Futaba®

REV.–

TO FEG

VACUUM FLUORESCENT DISPLAY MODULE

ENGINEERING PROPOSAL

M202MD20CY

EVALUATION
☐ ACCEPTED WITHOUT ANY CHANGE
☐ THE FOLLOWING CHANGE IS REQUIRED

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1. GENERAL SPECIFICATIONS

1-1. Type

Table-1

Type	M202MD20CY
Digit Format	5×7 Dot Matrix with Descriptor, period and comma

1-2. DIMENSIONS, WEIGHT (Refer FIGURE-1)

Table-2

Item	Specification	Unit
Outer Dimension	(L) 204±1.0 (W) 49.5±1.0 (T) 23.1 Max.	mm
Weight	T.B.D	g

1-3. SPECIFICATIONS OF THE DISPLAY PANEL (Refer FIGURE-4)

Table-3

Item	Specification	Unit
Display Area (M×H)	157.05×22.86	mm
Number of Digits	20 digits (5×7)×2 rows	–
Digits Size (H×M)	9.03×5.25	mm
Color of Illumination	Green (λp=505nm)	–

1-4. ENVIRONMENT CONDITIONS

Table-4

Item	Symbol	Min.	Max.	Unit
Operating Temperature	*T*opr	-40	+85	°C
Storage Temperature	*T*stg	-40	+85	°C
Operating Humidity	*H*opr	20	85	%
Storage Humidity	*H*stg	20	90	%
Vibration (10 to 55 Hz)	–	–	4	G
Shock	–	–	40	G

Note) Avoid operations and or storage in moist environmental conditions.

1-5. ABSOLUTE MAXIMUM RATINGS

Table-5

Item	Symbol	Min.	Max.	Unit
Supply Voltage	*V*cc	–	6.3	V
Input Signal Voltage	V_{IS}	-0.3	*V*cc+0.3	V

1-6. RECOMMENDED OPERATING CONDITIONS

Table-6

Item	Symbo	Condition	Min.	Typ	Max.	Unit
Supply Voltage	Vcc	–	4.75	5.0	5.25	V
H-Level Input Voltage	V_{IH}	USB	2.0	–	–	V
L-Level Input Voltage	V_{IL}		—	–	0.8	V
Difference input sensitivity	V_{DI}	|(D+)-(D-)|	0.2	—	—	V
Deta "1"(MARK)	V_{MARK}	RS232-C	-15	—	-5	V
Deta "0"(SPACE)	V_{SPACE}		5	—	15	V

1-7. ELECTRICAL CHARACTERISTICS

Table-7

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Current	Icc	–	900	1250	mA
Power Consumption	–	–	4.5	6.25	W
Luminance	L	350	700	–	cd/m^2
H-Level Output Voltage	V_{OH}	Vcc-0.5	–	–	V
L-Level Output Voltage	V_{OL}	–	–	0.5	V

Note) The surge current can be approx.3 times the specified supply current at power on. However, the exact peak surge current amplitude and duration are dependent on the Characteristics of the host power supply.

2. FUNCTIONS

2-1. DATA AND CONTROL CODE WRITE IN

The display character form follows equivalent to ASCII (Alphabets, Cyrillic alphabets, Numerals, and Symbols etc.).

After a character is written in, the write-in position will be shifted to the right one digit automatically.

A character data is written in to the right end of second row, the write-in position will move to the left end of first row.

The new character data is written in to the left end of first row, new character is over-writed.

2-2. CONTROL CODE

The control codes are available as follows.

The details will be explained from the next page.

(1)	DIM	: Dimming	: (04 HEX)
(2)	BS	: Back Space	: (08 HEX)
(3)	HT	: Horizontal Tab	: (09 HEX)
(4)	CLR	: Clear	: (0D HEX)
(5)	DP	: Display Position	: (10 HEX)
(6)	ALD	: All Display	: (0F HEX)
(7)	BLK	: Blinking	: (0A HEX)
(8)	SCR	: Scroll	: (0B HEX)
(9)	DC	: Cursor Mode	: (17 HEX)
(10)	DC1	: Cyrillic Font Select	: (1B HEX)
(11)	DC2	: Japanese Katakana Font Select	: (1C HEX)
(12)	DC3	: General European Font Select	: (1D HEX)
(13)	RST	: Reset	: (1F HEX)
(14)	PRD	: Period Set	: (1E+2E HEX)
(15)	CMA	: Comma Set	: (1E+2C HEX)
(16)	PAC	: Period and Comma Set	: (1F+3B HEX)
(17)	UDF	: Store a User-Definable Font	: (18 HEX)
(18)	DUF	: Display a User-Definable Font	: (19 HEX)

(1) DIM (Dimming)
The luminance can be controlled into six levels by using this function.
After writing 04 HEX, the following dimming data is written to change the luminance out put.

