

# SPECIFICATION

MODEL No.	LQ020B8UB02
FILE No.	LT-02X01A
ISSUE	Mar. 20, 2006
PAGE	58 pages

DEVICE SPECIFICATION for

## TFT LCD Module

Model No.

**LQ020B8UB02**

## NOTICE

This publication is the proprietary of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.

The application circuit examples in this publication are provided to explain the representative applications of SHARP's devices and are not intended to guarantee any circuit design or permit any industrial property right or other rights to be executed. SHARP takes no responsibility for any problems related to any industrial property right or a third party resulting from the use of SHARP's devices, except for those resulting directly from device manufacturing processes.

Observe the following points when using any device in this publication. SHARP takes no responsibility for damage caused by improper use of the devices.

The device in this publication was designed and manufactured for use in Telecommunication equipment .

The appropriate design measures should be taken to ensure reliability and safety when SHARP's devices are used for equipment such as:

- Transportation control and safety equipment(i.e., aircraft, trains, automobiles, etc.)
- Traffic signals                      • Gas leakage sensor breakers
- Alarm equipment                      • Various safety devices etc.

SHARP's devices shall not be used for equipment that requires extremely high level of reliability, such as:

- Military and space applications                      • Nuclear power control equipment
- Medical equipment for life support

Contact and consult with a SHARP representative if there are any questions about the contents of this publication.

## Table of Contents

1. Application .....	3
2. Overview.....	3
3. Mechanical Specifications.....	3
4. Input / Output Terminal .....	4
5. Absolute Maximum Ratings .....	5
6. Electrical Characteristics.....	6
6-1. Recommended operating conditions.....	6
6-2. Backlight driving.....	7
6-3. AC Characteristics .....	7
7. MPU Bus Protocol.....	10
7-1. Summary of memory addressing .....	10
7-2. Display RAM .....	11
7-3. The relation between Display RAM and Address .....	12
7-4. Significance of Data bit.....	15
7-5. Gradation LSB control .....	16
7-6. Low Power 8 color mode .....	16
7-7. Access to Register and Display RAM .....	17
8. Available commands .....	18
8-1. Column Address .....	19
8-2. Page Address.....	19
8-3. Pixel Format .....	20
8-4. Write RAM .....	21
8-5. Read RAM .....	22
8-6. Display Normal.....	23
8-7. Display Inverted .....	23
8-8. Sleep Disable.....	24
8-9. Sleep Enable.....	24
8-10. Low Power Enable .....	25
8-11. Low Power Disable.....	25
8-12. Display Off.....	26
8-13. Display On .....	26
8-14. Volume Control.....	26
8-15. Timing Control .....	27
8-16. Non Operation .....	30
8-17. Initial status .....	30
8-18. Internal Register Read.....	30
8-19. Read ID .....	32
8-20. LCD Drive Mode Chart.....	33
8-21 Module Status Chart.....	34
9. Power Sequence & Command Flowing .....	35
9-1. Power ON.....	35
9-2. Power OFF.....	36
9-3. Partial Display .....	37
9-4. Changing Scan Mode.....	38
10. Optical Characteristics .....	39
11. Display Quality .....	46
12. Handling Precautions.....	46
13. Reliability Test Conditions.....	48
14. Forwarding Form .....	49
15. Miscellaneous .....	51
Appendix .....	52
Appendix A : Outline Dimensions .....	52
Appendix B : LCD-Module Assy.....	53
Appendix C : Assignment of I/O Pin.....	54
Appendix D : System Block Diagram .....	55
Appendix E : FPC Circuit Diagram .....	56
Appendix F : Parts mounted on FPC Diagram.....	57
Appendix G : Volume control value and contrast, flicker.....	58

# 1. Application

This document is applied to LQ020B8UB02, SHARP's active matrix LCD(Liquid Crystal Display) module, which is suitable for mobile application, such as a cellular phone.

## 2. Overview

LQ020B8UB02 is composed of a glass panel, driving IC's, a backlight system with three LED(Light-Emitting Diode)'s, and a metal frame. A frame memory is embedded in one of the IC's, and no driving signal is required for still pictures. No LED driver is mounted. This panel is normally white.

