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DEVICE SPECIFICATION FOR

TFT - LCD module

MODEL No. LQ092B5DW02

PART No.   8 928 554 058

CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

BY _____
TOSHIYUKI MAKII
Department General manager
Engineering Department II
Liquid Crystal Display Division III
Liquid Crystal Display Group
SHARP CORPORATION

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1. General

This TFT-LCD module is a color active matrix LCD (Liquid Crystal Display) module of transmissive type incorporating amorphous silicon TFT (Thin Film Transistor).

It is composed of TFT-LCD panel, driver ICs,FPC, shielding case and LED-backlight unit.
（Driving circuit for LED-backlight is excluded.）

2. Features

・The 9.2 screen produces a high resolution image that is composed of 153,600 pixels elements
  in a stripe arrangement.

・Possible to indicate 262,144 colors by 18 bits (6 bits x RGB) data signal.

・Wide viewing angle technology without gray scales inversion.

・Reduced reflection as a result of low reflection black matrix and an antiglare (AG) polarizer being
  adopted.

・By COG method, realized a slim, lightweight, and compact module.

・Realized a high quality picture of the natural color appearance by adopting the ASV-Normally
  black Mode.

・Built-in LED backlight with the high performance of start-up in the low temperature.

3. Mechanical specifications

Table 3- 1

Parameter	Specifications	Units	Remarks
Display format	153,600	pixels	
	960(W)×RGB×160(H)	dots	
Active area	230.4 （W） ×38.4 （H）	mm	
Screen size (Diagonal)	23.37[9.2 "]	cm	
Dot pitch	80.0 （W） ×240.0 （H）	μm	
Pixel configuration	R,G,B Stripe configuration		
Outline dimension	242.0 (W)×52.83 (H)×10.3 (D)	mm	[Note 3-1]
Mass	170±10	g	

[Note 3-1]
 Excluding protrusions. Typical values are given.
 For detailed measurements and tolerances, refer to Fig. 1, Outline Dimensions.

4.Input terminal

4-1)TFT-LCD panel driving part

Table 4-1

Pin No.	Symbol	Description	Remarks
1	VL	Gamma voltage	
2	V12	Gamma voltage	
3	V10	Gamma voltage	
4	V8	Gamma voltage	
5	V7	Gamma voltage	
6	V5	Gamma voltage	
7	V3	Gamma voltage	
8	VH	Gamma voltage	
9	VSHA	Power supply（+13.4V）	
10	SPIO	Start pulse output signal for source driver	【Note4-1】
11	LBR	Setting signal of horizontal display direction	【Note4-1】
12	GND	Ground	
13	CLD	Clock signal for source driver	
14	GND	Ground	
15	POL	Polarity reversing signal of LCD output	
16	LS	Source data transfer signal	
17	VSHD	Power supply(+3.3V)	
18	B5	Blue data signal (MSB)	
19	B4	Blue data signal	
20	B3	Blue data signal	
21	B2	Blue data signal	
22	B1	Blue data signal	
23	B0	Blue data signal (LSB)	
24	GND	Ground	
25	G5	Green data signal(MSB)	
26	G4	Green data signal	
27	G3	Green data signal	
28	G2	Green data signal	
29	G1	Green data signal	
30	G0	Green data signal(LSB)	
31	GND	Ground	
32	R5	Red data signal(MSB)	
33	R4	Red data signal	
34	R3	Red data signal	
35	R2	Red data signal	
36	R1	Red data signal	
37	R0	Red data signal(LSB)	
38	SPOI	Start pulse input signal for source driver	【Note4-1】
39	CS	CS signal	
40	VCOM	VCOM signal	
41	NC		
42	VGH	Power supply of gate ON(+25V)	
43	NC		
44	MODE1	Output mode setting signal 1 of gate driver	【Note4-2】
45	MODE2	Output mode setting signal 2 of gate driver	【Note4-2】
46	TST	Setting signal for gate driver(Lo fixed)	
47	CLS	Clock signal for gate driver	
48	SPS	Start pulse Input for gate driver	
49	NC		
50	VGL	Power supply of gate OFF(-8.0V)	

[Note4-1] Horizontal direction of the scanning can be controlled according to this signal.

Table 4-2

Display mode	LBR	SPIO	SPOI
Normal displayed	Hi	Input mode	Output mode
Right/Left reverse mode	Lo	Output mode	Input mode

[Note4-2] The mode of the gate driver output can be selected by setting MODE1 and MODE2.
　　　　Refer to item 6-1) power supply sequence.

Table4-3

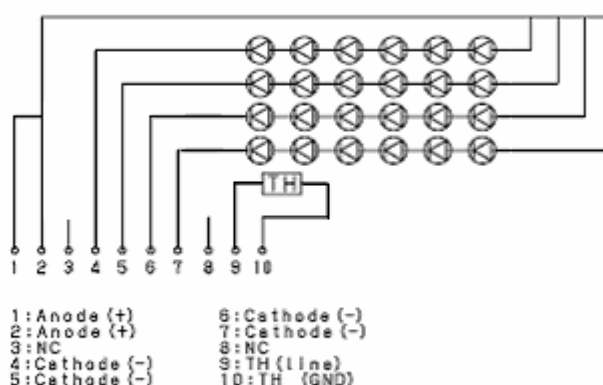| MODE1	Hi
MODE2	Lo

　Lo=GND , Hi=VSHD

4-2) Backlight driving part

Table4-4

Pin No.	Symbol	Description	Remarks
1	VLA	LED anode terminal (+)	
2	VLA	LED anode terminal (+)	
3	NC	NC	
4	VLC1	LED cathode terminal 1 (−)	[Note 4-3]
5	VLC2	LED cathode terminal 2 (−)	[Note 4-3]
6	VLC3	LED cathode terminal 3 (−)	[Note 4-3]
7	VLC4	LED cathode terminal 4 (−)	[Note 4-3]
8	NC	NC	
9	TH1	Thermal sensor for LED	[Note 4-4]
10	TH2	Thermal sensor for LED	[Note 4-4]

[Note4-3]　　6 LEDs × 4 chains
[Note4-4]　　NTC : NSM3302J410J3　(OHIZUMI MFG. CO.,LTD.)

1:Anode (+)
2:Anode (+)
3:NC
4:Cathode (−)
5:Cathode (−)
6:Cathode (−)
7:Cathode (−)
8:NC
9:TH (line)
10:TH (GND)

5.Absolute maximum rating

Teble5-1 Absolute maximum ratings   GND=0V

Parameter		Symbol	MIN	MAX	Unit	Remark
Power supply of source driver	Analog	VSHA	−0.3	+14.0	V	Ta=25℃
	Digital	VSHD	−0.3	+4.0	V	〃
Power supply of gate driver		VGH	−0.3	+35.0	V	〃
		VGL	−20.0	+0.3	V	〃
		VGH−VGL	−0.3	+38.0	V	〃
Input signal	Digital	VID	−0.3	VSHD+0.3	V	〃 ,[Note5-1]
	Analog	VIA	−0.3	VSHA+0.3	V	〃 ,[Note5-2]
Common electrode driving signal		VCOM,CS	−0.3	+14.0	V	〃
Storage temperature		Tstg	−40	90	℃	[Note5-3,4]
Operating temperature (Panel temperature)		Topr1	−40	85	℃	[Note5-5,6]
Operating temperature (Ambient temperature)		Topr2	−30	70	℃	[Note5-6]

[Note5-1] SPIO,LBR,CLD,POL,LS,B5～B0,G5～G0,R5～R0,SPOI,MODE1,MODE2,R/L,CLS,SPS
[Note5-2] VH,V3,V5,V7,V8,V10,V12,VL
[Note5-3] This rating applies to all parts of the module and should not be exceeded.
[Note5-4] Maximum wet-bulb temperature is 57℃. Avoid dew condensation on the module.
　　　　　Otherwise electrical current leaks will occur , and it cannot meet the specifications.
[Note5-5] The operating temperature guarantees only operation of the circuit. For contrast, speed of
　　　　　response, and other factors related to display quality are determined in the circumstances
　　　　　with Ta=＋25℃.
[Note5-6] Ambient temperature when the backlight is lit. (Reference value)

6.Electrical characteristics

6-1) TFT-LCD panel driving section

Table6-1　Recommended operating conditions　　　　　　　　　　GND=0V , Ta=25℃

Parameter			Symbol	MIN	TYP	MAX	Unit	Remarks
Power supply of source driver	Analog		VSHA	+13.3	+13.4	+13.5	V	
	Digital		VSHD	+3.0	+3.3	+3.6	V	
Power supply of gate driver	TFT driving	Hi	VGH	+24.8	+25.0	+25.2	V	
		Lo	VGL	−8.2	−8.0	−7.8	V	
Power supply of gray image			VH,VL,V*	GND	−	VSHA	V	
Input voltage of source driver	Hi input		VIHS	0.7×VSHD	−	VSHD	V	[Note6-1]
	Lo input		VILS	GND	−	0.3×VSHD	V	
Input current of source driver	Hi input		IIHS	−	−	4	μA	[Note6-1]
	Lo input		IILS	−4	−	−	μA	
Input voltage of gate driver	Hi input		VIHG	0.8×VSHD	−	VSHD	V	[Note6-2]
	Lo input		VILG	GND	−	0.2×VSHD	V	
Input current of gate driver	Hi input		IIHG	−	−	1	μA	
	Lo input		IILG	−1	−	−	μA	
Common electrode driving signal			VCOM	+3.7	+5.2	+6.7	V	
CS driving signal			VCS	−	VCOM	−	V	

[Caution] Notes when power supply is turned on.

