## Computer System

1) Figure 1 shows a high level system block diagram of the computer system used for the case study.

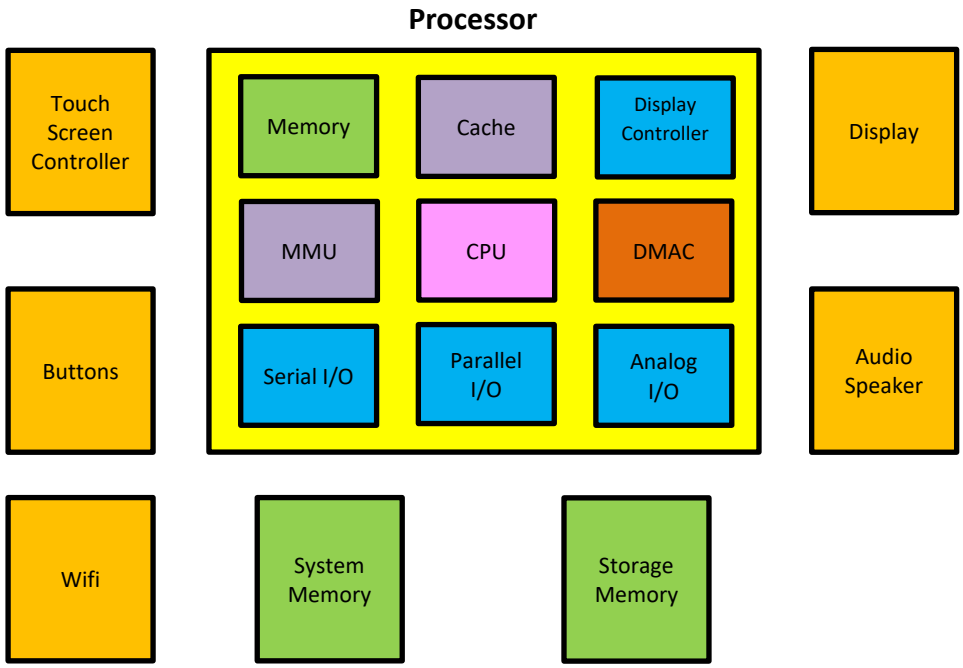


**Figure 1: Computer System Block Diagram**

**Table 1: Processor Information**

| Overview | Peripheral | Electrical Interface |
|---|---|---|
| • Von-Neumann Architecture<br>• 12 Data Registers (32-bit)<br>• 256 Kbyte on-chip SRAM, 512 Kbyte on-chip Flash,<br>• 2 Kbyte on-chip EEPROM<br>• 4 Kbyte Cache (Data and Instruction)<br>• 400 Mhz CPU clock<br>• 200 Mhz External Parallel Bus interface (16-bits)<br>• DMA Controller<br>• Memory Management Unit | • **SPI**<br>Max clock speed: 50 Mhz<br>• **UART**<br>Max baud rate: 115200 Kbps<br>• **I2C**<br>Max clock rate: 400 Khz<br>• **USB 2.0 Host**<br>Max bitrate: 480Mbps<br>• **ADC**<br>Max Sampling rate: 48 Khz<br>Data width: 16bits<br>• **DAC**<br>Max Sampling rate: 48 Khz<br>Data width: 16bits<br>• **Display Controller**<br>24-bit bus<br>Maximum speed 270 Mhz | • V(OH):<br>3V(max), 2.4V(min)<br>• V(OL):<br>0.8V(max), 0V(min)<br>• V(IH):<br>3V(max), 1.8V(min)<br>• V(IL):<br>1.2V(max), 0V(min) |

**Device/Module Information**

**2) Touch Screen Controller**

(a) Part Number: TS001SPI

| Overview | SPI | Electrical Interface |
|---|---|---|
| • Maximum screen size supported = 1080x720<br>• 8Kbyte on-chip memory<br>• 200Hz position report rate for (x,y) coordinates<br>• SPI interface | • Max Clock rate: 10Mhz<br>• Full duplex operation | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

(b) Part Number: TS002UART

| Overview | UART | Electrical Interface |
|---|---|---|
| • Maximum screen size supported = 960x640<br>• 4Kbyte on-chip memory<br>• 100Hz position report rate for (x,y) coordinates<br>• UART interface | • Max Baud rate: 115200bps<br>• Full duplex operation | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(c) Part Number: TS003UART

| Overview | UART | Electrical Interface |
|---|---|---|
| • Maximum screen size supported = 960x640<br>• 4Kbyte on-chip memory<br>• 100Hz position report rate for (x,y) coordinates<br>• UART interface | • Max Baud rate: 115200bps<br>• Full duplex operation | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

