DEVICE SPECIFICATION FOR

TFT-LCD Module

MODEL No.

LQ160E1LG21

PRESENTED

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SHARP CORPORATION

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SPEC No.	DATE	REVISED		SUMMARY	NOTE
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1. Application

This specification applies to the color 16.0 SXGA TFT-LCD module LQ160E1LG21.

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2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT　(Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit and a back light unit. Graphics and texts can be displayed on a $1280 \times 3 \times 1024$ dots panel with about 16 million colors by supplying 48 bit data signals(8bit×2pixel×RGB) , two display enable signals, two dot clock signals, +12V DC supply voltages for TFT-LCD panel driving and supply voltage for back light.

It is a wide viewing-angle-module (Vertical viewing angle:100° Horizontal viewing angle:130° ,CR≧10).

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	40.7 (Diagonal)	cm
	16.0 (Diagonal)	Inch
Active area	317.8 (H)×254.2 (V)	mm
Pixel format	1280 (H)×1024 (V)	Pixel
	(1 pixel＝R＋G＋B dots)	
Pixel pitch	0.248 (H)×0.248 (V)	mm
Pixel configuration	R,G,B vertical stripe	
Display mode	Normally white	
Unit outline dimensions *1	357 (W)×282 (H)×20.5 (D)	mm
Mass	1700 ± 70	g
Surface treatment	Anti-glare and hard-coating 2H (Haze value = 28)	

*1.Note: excluding back light cables.

The thickness of module (D) doesn't contain the projection.

Outline dimensions are shown in Fig.1.

4. Input Terminals

4-1. TFT-LCD panel driving

CN1 (Interface signals and +12VDC power supply)

Using connectors	: FI-X30S-HF (Japan Aviation Electronics Ind, Ltd.)	
Corresponding connectors	: FI-X30H,FI-X30C or FI-X30M	
	(Japan Aviation Electronics Ind, Ltd.)	
Using LVDS Receiver	: THC63LVDF84A-L(THine Electronics, Inc.)	
Corresponding LVDS Transmitter	: THC63LVDM83A-85(THine Electronics, Inc.)	
	or interchangeable device.	

Pin No.	Symbol	Function	Remark
1	Vcc	+12V power supply	
2	Vcc	+12V power supply	
3	Vcc	+12V power supply	
4	Vss	GND	
5	Vss	GND	
6	Vss	GND	
7	SELLVDS	Select LVDS data order 【Note2】	3.3V C-MOS Pull Up
8	BLON	Back light ON signal (output) 【Note1】	
9	DGND	Digital GND	
1 0	RxBIN3+	Positive (+) LVDS CH3 differential data input (B port)	LVDS
1 1	RxBIN3-	Negative (-) LVDS CH3 differential data input (B port)	LVDS
1 2	RxBCLKIN+	Positive (+) LVDS CH3 differential data input (B port)	LVDS
1 3	RxBCLKIN-	Negative (-) LVDS CH3 differential data input (B port)	LVDS
1 4	RxBIN2+	Positive (+) LVDS CH2 differential data input (B port)	LVDS
1 5	RxBIN2-	Negative (-) LVDS CH2 differential data input (B port)	LVDS
1 6	RxBIN1+	Positive (+) LVDS CH1 differential data input (B port)	LVDS
1 7	RxBIN1-	Negative (-) LVDS CH1 differential data input (B port)	LVDS
1 8	RxBIN0+	Positive (+) LVDS CH0 differential data input (B port)	LVDS
1 9	RxBIN0-	Negative (-) LVDS CH0 differential data input (B port)	LVDS
2 0	RxAIN3+	Positive (+) LVDS CH3 differential data input (A port)	LVDS
2 1	RxAIN3-	Negative (-) LVDS CH3 differential data input (A port)	LVDS
2 2	RxACLKIN+	Positive (+) LVDS CH3 differential clock input (A port)	LVDS
2 3	RxACLKIN-	Negative (-) LVDS CH3 differential clock input (A port)	LVDS
2 4	RxAIN2+	Positive (+) LVDS CH2 differential data input (A port)	LVDS
2 5	RxAIN2-	Negative (-) LVDS CH2 differential data input (A port)	LVDS
2 6	RxAIN1+	Positive (+) LVDS CH1 differential data input (A port)	LVDS
2 7	RxAIN1-	Negative (-) LVDS CH1 differential data input (A port)	LVDS
2 8	RxAIN0+	Positive (+) LVDS CH0 differential data input (A port)	LVDS
2 9	RxAIN0-	Negative (-) LVDS CH0 differential data input (A port)	LVDS
3 0	LVDSGEN	LVDSGND	

【Note】 This module has dual pixel port to receive dual pixel data at the same time . A port receives first pixel data and B port receives second pixel data in dual pixel data.
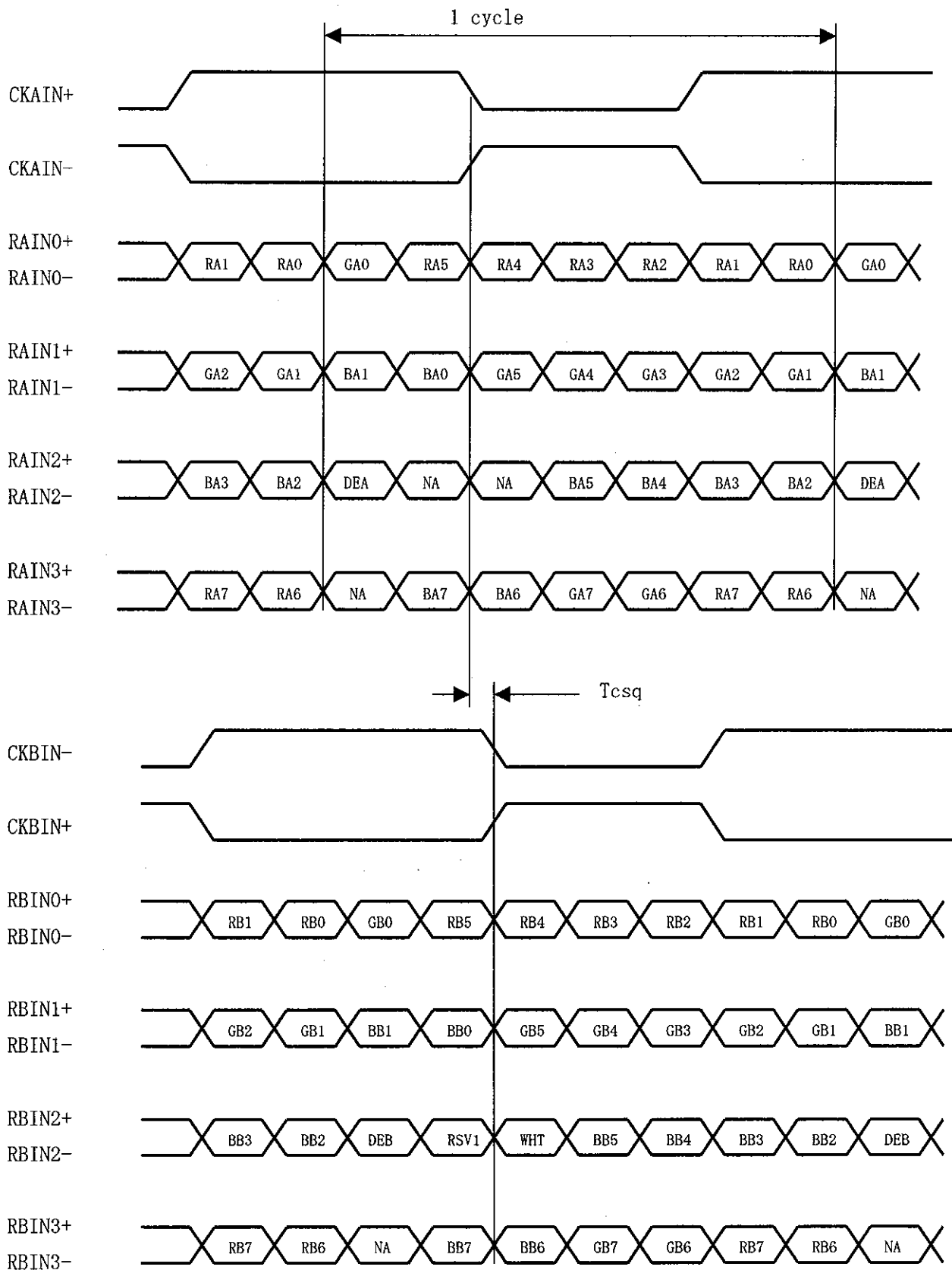
【Note1】 BLON:It change from L to H at 7 frames after Vcc ON.

