ALL IN ONE PRINTER

Operational / Technical Description.

The All in One Printer, AIO, is located in the check-out lane of retail outlets and interfaces to a Point of Sale register to monitor transactions. Based on transaction content coupons may print, audio is played and LED's may light up.

Consumers may identify themselves by means of a Mifare RFID tag at the end of the transaction. The Mifare reader device is embedded under the keypad. The AIO will link transactions with specific consumer ID's and upload the data over the internet to a host system for processing. This will result in sending instructions from host to AIO to print coupons or play audio (mp3) files. For printing a standard off the shelf Star TSP654 printer is integrated into the unit.

For on-site communication between AIO's and other devices mounted on gas dispensers a Zigbee network is used. The AIO is equipped with a 2.45 GHz antenna mounted on the back of the unit.

Main Circuit Functions.

Power Supply:
24V input from an external power supply is converted into 1.0V, 9V, 3.3V and 5V with controlled power up sequence. An early loss of power signal is provided.

Processor :
ARM9EJ-S chip running at 400 MHz with 32 kB internal RAM and 18.432 MHz external crystal oscillator.

External Memory
- 16 MBit Nor Flash
- 64 Mbytes (32 x 16) SDRAM
- 4 GBytes of NAND Flash

Zigbee:
The circuit utilizes a ZIC2410, a single chip processor compliant with ZigBee specifications and IEEE802.15.4, a complete wireless solution for ZigBee applications. The ZIC2410consists of an RF transceiver with baseband modem, a hardwired MAC and an embedded 8051 microcontroller with internal flash memory. The 2.45 GHz antenna is detachable and mounted on the back of the unit. Communication to the main processor is realized with 2 1.1 Mbps serial channels.

RF-ID:
Build around MFRC530 processor a highly integrated reader IC for contactless communication at 13.56 MHz. The receiver module provides efficient demodulation/decoding circuitry implementation for compatible transponder signals . The digital module, manages the complete ISO/IEC 14443 A standard framing and error detection (parity and CRC). The internal transmitter module directly drives an antenna designed for a proximity operating distance up to 100 mm without any additional active circuitry. The antenna is implemented by means of copper traces on the PCB. Communication to the main processor takes place via a Serial Peripheral Interface (SPI) interface.

Audio:
The DAC circuit converts a 16 bit 44.1 kHz input stream to drive a single chip amplifier delivering 1.1 Watt into 8 Ohm speaker.

I/O ports:
- Serial Ports (3):
  - Printer sniffer (2x): 2 wire serial ports RX / TX
  - Loyalty Port: BI directional RS 232 with CTS and RTS
- Ethernet (1): 10/100 Mbps
- USB (3)
  - Device port external USB-B
  - Host port external, USB-A
  - Host port internal on 5 pin header. This connection is used for the Star TSP 654 printer.
- Card reader Interface for 3 track magnetic stripe cards on internal header
- Keypad w. LED: 5 keys or 4x5 matrix.