OPTi Notebook Frequency Generator

General Description

The **AV9154A-60** is a low cost frequency generator designed for general purpose PC and disk drive applications. Its CPU clocks provide all necessary frequencies for 286, 386 and 486 systems, including support for the latest speeds of processors. The standard devices use a 14.318 MHz crystal to generate the CPU and peripheral clocks for integrated desktop and notebook motherboards.

The **AV9154A-60** is specifically designed for use with OPTi core logic chip sets.

The **AV9154A-60** can operate at 5.0V±10% or 3.3V±10%, but the CPU frequencies are limited (see the asterisks on the selection tables on page three) during 3.3V operation. The parts have two power-down pins. One shuts off the CPU clock to a low state when the power-down pin is taken high, and the other turns off the 14.318 MHz output in the same manner.
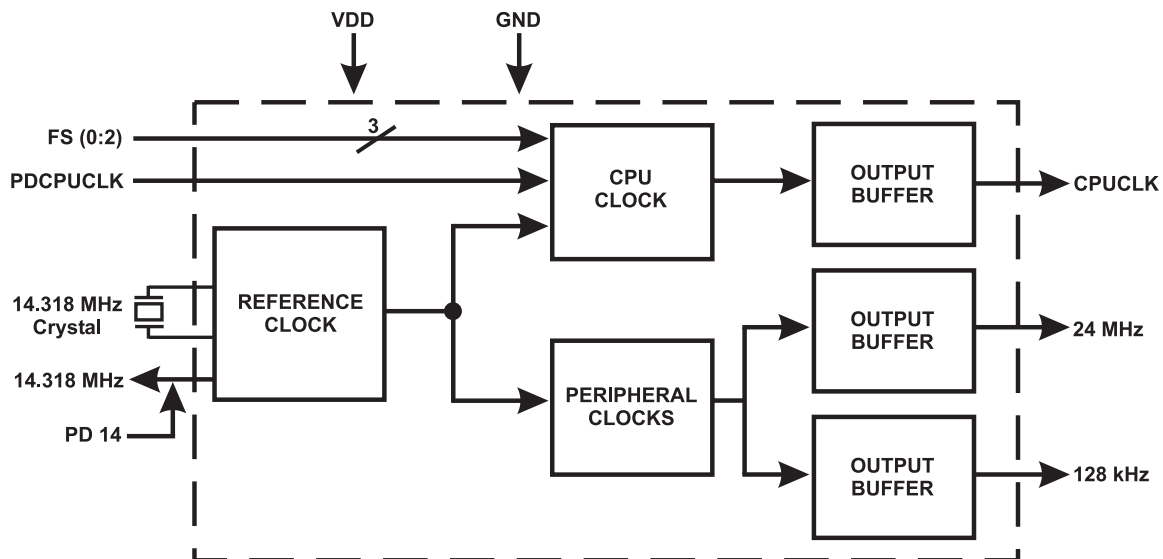
Features

- Compatible with 286, 386, and 486 CPUs
- Up to 66.6 MHz (-60) CPU clocks
- All loop filter components internal
- 3.3V and 5V operation
- 16-pin 150-mil SOIC
- Power-down control of CPU clock

Applications

Computer Motherboards: The **AV9154A-60** replaces crystals and oscillators, saving board space, component cost, part count and inventory costs. It produces switchable CPU clock and up to four fixed clocks to drive floppy disk, communications, super I/O, bus and/or keyboard devices. The small package and 3.3V operation is perfect for handheld computers.
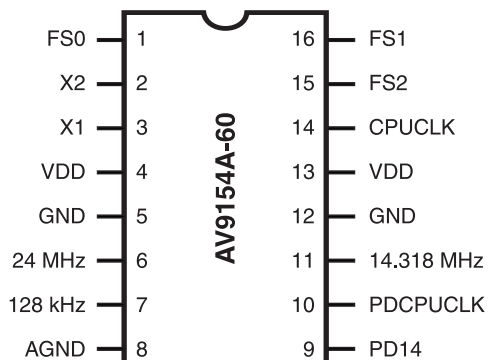
Block Diagram

AV9154A-60

Pin Configuration

```
        ┌───────┐
FS0 ──┤1      16├── FS1
 X2 ──┤2      15├── FS2
 X1 ──┤3      14├── CPUCLK
VDD ──┤4  AV9154A-60  13├── VDD
GND ──┤5      12├── GND
24 MHz ──┤6    11├── 14.318 MHz
128 kHz ──┤7   10├── PDCPUCLK
AGND ──┤8      9├── PD14
        └───────┘
```

16-Pin SOIC

Functionality

(in MHz, assuming 14.318 MHz input)

FS2	FS1	FS0	CPUCLK
0	0	0	8
0	0	1	16
0	1	0	20
0	1	1	25
1	0	0	33.33
1	0	1	40
1	1	0	50
1	1	1	66.66

Actual Output Frequencies

(in MHz, assuming 14.318 MHz input)

