

MC34063A Boost Converter Module

FEATURES

- MC34063A Boost Converter Module
- Input Voltage: 3.3V
- Output Voltage: 5.0V
- Output Current: Max. 175mA
- Compact Size Step-Up Converter

APPLICATIONS

- Simple Converter from 3.3V to 5V with 175mA

DESCRIPTION

The MC34063A Boost Converter Module receives 3.3V input voltage and converts it into a stable 5V DC output voltage.

APPLICATION GUIDE

The MC34063A Boost Converter Module is capable of delivering around 175mA maximum output current, which is suitable for most small electronic projects. Compact and inexpensive, this board is perfect for use when a 3.3V to 5V power source conversion is needed.

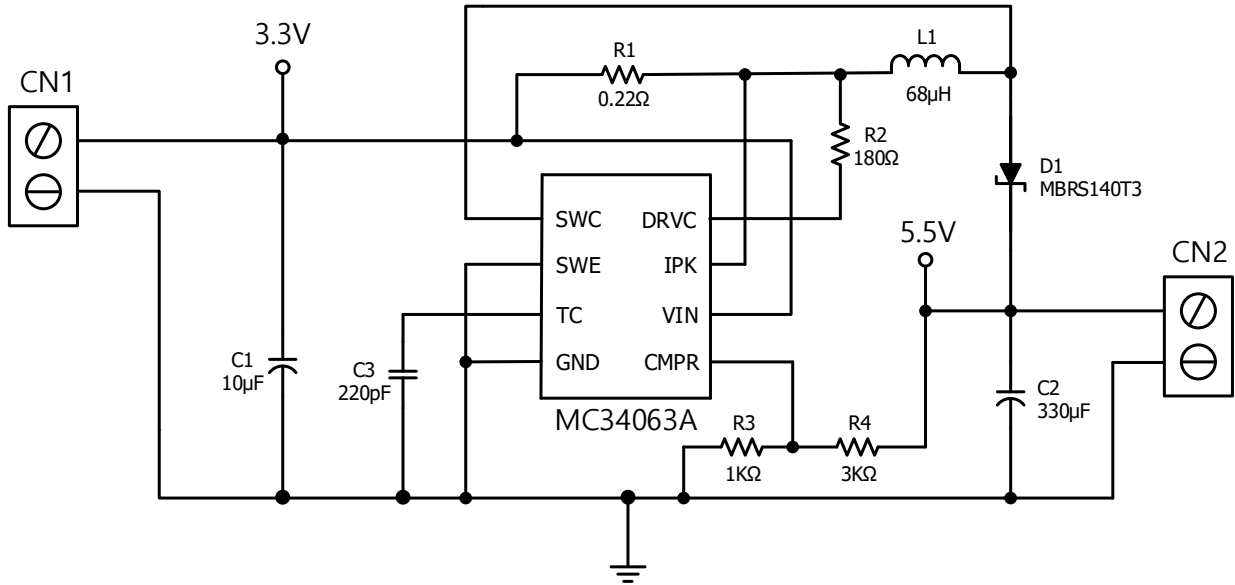


ORDERING INFORMATION

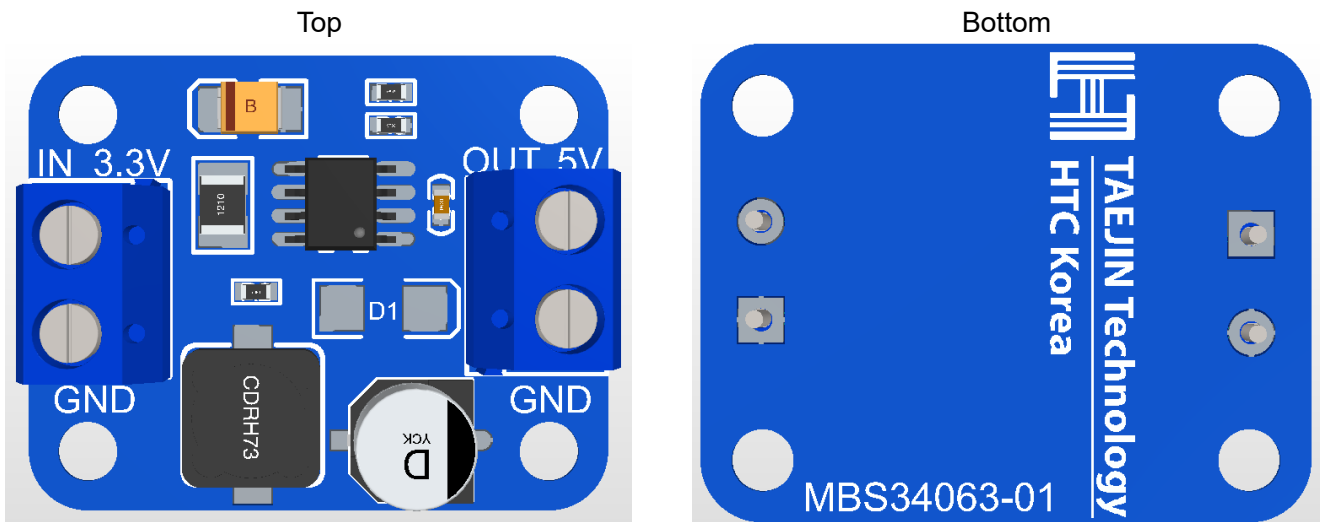
Part Number	MBS34063-01
Device	MC34063A Boost Converter Module
Package	Assembled Module (31mm X 25mm)

