

# 56-pin CK505 for Embedded Intel Systems

# ICS9EPRS525

**Recommended Application:**

56-pin CK505 compatible clock, w/fully integrated Vreg and series resistors on differential outputs for embedded applications

**Output Features:**

- 2 - CPU differential low power push-pull pairs
- 7 - SRC differential push-pull pairs
- 1 - CPU/SRC selectable differential low power push-pull pair
- 1 - SRC/DOT selectable differential low power push-pull pair
- 1 - SRC/SE selectable differential push-pull pair/Single-ended outputs
- 5 - PCI, 33MHz
- 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 all outputs
- SRC outputs meet PCIe Gen2 when sourced from PLL3

**Features/Benefits:**

- Supports spread spectrum modulation, 0 to -0.5% down spread
- Supports CPU clks up to 400MHz
- Uses external 14.318MHz crystal, external crystal load caps are required for frequency tuning

**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.

**Pin Configuration**

|                       |    |    |                         |
|-----------------------|----|----|-------------------------|
| PCI0/CR#_A            | 1  | 56 | SCLK                    |
| VDDPCI                | 2  | 55 | SDATA                   |
| PCI1/CR#_B            | 3  | 54 | REF0/FSLC/TEST_SEL      |
| PCI2/TME              | 4  | 53 | VDDREF                  |
| PCI3/CFG0             | 5  | 52 | X1                      |
| PCI4/SRC5_EN          | 6  | 51 | X2                      |
| PCI_F5/ITP_EN         | 7  | 50 | GNDREF                  |
| GNDPCI                | 8  | 49 | FSLB/TEST_MODE          |
| VDD48                 | 9  | 48 | CK_PWRGD/PD#            |
| USB_48MHz/FSLA        | 10 | 47 | VDDCPU                  |
| GND48                 | 11 | 46 | CPUT0_LRS               |
| VDD96IO               | 12 | 45 | CPUC0_LRS               |
| DOTT_96_LRS/SRCT0_LRS | 13 | 44 | GNDCPU                  |
| DOTC_96_LRS/SRCC0_LRS | 14 | 43 | CPUT1_F_LRS             |
| GND                   | 15 | 42 | CPUC1_F_LRS             |
| VDD                   | 16 | 41 | VDDCPUIO                |
| SRCT1_LRS/SE1         | 17 | 40 | NC                      |
| SRCC1_LRS/SE2         | 18 | 39 | CPUT2_ITP_LRS/SRCT8_LRS |
| GND                   | 19 | 38 | CPUC2_ITP_LRS/SRCC8_LRS |
| VDDPLL3IO             | 20 | 37 | VDDSRCIO                |
| SRCT2_LRS/SATAT_LRS   | 21 | 36 | SRCT7_LRS/CR#_F         |
| SRCC2_LRS/SATAC_LRS   | 22 | 35 | SRCC7_LRS/CR#_E         |
| GNDSRC                | 23 | 34 | GNDSRC                  |
| SRCT3_LRS/CR#_C       | 24 | 33 | SRCT6_LRS               |
| SRCC3_LRS/CR#_D       | 25 | 32 | SRCC6_LRS               |
| VDDSRCIO              | 26 | 31 | VDDSRC                  |
| SRCT4_LRS             | 27 | 30 | PCI_STOP#/SRCT5_LRS     |
| SRCC4_LRS             | 28 | 29 | CPU_STOP#/SRCC5_LRS     |

**56-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 CRA#_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 7<br>0 = PCI0 enabled (default)<br>1= CRA# enabled. Byte 5, bit 6 controls whether CRA# controls SRC0 or SRC2 pair<br>Byte 5, bit 6<br>0 = CRA# controls SRC0 pair (default),<br>1= CRA# controls SRC2 pair   |
| 2     | VDDPCI                | PWR  | Power supply for PCI clocks, nominal 3.3V   |
| 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 CRB#_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 5<br>0 = PCI1 enabled (default)<br>1= CRB# enabled. Byte 5, bit 6 controls whether CRB# controls SRC1 or SRC4 pair<br>Byte 5, bit 4<br>0 = CRB# controls SRC1 pair (default)<br>1= CRB# 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 NOT allowed<br>After being sampled on power-up, this pin becomes a 3.3V PCI Output   |
| 5     | PCI3/CFG0             | I/O  | 3.3V PCI clock output/Configuration Strap. See PCI3 Configuration Table for more information  |
| 6     | PCI4/SRC5_EN          | I/O  | 3.3V PCI clock output / SRC5 pair or PCI_STOP#/CPU_STOP# enable strap. On powerup, the logic value on this pin determines if the SRC5 pair is enabled or if CPU_STOP#/PCI_STOP# is enabled (pins 29 and 30). The latched value controls the pin function on pins 29 and 30 as follows<br>0 = PCI_STOP#/CPU_STOP#<br>1 = SRC5/SRC5#  |
| 7     | PCI_F5/ITP_EN         | I/O  | Free running PCI clock output and ITP/SRC8 enable strap. This output is not affected by the state of the PCI_STOP# pin. On powerup, the state of this pin determines whether pins 38 and 39 are an ITP or SRC pair.<br>0 =SRC8/SRC8#<br>1 = ITP/ITP#  |
| 8     | GNDPCI                | PWR  | Ground pin for the PCI outputs  |
| 9     | VDD48                 | PWR  | Power pin for the 48MHz output and PLL.3.3V   |
| 10    | USB_48MHz/FSLA        | I/O  | 3.3V tolerant input for CPU frequency selection. Refer to input electrical characteristics for Vil_FS and Vih_FS values. / Fixed 48MHz USB clock output. 3.3V.  |
| 11    | GND48                 | PWR  | Ground pin for the 48MHz outputs  |
| 12    | VDD96IO               | PWR  | Power supply for DOT96 outputs, 1.05V to 3.3V.  |
| 13    | DOTT_96_LRS/SRCT0_LRS | OUT  | True clock of low power differential SRC or DOT96 with integrated 33 ohm Rs. The power-up default function is SRC0. After powerup, this pin function may be changed to DOT96 via SMBus Byte 1, bit 7 as follows:<br>0= SRC0<br>1=DOT96  |
| 14    | DOTC_96_LRS/SRCC0_LRS | OUT  | Complement clock of low power differential SRC or DOT96 with integrated 33 ohm Rs. The power-up default function is SRC0#. After powerup, this pin function may be changed to DOT96# via SMBus Byte 1, bit 7 as follows<br>0= SRC0#<br>1=DOT96#   |
| 15    | GND                   | PWR  | Ground pin.   |
| 16    | VDD                   | PWR  | Power supply, nominal 3.3V  |
| 17    | SRCT1_LRS/SE1         | OUT  | True clock of low power differential SRC1 clock pair with integrated 33 ohm Rs. / 3.3V single-ended output. The powerup default is 100 MHz SRC, -0.5% downspread. The pin function may be changed via SMBus B1b[4:1]  |
| 18    | SRCC1_LRS/SE2         | OUT  | Complement clock of low power differential SRC1 clock pair with integrated 33 ohm Rs / 3.3V single-ended output. The powerup default is 100 MHz SRC, -0.5% downspread. The pin function may be changed via SMBus B1b[4:1]   |
| 19    | GND                   | PWR  | Ground pin.   |
| 20    | VDDPLL3IO             | PWR  | Power supply for PLL3 outputs. 1.05V to 3.3V.   |
| 21    | SRCT2_LRS/SATAT_LRS   | OUT  | True clock of low power differential SRC/SATA clock pair with integrated Rs.  |
| 22    | SRCC2_LRS/SATAC_LRS   | OUT  | Complement clock of low power differential push-pull SRC/SATA clock pair with integrated 33 ohm Rs.   |
| 23    | GNDSRC                | PWR  | Ground pin for the SRC outputs  |
| 24    | SRCT3_LRS/CR#_C       | I/O  | True clock of low power differential SRC clock pair with integrated 33 ohm Rs./ Clock Request control C for either SRC0 or SRC2 pair. 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 SRC output must first be disabled in byte 4, bit 7 of SMBus address space . After the SRC 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 CRC#_EN bit located in byte 5 of SMBUs address space.<br>Byte 5, bit 3<br>0 = SRCCLK3 enabled (default)<br>1= CRC# enabled. Byte 5, bit 2 controls whether CRC# controls SRC0 or SRC2 pair<br>Byte 5, bit 2<br>0 = CRC# controls SRC0 pair (default),<br>1= CRC# controls SRC2 pair |

