



3A 23V Synchronous PWM Step-Down Converter with Low Dropout Voltage Output

■ **FEATURES**

- 3A Continuous Output Current
- internal Soft Start
- Up to 90% Efficiency for Heavy Load
($V_{in}=12V$, $V_{out}=3.3V$, $I_{out}=3.0A$)
- Low $R_{ds(on)}$ Internal Switches: 150m Ω and 120m Ω
- Stable with Low ESR Output Ceramic Capacitors
- Up to 93% Efficiency
- <1 μA Supply Current in Shutdown Mode
- Fixed 340KHz Frequency
- Thermal Shutdown
- Cycle by Cycle Over Current Protection
- Wide 4.5 to 23V Operating Input Range
- Output Adjustable from 0.925V to 12V
- Under Voltage Lockout
- Output Voltage 2 is available from 0.8V~5V Adjustable Version.
- Available in $\pm 2\%$ Output Tolerance.
- Extra Mosfet to control current of output voltage 2.
- Internal OVP UVLO for Output1 and Output2

■ **APPLICATIONS**

- Networking Systems
- Distributed Power Systems
- Pre-Regulator for Linear Regulators.
- LCD TV, LCD Monitor, DPF.
- Portable AV Equipment.
- Note Book PC Applications.
- PC Peripherals.
- Set-top Box

■ **DESCRIPTION**

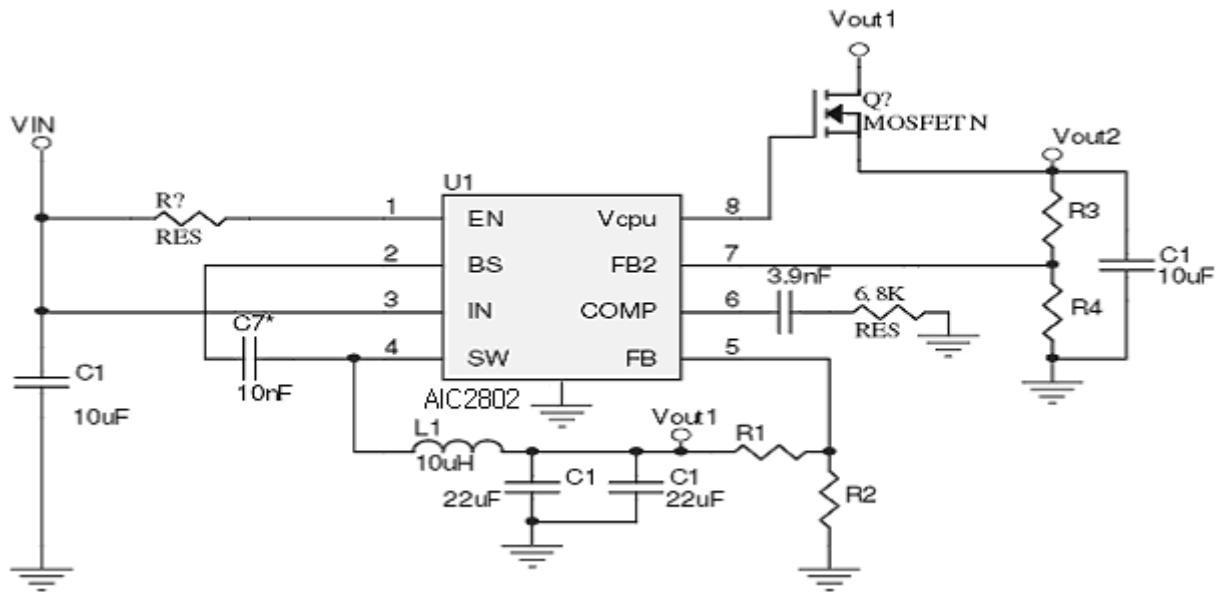
The AIC2802 is a synchronous step-down regulator with an integrated Power MOSFET and extra Power MOSFET to control output voltage². It achieves 3A continuous output current over a wide input supply range with excellent load and line regulation.

Current mode operation provides fast transient response and eases loop stabilization.

The Output Voltage¹ adjusted by R1, R2 and Output Voltage 2 adjusted by R3, R4.

Fault condition protection includes cycle-by-cycle current limiting and thermal shutdown. Internal soft-start reduces the stress on the input source and the output overshoot at turn-on. In shutdown mode, the regulator draws 1 μA or less of supply current.

The AIC2802 is available in SOP-8 with Exposed Pad Package.

