FEATURES

- 3V to 30V Input Voltage Operation.
- Internal 1.6A Peak Current Switch.
- Internal ±1.8% Reference.
- Low Quiescent Current at 1.6mA.
- Frequency Operation from 100Hz to 100KHz.
- Current Limiting.

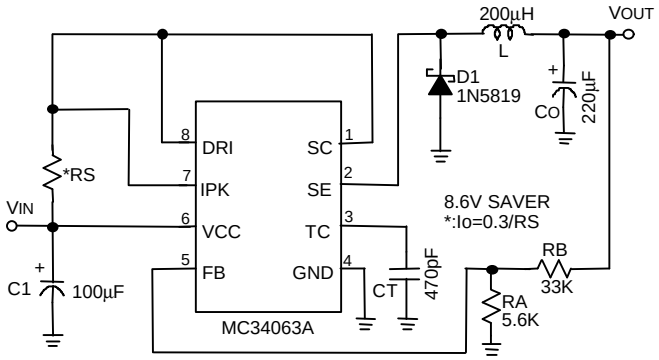
APPLICATIONS

- Saver for Cellular phones
- DC-DC Converter Module

DESCRIPTION

The MC34063A by Analog Integrations Corporation, an improved second source over the industrial standard MC34063A, 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 ±1.8% internal reference and low quiescent current of 1.6mA are among the improvements of the device over the competition.

TYPICAL APPLICATION CIRCUIT



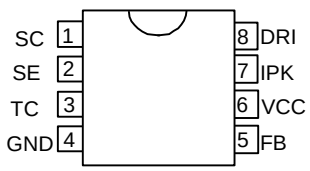
Saver Circuit for Cellular Phone

ORDERING INFORMATION

MC34063A XX

- PACKAGE TYPE
  N: PLASTIC DIP
  S: SMALL OUTLINE
- TEMPERATURE
  C: 0°C~+70°C

ORDER NUMBER	PIN CONFIGURATION
MC34063ACN (PLASTIC DIP)	TOP VIEW
MC34063ACS (PLASTIC SO)	



ABSOLUTE MAXIMUM RATINGS

Supply Voltage 30V

Comparator Input Voltage Range ..... -0.3V~30V

Switch Collector Voltage 30V

Switch Emitter Voltage 30V

Switch Collector to Emitter Voltage 30V

Driver Collector Voltage 30V

Switch Current 1.6A

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

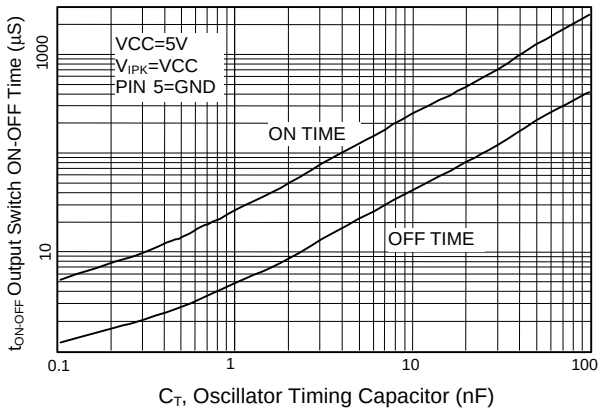
Storage Temperature Range..... - 65°C~150°C

■ ELECTRICAL CHARACTERISTICS (VCC= 5V, Ta=25°C, unless otherwise specified.)

