Also, With the internal temperature compensation circuit, the AMC34063A provides an internally trimmed precision 2% reference voltage of 1.25V. These features make the AMC34063A suitable for step-up, step-down and voltage-inverting applications.	■ Wide Input Operating Range: 3.0V to 40V ■ Output Switch Current up to 1.5A ■ 100KHz operational Frequency ■ Low Standby Current □ Internally trimmed 2% 1.25V Reference Voltage □ Adjustable Output Voltage □ Available in 8 Pin Plastic DIP and 8 Pin S.O Packages □ Direct pin-to-pin replacement for industrial product MC34063A.

APPLICATIONS	PACKAGE PIN OUT
□ Chargers □ Adaptors □ Mother Board □ Scanner	M PACKAGE (TOP VIEW) DM PACKAGE (TOP VIEW)

ORDER INFORMATION			
T_A (°C)	M	Plastic DIP 8-pin	DM Plastic SO-8 8-pin
0 to 70		AMC34063AM	AMC34063ADM
Note: All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e. AMC34063ADMT).			

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage (V_{CC})	40V
Operating Junction temperature	
Plastic (M, DM Package)	150 °C
Storage Temperature Range	-65 °C to 150 °C
Lead temperature (Soldering, 10 seconds)	300 °C

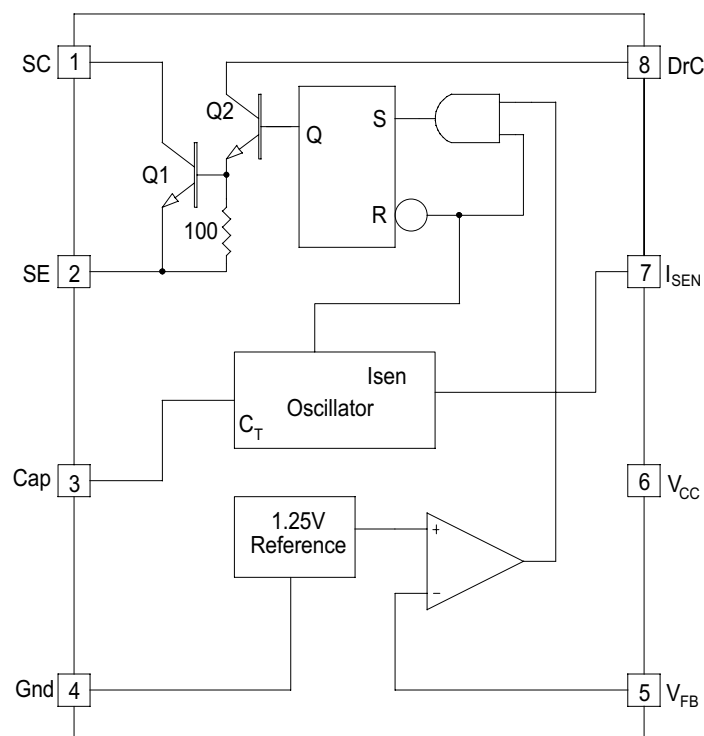
Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground.
Currents are positive into, negative out of the specified terminal.

THERMAL DATA**M PACKAGE:**

Thermal Resistance-Junction to Ambient, θ_{JA}	95 °C/W
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DM PACKAGE:

Thermal Resistance-Junction to Ambient, θ_{JA}	165 °C/W
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BLOCK DIAGRAM**Pin Assignment Descriptions**

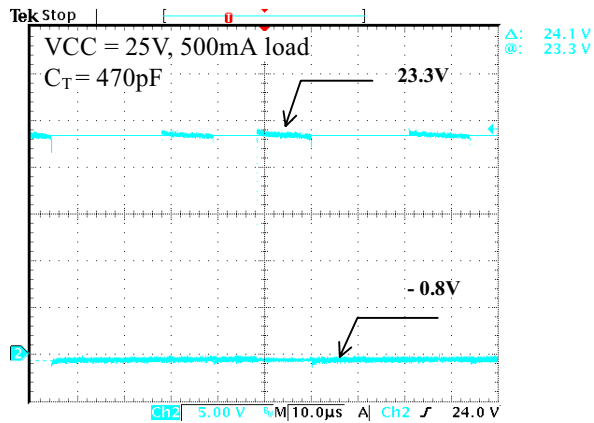
Pin 1 : SC - Switch Collector	Pin 8 : DrC - Driver Collector
Pin 2 : SE - Switch Emitter	Pin 7 : I_{SEN} - I Peak Sense
Pin 3 : Cap - Oscillator Timing Capacitor	Pin 6 : V_{CC} - Power Supply
Pin 4 : Gnd - Ground	Pin 5 : V_{FB} - Comparator inverting input

