



**Pin Description**

Symbol	Pin NO.	Description
SC	1	1.2A 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

**Absolute Maximum Ratings**

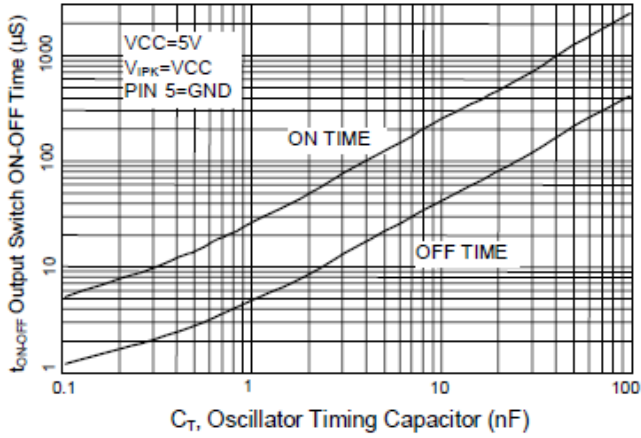
Supply Voltage	40V
Comparator Input Voltage Range	-0.3V~40V
Switch Collector Voltage	40V
Switch Emitter Voltage	40V
Switch Collector to Emitter Voltage	40V
Driver Collector Voltage	40V
Switch Current	1.5A
Power Dissipation and Thermal Characteristics	
DIP Package	
Ta= 25°C	1.0W
Thermal Resistance	100°C /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** ( $V_{CC}=5V, T_a=25^{\circ}C$  (unless otherwise specified.))

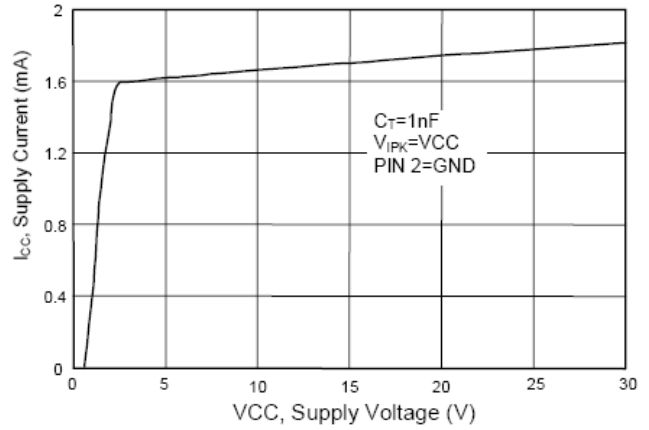
Parameter	Test Conditions	Symbol	MIN.	TYP.	MAX.	Unit
<b>Oscillator</b>						
Frequency	$V_{PIN5}=0V, C_T=1nF$	$f_{OSC}$	24	35	46	KHz
Charging Current	5.0V~VCC~30V	$I_{CHG}$	24	35	46	$\mu A$
Discharge Current	5.0V~VCC~30V	$I_{DISCHG}$	140	220	260	$\mu A$
Voltage Swing	PIN 3	$V_{OSC}$		0.6		V
Discharge to Charge Current Ratio	$V_{IPK(SENSE)}=VCC$	$I_{DISCHG}/I_{CHG}$		6.0		
Current Limit Sense Voltage	$I_{CHG}=I_{DISCHG}$	$V_{IPK(SENSE)}$	250	300	400	mV
<b>Output Switch</b>						
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 ~-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	$V_{CE}=30V$	$I_{C(OFF)}$		10		nA
<b>Comparator</b>						
Threshold Voltage	$0^{\circ}C \sim T_a \sim 70^{\circ}C$	$V_{FB}$	1.225	1.25	1.275	V
Threshold Voltage			1.19		1.31	V
Threshold Voltage Line Regulation	3.0V~VCC~30V	$REG_{LINE}$		0.1	0.3	mV/V
Input Bias Current	$V_{IN}=0V$	$I_{IB}$		0.4	1	$\mu A$
Supply current	$V_{IPK(SENSE)}=VCC$ $V_{PIN5}>V_{FB}$ 5.0V~VCC~30V $C_T=0.001\mu F, PIN2=GND$ Remaining pins open	$I_{CC}$		1.6	3	mA

