DATASHEET

K8 Clock Chip for Serverworks HT2100 Servers

ICS932S805C

Recommended Application:

Serverworks HT2100-based systems using AMD K8 processors

Output Features:

- 7 - Pairs of AMD K8 clocks
- 6 - Pair of SRC/PCI Express* clock
- 3 - 14.318 MHz REF clocks
- 3 - 48MHz clocks
- 2 - PCI 33 MHz clocks
- 2 - 25MHz clocks

Features:

- Spread Spectrum for EMI reduction
- Outputs may be disabled via SMBus
- M/N programming via SMBus

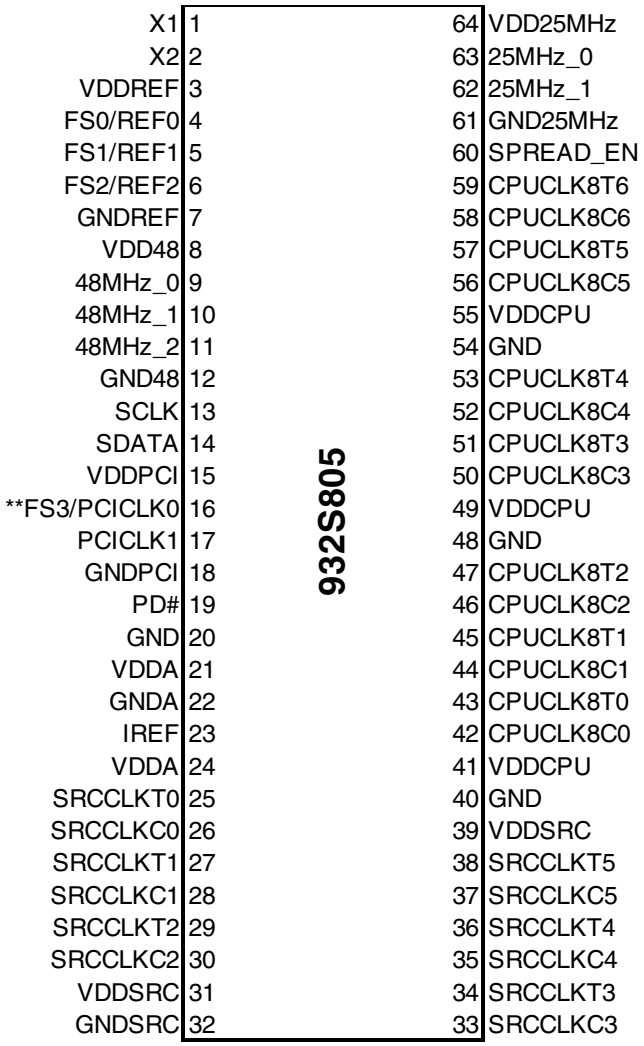
Functionality

FS2	FS1	FS0	CPU (MHz)
0	0	0	Hi-Z
0	0	1	X/6
0	1	0	180.00
0	1	1	220.00
1	0	0	100.00
1	0	1	133.33
1	1	0	166.67
1	1	1	200.00

Power Groups

Pin Number		Description
VDD	GND	
8	12	48MHz Clocks
64	61	25MHz Clocks
15	18	33 MHz PCI Clocks
21,24	22	IREF, Analog Core
31, 39	32	SRC clocks
55, 49, 41	54, 48, 40	K8 CPU Clocks
3	7	REF Clocks, Xtal Osc.

Pin Configuration:



64-TSSOP

* Internal Pull-Up Resistor

** Internal Pull-Down Resistor

Pin Description

PIN #	PIN NAME	TYPE	DESCRIPTION
1	X1	IN	Crystal input, Nominally 14.318MHz.
2	X2	OUT	Crystal output, Nominally 14.318MHz
3	VDDREF	PWR	Ref, XTAL power supply, nominal 3.3V
4	FS0/REF0	I/O	Frequency select latch input pin / 14.318 MHz reference clock.
5	FS1/REF1	I/O	Frequency select latch input pin / 14.318 MHz reference clock.
6	FS2/REF2	I/O	Frequency select latch input pin / 14.318 MHz reference clock.
7	GNDREF	PWR	Ground pin for the REF outputs.
8	VDD48	PWR	Power pin for the 48MHz output.3.3V
9	48MHz_0	OUT	48MHz clock output.
10	48MHz_1	OUT	48MHz clock output.
11	48MHz_2	OUT	48MHz clock output.
12	GND48	PWR	Ground pin for the 48MHz outputs
13	SCLK	IN	Clock pin of SMBus circuitry, 5V tolerant.
14	SDATA	I/O	Data pin for SMBus circuitry, 3.3V tolerant.
15	VDDPCI	PWR	Power supply for PCI clocks, nominal 3.3V
16	**FS3/PCICLK0	I/O	Frequency select latch input pin / 3.3V PCI clock output.
17	PCICLK1	OUT	PCI clock output.
18	GNDPCI	PWR	Ground pin for the PCI outputs
19	PD#	IN	Asynchronous active low input pin used to power down the device. The internal clocks are disabled and the VCO and the crystal are stopped.
20	GND	PWR	Ground pin.
21	VDDA	PWR	3.3V power for the PLL core.
22	GNDA	PWR	Ground pin for the PLL core.
23	IREF	OUT	This pin establishes the reference current for the differential current-mode output pairs. This pin requires a fixed precision resistor tied to ground in order to establish the appropriate current. 475 ohms is the standard value.
24	VDDA	PWR	3.3V power for the PLL core.
25	SRCCLKT0	OUT	True clock of differential SRC clock pair.
26	SRCCLKC0	OUT	Complement clock of differential SRC clock pair.
27	SRCCLKT1	OUT	True clock of differential SRC clock pair.
28	SRCCLKC1	OUT	Complement clock of differential push-pull SRC clock pair.
29	SRCCLKT2	OUT	True clock of differential SRC clock pair.
30	SRCCLKC2	OUT	Complement clock of differential SRC clock pair.
31	VDDSRC	PWR	Supply for SRC clocks, 3.3V nominal
32	GNDSRC	PWR	Ground pin for the SRC outputs

