

# 64-PIN CK505 W/FULLY INTEGRATED VOLTAGE REGULATOR + INTEGRATED SERIES RESISTOR

ICS9LPRS501

## Recommended Application:

CK505 compliant clock with fully integrated voltage regulator and Internal series resistor on differential outputs, PCIe Gen 1 compliant

## Output Features:

- 2 - CPU differential low power push-pull pairs
- 10 - SRC differential low power push-pull pairs
- 1 - CPU/SRC selectable differential low power push-pull pair
- 1 - SRC/DOT selectable differential low power push-pull pair
- 5 - PCI, 33MHz
- 1 - PCI\_F, 33MHz free running
- 1 - USB, 48MHz
- 1 - REF, 14.318MHz

## Key Specifications:

- CPU outputs cycle-cycle jitter < 85ps
- SRC output cycle-cycle jitter < 125ps
- PCI outputs cycle-cycle jitter < 250ps
- +/- 100ppm frequency accuracy on CPU & SRC clocks

## Features/Benefits:

- Does not require external pass transistor for voltage regulator
- Integrated series resistors on differential outputs,  $Z_o=50\Omega$
- Supports spread spectrum modulation, default is 0.5% down spread
- Uses external 14.318MHz crystal, external crystal load caps are required for frequency tuning
- One differential push-pull pair selectable between SRC and two single-ended outputs

**Table 1: CPU Frequency Select Table**

| FS <sub>L</sub> C <sup>2</sup><br>B0b7 | FS <sub>L</sub> B <sup>1</sup><br>B0b6 | FS <sub>L</sub> A <sup>1</sup><br>B0b5 | CPU<br>MHz | SRC<br>MHz | PCI<br>MHz | REF<br>MHz | USB<br>MHz | DOT<br>MHz |
|--|--|--|------------|------------|------------|------------|------------|------------|
| 0                                      | 0                                      | 0                                      | 266.66     | 100.00     | 33.33      | 14.318     | 48.00      | 96.00      |
| 0                                      | 0                                      | 1                                      | 133.33     |            |            |            |            |            |
| 0                                      | 1                                      | 0                                      | 200.00     |            |            |            |            |            |
| 0                                      | 1                                      | 1                                      | 166.66     |            |            |            |            |            |
| 1                                      | 0                                      | 0                                      | 333.33     |            |            |            |            |            |
| 1                                      | 0                                      | 1                                      | 100.00     |            |            |            |            |            |
| 1                                      | 1                                      | 0                                      | 400.00     |            |            |            |            |            |
| 1                                      | 1                                      | 1                                      | Reserved   |            |            |            |            |            |

1. FS<sub>L</sub>A and FS<sub>L</sub>B are low-threshold inputs. Please see V<sub>IL,FS</sub> and V<sub>IH,FS</sub> specifications in the Input/Supply/Common Output Parameters Table for correct values. Also refer to the Test Clarification Table.

2. FS<sub>L</sub>C is a three-level input. Please see the V<sub>IL,FS</sub> and V<sub>IH,FS</sub> specifications in the Input/Supply/Common Output Parameters Table for correct values.

## TSSOP Pin Configuration

|                |    |    |                    |
|----------------|----|----|--------------------|
| PCI0/CR#_A     | 1  | 64 | SCLK               |
| VDDPCI         | 2  | 63 | SDATA              |
| PCI1/CR#_B     | 3  | 62 | REF0/FSLC/TEST_SEL |
| PCI2/TME       | 4  | 61 | VDDREF             |
| PCI3           | 5  | 60 | X1                 |
| PCI4/SRC5_EN   | 6  | 59 | X2                 |
| PCI_F5/ITP_EN  | 7  | 58 | GNDREF             |
| GNDPCI         | 8  | 57 | FSLB/TEST_MODE     |
| VDD48          | 9  | 56 | CK_PWRGD/PD#       |
| USB_48MHz/FSLA | 10 | 55 | VDDCPU             |
| GND48          | 11 | 54 | CPUT0              |
| VDD96_IO       | 12 | 53 | CPUC0              |
| DOTT_96/SRCT0  | 13 | 52 | GNDCPU             |
| DOTC_96/SRCC0  | 14 | 51 | CPUT1_F            |
| GND            | 15 | 50 | CPUC1_F            |
| VDD            | 16 | 49 | VDDCPU_IO          |
| SRCT1/SE1      | 17 | 48 | NC                 |
| SRCC1/SE2      | 18 | 47 | CPUT2_ITP/SRCT8    |
| GND            | 19 | 46 | CPUC2_ITP/SRCC8    |
| VDDPLL3_IO     | 20 | 45 | VDDSRC_IO          |
| SRCT2/SATAT    | 21 | 44 | SRCT7/CR#_F        |
| SRCC2/SATAC    | 22 | 43 | SRCC7/CR#_E        |
| GNDSRC         | 23 | 42 | GNDSRC             |
| SRCT3/CR#_C    | 24 | 41 | SRCT6              |
| SRCC3/CR#_D    | 25 | 40 | SRCC6              |
| VDDSRC_IO      | 26 | 39 | VDDSRC             |
| SRCT4          | 27 | 38 | PCI_STOP#/SRCT5    |
| SRCC4          | 28 | 37 | CPU_STOP#/SRCC5    |
| GNDSRC         | 29 | 36 | VDDSRC_IO          |
| SRCT9          | 30 | 35 | SRCC10             |
| SRCC9          | 31 | 34 | SRCT10             |
| SRCC11/CR#_G   | 32 | 33 | SRCT11/CR#_H       |

## TSSOP Pin Description

| PIN # | PIN NAME       | TYPE | DESCRIPTION   |
|-------|----------------|------|---|
| 1     | PCI0/CR#_A     | I/O  | 3.3V PCI clock output or Clock Request control A for either SRC0 or SRC2 pair<br>The power-up default is PCI0 output, but this pin may also be used as a Clock Request control of SRC pair 0 or SRC pair 2 via SMBus. Before configuring this pin as a Clock Request Pin, the PCI output must first be disabled in byte 2, bit 0 of SMBus address space. After the PCI output is disabled (high-Z), the pin can then be set to serve as a Clock Request pin for either SRC pair 2 or pair 0 using the CR#_A_EN bit located in byte 5 of SMBus address space.<br>Byte 5, bit 7<br>0 = PCI0 enabled (default)<br>1 = CR#_A enabled. Byte 5, bit 6 controls whether CR#_A controls SRC0 or SRC2 pair<br>Byte 5, bit 6<br>0 = CR#_A controls SRC0 pair (default),<br>1 = CR#_A controls SRC2 pair |
| 2     | VDDPCI         | PWR  | Power supply pin for the PCI outputs, 3.3V nominal  |
| 3     | PCI1/CR#_B     | I/O  | 3.3V PCI clock output/Clock Request control B for either SRC1 or SRC4 pair<br>The power-up default is PCI1 output, but this pin may also be used as a Clock Request control of SRC pair 1 or SRC pair 4 via SMBus. Before configuring this pin as a Clock Request Pin, the PCI output must first be disabled in byte 2, bit 1 of SMBus address space. After the PCI output is disabled (high-Z), the pin can then be set to serve as a Clock Request pin for either SRC pair 1 or pair 4 using the CR#_B_EN bit located in byte 5 of SMBus address space.<br>Byte 5, bit 5<br>0 = PCI1 enabled (default)<br>1 = CR#_B enabled. Byte 5, bit 6 controls whether CR#_B controls SRC1 or SRC4 pair<br>Byte 5, bit 4<br>0 = CR#_B controls SRC1 pair (default)<br>1 = CR#_B controls SRC4 pair     |
| 4     | PCI2/TME       | I/O  | 3.3V PCI clock output / Trusted Mode Enable (TME) Latched Input. This pin is sampled on power-up as follows<br>0 = Overclocking of CPU and SRC Allowed<br>1 = Overclocking of CPU and SRC <b>NOT</b> allowed<br>After being sampled on power-up, this pin becomes a 3.3V PCI Output   |
| 5     | PCI3           | OUT  | 3.3V PCI clock output.  |
| 6     | PCI4/SRC5_EN   | I/O  | 3.3V PCI clock output / SRC5 pair or PCI_STOP#/CPU_STOP# enable strap. On powerup, the logic value on this pin determines if the SRC5 pair is enabled or if CPU_STOP#/PCI_STOP# is enabled (pins 37 and 38). The latched value controls the pin function on pins 37 and 38 as follows<br>0 = PCI_STOP#/CPU_STOP#<br>1 = SRC5/SRC5#  |
| 7     | PCI_F5/ITP_EN  | I/O  | Free running PCI clock output and ITP/SRC8 enable strap. This output is not affected by the state of the PCI_STOP# pin. On powerup, the state of this pin determines whether pins 38 and 39 are an ITP or SRC pair.<br>0 = SRC8/SRC8#<br>1 = ITP/ITP#   |
| 8     | GNDPCI         | PWR  | Ground for PCI clocks.  |
| 9     | VDD48          | PWR  | Power supply for USB clock, nominal 3.3V.   |
| 10    | USB_48MHz/FSLA | I/O  | Fixed 48MHz USB clock output. 3.3V / 3.3V tolerant input for CPU frequency selection. Refer to input electrical characteristics for Vil_FS and Vih_FS values.   |
| 11    | GND48          | PWR  | Ground pin for the 48MHz outputs.   |
| 12    | VDD96_IO       | PWR  | Power supply for DOT96 outputs, VDD96_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 13    | DOTT_96/SRCT0  | OUT  | True clock of SRC or DOT96. The power-up default function is SRC0. After powerup, this pin function may be changed to DOT96 via SMBus Byte 1, bit 7 as follows:<br>0 = SRC0<br>1 = DOT96  |
| 14    | DOTC_96/SRCC0  | OUT  | Complement clock of SRC or DOT96. The power-up default function is SRC0#. After powerup, this pin function may be changed to DOT96# via SMBus Byte 1, bit 7 as follows<br>0 = SRC0#<br>1 = DOT96#   |
| 15    | GND            | PWR  | Ground pin for the DOT96 clocks.  |
| 16    | VDD            | PWR  | Power supply for SRC / SE1 and SE2 clocks, 3.3V nominal.  |

## TSSOP Pin Description (continued)

| PIN # | PIN NAME     | TYPE | DESCRIPTION   |
|-------|--------------|------|---|
| 17    | SRCT1/SE1    | OUT  | True clock of differential SRC1 clock pair / 3.3V single-ended output. The powerup default is 100 MHz SRC, -0.5% downspread. The pin function may be changed via SMBus B1b[4:1]   |
| 18    | SRCC1/SE2    | OUT  | Complement clock of differential SRC1 clock pair / 3.3V single-ended output. The powerup default is 100 MHz SRC, -0.5% downspread. The pin function may be changed via SMBus B1b[4:1]   |
| 19    | GND          | PWR  | Ground pin for SRC / SE1 and SE2 clocks, PLL3.  |
| 20    | VDDPLL3_IO   | PWR  | Power supply for PLL3 output. VDDPLL3_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 21    | SRCT2/SATAT  | OUT  | True clock of differential SRC/SATA clock pair.   |
| 22    | SRCC2/SATAC  | OUT  | Complement clock of differential SRC/SATA clock pair.   |
| 23    | GNDSRC       | PWR  | Ground pin for SRC clocks.  |
| 24    | SRCT3/CR#_C  | I/O  | True clock of differential SRC clock pair/ Clock Request control C for either SRC0 or SRC2 pair<br>The power-up default is SRCCLK3 output, but this pin may also be used as a Clock Request control of SRC pair 0 or SRC pair 2 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC3 output must first be disabled in byte 4, bit 7 of SMBus address space . After the SRC3 output is disabled, the pin can then be set to serve as a Clock Request pin for either SRC pair 2 or pair 0 using the CR#_C_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 3<br>0 = SRC3 enabled (default)<br>1= CR#_C enabled. Byte 5, bit 2 controls whether CR#_C controls SRC0 or SRC2 pair<br>Byte 5, bit 2<br>0 = CR#_C controls SRC0 pair (default),<br>1= CR#_C controls SRC2 pair          |
| 25    | SRCC3/CR#_D  | I/O  | Complementary clock of differential SRC clock pair/ Clock Request control D for either SRC1 or SRC4 pair<br>The power-up default is SRCCLK3 output, but this pin may also be used as a Clock Request control of SRC pair 1 or SRC pair 4 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC3 output must first be disabled in byte 4, bit 7 of SMBus address space . After the SRC3 output is disabled, the pin can then be set to serve as a Clock Request pin for either SRC pair 1 or pair 4 using the CR#_D_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 1<br>0 = SRC3 enabled (default)<br>1= CR#_D enabled. Byte 5, bit 0 controls whether CR#_D controls SRC1 or SRC4 pair<br>Byte 5, bit 0<br>0 = CR#_D controls SRC1 pair (default),<br>1= CR#_D controls SRC4 pair |
| 26    | VDDSRC_IO    | PWR  | Power supply for SRC clocks. VDDSRC_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 27    | SRCT4        | I/O  | True clock of differential SRC clock pair 4   |
| 28    | SRCC4        | I/O  | Complement clock of differential SRC clock pair 4   |
| 29    | GNDSRC       | PWR  | Ground pin for SRC clocks.  |
| 30    | SRCT9        | OUT  | True clock of differential SRC clock pair.  |
| 31    | SRCC9        | OUT  | Complement clock of differential SRC clock pair.  |
| 32    | SRCC11/CR#_G | I/O  | SRC11 complement /Clock Request control for SRC9 pair<br>The power-up default is SRC11#, but this pin may also be used as a Clock Request control of SRC9 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC11 output pair must first be disabled in byte 3, bit 7 of SMBus configuration space After the SRC11 output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC9 pair using byte 6, bit 5 of SMBus configuration space<br><b>Byte 6, bit 5</b><br>0 = SRC11# enabled (default)<br>1= CR#_G controls SRC9   |