## Typical Performance Characteristics

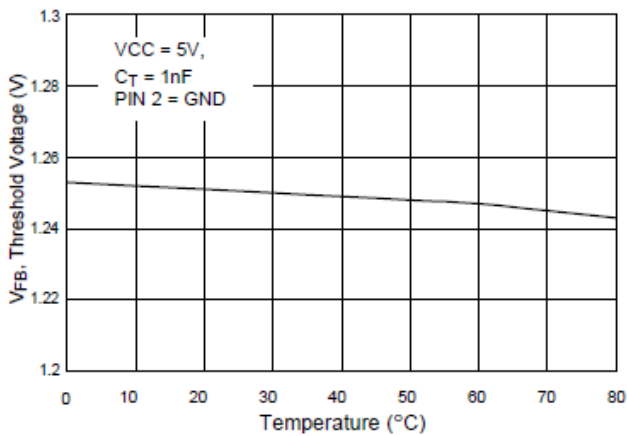
Output Switch ON-OFF Time vs. Oscillator Timing Capacitor



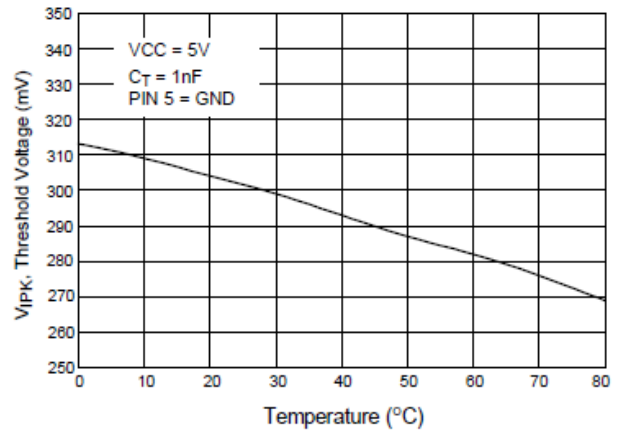
Standby Supply Current vs. Supply Voltage



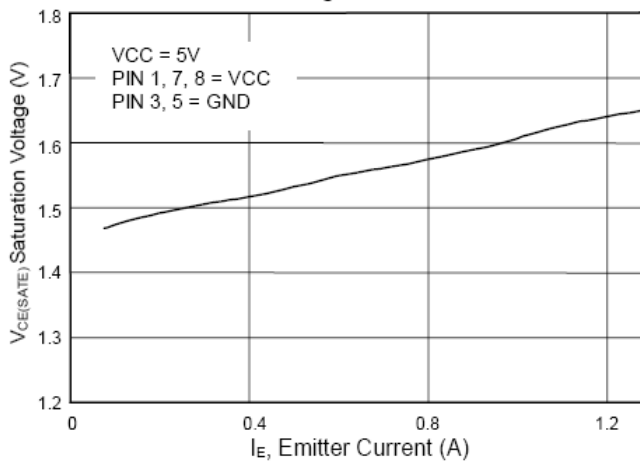
V<sub>FB</sub>, Threshold Voltage vs Temperature



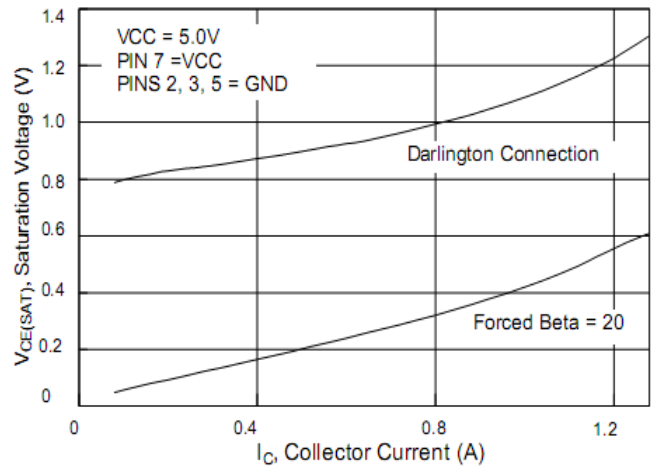
IPK Threshold Voltage vs Temperature



Emmitter-Follower Configuration Output Switch Saturation Voltage vs Emmitter Current



Common-Emitter Configuration Output Switch Saturation Voltage vs Collector Current



## 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	$\frac{I_{C(SWITCH)} (t_{ON} + t_{OFF})}{8 V_{RIPPLE(P-P)}}$	$\frac{I_{OUT} t_{ON}}{V_{RIPPLE(P-P)}}$	$\frac{I_{OUT} t_{ON}}{V_{RIPPLE(P-P)}}$

$V_{SAT}$  = Saturation voltage of the output switch.

