350KHz, 2A PWM Buck Converter

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

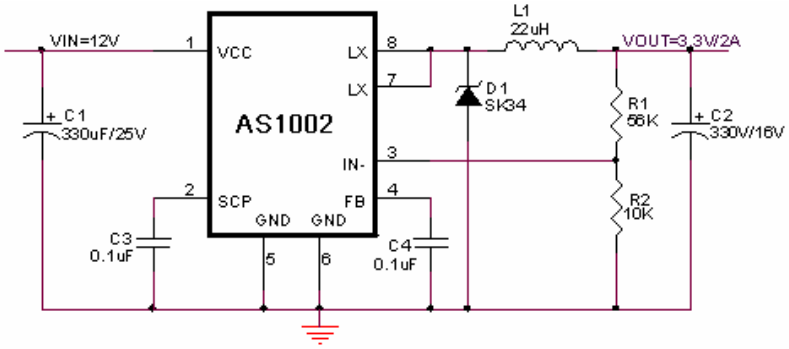
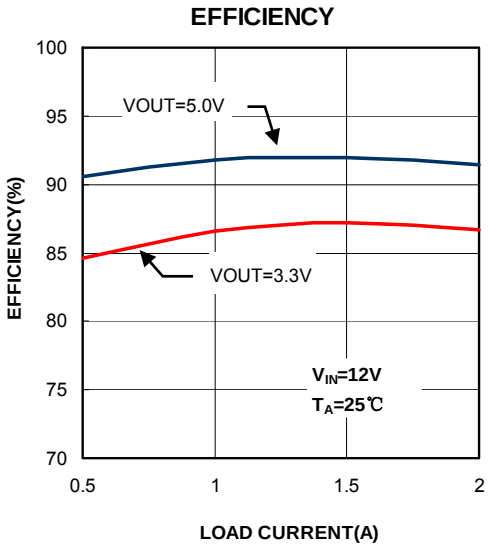


Figure1. 12V to 3.3V/2A Typical Application Circuit



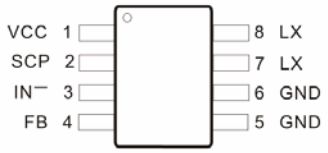
ABSOLUTE MAXIMUM RATINGS

(Note1)

V_{IN} Voltage Range……..…….. 3V to 20V
I_{OUT} Output Current ……..……2A
Error Amplifier IN-…….…… -0.3V to 1.2V
P_D Power Dissipation (T_A=25℃)……..… 650mW
Operating Temperature Range …. -40℃ to 85℃
Storage Temperature Range …... -65℃ to 150℃
Lead Temperature(Soldering, 10sec.) ……260℃

PACKAGE/ORDER INFORMATION

Top View



SOP-8 Plastic Package
T_{JMAX}=125℃ (Note2)

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_J is calculated from the ambient temperature T_A and power dissipation P_D according to the following formula:

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

ELECTRICAL CHARACTERISTICS

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

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

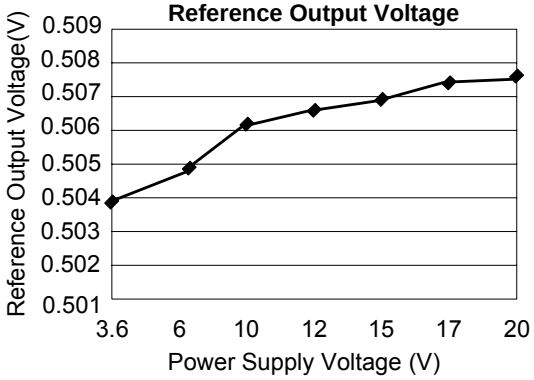
ELECTRICAL CHARACTERISTICS(Continuous)