　　Please do a power supply on and the power-off in the following order.

　　　　Turn on　　VSHD → VGL, Logic signal → VGH, VSHA, VH, VL, V*

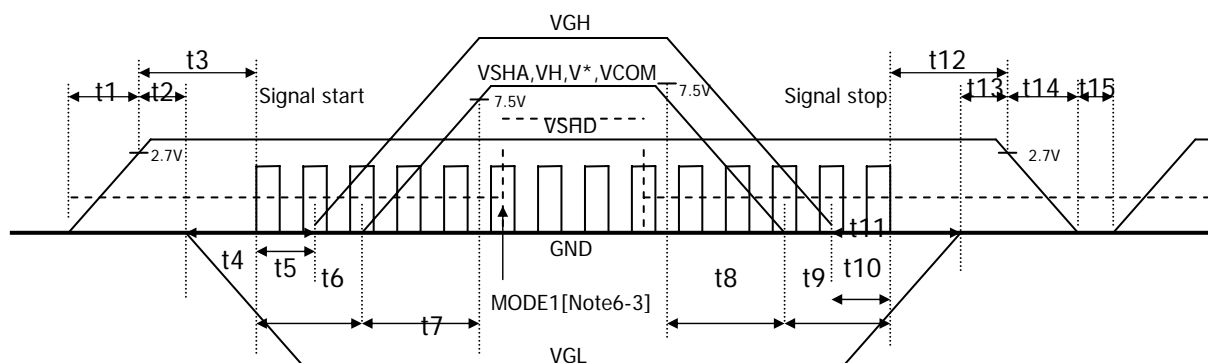　　　　Turn off　　VSHA, VH, VL, V*, VGH → Logic signal, VGL → VSHD

Table6-2　On-off conditions for supply voltage

symbol	MIN	MAX	UNIT	symbol	MIN	MAX	UNIT
t1	0	20	ms	t9	0	−	ms
t2	0	−	ms	t10	0	−	ms
t3	0	10	ms	t11	0	−	ms
t4	0	−	ms	t12	0	10	ms
t5	0	−	ms	t13	0	−	ms
t6	0	−	ms	t14	0	10	ms
t7	0	50	ms	t15	10	−	ms
t8	0	10	ms				

[Note6-1] Apply to terminal of SPIO,LBR,CLD,POL,LS,B5～B0,G5～G0,R5～R0 and SPOI.

[Note6-2] Apply to terminal of MODE1,MODE2,R/L,CLS and SPS.

[Note6-3] Input low voltage when turning on MODE1 terminal and keep low voltage for 2 vertical synchronizing periods or more after VGH has completely risen. After that, keep MODE1 terminal at high voltage until turning off the power.

[Note6-4] Recommended gamma voltage

Table6-3

Pin No.	Symbol		Remarks
1	VL	Connected to GND	
2	V12	+2.68	
3	V10	+3.40	
4	V8	+4.60	
5	V7	+7.80	
6	V5	+9.00	
7	V3	+9.71	
8	VH	Connected to VSHA(13.4V)	

(*) It may be necessary to input the DC voltage into these terminals to optimize gamma value of new NB panel.

6-2) Backlight unit driving section

Table 6-4

Parameter	Symbol	MIN	TYP	MAX	Unit	Remarks
LED voltage	Vf	−	18.5	21.0	V	Ta=25℃,If=60mA
LED voltage	Vf-30	−	−	22.0	V	Ta=-30℃,If=60mA
LED current	If	−	60	65	mA	
Power consumption	Wf	−	4.45	−	W	[Note6-5] Ta=25℃

[Note6-5] Reference, Wf = Vf x If x parallel qty.

6-3) Timing characteristics of input signals

Timing diagrams of input signal are shown in Fig2-1, Fig2-2.

Table6-5

VSHA=13.4V,VSHD=3.3V,GND=0V,Ta=25℃

	Parameter	Symbol	MIN	TYP	MAX	Unit	Terminal
Source	Operating Clock frequency	fcld	15.9	18.0	19.8	MHz	CLD [Note6-5]
	High level clock width	Tcwh	4	－	－	ns	
	Low level clock width	Tcwl	4	－	－	ns	
	Clock rise time	Tcr	－	－	7	ns	
	Clock fall time	Tcf	－	－	7	ns	
	Start pulse set up time	Tsusp	4	－	－	ns	SPOI SPIO [Note6-6]
	Start pulse hold time	Thsp	2	－	－	ns	
	Start pulse width	Twsp	1/fcld	－	－	ns	
	LS pulse Start pulse time	Tlssp	5/fcld	－	－	ns	LS
	Last data LS time	Tldt	2/fcld	－	－	ns	
	LS pulse set up time(CLD)	Tsulscld	9	－	－	ns	
	High level LS pulse wide	Twls	5/fcld	36/fcld	－	ns	
	LS pulse set up time (CL)	Tsuls	5.0	－	－	μs	
	POL LS pulse time	Tpolls	14	－	－	ns	
	LS CLS time	Tlscls	0	－	－	μs	
	Data set up time	Tsud	4	－	－	ns	R0～R5,G0～G5,B0～B5
	Data hold time	Thd	2	－	－	ns	
Gate	Operating Clock frequency	fcls	14.46	14.83	16.04	kHz	CLS
	Clock pulse with	Twl	500	－	－	ns	
	Clock rise time	Trcls	－	－	100	ns	
	Clock fall time	Tfcls	－	－	100	ns	
	Start pulse frequency	fsps	59	60.03	61	Hz	SPS
	Start pulse set up time	Tsusps	100	－	－	ns	
	Start pulse hold time 1	Thsps1	300	－	－	ns	
	Start pulse hold time 2	Thsps2	30	－	－	ns	
	Start pulse rise time	Trsps	－	－	100	ns	
	Start pulse fall time	Tfsps	－	－	100	ns	

[Note6-5] It is also possible that Tcr,Tcf exceeds the maximum value when the clock frequency doesn't reach the maximum value. But please confirm there is no problem.

[Note6-6] The rising pulse in CLD is existed only 1 time during Hi period (Twsp) on start pulse.

6-4）Electric power consumption

Table6-4   Ta =25℃

Symbol	Voltage conditiion	MIN	TYP	MAX	Unit
ISHA	VSHA=+13.4V	－	23	46	mA
ISHD	VSHD=+3.3V	－	8	16	mA
IGH	VDD=+25.0V	－	0.4	0.6	mA
IGL	VEE=－8.0V	－	－0.4	－0.6	mA

