

### FEATURES

- Precision feedback reference voltage: 0.5V (2%)
- Wide supply voltage operating range: 3.0 to 20V
- Low current consumption: 5.5mA
- Internal fixed oscillator frequency: Typ. 350KHz
- Programmable Soft-Start function (SS)
- Short Circuit Shutdown and Auto Re-start function(ARSCP)
- Built-in P-MOSFET for 2A loading capability
- Package: SOP8

### GENERAL DESCRIPTION

The AS1002 is a buck topology of switching regulator for wide operating voltage applications field. The AS1002 includes a high current P-MOSFET, high precision reference (0.5V) for comparing output voltage with feedback amplifier, an internal dead-time control and oscillator for controlling the maximum duty cycle and PWM frequency, and has power-on programmable soft start time and short circuit PMOS turn-off and auto re-start protection functions.

### APPLICATIONS

- PC Monitors
- Distributed Power Systems
- Battery Charger
- Pre-Regulator for Linear Regulators

### TYPICAL APPLICATION

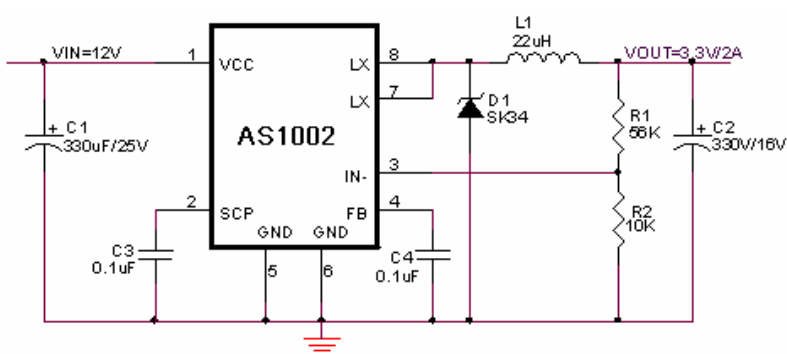
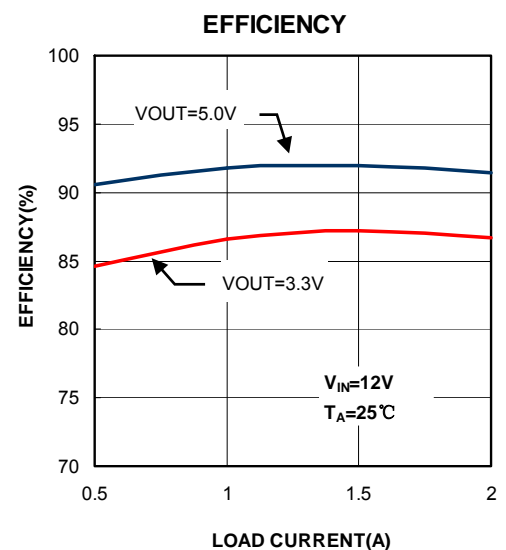


Figure1. 12V to 3.3V/2A Typical Application Circuit



### ABSOLUTE MAXIMUM RATINGS

(Note1)

V <sub>IN</sub> Voltage Range.....	3V to 20V
I <sub>OUT</sub> Output Current .....	2A
Error Amplifier IN-.....	-0.3V to 1.2V
P <sub>D</sub> Power Dissipation (T <sub>A</sub> =25°C) .....	650mW
Operating Temperature Range ....	-40°C to 85°C
Storage Temperature Range .....	-65°C to 150°C
Lead Temperature(Soldering, 10sec.) .....	260°C

### PACKAGE/ORDER INFORMATION

<p>Top View</p> <p>SOP-8 Plastic Package T<sub>JMAX</sub>=125°C (Note2)</p>	ORDER PART NUMBER
	AS1002EBT
	PART MARKING
	A1002

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

**Note 2:** T<sub>J</sub> is calculated from the ambient temperature T<sub>A</sub> and power dissipation P<sub>D</sub> according to the following formula:

