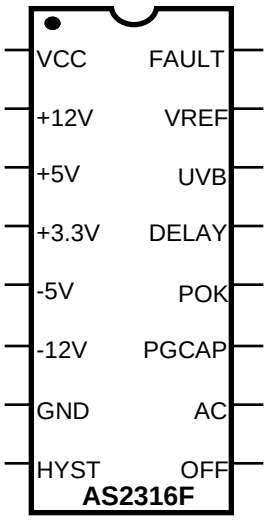
AS2316F
AS2333F
Secondary Side Housekeeping Chips

DESCRIPTION

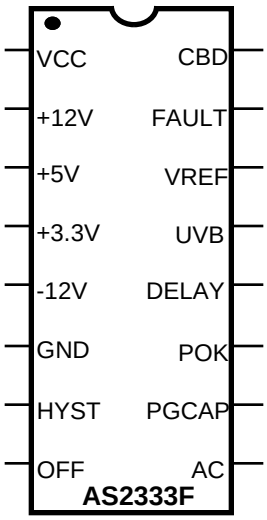
The AS23xx is a housekeeping circuit for monitoring the outputs of power supplies. It directly senses all the output rails without the need for external dividers and detects undervoltage and overvoltage. It also provides an additional undervoltage comparator which may be configured with any arbitrary hysteresis to sense a divided down representation of the AC bulk voltage. The housekeeping section provides all the features necessary to allow external caps to set the common timing features of PC type power supplies. In addition, negative rails may be sensed without the necessity of a V_{EE} connection, and negative sensing may be disabled without affecting operation of the positive sense section. This IC is available in 16 lead packages. Outputs include a POK (Power OK) and a fault signal.

The AS2316F includes sensing for +/- 12 V, +/- 5 V, and 3.3 V. The AS2333F exchanges a Crow-Bar Driver output for the -5 V input.