6-5) Input Data Signals and Display Position on the screen

U P

D1,DH1	D2,DH1	D3,DH1		D960,DH1
D1,DH2	D2,DH2			
D1,DH3				
		R G B		
D1,DH160				D960,DH160
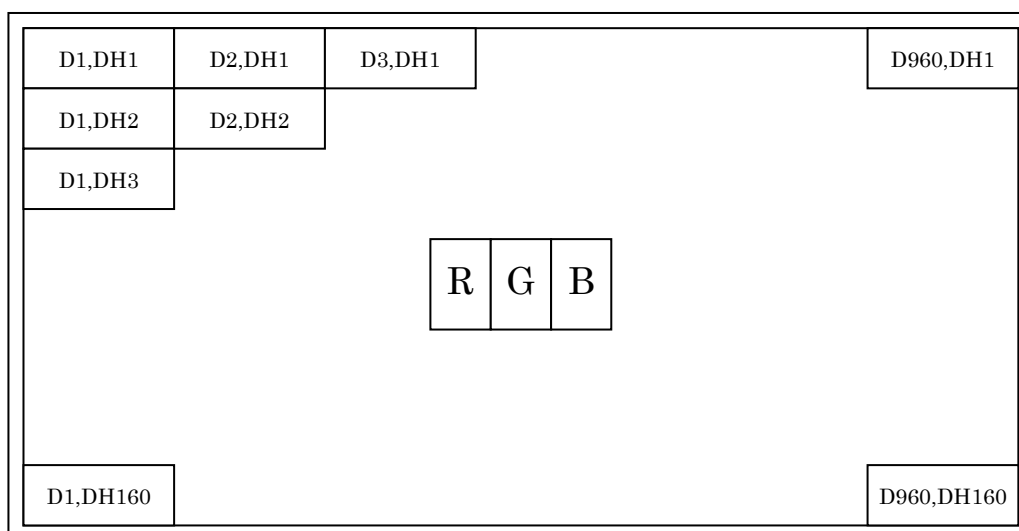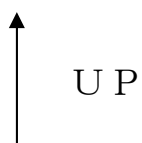
Display position of input data (H,V)

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

Table7

	Colors & Gray scale	Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
						Data signal					0 :Low level voltage				1 :High level voltage					
Basic color	Black	—	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	1	1	1	1	1	1
	Green	—	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	—	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	—	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	—	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	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
Gray Scale of red	Black	GS0	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
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓			↓						↓						↓			
	⇩	↓			↓						↓						↓			
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	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
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	↓			↓						↓						↓			
	⇩	↓			↓						↓						↓			
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of bleu	Black	GS0	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	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	↓			↓						↓						↓			
	⇩	↓			↓						↓						↓			
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Bleu	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : low level voltage   1 : high level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

8.Optical characteristics

Table 8   Ta=25℃

Parameter			Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range			Δθ11 Δθ12	CR≧100	30	40	—	°(degree)	【Note 8-1,2】
			Δθ21, Δθ22	CR≧100	35	45	—	°(degree)	
Contrast ratio			CRp	Perpendicular θ＝0°	700	1,000	—		【Note 8-2】
Response time	+25℃ (＊)	Rise	τr	Black=>White	—	8	14	ms	【Note 8-3】
				worst(L0→L8)	_	71	90	ms	
		Fall	τd	White=>Black	_	6	12	ms	(＊) Ambient Temperature
				worst(L16→L8)	_	32	39	ms	
	0℃ (＊)	Rise	τr	Black=>White	_	25	34	ms	
				worst(L0→L8)	_	154	196	ms	
		Fall	τd	White=>Black	_	25	41	ms	
				worst(L16→L8)	_	55	73	ms	
	-20℃ (＊)	Rise	τr	Black=>White	_	55	77	ms	
				worst(L0→L8)	_	521	719	ms	
		Fall	τd	White=>Black	_	68	106	ms	
				worst(L16→L8)	_	208	306	ms	
	-30℃ (＊)	Rise	τr	Black=>White	_	111	151	ms	
				worst(L0→L8)	_	1095	1413	ms	
		Fall	τd	White=>Black	_	148	270	ms	
				worst(L16→L8)	—	431	606	ms	
White Luminance			Y	IF=60mA θ＝0°	810	1,055	—	cd/m²	
Uniformitye				IF=60mA θ＝0° Lmax/Lmin	—	1.35	1.4		【Note 8-7】
Chromaticity	White	x		IF=60mA θ＝0°	0.264	0.304	0.344		【Note 8-4】
		y			0.285	0.325	0.365		
	Red	x			0.596	0.636	0.676		
		y			0.268	0.308	0.348		
	Green	x			0.312	0.352	0.392		
		y			0.520	0.560	0.600		
	Blue	x			0.118	0.158	0.198		
		y			0.044	0.084	0.124		
LED life time	+25℃	-		Continuation	10,000	—	—	hour	【Note 8-5】
	−30℃	-		Intermittent	2,000	—	—	time	【Note 8-6】

※Measure after 30 minutes of power on. The optical measurement of the characteristic is to be done in the condition which is equal to the darkroom or use the measuring method described in the following Fig.(ⅰ).

Photo detector（SR-3）

400　　　±

Field=1°

Center of the screen($\theta = 0°$)

TFT-LCD module
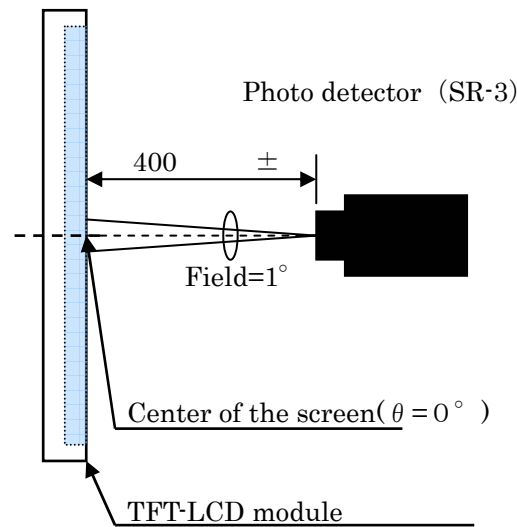
Fig.(ⅰ)　Measuring method of optical characteristics

【Note 8-1】　Viewing angle range is defined as follows.

Normal line

$\theta\,22$

$\theta\,11$

$\theta\,12$

$\theta\,21$

6 o'clock direction
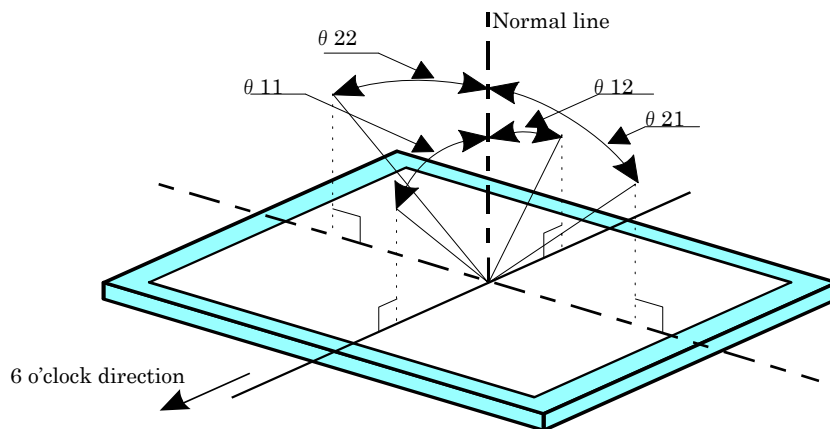
Fig.(ii) Definition for viewing angle

【Note 8-2】Contrast ratio is defined as follows:

$$\text{Contrast ratio(CR)}= \frac{\text{Photo detector output with LCD being "white"}}{\text{Photo detector output with LCD being "black"}}$$

Measured by SR-3.

【Note 8-3】 Response time is obtained by measuring the transition time of photo detector output, when input signals are applied so as to make the area "black" to and from "white".
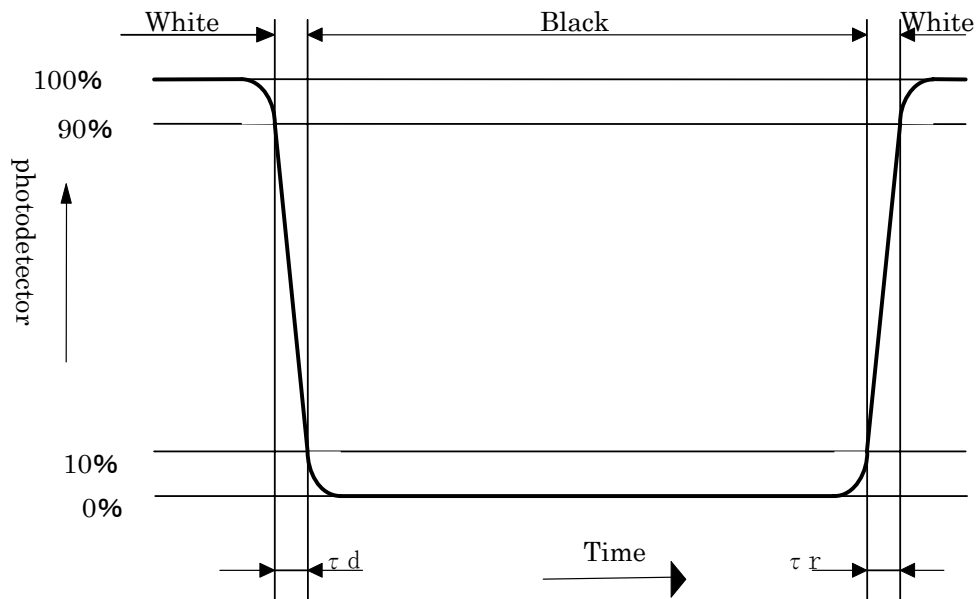
Fig.(iii)

【Note 8-4】 Measured on the center area of the panel at a viewing cone 1° by TOPCON luminance meter SR-3.(After 30 minutes operation)

【Note 8-5】 Backlight life time is defined as the time when the brightness of the panel not to become less than 50% of the original value in the continuous operation under the condition of LED forward current If=60mA.

