



### 64-pin CK505 w/Fully Integrated Voltage Regulator + Integrated Series Resistor

#### Recommended Application:

CK505 compliant clock with fully integrated voltage regulator and Internal series resistor on differential outputs

#### Output Features:

- 2 - CPU differential low power push-pull pairs
- 9 - 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 33ohm 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
- Selectable between one SRC differential push-pull pair and two single-ended outputs

| Pin Configuration     |    |    |                    |
|-----------------------|----|----|--------------------|
| PCI0/CR#_A            | 1  | 64 | CLK                |
| VDDPCI                | 2  | 63 | SDATA              |
| PCI1/CR#_B            | 3  | 62 | REF0/FSLC/TEST_SEL |
| PCI2/TME              | 4  | 61 | VDDREF             |
| PCI3                  | 5  | 60 | X1                 |
| PCI4/27_Select        | 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              |
| SRCT0/DOTT_96         | 13 | 52 | GNDCPU             |
| SRCC0/DOTC_96         | 14 | 51 | CPUT1_F            |
| GND                   | 15 | 50 | CPUC1_F            |
| VDDPLL3               | 16 | 49 | VDDCPU_IO          |
| 27MHz_NonSS/SRCT1/SE1 | 17 | 48 | NC                 |
| 27MHz_SS/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#          |
| SRCC4                 | 28 | 37 | CPU_STOP#          |
| GNDSRC                | 29 | 36 | VDDSRC_IO          |
| SRCT9                 | 30 | 35 | SRCC10             |
| SRCC9                 | 31 | 34 | SRCT10             |
| SRCC11/CR#_G          | 32 | 33 | SRCT11/CR#_H       |

64-TSSOP

\* Internal Pull-Up Resistor

\*\* Internal Pull-Down Resistor

64-TSSOP

| 27_Select (power on latch) | 0                                | 1                                           |
|----------------------------|----------------------------------|---------------------------------------------|
| Pin13/14 & Pin17/18        | DOT96, LCD_SS<br>Byte1 bit7 = 1. | SRCC0, 27MHz Non SS & SS<br>Byte1 bit7 = 0. |

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.



# ICS9LPRS365 Datasheet

## 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     | PCI4/27_Select | I/O  | 3.3V PCI clock output / 27MHz mode select for pin17, 18 strap. On powerup, the logic value on this pin determines the power-up default of DOT_96/SRC0 and 27MHz/SRC1 output and the function table for the pin17 and pin18.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 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 46 and 47 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  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 13    | DOTT_96/SRCT0  | OUT  | True clock of SRC or DOT96. The power-up default function depends on 27_Select, 1= SRC0, 0=DOT96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 14    | DOTC_96/SRCC0  | OUT  | Complement clock of SRC or DOT96. The power-up default function depends on 27_Select, 1= SRC0, 0=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    | 27MHz_NonSS/SRCT1/SE1 | OUT  | True clock of differential SRC1 clock pair / 3.3V single-ended output. 27_Select determines the power-up default, 1=27MHz non-spread SE clock, 0 = LCD_SST 100MHz differential clock. See table 2 for more information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 18    | 27MHz_SS/SRCC1/SE2    | OUT  | Complement clock of differential SRC1 clock pair / 3.3V single-ended output. 27_Select determines the power-up default, 1=27MHz spread SE clock, 0 = LCD_SSC 100MHz differential clock. See table 2 for more information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 19    | GND                   | PWR  | Ground pin for SRC / SE1 and SE2 clocks, PLL3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 20    | VDDPLL3_IO            | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 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  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 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 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 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><b>Byte 6, bit 4</b><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  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 37    | CPU_STOP#       | IN   | Stops all CPU Clocks, except those set to be free running clocks. In AMT mode 3 bits are shifted in from the ICH to set the FSC, FSB, FSA values                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 38    | PCI_STOP#       | IN   | Stops all PCI Clocks, except those set to be free running clocks. In AMT mode 3 bits are shifted in from the ICH to set the FSC, FSB, FSA values                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 39    | VDDSRC          | PWR  | VDD pin for SRC Pre-drivers, 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  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

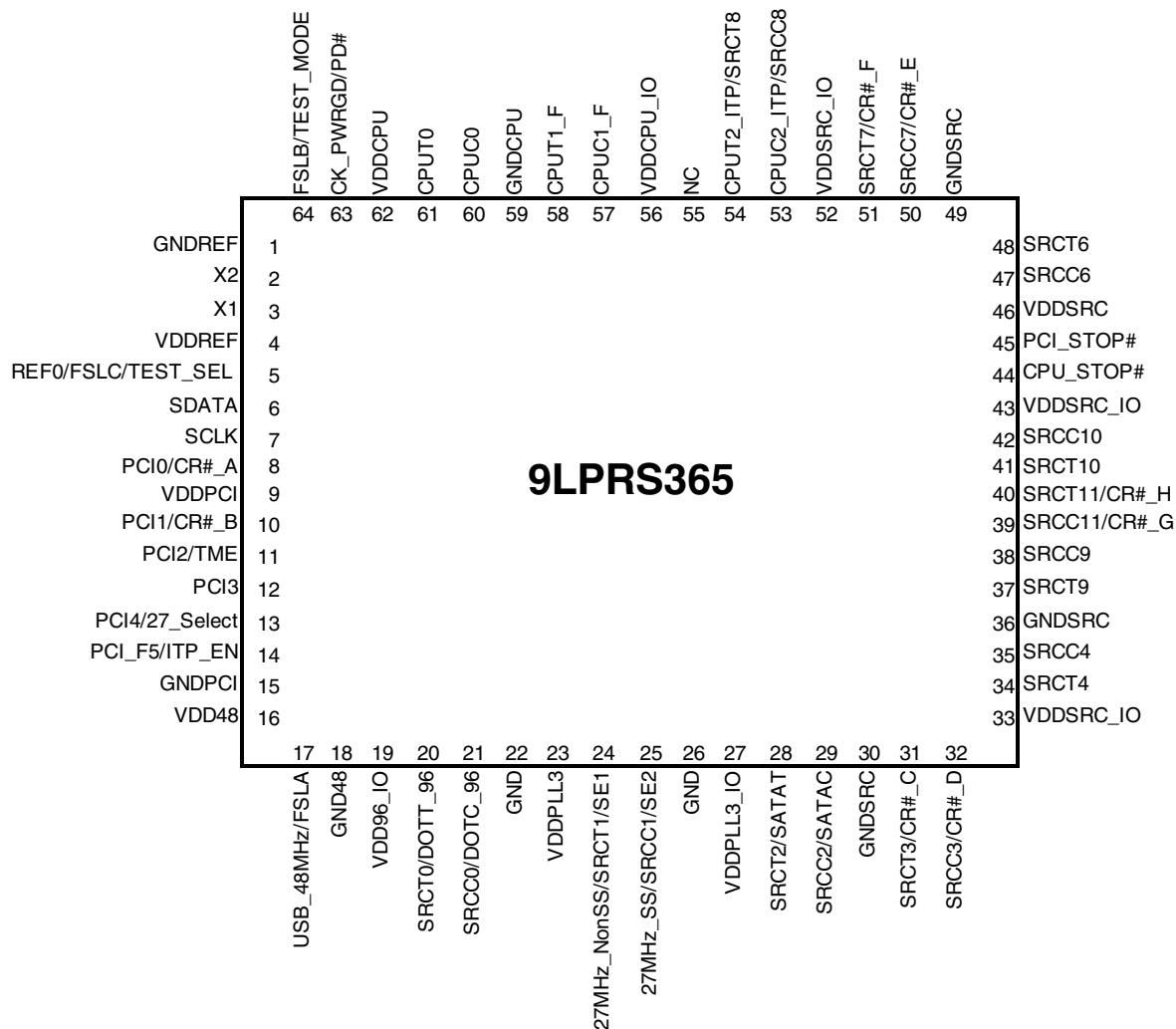


## TSSOP Pin Description (Continued)

| PIN # | PIN NAME           | TYPE | DESCRIPTION                                                                                                                                                                                                                                                               |
|-------|--------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 49    | VDDCPU_IO          | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                  |
| 50    | CPUC1_F            | OUT  | Complement clock of low power differential CPU clock pair. This clock will be free-running during iAMT.                                                                                                                                                                   |
| 51    | CPUT1_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    | CPUT0              | 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 $V_{IL\_FS}$ 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.  |
| 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 $V_{IL\_FS}$ 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.                                                                                                                                                                                                                                |



