

### 1.0 Features

- Generates up to nine clock outputs, grouped as 4-4-1 from one reference clock input
- Pin enable/disable of two banks of four clocks
- Auto power-down shuts off PLL, brings outputs low in the absence of any REF input
- Tracking skew < 200ps (spread-spectrum tolerant)
- Input-to-output propagation delay < 200ps
- Available in a 16-pin 0.150" SOIC

**Table 1: Clock Enable Configuration**

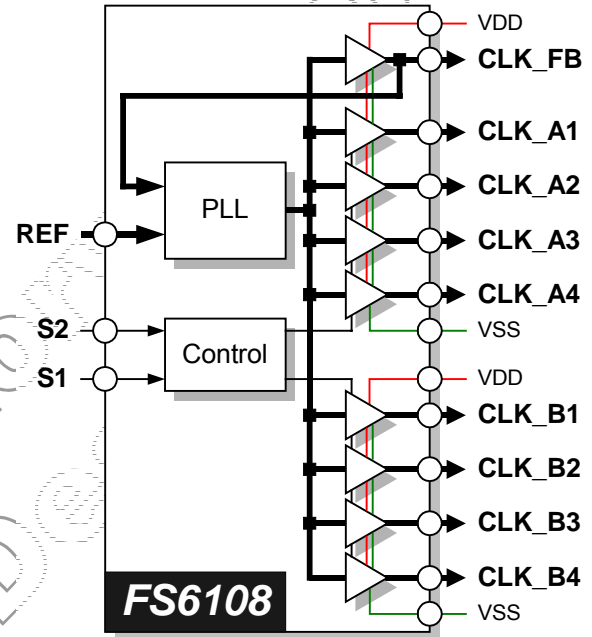
CONTROL		CLOCK OUTPUTS (MHz)			
S2	S1	CLK_A1:4	CLK_B1:4	CLK_FB	Source
0	0	Tristate	Tristate	Driven	PLL
0	1	Driven	Tristate	Driven	PLL
1	0	Driven	Driven	Driven	REF
1	1	Driven	Driven	Driven	PLL

**Table 2: Pin Descriptions**

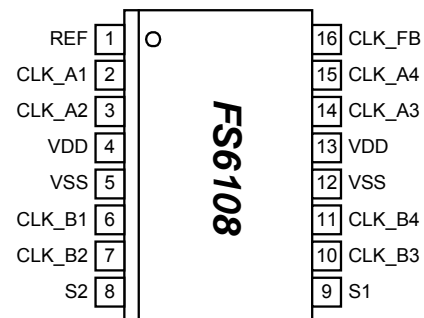
Key: DI = Digital Input; DI<sup>U</sup> = Input with Internal Pull-Up; DI<sub>D</sub> = Input with Internal Pull-Down; DIO = Digital Input/Output; DO = Digital Output; P = Power/Ground; # = Active-low pin

PIN	TYPE	NAME	DESCRIPTION
2	DO <sub>D</sub>	CLK_A1	Clock output
3	DO <sub>D</sub>	CLK_A2	Clock output
14	DO <sub>D</sub>	CLK_A3	Clock output
15	DO <sub>D</sub>	CLK_A4	Clock output
6	DO <sub>D</sub>	CLK_B1	Clock output
7	DO <sub>D</sub>	CLK_B2	Clock output
10	DO <sub>D</sub>	CLK_B3	Clock output
11	DO <sub>D</sub>	CLK_B4	Clock output
16	DO <sub>D</sub>	CLK_FB	Clock output that also provides an internal feedback connection to the PLL
1	DI <sub>D</sub>	REF	Reference clock input
8, 9	DI <sup>U</sup>	S2, S1	Two select inputs that enable and disable the clock outputs, and enable or bypass the PLL
4, 13	P	VDD	3.3V power supply
5, 12	P	VSS	Ground

**Figure 1: Block Diagram**



**Figure 2: Pin Configuration**



# FS6108-01

## 1:9 Zero Delay Buffer IC



## 2.0 Electrical Specifications

### Table 3: Absolute Maximum Ratings

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These conditions represent a stress rating only, and functional operation of the device at these or any other conditions above the operational limits noted in this specification is not implied. Exposure to maximum rating conditions for extended conditions may affect device performance, functionality, and reliability.

