ZOVOX

ZVX719

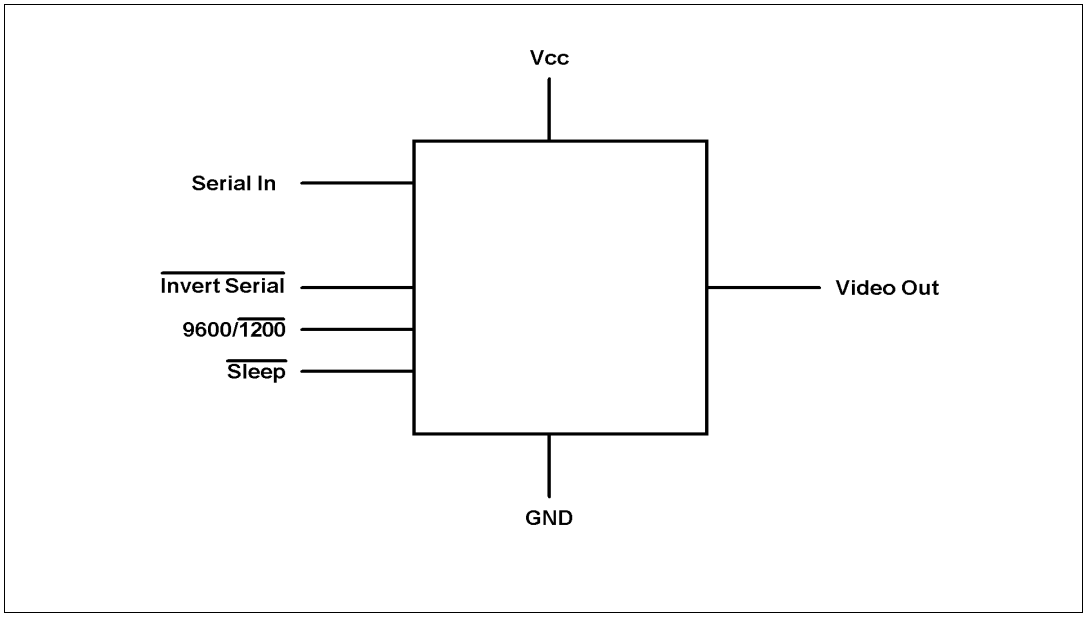
Serial Input, Monochrome Video Adapter, 40 characters x 24 lines

General Description

The ZVX719 is a compact and completely self contained video adapter. Video displays can be easily added to electronics devices by use of a single serial communications line (9600-8-N-1 or 1200-8-N-1). Control characters provide standard terminal functions. The adapter generates a 262 line, 60 Hz, 1V p-p, non-interlaced video signal. The serial input is compatible with RS-232, TTL, and CMOS signal levels.

Features

- no external components
- crystal controlled accuracy
- +3V to +7V supply range
- no programming required
- low power design
- non-interlaced output
- several package options available
- user selectable data polarity
- status LED
- 40 deep serial input FIFO
- user selectable baud rate