## Pin Configuration



## 64-pin MLF

### 64-MLF

| 27_Select (power on latch) | 0                               | 1                                         |
|----------------------------|---------------------------------|-------------------------------------------|
| Pin20/21 & Pin24/25        | DOT96, LCD_SS<br>Byte1 bit7 = 1 | SRC0, 27MHz Non SS & SS<br>Byte1 bit7= 0. |



## 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 Vil_FS and Vih_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 <b>NOT</b> 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    | PCI4/27_Select     | I/O  | 3.3V PCI clock output / 27MHz mode select for pin24, 25 strap. On powerup, the logic value on this pin determines the power-up default of DOT_96/SRC0 and 27MHz/SRC1 output and the function talbe for the pin24 and pin25.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 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 53 and 54 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  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 20    | DOTT_96/SRCT0         | OUT  | True clock of SRC or DOT96. The power-up default function depends on 27_Select, 1= SRC0, 0=DOT96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 21    | DOTC_96/SRCC0         | OUT  | Complement clock of SRC or DOT96. The power-up default function depends on 27_Select, 1= SRC0, 0=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    | 27MHz_NonSS/SRCT1/SE1 | OUT  | True clock of differential SRC1 clock pair / 3.3V single-ended output. 27_Select determines the power-up default, 1=27MHz non-spread SE clock, 0 = LCD_SST 100MHz differential clock. See table 2 for more information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 25    | 27MHz_SS/SRCC1/SE2    | OUT  | Complement clock of differential SRC1 clock pair / 3.3V single-ended output. 27_Select determines the power-up default, 1=27MHz spread SE clock, 0 = LCD_SSC 100MHz differential clock. See table 2 for more information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 26    | GND                   | PWR  | Ground pin for SRC / SE1 and SE2 clocks, PLL3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 27    | VDDPLL3_IO            | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 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  | <p>True clock of differential SRC clock pair/ Clock Request control C for either SRC0 or SRC2 pair</p> <p>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.</p> <p>Byte 5, bit 3</p> <p>0 = SRC3 enabled (default)</p> <p>1= CR#_C enabled. Byte 5, bit 2 controls whether CR#_C controls SRC0 or SRC2 pair</p> <p>Byte 5, bit 2</p> <p>0 = CR#_C controls SRC0 pair (default),</p> <p>1= CR#_C controls SRC2 pair</p>          |
| 32    | SRCC3/CR#_D           | I/O  | <p>Complementary clock of differential SRC clock pair/ Clock Request control D for either SRC1 or SRC4 pair</p> <p>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.</p> <p>Byte 5, bit 1</p> <p>0 = SRC3 enabled (default)</p> <p>1= CR#_D enabled. Byte 5, bit 0 controls whether CR#_D controls SRC1 or SRC4 pair</p> <p>Byte 5, bit 0</p> <p>0 = CR#_D controls SRC1 pair (default),</p> <p>1= CR#_D controls SRC4 pair</p> |





## MLF Pin Description (Continued)

| PIN # | PIN NAME     | TYPE | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------|--------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 33    | VDDSRC_IO    | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 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  | <p>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</p> <p><b>Byte 6, bit 5</b><br/>0 = SRC11# enabled (default)<br/>1 = CR#_G controls SRC9</p> |
| 40    | SRCT11/CR#_H | I/O  | <p>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 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</p> <p>Byte 6, bit 4<br/>0 = SRC11 enabled (default)<br/>1 = CR#_H controls SRC10.</p>       |
| 41    | SRCT10       | OUT  | True clock of differential SRC clock pair.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 42    | SRCC10       | OUT  | Complement clock of differential SRC clock pair.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 43    | VDDSRC_IO    | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 44    | CPU_STOP#    | IN   | Stops all CPU Clocks, except those set to be free running clocks. In AMT mode 3 bits are shifted in from the ICH to set the FSC, FSB, FSA values                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 45    | PCI_STOP#    | IN   | Stops all PCI Clocks, except those set to be free running clocks. In AMT mode 3 bits are shifted in from the ICH to set the FSC, FSB, FSA values                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 46    | VDDSRC       | PWR  | VDD pin for SRC Pre-drivers, 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  | <p>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</p> <p><b>Byte 6, bit 7</b><br/>0 = SRC7# enabled (default)<br/>1 = CR#_E controls SRC6.</p> |
| 51    | SRCT7/CR#_F     | I/O  | <p>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</p> <p><b>Byte 6, bit 6</b><br/>0 = SRC7# enabled (default)<br/>1 = CR#_F controls SRC8.</p>        |
| 52    | VDDSRC_IO       | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 53    | CPUC2_ITP/SRCC8 | OUT  | <p>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#</p>                                                                                                                                                                                                                                                                                          |
| 54    | CPUT2_ITP/SRCT8 | OUT  | <p>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</p>                                                                                                                                                                                                                                                                                                        |
| 55    | NC              | N/A  | No Connect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 56    | VDDCPU_IO       | PWR  | 1.05V to 3.3V from external power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 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 Vil_FS and Vih_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.                                                                                                                                                                                                                                                                                                                         |

