



GENERAL DESCRIPTION

The AMS34063 is a monolithic control circuit containing the primary functions required for DC/DC converters. The device consists of an internal temperature compensated reference, comparator, controlled duty cycle oscillator with an active current limit circuit, driver and high current output switch. This device is specifically designed to be incorporated in step-down, step-up and voltage-inverting applications with a minimum number of external components. The $\pm 2\%$ internal reference and low quiescent current of 1.6mA are among the improvements of the device over the competition

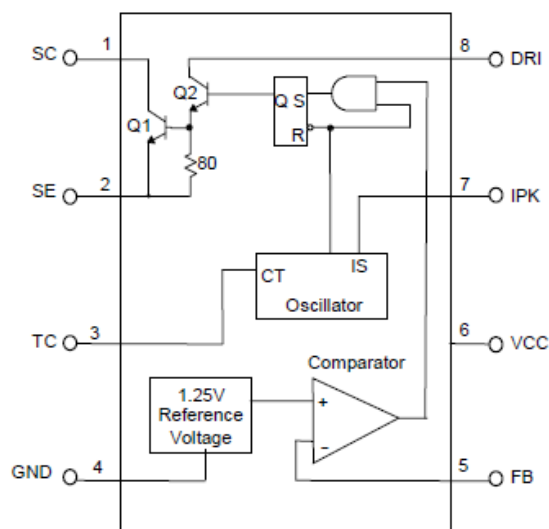
FEATURES

- ◆ 3V to 40V Input Voltage Operation.
- ◆ Internal 1.5A Peak Current Switch.
- ◆ Internal $\pm 2\%$ Reference.
- ◆ Low Quiescent Current .
- ◆ Frequency Operation Up to 100KHz.
- ◆ Low Dropout Operation: 100% Duty Cycle
- ◆ Current Limiting.
- ◆ Standard DIP8 and SOP8 Packages

Applications

- ◆ DC-DC Converter Module
- ◆ ADSL Modems
- ◆ Hub.
- ◆ Battery Chargers

Functional Diagram





Pin Description

Symbol	Pin NO.	Description
SC	1	1.5A switch collector
SE	2	Darlington switch emitter
TC	3	Oscillator timing capacitor
GND	4	Power GND
FB	5	Feedback comparator inverting input
VCC	6	Power supply input
IPK	7	Highside current sense input, VCC - VIPK=300mV
DRI	8	Drive collector

Ordering Information

ORDERING NUMBER	PACKAGE
AMS34063	SOP8
AMS34063A	DIP8

Absolute Maximum Ratings

Supply Voltage	40V
Comparator Input Voltage Range	-0.3V~40V
Switch Collector Voltage	40V
Switch Emitter Voltage	40V
Switch Collector to Emitter Voltage	40V
Driver Collector Voltage	40V
Switch Current.....	1.5A
Power Dissipation and Thermal Characteristics	
DIP Package	
Ta= 25°C.....	1.0W
Thermal Resistance	100°C /W
SO Package	
Ta= 25°C	625mW
Thermal Resistance	160°C /W
Operating Junction Temperature	125°C
Operating Ambient Temperature Range	0°C~70°C
Storage Temperature Range	- 65°C~150°C



Electrical Characteristics (V_{CC}= 5V, T_a=25°C (unless otherwise specified.))

