

#### RD890 SYSTEM CLOCK FOR AMD-BASED SERVERS

#### 932S890C

## **General Description**

The 932S890C is a main clock synthesizer chip for SR5690/SR5670 AMD Servers. An SMBus interface allows full control of the device.

### **Recommended Application**

SR5690/SR5670 AMD-based Servers

### **Output Features**

- Low power differential outputs with integrated series resistors for Zo=50ohm systems
- 4 -Differential 200MHz CPU pairs
- 2 Differential 100MHz HT3 pairs
- 14 Differential PCIe Gen2 SRC pairs
- 1 Differential non-spread SATA clock
- 2 48MHz USB clocks (180 degrees out of phase for EMI reduction)
- 2 SIO clocks (selectable 48MHz or 24MHz). 180 degrees out of phase for EMI reduction
- 2 14.318MHz REF clock outputs

#### Features/Benefits

- Spread Spectrum; EMI reduction
- Outputs may be disabled via SMBus; saves power
- External crystal load capacitors; maximum frequency accuracy

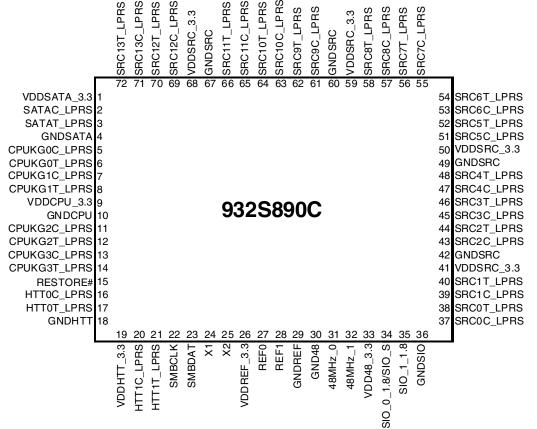
### **Key Specifications**

- CPU output cycle-to-cycle jitter <100ps
- SRC output cycle-to-cycle jitter <125ps</li>
- 48MHz output cycle-to-cycle jitter <130ps
- SIO output cycle-to-cycle jitter <150ps</li>
- SRC output phase jitter <3.1ps rms (PCle Gen2)
- +/- 50ppm frequency accuracy on all clocks, assuming REF is trimmed to 0 ppm)

#### Table 1: 932S890 Functionality

CPU	HTT	SRC	SATA	REF	SIO	USB	DOT
MHz	MHz	MHz	SAIA	MHz	310	MHz	MHz
200.00	100.00	100.00	100.00	14.318	24/48	48.00	96.00

## Pin Configuration



<sup>\*</sup> Indicates that pin has 120Kohm internal pullup resistor.

# **Pin Descriptions**

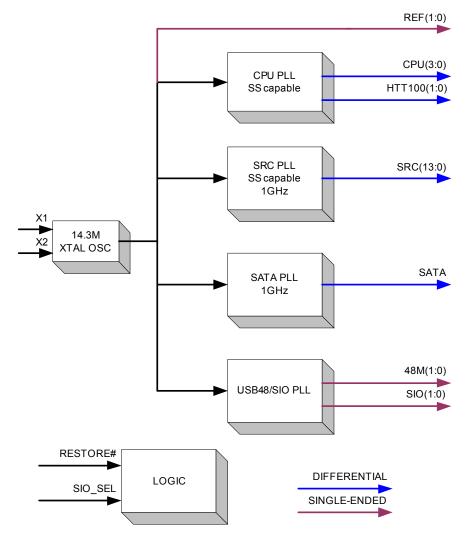
PIN #	PIN NAME	PIN TYPE				
1	VDDSATA_3.3	PWR	Power supply for SATA core logic, nominal 3.3V			
2	SATAC_LPRS	OUT	Complement clock of low power differential SATA clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			
3	SATAT_LPRS	OUT	True clock of low power differential SATA clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			
4	GNDSATA	GND	Ground pin for the SATA output			
5	CPUKG0C_LPRS	OUT	Complementary signal of low-power differential push-pull AMD "Greyhound" clock with integrated series resistor. (no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
6	CPUKG0T_LPRS	OUT	True signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor(no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
7	CPUKG1C_LPRS	OUT	Complementary signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor. (no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
8	CPUKG1T_LPRS	OUT	True signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor(no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
9	VDDCPU_3.3	PWR	Supply for CPU core and outputs, 3.3V nominal			
10	GNDCPU	GND	Ground pin for the CPU outputs			
11	CPUKG2C_LPRS	OUT	Complementary signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor. (no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
12	CPUKG2T_LPRS	OUT	True signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor(no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
13	CPUKG3C_LPRS	OUT	Complementary signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor. (no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
14	CPUKG3T_LPRS	OUT	True signal of low-power differential push-pull AMD "Greyhound" CPU clock with integrated series resistor(no 33 ohm series resistor needed and no 50 ohm pull down resistor needed)			
15	RESTORE#	I/O	Open Drain I/O. As an input it restores the PLL's to power up default state. As an output, this signal is driven low when the internal watchdog hardware timer expires. It is cleared when the internal watchdog hardware timer is reset or disabled. The input is falling edge triggered.  0 = Restore Settings, 1 = normal operation.			
16	HTT0C_LPRS	OUT	Complementary signal of low-power differential push-pull Hypertransport 3 clock with integrated series resistor. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			
17	HTT0T_LPRS	OUT	True signal of low-power differential push-pull Hypertransport 3 clock with integrated series resistor. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			
18	GNDHTT	PWR	Ground pin for the HTT outputs			
19	VDDHTT_3.3	PWR	Supply for HTT clocks, nominal 3.3V.			
20	HTT1C_LPRS	OUT	Complementary signal of low-power differential push-pull Hypertransport 3 clock with integrated series resistor. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			
21	HTT1T_LPRS	OUT	True signal of low-power differential push-pull Hypertransport 3 clock with integrated series resistor. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			
22	SMBCLK	IN	Clock pin of SMBus circuitry, 5V tolerant.			
23	SMBDAT	I/O	Data pin for SMBus circuitry, 5V tolerant.			
24	X1	IN	Crystal input, nominally 14.318MHz			
25	X2	OUT	Crystal output, nominally 14.318MHz			
26	VDDREF_3.3	PWR	Ref, XTAL power supply, nominal 3.3V			
	REF0	OUT	14.318 MHz reference clock, 3.3V			
28	REF1	OUT	14.318 MHz reference clock, 3.3V			
29	GNDREF	GND	Ground pin for the REF outputs.			
	GND48	GND	Ground pin for the 48MHz outputs			
31	48MHz_0	OUT	48MHz clock output.			
32	48MHz_1	OUT	48MHz clock output. (180 degrees out of phase with 48MHz_0)			
33	VDD48_3.3	PWR	Power pin for the 48MHz and SIO outputs and core. 3.3V			
34	SIO_0_1.8/SIO_SEL	I/O	Selectable 48MHz or 24MHz output/SIO Select Latched Input  0 = 24MHz, 1 = 48MHz.			
	SIO_1_1.8	OUT	Selectable 48MHz or 24MHz output. (180 out of phase with SIO 0. Selected by SIO latched input. 0 = 24MHz, 1 = 48MHz.			
36	GNDSIO	GND	Ground pin for the SIO outputs			

