

# APPLICATION NOTE

## VACUUM FLUORESCENT DISPLAY MODULE

### GRAPHIC DISPLAY MODULE

#### GP9002A01A

#### GENERAL DESCRIPTION

FUTABA GP9002A01A is a graphic display module using a FUTABA 128×64 VFD.

Consisting of a VFD, display drivers and a control circuit, the module can be driven by connecting to the host system through a simple interface.

## 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 (approx.64V) 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.

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## 1. FEATURES

- 1-1. High quality and long life can be achieved with FUTABA VFD.
- 1-2. It consists of a control ASIC and a power circuit.
- 1-3. Compact and light weight unit by using packed display drivers and one chip VFD controller.
- 1-4. The Interface can be selected from 8bit Parallel or synchronous serial.

## 2. GENERAL DESCRIPTION

### 2-1. DIMENSIONS, WEIGHT (Refer to FIGURE-4)

Table-1

Item	Specification	Unit
Outer dimensions	(W) 103±1 (H) 53.5±1 (T) 22.2 MAX.	mm
Weight	Approx. 85	g

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

Table-2

Item	Specification	Unit
Display Area	57.48(W)×28.68(H)	mm
Number of Dots	128×64	Dot
Dot Size (H×W)	0.33×0.33	mm
Dot Pitch (H×W)	0.45×0.45	mm
Color Illumination (VFD)	Green ( $\lambda$ p=505nm)	—
Luminance	500 (Typ)	cd/m <sup>2</sup>

Note) By using a filter, uniform color range from blue to orange (including white) can be obtained.

### 2-3. ENVIRONMENT CONDITIONS

Table-3

Item	Symbol	Min.	Max.	Unit
Operation Temperature	<i>T</i> <sub>opr</sub>	-40	+85	°C
Storage Temperature	<i>T</i> <sub>stg</sub>	-40	+85	°C
Operating Humidity	<i>H</i> <sub>opr</sub>	20	85	%
Storage Humidity	<i>H</i> <sub>stg</sub>	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	$V_{CC}$	-0.3	6.0	V
Input Signal Voltage	$V_I$	-0.5	$V_{CC}+0.5$	V

## 2-5. RECOMMEND OPERATING CONDITIONS

Table-5

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
H-Level Input Voltage	$V_{IH}$	$V_{CC} \times 0.7$	—	$V_{CC}$	V
L-Level Input Voltage	$V_{IL}$	0	—	$V_{CC} \times 0.3$	V