Pin Description (continued)

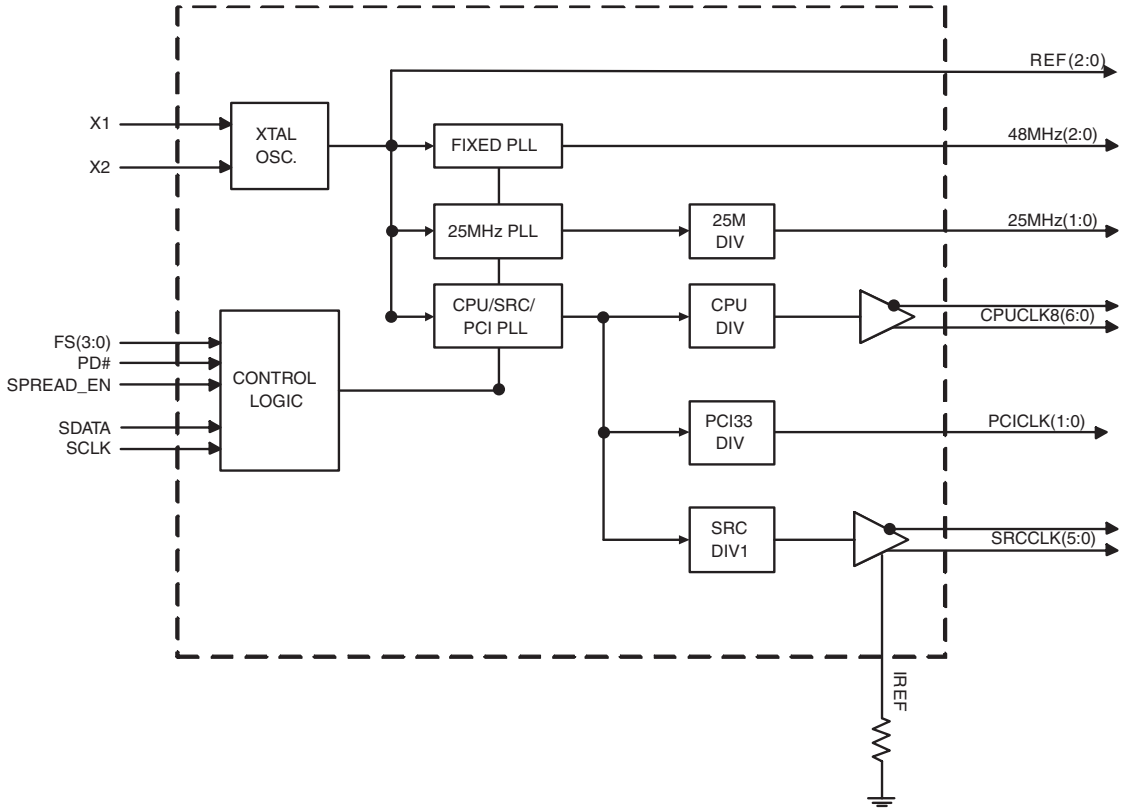
PIN #	PIN NAME	TYPE	DESCRIPTION
33	SRCCLKC3	OUT	Complement clock of differential SRC clock pair.
34	SRCCLKT3	OUT	True clock of differential SRC clock pair.
35	SRCCLKC4	OUT	Complement clock of differential SRC clock pair.
36	SRCCLKT4	OUT	True clock of differential SRC clock pair.
37	SRCCLKC5	OUT	Complement clock of differential SRC clock pair.
38	SRCCLKT5	OUT	True clock of differential SRC clock pair.
39	VDDSRC	PWR	Supply for SRC clocks, 3.3V nominal
40	GND	PWR	Ground pin.
41	VDDCPU	PWR	Supply for CPU clocks, 3.3V nominal
42	CPUCLK8C0	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
43	CPUCLK8T0	OUT	True clock of differential 0.8V push-pull K8 pair.
44	CPUCLK8C1	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
45	CPUCLK8T1	OUT	True clock of differential 0.8V push-pull K8 pair.
46	CPUCLK8C2	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
47	CPUCLK8T2	OUT	True clock of differential 0.8V push-pull K8 pair.
48	GND	PWR	Ground pin.
49	VDDCPU	PWR	Supply for CPU clocks, 3.3V nominal
50	CPUCLK8C3	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
51	CPUCLK8T3	OUT	True clock of differential 0.8V push-pull K8 pair.
52	CPUCLK8C4	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
53	CPUCLK8T4	OUT	True clock of differential 0.8V push-pull K8 pair.
54	GND	PWR	Ground pin.
55	VDDCPU	PWR	Supply for CPU clocks, 3.3V nominal
56	CPUCLK8C5	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
57	CPUCLK8T5	OUT	True clock of differential 0.8V push-pull K8 pair.
58	CPUCLK8C6	OUT	Complementary clock of differential 0.8V push-pull K8 pair.
59	CPUCLK8T6	OUT	True clock of differential 0.8V push-pull K8 pair.
60	SPREAD_EN	IN	Asynchronous, active high input to enable spread spectrum functionality.
61	GND25MHz	PWR	Ground pin for the 25Mhz outputs
62	25MHz_1	OUT	25MHz clock output, 3.3V
63	25MHz_0	OUT	25MHz clock output, 3.3V
64	VDD25MHz	PWR	Power supply for 25MHz clocks, 3.3V nominal.

