



Features

- SLG505YC56D is compliant to Intel CK505 clock specification
- Ideal for both desktop and mobile application
- TME (Trusted Mode Enable) input to disable over-clocking support
- New “SR” type differential output to reduce power consumption and improve signal integrity
- CLK_REQ# inputs to support SRC clock power management
- 3.3 and low voltage (0.8V) I/O Power Supply
- 56 pin TSSOP Package

Output Summary

- 2- differential CPU clock outputs @ 0.8V
- 1 - selectable differential CPU/SRC clock output @ 0.8V
- 1 - selectable differential DOT96/SRC clock output @ 0.8V
- 6 - differential Serial Reference Clock (SRC) clock outputs @ 0.8V
- 1 - differential SATA clock output @ 0.8V
- 1 - single-ended 48MHz clock output @ 3.3V
- 6 - single-ended 33MHz clock outputs @ 3.3V
- 1 - single-ended 14.318MHz clock output @ 3.3V

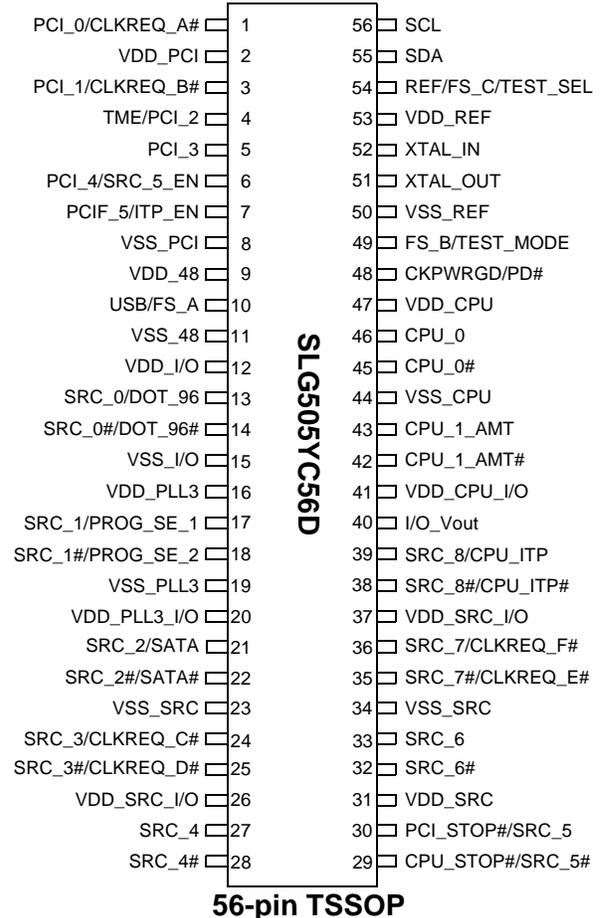
Table 1. Frequency Select Table (FS_C, FS_B, FS_A)

FS_C	FS_B	FS_A	CPU (MHz)	SRC (MHz)	PCI (MHz)	REF (MHz)	DOT_96 (MHz)	USB (MHz)	
0	0	0	266.6	100.0	33.3	14.318	96.0	48.0	
0	0	1	133.3	100.0	33.3	14.318	96.0	48.0	
0	1	0	200.0	100.0	33.3	14.318	96.0	48.0	
0	1	1	166.6	100.0	33.3	14.318	96.0	48.0	
1	0	0	333.3	100.0	33.3	14.318	96.0	48.0	
1	0	1	100.0	100.0	33.3	14.318	96.0	48.0	
1	1	0	400.0	100.0	33.3	14.318	96.0	48.0	
1	1	1	Reserved						

Table 2. PROG_SE_1 and PROG_SE_2 Configuration

B1b4	B1b3	B1b2	B1b1	PROG_SE_1 Pin 17	PROG_SE_2 Pin 18
0	0	0	0	SRC_1	SRC_1#
0	0	0	1	SRC_1 (LCD_CLK Stdby)	SRC_1# (LCD_CLK Stdby)
0	0	1	0	LCD_CLK (-0.5% SS)	LCD_CLK# (-0.5% SS)
0	0	1	1	LCD_CLK (-1.0% SS)	LCD_CLK# (-1.0% SS)
0	1	0	0	LCD_CLK (-1.5% SS)	LCD_CLK# (-1.5% SS)
0	1	0	1	LCD_CLK (-2.0% SS)	LCD_CLK# (-2.0% SS)
0	1	1	0	LCD_CLK (-2.5% SS)	LCD_CLK# (-2.5% SS)
0	1	1	1	Reserved	
1	0	0	0	24.576MHz	24.576MHz
1	0	0	1	24.576MHz	98.304MHz
1	0	1	0	98.304MHz	98.304MHz
1	0	1	1	27MHz	27MHz
1	1	0	0	25MHz	25MHz
1	1	0	1	Reserved	
1	1	1	0	Reserved	
1	1	1	1	Reserved	

Pin Configuration



Other brands and names may be claimed as the property of others



Pin Description

Pin #	Name	Type	Description
1	PCI_0/CLKREQ_A#	I/O, SE	Configurable PCI clock output or CLKREQ input.
2	VDD_PCI	PWR	3.3V power supply for outputs.
3	PCI_1/CLKREQ_B#	I/O, SE	Configurable PCI clock output or CLKREQ input.
4	TME/PCI_2	I/O, SE	PCI clock output. TME (Trusted Mode Enabled) strap input. Only SLG84505 supports TME input. In SLG84515, this pin will be defined as PCI_2 output.
5	PCI_3	O, SE	PCI clock output.
6	PCI_4/SRC_5_EN	I/O, SE	PCI clock output. When SRC_5_EN is sampled HIGH during CKPWRGD assertion, it will configure PCI_STOP#/SRC_5 and CPU_STOP#/SRC_5# as SRC_5 and SRC_5# respectively. When SRC_5_EN is sampled LOW, it will configure these pins as PCI_STOP# and CPU_STOP#.
7	PCIF_5/ITP_EN	I/O, SE	Free running PCI clock output. When ITP_EN input is sampled HIGH during CKPWRGD assertion, it will configure CPU_ITP/SRC_8 as CPU output.
8	VSS_PCI	GND	Ground for outputs.
9	VDD_48	PWR	3.3V power supply for outputs.
10	USB/FS_A	I/O, SE	USB clock output. Frequency Select input to determine CPU output frequency.
11	VSS_48	GND	Ground for outputs.
12	VDD_I/O	PWR	Low voltage I/O power supply for outputs.
13	SRC_0/DOT_96	O, DIF	Configurable SRC or 96 MHz DOT clock output.
14	SRC_0#/DOT_96#	O, DIF	Configurable SRC or 96 MHz DOT clock output.
15	VSS_I/O	GND	Ground for outputs.
16	VDD_PLL3	PWR	3.3V power supply for outputs.
17	SRC_1/PROG_SE_1	O, DIF/SE	Configurable SRC or Programmable SE output. SE output can be configured as 24.576MHz, 27MHz or 25MHz.
18	SRC_1#/PROG_SE_2	O, DIF/SE	Configurable SRC or Programmable SE output. SE output can be configured as 24.576MHz, 27MHz or 25MHz.
19	VSS_PLL3	GND	Ground for outputs.
20	VDD_PLL3_I/O	PWR	Low voltage I/O power supply for outputs.
21	SRC_2/SATA	O, DIF	Configurable Serial Reference clock for SATA or PCI Express device.
22	SRC_2#/SATA#	O, DIF	Configurable Serial Reference clock for SATA or PCI Express device.
23	VSS_SRC	GND	Ground for outputs.
24	SRC_3/CLKREQ_C#	I/O	Configurable differential CPU clock output or CLKREQ input.
25	SRC_3#/CLKREQ_D#	I/O	Configurable differential CPU clock output or CLKREQ input.
26	VDD_SRC_I/O	PWR	Low voltage I/O power supply for outputs.
27	SRC_4	O, DIF	Differential Serial Reference Clock output.
28	SRC_4#	O, DIF	Differential Serial Reference Clock output.