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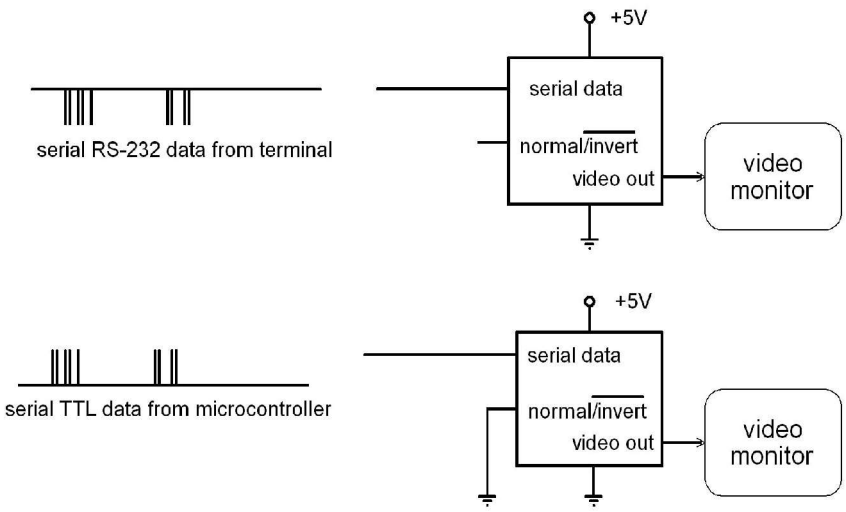
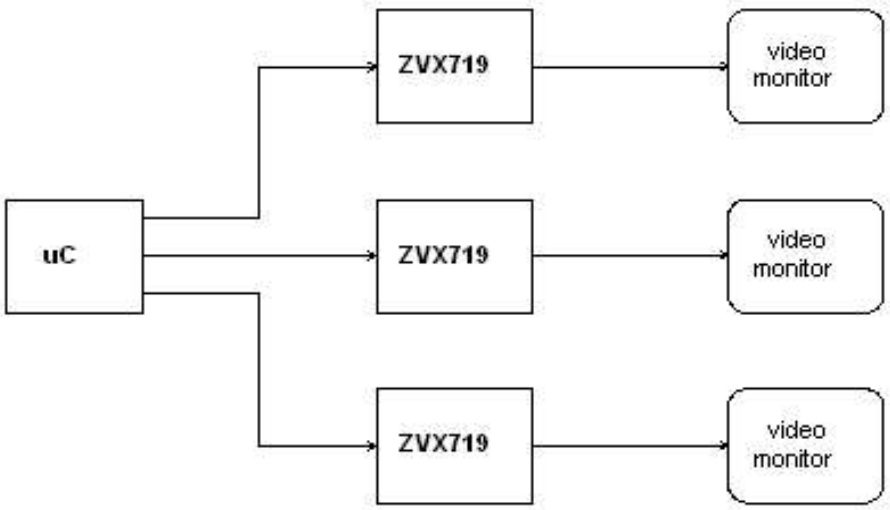
Typical Applications





drive multiple monitors from a single µC

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Control Code Summary

ASCII	*Keystroke*	*Function*	*Notes*
\001	Control+A	Cursor Home	
\002	Control+B	Hide Display	data unchanged
\003	Control+C	Restore Display	
\004	Control+D	Disable Cursor	
\005	Control+E	Select Box Cursor	
\006	Control+F	Select Underline Cursor	
\007	Control+G	Display Character Set	command takes 5.5ms
\008	Control+H	Backspace	destructive
\009	Control+I	Enable Splash Screen	command takes 4.5ms
\010	Control+J	Line Feed	move cursor down 1 line
\012	Control+L	Form Feed (clear display)	
\013	Control+M	Carriage Return	
\014	Control+N	Disable Splash Screen	command takes 4.5ms
\016	Control+P	Position Cursor	requires 2 arguments
\017	Control+Q	Enable Auto LF	append LF to all CR
\018	Control+R	Disable Auto LF	
\019	Control+S	Enable Scroll	
\020	Control+T	Disable Scroll	
\021	Control+U	Enable Inverted Video	command takes 35ms
\022	Control+V	Disable Inverted Video	command takes 35ms
\023	Control+W	Enable Wrap	
\024	Control+X	Disable Wrap	
\026	Control+Z	Reboot	allow 650ms
\027	Esc	Escape code prefix	see table below

Escape Code Sequences

Four escape sequences are supported. These correspond to the escape sequences that are sent by the four arrows keys of an ANSI terminal. ANSI terminal emulation is available in HyperTerminal and other terminal programs. These sequences move the cursor . The cursor will NOT wrap at the edge of the screen.

Key Sequence	*Codes*	*Arrow Key*
Esc [A	\027\091\065	Up
Esc [B	\027\091\066	Down
Esc [C	\027\091\067	Right
Esc [D	\027\091\068	Left

Control Code Description

\001, CTRL+A CURSUR HOME
Moves cursor to top left corner of display.

\002, CTRL+B HIDE DISPLAY
Display is blanked. No data is changed.

\003, CTRL+C SHOW DISPLAY
Restores blanked display. No data is changed.

