SHARP

Issue No.	SH-HAPM-100304

March 4, 2010

Specifications (Tentative)

Product Type: 4.3inch LCD Display module (including 1 chip graphic controller)

Model No.: LR0G941/42

* This specification contains XXpages including attachment documents etc,.
Please mention us by the purchase order if you have an objection about our delivered specifications.

Development Dept.4
System Device Division 2
Electronic Components And Devices Group
SHARP CORPORATION

SHARP

* Handle this document carefully for it contains material protected by international copyright law. Any reproduction, full or in part, of this material is prohibited without the express written permission of the company.

* When using the products covered herein, please observe the conditions written herein and the precautions outlined in the following paragraphs. In no event shall the company be liable for any damages resulting form failure to strictly adhere to these conditions and precautions.

(Precautions)

(1) Please do verify the validity of this part after assembling it in customer's products, when customer wants to make catalogue and instruction manual based on the specification sheet.

(2) The products covered herein are designed and manufactured for the following application areas. When using the products covered herein for the equipment listed in paragraph (2), even for the following application areas, be sure to observe the precautions given in Paragraph (2). Never use the products for the equipment listed in Paragraph (3).

- Office electronics
- Instrumentation and measuring equipment
- Machine tools
- Audiovisual equipment
- Home appliances
- Communication equipment other than for trunk lines

(3) These contemplating using the products covered herein for the following equipment which demands high reliability, should first contact a sales representative of the company and then accept responsibility for incorporating into the design fail-safe operation, redundancy, and other appropriate measures for ensuring reliability and safety of the equipment and the overall system.

- Control and safety devices for airplanes, trains, automobiles, and other transportation equipment
- Mainframe computers
- traffic control systems
- Gas leak detectors and automatic cutoff devices
- Rescue and security equipment
- Other safety devices and safety equipment, etc.

(4) Do not use the products covered herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.

- Aerospace equipment
- Communications equipment for trunk lines
- Control equipment for the nuclear power industry
- Medical equipment related to life support, etc.

(5) please direct all queries and comments regarding the interpretation of the above three Paragraphs to a sales representative of the company.

* Please direct all queries regarding the products covered herein to a sales representative of the company.

SHARP

Contents

1. Outline

This module is fundamentally composed of a printed circuits board including 4.3 inch WQVGA color TFT LCD panel, 1 chip graphic controller (LR35504) ,backlight LED driver,512K bits EEPROM,4G bits NAND Flash memory and 512M bits SDRAM. And we can provide the products attached transparent touch panel.

Fig. 1-1 appearance of surface (LR0G942)

Fig. 1-2 appearance of Back (LR0G942)

Table 1-1 Article of product lineup

Product Name	Touch panel
LR0G941	x
LR0G942	o

2. Features

This LCD display module equips with the following items.

- Graphic controller (LR35504)
  32bit CPU(ARM926EJ-S) , 108/54MHz operation

  Built-in RAM
  (work RAM:96kbyte, video RAM: 512kbyte)
  SDRAM controller, camera module I/F, JPEG Enc/Dec, LCDC, digital LCD I/F, SOUND generator, Microphone input, CDCard I/F, IrSS communication I/F, UART, NAND flash memory I/F, Timer, WDT, RTC, SPI, I2C, PWM, GPIO others
  (* Refer to "LR35504 User's Manual" in detail.)

- 4.3 inches WQVGA TFT LCD panel(LQ043T3DX04) attached LED backlight

- Analog video decoder equipped

  Applying sampling rate: NTSC(ITU-R BT601) 13.5MHz

- 4Gbits NAND flash memory

- 512M bits SDRAM x2

- Connector for external I/F
  Video input, IrSS input/output, Microphone input(I2S), SOUND output (I2S), UART I/O, SDCard I/F(2ch), SPI(1ch), GPIO

- 4.3 inches transparent touch panel (LR0G942)

- Recommended power supply : DC 5.0V±10％ more over 2A

3. Mechanical specifications

Table 3-1 appearance specification

	items	specification	unit
body	Dimensions	- x -	mm
	Weight *1	- / -	g
display	Display size	10.9 (4.3 inches)	cm
	Effective display area	95.04(H)×53.856(V)	mm
	Dot structure	480(H)×RGB×272(V)	dot
	Dot pitch	0.198(H)×0.198(V)	mm
	Display type	R.G.B vertical stripe	-
	Display mode	Normally Black	-
Touch panel	Dimensions	105.80x69.30	mm
	Viewing Area	96.20x58.76	mm
	Active Area	94.60x57.16	mm