【Note2】 SELLVDS(Thine:THC63LVDM83A)

Transmitter		SELLVDS	
Pin No	Data	=L	=H
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	WHT 【Note3】	WHT 【Note3】
28	TC5	(RSV1)	(RSV1)
30	TC6	DE	DE
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	(NA)	(NA)

【Note3】 WHT: It is a precedent signal for powering OFF.   Use it in "Low" at a normal operation and Switch it to "High" about 2 vertical signal timings before powering off so that electrical charge remained at power-off can be reduced.   When this function is not used, the signal should be fixed in "Low"(=GND) for usage.
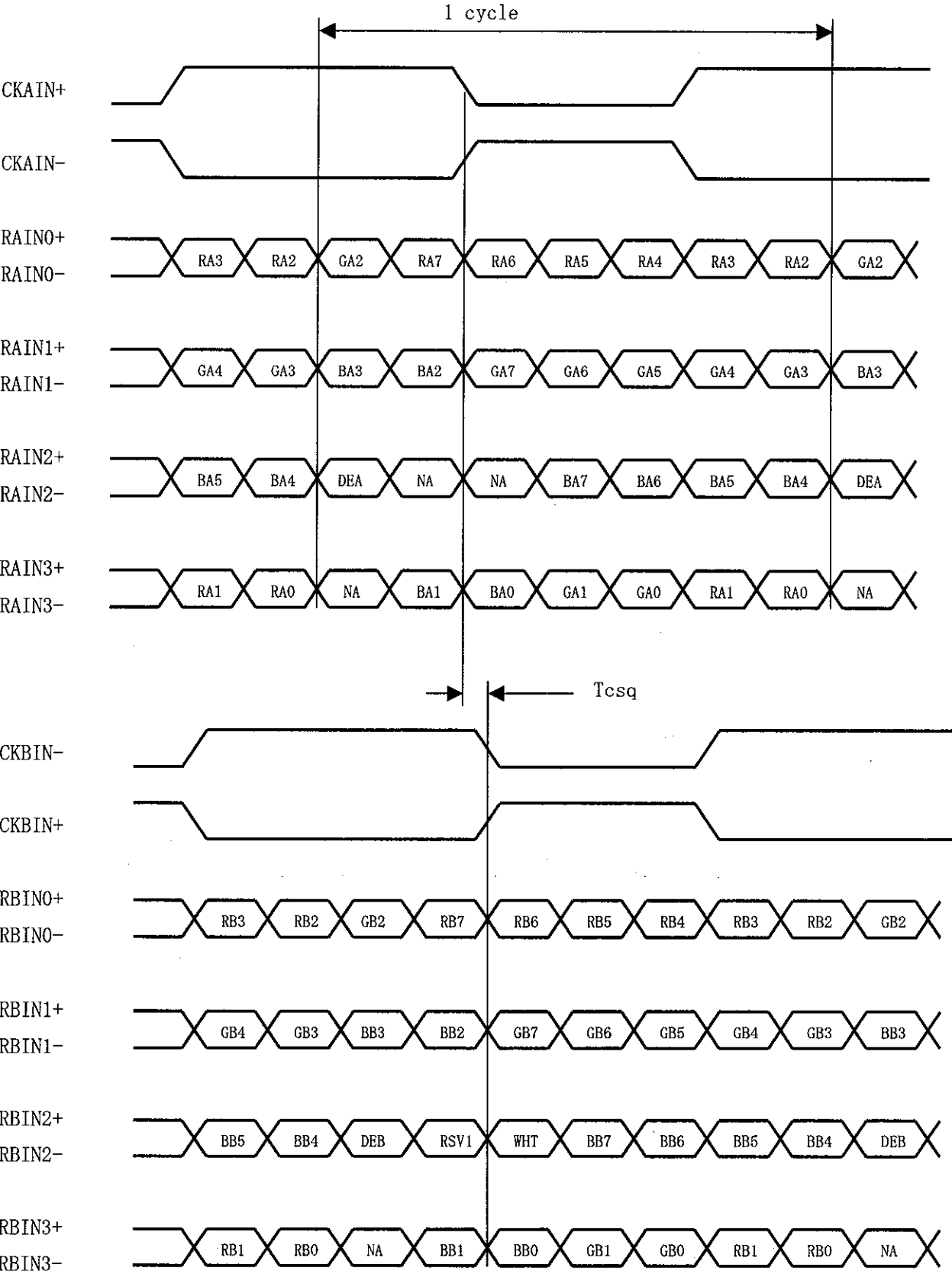
< SELLVDS= Low >

1 cycle

CKAIN+

CKAIN−

RAIN0+
RAIN0−

| RA1 | RA0 | GA0 | RA5 | RA4 | RA3 | RA2 | RA1 | RA0 | GA0 |

RAIN1+
RAIN1−

| GA2 | GA1 | BA1 | BA0 | GA5 | GA4 | GA3 | GA2 | GA1 | BA1 |

RAIN2+
RAIN2−

| BA3 | BA2 | DEA | NA | NA | BA5 | BA4 | BA3 | BA2 | DEA |

RAIN3+
RAIN3−

| RA7 | RA6 | NA | BA7 | BA6 | GA7 | GA6 | RA7 | RA6 | NA |

Tcsq

CKBIN−

CKBIN+

RBIN0+
RBIN0−

| RB1 | RB0 | GB0 | RB5 | RB4 | RB3 | RB2 | RB1 | RB0 | GB0 |

RBIN1+
RBIN1−

| GB2 | GB1 | BB1 | BB0 | GB5 | GB4 | GB3 | GB2 | GB1 | BB1 |

RBIN2+
RBIN2−

| BB3 | BB2 | DEB | RSV1 | WHT | BB5 | BB4 | BB3 | BB2 | DEB |

RBIN3+
RBIN3−

| RB7 | RB6 | NA | BB7 | BB6 | GB7 | GB6 | RB7 | RB6 | NA |

DE: Display Enable

RSV1: Reserve (Fixed GND)

