DESCRIPTION

The A34063 series is a monolithic control circuit that integrates the primary functions required for DC-to-DC converter applications.

It includes an internal temperature-compensated reference, comparator, controlled-duty-cycle oscillator with an active current-limit circuit, driver, and a high-current output switch.

This series is specifically designed for step-down, step-up, and voltage-inverting applications, requiring only a minimal number of external components.

The A34063 is available in SOP8, MSOP8, and DIP8 packages.

ORDERING INFORMATION

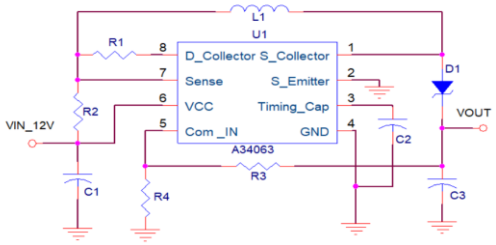
Package Type	Part Number	
SOP8 SPQ: 2,500pcs/Reel	M8	A34063M8R
MSOP8 SPQ: 2,500pcs/Reel	MS8	A34063MS8R
DIP8 SPQ: 2,000pcs/Box	P8	A34063P8U
Note	R: Tape & Reel U: Tube	
AiT provides all RoHS products		

FEATURES

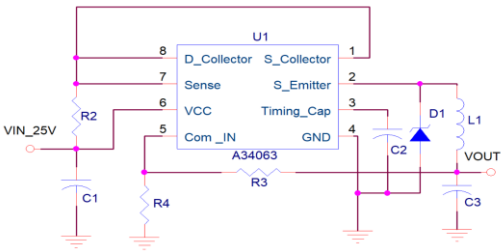
- Operation from 3.0V to 40V input
- Low standby current
- Current limiting
- Output switch current up to 1.5A
- Adjustable output voltage
- Operation at frequencies up to 100kHz
- Precision reference (2%)
- Available in SOP8, MSOP8, and DIP8 Packages

TYPICAL APPLICATION

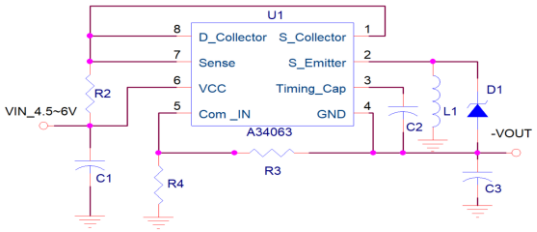
Step-Up Converter



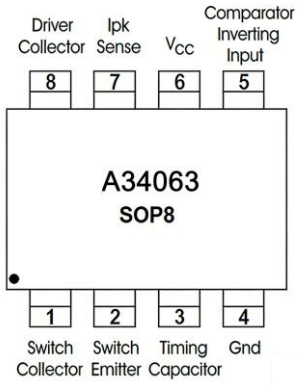
Sept -Down Converter



Voltage Inverting

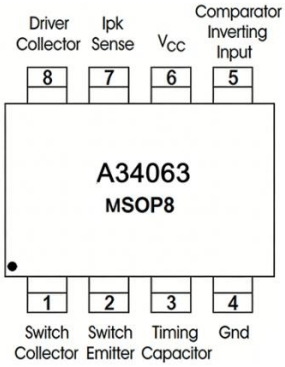


PIN DESCIPTION



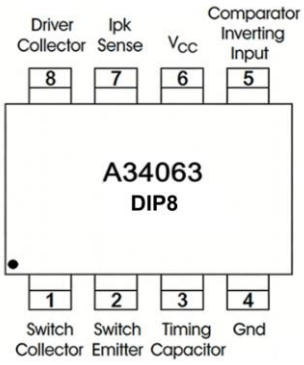
SOP8, M8

Top View



MSOP8, MS8

Top View



DIP8, P8

Top View

Pin	#	Type	Description
Switch Collector	1	I/O	High-current internal switch collector input.
Switch Emitter	2	I/O	High-current internal switch emitter output.
Timing Capacitor	3	-	Connect to a timing capacitor to change the switching frequency.
GND	4	Power	Ground
Comparator Inverting Input	5	I	Connect to a resistor divider network to create a feedback loop.
V_{CC}	6	Power	Logic supply voltage.
I_{PK} Sense	7	I	Current-limit sense input.
Driver Collector	8	I/O	Darlington pair driving transistor collector input.