Touch panel is equipped to LR0G942
*1: TP equipped/non-TP

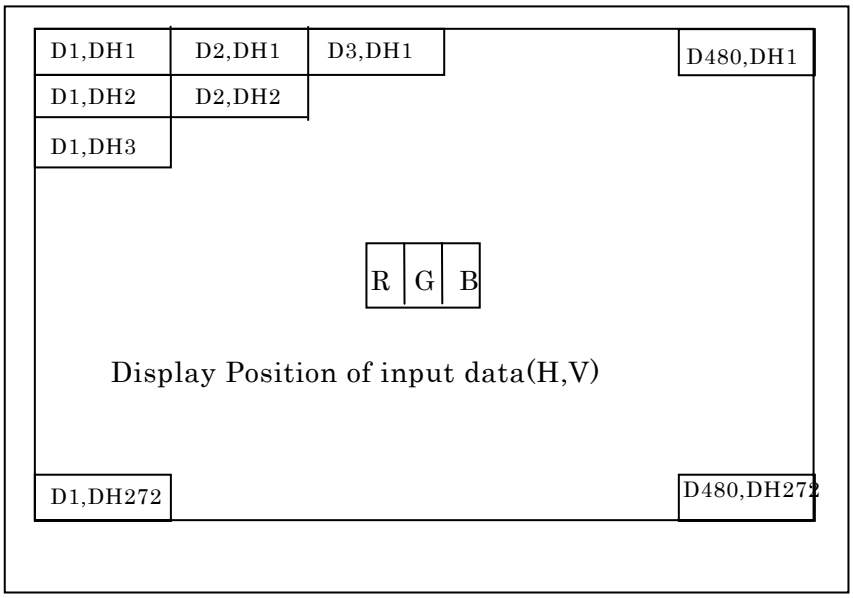

Fig. 3-1 Dot display position

4. Block diagram

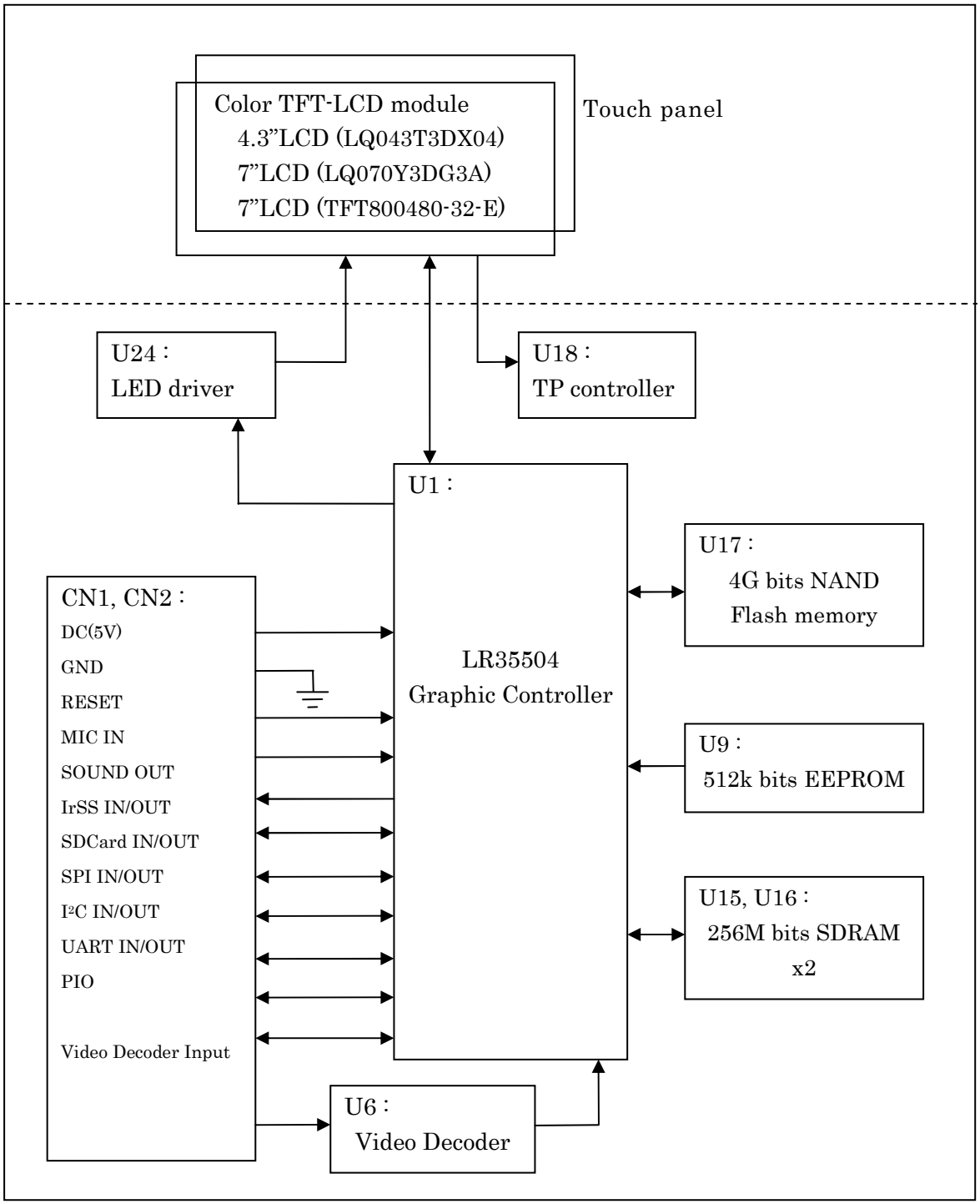

Fig. 4-1 Block Diagram

SHARP

5. Input Output terminal name and function

5.1 CN1(IO connector 1)

Table 5-1 Terminal list of connector1

Pin No.	記　号	I/O	機　能	※
1	EXT_RESETB	I	External Reset Input	
2	BOOT	I	BOOT Select Input	
3	MIC_MCLK	I/O	MIC Master Clock Output / PWM / PIO	
4	MIC_SCK	I/O	MIC I2S Clock Input / PWM / PIO	
5	MIC_SD	I/O	MIC I2S Data Input / PWM / PIO	
6	MIC_WS	I/O	MIC I2S Word Select Input / PWM / PIO	
7	SND_MCLK	I/O	Sound Master Clock Output / PWM / PIO	
8	SND_SCK	I/O	Sound I2S Clock Output / PWM / PIO	
9	SND_SD	I/O	Sound I2S Data Output / PWM / PIO	
10	SND_WS	I/O	Sound I2S Word Select Output / PWM / PIO	
11	EXT_IR_RX	I	IrSS Receive Data Input	
12	IR_SD	I/O	IrSS Shut Down Output / PWM / PIO	
13	EXT_IR_TX	O	IrSS Transmit Data Output	
14	URT0_TXD	I/O	UART Transmit Data Output / PWM / PIO	
15	URT0_RXD	I/O	UART Receive Data Input / PWM / PIO	
16	URT0_RTS	I/O	UART Transmit Request Output / PWM / PIO	
17	URT0_CTS	I/O	UART Transmit Clear Input / PWM / PIO	
18	PIO_PB9	I/O	PWM / PIO	
19	PIO_PB10	I/O	PWM / PIO	
20	PIO_PB11	I/O	PWM / PIO	
21	PIO_PB12	I/O	PWM / PIO	
22	PIO_PB13	I/O	PWM / PIO	
23	PIO_PB14	I/O	PWM / PIO	
24	EXT_I2C_SCL	I/O	I2C Clock / PWM / PIO	*1
25	EXT_I2C_SDA	I/O	I2C Data / PWM / PIO	*1
26	VD_A1	I	Video Decoder Analog Input 1	
27	VD_A2	I	Video Decoder Analog Input 2	
28	VD_A3	I	Video Decoder Analog Input 3	
29	VD_A4	I	Video Decoder Analog Input 4	
30	VD_AGND	—	Video Decoder Analog Ground	
31	SDC0_D0	I/O	SDCard 0 Data Bus 0 / PWM / PIO	*2
32	SDC0_D1	I/O	SDCard 0 Data Bus 1 / PWM / PIO	*2
33	SDC0_D2	I/O	SDCard 0 Data Bus 2 / PWM / PIO	*2
34	SDC0_D3	I/O	SDCard 0 Data Bus 3 / PWM / PIO	*2
35	SDC0_CMD	I/O	SDCard 0 Command / PWM / PIO	*2
36	SDC0_CLK	I/O	SDCard 0 Clock / PWM / PIO	*2
37	SDC0_WP	I/O	SDCard 0 Write Protect / PWM / PIO	*2
38	SDC0_CD	I/O	SDCard 0 Card Detect / PWM / PIO	*2
39	SPI1_SCEZ	I/O	SPI1 Chip Enable / PIO	*3
40	SPI1_SCLK	I/O	SPI 1 Clock / PIO	*3
41	SPI1_SIN	I/O	SPI 1 Receive Data / PIO	*3
42	SPI1_SOUT	I/O	SPI 1 Transmit Data / PIO	*3
43	SDC1_D0	I/O	SDCard 1 Data Bus 0 / PIO	*4
44	SDC1_D1	I/O	SDCard 1 Data Bus 1 / PIO	*4
45	SDC1_D2	I/O	SDCard 1 Data Bus 2 / PIO	*4

46	SDC1_D3	I/O	SDCard 1 Data Bus 3 / PIO	*4
