LJ64K052

El Display Module

(Spec. No.: LA-08203B)

Spec. Issue Date: August 8, 2000

PREPARED BY: DATE		SPEC No.	LA-08203B
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THE TWO VED BY.	DUTY LIQUID CRISTAL DISPLAY GROUP	PAGE	23
	SHARP CORPORATION	APPLICA	BLE DIVISION
	SPECIFICATION	☐ TFT DEVI☐ LCD PRO CENTER	VELOPMENT CENTER ELOPMENT CENTER DUCTS DEBELOPMENT TON DEPT.(EL Gr)
SPECIFICA MODEL No.	EL Display Module LJ64K052		
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Duty Liquid Crystal Display Group SHARP CORPORATION

MODEL No.

LJ64K052

DOC. FIRST ISSUE

RECORDS OF REVISION

IDENT. DATA No.

DATE	REF. PAGE PARAGRAPH DRAWING No.	REVISED Na	SUMMARY	CHECK & APPROVAL
Apr. 19. '96			New	t. mounture
Oct.13.' 98	Page 1	Δ	Change Dot size in Mechanical Specifications.(0.23 : 0.26→0.222 : 0.255)	
	Page 3	<u>^</u>	Change of the electric characteristic. (10mA→10~20mA)	
	Page 4	\triangle	Change Fill factor in Optical Characteristics.	
	Page 12	A	Change of the outline. (Change of the FPC shape.)	
	Page 13	<u>\$</u>	Change Cautions for Operation.	I avelue
	Page 15	Â	Change of the resistance value. $(47\Omega \times 11 \rightarrow 390\Omega \times 11)$	U. Kawaguchi
	Page 16	<u>^</u>	Change of fuse model.	
	Page 19	&	Add Barcode Label on a packing case.	
			A A A A	
			Because of circuit board Change.	
Aug.1.'00	Page 4,5		Add the description about brightness measures.	<i>t</i> :
	Page 18,19	<u> </u>	Change Packing specification.	M. Kawaguchis.
	Page 19	Δ	Add Barcode Label on a Packing case.	101.1
	Page 20	Δ	Add Serial number.	
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[Notice]

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The device listed in these specification sheets was designed and manufactured for use in OA equipment, Measuring equipment.

In case of using the device for applications such as control and safety equipment for transportation(aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment(trunk lines), nuclear power control equipment and medical or other equipment for life support.

SHARP assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these specification sheets.

Contact and consult with a SHARP sales representative for any questions about this device.

1. Application

This data sheet is to introduce the specification of EL display module, LJ64K052.

2. Overview

The Sharp EL display module consists of a thin film EL panel, high voltage ICs for panel driving and a display control circuit. By supplying eleven input signals of CMOS level and two DC power supplies of +5 V and +12 V arbitrary graphs and characters can be displayed.

3. Mechanical Specifications

Parameter	S	Unit	
`	Width \times	Height $ imes$ Depth	
Outline dimensions	267 $ imes$	220 × 23.5 (Note 1)	mm
Number of matrix electrodes	640 ×	480	_
Active area	211.1 ×	158.3	mm
Dot pitch	0.33 ×	0.33	mm
Dot pitch ratio	1 ×	1	-
Dot size	0.222 ×	0.255	mm
Mass	800		g



Note 1) Details of outline dimensions are shown at Page 12.

4. Absolute Maximum Ratings

4-1 Electrical absolute maximum ratings

(Ta=25 ℃)

			(10 =0 0)
Parameter	Symbol	Rating	Unit
Interface signal (Logic "H")	VIH	$V_{L} + 0.3$	V
Interface signal (Logic "L")	VIL	- 0.3	V
Supply voltage (Logic)	VL	+ 7	V
Supply voltage (panel drive)	$V_{\rm D}$	+ 14	V

4-2 Environmental conditions

Parameter	Tstg		Topr		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	- 40 ℃	+80 ℃	-5℃	+55 ℃	Note 1)
Humidity	Note 2)		Note 2)		No condensation
Vidration	Note 3)		~		No operating
Shock	Note 4)				No operating

Note 1) Survival : $-20 \, ^{\circ}\mathbb{C}$ to $+65 \, ^{\circ}\mathbb{C}$ No permanent damage will occur.