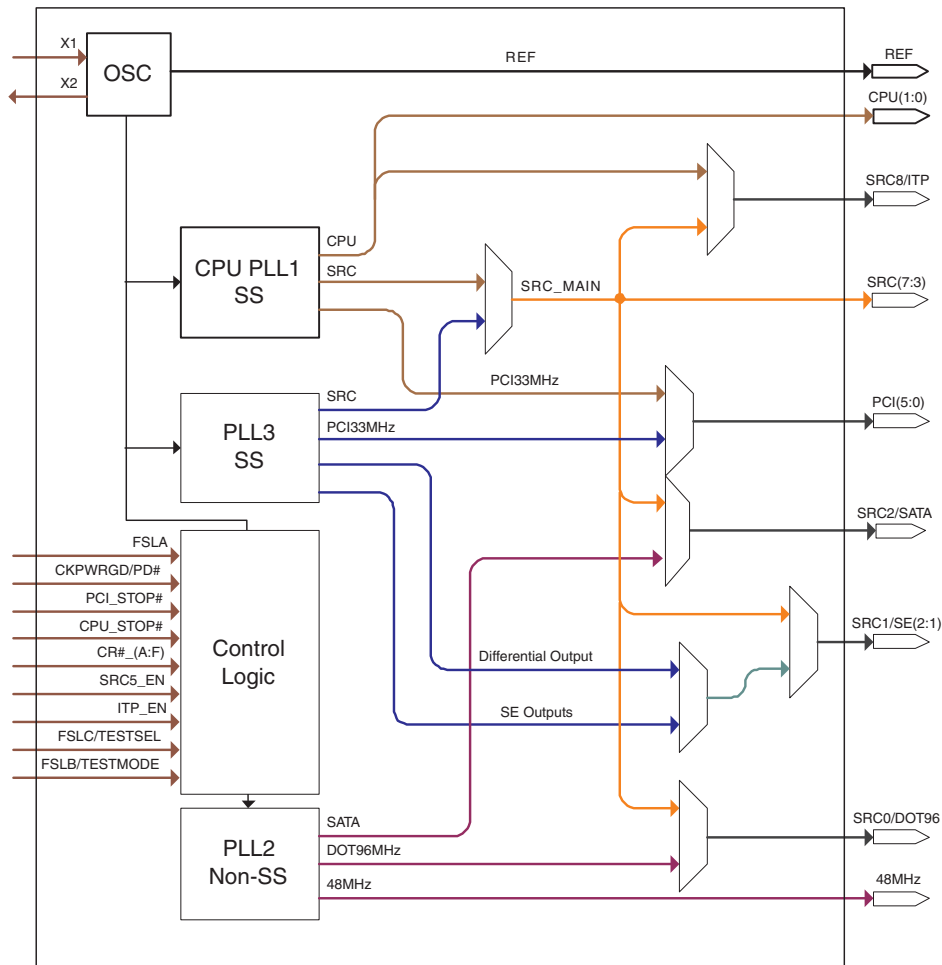
Pin Description (continued)

| PIN # | PIN NAME                | TYPE | DESCRIPTION  |
|-------|-------------------------|------|--|
| 25    | SRCC3_LRS/CR#_D         | I/O  | Complementary clock of low power differential SRC clock pair with integrated 33 ohm Rs/ Clock Request control D for either SRC1 or SRC4 pair. The power-up default is SRCLK3 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 SRC output must first be disabled in byte 4, bit 7 of SMBus address space. After the SRC 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 CRD#_EN bit located in byte 5 of SMBus address space.<br>Byte 5, bit 1<br>0 = SRC3 enabled (default)<br>1 = CRD# enabled. Byte 5, bit 0 controls whether CRD# controls SRC1 or SRC4 pair<br>Byte 5, bit 0<br>0 = CRD# controls SRC1 pair (default),<br>1 = CRD# controls SRC4 pair |
| 26    | VDDSRCIO                | PWR  | Power supply for SRC outputs. 1.05V to 3.3V.   |
| 27    | SRCT4_LRS               | OUT  | True clock of low power differential SRC clock pair with integrated 33 ohm Rs.   |
| 28    | SRCC4_LRS               | OUT  | Complement clock of low power differential SRC clock pair with 33 ohm integrated Rs.   |
| 29    | CPU_STOP#/SRCC5_LRS     | I/O  | Stops all CPUCLK, except those set to be free running clocks /<br>Complement clock of low power differential SRC pair with 33 ohm integrated Rs.   |
| 30    | PCI_STOP#/SRCT5_LRS     | I/O  | Stops all PCICLKs at logic 0 level, when low. Free running PCICLKs are not effected by this input. / True clock of low power differential SRC pair with integrated 33 ohm Rs.  |
| 31    | VDDSRC                  | PWR  | Supply for SRC PLL, 3.3V nominal   |
| 32    | SRCC6_LRS               | OUT  | Complement clock of low power differential SRC clock pair with 33 ohm integrated Rs.   |
| 33    | SRCT6_LRS               | OUT  | True clock of low power differential SRC clock pair with integrated 33 ohm Rs.   |
| 34    | GNDSRC                  | PWR  | Ground pin for the SRC outputs   |
| 35    | SRCC7_LRS/CR#_E         | I/O  | Complement clock of differential push-pull SRC clock pair with 33 ohm integrated Rs. / Clock Request control E for SRC6 pair. 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>Byte 6, bit 7<br>0 = SRC7# enabled (default)<br>1 = CRE# enabled  |
| 36    | SRCT7_LRS/CR#_F         | I/O  | True clock of differential push-pull SRC clock pair/ 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 7 of SMBus configuration space   |
| 37    | VDDSRCIO                | PWR  | Power supply for SRC outputs. 1.05V to 3.3V.   |
| 38    | CPUC2_ITP_LRS/SRCC8_LRS | OUT  | Complement clock of low power differential CPU2/Complement clock of differential SRC pair. 33 ohm Rs is integrated. 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#   |
| 39    | CPUT2_ITP_LRS/SRCT8_LRS | OUT  | True clock of low power differential CPU2/True clock of differential SRC pair. 33 ohm Rs is integrated. 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   |
| 40    | NC                      | N/A  | No Connect   |
| 41    | VDDCPUIO                | PWR  | Power supply for CPU outputs, 1.05V to 3.3V.   |
| 42    | CPUC1_F_LRS             | OUT  | Complementary clock of low power differential push-pull CPU output with integrated 33 ohm Rs. This CPU clock is free running during iAMT.  |
| 43    | CPUT1_F_LRS             | OUT  | True clock of differential push-pull CPU clock pair with integrated 33 ohm Rs. This clock is free running during iAMT.   |
| 44    | GNDCPU                  | PWR  | Ground pin for the CPU outputs   |
| 45    | CPUC0_LRS               | OUT  | Complement clock of low power differential CPU clock pair with integrated 33 ohm Rs.   |
| 46    | CPUT0_LRS               | OUT  | True clock of low power differential CPU clock pair with integrated 33 ohm Rs.   |
| 47    | VDDCPU                  | PWR  | Supply for CPU PLL, 3.3V nominal   |
| 48    | CK_PWRGD/PD#            | IN   | Notifies CK505 to sample latched inputs, or iAMT entry/exit, or PWRDWN# mode   |
| 49    | 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.   |
| 50    | GNDREF                  | PWR  | Ground pin for the REF outputs.  |
| 51    | X2                      | OUT  | Crystal output, Nominally 14.318MHz  |
| 52    | X1                      | IN   | Crystal input, Nominally 14.318MHz.  |
| 53    | VDDREF                  | PWR  | Ref. XTAL power supply, nominal 3.3V   |
| 54    | REF0/FSLC/TEST_SEL      | I/O  | 14.318 MHz reference clock./ 3.3V tolerant 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  |
| 55    | SDATA                   | I/O  | Data pin for SMBus circuitry, 5V tolerant.   |
| 56    | SCLK                    | IN   | Clock pin of SMBus circuitry, 5V tolerant.   |