Parameter	Test Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Oscillator						
Frequency	V _{PIN5} = 0V, C _T = 1nF	f _{OSC}	24	35	46	KHz
Charging Current	5.0V~V _{CC} ~40V	I _{CHG}	24	35	46	μA
Discharge Current	5.0V~V _{CC} ~40V	I _{DISCHG}	140	220	260	μA
Voltage Swing	PIN 3	V _{OSC}		0.6		V
Discharge to Charge Current Ratio	V _{IPK(SENSE)} = V _{CC}	I _{DISCHG} / I _{CHG}		6.0		
Current Limit Sense Voltage	I _{CHG} = I _{DISCHG}	V _{IPK(SENSE)}	250	320	400	mV
Output Switch						
Saturation Voltage, Darlington Connection	I _{SW} = 1.0A; V _{C(DRIVER)} = V _{C(SWITCH)}	V _{CE(SAT)}		1.0	1.3	V
Saturation Voltage	I _{SW} = 1.0A; I _{C(DRIVER)} = 50mA (Forced β = 20)	V _{CE(SAT)}		0.45	0.7	V
DC Current Gain	I _{SW} = 1.0A; V _{CE} = 5.0V	h _{FE}	50	75		
Collector Off-State Current	V _{CE} = 40V	I _{C(OFF)}		10		nA
Comparator						
Threshold Voltage	0°C~T _a ~70°C	V _{FB}	1.225	1.25	1.275	V
Threshold Voltage			1.19		1.31	V
Threshold Voltage Line Regulation	3.0V~V _{CC} ~40V	REGLINE	0.1	0.3		mV/V
Input Bias Current	V _{IN} = 0V	I _{IB}	0.41			μA
Supply current	V _{IPK(SENSE)} = V _{CC} V _{PIN 5} > V _{FB} 5.0V~V _{CC} ~40V C _T = 0.001μF, PIN 2 = GND	ICC			4	Ma



Typical Performance Characteristics

Figure 1. Output Switch On-Off Time versus Oscillator Timing Capacitor

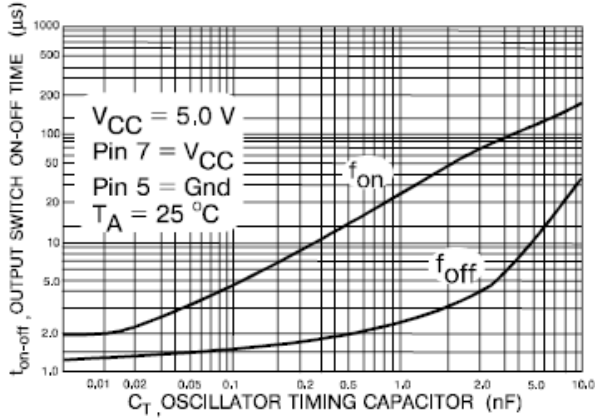


Figure 2. Timing Capacitor Waveform

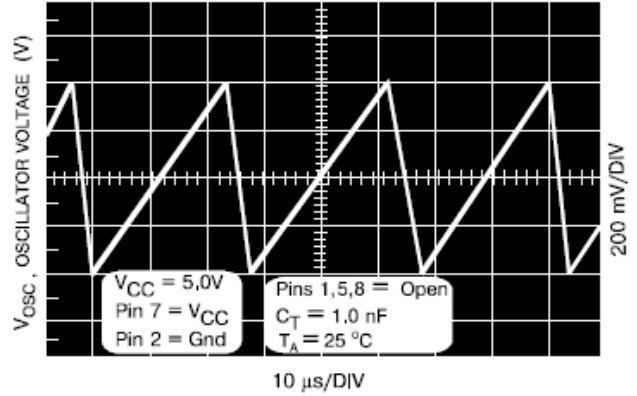


Figure 3. Emitter Follower Configuration Output Saturation Voltage versus Emitter Current

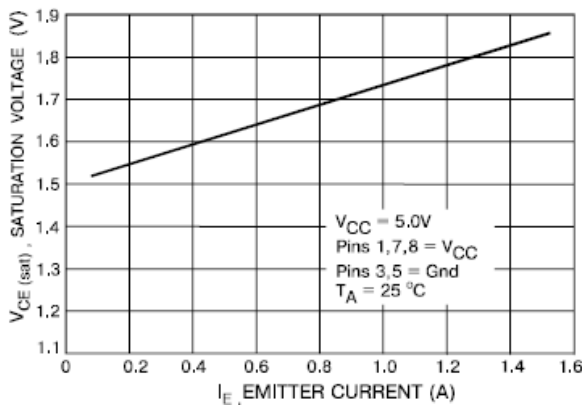


Figure 4. Common Emitter Configuration Output Switch Saturation Voltage versus Collector Current