\004, CTRL+D HIDE CURSOR
Cursor is not shown. No other data is changed.

\005, CTRL+E SELECT UNDERLINE CURSOR
Use a blinking underline for the cursor.

\006, CTRL+F SELECT BLOCK CURSOR
Use a blinking solid block for the cursor.

\007, CTRL+G DISPLAY CHARACTER SET
Character set is displayed on screen for reference. Caution: all previous display data are lost.

\008, CTRL+H BACKSPACE
Moves the cursor left one position and erases the character in that space. Will not wrap past first (leftmost) position in line.

\009, CTRL+I ENABLE BOOT SCREEN
Zovox name and software revision is shown on screen until first serial character is received. Default setting. This setting is stored in EEPROM and is retained

after power-loss. Command requires 5ms to execute. (see also CTRL+N)

\010, CTRL+J LINE FEED

Moves the cursor down one line (without moving left or right). If SCROLL is *on*, the display will scroll after the cursor reaches the bottom line. If SCROLL is *off*, the cursor will wrap to the top of the screen after reaching the bottom line.

\012, CTRL+L FORM FEED

Clears the display and positions cursor at top left corner of display. All display data are erased.

\013, CTRL+M, Enter CARRIAGE RETURN

Moves cursor to leftmost position of current line. If AUTO-LF is *on*, cursor will advance to next line. (see also CTRL+Q)

\014, CTRL+N DISABLE BOOT SCREEN

Prevents boot screen from being displayed immediately following power-up. This setting is stored in EEPROM and is retained after power-loss. Command requires 5ms to execute. (see also CTRL+I)

\016, CTRL+P POSITION CURSOR

This command must be followed by two bytes to specify the position of the cursor. The first byte specifies the column (0..23); the second byte specifies the row (0..23).

examples:	\016\000\000	cursor goes to top left corner
	\016\023\000	cursor goes to top right corner
	\016\011\023	cursor goes to middle of bottom line

\017, CTRL+Q ENABLE AUTO LINE FEED

After this command, a *Line Feed* will be automatically appended to every *Carriage Return* that is received. This mode is enabled at power-up.

\018, CTRL+R DISABLE AUTO LINE FEED

Prevent a *Line Feed* from being automatically appended to every *Carriage Return* that is received. This function will remain in effect until a CTRL+Q command is received, power loss, or reboot (CTRL-Z).

\019, CTRL+S ENABLE SCROLL

With SCROLL enabled, after reaching the bottom of the display, the cursor stays on the bottom line after subsequent *Line Feed* commands. The display

data will move up one line. SCROLL is controlled independently of WRAP. SCROLL is enabled at power-up and after reboot. (see also CTRL+T, CTRL+W, CTRL+X)

\020, CTRL+T DISABLE SCROLL
With SCROLL disabled, when the cursor reaches the bottom line of the display, the next *Line Feed* command will cause the cursor to go to the top row of the same column. (see also CTRL+S, CTRL+W, CTRL+X)

\021, CTRL+U ENABLE INVERTED VIDEO
This command causes all data to be displayed as dark characters (or graphics) on a light background. This command will effect the entire screen and cannot be used to selectively display only certain portions of the screen in inverted video. This command takes 35ms to process. It is up to the user to prevent input buffer overflow following this command. (see CTRL+V)

\022, CTRL+V DISABLE INVERTED VIDEO
This command causes all data to be displayed as light characters (or graphics) on a dark background. This command takes 35ms to process. It is up to the user to prevent input buffer overflow following this command. Inverted video is disabled at power-up and after reboot. (see CTRL+U)

\023, CTRL+W ENABLE WRAP
With WRAP enabled, the cursor will proceed to the beginning of the next line after reaching the last column of a line. After reaching the bottom right corner of the display, the cursor will go to the top left corner, if SCROLL is disabled; if SCROLL is enabled, the display data will move up one line and the cursor will go to the bottom left corner of the display. WRAP is enabled at power-up and after reboot. (see CTRL+X)

\024, CTRL+X DISABLE WRAP
With WRAP disabled, the cursor will move off display after reaching the end of a line. Subsequent display data is ignored until some other command (such as a C*arriage Return*) moves the cursor back onto the screen. (see also, CTRL+W)

\026, CTRL+Z REBOOT
Force a cold boot of the display processor. Useful for software debugging to test for power-up conditions without cycling system power.