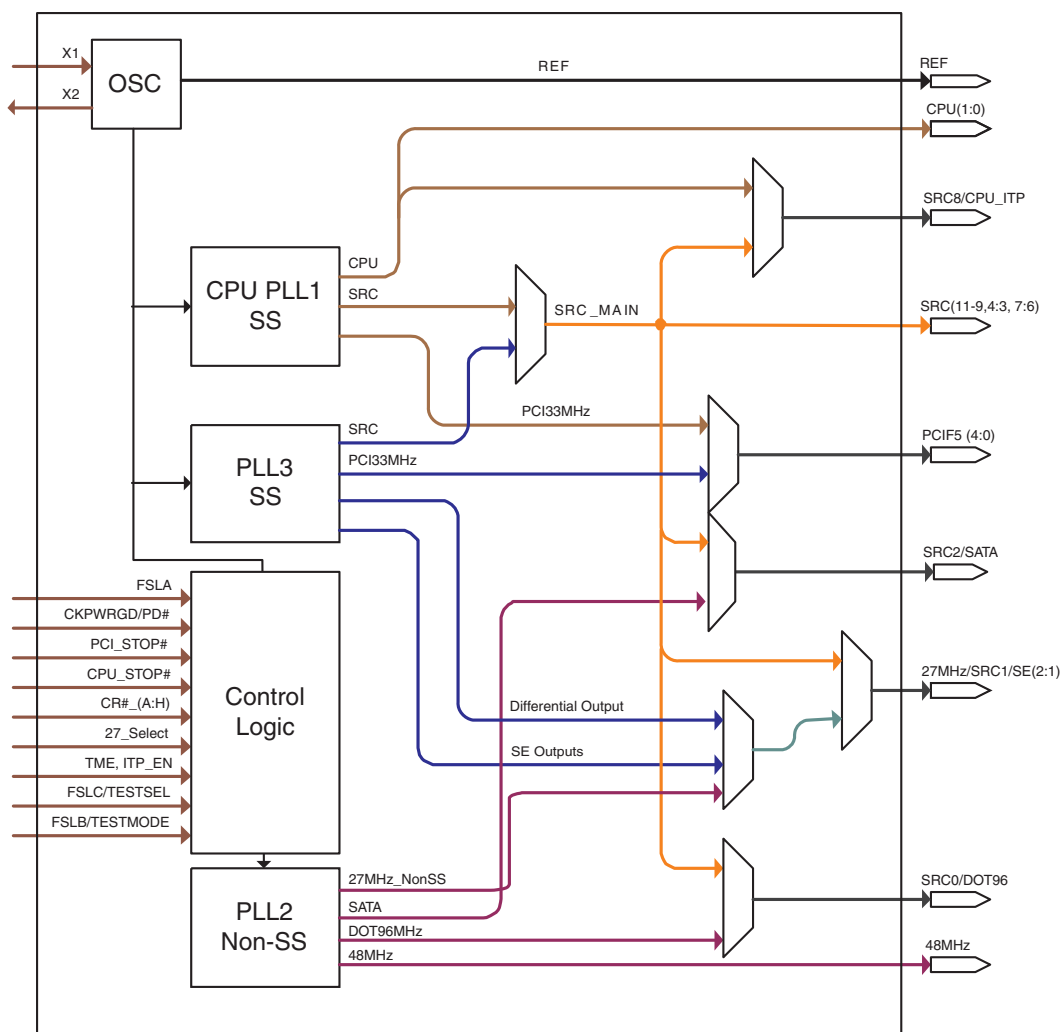


# ICS9LPRS365 Datasheet

## General Description

**ICS9LPRS365** follows Intel CK505 Yellow Cover specification. This clock synthesizer provides a single chip solution for next generation P4 Intel processors and Intel chipsets. **ICS9LPRS365** is driven with a 14.318MHz crystal. It also provides a tight ppm accuracy output for Serial ATA and PCI-Express support.

## 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

| PARAMETER              | SYMBOL            | CONDITIONS                          | MIN       | MAX | UNITS | Notes |
|------------------------|-------------------|-------------------------------------|-----------|-----|-------|-------|
| Maximum Supply Voltage | VDDxxx            | Core/Logic Supply                   |           | 4.6 | V     | 1,2   |
| Maximum Supply Voltage | VDDxxx_IO         | Low Voltage Differential I/O Supply |           | 3.8 | V     | 1,2   |
| Maximum Input Voltage  | V <sub>IH</sub>   | 3.3V LVCMOS Inputs                  |           | 4.6 | V     | 1,2,3 |
| Minimum Input Voltage  | V <sub>IL</sub>   | Any Input                           | GND - 0.5 |     | V     | 1,2   |
| Storage Temperature    | T <sub>s</sub>    | -                                   | -65       | 150 | °C    | 1,2   |
| Case Temperature       | T <sub>case</sub> | -                                   |           | 115 | °C    | 1,2   |
| Input ESD protection   | ESD prot          | Human Body Model                    | 2000      |     | V     | 1,2   |

<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 maximum VDD

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

| PARAMETER                                    | SYMBOL                  | CONDITIONS                                                                                           | MIN                   | TYPICAL | MAX                   | UNITS | Notes |
|----------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------|-----------------------|---------|-----------------------|-------|-------|
| Ambient Operating Temp                       | T <sub>ambient</sub>    | -                                                                                                    | 0                     |         | 70                    | °C    | 1     |
| Supply Voltage                               | VDDxxx                  | Supply Voltage                                                                                       | 3.135                 |         | 3.465                 | V     | 1     |
| Supply Voltage                               | VDDxxx_IO               | Low-Voltage Differential I/O Supply                                                                  | 1                     |         | 3.465                 | V     | 1     |
| Input High Voltage                           | V <sub>IHSE</sub>       | Single-ended inputs                                                                                  | 2                     |         | V <sub>DD</sub> + 0.3 | V     | 1     |
| Input Low Voltage                            | V <sub>ILSE</sub>       | Single-ended inputs                                                                                  | V <sub>SS</sub> - 0.3 |         | 0.8                   | V     | 1     |
| Input Leakage Current                        | I <sub>IN</sub>         | V <sub>IN</sub> = V <sub>DD</sub> , V <sub>IN</sub> = GND                                            | -5                    |         | 5                     | uA    | 1     |
| Input Leakage Current                        | I <sub>INRES</sub>      | Inputs with pull or pull down resistors<br>V <sub>IN</sub> = V <sub>DD</sub> , V <sub>IN</sub> = GND | -200                  |         | 200                   | uA    | 1     |
| Output High Voltage                          | V <sub>OHSE</sub>       | Single-ended outputs, I <sub>OH</sub> = -1mA                                                         | 2.4                   |         |                       | V     | 1     |
| Output Low Voltage                           | V <sub>OLSE</sub>       | Single-ended outputs, I <sub>OL</sub> = 1 mA                                                         |                       |         | 0.4                   | V     | 1     |
| Output High Voltage                          | V <sub>OHDF</sub>       | Differential Outputs, I <sub>OH</sub> = TBD mA                                                       | 0.7                   |         | 0.9                   | V     | 1     |
| Output Low Voltage                           | V <sub>OLDIF</sub>      | Differential Outputs, I <sub>OL</sub> = TBD mA                                                       |                       |         | 0.4                   | V     | 1     |
| Low Threshold Input-High Voltage (Test Mode) | V <sub>IH_FS_TEST</sub> | 3.3 V +/-5%                                                                                          | 2                     |         | V <sub>DD</sub> + 0.3 | V     | 1     |
| Low Threshold Input-High Voltage             | V <sub>IH_FS</sub>      | 3.3 V +/-5%                                                                                          | 0.7                   |         | 1.5                   | V     | 1     |
| Low Threshold Input-Low Voltage              | V <sub>IL_FS</sub>      | 3.3 V +/-5%                                                                                          | V <sub>SS</sub> - 0.3 |         | 0.35                  | V     | 1     |
| Operating Supply Current                     | I <sub>DD_DEFAULT</sub> | 3.3V supply, PLL3 off                                                                                |                       | 95      | 250                   | mA    | 1     |
|                                              | I <sub>DD_PLL3DIF</sub> | 3.3V supply, PLL3 Differential Out                                                                   |                       | 106     | 250                   | mA    | 1     |
|                                              | I <sub>DD_PLL3SE</sub>  | 3.3V supply, PLL3 Single-ended Out                                                                   |                       | 101     | 250                   | mA    | 1     |
|                                              | I <sub>DD_IO</sub>      | 0.8V supply, Differential IO current, all outputs enabled                                            | 25                    | 32      | 80                    | mA    | 1     |
| Power Down Current                           | I <sub>DD_PD3.3</sub>   | 3.3V supply, Power Down Mode                                                                         |                       | 26      | 30                    | mA    | 1     |
|                                              | I <sub>DD_PDIO</sub>    | 0.8V IO supply, Power Down Mode                                                                      |                       | 0.23    | 0.5                   | mA    | 1     |
| iAMT Mode Current                            | I <sub>DD_iAMT3.3</sub> | 3.3V supply, iAMT Mode                                                                               |                       | 47      | 80                    | mA    | 1     |
|                                              | I <sub>DD_iAMT0.8</sub> | 0.8V IO supply, iAMTMode                                                                             |                       | 5       | 10                    | mA    | 1     |
| Input Frequency                              | F <sub>i</sub>          | V <sub>DD</sub> = 3.3 V                                                                              |                       |         | 14.318                | MHz   | 1     |
| Pin Inductance                               | L <sub>pin</sub>        |                                                                                                      |                       |         | 7                     | nH    | 1     |
| Input Capacitance                            | C <sub>IN</sub>         | Logic Inputs                                                                                         | 1.5                   |         | 5                     | pF    | 1     |
|                                              | C <sub>OUT</sub>        | Output pin capacitance                                                                               |                       |         | 6                     | pF    | 1     |
|                                              | C <sub>INX</sub>        | X1 & X2 pins                                                                                         |                       |         | 5                     | pF    | 1     |
| Spread Spectrum Modulation Frequency         | f <sub>SSMOD</sub>      | Triangular Modulation                                                                                | 30                    |         | 33                    | kHz   | 1     |