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise specified.

V_{CC}, Power Supply Voltage	40V
V_{IR}, Comparator Input Voltage Range	-0.3V ~ +40V
$V_{C(Switch)}$, Switch Collector Voltage	40V
$V_{E(Switch)}$, Switch Emitter Voltage (VPin1=40V)	40V
$V_{CE(Switch)}$, Switch Collector-to-Emitter Voltage	40V
$V_{C(Driver)}$, Driver Collector Voltage	40V
$I_{C(Driver)}$, Driver Collector Current *	100mA
I_{Sw}, Switch Current	1.5A
T_J, Operating Junction Temperature	150℃
T_A, Operating Ambient Temperature Range	-40℃ ~ +85℃
T_{STG}, Storage Temperature Range	-65℃ ~ +150℃
ESD (HBM)	2500V
T_L, Lead Temperature (Soldering, 10 seconds)	245℃

Stresses above 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 in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

V_{CC}=5V, T_A=T_{Low} to T_{High},, unless otherwise specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OSCILLATOR						
Frequency	f_{osc}	V_{Pin5}=0V, C_T=1.0nF, T_A=25℃	24	33	42	kHz
Charge Current	I_{chg}	V_{CC}=5V ~ 40V, T_A=25℃	24	35	42	μA
Discharge Current	I_{dischg}	V_{CC}=5V ~ 40V, T_A=25℃	140	220	260	μA
Discharge-To-Charge Current Ratio	I_{dischg}/I_{chg}	V_{Pin7} to V_{CC}, T_A=25℃	5.20	6.50	7.50	-
Current Limit Sense Voltage	$V_{Ipk(sense)}$	I_{chg}=I_{dischg}, T_A=25℃	250	300	350	mV
OUTPUT SWITCH						
Saturation Voltage, Darlington Connection	$V_{CE\ (sat)}$	I_{Sw}=1.0A, Pins1and Pin8 connected	-	1	1.30	V
Saturation Voltage, Darlington Connection	$V_{CE\ (sat)}$	I_{Sw}=1.0A, R_{Pin8}=82Ω to V_{CC}, forced β~20	-	0.45	0.70	V
DC Current Gain	h_{FE}	I_{SW}=1.0A, V_{CE}=5.0V, T_A=25℃	50	75	-	V
Collector Off-State Current	$I_{C(off)}$	V_{CE}=40V	-	1	100	μA
COMPARATOR						
Threshold Voltage	V_{th}	T_A=25℃	1.225	1.25	1.275	V
		Full range	1.21	-	1.29	
Threshold Voltage Line Regulation	Reg_{line}	V_{CC}=3.0V ~ 40V	-	1.4	5	mV
Input Bias Current	I_{IB}	V_{IN}=0V	-	-20	-400	nA
TOTAL DEVICE						
Supply Current	I_{CC}	V_{CC}=5.0V to 40V, C_T=1.0nF, V_{Pin7}=V_{CC}, V_{Pin5}>V_{th}, V_{Pin2} =GND, remaining pins - open	-	-	4	mA

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Output Switch On-Off Time Versus

Fig 2. Timing Capacitor Waveform

Oscillator Timing Capacitor

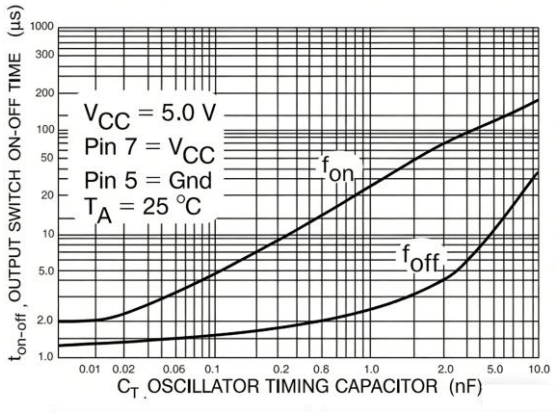


Fig.3. Emitter Follower Configuration Output Saturation Voltage Versus Emitter Current