General Description

The **ICS932S805** is a main clock synthesizer chip that, when paired with ICS9DB108, provides all clocks required by Serverworks HT2100-based servers.

An SMBus interface allows full control of the device.

Block Diagram



Single-ended Terminations

Single-ended Output Strength	Number of Loads on Board	Series Resistor for Proper Termination		
		Zo = 50 ohms	Zo = 55 ohms	Zo = 60 ohms
48MHz 1 Load	1	15	24	30
48MHz 2 Load	2	4.7	15	20
25MHz 1 Load	1	15	24	30
25MHz 2 Load	2	4.7	15	20
PCI 1 Load	1	15	24	30
PCI 2 Load	2	4.7	15	20
REF 1 Load	1	15	24	30
REF 2 Load	2	4.7	15	20

CPU Divider Ratios

	Divider (3:2)								
Divider (1:0)	**Bit**	**00**		**01**		**10**		**11**	**MSB**
	00	0000	**4**	0100	**8**	1000	**16**	1100	**32**
	01	0001	**3**	0101	**6**	1001	**12**	1101	**24**
	10	0010	**5**	0110	**10**	1010	**20**	1110	**40**
	11	0011	**15**	0111	**30**	1011	**60**	1111	**120**
	LSB	Address	Div	Address	Div	Address	Div	Address	Div

PCI Divider Ratios

	Divider (3:2)								
Divider (1:0)	**Bit**	**00**		**01**		**10**		**11**	**MSB**
	00	0000	**4**	0100	**8**	1000	**16**	1100	**32**
	01	0001	**3**	0101	**6**	1001	**12**	1101	**24**
	10	0010	**5**	0110	**10**	1010	**20**	1110	**40**
	11	0011	**15**	0111	**30**	1011	**60**	1111	**120**
	LSB	Address	Div	Address	Div	Address	Div	Address	Div

SRC Divider Ratios

	Divider (3:2)								
Divider (1:0)	**Bit**	**00**		**01**		**10**		**11**	**MSB**
	00	0000	**2**	0100	**4**	1000	**8**	1100	**16**
	01	0001	**3**	0101	**6**	1001	**12**	1101	**24**
	10	0010	**5**	0110	**10**	1010	**20**	1110	**40**
	11	0011	**7**	0111	**14**	1011	**28**	1111	**56**
	LSB	Address	Div	Address	Div	Address	Div	Address	Div

General SMBus serial interface information

How to Write:

- Controller (host) sends a start bit.
- Controller (host) sends the write address D2 (H)
- ICS clock will ***acknowledge***
- Controller (host) sends the begining byte location = N
- ICS clock will ***acknowledge***
- Controller (host) sends the data byte count = X
- ICS clock will ***acknowledge***
- Controller (host) starts sending ***Byte N through Byte N + X -1***
- ICS clock will ***acknowledge*** each byte ***one at a time***
- Controller (host) sends a Stop bit

How to Read:

- Controller (host) will send start bit.
- Controller (host) sends the write address D2 (h)
- ICS clock will ***acknowledge***
- Controller (host) sends the begining byte location = N
- ICS clock will ***acknowledge***
- Controller (host) will send a separate start bit.
- Controller (host) sends the read address D3 (h)
- ICS clock will ***acknowledge***
- ICS clock will send the data byte count = X
- ICS clock sends ***Byte N + X -1***
- ICS clock sends ***Byte 0 through byte X (if $X_{(h)}$ was written to byte 8)***.
- Controller (host) will need to acknowledge each byte
- Controllor (host) will send a not acknowledge bit
- Controller (host) will send a stop bit

Index Block Write Operation

Controller (Host)			ICS (Slave/Receiver)
T	starT bit		
Slave Address D2(h)			
WR	WRite		
			ACK
Beginning Byte = N			
			ACK
Data Byte Count = X			
			ACK
Beginning Byte N		X Byte	
			ACK
◇			
◇			◇
◇			◇
			◇
Byte N + X - 1			
			ACK
P	stoP bit		

Index Block Read Operation

Controller (Host)		ICS (Slave/Receiver)	
T	starT bit		
Slave Address D2(h)			
WR	WRite		
		ACK	
Beginning Byte = N			
		ACK	
RT	Repeat starT		
Slave Address D3(h)			
RD	ReaD		
		ACK	
		Data Byte Count = X	
ACK			
		X Byte	Beginning Byte N
ACK			
			◇
◇			◇
◇			◇
◇			
			Byte N + X - 1
N	Not acknowledge		
P	stoP bit		

SMBus Table: Frequency Select and Spread Control Register

Byte 0	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	FS Source	Latched Input or SMBus Frequency Select	RW	Latched Inputs	SMBus	0
Bit 6	-	Spread Spectrum Enable	Spread Enable for CPU, SRC and PCI Outputs. **Setting SPREAD_EN pin to '1', forces Spread ON and overides this bit.**	RW	OFF	ON	0
Bit 5	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 4	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 3	-	FS3	Freq Select Bit 3	RW	See CPU Frequency Select Table		Latched
Bit 2	-	FS2	Freq Select Bit 2	RW			Latched
Bit 1	-	FS1	Freq Select Bit 1	RW			Latched
Bit 0	-	FS0	Freq Select Bit 0	RW			Latched