NA: Not Available

〈 SELLVDS= High 〉

1 cycle

CKAIN+

CKAIN−

RAIN0+ RAIN0−	RA3	RA2	GA2	RA7	RA6	RA5	RA4	RA3	RA2	GA2
RAIN1+ RAIN1−	GA4	GA3	BA3	BA2	GA7	GA6	GA5	GA4	GA3	BA3
RAIN2+ RAIN2−	BA5	BA4	DEA	NA	NA	BA7	BA6	BA5	BA4	DEA
RAIN3+ RAIN3−	RA1	RA0	NA	BA1	BA0	GA1	GA0	RA1	RA0	NA

Tcsq

CKBIN−

CKBIN+

RBIN0+ RBIN0−	RB3	RB2	GB2	RB7	RB6	RB5	RB4	RB3	RB2	GB2
RBIN1+ RBIN1−	GB4	GB3	BB3	BB2	GB7	GB6	GB5	GB4	GB3	BB3
RBIN2+ RBIN2−	BB5	BB4	DEB	RSV1	WHT	BB7	BB6	BB5	BB4	DEB
RBIN3+ RBIN3−	RB1	RB0	NA	BB1	BB0	GB1	GB0	RB1	RB0	NA

DE: Display Enable

RSV1: Reserve (Fixed GND)

NA: Not Available

4-2. Back light driving

CN 2, 4 (High voltage side)

	The module-side connector	: BHSR-02VS-1	(JST)
	The user-side connector	: SM02B-BHSS-1-TB	(JST)

Pin no.	symbol	Function	Cable color
1	VH-1	Power supply for lamp 1 (High voltage side)	CN2 : Red CN4 : Blue
2	VH-2	Power supply for lamp 2 (High voltage side)	White

CN 3,5(Low voltage side)

	The module-side connector	: BHR−02VS−1	(JST)
	The user-side connector	: SM02(4.0)B−BHS−1−TB	(JST)

Pin no.	symbol	Function	Cable color
1	VL-1	Power supply for lamp 1 (Low voltage side)	CN3 : Red CN5 : Blue
2	VL-2	Power supply for lamp 2 (Low voltage side)	White

The pair of CN2 and CN3 is for the same CCFT lamps. The pair of CN4 and CN5 is in the same way.
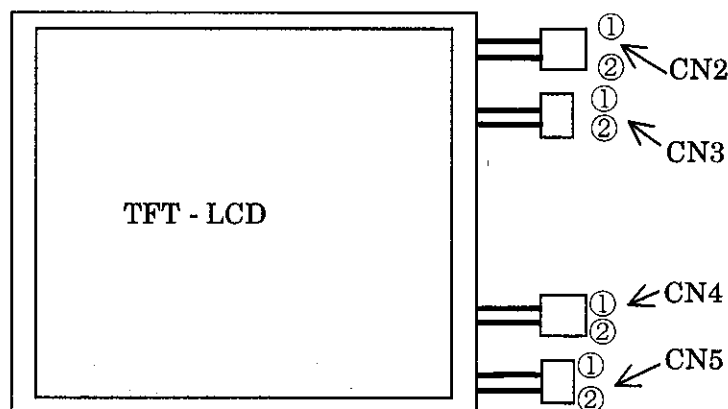
5. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage	V_I	Ta=25℃	−0.3 〜 +3.6	V	
+12.0V supply voltage	Vcc	Ta=25℃	0 〜 + 14	V	
Storage temperature	Tstg	−	−25 〜 +60	℃	【Note1】
Operating temperature (Ambient)	Topa	−	0 〜 +50	℃	

【Note1】 Humidity : 95%RH Max. (Ta≦40℃)

Maximum wet-bulb temperature at 39℃ or less. (Ta>40℃)

No condensation.

6. Electrical Characteristics

6-1. TFT-LCD panel driving   Ta＝25℃

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Vcc	Supply voltage	Vcc	+11.4	+12.0	+12.6	V	【Note1】
	Current dissipation	Icc	—	250	390	mA	【Note2】
Permissive input ripple voltage		V_{RF}	—	—	100	mVp-p	
Input voltage (Low)		V_{IL}	0	—	+0.6	V	SELLVDS
Input voltage (High)		V_{IH}	+2.7	—	+3.3	V	SELLVDS
Input current (Low)		I_{IL}	—	—	500	μA	VI=GND
Input current (High)		I_{IH}	—	—	100	μA	V_I=Vcc
Output voltage (Low)		V_{OL}	—	—	0.4	V	BLON:I_{OL}=1mA
Output voltage (High)		V_{OH}	2.1	—	—	V	BLON:I_{OH}=1mA

【Note1】

1) On-off sequences of Vcc and data

$0 < t1 \leq 60ms$

$0 < t2 \leq 10ms$

$0 \leq t3 \leq 1s$

$t4 \geq 100ms$

$t5 \geq 40ms$
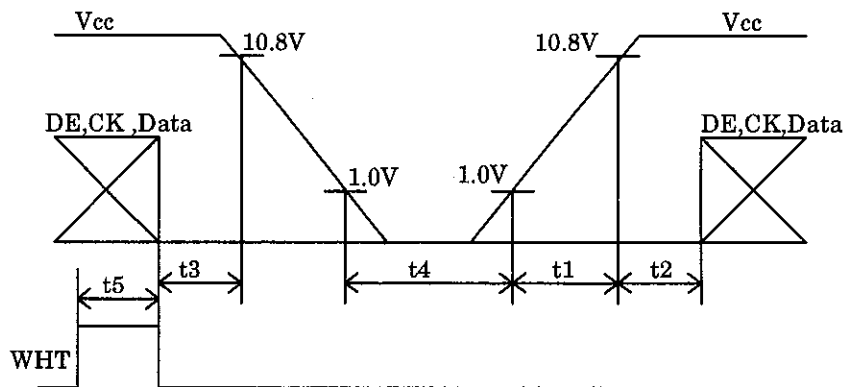
2) Dip conditions for supply voltage

Vmin=10.8V,Vth=9.6V

1) Vth $\leq$ Vcc< Vmin

td$\leq$ 10ms

2) Vcc<Vth

The LCD module shuts down.
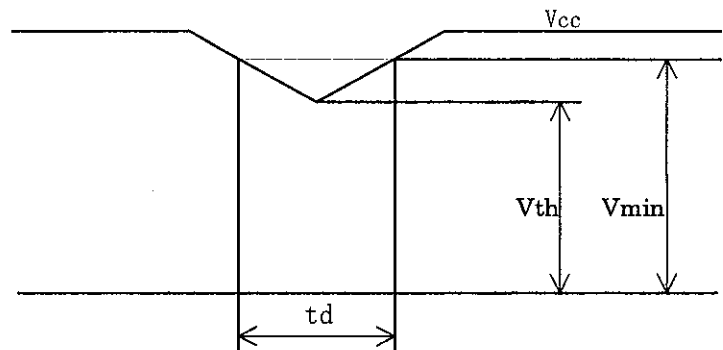
【Note2】 Typical current situation : 16-gray-bar pattern

Vcc=+12.0V

Gray scale : GS(16n)

n=0～15

The explanation of each gray scale ,GS(16n), is described

below section 8.
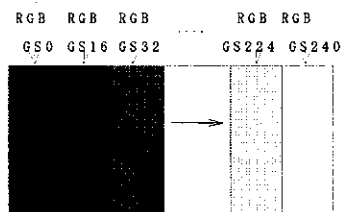
6-2. Back light driving

The back light system is an edge-lighting type with four CCFTs (Cold Cathode Fluorescent Tube).

