Noritake **itron**

Vacuum Fluorescent Display Module

Hardware Specification

Model: GU256X64F-A002

Specification No: DS-1359-0000-00

Date Of Issue: October 12, 2007 (00)

Revision:

This specification is subject to change without prior notice.

Index.

1 General Description

1.1 Scope

This specification covers the hardware and its requirements of the vacuum fluorescent graphic display module GU256X64F-A002.

1.2 Construction

The module consists of a 256 x 64dot graphic BD-VFD, DC/DC converter, display controller, and all necessary control logic.

1.3 Outline

Power supply: + 5 V_{DC} only
Parallel interface: Supports the Intel 80xx type microprocessors (8-bit bus)
                     Supports the Motorola 68xx type microprocessors (8-bit bus)
Serial interface: Synchronous serial interface
Gray scale: 4 types available (2, 4, 8, 16 levels)
Display memory: 8K-byte on-chip SRAM
                     2 Gray scale mode : 4 screen
                     4 Gray scale mode : 2 screen
                     8 Gray scale mode : 1 screen
                     16 Gray scale mode : 1 screen
Function: Display control
                     Layer Control
                     Memory fill

For more detail;
Refer to specification:
DS-1359-0001-xx: "General function" spec.

1.4 Block Diagram
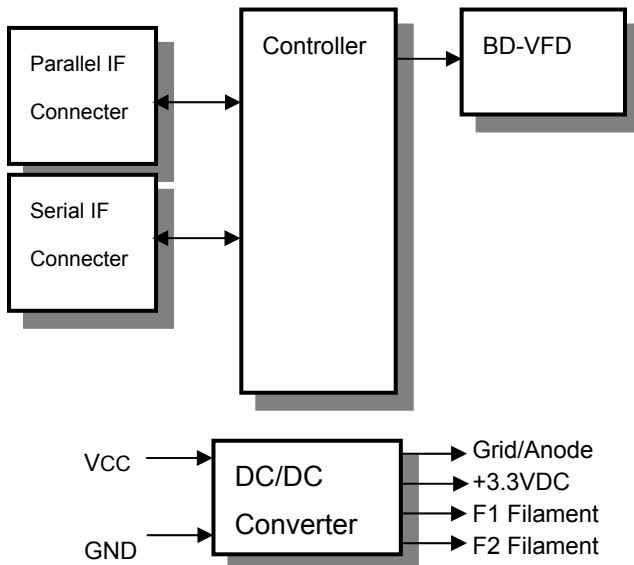
2   Electrical specification

2.1   Absolute Maximum Ratings

Power Supply Voltage

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VCC	-0.3	-	+6.0	VDC	

Logic Supply Voltage

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Parallel IF	D0-D7, XWR/RW, XRD/EN, RS, XCS, XRESET	VpIN	-0.3	-	3.7	VDC	VCC=5.0V
			-0.3	—	VCC+0.5	VDC	VCC=0V
Serial I/F	SPISI, SPICK, SPICS, ROMACS, XRESET	VsIN	-0.3	-	3.7	VDC	VCC=5.0V
			-0.3	—	VCC+0.5	VDC	VCC=0V

VIN (VpIN & VsIN) are based on logic voltage (3.3V) made internally from VCC. So, Logic signal shouldn't be input in case of less than VCC=4.75V.

2.2   Electrical ratings

Power Supply Voltage.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VCC	4.75	5.00	5.25	VDC	

All driving voltage for the VFD is converted from the DC/DC converter on board.

2.3 Electrical Characteristics

Logic input/output condition

Measuring Conditions: Ambient temperature = 25degrees, VCC =5.0VDC

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	Note
Parallel I/F	Logic input current D0-D7	IpIH1	-	-	1.0	uA	-	-
		IpIL1	-	-	-0.15	mA	-	-
	Logic input current XWR/RW, XRD/EN RS, XCS	VpIH2	-	-	1.0	uA	-	-
		VpIL2	-	-	-0.25	mA	-	-
	Logic input voltage D0-D7, XWR/RW, XRD/EN, RS, XCS	VpIH	2.0	-	-	VDC	-	-
		VpIL	-	-	0.8	VDC	-	-
	Logic output voltage WAIT	VpOH	2.7	-	-	VDC	IpOH=-5mA	-
		VpOL	-	-	0.5	VDC	IpOL=5mA	-
Serial I/F	Logic input current SPISI, SPICK, SPICS, ROMACS	IsIH	-	-	1.0	uA	-	-
		IsIL	-	-	-0.15	mA	-	-
	Logic input voltage SPISI, SPICK, SPICS, ROMACS	VsIH	2.0	-	-	VDC	-	-
		VsIL	-	-	0.8	VDC	-	-
	Logic output voltage SPISO	VsOH	2.7	-	-	VDC	IsOH=-5mA	-
		VsOL	-	-	0.5	VDC	IsOL=5mA	-
FRP	Logic output voltage	VfOH	2.7	-	-	VDC	IrOH=-5mA	
		VfOL	-	-	0.5	VDC	IrOL=5mA	
XRESET	Logic input current	IrIH	-	-	1.0	uA		
		IrIL	-	-	-0.65	uA		
	Logic input voltage	VrIH	1.1	-	2.4	VDC		
		VrIL	0.5	-	1.7	VDC		
TEST	Logic input current	ItIH	-	-	1.0	uA		
		ItIL	-	-	-0.35	uA		
	Logic input voltage	VtIH	2.0	-	-	VDC	-	-
		VtIL	-	-	0.8	VDC	-	-