SMBus Table: Output Control Register

Byte 1	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	6	REF2	Output Enable	RW	Disable (Low)	Enable	1
Bit 6	5	REF1	Output Enable	RW	Disable (Low)	Enable	1
Bit 5	4	REF0	Output Enable	RW	Disable (Low)	Enable	1
Bit 4	17	PCICLK1	Output Enable	RW	Disable (Low)	Enable	1
Bit 3	16	PCICLK0	Output Enable	RW	Disable (Low)	Enable	1
Bit 2	11	48MHz_2	Output Enable	RW	Disable (Low)	Enable	1
Bit 1	10	48MHz_1	Output Enable	RW	Disable (Low)	Enable	1
Bit 0	9	48MHz_0	Output Enable	RW	Disable (Low)	Enable	1

SMBus Table: Output Control Register

Byte 2	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 6	59/58	CPUCLK8(6)	Output Enable When Disabled CPUCLKT = 0 CPUCLKC = 1	RW	Disable	Enable	1
Bit 5	57/56	CPUCLK8(5)		RW	Disable	Enable	1
Bit 4	53/52	CPUCLK8(4)		RW	Disable	Enable	1
Bit 3	51/50	CPUCLK8(3)		RW	Disable	Enable	1
Bit 2	47/46	CPUCLK8(2)		RW	Disable	Enable	1
Bit 1	45/44	CPUCLK8(1)		RW	Disable	Enable	1
Bit 0	43/42	CPUCLK8(0)		RW	Disable	Enable	1

SMBus Table: Output Control Register

Byte 3	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	SRC CLKs	SRCCLK PD	SRCCLK Power Down Drive Mode	RW	Driven	Hi-Z	0
Bit 6	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 5	38/37	SRCCLK5	Output Enable	RW	Disable (Hi-Z)	Enable	1
Bit 4	36/35	SRCCLK4	Output Enable	RW	Disable (Hi-Z)	Enable	1
Bit 3	34/33	SRCCLK3	Output Enable	RW	Disable (Hi-Z)	Enable	1
Bit 2	29/30	SRCCLK2	Output Enable	RW	Disable (Hi-Z)	Enable	1
Bit 1	27/28	SRCCLK1	Output Enable	RW	Disable (Hi-Z)	Enable	1
Bit 0	25/26	SRCCLK0	Output Enable	RW	Disable (Hi-Z)	Enable	1

SMBus Table: Drive Strength Control Register

Byte 4	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	6	REF2	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 6	5	REF1	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 5	4	REF0	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 4	17	PCICLK1	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 3	16	PCICLK0	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 2	11	48MHz_2	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 1	10	48MHz_1	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 0	9	48MHz_0	Drive Strength Select	RW	1 Load	2 Loads	1

SMBus Table: SRC Frequency Select Register

Byte 5	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	62	25MHz_1	Output Enable	RW	Disable (Low)	Enable	1
Bit 6	63	25MHz_0	Output Enable	RW	Disable (Low)	Enable	1
Bit 5	62	25MHz_1	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 4	63	25MHz_0	Drive Strength Select	RW	1 Load	2 Loads	1
Bit 3	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 2	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 1	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 0	-	Reserved	Reserved	RW	Reserved	Reserved	0

SMBus Table: Device ID Register

Byte 6	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	DevID 7	Device ID MSB	R	-	-	1
Bit 6	-	DevID 6	Device ID 6	R	-	-	0
Bit 5	-	DevID 5	Device ID 5	R	-	-	0
Bit 4	-	DevID 4	Device ID4	R	-	-	0
Bit 3	-	DevID 3	Device ID3	R	-	-	0
Bit 2	-	DevID 2	Device ID2	R	-	-	1
Bit 1	-	DevID 1	Device ID1	R	-	-	0
Bit 0	-	DevID 0	Device ID LSB	R	-	-	1

SMBus Table: Vendor ID Register

Byte 7	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	RID3	Revision ID	R	-	-	X
Bit 6	-	RID2		R	-	-	X
Bit 5	-	RID1		R	-	-	X
Bit 4	-	RID0		R	-	-	X
Bit 3	-	VID3	VENDOR ID (0001 = ICS)	R	-	-	0
Bit 2	-	VID2		R	-	-	0
Bit 1	-	VID1		R	-	-	0
Bit 0	-	VID0		R	-	-	1

SMBus Table: Byte Count Register

Byte 8	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	BC7	Byte Count Programming b(7:0)	RW	Writing to this register will configure how many bytes will be read back, default is 9 bytes.		0
Bit 6	-	BC6		RW			0
Bit 5	-	BC5		RW			0
Bit 4	-	BC4		RW			0
Bit 3	-	BC3		RW			1
Bit 2	-	BC2		RW			0
Bit 1	-	BC1		RW			0
Bit 0	-	BC0		RW			1

SMBus Table: Reserved Register

Byte 9	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 6	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 5	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 4	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 3	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 2	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 1	-	Reserved	Reserved	RW	Reserved	Reserved	0
Bit 0	-	Reserved	Reserved	RW	Reserved	Reserved	0

SMBus Table: M/N Programming Enable

Byte 10	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	M/N_EN	CPU PLL M/N Programming Enable	RW	Disable	Enable	0
Bit 6	-	Reserved	Reserved	RW	-	-	0
Bit 5	-	Reserved	Reserved	RW	-	-	0
Bit 4	-	Reserved	Reserved	RW	-	-	0
Bit 3	-	Reserved	Reserved	RW	-	-	0
Bit 2	-	Reserved	Reserved	RW	-	-	0
Bit 1	-	Reserved	Reserved	RW	-	-	0
Bit 0	-	Reserved	Reserved	RW	-	-	0

