SUPPLY VOLTAGE MONITOR

ISSUE 3 – JANUARY 1998

ZSM561

DEVICE DESCRIPTION

The ZSM561 is a three terminal under voltage monitor circuit for use in microprocessor systems. The threshold voltage of the device has been set to 4.6 volts making it ideal for 5 volt circuits.

Included in the device is a precise voltage reference and a comparator with built in hysteresis to prevent erratic operation. The ZSM561 features an open collector output capable of sinking at least l0mA which only requires a single external resistor to interface to following circuits.

Operation of the device is guaranteed from one volt upwards, from this level to the device threshold voltage the output is held low providing a power on reset function. Should the supply voltage, once established, at any time drop below the threshold level then the output again will pull low. Also included is a 6 volt zener diode connected between Vcc and Gnd. With just the addition of a low cost external NPN transistor and resistor, this zener allows the ZSM561 to provide both regulator and supply monitor functions

The device is available in a TO92 package for through hole applications as well as SO8 and SOT223 for surface mount requirements.

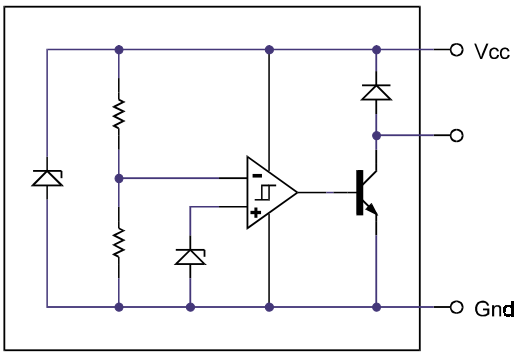
FEATURES

- SO8, SOT223 and TO92 packages
- Power on reset generator
- Automatic reset generation
- Low standby current
- Guaranteed operation from 1 volt
- Wide supply voltage range
- Internal clamp diode to discharge delay capacitor
- 4.6 volt threshold for 5 volt logic
- 20mV hysteresis prevents erratic operation

APPLICATIONS

- Microprocessor systems
- Computers
- Computer peripherals
- Instrumentation
- Automotive
- Battery powered equipment

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATING

Input Supply Voltage	-1 to 7V	Operating Junction Temperature	150°C
Supply Zener Current	25mA continuous	Operating Temperature	-40 to 85°C
Offstate Output Voltage	7V	Storage Temperature	-65 to 150°C
Onstate Output Sink Current(Note 1)	Internally limited	**Power Dissipation**	
Clamp Diode Forward Current(Note 1)	100mA	TO92	780mW
		SOT223	2W(Note 2)
		SO8	780mW(Note 2)

TEST CONDITIONS
(T_{amb}=25°C for typical values, T_{amb}=-40 to 85°C for min/max values (Note3))

COMPARATOR

PARAMETER	SYMBOL	MIN	TYP.	MAX.	UNITS
Threshold Voltage High state output (Vcc increasing)	V_{IH}	4.5	4.61	4.7	V
Threshold Voltage Low state output (Vcc decreasing)	V_{IL}	4.5	4.59	4.7	V
Hysteresis	V_H	0.01	0.02	0.05	V

OUPUT

Output sink saturation:	V_{OL}				
(V_{cc}=4.0V, I_{sink}=8.0mA)			0.46	1.0	V
(V_{cc}=4.0V, I_{sink}=2.0mA)			0.15	0.4	V
(V_{cc}=1.0V, I_{sink}=0.1mA)				0.25	V
Onstate output sink current (V_{cc} , Output=4V)	I_{sink}	10	20	60	mA
Offstate output leakage current (V_{cc} , Output=5V)	I_{oh}		0.02	0.5	µA
Clamp diode forward voltage (I_f=10mA)	V_f	0.6	1.2	1.5	V
Propagation delay (V_{in} 5V to 4V, R_l=10k, T_{amb}=25°C)	T_d		1.5		µs

SUPPLY ZENER

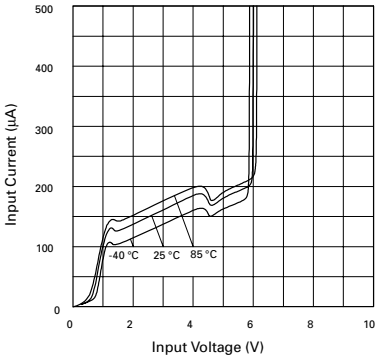
Avalanche Voltage:(Icc=1mA)	V_z	5.8	6	6.2	V
Slope Resistance: (Icc=15mA)	R_z		45	60	Ω
(Icc=15mA to 50mA)			21	30	Ω