# **Pin Descriptions (cont.)**

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SRC4C_LPRS OUT resistor needed)  OUT complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC4T_LPRS OUT resistor needed.)  SRC5T_LPRS OUT series resistor needed.)  SRC5C_LPRS OUT series resistor needed.)  Complement clock of low power differenti			_	
SRC4C_LPRS	46	SRC3T_LPRS	OUT	
Series resistor needed)  WDDSRC GND  GNDSRC  GND  Growle pin for the SRC outputs  SRCSC_LPRS  OUT  Tree clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. LPRS  SRCSC_LPRS  OUT  Tree clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. LPRS  SRCSC_LPRS  OUT  Tree clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Lock pair. (no 50 ohm shunt resistor to GND and no 33				
48 SRC4T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series no series provided to the SRC cutouts SPACSC_LPRS OUT Series resistor needed).  50 VDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal.  51 SRC5C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  52 SRC5T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  53 SRC6C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  54 SRC6T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  55 SRC7C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  56 SRC7T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  57 SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  58 SRC8T_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. Needed).  58 SRC8T_LPRS OUT SRC come and outputs, 3.3V nominal.  60 GNDSRC GND	47	SRC4C_LPRS	001	series resistor needed)
49 ANDSRC 50 VDDSRC 3.3 FWR 50 VDDSRC 3.3 FWR 50 VDDSRC 3.3 FWR 51 SRC5C_LPRS 52 SRC5C_LPRS 53 SRC6C_LPRS 54 SRC6C_LPRS 55 SRC6C_LPRS 56 SRC7C_LPRS 57 SRC6C_LPRS 58 SRC7C_LPRS 59 VDDSRC 3.3 FWR 50 VDDSRC 3.3 FW	40	0004T   D00	6117	
Supply for SRC core and outputs, 3.3 / nominal	48	SRC41_LPRS	001	resistor needed)
SRCSC_LPRS OUT Complement dock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC6C_LPRS OUT SINCE PROVIDED THE Clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC6C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC6C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC7C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC7L_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC11_LPRS OUT Series resistor needed)  GOUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  GOUT Complement clock of low	49	GNDSRC	GND	Ground pin for the SRC outputs
SHCSC_LPRS OUT Series resistor needed)  SRCST_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT Series resistor needed)  SRCSC_LPRS OUT SERCE Clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT SERCE Clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT SRC core and outputs, 3.3V nominal  GNDSRC GND Ground pin for the SRC outputs  SRCSC_LPRS OUT SCRC core and outputs, 3.3V nominal  GNDSRC GND True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT SCRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRCSC_LPRS OUT SCRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resis	50	VDDSRC_3.3	PWR	
Secretary Session research  Secretary Session research  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC6C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC7C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC7C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC7C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC10C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no	F-1	CDCEC LDDC	OUT	Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm
SRC6_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  55 SRC7C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. PRS  56 SRC7C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor. PRS  57 SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  59 VDDSRC_33 PWR Supply for SRC core and outputs, 3.3V nominal  60 GNDSRC GND Ground pin for the SRC outputs  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  61 SRC9C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  62 SRC9T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  63 SRC10C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  64 SRC10T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  65 SRC11C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  76 GNDSRC GNDSRC GND GNDGRC GND	51	SHC5C_LPH5	001	
SRC6C_LPRS OUT complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  54 SRC7C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  55 SRC7C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  56 SRC7T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  57 SRC8C_LPRS OUT SRC6C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  59 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  60 GNDSRC GND Ground pin for the SRC outputs  61 SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  62 SRC9T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  63 SRC10C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  64 SRC10T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  65 SRC11C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC GND Ground pin for the SRC outputs  68 VDDSRC_33 PWR Supply for SRC core and outputs, 3.3V nominal  69 SRC12C_LPRS OUT True clock of low power differential SRC clock pair. (no	50	CDCET I DDC	OUT	True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series
SRC8C_LPRS OUT Series resistor needed)  54 SRC7C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  55 SRC7C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  56 SRC7T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  57 SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  59 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  60 GNDSRC GND Ground pin for the SRC outputs  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC9T_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  62 SRC9T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  63 SRC10C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  64 SRC10T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  65 SRC11C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC GND Ground pin for the SRC outputs  68 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  69 SRC12C_LPRS OUT True clock of low power different	52	ShC31_LFh3	001	
SRC6T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  55 SRC7C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  56 SRC7T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  57 SRC8C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  59 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  60 GNDSRC GND GROND GND GND GND GND GND GND GND GND GND G	E2	SDCSC LDDS	OUT	Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm
SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  56 SRC7C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  57 SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  59 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  60 GNDSRC GND GND Ground pin for the SRC outputs  61 SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  62 SRC9T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  63 SRC10C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  64 SRC10T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  65 SRC11T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC GND Ground pin for the SRC outputs  68 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  69 SRC12C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  70 SRC12LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  71 SRC13C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm sh	55	ShCoc_LFh3	001	series resistor needed)
Fresistor needed)  SRC7C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC10C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC10C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low pow	54	SBC6T LPBS	OUT	True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series
series resistor needed)  56 SRC7T_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  57 SRC8C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  58 SRC8T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  59 VDDSRC_3.3  PWR  Supply for SRC core and outputs, 3.3V nominal  60 GNDSRC  GND  Ground pin for the SRC outputs  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  62 SRC9T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  63 SRC10C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  64 SRC10T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  65 SRC11C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC  GND  Ground pin for the SRC outputs  SRC12C_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  70 SRC12T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  71 SRC13T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series res		011001_21110	001	
SRC8C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8C_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC8T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT Ground pin for the SRC outputs  GND Ground pin for the SRC outputs  SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC9C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  SRC10C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND	55	SRC7C LPRS	OUT	
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Gomplement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  GRC10T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  GSRC11C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  GRC11T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  GRDSRC  GND  Ground pin for the SRC outputs  Supply for SRC core and outputs, 3.3V nominal  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)	62	SRC9T_LPRS	OUT	l · · · · · · · · · · · · · · · · · · ·
series resistor needed)  64 SRC10T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  65 SRC11C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC  GND  Ground pin for the SRC outputs  68 VDDSRC_3.3  PWR  Supply for SRC core and outputs, 3.3V nominal  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  70 SRC12C_LPRS  OUT  SRC13C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)	-		+	, , , , , , , , , , , , , , , , , , ,
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resistor needed)  65 SRC11C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  66 SRC11T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC  GND  Ground pin for the SRC outputs  SRC12C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  70 SRC12T_LPRS  OUT  SRC13C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			1	
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series resistor needed)  66 SRC11T_LPRS  OUT  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  67 GNDSRC  GND  Ground pin for the SRC outputs  68 VDDSRC_3.3  PWR  Supply for SRC core and outputs, 3.3V nominal  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  70 SRC12T_LPRS  OUT  SRC13C_LPRS  OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)	<u> </u>		1 -	
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resistor needed)  67 GNDSRC GND Ground pin for the SRC outputs  68 VDDSRC_3.3 PWR Supply for SRC core and outputs, 3.3V nominal  69 SRC12C_LPRS OUT  70 SRC12T_LPRS OUT  SRC13C_LPRS OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  71 SRC13C_LPRS OUT  Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)			1	
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71 SRC13C_LPRS OUT Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series resistor needed)  72 SRC13T_LPRS OUT  73 SRC13T_LPRS OUT	70	CDC10T LDDC	CUIT	
71 SRC13C_LPRS OUT series resistor needed)  72 SRC13T_LPRS OUT True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series		SHUIZI_LPHS	001	
Series resistor needed)  True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm series	71	CDC12C LDDC	OUT	Complement clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no 33 ohm
1 72 ISBC131 IPBS - 1 OIII - 1		SHUISU_LPRS	001	
resistor needed)	72	SBC13T LDDS	OUT	True clock of low power differential SRC clock pair. (no 50 ohm shunt resistor to GND and no $\overline{33}$ ohm series
	12	SHOISI_LPRS	1 001	resistor needed)