【Note 8-6】 The intermittent cycles is defined as a time when brightness is not become under 50% of the original value under the condition of following cycle.

Ambient temperature:-30℃
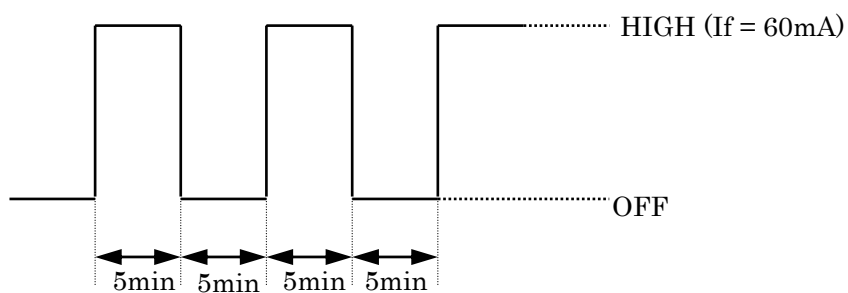
【Note 8-7】 Measuring point is defined as follows.
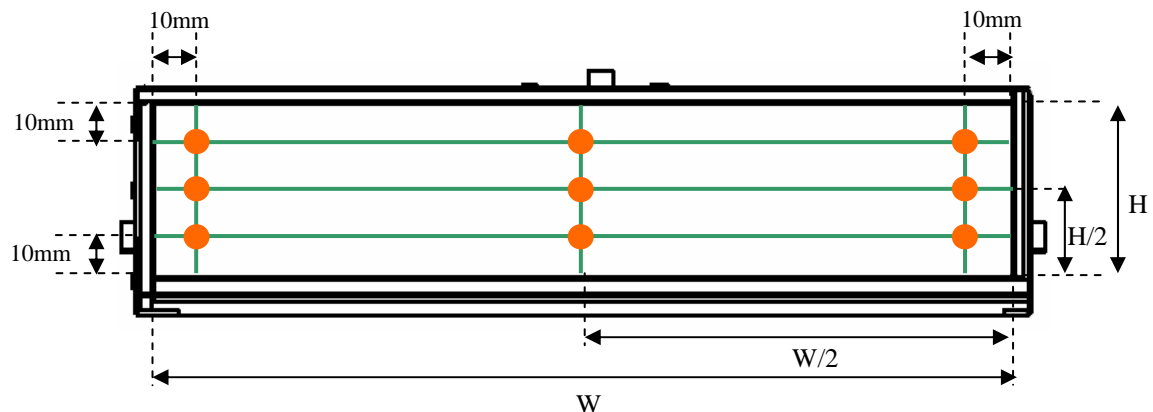
The measurement of white luminance measures 9 points of the above figure.
The maximum and minimum luminance are chosen as a result.
Luminance uniformity = Maximum Luminance / Minimum Luminance

9.Display quality

The display quality of the color TFT-LCD module shall be in compliance with <u>Outgoing Inspection Standards for TFT-LCD.</u>

10. Mechanical characteristics

10-1) External appearance
Do not exist extreme defects. (See Fig. 1)

10-2) Input connector performance
1)Applicable connector：FH28-50S-0.5SH(05) (HRS)
2)FPC flexibility： One side wiring area with film cover coating
If it had been tested bending under radius nothingness and
bending angle 180degrees, the FPC should not be cut.
(It should be bend by hand and only at once).

11. Handling instructions

11-1) Handling of FPC
①FPC shall be bended only at one side wiring area with film cover coating.
②Please do not hang a LCD module or do not apply excessive power for FPC.

11-2) Mounting of module
③This LCD module is designed to be mounted on equipment using the mounting tabs in the
four corners of the module at the rear side.
④On mounting the module, be sure to fix the module on the same plane, taking care not to
wrap or twist the module.
Don't reach the pressure of touch-switches of the set side to a module directly, because
images may be disturbed.
⑤Please power off the module when you connect the input connector.

11-3) Precautions in mounting
①Polarizer which is made of soft material and susceptible to flaw must be handled carefully.
Protection sheet is applied on the surface to protect it against scratches and dirties.
It is recommended to remove off the protection sheet immediately before the use, taking care
of static electricity.
②Precautions in removing the protection sheet

A) Working environment

When the protection sheet is removed off, static electricity may cause dust to stick to the polarizer surface.

To avoid this, the following working environment is desirable.

    a) Floor: Conductive treatment of 1MΩ or more on the tile
          (conductive mat or conductive paint on the tile)
    b) Clean room free form dust and with an adhesive mat on the doorway
    c) Advisable humidity:50%～70%   Advisable temperature:15℃～27℃
    d) Workers shall wear conductive shoes, conductive work clothes, conductive gloves and an earth band.

B) Working procedures
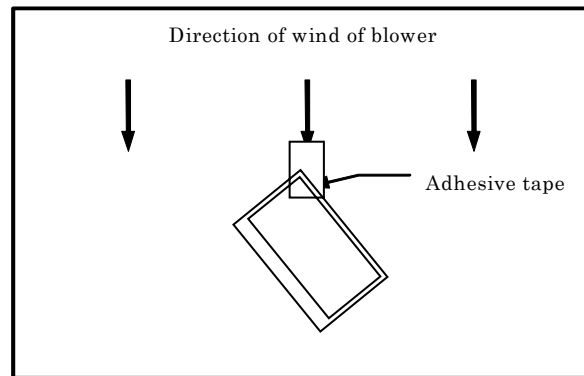
a) Direct the wind of discharging blower somewhat downward to ensure that module is blown sufficiently.
Keep the distance between module and discharging blower within 20 cm.

b) Attach adhesive tape to the protection sheet part near discharging blower so as to protect polarizer against flaw.

c) Remove off the protection sheet, pulling adhesive tape slowly to your side.

d) On removing the protection sheet, pass the module to the next work process to prevent the module to get dust.

e) Method of removing dust from polarizer
    ・ Blow off dust with N2 blower for which static electricity preventive measure has been taken.
    ・ Since polarizer is vulnerable, wiping should be avoided.
      But when the panel has stain or grease, we recommend to use adhesive tape to softly remove them from the panel.

③When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth. For stubborn dirties, wipe the part, breathing on it.
Wipe off water drop or finger grease immediately.　Long contact with water may cause discoloration or spots.

④TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Handle with care.

⑤Since CMOS LSI is used in this module, take care of static electricity and earth your body when handling.

11-4) Caution of product design
①The LCD module shall be protected against water salt-water by the waterproof cover.
②Please take measures to interferential radiation from module, to do not interfere surrounding appliances.

11-5)Others

①Do not expose the module to direct sunlight or intensive ultraviolet rays for several hours;
   liquid crystal is deteriorated by ultraviolet rays.

②Store the module at a temperature near the room temperature. At lower than the rated
   storage temperature, liquid crystal solidifies, causing the panel to be damaged. At higher
   than the rated storage temperature, liquid crystal turns into isotropic liquid and may
   not recover.

③If LCD panel breaks, there may be a possibility that the liquid crystal escapes from the
   panel. Since the liquid crystal is injurious, do not put it into the eyes or mouth. When liquid
   crystal sticks to hands, feet or clothes, wash it out immediately with soap.

④Adjust DC bias for Common electrode drive (COM DC) as final product. In case of no
   adjustment, the degradation of picture quality may happen.