Note 2) Ta≤40 °C ······ 95 % RH Max Ta>40 °C Absolute humidity shall be less than Ta=40 ℃/95 % RH.

 $5 \sim 55 \, \mathrm{Hz}$ Frequency range Note 3)

Sweep time

; 15 min each axis

Dwell at resonance; 10 min each resonance

Peak-to-peak

amplitude; 3.17 mm over $5 \sim 10$ Hz range

1.52 mm over $10 \sim 25 \, \mathrm{Hz}$ range

0.38 mm over $25 \sim 55$ Hz range

 $55 \sim 500 \, \mathrm{Hz}$ Frequency range

Sweep time

120 min each axis

Dwell at resonance;

30 min each resonance

Peak-to-peak

amplitude;

30 m/s² peak acceleration

Note 4) Acceleration

 491 m/s^2

Pulse width

11 ms

3 times for each direction of $\pm X/\pm Y/\pm Z$.

5. Electrical Characteristics

(Ta=25 ℃, Frame frequency=120 Hz)

Parameter	Symbol		Unit		
		Min.	Тур.	Max.	
Supply voltage (Logic)	VL	+ 4.75	+ 5.0	+ 5.25	V
Supply current (Logic, VL=+5 V)	IL	30		300	mA
Supply voltage (Panel drive)	VD	+ 11.4	+12.0	+12.6	V
Supply current (Panel drive, VD=+12 V)	ID	(※1)		1800	mA
Total power (V _L =+5 V, V _D =+12 V)	Рт	-	12		W

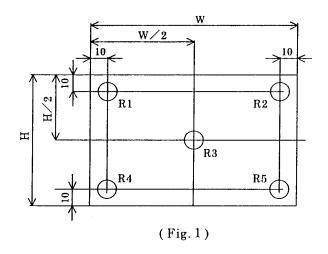
 $[\]triangle$ (%1) When the input signal is suspended, it becomes about $10\sim20$ mA.

6. Optical Characteristics

(Ta=25 ℃, Frame frequency=120 Hz

				(1	a=25 C	Frame	trequenc	y=120 Hz)
	Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit	Remark
	Areal Luminance	Lon	All dots lit	25	40	_	cd/m^2	
	OFF luminance	Loff	All dots		_	3.4	cd/m²	Note 1)
	Luminance dis-	△ Ldis	All dots lit		_	35	%	Note 5)
ļ	tribution							
Δ	Fill factor	*		_	0.52	_		Note 2)
	Shadowing characteristics	△ Lsd	fixed pattern		2	_	%	Note 3)
ł					4.00		•	
	Viewing angle				160			
L	Contrast		٠	33:1	50:1			Note 4)

Note 1) Average luminance measured in circular windows (R1 \sim R5) shown in Fig.1 (Circular window diameter: ϕ 13 mm)



H 158.3 : Height of active area

W 211.1 : Width of active area

Unit: mm

Tolerance of

luminace: ±10 %

The following formula defines the luminance distribution:

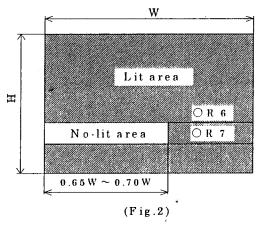
$$\Delta L_{DIS} = \left(1 - \frac{L_{MIN}}{L_{MAX}}\right) \times 100(\%)$$

where L_{MAX} is the maximum luminance and L_{MIN} is the minimum luminance taken at the five locations in Fig.1.

Note 2) The ratio of the emission to area the display area. SHARP's EL has comparatively high fill factor, and therefore, the visibility of display is excellent.

Note 3) Shadowing characteristics means the variation of luminance according to the number of dots lit on a scanning line.

Thanks to the addition of the shadowing compensation circuit, the display quality of SHARP's EL is improved.

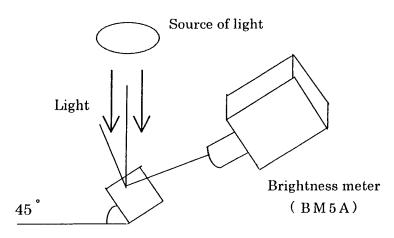


The following formula defines the shadowing characteristics:

$$\Delta L_{SD} = \left(\frac{L_N}{L_L} - 1\right) \times 100(\%)$$

where LL is the luminance at R6, LN at R7.