1 Byte (04 HEX) (DIM command code)	+	1 Byte (Dimming level data)

Table-8

Dimming Level	Data
100 %	FF HEX
80 %	80 HEX
60 %	60 HEX
40 %	40 HEX
20 %	20 HEX
0%	00 HEX

(2) BS (Back Space)
The write-in position is shifted to the left one digit, and character previously displayed on the digit will be cleared.
When the write-in position is on the most significant digit of the second row, the write-in position moves to the least significant digit of the first row.
When the write-in position is on the most significant digit of the first row, the write-in position moves to the least significant of the second row.

(3) HT (Horizontal Tab)
The write-in position is shifted to the right one digit. When the write-in position is on the least significant digit of the first row, the write-in position will move to the most significant of the second row.
When the write-in position is on the least significant digit of the second row, the write-in position will move to the most significant digit of the first row.

(4) CLR (Clear)
All the characters displayed are erased, the write-in position moves to the most significant digit of the first row.
But the Dimming level and Cursor Mode are kept.

(5) DP (Display Position)
Instead of writing a character from the first digit, the write-in starting position can be pointed out by using this function.
After writing 10 HEX to prepare the module for this command, the successive another HEX byte is written to specify the position desired.

(6) ALD (All Display)
The full dots in all digits are displayed.
The dimming level is set for 100 %.
To release this mode, the module should be turned off or the RST command should be written.

	The most significant digit	The least significant digit
First row	00 HEX	13 HEX
Second row	14 HEX	27 HEX

(7) BLK (Blinking)

Blinking character can be realized by using this command.
The command frame consists of following three bytes.

1 byte	+	1 byte	+	1 byte
0A hex		(Start digit)		(Number of digits)

- The second byte represents start digit address of the blinking ON/OFF characters. (The value of the digit address is specified as below.)

Start digit address (hex)

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27

- In case 28 ~ FF hex is transferred as the second byte, its data is ignored and also BLK command will be canceled then.
- The third byte represents the number of digits which is specified as the blinking digits.
- In case the number of specified digits overflows the display area, the data is ignored and also BLK command will be canceled then.
- The maximum value of the third byte is the number of digits from the start digits specified by second byte to the right end digit of the second row.
- To make the digits blinking ON or OFF the most significant bit of the third byte must be set to "1" or "0".

D7	D6	D5	D4	D3	D2	D1	D0
	0	0					

1 : blinking ON
0 : blinking OFF

(Note) In case specified digits for blinking overlap an area where has been previously specified, latest command data is prior.

(Note) After executing CLR/ALD/RST, all of blinking digits are initialized as blinking OFF.

(8) SCR (Scroll)

SCR command can realize an automatic scrolling message.

Command frame

1 byte	+	1 byte	+	1 byte	+	60 byte max.
0B(HEX)		(Scroll mode)		(Timer)		(Message data)

- A Message starts scrolling after receiving all of data in a command frame. The end of data is identified by the code "END" (02 hex). In case there are some characters on the specified row, once the row is cleared and starts scrolling a message.
- After starting to scroll a message, write-in position moves to the left end of the row where is not defined to the scroll mode.
- The scroll mode can be canceled by CLR/ALD RST commands.

1) Scroll mode set

Selection of the row and direction are specified by the second byte (Scroll mode) as follows.

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	0	0		

1: Scrolling at the first row
0: Scrolling at the second row

1: Scrolling to the right side from the left.
0: Scrolling to the left side from the right.

2) Timer
This third byte specifies an interval time of scrolling. Minimum interval time is 0.1 sec.

Table-9

Interval time	0.1 sec	0.2 sec	-----	12.7 sec
Data	01 hex	02 hex	-----	7F hex

* Initial value is 0.5 sec as 00 hex.

3) Message data
Maximum 60 bytes characters can be displayed with scrolling. These 60 bytes data include ID data which are described as follows and can realize some functions in the scrolling

*ID data

a) PAUSE (01 hex)+(Pause time, 1byte):
The scrolling pauses for a time specified the following one byte.

Table-10

Pause time	0.1 sec	0.2 sec	-----	12.7 sec
Data	01 hex	02 hex	-----	7F hex

* Initial value is 0.5sec as 00 hex.

b) CLEAR (03 hex):
Clear displaying message on the row. Afterwards it continues from the character after Clear ID code 03 hex.

c) END (02 hex):
The END ID code 02 hex must be transferred following the message data.
After receiving END, ID code, the messages restart from the top of the message data.

Note1) In case a message data is 60 bytes without END data, the scrolling message starts again from the top of the message data.

2) In case a message data is 60 bytes and last data is PAUSE, the PAUSE function is canceled.

3) When a scrolling message begins, cursor mode is set for non lighting mode, and all of blinking characters are canceled (no blinking), brightness level is set at 100%.

4) In case the module receives DC/BLK/DIM TBK/SCR/CAL commands while scrolling message, these command are ignored.

5) In case command frame data or message data includes improper data, all of data are ignored and also SCR command will be canceled then.

(9) DC (Cursor Mode)

After writing 17 HEX, the successive another HEX byte mentioned under is written to change the cursor mode.

1 Byte (17 HEX)	+	1 Byte
(DC command code)		(Select Mode Data)

Table-9

Select Mode	Data
Lighting	FF HEX
Blinking	88 HEX
No Lighting	00 HEX

The cursor is always displayed at the write-in position.

