



DATA SHEET

FLUORESCENT INDICATOR MODULE FC20X1SA-AA/AB

X-Y DOT TYPE FIP MODULE (CHARACTER) 20^{ch} × 1^{line}, 5 × 7 DOT FORMAT

NEC Dot Matrix Type Fluorescent Indicator Modules, Model FC20X1SA-AA/AB, provide 20 characters capacity (1 line x 20 characters) of alphanumeric and any kind of foreign characters with associated electronics, having repertoire of up to 224 characters defined by 8-bit codes.

The characters are displayed on NEC FLUORESCENT INDICATOR PANEL (FIP), model CF20X1SA in a 5 x 7 dot matrix.

These FIP modules are of CIG (Chip In Glass) type and are equipped with:

- An eight-bit one-chip CMOS microcomputer
- Latch and driver chips
- Character generator
- DC/DC, AC converter
- Reset circuitry

These modules are readily interfaced to a host system since they can be directly connected to the Data Bus and other control signals, making them particularly suitable for OEM's sophisticated applications such as man-machine interface.

FEATURES

- Can be driven by 5 V power source.
- Directly connectable to a Data Bus of a host system because it is equipped with a microcomputer chip.
- Data input through an 8-Bit Parallel or Serial Data Bus.
- Wide operational temperature range (-20 to +70 °C).
- Long life and high reliability.
- Light in weight and very compact.

APPLICATIONS

- Word-processing equipment
- Typewriters
- Photocopiers
- Medical/Chemical analytical instruments
- Automated teller terminals
- N/C machine tools
- Test instrumentation
- Data terminals

The information in this document is subject to change without notice.

FC20X1SA-AA/AB

NEC ELECTRONICS

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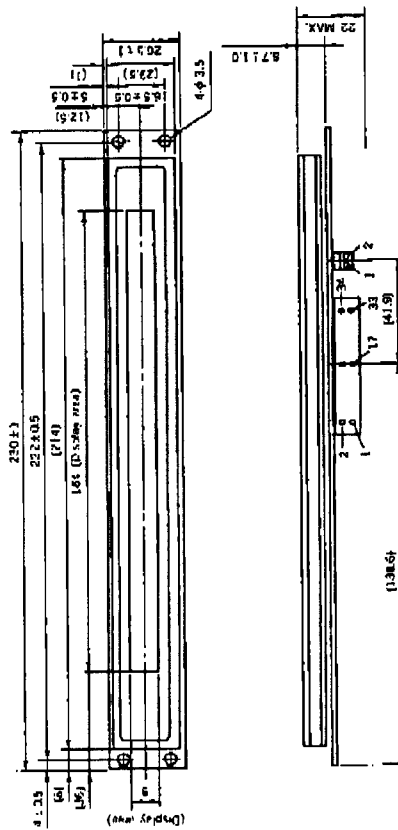
FC20X1SA-AA/AB

GENERAL SPECIFICATION

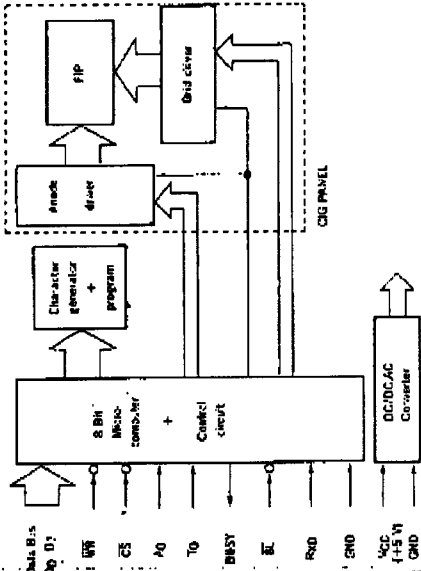
- No. of Characters 20 (20 characters, 1 line)
- Character Format 5 x 7 dot matrix
- Character Height 9.0 mm
- Character Width 6.3 mm
- Dot Pitch 1.56 mm
- Dot Size 0.8 mmφ
- Color Green (w/ infrared filter)
- Luminance 1 000 cd/m² (291 fL) TYP.
500 cd/m² (145 fL) MIN.
- Character Pitch 8.3 mm
- Weight 100 g. approx.