The trans-reflective glass panel works sufficiently under whichever bright or dark circumstances. Reduced color mode allows lower power consumption by decreasing colors from 65,536 to eight. In addition, partial scanning is appropriate for a mobile phone. This is a manner of refreshing only limited lines as is illustrated below:

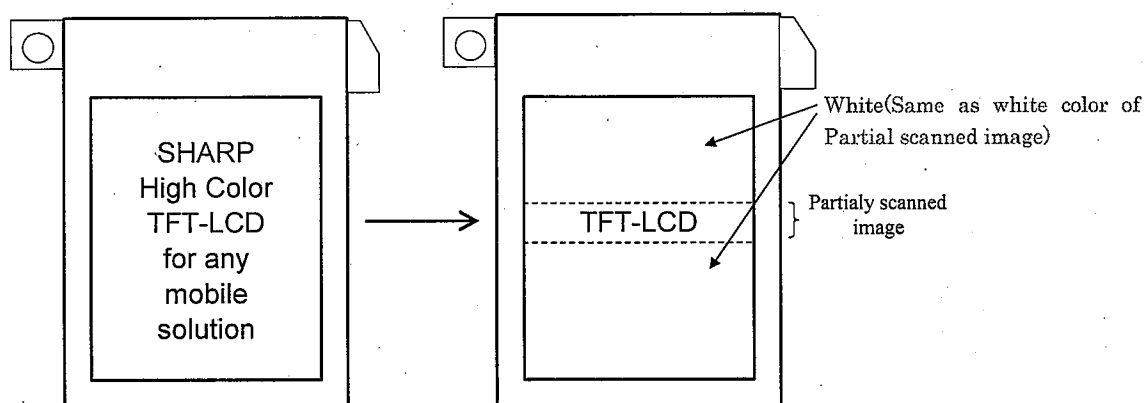


Fig. 1 Partial scanning

The diagonal size of the active area is 1.97 inches. The display panel performs 132 × RGB × 162 dot resolution and 65,536 color depth. Amorphous Silicon TFT(Thin Film Transistor) technology realizes faster response time, and it is fit for movies.

## 3. Mechanical Specifications

Table 1

Parameter	Specification	Unit	Remark
Screen size (diagonal)	5.01	cm	
	1.97	inch	
Active area size	31.68 (H) × 38.88 (V)	mm	
Pixel format	132 (H) × 162 (V) (1 pixel = R + G + B dots)	pixels	
Pixel pitch	0.24 (H) × 0.24 (V)	mm	
Pixel configuration	R, G, B vertical stripe		
Outline dimensions	39.1 (W) × 58.0 (H) × 3.4 (D)	mm	[Note 3-1]
Mass	12.5±0.5	g	
Surface treatment	Clear hard-coating 2H Anti-Reflection Diffuser=0%		
COG-ACF	AC-8403(Hitachi Chemical)		
FPC-ACF	AC-7106(Hitachi Chemical)		

[Note 3-1] Protrusions and FPC(Flexible Printed Circuit) are excluded. For more detailed information, refer to Appendix A attached on the last page.

## 4. Input / Output Terminal

LCD-side connector: 55560-0201 (Molex)

Mating connector: 54722-0201(Molex)

Table 2

Pin No.	Symbol	I/O	Description	Remark
3	VDDI	Power supply	Power supply for digital circuits	
10	VDD	Power supply	Power supply for analog circuits	
11,12	GND	Ground		
20	RESX	Input	Reset signal (low active)	
19	CSX	Input	Chip select	
18	WRX	Input	Memory write enable (low active)	
17	RDX	Input	Memory read enable (low active)	
16	A0	Input	Address bit. Low level represents a command byte is currently on the MPU(Micro Processing Unit) bus, and high level shows a parameter byte.	
15	D0	Bi-directional	(LSB)	
14	D1	Bi-directional		
13	D2	Bi-directional		
8	D3	Bi-directional	8-bit MPU bus	
7	D4	Bi-directional	Command (A0 = low) or parameter (A0 = high)	
6	D5	Bi-directional		
5	D6	Bi-directional		
4	D7	Bi-directional	(MSB)	
9	PSD	Output	PSD signal	*1
2	VLED+	Power supply	LED power supply (anode)	
1	VLED-	Power supply	LED power supply (cathode)	

Also refer to Appendix A "Outline dimension" and Appendix B "Assignment of I/O Pin".

\*1 PSD=H: Panel scanning timing, PSD=L: Panel non-scanning timing

PSD pin must be OPEN or Terminated when not use, since this pin is for output.