Displaze Limited **Technical Specification**	Form : QCF51 Dated : 23rd February 2000 Revision : 3.1 Approved : Mark Cartlidge

Unit / Module Name:	Wide Dimming Range Inverter
Unit / Module Number:	INV3004
Used On:	
Document Issue:	0.03
Date:	18-4-2004

Outline Description

This specification outlines the base requirements for a Wide Dimming Range Inverter. The part number reflects the overall output power and number of driven lamps. In this case the estimated output power is 30 Watts and 4 lamps.

Approvals	Date
Managing Director	
Software Manager	
Design Engineer	

Document Classification

This Document/message is intended only for the use of the individual or entity to which it is addressed and contains information that is privileged and confidential. If the reader of this message is not the intended recipient or the employee or agent responsible for delivering the message to the recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify sender immediately by telephone (+44 (0)1296-469770) and destroy the original document/message

Disclaimer

Displaze is continually improving its products and reserves the right to change the details of this document without notice. Every effort has been made to ensure the accuracy of this document, however the manufacturer cannot accept responsibility for any loss or damage caused as a result of using this document.

Notice of any mistakes, inconsistencies or comments relating to this document would be gratefully received by fax to Displaze. All rights reserved. No part of this document may be reproduced, in any form or by any means, without the written permission of Displaze Ltd.

Revision History

Rev No.:	Date	Description	Checked	Approved	Prepared	Issue Date
0.01	17-09-04	Initial Release				
0.02	18-8-04	Input connector details added				
0.03	9-11-04	Pin Allocation Checked				

Table of Contents

Table of Figures

Error! No table of figures entries found.

1 General Description

The INV3004INV3004 is a CCFL inverter, which operates a range of backlights as specified in the table below. The inverter has an on-board voltage controlled dimming circuit to provide an extremely wide luminance adjustment range. Over the entire dimming range, there is no noticeable lamp flickering and the uniformity of the backlight is well maintained.

LCD Part No.:	No. of CCFL	Operating Voltage (Vrms)	Strike Voltage (Vrms)	Operating Current (mA)	Lamp Freq. (kHz)	Connectors	Notes
M150XN04	4	680	1000	5.5	55	3 x SM03(4.0)B-BHS-1-TB (JST)	25ºC
M170EG01V1	4	660	1150	7.5	60	4 x SM02B-BHS-1-TB (JST)	25ºC
M190EN02	4	720	1500	7.0	50	4 x SM02(8.0)B-BHSS (JST)	25ºC
M201UN02		760	1200	6.0	50	2 x SM02B-BHSS-1 (JST) 2 x SM04B-BHS-1 (JST)	25ºC
LF1051	4	960	1100	5.5	55		

Table 1: List of Supported Panels

The INV3004 inverter operates at a 12V DC input and can drive up to 6 CCFLs for a maximum lamp power of 30 Watts. If 6 lamps are required please contact your local sales office to discuss factory customization to your requirement.

2 Key Features

- Easy to Use Brightness Control

- MAXDIM Wide Range Dimming offering up to 1000:1

- Output Short-Circuit Protection and Automatic Strike-Voltage Regulation and Timeout

- Flicker Free Dimming

- Factory Configurable for wide range of panels

- Slow start to reduce switch on surge

- On-board Power Input smoothing circuit minimising panel interference

3 Absolute Ratings

Parameter	Value			Units	Notes
	Min.	Typ.	Max.		
Operating Voltage	11.5	12	12.5	V DC	
Operating Temp	-15		60	ºC	
Storage Temp	-20		80	ºC	
Current Consumption		3		A	Ambient temperature 22ºC
Control Voltage		5		V DC	Off
		0			On
Dimming Voltage		5			100%
		0			0%
V_{strike}			2000	Vrms	
Lamp Current			8	mA	

4 Recommended Operating Conditions

Parameter	Value			Units	Notes
	Min.	Typ.	Max.		
Operating Voltage	11.5	12	12.5	V DC	
Current Consumption		3		A	Ambient temperature 22ºC
Control Voltage		5		V DC	Off
		0			On
Dimming Voltage		5			100%
		0			0%
Lamp Voltage	420		960	Vrms	
Lamp Current		7		mA	100% Luminance
Operating Frequency	55		70	kHz	

5 Dimming Control

The INV3004 inverter accepts a 0 - 5V analog voltage for dimming control. As the dimming voltage Vd decreases from +5V, the lamp current waveform is pulse width modulated at a repetition rate high enough to prevent LCD screen flicker. Within each PWM cycle, the lamps in the backlight are turned fully "ON" for a fraction of the cycle time. The human eyes, being very slow with respect to the PWM rate, respond to the average light produced over the PWM cycle. As a result, the luminance of the backlight and/or the LCD screen is approximately proportional to the duty cycle of the PWM waveform.

In general, inverters with PWM dimming have a very wide luminance adjustment range. For most practical cases, the INV3004 inverter can achieve a maximum dimming ratio of about 1000:1. Hence, the luminance of the backlight or the LCD screen can be adjusted from 100% to 0.1%.

The 0 - 5V dimming voltage can be generated simply by using a potentiometer (Fig. TBA) or by a voltage step generating circuits as shown in Fig TBA.

