

# **MX8**

## **Vertical Hand Held Terminal**

### **Functional Specification**

Company Confidential

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## 1.0 Product overview

The MX8 Vertical Hand Held Terminal is intended to meet the market requirements for thin client terminals which run the Microsoft Windows CE OS. The product will incorporate an Intel XScale CPU and Windows CE 5.0 operating system. The MX8 will use an active quarter VGA display with integral keyboard and support an 802.11a/b/g WLAN radio.

## Functional Requirements

### 2.1 Software

The MX8 will support the Windows CE 5.0 operating system (Win CE 5.0 Pro), with proprietary boot loader, OAL supporting XScale CPU, and device drivers for all system devices. The image will be stored on FLASH ROM and be loaded into RAM for execution.

### 2.2 CPU

The MX8 will use the Intel XScale PXA270 520 MHz CPU.

### 2.3 Memory

The MX8 will support 128MB of SDRAM. The operating system will execute out of RAM. MX8 will have 128M Strata FLASH ROM for storage of boot loader code, operating system and program code, as well as persistent storage. Boot code consists of:

- Boot loader code
- System low-level diagnostics code

The MX8 will have one miniSD slot for software updates or data storage. The miniSD slot is accessible from the battery compartment. Options to include 128MB to 1G

### 2.4 Quarter VGA Color Display

Display shall be available in quarter VGA active color.

- 240 (horizontal) x 320 (vertical) 1/4 VGA active TFT color, LED backlight
- Diagonal viewing area 2.8" (7.1 cm)
- Brightness: 300 nits nominal with touchscreen
- Viewing angles:  $\pm 60^\circ$  (horizontal) and  $+60^\circ/-40^\circ$  (vertical) viewing angle, C/R = 10
- Contrast Radio (C/R): 300 typical
- Targeted to indoor applications

### 2.5 Keyboard

#### 2.5.1 Matrix keyboard and Overlays

The MX8 will support a single 32 key layout like that of the MX7. The keyboard is backlit for use in dark areas. The keyboard backlight should follow the same power management scheme as the display backlight. The keys are coated (e.g., epoxy and Seal-Plast<sup>TM</sup>) for resistance to abrasion prematurely wearing through the key legends. The keys should all be tested for up to 1M key presses

The trigger on the trigger handle is treated as an additional scanner key, activating the scanner. The trigger is mappable like all the other keys on the keyboard.

## **2.5.2 Scan Key**

One large key will be provided to initiate internal scanner operation.

## **2.5.3 Power Key**

One key will be provided as a “power” key. The software will read this momentary-action key. In normal usage, “power off” will cause the unit to go into suspend; “power on” will resume from suspend.

## **2.6 Vibration Support**

A device will be installed in the terminal to provide a slight, physical vibration. This is similar to a vibrating beeper or cell phone effect. The device is strong enough to be felt with or without the handle configuration option. This effect needs to be controllable via software. Refer to software document 161427-0001 for API descriptions which control the vibration.

## **2.7 External I/O connection**

There will be only one connector on the bottom of the terminal. That connector will support multiple Input/Output capabilities described below.

### **2.7.1 RS-232 Serial Port**

The MX8 will have one serial port, by default configured as COM1. It will support data exchange via ActiveSync, but will not automatically start ActiveSync when connected, since this interferes with use of serial peripherals.

### **2.7.2 USB Client Port**

The MX8 will have one USB 1.1 (minimum) Client port for active sync applications. An accessory USB cable will be created to go from the MX8 terminal connector to a USB Type A plug for connection to a PC for ActiveSync.

### **2.7.3 Audio connection**

The MX8 will have an audio headset interface on the bottom terminal connector. An accessory connection cable will be created to go from MX8 terminal connector to Voxware quick disconnect 4-pin interface. This cable will be used to adapt to specific styles of headsets for voice input, mono output. It is required that insertion of the headset plug will cut off audio output to the speaker in the terminal housing. All sound previously directed to the speaker will be redirected to the headphone, including beeps.

### **2.7.4 Power Input**

The MX8 will have a power input interface on the bottom terminal connector. This will allow powering the terminal externally, (i.e., from an external AC/DC power supply) while in operation. The input power will provide in-terminal charging of the main battery.