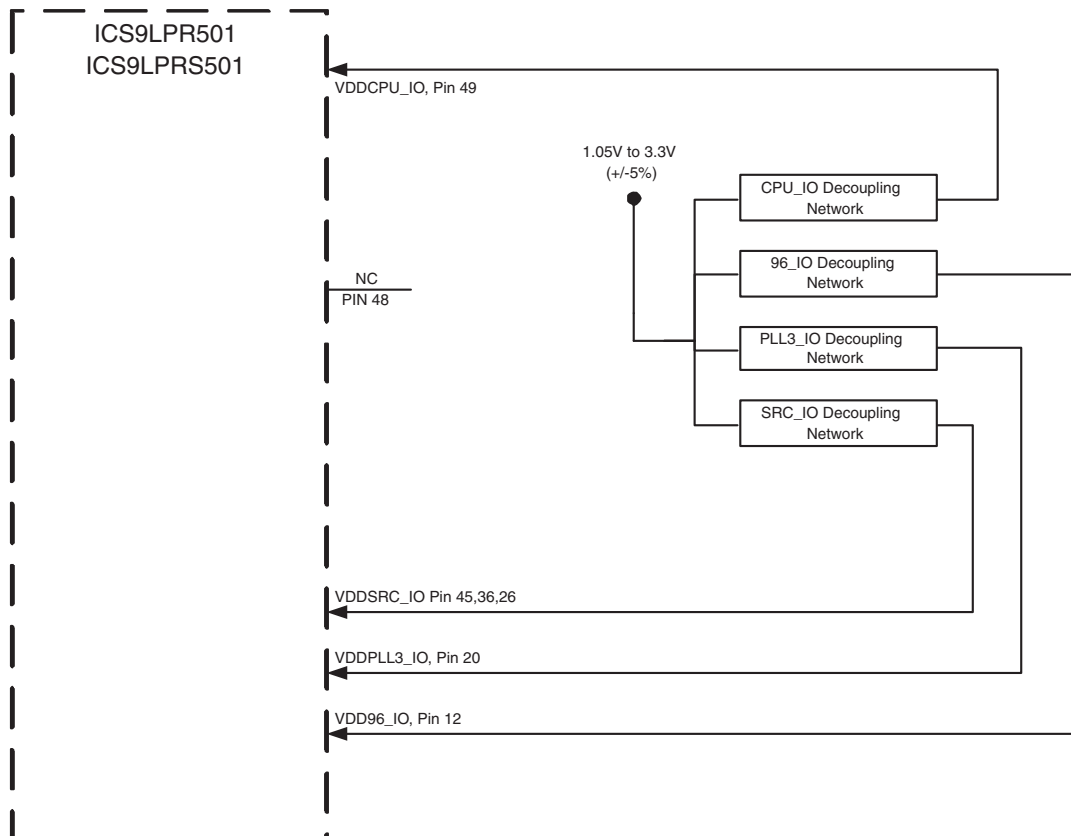
## TSSOP Pin Description (Continued)

| PIN # | PIN NAME        | TYPE | DESCRIPTION   |
|-------|-----------------|------|---|
| 33    | SRCT11/CR#_H    | I/O  | SRC11 true or Clock Request control H for SRC10 pair<br>The power-up default is SRC11, but this pin may be used as a Clock Request control of SRC10 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC11 output pair must first be disabled in byte 3 bit 7 of SMBus configuration space After the SRC11 output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC10 pair using byte 6, bit 4 of SMBus configuration space<br>Byte 6, bit 4<br>0 = SRC11 enabled (default)<br>1 = CR#_H controls SRC10.              |
| 34    | SRCT10          | OUT  | True clock of differential SRC clock pair.  |
| 35    | SRCC10          | OUT  | Complement clock of differential SRC clock pair.  |
| 36    | VDDSRC_IO       | PWR  | Power supply for SRC outputs. VDDSRC_IO is 1.05 to 3.3V with +/-5% tolerance  |
| 37    | CPU_STOP#/SRCC5 | I/O  | Stops all CPU Clocks, except those set to be free running clocks /<br>Complement clock of differential SRC pair. The function of this pin is set up by the power-up strap on pin 6, PCI4/SRC5_EN. The logic value sampled on pin 6 at power-up sets the function as follows:<br>0 = CPU_STOP#<br>1 = SRC5<br>In AMT mode 3 bits are shifted in from the ICH to set the FSC, FSB, FSA values   |
| 38    | PCI_STOP#/SRCT5 | I/O  | Stops all PCI Clocks, except those set to be free running clocks /<br>Complement clock of differential SRC pair. The function of this pin is set up by the power-up strap on pin 6, PCI4/SRC5_EN. The logic value sampled on pin 6 at power-up sets the function as follows:<br>0 = PCI_STOP#<br>1 = SRC5#<br>In AMT mode, this pin is a clock input which times the FSC, FSB, FSA bits shifted in on pin 37.   |
| 39    | VDDSRC          | PWR  | VDD pin for SRC internal circuits, 3.3V nominal   |
| 40    | SRCC6           | OUT  | Complement clock of low power differential SRC clock pair.  |
| 41    | SRCT6           | OUT  | True clock of low power differential SRC clock pair.  |
| 42    | GNDSRC          | PWR  | Ground for SRC clocks   |
| 43    | SRCC7/CR#_E     | I/O  | SRC7 complement or Clock Request control E for SRC6 pair<br>The power-up default is SRC7#, but this pin may also be used as a Clock Request control of SRC6 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC7 output pair must first be disabled in byte 3, bit 3 of SMBus configuration space . After the SRC output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC6 pair using byte 6, bit 7 of SMBus configuration space<br><b>Byte 6, bit 7</b><br>0 = SRC7# enabled (default)<br>1 = CR#_E controls SRC6. |
| 44    | SRCT7/CR#_F     | I/O  | SRC7 true or Clock Request control 8 for SRC8 pair<br>The power-up default is SRC7, but this pin may also be used as a Clock Request control of SRC8 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC7 output pair must first be disabled in byte 3, bit 3 of SMBus configuration space After the SRC output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC8 pair using byte 6, bit 6 of SMBus configuration space<br><b>Byte 6, bit 6</b><br>0 = SRC7# enabled (default)<br>1 = CR#_F controls SRC8.          |
| 45    | VDDSRC_IO       | PWR  | Power supply for SRC outputs. VDDSRC_IO is 1.05 to 3.3V with +/-5% tolerance  |
| 46    | CPUC2_ITP/SRCC8 | OUT  | Complement clock of low power differential CPU2/Complement clock of differential SRC pair. The function of this pin is determined by the latched input value on pin 7, PCIF5/ITP_EN on powerup. The function is as follows:<br>Pin 7 latched input Value<br>0 = SRC8#<br>1 = ITP#   |
| 47    | CPUT2_ITP/SRCT8 | OUT  | True clock of low power differential CPU2/True clock of differential SRC pair. The function of this pin is determined by the latched input value on pin 7, PCIF5/ITP_EN on powerup. The function is as follows:<br>Pin 7 latched input Value<br>0 = SRC8<br>1 = ITP   |
| 48    | NC              | N/A  | No Connect  |

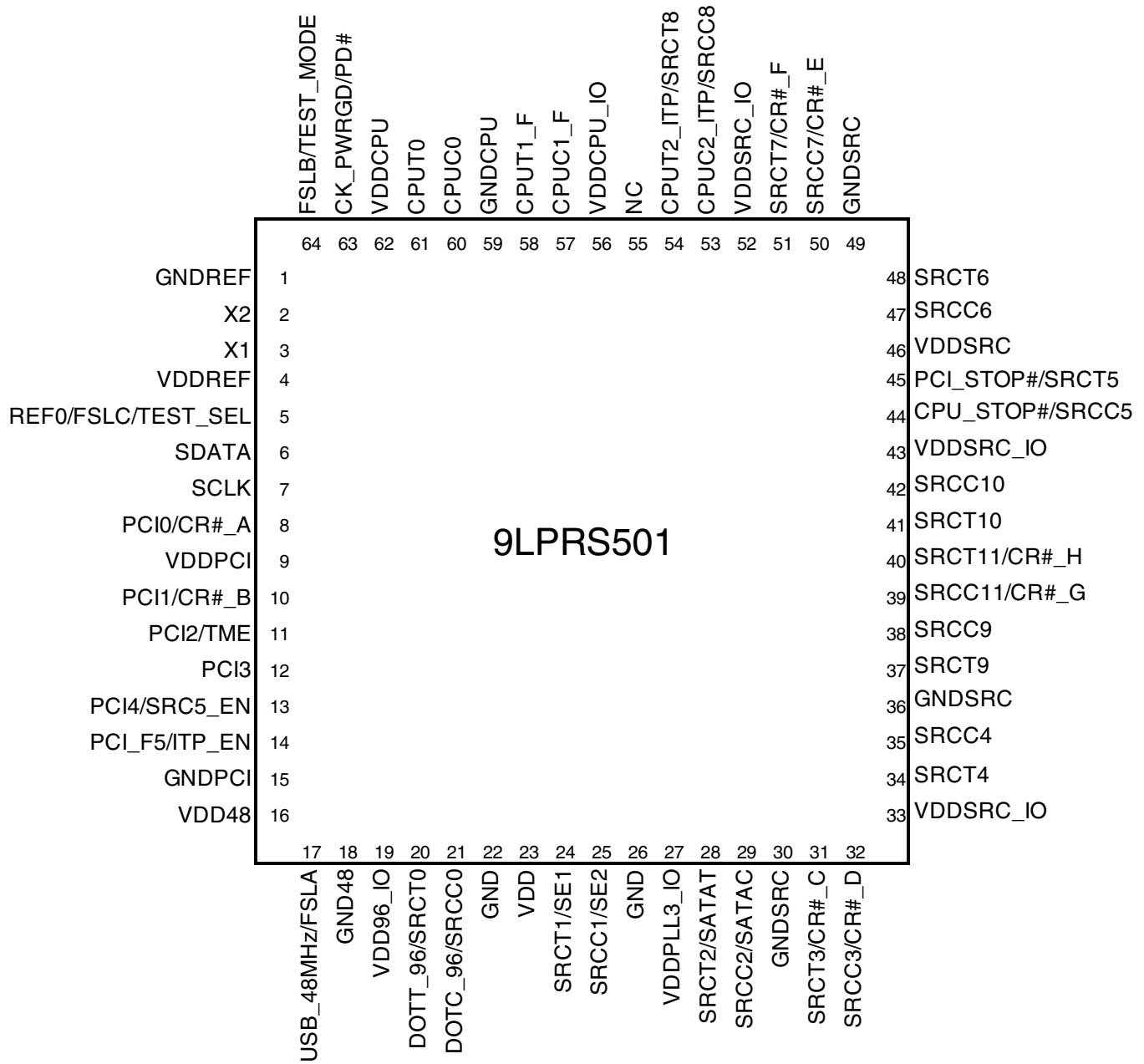
## TSSOP Pin Description (Continued)

| PIN # | PIN NAME           | TYPE | DESCRIPTION  |
|-------|--------------------|------|--|
| 49    | VDDCPU_IO          | PWR  | Supply for CPU outputs. VDDCPU_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 50    | CPUC1_F            | OUT  | Complement clock of low power differential CPU clock pair. This clock will be free-running during iAMT.  |
| 51    | CPUC1_F            | OUT  | True clock of low power differential CPU clock pair. This clock will be free-running during iAMT.  |
| 52    | GNDCPU             | PWR  | Ground Pin for CPU Outputs   |
| 53    | CPUC0              | OUT  | Complement clock of low power differential CPU clock pair.   |
| 54    | CPUC0              | OUT  | True clock of low power differential CPU clock pair.   |
| 55    | VDDCPU             | PWR  | Power Supply 3.3V nominal.   |
| 56    | CK_PWRGD/PD#       | IN   | Notifies CK505 to sample latched inputs, or iAMT entry/exit, or PWRDWN# mode   |
| 57    | FSLB/TEST_MODE     | IN   | 3.3V tolerant input for CPU frequency selection. Refer to input electrical characteristics for $V_{i\_FS}$ and $V_{ih\_FS}$ values. TEST_MODE is a real time input to select between Hi-Z and REF/N divider mode while in test mode. Refer to Test Clarification Table.  |
| 58    | GNDREF             | PWR  | Ground pin for crystal oscillator circuit  |
| 59    | X2                 | OUT  | Crystal output, nominally 14.318MHz.   |
| 60    | X1                 | IN   | Crystal input, Nominally 14.318MHz.  |
| 61    | VDDREF             | PWR  | Power pin for the REF outputs, 3.3V nominal.   |
| 62    | REF0/FSLC/TEST_SEL | I/O  | 3.3V 14.318MHz reference clock/3.3V tolerant low threshold input for CPU frequency selection. Refer to input electrical characteristics for $V_{i\_FS}$ and $V_{ih\_FS}$ values/ TEST_SEL: 3-level latched input to enable test mode. Refer to Test Clarification Table. |
| 63    | SDATA              | I/O  | Data pin for SMBus circuitry, 5V tolerant.   |
| 64    | SCLK               | IN   | Clock pin of SMBus circuitry, 5V tolerant.   |