## General Description

ICS9EPRS525 is compliant Intel CK505 Yellow Cover specification. This clock synthesizer provides a single chip solution for Intel desktop chipsets. ICS9EPRS525 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    |                      |
| 41, 47     | 44     | CPUCLK               |
| 16         | 15     | Master Clock, Analog |
| 26, 31, 37 | 23, 34 | SRCCLK               |
| 20         | 19     | PLL3/SE              |
| 12         | 11     | DOT 96Mhz            |
| 9          | 11     | USB 48               |
| 53         | 50     | Xtal, REF            |
| 2          | 8      | PCICLK               |

## Absolute Maximum Ratings - DC Parameters

| PARAMETER              | SYMBOL          | CONDITIONS                          | MIN       | MAX | UNITS | Notes |
|------------------------|-----------------|-------------------------------------|-----------|-----|-------|-------|
| Maximum Supply Voltage | VDDxxx          | Supply Voltage                      |           | 4.6 | V     | 7     |
| Maximum Supply Voltage | VDDxxx_IO       | Low-Voltage Differential I/O Supply |           | 3.8 | V     | 7     |
| Maximum Input Voltage  | V <sub>IH</sub> | 3.3V Inputs                         |           | 4.6 | V     | 4,5,7 |
| Minimum Input Voltage  | V <sub>IL</sub> | Any Input                           | GND - 0.5 |     | V     | 4,7   |
| Storage Temperature    | T <sub>s</sub>  | -                                   | -65       | 150 | °C    | 4,7   |
| Input ESD protection   | ESD prot        | Human Body Model                    | 2000      |     | V     | 6,7   |

