# Semiconductor Product Brief

**September, 12,2001 Rev.1.42**

# LC77700B
# IAPr™ (Internet Access Processor)

## - Overview

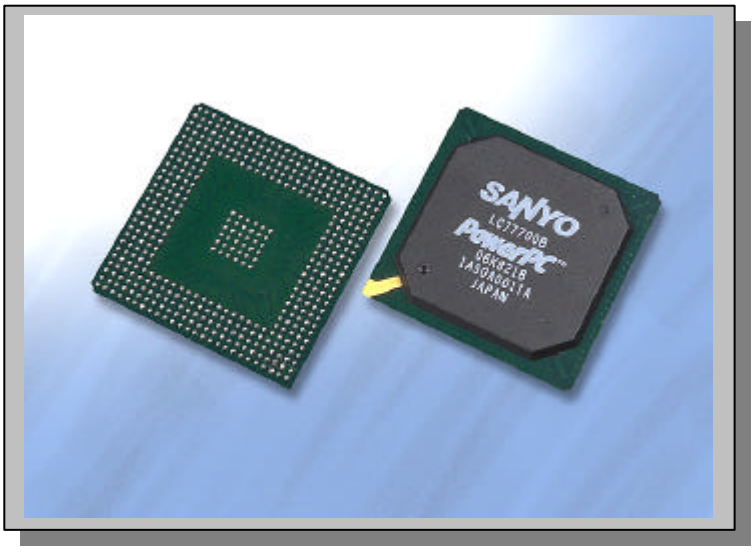
We have developed the Internet Access Processor (IAPr™: LC77700B). Our IAPr™ makes it possible to develop the network terminals easier.

## - Feature

LC77700B is a high performance generic controller engine for communication application incorporating RISC CPU. It integrates many peripherals such as LCD controller, Touch panel controller and USB and thus suitable for high performance and highly functional network terminals application.

## - Major functions

| | | |
|---|---|---|
| • CPU | PowerPC™405 Core | Operates at 192MHz |
| | Cache | I-Cache 16KBytes |
| | | D-Cache 8KBytes |
| • Memory Controller | | |
| • LCD Controller | Color STN, DSTN and TFT | |
| | Resolution 1/4VGA-SVGA | |
| • Touch Panel Controller | | |
| • USB | Host | 2Ports |
| | Function | 1Port |
| • HDLC | 2 Channels | |
| • IrDA | 1 Channel | |
| • PCMCIA | 2 Channels | |
| • Smart Card I/F | | |
| • IEEE1284 | | |
| • Serial Port | | |




## - Supply Voltage

| | |
|---|---|
| Internal Logic | 2.5V |
| I/O | 3.3V |

## - Package

Enhanced PBGA456Pin
Pin-to-pin interval 1mm, Square of 27mm

## - Contact

SANYO Electric Co., Ltd
Semiconductor Company
Semiconductor Technology Development Center
Urabe
TEL : 81-3 - 3837 - 6345
FAX : 81-3- 3837 - 6379