RECOMMENDED OPERATING CONDITIONS					
Parameter	Symbol	Recommended Operating			Units
		Min.	Typ.	Max.	
Comparator Input Voltage	V_{FB}	-0.3 to +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 1)	$I_{C(driver)}$			100	mA
Switch Current	I_{SW}			1.5	A
Timing Capacitor (connected to Cap pin)	C_T		1		nF
Operating Ambient Temperature Range	T_A	0 to +70			°C

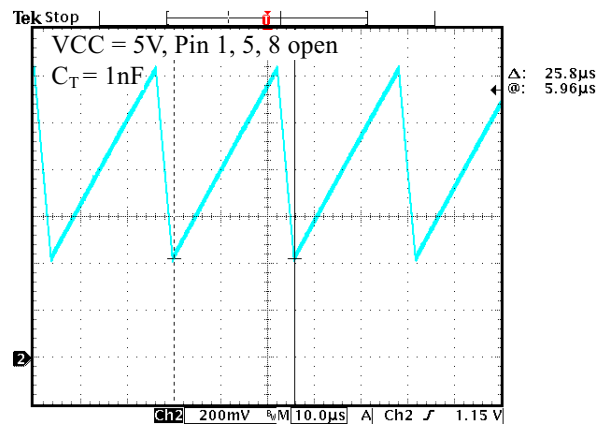
Note 1: Maximum package power dissipation limits must be observed.

ELECTRICAL CHARACTERISTICS						
V _{CC} =5.0 V, T _A =0°C to 70°C, unless otherwise specified.						
Parameter	Symbol	Test Conditions	AMC34063A			Units
			Min.	Typ.	Max.	
OSCILLATOR						
Frequency	f _{osc}	V _{Pin 5} = 0 V, C _T = 1.0 nF, T _A = 25 °C	24	33	42	KHz
Charge Current	I _{chg}	V _{CC} = 5.0 V to 40 V, T _A = 25 °C	24	35	42	μA
Discharge Current	I _{dischg}	V _{CC} = 5.0 V to 40 V, T _A = 25 °C	140	220	260	μA
Discharge to Charge Current Ratio	I _{dischg} /I _{chg}	Pin 7 to V _{CC} , T _A = 25 °C	5.2	6.5	7.5	-
Current Limit Sense Voltage	V _{sense}	I _{chg} = I _{dischg} , T _A = 25 °C	250	300	350	mV
OUTPUT SWITCH						
Saturation Voltage, Darlington Connection	V _{CE(sat)}	I _{SW} = 1.0 A, Pins 1, 8 connected	-	1.0	1.3	V
Saturation Voltage	V _{CE(sat)}	I _{SW} = 1.0 A, R _{pin 8} =82 Ω to V _{CC} , Forced β = 20	-	0.45	0.7	V
DC Current Gain	h _{FE}	I _{SW} = 1.0 A, V _{CE} = 5.0 V, T _A = 25 °C	50	75	-	-
Collector Off—State Current	I _{C(off)}	V _{CE} = 40 V	-	0.01	100	μA
COMPARATOR						
Threshold Voltage	V _{th}	T _A = 25 °C	1.225	1.25	1.275	V
		T _A =0 °C to 70 °C	1.21	-	1.29	
Threshold Voltage Line Regulation	Reg _{line}	V _{CC} = 3.0 V to 40 V	-	1.4	5.0	mV
Input Bias Current	I _{IB}	V _{FB} = 0 V	-	-20	-400	nA
TOTAL DEVICE						
Supply current	I _{CC}	V _{CC} = 5.0 V to 40 V, C _T = 1.0nF, Pin 7 = V _{CC} , V _{FB} > V _{th} , Pin 2= Gnd, remaining pins open	-	-	4.0	mA