■ TYPICAL APPLICATIONS CIRCUIT


AIC2802 Application Circuit

■ PIN CONFIGURATION

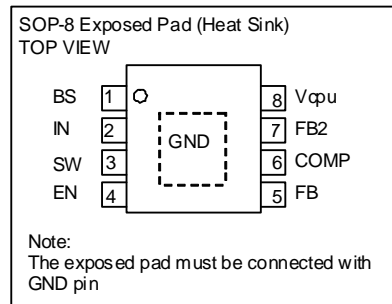
AIC2802-XXXXXX

- PACKING TYPE
TR: TAPE & REEL
TB: TUBE
- PACKAGING TYPE
R8: SOP-8 Exposed Pad
- G: GREEN PACKAGE
- 3: 340KHz
5: 550KHz

Example:

AIC2802-3GR8TR

- 340KHz GREEN SOP-8 Exposed
Pad (Heat Sink) Package and TAPE
& REEL Packing Type



■ ABSOLUTE MAXIMUM RATINGS

Input Voltage (V_{IN}).....	-0.3V to 26V
SW pin Voltage (V_{SW}).....	-1V to $V_{IN} + 0.3V$
BS Pin Voltage.....	$V_{SW} - 0.3V$ to $V_{SW} + 6V$
EN Pin Voltage.....	-0.3V to V_{IN}
All Other Pins Voltage.....	-0.3V to 6V
Operating Ambient Temperature Range T_A	-40°C~85°C
Operating Maximum Junction Temperature T_J	150°C
Storage Temperature Range T_{STG}	-65°C~150°C
Lead Temperature (Soldering 10 Sec.).....	260°C
Thermal Resistance Junction to Case SOP-8 Exposed Pad*.....	15°C/W
Thermal Resistance Junction to Ambient SOP-8 Exposed Pad*.....	60°C/W

(Assume no Ambient Airflow)

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

*The package is place on a two layers PCB with 2 ounces copper and 2 square inch, connected by 8 vias.

■ ELECTRICAL CHARACTERISTICS

$V_{IN}=12V$, unless otherwise specified. Typical values are at $T_A=+25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Shutdown Supply Current		$V_{EN} = 0V$		0.3	3	μA
Supply Current		$V_{FB} = 1.0V$		1.9	2.4	mA
Feedback Voltage 1	V_{FB}	$4.5V \leq V_{IN} \leq 23V$	0.9	0.925	0.95	V
Feedback Overvoltage 1Threshold				1.2		V
Feedback Voltage 2	V_{FB2}	$4.5V \leq V_{O1} \leq 7V$	0.588	0.6	0.612	V
Feedback Overvoltage 2Threshold				0.625		V
Error Amplifier Voltage Gain	A_{EA}			400		V/V
Error Amplifier Transconductance	G_{EA}	$\Delta I_{COMP} = \pm 10\mu A$		820		$\mu A/V$
High-Side Switch On-Resistance	$R_{DS(ON)1}$			110		$m\Omega$
Low-Side Switch On-Resistance	$R_{DS(ON)2}$			85		$m\Omega$
High-Side Switch Leakage Current		$V_{EN} = 0V, V_{SW} = 0V$			10	μA
Upper Switch Current Limit		Minimum Duty Cycle	4	5.5		A
Lower Switch Current Limit		From Drain to Source		0.9		A
COMP to Current Sense Transconductance	G_{CS}			5.2		A/V
Oscillation Frequency	f_{OSC}		300	340	380	KHz
Short Circuit Oscillation Frequency		$V_{FB} = 0V$		110		KHz
Maximum Duty Cycle	D_{MAX}	$V_{FB} = 0.8V$		90		%
Minimum On Time	T_{ON}			220		ns
EN Shutdown Threshold Voltage		V_{EN} Rising	1.1	1.5	2.2	V
EN Shutdown Threshold Voltage Hysteresis				220		mV
Under Voltage Lockout Threshold		V_{IN} Rising	3.7	4.1		V
Under Voltage Lockout Threshold Hysteresis				210		mV
Soft-Start Period for Vout1				5		ms
Soft-Start Period for Vout2				0.5		ms
Vcpu Voltage					5	V
Thermal Shutdown				160		$^{\circ}C$

Note 1: Specifications are production tested at $T_A=25^{\circ}C$. Specifications over the $-40^{\circ}C$ to $85^{\circ}C$ operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