$$T_J = T_A + P_D \times \Theta_{JA}$$

### ELECTRICAL CHARACTERISTICS

V<sub>IN</sub> =6V, T<sub>A</sub> = -40°C to +85°C, unless otherwise noted. Typical values are T<sub>A</sub> = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Reference</b>					
V <sub>REF</sub> Voltage	COMP connected to FB	0.490	0.5	0.510	V
V <sub>REF</sub> Regulation	V <sub>CC</sub> =3.0V to 20V		2	12.5	mV
V <sub>REF</sub> Change with Temp.	T <sub>A</sub> =-25°C to 25°C		1	2	%
	T <sub>A</sub> =25°C to 85°C		1	2	
<b>Soft Start (SS)</b>					
S.S. Source Current	V <sub>SS</sub> = 0V	-15	-10	-7	μA
Soft Start Threshold Voltage	-	0.8	0.9	1.0	V
<b>Short Circuit Protection(SCP)</b>					
S.C.P Source Current	V <sub>SCP</sub> =0V	-15	-10	-7	μA
SCP Re-start/Hold time	V <sub>COMP</sub> >0.8V		1/20		-
S.C.P Threshold Voltage	V <sub>FB</sub> >450mV	0.9	1.0	1.1	V
<b>Oscillator(OSC)</b>					
f <sub>OSC</sub>		300	350	400	KHz
f <sub>OSC</sub> Change with Voltage	V <sub>CC</sub> =3.0 V to 20V	-	5		%
f <sub>OSC</sub> Change with Temperature	T <sub>A</sub> =--25°C to 85°C	-	5	-	%

**ELECTRICAL CHARACTERISTICS(Continuous)**

$V_{IN} = 6V$ ,  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise noted. Typical values are  $T_A = 25^{\circ}C$

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Error Amplifier(EA)</b>					
Input Threshold Voltage	$V_{FB} = 450mV$	490	500	510	mV
$V_T$ Change with Voltage	$V_{CC} = 3V$ to $20V$	-	5	20	mV
$V_T$ Change with Temperature	$T_a = -25^{\circ}C$ to $85^{\circ}C$	-	1	-	%
Input Bias Current	--	-1.0	-0.2	1.0	$\mu A$
Voltage Gain	--	-	100	-	V/V
Frequency Bandwidth	$A_v = 0$ dB	-	6	-	MHz
Output Voltage Swing Positive	$V_{IN-} = 0.3V$	0.78	0.87	-	V
Output Voltage Swing Negative	$V_{IN-} = 0.7V$	-	0.05	0.2	
Output Source Current	$V_{FB} = 450mV$	-	-45	-30	$\mu A$
Output Sink Current		30	45	-	$\mu A$