Power Supply condition

Measuring Conditions: Ambient temperature = 25degrees, VCC =5.0VDC

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	Note
Power Supply Current 1	ICC1	-	1.4	1.8	ADC		(1)
Power Supply Current 2	ICC2	-	1.0	1.3	ADC		(2)
Power Supply Current 3	ICC3		20	30	mADC		(3)

Note

(1),(2) ICC1 shows the cuurent at all dots in the screen are lighted and ICC2 at all dots off. At power on rush, more than 2times current of above table should be expected. Provide the quick rise type power supply (<100msec.).

(3)Icc3 shows the current at Display Power OFF Mode (Display power control command).
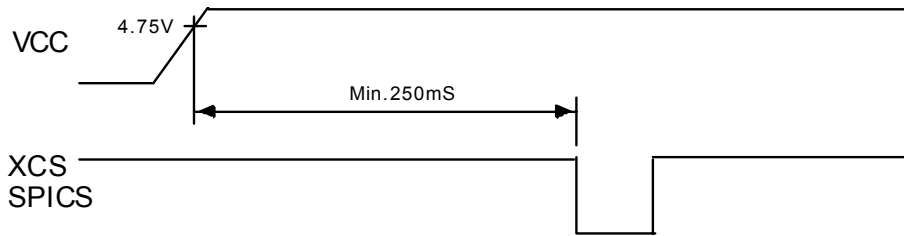
3 Optical Specifications

Number of dots:	16,384（256 x 64）
PCB Size:	217.0mm x 64.0 mm (X x Y)
Display area:	162.41mm x 40.49mm(X x Y)
Dot size:	0.485mm x 0.485mm(X x Y)
Dot pitch:	0.635mm x 0.635mm (X x Y)
Luminance:	350cd/m^2 Min. (700cd/m^2 Typ.)
Color of illumination:	Green (Blue Green)

4 Environmental Specifications

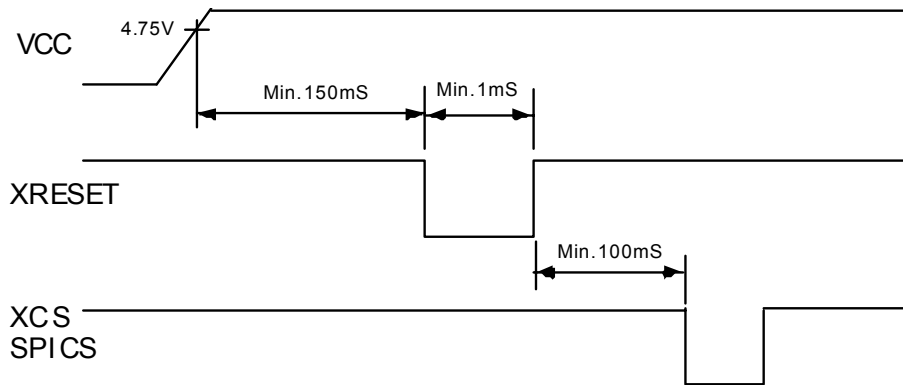|	
Operating temperature:	-40 to +70degreess
Storage temperature:	-40 to +85degrees
Storage humidity:	20 to 80 % R.H(Non Condensing)
Vibration:	10-55-10Hz, all amplitude 1mm, 30Min., X-Y-Z (Non operating)
Shock:	392m/s^2 (40G) 9mS X-Y-Z (Non operating)

5 Reset Timing

5.1 At power ON

VCC

4.75V

Min.250mS

XCS
SPICS

5.2 External RESET

VCC

4.75V

Min.150mS   Min.1mS

XRESET

Min.100mS

XCS
SPICS

6 FRP Output Timing

Typ.10mS

Typ.152uS

FRP

*This value is at normal operate condition(initial value).