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# **Block Diagram**



932S890 Power Hookup

Pin N	umber	Description		
VDD	GND	Description		
1	4	SATA PLL and output		
9	10	CPU PLL and outputs		
19	18	HTT outputs		
26	29	XTAL Osc and REF outputs		
33	30	48MHz PLL and Outputs		
33	36	SIO Outputs		
41, 50, 59,	42, 49, 60,	SRC PLL and Outputs		
68	67	Sho PLL and Outputs		

Table 2: IO\_Vout select table

B5b2	B5b1	B5b0	IO_Vout
0	0	0	0.3V
0	0	1	0.4V
0	1	0	0.5V
0	1	1	0.6V
1	0	0	0.7V
1	0	1	0.8V
1	1	0	0.9V
1	1	1	1.0V

## **CPU Frequency Selection Table**

	CPU FS4	CPU FS3						
	Byte 3,	Byte 3,	CPU FS2	CPU FS1	CPU FS0	CPU	HTT	0
Line	bit 4	bit 3	Byte3,	Byte3,	Byte3,	Speed	Speed	Spread
	(Spread	(DN/CTR	bit2	bit1	bit0	(MHz)	(MHz)	%
	Enable)	Spread)				,	,	
0	0	0	0	0	0	184.47	92.24	
1	0	0	0	0	1	188.24	94.12	
2	0	0	0	1	0	192.08	96.04	
3	0	0	0	1	1	196.00	98.00	SSOFF
4	0	0	1	0	0	200.00	100.00	0%
5	0	0	1	0	1	204.00	102.00	
6	0	0	1	1	0	208.08	104.04	
7	0	0	1	1	1	212.24	106.12	
8	0	1	0	0	0	184.47	92.24	
9	0	1	0	0	1	188.24	94.12	
10	0	1	0	1	0	192.08	96.04	
11	0	1	0	1	1	196.00	98.00	SS OFF
12	0	1	1	0	0	200.00	100.00	0%
13	0	1	1	0	1	204.00	102.00	
14	0	1	1	1	0	208.08	104.04	
15	0	1	1	1	1	212.24	106.12	
16	1	0	0	0	0	184.47	92.24	
17	1	0	0	0	1	188.24	94.12	
18	1	0	0	1	0	192.08	96.04	DOWN
19	1	0	0	1	1	196.00	98.00	SPREAD'-
20	1	0	1	0	0	200.00	100.00	0.5%
21	1	0	1	0	1	204.00	102.00	0.5%
22	1	0	1	1	0	208.08	104.04	
23	1	0	1	1	1	212.24	106.12	
24	1	1	0	0	0	184.47	92.24	
25	1	1	0	0	1	188.24	94.12	
26	1	1	0	1	0	192.08	96.04	CENTER
27	1	1	0	1	1	196.00	98.00	SPREAD
28	1	1	1	0	0	200.00	100.00	
29	1	1	1	0	1	204.00	102.00	'+/-0.25%
30	1	1	1	1	0	208.08	104.04	
31	1	1	1	1	1	212.24	106.12	

**SRC Frequency Selection Table** 

	SRC FS4	SRC FS3						
	Byte 4,	Byte 4,	SRC FS2	SRC FS1	SRC FS0			
	bit 4	bit 3	Byte 4,	Byte 4,	Byte 4,	SRC	Sprd	
	(Spread	(DWN/CTR	bit2	bit1	bit0	(MHz)	%	
Line	Enable)	Spread)						
0	0	0	0	0	0	92.24		
1	0	0	0	0	1	94.12		
2	0	0	0	1	0	96.04		
3	0	0	0	1	1	98.00	SS OFF	
4	0	0	1	0	0	100.00	0%	
5	0	0	1	0	1	102.00		
6	0	0	1	1	0	104.04		
7	0	0	1	1	1	106.12		
8	0	1	0	0	0	92.24		
9	0	1	0	0	1	94.12	1	
10	0	1	0	1	0	96.04	1	
11	0	1	0	1	1	98.00	SSOFF	
12	0	1	1	0	0	100.00	0%	
13	0	1	1	0	1	102.00		
14	0	1	1	1	0	104.04		
15	0	1	1	1	1	106.12		
16	1	0	0	0	0	92.24		
17	1	0	0	0	1	94.12	1	
18	1	0	0	1	0	96.04	DOWN	
19	1	0	0	1	1	98.00	SPREAD'-	
20	1	0	1	0	0	100.00	0.5%	
21	1	0	1	0	1	102.00	0.5%	
22	1	0	1	1	0	104.04		
23	1	0	1	1	1	106.12		
24	1	1	0	0	0	92.24		
25	1	1	0	0	1	94.12		
26	1	1	0	1	0	96.04	CENTER	
27	1	1	0	1	1	98.00	SPREAD	
28	1	1	1	0	0	100.00	SPREAD '+/-0.25%	
29	1	1	1	0	1	102.00	T/-U.2J/0	
30	1	1	1	1	0	104.04		
31	1	1	1	1	1	106.12		

## **Absolute Maximum Ratings**

Stresses above the ratings listed below can cause permanent damage to the 932S890C. These ratings, which are standard values for IDT commercially rated parts, are stress ratings only. 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 can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
3.3V Core Supply Voltage	VDDxxx	-		3.3	GND + 3.9V	٧	1
Storage Temperature	Ts	-	-65		150	°C	1
Ambient Operating Temp	Tambient	-	0		70	°C	1
Case Temperature	Tcase	-			115	°C	1
Input ESD protection HBM	ESD prot	-	2000			V	1

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

## **Electrical Characteristics-Input/Supply/Common Output Parameters**

PARAMETER	SYMBOL	CONDITIONS*	MIN	TYP	MAX	UNITS	Notes
3.3V Core Supply Voltage	VDDxxx	•	3.135	3.3	3.465	V	1
Input High Voltage	$V_{IH}$	VDD = 3.3 V +/-5%	2		$V_{DD} + 0.3$	V	1
Input Low Voltage	V <sub>IL</sub>	VDD = 3.3 V +/-5%	V <sub>SS</sub> - 0.3		0.8	٧	1
Input High Current	I <sub>H</sub>	$V_{IN} = V_{DD}$	-5		5	uA	1
Input Low Current	I <sub>IL1</sub>	V <sub>IN</sub> = 0 V; Inputs with no pull-up resistors	-5			uA	1
input Low Guitent	l <sub>IL2</sub>	$V_{IN} = 0 V$ ; Inputs with pull-up resistors	-200			uA	1
Operating Current	I <sub>DD3.3OP</sub>	all outputs driven			250	mA	1
Input Frequency	Fi	VDD = 3.3 V +/-5%		14.31818		MHz	2
Pin Inductance	$L_{pin}$				7	nΗ	1
	C <sub>IN</sub>	Logic Inputs			5	pF	1
Input Capacitance	C <sub>OUT</sub>	Output pin capacitance			6	pF	1
	C <sub>INX</sub>	X1 & X2 pins			5	pF	1
Clk Stabilization	T <sub>STAB</sub>	From VDD Power-Up to 1st clock			1.8	ms	1
Modulation Frequency		Triangular Modulation	30		33	kHz	1
SMBus Voltage	$V_{DDSMB}$		2.7		5.5	V	1
Low-level Output Voltage	$V_{OLSMB}$	@ I <sub>PULLUP</sub>			0.4	V	1
Current sinking at V <sub>OL</sub> = 0.4 V	I <sub>PULLUPSMB</sub>		4	6		mA	1
SMBCLK/SMBDAT Clock/Data Rise Time	T <sub>RSMB</sub>	(Max V IL - 0.15) to (Min VIH + 0.15)			1000	ns	1
SMBCLK/SMBDAT Clock/Data Fall Time	T <sub>FSMB</sub>	(Min VIH + 0.15) to (Max VIL - 0.15)			300	ns	1

<sup>\*</sup>TA = 0 - 70°C; Supply Voltage VDD = 3.3 V + /-5%

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>&</sup>lt;sup>2</sup> Input frequency should be measured at the REF pin and tuned to ideal 14.31818MHz to meet ppm frequency accuracy on PLL outputs.