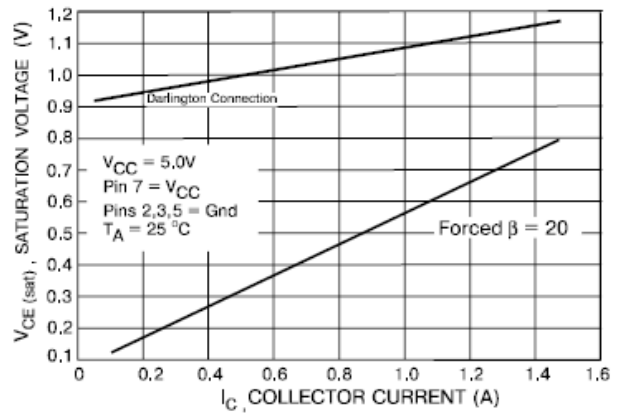


Figure 5. Current Limit Sense Voltage versus Temperature

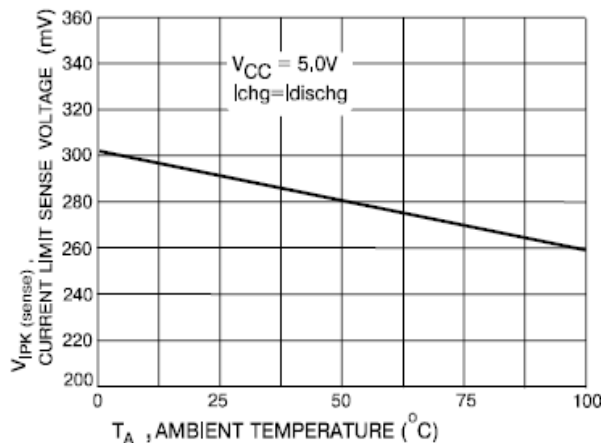
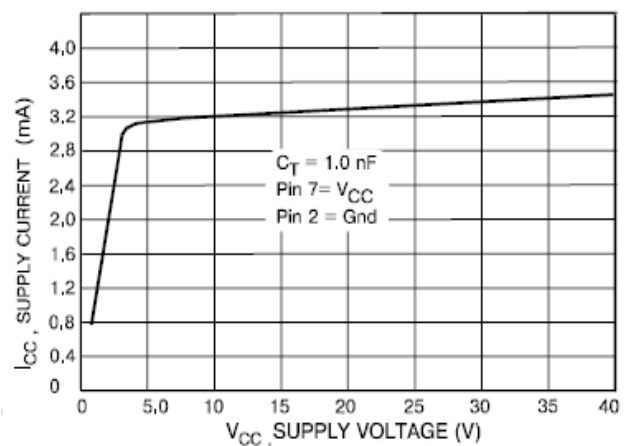