ESC [A, \027\091\065 UP ARROW
Move cursor up one line. Does not WRAP.

ESC [B, \027\091\066 DOWN ARROW
Move cursor down one line. Does not WRAP.

ESC [C, \027\091\067 RIGHT ARROW
Move cursor right one column. Does not WRAP.

ESC [D, \027\091\068 LEFT ARROW
Move cursor left one column. DOES not WRAP.

Electrical Characteristics

Parameter	*min*	*max*	*typ*	*Units*
Supply Voltage	3.0	7.0	5.0	V
Supply Current, operating			20	mA
Supply Current, sleep			2	mA
Video Output Voltage into 75ohm load, p-p			1	V
Serial Data input, Vih	2.5	12		V
Serial Data input, Vil	-12	0.5		V

Horizontal Timing Characteristics

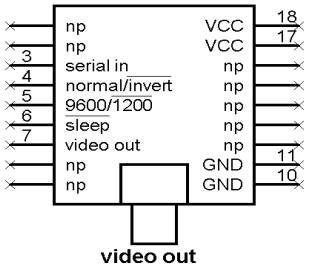
item	*Time (usec)*
horizontal line	63.5
horizontal sync tip	4.7
back porch	8.8
active video	39
front porch	11

Vertical Timing Characteristics

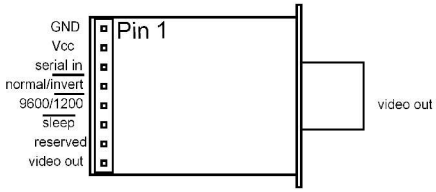
item	*Time (lines)*
video frame	262
vertical sync tip	3
vertical back porch	27
vertical active video	216
vertical front porch	16

Pinouts (top view)

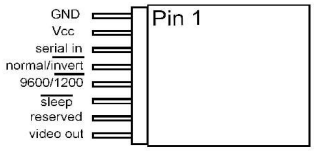
h package



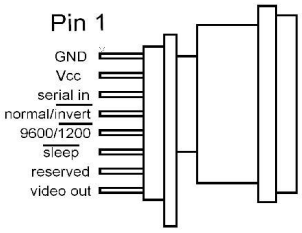
p package



v package



g package

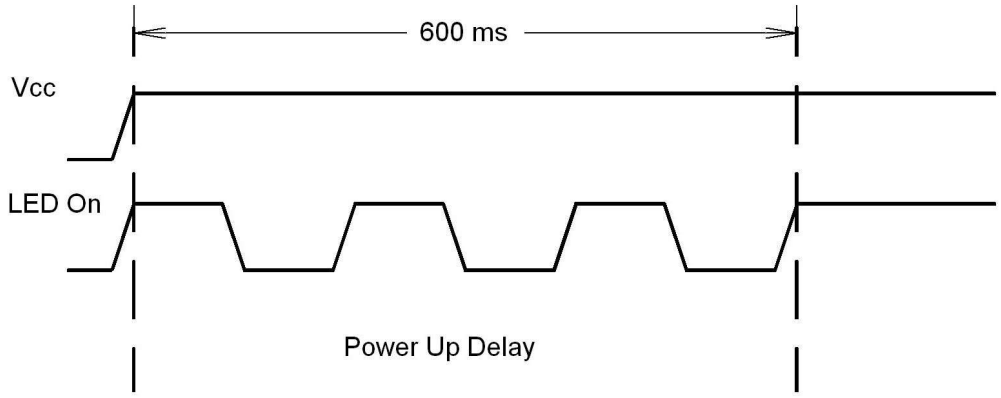


Pin Definitions

name	*function*
np	no pin at this location
serial in	serial data input to adapter
invert serial	hi for RS-232 levels, lo to invert data from microcontroller. this pin has internal pull-up
9600/1200	baud rate select, hi for 9600, lo for 1200 baud this pin has internal pull-up
sleep	hi for normal operation, lo to enter sleep mode this pin has internal pull-up
video out	video output. same signal is available at RCA jack (except v package). 1V p-p into 75 ohm load
reserved	reserved for future use. do not connect.
GND	power ground. pins are internally connected
Vcc	power positive. pins are internally connected