7 Connector

7.1 Parallel Interface Connector (CN3)

Pin No.	Signal name	Function	Direction	Pin No.	Signal name	Function	Direction
1	D7	Data input	Bi-Direction	2	D6	Data input	Bi-Direction
3	D5	Data input	Bi-Direction	4	D4	Data input	Bi-Direction
5	D3	Data input	Bi-Direction	6	D2	Data input	Bi-Direction
7	D1	Data input	Bi-Direction	8	D0	Data input	Bi-Direction
9	GND	Ground	Input	10	XWR/RW	Data write	Input
11	GND	Ground	Input	12	XRD/EN	Data read	Input
13	GND	Ground	Input	14	RS	Command/Data	Input
15	GND	Ground	Input	16	XCS	Chip select	Input
17	GND	Ground	Input	18	WAIT*	Factory Use Only*	Output
19	FRP	Frame Pulse	Output	20	XRESET	Reset	Input

* Internally connected. (Be sure to leave this pin open)

7.2 Serial Interface Connecter (CN2)

Pin No.	Signal name	Function	Direction
1	SPISO	Data Output	Output
2	SPISI	Data Input	Input
3	SPICK	Data Clock	Input
4	SPICS	Chip Select	Input
5	ROMACS *	Factory Use Only*	Input
6	FRP	Frame Pulse	Output
7	XRESET	Reset	Input
8	GND	Ground	Input

* Internally connected. (Be sure to leave this pin open)

7.3 Power connector (CN1)

Pin No.	Signal name	Function	Direction
1	VCC	Power supply (5V)	Input
2	TEST*	Test (Factory use only)	Input
3	GND	Ground	Input

* Internally connected. (Be sure to leave this pin open)

8 Other

Refer to "General Function Technical Data" for Detail of interface timing and Jumper setting.

9 Outline Drawing

Unit:mm
( ):Reference Only

217.0±0.5
207.0±0.4
(193.0)
(162.41)
(46.0)
(3.35)
256x64 Dots
Dot pitch : 0.635mm
(85.25)
(27.5)
4-φ3.5±0.25
5.0±0.5
(12.0)
(13.7)
(5.0)
5.0±0.3
(32.0)
(40.49)
(57.0)
54.0±0.3
64.0±0.9

(212.6)
(5.55)
12.9±1.0

(1.6)
MAX10.0

Power Connector
JST:B3B-XH-A
Mate Connector JST:XHP-3

Signal (Serial) Connector
JST:B8B-XH-A
Mate Connector JST:XHP-8

Signal (Parallel) Connector
IRISO:IMSA-9032B-20P-GF or equivalent
Mate Connector IAF:PS-20SEN-D4P1
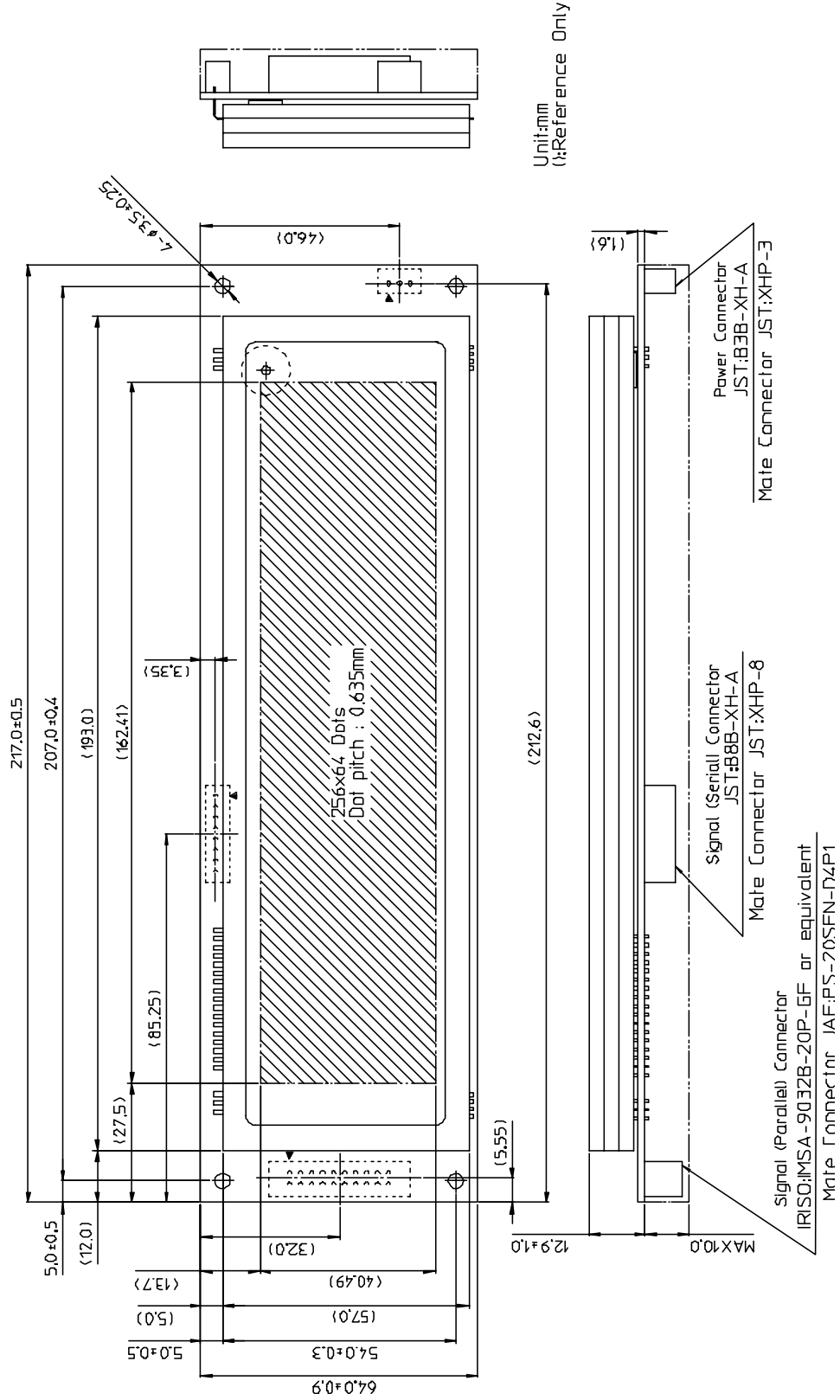
Notice for the Cautious Handling VFD Modules