# AC Electrical Characteristics-Low-Power DIF Outputs: CPUKG and HTT

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Crossing Point Variation	$\Delta V_{CROSS}$	Single-ended Measurement			140	mV	1,2,5
CPU Frequency (HTT = 1/2 of CPU Frequency)	f <sub>CPU</sub>	Spread Specturm On	198.8		200	MHz	1,3
Long Term Accuracy	ppm	Spread Specturm Off	-50		+50	ppm	1,11
Rising Edge Slew Rate	S <sub>RISE</sub>	Differential Measurement	0.5		10	V/ns	1,4
Falling Edge Slew Rate	S <sub>FALL</sub>	Differential Measurement	0.5		10	V/ns	1,4
Slew Rate Variation	t <sub>SLVAR</sub>	Single-ended Measurement			20	%	1
CPU, DIF HTT Jitter - Cycle to Cycle	CPUJ <sub>C2C</sub>	Differential Measurement			150	ps	1,6
Accumulated Jitter	t <sub>JACC</sub>	See Notes			1	ns	1,7
Peak to Peak Differential  Voltage	$V_{D(PK-PK)}$	Differential Measurement	400		2400	mV	1,8
Differential Voltage	$V_D$	Differential Measurement	200		1200	mV	1,9
Duty Cycle	D <sub>CYC</sub>	Differential Measurement	45		55	%	1
Amplitude Variation	ΔV <sub>D</sub>	Change in $V_D$ DC cycle to cycle	-75		75	mV	1,10
CPU[3:0] Skew	CPU <sub>SKEW30</sub>	Differential Measurement			200	ps	1
HTT[1:0] Skew	HTT <sub>SKEW10</sub>	Differential Measurement			100	ps	1

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>&</sup>lt;sup>2</sup> Single-ended measurement at crossing point. Value is maximum – minimum over all time. DC value of common mode is not important due to the blocking cap.

<sup>&</sup>lt;sup>3</sup> Minimum Frequency is a result of 0.5% down spread spectrum

<sup>&</sup>lt;sup>4</sup> Differential measurement through the range of ±100 mV, differential signal must remain monotonic and within slew rate spec when crossing through this region.

<sup>&</sup>lt;sup>5</sup> Defined as the total variation of all crossing voltages of CLK rising and CLK# falling. Matching applies to rising edge rate of CLK and falling edge of CLK#. It is measured using a +/-75mV window centered on the average cross point where CLK meets CLK#.

 $<sup>^{\</sup>widehat{\text{6}}}\text{Max}$  difference of  $t_{\text{CYCLE}}$  between any two adjacent cycles.

<sup>&</sup>lt;sup>7</sup> Accumulated tjc over a 10 µs time period, measured with JIT2 TIE at 50ps interval.

<sup>&</sup>lt;sup>8</sup> VD(PK-PK) is the overall magnitude of the differential signal.

<sup>&</sup>lt;sup>9</sup> VD(min) is the amplitude of the ring-back differential measurement, guaranteed by design, that ring-back will not cross 0V VD. VD(max) is the largest amplitude allowed.

<sup>&</sup>lt;sup>10</sup> The difference in magnitude of two adjacent VD\_DC measurements. VD\_DC is the stable post overshoot and ring-back part of the signal.

<sup>11</sup> All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REFOUT is at 14.31818MHz

## AC Electrical Characteristics-Low-Power DIF Outputs: SRC, SATA

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
SRC/SATA Frequency	f <sub>SRC_SATA</sub>	Spread Specturm Off		100		MHz	1,6
Long Term Accuracy	ppm	Spread Specturm Off	-50		+50	ppm	1,6
Rising Edge Slew Rate	t <sub>SLR</sub>	Differential Measurement	2.5		8	V/ns	1,2
Falling Edge Slew Rate	t <sub>FLR</sub>	Differential Measurement	2.5		8	V/ns	1,2
Slew Rate Variation	t <sub>SLVAR</sub>	Single-ended Measurement			20	%	1
Maximum Output Voltage	$V_{HIGH}$	Includes overshoot			1150	mV	1
Minimum Output Voltage	$V_{LOW}$	Includes undershoot	-300			mV	1
Differential Voltage Swing	$V_{SWING}$	Differential Measurement	300			mV	1
Crossing Point Voltage	$V_{XABS}$	Single-ended Measurement	300		550	mV	1,3,4
Crossing Point Variation	$V_{XABSVAR}$	Single-ended Measurement			140	mV	1,3,5
Duty Cycle	D <sub>CYC</sub>	Differential Measurement	45		55	%	1
Jitter - Cycle to Cycle	SRCJ <sub>C2C</sub>	Differential Measurement			125	ps	1
SRC[13:0] Skew Even Outputs	SRC <sub>SKEW_E</sub>	Differential Measurement			200	ps	1,8
SRC[13:0] Skew Odd Outputs	SRC <sub>SKEW_O</sub>	Differential Measurement			200	ps	1,8
SRC[13:0] Even to Odd Skew	SRC <sub>SKEW</sub>	Differential Measurement	1275	1375	1475	ps	1,8
		PCle Gen 1 specs (1.5 - 22 MHz)		40	86	ps	1, 7
Jitter, Phase	<sup>t</sup> jphaseSRC	PCIe Gen 2 (8-16 MHz, 5-16 MHz) Lo-band content (10kHz to 1.5MHz)		1.6	3	ps rms	1, 7
		PCIe Gen 2 (8-16 MHz, 5-16 MHz) Hi-band content (1.5MHz to Nyquist)		2.6	3.1	ps rms	1, 7

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>&</sup>lt;sup>2</sup> Slew rate measured through V swing centered around differential zero

<sup>&</sup>lt;sup>3</sup>Vxabs is defined as the voltage where CLK = CLK#

<sup>&</sup>lt;sup>4</sup> Only applies to the differential rising edge (CLK rising and CLK# falling)

<sup>&</sup>lt;sup>5</sup> Defined as the total variation of all crossing voltages of CLK rising and CLK# falling. Matching applies to rising edge rate of CLK and falling edge of CLK#. It is measured using a +/-75mV window centered on the average cross point where CLK meets CLK#.

<sup>&</sup>lt;sup>6</sup> All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REFOUT is at 14.31818MHz

<sup>&</sup>lt;sup>7</sup> Applicable to all SRC outputs. See http://www.pcisig.com for complete specs. Guaranteed by design and characterization, not tested in production.

<sup>&</sup>lt;sup>8</sup> SRC outputs are divided into two banks, odd and even. The odd bank skew window is 200 ps. The even bank skew window is 200ps. The skew between the even and odd banks is intentionally set at 1375ps.

