Preface:

The purpose of this document is to give technical information of the Hand-Held POS Terminal: "NURIT- 8000" for FCC regulation. The description is based on the attached block diagram and schematics of the terminal.

General:

The Nurit-8000 is built out of the following components:

- **A specially designed Smart Li-ion battery pack.**
- **Main or CPU board.**
- **Connectors Adapter board.**
- **Back lit Keyboard.**
- **Specially designed graphic display with touch panel.**
- **An OEM RIM-802 radio.**
- **A specially designed flexible built in antenna.**
- **An easy-load fast thermal printer.**

Smart Battery Pack:

The battery pack is built out of two series connected Li-ion batteries which are connected via a specially designed protection circuit based on the protection IC S-8232A. The protection circuit includes a charge/discharge monitor device based on the BQ2019. Protection is achieved upon overcharge, overdischarge, overheat and short circuit conditions.
Operation battery pack voltage can be 6.5V to 8.4V.

CPU Board:

The CPU board includes the following circuits:

MAIN power supply:

The main power supply produces +3.3V also called VCC. It is used for the logic circuits also used to drive the display contast power supply. The power supply consists of the TC120333 step down PWM controller in a configuration of a buck (step-down) regulator running in a frequency of 200KHz-300KHz. The 3.3V power supply includes a soft start mechanism and a built in FET.
The drain of the FET is tied to a Schottky diode and the energy storage inductor. The output of the inductor is tied to the voltage sense input of the PWM controller. The inductor is also tied to an output filter capacitor and a protection zener diode, then to the powered circuitry. Regulation of 3.3V is accomplished by variation of the duty-cycle of the switching FET upon sensing the feedback voltage.

PRINTER POWER:

The printer mechanism is powered directly from the battery pack. However it is controlled by a high power MOSFET switch.

ASIC core power supply:

The core of the ASIC is the ARM7-TDMI which is powered by a linear LDO power supply. This voltage is +2.5V also called VCC_CORE.

LOW-BAT detection circuit:

The CPU board includes a power-loss detection circuit in order to detect low voltage battery and battery removal during operation. When the input DC voltage goes below 6V, it is detected by a comperator circuit and signals the CPU by one of the interrupt signals that a power loss occurred. Then, the last status of the terminal is saved. Upon power-up the CPU is being signal for power recovery and the last status is restored.

ASIC and System processor:

The main system processor is a ARM7-TDMI with a 32 bit core, 16-bit data bus and 24-bit address bus. The processor runs with a system clock of 20MHz which is produced by an external crystal. The processor has an internal PLL that's multiply the clock by 4 to 80 MHz. The system ASIC has a built-in oscillator, which produces, with an external 20Mhz crystal, the system clock. The ASIC is also controlling the CPU bus timing. The ASIC also includes part of the decoding logic of the system. It produces controlling signals to the printer mechanism and to the graphic display contrast drive circuit. The ASIC has a built-in 3 UARTs. The ASIC also includes system-reset circuit and the On/Off switch debounce circuit.

System Memory:

The unit includes 1Mbyte program flash memory which can be upgraded to 2Mbytes. The unit includes static RAM from 128Kbytes up to 2Mbytes with hardware write protected feature for sections of the memory. The RAM is backed up with an on-board 2.4V 40mAh NiMH battery.

System Real Time Clock (RTC):

The System RTC is part of the system ASIC. The ASIC is drived by an external 32KHz oscillator circuit. The RTC is powered by the VCC_CORE and backed-up with the same on board NiMh of the RAM. The battery is charged when the unit is turned on.

Printer:

The printer mechanism is Seiko LTPA-245 - a line thermal printer mechanism, with a resolution of 384 dots/line, and with a maximum speed of 12.5 character/second (at 7.2V). It also features Out of paper detection and Head temperature detection. The Head temperature is evaluated using a A2D circuit, controlled by the ASIC signals. The printer head and motor is fed with a 7.2V(VP signal), from the printer power-supply switch. The printer motor control interface is built with BA6845FS current controlled bidirectional motor driver (also fed from a 7.2V), and built on LM393A retriggerable monostable multivibrator. The motor operation mode is determined by 2 phase state signals, which is driven by the System ASIC. The printer clock and data are serially interfaced. The serial clock for the printer is a 4MHz clock, which is derived from the CPU clock. Each time Data byte is loaded into a shifter device and then is serially shifted to the printer, synchronized with the printer serial clock. After all data is loaded into the thermal head shift register, the head is activated by the DST (data strobe)

signals ,each of them for one of the six printing area of the head. In order to protect the head from overheat due to software problem, there is a hardware watch-dog mechanism which forced every 8mSec the DST signals into logic "low" state.