Handling and Usage Precautions:
Please carefully follow the appropriate product application notes for proper usage, safety handling, and operation standards for maximum performance.

[VFD tubes are made of glass]
- Because the edges of the VFD glass-envelop are not smooth, it is necessary to handle carefully to avoid injuries to your hands
- Please avoid breaking the VFD glass-envelop to prevent injury from sharp glass particles.
- The tip of the exhaust pipe is fragile so avoid shock from impact.
- It is recommended to allow sufficient open space surrounding the exhaust pipe to avoid possible damage.
- Please design the PCB for the VFD-module within 0.3 mm warping tolerance to avoid any forces that may damage the display due to PCB distortion causing a breakdown of the electrical circuit leading to VFD failure.

[High voltage]
- Avoid touching conductive electrical parts, because the VFD-module uses high voltage exceeding 30～100 volts.
- Even when electric power is turned off, it may take more than one minute for the electrical current to discharge.

[Cable connection]
- Do not unplug the power and/or data cables of VFD-modules during operating condition because unrecoverable damage may result.
- Sending input signals to the VFD-module during a power off condition sometimes causes I/O port damage.
- It is recommended to use a 30 cm or shorter signal cable to prevent functional failures.

[Electrostatic charge]
- VFD-modules need electrostatic free packaging and protection from electrostatic charges during handling and usage.

[Structure]
- During operation, VFD and VFD-modules generate heat. Please consider sufficient heat radiation dissipation using heat sink solutions.
- We prefer to use UL grade materials or components in conjunction with VFD-modules.
- Wrap and twist motion causes stress and may break VFDs & VFD modules. Please adhere to allowances within 0.3mm at the point of attachment.

[Power]
- Apply regulated power to the VFD-module within specified voltages to protect from failures.
- Because some VFD-modules may consume in rush current equal to twice the typical current at power-on timing, we recommend using a sufficient power capability and quick starting of the power regulator.
- VFD-module needs a specified voltage at the point of connection. Please use an adequate power cable to avoid a decrease in voltage. We also recommend inserting a power fuse for extra protection.

[Operating consideration]
- Illuminating phosphor will decrease in brightness during extended operation. If a fixed pattern illuminates for an extended period,(several hours), the phosphor efficiency will decrease compared to the non operating phosphor causing a non uniform brightness among pixels. Please consider programming the display patterns to use all phosphor segments evenly. Scrolling may be a consideration for a period of time to refresh the phosphor condition and improve even illumination to the pixels.
- We recommend using a signal cable 30cm or less to avoid some possible disturbances to the signal.

[Storage and operating environment]
- Please use VFD-modules under the recommended specified environmental conditions. Salty, sulfur and dusty environments may damage the VFD-module even during storage.

[Discard]
- Some VFDs contain a small amount of cadmium in the phosphor and lead in the solder. When discarding VFDs or VFD-modules, please adhere to governmental related laws or regulations.

[Others]
- Although the VFD-module is designed to be protected from electrical noise, please plan your circuitry to exclude as much noise as possible.
- Do not reconstruct or repair the VFD-module without our authorization. We cannot assure the quality or reliability of unauthorized reconstructed VFD-modules.

Notice:
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