



# AS2208

Primary Side PWM Controller  
Preliminary Specification

## Features

- Low Startup Current
- Single-start or auto-restart modes
- Oscillator trimmed for precision duty cycle clamp
- Standard temperature range extended to 105°C
- Remote on / off control
- Self limiting supply Voltage
- Standard current mode control

## Description

The AS2208 is a simplified pulse width modulation controller, offering similar functionality as that of the AS3842. Based on the AS2214, the AS2208 provides the additional features of low startup current and overvoltage latching, making it a good solution for adapter applications.

The PWM function is controlled by the current sense comparator for normal current mode control. The COMP pin, which serves as an input to the current sense comparator, provides a 1 mA current source which can be tied directly to the control loop optocoupler. The output stage is a high current totem pole output that sees only 85 ns delay from the PWM comparator.

The AS2208 requires only 100  $\mu$ A of startup current. The undervoltage lockout (UVLO) thresholds are nominally 14V for turn on and 8 V for turn off. The VREG pin, based on a trimmed bandgap reference, provides a temperature compensated 5 V to loads of up to 50 mA. The oscillator discharge current is trimmed to provide guaranteed duty cycle clamping.

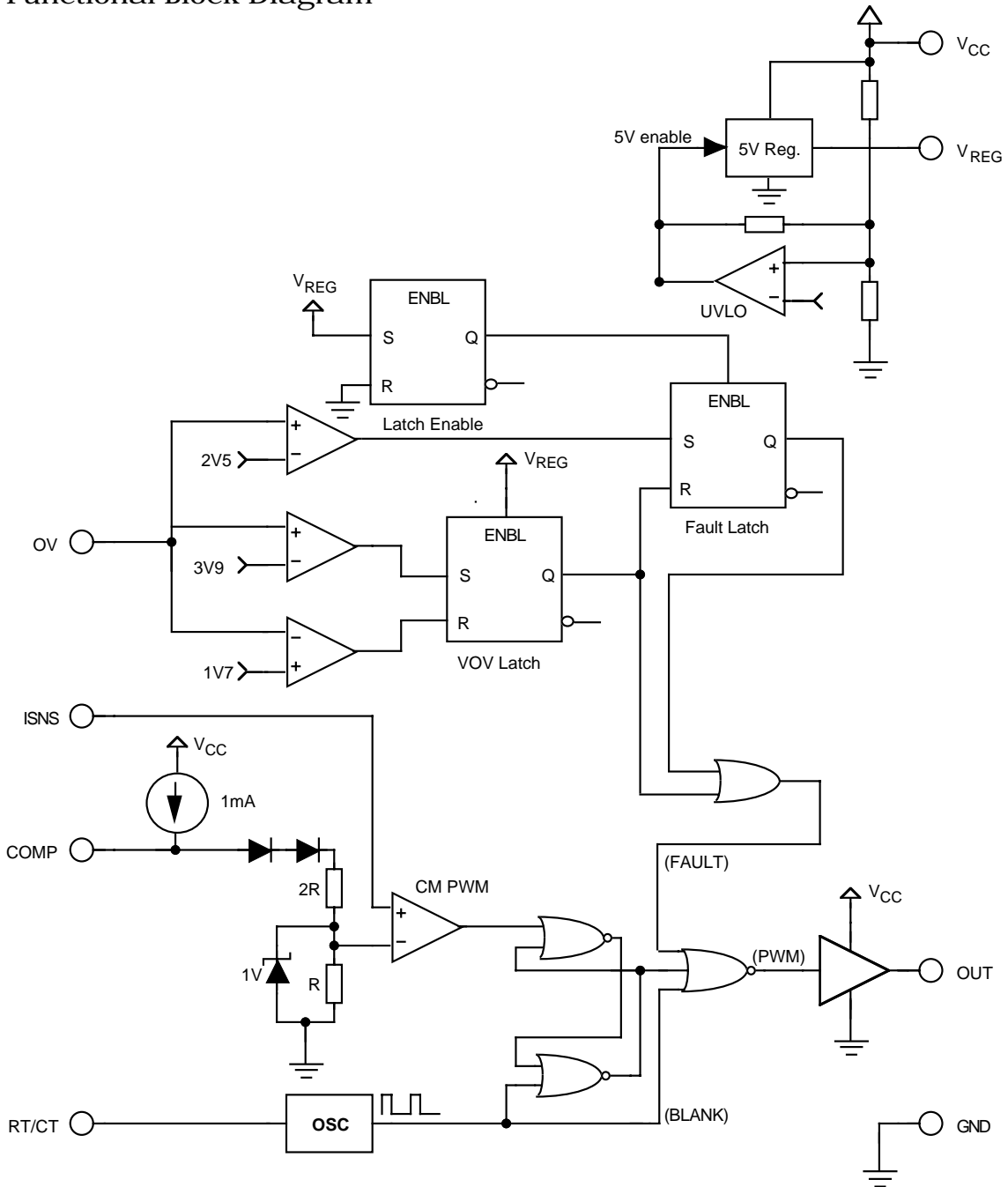
## Pin Configuration — Top view



## Ordering Information

Package	Temperature Range	Order Code
8-Pin Plastic DIP	0 to 105° C	AS2208N
8-Pin Plastic SOIC	0 to 105° C	AS2208D

Functional Block Diagram



## Pin Function Description

Pin Number	Function	Description