## Fully Integrated Regulator Connection for Desktop/Mobile Applications



MLF Pin Configuration



## MLF Pin Description

| PIN # | PIN NAME           | TYPE | DESCRIPTION  |
|-------|--------------------|------|--|
| 1     | GNDREF             | PWR  | Ground pin for crystal oscillator circuit  |
| 2     | X2                 | OUT  | Crystal output, nominally 14.318MHz.   |
| 3     | X1                 | IN   | Crystal input, Nominally 14.318MHz.  |
| 4     | VDDREF             | PWR  | Power pin for the REF outputs, 3.3V nominal.   |
| 5     | REF0/FSLC/TEST_SEL | I/O  | 3.3V 14.318MHz reference clock/3.3V tolerant low threshold input for CPU frequency selection. Refer to input electrical characteristics for $V_{IL\_FS}$ and $V_{IH\_FS}$ values/ TEST_SEL: 3-level latched input to enable test mode. Refer to Test Clarification Table.  |
| 6     | SDATA              | I/O  | Data pin for SMBus circuitry, 5V tolerant.   |
| 7     | SCLK               | IN   | Clock pin of SMBus circuitry, 5V tolerant.   |
| 8     | PCI0/CR#_A         | I/O  | 3.3V PCI clock output or Clock Request control A for either SRC0 or SRC2 pair<br>The power-up default is PCI0 output, but this pin may also be used as a Clock Request control of SRC pair 0 or SRC pair 2 via SMBus. Before configuring this pin as a Clock Request Pin, the PCI output must first be disabled in byte 2, bit 0 of SMBus address space . After the PCI output is disabled (high-Z), the pin can then be set to serve as a Clock Request pin for either SRC pair 2 or pair 0 using the CR#_A_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 7<br>0 = PCI0 enabled (default)<br>1 = CR#_A enabled. Byte 5, bit 6 controls whether CR#_A controls SRC0 or SRC2 pair<br>Byte 5, bit 6<br>0 = CR#_A controls SRC0 pair (default),<br>1 = CR#_A controls SRC2 pair |
| 9     | VDDPCI             | PWR  | Power supply pin for the PCI outputs, 3.3V nominal   |
| 10    | PCI1/CR#_B         | I/O  | 3.3V PCI clock output/Clock Request control B for either SRC1 or SRC4 pair<br>The power-up default is PCI1 output, but this pin may also be used as a Clock Request control of SRC pair 1 or SRC pair 4 via SMBus. Before configuring this pin as a Clock Request Pin, the PCI output must first be disabled in byte 2, bit 1 of SMBus address space . After the PCI output is disabled (high-Z), the pin can then be set to serve as a Clock Request pin for either SRC pair 1 or pair 4 using the CR#_B_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 5<br>0 = PCI1 enabled (default)<br>1 = CR#_B enabled. Byte 5, bit 6 controls whether CR#_B controls SRC1 or SRC4 pair<br>Byte 5, bit 4<br>0 = CR#_B controls SRC1 pair (default)<br>1 = CR#_B controls SRC4 pair     |
| 11    | PCI2/TME           | I/O  | 3.3V PCI clock output / Trusted Mode Enable (TME) Latched Input. This pin is sampled on power-up as follows<br>0 = Overclocking of CPU and SRC Allowed<br>1 = Overclocking of CPU and SRC <u>NOT</u> allowed<br>After being sampled on power-up, this pin becomes a 3.3V PCI Output  |
| 12    | PCI3               | OUT  | 3.3V PCI clock output.   |
| 13    | PCI4/SRC5_EN       | I/O  | 3.3V PCI clock output / SRC5 pair or PCI_STOP#/CPU_STOP# enable strap. On powerup, the logic value on this pin determines if the SRC5 pair is enabled or if CPU_STOP#/PCI_STOP# is enabled (pins 29 and 30). The latched value controls the pin function on pins 29 and 30 as follows<br>0 = PCI_STOP#/CPU_STOP#<br>1 = SRC5/SRC5#   |
| 14    | PCI_F5/ITP_EN      | I/O  | Free running PCI clock output and ITP/SRC8 enable strap. This output is not affected by the state of the PCI_STOP# pin. On powerup, the state of this pin determines whether pins 38 and 39 are an ITP or SRC pair.<br>0 =SRC8/SRC8#<br>1 = ITP/ITP#   |
| 15    | GNDPCI             | PWR  | Ground for PCI clocks.   |
| 16    | VDD48              | PWR  | Power supply for USB clock, nominal 3.3V.  |



## MLF Pin Description (Continued)

| PIN # | PIN NAME       | TYPE | DESCRIPTION   |
|-------|----------------|------|---|
| 17    | USB_48MHz/FSLA | I/O  | Fixed 48MHz USB clock output. 3.3V/ 3.3V tolerant input for CPU frequency selection. Refer to input electrical characteristics for Vil_FS and Vih_FS values.  |
| 18    | GND48          | PWR  | Ground pin for the 48MHz outputs.   |
| 19    | VDD96_IO       | PWR  | Power supply for DOT96 outputs, VDD96_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 20    | DOTT_96/SRCT0  | OUT  | True clock of SRC or DOT96. The power-up default function is SRC0. After powerup, this pin function may be changed to DOT96 via SMBus Byte 1, bit 7 as follows:<br>0= SRC0<br>1=DOT96   |
| 21    | DOTC_96/SRCC0  | OUT  | Complement clock of SRC or DOT96. The power-up default function is SRC0#. After powerup, this pin function may be changed to DOT96# via SMBus Byte 1, bit 7 as follows<br>0= SRC0#<br>1=DOT96#  |
| 22    | GND            | PWR  | Ground pin for the DOT96 clocks.  |
| 23    | VDD            | PWR  | Power supply for SRC / SE1 and SE2 clocks, 3.3V nominal.  |
| 24    | SRCT1/SE1      | OUT  | True clock of differential SRC1 clock pair / 3.3V single-ended output. The powerup default is 100 MHz SRC, -0.5% downspread. The pin function may be changed via SMBus B1b[4:1]   |
| 25    | SRCC1/SE2      | OUT  | Complement clock of differential SRC1 clock pair / 3.3V single-ended output. The powerup default is 100 MHz SRC, -0.5% downspread. The pin function may be changed via SMBus B1b[4:1]   |
| 26    | GND            | PWR  | Ground pin for SRC / SE1 and SE2 clocks, PLL3.  |
| 27    | VDDPLL3_IO     | PWR  | Power supply for PLL3 output. VDDPLL3_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 28    | SRCT2/SATAT    | OUT  | True clock of differential SRC/SATA clock pair.   |
| 29    | SRCC2/SATAC    | OUT  | Complement clock of differential SRC/SATA clock pair.   |
| 30    | GNDSRC         | PWR  | Ground pin for SRC clocks.  |
| 31    | SRCT3/CR#_C    | I/O  | True clock of differential SRC clock pair/ Clock Request control C for either SRC0 or SRC2 pair<br>The power-up default is SRCCLK3 output, but this pin may also be used as a Clock Request control of SRC pair 0 or SRC pair 2 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC3 output must first be disabled in byte 4, bit 7 of SMBus address space . After the SRC3 output is disabled, the pin can then be set to serve as a Clock Request pin for either SRC pair 2 or pair 0 using the CR#_C_EN bit located in byte 5 of SMBUS address space.<br>Byte 5, bit 3<br>0 = SRC3 enabled (default)<br>1= CR#_C enabled. Byte 5, bit 2 controls whether CR#_C controls SRC0 or SRC2 pair<br>Byte 5, bit 2<br>0 = CR#_C controls SRC0 pair (default),<br>1= CR#_C controls SRC2 pair          |
| 32    | SRCC3/CR#_D    | I/O  | Complementary clock of differential SRC clock pair/ Clock Request control D for either SRC1 or SRC4 pair<br>The power-up default is SRCCLK3 output, but this pin may also be used as a Clock Request control of SRC pair 1 or SRC pair 4 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC3 output must first be disabled in byte 4, bit 7 of SMBus address space . After the SRC3 output is disabled, the pin can then be set to serve as a Clock Request pin for either SRC pair 1 or pair 4 using the CR#_D_EN bit located in byte 5 of SMBUS address space.<br>Byte 5, bit 1<br>0 = SRC3 enabled (default)<br>1= CR#_D enabled. Byte 5, bit 0 controls whether CR#_D controls SRC1 or SRC4 pair<br>Byte 5, bit 0<br>0 = CR#_D controls SRC1 pair (default),<br>1= CR#_D controls SRC4 pair |



## MLF Pin Description (Continued)

| PIN # | PIN NAME        | TYPE | DESCRIPTION  |
|-------|-----------------|------|--|
| 33    | VDDSRC_IO       | PWR  | Power supply for SRC clocks. VDDSRC_IO is 1.05 to 3.3V with +/-5% tolerance  |
| 34    | SRCT4           | I/O  | True clock of differential SRC clock pair 4  |
| 35    | SRCC4           | I/O  | Complement clock of differential SRC clock pair 4  |
| 36    | GNDSRC          | PWR  | Ground pin for SRC clocks.   |
| 37    | SRCT9           | OUT  | True clock of differential SRC clock pair.   |
| 38    | SRCC9           | OUT  | Complement clock of differential SRC clock pair.   |
| 39    | SRCC11/CR#_G    | I/O  | SRC11 complement /Clock Request control for SRC9 pair<br>The power-up default is SRC11#, but this pin may also be used as a Clock Request control of SRC9 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC11 output pair must first be disabled in byte 3, bit 7 of SMBus configuration space After the SRC11 output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC9 pair using byte 6, bit 5 of SMBus configuration space<br><b>Byte 6, bit 5</b><br>0 = SRC11# enabled (default)<br>1 = CR#_G controls SRC9 |
| 40    | SRCT11/CR#_H    | I/O  | SRC11 true or Clock Request control H for SRC10 pair<br>The power-up default is SRC11, but this pin may also be used as a Clock Request control of SRC10 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC11 output pair must first be disabled in byte 3, bit 6 of SMBus configuration space After the SRC11 output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC10 pair using byte 6, bit 4 of SMBus configuration space<br>Byte 6, bit 4<br>0 = SRC11 enabled (default)<br>1 = CR#_H controls SRC10.       |
| 41    | SRCT10          | OUT  | True clock of differential SRC clock pair.   |
| 42    | SRCC10          | OUT  | Complement clock of differential SRC clock pair.   |
| 43    | VDDSRC_IO       | PWR  | Power supply for SRC outputs. VDDSRC_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 44    | CPU_STOP#/SRCC5 | I/O  | Stops all CPU Clocks, except those set to be free running clocks /<br>Complement clock of differential SRC pair. The function of this pin is set up by the power-up strap on pin 6, PCI4/SRC5_EN. The logic value sampled on pin 6 at power-up sets the function as follows:<br>0= CPU_STOP#<br>1 = SRC5<br>In AMT mode 3 bits are shifted in from the ICH to set the FSC, FSB, FSA values   |
| 45    | PCI_STOP#/SRCT5 | I/O  | Stops all PCI Clocks, except those set to be free running clocks /<br>Complement clock of differential SRC pair. The function of this pin is set up by the power-up strap on pin 6, PCI4/SRC5_EN. The logic value sampled on pin 6 at power-up sets the function as follows:<br>0= PCI_STOP#<br>1 = SRC5#<br>In AMT mode, this pin is a clock input which times the FSC, FSB, FSA bits shifted in on pin 37.   |
| 46    | VDDSRC          | PWR  | VDD pin for SRC internal circuits, 3.3V nominal  |
| 47    | SRCC6           | OUT  | Complement clock of low power differential SRC clock pair.   |
| 48    | SRCT6           | OUT  | True clock of low power differential SRC clock pair.   |

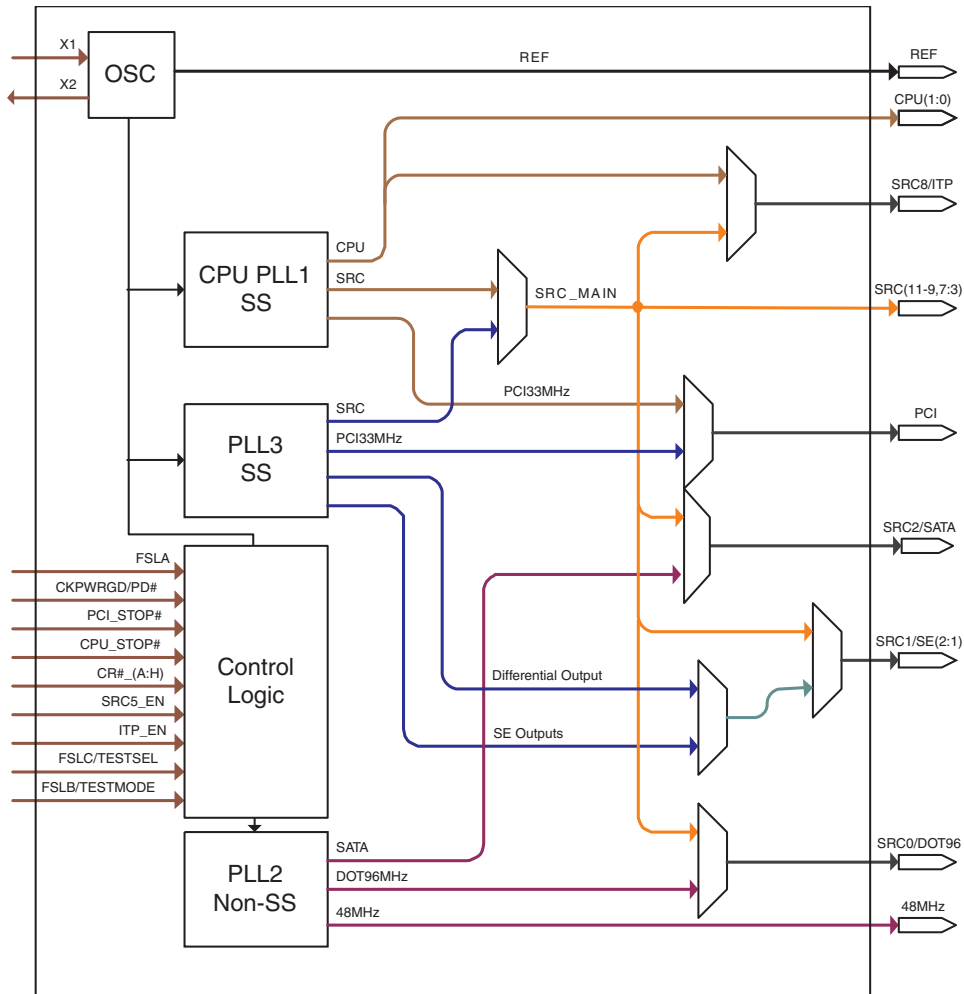
## MLF Pin Description (Continued)

