DESCRIPTION

The RM34063 by Analog Integrations Corporation, an improved second source over the industrial standard RM34063, 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 stepdown, step-up and voltage-inverting applications with a minimum number of external components. The ±1.8% internal reference and low quiescent current of 2.4mA are among the improvements of the device over the competition.

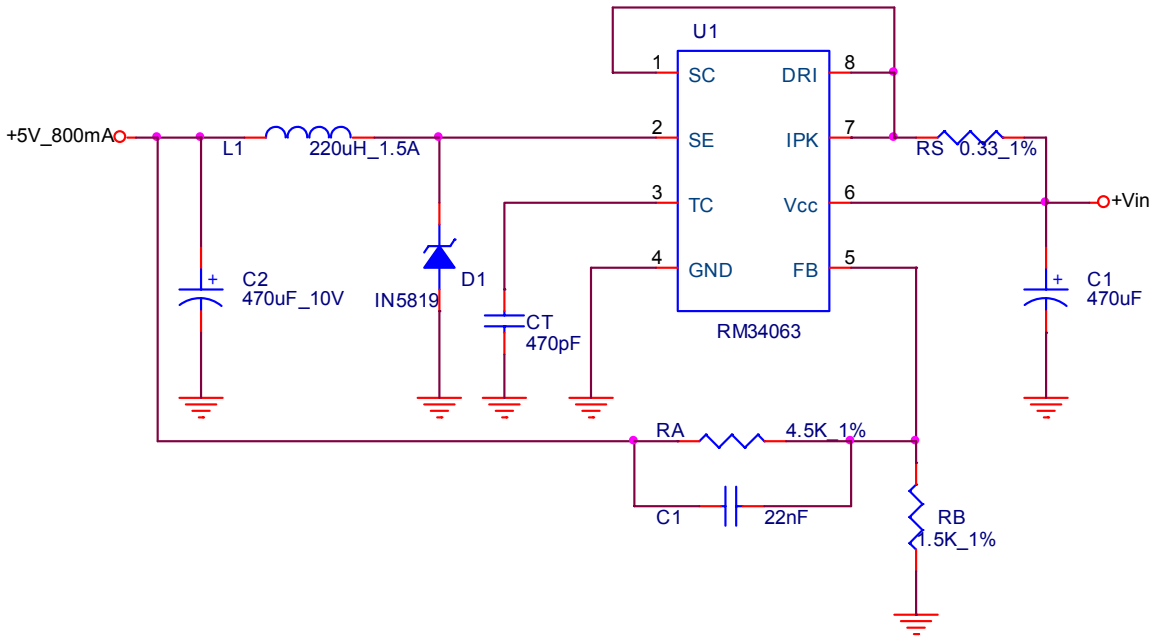
FEATURES

•3V to 40V Input Voltage Operation
•Internal 1.2A Peak Current Switch
•Internal ±1.8% Reference
•Low Quiescent Current at 2.4mA
•Frequency Operation from 100Hz to 100KHz.
•Current limit

Applications

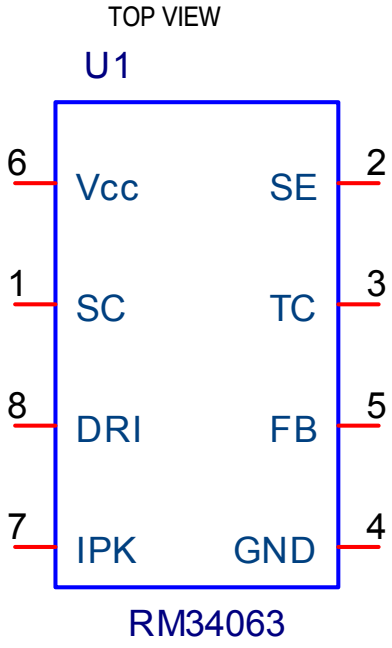
•Saver for Cellular phones
•DC-DC Converter Module