Pin Description (continued)

Pin #	Name	Type	Description
29	CPU_STOP#/SRC_5#	I/O	Configurable CPU_STOP# input or differential Serial Reference Clock output.
30	PCI_STOP#/SRC_5	I/O	Configurable PCI_STOP# input or differential Serial Reference Clock output.
31	VDD_SRC	PWR	3.3V power supply for outputs.
32	SRC_6#	O, DIF	Differential Serial Reference Clock output.
33	SRC_6	O, DIF	Differential Serial Reference Clock output.
34	VSS_SRC	GND	Ground for outputs.
35	SRC_7#/CLKREQ_E#	I/O	Configurable differential CPU clock output or CLKREQ input.
36	SRC_7/CLKREQ_F#	I/O	Configurable differential CPU clock output or CLKREQ input.
37	VDD_SRC_I/O	PWR	Low voltage I/O power supply for outputs.
38	SRC_8#/CPU_ITP#	O, DIF	Selectable differential CPU or SRC output. It will configure as CPU clock when ITP_EN is sampled HIGH. It will configure as SRC clock when ITP_EN is sampled LOW.
39	SRC_8/CPU_ITP	O, DIF	Selectable differential CPU or SRC output. It will configure as CPU clock when ITP_EN is sampled HIGH. It will configure as SRC clock when ITP_EN is sampled LOW.
40	I/O_Vout	O, SE	I/O voltage reference output.
41	VDD_CPU_I/O	PWR	Low voltage I/O power supply for outputs.
42	CPU_1_AMT#	O, DIF	Differential CPU Clock output.
43	CPU_1_AMT	O, DIF	Differential CPU Clock output.
44	VSS_CPU	GND	Ground for outputs.
45	CPU_0#	O, DIF	Differential CPU Clock output.
46	CPU_0	O, DIF	Differential CPU Clock output.
47	VDD_CPU	PWR	3.3V power supply for outputs.
48	CKPWRGD/PD#	I	CKPWRGD is a 3.3V LVTTTL input. It acts as a level sensitive strobe to latch the FS pins and other multiplexed inputs. After CKPWRGD assertion, it becomes a real time input for asserting power down (active high).
49	FS_B/TEST_MODE	I	Frequency Select input to determine CPU output frequency. When in test mode, FS_B/TEST_MODE will configure outputs to run at REF or Hi-Z. 0 = Hi-Z, 1 = REF
50	VSS_REF	GND	Ground for outputs.
51	XTAL_OUT	O, SE	14.318MHz crystal output.
52	XTAL_IN	I	14.318MHz crystal input.
53	VDD_REF	PWR	3.3V power supply for outputs.
54	REF/FS_C/TEST_SEL	I/O, SE	14.318 reference clock output. When FS_C/TEST_SEL input is pulled to 3.3V during CKPWRGD# assertion, the device will configure into TEST MODE. Refer to DC Parameters section for FS input voltage threshold. After CKPWRGD assertion, this pin will be configured as REF output.
55	SDA	I/O, SE	Serial Interface bus data input and output.
56	SCL	I	Serial Interface bus clock input.



Block Diagram

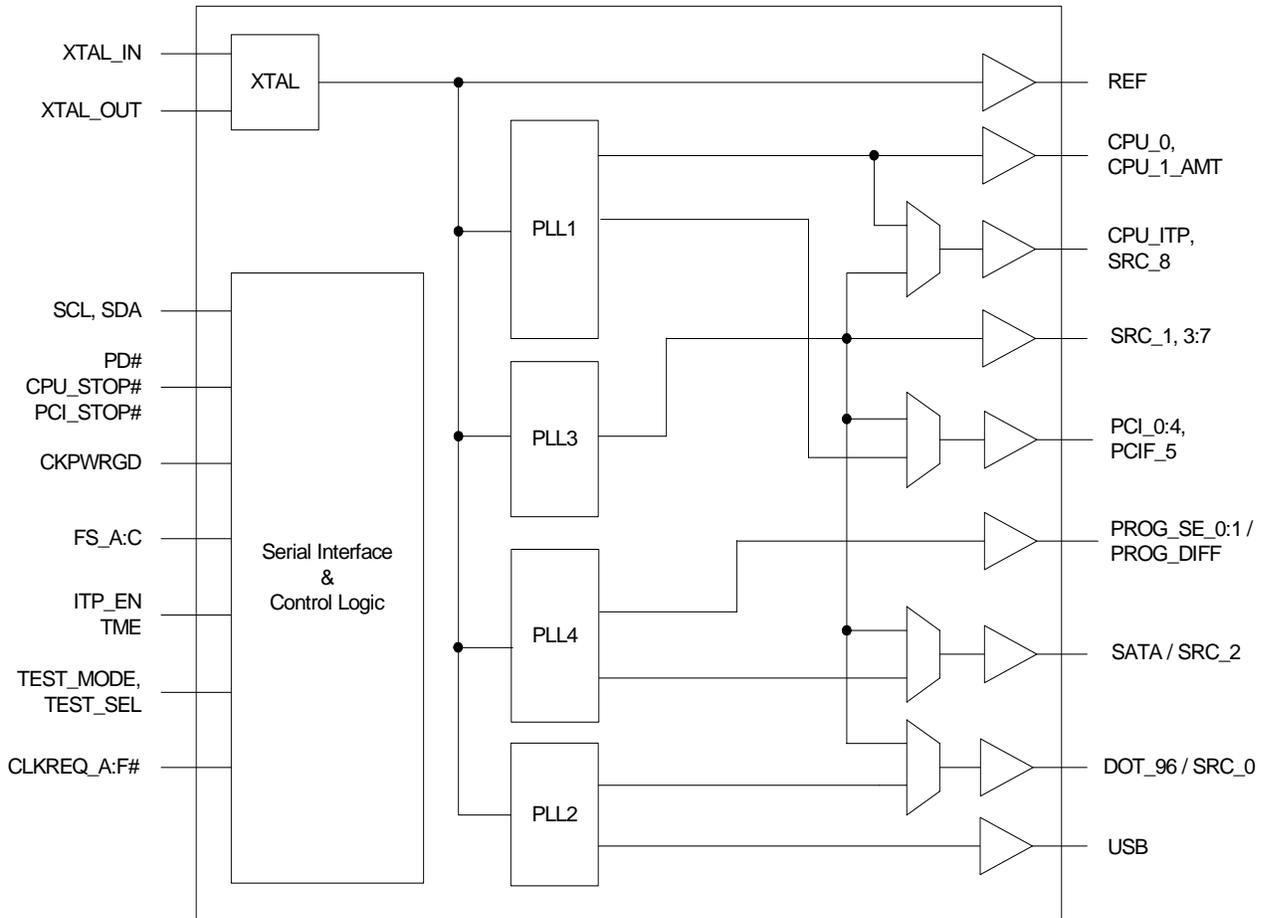


Figure 1. Simplified Block Diagram



Low Voltage type “SR” differential output buffer

The CK505 utilizes a new output buffer for all differential clocks. The low power type SR buffer is a departure from the type X buffer used in previous CK410 clock generators. The type SR buffer uses efficient NMOS push-pull drivers powered off a low voltage power rail, offering a reduction in power consumption, improve edge rate performance, and cross point voltage control.

