NEC Corporation
NEC Electron Devices
Display Device Operations Unit
Color LCD Division
2nd Engineering Department

INVERTER

Type No. 104PWBR1

Data Sheet

(Second edition)

INTRODUCTION

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NEC products are classified into the following three quality grades:
"Standard", "Special", "Specific"

The ***"Specific"*** quality grade applies only to applications developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a product depend on its quality grade, as indicated below. Customers must check the quality grade of each application before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Military systems, aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems (medical equipment, etc.) and any other equipment

The quality grade of this product is ***"Standard"*** unless otherwise specified in this SPECIFICATIONS. If customers intend to use this product for applications other than those specified for ***"Standard"*** quality grade, they should contact an NEC Corporation sales representative in advance.

Anti-radioactive design is not implemented in this product.

DESCRIPTION

104PWBR1 is type name of inverter to replace. And the inverter consists of inverter circuit board, transformer and electric parts. Adaptable modules are as follows.

- NL6448AC33-18A
- NL6448AC33-18B
- NL6448AC33-18J
- NL6448AC33-24
- NL6448AC33-27
- NL6448AC33-29
- NL6448BC33-31
- NL6448BC33-31D
- NL8060AC26-11
- NL8060BC26-17

1. GENERAL SPECIFICATIONS

Items	Specifications	Unit
Inverter size	25.0 ± 0.5 (H) × 105.0 $^{+0.7}_{-0.3}$ (V) × 10.2 max (D)	mm
Weight	20 (max.), 15 (typ.)	g
Delivery unit	10 (minimum)	pcs

2. ABSOLUTE MAXIMUM RATINGS FOR LCD MODULES

Parameters	Symbols	Ratings	Unit	Remarks
Storage temp.	Tst	-20 to +60	℃	—
Operating temp.	Top	0 to +50	℃	Module surface Note 1
Supply voltage	VDDB	-0.3 to +15.0	V	—
Logic input “L” voltage	VIL	-0.3	V	—
Logic input “H” voltage	VIH	7	V	—
Lamp voltage	VL	2000	Vrms	—
Relative humidity (RH) Note 2	≤95		%	Ta≤40 ℃
	≤85		%	40＜Ta≤50 ℃
Absolute humidity Note 2	Absolute humidity shall not exceed Ta=50℃, 85% relative humidity level.		g/m^3	Ta＞50 ℃

Note 1: Measured at the LCD panel

Note 2: No condensation

3. ELECTRICAL CHARACTERISTICS

(1) Inverter (Ta＝25℃)

Items	Symbols	Min.	Typ.	Max.	Unit	Remarks
Supply voltage	VDDB	11.4	12.0	12.6	V	-
Supply current	IDDB	-	500	550	mA	Maximum luminance
Luminance control voltage Note 1	-	-	2.5	-	V	Maximum luminance, CN3-2Pin BRTH
		-	1.2	-	V	Minimum luminance, CN3-2Pin BRTH
Logic input “L” voltage	VIL	0	-	1.5	V	BRTC
Logic input “H” voltage	VIH	3.5	-	5.0	V	
Noises	-	-	-	25	dB	At distance of 5cm
Oscillator frequency	FO	50	54	58	kHz	-
Luminance frequency	FB	250	270	290	Hz	-
Luminance control range	-					Maximum luminance: 100%
Luminance select	-	60	-	100	%	CN1-5PIN.
Variable steps	-	-	50 to 100	-	%	CN3-2, 3PIN.
Open lamp voltage	-	1265	1300	-	Vrms	-

Note 1: Refer to Note 2 Luminance control terminal (CN3) of 4. INTERFACE PIN CONNECTION.

＜Fuses＞

This product has fuses listed below. Check and evaluate power supplies of customer's system.

Supply voltage	Type	Supplier	Rating	Remark
VDDB	KE10	Daito	24V/1.0A	―

Note1 : The power capacity should be more than 2 times of fuse ratings from safety point of view. If the power capacity of customer system is less than above request, check and evaluate it carefully.

(2) Lamp (Reference data) (Ta＝25℃)

Items	Symbols	Min.	Typ.	Max.	Unit	Remarks
Lamp current	IL	-	5.0	-	mArms	Per lamp
Lamp voltage	VL	-	510	-	Vrms	
Power consumption	PL	-	2.55	-	W	
Lamp turn on voltage (without 104LHS29L)	VS	840	-	-	Vrms	
Lamp turn on voltage (only 104LHS29L)	VS	720	-	-	Vrms	

4. INTERFACE PIN CONNECTION

CN1 socket
Part No. : LZ-5P-SL-SMT
Adaptable plug : LZ-5S-SC3
Supplier : Japan Aviation Electronics Industry Limited (JAE)

Pin No.	Symbols	Remarks
1	VDDB	Power supply
2	VDDB	Power supply
3	GNDB	Backlight ground
4	GNDB	Backlight ground
5	BRTHL	Luminance select Note 1

Note 1: Luminance select
High luminance (100%) ···BRTHL = "+5V" or "Open"
Low luminance (60%) ···BRTHL = "GNDB level"

CN2 socket
Part No. : SM03(4.0)B-BHS-TB
Adaptable plug : BHR-03VS-1
Supplier : J.S.T TRADING COMPANY, LTD.