⑤Observe all other precautionary requirements in handling general electronic components.
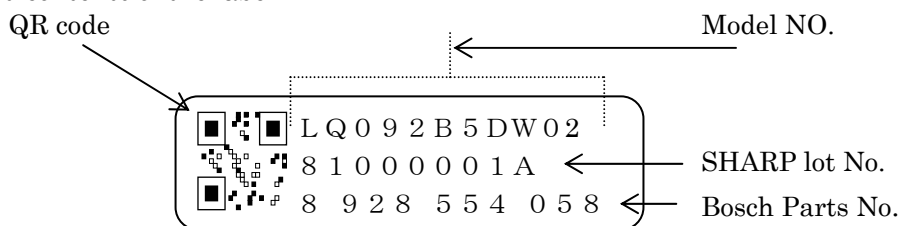
12.Packing form

a) Piling number of cartons : MAX   10
b) Package quantity in one carton 30 pcs
c) Carton size: 573×373×203 mm
d) Total mass of one carton filled with full modules: 6.6kg
e) Conditions for storage.
   Environment
       ①Temperature : 0～40℃
       ②Humidity   : 60%RH or less (at 40℃)
                         No dew condensation at low temperature and high humidity.
       ③Atmosphere   :Harmful gas, such as acid or alkali which corrodes electronic
                         components and/or wires, must not be detected.
       ④Period   : about 3 months
       ⑤Opening of the package : In order to prevent the LCD module from breakdown by
                               electrostatic charges, please control the room humidity over
                               50%RH and open the package taking sufficient countermeasures
                               against electrostatic charges, such asearth, etc.

13.Indication of lot number

①Attached location of the label
②Indicated contents of the label

QR code   Model NO.

■ ■ L Q 0 9 2 B 5 D W 0 2
    8 1 0 0 0 0 0 1 A   ←————— SHARP lot No.
■   8 9 2 8   5 5 4   0 5 8   ←———— Bosch Parts No.

contents of lot No.   the 1st figure ‥ production year   (ex. 2008 : 8)
                      the 2nd figure ‥ production month   1,2,3,‥‥‥,9,X,Y,Z
                      the 3rd～7th figure ‥ serial No.   00001～
                      the 8th figure ‥ revision marks   A,B,C‥

13-2) Fab locations
    Panel production : Sharp (Mie factory) － Mie tech
    LCD assembly : WSEC(China)
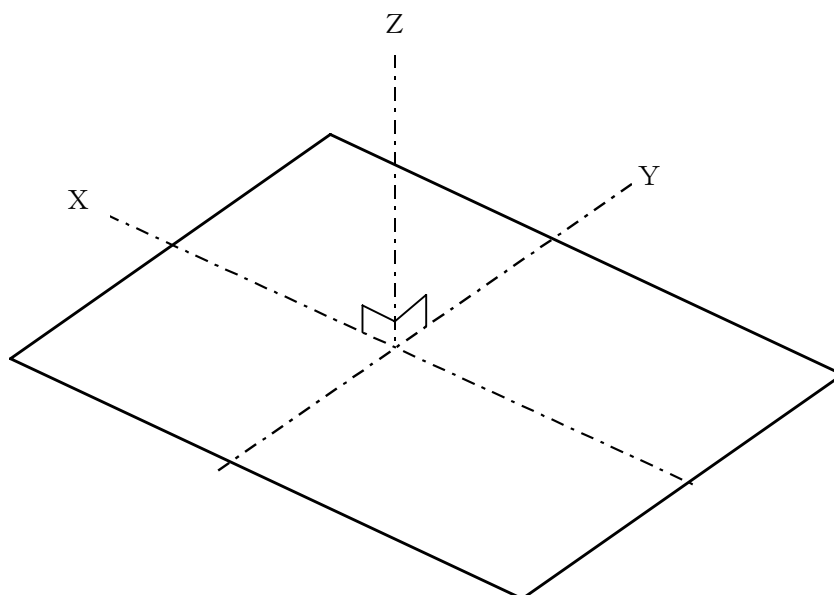
9. Reliability test

Table 9

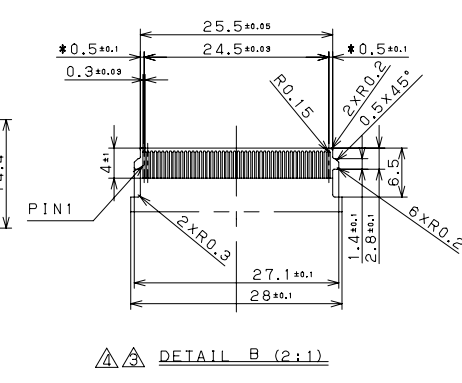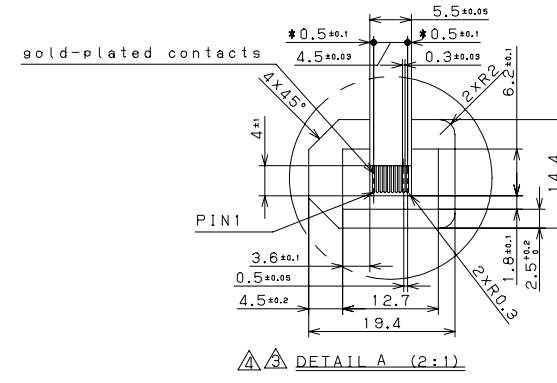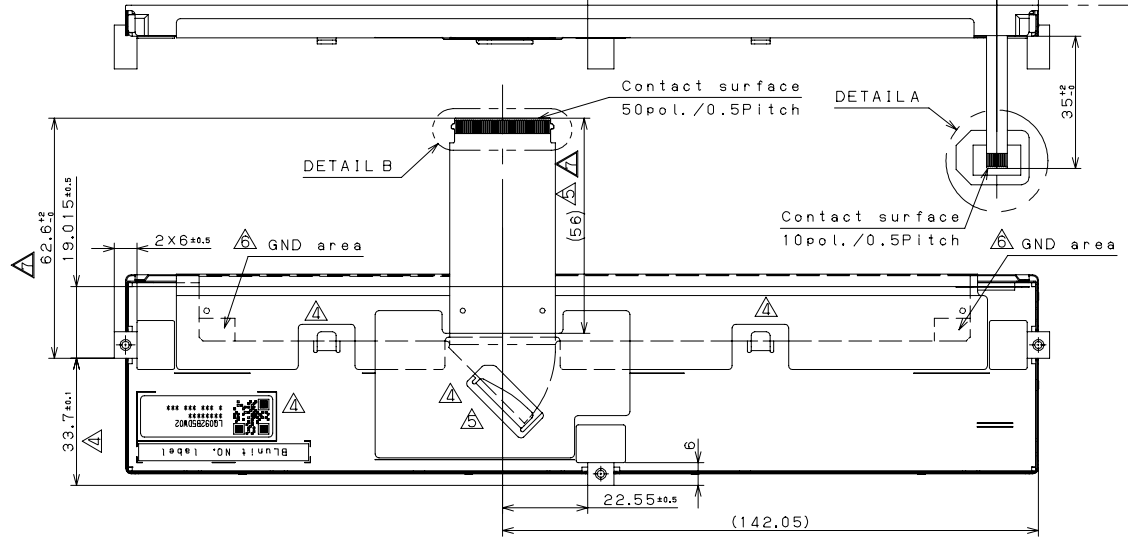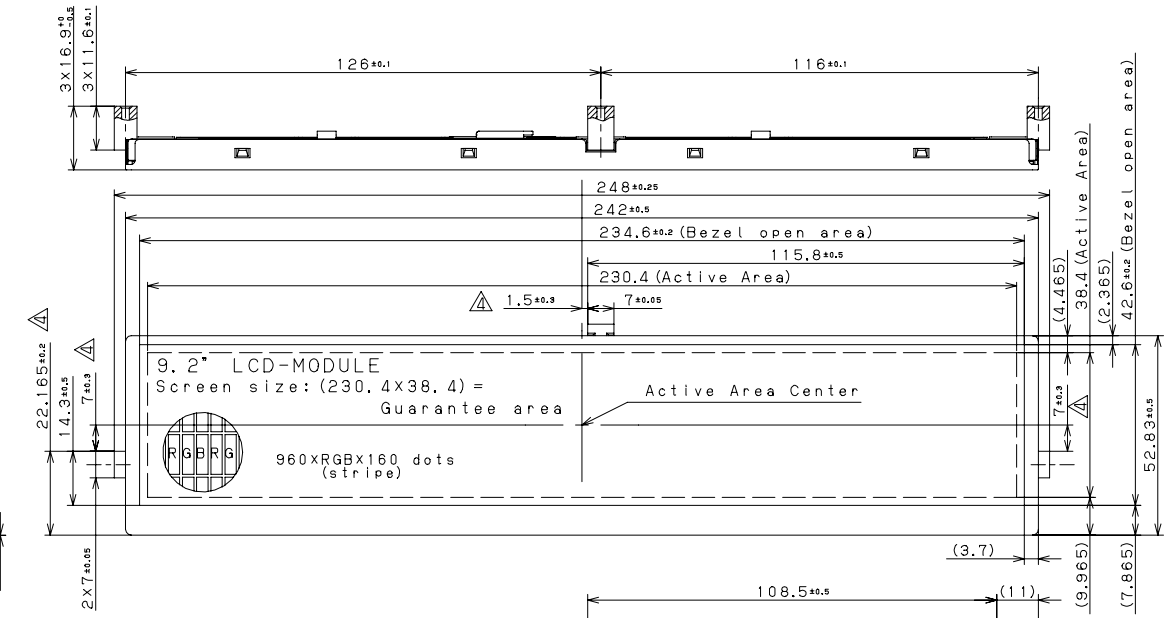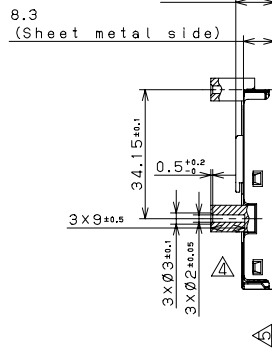| No.	Test items	Test conditions
1	High temperature storage test	Ta=+85℃ 240h
2	Low temperature storage test	Ta=-40℃ 240h
3	High temperature And high humidity operating test	Tp=+60℃, 90%RH 240h
4	High temperature operating test	Tp=+85℃ 240h
5	Low temperature operating test	Ta=-30℃ 240h
6	Electro static discharge test	$\pm$200V, 200pF(0Ω) 1 times for each terminals
7	Shock test	980m/s^2・6ms, $\pm$X, $\pm$Y, $\pm$Z 3times for each direction (JIS C0041,A-7 condition C)
8	Vibration test	Frequency range：8～33.3Hz , Stroke：1.3mm Frequency range：33.3Hz～400Hz , Acceleration：29.4 m/s^2 Cycle：15 minutes X,Z 2 hours for each directions, 4 hours for Y direction (total 8 hours)
9	Heat shock test storage test	Ta=-30～+85℃ , 200cycles (0.5h) (0.5h)