\*T<sub>A</sub> = 0 - 70°C; V<sub>DD</sub> = 3.3 V +/-5%

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



### Electrical Characteristics - SMBus Interface

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

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

### AC Electrical Characteristics - Input/Common Parameters

| PARAMETER         | SYMBOL      | CONDITIONS                                               | MIN | MAX | UNITS | Notes |
|-------------------|-------------|----------------------------------------------------------|-----|-----|-------|-------|
| Clk Stabilization | $T_{STAB}$  | From VDD Power-Up or de-assertion of PD# to 1st clock    |     | 1.8 | ms    | 1     |
| Tdrive_SRC        | $T_{DRSRC}$ | SRC output enable after<br>PCI_STOP# de-assertion        |     | 15  | ns    | 1,2   |
| Tdrive_PD#        | $T_{DRPD}$  | Differential output enable after<br>PD# de-assertion     |     | 300 | us    | 1     |
| Tdrive_CPU        | $T_{DRSRC}$ | CPU output enable after<br>CPU_STOP# de-assertion        |     | 10  | ns    | 1,2   |
| Tfall_PD#         | $T_{FALL}$  | Fall/rise time of PD#, PCI_STOP#<br>and CPU_STOP# inputs |     | 5   | ns    | 1,2   |
| Trise_PD#         | $T_{RISE}$  |                                                          |     | 5   | ns    | 1,2   |

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

<sup>2</sup>Optional. Only applies when PCI\_STOP# and/or CPU\_STOP# is present.

### AC Electrical Characteristics - Low Power Differential Outputs

| PARAMETER                   | SYMBOL         | CONDITIONS               | MIN  | MAX  | UNITS | NOTES |
|-----------------------------|----------------|--------------------------|------|------|-------|-------|
| Rising Edge Slew Rate       | $t_{SLR}$      | Differential Measurement | 2.5  | 8    | V/ns  | 1,2   |
| Falling Edge Slew Rate      | $t_{FLR}$      | Differential Measurement | 2.5  | 8    | V/ns  | 1,2   |
| Slew Rate Variation         | $t_{SLVAR}$    | Single-ended Measurement |      | 20   | %     | 1     |
| Maximum Output Voltage      | $V_{HIGH}$     | Includes overshoot       |      | 1150 | mV    | 1     |
| Minimum Output Voltage      | $V_{LOW}$      | Includes undershoot      | -300 |      | mV    | 1     |
| Differential Voltage Swing  | $V_{SWING}$    | Differential Measurement | 300  |      | mV    | 1     |
| Crossing Point Voltage      | $V_{XABS}$     | Single-ended Measurement | 300  | 550  | mV    | 1,3,4 |
| Crossing Point Variation    | $V_{XABSVAR}$  | Single-ended Measurement |      | 140  | mV    | 1,3,5 |
| Duty Cycle                  | $D_{CYC}$      | Differential Measurement | 45   | 55   | %     | 1     |
| CPU Jitter - Cycle to Cycle | $CPUJ_{C2C}$   | Differential Measurement |      | 85   | ps    | 1     |
| SRC Jitter - Cycle to Cycle | $SRCJ_{C2C}$   | Differential Measurement |      | 125  | ps    | 1     |
| DOT Jitter - Cycle to Cycle | $DOTJ_{C2C}$   | Differential Measurement |      | 250  | ps    | 1     |
| CPU[1:0] Skew               | $CPU_{SKEW10}$ | Differential Measurement |      | 100  | ps    | 1     |
| CPU[2:ITP:0] Skew           | $CPU_{SKEW20}$ | Differential Measurement |      | 150  | ps    | 1     |
| SRC[10:0] Skew              | $SRC_{SKEW}$   | Differential Measurement |      | TBD  | ps    | 1     |

\* $T_A = 0 - 70^\circ\text{C}$ ;  $V_{DD} = 3.3\text{ V} \pm 5\%$ ;  $C_L = 5\text{pF}$ ,  $R_S = 22\Omega$  (unless specified otherwise.)

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

<sup>2</sup>Slew rate measured through  $V_{swing}$  centered around differential zero

<sup>3</sup> $V_{xabs}$  is defined as the voltage where  $CLK = CLK\#$

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

<sup>5</sup>Defined as the total variation of all crossing voltages of CLK rising and CLK# falling. Matching applies to rising edge rate of CLK and falling edge of CLK#.



## Electrical Characteristics - PCICLK/PCICLK\_F

| PARAMETER                 | SYMBOL               | CONDITIONS                             | MIN         | MAX      | UNITS | NOTES |
|---------------------------|----------------------|----------------------------------------|-------------|----------|-------|-------|
| Long Accuracy             | ppm                  | see T <sub>period</sub> min-max values | -300        | 300      | ppm   | 1,2   |
| Clock period              | T <sub>period</sub>  | 33.33MHz output nominal                | 29.99100    | 30.00900 | ns    | 2     |
|                           |                      | 33.33MHz output spread                 |             | 30.15980 | ns    | 2     |
| Absolute min/max period   | T <sub>abs</sub>     | 33.33MHz output nominal/spread         | 29.49100    | 30.65980 | ns    | 2     |
| Output High Voltage       | V <sub>OH</sub>      | I <sub>OH</sub> = -1 mA                | 2.4         |          | V     | 1     |
| Output Low Voltage        | V <sub>OL</sub>      | I <sub>OL</sub> = 1 mA                 |             | 0.4      | V     | 1     |
| Output High Current       | I <sub>OH</sub>      | V <sub>OH</sub> @ MIN = 1.0 V          | -33         |          | mA    | 1     |
|                           |                      | V <sub>OH</sub> @ MAX = 3.135 V        |             | -33      | mA    | 1     |
| Output Low Current        | I <sub>OL</sub>      | V <sub>OL</sub> @ MIN = 1.95 V         | 30          |          | mA    | 1     |
|                           |                      | V <sub>OL</sub> @ MAX = 0.4 V          |             | 38       | mA    | 1     |
| Rising Edge Slew Rate     | t <sub>SLR</sub>     | Measured from 0.8 to 2.0 V             | 1           | 4        | V/ns  | 1     |
| Falling Edge Slew Rate    | t <sub>FLR</sub>     | Measured from 2.0 to 0.8 V             | 1           | 4        | V/ns  | 1     |
| Duty Cycle                | d <sub>TI</sub>      | V <sub>T</sub> = 1.5 V                 | 45          | 55       | %     | 1     |
| Skew                      | t <sub>skew</sub>    | V <sub>T</sub> = 1.5 V                 |             | 250      | ps    | 1     |
| Intentional PCI-PCI delay | t <sub>delay</sub>   | V <sub>T</sub> = 1.5 V                 | 200 nominal |          | ps    | 1,3   |
| Jitter, Cycle to cycle    | t <sub>jyc-cyc</sub> | V <sub>T</sub> = 1.5 V                 |             | 500      | ps    | 1     |