The characteristics of the lamp are shown in the following table.

The value mentioned below is at the case of one CCFT.

CCFT Model Name : KTCE264MSTF-331KB170-3 (Stanley Electric Co.,Ltd)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp current range	I_L	3.5	6.0	7.0	MArms	【Note1】
Lamp voltage	V_L	—	640	—	Vrms	Ta=25℃
Lamp power consumption	P_L	—	3.84	—	W	【Note2】
Lamp frequency	F_L	30	60	70	KHz	【Note4】
Kick-off voltage	Vs	—	—	1100	Vrms	Ta=25℃ 【Note5】
		—	—	1500	Vrms	Ta=0℃ 【Note5】
Lamp life time	T_L	50,000	—	—	Hour	【Note6】

【Note1】 A lamp can be light in the range of lamp current shown above.

Maximum rating for current is measured by high frequency current measurement equipment connected to V_{LOW} at circuit showed below.

(Note : To keep enough kick-off voltage and necessary steady voltage for CCFT.)

Lamp frequency   : 30 ～ 70 kHz

Ambient temperature :   0 ～ 50 ℃
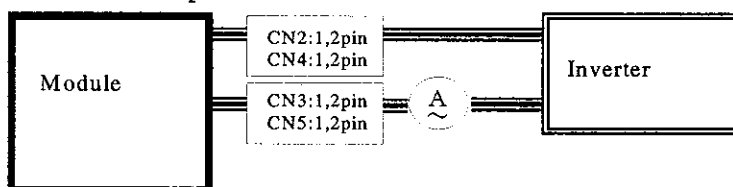
【Note2】 Referential data per one CCFT by calculation (I_L × V_L).
The data doesn't include loss at inverter .

【Note3】 Synchronize frequency and phase of two CCFT in the same connector.
Otherwise it may exceed rated voltage of connector.

【Note4】 Lamp frequency of inverter may produce interference with horizontal synchronous frequency, and this may cause horizontal beat on the display. Therefore, adjust lamp frequency, and keep inverter as far as from module or use electronic shielding between inverter and module to avoid interference.

【Note5】 The voltage above this value should be applied to the lamp for more than 1 second to startup. Otherwise the lamp may not be turned on .

【Note6】 Lamp life time is defined as the time when either ① or ② occurs in the continuous operation under the condition of Ta=25℃ and I_L=6.0±0.5mArms .

① Brightness becomes 50% of the original value under standard condition.

② Kick-off voltage at Ta=0℃ exceeds maximum value, 1420Vrms .

《Note》 The performance of the back light, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp .When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the back light and the inverter (miss-lighting, flicker, etc.) never occurs. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

Use the lamp inverter power source incorporating such safeguard as overvoltage / overcurrent protective circuit or lamp voltage waveform detection circuit, which should have individual control of each lamp.

In case one circuit without such individual control is connected to more than two lamps, excessive current may flow into one lamp when the other one is not in operation.

7. Timing characteristics of input signals

7-1-1. Timing characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	l/Tc	40	55	68.5	MHz	
	Skew	Tcsq	1	0	1	clock	[Note1]
Data enable signal	Horizontal period	TH	705	848	928	clock	
			12.0	15.0	18.5	μs	
	Horizontal period (High)	THd	640	640	640	clock	
	Vertical period	TV	1026	1066	2043	line	[Note2]
			13.3	16.0	24.5	ms	
	Vertical period (High)	TVd	1024	1024	1024	line	

[Note1] Lvds (A port)− Lvds (B port) phase difference

[Note2] In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.
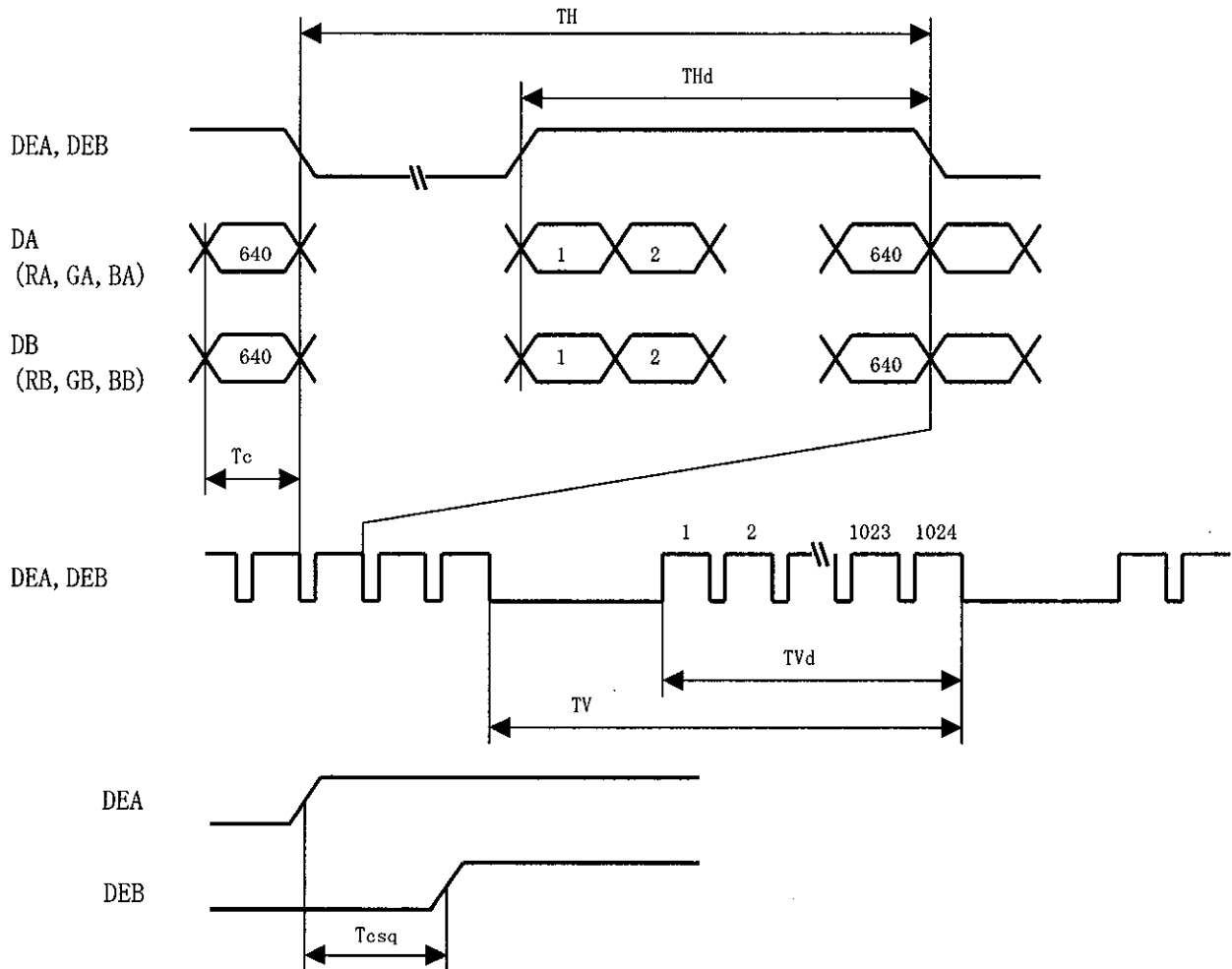
7-2 Input Data Signals and Display Position on the screen

Graphics and texts can be displayed on a 1280 $\times$ 3 $\times$ 1024 dots panel with 16M colors by supplying 48 bit data signal (8bit/color [256 gray scales] $\times$ 3 $\times$ 2 pixels).