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

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

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

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

| PARAMETER                                     | SYMBOL                  | CONDITIONS  | MIN                   | MAX                   | UNITS | Notes |
|---|-------------------------|---|-----------------------|-----------------------|-------|-------|
| Ambient Operating Temp                        | T <sub>ambient</sub>    | -   | 0                     | 70                    | °C    |       |
| Supply Voltage                                | VDDxxx                  | Supply Voltage  | 3.135                 | 3.465                 | V     |       |
| Supply Voltage                                | VDDxxx_IO               | Low-Voltage Differential I/O Supply   | 0.9975                | 3.465                 | V     | 10    |
| Input High Voltage                            | V <sub>IHSE</sub>       | Single-ended 3.3V inputs  | 2                     | V <sub>DD</sub> + 0.3 | V     | 3     |
| Input Low Voltage                             | V <sub>ILSE</sub>       | Single-ended 3.3V inputs  | V <sub>SS</sub> - 0.3 | 0.8                   | V     | 3     |
| Low Threshold Input- High Voltage             | V <sub>IH_FS_TEST</sub> | 3.3 V +/-5%   | 2                     | VDD + 0.3             | V     | 8     |
| Low Threshold Input- FSC = '1'<br>Voltage     | V <sub>IH_FS_FSC</sub>  | 3.3 V +/-5%   | 0.7                   | 1.5                   | V     | 8     |
| Low Threshold Input- FSA,FSB = '1'<br>Voltage | V <sub>IH_FS_FSAB</sub> | 3.3 V +/-5%   | 0.7                   | VDD+0.3               | V     |       |
| Low Threshold Input-Low Voltage               | V <sub>IL_FS</sub>      | 3.3 V +/-5%   | V <sub>SS</sub> - 0.3 | 0.35                  | V     |       |
| PCI3/CFG0 Input                               | V <sub>IL_CFGHI</sub>   | Optional input, 2.75V typ.  | 2.4                   | VDD+0.3               | V     | 9, 10 |
| PCI3/CFG0 Input                               | V <sub>IL_CFGMID</sub>  | Optional input, 1.65V typ.  | 1.3                   | 2                     | V     | 9, 10 |
| PCI3/CFG0 Input                               | V <sub>IL_CFGLO</sub>   | Optional input, 0.55V typ.  | V <sub>SS</sub> - 0.3 | 0.9                   | V     | 9, 10 |
| Input Leakage Current                         | I <sub>IN</sub>         | V <sub>IN</sub> = V <sub>DD</sub> , V <sub>IN</sub> = GND   | -5                    | 5                     | uA    | 2     |
| Input Leakage Current                         | I <sub>INRES</sub>      | Inputs with pull up or pull down resistors<br>V <sub>IN</sub> = V <sub>DD</sub> , V <sub>IN</sub> = GND | -200                  | 200                   | uA    |       |
| Output High Voltage                           | V <sub>OHSE</sub>       | Single-ended outputs, I <sub>OH</sub> = -1mA  | 2.4                   |                       | V     | 1     |
| Output Low Voltage                            | V <sub>OLSE</sub>       | Single-ended outputs, I <sub>OL</sub> = 1 mA  |                       | 0.4                   | V     | 1     |
| Operating Supply Current                      | I <sub>DDOP3.3</sub>    | Full Active, C <sub>L</sub> = Full load; I <sub>dd</sub> 3.3V   |                       | 115                   | mA    |       |
|   | I <sub>DDOPIO</sub>     | Full Active, C <sub>L</sub> = Full load; IDD IO   |                       | 55                    | mA    | 10    |
| iAMT Mode Current                             | I <sub>DDIAMT3.3</sub>  | M1 mode, 3.3V Rail  |                       | 36                    | mA    |       |
|   | I <sub>DDIAMTIO</sub>   | M1 Mode, IO Rail  |                       | 10                    | mA    |       |
| Powerdown Current                             | I <sub>DDPD3.3</sub>    | Power down mode, 3.3V Rail  |                       | 5                     | mA    |       |
|   | I <sub>DDPDIO</sub>     | Power down mode, IO Rail  |                       | 0.1                   | mA    | 10    |
| Input Frequency                               | F <sub>i</sub>          | V <sub>DD</sub> = 3.3 V   |                       | 15                    | MHz   |       |
| Pin Inductance                                | L <sub>pin</sub>        |   |                       | 7                     | nH    |       |
| Input Capacitance                             | C <sub>IN</sub>         | Logic Inputs  | 1.5                   | 5                     | pF    |       |
|   | C <sub>OUT</sub>        | Output pin capacitance  |                       | 6                     | pF    |       |
|   | C <sub>INX</sub>        | X1 & X2 pins  |                       | 6                     | pF    |       |
| Clk Stabilization                             | T <sub>STAB</sub>       | From VDD Power-Up or de-assertion of PD to 1st clock  |                       | 1.8                   | ms    |       |
| Tdrive_CR_off                                 | T <sub>DRCROFF</sub>    | Output stop after CR deasserted   |                       | 400                   | ns    |       |
| Tdrive_CR_on                                  | T <sub>DRCRON</sub>     | Output run after CR asserted  |                       | 0                     | us    |       |
| Tdrive_CPU                                    | T <sub>DRSRC</sub>      | CPU output enable after<br>PCI_STOP# de-assertion   |                       | 10                    | ns    |       |
| Tfall_SE                                      | T <sub>FALL</sub>       | Fall/rise time of all 3.3V control inputs from 20-80%   |                       | 10                    | ns    |       |
| Trise_SE                                      | T <sub>RISE</sub>       |   |                       | 10                    | ns    |       |
| SMBus Voltage                                 | V <sub>DD</sub>         |   | 2.7                   | 5.5                   | V     |       |
| Low-level Output Voltage                      | V <sub>OLSMB</sub>      | @ I <sub>PULLUP</sub>   |                       | 0.4                   | V     |       |
| Current sinking at V <sub>OLSMB</sub> = 0.4 V | I <sub>PULLUP</sub>     | SMB Data Pin  | 4                     |                       | mA    |       |
| SCLK/SDATA<br>Clock/Data Rise Time            | T <sub>RI2C</sub>       | (Max V <sub>IL</sub> - 0.15) to<br>(Min V <sub>IH</sub> + 0.15)   |                       | 1000                  | ns    |       |
| SCLK/SDATA<br>Clock/Data Fall Time            | T <sub>FI2C</sub>       | (Min V <sub>IH</sub> + 0.15) to<br>(Max V <sub>IL</sub> - 0.15)   |                       | 300                   | ns    |       |
| Maximum SMBus Operating<br>Frequency          | F <sub>SMBUS</sub>      |   |                       | 100                   | kHz   |       |
| Spread Spectrum Modulation<br>Frequency       | f <sub>SSMOD</sub>      | Triangular Modulation   | 30                    | 33                    | kHz   |       |

## ICS9EPRS525 56-pin CK505 for Embedded Systems

**NOTES on Input/Supply/Common Output DC Parameters: (unless otherwise noted, guaranteed by design and characterization, not 100% tested in production).**

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

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

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

<sup>4</sup> Intentionally blank

<sup>5</sup> Maximum VIH is not to exceed VDD

<sup>6</sup> Human Body Model

<sup>7</sup> Operation under these conditions is neither implied, nor guaranteed.

<sup>8</sup> Frequency Select pins which have tri-level input

<sup>9</sup> PCI3/CFG0 is optional

<sup>10</sup> If present. Not all parts have this feature.

### AC Electrical Characteristics - Low Power Differential Outputs

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

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

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

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

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

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

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

<sup>6</sup> Total distributed intentional SRC to SRC skew. Maximum allowable interpair skew is 150 ps.

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

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

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

<sup>10</sup> Matching applies to rising edge rate for Clock and falling edge rate for Clock#. It is measured using a +/-75mV window centered on the average cross point where Clock rising meets Clock# falling. The median cross point is used to calculate the voltage

### Clock Jitter Specs - Low Power Differential Outputs

| PARAMETER                   | SYMBOL  | CONDITIONS               | MIN | MAX | UNITS | NOTES |
|-----------------------------|---------|--------------------------|-----|-----|-------|-------|
| CPU Jitter - Cycle to Cycle | CPUJC2C | Differential Measurement |     | 85  | ps    | 1     |
| SRC Jitter - Cycle to Cycle | SRCJC2C | Differential Measurement |     | 125 | ps    | 1     |
| DOT Jitter - Cycle to Cycle | DOTJC2C | Differential Measurement |     | 250 | ps    | 1     |

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

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

### Differential Clock Tolerances

|                       | CPU    | SRC    | DOT96 |  |     |
|-----------------------|--------|--------|-------|--|-----|
| PPM tolerance         | 100    | 100    | 100   |  | ppm |
| Cycle to Cycle Jitter | 85     | 125    | 250   |  | ps  |
| Spread                | -0.50% | -0.50% | 0     |  | %   |

### Clock Periods - Differential Outputs with Spread Spectrum Disabled

| SSC OFF  | Center Freq. MHz | Measurement Window     |                             |                             |                      |                             |                             |                        | Units | Notes |
|----------|------------------|------------------------|-----------------------------|-----------------------------|----------------------|-----------------------------|-----------------------------|------------------------|-------|-------|
|          |                  | 1 Clock                | 1us                         | 0.1s                        | 0.1s                 | 0.1s                        | 1us                         | 1 Clock                |       |       |
|          |                  | -c2c jitter AbsPer Min | -SSC Short-Term Average Min | - ppm Long-Term Average Min | 0 ppm Period Nominal | + ppm Long-Term Average Max | +SSC Short-Term Average Max | +c2c jitter AbsPer Max |       |       |
| CPU      | 100.00           | 9.91400                |                             | 9.99900                     | 10.00000             | 10.00100                    |                             | 10.08600               | ns    | 1,2   |
|          | 133.33           | 7.41425                |                             | 7.49925                     | 7.50000              | 7.50075                     |                             | 7.58575                | ns    | 1,2   |
|          | 166.67           | 5.91440                |                             | 5.99940                     | 6.00000              | 6.00060                     |                             | 6.08560                | ns    | 1,2   |
|          | 200.00           | 4.91450                |                             | 4.99950                     | 5.00000              | 5.00050                     |                             | 5.08550                | ns    | 1,2   |
|          | 266.67           | 3.66462                |                             | 3.74962                     | 3.75000              | 3.75037                     |                             | 3.83537                | ns    | 1,2   |
|          | 333.33           | 2.91470                |                             | 2.99970                     | 3.00000              | 3.00030                     |                             | 3.08530                | ns    | 1,2   |
|          | 400.00           | 2.41475                |                             | 2.49975                     | 2.50000              | 2.50025                     |                             | 2.58525                | ns    | 1,2   |
| SRC/SATA | 100.00           | 9.87400                | 9.99900                     | 10.00000                    | 10.00100             | 10.12600                    | ns                          | 1,2                    |       |       |
| DOT96    | 96.00            | 10.16563               | 10.41563                    | 10.41667                    | 10.41771             | 10.66771                    | ns                          | 1,2                    |       |       |