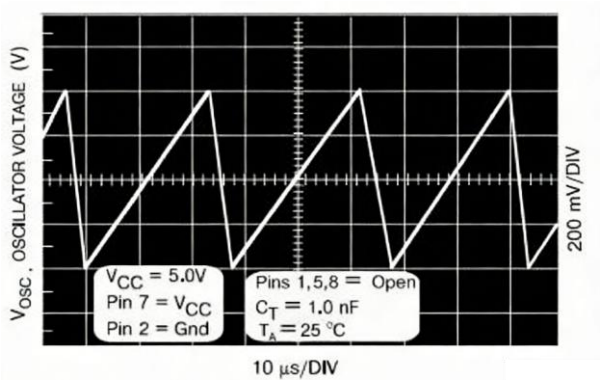


Fig 4. Common Emitter Configuration Output Saturation Voltage Versus Collector Current

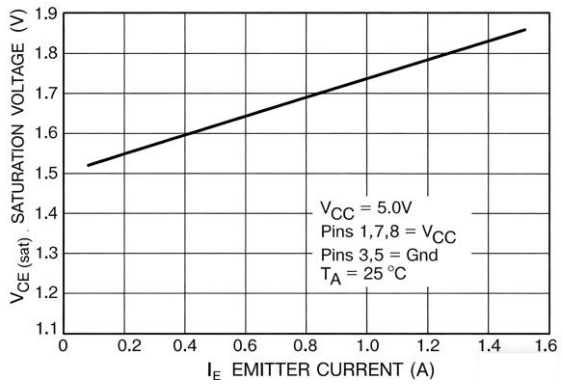


Fig 5. Current Limit Sense Voltage Versus Temperature

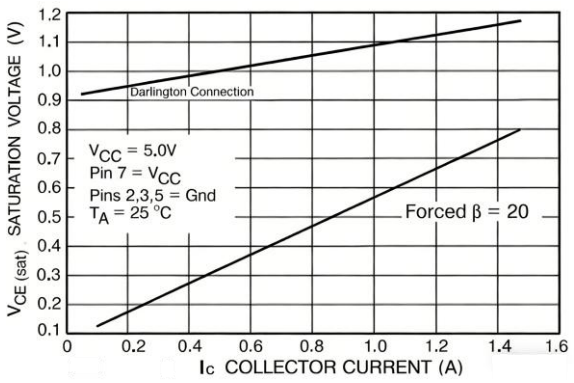
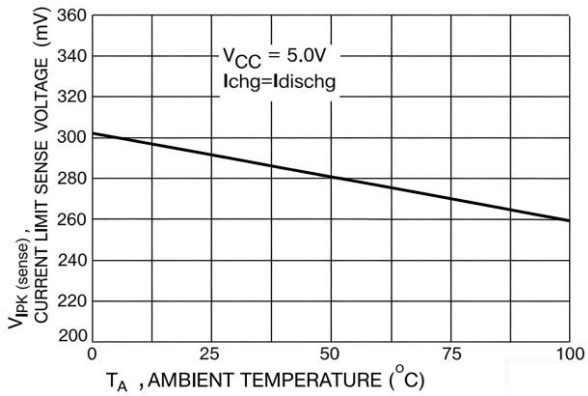
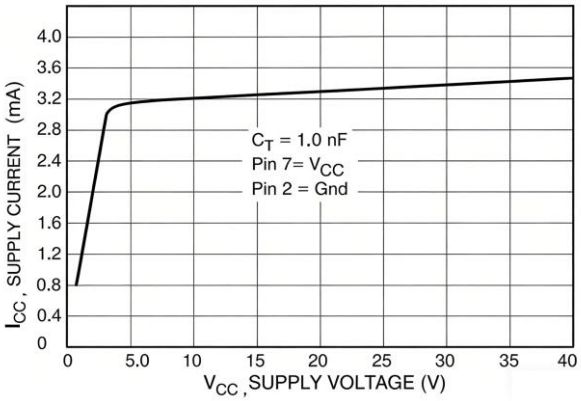