TYPICAL APPLICATION



Note: $V_{OUT} = V_{FB} \times (1+R_A/R_B)$.
V_{FB}=1.25V

PACKAGE INFORMATION



SOP-8L

PIN FUNCTIONS

Pin	Symbol	Function Description
1	SC	1.5A switch collector
2	SE	Darlington switch emitter
3	TC	Oscillator timing capacitor
4	GND	Power GND
5	FB	Feedback comparator inverting input
6	VCC	VCC - Power supply input
7	IPK	IPK -High-side current sense input,VCC -V_{IPK}=300mV
8	DRI	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 1.2A
Power Dissipation and Thermal Characteristics
DIP Package
Ta= 25℃ 1.0W
Thermal Resistance .....100℃ /W
SO Package
Ta= 25℃.....625mW
Thermal Resistance .....160℃/W
Operating Junction Temperature .....125℃
Operating Ambient Temperature Range .....0℃~70℃
Storage Temperature Range ..... - 65℃~150℃

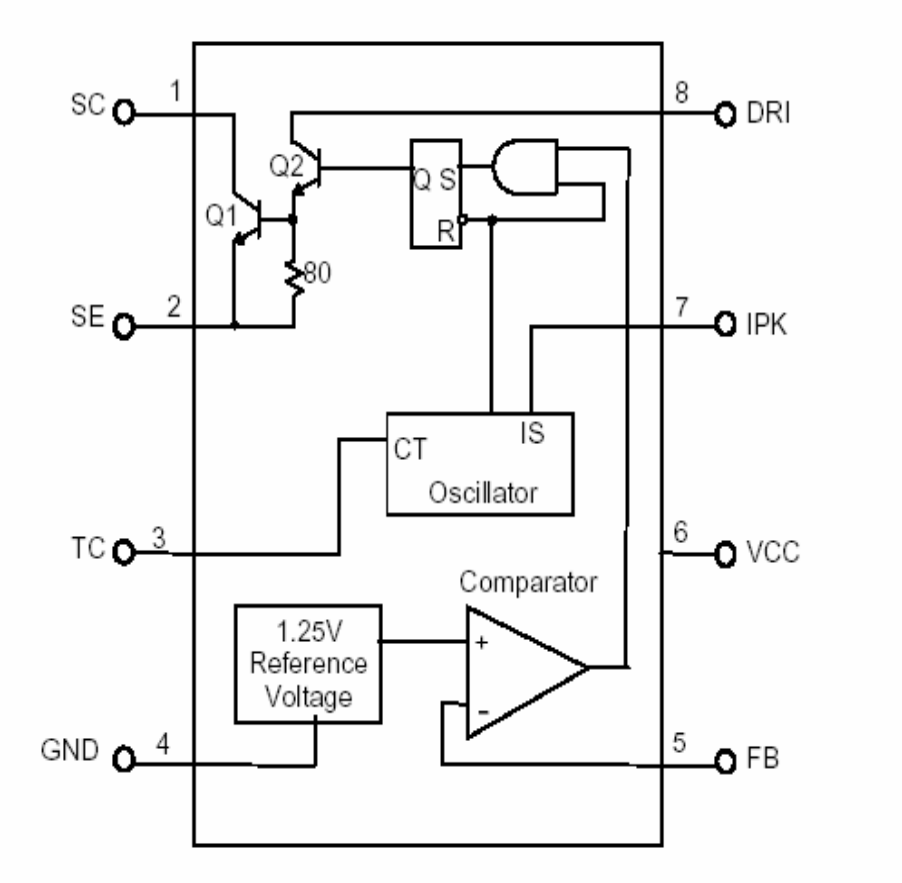
ELECTRICAL CHARACTERISTICS

(VCC= 5V, Ta=25℃, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Oscillator						
Charging Current	I_{CHG}	$V_{PIN7}=V_{CC}$,V_{CC}=40V	23	32.0	41.0	μA
Discharge Current	I_{DISCHG}	$V_{PIN7}=V_{CC}$,V_{CC}=40V	140	190	260	μA
Discharge To Charge Current Ratio	K	$V_{PIN7}=V_{CC}$,V_{CC}=40V	5.4	6.3	7.4	
Frequency of Oscillation	Fosc	CT=0.001uf,V_{CC}=5V	26	33	44	kHz
Current Limit Sense Voltage	V_{IPK}	$I_{CHG}=I_{DISCHG}$,V_{CC}=5V	250	300	350	mV
Output Switch						
Saturation Voltage, Darlington Connection	V_{CES1}	I_{CT1}=1.0A,$V_{CT1}=V_{CT2}$	0.10	0.90	1.20	V
Saturation Voltage	V_{CES2}	I_{CT1}=1.0A, R_{PIN8}=82Ω, V_{CT1}=+5V,	0.10	0.45	0.70	V
DC Current Gain	h_{FE}	I_{CT1}=1.0A,V_{CET1}=5V	50	120	260	
Collector Off-State Current	$I_{C(off)}$	V_{CET1}=40V		0.01	10.0	μA