The cursor is formed by the five dots located the bottom of 5×7 dots matrix character font.

The cursor will be displayed as an over writing mode and the behavior of the cursor under the lighting mode and blinking mode are explained below.

a) Lighting Mode

When the non displayed position is assigned as a write-in position, the cursor will be displayed there.

But, the position that one of the characters has already been located is assigned, this character will be eliminated and the cursor will be displayed.

b) Blinking Mode

The cursor will be repeated ON and OFF every 0.3 second when the non displayed position is selected for the write-in position.

And the position of the character has already been located on is selected (as a write-in position), the character and the cursor will be displayed alternately.

c) No Lighting Mode

The no lighting mode means that the cursor will not be displayed. When the power is turned on, no lighting mode will be selected automatically.

Therefore, if the cursor is required, DC command should be sent to select the cursor lighting or blinking mode.

(10) DC1 (Cyrillic Font Select)

The Cyrillic font Select (See figure-3) is selected.

DC1 is selected at the time of power source throwing, until DC2 or DC3 is executed, selection of the font table does not change.

(11) DC2 (Japanese Katakana Font Select)

The Japanese Katakana font Select (See figure-4) is selected.

(12) DC3 (General European Font Select)

The General European font Select (See figure-5) is selected.

(13) RST (Reset)

This command is used to initialize the module.
All the characters displayed are erased, then the write-in position will be set on the most significant digit of the first row.
The displaying status is the same as the power on reset, but the font data which the customer has defined are kept.
The cursor mode is set for no lighting mode, the dimming level is set for 100 %.
When this command is executed, selection of the font table becomes DC1.

(14) PRD (Period Set)

Both of the character code, which specified with Pd and the period at the right side of the character are displayed. The character and period are moved or cleared when execution of each command or overwrite of the usual character code are performed.

1 byte		1 byte		1 byte
1E hex	+	2E hex	+	*Pd*

(15) CMA (Comma Set)

Both of the character code, which specified with Pd and the comma at the right side of the character are displayed. The character and comma are moved or cleared when execution of each command or overwrite of the usual character code are performed.

1 byte		1 byte		1 byte
1E hex	+	2C hex	+	*Pd*

(16) PAC (Period and Comma Set)

Both of the character code, which specified with Pd the period and the comma at the right side of the character are displayed. The character and period and comma are moved or cleared when execution of each command or overwrite of the usual character code are performed.

1 byte		1 byte		1 byte
1E hex	+	3B hex	+	*Pd*

(17) UDF (Store a User-Definable Font)

The characters can be designed by using this command.
These font data are memorized in the RAM of the module.

1 Byte (1B HEX) + 1 Byte (00～0F HEX) +PT1 +PT2 + PT3 +PT4 + PT5
(UDF command code) (CHR code)

Any 5×7 dots pattern consisted of data form PT1 through PT5 (3rd to 7th byte) can be stored in the character code location specified by CHR (2nd byte).
And the maximum kinds of UDFs (User Definable Fonts) are 16 characters at once.

1st byte	: UDF (1B Hex)	••Specify UDF command
2nd byte	: CHR (00 Hex to 0F Hex)	••Specify the character code location
3rd to 7th byte	: (00 Hex to FF Hex)	••Specify ON or OFF of 35 dots position

FIG-1 shows the relation between dot position and data formation.
The notation of "X,Y" means the Yth bit of Xth byte.
For example, the 3.0 means LSB of 3rd byte. ("1"= dot turn on, "0"= dot turn off)

Bit Map of 5 x 7 Dot

3.7	3.6	3.5	3.4	3.3
3.2	3.1	3.0	4.7	4.6
4.5	4.4	4.3	4.2	4.1
4.0	5.7	5.6	5.5	5.4
5.3	5.2	5.1	5.0	6.7
6.6	6.5	6.4	6.3	6.2
6.1	6.0	7.7	7.6	7.5

Note) 7.0 to 7.4 are don't care.

(Example) In case of "F"

1	1	1	1	1
1	0	0	0	0
1	0	0	0	0
1	1	1	1	0
1	0	0	0	0
1	0	0	0	0
1	0	0	0	0

PT1 (3rd byte) : FC Hex
PT2 (4th byte) : 21 Hex
PT3 (5th byte) : E8 Hex
PT4 (6th byte) : 42 Hex
PT5 (7th byte) : 00 Hex

(18) DUF (Display a User-Definable Font)

The character defined by UDF is displayed by this command.
After writing 1C HEX, the successive CHR code is written to display User Definable Font. The CHRs are character codes defined by UDF.