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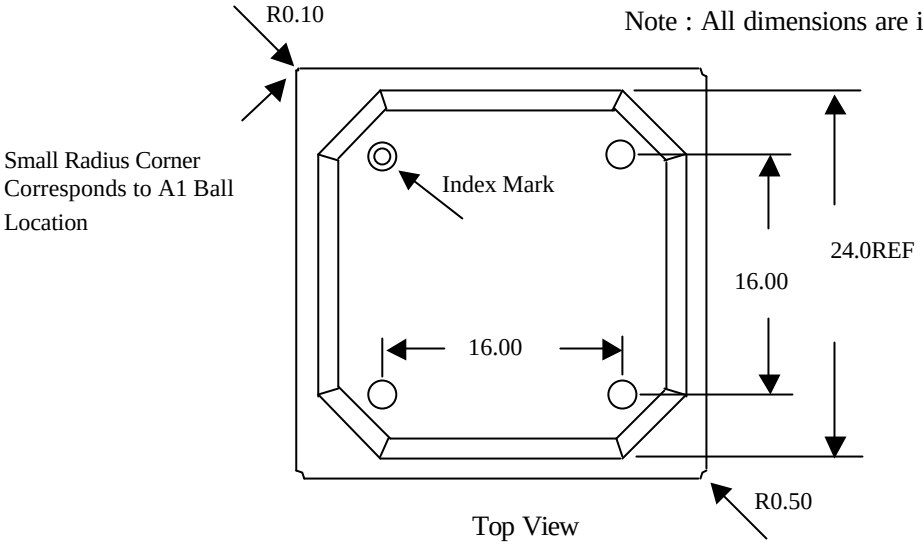
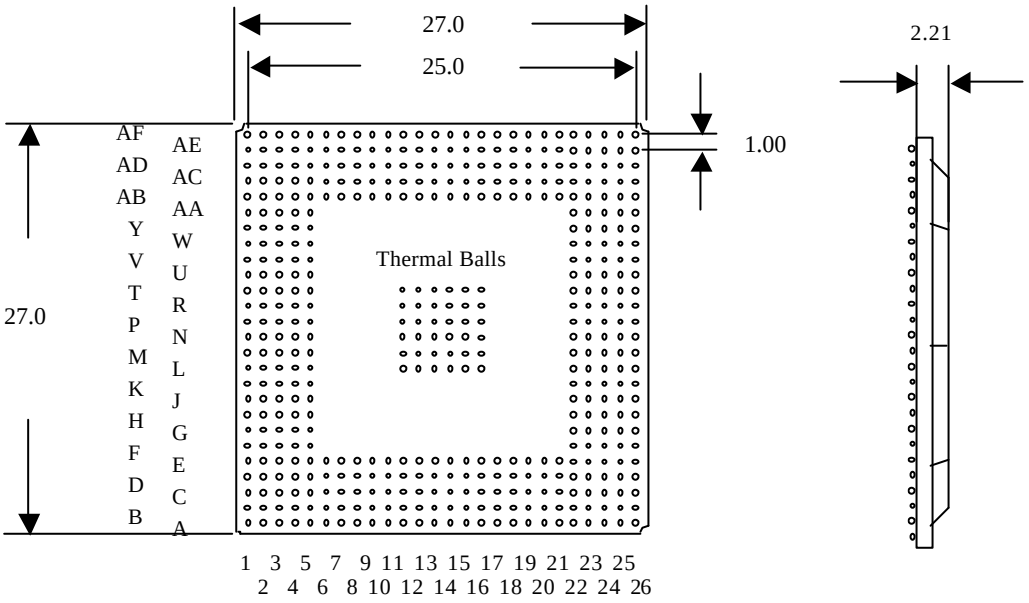
## - appearance




Top View




Bottom View



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## - Macro Functions

- PowerPC405
  - Loaded with 16KBytes I-Cache and 8KBytes D-Cache
  - Operates at 192MHz at maximum
  - 5-tiered pipeline
  - Incorporates PIT（Programmable Interval Timer）, FIT（Fixed Interval Timer）and Watch Dog Timer
  - MAC(16×16＋32)：2 cycle, 1 cycle throughput
  - JTAG Support

- DMA
  - 4 Channels　USB Device　1 channel
    Fast IrDA　2 channels
    IEEE1284　1 channel

- Interrupt Controller
  - External Interrupt　8 sources
  - Internal Interrupt　24 sources

- Power Management
  - Sleep control is applicable to each independent macro

- SDRAM Controller
  - Max 96MHz

- SRAM/ROM/Peripheral Controller
  - Chip select　8 pins
  - Directly connectable to DRAM
  - Directly connectable to SRAM/ROM

- LCD Controller
  - Complies with Mono-STN, Color-STN and TFT
  - Deals with both single-Scan and Dual-Scan
  - Applicable to resolution of 1/4VGA-SVGA
  - Programmable LCD Timing Generation

- TPC（Touch Panel Controller）
  - Read speed is changeable to 10 to150 points/second
  - Offers up to 1024 x 1024 resolution with 10 bit AD Converter
  - Lessens chattering noise generated by pens and/or noise from LCD using standardization treatment
  - 2-point calibration

- USB（Universal Serial Bus）
  - Supports both Host and Device
  - Compliant to USB1.1 and OHCI1.2
  - Deals with both Full Speed（12Mbps）and Low Speed(1.5Mbps)
  - Supports Isochronous, Interrupt, Control and Bulk transfer
  - Applicable to both 2Port（Host）and 1Port（Device）

- IrDA
  - 1 channel
  - Compliant to IrDA1.1
  - Transmission rate　4Mbps(Max)

- PCMCIA
  - Based on PCMCIA interface standard Ver2.0
  - Equipped with card write protect function
  - 2 channels

- IEEE1284
  - Supports Compatibility, Nibble, Byte, ECP and Negotiation Modes
    （No support for EPP and ECP with RLE）

- HDLC（High level Data Link Control）
  - Full Duplex, 2 Channels
  - Flag Transmission/Detection
  - Insert/Delete of 0
  - CRC Generation/Inspection（$X^{16}+X^{12}+X^{5}+1$：CRC-CCITT）
  - Abort Transmission/Detection
  - Detection of Address Field（1Byte）
  - Auto-transmission of Address Field（1Byte）
  - FIFO（Receiver and transmitter：16Byte）
  - Over-Flow/Under-flow detection
  - Random number generation（M series）
  - Compliant to both master and slave modes

- IOM2（ISDN Oriented Modular interface2）
  - Applicable to terminal（Multiplexed 3 IOM channels)
  - Slave operation