47	SDC1_CMD	I/O	SDCard 1 Command / PIO	*5
48	SDC1_CLK	I/O	SDCard 1 Clock / PIO	*5
49	SDC1_WP	I/O	SDCard 1 Write Protect / PIO	*5
50	SDC1_CD	I/O	SDCard 1 Card Detect / PIO	*5
51	EP_WP	I	EEPROM Write Protect	

Connector：JAE　FI-RNE51SZ-HF-R1500

*1. When it is used as an I2C, please pull up it with 4.7kΩ from the outside.
*2. When it is used as a SD Card interface, please pull up it with 4.7kΩ from the outside.
*3. This terminal is connected electrically to LR35504 by setting up the SELECT2 signal on this module circuit board in “Low” by the software.
This terminal can be used as a SPI interface or PIO in state of connecting to LR35504.
*4. This terminal is connected electrically to LR35504 by setting up the SELECT3 signal on this module circuit board in “High” by the software. This terminal can be used as a SPI interface or PIO in state of connecting to LR35504. When it is used as a SD Card interface, please pull up it with 4.7kΩ from the outside.
*5. This terminal is connected electrically to LR35504 by setting up the SELECT2 signal on this module circuit board in “High” by the software. This terminal can be used as a SD card interface or PIO in state of connecting to LR35504, When it is used as a SD card interface, please pull up it with 4.7kΩ from the outside.

SHARP

5.2 CN2(IO connector 2)

Table 5-2. Terminal list of Connector2

Pin No.	記　号	I/O	機　能	※
1	PIO_PB3	I/O	PWM / PIO	
2	PIO_PB6	I/O	PWM / PIO	
3	PIO_PB15	I/O	PWM / PIO	
4	PIO_PB16	I/O	PWM / PIO	
5	PIO_PB17	I/O	PWM / PIO	
6	PIO_PB18	I/O	PWM / PIO	
7	PIO_PB19	I/O	PWM / PIO	
8	PIO_PB20	I/O	PWM / PIO	
9	PIO_PB21	I/O	PWM / PIO	
10	PIO_PB22	I/O	PWM / PIO	
11	PIO_PB28	I/O	PWM / PIO	
12	PIO_PB34	I/O	PWM / PIO	
13	PIO_PB35	I/O	PWM / PIO	
14	PIO_PB36	I/O	PWM / PIO	
15	PIO_PB37	I/O	PWM / PIO	
16	PIO_PB38	I/O	PWM / PIO	
17	GND	—	Ground	
18	3.3V	—	Internal Power (3.3V)	
19	3.3V	—	Internal Power (3.3V)	
20	3.3V	—	Internal Power (3.3V)	
21	3.3V	—	Internal Power (3.3V)	
22	GND	—	Ground	
23	GND	—	Ground	
24	GND	—	Ground	
25	GND	—	Ground	
26	1.8V	—	Internal Power (1.8V)	
27	1.8V	—	Internal Power (1.8V)	
28	GND	—	Ground	
29	GND	—	Ground	
30	1.5V	—	Internal Power (1.5V)	
31	1.5V	—	Internal Power (1.5V)	
32	GND	—	Ground	
33	GND	—	Ground	
34	DC5V	—	Power (5V)	
35	DC5V	—	Power (5V)	
36	DC5V	—	Power (5V)	
37	DC5V	—	Power (5V)	
38	GND	—	Ground	
39	GND	—	Ground	
40	GND	—	Ground	
41	GND	—	Ground	