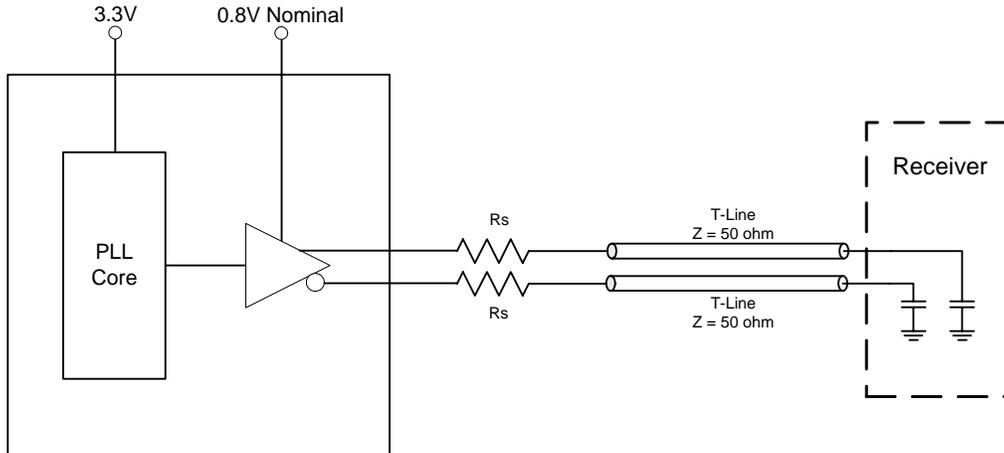


Figure 2. Type SR Differential Output Buffer

CK505 Integrated Linear Regulator and Control

The CK505 features an internal regulator to provide a low voltage reference not possible with common discrete low dropout (LDO) linear regulators. An on-die comparator is used to drive the variable IO_Vout reference voltage to an external pass element such as a common 2N3904 (SOT23) NPN transistor for platform using a Vin > +1.5V or a BSS138 MOSFET for platforms using a Vin < +1.5V to provide a low voltage power supply for the type SR buffers.

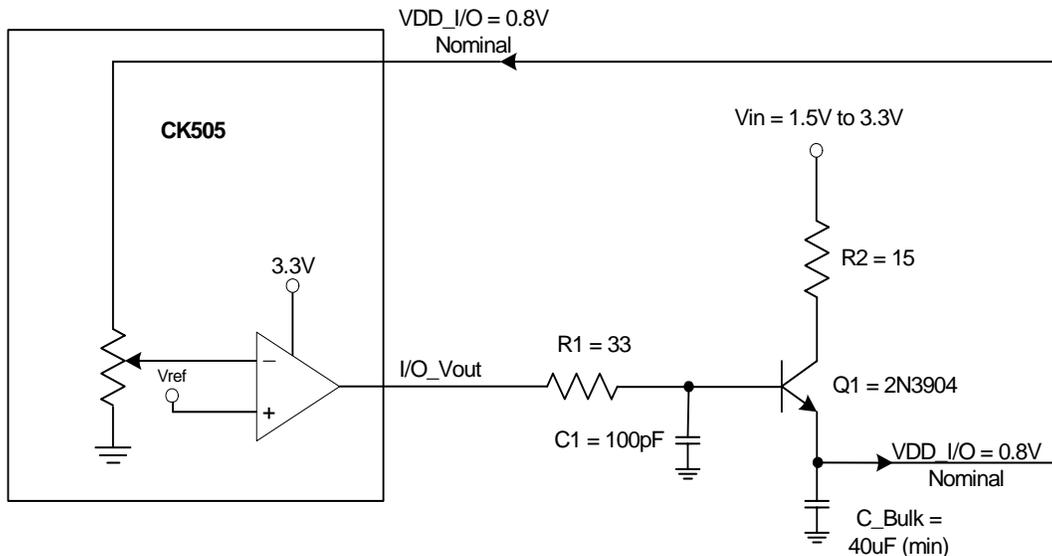


Figure 3. CK505 Integrated Linear Regulator



Output Drive Status Summary

Table 3. Output drive status for PCI_STOP#, CPU_STOP#, CR# asserted and SMBus OE disabled

		PCI_STOP# asserted	CPU_STOP# asserted	CR# asserted	SMBus OE Disabled
Single-ended clocks	Stoppable	Driven low	Running	Running	Driven low
	Non-Stoppable	Running	Running	Running	
Differential Clocks	Stoppable	Clock driven high Clock# driven low	Clock driven high Clock# driven low	Clock and Clock# are Hi-Z	Clock and Clock# are Hi-Z
	Non-Stoppable	Running	Running	Running	

Table 4. Output drive status during different power management state

	All Single-ended Clocks		All Differential Clocks, Except CPU1		CPU1	
	w/o strap	w strap	Clock	Clock#	Clock	Clock#
Latches Open State	Low	Hi-Z	Low or 20K pull-down	Low	Low or 20K pull-down	Low
Powerdown	Low	Low	Low or 20K pull-down	Low	Low or 20K pull-down	Low
M1	Low	Low	Low or 20K pull-down	Low	Running	Running
*Virtual Power Cycle to latches Open	Clock output status identical to "Latches Open State"					

*Note: Virtual Power Cycle - Latches open is accomplished by first programming the PD_RESTORE bit, byte 0, bit 0 = 0 which clears all configuration registers upon assertion of PD# low. Upon detection of PD# low, it will immediately go to "Latches Open State" and all registers and state machines will be reset as if a full power cycle has occurred.



Serial Bus Interface

A two-wire serial interface is provided as the programming interface for the clock synthesizer. The serial interface is fully compliance to the SMBus 2.0 specification. The registers associated with the two-wire interface initializes to their default setting upon power-up, and therefore use of this interface is optional.

The serial interface supports block write and block read operation from any SMBus master devices. For block write and block read operations, the bytes must be accessed in sequential order from lowest to highest byte (most significant bit first) with the ability to stop after any complete byte has been transferred. The block write and block read protocol is outlined in *Table 5*. The slave receiver address is 11010010 (D2h).