### Clock Periods - Differential Outputs with Spread Spectrum Enabled

| SSC ON | Center Freq. MHz | Measurement Window     |                             |                             |                      |                             |                             |                        | Units | Notes |
|--------|------------------|------------------------|-----------------------------|-----------------------------|----------------------|-----------------------------|-----------------------------|------------------------|-------|-------|
|        |                  | 1 Clock                | 1us                         | 0.1s                        | 0.1s                 | 0.1s                        | 1us                         | 1 Clock                |       |       |
|        |                  | -c2c jitter AbsPer Min | -SSC Short-Term Average Min | - ppm Long-Term Average Min | 0 ppm Period Nominal | + ppm Long-Term Average Max | +SSC Short-Term Average Max | +c2c jitter AbsPer Max |       |       |
| CPU    | 99.75            | 9.91406                | 9.99906                     | 10.02406                    | 10.02506             | 10.02607                    | 10.05107                    | 10.13607               | ns    | 1,2   |
|        | 133.00           | 7.41430                | 7.49930                     | 7.51805                     | 7.51880              | 7.51955                     | 7.53830                     | 7.62330                | ns    | 1,2   |
|        | 166.25           | 5.91444                | 5.99944                     | 6.01444                     | 6.01504              | 6.01564                     | 6.03064                     | 6.11564                | ns    | 1,2   |
|        | 199.50           | 4.91453                | 4.99953                     | 5.01203                     | 5.01253              | 5.01303                     | 5.02553                     | 5.11053                | ns    | 1,2   |
|        | 266.00           | 3.66465                | 3.74965                     | 3.75902                     | 3.75940              | 3.75977                     | 3.76915                     | 3.85415                | ns    | 1,2   |
|        | 332.50           | 2.91472                | 2.99972                     | 3.00722                     | 3.00752              | 3.00782                     | 3.01532                     | 3.10032                | ns    | 1,2   |
|        | 399.00           | 2.41477                | 2.49977                     | 2.50602                     | 2.50627              | 2.50652                     | 2.51277                     | 2.59777                | ns    | 1,2   |
| SRC    | 99.75            | 9.87406                | 9.99906                     | 10.02406                    | 10.02506             | 10.02607                    | 10.05107                    | 10.17607               | ns    | 1,2   |

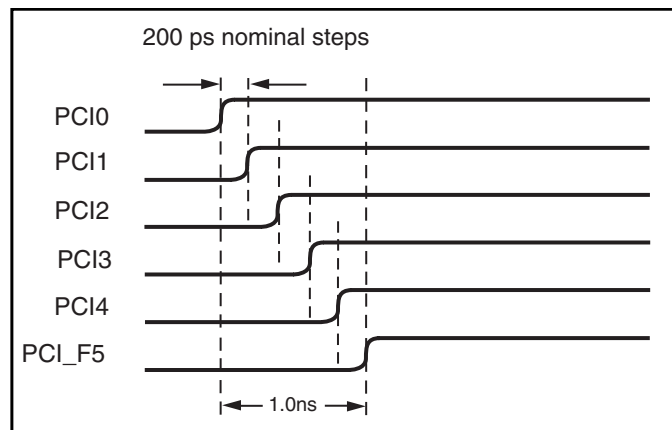
<sup>1</sup>Guaranteed by design and characterization, not 100% tested in production.

<sup>2</sup>All Long Term Accuracy specifications are guaranteed with the assumption that the crystal input is tuned to exactly 14.31818MHz.

## Electrical Characteristics - PCICLK/PCICLK\_F

| PARAMETER                    | SYMBOL                | CONDITIONS                             | MIN      | MAX      | UNITS | NOTES |
|------------------------------|-----------------------|--|----------|----------|-------|-------|
| Long Accuracy                | ppm                   | see T <sub>period</sub> min-max values | -100     | 100      | ppm   | 1,2   |
| Clock period                 | T <sub>period</sub>   | 33.33MHz output no spread              | 29.99700 | 30.00300 | ns    | 2     |
|                              |                       | 33.33MHz output spread                 | 30.08421 | 30.23459 | ns    | 2     |
| Absolute min/max period      | T <sub>abs</sub>      | 33.33MHz output no spread              | 29.49700 | 30.50300 | ns    | 2     |
|                              |                       | 33.33MHz output nominal/spread         | 29.56617 | 30.58421 | ns    | 2     |
| 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                 |          | 0.55     | 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     |
| Pin to Pin Skew              | t <sub>skew</sub>     | V <sub>T</sub> = 1.5 V                 |          | 250      | ps    | 2     |
| Intentional PCI to PCI delay | t <sub>skew</sub>     | V <sub>T</sub> = 1.5 V                 | 100      | 200      | ps    | 2     |
| Duty Cycle                   | d <sub>t1</sub>       | V <sub>T</sub> = 1.5 V                 | 45       | 55       | %     | 2     |
| Jitter, Cycle to cycle       | t <sub>JCYC-cyc</sub> | V <sub>T</sub> = 1.5 V                 |          | 500      | ps    | 2     |