Ta= Ambient temperature, Tp= Panel temperature

【Check items】 In the standard condition, there shall be no practical problems that may affect the display function.

【Note】 X,Y,Z directions are shown as follows:

SHARP

TENTATIVE

9.2" LCD-MODULE
Screen size: (230.4×38.4) =
        Guarantee area

RGBRG   960×RGB×160 dots
         (stripe)

Active Area Center

126±0.1   116±0.1

248±0.25
242±0.5
234.6±0.2 (Bezel open area)
115.8±0.5
230.4 (Active Area)
1.5±0.3   7±0.05

38.4 (Active Area)
42.6±0.2 (Bezel open area)
(4.465)
(2.365)
52.83±0.5
(3.7)
(9.965)
(7.865)

3×16.9+0 -0.5
3×11.6±0.1

8.3
(Sheet metal side)

(10.3)

34.15±0.1
0.5+0.2 -0
3×9±0.5
3×⌀3±0.1
3×⌀2±0.05
(0.1)

22.165±0.2
14.3±0.3
7±0.3
2×7±0.05

7±0.3
7±0.3

108.5±0.5   (11)

35+2 -0

Contact surface
50pol./0.5Pitch   DETAIL A

DETAIL B

Contact surface
10pol./0.5Pitch   GND area

GND area

62.6+2 -0
19.015±0.5
2×6±0.5

(56)

33.7±0.1

BU-unit No. label
LQ092B5DW02

6

22.55±0.5
(142.05)

gold-plated contacts

5.5±0.05
*0.5±0.1   *0.5±0.1
4.5±0.03   0.3±0.03
2×R2
6.2±0.1
4×45°
4±1
14.4
PIN1
3.6±0.1
0.5±0.05
4.5±0.2   12.7   1.8±0.1
2.5±0.2
2×R0.3
19.4

DETAIL A (2:1)

25.5±0.05
*0.5±0.1   24.5±0.03   *0.5±0.1
0.3±0.03   R0.15   2×R0.2
0.5×45°
4±1   2×R0.3   6.5
2×R0.3   1.4±0.1
2.8±0.1   6×R0.2
PIN1
27.1±0.1
28±0.1

DETAIL B (2:1)

1) * = Cheack Dimension (SPC)

Take care in set design to hide
the scratches and bubbles appeared on
the polarizer or other frame area
which is located outside of active area.

all the specified value is tentative.
all the specified value is tentative.
The technical literature is subject
to change without notice.

CONFIDENTIAL

General tolerance is ±0.5

unit:mm

Please do not copy this material
and do not disclose this to
third party.

DATE   2009.11.19   SCALE

MODEL   LQ092B5DW02   1/1

DRAWING NO   LCM-09025E   size A2

No.	DATE	REVISION	
	'10.07.05	Changes dimension.	k. goto
	'10.05.10	addition of FPC GND area.	k. goto
	'10.03.18	Changes Shape. addition of dimension.	k. goto
	'10.02.04	addition of dimension and tolerance.	k. goto
	'09.12.21	addition of dimension and tolerance.	k. goto
	'09.12.11	addition of LED-FPC dimension.	k. goto