Table 5. Block Read and Block Write protocol

Block Write Protocol		Block Read Protocol	
Bit	Description	Bit	Description
1	Start	1	Start
2:8	Slave address - 7 bits	2:8	Slave address - 7 bits
9	Write	9	Write
10	Acknowledge from slave	10	Acknowledge from slave
11:18	Command Code - 8 Bit '00000000' stands for block operation	11:18	Command Code - 8 Bit '00000000' stands for block operation
19	Acknowledge from slave	19	Acknowledge from slave
20:27	Byte Count - 8 bits	20	Repeat start
28	Acknowledge from slave	21:27	Slave address - 7 bits
29:36	Data byte 0 - 8 bits	28	Read
37	Acknowledge from slave	29	Acknowledge from slave
38:45	Data byte 1 - 8 bits	30:37	Byte count from slave - 8 bits
46	Acknowledge from slave	38	Acknowledge
....	Data Byte N/Slave Acknowledge...	39:46	Data byte from slave - 8 bits
....	Data Byte N - 8 bits	47	Acknowledge
....	Acknowledge from slave	48:55	Data byte from slave - 8 bits
....	Stop	56	Acknowledge
		Data bytes from slave/Acknowledge
		Data byte N from slave - 8 bits
		Not Acknowledge
		Stop



Table 6. Byte Read and Byte Write protocol

Byte Write Protocol		Byte Read Protocol	
Bit	Description	Bit	Description
1	Start	1	Start
2:8	Slave address - 7 bits	2:8	Slave address - 7 bits
9	Write	9	Write
10	Acknowledge from slave	10	Acknowledge from slave
11:18	Command Code - 8 bits '1xxxxxx' stands for byte operation bit[6:0] of the command code represents the offset of the byte to be accessed	11:18	Command Code - 8 bits '1xxxxxx' stands for byte operation bit[6:0] of the command code represents the offset of the byte to be accessed
19	Acknowledge from slave	19	Acknowledge from slave
20:27	Data byte - 8 bits	20	Repeat start
28	Acknowledge from slave	21:27	Slave address - 7 bits
29	Stop	28	Read
		29	Acknowledge from slave
		30:37	Data byte from slave - 8 bits
		38	Not Acknowledge
		39	Stop



Control Register Summary

Control Register 0

Bit	Type	Description/Function	Power up condition
7	R	Reflected the value of FS_C pin sampled on power up	X
6	R	Reflected the value of FS_B pin sampled on power up	X
5	R	Reflected the value of FS_A pin sampled on power up	X
4	RW	iAMT Enable 0 = Legacy Mode 1 = iAMT Mode Note: Once this bit is set, it cannot be disabled or cleared by writing a "0". This bit can only be cleared by a power-on-reset.	0
3	RW	Reserved	0
2	RW	Reserved Note: In CK505 clock specification, this bit is defined as SRC output PLL source and it is based on a 3-PLL architecture. We do not implement this bit because SLG505YC56D uses a 4-PLL architecture and generate SRC clock from a dedicate PLL. We use a 4_PLL architecture to optimize SRC clock jitter performance.	0
1	RW	SATA output PLL source 0 = Same source as SRC outputs 1 = PLL2 (48M PLL) and fixed at 100MHz	0
0	RW	Configuration control for power down mode 0 = Upon assertion of PD#, the clock generator will initiate a full reset. Under this condition, the clock generator will emulate a cold power on reset internally and re-latch the FS input pins 1 = Legacy PD# input mode	1

Control Register 1

Bit	Type	Description/Function	Power up condition
7	RW	SRC_0 and DOT_96 output selection 0 = SRC_0 output 1 = DOT_96 output	0
6	RW	PLL1 (CPU PLL) center spread enable 0 = down spread 1 = center spread	0
5	RW	PLL3 (PCIEX PLL) center spread enable 0 = down spread 1 = center spread Note: This bit has no impact if SRC clocks are sourced from PLL1 (CPU PLL)	0



Control Register 1 (continued)

Bit	Type	Description/Function	Power up condition
4:1	RW	PLL3 (PCIEX PLL) configuration control 0000 = PLL3 disabled, SRC_1 uses the same PLL as other SRC outputs 0001 = 100MHz 0.5% (SSC standby, PLL3 on, SRC_1 uses the same PLL as other SRC outputs) 0010 = 100MHz 0.5% (only SRC_1 sourced from PLL3) 0011 = 100MHz 1.0% (only SRC_1 sourced from PLL3) 0100 = 100MHz 1.5% (only SRC_1 sourced from PLL3) 0101 = 100MHz 2.0% (only SRC_1 sourced from PLL3) 0110 = 100MHz 2.5% (only SRC_1 sourced from PLL3) 0111 = Reserved 1000 = 24.576MHz for Prog_SE_1 & Prog_SE_2 (1394A support) 1001 = 24.576MHz for Prog_SE_1 & 98.304Mhz for Prog_SE_2 (1394A/B support) 1010 = 98.304MHz for Prog_SE_1 & Prog_SE_2 (1394B support) 1011 = 27MHz for Prog_SE_1 & Prog_SE_2 1100 = 25MHz for Prog_SE_1 & Prog_SE_2 1101 = Reserved 1110 = Reserved 1111 = Reserved	0001
0	RW	PCI outputs PLL source 0 = PLL1 (CPU PLL) 1 = same source as SRC outputs	1

Control Register 2

Bit	Type	Description/Function	Power up condition
7	RW	REF Output Enabled 0 = Disabled 1 = Enabled	1
6	RW	48MHz Output Enabled 0 = Disabled 1 = Enabled	1
5	RW	PCIF_5 Output Enabled 0 = Disabled 1 = Enabled	1
4	RW	PCI_4 Output Enabled 0 = Disabled 1 = Enabled	1
3	RW	PCI_3 Output Enabled 0 = Disabled 1 = Enabled	1
2	RW	PCI_2 Output Enabled 0 = Disabled 1 = Enabled	1
1	RW	PCI_1 Output Enabled 0 = Disabled 1 = Enabled	1
0	RW	PCI_0 Output Enabled 0 = Disabled 1 = Enabled	1



Control Register 3

Bit	Type	Description/Function	Power up condition
7	RW	Reserved	1
6	RW	Reserved	1
5	RW	Reserved	1
4	RW	SRC_8/CPU_ITP Output Enabled 0 = Disabled 1 = Enabled	1
3	RW	SRC_7 Output Enabled 0 = Disabled 1 = Enabled	1
2	RW	SRC_6 Output Enabled 0 = Disabled 1 = Enabled	1
1	RW	SRC_5 Output Enabled 0 = Disabled 1 = Enabled	1
0	RW	SRC_4 Output Enabled 0 = Disabled 1 = Enabled	1

Control Register 4

Bit	Type	Description/Function	Power up condition
7	RW	SRC_3 Output Enabled 0 = Disabled 1 = Enabled	1
6	RW	SATA/SRC_2 Output Enabled 0 = Disabled 1 = Enabled	1
5	RW	SRC_1 Output Enabled 0 = Disabled 1 = Enabled	1
4	RW	SRC_0/DOT_96 Output Enabled 0 = Disabled 1 = Enabled	1
3	RW	CPU_1 Output Enabled 0 = Disabled 1 = Enabled	1
2	RW	CPU_0 Output Enabled 0 = Disabled 1 = Enabled	1
1	RW	PLL1 (CPU PLL) Spread Spectrum enable 0 = Disabled 1 = Enabled	1
0	RW	PLL3 (PCIEX PLL) Spread Spectrum enable 0 = Disabled 1 = Enabled Note: This bit has no impact if SRC clocks are sourced from PLL1 (CPU PLL)	1



