

# APPLICATION NOTE

## VACUUM FLUORESCENT DISPLAY MODULE

### CHARACTER DISPLAY MODULE

### M202MD15DA

#### GENERAL DESCRIPTION

Futaba Vacuum Fluorescent Display M202MD15DA, with Futaba VFD 202-MD-15GNK display, produces 20 digits on 2 rows.

Each character is displayed in 5×8 dot matrix.

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

The bright and aesthetically pleasing VFD makes the module desirable for application in office equipment's, 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. Two hundred twenty-three different characters consisting of alphanumeric and other symbols can be displayed.
- 1-2. By using dimming function, brightness can be controlled into six levels.
- 1-3. Since a DC/DC converter is included, only a 5V power is required to operate the module.
- 1-4. High quality reliability and long life can be achieved with FUTABA VFD.
- 1-5. The module can be communicated by RS-232C interface.
- 1-6. The module's small, light and thin mechanical sizing allows for maximum mounting flexibility.

## 2. GENERAL SPECIFICATIONS

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

Table-1

Item	Specification	Unit
Outer Dimensions	(W) $146 \pm 1$	mm
	(H) $43 \pm 1$	
	(T) 25.1 Max.	
Weight	Approx. 80	g

### 2-2. SPECIFICATIONS OF THE DISPLAY PANEL

Table-2

Item	Specification	Unit
Display Area	101.75 (W) $\times$ 18.5 (H)	mm
Number of Digit	20 digits (5 $\times$ 8 Dots) $\times$ 2 rows	–
Character Size (5 $\times$ 7 Dots)	7.74(H) $\times$ 3.9(W)	mm
Character Pitch	9.64(H) $\times$ 5.15(W)	mm
Dot Size	1.02(H) $\times$ 0.7(W)	mm
Dot Pitch	1.12(H) $\times$ 0.8(W)	mm
Color of Illumination	Green( $\lambda_p=505\text{nm}$ )	–

## 2-3. ENVIRONMENT CONDITIONS

Table-3

Item	Symbol	Min.	Max.	Unit
Operating Temperature	$T_{opr}$	-20	+70	°C
Storage Temperature	$T_{stg}$	-20	+70	°C
Operating Humidity (Note)	$H_{opr}$	20	85	%
Storage Humidity (Note)	$H_{stg}$	20	90	%
Vibration (10~55Hz)	—	—	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	$V_{cc}$	—	26.4	V
Input Signal Voltage	$V_{IS}$	-20	+20	V

## 2-5. RECOMMENDED OPERATING CONDITIONS

Table-5

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	$V_{cc}$	—	21.6	24.0	26.4	V
DATA “1”(MARK)	$V_{MARK}$	RS-232C	-15	—	-5	V
DATA “0”(SPACE)	$V_{SPACE}$		5	—	15	V

## 2-6. ELECTRICAL CHARACTERISTICS

Table-6

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Current (Note1)	$I_{cc}$	$V_{cc}=24.0V$ All on	—	105	125	mA
Power Consumption	—		—	2.52	3.0	W
Luminance	$L$		350	500	—	cd/m <sup>2</sup>

