



# Ultra Low Power 3-Pin Voltage Window Surveillance with Time-out

## Features

- Voltage Window monitoring
- Clear microprocessor restart after power up
- Processor reset at power down
- Reset output guaranteed down to  $V_{DD} = 1\text{ V}$
- Low power consumption: typ. 3 mA at  $V_{DD} = 5\text{ V}$
- - 40 to +85 °C temperature range
- On request extended temperature range, -40 to +125 °C
- On-chip oscillator
- No external components required
- Push-pull or Open drain output
- TO-92, SOT-23 5L and SOT-223 <sup>1)</sup> packages
- Pin compatible with DS 1233 A in TO-92 and SOT-223

<sup>1)</sup> On request

## Description

The V6310 is a CMOS device which monitors the supply voltage of any electronic system, and generates the appropriate Reset signal. The gap between the two thresholds defines the allowed voltage range. As long as  $V_{DD}$  stays inside this voltage window, the output stays inactive. If  $V_{DD}$  drops below  $V_{THlow}$ , or rises above  $V_{THhigh}$ , the output gets active. When  $V_{DD}$  enters into the allowed range, the output remains active for an additional 50 ms (typ.). This allows the system to stabilize before getting fully active. The lower threshold voltage may be obtained in different versions:

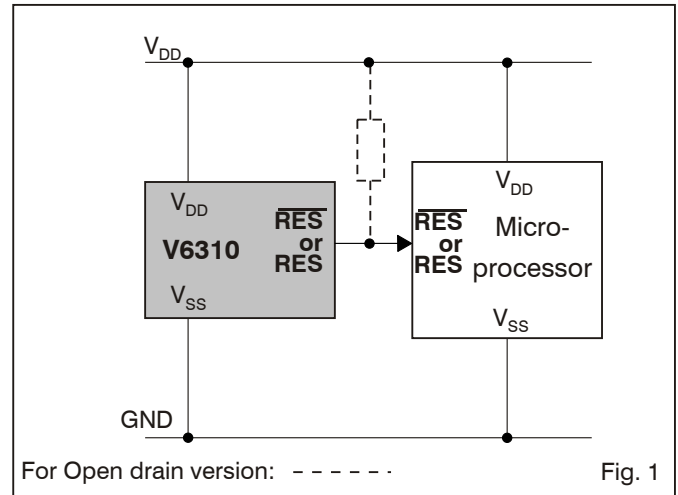
- 2.0V to 6V
- 2.4V to 6V
- 2.8V to 6V
- 3.5V to 6V
- 4.0V to 6V
- 4.5V to 6V

## Applications

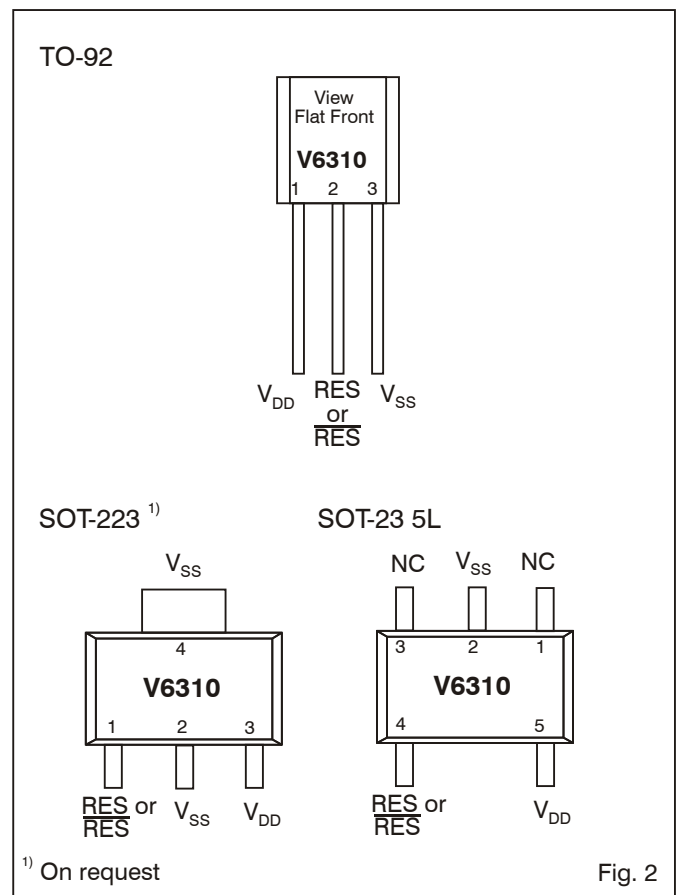
All microprocessor applications where an automatic restart is required:

- Computer electronics
- White / Brown goods
- Automotive electronics
- Industrial electronics
- Telecom systems
- Hand-held systems

## Typical Operating Configuration



## Pin Assignment





## Absolute Maximum Ratings

Parameter	Symbol	Conditions
Voltage at $V_{DD}$ to $V_{SS}$	$V_{DD}$	-0.3V to +10 V
Min. voltage at RES or $\overline{RES}$	$V_{min}$	$V_{SS} - 0.3 V$
Max. voltage at RES or $\overline{RES}$	$V_{max}$	$V_{DD} + 0.3 V$
Storage temperature range	$T_{STO}$	-65° to +150 °C

Table 1

Stresses above these listed maximum ratings may cause permanent damage to the device. Exposure beyond specified operating conditions may affect device reliability or cause malfunction.

## Handling Procedures

This device has built-in protection against high static voltages or electric fields; however, anti-static precautions must be taken as for any other CMOS component. Unless otherwise specified, proper operation can only occur when all terminal voltages are kept within the supply voltage range.

## Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Operating temperature <sup>1)</sup>	$T_A$	-40		+125	°C
Positive supply voltage	$V_{DD}$	1		8	V

Table 2

<sup>1)</sup> The maximum operating temperature is confirmed by sampling at initial device qualification.

## Electrical Characteristics

$T_A = -40$  to  $+85$  °C, unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Min. at 25 °C	Typ.	Max. at 25 °C	Max.	Units
Supply current <sup>1)</sup>	$I_{DD}$	$V_{DD} = 2 V$			1.5	2.1	3.1	mA
	$I_{DD}$	$V_{DD} = 5 V$			3.0	3.9	5.7	mA
	$I_{DD}$	$V_{DD} = 8 V$			5.2	6.8	10.0	mA
Threshold Low Voltage	$V_{THlow}$	Version: A,G,M	1.77	1.84	1.95	2.04	2.17	V
	$V_{THlow}$	Version: B,H,N	2.09	2.18	2.32	2.41	2.55	V
	$V_{THlow}$	Version: C,I,O	2.48	2.59	2.73	2.86	3.03	V
	$V_{THlow}$	Version: D,J,P	3.11	3.23	3.42	3.59	3.80	V
	$V_{THlow}$	Version: E,K,Q	3.55	3.70	3.88	4.08	4.32	V
Threshold High Voltage	$V_{THhigh}$	Version: F,L,R	4.05	4.22	4.42	4.67	4.95	V
Threshold hysteresis	$V_{HYS}$			25				mV
RES Output Low Level	$V_{OL}$	$V_{DD} = 5 V, I_{OL} = 8 mA$			175		400	mV
	$V_{OL}$	$V_{DD} = 3 V, I_{OL} = 4 mA$			140		300	mV
	$V_{OL}$	$V_{DD} = 1 V, I_{OL} = 50 mA$			20		90	mV
RES Output High Level	$V_{OH}$	$V_{DD} = 5 V, I_{OH} = -8 mA$	4.3		4.5			V
	$V_{OH}$	$V_{DD} = 3 V, I_{OH} = -4 mA$	2.3		2.6			V
	$V_{OH}$	$V_{DD} = 1 V, I_{OH} = -100 mA$	850		950			mV
Output leakage current <sup>2)</sup>	$I_{LEAK}$	$V_{DD} = 5.5 V$			0.05		1	mA