$V_F$  = voltage drop of the ringback rectifier

The following power supply characteristics must be chosen:

$V_{IN}$  -Nominal input voltage.

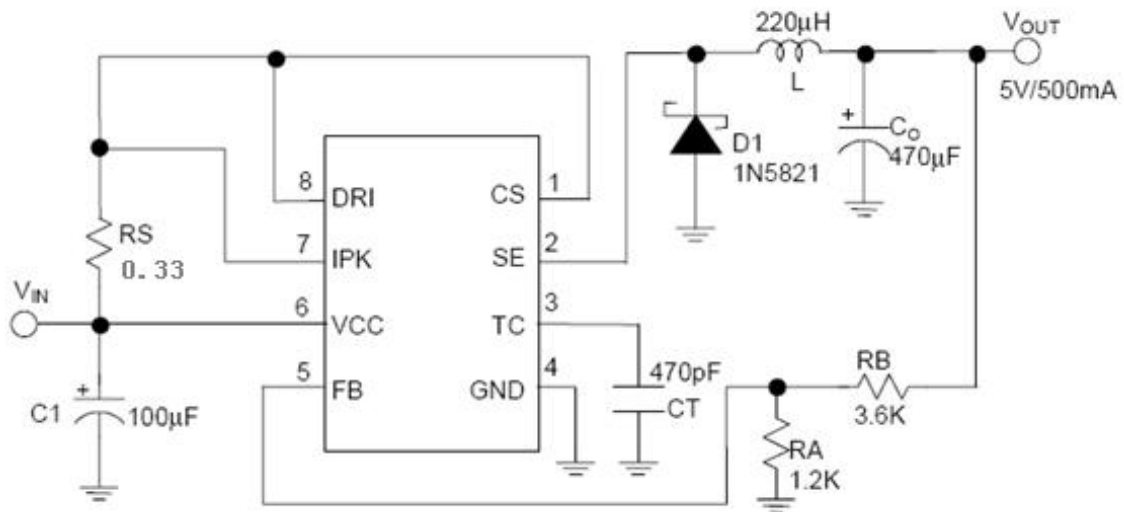
$V_{OUT}$  -Desired output voltage,

$|V_{OUT}| = 1.25 (1 + RB/RA)$   
 $I_{OUT}$  - Desired output current.

$F_{MIN}$  - Minimum desired output switching frequency at the selected values for  $V_{IN}$  and  $I_{OUT}$

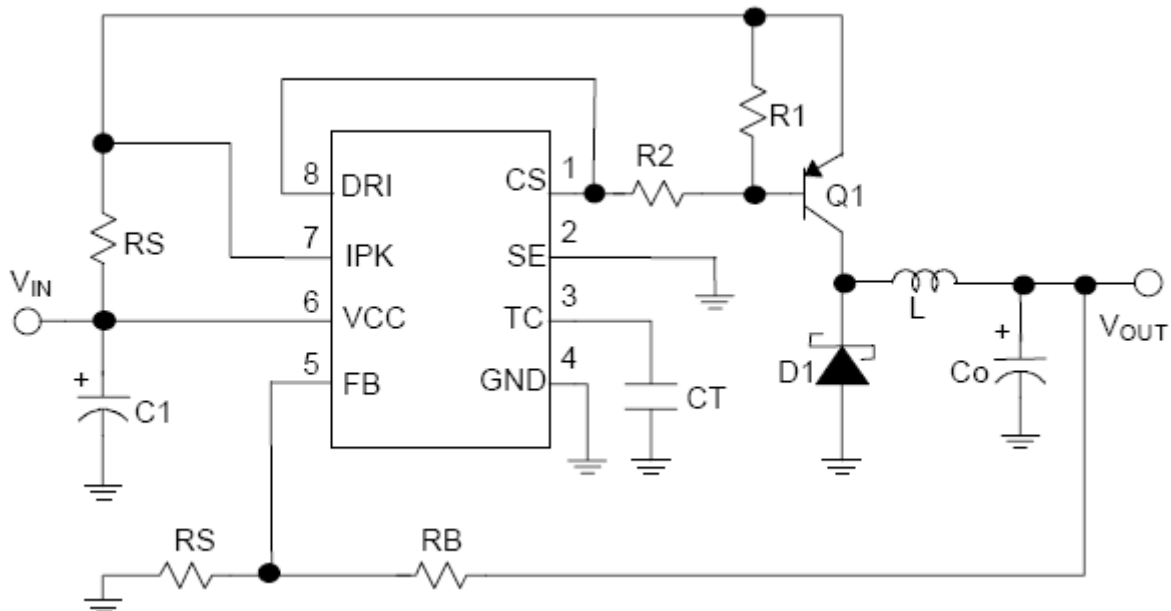
$V_{RIPPLE(P-P)}$  - Desired peak-to-peak output ripple voltage. In practice, the calculated value will need to be increased due to the capacitor equivalent series resistance and board layout. The ripple voltage should be kept to a low value since it will directly effect the line and load regulation.