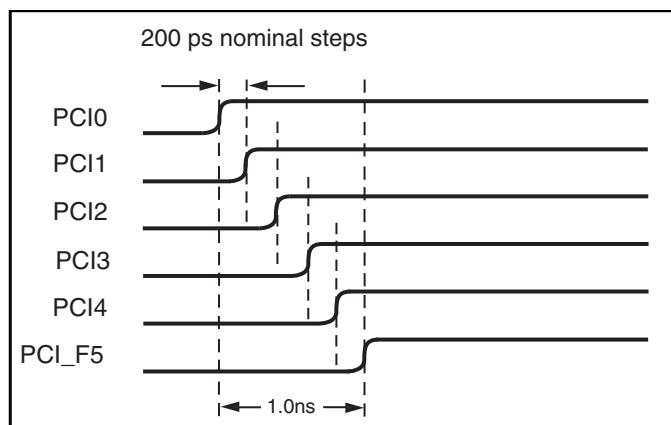
\*T<sub>A</sub> = 0 - 70°C; V<sub>DD</sub> = 3.3 V +/-5%

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

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

<sup>3</sup> See PCI Clock-to-Clock Delay Figure

## Intentional PCI Clock to Clock Delay





## Electrical Characteristics - USB48MHz

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

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

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

## Electrical Characteristics - SE 24.576MHz

| PARAMETER              | SYMBOL               | CONDITIONS                                     | MIN      | MAX      | UNITS | NOTES |
|------------------------|----------------------|------------------------------------------------|----------|----------|-------|-------|
| Long Accuracy          | ppm                  | see Tperiod min-max values                     | -300     | 300      | ppm   | 1,2   |
| Clock period           | $T_{\text{period}}$  | 24.576MHz output nominal                       | 40.70231 | 40.67790 | ns    | 2     |
| Output High Voltage    | $V_{\text{OH}}$      | $I_{\text{OH}} = -1 \text{ mA}$                | 2.4      |          | V     | 1     |
| Output Low Voltage     | $V_{\text{OL}}$      | $I_{\text{OL}} = 1 \text{ mA}$                 |          | 0.4      | V     | 1     |
| Output High Current    | $I_{\text{OH}}$      | $V_{\text{OH}} @ \text{MIN} = 1.0 \text{ V}$   | -29      |          | mA    | 1     |
|                        |                      | $V_{\text{OH}} @ \text{MAX} = 3.135 \text{ V}$ |          | -23      | mA    | 1     |
| Output Low Current     | $I_{\text{OL}}$      | $V_{\text{OL}} @ \text{MIN} = 1.95 \text{ V}$  | 29       |          | mA    | 1     |
|                        |                      | $V_{\text{OL}} @ \text{MAX} = 0.4 \text{ V}$   |          | 27       | mA    | 1     |
| Rising Edge Slew Rate  | $t_{\text{SLR}}$     | Measured from 0.8 to 2.0 V                     | 1        | 4        | V/ns  | 1     |
| Falling Edge Slew Rate | $t_{\text{FLR}}$     | Measured from 2.0 to 0.8 V                     | 1        | 4        | V/ns  | 1     |
| Duty Cycle             | $d_{\text{IT}}$      | $V_{\text{T}} = 1.5 \text{ V}$                 | 45       | 55       | %     | 1     |
| Jitter, Cycle to cycle | $t_{\text{jyc-cyc}}$ | $V_{\text{T}} = 1.5 \text{ V}$                 |          | 500      | ps    | 1     |

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

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

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



## Electrical Characteristics - REF-14.318MHz

| PARAMETER               | SYMBOL        | CONDITIONS                                                                         | MIN     | MAX      | UNITS | Notes |
|-------------------------|---------------|------------------------------------------------------------------------------------|---------|----------|-------|-------|
| Long Accuracy           | ppm           | see Tperiod min-max values                                                         | -300    | 300      | ppm   | 1,2   |
| Clock period            | $T_{period}$  | 14.318MHz output nominal                                                           | 69.8203 | 69.8622  | ns    | 2     |
| Absolute min/max period | $T_{abs}$     | 14.318MHz output nominal                                                           | 69.8203 | 70.86224 | ns    | 2     |
| Output High Voltage     | $V_{OH}$      | $I_{OH} = -1 \text{ mA}$                                                           | 2.4     |          | V     | 1     |
| Output Low Voltage      | $V_{OL}$      | $I_{OL} = 1 \text{ mA}$                                                            |         | 0.4      | V     | 1     |
| Output High Current     | $I_{OH}$      | $V_{OH} @ \text{MIN} = 1.0 \text{ V}$ ,<br>$V_{OH} @ \text{MAX} = 3.135 \text{ V}$ | -33     | -33      | mA    | 1     |
| Output Low Current      | $I_{OL}$      | $V_{OL} @ \text{MIN} = 1.95 \text{ V}$ ,<br>$V_{OL} @ \text{MAX} = 0.4 \text{ V}$  | 30      | 38       | mA    | 1     |
| Rising Edge Slew Rate   | $t_{SLR}$     | Measured from 0.8 to 2.0 V                                                         | 1       | 4        | V/ns  | 1     |
| Falling Edge Slew Rate  | $t_{FLR}$     | Measured from 2.0 to 0.8 V                                                         | 1       | 4        | V/ns  | 1     |
| Duty Cycle              | $d_{11}$      | $V_T = 1.5 \text{ V}$                                                              | 45      | 55       | %     | 1     |
| Jitter                  | $t_{jcy-cyc}$ | $V_T = 1.5 \text{ V}$                                                              |         | 1000     | ps    | 1     |

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

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

**Preferred drive strengths using CK505 clock sources.**

**Transmission lines to load do not share series resistors.**

**Desktop ( $Z_0=50\Omega$ ) and mobile ( $Z_0=55\Omega$ ) have the same drive strength.**

| D.C.Drive<br>Strength | Number of Loads<br>to Drive | Match Point for N & P<br>Voltage / Current<br>(mA) | Number of Loads Actually Driven.<br>[ $Z_0=55\Omega$ ] |                            |                            |
|-----------------------|-----------------------------|----------------------------------------------------|--------------------------------------------------------|----------------------------|----------------------------|
|                       |                             |                                                    | 1 Load $R_s =$                                         | 2 Loads $R_s =$            | 3 Loads $R_s =$            |
|                       | 1                           | 0.56 / 33<br>(17 $\Omega$ )                        | 33 $\Omega$ [39 $\Omega$ ]                             | -                          | -                          |
|                       | 2                           | 0.92 / 66<br>(14 $\Omega$ )                        | 39 $\Omega$ [43 $\Omega$ ]                             | 22 $\Omega$ [27 $\Omega$ ] | -                          |
|                       | 3                           | 1.15 / 99<br>(11.6 $\Omega$ )                      | 43 $\Omega$ [43 $\Omega$ ]                             | 27 $\Omega$ [33 $\Omega$ ] | 15 $\Omega$ [22 $\Omega$ ] |