Table 3

<sup>1)</sup> RES or  $\overline{RES}$  open

<sup>2)</sup> Only for Open drain versions

## Timing Characteristics

$V_{DD} = 5.0 V, T_A = -40$  to  $+85$  °C, unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Power on reset time	$t_{POR}$		25	50	75	ms
Sensitivity around $V_{THhigh}$ <sup>3)</sup>	$t_{SEN high}$	for $V_{DD} = 5 V$ to $7 V$ in 5 ms	18	$0.8 t_{Rhigh}$		ms
Sensitivity around $V_{THlow}$	$t_{SEN low}$	for $V_{DD} = 5 V$ to $3 V$ in 5 ms	20	$0.8 t_{Rlow}$		ms
Reaction time around $V_{THhigh}$	$T_{Rhigh}$	for $V_{DD} = 5 V$ to $7 V$ in 5 ms	20	55	90	ms
Reaction time around $V_{THlow}$ <sup>3)</sup>	$T_{Rlow}$	for $V_{DD} = 5 V$ to $3 V$ in 5 ms	22	75	150	ms

<sup>3)</sup> Tested on versions with  $V_{THlow}$  higher than 3 V

Table 4



## Timing Waveforms

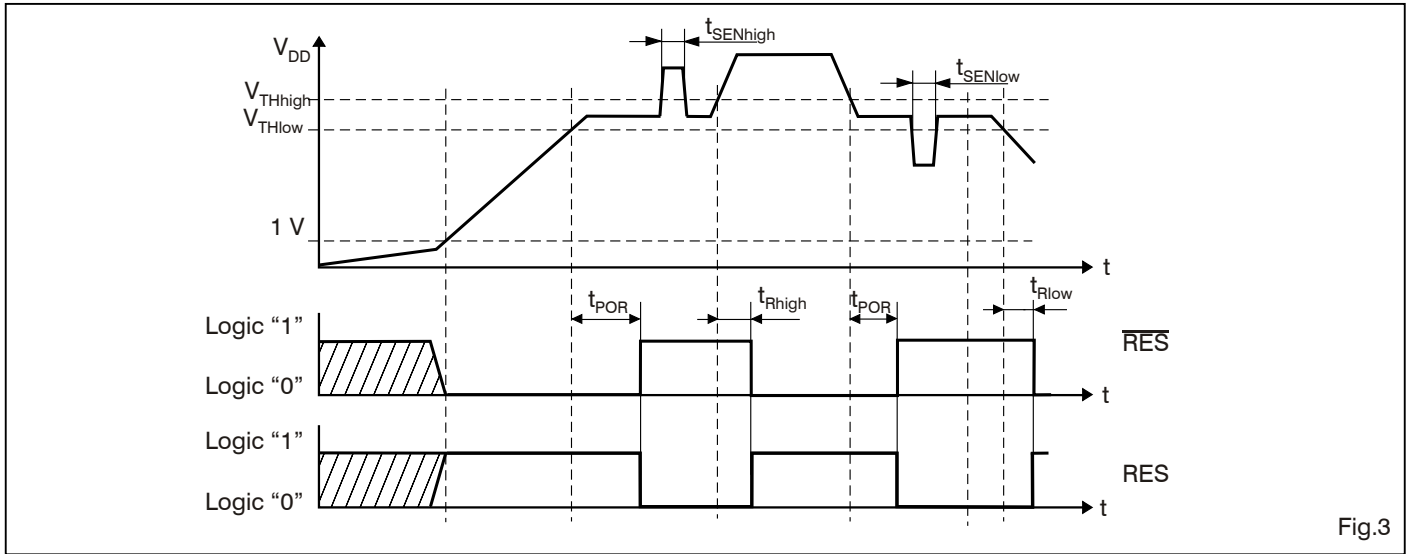


Fig.3

## Block Diagram

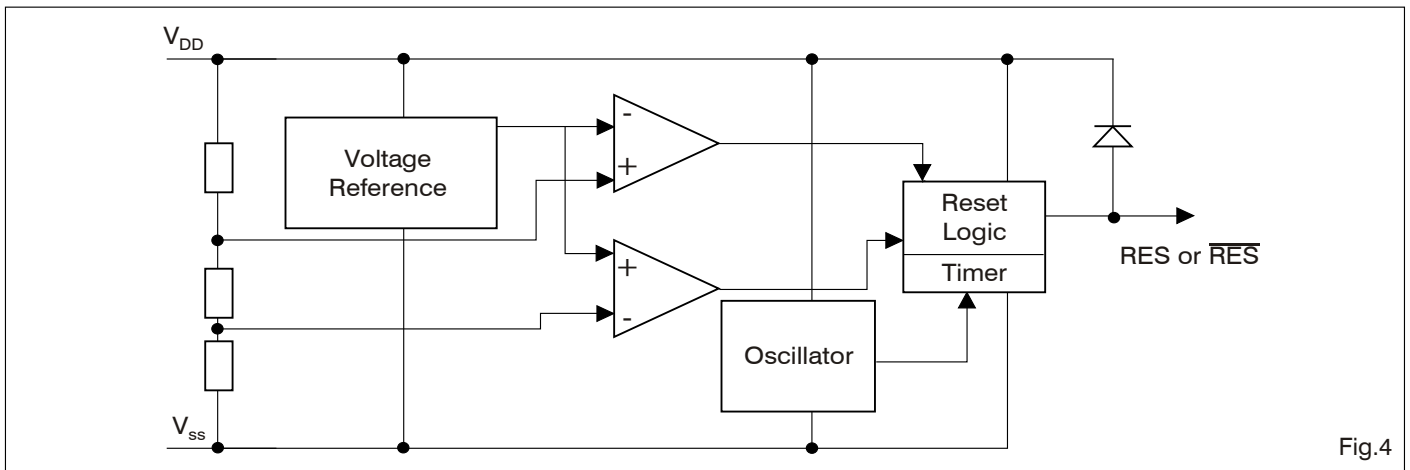


Fig.4

## Pin Description

### TO-92

Pin	Name	Function
1	$V_{DD}$	Positive Supply
2	RES or $\overline{RES}$	Reset output
3	$V_{SS}$	Supply ground

Table 5

### SOT-23 5L

Pin	Name	Function
1	NC	No connection
2	$V_{SS}$	Supply ground
3	NC	No connection
4	RES or $\overline{RES}$	Reset output
