rev 1.3

3.3V 'SpreadTrak' Zero Delay Buffer

General Features

- 15 MHz to 133 MHz operating range, compatible with CPU and PCI bus frequencies.
- Zero input - output propagation delay.
- Multiple low-skew outputs.
  - Output-output skew less than 250 pS.
  - Device-device skew less than 700 pS.
  - One input drives 9 outputs, grouped as 4+4+1 (ASM5P23S09A).
  - One input drives 5 outputs (ASM5P23S05A).
- Less than 200 pS cycle-to-cycle jitter is compatible with Pentium® based systems.
- Test Mode to bypass PLL (ASM5P23S09A only, refer Select Input Decoding Table).
- Available in 16-pin, 150-mil SOIC and 4.4 mm TSSOP packages for ASM5P23S09A and in 8-pin, 150-mil SOIC and 4.4 mm TSSOP packages for ASM5P23S05A.
- 3.3V operation
- Advanced 0.35μ CMOS technology.
- 'SpreadTrak'.

Functional Description

ASM5P23S09A is a versatile, 3.3V zero-delay buffer designed to distribute high-speed clocks with Spread Spectrum capability. It is available in a 16-pin package. The ASM5P23S05A is the eight-pin version of the ASM5P23S09A. It accepts one reference input and drives out five low-skew clocks.

The -1H version of the ASM5P23SxxA operates at up to 133 MHz frequency, and has higher drive than the -1 device. All parts have on-chip PLLs that lock to an input clock on the REF pin. The PLL feedback is on-chip and is obtained from the CLKOUT pad.

The ASM5P23S09A has two banks of four outputs each, which can be controlled by the Select inputs as shown in the Select Input Decoding Table. If all the output clocks are not required, Bank B can be three-stated. The select input also allows the input clock to be directly applied to the outputs for chip and system testing purposes.

Multiple ASM5P23S09A and ASM5P23S05A devices can accept the same input clock and distribute it. In this case the skew between the outputs of the two devices is guaranteed to be less than 700 pS.

All outputs have less than 200 pS of cycle-to-cycle jitter. The input and output propagation delay is guaranteed to be less than 250 pS, and the output to output skew is guaranteed to be less than 250 pS.

The ASM5P23S09A and the ASM5P23S05A are available in two different configurations, as shown in the ordering information table. The ASM5P23SxxA-1 is the base part. The ASM5P23SxxA-1H is the high drive version of the -1 part and its rise and fall times are much faster than -1 part.

Block Diagram
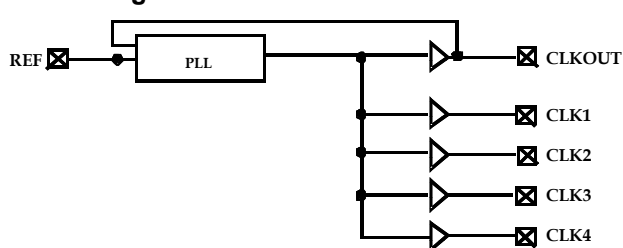
ASM5P23S05A
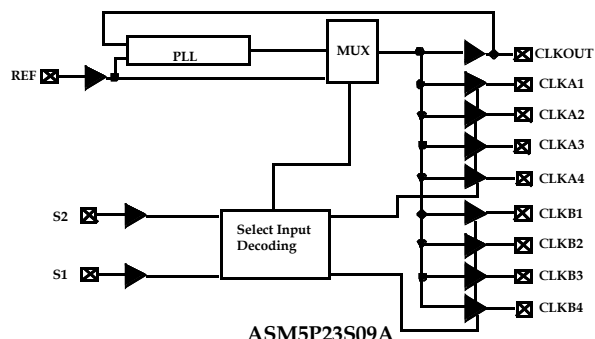
ASM5P23S09A

rev 1.3

Select Input Decoding for ASM5P23S09A

S2	S1	Clock A1 - A4	Clock B1 - B4	CLKOUT [1]	Output Source	PLL Shut-Down
0	0	Three-state	Three-state	Driven	PLL	N
0	1	Driven	Three-state	Driven	PLL	N
1	0	Driven	Driven	Driven	Reference	Y
1	1	Driven	Driven	Driven	PLL	N

Note:

1. This output is driven and has an internal feedback for the PLL. The load on this output can be adjusted to change the skew between the reference and the output.
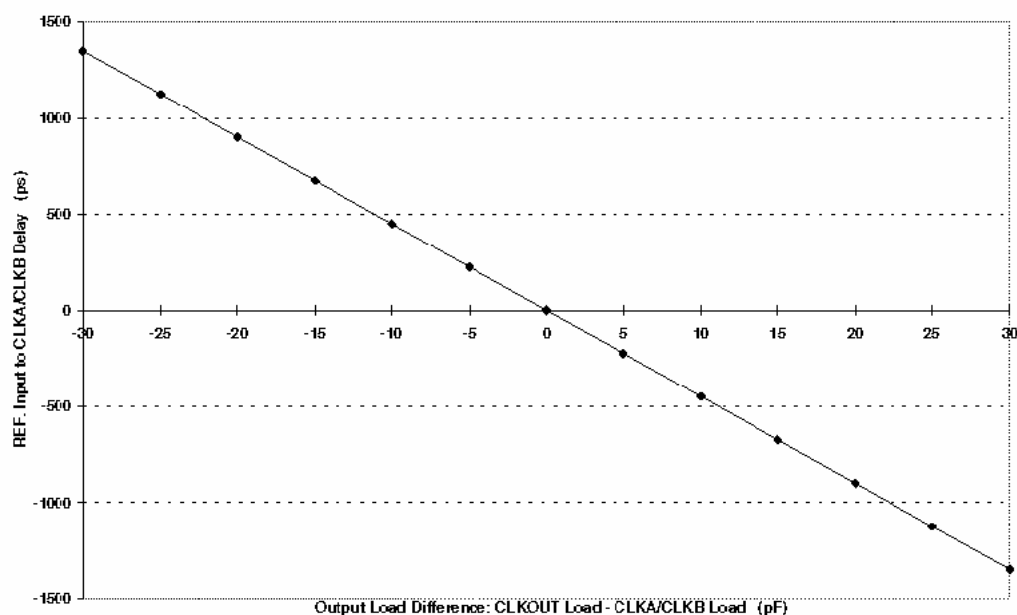
Zero Delay and Skew Control

All outputs should be uniformly loaded to achieve Zero Delay between input and output. Since the CLKOUT pin is the internal feedback to the PLL, its relative loading can adjust the input-output delay.

For applications requiring zero input-output delay, all outputs, including CLKOUT, must be equally loaded. Even if CLKOUT is not used, it must have a capacitive load equal to that on other outputs, for obtaining zero-input-output delay.
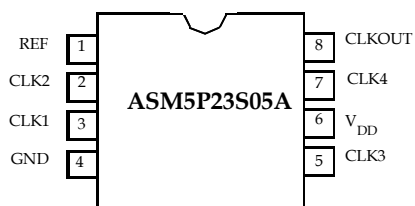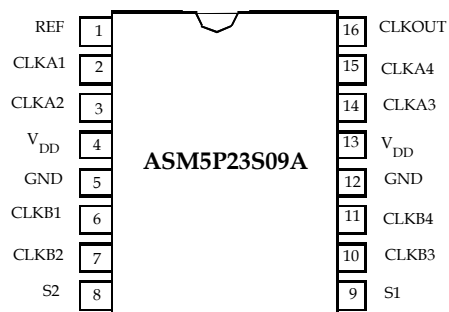
SpreadTrak

Many systems being designed now utilize a technology called Spread Spectrum Frequency Timing Generation. ASM5P23S09A and ASM5P23S05A are designed so as not to filter off the Spread Spectrum feature of the Reference input, assuming it exists. When a zero delay buffer is not designed to pass the Spread Spectrum feature through, the result is a significant amount of tracking skew which may cause problems in the systems requiring synchronization.

Notice: The information in this document is subject to change without notice.

rev 1.3

Pin Configuration

```
        REF  ─┤1        16├─  CLKOUT
       CLKA1 ─┤2        15├─  CLKA4
       CLKA2 ─┤3        14├─  CLKA3
        V_DD ─┤4  ASM5P23S09A  13├─  V_DD
        GND  ─┤5        12├─  GND
       CLKB1 ─┤6        11├─  CLKB4
       CLKB2 ─┤7        10├─  CLKB3
        S2   ─┤8         9├─  S1
```

```
        REF  ─┤1         8├─  CLKOUT
       CLK2  ─┤2         7├─  CLK4
       CLK1  ─┤3  ASM5P23S05A  6├─  V_DD
        GND  ─┤4         5├─  CLK3
```

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rev 1.3

Pin Description for ASM5P23S09A

Pin #	Pin Name	Description
1	REF[2]	Input reference frequency, 5V tolerant input
2	CLKA1[3]	Buffered clock output, bank A
3	CLKA2[3]	Buffered clock output, bank A
4	V_{DD}	3.3V supply
5	GND	Ground
6	CLKB1[3]	Buffered clock output, bank B
7	CLKB2[3]	Buffered clock output, bank B
8	S2[4]	Select input, bit 2
9	S1[4]	Select input, bit 1
10	CLKB3[3]	Buffered clock output, bank B
11	CLKB4[3]	Buffered clock output, bank B
12	GND	Ground
13	V_{DD}	3.3V supply
14	CLKA3[3]	Buffered clock output, bank A
15	CLKA4[3]	Buffered clock output, bank A
16	CLKOUT[3]	Buffered output, internal feedback on this pin