MC34063A Boost Converter Module

SCHEMATICS



LAYOUT

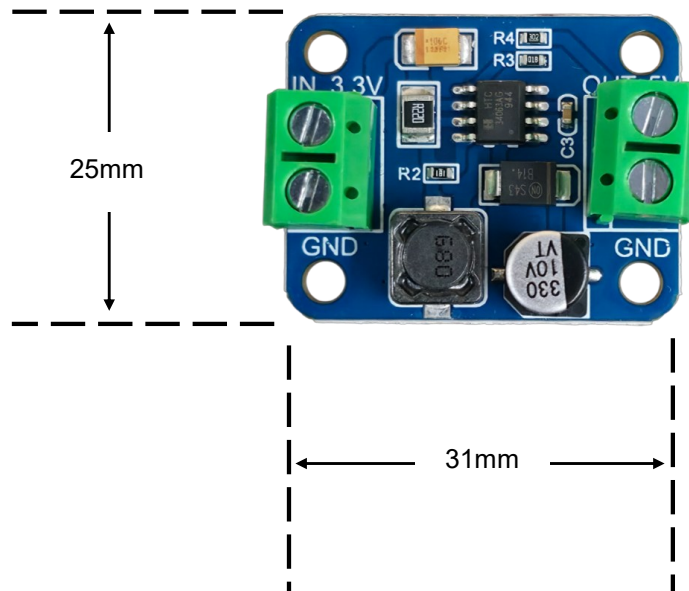


MC34063A Boost Converter Module

PARTS LIST

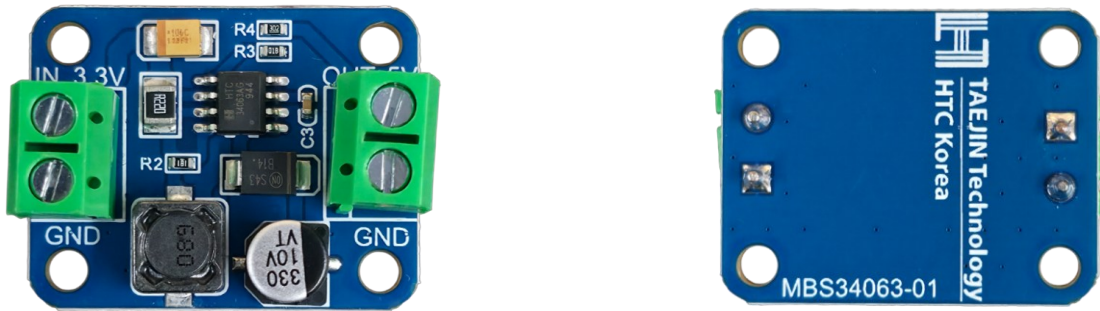
Name	Description	P/N	Qty.	Distributor
PCB	Printed Circuit Board	FR4 Lead-Free PCB	1	TAEJIN
IC	MC34063AGD	MC34063AGD, SOP-8	1	TAEJIN
Jack	2P / KF301	2P / KF301, 5.08mm	2	Generic
Diode	Schottky Rectifier Diode	MBRS140T3G	1	Generic
Inductor	68µH Inductor	68µH Inductor SMD	1	Generic
Resistor	1.0kΩ Resistor	1.0kΩ 1% Resistor, 1608(0603)	1	Generic
Resistor	3.0kΩ Resistor	3.0kΩ 1% Resistor, 1608(0603)	1	Generic
Resistor	180Ω Resistor	180Ω 1% Resistor, 1608(0603)	1	Generic
Resistor	0.22Ω Resistor	0.22Ω 1% Resistor, 3225(1210)	1	Generic
Capacitor	330µF Capacitor	330µF/10V Ceramic Capacitor	1	Generic
Capacitor	10µF Capacitor	10µF/16V Tantal Capacitor	1	Generic
Capacitor	220pF Capacitor	220pF/50V Capacitor, 1608(0603)	1	Generic

