PC MAIN CLOCK - CK540 ICS9UMS9001

Recommended Application:

Calistoga Based Ultra-Mobile PC (UMPC)

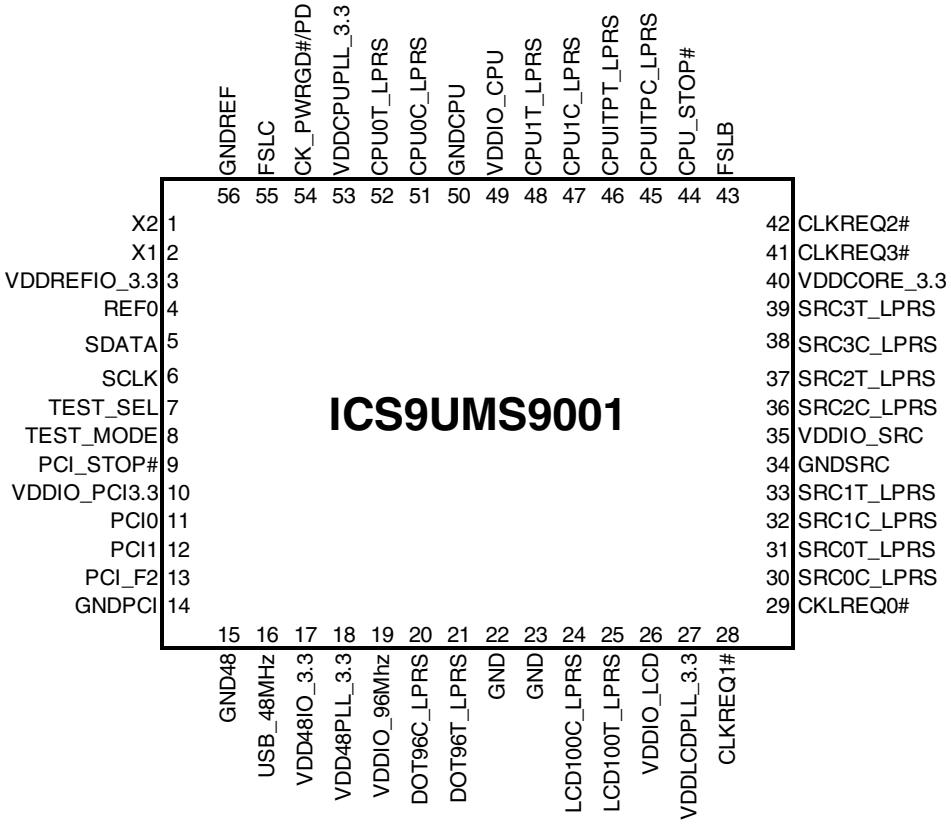
Output Features:

- 2 - CPU Low Power differential push-pull pairs
- 1 - ITP low power differential push-pull pair
- 4 - SRC low power differential push-pull pairs
- 1 - LCD100 SSCD low power differential push-pull pair
- 1 - DOT96 low power differential push-pull pair
- 3 - PCI, 33MHz
- 1 - USB, 48MHz
- 1 - REF, 14.31818MHz

Features/Benefits:

- Supports Dothan ULV CPUs with 100 and 133 MHz CPU outputs
- Dedicated TEST/SEL and TEST/MODE pins saves isolation resistors on pins
- PCI_SRC and CPU STOP inputs for power manangment
- Fully integrated Vreg
- Integrated series resistors on differential outputs
- Supports split rail operation for maximum power savings
- Also runs from single 3.3V rail
- 1.05V-3.3V support for differential VDDIO