Engineering Department.2
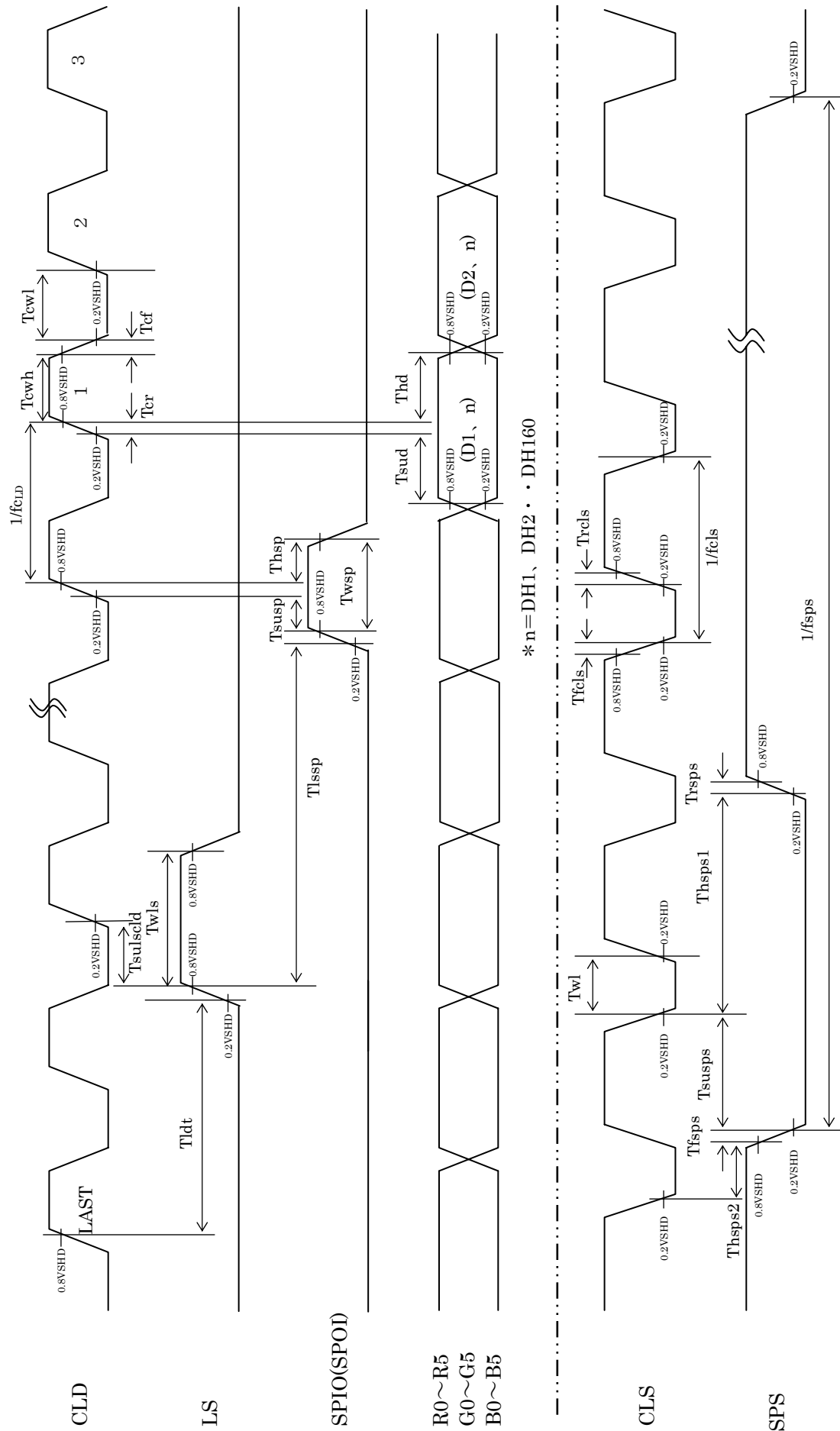LIQUID CRYSTAL DISPLAY DIVISION.3
LIQUID CRYSTAL DISPLAY GROUP
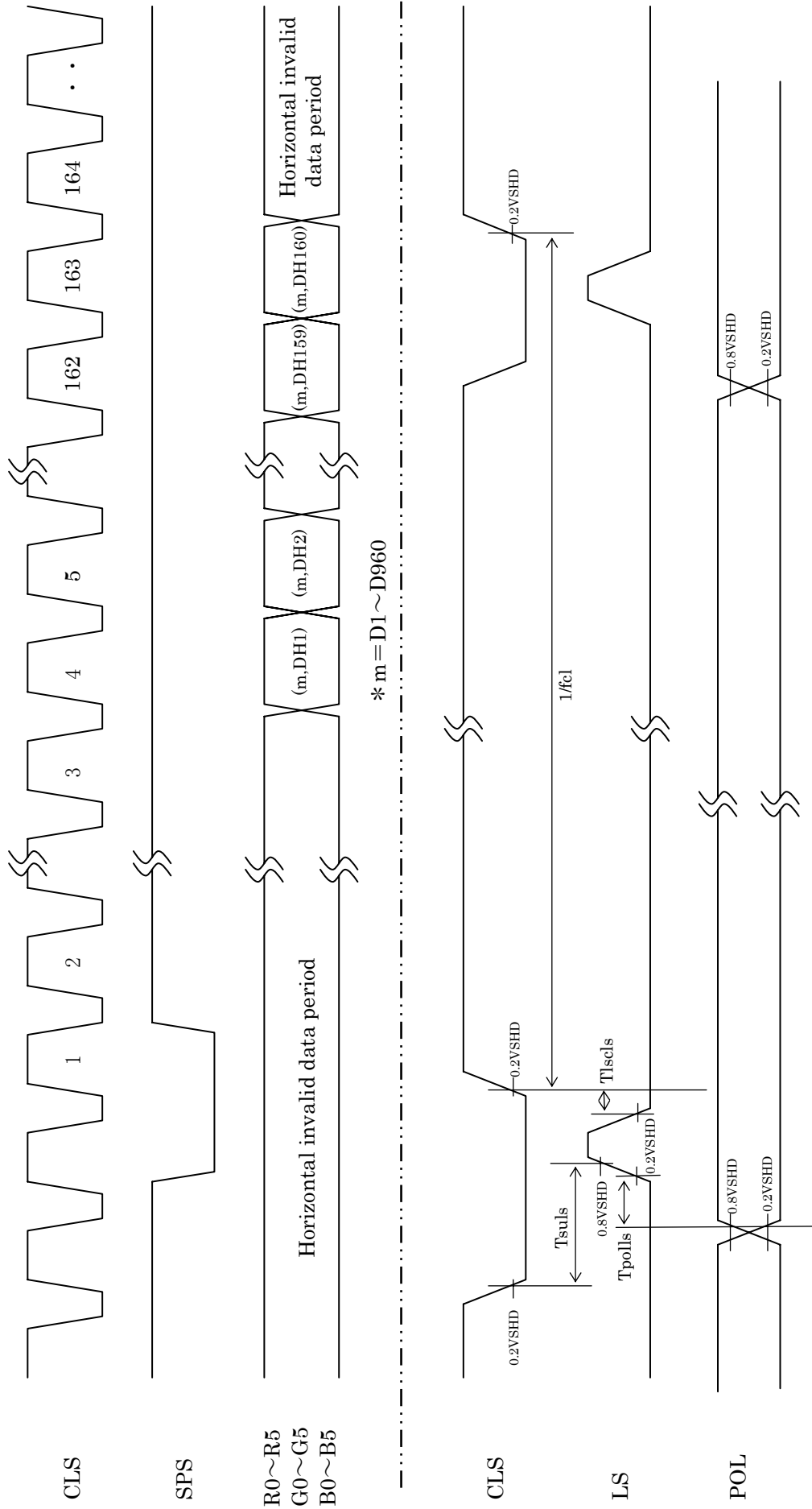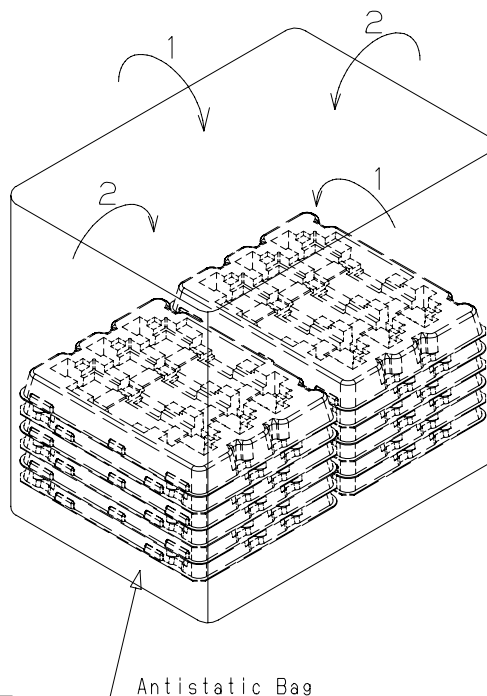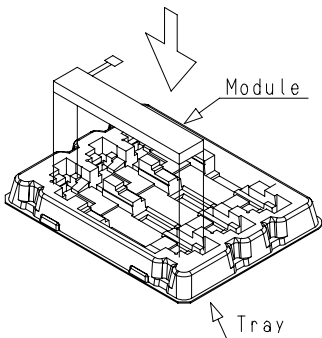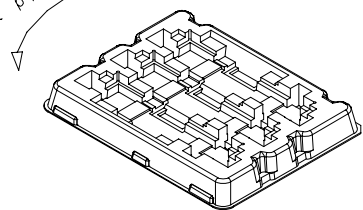SHARP CORPORATION

Fig.2-1. Input signal waveform

Fig.2-2. Input signal waveform

The tray is rotated
by 180 degrees and
it piles it up.

Module

Tray

Tray of six steps

Creped paper tape
Thing to turn edge
by 5mm (20cm in length)

Antistatic Bag

Carton

OPP tape

203

373

573
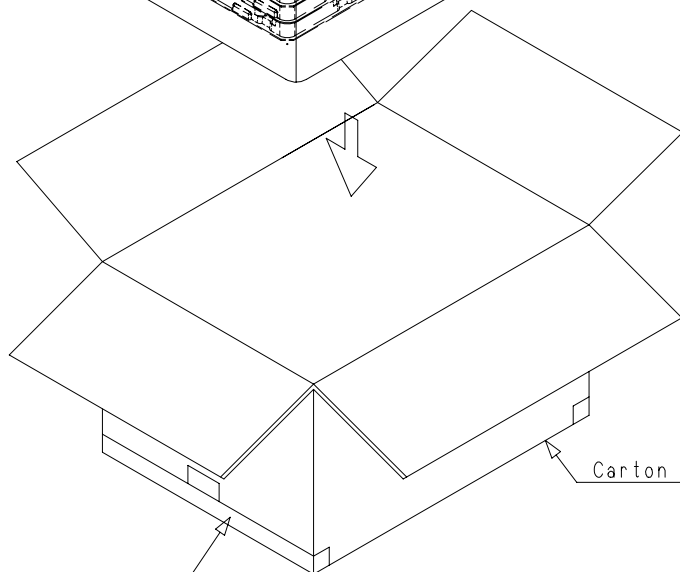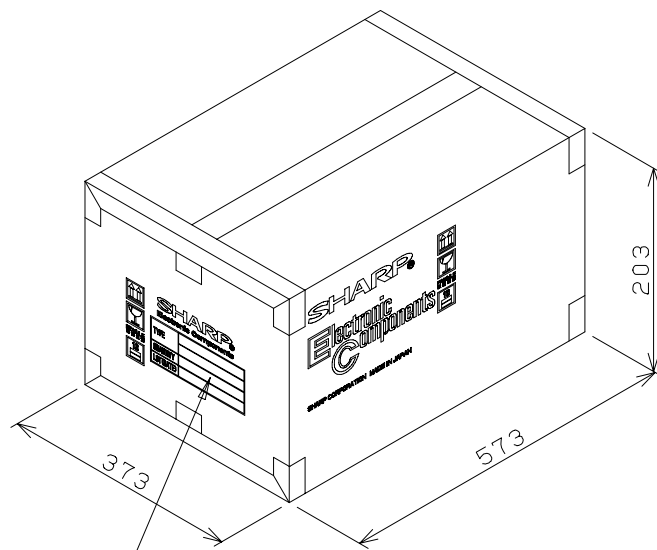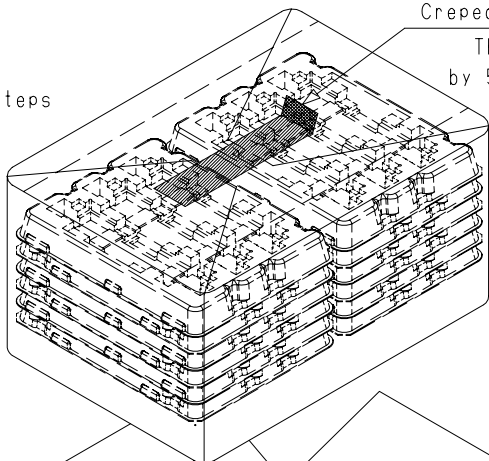
Barcord label