Pin Description for ASM5P23S05A

Pin #	Pin Name	Description
1	REF[2]	Input reference frequency, 5V-tolerant input
2	CLK2[3]	Buffered clock output
3	CLK1[3]	Buffered clock output
4	GND	Ground
5	CLK3[3]	Buffered clock output
6	V_{DD}	3.3V supply
7	CLK4[3]	Buffered clock output
8	CLKOUT[3]	Buffered clock output, internal feedback on this pin

Notes:
2. Weak pull-down.
3. Weak pull-down on all outputs.
4. Weak pull-up on these inputs.

rev 1.3

Absolute Maximum Ratings

Parameter	Min	Max	Unit
Supply Voltage to Ground Potential	-0.5	+7.0	V
DC Input Voltage (Except REF)	-0.5	VDD + 0.5	V
DC Input Voltage (REF)	-0.5	7	V
Storage Temperature	-65	+150	°C
Max. Soldering Temperature (10 sec)		260	°C
Junction Temperature		150	°C
Static Discharge Voltage (per MIL-STD-883, Method 3015)		2000	V

Note: These are stress ratings only and functional usage is not implied. Exposure to absolute maximum ratings for prolonged periods can affect device reliability.

Operating Conditions for ASM5P23S05A and ASM5P23S09A - Commercial Temperature Devices

Parameter	Description	Min	Max	Unit
V_{DD}	Supply Voltage	3.0	3.6	V
T_A	Operating Temperature (Ambient Temperature)	0	70	°C
C_L	Load Capacitance, below 100 MHz		30	pF
C_L	Load Capacitance, from 100 MHz to 133 MHz		10	pF
C_{IN}	Input Capacitance		7	pF

Electrical Characteristics for ASM5P23S05A and ASM5P23S09A - Commercial Temperature Devices

Parameter	Description	Test Conditions	Min	Typ	Max	Unit
V_{IL}	Input LOW Voltage[5]				0.8	V
V_{IH}	Input HIGH Voltage[5]		2.0			V
I_{IL}	Input LOW Current	V_{IN} = 0V			50.0	µA
I_{IH}	Input HIGH Current	V_{IN} = V_{DD}			100.0	µA
V_{OL}	Output LOW Voltage[6]	I_{OL} = 8mA (-1) I_{OH} = 12mA (-1H)			0.4	V
V_{OH}	Output HIGH Voltage[6]	I_{OL} = -8mA (-1) I_{OH} = -12mA (-1H)	2.4			V
I_{DD}	Supply Current	Unloaded outputs at 66.67 MHz, SEL inputs at V_{DD}			34	mA
Z_O	Output Impedance			23		Ω

Notes:
5. REF input has a threshold voltage of VDD/2
6. Parameter is guaranteed by design and characterization. Not 100% tested in production

Notice: The information in this document is subject to change without notice.

rev 1.3

Switching Characteristics for ASM5P23S05A-1 and ASM5P23S09A-1 Commercial Temperature Devices[7]

Parameter	Description	Test Conditions	Min	Typ	Max	Unit
$1/t_1$	Output Frequency	30-pF load	15		100	MHz
		10-pF load	15		133	
	Duty Cycle [8] = $(t_2 / t_1) * 100$	Measured at 1.4V, F_{OUT} = 66.67 MHz	40.0	50.0	60.0	%
t_3	Output Rise Time [8]	Measured between 0.8V and 2.0V			2.50	nS
t_4	Output Fall Time [8]	Measured between 2.0V and 0.8V			2.50	nS
t_5	Output-to-output skew [8]	All outputs equally loaded			250	pS
t_6	Delay, REF Rising Edge to CLKOUT Rising Edge [8]	Measured at V_{DD} /2		0	±350	pS
t_7	Device-to-Device Skew [8]	Measured at V_{DD}/2 on the CLKOUT pins of the device		0	700	pS
t_J	Cycle-to-cycle jitter [8]	Measured at 66.67 MHz, loaded outputs			200	pS
t_{LOCK}	PLL Lock Time [8]	Stable power supply, valid clock presented on REF pin			1.0	mS

Notes:

7. All parameters specified with loaded outputs.
8. Parameter is guaranteed by design and characterization. Not 100% tested in production

Operating Conditions for ASM5I23S05A and ASM5I23S09A Industrial Temperature Devices

Parameter	Description	Min	Max	Unit
V_{DD}	Supply Voltage	3.0	3.6	V
T_A	Operating Temperature (Ambient Temperature)	-40	85	°C
C_L	Load Capacitance, below 100 MHz		30	pF
C_L	Load Capacitance, from 100 MHz to 133 MHz		15	pF
C_{IN}	Input Capacitance		7	pF