Pin No.	Symbols	Remarks
1	V_{LOW}	Low voltage terminal
2	V_{HIGH}	High voltage terminal
3	V_{HIGH}	High voltage terminal

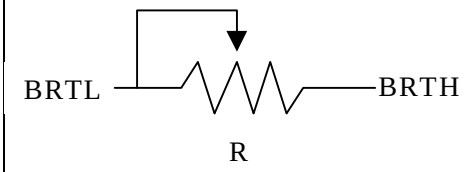
Note 1: V_{HIGH} and V_{LOW} must connect correctly. If you make a mistake to connect, you will get hurt and the module will break.

CN3 socket
Part No. : IL-Z-3PL-SMTY
Adaptable plug : IL-Z-3S-S125C3
Supplier : Japan Aviation Electronics Industry Limited (JAE)

Pin No.	Symbols	Remarks
1	BRTC	Backlight ON/OFF signal Note 1
2	BRTH	Luminance control terminal Note 2
3	BRTL	Luminance control terminal Note 2

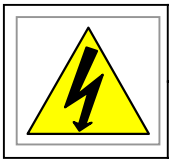
Note 1: Backlight ON/OFF signal
Backlight ON ⋯ BRTC = "+5V " or "Open"
Backlight OFF ⋯ BRTC = "GNDB level"

Note 2: Luminance control terminal

Function	How to adjust
Variable resistor	This way works when BRTHL (No. 5 pin) of CN1 is opened. Please connect BRTH and BRTL. The variable resistor for luminance control should be 10kΩ type, and zero point of the resistor correspond to the minimum of luminance.  [Minimum luminance (50%) : R=0Ω Maximum luminance (100%) : R=10kΩ] (Mating variable resistor: 10 kΩ ±5 %)
Voltage	This way works when BRTHL and BRTL are opened. The range of input voltage between BRTH and GND is as follows. [Minimum luminance (50%) : 2.5V Maximum luminance (100%) : ≤1.2V]

《Rear view》

5. MARKING

	Contents	Indication position
Type name	104PWBR1	on the board
Caution label	 HIGH VOLTAGE **CAUTION** RISK OF ELECTRIC SHOCK. DISCONNECT THE ELECTRIC	on the protection sheet

6. RELIABILITY TEST

This test is in accordance with the LCD module. Refer to Reliability Test of the LCD module.

7. GENERAL CAUTIONS

Because next figures and sentence are very important, please understand these contents as follows.

⚠ CAUTION	This figure is a mark that you will get hurt and/or the module will have damages when you make a mistake to operate.

	This figure is a mark that you will get an electric shock when you make a mistake to operate.
	This figure is a mark that you will get hurt when you make a mistake to operate.

⚠ CAUTIONS

	Do not touch an inverter – on which a caution label is stuck – while the LCD module is working, because of high voltage. And, Do not remove inverter protection sheet.

(1) Safety precautions

a. Because high voltage is present when the inverter is working, there is danger of electrical shock. So that, make secure powered off when you handle the inverter and the lamp holder.
b. Do not impulse and press the inverter, otherwise the parts may be damaged.
c. There is danger that the inverter might be charged at high voltage after use of the module, be sure to wait some time after switching power OFF before starting work.
d. Do not touch connector pins to avoid bad connections. When handling it, take adequate care.

(2) Quality precautions

a. Static electricity may damage the product (LCD module). When handling the product, take adequate care to eliminate static electricity (grounding band, ion shower, etc.). Periodically maintain your ion shower, etc., to check performance.
b. Dewdrop atmosphere must be avoided.
c. Do not store and/or operate the LCD module in a high temperature and/or high humidity atmosphere. Storage in an anti-static pouch and under the room temperature atmosphere is recommended.
d. Do not operate the LCD module in high magnetic field.

