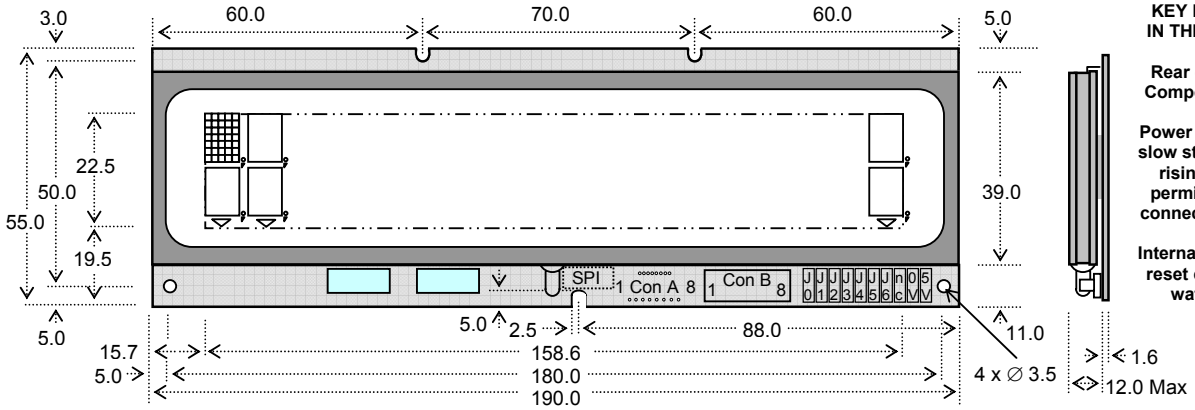
VACUUM FLUORESCENT DISPLAY MODULE CU20029SCPB-KV90B

- **2 Lines of 20 Characters**
- **9mm High 5 x 7 Dot Matrix Font**
- **Single 12V DC Supply**
- **High Brightness Blue Green Display**
- **ASCII + Extended Character Font**
- **Low Profile Construction**
- **Asynchronous Serial Interface**
- **User Defined Display Pixels**

The module includes the VFD glass, VF drivers and micro-controller with refresh RAM, character generation and interface logic. The RS232 serial interface is suitable for connection to a host PC serial port and accepts baud rates up to 19,200 with or without parity. Optional user SPI & I/O interfaces. User defined characters can be down loaded to the display RAM allowing any character pattern to be shown. The module features a low profile design with numerous custom options available including special fonts, application specific commands and key scanning. Please send us your request.



KEY FACTORS IN THIS DESIGN

Rear of PCB is Component Free

Power supply can slow start from 0V rising to 12V, permitting long connecting cable.

Internal brown out reset circuit and watchdog.

Con B is Molex 90814-0008 which mates with Molex 90327-0308. The 5V outputs on the jumper pads are for 15mA slave logic connection. **Dimensions in mm**

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Condition
Power Supply Voltage	V_{DD}	12.0VDC +/- 10%	G_{ND}=0V
Power Supply Current	I_{DD}	260 mA DC Typ.	V_{DD}=12V
RS232 Serial High Input	V_{IH}	3.5VDC min.	
RS232 Serial Low Input	V_{IL}	1.5VDC max.	
RS232 Serial High Output	V_{OH}	4.5VDC min.	
RS232 Serial Low Output	V_{OL}	0.33VDC max.	

Optical filters can provide violet, red, yellow, blue and green output.

OPTICAL CHARACTERISTICS

Character Size/Pitch (XxY mm)	5.25 x 9.0 / 8.0 x 10.5
Dot Size/Pitch (XxY mm)	0.85 x 1.05 / 1.1 x 1.33
Luminance	700 cd/m^2 (200 fL) Typ.
Colour of Illumination	Blue-Green (505nm)