Pin Configuration



56-pin MLF

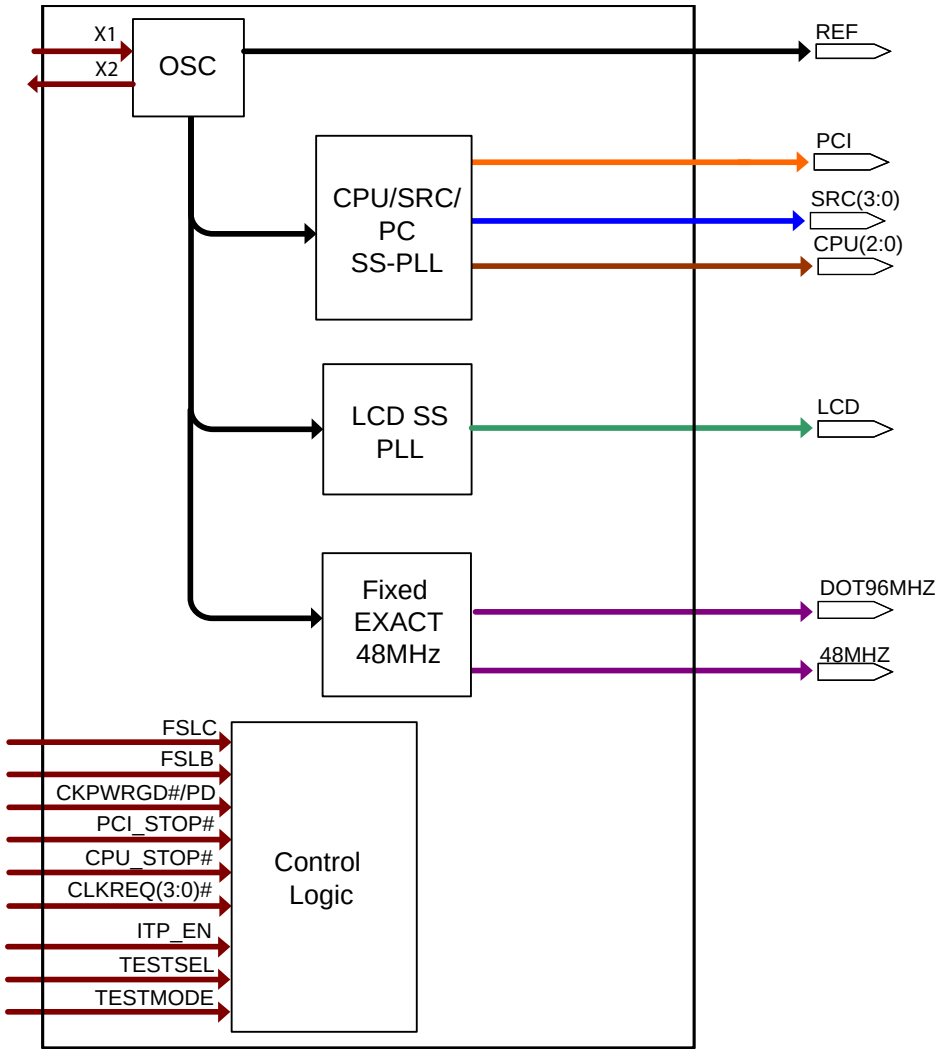
Pin Description

PIN #	PIN NAME	TYPE	DESCRIPTION
1	X2	OUT	Crystal output, nominally 14.318MHz.
2	X1	IN	Crystal input, Nominally 14.318MHz.
3	VDDREFIO_3.3	PWR	Power pin for the REF output and crystal oscillator. 3.3V nominal.
4	REF0	OUT	3.3V 14.318MHz reference clock
5	SDATA	I/O	Data pin for SMBus circuitry, 5V tolerant.
6	SCLK	IN	Clock pin of SMBus circuitry, 5V tolerant.
7	TEST_SEL	IN	3.3V input that puts the part in test mode. This is a realtime input. See the Test Clarification Table for details.
8	TEST_MODE	PWR	When Test mode is selected, this chooses either hi-Z or REF/N for the outputs.
9	PCI_STOP#	IN	3.3V tolerant input that stops all PCI and SRC clocks, except those set to be free running.
10	VDDIO_PCI3.3	PWR	3.3V power supply for the PCI outputs
11	PCI0	OUT	3.3V PCI clock output.
12	PCI1	OUT	3.3V PCI clock output.
13	PCI_F2	OUT	Free running 3.3V PCI clock output
14	GNDPÇI	PWR	Ground for PCI output clocks.
15	GND48	PWR	Ground for the USB clock.
16	USB_48MHz	OUT	Fixed 3.3V 48MHz USB clock output
17	VDD48IO_3.3	PWR	3.3V Power supply for the 48MHz output
18	VDD48PLL_3.3	PWR	3.3V Power supply for the 48/96MHz PLL
19	VDDIO_96Mhz	PWR	Power supply for DOT96 output. VDD_IO = 1.05 to 3.3V +/-5%.
20	DOT96C_LPRS	OUT	Complement side of low-power CK505-type 96MHz differential clock. Rs is integrated (No external series resistor required).
21	DOT96T_LPRS	PWR	True side of low-power CK505-type 96MHz differential clock. Rs is integrated (No external series resistor required).
22	GND	PWR	Ground for 96MHz output
23	GND	OUT	Ground for LCD 100 MHz output.
24	LCD100C_LPRS	OUT	Complement side of low-power CK505-type LCD100MHz spreading differential clock. Rs is integrated (No external series resistor required).
25	LCD100T_LPRS	OUT	True side of low-power CK505-type LCD100MHz spreading differential clock. Rs is integrated (No external series resistor required).
26	VDDIO_LCD	PWR	Power supply for LCD100 output. VDD_IO = 1.05 to 3.3V +/-5%.
27	VDDLCDPLL_3.3	PWR	3.3V Power supply for the LCD100 Spreading PLL
28	CLKREQ1#	IN	Clock request input for SRC output pair 1. See the SRC, LCD, DOT Power Management Table for details

Pin Description (continued)