FS2	FS1	FS0	CPUCLK
0	0	0	8.182
0	0	1	16.11
0	1	0	20.05
0	1	1	25.06
1	0	0	33.24
1	0	1	40.09
1	1	0	50.11
1	1	1	66.48

Pin Descriptions

PIN NUMBER	PIN NAME	TYPE	DESCRIPTION
1	FS0	I	Frequency Select 0 for CPUCLK.
2	X2	O	Crystal out. Connect a 14.318 MHz crystal to this pin.
3	X1	I	Crystal in. Connect a 14.318 MHz crystal to this pin.
4	VDD	P	Digital Power (+3.3V or +5V).
5	GND	P	Digital Ground.
6	24 Mhz	O	24 MHz clock output.*
7	128 kHz	O	128 kHz clock output.*
8	AGND	P	Analog Ground.
9	PD14	I	Power-down 14.318 MHz output (active high).
10	PDCPUCLK	I	Power-down CPU clock (active high).
11	14.318 Mhz	O	14.318 MHz reference clock output.*
12	GND	P	Digital Ground.
13	VDD	P	Digital Power (+3.3V or +5V).
14	CPUCLK	O	CPU Clock output determined by status of FS0 - FS2.
15	FS2	I	Frequency Select 2 for CPUCLK.
16	FS1	I	Frequency Select 1 for CPUCLK.

Note:
No internal pull-ups on any Inputs.
* Frequencies shown are assuming a 14.318 MHz input.

Absolute Maximum Ratings

VDD referenced to GND 7V
Operating temperature under bias. . . . . 0°C to +70°C
Storage temperature . . . . -40°C to +150°C
Voltage on I/O pins referenced to GND. . . . . GND -0.5V to VDD +0.5V
Power dissipation . . . . 0.5 Watts

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.

Electrical Characteristics at 5V

V_{DD} =+5V±10%, T_A=0°C to 70°C unless otherwise stated

DC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Low Voltage	V_{IL}	V_{DD}=5V	-	-	0.8	V
Input High Voltage	V_{IH}	V_{DD}=5V	2.0	-	-	V
Input Low Current	I_{IL}	V_{IN}=0V	-	-	-5	µA
Input High Current	I_{IH}	V_{IN}=V_{DD}	-	-	5	µA
Output Low Voltage [1]	V_{OL}	I_{OL}=10mA	-	0.15	0.4	V
Output High Voltage [1]	V_{OH}	I_{OH}=-30mA	2.4	3.7	-	V
Output Low Current [1]	I_{OL}	V_{OL}=0.8V	15	32	-	mA
Output High Current [1]	I_{OH}	V_{OH}=2.4V	-	-48	-30	mA
Supply Current	I_{DD}	No load [2]	-	25	50	mA
Output Frequency Change over Supply and Temperature [1]	F_D	With respect to typical frequency	-	0.002	0.01	%
Short circuit current [1]	I_{SC}	Each output clock	25	40	-	mA
Input Capacitance [1]	C_i	Except X1, X2	-	-	10	pF
Load Capacitance [1]	C_L	Pins X1, X2	-	20	-	pF
Supply Current, lowest	I_{DDSTBY}	When powered-down	-	20	-	mA

Note:
1. Parameter is guaranteed by design and characterization. Not 100% tested in production.
2. All clocks on AV9154A-60 running at highest possible frequencies.

Electrical Characteristics at 5V

V_{DD} =+5V±10%, T_A=0°C to 70°C unless otherwise stated

AC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Clock Rise time[1]	t_{ICr}				20	ns
Input Clock Fall time[1]	t_{ICf}				20	ns
Output Rise time[1]	t_r	15pF load, 0.8 to 2.0V	-	1	2	ns
Rise time[1]	t_r	15pF load, 20% to 80% V_{DD}	-	2	4	ns
Output Fall time[1]	t_f	15pF load, 2.0 to 0.8V	-	1	2	ns
Fall time[1]	t_f	15pF load, 80% to 20% V_{DD}	-	2	4	ns
Duty cycle[1]	d_t	15pF load	40/60	48/52	60/40	%
Duty cycle, reference clock[1]	d_t	15pF load	40/60	43/57	60/40	%
Jitter, one sigma[1]	T_{jls}	As compared with clock period		±0.8	±2.5	%
Jitter, absolute[1]	T_{jab}			±2	±5	%
Jitter, absolute[1]	T_{jab}	16-80 MHz clocks			700	ps
Input Frequency[1]	f_i			14.318		MHz
Frequency Transition time[1]	t_{ft}	From 16 to 80 MHz		15	20	ms
Power-up time[1]	t_{pu}	From off to 50 MHz		15		ms

Note:
1. Parameter is guaranteed by design and characterization. Not 100% tested in production.