## **2.8 Audio Support**

The MX8 shall include a speaker (the speaker will be the same as that used in MX7). The purpose of the speaker is for audible verification signals normally used by the Windows CE operating system. The speaker will be located on the front housing. The terminal will produce a Sound Pressure Level (loudness) of at least 102 dB measured from the front as follows:

Frequency:  $2650 \pm 100$  Hz

Distance: 10 cm on axis in front of unit.

Duration: Continuous 2650 Hz tone.

Attack Time: Audio subsystem attains maximum amplitude by the 4<sup>th</sup> cycle (resonance frequency) as measured at the RCA audio output connector on the Radio Shack Digital Sound Level Meter model 33-2055 or equivalent

## **2.9 Radio Support**

### **2.9.1 802.11 Radio Support**

The MX8 shall support 802.11b/g radio (LXE #480829-6415). The radio interface on the CPU board does not allow "hot swapping" the radio.

The coverage and throughput of the LXE radio must meet or exceed FA performance limits:

With a Cisco 1242 AP – The radio and LXE terminal must provide 125 kbps throughput at the site survey limits.

### **2.9.2 Bluetooth**

A daughter board will be developed that supports one Bluetooth radio based on the Murata LBMA46NDE2 module. 802.11 will retain connection while Bluetooth is operating at FA limits. Hardware interface to the WIFI radio will be implemented to enable co-existence in the radio band they share.

The Antenna for the Bluetooth will be integrated together into a daughter board

## **2.10 Antenna**

The MX8 shall support two internal dual band antennas for diversity (for Wifi) to support a/b/g radio with Micro UFL connector.

## **2.11 Internal Barcode Scanner**

The MX8 shall support multiple internal scan engines:

- EV15 decoded 1D imager from Intermec
- SE955 decoded scanner from Symbol
- 2D undecoded imager (5300) from Hand Held Products

The system must meet the depth of field, distance and other specifications of each of the individual devices.

## **2.12 Main Battery**

The MX8 will be powered by a main battery pack with sufficient capacity to allow the terminal to operate through an 8 hr shift as qualified in the performance section of this document. A hold-up time of four days at 25°C is required with a fully charged main battery remaining installed. It should take no longer than 5 hrs to charge the main battery while in-terminal and connected to an external power source.

The battery is removable by the user without tools. The system will support charging the main battery while installed in the terminal by attaching an external power source.

## **2.13 Back-up Battery**

A Back-up Battery shall be provided for the MX8. The backup battery and its charger shall be internal to the MX8. If the backup battery is completely drained, it may take up to 12 hours to recharge. If the main battery is removed, the backup battery will allow retention of key information for 5 minutes to allow swapping of the main battery.

Charging of the Backup Battery is provided to maintain the battery near full charge at all times. The back-up battery is not user replaceable.

## **2.14 Accessories**

The following accessories will be provided for the MX8:

1. Trigger Handle
2. Passive Mobile cradle
3. Desk Cradle with Spare Battery Charger
4. An AC/DC power supply for the desktop cradle
5. An AC/DC power supply for the 4 slots battery charger
6. Cable, USB Client + power input "Y" cable
7. Cable RS-232 + power input "Y" cable
8. Cable, Headset adapter
9. Four slots Battery charger
10. SD Memory Cards
11. Spare Battery

### **2.14.1 Trigger Handle**

A user installable trigger handle with rubber overmold in the grip area and a tethered wrist strap is required. The MX8 is able to rest on the trigger handle and scanner window without falling over.

The trigger is mappable just like all the keys on the keyboard. A test application is provided which will detect a trigger press and initiate a scan operation.

### **2.14.2 Passive Mobile Cradle**

The mobile cradle is a passive vehicle cradle which holds the MX8 on a forklift truck. There will be no power or communication connections to the MX8 through the cradle. A RAM™ mount system will be provided with the passive cradle for attachment to the forklift truck. The cradle must allow display & keypad visibility and access while mounted and include the ability for one-handed insertion and extraction.

### **2.14.3 Desk Cradle with Spare Battery Charger**

A single slot desk cradle with single slot battery charger is required. The desk cradle will have external connectors for the MX8's RS-232, USB client and headset ports. The single slot spare battery charging slot will be capable of charging a spare battery in less than 5 hours. An external universal AC/DC power supply is provided with the cradle.