ENVIRONMENTAL SPECIFICATION

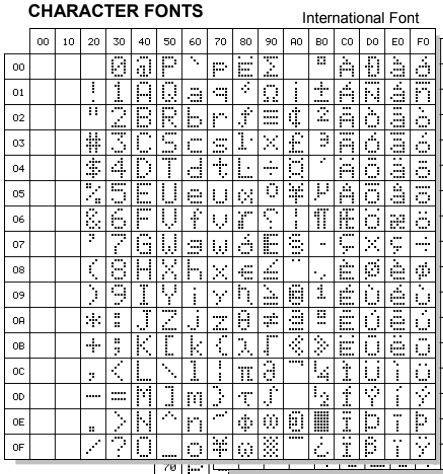
Operating Temperature	-30°C to +80°C
Storage Temperature	-40°C to +85°C
Operating Humidity	20 to 85% RH @ 25°C

SOFTWARE COMMANDS

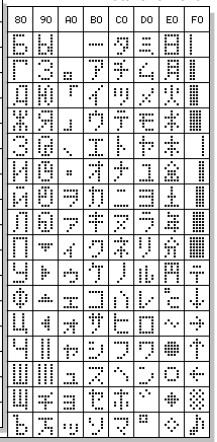
Command Name	Hex
Back Space	08
Horizontal Tab	09
Line Feed	0A
Cursor Home*	0C
Carriage Return	0D
Clear Display*	0E
XON (software handshaking)	11
Scroll Write Mode	12
XOFF(software handshaking)	13
Normal Write Mode*	14
Cursor On	15
Cursor Off*	16
Set Decimal Point On	17
Set Comma Tail On	18
Set Arrow On	19
Arrow, Point & Comma Off	1A
Escape	1B
➢ Report STATUS	+41
➢ Report RAM Check Sum	+43
➢ Cursor Position	+48
➢ Software Reset	+49
➢ Set Luminance to 50%	+4C
➢ Power Down (40mA typ)	+4D
➢ Report Version	+53
➢ Cursor Blink On	+54
User Defined Font	1C
Set to International Font*	1D
Set to Katakana Font	1E
Set to Russian Font	1F
Selected Font Characters Mixing Fonts is Permitted	20 – FF

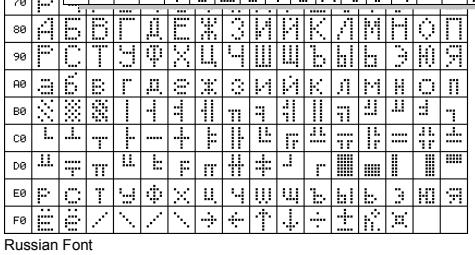
CHARACTER FONTS

International Font



Katakana Font





Russian Font

If J5 is Open, 'R' is sent to host if power 'on' or watchdog reset.

If parity error, 'P' is sent to host.

* Reset Default.

Custom fonts and commands available.

INTERFACE CONNECTORS

A	B	Signal	Function
5	1	DIN	Receive
1	2	EIN	Host Busy
3	3	DOUT	Transmit
2	4	EOUT	Module Busy
4	5	GND	0V
7	6	GND	0V
6	7	VDD	+12V
8	8	VDD	+12V