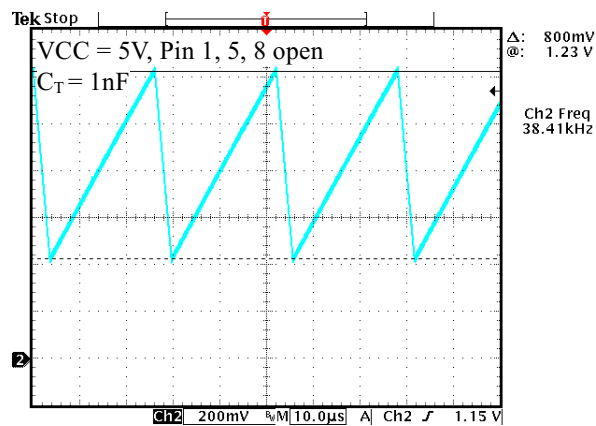
CHARACTERIZATION CURVES



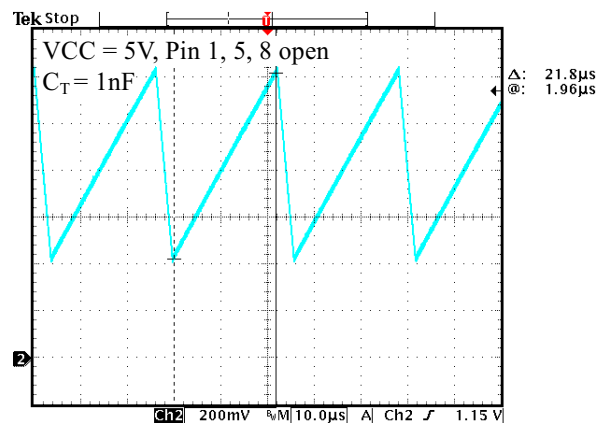
SE pin (PIN#2) waveform
on 5V step down converter