1	COMP	This is the inverting input to the PWM comparator. A divided and level shifted representation of this voltage is compared to the ISNS input to determine OUT duty cycle. A 1 mA current source is provided as a pull-up for an optocoupler.
2	ISNS	A voltage proportional to inductor current is connected to this pin. The PWM uses this information to terminate the gate drive of the output.
3	RT/CT	Oscillator frequency and maximum duty cycle are set by connecting a resistor ( $R_T$ ) to VREG and a capacitor ( $C_T$ ) to ground.
4	OV	This pin latches OUT low when pulled above 2.5 V. The latch can be reset by pulling OV above 4 V then back to ground.
5	GND	Circuit common ground.
6	OUT	This totem pole output is designed to directly drive a power MOSFET switch capable of sourcing and sinking peak currents up to 1 A.
7	V <sub>CC</sub>	Positive supply voltage for the IC.
8	V <sub>REG</sub>	Output of 5V series regulator.

## Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply Voltage ( $I_{CC} < 30$ mA)	V <sub>CC</sub>	Self-Limiting	V
Supply Voltage (Low Impedance Source)	V <sub>CC</sub>	20	V
Reference Current	I <sub>REF</sub>	200	mA
Output Current	I <sub>OUT</sub>	1	A
Output Voltage	V <sub>OUT</sub>	20	V
Continuous Power Dissipation at 25° C	P <sub>D</sub>	500	mW
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-65 to 150	°C
Lead Temperature, Soldering 10 Seconds	T <sub>L</sub>	300	°C

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

## Recommended Conditions

Parameter	Symbol	Rating	Unit
Supply Voltage	V <sub>CC</sub>	10 - 15	V
Oscillator	F <sub>OSC</sub>	50 - 250	kHz

## Typical Thermal Resistance

Package	$\theta_{JA}$	$\theta_{JC}$	Typical Derating
8L PDIP	95° C/W	50° C/W	10.5 mW/°C
8L SOIC	175° C/W	45° C/W	5.7 mW/°C