Two pixel-data are sampled at the same time.

$*$ DA(A port) : RA0~RA7, GA0~GA7, BA0~BA7
$*$ DB(B port) : RB0~RB7, GB0~GB7, BB0~BB7
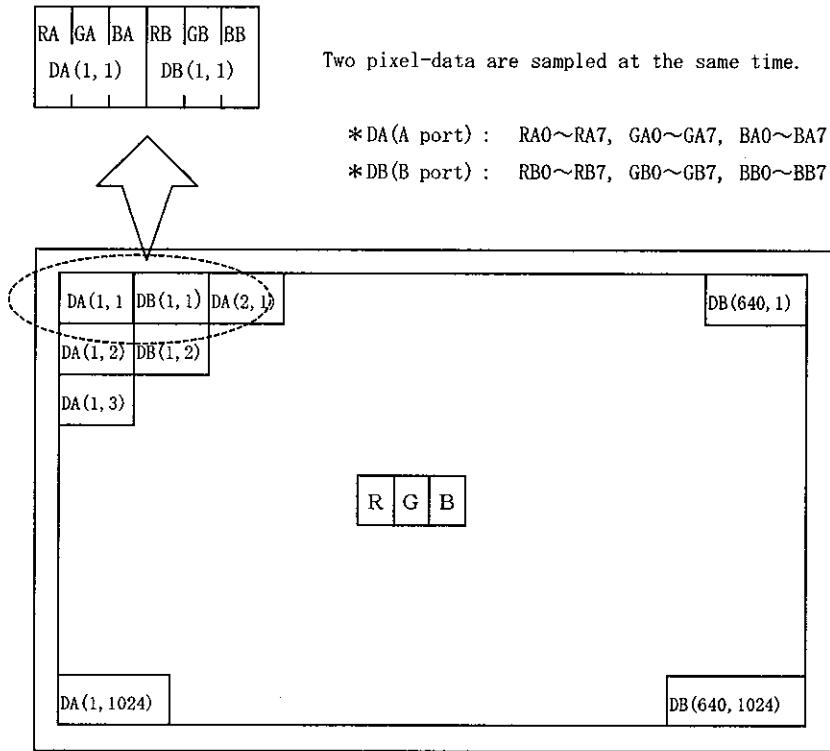
Display position of input data (H, V)

8. Input Signals, Basic Display Colors and Gray Scale of Each Color

Colors & Gray scale	Gray Scale	RA0/RB0	RA1/RB1	RA2/RB2	RA3/RB3	RA4/RB4	RA5/RB5	RA6/RB6	RA7/RB7	GA0/GB0	GA1/GB1	GA2/GB2	GA3/GB3	GA4/GB4	GA5/GB5	GA6/GB6	GA7/GB7	BA0/BB0	BA1/BB1	BA2/BB2	BA3/BB3	BA4/BB4	BA5/BB5	BA6/BB6	BA7/BB7
Basic Color																									
Black	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Green	—	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Cyan	—	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	—	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magenta	—	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
White	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red																									
Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⇧	↓				↓								↓								↓				
⇩	↓				↓								↓								↓				
Brighter	GS250	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⇩	GS251	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red	GS252	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green																									
Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⇧	GS1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	GS2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⇧	↓				↓								↓								↓				
⇩	↓				↓								↓								↓				
Brighter	GS250	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
⇩	GS251	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Green	GS252	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue																									
Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
⇧	↓				↓								↓								↓				
⇩	↓				↓								↓								↓				
Brighter	GS250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
⇩	GS251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Blue	GS252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

0 : Low level voltage,   1 : High level voltage.

Each basic color can be displayed in 256 gray scales from 8 bit data signals. According to the combination of total 48 bit data signals, the 16-million-color display can be achieved on the screen.

9. Optical Characteristics

Ta=25℃, Vcc =+12V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Vertical	θ 11	(CR≧5)	45	65	—	Deg.	[Note1,4]
		θ 12		50	65	—	Deg.	
	Horizontal	θ 21, θ 22		60	80	—	Deg.	
	Vertical	θ 11	(CR≧10)	35	50	—	Deg.	[Note1,4]
		θ 12		40	50	—	Deg.	
	Horizontal	θ 21, θ 22		50	65	—	Deg.	
Contrast ratio		C R	θ =0°	230	300	—		[Note2,4]
Response Time	Rise	τ r		—	10	25	m s	[Note3,4]
	Decay	τ d		—	35	50	m s	
Chromaticity of White		Wx		0.273	0.303	0.333	—	[Note4]
		Wy		0.289	0.319	0.349	—	
Chromaticity of Red		Rx		0.570	0.600	0.630	—	
		Ry		0.308	0.338	0.368	—	
Chromaticity of Green		Gx		0.240	0.270	0.300	—	
		Gy		0.550	0.580	0.610	—	
Chromaticity of Blue		Bx		0.116	0.146	0.176	—	
		By		0.071	0.101	0.131	—	
Luminance of white		YL		190	230	—	cd/m^2	IL=6.0mA rms FL=60kHz [Note4]
White Uniformity		δ w		—	—	1.25	—	[Note5]

※The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.2 below.
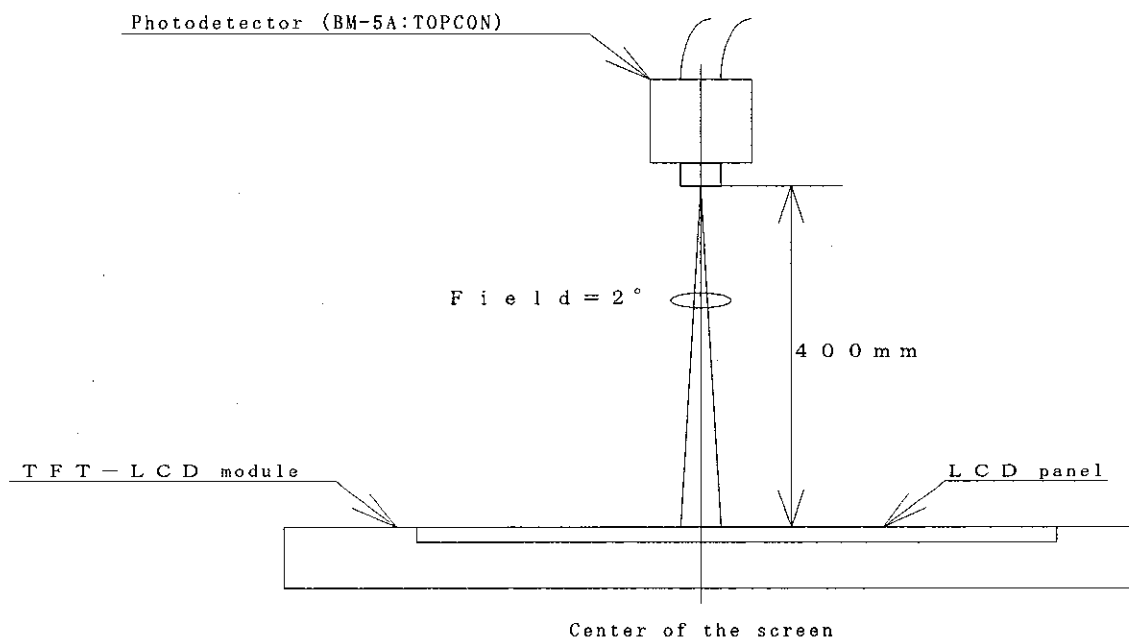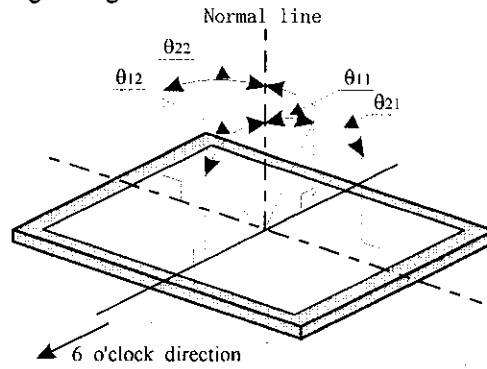