The LCD luminance and the inverter current vary almost linearly if Vd is plotted in log scale (Fig. TBA). Thus, it is recommended that a logarithmic voltage step generating circuit be used to provide a nearly linear luminance adjustment.
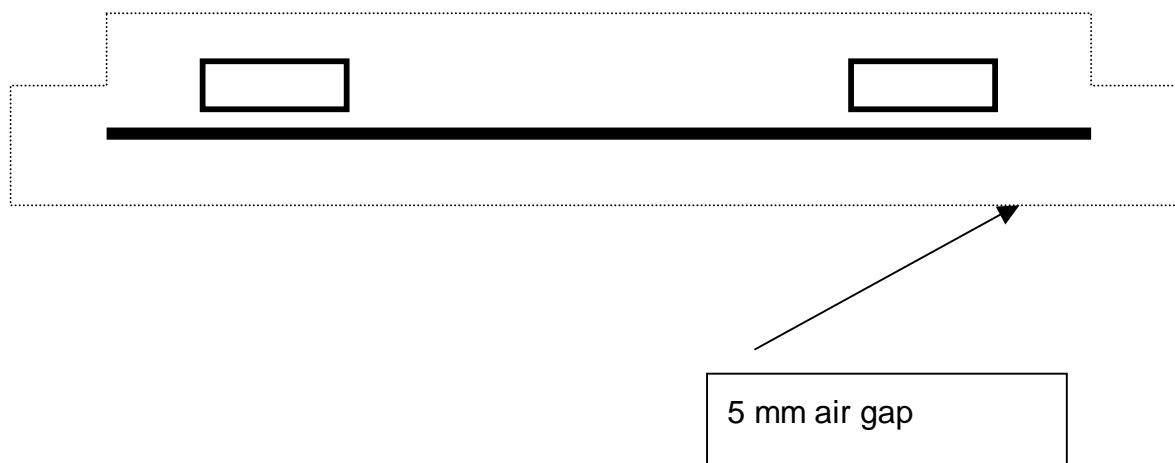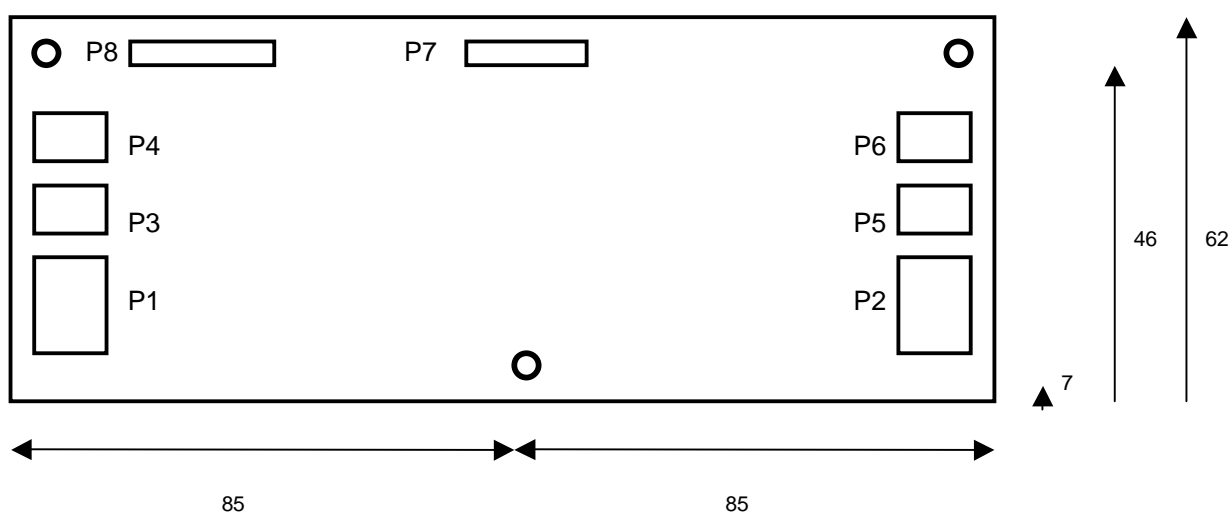
6   Mechanical Configuration

Height: 18mm + 10mm total recommended clearance

Length: 170mm

Width: 62mm

Clearance of 5 mm around the high voltage transformer and output connectors above and below the PCB is essential if reliability is to be maintained.

5 mm air gap

7 Safety

This module presents a hazard to the user and should be marked as necessary to provide adequate warning of the hazard.

Attention should be given to notify the user of the necessary safety precautions in all supporting documentation.

8 EMC

This module is designed to operate from within an enclosed host system, which is built to provide EMC shielding. Operation within the EU EMC guidelines is not guaranteed unless it is installed within an adequate host system.

This module is protected from damage by fast voltage transients originating from outside the host system, which may be introduced through the output cables.

9   Interface Requirements – Electrical

9.1 Connectors

.

Part	Part Number	Notes
P1,2	SM04(4.0)B-BHS-1-TB 4WRASM HDR	JST
P3,4,5,6	SM02B-BHSS-1-TB 2WRA SM HEADER	JST
P7	B6B-EH-A 2.5MM 6 WAY CONNECTOR	JST
P8	B8B-EH-A 2.5MM 8 WAY CONNECTOR	JST

Power input connector P8

1	+12v input
2	+12v input
3	+12v input
4	Enable, H=on, L=off (H=5Vto12V)
5	+12v filtered output
6	0v
7	0v
8	0v

Control input P7

1	Brightness control 0-5v (0=min, 5V=max.)
2	0v
3	7.5v o/p for brightness control
4	7.5v o/p for brightness control
5	LED anode, tracks brightness.
6	LED 0v

When using an analogue potentiometer connect the wiper to pin1 via a 33k resistor.