Control Register 5

Bit	Type	Description/Function	Power up condition
7	RW	CLKREQ_A# enable 0 = Configure pin 1 as PCI_0 output 1 = Configure pin 1 as CLKREQ_A# input	0
6	RW	CLKREQ_A# mapping 0 = SRC_0 1 = SRC_2	0
5	RW	CLKREQ_B# enable 0 = Configure pin 3 as PCI_1 output 1 = Configure pin 3 as CLKREQ_B# input	0
4	RW	CLKREQ_B# mapping 0 = SRC_1 1 = SRC_4	0
3	RW	CLKREQ_C# enable 0 = Configure pin 24 as SRC_3 output 1 = Configure pin 24 as CLKREQ_C# input Note: To configure this pin as CLKREQ_C# input, SRC_3 needs to be disabled by clearing Byte[4], bit[7] to "0" before setting this bit.	0
2	RW	CLKREQ_C# mapping 0 = SRC_0 1 = SRC_2	0
1	RW	CLKREQ_D# enable 0 = Configure pin 25 as SRC_3# output 1 = Configure pin 25 as CLKREQ_D# input Note: To configure this pin as CLKREQ_D# input, SRC_3 needs to be disabled by clearing Byte[4], bit[7] to "0" before setting this bit.	0
0	RW	CLKREQ_D# mapping 0 = SRC_1 1 = SRC_4	0

Control Register 6

Bit	Type	Description/Function	Power up condition
7	RW	CLKREQ_E# enable 0 = Configure pin 35 as SRC_7# output 1 = Configure pin 35 as CLKREQ_E# input to control SRC_6 output Note: To configure this pin as CLKREQ_E# input, SRC_7 needs to be disabled by clearing Byte[3], bit[3] to "0" before setting this bit.	0
6	RW	CLKREQ_F# enable 0 = Configure pin 36 as SRC_7 output 1 = Configure pin 36 as CLKREQ_F# input to control SRC_8 output Note: To configure this pin as CLKREQ_F# input, SRC_7 needs to be disabled by clearing Byte[3], bit[3] to "0" before setting this bit.	0
5	RW	Reserved	0
4	RW	Reserved	0
3	RW	Reserved	0
2	RW	Reserved	0



Control Register 6 (continued)

Bit	Type	Description/Function	Power up condition
1	RW	PCI_STOP# control for SSCD output 0 = Free-running 1 = SSCD clock are stopped when PCI_STOP# is active	0
0	R	PCI_STOP# control for SRC outputs 0 = Free-running 1 = SRC clock are stopped when PCI_STOP# is active	0

Control Register 7

Bit	Type	Description/Function	Power up condition
7	R	Revision ID bit 3	0
6	R	Revision ID bit 2	0
5	R	Revision ID bit 1	0
4	R	Revision ID bit 0	0
3	R	Vendor ID bit 3	0
2	R	Vendor ID bit 2	1
1	R	Vendor ID bit 1	1
0	R	Vendor ID bit 0	0

Control Register 8

Bit	Type	Description/Function	Power up condition
7:4	R	Device ID 0000 = 56 pin TSSOP or SSOP 0001 = 64 pin TSSOP 0010 to 1111 = Reserved	0000
3	RW	Reserved	0
2	RW	Reserved	0
1	RW	Prog_SE_1 output enable 0 = Disabled 1 = Enabled	0
0	RW	Prog_SE_2 output enable 0 = Disabled 1 = Enabled	0

Control Register 9

Bit	Type	Description/Function	Power up condition
7	RW	PCI_STOP# control for PCIF_5 0 = Free-running 1 = PCIF_5 is stopped when PCI_STOP# is active	0
6	R	Trusted mode enabled input status 0 = Normal operation (full function) 1 = Trusted mode enabled (no over-clocking allowed)	X
5	RW	REF output drive strength control 0 = 1x (2 loads) 1 = 2x (3 loads)	1



Control Register 9 (continued)

Bit	Type	Description/Function	Power up condition
4	RW	REF or Tristate Select for Test Mode 0 = Tristate 1 = REF	0
3	RW	Test Clock Mode Entry Control 0 = Normal operation 1 = REF or Tristate mode	0
2:0	RW	IO_VOUT control 000 = 0.3V 001 = 0.4V 010 = 0.5V 011 = 0.6V 100 = 0.7V 101 = 0.8V 110 = 0.9V 111 = 1.0V	101

Control Register 10

Bit	Type	Description/Function	Power up condition
7:0	RW	Reserved	00000000

Control Register 11

Bit	Type	Description/Function	Power up condition
7:0	RW	Reserved	00000000

Control Register 12

Bit	Type	Description/Function	Power up condition
7:6	RW	Reserved	00
5:0	RW	Byte count register for block read operation Note: The default value is 13. To read more than 13 bytes, system BIOS needs to change this register to the number of bytes it intends to read.	001101

Control Register 13 (Manufacturing Test Control)

Bit	Type	Description/Function	Power up condition
7	RW	Vendor Manufacturing/Production Test Mode. Please write with "0"	0
6	RW	Vendor Manufacturing/Production Test Mode. Please write with "0"	0
5:0	RW	Reserved	000000



Control Register 14 (Programmable CPU)

Bit	Type	Description/Function	Power up condition
7	RW	Frequency Select Source 0 = HW (Latched FS inputs) 1 = SW (Output frequency controlled by the value of bit[6:2]) Note: This bit will be forced to a "0" when TME is enabled.	0
6:2	RW	SW Frequency Select bit[4:0] Note: Default settings for bit[2:0] are determined by the latched value of FS_C to FS_A inputs.	00xxx
1	RW	Bit 9 of programmable CPU frequency	0
0	RW	Bit 8 of programmable CPU frequency	1

Control Register 15 (Programmable CPU Frequency Value)

Bit	Type	Description/Function	Power up condition
7:0	RW	Bit[7:0] of programmable CPU frequency SMArT Programming Interface 10-bit control register to support programmable CPU output frequency. The programmed value indicated the actual CPU output frequency. For example, a "07Fh" will correspond to a "127MHz" output frequency. A "085h" will correspond to "133MHz" and a "1FFh" will correspond to a "511MHz" output frequency.	00001010

Control Register 16 (Programmable SRC Frequency Value)

Bit	Type	Description/Function	Power up condition
7:0	RW	Bit[7:0] of programmable SRC frequency SMArT Programming Interface 8-bit control register to support programmable SRC output frequency. The programmed value indicated the actual SRC output frequency. For example, a "7Fh" will correspond to a "127MHz" output frequency, while A "85h" will correspond to "133MHz". The default is set at "64h" or "100MHz".	01100100

Control Register 17 (Programmable CPU/SRC Control)

Bit	Type	Description/Function	Power up condition
7	RW	CPU SMArT Programming Interface Enable 0 = HW or SW Table 1 = CPU SMArT Programming Interface Enabled Note: This bit will be forced to a "0" when TME is enabled.	0
6	RW	SRC SMArT Programming Interface Enable 0 = HW or SW Table 1 = SRC SMArT Programming Interface Enabled Note: This bit will be forced to a "0" when TME is enabled.	0



Control Register 17 (Programmable CPU/SRC Control) (continued)

Bit	Type	Description/Function	Power up condition
5:0	RW	Reserved	000000

Control Register 18 (Watchdog Timer Value)

Bit	Type	Description/Function	Power up condition
7	RW	Time Base Select 0 = 293.6 msec 1 = 1.174 second	0
6:0	RW	Hard Alarm Watchdog Timer Value Timer value = bit[6:0] x time base	0001110

Control Register 19 (Watchdog Timer Control)

Bit	Type	Description/Function	Power up condition
7	RW	Watchdog Enable 0 = Stop Watchdog Timer 1 = Enable Watchdog. Timer will start counting down after a frequency change occurs	0
6	RW	Watchdog Hard Alarm Time-out Status 0 = No time-out occurs (read). Ignore (write) 1 = Hard Alarm time-out occurred (read). Clear Watchdog Hard Alarm time-out status bit (write)	0
5	RW	Reserved	0
4	RW	Reserved	0
3	RW	Reserved	0
2	RW	Reserved	0
1	RW	Reserved	0
0	RW	Reserved	0