Comparator						

Threshold Voltage	V_{TH}	V_{CC}=40V,V_{CC}=5V	1.228	1.250	1.272	V
Threshold Voltage Line Regulation	ΔV_{TH}	V_{CC}=40V,V_{CC}=5V		1.5	5.0	mV
Input Bias Current	I_{IB}	VI=0V		0.01	0.4	μA
Overall						
Voltage Source Current	I_{CC}	**V_{CC}=5~40V,CT=0.001μF, V_{PIN7}=V_{CC} ,V_{PIN5}>VTH, PIN to GND**	1.0	2.4	4.0	mA

BLOCK DIAGRAM



■APPLICATION INFORMATION

●DESIGN FORMULA TABLE

Calculation	Step-down	Step-up	Voltage-inverting
$\frac{t_{on}}{t_{off}}$	$\frac{V_{OUT}+V_F}{V_{IN}-V_{SAT}-V_{OUT}}$	$\frac{V_{OUT}+V_F-V_{IN(MIN)}}{V_{IN(MIN)}-V_{SAT}}$	$\frac{\lvert V_{OUT}\rvert+V_F}{V_{IN}-V_{SAT}}$
$(t_{on}+t_{off})_{MAX}$	$\frac{1}{F_{MIN}}$	$\frac{1}{F_{MIN}}$	$\frac{1}{F_{MIN}}$
C_T	$4\times10^{-5}t_{on}$	$4\times10^{-5}t_{on}$	$4\times10^{-5}t_{on}$
$I_{C(SWITCH)}$	$2I_{OUT(MAX)}$	$2I_{out(MAX)}(\frac{t_{on}+t_{off}}{t_{off}})$	$2I_{out(MAX)}(\frac{t_{on}+t_{off}}{t_{off}})$
RS	$\frac{0.33}{I_{C(SWITCH)}}$	$\frac{0.33}{I_{C(SWITCH)}}$	$\frac{0.33}{I_{C(SWITCH)}}$
$L(MIN)$	$\left(\frac{V_{IN(MIN)}-V_{SAT}-V_{OUT}}{I_{C(SWITCH)}}\right)t_{on(M}$	$\left(\frac{V_{IN(MIN)}-V_{SAT}}{I_{C(SWITCH)}}\right)t_{on(MA}$	$\left(\frac{V_{IN(MIN)}-V_{SAT}}{I_{C(SWITCH)}}\right)t_{on(MA}$
C_O	$\frac{I_{C(SWITCH)}(t_{on}+t_{off})}{8V_{RIPPLE(P-P)}}$	$\frac{I_{OUT}\times t_{on}}{8V_{RIPPLE(P-P)}}$	$\frac{I_{OUT}\times t_{on}}{8V_{RIPPLE(P-P)}}$

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

V_F =Forward voltage drop of the ringback rectifier

The following power supply characteristics must be chosen:

V_{IN} - Nominal input voltage.