Fig 6. Standby Supply Current Versus Supply Voltage





APPLICATION INFORMATION

Fig 1. Step– Up converter

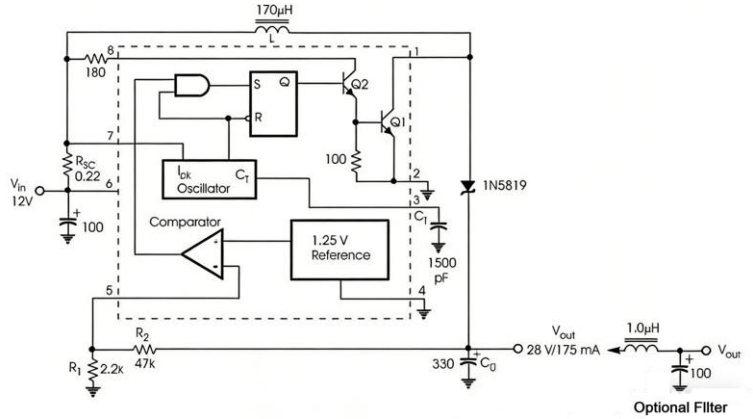


Fig 2. External current boost connections for I_C Peak greater than 1.5A

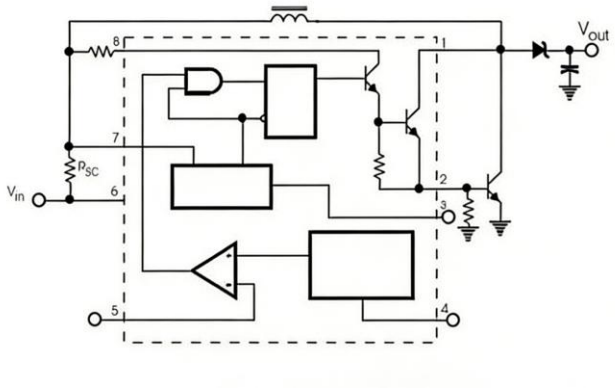


Fig2-a External NPN Switch

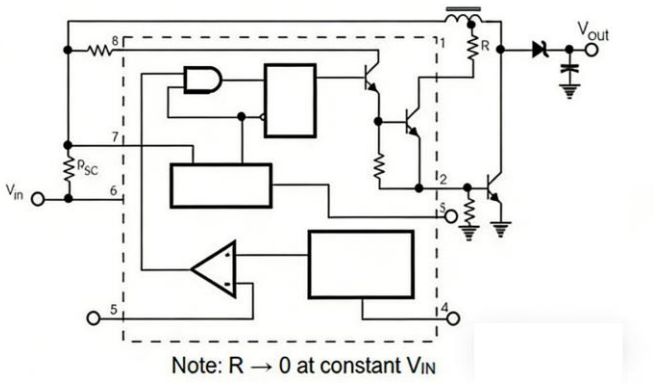


Fig2-b External NPN Saturated Switch

Fig 3. Step-down Converter

