

## VERY LOW POWER MICROPROCESSOR RESET DEVICES

### DESCRIPTION

The ZXCM209/210 are three terminal supervisory circuits used to monitor the power supplies in microprocessor and digital systems. They provide a high performance economical solution when used with 5V, 3V or lower powered circuits. Reset thresholds suitable for operation with a variety of supply voltages are available.

These devices provide a reset signal whenever the supply voltage falls below a preset threshold, keeping it asserted for a minimum delay period of 140ms after the supply has risen above the reset level. The ZXCM209 has an active-low RESET output (which is guaranteed to be in the correct state for supplies down to 1V), while the ZXCM210 has an active-high RESET output.

The reset comparator has built-in hysteresis to prevent erratic operation and is designed to ignore supply transients. Low supply current (typically 2 $\mu$ A) makes the ZXCM209/210 devices ideal for use in portable equipment. They are available in a 3-pin SOT23 surface mount package with an industry standard pinout.

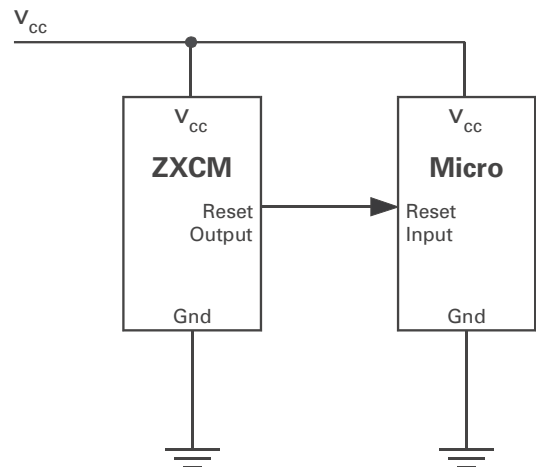
### FEATURES

- Enhanced alternative to MAX809/810 and similar parts
- Precision monitoring of 5V, 3.3V, 3V power supply voltages
- 1% threshold tolerance
- 2 $\mu$ A typical supply current
- 140ms minimum power on reset pulse width
- Alternative minimum pulse widths available, contact your local sales office for availability
- RESET LOW Output (ZXCM209)
- RESET HIGH Output (ZXCM210)
- Power supply transient immunity
- No latch up
- No external components
- 3-Pin SOT23 package

### APPLICATIONS

- Computer systems
- Controllers
- Instrumentation
- Microprocessor power monitoring
- Microcontroller power monitoring
- Power supplies
- Portable/Battery-powered equipment
- Automotive

### APPLICATION CIRCUIT



# ZXCM209

# ZXCM210

## ABSOLUTE MAXIMUM RATINGS

Terminal Voltage with respect to  $G_{ND}$

$V_{CC}$	-0.3V to 7.0V
RESET, RESET	-0.3V to ( $V_{CC} + 0.3V$ )
Input Current, $V_{CC}$	20mA
Output Current	20mA
Rate of Rise, $V_{CC}$	250V/ $\mu$ s
Continuous Power Dissipation	500mW
Operating Temperature Range	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum conditions for extended periods may affect device reliability.

## ELECTRICAL CHARACTERISTICS

TEST CONDITIONS (unless otherwise stated)  $V_{CC}$  = full range,  $T_A$  = -55°C to +125°C

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
$V_R$	$V_{CC}$ Range	$T_A=0^\circ$ to $70^\circ\text{C}$ $T_A=-55^\circ$ to $125^\circ\text{C}$	1.0 1.2		5.5 5.5	V V
$I_{CC}$	Supply Current			2	5	$\mu$ A
$V_{TH}$	Reset Threshold	Suffix L; $T_A=25^\circ\text{C}$	4.58	4.63	4.68	V
		Suffix M; $T_A=25^\circ\text{C}$	4.34	4.38	4.42	V
		Suffix J; $T_A=25^\circ\text{C}$	3.96	4.00	4.04	V
		Suffix T; $T_A=25^\circ\text{C}$	3.05	3.08	3.11	V
		Suffix S; $T_A=25^\circ\text{C}$	2.90	2.93	2.96	V
$V_{THT}$	Reset Threshold Tolerance	$T_A=25^\circ\text{C}$		1		%
		$T_A=-55^\circ$ to $125^\circ\text{C}$			5	%
$\Delta V_{TH}/^\circ\text{C}$	Reset Threshold Temp. Coefficient			50		ppm/ $^\circ\text{C}$
$V_D$	$V_{CC}$ to Reset Delay			30		$\mu$ s
$V_{TO}$	Reset Active Timeout Period		140		560	ms