## Intentional PCI Clock to Clock Delay



## Electrical Characteristics - USB48MHz

| PARAMETER               | SYMBOL                | CONDITIONS                             | MIN      | MAX      | UNITS | NOTES |
|-------------------------|-----------------------|--|----------|----------|-------|-------|
| Long Accuracy           | ppm                   | see T <sub>period</sub> min-max values | -100     | 100      | ppm   | 2,4   |
| Clock period            | T <sub>period</sub>   | 48.00MHz output nominal                | 20.83125 | 20.83542 | ns    | 2,3   |
| Absolute min/max period | T <sub>abs</sub>      | 48.00MHz output nominal                | 20.48125 | 21.18542 | ns    | 2     |
| CLK High Time           | T <sub>HIGH</sub>     |  | 8.216563 | 11.15198 | V     |       |
| CLK Low time            | T <sub>LOW</sub>      |  | 7.816563 | 10.95198 | V     |       |
| Output High Voltage     | V <sub>OH</sub>       | I <sub>OH</sub> = -1 mA                | 2.4      |          | V     |       |
| Output Low Voltage      | V <sub>OL</sub>       | I <sub>OL</sub> = 1 mA                 |          | 0.55     | V     |       |
| Output High Current     | I <sub>OH</sub>       | V <sub>OH</sub> @ MIN = 1.0 V          | -29      |          | mA    |       |
|                         |                       | V <sub>OH</sub> @ MAX = 3.135 V        |          | -23      | mA    |       |
| Output Low Current      | I <sub>OL</sub>       | V <sub>OL</sub> @ MIN = 1.95 V         | 29       |          | mA    |       |
|                         |                       | V <sub>OL</sub> @ MAX = 0.4 V          |          | 27       | mA    |       |
| Rising Edge Slew Rate   | t <sub>SLR</sub>      | Measured from 0.8 to 2.0 V             | 1        | 2        | V/ns  | 1     |
| Falling Edge Slew Rate  | t <sub>FLR</sub>      | Measured from 2.0 to 0.8 V             | 1        | 2        | V/ns  | 1     |
| Duty Cycle              | d <sub>t1</sub>       | V <sub>T</sub> = 1.5 V                 | 45       | 55       | %     | 2     |
| Jitter, Cycle to cycle  | t <sub>JCYC-cyc</sub> | V <sub>T</sub> = 1.5 V                 |          | 350      | ps    | 2     |



**Electrical Characteristics - REF-14.318MHz**

| PARAMETER               | SYMBOL   | CONDITIONS                             | MIN      | MAX      | UNITS | Notes |
|-------------------------|----------|--|----------|----------|-------|-------|
| Long Accuracy           | ppm      | see Tperiod min-max values             | -100     | 100      | ppm   | 2, 4  |
| Clock period            | Tperiod  | 14.318MHz output nominal               | 69.82033 | 69.86224 | ns    | 2, 3  |
| Absolute min/max period | TabS     | 14.318MHz output nominal               | 69.83400 | 70.84800 | ns    | 2     |
| CLK High Time           | THIGH    |  | 29.97543 | 38.46654 | V     |       |
| CLK Low time            | TLOW     |  | 29.57543 | 38.26654 | V     |       |
| Output High Voltage     | VOH      | IOH = -1 mA                            | 2.4      |          | V     |       |
| Output Low Voltage      | VOL      | IOL = 1 mA                             |          | 0.4      | V     |       |
| Output High Current     | IOH      | VOH @MIN = 1.0 V,<br>VOH@MAX = 3.135 V | -33      | -33      | mA    |       |
| Output Low Current      | IOL      | VOL @MIN = 1.95 V,<br>VOL @MAX = 0.4 V | 30       | 38       | mA    |       |
| Rising Edge Slew Rate   | tSLR     | Measured from 0.8 to 2.0 V             | 1        | 4        | V/ns  | 1     |
| Falling Edge Slew Rate  | tFLR     | Measured from 2.0 to 0.8 V             | 1        | 4        | V/ns  | 1     |
| Duty Cycle              | dt1      | VT = 1.5 V                             | 45       | 55       | %     | 2     |
| Jitter, Cycle to cycle  | tjcy-cyc | VT = 1.5 V                             |          | 1000     | ps    | 2     |

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

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

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

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

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

Table 1: CPU Frequency Select Table

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

- 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.
- 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 (only applies in Mode 0, see Table 6)

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

**Table 3: IO\_Vout select table**

| B9b2 | B9b1 | B9b0 | IO_Vout |
|------|------|------|---------|
| 0    | 0    | 0    | 0.3V    |
| 0    | 0    | 1    | 0.4V    |
| 0    | 1    | 0    | 0.5V    |
| 0    | 1    | 1    | 0.6V    |
| 1    | 0    | 0    | 0.7V    |
| 1    | 0    | 1    | 0.8V    |
| 1    | 1    | 0    | 0.9V    |
| 1    | 1    | 1    | 1.0V    |

**Table 4: Device ID table**

| B8b7 | B8b6 | B8b5 | B8b4 | Comment      |
|------|------|------|------|--------------|
| 0    | 0    | 0    | 0    | 56 pin TSSOP |

**Table 5: Slew Rate Selection Table**

| Bit 1 | Bit 0 | Slew Rate       |
|-------|-------|-----------------|
| 0     | 0     | HI-Z            |
| 0     | 1     | 0.7X (1.4V/ns)  |
| 1     | 0     | 0.8X (1.6 V/ns) |
| 1     | 1     | 1X (2.0 V/ns)   |

**Table 6. PCI3 Configuration Table**

| PCI3/CFG0<br>HW Strap | PCI2/TME<br>HW Strap | Note: 2 bits are needed since<br>CFG0 is tri-level input |                               | SRC_Main_SE<br>L<br>(Byte 0, bit 2) | Config Mode |
|-----------------------|----------------------|--|-------------------------------|-------------------------------------|-------------|
|                       |                      | PCI3_CFG1<br>(Byte 11, bit 7)                            | PCI3_CFG0<br>(Byte 11, bit 6) |                                     |             |
| Low                   | 0 or 1               | 0  | 0                             | 0                                   | 0 = Default |
| Mid                   | 0 or 1               | 0  | 1                             | 1                                   | 1           |
| High                  | TME=0                | 1  | 0                             | 1                                   | 2           |
| High                  | TME=1                | 1  | 1                             | 1                                   | 3           |

**Table 7. PLL Modes for PCI3 Configurations**

| Config<br>Mode | PLL1            |        | PLL2      |     | PLL3    |      | SRC1     | PLL Source                   |
|----------------|-----------------|--------|-----------|-----|---------|------|----------|------------------------------|
|                | Outputs         | SSC    | Outputs   | SSC | Outputs | SSC  |          |                              |
| 0 = Default    | CPU/SRC/<br>PCI | Down   | USB       | NA  | -       | -    | 100MHz   | PLL1<br>(Table 2<br>applies) |
| 1              | CPU             | Down   | USB       | NA  | SRC/PCI | Down | 100MHz   | PLL3                         |
| 2              | CPU             | Center | USB       | NA  | SRC/PCI | Down | 100MHz   | PLL3                         |
| 3              | CPU             | Center | USB/LAN25 | NA  | SRC/PCI | Down | 25MHz SE | PLL2*                        |

\*Note: In Mode 3, Byte 8, bit (1:0) must be set to '1' to enable pin 17,18

**Table 8. ME Clock Selection Table**

| PCIF5/<br>ITP_EN | iAMT_EN | CPU2_AMT_EN | CPU1_AMT_EN | Description                         |
|------------------|---------|-------------|-------------|-------------------------------------|
| x                | 1       | 0           | 0           | Reserved                            |
| x                | 1       | 0           | 1           | Default, CPU1 = iAMT Clock          |
| 1                | 1       | 1           | 0           | CPU2 = iAMT Clock                   |
| 1                | 1       | 1           | 1           | CPU1 and CPU2 both run in iAMT mode |

**PCI\_STOP# Power Management**

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

**CPU\_STOP# Power Management**

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

**CR# Power Management**

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

**PD# Power Management**

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

## General SMBus serial interface information for the ICS9EPRS525

### How to Write:

- Controller (host) sends a start bit.
- Controller (host) sends the write address  $D2_{(H)}$
- ICS clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- ICS clock will **acknowledge**
- Controller (host) sends the data byte count = X
- ICS clock will **acknowledge**
- Controller (host) starts sending **Byte N through Byte N + X - 1**
- ICS clock will **acknowledge** each byte **one at a time**
- Controller (host) sends a Stop bit