- UART（Universal Asynchronous Receiver Transmitter）
  - Similar to 16550
  - 16Bytes FIFO Receiver/Transmitter
  - Capable of addition/deletion of added bit (Start, Stop, Parity) used in asynchronous communication
  - Interrupt generation is available
  - Incorporates Programmable Baud Rate Generator（Divided 1-($2^{16}$-1)）
  - 3 channels

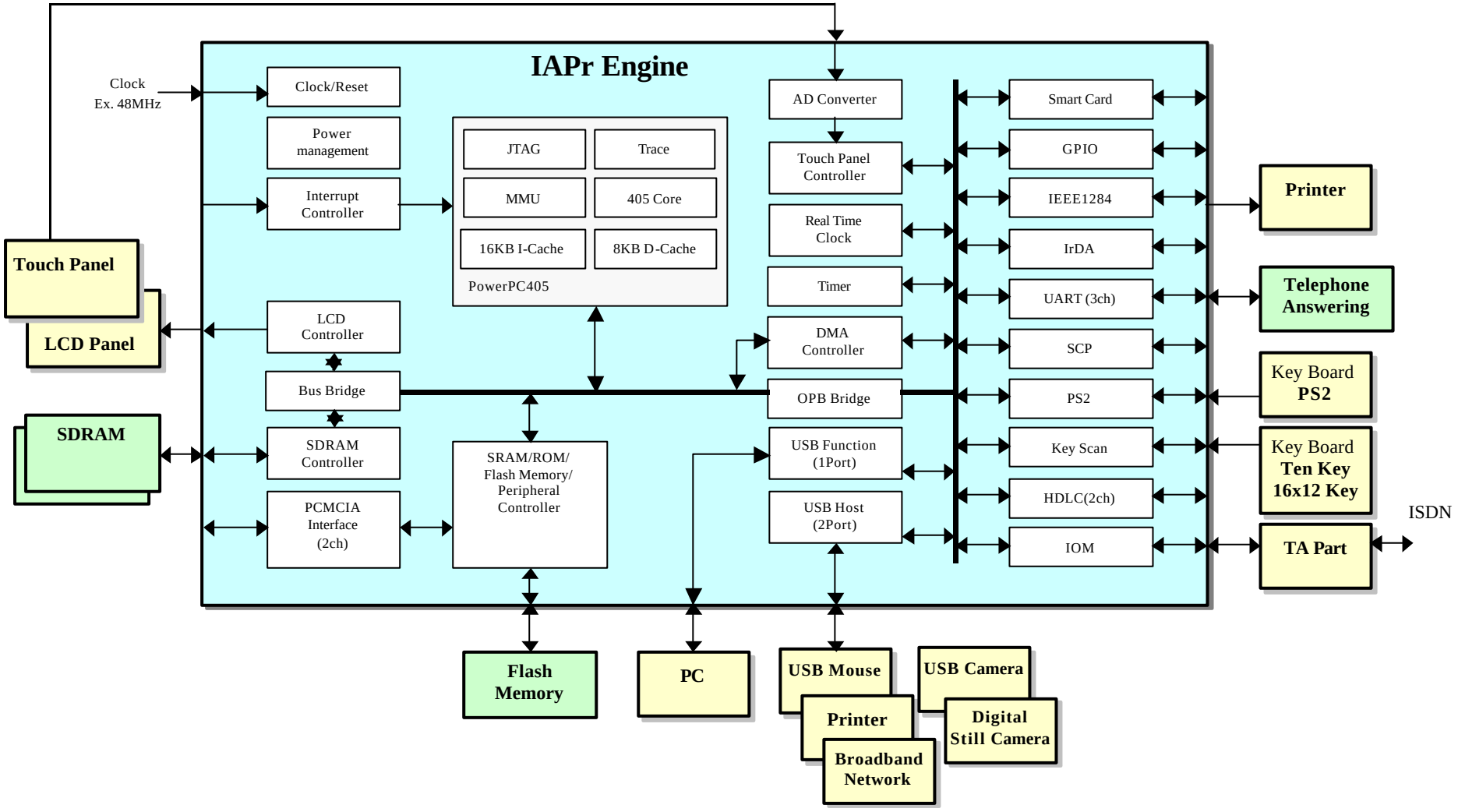
- SCP（Serial Communication Port）
  - Full Duplex
  - Synchronous transmission
  - Programmable clock rate

- RTC（Real Time Clock）
  - Low power operation
  - 12-hour and 24-hour modes
  - Summer time support
  - Supports memory area (114Bytes)capable of back-up

- GPT（General Purpose Timer）
  - Improves functionality as it is added to the timer originally incorporated in PowerPC405 Core
  - 32bits Time Base
  - Incorporates 5 Compare Timers

## - Brock Diagram and Application example

This shows an example of configuration for Internet Screen Phone connected by ISDN (Similar in case of other networks).



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