Figure 6. Standby Supply Current versus Supply Voltage





Application Information

Design Formula Table

CALCULATION	STEP-DOWN	STEP-UP	VOLTAGE-INVERTING
$\frac{t_{ON}}{t_{OFF}}$	$\frac{V_{OUT} + V_F}{V_{IN(MIN)} - V_{SAT} - V_{OUT}}$	$\frac{V_{OUT} + V_F - V_{IN(MIN)}}{V_{IN(MIN)} - V_{SAT}}$	$\frac{ V_{OUT} + V_F}{V_{IN} - V_{SAT}}$
$(t_{ON} + t_{OFF})_{MAX}$	$\frac{1}{F_{MIN}}$	$\frac{1}{F_{MIN}}$	$\frac{1}{F_{MIN}}$
C_T	$4 \times 10^{-5} t_{ON}$	$4 \times 10^{-5} t_{ON}$	$4 \times 10^{-5} t_{ON}$
$I_{C(SWITCH)}$	$2I_{OUT(MAX)}$	$2I_{OUT(MAX)} \left(\frac{t_{ON} + t_{OFF}}{t_{OFF}} \right)$	$2I_{OUT(MAX)} \left(\frac{t_{ON} + t_{OFF}}{t_{OFF}} \right)$
RS	$0.33/I_{C(SWITCH)}$	$0.33/I_{C(SWITCH)}$	$0.33/I_{C(SWITCH)}$
L(MIN)	$\left(\frac{V_{IN(MIN)} - V_{SAT} - V_{OUT}}{I_{C(SWITCH)}} \right) t_{ON(MAX)}$	$\left(\frac{V_{IN(MIN)} - V_{SAT}}{I_{C(SWITCH)}} \right) t_{ON(MAX)}$	$\left(\frac{V_{IN(MIN)} - V_{SAT}}{I_{C(SWITCH)}} \right) t_{ON(MAX)}$
Co	$\frac{I_{C(SWITCH)} (t_{ON} + t_{OFF})}{8V_{RIPPLE(P-P)}}$	$\frac{I_{OUT} t_{ON}}{V_{RIPPLE(P-P)}}$	$\frac{I_{OUT} t_{ON}}{V_{RIPPLE(P-P)}}$

VSAT = Saturation voltage of the output switch.

VF = voltage drop of the ringback rectifier

The following power supply characteristics must be chosen:

VIN -Nominal input voltage.

VOUT -Desired output voltage,

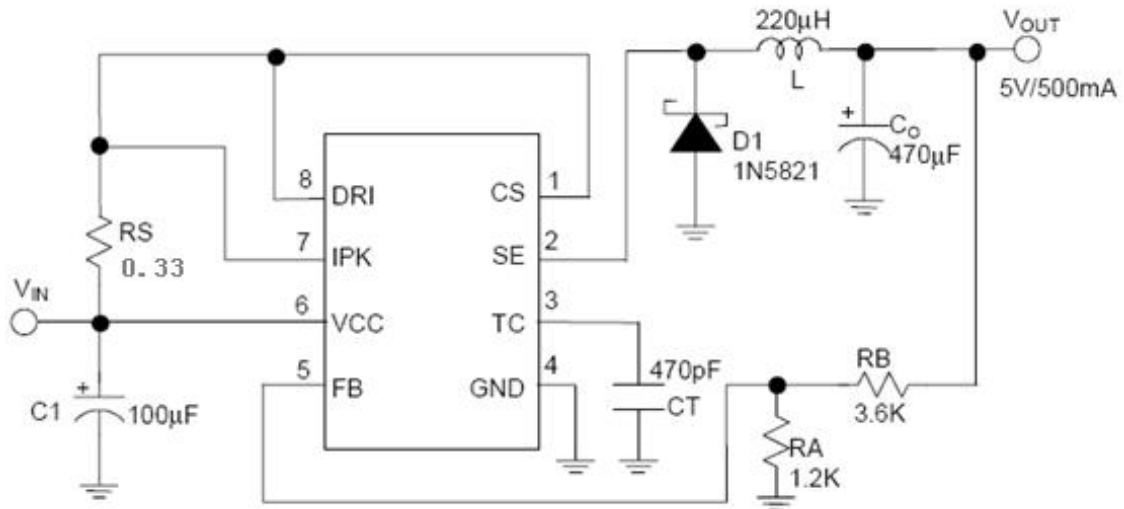
$$|V_{OUT}| = 1.25 (1 + R_B/R_A)$$

IOUT - Desired output current.

FMIN - Minimum desired output switching frequency at the selected values for VIN and IOU

VRIPPLE (P-P) - Desired peak-to-peak output ripple voltage. In practice, the calculated value will need to be increased due to the capacitor equivalent series resistance and board layout. The ripple voltage should be kept to a low value since it will directly effect the line and load regulation.

