

## 1.0 GENERAL DESCRIPTION

This series of graphical 140 x 16 dot matrix Vacuum Fluorescent Display (VFD) modules is capable of displaying both graphics and text using built-in font tables. The modules contain VFD driver circuitry, one microcontroller, one DC-DC/AC converter and various host interfaces.

A five-pin connector supports the serial interface connections and a fourteen-pin connector supports the parallel interface. Both connections also require a 5VDC power supply to operate the module. See sections *System Block Diagram* and *Parallel Interface Connector* and *Serial Interface Connector* for more detail.

## 1.1 FEATURES

- 5VDC operation
- -40°C to +85°C operation
- displays both graphics and text simultaneously
- 140 x 16 dot matrix with fixed and proportional fonts for smoother character spacing
- 14 international font sets with up to 16 user defined characters
- font magnification up to 4X horizontally and 2X vertically
- 1000 cd/m<sup>2</sup> maximum luminance and wide viewing angles
- 8 levels of brightness control from 12.5% to 100%
- screen saver modes to reduce power consumption and to reduce image burn-in
- up to 4 screen windows with independent control
- variable speed scrolling
- legendary Futaba quality and reliability
- choice of serial and parallel interfaces

NAGP1235AA-0: parallel and RS-232 asynchronous serial communication (9.6K – 115.2K baud)

NAGP1235AA-2: parallel, synchronous and asynchronous serial communication (9.6K – 115.2K baud)

NAGP1235AA-3: synchronous and asynchronous serial communication (9.6K – 115.2K baud)

## 2.0 APPLICABLE DOCUMENTS

- Futaba Vacuum Fluorescent Display Specification GP1235AI
- Futaba America Engineering Standard FAES 801, Printed Circuit Board Markings

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2 OF 41

### 3.0 GENERAL SPECIFICATIONS

Item		Value
number of dots		140 columns X 16 rows
dot height (mm)		1.025
dot width (mm)		0.585
dot pitch vertical (mm)		1.185
dot pitch horizontal (mm)		0.735
pattern width (mm)		102.75
pattern height (mm)		18.8
peak wavelength of illumination		green x = 0.24, y = 0.41
Luminance (cd/m <sup>2</sup> )	min.	500 @ 100% luminance
	typ.	1000 @ 100% luminance

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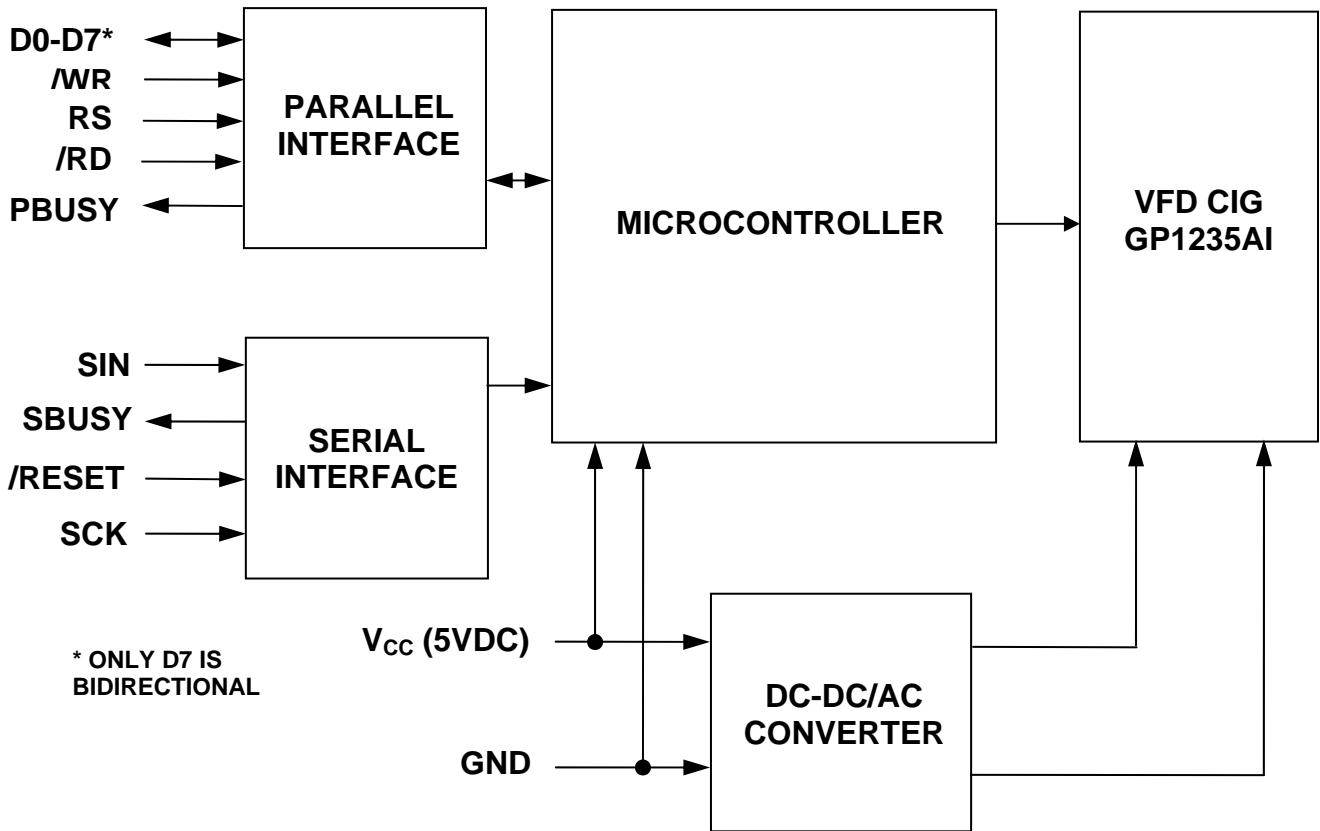
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3 OF 41