| PIN # | PIN NAME        | TYPE | DESCRIPTION  |
|-------|-----------------|------|--|
| 49    | GNDSRC          | PWR  | Ground for SRC clocks  |
| 50    | SRCC7/CR#_E     | I/O  | SRC7 complement or Clock Request control E for SRC6 pair<br>The power-up default is SRC7#, but this pin may also be used as a Clock Request control of SRC6 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC7 output pair must first be disabled in byte 3, bit 3 of SMBus configuration space. After the SRC output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC6 pair using byte 6, bit 7 of SMBus configuration space<br><b>Byte 6, bit 7</b><br>0 = SRC7# enabled (default)<br>1 = CR#_E controls SRC6. |
| 51    | SRCT7/CR#_F     | I/O  | SRC7 true or Clock Request control 8 for SRC8 pair<br>The power-up default is SRC7, but this pin may also be used as a Clock Request control of SRC8 via SMBus. Before configuring this pin as a Clock Request Pin, the SRC7 output pair must first be disabled in byte 3, bit 3 of SMBus configuration space. After the SRC output is disabled (high-Z), the pin can then be set to serve as a Clock Request for SRC8 pair using byte 6, bit 6 of SMBus configuration space<br><b>Byte 6, bit 6</b><br>0 = SRC7# enabled (default)<br>1 = CR#_F controls SRC8.        |
| 52    | VDDSRC_IO       | PWR  | Power supply for SRC outputs. VDDSRC_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 53    | CPUC2_ITP/SRCC8 | OUT  | Complement clock of low power differential CPU2/Complement clock of differential SRC pair. The function of this pin is determined by the latched input value on pin 7, PCIF5/ITP_EN on powerup. The function is as follows:<br>Pin 7 latched input Value<br>0 = SRC8#<br>1 = ITP#  |
| 54    | CPUT2_ITP/SRCT8 | OUT  | True clock of low power differential CPU2/True clock of differential SRC pair. The function of this pin is determined by the latched input value on pin 7, PCIF5/ITP_EN on powerup. The function is as follows:<br>Pin 7 latched input Value<br>0 = SRC8<br>1 = ITP  |
| 55    | NC              | N/A  | No Connect   |
| 56    | VDDCPU_IO       | PWR  | Supply for CPU outputs. VDDCPU_IO is 1.05 to 3.3V with +/-5% tolerance   |
| 57    | CPUC1_F         | OUT  | Complement clock of low power differential CPU clock pair. This clock will be free-running during iAMT.  |
| 58    | CPUT1_F         | OUT  | True clock of low power differential CPU clock pair. This clock will be free-running during iAMT.  |
| 59    | GNDCPU          | PWR  | Ground Pin for CPU Outputs   |
| 60    | CPUC0           | OUT  | Complement clock of low power differential CPU clock pair.   |
| 61    | CPUT0           | OUT  | True clock of low power differential CPU clock pair.   |
| 62    | VDDCPU          | PWR  | Power Supply 3.3V nominal.   |
| 63    | CK_PWRGD/PD#    | IN   | Notifies CK505 to sample latched inputs, or iAMT entry/exit, or PWRDWN# mode   |
| 64    | FSLB/TEST_MODE  | IN   | 3.3V tolerant input for CPU frequency selection. Refer to input electrical characteristics for $V_{il\_FS}$ and $V_{ih\_FS}$ values. TEST_MODE is a real time input to select between Hi-Z and REF/N divider mode while in test mode. Refer to Test Clarification Table.   |

### General Description

ICS9LPRS501 follows Intel CK505 Yellow Cover specification. This clock synthesizer provides a single chip solution for next generation Intel processors and Intel chipsets. ICS9LPRS501 is driven with a 14.318MHz crystal. It also provides a tight ppm accuracy output for Serial ATA and PCI-Express support.

### Functional Block Diagram



### Power Groups

| Pin Number |            | Description          |                   |
|------------|------------|----------------------|-------------------|
| VDD        | GND        |                      |                   |
| 49         | 52         | CPUCLK               | Low power outputs |
| 55         | 52         | Master Clock, Analog |                   |
| 26, 36, 45 | 23, 29, 42 | SRCCLK               | Low power outputs |
| 39         | 23, 29, 42 |                      | PLL 1             |
| 20         | 19         | PLL3/SE              | Low power outputs |
| 16         | 19         |                      | PLL 3             |
| 12         | 11         | DOT 96Mhz            | Low power outputs |
| 9          | 11         | USB 48               |                   |
| 61         | 58         | Xtal, REF            |                   |
| 2          | 8          | PCICLK               |                   |

**Absolute Maximum Ratings - DC Parameters**

| PARAMETER                                   | SYMBOL            | CONDITIONS                          | MIN       | TYP | MAX  | UNITS | Notes |
|---|-------------------|-------------------------------------|-----------|-----|------|-------|-------|
| Maximum Supply Voltage                      | VDDxxx            | Supply Voltage                      |           |     | 4.6  | V     | 7     |
| Maximum Supply Voltage                      | VDDxxx_IO         | Low-Voltage Differential I/O Supply |           |     | 3.8  | V     | 7     |
| Maximum Input Voltage                       | V <sub>IH</sub>   | 3.3V Inputs                         |           |     | 4.6  | V     | 4,5,7 |
| Minimum Input Voltage                       | V <sub>IL</sub>   | Any Input                           | GND - 0.5 |     |      | V     | 4,7   |
| Case Temperature                            | T <sub>case</sub> |                                     |           |     | 115  | °C    |       |
| Thermal Resistance from Die to Ambient Air  | J <sub>A</sub>    |                                     |           |     | 32.5 | °C/W  |       |
| Thermal Resistance from Die to Package Case | J <sub>C</sub>    |                                     |           |     | 68.2 | °C/W  |       |
| Storage Temperature                         | T <sub>s</sub>    | -                                   | -65       |     | 150  | °C    | 4,7   |
| Input ESD protection                        | ESD prot          | Human Body Model                    | 2000      |     |      | V     | 6,7   |

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

<sup>2</sup>Operation under these conditions is neither implied, nor guaranteed.

<sup>3</sup>Maximum input voltage is not to exceed VDD

**AC Electrical Characteristics - Low Power Differential Outputs**

| PARAMETER                  | SYMBOL    | CONDITIONS               | MIN  | TYP   | MAX  | UNITS | NOTES |
|----------------------------|-----------|--------------------------|------|-------|------|-------|-------|
| Rising Edge Slew Rate      | tSLR      | Averaging on             | 2.5  | 3.35  | 4    | V/ns  | 2, 3  |
| Falling Edge Slew Rate     | tFLR      | Averaging on             | 2.5  | 3.30  | 4    | V/ns  | 2, 3  |
| Slew Rate Variation        | tSLVAR    | Averaging on             |      |       | 20   | %     | 1, 10 |
| Differential Voltage Swing | VSWING    | Averaging off            | 300  |       |      | mV    | 2     |
| Crossing Point Voltage     | VXABS     | Averaging off            | 300  | 405.5 | 550  | mV    | 1,4,5 |
| Crossing Point Variation   | VXABSVAR  | Averaging off            |      | 60    | 140  | mV    | 1,4,9 |
| Maximum Output Voltage     | VHIGH     | Averaging off            |      | 894   | 1150 | mV    | 1,7   |
| Minimum Output Voltage     | VLOW      | Averaging off            | -300 | 59.5  |      | mV    | 1,8   |
| Duty Cycle                 | DCYC      | Averaging on             | 45   | 51.0  | 55   | %     | 2     |
| CPU[1:0] Skew              | CPUSKEW10 | Differential Measurement |      | 47    | 100  | ps    | 1     |
| CPU[2_ITP:0] Skew          | CPUSKEW20 | Differential Measurement |      | 125   | 150  | ps    | 1     |
| SRC[10:0] Skew             | SRCSEW    | Differential Measurement |      | 704   | 3000 | ps    | 1,6   |

**NOTES on DIF Output AC Specs: (unless otherwise noted, guaranteed by design and characterization, not 100% tested in production).**

<sup>1</sup>Measurement taken for single ended waveform on a component test board (not in system)

<sup>2</sup>Measurement taken from differential waveform on a component test board. (not in system)

<sup>3</sup>Slew rate emasured through V<sub>swing</sub> voltage range centered about differential zero

<sup>4</sup>V<sub>cross</sub> is defined at the voltage where Clock = Clock#, measured on a component test board (not in system)

<sup>5</sup>Only applies to the differential rising edge (Clock rising, Clock# falling)

<sup>6</sup>Total distributed intentional SRC to SRC skew.

<sup>7</sup>The max voltage including overshoot.

<sup>8</sup>The min voltage including undershoot.

<sup>9</sup>The total variation of all V<sub>cross</sub> measurements in any particular system. Note this is a subset of V<sub>cross</sub> min/mas (V<sub>Cross</sub> absolute) allowed. The intent is to limit V<sub>cross</sub> induced modulation by setting C<sub>cross\_delta</sub> to be smaller than V<sub>Cross</sub> absolute.

<sup>10</sup>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 calculations.

**Clock Jitter Specs - Low Power Differential Outputs**

| PARAMETER                    | SYMBOL   | CONDITIONS               | MIN | TYP  | MAX | UNITS | NOTES |
|------------------------------|----------|--------------------------|-----|------|-----|-------|-------|
| CPU Jitter - Cycle to Cycle  | CPUJC2C  | Differential Measurement |     | 58.1 | 85  | ps    | 1     |
| SRC Jitter - Cycle to Cycle  | SRCJC2C  | Differential Measurement |     | 36.2 | 125 | ps    | 1,2   |
| SATA Jitter - Cycle to Cycle | SATAJC2C | Differential Measurement |     | 46.8 | 125 | ps    | 1     |
| DOT Jitter - Cycle to Cycle  | DOTJC2C  | Differential Measurement |     | 73.0 | 250 | ps    | 1     |

**NOTES on DIF Output Jitter: (unless otherwise noted, guaranteed by design and characterization, not 100% tested in production).**

<sup>1</sup>Jitter specs are specified as measured on a clock characterization board. System designers need to take special care not to use these numbers, as the in-system performance will be somewhat degraded. The receiver EMTS (chispet or CPU) will have the receiver jitter specs as measured in a real system.

<sup>2</sup>Phase jitter requirement: The SRC outputs will meet the reference clock jitter requirements from the PCI Express Gen1 Base Spec. The test is performed on a component test board under quiet conditions with all outputs on. Jitter analysis is performed using the standardized tool provided by the PCI SIG.

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

| PARAMETER  | SYMBOL                            | CONDITIONS  | MIN                   | TYP      | MAX                   | UNITS | Notes |
|--|-----------------------------------|---|-----------------------|----------|-----------------------|-------|-------|
| Ambient Operating Temp                                   | T <sub>ambient</sub>              | -   | 0                     | 25       | 70                    | °C    |       |
| Supply Voltage   | VDD <sub>xxx</sub>                | Supply Voltage  | 3.135                 | 3.3      | 3.465                 | V     |       |
| Supply Voltage   | VDD <sub>xxx</sub> _IO            | Low-Voltage Differential I/O Supply   | 0.9975                | 1.05     | 3.465                 | V     | 10    |
| Input High Voltage                                       | V <sub>IHSE</sub>                 | Single-ended 3.3V inputs  | 2.2                   |          | V <sub>DD</sub> + 0.3 | V     | 3     |
| Input Low Voltage  | V <sub>ILSE</sub>                 | Single-ended 3.3V inputs  | V <sub>SS</sub> - 0.3 |          | 0.8                   | V     | 3     |
| Low Threshold Input-High Voltage FSC = Test Mode         | V <sub>IH_FSC_TEST</sub>          | 3.3 V +/-5%   | 2                     |          |                       | V     | 8     |
| Low Threshold Input-FSC = '1' Voltage                    | V <sub>IH_FSC_1</sub>             | 3.3 V +/-5%   | 0.7                   |          | 1.5                   | V     | 8     |
| Low Threshold Input-FSA,FSB = '1' Voltage                | V <sub>IH_FSUB_1</sub>            | 3.3 V +/-5%   | 0.7                   |          |                       | V     |       |
| Low Threshold Input-Low Voltage                          | V <sub>IL_FS</sub>                | 3.3 V +/-5%   | V <sub>SS</sub> - 0.3 |          | 0.35                  | V     |       |
| Input Leakage Current                                    | I <sub>IN</sub>                   | V <sub>IN</sub> = V <sub>DD</sub> , V <sub>IN</sub> = GND   | -5                    |          | 5                     | uA    | 2     |
| Input Leakage Current                                    | I <sub>INRES</sub>                | Inputs with pull up or pull down resistors<br>V <sub>IN</sub> = V <sub>DD</sub> , V <sub>IN</sub> = GND | -200                  |          | 200                   | uA    |       |
| Output High Voltage                                      | V <sub>OHSE</sub>                 | Single-ended outputs, I <sub>OH</sub> = -1mA  | 2.4                   |          |                       | V     |       |
| Output Low Voltage                                       | V <sub>OLSE</sub>                 | Single-ended outputs, I <sub>OL</sub> = 1 mA  |                       |          | 0.4                   | V     |       |
| Operating Supply Current                                 | I <sub>DDP3.3</sub>               | Full Active, C <sub>L</sub> = Full load; IDD 3.3V   |                       | 135      | 200                   | mA    |       |
|  | I <sub>DDPIO</sub>                | Full Active, C <sub>L</sub> = Full load; IDD IO   |                       | 72       | 80                    | mA    |       |
| iAMT Mode Current  | I <sub>DDI<sub>AMT</sub>3.3</sub> | M1 mode, 3.3V Rail  |                       | 53       | 65                    | mA    |       |
|  | I <sub>DDIAMTIO</sub>             | M1 Mode, IO Rail  |                       | 7        | 10                    | mA    |       |
| Powerdown Current  | I <sub>DDP3.3</sub>               | Power down mode, 3.3V Rail, B63b0 = '1'   |                       | 22       | 25                    | mA    |       |
|  | I <sub>DDPIO</sub>                | Power down mode, IO Rail  |                       | 0.01     | 0.1                   | mA    |       |
| Input Frequency  | F <sub>I</sub>                    | V <sub>DD</sub> = 3.3 V   |                       | 14.31818 | 15                    | MHz   |       |
| Pin Inductance   | L <sub>pin</sub>                  |   |                       |          | 7                     | nH    |       |
| Input Capacitance  | C <sub>IN</sub>                   | Logic Inputs  | 1.5                   |          | 5                     | pF    |       |
|  | C <sub>OUT</sub>                  | Output pin capacitance  |                       |          | 6                     | pF    |       |
|  | C <sub>INX</sub>                  | X1 & X2 pins  |                       |          | 6                     | pF    |       |
| Clk Stabilization  | T <sub>STAB</sub>                 | From VDD Power-Up or de-assertion of PD to 1st clock  |                       | 1.2      | 1.8                   | ms    |       |
| Tdrive_CR_off  | T <sub>DRCROFF</sub>              | Output stop after CR deasserted   |                       |          | 400                   | ns    |       |
| Tdrive_CR_on   | T <sub>DRCRON</sub>               | Output run after CR asserted  |                       |          | 0                     | us    |       |
| Tdrive_CPU   | T <sub>DRSRC</sub>                | CPU output enable after PCI_STOP# de-assertion  |                       |          | 10                    | ns    |       |
| Tfall_SE   | T <sub>FALL</sub>                 | Fall/rise time of all 3.3V control inputs from 20-80%. Inputs must be monotonic                         |                       |          | 10                    | ns    | 1     |
| Trise_SE   | T <sub>RISE</sub>                 |   |                       |          | 10                    | ns    | 1     |
| SMBus Voltage  | V <sub>DD</sub>                   |   | 2.7                   |          | 5.5                   | V     |       |
| Low-level Output Voltage                                 | V <sub>OL<sub>SMB</sub></sub>     | @ I <sub>PULLUP</sub>   |                       |          | 0.4                   | V     |       |
| Current sinking at V <sub>OL<sub>SMB</sub></sub> = 0.4 V | I <sub>PULLUP</sub>               | SMB Data Pin  | 4                     |          |                       | mA    |       |
| SCLK/SDATA Clock/Data Rise Time                          | T <sub>RI2C</sub>                 | (Max VIL - 0.15) to (Min VIH + 0.15)  |                       |          | 1000                  | ns    |       |
| SCLK/SDATA Clock/Data Fall Time                          | T <sub>FI2C</sub>                 | (Min VIH + 0.15) to (Max VIL - 0.15)  |                       |          | 300                   | ns    |       |
| Maximum SMBus Operating Frequency                        | F <sub>SMBUS</sub>                |   |                       |          | 100                   | kHz   |       |
| Spread Spectrum Modulation Frequency                     | f <sub>SSMOD</sub>                | Triangular Modulation   | 30                    | 32.54    | 33                    | kHz   |       |