Application Examples



Line Regulation	$V_{IN} = 10V \sim 20V @ I_o = 500mA$	40mV
Load Regulation	$V_{IN} = 15V, @ I_o = 10mA \sim 500mA$	5mV
Short Circuit Current	$V_{IN} = 15V, @ R_L = 0.1 \Omega$	1.3A

Fig.1 Step-Down converter

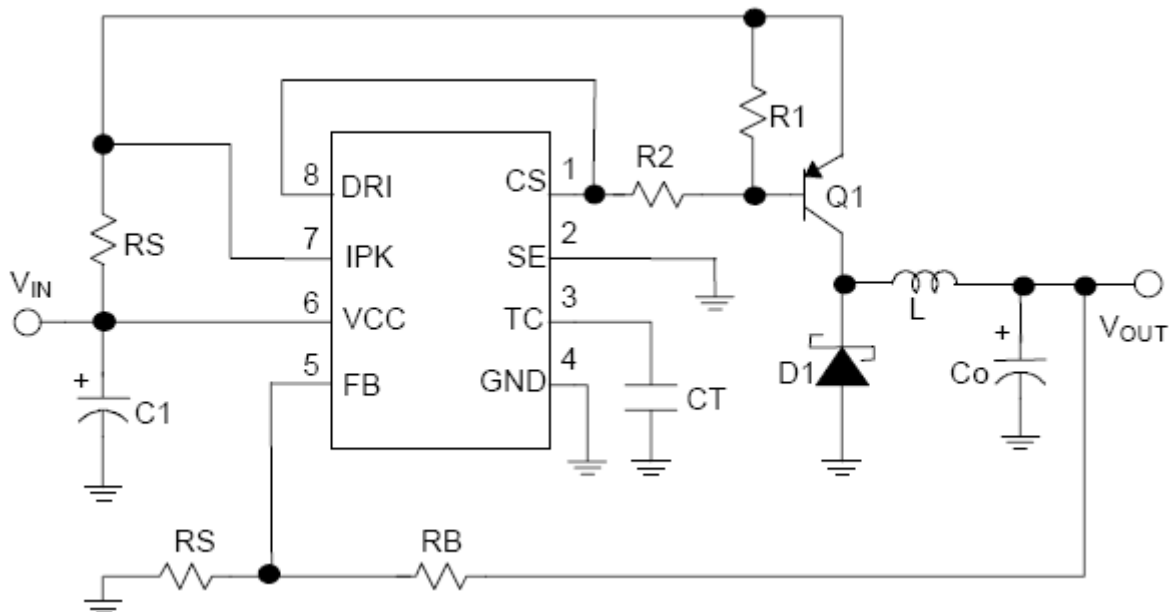
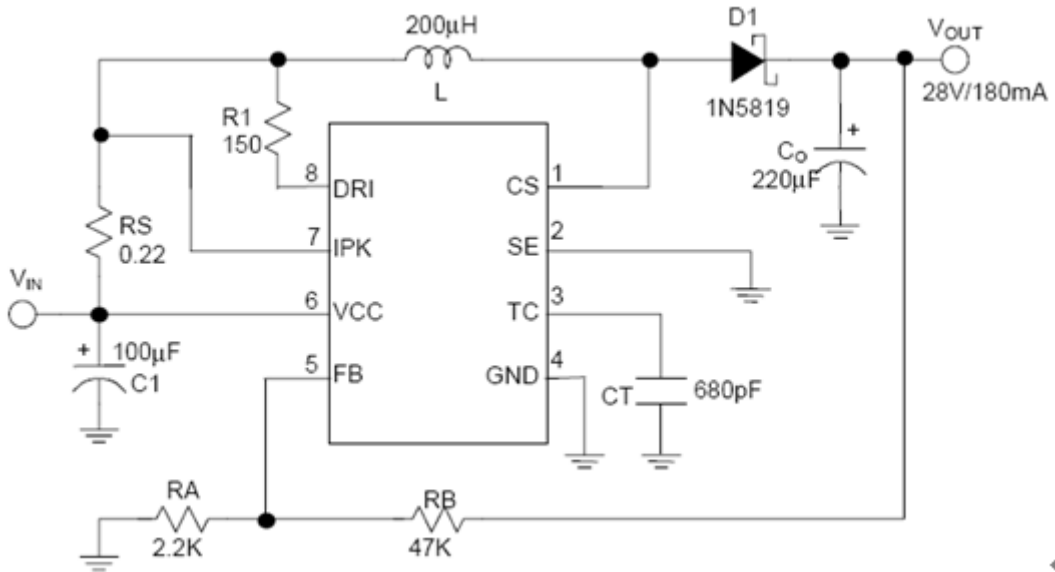