TOTAL DEVICE

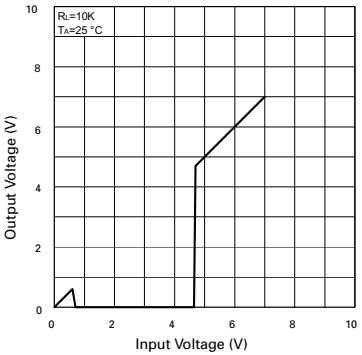
Operating input voltage range(Note 5)	V_{cc}	1.0 to 7			V
Quiescent current (V_{cc}=5V)	I_q		135	200	µA

ZSM561

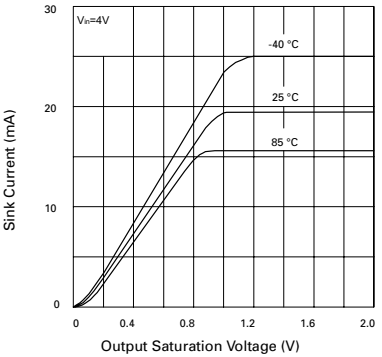
TYPICAL CHARACTERISTICS



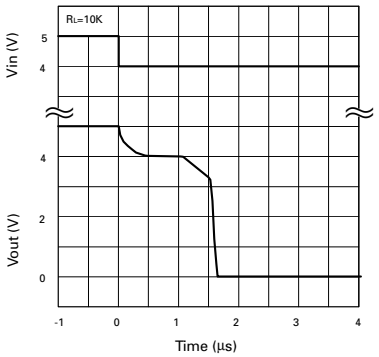
Input Current vs. Input Voltage



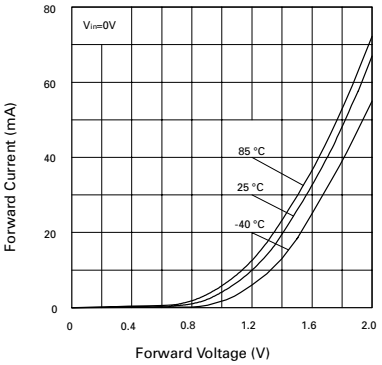
Output Voltage vs. Input Voltage



Output Saturation Voltage vs. Sink Current

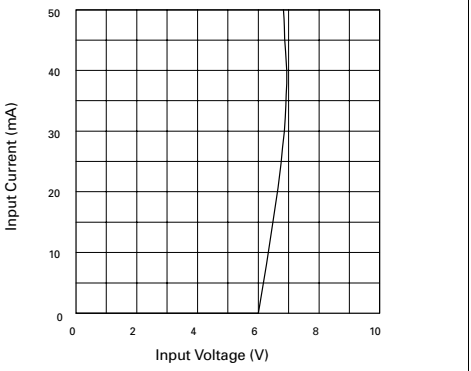


Reset Delay Time

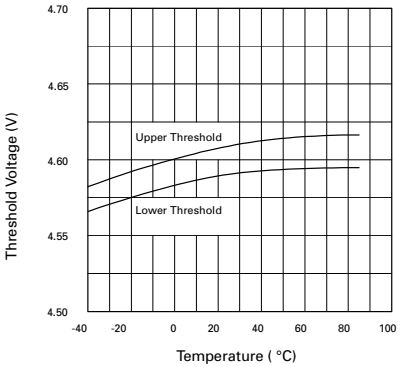


Clamp Diode Forward Current vs. Voltage

TYPICAL CHARACTERISTICS

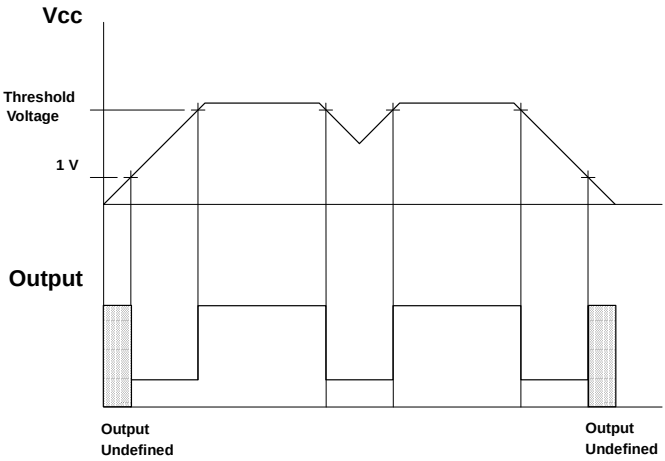


Input Current vs. Input Voltage



Threshold Voltage vs. Temperature

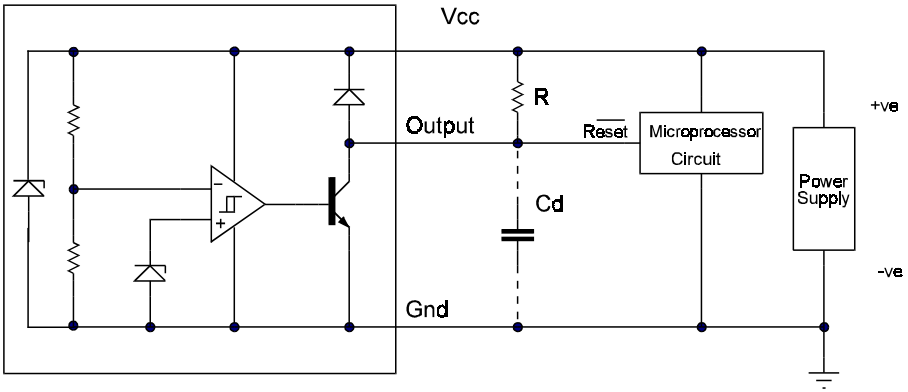
TIMING DIAGRAM



Note:

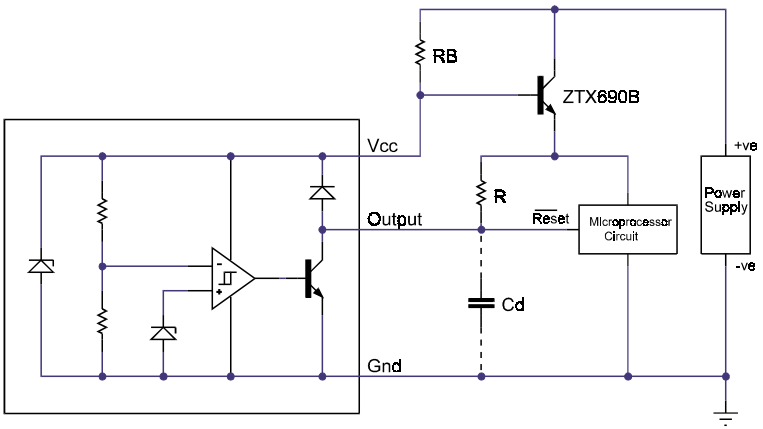
1. Maximum package power dissipation must be observed.
2. Maximum power dissipation for the SOT223 and SO8 packages is calculated assuming that the device is mounted on a PCB measuring 2 inches square.
3. Low duty cycle pulse techniques are used during test to maintain junction temperatures as close to ambient as possible
