AMERICAN MICROSYSTEMS, INC.

FS6385

Triple PLL Clock Generator IC

March 2000

FOR REVIEW

1.0 Features

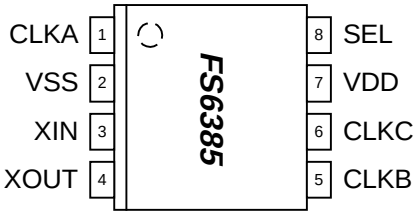
- Triple phase-locked loop (PLL) device with three output clock frequencies
- 3.3V supply voltage
- Small circuit board footprint (8-pin 0.150″ SOIC)
- Custom frequency selections available - contact your local AMI Sales Representative for more information

2.0 Description

The FS6385 is a monolithic CMOS clock generator IC designed to minimize cost and component count in digital video/audio systems.

Three high-resolution phase-locked loops generate three output clocks (CLKA, CLKB and CLKC) through an array of post-dividers. All frequencies are ratiometrically derived from the crystal oscillator frequency. The locking of all the output frequencies together can eliminate unpredictable artifacts in video systems and reduce electromagnetic interference (EMI) due to frequency harmonic stacking.

Figure 1: Pin Configuration



8-pin (0.150″) SOIC

Table 1: Crystal / Output Frequencies

DEVICE	f_{XIN} (MHz)	CLKA (MHz)	CLKB (MHz)	CLKC (MHz)
FS6385-xx	13.8240	36.8640(SEL=VSS) (f_{XIN}* 8 / 3) 16.9344(SEL=VDD) (f_{XIN}* 49 / 40)	16.9344 (f_{XIN}* 49 / 40)	27.000 (f_{XIN} * 125 / 64)
FS6385-yy	13.5000	36.8640(SEL=VSS) (f_{XIN}* 1024 / 375) 16.9344(SEL=VDD) (f_{XIN}* 784 / 625)	16.9344 (f_{XIN}* 784 / 625)	27.000 (f_{XIN} * 2)

NOTE: Contact AMI for custom PLL frequencies

Figure 2: Block Diagram

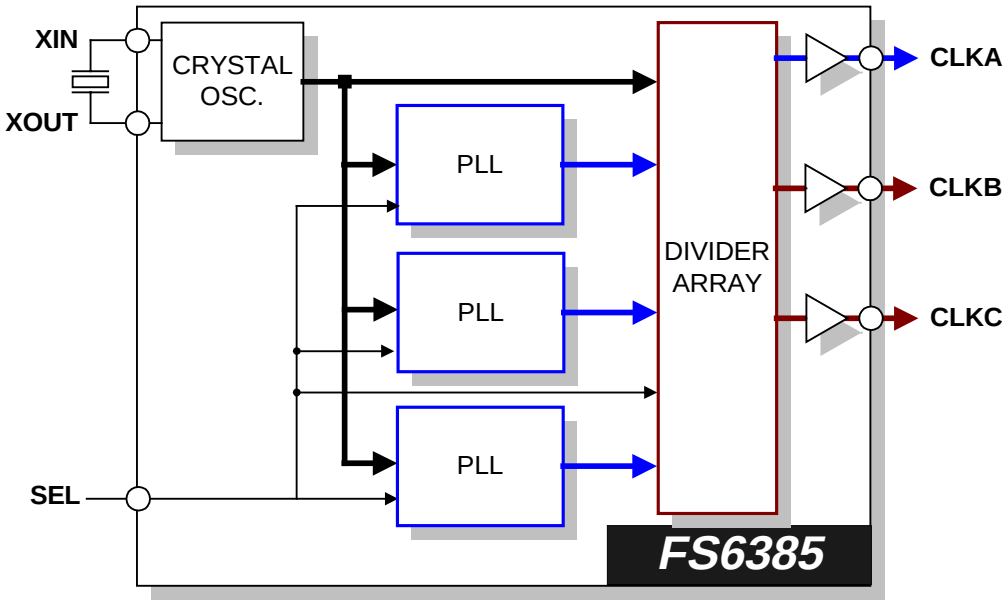


Table 2: Pin Descriptions

Key: AI = Analog Input; AO = Analog Output; DI = Digital Input; DI^U = Input with Internal Pull-Up; DI_D = Input with Internal Pull-Down; DIO = Digital Input/Output; DI-3 = Three-Level Digital Input, DO = Digital Output; P = Power/Ground; # = Active Low pin

PIN	TYPE	NAME	DESCRIPTION
1	DO	CLKA	Clock Output A
2	P	VSS	Ground
3	AI	XIN	Crystal Oscillator Feedback / External Clock Input
4	AO	XOUT	Crystal Oscillator Drive
5	DO	CLKB	Clock Output B
6	DO	CLKC	Clock Output C
7	P	VDD	Power (+3.3 volts)
8	DI^U	SEL	Select Input (see Table 1)

3.0 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} = 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}	3.3V ± 10%	3.0	3.3	3.6	V
Ambient Operating Temperature Range	T_A		0		70	°C

Table 5: DC Electrical Specifications

Unless otherwise stated, V_{DD} = 3.3V ± 10%, no load on any output, and ambient temperature range T_A = 0°C to 70°C. Parameters denoted with an asterisk (*) represent nominal characterization data and are not production tested to any specific limits. Where given, MIN and MAX characterization data are ± 3σ from typical. Negative currents indicate current flows out of the device.