SIZE INFORMATION

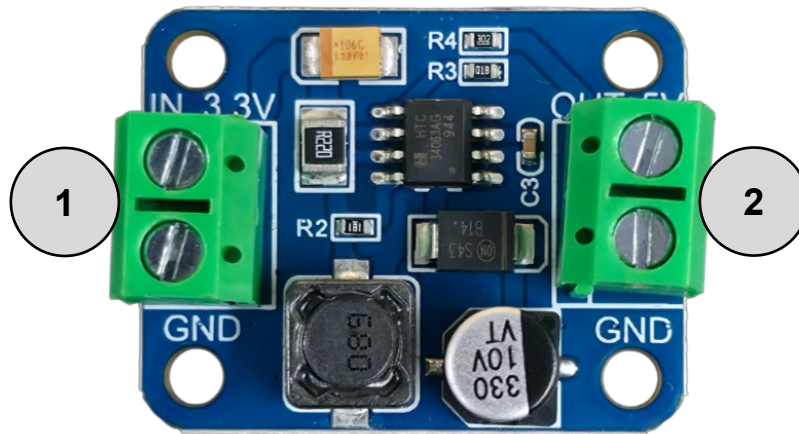


MC34063A Boost Converter Module

PRODUCT IMAGE



I/O PORT CONFIGURATION AND DESCRIPTION



Designator	Port Name	Port Description
1	Input Connector	3.3V Input Connector
2	Output Connector	5.0V Output Connector

MC34063A Boost Converter Module

REVISION NOTICE

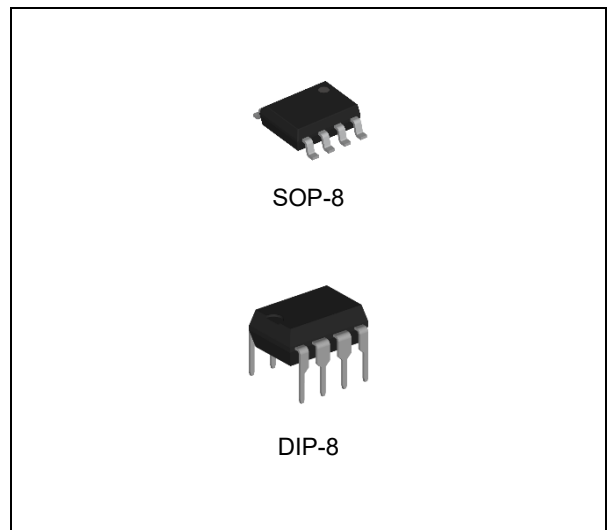
The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.

FEATURES

- Output Switch Current In Excess of 1.5A
- 2% Reference Accuracy
- Low Quiescent Current : 2.5mA(Typ.)
- Operating From 3V to 40V
- Frequency Operation to 100KHz
- Active Current Limiting
- MC34063AG is Halogen Free Products

APPLICATION

- Battery Chargers
- NICs / Switches / Hubs
- ADSL Modems
- Negative Voltage Power Supplies



ORDERING INFORMATION

Device	Package
MC34063AGD	SOP-8
MC34063AGN	DIP-8

DESCRIPTION

The MC34063AG series is a monolithic control circuit delivering the main functions for DC-DC voltage converting. The device contains an internal temperature compensated reference, comparator, duty cycle controlled oscillator with an active current limit circuit driver and high current output switch.

Output voltage is adjustable through two external resistors with a 2% reference accuracy.

Employing a minimum number of external components the MC34063AG devices series is designed for Step-Down, Step-Up and Voltage-Inverting applications.

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Power Supply Voltage	V_{CC}	-	40	V
Comparator Input Voltage Range	V_{IR}	-0.3	40	V
Switch Collector Voltage	V_{SWC}		40	V
Switch Emitter Voltage($V_{SWC}=40V$)	V_{SWE}		40	V
Switch Collector to Emitter Voltage	V_{CE}		40	V
Driver Collector Voltage	V_{dc}	-	40	V
Driver Collector Current (Note 2)	I_{dc}	-	100	mA
Switch Current	I_{SW}	-	1.5	A

ABSOLUTE MAXIMUM RATINGS (Continued)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Junction Temperature Range	T _J	-40	150	°C
Storage Temperature Range	T _{STG}	-65	150	°C

Note 1. Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

(*) This value depends from thermal design of PCB on which the device is mounted.

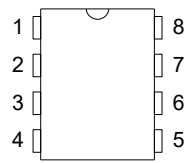
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	V _{CC}	3	40	V
Operating Junction Temperature	T _J	-40	125	°C
Operating Ambient Temperature	T _A	-40	125	°C

ORDERING INFORMATION

Package	Order No.	Description	Supplied As	Status
SOP-8	MC34063AGD	1.5A, 100kHz	Tape & Reel	Active
DIP-8	MC34063AGN	1.5A, 100kHz	Tube	Active