## NOTES on DC Parameters: (unless otherwise noted, guaranteed by design and characterization, not 100% tested in production).

<sup>1</sup>Signal is required to be monotonic in this region.

<sup>2</sup>input leakage current does not include inputs with pull-up or pull-down resistors

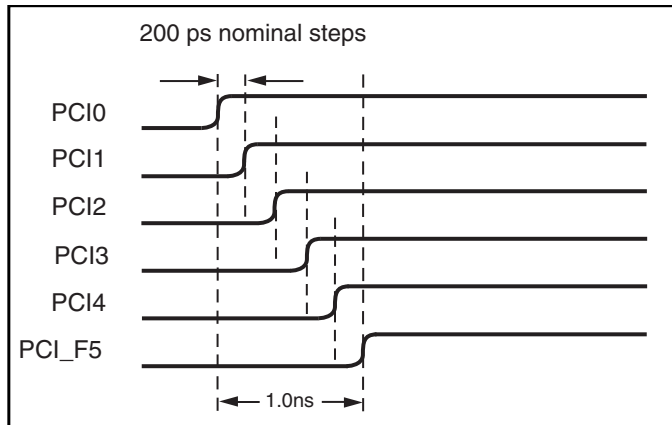
<sup>3</sup>3.3V referenced inputs are: PCI\_STOP#, CPU\_STOP#, TME, SRC5\_EN, ITP\_EN, SCLKL, SDATA, TESTMODE, TESTSEL, CKPWRGD and CR# inputs if selected.

<sup>4</sup>Intentionally blank

## Electrical Characteristics - PCICLK/PCICLK\_F

| PARAMETER                    | SYMBOL               | CONDITIONS                     | MIN      | TYP  | MAX      | UNITS | NOTES |
|------------------------------|----------------------|--------------------------------|----------|------|----------|-------|-------|
| Long Accuracy                | ppm                  | see Tperiod min-max values     | -100     | 0    | 100      | ppm   | 1,2   |
| Clock period                 | T <sub>period</sub>  | 33.33MHz output no spread      | 29.99700 |      | 30.00300 | ns    | 2     |
|                              |                      | 33.33MHz output spread         | 30.08421 |      | 30.23459 | ns    | 2     |
| Absolute min/max period      | T <sub>abs</sub>     | 33.33MHz output no spread      | 29.49700 |      | 30.50300 | ns    | 2     |
|                              |                      | 33.33MHz output nominal/spread | 29.56617 |      | 30.58421 | ns    | 2     |
| Rising Edge Slew Rate        | t <sub>SLR</sub>     | Measured from 0.8 to 2.0 V     | 1        | 1.71 | 4        | V/ns  | 1     |
| Falling Edge Slew Rate       | t <sub>FLR</sub>     | Measured from 2.0 to 0.8 V     | 1        | 1.78 | 4        | V/ns  | 1     |
| Pin to Pin Skew              | t <sub>skew</sub>    | V <sub>T</sub> = 1.5 V         |          |      | 250      | ps    | 2     |
| Intentional PCI to PCI delay | t <sub>skew</sub>    | V <sub>T</sub> = 1.5 V         | 100      | 187  | 300      | ps    | 2     |
| Duty Cycle                   | d <sub>t1</sub>      | V <sub>T</sub> = 1.5 V         | 45       | 51   | 55       | %     | 2     |
| Jitter, Cycle to cycle       | t <sub>jyc-cyc</sub> | V <sub>T</sub> = 1.5 V         |          | 103  | 500      | ps    | 2     |

## Intentional PCI Clock to Clock Delay



## Electrical Characteristics - USB48MHz

| PARAMETER               | SYMBOL               | CONDITIONS                 | MIN      | TYP   | MAX      | UNITS | NOTES |
|-------------------------|----------------------|----------------------------|----------|-------|----------|-------|-------|
| Long Accuracy           | ppm                  | see Tperiod min-max values | -100     | 0     | 100      | ppm   | 2,4   |
| Clock period            | T <sub>period</sub>  | 48.00MHz output nominal    | 20.83125 |       | 20.83542 | ns    | 2,3   |
| Absolute min/max period | T <sub>abs</sub>     | 48.00MHz output nominal    | 20.48125 |       | 21.18542 | ns    | 2     |
| CLK High Time           | T <sub>HIGH</sub>    |                            | 8.216563 |       | 11.15198 | V     |       |
| CLK Low time            | T <sub>LOW</sub>     |                            | 7.816563 |       | 10.95198 | V     |       |
| Rising Edge Slew Rate   | t <sub>SLR</sub>     | Measured from 0.8 to 2.0 V | 1        | 1.2   | 2        | V/ns  | 1     |
| Falling Edge Slew Rate  | t <sub>FLR</sub>     | Measured from 2.0 to 0.8 V | 1        | 1.3   | 2        | V/ns  | 1     |
| Duty Cycle              | d <sub>t1</sub>      | V <sub>T</sub> = 1.5 V     | 45       | 50.8% | 55       | %     | 2     |
| Jitter, Cycle to cycle  | t <sub>jyc-cyc</sub> | V <sub>T</sub> = 1.5 V     |          | 132.2 | 350      | ps    | 2     |

## Electrical Characteristics - REF-14.318MHz

| PARAMETER               | SYMBOL   | CONDITIONS                 | MIN      | TYP  | MAX      | UNITS | Notes |
|-------------------------|----------|----------------------------|----------|------|----------|-------|-------|
| Long Accuracy           | ppm      | see Tperiod min-max values | -100     | 0    | 100      | ppm   | 2, 4  |
| Clock period            | Tperiod  | 14.318MHz output nominal   | 69.82033 |      | 69.86224 | ns    | 2, 3  |
| Absolute min/max period | Tabs     | 14.318MHz output nominal   | 69.83400 |      | 70.84800 | ns    | 2     |
| CLK High Time           | THIGH    |                            | 29.97543 |      | 38.46654 | V     |       |
| CLK Low time            | TLOW     |                            | 29.57543 |      | 38.26654 | V     |       |
| Rising Edge Slew Rate   | tSLR     | Measured from 0.8 to 2.0 V | 1        | 1.4  | 4        | V/ns  | 1     |
| Falling Edge Slew Rate  | tFLR     | Measured from 2.0 to 0.8 V | 1        | 1.7  | 4        | V/ns  | 1     |
| Duty Cycle              | dt1      | V <sub>T</sub> = 1.5 V     | 45       | 53.1 | 55       | %     | 2     |
| Jitter, Cycle to cycle  | tjyc-cyc | V <sub>T</sub> = 1.5 V     |          | 138  | 1000     | ps    | 2     |

## Electrical Characteristics - SE1/2=25MHz

| PARAMETER               | SYMBOL                | CONDITIONS                          | MIN      | TYP  | MAX      | UNITS | NOTES |
|-------------------------|-----------------------|-------------------------------------|----------|------|----------|-------|-------|
| Long Accuracy           | ppm                   | see Tperiod min-max values          | -100     | 0    | 100      | ppm   | 1,2   |
| Clock period            | T <sub>period</sub>   | 25.00MHz output nominal             | 39.99600 |      | 40.00400 | ns    | 1     |
| Absolute min/max period | T <sub>abs</sub>      | 25.00MHz output nominal             | 39.32360 |      | 40.67640 | ns    | 1     |
| Rising Edge Slew Rate   | t <sub>SLR</sub>      | Measured from 0.8 to 2.0 V          | 1        | 1.2  | 2        | V/ns  | 1     |
| Falling Edge Slew Rate  | t <sub>FLR</sub>      | Measured from 2.0 to 0.8 V          | 1        | 1.3  | 2        | V/ns  | 1     |
| Duty Cycle              | d <sub>t1</sub>       | V <sub>T</sub> = 1.5 V              | 45       | 50.8 | 55       | %     | 1     |
| Jitter, Cycle to cycle  | t <sub>jCyc-cyc</sub> | V <sub>T</sub> = 1.5 V              |          | 60   | 500      | ps    | 1     |
| Jitter, Long Term       | t <sub>LtJ</sub>      | V <sub>T</sub> = 1.5 V @ 10us delay |          | 780  | 1000     | ps    | 1     |

## NOTES on SE outputs: (unless otherwise noted, guaranteed by design and characterization, not 100% tested in production).

<sup>1</sup>Edge rate in system is measured from 0.8V to 2.0V.

<sup>2</sup>Duty cycle, Period and Jitter are measured with respect to 1.5V

<sup>3</sup>The average period over any 1us period of time

<sup>4</sup>Using frequency counter with the measurement interval equal or greater than 0.15s, target frequencies are 14.318180 MHz, 33.333333MHz and 48.000000MHz

Table 1: CPU Frequency Select Table

| FS <sub>L</sub> C <sup>2</sup><br>B0b7 | FS <sub>L</sub> B <sup>1</sup><br>B0b6 | FS <sub>L</sub> A <sup>1</sup><br>B0b5 | CPU<br>MHz | SRC<br>MHz | PCI<br>MHz | REF<br>MHz | USB<br>MHz | DOT<br>MHz |
|--|--|--|------------|------------|------------|------------|------------|------------|
| 0                                      | 0                                      | 0                                      | 266.66     | 100.00     | 33.33      | 14.318     | 48.00      | 96.00      |
| 0                                      | 0                                      | 1                                      | 133.33     |            |            |            |            |            |
| 0                                      | 1                                      | 0                                      | 200.00     |            |            |            |            |            |
| 0                                      | 1                                      | 1                                      | 166.66     |            |            |            |            |            |
| 1                                      | 0                                      | 0                                      | 333.33     |            |            |            |            |            |
| 1                                      | 0                                      | 1                                      | 100.00     |            |            |            |            |            |
| 1                                      | 1                                      | 0                                      | 400.00     |            |            |            |            |            |
| 1                                      | 1                                      | 1                                      | Reserved   |            |            |            |            |            |

1. FS<sub>L</sub>A and FS<sub>L</sub>B are low-threshold inputs. Please see V<sub>IL,FS</sub> and V<sub>IH,FS</sub> specifications in the Input/Supply/Common Output Parameters Table for correct values.

Also refer to the Test Clarification Table.

2. FS<sub>L</sub>C is a three-level input. Please see the V<sub>IL,FS</sub> and V<sub>IH,FS</sub> specifications in the Input/Supply/Common Output Parameters Table for correct values.