Bytes 11:14 Are Reserved

SMBus Table: CPU/SRC Frequency Control Register

Byte 15	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	N Div8	N Divider Prog bit 8	RW	The decimal representation of M and N Divier in Byte 15 and 16 will configure the CPU VCO frequency. Default at power up = latch-in or Byte 0 Rom table. VCO Frequency = 14.318 x [NDiv(9:0)+8] / [MDiv(5:0)+2]		X
Bit 6	-	N Div9	N Divider Prog bit 9	RW			X
Bit 5	-	M Div5	M Divider Programming bit (5:0)	RW			X
Bit 4	-	M Div4		RW			X
Bit 3	-	M Div3		RW			X
Bit 2	-	M Div2		RW			X
Bit 1	-	M Div1		RW			X
Bit 0	-	M Div0		RW			X

SMBus Table: CPU/SRC Frequency Control Register

Byte 16	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	N Div7	N Divider Programming Byte12 bit(7:0) and Byte11 bit(7:6)	RW	The decimal representation of M and N Divier in Byte 15 and 16 will configure the CPU VCO frequency. Default at power up = latch-in or Byte 0 Rom table. VCO Frequency = 14.318 x [NDiv(9:0)+8] / [MDiv(5:0)+2]		X
Bit 6	-	N Div6		RW			X
Bit 5	-	N Div5		RW			X
Bit 4	-	N Div4		RW			X
Bit 3	-	N Div3		RW			X
Bit 2	-	N Div2		RW			X
Bit 1	-	N Div1		RW			X
Bit 0	-	N Div0		RW			X

SMBus Table: CPU/SRC Spread Spectrum Control Register

Byte 17	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	SSP7	Spread Spectrum Programming bit(7:0)	RW	These Spread Spectrum bits in Byte 17 and 18 will program the spread pecentage of CPU and SRC outputs.		X
Bit 6	-	SSP6		RW			X
Bit 5	-	SSP5		RW			X
Bit 4	-	SSP4		RW			X
Bit 3	-	SSP3		RW			X
Bit 2	-	SSP2		RW			X
Bit 1	-	SSP1		RW			X
Bit 0	-	SSP0		RW			X

SMBus Table: CPU/SRC Spread Spectrum Control Register

Byte 18	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	Reserved	Reserved	R	-	-	0
Bit 6	-	SSP14	Spread Spectrum Programming bit(14:8)	RW	These Spread Spectrum bits in Byte 17 and 18 will program the spread pecentage of CPU and SRC outputs.		X
Bit 5	-	SSP13		RW			X
Bit 4	-	SSP12		RW			X
Bit 3	-	SSP11		RW			X
Bit 2	-	SSP10		RW			X
Bit 1	-	SSP9		RW			X
Bit 0	-	SSP8		RW			X

SMBus Table: SRC Spread Spectrum Control Register

Byte 18	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	Reserved	Reserved	R	-	-	0
Bit 6	-	Reserved	Reserved	R	-	-	0
Bit 5	-	Reserved	Reserved	R	-	-	0
Bit 4	-	Reserved	Reserved	R	-	-	0
Bit 3	-	Reserved	Reserved	R	-	-	0
Bit 2	-	Reserved	Reserved	R	-	-	0
Bit 1	-	Reserved	Reserved	R	-	-	0
Bit 0	-	Reserved	Reserved	R	-	-	0

SMBus Table: Programmable Output Divider Register

Byte 19	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	CPUDiv3	CPU Divider Ratio Programming Bits	RW	See CPU Divider Ratios Table		X
Bit 6	-	CPUDiv2		RW			X
Bit 5	-	CPUDiv1		RW			X
Bit 4	-	CPUDiv0		RW			X
Bit 3	-	Reserved	Reserved	R	-	-	0
Bit 2	-	Reserved	Reserved	R	-	-	0
Bit 1	-	Reserved	Reserved	R	-	-	0
Bit 0	-	Reserved	Reserved	R	-	-	0

SMBus Table: Programmable Output Divider Register

Byte 20	Pin #	Name	Control Function	Type	0	1	PWD
Bit 7	-	33MHzDiv3	33MHz Divider Ratio Programming Bits	RW	33MHz Divider Ratio Table		X
Bit 6	-	33MHzDiv2		RW			X
Bit 5	-	33MHzDiv1		RW			X
Bit 4	-	33MHzDiv0		RW			X
Bit 3	-	SRC_Div3	SRC_ Divider Ratio Programming Bits	RW	SRC Divider Ratio Table		X
Bit 2	-	SRC_Div2		RW			X
Bit 1	-	SRC_Div1		RW			X
Bit 0	-	SRC_Div0		RW			X

SMBusTable: Reserved Regsiter
Byte 21 is reserved do not write this register!