Fig.2 Optical characteristics measurement method

【Note1】 Definitions of viewing angle range:

Normal line

θ_{22}

θ_{12} θ_{11}
θ_{21}

6 o'clock direction

【Note2】 Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

【Note3】 Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

white   black   white

Photodetector output
(Relative Value)

100%
90%

10%
0%

τr τd

time
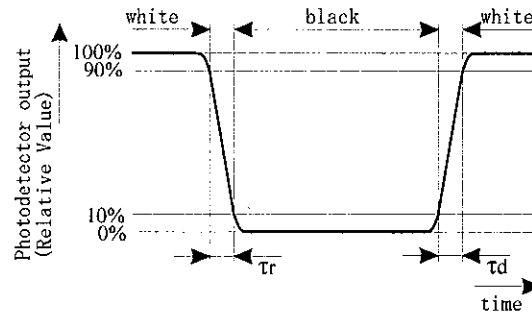
【Note4】 This shall be measured at center of the screen.

【Note5】 Definition of white uniformity:

White uniformity is defined as the following with five measurements (A~E).

320   640   960   pixel

A   D   256

C   512

B   E   768
pixel
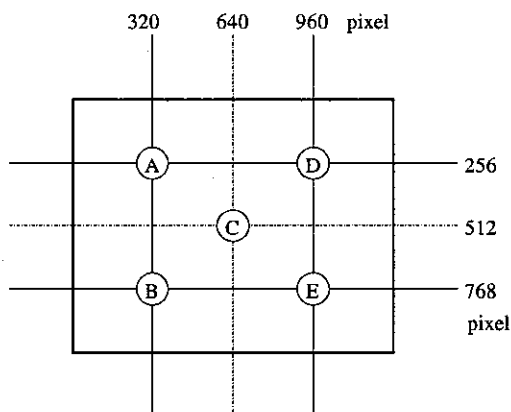
$$\delta w = \frac{\text{Maximum Luminance of five points (brightness)}}{\text{Minimum Luminance of five points (brightness)}}$$

10. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable.

b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.

c) Since the front polarize is easily damaged, pay attention not to scratch it.

d) Since long contact with water may cause discoloration or spots, wipe off water drop immediately.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this module, take care of static electricity and take the human earth into consideration when handling.

h) Make sure the four mounting holes of the module are grounded sufficiently. Take electro-magnetic interference (EMI) into consideration.

i) The module has some printed circuit boards (PCBs) on the back side. Take care to keep them form any stress or pressure when handling or installing the module; otherwise some of electronic parts on the PCBs may be damaged.

j) Observe all other precautionary requirements in handling components.

k) When some pressure is added onto the module from rear side constantly, it causes display non-uniformity issue , functional defect, etc. So, please avoid such design.

l) When handling LCD modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD modules.

11. Packing form

a) Piling number of cartons : maximum   8 cartons

b) Packing quantity in one carton : 5 module

c) Carton size : 513 mm(W) $\times$ 433 mm(H) $\times$ 227 mm(D)

d) Total mass of one carton filled with full modules : 11950 g

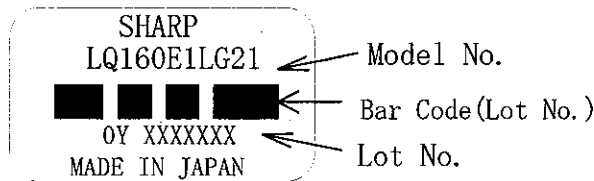Packing form is shown in Fig.3

12. Reliability test items

No.	Test item	Conditions
1	High temperature storage test	Ta = 60°C　　　240h
2	Low temperature storage test	Ta = -25°C　　　240h
3	High temperature & high humidity operation test	Ta = 40°C ; 95%RH　240h (No condensation)
4	High temperature operation test	Ta = 50°C　　　240h (The panel temp. must be less than 60°C)
5	Low temperature operation test	Ta = 0°C　　　240H
6	Vibration test (non- operating)	Frequency : 10～57Hz/Vibration width (one side) : 0.075mm 　　　　　　　　: 58～500Hz/Gravity : $9.8m/s^2$ Sweep time : 11minutes Test period : 3 hours 　　　　　　　(1 hour for each direction of X,Y,Z)
7	Shock test (non- operating)	Max. gravity : $490m/s^2$ Pulse width : 11ms, sine wave Direction : ±X, ±Y, ±Z, 　　　　　　　once for each direction.

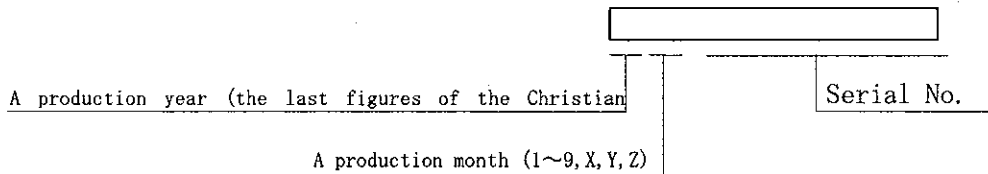【Result Evaluation Criteria】

　　Under the display quality test conditions with normal operation state, these shall be no change which may affect practical display function.

13. Others

1) Lot No. and indication Bar Code Label:

```
    SHARP
  LQ160E1LG21  ←— Model No.
  ■ ■ ■ ■  ←— Bar Code(Lot No.)
  0Y XXXXXXX  ←— Lot No.
  MADE IN JAPAN
```

How to express Lot No.

```
┌──────────────────────┐
│                      │
└──────────────────────┘
```

A production year (the last figures of the Christian

A production month (1～9, X, Y, Z)

Serial No.

2) Adjusting volume have been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

3) Disassembling the module can cause permanent damage and should be strictly avoided.

4) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

5) The chemical compound which causes the destruction of ozone layer is not being used.

6) Material information of LPG(Light Pipe Guide) are labeled on the back of the module.

```
┌─────────────────────────────┐
│    MATERIAL INFORMATION      │
│ >PLASTIC LIGHT GUIDE:PMMA<   │
└─────────────────────────────┘
```

7) When any question or issue occurs, it shall be solved by mutual discussion.