### **2.14.4 AC/DC power supply for desktop cradle**

An external AC/DC power supply device will be provided to operate the terminal from AC power rather than the terminal main battery. The external power supply will also allow for charging the main battery while plugged into the terminal. The power supply is delivered without an AC power cord, but must use an IEC standard connector type cord.

### **2.14.5 AC/DC power supply for 4 slot battery charger**

An external AC/DC power supply device will be provided to operate the 4 Slot battery charger from AC power. The power supplies is delivered without an AC power cord, but must use an IEC standard connector type cord.

### **2.14.6 USB Client + power input “Y” cable**

A “Y” cable will be created with a terminal matching connector on one end with two cables coming out of that connector. One of the two cables will be terminated with a USB type A plug. Only USB-Client signals will pass through this cable. This cable will be approximately 6 foot in length. The purpose of this cable is for ActiveSync to a PC Host computer during desktop development. The other cable of the “Y” cable will be terminated with a power receptacle. This connector will accept a plug from a AC/DC power supply. This cable will be approximately 6” in length.

### **2.14.7 RS232 + power input “Y” cable**

A “Y” cable will be created with a terminal matching connector on one end with two cables coming out of that connector. One of the two cables will be terminated with a D9 female on the other. Only the RS-232 signals will pass through the cable. This cable will be approximately 6 foot in length. The purpose of this cable is for ActiveSync to a PC during desktop development. The other cable of the “Y” cable will be terminated with a power receptacle. This connector will accept a plug from a AC/DC power supply. This cable will be approximately 6” in length.

### **2.14.8 Headset adapter cable**

The headset adapter cable will connect to VXI brand Tuffset headsets via a proprietary quick disconnect connector.

### **2.14.9 4 slot battery charger**

A 4 slot battery charger is capable of recharging 1 to 4 batteries in less than 5 hours. Each charging slot should have a status LED to indicate the charging state. The power supply is delivered without an AC power cord, but must use an IEC standard connector type cord.

### **2.14.10 SD Memory Cards**

Mini SD Memory cards of sizes 128MB, 512MB and 1GB will be made available.

## **2.15 Real Time Clock**

An external RTC will be implemented in the MX8, which interface to the CPU via an I<sup>2</sup>C bus. The RTC has a backup power using a non-rechargeable Lithium coin cell. During normal operation, the RTC is running on the main battery, and only switch to the backup power when the main battery is removed from the terminal.

The Lithium coin cell will be mounted using a coin cell holder. To replace the coin cell battery, the terminal has to be dismantled. The coin cell should have a minimum 5 year life with normal usage. (A typical normal usage is assuming user will leave the main battery in the terminal during normal working days (Mon – Fri), and only remove the main battery during the weekends).

## 3.0 Attribute Requirements

### 3.1 Ergonomics

#### Size

7.58" Long x 2.84" Wide (at display) / 2.45" Wide (at keyboard) x 1.76" thick (display) / 1.52" thick (at keyboard/battery)

#### Weight

Not to exceed 18 oz including radio, battery, scanner and handle. The terminal should not exceed 14 oz without the handle and handstrap.

#### Color

The main housing will be Dark Gray with Black overlays around the keys and the display.

Color code: GE Gray GY1197

#### Logo

An "LXE" logo will be integral to the bezel overlay which will fit into a recess on the front of the computer.

The product name (e.g., "MX8") will be on the front of the terminal and will be removable (i.e., on an overlay or separate label).

### 3.2 Environmental

Note: Environmental specifications below apply to, and qualification will be performed on, full system configurations including scanners and radios.

#### Standard Operation temperature range (non-condensing)

Low temperature operation: 14°F (-10°C) for 48 hours

High temperature operation: 122°F (50°C) / 35~95% RH for 168 hours

#### Storage temperature range

Low temperature storage: -4°F (-20°C) for 24 hours

High temperature / high humidity storage: 158°F (70°C) / 85% RH for 72 hours

#### Humidity (operating)

5% to 90% RH non-condensing at 104°F (40°C)

#### Vibration

0.03G<sup>2</sup>/Hz : 20Hz to 2kHz random wave with 3dB/octave roll off at 80Hz & 350Hz (1hour for each axis, total 3 axes) (MIL STD 801F)

#### Ingress protection enclosure rating

IEC 60529 compliant to IP54 (category I for dustproof)

## Appendix 1: MX8 Interfaces and Configuration