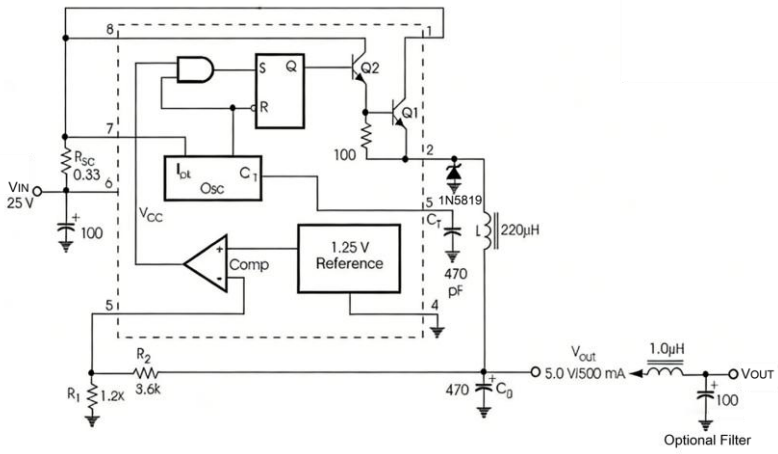


Fig 4. External current Buck connections for I_C Peak greater than 1.5A

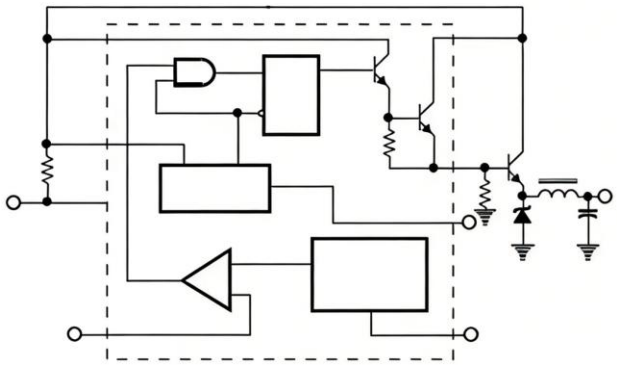


Fig4-a External NPN Switch

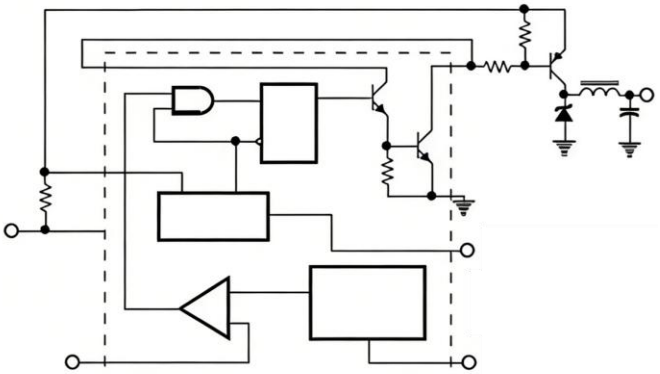


Fig4-b External PNP Saturated Switch

Fig 5. Voltage inverting converter

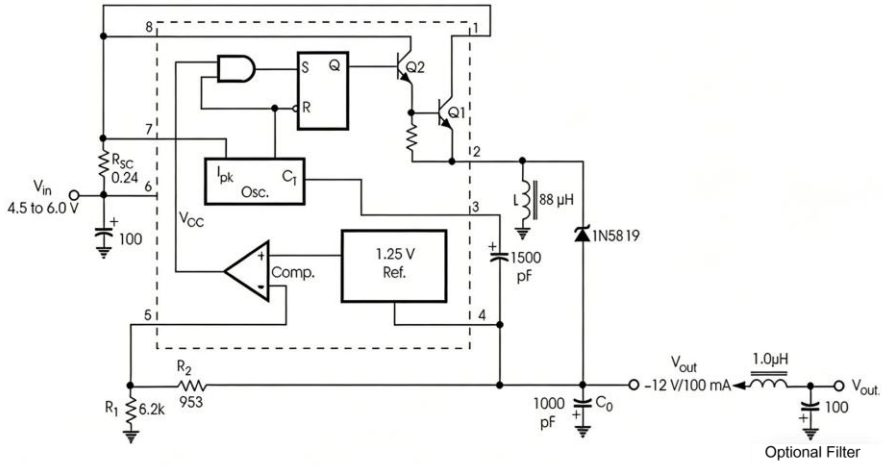


Fig 6. External Voltage Inverting regulator connections for IC Peak greater than 1.5A