Connector：JAE　　FI-RNE41SZ-HF-R1500

5.3 CN4(JTAG connector)

Table 5-1. Terminal list of Connector4

Pin No.	記　号	I/O	機　能	※
1	VTref	—	Target reference voltage (3.3V)	
2	Vsup	—	Supply voltage (3.3V) to ICE	
3	nTRST	I	Reset signal to LR35504 JTAG port	
5	TDI	I	Test data input to LR35504	
7	TMS	I	Test mode input to LR35504	
9	TCK	I	Test Clock Input	
11	RTCK	O	Return Test Clock Output	
13	TDO	O	Test data output to ICE	
4,6,8, 10,12, 14,16, 18,20	GND	—	Ground	
15, 17,19	NC	—	No connect	

Connector :Kyocera- elco　　00 8261 203 214 888+

* This connector is not assembled.

6. Circuit board parts arrangement figure

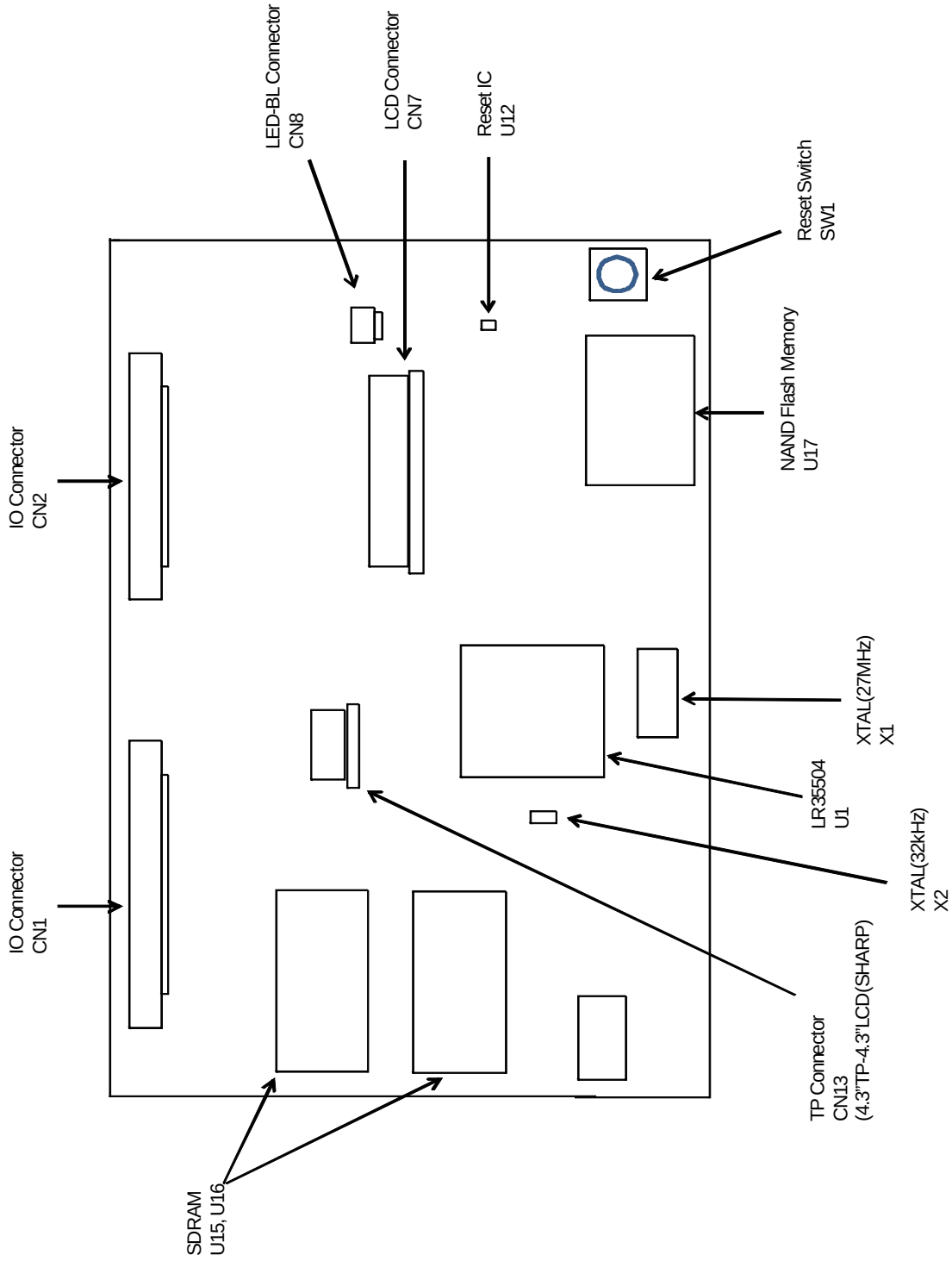

Fig. 6-1 Surface

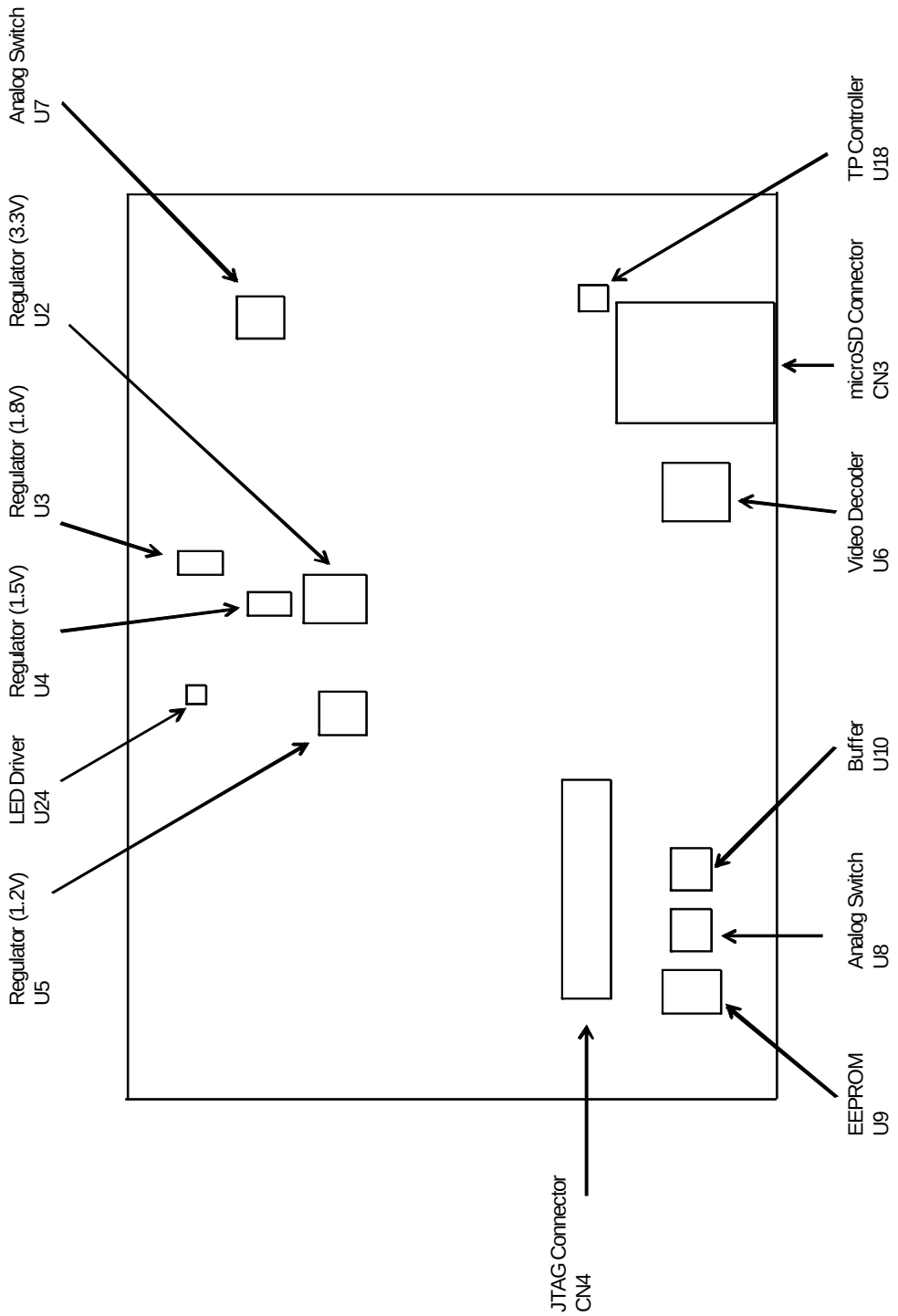

Fig. 6-2 Back

7. Electric characteristics

7.1 Absolute Maximum Ratings

Table 7-1 Absolute Maximum Ratings

Items	Symbol	Condition	Spec.	Unit	Note
Input power voltage	Vpow		+4.25 ~ +5.75	V	
Input signal voltage	VI	Ta=25℃	-0.3 ~ +3.6	V	
Storage Temperature	Tstg	-	-20 ~ +70	℃	Without dew
Operating Temp.	Topr	-	-10 ~ +60	℃	Without dew

7.2 Operating conditions