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rev 1.3

Electrical Characteristics for ASM5I23S05A and ASM5I23S09A Industrial Temperature Devices

Parameter	Description	Test Conditions	Min	Typ	Max	Unit
V_{IL}	Input LOW Voltage				0.8	V
V_{IH}	Input HIGH Voltage		2.0			V
I_{IL}	Input LOW Current	$V_{IN} = 0V$			50.0	µA
I_{IH}	Input HIGH Current	$V_{IN} = V_{DD}$			100.0	µA
V_{OL}	Output LOW Voltage	$I_{OL} = 8mA$ (-1, -2) $I_{OH} = 12mA$ (-1H, -5H)			0.4	V
V_{OH}	Output HIGH Voltage	$I_{OL} = -8mA$ (-1) $I_{OH} = -12mA$ (-1H)	2.4			V
I_{DD}	Supply Current	Unloaded outputs 100MHz REF, Select inputs at V_{DD} or GND			50	mA
		Unloaded outputs, 66.67MHz REF (-1)			34	
		Unloaded outputs, 33MHz REF (-1)			19	
Z_O	Output Impedance			23		Ω

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rev 1.3

Switching Characteristics for ASM5I23S05A-1H and ASM5I23S09A-1H Industrial Temperature Devices[7]
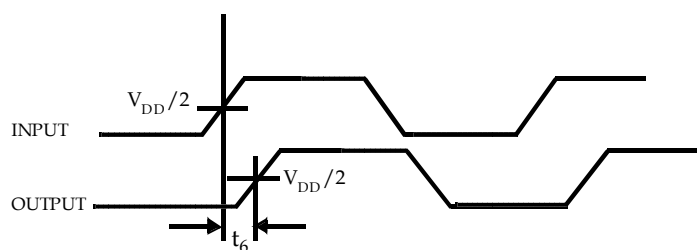
Parameter	Description	Test Conditions	Min	Typ	Max	Unit
$1/t_1$	Output Frequency	30 pF load	15		100	MHz
		10 pF load	15		133	
	Duty Cycle [9] = $(t_2 / t_1) * 100$	Measured at 1.4 V, F_{OUT} = 66.67 MHz	40.0	50.0	60.0	%
	Duty Cycle [9] = $(t_2 / t_1) * 100$	Measured at 1.4 V, F_{OUT} < 50.0 MHz	45.0	50.0	55.0	
t_3	Output Rise Time [9]	Measured between 0.8V and 2.0V			1.50	nS
t_4	Output Fall Time [9]	Measured between 2.0V and 0.8V			1.50	nS
t_5	Output-to-output skew [9]	All outputs equally loaded			250	pS
t_6	Delay, REF Rising Edge to CLKOUT Rising Edge [9]	Measured at V_{DD} /2		0	± 350	pS
t_7	Device-to-Device Skew [9]	Measured at V_{DD}/2 on the CLKOUT pins of the device		0	700	pS
t_8	Output Slew Rate [9]	Measured between 0.8V and 2.0V using Test Circuit #2	1			V/nS
t_J	Cycle-to-cycle jitter [9]	Measured at 66.67 MHz, loaded outputs			200	pS
t_{LOCK}	PLL Lock Time [9]	Stable power supply, valid clock pre sented on REF pin			1.0	mS

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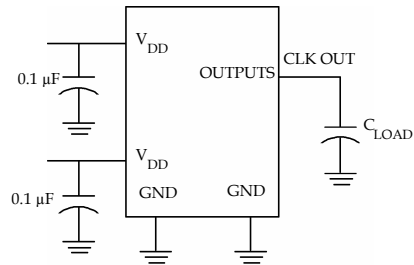9. Parameter is guaranteed by design and characterization. Not 100% tested in production

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rev 1.3

Switching Waveforms

Duty Cycle Timing
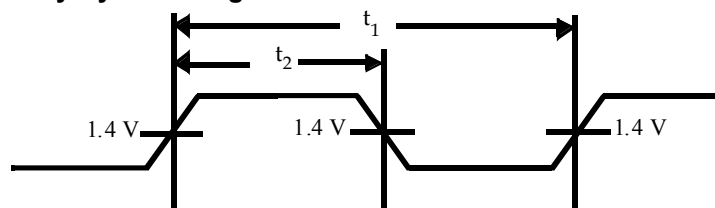
All Outputs Rise/Fall Time
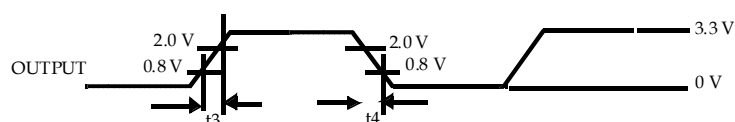
Output - Output Skew
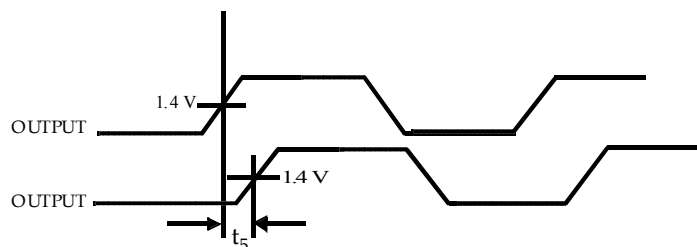
Input - Output Propagation Delay