### 3.2 SYSTEM BLOCK DIAGRAM



### 3.3 ENVIRONMENTAL SPECIFICATIONS

Item	Symbol	Min.	Max.	Unit	Comment
operating temperature	Topr	-40	+85	°C	
storage temperature	Tstg	-40	+85	°C	
operating humidity	Hopr	-	85	%RH	without condensation
storage humidity	Hstg	-	90	%RH	without condensation
Vibration	-	-	4	G	total amplitude: 1.5mm freq: 10 ~ 55 Hz sine wave sweep time: 1 min / cycle duration: 2 hrs / axis (X, Y, Z)
Shock	-	-	40	G	duration: 11ms waveform: half sine wave 3 times / axis (X, Y, Z, -X, -Y, -Z)

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5 OF 41

### 3.4 ABSOLUTE MAXIMUM SPECIFICATIONS

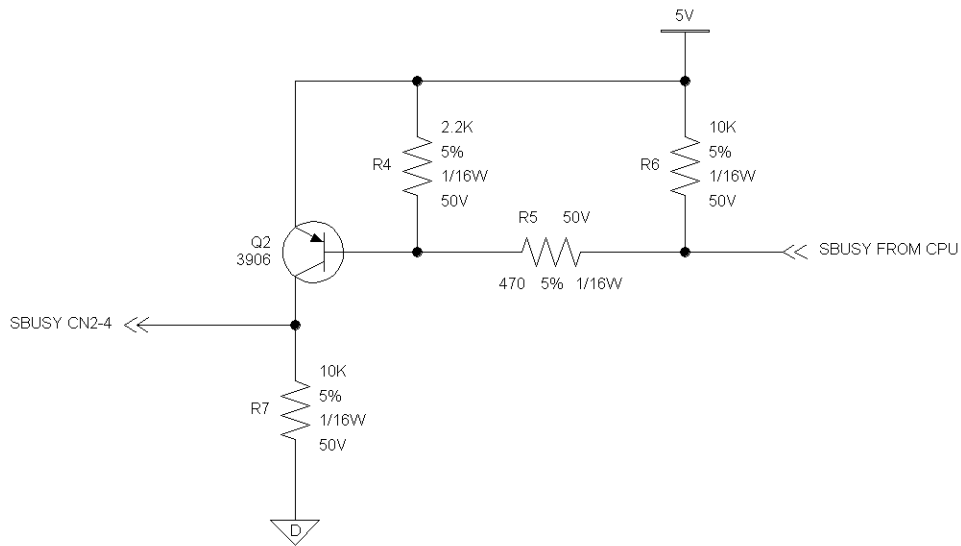
Item	Symbol	Min.	Max.	Unit
supply voltage	$V_{CC}$	-0.3	6.0	V
input signal voltage	$V_{IS}$	-0.3	$V_{CC}+0.3$	V

### 3.5 DC ELECTRICAL SPECIFICATIONS

Item	Symbol	Min.	Typ.	Max.	Unit
supply voltage	$V_{CC}$	4.75	5.0	5.25	V
supply current	$I_{CC}$	-	500	650	mA
high-level input signal voltage	$V_{IH}$	$0.8 * V_{CC}$	-	$V_{CC}$	V
low-level input signal voltage	$V_{IL}$	0.0	-	$0.2 * V_{CC}$	V
high-level output signal voltage (see Notes 1 & 2)	$V_{OH}$	4.0	-	$V_{CC}$	V
low-level output signal voltage (see Note 1)	$V_{OL}$	0	-	0.5	V

Notes:

- $V_{CC} = 5.0V$ ,  $R_L = 3K\Omega$  to GND
- SBUSY is an open collector output.



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6 OF 41