Table 2: PLL3 Quick Configuration

| B1b4 | B1b3 | B1b2 | B1b1 | Pin 17         | Pin 18 | Spread           | Comment                            |
|------|------|------|------|----------------|--------|------------------|------------------------------------|
|      |      |      |      | MHz            | MHz    | %                |                                    |
| 0    | 0    | 0    | 0    | PLL 3 disabled |        |                  |                                    |
| 0    | 0    | 0    | 1    | 100.00         | 100.00 | 0.5% Down Spread | SRCCLK1 from SRC_MAIN              |
| 0    | 0    | 1    | 0    | 100.00         | 100.00 | 0.5% Down Spread | Only SRCCLK1 from PLL3             |
| 0    | 0    | 1    | 1    | 100.00         | 100.00 | 1% Down Spread   | Only SRCCLK1 from PLL3             |
| 0    | 1    | 0    | 0    | 100.00         | 100.00 | 1.5% Down Spread | Only SRCCLK1 from PLL3             |
| 0    | 1    | 0    | 1    | 100.00         | 100.00 | 2% Down Spread   | Only SRCCLK1 from PLL3             |
| 0    | 1    | 1    | 0    | 100.00         | 100.00 | 2.5% Down Spread | Only SRCCLK1 from PLL3             |
| 0    | 1    | 1    | 1    | N/A            | N/A    | N/A              | N/A                                |
| 1    | 0    | 0    | 0    | 24.576         | 24.576 | None             | 24.576Mhz on SE1 and SE2           |
| 1    | 0    | 0    | 1    | 24.576         | 98.304 | None             | 24.576Mhz on SE1, 98.304Mhz on SE2 |
| 1    | 0    | 1    | 0    | 98.304         | 98.304 | None             | 98.304Mhz on SE1 and SE2           |
| 1    | 0    | 1    | 1    | 27.000         | 27.000 | None             | 27Mhz on SE1 and SE2               |
| 1    | 1    | 0    | 0    | 25.000         | 25.000 | None             | 25Mhz on SE1 and SE2               |
| 1    | 1    | 0    | 1    | N/A            | N/A    | N/A              | N/A                                |
| 1    | 1    | 1    | 0    | N/A            | N/A    | N/A              | N/A                                |
| 1    | 1    | 1    | 1    | N/A            | N/A    | N/A              | N/A                                |



Table 3: IO\_Vout select table

| B9b2 | B9b1 | B9b0 | 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    |

Table 4: Device ID table

| B8b7 | B8b6 | B8b5 | B8b4 | Comment          |
|------|------|------|------|------------------|
| 0    | 0    | 0    | 0    | 56 pin TSSOP/QFN |
| 0    | 0    | 0    | 1    | 64 pin TSSOP/QFN |
| 0    | 0    | 1    | 0    | Reserved         |
| 0    | 0    | 1    | 1    | Reserved         |
| 0    | 1    | 0    | 0    | Reserved         |
| 0    | 1    | 0    | 1    | Reserved         |
| 0    | 1    | 1    | 0    | Reserved         |
| 0    | 1    | 1    | 1    | Reserved         |
| 1    | 0    | 0    | 0    | Reserved         |
| 1    | 0    | 0    | 1    | Reserved         |
| 1    | 0    | 1    | 0    | Reserved         |
| 1    | 0    | 1    | 1    | Reserved         |
| 1    | 1    | 0    | 0    | Reserved         |
| 1    | 1    | 0    | 1    | Reserved         |
| 1    | 1    | 1    | 0    | Reserved         |
| 1    | 1    | 1    | 1    | Reserved         |

## PCI\_STOP# Power Management

| SMBus OE Bit | PCI_STOP# | Stop Drive Mode | Single-ended Clocks |              | Differential Clocks<br>(Except CPU) |              |
|--------------|-----------|-----------------|---------------------|--------------|-------------------------------------|--------------|
|              |           |                 | Stoppable           | Free running | Stoppable                           | Free running |
| Enable       | 1         | X               | Running             | Running      | Running                             | Running      |
|              | 0         | 0               | Low                 | Low          | CK= High<br>CK# = Low               | Running      |
|              |           | 1               |                     |              | CK= Pull<br>down<br>CK# = Low       | Running      |
| Disable      | X         | X               | Low                 |              | CK= Pull down, CK# = Low            |              |

## CPU\_STOP# Power Management

| SMBus OE Bit | PCI_STOP# | Stop Drive Mode | Differential Clocks        |              |
|--------------|-----------|-----------------|----------------------------|--------------|
|              |           |                 | Stoppable                  | Free running |
| Enable       | 1         | X               | Running                    | Running      |
|              | 0         | 0               | CK= High<br>CK# = Low      | Running      |
|              |           | 1               | CK= Pull down<br>CK# = Low | Running      |
| Disable      | X         | X               | Low                        |              |

## CR# Power Management

| SMBus OE Bit | CR# | Stop Drive Mode | Differential Clocks       |              |
|--------------|-----|-----------------|---------------------------|--------------|
|              |     |                 | Stoppable                 | Free running |
| Enable       | 1   | X               | Running                   | Running      |
|              | 0   |                 | CK= Pull down, CK# = Low  |              |
| Disable      | X   |                 | CK = Pull down, CK# = Low |              |

## PD# Power Management

| Device State                           | Single-ended Clocks |                 | Differential Clocks<br>(Except CPU1) | CPU1                       |
|--|---------------------|-----------------|--------------------------------------|----------------------------|
|  | w/o Latched input   | w/Latched input |                                      |                            |
| Latches Open                           | Low                 | Hi-Z            | CK= Pull down, CK# = Low             | CK= Pull down, CK# = Low   |
| Power Down                             |                     |                 | CK= Pull down<br>CK# = Low           | CK= Pull down<br>CK# = Low |
| M1                                     |                     |                 | CK= Pull down<br>CK# = Low           | Running                    |
| Virtual Power Cycle<br>to Latches Open |                     |                 | CK= Pull down, CK# = Low             | CK= Pull down, CK# = Low   |

## General SMBus serial interface information for the ICS9LPRS501

### How to Write:

- Controller (host) sends a start bit.
- Controller (host) sends the write address D2<sub>(H)</sub>
- 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**
- 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<sub>(H)</sub>
- ICS clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- ICS clock will **acknowledge**
- Controller (host) will send a separate start bit.
- Controller (host) sends the read address D3<sub>(H)</sub>
- 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<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 Write Operation     |           |                      |
|---------------------------------|-----------|----------------------|
| Controller (Host)               |           | ICS (Slave/Receiver) |
| T                               | starT bit |                      |
| Slave Address D2 <sub>(H)</sub> |           |                      |
| WR                              | WRite     |                      |
|                                 |           | ACK                  |
| Beginning Byte = N              |           |                      |
|                                 |           | ACK                  |
| Data Byte Count = X             |           |                      |
|                                 |           | ACK                  |
| Beginning Byte N                | X Byte    |                      |
| ○                               |           | ACK                  |
| ○                               |           | ○                    |
| ○                               |           | ○                    |
| Byte N + X - 1                  |           | ○                    |
|                                 |           | ACK                  |
| P                               | stoP bit  |                      |

| Index Block Read Operation      |                 |                      |
|---------------------------------|-----------------|----------------------|
| Controller (Host)               |                 | ICS (Slave/Receiver) |
| T                               | starT bit       |                      |
| Slave Address D2 <sub>(H)</sub> |                 |                      |
| WR                              | WRite           |                      |
|                                 |                 | ACK                  |
| Beginning Byte = N              |                 |                      |
|                                 |                 | ACK                  |
| RT                              | Repeat starT    |                      |
| Slave Address D3 <sub>(H)</sub> |                 |                      |
| RD                              | ReaD            |                      |
|                                 |                 | ACK                  |
|                                 |                 | Data Byte Count = X  |
| ACK                             |                 |                      |
| ACK                             |                 | Beginning Byte N     |
| ○                               |                 | ○                    |
| ○                               |                 | ○                    |
| ○                               |                 | ○                    |
|                                 |                 | Byte N + X - 1       |
| N                               | Not acknowledge |                      |
| P                               | stoP bit        |                      |

**Byte 0 FS Readback and PLL Selection Register**

| Bit | Pin | Name         | Description  | Type | 0  | 1                       | Default |
|-----|-----|--------------|--|------|--|-------------------------|---------|
| 7   | -   | FSLC         | CPU Freq. Sel. Bit (Most Significant)  | R    | See Table 1 : CPU Frequency Select Table |                         | Latch   |
| 6   | -   | FSLB         | CPU Freq. Sel. Bit   | R    |  |                         | Latch   |
| 5   | -   | FSLA         | CPU Freq. Sel. Bit (Least Significant)   | R    |  |                         | Latch   |
| 4   | -   | iAMT_EN      | Set via SMBus or dynamically by CK505 if detects dynamic M1  | RW   | Legacy Mode                              | iAMT Enabled            | 0       |
| 3   |     | Reserved     | Reserved   | RW   |  |                         | 0       |
| 2   | -   | SRC_Main_SEL | Select source for SRC Main   | RW   | SRC Main = PLL1                          | SRC Main = PLL3         | 0       |
| 1   | -   | SATA_SEL     | Select source for SATA clock   | RW   | SATA = SRC_Main                          | SATA = PLL2<br>See Note | 0       |
| 0   | -   | PD_Restore   | 1 = on Power Down de-assert return to last known state<br>0 = clear all SMBus configurations as if cold power-on and go to latches open state<br>This bit is ignored and treated as '1' if device is in iAMT mode. | RW   | Configuration Not Saved                  | Configuration Saved     | 1       |

Note: If setting Byte 0, bit 1 to 1 to make SATA non-spreading, Byte63, bit 1 must be set to '1' first to turn on the SATA PLL.

**Byte 1 DOT96 Select and PLL3 Quick Config Register**

| Bit | Pin   | Name         | Description                    | Type | 0   | 1                 | Default |
|-----|-------|--------------|--------------------------------|------|---|-------------------|---------|
| 7   | 13/14 | SRC0_SEL     | Select SRC0 or DOT96           | RW   | SRC0  | DOT96             | 0       |
| 6   | -     | PLL1_SSC_SEL | Select 0.5% down or center SSC | RW   | Down spread   | Center spread     | 0       |
| 5   |       | PLL3_SSC_SEL | Select 0.5% down or center SSC | RW   | Down spread   | Center spread     | 0       |
| 4   |       | PLL3_CF3     | PLL3 Quick Config Bit 3        | RW   | See Table 2: PLL3 Quick Configuration<br>Only applies if Byte 0, bit 2 = 0. |                   | 0       |
| 3   |       | PLL3_CF2     | PLL3 Quick Config Bit 2        | RW   |   |                   | 0       |
| 2   |       | PLL3_CF1     | PLL3 Quick Config Bit 1        | RW   |   |                   | 0       |
| 1   |       | PLL3_CF0     | PLL3 Quick Config Bit 0        | RW   |   |                   | 1       |
| 0   |       | PCI_SEL      | PCI_SEL                        | RW   | PCI from PLL1   | PCI from SRC_MAIN | 1       |

**Byte 2 Output Enable Register**

| Bit | Pin | Name     | Description                                       | Type | 0               | 1              | Default |
|-----|-----|----------|---|------|-----------------|----------------|---------|
| 7   |     | REF_OE   | Output enable for REF, if disabled output is Hi-Z | RW   | Output Disabled | Output Enabled | 1       |
| 6   |     | USB_OE   | Output enable for USB                             | RW   | Output Disabled | Output Enabled | 1       |
| 5   |     | PCIF5_OE | Output enable for PCI5                            | RW   | Output Disabled | Output Enabled | 1       |
| 4   |     | PCI4_OE  | Output enable for PCI4                            | RW   | Output Disabled | Output Enabled | 1       |
| 3   |     | PCI3_OE  | Output enable for PCI3                            | RW   | Output Disabled | Output Enabled | 1       |
| 2   |     | PCI2_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   |     | SRC11_OE    | Output enable for SRC11       | RW   | Output Disabled | Output Enabled | 1       |
| 6   |     | SRC10_OE    | Output enable for SRC10       | RW   | Output Disabled | Output Enabled | 1       |
| 5   |     | SRC9_OE     | Output enable for SRC9        | RW   | Output Disabled | Output Enabled | 1       |
| 4   |     | SRC8/ITP_OE | Output enable for SRC8 or ITP | RW   | Output Disabled | Output Enabled | 1       |
| 3   |     | SRC7_OE     | Output enable for SRC7        | RW   | Output Disabled | Output Enabled | 1       |
| 2   |     | SRC6_OE     | Output enable for SRC6        | RW   | Output Disabled | Output Enabled | 1       |
| 1   |     | SRC5_OE     | Output enable for SRC5        | RW   | Output Disabled | Output Enabled | 1       |
| 0   |     | SRC4_OE     | Output enable for SRC4        | RW   | Output Disabled | Output Enabled | 1       |

**Byte 4 Output Enable and Spread Spectrum Disable Register**

| Bit | Pin | Name          | Description                     | Type | 0               | 1              | Default |
|-----|-----|---------------|---------------------------------|------|-----------------|----------------|---------|
| 7   |     | SRC3_OE       | Output enable for SRC3          | RW   | Output Disabled | Output Enabled | 1       |
| 6   |     | SATA/SRC2_OE  | Output enable for SATA/SRC2     | RW   | Output Disabled | Output Enabled | 1       |
| 5   |     | SRC1_OE       | Output enable for SRC1          | RW   | Output Disabled | Output Enabled | 1       |
| 4   |     | SRC0/DOT96_OE | Output enable for SRC0/DOT96    | RW   | Output Disabled | Output Enabled | 1       |
| 3   |     | CPU1_OE       | Output enable for CPU1          | RW   | Output Disabled | Output Enabled | 1       |
| 2   |     | CPU0_OE       | Output enable for CPU0          | RW   | Output Disabled | Output Enabled | 1       |
| 1   |     | PLL1_SSC_ON   | Enable PLL1's spread modulation | RW   | Spread Disabled | Spread Enabled | 1       |
| 0   |     | PLL3_SSC_ON   | Enable PLL3's spread modulation | RW   | Spread Disabled | Spread Enabled | 1       |