Device - Device Skew
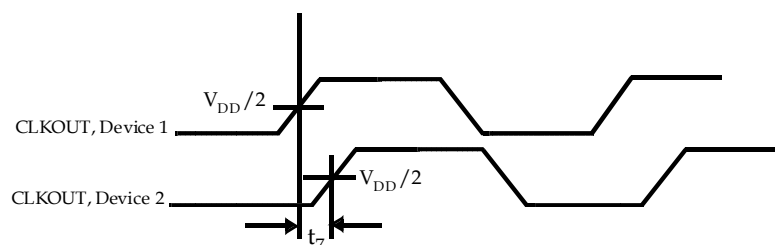
rev 1.3

Test Circuits

Test Circuit #1

Test Circuit #2
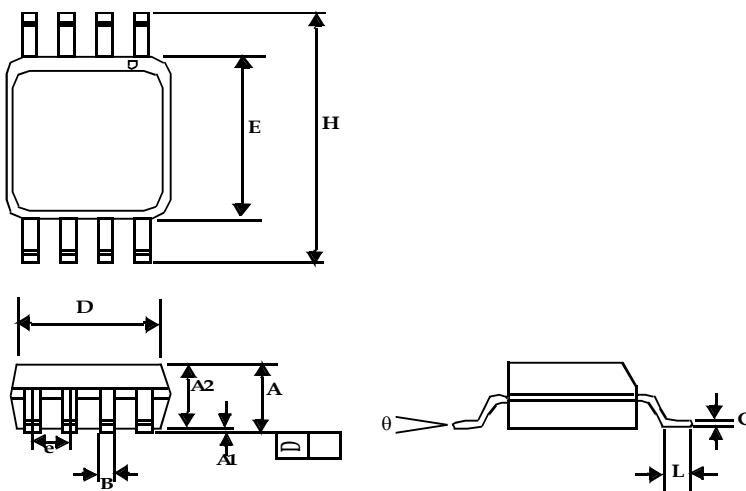

For parameter t_s

Notice: The information in this document is subject to change without notice.
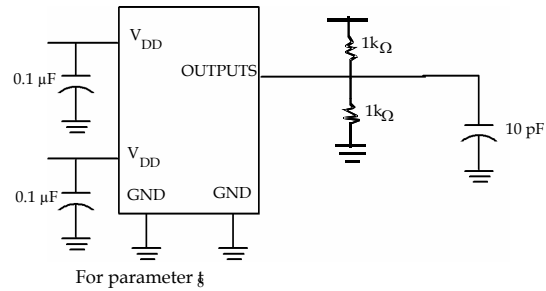
rev 1.3

Package Information

<div align="center">

8-lead (150-mil) SOIC Package

</div>

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

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rev 1.3

8-lead Thin Shrunk Small Outline Package (4.40-MM Body)
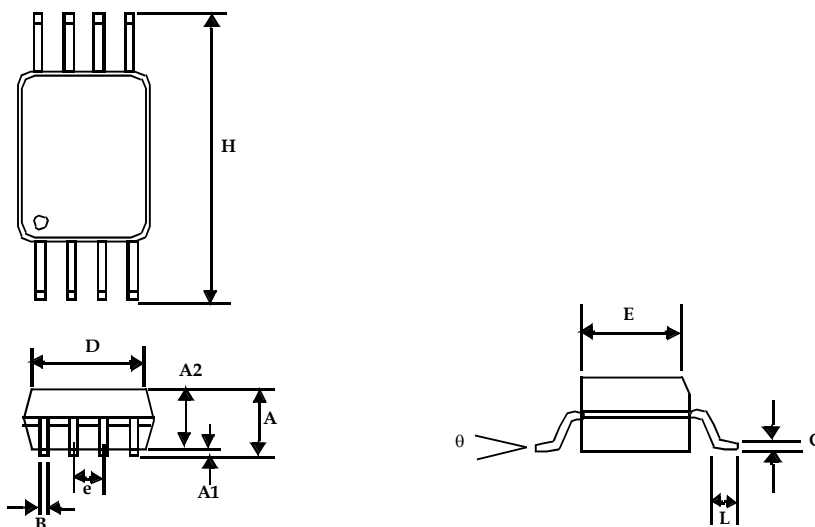
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