Control Register 20 (Drive strength Control)

Bit	Type	Description/Function	Power up condition
7	RW	48MHz clock drive strength control 0 = Normal 1 = High	0
6	RW	Reserved	1
5	RW	Reserved	1
4	RW	PCIF_5 output drive strength 0 = Normal 1 = High	0
3	RW	Reserved	1
2	RW	PCI_3:4 output drive strength 0 = Normal 1 = High	0
1	RW	Reserved	1



Control Register 20 (Drive strength Control) (continued)

Bit	Type	Description/Function	Power up condition
0	RW	PCI_0:2 output drive strength 0 = Normal 1 = High	0

Control Register 21 to 28 (Reserved)

Bit	Type	Description/Function	Power up condition
7:0	RW	Reserved	X



Crystal Recommendations

The SLG505YC56D requires a **Parallel Resonance Crystal**. Substituting a series resonance crystal will cause the SLG505YC56D to operate at the wrong frequency and violate the ppm specification. For most applications there is a 300ppm frequency shift between series and parallel crystals due to incorrect loading.

Table 7. Crystal Recommendations.

Frequency (Fund)	Cut	Loading	Load Cap	Drive (max.)	Shunt Cap (max.)	Motional (max.)	Cut Accuracy (max.)	Temp Stability (max.)	Aging (max.)
14.31818MHz	AT	Parallel	20pF	0.1mW	5pF	0.016pF	35ppm	30ppm	5ppm

Absolute Maximum Ratings

Max VDD Supply Voltage (VDD_3.3):..... 4.6V
 Max VDD_I/O Supply Voltage (VDD_I/O):..... 1.5V
 Max Input Voltage (Vih):..... 4.6V
 Min Input Voltage (Vil):..... -0.5V

Storage Temperature::..... -65°C to + 150°C
 Operating Temperature (Ambient, no airflow): . 0°C to +70°C
 ESD Protection (Min):..... 2000V

DC Electrical Characteristics

Operating Conditions

Symbol	Description	Conditions	Min	Typ	Max	Unit
VDD_3.3	3.3V Supply Voltage	±5%	3.135		3.465	V
Vih	Input High Voltage (SE)		2.0		VDD+0.3	V
Vil	Input Low Voltage (SE)		VSS-0.3		0.8	V
Vih_FS_Test	Input High Voltage (SE)		2.0		VDD+0.3	V
Vih_FS_Normal	Input High Voltage (FS)		0.7		1.5	V
Vil_FS_Normal	Input Low Voltage (FS)		VSS-0.3		0.35	V
Iil	Input Leakage Current	0 < Vin < VDD	-5		+5	uA
Voh	Output High Voltage (SE)	Ioh = -1mA	2.4			V
Vol	Output Low Voltage (SE)	Iol = 1mA			0.4	V
VDD_I/O	Low Voltage Differential I/O Supply Voltage		0.72		0.88	V
Cin	Input Pin Capacitance		1.5		5	pF
Cout	Output Pin Capacitance				6	pF
Lpin	Pin Inductance				7	nH
Idd_3.3V	Operating Supply Current, default configuration				250	mA
Idd_IO_0.8V	Differential I/O current, all output enabled		25		80	mA
Idd_PD_3.3V	Powerdown Supply Current, 3.3V				1.0	mA
Idd_PD_0.8V	Powerdown Supply Current, 0.8V				0.1	mA
Idd_M1_3.3V	M1 Mode Supply Current, 3.3V				40	mA
Idd_M1_0.8V	M1 Mode Supply Current, 0.8V				16	mA



AC Electrical Characteristics

Differential Outputs (CPU, SRC, DOT_96) Timing Characteristics

Symbol	Description	Min.	Max.	Unit	Conditions
Laccuracy	Long term accuracy		300	ppm	Using frequency counter with the measurement interval equal or greater than 0.15 second
Tperiod	Average CPU Period (100MHz, SSC disabled)	9.997001	10.003000	ns	Average period over 1 us
Tperiod	Average CPU Period (133MHz, SSC disabled)	7.497751	7.502251	ns	Average period over 1 us
Tperiod	Average CPU Period (166MHz, SSC disabled)	5.998201	6.001801	ns	Average period over 1 us
Tperiod	Average CPU Period (200MHz, SSC disabled)	4.998500	5.001500	ns	Average period over 1 us
Tperiod	Average CPU Period (266MHz, SSC disabled)	3.748875	3.751125	ns	Average period over 1 us
Tperiod	Average CPU Period (333MHz, SSC disabled)	2.999100	3.000900	ns	Average period over 1 us
Tperiod	Average CPU Period (400MHz, SSC disabled)	2.499250	2.500750	ns	Average period over 1 us
Tperiod	Average CPU Period (100MHz, SSC enabled)	9.997001	10.05327	ns	Average period over 1 us
Tperiod	Average CPU Period (133MHz, SSC enabled)	7.497751	7.539950	ns	Average period over 1 us
Tperiod	Average CPU Period (166MHz, SSC enabled)	5.998201	6.031960	ns	Average period over 1 us
Tperiod	Average CPU Period (200MHz, SSC enabled)	4.998500	5.026634	ns	Average period over 1 us
Tperiod	Average CPU Period (266MHz, SSC enabled)	3.748875	3.769975	ns	Average period over 1 us
Tperiod	Average CPU Period (333MHz, SSC enabled)	2.999100	3.015980	ns	Average period over 1 us
Tperiod	Average CPU Period (400MHz, SSC enabled)	2.499250	2.513317	ns	Average period over 1 us
Tperiod	Average SRC Period (100MHz, SSC disabled)	9.997001	10.003000	ns	Average period over 1 us
Tperiod	Average SRC Period (100MHz, SSC enabled)	9.997001	10.05327	ns	Average period over 1 us
Tperiod	Average DOT_96 Period (96MHz)	10.41354	10.41979	ns	Average period over 1 us
Tabs	Absolute Min/Max CPU Period (100, SSC disabled)	9.912001	10.08800	ns	
Tabs	Absolute Min/Max CPU Period (133, SSC disabled)	7.412751	7.587251	ns	
Tabs	Absolute Min/Max CPU Period (166, SSC disabled)	5.913201	6.086801	ns	
Tabs	Absolute Min/Max CPU Period (200, SSC disabled)	4.913500	5.086500	ns	
Tabs	Absolute Min/Max CPU Period (266, SSC disabled)	3.663875	3.836125	ns	
Tabs	Absolute Min/Max CPU Period (333, SSC disabled)	2.914100	3.085900	ns	
Tabs	Absolute Min/Max CPU Period (400, SSC disabled)	2.414250	2.585750	ns	
Tabs	Absolute Min/Max CPU Period (100, SSC enabled)	9.912001	10.13827	ns	
Tabs	Absolute Min/Max CPU Period (133, SSC enabled)	7.412751	7.624950	ns	
Tabs	Absolute Min/Max CPU Period (166, SSC enabled)	5.913201	6.116960	ns	
Tabs	Absolute Min/Max CPU Period (200, SSC enabled)	4.913500	5.111634	ns	
Tabs	Absolute Min/Max CPU Period (266, SSC enabled)	3.663875	3.854975	ns	
Tabs	Absolute Min/Max CPU Period (333, SSC enabled)	2.914100	3.100980	ns	
Tabs	Absolute Min/Max CPU Period (400, SSC enabled)	2.414250	2.598317	ns	
Tabs	Absolute Min/Max SRC Period (100, SSC disabled)	9.872001	10.12800	ns	
Tabs	Absolute Min/Max SRC Period (100, SSC enabled)	9.872001	10.17827	ns	
Tabs	Absolute Min/Max DOT_96 Period (96MHz)	10.16354	10.66979	ns	