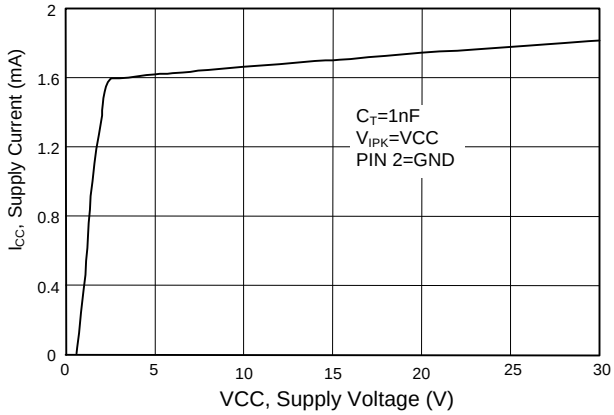
PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Oscillator						
Charging Current	5.0V≤VCC≤30V	I_{CHG}	10	25	40	μA
Discharge Current	5.0V≤VCC≤30V	I_{DISCHG}	100	150	200	μA
Voltage Swing	PIN 3	V_{OSC}		0.6		V
Discharge to Charge Current Ratio	$V_{IPK(SENSE)}$ =VCC	I_{DISCHG}/ I_{CHG}		6.0		
Current Limit Sense Voltage	$I_{CHG}=I_{DISCHG}$	$V_{IPK(SENSE)}$	250	300	350	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)	$V_{CE\ (SAT)}$		0.4	0.7	V
DC Current Gain	I_{SW}=1.0A; V_{CE}=5.0V	h_{FE}	35	120		
Collector Off-State Current	V_{CE}=30V	$I_{C(OFF)}$		10		nA
Comparator						
Threshold Voltage	0°C≤Ta≤70°C	V_{FB}	1.227	1.25	1.273	V
Threshold Voltage			1.21		1.29	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	μA
Supply current	$V_{IPK(SENSE)}$=VCC $V_{PIN\ 5}>V_{FB}$ 5.0V≤VCC≤30V C_T=0.001μF, PIN 2=GND Remaining pins open	I_{CC}		1.6	3	mA

TYPICAL PERFORMANCE CHARACTERISTICS

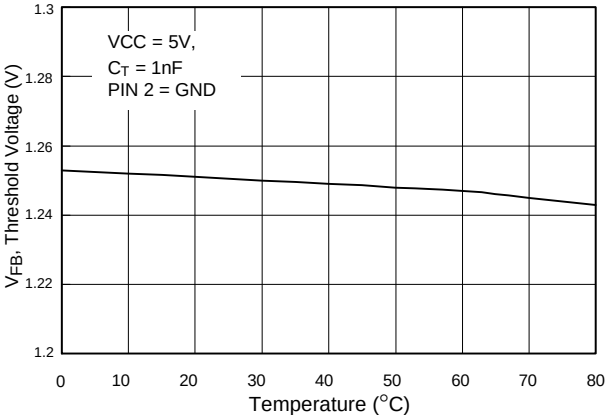
Output Switch ON-OFF Time vs. Oscillator Timing Capacitor



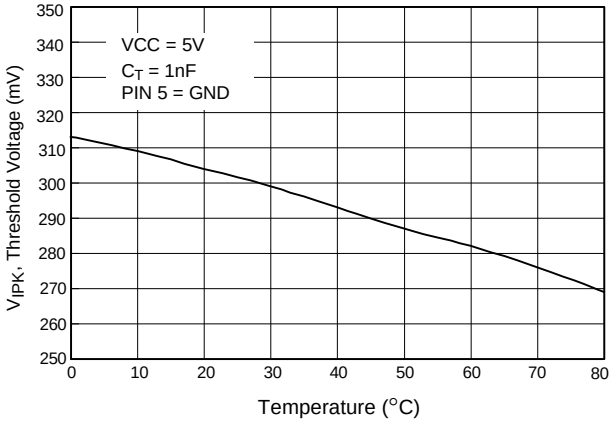
Standby Supply Current vs. Supply Voltage