◎ Carton storage condition

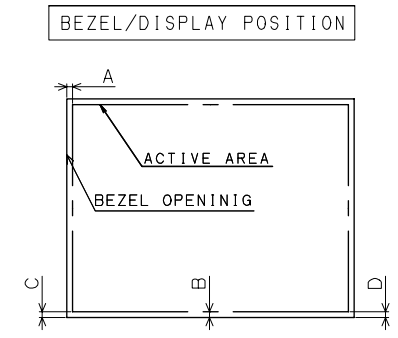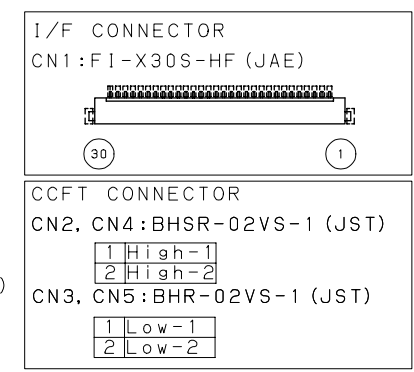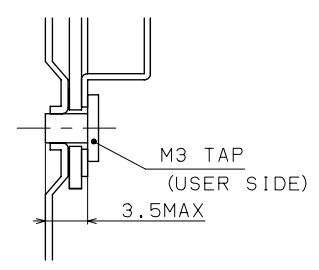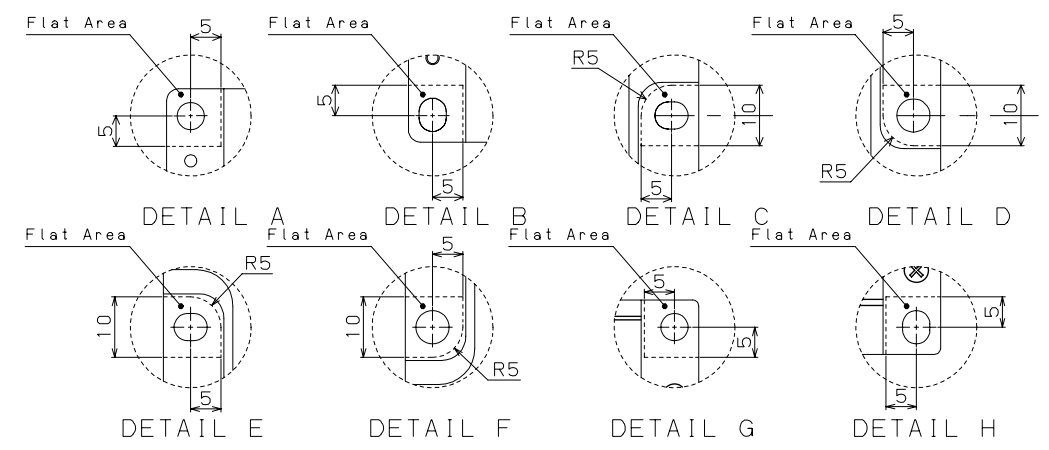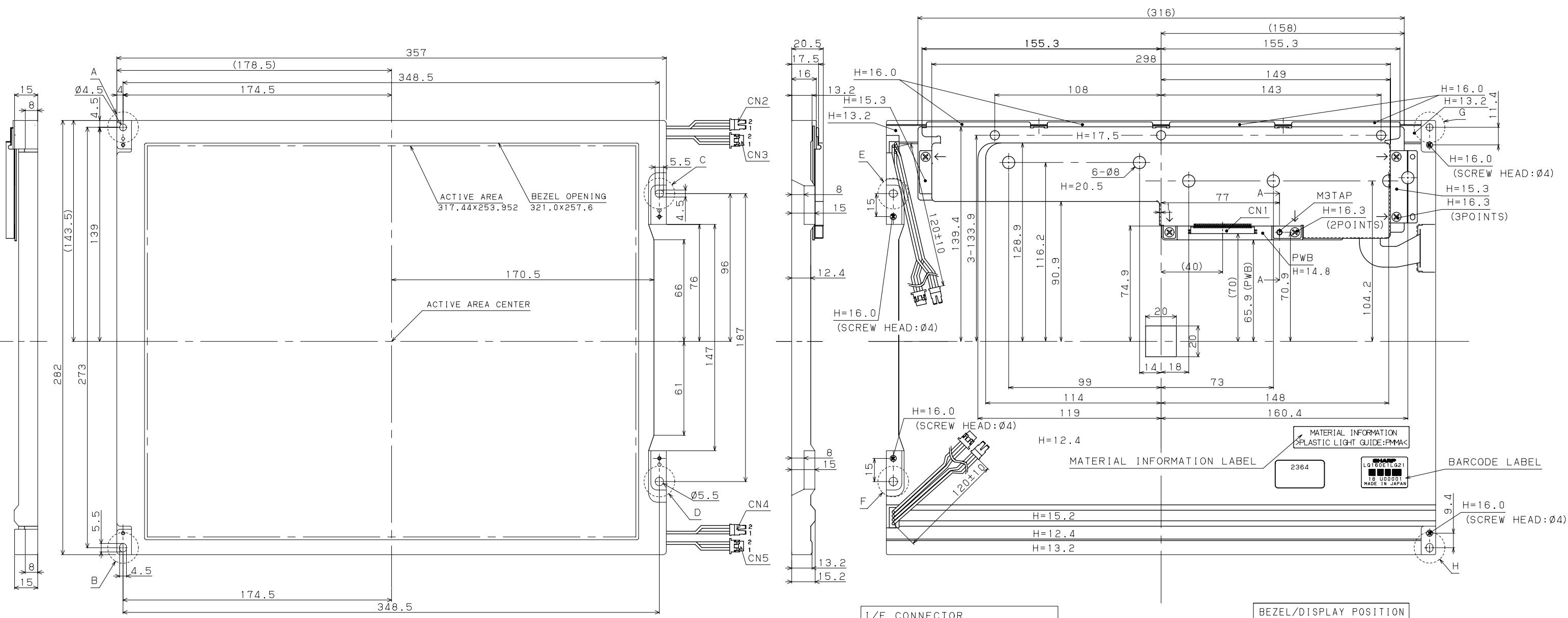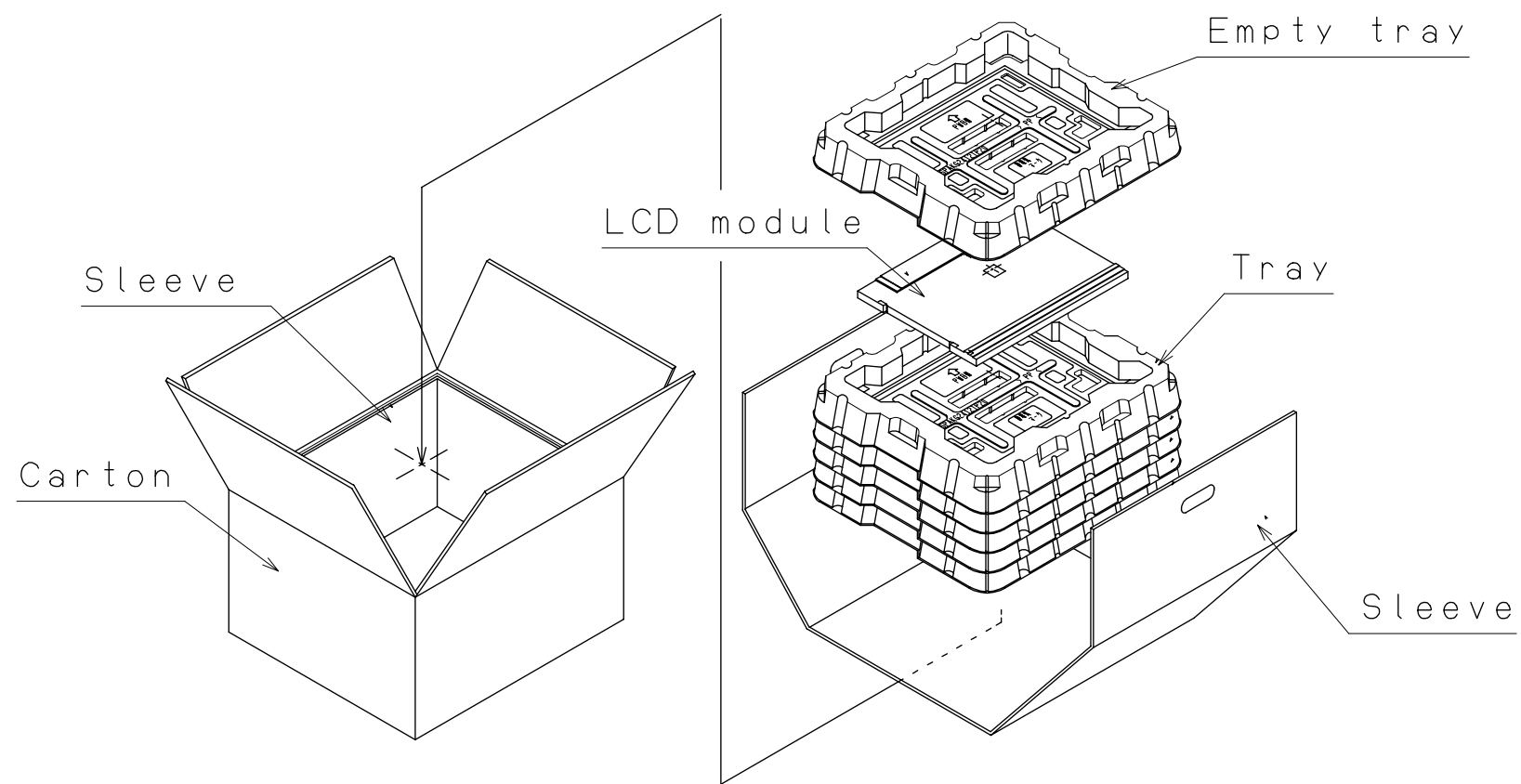|	
Temperature	0℃ to 40℃
Humidity	95%RH or less
Reference condition :	20℃ to 35℃ , 85%RH or less (summer)
	: 5℃ to 15℃ , 85%RH or less (winter)
	・ the total storage time (40℃,95%RH) : 240H or less
Sunlight	Be sure to shelter a product from the direct sunlight.
Atmosphere	Harmful gas, such as acid and alkali which bites electronic components and/or wires, must not be detected.
Notes	Be sure to put cartons on palette or base, don't put it on floor, and store them with removing from wall
	Please take care of ventilation in storehouse and around cartons, and control changing temperature is within limits of natural environment
Storage period	1 year