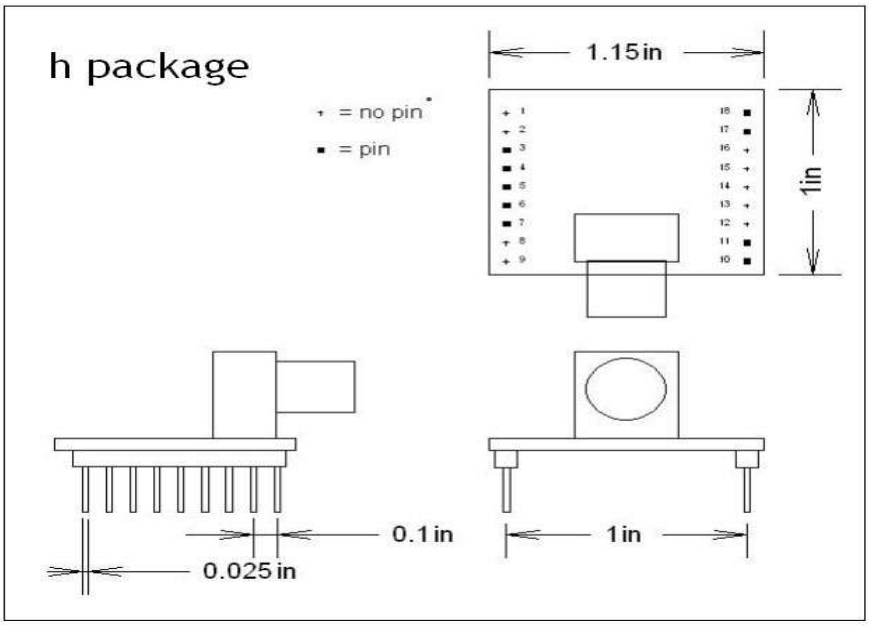
Status LED

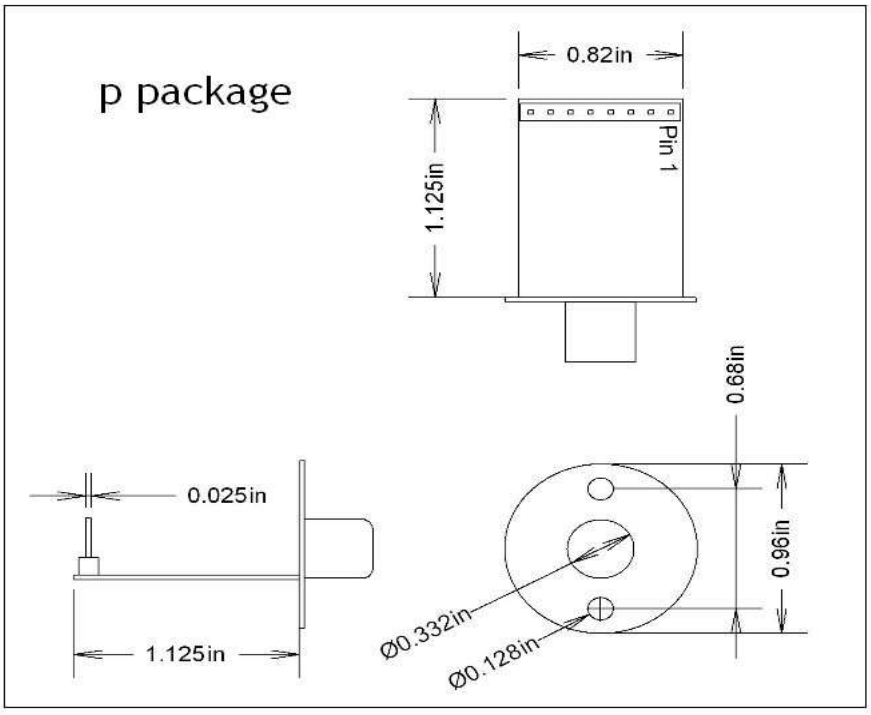
All ZVX719 variants have a status LED which is normally on while power is applied. The LED blinks off three times at power up and subsequently blinks during receipt of serial data.