PINOUT



AS2316F
16L PDIP
16L SOIC

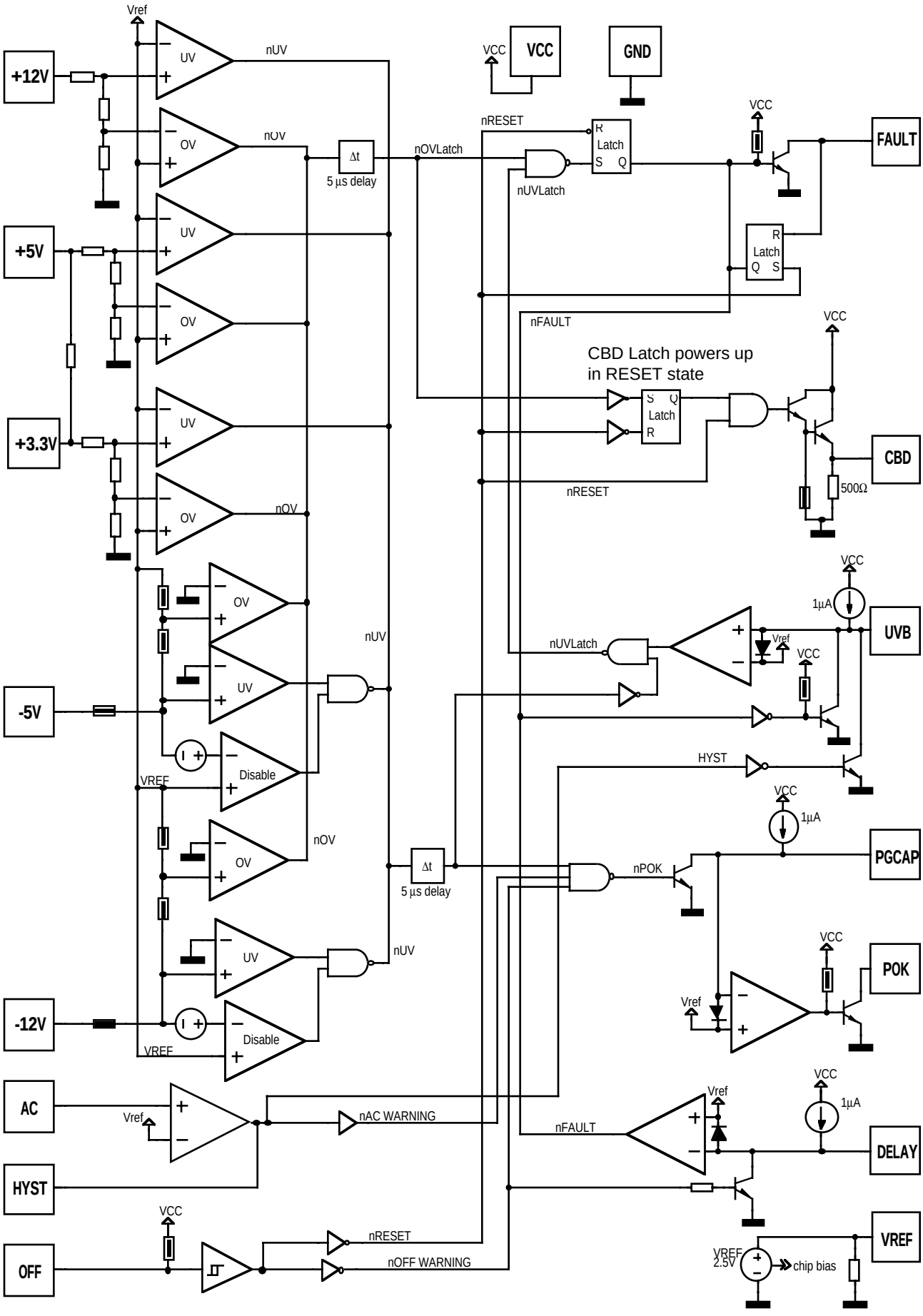


AS2333F
16L PDIP
16L SOIC

ORDERING INFORMATION

Product	Temperature Range	Package	Part No.
AS2316F	0 to 105 °C	16-Pin Plastic SOIC	AS2316-16*D-F-000
AS2316F	0 to 105 °C	16-Pin Plastic DIP	AS2316-16*N-F-000
AS2333F	0 to 105 °C	16-Pin Plastic SOIC	AS2333-16*D-F-000
AS2333F	0 to 105 °C	16-Pin Plastic DIP	AS2333-16*N-F-000

BLOCK DIAGRAM



PIN FUNCTION DESCRIPTION

Pin Number		Function	Description
AS2316	AS2333		
1	1	VCC	Power input to the chip.
2	2	+12V	Input for overvoltage and undervoltage for the +12V rail.
3	3	+5V	Input for overvoltage and undervoltage for the +5V rail.
4	4	+ 3.3V	Input for overvoltage and undervoltage for the +3.3V rail.
5		-5V	Input for overvoltage and undervoltage for the -5V rail .
6	5	-12V	Input for overvoltage and undervoltage for the -12V rail. This function may disabled by tying this pin to a positive voltage above 2.4V.
7	6	GND	Signal ground and silicon substrate
8	7	HYST	Open collector output of the AC undervoltage comparator. A resistor between this pin and AC will provide hysteresis to the AC undervoltage sensing.
9	8	OFF	Pulling this pin low will reset the FAULT latch and discharge the start-up timing capacitors, UVB and PG CAP, allowing normal start-up of the system. Pulling this pin high will send the FAULT signal high, prompting a system shutdown.
10	9	AC	Non-inverting input to the AC undervoltage sensing comparator. If the AC pin is less than 2.5V, POK goes low and UVB cap discharges.
11	10	PG CAP	A cap to ground provides a delay between undervoltage sensing becoming good and the POK output going high. Cap discharges whenever an output or AC undervoltage is detected.
12	11	POK	Open collector output of the undervoltage sensing comparators. This pin goes low upon an undervoltage condition. Except for the delay set by the PG CAP, this pin always reflects the actual state of the undervoltage sensing.
13	12	DELAY	A cap to ground will delay the FAULT signal when the OFF pin is used to shut down the system. The POK will signal a power fail warning immediately, but the FAULT shutdown of the power supply will be delayed.
14	13	UVB	A cap to ground provides start-up blanking of the undervoltage sensing portion of the FAULT signal. This pin may also be grounded to prevent undervoltage conditions from triggering the Fault signal. This pin discharges the cap whenever AC goes low or the FAULT pin goes high.
15	14	VREF	2.5 V Voltage reference. This is a series regulator type reference.
16	15	FAULT	Open collector output of the overvoltage and undervoltage comparators.
	16	CBD	Crow bar drive output of the overvoltage faults only.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit
Supply Voltage	V_{CC}	20	V
Continuous Power	P_D	1000	mW
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-60 to 150	℃
Lead Temperature (soldering, 10 seconds)	T_L	300	℃

ELECTRICAL CHARACTERISTICS

Electrical characteristics are guaranteed over the full junction temperature range (0-105 °C). Ambient temperature must be derated based upon power dissipation and package thermal characteristics. Unless otherwise specified, the conditions of test are VCC = 12V; +3.3V= 3.3V; +5V = 5V; +12V = 12V; -12V = -12V; OFF= low

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
BIAS (VCC)						
Supply current	I_{CC}	no faults		8	12	mA
Min Vcc for operation	Vcc Min	Vref= 2.5V, no faults	4.2			V
VOLTAGE REFERENCE						
Output Voltage	VREF	I_{REF}= 0 mA Tj= 25° C	2.488	2.500	2.525	V
Line Regulation	ΔVREF	Vcc= 5V to 15 V		10	15	mV
Load Regulation	ΔVREF	I_{REF}= 0 to -5mA		10	15	mV
Temperature Deviation*	ΔVREF	0< Tj < 105 °C		10	15	mV
UNDERVOLTAGE, OVERVOLTAGE						
+3.3V						
+3.3V Undervoltage	UV		2.87	2.95	3.03	V
+3.3V Overvoltage	OV		3.76	3.86	3.96	V
+3.3V Input Current	IB	$V_{+3.3}$ = 3.30 V, V_{+5} = 5.00 V	-0.1	0	0.1	mA
+5V						
+5V Undervoltage	UV		4.40	4.50	4.60	V
+5V Overvoltage	OV		5.74	5.89	6.04	V
+5V Input Current	IB	V_{+5}= 5.00 V, $V_{+3.3}$ = 3.30 V		1.6	2.5	mA

*Temperature deviation is defined as the maximum deviation of the reference over the given temperature range and does not imply an incremental deviation at any given temperature.