Note 4) The condition of measuring contrast



The environment in which contrast is measured (500 1x)

Note 4) Brightness measures

We measure brightness using sharp's examination device that is proofread by standard-machine:BM-5A(TOPCON).

7. Timing Characteristics

7-1 Input signals

This module is driven by line-at-a-time scanning method with following 11 CMOS level input signals.

Parameter	Symbol		Description		
Data input clock	CP2	Clock signal for inputting the display data into			
signal		the EL module.			
Display	UD0~3	Data signal for the upper part of display	The signals are sampled at every falling edge of the data input clock signal.		
data signal	LD0~3	Data signal for the lower part of display	The display is "ON" while the logic is "H" and "OFF" while the logic is "L".		
Input data latch signal	CP1	This signal controls the "timing of line-at-a-time scanning" and the "latch timing of the data side shift register on falling edge".			
Scan start-up signal	S	This signal controls frame frequency. And the contents of the display data signal are displayed on the first line by combination with this signal.			

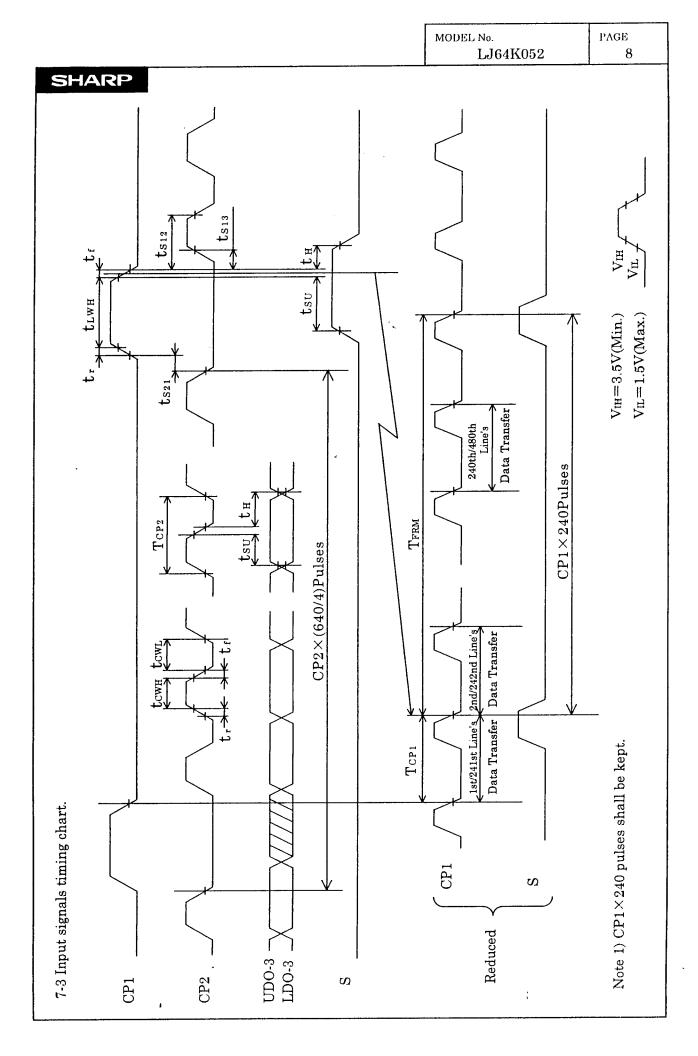
7-2 Input signals timing characteristics

(Ta=25 ℃)

Parameter	Symbol	Min.	Тур.	Max.	Unit
Frame frequency	1/Tfmr	60	_	120	Hz
CP2 clock cycle	ТСР2	154	_		ns
High level clock width	tcwn	60			ns
Low level clock width	tcwl	60			n s
CP1 clock cycle	Тсрі	31	_		μs
High level latch clock width	trмн	60		_	ns
Data set up time	tsu	50			ns
Data hold time	tн	40			n s
CP1↑ clock allowance time	ts21	0	-	_	n s
from CP2↓					
CP2 ↓ clock allowance time	ts12	200			ns
from CP1↓	٠				·
CP2↑ clock allowance time	tsia	100	_	-	ns
from CP1↓					
Clock rise/fall time	tr, tf	-	_	trf *	ns