V_{OUT} - Desired output voltage,

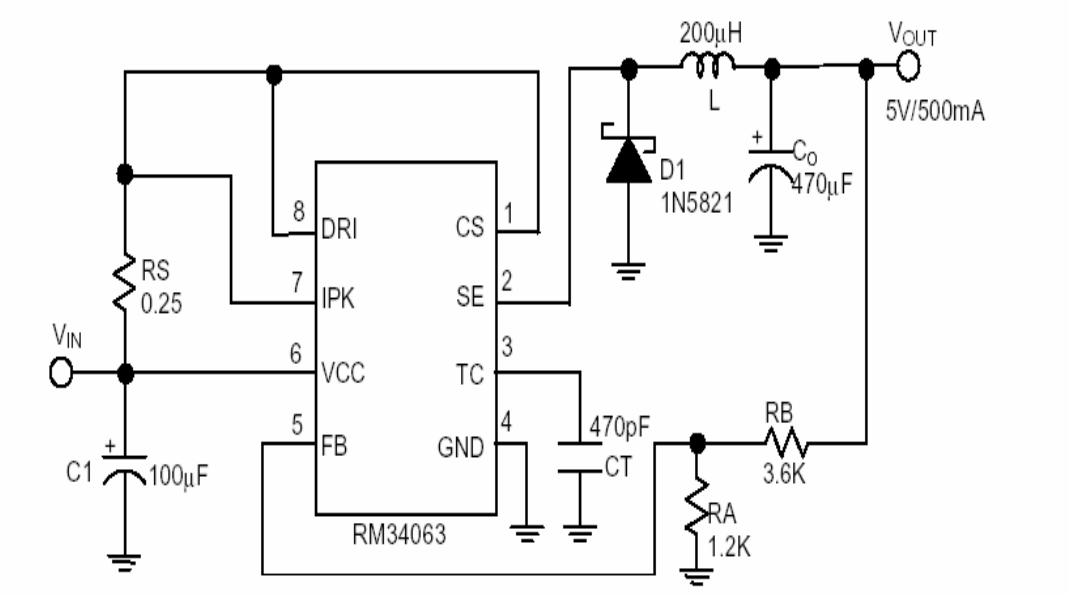
V_{OUT} =1.25 (1 + RB/RA)

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



Line Regulation	V_{IN}=10V~20V@I_O=500mA	40mV
Load Regulation	V_{IN}=15V,@ I_O=10mA~500mA	5mV
Short Circuit Current	V_{IN}=15V,@R_L=0.1Ω	1.3A