1 Byte (1C HEX) + 1 Byte (00～0F HEX)
(DUF command code) (CHR code)

3. INTERFACE CONNECTION

3-1-1 RS-232C CONNECTION

Connector : 5267-08A-X (CN1) (Molex) or equivalent
Socket : 5264-08 (Molex) or equivalent

Table-11

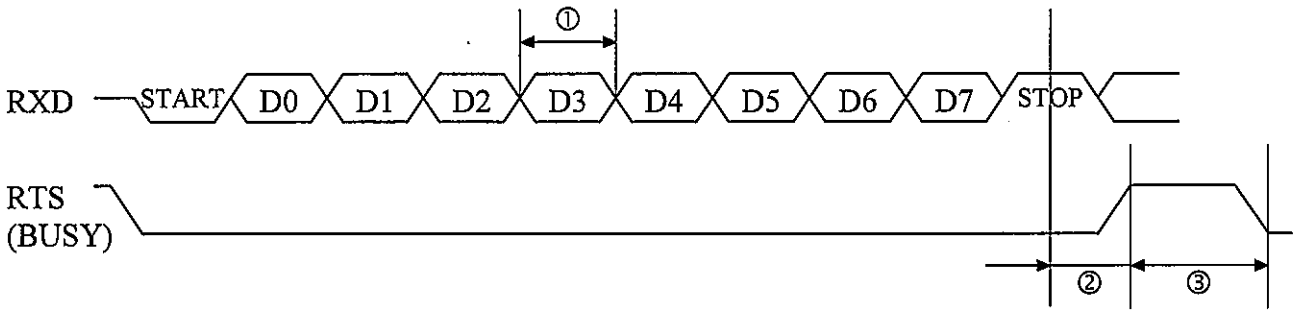
PIN No.	Signal	Output/Input
1	RTS	Output
2	CTS	Input
3	GND	–
4	GND	–
5	RXD	Input
6	TXD	Output
7	+5V	–
8	+5V	–

Note) The module can received data regardless of the CTS level, when RTS signal is enable (RTS = SPACE "0").

3-1-2. WRITE-IN TIMING

Serial Input

* The signal level in the following timing chart is described by logic level. (Not RS232C level)



① t (DATA) = 10^6/9600(bps) [μs]
② t (WAIT) = 200 [μs] MAX
③ t (BUSY) = 1 [ms] MAX

3-2-1 USB CONNECTION

This module will communicate with the USB 2.0 interface (Full speed) if the USB cable is plugged.
The communication with USB is based on HID class.
VFD Control Protocol uses HID report. HID report consists of the byte number of sending data and the sending data.
For HID, the report of data (IN or OUT) is fixed-length
The sum of data size and data is declared in HID Report Descriptor.
The data size means the size of sending data. Max is 63. So the report can send 63bytes data max.

Following is type of report.
| Data Size(8) | Data(8)[63] |

[Example]
Brightness adjustment (100%) and Display 'ABC'
06 1B 17 0F 41 42 43 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00

Connector : 5268-09A(CN2) (Molex) or equivalent
Socket : SD-5264-09 (Molex) or equivalent

Table-12

PIN No.	Signal	Remarks
1	Vcc	USB Bus power
2	D-	Differential Signal
3	D+	Differential Signal
4	GND	—
5	CN-FGND	Frame Ground
6	+5V	External Power Source
7	+5V	External Power Source
8	GND	—
9	GND	—

3-2-2 USB DESCRIPTOR

Standard Device Descriptor Table-13

Offset	Field	Description	Size [byte]	Value	Comment
0	bLength	Size of descriptor in bytes	1	12H	
1	bDescriptorType	DEVICE Descriptor Type	1	01H	
2	bcdUSB	USB Release Number in BCD	2	0200H	Rev.2.0
4	bDeviceClass	Class code	1	00H	
5	bDeviceSubClass	Subclass code	1	00H	
6	bDeviceProtocol	Protocol code	1	00H	
7	bMaxPacketSize	Maximum packet size for endpoint zero	1	40H	64 bytes
8	idVendor	Vendor ID	2	1008H	Futaba
10	idProduct	Product ID	2	T.B.D	M202MD20CY
12	bcdDevice	Device release number in BCD	2	0100H	1.00
14	iManufacturer	Index of string descriptor describing manufacturer	1	01H	
15	iProduct	Index of string descriptor describing product	1	02H	
16	iSerialNumber	Index of string descriptor describing the device's serial number	1	00H	
17	bNumConfigurations	Number of possible configurations	1	01H	

Standard Configuration Descriptor Table-14

Offset	Field	Description	Size [byte]	Value	Comment
0	bLength	Size of this descriptor in bytes	1	09H	
1	bDescriptorType	CONFIGURATION Descriptor Type	1	02H	
2	wTotalLength	Total length of data returned for this configuration	2	003BH	59 bytes
4	bNumInterfaces	Number of interfaces supported by this configuration	1	01H	
5	bConfigurationValue	Value to use as an argument	1	01H	
6	iConfiguration	Index of string descriptor describing this configuration	1	00H	
7	bmAttributes	Configuration characteristics	1	C0H	Bus powered Disable Remote Wakeup
8	MaxPower	Maximum power consumption	1	FAH	500mA