# Electrical Characteristics-USB - 48MHz, SIO 48/24MHz

PARAMETER	SYMBOL	CONDITIONS*	MIN	TYP	MAX	UNITS	NOTES
Long Accuracy	ppm	see Tperiod min-max values	-50		+50	ppm	1,2
Clock period	T <sub>P ERIOD</sub>	USB output nominal	20.702	20.833	20.964	ns	3,5
Clock Low Time	$T_{LOW}$	Measure from < 0.6V	9.375		11.458	ns	3
Clock High Time	T <sub>HIGH</sub>	Measure from > 2.0V	9.375		11.458	ns	3
Rise Time	t <sub>r_USB</sub>	$V_{OL}$ = 20% of Voh, $V_{OH}$ = 80%of Voh	0.5		3	ns	1
Fall Time	$t_{f\_USB}$	$V_{OL}$ = 20% of Voh, $V_{OH}$ = 80%of Voh	0.5		3	ns	1
Output High Voltage	V <sub>OHUSB</sub>	I <sub>OH</sub> = -1 mA	2.4			V	1,3
Output Low Voltage	V <sub>OLUSB</sub>	I <sub>OL</sub> = 1 mA			0.4	V	1,3
Output High Voltage	V <sub>OHSIO</sub>	I <sub>OH</sub> = -0.2 mA	1.8	2	2.2	V	1,4
Output Low Voltage	V <sub>OLSIO</sub>	$I_{OL} = 0.2 \text{ mA}$			0.4	V	1,4
Duty Cycle	d <sub>CYCUSB</sub>	V <sub>T</sub> = 1.5 V	45		55	%	1,3
Skew	t <sub>SKEW</sub>	V <sub>T</sub> = 1.5 V			250	ps	1
Jitter, Cycle to cycle	tjcyc-cyc	V <sub>T</sub> = 1.5 V			130	ps	1,3

<sup>\*</sup>TA = 0 - 70°C; Supply Voltage VDD = 3.3 V + /-5%

### **Electrical Characteristics—REF-14.318MHz**

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
Long Accuracy	ppm	see Tperiod min-max values	-50		+50	ppm	1,2
Long Term Jitter	t <sub>jLT</sub>	@ 1us			500	ps	1,2
Clock period	T <sub>PERIOD</sub>	14.318MHz output nominal	69.6378	69.8413	70.0448	ns	2,3
Clock Low Time	$T_{LOW}$	Measure from $V_T = 50\%$	2			ns	2
Clock High Time	T <sub>HIGH</sub>	Measure from $V_T = 50\%$	2			ns	2
Output High Voltage	V <sub>OH</sub>	I <sub>OH</sub> = -1 mA	2.4	2.8	3.3	V	1
Output Low Voltage	$V_{OL}$	I <sub>OL</sub> = 1 mA	0		0.4	V	1
Rise Time	t <sub>R</sub>	$V_{OL} = 20\%$ of $V_{OH}$ , $V_{OH} = 80\%$ of $V_{OH}$			1.5	ns	1
Fall Time	t <sub>F</sub>	$V_{OL} = 20\%$ of $V_{OH}$ , $V_{OH} = 80\%$ of $V_{OH}$			1.5	ns	1
Skew	t <sub>SKEW</sub>	Measure from $V_T = 50\%$			250	ps	1
Duty Cycle	d <sub>t1</sub>	$V_T = V_{OH}/2$	45		55	%	1
Jitter, Cycle to Cycle	t <sub>jcyc-cyc</sub>	Measure from $V_T = 50\%$			200	ps	1
Jitter, Peak to Peak	t <sub>jPK-PK</sub>	$\begin{aligned} &\text{Measure from V}_{\text{T}} = 50\% \text{ (0.9V)} \\ &t_{jpk-pk} = [lt_{jcyc-cyc}maxl + lt_{jcyc-cyc}minl]/2 \end{aligned}$			200	ps	1

<sup>\*</sup>TA = 0 - 70°C; Supply Voltage VDD = 3.3 V + /-5%

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>&</sup>lt;sup>2</sup>IDT recommended and/or chipset vendor layout guidelines must be followed to meet this specification

<sup>&</sup>lt;sup>3</sup>Applies to USB outputs only

<sup>&</sup>lt;sup>4</sup>Applies to SIO outputs only

<sup>&</sup>lt;sup>5</sup>SIO 24MHz outputs are 1/2 of USB48MHz frequency (twice the period). Includes cycle to cycle jitter.

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>&</sup>lt;sup>2</sup> All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REFOUT is at 14.31818MHz

<sup>&</sup>lt;sup>3</sup> Includes cycle to cycle jitter.

# Clock Periods-Differential Outputs with Spread Spectrum Enabled

Measuren	nent Window	1 Clock	1us	0.1s	0.1s	0.1s	1us	1 Clock		
Symbol		Lg-	-SSC	-ppm error	0ppm	+ ppm error	+SSC	Lg+		
Definition		Absolute Period	Short-term Average	Long-Term Average	Period	Long-Term Average	Short-term Average	Period		
Der	Definition		Minimum Absolute Period	Minimum Absolute Period	Nominal	Maxim um	Maximum	Maximum	Units	Notes
Signal Name	HTT/SRC 100	9.87456	9.99956	10.02456	10.02506	10.02556	10.05056	10.17556	ns	1,2
Signal Name	CPU 200	4.84978	4.99978	5.01228	5.01253	5.01278	5.02528	5.17528	ns	1,2

# Clock Periods-Differential Outputs with Spread Spectrum Disabled

Measuren	Measurement Window		1us	0.1s	0.1s	0.1s	1us	1 Clock		
Sy	rmbol	Lg-	-SSC	-ppm error	0ppm	+ ppm error	+SSC	Lg+		
Definition		Absolute Short-term Long-Term Period Average Average Period Average Short-term Average		Period						
Dei	Definition		Minimum Absolute Period	Minimum Absolute Period	Nominal	Maxim um	Maximum	Maximum	Units	Notes
	SRC 100	9.87450		9.99950	10.00000	10.00050		10.12550	ns	1,2
Signal Name	SATA 100	9.87450		9.99950	10.00000	10.00050		10.12550	ns	1,2
	CPU 200	4.84975		4.99975	5.00000	5.00025		5.15025	ns	1,2

<sup>&</sup>lt;sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>&</sup>lt;sup>2</sup> All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REFOUT is at 14.31818MHz

### **General SMBus Serial Interface Information**

#### **How to Write**

- · Controller (host) sends a start bit
- · Controller (host) sends the write address
- IDT clock will acknowledge
- Controller (host) sends the beginning byte location = N
- IDT clock will acknowledge
- Controller (host) sends the byte count = X
- IDT clock will acknowledge
- Controller (host) starts sending Byte N through Byte N+X-1
- IDT clock will acknowledge each byte one at a time
- Controller (host) sends a Stop bit

	Index Blo	ock '	Write Operation
Controll	er (Host)		IDT (Slave/Receiver)
Т	starT bit		
Slave A	Address		
WR	WRite		
			ACK
Beginning	Byte = N		
			ACK
Data Byte	Count = X		
			ACK
Beginnin	g Byte N		
			ACK
0		×	
0		X Byte	0
0		ė	0
			0
Byte N	Byte N + X - 1		
			ACK
Р	stoP bit		

Read Address	Write Address
D3 <sub>(H)</sub>	D2 <sub>(H)</sub>

#### **How to Read**

- · Controller (host) will send a start bit
- Controller (host) sends the write address
- IDT clock will acknowledge
- Controller (host) sends the beginning byte location = N
- IDT clock will acknowledge
- Controller (host) will send a separate start bit
- · Controller (host) sends the read address
- IDT clock will acknowledge
- IDT clock will send the data byte count = X
- IDT clock sends Byte N+X-1
- IDT clock sends Byte 0 through Byte X (if X<sub>(H)</sub> was written to Byte 8)
- Controller (host) will need to acknowledge each byte
- Controller (host) will send a not acknowledge bit
- · Controller (host) will send a stop bit

	Index Block F	Read O	peration
Cor	ntroller (Host)		IDT (Slave/Receiver)
Т	starT bit		
SI	ave Address		
WR	WRite		
			ACK
Begi	Beginning Byte = N		
			ACK
RT	Repeat starT		
SI	ave Address		
RD	ReaD		
			ACK
			Data Byte Count=X
	ACK		
			Beginning Byte N
	ACK		
		ę	0
	0	X Byte	0
	0	×	0
	0		
			Byte N + X - 1
N	Not acknowledge		
Р	stoP bit		