**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**

| 27 Select | B1b4 | B1b3 | B1b2 | B1b1 | Pin17 (TSSOP)<br>/ Pin24 (MLF) | Pin18 (TSSOP)<br>/ Pin25 (MLF) | Spread              | Comment                            |
|-----------|------|------|------|------|--------------------------------|--------------------------------|---------------------|------------------------------------|
|           |      |      |      |      | MHz                            | MHz                            | %                   |                                    |
| 0         | 0    | 0    | 0    | 0    | PLL 3 disabled                 |                                |                     |                                    |
| 0         | 0    | 0    | 0    | 1    | 100.00                         | 100.00                         | 0.5% Down Spread    | SRCCLK1 from SRC_MAIN              |
| 0         | 0    | 0    | 1    | 0    | 100.00                         | 100.00                         | 0.5% Down Spread    | Only SRCCLK1 from PLL3             |
| 0         | 0    | 0    | 1    | 1    | 100.00                         | 100.00                         | 1% Down Spread      | Only SRCCLK1 from PLL3             |
| 0         | 0    | 1    | 0    | 0    | 100.00                         | 100.00                         | 1.5% Down Spread    | Only SRCCLK1 from PLL3             |
| 0         | 0    | 1    | 0    | 1    | 100.00                         | 100.00                         | 2% Down Spread      | Only SRCCLK1 from PLL3             |
| 0         | 0    | 1    | 1    | 0    | 100.00                         | 100.00                         | 2.5% Down Spread    | Only SRCCLK1 from PLL3             |
| 0         | 0    | 1    | 1    | 1    | N/A                            | N/A                            | N/A                 | N/A                                |
| 0         | 1    | 0    | 0    | 0    | 24.576                         | 24.576                         | None                | 24.576Mhz on SE1 and SE2           |
| 0         | 1    | 0    | 0    | 1    | 24.576                         | 98.304                         | None                | 24.576Mhz on SE1, 98.304Mhz on SE2 |
| 0         | 1    | 0    | 1    | 0    | 98.304                         | 98.304                         | None                | 98.304Mhz on SE1 and SE2           |
| 0         | 1    | 0    | 1    | 1    | 27.000                         | 27.000                         | None                | 27Mhz on SE1 and SE2               |
| 0         | 1    | 1    | 0    | 0    | 25.000                         | 25.000                         | None                | 25Mhz on SE1 and SE2               |
| 0         | 1    | 1    | 0    | 1    | N/A                            | N/A                            | N/A                 | N/A                                |
| 0         | 1    | 1    | 1    | 0    | N/A                            | N/A                            | N/A                 | N/A                                |
| 0         | 1    | 1    | 1    | 1    | N/A                            | N/A                            | N/A                 | N/A                                |
| 1         | 0    | 0    | 0    | 0    | N/A                            | N/A                            | N/A                 |                                    |
| 1         | 0    | 0    | 0    | 1    | N/A                            | N/A                            | N/A                 |                                    |
| 1         | 0    | 0    | 1    | 0    | 27MHz_nonSS                    | 27MHz_SS                       | 0.5% Down Spread    |                                    |
| 1         | 0    | 0    | 1    | 1    | 27MHz_nonSS                    | 27MHz_SS                       | 1% Down Spread      |                                    |
| 1         | 0    | 1    | 0    | 0    | 27MHz_nonSS                    | 27MHz_SS                       | 1.5% Down Spread    |                                    |
| 1         | 0    | 1    | 0    | 1    | 27MHz_nonSS                    | 27MHz_SS                       | 2% Down Spread      |                                    |
| 1         | 0    | 1    | 1    | 0    | 27MHz_nonSS                    | 27MHz_SS                       | 0.75% Down Spread   |                                    |
| 1         | 0    | 1    | 1    | 1    | 27MHz_nonSS                    | 27MHz_SS                       | 1.25% Down Spread   |                                    |
| 1         | 1    | 0    | 0    | 0    | 27MHz_nonSS                    | 27MHz_SS                       | 1.75% Down Spread   |                                    |
| 1         | 1    | 0    | 0    | 1    | 27MHz_nonSS                    | 27MHz_SS                       | 0.5% Center Spread  |                                    |
| 1         | 1    | 0    | 1    | 0    | 27MHz_nonSS                    | 27MHz_SS                       | 0.75% Center Spread |                                    |
| 1         | 1    | 0    | 1    | 1    | N/A                            | N/A                            |                     |                                    |
| 1         | 1    | 1    | 0    | 0    | N/A                            | N/A                            |                     |                                    |
| 1         | 1    | 1    | 0    | 1    | N/A                            | N/A                            |                     |                                    |
| 1         | 1    | 1    | 1    | 0    | N/A                            | N/A                            |                     |                                    |
| 1         | 1    | 1    | 1    | 1    | 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    |

**CPU Power Management Table**

| PD# | CPU_STOP# | PCI_STOP# | CR# | SMBus<br>Register OE | CPU1    | CPU1#   | CPU(0,2) | CPU(0,2)# |
|-----|-----------|-----------|-----|----------------------|---------|---------|----------|-----------|
| 1   | 1         | 1         | X   | Enable               | Running | Running | Running  | Running   |
| 0   | X         | X         | X   | Enable               | Low/20K | Low     | Low/20K  | Low       |
| 1   | 0         | X         | X   | Enable               | High    | Low     | High     | Low       |
| 1   | X         | X         | X   | Disable              | Low/20K | Low     | Low/20K  | Low       |
| M1  |           |           |     |                      | Running | Running | Low/20K  | Low       |

**SRC, LCD, DOT Power Management Table**

| PD# | CPU_STOP# | PCI_STOP# | CR# | SMBus<br>Register OE | SRC/LCD  | SRC#/LCD# | SRC/LCD                      | SRC#/LCD# | DOT     | DOT#    |
|-----|-----------|-----------|-----|----------------------|----------|-----------|------------------------------|-----------|---------|---------|
|     |           |           |     |                      | Free-Run |           | PCI Stoppable/CR<br>Selected |           |         |         |
| 1   | X         | 1         | 0   | Enable               | Running  | Running   | Running                      | Running   | Running | Running |
| 0   | X         | X         | X   | Enable               | Low/20K  | Low       | Low/20K                      | Low       | Low/20K | Low     |
| 1   | X         | 0         | X   | Enable               | Running  | Running   | High                         | Low       | Running | Running |
| 1   | X         | X         | 1   | Enable               | Running  | Running   | Low/20K                      | Low       | Running | Running |
| 1   | X         | X         | X   | Disable              | Low/20K  | Low       | Low/20K                      | Low       | Low/20K | Low     |
| M1  |           |           |     |                      | Low/20K  | Low       | Low/20K                      | Low       | Low/20K | Low     |

**Singled-ended Power Management Table**

| PD# | CPU_STOP# | PCI_STOP# | CR# | SMBus<br>Register OE | PCIF/PCI | PCIF/PCI  | USB     | REF     |
|-----|-----------|-----------|-----|----------------------|----------|-----------|---------|---------|
|     |           |           |     |                      | Free-run | Stoppable |         |         |
| 1   | X         | 1         | X   | Enable               | Running  | Running   | Running | Running |
| 0   | X         | X         | X   | Enable               | Low      | Low       | Low     | Low     |
| 1   | X         | 0         | X   | Enable               | Running  | Low       | Running | Running |
| 1   | X         | X         | X   | Disable              | Low      | Low       | Low     | Low     |
| M1  |           |           |     |                      | Low      | Low       | Low     | Low     |



## General SMBus serial interface information for the ICS9LPRS365

### 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

| 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  |                      |     |

### 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 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                             |                 |                      |
|                                 |                 | Beginning Byte N     |
| ACK                             |                 |                      |
|                                 |                 | ○                    |
| ○                               |                 | ○                    |
| ○                               |                 | ○                    |
| ○                               |                 |                      |
|                                 |                 | 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 (Sticky Bit) | 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         | 0       |
| 0   | -   | PD_Restore   | If config saved, on deassert return to last known state else clear all config as if cold power on and go to latches open state | RW              | Configuration Not Saved                  | Configuration Saved | 1       |