Interface Descriptor (#1) Table-15

Offset	Field	Description	Size [Byte]	Value	Comment
0	bLength	Size of this descriptor in bytes	1	09H	
1	bDescriptorType	INTERFACE Descriptor Type	1	04H	
2	bInterfaceNumber	Number of this interface	1	00H	VFD Control
3	bAlternateSetting	Value used to select this alternate setting	1	00H	
4	bNumEndpoints	Number of endpoints used by this interface	1	01H	
5	bInterfaceClass	Class code	1	03H	HID
6	bInterfaceSubClass	Subclass code	1	00H	
7	bInterfaceProtocol	Protocol code	1	00H	
8	iInterface	Index of string descriptor describing this interface	1	02H	

HID Descriptor (#1) Table-16

Offset	Field	Description	Size [Byte]	Value	Comment
0	bLength	Size of HID descriptor	1	09H	
1	bDescriptorType	HID descriptor type	1	21H	HID Class descriptor
2	bcdHID	HID class specification	2	0110H	HID Revision 1.10
4	bCountry	Country code of the localized hardware	1	00H	Not defined
5	bNumDescriptors	Number of class descriptors	1	01H	1 report descriptor
6	bReportType	Type of class descriptor	1	22H	REPORT descriptor
7	wReportLength	Descriptor length	2	0027H	39 bytes

Endpoint Descriptor (#1) Table-17

Offset	Description	Size [Byte]	Value	Comment
0	Size of this descriptor in bytes	1	07H	
1	ENDPOINT Descriptor Type	1	05H	
2	The address of the endpoint on the USB device described by this descriptor	1	83H	EP3, IN
3	The endpoint's attributes	1	03H	Interrupt Transfer
4	Maximum packet size this endpoint	2	0008H	
6	Interval for polling endpoint for data transfers	1	14H	20[ms]

HID Report Descriptor(#1) Table-18

Part	Value (HEX)
Usage Page(Vendor-defined),	06 7F FF
Usage (VFD_CONTROL),	09 06
Collection (Application),	A1 01
Usage (VFD_DATA_SIZE),	09 80
Logical Minimum (0),	15 00
Logical Maximum (255),	26 FF 00
Report Size (8),	75 08
Report Count (1),	95 01
Input (Data,Variable,Absolute),	81 02
Usage (VFD_DATA_INPUT),	09 81
Report Count (63),	95 3F
Input (Data,Variable,Absolute),	81 02
Usage (VFD_DATA_SIZE),	09 80
Report Count (1),	95 01
Output (Data,Variable,Absolute),	91 02
Usage (VFD_DATA_OUTPUT),	09 82
Report Count (63),	95 3F
Output (Data,Variable,Absolute),	91 02
End Collection	C0

Table-19

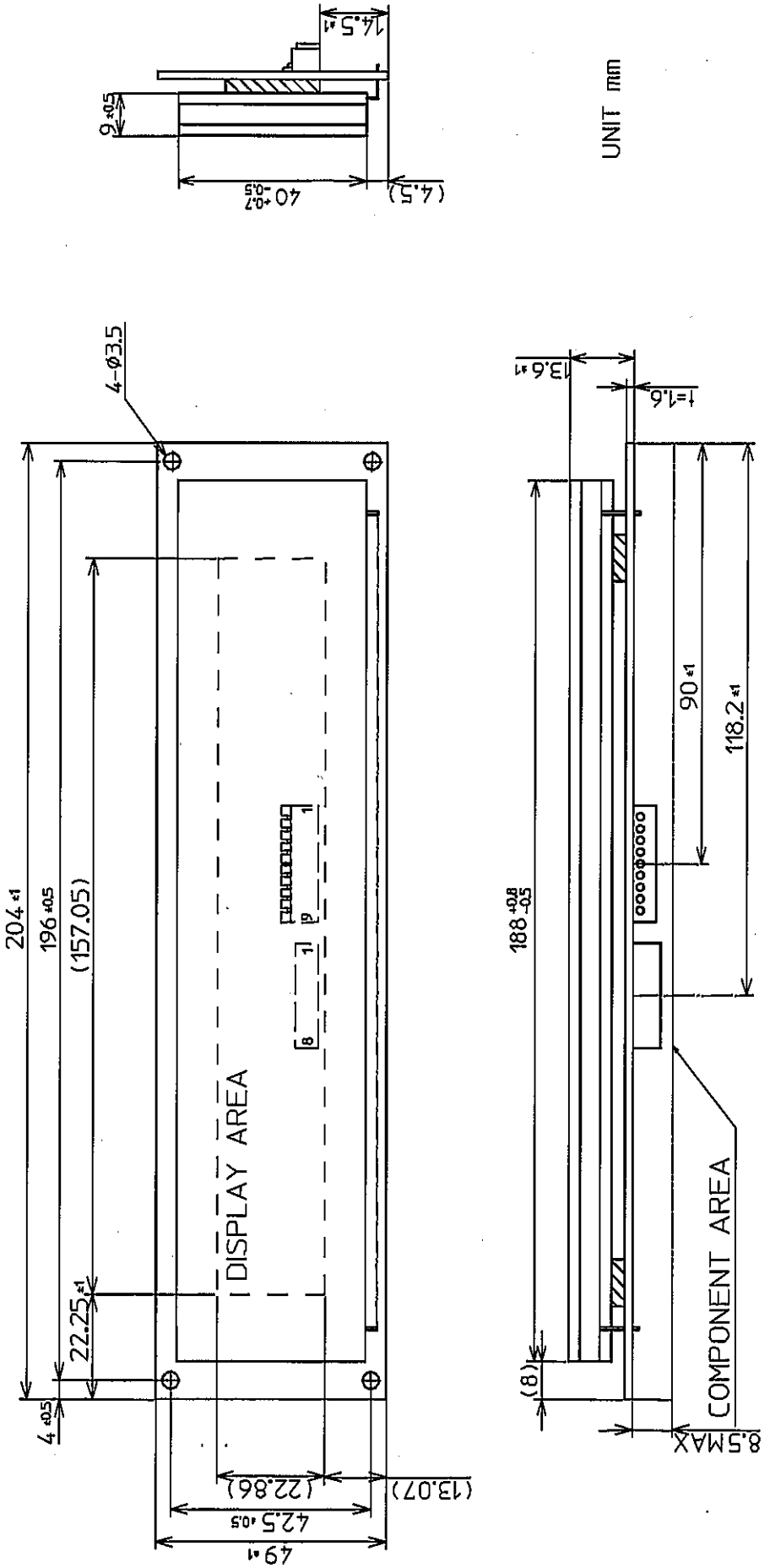
Description	Value (HEX)
VFD_CONTROL	06
VFD_DATA_SIZE	80
VFD_DATA_INPUT	81
VFD_DATA_OUTPUT	82

