

## High-Efficiency, Bootstrapped DC/DC Converter

### FEATURES

- 3V to 20V Input Voltage Operation.
- Internal 800mA Switch.
- Bootstrapped Driver for N-Channel MOSFET.
- High Efficiency (up to 90%).
- Fast Transient Response.
- Internal  $\pm 2\%$  Reference.
- Low Quiescent Current at 1.6mA.
- Frequency Operation from 200Hz to 200KHz.

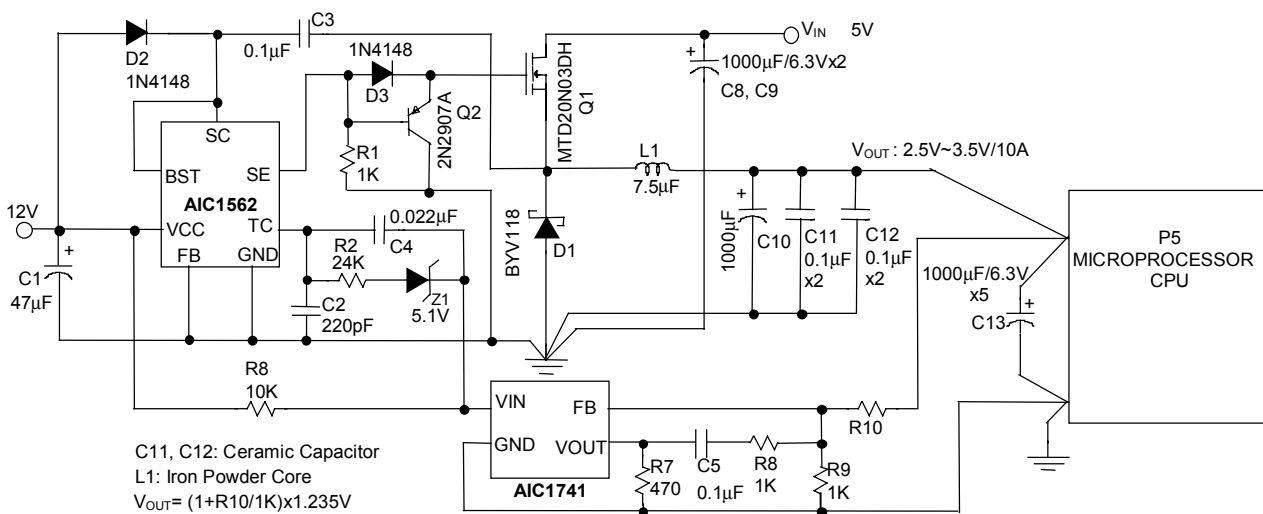
### APPLICATIONS

- CPU Power Supplies for Mother Boards.
- DC/DC Converters for CPU VRMs.
- Step-Down DC-DC Converter Module.

### DESCRIPTION

The AIC1562 is a high performance monolithic DC/DC converter drive IC with output-bootstrapping capability, designed specifically for driving N-channel MOSFET to achieve maximum possible power conversion efficiency. The device consists of an internal temperature compensated reference, comparator, controlled duty cycle oscillator, bootstrapped driver and a 800mA output switch. Working with the AIC1741, a low power adjustable regulator, the AIC1562 works at 100% duty cycle under heavy load transient conditions to minimize transient response time, making it an idea precision switching power solution to stringent requirements on computer mother boards.

### TYPICAL APPLICATION CIRCUIT



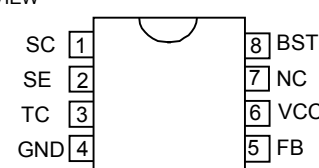
CPU Power Supply for P5 Mother Board

## ORDERING INFORMATION

AIC1562 XX

PACKAGE TYPE  
 N: PLASTIC DIP  
 S: SMALL OUTLINE

TEMPERATURE  
 C: 0°C~+70°C

ORDER NUMBER	PIN CONFIGURATION
AIC1562CN (PLASTIC DIP)	TOP VIEW 
AIC1562CS (PLASTIC SO)	

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage .....	20V
Comparator Input Voltage Range .....	-0.3V~20V
Switch Collector Voltage .....	20V
Switch Emitter Voltage .....	20V
Switch Collector to Emitter Voltage .....	20V
Driver Collector Voltage .....	20V
Switch Current .....	1A