^{*} t_{rf} = $(T_{CP2}$ - t_{CWH} - $t_{CWL}) / 2 \leq 30$ ns max

Note) The vertical blanking time ($T_{FRM}-T_{CP1}\times 240$) shall be minimized to avoid the flickering lines around the center of the display. (around 240th and 241st horizontal lines)

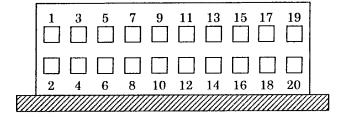


8. Interface signals and power supply connectors

Assignment of pins of connector CN5

	abolgiment of pine of connector of to						
No.	SIGNAL	No.	SIGNAL				
1	UD1	2	UDO				
3	UD3	4	UD2				
5	LD1	6	LD0				
7	LD3	8	${ m LD2}$				
9	CP2	10	GND				
11	CP1	12	GND				
13	S	14	GND				
15	- GNĎ	16	GND				
17	+ 5 V	18	+ 5 V				
19	+12 V	20	+12 V				

Arrangement of pins of connector CN5

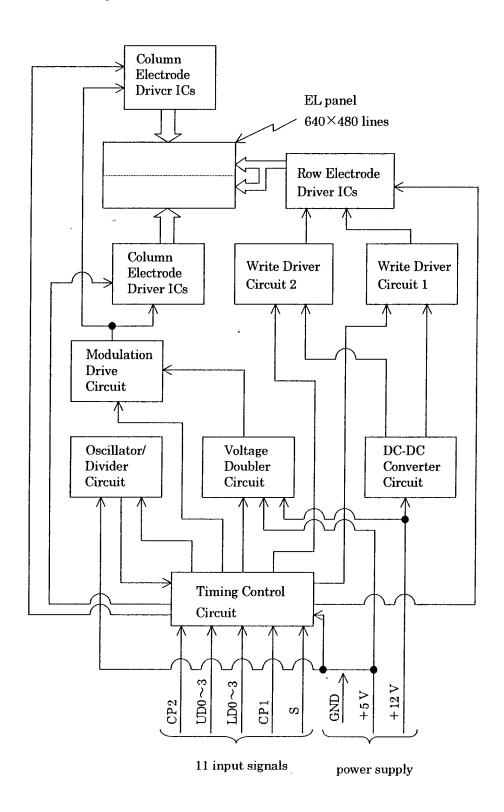


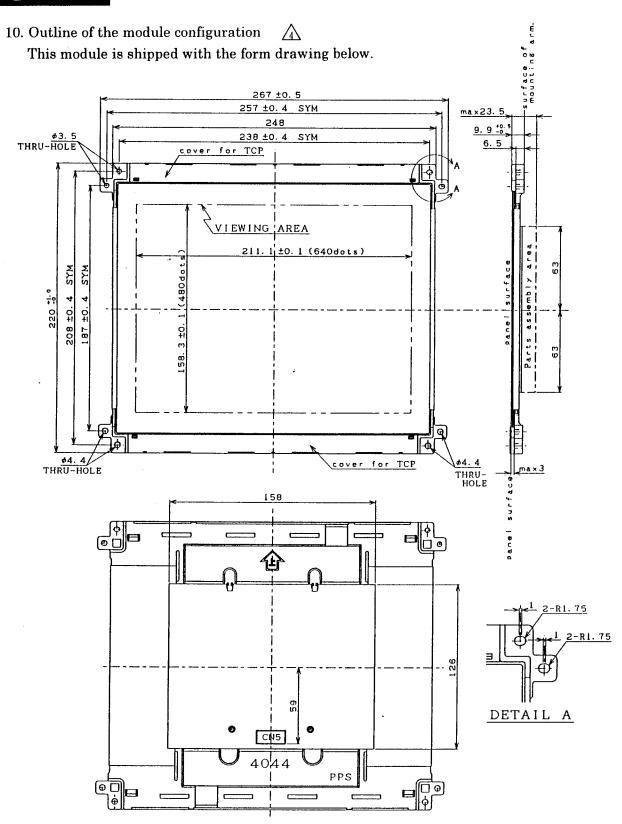
Connectors

Connectors	Mode	l No.	Maker
Module-side pin header	DF11-20DP-2DS	or equivalents	HIROSE ELECTRIC CO.
Fitting socket	DF11-20DS-2C	or equivalents	HIROSE ELECTRIC CO.
(crimp contact)	(DF11-2428SC)		

- Note 1) The length of the cable shall not exceed 50 cm.
- Note 2) This module is not supplied with the fitting socket and the cable.
- Note 3) Please connect all of each terminal of the above-mentioned input signal, supply voltage, and GND.