Link EIN and EOUT for XON/XOFF
CONA is a dual hole 2mm/2.54mm pitch array

PCB JUMPERS (O)pen (L)ink

Baud	J2	J1	J0
19200	O	O	O
9600	O	O	L
4800	O	L	O
2400	O	L	L
1200	L	O	O

Parity	J4	J3
EVEN	O	O
ODD	O	L
NONE	L	L

Test	J6
ON	L

CONTACT

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SOFTWARE COMMANDS

Instruction (Busy Time)	Data Format	Description
Backspace 10us	08H	Moves the cursor left by one character. If the cursor is at the left end of the bottom line the cursor moves to the right end of the line above If the cursor is at the left end of the top line no cursor movement is made.
Horizontal Tab 10us	09H	Moves the cursor right by one character. If the cursor is at the right end of the top line the cursor moves to the left end of the line below. When the cursor is at the right end of the bottom line the cursor moves to the left end of the top line.
Line Feed 10us	0AH	Moves the cursor down by one character. If the cursor is at the bottom of the display the cursor moves to the top of the display.
Cursor Home 10us	0CH	Moves the cursor position to the top left of the display.
Carriage Return 10us	0DH	Moves the cursor to the left end of the display maintaining the current vertical position.
Clear Display 304us	0EH	Clear all displayed characters. No cursor movement is made.
XON (Software Handshaking) 6us	11H	Signal host ready to receive data. 11H will be returned after each byte received to signal module ready. EIN and EOUT must first be linked to enable software handshaking.
Scroll Write Mode 6us	12H	When the cursor reaches the right end of the current line the contents are scrolled left by one character upon each further character write.
XOFF (Software Handshaking) 6us	13H	Signal host not ready to receive data. 13H will be returned after each byte received to signal module not ready. EIN and EOUT must first be linked to enable software handshaking.
Normal Write Mode 6us	14H	Increments the cursor position after every character write. If the cursor is at the right end of the bottom line the cursor will be moved to the left end of the top line. (default)
Cursor on 6us	15H	5x7 block cursor is displayed.
Cursor off 6us	16H	No cursor is displayed. (default)
Set Decimal Point on 10us	17H	Turns on the decimal point at the current cursor position.
Set Comma Tail on 10us	18H	Turns on the comma tail at the current cursor position.
Set Arrow on 10us	19H	Turns on the arrow at the current cursor position. (only effective on the bottom line)
Arrow, Point & Comma off 10us	1AH	Turns the arrow, decimal point and comma off at the current cursor position.
Report Status 6us (1BH) 4us (41H)	1BH + 41H	A single byte is returned containing the module's status. Bit 7 cursor row 0 = row 1, 1 = row 2 Bit 6 PSU status 0 = PSU on, 1 = PSU off Bit 5 luminance level 0 = 50%, 1 = 100% Bit 4 unused Bit 3 unused Bit 2 unused Bit 1/0 font set 00 = International, 01 = Katakana, 10 = Russian
Report RAM Checksum 6us (1BH) 20us (41H)	1BH + 43H	A single byte is returned containing the RAM checksum.
Cursor Position 6us (1BH) 7us (48H) 12us (00H-27H)	1BH + 48H + 00H – 27H	Sets the cursor position 0 – 39.
Software Reset 6us (1BH) 330us (49H)	1BH + 49H	Resets the display to power on defaults:- - International Font, Cursor Off, Maximum Brightness, Clear Display.
Set Luminance to 50% 6us (1BH) 10us (4CH)	1BH + 4CH	Sets the display brightness to 50% of maximum brightness.
Power Down 6us (1BH) 15us (4DH)	1BH + 4DH	Sets the module into power save mode. (40mA typical). Software reset command (1BH 49H) must be given to stop power save mode. Please note: The module will reset to power on defaults after the reset command.
Report Version 6us (1BH) 18us (53H)	1BH + 53H	The software version is returned as a single byte between 1 and 255.
Cursor Blink on 6us (1BH) 18us (54H)	1BH + 54H	Cursor is set to blink at a frequency of 1Hz. The block cursor will not appear until 'Cursor on' command has been received.
User Defined Font 6us (1CH) 6us (data bytes 1-4) 30us (data byte 5)	1CH + data byte 1 + data byte 2 + data byte 3 + data byte 4 + data byte 5	Defines a user character at the current cursor position. All user defined fonts are lost at power on or reset.
Select Font Table 7us	1DH/1EH/1FH	1DH = International Font (default). 1EH = Katakana Font. 1FH = Russian Font
Selected Font Characters 28us	20H – FFH	Display character from selected font.

Bit / Byte assignment

	7	6	5	4	3	2	1	0
Byte 1	P1	P2	P3	P4	P5	P6	P7	P8
Byte 2	P9	P10	P11	P12	P13	P14	P15	P16
Byte 3	P17	P18	P19	P20	P21	P22	P23	P24
Byte 4	P25	P26	P27	P28	P29	P30	P31	P32
Byte 5	P33	P34	P34	-	-	-	-	-

Dot assignment

P1	P2	P3	P4	P5
P6	P7	P8	P9	P10
P11	P12	P13	P14	P15
P16	P17	P18	P19	P20
P21	P22	P23	P24	P25
P26	P27	P28	P29	P30
P31	P32	P33	P34	P35

Notes:- Busy times are not inclusive of a 500us scan period, this must be taken into consideration. If the cursor is enabled, busy times will increase by a further 50us. Cursor position (00H) is the top left of the display. All data shown is in hexadecimal format.