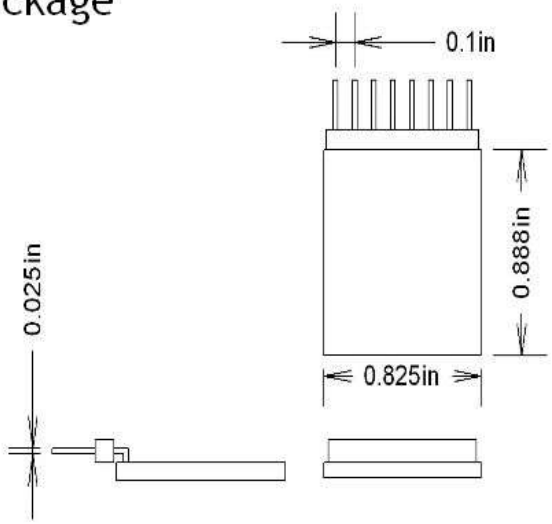
Package dimensions

All dimensions are approximate. For clarity, circuit components are not illustrated.

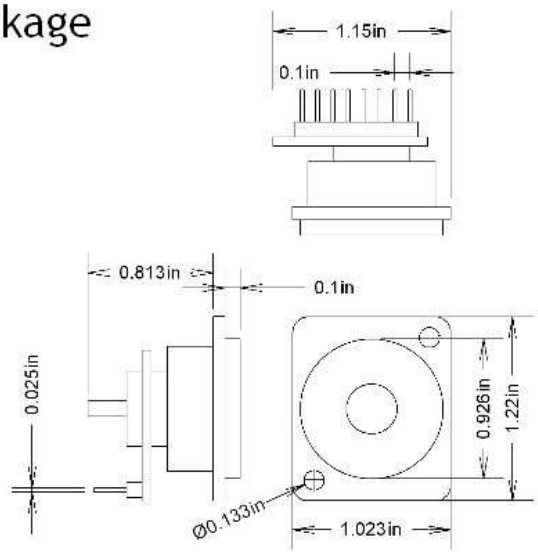




v package



g package



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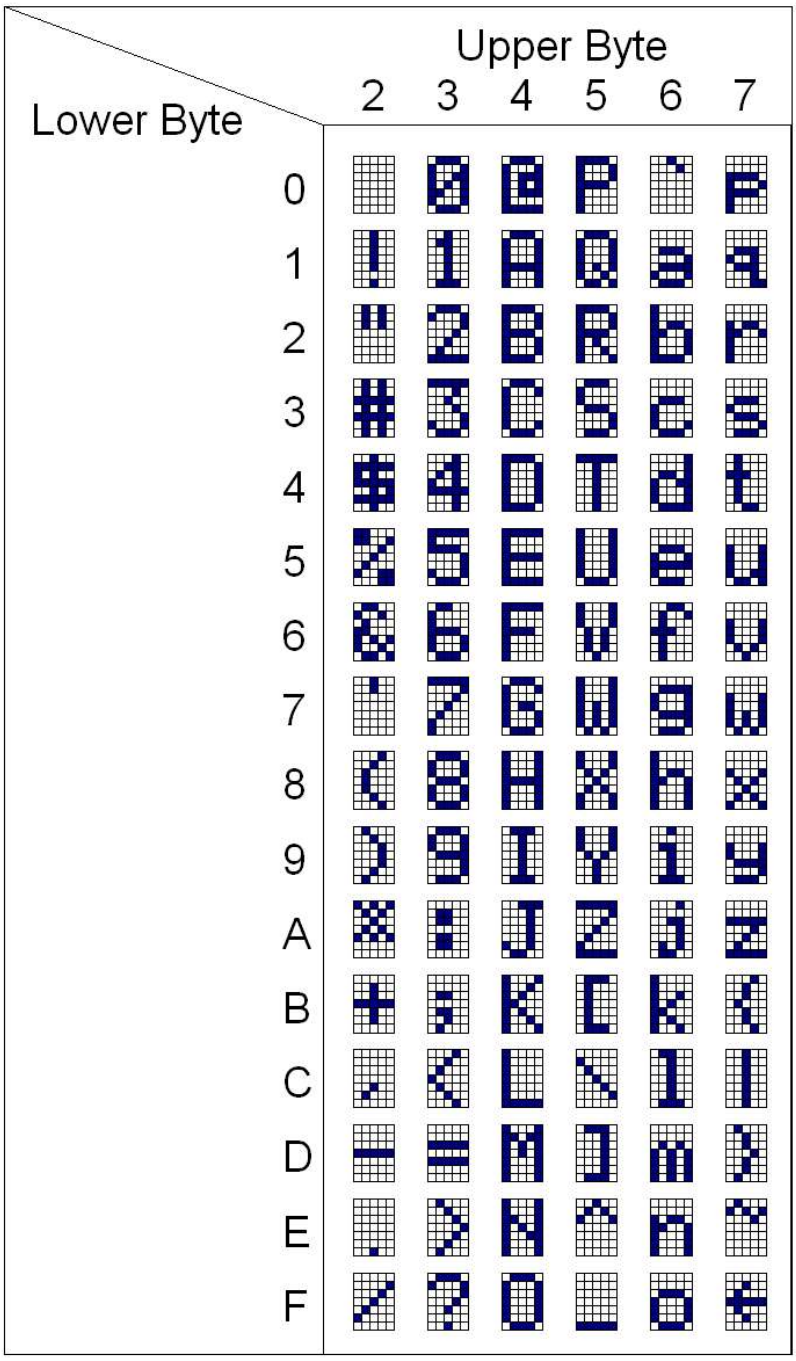
Character ROM