9. Functional Block Diagram





Note 1) Unspecified tolerance to be ± 0.5 .

Note 2) Mountiong of this display module should be done using the 4 thruhole among the 8 thruhole.

(Unitimm)

- 11. Handling Instructions and Cautions for Operation 🛕
 - 1. Handle the module with care of ESD, The operator and the place around him must be guard against ESD. Especially, please note that the module might be destroyed by ESD when you directly touch the IC or the wiring pattern in the EL display module.

 Hold the mounting arms of 4 corners (of the module) when you handle it, to protect you
 - from electric shock prevention etc.
 - 2. Since the EL panel is made of glass, care shall be taken to avoid the breakage caused by dropping or bumping it.
 - 3. Please avoid detaching and decomposing the display control board or the flat cable because these cause the breakdown.
 - 4. Do not insert nor extract the input cable when the power is supplied.
 - 5. Do not touch the display control PWB on the rear side of the module while in operation. There is risk of electric shock, because it generates AC pulses of about 200V. And even after the power off, do not touch components on the PWB because high voltage might be contained in circuits.
 - 6. Please use the module within the rated operational voltage and temperature specified in this literature, because the breakdown is caused by using which exceeds regulated operation voltage and temperature. The operation temperature is specified by ambient temperature. Test carefully the inner temperature of your product (module ambient temperature), and decide operational temperature of your products.
 - 7. Please avoid the operation in water dew because if water dew covers connentors or circuits even a little, if may cause mis-operation and sometimes it breakes the module.
 - 8. If your product is used in dusty air, or covered by oil dew, or by acid/alkaline mist, protect PWB of the module by filter etc.
 - 9. Do not use the module in corrosive gas. Do not use packing that contains sulfer, or spaser that contains sulfer rubber for mounting filter.
 - 10. To avoid the image retention caused by the luminance change due to time lapse, and to extend the panel life, please pay attention to the design of display, so that a fixed pattern may not be displayed as possible as you can, and by using all parts of the viewing area evenly. Also, we would recommend to use the module at the ambient temperature as low as you can because the temperature is one of the causes of acceleration of the luminance change due to time lapse.

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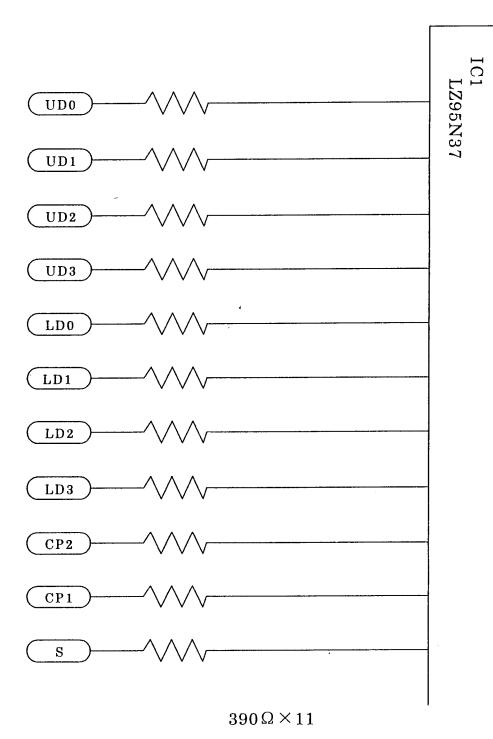
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- 11. To prevent smoke or fire in abnormal status, this module installs the fuses. But the fuses may not be melt down, and the temperature of the parts can rise, depending on the conditions of the usage, characteristic of power supply's current capacity, or defect mode. Therefore, take care that combustibles shall be set away from the module.
- 12. When you return the module to us, and you are forced to pack it in different manner with our specification, use enough amount of packing cushion to prevent stress to the panel.
- 13. Please observe the notes for usual electronic components strictly.