**Idle Period Adjustment**

Maximum duty cycle	$V_{IN-} = 0.2V$	-	80	-	%
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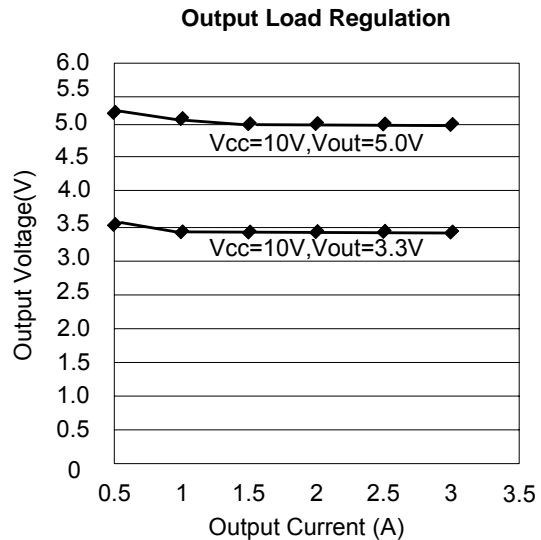
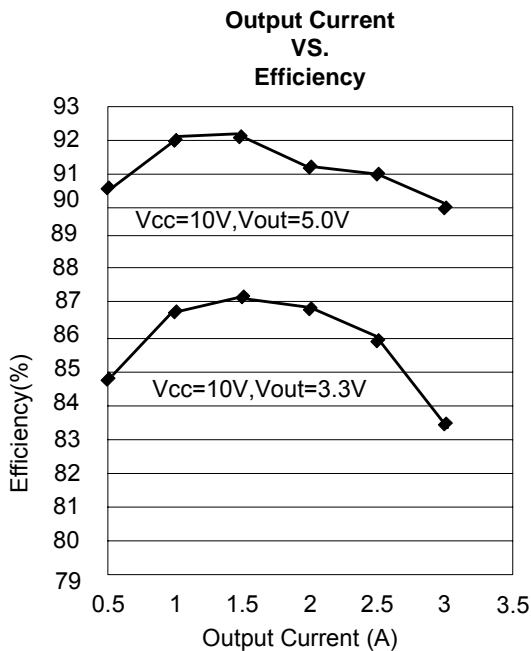
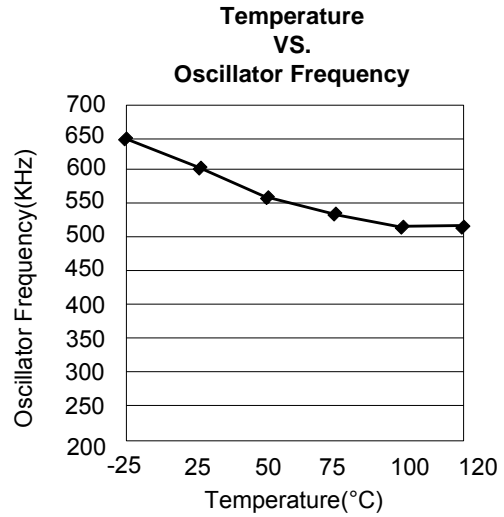
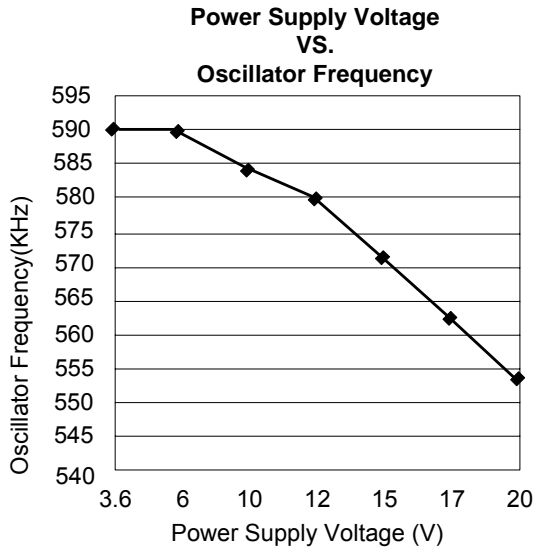
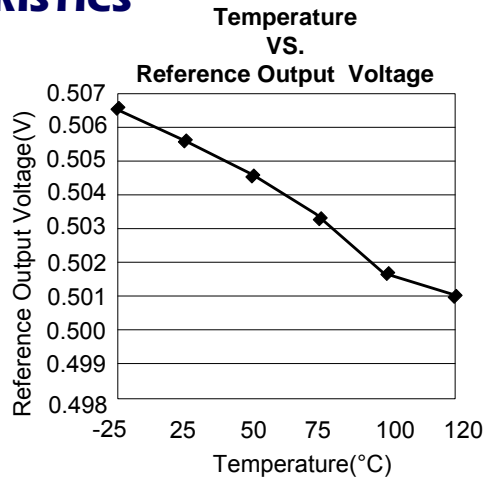
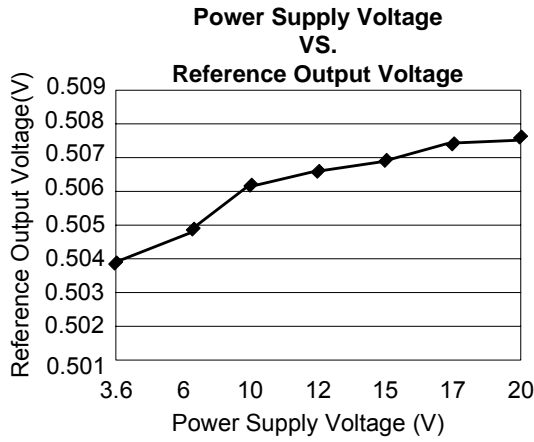
**Output**

PMOS D-S voltage	$V_{FB} = 0.1V$	-25	-		V
PMOS source current		-2			A
PMOS On resistance	$V_{CC} = 5.0V$ , $V_{IN-} = 0V$	70	90		$m\Omega$
	$V_{CC} = 10V$ , $V_{IN-} = 0V$	42	65		
Output leakage current	SCP active	5	-		$\mu A$