## ELECTRICAL CHARACTERISTICS ZXCM209

TEST CONDITIONS (unless otherwise stated)  $V_{CC}$  = full range,  $T_A$  = -55°C to +125°C

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
$V_{OL}$	Reset Output Voltage Low	$V_{CC} > 1V, I_{OL} = 100\mu A$ (0 to 85°C)			0.3	V
		$V_{CC} > 1.2V, I_{OL} = 200\mu A$			0.3	V
		$V_{TH} > V_{CC} > 2.5V, I_{OL} = 2.7mA$			0.4	V
$V_{OH}$	Reset Output Voltage High	$V_{CC} > V_{THmax}, I_{OH} = 1mA$	$0.8V_{CC}$			V

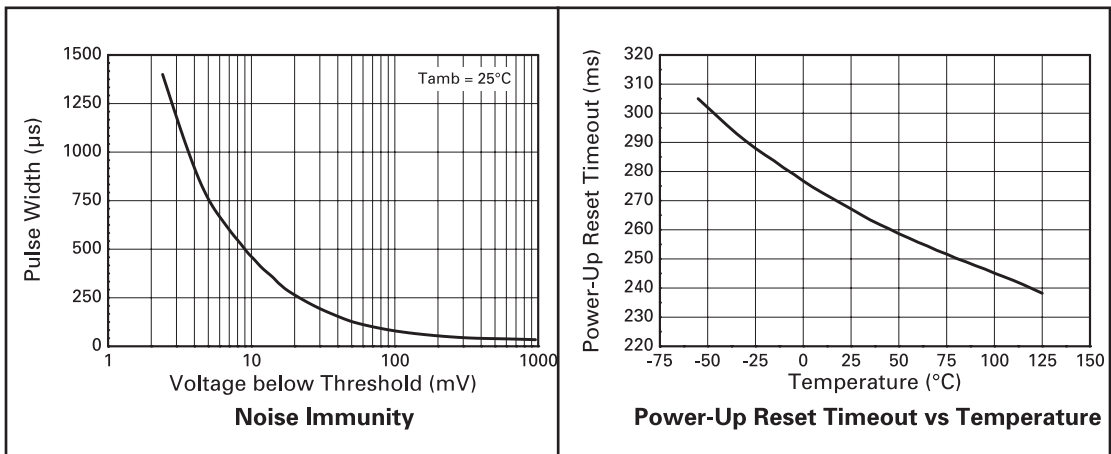
## ELECTRICAL CHARACTERISTICS ZXCM210

TEST CONDITIONS (unless otherwise stated)  $V_{CC}$  = full range,  $T_A$  = -55°C to +125°C

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
$V_{OL}$	Reset Output Voltage Low	$V_{CC} > V_{THmax}, I_{OL} = 2mA$			0.3	V
		$V_{CC} > V_{THmax}, I_{OL} = 2.7mA$			0.4	V
$V_{OH}$	Reset Output Voltage High	$V_{CC} > 1.5V, I_{OH} = 150\mu A$	$0.8V_{CC}$			V
		$V_{CC} > V_{TH} > 2.5V, I_{OH} = 1mA$	$0.8V_{CC}$			V

