Z89320

16-BIT DSP DIGITAL SIGNAL PROCESSOR

GENERAL DESCRIPTION

The Z89320 is a second generation, 16-bit fractional, two's complement CMOS Digital Signal Processor (DSP). Most instructions, including multiply and accumulate, are accomplished in a single clock cycle. The processor contains 1Kbyte of on-chip data RAM (two blocks of 256 16-bit words), 4K words of program ROM. Also, the processor features a 24-bit ALU, a 16x16 multiplier, a 24-bit Accumulator and a shifter. Additionally, the processor contains a six-level stack, three vectored interrupts and two inputs for conditional program jumps. Each RAM block contains a set of three pointers which may be incremented or decremented automatically to affect hardware looping without software overhead. The data RAMs can be simultaneously addressed and loaded to the multiplier for a true single cycle multiply.

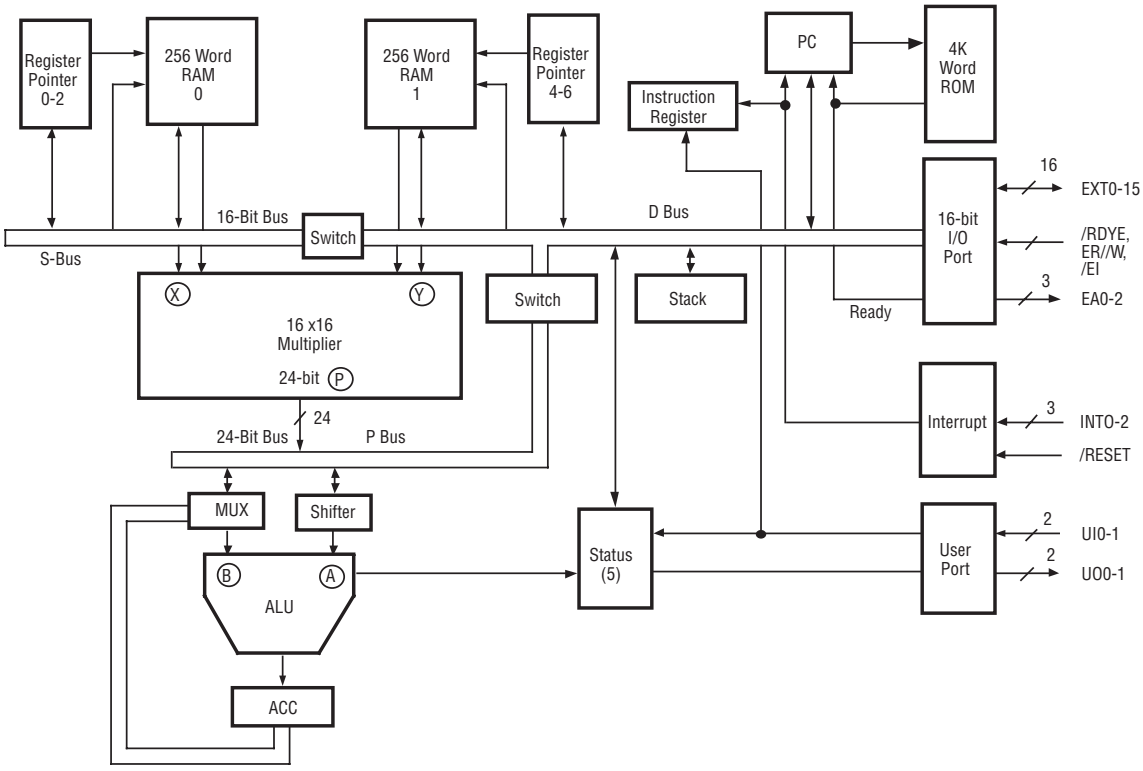
The device includes a 16-bit I/O bus for transferring data or for mapping peripherals into the processor address space. Additionally, there are two general purpose user inputs and two user outputs. Operation with slow peripherals is accompished with a ready input pin.

Development tools for the IBM PC include a relocatable assembler, a linker loader, and an ANSI-C compiler. Also, the development tools include a simulator/debugger, a cross assembler for the TMS320 family assembly code and a hardware emulator.

Notes:
All Signals with a preceding front slash, "/", are active Low, e.g.: B//W (WORD is active Low); /B/W (BYTE is active Low, only).