PIN #	PIN NAME	TYPE	DESCRIPTION
29	CKLREQ0#	IN	Clock request input for SRC output pair 0. See the SRC, LCD, DOT Power Management Table for details
30	SRC0C_LPRS	OUT	Complement side of low-power CK505-type SRC0 differential clock. Rs is integrated (No external series resistor required).
31	SRC0T_LPRS	OUT	True side of low-power CK505-type SRC0 differential clock. Rs is integrated (No external series resistor required).
32	SRC1C_LPRS	OUT	Complement side of low-power CK505-type SRC1 differential clock. Rs is integrated (No external series resistor required).
33	SRC1T_LPRS	OUT	True side of low-power CK505-type SRC1 differential clock. Rs is integrated (No external series resistor required).
34	GNDSRC	PWR	Ground for SRC clocks
35	VDDIO_SRC	PWR	Power supply for SRC outputs. VDD_IO = 1.05 to 3.3V +/-5%.
36	SRC2C_LPRS	OUT	Complement side of low-power CK505-type SRC2 differential clock. Rs is integrated (No external series resistor required).
37	SRC2T_LPRS	OUT	True side of low-power CK505-type SRC2 differential clock. Rs is integrated (No external series resistor required).
38	SRC3C_LPRS	OUT	Complement side of low-power CK505-type SRC3 differential clock. Rs is integrated (No external series resistor required).
39	SRC3T_LPRS	OUT	True side of low-power CK505-type SRC3 differential clock. Rs is integrated (No external series resistor required).
40	VDDCORE_3.3	PWR	3.3V Power supply for 3.3V core
41	CLKREQ3#	IN	Clock request input for SRC output pair 2. See the SRC, LCD, DOT Power Management Table for details
42	CLKREQ2#	IN	Clock request input for SRC output pair 2. See the SRC, LCD, DOT Power Management Table for details
43	FSLB	IN	Low threshold Frequency Select input. See Table 1: CPU Frequency Select Table and the Vih_fs and Vil_fs specifications.
44	CPU_STOP#	IN	Stops all CPU clocks except those set to be free running.
45	CPUITPC_LPRS	OUT	Complement side of low-power CK505-type CPUITP differential clock. Rs is integrated (No external series resistor required). Note that this pin is NOT muxed with an SRC output.
46	CPUITPT_LPRS	OUT	True side of low-power CK505-type CPUITP differential clock. Rs is integrated (No external series resistor required).
47	CPU1C_LPRS	OUT	Complement side of low-power CK505-type CPU1 differential clock. Rs is integrated (No external series resistor required). Note that this pin is NOT muxed with an SRC output.
48	CPU1T_LPRS	OUT	True side of low-power CK505-type CPU1 differential clock. Rs is integrated (No external series resistor required).
49	VDDIO_CPU	PWR	Power supply for CPU outputs. VDD_IO = 1.05 to 3.3V +/-5%.
50	GNDCPU	PWR	Ground Pin for CPU Outputs
51	CPU0C_LPRS	OUT	Complement side of low-power CK505-type CPU1 differential clock. Rs is integrated (No external series resistor required). Note that this pin is NOT muxed with an SRC output.
52	CPU0T_LPRS	OUT	True side of low-power CK505-type CPU1 differential clock. Rs is integrated (No external series resistor required).
53	VDDCPUPLL_3.3	PWR	3.3V Power Supply for CPU PLL.
54	CK_PWRGD#/PD	IN	Notifies 9UMS9001 to sample latched inputs or enter power down mode. 1 = Power down mode Falling Edge = Sample latched inputs 0 = Normal operation
55	FSLC	IN	Low threshold Frequency Select input. See Table 1: CPU Frequency Select Table and the Vih_fs and Vil_fs specifications.
56	GNDREF	PWR	Ground pin for crystal oscillator circuit and REF output

Funtional Block Diagram



Power Groups

Pin Number			Description	
VDD3.3V	VDDIO 1.05~3.3V	GND		
	49	50	CPUCLK	Low power outputs
53				Analog
53			Master Clock, Analog	
	35	34	SRCCLK	Low power outputs
40				Analog
	26	23	LCDCLK	Low power outputs
27				PLL
	19	22	DOT 96Mhz	Low power outputs
17, 18		15	USB 48	
3		56	Xtal, REF	
10		14	PCICLK	

Table 1: CPU Frequency Select Table

FS_LC[1] B0b7	FS_LB[1] B0b6	CPU MHz	SRC MHz	PCI MHz	REF MHz	USB MHz	DOT MHz
0	0	133.33	100.00	33.33	14.318	48.00	96.00
0	1	Reserved					
1	0	100.00	100.00	33.33	14.318	48.00	96.00
1	1	200.00					

1. FS_LC is a low-threshold input.Please see V_{IL_FS} and V_{IH_FS} specifications in the Input/Supply/Common Output Parameters Table for correct values. Also refer to the Test Clarification Table.