+12V

+12V Undervoltage	UV		10.25	10.50	10.60	V
+12V Overvoltage	OV		14.53	14.90	15.27	V
+12V Input Current	IB	V_{+12}= 12.0 V		0.8	1.5	mA

-5V

-5V Undervoltage	UV		-3.80	-4.00	-4.20	V
-5V Overvoltage	OV		-6.00	-6.25	-6.55	V
-5V Input Current	IB	V_{-5}= -5.0 V		-80	-150	µA
-5V Disable Voltage	VD	Min voltage to disable comparator*		2.3	2.4	V

-12V

-12V Undervoltage	UV		-9.20	-9.55	-9.8	V
-12V Overvoltage	OV		-14.55	-15.04	-15.60	V
-12V Input Current	IB	V_{-12}= -12.0 V		-100	-200	µA
-12V Disable Voltage	VD	Min voltage to disable comparator*		2.0	2.2	V

*Leaving these pins open circuit will also disable the comparators.

AC/HYST

AC Undervoltage	UV	Tj= 25 °C	2.460	2.520	2.540	V
AC Input Current	IB			-0.5	-1	µA
HYST High State Leakage	IL	V_{HYST}= 5 V; AC> 2.5 V		0.01	1	µA
HYST Output Current	IOL	V_{HYST}= 0.3V; AC< 2.5 V	1	3		mA
HYST Low Voltage	VOL	I_{HYST} = 1 mA; AC< 2.5 V			0.3	V

START-UP/ SHUTDOWN FUNCTIONS

UVB Pullup Current Source	IOH	V_{UVB}= 2.0 V; no faults	-0.4	-1	-1.9	µA
UVB Clamp	VOH max	I_{UVB}=10 µA; no faults	2.9	3.1	3.3	V
UVB Discharge Current (AC shutdown)	I_{UVB}	V_{UVB}= 2.0 V; FAULT= low AC< 2.5 V	3	8		mA
UVB Discharge Current (FAULT shutdown)	IOL	V_{UVB}= 2.0 V; FAULT= high AC> 2.5 V	2.5	10		mA
UVB Low Output Voltage	VOL	I_{UVB}= 100 µA; FAULT = low; AC< 2.5 V			0.2	V
PG CAP Pullup Current Source	IOH	V_{PGCAP}= 2.0 V; no faults	-0.5	-1	-1.4	µA
PG CAP Clamp	VOH max	I_{PGCAP}= 10 µA; no faults; AC>2.5 V	2.9	3.1	3.3	V
PG CAP Discharge Current	IOL	V_{PGCAP}= 2.0V; undervoltage condition	2	6		mA
PG CAP Low Output Voltage	VOL	I_{PGCAP}= 100 µA; undervoltage condition			0.2	V
OFF Input High Voltage	VIH		2.0			V
OFF Input Low Voltage	VIL				0.8	V
OFF Pullup to VCC	R	V_{OFF}= 0V	25	50	100	kΩ
DELAY Pullup Current Source	IOH	V_{DELAY}= 0 V; OFF=high	-0.5	-1	-2.0	µA
DELAY Clamp	VOH max	I_{DELAY}= 10 µA; OFF=high	2.9	3.1	3.3	V
DELAY Discharge Current	IOL	V_{DELAY}= 2.0 V; OFF= low	2.5	10		mA
DELAY Low Output Voltage	VOL	I_{DELAY}= 100 µA; OFF= low			0.2	V

OUTPUTS

POK High Leakage	IL	V_{POK}=12 V; no faults		100	200	µA
POK Output Current	IOL	V_{POK}= 0.4 V; Vcc≥ 7 V undervoltage condition	5	10		mA
FAULT High State Leakage	IL	V_{FAULT}= 12 V; OFF= high		0.01	1	µA
FAULT Output Current	VOL	V_{FAULT}= 0.4 V; no faults				
		Vcc= 12V	3	10		mA
		Vcc= 5V	1.3	4		mA
FAULT delay on overvoltage	t_d		2.5	5	7.5	µs
FAULT delay on undervoltage	t_d		2.5	5	7.5	µs
CBD (Crow Bar Drive) Min. Output Current	IOH	overvoltage condition	-25	-35		mA
CBD Output High Voltage	VOH	I_{CBD}= 0 mA, T= 25°C	2.0	2.5	3.0	V
		I_{CBD}= 0 mA, T=0-105°C*, overvoltage condition	1.4		3.3	V
CBD Pulldown Resistance	Rout	I_{CBD}= 1mA; no faults	300	500	1000	Ω

*Max occurs at low temp

Date: March 4, 1999