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
3.3V Core Supply Voltage	VDD_A		GND + 4.5V	V	1
3.3V Logic Input Supply Voltage	VDD_In	GND - 0.5	GND +4.5V	V	1
Storage Temperature	Ts	-65	150	°C	
Ambient Operating Temp	Tambient	0	70	°C	
Input ESD protection human body model	ESD prot	2000		V	1

[1]Operation at these extremes is neither implied nor guaranteed

Electrical Characteristics - Input/Supply/Common Output Parameters

T_A = 0 - 70°C; Supply Voltage V_{DD} = 3.3 V +/-5%

PARAMETER	SYMBOL	Conditions	MIN	TYP	MAX	UNITS	NOTES
Input High Voltage	V_{IH}	3.3 V +/-5%	2		V_{DD} + 0.3	V	1
Input Low Voltage	V_{IL}	3.3 V +/-5%	V_{SS} - 0.3		0.8	V	1
Input High Current	I_{IH}	V_{IN} = V_{DD}	-5		5	uA	1
Input Low Current	I_{IL1}	V_{IN} = 0 V; Inputs with no pull-up resistors	-5			uA	1
	I_{IL2}	V_{IN} = 0 V; Inputs with pull-up resistors	-200			uA	1
Operating Supply Current	$I_{DD3.3OP}$	Full Active, C_L = Full load;		258	350	mA	
Operating Current	$I_{DD3.3OP}$	all outputs driven			tbd	mA	
Powerdown Current	$I_{DD3.3PD}$	all diff pairs driven			tbd	mA	
		all differential pairs tri-stated			tbd	mA	
Input Frequency[3]	F_i	V_{DD} = 3.3 V		14.318		MHz	3
Pin Inductance[1]	L_{pin}				7	nH	1
Input Capacitance[1]	C_{IN}	Logic Inputs			5	pF	1
	C_{OUT}	Output pin capacitance			6	pF	1
	C_{INX}	X1 & X2 pins			5	pF	1
Clk Stabilization[1,2]	T_{STAB}	From V_{DD} Power-Up or de-assertion of PD# to 1st clock			3	ms	1,2
Modulation Frequency		Triangular Modulation	30		33	kHz	1
SMBus Voltage	V_{DD}		2.7		5.5	V	1
Low-level Output Voltage	V_{OL}	@ I_{PULLUP}			0.4	V	1
urrent sinking at V_{OL} = 0.4	I_{PULLUP}		4			mA	1
SCLK/SDATA Clock/Data Rise Time[3]	T_{RI2C}	(Max VIL - 0.15) to (Min VIH + 0.15)			1000	ns	1
SCLK/SDATA Clock/Data Fall Time[3]	T_{FI2C}	(Min VIH + 0.15) to (Max VIL - 0.15)			300	ns	1

[1]Guaranteed by design and characterization, not 100% tested in production.

[2]See timing diagrams for timing requirements.

[3] Input frequency should be measured at the REFOUT pin and tuned to ideal 14.31818MHz to meet ppm frequency accuracy on PLL outputs.

Electrical Characteristics - K8 Push Pull Differential Pair

T_A = 0 - 70°C; V_{DD} = 3.3 V +/-5%; C_L =AMD64 Processor Test Load

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Rising Edge Rate	$\delta V/\delta t$	Measured at the AMD64 processor's test load. 0 V +/- 400 mV (differential measurement)	2		10	V/ns	1
Falling Edge Rate	$\delta V/\delta t$		2		10	V/ns	1
Differential Voltage	V_{DIFF}	Measured at the AMD64 processor's test load. (single-ended measurement)	0.4	1.25	2.3	V	1
Change in V_{DIFF_DC} Magnitude	ΔV_{DIFF}		-150		150	mV	1
Common Mode Voltage	V_{CM}		1.05	1.25	1.45	V	1
Change in Common Mode Voltage	ΔV_{CM}		-200		200	mV	1
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	Measurement from differential wavefrom. Maximum difference of cycle time between 2 adjacent cycles.	0	100	200	ps	1
Jitter, Accumulated	t_{ja}	Measured using the JIT2 software package with a Tek 7404 scope. TIE (Time Interval Error) measurement technique: Sample resolution = 50 ps, Sample Duration = 10 µs	-1000		1000		1,2,3
Duty Cycle	d_{t3}	Measurement from differential wavefrom	45		53	%	1
Output Impedance	R_{ON}	Average value during switching transition. Used for determining series termination value.	15	35	55	Ω	1
Group Skew	$t_{src-skew}$	Measurement from differential wavefrom			250	ps	1

[1]Guaranteed by design and characterization, not 100% tested in production.

[2] All accumulated jitter specifications are guaranteed assuming that REF is at 14.31818MHz

[3] Spread Spectrum is off

Electrical Characteristics - SRC 0.7V Current Mode Differential Pair

T_A = 0 - 70°C; V_{DD} = 3.3 V +/-5%; C_L =2pF, R_S=33.2Ω, R_P=49.9Ω, I_{REF} = 475Ω

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Current Source Output Impedance	Zo	$V_O = V_x$	3000			Ω	1
Voltage High	VHigh	Statistical measurement on single ended signal using oscilloscope math function.	660		850	mV	1,3
Voltage Low	VLow		-150		150		1,3
Max Voltage	Vovs	Measurement on single ended signal using absolute value.			1150	mV	1
Min Voltage	Vuds		-300				1
Crossing Voltage (abs)	Vcross(abs)		250	350	550	mV	1
Crossing Voltage (var)	d-Vcross	Variation of crossing over all edges		12	140	mV	1
Long Accuracy	ppm	see Tperiod min-max values	-300		300	ppm	1,2
Average period	Tperiod	75.00 MHz nominal	8.5684	8.5714	8.5744	ns	2
		75.00 MHz spread	8.5684		8.6244	ns	2
		100.00 MHz nominal	9.9970	10.0000	10.0030	ns	2
		100.00 MHz spread	9.9970		10.0530	ns	2
		116.67 MHz nominal	13.3303	13.3333	13.3363	ns	2
		116.67 MHz spread	13.3303		13.3863	ns	2
		133.33 MHz nominal	7.4972	7.5002	7.5032	ns	2
		133.33 MHz spread	7.4972		7.5532	ns	2
Absolute min period	Tabsmin	@100.00MHz nominal/spread	9.8720			ns	1,2
Rise Time	t_r	V_{OL} = 0.175V, V_{OH} = 0.525V	175		700	ps	1
Fall Time	t_f	V_{OH} = 0.525V V_{OL} = 0.175V	175		700	ps	1
Rise Time Variation	d-t_r			30	125	ps	1
Fall Time Variation	d-t_f			30	125	ps	1
Duty Cycle	d_{t3}	Measurement from differential wavefrom	45		55	%	1
Group Skew	$t_{src-skew}$	Measurement from differential wavefrom			250	ps	
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	Measurement from differential wavefrom			125	ps	1

[1]Guaranteed by design and characterization, not 100% tested in production.

