
APPLICATION NOTE

VACUUM FLUORESCENT DISPLAY MODULE

AN-E-2215B



CHARACTER DISPLAY MODULE

M404SD01BA INSTRUCTION MANUAL

GENERAL DESCRIPTION

Futaba Vacuum Fluorescent Display Module M404SD01BA, with Futaba VFD 404-SD-01G Display, produces 40 digits on 4 rows.

Each character is displayed in 5×7 dot matrix.

Consisting of a VFD, one chip controller, driver IC, the module can be connected directly to the system bus, thus simplifying interfacing.

The bright and anesthetically pleasing VFD makes the module desirable for application in office equipment's, such as electronic typewriters, computer terminals, measuring equipment, etc.

Important Safety Notice

Please read this note carefully before using the product.

Warning

- The module should be disconnected from the power supply before handling.
- The power supply should be switched off before connecting or disconnecting the power or interface cables.
- The module contains electronic components that generate high voltages which may cause an electrical shock when touched.
- Do not touch the electronic components of the module with any metal objects.
- The VFD used on the module is made of glass and should be handled with care. When handling the VFD, it is recommended that cotton gloves be used.
- The module is equipped with a circuit protection fuse.
- Under no circumstances should the module be modified or repaired.
Any unauthorized modifications or repairs will invalidate the product warranty.
- The module should be abolished as the factory waste.

1. FEATURES

- 1-1. One chip controller is equipped on the module and it realizes intelligent terminal.
The module can be connected to the system bus directly.
- 1-2. Two hundred and eighteen character fonts consisting of alphabets, katakanas, numeral and other symbols can be displayed.
- 1-3. By using dimming function, brightness can be controlled into 4 levels.
- 1-4. Since a DC/DC converter is included, only 5Vdc power source is required to operate the module.
- 1-5. High quality and reliability, also long life can be achieved with FUTABA VFD.
- 1-6. Compact, light weight and thin design by using SMART (Surface Mount And Reflow Technology) provides excellent built-in capability.
- 1-7. Either parallel or serial input interface can be selected.
- 1-8. Additionally, original character fonts can be defined and displayed.
Three user definable characters are available.

2. PRODUCT SPECIFICATION

2-1. OUTER DIMENSIONS, WEIGHT (See FIGURE-1)

Table-1

Item	Specification	Unit
Outer Dimension	(L) 230±1	mm
	(W) 60±1	
	(T) 32 Max.	
Weight	Approx. 250	g

2-2. SPECIFICATION OF THE DISPLAY PANEL

Table-2

Item	Specification	Unit
Display Area (W×H)	170.7×30.5	mm
Number of digits	40 digits (5×7)×4rows	dot
Digits Size (W×H)	0.4×0.5	mm
Digits Pitch (W×H)	0.65×0.75	mm
Character Size (W×H)	3.0×5.0	mm
Character Pitch (W×H)	4.3×8.5	mm
Color of Illumination	Green ($\lambda_p=505\text{nm}$)	–

2-3. ENVIRONMENT CONDITION

Table-3

Item	Symbol	Min.	Max.	Unit
Operating Temperature	T_{opr}	0	+70	°C
Storage Temperature	T_{stg}	-20	+70	°C
Operating Humidity	H_{opr}	20	85	%
Storage Humidity	H_{stg}	20	90	%
Vibration (10 to 55Hz)	–	–	4	G
Shock	–	–	40	G

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

2-4. ABSOLUTE MAXIMUM RATINGS

Table-4

Item	Symbol	Min.	Max.	Unit
Supply Voltage	V_{cc}	–	7.0	V
Input Signal Voltage	V_{IS}	-0.4	5.5	V

2-5. RECOMMENDED OPERATING CONDITIONS

Table-5

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	–	4.5	5.0	5.5	V
H-Level Input Voltage	V_{IH}	$V_{CC}=5V$	2.0	–	5.25	V
H-Level Input Voltage	V_{IL}	$V_{CC}=5V$	–	–	0.8	V