4. A time delayed reset can be accomplished with the additional Cd.
5. Operation above V_z may be restricted by the supply current rating I_z

APPLICATION CIRCUITS



$$T_{DY} = RCd \ln\left(\frac{1}{1 - \frac{V_{TH(mpu)}}{V_{in}}}\right)$$

T_{DY} = Time (Seconds)
V_{TH} = Microprocessor ResetThreshold
V_{in} = Power Supply Voltage



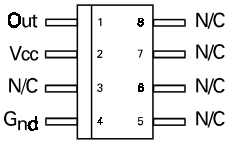
$$R_B = \frac{(V_{INMIN} - 6)}{(I_Q + \frac{I_L}{h_{FE}})}$$

V_{INMIN} = The minimum input voltage provided by the unregulated supply.
I_Q = The ZSM561 quiescent current (ie 200 µA)
I_L = Load current taken by the microprocessor system.

h_{FE} = The minimum h_{FE} that can be expected from the pass transistor under worst case conditions. (ie Lowest temperature and minimum input voltage). For the ZTX690B a value of 250 could be used.

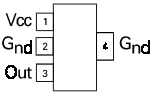
CONNECTION DIAGRAMS

SO8 Package Suffix – N8



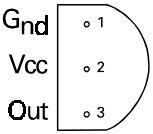
Top View

SOT223 Package Suffix – G



Top View –
Pin 4 floating or connected to pin 2

TO92 Package Suffix – C



Bottom View

ORDERING INFORMATION

Part Number	Package	Part Mark
ZSM561N8	SO8	ZSM561
ZSM561G	SOT223	ZSM561
ZSM561C	TO92	ZSM561