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

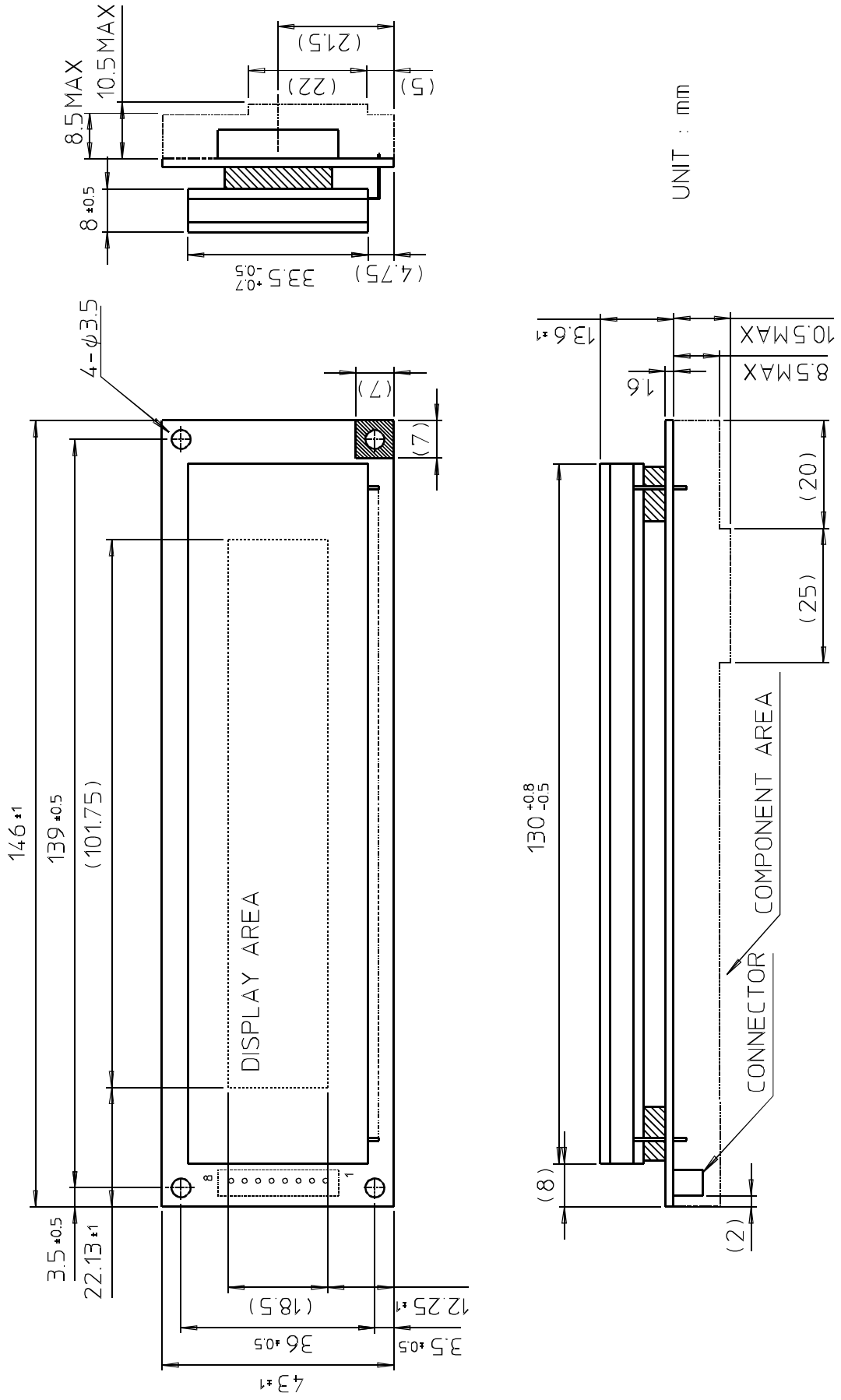
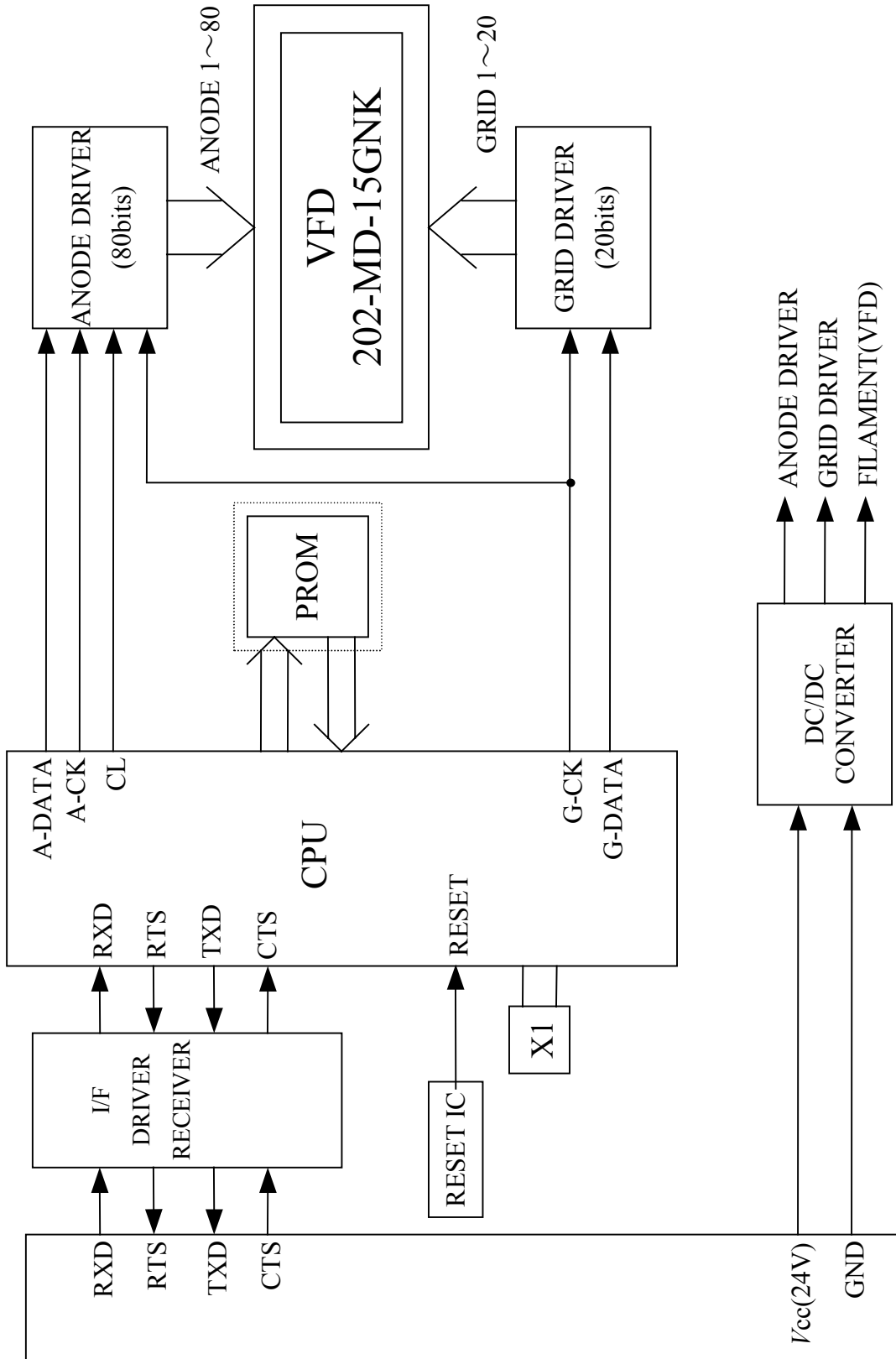