MODULE CONSTRUCTION

OUTLINE DRAWING



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	VALUE	UNIT
Display Supply Voltage	V _{CC}	+7	V
High Level Input Voltage	V _{IH}	+7	V
Low Level Input Voltage	V _{IL}	-0.5	V
Operating Temperature Range	T _{OP}	-20 to +70	°C
Storage Temperature Range	T _{stg}	-40 to +85	°C
Relative Humidity (Operation)	H _{OP}	0 to 85	%
Relative Humidity (Storage)	H _{stg}	0 to 95	%
Vibration	-	Displacement: 0.5 mm X, Y, Z axis (10 to 55 Hz) 40 (10 ms)	G
Shock	-	-	-

ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Display Supply Voltage	V _{CC}	4.75	5.0	5.25	V
Display Supply Current*	I _{CC} (V _{CC} = 5 V)	-	0.5	0.7	A
High Level Input Voltage	V _{IH}	2.2	-	5.25	V
Low Level Input Voltage	V _{IL}	-0.3	-	0.8	V
High Level Output Voltage	V _{OH}	4.45	-	-	V
I _{OH} = 50 μA					
Low Level Output Voltage	V _{OL}	-	-	0.45	V
I _{OL} = 1.5 mA					

* The value is defined with all in "0" character.
 ** All tests are CMOS level.

FUNCTIONS

These modules are provided with five general functions as follows:

- (0) DATA WRITE
- (1) COMMAND WRITE
- (2) TEST MODE
- (3) BLANKING
- (4) SERIAL DATA INPUT

CS	WE	A ₀	BL	T ₀	FUNCTION	DATA BUS DIRECTION	
						HUB/SYSTEM	MODULE
0	0	1	0	-	DATA WRITE	→	
0	0	1	1	-	COMMAND WRITE	→	
-	-	-	0	-	BLANKING	-	
-	-	-	0	0	TEST MODE	-	

GENERAL FUNCTIONS

Since data write and command write are done, busy signal, which indicates data operation performance, is output.
 (During data operation performance: busy signal = logic "1")

(1) DATA WRITE

When WE changes from "0" to "1" at the setting of CS = A₀ = "0", Data Write becomes possible. All data and command codes are shown in Table 1 and 2 (p. 7). (Apply correspondingly to JIS C-6229)

Each control data performs the following control:

- BS: BACK SPACE
- DC1 MODE: The cursor position shifts one character to the left. If it is at the left end, it cannot shift anymore.
- DC2 MODE: The same as above.
- HORIZONTAL TAB
- DC1 MODE: The cursor shifts one character to the right. If it is at the right end, it cannot shift anymore.
- DC2 MODE: The same as above.
- LF: LINE FEED
- DC1 MODE: All characters are cleared, while the cursor position remains at the same position.
- DC2 MODE: The same as above.
- CLR: CLEAR
- DC1 MODE: The data clears display. The cursor position shifts to the left end.
- DC2 MODE: The same as above.
- CR: CARRIAGE RETURN
- DC1 MODE: The cursor position shifts to the left end.
- DC2 MODE: The same as above.
- ESC: ESCAPE

The cursor position may be defined by 1 byte data after the ESC data.

- 0000 0000 (1st column)
- 0001 0011 (20th column)

Display Modes

The modules have two selectable display modes, DC1 and DC2. The display mode is kept until another mode is selected.

- DC1 MODE: PRIMARY MODE

The cursor position shifts one character to the right automatically, when a character data is written. If it is at the right end, it shifts to the left end.

- DC2 MODE: HORIZONTAL SCROLL MODE

All characters are shifted by one character to the left and the newly written character is displayed at the neighbor position of the right end, while the cursor position reaches to the left end.

Cursor Mover

The modules have three selectable cursor modes (DC3, DC4, DC5). A cursor mode is kept till another mode is selected.

- DC3 MODE: The cursor turns ON.
- DC4 MODE: The cursor turns OFF.
- DC5 MODE: The cursor turns on and blinks.

These modules have also three other cursor functions:

- CM1: No action.
- CM2: All segments located at the cursor position are lit.
- CM3: The characters located at the cursor position are lit in reverse.

(2) COMMAND WRITE

At the writing of CS = "0", A₀ = "1", when WR changes from "0" to "1", the following command is written. This is possible, however, only when the busy signal is at logic "0".

00H (00H)	Set the cursor position.
10H (10H)	Cursor code (its ON). Place position (its ON). Shift key (its ON). Shift key (its ON).
02H (01H)	Cursor blink (its ON).
04H (02H)	Cursor blink (its ON).
11H (03H)	Character deletion
12H (04H)	The shift key is ON at the cursor position and left or right characters by one character are deleted to the right. The character at the right end overflows. The cursor returns to the end position. While data is written in which progress for the next character to be written.
111H (05H)	Character deletion
112H (06H)	The data at the cursor at the cursor position. The character is deleted to the right. While data is written in which progress for the next character to be written.
113H (07H)	Reset
114H (08H)	This clears display and memory. Set up power ON condition.