[2] All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REF is at 14.31818MHz

[3]$I_{REF} = V_{DD}/(3xR_R)$. For R_R = 475Ω (1%), I_{REF} = 2.32mA. I_{OH} = 6 x I_{REF} and V_{OH} = 0.7V @ Z_O=50Ω.

Electrical Characteristics - 33 MHz PCICLK, 25MHz Outputs

T_A = 0 - 70°C; VDD=3.3V +/-5%; C_L = 5 pF (unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
PCI Long Accuracy	ppm	see Tperiod min-max values	-300		300	ppm	1,2
PCI Clock period	T_{period}	33.33MHz output nominal	29.9910		30.0090	ns	2
		33.33MHz output spread	29.9910		30.1598	ns	2
25MHz Long Accuracy	ppm	see Tperiod min-max values	-100		100	ns	2
25MHz Clock period	T_{period}	25MHz output nominal	0.0000		0.0000	ns	2
Output High Voltage	V_{OH}	I_{OH} = -1 mA	2.4			V	1
Output Low Voltage	V_{OL}	I_{OL} = 1 mA			0.55	V	1
Output High Current	I_{OH}	V_{OH} @MIN = 1.0 V	-33			mA	1
		V_{OH}@ MAX = 3.135 V			-33	mA	1
Output Low Current	I_{OL}	V_{OL} @ MIN = 1.95 V	30			mA	1
		V_{OL} @ MAX = 0.4 V			38	mA	1
Edge Rate	δV/δt	Rising edge rate	1		4	V/ns	1
Edge Rate	δV/δt	Falling edge rate	1		4	V/ns	1
Duty Cycle	d_{t1}	V_T = 1.5 V	45		55	%	1
PCI Skew	t_{sk1}	V_T = 1.5 V			250	ps	1
25MHz Skew	t_{sk1}	V_T = 1.5 V			250	ps	1
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	V_T = 1.5 V			250	ps	1

[1]Guaranteed by design and characterization, not 100% tested in production.

[2] All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REF is at 14.31818MHz

Electrical Characteristics - 48MHz

T_A = 0 - 70°C; V_{DD} = 3.3 V +/-5%; C_L = 5 pF (unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
Long Accuracy	ppm	see Tperiod min-max values	-100		100	ppm	1,2
Clock period	T_{period}	48.00MHz output nominal	20.8257		20.8340	ns	2
Output High Voltage	V_{OH}	I_{OH} = -1 mA	2.4			V	1
Output Low Voltage	V_{OL}	I_{OL} = 1 mA			0.55	V	1
Output High Current	I_{OH}	V_{OH} @ MIN = 1.0 V	-33			mA	1
		V_{OH}@ MAX = 3.135 V			-33	mA	1
Output Low Current	I_{OL}	V_{OL} @MIN = 1.95 V	30			mA	1
		V_{OL} @ MAX = 0.4 V			38	mA	1
Edge Rate	δV/δt	Rising edge rate	1		2	V/ns	1
Edge Rate	δV/δt	Falling edge rate	1		2	V/ns	1
Duty Cycle	d_{t1}	V_T = 1.5 V	45		55	%	1
Group Skew	t_{sk1}	V_T = 1.5 V			250	ps	1
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	V_T = 1.5 V			150	ps	1

[1]Guaranteed by design and characterization, not 100% tested in production.

[2] All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REF is at 14.31818MHz

Electrical Characteristics - REF-14.318MHz

T_A = 0 - 70°C; V_{DD} = 3.3 V +/-5%; C_L = 5 pF (unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
Long Accuracy	ppm	see Tperiod min-max values	-300		300	ppm	1
Clock period	T_{period}	14.318MHz output nominal	69.8270		69.8550	ns	2
Output High Voltage	V_{OH}	I_{OH} = -1 mA	2.4			V	1
Output Low Voltage	V_{OL}	I_{OL} = 1 mA			0.4	V	1
Output High Current	I_{OH}	V_{OH}@MIN = 1.0 V, V_{OH}@MAX = 3.135 V	-29		-23	mA	1
Output Low Current	I_{OL}	V_{OL}@MIN = 1.95 V, V_{OL}@MAX = 0.4 V	29		27	mA	1
Edge Rate	δV/δt	Rising edge rate	1		2	V/ns	1
Edge Rate	δV/δt	Falling edge rate	1		2	V/ns	1
Skew	t_{sk1}	V_T = 1.5 V			500	ps	1
Duty Cycle	d_{t1}	V_T = 1.5 V	45		55	%	1
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	V_T = 1.5 V			1000	ps	1

[1]Guaranteed by design and characterization, not 100% tested in production.