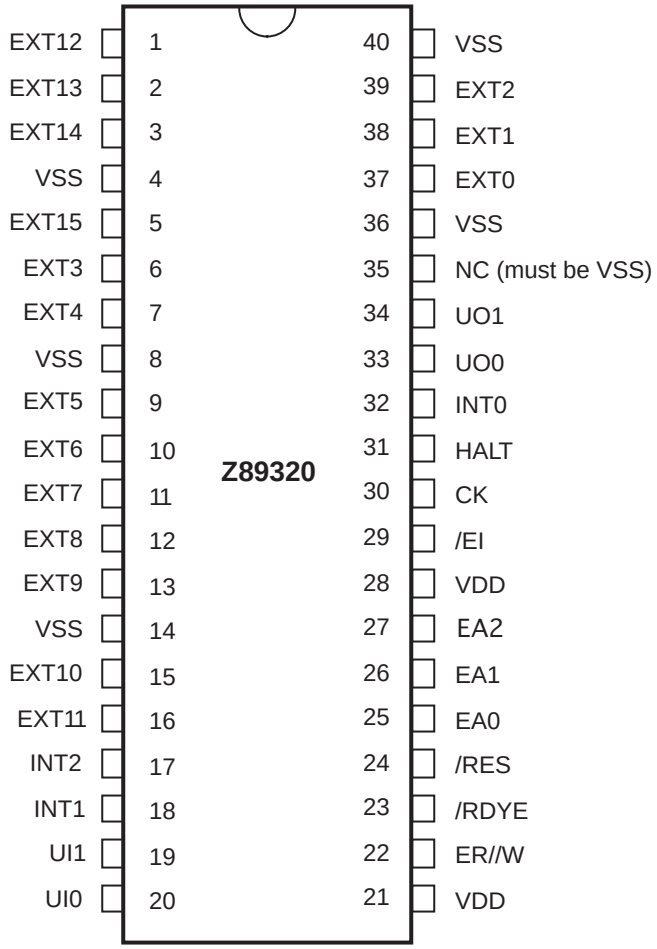
Power connections follow conventional descriptions below:

Connection	Circuit	Device
Power	V_{CC}	V_{DD}
Ground	GND	V_{SS}

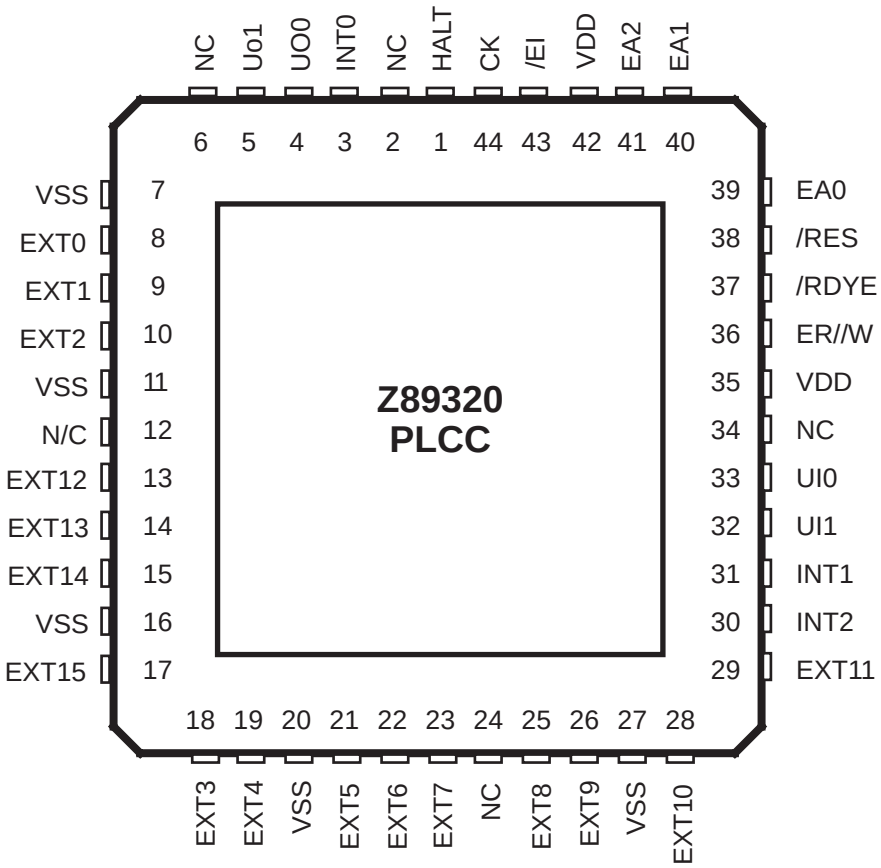


Functional Block Diagram

PIN DESCRIPTION



40-Pin DIP Pin Assignments



44-Pin PLCC Pin Assignments (Standard Mode)

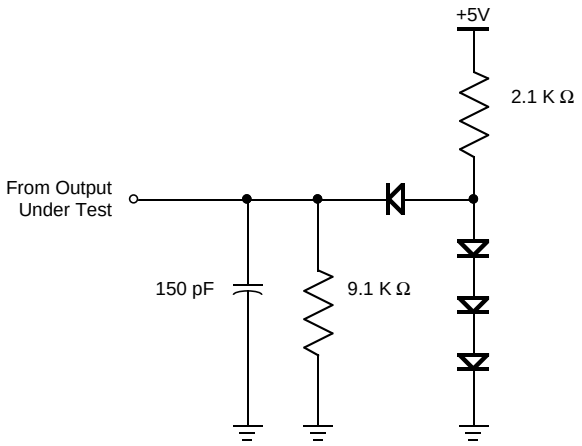
ABSOLUTE MAXIMUM RATINGS

Storage temperature range	-65°C to +150°C
Lead temperature (if packaged)	300°C for 10 sec.
V_{DD} Voltage to V_{SS}	-0.5 to 7.0V
All other pins	V_{DD}+0.5V to V_{SS}-0.5V

Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; operation of the device at any condition above those indicated in the operational sections of these specifications is not implied. Exposure to absolute maximum rating conditions for extended period may affect device reliability.

STANDARD TEST CONDITIONS

The characteristics listed below apply for standard test conditions as noted. All voltages are referenced to ground. Positive current flows into the referenced pin (Test Load Diagram).