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

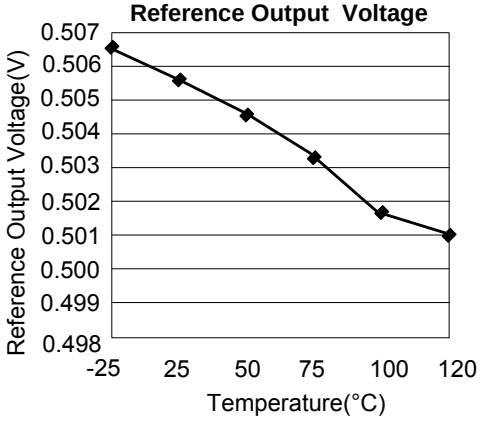
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Error Amplifier(EA)					
Input Threshold Voltage	V_{FB}=450mV	490	500	510	mV
V_T Change with Voltage	V_{CC}=3V to 20V	-	5	20	mV
V_T Change with Temperature	Ta = -25℃to 85℃	-	1	-	%
Input Bias Current	--	-1.0	-0.2	1.0	μA
Voltage Gain	--	-	100	-	V/V
Frequency Bandwidth	Av=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	μA
Output Sink Current		30	45	-	μA
Idle Period Adjustment					
Maximum duty cycle	V_{IN-} =0.2V	-	80	-	%
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	mΩ
	V_{CC}=10V, V_{IN-}=0V		42	65	
Output leakage current	SCP active		5	-	μA
Total device					
Standby supply current		-	4.5	6	mA

TYPICAL PERFORMANCE CHARACTERISTICS

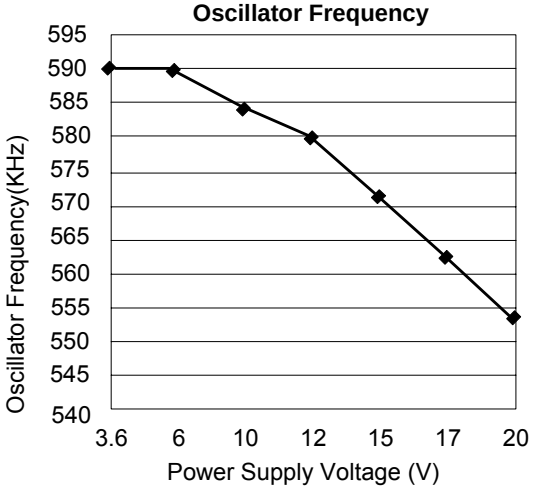
Power Supply Voltage VS. Reference Output Voltage



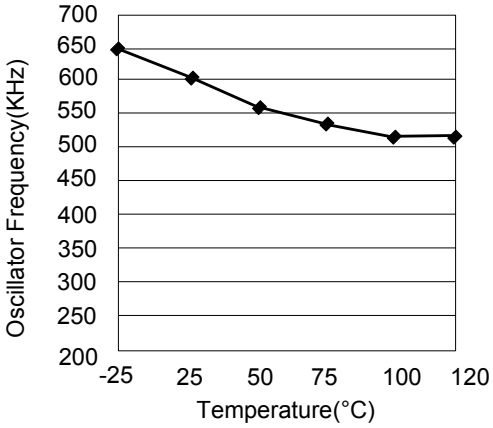
Temperature VS. Reference Output Voltage



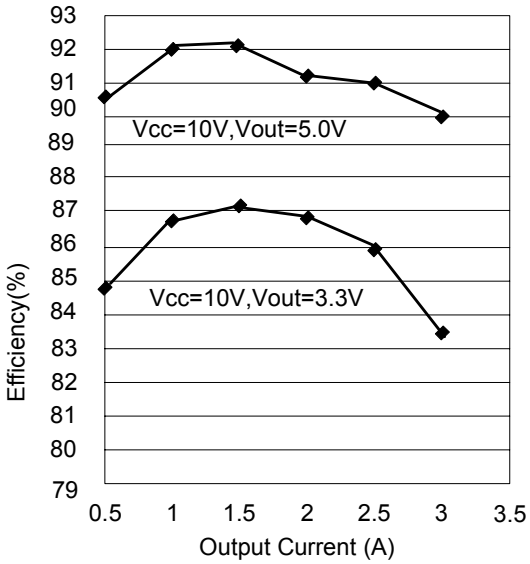
Power Supply Voltage VS. Oscillator Frequency



