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APPLICATION NOTE 6.8

Desktop Server Diagnostic Panel Application for the FDC37C95x Ultra I/O Controllers

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The FDC37C957FR Ultra I/O controller is an advanced Plug-and-Play I/O device that includes an advanced 8051 microntroller core with a shared FLASH EPROM interface. This 8051 has control over multiple chip sub-functions including the PS/2 keyboard interface logic, a keyboard scanner, power-management functions, Access.Bus interface block, Real Time Clock, Parallel Port, Serial Port, Two Pulse Width Modulators, an IR Port, and over 42 General Purpose I/O pins.

The 95x was developed specifically for laptop applications, however, as desktops become more advanced with power management features, (e.g. IBM's RapidResume™ and Microsoft's On Now and ACPI initiatives), and high-end server features such as remote diagnostics, the added flexibility and power of the 95x allows system designers to add these features without increasing overall component cost.

The 95x includes a 16x8 integrated keyboard scanner with automatic polling modes which can be used in a laptop for a full 128 key keyboard in addition to the four external PS/2 pointing and keyboard devices. This circuitry can also be used in a desktop to provide a small keypad and alphanumeric display. This keypad may consist of as little as a turbo/reset/power switch pad, or it may be as large as a full alpha-numeric entry pad (such as on an embedded MMI). A display may be as simple as two 7 segment LEDs for CPU speed/POST display, or it may be as advanced as a small graphical LCD display for icons.

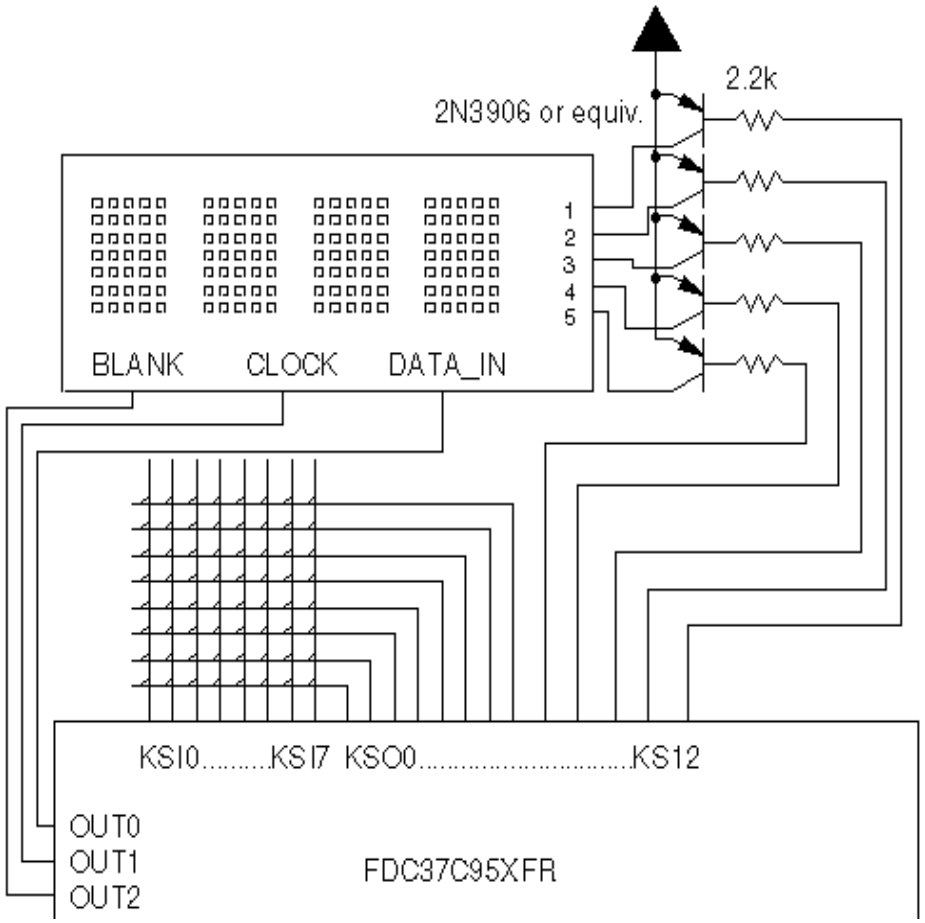
The scanner KSO lines are driven by a simple 1-of-16 decoder with 4 mA open-drain outputs. Weak pullups on the KSI lines allow direct connection to a switch array such that when a switch is closed, the corresponding KSI transitions from logic high to low. The rotating 1-of-16 decoder will stop and interrupt the 8051 signalling a key has been pressed. The 4 bit value of the KSO driver can be read as the column number, and the KSI 8 bit port can be read to determine which key in that column has been pressed.

This application note describes a simple 64 key keypad (enough for full alphanumerics and control keys), and a 4 character alphanumeric LED display (HP Opto. P/N HCMS-2700). This type of display requires a serial stream of data to fill the 7 elements of the 4 characters column-by-column with a 28 bit serial stream of pixel data. This requires a "bit-banging" overhead of 28 bits x 5 columns x two writes per bit x 100 Hz refresh (min) = 28,000 writes/s to sustain this display. This is easly handled by the 16MHz 8051.

Other types of displays can also be used. A two digit 7-segment display could be driven with 8 GPOUT pins (7-segments + decimal point) and only two KSO lines.
Digital alphanumeric displays with character RAM (such as HP HDLR-2416) handle the character generation and refresh, and require the 8051 only to write ASCII data through an 8-bit or serial port. Mid-range (performance and price) options include hexadecimal displays with built in latches and decoders (such as HP 5082-73xx). These displays accept 4-bit binary nibbles and can be latched. An 8 character hex display using these devices would use 4 GPOUT pins and 8 KSO lines.

Using the 95x's mailbox registers, or parallel port access, the Host CPU can write POST codes to the 8051. If the Host hangs, the WDT will restart the 8051 and return control of the FLASH to the 8051. The 8051 can then actively display the last POST code and enter an active debug mode. Since the 8051 has access to the full Host CMOS register set, the 8051 MMI can then be used to display and modify CMOS and BIOS data values, and then attempt to re-boot the machine. Depending on the complexity of the alphanumeric display implemented, the entire BIOS setup screen could be navigated on the front panel without even initializing video (or having a monitor connected).

Server farms can benefit from this by displaying load or backup statistics for each machine, without having to purchase multiple monitors or cycle through each server with a monitor switch. The keypad can also be used as a very high security keyboard lockout password entry point.



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