Table 2: LCD Quick Configuration

B1b3	B1b2	B1b1	B1b0	Pin 24/25 MHz	Spread %	Comment
0	0	0	0	100.00	0.25% Down Spread	LCDCLK
0	0	0	1	100.00	0.5% Down Spread	LCDCLK
0	0	1	0	100.00	1% Down Spread	LCDCLK
0	0	1	1	100.00	1.25% Down Spread	LCDCLK
0	1	0	0	100.00	1.5% Down Spread	LCDCLK
0	1	0	1	100.00	2% Down Spread	LCDCLK
0	1	1	0	100.00	2.5% Down Spread	LCDCLK
0	1	1	1	100.00	3.0% Down Spread	LCDCLK
1	0	0	0	100.00	0.25% Center Spread	LCDCLK
1	0	0	1	100.00	0.5% Center Spread	LCDCLK
1	0	1	0	100.00	1% Center Spread	LCDCLK
1	0	1	1	100.00	1.25% Center Spread	LCDCLK
1	1	0	0	100.00	1.5% Center Spread	LCDCLK
1	1	0	1	100.00	2% Center Spread	LCDCLK
1	1	1	0	100.00	2.5% Center Spread	LCDCLK
1	1	1	1	100.00	3.0% Center Spread	LCDCLK

Table 3: 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

Absolute Maximum Ratings

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	Notes
Maximum Supply Voltage	VDDxxx_3.3	Supply Voltage		4.6	V	1,7
Maximum Supply Voltage	VDDxxx_1.8	Supply Voltage		2.3	V	1,7
Maximum Supply Voltage	VDDxxx_IO	Low-Voltage Differential I/O Supply		3.8	V	1,7
Maximum Input Voltage	V_{IH}	3.3V LVCMOS Inputs		4.6	V	1,7,8
Minimum Input Voltage	V_{IL}	Any Input	GND - 0.5		V	1,7
Storage Temperature	Ts	-	-65	150	°C	1,7
Input ESD protection	ESD prot	Human Body Model	2000		V	1,7

Electrical Characteristics - Input/Supply/Common Output Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	Notes
Ambient Operating Temp	Tambient	-	0	70	°C	1
Supply Voltage	VDDxxx_3.3	Supply Voltage	3.135	3.465	V	1
Supply Voltage	VDDxxx_1.8	Supply Voltage	1.71	1.89	V	1
Supply Voltage	VDDxxx_IO	Low-Voltage Differential I/O Supply	1.05	3.465	V	1
Input High Voltage	V_{IHSE}	Single-ended inputs	2	V_{DD} + 0.3	V	1
Input Low Voltage	V_{ILSE}	Single-ended inputs	V_{SS} - 0.3	0.8	V	1
Input Leakage Current	I_{IN}	$V_{IN} = V_{DD}$, $V_{IN} = GND$	-5	5	uA	1
Input Leakage Current	I_{INRES}	Inputs with pull or pull down resistors $V_{IN} = V_{DD}$, $V_{IN} = GND$	-200	200	uA	1
Output High Voltage	V_{OHSE}	Single-ended outputs, I_{OH} = -1mA	2.4		V	1
Output Low Voltage	V_{OLSE}	Single-ended outputs, I_{OL} = 1 mA		0.4	V	1
Output High Voltage	V_{OHDIF}	Differential Outputs	0.7	0.9	V	1
Output Low Voltage	V_{OLDIF}	Differential Outputs		0.4	V	1
Low Threshold Input-High Voltage (Test Mode)	$V_{IH\_FS\_TEST}$	3.3 V +/-5%	2	V_{DD} + 0.3	V	1
Low Threshold Input-High Voltage	V_{IH_FS}	3.3 V +/-5%	0.7	1.5	V	1
Low Threshold Input-Low Voltage	V_{IL_FS}	3.3 V +/-5%	V_{SS} - 0.3	0.35	V	1
Operating Supply Current	$I_{DD\_DEFAULT}$	3.3V supply, LCDPLL off		80	mA	1
	I_{DD_LCDEN}	3.3V supply, LCDPLL enabled		100	mA	1
	I_{DD_IO}	0.8V supply, Differential IO current, all outputs enabled		25	mA	1
Power Down Current	$I_{DD\_PD3.3}$	3.3V supply, Power Down Mode		1	mA	1
	I_{DD_PDIO}	0.8V IO supply, Power Down Mode		0.1	mA	1
Input Frequency	F_i	V_{DD} = 3.3 V		15	MHz	2
Pin Inductance	L_{pin}			7	nH	1
Input Capacitance	C_{IN}	Logic Inputs	1.5	5	pF	1
	C_{OUT}	Output pin capacitance		6	pF	1
	C_{INX}	X1 & X2 pins		7	pF	1
Spread Spectrum Modulation Frequency	f_{SSMOD}	Triangular Modulation	30	33	kHz	1