Electrical Characteristics at 3.3V

Operating V_{DD} =+3.0V to +3.7V, T_A=0°C to 70°C unless otherwise stated

DC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Low Voltage	V_{IL}		-	-	$0.2V_{DD}$	V
Input High Voltage	V_{IH}		$0.7V_{DD}$	-	-	V
Input Low Current	I_{IL}	V_{IN}=0V	-5	-	5	µA
Input High Current	I_{IH}	V_{IN}=V_{DD}	-5	-	5	µA
Output Low Voltage[1]	V_{OL}	I_{OL}=6mA	-	$0.05V_{DD}$	$0.1V_{DD}$	V
Output High Voltage[1]	V_{OH}	I_{OH}=-4mA	$0.85V_{DD}$	$0.94V_{DD}$	-	V
Supply Current	I_{DD}	Note 2, no load	-	15	27	mA
Output Low Current[1]	I_{OL}	V_{OL}=$0.2V_{DD}$	12	22	-	mA
Output High Current[1]	I_{OH}	V_{OH}=$0.7V_{DD}$	-	-11	-6.5	mA
Output Frequency Change over Supply and Temperature[1]	F_d	With respect to typical frequency	-	0.002	0.01	%
Input Capacitance[1]	C_i	Except X1, X2	-	-	10	pF
Load Capacitance[1]	C_L	Pins X1, X2	-	20	-	pF
Supply Current, lowest	I_{DDL}	When powered-down	-	14	-	mA
Short Circuit Current[1]	I_{SC}		-	30	-	mA

Note:
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2. All clocks on AV9154A-60 running at highest possible frequencies.

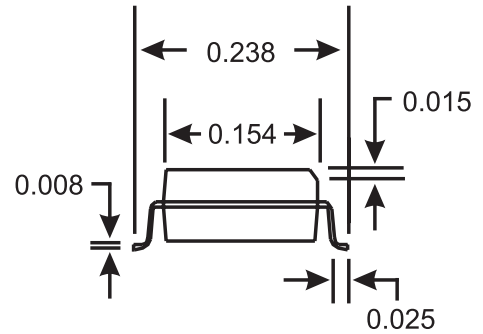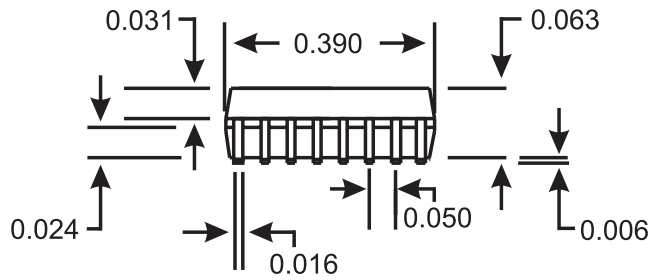## Electrical Characteristics at 3.3V

Operating V_{DD} =+3.0V to +3.7V, T_A=0°C to 70°C unless otherwise stated

AC Characteristics						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Input Clock Rise time[1]	t_{ICr}		-	-	20	ns
Input Clock Fall time[1]	t_{ICf}		-	-	20	ns
Rise time[1]	t_r	15pF load	-	-	4	ns
Fall time[1]	t_f	15pF load	-	-	4	ns
Duty cycle, fixed clocks[1]	d_t	15pF load	40/60	48/52	60/40	%
Duty cycle, reference clock[1]	d_t	15pF load	40/60	43/57	60/40	%
Jitter, one sigma[1], 20-66 MHz	T_{jls1}		-	100	200	ps
Jitter, one sigma[1], below 20 MHz	T_{jls2}		-	0.5	2	%
Jitter, absolute[1] , 20-66 Mhz	T_{jabs1}		-350	±165	350	ps
Jitter, absolute[1] , below 20 Mhz	T_{jabs2}		-5	±3	±5	%
Frequency Transition time[1]	t_{ft}	from 8 to 33 Mhz	-	-	20	ms
Power-up time[1]	t_{pu}	from off to 50 Mhz	-	15	-	ms
Output Frequency[1]	f_o		2		33	MHz
Input Frequency[1]	f_i		-	14.318	-	MHz

Note:
1. Parameter is guaranteed by design and characterization. Not 100% tested in production.

16-Pin SOIC Package

Ordering Information

AV9154A-60CS16

Example:

ICS XXXX-PPP M X#W

Lead Count & Package Width
Lead Count=1, 2 or 3 digits
W=.3" SOIC or .6" DIP; None=Standard Width

Package Type
S=SOIC

Pattern Number (2 or 3 digit number for parts with ROM code patterns)
Device Type (consists of 3 or 4 digit numbers)
Prefix
ICS, AV=Standard Device; GSP=Genlock Device