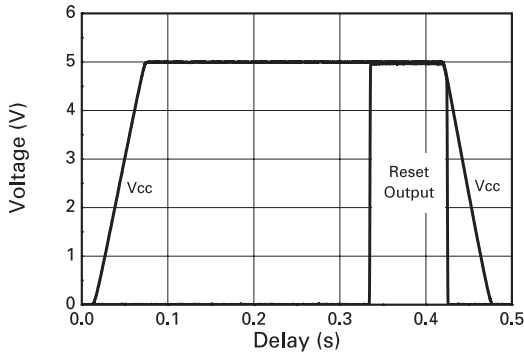
Note: Device testing is performed at  $T_A = 25^\circ C$ . Device thermal performance is guaranteed by design

## TYPICAL CHARACTERISTICS

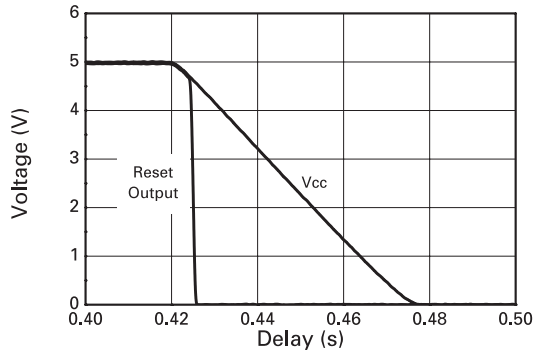


# ZXCM209 ZXCM210

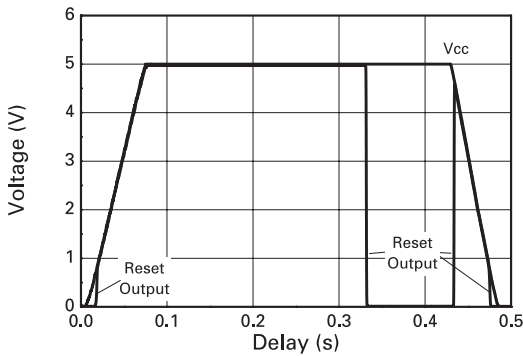
## TYPICAL CHARACTERISTICS



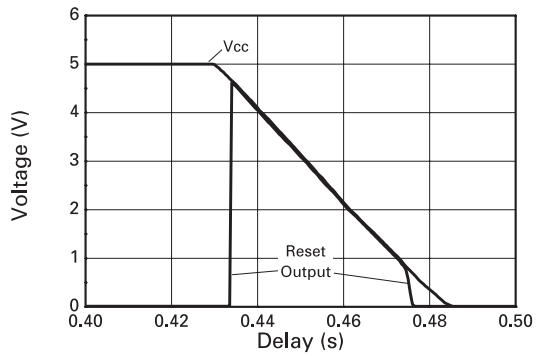
Reset Switching Characteristics - ZXCM209L



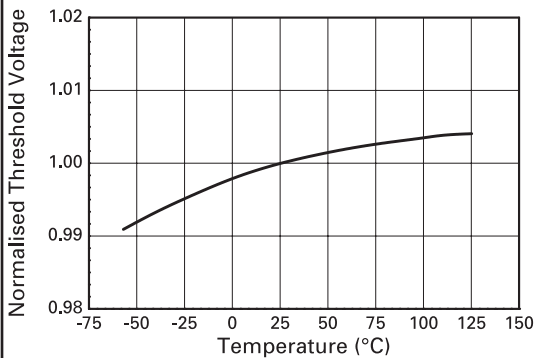
Reset Low Switching Characteristic - ZXCM209L



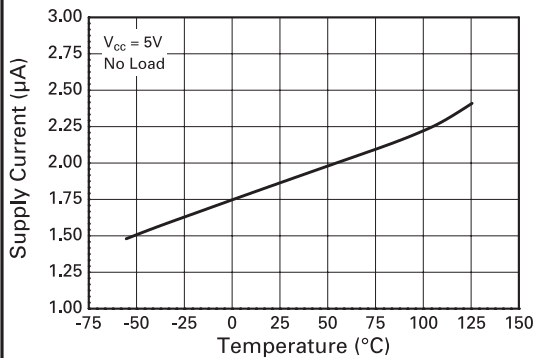
Reset Switching Characteristics - ZXCM210L