AC Electrical Characteristics - Input/Common Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	Notes
Clk Stabilization	T_{STAB}	From VDD Power-Up or de-assertion of PD# to 1st clock		1.8	ms	1
Tdrive_SRC	T_{DRSRC}	SRC output enable after PCI_STOP# de-assertion		15	ns	1
Tdrive_PD#	T_{DRPD}	Differential output enable after PD# de-assertion		300	us	1
Tdrive_CPU	T_{DRSRC}	CPU output enable after CPU_STOP# de-assertion		10	ns	1
Tfall_PD#	T_{FALL}	Fall/rise time of PD#, PCI_STOP# and CPU_STOP# inputs		5	ns	1
Trise_PD#	T_{RISE}			5	ns	1

AC Electrical Characteristics - Low Power Differential Outputs

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	NOTES
Rising Edge Slew Rate	t_{SLR}	Differential Measurement	1	4	V/ns	1,2
Falling Edge Slew Rate	t_{FLR}	Differential Measurement	1	4	V/ns	1,2
Rise/Fall Time Variation	t_{SLVAR}	Single-ended Measurement		125	ps	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_{CYC}	Differential Measurement	45	55	%	1
CPU Jitter - Cycle to Cycle	$CPUJ_{C2C}$	Differential Measurement		85	ps	1
SRC Jitter - Cycle to Cycle	$SRCJ_{C2C}$	Differential Measurement		125	ps	1
DOT Jitter - Cycle to Cycle	$DOTJ_{C2C}$	Differential Measurement		250	ps	1
CPU[1:0] Skew	CPU_{SKEW10}	Differential Measurement		100	ps	1
CPU[2_ITP:0] Skew	CPU_{SKEW20}	Differential Measurement		150	ps	1
SRC[3:0] Skew	SRC_{SKEW}	Differential Measurement		250	ps	1

Electrical Characteristics - PCICLK/PCICLK_F

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	NOTES
Long Accuracy	ppm	see Tperiod min-max values	-300	300	ppm	1,6
Clock period	T_{period}	33.33MHz output nominal	29.99100	30.00900	ns	6
		33.33MHz output spread		30.15980	ns	6
Absolute min/max period	T_{abs}	33.33MHz output nominal/spread	29.49100	30.65980	ns	6
Output High Voltage	V_{OH}	I_{OH} = -1 mA	2.4		V	1
Output Low Voltage	V_{OL}	I_{OL} = 1 mA		0.4	V	1
Output High Current	I_{OH}	V_{OH} @MIN = 1.0 V	-33		mA	1
		V_{OH}@MAX = 3.135 V		-33	mA	1
Output Low Current	I_{OL}	V_{OL} @ MIN = 1.95 V	30		mA	1
		V_{OL} @ MAX = 0.4 V		38	mA	1
Rising Edge Slew Rate	t_{SLR}	Measured from 0.8 to 2.0 V	1	4	V/ns	1
Falling Edge Slew Rate	t_{FLR}	Measured from 2.0 to 0.8 V	1	4	V/ns	1
Duty Cycle	d_{t1}	V_T = 1.5 V	45	55	%	1
Skew	t_{skew}	V_T = 1.5 V		250	ps	1
Intentional PCI-PCI delay	t_{delay}	V_T = 1.5 V	0 nominal		ps	1,9
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	V_T = 1.5 V		500	ps	1

Electrical Characteristics - USB48MHz

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	NOTES
Long Accuracy	ppm	see Tperiod min-max values	-100	100	ppm	1,2
Clock period	T_{period}	48.00MHz output nominal	20.83125	20.83542	ns	2
Absolute min/max period	T_{abs}	48.00MHz output nominal	20.48130	21.18540	ns	2
Output High Voltage	V_{OH}	I_{OH} = -1 mA	2.4		V	1
Output Low Voltage	V_{OL}	I_{OL} = 1 mA		0.4	V	1
Output High Current	I_{OH}	V_{OH} @MIN = 1.0 V	-29		mA	1
		V_{OH}@MAX = 3.135 V		-23	mA	1
Output Low Current	I_{OL}	V_{OL} @ MIN = 1.95 V	29		mA	1
		V_{OL} @ MAX = 0.4 V		27	mA	1
Rising Edge Slew Rate	t_{SLR}	Measured from 0.8 to 2.0 V	1	2	V/ns	1
Falling Edge Slew Rate	t_{FLR}	Measured from 2.0 to 0.8 V	1	2	V/ns	1
Duty Cycle	d_{t1}	V_T = 1.5 V	45	55	%	1
Jitter, Cycle to cycle	$t_{jcyc-cyc}$	V_T = 1.5 V		350	ps	1

Electrical Characteristics - SMBus Interface

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	Notes
SMBus Voltage	V_{DD}		2.7	5.5	V	1
Low-level Output Voltage	V_{OLSMB}	@ I_{PULLUP}		0.4	V	1
Current sinking at V_{OLSMB} = 0.4 V	I_{PULLUP}	SMB Data Pin	4		mA	1
SCLK/SDATA Clock/Data Rise Time	T_{RI2C}	(Max VIL - 0.15) to (Min VIH + 0.15)		1000	ns	1
SCLK/SDATA Clock/Data Fall Time	T_{FI2C}	(Min VIH + 0.15) to (Max VIL - 0.15)		300	ns	1
Maximum SMBus Operating Frequency	F_{SMBUS}	Block Mode		100	kHz	1