Fig. 1 Step-Down Converter

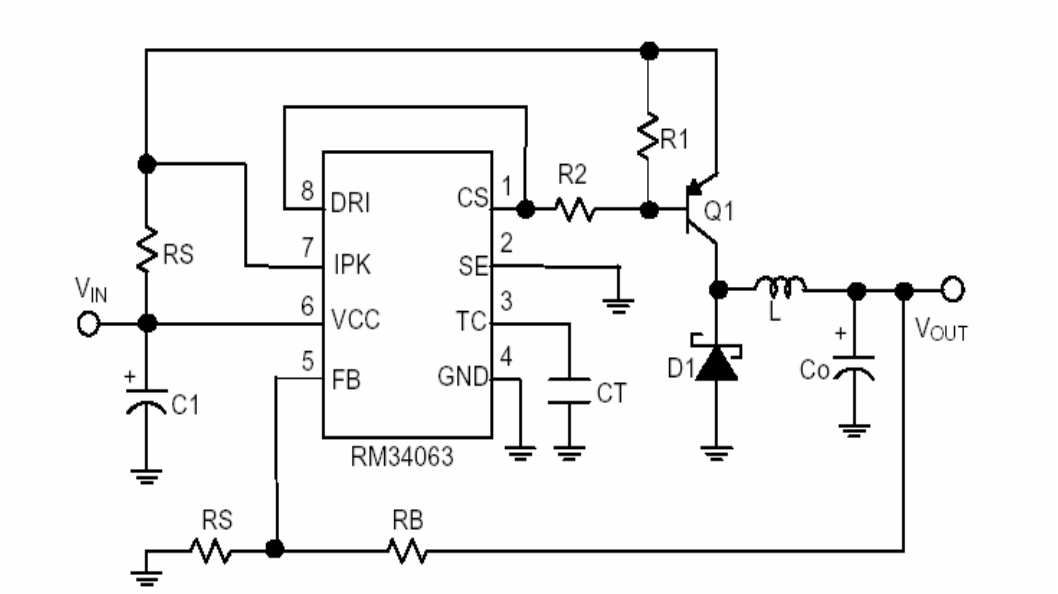
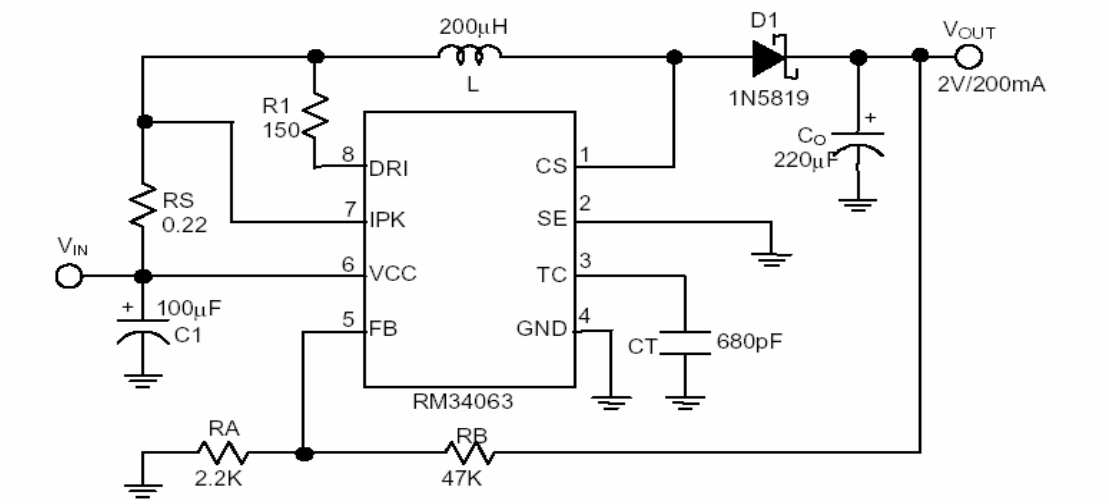


Fig. 2 Step-Down Converter with External PNP Saturation Switch

■APPLICATION EXAMPLES(CONTINUED)



Line Regulation	V_{IN}=8V~16V@I_O=200mA	100mV
Load Regulation	V_{IN}=12V,@ I_O=80mA~200mA	5mV