社内品番	: (4S)LQ092B5DW02
LotNo.	:2010.**.**
Quantity	:30 pcs
ユーザー品番	:8 928 554 058
シャープ物流用ラベルです。（＊＊＊＊＊）	

*The carton:Up to 10steps.
*Carton size:573X373X203(H)
*Max 30modules in each carton

Appendix1 Data sheet of themistor

Part No.： ＮＳＭ３３０２Ｊ４１０Ｊ３
R 25　 ： 3000 Ω　 Tolerance is 5 %
B 25/85 : 4100 Ｋ　 Tolerance is 5 %

Tx(℃)	Rmin.(Ω)	Rnom.(Ω)	Rmax.(Ω)
-40	124977	160521	205658
-39	116007	148416	189405
-38	107750	137318	174562
-37	100145	127135	160996
-36	93135	117786	148588
-35	86670	109195	137231
-34	80704	101297	126828
-33	75194	94030	117292
-32	70102	87340	108545
-31	65393	81176	100516
-30	61037	75494	93142
-29	57004	70252	86363
-28	53267	65414	80129
-27	49804	60945	74390
-26	46592	56814	69106
-25	43611	52994	64235
-24	40843	49459	59744
-23	38271	46186	55600
-22	35880	43154	51774
-21	33656	40343	48239
-20	31586	37736	44971
-19	29659	35316	41948
-18	27863	33069	39150
-17	26189	30981	36559
-16	24628	29041	34158
-15	23171	27235	31932
-14	21811	25555	29867
-13	20541	23991	27950
-12	19353	22533	26170
-11	18243	21175	24516
-10	17205	19908	22978
-9	16233	18725	21547
-8	15322	17622	20216
-7	14469	16591	18976
-6	13670	15628	17820
-5	12921	14727	16744
-4	12217	13884	15739
-3	11557	13096	14802
-2	10938	12358	13927
-1	10355	11666	13110
0	9808.1	11018	12347
1	9293.6	10411	11633
2	8809.6	9840.8	10965
3	8354.2	9306.0	10340
4	7925.4	8803.9	9755.3
5	7521.5	8332.3	9207.4

Part No.：ＮＳＭ３３０２Ｊ４１０Ｊ３

Tx(°C)	Rmin.(Ω)	Rnom.(Ω)	Rmax.(Ω)
6	7141.0	7889.2	8693.9
7	6782.3	7472.6	8212.5
8	6444.0	7080.8	7761.0
9	6124.9	6712.2	7337.4
10	5823.7	6365.2	6939.7
11	5539.4	6038.5	6566.2
12	5270.9	5730.8	6215.2
13	5017.1	5440.7	5885.4
14	4777.3	5167.3	5575.2
15	4550.5	4909.4	5283.4
16	4336.0	4666.1	5008.8
17	4133.0	4436.5	4750.3
18	3940.8	4219.6	4506.8
19	3758.9	4014.8	4277.4
20	3586.5	3821.2	4061.1
21	3423.1	3638.2	3857.2
22	3268.3	3465.2	3664.8
23	3121.5	3301.5	3483.2
24	2982.2	3146.6	3311.9
25	2850.0	3000.0	3150.0
26	2712.5	2862.0	3012.2
27	2582.6	2731.3	2881.3
28	2459.8	2607.5	2757.1
29	2343.7	2490.1	2639.1
30	2233.9	2378.9	2527.0
31	2130.0	2273.4	2420.4
32	2031.6	2173.3	2319.0
33	1938.5	2078.3	2222.6
34	1850.2	1988.1	2130.9
35	1766.6	1902.5	2043.6
36	1687.4	1821.1	1960.5
37	1612.2	1743.8	1881.3
38	1540.9	1670.2	1805.9
39	1473.3	1600.3	1734.0
40	1409.0	1533.8	1665.4
41	1348.0	1470.5	1600.1
42	1290.1	1410.2	1537.7
43	1235.0	1352.9	1478.2
44	1182.7	1298.2	1421.4
45	1132.9	1246.1	1367.2
46	1085.6	1196.5	1315.4
47	1040.5	1149.1	1265.9
48	997.66	1104.0	1218.6
49	956.83	1060.9	1173.4
50	917.95	1019.8	1130.2
51	880.90	980.59	1088.8
52	845.59	943.12	1049.3
53	811.93	907.33	1011.4
54	779.84	873.14	975.16
55	749.22	840.46	940.45

Part No.：ＮＳＭ３３０２Ｊ４１０Ｊ３

Tx(°C)	Rmin.(Ω)	Rnom.(Ω)	Rmax.(Ω)
56	720.00	809.22	907.21
57	692.12	779.34	875.36
58	665.50	750.76	844.84
59	640.07	723.42	815.58
60	615.78	697.25	787.53
61	592.57	672.20	760.63
62	570.39	648.21	734.81
63	549.18	625.24	710.05
64	528.89	603.22	686.28
65	509.49	582.12	663.45
66	490.92	561.90	641.54
67	473.14	542.51	620.49
68	456.13	523.91	600.26
69	439.83	506.07	580.83
70	424.22	488.95	562.14
71	409.27	472.52	544.18
72	394.93	456.74	526.91
73	381.19	441.60	510.29
74	368.01	427.05	494.31
75	355.38	413.07	478.92
76	343.25	399.63	464.12
77	331.62	386.72	449.86
78	320.45	374.31	436.13
79	309.73	362.37	422.91
80	299.43	350.89	410.17
81	289.57	339.88	397.93
82	280.06	329.24	386.08
83	270.92	319.00	374.67
84	262.14	309.14	363.66
85	253.70	299.65	353.04
86	245.57	290.51	342.80
87	237.76	281.70	332.92
88	230.25	273.21	323.39
89	223.02	265.03	314.18
90	216.05	257.15	305.30
91	209.35	249.55	296.72
92	202.90	242.22	288.43
93	196.68	235.14	280.42
94	190.70	228.32	272.69
95	184.93	221.74	265.21
96	179.37	215.38	257.99
97	174.01	209.25	251.00
98	168.84	203.33	244.25
99	163.86	197.61	237.72
100	159.05	192.08	231.40
101	154.41	186.75	225.29
102	149.94	181.59	219.38
103	145.62	176.61	213.65
104	141.45	171.79	208.11
105	137.43	167.13	202.75

Part No.：ＮＳＭ３３０２Ｊ４１０Ｊ３

Tx(°C)	Rmin.(Ω)	Rnom.(Ω)	Rmax.(Ω)
106	133.54	162.63	197.55
107	129.79	158.27	192.52
108	126.16	154.06	187.65
109	122.66	149.98	182.93
110	119.28	146.04	178.36
111	116.00	142.22	173.92
112	112.84	138.52	169.63
113	109.78	134.94	165.46
114	106.82	131.48	161.42
115	103.96	128.12	157.51
116	101.19	124.87	153.71
117	98.516	121.72	150.02
118	95.924	118.67	146.45
119	93.415	115.71	142.98
120	90.986	112.85	139.61
121	88.635	110.07	136.34
122	86.357	107.37	133.17
123	84.151	104.76	130.09
124	82.014	102.22	127.09
125	79.943	99.762	124.19