Fig.2 Step-Down converter with External PNP Saturation Switch

Application Examples (Continued)



Line Regulation	$V_{IN} = 8V \sim 16V @ I_o = 180mA$	50mV
Load Regulation	$V_{IN} = 12V, @ I_o = 80mA \sim 180mA$	10mV

Fig.3 Step-Up converter

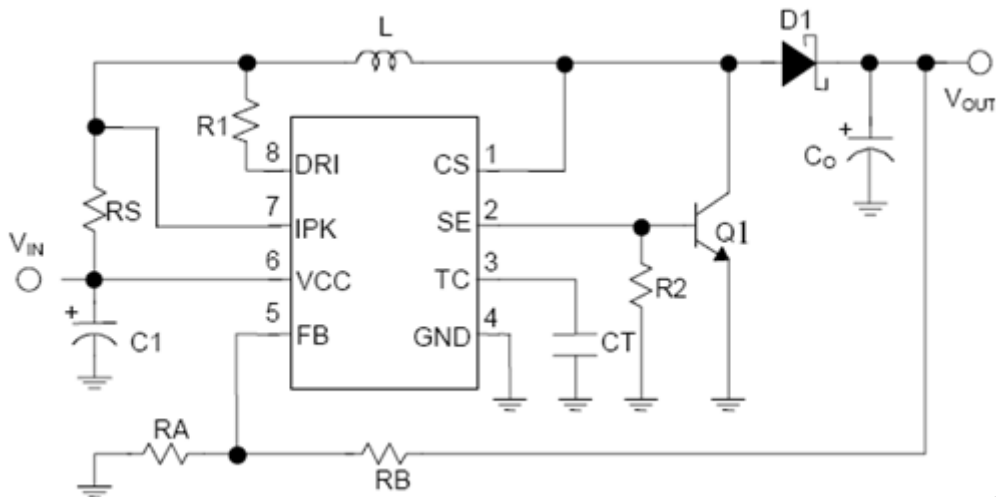
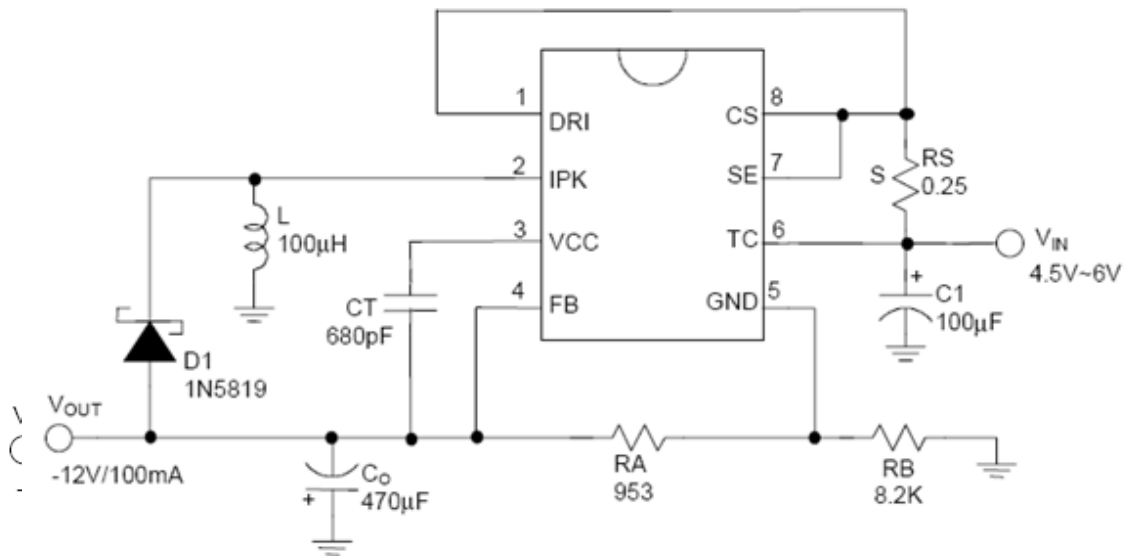