### 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           | R    | SRC0                                                                       | DOT96         | Note 1  |
| 6   | -     | PLL1_SSC_SEL | Select 0.5% down or center SSC | RW   | Down spread                                                                | Center spread | 0       |
| 5   |       | Reserved     |                                | RW   |                                                                            |               | 0       |
| 4   | 17/18 | PLL3_CF3     | PLL3 Quick Config Bit 3        | RW   | See Table 2: pin17, 18 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   |                                                                            |               | 1       |
| 1   |       | PLL3_CF0     | PLL3 Quick Config Bit 0        | RW   |                                                                            |               | 0       |
| 0   |       | PCI_SEL      | PCI_SEL                        | RW   | PCI from PLL1                                                              | PCI from PLL3 | 1       |

Note 1 : When 27\_Select pin = 0, B1b7 PWD = 1, , when 27\_Select pin = 1, PWD = 0

### Byte 2 Output Enable Register

| Bit | Pin | Name     | Description                                             | Type | 0               | 1              | Default |
|-----|-----|----------|---------------------------------------------------------|------|-----------------|----------------|---------|
| 7   |     | REF_OE   | Output enable for REF, if disabled output is tri-stated | 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   |     | Reserved    | Reserved                      | 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 = 0 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 | If set, LCD_SS stops with PCI_STOP# | RW   | Free Running  | Stops with<br>PCI_STOP#<br>assertion | 0       |
| 0   |     | SRC_STP_CRTL  | If set, SRCs stop with PCI_STOP#    | RW   | Free Running  | Stops with<br>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 |   | 0       |
| 6   |     | Rev Code Bit 2  |                                  | R    |                 |   | 0       |
| 5   |     | Rev Code Bit 1  |                                  | R    |                 |   | 1       |
| 4   |     | Rev Code Bit 0  |                                  | R    |                 |   | 0       |
| 3   |     | Vendor ID bit 3 | Vendor ID<br>ICS is 0001, binary | R    |                 |   | 0       |
| 2   |     | Vendor ID bit 2 |                                  | R    |                 |   | 0       |
| 1   |     | Vendor ID bit 1 |                                  | R    |                 |   | 0       |
| 0   |     | Vendor ID bit 0 |                                  | R    |                 |   | 1       |



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## 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 differentiating between CK505 package options, etc. | R    | See Device ID Table |         | 1                        |
| 6   |     | Device_ID2 |                                                                                                | R    |                     |         | 1                        |
| 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 | 27_Select power on latch |
| 0   |     | SE2_OE     | Output enable for SE2                                                                          | RW   | Disabled            | Enabled | 27_Select power on latch |

## Byte 9 Output Control Register

| Bit | Pin | Name             | Description                                         | Type | 0                                             | 1                              | Default |
|-----|-----|------------------|-----------------------------------------------------|------|-----------------------------------------------|--------------------------------|---------|
| 7   |     | PCIF5_STOP_EN    | Allows control of PCIF5 with assertion of PCI_STOP# | RW   | Free running                                  | Stops with PCI_STOP# assertion | 0       |
| 6   |     | TME_Readback     | Trusted Mode Enable (TME) strap status              | R    | normal operation                              | no overclocking                | 0       |
| 5   |     | REF Strength     | Sets the REF output drive strength                  | RW   | 1X (2Loads)                                   | 2X (3 Loads)                   | 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 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 (Default is 0.8V) |                                | 1       |
| 1   |     | IO_VOUT1         | IO Output Voltage Select                            | RW   |                                               |                                | 0       |
| 0   |     | IO_VOUT0         | IO Output Voltage Select (Least Significant Bit)    | RW   |                                               |                                | 1       |

## Byte 10 Free-Running Control Register

| Bit | Pin | Name                      | Description                             | Type | 0                 | 1           | Default         |
|-----|-----|---------------------------|-----------------------------------------|------|-------------------|-------------|-----------------|
| 7   |     | 27_Select Latch read back | Readback of 27_Select latch             | R    | Dot96/ LCD_SS /SE | SRC0/ 27MHz | 27_Select latch |
| 6   |     | Reserved                  | Reserved                                | RW   | -                 | -           | 1               |
| 5   |     | Reserved                  | Reserved                                | RW   | -                 | -           | 1               |
| 4   |     | CPU1_AMT_EN               | M1 mode clk enable                      | RW   | Disable           | Enable      | 1               |
| 3   |     | Reserved                  | Reserved                                | RW   | -                 | -           | 1               |
| 2   |     | CPU 2 Stop Enable         | Enables control of CPU2 with CPU_STOP#  | RW   | Free Running      | Stoppable   | 1               |
| 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 Strength Control Register

| Bit | Pin | Name     | Description | Type | 0  | 1  | Default |
|-----|-----|----------|-------------|------|----|----|---------|
| 7   |     | 48MHz    | Reserved    | RW   | 1x | 2x | 0       |
| 6   |     | PCIF5    |             | RW   | 1x | 2x | 0       |
| 5   |     | PCI4     |             | RW   | 1x | 2x | 0       |
| 4   |     | PCI3     |             | RW   | 1x | 2x | 0       |
| 3   |     | PCI2     |             | RW   | 1x | 2x | 0       |
| 2   |     | PCI1     |             | RW   | 1x | 2x | 0       |
| 1   |     | PCI0     |             | RW   | 1x | 2x | 0       |
| 0   |     | Reserved | Reserved    | RW   | -  | -  | 0       |



## Byte 12 Byte Count Register

| Bit | Pin | Name     | Description                                      | Type | 0 | 1 | Default |
|-----|-----|----------|--------------------------------------------------|------|---|---|---------|
| 7   |     | Reserved |                                                  | RW   |   |   | 0       |
| 6   |     | Reserved |                                                  | RW   |   |   | 0       |
| 5   |     | BC5      | Read Back byte count register,<br>max bytes = 32 | RW   |   |   | 0       |
| 4   |     | BC4      |                                                  | RW   |   |   | 0       |
| 3   |     | BC3      |                                                  | RW   |   |   | 1       |
| 2   |     | BC2      |                                                  | RW   |   |   | 1       |
| 1   |     | BC1      |                                                  | RW   |   |   | 0       |
| 0   |     | BC0      |                                                  | RW   |   |   | 1       |

## Byte 13 VCO Frequency Control Register PLL1

| 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<br>to reference divider value. Default at power up =<br>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 VCO Frequency Control Register PLL1

| Bit | Pin | Name   | Description                                                                                                                        | Type | 0 | 1 | Default |
|-----|-----|--------|------------------------------------------------------------------------------------------------------------------------------------|------|---|---|---------|
| 7   |     | N Div7 | The decimal representation of N Div (9:0) is equal to<br>VCO divider value. Default at power up = latch-in or<br>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 Spread Spectrum Control Register PLL1

| Bit | Pin | Name | Description                                                                                              | Type | 0 | 1 | Default |
|-----|-----|------|----------------------------------------------------------------------------------------------------------|------|---|---|---------|
| 7   |     | SSP7 | These Spread Spectrum bits will program the<br>spread percentage. Contact ICS for the correct<br>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 Spread Spectrum Control Register PLL1

| Bit | Pin | Name     | Description                                                                                              | Type | 0 | 1 | Default |
|-----|-----|----------|----------------------------------------------------------------------------------------------------------|------|---|---|---------|
| 7   |     | Reserved | Reserved                                                                                                 | RW   | - | - | 0       |
| 6   |     | SSP14    | These Spread Spectrum bits will program the<br>spread percentage. Contact ICS for the correct<br>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 VCO Frequency Control Register PLL3

| 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 VCO Frequency Control Register PLL3

| 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 Spread Spectrum Control Register PLL3

| 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 Spread Spectrum Control Register PLL3

| 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            | 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   |     | M/N Enable | CPU PLL M/N Enable     | RW | Disable | Enable | 0       |
| 0   |     | M/N Enable | SRC/PCI PLL M/N Enable | RW | Disable | Enable | 0       |