Others

If any problem should arise from this specification, the supplier and user should work out a mutually acceptable solution.

12. Circuit scheme of the signal input block 12.



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13. Power supply input circuit

(a) Over current protection

This module equips fuses in power supply input circuit protecting fire accident rising from over current in internal circuit, so the fuse may melt down when the specifications are not kept or in case of short circuit.

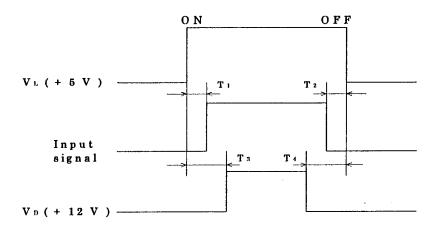
Fuse specifications 🕎

Parts No.	Model No.	Ratings	Melt type	Anthorizaition Standard		
F 1	MMCT	800 mA	slow	UL.CSA		
F 2	MMCT	1.6 A	slow	"		
F 3	MMCT	1.6 A	slow	"		

Maker: S.O.C

Note) Fuses is not open in the case current capacity of power supply is small. On the other hand fuses is open by surge current in case of current capacity of power supply is big or supply power to the module using relays. In consequence please you thoroughly investigate the module. (ref: Please choose the power supply which can send $1.5\sim2$ times electric current as much as fuse's ratings in unusual case.)

(b) Power on/off sequence

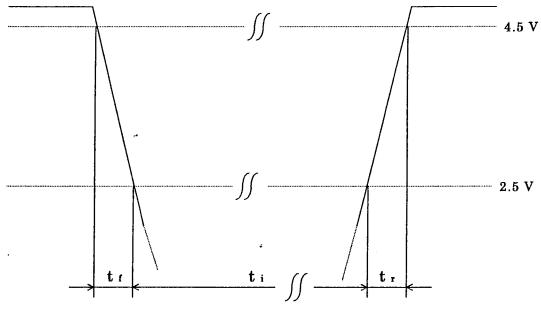


Note) $T_1 \sim 4 \geq 0$ shall be kept.

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(c) Take account of the sheme below for 5 VDC input rising up time and falling down time of 5 VDC



 $t_f = falling down time$ $t_r = rising up time$

- (1) t_f , $t_r \leq 100$ ms is better to be kept.
- (2) $t_i \ge 1 \text{ ms shall be kept.}$

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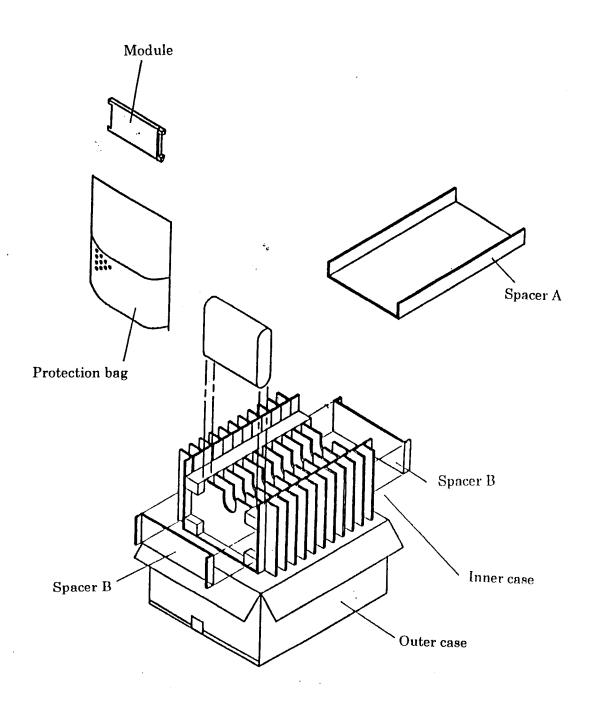
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14. Packing Specification 🗥