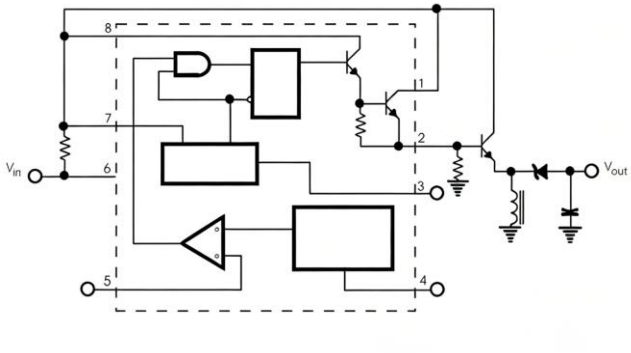


Fig6-a External NPN Switch

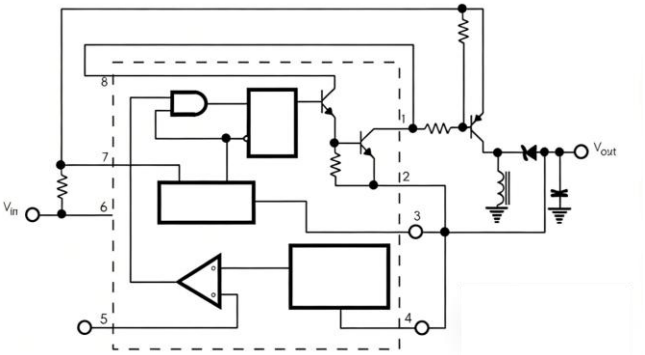
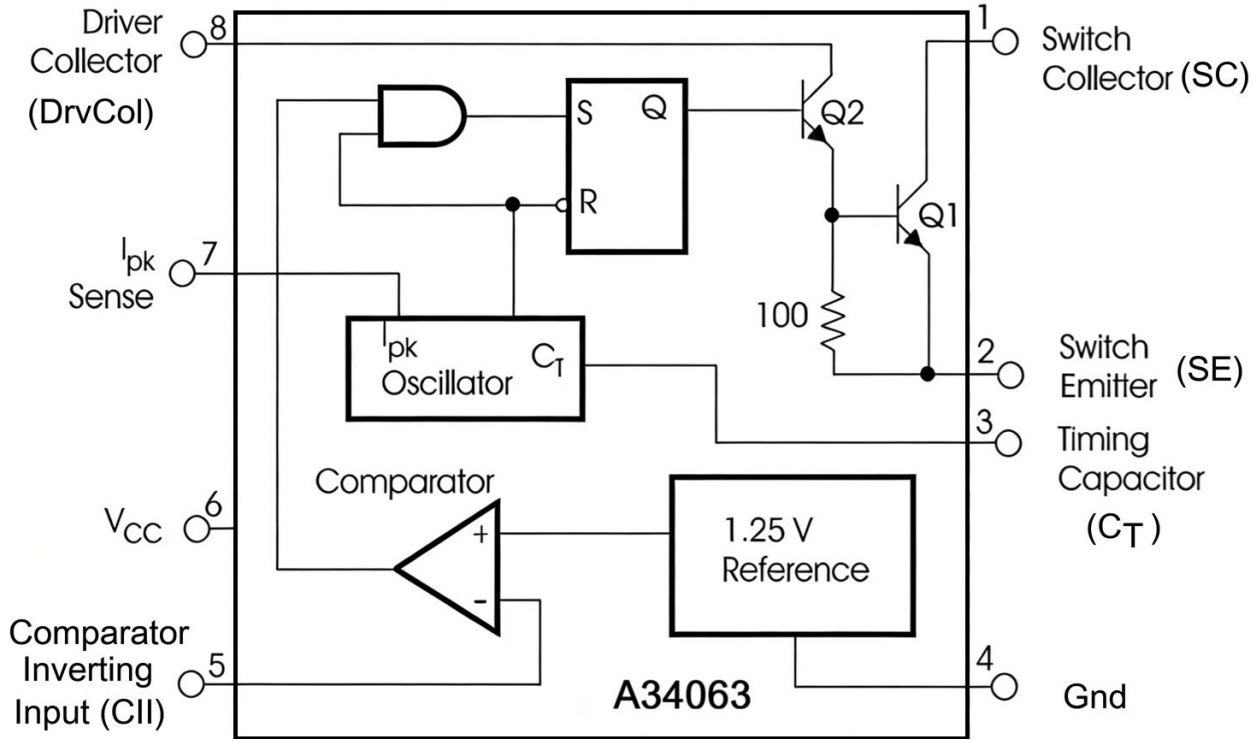