Fig. 3 Step-Up Converter

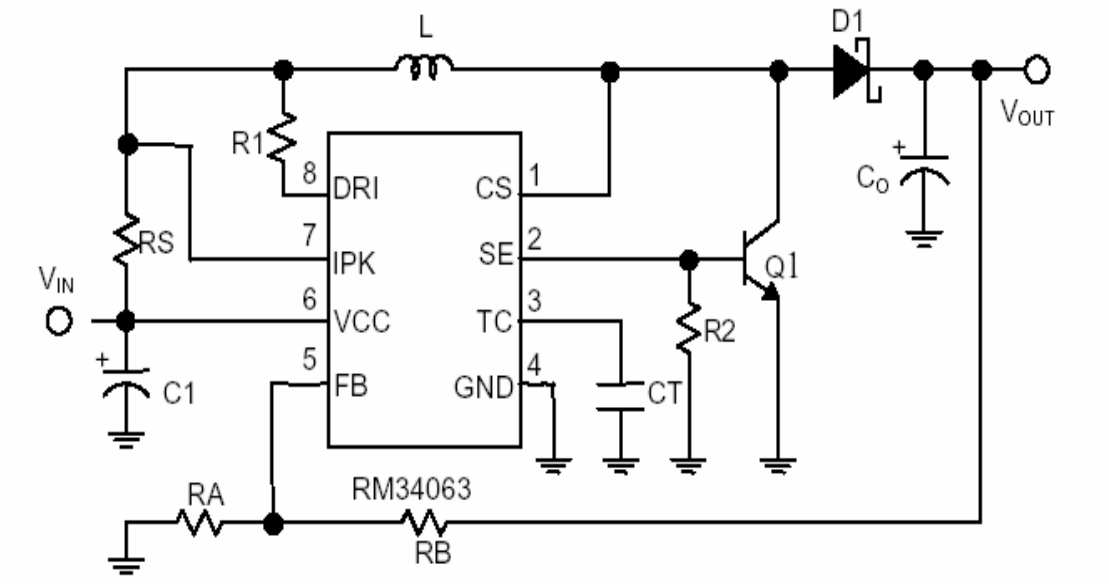
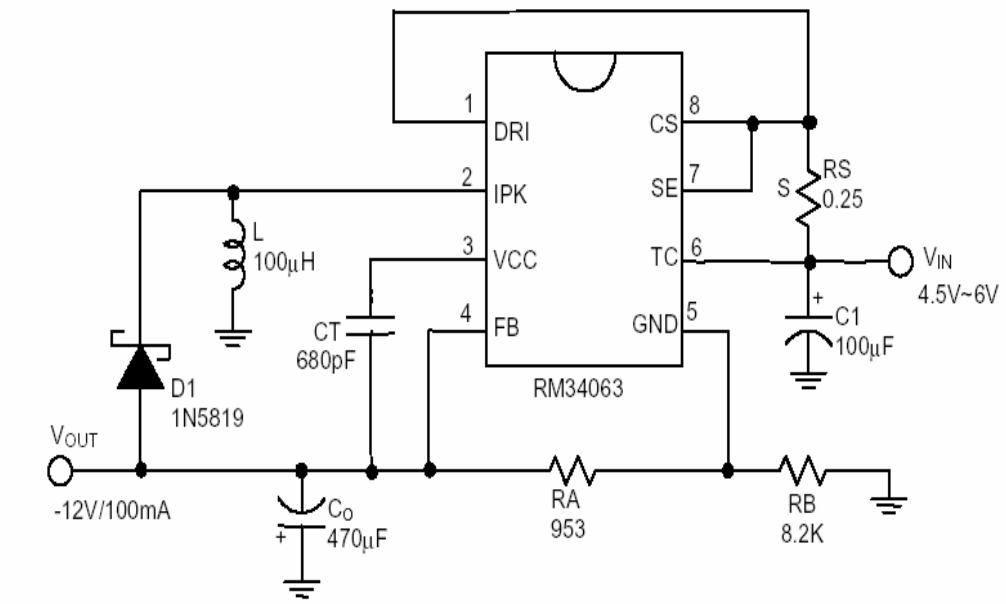


Fig. 4 Step-Up Converter with External NPN Switch



Line Regulation	V_{IN}=4.5V~6V@I_O=100mA	20mV
Load Regulation	V_{IN}=5V,@ I_O=10mA~100mA	100mV