rev 1.3

16-lead (150 Mil) Molded SOIC Package
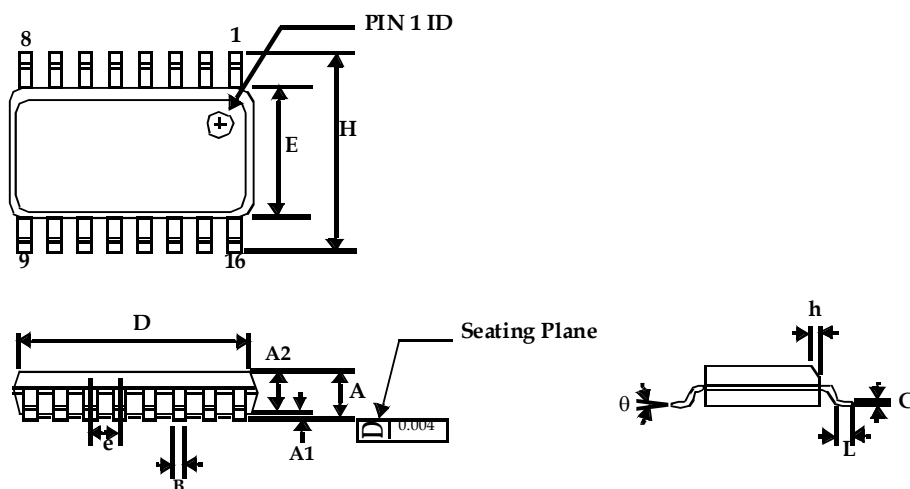
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
A2	0.049	0.059	1.25	1.50
B	0.013	0.022	0.33	0.53
C	0.008	0.012	0.19	0.27
D	0.386	0.394	9.80	10.01
E	0.150	0.157	3.80	4.00
e	0.050 BSC		1.27 BSC	
H	0.228	0.244	5.80	6.20
h	0.010	0.016	0.25	0.41
L	0.016	0.035	0.40	0.89
θ	0°	8°	0°	8°

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16-lead Thin Shrunk Small Outline Package (4.40-MM Body)
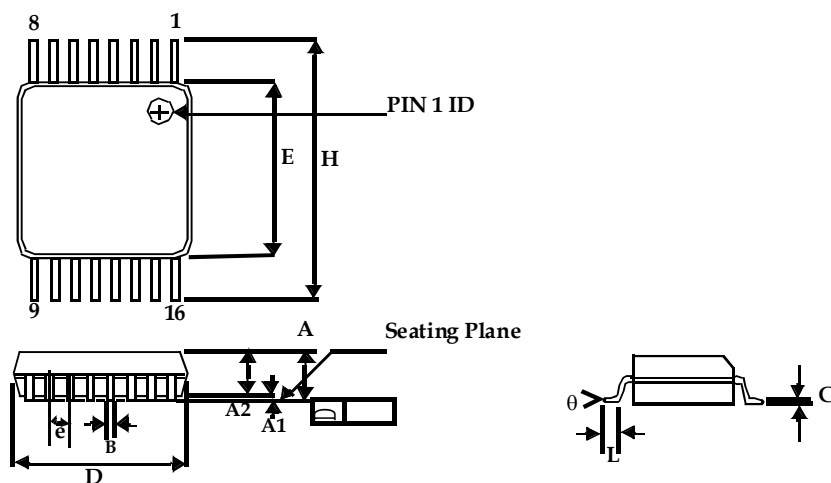
Symbol	Dimensions			
	Inches		Millimeters	
	Min	**Max**	**Min**	**Max**
A		0.043		1.20
A1	0.002	0.006	0.05	0.15
A2	0.031	0.041	0.80	1.05
B	0.007	0.012	0.19	0.30
C	0.004	0.008	0.09	0.20
D	0.193	0.201	4.90	5.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.030	0.50	0.75
θ	0°	8°	0°	8°