SMBus Table: Output Enable Control Register

Byte	0	Name	Description	Туре	0	1	Default
	Bit 7	HTT1_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 6	HTT0_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 5	REF0_OE	Output Enable	RW	Low	Enabled	1
	Bit 4	REF1_OE	Output Enable	RW	Low	Enabled	1
	Bit 3	SIO_0_OE	Output Enable	RW	Hi-Z	Enabled	1
	Bit 2	SIO_1_OE	Output Enable	RW	Low	Enabled	1
	Bit 1	48MHz_1_OE	Output Enable	RW	Low	Enabled	1
	Bit 0	48MHz_0_OE	Output Enable	RW	Low	Enabled	1

SMBus Table:Output Enable Control Register

Byte	1	Name	Control Function	Type	0	1	Default
	Bit 7	SRC13_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 6	SRC12_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 5	SRC11_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 4	SRC10_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 3	SRC9_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 2	SRC8_OE	Output Enable	RW	Low/Low	Enabled	1
	Bit 1	SRC7_OE	Output Enable	RW	Low/Low	Enabled	1
ſ	Bit 0	SRC6_OE	Output Enable	RW	Low/Low	Enabled	1

SMBus Table: Output Enable Control Register

	Cilizate ration output zinatio contact neglete.								
Byte	2	Name	Control Function	Туре	0	1	Default		
	Bit 7	SRC5_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 6	SRC4_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 5	SRC3_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 4	SRC2_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 3	SRC1_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 2	SRC0_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 1	SATA_OE	Output Enable	RW	Low/Low	Enabled	1		
	Bit 0	CPU0_OE	Output Enable	RW	Low/Low	Enabled	1		

SMBus Table: CPU/HTT Frequency and Output Enable Control Register

Byte	3	Name	Control Function	Туре	0	1	Default
	Bit 7	CPU3_OE	Output enable	RW	Low/Low	Enabled	1
	Bit 6	CPU2_OE	Output enable	RW	Low/Low	Enabled	1
	Bit 5	CPU1_OE	Output enable	RW	Low/Low	Enabled	1
	Bit 4	CPU SS Enable	Spread Enable	RW	SS Off	SS On	0
	Bit 3	CPU Spread Type	Down or Center Spread	RW	0.5% Down Spread	0.5% Center Spread (+/-0.25%)	0
	Bit 2	CPU_FS2	CPU Frequency Select	RW	•	ency Select Table	1
	Bit 1	CPU_FS1	CPU Frequency Select	RW	Default value corresponds to 200MHz.  Note that HTT frequency tracks the CPU frequency		0
	Bit 0	CPU_FS0	CPU Frequency Select LSB	RW	and is equal t	o 1/2 for CPU.	0

SMBus Table: SRC Frequency Control Register

Byte	4	Name	Control Function	Type	0	1	Default			
	Bit 7		R	eservec			0			
	Bit 6		R	eserve			0			
	Bit 5		Reserved							
	Bit 4	SRC SS Enable	Spread Enable	RW	SS Off	SS On	0			
	Bit 3	SRC Spread Type	Down or Center Spread	RW	0.5% Down Spread	0.5% Center Spread	0			
	Bit 2	SRC_FS2	SRC Frequency Select	RW	Soo SDC Frogue	anov Sologt Table	1			
	Bit 1	SRC_FS1	SRC Frequency Select	RW	See SRC Frequency Select Table		0			
	Bit 0	SRC_FS0	SRC Frequency Select LSB	RW	Default Corresponds to 100MHz					

SMBus Table: N-Step Select and SIO Readback Register

Byte	5	Name	Control Function	Туре	0	1	Default		
	Bit 7	SIO_SEL	Selects 24MHz or 48MHz	R	24MHz	48MHz	Latch		
	Bit 6	CPU M/N En	CPU PLL M/N Prog. Enable	RW	M/N Prog. Disabled	M/N Prog. Enabled	0		
	Bit 5	SRC M/N En	SRC M/N Prog.Enable	RW	M/N Prog. Disabled	M/N Prog. Enabled	0		
	Bit 4	Test_Sel	Selects Test Mode	RW	Normal mode	All ouputs are REF/N	0		
	Bit 3		R	Reserved					
	Bit 2	IO_VOUT2	IO Output Voltage Select (Most Significant Bit)	RW	See Table 9:	/ IO Salaation	1		
	Bit 1	IO_VOUT1	IO Output Voltage Select	IO Output Voltage Select RW See Table 2: V_IO Selection			0		
	Bit 0	IO_VOUT0	IO Output Voltage Select (Least Significant Bit)	RW	(Default is 0.8V)		1		

SMBus Table: Byte Count Register

Byte	6	Name	Control Function	Туре	0	1	Default
	Bit 7		F	Reserve	ı		0
	Bit 6		F	Reserve	i		0
	Bit 5	BC5	BC5 Byte Count bit 5 (MSB) RW				0
	Bit 4	BC4	Byte Count bit 4	RW	W		0
	Bit 3	BC3	Byte Count bit 3	RW	Determines the number of	of bytes that are read back	1
	Bit 2	BC2	Byte Count bit 2	RW	from the device. Default is 08 hex.		0
	Bit 1	BC1	Byte Count bit 1	Count bit 1 RW		0	
	Bit 0	BC0	Byte Count bit 0 (LSB)	RW			0

SMBus Table: Device ID register

Byte	7	Name	Control Function	Туре	0	1	Default
	Bit 7	Device ID7		R			Х
	Bit 6	Device ID6		R			х
	Bit 5	Device ID5		R			Х
	Bit 4	Device ID4	Device ID	R	90 hay fa	r 932S820	Х
	Bit 3	Device ID3	Device ib	R	OB HEX IO	1 9323020	Х
	Bit 2	Device ID2		R			Х
	Bit 1	Device ID1		R			х
	Bit 0	Device ID0	7	R			Х

SMBus Table: Vendor & Revision ID Register

Byte	8	Name	Control Function	Туре	0	1	Default
	Bit 7	RID3		R	Boy A	= 0000	Х
	Bit 6	RID2	REVISION ID	R	-		Х
	Bit 5	RID1	NEVISION ID	R	Rev B = 0001 Rev C = 0010	Х	
	Bit 4	RID0		R		= 0010	Х
	Bit 3	VID3		R	-	-	0
	Bit 2	VID2	VENDOR ID	R		-	0
	Bit 1	VID1	VENDOR ID	R		0	
	Bit 0	VID0		R	-	-	1

SMBus Table: WatchDog Timer Control Register

			Control Function	Type	U	I	Default
E	Bit 7	HWD_EN	Watchdog Hard Alarm Enable	RW	Disable and Reload Hartd Alarm Timer, Clear WD Hard status bit.	Enable Timer	0
	Bit 6	SWD_EN	Watchdog Soft Alarm Enable	RW	Disable	Enable	0
	Bit 5	WD Hard Status	WD Hard Alarm Status	R	Normal	Alarm	Χ
	Bit 4	WD Soft Status	WD Soft Alarm Status	R	Normal	Alarm	Χ
E	Bit 3	WDTCtrl	Watch Dog Alarm Time base Control	RW	290ms Base	1160ms Base	0
	Bit 2	HWD2	WD Hard Alarm Timer Bit 2	RW	These bits represent the n	umber of Watch Dog Time	1
E	Bit 1	HWD1	WD Hard Alarm Timer Bit 1	RW	Base Units that pass before	e the Watch Alarm expires.	1
E	Bit 0	HWD0	WD Hard Alarm Timer Bit 0	RW	Default is 7 X	( 290ms = 2s.	1

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SMBus Table: WD Timer Safe Frequency Control Register