(3) TEST MODE

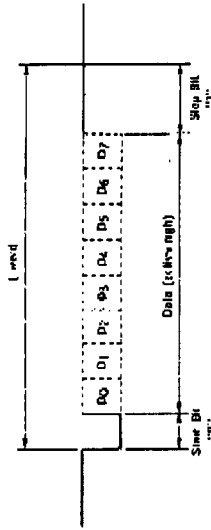
After Test Mode is initiated, when T₀ = "0" and power is switched on, the stored characters in the modules are repeatedly and automatically displayed one by one.
Once the Test mode is initiated, no writing of external Data and Command is possible, unless the power is turned off or Reset signal is inputted.

(4) BLANKING

The displays are blanked by turning BL = "0".
Quick blanking response is possible due to direct ON, OFF operation of the driver. Since the content of memory is not affected, restoring of BL = "1" displays the previous characters. Use of this line facilitates thinking of the displays.

(5) SERIAL DATA INPUT

Serial Data Input is asynchronously transmitted, through terminal "RXD", at CAI/O signal level. Baud rate is selectable using jumpers J1 to J3, and the various baud rate selectable combinations are shown in the table below. One word consists of 8-bit data with one start bit and two stop bits as shown below.



	J3	J2	J1	Baud Rate (baud)
L	L	L	L	9600
L	L	L	H	4800
L	L	H	L	2400
L	L	H	H	1200
H	L	L	L	600
H	L	L	H	300
H	L	H	L	150
H	L	H	H	75

MODULE INITIALIZATION (INITIAL STATE)

The following occurs automatically during power-up of the module:

- (1) All character data becomes "SPACE".
- (2) Cursor position is set to the left end (CMT).
- (3) The luminance level is set to DIM1.
- (4) Display mode is set to DC1.

GENERAL CAUTIONS

- (1) The module may be damaged if the interface connector is plugged in or out without switching off the external power supply or interrupting signals.
- (2) The external power supply must reach the specified supply voltage within 100 ms after switch-on.
- (3) When power supply is switched on, it has to allow surge current (about 1.5 times the specified value) as it enables to start the oscillation of DC/DC, AC converter in the module.
- (4) When input voltage from the power supply is lower than the specified value, effects may happen by abnormal operation of DC/DC, AC converter and it may cause burn-out of fuse resistor or a surge of the axis. Higher input voltage than the specified value may cause incorrect operation as well. Specified typical supply voltage to the module is preferable.
- (5) When handling and operating this module, special care must be taken in order to avoid any damage. The module should be kept away from places where vibrations and shocks exceeding those specified in this prospect are present.
- (6) The display panel installed in the module is mainly composed of glass. Therefore, it should be handled very carefully.
- (7) Do not use the module under too strong EMI. It might cause the module to malfunction. It is recommended to use the module with interface cable of less than 50 cm length in order to keep correct signal transfer.

NEC cannot assume any responsibility for any circuit shown or represented, that they are free from patent infringement.

PIN CONNECTION

(1) Interface Pin Connection

Module Side

Connector: HIF33C-3MP-A-2.54DS or equivalent

Pin No.	Signal	Pin No.	Signal
1	D ₇	2	GND
3	D ₆	4	GND
5	D ₅	6	GND
7	D ₄	8	GND
9	D ₃	10	GND
11	D ₂	12	GND
13	D ₁	14	GND
15	D ₀	15	GND
17	WR	18	GND
19	A ₀	20	GND
21	N.C.	22	GND
23	CS	24	GND
25	T ₀	26	GND
27	BUSY	28	GND
29	BL	30	GND
31	N.C.	32	GND
33	Fixo	34	GND

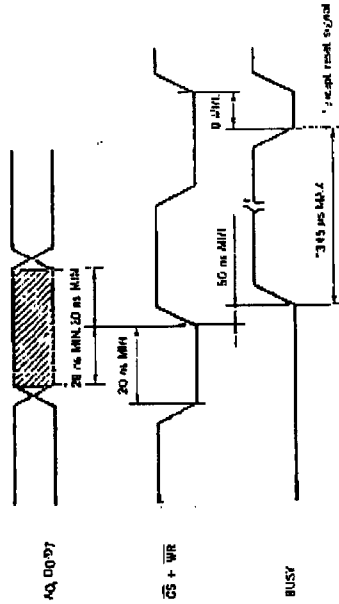
N.C.: Non-connection

System side

HIF3BA-340-2.54R or equivalent

HIROSE Electric Co., Ltd.]

TIMING CHART



(2) Power supply Pin Connection

Module Side

Connector: 17182B-2 (AMP)

System Side

Housing: 17182B-2 (AMP)

Pin: 170204-1 (AMP)

or 170204-2 (AMP)

Pin No.	Connection
1	V _{CC} (+5 V)
2	GND