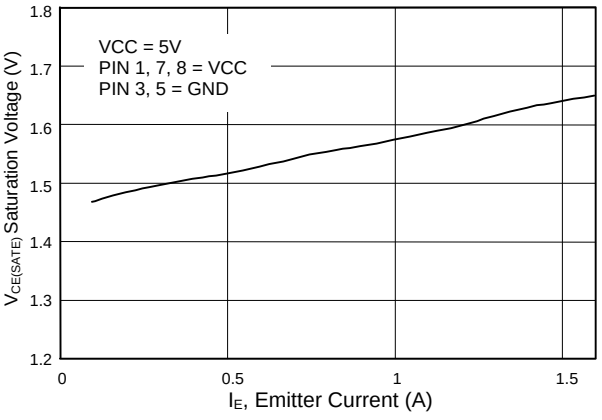
V_{FB}, Threshold Voltage vs Temperature



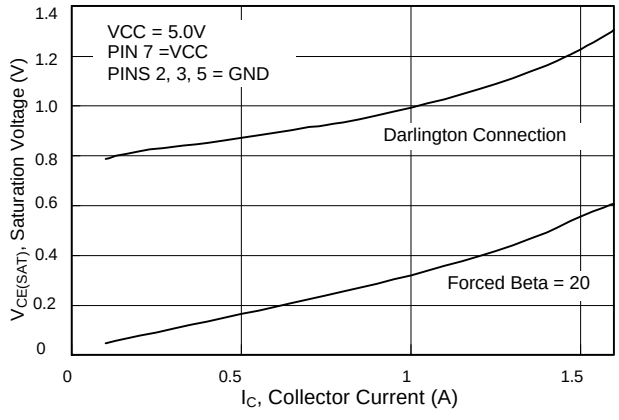
IPK Threshold Voltage vs Temperature



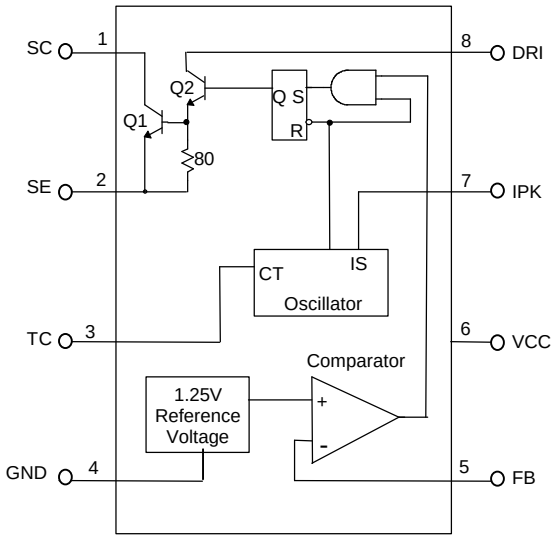
Emmiter-Follower Configuration Output Switch Saturation Voltage vs Emmiter Current



Common-Emitter Configuration Output Switch Saturation Voltage vs Collector Current