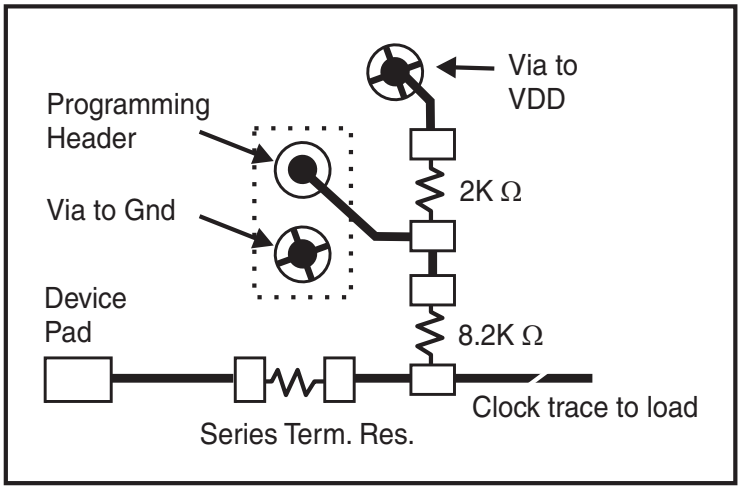
[2] All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REF is at 14.31818MHz

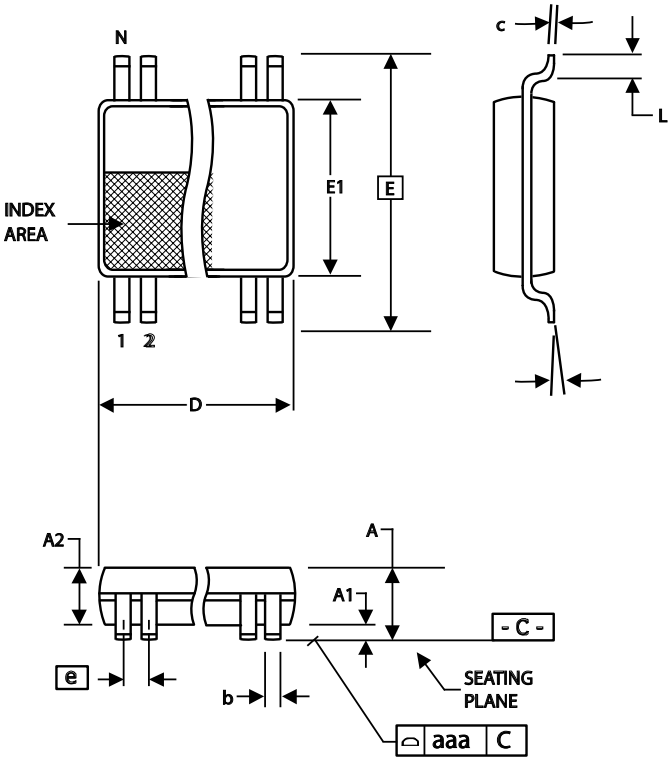
Shared Pin Operation - Input/Output Pins

The I/O pins designated by (input/output) on the **ICS932S805** serve as dual signal functions to the device. During initial power-up, they act as input pins. The logic level (voltage) that is present on these pins at this time is read and stored into a 5-bit internal data latch. At the end of Power-On reset, (see AC characteristics for timing values), the device changes the mode of operations for these pins to an output function. In this mode the pins produce the specified buffered clocks to external loads.

To program (load) the internal configuration register for these pins, a resistor is connected to either the VDD (logic 1) power supply or the GND (logic 0) voltage potential. A 10 Kilohm (10K) resistor is used to provide both the solid CMOS programming voltage needed during the power-up programming period and to provide an insignificant load on the output clock during the subsequent operating period.

Figure 1 shows a means of implementing this function when a switch or 2 pin header is used. With no jumper is installed the pin will be pulled high. With the jumper in place the pin will be pulled low. If programmability is not necessary, than only a single resistor is necessary. The programming resistors should be located close to the series termination resistor to minimize the current loop area. It is more important to locate the series termination resistor close to the driver than the programming resistor.





6.10 mm. Body, 0.50 mm. Pitch TSSOP
(240 mil) (20 mil)

SYMBOL	In Millimeters COMMON DIMENSIONS		In Inches COMMON DIMENSIONS	
	MIN	MAX	MIN	MAX
A	--	1.20	--	.047
A1	0.05	0.15	.002	.006
A2	0.80	1.05	.032	.041
b	0.17	0.27	.007	.011
c	0.09	0.20	.0035	.008
D	SEE VARIATIONS		SEE VARIATIONS	
E	8.10 BASIC		0.319 BASIC	
E1	6.00	6.20	.236	.244
e	0.50 BASIC		0.020 BASIC	
L	0.45	0.75	.018	.030
N	SEE VARIATIONS		SEE VARIATIONS	
α	0°	8°	0°	8°
aaa	--	0.10	--	.004

VARIATIONS

N	D mm.		D (inch)	
	MIN	MAX	MIN	MAX
64	16.90	17.10	.665	.673

Reference Doc.: JEDEC Publication 95, MO-153

10-0039

Ordering Information

ICS932S805yGLFT

Example:

ICS XXXX y G - LF T

- **Designation for tape and reel packaging**
- **RoHS Compliant (Optional)**
- **Package Type**
  G = TSSOP
- **Revision Designator** (will not correlate with datasheet revision)
- **Device Type**
- **Prefix**
  ICS = Standard Device

Revision History

Rev.	Issue Date	Description	Page #
A	02/21/08	1. Corrected Byte0 bits 7:6. They are no longer reserved. 2. Corrected SMBUS CPU PLL programming registers (Moved from Bytes 11:14 to Bytes 15:18)	8, 11,12
B	02/21/08	Updated maximum value for 48MHz Jitter, cycle to cycle	15

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