Byte	10	Name	Control Function	Type	0	1	Default
	Bit 7	SWD2	WD Soft Alarm Timer Bit 2	RW	These bits represent the number of Watch Dog Time		1
	Bit 6	SWD1	WD Soft Alarm Timer Bit 1	RW	Base Units that pass before the Watch Alarm expires		1
	Bit 5	SWD0	WD Soft Alarm Timer Bit 0	RW		t is 7 X 290ms = 2s.	
	Bit 4	WD SF4		RW	1	fe frequency that the device	0
	Bit 3	WD SF3	Watch Dog Hard Alarm Safe	RW	returns to if the Watchdog	Hardware Timer expires.	0
	Bit 2	WD SF2	Freq Programming bits	RW	The value show here cor	responds to the power up	1
	Bit 1	WD SF1	r req r rogramming bits	RW	default of the device. See th	efault of the device. See the various Frequency Selec	
	Bit 0	WD SF0		RW	Tables for the ex	cact frequencies.	0

SMBus Table: CPU PLL Frequency Control Register

Byte	11	Name	Control Function	Туре	0	1	Default
	Bit 7	N Div2	N Divider Prog bit 2	RW			Х
	Bit 6	N Div1	N Divider Prog bit 1	RW			Χ
	Bit 5	M Div5		RW	The decimal representation	n of M and N Divider in Byte	Χ
	Bit 4	M Div4		RW	16 and 17 will configure the	VCO frequency. Default at	Χ
	Bit 3	M Div3	M Divider Programming bits	RW	power up = Byte 3 Rom t	table. See M/N Caculation	Χ
	Bit 2	M Div2	Wi Divider i Togramming bits	RW	Tables for VCO fr	equency formulas.	Χ
	Bit 1	M Div1		RW			Χ
	Bit 0	M Div0		RW			Х

SMBus Table: CPU PLL Frequency Control Register

Byte	12	Name	Control Function	Туре	0	1	Default
	Bit 7	N Div10		RW			X
	Bit 6	N Div9		RW			Х
	Bit 5	N Div8		RW	The decimal representation	n of M and N Divider in Byte	Х
	Bit 4	N Div7	N Divider Programming	RW	16 and 17 will configure the	VCO frequency. Default at	Х
	Bit 3	N Div6	b(10:3)	RW	power up = Byte 3 Rom t	able. See M/N Caculation	Х
	Bit 2	N Div5		RW	Tables for VCO fr	equency formulas.	Х
	Bit 1	N Div4		RW			Х
ſ	Bit 0	N Div3		RW			Х

SMBus Table: CPU PLL Spread Spectrum Control Register

Byte	13	Name	Control Function	Туре	0	1	Default
	Bit 7	SSP7		RW			Х
	Bit 6	SSP6		RW			Х
	Bit 5	SSP5		RW			Х
	Bit 4	SSP4	Spread Spectrum	RW	These bits set the CPU	spread pecentage.Please	Х
	Bit 3	SSP3	Programming b(7:0)	RW	contact IDT for the	appropriate values.	Х
	Bit 2	SSP2	7	RW			Х
	Bit 1	SSP1		RW			X
	Bit 0	SSP0		RW			Х

SMBus Table: CPU PLL Spread Spectrum Control Register

Byte	14	Name	Control Function	Type	0	1	Default
	Bit 7	SSP15		RW			Х
	Bit 6	SSP14		RW			Χ
	Bit 5	SSP13		RW			Χ
	Bit 4	SSP12	Spread Spectrum	RW	These bits set the CPU	spread pecentage.Please	Χ
	Bit 3	SSP11	Programming b(15:8)	RW	contact IDT for the	appropriate values.	Х
	Bit 2	SSP10		RW			Х
	Bit 1	SSP9		RW			Х
	Bit 0	SSP8		RW			Х

Note: If CLKREQA and CLKREQB are both selected to control an output, the control condition is an OR function. CLKREQA# = 0 OR CLKREQB = 0 results in the controlled output running.

SMBUS Table: SRC Frequency Control Register

Byte	15	Name	Control Function	Type	0	1	Default
	Bit 7	N Div2	N Divider Prog bit 2	RW			Χ
	Bit 6	N Div1	N Divider Prog bit 1	RW			Χ
	Bit 5	M Div5		RW	The decimal representation of M and N Divider in Byte	Χ	
	Bit 4	M Div4		RW	•	SRC VCO frequency. See	Χ
	Bit 3	M Div3	M Divider Programming	RW	J	r VCO frequency formulas.	Χ
	Bit 2	M Div2	bit (5:0)	RW	W/N Caculation Tables to	r vco irequency formulas.	Χ
	Bit 1	M Div1		RW			Χ
	Bit 0	M Div0		RW			Χ

SMBUS Table: SRC Frequency Control Register

Byte	16	Name	Control Function	Туре	0	1	Default
	Bit 7	N Div10		RW			Χ
	Bit 6	N Div9		RW			Χ
	Bit 5	N Div8	N Divider Programming	RW	The decimal representation	n of M and N Divider in Byte	Χ
	Bit 4	N Div7	Byte16 bit(7:0) and Byte15	RW	•	SRC VCO frequency. See	Χ
	Bit 3	N Div6	bit(7:6)	RW	_	r VCO frequency formulas.	Χ
	Bit 2	N Div5	Dit(7.0)	RW	W/N Caculation Tables 10	vco frequency formulas.	Χ
	Bit 1	N Div4		RW			Χ
	Bit 0	N Div3		RW			X

SMBUS Table: SRC Spread Spectrum Control Register

Byte	17	Name	Control Function	Type	0	1	Default
	Bit 7	SSP7		RW			X
	Bit 6	SSP6		RW			Х
	Bit 5	SSP5		RW			Х
	Bit 4	SSP4	Spread Spectrum	RW	These bits set the SRC s	pread pecentages.Please	Х
	Bit 3	SSP3	Programming bit(7:0)	RW	contact IDT for the	appropriate values.	Х
	Bit 2	SSP2	. , ,	RW			Х
	Bit 1	SSP1		RW			Х
	Bit 0	SSP0		RW			Х

SMBUS Table: SRC Spread Spectrum Control Register

Byte	18	Name	Control Function	Туре	0	1	Default
	Bit 7	SSP15		RW			Χ
	Bit 6	SSP14		RW			Χ
	Bit 5	SSP13		RW			Χ
	Bit 4	SSP12	Spread Spectrum	RW	These bits set the SRC s	pread pecentages.Please	Χ
	Bit 3	SSP11	Programming bit(15:8)	RW	contact IDT for the	appropriate values.	Χ
	Bit 2	SSP10		RW			Χ
	Bit 1	SSP9		RW			Χ
	Bit 0	SSP8		RW			Χ

SMBus Table: SRC N Divider Control Register

Byte	19	Name	Control Function	Туре	0	1	Default
	Bit 7	SRC NDiv0	LSB N Divider Programming	RW	N Divider LSB (bit 0) for	SRC M/N programming.	Χ
	Bit 6		R	eserved			0
	Bit 5		R	eserved			0
	Bit 4		R	eserved			0
	Bit 3		R	eserved			0
	Bit 2		R	eserved			0
	Bit 1		R	eserved			0
ſ	Bit 0		R	eserved			0