BLOCK DIAGRAM



PIN DESCRIPTIONS

PIN 1: SC - 1.6A switch collector

PIN 2: SE - Darlington switch emitter

PIN 3: TC - Oscillator timing capacitor

PIN 4: GND - Power GND

PIN 5: FB - Feedback comparator inverting input

PIN 6: VCC - Power supply input

PIN 7: IPK - Highside current sense input, VCC - V_{IPK}=300mV

PIN 8: DRI - Drive collector

APPLICATION INFORMATION

- **DESIGN FORMULA TABLE**

CALCULATION	STEP-DOWN	STEP-UP	VOLTAGE-INVERTING
$\frac{t_{ON}}{t_{OFF}}$	$\frac{V_{OUT} + V_F}{V_{IN(MIN)} - V_{SAT} - V_{OUT}}$	$\frac{V_{OUT} + V_F - V_{IN(MIN)}}{V_{IN(MIN)} - V_{SAT}}$	$\frac{\lvert V_{OUT}\rvert + V_F}{V_{IN} - V_{SAT}}$
$(t_{ON} + t_{OFF})_{MAX}$	$\frac{1}{F_{MIN}}$	$\frac{1}{F_{MIN}}$	$\frac{1}{F_{MIN}}$
C_T	$4x10^{-5}t_{ON}$	$4 \times 10^{-5}t_{ON}$	$4 \times 10^{-5}t_{ON}$
$I_{C\ (SWITCH)}$	$2I_{OUT(MAX)}$	$2I_{OUT(MAX)}\ (\frac{t_{ON} + t_{OFF}}{t_{OFF}})$	$2I_{OUT(MAX)}\ (\frac{t_{ON} + t_{OFF}}{t_{OFF}})$
RS	$0.33/I_{C(SWITCH)}$	$0.33/ I_{C\ (SWITCH)}$	$0.33/ I_{C\ (SWITCH)}$
L(MIN)	$(\frac{V_{IN(MIN)} - V_{SAT} - V_{OUT}}{I_{C(SWITCH)}})t_{ON(MAX)}$	$(\frac{V_{IN(MIN)} - V_{SAT}}{I_{C(SWITCH)}})t_{ON(MAX)}$	$(\frac{V_{IN(MIN)} - V_{SAT}}{I_{C(SWITCH)}})t_{ON(MAX)}$
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 = Forward voltage drop of the ringback rectifier

The following power supply characteristics must be chosen:

V_{IN} - Nominal input voltage.

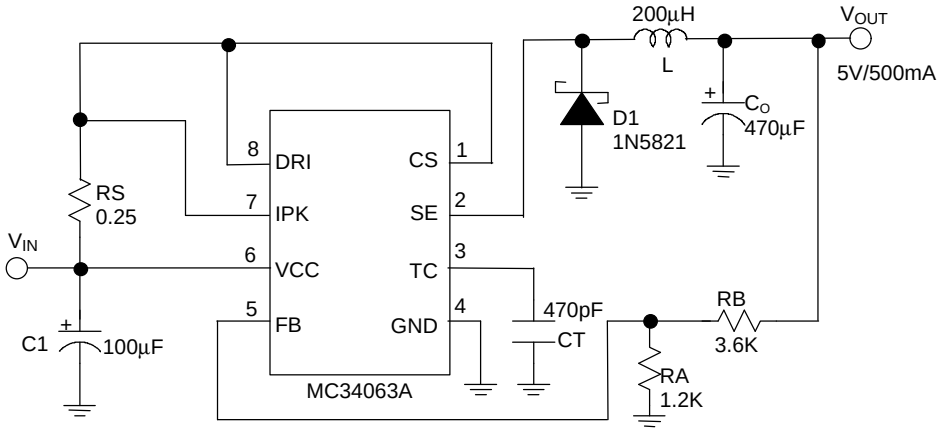
V_{OUT} - Desired output voltage,
$|V_{OUT}| = 1.25 (1 + RB/RA)$