FIGURE-2



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	a	E	I	—	g	E	↑	↘
0 0 0 1	1	ID PAUSE			!	1	A	Q	a	q	B	S	g	フ	+	△	↓
0 0 1 0	2	ID END			"	2	B	R	b	r	r	w	フ	イ	ウ	×	+
0 0 1 1	3	ID CLEAR			#	3	C	S	c	s	d	o	フ	ウ	テ	E	ア
0 1 0 0	4	DIM			\$	4	D	T	d	t	e	フ	フ	ト	ト	A	R
0 1 0 1	5				%	5	E	U	e	u	n	フ	=	オ	オ	1	日
0 1 1 0	6				&	6	F	V	f	v	θ	フ	カ	フ	フ	A	←
0 1 1 1	7		DC		'	7	G	W	g	w	λ	フ	+	フ	フ	火	+
1 0 0 0	8	BC			(	8	H	X	h	x	P	2	フ	フ	フ	フ	フ
1 0 0 1	9	HT			)	9	I	Y	i	y	π	3	フ	フ	フ	フ	フ
1 0 1 0	A	BLK			*	A	J	Z	j	z	P	*	フ	フ	フ	フ	フ
1 0 1 1	B	SCR			+	B	K	L	k	l	6	フ	フ	フ	フ	フ	フ
1 1 0 0	C	CAL	DC1		.	C	L	*	l	z	フ	フ	フ	フ	フ	フ	フ
1 1 0 1	D	CLR	DC2		—	D	M	I	m	フ	フ	フ	フ	フ	フ	フ	フ
1 1 1 0	E				.	E	N	^	n	フ	フ	フ	フ	フ	フ	フ	フ
1 1 1 1	F	ALD	RST		/	F	O	_	o	フ	フ	フ	フ	フ	フ	フ	SP