PARAMETER	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage ( $V_{SS} = \text{ground}$ )	$V_{DD}$	$V_{SS}-0.5$	7	V
Input Voltage, dc	$V_I$	$V_{SS}-0.5$	$V_{DD}+0.5$	V
Output Voltage, dc	$V_O$	$V_{SS}-0.5$	$V_{DD}+0.5$	V
Input Clamp Current, dc ( $V_I < 0$ or $V_I > V_{DD}$ )	$I_{IK}$	-50	50	mA
Output Clamp Current, dc ( $V_I < 0$ or $V_I > V_{DD}$ )	$I_{OK}$	-50	50	mA
Storage Temperature Range (non-condensing)	$T_S$	-65	150	°C
Ambient Temperature Range, Under Bias	$T_A$	-55	125	°C
Junction Temperature	$T_J$		125	°C
Lead Temperature (soldering, 10s)			260	°C
Input Static Discharge Voltage Protection (MIL-STD 883E, Method 3015.7)			2	kV



### **CAUTION: ELECTROSTATIC SENSITIVE DEVICE**

Permanent damage resulting in a loss of functionality or performance may occur if this device is subjected to a high-energy electrostatic discharge.

### Table 4: Operating Conditions

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	MIN.	TYP.	MAX.	UNITS
Supply Voltage	$V_{DD}$		3.0	3.3	3.6	V
Operating Temperature Range	$T_A$		0		70	°C
Load Capacitance	$C_L$	CLK_A1:4, CLK_B1:4, CLK_FB			30	pF
Reference Frequency Range	$f_{REF}$		10		66.67	MHz

### Table 5: DC Electrical Specifications

Unless otherwise stated, all power supplies = 3.6V, no load on any output, and ambient temperature range  $T_A = 0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ . Parameters denoted with an asterisk (\*) represent nominal characterization data and are not currently production tested to any specific limits. MIN and MAX characterization data are  $\pm 3\sigma$  from typical. Negative currents indicate current flows out of the device.

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	MIN.	TYP.	MAX.	UNITS
<b>Overall</b>						
Supply Current, Dynamic, with Loaded Outputs	$I_{DD}$	$f_{REF} = 66.6\text{MHz}$ ; all supplies = 3.465V		36		mA
Supply Current, Static	$I_{DDs}$	REF stopped either high or low		20		$\mu\text{A}$
<b>Reference Input (REF)</b>						
High-Level Input Voltage	$V_{IH}$		2.0		$V_{DD}+0.3$	V
Low-Level Input Voltage	$V_{IL}$		$V_{SS}-0.3$		0.8	V
High-Level Input Current (pull-down)	$I_{IH}$	$V_{IH} = 3.3\text{V}$		25		$\mu\text{A}$
Low-Level Input Current	$I_{IL}$		-1		1	$\mu\text{A}$
<b>Digital Inputs (S1, S2)</b>						
High-Level Input Voltage	$V_{IH}$		2.0		$V_{DD}+0.3$	V
Low-Level Input Voltage	$V_{IL}$		$V_{SS}-0.3$		0.8	V
High-Level Input Current	$I_{IH}$		-1		1	$\mu\text{A}$
Low-Level Input Current (pull-up)	$I_{IL}$	$V_{IL} = 0\text{V}$		-30		$\mu\text{A}$
<b>Clock Outputs (CLK_A1:4, CLK_B1:4, CLK_FB)</b>						
High Level Output Source Current	$I_{OH}$	$V_O = 2.4\text{V}$	-7	-65		mA
Low Level Output Sink Current	$I_{OL}$	$V_O = 0.4\text{V}$		26	7	mA
Output Impedance	$Z_{OL}$	Measured at 1.5V, output driving low		20		$\Omega$
	$Z_{OH}$	Measured at 1.5V, output driving high		18		
Tristate Output Current	$I_{OZ}$		-10		10	$\mu\text{A}$
Short Circuit Output Source Current	$I_{OSH}$	$V_{DD} = 3.6\text{V}$ , $V_O = 0\text{V}$ ; shorted for 30s, max.		-96		mA
Short Circuit Output Sink Current	$I_{OSL}$	$V_{DD} = V_O = 3.6\text{V}$ , shorted for 30s, max.		90		mA

### Table 6: AC Timing Specifications

Unless otherwise stated, all power supplies = 3.6V, no load on any output, and ambient temperature range  $T_A = 25^{\circ}\text{C}$ . Parameters denoted with an asterisk (\*) represent nominal characterization data and are not currently production tested to any specific limits. MIN and MAX characterization data are  $\pm 3\sigma$  from typical.