**Byte 5 Clock Request Enable/Configuration Register**

| Bit | Pin | Name      | Description  | Type | 0             | 1             | Default |
|-----|-----|-----------|--|------|---------------|---------------|---------|
| 7   |     | CR#_A_EN  | Enable CR#_A (clk req),<br>PCI0_OE must be = 1 for this bit to take effect | RW   | Disable CR#_A | Enable CR#_A  | 0       |
| 6   |     | CR#_A_SEL | Sets CR#_A to control either SRC0 or SRC2                                  | RW   | CR#_A -> SRC0 | CR#_A -> SRC2 | 0       |
| 5   |     | CR#_B_EN  | Enable CR#_B (clk req)   | RW   | Disable CR#_B | Enable CR#_B  | 0       |
| 4   |     | CR#_B_SEL | Sets CR#_B -> SRC1 or SRC4   | RW   | CR#_B -> SRC1 | CR#_B -> SRC4 | 0       |
| 3   |     | CR#_C_EN  | Enable CR#_C (clk req)   | RW   | Disable CR#_C | Enable CR#_C  | 0       |
| 2   |     | CR#_C_SEL | Sets CR#_C -> SRC0 or SRC2   | RW   | CR#_C -> SRC0 | CR#_C -> SRC2 | 0       |
| 1   |     | CR#_D_EN  | Enable CR#_D (clk req)   | RW   | Disable CR#_D | Enable CR#_D  | 0       |
| 0   |     | CR#_D_SEL | Sets CR#_D -> SRC1 or SRC4   | RW   | CR#_D -> SRC1 | CR#_D -> SRC4 | 0       |

**Byte 6 Clock Request Enable/Configuration and Stop Control Register**

| Bit | Pin | Name                    | Description                                       | Type | 0             | 1                                 | Default |
|-----|-----|-------------------------|---|------|---------------|-----------------------------------|---------|
| 7   |     | CR#_E_EN                | Enable CR#_E (clk req) -> SRC6                    | RW   | Disable CR#_E | Enable CR#_E                      | 0       |
| 6   |     | CR#_F_EN                | Enable CR#_F (clk req) -> SRC8                    | RW   | Disable CR#_F | Enable CR#_F                      | 0       |
| 5   |     | CR#_G_EN                | Enable CR#_G (clk req) -> SRC9                    | RW   | Disable CR#_G | Enable CR#_G                      | 0       |
| 4   |     | CR#_H_EN                | Enable CR#_H (clk req) -> SRC10                   | RW   | Disable CR#_H | Enable CR#_H                      | 0       |
| 3   |     | Reserved                | Reserved  | RW   |               |                                   | 0       |
| 2   |     | Reserved                | Reserved  | RW   |               |                                   | 0       |
| 1   |     | SSCD_STP_CRTL<br>(SRC1) | If set, SSCD (SRC1) stops with PCI_STOP#          | RW   | Free Running  | Stops with PCI_STOP#<br>assertion | 0       |
| 0   |     | SRC_STP_CRTL            | If set, SRCs (except SRC1) stop with<br>PCI_STOP# | RW   | Free Running  | Stops with PCI_STOP#<br>assertion | 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 |                                  | R    |                 |   | 0       |
| 2   |     | Vendor ID bit 2 | Vendor ID<br>ICS is 0001, binary | R    |                 |   | 0       |
| 1   |     | Vendor ID bit 1 |                                  | R    |                 |   | 0       |
| 0   |     | Vendor ID bit 0 |                                  | R    |                 |   | 1       |

**Byte 8 Device ID and Output Enable Register**

| Bit | Pin | Name       | Description  | Type | 0                   | 1       | Default |
|-----|-----|------------|--|------|---------------------|---------|---------|
| 7   |     | Device ID3 | Table of Device identifier codes, used for<br>differentiating between CK505 package<br>options, etc. | R    | See Device ID Table |         | 0       |
| 6   |     | Device ID2 |  | R    |                     |         | 0       |
| 5   |     | Device ID1 |  | R    |                     |         | 0       |
| 4   |     | Device ID0 |  | R    |                     |         | 1       |
| 3   |     | Reserved   | Reserved   | RW   | -                   | -       | 0       |
| 2   |     | Reserved   | Reserved   | RW   | -                   | -       | 0       |
| 1   |     | SE1_OE     | Output enable for SE1  | RW   | Disabled            | Enabled | 0       |
| 0   |     | SE2_OE     | Output enable for SE2  | RW   | Disabled            | Enabled | 0       |

**Byte 9 Output Control Register**

| Bit | Pin | Name             | Description  | Type | 0  | 1                                 | Default |
|-----|-----|------------------|--|------|--|-----------------------------------|---------|
| 7   |     | PCIF5_STOP_EN    | Allows control of PCIF5 with assertion of<br>PCI_STOP# | RW   | Free running                                     | Stops with PCI_STOP#<br>assertion | 0       |
| 6   |     | TME_Readback     | Trusted Mode Enable (TME) strap status                 | R    | normal operation                                 | no overlocking                    | 0       |
| 5   |     | Reserved         | Reserved   | RW   | -  | -                                 | 1       |
| 4   |     | Test Mode Select | Allows test select, ignores REF/FSC/TestSel            | RW   | Outputs HI-Z                                     | Outputs = REF/N                   | 0       |
| 3   |     | Test Mode Entry  | Allows entry into test mode, ignores<br>FSB/TestMode   | RW   | Normal operation                                 | Test mode                         | 0       |
| 2   |     | IO_VOUT2         | IO Output Voltage Select (Most Significant Bit)        | RW   | See Table 3: V_IO Selection<br>(Default is 0.8V) |                                   | 1       |
| 1   |     | IO_VOUT1         | IO Output Voltage Select                               | RW   |  |                                   | 0       |

## Byte 10 CK505 Rev 0.85 Functions (ICS Rev H Silicon and Higher)

| Bit | Pin | Name              | Description                             | Type | 0                    | 1            | Default |
|-----|-----|-------------------|---|------|----------------------|--------------|---------|
| 7   |     | SRC5_EN Readback  | Readback of SRC5 enable latch           | R    | CPU/PCI Stop Enabled | SRC5 Enabled | Latch   |
| 6   |     | Reserved          | Reserved                                | RW   | TBD                  | TBD          | 0       |
| 5   |     | Reserved          |   | RW   | TBD                  | TBD          | 0       |
| 4   |     | Reserved          |   | RW   | TBD                  | TBD          | 0       |
| 3   |     | Reserved          |   | RW   | TBD                  | TBD          | 0       |
| 2   |     | Reserved          |   | RW   | TBD                  | TBD          | 0       |
| 1   |     | CPU 1 Stop Enable | Enables control of CPU1 with CPU_STOP#  | RW   | Free Running         | Stoppable    | 1       |
| 0   |     | CPU 0 Stop Enable | Enables control of CPU 0 with CPU_STOP# | RW   | Free Running         | Stoppable    | 1       |

## Byte 11 CK505 Rev 1.0 functions (ICS Rev P silicon and higher)

| Bit | Pin | Name             | Description                                 | Type | 0                   | 1                    | Default |
|-----|-----|------------------|---|------|---------------------|----------------------|---------|
| 7   |     | Reserved         | Reserved                                    | RW   | TBD                 | TBD                  | 0       |
| 6   |     | Reserved         |   | RW   | TBD                 | TBD                  | 0       |
| 5   |     | Reserved         |   | RW   | TBD                 | TBD                  | 0       |
| 4   |     | Reserved         |   | RW   | TBD                 | TBD                  | 0       |
| 3   |     | CPU2_iAMT_EN     | Enables CPU2(ITP) output in iAMT state (M1) | RW   | Off in iAMT         | Free running in iAMT | 0       |
| 2   |     | CPU1_iAMT_EN     | Enables CPU1 output in iAMT state (M1)      | RW   | Off in iAMT         | Free running in iAMT | 1       |
| 1   |     | PCIe-Gen2        | PCIe-Gen2 status                            | R    | PCIe Gen1 compliant | PCIe Gen2 compliant  | 0       |
| 0   |     | CPU2 Stop Enable | Enables control of CPU2(ITP) with CPU_STOP# | RW   | Free Running        | Stoppable            | 1       |

## Byte 12 Byte Count Register

| Bit | Pin | Name     | Description                   | Type | 0 | 1 | Default |
|-----|-----|----------|-------------------------------|------|---|---|---------|
| 7   |     | Reserved | Read Back byte count register | RW   |   |   | 0       |
| 6   |     | Reserved |                               | RW   |   |   | 0       |
| 5   |     | BC5      |                               | RW   |   |   | 0       |
| 4   |     | BC4      |                               | RW   |   |   | 0       |
| 3   |     | BC3      |                               | RW   |   |   | 1       |
| 2   |     | BC2      |                               | RW   |   |   | 1       |
| 1   |     | BC1      |                               | RW   |   |   | 0       |
| 0   |     | BC0      |                               | RW   |   |   | 1       |

## Byte 13 CK505 PLL1 M/N Programming Register

| Bit | Pin | Name   | Description  | Type | 0 | 1 | Default |
|-----|-----|--------|--|------|---|---|---------|
| 7   |     | N Div8 | N Divider 8  | RW   | - | - | X       |
| 6   |     | N Div9 | N Divider 9  | RW   | - | - | X       |
| 5   |     | M Div5 | The decimal representation of M Div (5:0) is equal to reference divider value. Default at power up = latch-in or Byte 0 Rom table. | RW   | - | - | X       |
| 4   |     | M Div4 |  | RW   | - | - | X       |
| 3   |     | M Div3 |  | RW   | - | - | X       |
| 2   |     | M Div2 |  | RW   | - | - | X       |
| 1   |     | M Div1 |  | RW   | - | - | X       |
| 0   |     | M Div0 |  | RW   | - | - | X       |

## Byte 14 CK505 PLL1 M/N Programming Register

| Bit | Pin | Name   | Description  | Type | 0 | 1 | Default |
|-----|-----|--------|--|------|---|---|---------|
| 7   |     | N Div7 | The decimal representation of N Div (9:0) is equal to VCO divider value. Default at power up = latch-in or Byte 0 Rom table. | RW   | - | - | X       |
| 6   |     | N Div6 |  | RW   | - | - | X       |
| 5   |     | N Div5 |  | RW   | - | - | X       |
| 4   |     | N Div4 |  | RW   | - | - | X       |
| 3   |     | N Div3 |  | RW   | - | - | X       |
| 2   |     | N Div2 |  | RW   | - | - | X       |
| 1   |     | N Div1 |  | RW   | - | - | X       |
| 0   |     | N Div0 |  | RW   | - | - | X       |

## Byte 15 CK505 PLL1 Spread Spectrum Control Register

| Bit | Pin | Name | Description  | Type | 0 | 1 | Default |
|-----|-----|------|--|------|---|---|---------|
| 7   |     | SSP7 | These Spread Spectrum bits will program the spread percentage. Contact ICS for the correct values. | RW   | - | - | X       |
| 6   |     | SSP6 |  | RW   | - | - | X       |
| 5   |     | SSP5 |  | RW   | - | - | X       |
| 4   |     | SSP4 |  | RW   | - | - | X       |
| 3   |     | SSP3 |  | RW   | - | - | X       |
| 2   |     | SSP2 |  | RW   | - | - | X       |
| 1   |     | SSP1 |  | RW   | - | - | X       |
| 0   |     | SSP0 |  | RW   | - | - | X       |

**Byte 16 CK505 PLL1 Spread Spectrum Control Register**

| Bit | Pin | Name     | Description  | Type | 0 | 1 | Default |
|-----|-----|----------|--|------|---|---|---------|
| 7   |     | Reserved | Reserved   | RW   | - | - | 0       |
| 6   |     | SSP14    | These Spread Spectrum bits will program the spread percentage. Contact ICS for the correct values. | RW   | - | - | X       |
| 5   |     | SSP13    |  | RW   | - | - | X       |
| 4   |     | SSP12    |  | RW   | - | - | X       |
| 3   |     | SSP11    |  | RW   | - | - | X       |
| 2   |     | SSP10    |  | RW   | - | - | X       |
| 1   |     | SSP9     |  | RW   | - | - | X       |
| 0   |     | SSP8     |  | RW   | - | - | X       |

**Byte 17 CK505 PLL3 M/N Programming Register**

| Bit | Pin | Name   | Description  | Type | 0 | 1 | Default |
|-----|-----|--------|--|------|---|---|---------|
| 7   |     | N Div8 | N Divider 8  | RW   | - | - | X       |
| 6   |     | N Div9 | N Divider 9  | RW   | - | - | X       |
| 5   |     | M Div5 | The decimal representation of M Div (5:0) is equal to reference divider value. Default at power up = latch-in or Byte 0 Rom table. | RW   | - | - | X       |
| 4   |     | M Div4 |  | RW   | - | - | X       |
| 3   |     | M Div3 |  | RW   | - | - | X       |
| 2   |     | M Div2 |  | RW   | - | - | X       |
| 1   |     | M Div1 |  | RW   | - | - | X       |
| 0   |     | M Div0 |  | RW   | - | - | X       |

**Byte 18 CK505 PLL3 M/N Programming Register**

| Bit | Pin | Name   | Description  | Type | 0 | 1 | Default |
|-----|-----|--------|--|------|---|---|---------|
| 7   |     | N Div7 | The decimal representation of N Div (9:0) is equal to VCO divider value. Default at power up = latch-in or Byte 0 Rom table. | RW   | - | - | X       |
| 6   |     | N Div6 |  | RW   | - | - | X       |
| 5   |     | N Div5 |  | RW   | - | - | X       |
| 4   |     | N Div4 |  | RW   | - | - | X       |
| 3   |     | N Div3 |  | RW   | - | - | X       |
| 2   |     | N Div2 |  | RW   | - | - | X       |
| 1   |     | N Div1 |  | RW   | - | - | X       |
| 0   |     | N Div0 |  | RW   | - | - | X       |

