ST49C155

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PREPROGRAMMED CPU MOTHERBOARD FREQUENCY GENERATOR

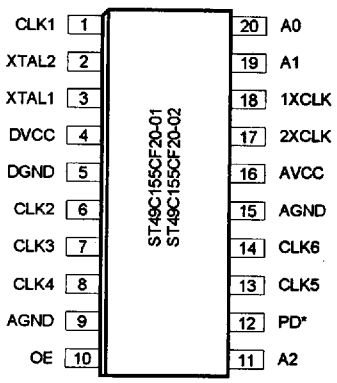
GENERAL DESCRIPTION

The ST49C155 is a monolithic analog CMOS device designed to generate eight simultaneous clock outputs for mother board applications. It is designed in a 1.2µ process to achieve 100 MHz operation with low clock jitter.

The ST49C155 may be used to replace existing BUS and I/O clocks generated from individual oscillators so that board space and number of oscillators are reduced. The high speed analog CMOS phase locked loops use the 14.318 MHz system clock or external crystal connected between XTAL1 and XTAL2 as the reference clock (reference clock can be changed to generate non-standard frequencies from the standard programmed device).

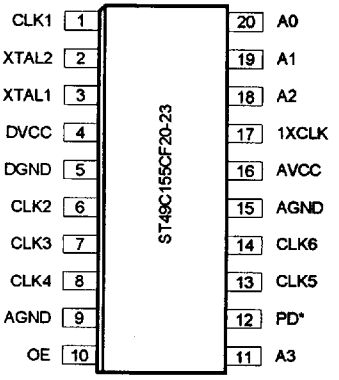
The ST49C155 is metal mask programmable to provide any custom set of CPUCLK frequencies. The programmed clock outputs are selectable via four address lines for 1XCLK / 2XCLK outputs.

SOIC Package



FEATURES

- Can replace multiple oscillators/crystals
- Pin -to-pin compatible to AV9155
- Compatible with 286, 386, and 486 CPUs
- Supports Turbo modes
- Generates communications clock, keyboard clock, floppy disk clock, system reference clock, bus clock and CPU clock
- Skew controlled 2X and 1X clocks
- Programmable analog phase locked loop
- High speed (up to 100 MHz output)
- Low power single 5V CMOS technology
- 20 pin dip or SOIC package



ORDERING INFORMATION

Part number	Package	Operating temperature
ST49C155CP20-xx	Plastic-DIP	0° C to +70° C
ST49C155CF20-xx	SOIC	0° C to +70° C
ST49C155CJ20-xx	PLCC	0° C to +70° C

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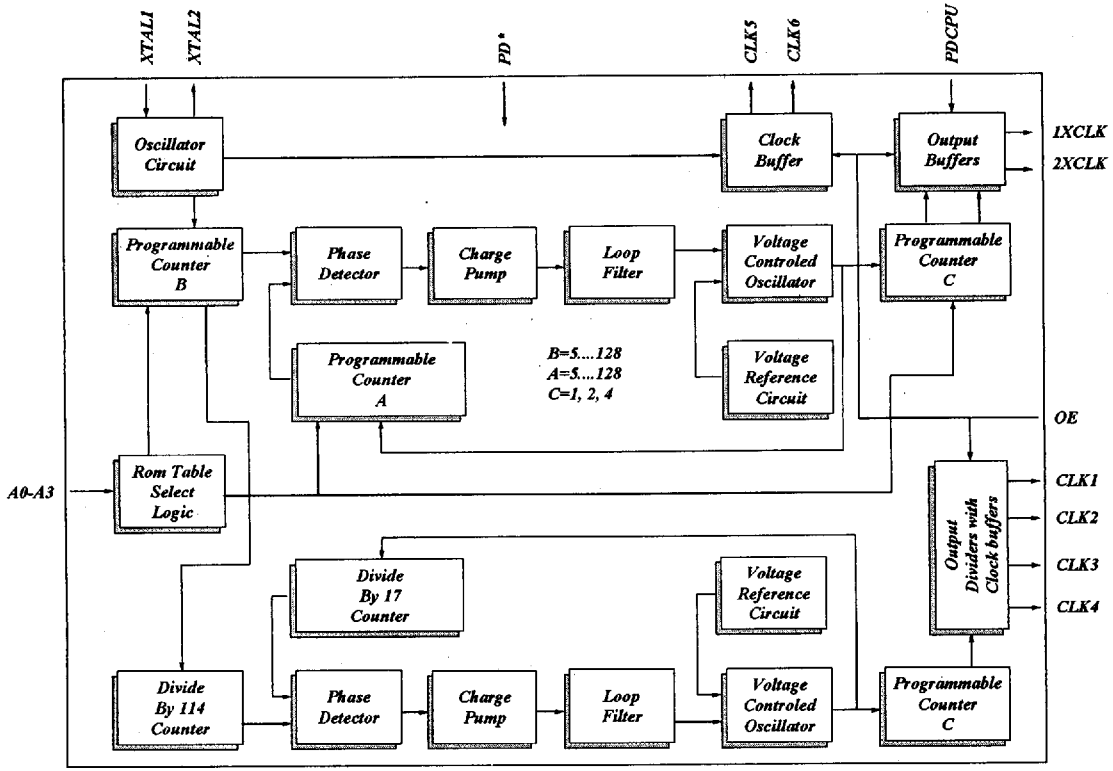
BLOCK DIAGRAM