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	MIN.	TYP.	MAX.	UNITS
<b>Clock Outputs (CLK_A1:4, CLK_B1:4, CLK_FB)</b>						
Duty Cycle *	$d_t$	Ratio of high pulse width to one clock period, measured at 1.5V	45		55	%
Jitter, Period (peak-peak) *	$t_{j(\Delta P)}$	From rising edge to rising edge at 1.5V, $C_L=30\text{pF}$		75		ps
Skew, Tracking	$t_{sk(tr)}$	$\pm 0.5\%$ non-linear (Lexmark) profile @ 31.5kHz		190		ps
Skew, Bank Output-Bank Output	$t_{sk(b)}$	CLK_A2 to CLK_B1; $C_L=30\text{pF}$		250		ps
PLL Reference Zero Delay	$t_{\phi}$	REF to CLK_FB		150		ps
Rise Time *	$t_r$	Measured @ 0.8V – 2.0V; $C_L=30\text{pF}$		1.6		ns
Fall Time *	$t_f$	Measured @ 2.0V – 0.8V; $C_L=30\text{pF}$		1.0		ns

# FS6108-01

## 1:9 Zero Delay Buffer IC



### 3.0 Package Information

**Table 7: 16-pin SOIC (0.150") Package Dimensions**

	DIMENSIONS			
	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.061	0.068	1.55	1.73
A1	0.004	0.0098	0.102	0.249
A2	0.055	0.061	1.40	1.55
B	0.013	0.019	0.33	0.49
C	0.0075	0.0098	0.191	0.249
D	0.386	0.393	9.80	9.98
E	0.150	0.157	3.81	3.99
e	0.050 BSC		1.27 BSC	
H	0.230	0.244	5.84	6.20
h	0.010	0.016	0.25	0.41
L	0.016	0.035	0.41	0.89
$\theta$	0°	8°	0°	8°

Diagram illustrating the 16-pin SOIC (0.150") package dimensions. The drawing shows the top view, side view, and a detailed view of the lead profile. Key dimensions are labeled: A (height), A1 (lead height), A2 (lead height), B (lead width), C (lead thickness), D (package width), E (lead pitch), H (total height), h (lead thickness), L (lead length), and  $\theta$  (lead angle). The package is labeled "AMI AMERICAN MICROSYSTEMS, INC." and "16". A note indicates "ALL RADII: 0.005" TO 0.01".

**Table 8: 16-pin SOIC (0.150") Package Characteristics**

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	TYP.	UNITS
Thermal Impedance, Junction to Free-Air	$\theta_{JA}$	Air flow = 0 m/s	109	°C/W
Lead Inductance, Self	$L_{11}$	Corner lead	4.0	nH
		Center lead	3.0	
Lead Inductance, Mutual	$L_{12}$	Any lead to any adjacent lead	0.4	nH
Lead Capacitance, Bulk	$C_{11}$	Any lead to $V_{SS}$	0.5	pF

### 4.0 Ordering Information

**Table 9: Device Ordering Codes**

DEVICE NUMBER	ORDERING CODE	PACKAGE TYPE	OPERATING TEMPERATURE RANGE	SHIPPING CONFIGURATION
FS6108-01	12055-801	16-pin (0.150") SOIC	0°C to 70°C (Commercial)	Tape and Reel
	12055-801	16-pin (0.150") SOIC	0°C to 70°C (Commercial)	Tubes

Contact Factory Prior to New Designs

**Copyright © 2000 American Microsystems, Inc.**

Devices sold by AMI are covered by the warranty and patent indemnification provisions appearing in its Terms of Sale only. AMI makes no warranty, express, statutory implied or by description, regarding the information set forth herein or regarding the freedom of the described devices from patent infringement. AMI makes no warranty of merchantability or fitness for any purposes. AMI reserves the right to discontinue production and change specifications and prices at any time and without notice. AMI's products are intended for use in commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or life-sustaining equipment, are specifically not recommended without additional processing by AMI for such applications.

American Microsystems, Inc., 2300 Buckskin Rd., Pocatello, ID 83201, (208) 233-4690, FAX (208) 234-6796, WWW Address: <http://www.amis.com> E-mail: [tgp@amis.com](mailto:tgp@amis.com)