SP : SPACE

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	0	0	0	0	1	1	1	1	1	1	1	1
	D5	0	0	1	1	1	0	1	1	0	0	1	1	0	1	0	1
	D4	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
0 0 0 0	0		DP	SP	0	a	P	'	P	e	w	SP	"	A	E	a	z
0 0 0 1	1	ID PAUSE		!	1	A	Q	a	q	*	'	i	+	A	N	a	R
0 0 1 0	2	ID END		"	2	B	R	b	r	,	'	e	2	A	o	a	o
0 0 1 1	3	ID CLEAR		+	3	C	S	c	s	+	"	E	3	A	o	a	o
0 1 0 0	4	DIM		\$	4	D	T	d	t	..	"	x	'	A	o	a	o
0 1 0 1	5			%	5	E	U	e	u	..	'	y	^	A	o	a	o
0 1 1 0	6			&	6	F	V	f	v	T	.	i	^	E	o	a	o
0 1 1 1	7		DC	'	7	G	W	g	w	*	-	S	.	G	x	G	+
1 0 0 0	8	BC		(	8	H	X	h	x	'	"	.	,	e	o	e	o
1 0 0 1	9	HT		)	9	I	Y	i	y	*	^	B	^	E	o	e	o
1 0 1 0	A	BLK		*	:	J	Z	j	z	*	*	a	o	e	o	e	o
1 0 1 1	B	SCR		+	:	K	L	k	l	<	>	*	*	E	o	e	o
1 1 0 0	C	CAL	DC1	,	<	L	\	l	l	E	e	-	W	i	U	i	U
1 1 0 1	D	CLR	DC2	-	=	M	I	m	l	l	=	-	W	i	v	i	W
1 1 1 0	E			.	>	N	^	n	"	Z	Z	Q	W	P	i	P	
1 1 1 1	F	ALD	RST	/	?	O	_	o	SP	■	v	"	z	i	B	i	W

SP : SPACE

## 6. WARRANTY

The display module is guaranteed 1 year after the shipment from FUTABA.

## 4. OPERATING RECOMMENDATIONS

4-1. Since VFDs are made of glass material.

Avoid applying excessive shock or vibration beyond the specifications for the module.

Careful handling is essential, especially the exhaust chip when mounting the module.

4-2. Applying lower voltage than the specified may cause non activation for selected pixels.

Conversely, higher voltage may cause may non-selected pixel to be activated.

4-3. If the start up time of the supply voltage is slow, the controller may not be reset.

The supply voltage must be risen up to specified voltage level within 30msec.

4-4. DC/DC converter is equipped on the module, the surge current may be approximately 10 times the specified supply current at the power on.

4-5. Avoid using the module where excessive noise interface is expected. Noise affects the interface signal and cause improper operation.

Keep the length of the interface cable less than 50cm (When the longer cable is required, please contact FUTABA engineering.).

4-6. When fixed pattern is displayed for long time, you may see uneven luminance.

It is recommended to change the display patterns sometimes is order keep best display quality.

## REMARKS :

The specification is subject to change without prior notice.

Your consultation with FUTABA sales office is recommended for the use of module.