Fig.4 Step-up Converter with External NPN Switch

Application Examples (Continued)



Line Regulation	$V_{IN}=4.5V\sim 6V @ I_O=100mA$	20mV
Load Regulation	$V_{IN}=4.5V\sim 6V @ I_O=100mA$	100mV

Fig.5 Inverting Converter

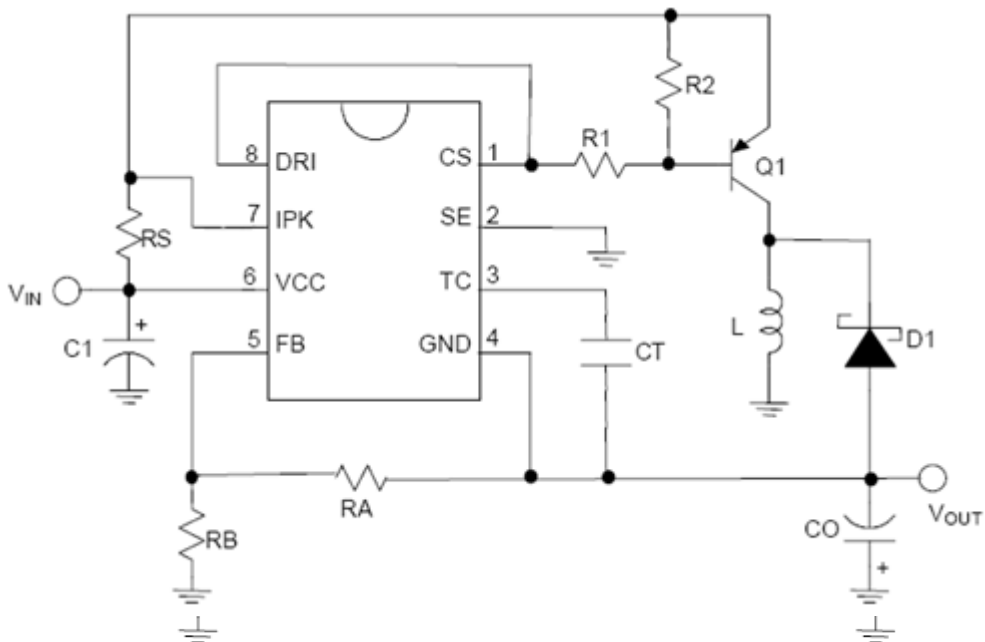
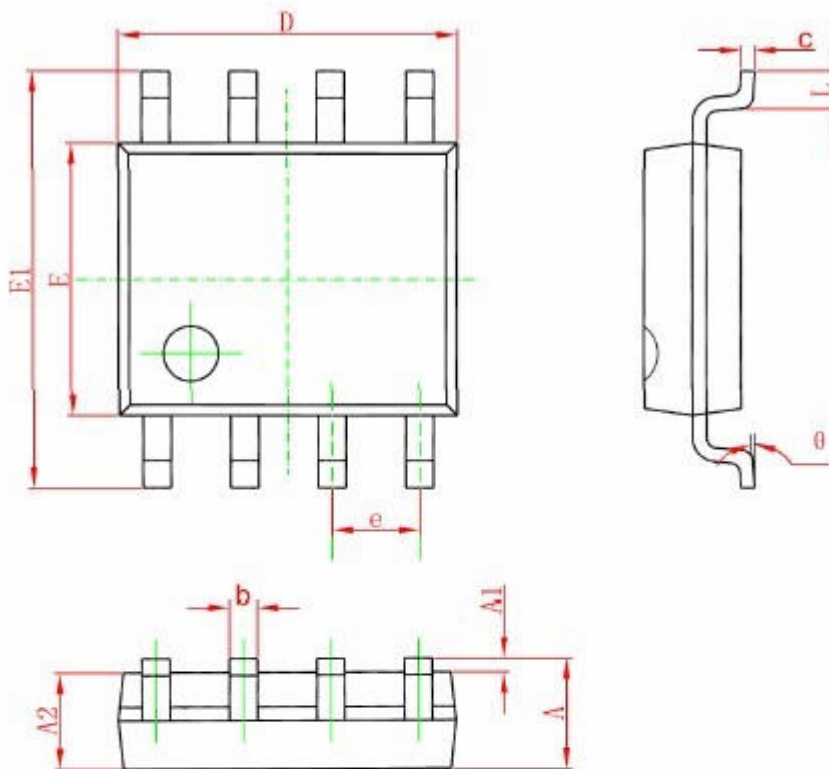