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

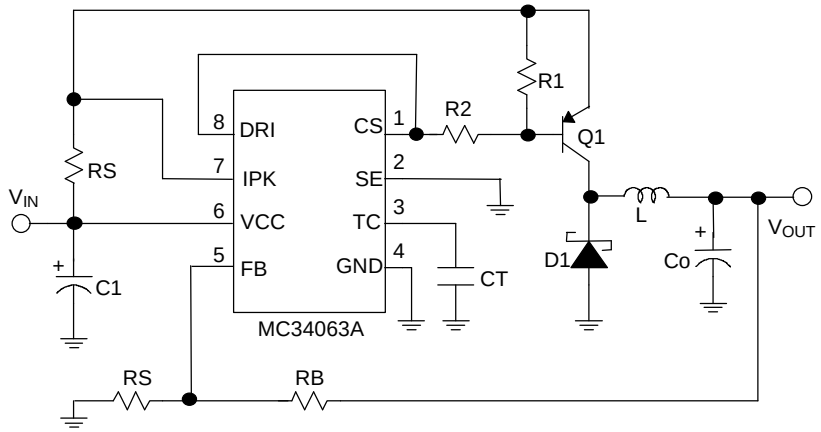
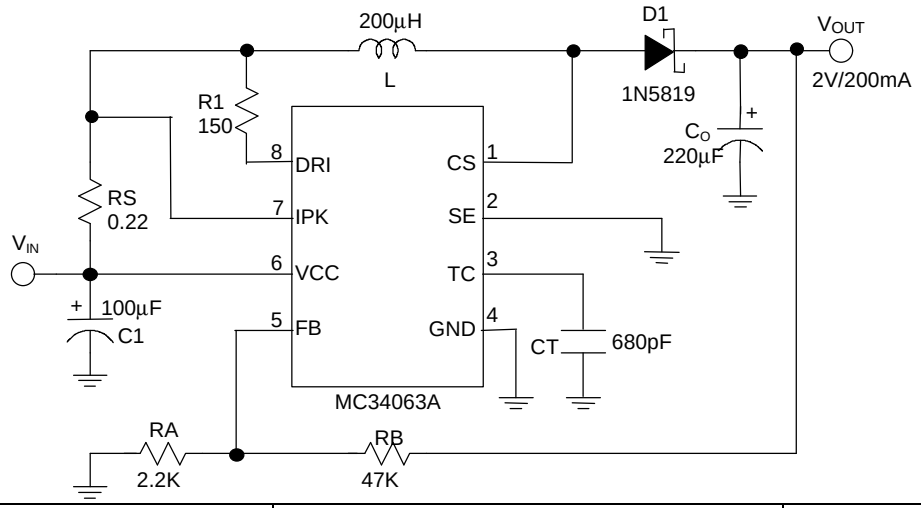


Fig. 2 Step-Down Converter with External PNP Saturation Switch

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

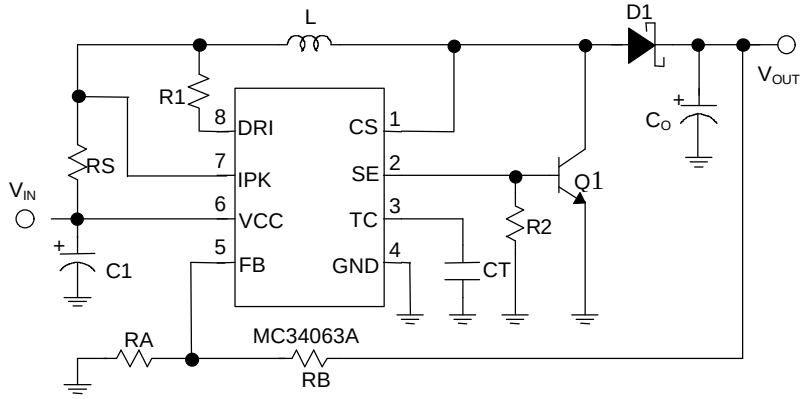
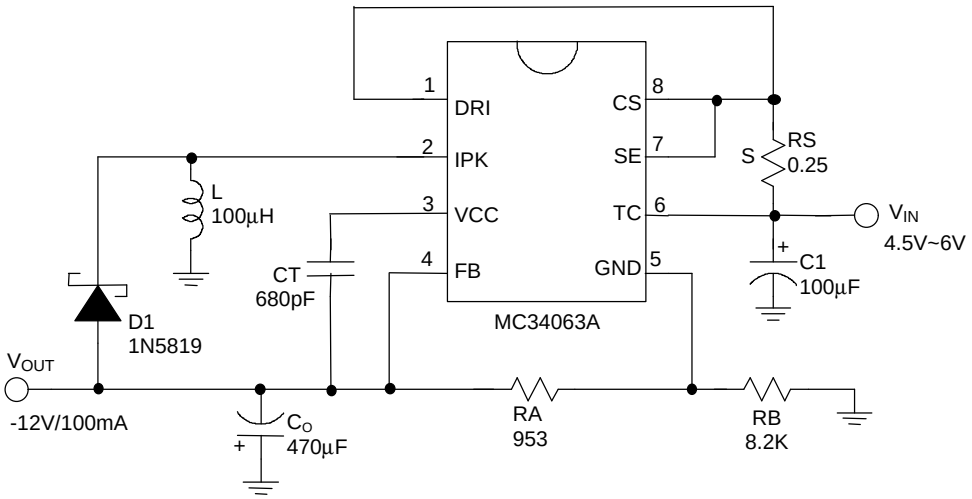