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rev 1.3

Ordering Codes

Ordering Code	Marking	Package Type	Operating Range
ASM5P23S09A-1-16-ST	5P23S09A-1	16-pin 150-mil SOIC-TUBE	Commercial
ASM5I23S09A-1-16-ST	5I23S09A-1	16-pin 150-mil SOIC-TUBE	Industrial
ASM5P23S09A-1-16-SR	5P23S09A-1	16-pin 150-mil SOIC-TAPE & REEL	Commercial
ASM5I23S09A-1-16-SR	5I23S09A-1	16-pin 150-mil SOIC-TAPE & REEL	Industrial
ASM5P23S09A-1-16-TT	5P23S09A-1	16-pin 4.4-mm TSSOP-TUBE	Commercial
ASM5I23S09A-1-16-TT	5I23S09A-1	16-pin 4.4-mm TSSOP-TUBE	Industrial
ASM5P23S09A-1-16-TR	5P23S09A-1	16-pin 4.4-mm TSSOP-TAPE & REEL	Commercial
ASM5I23S09A-1-16-TR	5I23S09A-1	16-pin 4.4-mm TSSOP-TAPE & REEL	Industrial
ASM5P23S09A-1H-16-ST	5P23S09A-1H	16-pin 150-mil SOIC-TUBE	Commercial
ASM5I23S09A-1H-16-ST	5I23S09A-1H	16-pin 150-mil SOIC-TUBE	Industrial
ASM5P23S09A-1H-16-SR	5P23S09A-1H	16-pin 150-mil SOIC-TAPE & REEL	Commercial
ASM5I23S09A-1H-16-SR	5I23S09A-1H	16-pin 150-mil SOIC-TAPE & REEL	Industrial
ASM5P23S09A-1H-16-TT	5P23S09A-1H	16-pin 4.4-mm TSSOP-TUBE	Commercial
ASM5I23S09A-1H-16-TT	5I23S09A-1H	16-pin 4.4-mm TSSOP-TUBE	Industrial
ASM5P23S09A-1H-16-TR	5P23S09A-1H	16-pin 4.4-mm TSSOP-TAPE & REEL	Commercial
ASM5I23S09A-1H-16-TR	5I23S09A-1H	16-pin 4.4-mm TSSOP-TAPE & REEL	Industrial
ASM5P23S05A-1-08-ST	5P23S05A-1	8-pin 150-mil SOIC-TUBE	Commercial
ASM5I23S05A-1-08-ST	5I23S05A-1	8-pin 150-mil SOIC-TUBE	Industrial
ASM5P23S05A-1-08-SR	5P23S05A-1	8-pin 150-mil SOIC-TAPE & REEL	Commercial
ASM5I23S05A-1-08-SR	5I23S05A-1	8-pin 150-mil SOIC-TAPE & REEL	Industrial
ASM5P23S05A-1-08-TT	5P23S05A-1	8-pin 4.4-mm TSSOP-TUBE	Commercial
ASM5I23S05A-1-08-TT	5I23S05A-1	8-pin 4.4-mm TSSOP-TUBE	Industrial
ASM5P23S05A-1-08-TR	5P23S05A-1	8-pin 4.4-mm TSSOP-TAPE & REEL	Commercial
ASM5I23S05A-1-08-TR	5I23S05A-1	8-pin 4.4-mm TSSOP-TAPE & REEL	Industrial
ASM5P23S05A-1H-08-ST	5P23S05A-1H	8-pin 150-mil SOIC-TUBE	Commercial
ASM5I23S05A-1H-08-ST	5I23S05A-1H	8-pin 150-mil SOIC-TUBE	Industrial
ASM5P23S05A-1H-08-SR	5P23S05A-1H	8-pin 150-mil SOIC-TAPE & REEL	Commercial
ASM5I23S05A-1H-08-SR	5I23S05A-1H	8-pin 150-mil SOIC-TAPE & REEL	Industrial
ASM5P23S05A-1H-08-TT	5P23S05A-1H	8-pin 4.4-mm TSSOP-TUBE	Commercial
ASM5I23S05A-1H-08-TT	5I23S05A-1H	8-pin 4.4-mm TSSOP-TUBE	Industrial
ASM5P23S05A-1H-08-TR	5P23S05A-1H	8-pin 4.4-mm TSSOP-TAPE & REEL	Commercial
ASM5I23S05A-1H-08-TR	5I23S05A-1H	8-pin 4.4-mm TSSOP-TAPE & REEL	Industrial

rev 1.3

Ordering Codes (Contd..)