2-6. ELECTRICAL CHARACTERISTICS

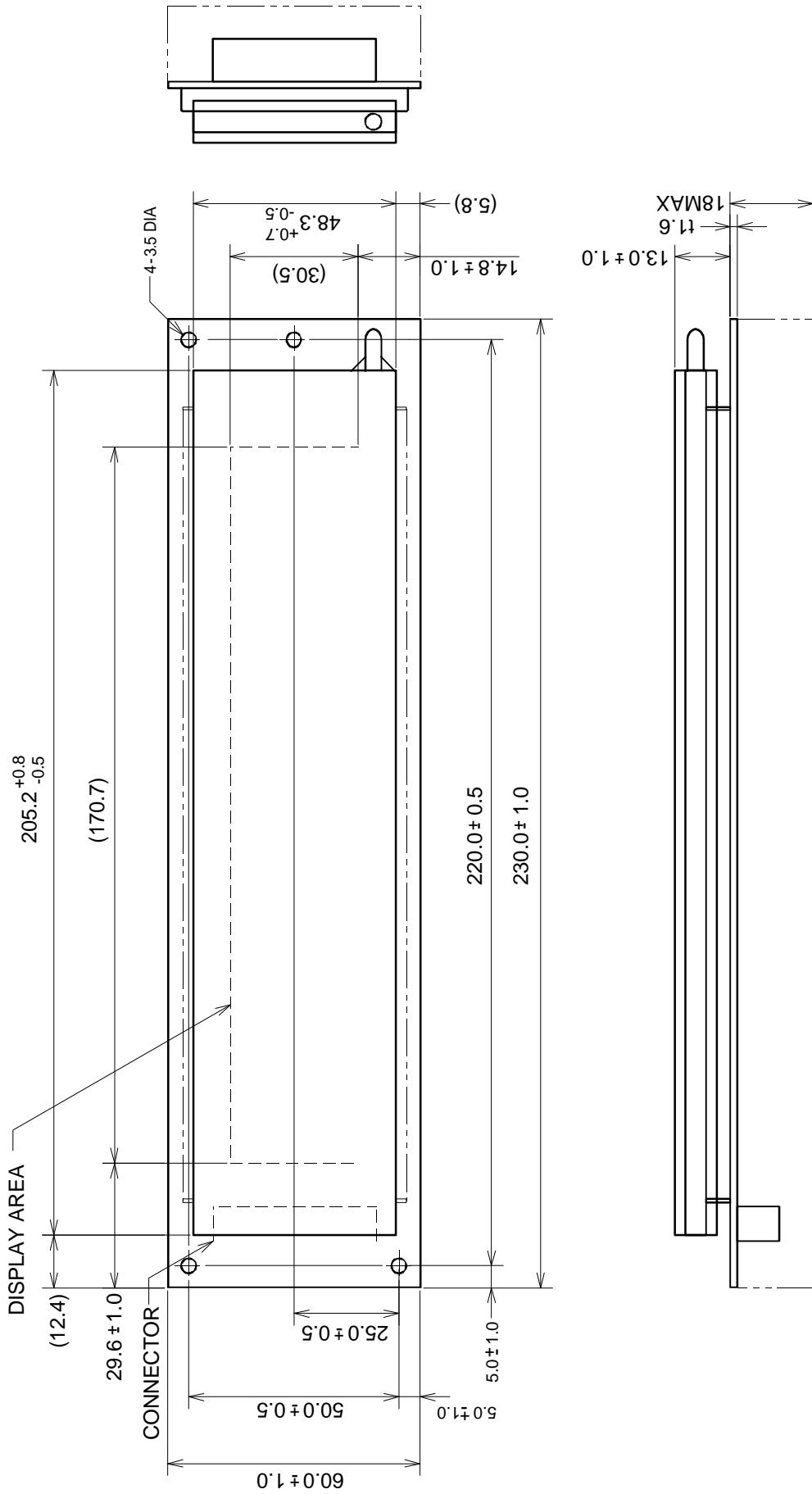
Table-6

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Current	I_{CC}	$V_{CC}=5V$ All On	–	1.4	1.6	A
Power Consumption	–		–	7	8	W
Luminance	L		340 (100)	690 (200)	–	cd/m ² (fL)
H-Level Input Current	I_{IH}	$V_{CC}=5.5V$	–	–	20	μA
L-Level Input Current	I_{IL}	$V_{CC}=5.5V$	-0.4	–	–	mA
H-Level Output Voltage	V_{OH}	$V_{CC}=4.5V$ $I_{OH}=-0.5mA$	2.4	–	–	V
L-Level Output Voltage	V_{OL}	$V_{CC}=4.5V$ $I_{OL}=0.5mA$	0.25	–	0.4	V

Note) The surge current can be approx.10 times the specified supply current at power on.