Smart card (SAM0) and SAM's interface (Optional):

There are 2 optional accessible SAM's : SAM1 and SAM2. The control interface is built with NCN6000D smart card interface IC. Each SAM and Smart Card on the CPU board uses a +5V(SAM_VCC) voltage, which is regulated from the its own smart card interface IC. The signals for the SAM's are given from the external data bus. The clock for the SAM's is 4MHz clock. The signals used are: input data with data enable, output data, reset, clock with clock enable, and card detect. Output signals from the SAM's and the smart-card are multiplexed to the system ASIC. The clock for the smart card is asynchronous 4MHz clock, or alternatively synchronous clock. It has Card Insertion detection and it uses all the above mentioned signals as the SAMs.

RS-232 Communication:

There are 3 RS-232 serial communication ports. One used as the PC port, which is a full hand-shake port. It is driven by the Sysytem ASIC built in UART. The port is connected via level shifter from TTL voltage levels to RS-232C voltage levels.
The second port is used for the external operation. It is driven by the System ASIC built in UART. The third port is used to provide radio interface.

Display:

Is a 128x128 pixels graphic display module, with a built in controller, with 4-wire resistive touch panel and LED back light. It is operated from the main +3.3V(VCC). The display contrast is a variable contrast that is controlled from PWM switching inverter power supply by the System ASIC. The 4-wire touch screen panel works by applying a voltage across the vertical or horizontal resistive network. The A2D converts the voltage measured at the point the panel is touched. The back light for the display is a variable back light, controlled from the System ASIC, via PWM circuit.

Display contrast power supply:

A switching inverter power supply controlles the display contrast. The voltage can vary from –10VDC to –15VDC. The display contrast controller is the MAX749.

Magnetic Card Reader:

Includes a 2-track card reader head, which is connected to the card reader interface. The card reader interface is built of some stages: amplifier stage, integrator and hysteresic comperator stage, buffer stage, and diffrentiator stage. When a card is swiped through the card reader slot, a magnetic field change on the card magnetic strip is sensed by the magnetic head and is translated into short pulses. Each pulse causes an interrupt to the processor and this way the information is analyzed. The interrupt can be masked by the software.

RIM-802 Radio power supply:

The power-supply produces 4.4V also called RADIO_PWR for the RIM-802 RADIO. The power supply consists of the MAX 1627 PWM controller in a configuration of a buck

(step-down) regulator running in a frequency up to 300KHz. A battery voltage is applied throughout a current sense resistor and a p-channel FET switch, which is controlled by the PWM controller. The drain of the FET is tied to a Schottky diode and the energy storage inductor. The output of the inductor is tied to voltage divider, which connected to the sense input of the PWM controller. The inductor is also tied to an output filter capacitor, then to the powered circuitry. Regulation of +4.4V is accomplished by variation of the duty-cycle of the switching FET upon sensing the feedback voltage. The radio power-supply can work in an input voltage range of 6V-16V. Radio power-on switch enables the radio power. Radio power-supply can be switched On/Off by the software.

RIM – 802 Radio Interface Circuit:

The radio interface circuit consists of latches and buffer logic. The radio interface is fed from a +3.3V voltage (VCC). The radio UART RXD/TXD signals are connected to the third UART of the System ASIC.

ARDIS RIM-802 Radio Module:

The radio consists of a Research in Motion (RIM) OEM Radio Module 802,manufactured by RIM, to support the Ardis standard. The module supports a serial interface of 3.3 Vdc with link speed of 9600 bit/sec. The transmitter delivers from 60mV to 2W into the 50-ohm antenna port. The transmit frequency band is 806 MHz to 825 MHz, and the receiving band is 851 MHz to 870 MHz. The main power supply requires 4.1 40 4.75 Vdc. The receiver current consumption is 61 mA. The standby current consumption is less than 0.2 mA in "low-power standby" mode and 5.5 mA in regular standby mode. The RIM module is capable of delivering a one-second burst of up to 1.7A when required by the transmitter. The antenna connection is 50-Ohm impedance.

Antenna:

The antenna is a custom designed flexible built in antenna. Used for 806-870MHz Datatac terminal. Consists of pigtail cable RG178 with right angle MMCX connector. Antenna gain is -1 dBi average. Polarization is linear, vertical. Pattern: Omni directional in azimuth, ?7 dB ripple maximum. Antenna impedance is 50 Ohm nominal. The VSWR is max 2:1 in the band.

Keyboard board:
Includes the following circuit:

Keyboard Matrix:

Built as a 5 X 4(raw/column) matrix keyboard (total of 20 keypads). A polling method across the keyboard matrix is used for a key detection. The keyboard matrix is connected to a latch and to a buffer through pull-up resistors. The On/Off key, which is connected in one pole to the GND, is used for controlling the battery switch.

Connectors Adapter board:

This board provider connection between the main board and the battery pack, docking station, external charger, external earpiece and any external device that can be connected to Nurit-8000 via Data port (i.e. barcode reader, modem, etc).