Table 7-2 Operating conditions

Items	Symbol	MIN.	TYP.	MAX.	Unit
Power supply	Vpow	4.5	5.0	5.5	V
Internal clock freq.	Fopr		54.0/108.0 *		MHz

Note: It's possible to change by software.

7.3 DC Characteristics (Connector1 and Connector2)

Table 7-3 DC Characteristics

(Vpow=4.5V ~ 5.5V,Video IN=1.3V_{P-P},Ta = -10℃ ~ +60℃)

Items	Symbol	Measurement condition	Specification			Unit	*
			MIN.	TYP.	MAX.		
Input voltage	VIL1		0		0.8	V	1
	VIH1		2.0		3.6		5
	VIL2		0		0.7	V	2
	VIH2		2.1		3.6		
	VIL3		0		0.9	V	3
	VIH3		2.4		3.6		
Analog input voltage	Vivin	C Coupling	0.20		0.80	Vpp	4
Input current	IIL1	Vin=0V			±10	µA	6
	IIH1	Vin=3.3V			±10		
	IIL2	Vin=0V			140	µA	7
	IIH2	Vin=3.3V			±10		
	IIL3	Vin=0V			±1.0	µA	3
	IIH3	Vin=3.3V			±1.0		
	IIL4	Vin=0V			±0.2	µA	8
	IIH4	Vin=3.3V			±0.2		
	IIL5	Vin=0V			±5.0	µA	5
	IIH5	Vin=3.3V			±5.0		
Output voltage	VOL1	IOL=4mA			0.5	V	9
	VOH1	IOH=-4mA	2.9				
	VOL2	IOL=9mA			0.5	V	10
	VOH2	IOH=-9mA	2.9				

Current consumption	IPOW1	Vpow=5V		-/-		mA	11
	IPOW2			-/-			12

Refer to a table 7-4 for each applied terminal of the following condition (*1~ *10).