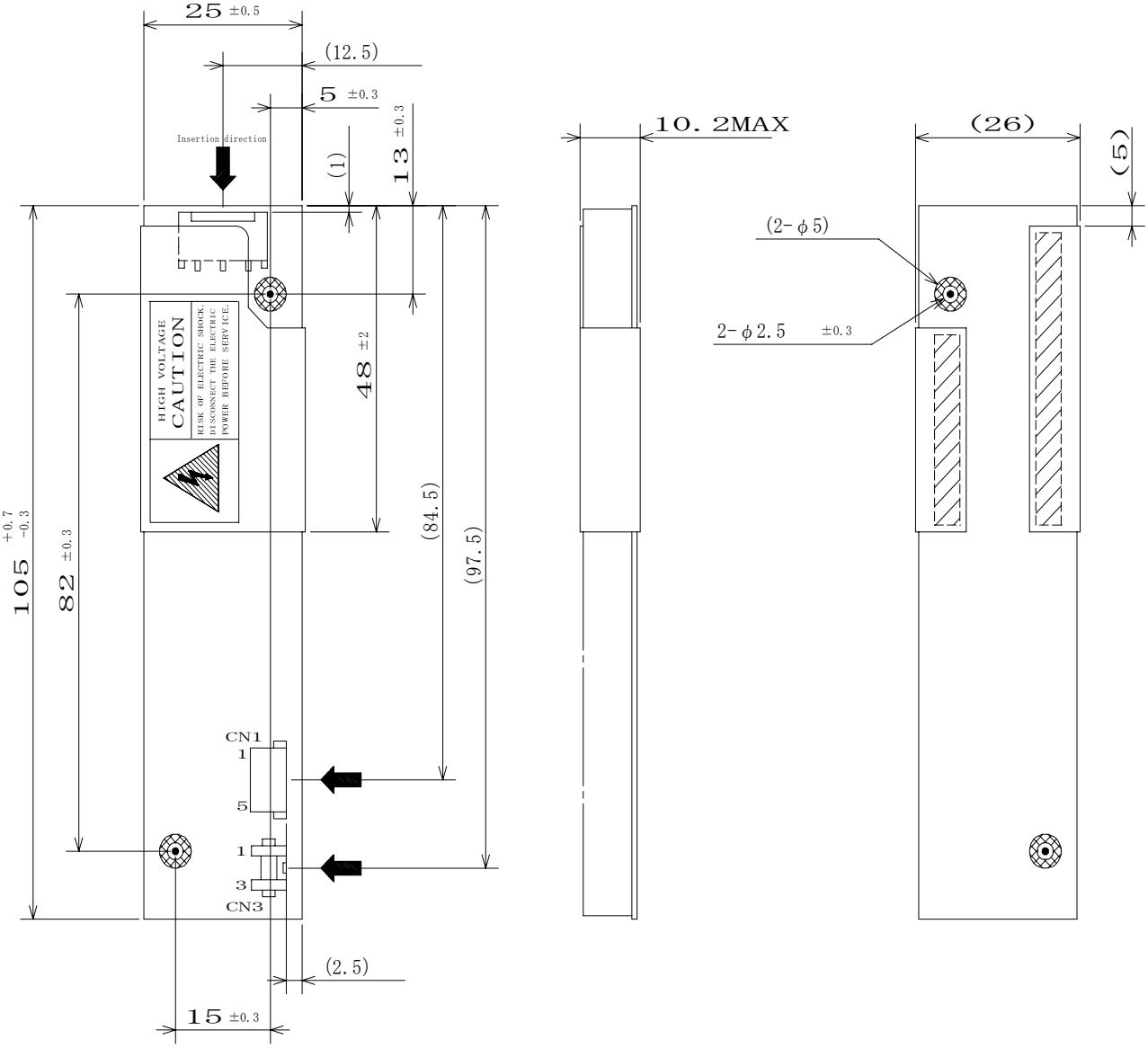
(3) Other cautions

a. Do not disassemble and/or reassemble inverter.
b. Do not a readjust variable resistors or switches etc.
c. Set a inverter 1mm or more away from attachment positions in order to prevent the inverter from bending.
e.g., Washer condition: The washer thickness (P) = 1.0mm (min.)
The washer diameter (ϕ) = 5.0mm (Recommended value)

(4) Disposal method

a. The lamp holder contains cold cathode fluorescent lamps. Please follow local ordinances or regulations for its disposal.

8. OUTLINE DRAWING (Reference)
(Unit: mm)



Revision History

Rev.	Prepared date	Revision contents and approval	Signature of writer
1.	Nov. 17, 2000	DOD-H8208	*Approved by* A. Okamoto *Checked by* T. Kusanagi *Prepared by* A. Kumano
2.	June 29, 2001	P.3 ・1.GENERAL SPECIFICATIONS Weight : 25(max.)→20(max.) 15(typ.) is added. Delivery : Sets → pcs P.4 ・3.ELECTRICAL CHARACTERISTICS Note 1 and Note 2 are deleted. Note 3 → Note 1 Fuses are added. P.5,6 ・4.INTERFACE PIN CONNECTION CN1, CN3 : "H(+5V)" → "+5V" "L(GND level)"→"GNDB level" CN2 : VL→V_{LOW}, VH→V_{HIGH} P.9 ・GENERAL CAUTIONS (3) c. Put washers on the inverter rear side. → Set a inverter 1mm or more away from attachment positions. Condition →e.g., Washer condition	*Approved by* (H. Moriyama) *Checked by* (T. Kusanagi) *Prepared by* (A. Kumano)