SMBUS Table: CPU Output Divider Register

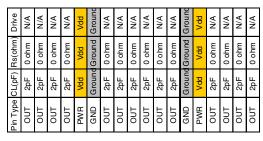
Byte	20	Name	Control Function	Type	0	1	Default
	Bit 7	CPU NDiv0	LSB N Divider Programming	RW	Byte 20 has the N Divide	r LSB (bit 0) for CPU M/N	Х
	Bit 6		R	eserved			0
	Bit 5		R	eserved			0
	Bit 4		R	eserved			0
	Bit 3	CPUDiv3		RW	0000:/2 ; 0100:/4	1000:/8 ; 1100:/16	Χ
	Bit 2	CPUDiv2	CPU Divider Ratio	RW	0001:/3 ; 0101:/6	1001:/12 ; 1101:/24	Χ
	Bit 1	CPUDiv1	Programming Bits	RW	0010:/5; 0110:/10	1010:/20 ; 1110:/40	Χ
	Bit 0	CPUDiv0		RW	0011:/9 ; 0111:/18	1011:/36 ; 1111:/72	Х

#### Bytes 21 to 63 Are Reserved

#### CPU, SRC and PCI Divider Ratios

Div(3:0)	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
Divider	2	3	5	15	4	6	10	30	8	12	20	60	16	24	40	120

### **Drive Strength and Terminations**



	SRC13T_LPRS	SRC13C_LPRS	SRC12T_LPRS	SRC12C_LPRS	VDDSRC_3.3	GNDSRC	SRC11T_LPRS	SRC11C_LPRS	SRC10T_LPRS	SRC10C_LPRS	SRC9T_LPRS	SRC9C_LPRS	GNDSRC	VDDSRC_3.3	SRC8T_LPRS	SRC8C_LPRS	SRC7T_LPRS	SRC7C_LPRS	
	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	
TA_3.3 1																			

Drive	Rs(ohm)	CL(pF)	Pin Type
Vdd	Vdd	Vdd	PWR
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
Ground	Ground	Ground	GND
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
Vdd	Vdd	Vdd	PWR
Ground	Ground	Ground	GND
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
I/O	I/O	I/O	I/O
N/A	0 ohm	2pF	OUT
N/A	0 ohm	2pF	OUT
Ground	Ground	Ground	PWR

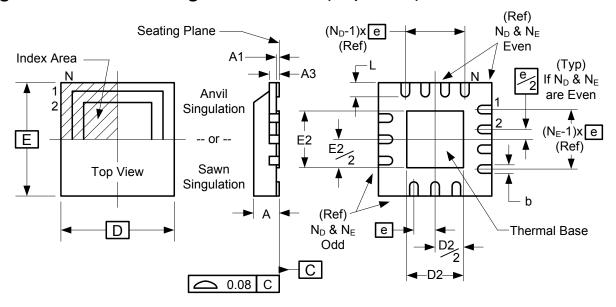
	SRC1	SRC1	SRC1	SRC1	VDDS	GND	SRC1	SRC1	SRC1	SRC1	SRCS	SRC9	GND:	VDDS	SRCE	SRC8	SRC7	SRC7	
	72				68			65			62	61	60	59			56		
VDDSATA_3.3 1																			54 SRC6T_LPRS
SATAC_LPRS 2																			53 SRC6C_LPRS
SATAT_LPRS 3																			52 SRC5T_LPRS
GNDSATA 4																			51 SRC5C_LPRS
CPUKG0C_LPRS 5																			50 VDDSRC_3.3
CPUKG0T_LPRS 6																			49 GNDSRC
CPUKG1C_LPRS 7																			48 SRC4T_LPRS
CPUKG1T_LPRS 8																			47 SRC4C_LPRS
VDDCPU_3.3 9							9	32	2	80	90	C							46 SRC3T_LPRS
GNDCPU 10 CPUKG2C LPRS 11							J.	<u></u>		0.	,,	•							45 SRC3C_LPRS
CPUKG2C_LPRS 11 CPUKG2T LPRS 12																			44 SRC2T_LPRS 43 SRC2C LPRS
CPUKG3C_LPRS 13																			42 GNDSRC
CPUKG3T LPRS 14																			41 VDDSRC 3.3
RESTORE# 15																			40 SRC1T LPRS
HTT0C_LPRS 16																			39 SRC1C_LPRS
HTTOT LPRS 17																			38 SRC0T_LPRS
GNDHTT 18																			37 SRC0C_LPRS
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
	3.3	38	3S	¥	۲	X	X2	3.3	0=	F1	Ш	48	0	_	6.3	S	ω	0	
		ä	4	SMBCLK	SMBDAT	^	•	- 1	REFO	REF1	GNDREF	GND48	48MHz_0	48MHz_1	VDD48_3.3	1.8/SIO_S	SIO_1_1	GNDSIO	
	÷	2	긭	Ĭ	Ĭ			띭	_	_	ž	ਯ	8	8≥	4	8/S	o	Z.	
	VDDHTT	HTT1C_LPRS	HTT1T_LPRS	0)	0)			VDDREF			9		4	4	9		S	_	
	7	Ξ	도					7								0			

Pin Type	CL(pF)	Rs(ohm)
OUT	2pF	0 ohm
PWR	Vdd	Vdd
GND	Ground	Ground
OUT	2pF	0 ohm
GND	Ground	Ground
PWR	Vdd	Vdd
OUT	2pF	0 ohm

Pin Type	PWR	OUT	TUO	Z	O/I	N	TUO	PWR	TUO	TUO	GND	GND	TUO	TUO	PWR	0/1	TUO	GND
CL(pF)	ρpΛ	2pF	2pF	SCLK	SDATA	30pF	30 pF	ρpΛ	3.9pF	3.9pF	Ground	Ground	3.9pf	3.9pf	ρpΛ	3.9pf	3.9pf	Ground
Rs(ohm) CL(pF)	ρρΛ	0 ohm	0 ohm	SCLK	SDATA	N/A	N/A	ρpΛ	39 ohm	39 ohm	Ground	Ground	39 ohm	39 ohm	ρpΛ	29 ohm	29 ohm	Ground
Drive	Ndd	A/N	N/A	SCLK	SDATA	N/A	N/A	ρpΛ	2X	2X	Ground	Ground	2X	2X	Ndd	1X	1X	Ground

Resistor values are for default drive strength driving a single transmission line with Zo = 50 ohms!

### Package Outline and Package Dimensions (72-pin MLF)



	Millim	eters
Symbol	Min	Max
Α	0.8	1.0
A1	0	0.05
A3	0.25 Re	ference
b	0.18	0.3
е	0.50 E	BASIC
D x E BASIC	10.00 >	(10.00
D2 MIN./MAX.	5.75	6.15
E2 MIN./MAX.	5.75	6.15
L MIN./MAX.	0.3	0.5
$N_D$	1	8
N <sub>E</sub>	1	8

# **Ordering Information**

Part / Order Number	Marking	<b>Shipping Packaging</b>	Package	Temperature
932S890CKLF	see page 13	Trays	72-pin MLF	0 to +70° C
932S890CKLFT		Tape and Reel	72-pin MLF	0 to +70° C

<sup>&</sup>quot;LF" suffix to the part number are the Pb-Free configuration and are RoHS compliant.

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<sup>&</sup>quot;C" is the device revision designator (will not correlate with the datasheet revision).

## **Revision History**

Rev.	Issue Date	Who	Description	Page #
Α	1/15/2009	RDW	Updates to pin descriptions, electrical tables, power tables, release to final	Various
В	2/26/2009	RDW	Updates to pin 71 & 72 descriptions.	3
			1. Updated PPM tolerances to +/-50ppm from +/-100ppm	
			2. Updated clock periods to reflect this.	
			3. Added footnote 3 to 14.318M Electrical Table	
			4. Updated ppm reference on page 1 to reflect this.	
С	2/10/2011	RDW	5. Added clock periods table after page 10.	1,8,9,10,19
D	5/20/2011	RDW	Updated to new datasheet template.	Various

932S890C RD890 SYSTEM CLOCK FOR AMD-BASED SERVERS

**SYNTHESIZERS** 

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(Rev.1.0 Mar 2020)

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