### How to Read:

- Controller (host) will send start bit.
- Controller (host) sends the write address  $D2_{(H)}$
- ICS clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- ICS clock will **acknowledge**
- Controller (host) will send a separate start bit.
- Controller (host) sends the read address  $D3_{(H)}$
- ICS clock will **acknowledge**
- ICS clock will send the data byte count = X
- ICS clock sends **Byte N + X - 1**
- ICS clock sends **Byte 0 through byte X (if  $X_{(H)}$  was written to byte 8).**
- Controller (host) will need to acknowledge each byte
- Controller (host) will send a not acknowledge bit
- Controller (host) will send a stop bit

| Index Block Write Operation |           |                      |
|-----------------------------|-----------|----------------------|
| Controller (Host)           |           | ICS (Slave/Receiver) |
| T                           | starT bit |                      |
| Slave Address $D2_{(H)}$    |           |                      |
| WR                          | WRite     |                      |
|                             |           | ACK                  |
| Beginning Byte = N          |           |                      |
|                             |           | ACK                  |
| Data Byte Count = X         |           |                      |
|                             |           | ACK                  |
| Beginning Byte N            |           | X Byte               |
| ○                           |           |                      |
| ○                           |           |                      |
| ○                           |           |                      |
| Byte N + X - 1              |           |                      |
|                             |           | ACK                  |
| P                           | stoP bit  |                      |

| Index Block Read Operation |                 |                      |
|----------------------------|-----------------|----------------------|
| Controller (Host)          |                 | ICS (Slave/Receiver) |
| T                          | starT bit       |                      |
| Slave Address $D2_{(H)}$   |                 |                      |
| WR                         | WRite           |                      |
|                            |                 | ACK                  |
| Beginning Byte = N         |                 |                      |
|                            |                 | ACK                  |
| RT                         | Repeat starT    |                      |
| Slave Address $D3_{(H)}$   |                 |                      |
| RD                         | ReaD            |                      |
|                            |                 | ACK                  |
|                            |                 | Data Byte Count = X  |
| ACK                        |                 | X Byte               |
| 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   | 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     | Latch   |
| 1   | -   | SATA_SEL     | Select source for SATA clock   | RW   | SATA = SRC_Main                          | SATA = PLL2         | 0       |
| 0   | -   | PD_Restore   | 1 = on Power Down de-assert return to last known state<br>0 = clear all SMBus configurations as if cold power-on and go to latches open state<br>This bit is ignored and treated at '1' if device is in iAMT mode. | 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           | RW   | SRC0   | DOT96             | 0       |
| 6   | -     | PLL1_SSC_SEL | Select 0.5% down or center SSC | RW   | Down spread  | Center spread     | Latch   |
| 5   |       | PLL3_SSC_SEL | Select 0.5% down or center SSC | RW   | Down spread  | Center spread     | 0       |
| 4   |       | PLL3_CF3     | PLL3 Quick Config Bit 3        | RW   | See Table 2: PLL3 Quick Configuration<br><b>Only applies if Byte 0, bit 2 = 0.</b> |                   | 0       |
| 3   |       | PLL3_CF2     | PLL3 Quick Config Bit 2        | RW   |  |                   | 0       |
| 2   |       | PLL3_CF1     | PLL3 Quick Config Bit 1        | RW   |  |                   | 0       |
| 1   |       | PLL3_CF0     | PLL3 Quick Config Bit 0        | RW   |  |                   | 1       |
| 0   |       | PCI_SEL      | PCI_SEL                        | RW   | PCI from PLL1  | PCI from SRC_MAIN | 1       |

**Byte 2 Output Enable Register**

| Bit | Pin | Name     | Description   | Type | 0               | 1              | Default |
|-----|-----|----------|---|------|-----------------|----------------|---------|
| 7   |     | REF_OE   | Output enable for REF, if disabled output is 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   |     | PCIO_OE  | Output enable for PCIO                                  | RW   | Output Disabled | Output Enabled | 1       |

**Byte 3 Output Enable Register**

| Bit | Pin | Name        | Description                   | Type | 0               | 1              | Default |
|-----|-----|-------------|-------------------------------|------|-----------------|----------------|---------|
| 7   |     | Reserved    | Reserved                      | RW   | -               | -              | 1       |
| 6   |     | Reserved    | Reserved                      | RW   | -               | -              | 1       |
| 5   |     | Reserved    | Reserved                      | RW   | -               | -              | 1       |
| 4   |     | SRC8/ITP_OE | Output enable for SRC8 or ITP | RW   | Output Disabled | Output Enabled | 1       |
| 3   |     | SRC7_OE     | Output enable for SRC7        | RW   | Output Disabled | Output Enabled | 1       |
| 2   |     | SRC6_OE     | Output enable for SRC6        | RW   | Output Disabled | Output Enabled | 1       |
| 1   |     | SRC5_OE     | Output enable for SRC5        | RW   | Output Disabled | Output Enabled | 1       |
| 0   |     | SRC4_OE     | Output enable for SRC4        | RW   | Output Disabled | Output Enabled | 1       |

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

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

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

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

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

| Bit | Pin | Name                    | Description                                    | Type | 0             | 1                                    | Default |
|-----|-----|-------------------------|--|------|---------------|--------------------------------------|---------|
| 7   |     | CR#_E_EN                | Enable CR#_E (clk req) -> SRC6                 | RW   | Disable CR#_E | Enable CR#_E                         | 0       |
| 6   |     | CR#_F_EN                | Enable CR#_F (clk req) -> SRC8                 | RW   | Disable CR#_F | Enable CR#_F                         | 0       |
| 5   |     | Reserved                | Reserved                                       | RW   | -             | -                                    | 0       |
| 4   |     | Reserved                | Reserved                                       | RW   | -             | -                                    | 0       |
| 3   |     | Reserved                | Reserved                                       | RW   | -             | -                                    | 0       |
| 2   |     | Reserved                | Reserved                                       | RW   | -             | -                                    | 0       |
| 1   |     | SSCD_STP_CRTL<br>(SRC1) | If set, SSCD (SRC1) stops with PCI_STOP#       | RW   | Free Running  | Stops with<br>PCI_STOP#<br>assertion | 0       |
| 0   |     | SRC_STP_CRTL            | If set, SRCs (except SRC1) 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 |   | X       |
| 6   |     | Rev Code Bit 2  |                                  | R    |                 |   | X       |
| 5   |     | Rev Code Bit 1  |                                  | R    |                 |   | X       |
| 4   |     | Rev Code Bit 0  |                                  | R    |                 |   | X       |
| 3   |     | Vendor ID bit 3 | Vendor ID<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       |