LD-13808-18

I/F CONNECTOR
CN1:FI-X30S-HF (JAE)

CCFT CONNECTOR
CN2, CN4:BHSR-02VS-1 (JST)

1	High-1
2	High-2

CN3, CN5:BHR-02VS-1 (JST)

1	Low-1
2	Low-2

SECT. A-A

NOTES)
1) UNSPECIFIED TOLERANCE TO BE ±0.5.
2) WARPING OF COMPONENTS SUCH AS TAPE,
   BEZEL, PCB, CHASSIS, FPC, PROTECTION COVER,
   ETC. ARE EXCLUDED FROM THICKNESS AND
   DIMENSIONS OF THE MODULE.

BEZEL/DISPLAY POSITION

1) TOLERANCE X-DIRECTION A:1.8±0.8
2) TOLERANCE Y-DIRECTION B:1.8±0.8
3) OBLIQUITY OF DISPLAY AREA IC-DI<0.8

DETAIL A   DETAIL B   DETAIL C   DETAIL D

DETAIL E   DETAIL F   DETAIL G   DETAIL H

Fig. 1 OUTLINE DIMENSIONS (LQ160E1LG21)

社内品番: (4S) LQ160E1LG21 ← ①

LotNO. : (1T) 2001.09.15 ← ②

Quantity: (Q) 5 pcs ← ③

ユーザー品番 : ← ④

シャープ物流用ラベルです。 ← ⑤

①Model No.

②Lot No. (Date)

③Quantity

④User model No.

⑤Sharp model No.

Empty tray

LCD module

Tray

Sleeve

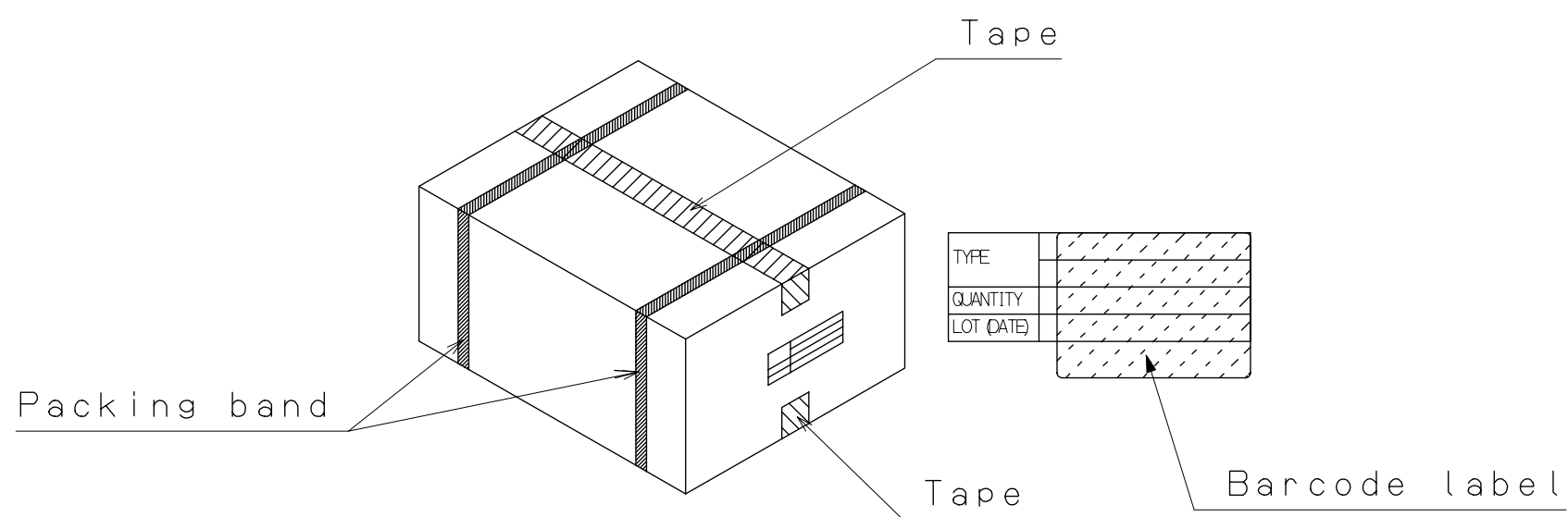Sleeve

Carton

Tape

Packing band

Tape

Barcode label

TYPE

QUANTITY

LOT (DATE)

Fig.3 PACKING FORM (LQ160E1LG21)