SYMBOL DESCRIPTION (ST49C155-01/ -02)

Symbol	Pin	Signal Type	Pin Description
CLK1	1	O	1.8432 MHz clock output.
XTAL2	2	O	Crystal output.
XTAL1	3	I	Crystal or External clock input.
DVCC	4	I	Digital supply voltage. Single +5 volts.
DGND	5	O	Digital signal ground.
CLK2	6	O	16 MHz (ST49C155-01) or 32 MHz (ST49C155-02) clock output.
CLK3	7	O	24 MHz floppy disk clock output.
CLK4	8	O	12 MHz keyboard clock output.
AGND	9	O	Analog ground.
OE	10*	O	Output Enable (active high). Low on this pin sets all the outputs to three state mode.
A2	11	I	CPU clock frequency select address 2.
PD*	12*	I	Power down (active low). Shuts off entire chip when low.
CLK5	13	O	14.318 MHz reference clock output.
CLK6	14	O	14.318 MHz reference clock output.
AGND	15	O	Analog ground.
AVCC	16	I	Analog supply voltage. Single +5 volts.
2XCLK	17	I	2X CPU clock output.
1XCLK	18	I	1X CPU clock output.
A1	19	I	CPU clock frequency select address 1.
A0	20	I	CPU clock frequency select address 0.

*Have internal pull-up resistor on inputs

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SYMBOL DESCRIPTION (ST49C155-03)

Symbol	Pin	Signal Type	Pin Description
CLK1	1	O	6 MHz clock output.
XTAL2	2	O	Crystal output.
XTAL1	3	I	Crystal or External clock input.
DVCC	4	I	Digital supply voltage. Single +5 volts.
DGND	5	O	Digital signal ground.
CLK2	6	O	24 MHz floppy disk clock output.
CLK3	7	O	16 MHz bus clock output.
CLK4	8	O	8 MHz keyboard clock output.
AGND	9	O	Analog ground.
OE	10*	O	Output Enable (active high). Low on this pin sets all the outputs to three state mode.
A3	11	I	CPU clock frequency select address 3.
PD*	12*	I	Power down (active low). Shuts off entire chip when low.
CLK5	13	O	14.318 MHz reference clock output.
CLK6	14	O	14.318 MHz reference clock output.
AGND	15	O	Analog signal ground.
AVCC	16	I	Analog supply voltage. Single +5 volts.
1XCLK	17	I	CPU clock output.
A2	18	I	CPU clock frequency select address 2.
A1	19	I	CPU clock frequency select address 1.
A0	20	I	CPU clock frequency select address 0.

*Have internal pull-up resistor on inputs

CPU CLOCK TABLE FOR ST49C155-01, -02 (using 14.318 MHz input. All frequencies in MHz).

A2 A1 A0	2XCLK	1XCLK
0 0 0	8	4
0 0 1	16	8
0 1 0	32	16
0 1 1	40	20
1 0 0	50	25
1 0 1	66.66	33.33
1 1 0	80	40
1 1 1	100	50

ST49C155-03 (using 14.318 MHz input. All frequencies in MHz).

A3 A2 A1 A0	1XCLK
0 0 0 0	16
0 0 0 1	40
0 0 1 0	50
0 0 1 1	80
0 1 0 0	66.66
0 1 0 1	100
0 1 1 0	8
0 1 1 1	4
1 0 0 0	8
1 0 0 1	20
1 0 1 0	25
1 0 1 1	40
1 1 0 0	33.33
1 1 0 1	50
1 1 1 0	4
1 1 1 1	2

ST49C155-23 (using 14.318 MHz input. All frequencies in MHz).