## Electrical Characteristics

Electrical Characteristics are guaranteed over full junction temperature range (0 to 105° C). Ambient temperature must be derated based on power dissipation and package thermal characteristics. Unless otherwise specified, the conditions of test are  $V_{CC} = 15\text{ V}$ ;  $BOK = 3\text{ V}$ ;  $OV = 0\text{ V}$ ;  $R_T = 680\ \Omega$ ;  $C_T = 10\text{ nF}$ . To override UVLO,  $V_{CC}$  should be raised above 18 V prior to test.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>5 V Regulator</b>						
Output Voltage	$V_{REG}$	$I_{REG} = 1\text{ mA}$ , $T_J = 25^\circ\text{C}$	4.90	5.00	5.10	V
Line Regulation	PSRR	$9 \leq V_{CC} \leq 18\text{ V}$		5	15	mV
Load Regulation		$1 \leq I_{REG} \leq 20\text{ mA}$		5	15	mV
Temperature Stability	$TC_{REG}$			0.2	0.4	mV/°C
Total Output Variation		Line, Load, Temperature	4.85		5.15	V
Long-Term Stability		Over 1,000 hrs at 25°C		5	25	mV
Output Noise Voltage	$V_{NOISE}$	$10 \leq f \leq 100\text{ kHz}$ , $T_J = 25^\circ\text{C}$		50		$\mu\text{V}$
Maximum Source Current	$I_{MAX}$	$V_{REG} = 4.8\text{ V}$	30	120	180	mA
<b>Oscillator</b>						
Initial Accuracy	$F_{OSC}$	$T_J = 25^\circ\text{C}$	108	120	132	kHz
Voltage Stability		$9 \leq V_{CC} \leq 18\text{ V}$		0.2	1	%
Temperature Stability	$TC_F$	$T_{MIN} \leq T_J \leq T_{MAX}$		5		%
Amplitude	$V_{OSC}$	$V_{RT/CT}$ peak-to-peak		1.55		V
Upper Trip Point	$V_H$			2.80		V
Lower Trip Point	$V_L$			1.25		V
Discharge Current	$I_{DSC}$		7.50	8.70	9.50	mA
Duty cycle Limit		$R_T = 680\ \Omega$ , $C_T = 10\text{ nF}$ , $T_J = 25^\circ\text{C}$	46	50	55	%
Over-Temperature Shutdown	$T_{OT}$			140		°C
<b>Current Sense Comparator</b>						
Transfer Gain	$AV_{ISNS}$	$-0.2 \leq V_{ISNS} \leq 0.8\text{ V}$	2.85	3.00	3.15	V/V
ISNS Level Shift	$V_{LS}$	$V_{ISNS} = 0\text{ V}$		1.50		V
Maximum Input Signal	$V_{ISNS\ MAX}$	$V_{COMP} = +5\text{ V}$	1.00	1.08	1.20	V
Input Bias Current	$I_{BIAS\ ISNS}$	$V_{COMP} = +5\text{ V}$		-1	-10	$\mu\text{A}$
COMP Source Current	$I_{COMP}$	$V_{COMP} = +5\text{ V}$	0.6	1.0		mA
COMP Swing High	$V_{COMP}$		5.2	5.6		V
Power Supply Rejection Ratio	PSRR	$9 \leq V_{CC} \leq 18\text{ V}$		70		dB
Propagation Delay to Output	$t_{PB}$			85	150	ns

Electrical Characteristics (cont'd)

Electrical Characteristics are guaranteed over full junction temperature range (0 to 105° C). Ambient temperature must be derated based on power dissipation and package thermal characteristics. Unless otherwise specified, the conditions of test are V<sub>CC</sub> = 15 V; BOK = 3 V; OV = 0V; R<sub>T</sub> = 680 Ω; C<sub>T</sub> = 10 nF. To override UVLO, V<sub>CC</sub> should be raised above 18 V prior to test.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Output</b>						
Output Low Level	V <sub>OL</sub>	I <sub>SINK</sub> = 20 mA		0.1	0.4	V
Output Low Level	V <sub>OL</sub>	I <sub>SINK</sub> = 150 mA		1.5	2.2	V
Output High Level	V <sub>OH</sub>	I <sub>SOURCE</sub> = 20 mA	13	13.5		V
Output High Level	V <sub>OH</sub>	I <sub>SOURCE</sub> = 150 mA	12	13		V
Rise Time	t <sub>R</sub>	C <sub>L</sub> = 1 nF		50	150	ns
Fall Time	t <sub>F</sub>	C <sub>L</sub> = 1 nF		50	150	ns
Maximum Duty Cycle	D <sub>MAX</sub>		94	97	100	%
Minimum Duty Cycle	D <sub>MIN</sub>		0			%
<b>Over-Voltage Input</b>						
OV Threshold	V <sub>OV</sub>		2.50	2.80	3.10	V
OV Reset Threshold	V <sub>VOVH</sub>		3.80	4.00	4.50	V
OV Clear Threshold	V <sub>VOVL</sub>		1.10	1.75	2.20	V
OV Bias Current	I <sub>BIAS OV</sub>	V <sub>REG</sub> = 5 V, V <sub>OV</sub> ≤ OV Threshold	-1	-0.2	1	μA
<b>Under Voltage Lockout</b>						
Startup Threshold	V <sub>CC (ON)</sub>		12.5	14.0	15.8	V
Minimum Operating Voltage after Turn-on	V <sub>CC (OFF)</sub>		7.3	8.0	8.5	V
Startup Current	I <sub>CC</sub>	V <sub>CC</sub> = 13 V		105	150	μA
Operating Supply Current	I <sub>CC</sub>			12	20	mA
Supply Voltage Clamp	V <sub>CC Zener</sub>	I <sub>CC</sub> = 30 mA		18		V
Output Impedance to GND in UVLO State	Z <sub>OUT</sub>	V <sub>CC</sub> = 6 V		22.0		kΩ

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