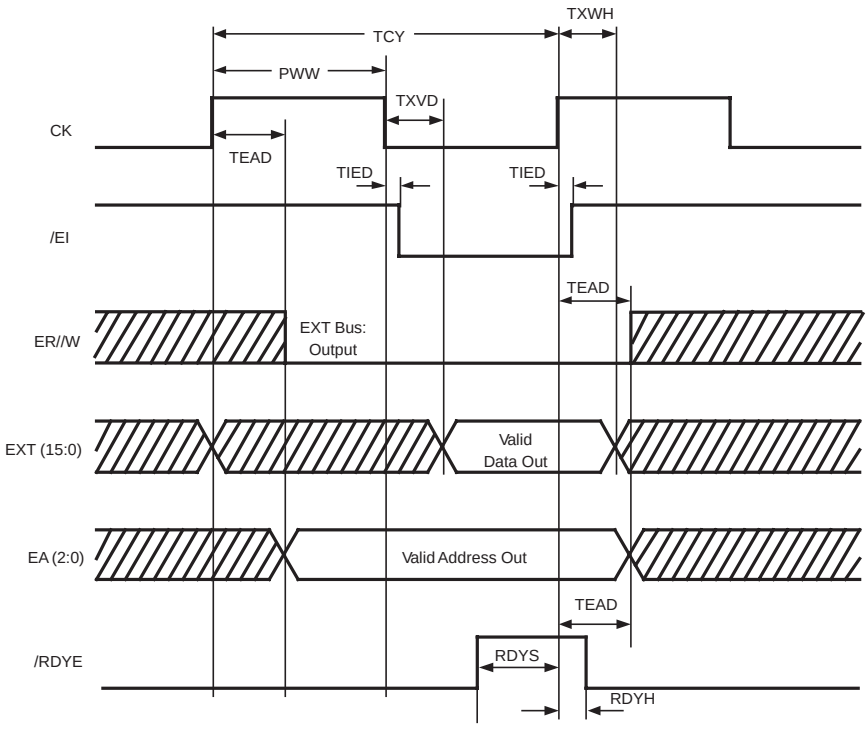
Test Load Diagram

DC ELECTRICAL CHARACTERISTICS

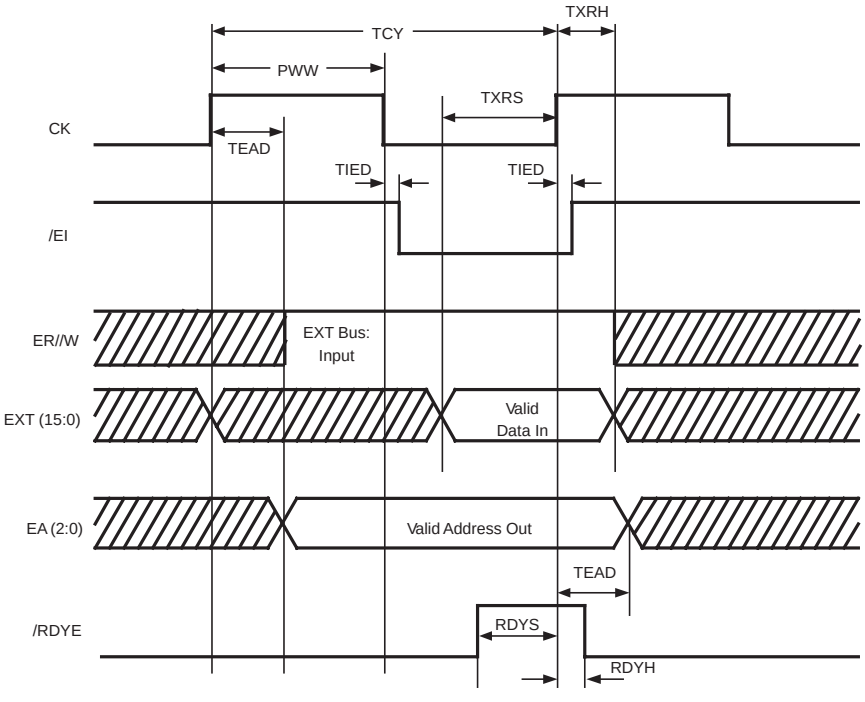
(V_{DD}= 5V ± 5%, T_A = 0°C to +70°C unless otherwise specified)

Symbol	Parameter	Condition	Min.	Max.	Units
I_{DD}	Supply Current	V_{DD}=5.25V fclock=10 MHz		40	mA
I_{DC}	DC Power Consumption	V_{DD}=5.25V	1 mA	5	mA
V_{IH}	Input High Level		0.9 V_{DD}		V
V_{IL}	Input Low Level			0.1 V_{DD}	V
IL	Input Leakage			1	µA
V_{OH}	Output High Voltage	I_{OH}=-100 µA	V_{DD}-0.2		V
V_{OL}	Output Low Voltage	I_{OL}=0.5 mA		0.5	V
I_{FL}	Output Floating Leakage Current			5	µA

AC TIMING DIAGRAM



WRITE to external device timing



READ from external device timing

AC ELECTRICAL CHARACTERISTICS

(V_{DD} = 5V ± 5%, T_A = 0°C to +70°C unless otherwise specified)

Symbol	Parameter	Min.	Max.	Units
TCY	Clock Cycle Time	100	1000	ns
PWW	Clock Pulse Width	45		ns
Tr	Clock Rise Time	2	4	ns
Tf	Clock Fall Time	2	4	ns
TEAD	EA,ER//W Delay from CK	15	25	ns
TXVD	EXT Data Output Valid from CK	5	25	ns
TXWH	EXT Data Output Hold from CK	15		ns
TXRS	EXT Data Input Setup Time	15		ns
TXRH	EXT Data Input Hold from CK	0	15	ns
TIED	/EI Delay Time from CK	0	5	ns
RDYS	Ready Setup Time	10		ns
RDYH	Ready Hold Time	0		ns

Low Margin:
Customer is advised that this product does not meet Zilog's internal guardbanded test policies for the specification requested and is supplied on an exception basis. Customer is cautioned that delivery may be uncertain and that, in addition to all other limitations on Zilog liability stated on the front and back of the acknowledgement, Zilog makes no claim as to quality and reliability under the CPS. The product remains subject to standard warranty for replacement due to defects in materials and workmanship.

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