A2 A1 A0	2XCLK	1XCLK
0 0 0	75	37.5
0 0 1	32	16
0 1 0	60	30
0 1 1	40	20
1 0 0	50	25
1 0 1	66.66	33.33
1 1 0	80	40
1 1 1	52	26

PERIPHERAL CLOCK TABLE FOR ST49C155-01

CLK1	CLK2	CLK3	CLK4
1.8432	16	24	12

PERIPHERAL CLOCK TABLE FOR ST49C155-02

CLK1	CLK2	CLK3	CLK4
1.8432	32	24	12

PERIPHERAL CLOCK TABLE FOR ST49C155-03

CLK1	CLK2	CLK3	CLK4
6	24	16	8

PERIPHERAL CLOCK TABLE FOR ST49C155-23

CLK1	CLK2	CLK3	CLK4
1.843	16	24	12

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ACTUAL OUTPUT FREQUENCIES

CPU CLOCK TABLE FOR ST49C155-01, -02

A2	A1	A0	2XCLK	1XCLK
0	0	0	7.5	3.75
0	0	1	15.51	7.76
0	1	0	32.22	16.11
0	1	1	40.09	20.05
1	0	0	50.11	25.06
1	0	1	66.82	33.41
1	1	0	80.18	40.09
1	1	1	100.23	50.11

CPU CLOCK TABLE FOR ST49C155-03

A3	A2	A1	A0	1XCLK
0	0	0	0	15.51
0	0	0	1	40.09
0	0	1	0	50.11
0	0	1	1	80.18
0	1	0	0	66.82
0	1	0	1	100.23
0	1	1	0	7.58
0	1	1	1	4.30
1	0	0	0	7.76
1	0	0	1	20.05
1	0	1	0	25.06
1	0	1	1	40.09
1	1	0	0	33.41
1	1	0	1	50.11
1	1	1	0	3.79
1	1	1	1	2.15

CPU CLOCK TABLE FOR ST49C155-23

A2	A1	A0	2XCLK	1XCLK
0	0	0	75.170	37.585
0	0	1	31.940	15.970
0	1	0	60.136	30.068
0	1	1	40.090	20.045
1	0	0	50.113	25.057
1	0	1	66.476	33.238
1	1	0	80.181	40.091
1	1	1	51.903	25.952

PERIPHERAL CLOCK TABLE FOR ST49C155-01

CLK1	CLK2	CLK3	CLK4
1.8432	16	23.71	11.86

PERIPHERAL CLOCK TABLE FOR ST49C155-02

CLK1	CLK2	CLK3	CLK4
1.8432	32.01	24	12

PERIPHERAL CLOCK TABLE FOR ST49C155-03

CLK1	CLK2	CLK3	CLK4
6	24	16	8

PERIPHERAL CLOCK TABLE FOR ST49C155-23

CLK1	CLK2	CLK3	CLK4
1.843	16	24	12

ABSOLUTE MAXIMUM RATINGS

Supply voltage	7 Volts
Voltage at any pin	GND-0.3 V to VCC+0.3 V
Operating temperature	0° C to +70° C
Storage temperature	-40° C to +150° C
Package dissipation	500 mW

DC ELECTRICAL CHARACTERISTICS

T_A=0° - 70° C, Vcc=5.0 V ± 10% unless otherwise specified.

Symbol	Parameter	Limits Min	Typ	Max	Units	Conditions
V_{IL}	Input low level			0.8	V	
V_{IH}	Input high level	2.0			V	
V_{OL}	Output low level			0.4	V	I_{OL} = 8.0 mA
V_{OH}	Output high level	2.4			V	I_{OH} = 8.0 mA
I_{IL}	Input low current			-1	mA	Except pins 2, 10, 12
I_{IH}	Input high current			1	mA	VIN=Vcc
I_{CC}	Operating current		45	65	mA	No load.
R_{IN}	Internal pull-up resistance		680		kΩ	Pins 10,12

FREQUENCY TRANSITIONS

The ST49C155 is designed to provide smooth, glitch-free frequency transitions on the 1XCLK and 2XCLK clocks when the frequency select pins are changed. These frequency transitions are less than 0.1% frequency change per clock period.

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AC ELECTRICAL CHARACTERISTICS

T_A=0° - 70° C, Vcc=5.0 V ± 10% unless otherwise specified.

Symbol	Parameter	Limits Min	Limits Typ	Limits Max	Units	Conditions
T_4	Rise time		1	2	ns	0.8V - 2.0V, 15pF
T_5	Fall time		1	2	ns	2.0V - 0.8V, 15pF
T_6	Duty cycle	40	48/52	60	%	1.4V switch point
T_6	Duty cycle	40	48/52	55	%	Vcc/2 switch point
T_7	Jitter 1 sigma		±0.5	±2	%	
T_7	Jitter absolute		±2	±5	%	
T_8	Input frequency		14.318		MHz	
T_9	Input clock rise time			20	ns	
T_{10}	Input clock fall time			20	ns	

TIMING DIAGRAM