5	$V_{DD}$	Positive supply

Table 6

### SOT-223<sup>1)</sup>

Pin	Name	Function
1	RES or $\overline{RES}$	Reset output
2	$V_{SS}$	Supply ground
3	$V_{DD}$	Positive Supply
4 *	$V_{SS}$	Supply ground

\* Internally connected to pin 2

<sup>1)</sup> On request

Table 7



## Ordering Information

The V 6310 is available with Push-pull or Open drain output stage and Reset active low or high.

Ordering form: V6310 <version letter> < packaging >

Example: Smart reset with: - Reset active low

- Open drain output
- 2.8 V threshold
- TO-92 package

### V6310 O TO-92

When ordering, please specify the complete part number.

## Version letter definition

Output stage	Threshold Low Voltage [V]					
	2.0	2.4	2.8	3.5	4.0	4.5
Push-pull, Reset active low	A <sup>1)</sup>	B <sup>1)</sup>	C <sup>1)</sup>	D <sup>1)</sup>	E <sup>1)</sup>	F <sup>1)</sup>
Push-pull, Reset active high	G <sup>1)</sup>	H <sup>1)</sup>	I <sup>1)</sup>	J <sup>1)</sup>	K <sup>1)</sup>	L <sup>1)</sup>
Open drain, Reset active low	M <sup>1)</sup>	N <sup>1)</sup>	O	P <sup>1)</sup>	Q <sup>1)</sup>	R <sup>1)</sup>

Table 7

Chip form and SOT-223 on request

<sup>1)</sup> Non-stock items, minimum order 30 K pieces.