Differential Outputs (CPU, SRC, DOT_96) Timing Characteristics

Symbol	Description	Min.	Max.	Unit	Conditions
Slew_rise	Rising slew rate	2.5	8.0	V/ns	1. Use 'average' acquisition mode of the scope 2. Measurement taken from differential waveform 3. Slew rate measured through V_swing voltage range centered about differential zero
Slew_fall	Falling slew rate	2.5	8.0	V/ns	1. Use 'average' acquisition mode of the scope 2. Measurement taken from differential waveform 3. Slew rate measured through V_swing voltage range centered about differential zero
Slew_var	Slew rate matching		20	%	1. Use 'average' acquisition mode of the scope 2. Measurement taken from single ended waveform 3. Matching applies to rising edge rate for Clock and falling edge rate for Clock#. It is measured using a +/-75mV window centered on the average cross point where Clock rising meets Clock# falling. The median cross point is used to calculate the voltage thresholds the oscilloscope is to use for the edge rate calculation
V_swing	Differential output swing	300		mV	Measurement taken from differential waveform
V_cr	Crossing point voltage	300	550	mV	1. Measurement taken from single ended waveform 2. V_cross is defined as the voltage where Clock = Clock# 3. Only applies to the differential rising edge (i.e. Clock rising and Clock# falling)
V_cr_dlt	Variation of V_cr		140	mV	1. Measurement taken from single ended waveform 2. V_cross is defined as the voltage where Clock = Clock# 3. V_cross delta is defined as the total variation of all crossing voltages of rising Clock and falling Clock#
Tccjitter	Cycle to Cycle Jitter (CPU)		85	ps	
Tccjitter	Cycle to Cycle Jitter (SRC)		125	ps	
Tccjitter	Cycle to Cycle Jitter (DOT_96)		250	ps	
Duty Cycle	Duty Cycle	45	55	%	
Tskew	Pin-to-Pin Skew (CPU_0 & CPU_1)		100	ps	
Tskew	Pin-to-Pin Skew (CPU_2)		150	ps	
Tskew	Pin-to-Pin Skew (all SRC outputs)		TBD	ps	

PCI Timing Characteristics

Symbol	Description	Min	Max	Units	Conditions
Laccuracy	Long term accuracy		300	ppm	1. Measured with respect to 1.5V 2. Using frequency counter with the measurement interval equal or greater than 0.15s, target frequency is 33.333333MHz
Tperiod	Average Period (SSC disabled)	29.99100	30.00900	ns	1. Measured with respect to 1.5V 2. Average period over any 1us period of time
Tperiod	Average Period (SSC enabled, -0.5%)	29.99100	30.15980	ns	1. Measured with respect to 1.5V 2. Average period over any 1us period of time
Tabs	Absolute Min/Max Period (SSC disabled)	29.49100	30.50900	ns	
Tabs	Absolute Min/Max Period (SSC enabled, -0.5%)	29.49100	30.65980	ns	
Thigh	CLK high time	12	N/A	ns	
Tlow	CLK low time	12	N/A	ns	



PCI Timing Characteristics

Symbol	Description	Min	Max	Units	Conditions
Edge Rate	Rising edge rate	1.0	4.0	V/ns	Measured from 0.4V to 2.4V in test board, measured from 0.8V to 2.0V in system
Edge Rate	Falling edge rate	1.0	4.0	V/ns	Measured from 0.4V to 2.4V in test board, measured from 0.8V to 2.0V in system
Tccjitter	Cycle to cycle jitter		500	ps	Measured with respect to 1.5V
Duty Cycle	Duty Cycle	45	55	%	Measured with respect to 1.5V
Tskew	Pin-to-Pin Skew		1000	ps	

USB_48 Timing Characteristics

Symbol	Description	Min	Max	Units	Conditions
Laccuracy	Long term accuracy		300	ppm	1. Measured with respect to 1.5V 2. Using frequency counter with the measurement interval equal or greater than 0.15s, target frequency is 48.000000MHz
Tperiod	Average Period	20.83125	20.83542	ns	1. Measured with respect to 1.5V 2. Average period over any 1us period of time
Tab	Absolute Min/Max Period	20.48125	21.18542	ns	
Thigh	CLK high time	8.094	10.036	ns	
Tlow	CLK low time	7.694	9.836	ns	
Edge Rate	Rising edge rate	1.0	2.0	V/ns	Measured from 0.4V to 2.4V in test board, measured from 0.8V to 2.0V in system
Edge Rate	Falling edge rate	1.0	2.0	V/ns	Measured from 0.4V to 2.4V in test board, measured from 0.8V to 2.0V in system
Tccjitter	Cycle to cycle jitter		350	ps	Measured with respect to 1.5V
Duty Cycle	Duty Cycle	45	55	%	Measured with respect to 1.5V

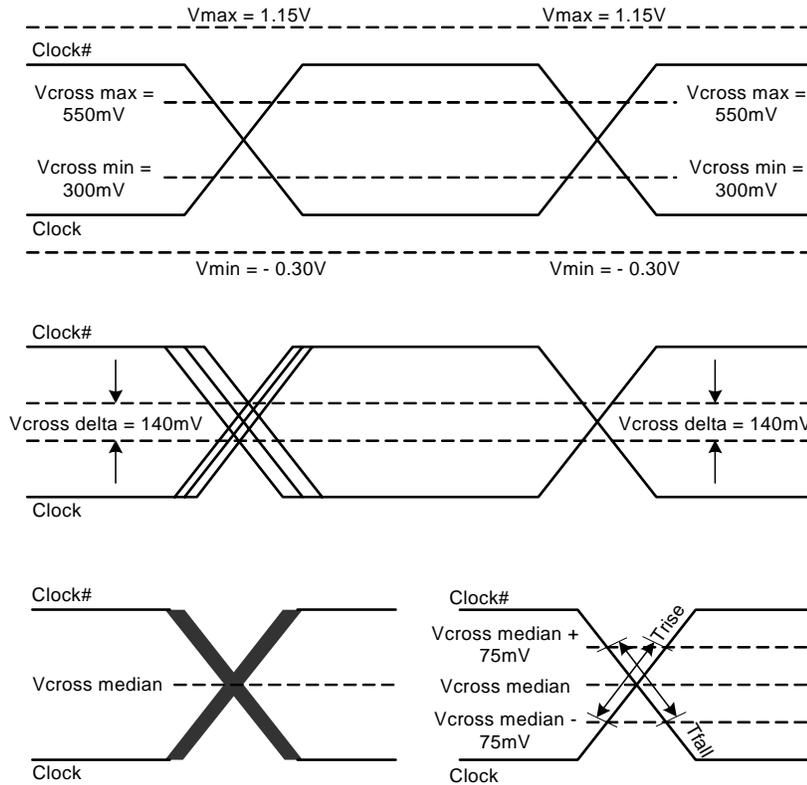
REF Timing Characteristics

Symbol	Description	Min	Max	Units	Conditions
Laccuracy	Long term accuracy		300	ppm	1. Measured with respect to 1.5V 2. Using frequency counter with the measurement interval equal or greater than 0.15s, target frequency is 14.318180MHz
Tperiod	Average Period	69.82033	69.86224	ns	1. Measured with respect to 1.5V 2. Average period over any 1us period of time
Tab	Absolute Min/Max Period	68.82033	70.86224	ns	
Thigh	CLK high time	TBD	TBD	ns	
Tlow	CLK low time	TBD	TBD	ns	
Edge Rate	Rising edge rate	1.0	4.0	V/ns	Measured from 0.4V to 2.4V in test board, measured from 0.8V to 2.0V in system
Edge Rate	Falling edge rate	1.0	4.0	V/ns	Measured from 0.4V to 2.4V in test board, measured from 0.8V to 2.0V in system
Tccjitter	Cycle to cycle jitter		1000	ps	Measured with respect to 1.5V
Duty Cycle	Duty Cycle	45	55	%	Measured with respect to 1.5V