Fig6-b External PNP Saturated Switch

BLOCK DIAGRAM



DESIGN FORMULA

Calculation	Step-up	Step-down	Voltage-inverting
ton	$\frac{V_{out} + V_{F-Vin(min)}}{V_{in(min)} - V_{sat}}$	$\frac{V_{out} + V_F}{V_{in(min)} - V_{sat} - V_{out}}$	$\frac{\lvert V_{out}\rvert + V_F}{V_{in} - V_{sat}}$
C_T	4.0 x 10-5 t_{on}	4.0 x 10-5 t_{on}	4.0 x 10-5 t_{on}
(t_{on} + t_{off}) max	$\frac{1}{fmin}$	$\frac{1}{fmin}$	$\frac{1}{fmin}$
$I_{pk(switch)}$	$2I_{out(max)}\left(\frac{t_{on}}{t_{off}} + 1\right)$	$2I_{out(max)}$	$2I_{out(max)}\left(\frac{t_{on}}{t_{off}} + 1\right)$
R_{sc}	$0.3/I_{pk(Switch)}$	$0.3/I_{pk(Switch)}$	0.3/Ipk(Switch)
$L_{(min)}$	$\left(\frac{(V_{in(min)} - V_{sat})}{I_{pk(switch)}}\right)t_{on(max)}$	$\left(\frac{(V_{in(min)} - V_{sat} - V_{out})}{I_{pk(switch)}}\right)t_{on(max)}$	$\left(\frac{(V_{in(min)} - V_{sat})}{I_{pk(switch)}}\right)t_{on(max)}$
C_o	$9\frac{I_{out}t_{on}}{V_{ripple(pp)}}$	$\frac{I_{pk(switch)}(t_{on} + t_{off})}{8V_{ripple(pp)}}$	$9\frac{I_{out}t_{on}}{V_{ripple(pp)}}$
V_{OUT}	1.25(1+R2/R1)	1.25(1+R2/R1)	-1.25(1+R2/R1)

TERMS AND DEFINITIONS

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

V_F – Forward voltage drop of the output rectifier.

The following power supply characteristics must be chosen:

V_{in} – Nominal input voltage.

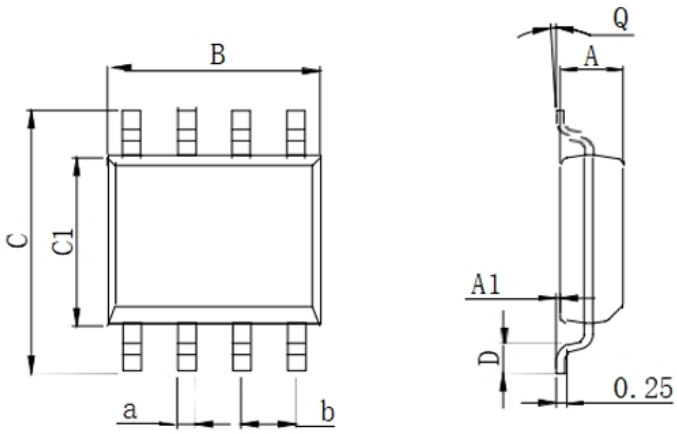
V_{out} – Desired output voltage,|Vout| =1.25 (1 +R2 / R1)

f_{min} – Minimum desired output switching frequency at the selected values of V_{in} and I_{out}.

$V_{ripple(p-p)}$ – Desired peak-to-peak output ripple voltage. In practice, the calculated capacitor value will need to be increased due to its equivalent series resistance and board layout. The ripple voltage should be kept to a low value since it will directly affect the line and load regulation.