*1: IO terminal connected to LR35504 (Non-Schmitt buffer input)
*2: IO terminal connected to LR35504 (Schmitt buffer input)
*3: Input terminal connected to the buffer.
*4: Analog video decoder input terminal
*5: Input terminal connected to AND gate
*6: IO terminal connected to LR35504 (Internal pull up resister of LR35504 set off)
*7: IO terminal connected to LR35504 (Internal pull up resister of LR35504 set on)
*8: IO terminal connected to analog switch
*9: Output terminal connected to LR35504
*10: Output terminal connected to the buffer.
*11: Internal clock operated at 54MHz
*12: Internal clock operated at 108MHz

Table 7-1 Terminal list with DC characteristics condition

CN	No	Terminal name	Applied condition			CN	No	Terminal name	Applied condition		
1	1	EXT_RESETB	*2	*6		1	37	SDC0_WP	*1	*6*7	*9
	2	BOOT	*1	*6*7			38	SDC0_CD	*1	*6*7	*9
	3	MIC_MCLK	*1	*6*7	*9		39	SPI1_SCEZ	*1	*8	*9
	4	MIC_SCK	*1	*6*7	*9		40	SPI1_SCLK	*1	*8	*9
	5	MIC_SD	*1	*6*7	*9		41	SPI1_SIN	*1	*8	*9
	6	MIC_WS	*1	*6*7	*9		42	SPI1_SOUT	*1	*8	*9
	7	SND_MCLK	*1	*6*7	*9		43	SDC1_D0	*1	*8	*9
	8	SND_SCK	*1	*6*7	*9		44	SDC1_D1	*1	*8	*9
	9	SND_SD	*1	*6*7	*9		45	SDC1_D2	*1	*8	*9
	10	SND_WS	*1	*6*7	*9		46	SDC1_D3	*1	*8	*9
	11	EXT_IR_RX	*3				47	SDC1_CMD	*1	*8	*9
	12	IR_SD	*1	*6*7	*9		48	SDC1_CLK	*1	*8	*9
	13	EXT_IR_TX			*10		49	SDC1_WP	*1	*8	*9
	14	URT0_TXD	*1	*6*7	*9		50	SDC1_CD	*1	*8	*9
	15	URT0_RXD	*1	*6*7	*9		51	EP_WP	*1	*6*7	
	16	URT0_RTS	*1	*6*7	*9	2	1	PIO_PB3	*1	*6*7	*9
	17	URT0_CTS	*1	*6*7	*9		2	PIO_PB6	*1	*6*7	*9
	18	PIO_PB9	*1	*6*7	*9		3	PIO_PB15	*1	*6*7	*9
	19	PIO_PB10	*1	*6*7	*9		4	PIO_PB16	*1	*6*7	*9
	20	PIO_PB11	*1	*6*7	*9		5	PIO_PB17	*1	*6*7	*9
	21	PIO_PB12	*1	*6*7	*9		6	PIO_PB18	*1	*6*7	*9
	22	PIO_PB13	*1	*6*7	*9		7	PIO_PB19	*1	*6*7	*9
	23	PIO_PB14	*1	*6*7	*9		8	PIO_PB20	*1	*6*7	*9
	24	EXT_I2C_SCL	*2	*6*7	*9		9	PIO_PB21	*1	*6*7	*9
	25	EXT_I2C_SDA	*2	*6*7	*9		10	PIO_PB22	*1	*6*7	*9
	26	VD_A1	*4				11	PIO_PB28	*1	*6*7	*9
	27	VD_A2	*4				12	PIO_PB34	*1	*6*7	*9
	28	VD_A3	*4				13	PIO_PB35	*1	*6*7	*9
	29	VD_A4	*4				14	PIO_PB36	*1	*6*7	*9
	30	VD_AGND					15	PIO_PB37	*1	*6*7	*9
	31	SDC0_D0	*1	*8	*9		16	PIO_PB38	*1	*6*7	*9
	32	SDC0_D1	*1	*6*7	*9		17	GND			
	33	SDC0_D2	*1	*6*7	*9		18	3.3V			
	34	SDC0_D3	*1	*6*7	*9		19	3.3V			
	35	SDC0_CMD	*1	*6*7	*9		20	3.3V			
	36	SDC0_CLK	*1	*6*7	*9		21	3.3V			

CN	No	Terminal name	Applied condition
2	22	GND	
	23	GND	
	24	GND	
	25	GND	
	26	1.8V	
	27	1.8V	
	28	GND	
	29	GND	
	30	1.5V	
	31	1.5V	
	32	GND	
	33	GND	
	34	DC5V	
	35	DC5V	
	36	DC5V	
	37	DC5V	
	38	GND	
	39	GND	
	40	GND	
	41	GND	
4	1	VTref	
	2	Vsup	
	3	nTRST	*5
	4	GND	
	5	TDI	*1 *6
	6	GND	
	7	TMS	*1 *6
	8	GND	
	9	TCK	*1 *6
	10	GND	
	11	NC	
	12	GND	
	13	TDO	*9
	14	GND	
	15	NC	
	16	GND	
	17	NC	

CN	No	端子名	Applied condition
4	18	GND	
	19	NC	
	20	GND	

8. Power Supply ON/OFF Sequence

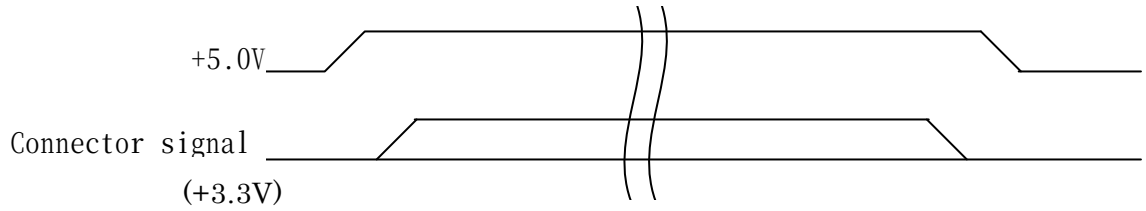

Fig. 7-1 Power supply setup sequence

* Input the signal after power supply holds high level.