Electrical Characteristics - REF-14.318MHz

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS	Notes
Long Accuracy	ppm	see Tperiod min-max values	-300	300	ppm	1,2
Clock period	T_{period}	14.318MHz output nominal	69.8203	69.8622	ns	2
Absolute min/max period	T_{abs}	14.318MHz output nominal	69.8203	70.86224	ns	2
Output High Voltage	V_{OH}	I_{OH} = -1 mA	2.4		V	1
Output Low Voltage	V_{OL}	I_{OL} = 1 mA		0.4	V	1
Output High Current	I_{OH}	V_{OH}@MIN = 1.0 V, V_{OH}@MAX = 3.135 V	-33	-33	mA	1
Output Low Current	I_{OL}	V_{OL}@MIN = 1.95 V, V_{OL}@MAX = 0.4 V	30	38	mA	1
Rising Edge Slew Rate	t_{SLR}	Measured from 0.8 to 2.0 V	1	4	V/ns	1
Falling Edge Slew Rate	t_{FLR}	Measured from 2.0 to 0.8 V	1	4	V/ns	1
Duty Cycle	d_{t1}	V_T = 1.5 V	45	55	%	1
Jitter	$t_{jcyc-cyc}$	V_T = 1.5 V		1000	ps	1

Notes on Electrical Characteristics:

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

[2] Slew rate measured through Vswing centered around differential zero

[3] Vxabs is defined as the voltage where CLK = CLK#

[4] Only applies to the differential rising edge (CLK rising and CLK# falling)

[5] 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#. The average cross point is used to calculate the voltage thresholds the oscilloscope is to use for the edge rate calculations.

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

[7] Operation under these conditions is neither implied, nor guaranteed.

[8] Maximum input voltage is not to exceed maximum VDD

[9] See PCI Clock-to-Clock Delay Figure

General I²C serial interface information for the ICS9UMS9001

How to Write:

- Controller (host) sends a start bit.
- Controller (host) sends the write address D2 (H)
- ICS clock will ***acknowledge***
- Controller (host) sends the beginning byte location = N
- ICS clock will ***acknowledge***
- Controller (host) sends the data byte count = X
- ICS clock will ***acknowledge***
- Controller (host) starts sending ***Byte N through Byte N + X -1***
  (see Note 2)
- ICS clock will ***acknowledge*** each byte ***one at a time***
- Controller (host) sends a Stop bit

How to Read:

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

Index Block Write Operation

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

Index Block Read Operation

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

Byte 0 FS Readback, SS Enable, STOP Control Register

Bit	Pin	Name	Description	Type	0	1	Default
7	-	FSLC	CPU Freq. Sel. Bit MSB	**RW**	See Frequency Select Table		Latch
6		FSLB	CPU Freq. Sel. Bit LSB	**RW**			Latch
5		CPU_SS_EN	Spread spectrum enable for CPU/SRC/PCI outputs	RW	SS Disabled	SS Enabled	1
4		LCD_Enable	Turns On LCD PLL	RW	Off	On	1
3		SRC3_STOP	SRC 3 Stop Control	RW	Free Running	Stops with PCI_STOP# Assertion	0
2		SRC2_STOP	SRC 2 Stop Control	RW			0
1		SRC1_STOP	SRC 1 Stop Control	RW			0
0		SRC0_STOP	SRC 0 Stop Control	RW			0

Byte 1 LCD Quick Config and CPU Stop ControlRegister

Bit	Pin	Name	Description	Type	0	1	Default
7		CPU_ITP_STOP	CPU_ITP Stop Control	RW	Free Running	Stops with CPU_STOP# assertion	0
6		CPU1_STOP	CPU1 Stop Control	RW			1
5		CPU0_STOP	CPU0 Stop Control	RW			1
4		LCD_SS_EN	Turns on SS for LCD PLL	RW	Off	On	1
3		LCD_SSC_SEL	Select down or center SSC	RW	Down spread	Center spread	0
2		LCD_CF2	PLL3 Quick Config Bit 2	RW	See Table 2: LCD Quick Configuration		0
1		LCD_CF1	PLL3 Quick Config Bit 1	RW			0
0		LCD_CF0	PLL3 Quick Config Bit 0	RW			1

Byte 2 Output Enable and Stop Control Register

Bit	Pin	Name	Description	Type	0	1	Default
7		PCI_F2_STOP	Free running PCI Stop Control	RW	Free Running	Stops with PCI_STOP# assertion	0
6		PCI1_STOP	PCI1 Stop Control	RW			1
5		PCI0_STOP	PCI 0 Stop Control	RW			1
4		REF_OE	Output enable for REF	RW	Output Disabled	Output Enabled	1
3		USB_OE	Output enable for USB	RW	Output Disabled	Output Enabled	1
2		PCIF2_OE	Output enable for PCI2	RW	Output Disabled	Output Enabled	1
1		PCI1_OE	Output enable for PCI1	RW	Output Disabled	Output Enabled	1
0		PCI0_OE	Output enable for PCI0	RW	Output Disabled	Output Enabled	1