Ordering Code	Marking	Package Type	Operating Range
ASM5P23S09AF-1-16-ST	5P23S09AF-1	16-pin 150-mil SOIC-TUBE, Pb free	Commercial
ASM5I23S09AF-1-16-ST	5I23S09AF-1	16-pin 150-mil SOIC-TUBE, Pb free	Industrial
ASM5P23S09AF-1-16-SR	5P23S09AF-1	16-pin 150-mil SOIC-TAPE & REEL, Pb free	Commercial
ASM5I23S09AF-1-16-SR	5I23S09AF-1	16-pin 150-mil SOIC-TAPE & REEL, Pb free	Industrial
ASM5P23S09AF-1-16-TT	5P23S09AF-1	16-pin 4.4-mm TSSOP-TUBE, Pb free	Commercial
ASM5I23S09AF-1-16-TT	5I23S09AF-1	16-pin 4.4-mm TSSOP-TUBE, Pb free	Industrial
ASM5P23S09AF-1-16-TR	5P23S09AF-1	16-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Commercial
ASM5I23S09AF-1-16-TR	5I23S09AF-1	16-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Industrial
ASM5P23S09AF-1H-16-ST	5P23S09AF-1H	16-pin 150-mil SOIC-TUBE, Pb free	Commercial
ASM5I23S09AF-1H-16-ST	5I23S09AF-1H	16-pin 150-mil SOIC-TUBE, Pb free	Industrial
ASM5P23S09AF-1H-16-SR	5P23S09AF-1H	16-pin 150-mil SOIC-TAPE & REEL, Pb free	Commercial
ASM5I23S09AF-1H-16-SR	5I23S09AF-1H	16-pin 150-mil SOIC-TAPE & REEL, Pb free	Industrial
ASM5P23S09AF-1H-16-TT	5P23S09AF-1H	16-pin 4.4-mm TSSOP-TUBE, Pb free	Commercial
ASM5I23S09AF-1H-16-TT	5I23S09AF-1H	16-pin 4.4-mm TSSOP-TUBE, Pb free	Industrial
ASM5P23S09AF-1H-16-TR	5P23S09AF-1H	16-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Commercial
ASM5I23S09AF-1H-16-TR	5I23S09AF-1H	16-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Industrial
ASM5P23S05AF-1-08-ST	5P23S05AF-1	8-pin 150-mil SOIC-TUBE, Pb free	Commercial
ASM5I23S05AF-1-08-ST	5I23S05AF-1	8-pin 150-mil SOIC-TUBE, Pb free	Industrial
ASM5P23S05AF-1-08-SR	5P23S05AF-1	8-pin 150-mil SOIC-TAPE & REEL, Pb free	Commercial
ASM5I23S05AF-1-08-SR	5I23S05AF-1	8-pin 150-mil SOIC-TAPE & REEL, Pb free	Industrial
ASM5P23S05AF-1-08-TT	5P23S05AF-1	8-pin 4.4-mm TSSOP-TUBE, Pb free	Commercial
ASM5I23S05AF-1-08-TT	5I23S05AF-1	8-pin 4.4-mm TSSOP-TUBE, Pb free	Industrial
ASM5P23S05AF-1-08-TR	5P23S05AF-1	8-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Commercial
ASM5I23S05AF-1-08-TR	5I23S05AF-1	8-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Industrial
ASM5P23S05AF-1H-08-ST	5P23S05AF-1H	8-pin 150-mil SOIC-TUBE, Pb free	Commercial
ASM5I23S05AF-1H-08-ST	5I23S05AF-1H	8-pin 150-mil SOIC-TUBE, Pb free	Industrial
ASM5P23S05AF-1H-08-SR	5P23S05AF-1H	8-pin 150-mil SOIC-TAPE & REEL, Pb free	Commercial
ASM5I23S05AF-1H-08-SR	5I23S05AF-1H	8-pin 150-mil SOIC-TAPE & REEL, Pb free	Industrial
ASM5P23S05AF-1H-08-TT	5P23S05AF-1H	8-pin 4.4-mm TSSOP-TUBE, Pb free	Commercial
ASM5I23S05AF-1H-08-TT	5I23S05AF-1H	8-pin 4.4-mm TSSOP-TUBE, Pb free	Industrial
ASM5P23S05AF-1H-08-TR	5P23S05AF-1H	8-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Commercial
ASM5I23S05AF-1H-08-TR	5I23S05AF-1H	8-pin 4.4-mm TSSOP-TAPE & REEL, Pb free	Industrial

rev 1.3

Device Ordering Information

A S M 5 P 2 3 S 0 5 A F - 0 8 T R

OR - SOT23/T/R	SR - SOIC, T/R
TT – TSSOP, TUBE	QR – QFN, T/R
TR - TSSOP, T/R	QT - QFN, TUBE
VT – TVSOP, TUBE	BT - BGA, TUBE
VR – TVSOP, T/R	BR – BGA, T/R
ST – SOIC, TUBE	

PIN COUNT

LEAD FREE PART

PART NUMBER

X = Automotive	I = Industrial	P or n/c = Commercial
1 – reserved		6 – power management
2 - Non PLL based		7 – power management
3 – EMI Reduction		8 – power management
4 – DDR support products		9 – Hi performance
5 – STD Zero Delay Buffer		0 - reserved

Alliance Semiconductor Mixed Signal Product

Licensed under US patent #5,488,627, #6,646,463 and #5,631,920.

Notice: The information in this document is subject to change without notice.

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                   ASM5P23S05A
Document Version: 1.3

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to Alliance Semiconductor, dated 11-11-2003

3.3V 'SpreadTrak' Zero Delay Buffer   **18 of 18**

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