## Application Examples



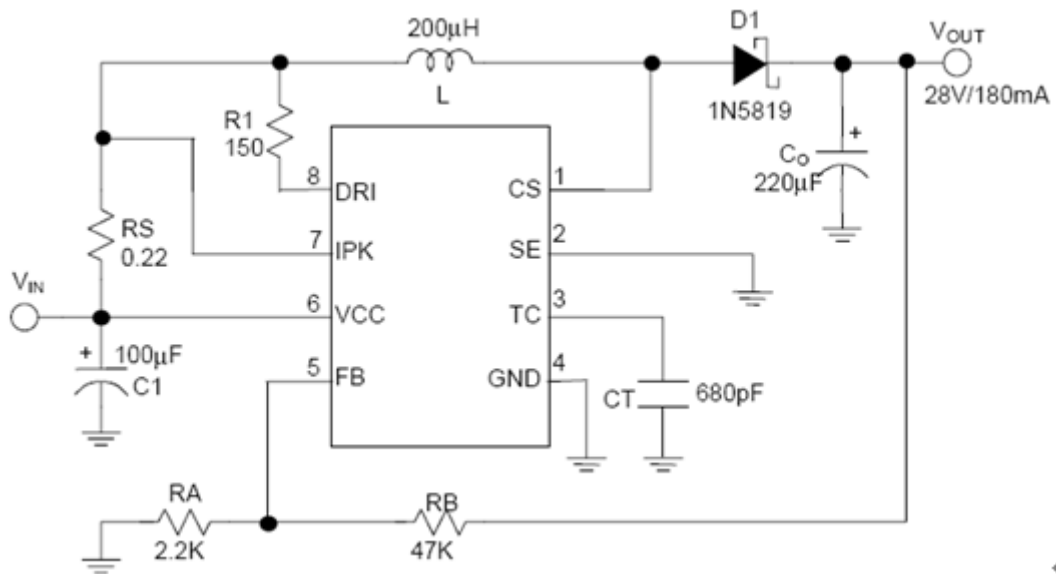
<b>Line Regulation</b>	$V_{IN} = 10V \sim 20V @ I_o = 500mA$	40mV
<b>Load Regulation</b>	$V_{IN} = 15V, @ I_o = 10mA \sim 500mA$	5mV
<b>Short Circuit Current</b>	$V_{IN} = 15V, @ R_L = 0.1 \Omega$	1.3A

**Fig.1 Step-Down converter**



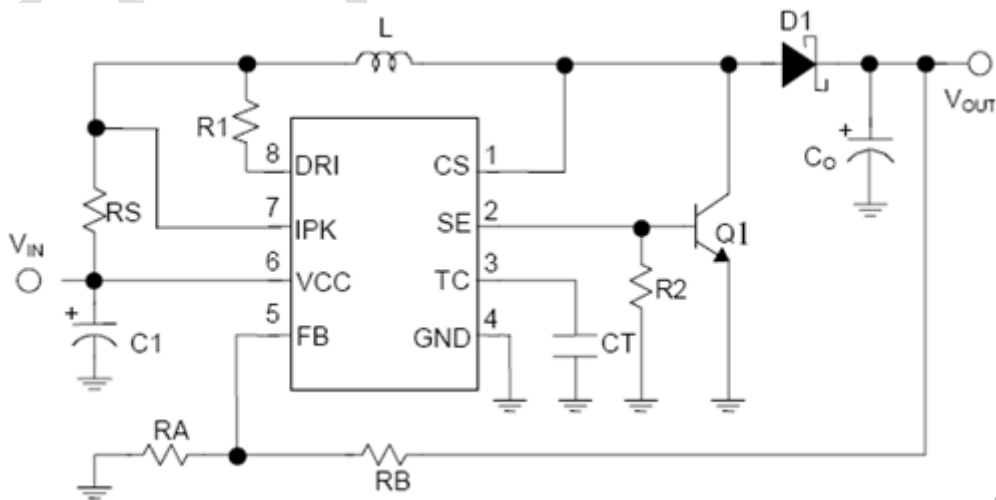
**Fig.2 Step-Down converter with External PNP Saturation Switch**