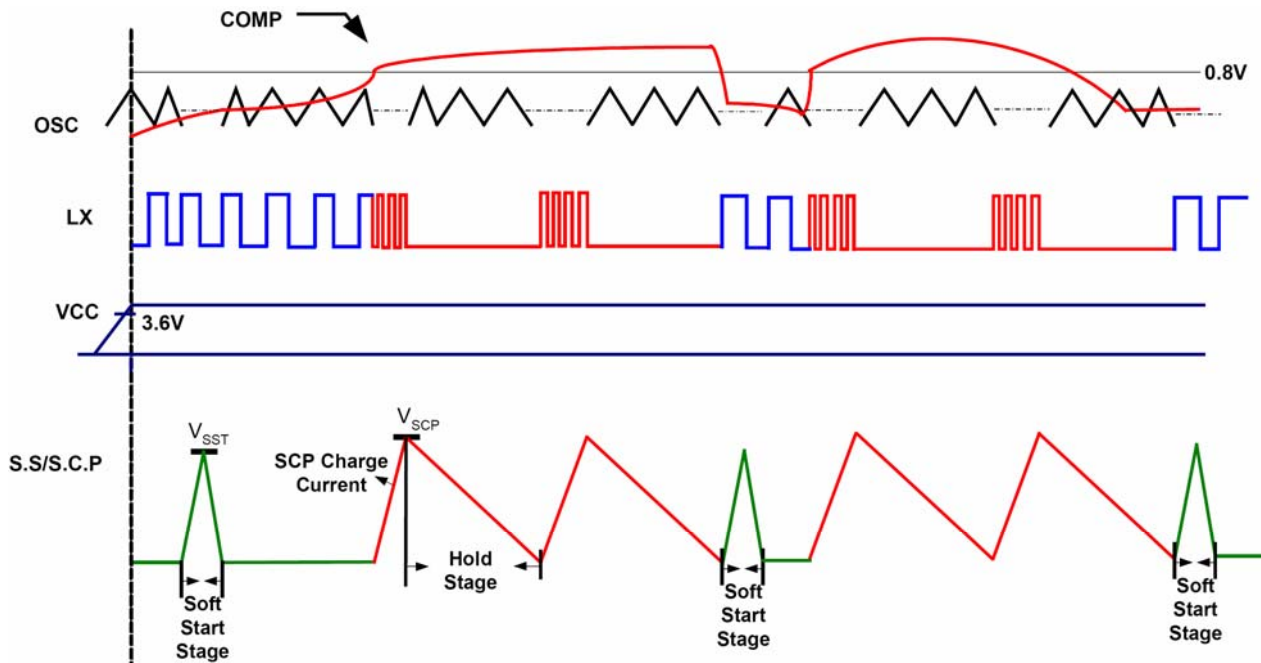
**Total device**

Standby supply current		-	4.5	6	mA
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**TYPICAL PERFORMANCE CHARACTERISTICS**