Fig. 4 Step-Up Converter with External NPN Switch

■ APPLICATION EXAMPLES (CONTINUED)



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

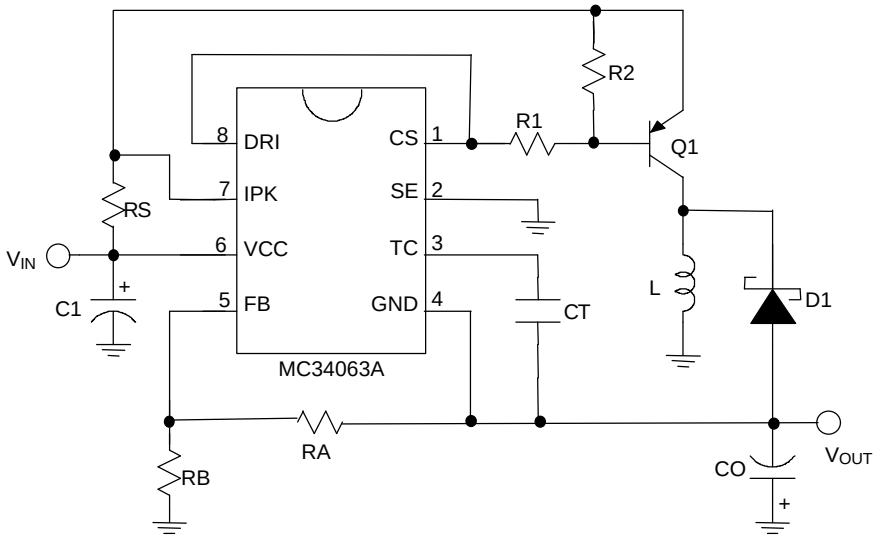
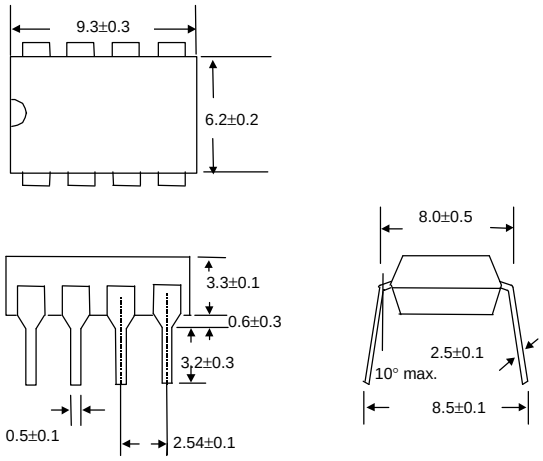


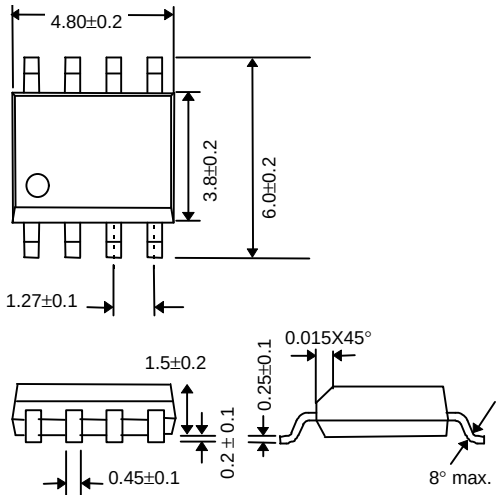
Fig 6. Voltage Inverting Converter With PNP Saturated Switch

PHYSICAL DIMENSIONS

- **8 LEAD PLASTIC DIP**



- **8 LEAD PLASTIC SO**



UNIT: mm