**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    | 56-pin device |         | 0       |
| 6   |     | Device_ID2 |  | R    |               |         | 0       |
| 5   |     | Device_ID1 |  | R    |               |         | 0       |
| 4   |     | Device_ID0 |  | R    |               |         | 0       |
| 3   |     | Reserved   | Reserved   | RW   | -             | -       | 0       |
| 2   |     | Reserved   | Reserved   | RW   | -             | -       | 0       |
| 1   |     | SE1_OE     | Output enable for SE1  | RW   | Disabled      | Enabled | 0       |
| 0   |     | SE2_OE     | Output enable for SE2  | RW   | Disabled      | Enabled | 0       |

**Byte 9 Output Control Register**

| Bit | Pin | Name             | Description   | Type | 0  | 1                              | Default |
|-----|-----|------------------|---|------|--|--------------------------------|---------|
| 7   |     | PCIF5_STOP_EN    | Allows control of PCIF5 with assertion of 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                | Latch   |
| 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<br>(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 Stop Enable Register**

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

**Byte 11 iAMT Enable Register**

| Bit | Pin | Name              | Description   | Type | 0                            | 1                    | Default |
|-----|-----|-------------------|---|------|------------------------------|----------------------|---------|
| 7   |     | PCI3_CFG1         | See PCI3 Configuration Table 28                                       | R    | See PCI3 Configuration Table |                      | Latch   |
| 6   |     | PCI3_CFG0         |   | R    |                              |                      | Latch   |
| 5   |     | Reserved          | Reserved  | RW   | -                            | -                    | 0       |
| 4   |     | Reserved          | Reserved  | RW   | -                            | -                    | 1       |
| 3   |     | CPU2_AMT_EN       | Determines if CPU2 runs in M1 mode. Only valid if ITP_EN=1. See Note. | RW   | Does not Run                 | Runs                 | 0       |
| 2   |     | CPU1_AMT_EN       | Determines if CPU1 runs in M1 mode. See Note.                         | RW   | Does not Run                 | Runs                 | 1       |
| 1   |     | PCI-E_GEN2        | Determines if PCI-E Gen2 compliant                                    | R    | non-Gen2                     | PCI-E Gen2 Compliant | 1       |
| 0   |     | CPU 2 Stop Enable | Enables control of CPU 0 with CPU_STOP#                               | RW   | Free Running                 | Stoppable            | 1       |

**NOTE: A value of '00' for Bit(3:2) in Byte 11 is reserved and not a valid configuration.**



**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 to 28 Reserved****Byte 29 Slew Rate Control**

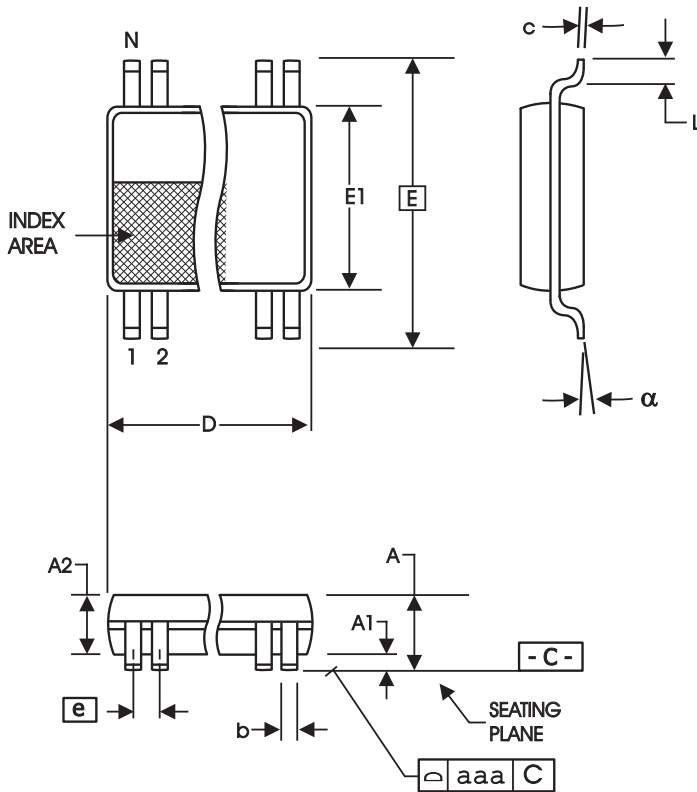
| Bit | Pin | Name          | Description                 | RW | 0                             | 1       | Default |
|-----|-----|---------------|-----------------------------|----|-------------------------------|---------|---------|
| 7   |     | USB_Slew1     | USB Slew Rate Control (MSB) | RW | See Slew Rate Selection Table |         | 1       |
| 6   |     | USB_Slew0     | USB Slew Rate Control (LSB) | RW |                               |         | 0       |
| 5   |     | PCI_Slew1     | PCI Slew Rate Control (MSB) | RW | See Slew Rate Selection Table |         | 1       |
| 4   |     | PCI_Slew0     | PCI Slew Rate Control (LSB) | RW |                               |         | 1       |
| 3   |     | Reserved      |                             | RW |                               |         | 1       |
| 2   |     | REF Slew Rate | Changes Ref Slew Rate       | RW | 1.2V/ns                       | 2.2V/ns | 1       |
| 1   |     | Reserved      |                             | RW |                               |         | 0       |
| 0   |     | Reserved      |                             | RW |                               |         | 0       |

### 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  |                             |                              |                           |                          |        |
| FSLB/TEST_MODE -->low Vth input  | >2.0V                       | 1                            | X                         | 1                        | REF/N  |
| 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.<br>If test mode is invoked by B9b3, only B9b4<br>is used to select HI-Z or REF/N<br>FSLB/TEST_Mode pin is not used.<br>Cycle power to disable test mode, one shot control | <2.0V                       | X                            | 1                         | 0                        | HI-Z   |
|  | <2.0V                       | X                            | 1                         | 1                        | REF/N  |

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

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



56-Lead 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  |
| 56 | 13.90 | 14.10 | .547     | .555 |

Reference Doc.: JEDEC Publication 95, M O-153

10-0039

Ordering Information

| Part/Order Number | Shipping Packaging | Package      | Temperature   |
|-------------------|--------------------|--------------|---------------|
| 9EPRS525AGLFF     | Tubes              | 56-pin TSSOP | 0 to +70° C   |
| 9EPRS525AGLFT     | Tape and Reel      | 56-pin TSSOP | 0 to +70° C   |
| 9EPRS525AGILFF    | Tubes              | 56-pin TSSOP | -40 to +85° C |
| 9EPRS525AGILFT    | Tape and Reel      | 56-pin TSSOP | -40 to +85° C |

Parts that are ordered with a "LF" suffix to the part number are the Pb-Free configuration and are RoHS compliant. Due to package size constraints, actual top-side marking may differ from the full orderable part number.

## Revision History

| Rev. | Issue Date | Description                 | Page # |
|------|------------|-----------------------------|--------|
| 0.1  | 7/31/2009  | Initial Release             | -      |
| A    | 8/19/2009  | Released to final.          |        |
| B    | 1/21/2010  | Updated Power Groups table. | 4      |
|      |            |                             |        |
|      |            |                             |        |
|      |            |                             |        |

This product is protected by United States Patent NO. 7,342,420 and other patents.

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