Reset Low Switching Characteristic - ZXCM210L



Normalised Threshold Voltage vs Temperature



Supply Current vs Temperature

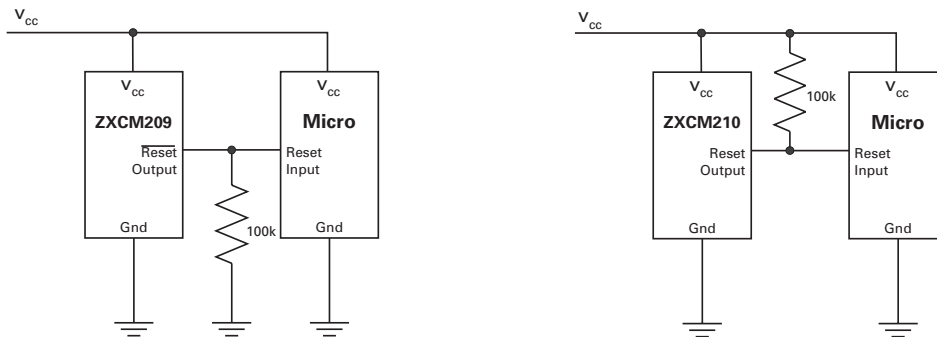
## APPLICATIONS INFORMATION

### Negative going $V_{cc}$ transients

The ZXCM209/210 are, to a good degree, immune to short duration negative going supply transients. Under certain circumstances very brief transients are allowed without inappropriate false triggering of the reset circuit. The response to supply transients is shown in the Noise Immunity graph in the typical characteristics. The graph indicates the typical allowable transient duration for a specified threshold overdrive such that a reset pulse is not generated. Addition of a bypass capacitor, e.g. 0.1 $\mu$ F, as close as possible to the  $V_{cc}$  pin will provide extra transient immunity.

### Reset valid down to very low supply voltages

With  $V_{cc}$  between 0V and 1V the output of the ZXCM209/210 may be in an undefined state. In many systems this is inconsequential as the microprocessor, and other circuits, will be inoperative with supplies this low. In applications where this is important, the addition of an external resistor ensures that the reset output remains valid for  $V_{cc} < 1V$ . The resistor value is non critical: a value of 100k $\Omega$  is recommended. For the ZXCM209 the resistor should be applied between reset output and ground; for the ZXCM210 between reset output and  $V_{cc}$ . Figure 1 shows the connection diagram for the ZXCM devices in these configurations.



**Figure 1**  
Circuit for operation of ZXCM with reset valid down to very low supply voltage.

# ZXCM209 ZXCM210

## Interfacing to $\mu P$ 's with bidirectional reset I/O

The ZXCM series can be used with microprocessors having bidirectional reset pins, such as Motorola 68HC11 series. The addition of a 4.7k resistor between the ZXCM reset output and the processor input ensures correct

operation of the reset circuit. A buffer to other circuit components is then required to enable the processor reset drive to operate correctly. The circuit configuration is shown in Figure 2.

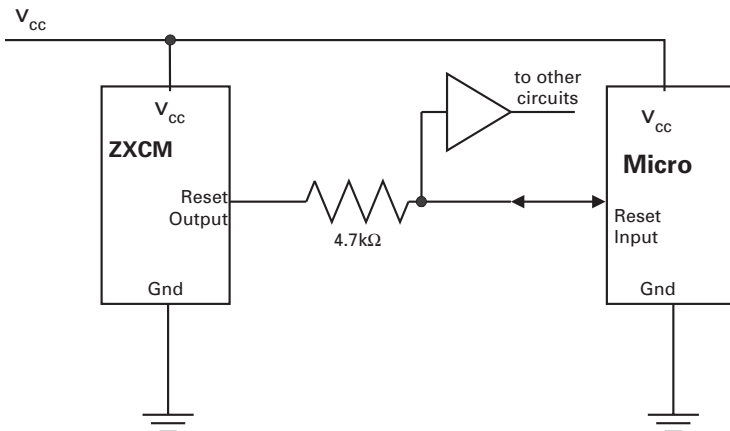
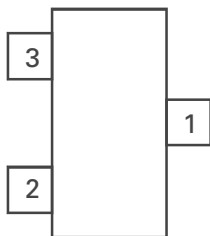


Figure 2  
Interfacing to  $\mu P$ 's with bidirectional reset I/O.