\*These bits are disabled if TME is latched to 1



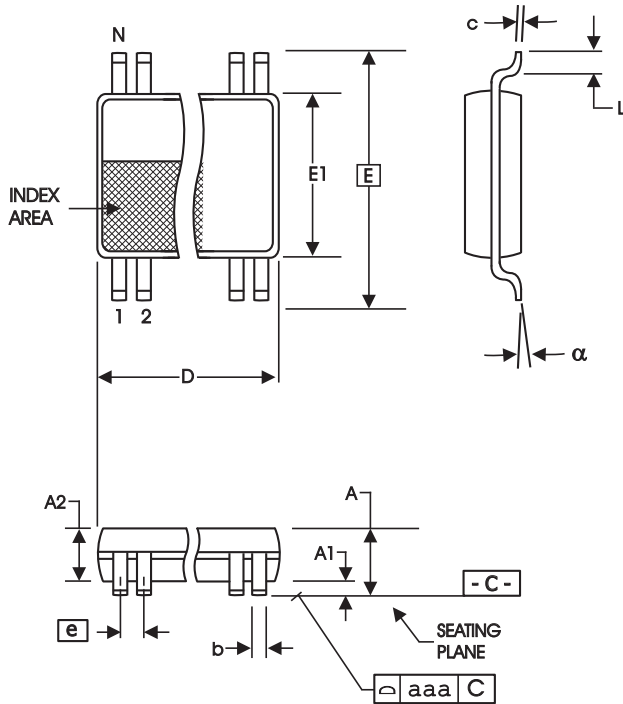


### Test Clarification Table

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

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

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



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 |

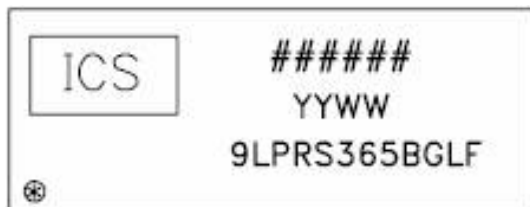
### VARIATIONS

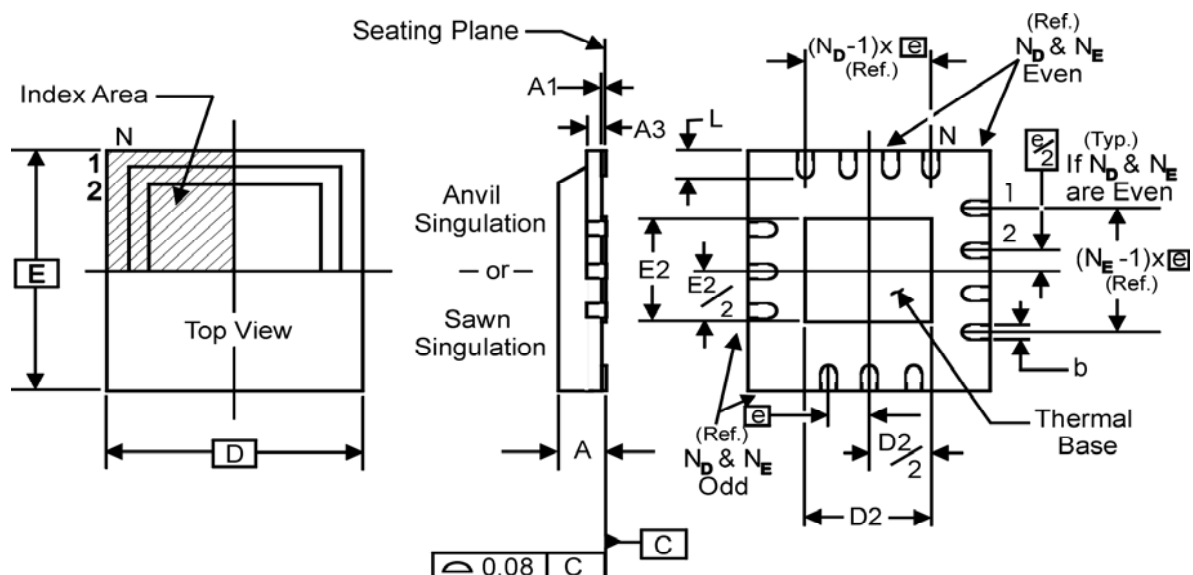
| N  | D mm. |       | D (inch) |      |
|----|-------|-------|----------|------|
|    | MIN   | MAX   | MIN      | MAX  |
| 64 | 16.90 | 17.10 | .665     | .673 |

Reference Doc.: JEDEC Publication 95, MO-153

10-0039

## Marking Diagram





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

### DIMENSIONS

|       |    |
|-------|----|
| N     | 64 |
| $N_D$ | 16 |
| $N_E$ | 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 |

### Marking Diagram



### Ordering Information

| Part/Order Number | Marking     | Shipping Packaging | Package  | Temperature |
|-------------------|-------------|--------------------|----------|-------------|
| 9LPRS365BGLF      | See page 26 | Tubes              | 64-TSSOP | 0 to +70° C |
| 9LPRS365BGLFT     |             | Tape and Reel      |          |             |
| 9LPRS365BKLF      | See page 27 | Tubes              | 64-VQFN  |             |
| 9LPRS365BKLFT     |             | Tape and Reel      |          |             |



## Revision History

| Rev. | Issue Date | Description                                                                                | Page #              |
|------|------------|--------------------------------------------------------------------------------------------|---------------------|
| 0.1  | 4/5/2006   | Initial Release                                                                            | -                   |
| 0.2  | 7/11/2006  | Updated Electrical Characteristics.                                                        | 12                  |
| 0.3  | 8/25/2006  | 1. Updated pin description and I2C.                                                        | 2-5, 7-10,<br>22-23 |
| 0.4  | 10/25/2006 | Added Byte 21.                                                                             | 23                  |
| 0.5  | 11/22/2006 | 1. Updated pin description of pin #33 (TSSOP) and pin #40 (QFN)<br>2. Updated B1b0 in I2C. | 4,9, 19             |
| 0.6  | 11/29/2006 | Updated DS to reflect revision C changes                                                   | Various             |
| 0.65 | 3/7/2007   | Updated Features/Benefits.                                                                 | 1                   |
| 0.7  | 3/9/2007   | Updated Supply currents in Electrical Characteristics.                                     | 12                  |
| 0.8  | 3/20/2007  | Updated Byte 5 bit 7 description in the I2C                                                | 20                  |
| 0.9  | 4/3/2007   | Updated B[11,21] in the I2C                                                                | 23                  |
| 0.91 | 5/21/2007  | Removed Pull-up/Pull-Down footnotes.                                                       | 1                   |
| 0.92 | 7/16/2007  | Updated Case Temperature in Electrical Characteristics.                                    | 12                  |
| 0.93 | 4/8/2008   | 1. Updated MLF ordering Information.<br>2. Reformatted Dimensions Tables.                  | 26                  |
| 0.94 | 6/3/2008   | Updated Pin Description and SMBUS.                                                         | Various             |
| 0.95 | 9/18/2008  | Updated Electrical Characteristics.                                                        | Various             |
| 0.96 | 12/12/2008 | Added DS-Loading table.                                                                    | 16                  |
| 0.97 | 1/28/2009  | Update Table2, SMBus Byte1 table, added 27_Select tables for TSSOP and MLF                 | Various             |
| 0.98 | 4/1/2009   | Update SEL27 and ITP_EN pin descriptions.                                                  | Various             |
| 0.99 | 9/9/2009   | Added updated ordering information table and marking diagrams.                             | 26, 27              |
| A    | 9/1/2010   | Updated PLL3 Quick Configuration table                                                     | 17                  |