PIN CONFIGURATION

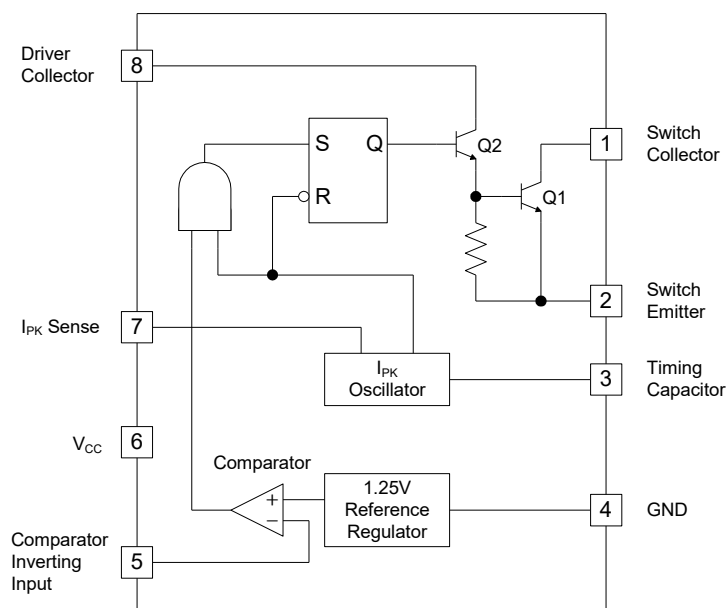


SOP-8 / DIP-8

PIN DESCRIPTION

Pin No.	DIP-8 PKG	
	Name	Function
1	Switch Collector	Internal switch transistor collector
2	Switch Emitter	Internal switch transistor emitter
3	Timing Capacitor	Timing Capacitor to control the switching frequency
4	GND	Ground pin for all internal circuits
5	Comparator Inverting Input	Inverting input pin for internal comparator
6	V _{CC}	Voltage supply
7	I _{PK} Sense	Peak Current Sense Input by monitoring the voltage drop across an external I sense resistor to limit the peak current through the switch
8	Driver Collector	Voltage driver collector

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS

(Refer to the test circuits, $V_{CC}=5V$, $T_A=T_{LOW}$ to T_{HIGH} , unless otherwise specified, see note 2)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
OSCILLATOR						
F _{OSC}	Frequency	V _{PIN5} =0V, C _T =1nF, T _A =25°C	24	33	42	KHz
I _{CHG}	Charge Current	V _{CC} =5 to 40V, T _A =25°C	24	35	42	μA
I _{DISCHG}	Discharge Current	V _{CC} =5 to 40V, T _A =25°C	140	220	260	μA
I _{DISCHG} /I _{CHG}	Discharge to Charge Current Ratio	Pin 7= V _{CC} , T _A =25°C	5.2	6.5	7.5	
V _{IPK(SENSE)}	Current Limit Sense Voltage	I _{CHG} =I _{DISCHG} , T _A =25°C	250	300	350	mV
OUTPUT SWITCH						
V _{CE(SAT)}	Saturation Voltage, Darlington connection	I _{SW} =1A, Pins 1,8 connected		1.0	1.3	V
V _{CE(SAT)}	Saturation Voltage	I _{SW} =1A, R _{PIN8} =82Ω to V _{CC} , Forced β ~ 20		0.45	0.7	V
h _{FE}	DC Current Gain	I _{SW} =1A, V _{CE} =5V, T _A =25°C	50	75		
I _{C(OFF)}	Collector Off-State Current	V _{CE} = 40V		1.0	100	μA
COMPARATOR						
V _{TH}	Threshold Voltage	T _A =25°C	1.225	1.25	1.275	V
		T _A =T _{LOW} to T _{HIGH}	1.21		1.29	V
REG _{LINE}	Threshold Voltage Line Regulation	V _{CC} = 3 to 40V		1.4	5	mV
I _{IB}	Input Bias Current	V _{IN} = 0V		-20	-400	nA
TOTAL DEVICE						
I _{CC}	Supply Current	V _{CC} = 5 to 40V, C _T =1nF Pin7= V _{CC} , V _{PIN5} >V _{TH} , Pin2=GND Remaining pins open		1.4	4	mA

Note 1. Maximum package power dissipation limit must be observed.

Note 2. T_{LOW}= -40°C, T_{HIGH}= +125°C

Note 3. If Darlington configuration is not used, care must be taken to avoid deep saturation of output switch.

The resulting switch-off time may be adversely affected.

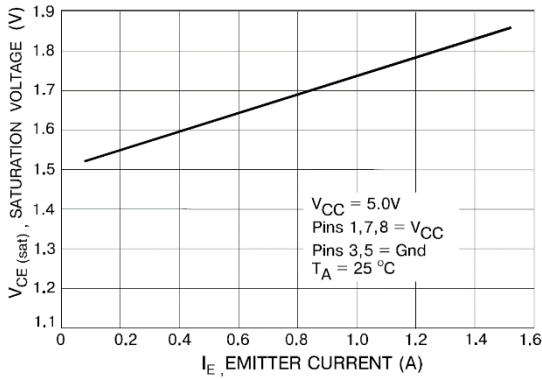
In a Darlington configuration the following output driver condition is suggested:

$$\text{Forced } \beta \text{ of output switch : } \frac{I_{C(OUTPUT)}}{I_{C(DRIVER)} - 7.0mA^*} \geq 10$$