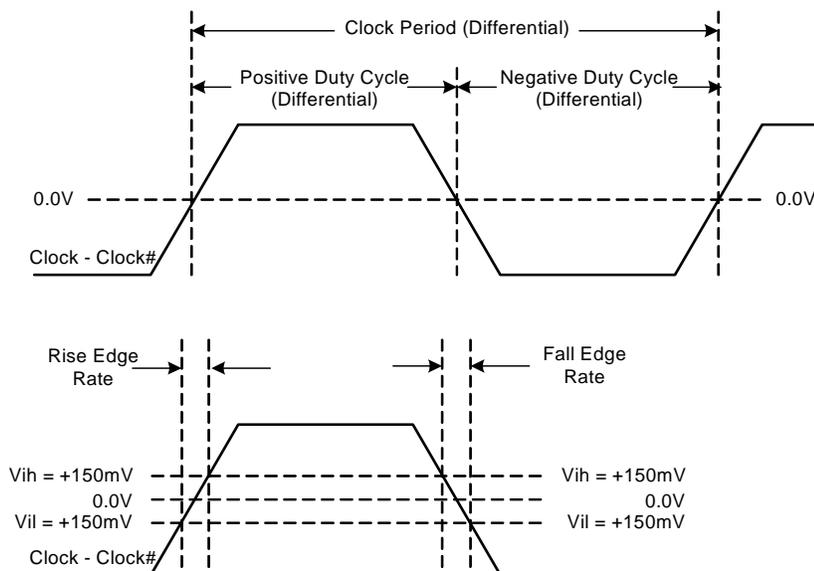


Measurement Points for Differential Clocks

Single ended (SE) measurement waveforms



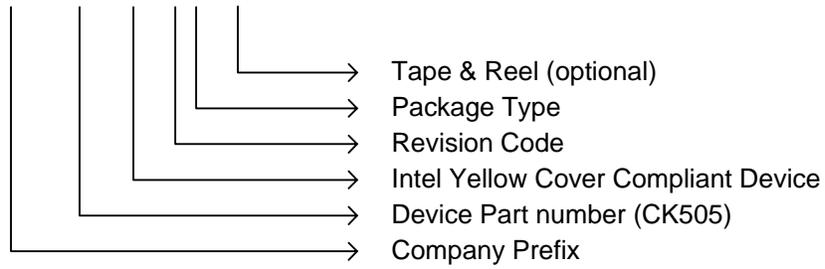
Differential (DIFF) measurement waveforms





Ordering Information

SLG xxx YC y z TR

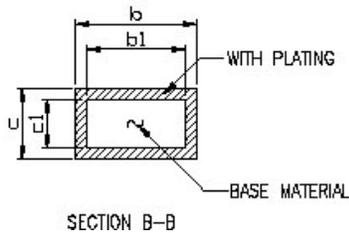
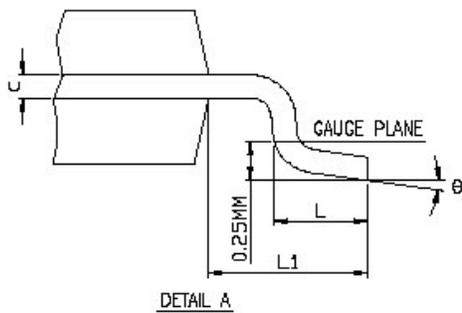
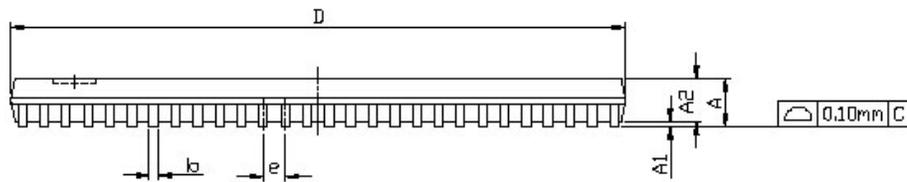
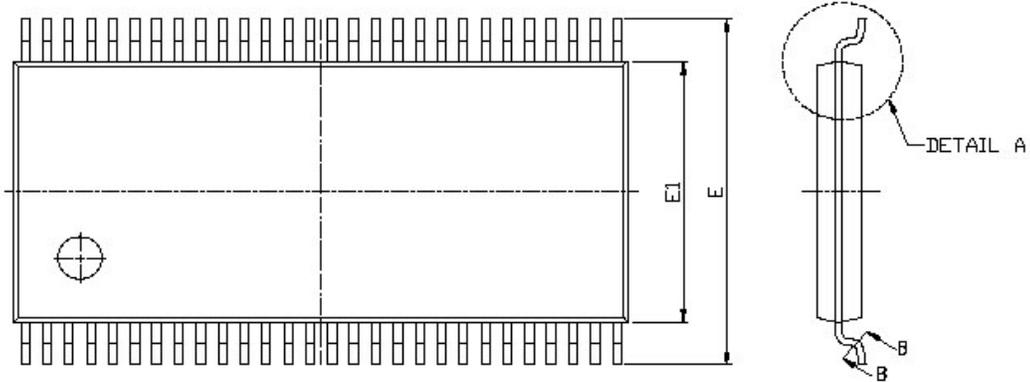


Part Number	Package Type	Temperature Range
SLG505YC56DT	56 Lead Green Package TSSOP (Revision D)	Commercial, 0° to 70°C
SLG505YC56DTTR	56 Lead Green Package TSSOP (Revision D) - Tape and Reel	Commercial, 0° to 70°C



Package Drawing and Dimensions

56 Lead TSSOP Package



SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM	MAX.	MIN.	NOM	MAX.
A			1.20			0.047
A1	0.05		0.15	0.002		0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
E	8.00	8.10	8.20	0.315	0.319	0.323
E1	6.00	6.10	6.20	0.236	0.240	0.244
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 REF.			0.039 REF.		
b	0.20 TYP.			0.008 TYP.		
b1	0.15 TYP.			0.006 TYP.		
c	0.09		0.20	0.004		0.008
c1	0.05	0.15	0.16	0.002		0.006
e	0.50 BSC.			0.020 BSC.		
theta	0		8	0		8

N	D (MM)			JEDEC
	MIN.	NOM	MAX.	
48	12.40	12.50	12.60	MO-153ED
56	13.90	14.00	14.10	MO-153EE
64	16.90	17.00	17.10	MO-153EF