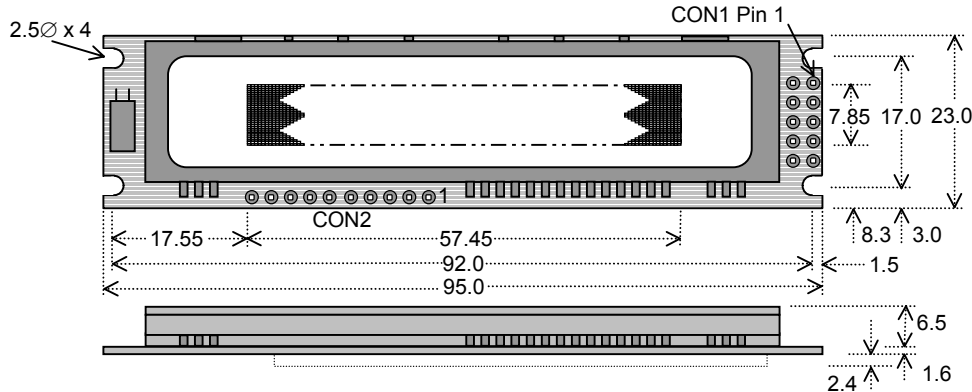


Graphic VFD Module

GU144x16D-K610A4

- ❑ 144 x 16 High Brightness Dot Graphic Display
- ❑ Single 5V DC Supply
- ❑ 3 ASCII Fonts (5 x 5, 5 x 7, 10 x 14)
- ❑ Asynchronous & SPI interface
- ❑ Wide Temperature -40 to +85°C

The module includes the VFD glass, VF drivers and microcontroller, character generation, interface logic and patented transformerless DC/DC converter. The CMOS serial interfaces are selected by a pushbutton on the back of the module. Auto key scanning is available on port PA0 – PA8.



Dimensions in mm.
tolerances.

Uses patent applied PSU which has no inductive components.
Brown out detector active when RES is not connected.

ELECTRICAL SPECIFICATION

Parameter	Sym	Min	Typ	Max	Unit	Condition
Supply Voltage	Vcc	4.5	5.0	5.25	V	Vss=0V
Supply Current	Icc	-	220	-	mA	Vcc=5V All dots
Logic High Input	V _{IH}	3.0	-	Vcc	V	Vcc=5V
Logic Low Input	V _{IL}	-0.5	-	1.5	V	Vcc=5V
Logic High Output	V _{OH}	4.2	-	-	V	I _{OH} = -3mA Vcc=5V
Logic Low Output	V _{OL}	-	-	0.6	V	I _{OL} = 20mA

ENVIRONMENTAL and OPTICAL SPECIFICATION

Parameter	Value
Display Area (XxY mm)	57.45 x 7.85
Dot Size/Pitch (XxY mm)	0.25 x 0.35 / 0.4 x 0.5
Luminance	1100 cd/m ² Typ
Colour of Illumination	Blue-Green (Filter for colours)
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Operating Humidity (non condensing)	10 to 90% @ 25°C

SOFTWARE COMMANDS

Hex	Command	Hex	Command
01-07	Run Macro	18 + len + data	Graphic Write
08	Backspace	19	Reset
09	Horizontal Tab	1A + data	Write Mode - direction
0A	Line Feed	1B + macro+len+data	Set Macro
0B	Home	1B + 4D	Erase All Macros
0C	Vertical Tab	1B + 4C/55	Lock/Unlock EEPROM
0D	Carriage Return	1B + 43	Request Checksum
0E	Clear End of Line	1B + 50/46	Power On/Off
0F	Test	1B + 48	Request Status
10 + x + y	Cursor Position	1B + 49 + data	Set Comms
11 +xl+yt+xr+yb	Set Area	1B + 44 + data	Enable I/O Port
12 +xl+yt+xr+yb	Clear Area	1B + 4F + data	Set Port Lines
13 +xl+yt+xr+yb	Invert Area	1B + 52	Read Port
14 +xl+yt+xr+yb	Set Outline	1B + 4B	Enable key scanning
15 +xl+yt+xr+yb	Clear Outline	1B + F8-FF	Brightness
16	Set Pixel	1C / 1D / 1E	Select Font
17	Clear Pixel	20 - FF	Character Write

The module defaults to a 2 line of 24 character display using the 5x7 font with single pixel spacing. The cursor position auto increments after each character write. The bottom left of a character is placed at the cursor x,y. The M(odule) Busy line indicates the module is busy when high. Connect the H(ost) Busy input to the MBusy to disable handshaking, which is mandatory for SPI communication. Hold the button at 'power on' to initiate setup and test. Use the button to select the configuration which is then stored in EEPROM. In async. mode, the SPI adopts master mode with serial in on MIN and out on MOUT. To send commands as hexadecimal, prefix the 2 bytes using character 60H. Example: `10`3F`01 = Position dot x=61 y=1. To send character 60H to the display, send 60H twice.
Subject to change without notice. Doc Ref: 03895 Iss1 23 Apr 02

CHARACTER SETS

MINI FONT (PROPORTIONAL SPACING)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	p
50	q	r	s	t	u	v	w	x	y	z	[\]	^	_	~

5x7 & 10x14 FONTS (FIXED SPACING)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00																
10																
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	p
50	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	[\]	^	_
80	~	°	¶	•	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
90	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
00	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
10	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
40	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
50	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
60	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
70	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
80	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
90	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
00	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
10	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
20	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
30	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
40	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
50	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
60	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
70	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
80	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
90	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
00	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
10	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
20	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
40	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
50	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
60	[[[[[[[[[[[[[[[[
70	\	\	\	\	\	\	\	\	\	\	\	\	\	\	\	\
80]]]]]]]]]]]]]]]]
90	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^
00	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
10	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
20	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
30	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
50	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
60	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
70	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
80	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊
90	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊	◊

CON1

Pin	Async	SPI
1	5V	5V
2	SCK	SCK
3	RXD	/SS
4	MOUT	SIN
5	0V	0V
6	MIN	SOUT
7	TXD	/IRQ
8	/RES	/RES
9	MB	MB
10	HB	HB

CON2

Pin	Signal
1	0V
2	PA0
3	PA1
4	PA2
5	PA3
6	PA4
7	PA5
8	PA6
9	PA7
10	PA8

Detailed specification, software commands and interface timing are available on request.

CONTACT

Noritake Sales Office Tel Nos
Nagoya Japan: +81 (0)52-561-9867
Canada: +1-416-291-2946
Chicago USA: +1-847-439-9020
Munich (D): +49 (0)89-3214-290
Itron UK: +44 (0)1493 601144
Rest Europe: +49 (0)61-0520-9220
www.noritake-iron.com