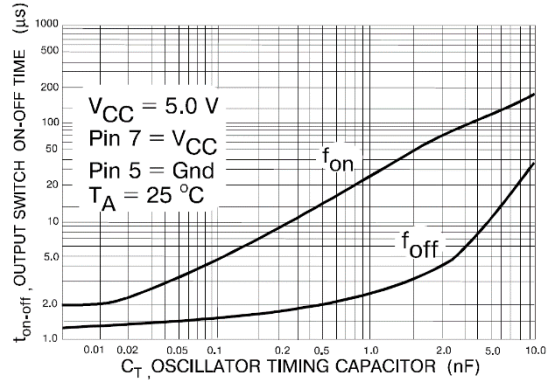
* Currentless due to a built in 1KΩ anti-leakage resistor

TYPICAL ELECTRICAL CHARACTERISTICS

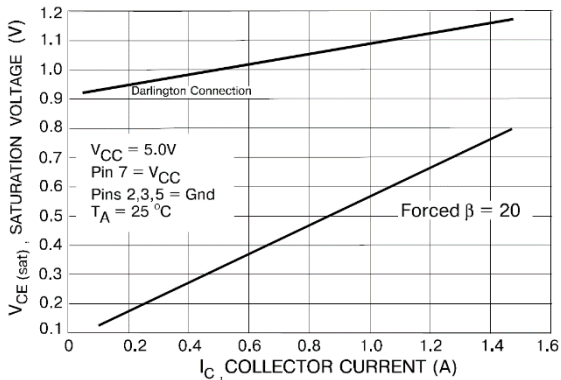
Emitter Follower Configuration Output
Saturation Voltage vs. Emitter Current



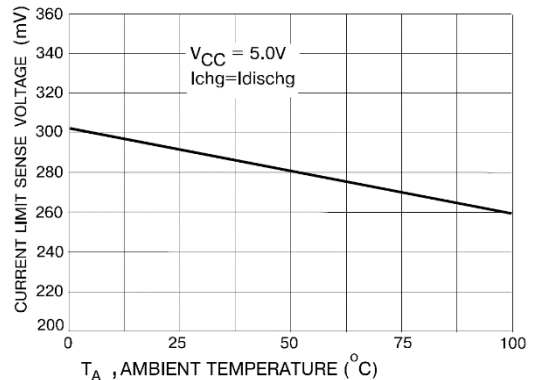
Output Switch ON-OFF Time
vs. Oscillator Timing Capacitor



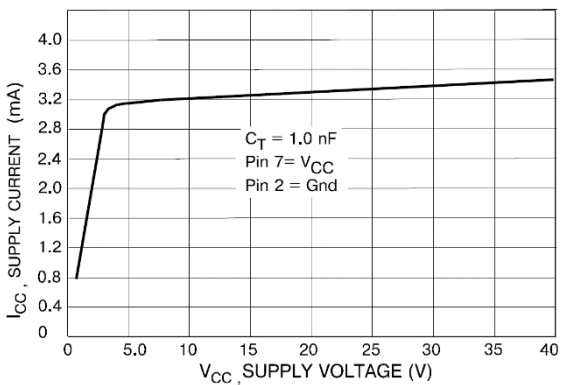
Common Emitter Configuration Output Switch
Saturation Voltage vs. Collector Current