SHARP

9. Precaution in handling 1 (Applied to LR0G941)

9.1 Flaw, Damage

(1) Don't drop or strike this module. If you take this action, a part of this module is possible to be damaged.

(2) Don't scrape, scratch, and don't take the great shock to cause distortion to LCD panel. It becomes an image defect when a wound on the surface of the LCD panel and a bruise, damage such as a chip occur.

9.2 Static electricity

(1) When you handle this module, connect a human body and a usable apparatus to the earth and discharge the static electricity. And, connect the human body through the resistance of 1MΩ for the safety.

(2) When you handle by your fingers directly, grip the portion without terminal and don't touch the terminals directly.

(3) Don't scratch with the cloths easy to charge the static electricity.

(4) Enter this module to the electrically conductive case at the time of the preservation, or carrying.

9.3 Handling of the LCD panel

(1) When you insert/pull FPC from the connector, switch off this module always.

(2) When you insert FPC into this module, avoid stress.

(3) Don't hang a LCD panel with gripping FPC, , and don't add the excessive stress to FPC.

(4) Be careful handling this LCD panel, because the polarizing plate is soft and tender. And for prevention from flaw and stain, the protection film(laminator) is stuck on the panel, so tear it off with taking care of static electricity just before using as much as possible. When you tear the polarizing plate laminator, be careful because adsorption such as trash by the static electricity may be occurred.

9.4 Trash, Dirt

(1) Don't touch the surface of the LCD panel, when the trash/dirt is attached to the surface of the LCD panel, we recommend the washing method as follows.

a) Blow it off by the ionized air blower.

b) When the surface of the LCD panel is dirt, wipe by the absorbent cotton or the soft cloths.

c) When the metal part(shield case) is dirt, wipe by the dry soft cloths. IN case the dirt is not removed, wipe it breathing.

d) When a water drop, finger fat, and so on stick for a long time, they become discoloration and the cause of the stain, so wipe on soon.

9.5 Others

(1) Don't touch the surface of the LCD panel, after tearing the protection sheet of the LCD panel.

(2) Avoid operating or storage under the condition of high/low temperature, and high humidity.

(3) There is any possibility of purchasing the materials from several makers for securing the quantity output

10. Precaution in handling 2 (Applied to LR0G942)

10.1 Flaw, Damage

(1) Don't drop or strike this module. If you take this action, a part of this module is possible to be damaged.
(2) Don't scrape, scratch, and don't take the great shock to cause distortion to LCD panel.
(3) It becomes an image defect when a wound on the surface of the LCD panel and a bruise, damage such as a chip occur.

10.2 Static electricity

(1) When you handle this module, connect a human body and a use apparatus to the earth and discharge the static electricity.
(2) And, connect the human body through the resistance of 1MΩ for the safety.
(3) When you handle by your fingers directly, grip the portion without terminal and don't touch the terminals directly.
(4) Don't scratch with the cloths easy to charge the static electricity.
(5) Enter this module to the electrically conductive case at the time of the preservation, or carrying.

10.3 Handling of the LCD panel/Transparent touch panel

(1) When you insert/pull FPC from the connector, switch off this module always.
(2) When you insert FPC into this module, avoid stress.
(3) Don't hang a LCD panel equipped touch panel with gripping FPC, , and don't add the excessive stress to FPC.
(4) Be careful handling this LCD module equipped touch panel, because the surface is soft and tender.
(5) And for prevention of flaw, and stain, the protection film(laminator) is stuck on the panel, so tear it off with taking care of static electricity just before using as much as possible.
(6) When you tear the laminator, be careful because adsorption such as trash by the static electricity may be occurred.

10.4 Caution for assembling the product equipped Transparent touch panel
(Applied to LR0G942)

(1) Design its structure impossible to press the area around A by using case, it is recommended to provide a buffer material at clearance as fig9-1.
(2) Avoid the design that bezel overlap and press the active area of the touch panel.
(3) In order to avoid the bezel press the surface of the touch panel at the routine used, we recommend a 0.3mm~0.5mm gap between the bezel and the surface of the touch panel. and the gap is guaranteed by cooperating with the structure of the bezel
(4) We recommend the use of a buffer material between the touch panel and the bezel as fig9-1.

(5) Avoid the bezel design as fig10-2.

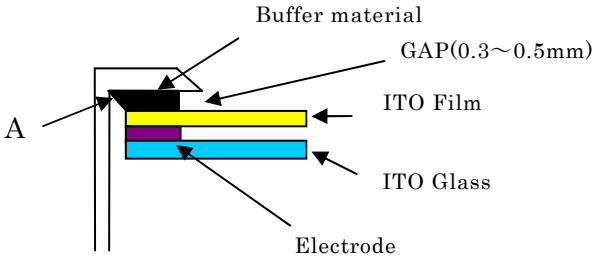

Fig. 10-1

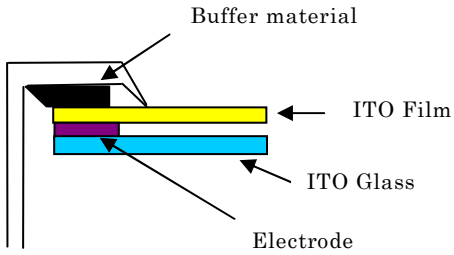

Fig. 10-2

(6) Design a round part to the bezel to protect the edge of the touch panel as fig10-3.