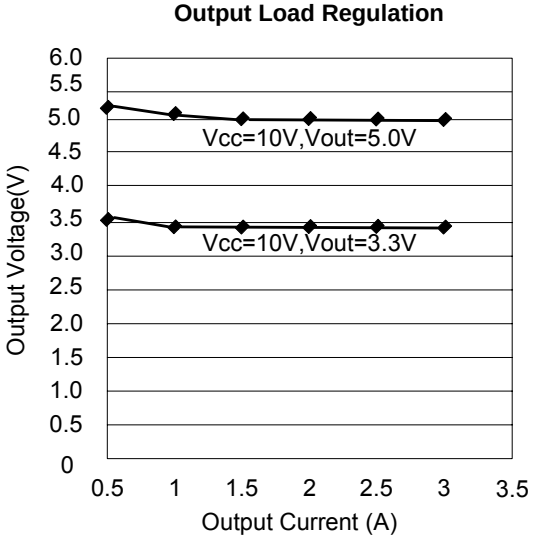
Temperature VS. Oscillator Frequency



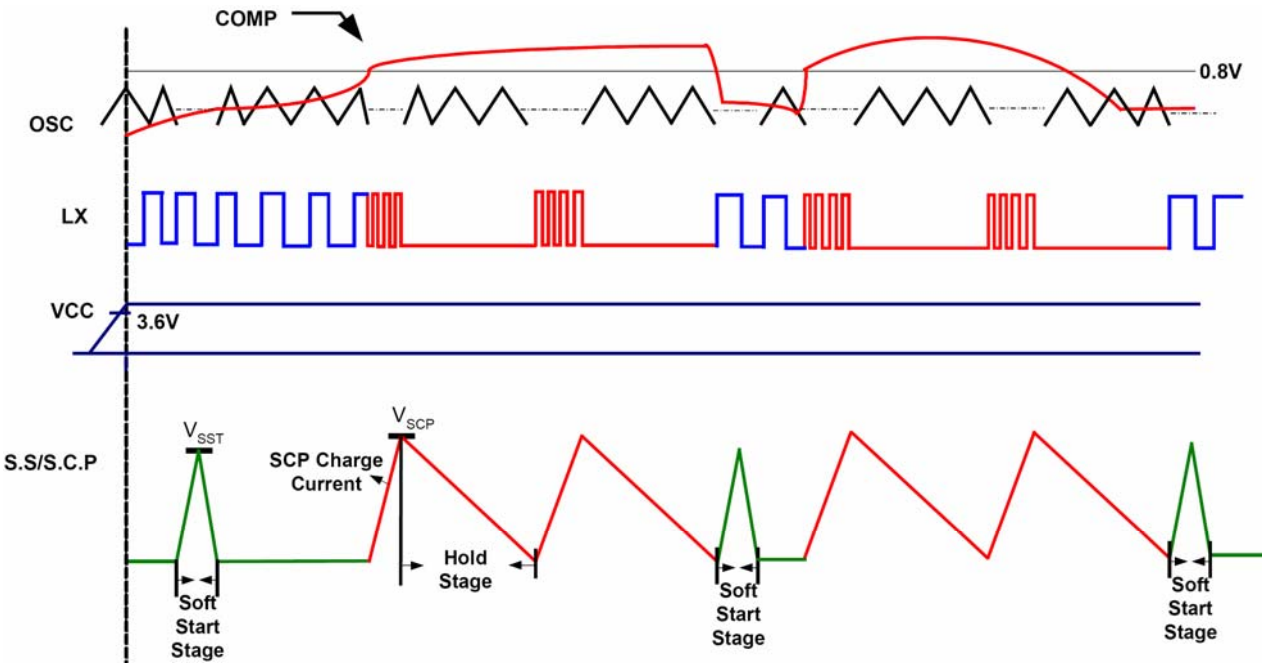
Output Current VS. Efficiency