### Power Dissipation and Thermal Characteristics

#### **DIP Package**

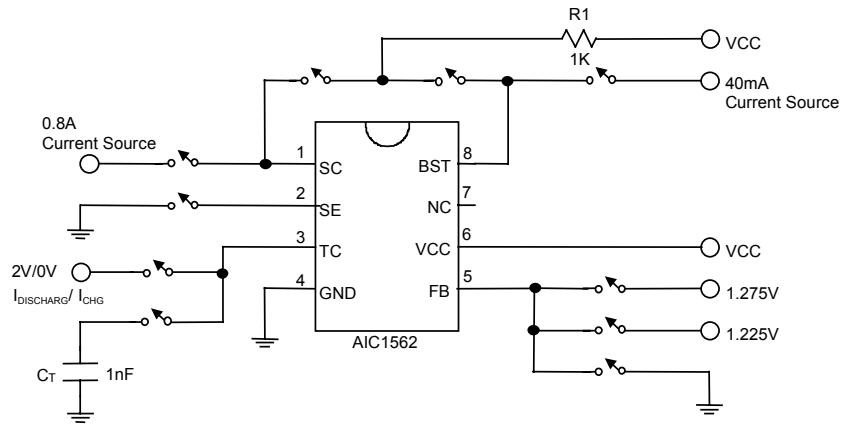
Ta= 25°C .....	1.0W
Thermal Resistance .....	100°C/W

#### **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

## TEST CIRCUIT

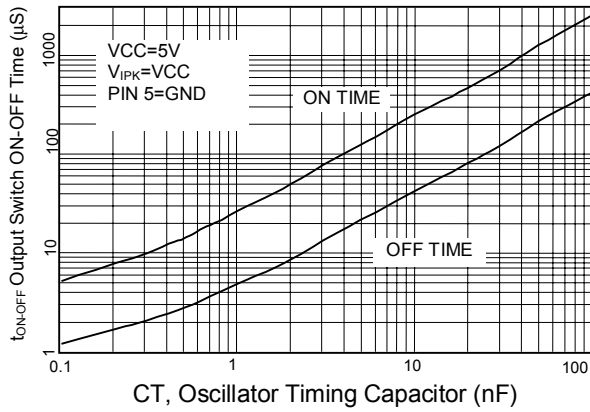


**ELECTRICAL CHARACTERISTICS** ( $V_{CC}=5V$ ,  $T_a=25^{\circ}C$  unless otherwise specified.)

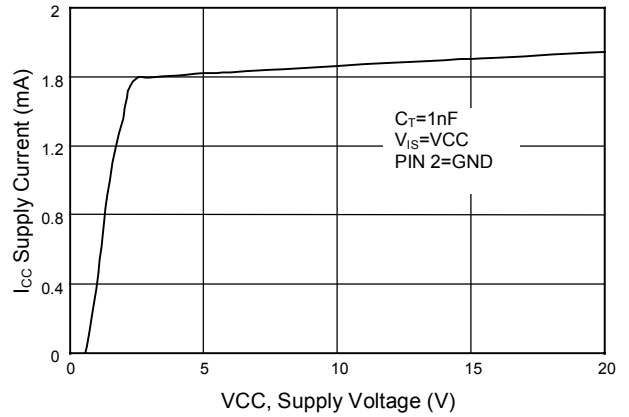
PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>Oscillator</b>						
Charging Current	$5.0V \leq V_{CC} \leq 20V$	$I_{CHG}$	15	25	35	A
Discharge Current	$5.0 \leq V_{CC} \leq 20V$	$I_{DISCHG}$	120	150	180	$\mu A$
Voltage Swing	PIN 3	$V_{OSC}$		0.6		V
Discharge to Charge Current Ratio	$V_{IS} = V_{CC}$	$I_{DISCHG} / I_{CHG}$		6.0		
<b>Output Switch</b>						
Saturation Voltage, Emitter Follower Connection	$I_{SE}=0.8A$ ; $V_{BST} = V_{SC} = V_{CC}$	$V_{CE(SAT)}$		1.6	2.0	V
Saturation Voltage	$I_{SC}=0.8A$ ; $I_{BST} = 40mA$ , (Forced $\cong 20$ )	$V_{CE(SAT)}$		0.5	0.8	V
DC Current Gain	$I_{SC} = 0.8A$ ; $V_{CE}=5.0V$	$h_{FE}$	35	120		
Collector Off-State Current	$V_{CE}=20V$	$I_{C(OFF)}$		10		nA
<b>Comparactor</b>						
Threshold Voltage	$T_a=25^{\circ}C$ $0^{\circ}C \leq T_a \leq 70^{\circ}C$	$V_{FB}$	1.225	1.25	1.275	V
			1.21		1.29	V
Threshold Voltage Line Regulation	$3.0V \leq V_{CC} \leq 20V$	$REG_{LINE}$		0.1	0.5	mV/V
Input Bias Current	$V_{IN}=0V$	$I_{IB}$		0.4	2	$\mu A$
Supply current	$V_{IS} = V_{CC}$ , pin 5 $> V_{FB}$ $5.0V \leq V_{CC} \leq 20V$ $C_T=1nF$ PIN 2=GND Remaining pins open	$I_{CC}$		1.6	3	mA