String Descriptor Table-20

No	Part	Description	Value
No.0	bLength	Length	0x04
	bDescriptorType	type=STRING	0x03
	bSting	LangID (English US)	0x0409
No.1	length	Length	TBD
	bDescriptorType	Type=STRING	0x03
	bSting	Manufacturer	TBD
No.2	bLength	Length	TBD
	bDescriptorType	Type=STRING	0x03
	bSting	Product	TBD

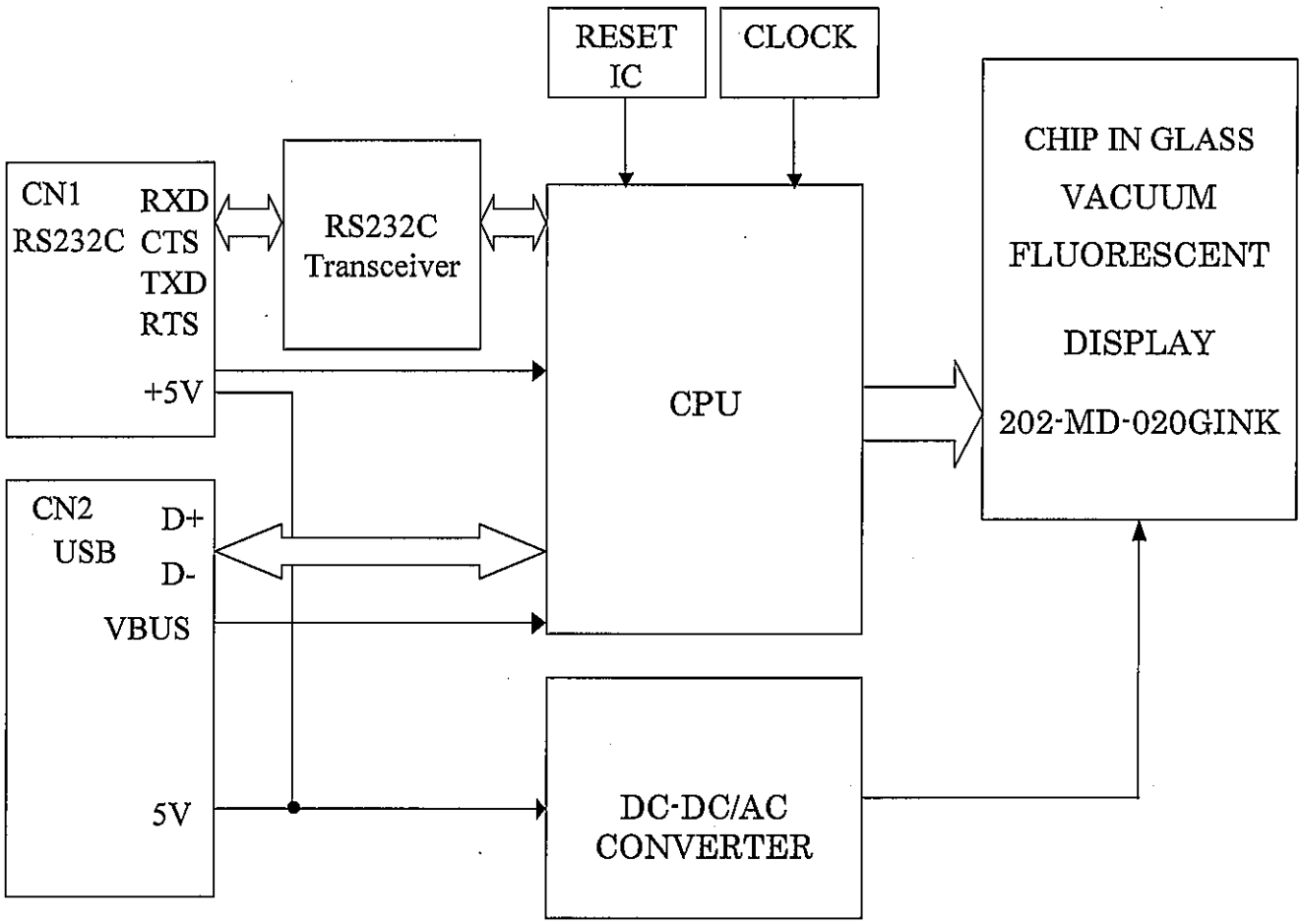
M202MD20CY MECHANICAL DRAWING

FIGURE-1



M202MD20CY　CIRCUIT BLOCK DIAGRAM

FIGURE-2



M202MD20CY DISPLAY CHARACTER CODE

FIGURE-3

Cyrillic font table

D7 D6 D5 D4 / D3 D2 D1 D0	0 0 0 0	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0	0 1 0 1	0 1 1 0	0 1 1 1	1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 0 0 0	0		DP	SP							SP					
0 0 0 1	1															
0 0 1 0	2															
0 0 1 1	3															
0 1 0 0	4	DIM														
0 1 0 1	5															
0 1 1 0	6															
0 1 1 1	7		DC													
1 0 0 0	8	BC	UDF													
1 0 0 1	9	HT	DUF													
1 0 1 0	A	BLK														
1 0 1 1	B	CRS	DC1													
1 1 0 0	C		DC2													
1 1 0 1	D	CLR	DC3													
1 1 1 0	E		PRD CMA PAC													
1 1 1 1	F	ALD	RST													

SP : SPACE

M202MD20CY DISPLAY CHARACTER CODE

FIGURE-4

Japanese Katakana font table

D7 D6 D5 D4 / D3 D2 D1 D0	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 0 0 0	0		DP	SP												
0 0 0 1	1															
0 0 1 0	2															
0 0 1 1	3															
0 1 0 0	4	DIM														
0 1 0 1	5															
0 1 1 0	6															
0 1 1 1	7		DC													
1 0 0 0	8	BC	UDF													
1 0 0 1	9	HT	DUF													
1 0 1 0	A	BLK														
1 0 1 1	B	CRS	DC1													
1 1 0 0	C		DC2													
1 1 0 1	D	CLR	DC3													
1 1 1 0	E		PRD CMA PAC													
1 1 1 1	F	ALD	RST													