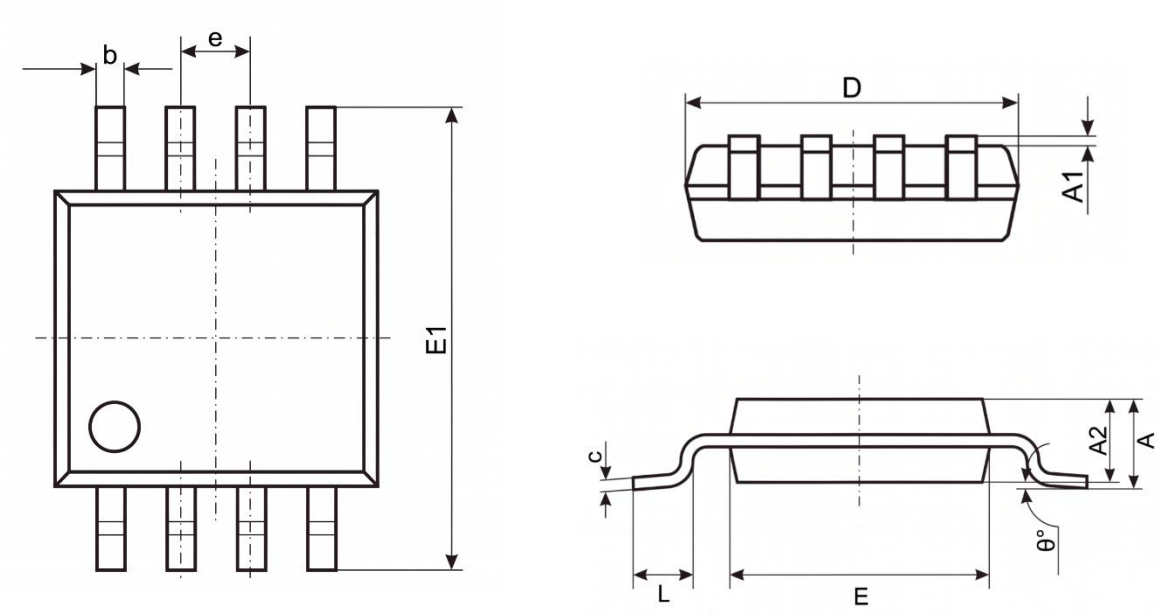
PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



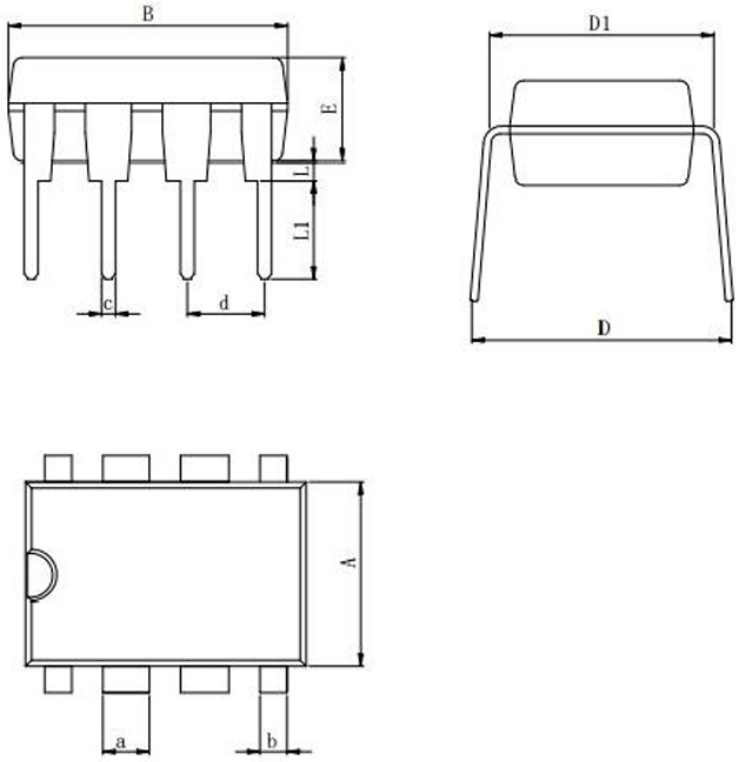
Symbol	Min.	Max.
A	1.350	1.550
A1	0.050	0.200
a	0.350	0.450
B	4.900	5.100
b	1.270 BSC.	
C	5.800	6.200
C1	3.800	4.000
D	0.400	0.800
Q	0°	8°

Dimension in MSOP8 (Unit: mm):



Symbol	Millimeters	
	Min	Max
A	0.820	1.100
A1	0.020	0.150
A2	0.750	0.950
b	0.250	0.380
c	0.090	0.230
D	2.900	3.100
E	2.900	3.100
E1	4.750	5.050
e	0.650 BSC	
L	0.400	0.800
θ	0°	6°

Dimension in DIP8 (Unit: mm)



Symbol	Min.	Max.
A	6.100	6.680
a	1.500	1.550
B	9.000	9.500
b	0.850	0.900
c	0.400	0.500
D	8.100	10.900
D1	7.420	7.820
d	2.540 BSC.	
E	3.100	3.550
L	0.500	0.700
L1	3.000	3.600

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