Fig 6. Voltage Inverting Converter With PNP Saturated Switch



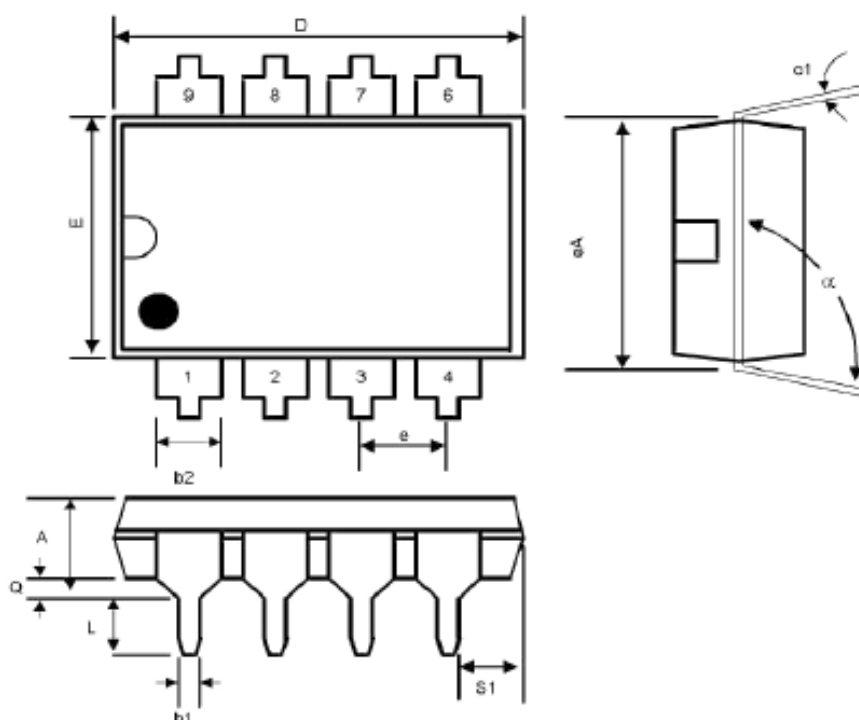
PACKAGE DESCRIPTION

SOP8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

DIP8 PACKAGE OUTLINE DIMENSIONS



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	-	0.200	-	5.08	-
b1	0.014	0.023	0.36	0.58	-
b2	0.045	0.065	1.14	1.65	-
c1	0.008	0.015	0.20	0.38	-
D	0.355	0.400	9.02	10.16	-
E	0.220	0.310	5.59	7.87	-
e	0.100 BSC		2.54 BSC		-
eA	0.300 BSC		7.62 BSC		-
L	0.125	0.200	3.18	5.08	-
Q	0.015	0.060	0.38	1.52	-
s1	0.005	-	0.13	-	-
α	90 ⁰	105 ⁰	90 ⁰	105 ⁰	-