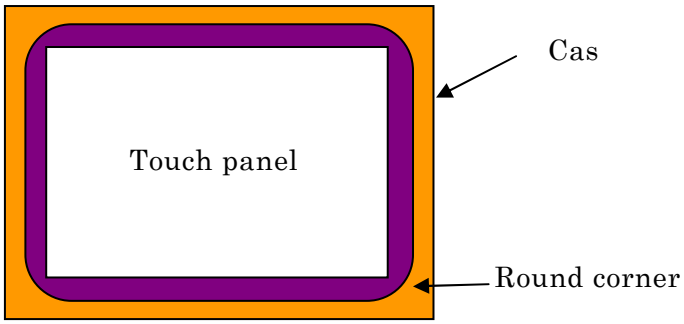

Fig. 10-3

(7) Because the corners of the transparent touch panel without chamfering, When positioning and fixing the transparent touch panel on the case, provide a R part of the case so as not to apply load on the corner of the transparent touch panel.

(8) Take care not to allow ethanol to soak into the joint of upper film and bottom glass; it may otherwise cause peering or defective operation.
Don't use any organic solvent or detergent other than ethanol. Don't use too adhesive protective tape to cover the outer film, if storage a long time, the adhesive residue may affect writing function.

10.5 Trash, Dirt

(1) Don't touch the surface of the touch panel, when the trash/dirt is attached to the surface of the touch panel, we recommend the washing method as follows.

a) Blow it off by the ionized air blower.
b) Clean off the touch panel by a soft cloths with alcohol in case of dirty. Don't use organic solvents except alcohol, acid or alkali solution.
c) When the metal part(shield case) is dirt, wipe by the dry soft cloths.
IN case the dirt is not removed, wipe it breathing.
d) When a water drop, finger fat, and so on stick for a long time, they become discoloration and the cause of the stain, so wipe on soon.

10.6 Others

(1) Avoid operating or storage under the condition of high/low temperature, and high humidity.

(2) There is any possibility of purchasing the materials from several makers for securing the quantity output

11. TFT-LCD panel specification

This module include LQ043T3DX0D which is product of SHARP CORPORATION as a display device.

Please refer " LQ043T3DX0D specification" as for detail of this TFT-LCD panel.

As for getting the specification, please contact to a sales representative of the company.

12. Transparent touch panel specification (Applied to LR0G942)

Table 11-1 Touch panel specification (Construction)

Items	Specification	Remark
1 Construction		
1-1 Top Layer	ITO Film	Hard Coating ITO Film Thickness:0.2mm
1-2 Bottom Layer	Glass	ITO Glass Thickness:0.7mm
1-3 Surface hardness	3H- pressure 500gf,45deg	Pencil Hardness
1-4 Voltage rating	DC 5V	

Table 11-2 Touch panel specification (Characteristics)

Item	Specification		Remark
2. Mechanical characteristics			
2-1 Operation force	10g-80g or less (Tip R0.8mm polyacetal/POM pen operation)/120g or less (Finger input) After test, operation force should be less than 150g		
2-2 Static load resistance	No glass break or crack after pressing the product vertically on the center of film surface from ITO film side with 4.5kg by 10 mm dia. Testing head of the manometer for 30 sec.		
2-3 Impact resistance	Appearance is in good condition and not broken after Φ9mm steel ball being dropped on the surface from 30cm height for one time.		
3 Electric characteristics			
3-1Terminal resistance	Rx-x: 100Ω to 1000Ω ,Ry-y: 100Ω to 1000Ω		Measuring at FPC pin
3-2 Linearity	Initial	After test	Analog type
	＜1.5%	＜2.0%	
3-3 Insulation	20MΩ or over (DC 25V)		
3-4 Chattering time	20m sec or less		
4 Optics Characteristics			
4-1 Light transmissivity	＞80% (By BM-5, white light)		Antiglare type

SHARP

13. Reliability Items(T.B.D)

1. Circuit board **Table 12-1**

Test Items	Test Conditions	
High temperature storage	Temperature	95℃
	Storage time	1000h
Low temperature storage	Temperature	-40℃
	Storage time	1000h
High temperature operation	Temperature	85℃
	Operation time	1000h
Low temperature operation	Temperature	-30℃
	Operation time	1000h
High temperature & high humidity operation	Temperature	65℃
	Humidity range	90～95%RH
	Operation time	1000h
Thermal shock	Temperature range	Ta= -40℃ to 95℃
	Storage time	0.5h ~ 0.5h
	Cycle number	200

In the above condition, no change in actual use after the examination.

2. Module **Table 12-2**

Test Items	Test conditions	
High temperature storage	Temperature	70℃
	Storage time	240h
Low temperature storage	Temperature	-20℃
	Storage time	240h
High temperature operation	Temperature	60℃
	Operation time	240h
Low temperature operation	Temperature	-10℃
	Operation time	240h
High temperature & high humidity operation	Temperature	40℃
	Humidity range	90～95%RH
	Operation time	240h
Thermal shock	Temperature range	Ta= -10℃ to 60℃
	Storage time	0.5h ~ 0.5h
	Cycle number	10
Vibration (non-operating)	1.Frequency:8~33.3Hz Total amplitude:1.3mm 2.Frequency:33.3～400Hz Acceleration: 29.4m/s2 Periodicity: 15min. Test period 8h (2h for each direction of X,Z and 4h for Y direction)	

In the above condition, no change in actual use after the examination.