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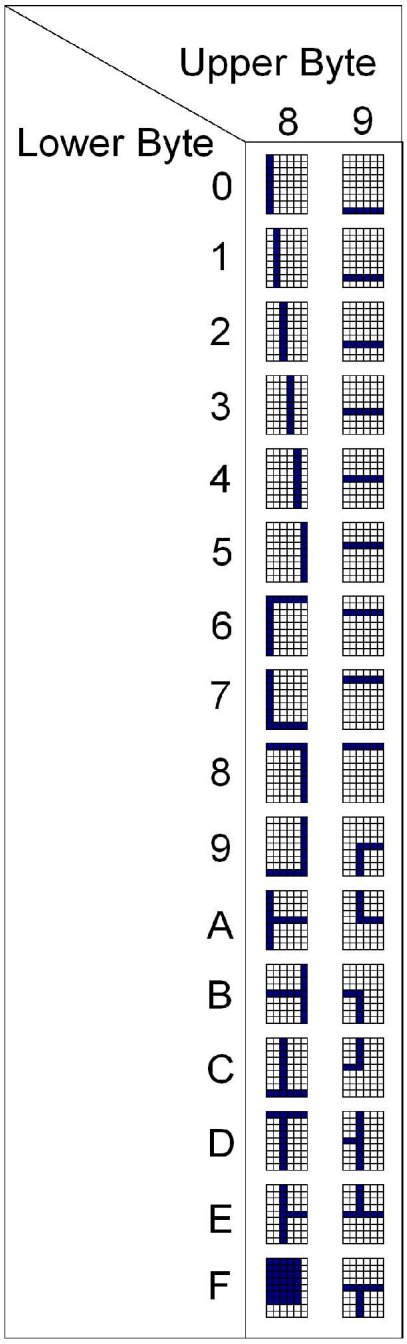
Graphic Characters in ROM

Graphic Characters allow the user to create screens with text and lines such as flow charts or menu buttons. All lines must be either horizontal or vertical; no diagonal lines are possible. Frames can be drawn around text.



Graphic Character Addresses