## 2-6. ELECTRICAL CHARACTERISTICS

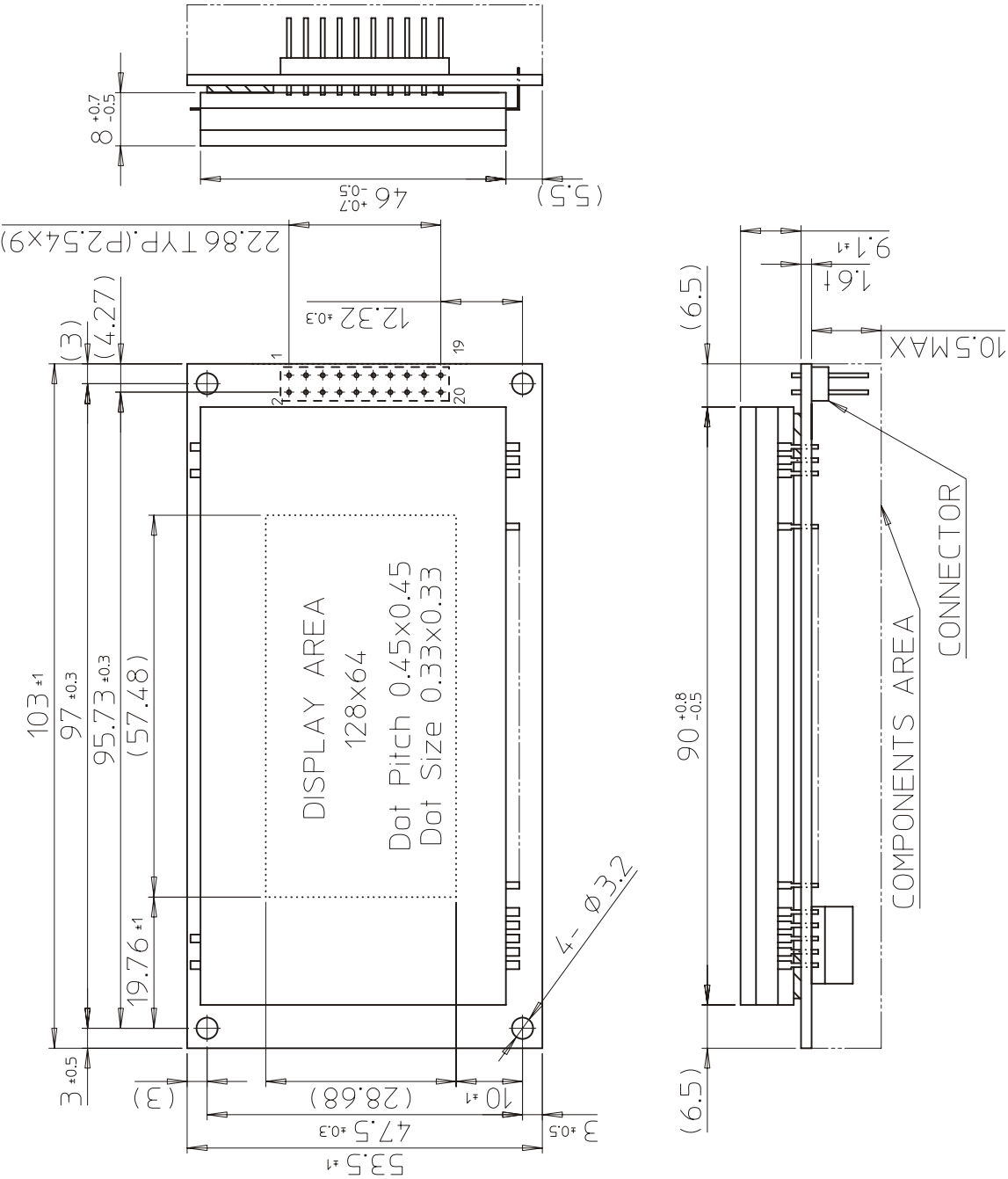
Table-6

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Current	$I_{CC}$	$V_{CC}=5.0V_{DC}$ All on	—	500	650	mA
Power Consumption	—		—	2.5	3.5	W
Luminance (VFD)	$L$		250	500	—	cd/m <sup>2</sup>
H-Level Output Voltage	$V_{OH}$	$I_{OH} = -2mA$	$V_{CC}-0.6$	—	$V_{CC}$	V
L-Level Output Voltage	$V_{OL}$	$I_{OL} = 2mA$	0	—	0.4	V

Note) The surge current can be approx. 5 times the specified supply current at power on.