SP : SPACE

M202MD20CY DISPLAY CHARACTER CODE

FIGURE-5

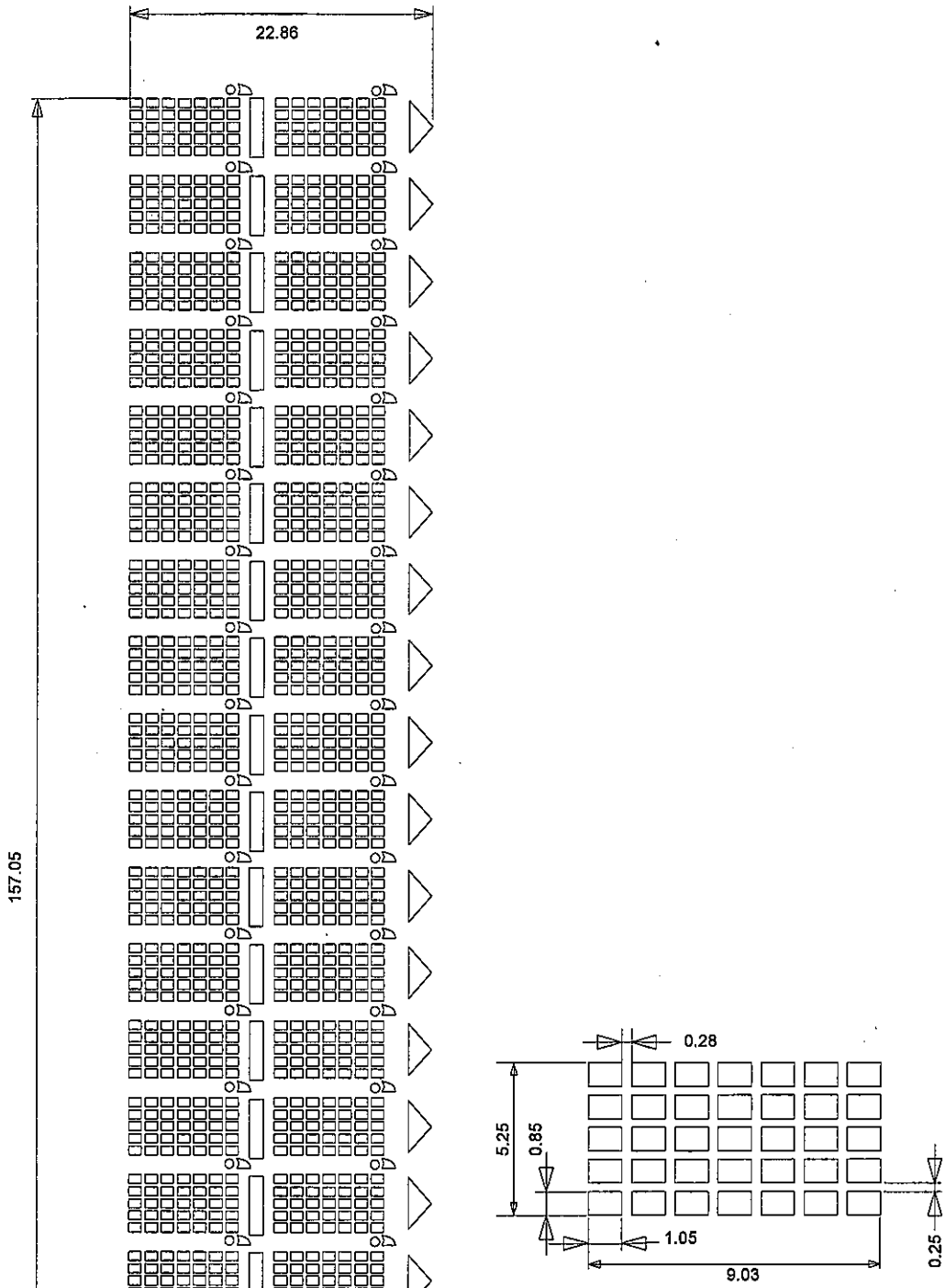
General European font table

D3 D2 D1 D0 \ D7 D6 D5 D4	0 0 0 0	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0	0 1 0 1	0 1 1 0	0 1 1 1	1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 0 0 0	0		DP	SP	0	@	P	`	p	Ç	É	á	∟	≡	α	≈
0 0 0 1	1			!	1	A	Q	a	q	ü	æ	í	▒	╞	ß	±
0 0 1 0	2			"	2	B	R	b	r	é	Æ	ó	▓	╟	Γ	≥
0 0 1 1	3			#	3	C	S	c	s	â	ô	ú	│	╚	π	≤
0 1 0 0	4	DIM		$	4	D	T	d	t	ä	ö	ñ	┤	╔	Σ	⌠
0 1 0 1	5			%	5	E	U	e	u	à	ò	Ñ	╡	╩	σ	⌡
0 1 1 0	6			&	6	F	V	f	v	å	û	ª	╢	╦	µ	÷
0 1 1 1	7		DC	'	7	G	W	g	w	ç	ù	º	╖	╠	τ	≈
1 0 0 0	8	BC	UDF	(	8	H	X	h	x	ê	ÿ	¿	╕	═	Φ	°
1 0 0 1	9	HT	DUF	)	9	I	Y	i	y	ë	Ö	⌐	╣	╬	Θ	∙
1 0 1 0	A	BLK		*	:	J	Z	j	z	è	Ü	¬	║	╧	Ω	·
1 0 1 1	B	CRS	DC1	+	;	K	[	k	{	ï	¢	½	╗	╨	δ	√
1 1 0 0	C		DC2	,	<	L	\	l	|	î	£	¼	╜	∞	ⁿ	²
1 1 0 1	D	CLR	DC3	-	=	M	]	m	}	ì	¥	¡	╜	SP	φ	ε	■
1 1 1 0	E		PRD CMA PAC	.	>	N	^	n	~	Ä	₧	«	╛	SP	ε	SP	SP
1 1 1 1	F	ALD	RST	/	?	O	_	o	⌂	Å	ƒ	»	┐	SP	∩	≡	

SP : SPACE

M202MD20CY　DISPLAY PATTERN DETAIL

FIGURE-6



5. WARRANTY

This display module is guaranteed for one year after the shipment from FUTABA.

6. CAUTIONS FOR OPERATION

6-1. Since VFD is are made of glass material.
Avoid applying excessive shock or vibration beyond the specification for the module.
Careful handing is essential.

6-2. Applying lower voltage than the specified may cause non activation for selected pixels.
Conversely, higher voltage may cause non-selected pixel to be activated.
If such a phenomenon is observed, check the voltage level of the power supply.

6-3. Avoid plugging or unplugging the interface connection with the power on.

6-4. Avoid using the module where excessive noise interference is expected.
Noise affects the interface signal and causes improper operation.
Keep the length of the interface cable less than 50cm.
(When the longer cable is required, please confirm there is nose affection.)

6-5. When power is turned off, the capacitor will not discharge immediately.
Avoid touching IC and others.
The shorting of the mounted components within 30 sec., after power off, may cause damage.

6-6. The fuse is mounted on the module as circuit protection.

6-7. When fixed pattern is displayed for long time, you may see uneven luminance.
It is recommended to change the display patterns sometimes in order to keep best display quality.

＊This product is the RoHS order corresponding module.

REMARKS

This specification is subject to change without prior notice.
Your consultation with FUTABA sales office is recommended for the use of this module.