Current Limit Sense Voltage (VIPK)
vs. Temperature

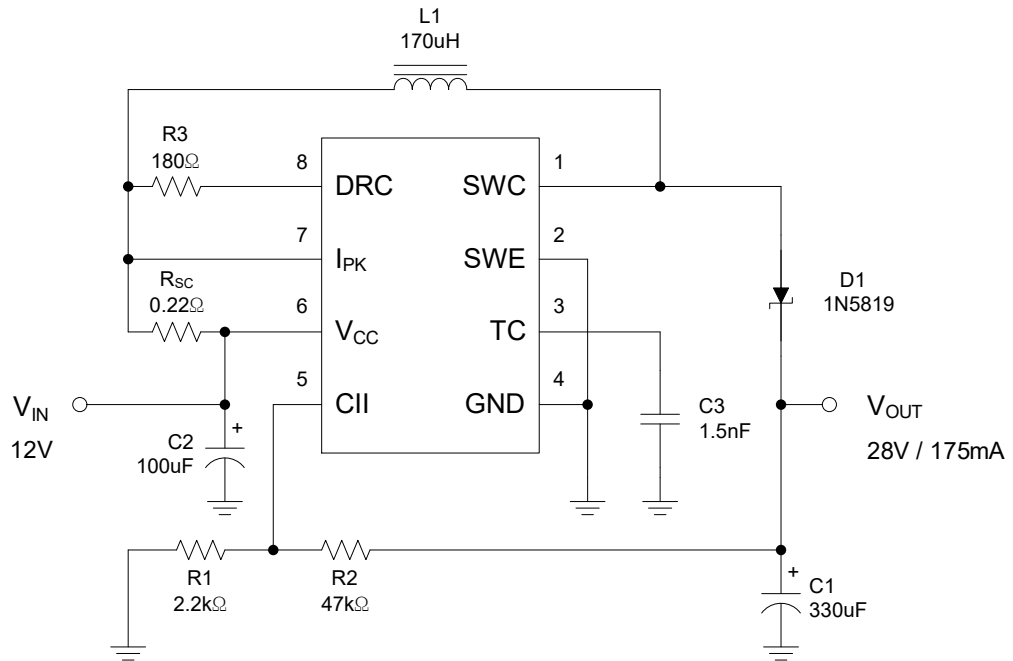


Standby supply current vs. Supply voltage

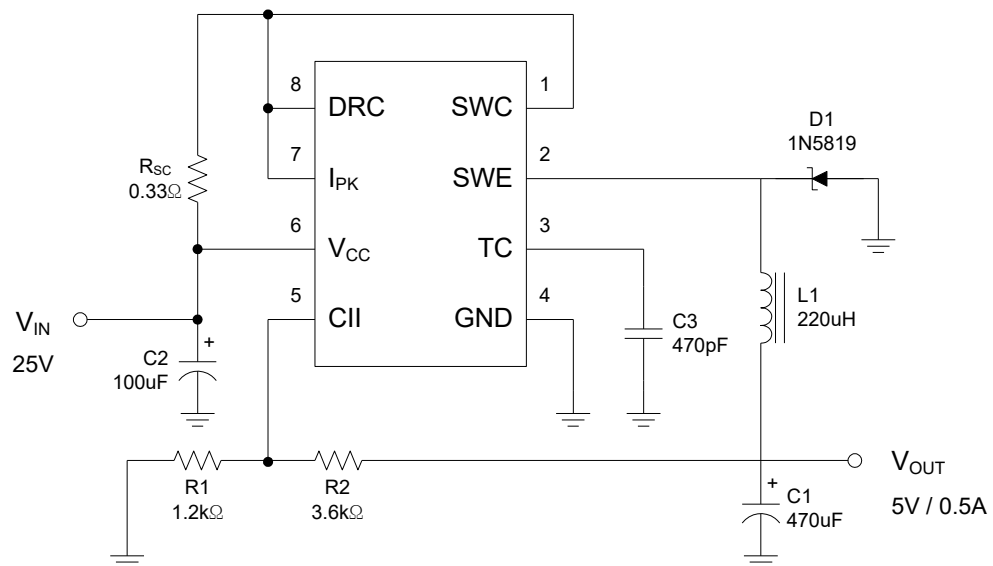


TYPICAL APPLICATION CIRCUIT

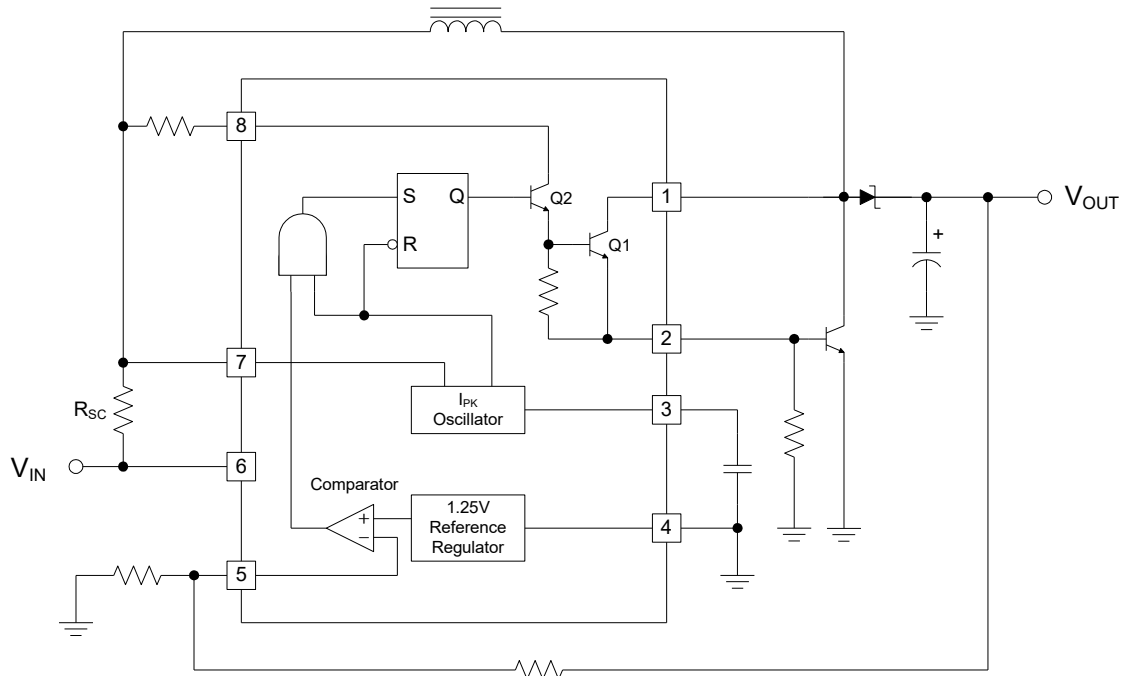
Step-Up Converter



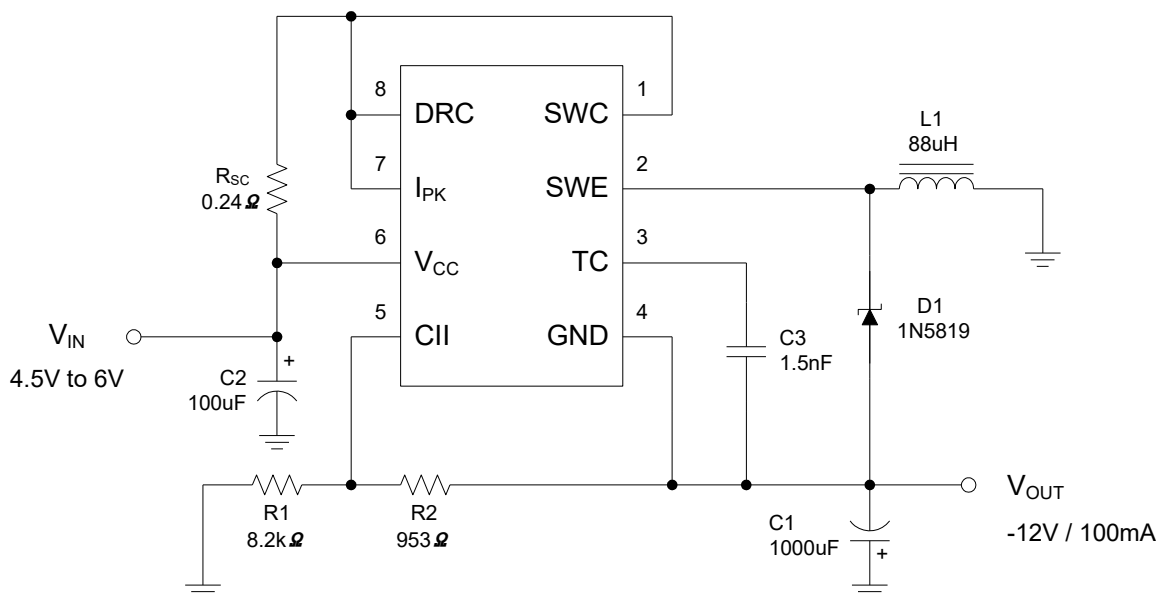
Step-Down Converter



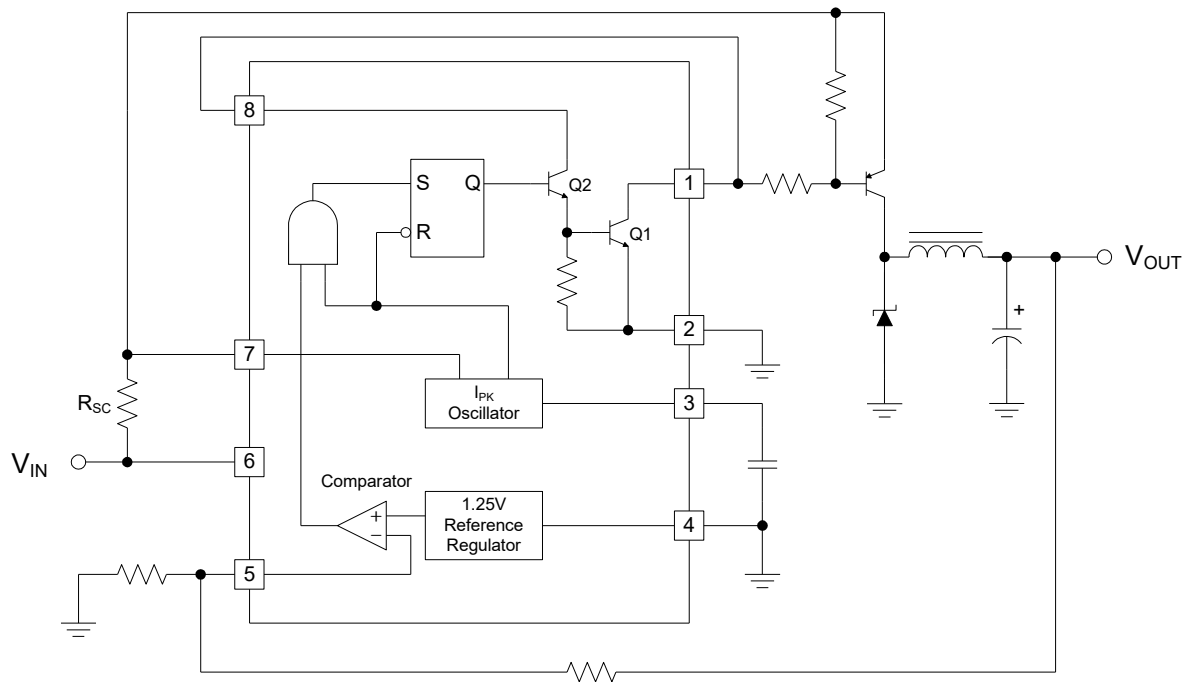
Step-Up with External NPN Switch



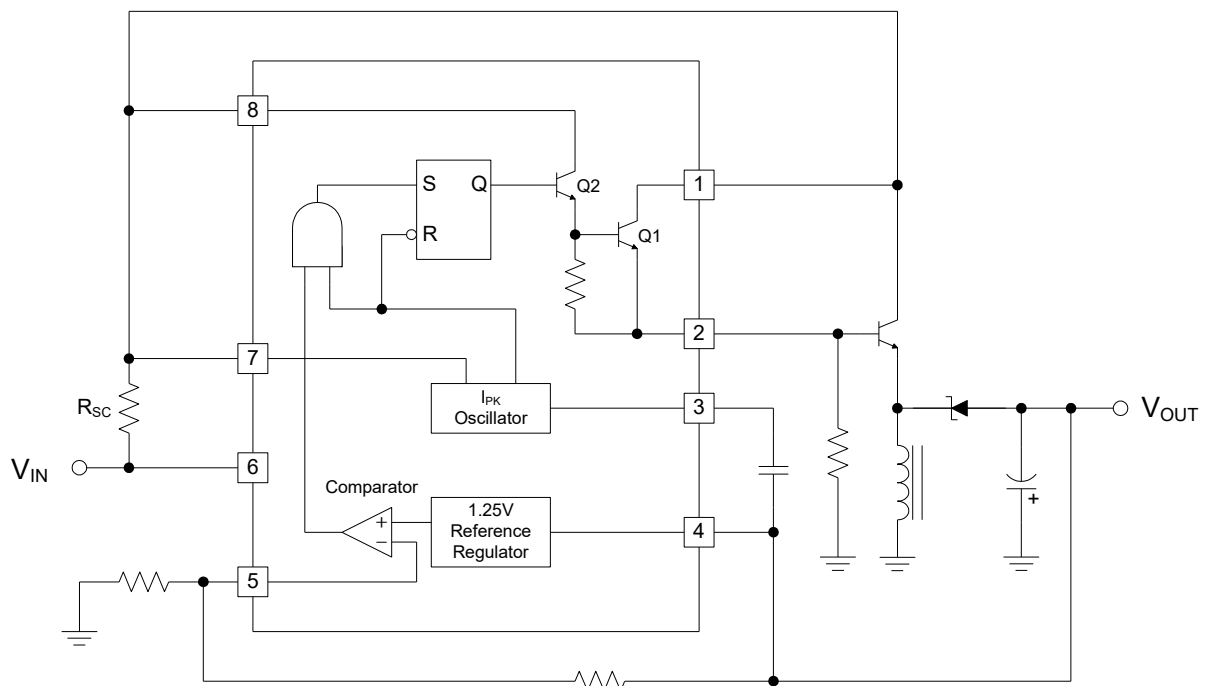
Voltage Inverting Converter



Step-Down with External PNP Switch



Voltage Inverting with External NPN Switch



DESIGN FORMULA TABLE

CALCULATION	STEP-UP	STEP-DOWN	VOLTAGE-INVERTING