10pcs./packing

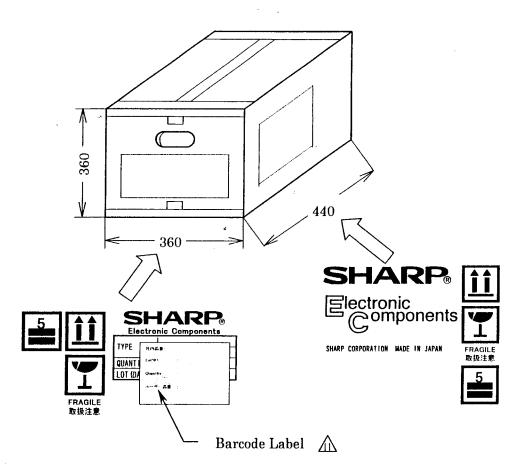
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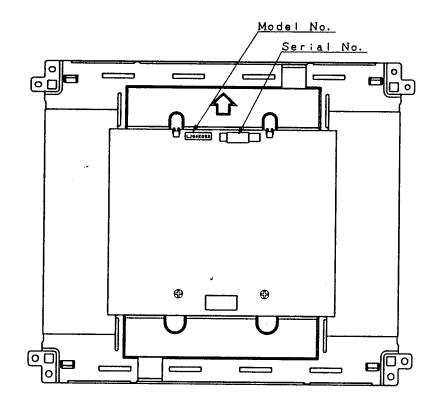
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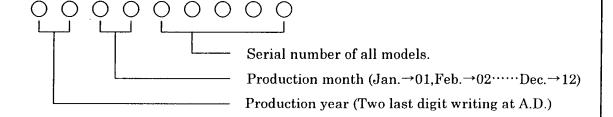
(Unit: mm)

15. Serial number 🛕

(1) Position



(2) Content



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NORTH AMERICA

SHARP Microelectronics of the Americas 5700 NW Pacific Rim Blvd. Camas, WA 98607, U.S.A.

Phone: (1) 360-834-2500 Fax: (1) 360-834-8903 Fast Info: (1) 800-833-9437 www.sharpsma.com

TAIWAN

SHARP Electronic Components (Taiwan) Corporation 8F-A, No. 16, Sec. 4, Nanking E. Rd. Taipei, Taiwan, Republic of China Phone: (886) 2-2577-7341

Fax: (886) 2-2577-7326/2-2577-7328

CHINA

SHARP Microelectronics of China (Shanghai) Co., Ltd.
28 Xin Jin Qiao Road King Tower 16F Pudong Shanghai, 201206 P.R. China Phone: (86) 21-5854-7710/21-5834-6056 Fax: (86) 21-5854-4340/21-5834-6057 **Head Office:**

No. 360, Bashen Road, Xin Development Bldg. 22 Waigaoqiao Free Trade Zone Shanghai 200131 P.R. China Email: smc@china.global.sharp.co.jp

EUROPE

SHARP Microelectronics Europe
Division of Sharp Electronics (Europe) GmbH
Sonninstrasse 3

20097 Hamburg, Germany Phone: (49) 40-2376-2286 Fax: (49) 40-2376-2232 www.sharpsme.com

SINGAPORE

SHARP Electronics (Singapore) PTE., Ltd. 438A, Alexandra Road, #05-01/02 Alexandra Technopark, Singapore 119967 Phone: (65) 271-3566 Fax: (65) 271-3855

HONG KONG

SHARP-ROXY (Hong Kong) Ltd. 3rd Business Division, 17/F, Admiralty Centre, Tower 1 18 Harcourt Road, Hong Kong Phone: (852) 28229311 Fax: (852) 28660779 www.sharp.com.hk

Shenzhen Representative Office:

Room 13B1, Tower C, Electronics Science & Technology Building Shen Nan Zhong Road

Shenzhen, P.R. China Phone: (86) 755-3273731 Fax: (86) 755-3273735

JAPAN

SHARP Corporation
Electronic Components & Devices
22-22 Nagaike-cho, Abeno-Ku
Osaka 545-8522, Japan
Phone: (81) 6-6621-1221
Env: (81) 6117, 735300/6117, 73530

Fax: (81) 6117-725300/6117-725301

www.sharp-world.com

KOREA

SHARP Electronic Components (Korea) Corporation RM 501 Geosung B/D, 541 Dohwa-dong, Mapo-ku Seoul 121-701, Korea Phone: (82) 2-711-5813 ~ 8 Fax: (82) 2-711-5819