## PIN DESCRIPTION

Pin Number	Pin Name	Pin Function
1	V <sub>CC</sub>	Supply voltage (+5, +3.3, +3 volts)
2	RESET (ZXCM209) RESET (ZXCM210)	Output remains low while V <sub>CC</sub> is below the reset threshold, and for a minimum 140ms after V <sub>CC</sub> rises above the reset threshold. Output remains high while V <sub>CC</sub> is below the reset threshold, and for a minimum 140ms after V <sub>CC</sub> rises above the reset threshold.
3	Gnd	Ground



## ORDERING INFORMATION

PART NUMBER	TEMPERATURE RANGE	PACKAGE	RESET OUTPUT
ZXCM209xF	-55 to 125°C	SOT23	LOW
ZXCM210LF	-55 to 125°C	SOT23	HIGH

x=Insert appropriate threshold voltage code.

### ZXCM209 Threshold voltage codes

PART MARK	THRESHOLD CODE	RESET THRESHOLD (V)
M22	L	4.63
M23	M	4.38
M24	J	4.00
M25	T	3.08
M26	S	2.93
M27	R	2.63

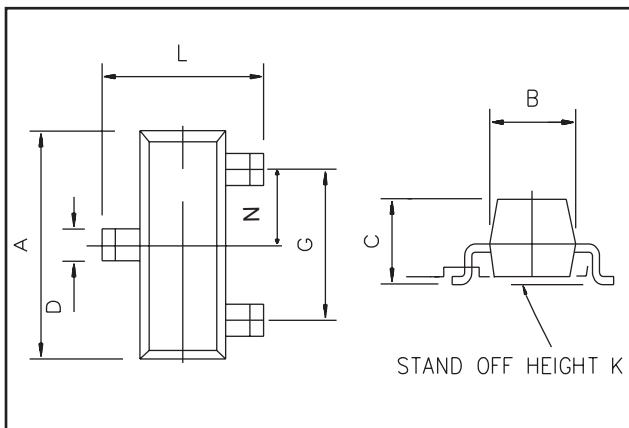
### ZXCM210 Threshold voltage codes

PART MARK	THRESHOLD CODE	RESET THRESHOLD (V)
M28	L	4.63

The only Reset High variant currently available is the ZXCM210LF. Contact your local Zetex Office for more details.

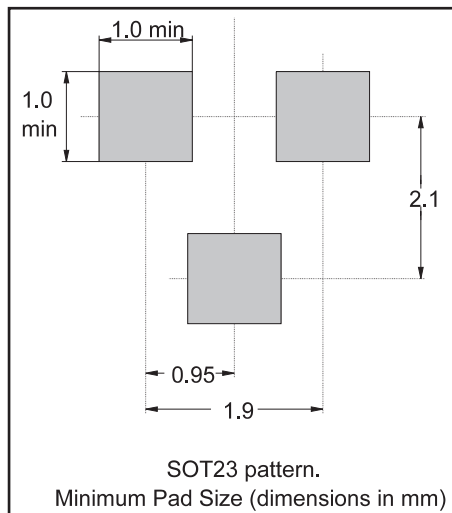
# ZXCM209 ZXCM210

## PACKAGE DIMENSIONS



DIM	Millimetres		Inches	
	Min	Max	Min	Max
A	2.67	3.05	0.105	0.120
B	1.20	1.40	0.047	0.055
C	-	1.10	-	0.043
D	0.37	0.53	0.0145	0.021
F	0.085	0.15	0.0033	0.0059
G	NOM 1.9		NOM 0.075	
K	0.01	0.10	0.0004	0.004
L	2.10	2.50	0.0825	0.0985
N	NOM 0.95		NOM 0.037	

## PAD LAYOUT DETAILS



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