**TYPICAL PERFORMANCE CHARACTERISTICS**

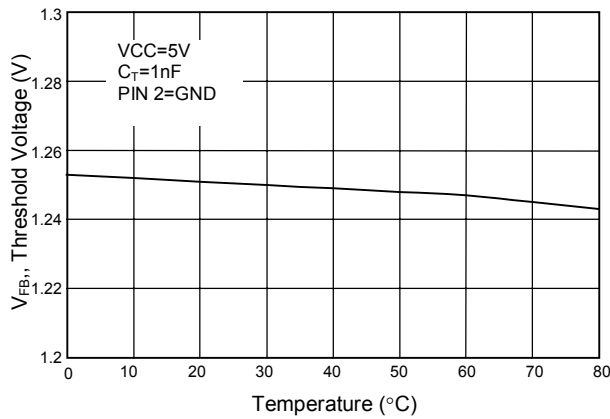
Output Switch ON-OFF Time vs. Oscillator Timing Capacitor



Standby Supply Current vs. Supply Voltage



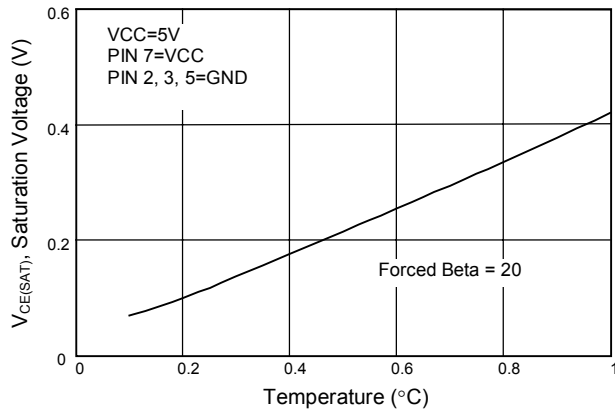
V<sub>FB</sub>, Threshold Voltage vs Temperature



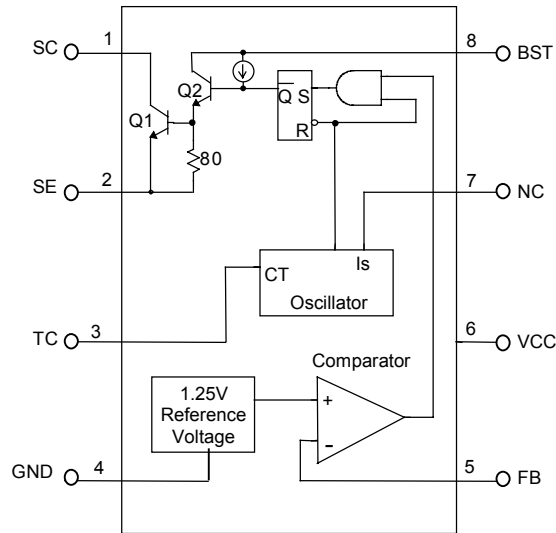
Emitter Follower Configuration Output Switch Saturation Voltage vs. Emitter Current



Common Emitter Configuration Output Switch Saturation Voltage vs. Collector Current



**■ BLOCK DIAGRAM**

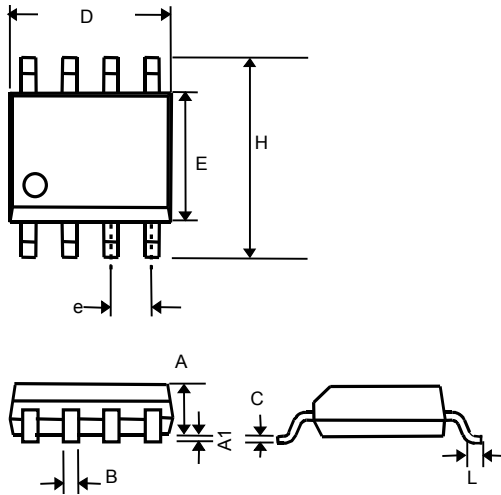


**■ PIN DESCRIPTIONS**

- PIN 1: SC - 0.8A switch collector.
- PIN 2: SE - Darlington switch emitter.
- PIN 3: TC - Oscillator timing capacitor.
- PIN 4: GND - Power ground.
- PIN 5: FB - Feedback comparator inverting input.
- PIN 6: VCC - Power supply input.
- PIN 7: NC -
- PIN 8: BST - Bootstrapped driver collector.

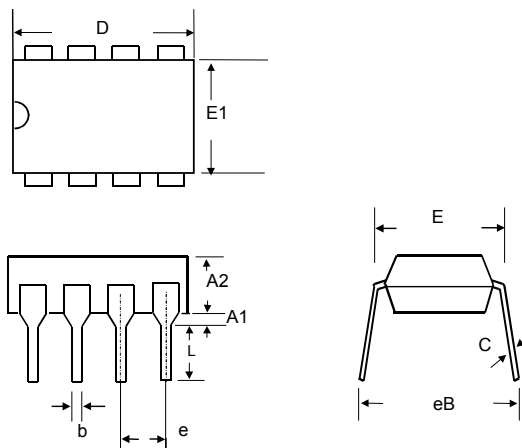
## ■ PHYSICAL DIMENSIONS

- 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

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Datasheets for electronics components.