M404SD01BA MECHANICAL DIMENSIONS

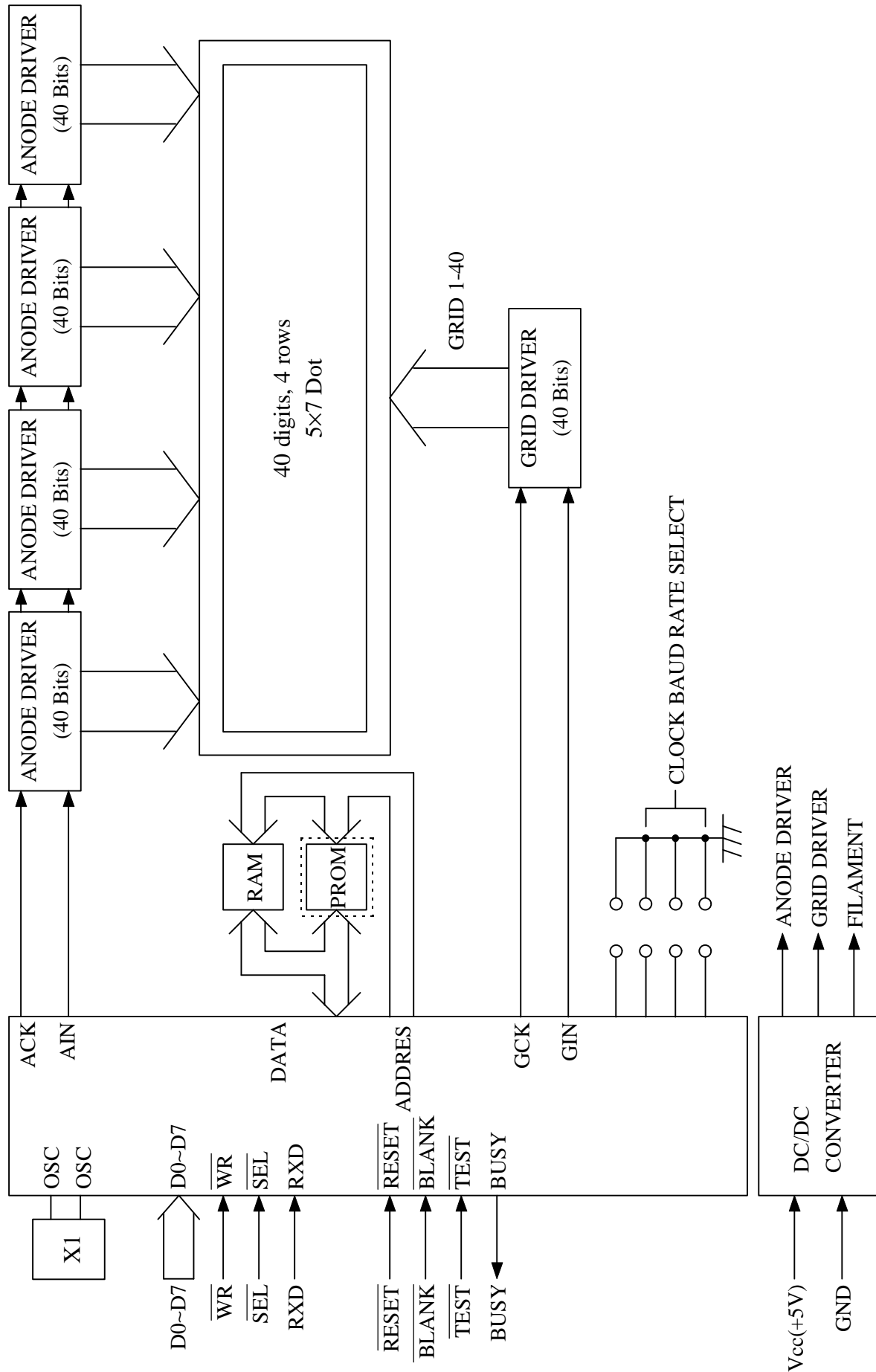
FIGURE-1



UNIT: mm

M404SD01BA CIRCUIT BLOCK DIAGRAM

FIGURE-2



M404SD01BA DISPLAY CHARACTER CODE

FIGURE-3

D3 D2 D1 D0	D7	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	D6	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
	D5	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0
	D4	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	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	a	P	`	P	e	E		—	g	ε	↑	↗
0 0 0 1	1		DC1	!	1	A	Q	a	q	B	S	g	7	7	ε	↓	↘
0 0 1 0	2		DC2	"	2	B	R	b	r	r	E	r	4	u	x	+	*
0 0 1 1	3	DEF	DC3	#	3	C	S	c	s	Δ	R	u	o	7	E	+	≡
0 1 0 0	4	DIM	DC4	\$	4	D	T	d	t	E	l	\	I	l	+	4	
0 1 0 1	5		DC5	%	5	E	U	e	u	7	x	=	o	*	1	↳	
0 1 1 0	6			&	6	F	V	f	v	θ	h	7	h	二	3	↳	L
0 1 1 1	7			'	7	G	W	g	w	λ	-	7	+	7	7	↳	o
1 0 0 0	8	BS		(8	H	X	h	x	P	2	4	o	*	U	↳	o
1 0 0 1	9)	9	I	Y	i	y	π	3	o	7	U	↳	↳	↳
1 0 1 0	A	LF	UP	*	#	J	Z	j	z	P	*	ε	コ	∩	↳	↳	↳
1 0 1 1	B	HM CLR	DWN	+	;	K	L	k	l	ε	6	4	*	7	ε	□	≡
1 1 0 0	C		RT	,	<	L	*	l	l	7	↳	↳	ε	7	7	↳	UF0
1 1 0 1	D	CLR + LF	LT	—	=	M	J	m	↳	φ	7	↳	7	↳	↳	↳	UF1
1 1 1 0	E			.	>	N	^	n	^	o	±	ε	ε	↳	↳	↳	UF2
1 1 1 1	F		RST	/	?	O	_	o	■	Σ	g	u	u	7	g	.	

SP : SPACE