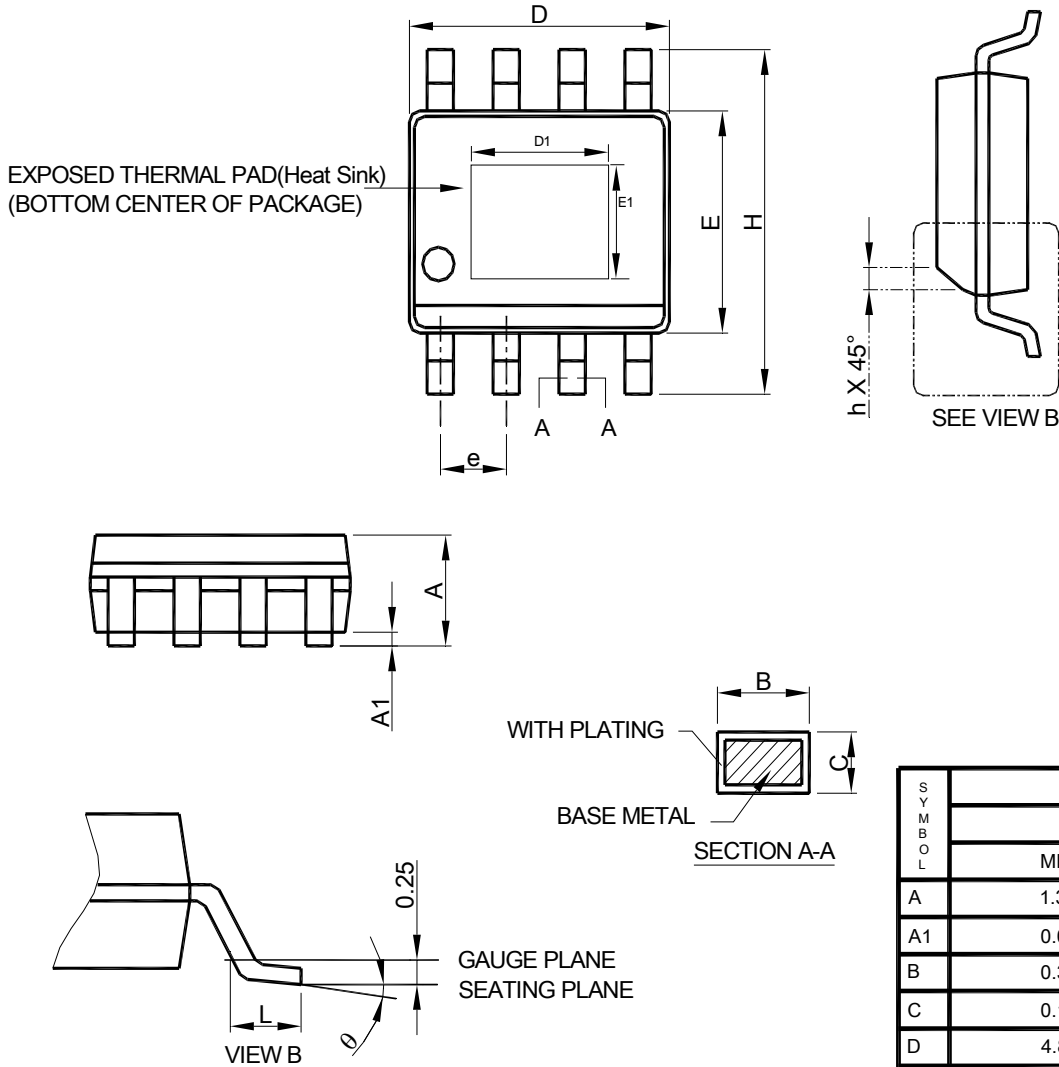
Note 2: It is recommended to use duty ratio above 10% for minimizing resultant duty cycle jitter.

■ PIN DESCRIPTIONS

SOP-8 Pin No.	Pin Name	Pin Function
1	BS	High Side Gate Drive Boost Input. BS supplies the drive for the high-side N-Channel MOSFET switch. Connect a 10nF or greater capacitor from SW to BS to power the high-side switch.
2	IN	Power Input. IN supplies the power to the IC, as well as the step-down converter switches. Drive IN with a 4.5 to 23V power source. By pass IN to GND with a suitably large capacitor to eliminate noise on the input to the IC.
3	SW	Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from switch to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.
4	EN	Enable Input. EN is a digital input that turns the regulator on or off. Drive EN high to turn on the regulator. Drive it low to turn it off. For automatic strat-up, attach to IN with a 100k Ω pull up resistor.
5	FB	Feedback Input. FB senses the output voltage to regulate that voltage. Drive feedback with a resistive voltage divider from the output voltage.
6	COMP	Compensation Node. COMP is used to compensate the regulation control loop. Connect a series RC network form COMP to GND to compensate the regulation control loop. In some cases, an additional capacitor from COMP to GND is required.
7	FB2	Feedback Input2. FB2 senses the output voltage 2 to regulate that voltage. Drive feedback with a resistive voltage divider from the output voltage.
8	VCPU	To Driver the Mosfet for extra output voltage 2.
9	GND	Ground. Connect the exposed pad on backside.

PHYSICAL DIMENSIONS

SOP-8 Exposed Pad(Heat Sink)



SYMBOL	SOP-8 Exposed Pad(Heat Sink)	
	MILLIMETERS	
	MIN.	MAX.
A	1.35	1.75
A1	0.00	0.15
B	0.31	0.51
C	0.17	0.25
D	4.80	5.00
D1	1.50	3.50
E	3.80	4.00
E1	1.0	2.55
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.27
θ	0°	8°

- Note : 1. Refer to JEDEC MS-012E.
 2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
 3. Dimension "E" does not include inter-lead flash or protrusions.
 4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Note:

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