Output Load Regulation



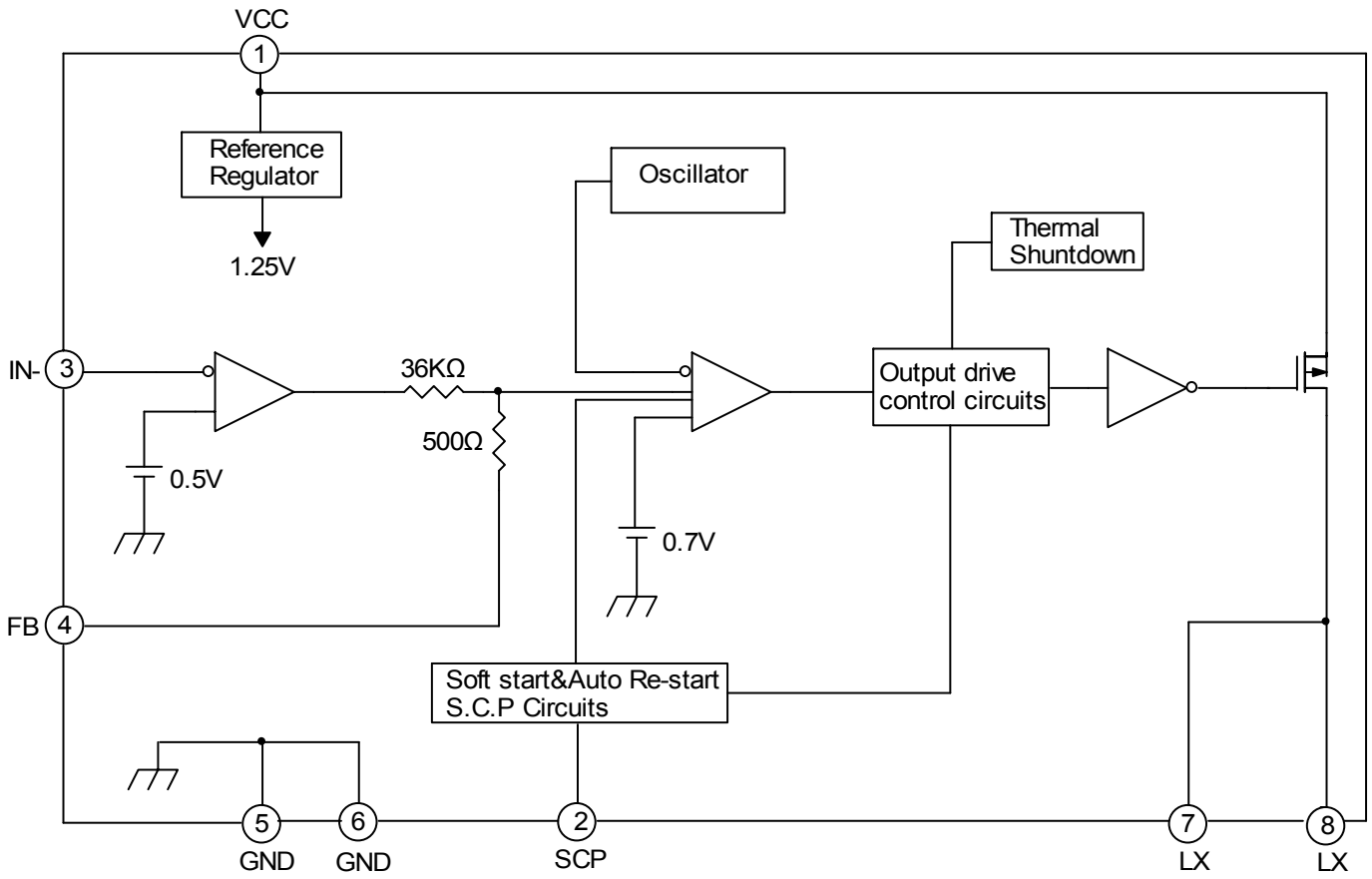
TIMING WAVEFORM



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