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	MIN.	TYP.	MAX.	UNITS
Overall						
Supply Current, Dynamic, with Loaded Outputs	I_{DD}			30		mA
Crystal Oscillator						
Crystal Loading Capacitance	$C_{L(xtal)}$	As seen by a crystal connected to XIN and XOUT		16		pF
Clock Outputs (CLKA, CLKB, CLKC)						
Output Impedance *	z_{OH}	V_O = 0.5V_{DD}; output driving high		45		Ω
	z_{OL}	V_O = 0.5V_{DD}; output driving low		45		
Short Circuit Source Current *	I_{OSH}	V_O = 0V; shorted for 30s, max.		-35		mA
Short Circuit Sink Current *	I_{OSL}	V_O = 3.3V; shorted for 30s, max.		35		mA

Table 6: AC Timing Specifications

Unless otherwise stated, V_{DD} = 3.3V ± 10%, no load on any output, and ambient temperature range T_A = 0°C to 70°C. Parameters denoted with an asterisk (*) represent nominal characterization data and are not production tested to any specific limits. Where given, MIN and MAX characterization data are ± 3σ from typical.

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	MIN.	TYP.	MAX.	UNITS
Overall						
Synthesis Error		(unless otherwise noted in Frequency Table)			0	ppm
Clock Outputs (CLKA, CLKB, CLKC)						
Duty Cycle *		Ratio of high pulse width (as measured from rising edge to next falling edge at V_{DD}/2) to one clock period	45		55	%
Jitter, Period (peak-peak) *	$t_{j(\Delta P)}$	From rising edge to next rising edge at V_{DD}/2, C_L = 10pF		300		ps
Rise Time *	t_r	V_{DD} = 3.3V; V_O = 0.3V to 3.0V; C_L = 10pF		3		ns
Fall Time *	t_f	V_{DD} = 3.3V; V_O = 3.0V to 0.3V; C_L = 10pF		2.5		ns

4.0 Package Information

Table 7: 8-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	0.189	0.196	4.80	4.98
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
Θ	0°	8°	0°	8°

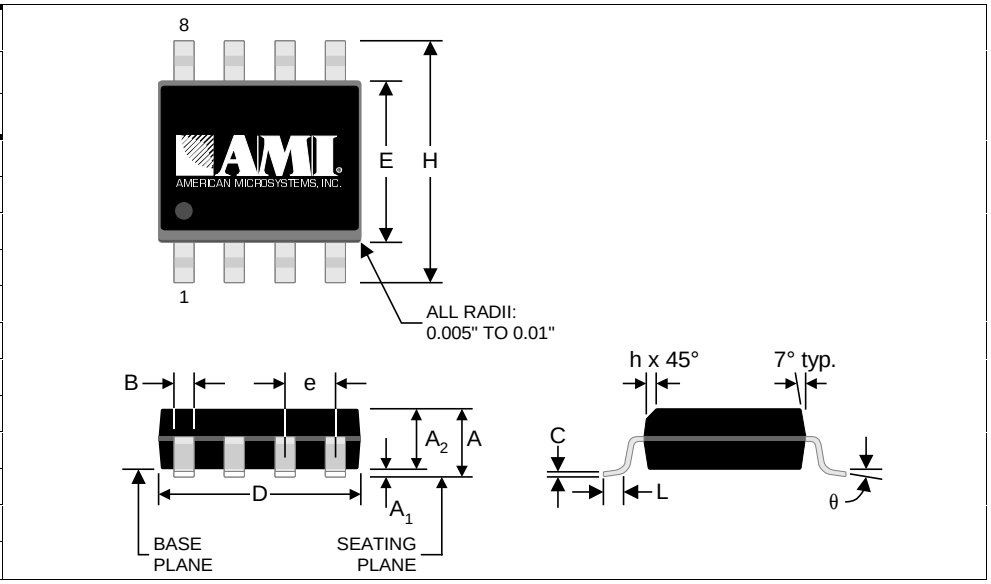


Table 8: 8-pin SOIC (0.150") Package Characteristics

PARAMETER	SYMBOL	CONDITIONS/DESCRIPTION	TYP.	UNITS
Thermal Impedance, Junction to Free-Air 8-pin 0.150" SOIC	Θ_{JA}	Air flow = 0 m/s	110	°C/W
Lead Inductance, Self	L_{11}	Corner lead	2.0	nH
		Center lead	1.6	
Lead Inductance, Mutual	L_{12}	Any lead to any adjacent lead	0.4	nH
Lead Capacitance, Bulk	C_{11}	Any lead to V_{SS}	0.27	pF

5.0 Ordering Information

ORDERING CODE	DEVICE NUMBER	PACKAGE TYPE	OPERATING TEMPERATURE RANGE	SHIPPING CONFIGURATION
t.b.d.	FS6385-xx	8-pin (0.150") SOIC (Small Outline Package)	0°C to 70°C (Commercial)	Tape and Reel
t.b.d.	FS6385-xx	8-pin (0.150") SOIC (Small Outline Package)	0°C to 70°C (Commercial)	Tubes

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