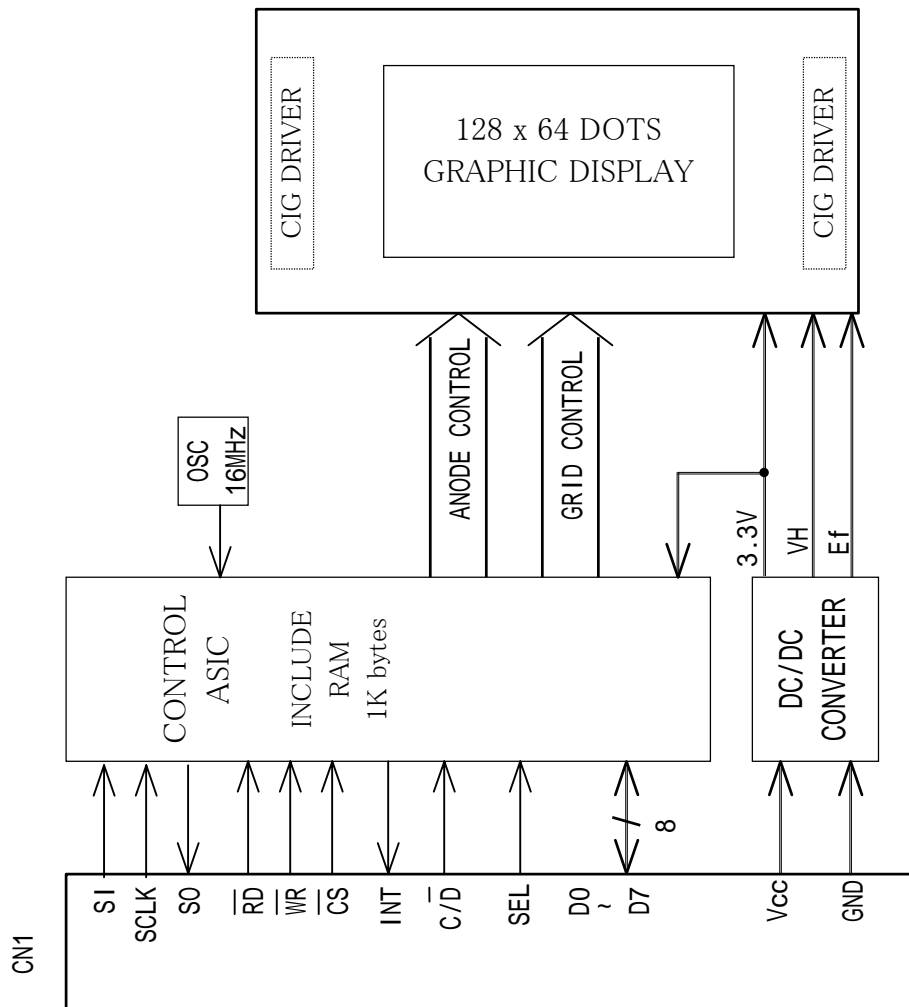
OUTER DIMENSION

FIGURE-4



# CIRCUIT BLOCK DIAGRAM

FIGURE-5



FONT TABLE

FIGURE-6

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
20		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	



## 7. WARRANTY

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

## 8. CAUTIONS FOR DETERMINING AND EXPORTING REGULATED GOODS OR SERVICES

This product does not correspond to the goods or services regulated by Japan's Foreign Exchange and Foreign Trade Law. If this product is combined with other products in order to make equipment, whether this product is regulated or not is judged by such newly made equipment. We ask you to determine by yourself whether the equipment corresponds to the regulated goods when this product is incorporated in the equipment.

We also ask you to confirm that this product will not be incorporated in any weapon or used for manufacturing any weapon.

If you export or re-export this product, we recommend you to adopt measures for appropriate export procedures, if any.

## 9. CAUTIONS FOR OPERATION

- 9-1. 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.
- 9-2. The DC/DC converter generates approximately 64Vdc, avoid touching it with bare hands, or to other circuits.
- 9-3. Avoid using the module where excessive noise interface is expected.  
Noise affects the interface signal and causes improper operation.  
Keep the length of the interface cable less than 30cm.  
(When the longer cable is required, please confirm there is no noise affection.)
- 9-4. 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.
- 9-5. When fixed pattern is displayed for a long time, you may see uneven luminance.  
It is recommended to change the display patterns sometimes in order to keep best display quality.
- 9-6. DC/DC converter is equipped on the module, the surge current may be approximately 5 times the specified supply current at the power on.

### REMARKS :

The specification is subject to change without prior notice.

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