Fig.5 Inverting Converter

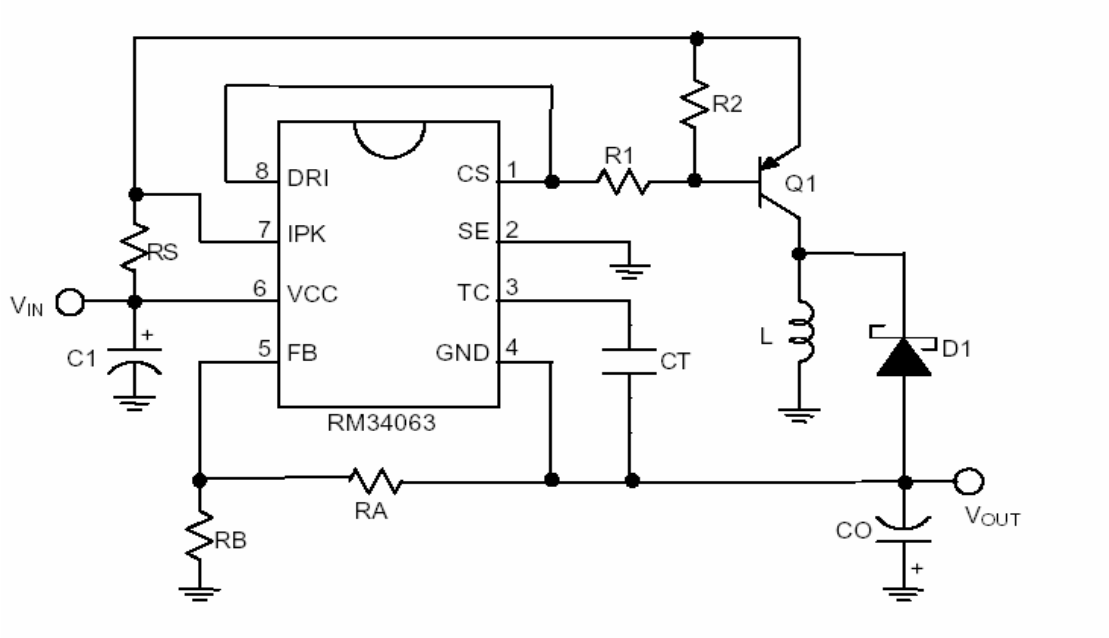
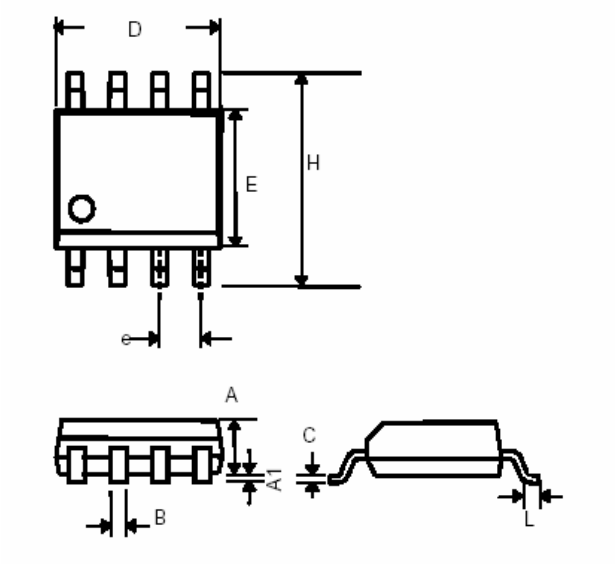


Fig 6. Voltage Inverting Converter With PNP Saturated Switch

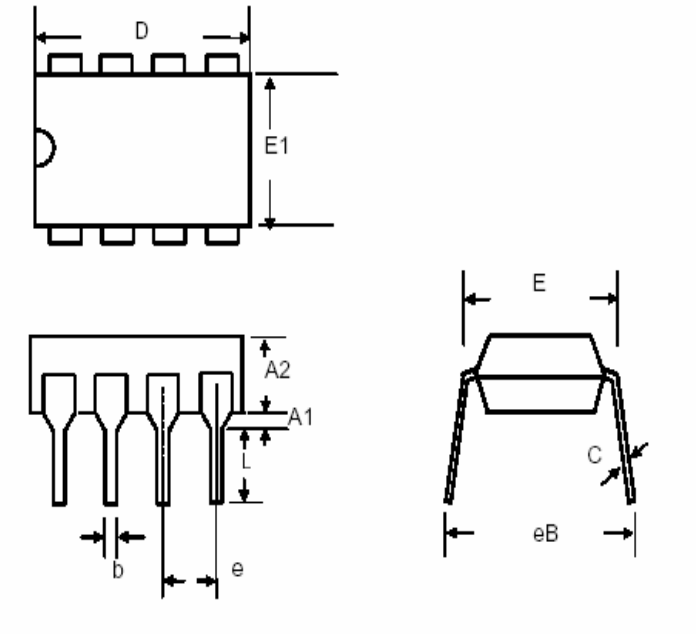
■PHYSICAL DIMENSIONS

•8 LEAD PLASTIC SO (unit: mm)



SYMBOL	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27(typ)	
H	5.80	6.20
L	0.40	1.27

•8 LEAD PLASTIC DIP (unit: mm)



SYMBOL	MIN	MAX
A1	0.381	—
A2	2.92	4.96
b	0.35	0.56
C	0.20	0.36
D	9.01	10.16
E	7.62	8.26
E1	6.09	7.12
e	2.54(typ)	
eB	—	10.92
L	2.92	3.81