### TIMING WAVEFORM

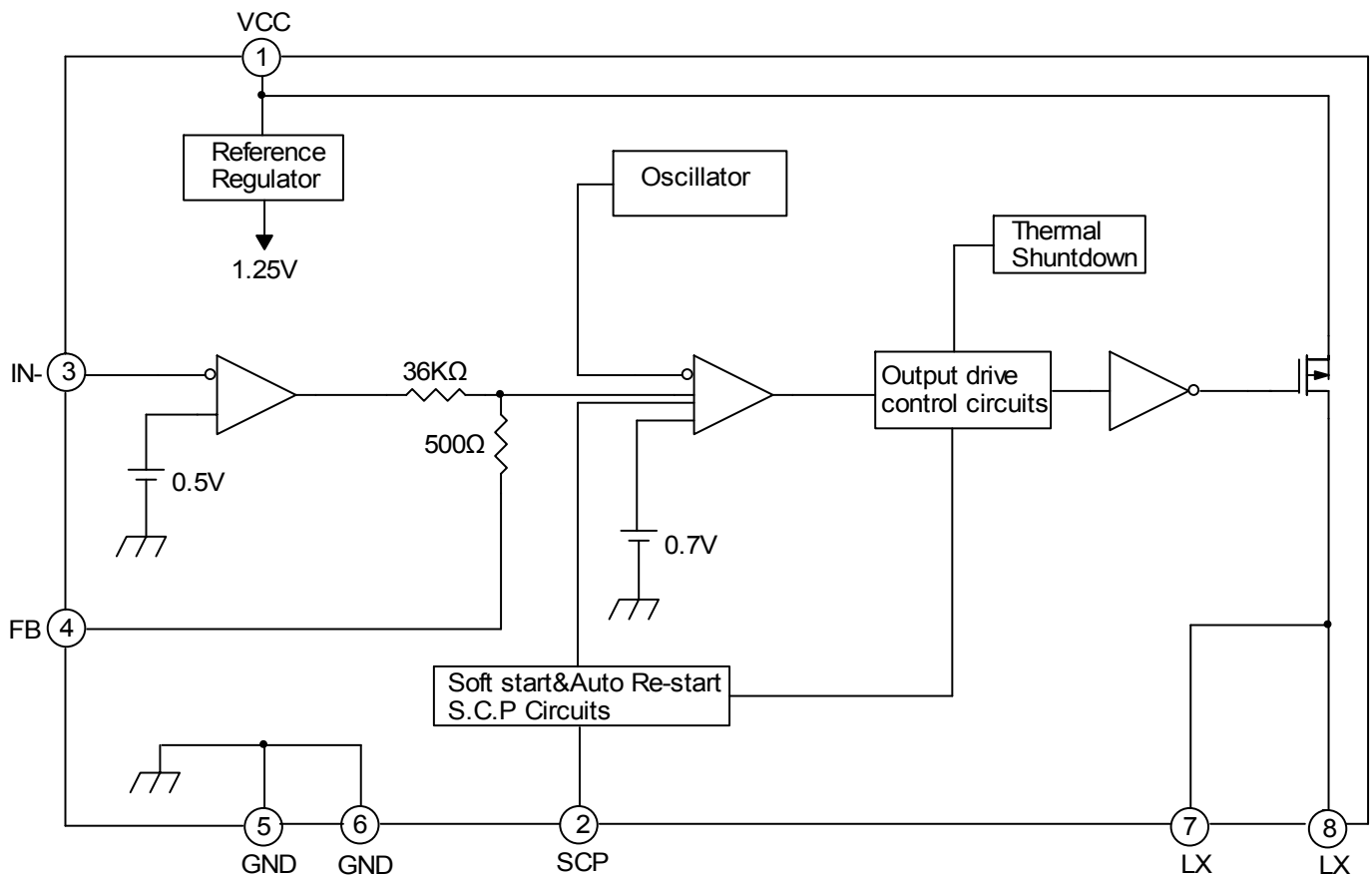


**PIN FUNCTIONS**

**VCC (Pin 1):** IC Power Supply (PMOS Source)  
**SS/SCP (Pin 2):** Connecting with a Soft-start & ARSCP timing capacitor  
**IN- (Pin 3):** Error Amplifier Inverting Input  
**FB (Pin 4):** Error Amplifier Compensation Output

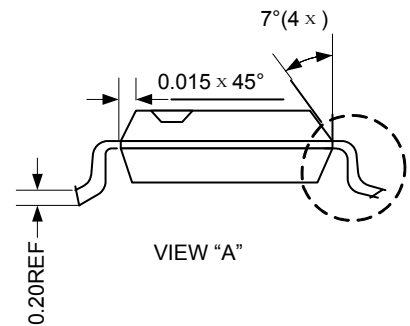
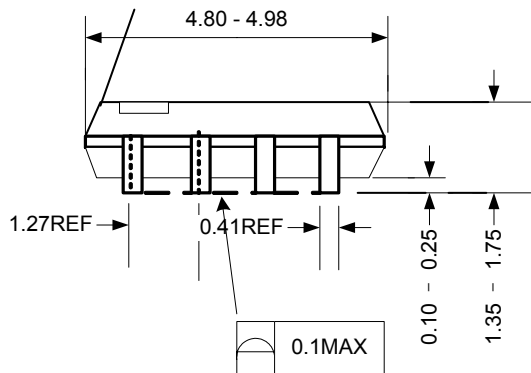
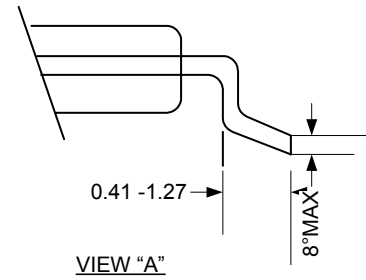
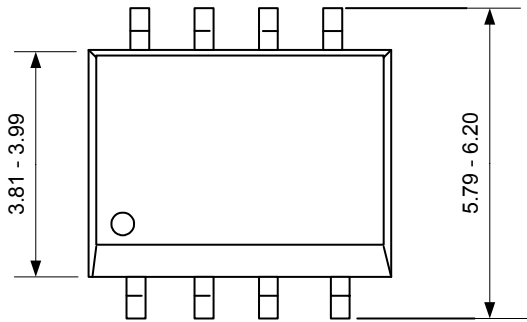
**GND (Pin 5):** IC Ground  
**GND (Pin 6):** IC Ground  
**LX (Pin 7):** PMOS High Current Output  
**LX (Pin 8):** PMOS High Current Output

**BLOCK DIAGRAM**



**PACKAGE DESCRIPTION** Dimensions in millimeters unless otherwise noted

**Package**  
**8-Lead Plastic SOP-8L**



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