Byte 3 Output Enable Register

Bit	Pin	Name	Description	Type	0	1	Default
7		CPU_ITP_OE	Output enable for CPU_ITP	RW	Output Disabled	Output Enabled	1
6		CPU1_OE	Output enable for CPU1	RW	Output Disabled	Output Enabled	1
5		CPU0_OE	Output enable for CPU0	RW	Output Disabled	Output Enabled	1
4		Reserved	Reserved	RW			0
3		SRC3_OE	Output enable for SRC4	RW	Output Disabled	Output Enabled	1
2		SRC2_OE	Output enable for SRC4	RW	Output Disabled	Output Enabled	1
1		SRC1_OE	Output enable for SRC4	RW	Output Disabled	Output Enabled	1
0		SRC0_OE	Output enable for SRC4	RW	Output Disabled	Output Enabled	1

Byte 4 Output Enable and CLKREQ# Control Register

Bit	Pin	Name	Description	Type	0	1	Default
7		DOT96_OE	Output enable for DOT96	RW	Output Disabled	Output Enabled	1
6		LCD100_OE	Output enable for LCD100	RW	Output Disabled	Output Enabled	1
5		Reserved	Reserved	RW			0
4		Reserved	Reserved	RW			0
3		SRC3_CR	SRC3 CLKREQ3# Enable	RW	Not controlled by CLKREQ#	Controlled by CLKREQ#	0
2		SRC2_CR	SRC2 CLKREQ2# Enable	RW			0
1		SRC1_CR	SRC1 CLKREQ1# Enable	RW			0
0		SRC0_CR	SRC0 CLKREQ0# Enable	RW			0

Byte 5 Drive Strength Control Register

Bit	Pin	Name	Description	Type	0	1	Default
7		PCI_F2 Strength	Sets the PCI_F2 output drive strength	RW	1 Load	2 Loads	1
6		PCI1 Strength	Sets the PCI1 output drive strength	RW			1
5		PCI0 Strength	Sets the PCI0 output drive strength	RW			1
4		48MHz Strength	Sets the 48MHz output drive strength	RW			1
3		REF Strength	Sets the REF output drive strength	RW	2 Loads	3 Loads	1
2		IO_VOUT2	IO Output Voltage Select (Most Significant Bit)	RW	See Table 3: V_IO Selection (Default is 0.8V)		1
1		IO_VOUT1	IO Output Voltage Select	RW			0
0		IO_VOUT0	IO Output Voltage Select (Least Significant Bit)	RW			1

Byte 6 Reserved Register

Bit	Pin	Name	Description	Type	0	1	Default
7		Reserved	Reserved	RW			0
6		Reserved	Reserved	RW			0
5		Reserved	Reserved	RW			0
4		Reserved	Reserved	RW			0
3		Reserved	Reserved	RW			0
2		Reserved	Reserved	RW			0
1		Reserved	Reserved	RW			0
0		Reserved	Reserved	RW			0

Byte 7 Vendor ID/ Revision ID

Bit	Pin	Name	Description	Type	0	1	Default
7		Rev Code Bit 3	Revision ID	R	Vendor specific		X
6		Rev Code Bit 2		R			X
5		Rev Code Bit 1		R			X
4		Rev Code Bit 0		R			X
3		Vendor ID bit 3	Vendor ID ICS is 0001, binary	R			0
2		Vendor ID bit 2		R			0
1		Vendor ID bit 1		R			0
0		Vendor ID bit 0		R			1

Byte 8 Device ID Register

Bit	Pin	Name	Description	Type	0	1	Default
7		Device_ID3	Package ID code	R	Devide ID = 0011 Hex 56-pin QFN		0
6		Device_ID2		R			0
5		Device_ID1		R			1
4		Device_ID0		R			1
3		Reserved	Reserved	RW			0
2		Reserved	Reserved	RW			0
1		Reserved	Reserved	RW			0
0		Reserved	Reserved	RW			1