**Byte 19 CK505 PLL3 Spread Spectrum Control Register**

| Bit | Pin | Name | Description  | Type | 0 | 1 | Default |
|-----|-----|------|--|------|---|---|---------|
| 7   |     | SSP7 | These Spread Spectrum bits will program the spread percentage. Contact ICS for the correct values. | RW   | - | - | X       |
| 6   |     | SSP6 |  | RW   | - | - | X       |
| 5   |     | SSP5 |  | RW   | - | - | X       |
| 4   |     | SSP4 |  | RW   | - | - | X       |
| 3   |     | SSP3 |  | RW   | - | - | X       |
| 2   |     | SSP2 |  | RW   | - | - | X       |
| 1   |     | SSP1 |  | RW   | - | - | X       |
| 0   |     | SSP0 |  | RW   | - | - | X       |

**Byte 20 CK505 PLL3 Spread Spectrum Control Register**

| Bit | Pin | Name     | Description  | Type | 0 | 1 | Default |
|-----|-----|----------|--|------|---|---|---------|
| 7   |     | Reserved | Reserved   | RW   | - | - | 0       |
| 6   |     | SSP14    | These Spread Spectrum bits will program the spread percentage. Contact ICS for the correct values. | RW   | - | - | X       |
| 5   |     | SSP13    |  | RW   | - | - | X       |
| 4   |     | SSP12    |  | RW   | - | - | X       |
| 3   |     | SSP11    |  | RW   | - | - | X       |
| 2   |     | SSP10    |  | RW   | - | - | X       |
| 1   |     | SSP9     |  | RW   | - | - | X       |
| 0   |     | SSP8     |  | RW   | - | - | X       |

**Byte 21 M/N Enables**

| Bit | Pin | Name               | Description | Type | 0       | 1      | Default |
|-----|-----|--------------------|-------------|------|---------|--------|---------|
| 7   |     | Reserved           |             | RW   |         |        | 0       |
| 6   |     | Reserved           |             | RW   |         |        | 0       |
| 5   |     | Reserved           |             | RW   |         |        | 0       |
| 4   |     | Reserved           |             | RW   |         |        | 0       |
| 3   |     | Reserved           |             | RW   |         |        | 0       |
| 2   |     | Reserved           |             | RW   |         |        | 0       |
| 1   |     | M/N Enable CPU     |             | RW   | Disable | Enable | 0       |
| 0   |     | M/N Enable SRC/PCI |             | RW   | Disable | Enable | 0       |



**Byte 22 CPU M/N Programming**

| Bit | Pin | Name        | Description           | Type | 0 | 1 | Default |
|-----|-----|-------------|-----------------------|------|---|---|---------|
| 7   |     | N Div bit 8 | PLL 1 M/N Programming | RW   | - | - | X       |
| 6   |     | N Div bit 9 | (Intel PLL1 CPU)      | RW   | - | - | X       |
| 5   |     | M Div Bit 5 |                       | RW   | - | - | X       |
| 4   |     | M Div Bit 4 |                       | RW   | - | - | X       |
| 3   |     | M Div Bit 3 |                       | RW   | - | - | X       |
| 2   |     | M Div Bit 2 |                       | RW   | - | - | X       |
| 1   |     | M Div Bit 1 |                       | RW   | - | - | X       |
| 0   |     | M Div Bit 0 |                       | RW   | - | - | X       |

**Byte 23 CPU M/N Programming**

| Bit | Pin | Name        | Description           | Type | 0 | 1 | Default |
|-----|-----|-------------|-----------------------|------|---|---|---------|
| 7   |     | N Div bit 7 | PLL 1 M/N Programming | RW   | - | - | X       |
| 6   |     | N Div bit 6 | (Intel PLL1 CPU)      | RW   | - | - | X       |
| 5   |     | N Div bit 5 |                       | RW   | - | - | X       |
| 4   |     | N Div bit 4 |                       | RW   | - | - | X       |
| 3   |     | N Div bit 3 |                       | RW   | - | - | X       |
| 2   |     | N Div bit 2 |                       | RW   | - | - | X       |
| 1   |     | N Div bit 1 |                       | RW   | - | - | X       |
| 0   |     | N Div Bit 0 |                       | RW   | - | - | X       |

**Bytes 24-62 Reserved****Byte 63 Special Power Management Features (Rev P Silicon and Higher)**

| Bit | Pin | Name            | Description                       | RW | 0   | 1  | Default |
|-----|-----|-----------------|-----------------------------------|----|-----|----|---------|
| 7   |     | Reserved        |                                   | RW |     |    | 0       |
| 6   |     | Reserved        |                                   | RW |     |    | 0       |
| 5   |     | Reserved        |                                   | RW |     |    | 0       |
| 4   |     | Reserved        |                                   | RW |     |    | 0       |
| 3   |     | Reserved        |                                   | RW |     |    | 0       |
| 2   |     | Reserved        |                                   | RW |     |    | 0       |
| 1   |     | SATA PLL        | Power Management Feature          | RW | off | on | Note    |
| 0   |     | XTAL PD Control | Controls XTAL on/off in legacy PD | RW | off | on | 1       |

**Note: Default is "off" for Rev P Silicon and higher.**

**Test Clarification Table**

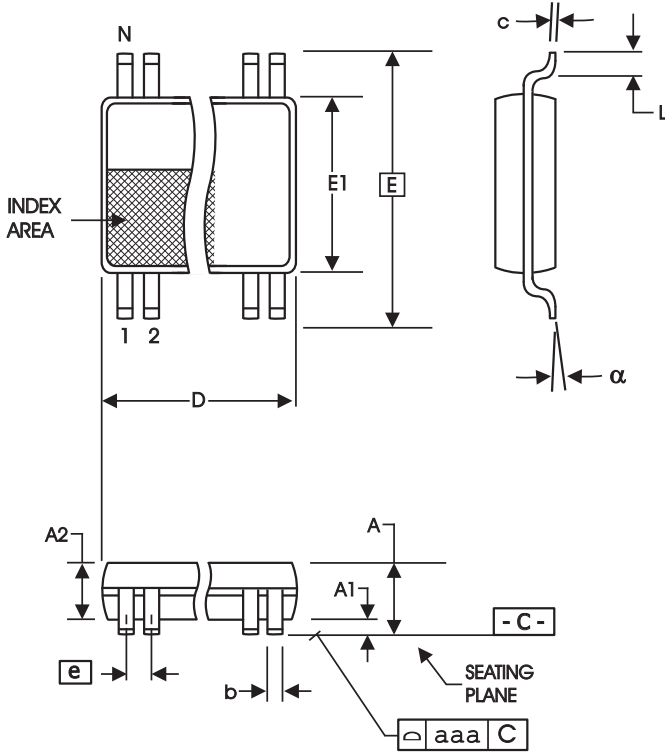
| Comments  | HW                          |                              | SW                        |                          | OUTPUT |
|---|-----------------------------|------------------------------|---------------------------|--------------------------|--------|
|   | FSLC/<br>TEST_SEL<br>HW PIN | FSLB/<br>TEST_MODE<br>HW PIN | TEST<br>ENTRY BIT<br>B9b3 | REF/N or<br>HI-Z<br>B9b4 |        |
|   | <2.0V                       | X                            | 0                         | 0                        | NORMAL |
| Power-up w/ TEST_SEL = 1 to enter test mode<br>Cycle power to disable test mode<br>FSLC./TEST_SEL -->3-level latched input<br>If power-up w/ V>2.0V then use TEST_SEL<br>If power-up w/ V<2.0V then use FSLC<br>FSLB/TEST_MODE -->low Vth input<br>TEST_MODE is a real time input | >2.0V                       | 0                            | X                         | 0                        | HI-Z   |
|   | >2.0V                       | 0                            | X                         | 1                        | REF/N  |
|   | >2.0V                       | 1                            | X                         | 0                        | REF/N  |
|   | >2.0V                       | 1                            | X                         | 1                        | REF/N  |
| If TEST_SEL HW pin is 0 during power-up,<br>test mode can be invoked through B9b3.<br>If test mode is invoked by B9b3, only B9b4<br>is used to select HI-Z or REF/N<br>FSLB/TEST_Mode pin is not used.<br>Cycle power to disable test mode, one shot control                      | <2.0V                       | X                            | 1                         | 0                        | HI-Z   |
|   | <2.0V                       | X                            | 1                         | 1                        | REF/N  |

B9b3: 1= ENTER TEST MODE, Default = 0 (NORMAL OPERATION)

B9b4: 1= REF/N, Default = 0 (HI-Z)

ICS9LPRS501

64-PIN CK505 W/FULLY INTEGRATED VOLTAGE REGULATOR + INTEGRATED SERIES RESISTOR



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

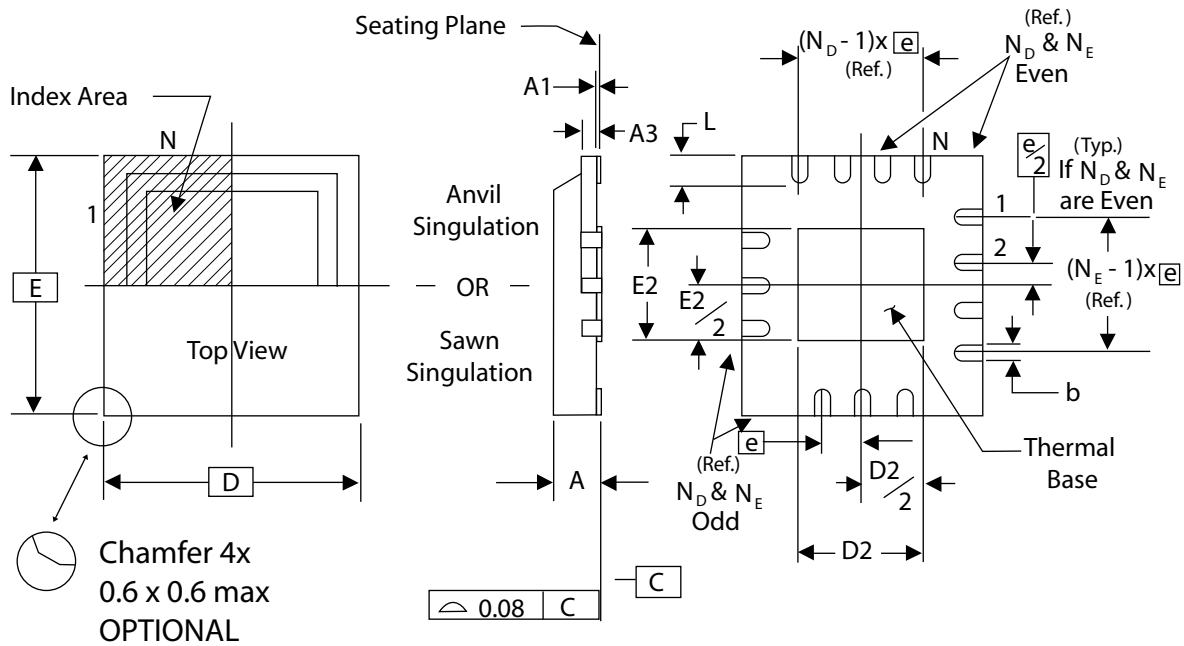
| SYMBOL | In Millimeters<br>COMMON DIMENSIONS |      | In Inches<br>COMMON DIMENSIONS |      |
|--------|-------------------------------------|------|--------------------------------|------|
|        | MIN                                 | MAX  | MIN                            | MAX  |
| A      | --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

VARIATIONS

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

Reference Doc.: JEDEC Publication 95, MO-153

10-0039



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

**DIMENSIONS**

| SYMBOL         | 64L |
|----------------|-----|
| N              | 64  |
| N <sub>D</sub> | 16  |
| N <sub>E</sub> | 16  |

**OPTION 1 DIMENSIONS (mm)**

| 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     |      |
| D x E BASIC    | 9.00 x 9.00    |      |
| D2 MIN. / MAX. | 7.00           | 7.25 |
| E2 MIN. / MAX. | 7.00           | 7.25 |
| L MIN. / MAX.  | 0.30           | 0.50 |

**OPTION 2 DIMENSIONS (mm)**

| 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     |      |
| D x E BASIC    | 9.00 x 9.00    |      |
| D2 MIN. / MAX. | 6.00           | 6.25 |
| E2 MIN. / MAX. | 6.00           | 6.25 |
| L MIN. / MAX.  | 0.30           | 0.50 |

**Ordering Information**

| Part / Order Number | Shipping Packaging | Package      | Temperature |
|---------------------|--------------------|--------------|-------------|
| 9LPRS501SGLF        | Tubes              | 64-pin TSSOP | 0 to +70° C |
| 9LPRS501SGLFT       | Tape and Reel      | 64-pin TSSOP | 0 to +70° C |
| 9LPRS501SKLF        | Trays              | 64-pin MLF   | 0 to +70° C |
| 9LPRS501SKLFT       | Tape and Reel      | 64-pin MLF   | 0 to +70° C |

“LF” suffix to the part number are the Pb-Free configuration, RoHS compliant.

**Revision History**

| <b>Rev.</b> | <b>Issue Date</b> | <b>Description</b>   | <b>Page #</b>            |
|-------------|-------------------|--|--------------------------|
| A           | 2/15/2008         | 1. Updated PLL3 Configuration Table.<br>2. Release to Final.   | -                        |
| B           | 4/25/2008         | Updated note on Byte 63.   | 24                       |
| C           | 9/3/2008          | 1. Updated Electrical Table.<br>2. Updated SMBus Byte 9.   | 12,<br>21                |
| D           | 9/30/2008         | Added case temperature   | 12                       |
| E           | 11/12/2008        | Added Electrical table for SE1/2=25MHz.  | 15                       |
| F           | 2/23/2009         | Updated note under Byte 63 table.  | 24                       |
| G           | 5/19/2011         | 1. Updated Electrical Tables to latest CK505 format<br>2. Added note to SMBus byte 0 clarifying interaction with Byte 63<br>3. Updated ordering information to latest format | 12-15, 20,<br>22, 26, 27 |

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(Rev.1.0 Mar 2020)

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