Cap pin (PIN#3) waveform



Cap pin (PIN#3) waveform



Cap pin (PIN#3) waveform

Figure 1 – Step-Up Converter Application Circuits

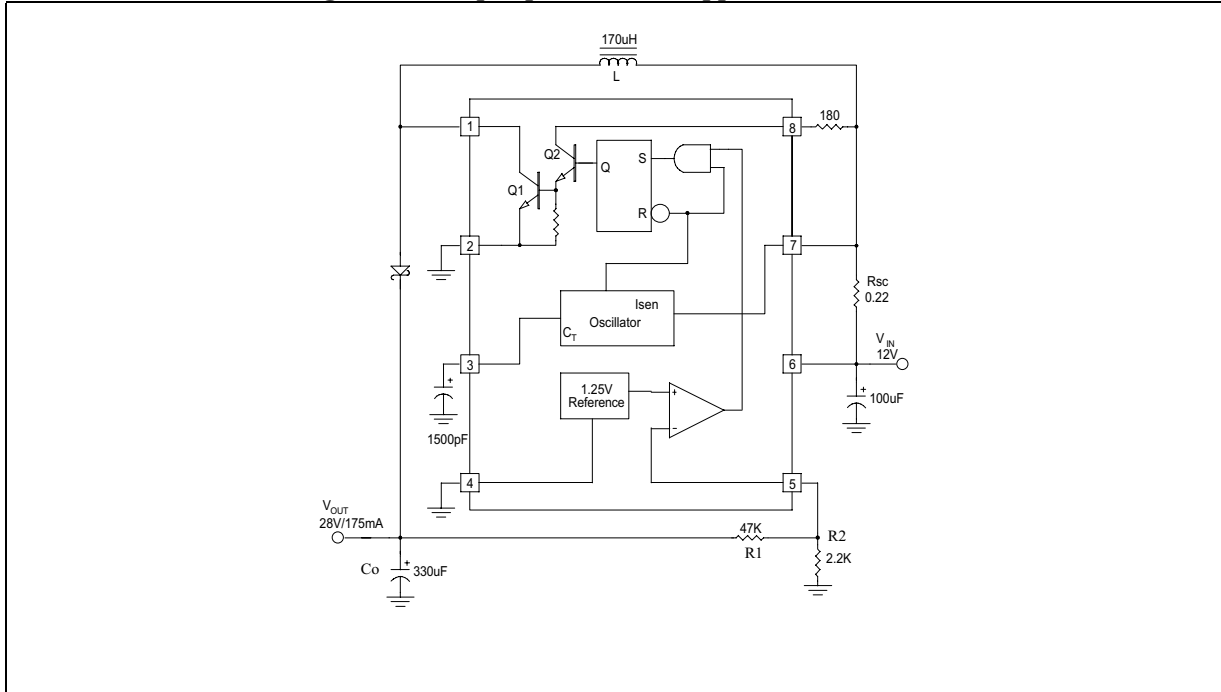
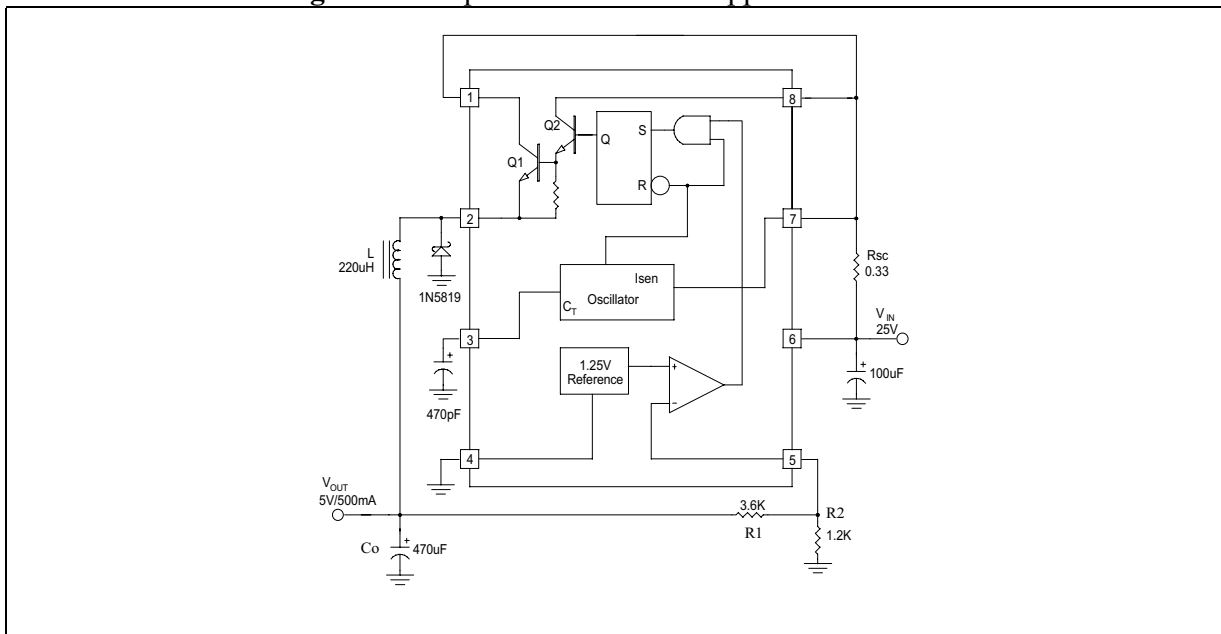


Figure 2 – Step-Down Converter Application Circuit



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Typical Design Reference Table:

Calculation	Step-Down	Step-Up	Voltage-Inverting
t_{on}/t_{off}	$\frac{V_{out} + V_F}{V_{in(min)} - V_{sat} - V_{out}}$	$\frac{V_{out} + V_F - V_{in(min)}}{V_{in(min)} - V_{sat}}$	$\frac{ V_{out} + V_F}{V_{in} - V_{sat}}$
$t_{on} + t_{off}$	$\frac{1}{f}$	$\frac{1}{f}$	$\frac{1}{f}$
t_{off}	$\frac{t_{on} + t_{off}}{t_{on}/t_{off} + 1}$	$\frac{t_{on} + t_{off}}{t_{on}/t_{off} + 1}$	$\frac{t_{on} + t_{off}}{t_{on}/t_{off} + 1}$
t_{on}	$(t_{on} + t_{off}) - t_{off}$	$(t_{on} + t_{off}) - t_{off}$	$(t_{on} + t_{off}) - t_{off}$
C_T	$4.0 \times 10^{-5} t_{on}$	$4.0 \times 10^{-5} t_{on}$	$4.0 \times 10^{-5} t_{on}$
$I_{pk(switch)}$	$2I_{out(max)}$	$2I_{out(max)} (t_{on}/t_{off} + 1)$	$2I_{out(max)} (t_{on}/t_{off} + 1)$
R_{SC}	$0.3/I_{pk(switch)}$	$0.3/I_{pk(switch)}$	$0.3/I_{pk(switch)}$
$L_{(min)}$	$\left(\frac{(V_{in(min)} - V_{sat} - V_{out})}{I_{pk(switch)}} \right) t_{on(max)}$	$\left(\frac{(V_{in(min)} - V_{sat})}{I_{pk(switch)}} \right) t_{on(max)}$	$\left(\frac{(V_{in(min)} - V_{sat})}{I_{pk(switch)}} \right) t_{on(max)}$
C_O	$\frac{I_{pk(switch)} (t_{on} + t_{off})}{8V_{ripple(pp)}}$	$9 \frac{I_{out} t_{on}}{V_{ripple(pp)}}$	$9 \frac{I_{out} t_{on}}{V_{ripple(pp)}}$

V_F : Forward Voltage drop of the output rectifier

V_{sat} : Saturation voltage of the output switch.

The following power supply characteristics must be chosen:

V_{in} - Nominal input voltage

V_{out} - Desired output voltage, $|V_{out}| = 1.25(1 + R1/R2)$

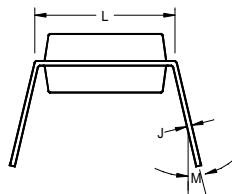
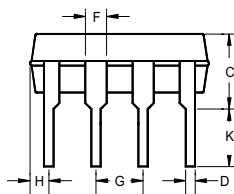
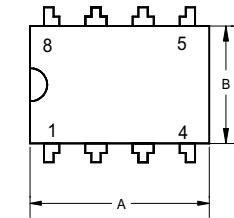
I_{out} - Desired output current.

f_{min} - Minimum desired output switching frequency at the selected values of V_{in} and I_O

$V_{ripple(pp)}$ - Desired peak – to – peak output ripple voltage.

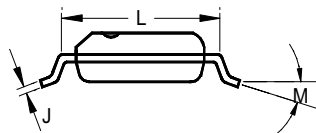
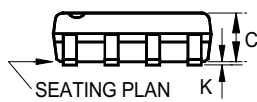
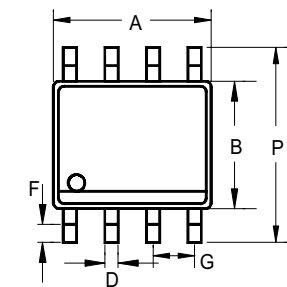
Application concerns:

To get the best regulation performance, Low ESR capacitors at V_{out} are suggested.

8-Pin Plastic DIP

	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.355	0.365	0.400	9.02	9.27	10.16
B	0.240	0.250	0.280	6.10	6.35	7.11
C	-	-	0.210	-	-	5.33
D	-	0.018	-	-	0.46	-
F	-	0.060	-	-	1.52	-
G	-	0.100	-	-	2.54	-
H	0.050	-	0.090	1.27	-	2.29
J	0.008	-	0.015	0.20	-	0.38
K	0.115	0.130	0.150	2.92	3.30	3.81
L	0.300 BSC.			7.62 BSC.		
M	-	7°	15°	-	7°	15°

Note: For 8-pin Plastic package, 60 units per tube

8-Pin Plastic S.O.I.C.

	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.183	-	0.202	4.65	-	5.13
B	0.144	-	0.163	3.66	-	4.14
C	0.068	-	0.074	1.73	-	1.88
D	0.010	-	0.020	0.25	-	0.51
F	0.015	-	0.035	0.38	-	0.89
G	0.050 BSC			1.27 BSC		
J	0.007	-	0.010	0.19	-	0.25
K	0.005	-	0.010	0.13	-	0.25
L	0.189	-	0.205	4.80	-	5.21
M	-	-	8°	-	-	8°
P	0.228	-	0.244	5.79	-	6.20

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