t_{on} / t_{off}	$\frac{V_{out} + V_F - V_{in(min)}}{V_{in(min)} - V_{sat}}$	$\frac{V_{out} + V_F}{V_{in(min)} - V_{sat} - V_{out}}$	$\frac{ V_{out} + V_F}{V_{in} + V_{sat}}$
$(t_{on} + t_{off})_{max}$	$\frac{1}{f_{min}}$	$\frac{1}{f_{min}}$	$\frac{1}{f_{min}}$
C_T	$4.0 \times 10^{-5} \times t_{on}$	$4.0 \times 10^{-5} \times t_{on}$	$4.0 \times 10^{-5} \times t_{on}$
$I_{pk(switch)}$	$2 \times I_{out(max)} \times \left(\frac{t_{on}}{t_{off}} + 1\right)$	$2 \times I_{out(max)}$	$2 \times I_{out(max)} \times \left(\frac{t_{on}}{t_{off}} + 1\right)$
R_{sc}	$\frac{0.3}{I_{pk(Switch)}}$	$\frac{0.3}{I_{pk(Switch)}}$	$\frac{0.3}{I_{pk(Switch)}}$
$L_{(min)}$	$\left(\frac{V_{in(min)} - V_{sat}}{I_{pk(Switch)}}\right) \times t_{on(max)}$	$\left(\frac{V_{in(min)} - V_{sat}}{I_{pk(Switch)}}\right) \times t_{on(max)}$	$\left(\frac{V_{in(min)} - V_{sat}}{I_{pk(Switch)}}\right) \times t_{on(max)}$
C_o	$9 \times \frac{I_{out} \times t_{on}}{V_{ripple(pp)}}$	$\frac{I_{pk(switch)} \times (t_{on} + t_{off})}{8 \times V_{ripple(pp)}}$	$9 \times \frac{I_{out} \times t_{on}}{V_{ripple(pp)}}$

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

V_F - Forward voltage drop of the output rectifier.

V_{in} - Nominal input voltage.

V_{out} - Desired output voltage, $V_{out} = 1.25(1+R2/R1)$

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.

REVISION NOTICE

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