## Application Examples (Continued)



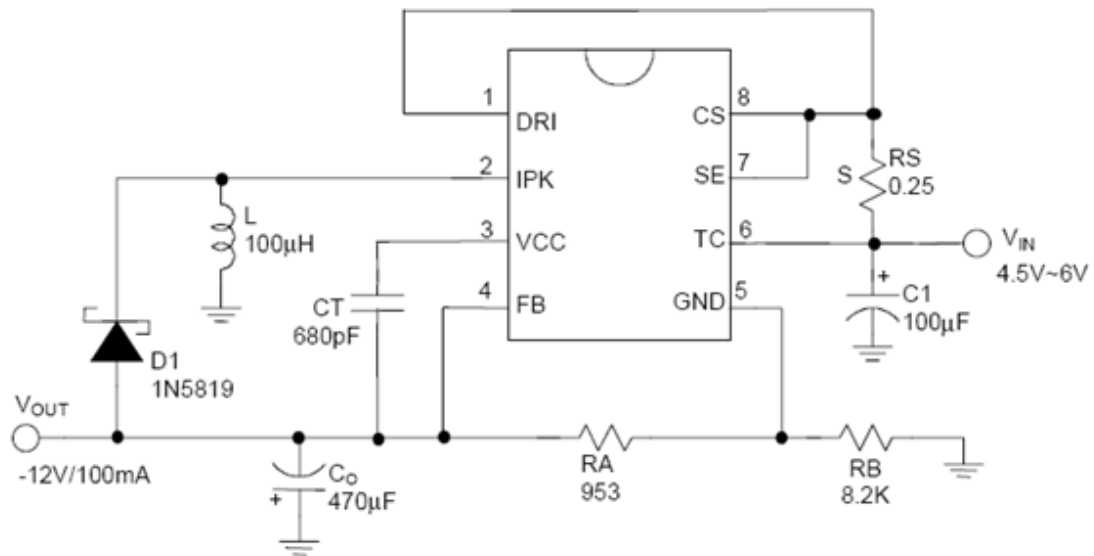
Line Regulation	$V_{IN} = 8V \sim 16V @ I_o = 180mA$	50mV
Load Regulation	$V_{IN} = 12V, @ I_o = 80mA \sim 180mA$	10mV

**Fig.3 Step-Up converter**



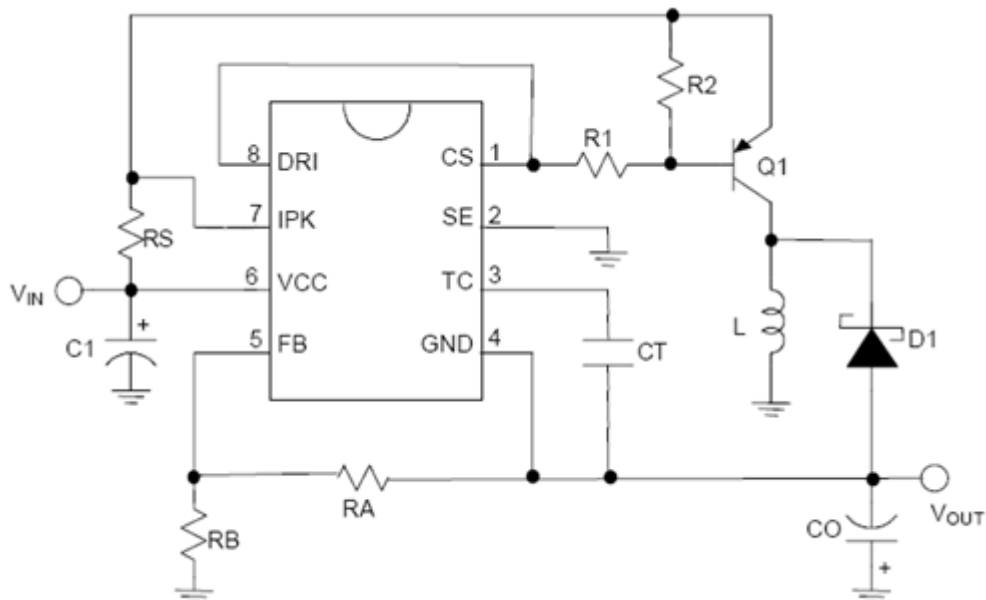
**Fig.4 Step-up Converter with External NPN Switch**