### 3) Wifi Module

(a) Part Number: WIFI0001N

| Overview | USB | Electrical Interface |
|---|---|---|
| • Max wireless data rate 100Mbps<br>• USB interface | • Supports up to USB2.0, 480Mbps. | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

(b) Part Number: WIFI0010AC

| Overview | SPI | Electrical Interface |
|---|---|---|
| • Max wireless data rate 100Mbps<br>• SPI interface | • Max Clock rate: 50Mhz<br>• Full duplex operation | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(c) Part Number: WIFI0015AC

| Overview | SPI | Electrical Interface |
|---|---|---|
| • Max wireless data rate 100Mbps<br>• SPI interface | • Max Clock rate: 50Mhz<br>• Full duplex operation | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

4) Memory

(a) Part Number: DRAM0001-4M8

| Overview | Electrical Interface |
|---|---|
| • 4 Mbyte Dynamic RAM<br>• 8-bit Parallel interface<br>• Maximum data strobe rate = 100Mhz | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

(b) Part Number: DRAM0002-16M16

| Overview | Electrical Interface |
|---|---|
| • 16 Mbyte Dynamic RAM<br>• 16-bit Parallel interface<br>• Maximum data strobe rate = 100Mhz | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(c) Part Number: SRAM0001-1M8

| Overview | Electrical Interface |
|---|---|
| • 1 Mbyte Static RAM<br>• 8-bit Parallel interface<br>• Maximum data strobe rate = 200Mhz | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

(d) Part Number: SRAM0002-2M16

| Overview | Electrical Interface |
|---|---|
| • 2 Mbyte Static RAM<br>• 16-bit Parallel interface<br>• Maximum data strobe rate = 200Mhz | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(e) Part Number: EEPROM0001-256K

| Overview | Electrical Interface |
|---|---|
| • 256 Kbyte EEPROM<br>• SPI interface<br>• Maximum SPI clock rate = 50Mhz<br>• Page Size = 64bytes | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(f) Part Number: NAND0001-64M

| Overview | Electrical Interface |
|---|---|
| • 64 Mbyte NAND Flash<br>• 8-bit parallel interface<br>• Maximum data strobe rate = 50Mhz<br>• Page Size = 64Kbytes | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(g) Part Number: NOR0001-1M

| Overview | Electrical Interface |
|---|---|
| • 1 Mbyte NOR Flash<br>• 16-bit parallel interface<br>• Maximum data strobe rate = 10Mhz<br>• Page Size = 4Kbytes | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(h) Part Number: HDD001

| Overview | Electrical Interface |
|---|---|
| ▪ 4 surfaces<br>▪ 1024 tracks per surface<br>▪ 128 sectors per track<br>▪ 512 bytes/sector<br>▪ Track-to-track seek time = 5 msec<br>▪ Rotational speed = 5000 RPM<br>• MTTF = 500,000 hours | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

(i) Part Number: HDD002

| Overview | Electrical Interface |
|---|---|
| ▪ 8 heads<br>▪ 1024 cylinders<br>▪ 256 sectors per track<br>▪ 512 bytes/sector<br>▪ Track-to-track seek time = 4 msec<br>▪ Rotational speed =10000 RPM<br>• MTTF = 1,000,000 hours | • V(OH): 5V(max), 4.2V(min)<br>• V(OL): 1.3V(max), 0V(min)<br>• V(IH): 5V(max), 3.6V(min)<br>• V(IL): 1.8V(max), 0V(min) |

5) Display Controller

(a) Part Number: LCD0001-HD

| Overview | Electrical Interface |
|---|---|
| • Supports up to 1920x1080 pixels display<br>• 24-bit Parallel interface<br>• Maximum clock rate = 200Mhz<br>• 16Mbyte video buffer | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |

(b) Part Number: LCD0002-XVGA

| Overview | Electrical Interface |
|---|---|
| • Supports up to 960x640 pixels display<br>• SPI interface<br>• Maximum clock rate = 20Mhz<br>• 1Mbyte video buffer | • V(OH): 3V(max), 2.4V(min)<br>• V(OL): 0.8V(max), 0V(min)<br>• V(IH): 3V(max), 1.8V(min)<br>• V(IL): 1.2V(max), 0V(min) |