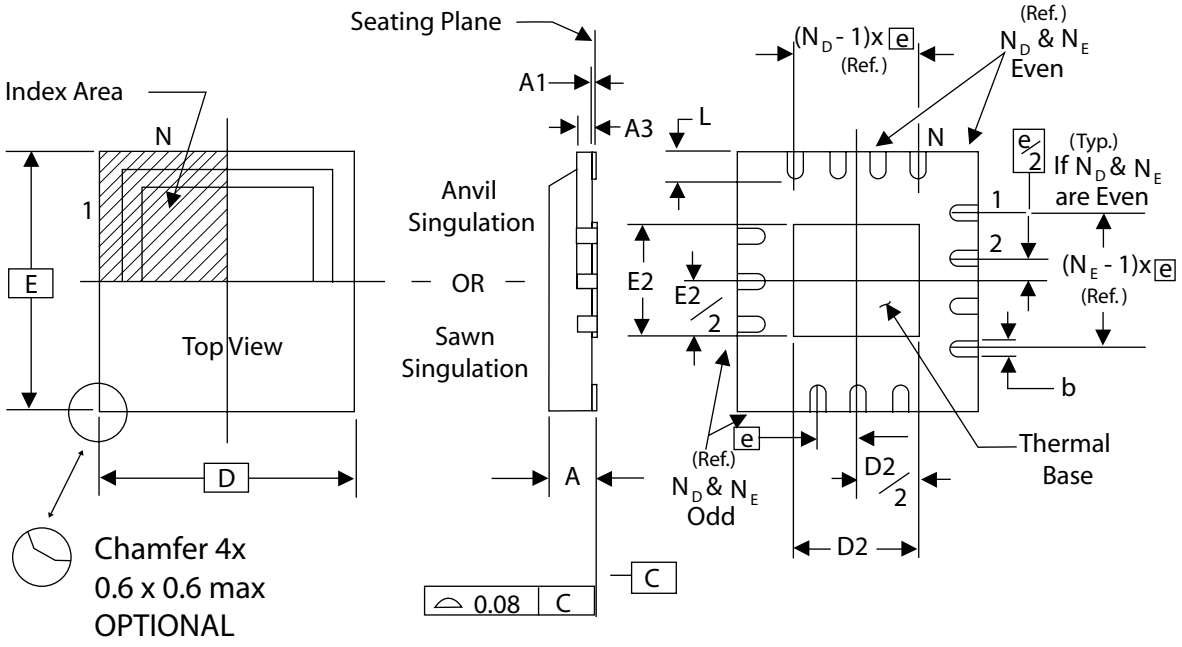
Byte 9 Test Mode Register

Bit	Pin	Name	Description	Type	0	1	Default
7		LCD_STOP	LCD Stop Control	RW	Free Running	Stops with PCI_STOP# assertion	0
6		Reserved	Reserved	RW			0
5		Reserved	Reserved	RW			0
4		Test Mode Select	Allows test select, ignores Test Sel input pin	RW	Outputs HI-Z	Outputs = REF/N	0
3		Test Mode Entry	Enters into test mode, ignores input pin	RW	Normal operation	Test mode	0
2		Reserved	Reserved	RW			0
1		Reserved	Reserved	RW			0
0		PLL1_SS	PLL1 Spread Spectrum Mode	RW	Down-spread	Center-spread	0

Test Clarification Table

Comments	HW		SW		
	TEST_SEL HW PIN	TEST_MODE HW PIN	TEST ENTRY BIT B9b3	REF/N or HI-Z B9b4	OUTPUT
	<2.0V	X	0	0	NORMAL
	>2.0V	0	X	0	HI-Z
	>2.0V	0	X	1	REF/N
Power-up w/ TEST_SEL = 1 to enter test mode	>2.0V	1	X	0	REF/N
Cycle power to disable test mode TEST_MODE -->low Vth input TEST_MODE is a real time input	>2.0V	1	X	1	REF/N
	<2.0V	X	1	0	HI-Z
If TEST_SEL HW pin is 0 during power-up, test mode can be invoked through B9b3. If test mode is invoked by B9b3, only B9b4 is used to select HI-Z or REF/N FSLB/TEST_Mode pin is not used. Cycle power to disable test mode, one shot control	<2.0V	X	1	1	REF/N

B9b3: 1= ENTER TEST MODE, Default = 0 (NORMAL OPERATION)
B9b4: 1= REF/N, Default = 0 (HI-Z)



THERMALLY ENHANCED, VERY THIN, FINE PITCH
QUAD FLAT / NO LEAD PLASTIC PACKAGE

DIMENSIONS

SYMBOL	MIN.	MAX.
A	0.8	1.0
A1	0	0.05
A3	0.25 Reference	
b	0.18	0.3
e	0.50 BASIC	

DIMENSIONS

SYMBOL	ICS 56L TOLERANCE
N	56
N_D	14
N_E	14
D x E BASIC	8.00 x 8.00
D2 MIN. / MAX.	4.35 / 4.65
E2 MIN. / MAX.	5.05 / 5.35
L MIN. / MAX.	0.30 / 0.50

Ordering Information

ICS9UMS9001yKLF-T

Example:

ICS XXXX y K LF- T

- **Designation for tape and reel packaging**
- **Lead Free, RoHS Compliant**
- **Package Type**
  K = MLF
- **Revision Designator** (will not correlate with datasheet revision)
- **Device Type**
- **Prefix**
  ICS (not part of the orderable part number)

Revision History

Rev.	Issue Date	Description	Page #
A	8/28/2008	1. Removed CK505 reference is Device ID byte of SMBus 2. Moved SMBus AFTER electrical characteristics 3. Made Data sheet Rev A device. 4. Move to Final	8, 9, 10