## 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**

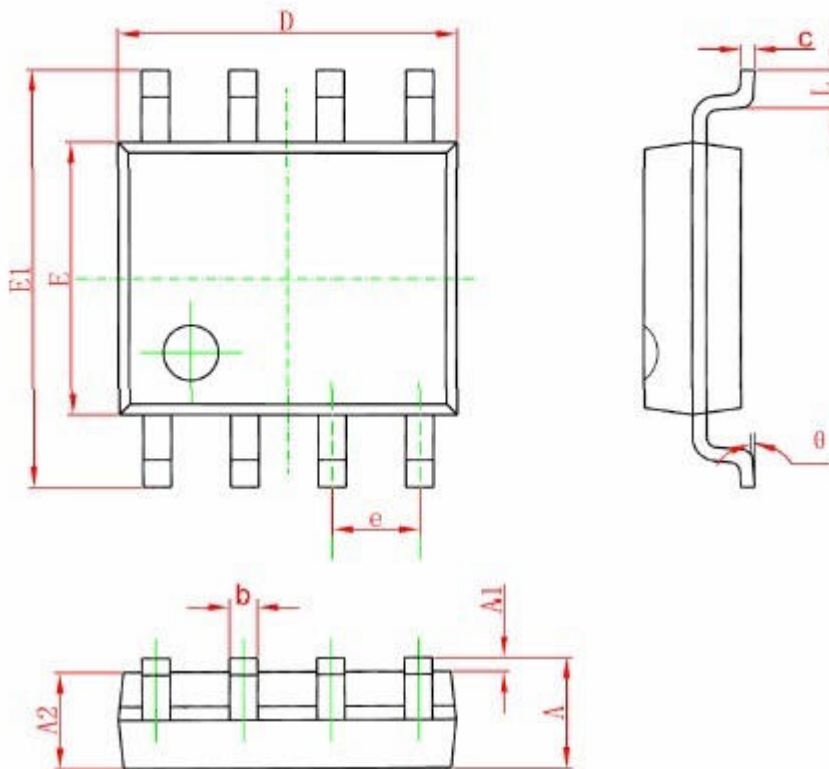


**Fig 6. Voltage Inverting Converter With PNP Saturated Switch**



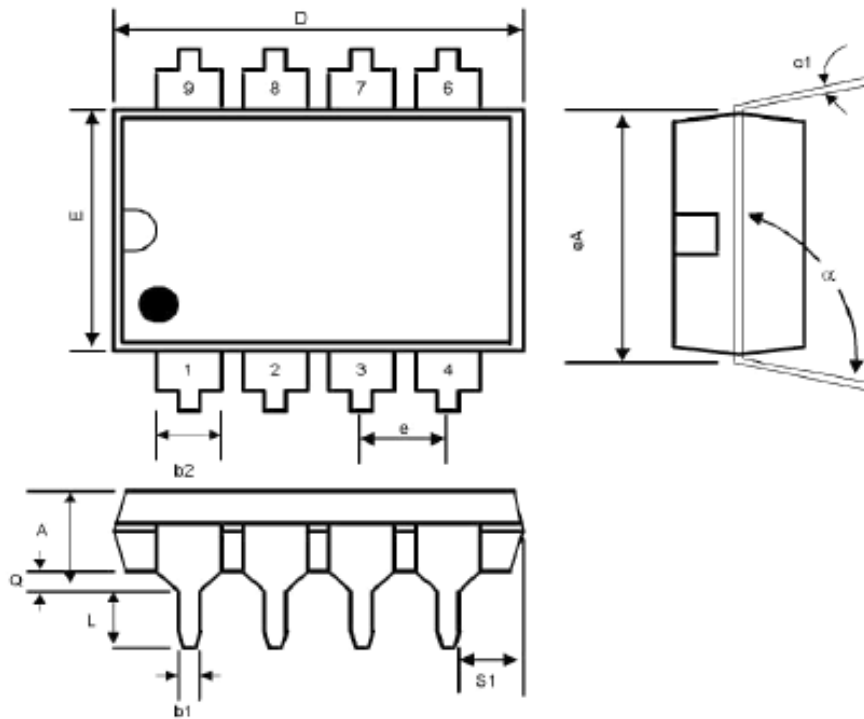
## PACKAGE DESCRIPTION

### 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 <sup>0</sup>	105 <sup>0</sup>	90 <sup>0</sup>	105 <sup>0</sup>	-

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